

Field Report: IBM InfoSphere MDM Reference Data Management Hub

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Why is “Reference Data Management” So Important?

Reference Data Management (RDM) is a relatively new offspring of Master Data Management (MDM) functionality to provide the processes and technologies for recognizing, harmonizing and sharing coded, relatively static data sets for “reference” by multiple constituencies (people, systems, and other data). Many current commercial RDM solutions from vendors such as IBM, Informatica, Orchestra Networks, SAP and Software AG re-purpose their MDM hub functionality to manage reference data as a special type of master data. Such a system provides governance, process, security, and audit control around reference data mastering. The RDM system also manages complex mappings between different reference data representations across the enterprise. Most contemporary RDM systems provide a publish-subscribe model for the sharing of such reference data.

Prior to the availability of commercial RDM solutions, many organizations built out customized solutions using existing software such as RDBMS, spreadsheets, workflow software (business process management or BPM) and other tools. Such systems too often lacked change management, audit controls, and security and have increasingly become compliance risks. Because reference data is used to drive key business processes and application logic, errors in reference data can have a major negative and multiplicative business impact. Mismatches in reference data can have a major impact on data quality, can affect the integrity of BI reports, and is a common source of application integration failure. These systems suffered for a number of reasons, and just as businesses no longer build their own custom CRM, ERP, and MDM systems, so too are organizations acquiring commercial RDM solutions which can be easily tailored or configured and which have the full ongoing support of a major software vendor. Within the realm of commercial RDM solutions, there now exist two main families -- “multi-domain RDM” and “real-time RDM”. “Multi-domain RDM” solutions provide for non-industry specific solutions such as human resource data, ISO country codes, and other non-volatile reference data to be mastered and shared. “Real-time RDM” is very high performance solution for use in the capital markets industry (brokers, asset managers, and securities services firms) as well as command and control military/intelligence markets.

Increasingly, many large enterprises have begun to make RDM their initial test case or proof-of-concept for their MDM evaluations. Concurrently, MDM vendors are rushing to market RDM solutions to apply an MDM approach for centralized governance, stewardship and control. Cognizant, iGATE Patni, Kingland Systems, Wipro Technologies, and other systems integrators will move into the “securities master” market (via OEMing of Informatica and IBM MDM) and take advantage of the pricing umbrella of GoldenSource. By 2015, pervasive, low cost RDM will be commoditized via the efforts of Microsoft and Oracle as these vendors provide low or no-cost RDM solutions as part of their software families. Moreover, as many large enterprises have begun to make RDM their initial test case or proof-of-concept for their MDM evaluations, the vendor community is responding by providing easier-to-manage entry points into RDM use cases using either existing MDM platforms or purpose-built RDM solutions which use MDM as their foundation. Clearly, managing “simple” reference data will prove to be a key sales entry point for large enterprises and their MDM vendors. Additionally, RDM can be expected to become a “ramp up” point of entry for many organizations planning for CUSTOMER, PRODUCT master and other domains, as well as an entry point into master data governance.

Clearly, Reference Data Management is a major IT initiative being undertaken by a large number of market-leading global 5000 enterprises. Both as an IT discipline and a commercial off-the-shelf software solution, RDM solutions are being brought to market at an increasing pace. Additionally, RDM is a good entry-level project to show success for initial MDM investment which can be built on as a data governance model.

BOTTOM LINE: The July 2012 general availability release of IBM's RDM hub represents the IT industry's first purpose-built, enterprise-strength multi-domain RDM hub. Based on what was formerly known as IBM MDM Server (now known as IBM InfoSphere MDM) and a co-development effort with multiple large IBM customers, the product is an attractive enterprise-ready solution for those organizations requiring reference data management. During 2012-13, organizations evaluating RDM solutions should review their use cases and how they map to IBM's RDM hub solution, independent of existing IBM MDM investments.

