Essential Elements of a Master Data Management Architecture

ABSTRACT

Building master data management (MDM) into an IT infrastructure is not as simple as buying a product and plugging it in. Rather, selecting the right MDM architecture is a function of business and technological considerations. Business considerations include management style, organizational structure, and governance. Technical considerations include vendor affinity policy, middleware architecture, and modeling capabilities. In this presentation, Burton Group Principal Analyst, Joe Bugajski, will examine the MDM architecture selection decision, and four of the most common MDM architectural styles: local MDM, hub MDM, federated database MDM, and hybrid MDM. He also will review the characteristics of an MDM system.

BIOGRAPHY

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Joe Bugajski is principal analyst for Gartner's Burton Group Research. He covers IT governance, enterprise architecture, and data standards, data access, master data management, information quality, and data integration. Prior to Burton Group, Joe was founder and managing partner of Venture KPI Research Partners who deliver due diligence for venture capitalists. Before this, Joe was chief data officer for Visa International bearing global responsibility for information interoperability. He was Visa's resident entrepreneur and chief enterprise architect of back office, risk control, and business intelligence infrastructure systems. Prior to Visa, Joe was CEO of Triada, a global business intelligence software maker. Before Triada, Joe was an executive at Ford Motor Company, responsible for engineering information systems and prototype vehicle manufacturing in which function he architected the legendary Taurus/Sable engineering program. Joe is also a data analytics researcher with four patents and twenty-six peer-reviewed publications.

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Elements of an MDM Architecture

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Secure master data first, foremost, and always

Agenda

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- Organizational and technical environment
- Architectural styles
  - Hub
  - Repository
  - Hybrid
- MDM system components
  - Development and Governance Tools
  - Master data definitions
  - Data quality processes
  - Services and message interface
  - Utility services
  - Infrastructure services
- Recommendations

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ORGANIZATIONAL AND TECHNICAL ENVIRONMENT

Organizational and Technical Environment 5

- Organizational issues associated with MDM
  - Do agreements among business units come readily?
  - Does the organization have a strong data governance program?
  - Is the business a holding company?
  - Is MDM strongly supported?
  - Is IT centralized?

Organizational and Technical Environment 6

- Technical environmental issues associated with MDM
  - Is there a strongly preferred vendor or a vendor sourcing policy?
  - Is IT moving toward a services (i.e., SOA) infrastructure?
  - Is there a middleware standard for ETL and data quality?
  - Are there modelers capable of building MDM data models?

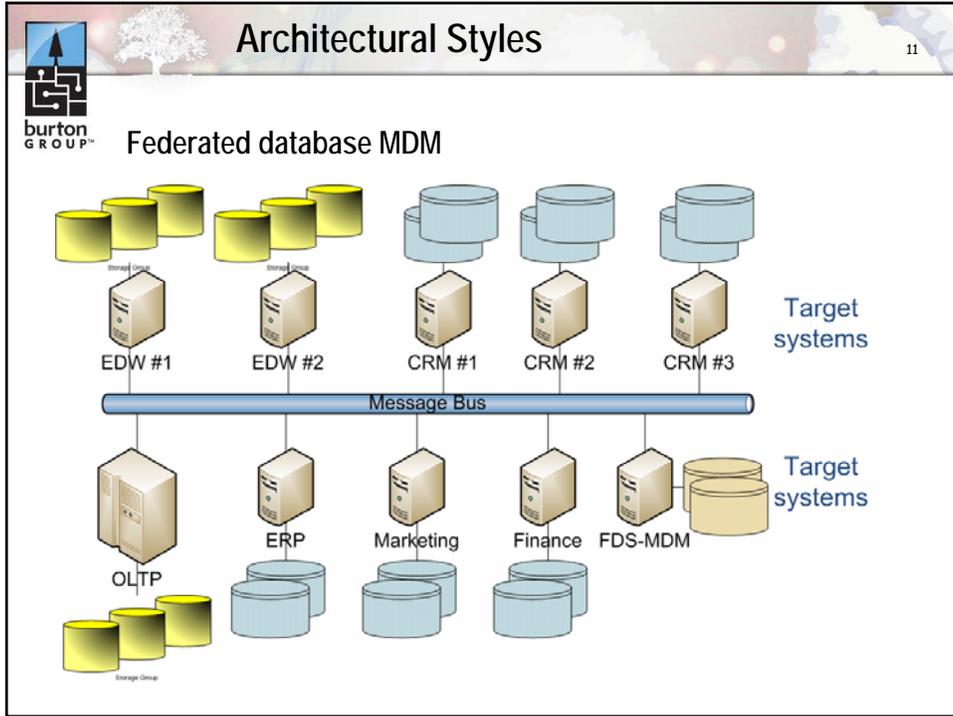*Essential Elements of a Master Data Management (MDM) Architecture*

