Orpic Releasing and Realizing the Potential of the PI System

Presented by

A B Rozario

Who are we

- **Oman Oil Refineries and Petroleum Industries Company**
- Nation’s refining and petrochemical company for the Sultanate of Oman
- Orpic is Oman`s largest refining and petrochemical company and is one of the most rapidly growing businesses in the Middle East`s oil industry.
- Orpic provide fuel, chemicals, plastics and other petroleum products to Oman and also exports globally.

Agenda

- About Orpic
- Business Challenge
- PI System Application
- Implementation Details
- Benefit Realization
- Transformation of Data into Value
- Future

Sultanate of Oman

- Oman, officially the Sultanate of Oman, is an Arab country in the southeastern coast of the Arabian Peninsula.
- Muscat is the capital of Oman
- Member of Gulf Cooperation Council (GCC)

About Orpic

- Orpic's history begins in 1982 with the commissioning of its first refinery in Muscat
- Orpic was founded as a Corporation in 2011
- Created from the integration of three companies
  - Oman Refineries and Petrochemicals Company LLC (ORPC) with 2 refineries in Muscat and Sohar
  - Aromatics Oman LLC (AOL) and
  - Oman Polypropylene (OPP)

Orpic Values

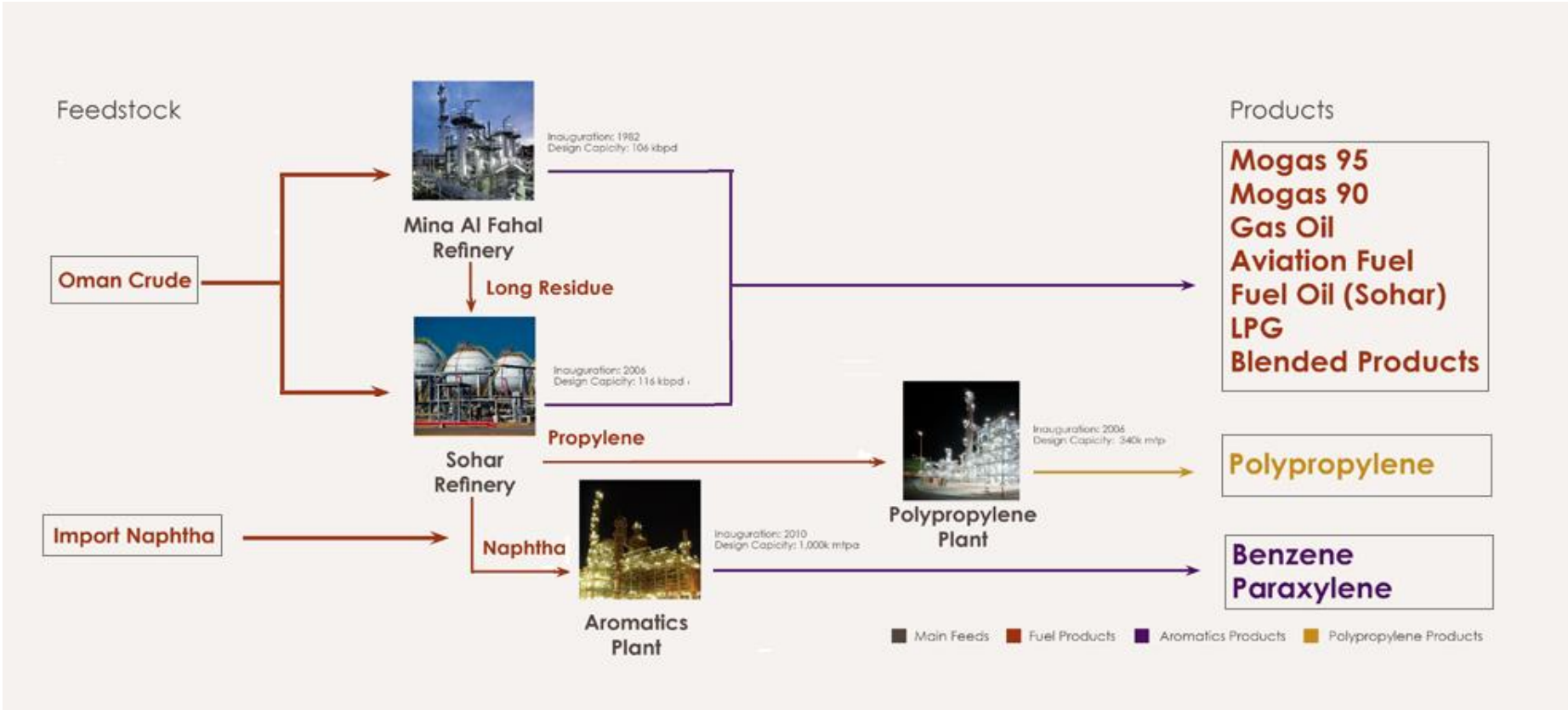
We put safety and the environment first

We bring the potential of our people alive

We aim for leading performance

We serve Oman with pride

Orpic Current Business



Upcoming Mega Projects

Sohar Refinery Improvement Project (SRIP) 2016

- 5 new units are being added to existing refinery
- Will increase Orpic's fuel production by 4.2 million tons per year
- Increase Naphtha & Polypropylene production to 75%, for Aromatics & Polypropylene Plant

