Infrastructure Industry Offer Portfolio & Roadmap

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Infrastructure Offerings, Architecture, Demos and Success Stories

1	Infrastructure Market Offering
2	Architecture – Smart City, FMS
3	Architecture – Transportation
4	Architecture – Data Centers
5	Execution Strategy

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Infrastructure Market

Segment Selection

Facility / Fleet Management	Data Centers	Transportation Facilities & Infrastructure	Specialized Projects	Smart Cities
• Fleet of facilities/buildings/ sites • Large campus management • Universities, Medical, military bases, distribution centers, retail chain stores	• IT data centers and Cloud businesses • Fast growing market • Global footprint • Colo or Enterprise DataCenters	• Airport upgrades • Railway network • Power SCADA • Passenger information system • Tunnels, Ports, Subway, Airports	• Stadiums, Malls, Hotels & infrastructure upgrades • Opportunities with similar attributes - fleet operation of wind farms, solar farms	• Various public services centric applications • Growth area • PPP – Public/Private partnership • Large scope • Energy mgmt. • Actionable data to Intelligent decision • Regulations

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Infrastructure Market, Key KPI's or Business Goals

Facility / Fleet Management

- Key KPI
  - Energy Efficiency
  - Cost of Maintenance
  - Chiller efficiency
  - Site Wide Supervision
  - Asset Performance
  - Customer Service

Data Centers

- Key KPI
  - PUE, DCIE
  - Server Utilization
  - Power Efficiency
  - Time to Ticket Resolution
  - DC Floor usage %
  - Capacity Management
  - Asset Performance

Transportation Facilities & Infrastructure

- Key KPI
  - Number of aircraft safety incidents, Customer service, Energy consumption, Baggage Delivery Time, Baggage waiting time, Baggage Loss Count,
  - Arrival Inbound efficiency, Departure Outbound efficiency,
  - Check-in waiting and processing times, Income per passenger
  - Asset Performance

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Software Portfolio Representation – Infrastructure

Industry View – Infrastructure Value Stream

Infrastructure Focus

Our Message:

A transformative integration approach (sites, people, process, assets and technology) to support centralized control and decisions across multiple sites.

Key Value Propositions:

- Reduce total cost of ownership through better system integration approach
- Improve asset availability and utilization
- Improve customer experience with digitalization of processes, information and communication
- Lower implementation costs with market leading hardware agnostic unified platform

Our Offer & Value:

Our software for the infrastructure industry offers industry leading platforms, a fit for purpose application portfolio and an innovative delivery approach through a “system of systems” methodology

Facility / Fleet Management	Data Centers	Transportation Facilities & Infrastructure	Specialized Projects	Smart Cities

Operations Management and Control
An extension of our Operations Control offering specific to Enterprise level Infrastructure projects- multiple facilities, sites, hospitals, ports etc. to manage electrical, mechanical, environmental, and physical security and other systems to improve efficiency

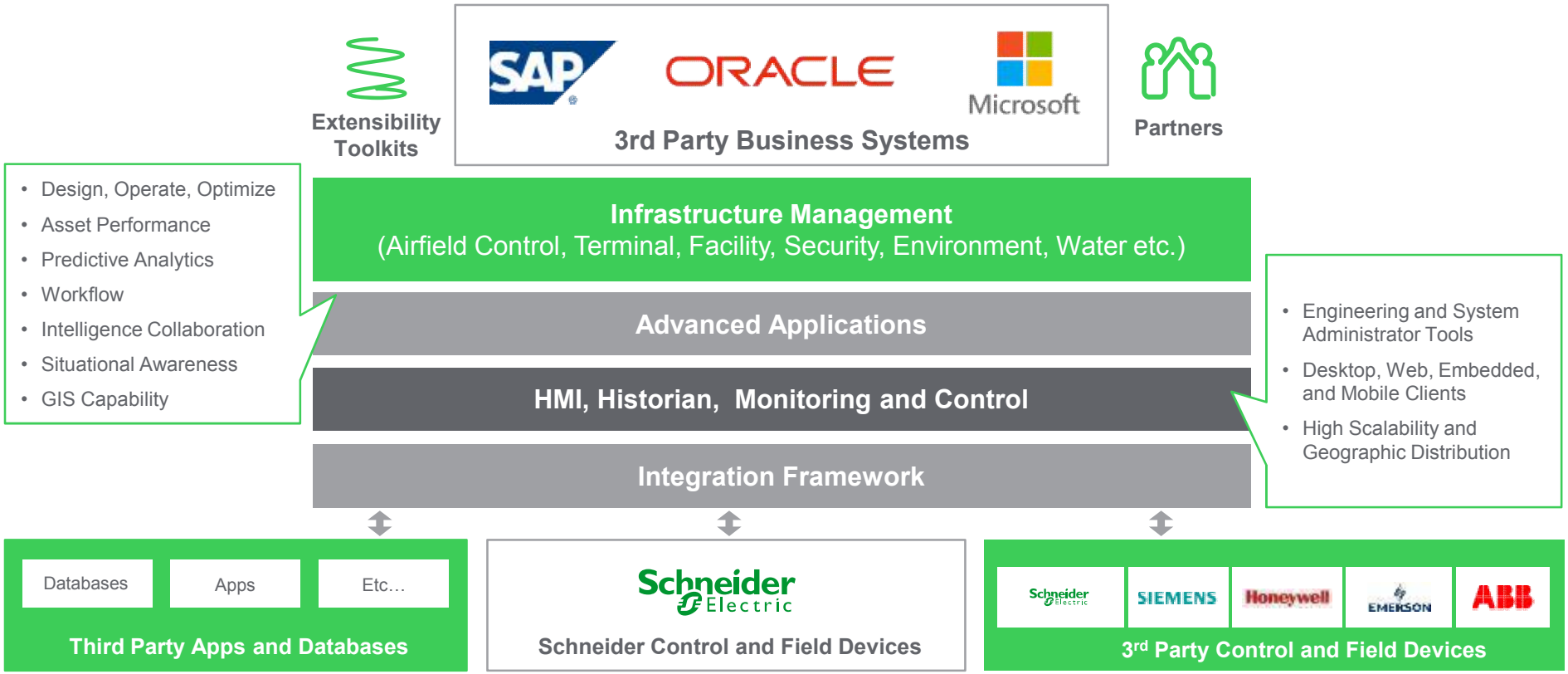
Asset Performance and Reliability
Improve asset reliability and performance to reduce unplanned downtime and maximize asset life

