Oracle Master Data Management: Executive Overview

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Executive Overview

INTRODUCTION

Fragmented inconsistent Product data slows time-to-market, creates supply chain inefficiencies, results in weaker than expected market penetration, and drives up the cost of compliance. Fragmented inconsistent Customer data hides revenue recognition, introduces risk, creates sales inefficiencies, and results in misguided marketing campaigns and lost customer loyalty[1]. "Product" and "Customer" are only two of a large number of key business entities we refer to as Master Data.

Master Data is the critical business information supporting the transactional and analytical operations of the enterprise. Master Data Management (MDM) is a combination of applications and technologies that consolidates, cleans, and augments this corporate master data, and synchronizes it with all applications, business processes, and analytical tools. This results in significant improvements in operational efficiency, reporting, and fact based decision-making.

"Through 2010, 70 percent of Fortune 1000 organizations will apply MDM programs to ensure the accuracy and integrity of commonly shared business information for compliance, operational efficiency and competitive differentiation purposes (0.7 probability)."

Gartner

Over the last several decades, IT landscapes have grown into complex arrays of different systems, applications, and technologies. This fragmented environment has created significant data problems. These data problems are breaking business processes; impeding Customer Relationship Management (CRM), Enterprise Resource Planning (ERP), and Supply Chain Management (SCM) initiatives; corrupting analytics; and costing corporations billions of dollars a year. MDM attacks the enterprise data quality problem at its source on the operational side of the business. This is done in a coordinated fashion with the data warehousing / analytical side of the business. This combined approach is proving itself to be very successful in leading companies around the world.

This paper will discuss what it means to 'manage' master data and outlines Oracle's MDM solution[2]. Oracle's technology components are ideal for building master data management systems, and Oracle's pre-built MDM solutions for key master data objects such as Product, Customer, Site, and Financial data can bring real business value in a fraction of the time it takes to build from scratch. Oracle's MDM portfolio also includes tools that directly support data governance within the master data stores. What's more, Oracle MDM utilizes Oracle's Application Integration Architecture to integrate the high quality authoritative master data into the IT landscape out-of-the-box. This fusion of applications and technology creates a solution superior to other MDM offerings on the market.

[1] Customer Data Integration – Reaching a Single Version of the Truth, Jill Dyche, Evan Levy Wiley & Sons, 2006

[2] Oracle Master Data Management, an Oracle Data Sheet, HURL

OVERVIEW

How do you get from a thousand points of data entry to a single view of the business? This is the challenge that has faced companies for many years. Service Oriented Architecture (SOA) is helping to automate business processes across disparate applications, but the data fragmentation remains. Modern business analytics on top of terabyte sized data warehouses are producing ever more relevant and actionable information for decision makers, but the data sources remain fragmented and inconsistent. These data quality problems continue to impact operational efficiency and reporting accuracy. Master Data Management is the key. It fixes the data quality problem on the operational side of the business and augments and operationalizes the data warehouse on the analytical side of the business. In this paper, we will explore the central role of MDM as part of a complete information management solution.

Master Data Management has two architectural components:

- The technology to profile, consolidate and synchronize the master data across the enterprise
- The applications to manage, cleanse, and enrich the structured and unstructured master data

MDM must seamlessly integrate with modern Service Oriented Architectures in order to manage the master data across the many systems that are responsible for data entry, and bring the clean corporate master data to the applications and processes that run the business.

MDM becomes the central source for accurate fully cross-referenced real time master data. It must seamlessly integrate with data warehouses and the Business Intelligence (BI) systems, designed to bring the right information in the right form to the right person at the right time.

In addition to supporting and augmenting SOA and BI systems, the MDM application must support data governance. MDM enables orchestrated data stewardship across the enterprise.

In order to successfully manage the master data, support corporate governance, and augment SOA and BI systems, the MDM applications must have the following characteristics:

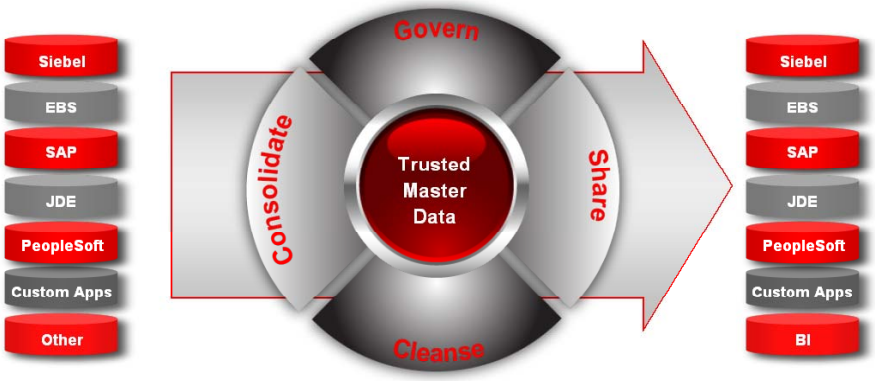
- A flexible, extensible and open data model to hold the master data and all needed attributes (both structured and unstructured). In addition, the data model must be application neutral, yet support OLTP workloads and directly connected applications.
- A metadata management capability for items such as business entity matrixed relationships and hierarchies.
- A source system management capability to fully cross-reference business objects and to satisfy seemingly conflicting data ownership requirements.
- A data quality function that can find and eliminate duplicate data while insuring correct data attribute survivorship.
- A data quality interface to assist with preventing new errors from entering the system even when data entry is outside the MDM application itself.

- A continuing data cleansing function to keep the data up to date.
- An internal triggering mechanism to create and deploy change information to all connected systems.
- A comprehensive data security system to control and monitor data access, update rights, and maintain change history.
- A user interface to support casual users and data stewards.
- A data migration management capability to insure consistency as data moves across the real time enterprise.
- A business intelligence structure to support profiling, compliance, and business performance indicators.
- A single platform to manage all master data objects in order to prevent the proliferation of new silos of information on top of the existing fragmentation problem.
- An analytical foundation for directly analyzing master data.
- A highly available and scalable platform for mission critical data access under heavy mixed workloads.

"… Though all reports may benefit from improved MDM, regulatory and financial reports are a hot spot, because they are scrutinized carefully today and can cause dire consequences when discrepancies are found. For example, the consistently applied definitions of MDM ensures that reports are populated with correct data, and the data lineage of MDM answers questions in the event of an audit."

TDWI

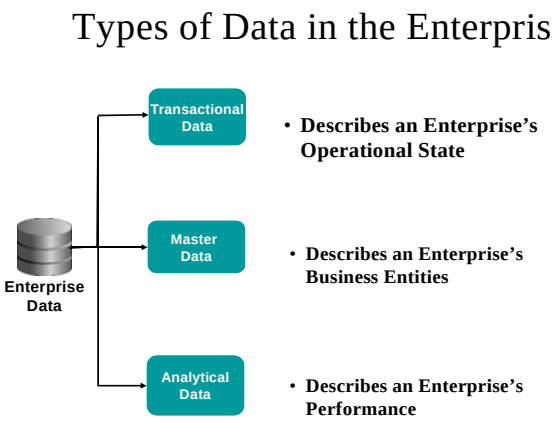
Oracle's market leading MDM solutions have all of these characteristics. With the broadest set of operational and analytical MDM applications in the industry, Oracle MDM is designed to support Governance, Risk mitigation, and Compliance (GRC) by eliminating inconsistencies in the core business data across applications and enabling strong process controls on a centrally managed master data store.



This paper examines: the nature of master data; MDM's central role in SOA and BI systems; the Oracle MDM Architecture; key MDM processes of profiling, consolidating, managing, synchronizing, and leveraging master data and how the Oracle MDM solution supports these processes; and Oracle's portfolio of pre-built master data management solutions. Finally, this paper discusses build vs. buy tradeoffs given the power and flexibility in the Oracle MDM architecture and out-of-the-box capabilities of the pre-built and pre-connected MDM Hubs.

ENTERPRISE DATA

An enterprise has three kinds of actual business data: Transactional, Analytical, and Master. Transactional data supports the applications. Analytical data supports decision-making. Master data represents the business objects upon which transactions are done and the dimensions around which analysis is accomplished.



Transactional Data

A company's operations are supported by applications that automate key business processes. These include areas such as sales, service, order management, manufacturing, purchasing, billing, accounts receivable and accounts payable. These applications require significant amounts of data to function correctly. This includes data about the objects that are involved in transactions, as well as the transaction data itself. For example, when a customer buys a product, the transaction is managed by a sales application. The objects of the transaction are the Customer and the Product. The transactional data is the time, place, price, discount, payment methods, etc. used at the point of sale. The transactional data is stored in OnLine Transaction Processing (OLTP) tables that are designed to support high volume low latency access and update.

Solutions that focus on managing transactional data under operational applications are called Operational MDM. They relay heavily on integration technologies. They bring real value to the enterprise, but lack the ability to influence reporting and analytics.