Muscat Sohar Pipeline Project (MSPP) 2017

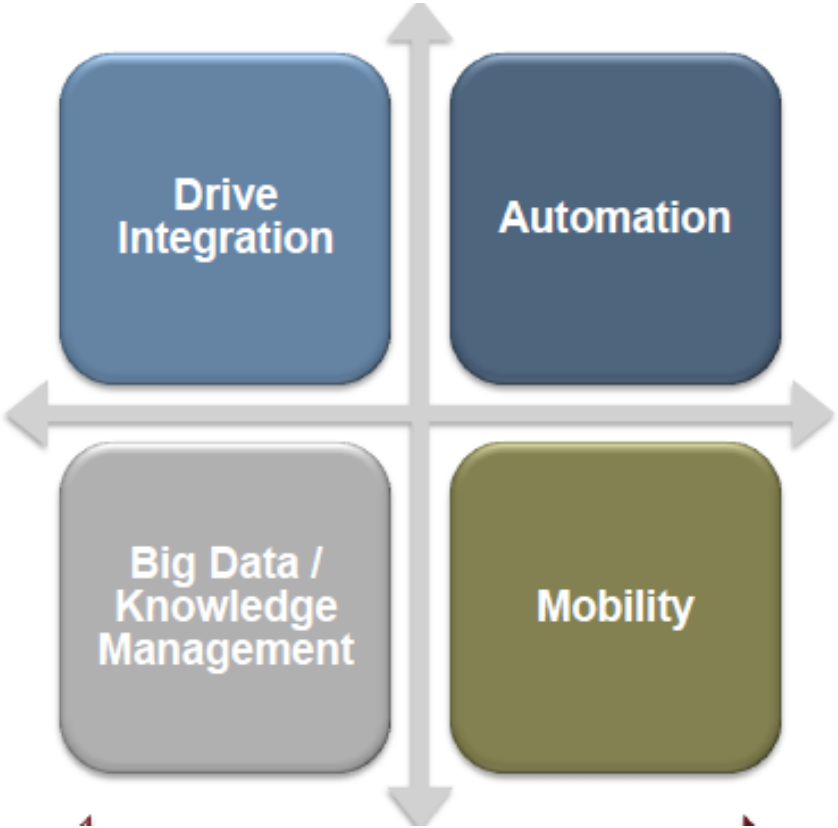
- 280km pipeline & storage facility
- Direct transfer of aviation fuel via multi purpose product pipeline
- Heavy fuel tank traffic to drop by 70%

Liwa Plastic Industries Complex (LPIC) 2020

- Polyethylene production in Oman for the first time
- Increase in plastics production to 1 million tons
- Significantly contribute to Oman GDP

Orpic ITS

- **Information Technology Services**
- ITS is spearheading all information technology initiatives for Orpic and backed up by technically skilled teams handling various aspects of information technology.
- The PI System at Orpic is implemented, enhanced, maintained and delivered by ITS



