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MEMBER OF THE MOL GROUP

OSIsoft.

REGIONAL SEMINAR 2012

EMEA

The Power of Data

Milan, May 24th 2012

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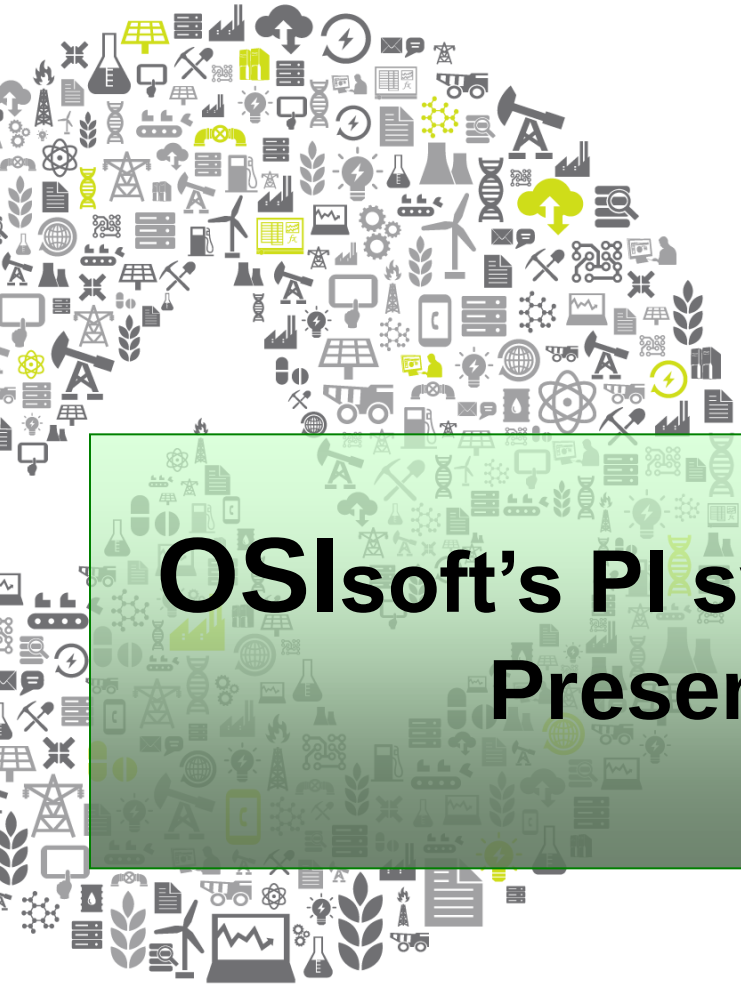

OSIsoft's PI system in Mantova Refinery
Present and future steps

Presented by

Francesco Pagani, Mantova Refinery

2012 **MOL GROUP**

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INTRODUCTION	• MOL group • IES refinery
SYSTEM	• Refinery info architecture
PI BASED SOLUTIONS	• KPI system implementation in IES refinery • Sigmafine and material balance • PI applications (AF explorer, PI-SMT, Processbook, Datalink)
PI FUTURE STEPS	• RT Webparts, LIMS, PI notifications, PSM
OVERALL BENEFITS	• Business challenge • Solutions and benefits • MOL integration and standardization • Managing the business and knowledge sharing • Tangible and untangible benefits

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ABOUT MOL GROUP

LEADING EUROPEAN INTEGRATED COMPANY

Integrated portfolio based on 3 pillars

UPSTREAM
E&P

EXPLORATION & PRODUCTION

Exploration a*ctivities in 11 countries*
Producing assets in 7 countries 142.5Mboe/day

DOWNSTREAM
R&M
Petchem

REFINING & MARKETING

5 refineries in 4 countries (Hungary, Slovakia, Italy, Croatia)
23,5 MTPA capacity
2 petchem plants
1686 filling stations in 10 countries

GAS MIDSTREAM
Gas storage
Gas Transmission

GAS

1,9 bcm UGS capacity
5,560 km pipeline in Hungary
international transit

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MOL - REFINING & MARKETING

SOLID BASIS WITH OUTSTANDING ORGANIC GROWTH OPPORTUNITIES

Integrated operation in adjacent markets

Refining

MOL Group
Capacity: 23.5 Mtpa (470 thbpd)

Danube Refinery
Capacity: 8.1 Mtpa (161 thbpd)
NCI: 10.6

Bratislava Refinery
Capacity: 6.1 Mtpa (122 thbpd)
NCI: 11.5

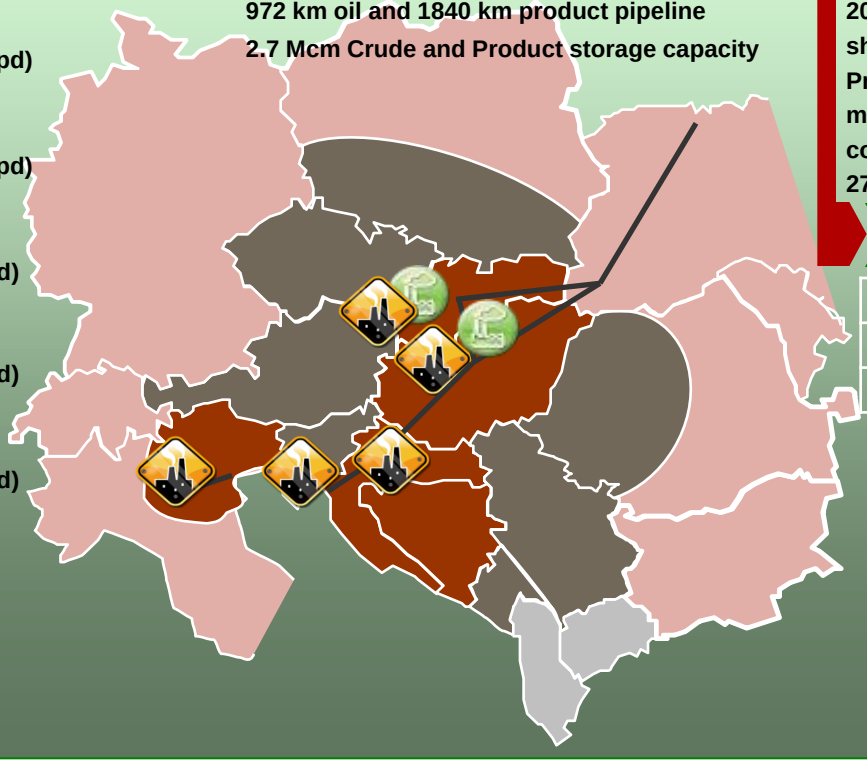
Rijeka Refinery
Capacity: 4.5 Mtpa (90 thbpd)
NCI: 9.1

Mantova Refinery
Capacity: 2.6 Mtpa (52 thbpd)
NCI: 8.4

Sisak Refinery
Capacity: 2.2 Mtpa (44 thbpd)
NCI: 6.1

Logistics

Logistics Network
40 depots in 7 countries
972 km oil and 1840 km product pipeline
2.7 Mcm Crude and Product storage capacity



Marketing

Wholesale
21.6 Mt sales volume
20% regional market share
Presence in 12 countries, market leader in 4 countries
27% end-user sales

Retail Network
1,600+ FS
7 brands in 11 countries
3.5 Mt total fuel sales
Avr. throughput: 2.7 Mlpa
16% captive market for Ref.

Petrochemicals

Capacity (ktpa)	TVK	SPC
Ethylene	660	220
Polymer	765	435

1.4 Mt external sales volume
12 % captive market for Refining

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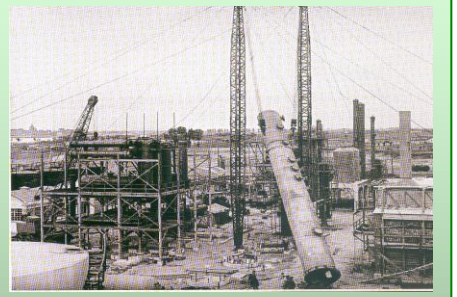
ABOUT IES

HISTORICAL BACKGROUND

More than sixty years of history

Founded in 1946 by local businessman

Crude Supplied by rail and barge



TOTAL takeover in 1950 to 1977

Crude line from Venice completed in 1963

Refinery capacity increased following plant investments to 2.6 Mt/y

1977 to 2007

CAMELI group acquires refinery and sustains investments to enhance conversion. Later decides to leave the oil business in 1994 and one of the shareholders founds IES

Further refinery consolidation development takes place with MHC construction

MOL acquisition in 2007

Significant investments underway to meet EU Directives and IPPC

Activities underway to develop MOL group synergies

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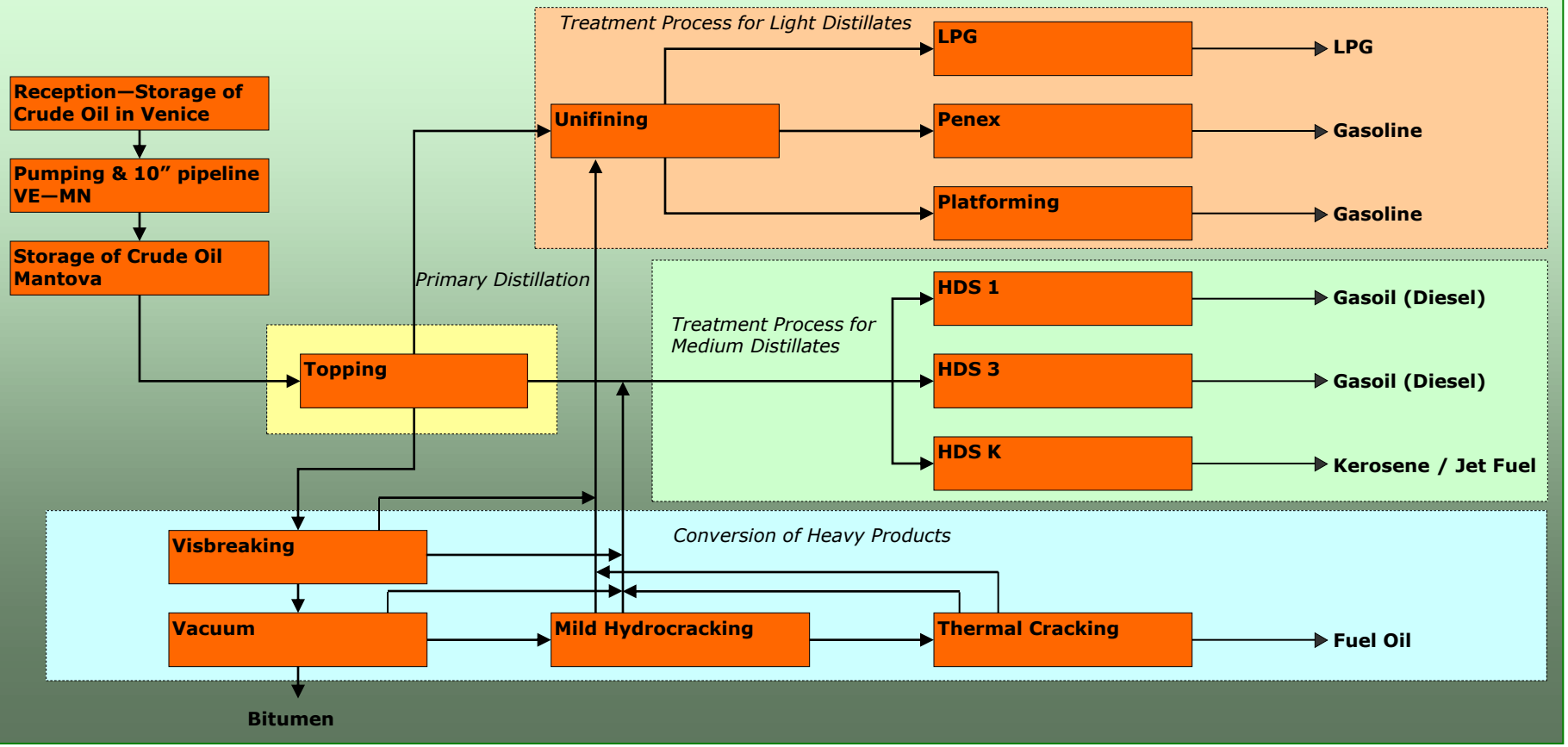
REFINERY BLOCK FLOW DIAGRAM

