Achieving Digital Transformation in Infrastructure with a ‘System of Systems’ Approach

Presented by: Rashesh Mody
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Our Strength - Installed Base, Global Reach, Partner Network

Wide Industry Coverage

- 19 of the top 20 petroleum companies
- 22 of the top 40 chemical companies
- 10 of the top 15 mining and minerals companies
- 25 of the top 50 food and beverage companies

Installed Base Strength

- Over 100,000 sites
- Over 2 Million licenses
- Over 20 Billion operating parameters monitored
- Over 12,000 terabytes of operating data processed

Scale
- 2800 people
- 10 R&D centers
- 24 project centers

Partner Ecosystem
- 4000 SI partners
- 160 technology partners
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Industry automation experience - A solid foundation for Infrastructure projects!

1. Mission Critical Applications
2. Apt for Large Opportunities
3. Hardware Agnosticism
4. Unique Deployment Approach
Seamless and uninterrupted movement of people, goods, data, natural resources and energy while leveraging best-in-class technology.

Connecting People, Processes, Systems and Sites

Quality of Life
Safe. Reliable. Sustainable
Infrastructure Imperatives

Beyond Real-time visibility. Sustainable Innovation through Digitization

1. System Integration
2. Operational Efficiency
3. Energy Optimization
4. Security/Statutory Regulations
5. Customer SLAs
Data Centers: Manage Growth

Single Pane: Uptime, Integration, and Efficiency

- Resiliency and High availability
- Standardization
- Remote Access
- System Integration
- Maximum Asset Utilization
- Situational Awareness
- Energy Optimization
Airports: Modernization

Single Pane: Uptime, Integration, and Efficiency

- Operational Efficiency
- Disparate Systems
- Rapid Response Time
- Operator Training
- Security Regulations
- Dynamic Environment
- Passenger Experience
Facility Management

Energy Efficiency and Improved Operations

- Diverse Systems/Vendors
- Energy Optimization
- Rapid Response
- Contextual Awareness
- Operational Efficiency
- Single Pane of Visualization
Facility Management Contd.

Complete supervision across distributed facilities or sites results in operational efficiency, reduced maintenance cost and time.

- **Physical Space**
  - Cooling – Chillers, Pumps, CRAHs
  - Power/Electrical – Generator, UPS, Battery, RDU/PDU

- **Lightning**
- **HVAC**
- **Transport**
- **Fire**
- **Security**
- **Environmental** – Temperature, Humidity, Pressure

**FM Operations**

**IT Management**
- NOC, Control Room

**SLA’s Compliant**
- 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**

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

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Smart City: Enhanced Experience
Optimizing Operational Systems and Empowering Human Systems

Smart Energy
- Adv Dist Management & GIS Solutions
- Smart Metering & Demand Response
- Renewables Integration & Micro Grids
- Real-Time Grid Management
- Gas Distribution Management

Smart Mobility
- EV Charging & Management Services
- Advanced Traffic Mgt (moving cars)
- Dynamic Tolling & Congestion Mgt
- Integrated Corridor Management (moving people)

Smart Water
- Distribution Mgt & Leak Detection
- Power, Control & Security Systems Integration
- Stormwater & Urban Flooding Mgt

Smart Public Services
- Public Safety
  - Video Surveillance
  - Emergency Mgt
- Digital City Services
  - e-Government
  - Education
  - Healthcare
  - Tourism
- Safe & Smart Streets

Smart Buildings & Homes
- City Energy Mgt
  - High-EE Buildings
  - Energy Mgt & Security
  - Energy Services
- Efficient Homes
  - Home Energy Mgt
- Renewables Integration Micro Grids

Smart Integration
- Integrated City Management Platform
- EcoDistrict Planning & Implementation
- Security and Energy Managed Services
- Weather Intelligence
How do we Address these Imperatives?

