VOYAGE2007

Corporate Implementation of PI in Bulk Manufacturing Sites

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Lilly

Answers That Matter.

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Agenda

- Lilly At-A-Glance
- Tom & Joe in context
- Corporate Vision
- Project Challenges
- Approach
- Typical System Architecture
- Application Examples
- PI Deployment Status and Next Steps

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At A Glance

- Large Pharmaceutical Manufacturer, founded 1876
- ~15.7 B$ Sales (2004)
- ~43000 employees worldwide, 8300 in R&D.
- Products marketed in 143 countries
- Products treat depression, schizophrenia, attention-deficit hyperactivity disorder, diabetes, osteoporosis, cancer and many other conditions
- Clinical research conducted in more than 60 countries
- Manufacturing plants located in 13 countries
- Research and development facilities located in 9 countries

In Context - Joe Pluckebaum

- Tall, thin engineer type, founded in 1957
- 20+ years experience in automation
- Joined Lilly in 1997
- Platform experience OSIsoft PI, DeltaV, A-B PLCs, etc.
- Manufacturing plant experiences - automotive component parts, water & waste water treatment, antibiotic fermentation
- OSIsoft product experience ProcessBook, DataLink, SMT, PI Server 3.x, RtWebParts, RtReports
- Work conducted in more than 3 countries
- Will SME for PI

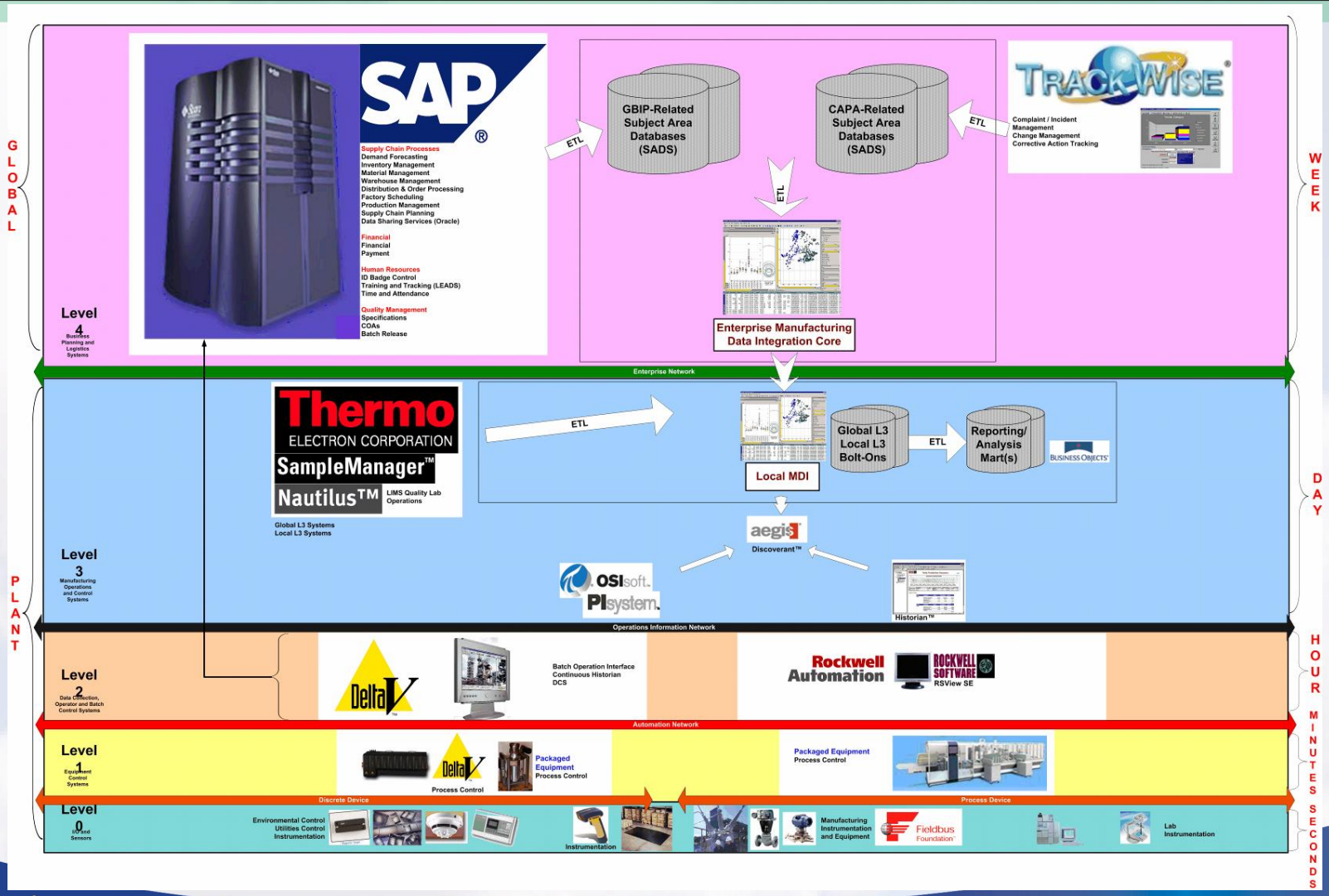
In Context – Tom Wagener

- Tall, thin IT type, founded in 1965
- 17 years experience in information technology
- Joined Lilly in 2002
- Manufacturing plant experiences - automotive component parts and final assembly, antibiotic fermentation and bulk pharmaceuticals
- Currently support PI installation at Tippecanoe Laboratories site – 5 PI servers, 11 IO nodes (5 clusters), 65,000 tags

Corporate Vision

- Common data architecture covering the standard 5 levels of systems infrastructure i.e. S95.
- Based on the use of major commercial hardware and software solutions.
- OSIsoft PI used for process data.
- Data Warehouse used for ‘transactional’ data.
  Typical data sources:
  - SAP – Financial, Material Usage
  - TrackWise – Incident Management
  - LIMS – Lab assay data
  - Maximo - Maintenance

Lilly Standard Data Architecture



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Challenges

- Site roll-out and alignment with Corporate Vision
- Philosophical change for users / Tailoring PI (COTS) to match legacy system functions
- Data Migration (thousands of batches and process data)
- Standardized implementation in all targeted plants
- Handling of OSIsoft products and applications evolution over time
- Validation, including secure data reporting in Excel

Approach

- Pre-implementation survey / study
- PI-Core and site-specific components
- PI-Core validation package and validation templates for site-specific components
- Corporate sponsorship / high-level management

Approach continued

- Corporate commitment:
  - PI Subject Matter Expert
  - Standardized PI software deployment tools (Intranet)
- Consistent deployment methods / teams
- Early applications prototyping
- Standardized training packages

Approach (a little deeper dive)

- Pre-implementation survey / study (roadmap):
  - Identify data sources/destinations
  - Standard and site-specific applications
  - Alignment with Corporate Vision
  - Implementation alternatives and recommendations
  - System architecture and licenses requirements

