



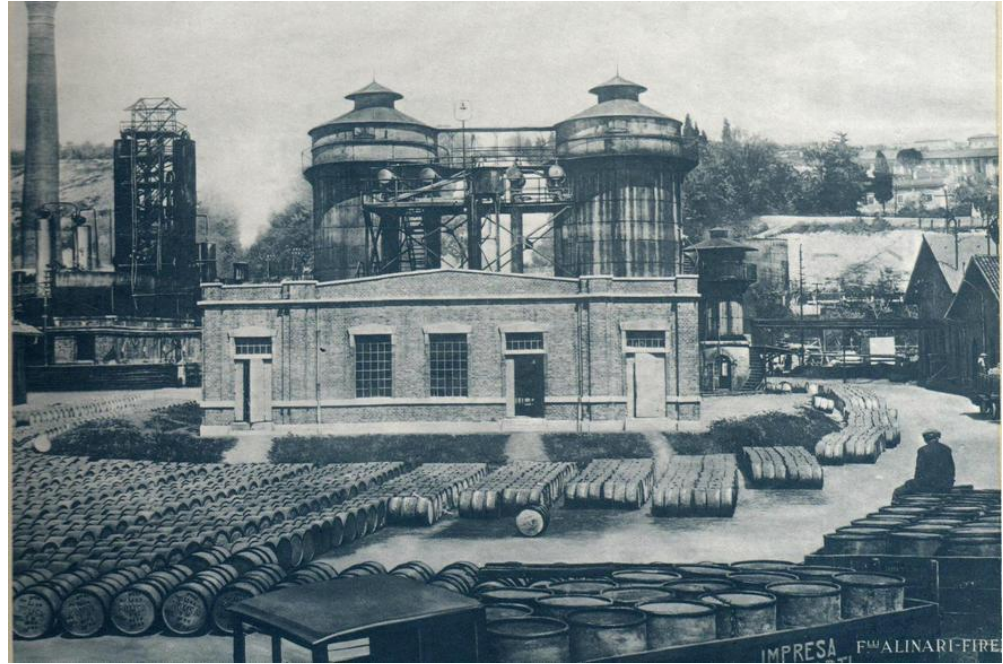
# The Journey into Integrated Refinery Information System with the PI System

Presented by Sergej Horvat  
Process Information Engineer













# History of Rijeka Oil Refinery

- First Europe's industrial oil refinery founded in 1882 with capacity of 60 000 t/y
- Becomes part of INA at 1964
- INA becomes part of MOL group at 2003



# About MOL Group

## Oil and Gas Company

	Countries of operation	40
	Number of employees	27,500
	Barrels of oil equivalent produced per year	36 MILLION
	Reserves SPE 2P	555M BARRELS OF OIL EQUIVALENT
	MOL Group Service Stations	1,750+
	Customers buying our fuels every day	750,000
	Refineries	4
	Refineries throughput per day	417,000 BARRELS
	Petrochemical facilities	2
	Petrochemical production	2080 KTPA



# Business challenge

Adequate material and utility balancing is essential for a refinery.  
It is the basis for:

- Accounting
- Controlling
- Performance Monitoring & KPI
- Production Planning
- Benchmarking
- Refinery Transparency
- Supporting Supply Chain Management activities
- Emission Control – Legal obligations, Norm obligations



# Background

- Inaccurate, EoS, EoL on some primary measurements at tank farms and battery limits of units
- Islands of control systems with own historians
- Rare automated connection of different systems
- Material movements are logged on paper
- Manual data entry into home made applications for reports
- Lately published reports

# Solution

Establish reliable and accurate primary measurements at tank farms and battery limits of units, implement the PI System for real-time data gathering and Sigmafine for material balance reconciliation in order to:

- Improve data accuracy and quality
- Improve reporting quality and speed
- Enable well-informed intelligent business decisions to users at all levels of the company - from the plant floor to the enterprise level
- Provide better information for Planning and Scheduling
- Reduce production losses
- Identify measurement meter maintenance (setting priority)
- Improve productivity