1. How can I monitor and control operations better for high efficiency?
2. How can I meet safety and regulatory norms?
3. How can I ensure availability of assets and resources?
4. How can I enable better decision making?
5. How can I enrich my user/customer experience?
## Transformative Integration Approach to Infrastructure Market

<table>
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<tr>
<th>Macro Trends</th>
<th>Demographic Shifts: Urbanization, City infrastructure</th>
<th>Big data and infrastructure build-outs: Technology shifts, and differentiation</th>
<th>Regulation and Safety: Security, Change management, regulation</th>
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</thead>
</table>
| Modernization and Upgrades | Improve operational efficiency  
  • Improve visibility, control and remote mgmt.  
  • Improve energy management  
  • Improve decision making using data analytics |  |  |
| Customer Experience | Improve System integration  
  • Minimize capital investment  
  • Supports multi-vendor landscape  
  • Improve integration of built and acquired operations – systems, sites, people and Assets |  |  |
| Safety, Regulations | Digitization of processes, information and communication: workers, end users, mgmt.  
  • Alerts and Response  
  • Evidence of regulation compliance |  | Intelligent integrated Software Solutions for Infrastructure Projects:  
A transformative integration approach (sites, people, process, assets and technology) to drive operational excellence across multiple sites through innovative solutions):  
### Key Value Propositions/Offer  
• Right Platform for Integration  
  • Increase operations efficiency  
  • Improve visibility and control  
  • Reduce total TCO, asset management  
• Right Application Portfolio  
  • Enrich customer experience – continuous awareness with optimized response  
  • Support safety and regulation compliance  
• Right Approach with Innovative Solutions  
  • Our master template based solution, processes, people and architecture are unique. |
We at Schneider Electric call this Transformative Integration Approach System of Systems
System of Systems
Achieving Digital Transformation in Infrastructure

1. Hardware Agnostic Platform
2. Model Driven Information
3. Centralized yet Collaborative
4. Out-of-the-box Situational Awareness
5. Advanced Alarm Management
6. Best-in-class Historian
7. Remote Access
8. Robust Workflow Management
Solution Approach: System of systems

CONNECT, COLLECT, ANALYZE and ACT from disparate data sources
## System of Systems - Value proposition

### System Platform

<table>
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<tr>
<th>Technology Excellence</th>
<th>Integration</th>
<th>Active Workflow</th>
<th>Mobile Apps</th>
<th>Control</th>
<th>Historian</th>
<th>Integrated IT Applications</th>
<th>IOT</th>
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<tbody>
<tr>
<td></td>
<td>• Ability to integrate with IT applications</td>
<td>• Cross functional workflow with the ability to communicate between people, device and systems</td>
<td>• Ready mobile apps- Smart Glance, Work Task &amp; Asset Maintenance</td>
<td>• Ability to control through HMI apart from ability to monitor real time data</td>
<td>• Historian is in-built in City OS, which captures Real time Analog data &amp; real time Boolean data (alert, events, operator's action)</td>
<td>• Ability to seamlessly integrate System platform, Workflow, Asset management along with mobile apps</td>
<td>• LORA, MQTT connectivity</td>
</tr>
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### Open Standard
- Real Time
- Scalable

### Operational Control
- (Human)
- (Machine)

### Future Ready
- Real Time
- Future Ready

### Technology Excellence
- Integration
- Active Workflow
- Mobile Apps
- Control
- Historian
- Integrated IT Applications
- IOT

**Life Is On**

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New Frontier: The Digital Journey Starts with the Digital Twin

Improve Operator Training, Reliability of Assets and Operational Profitability
Deployment: Iterative and Template based Approach

- Everything exists as an object template within City OS- resources, visualization / HMI, interfaces, workflow, etc.
- Master template based solution roll out with iterative processes
- Glocal model: Global expertise with local project teams.
- Structured project management processes and Enterprise Quality management structure
- Singapore based solution center with global support
Efficiency Improvement and ROI Opportunities

Real-time Optimization # of FTE
- Maintenance workload assessment
- Asset management, spare parts, staff
- Budget planning
- Avg. $.5-1M annual benefit

Energy Saving
- Integrated with real-time calendars, events and scheduler for un-utilized areas/equipment
- Avg. 10%M annual benefit

Asset Utilization
- Real-time monitoring and control
- Network failure detection to minimize operations
- Avg. $250K reduction in operational costs

Predictive Diagnostics for rotating equipment
- Predictive failure warning and fault diagnostics
- Centralized asset performance monitoring
- Predictive models, condition profiles
- Avg. $100K savings for each predicted failure

Customer Satisfaction improvement
- Enhance reporting and feedback

Operator Training improvement
- Enhance operational efficiency of new workforce
- Avg. ROI within 12-18 months

Intelligent Integrated Software Solutions for Hyper-Scale Data Center Projects:
A transformative integration approach (sites, people, process, assets and technology) to drive operational excellence across multiple sites through innovative solutions (Data Center Operations & Information Management):

1. Operational Efficiency
   Energy
   Asset Utilization
   People Utilization
2. Decision making and CSAT improvement
Successes…