Approach (a little deeper dive)

- Pre-implementation survey / study (roadmap):
  - Implementation Plan:
    - Effort estimation (internal / external resources)
    - High-level schedule and milestones
    - Validation strategy

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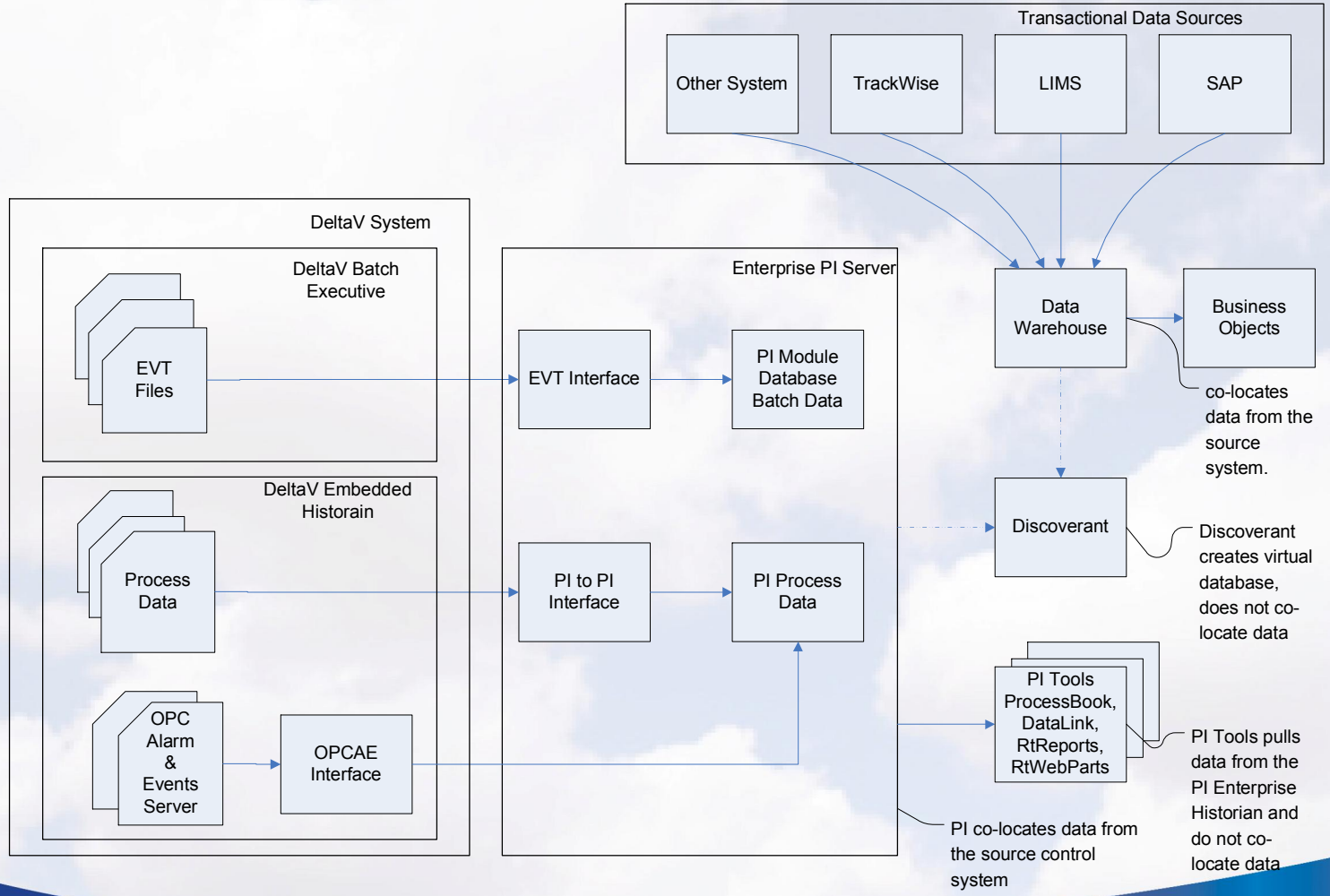
Approach (a little deeper dive)

- Early prototyping:
  - First draft of applications based on URS
  - Use of simulated data
  - Site presentation of all prototypes to multiple targeted users
  - Quick review/fix based on feedback
  - Second presentation to same users within the same week

Approach (a little deeper dive)

- Early prototyping:
  - Finalization of applications design and system configuration
  - Reduction in review and approval cycles
  - Early user buy-in

Typical System Architecture



System Architecture (a little deeper dive)

- PI-to-PI Interface:
- Lilly will continue using PI Continuous Historian until DeltaV version 10.x
- Historical Recovery Mode only
  - Exact replication of archived data
  - Compression settings only on the DeltaV side
  - Need to set compmax to force a regular refresh of data

System Architecture (a little deeper dive)

- EVT File Interface:
- Use of EVT Sync Utility to preserve original evt files
- When interface is installed on PI server, requires the use of a special user account matching a local account on the DeltaV application workstation (no password change)
- Alternative: install interface on the DeltaV application workstation and setup a PI Trust
- Batch events stored in PI Properties (not in tags)

