

Industrial Evolution – Lessons Learned

***3 Years of PI Hosting
30 Servers Deployed***

Simon Wright

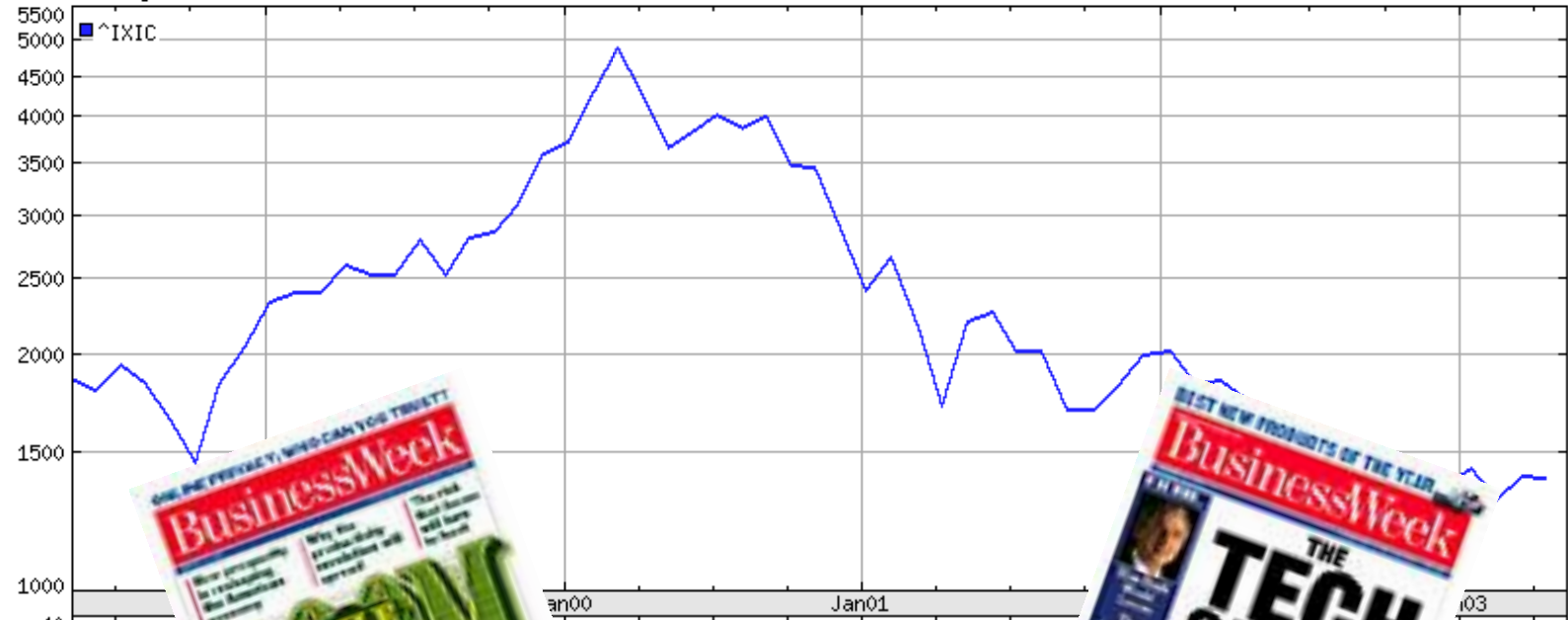
President, Industrial Evolution

Industrial Evolution – Lessons Learned

- *What we set out to do*
- *What we actually do*
- *Some statistics*
- *Architecture*
- *How we use PI System software*
- *Security! Security! Security! Security!*
- *Why our services are used*
- *3 case studies*
- *Summary of lessons learned*

History Lesson

NAS/NMS COMPOSITE
as of 8-May-2003



What We Set Out to Do – March 2000

- *Main funding by OSIsoft*
- *Service offerings*
 - *AnyWhere & AnyTime*
 - *Web access to PI data outside firewall*
 - *BestInClass*
 - *Hosted applications integrated with PI data*
 - *WorldsBest*
 - *Remote consulting by 3rd parties using PI*
 - *IndustryBest*
 - *Benchmarking one plant vs another*
- *Introduced at OSI Users Conference 2000*
- *Focus on value - no “PI-in-the-sky”!*