The "Field Report" Methodology

2012-13 "MDM & Data Governance Road Map". Part of the deliverables for our client Advisory Council is an annual set of milestones to serve as a "road map" to help Global 5000 enterprises focus efforts for their own MDM programs. For planning purposes, we thus annually identify ten milestones which we then explore, refine and publish via our MDM Alert research newsletter. This set of "strategic planning assumptions" presents an experience-based view of the key trends and issues facing IT organizations by highlighting: Master Data Management, Data Governance, Customer Data Integration (CDI), Product Information Management (PIM), and (as of 1H2012) Reference Data Management (RDM).

Thus the 2012-13 MDM road map helps Global 5000 enterprises (and IT vendors selling into this space) utilize these "strategic planning assumptions" to help focus their own road maps on large-scale and mission-critical MDM projects. During the following year, we use these milestones as the focus for our analyst research in that every research report we write either confirms or evolves one or more milestones as its premise:

1. [Pervasive MDM](#)
2. [Data governance](#)
3. [Business process hubs](#)
4. [Universal MDM](#)
5. [Reference data](#)
6. [Social MDM](#)
7. [Identity resolution](#)
8. [Big data](#)
9. [Business-critical MDM](#)
10. [Budgets/skills](#)

As an industry-funded multi-client study, the MDM Institute recently released its **"Reference Data Management: Market Review & Forecast for 2012-15"**. Among other benefits, this industry report provides insights into: what is RDM, what are the business drivers for RDM, what are the major use cases, what are the technical challenges, who are the major solution providers (software vendors and consultancies), how to evaluate such solutions, and what are the best practices for RDM in the large enterprise. Additionally, the MDM Institute is providing a series of Field Reports which will provide details on the merits and caveats of the variously marketed commercial multi-domain RDM solutions. Please reference <http://tcdii.com/mdmresearch/researchAgenda.html> for the latest editorial calendar of such Field Reports.

The majority of this Field Report on IBM's RDM hub therefore represents our analyst opinion buttressed by in-depth reviews, evaluations and (often) hands-on proof-of-concepts executed by the membership of the MDM Institute's Advisory Council.

Evolution of IBM InfoSphere MDM Reference Data Management Hub

IBM's RDM hub is arguably the first-to-market commercial RDM solution. While there have been a number of solutions that specifically address the straight through processing (STP) and real-time requirements of the capital market industry (i.e., Asset Control, Eagle, GoldenSource, et al), IBM's RDM hub is the first commercial product to address the general purpose, "multi-domain" RDM market. Specifically, IBM provides out-of-the-box RDM services to centrally create, change and distribute reference master data across an enterprise's entire landscape.

IBM's RDM hub is the result of an 18 month collaboration between IBM and two large clients: a major financial services provider (DNB ASA), and IBM's Office of the CIO (whose "use case" is the management of all reference data relative to IBM's web sites). IBM's RDM hub was first previewed as a prototype in 2009 at IBM's large enterprise software user conference Information on Demand (IOD) in Las Vegas.

The focus of IBM's RDM hub is delivering out-of-the-box functionality to provide and manage enterprise-strength master reference data. It is vital to note that IBM's RDM hub makes full use of the robust custom domain capability of IBM's market-leading InfoSphere MDM technology. In other words, IBM's RDM hub treats reference data as yet another type of master data domain similar to the way the InfoSphere MDM software manages CUSTOMER and PRODUCT master data. This provides a number of major advantages to the deploying organization:

- Common MDM support services to administer and deploy
- Common MDM infrastructure to manage
- Proven extensibility in production environments
- Full Service-Oriented Architecture (SOA) support via InfoSphere MDM's standard web services layer
- Broad commonality with the dominant IBM MDM hub in the Financial Services industry (especially banking and insurance) which provides a full-fledged ecosystem of trained and experienced employees and consultants

IBM's RDM hub is designed as a pre-built, user-configurable purpose-built solution, in contrast to the toolset approach espoused by other vendors that require extensive coding to build a new custom domain. IBM's RDM hub can manage the reference data used within IBM's MDM and BI subsystems as well as integrate with IBM's Business Glossary. The product is offered as a member of the IBM InfoSphere MDM family, and -has already been tested and vetted at a number of large IBM customers