Railways

Fleet Management

Airports

Fletcher Allen Health Care (Vermont)  
University of Cincinnati, OH  
Venetian Hotel, Las Vegas  
NY School District, 1200+ buildings
Carson City, NV - A "smart city" success story
Goals
• Efficiently manage the City’s water, wastewater, transportation, landfill, fleet, environmental and renewable power systems around the clock
• Leverage the latest virtualization technologies as well as increase situational awareness to achieve a high level of operational readiness

Challenges
• Deliver affordable and reliable utility services to citizens and visitors to Carson City and surrounding counties
• Reduce administration and overhead costs while significantly increasing the City’s operations reliability and disaster recovery processes

Results
• Remote management capabilities have resulted in 15% reduction in operations staff hours due to saved “drive time”
• Reduced work week from five eight-hour days to four ten-hour days
• Helps manage the city’s solar plants that provide up to 748,000 KWH of clean power each year
• Delivers more than 22 million gallons of water while processing 6.9 millions of gallons of wastewater each day

“Carson City has realized about a 50% reduction in staff time as a result of the Wonderware software.”
– James Jacklett, Electrical/Signal Supervisor, Carson City Public Works

Carson City, NV - A "smart city" success story
AENA, Barcelona El Prat Airport
AENA, Barcelona El Prat Airport

Goals
- Develop an integrated and centralized control platform to accommodate expansion for the airport, which would triple in size
- Ensure that the new platform in Barcelona would be replicable across the other airports in the AENA system
- Find a way to integrate, manage and optimize processes and systems coming from multiple vendors

Challenges
- Airport control systems information needed to be presented simply and in context to enable operators to quickly and accurately interpret it
- Existing control platform required operators to learn up to 20 different technologies and tools, so training was difficult, operations were not smooth, stress was high and costs were rising

Results
- Wonderware solution controls the processes throughout the airport that manage the terminal building and cooling and heating power plant as well as auxiliary buildings for luggage transport; additional systems are being deployed
- The system, which originally managed 35,000 signals, now handles 700,000 inputs through 80 servers; in the final phase, signals are expected to increase to nearly one million

“The centralization of operations that we get with Wonderware helps manage around 700,000 signals and is essential for a critical infrastructure like this. We can now quickly respond to incidents and also be proactive in optimizing management.”

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

Facilities Management
- Wonderware® System Platform
- Wonderware InTouch® HMI
- Wonderware Historian
- Wonderware Information Server
Goals

• Unify more than 1,200 municipal properties under a single, open building management system (BMS)

• Optimize the efficiency of heating systems in the buildings to cut energy consumption

Challenges

• The buildings were running proprietary BMS from several different vendors

• The properties were managed at six control facilities located around the city under the direction of five geographical districts and regional supervisors

Results

• An open BMS based on the Wonderware solution is in place, centralizing the management of the extensive property list (160 facilities in all)

• Regional supervisors all now have access to the BMS

• Energy consumption down with cost saving of more than US$ 43,000/yr.

• Adding buildings to the system is simple and more efficient due to the dynamic Wonderware software

“As our regional supervisors can now access all heating systems from a central location, they will be able to successively optimize the systems one by one.”

– Rüdiger Heinenbruch
Technical Operations Manager, Immobilien Bremen

Facilities Management
Asset Excellence
• Wonderware
Why Schneider Electric Industrial Software?

The Right **Platform:**
- Scalability
- Connectivity
- Redundancy
- SCADA
- Security
- Integration
- Architecture flexibility
- Deployment
- Visualization
- Configurability and designed for building System of systems.

The Right **Portfolio:**
- Workflow
- Asset Management
- Collaboration
- Analytics
- Reporting
- Information
- Enterprise integration
- Historian
- Energy Mgmt.
- Operations
- Mobile support
- Maintenance
- Performance.

The Right **Approach:**
- Repeatable models,
- Master template based solution development,
- Iterative approach,
- Situational awareness library,
- Glocal approach with Partner ecosystem.

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**Operational efficiencies**

**Reduced cost of ownership**

**Improve scale of operations**

**Improve safety and security**

**Improved Situational awareness for operators**

**Improved Situational awareness for citizens**

**Optimized Response**

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**The Right Partner** with global reach

**Continuous Awareness & Response**

**Customer Experience**

**Customization**

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*Life Is On*
Available Resources on System of Systems

Whitepapers, Presentations etc.