

**Lowering the total cost  
of ownership of SAP  
deployments through  
enterprise data integration.**

**Seven key steps to maximizing  
value from SAP**

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**Introduction**

Implementing and deploying SAP NetWeaver-based applications such as SAP R/3 and SAP NetWeaver BI (formerly known as SAP BW) can be long and costly IT projects. Organizations undertake these projects because they believe they will achieve a rate of return from the business benefits delivered by the SAP solutions that will exceed the cost of implementation. Delivering business value as quickly as possible and minimizing the expense associated with deploying and maintaining these types of applications are two important goals worthy of investigation. This guide discusses how purpose-built tools for source data profiling, data quality assurance, source and target data connectivity, and data movement can be used to speed up SAP R/3 and SAP NetWeaver BI deployments, as well as the consolidation of multiple SAP R/3 instances. Integration helps businesses accelerate the time to value from these systems and contributes to a greatly reduced total cost of ownership and improved business processes through decreased hand coding and maintenance costs.

**Business challenges**

Chief Information Officers (CIOs) are tasked with delivering business value through information technology. Any information technology (IT) project should be undertaken to support a key business initiative. Some of the top corporate initiatives include:

- *Increasing sales, revenue and income*
- *Faster time to market*
- *Improved efficiency*
- *Improved productivity*
- *New products and services for the organization*
- *Organizational transformations*
- *Improved customer service*
- *Reduced operating costs*

All organizations today face requirements to accomplish some or all of the objectives listed above. Each of these objectives in turn requires information to be collected and presented as a complete, holistic view of customers, of

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suppliers, of partners, or of business processes and operations. In turn, these objectives drive IT investments generally, and in particular the major investments in enterprise applications like enterprise resource planning (ERP), customer relationship management (CRM), supply chain management (SCM), business intelligence (BI) analytics and e-business. All these applications, and the many others that exist within the enterprise, must be integrated together to accomplish these business objectives. The key to it all is the data – having the right data, fit for its specific purpose, delivered to the right place. Successful enterprise integration begins with successful data integration.

In talking to companies who use SAP, a common theme has emerged: they want to use their SAP application investment to address the key business issues their organizations face.

- *They want to select one platform to handle all their SAP and non-SAP data integration needs because they want to maximize the return on their IT assets;*
- *They want to dramatically reduce time-to-market by automating a key piece of their application development process that they previously managed through custom code and point integration tools;*
- *They want to improve the overall quality of any data-centric application by focusing on quality as a key component of the integration effort.*

Even with companies who consider themselves an “SAP shop” generally operate a heterogeneous IT environment, with applications and databases from multiple vendors. Integration unquestionably becomes an important technical imperative in response to a strategic business imperative.

This guide covers four general areas where efficient, effective and fast data integration can really make a difference in not only accelerating the time to results but also minimizing the costs associated with rolling out SAP-specific deployments.

The first area is general SAP R/3 deployments. There may be significant amounts of data in many legacy systems that need to be handled when

populating an SAP R/3 deployment. This ERP data may also be required to feed business intelligence applications, so an ability to extract data and move it to a data warehouse or data mart must also be considered.

The second is a related topic: SAP R/3 instance consolidations and application migrations. Some large enterprises may have implemented many instances, or copies, of SAP R/3 and want to centralize them to keep maintenance costs in check, to streamline and better manage their overall business processes, or to make it easier to add new users to the system. Other organizations may be striving to migrate from either competitive enterprise applications, or disparate applications that serve similar purposes, to a new SAP R/3 deployment.

Third, many organizations are planning to deploy SAP NetWeaver BI, or expand the footprint of a current SAP NetWeaver BI system that primarily analyzes only SAP data. In each scenario, customers want to include non-SAP data in their application to ensure they are making sound business decisions from analytical software that uses all available data, both from SAP applications as well as non-SAP applications from vendors such as Oracle, PeopleSoft, Siebel and other legacy sources.