IBM MDM Family

IBM InfoSphere MDM Standard Edition - formerly *Initiate Master Data Service (MDS)*

IBM InfoSphere MDM Advanced Edition - *IBM MDM Server (formerly IBM WebSphere Customer Center & DWL) plus the former Initiate MDS*

IBM InfoSphere MDM Collaborative Edition - formerly *MDM Server for PIM (formerly WebSphere Product Center)*

IBM InfoSphere MDM Enterprise Edition - *Collaboration Server plus the former Initiate MDS plus IBM MDM Server*

IBM MDM Custom Domain Hub - formerly *Master Information Hub, this OEM version of IBM MDM Server enables customer domains to be developed by OEMs or IT organizations*

IBM Reference Data Management Hub - *An enterprise hub to manage the publishing & subscription of reference data from a central point which adopts an MDM approach to managing such data*

Source: The MDM Institute

Summary Evaluation - Top 10 Evaluation Criteria

As part of the interactions with its Customer Advisory Council, the MDM Institute captures and promotes models such as "top 10 evaluation criteria" for key MDM-related subsystems. During 2H2011 and as part of the background research for the much more comprehensive "**Reference Data Management: Market Review & Forecast for 2012-15**" report, more than thirty Global 5000 size enterprises shared their software evaluation processes and also contributed commentary and supporting details for a set of "top 10" evaluation criteria for RDM solutions. These evaluation criteria (figure 1) are discussed in more detail in the above referenced market study. The majority of this Field Report in turn takes these "top 10" evaluation criteria as a framework to discuss and understand the capabilities of IBM's RDM Hub.

1. Ability to Map Reference Data - IBM RDM's underpinnings include the ability to maintain a canonical view of reference data to enable the creation of a "standard" across the enterprise. However, not every application can consume or use the canonical representation. An RDM hub therefore must be able to manage application-specific or local representations of a reference data set in addition to the canonical data set. "Maps" enable a steward to create mapping relationships between the values in different sets. This includes the relationship between an application-specific set and the canonical set. These mapping relationships enable related values to be maintained in a synchronized way and supports the transcoding between the codes and values of the different representations of a set. An example in the healthcare industry is the need to map from the World Health Organization's historical ICD-9 codes to the newer ICD-10 codes. This ability to map between application-specific and canonical versions of reference data is key. With IBM's RDM hub solution, such RDM "maps" are treated as first class entities with their own versioning and life-cycle management. Converting values between different system formats is a critical mapping capability (e.g., one application representation to another). IBM's RDM hub supports 1:1, 1:many and many:many mappings between reference data set values. Such a mapping capability makes it relatively easy to automatically manage how changes to a set get propagated to related sets and maps. Furthermore as changes are made to an application-specific reference data set, the data steward (subject matter expert or SME) can easily identify those changes and determine whether they require new entries to be created.

Figure 1 - RDM Evaluation Criteria

1. **Ability to map reference data**
2. **Administration of reference data types**
3. **Management of reference data sets**
4. **Architecture**
5. **Hierarchy management over sets of reference data**
6. **Connectivity**
7. **Import and export**
8. **Versioning support**
9. **Security & access control**
10. **E2E lifecycle management**

Source: The MDM Institute

2. Administration of Reference Data Types - One of the common problems with homegrown reference data solutions is that the many different types of reference data cannot be easily represented by a single data model. The data model needs to be constantly changed and extended to support new reference data sets, and new properties specific to the varied types of reference data being managed. This typically requires development work and IT intervention. IBM's RDM product provides a default set of out-of-the-box properties that is common to all reference data sets - and new properties can be added to support specialized "types" of reference data without any coding. For example a color reference data set might require an additional property for storing the hex code for a color – with RDM a color type can be created which adds the hex code to the base set of properties of the default type. This ability to flexibly model reference data structures without making database changes (and re-generations and re-loads) reduces the need for ongoing development to support new types of reference data. In effect, IBM's RDM hub provides a semantic layer capability transparently on top of the

relational DBMS underpinnings of the InfoSphere MDM technology. New attributes can be defined at both the set level and value level via the RDM UI without requiring any programming. Once a type has been created, new reference data sets can be created based on that type.

