

SAP® SOLUTIONS FOR AUTO-ID AND ITEM SERIALIZATION

DRIVE BUSINESS PRODUCTIVITY WITH
REAL-TIME DATA CAPTURE

SAP® solutions for auto-ID and item serialization can sense and respond to the real world, bridging the gap between the physical world and the world of data in IT systems. These solutions drive business productivity by automating data capture, as well as supporting the serialization of products and assets. With serialization, a unique serial number applies to every item. Such granular identification can enhance product visibility, improve data accuracy, and improve decision making throughout a company's supply chain. The solutions are delivered within the SAP Auto-ID Enterprise offering.



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16 Drive Business Value with Auto-ID and Item Serialization

INTRODUCTION

ENABLING REAL-WORLD AWARENESS IN ENTERPRISE APPLICATIONS

SAP® solutions for auto-ID and item serialization enable “real-world awareness” by sensing and responding to the presence and movement of objects in real time. The solutions facilitate agile supply chain execution, efficient asset management, and adaptive manufacturing. SAP solutions for auto-ID and item serialization are proven and scalable solutions that smoothly integrate real-time data into enterprise applications. The SAP Auto-ID Enterprise offering comprises two key building blocks: the SAP Auto-ID Infrastructure offering and the SAP object event repository.

SAP Auto-ID Infrastructure

SAP Auto-ID Infrastructure is a local/regional-level solution for managing auto-ID-enabled (serialized) objects – from commissioning through reconciliation and association with business context. It enables organizations to integrate this real-world and serialized data into their business processes by extending core enterprise resource planning (ERP) processes with serialized data.

SAP Object Event Repository

The SAP object event repository is the centralized system of record that supports the orchestration of auto-ID instances across the enterprise and facilitates inter- and intracompany tracking of serialized objects. Certified by GS1 EPCglobal to be fully compliant with the company’s Electronic Product Code Information Services (EPCIS) standard, it harmonizes internal auto-ID serialization with auto-ID signals from outside trading partners, all within an active, real-time event-driven engine.

The SAP object event repository can support any number of SAP Auto-ID Infrastructure instances, which are responsible for managing serialized data, events, and business processes at a local level, such as a warehouse or a manufacturing plant.

SAP Auto-ID Enterprise

Combining SAP Auto-ID Infrastructure and the SAP object event repository into a single solution, SAP Auto-ID Enterprise leverages serialized information in a wide variety of supply chain,

manufacturing, service and asset management, and compliance applications. Companies that are undertaking or considering serialization projects can leverage SAP Auto-ID Enterprise as a strategic asset. SAP Auto-ID Enterprise provides a flexible platform that supports a wide range of serialization technologies (linear bar codes, 2-D codes, RFID tags, real-time location systems, sensors, etc.), supporting standards-based serialization (Electronic Product Code, or EPC, and Department of Defense) and also allowing custom identification mechanisms.

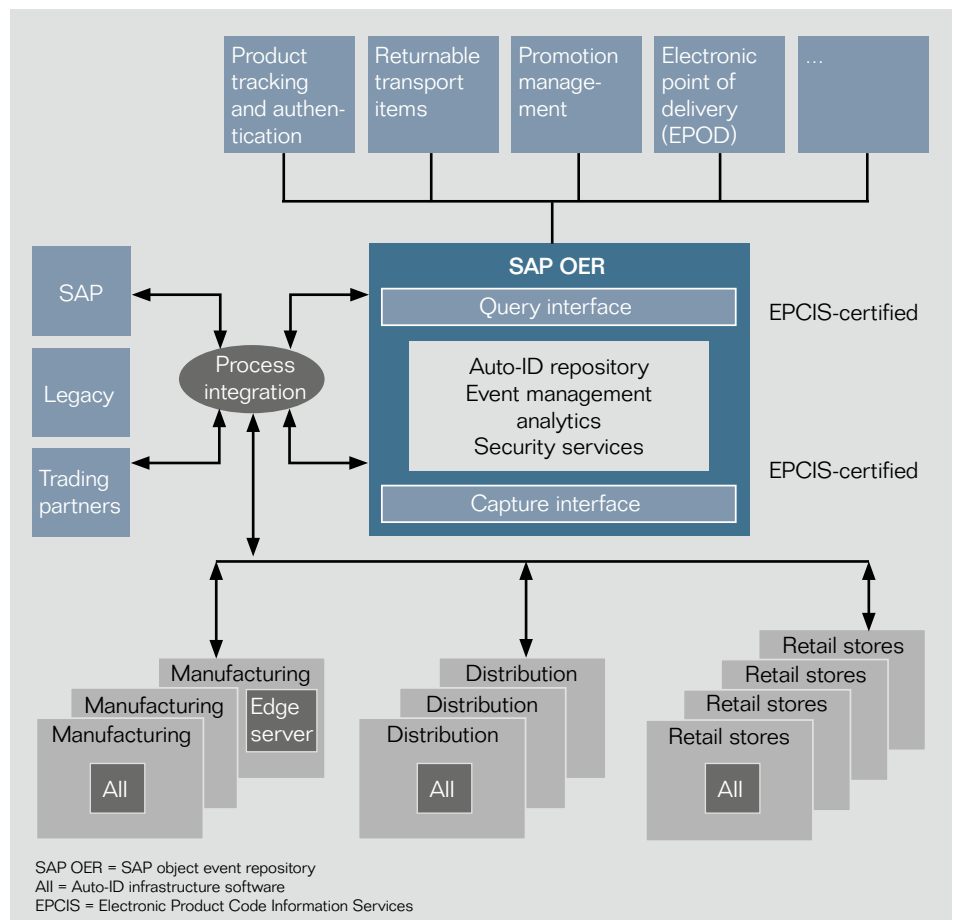


Figure 1: SAP® Solutions for Auto-ID and Item Serialization



SAP now has more than 400 customers in more than 17 industries, with a wide variety of applications that extend beyond “slap and ship” compliance to supporting value-driven processes in a variety of areas.