# Execution

The project was divided in two parallel subprojects:

## 1<sup>st</sup> Subproject: Instrumentation improvement

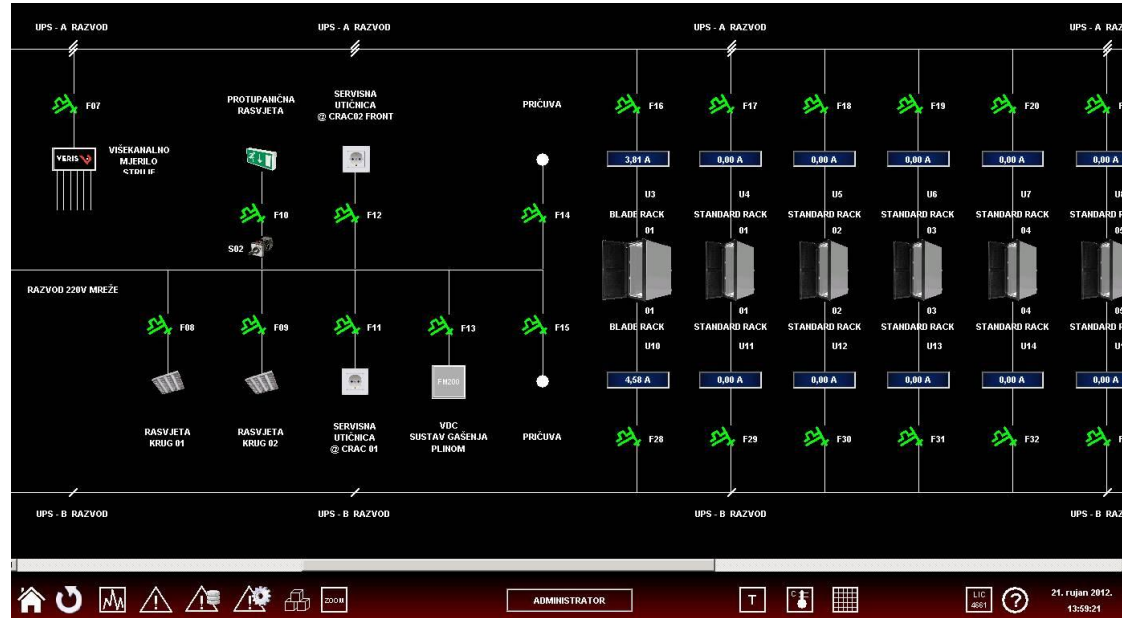
- Tanks
- Battery limit measurements

## 2<sup>nd</sup> Subproject: Refinery Information System upgrade

- Server room & Server park implementation
- Connecting distributed control systems
- The PI System integration

# Server room implementation

- HVAC 2 x 20 kW redundant
- UPS 2 x 20 kVA redundant
- Central supervision and control system
- Fire alarm and fire fighting
- Technical protection and video surveillance





