



**HONEYWELL
FORGE**

The Show Must Go On, But Where to Start?

Ensuring Business Continuity in
Industrial Operations

Philippe Millette

Global Refining and Chemicals Market Manager
Honeywell Process Solutions

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PHIL MILLETTE - BIO

- Philippe (Phil) Millette is **Global Refining and Chemicals Market Manager for Honeywell Process Solutions**
- Phil gained his professional experience through progressive positions over 41 years in the industry, having worked over 5 continents. He began his career with Dow Chemical and Esso Canada, was a consultant for IBM Europe, later worked with Setpoint / Aspen.
- Phil is responsible for articulating and communicating Honeywell's solutions and value for Refining and all Chemicals markets.
- Phil joined Honeywell in 2002 as Oil & Gas Consultant, providing industry consulting support across all Honeywell solutions. Phil later was Business Manager in Saudi Arabia, later focusing on Industrial Security Solutions and integration of the Enraf acquisition, based in Bahrain. Later based in Qatar, Phil was Principal Consultant for Advanced Solutions, covering the Middle East. Phil relocated to UK in 2013 and took his current role in 2016.
- Phil gained a Bachelor of Engineering in Chemical Engineering at McGill University in Montreal. He is a Professional Engineer registered in the province of Ontario, Canada. He is a member of ISA.



CHANGES IN THE REFINING INDUSTRY



COVID19: DEMAND COLLAPSE

>20 Refineries Shutdown
Slow Uptake & Recovery Of Flying Industry



CRUDE FEEDSTOCK DEMAND COLLAPSE

Large Capacity & Inventory Overhang



PEAK OIL DEMAND RATHER THAN SUPPLY

Demand Growth Is All In Asia



ULSFO & MARPOL

Lower Sulfur Specs Globally



RETAIL CAR DIESEL

In Disfavor In Europe



MANY SMALL REFINERIES CLOSING



MORE INTEGRATION TO CHEMICALS

Ongoing Plastic Growth



SHALE OIL = LIGHTER OIL

North America and Exports



THE REFINERY OF THE FUTURE

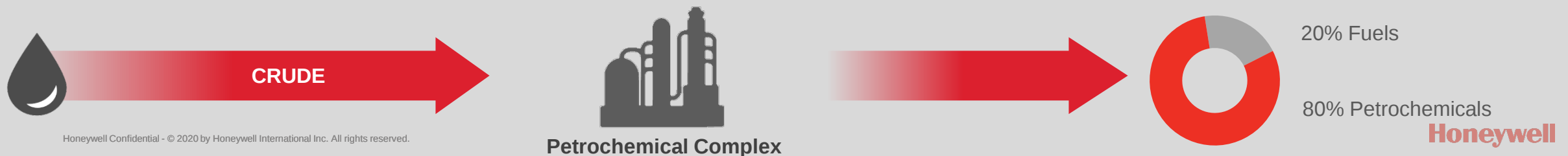
TRADITIONAL CRUDE PROCESSING: REFINING



REFINING & PETROCHEMICAL INTEGRATION

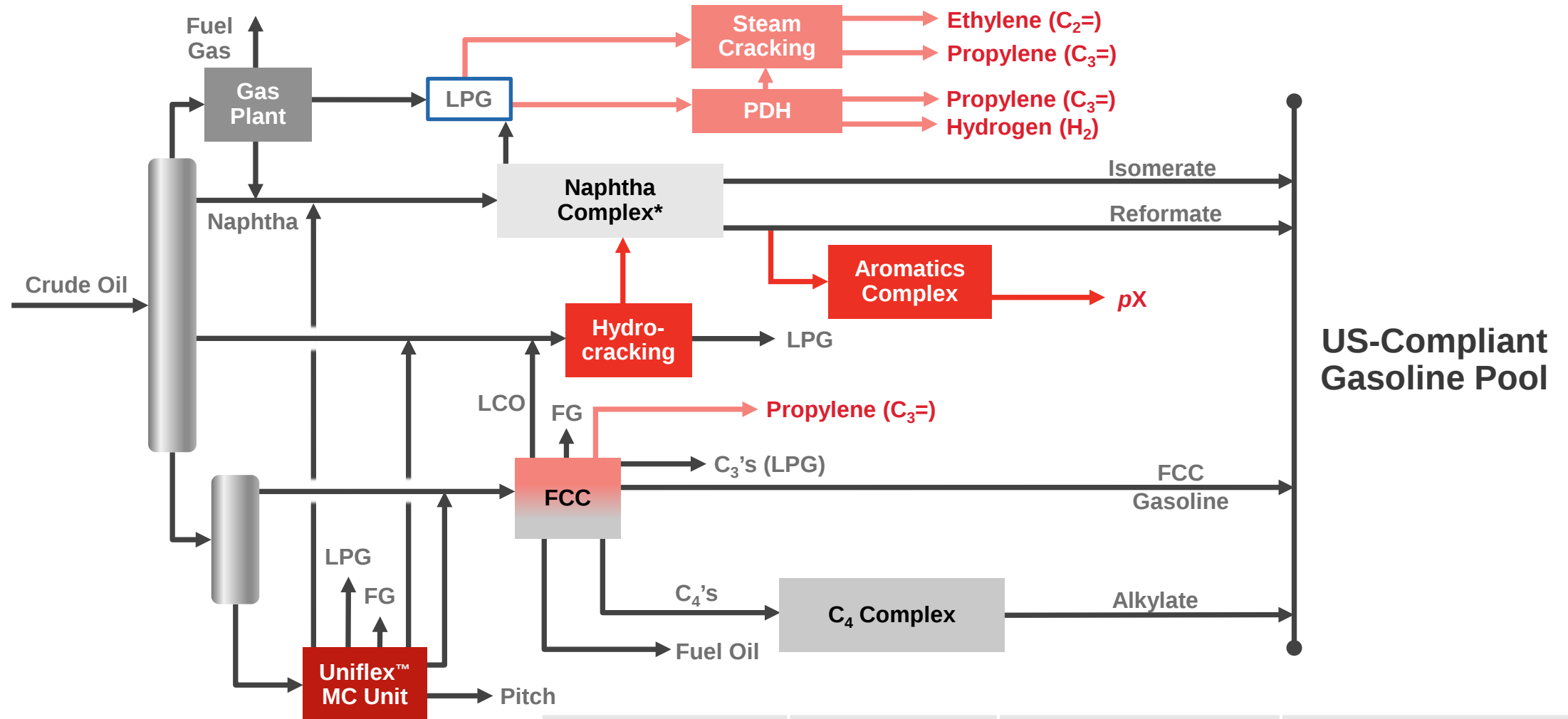


CRUDE TO CHEMICALS



INTEGRATED FUELS & PETROCHEMICALS

A GROWING TREND



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* Naphtha Complex Includes: NHT, Reformer & Isomerization

Uniflex™ MC Unit	+ Hydrocracker	+ Aromatics Complex	with Toluene Methylation
+ Steam Cracking	+ PDH		

THE REFINERY OF THE FUTURE IS...



FLEXIBLE

TO MEET RAPIDLY
CHANGING PRODUCT
MARKETS



CONNECTED

ACHIEVES BEST OPERATING
PERFORMANCE EVERY DAY



**INTEGRATED WITH
PETROCHEMICALS**

TO ACHIEVE HIGHER
MARGINS AND VALUE

Adaptable to Future Market Needs and Maximizing Value from Every Molecule

TECHNOLOGY CHANGES

FROM DECADE TO DECADE & EMERGIN CAPABILITY

AUTOMATION TRENDS



VIRTUALIZATION

Digitization of Projects,
Engineering and Operations



IO PROTOCOLS

HART, Ethernet-based IO,
Edge Devices Connected to Cloud



SMART ENGINEERING

Buy Control Capacity,
Not Controllers



FULL CYCLE IEC61511

Process Safety Lifecycle Mgmt &
Reviews of Existing



REDUCED FOOTPRINT

Smart/UIO, Smart Conditioning /
Barriers, Remote Cabinets



MACHINE LEARNING

Fundamental & Empirical Models
For Digital Twins



REFINING INDUSTRY TRENDS



CYBER THREATS

More Frequent, More Potentially
Impactful



INDIVIDUALS

Worn Gas Detection, Enhanced
Personal Safety, RTLS, Work &
Risk Mgmt.



