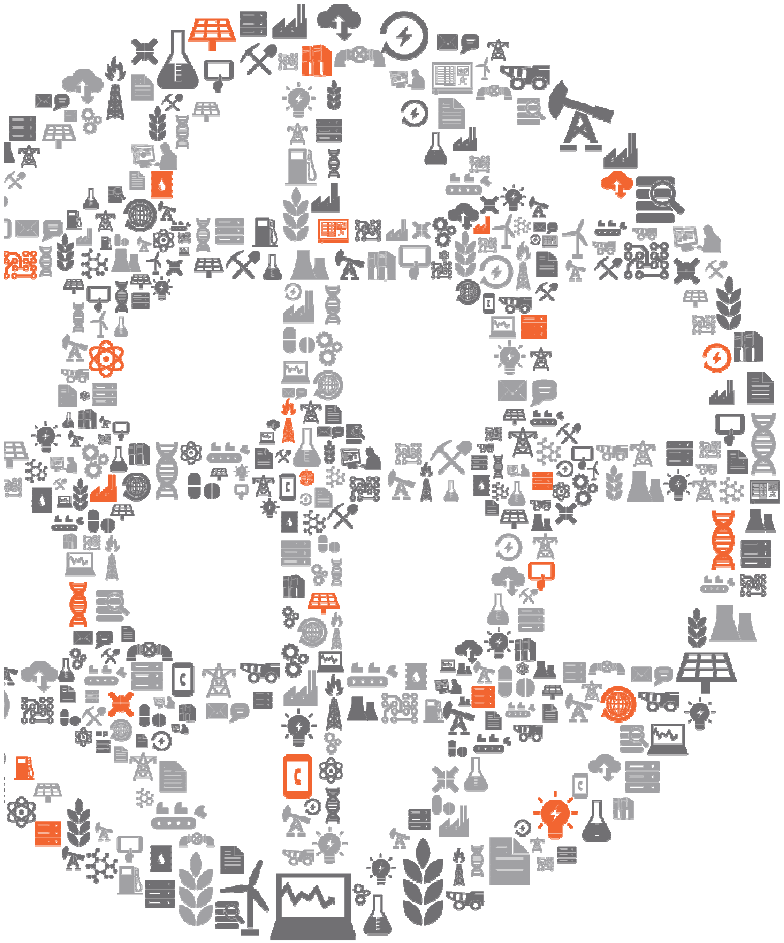

Dynamic Vessel Monitoring System

Presented by **Pradeep Gupta**

Adani Ports and SEZ Limited

Contents

1	Adani Group
2	PIMS
3	Dynamic Vessel Monitoring System (DVMS)

The Adani Group

Leading Business Conglomerate with interest in diversified sectors...

Resources

Sourcing hydrocarbons from around the world to fuel India's growth

Resources

- Coal Mining
- Oil & Gas Exploration
- Coal Trading

Logistics

Owning a large network of ports, railways, ships and operate various facilities around our ports

Logistics

- Multi Modal Logistics
- Ports
- Special Economic Zones

Energy

Leading player in private sector power generation

Energy

- Gas Distribution
- Power
- Bunkering
- Grain Silos & Fruits
- Edible Oil

Adani Group – Listed Companies

Adani Group has 3 listed companies....

Adani Enterprises Limited

(AEL)

Adani Power Limited

(APL)

Adani Ports & SEZ Limited

(APSEZ)

Adani Ports Infrastructure

Helping India build Port Capacity

- Adani initially started its first port at Mundra location. Later on it has aggressively added new Indian & Overseas ports to its portfolio.
- Adani Ports is targeting to achieve the mammoth figure of 200 million MT per annum Indian cargo handling by 2020
- In the last fin year Adani Ports (India) handled over 90 Million MT of cargo

Indian Ports & Terminals	Location	Year of Operations (expected)	Existing Capacity	Planned Capacity
Adani Mundra Port	Mundra, Gujarat	1998	165	240
Adani Petronet (Dahej) Port Pvt. Ltd.	Dahej, Gujarat	2010	20	20
Adani Abbot Point Terminal Pty Ltd	Australia	2011	50	100
Adani Hazira Port Private Ltd.	Hazira, Gujarat	2012	25	75
Adani Murmugoa Coal Terminal Pvt. Ltd.	Goa	(2013)		7
Adani Vizag Coal Terminal Pvt. Ltd.	Vizag, Andhra Pradesh	(2013)		7
Adani Kandla Bulk Terminal Private Ltd.	Kandla, Gujarat	(2014)		20
Total Capacity (Million MT)			**260**	**469**

APSEZ : Unparallel Operational Expertise

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Pilotage &Towage

- 20 tugs & master mariners
- 13 Dredgers for Capital Dredging across ports

Internal Transportation

- >580 kms of Conveyor Systems
- >120 kms of private roads
- >80 kms Railway Sidings

Berthing

- 22 Bulk Berths
- 8 Container Berths
- 2 Single Point Moorings

Storage

- 1 mn sq. mtrs of Warehouses
- 400 mega liters Liquid Tank Farms
- 12.5 Hectares of Back up yard for containers