Overview of the main plants



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IES – REFINING AND MARKETING

KEY STATISTICS
Main Refinery data

Key Refinery Statistics	
Processing Capacity (MT/y)	2.6
Processing Capacity (bbl/d)	57,000
Nelson Complexity Index	8.4
Shipping Capacity (T/d)	16,600
Storage Capacity (m3)	650,000
Full Time Refinery Staff	~400

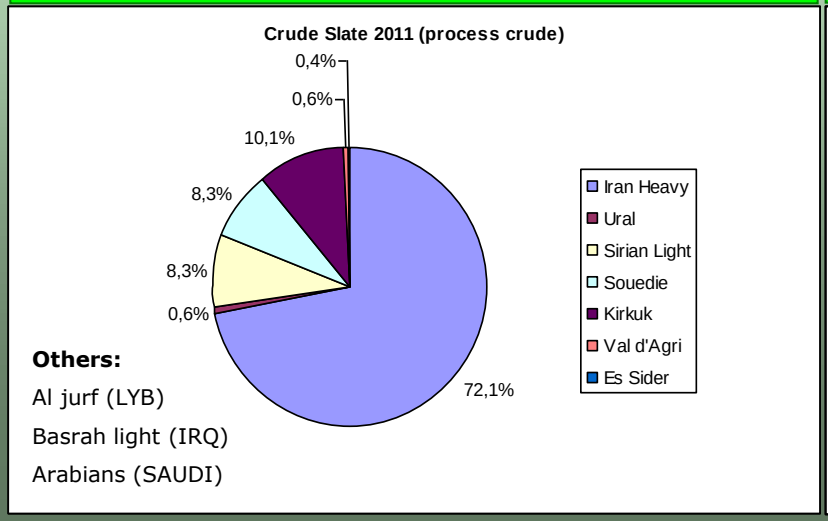
Retail Network

237+ FS

0,82% italian market

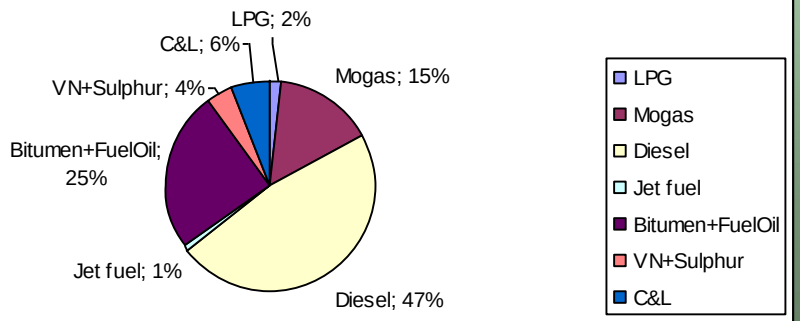
0,84% italian volume

Crude slate 2011
%



Others:
Al jurf (LYB)
Basrah light (IRQ)
Arabians (SAUDI)

Finished products 2011
%



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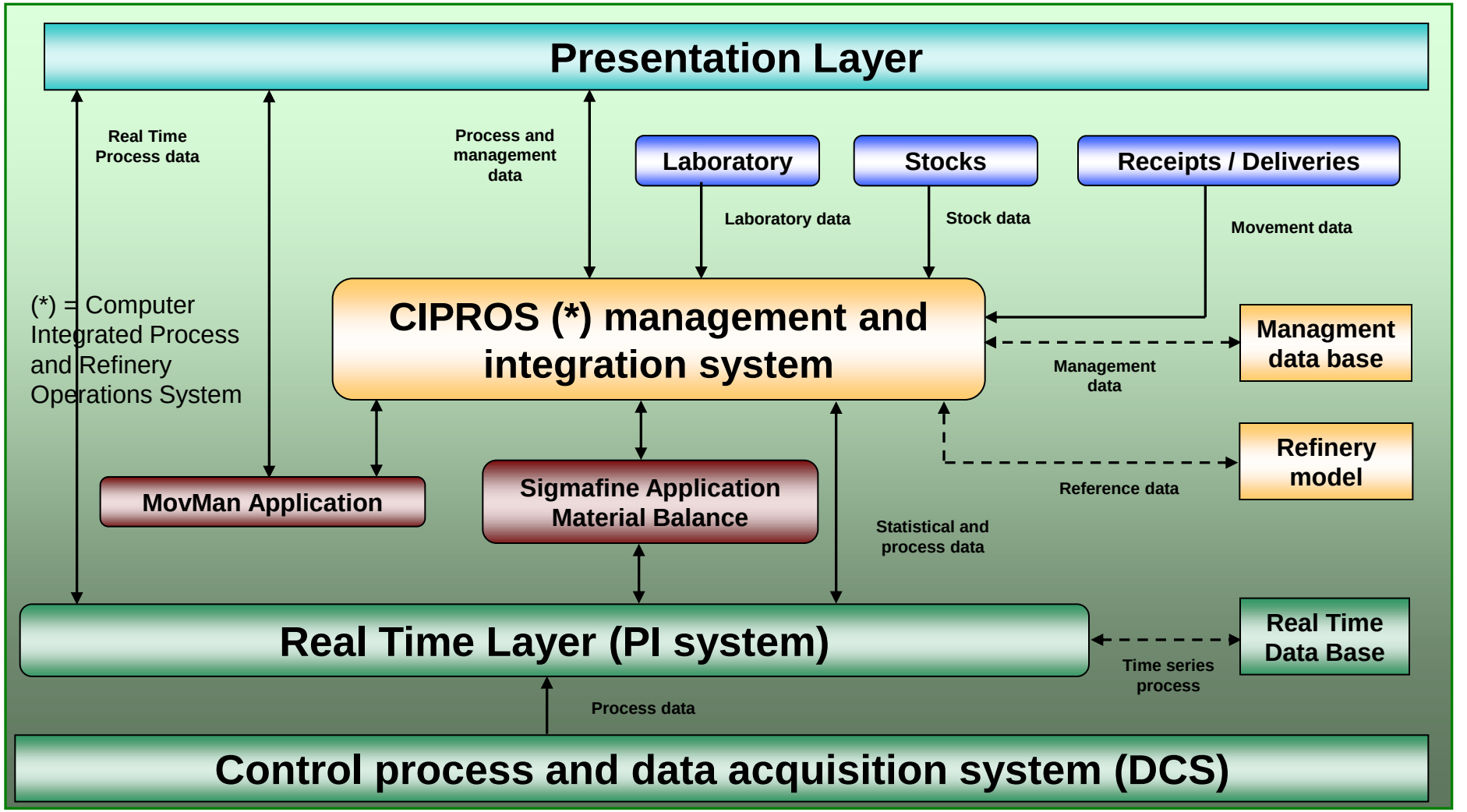
REFINERY INFORMATION SYSTEM ARCHITECTURE



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PI SYSTEM IN IES REFINERY

PI system implementation in 2008

PI-SDK 1.3.8.387

AF Explorer 1.3.3.1474

PI Processbook 3.2.0.0

PI-SMT 2010

PI server version 4

PI system now is:

- fast connection
- real time monitoring
- statistical data analysis
- plant modelization
- reporting
- performance monitoring (KPI)

PI system will also be:

- RT web portal
- lab system
- event notification
- PSM

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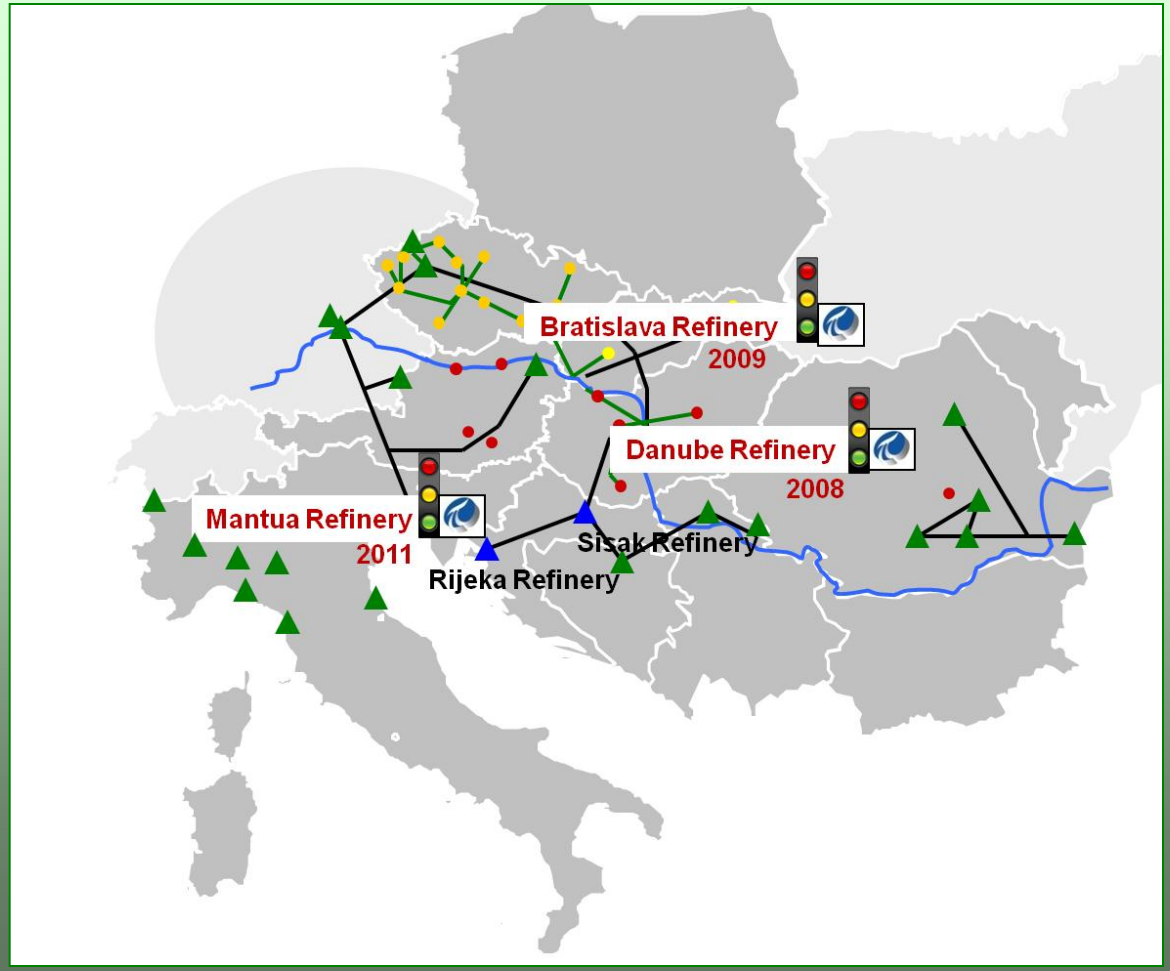
KPI SYSTEM INTEGRATION



System roll out

Units: 25
KPIs: ~500

Thematic dashboard: 3
KPIs: ~450

Units: 22
KPIs: ~300

Thematic dashboard: 1
KPIs: ~600

Units: 3
KPIs: ~20

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GENERAL AND SPECIFIC KPIs

DEFINITION:

KPIs are a combined set of metrics which give a clear picture of how the business is performing.
KPI are divided into two categories:

General KPI

Unit feed
Specific energy consumption
Specific steam consumption
Specific fuel gas consumption
Specific steam production

Refinery

Aggregated in Site and Area level

Area

Unit

Unit specific KPI

Yield of white products
Salt content of crude oil at desalter outlet
Inlet temperature of crude in pre-distillation_1
Inlet temperature of crude in pre-distillation_2
Vacuum in the vacuum column

Characteristics of good KPIs are:

- Up to date - dynamic management
- Useful and user focused
- Effective – simple and easy to understand
- Measurable, complemented with target and limits
- Important and relevant
- Drives continuous improvement
- Lead to positive actions

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KPIs AND PI POINTS

PI point names

M_B_MTHCK_STEAM_CONS_PV
M_B_MTHCK_FUEL_CONS_PV
M_B_MTHCK_ENERGY_CONS_PV
M_B_MTHCK_GENERATED_STEAM_PV
M_B_MTHCK_CONV_PV
M_B_MTHCK_UNIT_FEED_TRG_PV
M_B_MTHCK_SPEC_STEAM_CONS_TRG_PV
M_B_MTHCK_SPEC_FUEL_CONS_TRG_PV
M_B_MTHCK_SPEC_ENERGY_CONS_TRG_PV
M_B_MTHCK_SPEC_GENERATED_STEAM_TRG_PV
M_B_MTHCK_O2_FLUEGAS1201_TRG_PV
M_B_MTHCK_CONV_TRG_PV

PI point parameter definitions

A	B
Select (x)	Tag
	M_B_MTHCK_STEAM_CONS_PV
	M_B_MTHCK_FUEL_CONS_PV
	M_B_MTHCK_ENERGY_CONS_PV
	M_B_MTHCK_GENERATED_STEAM_PV
	M_B_MTHCK_CONV_PV
x	M_B_MTHCK_UNIT_FEED_TRG_PV
	M_B_MTHCK_SPEC_STEAM_CONS_TRG
	M_B_MTHCK_SPEC_FUEL_CONS_TRG_P
	M_B_MTHCK_SPEC_ENERGY_CONS_TR
	M_B_MTHCK_SPEC_GENERATED_STEA
	M_B_MTHCK_O2_FLUEGAS1201_TRG_P
x	M_B_MTHCK_CONV_TRG_PV

The main data source of the KPI sytem is PI points

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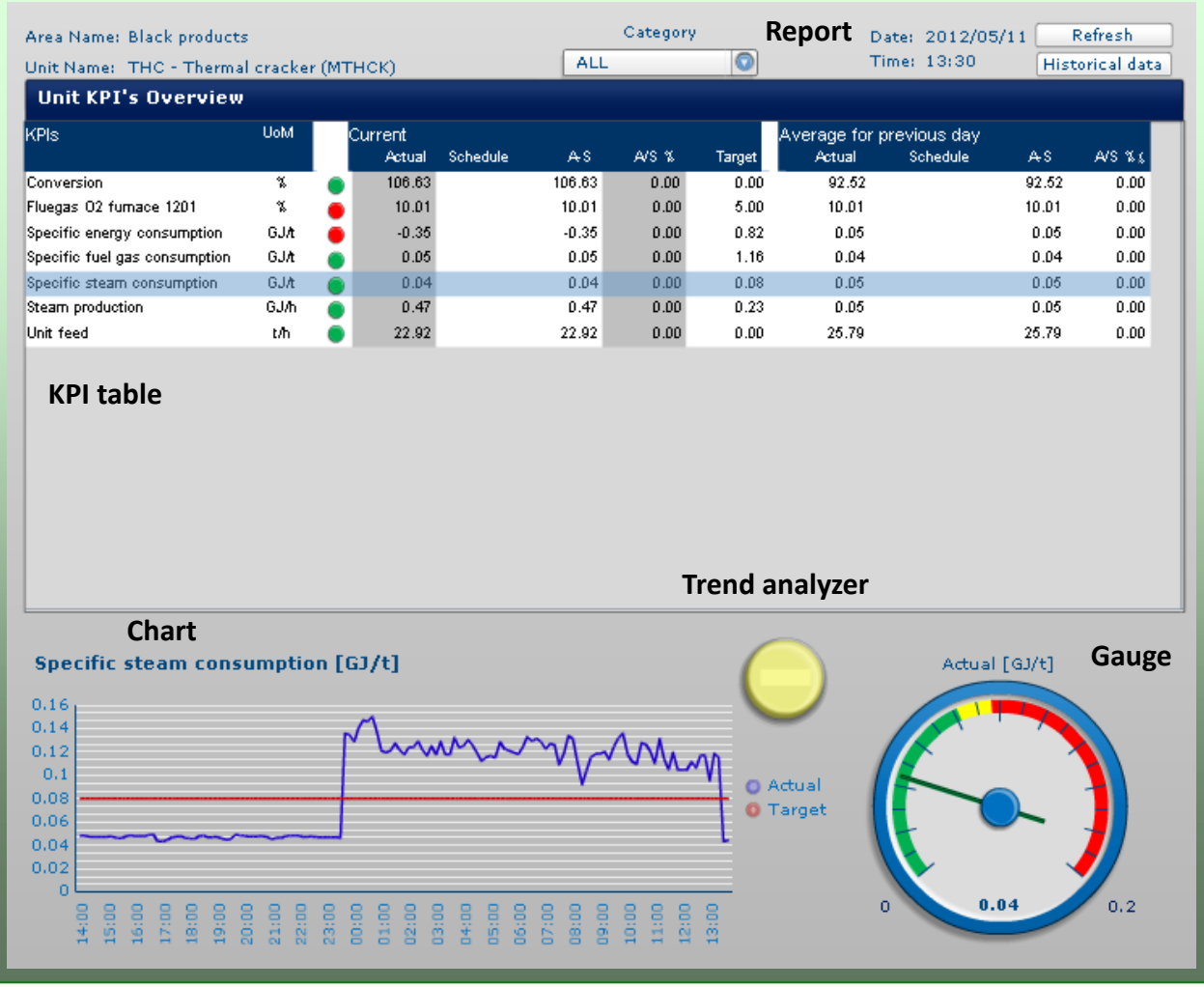
KPIs VISUALIZATION: THE DASHBOARD



Dashboard system helps to increase data visibility via Key Performance Indicators (KPI)

Daily operational performance monitoring

KPIs are public in refinery

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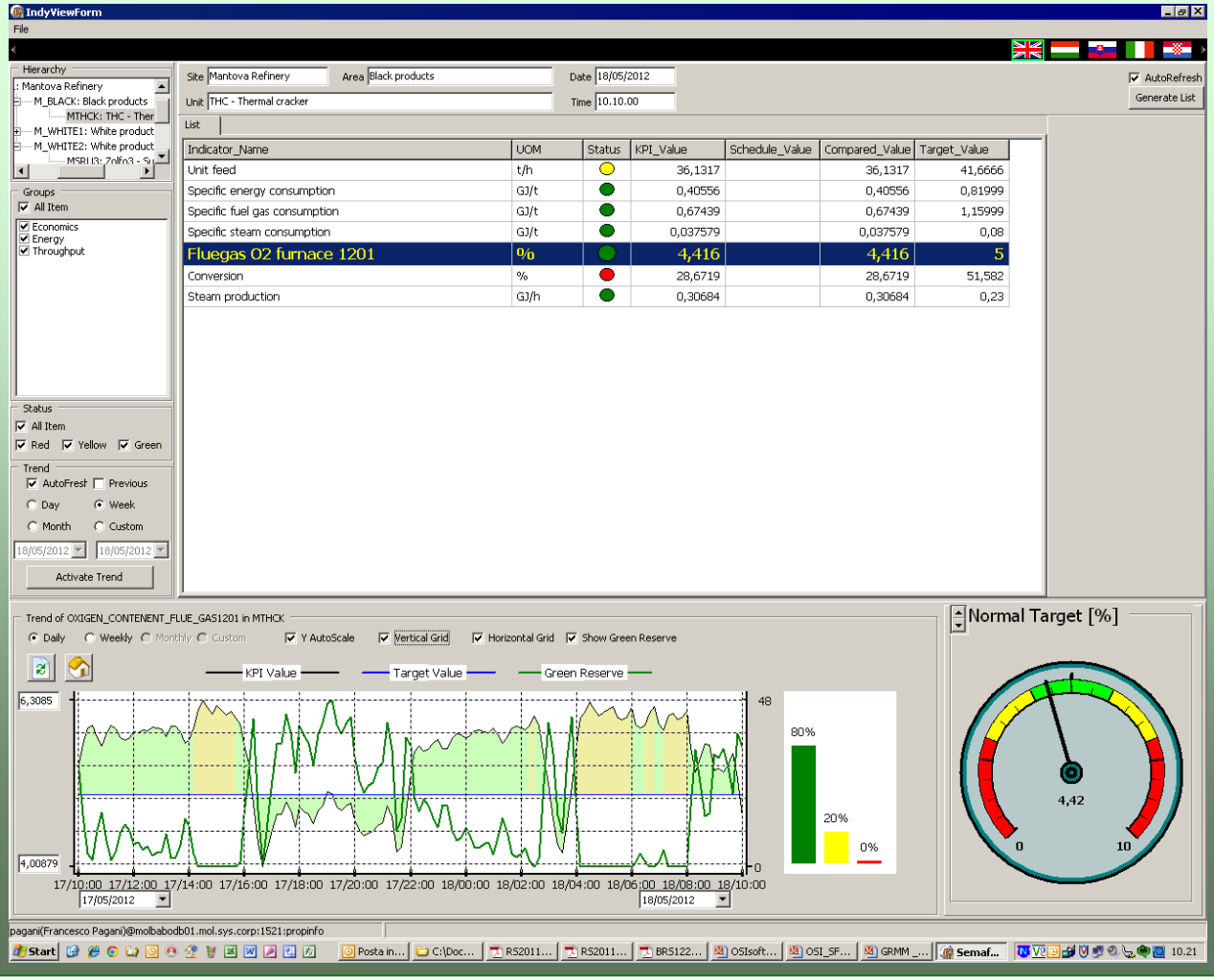
KPIs MANAGEMENT AND USAGE



Improve unit performance

The “Green reserve” is equal to “ margins for improvements”

Real time monitoring

Optimize process control

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SIGMAFINE AND MATERIAL BALANCE

Sigmafine Application provides the Refinery the daily reconcilied weight material balance, based on data stored in the Refinery Information System

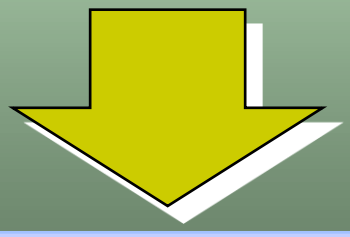
Production & Yields

Blending & Movements

Tanks & Products Inventory

Receipts & Deliveries

Consumption & Losses



Consistent data for process balance and performance computation
Validated data is available to make better business decisions

