

SAP White Paper
SAP NetWeaver



SAP[®] MASTER DATA MANAGEMENT

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CONTENTS

1	Executive Summary	4
2	Introduction	4
2.1	MDM – A Cost Savings Example	4
2.2	Systems Integration vs. Information Integration	5
3	The MDM Concept	6
3.1	Content Consolidation	6
3.2	Master Data Harmonization	7
3.3	Central Master Data Management	8
4	SAP MDM	9
4.1	The Building Blocks	9
4.1.1	SAP Exchange Infrastructure	10
4.1.2	Content Integrator	10
4.1.3	Master Data Server	10
4.1.4	SAP MDM Adapter	11
5	Summary	11

1 EXECUTIVE SUMMARY

For many companies maintaining distributed IT landscapes, common master data is crucial for business success. But managing it can be a challenge. Many companies find themselves storing the same duplicate master data across a number of different locations and systems. This produces redundancies and inconsistencies that can cost money, disrupt business, and adversely impact the quality of customer service.

Fortunately, SAP® Master Data Management (SAP® MDM) – a building block of the SAP® NetWeaver™ – enables companies to store, augment, and consolidate master data, while ensuring consistent distribution to all applications and systems within the IT landscape. Working across heterogeneous systems at multiple locations, SAP MDM leverages existing IT investments in business-critical data, delivering vastly reduced data maintenance costs through effective data management. And by ensuring cross-system data consistency, SAP MDM accelerates the execution of business processes, greatly improves decision making and helps companies maintain competitive advantage.

2 INTRODUCTION

Business processes without consistent master data have little business value—and can even negatively impact a company’s ability to compete. Within the context of large, heterogeneous IT landscapes, misaligned and inconsistent master data leads to costly data redundancies and even misleading analytics that can result in faulty business decisions.

But achieving master data consistency for all systems within a distributed IT environment has traditionally proven difficult. This reason alone explains why branch offices often work independently of the larger enterprise. Mergers and acquisitions, too, present significant problems with regard to consistent master data. While at a technical level, companies can indeed link new software solutions obtained in an acquisition – true integration at the business process level is routinely impeded due to fundamental incongruities between master data models.

Ultimately, master data management (MDM) enables dependable cross-system, enterprise-wide business processes and analytics – ensuring that everyone involved in the process has access to the same information and knowledge. This is why a solution that enables both the consolidation of master data as well as the availability of consistent data across systems boundaries offers a decisive competitive advantage.

2.1 MDM – A COST SAVINGS EXAMPLE

Take the example of a large retail company, Big Retail, Inc. Over time, Big Retail acquires three other retail establishments and operates them as wholly owned subsidiaries while maintaining their individual brand identities. These are Valuable Products Unlimited, The Quality Goods Company and Affordable Merchandise, Inc.

Running similar businesses, all three companies sell Deliciously Tasty Chocolate Bars. Each year, each of these companies buys approximately \$100,000 worth of these chocolate bars from the manufacturer, Worldwide Chocolates. Lacking an integrated order process that links all three shops to the headquarters of Big Retail, each company deals with Worldwide Chocolates independently. In effect, then, Big Retail spends \$300,000 annually for Deliciously Tasty Chocolate Bars.

However, because the master data from order processing is not integrated, Big Retail is unable to see this simple fact. Using MDM techniques to connect the order processes, on the other hand, Big Retail is able to see exactly how much annual business it does with Worldwide Chocolates and is able to negotiate a better deal. While Worldwide Chocolates awards a 5% discount on orders of \$100,000, it is willing to award a 15% discount on the \$300,000 order placed by Big Retail. Thus, with each subsidiary dealing with the manufacturer independently, Big Retail saves only \$5,000. But when negotiating from information obtained through properly managed master data, Big Retail saves \$45,000 – a significant cost savings that comes right off the bottom line.

2.2 SYSTEMS INTEGRATION VS. INFORMATION INTEGRATION

Some companies assume that enterprise-wide systems integration will achieve, in and of itself, the kind of process and information integration that enables the smooth running of business on a global scale. This is not the case. To put it more precisely, systems interoperability is a prerequisite for business process integration, but doesn't achieve the goal alone. Unfortunately, many companies get bogged down in the details of the systems integration initiative – and never move on to the issues of master data required for full process and information integration. This is understandable. After all, traditional integration initiatives require tremendous amounts of time and resources (coding point-to-point connections at the API level). As discussed later, a more efficient approach would be to employ an enterprise application integration (EAI) approach, using an exchange platform that ensures message handling, semantic mapping, routing and the queuing of data.