Analytical Data

Analytical data is used to support a company's decision making. Customer buying patterns are analyzed to identify churn, profitability, and marketing segmentation. Suppliers are categorized, based on performance characteristics over time, for better supply chain decisions. Product behavior is scrutinized over long periods to identify failure patterns. This data is stored in large Data Warehouses and possibly smaller data marts with table structures designed to support heavy aggregation, ad hoc queries, and data mining. Typically the data is stored in large fact tables surrounded by key dimensions such as customer, product, supplier, account, and location.

Solutions that focus on managing analytical data are called Analytical MDM. They relay heavily on data warehousing and BI technologies. They also bring real value to the enterprise, but lack the ability to influence operational systems. Any data cleansing done inside an Analytical MDM solution is invisible to the transactional applications and transactional applications knowledge is not available to the cleansing process.

Master Data

Master Data represents the business objects that are shared across more than one transactional application. This data represents the business objects around which the transactions are executed. This data also represents the key dimensions around which analytics are done. Master data creates a single version of the truth about these objects across the operational IT landscape.

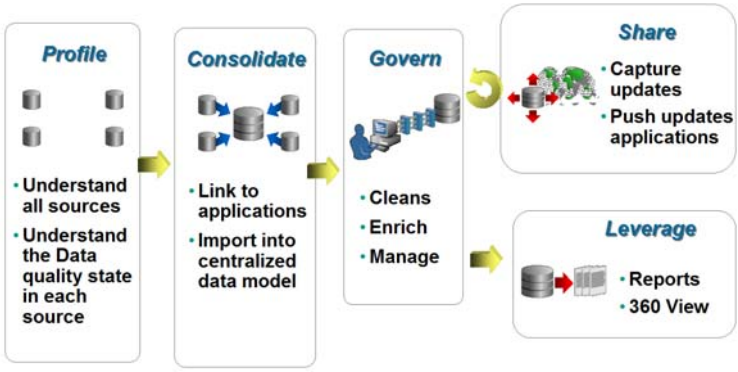
An MDM solution should to be able to manage all master data objects. These usually include Customer, Supplier, Site, Account, Asset, and Product. But other objects such as Invoices, Campaigns, or Service Requests can also cross applications and need consolidation, standardization, cleansing, and distribution. Different industries will have additional objects that are critical to the smooth functioning of the business.

It is also important to note that since MDM supports transactional applications, it must support high volume transaction rates. Therefore, Master Data must reside in data models designed for OLTP environments.

Maximum business value comes from managing both transactional and analytical master data. These solutions are called Enterprise MDM. Operational data cleansing improves the operational efficiencies of the applications themselves and the business process that use these applications. The resultant dimensions for analytical analysis are true representations of how the business is actually running. What's more, the insights realized through analytical processes are made available to the operational side of the business.

MASTER DATA MANAGEMENT PROCESSES

Now that we have identified the nature of master data, we need to identify the key processes that MDM solutions must support.



These are the key processes for any MDM system.

- Profile the master data. Understand all possible sources and the current state of data quality in each source.
- Consolidate the master data into a central repository and link it to all participating applications.
- Govern the master data. Clean it up, deduplicate it, and enrich it with information from 3rd party systems. Manage it according to business rules.
- Share it. Synchronize the central master data with the connected applications. Insure that data stays in sync across the IT landscape.
- Leverage the fact that a single version of the truth exists for all master data objects by supporting business intelligence systems and reporting.

Profile

The first step in any MDM implementation is to profile the data. This means that, for each master data business entity to be managed centrally in a master data repository, all existing systems that create or update the master data must be assessed as to their data quality. Deviations from a desired data quality goal must be analyzed. Examples include: the completeness of the data; the distribution of occurrence of values; the acceptable range of values; etc. Once implemented, the MDM solution will provide the ongoing data quality assurance, however, a thorough understanding of overall data quality in each contributing source system before deploying MDM will focus resources and efforts on the highest value data quality issues in the subsequent steps of the MDM implementation.

The Data Profiling and Correction option in Oracle Data Integration Suite (ODI) provides a systematic analysis of data sources chosen by the user for the purpose of gaining an understanding of and confidence in the data. It is a critical first step in the data integration process to ensure that the best possible set of baseline data quality rules are included in the initial MDM Hub.

Consolidate

Consolidation is the key to managing master data, and a logical and physical model that can hold the master data is a prerequisite to true consolidation.

