

SAP HANA

Intelligent Business Operations with SAP HANA®

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Operational effectiveness and agility – the ability to [respond quickly to changing business requirements and market trends](#) – can be a strategic competitive advantage for your organization. SAP® solutions have played and continue to play a big role in supporting intelligent business operations.

EXECUTIVE SUMMARY

Applications from SAP like those for enterprise resource planning, supply chain management, customer relationship management, and supplier relationship management have helped organizations standardize core processes and automate business operations for operational effectiveness. SAP NetWeaver® Process Orchestration software, with business process management, process integration, and business rules management technologies, as well as SAP PowerDesigner® software, have helped thousands of companies model, integrate, and orchestrate human-centric as well as system-centric processes. These solutions leverage the core functionalities from our business applications, as well as from homegrown applications.

Over the past few years, we have seen key trends and challenges in several industries. First, managers and employees demand a superior user experience, transparency, and value. Second, the increased pace of business, new channels to engage your customers, and greater volumes of operational data have led to the rise of Big Data in business operations. Third, employees across different departments, lines of business, even different companies, strive to be closely engaged in the value stream. Thus, they demand real-time intelligence and visibility into operations to improve responsiveness to possible threats and opportunities.

Fourth, we see the rapid emergence of knowledge work, where line-of-business users need a goal-oriented, collaborative approach to achieving business outcomes as opposed to structured, sequential, repetitive work.

In this paper, we articulate the renewal and rethinking of business process management technology leveraging the in-memory computing functionalities of the SAP HANA® platform. To address the challenges outlined above and support your intelligent business operations, we apply the principles of timeless software. These are principles for architecting enterprise software systems for nondisruptive and sustainable evolution.

THE NEED FOR BUSINESS PROCESS ORIENTATION

No matter what industry you operate in, you recognize that operational excellence and consistent execution of day-to-day business operations significantly improve customer satisfaction and lead to long-term stability and business success. Research strongly suggests that companies can enhance the performance of their daily business operations by taking a “process view” of the organization. Business process and value-stream orientation has proved to reduce interdepartmental conflicts, improve cross-functional collaboration, and significantly increase customer focus.





Our business architecture modeling technology, which incorporates business process model and notation (BPMN), helps you plan, document, and communicate business concepts in a single repository. Our process orchestration and business process management (BPM) technology allows you to automate and integrate processes end to end while maintaining a clear value-stream orientation. In addition, your organization is looking at ways to equip line-of-business users with more real-time visibility and operational intelligence so you can respond to opportunities and threats earlier than ever before. This convergence of process technology and operational intelligence is called intelligent business operations (IBO). Gartner defines IBO as follows: "IBO is an emerging style of business behavior that leverages analytics embedded in processes to support better decision making and improved knowledge worker collaboration. IBO-based processes are 'smart' about the context in which they run, which is influenced by events external to the process."¹



No matter what industry you operate in, you recognize that operational excellence and consistent execution of day-to-day business operations significantly improve customer satisfaction and lead to long-term stability and business success.

FOOTNOTES

1. Jim Sinur and W. Roy Schulte, "Use Intelligent Business Operations to Create Business Advantage," Gartner Inc., 2013.



Emergence of Big Processes

The fast pace of modern business, a volatile competitive landscape, the explosion of information – both structured and unstructured – from multiple channels, and the demands from IT consumerization have a huge impact on business operations. Departments within companies can no longer work in isolation. Organizations have to move away from the splintered and siloed views of business to “big-process thinking,” which Forrester defines as follows: “Big process shifts the organization’s focus from isolated BPM and process improvement projects to a sustainable, enterprise-wide business process transformation program supported by top executives.”² **Big processes**³ are complete business scenarios focused on delivering value to customers.

From a technology perspective, these big processes usually span multiple technical systems – packaged applications as well as operational systems (such as Web servers and manufacturing and telecom provisioning systems). Knowledge workers are typically involved in big processes due to the fact that they perform actions whenever exceptions occur.