Orpic's PI Journey

Orpic's Journey

Business Challenge

The Integration

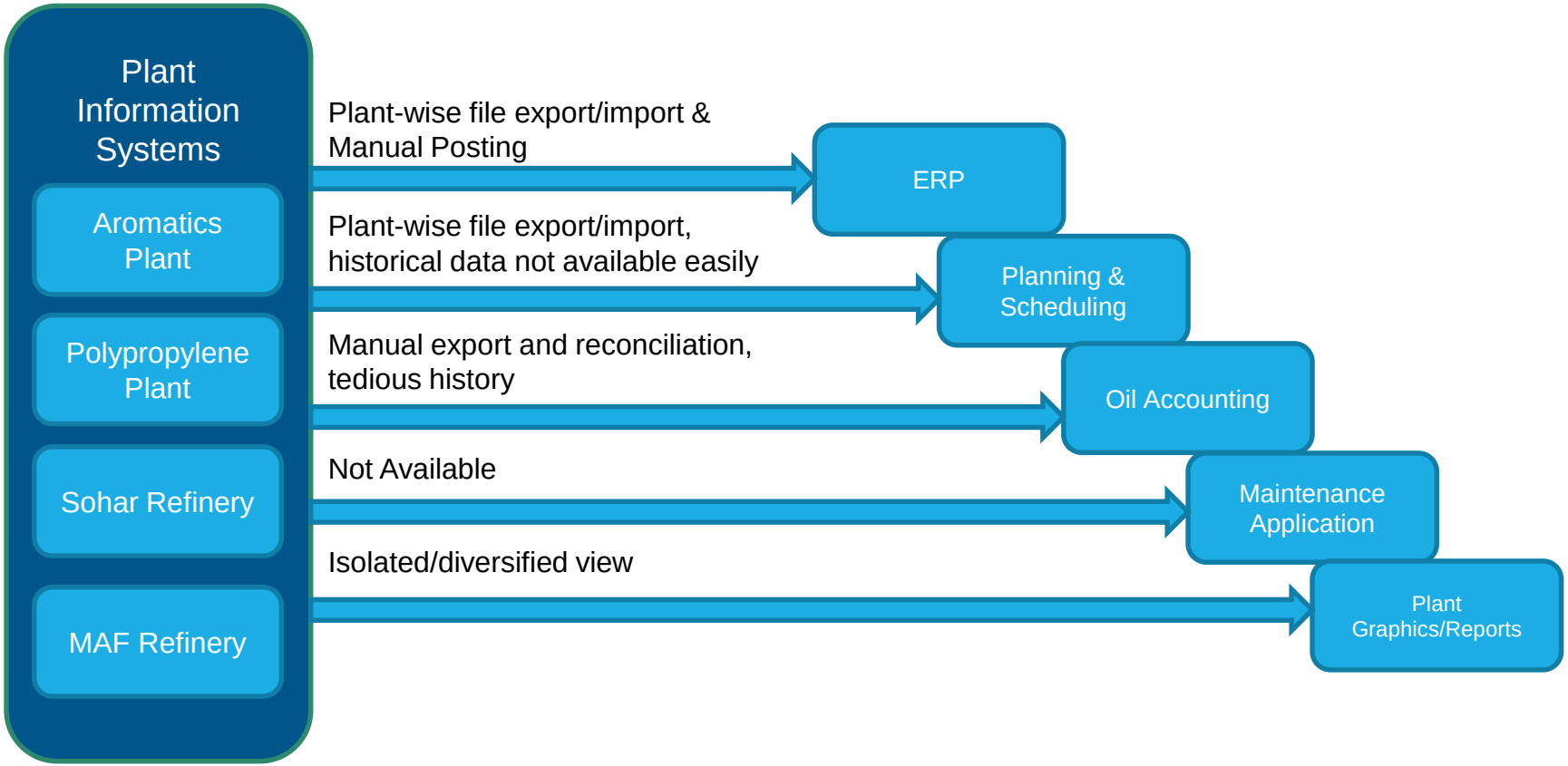
Core Challenge

Individual Orpic plants had plant information in multiple Plant Information Systems

The Effects

- Lack of unified visualization over the plants
- Creation of a simple production report or graphics was hectic, including slow retrieval of data
- Reports from individual plants had manual intervention, errors and inaccurate information
- Time consuming to collate information
- Challenge in routing critical information to ERP, Maintenance and Oil Accounting applications
- Maintenance for individual systems
- Hard to correlate plant-to-plant data
- Long engineering exercise for data transformation or statistical computation

Application Islands



Application Use Case

PI System Roll-Out

Unification by PI System Integration

Cause

- With an integrated mindset, Orpic selected the PI System and decided to position it as a single and integrated source for plant data

Reason

- PI Interfaces or PI Connectors for multiple control systems and databases
- Optimum storage
- Hosting ability in enterprise network and independent from control network
- Graphical and reporting features, similar to DCS, in normal desktop

Action

- Fostering the PI System was done in the following phases:
  - **Enhancements (Phase 1)**
  - **Realization (Phase 2)**

Enhancements (Phase 1)

Integration to individual plant control systems for real-time data

High availability of PI Interfaces for information continuity

High availability and virtualization of PI Server

Integration to ERP, maintenance application, oil accounting, APC, planning & scheduler

Realization (Phase 2)

Develop and deploy all plant graphics into the PI System, which was limited to plants

Migration of complete plant historical data from various plant information systems

Migration of laboratory results from various plants

Implementation

Plant History Migration Project

Project Objectives

Replace data and functional features of existing plant information systems (PIMS) & Laboratory Information System (LIMS)

Transfer historical data from existing PIMS into PI System

Construct graphics, reports and dashboards handled by existing PIMS

Train and facilitate staff to use the PI System

Project Stages

- Interfacing plan
- Migration strategy
- Reconciliation mechanism
- Validation process

- Temporary environment setup
- Replicate existing PIMS as VMs
- Build OPC H-DA/RDBMS interface to existing PIMS & LIMS
- Temporary PI Server with production archives

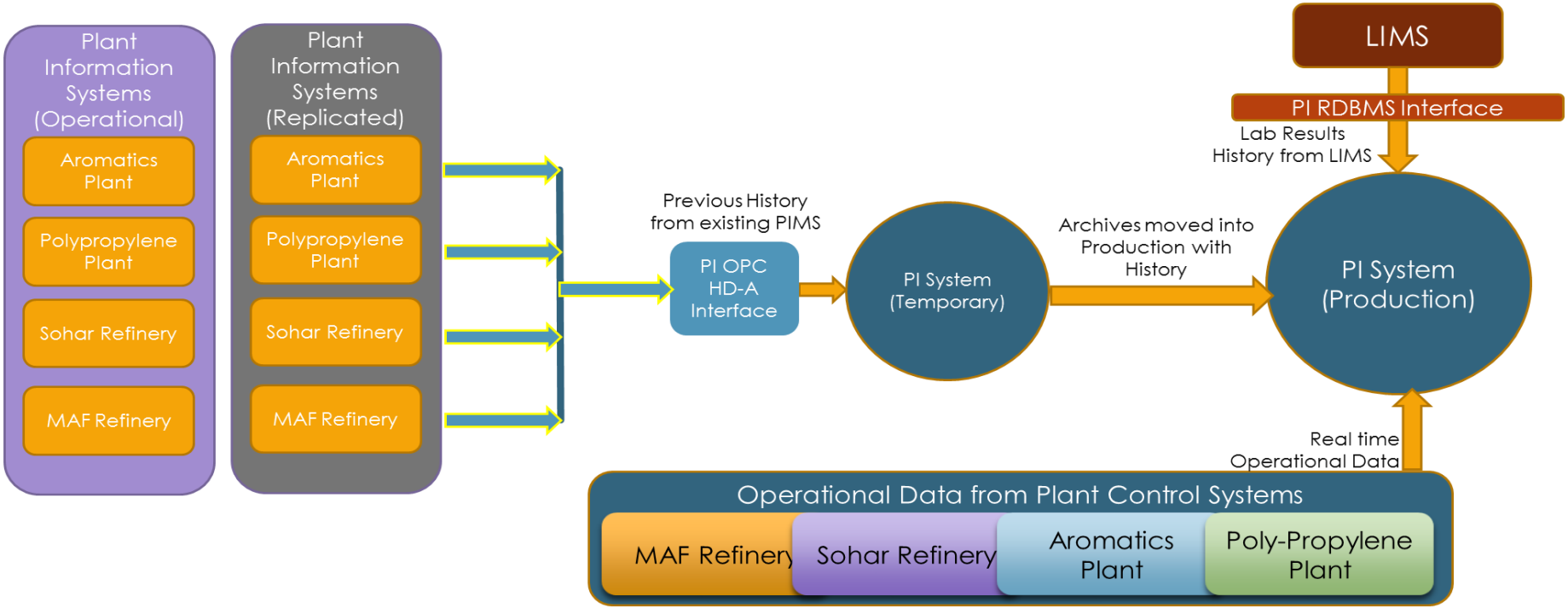
- PI Tag configuration to OPC H-DA interfaces
- PI Tag Distributor Tag SQL query modification
- PI Tag mapping to PIMS Tags