Once system interoperability is achieved, master data-at a business object level – needs to be exchanged and mapped on top of this technical integration layer. This, too, can be challenging. Companies engaged in such an effort will need a solution that can consolidate and harmonize master data – as well as enable consistent data maintenance and meticulous enterprise-wide

data object distribution. Without such a solution, companies will continue to make the same mistakes – and continue to pay for them. A few examples:

- **Costly, inefficient customer management:** Customers want efficient service. But when customer information is loosely dispersed across a wide range of applications, this is a tough demand to meet. Without consolidating this information, customer management processes are forced to rely on locally available information – which is often incomplete or even obsolete. This can significantly detract from a company's business performance – both in terms of cost efficiency and customer loyalty.
- **Proliferating parts diversity:** For companies involved in the manufacture or assembly of physical goods, the storage, procurement and cataloging of parts requires tremendous enterprise resources. Redundant master data can present a distorted picture of parts inventory, causing vexing supply chain gaps. Without efficiently managed master data, companies will continue to generate the kind of redundancies and low data quality that prohibit the smooth execution of collaborative logistics processes.
- **Faulty cross-group reporting:** As companies manage their bottom lines, inventories must be reduced, prices matched, and procurement processes streamlined. Cross-group reporting forms the basis for the business decisions that guide these initiatives. But when it is based on inconsistent, ill-managed data, cross-group reporting can lead to the kind of faulty executive decision making that adversely impacts business competitiveness.

A properly implemented MDM solution can solve all these problems – by sharing harmonized master data across system boundaries, fostering enhanced business collaboration, and ensuring cross-system data consistency regardless of the physical location or vendor origin of independent systems within the distributed IT environment.

We now turn to a detailed explanation of concepts central to Master Data Management.

3 THE MDM CONCEPT

Successful MDM in a heterogeneous IT environment involves more than the integration of systems. Master data must be accounted for and supported in its overall cross-system context throughout each business process.

At the same time, while companies may readily see the business advantages to properly managed master data, they cannot afford the downtime required to implement large enterprise-wide software packages. In addition, in this time of IT budget consciousness – following years of intense IT investment – most companies are in a mood to use what they already have rather than replace existing investment. That’s why any MDM solution must be:

- Quickly implemented without altering the existing systems landscape
- Tailored to the company’s business and organizational requirements through flexible business processes and the mapping of organizational structures
- Introduced on a step-by-step, evolutionary basis that minimizes disruptions to the daily flow of business

3.1 CONTENT CONSOLIDATION

Any master data management solution requires the consolidation of master data objects from different systems. This entails capabilities to:

- Search for master data objects across linked systems
- Identify identical or similar objects
- Cleanse objects as needed

After consolidation, information from different systems should be transferred to a business information warehouse where it can be accessed for unified, companywide analytics and reporting.

