

Field Report: TopBraid Reference Data Manager

Monday, October 5, 2015

Why is “Reference Data Management” So Important?

Reference Data Management (RDM) is a relatively new offspring of Master Data Management (MDM) functionality. RDM provides the processes and technologies for recognizing, harmonizing and sharing coded, relatively static data sets for “reference” by multiple constituencies (people, systems, and other master data domains). Certain MDM vendors such as IBM and SAP have re-purposed 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 the mastering of reference data. In addition, RDM systems also manage complex mappings between different reference data representations and different data domains across the enterprise. Most contemporary RDM systems also provide a service-oriented architecture (SOA) service layer for the sharing of such reference data.

Prior to the availability of commercial RDM solutions, organizations built custom solutions using existing software such as RDBMS, spreadsheets, workflow software (business process management or BPM) and other tools. Such systems often lacked change management, audit controls, and granular security/permissions. As a result, these legacy solutions 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 impact the integrity of BI reports and are a common source of application integration failure. Just as businesses no longer build their own CRM, ERP, and MDM systems, so too are organizations beginning to acquire commercial RDM solutions, which can be easily tailored or configured and have the full ongoing support of a major software vendor.

Within the realm of commercial RDM solutions, there are two main families: “multi-domain RDM” and “real-time RDM.” “Multi-domain RDM” solutions are non-industry specific solutions that can span functional areas (finance, risk and compliance, human resources) and content types (ISO country codes, and other non-volatile reference data to be mastered and shared). “Real-time RDM” is typically a 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.

During 2015-16, we believe a great amount of current and next-generation commerce will be facilitated by on-premises and cloud-based RDM solutions that support both “private” and “public” reference data. “Public” reference data is what many people typically think of when they consider reference data. Public reference data is based on standards where overall consistency is a primary goal. Examples of public reference data include industry standards (GS1 GPC), national standards (FIP 10-4, US Census MSA/CSA), International Standards (ISO, ISIC), and data from vendors (Bloomberg, D&B, S&P). “Private” reference data is used to maintain consistency when doing business with external parties. Examples of private reference data include financial and organizational hierarchies and employee organizational structures. Mapping logical connections between different master data domains and reference data illustrates that both kinds of reference data (public and private) have a large number of connections to every MDM domain. This means that an error in reference data will ripple outwards, affecting the quality of the master data in each domain, which in turn affects the quality in all dependent transactional systems. The heavily interconnected nature of reference data is why it requires separate management and 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: TopQuadrant's TopBraid RDM solution is a new entrant into the reference data marketplace. It is a self-service reference data governance hub for subject matter experts that provides "full spectrum" reference data to comprehensively support an enterprise's IT portfolio. Due to its agile-style approach to business data modelling, TopBraid RDM appears to be an excellent choice as a flexible and low cost (yet fast time to value) web-based solution for reference data governance. Additionally, its strong semantic querying features (based on open standards), taxonomy support, and mappings/crosswalks promote business user and data steward self-service that requires only modest initial IT support. Moreover, TopBraid RDM is a purpose-built reference data management solution rather than providing capabilities derived from an operational or consolidation MDM hub. During 2015-16, organizations evaluating reference data solutions where user-directed, agile governance of reference data is the key use case should consider the TopBraid RDM solution – independent of other MDM investments.

The "Field Report" Methodology

2015-16 "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 that 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: MDM, Data Governance, Customer Data Integration (CDI), Product Information Management (PIM), and Reference Data Management (RDM).

Thus the 2015-16 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 is releasing its **"Reference Data Management: Market Review & Forecast for 2015-16"** during 1H2016. 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 that will provide details on the merits and caveats of the variously marketed commercial multi-domain RDM solutions.