From an organizational perspective, people from several departments typically collaborate to achieve common goals. These big processes have a great impact on customer satisfaction and can be decisive

in winning customer loyalty. They are typically **high-value** processes and have to be managed effectively to keep business operations running efficiently and at top performance.

Big processes are closely linked to Big Data and acquire Big Data characteristics, such as high volume, high velocity, and variety of data and interaction (structured and unstructured). In addition, they are the “crown jewels,” supporting the key business operations of the company’s business model.

MANAGING HUB OPERATIONS IN LOGISTICS

Consider the example of a cross-docking logistics hub. Hundreds of thousands of shipments transit through a cross-docking hub every single day. Shipments arrive in inbound planes that are automatically guided to a parking position. Pallets (or unit-loading devices) that contain the shipments are unloaded in the apron. Workers move the pallets to the warehouse in tugs and trolleys, open them up, and put all shipments on long conveyor belts for sorting. Shipment packages are repaired, if necessary, and shipments then go through customs clearance and are loaded onto an outbound plane or a road container for the next destination.

2. Clay Richardson, Craig Le Clair, Alex Cullen, and Julian Keenan, “Embrace Five Disruptive Trends That Will Reshape BPM Excellence,” Forrester Research Inc., 2012.

3. Harshavardhan Jegadeesan, “Tame BIG Processes with SAP Operational Process Intelligence, powered by SAP HANA – Part 1,” SAP Community Network, blog, March 17, 2013, <http://scn.sap.com/community/operational-process-intelligence/blog/2013/03/17/tame-big-processes-with-sap-operational-process-intelligence-powered-by-sap-hana>.



Several departments and teams work toward the common goal of sorting and transiting all shipments every night. The departments and teams include the aviation hub, unloading, warehouse, hospital (repair area), customs, and loading. Several people – the hub operations manager, warehouse agent, and supervisors – work across the value stream of phases and milestones such as plane arrival, unloading, sorting in the warehouse, and loading on the outbound plane (see Figure 1).

Multiple IT systems are involved, such as the freight management system, aviation control systems, and workforce allocation systems. A cross-docking hub can handle between 250,000 and 400,000 shipments in a period of five to six hours every night. Managing the high-volume and high-velocity hub operations is a big process.

To manage the daily hub operations, your hub operations manager needs a real-time view of the hub operations. The manager needs to know the

number of shipments in different phases across the value stream as well as which shipments are in danger of delaying outbound planes. In addition, he or she needs real-time metrics, such as time taken for loading a plane, in order to dynamically allot people to problem areas. Your manager would also like to collaborate with colleagues to solve problems as they arise and take appropriate corrective actions. For example, he or she may need to start a workflow to assign more people to certain areas in the warehouse like the loading dock or the hospital. Or the manager may need to change plane-type assignments based on volumetric weight for a destination.

In summary, the people involved in your daily hub operations need real-time process visibility across the value stream. They must also be able to respond to insights collaboratively with appropriate actions. You can use process orchestration technology to optimize the flow of data, the work sequence, and the integration of process data across people and systems into the business scenario.

Figure 1: Example of Logistics Hub Operations



CUSTOMER ONBOARDING IN TELECOM

Consider the example of onboarding a new customer by a communications service provider in the telecom industry. A new customer can choose multiple services, such as a fixed-line, TV, Internet, or mobile connection, and would like hassle-free access to these services as quickly as possible.