Finally, SAP MDM is garnering more and more interest among SAP NetWeaver adopters. The issues with heterogeneous data and SAP MDM are similar to those with SAP NetWeaver BI: how do you implement SAP MDM as the master data management application that controls “product” as a business object, when there are many different sources of where, what and how “product” is defined in non-SAP operational systems. Understanding, harmonizing and transforming this data so it can be managed in SAP MDM is a complex problem in heterogeneous IT landscapes.

### **SAP R/3 deployments**

A recent study by The Conference Board painted a fairly ugly picture about ERP deployments in general.<sup>1</sup> This study reported that the respondents suffered from:

- *Difficulty in developing a business case*
- *Difficulty in realizing value*
- *Difficulty staying under budget*
- *Growing maintenance costs*
- *A moving target for a completed implementation due to evolving systems*

SAP R/3 deployments can be very stressful projects. Data may need to be integrated from many sources into the SAP R/3 system. Then, that ERP data may need to be consolidated or fed into other operational or analytical systems. Vast amounts of information can be involved in this ongoing process. Typically, this is not a one-time movement of information. There are incremental updates that need to be captured. Data flows constantly between systems. Some organizations may move tens of millions of records on a weekly basis. This process can be very difficult to manage. With so many possible system feeds, there can be data quality issues in addition to the data movement coordination. On-going data quality monitoring becomes a necessity to ensure new data added to the system doesn't "pollute" good, existing data.

IBM customers have further elaborated on challenges they have had when rolling out their SAP ERP system. These challenges include having a set of disparate, undocumented data sources and business practices. A poor understanding of source systems and business practices complicates the ability to map out a data migration plan and can lead to project delays. Data quality and incompatibility problems – for example, multiple names for a single customer – make it difficult to provide “clean” data and to transform this legacy data to conform to the new standards in the SAP R/3 system. The fact that business does not stop when you're rolling out a new system simply aggravates the problem – you need to keep the current one running for some time in parallel so people can do their work.

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It is not hard to imagine that data quality and incompatibilities between existing applications can be at the root of the difficulties named in the Conference Board survey. Everything from sourcing from disparate systems, to poor data quality and incompatible data across systems, to delays due to hand-coded mapping between the systems can make these projects difficult. What is required is a way to alleviate the pain associated with data acquisition, cleansing and integration, which would be a huge win for IT and thus a huge win for the business.

Figure 1 depicts what the architecture of an SAP R/3 deployment should include to overcome the issues noted above that make it difficult to quickly deploy and begin realizing business value.

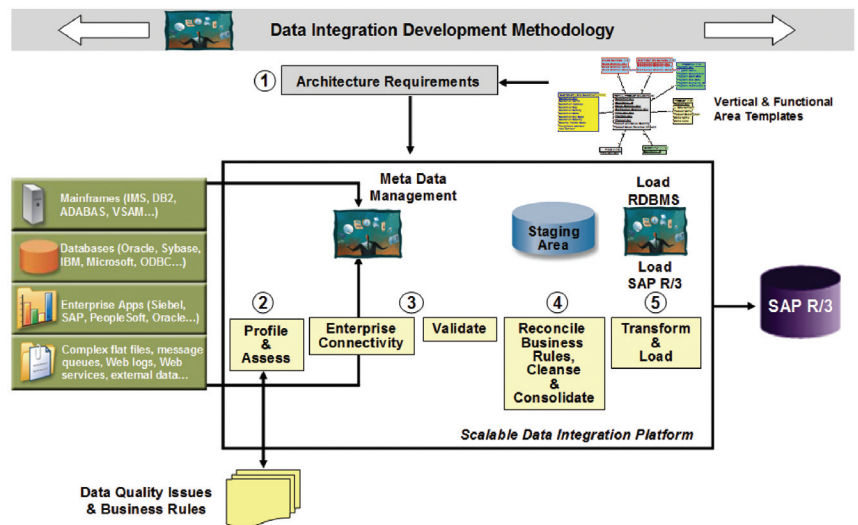


Figure 1. Data integration architecture to support SAP R/3 deployment

Data can come from any source, based on the set of requirements (step 1) outlined for the SAP R/3 deployment. These requirements should include a list of what data needs to be put into SAP R/3 and in what phases. To easily survey the information required, the data integration platform should include a facility to easily profile and assess (step 2) what data exists, where it is, and what it constitutes before you move it anywhere.