Business Challenges

SAP solutions for auto-ID and item serialization, like many other SAP offerings, have been engineered with the goal of helping modern enterprises adapt to the needs of a rapidly evolving business climate.

Competitive pressures are growing from year to year:

- With the continued evolution of globalization and offshoring, competitors are reducing direct material and labor costs, as well as providing innovative new service offerings.
- Consumer “big box” retailers are negotiating low prices and are looking for annual reductions as supply chain efficiencies improve.
- SKUs are proliferating in all industries, as companies compete for shelf space and mind share. Private labels compete with name brands, promotional SKUs abound, and “mass customization” drives products with millions of configured options.
- Supply chain velocity is increasing, as companies squeeze out inventory by moving from monthly to weekly to daily replenishment cycles, and extended visibility from point of sale (POS) and auto-ID (RFID, bar code, sensor, and others) allows companies to move to more demand-driven processes.
- The retail industry faces mandates for case and pallet tagging on a global scale.
- Health and safety concerns and liabilities are driving requirements for more rigorous employee protection, as well as asset maintenance and reporting.
- Emerging environmental concerns are imposing stricter requirements for recycling, reverse logistics, and appropriate disposal – for example, the Waste Electrical and Electronic Equipment Directive in the European Community.

Beyond Compliance

These applications are being implemented not only for compliance but also to drive business value in many innovative ways, including the following:

- Recall management – Food, drug, and cosmetic companies are finding an increasing need to track their products in their downstream supply chain so it is possible to recall them if contamination or tampering is suspected.
- Cold-chain tracking in food and life sciences for perishable goods and information on their “condition”
- Manufacturing and logistics visibility for outsourced manufacturing areas overseas such as Asia-Pacific
- Increasing medical caseloads and the need to reduce lethal complications due to medication errors
- Asset maintenance and repair
- Automotive kanban management
- Reduction of counterfeiting and gray-market activities

	From (pre-2006)	To (2006 forward)
Market Drivers	Compliance to Retail and Government Mandates <ul style="list-style-type: none"> ■ Retail compliance: case and pallet level ■ Item-level tagging for Pharma CII compliance ■ Logistics (shipping and receiving), asset tracking 	Compliance and Value <ul style="list-style-type: none"> ■ Retail and other compliance mandates still dominant ■ Beyond compliance, value initiatives emerging at industry leaders ■ Proof points across multiple industries ■ Logistics, asset tracking, manufacturing, supply chain, and so on
Technology Focus	RFID Physics and Infrastructure <ul style="list-style-type: none"> ■ Hardware infrastructure: tags, readers, printers, devices ■ Device integration: filtering, aggregation, management, control ■ Physical attributes: form factor, packaging configurations, environment, metals or liquids 	Compliance to Retail and Government Mandates <ul style="list-style-type: none"> ■ Market maturing for hardware, tags, installation expertise (art to science) ■ Gen 2 tags – Leap forward in read rates ■ Focus changing to using the data: Serialization, EPCIS, Pedigree, and so forth ■ Emergence of advanced sensors, motes, active tags, and so on

Figure 2: RFID Market Evolution

Together, these trends are driving organizations to be more innovative in improving processes to maximize productivity and asset utilization, while at the same time providing greater compliance and traceability. Auto-ID and unique serialization address these challenges.

Technology and Market Evolution

Bar code technology has experienced tremendous adoption in the last three decades. Now, newer technologies are gaining ground and are becoming excellent complements to or substitutes for established linear bar codes as means to carry information about products and items. These newer technologies include two-dimensional bar codes, RFID, and sensor networks.

Two-dimensional bar codes are gaining popularity rapidly because they can carry much more information than conventional linear bar codes at about the same price point. Two-dimensional bar codes can be read in any direction and can encode information about the class of product – just like regular bar codes – and about a particular and unique item. They are particularly popular in the pharmaceutical industry.

Though available since the 1920s and used in World War II to identify airplanes as friend or foe, RFID technology made major strides in the late 1990s (see Figure 2). RFID is no longer an experimental technology with expensive tags, driven by corporate and government mandates and suitable

only for early adopters. Technology has matured and come down in price, and applications are being announced almost daily, in almost every industry.

Sensors and sensor networks are becoming more capable and cheaper. The ability to monitor temperature, shock or vibration, moisture, and other conditions of serialized items, combined with the ability to wirelessly transfer this information, makes sensor networks very attractive platforms for data capture.

Classes of Applications

The customer base for SAP solutions for auto-ID and item serialization has also grown and matured. SAP now has more than 400 customers in more than 17 industries, with a wide variety of applications that extend beyond “slap-and-ship” compliance to supporting value-driven processes in a variety of areas. These applications fall into four major classes.

