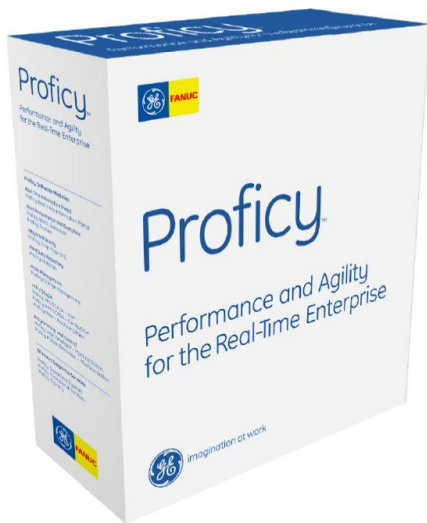




**MES –teemapäivä  
11.5.2011**



# MES Solutions



GE  
Intelligent Platforms

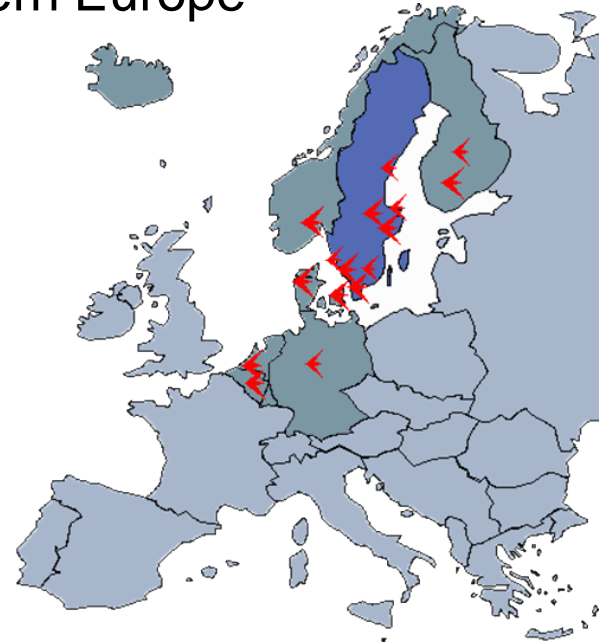
For more information **visit** us at [www.novotek.com](http://www.novotek.com)



# Novotek



- Public on Swedish Stock exchange
- Founded 1986
- GE - IP distributor - Working from Northern Europe
  - 16 departments in 7 countries
- Activities
  - Sales
  - Support
  - Training
  - Solution Design & Development
  - Proof Of Concept & Pilot
- 140+ employees
- 70+ MES implementations





GE Intelligent Platforms – Full Scale MES Solution

# PROFICY PRODUCT PORTFOLIO



# GE Intelligent Platforms



Global provider of high-technology based business solutions

Part of the GE Family - one of the most largest companies in the world

2000+ employees added with wide distributor network provide local presence in global markets

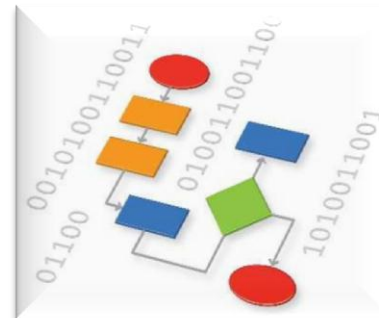
Broad portfolio of award-winning industrial software and hardware solutions



Your Success  
Our Goal

# GE Intelligent Platforms

- Strong portfolio of products
- Worldwide organization
- Novotek: distributor >20 years





# GE Intelligent Platforms

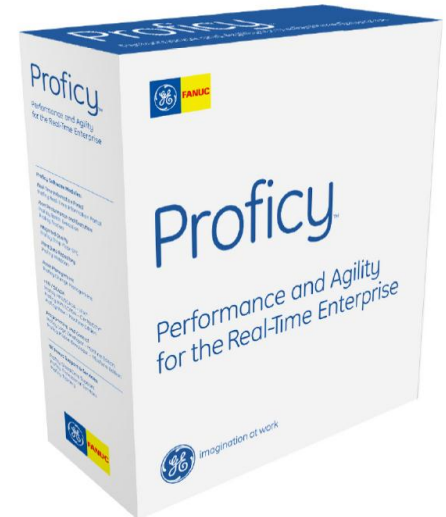
- Huge installbase > 300.000 licenses worldwide
- Complete "Out of the Box" solution for Intelligent Production Management
- Open and layered solutions based on latest industry standards





# Proficiency – Off-The Shelf Software Suite

- **Configured to match** manufacturing and business processes
- Based on Microsoft technologies - extensible using **standard tools**
- **Easier to use, maintain and evolve** than custom solutions
- **Easier to train** users for larger-scale adoption implementation, roll-outs and support
- Continually enhanced through input from **thousands of global users** across multiple industries





# Industrial Software Solutions

■ Traditional Automation Software delivers data collection, visualization, and analysis capabilities giving you best-in-class **HMI, SCADA, Batch and Change Management** solutions used and proven in nearly every conceivable industry and application



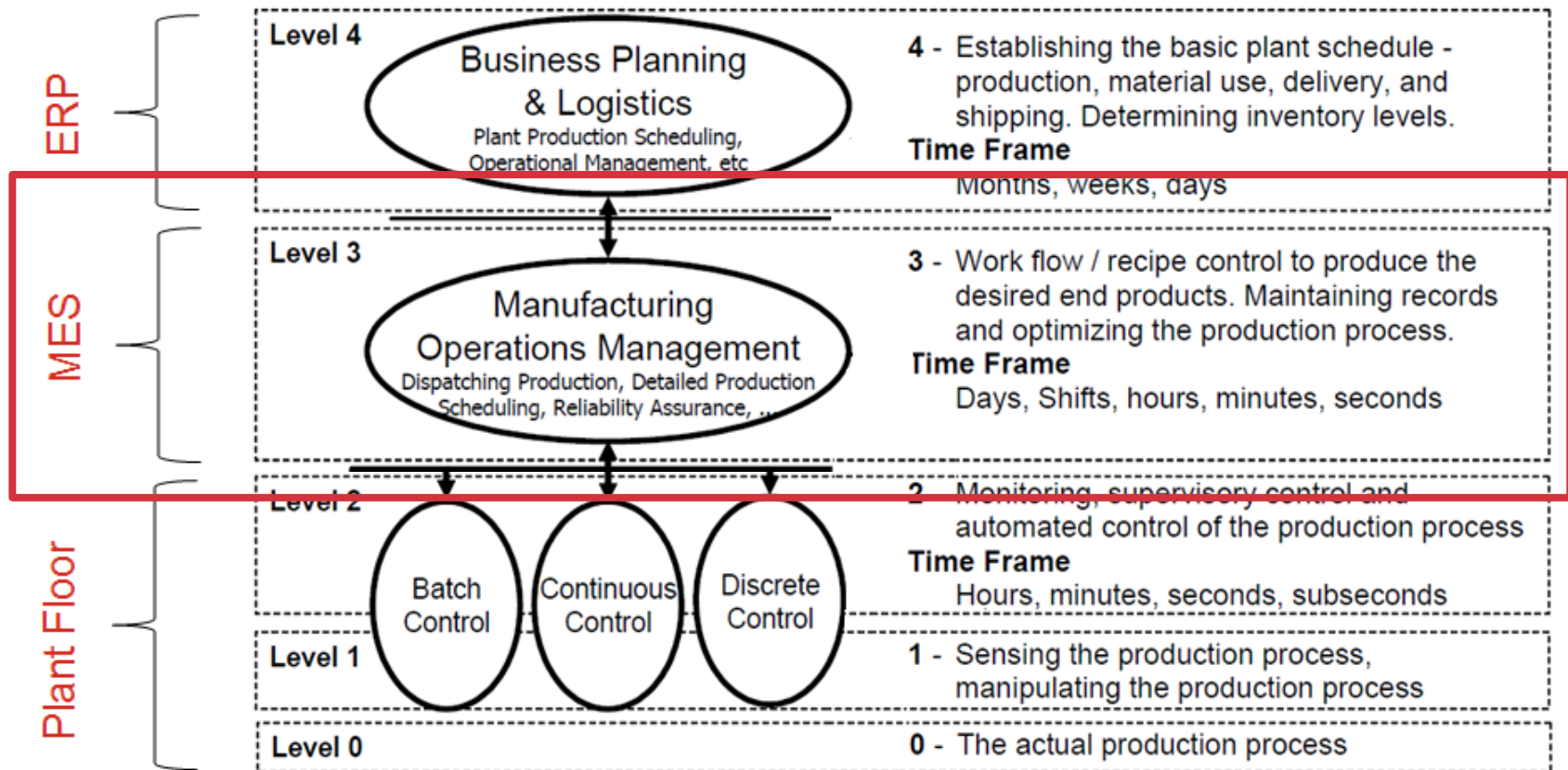
■ Manufacturing Operations Management Software bridges the gap between your plant floor and business systems, combining proven **Historian, Workflow, MES and Scheduling** capabilities