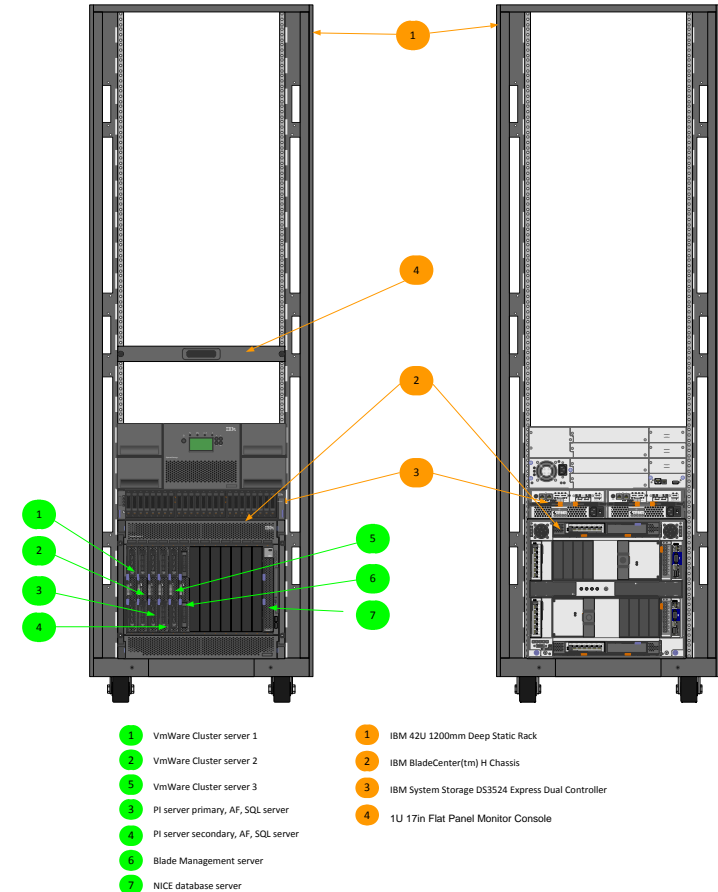
# Server park implementation

Designed with redundancy on hardware level

- 4 copper switches in 2 power zones
- 2 power supply from 2 sources
- 2 Fiber channel switches
- 4 Copper switches

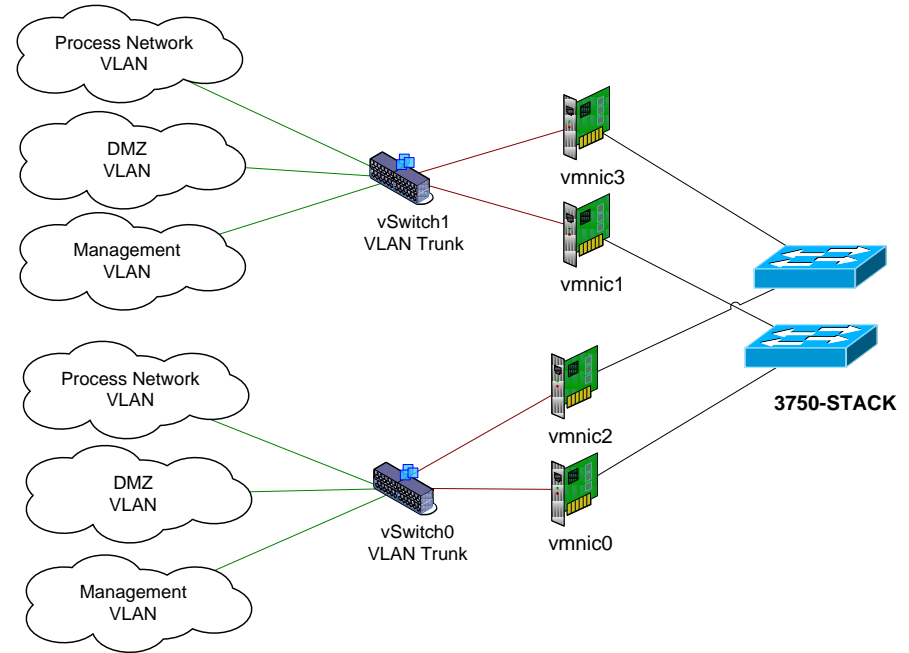
Blade Center H Servers with 7 physical machines

- 2 PI System servers in high availability
- 3 Vsphere 5 Cluster
- Power 7 – Oracle 11 db Server
- Management / Tivoli Server