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

Evolution of TopQuadrant's Reference Data Management Solution

TopQuadrant is an Enterprise Information Management (EIM) company that helps organizations govern its information irrespective of its structure, origin or location. TopQuadrant was founded in 2001 as the first semantic web consulting company in the US. Working with its first customers, The TopQuadrant team discovered that semantic web standards are especially well suited to providing integrated, next-generation information management and data governance solutions. This realization led to TopQuadrant developing its first product in 2006. TopQuadrant's products are marketed under the brand TopBraid and support reference data governance, business glossaries, metadata management, taxonomy and ontology management. Today, the product family consists of:

- TopBraid Reference Data Manager supports the governance and provisioning of enterprise reference data, including metadata management and a business glossaries module.
- TopBraid Enterprise Vocabulary Net supports search enrichment, content navigation and integration of unstructured data through the use of governed controlled vocabularies, including a content tagging module.
- TopBraid Insight is a virtual data warehouse that enables federated querying of data across diverse data sources as if they were in one place.
- TopBraid Live is a semantic applications server that is the foundation for each of TopQuadrant's products. TopBraid Live has also been used directly by customers and OEM-ed by other vendors to build custom business solutions not supported in the above products.
- TopBraid Composer is an Integrated Development Environment (IDE) and a modeling tool used to extend and customize TopQuadrant's solutions.

TopQuadrant's founders, Irene Polikoff, Ralph Hodgson and Robert Coyne met while working at IBM. The executive team has deep experience in information technology with over 60 years of combined experience in managing technology from concept to revenue. This team has a historical strong commitment to standards-based approaches to data semantics, with the mission of making enterprise information meaningful.

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 technologies and areas of interest. During 1H2015 and as part of the background research for the much more comprehensive “**Reference Data Management: Market Review & Forecast for 2015-16**” 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 TopBraid RDM as an RDM Hub.

1. Ability to Map Reference Data — An RDM hub must be able to manage application-specific or local adaptations of a reference data set (e.g., foreign language versions or additional fields.) along with canonical data sets. In addition, relationships between reference data sets should also be managed. With TopBraid RDM, flexible reference tables support both private (e.g., finance department) and public reference data (e.g., syndicated data such as DUNS and ISO and other standard reference data sets).

TopBraid can accommodate most any reference data that the customer wants to draw into the model via its business user interface. TopBraid RDM supports 1:1, 1:many and many:many mappings between reference data value sets, and comments can be included on each individual mapping. Since RDM captures usage information, services can translate between a code used by one system and the alternative used by another system. Taxonomies and associations can be easily modeled to construct reference taxonomies (e.g., industry classifications, product categories, market segments) and reference data maps (e.g., crosswalk ICD-9 code sets with ICD-10 code sets). 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. Changes may also be shepherded with tailored workflows to curate code changes or enable a collaborative sequence of activities and tasks to keep reference data sets accurate and relevant.

Figure 1 - Overview of TopBraid RDM

STRENGTHS

1. **Robust web-based self-service solution as purpose-built RDM with focus on integration with other tools to provide ‘full spectrum’ reference data in any form & delivery channel**
2. **Model-driven ease of deployment, use & extension**
3. **Supports comprehensive “metadata about reference data” plus strong taxonomy support & mappings/crosswalks**
4. **Business model & semantic querying features based on open standards¹**
5. **RACI-based governance & security with configurable, fine-grained notifications**
6. **On-premise & Cloud-enabled²**

CAVEATS

1. **Curated data sets not currently supplied (planned release, YE2015)**
2. **Just beginning to explicitly market RDM capabilities³**
3. **Underinvested in marketing**

¹ Widely-used, W3C (RDF, SPARQL) semantic-standards based platform

² Apache Docker = AMZN AWS, Azure, et al; SaaS available through Amazon Marketplace

³ Non-RDM customers using TopBraid for business glossaries & other aspects of metadata management include: Bank of America, J&J, JP Morgan Chase, Mayo Clinic, NASA, OECC, OTPP, Lilly, ServiceNow, Syngenta, Thomson Reuters, USAF and other Fortune 1000 companies across different industries including life sciences, financial services, oil/gas, digital media, manufacturing & energy industries

