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Leveraging PI ACE as Enabler in a Plant Manufacturing Execution System

Presented by **Roberto Gubellini, Mauro Misuri – Eli Lilly Italia**
Pierre Menard – Global Automation Partners

Agenda

- Lilly and *Global Automation Partners* At-A-Glance
- The story of the project
- The background
- Challenges & the solution
  - Architecture
  - Data flow
  - Client Tools
- Results & Benefits

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About Lilly

- Large Pharmaceutical Manufacturer
- Founded 1876 (135 year heritage)
- ~23 B$ Net Sales (2010)
- ~38,000 employees worldwide with ~ 7,500 in R&D
- Manufacturing plants located in 13 countries
- Clinical research conducted in more than 50 countries
- Research and development facilities located in 9 countries
- Products marketed in 143 countries
- Products treat depression, schizophrenia, attention-deficit hyperactivity disorder, diabetes, osteoporosis, cancer, and many other conditions

Source: www.lilly.com

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About Lilly Italy - Sesto Fiorentino (Florence)

- 50 years long story
- 1990: Global manufacturer for antibiotic products
  - FDA approved for antibiotic supply from 1996 until 2003
- 2003: Plant new mission, largest biotechnology center in Italy for Insulin production
- Now:
  - ~1000 employees (~650 in the manufacturing)
  - Productive capacity: ~ 100 million insulin cartridges for injectible pens and blister packaging
  - High level of automation and paperless production

Source: www.lilly.it

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Story of the project

- **The needs**
  - How could we better integrate MES with real-time data infrastructure?
- **The idea**
  - Can we achieve this using PI System components?
- **The feasibility study**
  - Let's investigate!
- **The implementation**
  - Let's do it!

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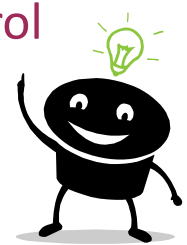
The idea – Roberto Gubellini

- Master's degree in Computer Science Engineering
- Joined Lilly in 2003, Manufacturing IT Platform & Infrastructure role during the first Insulin production project
- Since 2008
  - Process Automation Engineer for Data Historian,
  - Building Management System and Water Treatment control systems.
- Since 2009, second Insulin production project
  - Responsible for the rollout of the PI System
  - Process Monitoring solutions and the formulation process control system



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The feasibility study – Mauro Misuri

- Mauro Misuri is a Process Automation Specialist that joined Eli Lilly in 2000.
- Has more than 20 years of experience in automation and control systems.
- Extensive knowledge of
  - Formulation, Filling, and Component Processing machine automation
  - MES system
- Since 2009, joined second Insulin production project

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About *Global Automation Partners*

- Engineering firm specialized in delivering Automation and Manufacturing IT solutions and services for manufacturing industries (www.gap5.com)
- Leader in applying OSIsoft's technologies to integrate data and provide business intelligence for better decision making
- Offices in Canada (Montreal) and the US (Danbury, CT – San Francisco, CA - Greenville, SC - Indianapolis, IN – San Juan, Puerto Rico)
- Expertise in Pharma/Biotech, Food and Beverage, Chemical, Specialty Chemical, Petrochemical, and other industries
- Part of M+W Group since 2010
- Sister company M+W PA with global presence in Europe and Asia