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When the data exists in current enterprise packaged applications, a set of enterprise application connectors (step 3) facilitates getting to this packaged application data, which allows IT to avoid developing specialized routines to pull data on a repeatable basis. An interim data staging location (step 4) can optionally be used to bring all the information together in one place to run validation rules against it and to ensure there are no duplicates and no bad records, and then to consolidate any information from more than one source that should be combined. The final step (step 5) is to develop extraction, transformation and load (ETL) jobs that use the available SAP R/3 interfaces to populate the target application, in this case SAP R/3 or SAP R/3 Enterprise or mySAP ERP.

Many steps are involved in the process. The steps include tasks that can be addressed by metadata management tools, data profiling tools, data quality tools, and ETL tools. While each tool can be purchased separately from multiple vendors, the best solution would be to handle these tasks in a single, integrated platform. It is imperative that IT avoids getting into a situation where it must spend time, resources and effort integrating a disparate set of integration tools. An integrated data integration platform can be very appealing and cost effective, and is the first step in lowering your SAP cost of ownership.

### **A data integration solution for SAP R/3 deployments**

To address these issues, IBM provides a platform with SAP Certified Integration that covers the seven key areas of:

- 1. Connecting to all possible sources*
- 2. Profiling the data so you can easily understand what data there is and how it interrelates*
- 3. Assuring data quality using sophisticated probabilistic matching techniques and automating the process of standardizing and harmonizing the data*
- 4. Enabling ETL to reduce manual coding*
- 5. Connecting to all possible target databases and applications*
- 6. Running in parallel to support the biggest integration efforts in a timely way*
- 7. Managing all the integration metadata in a central repository*

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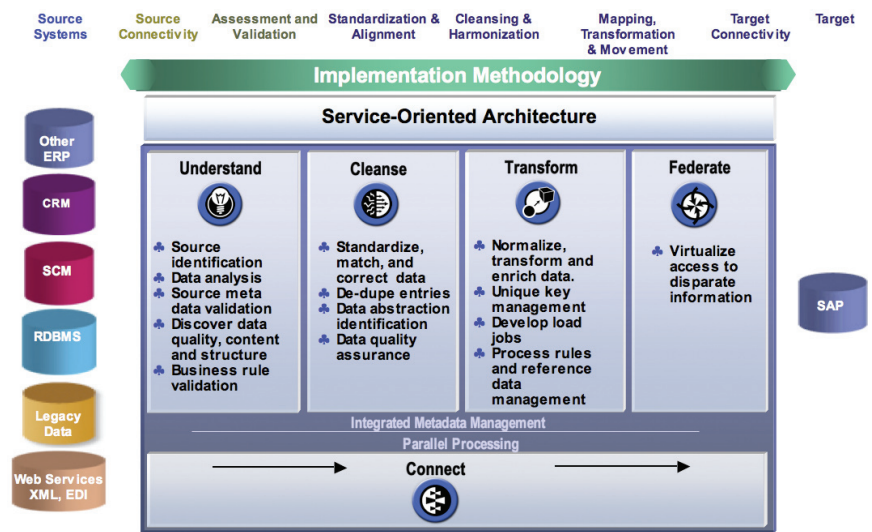


Figure 2. WebSphere Data Integration Suite applied to SAP R/3 Deployment

This platform includes all the required functionality for managing enterprise data integration applied to an SAP R/3 deployment. Packaged connectivity in the form of database Metabrokers™ and application connectivity kits exist both for accessing source data – including applications such as Oracle Applications, Siebel, PeopleSoft Enterprise and PeopleSoft EnterpriseOne (formerly J. D. Edwards OneWorld) – to bring it into the platform where it goes through phases for source data assessment and validation, standardization and alignment, cleansing and harmonization, and source to target mapping, data transformation and movement, as well as packaged connectivity for loading into an SAP R/3 target. The IBM WebSphere® DataStage Pack for SAP R/3 provides seamless connectivity to SAP R/3 that makes it easy for users to select data for use in ETL jobs for loading legacy data into SAP R/3. It delivers a graphical way to browse the metadata in SAP R/3 through its IDoc and BAPI interfaces, and select what information you want to load, so users don't have to write programs by hand to load the data. Similarly, the WebSphere DataStage® PACK for SAP R/3 can be used to extract SAP R/3 data for movement into a data warehouse or other business intelligence application, not only via IDocs and BAPIs, but also through an ABAP interface. WebSphere DataStage already contains



many other kinds of connectors for complex flat files, mainframe sources, merchant relational DBMS and other internal and external data sources.

