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VIEW POINT

THE CHANGING ROLE OF MASTER DATA MANAGEMENT IN TODAY'S DATA ECONOMY

Abstract

Ever since data emerged as the life force of businesses worldwide, master data management has been an essential capability. Even so, not all organizations were quick to adopt MDM solutions and tools. With recent advances in cloud, big data, AI/ML, and IoT, it is now imperative for enterprises to invest in or enhance their master data management approach, based on their maturity.

This paper looks at the evolution of the discipline of master data management over the years. It considers the most significant challenges of MDM amid digital transformation programs. The paper also lists out the best practices from a proven master data management maturity curve from Infosys that will help organizations derive greater value from their MDM programs.

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Introduction

For years, enterprises have relied on master data management (MDM) tools and solutions to provide the guidelines, principles, and best practices needed to manage master data across the organization. With data becoming the new currency in the digital economy, master data management remains an essential yet somewhat overlooked aspect of data operations. Some enterprises are seeing a shift from discrete MDM tools towards an overall framework that encompasses data standards, data dictionaries, and data processes to manage create, read, update, delete (CRUD) operations.

Innovations in technology and the rapid adoption of artificial intelligence and machine learning (AI/ML) make master data management more vital. Whether it requires a specific tool or an overall framework, MDM has unarguably evolved from a nice-to-have to a must-have capability. Owing to this relevance, enterprises ought to consider how mature their MDM practices are and whether these can support future innovations.

Evolution of Master Data Management

Since the 1990s, master data management has evolved as a discipline. In the beginning, it was considered a single-domain value-added capability within the enterprise system landscape. Later, its relevance grew as enterprises began to prioritize data quality, thereby leading to the introduction of multi-domain MDM tools. This evolution was propelled by the arrival of cloud, big data, AI/ML, and other technologies in the past decade.

For instance, many master data management software providers moved towards Software-as-a-Service (SaaS) models by hosting software on public or private cloud to ensure scalability and provide pay-as-you-go MDM services. Advances in AI/ML led to radical changes in how users view data quality when creating rules engines. Soon, the Data-as-a-Service model grew into prevalence such that providers now offer core MDM services as well as bundled services around data enrichment by tying up with third-party data service providers.

Figure 1 demonstrates the continuum of this evolution and the related technologies that helped MDM and maintenance progress to higher levels.