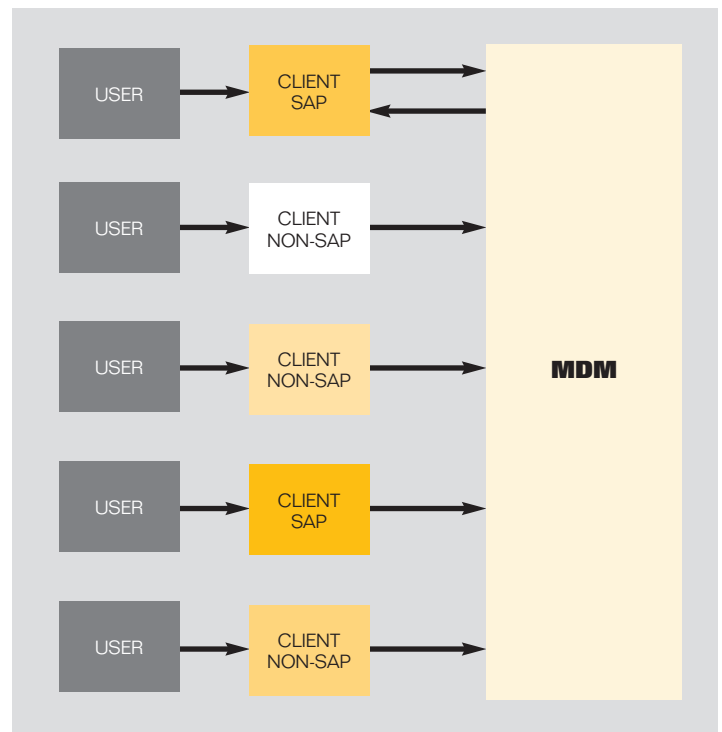


Figure 1: Content Consolidation – Data Flow and System Landscape

To minimize disruptions, an MDM solution should enable the consolidation of master data without adjusting originating systems. This can be achieved through the use of object type attributes, valid companywide, that map identical and similar master data objects throughout the entire system landscape. This enables different data formats and structures to be retained in various systems throughout the extended enterprise. Moreover, the assignment between identical data objects should also be updated each time a change is made, obviating the need to harmonize different identifiers for the same master data objects over the long term.

This kind of flexible, nonintrusive approach to master data consolidation lays the foundation for increasingly useful business analytics that leverage the accuracy of enterprise-wide data. This enables significant new abilities such as the capacity to produce accurate global spending analyses or centralized supplier product catalogs.

3.3 CENTRAL MASTER DATA MANAGEMENT

While maintaining object attribute subsets for local systems might be the smartest course of action for some business processes, companies will want the option of a more centralized solution for other business processes. That's why an MDM solution should also support the maintenance of a complete object definition – including object dependencies – in a centralized server for master data. Under such an arrangement, the maintenance of local systems happens rarely if ever. Instead, active status management procedures are used to update each of the individual distribution steps so that distribution can be executed in a controlled, transparent, and traceable manner.

The central maintenance of master data has numerous advantages for global companies seeking ways to enforce, among other things, brand identity and consistent product specifications. For example, a centralized data pool could supply globally dispersed upper management with consistent control over information relating to important global accounts. A similarly centralized data pool could supply up-to-date product data to multiple locations (including branch offices around the world) for the smooth management of production, assembly, sales, and distribution.

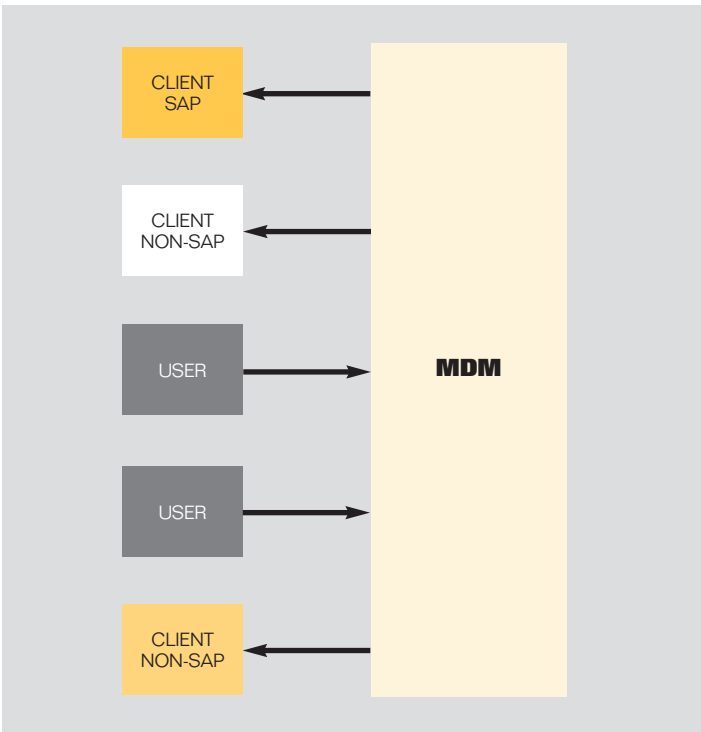


Figure 3: Central Master Data Management – Data Flow and System Landscape

3.2 MASTER DATA HARMONIZATION

While the consolidation of objects is necessary for quality master data management, it is not in itself sufficient for the needs of enterprises operating large distributed IT landscapes on a global scale. Consistent maintenance and distribution – which leads to the permanent harmonization of master data – is also required. Through the use of global attributes, companies can ensure that all systems receive the same master data during distribution. Thereafter, these distributed objects can be enriched with additional attribute values in the target systems.

