Transform EC&O with SAP® Solutions
Business Value with Intelligent ERP
The Need for an Intelligent ERP System

Supporting next practices in EC&O with intelligent ERP

US$15.5 trillion – that is the projected size of the construction market by 2030, up from $8 trillion today.¹ A recent study expects that 75% of the infrastructure that will exist in 2050 does not exist today, and that the design and expected outcomes will be transformative.² This is a huge opportunity for the construction industry; however, projects are getting more complex, and there are many inefficient and wasteful practices. Successful companies grow by increasing market share, self-performing to a greater extent, expanding internationally, and even operating some of the assets they build. How does a digital core with a true single source of truth help?

Responding to rapid changes

To execute on this, engineering, construction, and operations (EC&O) firms not only need to reengineer their business processes, but they also need to evaluate if they have the right technology platform that can deliver on that vision. This platform requires an IT architecture that provides both stability and long-term reliability for core enterprise processes, and, at the same time, allows for flexibility in areas where change is happening on a constant basis. The digital core provides uninterrupted, real-time transactions and analytics, the ability to work with Big Data, and connectivity to line-of-business (LoB) extensions that enable supporting processes such as sourcing networks. This seamlessly connects project progress and financial controls, aiding transparency and profitability and better enabling partnerships and new models such as integrated project delivery contracts.

Addressing innovative opportunities

The construction industry can apply technology and best practices that have been previously proven in the industrial sector. This industrialization of construction enables reliable outcomes and improves margins by increasing productivity, eliminating waste and surprises, and greatly reducing project risk. Existing business models collapse as “construction-ready,” disruptive technologies – such as robotics, enterprise mobility, virtual design and construction, and 3D printing – redefine design and processes. To remain competitive, new contract and service models such as integrated project delivery and public-private partnerships are required. Construction is ready to experience the dramatic productivity gains seen in other industries while vastly compressing the 50-year evolutionary process that took place in manufacturing.

Enhance and extend next-generation processes with intelligent ERP

Bringing SAP S/4HANA® and SAP® Leonardo technologies together as a digital core results in a more flexible and intelligent enterprise. To achieve next-generation business processes, companies need an intelligent ERP solution that can be continuously enhanced and extended with innovative business services and applications built on emerging technologies, including machine learning, blockchain, and the Internet of Things (IoT). Contractors that have big innovation appetites or prefer to be early adopters have already begun this journey.

Strategic Priorities in a Digital Economy

The digital economy is disruptive. Construction companies need strategic priorities that drive transformation. SAP supports a reimagined set of end-to-end (E2E) business scenarios to support the strategic priorities of working in a digital environment.

Expertise and knowledge
Digitalization of expertise and knowledge enables organizations to access best practices and highly skilled workers at the point of need. Companies use artificial intelligence, visual work instructions, and other technologies to maintain high quality and improve safety.

**E2E scenario: Turning purpose into performance** – Build the workforce of the future.

Connected construction
Establish the modern construction-manufacturing site with prefabrication in factory-like settings and real-time feedback for optimization of resources and equipment. 3D printing, robotics, and the digital twin drive opportunities for productivity gains seen in other industries.

**E2E scenario: Digital supply network** – Transform your traditional, linear supply chain into a responsive, digital supply network.

Intercompany collaboration
Model-based collaboration connects the project team to share the latest information while delivering at the lowest possible costs. Enhanced model-based scheduling results eliminate wasted hours spent waiting.

**E2E scenario: Simplifying the user experience** – Empower frontline users with a user-centric, consumer-grade experience.

Commissioning and operations
Improve the transition from the construction phase to the operational phase with a seamless transfer of data and models while harmonizing the information with as-built conditions. The digital twin concept is used to operate the facility moving forward in a more cost-effective and efficient way.

