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Staying ahead in the game: A transformative integration approach to the Infrastructure value chain

WHITEPAPER

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Executive Summary

Infrastructure segment comprises of multiple sub-segments – Facility/ Fleet Management, Data Centers, Transportation, Smart Cities, and Special projects while excluding Water/Waste Water. Each of the sub-segments face certain common challenges – optimising costs, centralised information management, enhanced customer experience and most importantly to have a holistic view of the operation by integrating various disparate applications.

This paper focusses on how a transformative System of System integration approach could support the centralised control and decisions across sites.

INTRODUCTION

Infrastructure provides a critical connection to the nation's businesses, communities and people, driving our economy and most importantly the quality of life. In order to stay competitive, every nation must move people, goods and data efficiently while delivering energy and water resources in a safe, reliable and sustainable manner. Within the infrastructure sub-segments there is a very strong move towards consolidation and upgrade. This paper focusses on managing multiple systems within the enterprise and across wide geographical zones, improving operational visibility through a unified platform.

Infrastructure segment imperatives are driven by macro and micro trend. At a macro level we have urbanisation, mounting cost pressures, and demand for improved customer experience. At a micro level, there are large Greenfield capital projects funded by private and public entities, energy management and reduced operating costs, opportunities to leverage advancements in technology. These eventually translate to industry drivers

1. Seamless Integration between systems, sites, people and assets
2. Improve operational efficiency and reduced energy cost
3. Adherence to various security, cyber security, safety and regulatory compliance
4. Deliver on service level agreements and exceed expectations

An enterprise should focus more than just monitoring real-time operations. Need of the hour is to extend beyond the traditional KPIs and leverage latest in technologies such as Big Data and Analytics, Advanced visualisation and workflow management capabilities so as to ensure sustainable innovation through digitisation.

In an attempt to generalise, we can think of the following as a common factor for each of the sub-segments and the subsequent sections will look at how each of the sub-segments could deal with the broad level imperatives to stay ahead of the game.

- Application silos – An enterprise has multiple applications each performing what they are intended to. But to sustain the competitiveness in this new age, the enterprise should have a holistic view of their end-to-end operations at any given point of time
- Information exchange – With the existence of multiple applications, it is only evident that enterprises don't really have the visibility or the intelligence that is required to take an intelligent business decision
- The convergence –Result of siloed applications imply that the information technology layer don't interact with operational technology (OT) systems used to monitor events, processes and devices and make adjustments in enterprise and industrial operations
- Availability – Resulting from the lack of convergence, an enterprise may have poor visibility into availability of its assets and the utilisation patterns thereof

Data Center

A cutting edge Data Center need to manage diverse systems – hardware and software, emerging trends and technologies, of varying ages, from numerous vendors, and with widely divergent levels of connectedness and interoperability.

Data Center imperatives include:

- Resiliency and availability ensuring business continuity
- Scalability and standardisation of systems
- Remote monitoring and controlling
- Multi-system/site integration leveraging existing investments made
- Asset management with predictive and condition based maintenance for maximum utilisation
- Situational awareness ensuring right information with the right context and at the right time
- Controlling energy and service costs
- Move from CAPEX to OpEx lease
- Workflow management to automate procedures and tasks with advanced reporting and analytics

Data Center transformation is not an overnight process, but a journey that requires optimisation of various individual functions. In a nutshell – combination and optimisation of resources, tools, best practices, and intelligence ensure lowest total cost of ownership and best returns an enterprise may anticipate. A Data Center transformation journey consists of moving from making tactical decisions arising from disparate systems to integrating various systems and applications with a strategic vision and eventually realising optimised state delivering best-in-class returns.

Airport

Airport management is also challenged to grow the business by supplementing aeronautical revenues with non-aeronautical revenue sources such as retail, restaurants and bars, parking, conference centers etc. in addition to attracting and retaining major airline service, managing government agency interaction and providing very high levels of customer service and satisfaction.