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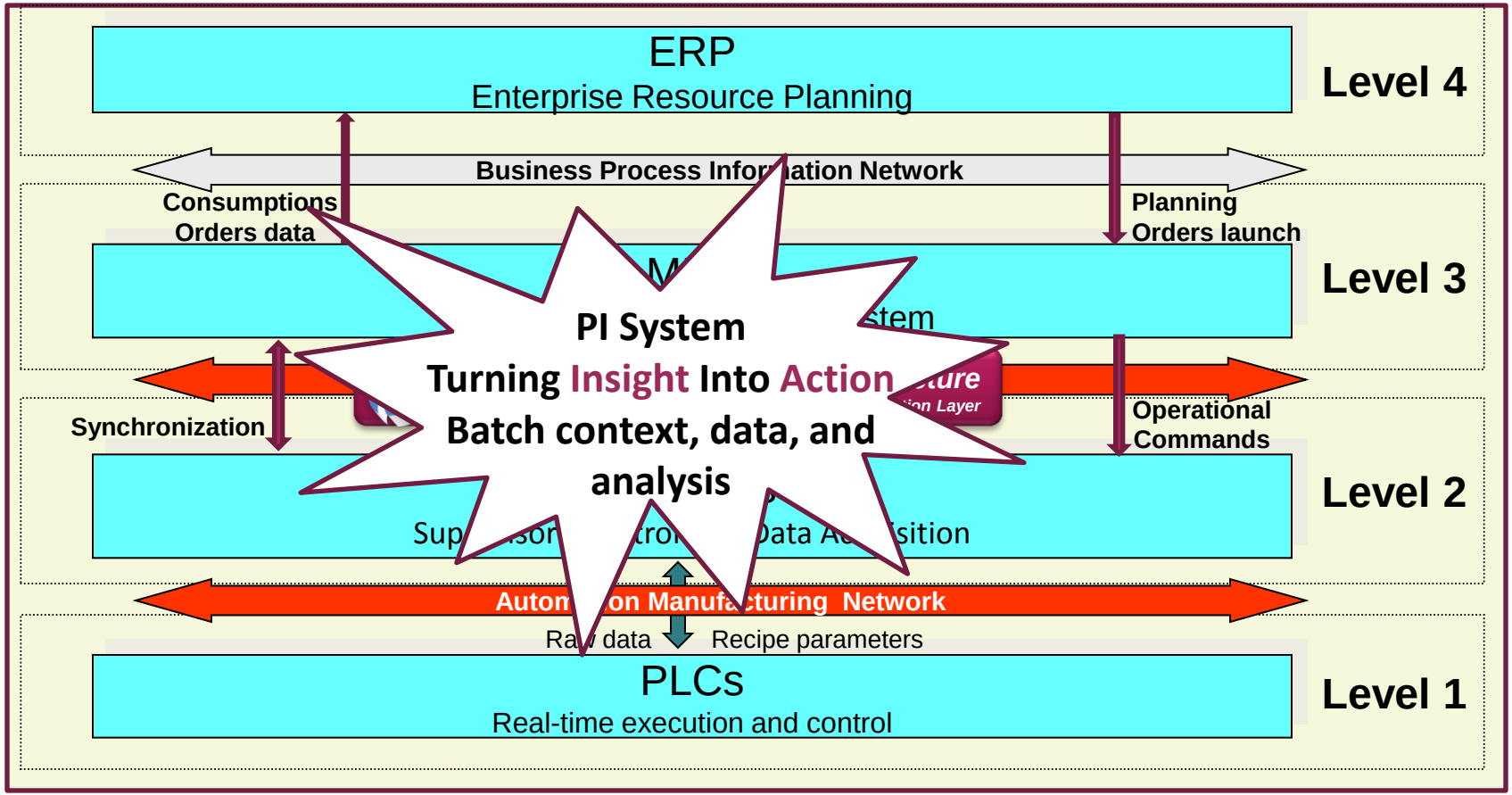
Logical System Architecture – S95 & S88