Moreover, objects that logically belong together can be changed and distributed together. This is helpful, for example, when dealing with the associated master data for a given product. Specifications, rollout schedules, marketing documents and other objects related to the product can be collected together in a consistent packet and distributed in one context to the recipient system.

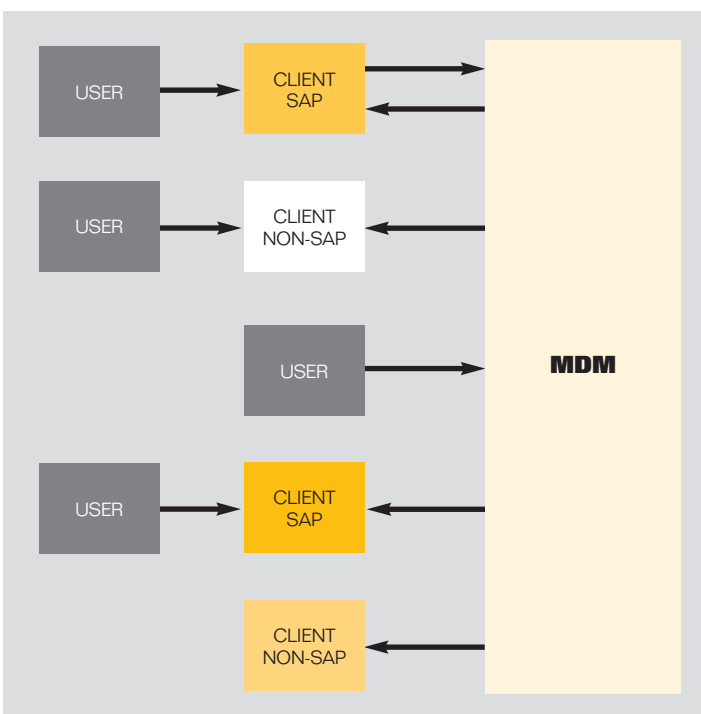


Figure 2: Master Data Harmonization – Data Flow and System Landscape

In order to properly harmonize data across a distributed system landscape, companies will look to their MDM solutions to provide tools and service that can aid in the process. Some of the capabilities companies will be looking for include:

- **Business context grouping:** This involves determining which data objects belong together in a business sense. For this, time and scope of distribution must be determined according to the life cycle of the business object—providing enhanced distribution control with regard to time and location.
- **Client-specific data control:** Some companies will want to control data at the local level – so that individual systems can receive only the data they need, only at the time they need it. This requires functionality that enables local-level systems to distinguish the parts of an overall data object and determine which parts it requires.
- **Synchronous duplicate checking:** This requires capabilities to synchronously check for the existence of duplicates during master data maintenance – in a way that safeguards data quality without interrupting time-critical work.
- **Seamlessly integrated workflows:** Many companies will want to use workflows to check master data for accuracy and redundancy, enrich objects according to individual requirements, and release them for distribution.
- **Automated distribution:** To improve efficiency, many companies will be looking to automate distribution. This involves the use of event triggers, with target systems being determined according to the business context of the event.

With these capabilities and others, a properly implemented MDM solution can help companies achieve greater business efficiencies through benefits such as better business partner administration, improved management of non-variable parts and the central provisioning of goods.

4 SAP MDM

SAP MDM creates a cohesive data environment that drives business process integration in a dynamic and heterogeneous system environment. It also fosters collaboration by ensuring cross-system data consistency – regardless of physical system location or vendor origin. And because SAP MDM works with existing IT investment and is implemented through an evolutionary process, it limits IT downtime and minimizes disruptions to day-to-day business.

4.1 THE BUILDING BLOCKS

To allow companies to store, augment, consolidate, and distribute master data in a consistent manner, SAP MDM consists of four building blocks. These include the SAP® Exchange Infrastructure, the content integrator, the master data server, and adapters for SAP and non-SAP systems.