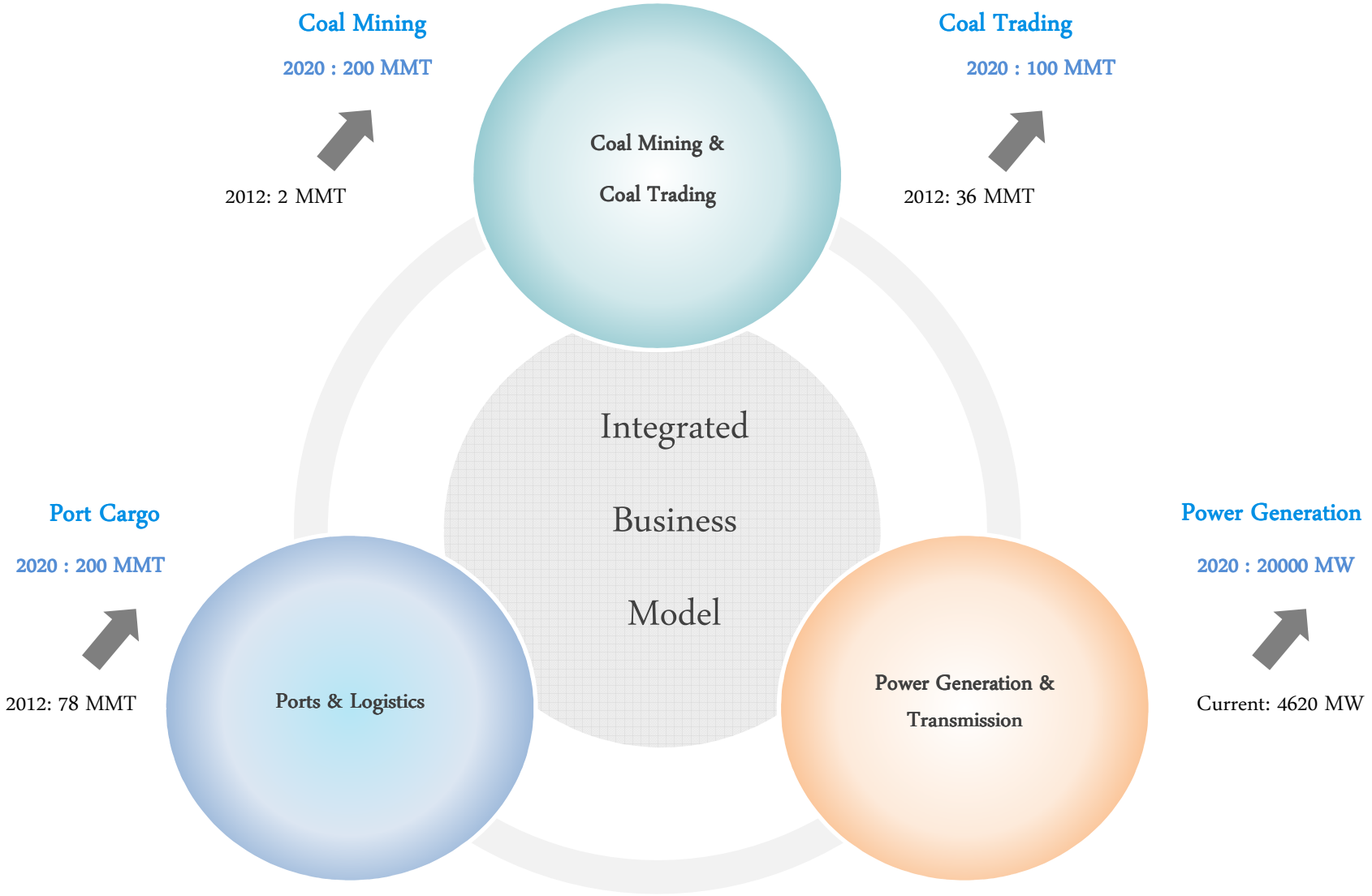
Cargo Handling

- Bulk Handling: 185 MTPA
- Containers: 5.25 MnTEUs
- Crude Handing: 50 MTPA
- Fully Mechanized Cargo handling terminals

Evacuation

- 150 kms of private railway line
- Pipelines over >1,000 kms
- 3km airstrip at Mundra

Today and 2020



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Introduction to PIMS

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- PIMS is a tool to achieve 'Operational excellence' by optimizing production in real time
- Integration of applications like Oracle, SQL server based and intelligent automation systems onboard Conveyors & Cranes
- PIMS allows the evaluation of system and operator performance
- Provide client tools for better trending, handling complex calculations
- PIMS will be consisting of two main areas:-
  - ✓ Integration of equipment information
  - ✓ Reports / dashboards

PI Components used in PIMS

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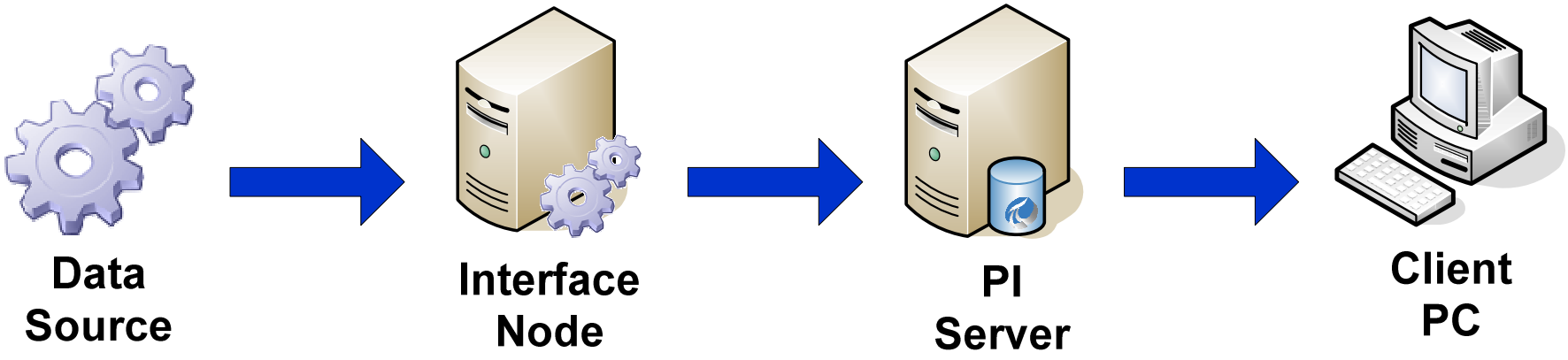
- PI Server 2010 with 10000 tags at Mundra,2000 tags at Dahej, 2000 tags at Hazira,2000 tags at Goa and 2000 tags at Vizag ports
- PI Asset Framework
- PI Clients- PI Combo (PI Processbook & PI Datalink)
- PI RDBMS Interface
- PI OPC Interface
- PI Notification
- PI Web Clients
- PI Modbus Serial Interface
- PI ACE
- PI PSA

