WebSphere® software

Extend the value of SAP ERP with SOA and IBM Master Data Management.

Contents

Introduction

The SAP ERP application is widely recognized as the predominant enterprise resource planning (ERP) application for consolidating disparate back-end systems into one seamless application for managing manufacturing-centric processes. ERP helps to fulfill basic manufacturing functions, such as human resources, order fulfillment and procurement, by unifying finance, manufacturing, warehouse systems and other process and line-of-business (LOB)-specific applications into one finite application so that departments within a company can share and use needed information. In today's competitive environment, IT departments within companies now face all-encompassing challenges to improve business processes to help maximize their overall company value in the following areas:

- *Workforce effectiveness*
- *Go-to-market effectiveness*
- *Process improvement*
- *Cost efficiency*
- *Risk mitigation*
- *IT optimization*

The ERP system is now seen as more than just an application providing manufacturing-process functionality. It is generally understood that SAP ERP contains a treasure trove of high-value information across a heterogeneous environment that is critical to enabling an organization to solve its top-of-mind business and IT challenges. The key to unlocking this high-value SAP ERP information is to provide access where ubiquitous data consumers can access and manipulate the appropriate data content. The first step to unlocking the data is to provide the ability to interact with the SAP ERP data in a service oriented architecture (SOA). SOA has been universally understood as providing the ability to interact with systems and applications through a collection of accessible, reusable application- and environment-agnostic services. As a result, IT departments are catching on to the trend to provide centralized access to systems and applications where every application within the heterogeneous environment uses the same services for access to critical business information.

The need for SOA

SOA provides the method to take advantage of all the critical data that is contained within your SAP ERP application. However, getting access to and being able to use that information is much more complicated. Implementing an SOA strategy provides the ability to make SAP ERP content accessible, and IBM can provide SOA capabilities by implementing a set of comprehensive tools and technologies.

Organizations of all sizes and across all industries struggle to get the right information into the right hands at the time it is needed. This lack of timely information is a direct result of the fact that IT organizations today have grown in unexpected ways — acquisitions, mergers, project-specific application development and a lack of established standards — and their approaches to information integration have been uncoordinated and reactive. As a result, and in spite of IT's best intentions, a set of common business issues have arisen that prevent organizations today from making the most of all of their information assets to drive innovation. These issues include:

- *Too much information and not knowing what is important*
- *Multiple versions of the critical applications running, creating inconsistencies and duplicating information*
- *Lack of trusted information*
- *Lack of agility*

These issues are common within organizations today because of how information integration has been approached in the past. Typically, organizations have tightly coupled data sources to the business processes or applications, primarily with specific point-to-point integration procedures (see Figure 1). The problem is that when each process creates custom access to information, organizations struggle with:

- *Inconsistent views of data across processes (for example, one process gets account data from different places than another process)*
- *Inconsistent application of rules to the data (for example, calculations are performed differently from process to process)*
- *Multiple points of maintenance for the same logic, making it complex, time-consuming and expensive to update*
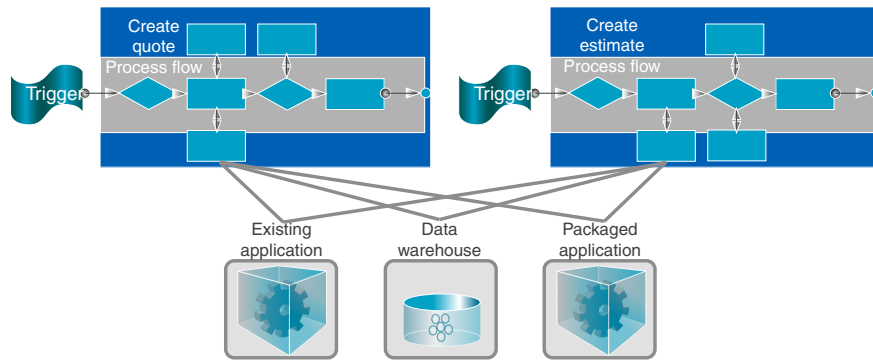
Figure 1. Tight coupling of data locks you in.