### **SAP R/3 instance consolidation**

A key business imperative related to a merger & acquisition or a reduction in expenses may drive the initiative to consolidate multiple SAP R/3 instances into one centralized system.<sup>2</sup> The original SAP R/3 instances may have been rolled out by region, by department, by business unit or other internal organizational breakout. Maintaining the staff, hardware and infrastructure to run these instances may be prohibitive as they multiply, and make it expensive to add new users. Many SAP R/3 instances can also complicate the task of developing a data warehouse because links to these systems need to be developed and maintained. Finally, as IT departments are asked to deliver on strategic initiatives such as creating a single view of a customer, enhancing inventory reporting, and preparing for reporting and analysis efforts such as Sarbanes-Oxley, the need to consolidate ERP data in a single source becomes a critical enabling task.

The issues in consolidating SAP R/3 instances may seem easy since all the data is at least in a system from a single vendor. But consider for a moment the following issues:

- *The source metadata from several SAP R/3 instances is not assembled in a single spot to understand what is available. If the instances were rolled out at different times, for different tasks, using different versions of SAP R/3, then there can still be a big issue with source data discovery.*
- *There may still be legacy system data that needs to be included.*
- *The master data – such as customer and supplier names and addresses, item numbers and descriptions – is not the same across SAP R/3 instances and other legacy sources, appears inconsistently within a description field, and/or there are duplicates.*
- *Challenges with ensuring business rules are understood, validated and harmonized across systems.*
- *There may be hundreds or thousands of ETL jobs that need to be written to move the data, as well as transformations required prior to loading the data into the new SAP R/3 environment.*

**SAP R/3 instance consolidation at a large global organization**

After being acquired and then de-merged, a large global chemical manufacturer found itself saddled with seven decentralized instances of SAP R/3, encompassing four release levels. Furthermore, an equal number of additional non-SAP ERP systems existed in the enterprise. In order to streamline their costs and make their business run more efficiently, the company embarked on an effort to create one centralized SAP R/3 instance. The business needs driving this included increasing shareholder value, minimizing business process complexity in a complex environment, positioning for future acquisitions, and reducing general and administrative costs. Faced with the prospect of completing this integration by hand, the company chose the IBM WebSphere Data Integration Suite to help complete the arduous tasks of connecting to source system data, assessing and validating it, standardizing, harmonizing, cleansing, mapping and transforming the data, and loading it into the target SAP R/3 Enterprise system. In addition to the business benefits from the project—which included an enhanced ability to negotiate vendor volume discounts, reduce spare parts inventory, and better sales contract management—the company expects to save \$37 million in costs annually. Compared to hand coding, they estimated saving over 11 person-years in work by using the WebSphere Data Integration Suite.

- Issues with ensuring these processes can be run repeatedly and managed and maintained centrally by a new staff.
- Issues with ensuring that processes are scalable and can be completed to deploy the new system on time and under budget.

There could be a significant amount of work needed to move data from many instances of SAP R/3 to a single, centralized SAP R/3 system.

**A data integration solution for SAP R/3 instance consolidations**

Consolidating SAP R/3 instances is a similar exercise as an SAP R/3 deployment, however many of the sources would be SAP R/3.