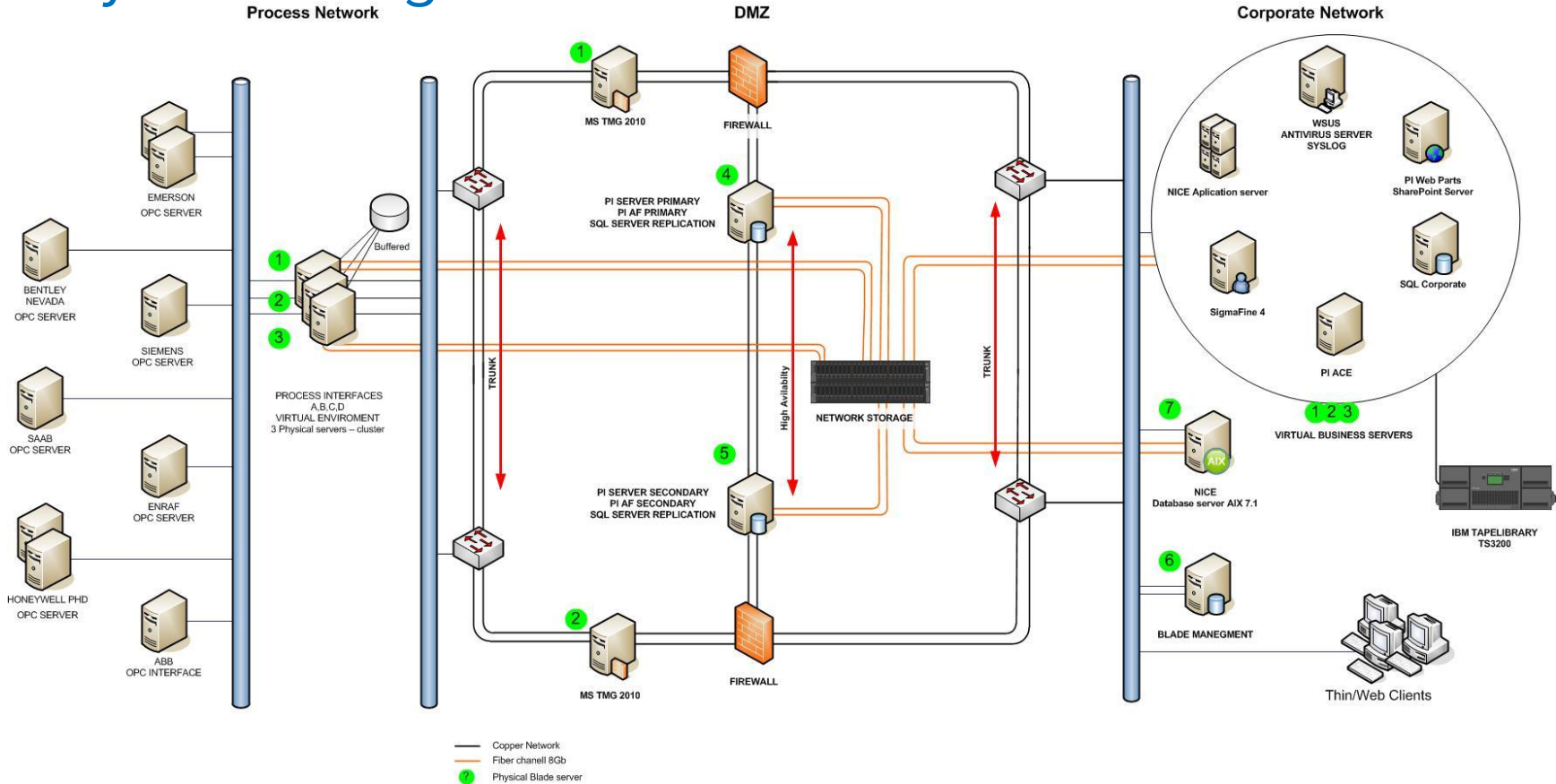


# Connecting distributed control systems

- Based on TCP/IP
- New infrastructure
- Connection with business network
- Securely
  - ISO/IEC 27002
  - NIST PCSRF
  - ISA SP99