ARCHITECTURAL STYLES

Architectural Styles

- Architectural style has to match the organizational and technical environment
  - Highly centralized IT use an MDM Repository
  - De-centralized IT use one of three federated MDM styles
- Four common architectural styles
  - Local MDM: use as a starting point, or for a single business unit
  - Hub MDM: use to connect discrete business operations
  - Federated Database MDM: use with ERP systems and large centralized IT environments
  - Hybrid MDM: use in complex IT environments with multiple existing MDM systems

Architectural Styles

Local MDM system implemented for a single business unit

Architectural Styles

Hub MDM architecture in a heterogeneous system environment

Architectural Styles

Federated database MDM

Architectural Styles

Hybrid MDM is one of three federated MDM architectural styles
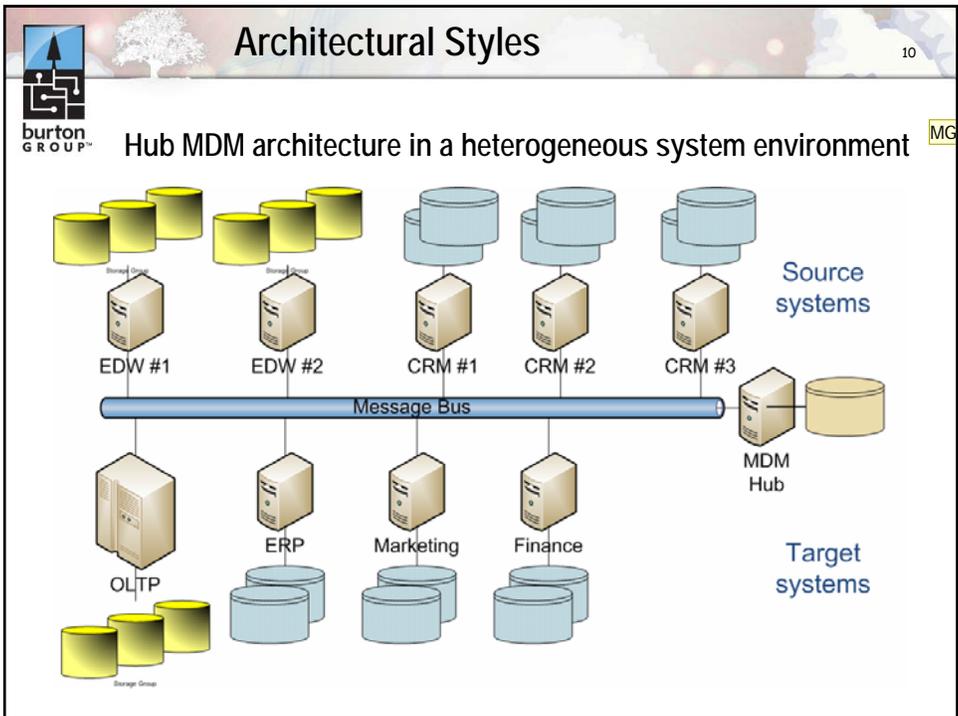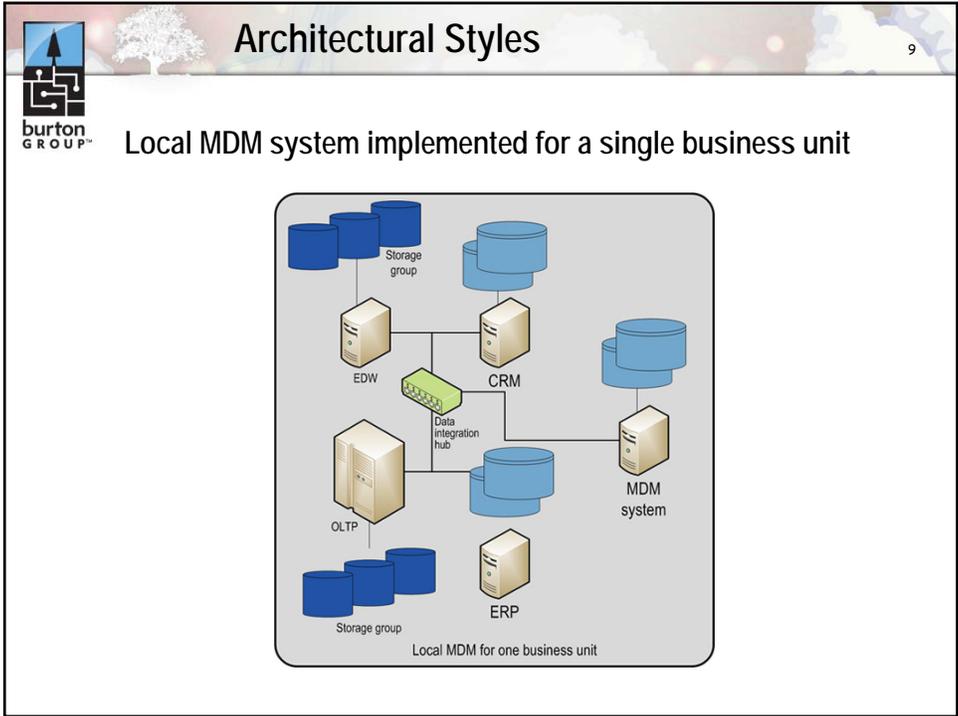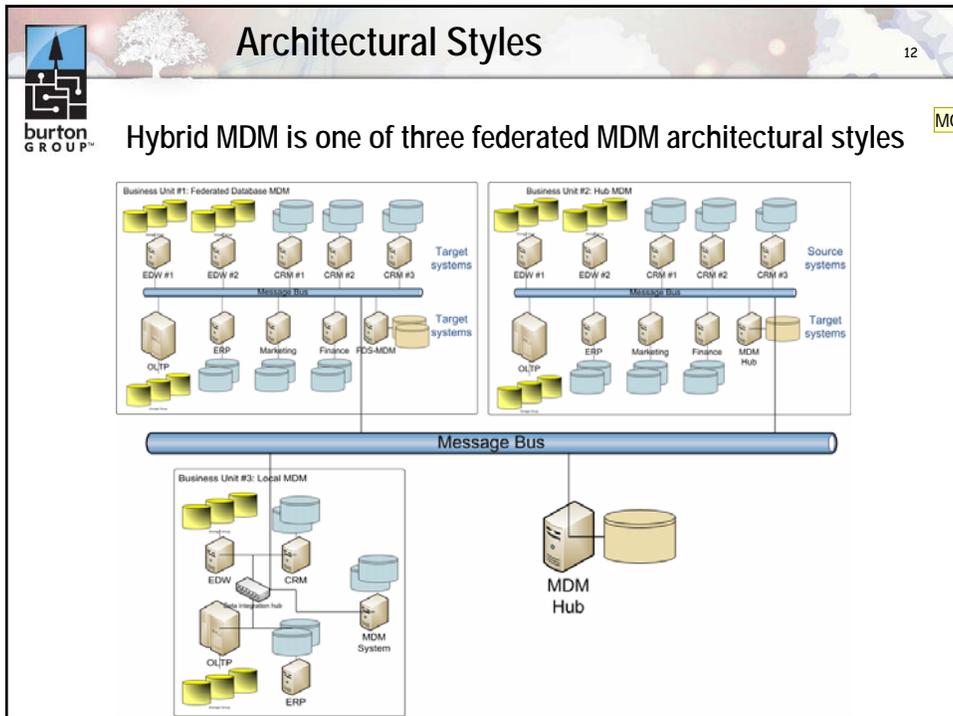
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MDM SYSTEM COMPONENTS