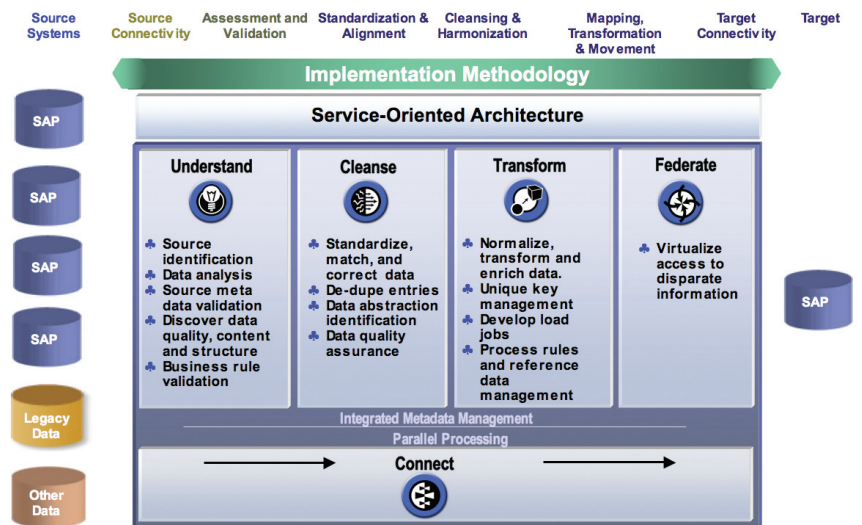


Figure 3. WebSphere Data Integration Suite applied to SAP R/3 Instance Consolidation

The multiple SAP R/3 instances (and other sources) are depicted on the left side of Figure 3. The WebSphere DataStage Pack for SAP R/3 includes an access capability into SAP R/3 to facilitate browsing and selecting the metadata to be put through the data discovery, data cleansing and data movement phases. The Pack is also used to load that data into SAP R/3 as described in the SAP R/3 deployment section above. All the other necessary steps to ensure data quality and develop repeatable, scalable data movement routines are handled in the core of the IBM platform in the same way as if the sources were non-SAP data.

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### SAP NetWeaver BI deployments

The total cost of ownership of an SAP NetWeaver BI deployment can also be quite large, especially if the intent is to collect all the relevant data that users need to make effective business decisions. Leaving data and information out of your SAP NetWeaver BI-fueled data warehouse or analytical application can lead managers to make decisions based on incomplete information. The consequences of this can be dire indeed. It is therefore critically important that all the data available be accessible in SAP NetWeaver BI.

SAP provides tools to easily move data from its other mySAP Business Suite applications, including SAP R/3, but loading data from non-SAP systems is a different effort. To assist customers with this, IBM offers pre-built connectors to SAP NetWeaver BI from leading enterprise applications such as Oracle Applications, Siebel and PeopleSoft.

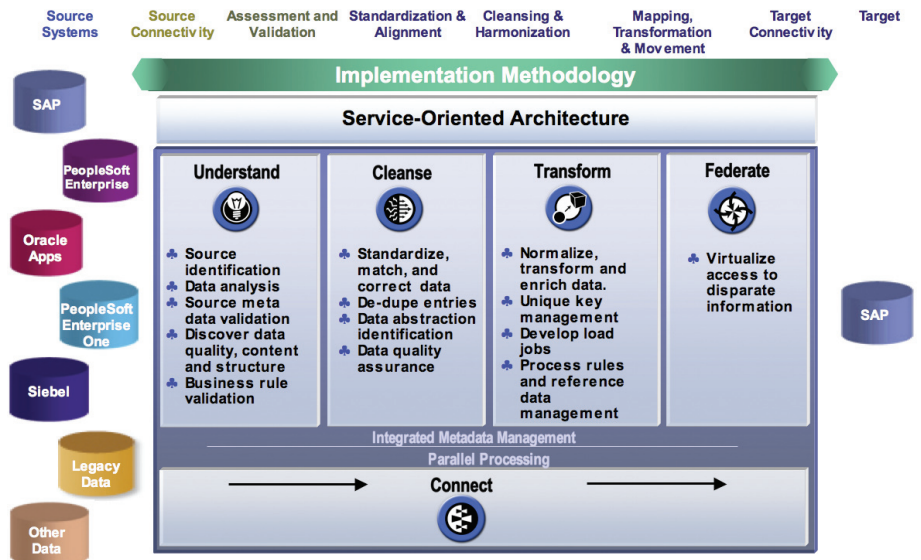


Figure 4. WebSphere Data Integration Suite applied to SAP NetWeaver BI deployment with non-SAP data sources