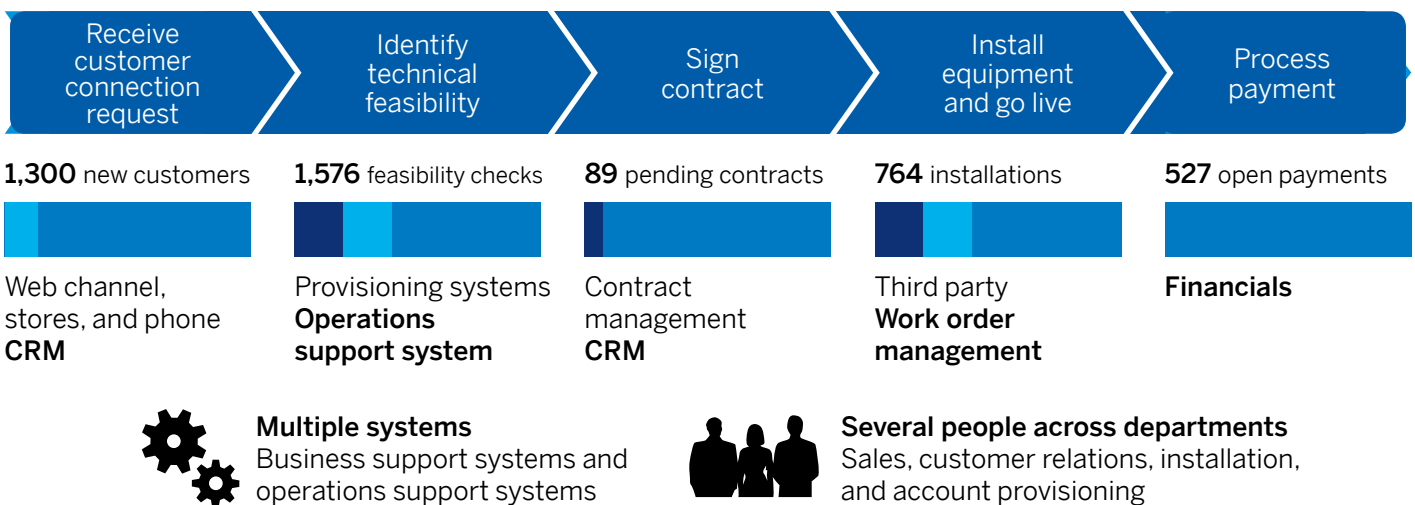
Several departments – sales, customer relations, the installation department (third-party contractors), and the account provisioning and activation department – have to collaborate across the onboarding value stream toward the common goal of providing a positive customer onboarding experience. The value chain is represented by high-level phases and milestones, such as receiving the customer request, identifying technical feasibility, signing the customer contract, installing equipment, and processing payment (see Figure 2).

Fragmented software systems support the value stream:

- The customer relationship management (CRM) software, including a Web channel, a store front end, and a phone channel, allows customers to send their connection request.
- The provisioning system, part of the operations support system, manages the technical feasibility tests on the basis of the services requested and the zone in which the customer resides.
- The CRM software is again used to enable the customer to sign the contract once the feasibility of the request has been determined.
- Work order management software issues work orders for the installation to third-party contractors to complete the installation and going-live process after the contract is signed.
- Provisioning systems activate the customer accounts again, and the customer is added to the billing cycle in the finance system after installation has taken place.

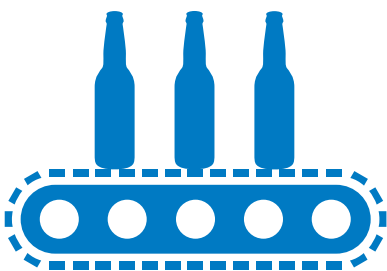
Figure 2: Example of Customer Onboarding in Telecom

Goal: Onboard customer within five days with no escalation



These fragmented IT systems hamper collaboration between employees across multiple departments. The zonal account director who tracks all new customer onboarding does not get any information about problems until they are escalated by the customers.

The customer onboarding operation is a big process, with high volumes and high value to communications service providers in the telecom industry. Such a big process fragmented across business support software (CRM, work order management, and finance) and operations support software (provisioning) can be documented in BPMN and orchestrated with BPM and process integration technologies. By orchestrating and automating this big process, you enable all involved people to work in the same context and to work effectively toward the same goal.



From a technology perspective, big processes usually span multiple technical systems – packaged applications as well as operational systems. They typically involve the actions of knowledge workers on exceptions.