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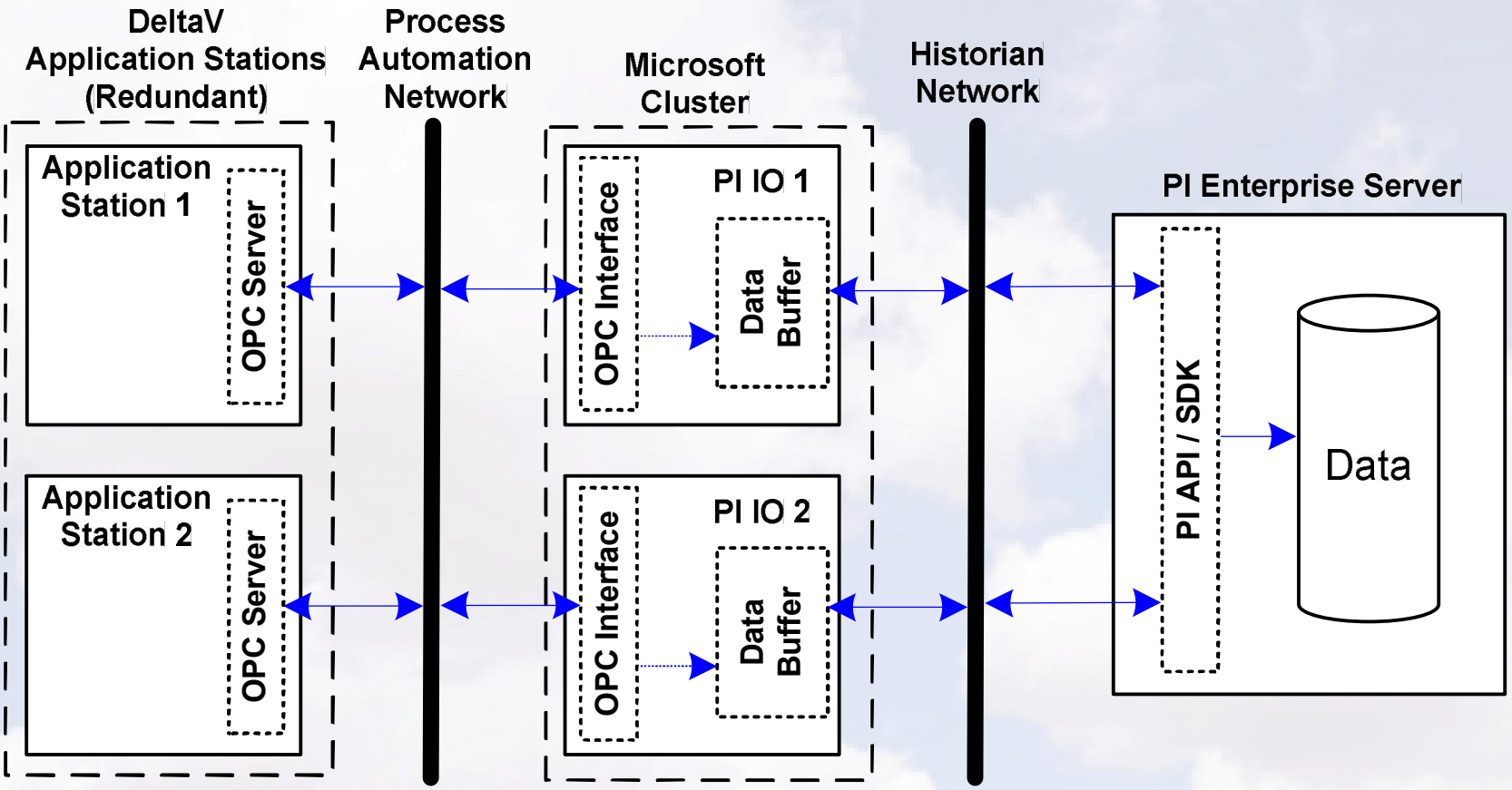
System Architecture (cont'd)

- OPC Alarms and Events Interface:
- Installed on the DeltaV application workstation to avoid data losses
- Make sure the Emerson OPC A&E server license was purchased!
- Requires the use of API buffering
- Setup to acquire all alarms and events types (simple, tracking and condition) into a single tag per DeltaV Module
- Setup to store only vendor-specific (DeltaV) attributes and to filter unnecessary event categories (download)