- Execute H-DA recovery in time slices
- Enable LIMS Distributor Tag for recovery
- Receive data into archives in temporary PI Server

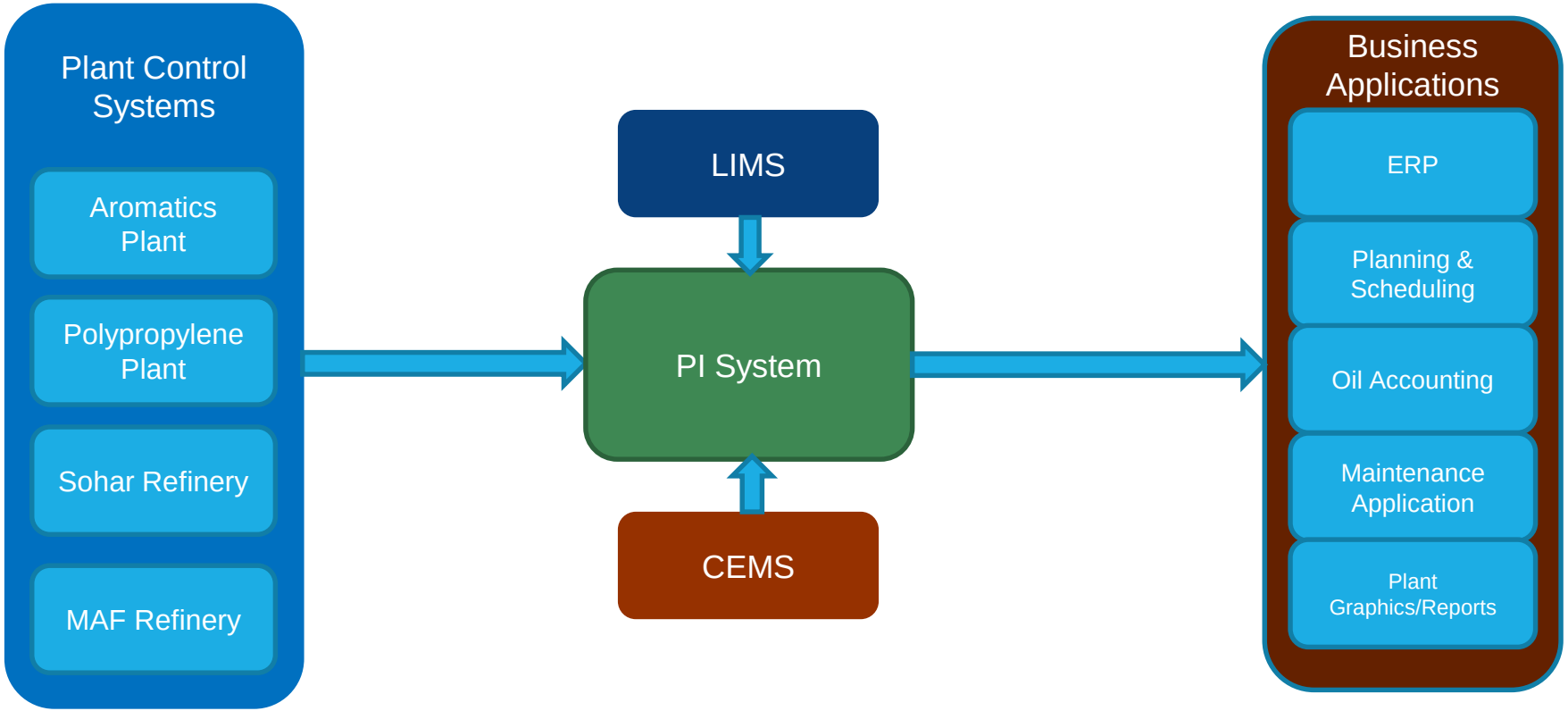
- Confirmation of data in temporary PI Server
- UAT