What's more, airport management also has to manage and optimise the entire passenger experience, and that is a people-intensive undertaking. Airport personnel are a key part of the entire airport machinery, and they need to be trained, informed, productive, efficient, available and responsive. Such an enormous people challenge requires that every part of the airport is digitally aware and connected, and that information is readily available by whoever needs it, wherever they need it, and whenever they need it.

- Ready access to good metrics and KPIs that cross both organisational and system boundaries
- Ability to drill-down into details, possibly as far as device-level information
- Integrated view of the operational systems. This is especially critical for emergency response situations, where the technology must support, not impede, emergency response
- Multiple complex systems with different standards and user interfaces create an extraordinary training burden
- Consolidate critical operational parameters from numerous systems into powerful operational dashboards
- Ability to acquire high volumes of data from a vast and growing number of diverse sources and managing, storing and presenting it according to context
- Be capable of providing appropriate closed-loop operational functionality, with intelligent decision support to all operations personnel regardless of role

Transformation for this segment means pulling all the pieces together into a unified system that can handle connectivity, data marshaling and contextualisation. It should provide a secure platform for real-time control and visualisation and extend comprehensive access to all types of devices for managers, staff and passengers. A transformative approach meets the core goals of disparate system integration, superior user experience, tremendous scalability and cost optimisation throughout the entire system lifecycle.

Smart Cities

Due to rapid urbanisation many cities have old and aging infrastructure with replacement cost being too high. Converting existing infrastructure to Smart Infrastructure is the key to making cities smarter as it is directly correlated to the quality of life.

Some of the drivers here include:

- Cities have many IT/OT systems supplied by various vendors. Ability to connect and exchange information is critical to develop smart application
- Increased use of public transit
- Buildings plan visibility to help fire fighters mitigate losses
- Improved energy consumption by smart buildings
- Traffic management for improved emergency response
- Land usage decisions to help locate schools and community facilities
- Improve water/waste water management for a safer environment
- High citizen experience to help adhere to most livable city index

A transformative approach here spans across various applications including facilities management, utilities, telecommunication, transportation, health and e-Governance. The approach is to not just connect all these disparate functions, but to collect, analyse and then act with a unified and holistic intelligence with the help of real-time data.

Transportation (Rail, Tunnels, Ports)

Regulatory changes, safety requirements, alternate modes of transportation with a combination of high labor costs and most importantly demand for high customer satisfaction are driving the push towards automation, advanced analytics and digitisation to improve customer experience.

Drivers here include:

- Rapid deployment while connecting multiple IO devices
- Ability to scale up even faster
- Compliant with regulatory bodies
- Repeatable models to ensure faster deployment
- Vast network connection points
- Real-time data processing to improve customer satisfaction
- Remote monitoring of operations and most importantly bringing people together in a cross functional process
- Advanced and predictive alarm management capabilities

Special Projects

The sub-segment here includes stadiums, malls, hotels and other infrastructure upgrades. Imperatives related to this sub-segment include getting a single view to all operations and how a differentiation is achieved by providing state-of-the-art services, energy management, security and overall rich customer experience. Segment with similar attributes - fleet management which is all about enterprise level monitoring and control across multiple facilities, sites etc. to manage the electro-mechanical and environmental systems in a secure channel to radically improve the efficiency.