This tight coupling of data to workflow can significantly inhibit the reuse and flexibility of information assets, and hinder organizations from fully using all of their information assets to increase insight into their business to drive innovation and operational efficiencies, or to reduce risk.

Treating information as a service improves flexibility

By treating information as a service to the business — in other words, loosely coupling data sources to workflows and applications — SOA can centralize and standardize the approach to data integration. Information-integration specialists are those who know and work daily within the complexity of an organization's heterogeneous data architecture. They build integration logic centrally and deploy it universally on an information server to establish connectivity to all relevant data sources, define inputs and outputs, record all relevant definitions in the metadata and then publish the entire integration pattern (or job) as a service to a services directory.

Within this approach, information integration is packaged as a service to business processes and applications so that consistent, manageable information is made available to every process in a standardized way. By treating information as a service, IT organizations can help ensure:

- *Consistent definition and packaging of data from process to process*
- *Consistent application of rules to the data as it flows in and out of processes and applications*
- *Improved data quality across all data sources*
- *Centralized control and maintenance of information for improved governance*

Information as a service enables organizations to increase their flexibility and responsiveness to take advantage of new market opportunities, respond to customer demands or counteract competitive threats.

So, how does this really work? How do information services interact with an SOA? Information services are only one piece of a larger enterprise SOA—focused on providing consistent, standardized information. These services abstract applications, processes and people from the complexities of data sources. Behind the scenes of this information-as-a-service layer (see Figure 2), these services might be performing complex processing, like requesting data from multiple sources, matching and serving out a single record and transforming data to a target format. But to the developer, these services are very simple, like "get customer," and are fully described in the Web Services Description Language (WSDL) directory and metadata. The developer doesn't need to know anything about the data source, the processing that occurs within the service or even the technology in which the service is deployed.
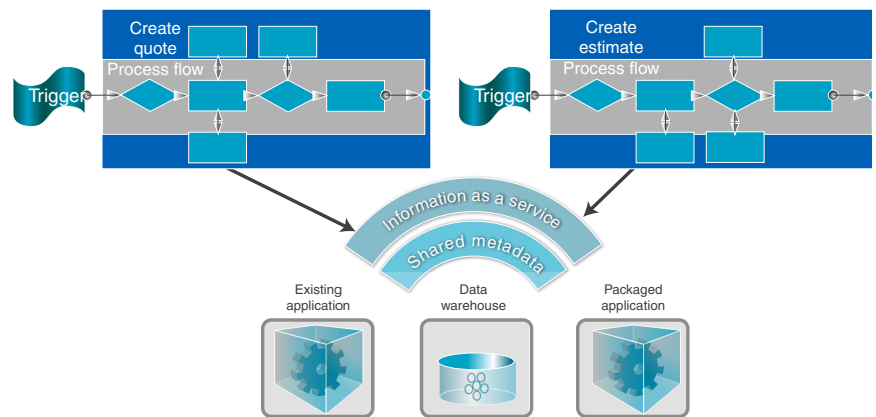

Figure 2. Information as a service improves flexibility.