Source: The MDM Institute

2. Administration of Reference Data Types — One of the common problems with homegrown reference data solutions is that a single data model cannot easily represent the many different types of reference data required for the enterprise. The data model needs to be extended to support new reference data sets and new properties specific to the varied types of reference data being managed. Because most MDM solutions use a relational DBMS approach, model changes require development work and IT intervention to enhance the repository, screens, and interfaces. This further reinforces the need for semantic or object-oriented modeling and implementation of reference data. TopQuadrant's RDM utilizes W3C semantic standards-based representation and models for everything in the product, including the data sets, metadata about the reference data, permissions and data quality rules. This provides more flexibility and interoperability than even proprietary object modeling approaches, and the data store is a standards-based NoSQL graph database conveniently persisted using any traditional SQL database. With this platform, TopBraid RDM is able to provide an organization total flexibility in defining diverse reference data types. With absolutely no coding nor involvement of administrators, any authorized user can define a new type of data and associated attributes and relationships. They can also manage information not only about reference data but also about the reference data sets themselves, such as who provides governance, what the onboarding procedures are, and where it is used.

3. Management of Reference Data Sets — TopBraid RDM takes a consensus-driven approach to designing interactions between data stewards and front-line business users. Specifically, its data governance and management capabilities provide stewards or reference data owners the power to tailor the curation, enrichment and approval of reference data on-boarding, changes and distribution. Change management and governance capabilities include: flexible RACI-based notifications, versioning, and "working copies" as virtual snapshots for review and approval before committing to production. The working copy mechanism is also used for verification of compliance of enterprise systems to the approved reference data. These capabilities can enable collaborative co-creation between cross-functional stakeholders across the front-office, back-office and performance management office to deliver reference data sets that ensure business agility and promote trustworthy insights. By providing intuitive UIs and a flexible data model to reference data stewards/SMEs/authors as well as information contributors and consumers, an enterprise can quickly install, configure and manage reference data with minimal ongoing IT involvement. With the business user as the design point, all of the UIs and stewardship processes are thus defined for RDM explicitly. This is in contrast to MDM solutions retrofitted to serve as RDM solutions. Such alternative RDM-via-custom-domain solutions typically entail more initial implementation work than a purpose-built/native RDM solution. In addition, the "custom build" approach usually requires additional development effort on an ongoing basis. Comparatively speaking, many other RDM solutions do *not* leverage the semantic/object data model but instead take a Swiss Army knife approach to RDM in that each RDM object type is implemented as a separate MDM domain.

4. Architecture/Performance — TopBraid RDM takes a configuration-based, model-driven approach to mastering any business entity. This requires absolutely no coding on part of an implementing organization. With the combination of a fully extensible logical data model coupled with a variety of application templates as modeling accelerators, TopBraid RDM provides extreme time-to-value and low maintenance (minimal IT involvement). The product also takes an in-memory approach to managing value sets. End users select a version of information, all of which is brought into memory to facilitate high performance automated attribute maintenance, and to compare alternate business perspectives of historical, forward-looking and production views into fully reconciled master reference information assets. TopBraid RDM leverages 64-bit architectures (H/W, OS) to deliver unlimited memory addressability as well as higher levels of concurrency to scale data processing as well as concurrent users. TopBraid RDM uses a standards-based NoSQL graph database as its repository on top of traditional RDBMS systems such as Oracle, MySQL and Microsoft SQL Server. With this, enterprises can take advantage of the graph database flexibility while enjoying the transactional support and mature backup and recovery capabilities of relational databases.

5. Hierarchy Management over Sets of Reference Data — Reference code tables can be either flat lists or have hierarchies. The hierarchical structure is a key aspect of reference data that needs to be managed in addition to the values and mapping relationships. With TopBraid RDM, a hierarchy can be defined over values within a code table, or a hierarchy can be defined where each level is a code table in its own right. And, any relationship can be used to view and export data as a hierarchy. While the meaning of reference data elements has low rates of change, the relationships, or hierarchies, defined by reference data change more frequently as a business realigns its reporting structures and systems to match changing business requirements. A simple example is how a company may have several definitions of what is included in North America with an alternative reference data set where the Legal department view may include Mexico in North America, yet a Sales and Marketing view may consider Mexico as part of a Latin American grouping. This need to customize, or adapt, reference data hierarchies and definitions manifests itself across all kinds of reference data — especially private reference data from the finance department or domain. For Finance, there are often three main adaptations: tax, regulatory reporting, and managerial. However, “privatized” reference data can cause problems if it loses its association with its original source. This is because sources continue to evolve (especially true for industry standards) and without lifecycle management and ties back to its “public” antecedent, the “privatized” set can quickly get out of sync, reducing the benefit of implementing a standard. This requires that the platform support adaptations while maintaining links to the original data set.