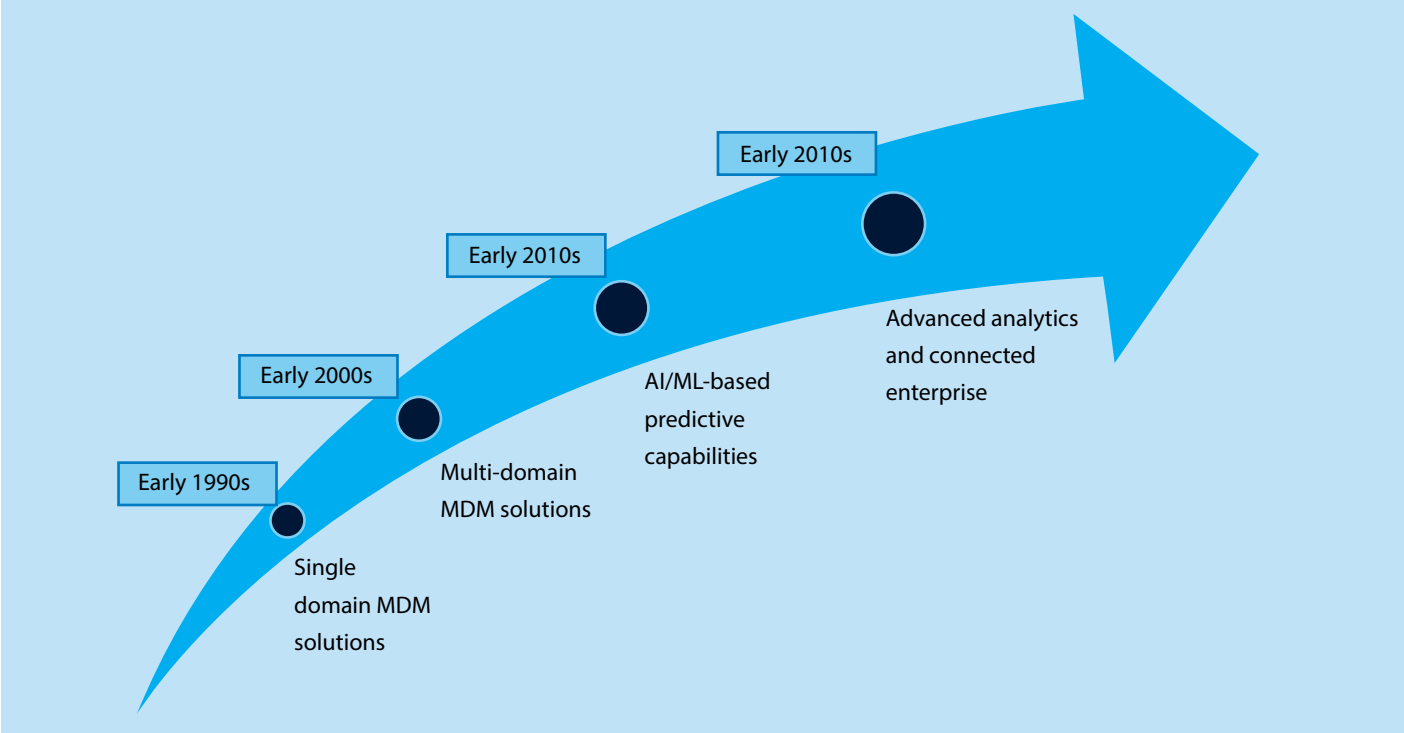

Figure 1 – The evolution of MDM over the years

Key Challenges in MDM Programs

Despite being around for over 20 years, MDM remains challenging for most organizations due to the struggle **with building the right business case.** One of the many arguments here is that master data management is an ongoing program, rather than a fixed implementation. Thus, organizations must be prepared to incur the necessary expenses to maintain the program after go-live due to costs involved in keeping data clean and ensuring data governance. Moreover, **data governance is typically underestimated** and organizations undermine the amount of effort needed to create successful well-governed MDM programs.

Due to the extensive scope of master data management programs, organizations tend to employ **big bang implementations** that often face delays and make it difficult to track the return on investment. Rather, organizations ought to consider breaking up implementations into phases with smaller milestones that deliver incremental value every few months.

There is also the issue of **data ownership**. Typically, MDM programs should be owned and driven by business teams, not IT. The key to successful MDM deployments is to give business users ownership of data, thereby averting failures.

Finally, as businesses become increasingly digital, enterprises wonder where to place MDM initiatives in their digital transformation journeys. For instance, should it be deployed first so as to leverage the benefits during the digital transformation or can it be done in parallel? In Infosys' experience, those running MDM programs in parallel with digital transformation have better outcomes. Organizations that choose to implement a master data management program before embarking on ERP or digital transformation sometimes suffer from time lost in running these programs sequentially. Moreover, if there are delays in completing the MDM program, the organization continues to miss out on the benefits of digital transformation.

Value and Benefits of (MDM_ Master Data Management

The slew of modern technologies including cloud, AI/ML, analytics, and big data have underlined the importance of master data management as a foundational platform for enterprises. As these technologies mature, they transform MDM into a capability that helps today's enterprise do several things. Some of the incremental gains to be achieved by MDM programs are:

Enable predictive decision-making

Every enterprise analyzes innumerable bytes of structured and unstructured data to get insights. Organizations with a well-defined MDM architecture and strategy can manage the steady stream of live data across the enterprise, and scale and consume vast data volumes to derive meaningful insights. In reality, MDM acts as the foundation of enterprise business intelligence, thereby enabling faster and smarter business decisions.

Build self-curating supply chains

A robust MDM strategy can support supply chain digitalization. By offering quality data, it also increases transparency across the supply chain and drives use cases that enhance predictability such as AI-based forecasting and self-curating supply chains.

Auto-classify master data

Classifying data appropriately and maintaining these datasets to run AI/ML models is a largely manual task. The automation of master data management enables business users to use self-service tools that can accurately classify the data based on certain characteristics, thereby eliminating the need for manual data maintenance.

The MDM Maturity Curve for Organizations

Each organization is at a different level with respect to master data maturity. Infosys recommends that organizations assess their current master data maturity, as a first step, so they can effectively move to a desired future state over a period of time. The MDM Maturity Curve by depicted below is a framework that measures the current state of maturity of any organization before they begin their MDM programs.