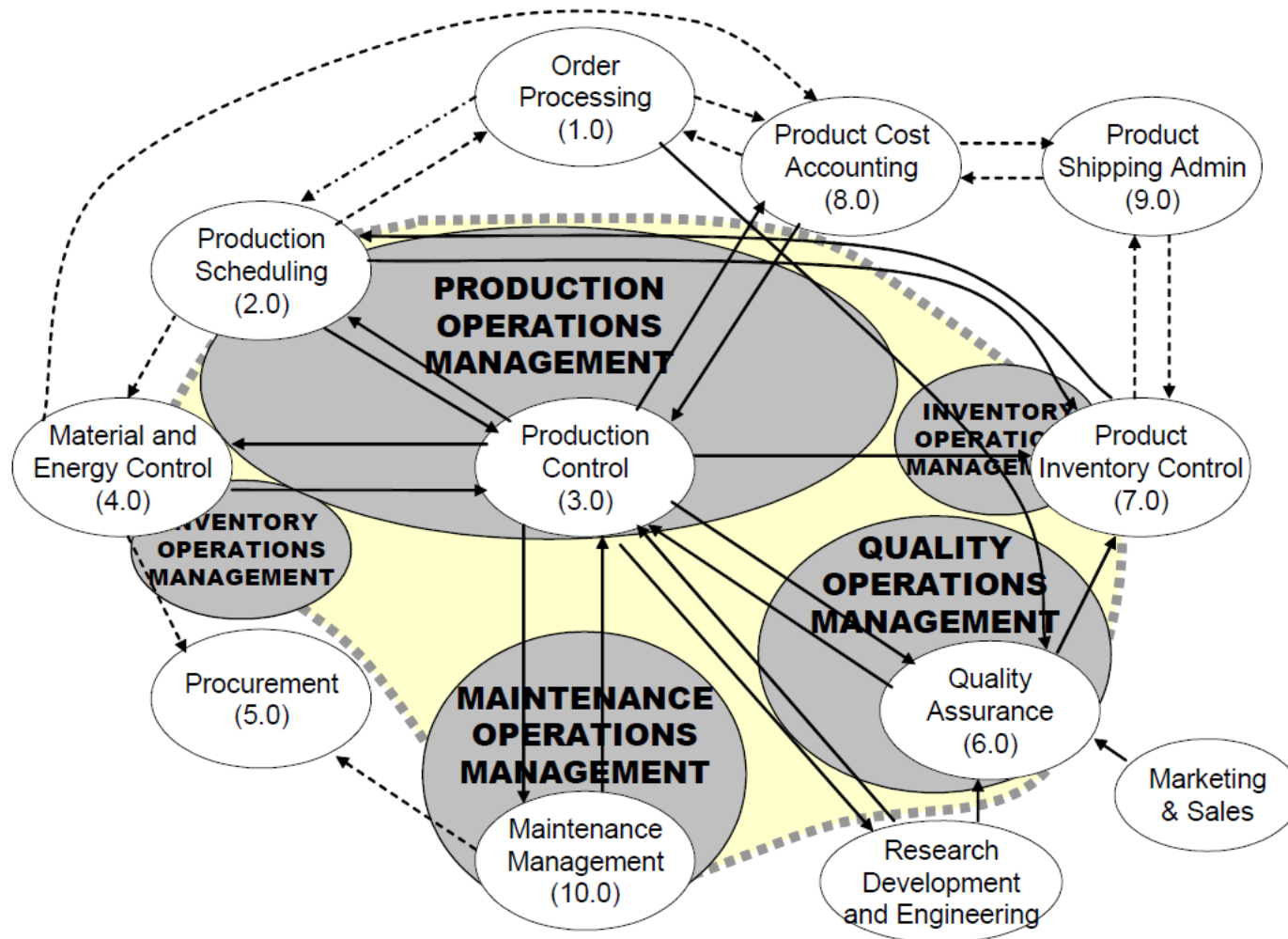




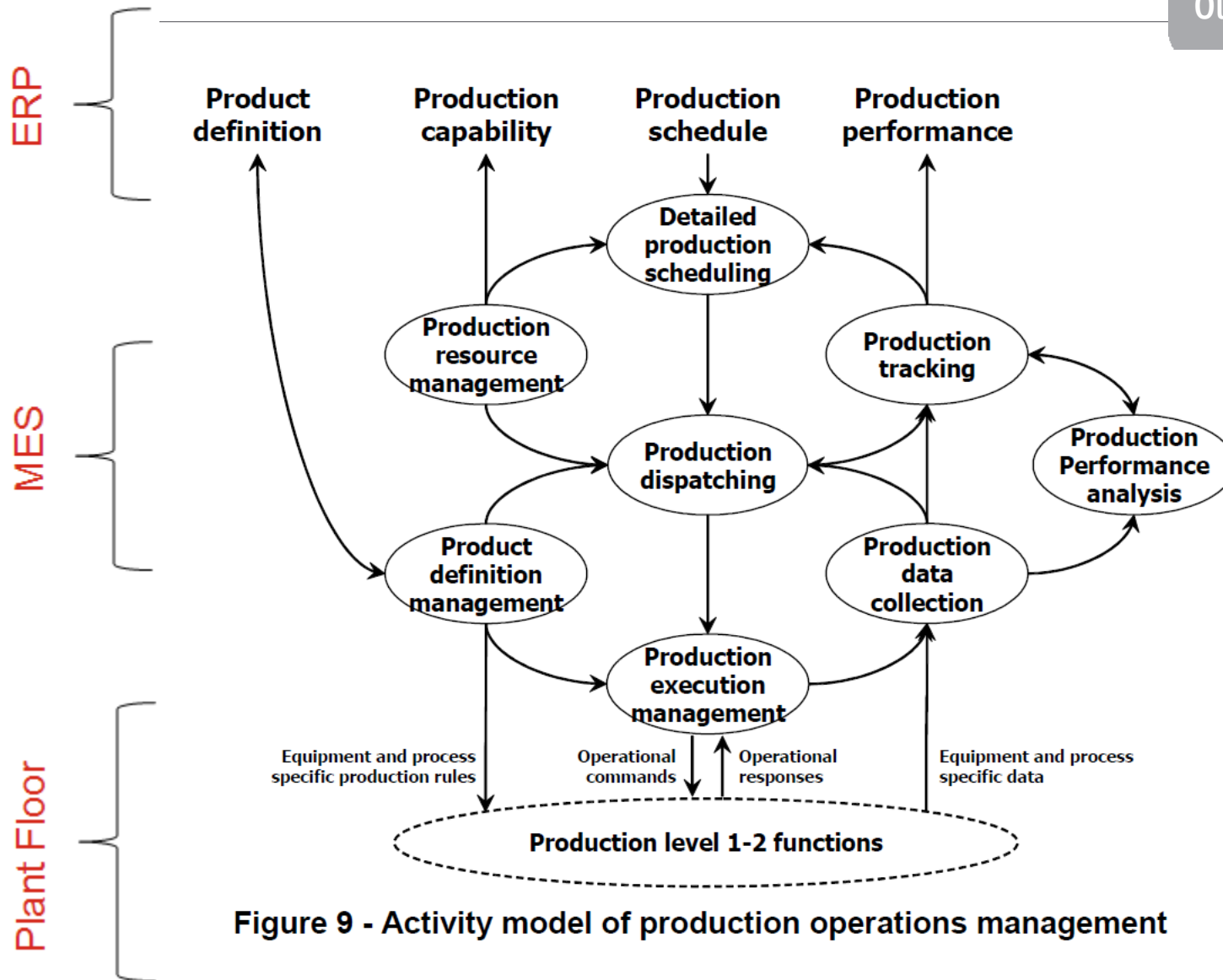


# ISA95 - Functional Hierarchy Model





**Figure 1 – Manufacturing operations management model**



**Figure 9 - Activity model of production operations management**



# Typical Vendor-Independent MES Modules

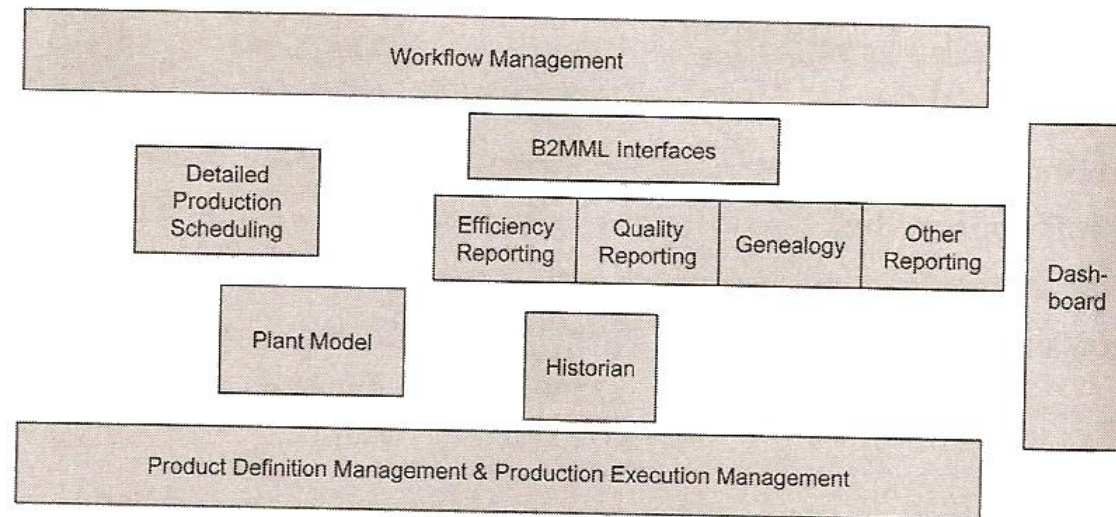


Figure 2.7 Simplified, vendor-independent overview of modules offered on the MES market

**Bianca Scholten, MES Guide for Executives – Why and How to Select, Implement and Maintain a Manufacturing Execution System**



Level 4

SCM

ERP

EAM

CRM

Level 3

### Common Requirements for any MES System:

- Modular Architecture
- Built on Standard Products
- Based on Accepted Technologies
- Open and Extendable
- Well Documented
- Widely Supported

