The Data-Driven Industrial Machinery and Components Company
Data Management for the Intelligent Enterprise
“Industrial companies have access to masses of data — both in their own information systems and from the wider network of connected assets. Using applied intelligence and analytics, leaders are harnessing the power of data to reinvent ways of working centered around the customer.”

Source: “The New World For Industrial Equipment” Accenture, 2018
Fourth Industrial Revolution

Fast-evolving world markets, more personalized customer requirements, and agile business models are some of the dynamics impacting the industrial machinery and components (IM&C) sector today. Manufacturers need to deal with a changing playing field and redefine their core strengths and learn to create value in industry value networks. They must meet customer demand for increased personalization and competitive prices by adding value-added digital services to products and turnkey solutions. They must also move towards providing new pay-as-you-go and usage-based pricing models. This requires management of global supply chains and right shoring amid impacts from geopolitical changes, inclement weather, and monetary fluctuations.

The good news is that big data, automation, machine learning, artificial intelligence (AI), and analytics are powering solutions to these drivers and challenges. In IM&C companies, data, analytical tools, and platforms are being put to work to support new business models, strategies, and drive record corporate profits.

The IM&C companies who are succeeding in this manner are on the path to becoming intelligent enterprises.

This means using data and analytics embedded in processes to provide insights and intelligence; data that spans R&D, manufacturing, forecasting, sales and marketing, aftermarket services, and more. It means providing every business, factory, department, partner, supplier, and customer with digital channels, digitally-enabled products, end-to-end solution lifecycle services, and actionable strategic intelligence.

Strategic priorities for IM&C companies include:

- Customer centricity
- Establishing a digital supply chain
- Developing new business models
- Creating digital smart products
- Serving the segment of One
Data Management in Industrial Manufacturing

At the heart of the intelligent enterprise is a new approach to data management. It requires the ability to do three things.

Integrate your diverse data sources. Data is the currency of digital transformation. Yet within most IM&C companies, data is scattered among multiple applications, files, data warehouses, data lakes, and public and private clouds.

Integrate your diverse data. Your data comes to you structured, semi-structured, and unstructured. It may be spatial, chart, numeric, geographic, time-series, relational, JavaScript object Notation (JSON), etcetera. Integrating all of these different types of data is extremely complex. It’s a prerequisite for becoming an intelligent enterprise.

Simplify your data landscape. Today, IM&C companies often lack a 360°-degree view of their data and data landscape. With different databases, apps, and clouds to support, no centralized solutions are being used to manage it all. Intelligent enterprise IM&C companies use process automation and a centralized, easy-to-use platform and interface to automate, improve processes, and simplify access to data so line-of-business managers can participate with data specialists in the development of creative products and solutions.
Data Imperatives for the Intelligent Enterprise

In working with thousands of enterprise customers facing common challenges, SAP identified three key data imperatives that make up the foundation for an intelligent enterprise.

38% Increase in machine learning and analytics adoption by manufacturers.

35% Increase in the adoption of analytics and machine learning-driven process and quality optimization.

34% Increase in process visualization and automation.

31% Growth rate for connected factories through the adoption of analytics, APIs and big data.

Source: PriceWaterhouseCoopers, 2017

Trusted data
Data you can rely on to make informed business decisions.

Connected, intelligent data
A single, unified view enabling advanced analytics and machine learning.

Cloud and architectural flexibility
Cloud freedom for data systems, applications, and system development.
Data-driven Use Cases for the Intelligent Industrial Manufacturer

Leading IM&C companies are leveraging data and analytics to uncover new opportunities for innovation. SAP HANA Data Management Suite supports an array of intelligent use cases, for optimizing and extending existing business processes or creating next-generation business models. The following are some examples:

**Optimize** existing processes for more efficiency and reliability with:
- Demand Signal Management & Forecasting
- Forecasting Raw Material Pricing Impacts
- Spares / Service Parts Inventory Optimization
- Connected Goods
- Connected Manufacturing
- Overall Equipment Effectiveness (OEE)
- Early Warning of Equipment Failures (IoT Equipment Monitoring)

**Extend** current business processes beyond efficiency gains to capture new sources of value through:
- Design-to-Distribution Product Traceability and Provenance
- Predictive Maintenance & Services
- Increase Operational Efficiency with AIN
- Asset Data Quality
- Predictive Quality Management
- Digital Twin – Real Time, Simulation-Based Equipment Monitor
- Dynamic Inventory Optimization