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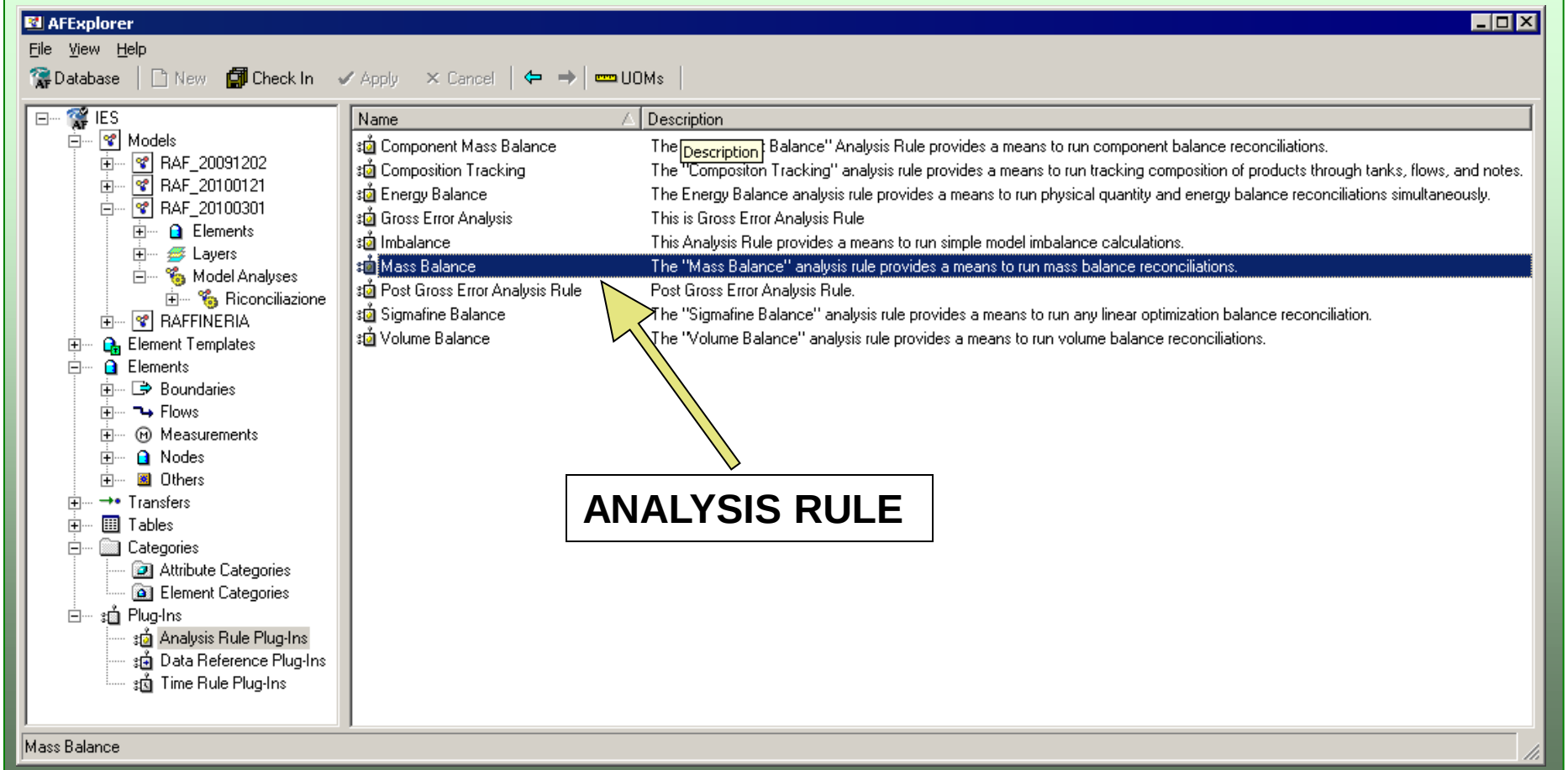
ANALYSIS RULE



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DESIGNING THE MODEL

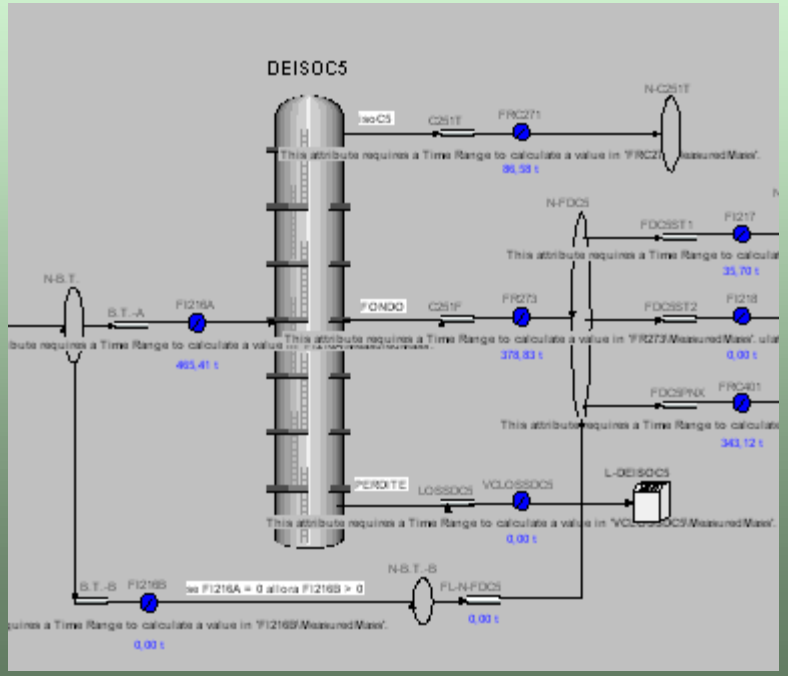
Two tools are available for designing a Sigmafine models

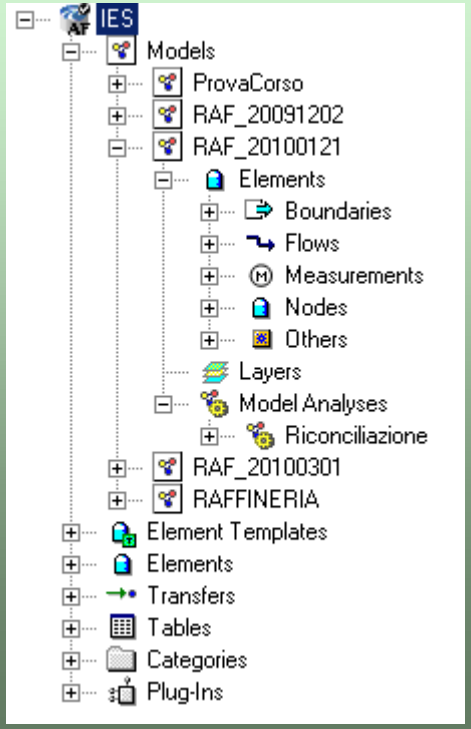
PI ProcessBook
to connect elements and model design

PI-AF Explorer
to configure elements

STEP TO CREATE A MODEL

1. AF Explorer -> define a new model in db
2. PI ProcessBook -> create a new display
3. Assign model (db) to display (file .pdi)





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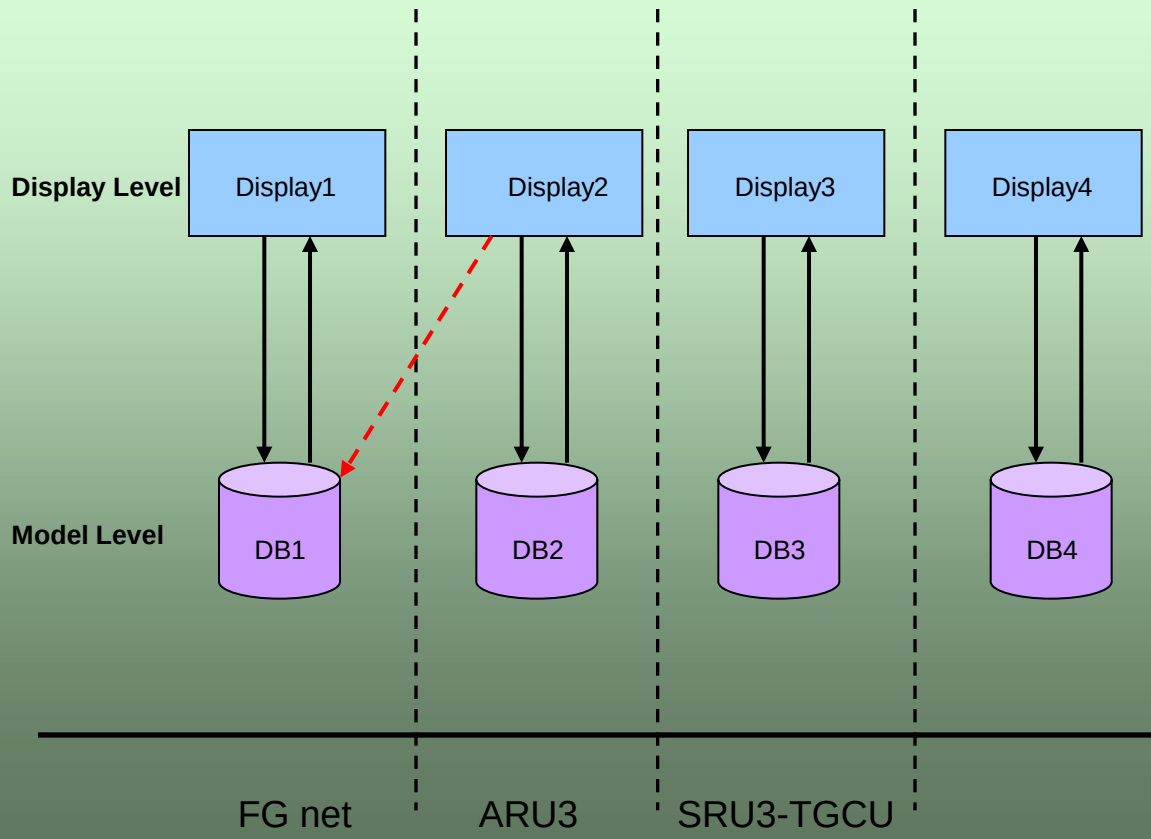
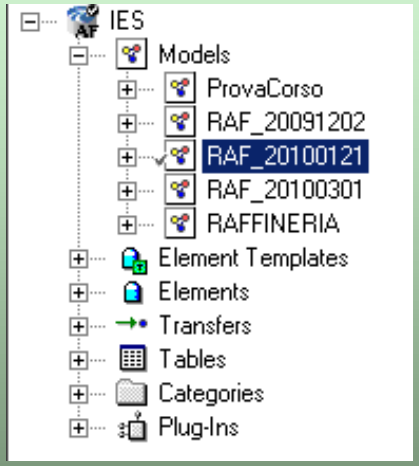
MANAGING THE VERSION (UPDATING)



PI-AF Explorer



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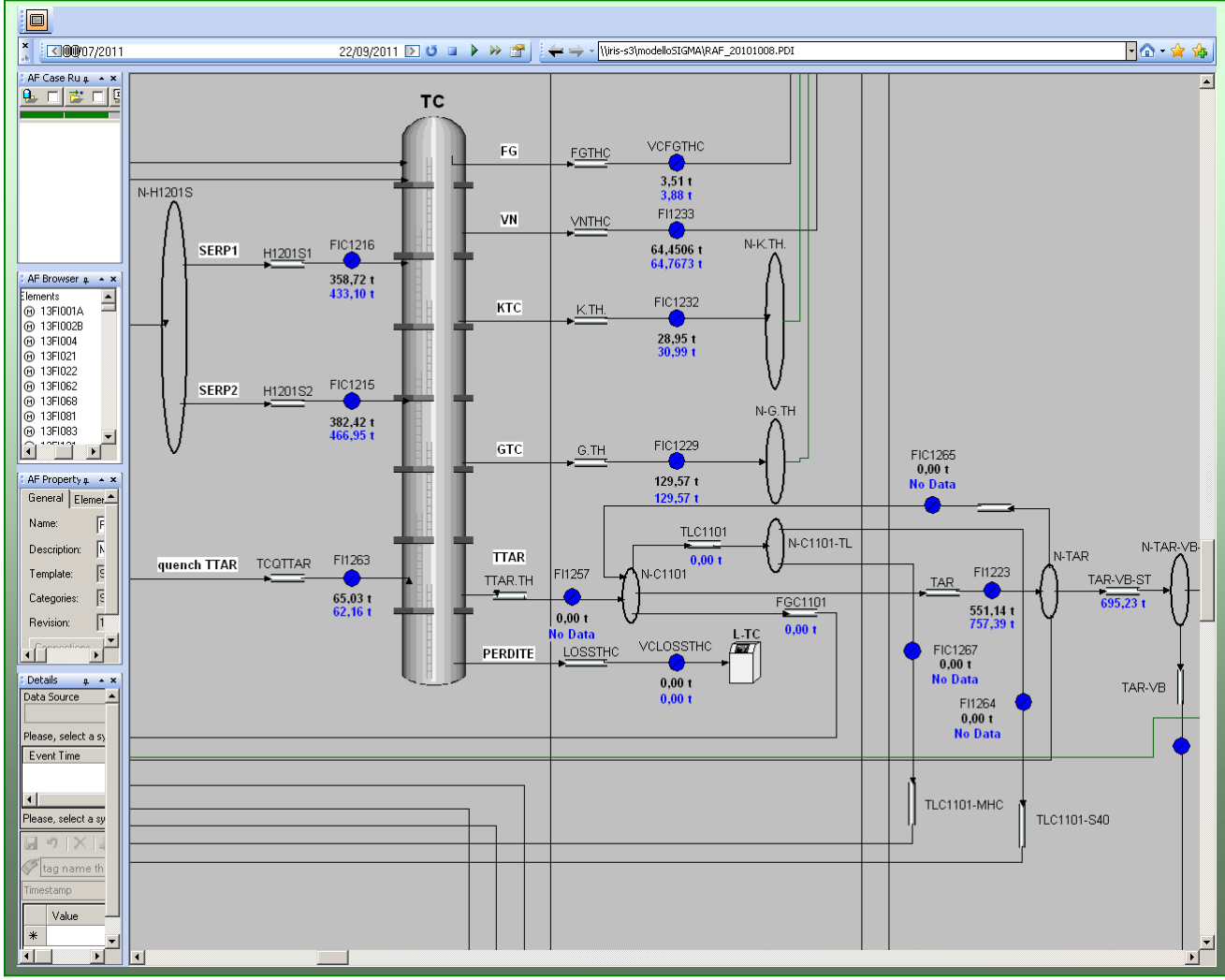
MODEL DISPLAY



System go live at 2009, October 23th

Customization with VBA script (VBA Language Reference Version 3.2)

Collect different data type to run the cases

The ProcessBook (common GUI) is the best way to visualize, build and edit the model, and run analyses on a model. This tool provides a multi-user environment for building and maintaining models. You can configure Sigmafine analyses and cases, run them, and then display the results.

