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# Information and SOA

## Gaining greater insights through Master Data Management

### Executive Summary

*Information management, which includes both data and content management, is an essential building block for Service-Oriented Architecture (SOA). By taking a service oriented approach to information, you can achieve much greater value from your information assets. Implementing Master Data Management services provides a multiplier effect by delivering high value business services on top of an information integration services.*

### Main Findings

- **Data is a critical component of an organisation's IT infrastructure**  
However, multiple different applications and databases contain common information, making it difficult to maintain an accurate and complete understanding of master data entities such as customers, products, and accounts.
- **Information as a Service is required to drive process efficiencies**  
Organisations need to look at the creation of a capability of providing a single view of data to any application or other calling service is required
- **Master Data Management (MDM) provides a key to opening up information as a service**  
MDM enables an organisation to take the common data held across and organisation and its value chains and make this a "single source of truth", providing greater data fidelity, greater responsiveness and greater capabilities for corporate governance and audit
- **Data integration and database federation still have their parts to play**  
The idea behind MDM is not the creation of a single, corporate database holding every piece of data but rather to create a common set of business services to manage master data both in a master data repository, and in application databases if required. Data updates to the MDM central data store can be synchronised to all the other applications that have a copy of that master information.
- **Service Oriented Architecture principles make MDM a key component going forwards**  
An SOA needs data that is available as a callable service, and MDM provides the best way to create a single callable information service that presents the common data that multiple SOA services and functions will require.

### Conclusion

The need for data to be easily available, responsive to SOA calling services and functions, and for common data to be correct is driving the need for such data to be held centrally. MDM provides the enabling capability to present common data as informational services, and must be a core part of any SOA project.

*An independent report by Quocirca Ltd.*

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Commissioned by IBM

The logo for Quocirca, featuring the word "quocirca" in a lowercase, sans-serif font. The letters "quoc" are in blue, "i" is in red, and "circa" is in black.

# 1 Information as a Service

A large corporation may typically have many different financial systems, several ERP and CRM systems (or at least different instances of one ERP and CRM system), and a multiplicity of other applications ranging from human resources applications to business intelligence. In practice, these applications are not isolated in a business process sense, but need to intercommunicate and exchange information with one another. As a result, the information architectures of many large organisations can be extremely complicated.

In order to resolve this complexity the concept of a service oriented architecture (SOA) has been developed. While the ideas that underpin this approach are not new, the technologies and standards for SOA that have been developed over the last few years hold out a real possibility of delivering on the promise of greater simplicity. At the same time, the successful implementation of an SOA should provide a much more flexible environment that will support the agility that modern organisations need.

However, although SOA may remove the complexity from application integration, it does nothing to alleviate the equally complex structures that relate applications to the data sources that they access. SOA principles need to be extended into the data layer through the provision of what is usually referred to as information services. These can be thought of as just another type of service aimed at data in much the same way as web services provide services aimed at specific functions. Many times, organisations that pursue SOA for application integration quickly realise the underlying data issues on key data items such as customers, products, and accounts. Therefore, when pursuing SOA, organisations must at the same time also address the foundational issue of master data management to ensure that composite applications have accurate and complete data.

Put simply, an SOA breaks applications down into component services, and then allows these services to be joined together as composite applications that can be rapidly constructed to meet the needs of changing business processes. The advantages of this approach are, firstly, that services can be reused in multiple applications and, secondly, that the architecture of SOA implementations facilitates intercommunication between applications. However, if the data structures and topologies that provide all of the information upon which these services and applications are based is not also addressed, many of the benefits of agility and flexibility that are promised by SOA will simply fail to materialise. Early adopters of SOA soon found out that one of the biggest problems that had to be faced was sorting out the data supporting their SOA initiative.