**Leveraging internal and external information in SAP NetWeaver BI**

*A large consumer packaged goods company was running most of their business on SAP, however they still had several non-SAP applications running critical segments of it. Their decision to use SAP NetWeaver BI as their enterprise data warehouse meant they had to load non-SAP data from these systems into SAP NetWeaver BI and make it appear as if the data was coming from SAP so users would easily understand it and be able to work with it. Furthermore, they were acquiring non-SAP-based point-of-sale (POS) data from the retailers. This POS data, along with the internal information merged into SAP NetWeaver BI, would allow their users to perform POS data analysis to better understand what was selling and where, which in turn would allow the company to streamline inventory levels at the retail distribution centers to avoid store-level inventory stock-outs and overstocks. By using the IBM data integration platform, the company was able to access the source data from the disparate systems and from the retailers, integrate it into SAP NetWeaver BI via the WebSphere DataStage Pack for SAP BW, and perform the required analysis and resulting decision-making from their SAP NetWeaver BI implementation. The result was a drastic reduction in inventory – \$99 million in that fiscal year – that contributed to new free cash flow of over \$161 million for that period.*

In the above example, source data from other enterprise applications systems is accessed through a WebSphere DataStage Pack designed for each application source. A separate Pack is used to access Oracle Applications, Siebel and PeopleSoft. Data from other sources such as complex flat files and mainframes is accessed in the same way as previously noted for deploying SAP R/3. Once the data is browsed and selected for extraction, it flows through the WebSphere Data Integration Suite to go through the same steps as previously described. These steps are common to both ERP and BI or data warehouse deployments because it is necessary to have good, clean data upon which to base decisions.

For loading into SAP NetWeaver BI, the WebSphere DataStage Pack for SAP BW is used. This Pack is similar in nature to the WebSphere DataStage Pack for SAP R/3. It has SAP Certified Integration and is designed to load non-SAP data into SAP NetWeaver BI via the Staging BAPI interface. In addition to simply pointing to existing objects in SAP NetWeaver BI, the Pack can also generate the relevant SAP NetWeaver BI objects during ETL design, which helps improve developer productivity. To assure performance, the WebSphere DataStage Pack for SAP BW can stream the data directly into SAP NetWeaver BI, so there is no need to land the data to disk during the load process. Finally, the Pack also supports extracting data from SAP NetWeaver BI via OpenHub Services, which allows users to leverage their BI data in SAP NetWeaver BI in departmental data marts and other downstream analytical or operational systems as necessary.

### **SAP MDM deployments**

Harmonizing the master reference data is a common activity that customers will undertake when performing an instance consolidation or a migration, or loading SAP NetWeaver BI with heterogeneous data. In the past, customers have done this harmonization inside the resulting application. However this has never addressed the problem of inconsistency and having multiple definitions of a customer, a product, a supplier, an employee or other “business object” in the operational systems that feed the warehouse. Ideally, customers would prefer a centralized repository of master data that can be managed, shared and synchronizing the master data used throughout the systems landscape. This inconsistency makes it difficult to count customers, obtain a single view of the customer, and provide the best customer service. With product, this can impede an ability to obtain favorable terms via strategic sourcing agreements – how can you negotiate this if you don’t know how many of a given part you need to order from a supplier if there are hundreds of part numbers and descriptions for the same item? Even among the mySAP Business Suite applications – CRM, SRM, FI/CO, HR etc. – this is a problem. SAP has recognized this and offers SAP Master Data Management (MDM) a component of SAP NetWeaver. Its primary function is to be the repository for managing, sharing and synchronizing master reference data to applications that subscribe to it.

Deploying SAP MDM in a heterogeneous landscape poses many of the same challenges as with SAP R/3 consolidation and SAP NetWeaver BI deployments – customers need to profile source data, de-duplicate and standardize it, then map it and load it into SAP MDM. Once it is populated with clean, harmonized data, then it needs to monitor data quality and make sure new records match records in the existing repository.

The IBM pathway to harmonizing your master data in a large heterogeneous environment is depicted in Figure 5.