Automation. In this class of applications, the primary business motivations are to leverage auto-ID to increase the efficiency of the workforce required to execute a business process or to increase data accuracy of a process to drive improved decision making or customer service. Examples include:

- Goods issue and receipt via automatic shipping and receiving processing based on bar code and RFID reads, eliminating the need for information workers to manually post transactions
- Automated returns delivery processing on bar code and RFID reads, eliminating the need for information workers to manually post transactions

- The ability to capture many RFID reads at one time, without line of sight, to enable a full lift truck to pass through a portal without individual case scanning or to identify all of the tools in a box without opening the box and individually scanning the tools

Track and trace. In this class of applications, the business value is derived from awareness of the status and location of serialized objects within the enterprise or across the supply chain. For example:

- A producer of a controlled substance needs to be aware of the location of all materials within its facilities to maintain tight controls and prevent shrinkage.
- A company that is shipping product wants to verify a customer's deduction claim for items not received.
- A consumer products company that has visibility into the quantity and location of its product within the retailer's distribution center, store back room, and store shelves can generate alerts to prevent out-of-stock situations – especially in cases of promotion execution or new-product introductions. This same company can combine auto-ID data with other forms of POS data to automate replenishments and optimize inventory levels.
- A company with products prone to counterfeiting can use serialization to provide an authentication service for its customers or to provide detailed pedigree information certifying the

chain of custody of the product. This same company can leverage the information to support product expiration management or a product recall campaign.

- Companies with mobile assets such as tools and containers can use serialization to drive higher asset utilization by tracking the “turns” of these assets between their facilities and their customer facilities. The company can send an alert, or even bill, if an asset is not returned in a timely manner.

Decision support and analytics. Data captured through the process of tracking serialized information through the supply chain is an invaluable source for business analysis applications to identify trends and drive continuous improvement. For example:

- Serialized product traced through a production line can identify the variability in cycle times at different operations as a function of the product type. This can help fine-tune line balancing and identify products with an unacceptable frequency of delays or quality problems.
- Product movements through the supply chain can be used to derive information about inventory levels and lead times, which can highlight performance issues.
- The movement of products with shelf-life constraints can be evaluated to detect process abnormalities that result in out-of-FIFO handling, driving inventory obsolescence issues.

SAP solutions for auto-ID and item serialization are delivered supporting a set of preconfigured business processes. The solutions execute many of the standard processes associated with auto-ID. These processes can be deployed as is, or they can be modified and extended using the configurable rules process.

Enriching business solutions. This area is more difficult to categorize, as it is the collection of highly innovative applications of auto-ID and serialization that SAP customers have designed that take advantage of the technology in unique ways – enabling capabilities that were previously impossible. For example:

- Companies with business processes based on consigned product (such as medical devices or tools) can trigger customer billing more quickly and accurately based on receipt of information about serialized product.
- Hospitals are using auto-ID technologies to track the process of administering drugs to patients to improve accuracy and reduce medication errors.

FLEXIBLE BUSINESS PROCESSES

ENABLING A WIDE RANGE OF OPERATIONS

Leveraging data and functionality residing in both SAP and non-SAP business applications, SAP solutions for auto-ID and item serialization have integrated the serialization activities originating from core production and distribution facilities of manufacturers, wholesalers, retailers, and service providers. Serialized data is created, captured, and associated with relevant business objects such as batches, ASNs, deliveries, and orders.

A core concept of SAP solutions for auto-ID and item serialization is the enablement of business processes. Business processes can be configured as a series of rules, which are triggered by events, and which in turn trigger a series of activities that perform validations, communicate with the devices in the network, trigger transactions in the back-end business system, and trigger communications with trading partners.

Using this flexible technology as a base, SAP solutions for auto-ID and item serialization are delivered supporting a set of preconfigured business processes. The solutions execute many of the standard processes associated with auto-ID. These processes can be deployed as is, or they can be modified and extended using the configurable rules process.

The primary standard business processes supported by SAP solutions for auto-ID and item serialization are described below.

Outbound Shipment

SAP solutions for auto-ID and item serialization enable customers to support the basic operating steps required to ship serialized product to customers. These steps include:

- Generating serial numbers for IDs (EPCs, DoD unique item identifiers [UIIs], or others)
- Commissioning RFID tags (or printing bar codes)
- Associating tags or bar codes with items, cases, or pallets
- Generating flexible multilevel hierarchies for cases, inner packs, and pallets
- Creating and updating handling units in the back-end ERP application
- Scanning and tracking outbound items associated with loading
- Associating serial numbers with delivery documents
- Verifying delivery requirements at the data-capture source
- Processing goods issue in the back-end ERP application

- Automatically triggering the sending of an advanced shipment notice (ASN) document to the customer, based on predefined conditions

The outbound shipment business process operates in two modes. The “slap-and-ship” (or stand-alone) mode is best suited for companies interested in basic slap-and-ship processing, while the “integrated” mode is recommended for companies that wish to extend the visibility of serialized information into their ERP system and provide for linkage between the order-to-cash process and the detailed serialized information. In some situations, SAP customers begin with the stand-alone mode and upgrade in a future phase to the integrated model.