The promise of SOA is that it will affect what every CEO wants to improve—profitable growth. Also, when implemented correctly, SOA can increase innovation by extending collaboration across the enterprise. It can also increase agility, responsiveness and time to market for new products and services. For organizations to fully capture the value that SOA promises, IBM has constructed an SOA reference architecture that is designed to help organizations frame their thinking and approaches to SOA initiatives in their business (see Figure 3).
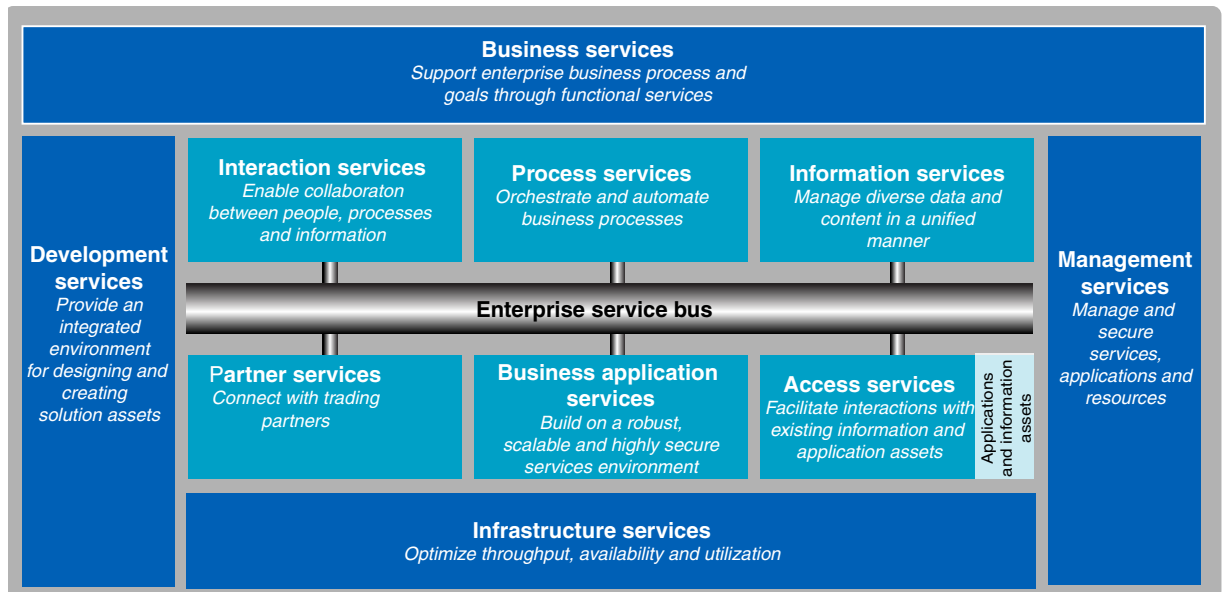
Figure 3. IBM SOA reference architecture

Many organizations approaching an SOA initiative typically focus primarily on business, process and application services. However, information services cannot be ignored. If a new business process or application is developed in response to a specific market need, it will require consistent and trusted information to ultimately deliver the value to the business. The ability to access, integrate and deliver information in a consistent, trusted and timely manner is therefore critical for any successful SOA implementation.

Beyond SOA: The need for master data management

The architecture of the ERP system presents several interesting challenges with regard to information management. All the necessary data within the ERP system exists within different application modules. Each ERP module contains groupings of repeated information such as products, customers, suppliers, items, locations, trading partners, bill of materials and chart of accounts. The issue with accessing each grouping, or data domain, of information is an issue based on the conceptual architecture of the SAP application. Each module within the ERP application has its own business processes and application logic for creating and maintaining the data that it uses. This fact alone is why unlocking the critical data located in the SAP ERP application is so complicated. That's where the concept of master data management (MDM) enters the equation.

The fundamental principle of MDM is that you can decouple master data from operational, transactional and analytical systems into a centralized, independent repository or hub and provide SOA business services to manage the master data independent of any LOB system or application. SAP ERP provides a perfect example of the need for MDM. This need has been validated by the mainstream adoption over the past several years of both customer data integration (CDI) and product information management (PIM) categories. These categories are generally recognized as subcomponents of MDM that concentrate on specific data domains.

CDI is concentrated on dealing with the customer-domain issue of MDM, which is about providing a single view of the customer. Early CDI adopters typically came from the financial services sector. However, CDI has reached a saturation point where it is being applied to a number of other industries, most notably gaining wide acceptance in manufacturing. PIM has been a primary MDM driver in the ERP manufacturing world by enabling the single view of the product, primarily within the retail and manufacturing industries. It is important to note that both CDI and PIM work with numerous secondary domains such as location, supplier and account, to name just a few.