Supporting Big Processes and Intelligent Business Operations

Today, many organizations leverage process automation functionalities built into their software to standardize their core business processes, such as purchasing or sales. In addition, built-in workflow functionalities help automate repetitive and structured activities, such as standard approval workflows. These systems reduce transactional costs and improve operational efficiencies. Still, typical software landscapes are heterogeneous and require costly integration of hundreds or thousands of interfaces between the standardized core and the silos of legacy applications. Therefore, organizations find it hard to cope with challenges posed by big processes for the following reasons:

- **Lack of end-to-end value-chain focus** – Traditional solution architectures focus on integrating disparate functional areas – finance, HR, and sales – rather than addressing the end-to-end value stream toward customer value.
- **Limited support for line-of-business users** – Knowledge workers on the front line of business operations typically like to collaborate to reach their business goals (such as on-time and quality delivery, measured by performance indicators) along the value chain. They also want to access information through multiple channels, including desktop computers, tablets, and mobile tools.
- **Slow and costly change** – Existing IT landscapes are difficult to change to rapidly respond to opportunities and threats. Big processes need to be adapted quickly on the basis of market trends and customer behavior. They support the core business model of the organization and help differentiate the organization from the competition.

- **Lack of support for high volume and high velocity of operations** – Heterogeneous process platforms were built at a time when the pace and volume of business were not as high as today. Hence, handling high-volume and high-velocity requirements poses a challenge.
- **Lack of visibility** – As a side effect of not having the value-stream focus, business operations are supported by splintered and siloed solution landscapes, leading to a lack of real-time visibility into operations. Lack of visibility translates into an inability to handle issues as they occur but before they turn into escalations, which can result in loss of customer trust and even financial liability.
- **Lack of consistent documentation** – Business process definitions are scattered among diverse documentation systems, each using different notations and different business languages (terms). This makes it difficult to align all business processes to a single value stream and hinders common understanding between business units.

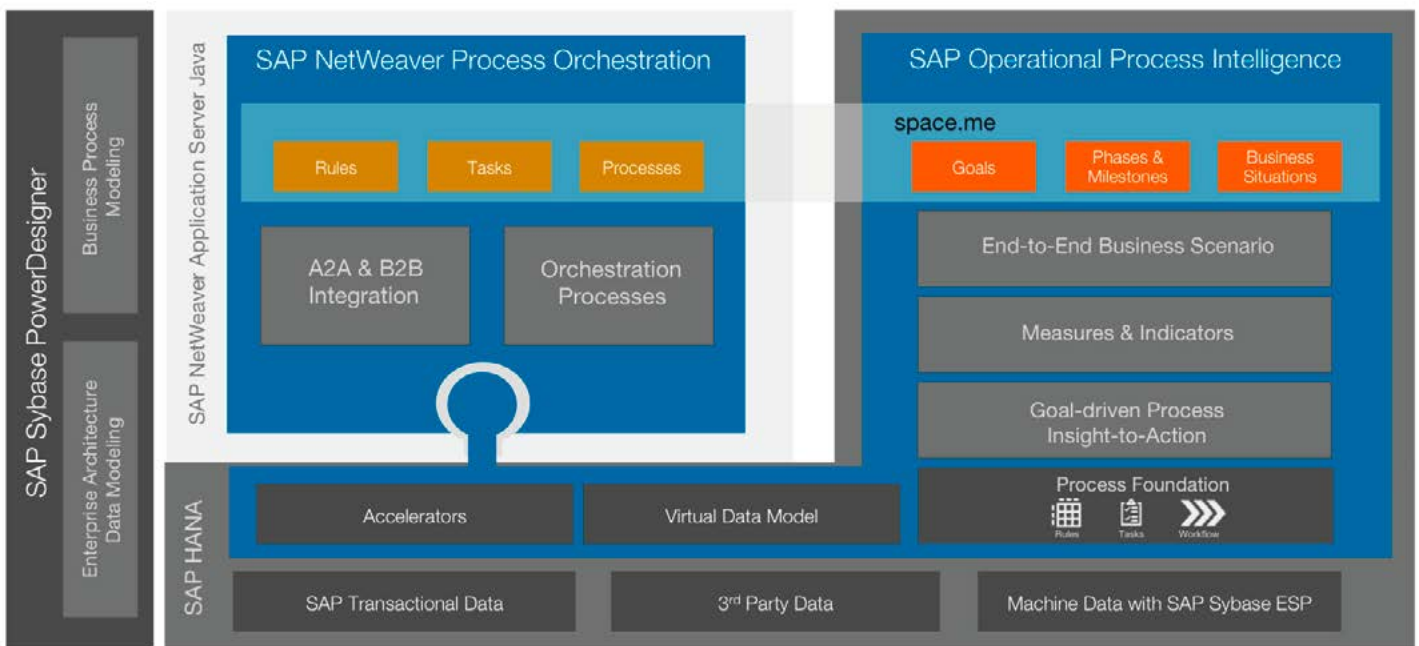
Some of the challenges, such as value-chain orientation and support for change, are partially addressed by business process management software and process integration tools. The tools help integrate and orchestrate business processes end to end by reusing the functions of packaged applications and homegrown software in the customer software landscape. However, using these tools to manage integration complexity and provide domain-specific process innovations adds additional layers of complexity. As a consequence, IT landscapes do not provide appropriate real-time process analytics to line-of-business users who seek guidance to reach their goals and business outcomes.