Inbound Receiving

The inbound receiving business process supports the standard elements that would be required by a company that needs to receive serialized product. This includes the following:

- Handle receipt and management of an ASN
- Capture inbound serialized information as it is scanned upon receipt
- Validate serial numbers against the inbound ASN
- Associate serial numbers with the inbound delivery document
- Process goods receipt in the back-end ERP application
- Automatically generate proof-of-delivery documentation based on predefined conditions

Returnable Transport Item Tracking

A common requirement is for companies to track mobile assets that would originate in their facility, get shipped to a trading partner's facility, and then return. Examples of returnable transport items (RTIs) could include pallets, intermediate bulk containers, gas cylinders, and kegs. This scenario is the basis for many asset management applications, where the goal is to track the location and status of assets in order to improve asset utilization. The same scenario is also the basis for various consignment scenarios. The standard RTI process supported by SAP software includes the following steps:

- Tracking of returnable container current and historic locations, from supplier to customer and back again
- Commissioning and maintenance of RFID tags or bar codes placed on returnable assets using the standard global returnable asset identifier format
- Tracking of the asset through the various operations within the supplier's facility, such as packing, loading, unpacking, and unloading
- Tracking of the asset through the various operations within the customer's facility
- Automatic monitoring of events, such as empty and full status, using event management tools that alert relevant parties of unintended or unexpected events or changes in status

Kanban

The kanban scenario supports the serialization of totes that are used in a manufacturing process and the automatic triggering of kanban "pull signals" as totes pass through a scanner that detects whether they are full or empty. This process is especially effective with RFID, where a number of totes can be conveyed on a lift truck through a portal to capture many signals simultaneously without scanning them individually. Kanban functionality supports the following:

- Upon detection of an "empty" signal: automatic kanban status change and creation of a replenishment element (for example, a PO)
- Upon detection of a "full" signal: automatic kanban status change, goods receipt posting, and creation of the material document

Product Tracking and Authentication

Product tracking and authentication is a process supported by SAP solutions for auto-ID and item serialization, enabled with the introduction of the SAP object event repository. This provides functionality to support business processes to track serialized information through the supply chain. It also provides services to authenticate that the serialized product originated from a trusted source and arrived at the intended destination.

This functionality is based on the serialized content stored in the SAP object event repository in conjunction with business information from back-end business systems. The key functionality of the product tracking and authentication module includes the following:

- Capture
 - IDs (such as EPCs, UIIs, Item Unique Identification [IUIDs], or other IDs), hierarchies, locations, and events from local SAP Auto-ID Infrastructure instances and third-party systems
 - Business object data from back-end ERP and other business applications
 - Association of ID information with business objects such as batches and lots, orders and deliveries, and other characteristics
 - Data exchange from trading partners
- Product tracking (via query interface or user interface)
 - By ID – status, location, events
 - By order or other business characteristics (batch)
 - By issuing alerts via event management (for example, a shipment did not arrive at the intended destination)
- Authentication
 - ID authentication
 - Extended authentication against secondary characteristics such as tag-ID, holospot, or other unique identifier, and location
 - Logging of authentication attempts, responses



SOLUTION CONCEPTS AND ELEMENTS

SAP STRATEGY FOR LEVERAGING SERIALIZED INFORMATION

Thanks to experience gained from more than 400 customers, SAP solutions for auto-ID and item serialization have matured as a scalable and sustainable foundation to incorporate automatic data capture and mass unique serialization functionality within enterprise business processes. This section further describes the elements comprising these solutions and how these elements fit into a broader SAP strategy of leveraging serialized information in support of a wide variety of business processes.

There are three main concepts embodied in SAP solutions for auto-ID and item serialization:

Unique identification of objects. The first concept is to support unique identification of objects so that they can be managed throughout their life cycle. Unique serial numbers are typically associated with assets such as equipment and inventory. This information is used to drive visibility, automation, accuracy, product life-cycle management, and compliance across business processes within the enterprise, as well as outside the four walls of the enterprise. It leverages data-exchange standards such as EPCIS framework from EPCglobal and IUID standards from the

U.S. Department of Defense. Using these standards, companies can exchange information about serialized objects with trading partners to gain extended visibility into the entire supply chain.

Automation of logistics processes.

The second concept is to leverage the benefits of RFID and intelligent sensor technology to automate and reengineer logistics processes and improve accuracy and productivity. This is supported through the following:

- Rapid scanning without line of sight or direct human action
- Writing and rewriting data into the RFID tags
- Capturing information such as location, temperature, or physical or chemical change

Auto-ID technologies provide rich data granularity and abilities for automation, which will foster innovation in applications and new business models.

Scalability. The third concept is to provide a scalable solution that can enable organizations to comply with mandate-driven initiatives yet grow the deployment to take advantage of next-generation applications. SAP solutions for auto-ID and item serialization have addressed these concepts as well as the following:

- Enterprise-wide view for object data
- Tagged product flow at multiple locations and multiple local processes
- Centralized data exchange with trading partners
- Single set of interfaces and repository for a growing number of enterprise applications

- Combination of various data streams (EPC, transaction, and POS) to drive business value
- Emergence of enterprise-centric applications such as electronic proof of delivery, promotions management, and replenishment
- Emergence of network-centric applications, such as product tracking and authentication and out-of-stock reduction

SAP views serialization as a strategic enabler of a new family of applications that will enhance asset management, supply chain management, reverse logistics, contract management, and a wide variety of other business processes.

The core of this strategy involves the following:

- A software foundation that facilitates serialization, not as a point solution but as part of the application infrastructure
- The integration of serialization activities into a wide variety of business processes, and the association of business information from a variety of business applications with serialized data

Leveraging data and functionality residing in both SAP and non-SAP business applications, SAP solutions for auto-ID and item serialization have integrated the serialization activities originating from core production and distribution facilities of manufacturers, wholesalers, retailers, and service providers. Serialized data is created, captured, and associated with relevant business objects such as batches, ASNs,

deliveries, and orders. This data is then stored in a centralized repository and is accessed and exchanged with trading partners in support of the business processes mentioned above.