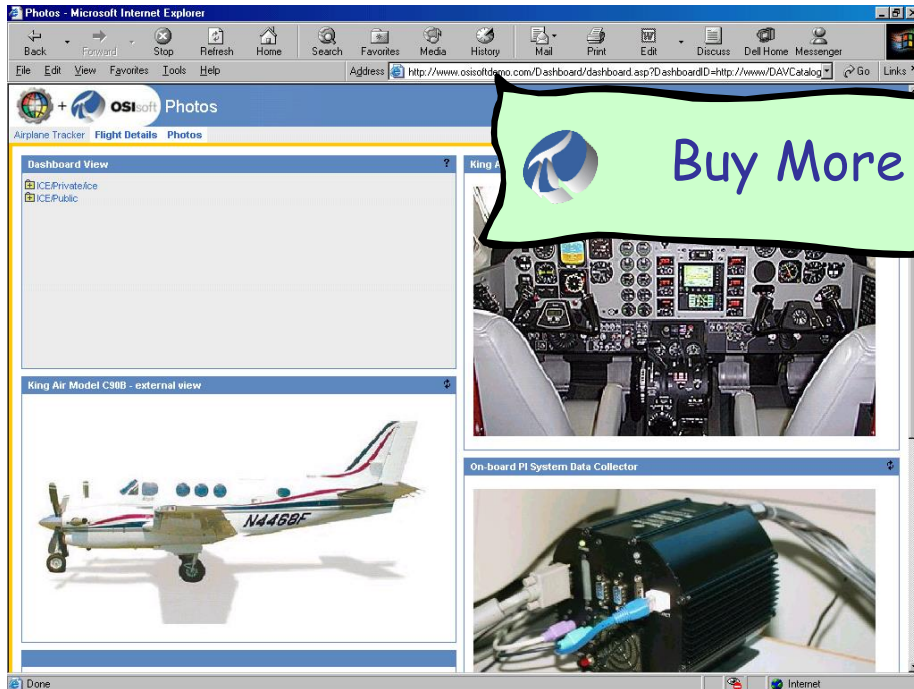
What We Actually Do – May 2003

- *Now at OSIssoft Users Conference 2003*
- *Strong, strategic partnership with OSIssoft*
- *Service offerings*
 - *AnyWhere & AnyTime* **60%**
 - *BestInClass* **10%**
 - *WorldsBest* **30%**
 - *IndustryBest* **In progress**

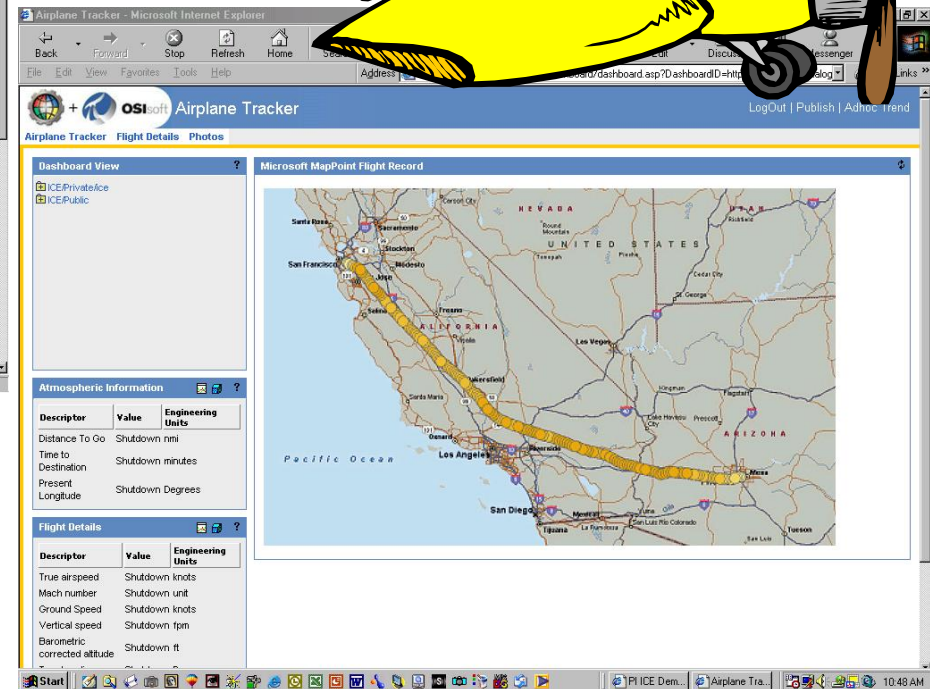
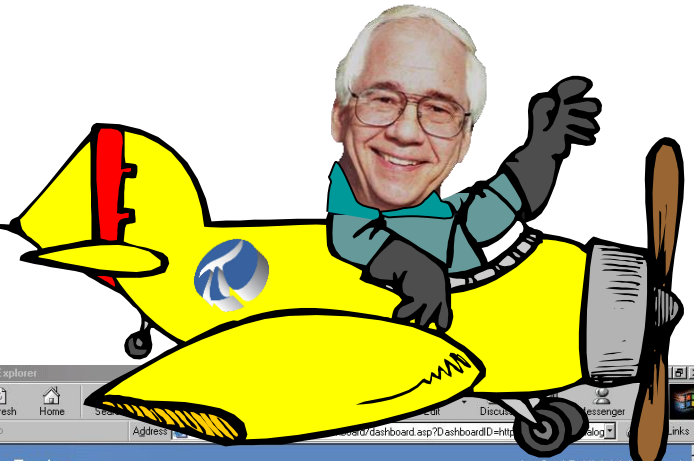
And...

We added ProTRAQ & ChemLogix VMI!