PLANT WIRELESS

More Acceptance of Mobile
Solutions



DISTRIBUTED SIL SOLUTIONS

F&G, BMS, Terminals

GENERAL TECHNOLOGY TRENDS



5G, SMART DEVICES, MOBILITY

Aware Apps, Intelligent Wearables,
Augmented & Virtual Reality

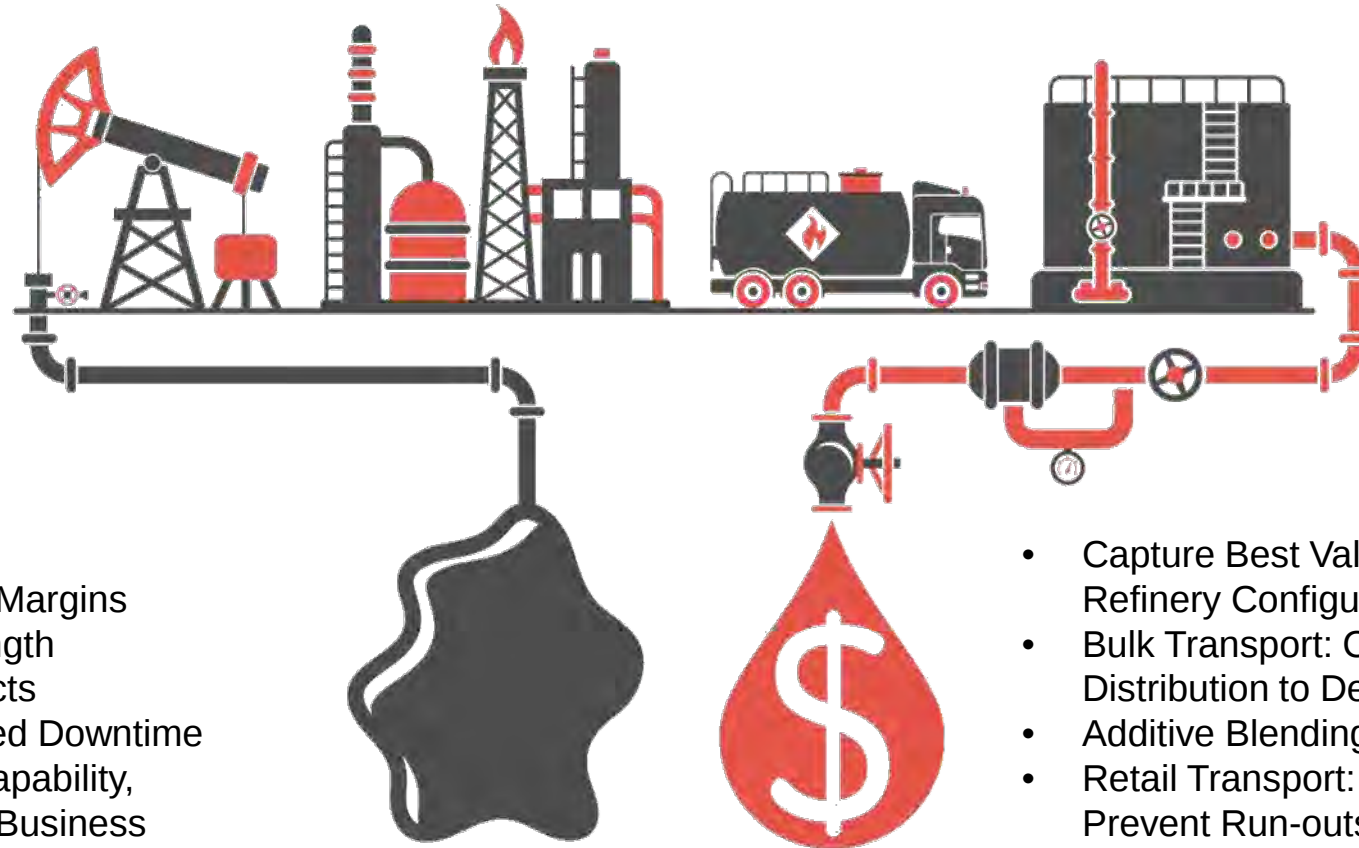


INDUSTRIAL-GRADE INTERFACES

Phones Tablets

REFINING ENTERPRISE

OPERATIONAL OBJECTIVES



INSIDE THE GATES

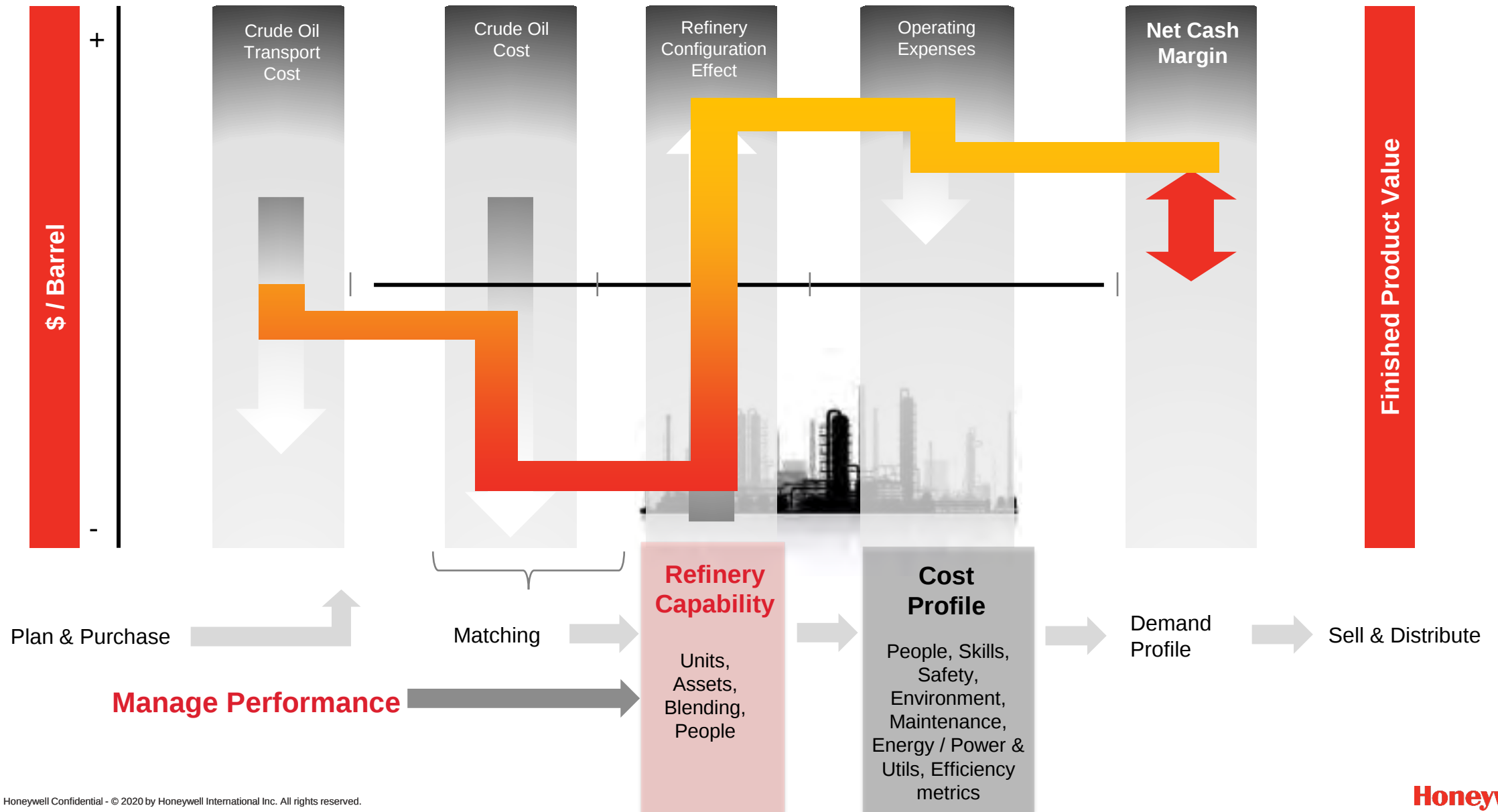
- Operate Safely
- Maximize Net Cash Margins
- Maintaining Run Length
- Make Quality Products
- Minimizing Unplanned Downtime
- Plan and Manage Capability, Sustainability of the Business

OUTSIDE THE GATES

- Capture Best Value Delivered Crude to Match Refinery Configuration & Demand Profile
- Bulk Transport: Capture Minimum Cost of Bulk Distribution to Depots/ Terminals
- Additive Blending
- Retail Transport: Ensure Supply Availability, Prevent Run-outs; Minimize Finished Product Landed Cost

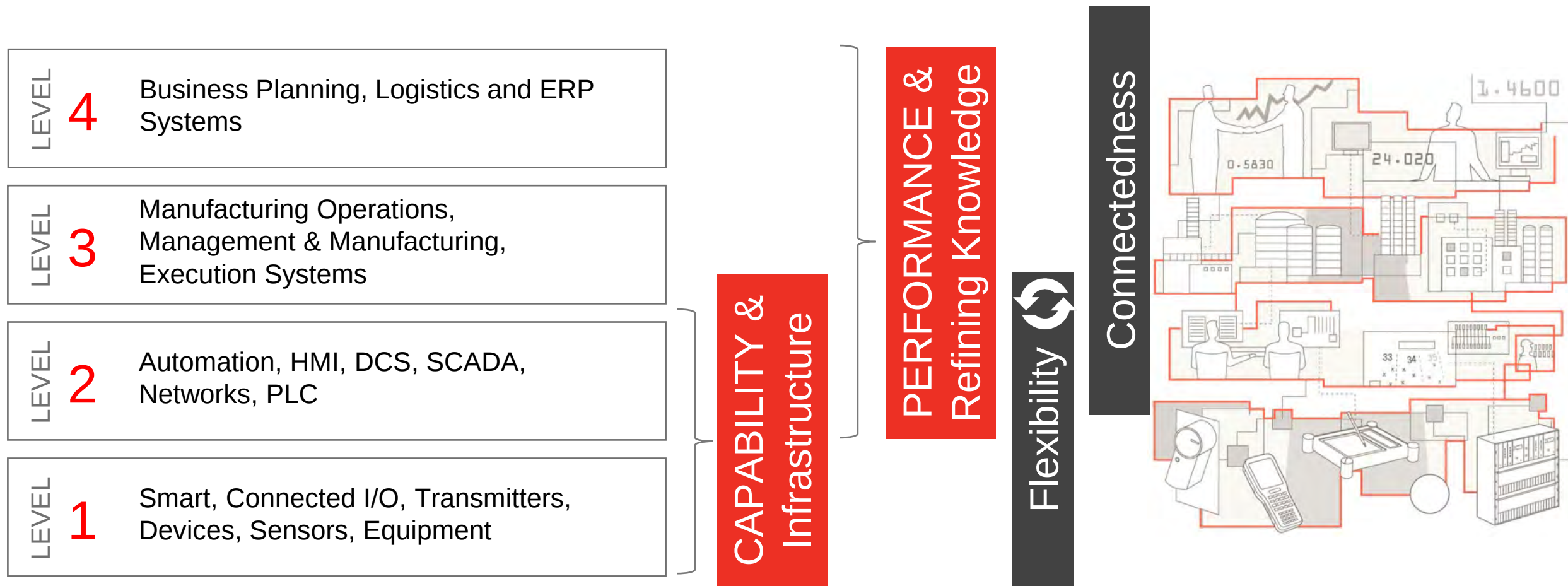
Managing Capability / Infrastructure of the refinery --- Managing Performance of the Refinery