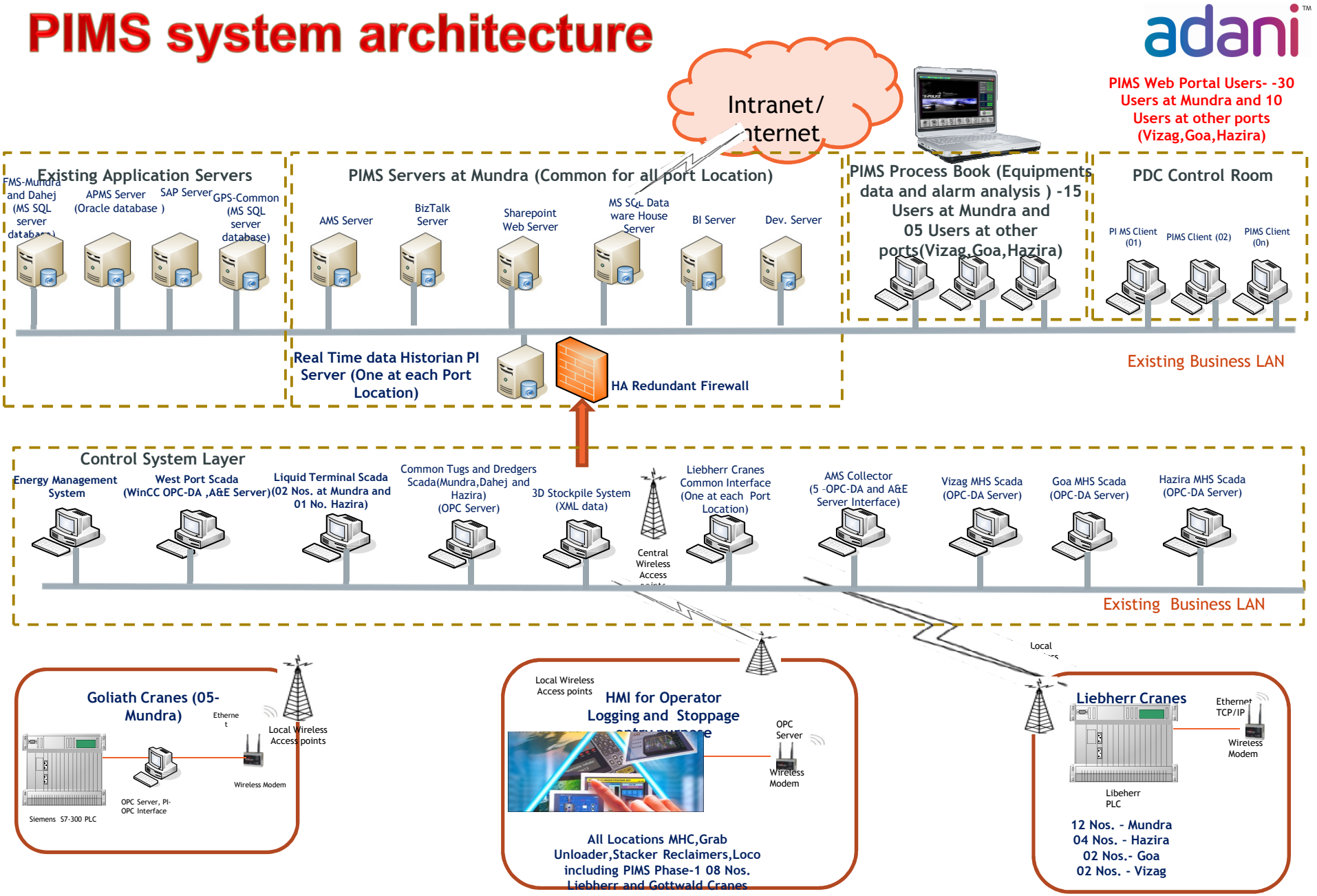
Project comprised integration of

- Coal conveyor system
- Hopper system
- Bagging system
- Mobile harbor and yard cranes
- Fuel management system
- GPS

- Liquid terminal automation
- LOCO
- Stacker / reclaimer
- Wagon and truck loading system
- SAP reports integration
- Reports using SSRS