**E2E scenario: Simplifying the process** – Transform the execution from multistep, batch-driven processes with latency, in terms of KPIs, to real-time processes with actionable insights.
Turning Purpose into Performance

Traditional scenario

• Traditional HR practices focusing on formal training programs are too slow to work in a world of constant change; the practices are calendar driven, static, and impersonal.
• With educational plans that are course and certifications driven, the shared information cannot flow quickly. The focus is only on a few new topics and limits educational success.
• Classroom-based training creates limitations in the context and usage of new communication methods. Top-down, directed approaches restrict access and consumption of new learning material.

A new world with SAP

• Reimagine people development by creating online learning communities. Make development resources and relationships widely accessible, and give every employee the power to realize their full potential.
• Employees are empowered to choose the medium and timing for their learning.
• Stronger active collaboration and social aspects support a tailored course consumption that helps realize the full potential of each employee.
• Build your own learning map from the complete course portfolio.
Digital Supply Network

**Traditional scenario**

- Disconnected departments and limited access to the business network prohibit responsive planning.
- When plans are not consistently created and shared, information cannot flow quickly. R&D, sourcing, sales, manufacturing, and planning are not aligned – wasting time and money.
- When companies rely on a few external partners and communicate manually with suppliers, visibility is limited – making collaboration difficult, delays inevitable, and the risk of error high.

**A new world with SAP**

Our cloud-based solution focuses on the digital construction experience for companies to work together in the design, plan, and build phases of construction and capital projects.

- Share one plan with all critical resources and partners to achieve visibility, agility, and responsiveness.
- Accelerate time to market with collaboration between R&D and sourcing.
- Achieve insight into future demand for premanufacturing and procurement, optimizing inventory.
- Align sales and project execution, and improve customer satisfaction.
- Transform linear supply chains into digital supply networks.
- Enable simultaneous collaboration with all relevant stakeholders.
- Place your company at the center.
Simplifying the User Experience

**Traditional scenario**

- Multiple screens and transactions are needed to create and maintain project data.
- Staffing and subcontracting separated from the project and reporting are built per application area, not across it.

**A new world with SAP**

- Obtain an intuitive user experience on any device, with a consolidated source of truth for all project-related information presented at the lowest level of granularity.
- Allow a single point of entry for project-related execution, so project managers can react more quickly and more accurately to all project-related tasks.

**Top value drivers**

- **95% faster** quote-to-order process when quotes are configured by a configure, price, quote
- **46% fewer** customer complaints when real-time order, billing, and invoicing are available

*Benefits are based on early adopters of SAP S/4HANA or conservative outside-in benefits due to moving from a traditional ERP to enhanced SAP S/4HANA, line-of-business or cloud capabilities, and SAP Leonardo technologies. As each enterprise is at a different level of maturity, we recommend working with you to determine the value proposition for your enterprise.*
Simplifying the Process

Traditional scenario

- Multiple stakeholders are needed to manage the design, execution, and operation of the construction object.
- All project participants produce multiple versions of drawings – alignment of content is difficult.
- Multiple data silos lead to inconsistent data.
- Version control of drawings and calculations is time-consuming, complex, and often incomplete.

The digital twin concept allows everybody to have access at any time to a consistent data source of the construction object.

- Obtain real-time availability, enabling harmonization of multiple data sources.
- Maintain preconfigured version control.
- Work with the same source to manage multiple trades much more effectively.
- Use a network approach that helps new participants to be immediately up to date.
- Enable data handover to occur without any further efforts.

A new world with SAP

The digital twin concept allows everybody to have access at any time to a consistent data source of the construction object.
Deep Dives Along the EC&O Value Chain

This section examines primary capabilities where value can be achieved through SAP S/4HANA, line-of-business (LoB) solutions, and SAP Leonardo.