REFINING MARGIN WALK



COMPLETENESS OF SCOPE IN REFINING

ENTERPRISE-WIDE SOLUTIONS | DEEP KNOWLEDGE OF REFINING



The Technologies and Expertise to Optimize Entire Refineries

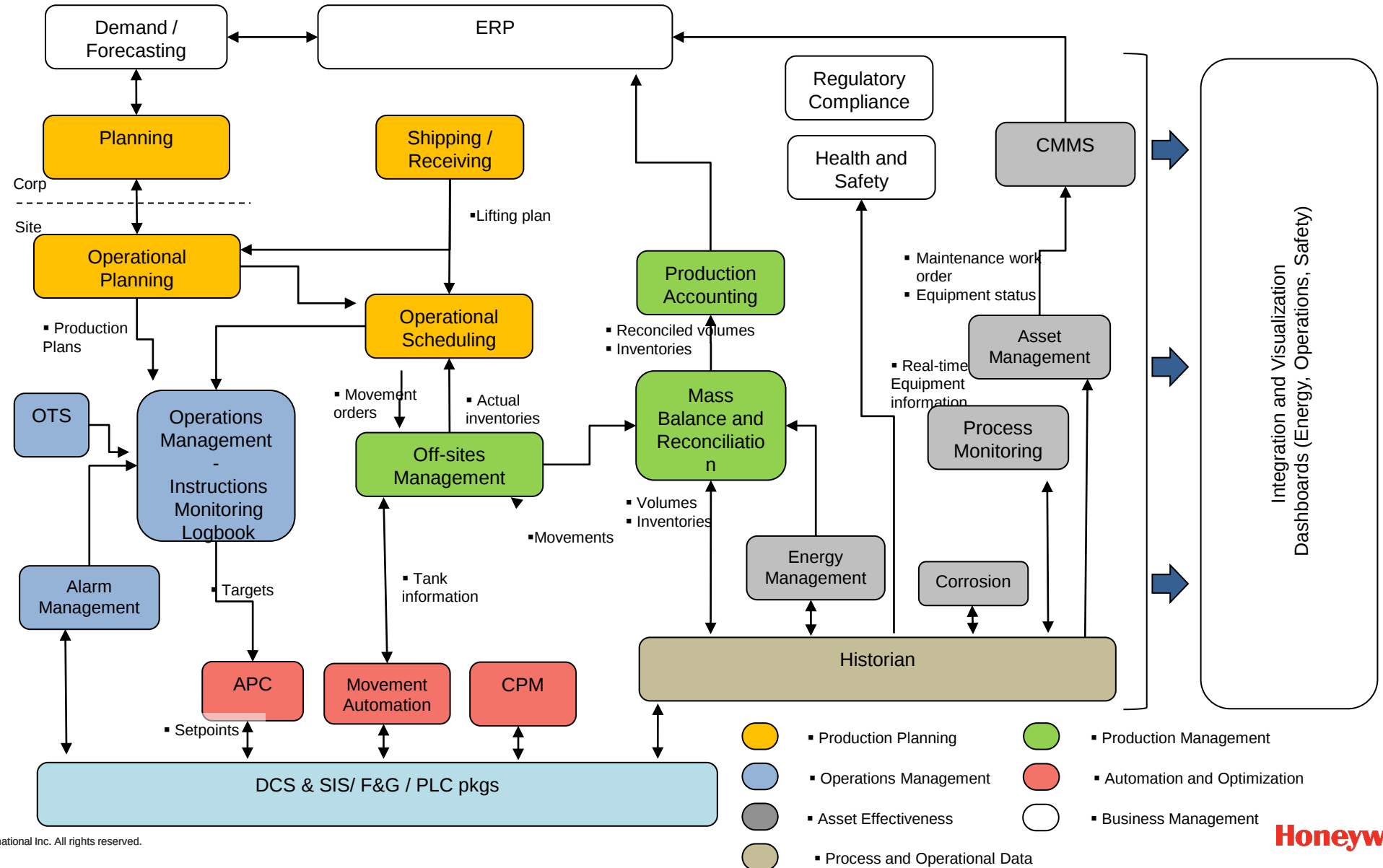
MISSION

**WE BUILD TOOLS FOR THOSE WHO
MAKE, SO THAT EVERY DAY IS THEIR
BEST DAY OF PERFORMANCE**

Reinvent the way industries measure, analyze,
and run their complex operations

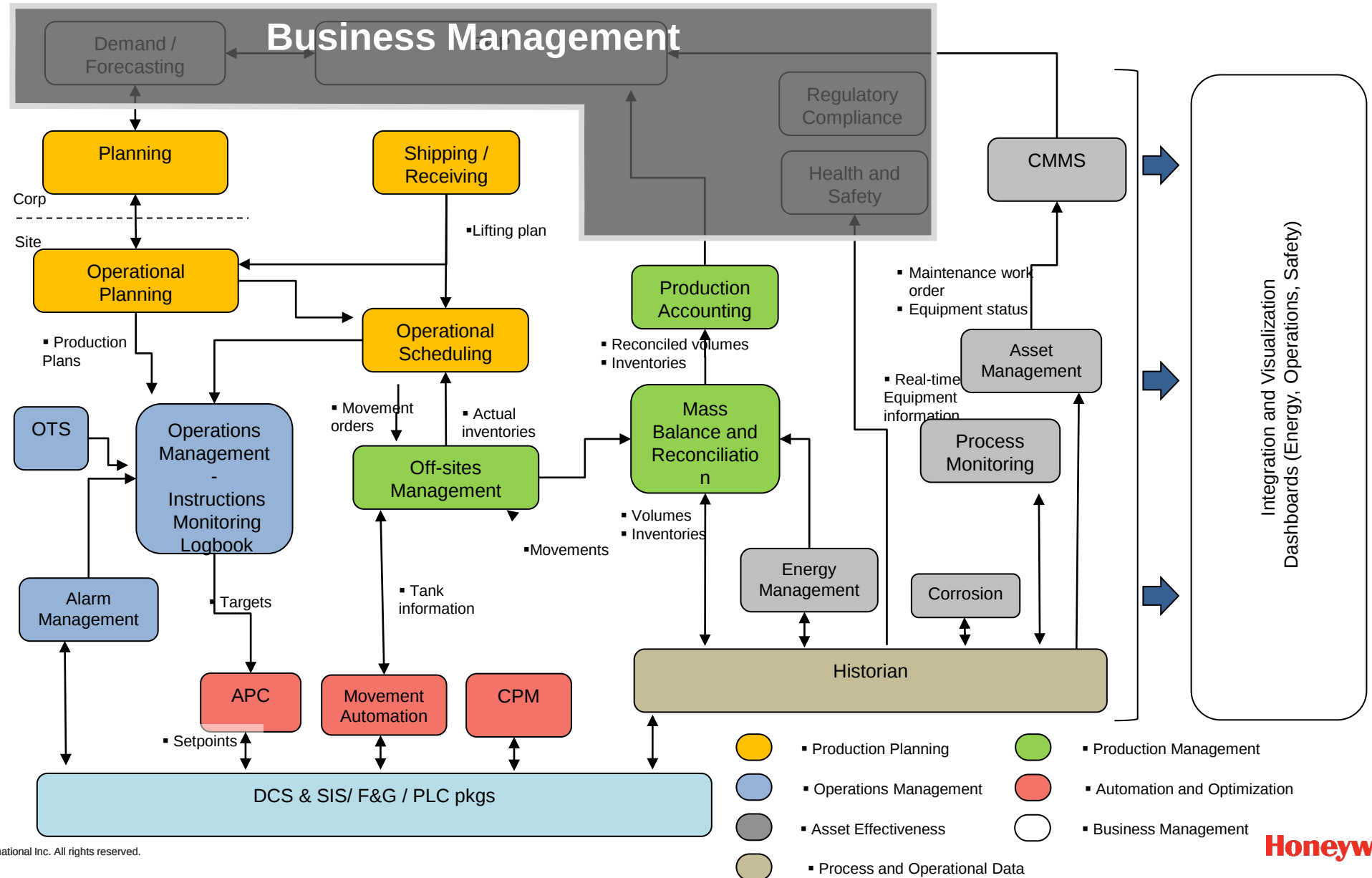
REFINING WORK PROCESSES & APPLICATION SPACE