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PI DATA REFERENCE IN THE MATERIAL BALANCE - 1

Meters:

MeasuredMass:

- Data Reference: PI Point
- Settings: \\server_name\tag_name;TimeRangeMethod=Total;CaseMethod=TimeRange;UOM=t

MassTolerance:

- Data Reference: Sigmafine
- Settings: CalcType=15;Measurement=MeasuredMass;Absolute=0;Relative=x;..

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PI DATA REFERENCE IN THE MATERIAL BALANCE - 2

Tanks:

MeasuredMass:

- Data Reference: PI Point
- Settings: \\server_name\tag_name;CaseMethod=EndTime; UOM=kg

MassTolerance:

- Data Reference: Sigmafine
- Settings: CalcType=15;Measurement=MeasuredMass;Absolute=0;Relative=**x**;..

Density:

- Data Reference: PI Point
- Settings: \\server_name\tag_name;CaseMethod=EndTime; UOM=kg/l

ReconciledMass

- Data Reference: PI Point
- Settings: \\server_name\tag_name;CaseMethod=StartTime; UOM=t;ReadOnly=False

Flows:

ReconciledMass

- Data Reference: PI Point
- Settings: \\server_name\tag_name;CaseMethod=StartTime; UOM=t;ReadOnly=False

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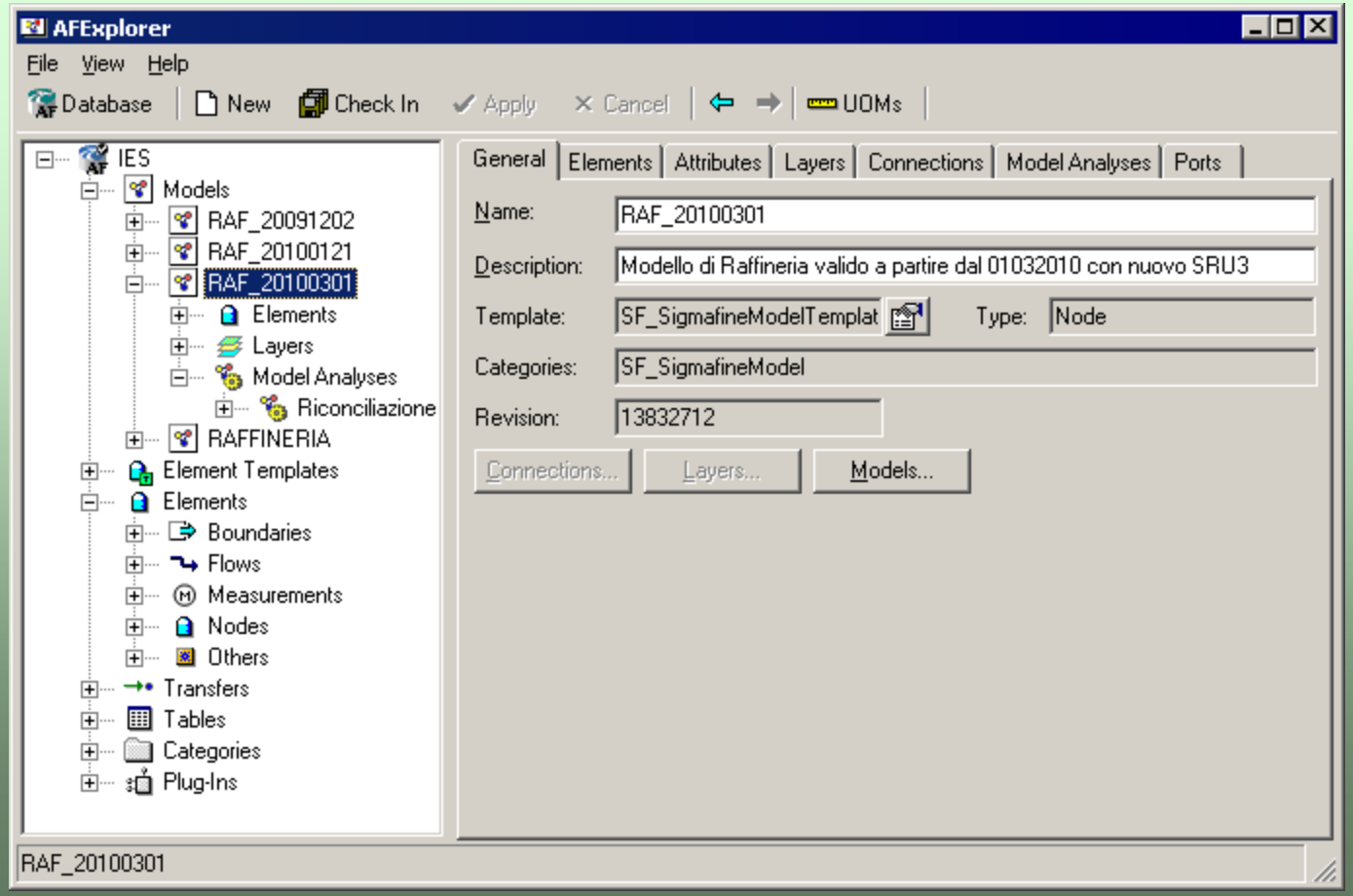
AF EXPLORER



Manage objects, templates, db, tables, transfers

High level language approach (classes, objects, inheritance)

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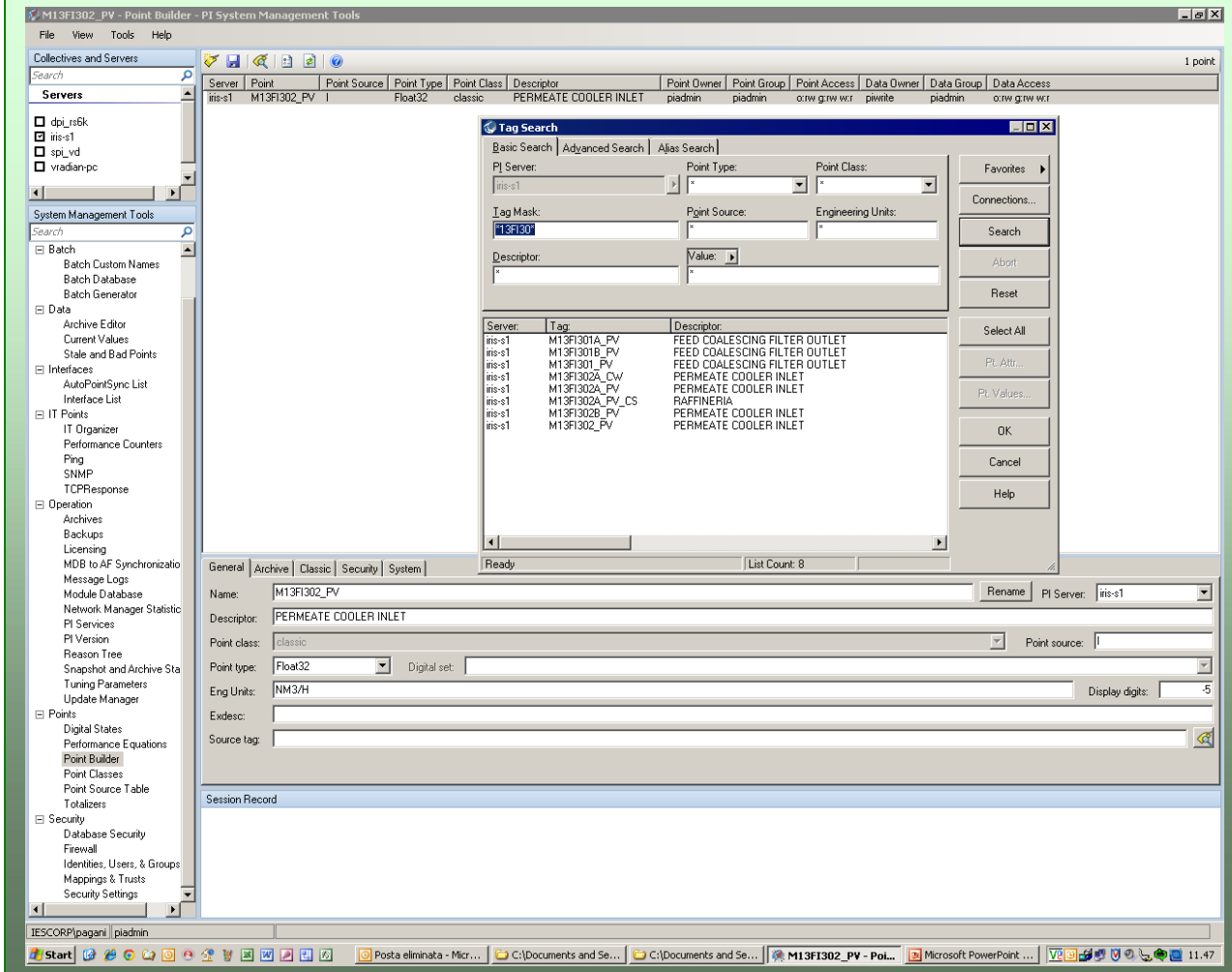
PI POINTS & SYSTEM MANAGEMENT



- Manage PI points
- Data retrieval (archive)
- Performance equation
- OPC interfaces
- Digital states
- Totalizers
- Mapping & Trusts