MDM System Components

High-level MDM system architecture
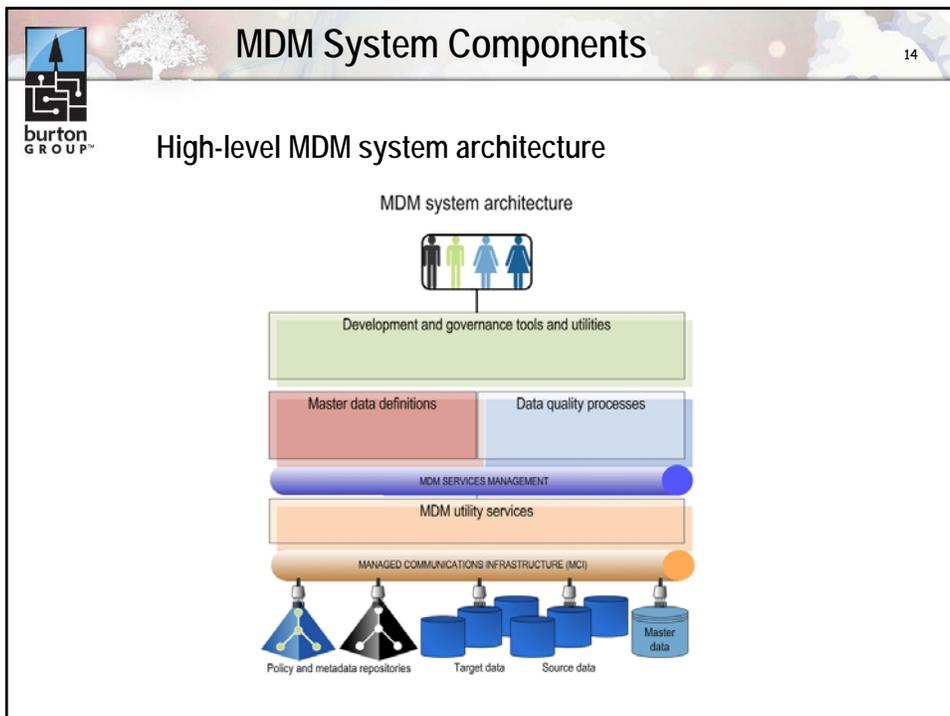
MDM System Components