SAP Auto-ID Enterprise comprises two products that are described in detail in the following sections:

- **SAP Auto-ID Infrastructure** facilitates the capture of serialized data from the devices at local sites and provides the business context to turn the data into meaningful business events by extending core ERP processes to encompass serialized product. SAP Auto-ID Infrastructure commissions, configures, maintains, and translates serial numbers (EPC, UID, and others) as necessary for building the first-level product-information layer. It also communicates with the business applications (SAP or non-SAP) to access the business context information necessary to properly validate and store serial information. Communications are generally handled via the **SAP NetWeaver® Process Integration (SAP NetWeaver PI)** offering. SAP Auto-ID Infrastructure includes preconfigured business functionality for inbound receiving, outbound shipment, e-kanban, and more.

■ Serialized information collected by SAP Auto-ID Infrastructure (or other EPCglobal-compatible data capture middleware) is often detailed, and it is stored in the auto-ID infrastructure instance that is local to the originating site. Some of this information may be routed to the **SAP object event repository**, where it is available to support applications that require

visibility between sites in the enterprise, or between the enterprise and other trading partners, to support a full range of business processes.

Altogether, the architecture of SAP solutions for auto-ID and item serialization maps closely to the reference architecture established by the EPCglobal organization, a nonprofit worldwide standards group made up of vendors and users that drafts specifications based on EPC. SAP's differentiation lies in developing a foundation based on these standards, while also preserving tight integration with the business data coming from business applications and leveraging an event management engine that allows automated "sense and respond"

processes when anomalies occur. SAP has observed that its customers extract maximum business value from serialized information only when they have the ability to associate this information with a wide variety of business objects, such as customers, orders, invoices, products, contracts, and many others – and to react to anomalies in near real time.

SAP Auto-ID Infrastructure

SAP Auto-ID Infrastructure is the element of the SAP solutions for auto-ID and item serialization that directly supports local/regional-level serialized processes. SAP Auto-ID Infrastructure is shown in Figure 3.

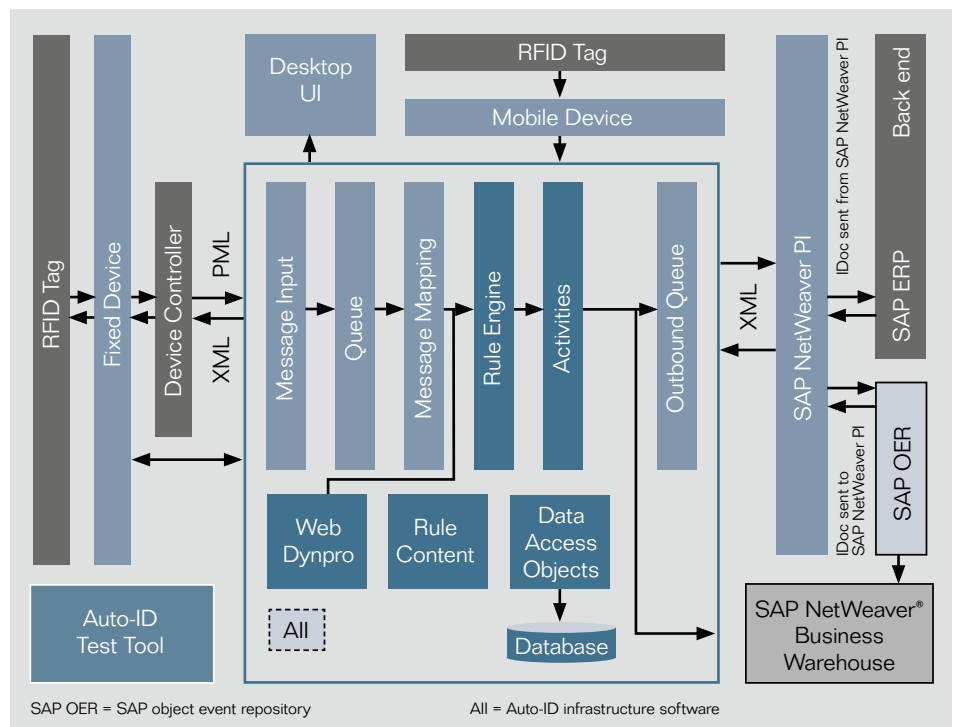


Figure 3: SAP® Auto ID Infrastructure – Inside Out



Core SAP Auto-ID Infrastructure Elements

Core elements of SAP Auto-ID Infrastructure include the following:

- **Mapping and rules processor** – Messages arriving from devices on the plant or warehouse floor are mapped, based on device location and event type, to configurable rules, which determine the business event that has occurred and what sequence of activities to execute.
- **Activities** – Discrete programs perform specific actions such as validations, updates, and communications required to execute the business process. Activities contain parameters such as exception criteria and thresholds. Activities are based upon the ABAP™ programming language workbench, which allows a company to modify existing activities and create its own to match its business requirements.
- **Routing engine** – The interpreted data in SAP Auto-ID Infrastructure is mapped to the relevant business objects inside the SAP Business Suite software, including the SAP ERP application, to facilitate automation of business processes. Using the mapping functionality of SAP NetWeaver PI, it is also possible to map to processes and data in non-SAP applications.
- **Prepackaged, configurable support for business processes** – Many business processes are supported by preconfigured content, including inbound receiving, outbound shipments, and RTI tracking. These processes, as described in the previous section, can be deployed out of the box or can be flexibly configured to

meet specific organizational requirements. “Prepackaged and configurable” means that rules and activities are created and packaged in a way to support the processes mentioned above, including all document and status associations.