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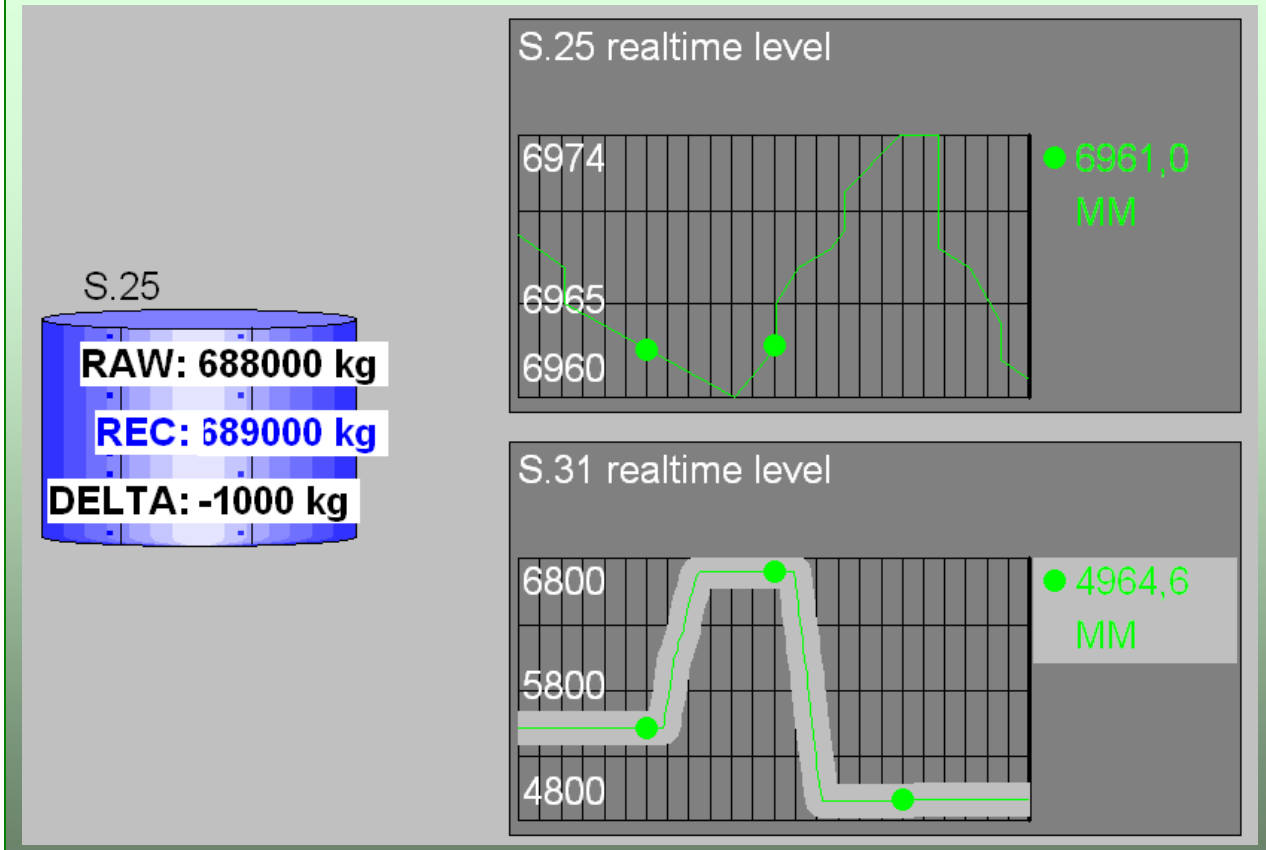
MONITORING WITH PROCESSBOOK



- PI tags monitoring
- PI calculation tags
- Trends and XY plots
- SQC analysis
- Standard deviation
- Comparison RAW vs REC data
- Unique version of process data
- System and data reliability

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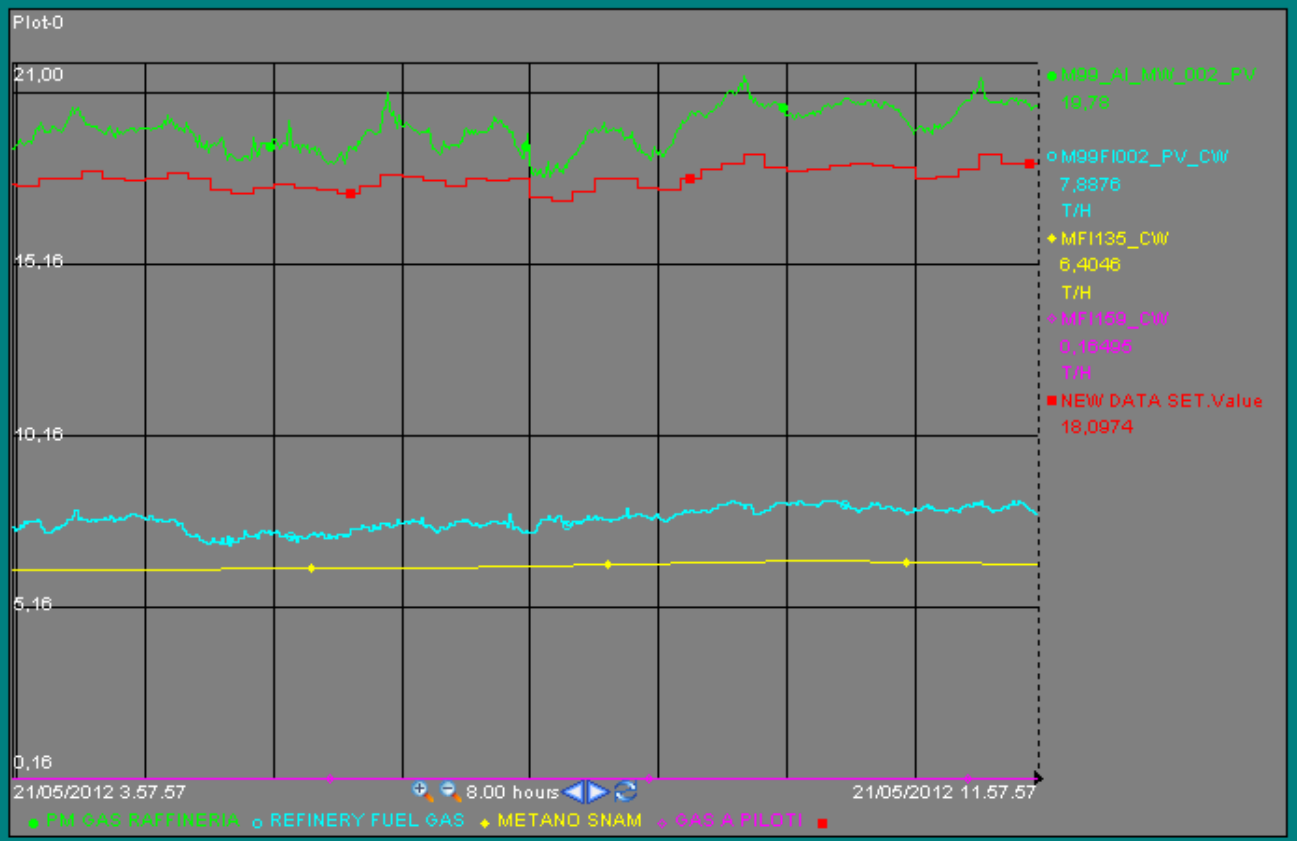
MONITORING WITH PROCESSBOOK – TRENDS AND MULTI STATE

Molecular Weight - Refinery Fuel Gas V.112



UNIT FEEDS

BLACK AREA

VB

Carica VB FIC1417	63,49 T/H
Carica VB FIC1418	60,78 T/H
Quench TTAR FIC1258	0,00 T/H

VAC

Carica Vuoto FIC1182	25,66 T/H
Carica Vuoto FIC1183	25,42 T/H
Carica Vuoto FIC1184	25,82 T/H
Carica Vuoto FIC1185	25,69 T/H
Carica Vuoto FI1181	100,82 T/H

MHC

throughput	62,36 T/H

THC

Carica THC FIC1216	16,83 T/H
Carica THC FIC1215	18,42 T/H
Carica THC FIC1243	1,19 T/H
Carica THC FIC1244	1,20 T/H
Quench TTAR FI1263	1,54 T/H

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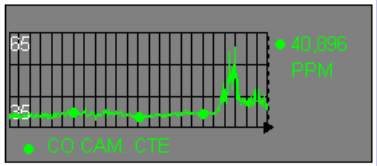
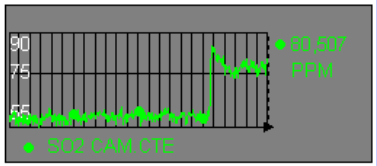
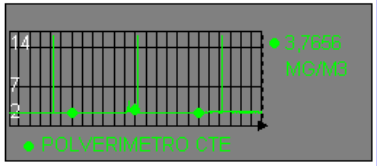
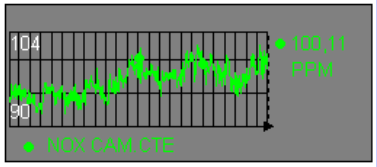
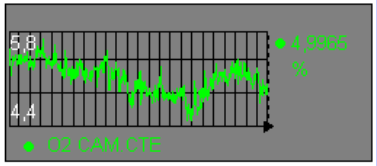
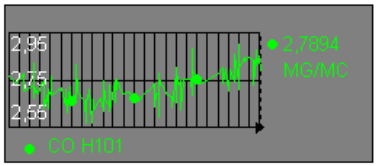
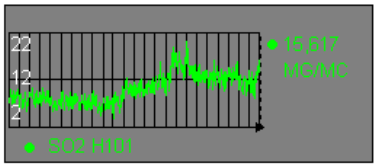
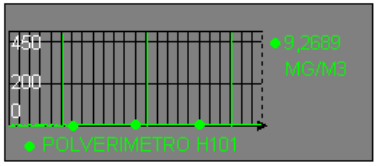
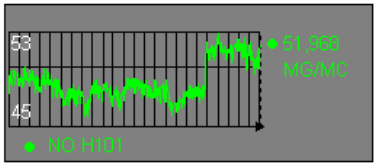
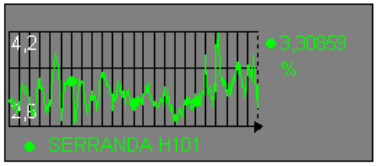
MONITORING WITH PROCESSBOOK – RT WEB PORTAL

EMISSIONS

Central Power Station

CO	40,90 PPM	
SO2	80,51 PPM	
PST	3,77 MG/M3	
NOx	100,11 PPM	
O2	5,00 %	

Crude Distillation Unit

CO	2,79 MG/MC	
SO2	15,62 MG/MC	
PST	9,27 MG/M3	
NO	51,97 MG/MC	
O2	3,31 %	

E.Q. 2011

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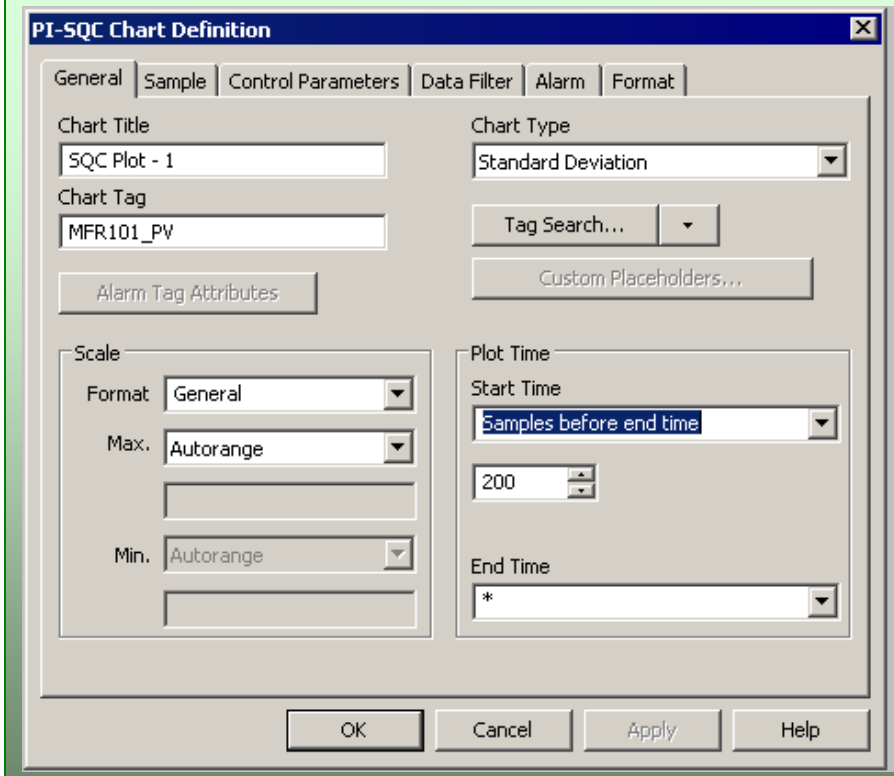
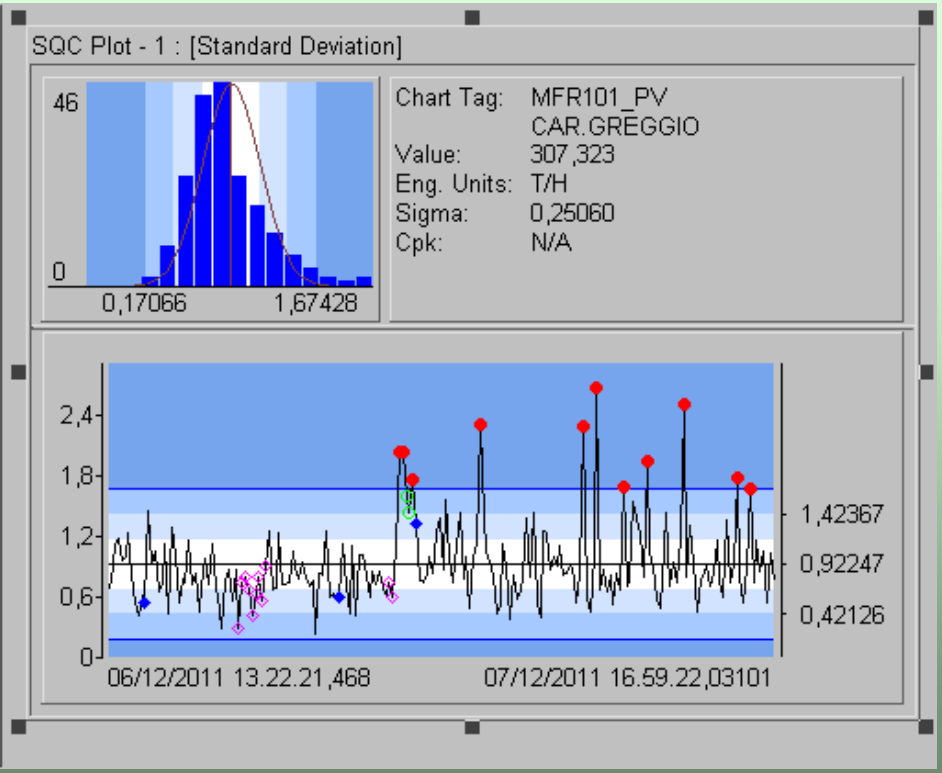
MONITORING WITH PROCESSBOOK – SQC & STD DEV