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## Preconstruction

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<th>Typical Challenges</th>
<th>Current State with ERP</th>
<th>Capabilities of SAP S/4HANA</th>
<th>Capabilities of Cloud-Based LoBs and SAP Leonardo</th>
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<tbody>
<tr>
<td>• Lack of a robust sourcing execution process</td>
<td>• Integration of mechanical and electrical disciplines in end-to-end design process</td>
<td>• Single multidisciplinary product definition enterprise-wide, reducing development errors and improving product lifecycle management</td>
<td>• Efficient definition, structuring, and management of customer requirements</td>
</tr>
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<td>• Missing a complete, integrated view of cyberphysical products</td>
<td>• Requirements not managed</td>
<td>• Enhanced CAD integration with authoring tools supporting cross-disciplinary product definition</td>
<td>• Traceability and impact analysis of changes in requirements</td>
</tr>
<tr>
<td>• No use of tests and simulations in the early design phases</td>
<td>• E-mail used for managing collaboration</td>
<td>• Management of embedded software versions</td>
<td>• Timely calculation of costs and other dimensions of new products to quickly identify cost drivers and more easily simulate and compare alternatives</td>
</tr>
<tr>
<td>• Inability to manage collaborative work and new requirements</td>
<td>• Ability to release engineering changes for unique lot numbers and release dates</td>
<td>• Instant transparency on live data with enhanced context-sensitive analytics</td>
<td>• Integrated configurator for single-level variant configuration models</td>
</tr>
<tr>
<td>• Inability to plan and manage engineering change</td>
<td>• Manual effort needed for simple costing estimates</td>
<td>• Configuration engine optimized with the SAP HANA® business data platform</td>
<td>• Effective project collaboration based on digital twins enabled with the SAP Project Intelligence Network application</td>
</tr>
<tr>
<td>• Failure to control product costs</td>
<td>• Variant configuration handled through the complete business process</td>
<td>• New simulation environment with an efficient user interface</td>
<td>• Simplified, streamlined, and automated processes for product compliance</td>
</tr>
<tr>
<td>• Complex and costly product configuration modeling</td>
<td>• Product safety and stewardship solutions helping automate compliance determination and embed compliance metrics in the R&amp;D environment</td>
<td>• Native integration to the SAP Ariba® Sourcing solution to initiate sourcing events and process sourcing awards</td>
<td>• Sourcing event execution and analysis</td>
</tr>
<tr>
<td>• Inability to access all compliance obligations for product segment, material, and markets</td>
<td></td>
<td>• Integrated configurator for single-level variant configuration models</td>
<td>• Sourcing award and contract integration using material master data to create purchase orders and outline agreements</td>
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<tr>
<td>• Inability to connect directly with suppliers and customers to receive and provide product sustainability information</td>
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</table>

### Business Benefits
- Faster time to market
- Reduced engineering change cost
- Ability to meet target costs
- Increased revenue from new products
- Reduced compliance management costs and fines, and fewer recalls due to noncompliance
- Greater sourcing savings from unit-price reduction
Project Delivery