Consolidation is the key to managing master data. Without consolidating all the master data attributes, key management capabilities such as the creation of blended records from multiple trusted sources is not possible. This is the #1 fundamental prerequisite to true master data consolidation[3].

Oracle MDM Hubs utilize state-of-the-art extensible data models. They are operational data models designed for OnLine Transaction Processing (OLTP). They are application neutral and capable of housings all corporate master data from all systems in all heterogeneous IT environments. This includes business objects such as Customer, Supplier, Distributor, Partner, Product, Assets, Installed Base and more. The models support all the master data that drives a business, no matter what systems source the master data fragments. This includes (but is not limited to) SAP, Siebel, JD Edwards, PeopleSoft, Oracle E-Business Suite, Microsoft, Acxiom, Dun & Bradstreet (D&B), billing systems, homegrown systems, and legacy systems. Tools to load the data are also provided. Scalable batch load tools manage the

[3] CDI Institute, Aaron Zornes

history and mappings from source systems. Oracle provides powerful Data Quality Servers to standardize, cleanse, and match master data attributes during the MDM Hub load process. This insures that the loaded data is clean and duplicates are eliminated on the way in.

Govern

Master data is consolidated so that it can be cleansed and governed. Specific business objects require specific management tools. Managing product data is very different than managing customer data. This is why Oracle provides Data Quality Servers for customer data and product data that are easily extended to suppliers and assets. Data Governance refers to the operating discipline for managing data and information as a key enterprise asset. This operating discipline includes organization, processes and tools for establishing and exercising decision rights regarding valuation and management of data. Data Governance is essential to ensuring that data is accurate, appropriately shared, and protected[4].

Oracle Data Watch and Repair for MDM (DWR) provides advanced governance capabilities. DWR is a data investigation and quality monitoring tool. It allows business users to assess the quality of their data through metrics, to discover or infer rules based on this data, and to monitor historical metrics about data quality. DWR is integrated with the Oracle MDM Hubs and provides any organization with a quick and powerful data profiling and correction solution that helps ensure Master Data Management success. Used by the data steward to perform ongoing data governance and data stewardship, DWR complements the deduplication, cleansing and matching processes performed by Oracle's Data Quality Servers with a day-to-day data monitoring tool[5].

Share

Clean augmented quality master data in its own silo does not bring the potential advantages to the organization. For MDM to be most effective, a modern SOA layer is needed to propagate the master data to the applications and expose the master data to the business processes. SOA and MDM need each other if the full potential of their respective capabilities are to be realized. Oracle MDM Hubs leverage Oracle Application Integration Architecture (AIA) to provide end-to-end pre-cabled MDM integration with operational applications. AIA includes a framework to build high-speed synchronization and business process management across different environments. Real-time synchronous and asynchronous events are processed to maintain quality master data across the enterprise.

Leverage

MDM creates a single version of the truth about every master data entity. This data feeds all operational and analytical systems across the enterprise. But more than this, key insights can be gleamed from the master data store itself. 360° views can be made available for the first time since operational and analytical systems split in

[4] Data Governance – Managing Information As An Enterprise Asset Part I – An Introduction, Eric Sweden, Enterprise Architect, NASCIO, April, 2008

[5] Oracle Data Watch and Repair for Master Data Management, an Oracle Data Sheet, HURI

the 1980s. Alternate hierarchies and what-if analysis can be performed directly on the master data.

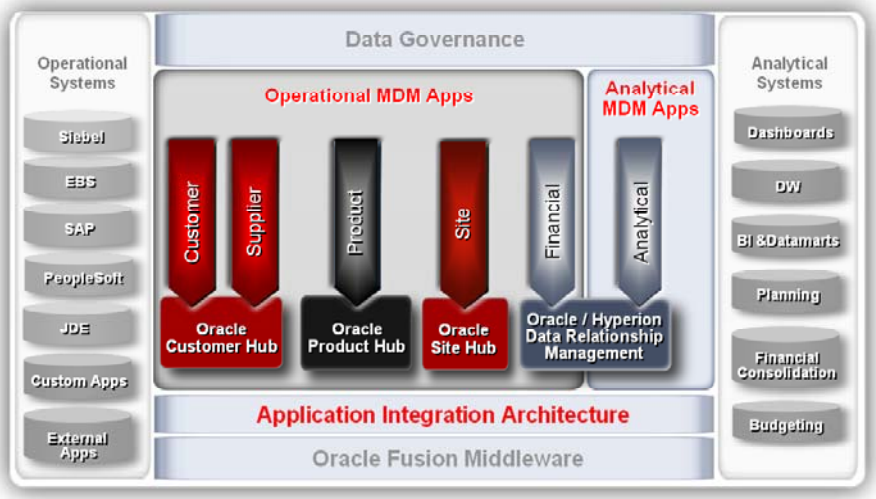
Create an enterprise view of analytical dimensions, reporting structures, performance measures and their related attributes and hierarchies using Hyperion DRM's data model-agnostic foundation. Construct departmental perspectives that bear referential integrity and consistency with master data constructs based on validations and business rules that enforce enterprise governance policies. Synchronize master data with downstream systems including BI/EPM systems, data warehouses and data marts to gain trustworthy insight.