What is required is a layer that lies above existing data tools such as ETL (extract, transform and load) and EII (enterprise information integration) and which exposes the services provided by these tools to the organisation's applications, while at the same time isolating the applications from the complexity of the underlying technology - an Information Service Layer (ISL). The functions of the various tools are exposed within the ISL to requesting services and applications, which are thereby isolated from the information storage layer. Middleware to carry out this function, using web services APIs to ensure data quality, transformation, movement and federation, has recently begun to appear on the market.

SOA at the application level is about functional development and the renewal of legacy applications and is mainly performed by developers. SOA at the human level is about the use of portal technologies to enable interaction with the web services and the communication, collaboration and workflow systems within the overall infrastructure. Information services is at the data level - data architects (people who understand the sources, relationships, and meanings of information across various systems) build reusable services that application developers can find and use without needing to understand these relationships and sources themselves. The information as a service model makes both development and deployment simpler and more flexible in a way that mirrors the impact of SOA on the application environment.

## 2 Master Data

Master data is the core data that describes the fundamentals of a business, such as its products, its employees, its customers and its suppliers, and all the cross relationships and hierarchies associated with this data that make it useful to the business. This referential data drives critical business decision making, and is arguably the single most valuable asset an organisation possesses within its IT environment. Yet, problems with master data plague businesses daily, due to incomplete, incorrect, inconsistent or simply inaccessible data.

These lead to:

- inefficient (and sometimes incorrect) communication with customers and suppliers
- duplicated IT systems doing the same roles, which could be consolidated
- customer complaints on purchased items because of incorrect information
- inefficiencies across business units who do not share customer, supplier, or product information.

The reasons for this problem are mainly historical. Traditionally, software was commissioned or purchased by individual business units to satisfy their specific requirements. The data for these applications was likewise stored at the department level, since the business units were each responsible for their own data and managed it locally within their systems. When the need arose to roll up departmental data in support of strategic decision-making, data warehouses and data marts were implemented, yet the source systems - where the data was managed on a daily basis - remained within the departmental applications. The executive level contributed to this data segregation problem by also acting as a department, complete with its own store of consolidated, cleansed and aggregated data that did not easily tie back to any of the source systems from which it came. Data may appear correct at departmental level, but at the global level—where currencies, accounting standards and regulatory requirements all vary—inconsistencies and inaccuracies appear. Even when we moved to enterprise applications, we had siloed databases of information, often with nominal copies of the same information, as each application required a complete record of a specific item.

As a result of this silo approach, most large organisations have multiple database systems, several of which may, for example, hold top-level customer data. As this data is duplicated and maintained in multiple systems and there are inadequate solutions in place to validate its integrity as it changes over time, it often conflicts. The problem is especially acute in global businesses, those with a history of mergers or with independent units operating under different cultures and regulatory structures. Consequently, many organisations struggle to reconcile master data from across the enterprise and regularly miss major opportunities and make costly errors throughout the business.

The solution to this is to come up with a policy for master data management (MDM) and master data integration (MDI) to consolidate and synchronise the information. MDM is aimed at creating one understanding of the most critical information an organisation is dependent upon – having a single record of this that always reflect the known position, where the impact of any transaction, workflow or other data change means that there is no possibility of one application acting against a non-synchronised, and therefore incorrect, version of the truth. MDM also embraces common data-centric processes that are shared among applications, allowing organisations to centralise and reuse business services for common data processes, such as adding a customer or viewing a product description. While MDM is focused on creating a single understanding of referential data, it is also capable of presenting multiple views of that data – to accommodate line-of-business rules/processes that govern who is allowed to access particular data items.

MDM and MDI should be aimed at the subset of data that is common across an organisation – for example, that common data which is held around customers that is needed by the CRM, ERP and SCM systems utilised across the organisation and its value chains. For other types of data, standard database federation and integration technologies can still be utilised, maintaining the investments in current technologies and capabilities.