Intelligent Business Operations and SAP HANA

Through renewing and rethinking, SAP enables process orchestration supported by SAP HANA to help address the challenges of big processes (see Figure 3).

Figure 3: Intelligent Business Operations with the SAP HANA® Platform



First, we are **renewing** SAP NetWeaver Process Orchestration software, which is now powered by SAP HANA. SAP NetWeaver Process Orchestration already provides integration, rules, tasks, and workflow functionalities to thousands of companies. It helps them orchestrate comprehensive, human-centric, and systems-centric processes and integrate application-to-application and business-to-business systems with each other. With SAP NetWeaver Process Orchestration powered by SAP HANA, we harness the in-memory computing functionalities of SAP HANA with accelerators⁴ to support specific scenarios. Native data compression functionalities allow us to control data growth. Most important, we bring real-time analytics functionalities onto the same box with transactional processing. This addresses a number of big-process challenges. Real-time analytics are

made possible by virtual data models, which are analytical data models for processes, tasks, and message flows. You can use SAP NetWeaver Process Orchestration powered by SAP HANA to orchestrate big processes representing the entire value chain.

Second, we are **rethinking** operational intelligence to enable intelligent business operations with SAP Operational Process Intelligence software. This product is also powered by SAP HANA; is based on a real-time, two-tier architecture; and acts as a decision-support system for line-of-business users. It provides users with end-to-end process visibility, insights on big-process phases and milestones, and real-time metrics and key performance indicators. SAP Operational Process Intelligence helps line-of-business users collaborate to solve problems, thus avoiding escalations.



Big processes are closely linked to Big Data and acquire Big Data characteristics, such as high volume, high velocity, and variety (structured and unstructured data and interaction). They are the “crown jewels,” supporting key business operations.