Information Management

Operations Control

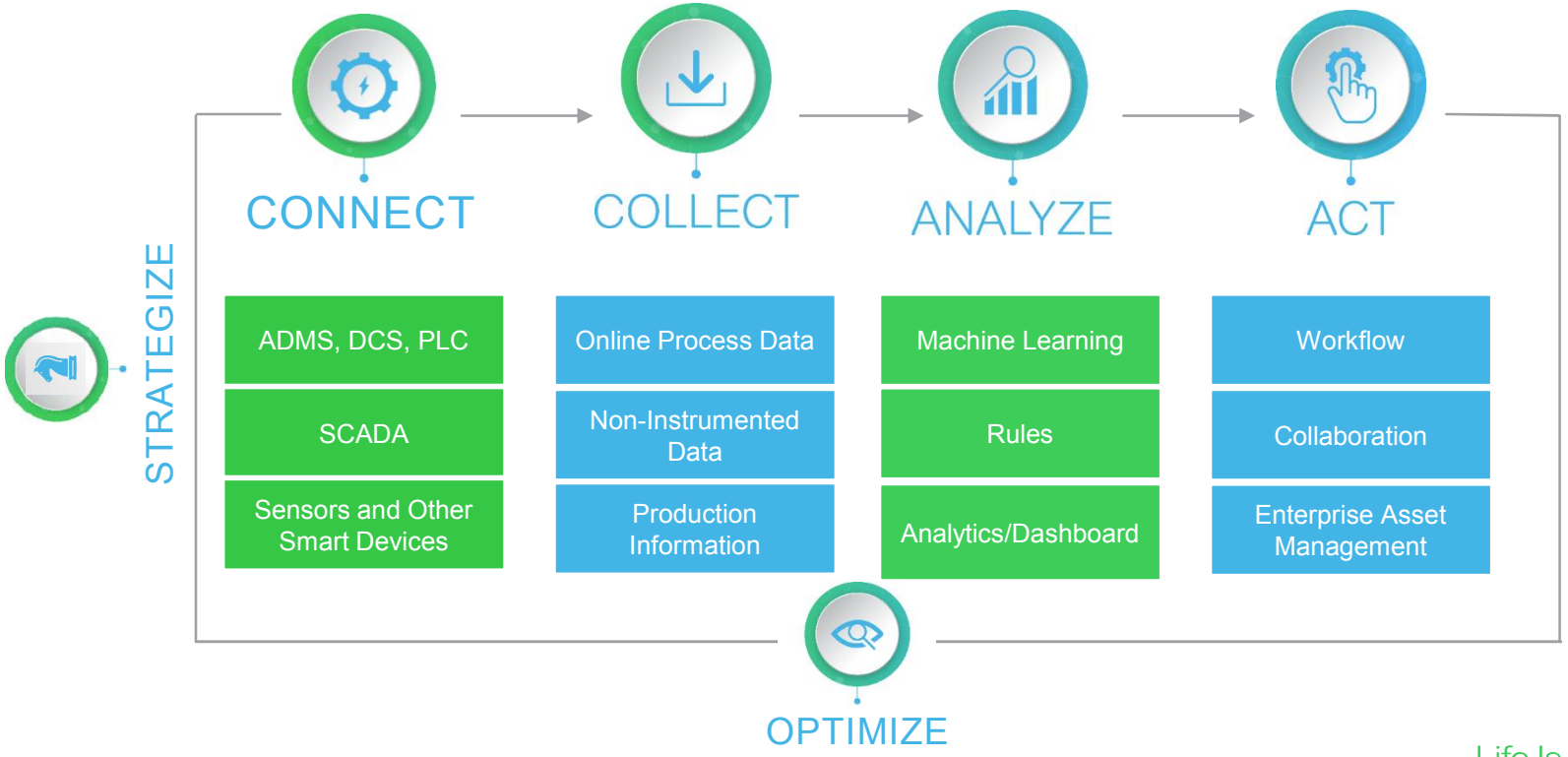
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Operational Intelligent Platform Solution for Infrastructure Market



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Enterprise Asset Performance Management



Comprehensive Asset Lifecycle Management

The asset can be our customers' supply chain network, workforce, plants, equipment or even individual devices.

Accomplished with market leading expertise, technology and partnerships.

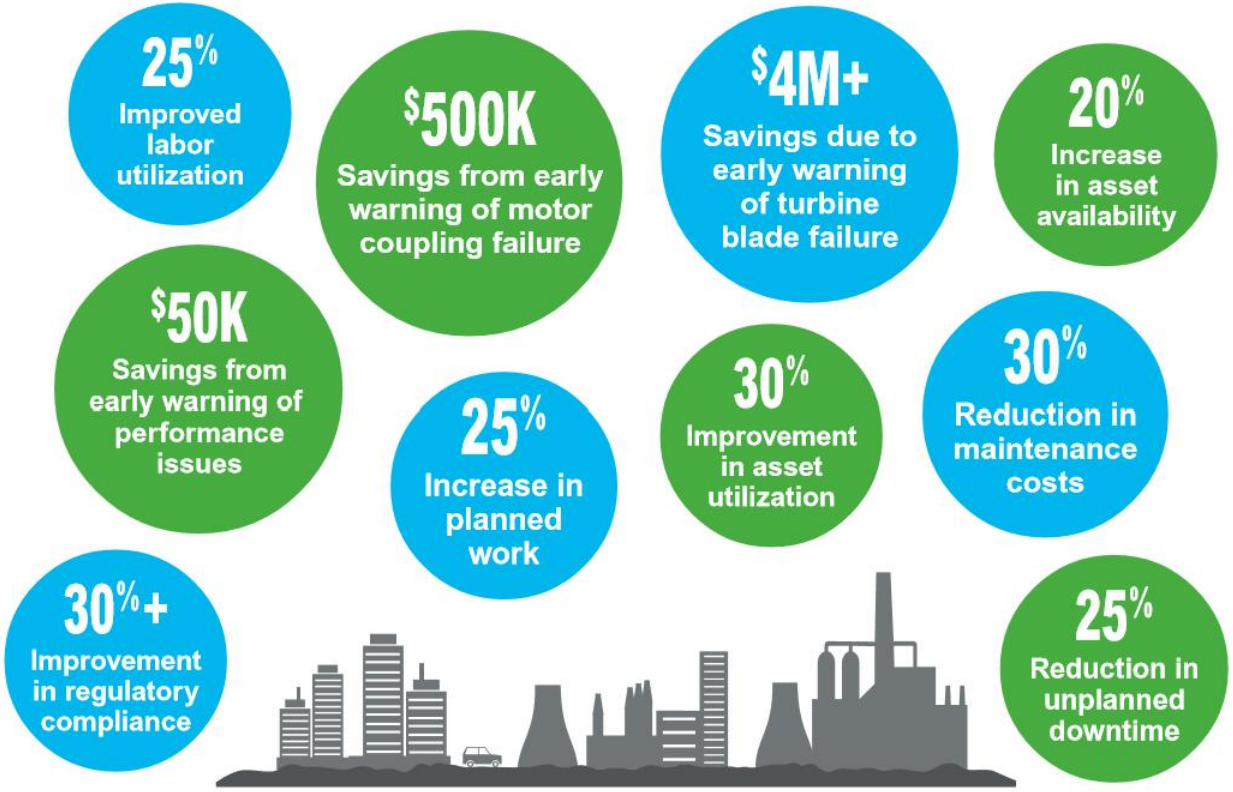
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Value and **Differentiation**

Comprehensive platform bridges the IT/OT divide enabling closed loop business operations. We differentiate through our:

- **People** (experience and domain expertise)
- **Price** (flexible pricing structure, easy to scale)
- **Proven** (technology and customer success)
- Unparalleled **ease of use** and access to **contextualized** information for decision support on any device
- Most **comprehensive** solution with open integration to existing systems
- Flexible **deployment** models (i.e. on premise, cloud, as a service)
- **Integrated** workflow and mobile applications for increased collaboration



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Transformation of Smart City Infrastructure
- Architecture, Portfolio, Case Study

Architecture, Portfolio, Case Study [Smart City, Fleet Management, Smart Buildings Management]