### 3 Master Data Management and SOA

Master Data Management (MDM) is a comprehensive strategy to determine and build a single, accurate and authoritative source of “truth” of a company’s information assets and deliver this on demand as a service. Using master data at the enterprise level is cheaper and more efficient than maintaining the same data in multiple applications, and eliminates the need for separate, departmentally maintained “versions of truth.” MDM also creates an environment where data “lag” is less of an issue – there is no waiting for a change to a piece of referential data to promulgate and synchronise across the whole organisation. MDM offers an improvement in master data correctness, consistency and accessibility that creates an opportunity for greater competitive advantage.

MDM must serve many consumers of data – from SOA business/application processes, to collaborative internal processes, and analytical users of data. In order to do this effectively, MDM must be multiform – it must manage multiple usage styles of various data consumers and it must manage multiple data domains and the relationships among them. Usage styles include:

- Operational – provide master data to operational applications in real-time via SOA
- Collaborative – manage a collaborative process to author and create master data
- Analytical – integrate with existing analytical applications to provide them with master data in a timely manner, while also integrating specialty analytic processes for master data

The idea of managing master data centrally, outside of business applications, is not new but has taken on new currency by market trends, such as:

- **Value chain collaboration.**  
Companies no longer operate as independent business entities. Instead, business data is exchanged throughout the value chain, via multiple industry specific protocols, on issues of common interest to suppliers, shippers, brokers, partners and customers alike; this requires accurate and consistent referential data to be accessible to all parties, in a secure and auditable manner.
- **Heightened customer service quality.**  
Reliable customer master data - with cross references to family members, company contacts, and services which they subscribe to - is necessary to achieve a holistic customer view and provide a differentiating competitive edge.
- **Portals and e-commerce.**  
The Web has become the single greatest avenue of business data consumption. Without a centralised repository of product/item master data tightly integrated with the corporate Web architecture, companies cannot meet the demand for accurate and timely information.
- **Increasing the pace of organic growth.**  
Organisations are looking to grow within their existing customer base – which requires them to cross-sell effectively to their existing clients. In order to be successful, they require a real-time understanding of the complete customer relationship, as well as knowledge of which products and packages to offer to that customer.
- **Regulatory compliance.**  
A master data management solution can centralise management of the business information necessary to satisfy compliance reporting and answer questions posed by executives, regulators and shareholders.

As companies move to service-oriented architectures, they see the need more and more for information to be available as a service. An MDM solution, together with MDI and real-time synchronisation technologies, becomes a foundational component of SOA. Core business data gets bundled with the data management logic required to use that data and together, they form information services available to requesting users, applications and portals. High

value business services can only be delivered on top of a robust and flexible information platform.

## 4 Industry Specific Implementations

The problems of master data are not specific to an industry, but there are different aspects for a specific industry, for which MDM can be streamlined. Multiform MDM refers to the ability to manage master data domains, as well as usages of that master data; usage patterns include operational (integration of master data with operational applications via SOA), collaborative (to manage a multistep process for authoring and maintaining master data, and analytical (to derive insight from master data). Often, certain industries gravitate towards similar starting points for their MDM strategy, and they typically begin with a single usage style and a few domains. In industries that are more consumer-oriented, such as financial services, insurance and telecommunications, MDM solutions that move an organisation's centre of gravity from contract to customer can be implemented. Then, that view can be leveraged across functions to increase cross-sell, optimise marketing offers, improve service, comply with regulations and deliver a better overall experience to customers. In more product-focused industries, such as industrial manufacturing, electronics and retail, MDM solutions are implemented to manage the collaborative process for creating and defining products and items. That, in turn, makes it possible to collapse key value chains such as new product introduction and drive a complete picture of products consistently out to e-commerce sites, catalogues and both supply and distribution channels.

The key to a "vertical" MDM solution lies in the data model: pre-defining and pre-populating this kind of solution with a master data model specific to a given vertical can help in making these solutions workable and in providing rapid time to capability and time to value.