Other Core Elements

Other core functionality includes the following:

- **Serialized number and format management** – Supports encoding and writing RFID tags, including Gen 2 RFID tags
- **Operational or perpetual database** – Stores site-level EPC serialization data and associated observation and event data, multilevel data aggregation, and associated business data. This repository integrates with the object event repository (see the next section) and can be used to facilitate local reporting.
- **Integration with business planning and execution applications via SAP NetWeaver PI** – Supports preconfigured integration with SAP ERP, as well as the ability to integrate to non-SAP back-end ERP applications
- **Analytical reports** – Predefined content for the SAP NetWeaver Business Warehouse (SAP NetWeaver BW) component allows for the tracking of a range of critical key performance indicators (KPIs) such as tag, read, and write statistics or supply chain metrics including cycle times and dwell times.

Functionality

SAP Auto-ID Infrastructure features a number of important enhancements:

- Enablement of numerous services of SAP Auto-ID Infrastructure to facilitate the development of customized processes that leverage serialization
- Support and integration for the SAP object event repository and enterprise EPCIS technology from SAP (see “SAP Object Event Repository” below)
- The generic document interface, which enables easier integration of ERP and other legacy systems’ documents with SAP Auto-ID Infrastructure for the enablement of serialized processes beyond the standard documents. With this tool (see Figure 4), it is possible for the customer to set up configuration to facilitate the download of any standard business document from the ERP software system into the auto-ID infrastructure (via SAP NetWeaver PI), without the need for customizing.
- Auto-ID integration with the SAP Extended Warehouse Management application (part of the SAP Supply Chain Management application), covering the following processes:
 - Auto-ID in inbound, including ASN handling, unloading, inbound delivery, and put-away
 - Auto-ID in outbound, including picking, handling-unit processing, packing, staging, loading, goods issue, and outbound delivery
 - Auto-ID in returns delivery processing
 - Auto-ID with resources, including warehouse task creation, open, and confirmation, based on RFID scans

SAP Object Event Repository

The SAP object event repository is an enterprise-level serial number repository for serialization standards such as EPC, UID, and others. Together with SAP Auto-ID Infrastructure, this repository becomes the system of record for all enterprise serialized information. The object event repository is based on the core requirements specified by EPCglobal, including the EPCIS capture interface and the EPCIS query interface. The object event repository landscape, shown in Figure 5, consists of an enterprise-level repository for uniquely identified objects such as EPC

The SAP object event repository provides highly scalable, object-level event processing throughout the supply chain. It enables discovery, tracking, reporting, and integration with business systems and enables business processes such as product tracking and authentication.

and UIDs. It also features a rich services layer to provide business context, discovery, event capture, and data exchange for these objects, supporting EPCglobal requirements.

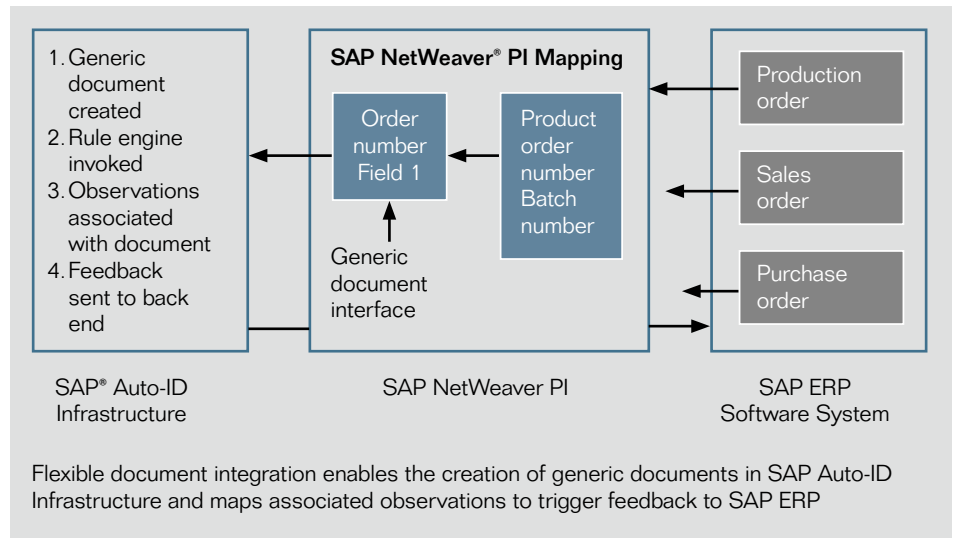


Figure 4: Integration Using the Generic Document Interface

The main elements and features of the object event repository are the following:

- Capture and query interfaces based on the EPCglobal EPCIS specification
- Data repository for events, observations, hierarchies, and associated business information
- Event processor, which maintains each serialized object as an event handler in order to track its entire life cycle and enables the configuration of alert notifications if a process does not execute as expected
- Central number-range management to distribute valid and unique EPC number ranges to each instance of the auto-ID infrastructure, from which they can be distributed down to edge devices
- Functionality for tracking and tracing of business objects and processes within and beyond enterprise boundaries
- Functionality for setting up alerts and exception management scenarios (through the SAP Event Management application) to track events such as early, late, or missed deliveries
- Automatic modeling of each EPC number as an event handler that can be tracked through the full life cycle of the EPC
- Analytics functionality, including predefined content for SAP NetWeaver BW, which allows for the tracking of a range of critical KPIs such as tag, read, and write statistics or supply chain metrics including cycle times and dwell times

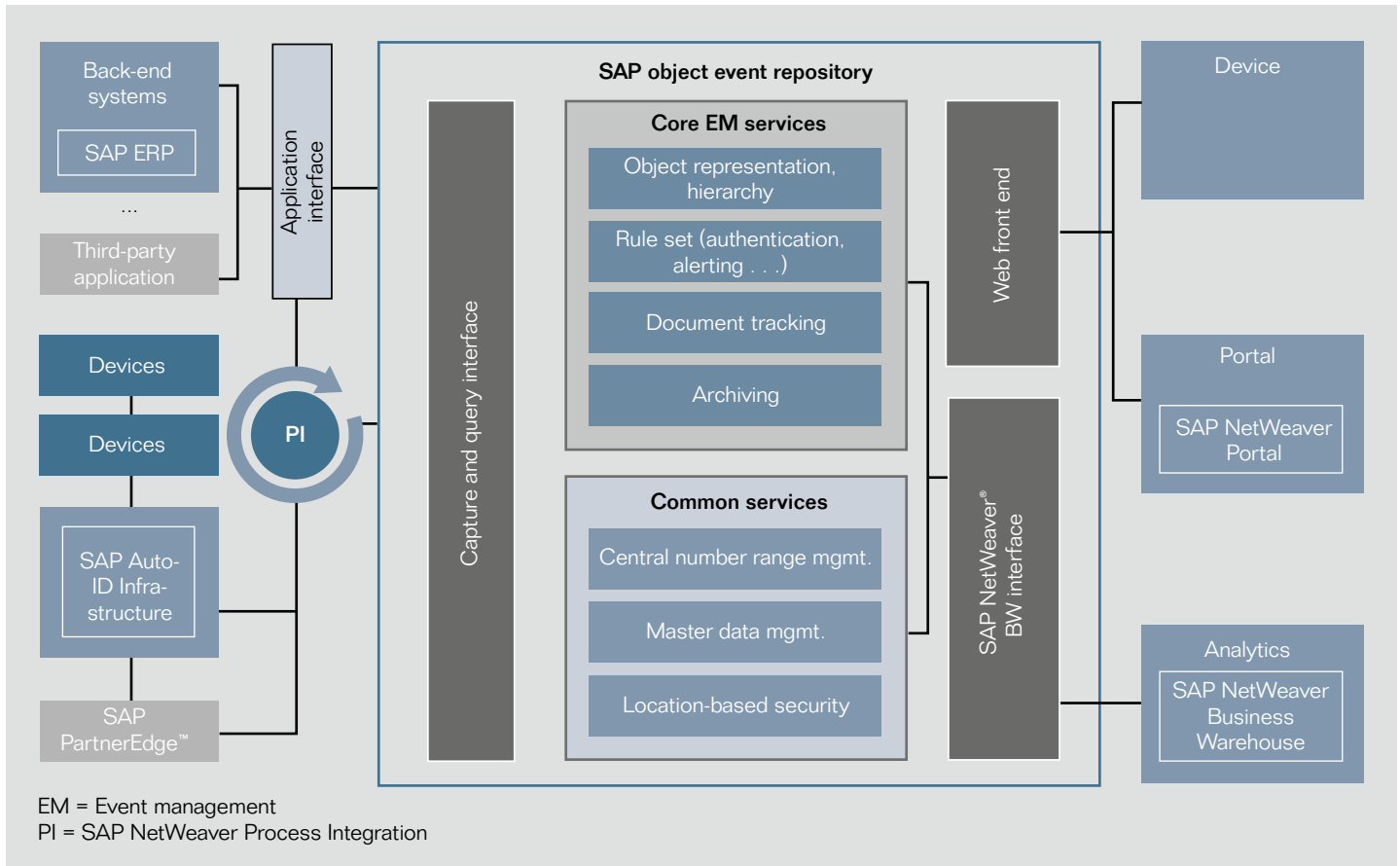


Figure 5: SAP® Object Event Repository Landscape

SAP PARTNER ECOSYSTEM FOR AUTO-ID

HELPING ENSURE FULL SUPPORT FOR CUSTOMERS' END-TO-END PROCESSES

In the industry, SAP has deep business process expertise and domain knowledge, which is reflected in the applications we offer. While SAP provides the applications, we rely on the expertise of our partners to provide other pieces of the value chain. SAP has cultivated a rich ecosystem of partners. Together with them, SAP provides complete, robust support for end-to-end processes. SAP partners in this area fall into the following categories: device management, independent software vendors (ISVs), and system integrators.

Device Management

Although SAP solutions are device-agnostic, SAP partners with device vendors to provide customers with an integrated solution that supports end-to-end processes. In addition, SAP collaborates with leading device middleware vendors that provide connectivity to a large range of devices such as RFID readers of varying frequencies, sensors, printers, and so forth.

SAP has published integration protocols for fixed and mobile devices (*SAP Auto-ID Infrastructure – DC 1.0* for fixed devices and *SAP Auto-ID Infrastructure – Mobile* for mobile devices). In addition, SAP has established a standard certification program for our device management partners through the SAP Integration and Certification Center location.