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- **Development and Governance Tools**
  - Data Governance for Stewards, Custodians, Architects, & DBAs
  - Application Programming Interface
  - Developer Tools (IDE)
  - Custom Connectors for Databases & Repositories
  - Data and Process Modeling
  - System Administration
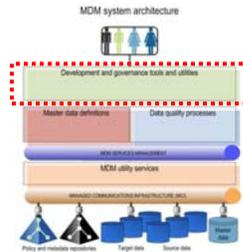
MDM System Components

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- **Master Data Definitions**
  - Source and Target Metadata
  - Data Transformation Models or Rules
  - Semantic Mappings
  - Syntax Mappings
  - Master Data Models
  - Data Deduplication
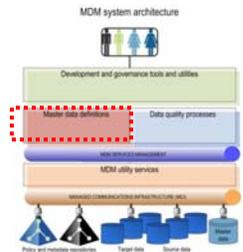
MDM System Components

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- **Data Quality Processes**
  - Product Information Reference Data
  - Name Libraries
  - Entity Name Recognition, Matching and Correction
  - Internet Protocol and Telephony Standards
 - Postal Standards for Place Names and Addresses
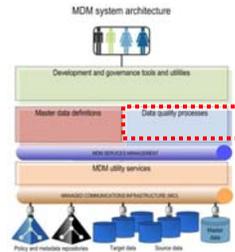
MDM system architecture

MDM System Components

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- **Utility Services**
  - Source and Target Data Access Code
  - Source and Target Data Topology
  - Data Mapping Audit Trail
  - MDM System Security Services
  - MDM System Management
  - Data Mapping Engine
  - Data Profiling and Analytics
  - Data Source to Target Mapping
  - Logging and Roll-Back
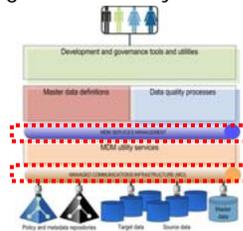 - Metadata and Data Dynamic Synchronization
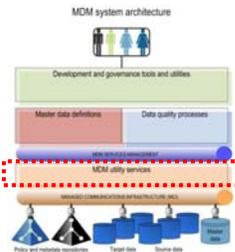
MDM system architecture

MDM System Components

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- **Services and Message Interface**
  - Organizes the MDM components into coherent functionality
  - Provides communications (e.g. XML messages) for MDM components
  - Authenticates and controls access to MDM components
- **Infrastructure Services**
  - Provides a range of utility services for a SOA environment
  - Provides access to policy and metadata repositories
  - Primary source of communication services to source and target systems
  - Provides identity, authentication, access control and general security services

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RECOMMENDATIONS

Conclusions

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- **Choose the architectural style that helps your organization to succeed with MDM**
  - Business units readily agree: chose local or federated database MDM architectural style and use an MDM repository
  - A strong data governance program exists or MDM is strongly supported: choose an architectural style that best meets your organization's technical requirements
  - The business is a holding company: choose local MDM for business units that require master data services
  - Central IT: choose a federated database style and an MDM repository

Conclusions

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- **Choose the architectural style that best fits the design of the IT infrastructure**
  - Work with the company's preferred major platform vendor if a vendor policy exists (e.g., IBM, Oracle, Microsoft, or Informatica)
  - SOA infrastructure works best with a hub MDM or a hybrid MDM
  - ETL and data quality vendors tools duplicate MDM functionality so use an MDM system with minimal number of duplicate services
  - Employ the best modelers to build master data models; if none work for IT, find a consultant with these skills
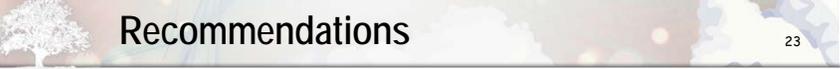
Recommendations

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- Always build a business case to improve poor-quality master data to reduce liabilities and increase revenue
  - Track and report progress to the business case
  - IT and business must collaborate to build an effective governance process for MDM
  - Choose an MDM product that provides governance support
- Pick the architectural style that best fits the organizational response to MDM and the IT infrastructure
- Start small with one master data category and add additional categories of data and additional MDM systems later
- Build local (database) MDM for simple systems but buy MDM for complex systems

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THANK YOU