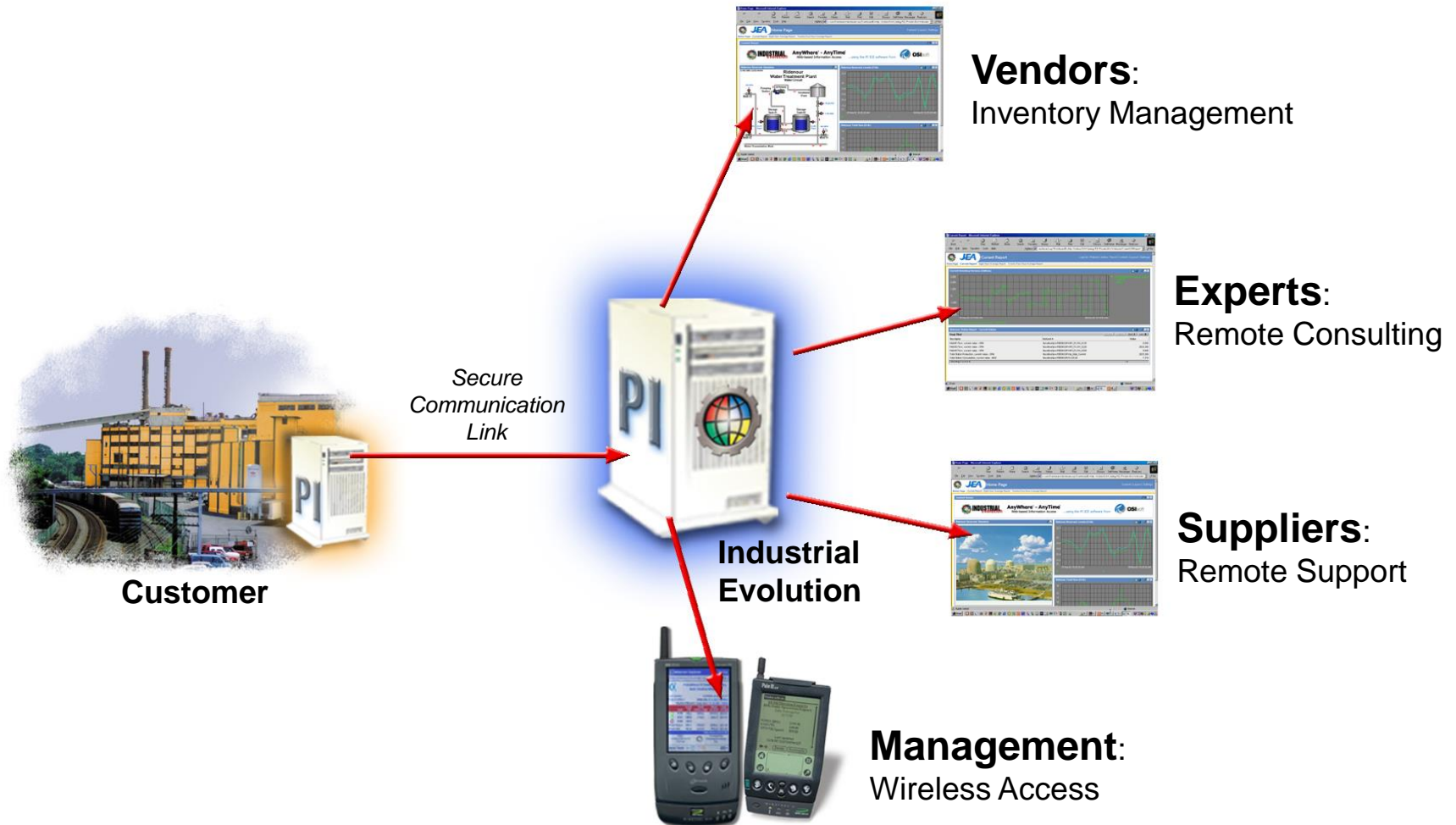
Plus... We Got PI in the Sky



Buy More PI...