PIMS system architecture



High level system architecture

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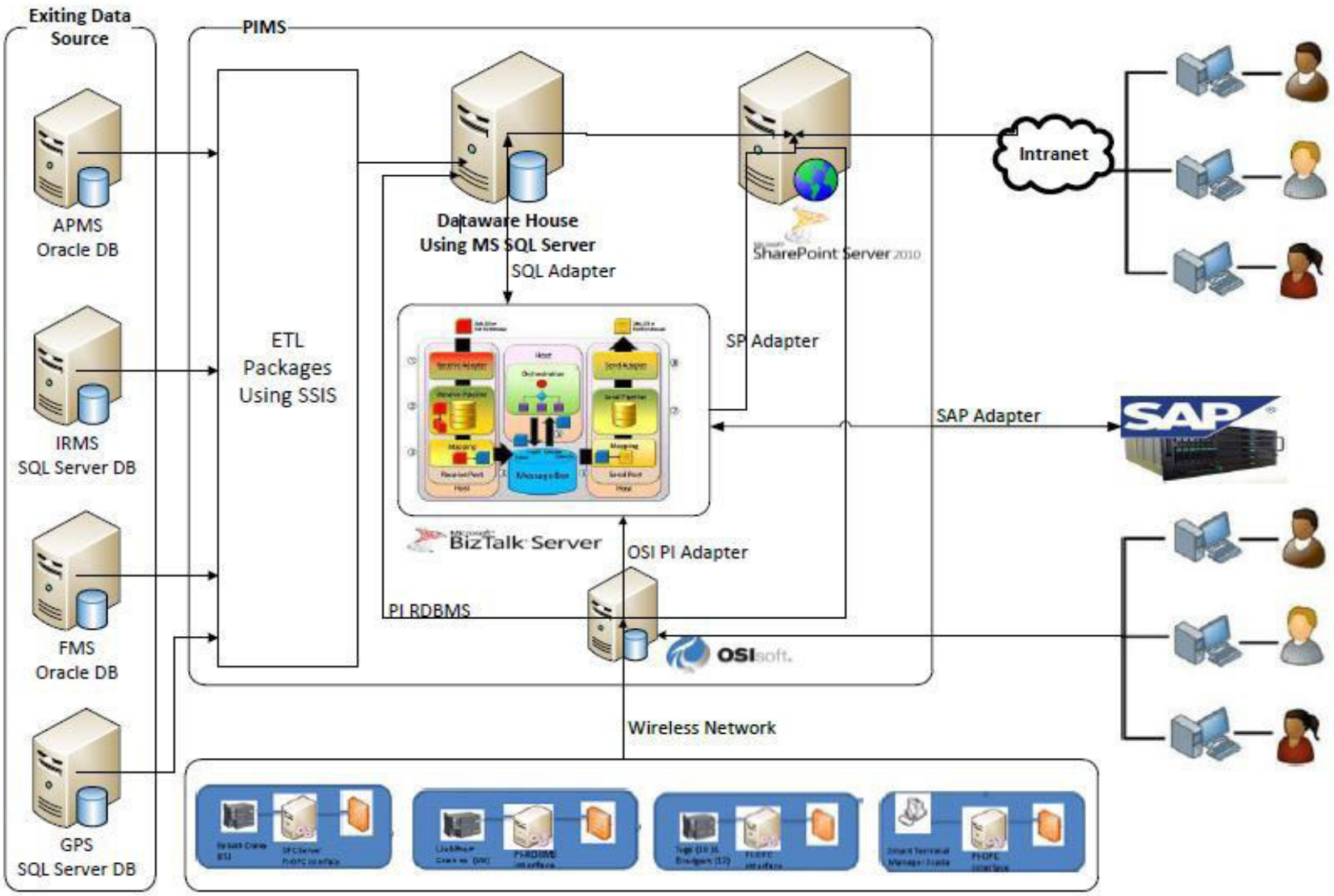
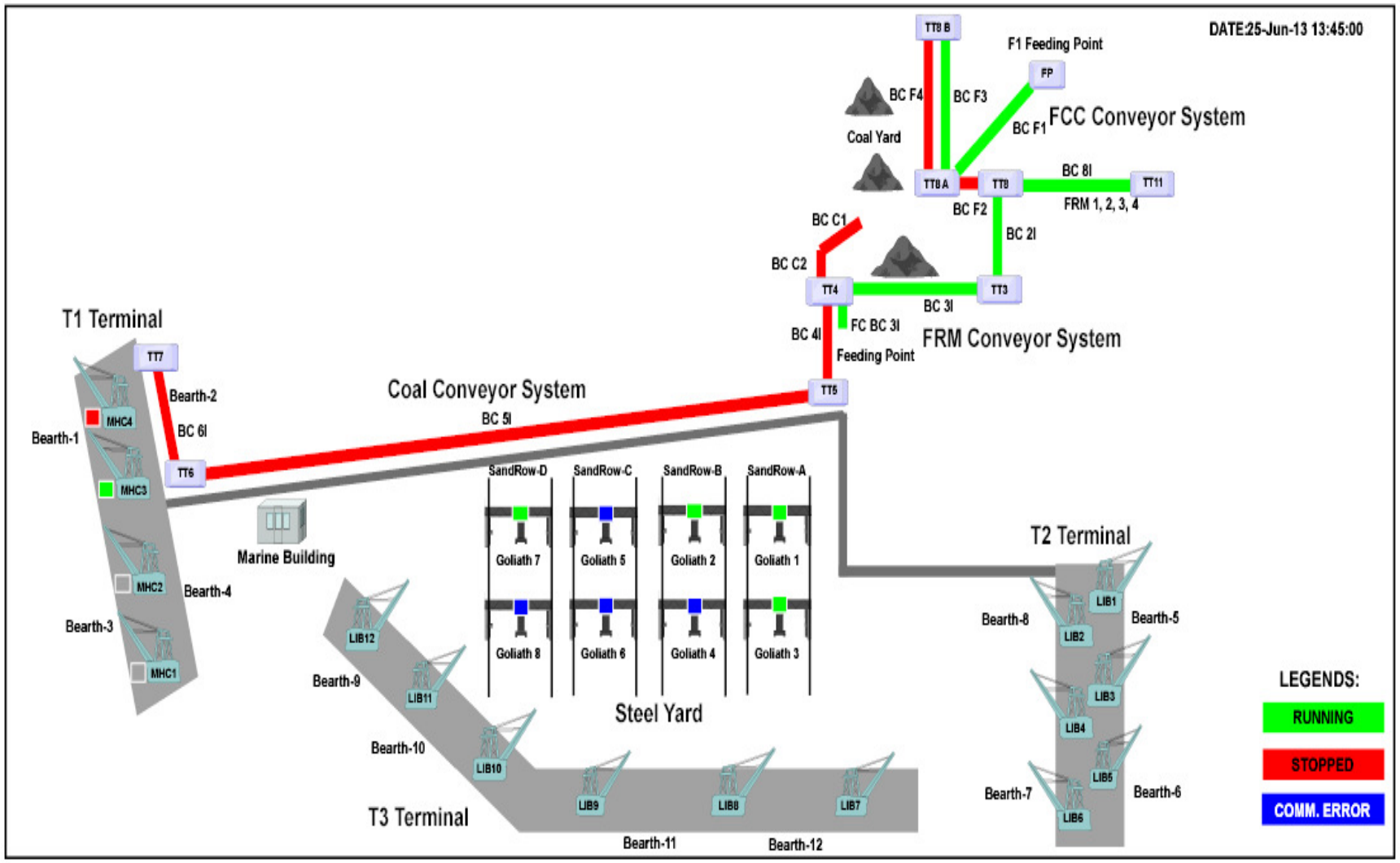
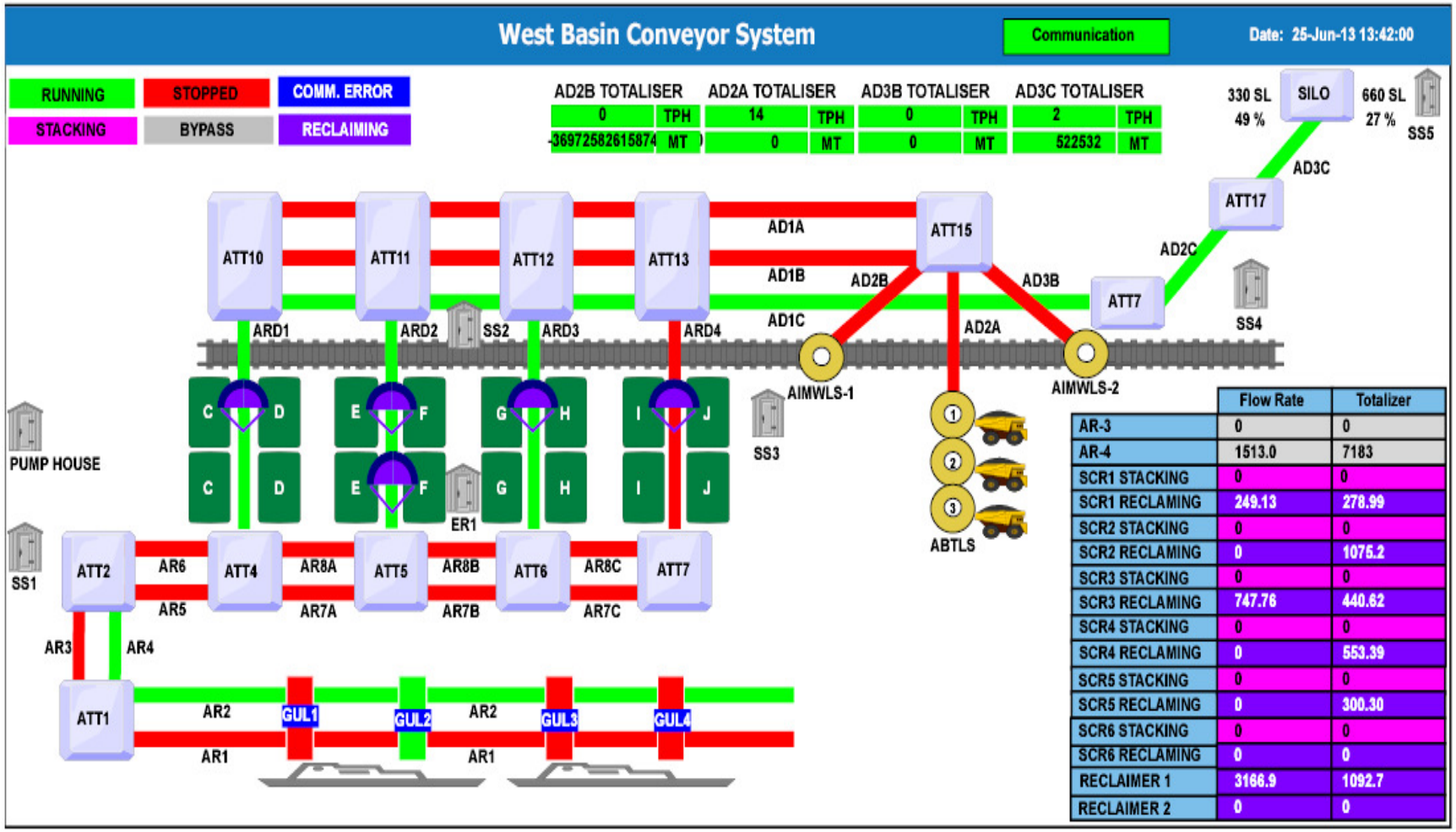