- Migration of filled archives to production PI System
- Remove existing PIMS

Project Setup



Plant History Migration Project

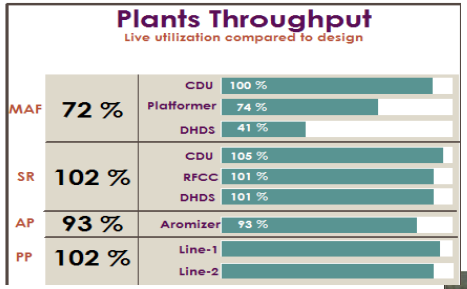


Realized Benefits

Plant Integration

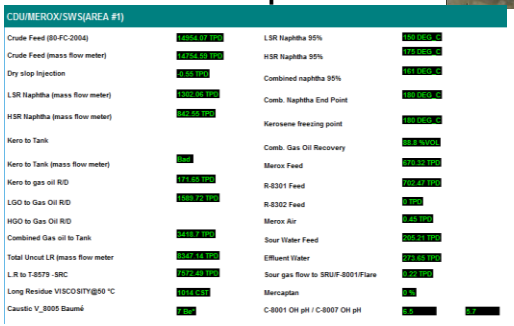
- Unified view and access to data from all plants
- Consolidated data storage
- Data correlation between plants for analysis, balancing and reconciliation

Plant Utilization

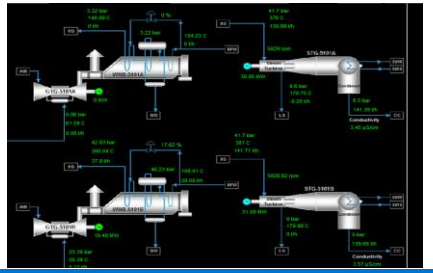


Pipeline Monitoring

Plant Reports



Utilities Consumption



Realized Benefits

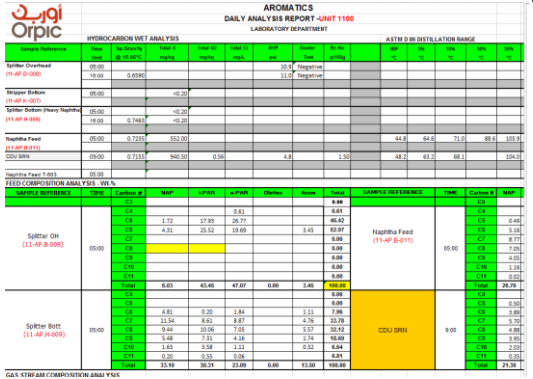
Lab Integration

- Availability of product quality along with operation parameters
- Rapid volumetric calculations

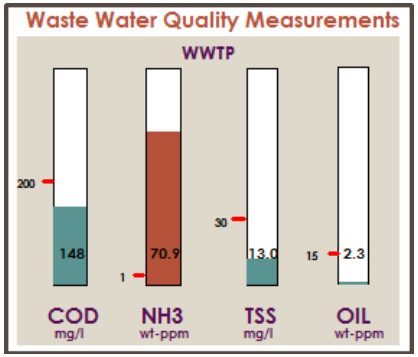
ERP Integration

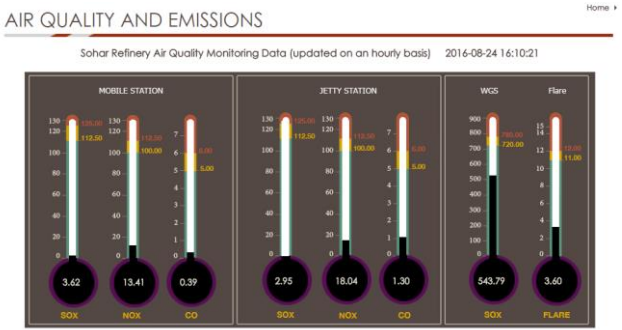
- Process information like tank farm stock, material movements, process parameters during transfers are available for reconciliation
- Emission statistics to our public website

Area Reports



Utilities Quality Report





www.orpic.om/AirQualitySample.aspx

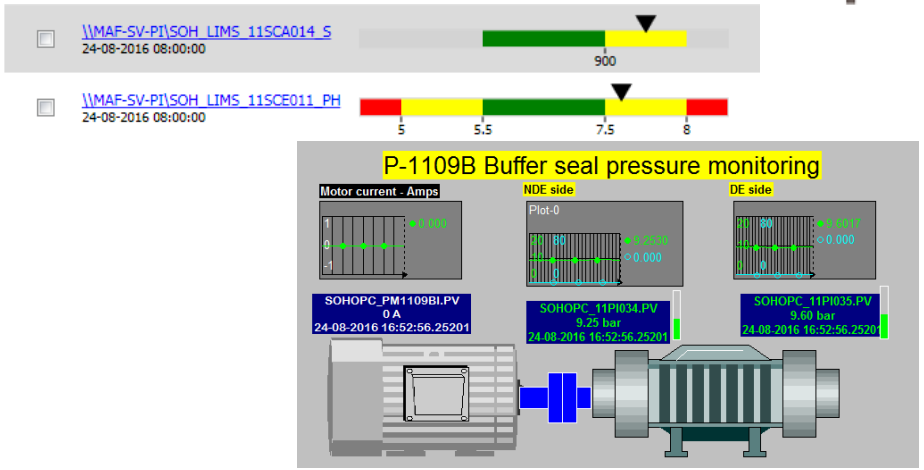
Realized Benefits

Maintenance Integration

- Process parameters affecting the life of plant assets are posted from the PI System to maintenance application
- Predictive Maintenance
- Condition Based Maintenance (CBM)