3. Management of Reference Data Sets - IBM's design point for its RDM hub is the "business user". By providing intuitive UIs and a flexible data model, an enterprise can quickly install, configure and import reference data with minimal need for ongoing IT involvement. IBM's RDM hub enables reference data stewards to immediately perform role-based CRUD (create/read/update/delete) operations over an enterprise's reference data sets -- with full end-to-end (E2E) lifecycle management and versioning. With the business user as the design point, all of the UIs and stewardship processes are thus defined for RDM, not MDM. This is in contrast to RDM solutions built as a custom domain on a multi-domain MDM platform. Such RDM-via-custom-domain solutions typically entail more initial implementation work than a purpose-built RDM packaged offering. In addition, the custom build approach usually requires additional development effort on an ongoing basis. Furthermore, the ability to define folders to group reference data sets together, combined with search and filter functions makes organizing and finding reference data within the IBM RDM hub solution extremely business user-intuitive -- i.e., the solution design point is the business RDM user not an MDM administrator. Comparatively speaking, many other RDM solutions do *not* use code table mapping management but instead take a Swiss Army knife to approach RDM in that each RDM object type is implemented as a separate MDM domain.

4. Architecture - The IBM RDM hub is architected to use an underlying domain model designed specifically for managing reference data which leverages the base IBM InfoSphere MDM platform framework and services for security, business rules, data quality processes, events and notifications, audit, and history. Conceptually, the solution has been designed as a business user application which runs as a stand-alone hub without the overhead of any other MDM domains. Additionally, the RDM solution has been implemented as a first class MDM domain which utilizes the fundamental IBM MDM platform repository and frameworks such as Event & Notification Framework, and History, etc. The RDM hub solution is fully Service-Oriented Architecture enabled and provides/uses a series of robust web services.

5. Hierarchy Management Over Sets of Reference Data - Reference code tables can be flat lists or have a hierarchical code structure. Hierarchical structure is a key aspect of reference data that needs to be managed in addition to the values and mapping relationships. For example, a hierarchy can be defined over values within a code table, or a hierarchy might be defined where each level is a code table in its own right. IBM's RDM hub supports creation of both types of hierarchy over reference data - a hierarchy over the values within a code table (a "tree hierarchy") and a hierarchy where each level is a code table in its own right (a "value hierarchy").

**Figure 2 -
Overview of IBM's RDM Hub**

STRENGTHS

1. ***Robust solution for centralized management, stewardship, & distribution of enterprise reference data.***
2. ***Purpose-built, commercially proven RDM hub***
3. ***Leverages IBM MDM Server as foundation***
4. ***Strong taxonomy support & mappings***
5. ***Ease of deployment, implementation, & use (very different design point from typical MDM)***
6. ***Market momentum***

CAVEATS

1. ***Lack of BPM integration & workflow (needs configurable workflow)***
2. ***Lacks Cloud architecture & SaaS offering***
3. ***Perception of excessive IBM software stack foundation as prerequisite***
4. ***Missing adapters for other IBM software (Discovery, etc.) & other major applications such as Oracle & SAP***

Source: The MDM Institute

An example of such a level-based hierarchy would be city/state/country where city, state, and country are each reference data sets. These hierarchies are defined within IBM's product by creating relationships between the values of the sets at each level. It is both valuable and meaningful to manage the relationships between the values across the sets.

6. Connectivity - It is vital that an RDM solution provide multiple, flexible means of connection to provide maximum "accessibility". Reference data must be made easily available to downstream application systems, remote subscribers, etc. Further, each consumer of RDM data must be able to access the data in a means and format that is most convenient to them. Therefore, RDM solutions must be able to expose the reference data in multiple, flexible diverse ways such as: (a) real-time channels via JMS, (b) on-demand access using SOAP or REST web services, (c) on-demand access or scheduled publication to flat and XML files, and (d) direct connections to remote databases. Each RDM channel must allow for retrieving either all data sets or lookups of specific entries. IBM's RDM solution supports the notion of "managed systems" as references to external systems which represent suppliers and consumers of reference data being managed. IBM's RDM hub supports export of reference data in XML and CSV format via batch export and UI. As expected, RDM additionally supports connectivity to the enterprise via the standard mechanisms provided by the base IBM MDM platform (Web services, MQ series, etc). IBM's RDM hub also provides a subscription capability so that integrations between its RDM and subscribing applications can be parameterized and controlled via the UI.