Oracle MDM Hubs leverage Oracle BI tools such as BI EE and BI Publisher to produce 360° views and cross-reference data to the Data Warehouse and maintain master dimensions in the master data store. Data quality and segmentation can be viewed directly from the master data repository. Out-of-the-box reports are provided and BI Publisher has full access to all master data attributes within constrains set up by the data security rules. Oracle's Analytical MDM can create an enterprise view of analytical dimensions, reporting structures, performance measures and their related attributes and hierarchies using Hyperion DRM's data model-agnostic foundation.

ORACLE MDM HIGH LEVEL ARCHITECTURE

The following figure identifies the major layers in the Oracle MDM architecture.

- Oracle Fusion Middleware provides supporting infrastructure.
- Application Integration Architecture links MDM data to applications and business processes.
- The MDM Applications layer contains all the base pre-built MDM Hubs and shared services.
- The top layer includes MDM based solutions for Data Governance



Application Integration Architecture

Application Integration Architecture (AIA) utilizes Oracle's premier SOA suite to build out-of-the-box Oracle Application integrations in the context of enterprise business processes. These integrations directly support MDM. There are multiple levels of integration between MDM and SOA.

- Connectors and transformations

- Mutually understood data structures and access methods
- Pre-Built Application and Master Data synchronization
- Pre-Built SOA/MDM Enterprise Business Processes

The business value goes up the more levels a vendor provides. All MDM vendors provide some level of connectors and templates for transformations. Only vendors that provide both MDM and SOA can integrate the two. Most of these vendors provide their SOA with knowledge of their MDM data structures and access methods. But only vendors who actually have applications can provide pre-built master data synchronizations and pre-built enterprise business processes.

MDM Pillars

The MDM Applications are organized around five key pillars. The following figure illustrates these pillars of every MDM Application.

- Trusted Master Data is held in a central MDM schema.
- Consolidation services manage the movement of master data into the central store.
- Cleansing services deduplication, standardize and augment the master data.
- Governance services control access, retrieval, privacy, auditing and change management rules.

- Sharing services include integration, web services, event propagation, and global standards based synchronization.

These pillars utilize generic services from the MDM Foundation layer and extend them with business entity specific services and vertical extensions.

MDM APPLICATIONS

Oracle MDM includes a large portfolio of purpose built master data management applications. The MDM Applications include all MDM Hubs and their corresponding data quality servers. Data Governance is also included.

- Oracle Customer Hub
- Oracle Customer Data Quality Servers
- Oracle Product Hub
- Oracle Product Data Quality Server
- Oracle Site Hub
- Oracle Data Relationship Management
- Oracle Data Watch and Repair

No other vendor on the market has this breath of master data element coverage.

MDM IMPLEMENTATIONS

Oracle has the full set of components for building an MDM solution: Oracle 11g with RAC for the Database; ODI-EE for E-LT, bulk data movement, real-time updates, and data services; Master entity data models; SOA Suite for integration; BPEL PM for orchestration; Portal for the user interface; IDM for managing users; WS Manager for managing services; BI EE for analytics; and JDeveloper for creating or extending the MDM management application. Oracle utilizes these technologies to build its MDM Hubs. Customers who want to build their own MDM solution should use these components as well.

Build vs Buy

"In less than 60 days, Home Depot was convinced that Siebel's CDI solution was the only solution that could give them a single view of their customers. We showed them that we could implement in one year a solution that they could possibly build in five, at five times the cost we proposed."