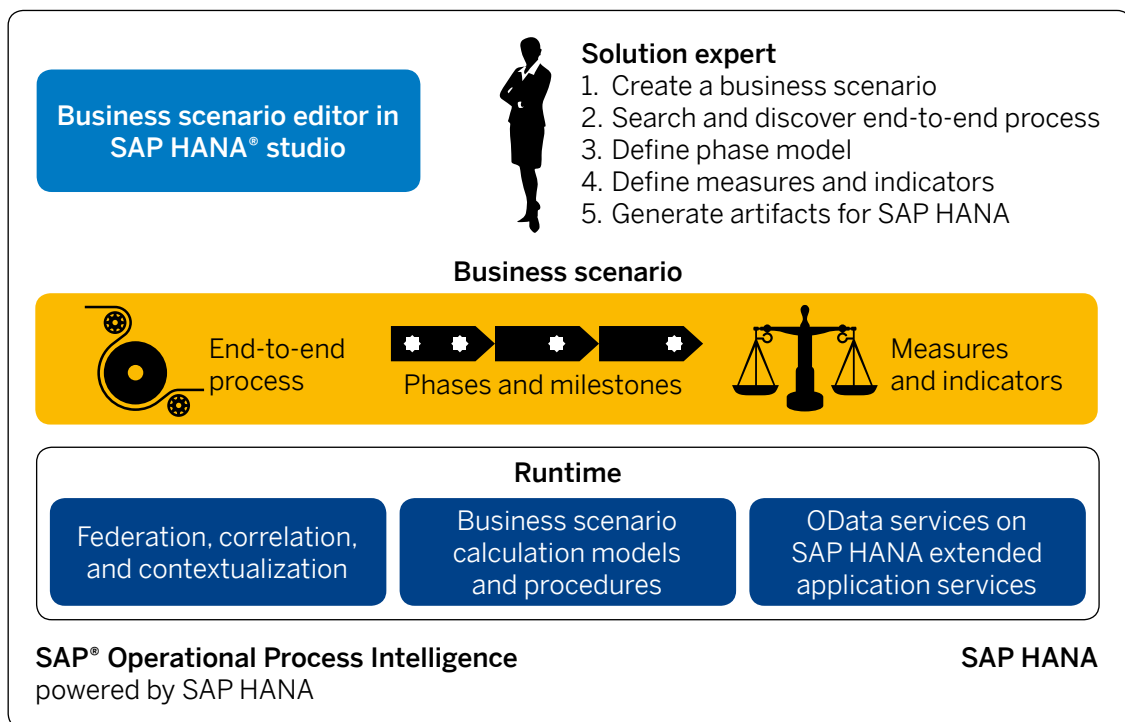
4. Accelerators include search, rule execution, monitoring, and process analytics. In addition, we leverage SAP HANA for correlation of replicated raw events into different scenarios of operational process intelligence. The data size correlation procedure (including different CalcViews) analyzes and contextualizes 3.9 million raw events, 9 GB of data, with 16 KB events per second, using four to five CPUs. The SAP HANA platform runs on HP ProLiant DL 580G7 Server, 512 GB of RAM, four CPUs, 40 cores, 80 threads, and 66680 SAPS.

Third, we are **revamping** business process documentation and modeling with SAP PowerDesigner software that is integrated with the SAP NetWeaver Business Process Management (SAP NetWeaver BPM) component and SAP HANA. With support from the software, we have streamlined the planning, designing, and communication of business process definitions. SAP PowerDesigner helps organizations capture current state business processes in normal business terms to drive BPMN designs. Stored in a central repository, these models serve as the basis for a consistent understanding of business process definitions across the enterprise. In turn, this clear process communication facilitates effective collaboration and helps establish a single view of truth.

The leading artifact in SAP Operational Process Intelligence is the **business scenario** (see Figure 4). The business scenario is configured by a solution expert who understands the business operations that use a business scenario editor. The business scenario editor can be installed on top of the SAP HANA studio.

A business scenario has three main components. First, it captures the high-level phases and milestones. Phases hide the technical complexity and provide a value-stream view to line-of-business users. You configure phases on the basis of process events that originate from the end-to-end flow configured in the previous step.

Figure 4: Business Scenario in SAP Operational Process Intelligence



Second, the business scenario captures the end-to-end flow of a big process. Here again, there are two options as adoption paths:

- You can assemble a big process from different fragments of multiple SAP and diverse non-SAP software systems and operational data providers. SAP Operational Process Intelligence provides ready support to discover process fragments from business workflows and from transactions from SAP Business Suite software, SAP NetWeaver BPM, the SAP NetWeaver Process Integration offering, and third-party software.
- You can orchestrate a big process using SAP NetWeaver Process Orchestration, and the solution expert can search for orchestrated processes and add them to the business scenario.

By providing both options listed above, SAP Operational Process Intelligence does not force you to orchestrate end-to-end processes before providing operational intelligence for a specific scenario. Such an approach provides multiple entry points. You can choose to automate, integrate, and orchestrate processes and then enable visibility and operational intelligence. Or you can start by getting visibility and understanding the status quo of your business operations and then decide to automate and orchestrate processes.

In addition, line-of-business users use space.me, a contextualized operational workspace that provides visibility into their processes and their tasks and helps them make optimized decisions to reach their goals and business outcomes.