TopBraid RDM provides support for cross-walking both “public” and “private” reference data sets. Common scenarios include mapping: (a) DUNS hierarchies to internal private corporate hierarchies; (b) enterprise risk management hierarchies (to manage credit risk, BASEL II/III, BCBS 239 compliance); (c) Salesforce.com organization structures to each other as well as downstream ERP applications; and (d) industry-specific reference data sets for the entertainment, media and publishing verticals. TopBraid RDM addresses both hierarchies and adaptations of master data. Unlike many other RDM platforms, TopBraid RDM is able to manage complex product hierarches (e.g., CPG and Financial Services) and classification sets (i.e., what level that hierarchy points to in other sets). Via multi-level and even unbalanced hierarchies, RDM can be put to work to model business relationships without limitations.

6. Connectivity — It is vital that an RDM solution provide multiple, flexible means of connectivity to provide maximum “accessibility.” Reference data must be made easily available to downstream application systems, remote subscribers, etc. Furthermore, consumers 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) on-demand access using SOAP or REST web services, (b) on-demand access or scheduled publication to flat and XML files, and (c) direct connections to remote databases. Each RDM channel must allow for retrieving either all data sets or lookups of specific entries. TopBraid RDM supports these three connectivity styles in an agile way; for instance, it enables end-users to easily and quickly create web services for distribution of reference data – without programming.

7. Import and Export — The TopBraid RDM solution 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, file servers or databases, as well as CSV, JSON, and XML formats. Wizards guide the user through the process of mapping the import columns to the reference data set properties within the hub. These mappings are saved and can be re-used in subsequent imports of data with the same structure. Power users may also use a simple scripting mechanism to develop import scripts to handle more complex data transformations which can include callouts to external web services and sources. Data can also be imported and exported using APIs provided in the product as web services. The verification of enterprise system conformance with reference data sets managed by TopBraid RDM is also supported through the product’s import capabilities. For example, a common use is for a web service to import the data used by an application which can then be compared with the respective RDM-governed reference data set.

8. Versioning Support — The notion of “time travel” or “temporal RDM” relates to the ability to traverse forward or backwards in time (“effective dates,” etc.) in support of recreating reference data tables and the hierarchies that manage the reference data relationships. TopBraid RDM 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. 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. It also supports the notion of “temporal” reference data across hierarchies and relationships. As an example, an analytical system needs access to current and prior historical versions of reference data in order to support trending and comparison reporting. Without consistent definitions (or translations), business analytics will be like “comparing apples to oranges.” Access to future dated reference data versions (e.g., “effective date” or “as of” dating for mergers or sales territory reorganizations) can be useful for impact analysis modeling. In addition, TopBraid RDM supports “cross-temporal” relationships/mappings that exist between different versions of the same reference data. This is commonly seen in classification standards such as North American Industrial Classification System (NAICS) or International Classification of Diseases (ICD). Codes in prior editions may have many-to-one, or one-to-many relationships with later editions. For example, in NAICS 2007 two codes exist for soy bean and oil seed processing. These codes were consolidated into one code for the 2012 version of NAICS. Therefore the single code in NAICS 2012 has a one-to-many relationship with codes in NAICS 2007. TopBraid RDM also provides modeling of business rules and constraints (on values and relationships) to maintain referential integrity between master data domains as well as versions (past, present and future).

9. Security and Access Control — TopBraid RDM provides robust and secure data sharing via role-based access control and a fine grained data hierarchy-centric security model. CRUD access to a particular entity is controlled by the user’s role, the groups that the user is a member of, and those groups’ data access privileges associated with the underlying business taxonomy. The solution supports native or external authentication, single sign-on and supports external directories including LDAP and Microsoft Active Directory.