**Transform** the value chain or business model to capture new revenue streams for:
- Engineering Data Warehouse and Manufacturing Analytics Platform
USE CASE: Demand Signal Management and Forecasting

Challenges

• Consumer-buying patterns are increasingly volatile
• Scattered, unstructured, and fast-growing demand and market data
• Long manufacturing cycles out of sync with customer purchasing dynamics
• Difficulty to have the right product at the right volume at the right location to meet demand
• Lack of return on investment for external market research data

Solution

• Automated process to capture incoming demand signals and data with rules to check data quality and completeness
• Align external data with internal business data to products in production, model test-outs, distribution networks, and compared to actual demands
• Improve the usability of incoming data with personalized standard UIs and ad hoc reporting capabilities to calculate and report market share and sales globally across countries and product categories

Benefits

• Increase profitability, revenue, and market penetration
• Improve market insights and forecasts using holistic information about the market
• Reduce out-of-stock, transit, and warehousing costs by having the right product in the right location to meet the demand
USE CASE: Forecasting Raw Materials Pricing Impact

Challenges

• Significant impact of raw materials on the whole product chain and margins (1% material cost change impact profitability by more than 1%)
• Volatility of raw material prices due to trading, scarcity, and changes in demand, causes frequent re-adjustments in financial forecasts
• Difficulty of carrying out realistic simulations of future margins with current raw material costs for specific business unit due to the high number of possible factor combinations (such as raw material costs (including freight or shipping charges), cost of storing the finished products, direct labor costs and overhead expenses

Solution

• Provide a 2-year simulation horizon of material costs and margin impact considering cost for raw materials, packaging materials, manufacturing costs, filling costs, and freight costs
  – For a combination of 6 billion unique prices (100 sales countries * 5000 products * 20 plants * 30 materials per product * 20 month forecast horizon)
• The Raw Material Price Impact Simulation combines and analyzes the various impact factors to arrive at more accurate forecasts.
• Enables what-if analyses to assess risks of the portfolio.

Benefits

• Identify the highest-margin products so they can highlighted by the sales force based on the knowledge of future demand and pricing
• Ability to simulate the price impacts across all dimensions of the business (such as sales regions, products, plants, materials per product and specific months) using HANA
• Calculate profit margins for various business planning scenarios, e.g. best case / worst case
• Simulations run in minutes instead of days and are provided as a web-based report

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**USE CASE: Spares and Service Parts Inventory Optimization**

**Challenges**
- Unpredictable spare parts demand
- Uneven availability of spares that align to the installed configuration
- Lack of certainty for long lead time items from suppliers
- Additional complexities like shelf-life and seasonality
- Stock-level management is difficult, due to inconsistent master data from plants, customer sites, and countries
- Poor visibility into spare part status or location within the supply chain

**Solution**
- Calculation and maintenance of material requirement planning (MRP) parameters to ensure target service level at minimum cost for each material
- No assumptions about the distribution of the demand
- Analysis of demand based on historical movements or reliability
- Support both simulation and optimization

**Benefits**
- Ability to visualize basic information for each material part across the whole supply chain
- Capture both planned and unplanned spares demand
- Improved stock levels and avoidance of stock outs or expiration
- Realistic simulation of actual demand patterns
- Predict the behavior of the supply chain in the future, based in a data snapshot from SAP ERP
- Simulate the effect of changed inventory policies, lead times, distribution paths, etc.
- Optimize inventory policies to achieve best possible trade-offs between service level and inventory holding cost
USE CASE: Connected Goods with RFID & IoT Device and Material Tracking

Challenges

• Unmonitored devices worth billions of dollars are distributed across remote facilities
• Limited visibility into device status or conditions (e.g., temperature, humidity)
• Infrequent manual auditing of device health and location
• Underutilized devices due to stock outs, device misuse, or misplacement
• Limited visibility into device performance, optimization, and efficiency
• Track revenue recognition or consumer engagement feedback per device

Solution

• Collect technical and business information from millions of connected devices to identify usage patterns, device performance, or theft
• Trigger real-time alerts and notifications based on current and historic device information
• Monitor device location from initial onboarding to retirement; display usage and map location
• Monitor device inventory and create low stock notifications or automatic delivery requests for replenishment to distribution partners
• Notify device owner of conditions that can lead to product spoilage or damage
• Connect remote devices to SAP back-end software and business systems