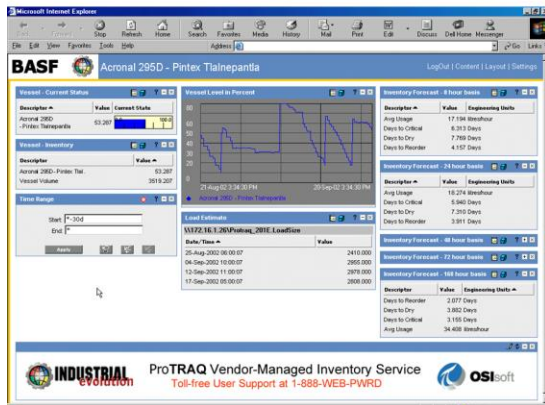


Secure Data Sharing

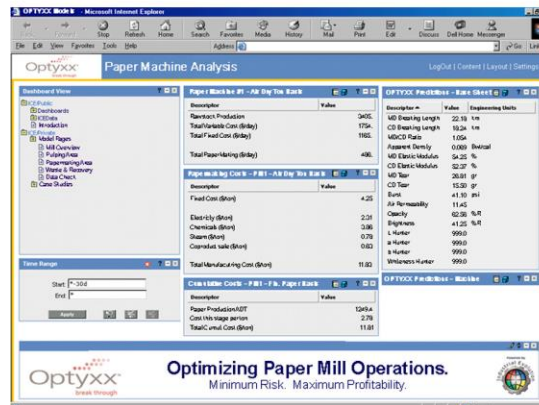


Sample Projects

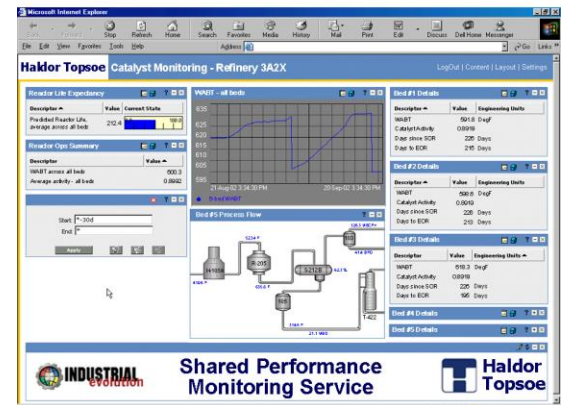
Vendor-Managed Inventory



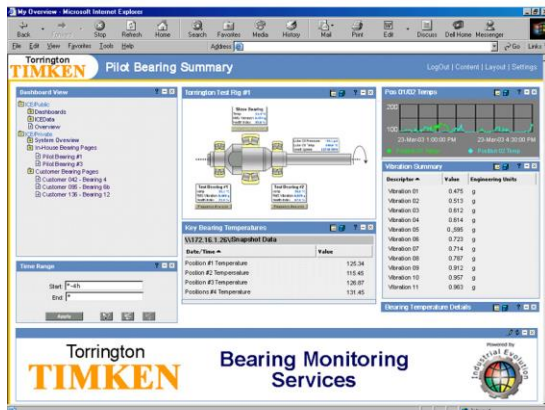
Real-Time Performance Management



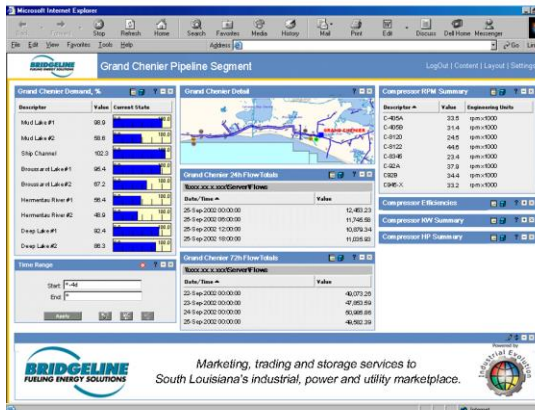
Remote Performance Monitoring



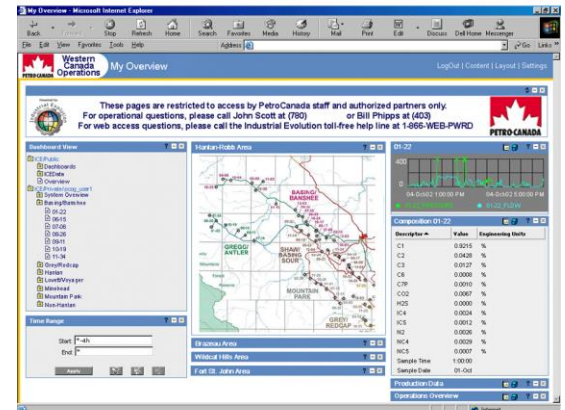
Remote Equipment Monitoring



Customer Collaboration



Business Partner Data Sharing



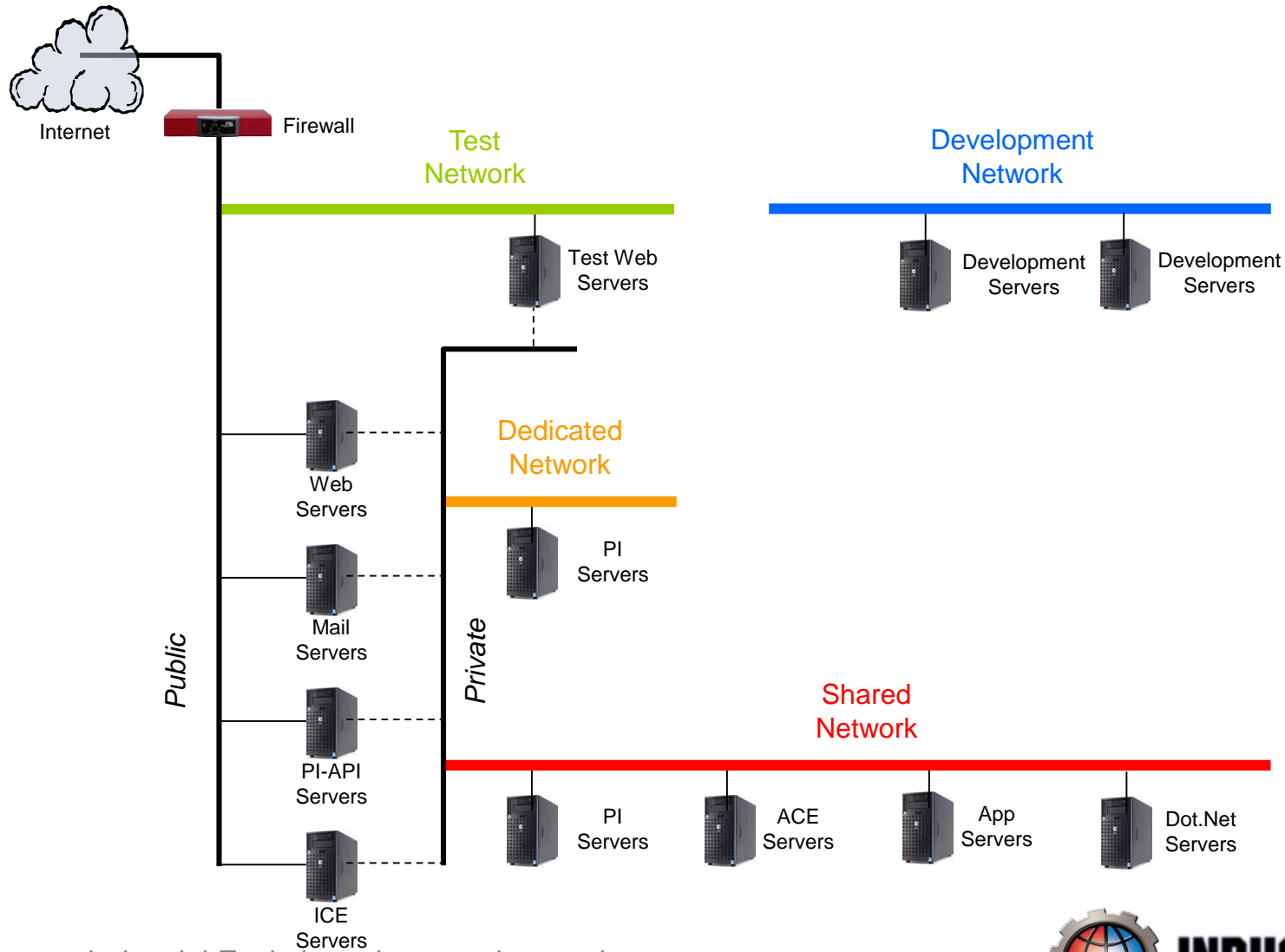
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Industrial Evolution – Lessons Learned