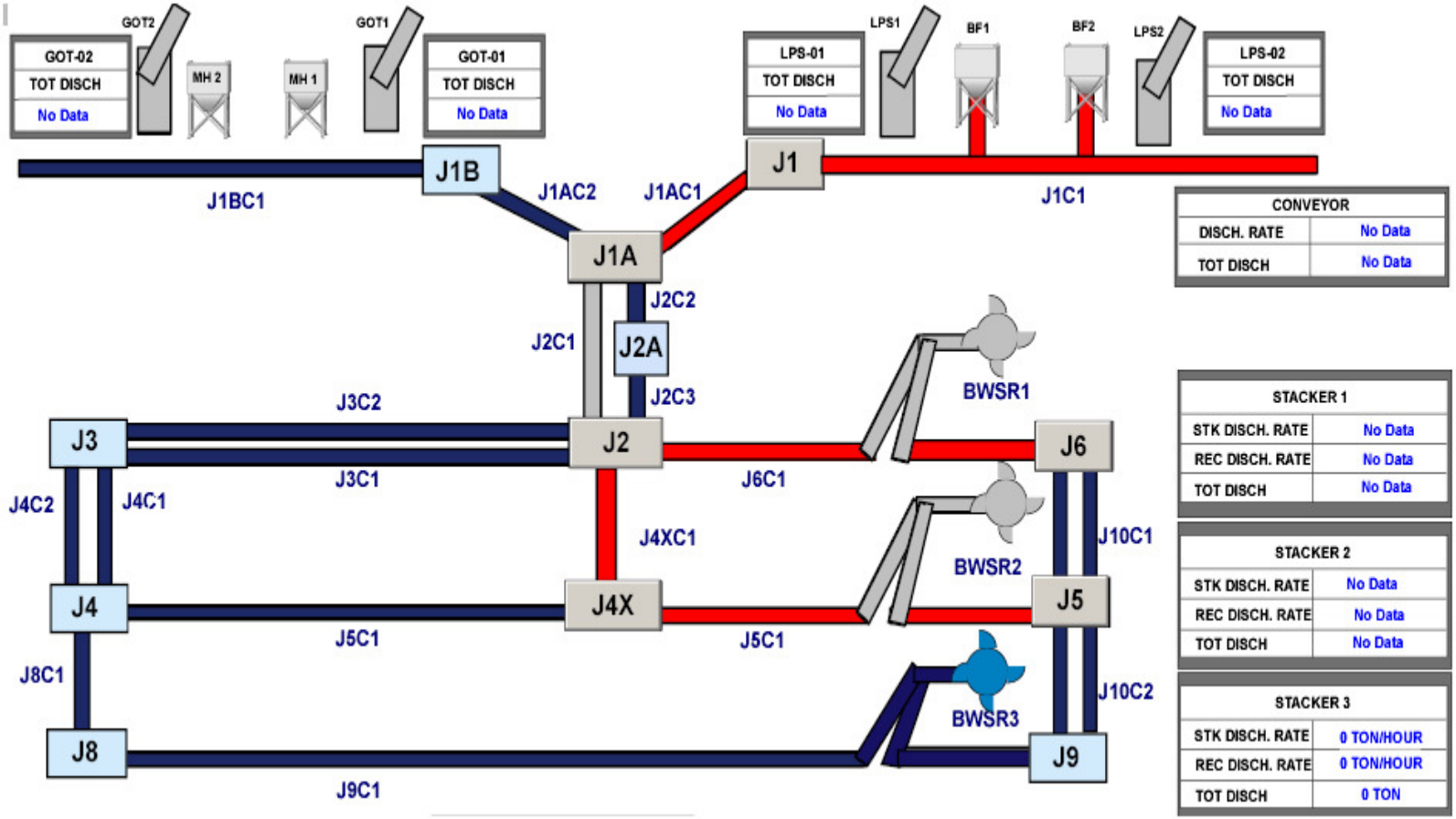
PIMS Screenshots - Fertilizer Cargo Complex



PIMS Screenshots - West Basin



PIMS Screenshots - Dahej Port



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Need for DVMS

To face lot of challenges in today's market with increase in customer expectations, stiff competition and reduced margins. On top of that, there are some complex operations, which need of a robust Supply Chain Management (SCM) solution which will help Adani Ports to

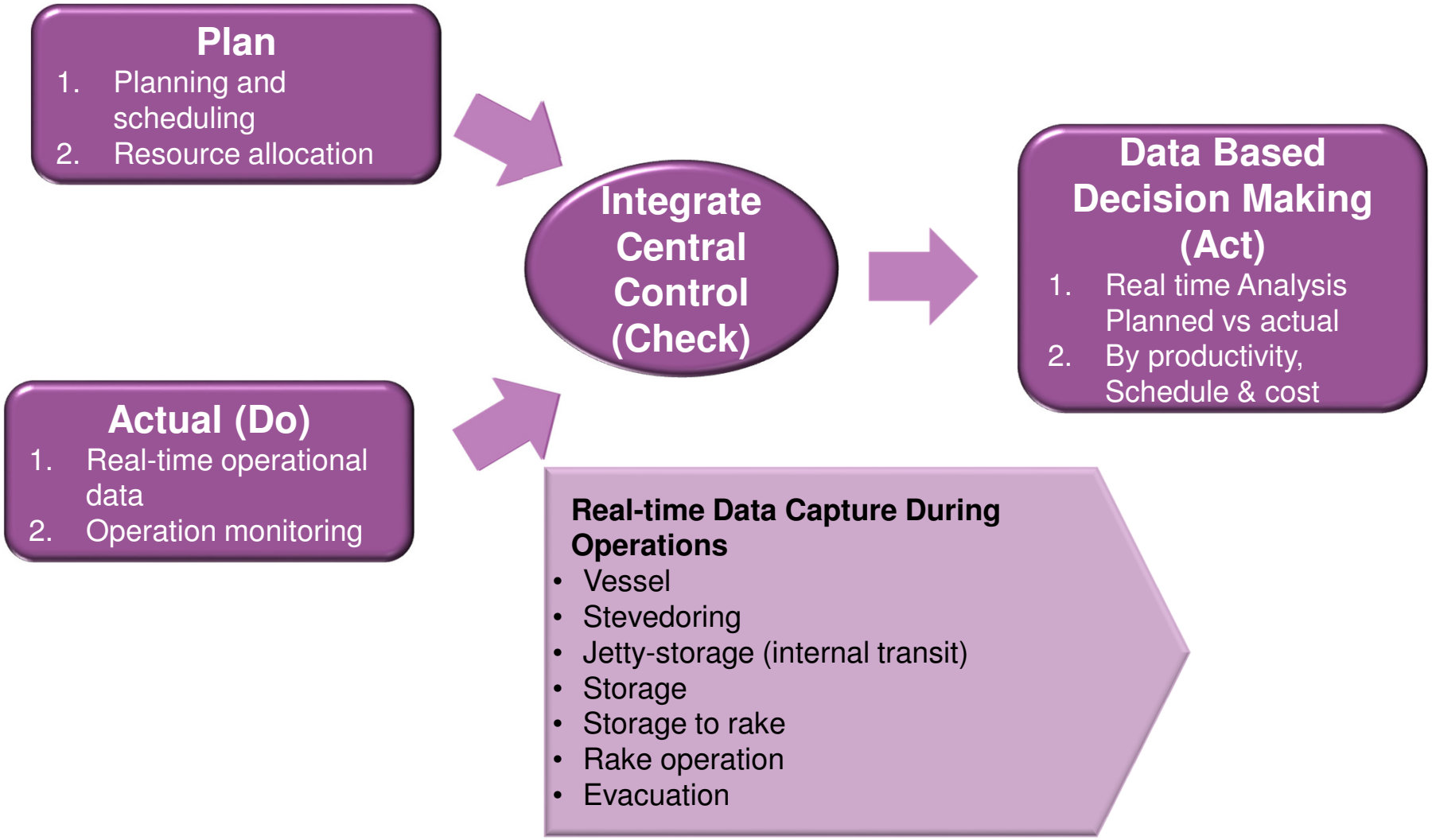
- Real time control of multi-cargo port operation
- Enhanced visualization:To bring hidden delays on surface in entire supply chain process
- Reduce the port operating cost by usage of optimum resource as per productivity needs
- Advanced analysis platform for performance comparison