Benefits

• Remotely monitor and manage smart connected devices
• Extend the enterprise digital core to the enterprise edge with connected devices
• Enable new business models and increase revenue and customer satisfaction
• Increase operational efficiency and process automation
USE CASE: Design-to-Distribution Product Traceability and Provenance

Challenges

- Difficulty to certify that all of the correct intellectual property (IP) licensing is in force through the value chain and avoid the consequences of IP leakage
- Guarantee that only authentic devices move through the value chain
- Solving yield issues as products move through the value chain with multiple factories, test facilities, and distributors

Solution

- Leverage block chain technology to create an irrefutable, validated record of material and product provenance from design and raw material origin to point of distribution and consumption.
- Offer item serialization and product traceability capabilities; clear product genealogy
- Support access and management of device design and configuration data alongside machine learning and IoT through blockchain as a service

Benefits

- Validation of outcomes and automatic execution of contract terms by all parties through blockchain-enabled smart contracts.
- Faster yield learning and improved identification of critical sources of loss
- Improved coordination and visibility throughout the value chain
- Better design-to-engineering-to-manufacturing integration
- Greater technical data and IP security
- Improved regulatory and license compliance (world wide)
- Ensure IP authenticity; increased effectiveness of fraud detection
Data: The Foundation of the Intelligent Enterprise

The intelligent enterprise has a suite of digital applications that ensures interconnected business processes are linked optimally to deliver a seamless user experience, fast adoption, and ease of operations. A library of intelligent technologies drives new innovative and simpler business operations.

The foundation of the intelligent enterprise is a comprehensive Digital Platform that facilitates the collection, connection and orchestration of data, as well as the open development, integration and extension of business processes support even the most critical business requirements (see Figure 1).

To become intelligent enterprises, IM&C companies must embrace technology to enable “next practices.”

These include:
- The power to harness and gain visibility into all available data
- The ability to make that data useful to support innovation and actionable insights
- An environment that lets you move very quickly to adapt to changing market conditions

Learn more about SAP's intelligent enterprise strategy.

Figure 1: Intelligent Technologies for Federated Data and Easy Data Access
SAP HANA Data Management Suite

A key part of the Digital Platform, SAP HANA Data Management Suite is the data platform that helps transform IM&C companies into intelligent enterprises. It enables you to deploy a greatly simplified data landscape that integrates diverse types of data from throughout the organization, partners, and clouds. The suite empowers your organization to capture, ingest, process, orchestrate, compute, and consume data at a tremendous rate. It turns your back office into a highly integrated, end-to-end decision factory that can monetize patterns, insights, and ideas for new products, services, and efficiencies (see Figure 2).

Figure 2: SAP HANA Data Management Suite
SAP HANA Data Management Suite Includes Four Key Solutions

An Advanced Business Data Platform

**SAP HANA** is an in-memory data platform that helps you accelerate business processes, deliver business intelligence, and simplify your IT environment.

Orchestration and Governance

**SAP® Data Hub** orchestrates a company’s data from raw feed to intelligence with real-time analysis on vast data sets without mass data duplication. It connects legacy data with new data sources such as Apache Hadoop and sensors and can handle unstructured and time-series data. It provides features to understand, integrate, cleanse, manage, associate, and archive data to optimize business processes and analytical insights.

Modeling Tools

**SAP Enterprise Architecture Designer** allows organizations to model across landscapes and processes to create and maintain a complete landscape architecture. Based on both SAP and non-SAP software, the architecture is easy to share and understand visually. The Web application enables all stakeholders to participate in planning, designing, and governing the architecture for greater consensus and compliance.

Public Cloud Services

**SAP Cloud Platform Big Data Services** delivers a full-service Big Data cloud solution based on Hadoop and Apache Spark, that meet rigorous demands for reliability, scalability, and security, allowing organizations to build applications and perform analysis in the cloud on a single copy of data.

*SAP and IM&C Companies

More than 12,200 industrial machinery and components manufacturers in 97 countries innovating with SAP solutions

*Source: IM&C Industry Facts*
For More Information

To find out more about SAP HANA Data Management Suite and how your company can become an intelligent enterprise, contact your SAP account representative or visit us online.

Learn more about SAP’s Digital Platform here.