Redundant System Architecture



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Redundant System Architecture

- Interface-level failover
- Isolated network traffic
- Supports regular administrative tasks (i.e. Microsoft security patch reboots)
- High availability of data
- Required to meet regulatory needs on data

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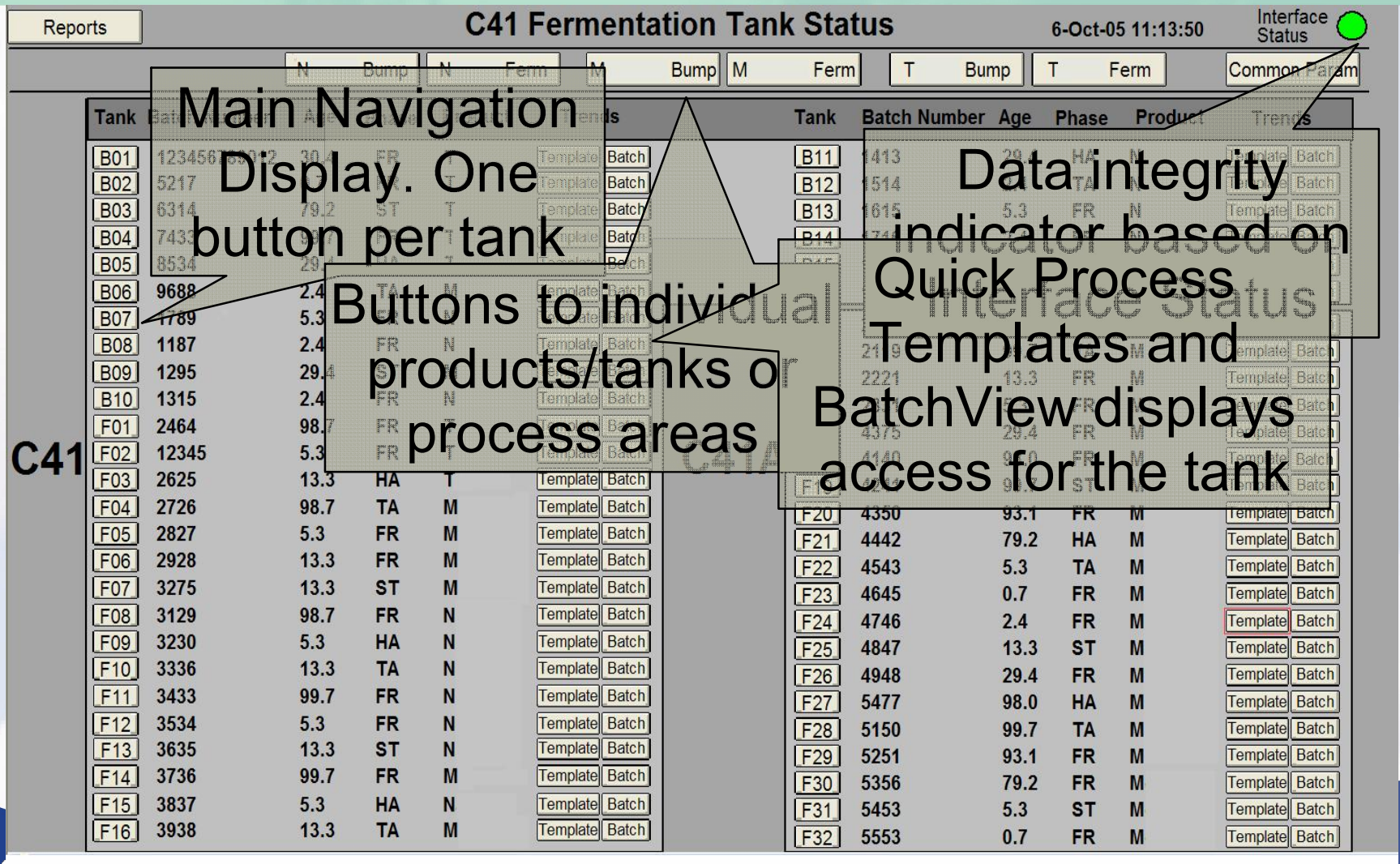
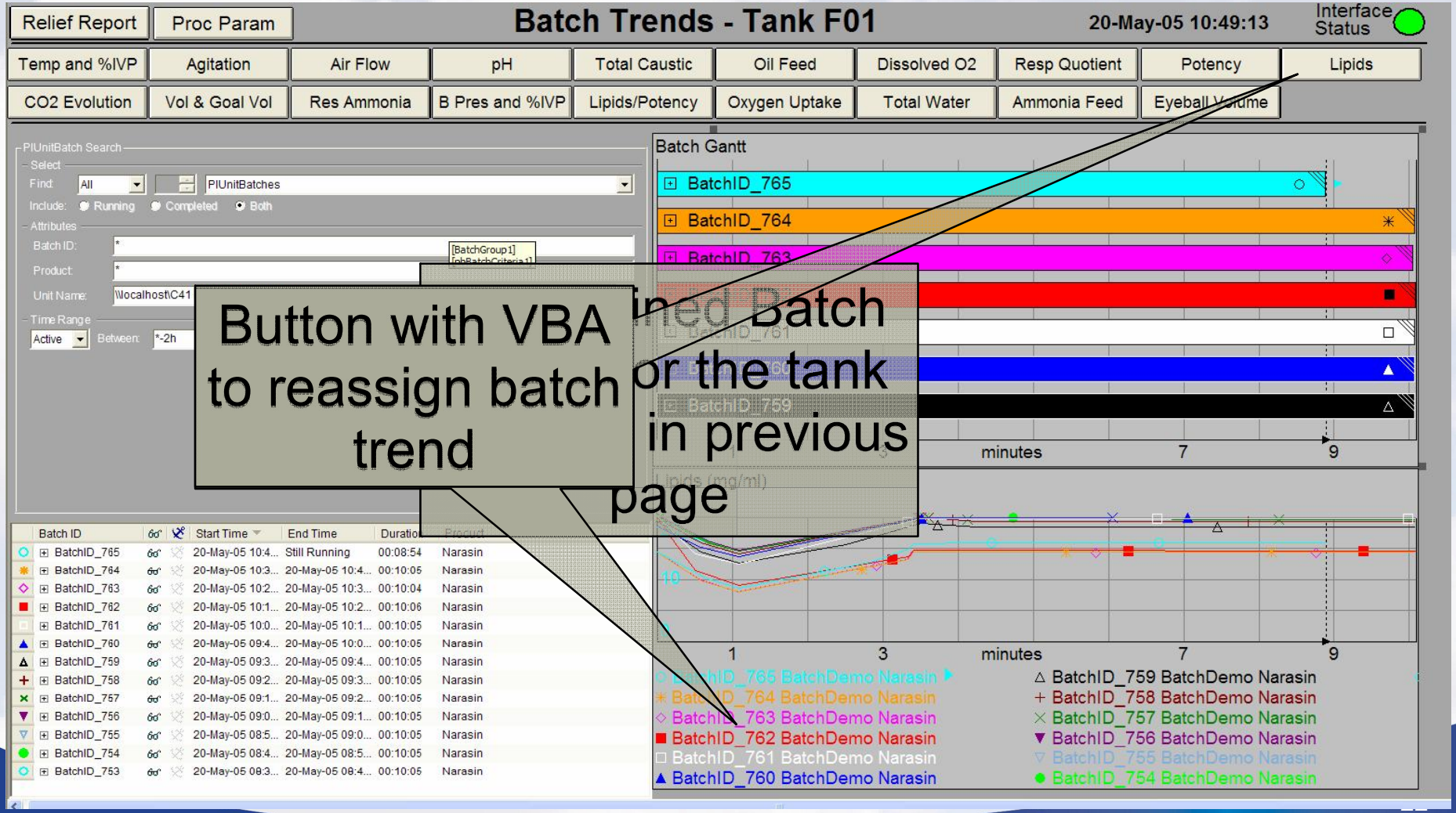
Example Displays