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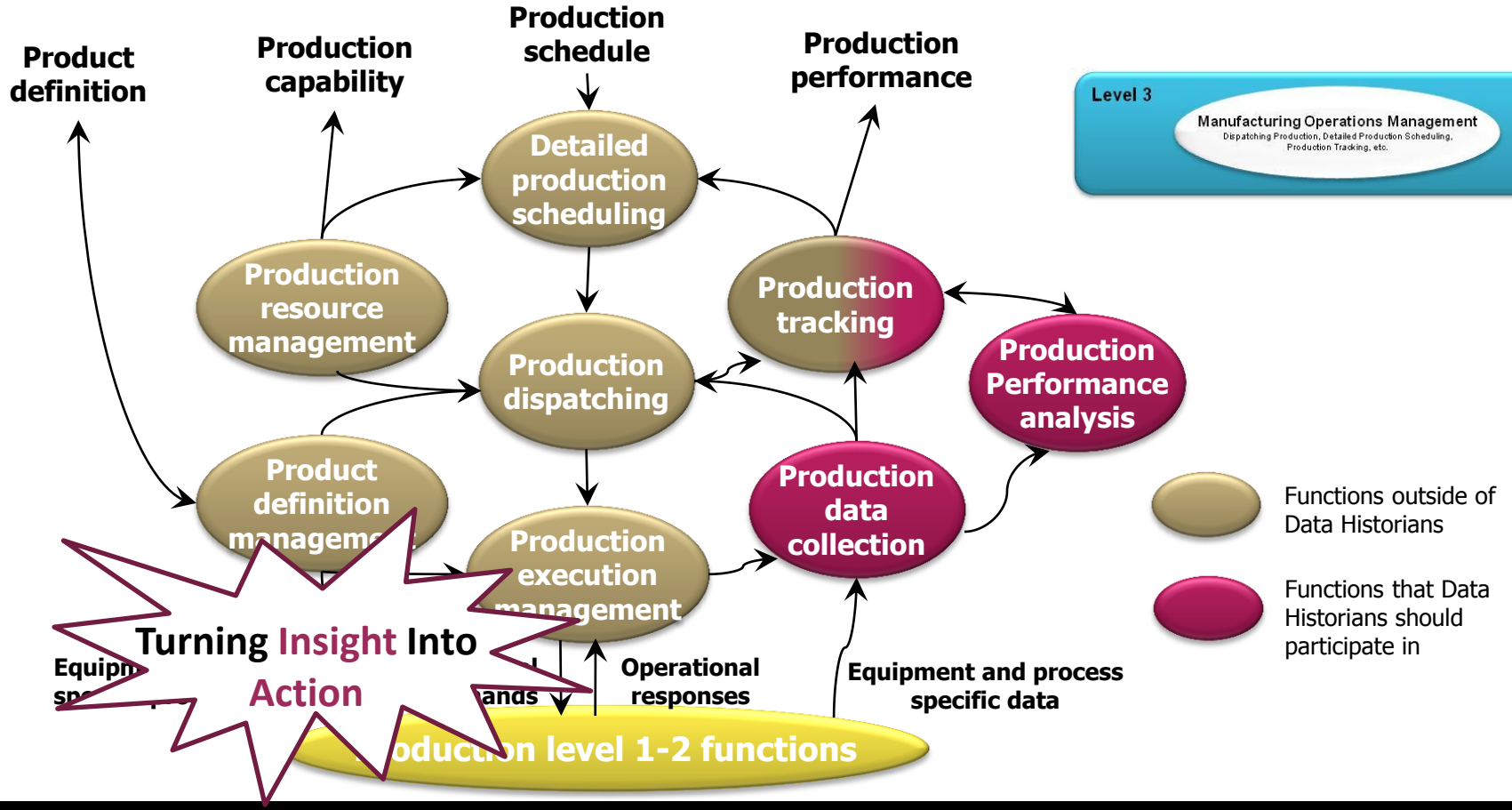
S95 Level 3: Manufacturing Operations Management Functions



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Scope of the project

Washers

Autoclaves

Processors

Formulation

Filling Line

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The implementation – Pierre Menard

- Joined Global Automation Partners in 2004 as a senior application engineer.
- Bachelor degree in Electrical Engineering.
- Over 23 years of experience in automation and industrial computing.
  - Involved for the past 12 years solely on PI System projects for aluminum and biotech industries.