Third, you can define key metrics and process indicators, such as cycle times and durations, directly on the level of the business scenario.

After configuring the business scenario, the solution expert does not need to program artifacts for SAP HANA. As the scenario is built and deployed, SAP Operational Process Intelligence generates optimized and native runtime artifacts for SAP HANA. These include calculation views, correlation procedures, and Open Data Protocol, or OData,⁵ services that are used to expose operational workspaces to line-of-business users. By combining SAP NetWeaver Process Orchestration and SAP Operational Process Intelligence with business applications on a common deployment of SAP HANA, we consolidate the landscape. In addition, this lets you lower the total cost of ownership (TCO) and unify the products on the SAP HANA platform for a more integrated experience.



The people involved in your daily hub operations need real-time process visibility across the value stream and the ability to respond to insights collaboratively with appropriate actions.

5. For more information about OData, visit www.odata.org.



THE SAP HANA PLATFORM ADVANTAGE

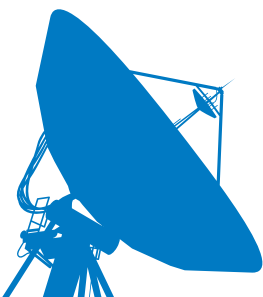
SAP HANA is a revolutionary in-memory computing platform that dramatically simplifies IT landscapes. It brings transactional and analytical functionalities together⁶ to support real-time decision making and thus increase the speed of business processes. Here are the native platform advantages that you can leverage when the intelligent business operations functionalities run on the SAP HANA platform.

Combined transactional and analytical processing – Traditionally, many companies extracted process data and logs and loaded them into the SAP Business Warehouse application to support analytical reporting needs. With the SAP HANA platform and its column store, you can perform both transactional processing of executing processes and analytical processing of process metrics and measurements (using virtual data models) in the same software system.

Real-time analytics – Benefit from analytics and data discovery functionalities by combining SAP NetWeaver Process Orchestration and SAP Operational Process Intelligence on SAP HANA with the SAP BusinessObjects™ Business Intelligence platform.

Landscape consolidation and TCO reduction – Given that we can deploy SAP NetWeaver Process Orchestration and SAP Operational Process Intelligence on the same instance of SAP HANA as on SAP Business Suite powered by SAP HANA, you can share data, consolidate the landscape, and reduce TCO.

Real-time visibility – SAP Operational Process Intelligence uses tools such as SAP Landscape Transformation software, SAP Replication Server®, and SAP Event Stream Processor to bring process events into SAP HANA in real time. This enables real-time visibility into business operations.



The customer onboarding operation is a big process, with high volumes and high value to communications service providers. By orchestrating and automating this big process, you enable all involved to work in the same context toward the same goal.

6. SAP HANA Database for Next-Generation Business Applications and Real-Time Analytics, SAP white paper, 2012, www.saphana.com/docs/DOC-1381.



Performance – SAP Operational Process Intelligence takes advantage of the processing speed of SAP HANA to correlate and contextualize thousands of process events per second arriving in real time from multiple sources. We also use the native decision table functionalities of SAP HANA to push down high-volume operational decisions into the platform. Process analytics for business process management processes also benefit from the speed of aggregated operations.

Compression – The column store in SAP HANA provides much-needed compression to handle and scale with high-volume and high-velocity data. Because the process data sources have characteristics of a dense matrix, we can take advantage of the column store for higher compression rates. Higher rates also help us to handle data growth well.

Extensions – The SAP HANA platform has a lot of native functionalities, such as predictive algorithms for predications and forecasts as well as planning functions. The platform also supports native application development with extended application services from SAP HANA, JavaScript, and procedures from SAP HANA. Such platform functionalities allow developers to build applications on top of what is already provided by SAP NetWeaver Process Orchestration and SAP Operational Process Intelligence.

Information architecture and data migration – With SAP PowerDesigner, you can quickly identify information assets. With its repository-level integration, you can readily migrate data assets to SAP HANA.