Examples – Displays (cont'd)



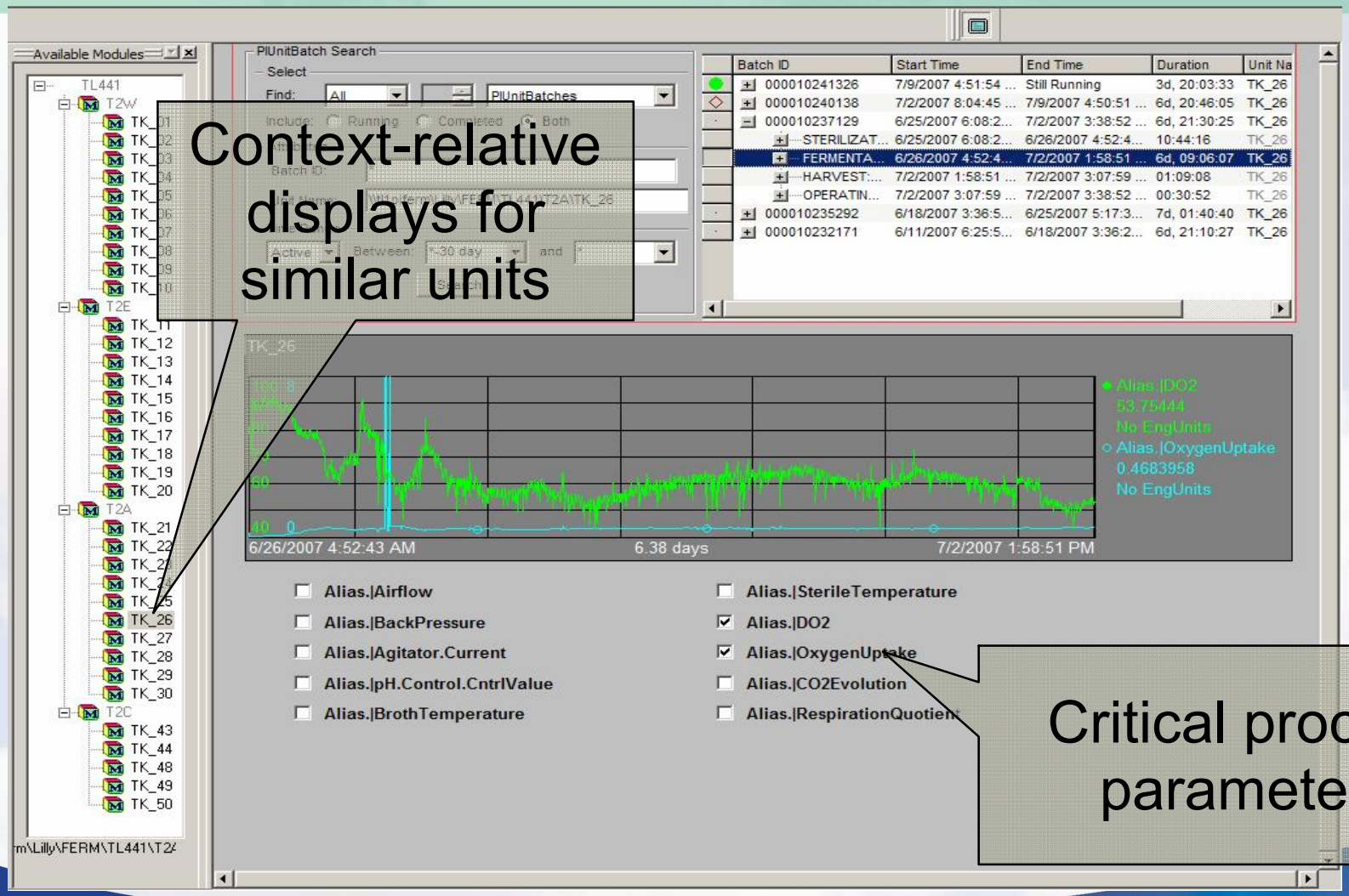
Button with VBA to reassign batch trend

ined Batch or the tank in previous page

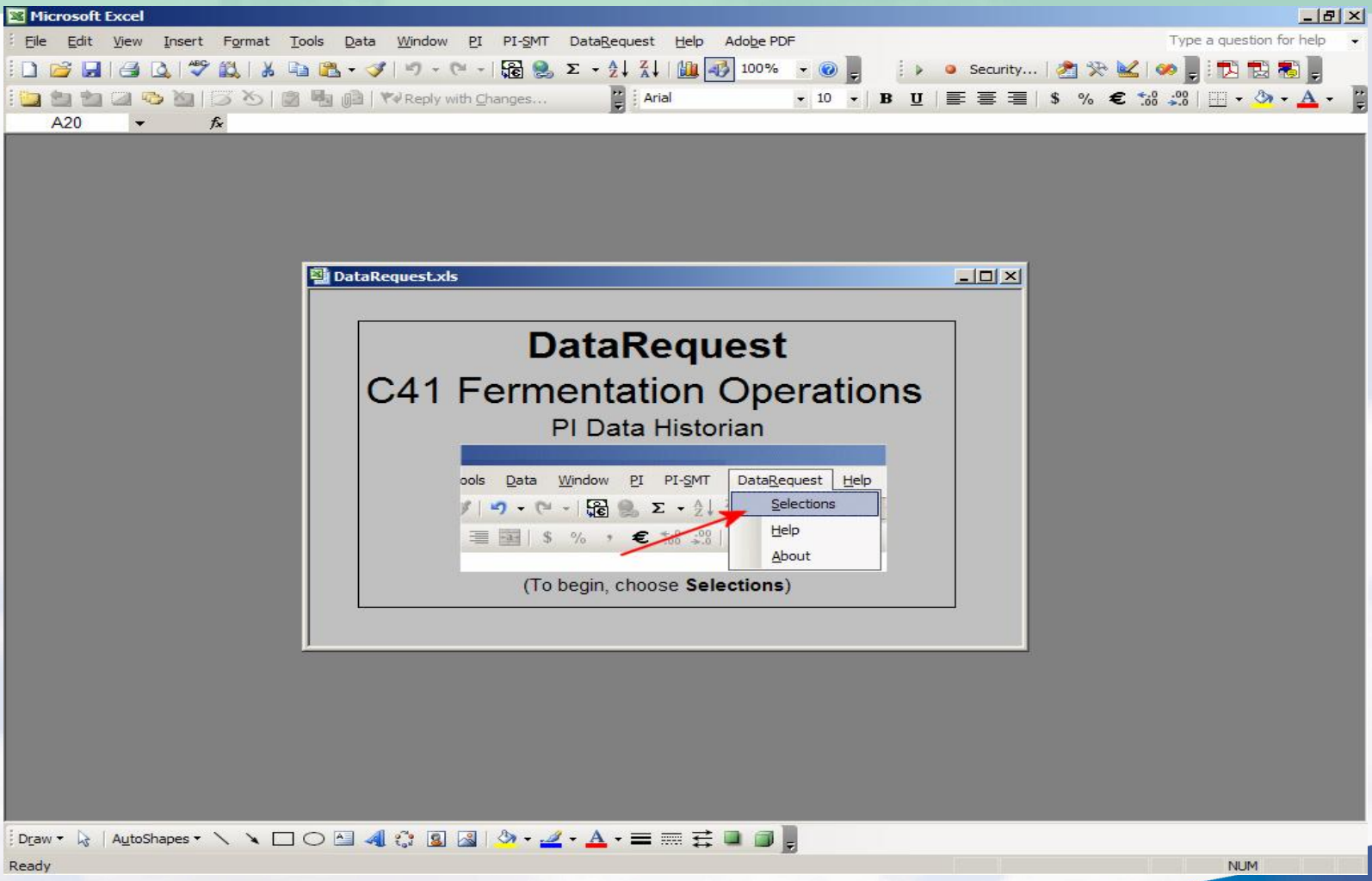
Examples – Displays (cont'd)

- BatchView displays:
- Buttons for batch trend reassignment was found very convenient:
  - Very easy to use
  - Prevents having to maintain multiple display pages
  - Minimum VBA code specifying list of aliases to plot and title
- Developed by our system integrator Global Automation Partners GAP

Examples – Displays (cont'd)



Data Request



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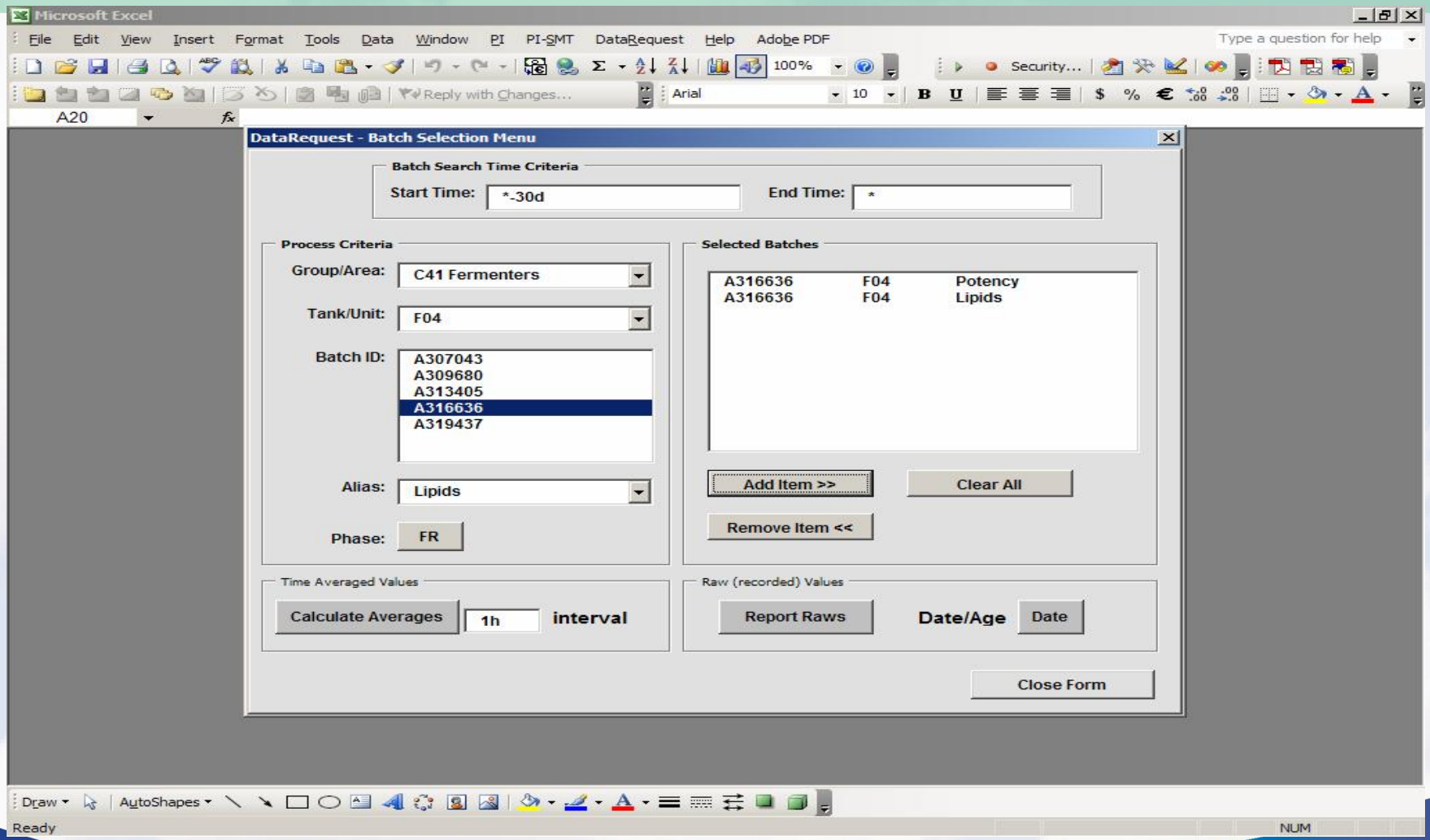
Data Request Form