Levels 0,1,2

Production Areas

Production Lines

Production Units

Process Cells

Production Equipment



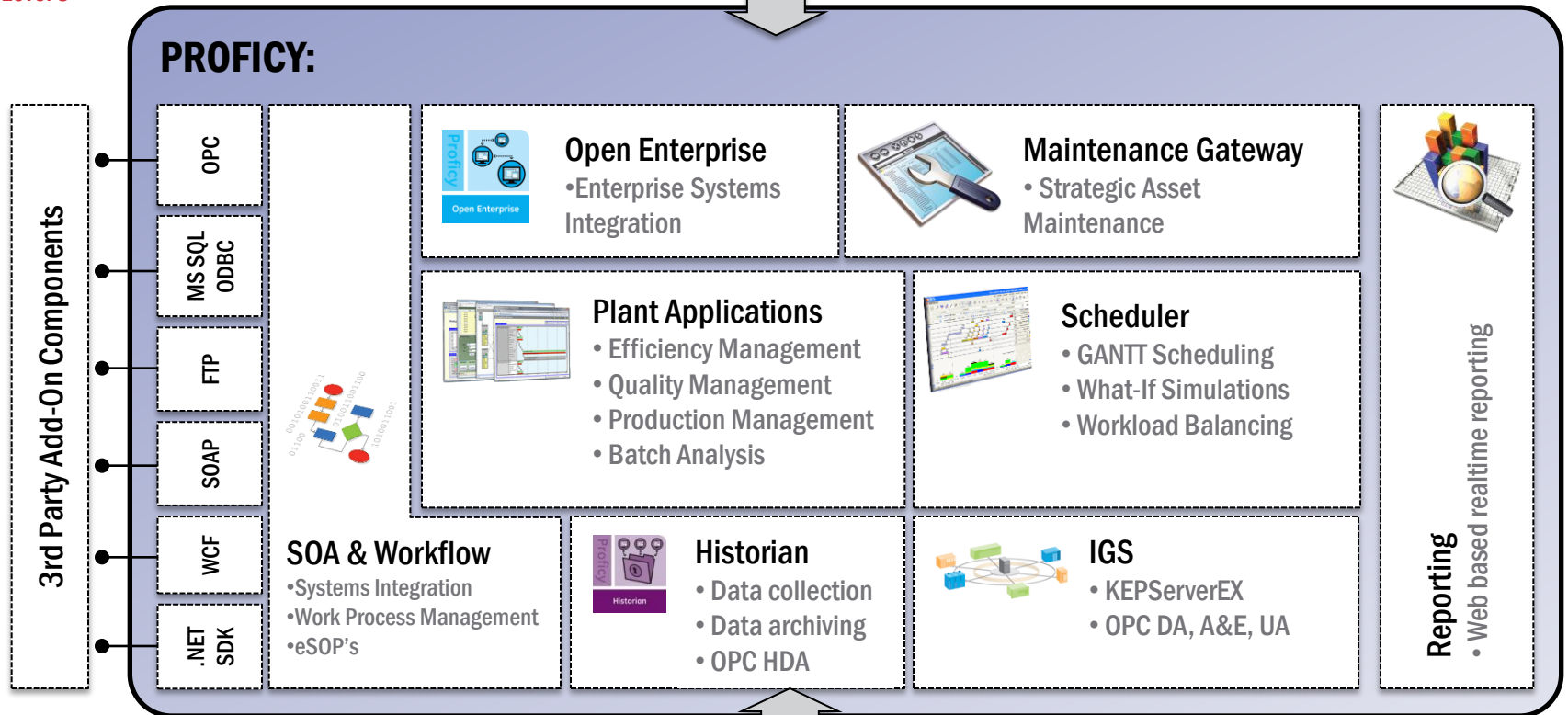


Your Success  
Our Goal

Level 4



Level 3

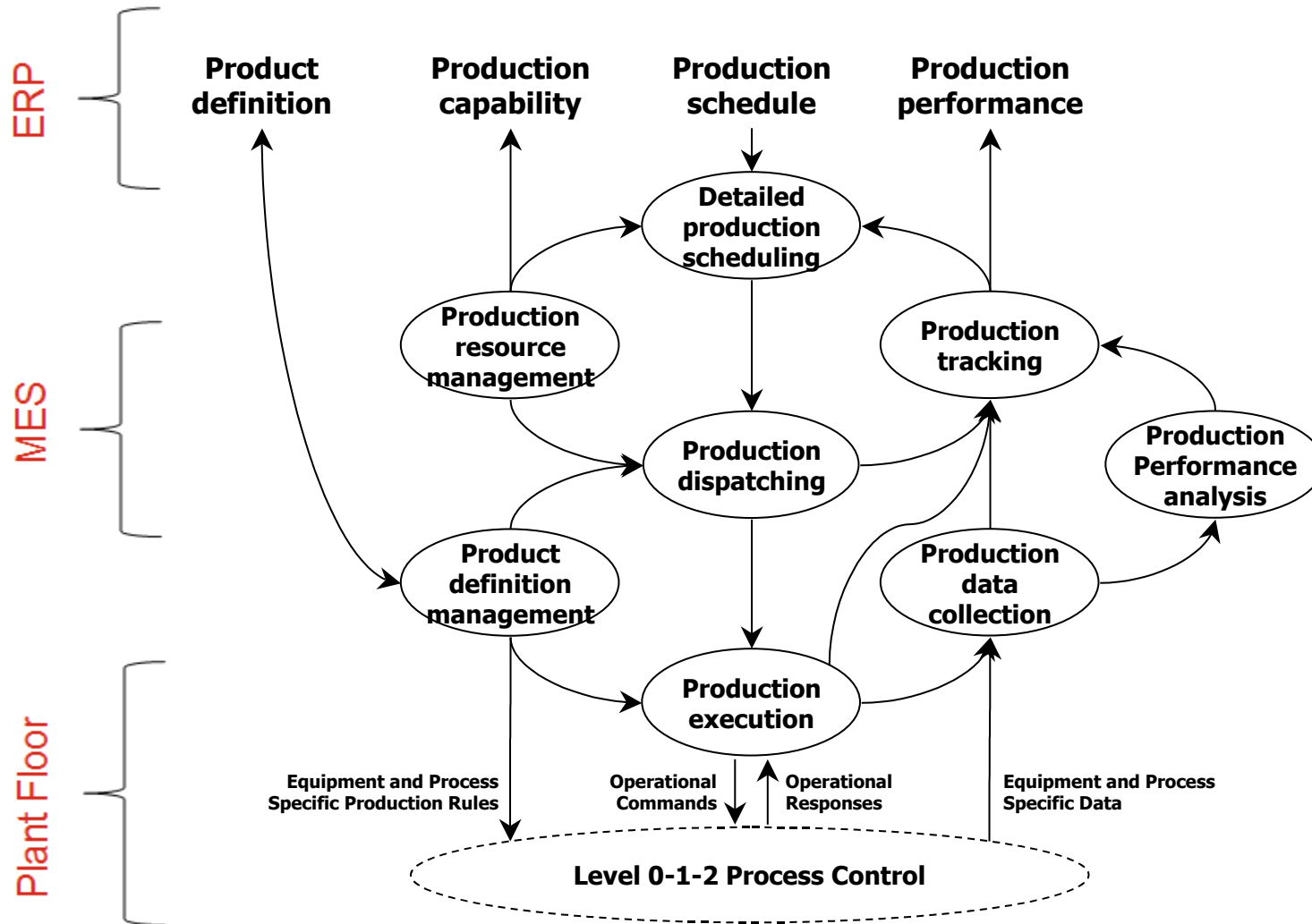


Levels 0,1,2

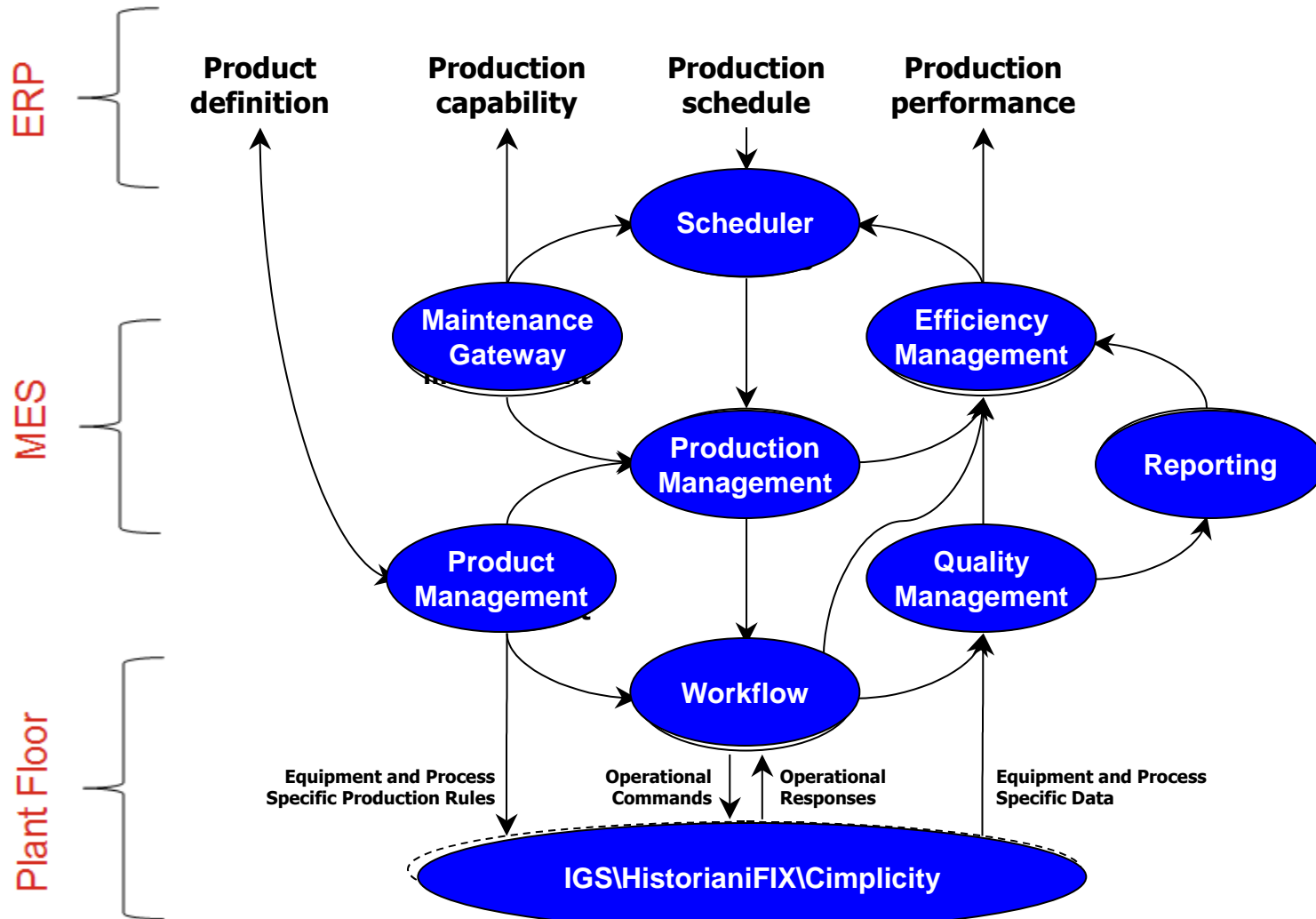




# ISA-95 Mapping



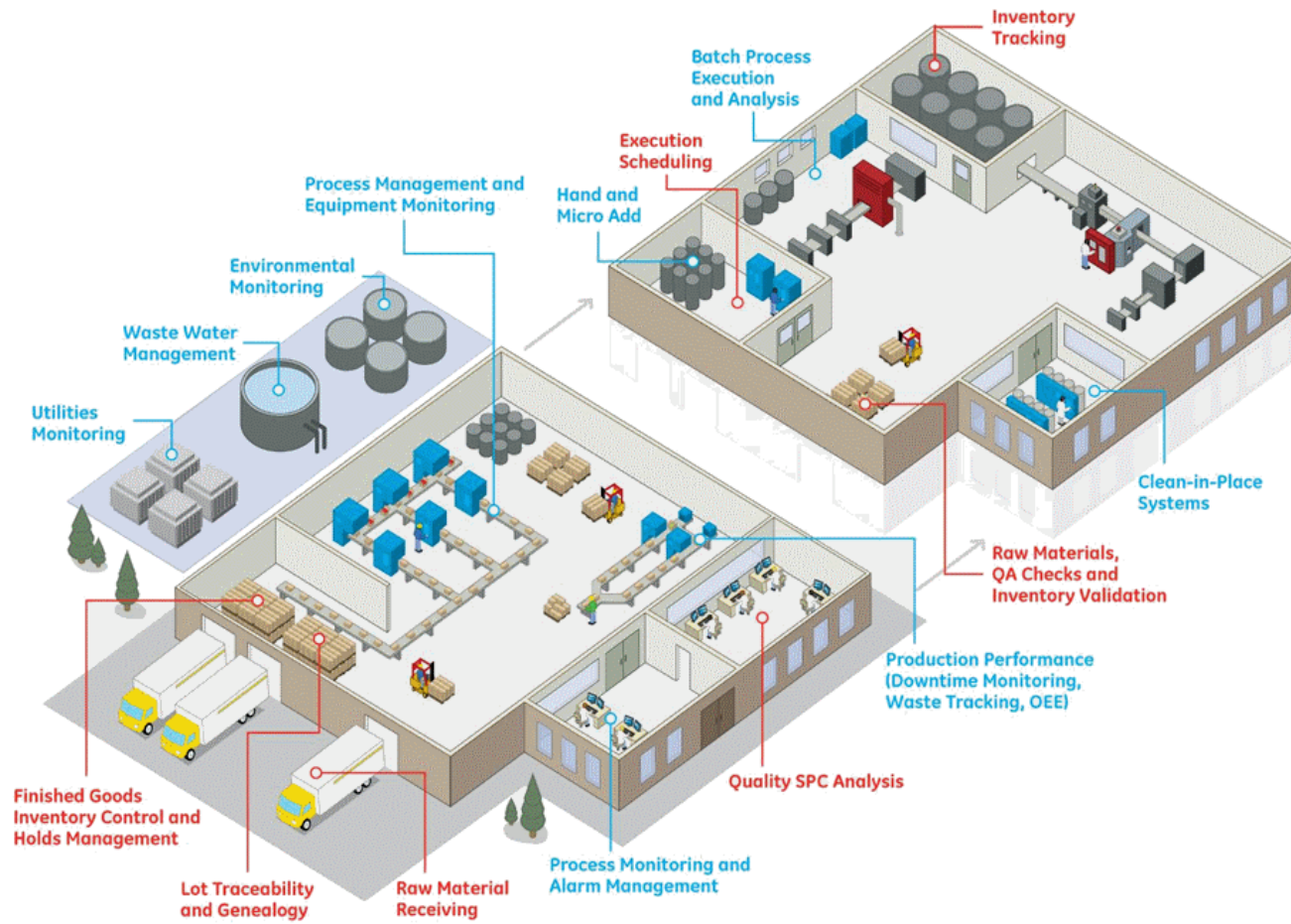
# ISA-95 Mapping







# Proficiency – Application Range





Examples:

# EXAMPLES OF TYPICAL PROFICY MES APPLICATIONS



# Example Application

## Overall Equipment Efficiency (OEE)



Your Success  
Our Goal

Level 4

SCM

ERP

EAM

CRM

Level 3

**OEE:**



**Reporting**

- Portal
- Productivity Dashboard



**Plant Applications**

- **Efficiency Management**



**Historian  
Database**

Levels 0,1,2

Production Areas

Production Lines

Production Units

Process Cells

Production Equipment



# Example Application

- Detailed Scheduling based on ERP Work Orders
- Workflow Management



Your Success  
Our Goal

Level 4

SCM

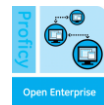
ERP

EAM

CRM

Level 3

## Detailed Scheduling and Workflow Management:



### Open Enterprise

- B2MML



### Scheduler

- GANTT Scheduling
- What-If Simulations
- Workload leveling



### SOA & Workflow

Levels 0,1,2

Production Areas

Production Lines

Production Units

Process Cells

Production Equipment



# Example Application

## ERP-to-Automation Integration



Your Success  
Our Goal

Level 4

SCM

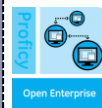
ERP

EAM

CRM

Level 3

## ERP-to-Automation Integration

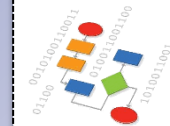


Open Enterprise

- B2MML



IGS  
OPC Server



SOA & Workflow

Levels 0,1,2

Production Areas

Production Lines

Production Units

Process Cells

Production Equipment





# Example Application

- Production Data Collection
- Legacy System Integration
- Work Process Management
- ERP Integration