One more critical ingredient: Deriving maximum value from heterogeneous information
Another critical component in making the most of your SAP ERP implementation is to provide the ability to ensure data quality. The success of any SOA and MDM initiative is directly dependent upon the accuracy and consistency of the data-integration processes that support it. The best intentions of SOA and MDM are at a loss for extending value to SAP ERP if data quality, data redundancy and semantic inconsistency issues are not addressed. Because of how data is dispersed in various formats, and the need for consistency across the ERP environment, the IBM Information Server platform provides the necessary added value to make SOA and MDM successful.

The challenge of unlocking the value of data from SAP ERP
When it comes to dealing with customer master data and providing a single customer view, SAP ERP systems face the following challenges:

- *They consist of different modules that have different purposes.*
- *They have specific, focused points of view that are not shared by other applications or systems in the environment.*
- *They have the potential for multiple unrelated instances of SAP ERP in any business environment.*

To fully maximize the value that SAP ERP offers to an organization, each of these challenges need to be addressed systematically and holistically.

SAP ERP systems consist of different modules that have different purposes
The first order-fulfillment example (see Figure 4) shows how different ERP modules work together to ease problems around order fulfillment. You can start to see that the definition of a customer changes in an ERP system depending on the specific customer interaction. So, to an employee in the warranty-service department, the customer is someone who needs service ("service to" in the ERP system). To a shipping clerk, the customer is the person who is about to receive the product ("ship to"). To a salesperson, the customer is the contact or decision maker ("sell to"), and to a credit and collections person, the customer is the accounts-payable clerk ("bill to"). Within this simple example, the ERP system already contains four different representations of a single customer.

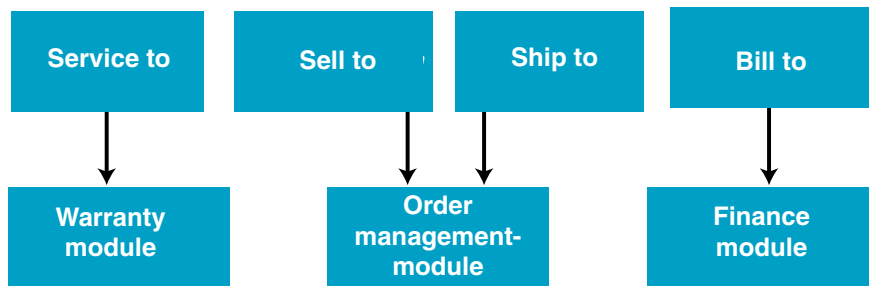| Service to	Sell to	Ship to	Bill to
↓	↓	↓	↓
Warranty module	Order management-module		Finance module