Take, for example, a large manufacturing company – how can MDM be of value to it? Manufacturing companies have numerous product data and content systems and need a single view of their data and processes. They also tend to have numerous manufacturing systems and ERP systems. Such a large number of different versions of the truth slow decision making, responsiveness and the ability to pursue new business opportunities or react to market forces. In such an environment, implementing a product information management (PIM) solution is a less costly and less risky first step toward an MDM, and one that tends to have a very strong return on investment (ROI). The PIM acts as the central control point to synchronise the master data and processes across all business applications - product life cycle management (PLM), ERP; e-commerce and supply chain - with the ability to manipulate the product and part data to provide relevant views to internal and external users. In this case, the MDM implementation is complementary to the ERP applications.

In addition, external data communication of product information between partners via specific standards (such as GS1 in the retail and consumer products industries, or IAAA in the automotive industry) is very important in improving the supply chain operations of many Industries.

### 4.1 Industry Models

Industry specific models, consisting of integrated data, processes and service templates, can be found for various industries, such as Banking, Insurance, Retail and Health. They foster business and IT collaboration and enterprise-wide approaches, and help deliver industry-specific best practises, ensuring that projects are delivered faster and with less risk. The models are designed to facilitate the deployment of a service oriented architecture, involving infrastructure solutions such as Master Data Management and Data Integration platforms, and help to develop a 'single analytical view of the truth' for clients in that industry.

However, the overall end result tends to be the same – the organisation concerned requires referential data to be stored in a manner that ensures that it is always correct, that it is always available, and that it is responsive to the business' needs.

## 5 Data to include in an MDM and optimising its usage

An MDM encompasses multiple data domains - core data needed to uniquely define objects such as parties (e.g. customers, vendors, suppliers, trading partners or employees), places (e.g. locations or geographies) and other entities (e.g. products or accounts). While not static data, it does not change as frequently as transactional data and is referenced on an on-going basis by business processes and other applications. Transactional data (such as a customer's purchase history or their interactions with a contact centre) should not be part of the MDM, being left within the purview of the owning application.

The key to better performance management and improved business insight lies in the initial choice of what referential data should be included within the MDM, in improving the quality of the master data on which those applications and processes rely, and in ensuring that this data can be easily and rapidly referenced by those applications and processes that are dependent on the data.

- **An MDM solution is only as good as the data stored within it.**  
A good MDM system should ensure that only "good" information gets stored, and should have strong checks to ensure that incorrect or incomplete information is not accepted. It should have a strong workflow capability with data validation rules to ensure that mass data being imported gets fully checked and is rejected if it fails any validation step, as well as validating multiple single updates from users or processes (e.g. adding new customer entries, or adding new product items) when running in production.
- **Improved business insight is gained from internal relationships found and stored in the MDM data.**

Additional internal links in the MDM data are useful for providing improved business advantage that should not be overlooked. As an example, for customer information, cross linkages between family members and their relationships improves business insight as well as providing cross business unit links to services that individuals may have subscribed to. Demonstrating the "bigger picture" of how individuals interact with a company provides better insight on potential additional sell opportunities, both to them and other clients who might see similar benefits in combined services.

For product/item information, many sellers have multiple sales channels, all with different ways of classifying and providing hierarchies of the same products/items that they wish to sell. A good MDM solution will provide the flexibility to support multiple hierarchies, linking to the products/items supporting these multiple sales channels all at the same time.

Master data is the language of doing business – the business objects, definitions, classifications, and terminology that describe business information, as well as the context for recording transaction data, while not holding the transactional data itself. Business and IT need to define enterprise-wide referential data that is linked to the business, which can be used to derive critical business information.

Most companies nowadays have some form of ERP and CRM system to process their day-to-day business transactions. MDM solutions enhance the referential data that forms the context of these transactions, and which includes information about business objects including associated structures and reporting hierarchies. A good MDM solution will have good proven integration with leading ERP and CRM systems, as well as with applications from multiple suppliers, and legacy applications that need to share such referential data.

It is necessary for an organisation to ensure that it understands its data needs, to understand the interdependencies and interactions between its own processes and the data there is in the organisation. Through this, an MDM model can be constructed, often in multiple stages, ensuring that key data is held once, and once only, while ensuring that transactional data and other secondary sources can still be accessed easily and rapidly through data integration and data federation techniques.