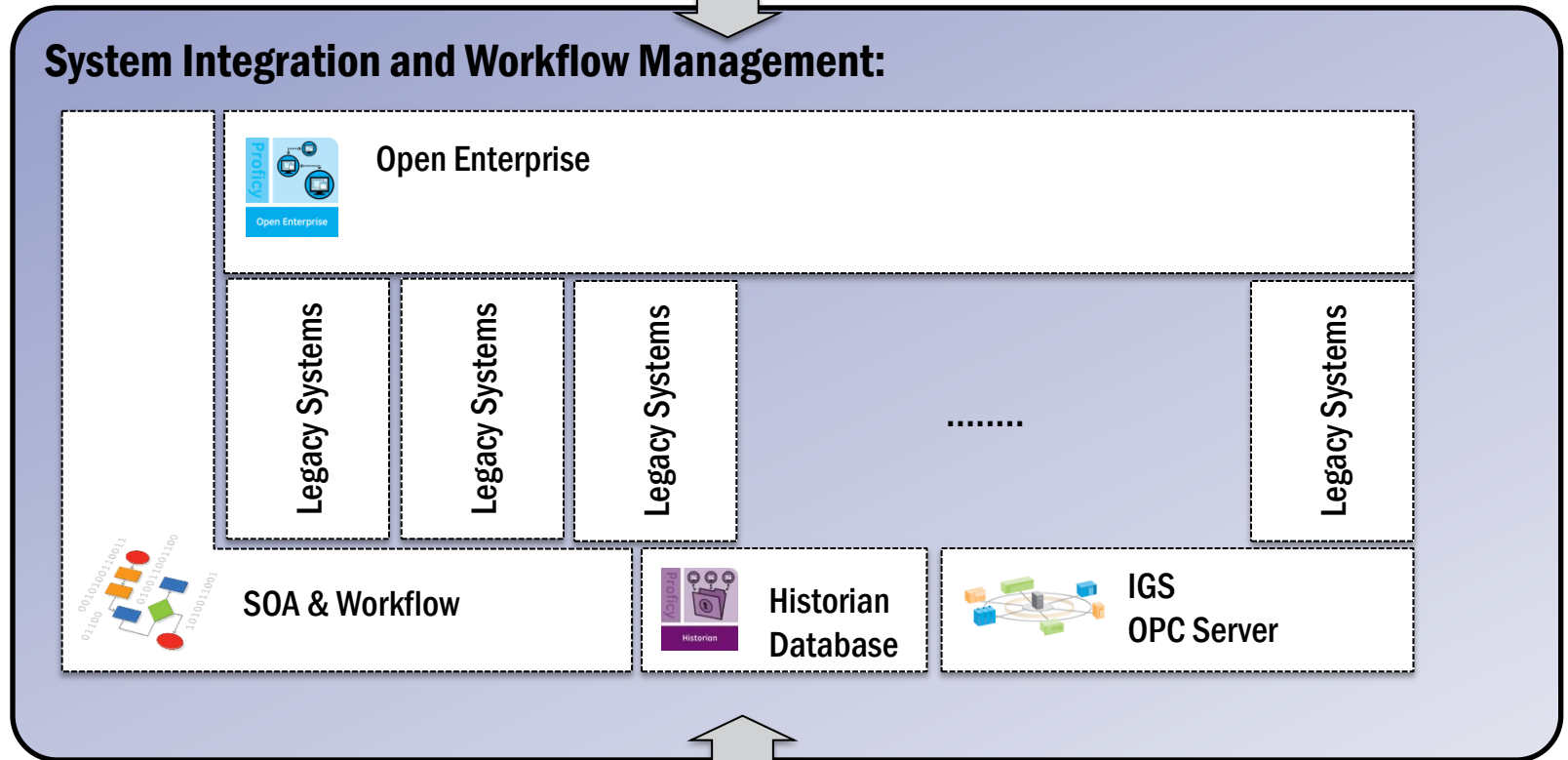


Your Success  
Our Goal

Level 4

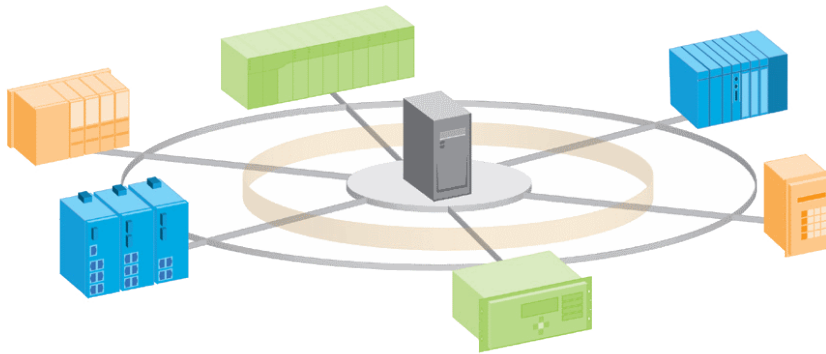


Level 3



Levels 0,1,2





Connecting you plant-floor devices

# PROFICY IGS – INDUSTRIAL GATEWAY SERVER

Powered by KEPServerEX



imagination at work



**KEPServerEX**

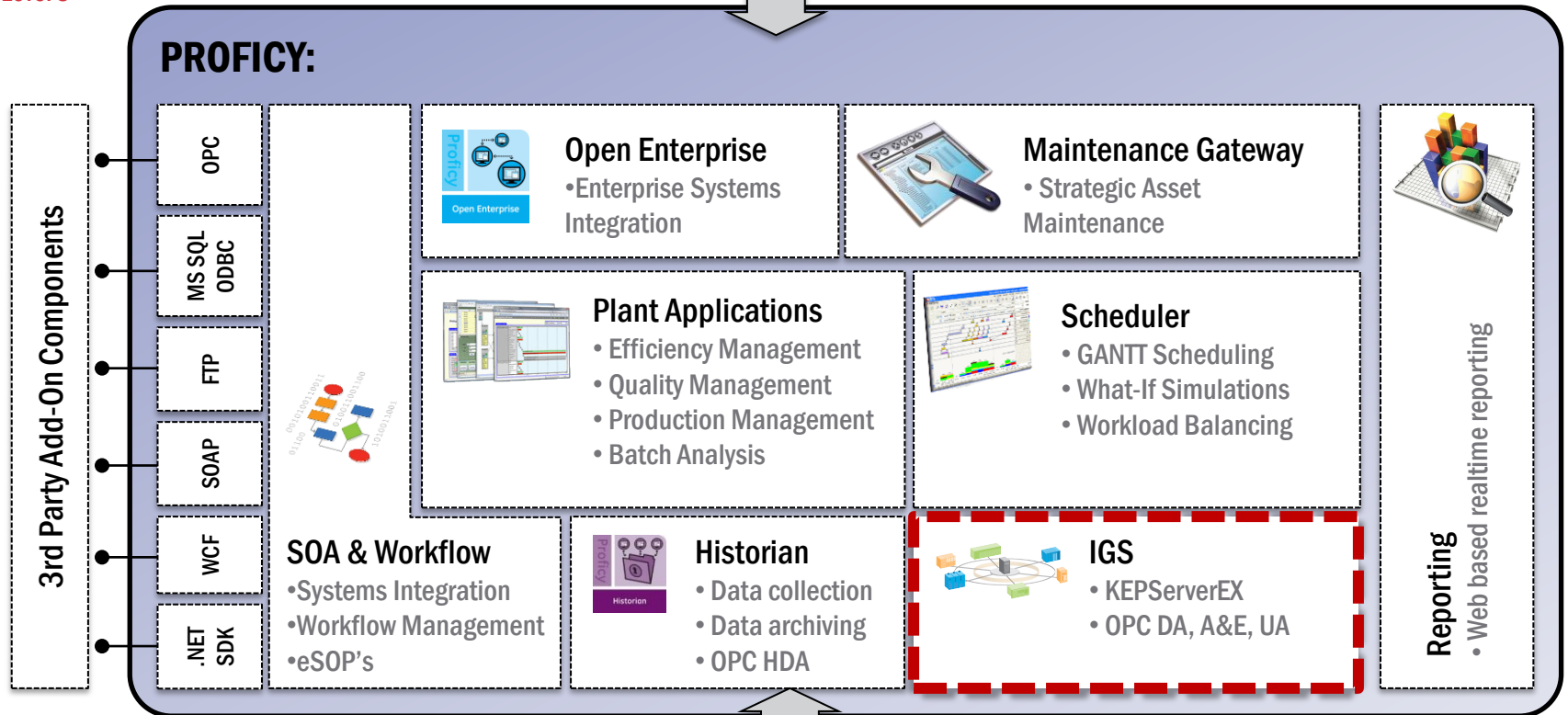


Your Success  
Our Goal

Level 4



Level 3



Levels 0,1,2





# Key Features

- Powered by industry leader KEPServerEX v5 Communications Server
- More than 100 protocols - Connectivity to thousands of devices from different vendors
- Built using OPC standards
- Certified OPC compliant
- Solutions and OPC connectivity into the entire Proficy software portfolio
- Cost effective pricing!



An enterprise data repository

# PROFICY HISTORIAN



imagination at work

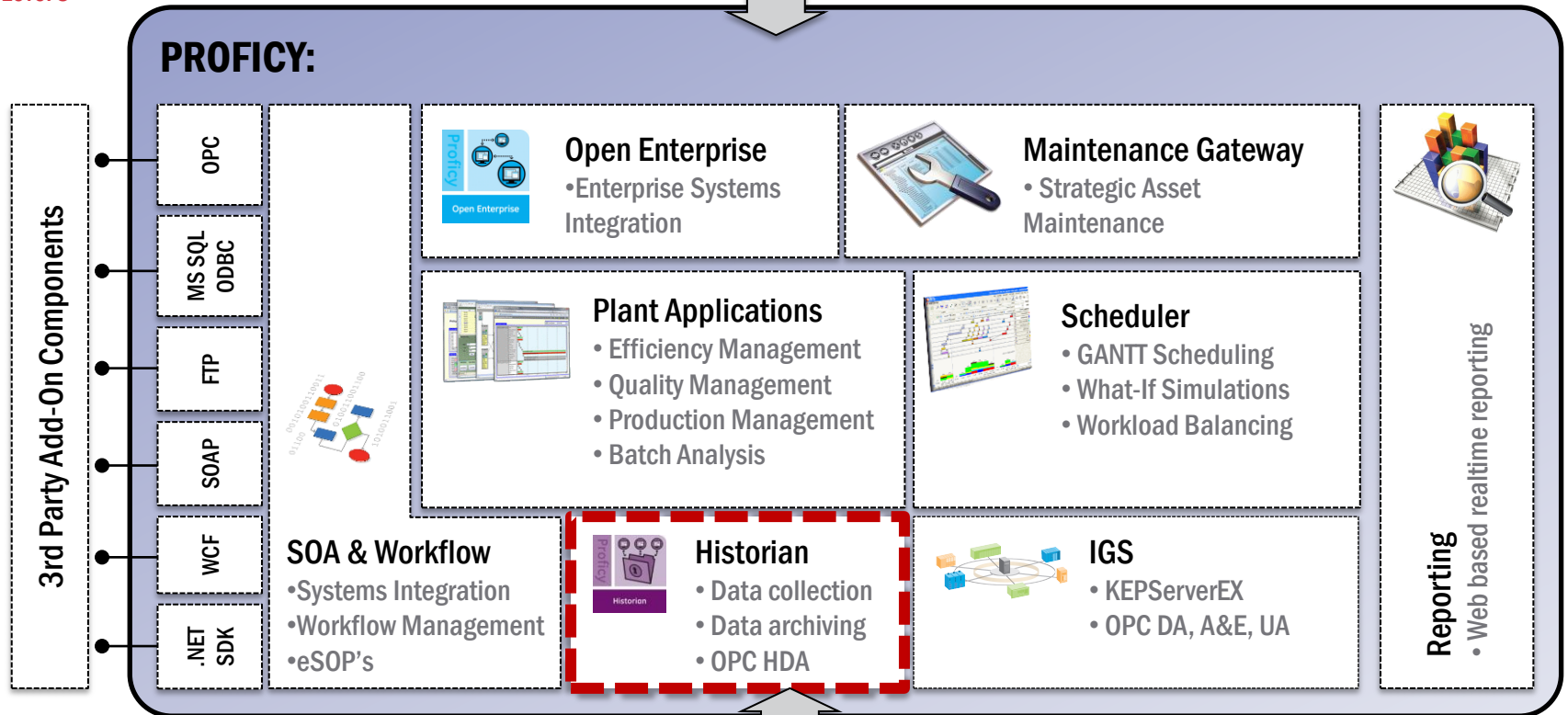


Your Success  
Our Goal

Level 4



Level 3



Levels 0,1,2





# What is Proficiency Historian

- Collect plant raw data into a secure, central repository
- Production “Flight Recorder”
- High performance storage & retrieval (20000 events/second)
- Reliability & data integrity: Automatic “Store & Forward”
- Easy access from other applications
- Highly scalable architecture to fit demanding requirements
  - Up to 250,000 tags per server
  - Support for clustering