Home Depot

But, even with a full stack of open flexible MDM technologies, creating a robust MDM application at the heart of this integrated infrastructure can be a daunting task. For example, to successfully manage customer data, the following functionality is minimally required: data import management; a source system management subsystem with full controls over attributes sourced by multiple applications; a relationship management subsystem that can handle unlimited numbers of all possible combinations of matrixed and hierarchical relationships; interaction history subsystem; location management with address correction capabilities; a robust configurable data quality engine for smart searching and duplicate elimination and prevention; workbench assistance for data quality engineers; data augmentation interfaces to third party vendors such as D&B; data security mechanisms down to the attribute; and triggering methodology for propagating data change.

Svilluppo implemented Oracle Customer Data Hub along with 10g Application Server Integration. The implementation only took four months including the integration of 8 different systems.

Svilluppo, Italy

Oracle's pre-built MDM Hub solutions are full-featured 3-tier Internet applications designed to participate in the full Oracle technology stack (as outlined in this paper) or to run independently in other open IT SOA environments. Building MDM solutions from scratch can take years. Oracle's pre-built MDM solutions can bring quality data to the enterprise in a matter of months.

Oracle Implementation Services

Oracle MDM Consulting Services (OCS) has the full range of Operational and Analytical MDM implementation methodologies and experience. OCS delivers capabilities in all areas of MDM deployments:

- **Governance and project control** – Includes a governance model, MDM mission and vision, MDM resources and availability, system and data owners alignment, enterprise data model ownership, data governance & stewardship plan, and change management processes.
- **Scope and business requirements** – Includes data sources, integrated feeding applications, integrated consuming applications, languages and countries, reporting and BI.
- **Data quality and data migration** – Includes data quality in sourcing applications, data quality targets, cleansing rules, survivorship rules, correction processes, cross-reference Ids, 3rd party cleansing tools.
- **Integration process and workflow** – Includes connectivity standards, data structure mappings, process flow coordination, error handling, security, performance & scalability.
- **Technology and architecture** – Includes migration technology, integration technology, analytics technology, federation, and process orchestration.
- **Data center and operational considerations** – Includes SLAs, high availability, capacity planning, and monitoring.

Using Oracle's proven methodology (Oracle Unified Method - OUM), project steps are broken down into logical phases, with identified tasks and goals within each phase. Oracle Consulting Services know how to bring home MDM projects of any size.

CONCLUSION

It has been said that data outlasts applications. This means that an organization's business data survives the changing application landscape. Technology advancements drive periodic application re-engineering, but the business products, suppliers, assets and customers remain. Oracle's Master Data Management (MDM) solution is a set of applications (MDM Hubs) designed to consolidate, cleanse, govern, and share these key business data objects across the enterprise and across time. It includes pre-defined extensible data models and access methods with powerful applications to centrally manage the quality and lifecycle of master business data.

If bad data impacts an operation only 5% of the time, it adds a staggering 45% to the cost of operations.

Poor data quality cost business' 10% to 20% of revenue!

Thomas C. Redman,
DM Review

Clean consolidated accurate master data seamlessly propagated throughout the enterprise can save companies millions of dollars a year; dramatically increase supply chain and selling efficiencies; improve customer loyalty; and support sound corporate governance. In this MDM space, Oracle is the market leader. Oracle has the largest installed base with the most live references. Oracle has the implementation know how to develop and utilize best data management practices with proven industry knowledge. Oracle's heritage in CRM, SCM, PLM, and ERP development insures a leadership position for integrating master data with operational applications. In addition, Oracle MDM leverages AIA and the best in class SOA infrastructure with the award winning Fusion Middleware suite and the best EPM and BI infrastructure with Oracle EPM and the OBI EE suite. These strengths have lead to a large Ecosystem with a large number of partners. These are the reasons why Oracle MDM provides more business value than any other solution available on the market.

Utilizing Oracle MDM Applications, companies around the world are operationalizing their data warehouses; consolidating systems; modernizing applications; re-engineering business processes; improving their reporting; increasing target marketing effectiveness; improving customer loyalty scores; managing risk more efficiently; accelerating new product introductions; and creating solid data foundations for CRM, ERP, PLM and SCM implementations.

Oracle MDM Hubs deliver a single, well defined, accurate, relevant, complete, and consistent view of master data across channels, departments, and geographies. The results for companies who implement Oracle MDM solutions are dramatic. Over 850 companies and organizations are managing billions of master data records with Oracle MDM. Companies such as Cisco, GE, Fidelity, Motorola, Dell, Symantec, Zebra, Telecom Italia, Home Depot, Supermarchés Match, Toyota, and Scottrade are realizing the promise of consolidated, clean, consistent master data feeding their operational and analytical systems. Companies are achieving that elusive goal: a single version of the truth about their business across the enterprise.

Master Data Management
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