Master Data Integration Services in a Heterogeneous Environment: SAP Example

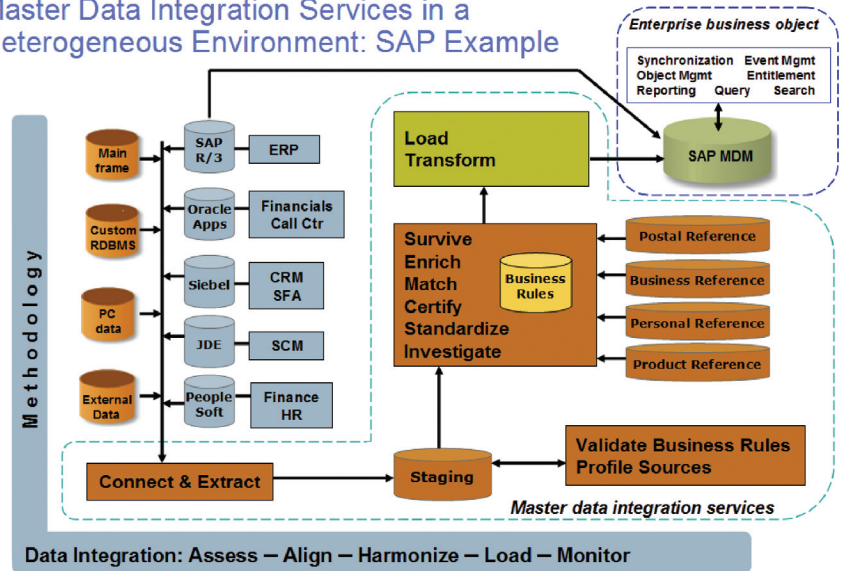


Figure 5. The IBM Pathway to Master Data Management

In the example in Figure 5, there is a large heterogeneous environment with many disparate sources handling different aspects of the business. This heterogeneous data from multiple systems of various ages, maturity, completeness and integrity is needed to feed the master data application repository.

The area encircled in aqua-colored dashed lines is the heterogeneous information integration process, based on the WebSphere Data Integration Suite, that includes the ability to connect to these sources so you can validate the business rules and profile the sources, then run through the data quality process of investigating the data, finding the duplicates, developing standardization rules, certifying data against a global address standard when that is the case, matching the data, enriching it with external reference data information (such as Dun & Bradstreet) as necessary, and creating a surviving record, that can then be mapped, and subsequently loaded, into the master data application, in this case SAP MDM. The master

data becomes a “business object” that SAP MDM then “owns” and controls for entitlement, synchronization, reporting, searching, querying and other capabilities.

The value that IBM is providing in this scenario is an ability to leverage the broad range of capabilities for accessing, profiling, fixing and moving data, so that an application such as SAP MDM can be deployed with clean data from the outset, and done more quickly than if the point of convergence and data cleansing were to take place inside this application. IBM’s tools and the pathway methodology are designed to address this process and make it as fast and efficient as possible. In the case of matching data, for example, the technology employs a probabilistic approach which means you get a high number of matches from the automated process than if you took a more deterministic approach, which will cause more manual intervention and thus slow the process.

**Lowering TCO for SAP projects**

In light of the solutions to the problems described above, what specific savings can users anticipate that will help lower the TCO from an SAP deployment, whether it is a new SAP R/3 system rollout including a data transfer to a BI application, whether it is a consolidation of many SAP R/3 instances into a single instance, whether it is an SAP NetWeaver BI deployment with many non-SAP data sources, or whether it is an SAP MDM deployment in a heterogeneous environment?