Plant Performance, Quality and Traceability

# PROFICY PLANT APPLICATIONS



imagination at work

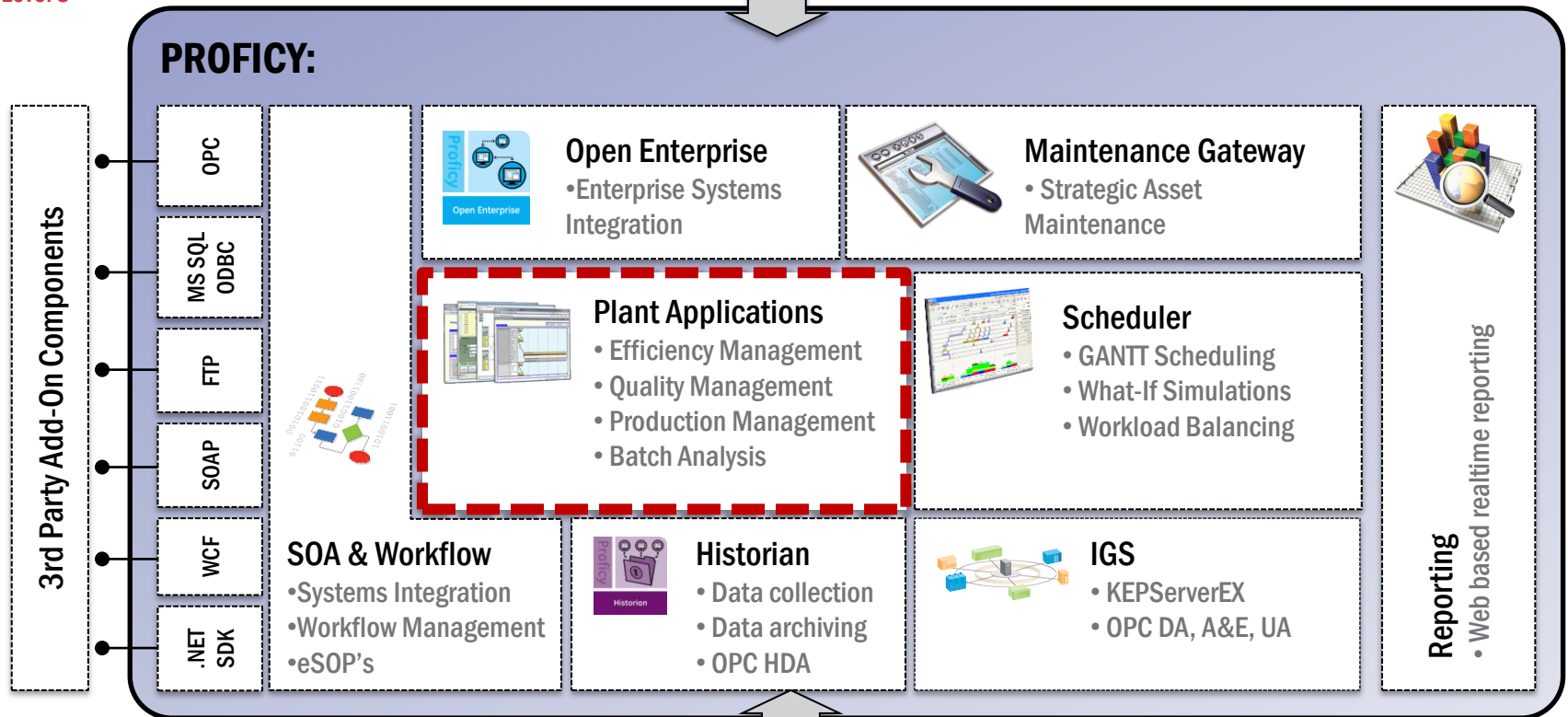


Your Success  
Our Goal

Level 4

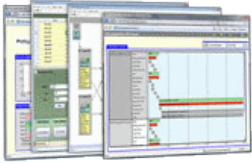


Level 3



Levels 0,1,2





# Proficiency Plant Applications

## Efficiency Management

A module to identify and monitor all areas of manufacturing for inefficiencies - perform root cause analyses, historical data summaries, schedule reports and control **overall equipment effectiveness (OEE)**.

## Production Management

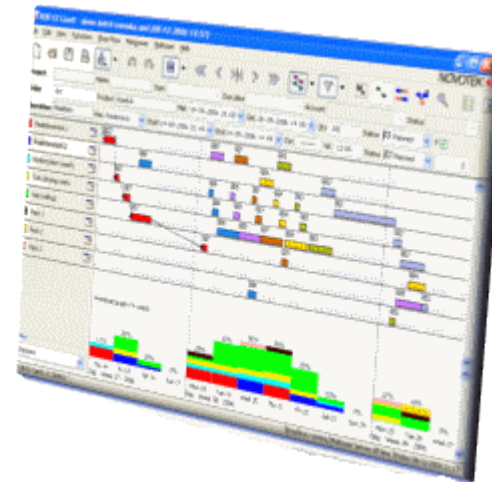
A system module to help oversee production operations including functions to control product flow between equipment, develop product **genealogy reports** and make **schedule changes to reduce excess inventory**.

## Quality Management

The Plant Applications Quality module helps you **increase product quality by lowering waste, reducing scrap** and significantly lowering product recall costs.



Your Success  
Our Goal



Interactive Detailed Scheduling Tool

# PROFICY SCHEDULER



imagination at work

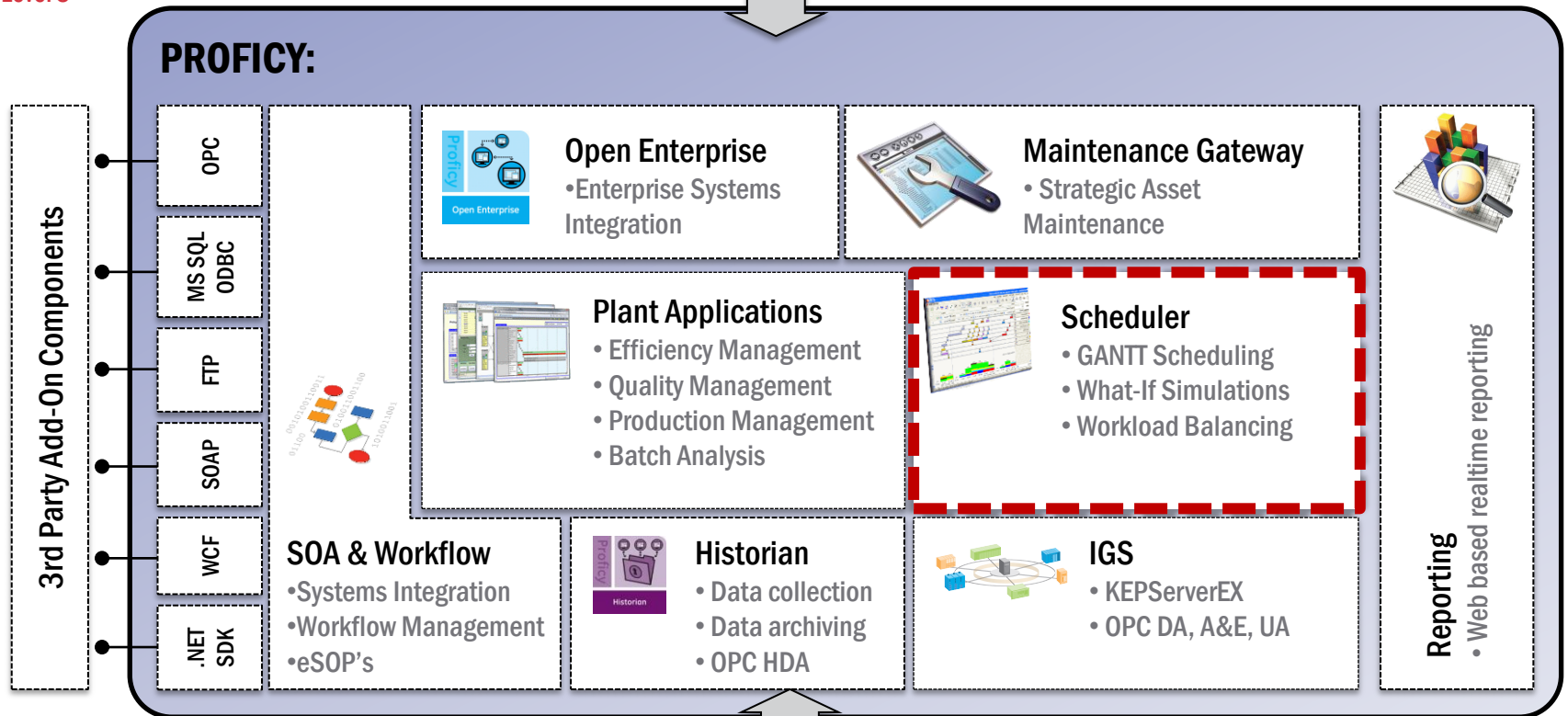


Your Success  
Our Goal

Level 4



Level 3



Levels 0,1,2



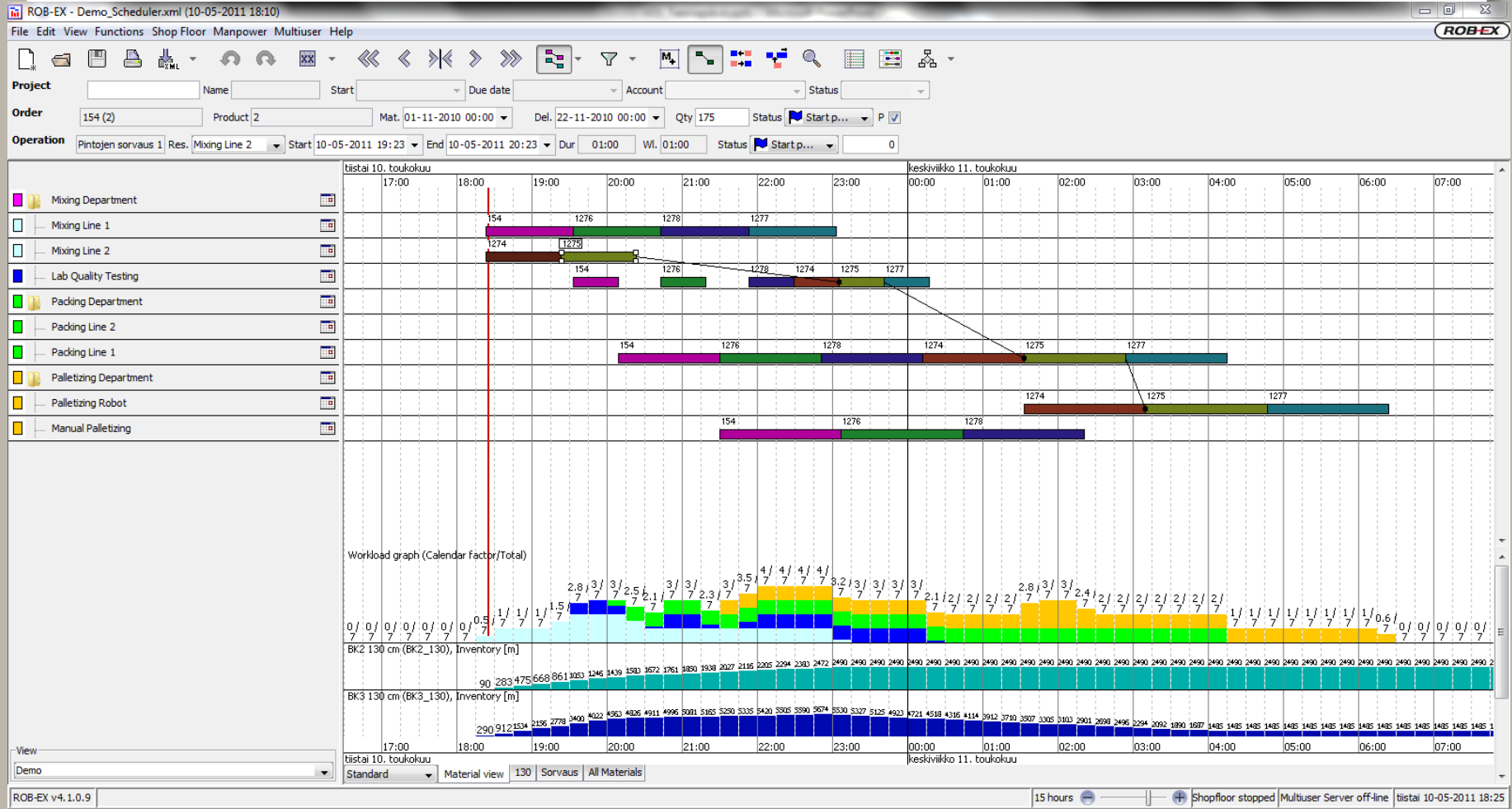


# Key Features

- Dynamic scheduling that provides overview of activities and resources
- Make overview of orders, workload, inventory
- Manage and evaluate complex consequences
- Simulate what happens if ....
- Balance workload, inventory and manpower
- Ensure due date conformance
- React fast and optimally to variation
- Respond fast and precise to customer inquiries