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Requirements

- Use PI System to enable integration between SCADA and MES
  - Core component of the solution
  - Automates transaction between SCADA systems and MES
  - Based on Scheduled algorithms
- Develop a Recipe Manager application
- Develop a Report Manager application

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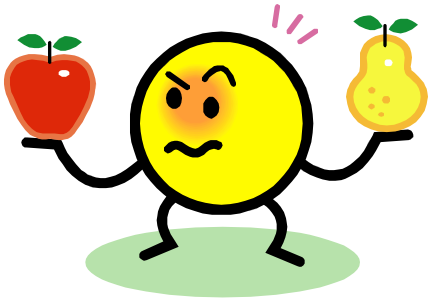
Constraints / Particularities

- Compatible with existing system architecture
  - Existing data in Relational databases
  - Rockwell, Siemens, RsBatch, etc…
- Fast Track / RAD
  - Must simplify and minimize coding (.NET libraries)
- Reliable, Scalable, Modular
  - One Design – Multi Vendor
  - Self-Healing / Immune to failure / Low maintenance cost
- Regulated environments (21 CFR Part 11)
  - Maximize COTS usage



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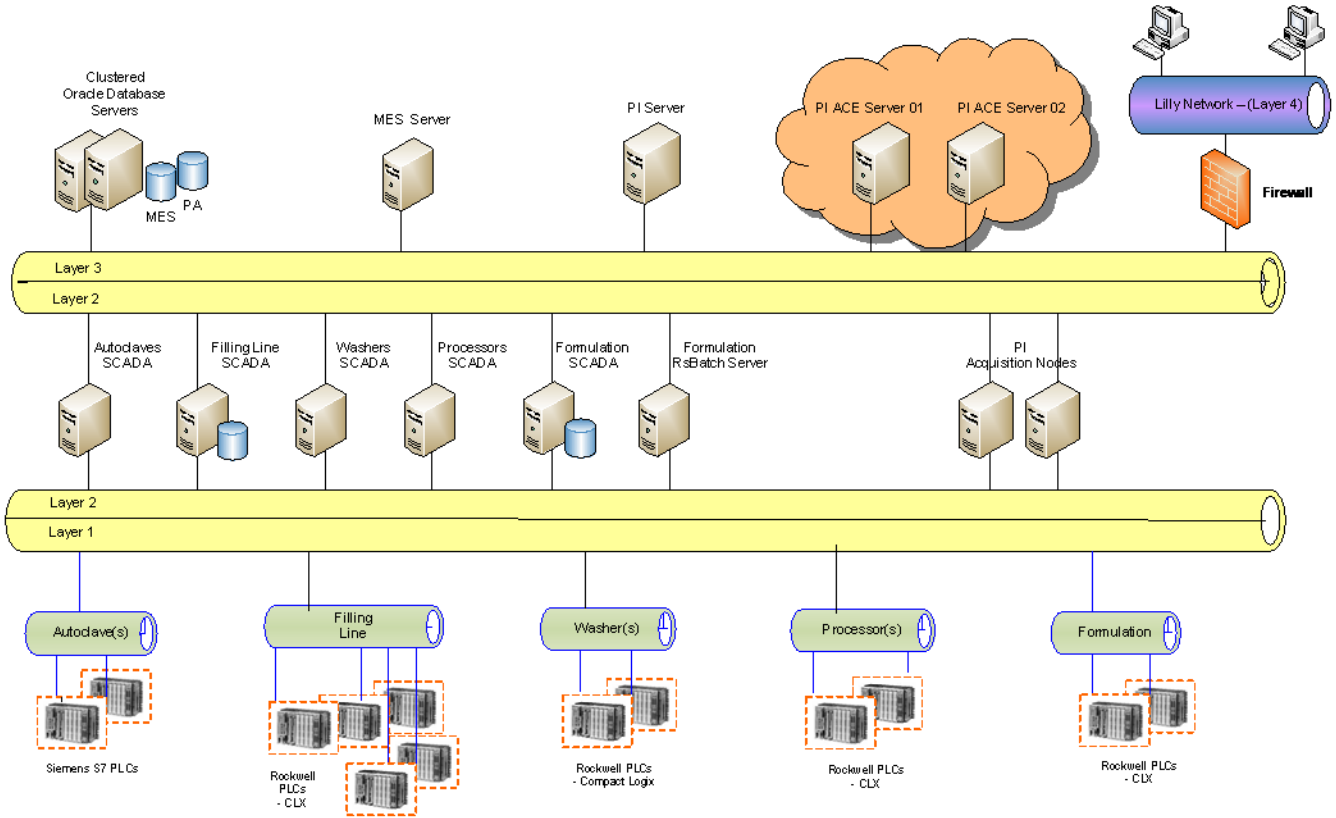
SCADA/MES Integrator - System Architecture