	Level 1 Initial stage	Level 2 Reactive stage	Level 3 Managed stage	Level 4 Proactive stage	Level 5 Strategic stage
Architecture	• Absence of master data models • Collections of different data dictionaries	• Review of options for information sharing • Attempts to collect data dictionaries into a single repository	• Defined core data model for persistence • Fundamental architecture for a shared master repository • Operational framework for low-level master data lifecycle activities	• Master models are established • Capability to move from index to transaction-based MDM framework • SOA in place for application architecture • Centralized management of business metadata	• Complete transaction integration available for internal applications • Published API interfaces enable straight-through processing involving master data repository
Governance and Data Quality	• Roles, responsibilities, policies, and standards are not defined • No mechanism to track data quality	• Is IT-led and lacks business involvement • Efforts to develop policies and standards • Ad-hoc identification of data quality issues	• Domain-level governance • Policies and standards are defined at the domain level • Data quality rules are defined with manual adherence	• Cross-enterprise multi-domain governance • Policies and standards are developed across domains • Use of data quality tools and metrics tracking	• Well-established cross-enterprise governance • Policies and standards are well-established and endorsed by leaders • Data quality program is adopted enterprise-wide in real-time with metrics reporting
Integration	• Duplicate copies of reference data • Limited data reuse • No reuse of application services	• Initial exploration of data consolidation for analytics • Data warehouse used as a core repository for master data	• Component services available for application integration • Services to synchronize applications with master repository	• Synchronization embedded within data lifecycle services • SOA-driven business application integration	• All application development is driven by business process models and their interaction with core master object models
Business Process Management	• Limited or no business involvement except at the highest level of requirements definition	• Conceptual business process models defined • Initial use of business rules embedded within applications	• Integration of business rules with master data operations • Connectivity between business apps and core data objects	• Reuse of business logic • Integration of business rules within a rules engine • Availability of business rules at the process level	• Most applications integrate with business rules engines • MDM enables embedded predictive analytics
Business Case	• No business case or ROI model	• Tactical IT-led master data projects	• Create an MDM business case • Efforts to define metrics that measure MDM value	• Business case is followed • Financial measurements used to track and communicate the delivered value	• Business case is linked to corporate strategic objectives • Continuous tracking and communication of delivered value

Figure 2 – Master Data Management Maturity Curve

Infosys helps organizations evaluate their current master data maturity and define a phased roadmap of how they can reach the desired state. The framework leverages the strong data management practices at Infosys along with best practices gleaned from successful programs with global customers. Some of these best practices are described below:

- **Start small but think big**. Consider every MDM program as a journey that ought to deliver incremental value over a 3 to 5-year horizon. This way, organizations can realize the short-term value of MDM and keep their MDM programs adequately funded.

- **Choose the right attributes for the master data**. It helps to select these attributes based on what needs to be shared with more than one downstream application.

- **Ensure data traceability during integration**. Set up the right integration architecture such that data exchange across the source, destination, and MDM application is managed through middleware. This will ensure there is traceability of records from source to destination and vice versa.

- **Use data dictionaries and data standards**. Every MDM project requires a data dictionary to manage the attribute definitions, attribute lineage, and any data quality rules associated with these attributes including the data governance-related aspects like ownership.

- **Design sensible onboarding workflows**. It is important to consider the time taken to complete each workflow as well as the roles required to enrich the workflow.

- **Maintain clean data quality**. Cleansing of master data records is mandatory before data is ingested by the hub. Institute a persistent data quality monitoring mechanism to ensure quality of data does not decline over time.

- **Focus on data governance**. While this is the most critical aspect, it is often also the most ignored area in any MDM deployment. A strong data governance organization structure with clearly-defined roles and responsibilities is imperative, without which even the best of tools will offer only limited data quality over time.

The Future of Master Data Management (MDM)

Looking ahead, enterprises can expect that master data management will continue on its evolutionary journey and support diverse futuristic use cases. The combination of big data, AI/ML, and MDM will create predictive MDM applications that are capable of AI-based predictive data profiling, AI/ML semantic classification, and automated data cleansing.

As data sharing becomes commonplace within trusted ecosystems, master data management will become essential in enabling connected enterprises. For instance, the emergence of the 'connected car' is possible through master data platforms among car manufacturers and the vendor ecosystem. It will also enable 360-degree view of customers, products, and suppliers. Finally, multi-domain MDM solutions that cross-leverage master data across entities and domains will help unlock the true potential of data so enterprises can gain competitive advantage.

Conclusion

Since the past 20 years, master data management has evolved from a nice-to-have capability to a critical one for all enterprises that leverage data. Despite being a mature field, MDM involves challenges such as building the right business case, high implementation costs, and syncing with digital transformation programs. With the right approach, MDM can help enterprises across industries unlock new capabilities such as predictive decision-making, auto-classification of data, and self-curating supply chains. To achieve this, enterprises should begin by assessing their current MDM maturity and build a roadmap to the desired state that follows key best practices around data attributes, governance, quality, integration, standards, and more. This will help enterprises improve their MDM practices and sharpen their competitive edge.

About the Author

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He has 22 years of experience in Master Data Management and Supply Chain transformation programs as a data architect. He has helped global clients with MDM strategy and deployments. He has helped clients across multiple industry segments including manufacturing, Hi-Tech, Retail, and services in their master data journey. He is a thought leader in the data management and supply chain management space.

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