Your Success  
Our Goal





Web Client for Real-Time Production Data

# REPORTING



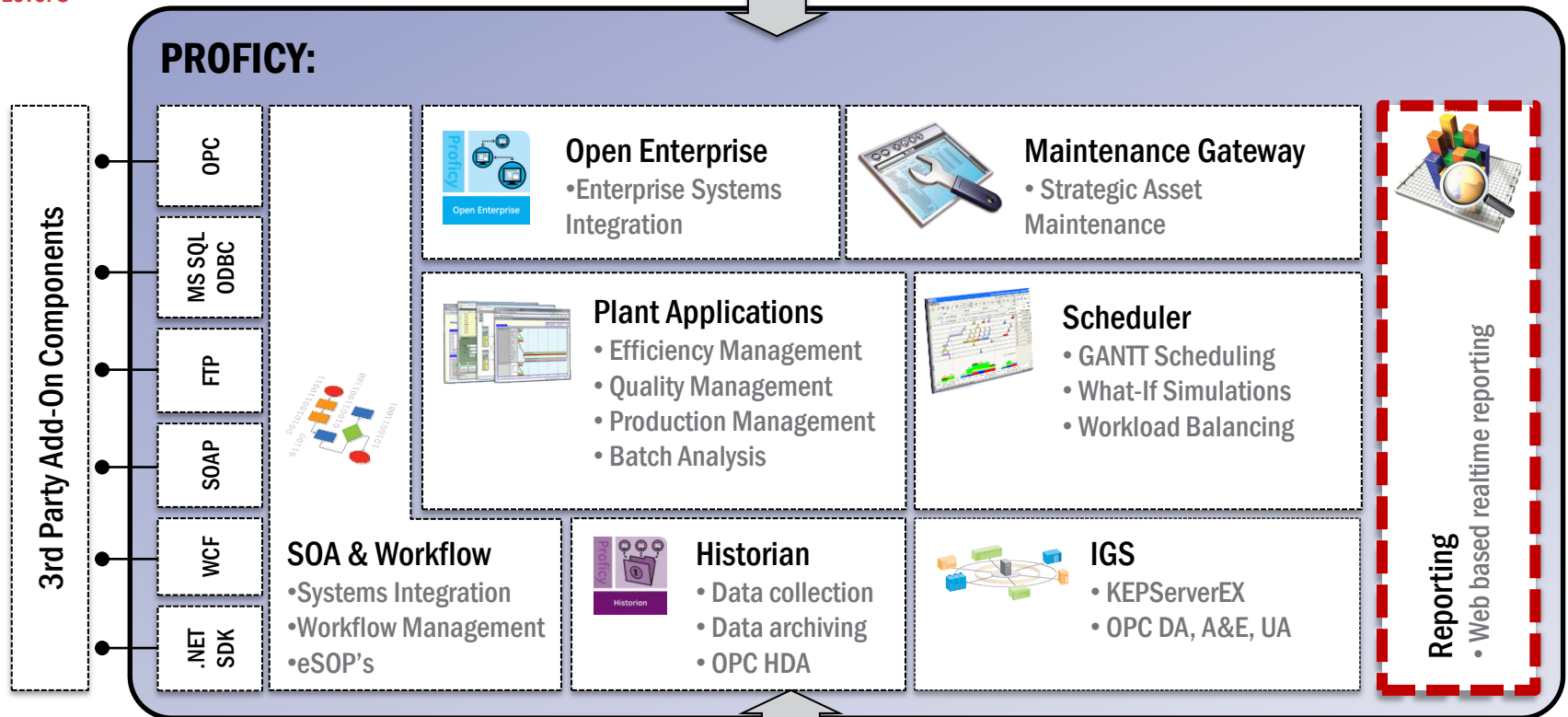


Your Success  
Our Goal

Level 4



Level 3



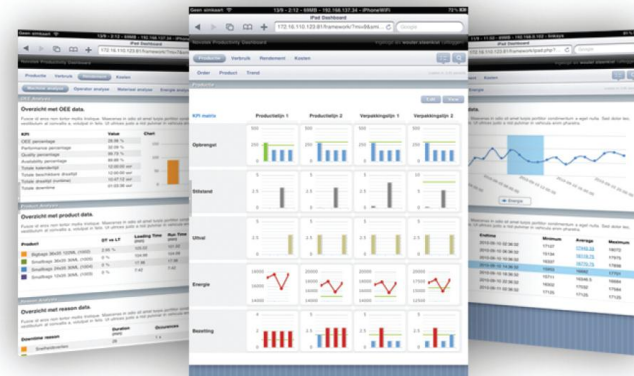
Levels 0,1,2





# Common Reporting Options in Proficy

- Plant Applications built-in Web Reports
- Proficy Portal
- Novotek Productivity Dashboard
- Microsoft SQL Reporting Services
- Custom Reporting
  - SDK or direct SQL connection





# Proficiency Web Reporting Key Features

## ■ Web based configuration

- Administration, Statement Generator, Screen Development

## ■ Script and HTML free

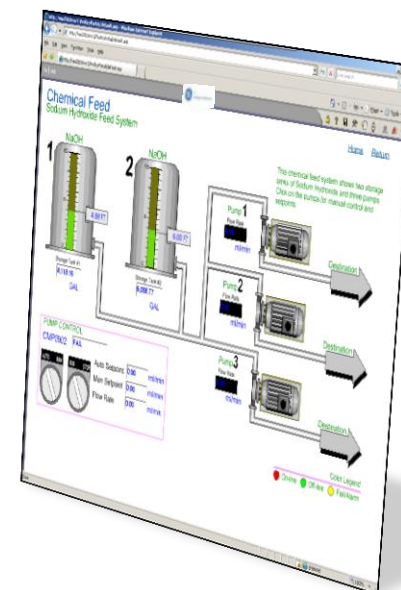
- No coding experience needed, Point click drag drop, Self service

## ■ Role-based navigation and security

- Login with windows Sign On
- Synchronize with Windows domain groups

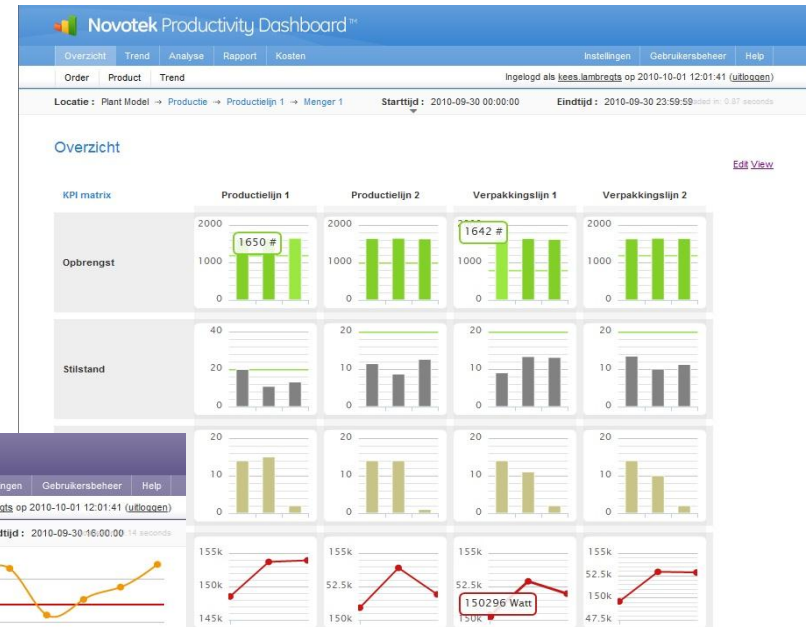
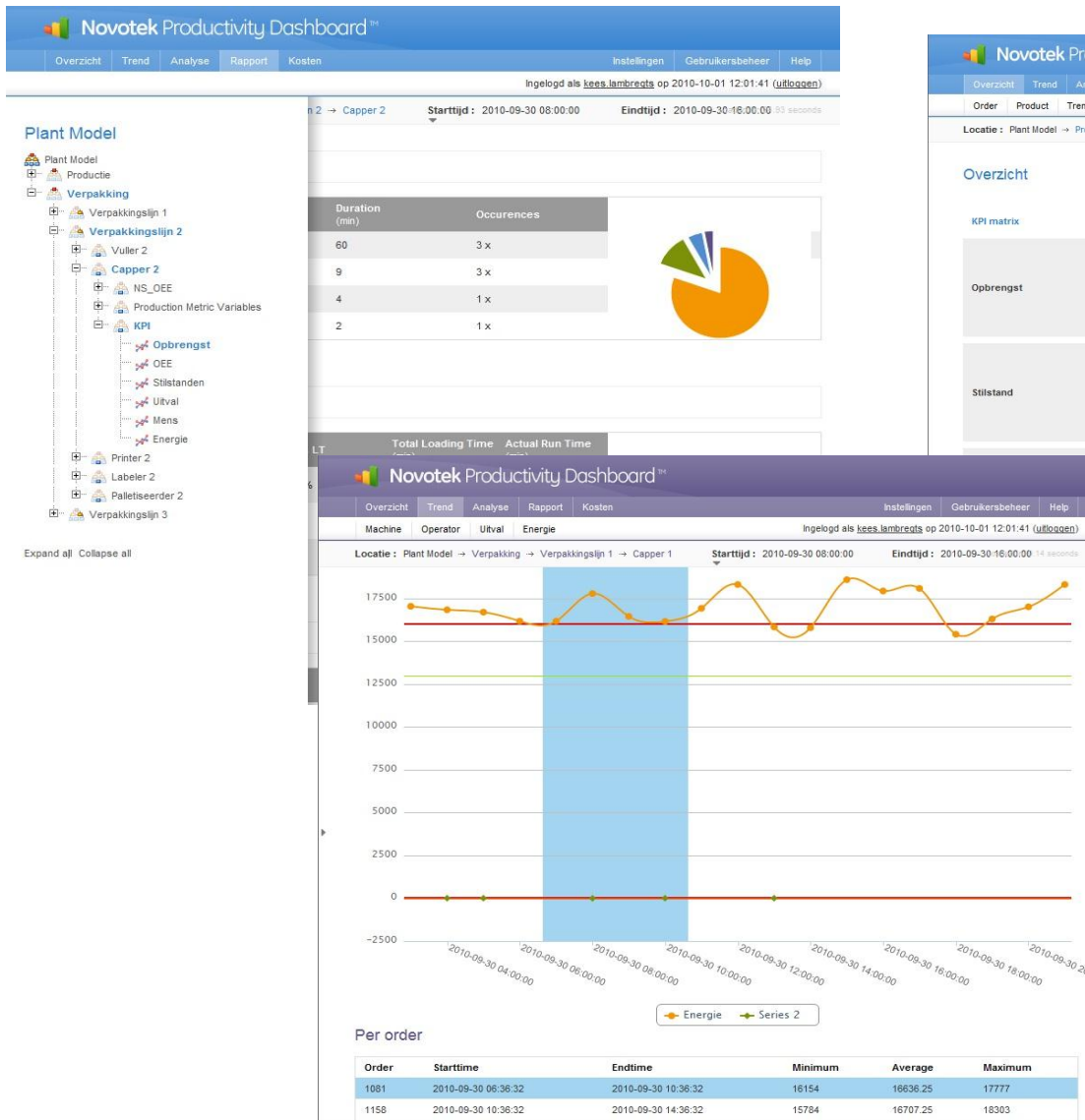
## ■ Easily convert interactive displays into reports

- Use Standard reports
- Individually customize
- Share with others





Your Success  
Our Goal





Your Success  
Our Goal

**Proficy™** Lot KP005.080518.001  
On KP005: Melkpasteur P5 (Configured for Non-Productive Time)  
Created: 20/05/2008 8:38:53

**Event Information**

Status	Verbruikt
Product	99P20001001
Start Time	18/05/2008 23:26:54
End Time	19/05/2008 9:24:39
Initial Volume	333070 L
Final Volume	-5741 L

**Alarm Information**

Conformance	Warning
Testing Percent	33
Alarms	0 0 0

**Actions**

- [Go to Previous Lot](#)
- [Go to Next Lot](#)
- [View Audit Trail](#)

**Analysis**

- [View Genealogy](#)
- [View Lot Timeline](#)
- [View Flow Timeline](#)
- [Trend Long Term](#)

**Downtime Summary**

Start	End	Fault	Location	Reasons	Actions
18/05/2008 9:16:59	19/05/2008 9:24:39	Onbekend	KP005: Melkpasteur P5	Ongeplande stilstand, Onbekend	<Unspecified>