HONEYWELL HAS SOLUTIONS ACROSS THE REFINING WORK PROCESSES AND APPLICATION SPACE



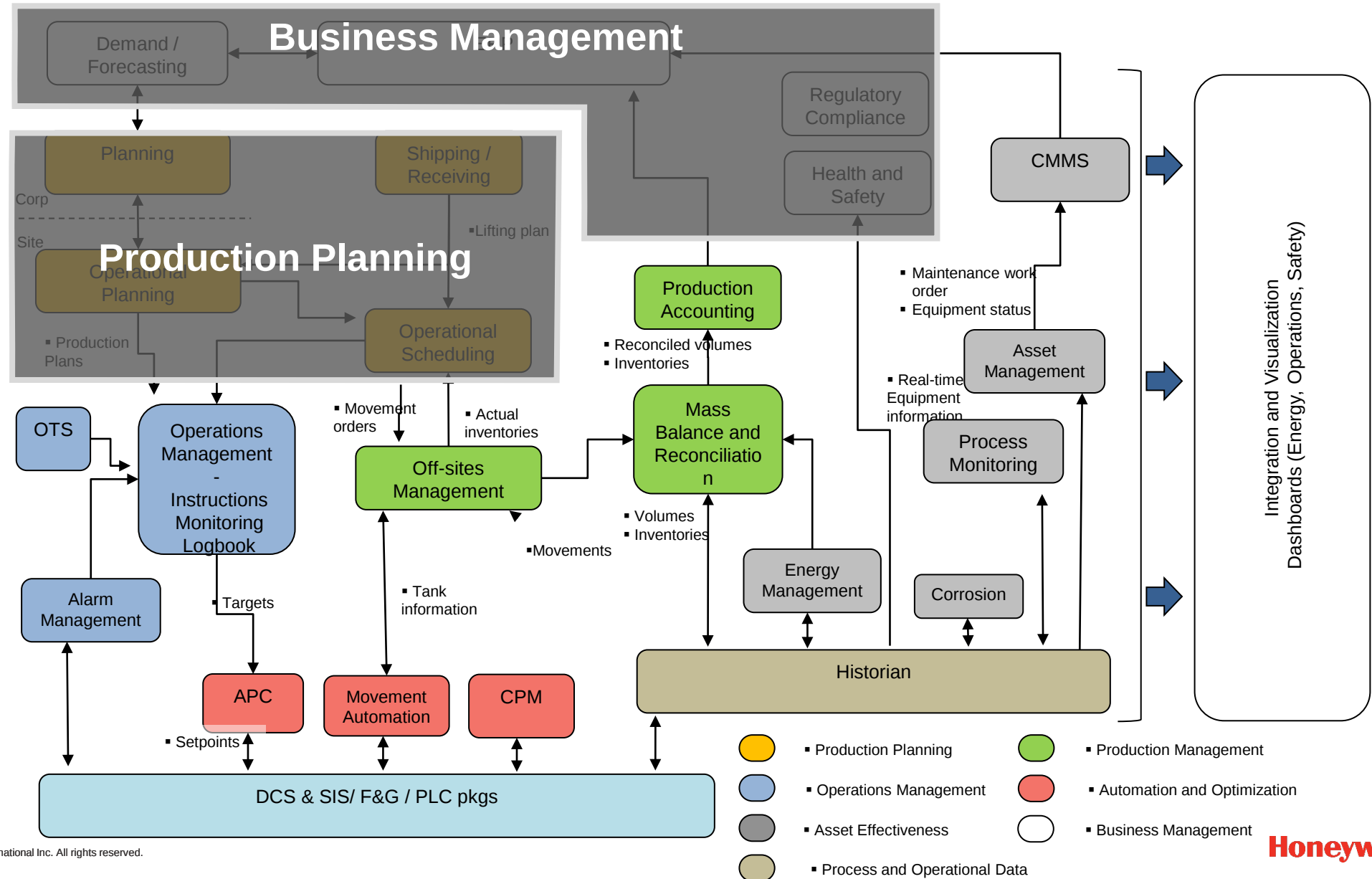
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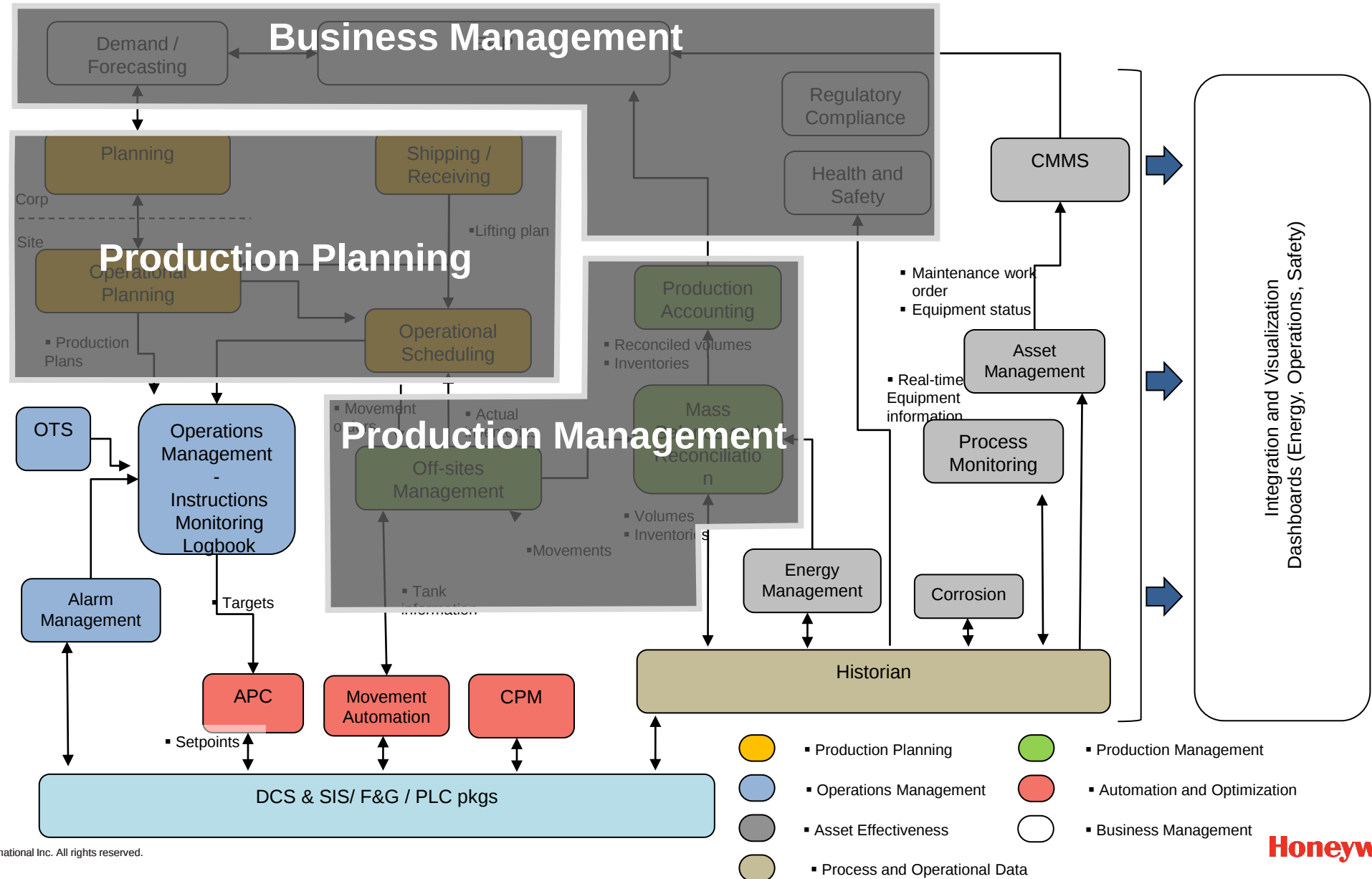
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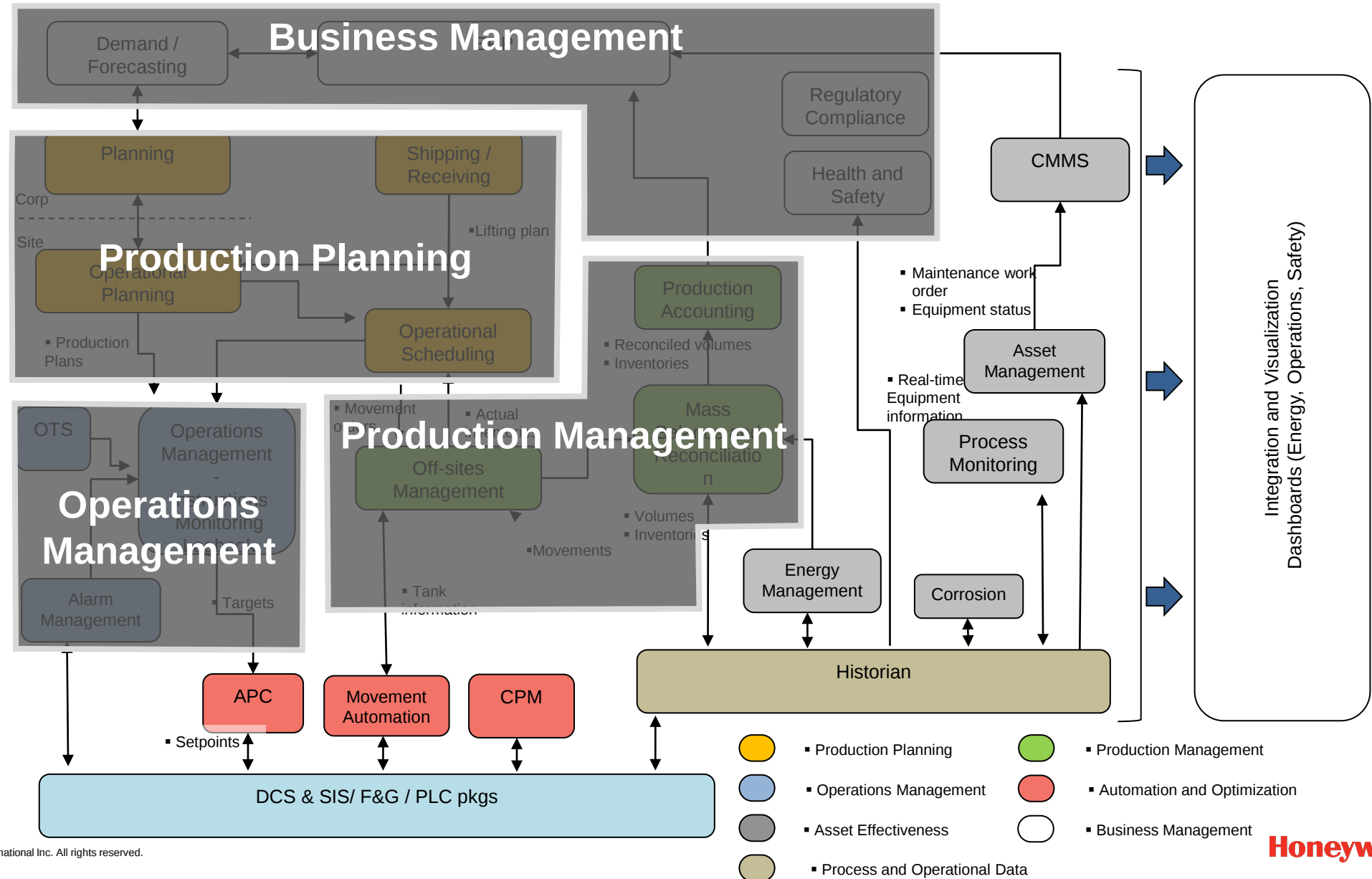
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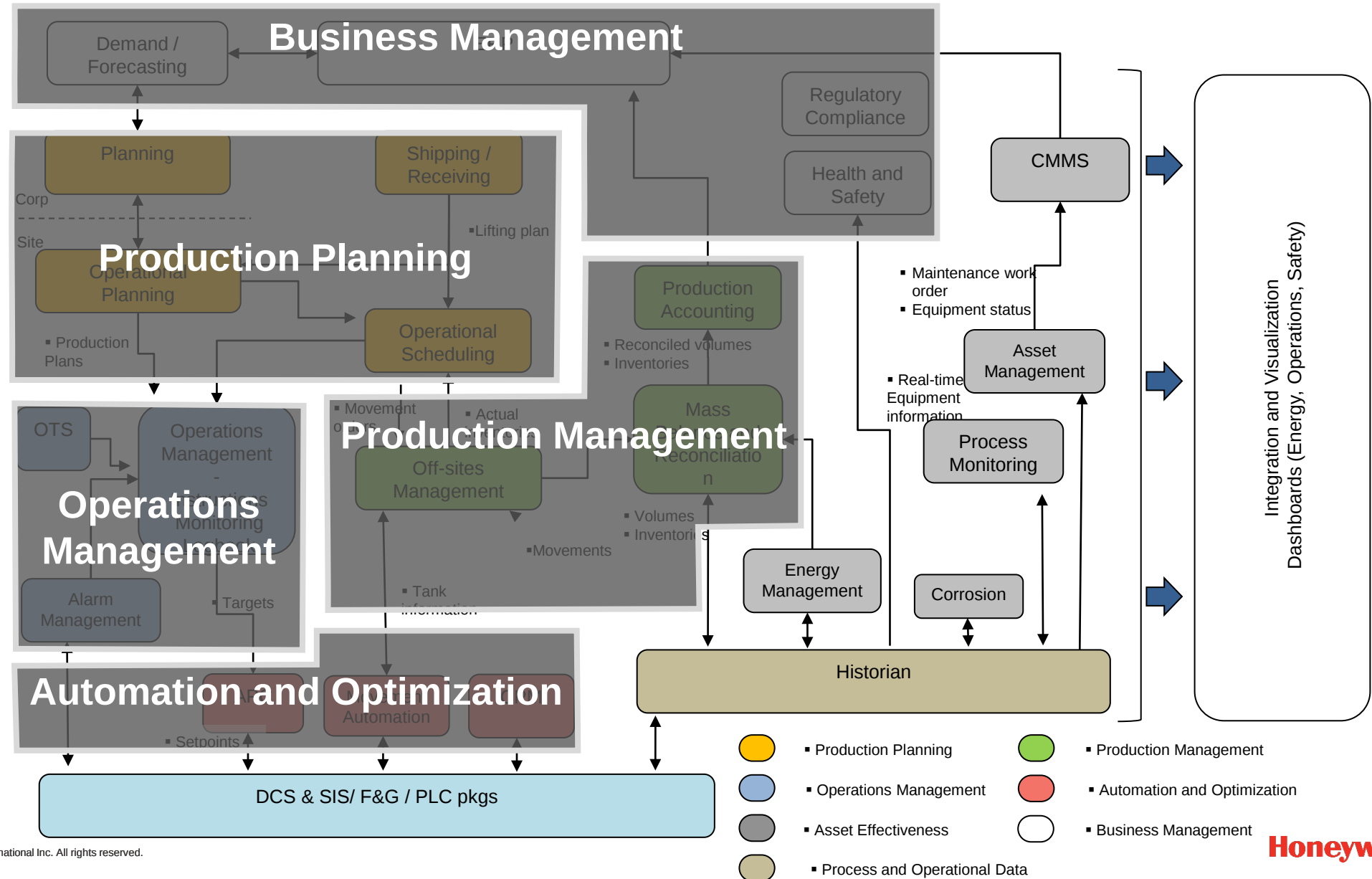