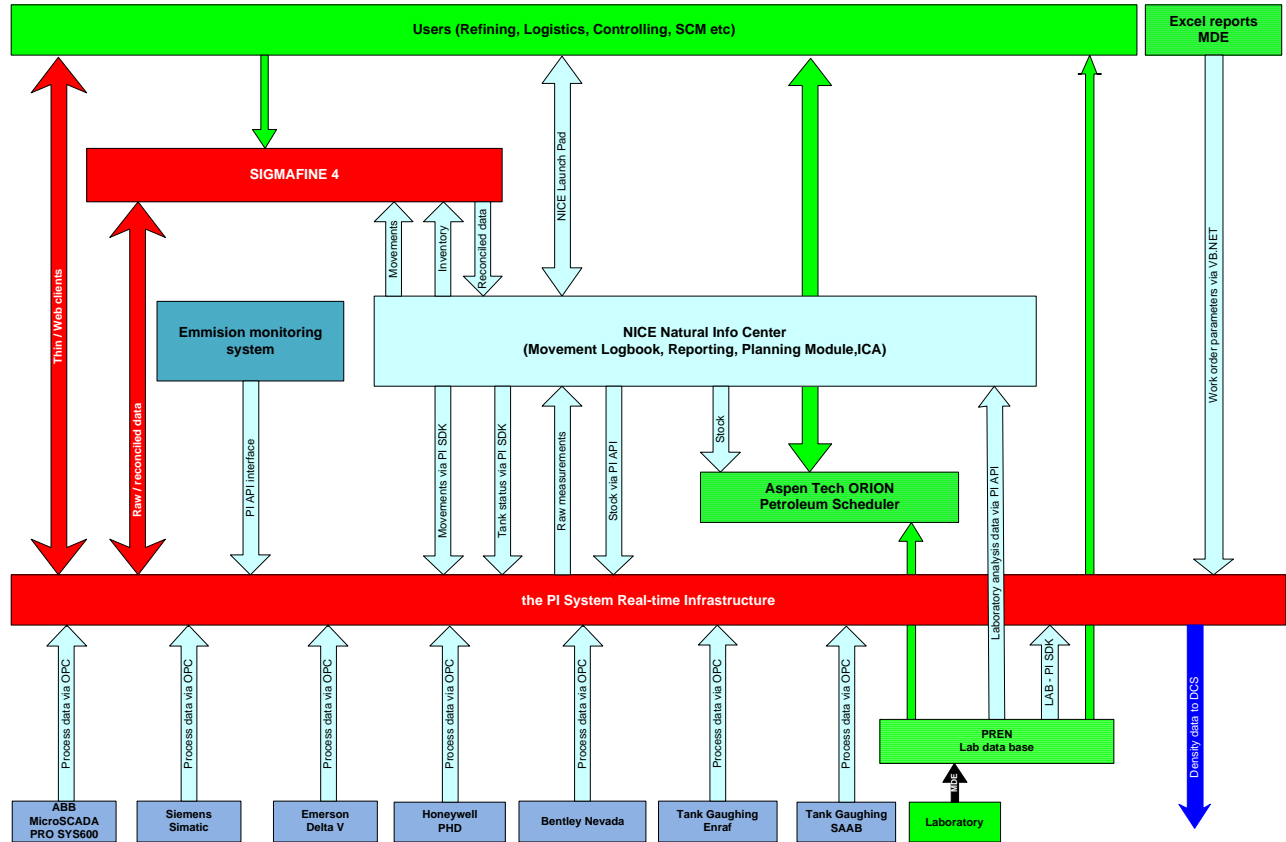
# PI System integration architecture



# Results: Data Integration

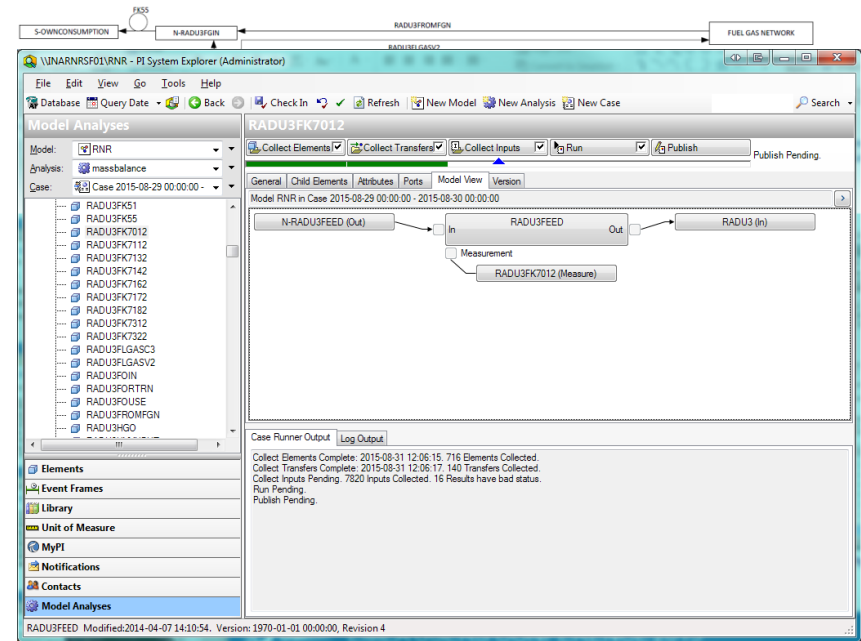
## Connectors

- OPC
- PI SDK
- PI API
- PI OLEDB
- VB for applications
- Native applications



# Results: Refinery material balance improvement

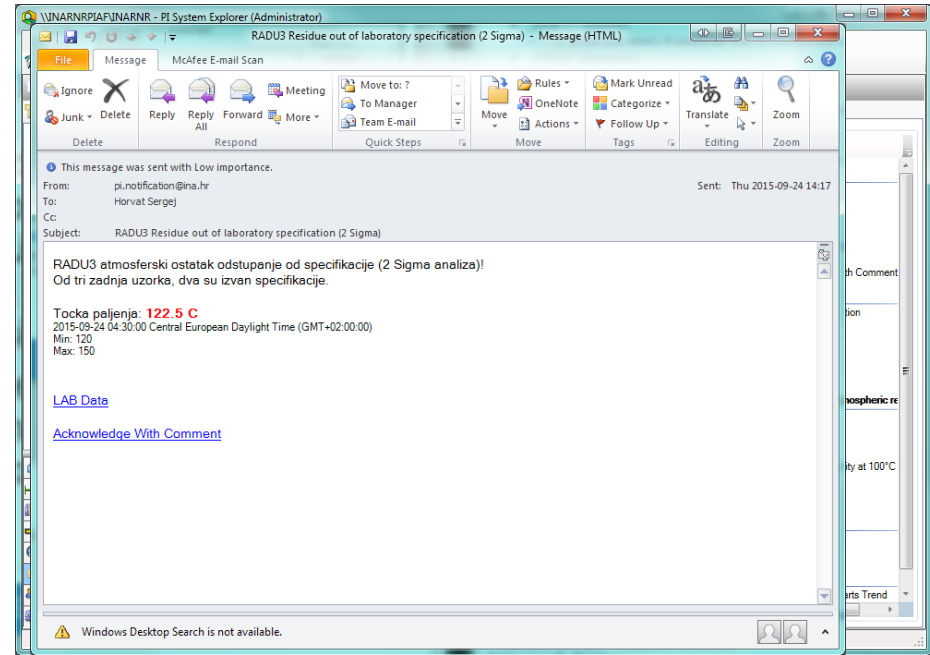
- Based on Sigmafine models by units
- Automatic raw data and movements loading
- Daily reconciliation reports by unit with better insight in unit production
  - yields
  - quantities
  - energy consumption
- Identify primary measurements errors



$$\text{In} - \text{Out} + \text{Production} - \text{Own Consumption} - \text{Accumulation} = 0$$