Compared to manual coding, IBM's experience with our customers indicates that project time can be cut by approximately 40% on average. The range may be anywhere from 30 to 60% or more depending on the complexity and state of the source data. The seven key process steps that the IBM platform can address include:

- 1. Packaged application connectivity:** *This process consists of using a graphical interface that connects via published APIs to manage connection strings to source and target systems, to browse source and target metadata, and use this connectivity to develop ETL jobs that can either pull or push the data from the source to the target. This step obviates the need for users to navigate source and target system tables and expedites the ETL job creation process.*
  
- 2. Data Source Identification, Analysis and Discovery:** *This process consists of discovering and identifying source data, and analyzing it to determine the best system of record that will serve as the source of data for specific subject areas. This process consists of developing an understanding of the data content—including quality, completeness, validity and compliance with business rules.*
  
- 3. Data Correction & Enrichment Analysis/Rules:** *This process consists of analyzing and developing rules to correct specific data quality problems that are critical issues for the company, e.g. incorrect values, duplication of data, inconsistent data content.*
  
- 4. Data Abstraction Identification:** *This process consists of identifying key entities (customer, account, etc.) of importance to the business.*



**5. Transformations and Data Normalization:** *This process consists of taking information from the Data Analysis and Discovery process and specifying the transformation steps required to standardize the disparate sources of data to a common format, consistent with a list of valid values, consolidated according to entities and attributes that support the rules of the business, and where necessary applying the Data Correction & Enrichment Rules defined to cleanse the data.*

**6. Unique Key Management:** *Based on the identified abstracted data, this process consists of maintaining source and target reference data (keys) for the migrated entities. This facilitates the creation of a single instance of entities that can span multiple systems.*

**7. Process Rules and Reference Data Management:** *This process consists of developing applications or review programs that will manage and maintain (new/update) the business rules used to migrate data and the reference data (e.g., valid list of material items) used to validate the integrity of the data being migrated.*

When these seven steps are grouped into more general project phases, the following table shows the overall average estimated savings of using an integrated data integration platform. Note that ETL-only focused tools do not cover phases A & B – leaving over 50% of the project untouched – and therefore may be limiting factors to a project’s success.

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<b>Grouped Project Phase</b>	<b>Approximate Percentage of Data Integration Project Effort</b>	<b>Estimated Savings (based on customer engagements)</b>
A.Source Identification and Data Profiling/Analysis	30%	40%
B.Data Correction & Enrichment	25%	50%
C.Data Abstraction & ETL Construction	20%	50%
D.Data Management Services – unique key, process rules and reference data management	15%	20%
E.Application Connectivity	10%	30%
Total	100%	40%

Because this is an iterative process, these types of savings in the area of data capture and maintenance can be significant, and can drive down the total cost of ownership related to an SAP project.

#### **Summary**

The process steps outlined above will be faced in SAP R/3, SAP NetWeaver BI and SAP MDM projects in heterogeneous environments. The only other way to attack it is through manual coding, or using multiple tools from multiple vendors to achieve the same results. However, this means customers are required to integrate their integration tools, and this effort will detract from the main goal of the project and could ultimately drag against any cost reduction gains made through the use of a tool. The most cost effective approach over the life of an SAP R/3 deployment, SAP R/3 instance consolidation, SAP BW and SAP MDM deployment with non-SAP data sources is to use an integrated platform for data profile and discovery, data quality and preparation, and data transformation and movement.

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The bottom line for your organization is not only lower TCO through the cost reductions, but also an expedited realization of the benefits from your project, because you can get to production more quickly than via traditional methods of data integration.

**IBM WebSphere Information Integration**

The WebSphere Data Integration Suite is part of a broad integration platform that integrates and transforms any data and content to deliver information you can trust for your critical business initiatives. The WebSphere Information Integration platform provides breakthrough productivity, flexibility and performance, so you and your customers and partners have the right information for running and growing your businesses. It helps you understand, cleanse and enhance information, while governing its quality to ultimately provide authoritative information. Integrated across the extended enterprise and delivered when you need it, this consistent, timely and complete information can enrich business processes, enable key contextual insights and inspire confident business decision-making.

**For more information**

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<sup>1</sup> The Conference Board, "ERP Trends" Research Report 1292-01-RR, June 2001

<sup>2</sup> There are different architectures for implementing an ERP instance consolidation. It may make business process sense to NOT have a centralized instance due to regulatory or governmental anomalies between business units or countries. In this case, enterprises have reduced the number of instances however they do not necessarily have a single enterprise instance. For simplicity, this paper uses a single centralized instance as an example, and the concepts discussed here apply to both scenarios.

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