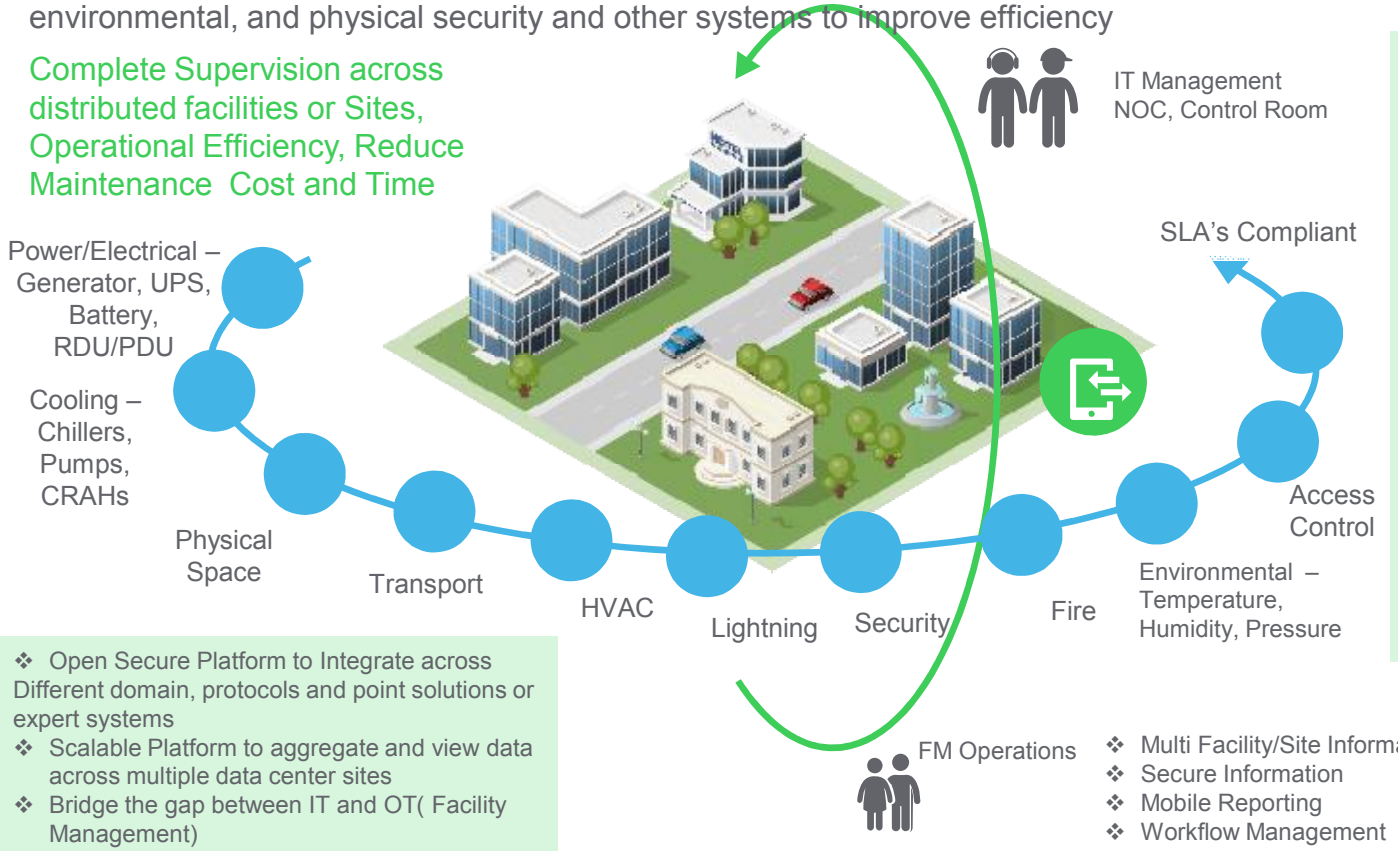


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Fleet Management

Enterprise Level Monitoring and Control across multiple Facilities, Sites, Hospitals, Ports etc. to manage electrical, mechanical, environmental, and physical security and other systems to improve efficiency

Complete Supervision across distributed facilities or Sites, Operational Efficiency, Reduce Maintenance Cost and Time



- Common Operating Picture
- Extensibility to Connect Multi-Vendor System or Devices
- Central Monitoring and Supervision and Dispatch
- Intuitive navigation and Situation Awareness across systems
- High Level KPI's and Drill down
- Data Collection and Aggregation
- Connectivity across different expert systems or SCADA Vendor Packages
- Dynamic Device/Asset Modeling
- Predictive Analytics - Prims
- High Availability and fully redundant
- Schedule and Maintenance Work Order
- Reduce Training and Cycle time to monitor a remote site
- **Scalable Open Platform**

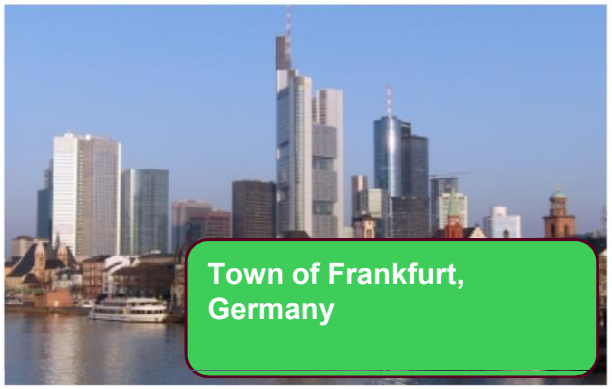
Network Optimization for Water and Energy (Aquis and Termis)

- Open Secure Platform to Integrate across Different domain, protocols and point solutions or expert systems
- Scalable Platform to aggregate and view data across multiple data center sites
- Bridge the gap between IT and OT(Facility Management)

- Multi Facility/Site Information
- Secure Information
- Mobile Reporting
- Workflow Management
- Maintenance Report

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Facility Management: Successes



Town of Frankfurt, Germany



Scientific Center, Julich



Ministry of Foreign Affairs

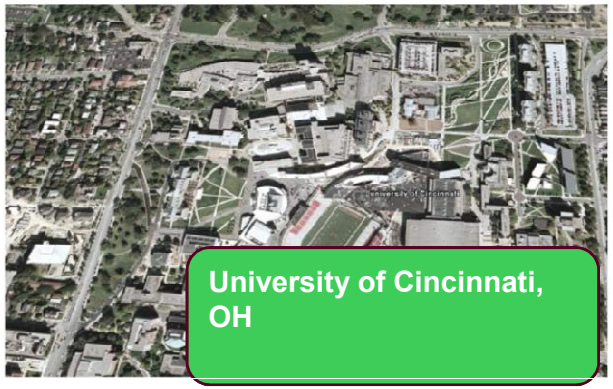


Museum Island, Berlin

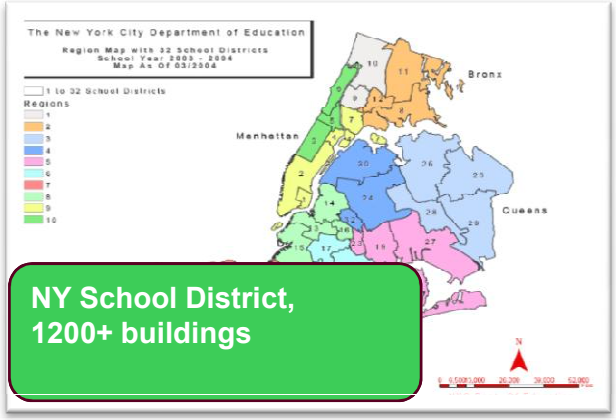
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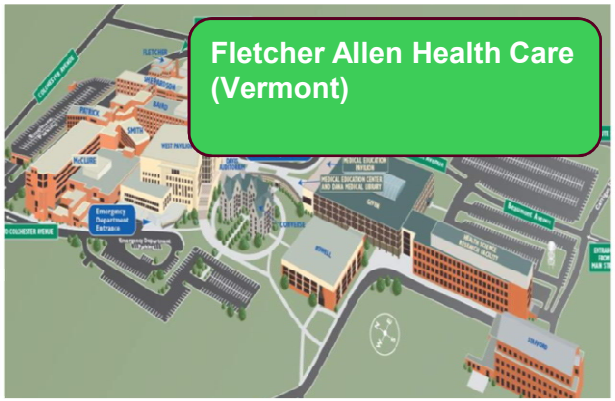
Facility Management: NA Successes



University of Cincinnati, OH



NY School District, 1200+ buildings



Fletcher Allen Health Care (Vermont)



Venetian Hotel, Las Vegas

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Operation Center for Education City, Qatar Foundation

Command and Control Center Management for Qatar Education City

- Monitoring and Control from two central control rooms to manage universities, research center, central plants, laboratories, convention center facilities to
  - Efficiently manage the City's water, wastewater, electrical, environmental and renewable power systems around the clock
  - Make the facility energy efficient optimized operation of Education City
- Ultimately expansion to 300+ Sites

- Command and Control Center for City provides fully redundant, scalable and unified supervision to manage multiple sub-systems deployed by many different BMS Vendors across the city and make facilities more safer, energy efficient and reduce O&M cost.
- Enterprise scalable software platform is required to aggregate different systems, unification, easy navigation and alarm management, KPI View and consistent operations to maintain facilities is critical.