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<tr>
<td>Inaccurate project estimates resulting in cost overruns, impacting profitability and customer satisfaction</td>
<td>Bid estimates managed outside of core systems (such as Microsoft Excel), with limited visibility of previous bids versus final outcomes</td>
<td>Analysis of previous bids allowing comparison of bids against budget versus actuals, for flexible reuse of previous bids and projects as a basis for reliable bids</td>
<td>Short-term demand prediction with demand-sensing algorithms and forecasts for medium to long-term demand</td>
</tr>
<tr>
<td>Time-consuming process for tracking progress and status of projects, often limiting proactive intervention</td>
<td>Various commercial aspects related to projects contained within different reports and solutions</td>
<td>Real-time postings to recognize revenue and self-service analytics, for a current view of project margin and progress on any device</td>
<td>Response planning for automated midterm allocation planning and order confirmation</td>
</tr>
<tr>
<td>Lack of visibility across all commercial aspects</td>
<td>Reports often provided only at period end, requiring users to analyze reports to discover issues rather than be proactively alerted</td>
<td>Comprehensive, next-generation project workspace providing one consolidated view of all project-related information</td>
<td>Direct sharing of forecasts and orders generated by the SAP Integrated Business Planning solution with suppliers through SAP Ariba Supply Chain solutions</td>
</tr>
<tr>
<td>Poorly managed risk mitigation as deviations in costs, time, and resources are detected too late, resulting in poor project performance</td>
<td>Forecasts often completed outside the system or with limited capabilities</td>
<td>Flexible forecasting capabilities and the ability to report against forecast outcomes and protect margins</td>
<td>Empowerment of business users to perform real-time, ad hoc analysis</td>
</tr>
<tr>
<td>Inaccurate project forecast, causing erosion of margins</td>
<td>Information held in different reports and a lack of reporting attributes, making it difficult to report profitability across all services</td>
<td>Easier analysis of all services and engagements, including identification of profitable services and customers</td>
<td>SAP Project Intelligence Network for project collaboration based on digital twins</td>
</tr>
<tr>
<td>Inability to analyze and understand which services are actually profitable</td>
<td>Resource management reports tending to be backward looking in terms of utilization</td>
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<tr>
<td>Difficulty matching the supply of resources to demand and predicting the demand of skills and forecast utilization</td>
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### Asset Management

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<tr>
<td>Inability to optimize equipment utilization for maintenance needs</td>
<td>Multitiered landscape consisting of SAP S/4HANA, component extensions, and business intelligence, making it challenging to access a single source of truth for all real estate–related information</td>
<td>SAP Multiresource Scheduling application integration with SAP S/4HANA</td>
<td>SAP Multiresource Scheduling as an add-on for optimization of work-order scheduling, defining maintenance slots and enabling work-center planning for labor and equipment</td>
</tr>
<tr>
<td>Lack of real-time insight into real estate resources at any location and time</td>
<td>Inaccurate and incomplete master data due to an inability to effectively integrate disparate equipment and real-estate object information</td>
<td>Ability to schedule all maintenance plans that are due within a specific time frame using mass scheduling functionality</td>
<td>Streamlined and automated processes for defining and fulfilling project labor demands</td>
</tr>
<tr>
<td>Inaccurate and incomplete master data due to an inability to effectively integrate disparate equipment and real-estate object information</td>
<td>Structured and unstructured master data managed using separate tools, increasing the probability of maintaining inconsistent real-estate master data</td>
<td>Consistent, up-to-date, and accurate master data across the enterprise using the SAP Master Data Governance application</td>
<td>SAP Asset Information Workbench application by Utopia for creating and maintaining complete information about the asset portfolio from internal and external sources, using one dashboard</td>
</tr>
<tr>
<td>Limited ability to provide maintenance technicians sufficient information to efficiently install, inspect, maintain, and repair equipment in the field, resulting in lower productivity and higher maintenance costs</td>
<td>SAP Multiresource Scheduling as an add-on for optimization of work-order scheduling, defining maintenance slots and enabling work-center planning for labor and equipment</td>
<td>New mobile application helping maintenance technicians report malfunctions, plan required repairs, and document and confirm maintenance work within intelligent buildings</td>
<td>SAP Asset Intelligence Network providing access to the most recent document version and spare-parts information of the equipment fleet</td>
</tr>
</tbody>
</table>

### Business Benefits

- Higher capacity utilization
- Greater productivity for employees and technicians
- More transparency in workforce demand
- Reduced maintenance and service costs
- Greater accuracy of asset information
- Higher asset reliability
SAP Strategy – Deliver the Intelligent Enterprise

**Intelligent ERP Is the Digital Core of an Intelligent Enterprise**

An intelligent enterprise can be continuously enhanced and extended with business services and applications built on a digital platform to create transformative business value.