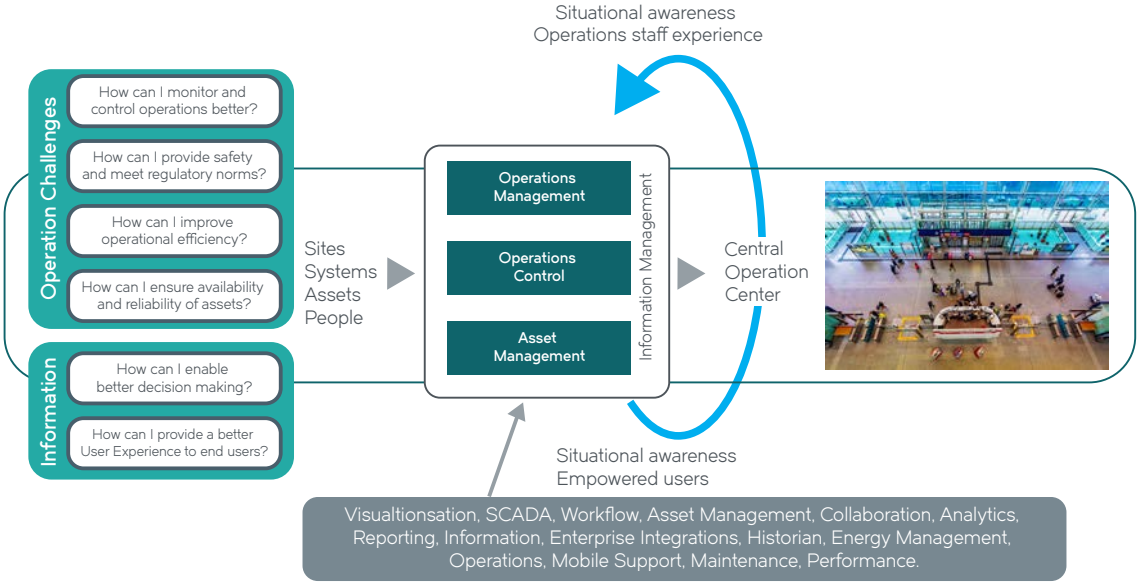
Transformative Integration

A critical enabler of transformative integration approach and to support centralised control across sites is with a scalable platform that could connect all systems and applications and present holistic intelligence as opposed to a siloed approach. Another area is coming together of information technology and operational technology to start reaping the benefits.

An organisation must ideally start with an area where there is a situation or problem and to be convinced that there is valuable and actionable information in the applications that are disparate. It's a journey that enterprises only start to realise the value once the systems and applications begin to interact.

When we start looking at such a system to bind all other applications/systems together, we expect to see:

- Reduced total cost of ownership through better system integration approach and by leveraging investments already made in systems and applications
- Improved asset utilisation and availability of assets with minimal downtime and most importantly predict the maintenance for these assets
- Improved customer experience with digitalisation of processes, information and communication
- Lower implementation costs with a hardware agnostic unified platform



How AVEVA Industrial Software portfolio delivers these functional value propositions:

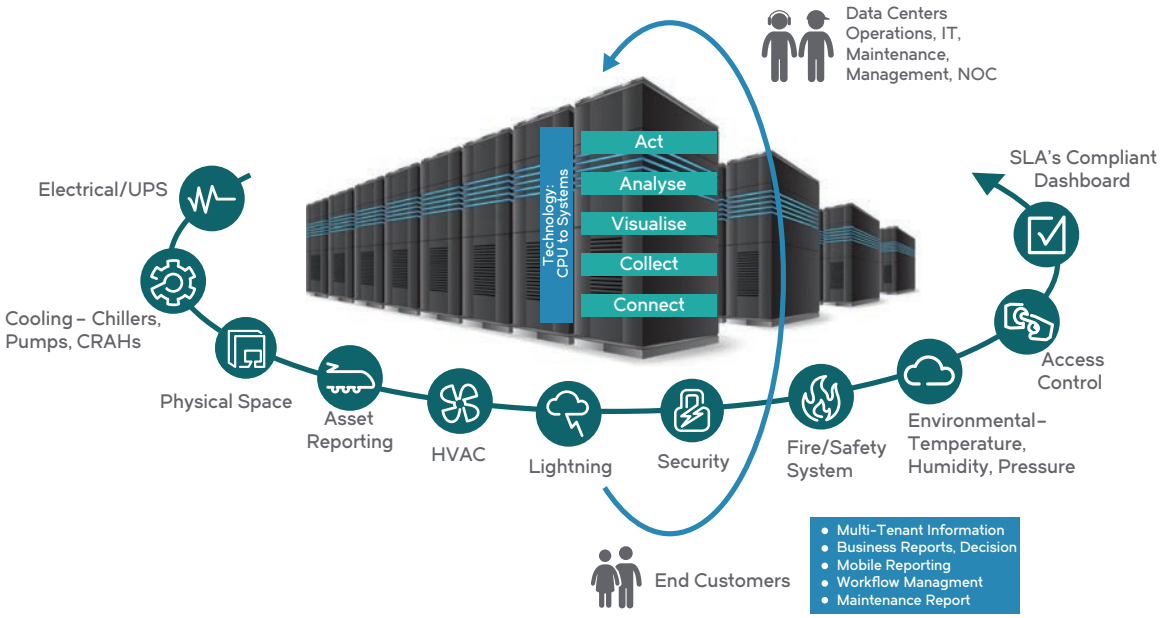
- Hardware agnostic platform for centralised control and device, system connectivity with Wonderware suite of products
- Asset performance monitoring, predictive maintenance capabilities and asset life maximisation through Avantis suite of products
- Enhanced workforce collaboration with real-time control and monitoring with Wonderware suite of products