- Challenges:
  - Very complex and 33 different vendor management systems
  - Lack of Standards, Poor Situation Awareness and diagnostics
  - High cost of Operations & Maintenance
  - Limited KPI, comparison across facilities
  - Needs efficiency improvement, energy efficiency, lower maintenance cost and standardization

Key features:

- Distributed and Central Mgmt.
- Configuration Management
- 1 Million IO + System
- Advanced Analytics, Drill Down, Navigation on System
- Situational Awareness for Operations
- Connectivity and integration of many disparate systems

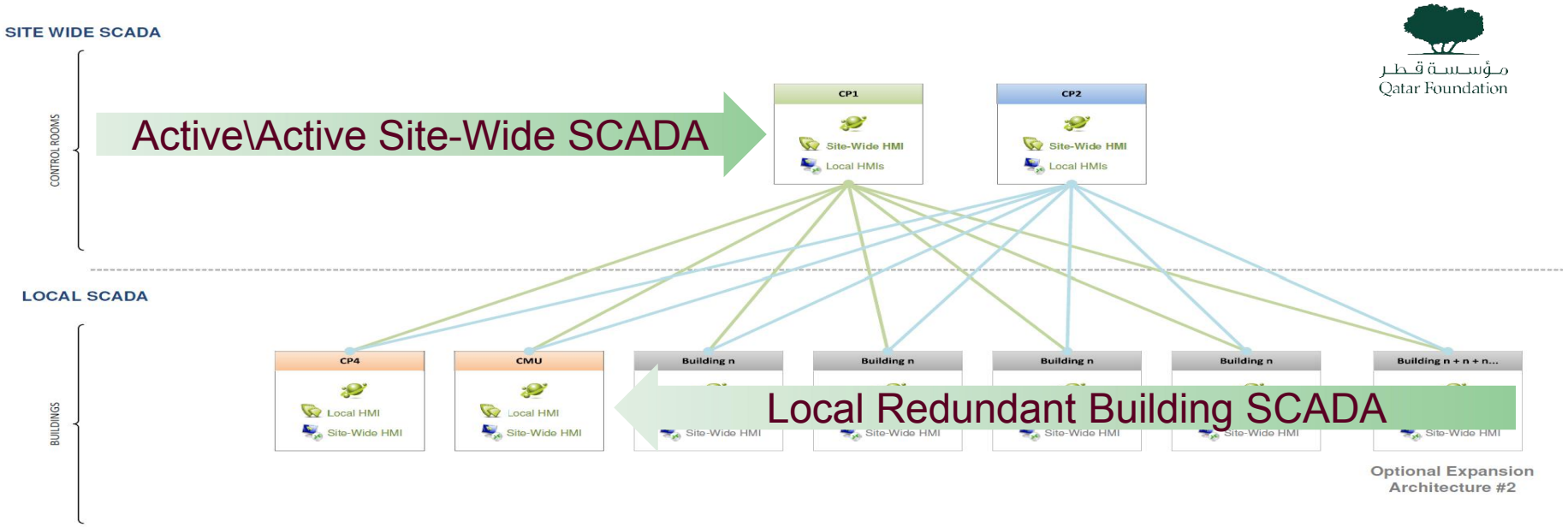
Customer Successes:

- Turn-key Enterprise Control Room is designed to manage 30 different Sub Systems across 33+ Facilities for Education City
- Right technology, right platform, right team, right partner produces right results



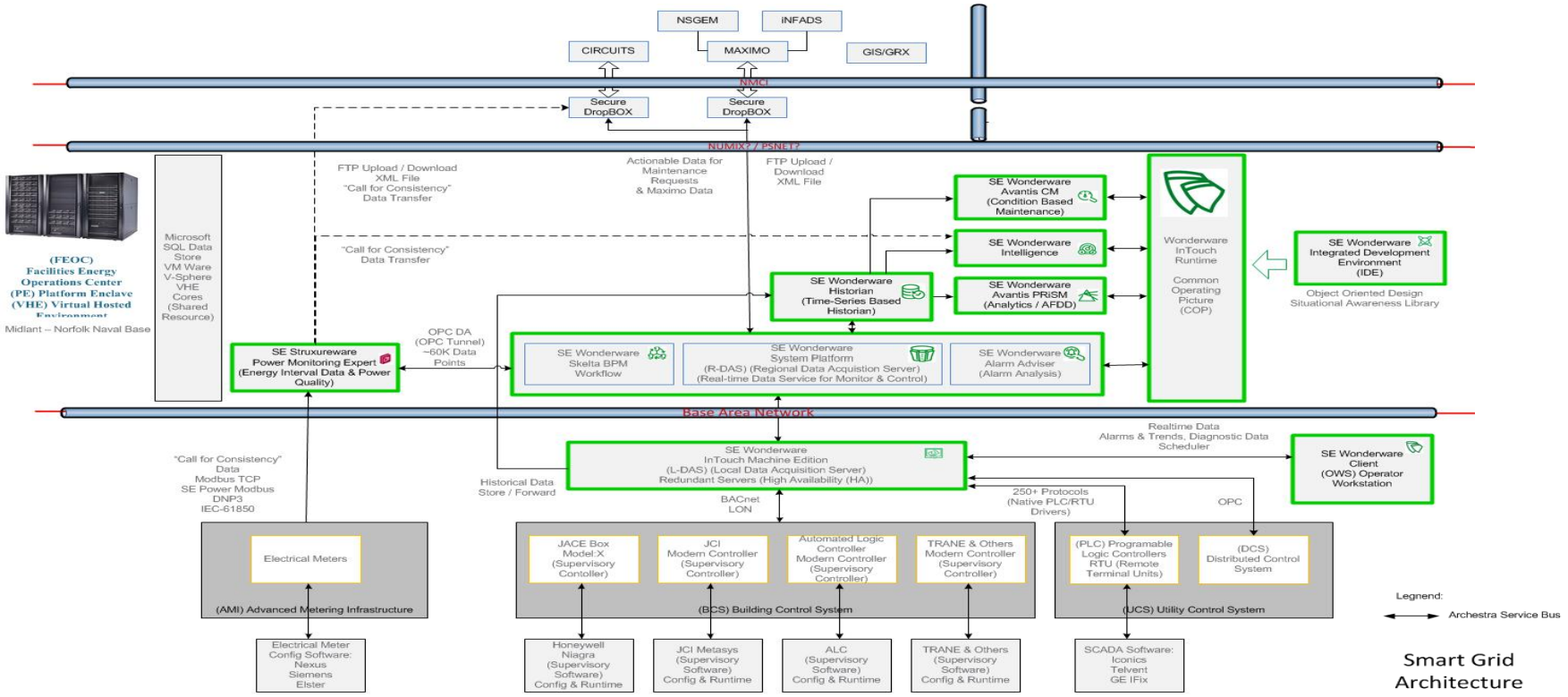
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Architecture – High Level Overview



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Smart Grid Architecture



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Transformation of Data Center Infrastructure
- Architecture, Portfolio, Case Study

Architecture, Portfolio, Case Study [Critical Infrastructure, Data Centers – Colo, Enterprise etc.]