10. E2E Lifecycle Management — TopBraid RDM includes an SME-intuitive data governance facility that provides UI and workflow processes to support formal governance of reference data, thus 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 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 TopBraid RDM solution supports configurable states and transitions without requiring IT development, enabling the formal governance processes to keep up with a company’s changing governance requirements. The built-in RDM governance workflows include task management to capture work items, questions and issues whereby tasks have statuses, comments and discussions. Additionally, TopBraid RDM supports RACI to capture accountability and responsibility, and these governance assignments can be informed through the lifecycle with configurable, fine-grained notifications of changes and other events at the data set and individual code level.

Competitive Outlook

Competition for an RDM product such as the TopBraid Reference Data Manager solution 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 reference data sets and their relationships to each other. Just as customer-built CRM, ERP and MDM 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. Commercial RDM software platforms often struggle to get the attention of large, well-known consulting firms for two reasons: (1) these consultancies would rather sell clients a custom RDM solution and (2) they would rather implement more complex RDM modules that increase implementation cycles and grow billing potential.

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. (e.g., Microsoft Master Data Services (MDS)). Many finance departments use tools such as Microsoft MDS for financial hierarchies and attempt to apply these tools to hierarchies in human resource assets, location assets, etc. To provide rudimentary RDM-like capabilities, any organization that utilizes Microsoft MDS will also need to introduce another 3rd party RDM bolt-on such as Profisee, Riversand or VisionWare. This approach has not proven enterprise-scalable in our experience and introduces multi-vendor complexities. TopBraid RDM has good support for hierarchical reference data sets; it supports these types of relationships to any depth of hierarchy.

Custom MDM Domain Type — Both Informatica (Informatica MDM) and SAP (SAP Master Data Governance CUSTOM object) offer the capability for custom domains to be created and managed in order 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. In multi-domain MDM solutions originally designed for managing customer data (e.g. IBM MDM Server and Informatica MDM), organizations report lack of data modeling flexibility, rudimentary lifecycle management capabilities and limited data governance features, in particular around authoring, workflow and cross-temporal relationship management. TopBraid RDM supports considerable modeling flexibility to enable custom MDM domain types via the ability to use such domains for RDM and other master data.

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 certain of these systems incur substantial processing overhead when attempting to scale into a large-scale enterprise solution. As an architectural/performance tuning option, certain of these RDM solutions offer the ability to run parts or all of the RDM/MDM platform on a standard relational DBMS platform.

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 IBM MDM Server and Kingland Systems' Security Master. Other organizations have attempted to manage look-up tables such as RDM data via an existing Asset Control, Eagle or GoldenSource real-time RDM by simplifying what features are used. The challenge in this scenario is that many times these premium priced real-time RDM solutions do not make good economic sense.

BOTTOM LINE

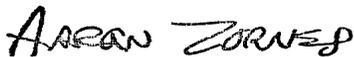
For the global 5000 enterprise — and increasingly the small-to-midsized business — approaching reference data management, TopBraid RDM can provide lower TCO relative to the alternative of ad hoc/DIY RDM based on multi-domain MDM. Key differentiating features include:

- Robust self-service solution that provides “full spectrum” reference data in any form and delivery channel
- Agile-style approach to business data modelling
- Flexible and low cost (yet fast time to value) web-based solution for reference data governance
- Strong semantic querying features based on open standards
- Taxonomy support with mappings/crosswalks to promote business user and data steward self-service that requires only modest initial IT support
- Purpose-built reference data management solution rather than providing capabilities derived from an operational or consolidation hub

Coming to market during 2015-16 are RDM solutions characterized by multiple, diverse levels of integration with market-dominant operational MDM hubs (IBM, Informatica, Oracle, SAP) as well as repackagings of existing mid-market MDM and data governance capabilities to address RDM business needs (e.g., Ataccama, Collibra, Microsoft MDS and Oracle DRM).

During 2015-16 for the key use case of user-directed, agile governance of reference data, organizations evaluating reference data management solutions should consider the TopBraid RDM solution – independent of other MDM investments.

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 industry-specific case studies and more on reference data management.



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Chief Research Officer

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About the MDM Institute

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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