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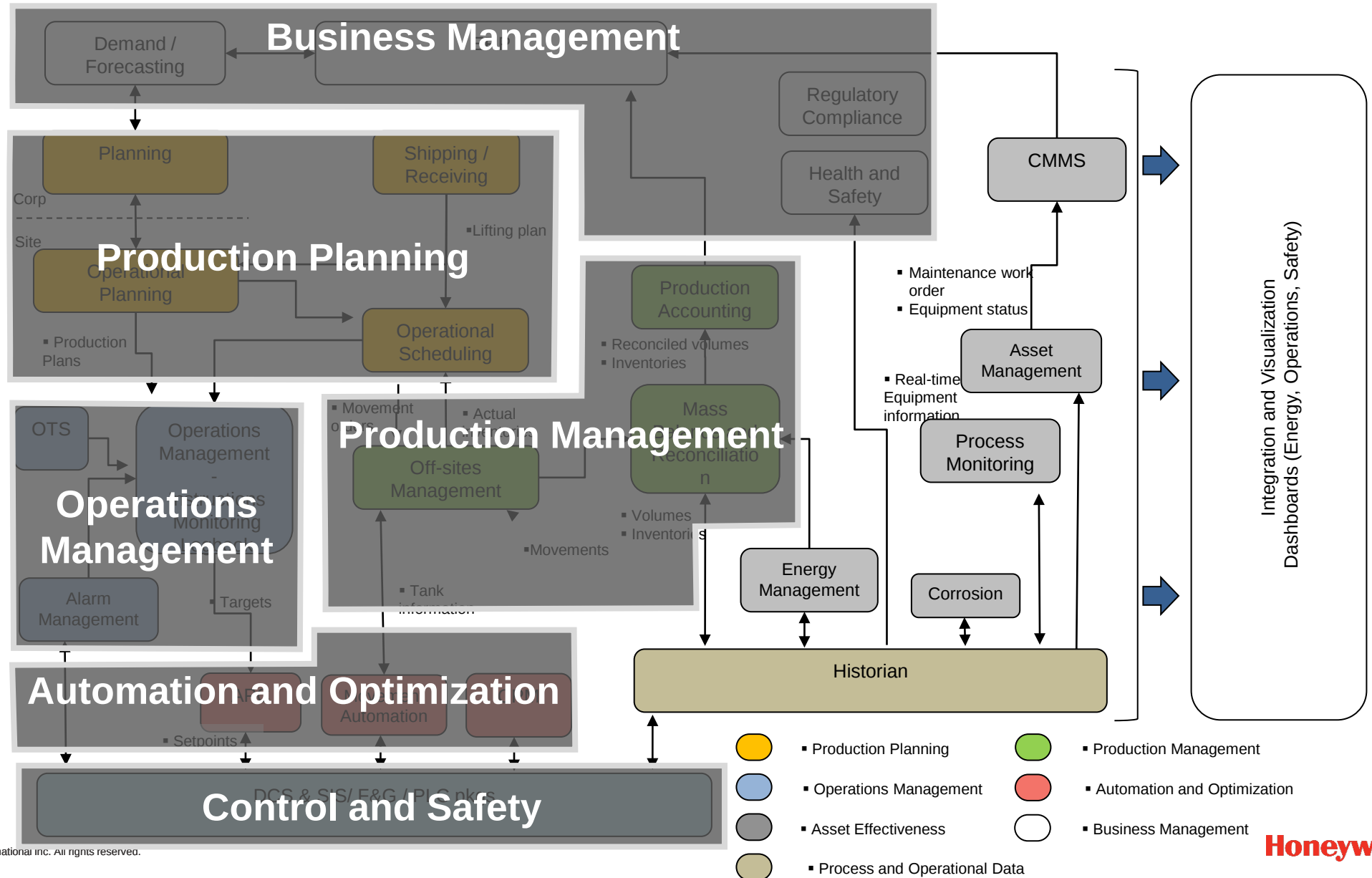
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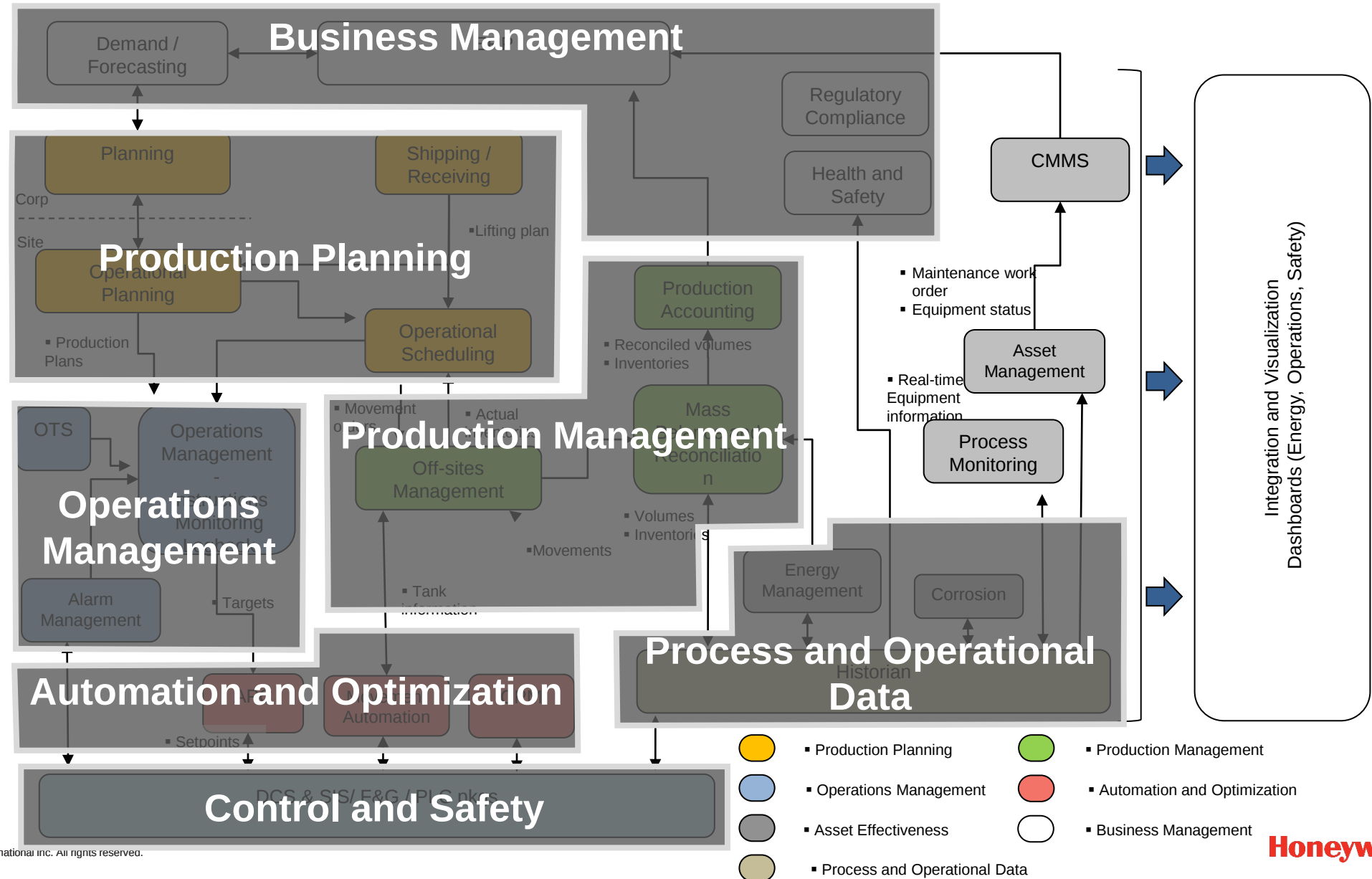
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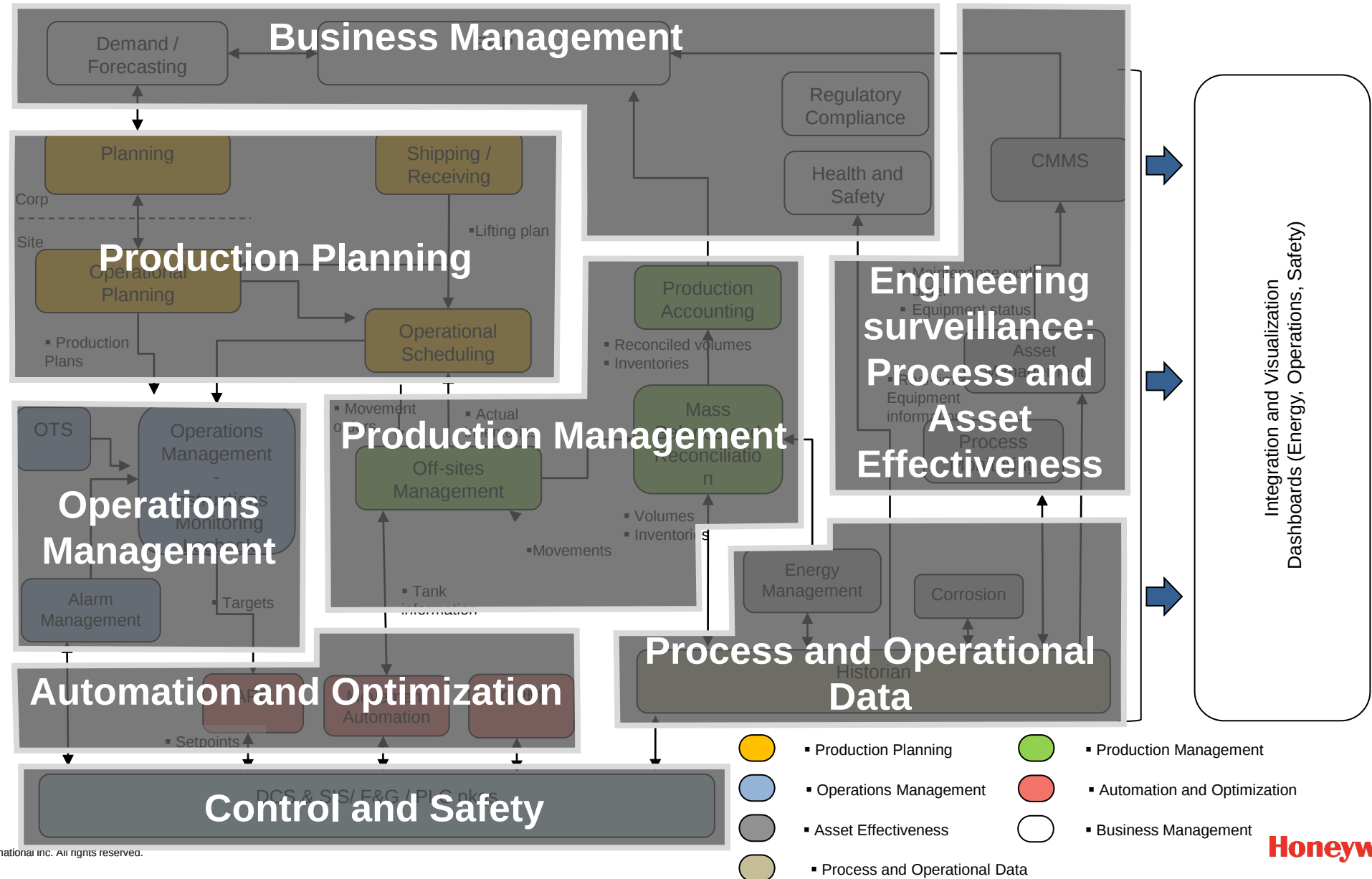
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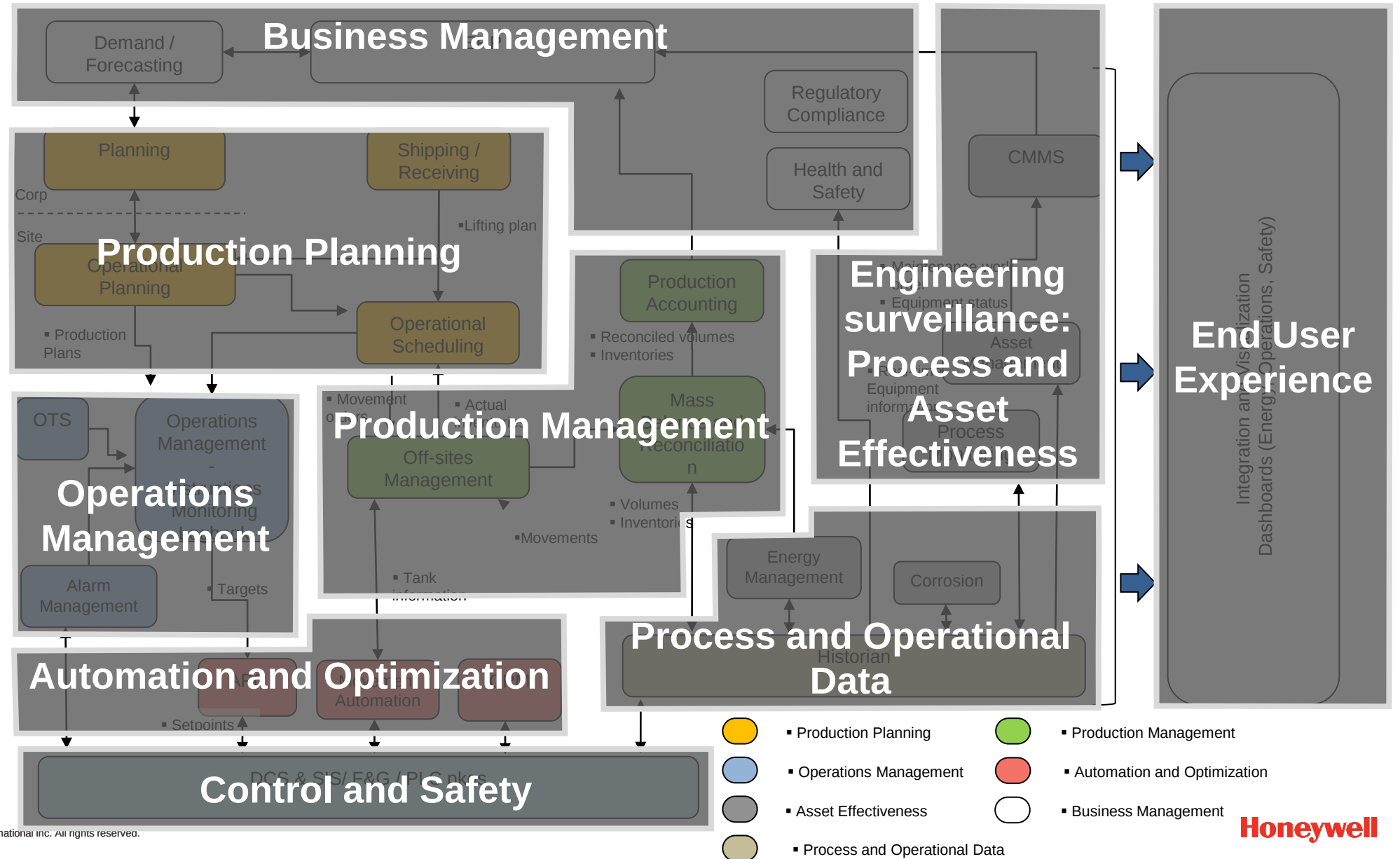
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REFINING WORK PROCESSES & APPLICATION SPACE