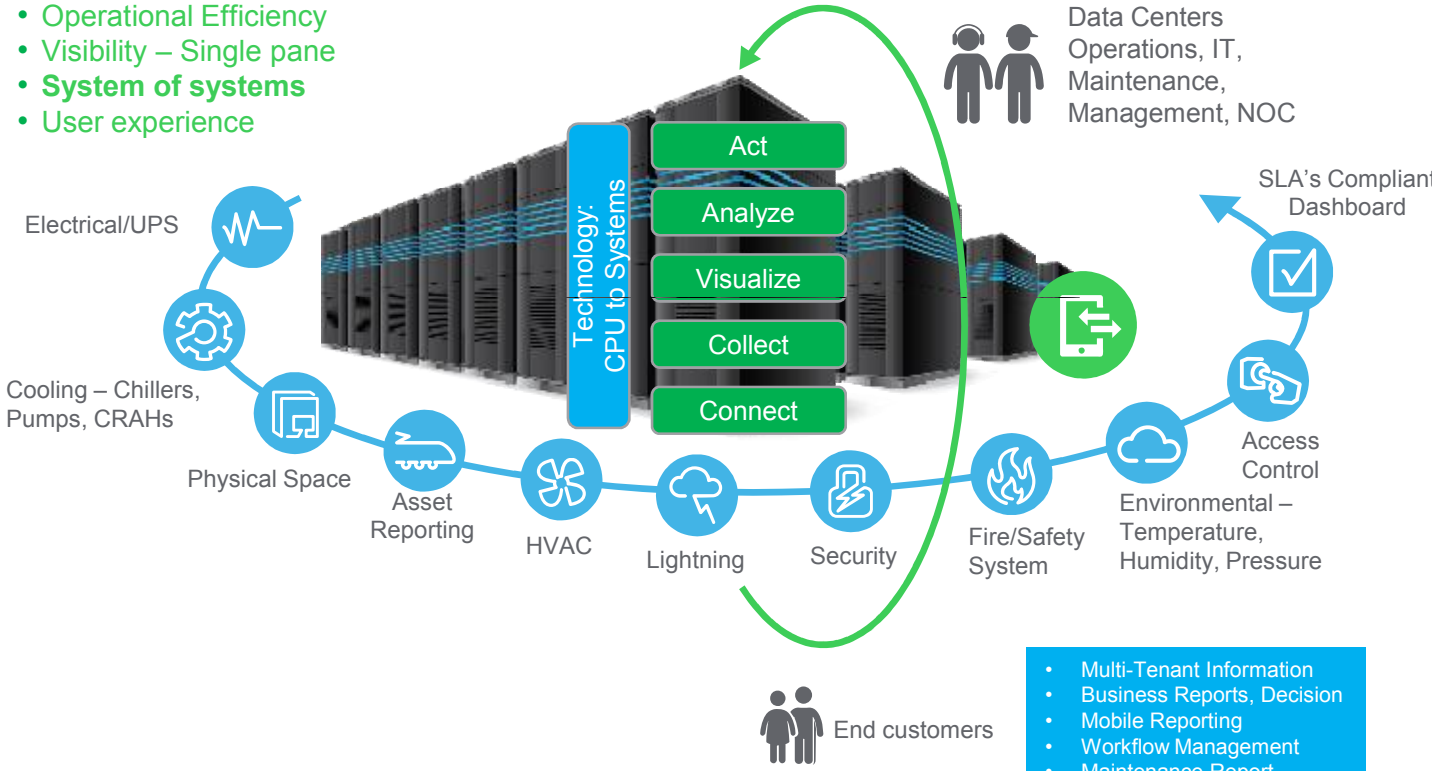
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Wonderware Solution: Data Center Operations and Information Management

Enterprise Level Monitoring and Control across multiple Data Centers to manage electrical, mechanical, environmental, and physical security systems to improve efficiency

- Operational Efficiency
- Visibility – Single pane
- **System of systems**
- User experience



- Multi-Tenant Information
- Business Reports, Decision
- Mobile Reporting
- Workflow Management
- Maintenance Report

Operations

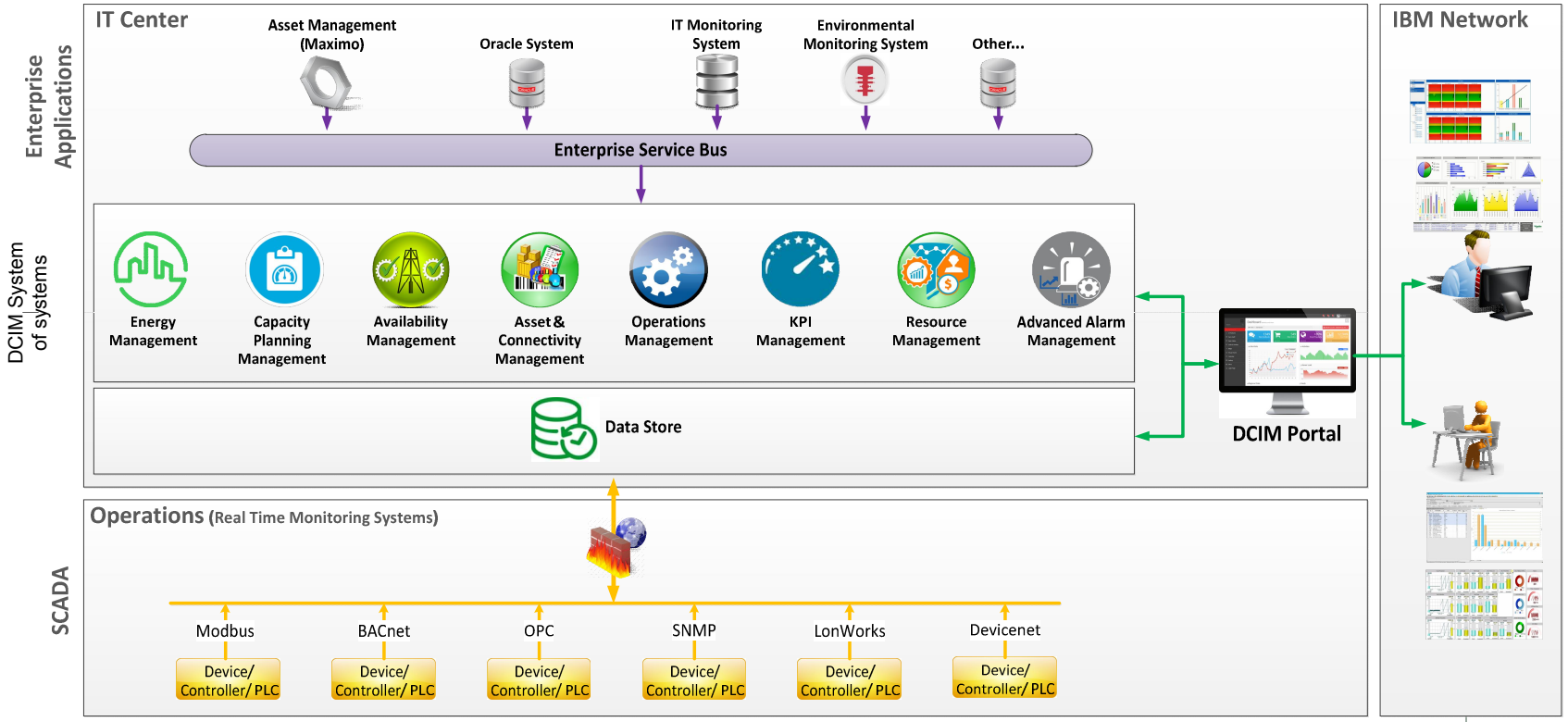
Information

Users

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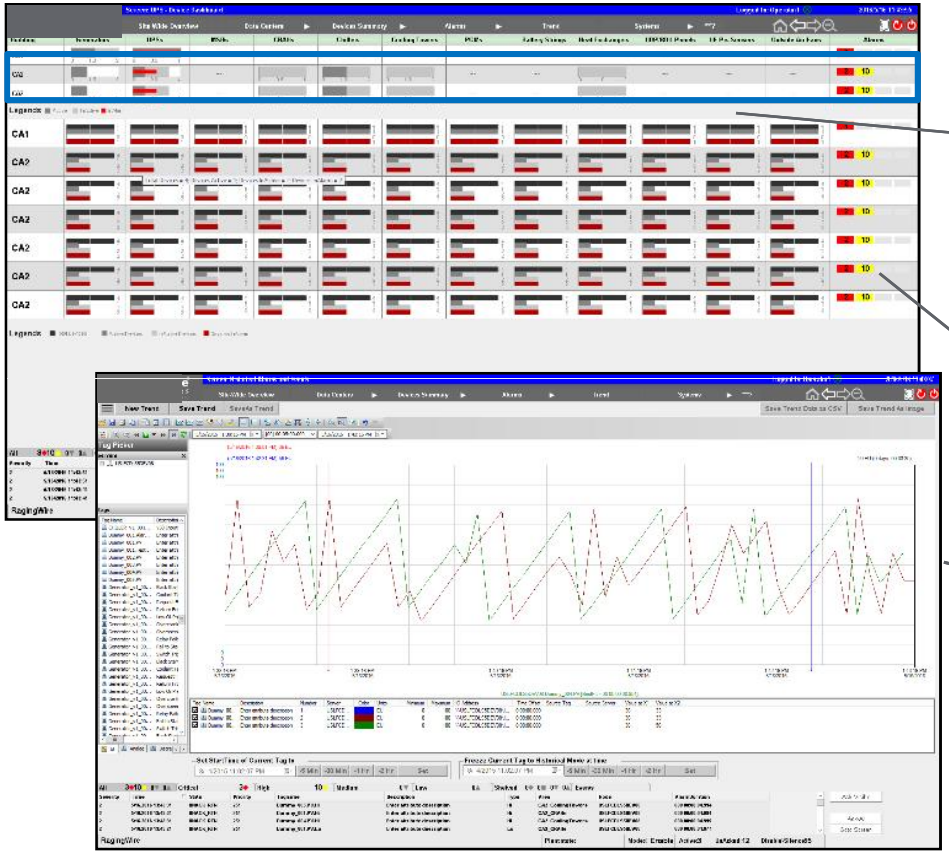
Information Architecture