In summation, what we offer to address the imperatives of the infrastructure value stream is a robust platform that binds/integrates enterprise and control applications with advanced real-time monitoring. At AVEVA Industrial Software, we call this enabler – System of Systems.

Application cases

System of Systems applies to each of the sub-segment that we discussed earlier. Following sections provide a quick snapshot in context with some of the sub-segments. Get in touch with a AVEVA solution expert to understand the cases in greater detail.

With **Data Center,** the System of Systems enables operational efficiency with enterprise level monitoring and control across multiple Data Centers to manage electro-mechanical, environmental, and physical security systems.



A System of Systems wrapper brings a scalable extensible/ interoperable secure platform which provides analytics, workflows, asset management, easy to configure options and actionable KPIs to improve overall efficiency, increasing speed to market and meeting sustainability goals across multiple sites.

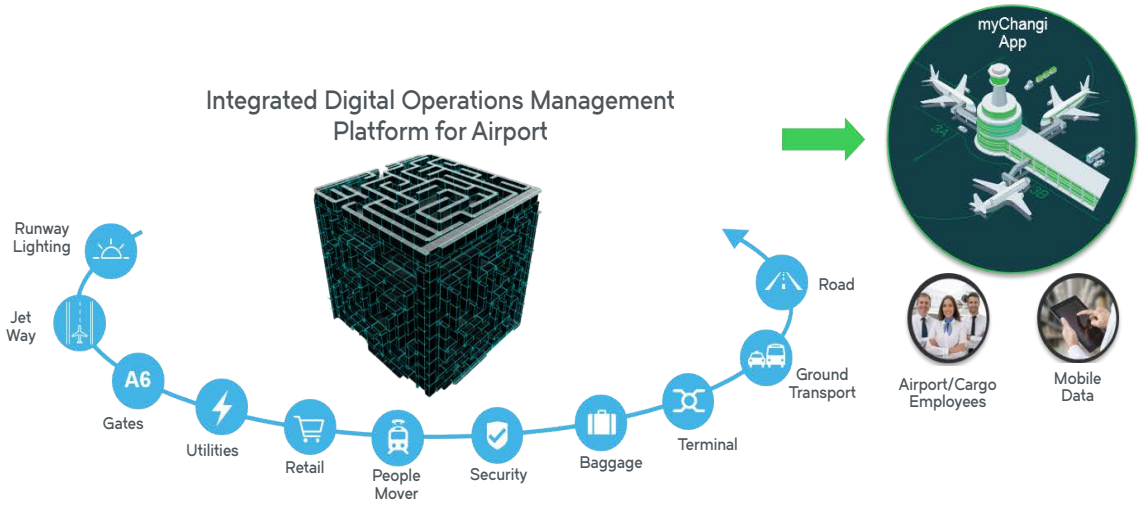
The value derived from collaborating, and contextualising operational and business information in a "System of Systems" or "Single Pane of Glass" include:

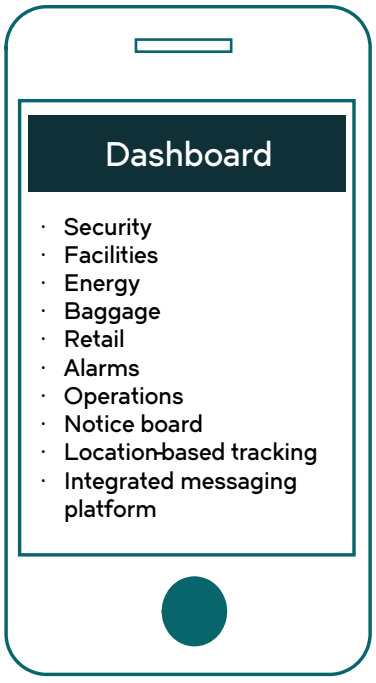
- Resiliency and availability ensuring business continuity
- Scalability and standardisation of systems
- Remote monitoring and controlling
- Multi-system/site integration leveraging existing investments made
- Asset management with predictive and condition based maintenance for maximum utilisation
- Situational awareness ensuring right information with the right context and at the right time
- Workflow management to automate procedures and tasks with advanced reporting and analytics

With **Airport**, the integrated platform provides contextual real-time awareness in an extremely complex multi-vendor landscape. System of Systems helps modern airports to lead the way by continuous innovation with stakeholders experience as the forefront objective while complying with new regulations and eco-friendly mandates. System of Systems augments customer experience through data driven innovation.

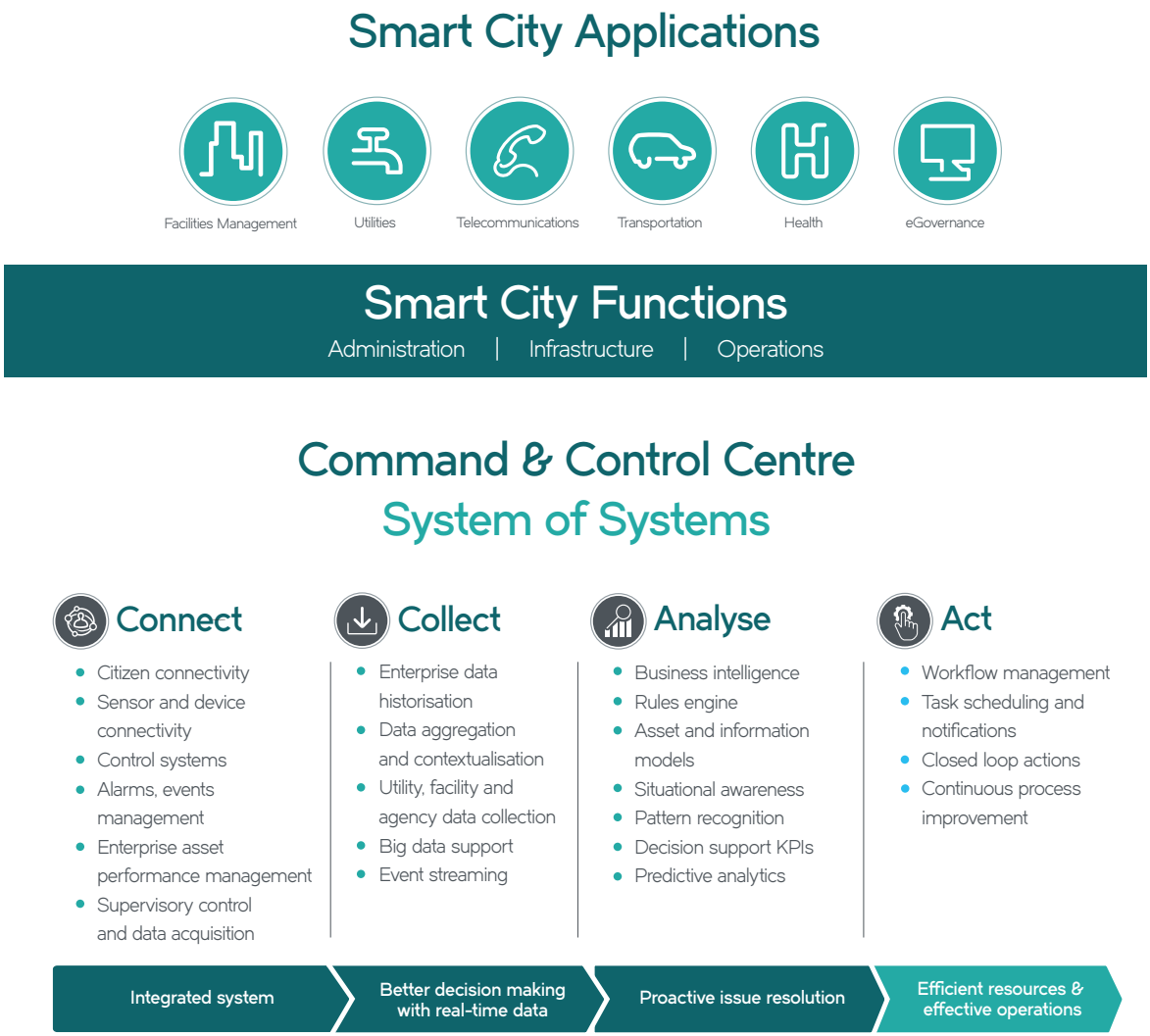
The approach would touch on 3 areas:

1. Leverage big data and analytics, with advanced visualisation and workflow management
2. Enable continuous awareness and optimised response for all airport operations
3. Initiate improved processes that sustain ongoing innovation through digitisation





With **Smart Cities**, the objective is enable city leaders to better serve citizens and businesses. A command and control center based on System of Systems is used to leverage information from various data sources for better decisions, to anticipate and resolve problems even before they are presented and finally to coordinate various resources and processes to operate seamlessly.



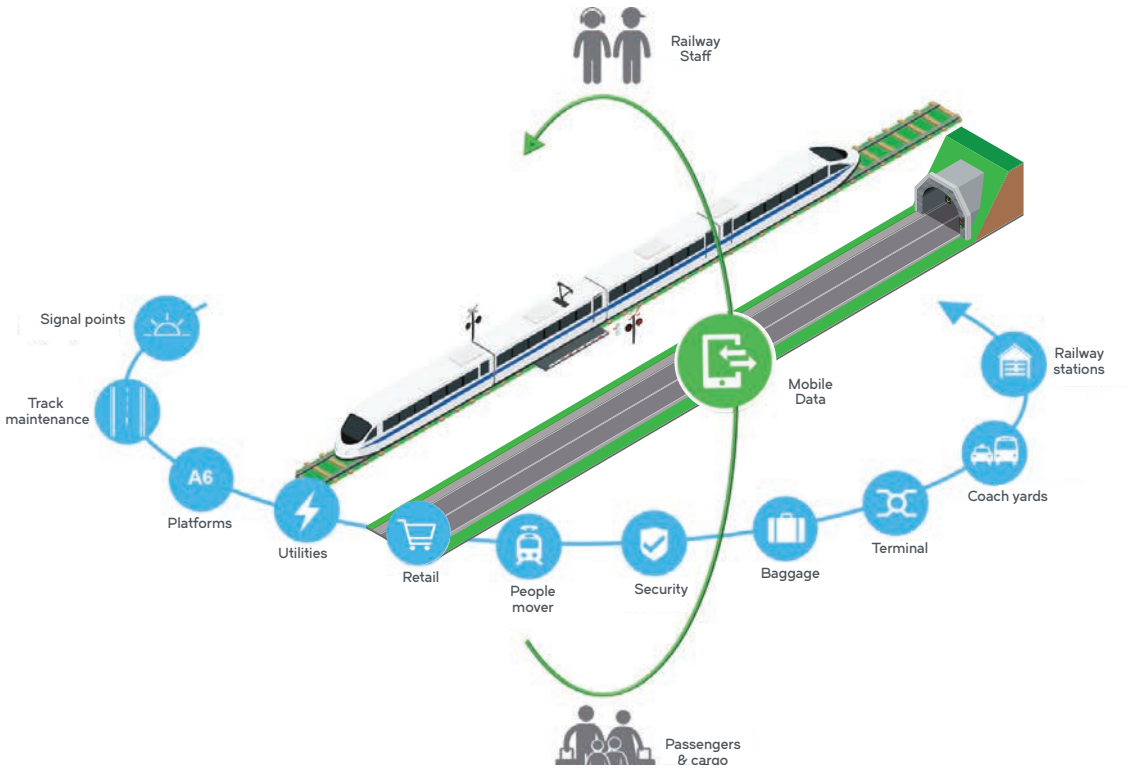
For Smart Cities to be efficient, they MUST be able to CONNECT, COLLECT, ANALYSE and ACT from disparate data sources.