The main problem with integrating transaction and other business data has been poor master data. Master data management becomes the focal point for ensuring data quality and consistency and provides the foundation of information integration initiatives.

## 6 Customer Examples

### 6.1 A CDI Solution Integrated with SAP

Honeywell International, a large diversified technology and manufacturing company with complex business-to-business relationships, needed an MDM solution to integrate with its SAP environment. The goal was to allow customer service teams to have different customer views across multiple applications – but all still based on one single, ‘golden’ customer master record.

#### 6.1.1 Customer’s Business Issue

To continue to grow its business and improve customer satisfaction, Honeywell needed to be able to manage and maintain a cross-line of business customer view. It determined that it needed to create a single operational instance of customer data across the entire enterprise. In addition, any solution had to provide a services oriented architecture, integrate with a heterogeneous environment (including SAP applications) and scale to meet the company’s requirements around volume and complexity.

#### 6.1.2 Customer’s approach to solving the business issue

The move toward Master Data Management for Customer Data Integration was a top-down initiative to encourage strategic account and partnership activity across organisations. WebSphere Customer Center, part of IBM’s Master Data Management family of products, was selected to help manage, maintain, and share customer master data company-wide. Customer databases from four business units – plus the corporate supplier database – all now feed into WebSphere Customer Center, which provides the trusted single view of the customer, and interacts with other systems via a consistent set of reusable SOA services.

#### 6.1.3 Customer’s perceived benefits from the implemented solution

By deploying this solution, Honeywell was able to realise its ‘Customer Data on Demand’ strategy and deliver a single ‘customer’ (in this case, an organisation and its hierarchies) view across the business to help it strengthen strategic customer relationships. As a result, it was able to increase its cross-enterprise focus on the customer. By using SOA services as the means of access, Honeywell reduced the integration and maintenance effort for applications which interface to the CDI solution, and furthermore, the information services offered by the solution maintains the integrity of this master data. Specific business benefits were 80% lower order processing and call-centre costs, with projected payback in less than one year; improved customer satisfaction and 92% reduction in new Web site development time and costs.

### 6.2 An End-to-End PIM solution in Consumer Electronics

Panasonic Europe, the European subsidiary of one of the world’s leading consumer electronics manufacturers, wanted a more effective way to create consistent and complete information about its products for customers, dealers and its websites. Due to intense competition, it was looking at ways to increase sales and lower operating costs. One area where it expected to get quick returns was by streamlining data and processes to get new products and modifications out to its e-Commerce sites and print catalogues.

#### 6.2.1 Customer’s Business Issue

With fierce competition and short product lifecycles due to changing technologies, success greatly depends on how quickly new products can be marketed. New product information must be quickly and accurately distributed to regional sales and marketing teams located in every country in Europe, with translations in every European language. Panasonic Europe was manually collecting product specifications from the factory and sending them out for

translation and validation by e-mail, slowing the distribution process. To remain competitive, it needed to speed the distribution of product data to its regional sales and marketing teams.

Historically, when one of its global factories began manufacturing a new product, the related product information – including low-resolution and high-resolution pictures and manuals in different languages - was sent to European marketing departments as Microsoft Excel data. The local marketing people would then have to enrich, translate and distribute this information to the sales force manually. The translating process was extremely cumbersome; for each new product, marketing staff would have to send product information to translation companies via e-mail, receive the translated copy back in an e-mail, and then cut and paste all of this information back into the Excel spreadsheets, Panasonic Europe's Web site, the company's SAP application and a number of other applications. With the sheer volume of products and the number of languages spoken in Europe, the effort involved was colossal.

### **6.2.2 Customer's approach to solving the business issue**

To address this need, Panasonic Europe implemented a solution based on IBM WebSphere Product Center software, a product information management solution that manages the process of creating, enhancing, and distributing product information to customers, dealers, Web sites and other applications. This removed a lot of the manual element of the product information management process.