# Results: Productivity

- Easy and fast data acquisition by users for reporting and analysis from one place
- Automated quality monitoring system with notifications in PI Server Asset Framework
- Over 1 000 calculation inside PI Server Asset Framework
- Custom based reports for easy reuse



# Results: Visibility

## Synthesis –PI WebPart portal

- Layered dashboards for real-time and analyzed data
  - Overview and KPI for managers
  - Details for engineers
- Over 200 views with integrated data model



# Impact on business

- Accurate and faster material balance reports
- Accurate planning
- KPI becomes important
- Earlier and better identification of measurement problems
- Faster reaction on product quality and environmental issues
- Reliable and accurate data for decision making
- One version of the Truth from bottom to top
- External company engagement on control of oil products is not needed anymore



# Future Plans and Next Steps

- Continue Synthesis development
- Upgrade to the PI System 2014 and the PI Asset Framework 2014
- Real-time Energy balance
- Sending smart signals to DCS
  - Alarm system
- Asset management
  - Condition based monitoring
  - Connection to SAP

# Summary

Adequate material and utility balancing is essential for a refinery operations it has direct impact on performance monitoring, planning, benchmarking....and thus directly impacts financial results.

Implementing the PI System as data infrastructure helped us in this challenge.



## BUSINESS CHALLENGES

- A. Adequate material and utility balance
- B. Performance Monitoring & KPI
- C. Production Planning & SCM
- D. Refinery Transparency

## SOLUTION

- A. Improve primary measurement accuracy and reliability
- B. Implement the PI System for real-time data infrastructure
- C. Implement Sigmafine for material balance reconciliation

## RESULTS AND BENEFITS

- A. Accurate daily reconciled material balance
- B. Accurate planning
- C. Increased productivity
- D. Visibility on all plant levels with one version of the Truth

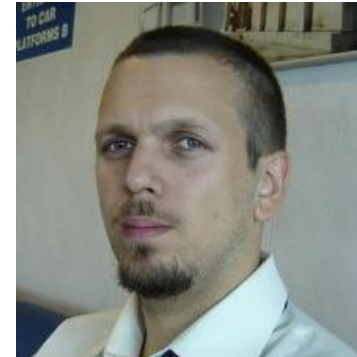
# Contact Information

Sergej Horvat

[sergej.horvat@ina.hr](mailto:sergej.horvat@ina.hr)

Process information engineer

INA d.d.



Rijeka oil Refinery Process information team:

- Darko Klarić - Head of process information
- Igor Gregurić - Process information engineer
- Sergej Horvat - Process information engineer
- Ivica Matasić - Process information engineer
- Zoran Grgić - Processing IT Independent Technician

# Questions

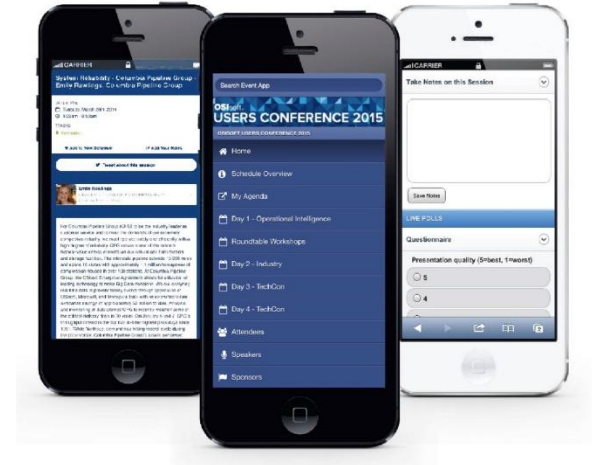
Please wait for the **microphone** before asking your questions



State your  
**name & company**

# Please don't forget to...

Complete the Online Survey  
for this session



<http://eventmobi.com/emeauc15>



감사합니다

谢谢

Danke

Merci

Gracias

Thank You

ありがとう

Спасибо

Obrigado