EC&O organizations that have big innovation appetites or prefer to be early adopters have already begun this journey.
SAP Portfolio of Solutions for EC&O

An E2E intelligent enterprise for engineering, construction, and operations

EC&O companies need to constantly innovate across their company value chain to drive profitable growth and adapt to how customers want to acquire, use, and pay for their projects and services. The capabilities delivered with SAP S/4HANA and preconfigured, native integration with LoB solutions from SAP help ensure that processes run smoothly and efficiently across the engagement lifecycle, allowing companies to balance supply and demand, drive sustainable revenue growth, and maintain margins.
The Value of SAP S/4HANA for EC&O Companies

SAP S/4HANA provides engineering, construction, and operations companies with a proven framework to adopt industry next practices while attaining operational excellence across the full value chain.

**Strategy enablement**
- Accelerate creation of new business models
- Enter into prefabrication projects
- Accelerate synergy for mergers and acquisitions
- Run live (SAP Digital Boardroom)
- Reorganize to new project methods, such as building information modeling
- Achieve greater speed and agility
- Run Simple (master complexity)
- Manage risk and ensure compliance

**Empowered employees**
- Higher productivity with a new, role-based way of working with the responsive, intuitive SAP Fiori® user experience on all devices
- Role-driven, user-centric processes and self-service business intelligence for user empowerment
- Actionable insights on unified, real-time data and processes with built-in system suggestions for decision support

**Business benefits***
- 10%–30% increased win rate at calls for proposal
- 10%–20% increased work in hand
- 10%–12% reduction in days outstanding
- 10%–15% reduction in revenue loss due to stock-outs
- 10%–12% reduction in total logistics cost
- 3%–5% reduction in supply chain planning cost
- Reduction in order fulfillment lead time

**IT benefits and total cost of ownership (TCO)**
- Simplified user adoption on-site
- Reduced data footprint
- Elimination of many desktop clients
- Lower testing costs
- Simplified landscapes
- Native integration

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Customers Are Achieving Value from SAP Solutions

Katerra

Industry
EC&O

SAP Solution
SAP S/4HANA and SAP BW/4HANA solution

Customer Web Site
https://katerra.com

Click here to view the customer video.

Katerra is revolutionizing the construction industry to make housing more affordable for 7.4 million extremely low-income families in the United States. To accomplish this mission, the construction-services startup adopted SAP HANA and SAP Leonardo technologies to form a vertically integrated, end-to-end business process – from design, procurement, and finance to manufacturing, logistics, and revenue recognition.

“For the first time, we have a truly integrated, end-to-end business process in place – from procurement and finances to logistics and revenue recognition.”
Grace Liu, CIO, Katerra

conwert Immobilien Invest

Industry
EC&O

SAP Solution
SAP HANA

Customer Web Site
www.vonovia.de

Click here to read the business transformation study.

conwert Immobilien Invest SE harmonized its infrastructure and transformed its business by turning its properties into individually running profit centers across 1,500 balance sheets with accounting, reporting, and consolidation processes for about 400 companies in real time. Using SAP HANA Enterprise Cloud and real-estate-specific components, conwert can better try new business models and roll out innovations. conwert sees potential to combine data with other companies, which will help gain an edge on the competition.

“The flexibility and scalability of SAP HANA Enterprise Cloud are hugely beneficial to us. We can simply add resources when needed – allowing us to quickly introduce new functions or tenants.”
Hannes Gutmeier, CIO, conwert Immobilien Invest SE
Customers Are Achieving Value from SAP Solutions

Swiss Property

Swiss Property is a Swiss real estate development company that builds residential real estate in an industrial way. It chose SAP to provide a platform for the future that can help make its vision of lean digital building a reality. SAP S/4HANA provides an integrated solution to support Swiss Property’s end-to-end processes, creating a foundation for further innovation and competitive differentiation in the construction industry. Additionally, the SAP Fiori user experience provides intuitive consumption with a personalized, responsive, and simple experience for Swiss Property’s users.

“Swiss Property strives to always be several steps ahead of our competition, and this is one of the reasons that we chose SAP S/4HANA Enterprise Management.”

Jaan Saar, Head of Process and IT, Swiss Property