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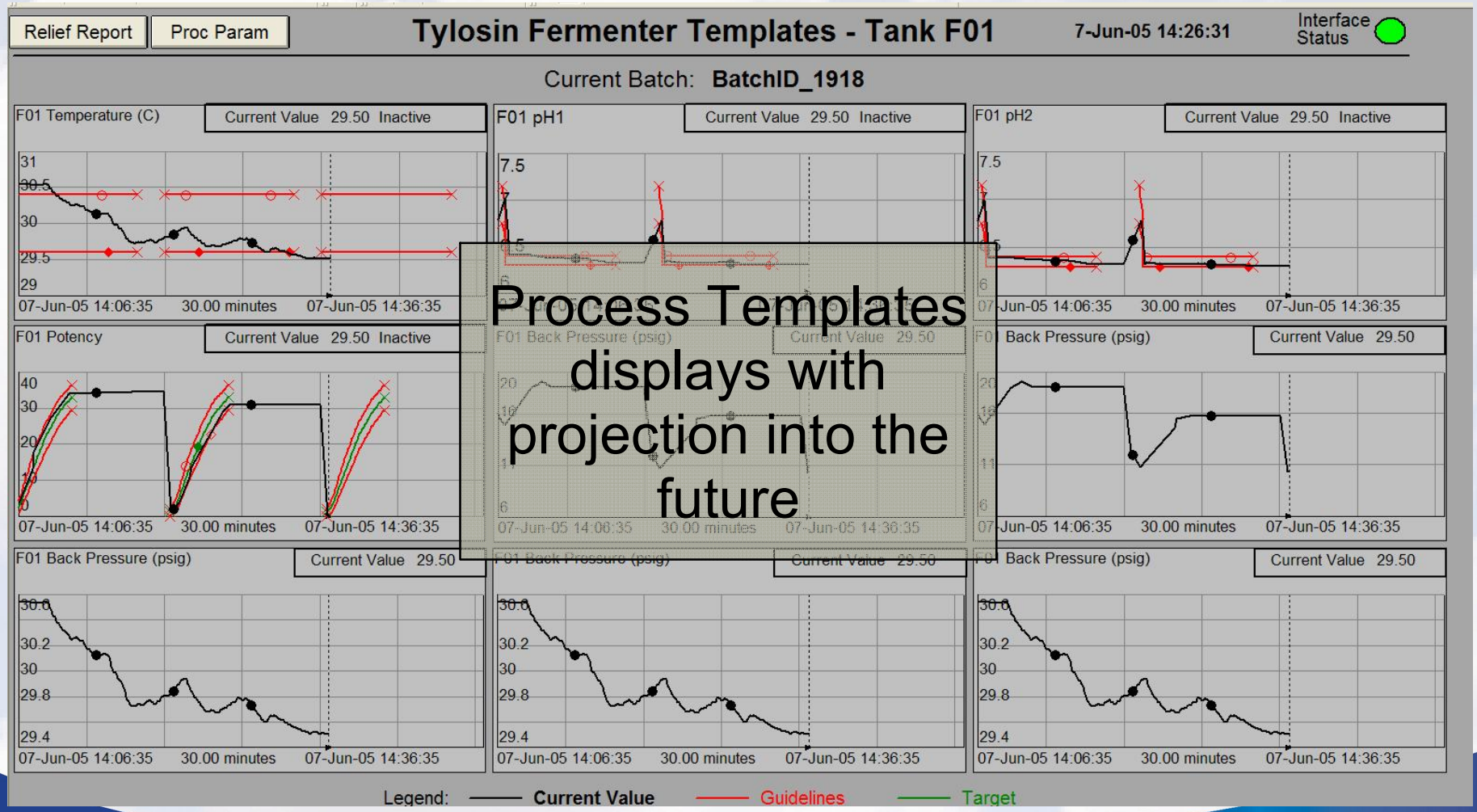
Data Request Results

Microsoft Excel - DataRequest.xls

	A	B	C	D
1	F04 [FR]	A316636	F04 [FR]	A316636
2	TankAge	Potency	TankAge	Lipids
3	0.0	8.60000	0.0	19.40000
4	1.0	8.60000	1.0	19.40000
5	2.0	8.60000	2.0	19.40000
6	3.0	8.60000	3.0	19.40000
7	4.0	8.60000	4.0	19.40000
8	5.0	8.60000	5.0	19.40000
9	6.0	8.60000	6.0	19.40000
10	7.0	8.60000	7.0	19.40000
11	8.0	8.60000	8.0	19.40000
12	9.0	8.60000	9.0	19.40000
13	10.0	8.60000	10.0	19.40000
14	11.0	8.60000	11.0	19.40000
15	12.0	8.60000	12.0	19.40000
16	13.0	8.60000	13.0	19.40000
17	14.0	8.60000	14.0	19.40000
18	15.0	8.60000	15.0	19.40000
19	16.0	8.60000	16.0	19.40000
20	17.0	8.60000	17.0	19.40000
21	18.0	8.60000	18.0	19.40000
22	19.0	8.60000	19.0	19.40000
23	20.0	8.60000	20.0	19.40000
24	21.0	8.60000	21.0	19.40000
25	22.0	8.60000	22.0	19.40000
26	23.0	8.60000	23.0	19.40000
27	24.0	8.60000	24.0	19.40000
28	25.0	8.60000	25.0	19.40000
29	26.0	8.60000	26.0	19.40000
30	27.0	8.60000	27.0	19.40000
31	28.0	8.60000	28.0	19.40000
32	29.0	8.60000	29.0	19.40000
33	30.0	8.60000	30.0	45.15067
34	31.0	8.60000	31.0	53.00000
35	32.0	8.60000	32.0	53.00000