HONEYWELL HAS SOLUTIONS ACROSS THE REFINING WORK PROCESSES AND APPLICATION SPACE



A VISION OF THE CONNECTED ENTERPRISE

WE BELIEVE IN A FUTURE WHEN:



EVERYTHING IS ALWAYS CONNECTED AND LEARNING



YOU COULD RUN YOUR OPERATIONS FROM A HOME OFFICE



PEOPLE ARE FREE TO FOCUS ON STRATEGIC TASKS



OPERATIONAL DATA IS EASY



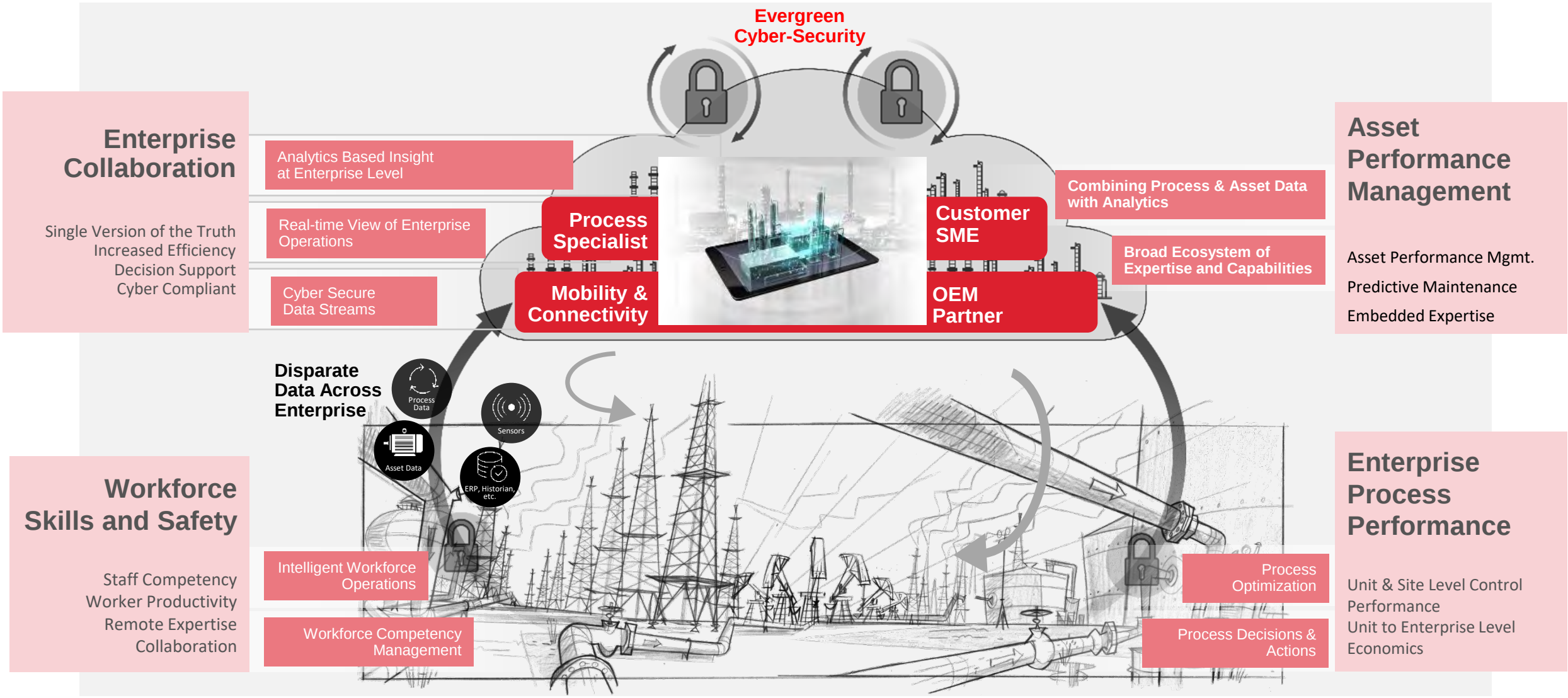
EVERY WORKER CAN BE AN EXPERT



HONEYWELL CONNECTED REFINERY

22

HONEYWELL FORGE



Enabled by the Forge Platform & cyber security

HONEYWELL FORGE VISION

EDGE-TO-CLOUD OPERATING MODEL

ENTERPRISE PERFORMANCE MANAGEMENT

EDGE SERVICES

Enable upstream and downstream autonomous control

OT DATA

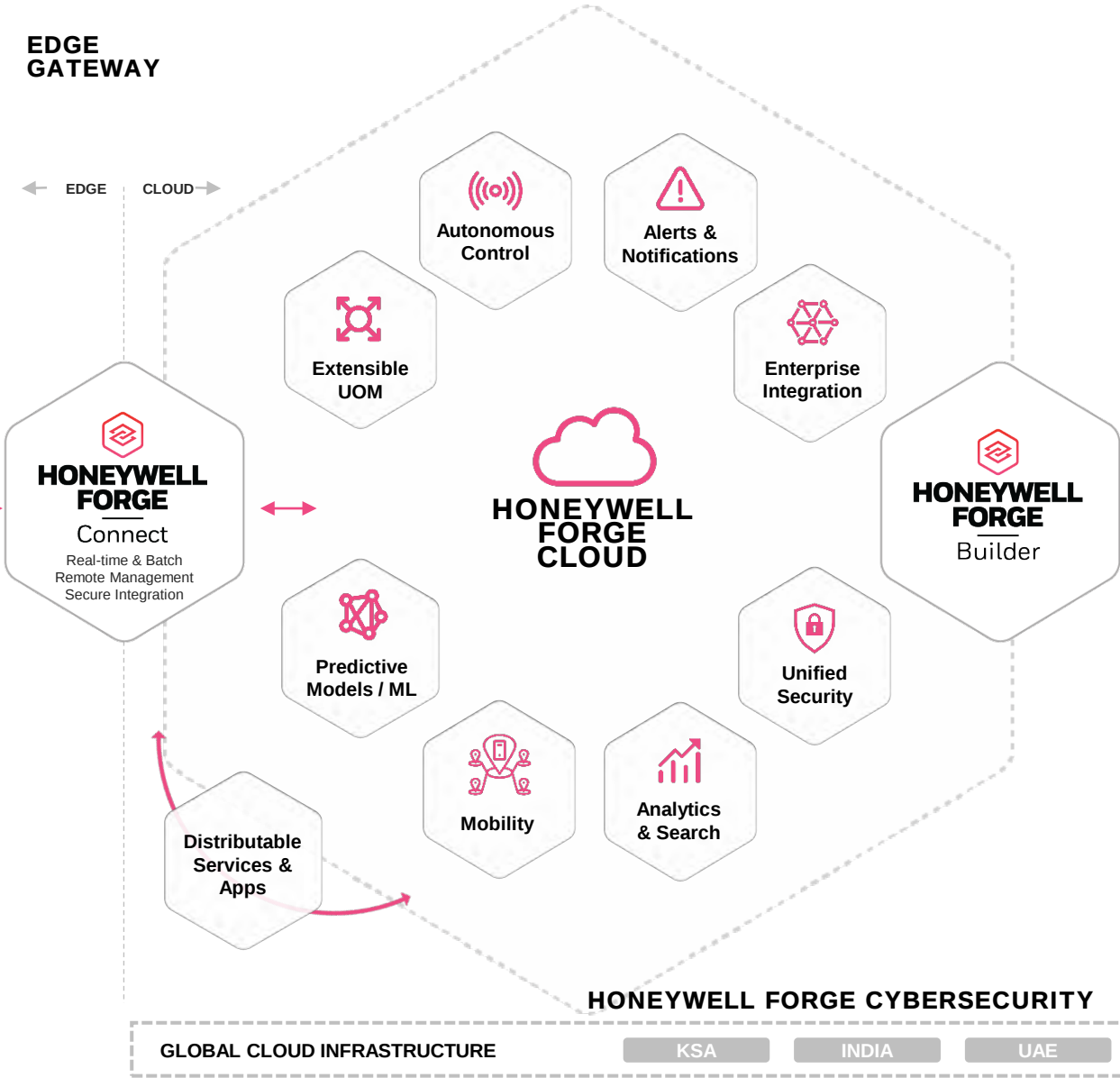
- Pump
- Valve
- BMS
- Flow
- Fire
- HVAC
- Security
- DCS
- Flight Data

IT DATA

- Historical

EDGE GATEWAY

EDGE CLOUD



APPLICATION CLOUDS

Codify domain knowledge of assets and experts in a contextual way

- AEROSPACE**
 - Maintenance Analytics
 - Flight Efficiency
- MANUFACTURING**
 - Asset Performance
 - Advanced Process Control
 - Worker Productivity
- BUILDING**
 - Portfolio Management
 - Energy Optimization
 - Predictive Maintenance
 - Centralized Control
 - Occupant Experience
- ANALYTICS**
 - Supply Chain Analytics

PARTNER SOLUTIONS

Continually learn and adapt to domains

- HONEYWELL**
 - AEROSPACE**
 - BUILDING TECHNOLOGIES**
 - PERFORMANCE MATERIALS & TECHNOLOGIES**
- SAFETY & PRODUCTIVITY SOLUTIONS**
- 3RD PARTY**
 - ISV SOLUTIONS**
 - OEMS**

DIGITALLY TRANSFORM

By industry

- Commercial Real Estate
- Pharma
- Hospitals
- Real Estate
- Oil & Gas
- Manufacturing
- Transportation
- Aerospace
- Defense



PROCESS PERFORMANCE MANAGEMENT

HONEYWELL FORGE ADVANCE PROCESS CONTROL

LAYERED OPTIMIZATION IN ONE SOLUTION



Optimize the plant and operate close to the limits

Create soft sensor models and improve the control

Identify accurate models by better step tests

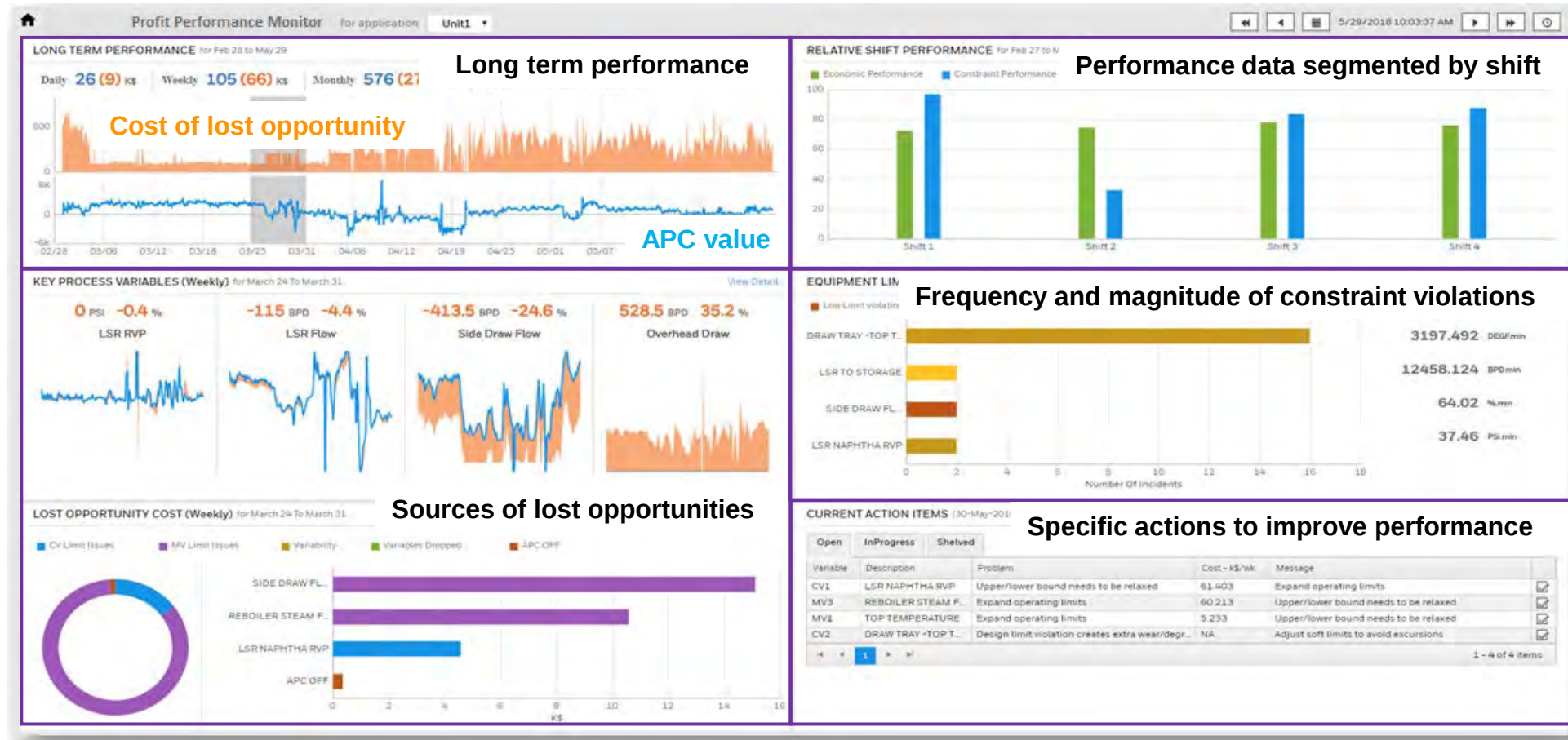
Monitor the unit operation and Act based on the gained insights