Data Center Architecture



Service Statistics

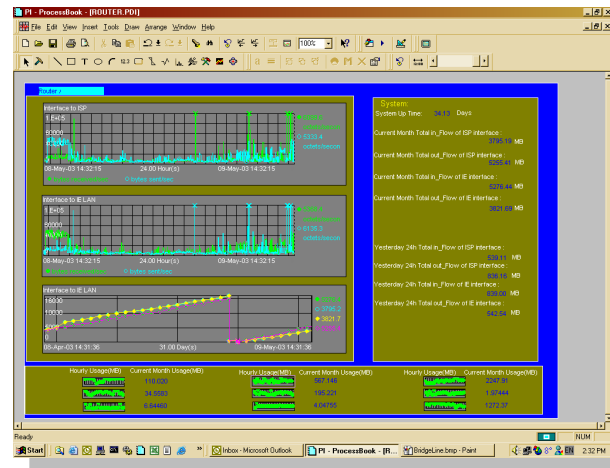
- *Data collection*
 - *>35 source locations*
(>250 with ChemLogix)
 - *>800 events/second*
 - *>100,000 data streams*
total
- *Users & displays*
 - *>250 user accounts*
created
 - *>650 ICE dashboards*
 - *>4,000 web parts*
 - *>500 other web displays*
- *Data forwarding*
 - *~5,000 data points*
forwarded to others
- *Application Hosting*
 - *~15 live applications*
- *System*
 - *~30 servers*
 - *>99.9% up-time*
- *Penetration*
 - *>70 companies served*
(>300 with ChemLogix)

How We Use PI – I

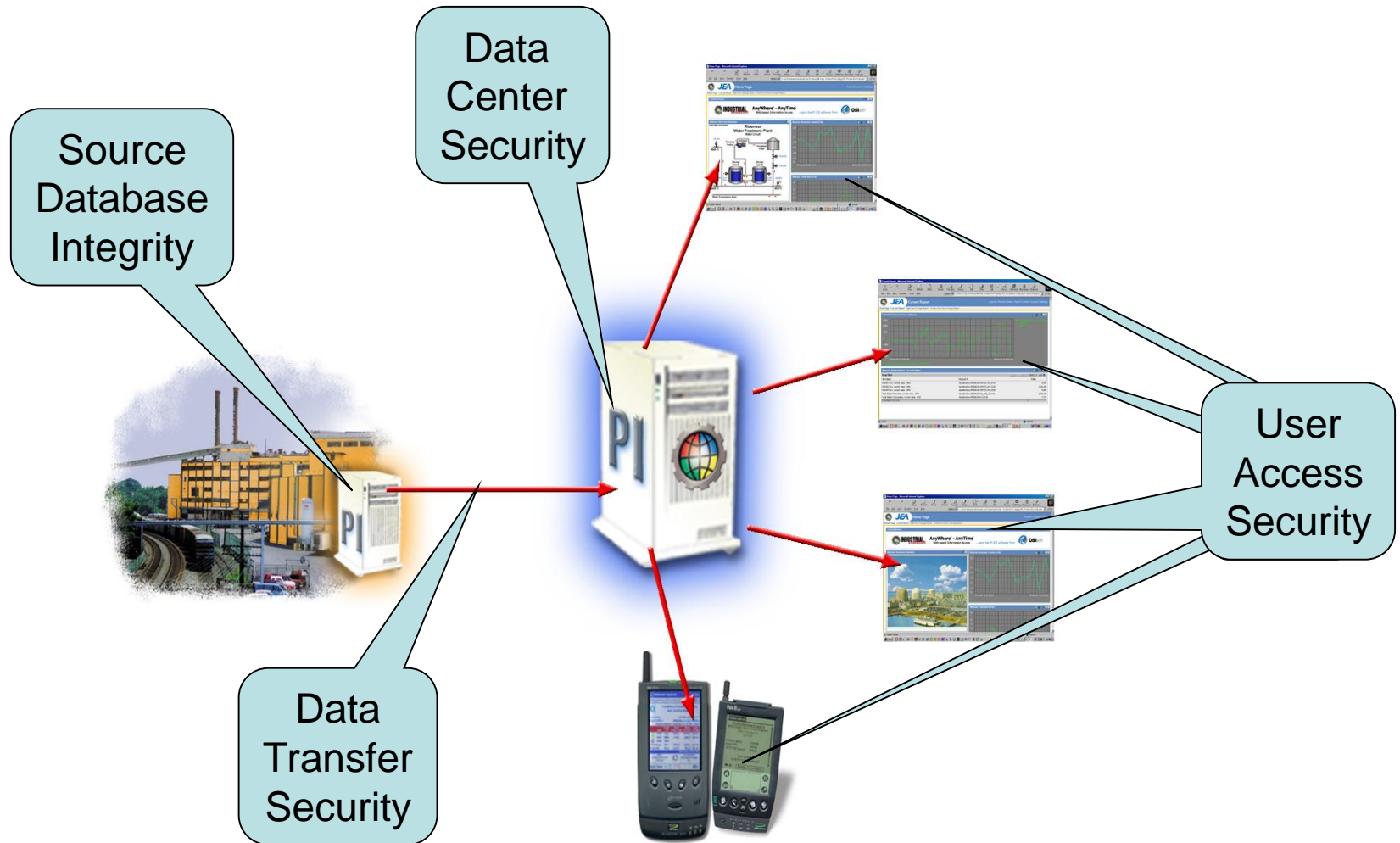
- *PI is at the heart of all our service offerings*
- *Data received multiple ways:*
 - *PI-to-PI*
 - *PI interface (for PHD, IP.21, WW, etc.)*
 - *Modem connection*
 - *FTP transfer*
 - *E-mail parser*
 - *Manual entry*
 - *Calculation & application results*
- *Data stored in PI*
- *MDB used for structure*
- *SDK for .NET & other application data I/O*
- *PE's for simple calcs*
- *ACE for applications (e.g. ProTRAQ)*
- *ProcessBook for display authoring*
- *ICE for Web displays*
- *OLEDB provider*