7. Import and Export - IBM RDM hub provides import and export of reference data in multiple formats. For example, for inbound and outbound mappings from/to data definitions, sources and destinations such as flat files or databases as well as CSV and XML formats. Wizards guide the user through the process of mapping the import columns to the reference data set properties within the hub. Data can be imported directly via the IBM RDM services interface or imported manually through the UI.

8. Versioning Support - IBM's RDM hub supports versioning of reference data sets and related mappings. Such versioning is used in conjunction with lifecycle management to manage changes to the reference data sets and mappings over time. With IBM's RDM solution, hierarchies are related to the version of the set that they are created against. This versioning support manages the lifecycle of a canonical set, the lifecycle of application-specific or local sets mapped to the canonical, and the lifecycle of the mappings themselves.

9. Security and Access Control - IBM's RDM solution provides robust role-based security. For example, CRUD access to a particular entity is controlled by the user's role, the group that the user is in, and related ownership of the entity, and the life-cycle state of the entity itself. This role-based authorization is configurable and integration with LDAP is supported.

10. E2E Lifecycle Management - IBM's RDM hub supports formal governance of reference data, putting end-to-end lifecycle management of enterprise reference data in the hands of business users -- reducing the burden on IT, and improving the overall quality of data used across the organization. This change management process is controlled through a configurable lifecycle management facility that is used by the data stewards to control versions of reference data sets and mappings that are in use. Every reference data set and mapping has a state that corresponds to its current state in the lifecycle (e.g., draft, approved, retired). The user interface is a role-based UI with built-in security, versioning, and review and approval lifecycle management. IBM's RDM solution supports lifecycle management such that lifecycle states and transitions are configurable without requiring development so new lifecycle processes and states can be defined as appropriate for a company's specific governance requirements.

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Competitive Outlook

Competition for a multi-domain RDM product such as the IBM RDM Hub includes:

- Custom-built, manual solutions
- Hierarchy management system adaptations
- Custom MDM domain type
- Multi-domain RDM
- Purpose-Built or Industry-Specific RDM

Custom-Built, Manual Solutions -- Many enterprises struggle with home-grown RDM using spreadsheets and other error-prone manual processes to manage to reference data sets and their relationships to each other. Just as customer-built CRM, ERP and MDM etc. have faded when commercial off-the-shelf solutions became widely available, so too will manual RDM solutions fall into disfavor. With custom-built or home-grown RDM solutions stewards have to rely on IT for changes to functionality and are unable to change the business rules relating to the reference data themselves.

Hierarchy Management System Adaptations -- Organizations can attempt to use simple hierarchy management software, but such systems do not readily support publish-subscribe, classification mapping, etc. Examples include: Microsoft Master Data Services (MDS) or Oracle Hyperion Data Relationship Management (DRM). Many financial departments successfully use reporting like tools such as Oracle DRM for financial product hierarchies, and then in turn take advantage of the hierarchy management capabilities to attempt human resource assets, location assets, etc. However, such systems have not proven enterprise-scalable in our experience.

Custom MDM Domain Type -- Both Informatica (Informatica MDM) and SAP (SAP NetWeaver MDM and SAP Master Data Governance CUSTOMER object) offer the capability for custom domains to be created and managed to implement reference data management. Reports from organizations that have gone this route indicate that it is not as easy to implement RDM as a custom domain type as these vendors promote.

Multi-Domain RDM -- Certain of the commercially available MDM products were architected with semantic layers on relational DBMS which provided flexibility in defining and managing multiple domain types (hence the name "multi-domain" or "multi-entity" MDM). While these products provide good flexibility and ease of use, the market feedback is that such systems incur substantial processing overhead when attempting to scale into a large-scale enterprise solution.