Dynamically optimize multiple Advanced Process Control applications

Coordinated planning and control at plant level

HONEYWELL FORGE ADVANCE PROCESS CONTROL

MONITORING AND ANALYTICS



DASHBOARD : IDENTIFY ~ ANALYZE ~ VISUALIZE ~ GAIN INSIGHTS ~ ACTION

CHALLENGES

- Overloaded APC engineers . only 3 In –house APC engineers manage 69 Honeywell APC applications across all the key units
- Reduced APC utilization
- Goal to increase productivity
- No Visibility on the operational performance and could not quantify recommendations

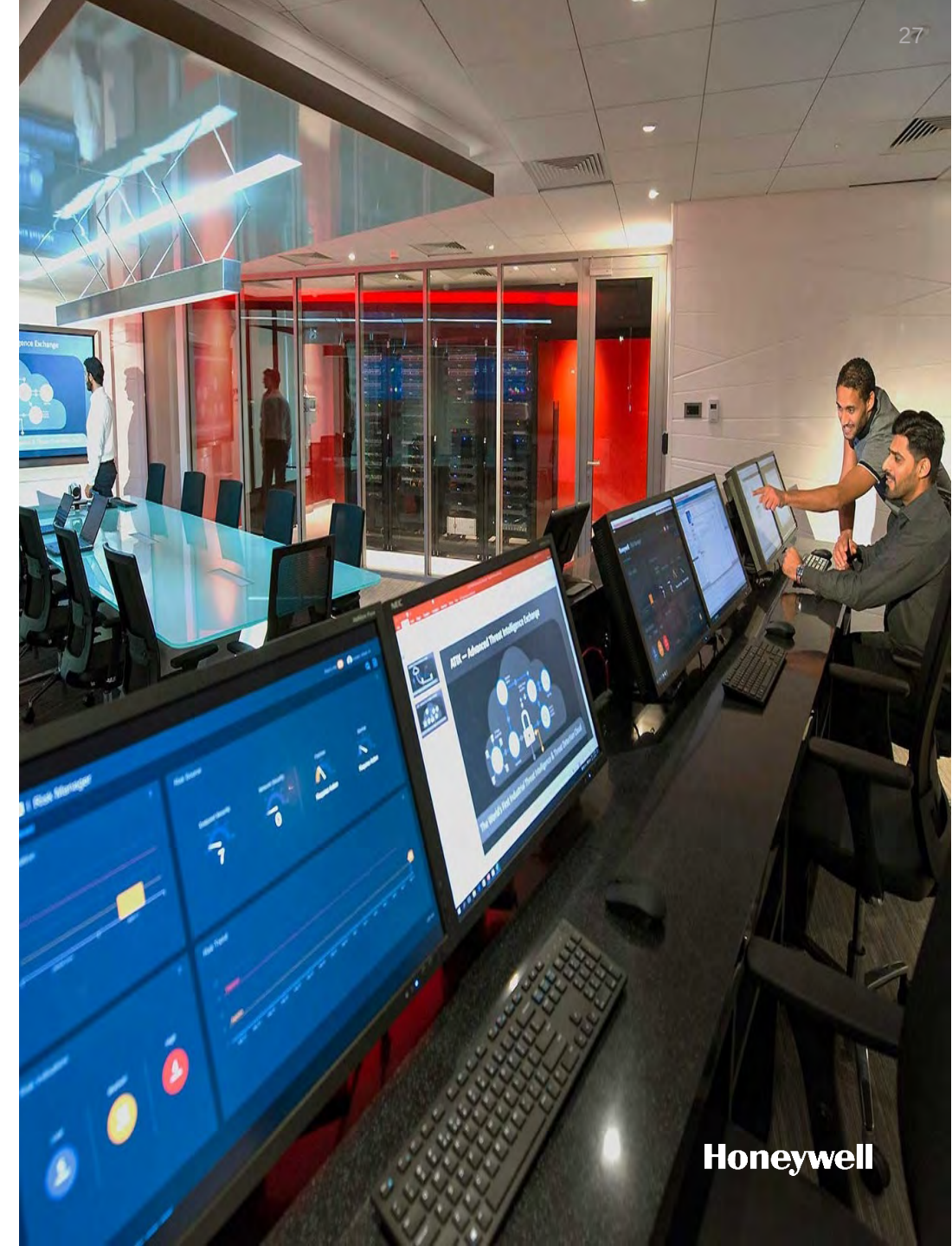
SOLUTION

- Cloud-based APC Performance Management Solution
- Monitors multiple APC applications from 1 location.
- Dashboards to monitor and analyze

BENEFITS

- Proactive identification of lost opportunities
- Reasons include potential shift in 'Pump around Strategy' and Operator Limit setting in Bottom of Column

3K/day Lost Opportunity Identified



ASSET PERFORMANCE MANAGEMENT

HONEYWELL FORGE ASSET PERFORMANCE MANAGEMENT

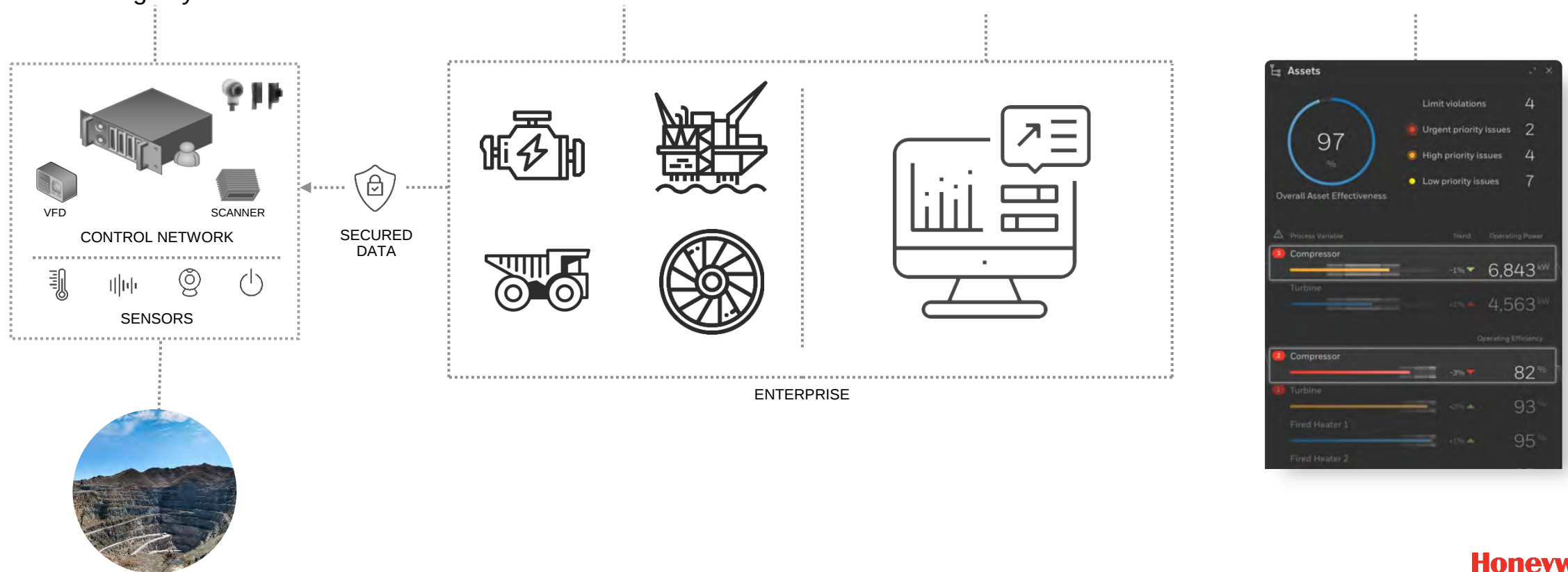
SOLUTION OVERVIEW

1 | Unify data sources from process historians, machine condition monitoring and edge systems

2 | Analyze unified dataset through performance digital twins and machine learning analytics models

3 | Detect impending issues, inefficient energy usage, and improvement opportunities

4 | Recommend corrective actions and detail source of analytics driving recommendation



HOLISTIC ASSET MODELING

50 MW TURBINE
COMPRESSOR

PERFORMANCE MODEL

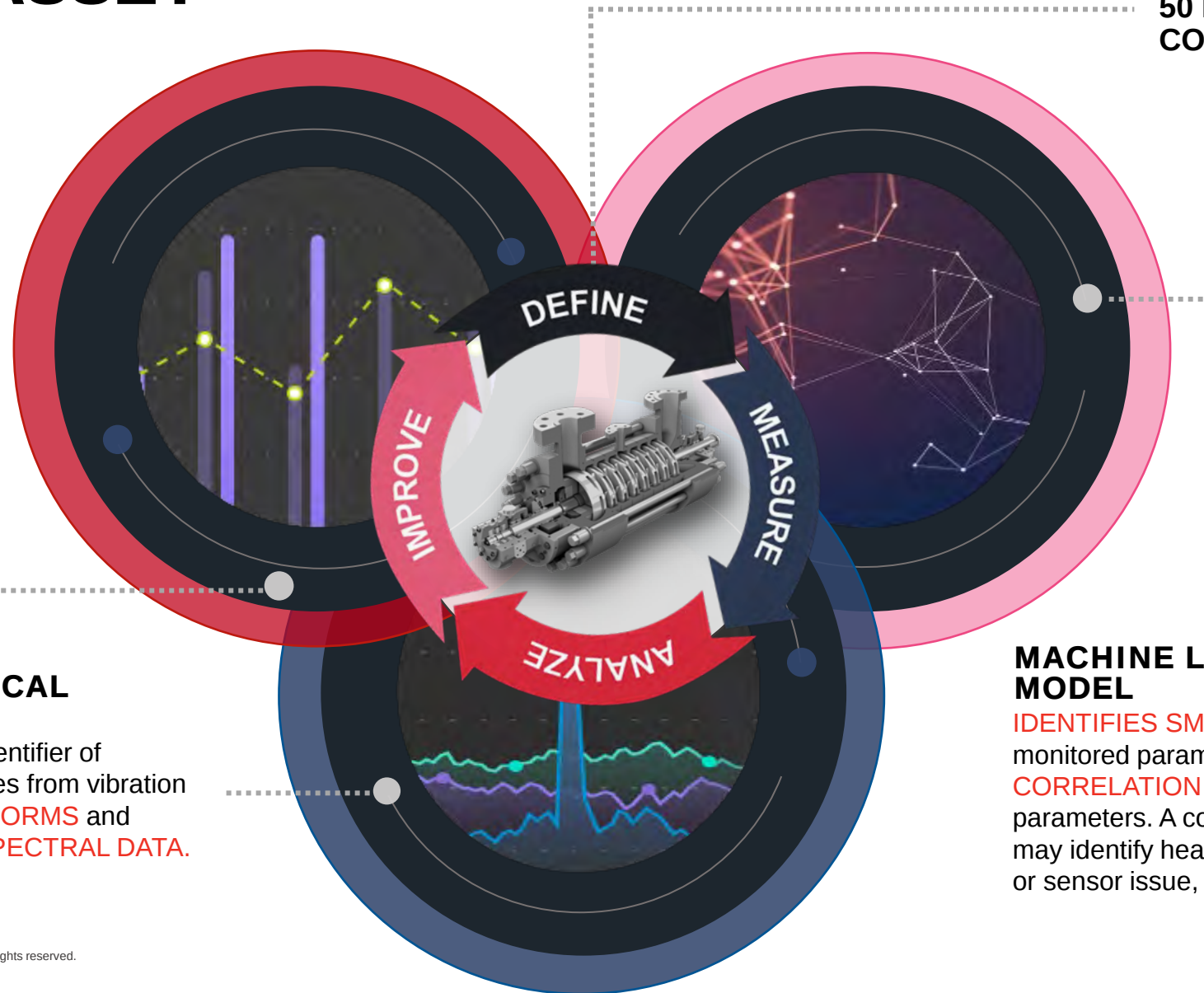
QUANTIFIES the **WORK** done by the machine. Imperative to measure efficiency and associated cost of inefficiency.