How We Use PI – II

- *IT Monitor for server & network monitoring*
 - *Bandwidth Usage*
 - *Server CPU, Memory Usage and Disk Space*
 - *PI attributes (Archived and Snapshot events, PI-PE)*
 - *Network availability*
 - *Web server usage and availability*
 - *Key application processes*



Security! Security! Security! Security!



Source Database Integrity

- **Objective**
 - *Ensure the source database and its associated servers and networks cannot be harmed*
- **Solution**
 - *Deny users direct access through firewall to networks or PI System*
 - *Create replica database containing values to be shared*
 - *Synchronize source database with replica database through single secure “tunnel” out through firewall*
 - *Allow users to only access the replica database*

Source Transfer Security

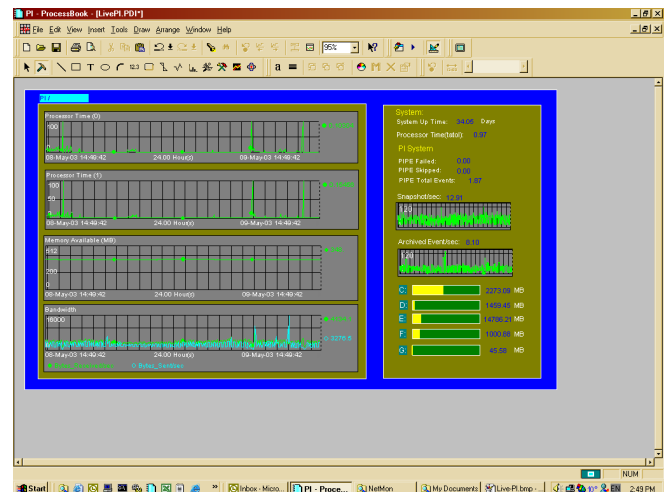
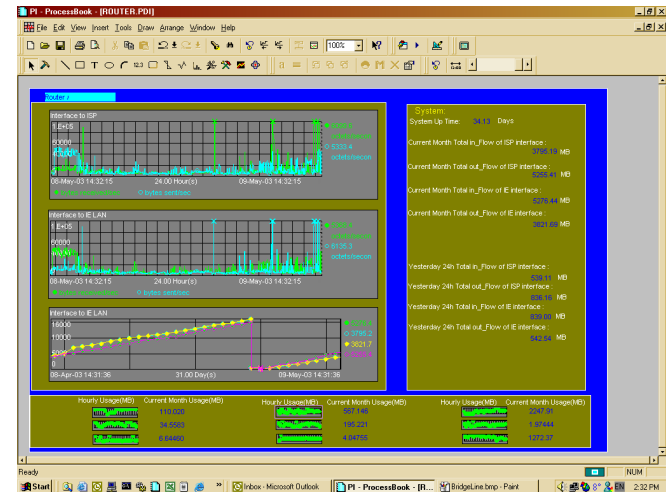
- *Objective*
 - *Install secure interface to local data source*
 - *Establish single communication channel through firewall*
 - *Ensure communications cannot be intercepted*
- *Solution*
 - *PI-to-PI (or PI-to-"Other") interface*
 - *PI point-level security*
 - *Branch office VPN using IPSec to complaint gateways or VPN appliances*
 - *3DES encryption*
 - *MD5 or SHA1 authentication*
 - *Shared access lists*