In simplest terms, there are three parts to that job: collecting, communicating and "crunching." First, a smart city connects and collects information about itself through sensors, other devices and existing systems. Next, it communicates that data using wired or wireless networks. Third, it "crunches" (analyses) that data to understand what's happening now and what's likely to happen next and finally to act based on the intelligence.

Source: Smart Cities Council Readiness Guide

With **Rail**, the imperatives are addressed by increased process automation of rail cars to increase safety and operating efficiency, leverage advanced analytics to optimise availability and maintenance and most importantly to digitise and greatly improve the customer experience. Overall, a user-friendly and connected interface that would make operating and managing the railway network as economical as possible.

The approach probably starts with standardising the technology components across networks with scope to scaling up and eventually connecting the individual stations, data points across the network. This includes applications for tracking real-time and historic data, managing passenger communications, and monitoring facilities, assets and functionality. The System of Systems here brings cross functional teams/people/processes together in a big factory with no roof and with thousands of IO points spread through the network. Real-time monitoring across the network increases efficiency and reduces cost.



Conclusion

In the increasingly complex world of Infrastructure, technology needs to be a powerful unifying asset, though few solutions offered today address core issues. The System of Systems approach presents a truly holistic approach which unifies disparate and complex system and data challenges and provides a centralised infrastructure to support operations and customer information systems across the entire value chain. The platform provides a single set of tools, with standards for design, engineering and visualisation that provide versatility and flexibility with uncompromised robustness, scalability, security.

Why AVEVA Industrial Software?

Our strength is in our installed base, the global reach and wide eco-system of partner network. We work with 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 baked by 4000 System Integrators and 160 technology partners. Our software powers applications in over 100,000 sites with over 2 Million licenses and monitors 20 Billion operating parameters and process over 12,000 terabytes of operating data.

Our project approach begins with comprehensive requirements assessment focused on meeting the overall objectives, while minimising execution risk. Our approach includes:

- Our ability to bring tremendous depth and breadth of prior global experience on projects of similar size, scope and complexity
- Our ability to provide a highly experienced and completely integrated execution team with strong leadership and proven standard practices
- A global team of experts and an extensive network of partners who are familiar with our tools, technology and implementation methodology
- A core execution team who will provide design guidance to ensure compliance and consistency across all elements and phases of the project from pre-award to handover
- Knowledge transfer and local support – resources from the local operation interface with the global AVEVA teams to facilitate knowledge transfer and long term site support.

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About the Author

Rashesh Mody is a Senior Leader with AVEVA Software. Rashesh's expertise includes Strategy / Product Management / R&D / Software Technology / Offshore Management. He has over 20+ years of experience spanning leadership and general management of the software technology business, extensive application knowledge in technology, Business/Production Systems, and Industrial Automation supporting Global 500 clients worldwide.

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About AVEVA

AVEVA is a global leader in engineering and industrial software driving digital transformation across the entire asset and operational lifecycle of capital-intensive industries.

The company's engineering, planning and operations, asset performance, and monitoring and control solutions deliver proven results to over 16,000 customers across the globe. Its customers are supported by the largest industrial software ecosystem, including 4,200 partners and 5,700 certified developers. AVEVA is headquartered in Cambridge, UK, with over 4,400 employees at 80 locations in over 40 countries.

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