Virtualization

- Dependency on IT hardware and its maintenance removed
- Scalability
- Consistent backups, disaster recovery setups ensuring business continuity
- Upgraded infrastructure
- Reduced maintenance



Realized Benefits

Data Migration

- Older historical data now available in the PI System for all plants
- Number of systems reduced by factor of 4 and TCO (total cost of ownership) by 40%
- This includes lab and process data for all years
- Inclusion of process graphics and reports in the PI System for access to plant visualizations beyond the control room

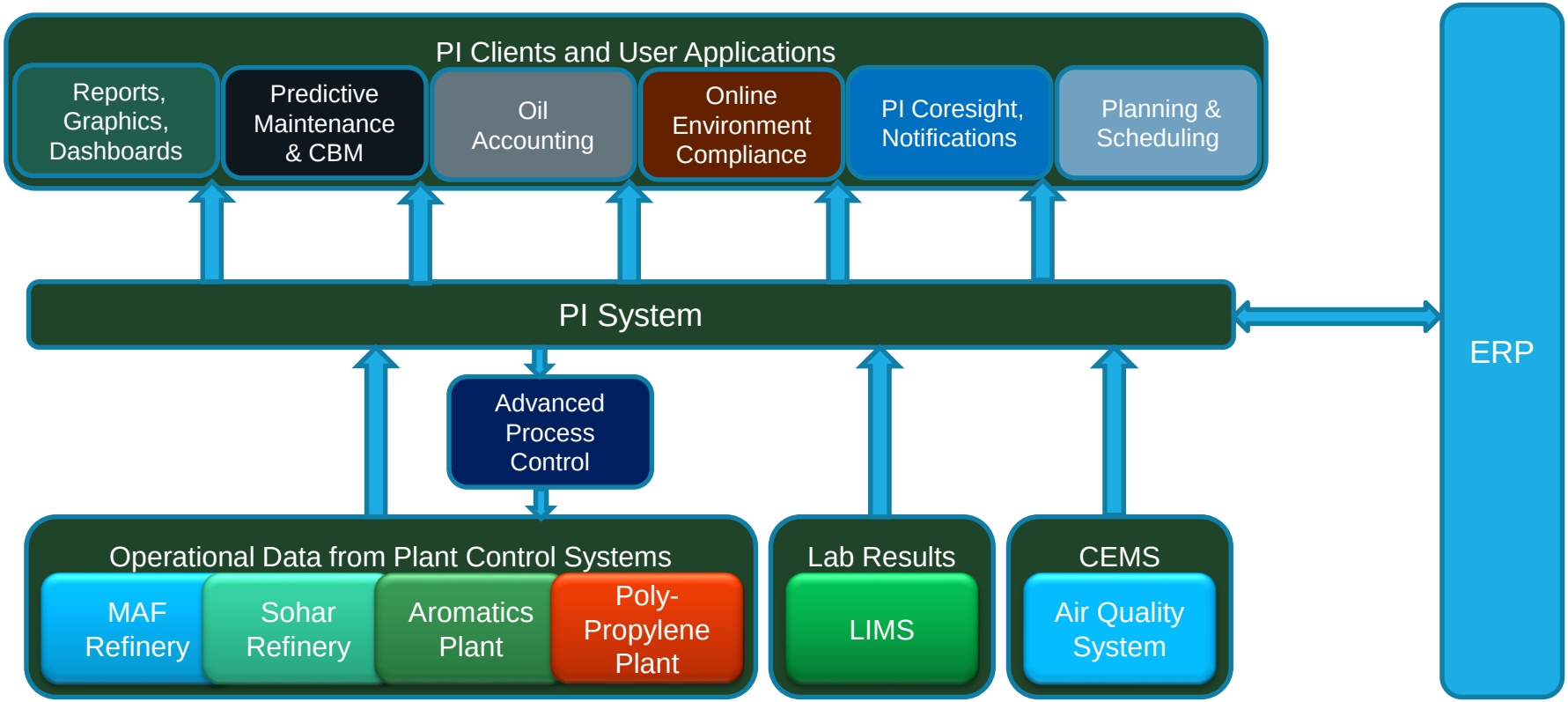
Business

- Ease of integration, use and administration
- Ease of digital transformation
- Valuable information reaches key decision makers, assisting in reporting, optimization and improvisation
- Excellence in routing critical information to ERP, maintenance and oil accounting applications
- Faster retrieval of historical data

PI System Products Used at Orpic

- PI Server 2012
  - Asset Framework (AF)
  - Notifications
- PI OPC DA/H-DA Interfaces
- PI RDBMS Interfaces
- PI System Access (PSA) with OPC & web services
- PI Coresight
- PI WebParts & DataLink Server
- PI ProcessBook & DataLink

PI System @ Orpic

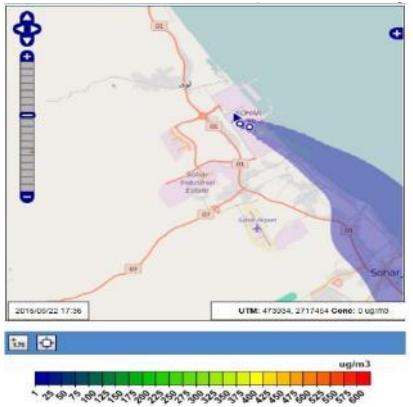


Digital Transformation

Summary

Air Dispersion Modelling

- A real-time simulation application generates flare, NOx and SOx concentration as plume from metrological and plant volumetric information
- PI System Calculates the exiting gas composition, toxicity concentration and velocity from DCS data.
- Metrological data is downloaded from online.