With the new solution, manufacturing plants input information directly into WebSphere Product Center or it can be imported from SAP, i2 and other applications. Product Managers have final approval and then the workflow sends it out to the agencies for translations. The translations need further approvals and then the information is ready for release. Only new information is sent for translation and all existing material is reused. Panasonic Europe can now simultaneously release the information to its e-Commerce web sites, print catalogue production department and its price change notification process.

### **6.2.3 Customer's perceived benefits from the implemented solution**

This scalable and flexible solution with integrated workflow capabilities helped Panasonic Europe achieve global simultaneous product launches; correct information for catalogues and advertising; faster price change notifications; and better POS integration. In terms of tangible gains, the solution helps reduce the time for creating and maintaining product information by up to 10% and also reducing data entry errors from 5% to 0.1 %. As a result, Panasonic Europe expects to save about €5 million per year. External partners will also reduce their costs by roughly 25%. By improving speed to market, Panasonic Europe now has 2 extra weeks for sales of new items which it is estimated will result in a three and a half percent increase in revenue.

## **7 Conclusion**

Data is the biggest asset within an organisation's technology environment, and yet the growth of data volumes within an organisation, and the growth of the number of applications and databases in use within an organisation, means that it is increasingly difficult for a company to gain any real information and knowledge from the data. Normal data integration techniques, looking at federating databases to gain access to multiple databases has a part to play, but the underlying problems will still remain – that there are too many instances of the same data held by the company, and that there may well be problems with data quality between this referential data.

Master data management provides a means of presenting this referential data from a single source, and makes the source available to all other systems as an information service. As we move towards a service oriented architecture infrastructure, the need to have referential data available as a service will grow.

MDM and SOA fit together closely; to optimise its use, MDM does require ancillary IT systems around it for importing data from multiple sources, synchronising data back to other applications and providing user access to employees and partners to update its data with the

correct security in place. Quocirca advises that MDM be seen as an inherent part of any SOA project, and that clients should evaluate who can provide a complete solution, not only the MDM component on its own.

## About Quocirca

Quocirca is a company that carries out world-wide perceptual research and analysis covering the business impact of information technology and communications (ITC). Its analyst team is made up of real-world practitioners with first hand experience of ITC delivery who continuously research and track the industry in the following key areas:

- Business Process Evolution and Enablement
- Enterprise Applications and Integration
- Communications, Collaboration and Mobility
- Infrastructure and IT Systems Management
- Utility Computing and Delivery of IT as a Service
- IT Delivery Channels and Practices
- IT Investment Activity, Behaviour and Planning
- Public sector technology adoption and issues

Through researching perceptions, Quocirca uncovers the real hurdles to technology adoption – the personal and political aspects of a company's environment and the pressures of the need for demonstrable business value in any implementation. This capability to uncover and report back on the end-user perceptions in the market enables Quocirca to advise on the realities of technology adoption, not the promises.

Quocirca research is always pragmatic, business orientated and conducted in the context of the bigger picture. ITC has the ability to transform businesses and the processes that drive them, but often fails to do so. Quocirca's mission is to help organisations improve their success rate in process enablement through the adoption of the correct technologies at the correct time.

Quocirca has a pro-active primary research programme, regularly polling users, purchasers and resellers of ITC products and services on the issues of the day. Over time, Quocirca has built a picture of long term investment trends, providing invaluable information for the whole of the ITC community.

Quocirca works with global and local providers of ITC products and services to help them deliver on the promise that ITC holds for business. Quocirca's clients include Oracle, Microsoft, IBM, Dell, T-Mobile, Vodafone, EMC, Symantec and Cisco, along with other large and medium sized vendors, service providers and more specialist firms.

Sponsorship of specific studies by such organisations allows much of Quocirca's research to be placed into the public domain.

Quocirca's independent culture and the real-world experience of Quocirca's analysts, however, ensure that our research and analysis is always objective, accurate, actionable and challenging.

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