Examples – Displays (cont'd)



Process Templates displays with projection into the future

Examples – Displays (cont'd)

- Process Templates displays:
  - Critical Operation Data monitoring
  - Phase-based templates
  - Based on Process Sciences data (fixed values) – PT provides good support for evolution of templates
  - One site has 35 defined templates and close to 500 monitors

Applications – Analysis & Reports

- Some pre-defined data analysis worksheets with some VBA code for providing full batch context
- Looking at expanding use of BatchView add-in for Excel
- Will implement RtReports for single batch reports

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Observed Results

- Approach allows for improved expectation management and budget/schedule control
- Consistency and standardization can be achieved
- PI-Core & associated validation package was a good idea
- Data migration tools ensure smooth transition and eliminate the need to maintain retired data historian systems
- Empowered users
  - Modern, powerful tools
  - Self-configurable applications
  - Need for regular training / refresh sessions

PI Deployment Status

- > 12 PI Enterprise Servers have been implemented
- Corporate Resource Maintains :
  - the coordination of the implementations
  - PI product evaluation and for supporting products deployment
  - Permanent lab setup for testing
  - Pilot tests
  - Intranet-based PI client deployment

Next Steps

- RtWebParts deployment
- RtReports deployment
- Replace multiple Biles and Associates AIM systems with PI
- Integration and use of PI data for extended data analysis and high-level business decision support

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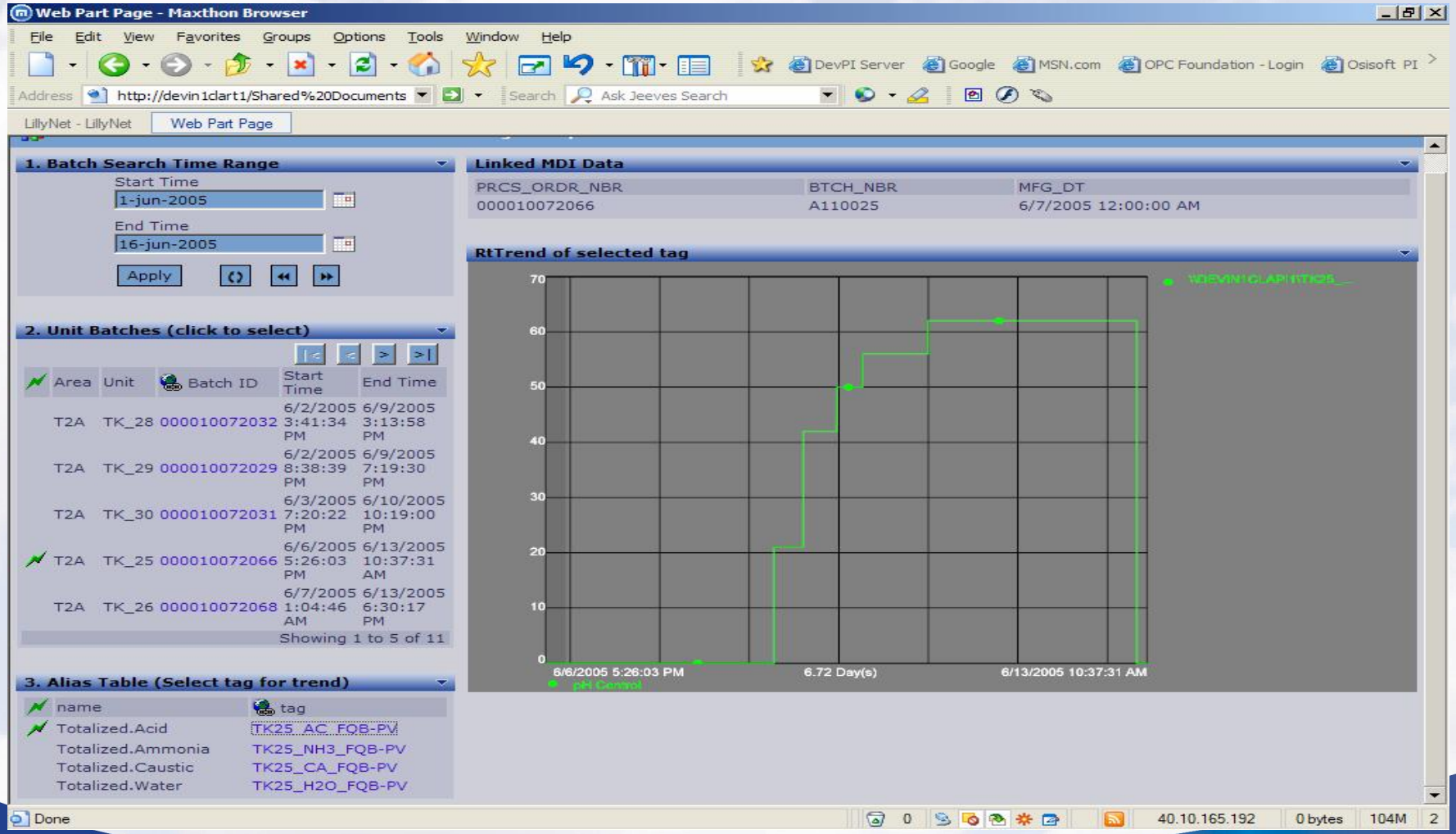
Portal Technology Prototype