Figure 4. Representations of a single customer in an order-fulfillment scenario

Although these modules briefly reconcile to help with order fulfillment, the ERP system still has a single point of view about what is important about the customer, and each module also has its own siloed perspective. Within ERP modules, the nature of customer information depends on the function of the ERP module. For example, if the ERP application focuses only on ship-to requests for inventory management and order processing and has no financial functions, it might need to pass sold-to information to a financial system. Ship-to information is what is important to the order-management module. Consequently, as shown in Figure 5, orders get fed into the accounts-receivable record, which knows the relationship between ship-to, bill-to and sold-to modules.
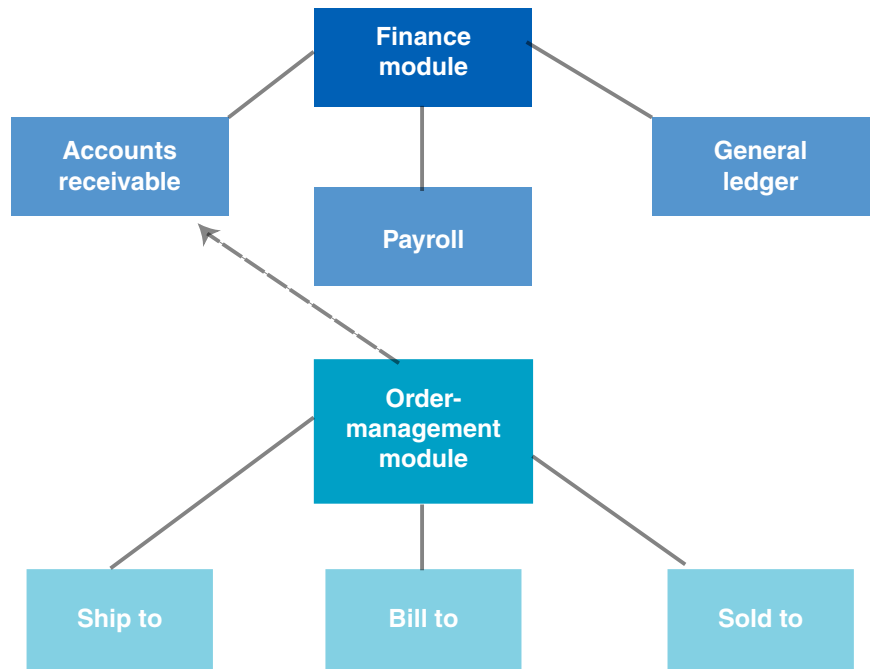
Figure 5. Passing sold-to information to a financial system

Most ERP systems focus on manufacturing and distribution where a physical product is involved. For example, a consumer-goods company (the manufacturer) might sell a product to a grocery store (see Figure 6). The grocery story has many branches, and the manufacturer needs to know which branches it is supposed to ship to. In this case, many ship-to requests would be incorporated in a single bill-to request, which could be handled by the regional accounts-payable department. The individual receiving clerk is the customer according to the ship-to ERP module. The shipping documents are added to an invoice and are sent to a bill-to module, and for the bill-to ERP module, the accounts-payable clerk becomes the customer. Although ERP function is important to and required in customer environments, you can see from this simple example that the view of the customer differs by ERP module, and the number of subcustomers continues to expand.
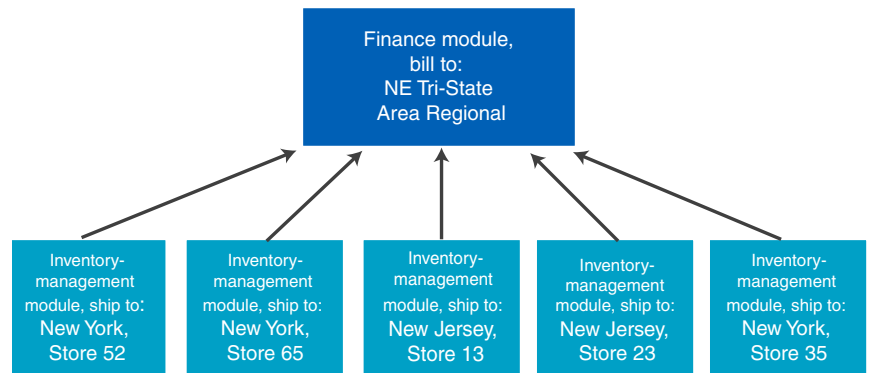
Figure 6. Inventory-management example

If the manufacturer is selling point-of-sale (POS) systems rather than consumer packaged goods, it would still have ship-to, bill-to and sold-to modules, but POS systems have to be maintained, so service-to modules would be added to the mix. Also, because this new process represents a different aspect of the business, the maintenance division (managed by the service-to module) could also have its own substructure for billing, creating another customer-data silo for service-bill-to information.