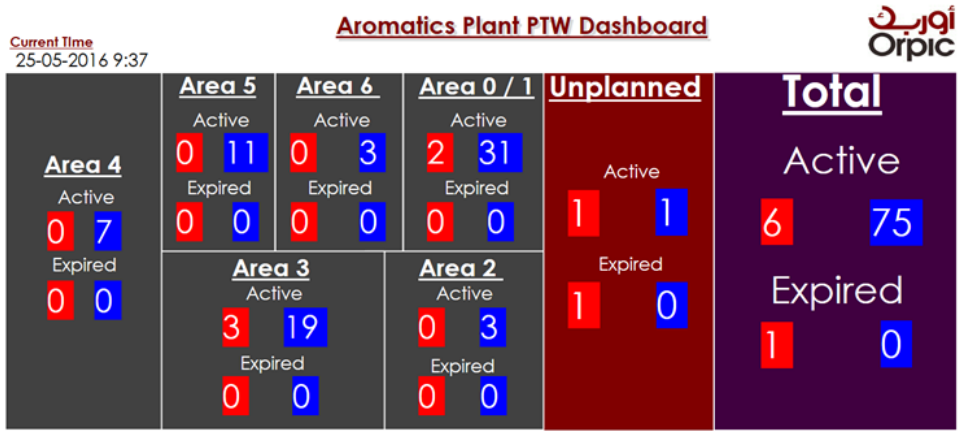


BUSINESS CHALLENGES	SOLUTION	RESULTS AND BENEFITS
• Environmental monitoring and emission planning were critical for Orpic • Predictive environment simulations based on metrological data	Combining PI System calculations ability using Performance Equations (PE) and online Metrological forecast, the environment dispersion tool was developed and implemented over CALPUFF	• Generating a simulation plume with weather inputs from WRF metrological data. • Generating simulated emission forecasts and analysis for Orpic.

Summary

OPERATIONAL SAFETY AND WORK PERMIT INDEX ON PI SYSTEM FROM ERP

The PI System is a cross-information tool between the corporate world and the plant, and at Orpic, we've utilized it to share critical operational safety information with plant communications.



BUSINESS CHALLENGES

- Real-time work monitoring in plant areas
- Safety index critical during evacuation

SOLUTION

- The permit counts of hot & cold permits are written to PI Tags from the ERP, and the PI System provides this information via PI Coresight displays in control rooms.

RESULTS AND BENEFITS

- Online visualization of permits illustrating work in respective plant areas
- Clear insight and trigger for evacuation plan.

TRANSFORMATION OF PI DATA @ ORPIC

In business and corporate scenarios

- Business systems, like ERP, BI and public websites use the PI System to extract data, such as stock inventories, material shipments, productivity and utilization.

In accounting

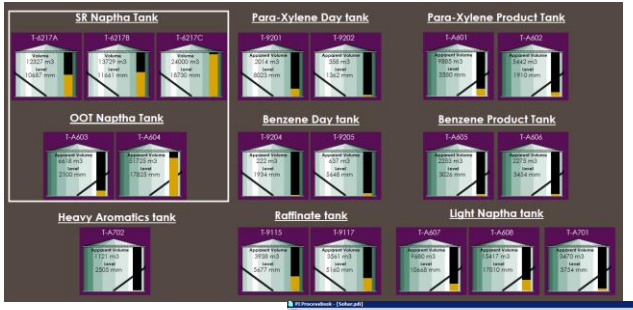
- The mass balance for the Orpic plants is computed using PI System data as well as material gains and losses.

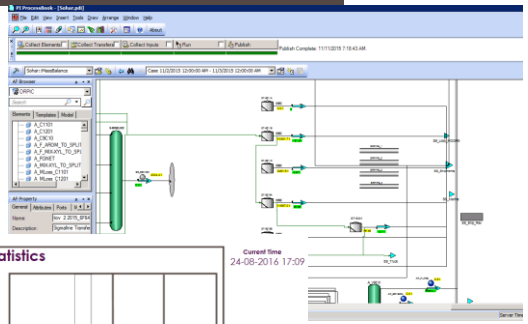
In HSE

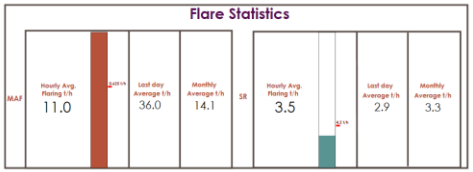
- Having process and air/water quality analyzers integrated, Orpic is able to perform above environmental monitoring, emission control and regulation compliance requirements.

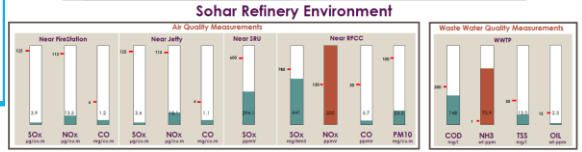
In supply chain

- Historical and real-time information are required for scheduling and planning. PI System data serves as the base data for operational scheduling, import/export planning, vessel scheduling, etc.