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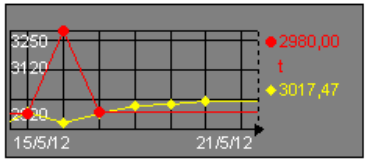
MONITORING WITH PROCESSBOOK – REC vs RAW DATA

RECONCILED MASS BALANCE - BLACK AREA

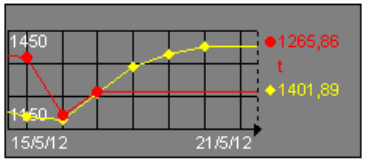
VB

Feed VB FIC1417	65,55 T/H	
Feed VB FIC1418	62,52 T/H	
Raw Feed	**3031,52**	
Rec Feed C.VIS	**2980,00 t**	



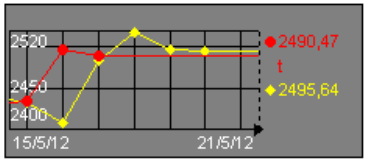
MHC

Feed MHC 15FIC002	58,95 T/H	
Raw Feed	**1392,53**	
Rec Feed C.MHC	**1265,86 t**	



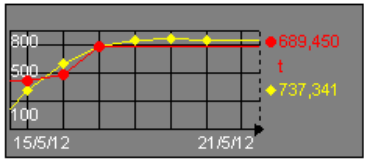
VAC

Feed Vacuum FIC1182	27,66 T/H	
Feed Vacuum FIC1183	28,06 T/H	
Feed Vacuum FIC1184	27,91 T/H	
Feed Vacuum FIC1185	27,95 T/H	
Raw Feed	**2523,85**	
Rec Feed R.VIS	**2490,47 t**	



THC

Feed THC FI1255	36,36 T/H	
Raw Feed	**720,94**	
Rec Feed C.TH	**689,45 t**	



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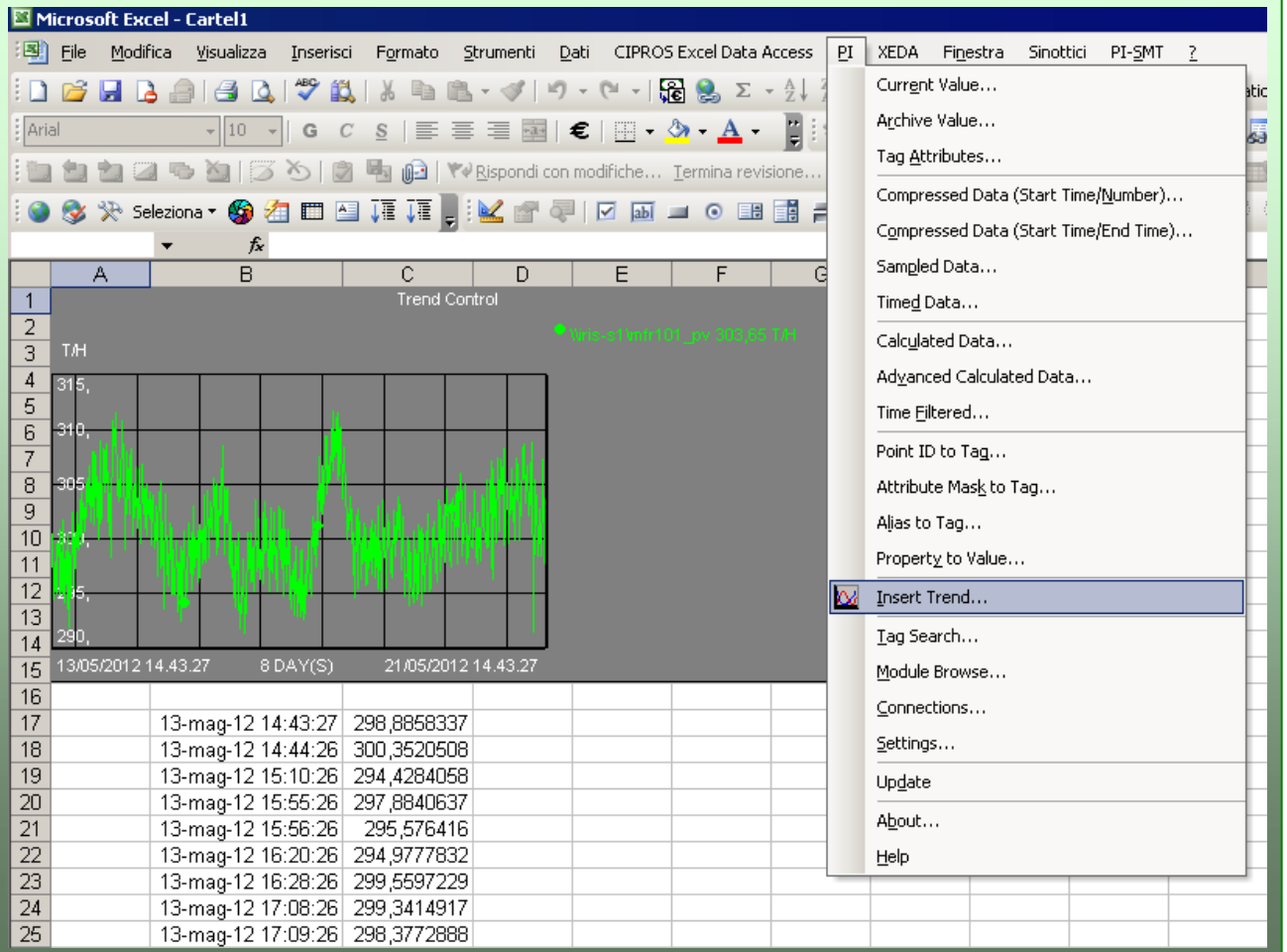
DATALINK

- Excel PI DataLink vs CIPROS(*)
- Graphical trends
- Immediate
- Great popularity



(*) = Computer Integrated Process and Refinery Operations System

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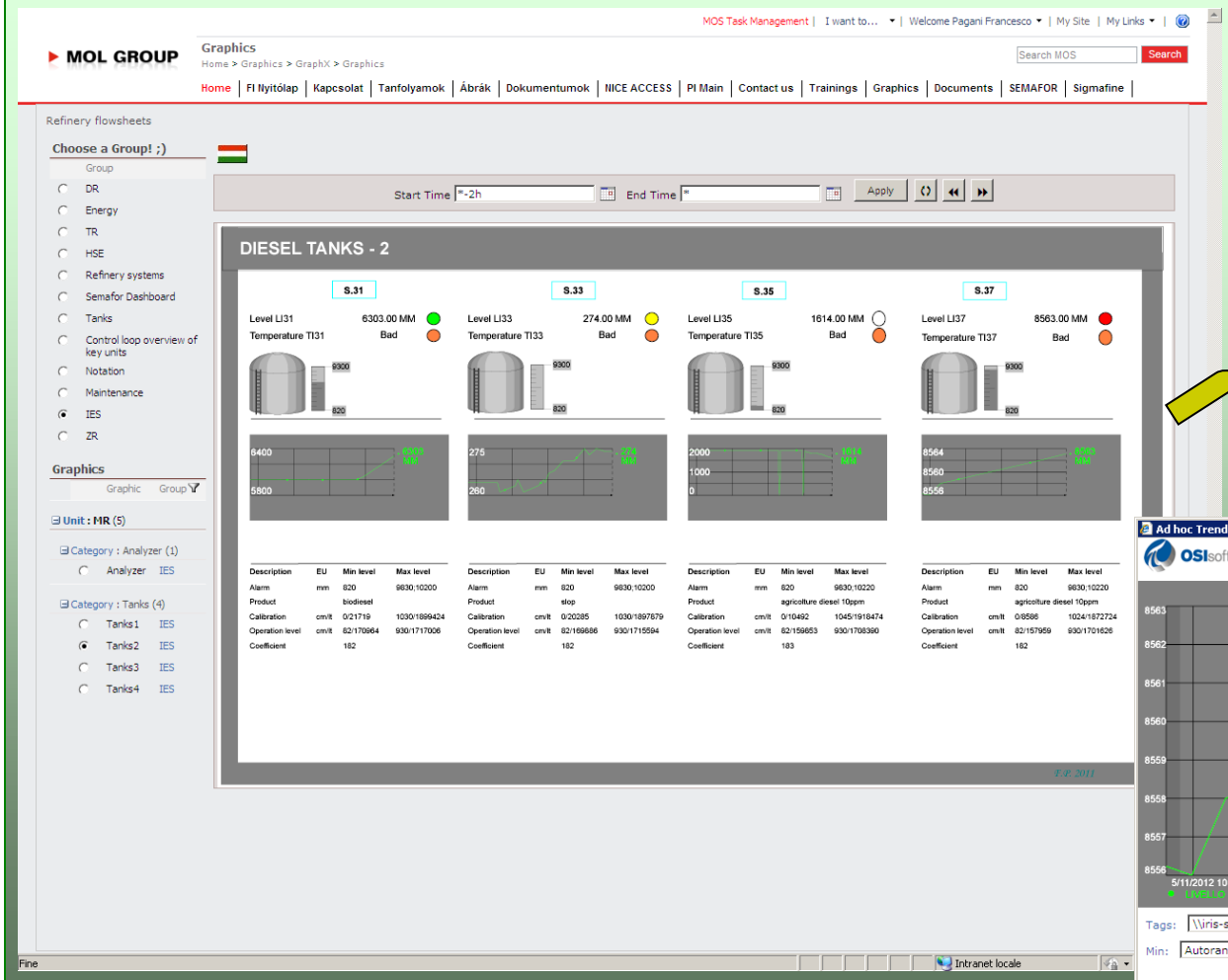
NEXT STEPS: RT WEB PARTS



- Processbook sheets published on intranet
- Everywhere and any time RT data available
- Shared info with the other refineries