KEY SCENARIOS

Using the intelligent business operations functionality supported by SAP HANA, you can perform three key scenarios. These scenarios are not mutually exclusive.

Big-Process Automation

You can orchestrate your structured processes across the value stream using SAP NetWeaver Process Orchestration. You can model processes using a standards-based approach (with BPMN 2.0 or service-oriented architecture, for example), and you can execute those processes in a high-performance process engine. You can compose existing application assets from packaged applications (SAP and non-SAP software) and home-grown software using various integration adapters to support big processes end to end. Line-of-business users share the same context, access consistent user interfaces on multiple devices, and can collaborate toward a common goal focused on customer value. Big-process automation also involves application-to-application and business-to-business integration.



By combining SAP NetWeaver Process Orchestration and SAP Operational Process Intelligence with business applications on a common deployment of SAP HANA, we consolidate the landscape.





Operational Intelligence with Process Visibility

You do not have to have process automation in place before using SAP Operational Process Intelligence – that is, you don't need orchestration before getting operational intelligence. You can build business scenarios, which represent the end-to-end process in SAP Operational Process Intelligence. Process events from multiple underlying systems supporting different parts of the value stream are then consumed in real time and correlated and contextualized to a unique instance of the end-to-end process. You can establish process visibility across the value stream, enable line-of-business users to gain real-time insights, help them collaboratively solve problems, and take appropriate actions.

High-Volume Operational Decisions in Real Time

SAP NetWeaver Process Orchestration offers high-performance, operational, decision management functionality with business rules management (BRM). BRM supports both inference and sequential rules, with inferential rules being supported by an in-memory Rete network. You can use business rules either independently or in BPM processes for process flow decisions, thus enabling flexible, rule-based workflows. In addition to the BRM functionalities, SAP HANA also has native decision tables, which enable business users to capture decisions in a compact IF-THEN-ELSE format and execute them natively inside SAP HANA. Such an approach can support high-volume decisions, where several thousands of operational decisions have to be made every second.



We believe that our integrated product offering will be the platform of choice for SAP and non-SAP customers to embark on the journey of adding intelligence to their business operations and achieving operational excellence and agility.



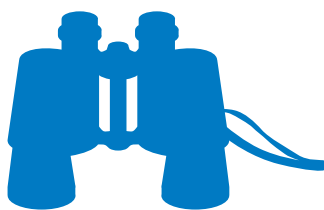
Outlook

As we continue this journey to renew process technology, we plan to add support for more operational process patterns in the future. For example, we plan to support “goal-driven processes.” The objective is to introduce case management functionalities to line-of-business users that support proactive engagement and improve collaboration as they work toward reaching explicit goals.⁷ These management functionalities can also validate progress as users attain intermediate milestones. The intention is for the software system to act as a business navigation guide that helps you avoid bottlenecks and reach business outcomes in the most efficient way by proposing appropriate actions to balance situations. With these functionalities, we plan to address one of the key challenges: supporting knowledge workers engaged in resolving problems and situations that are not well defined and not supported by structured workflows.

With the combination of SAP NetWeaver Process Orchestration and SAP Operational Process Intelligence powered by the SAP HANA platform, we aim to support big-process automation (using orchestration and integration functionalities) and operational intelligence. We believe that our integrated product offering will be the platform of choice for SAP and non-SAP customers to embark on the journey of adding intelligence to their business operations and achieving operational excellence and agility.

FIND OUT MORE

For more information about making your business operations more intelligent with SAP HANA, call your SAP representative or visit us on the Web at <https://www.sap.com/pc/tech/in-memory-computing-hana/software/operational-process-intelligence/index.html> or www.sap.com/pc/tech/business-process-management/software/process-orchestration/index.html.



Through renewing and rethinking, SAP enables process orchestration supported by SAP HANA to help address the challenges of big processes.

⁷ “Explicit, rule-based goals” can significantly enhance the decision-support functionalities of the system. These goals are designed to express the overall desired business outcome of a scenario in human- and machine-readable format, linking recommendations to execution activities and process instance visibility.



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The Best-Run Businesses Run SAP™