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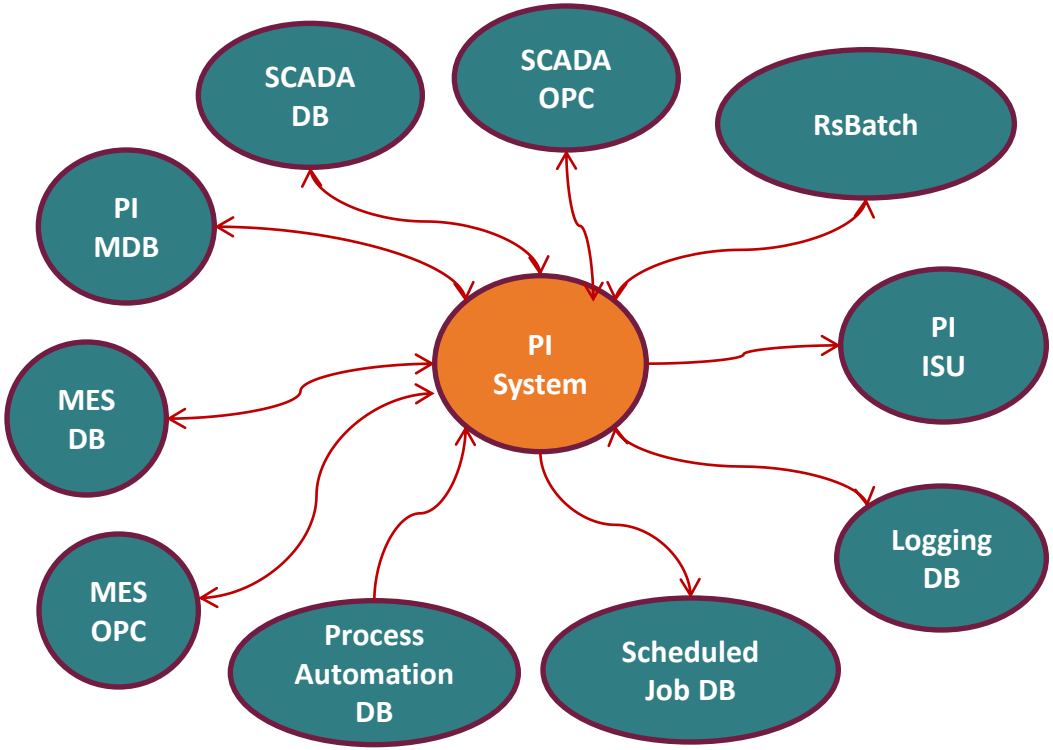
SCADA/MES Integrator – Data Flow



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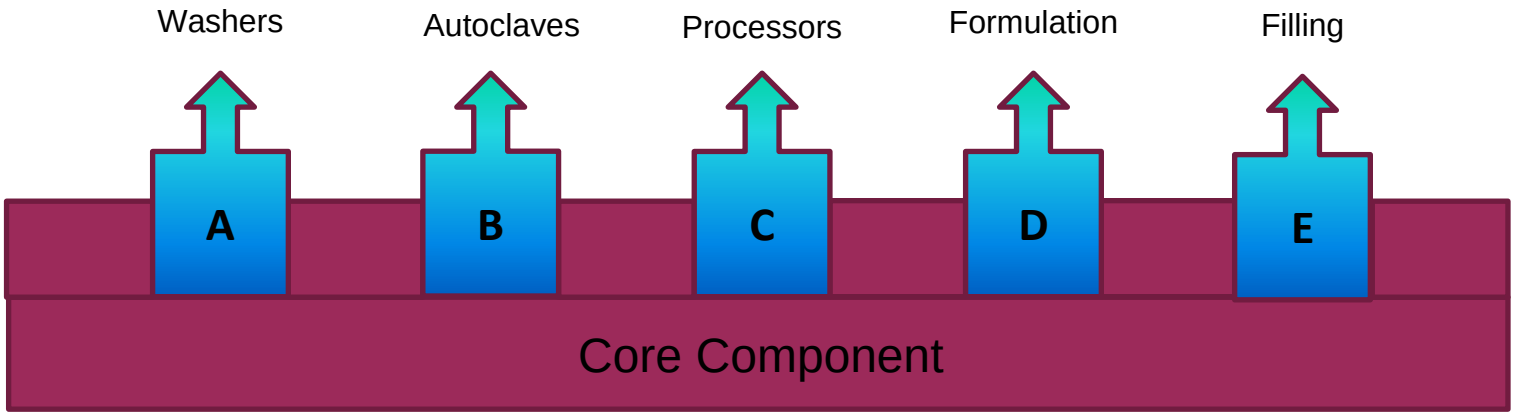
SCADA/MES Integrator - Modularity