Purpose-Built or Industry-Specific RDM -- Certain enterprises have used SAP's PIM solution as a consolidation type of RDM support. For example, consider SAP's "item master" with its staging areas and mini model for landing reference data which also includes simple workflows. There are also purpose-built RDM solutions which leverage the hierarchy management capabilities of a mainstream MDM platform such as Oracle MDM or IBM MDM -- Oracle's Site Hub and Kingland Systems' Security Master are examples. Other organizations have attempted to manage look-up tables such as RDM data via an existing Aim, Eagle or GoldenSource real-time RDM by simplifying what features are used. The challenge in this scenario is that these premium priced real-time RDM solutions do not represent good economic sense.

Futures for IBM RDM Hub

It is our view that IBM has a very strong vision for RDM going forward. Some of the key areas we believe IBM should focus on include: incorporating business process management (BPM), and enterprise content management (ECM) support for unstructured information.

Currently, IBM's solution is focused on out-of-the-box managed systems and subscriptions. In the future there should be more functionality in defining and managing "consumption" styles, i.e. workflow subscriptions. Organizations are also asking for impact analysis to understand the impact of an RDM change in one table to downstream consuming systems.

Another area needing attention is integration with other reference data consuming applications such as Oracle and SAP applications.

BOTTOM LINE

For the global 5000 enterprise (and increasingly the small-to-mid-sized business), approaching Reference Data Management, the IBM RDM hub can provide lower TCO relative to the alternative of custom RDM frameworks (or re-purposing of the more expensive, real-time RDM solutions).

While IBM RDM is a relatively new product (compared to other MDM solutions such as Oracle DRM, Orchestra Networks EBX, et al), its foundation is the industry proven, rock solid IBM InfoSphere MDM technology. **This MDM foundation (coupled with future IBM investments into this product) will enable more RDM-specific functionality to come to market very rapidly. A challenge for IBM marketing is that the company needs to break through the misconception that "IBM RDM hub requires a full IBM InfoSphere MDM installation as its foundation".**

Coming to market during 2012-13 are RDM solutions characterized by multiple, diverse levels of integration with market-dominant MDM hubs (IBM, Informatica, Oracle, SAP) as well as repackagings of existing mid-market MDM capabilities to address RDM business needs (e.g., Microsoft's RDM product for Microsoft Master Data Services and Oracle's ongoing sales campaign for Oracle Hyperion DRM, etc.). IBM's RDM hub is in the vanguard of such products and is an excellent choice for reference data management in enterprises ranging from SMB to Global 5000 size. Clearly, IBM's RDM solution has certain market advantages in that it is not a re-packaging but rather is a purpose-built RDM solution for centralized management, stewardship, and distribution of reference data within the enterprise.

See you at the next annual MDM & Data Governance Summit in your hemisphere where we will be hosting panels on "Best Practices in RDM" as well as providing certain industry-specific case studies and more on reference data management.



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The MDM Institute is the world's leading research and advisory consultancy exclusively focused on master data management. As chief research officer, Aaron Zornes delivers the technology-related insight necessary for its clients to make the right decisions in their use of master data management (MDM), customer data integration (CDI), reference data management (RDM) and data governance solutions to achieve their customer-centric business goals. The MDM Institute provides authoritative, independent and relevant consulting advice to senior IT leaders in corporations and government agencies, to business leaders in high-tech enterprises and professional services firms, and to technology investors. The MDM Institute delivers its research and advice to more than 60,000 clients in 10,500 distinct enterprises via Twitter, Linked In, Xing, Google+ and email newsletters. Additionally, each year more than 2,000 paid delegates attend its MDM & Data Governance Summit conference series held in London, New York City, San Francisco, Singapore, Sydney, Tokyo and Toronto (now in its seventh year). Founded in 2004, the MDM Institute is headquartered in San Francisco and has clients primarily in North America, Europe and Asia-Pacific. For more information, visit <http://www.the-mdm-institute.com>.

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