Introduction to DVMS

Objective

- To provide holistic visualization of the entire supply chain in Dry bulk and break bulk operations, which indicates the overall process, key resources involved and productivity / discharge rate
- Area of weakness in the supply chain can be identified on real time basis
- To reduce resources in the stronger links with an aim to reduce the operating cost
- DVMS system integrated with PI system and other applications like APMS, GPS and FMS system

Integrated Central Control Objective



Integrated Central Control Objective

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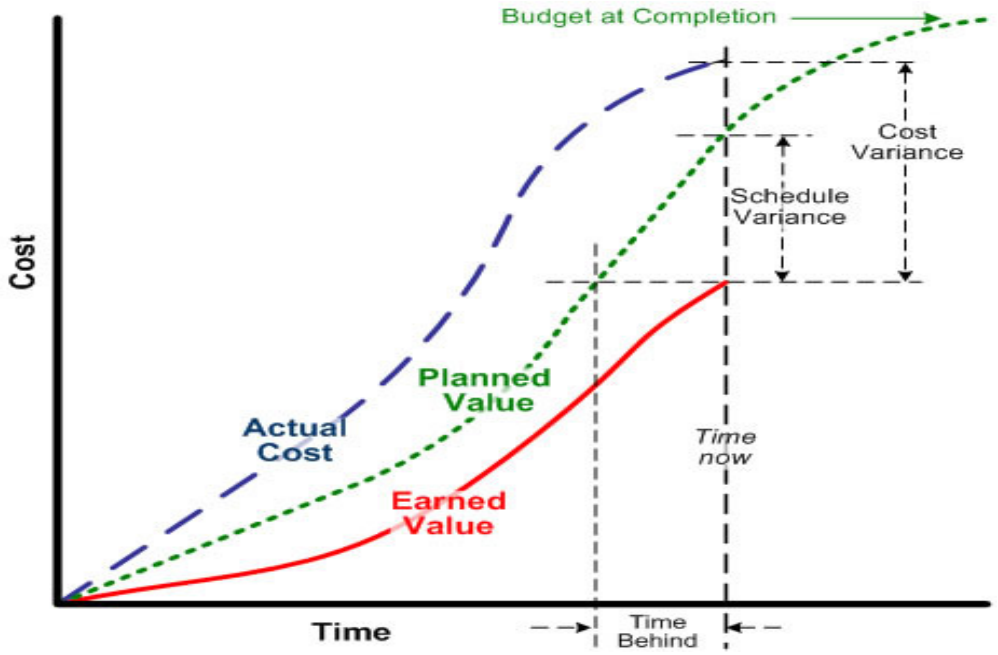
Real-time Variance Analysis

- Planned vs. actual
- Estimate future productivity to completion vs. actual trending earned productivity to completion
- Estimate future cost vs actual trending cost to budgeted cost at completion



Data Based Decision making

- Rectify actual operation within the planned threshold, by schedule, Productivity & cost
- Perform the role of portfolio management to port vessels operations
- Rebalance vessel supply chain line by allocation of resources (Equipment + labor)

Dynamic Vessel Monitoring System

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Basic Architectural Design of DVMS Operates at 2 Levels

Control System Layer

PLC Data + HMI Data

PI Historian

OPC Server

Operational System Layer

APMS

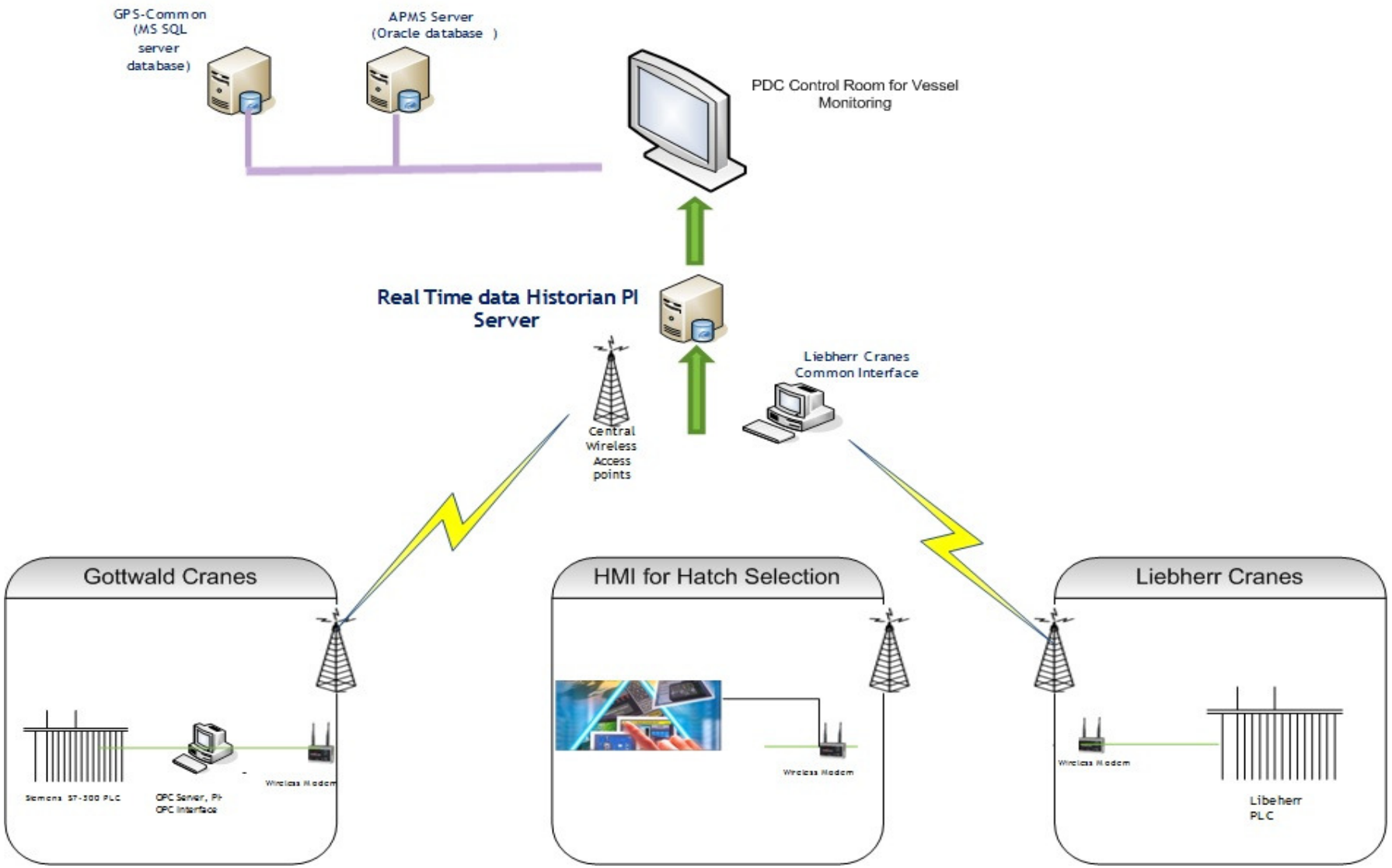
Biz Talk Server

PIMS

+

GPS

DVMS System architecture



Dynamic Vessel Monitoring System

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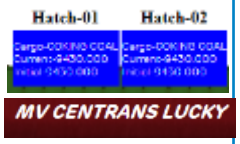
DVMS is an integrated tool for monitoring the overall vessel and for balancing the line of supply chain. The supply chain in a dry cargo operation comprises of the Shore cranes / vessel cranes, Hopper, Dumpers / Trailers / Conveyors and Back up equipments