SAP ERP systems have specific points of view that are not shared by other applications or systems
Front-office applications have a different point of view and purpose from ERP applications. When the POS sales representative calls on the grocery store branch, a front-office function is probably used to determine what promotion to offer to motivate buying behavior. Suppose the representative manages to convince the grocery store to purchase POS systems across the corporation, rather than just for a handful of stores. The contract is to deploy 20 percent of the POS systems the first year, 20 percent the second year and 60 percent the third year. In this example, the front-office system views the customer in a different way. It does not consider "sold-to" or, rather, it has a different definition of "sold-to" than the ERP system. In defining the customer, the front-office applications factor in headquarters or the holding company, the business relationships involved and the decision makers, but they do not consider the customer that the product is being shipped to, or who is being billed at a discrete level.

In addition, consider an organization that wants to deliver new customer self-service capabilities. In this scenario, the business could have an individual customer returning a product. The return needs to be processed, and the return information is crucial to the return-to system and to the portal that the client is using, as well as to the data warehouse that analyzes distributor-related information from a customer relationship management (CRM) point of view. However, a different data mart could also be analyzing ERP-related data, including where items are shipped and what the rate of return is. And yet another data mart could be analyzing activity related to warranty and extended service. In this self-service example, the ERP system, and consequently the related data marts, would not know of the return. For organizations that want to build an overall customer-segmentation strategy to factor in all aspects of the business — profitability of the product, profitability of the services team, cost of sell-to and service-to operation, use of low-cost channels — ERP applications alone are not sufficient because they are unable to reconcile these different views of the customer.

Clients who want to build an overall customer-segmentation strategy and use that segmentation to their best advantage need to deploy a MDM hub to break through the siloed walls of ERP modules and instances, marry customer master data together and deliver that information back to the data warehouse so that it can analyze customer data holistically. That output is then fed back to the CDI hub to maintain and persist that data across the enterprise.

There is a potential for multiple unrelated instances of SAP in any business environment ERP applications — whether from SAP or other vendors — clearly are important within an IT architecture. However, as with other applications in the environment, ERP systems create silos of information. In addition, multiple ERP silos and multiple ERP instances create subsilos that increase fragmentation and complexity. These subsilos make it easier to run ERP-oriented business functions, but they also make it harder to manage and maintain a single customer view.

Different back-office functions, usually grouped into modules, make up the definition of any ERP application. For example, the finance function is grouped into submodules that usually include general ledger, accounts receivable and payroll. Bill-to and sold-to data are important pieces of information for accounts receivable and for the general ledger. ERP service and warranty functions frequently have other modules, including warranty information, field calls and possibly their own billing modules. The ERP sales and distribution function often includes submodules for order management, inventory management and warehouse management. Also, there are frequently specialized ERP applications from niche vendors to manage specialized tasks, such as manufacturing resource planning and asset management (where to put inventory, how to avoid downtime, tracking downtime and so on).

Any of the modules under a given function can be provided as a stand-alone specialized product or as part of an SAP ERP suite. Frequently, organizations mix and match best-of-breed ERP applications to build up the most powerful ERP suite to meet their specific needs. Lots of nuances (and instances) are within ERP, and it is extremely rare to have one ERP system — and one instance of that system — used across all back-office functions. More frequently, clients use specialized solutions per function and different sets of solutions per geography and per manufacturing line.

The question to ask is: Is the business really performing all functions with a single instance of one ERP system? If the answer is no, then the back-office environment most likely is complex, with a severely limited ability to aggregate customer views across ERP applications, modules and instances, let alone across the broader enterprise environment.

Overview of IBM MDM

MDM is one of the hottest topics in organizations today. The ability to completely understand and manage key business entities – customers, suppliers, products, employees and so on – can bring enormous value to organizations by enabling businesses to:

- *Tailor their sales and marketing activities based on customer intimacy*
- *Use demand signals to streamline their supply chain and avoid out-of-stock situations*
- *Increase influence with suppliers with complete information*

All of these activities can carry some significant cost savings and revenue-generation benefits, so you can see why organizations are clamoring to find an effective MDM solution.