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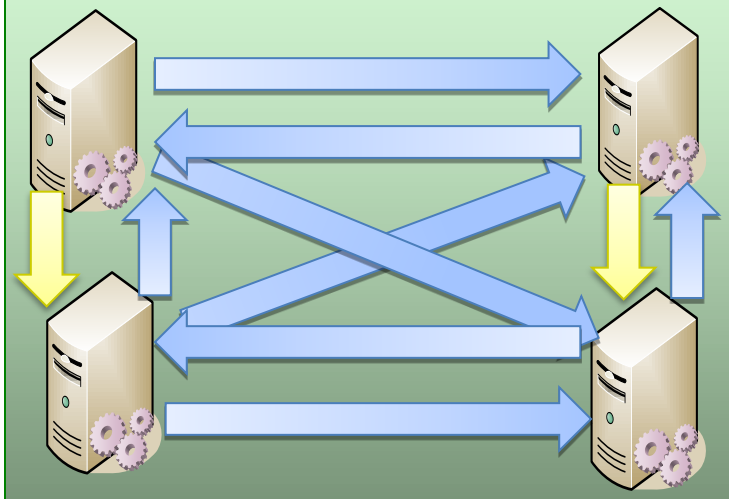
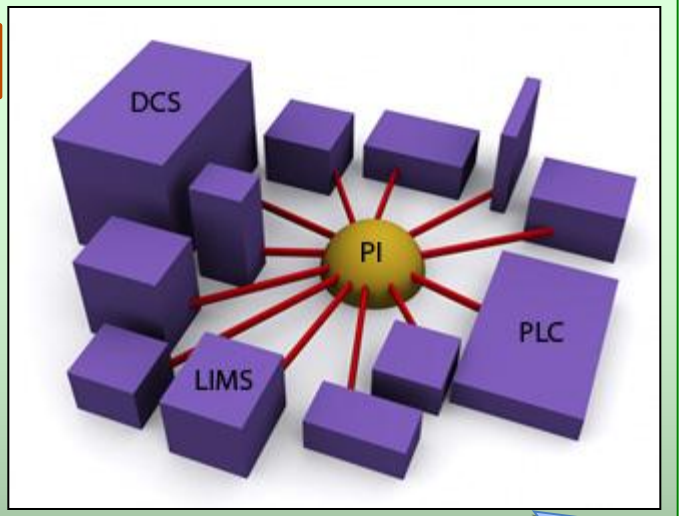
PI SYSTEM AND LABORATORY SYSTEM

Now

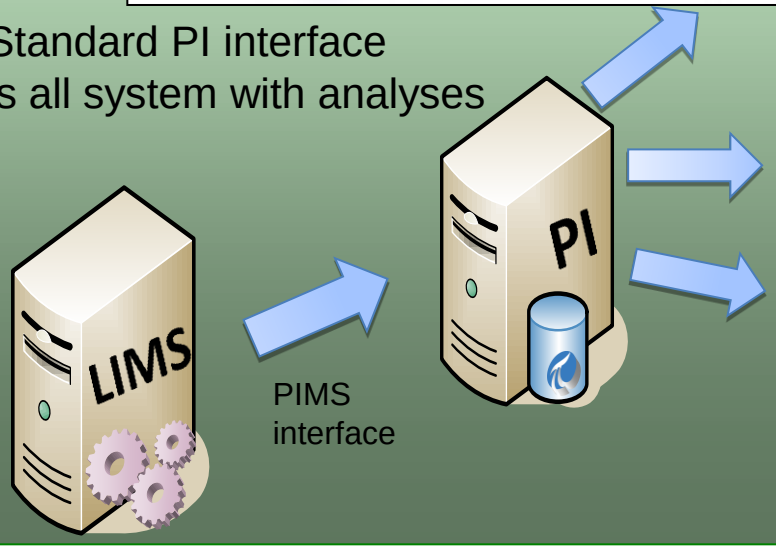
- Many many analyses interfeces from-to everywhere



Future



- Only one Standard PI interface
- PI provides all system with analyses data



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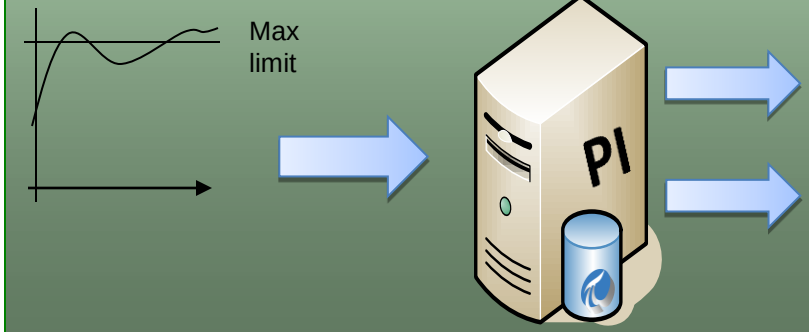
NOTIFICATIONS SYSTEM

Configure custom alarms based on any data source by leveraging the flexibility of PI AF.

Configure alarms to notify users for abnormal situations



Configure the platform to emit notifications when operational excursions occur.

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PROCESS SAFETY MANAGEMENT

Configure a Process Safety Management system (PSM) to:

- MOC Management of Change
  - Trackback of changes in Plant (PI tag, asset, etc.), Organisation, HR, Technological

- ICA Investigation and Corrective Actions
  - Quick and easy investigation process
  - Statistical analysis
  - Historical data
  - Decrease the number of unit shut-downs

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BUSINESS CHALLENGE

- Closing the gap between process control and business governance
- Providing real-time information for tighter control of operations
- Establishing a unified data model of Refining for all refineries in the group
- Overall monitoring of operations to fulfill strategic objectives

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SOLUTIONS AND BENEFITS

- Implemented PI System to collect process data from the field regardless supplier of process control system
- Building PI Asset Framework and Group level data model
- Provides portal to publish reports, graphical information for all authenticated users

- PI system as a basic and common platform
- Visible and controllable operations throughout the refineries
- Better situational awareness, stronger focus on corrective actions at all levels
- Users quickly find relevant information
- Closer to planned operations, scheduled activities, events

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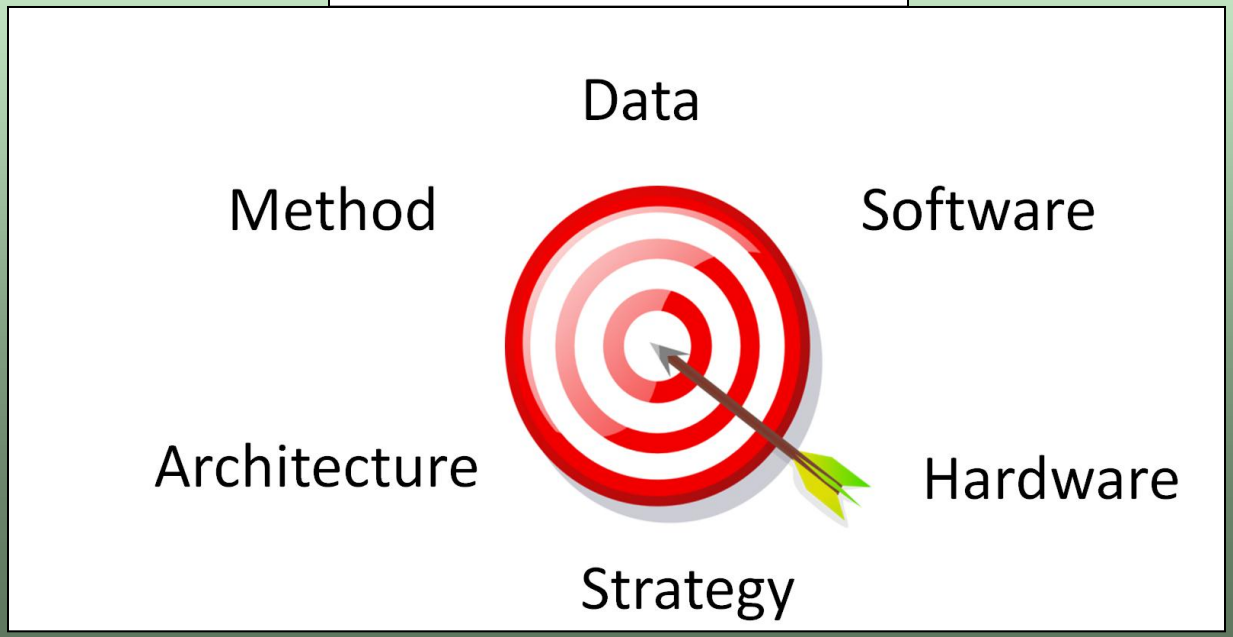
MOL INTEGRATION AND STANDARDIZATION

MOL (Hungary) PI System -1998;
SLOVNAFT (Slovakia) PI System - 2006;
IES (Italy) PI System – 2008;
INA (Croatia) PI System – 2012;

Unified system cornerstones



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MANAGING THE BUSINESS AND KNOWLEDGE SHARING

Knowledge sharing	Shared folders, local computers	PI Webparts and Portal
Communications	Poor communication between departments	Effective information sharing

Action to reach these goals:

Improve information-flow among departments & shifts
Optimized operational performance requires unified system hierarchy

Using the PI System as an integration and applications infrastructure supports consistency of information and applications

Sharing knowledge and experience between the different units and organizations using a well - defined application pool is essential.

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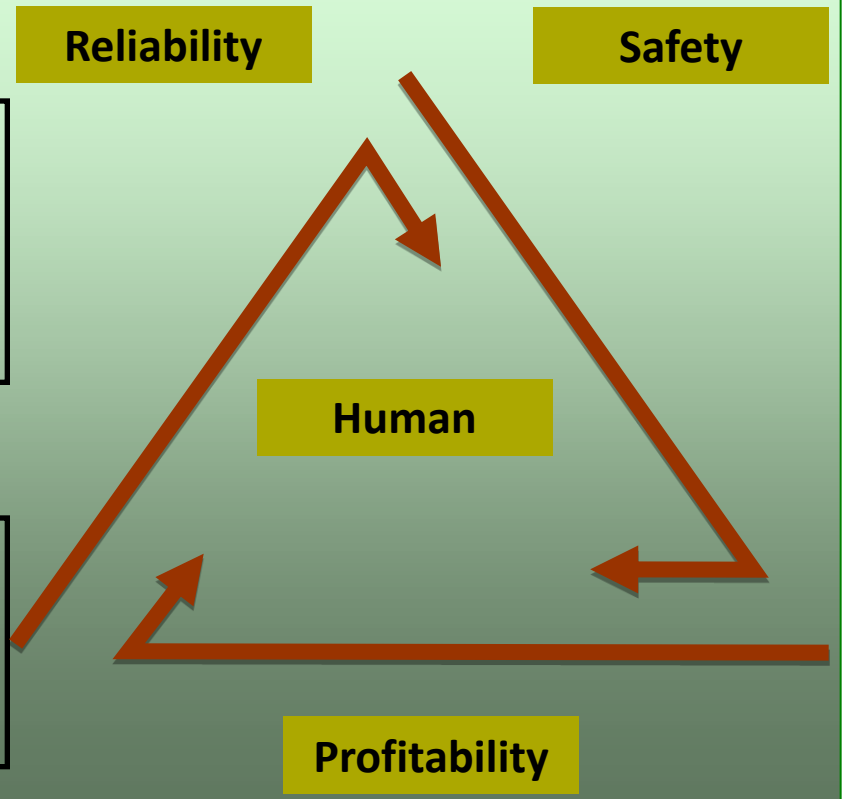
TANGIBLE AND INTANGIBLE BENEFITS

Tangible

- ❑ Improves productivity
- ❑ Ensures reliability
- ❑ Reduces downtime / numbers of shutdowns
- ❑ Supports cost-efficient decision making
- ❑ Enables Statistical based models and controls

Intangible

- ❑ Enhanced communications & information flow
- ❑ Heighten customer satisfaction
- ❑ Saves enormous time and effort
- ❑ Delivers instant, company-wide access to data



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THANK YOU

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Mantova Refinery

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