**Output Components**

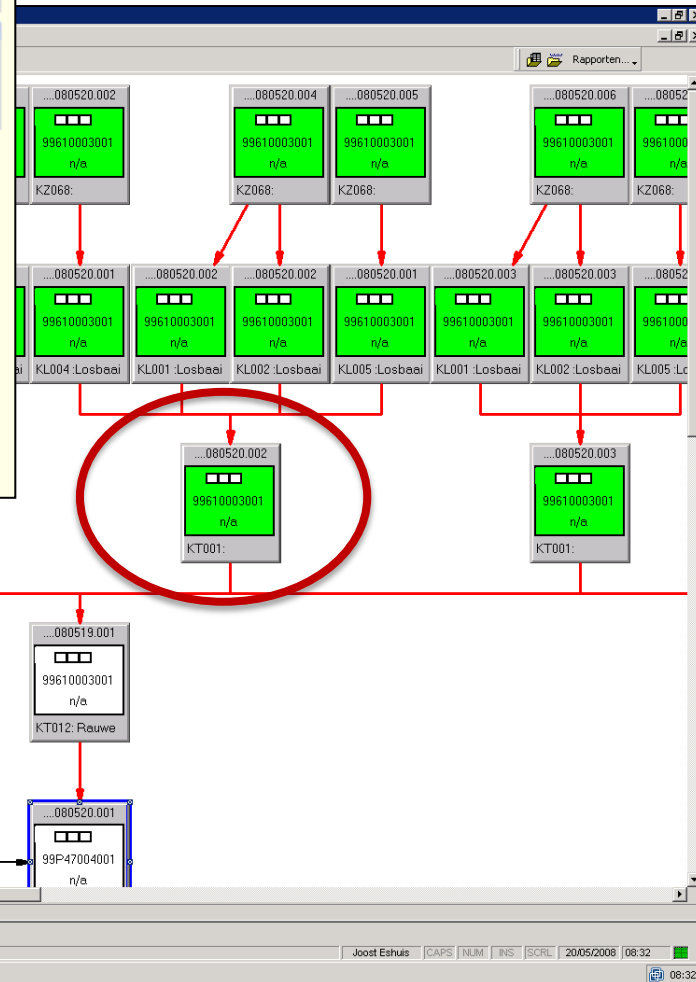
Item	Time	Product	Unit	Amount
PT025.080518.001	20/05/2008 5:27:04	99620001001	PT025: Tank 25 melkopslag	56378 L
PT022.080519.001	20/05/2008 4:57:10	99620001001	PT022: Tank 22 melkopslag	96966 L
PT027.080518.002	20/05/2008 1:42:14	99620001001	PT027: Tank 27 melkopslag	147528 L
IKH008.080519.001	19/05/2008 9:42:40	99650004001	IKH008: Holdingtank P8	2839 L
IKH007.080518.001	19/05/2008 9:36:10	99650004001	IKH007: Holdingtank P7	5059 L
IKH008.080518.001	19/05/2008 8:32:19	99650004001	IKH008: Holdingtank P8	30041 L

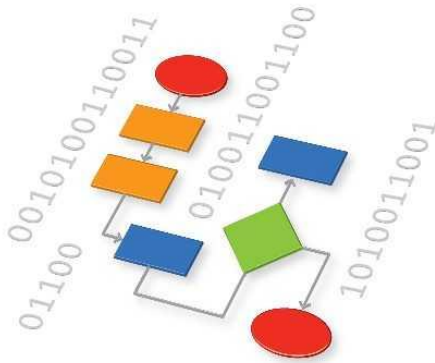
**Input Components**

Item	Time	Product	Unit	Amount
KT013.080518.001	19/05/2008 23:14:52	99610003001	KT013: Rauwe Melk tank 13	76700 L
KT012.080518.001	19/05/2008 20:26:26	99610003001	KT012: Rauwe Melk tank 12	59360 L
KT012.080518.001	19/05/2008 20:26:26	99610003001	KT012: Rauwe Melk tank 12	194320 L
KT011.080519.001	19/05/2008 1:19:05	99610003001	KT011: Rauwe Melk tank 11	2690 L

**Parameter Summary**

Variable	Lower Reject	Lower Warning	Target	Upper Warning	Upper Reject	Value	
<b>Variabelen</b>							
LIMS Update status						2	<input type="checkbox"/>
Set point Gem	30	36	40	42	43		<input type="checkbox"/>
Set Result Gem	30	35	40	45	50		<input type="checkbox"/>
Temperatuur Gem. (84176, °C)	73	73,8	74	74,7	74,99	74,76	<input type="checkbox"/>
<b>Genealogy Variabelen</b>							
<b>Staat Variabelen LIMS</b>							
<b>Staat Variabelen MES</b>							
<b>Production Metric Variables</b>							





Optimize Production with Work Process Management

# PROFICY WORKFLOW

POWERED BY PROFICY SOA



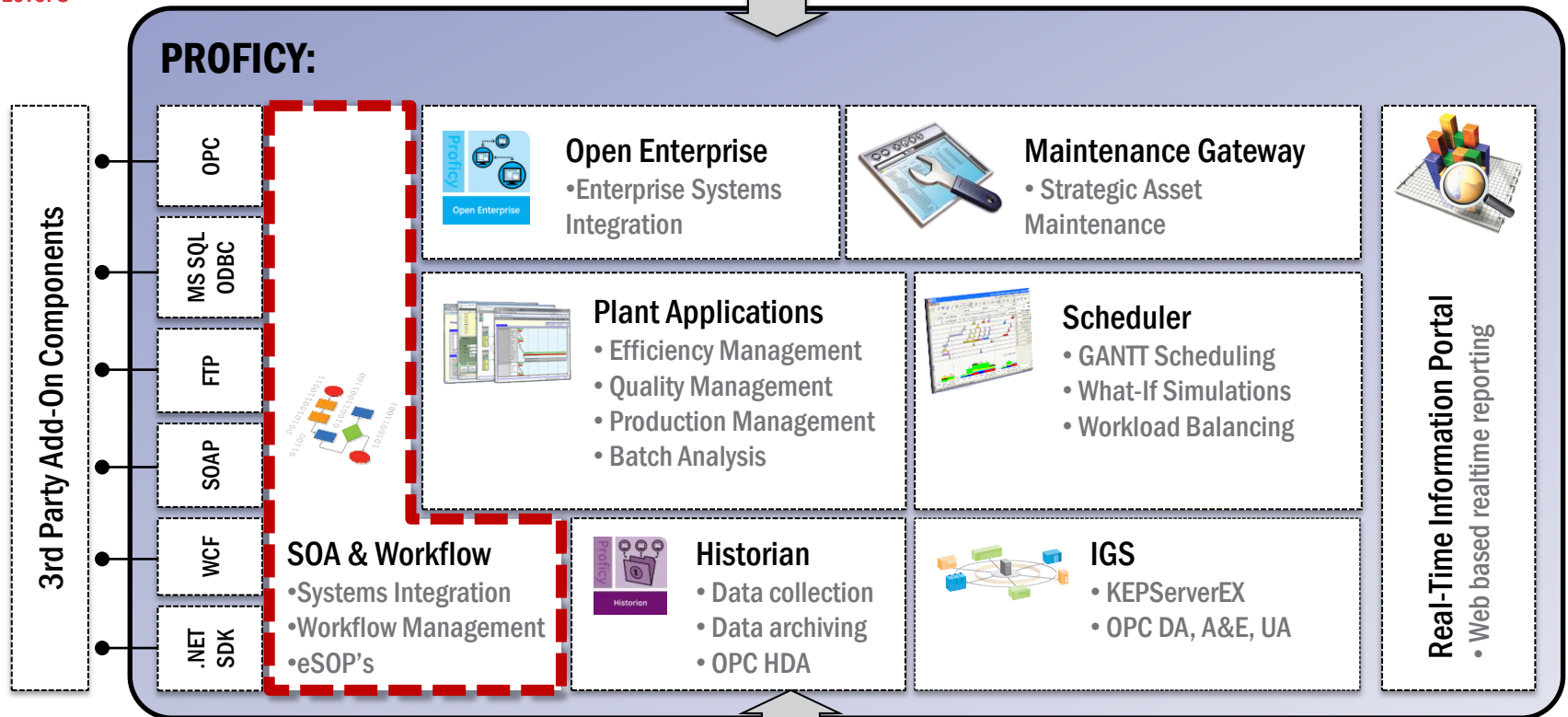


Your Success  
Our Goal

Level 4



Level 3



Levels 0,1,2







# **Proficiency SOA: An Industrial Service Oriented Architecture**

- Real-Time Middleware
- Centralized Configuration and Management Environment
- Diverse Client and 3rd Party Hosting Container
- Real-Time Services Bus
- Service Provider Interface for 3rd Party and Legacy System Integration
- Global Data and Services Repository
- Role-Based Security
- Event Services
- Diagnostic Services
- Object-Relational Persistence Engine
- ISA-88/ISA-95 Data Models
- Application Development Foundation







# What is Workflow?

*“The automation of a **process** during which **information** or **tasks** move from one participant to another for action according to a set of **rules**.”*



# What is Proficiency Workflow

- A system for improving and optimizing industrial and manufacturing practices
- Combining automated and manual processes through authoring, execution and analysis capabilities
- Non-Programmers can quickly create automated processes that impact your business every day



# EXAMPLE: WORKFLOW IN PRODUCT ASSEMBLY

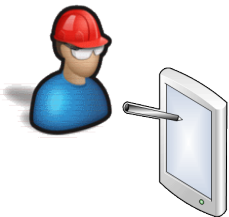


Your Success  
Our Goal

Repeat for all Input Components

Task 1:

**New product  
assembly**



Task 2:

**Scan**



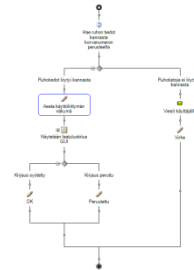
Task 3:

**Database  
Query**



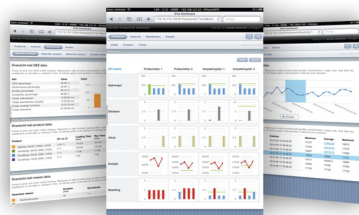
Task 4:

**Create  
Genealogy Links**



Task 5:

**Quality Tests**



Task 8:

**AGV Transport  
Order**



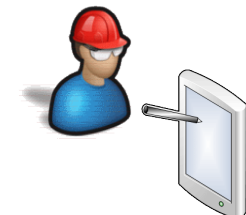
Task 7:

**Print**



Task 6:

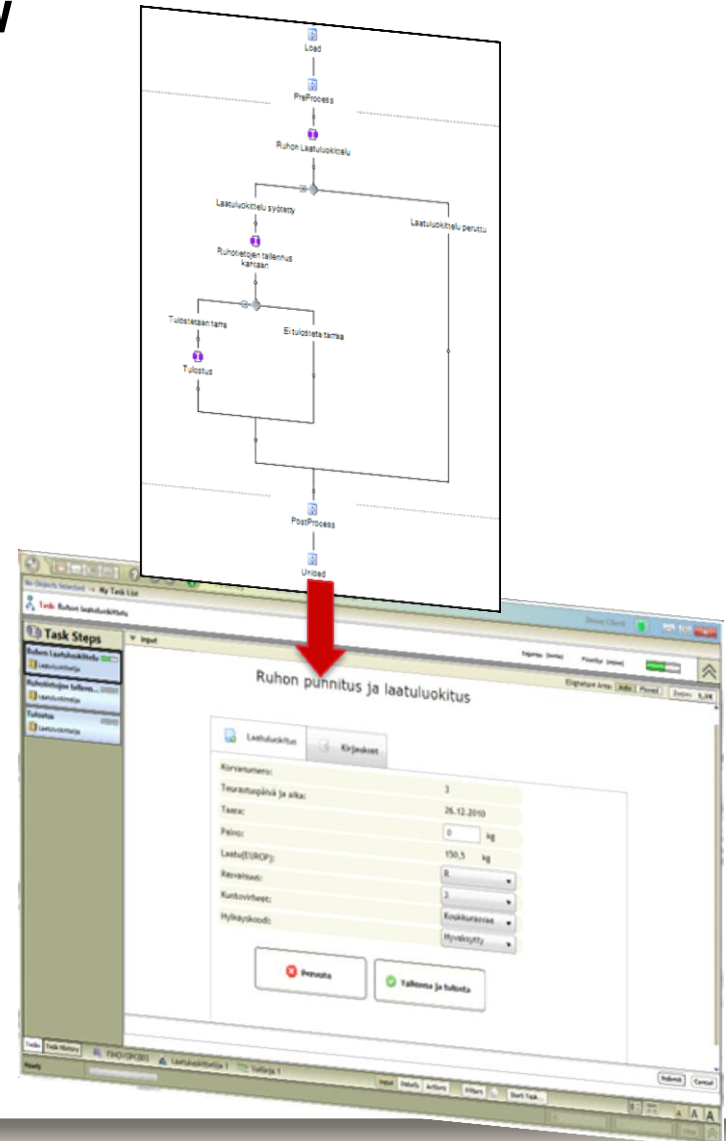
**Assembly  
Completed**





## Capture and Execute the Process Flow Model

1. Create the process model as *“flowchart”*
2. Add both manual and automatic steps having interaction between machines, personnel and systems
3. Proficy Workflow will execute the process model and provide visibility to the results





# Graphically define a Work Process

Welcome: proficy

Navigate Search

Find in Model

Workflows

- Get DT Reason...atus Change
- Manual Filter Backwash v1
- PA Mixer 1 Timed+ Sampling
- PA SP Test1
- Quality Sampling & Plant Apps**
- Sample - Call SQL Statement
- Sample - Call Stored Procedure
- Sample - Crea...Dynamic Event

Quality Sampling & Plant Apps -> Workflow Editor

Overview Workflow Editor Test/Debug Task Details Tracking Configuration

Standard Activities

- If/Else
- Local Subprocess
- Parallel
- Global Subprocesses

Workflow >

PreSubprocess

Runs before each subprocess

PostSubprocess

Runs after each subprocess

Load

PreProcess

Getting information from Plant Application

Get Quality Sample details in s95 Material

Mixer #1 Sample Required

Waiting for any Plant Apps Alarms

PostProcess

Unload

Workflow

General Settings

Continuous

Task Name Workflow.Task Title

Task Assignment

Location WFTraining

Personnel (no resource selected)

Parameters Edit...