Combining Operations data with Financial data, KPI, Asset management



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DataCenter Dashboards



Stacked Bar for :
- Active Devices
- InActive Devices

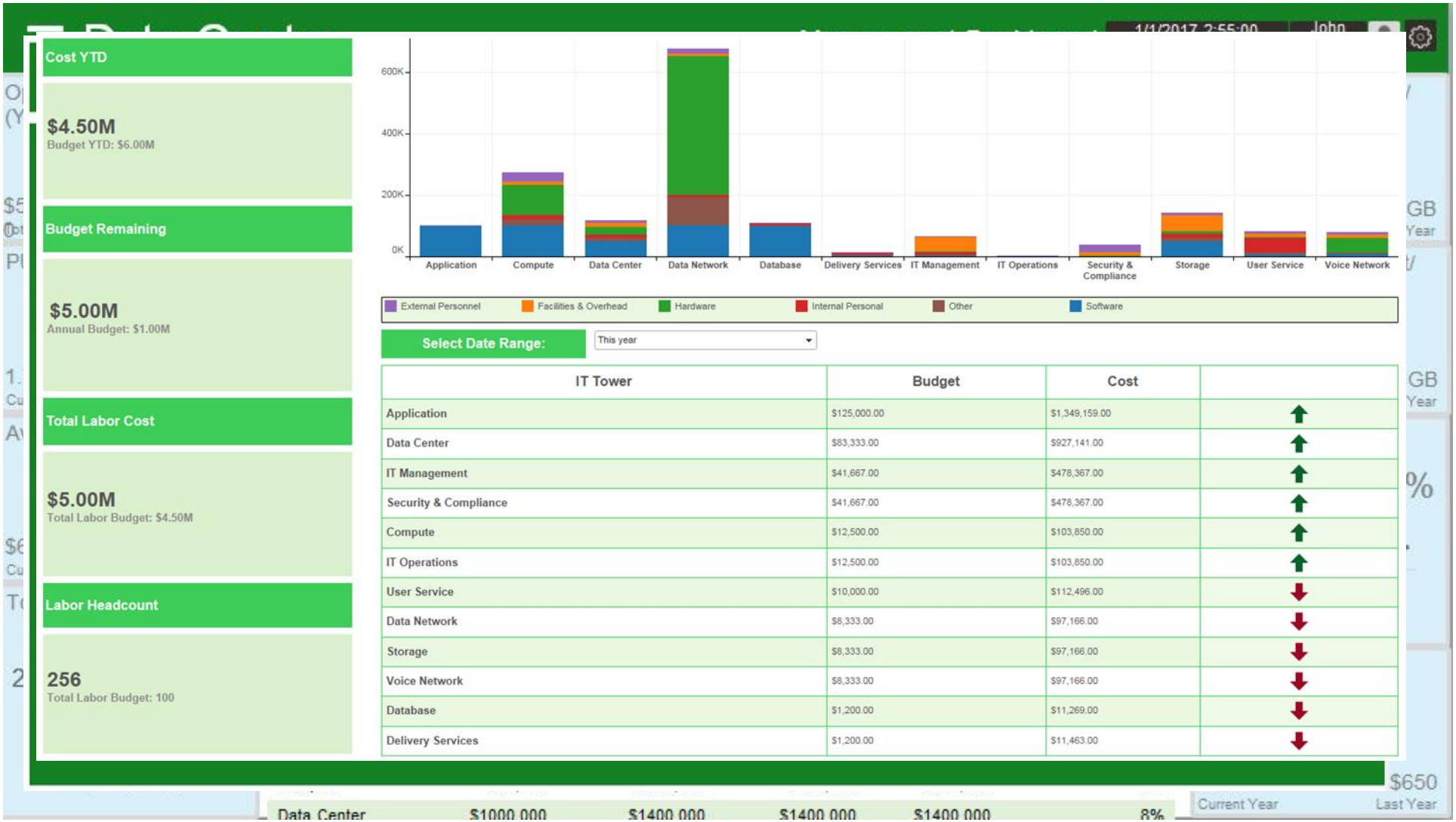
Red Bar for:
- Devices InAlarms

Displays different bars for:
- Total Devices
- Active Devices
- InActive Devices
- Devices InAlarms

Tiered Historical data

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Cost YTD
$4.50M
Budget YTD: $6.00M
Budget Remaining
$5.00M
Annual Budget: $1.00M
Total Labor Cost
$5.00M
Total Labor Budget: $4.50M
Labor Headcount
256
Total Labor Budget: 100
600K
400K
200K
0K
Application
Compute
Data Center
Data Network
Database
Delivery Services
IT Management
IT Operations
Security & Compliance
Storage
User Service
Voice Network
External Personnel
Facilities & Overhead
Hardware
Internal Personal
Other
Software
Select Date Range:
This year
IT Tower
Budget
Cost
Application $125,000.00 $1,349,159.00
Data Center $83,333.00 $927,141.00
IT Management $41,667.00 $478,367.00
Security & Compliance $41,667.00 $478,367.00
Compute $12,500.00 $103,850.00
IT Operations $12,500.00 $103,850.00
User Service $10,000.00 $112,496.00
Data Network $8,333.00 $97,166.00
Storage $8,333.00 $97,166.00
Voice Network $8,333.00 $97,166.00
Database $1,200.00 $11,269.00
Delivery Services $1,200.00 $11,463.00



Transformation of Transportation
- Architecture, Portfolio, Case Study

Architecture, Portfolio, Case Study [Tunnel, Airport, Port, Subway etc.]