MECHANICAL HEALTH

EARLIEST identifier of machine issues from vibration **TIME WAVEFORMS** and associated **SPECTRAL DATA**.

MACHINE LEARNING MODEL

IDENTIFIES SMALL VARIATION in all monitored parameters. Calculates the **CORRELATION** between measured parameters. A correlation change may identify health deterioration or sensor issue, etc.



PRE-BUILT ASSET TEMPLATES ACROSS APPLICATIONS

HIGHLY ADAPTABLE TO SERVE NEEDS ACROSS INDUSTRIES AND APPLICATIONS				
	REFINING & PETROCHEMICALS	O&G PRODUCTION	MINING & METALS	POWER GENERATION
CENTRIFUGAL PUMPS	✓	✓	✓	✓
HEAT EXCHANGES	✓	✓	✓	✓
ELECTRIC MOTORS	✓	✓	✓	✓
VALVES	✓	✓	✓	✓
TURBO & RECIPROCATING COMPRESSORS	✓	✓	✓	
FURNACES	✓		✓	✓
GAS & TEAM TURBINES	✓	✓		✓
FANS & BLOWERS	✓	✓	✓	
HAUL TRUCKS, EXCAVATORS, SHOVELS			✓	
CRUSHERS, DRILLS, DOZERS			✓	
REACTOR COLUMNS	✓			
OXIDIZERS	✓			
ESP's (Electric Submersible Pumps)		✓	✓	

WORLD'S LARGEST REFINERY

Centralized Asset Management & Reporting

CHALLENGES

- Disjointed and manual data analysis using Excel spreadsheets
- Needed improved maintenance planning abilities for **1000+ assets**
- Needed improved data collection
- Delayed reported often too late for timely action

SOLUTION

- Automated, near real-time monitoring and reporting of **7 sites**
- Enterprise scalable cloud solution for future expansion
- Roll-up machine performance calculations to unified KPI dashboard
- Automatic, continuous data collection

BENEFITS

- Single scalable infrastructure for business process standardization
- Real-time alerts from field to executives for improved communication and visibility
- Centralized installation for significant savings in hardware/maintenance cost

**Consolidated 1000's of Asset Spreadsheets Into
a Single Managed Monitoring Solution =
\$3M Annual Productivity Increase**



CONNECTED WORKERS

THE FIELD WORKER OF THE FUTURE



Is Always Connected

Can access contextual work information from any smart device or intelligent wearable



Collaborates with Site Experts

Connects and interact with experts to accelerate the resolution of problems



Builds Skills On The Go

Contextually access reference material to reinforce skills by doing



Learns On-Demand

Builds skills by learning from an extended library of rich media depicting procedures and best practices



Works With Digitized Workflows

Field data and observations are captured through digital methods and fully standardized



Has Access to Safety Alerts & Notifications

Visibility of safety standards and procedures while executing particular jobs in the field



Has Access to Digitized Know-Hows

Consult digitized expertise of more experienced field workers on-demand



Makes Decisions Based on Contextual Data

Accesses relevant information from historians, asset performance management and other enterprise systems

THE FIELD WORKER OF THE FUTURE

01  Mobile device or intelligent wearable for remote collaboration

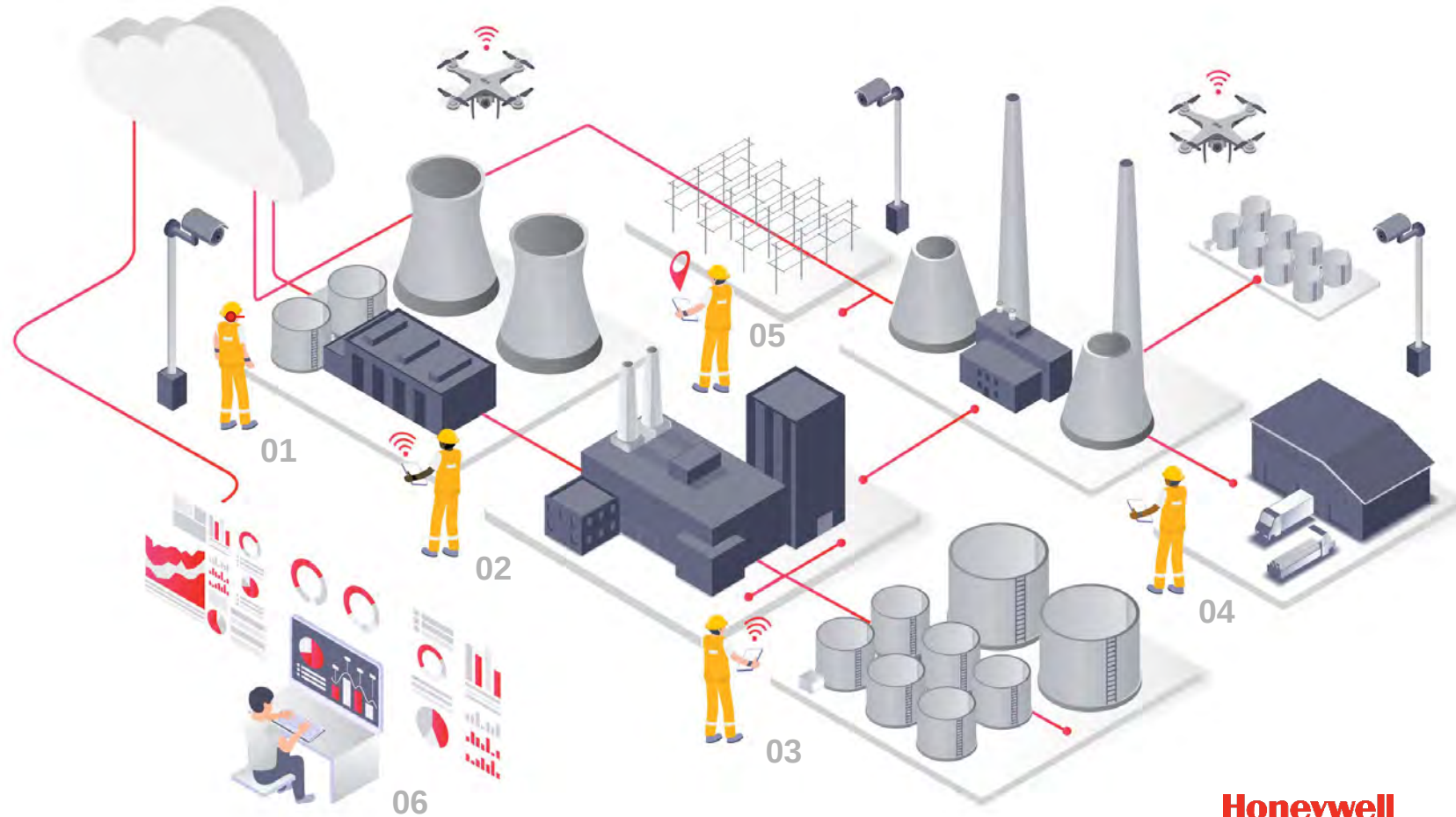
02  Mobility apps with contextual information

03  Remote assistance with expert video calls

04  On the job training with video repository

05  Location based services

06  Real time insights & recommendations



HONEYWELL FORGE WORKFORCE PRODUCTIVITY

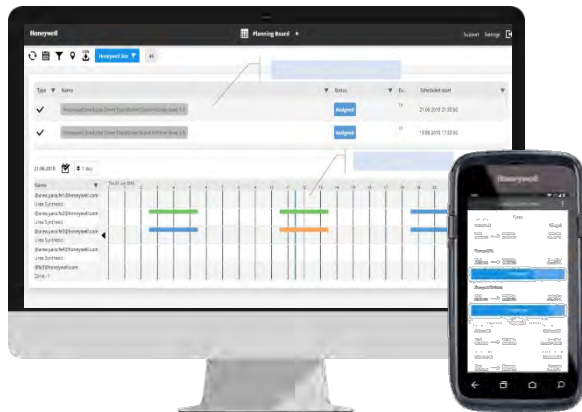
1 Honeywell Forge Inspection Rounds

Digitize workflows for improved data capture, increased compliance, and faster execution – Inspections, Checklists, Safety Protocols, Work Orders and Maintenance



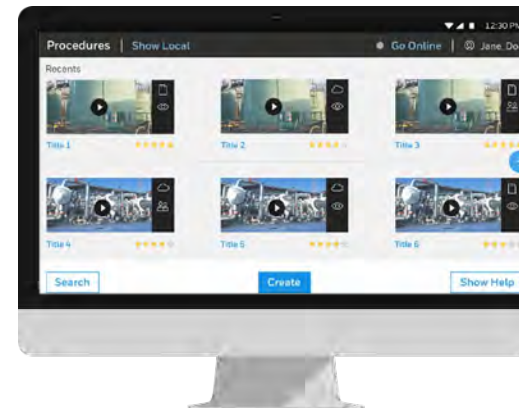
SAP
Maintenance

Asset
Performance
Manager

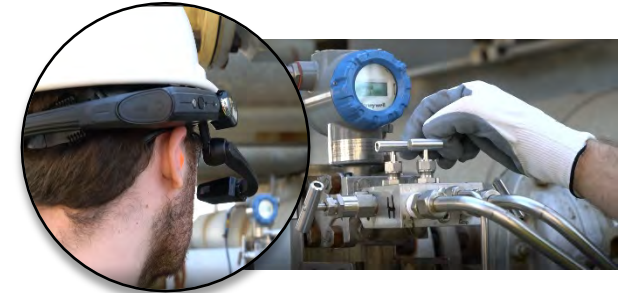


2 Honeywell Forge Worker Assist

Documents and video on demand for higher work quality



Collaboration with remote experts for faster problem resolution



Getting the Job Done; Correctly, Quickly and Safely

WORLD'S LARGEST REFINERY

Integrating Enterprise Data and Maintenance Operations

CHALLENGES

- Lack of existing solution integration including maintenance applications
- Require improved planning abilities
- Need to improve data collection

SOLUTION

- Honeywell Forge Workforce Productivity - Inspection Rounds
 - Mobile (field operator): 2,500
 - Portal (planner/supervisor): 2,000
- Enterprise scalable cloud solution: device agnostic, fully offline solution, and automated data collection

BENEFITS

- Proactive monitor asset performance with effective field audits
- New central limit repository on a single scalable infrastructure
- Real-time alerts for field executives for improved communication and visibility

Enterprise Solution Integration via a Digital Deskless Workforce



BRASKEM IDESA TRANSFORMS FIELD OPERATIONS

Improving The Compliance and Productivity at Braskem's Veracruz Petrochemical Plant

CHALLENGES

- Improve the productivity and compliance of procedures
- Capture the knowledge of experienced and retiring workers
- Provide critical insights and information to trainees and support workers
- Enhance Worker Safety

SOLUTION

- Deployed in 2 process plants with 10 intelligent wearables
- **Honeywell Forge Workforce Productivity** to provide:
 - Step-by-step instructions for common and complex tasks
 - Real-time access to experts in the central control room
 - Access to videos demonstrating key tasks
 - Access to instructions via a heads-up display and voice control

BENEFITS

- Outcomes-based solution to track specific worker and field operations KPIs
- Reduced the need for site visits from experts
- Empowered workers to continue learning on-demand and share their knowledge with peers



“Capturing all the relevant expertise and data and getting it to workers wherever and whenever needed, will help get trainees safely into the field faster and ensure that every worker operates to best standards.”

-Roberto Velasco Gutiérrez, Industrial Director

Braskem

Honeywell

QUESTIONS?



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