And while integrating the information from the vast array of data sources spread across a typical IT environment is certainly the first step to an effective MDM solution, it is only the beginning. After (or when) that master record has been established, IT teams need an organized and flexible approach to making that information available to all applications, business processes and people who can then use that information. By building a set of master data services to access, integrate and deliver this master information when, where and in the context it is needed, organizations can help ensure that their investment in MDM won't go to waste.

Master data services help ensure that key business data is always complete and accurate, making it easy to manage key data across heterogeneous systems. Once again, the information-services layer between applications, people, and business processes and the underlying data sources enables organizations to abstract all of the complexity of those sources from the developers and business users, allowing them to focus on using that information, not looking for it. Typical functions provided by master data services include:

- *Providing a centralized set of services for accessing and managing key business data*
- *Acting as an authoritative record, while synchronizing data with other sources*
- *Managing the complex hierarchies of business data*
- *Providing comprehensive coverage of the functions needed to manage master data*

Master data services are critical to not only help establish that single version of information, but for converting that single version into significant business value.

IBM MDM solutions provide a proven framework for managing master data across the enterprise. The fundamental principle of MDM is that you decouple master data from operational, transactional and analytical systems into a centralized independent repository or hub, and provide SOA business services to manage the master data independent of any LOB or system and application.

When thinking about MDM, an organization should consider the different types, or *domains*, of master data that need to be managed. These domains could include the customer, product, supplier, location, account or other types of domains. In addition to determining the domains that need to receive focus, the organization also should evaluate the way in which the data needs to be used or consumed, or the *usage types* of MDM. The three fundamental usage types of master data management are:

- Collaborative MDM *is a style of multiform MDM that manages the process of creating, defining and synchronizing master data. The focus is on the definition of master data.*
- Operational MDM *is a style of multiform MDM where the use and maintenance of master data occurs within operational processes and applications. The master data is used by other systems through real-time-accessible SOA services.*
- Analytical MDM *is a style of multiform MDM that provides accurate, consistent and up-to-date master data to data warehouses. It provides the ability to feed business-intelligence insight data back into collaborative and operational MDM. Analytical MDM also includes capabilities for specialized master data analytic functionality around identity and relationship resolution.*

Each usage type enables an organization to proactively detect and respond to events within the data life cycle. IBM is the only vendor that provides a multiform dynamic framework for managing master data. Multiform MDM enables you to manage multiple domains (customers, products, accounts, suppliers and locations) and usage types (collaborative, operational and analytical) regardless of where the data resides.

The IBM MDM portfolio
IBM MDM solutions provide extensive capabilities to organizations seeking to make the most of their information assets. The components of the IBM MDM portfolio include:

- *IBM WebSphere® Customer Center (operational MDM, customer domain)*
- *IBM WebSphere Product Center (collaborative MDM, product domain)*
- *IBM Entity Analytics (analytical MDM, customer domain)*
- *IBM Information Server*

WebSphere Customer Center
WebSphere Customer Center is the industry's most-robust enterprise CDI hub. It unifies customer data and transactions from multiple business and product silos and delivers this knowledge to all channels in real time. It is designed to provide once-and-done customer processing and establish a single source of customer information across the enterprise. With WebSphere Customer Center, you can manage customer-centric transactions, from simple customer-data updates to complex business processes, such as a customer acquisition and new business processing. You can use the product to inject marketing insight and customer knowledge into the operational processes of your organization, enabling improvements to sales and service functions based on complete customer knowledge.

WebSphere Product Center
WebSphere Product Center provides a single, integrated, consistent view of product and services information. It is a central repository for managing and linking information regarding products, locations, trading partners, organizations and terms of trade with the capability to synchronize with multiple internal existing systems, enterprise applications (including SAP R3) and repositories, as well as external partners and data pools such as UCCnet and Transora. WebSphere Product Center supports business initiatives that require companies to gain control of product information, such as new-product introduction, supply chain management, global data synchronization (GDS), B2B and business-to-consumer (B2C) e-commerce, radio frequency identification (RFID) and electronic product code information services (EPCIS), portal initiatives and composite applications.