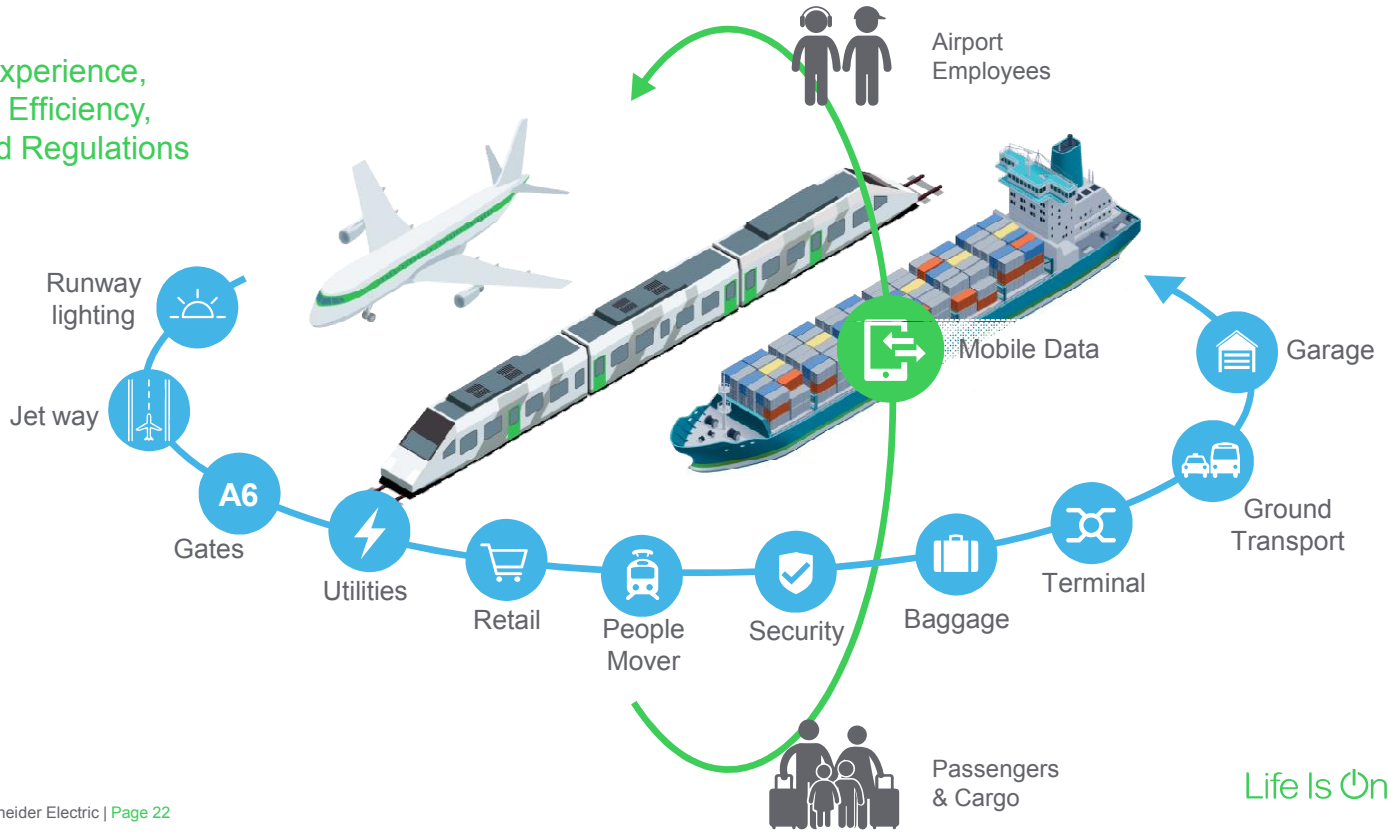
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Business Challenge:

Real-time awareness across functional silos in a multi-vendor landscape

Customer experience,
Operational Efficiency,
Security and Regulations

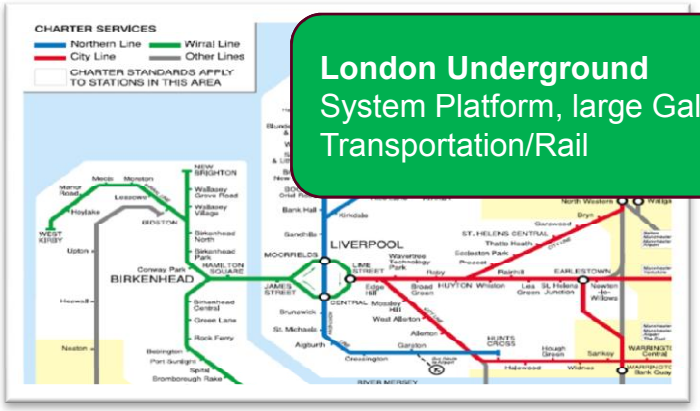


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Successes



AENA – Spain airports
Barcelona alone - 1M+ I/O
Transportation/Air



London Underground
System Platform, large Galaxy
Transportation/Rail



Edmonton International Airport
200,000 I/O
Transportation/Air



China Rail
1+ Million I/O
Transportation/Rail

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We have proven experience and references !

aena aeropuertos

AÉROPORTS DE PARIS

ANA Aeroportos de Portugal

Heathrow
Official airport website

AÉROPORTS DE MONTRÉAL

香港國際機場 HONG KONG INTERNATIONAL AIRPORT

CITY AIRPORT BREMEN



https://www.youtube.com/watch?v=3NWSVf_uJiE

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A33 Motorway Asti-Cuneo

The motorway Asti Cuneo, is currently a part is in exercise and part under construction; it is divided into two sections for a total of 90.15 Km, connected to each other by a distance of 20 Km A6 Highway Torino-Savona from Marene to Massimini. 11 junctons Viaducts, bridges, tunnel: 20 km total

System Integrator: Giordano e C. Spa









- System Platfform 50k io + 13 client Hmis fat/thin (RDP) clients
- Application redundancy (aos), HMI peer-to-peer (local distributed aos's),
- Virtualized VMWare

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AENA, Barcelona Airport, Spain

Smart airport management system solution – dynamic, intelligent infrastructure

System Platform, InTouch, Historian and Information Server

Handles over **1,000,000** signals:

- Control of escalators, elevators & passenger moving walkways; power management; air conditioning; fire safety systems
- Monitoring support – automated luggage transport system

Used at all 46 AENA-managed domestic airports





"The centralization of operations that we get with Wonderware ... is essential for a critical infrastructure like this."

– Jordi Asensi, Head of Systems and Database Management, AENA Barcelona Airport

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POWER HMI/SCADA



China Ministry of Railway

China Railway High-speed CRH

China Ministry of Railway manages and runs all state owned railway network in China.

Began to construct High Speed Railway in 2006, the High Speed Railway system attains a speed of 200-350 km/hr (124-217 mph)

At 50,000 km, when completed, it will be the longest high-speed rail in the world.



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Success Story

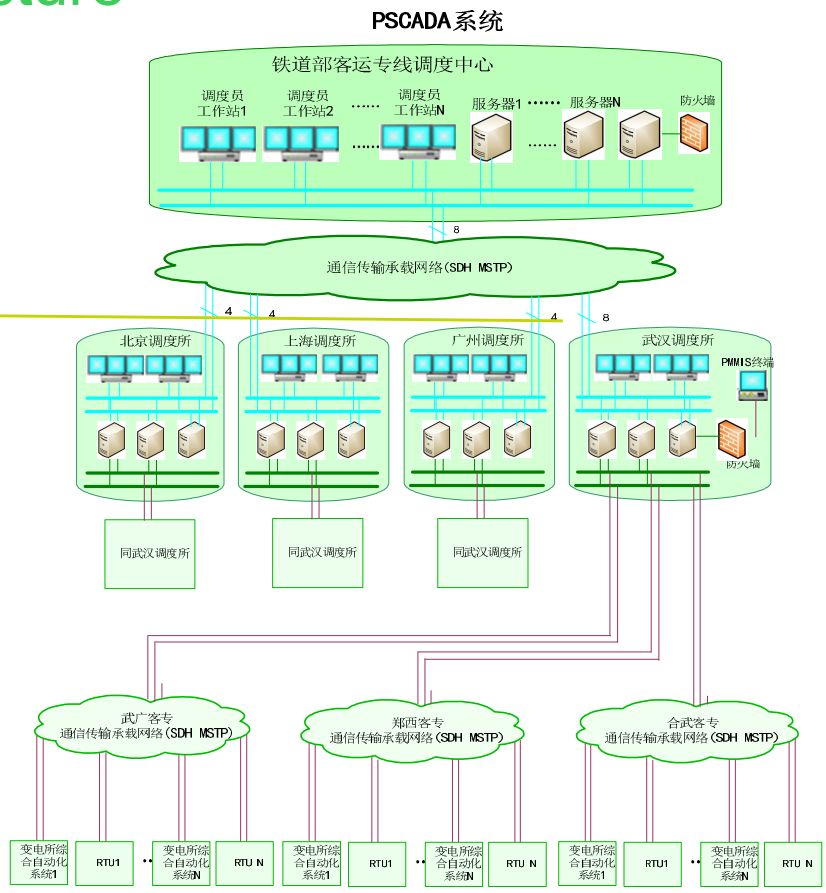
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China Railway Architecture