Crane

- It shows active number of system
- Crane data – productivity, reflect

Hatch

- Hatch number along with
- DVMS will show number of that of a vessel



Resources

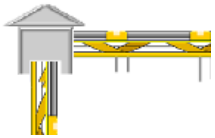
- The total number of shown beneath the figure

Dumper

- Number of dumpers and total along with last hour productivity

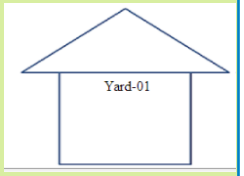
Conveyor

- In case, supply chain has a conveyor belt will be visible
- Productivity per hour reflect placed on it



Yard

- As per the allocation the back the system
- Number of available back up



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Scenarios Overview

Bulk Cargo

- Case 1: Vessel -> Shore Crane -> Hopper -> Dumper -> Yard -> Excavators & Loaders

- Case 2: Vessel -> Shore Crane -> Hopper -> Jetty -> Loader -> Dumper -> Yard -> Excavators & Loaders

- Case 3: Vessel -> Shore Crane -> Hopper -> Conveyor -> Dumping Point -> Loaders -> Dumper -> Yard

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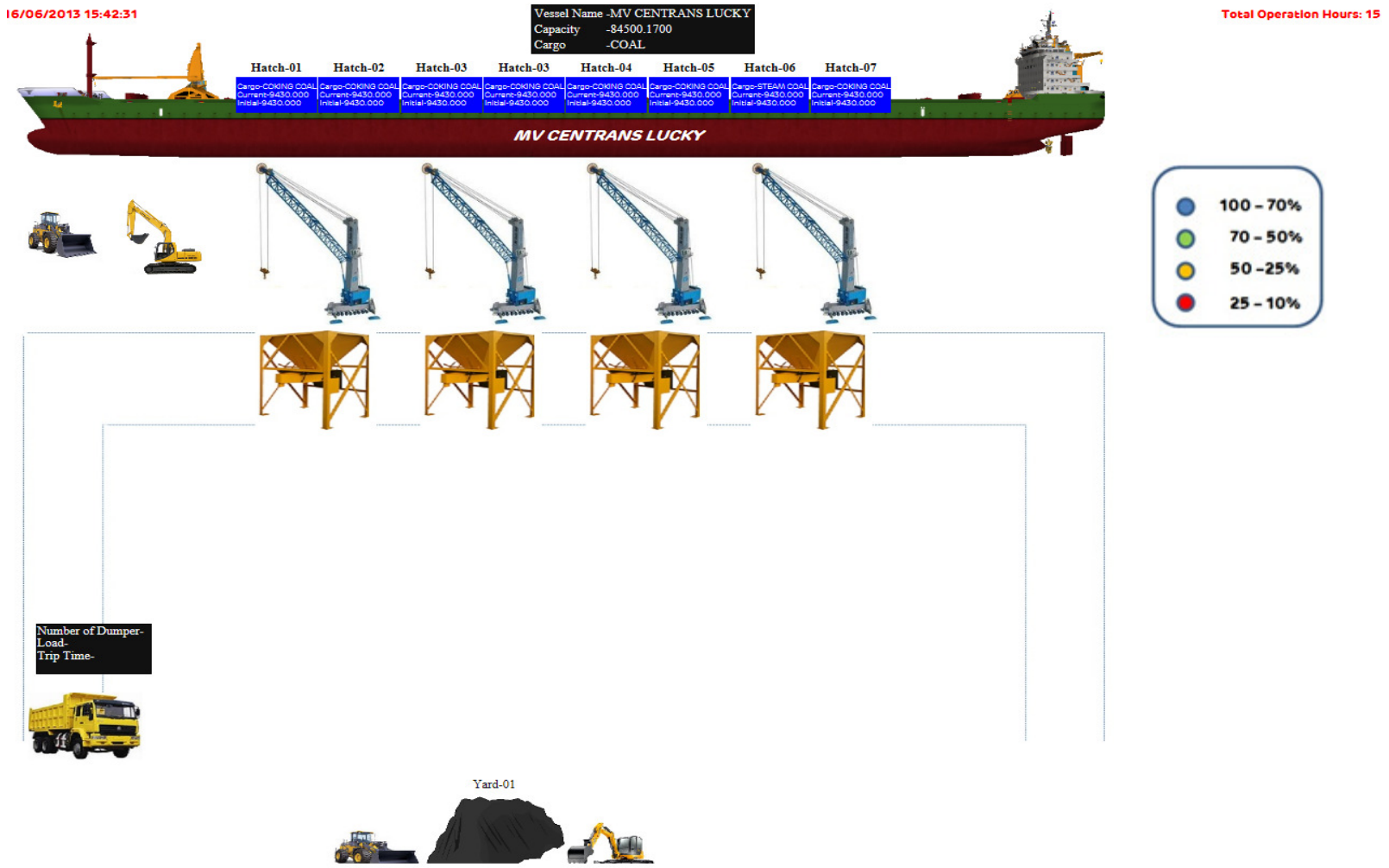
Case 1: Vessel -> Shore Crane -> Hopper -> Dumper -> Yard -> Excavators & Loaders