- One Design – Multi Vendor
- Modular and Scalable application
- Maintenance on a “per equipment” basis



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SCADA/MES Integrator - Modularity

- “Core Component” composed of:
  - Redundant PI ACE schedulers
  - Interface with SCADA stations
  - Interface with PI Server
  - Interface with Clustered Oracle databases (Logging, Recipes, Reports)
- “Cartridges” composed of:
  - Standalone SCADA / MES synchronization contexts
  - Developed on a vendors / equipment's basis.

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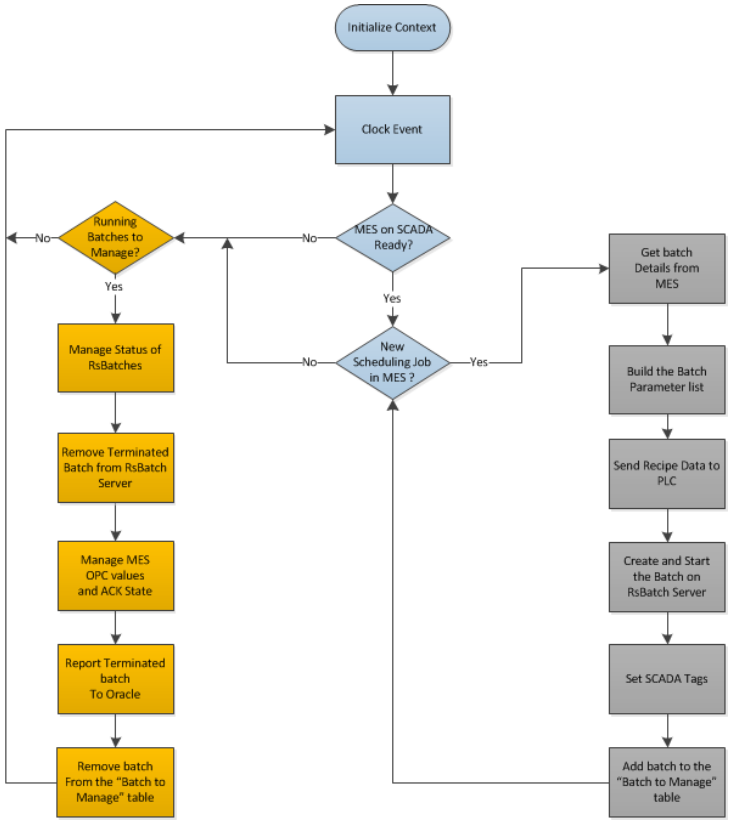
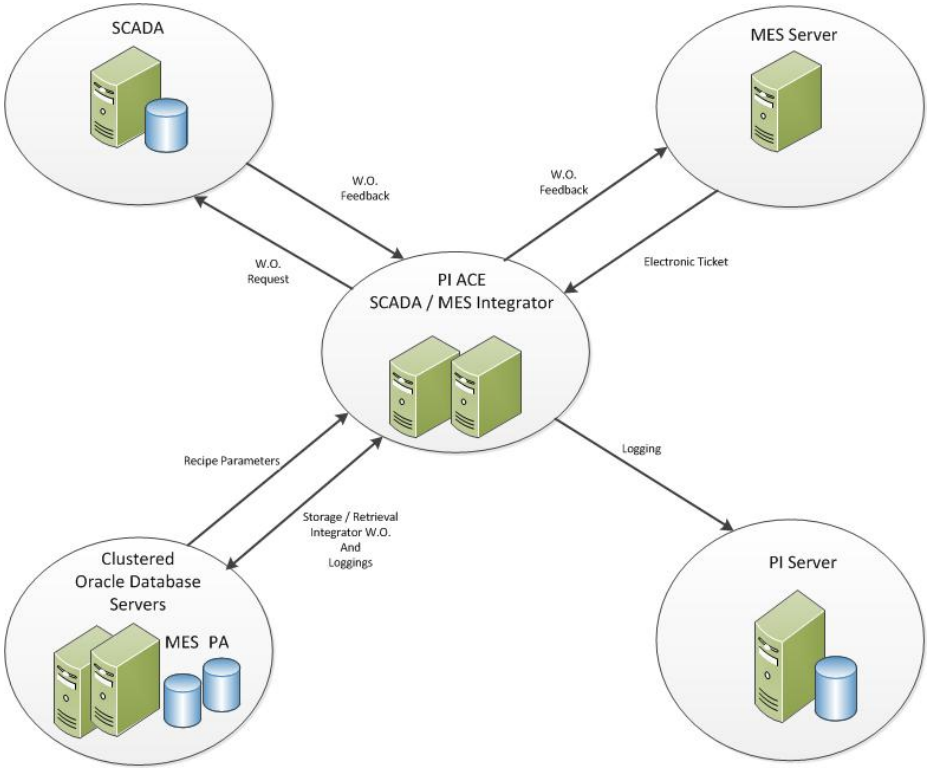
SCADA/MES Integrator – Process Flow