Data Center Security - I

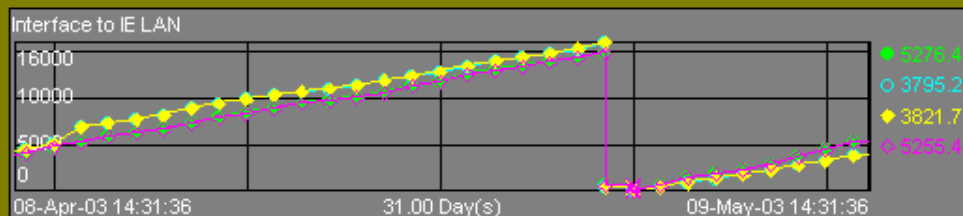
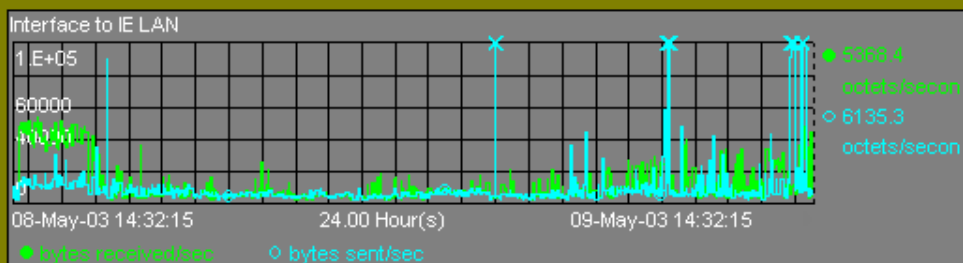
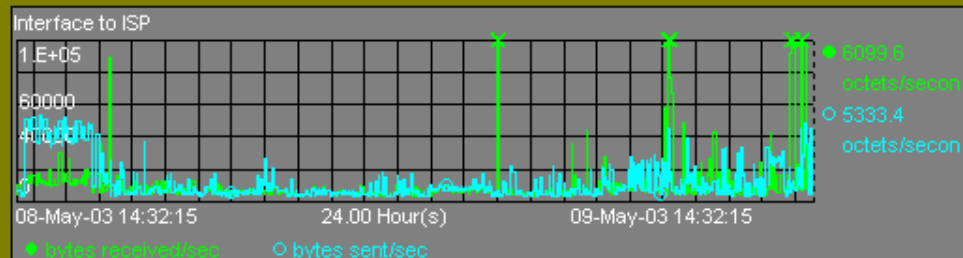
- *Objective*
 - *Safeguard data and systems against physical intrusion*
 - *Protect data and systems from loss*
- *Solution*
 - *Dedicated data center*
 - *24 x 7 building guard*
 - *Key-pad entry & intrusion detection*
 - *Heat & smoke detection*
 - *Server room temperature tracking*
 - *Back-up process & off-site storage*
 - *Personnel contract terms*

Data Center Security - II

- Objective
 - Safeguard data and networks against hackers
- Solution
 - Firewall
 - Windows 2000 IIS security
 - PI security
 - Anti-virus detection
 - Abnormal usage monitoring



Router 1



System:

System Up Time: 34.13 Days

Current Month Total in_Flow of ISP interface : 3795.19 MB

Current Month Total out_Flow of ISP interface : 5255.41 MB

Current Month Total in_Flow of IE interface : 5276.44 MB

Current Month Total out_Flow of IE interface : 3821.69 MB

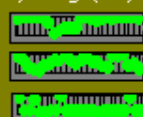
Yesterday 24h Total in_Flow of ISP interface : 539.11 MB

Yesterday 24h Total out_Flow of ISP interface : 836.16 MB

Yesterday 24h Total in_Flow of IE interface : 639.00 MB

Yesterday 24h Total out_Flow of IE interface : 542.54 MB

Hourly Usage(MB)	Current Month Usage(MB)
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Hourly Usage(MB)	Current Month Usage(MB)
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7.146

5.221

4755

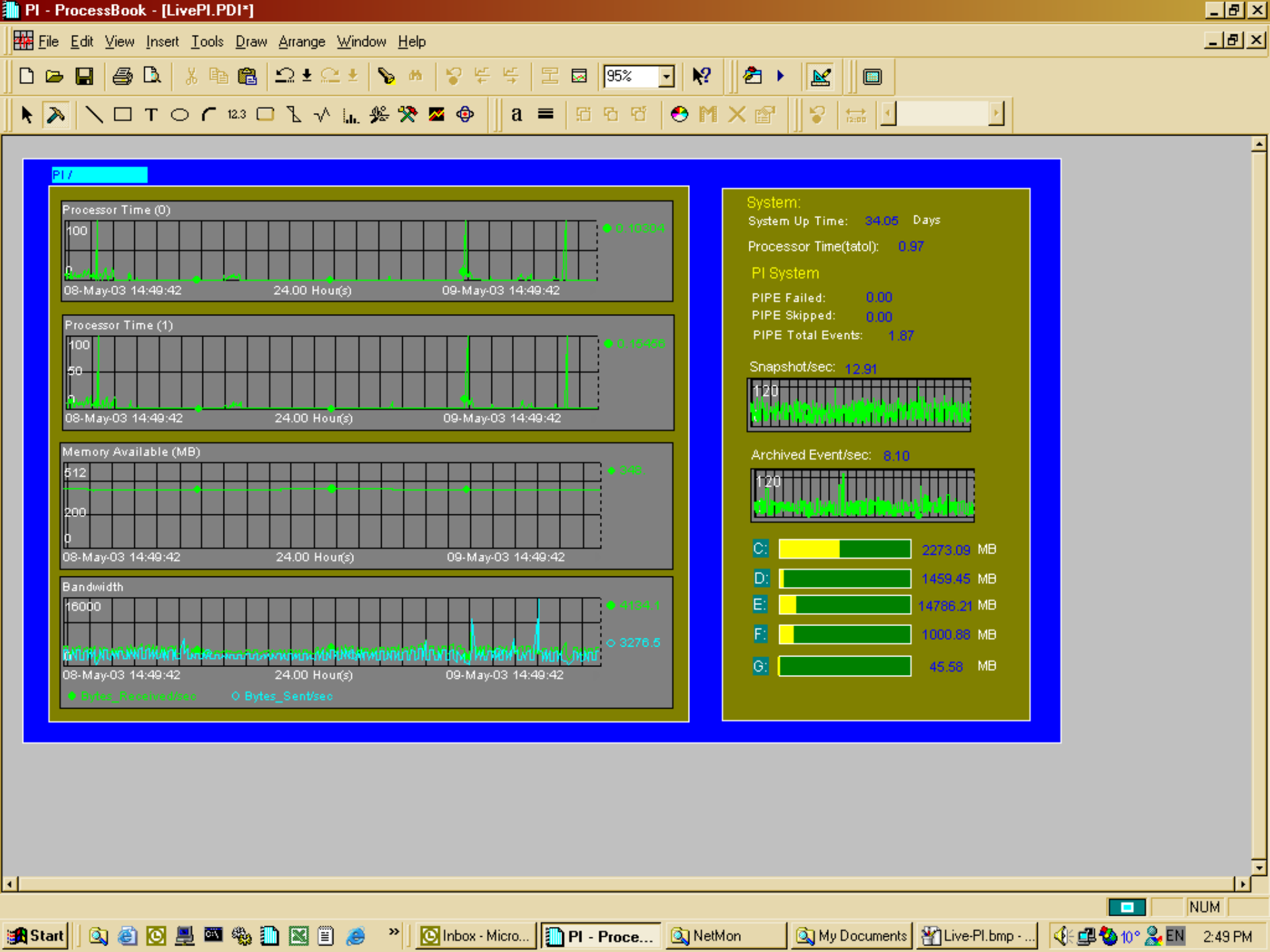
Hourly Usage(MB)	Current Month Usage(MB)
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2247.91