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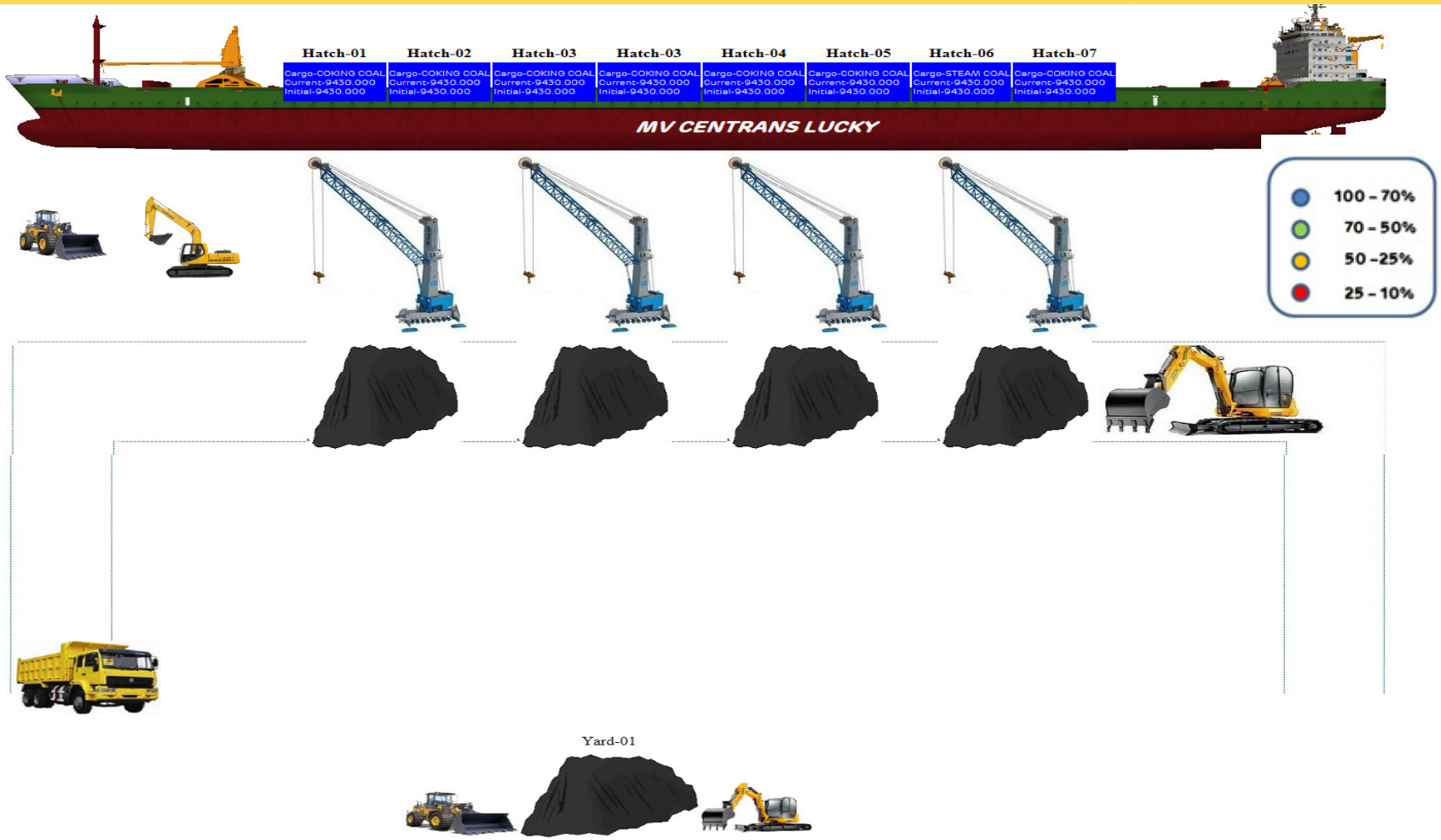
Case 2: Vessel -> Shore Crane -> Hopper -> Jetty -> Loader -> Dumper -> Yard -> Excavators & Loaders



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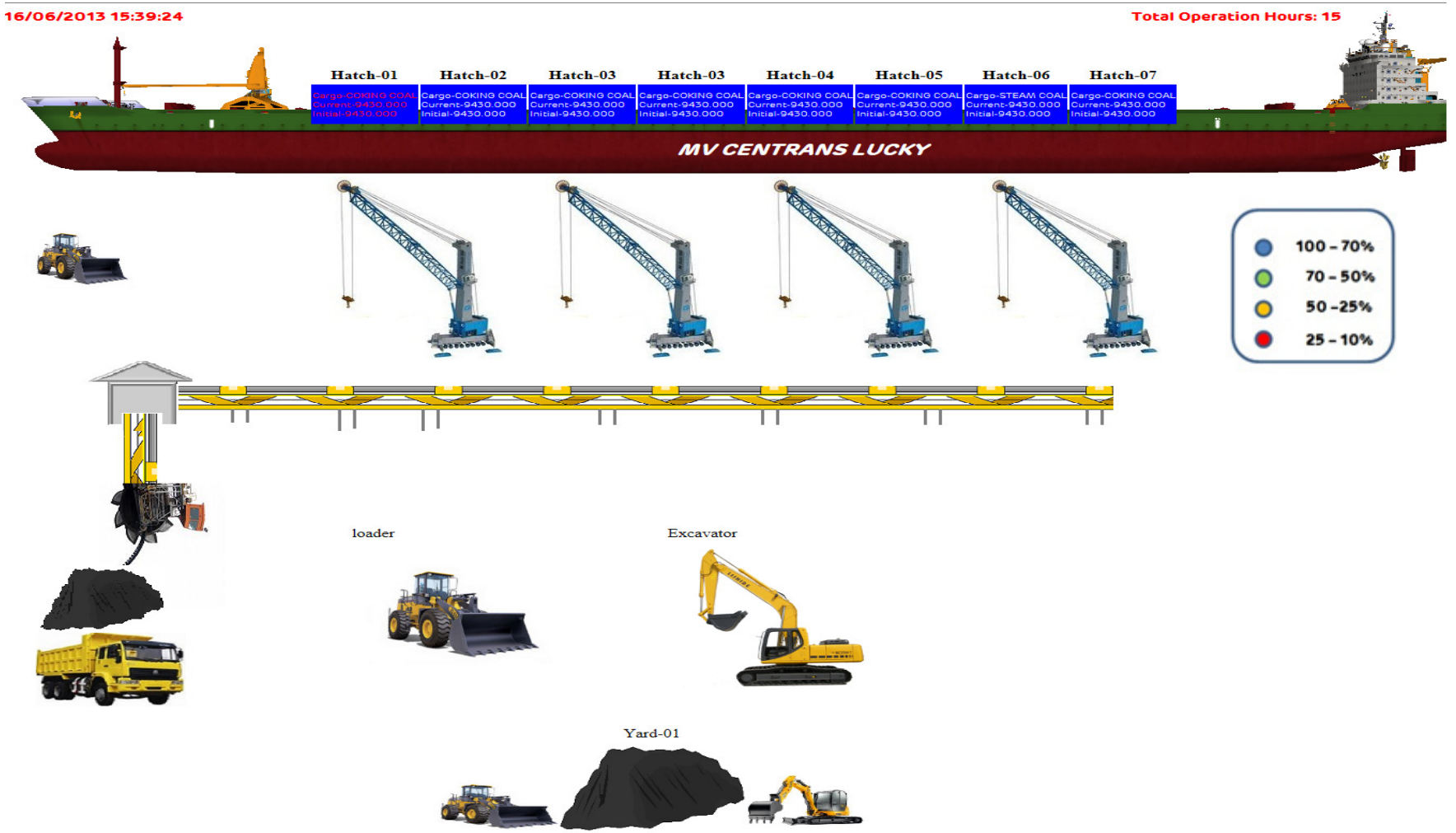
Case 3: Vessel -> Shore Crane -> Hopper -> Conveyor -> Dumping Point -> Loaders -> Dumper -> Yard



Benefits : Dynamic Vessel Monitoring System

- Better Vessel Planning, Equipment Allocation as well as Yard Planning to increase in profit margin
- Actual Vs Plan productivity in real time basis to Identification of process bottlenecks
- Optimum equipment deployment based on the per ton handling cost
- Advanced analysis platform and enhanced visualization for decision making
- Consolidated data availability of each vessel in entire port and base for Inter port Knowledge sharing for cost optimization

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THANK YOU

PI SYSTEM REGIONAL SEMINARS