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SCADA/MES Integrator - Reliability

- Extensive logging
  - Oracle tables (Detailed info, max 1 month duration)
  - PI Server (Initialisation info, Major Faults, life duration)
- ISU to monitor each SCADA/MES context

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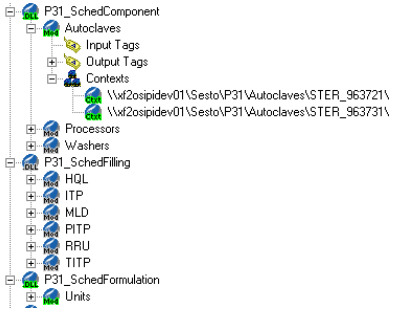
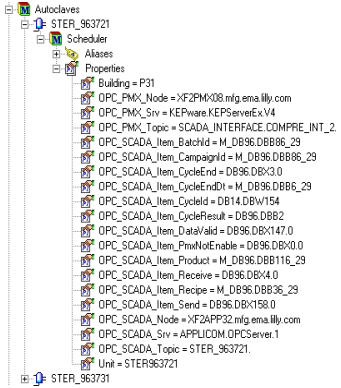
SCADA/MES Integrator - Configuration





- Through PI ACE Manager
  - Equipment's can be start/stop individually
- Through PI Module Database
  - Equipment OPC parameters are defined