1 Ministry of Railway Center

18 Regional Control Centers with one or more Galaxies at each center

New Areas will be added to the existing regional control centers

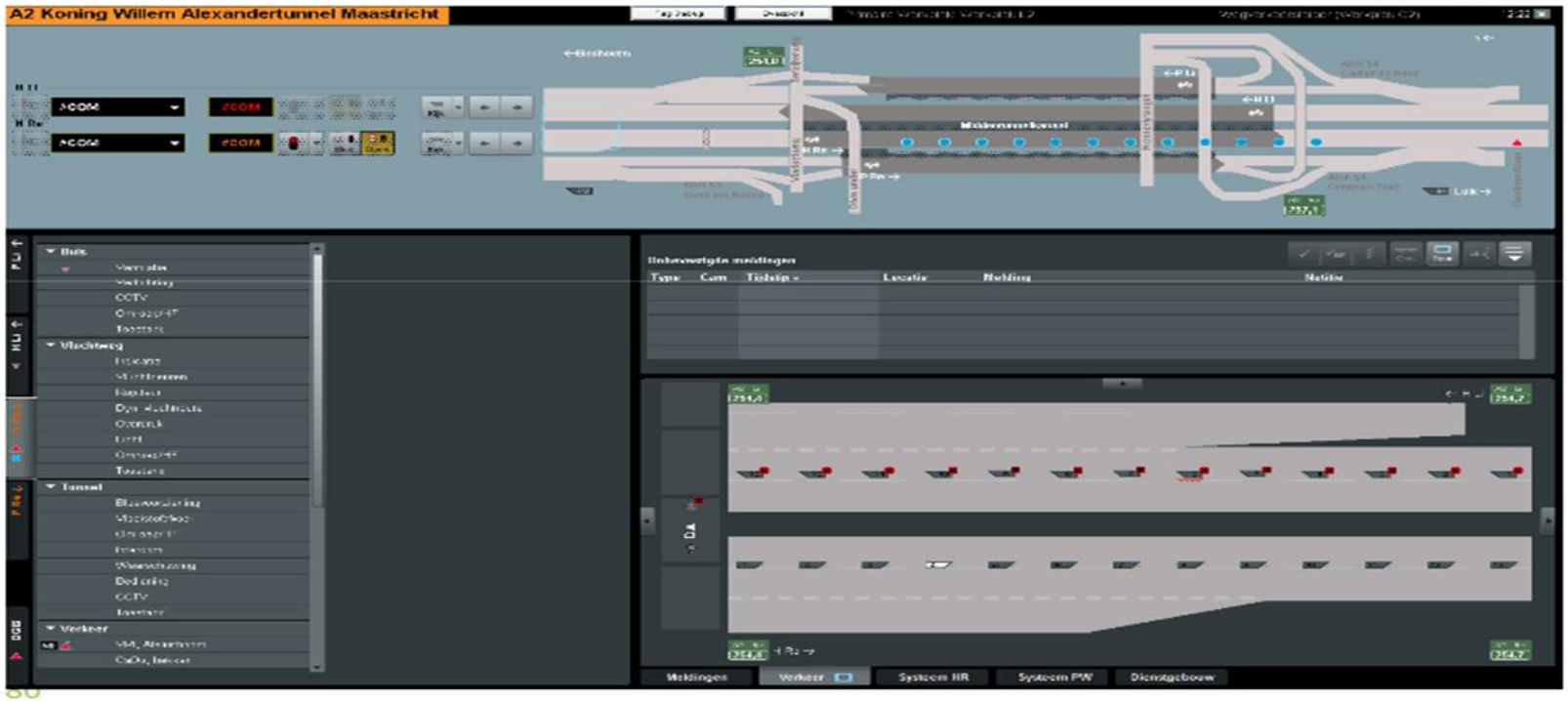


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Netherland Traffic Control Room Management - Citect

DE GROENE LOPER
ÉÉN PLAN VOOR STAD EN SNELWEG

GUI WVL Screen example



Execution Approach

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Infrastructure Solution Offering Roadmap

Solution Templates

- Control Room Solution Templates
- Site Solution Templates
- Model, Navigation
- Next Gen HMI Integration

Dashboards

- Dashboards, KPI, Doc Viewer, Scheduler, Filters, Advanced Search
- Intelligence and Workflow integrated
- Predictive Analytics and Condition based Model

Content

- Faceplates (BMS, DC, Airports)
- HVAC, Chiller, DC, PQM etc.
- Protocols – BacNet, Lon, SNMP, OPC etc.
- GIS Integration Capability

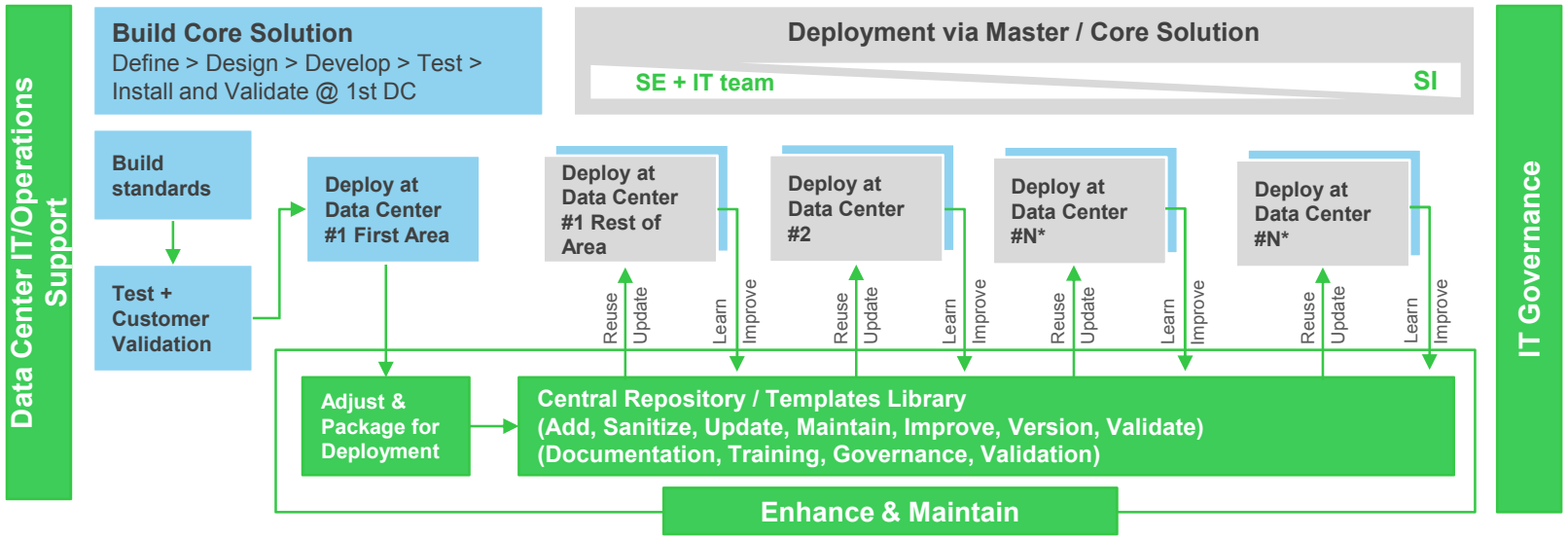




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Deployment: Iterative and Template based Approach



- Everything exists as an object template within Data Center Solution - resources, visualization / HMI, interfaces, workflow, etc.
- Master template based solution roll out with iterative processes
- Can be implemented in Virtual Server model - standardization
- Structured project management processes and Enterprise Quality management structure
- Global support

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Question:

1. What is the Key KPI Data Center Measured on **?**
   A. COM
   B. PUE
   C. EMI

2. What is the Key Software Sales Approach for Infrastructure offering?
   A. Unified Platform
   B. System of Systems
   C. Smart Platform

3. What does Infrastructure market covers**?**
   A. Ports, Airports, Fleet Management, Tunnels, Subways
   B. Data Centers, Smart City
   C. All of the above

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