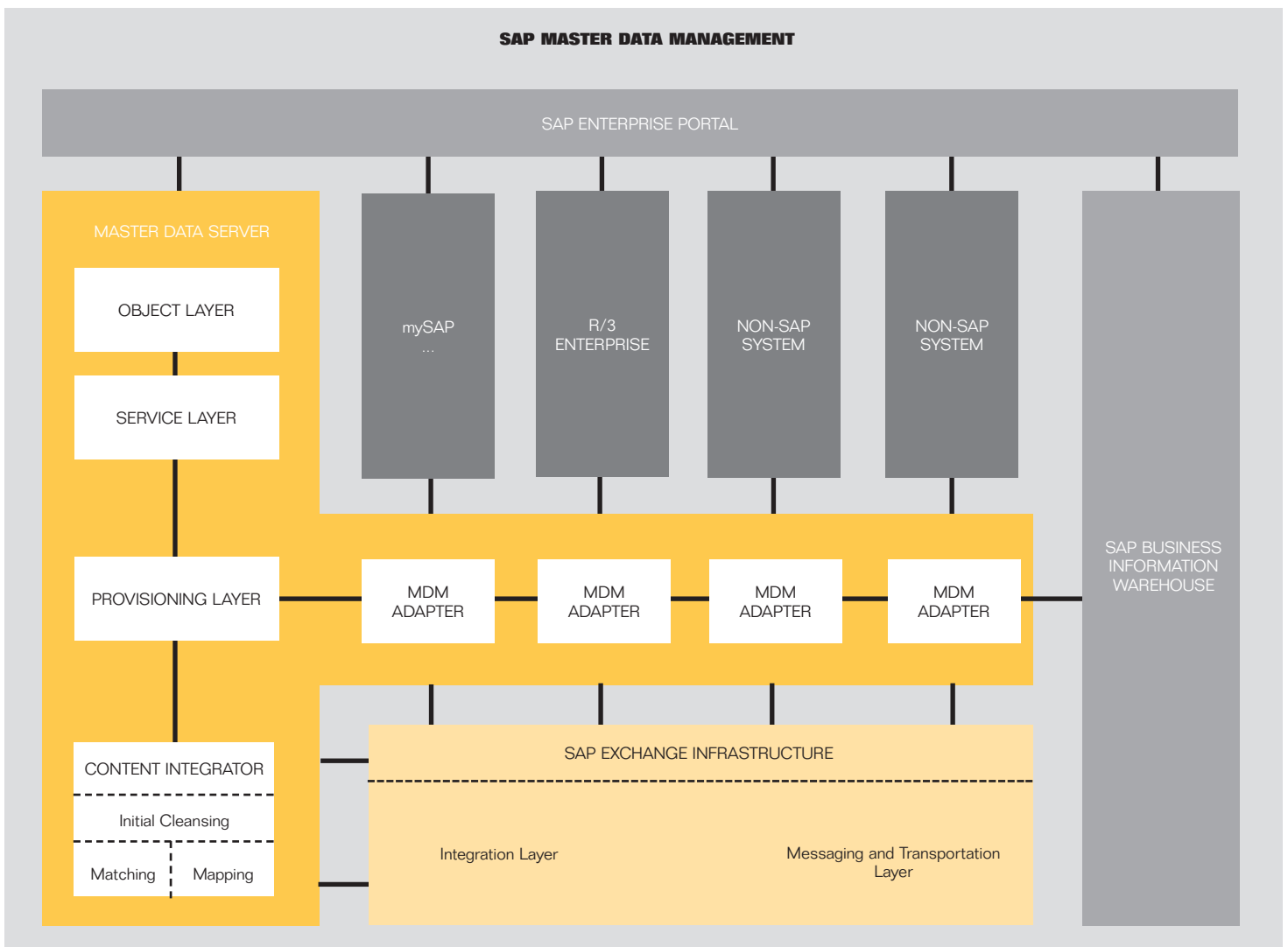


Figure 4: SAP MDM Building Blocks

4.1.1 SAP Exchange Infrastructure

The SAP Exchange Infrastructure (SAP® XI) enables inter-system communication in a highly heterogeneous, multi-vendor technology environment. Employing a state-of-the-art EAI approach to exchange-based collaboration and integration, SAP XI helps companies avoid the complexity and high maintenance costs of traditional point-to-point connectivity. And because SAP MDM runs on top of SAP XI, this makes the entire master data integration initiative easier.

During distribution, SAP MDM uses SAP XI to transport business objects to predetermined local systems within the distributed IT environment. While SAP MDM is responsible for defining business objects and maintaining them over time, SAP XI provides unique routing execution, queuing and format conversion capabilities for the secure transport of objects to their proper destinations.