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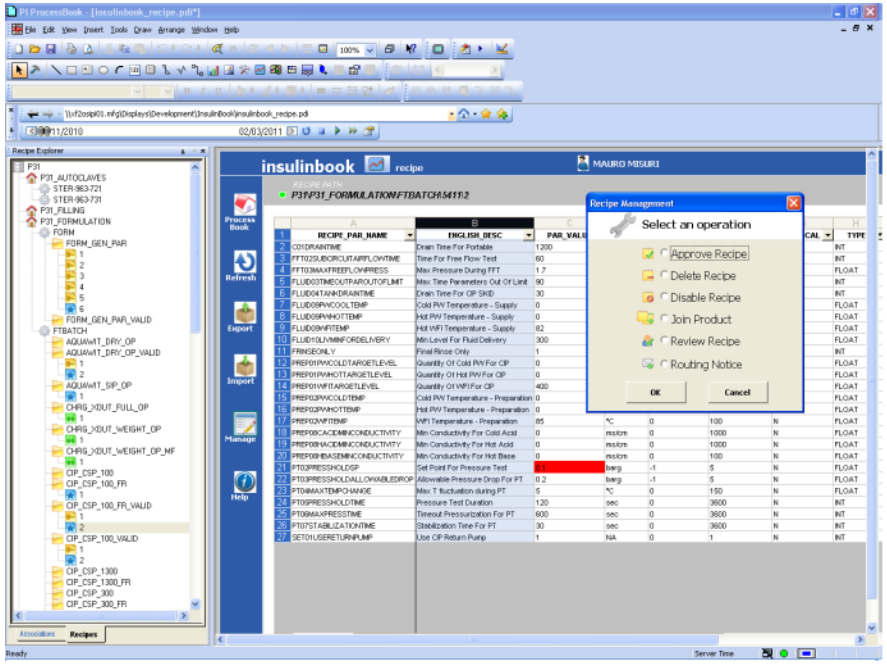
Recipe Management Tool



- Tree view recipe selection
- View Recipe parameters
- Excel Import/Export
- Review and Approve
- Email notification
- Recipe comparison
- Versioning management

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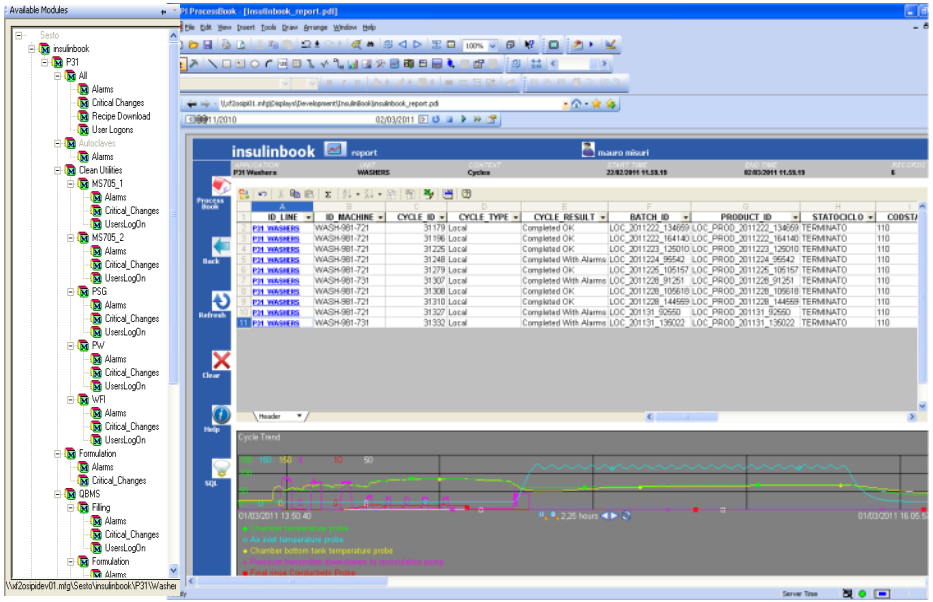
Report Management Tool



- PI Module DB Configuration
- Tree view Report selection
- Cycle Report Review
- Alarms Report Review
- Critical Changes Review
- Unit & Cycle based trends
- Report Approval Process

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Results & Benefits

- Reduction of deviation due to human errors
  - Automatic data entry of batch information
  - Automatic selection of according machine recipe parameters
- Reduction of Batch disposition time (from 80 down to 40 man hours)
- Real time control and traceability of production operations
- Enhanced paperless approach
- Low maintenance costs

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Future Plans and Next Steps

- Integrate the other Insulin production line
- Migration to PI Server 2010
- Leverage PI High Availability
- Leverage PI AF and coming PI Event Frames

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Questions

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Thank you

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