IBM Entity Analytics
IBM Entity Analytics is a technology that enables an organization to solve business problems related to recognizing true identity despite sophisticated identity misrepresentation and masking techniques. It allows users to resolve and recognize an individual ("who is who"), and to uncover and link nonobvious relationships between identities related to a company or organization—from customers, employees and prospects, to investors, vendors and partners ("who knows who") despite disparate or inconsistent information assets, and individual or group actions to disguise or misrepresent identity. Entity Analytics also enables you to use these technologies within an anonymized data space to determine who is who and who knows who in environments where there are extreme privacy and security concerns.

Because of IBM's robust functionality in the different domains of MDM, it is able to support multiform MDM, with reaches across domains and MDM consumption styles. By deploying a mature and richly functioning MDM platform, you can harness the master data trapped in your SAP applications— including SAP ERP—as well as in the other, non-SAP applications in your environment and use it to help grow your business and reduce your costs.

IBM Information Server: Information-integration services

Organizations today need consistent and trusted information delivered in context when and where they require it. The challenge, however, is that most large organizations have a complex web of heterogeneous data sources spread throughout their IT landscape. Accessing and integrating that data in a clean and consistent way can be extremely challenging — a process fraught with duplicate data, inconsistent formatting, existing systems thought retired but still running, misinterpreted fields and overlooked data sources.

IBM Information Server is a revolutionary new software platform from IBM that helps organizations derive more value from the complex, heterogeneous information spread across their systems. It enables organizations to integrate disparate data and deliver trusted information wherever and whenever needed to specific people, applications and processes. With this product, business and IT personnel can collaborate to understand the meaning, structure and content of virtually any type of information across practically every source.

As discussed previously, by providing information as a service, you can dramatically improve information consistency and relevancy by reusing existing integration services. With the ability to understand, cleanse, transform and deliver trusted information, and deliver all of this functionality as a service, information-integration services delivered by IBM Information Server can:

- *Map business meaning to technical data sources.*
- *Discover and cleanse information integrity and redundancy issues.*
- *Match identical records across different systems and link those records together.*
- *Transform data into the right format and context.*
- *Provide read and write capabilities across heterogeneous information sources.*

IBM Information Server achieves new levels of information-integration speed and flexibility by providing:

- *A comprehensive, unified foundation for enterprise information architectures, scalable to virtually any volume and processing requirement*
- *Auditable data quality as a foundation for trusted information across the enterprise*
- *Metadata-driven integration, providing breakthrough productivity and flexibility for integrating and enriching information*
- *Consistent, reusable information services along with application services and process services, an enterprise essential*
- *Accelerated time to value with proven, industry-aligned solutions and expertise*
- *Broad and deep connectivity to information across diverse sources, whether structured, unstructured, mainframe or applications*

Summary

Although SAP ERP is widely regarded as the predominant ERP product, combining its robust capabilities with implementing your SOA objectives can be a challenging task. MDM solutions can provide the answer. An MDM solution from IBM gives organizations the ability to completely understand and manage key business entities — customers, suppliers, products, employees and so on — that can bring enormous value to the business. The IBM MDM product portfolio, together with the leading-edge capabilities of IBM Information Server, can help companies navigate the complex web of heterogeneous data sources spread throughout their IT landscape and overcome the challenge of accessing and integrating data in a clean and consistent way.

Providing a layer of information-integration services based on IBM Information Server between the requesting applications and processes and the underlying data sources can bring enormous productivity benefits to the business by improving information consistency and relevancy through the reuse of existing integration services.

For more information

To learn more about MDM solutions from IBM, contact your IBM representative or IBM Business Partner, or visit:

ibm.com/software/data/masterdata/

To learn more about IBM Information Server, contact your IBM representative or IBM Business Partner, or visit:

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