SAP XI works with SAP MDM through a publish and subscribe mechanism. Master data marked for distribution is sent to the SAP XI platform using open protocols and standards such as HTTP, XML and XSL (publishing). A central routing model within the SAP XI platform stores information regarding which systems within the IT landscape want access to this master data (subscription). When it receives new master data, SAP XI performs value mappings (required for objects identified by different keys in multiple systems) and structural conversions (used for semantically equivalent types that are syntactically or structurally different). Once properly prepared, SAP XI distributes the data to interested systems using a queuing mechanism that guarantees messages are delivered consistently and exactly once.

4.1.2 Content Integrator

The content integrator (CI) connects master data objects in different systems using object characteristics. During the initial consolidation of master data – as well as during creation and change processes – these characteristics are used to match data objects in accordance with rules determined by the user.

Through this process, the content integrator is able to find identical master data objects and remove duplicates (identical objects in the same system) from relevant systems.

ID mappings that result from this matching process are used for both the distribution of master data as well as for cross-system reporting and analysis. The content integrator also includes an enterprise-wide search mechanism that provides the system location for each master data object.

4.1.3 Master Data Server

As the name would suggest, the master data server (MDS) serves as the central processing unit for the handling of master data across the enterprise. Tightly integrated with the content integrator and SAP XI, it is ultimately the MDS that enables the consolidation, harmonization and distribution of master data in complex system landscapes. While all data is administered by the MDS, data creation and maintenance can be executed both within the server and in connected local systems.

SAP classifies the tasks and capabilities of the MDS under the three following layers:

- **Object layer:** The object layer describes the master data objects in a flexible and extensible way, submitting them to the content integrator and SAP XI for further processing. The object layer makes predefined master data object types available, which can then be enhanced for use in individual applications.
- **Service layer:** The service layer provides generic services and methods for the management of master data. These include object creation, change and status management, querying, routine maintenance, authorization, workflow, collaborative data cleansing, and so on. Services can also be exposed as Web services where necessary.
- **Provisioning layer:** The provisioning layer controls master-data distribution in tight integration with SAP XI. As well as classic single object distribution, objects can be compiled from groups and distributed based on each object's business context as defined in the MDS. The existing publish and

subscribe mechanisms in SAP XI, moreover, are enhanced with intelligent subscription functionality that push data objects to local systems based on predefined business contexts.

4.1.4 SAP MDM Adapter

For the proper management of master data, each system in a multivendor, heterogeneous IT environment must be connected through an SAP MDM Adapter. This adapter receives all generated master data and unifies it into a common data format that allows SAP MDM to work with all business critical applications, regardless of vendor origin.

Because master data attributes can be enhanced at the local level to meet individual system needs, there needs to be a way to extract business-relevant data back from the local system to SAP MDM in order to maintain data object consistency. With bidirectional data-mapping capabilities, the SAP MDM Adapter delivers this capability – interacting with existing search and extraction functions at the local level as well as with SAP MDM services for context search and technical distribution.

For SAP systems, fully featured adapters will be included with SAP MDM. To cover the broad range of non-SAP and legacy systems, tools and a development framework are available for full data integration across the IT landscape. In addition, SAP is currently working with partners to build an ecosystem of adapters into SAP MDM.

5 SUMMARY

Companies now realize that ongoing competitiveness depends on the ability to free critical business processes from the confines of individual applications and execute them smoothly and consistently across system boundaries.

SAP MDM helps companies achieve this challenging goal in a way that leverages the existing system landscape and maximizes overall IT investment. Now there is a way to eliminate the data redundancies and inconsistencies that diminish business performance, while truly unifying the extended enterprise at the critical level of business processes.

Open and highly scalable, SAP MDM provides sophisticated data consolidation, harmonization, maintenance, and distribution mechanisms for SAP and non-SAP solutions. These features combine to help companies significantly reduce data maintenance costs – as well as the amount of inconsistent or outdated master data, which in turn minimizes the need for costly error handling.

But SAP MDM goes well beyond simple cost reduction. It also positively impacts your company's top and bottom line—ensuring cross-system data consistency in a way that vastly accelerates business process execution and fosters increased collaboration. And, by providing homogenized data for use in enterprise-wide business analytics, SAP MDM ultimately improves corporate decision making, increasing your company's ability to succeed in a highly competitive business environment.

THE BEST-RUN BUSINESSES RUN SAP



SAP AG

Neurottstraße 16

69190 Walldorf

Germany

T +49/18 05/34 34 24*

F +49/18 05/34 34 20*

* Subject to charge

www.sap.com