1.97444

1272.37



Data Center Security - III

- *Objective*
 - *Guarantee data integrity*
 - *Maintain system availability*
- *Solution*
 - *Redundant systems*
 - *Load balancing*
 - *Clustered servers with auto-failover*
 - *Automatic data recovery after communications failure*
 - *Performance monitoring*
 - *PI security*

User Access Security

- *Objective*
 - *Ensure data only gets to those authorized and in the form intended*
- *Solution*
 - *Verifiable UserID and Password*
 - *Renewal process*
 - *Windows authentication*
 - *Proprietary security layer*
 - *Optional – Digital certification*
 - *Optional – Physical tokens*
 - *SSL encrypted communications*

Case Study I – Remote Monitoring by 3rd Party Consultant

- *Requirements*
 - *3rd party access to customer's PI data*
 - *Integration with software application*
 - *Remote access*
- *Industrial Evolution solution*
 - *\$2-3,000 in labor (application integration)*
 - *No hardware; No software*
 - *~\$1,000 per month service fees*
- *Alternative approach*
 - *~\$100,000+ (mainly labor & hardware)*
 - *Install in-house PI System*
 - *Request customer build duplicate PI System in DMZ*
 - *Establish VPN & PI-to-PI*
 - *Who pays? Who maintains? Whose expertise?*

Case Study II – *Manufacturer Shares Data with 3 Partners*

- *Requirements*
 - *3rd party access to manufacturer's PI System*
 - *Personalized access privileges for each partner*
- *Industrial Evolution solution*
 - *\$5-10,000 in labor (new displays & reports)*
 - *No hardware, No software*
 - *~\$1,000 per month service fees*
- *Alternative approach*
 - *~\$100,000+ (mainly labor & hardware)*
 - *Build duplicate PI System in DMZ*
 - *Support and maintain 3rd party access*
 - *Support 3rd party users*

Case Study III – Data Collection from 5 Customer Tanks

- *Requirements*
 - *Scheduler wishes to replenish inventory before customer runs out*
 - *Salesman wants opportunity to sell up*
 - *Company needs access to inventory data from each customer site*
- *Industrial Evolution solution*
 - *<\$1,000 in labor*
 - *No software*
 - *Field hardware – as required (depends what exists)*
 - *~\$50-100 per location per month service fee*
- *Alternative approach*
 - *~\$30,000 (mainly labor & system hardware)*
 - *Field hardware – as required (same in both cases)*

Summary of Lessons Learned - I

- *PI performance is “as-advertized” – second to none*
 - *Interfaces robust and performant*
 - *Communication across the Web consume minimal bandwidth*
- *Security is customers’ #1 concern*
 - *We treat it as our #1 priority*
 - *We have invested significantly to avoid, detect, defeat and recover from intrusion*
- *Concerns over attacks exaggerated*
 - *We have experienced 0 hack attempts in 3 years;*
 - *(We have to hack ourselves to test systems)*
 - *In the same period, 5 mailed articles were lost in transit*
- *Availability*
 - *We have invested significantly to ensure availability*
 - *Weakest point is the ISP*

Summary of Lessons Learned - II

- *Latest products from OSIsoft are strong*
 - *We are at the leading edge of field testing*
- *When to use Industrial Evolution?*
 - *Not for Web visualization of your own PI data – buy PI-ICE*
 - *When you want to share your PI data with your customers, suppliers, or partners*
 - *When you wish to have access to real-time data from your customers, suppliers or partners*
- *Services are competitive for any scale of collaboration*
 - *1 tag – e.g. level on a tank*
 - *30,000 tags – e.g. pipeline meter information*
 - *It does not make sense to build a system and try and support it that relies on multiple connections to multiple parties – who pays? who is responsible for what?*