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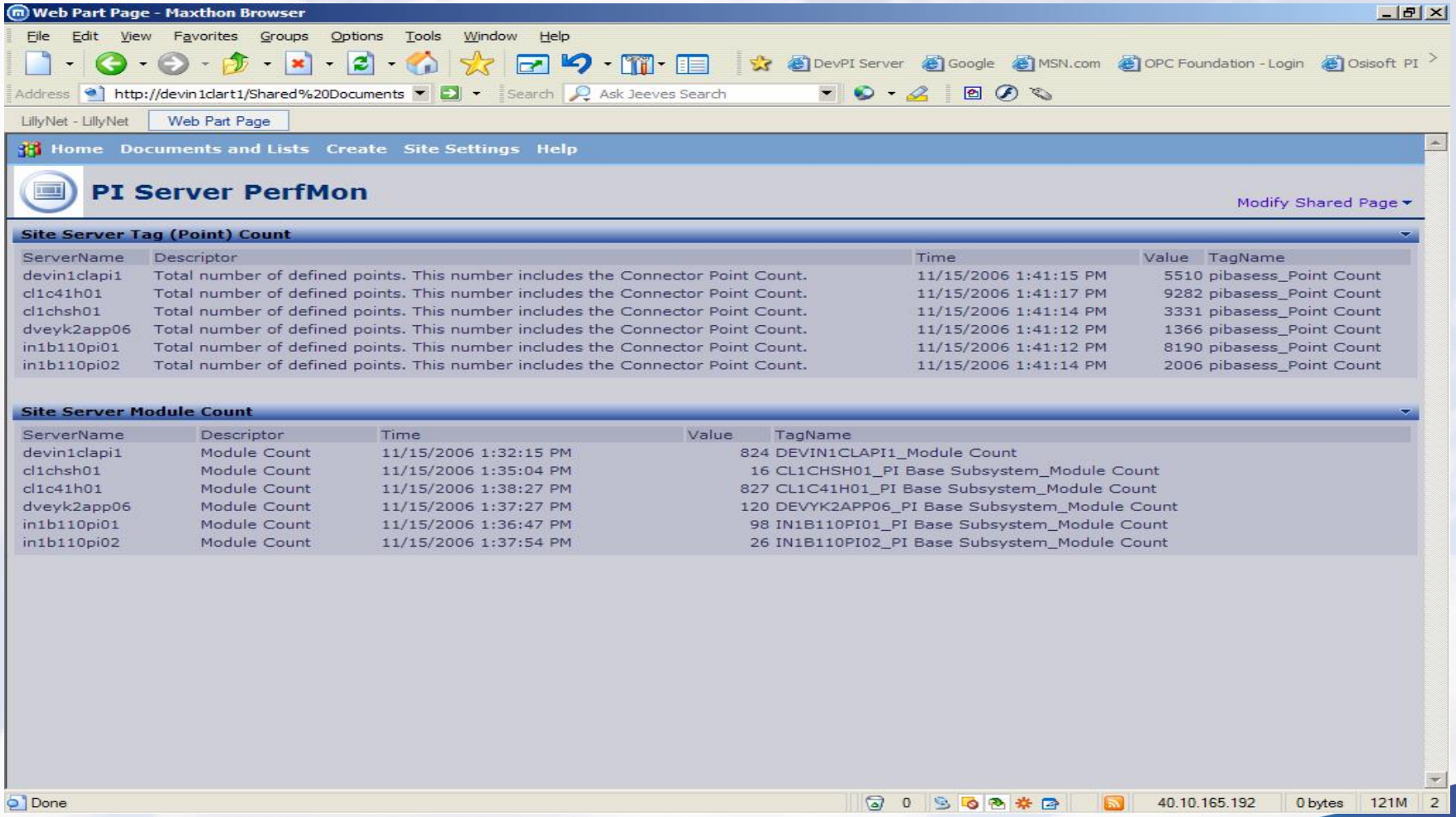
Server Point Counts



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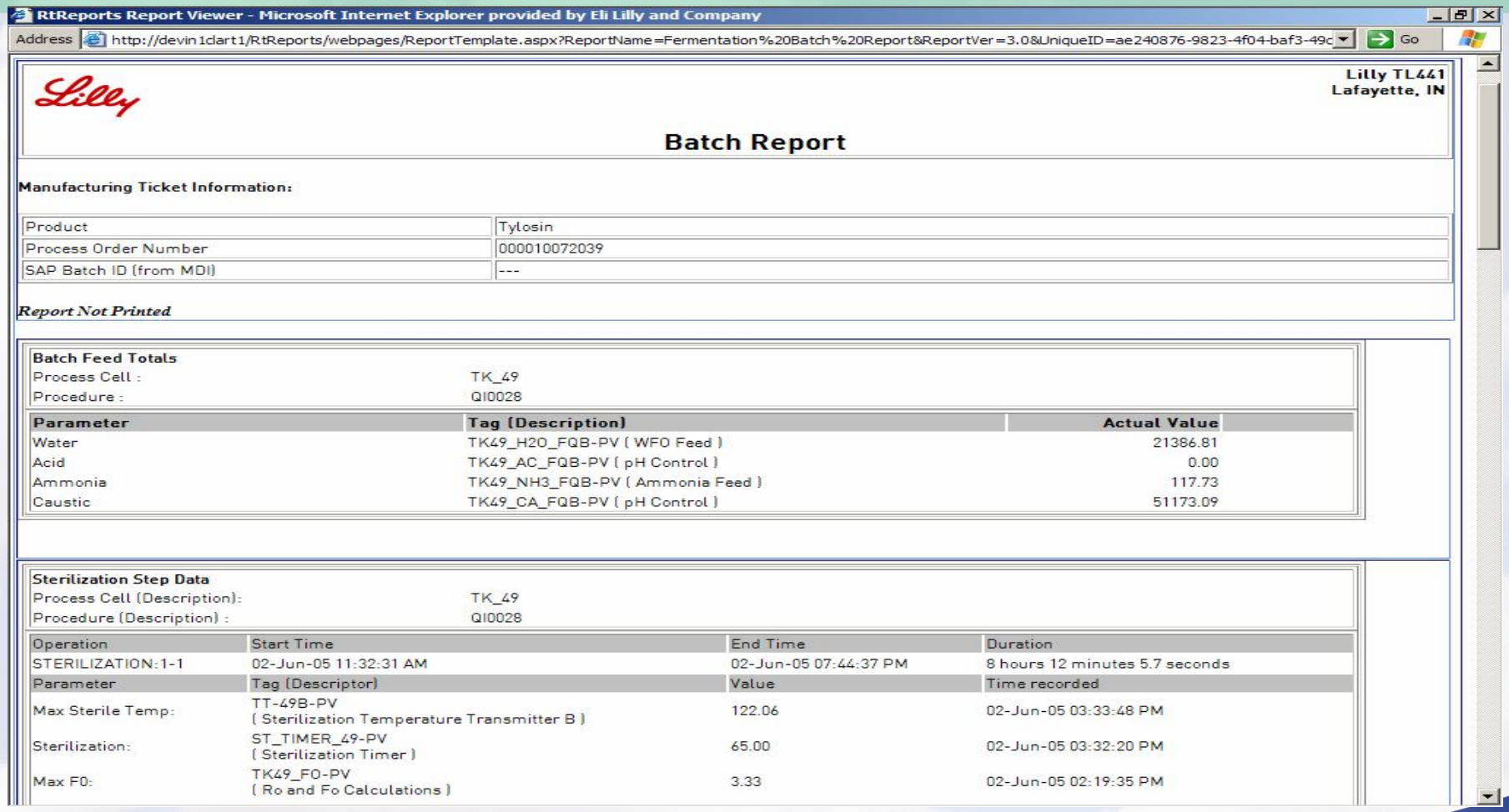
RtReports Prototype



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