For a complete list of certified partners proficient in auto-ID device and device controller technology (also known as device middleware), please visit www.sap.com/partners/directories/SearchSolution.epx and look under *All-DC-RFID 1.0 – Auto ID Infrastr. Device Controller 1.0*.

Independent Software Vendors

ISV partners provide value-added solutions to SAP software. SAP has a number of ISV partners in the auto-ID and RFID areas. In general, ISV certification is a two-level process. The first step is to achieve “Powered by SAP NetWeaver” product certification. Partners work with SAP to move to the next level, which is to develop and deliver an application built on the SAP NetWeaver technology platform.

The list of ISV partners continues to grow as partners build innovative new applications. The latest partner status information can be found on our corporate Web site at www.sap.com/partners/directories/searchpartner.epx.

System Integrators

SAP has a large number of partners who are system integrators trained and experienced in implementing SAP solutions for auto-ID and item serialization. SAP provides solutions and applications, while system integrators make the implementations successful, providing industry expertise, deep technical skills, and relentless support. With the

help of these partners, SAP has been instrumental in delivering very successful auto-ID deployments to our many satisfied customers.

A complete list of SAP partners who are trained and experienced system integrators can be found at www.sap.com/partners/directories/searchpartner.epx.

Together, SAP and its partners provide comprehensive solutions and have repeatedly delivered impressive results.

In the industry, SAP has deep business process expertise and domain knowledge, which is reflected in the applications we offer. While SAP provides the applications, we rely on the expertise of our partners to provide other pieces of the value chain. Together with our partners, we provide complete, robust support for end-to-end processes.

The strength of these partnerships has helped generate customer confidence in this emerging area.

DRIVE BUSINESS VALUE WITH AUTO-ID AND ITEM SERIALIZATION

MEET YOUR CURRENT AND FUTURE NEEDS WITH SAP SOLUTIONS

As auto-ID technologies mature, many industries are identifying new and innovative ways to capture business value, improve supply chain and asset management, and ensure compliance by leveraging these technologies and uniquely identified data.

Some of the key innovations that auto-ID and RFID are unlocking involve automation and the ability to associate uniquely identified data with business data from other business systems. In almost every situation, the capture of the unique serialized data is only the first step in a business process in which the serial-number information must be linked to other business information to achieve the desired objective. For example, in a customer-return scenario, the serial number of the returned product must be linked to the original invoice information to determine the correct credit amount. In a promotions management scenario, the locations of promotional items in the supply chain must be compared with information about the dates and locations of the planned promotion, to highlight any discrepancies.

SAP solutions for auto-ID and item serialization are architected to capture and store this very granular serialized data. We believe that serialized data captured and stored in the object event repository will be of strategic value to our customers.

As you begin to undertake auto-ID and item serialization initiatives, it is important to make these investments with an eye toward laying a long-term foundation that not only meets your current needs but optimizes future innovations as well. SAP solutions for auto-ID and item serialization are designed as a solid foundation. You can start small and easily grow from local to enterprise-wide deployments, protecting your investments as you go. SAP solutions are certified by EPCglobal EPCIS and support the item serialization necessary to comply with DoD mandates.

SAP has deep expertise in business processes and deep knowledge of auto-ID and serialization. We have more than 30 years of industry experience and a diverse, growing customer base. SAP solutions for auto-ID and item serialization reflect this strength, providing preconfigured software that supports crucial business processes such as product tracking and authentication. With these solutions and with the help of our partners, organizations can drive business value by leveraging auto-ID and serialization across the enterprise.

For more details and customer success stories, please visit us at www.sap.com/solutions/auto-id/index.epx.

Summary

SAP® solutions for auto-ID and item serialization drive business productivity by automating data capture and supporting the serialization of products and assets with the SAP Auto-ID Enterprise offering. With serialization, enterprises can enhance product visibility, improve data accuracy, and improve decision making throughout the supply chain. SAP Auto-ID Enterprise comprises two products: the SAP Auto-ID Infrastructure offering and the SAP object event repository.

Business Challenges

- Sense and respond to shifts in demand to minimize out-of-stock situations and lower transportation costs
- Comply with mandates for item identification and tracking
- Increase efficiency using process automation to operate swiftly and keep costs low
- Maintain clear visibility into product movements

Key Features

- **Mapping and rules processing** – Map messages arriving from devices on the plant or warehouse floor to determine what event has occurred and what sequence of activities to execute
- **Activities that match business requirements** – Perform specific actions such as validations, updates, and communications; modify existing activities or create new ones to match enterprise needs
- **Routing engine** – Map interpreted data to the relevant business objects inside SAP and non-SAP applications to facilitate automation of business processes
- **Prepackaged, configurable support for business processes** – Deploy preconfigured processes or configure the software to meet specific requirements

Business Benefits

- **Improved operational efficiency** through automated data discovery and automated event processing
- **Higher customer satisfaction** resulting from more accuracy and speed in shipping, receiving, and handling operations
- **Improved compliance with corporate mandates and regulatory requirements** enabled by standards certification
- **Improved supply chain management** through better efficiency and visibility throughout the entire supply chain
- **Lower costs and higher ROI** with scalable solutions that are viable for the long term

For More Information

To learn more, please visit our Web site at www.sap.com/solutions/auto-id/index.epx.

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