EventId In : Int32

Local Variables Edit...

Maximum Sample Count for Product Int...

Sampling Duration for Product Int32

EventName String

Product Name String

Sampling Interval TimeSpan TimeSpan

SamplingComplete Boolean

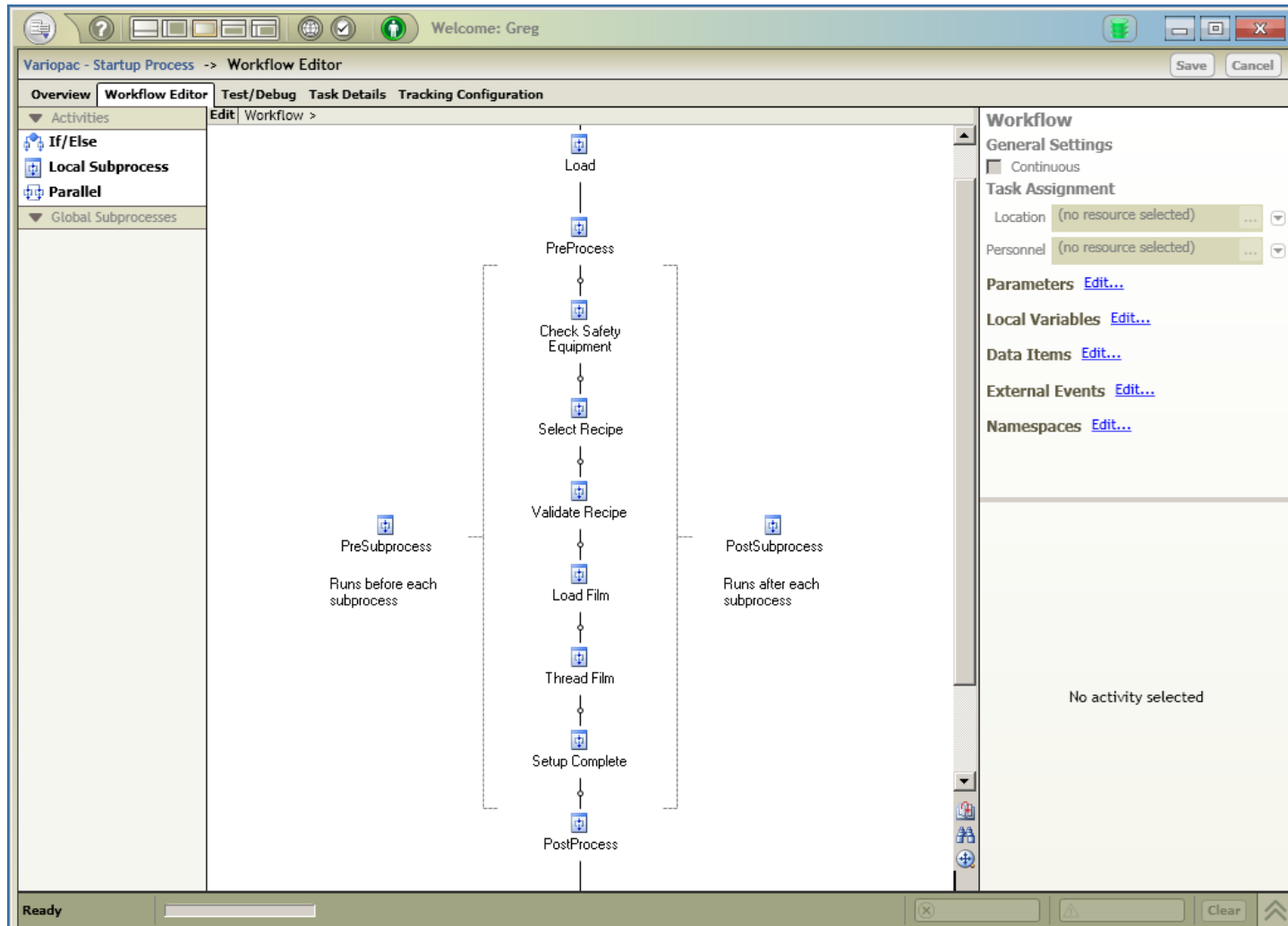
No activity selected

Ready Refresh Completed

Clear

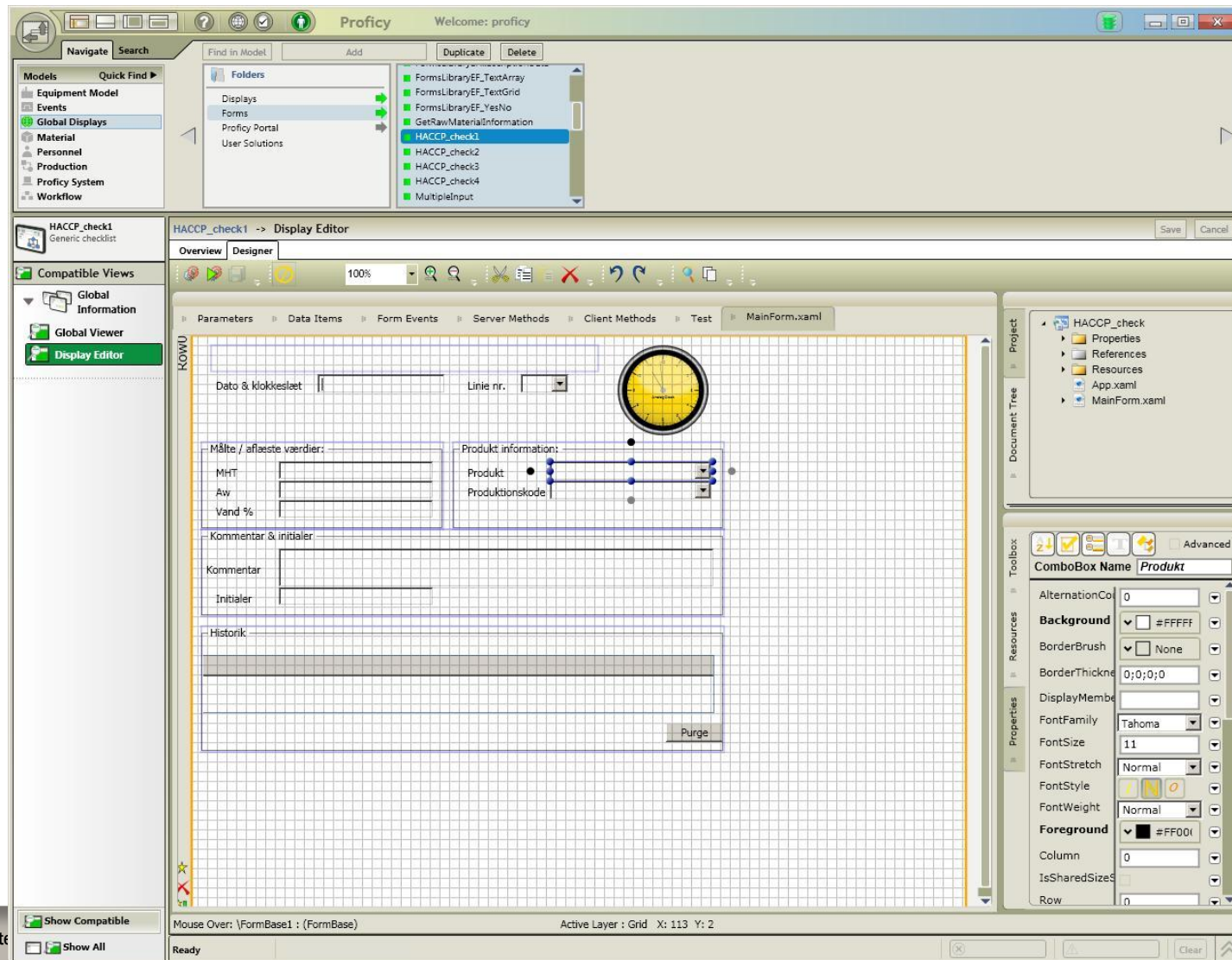


# High Level Steps/Subprocesses





# Built-in Form/GUI designer







**TASK:**  
Käyttäjän aktiivinen työtehtävä

Pääikkuna voi sisältää työvaiheesta riippuen mm:

- Käyttöliittymä tietojen syöttöön
- Raporttisivu
- Työohje sähköisenä dokumenttina
- Linkki tiedostoon
- Näkymä ulkopuoliseen järjestelmään (mm. WWW-sivu)

**TASK STEPS:**  
Työtehtävän vaiheet  
määritelty Workflow'ssa

The screenshot displays the Novotek Task Client interface. At the top, a green header bar contains the text 'Proficy Welcome: Laatuokittelija 1'. Below this, a 'Task List' section shows a single task: 'Task: Ruhon laatuokittelu'. The main area is divided into two panes. The left pane, titled 'Task Steps', lists three steps: 'Ruhon Laatuokittelu' (with a progress bar), 'Ruhotietojen tallenn...', and 'Tulostus'. The right pane, titled 'Input', contains a form for 'Ruhon punnitus ja laatu'. The form fields are: 'Korvanumero:' (3), 'Teurastuspäivä ja aika:' (26.12.2010), 'Taara:' (0 kg), 'Paino:' (150,5 kg), 'Laatu(EUROP):' (R), 'Rasvaisuus:' (3), 'Kuntovirheet:' (Koukkurasvaa), and 'Hylkayskoodi:' (Hyvaksytty). At the bottom of the form are two buttons: 'Peruuta' (Cancel) and 'Tallenna ja tulosta' (Save and Print). The bottom status bar shows 'Ready' and various navigation buttons like 'Input', 'Details', 'Actions', 'Filters', and 'Start Task...'. The bottom right corner has 'Submit' and 'Cancel' buttons.



# Workflow Clients

## Embedded inside SCADA Client

Active X

## Stand Alone Thick Clients

Launch from SCADA Client

Launch from web address

Launch from Start Menu

## Web Clients

Microsoft Silverlight Rich Web  
Clients





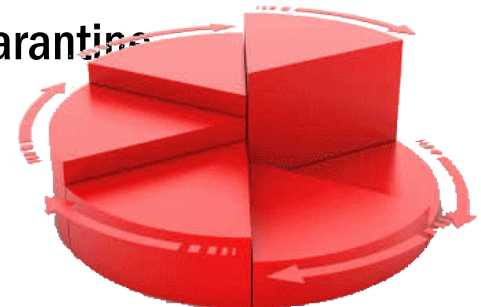
# Most Common Work Processes

## Work Instructions

- Electronic Work Instructions / SOPs
- Production Set Up
- "Standard Work" for Lean Initiatives – “Error proofing”
- Virtual Trainer

## Quality

- QA Plan & Sampling
- Quality Hold: Non Conformance, Rework and Quarantine





# Most Common Work Processes, cont.

## ■ Corrective Action

- Alarm Management and Corrective Action
- Exception Management
- HACCP Monitoring Procedures
- Troubleshooting Trees: Equipment Repair & In-Process Product Repair

## ■ Middleware

- Industrial Middleware
- Production Specification & Recipe Management