TRANSFORMATION OF PI DATA @ ORPIC

In Process Optimization

- Improving plant operational efficiency with plant analysis, Integrity Operating Window reactions based on plant conditions are achieved through PI System data

In Maintenance

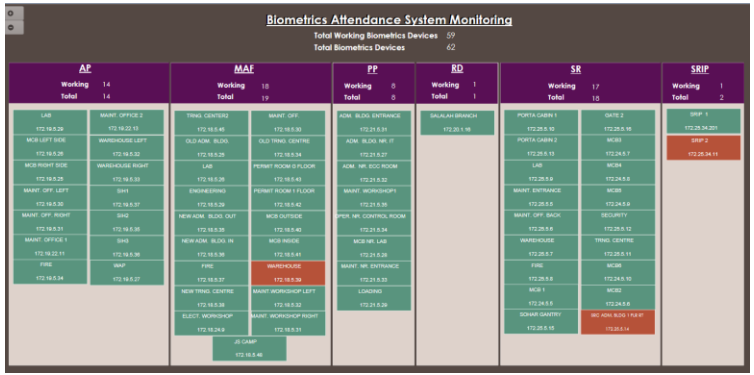
- as Condition based Monitoring and Predictive Maintenance
- Asset lifetime estimation

IN HRS

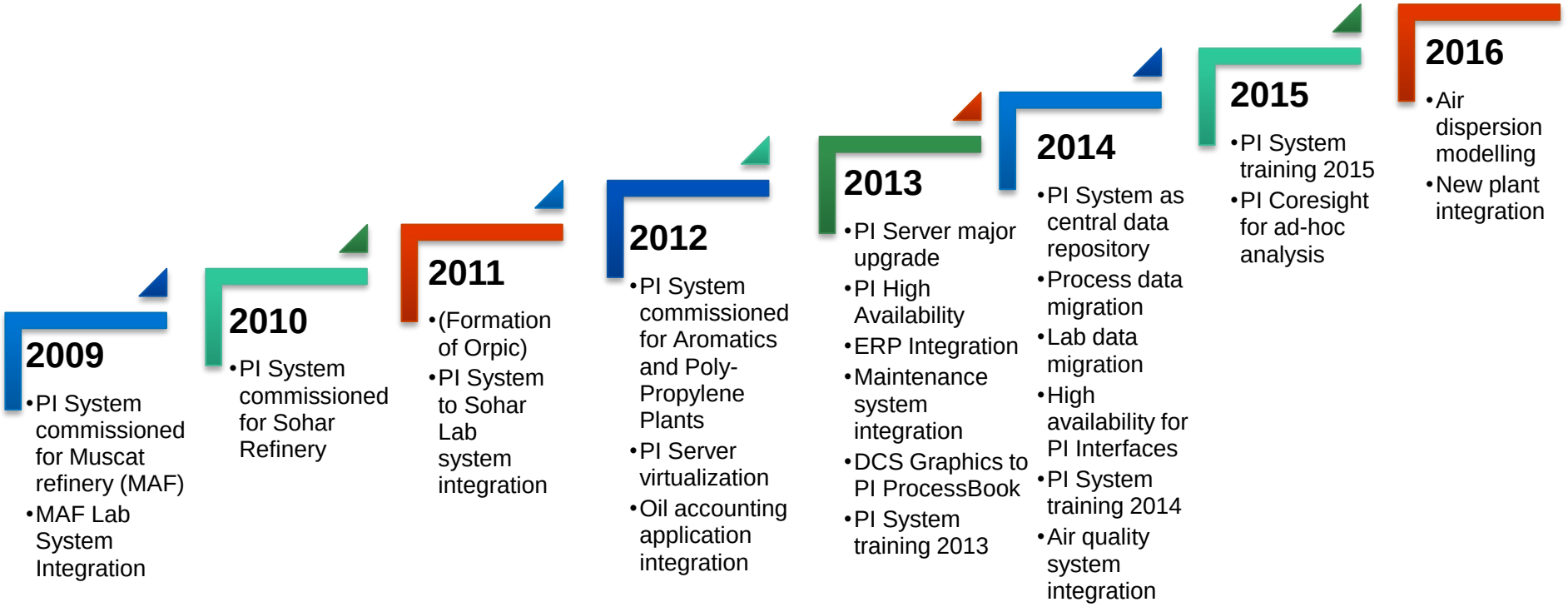
- Biometric Entry System Monitoring to monitor the biometric systems active state and report on failures to HR Team Members

Daily Orpic Plant

MAF Refinery	Actual/Design
CDU	88 %
DHDS	0%
Platformer	77%
Sohar Refinery (BPSD)	
CDU	105 %
RFCC	100 %
DHDS	101 %
Aromatics Plant (MT/day)	
NHTU Feed	95 %
Lt. Naphtha	83 %
Paraxylene	82 %
Benzene	79 %
PX+BZ	81 %
Polypropylene Plant (MT/Day)	
PP Feed	106 %
PP Granule Production	96 %



Progress Map



Coming Up…

- Integration of Orpic mega projects into the PI System landscape
- Mobile & web-based solutions for the PI System

Contact Information

A B Rozario
Berttilla.rozario@orpic.om
Sr. Specialist – MES IT
Orpic

Questions

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

State your **name & company**

Please remember to…

Complete the Online Survey for this session

http://ddut.ch/osisoft

감사합니다

谢谢

Danke

Gracias

Merci

Thank You

ありがとう

Спасибо

Obrigado