Master Data Management (MDM) Improves Information Quality to Deliver Value

ABSTRACT- -

Master Data Management (MDM) reasserts IT's role in responsibly managing business-critical information—master data—to reasonable quality and reliability standards. Master data includes information about products, customers, suppliers, locations, codes, and other critical business data. For most commercial businesses, governmental, and non-governmental organizations, master data is in a deplorable state. This is true although MDM is not new—it was, is, and will be IT's job to remediate and control.

Poor-quality master data is an unfunded enterprise liability. Bad data reduces the effectiveness of product promotions; it causes unnecessary confusion throughout the organization; it misleads corporate officers, regulators and shareholders; and it dramatically increases the IT cost burden with ceaseless and fruitless spending for incomplete error remediation projects.

This presentation describes—with examples—why senior IT management should launch an MDM process, what governance they should institute for master data, and how they can build cost-effective MDM solutions for the enterprises they serve.

BIOGRAPHY- -

Joe Bugajski
Senior Analyst
Burton Group

Joe Bugajski is a senior analyst for Burton Group. He covers IT governance, architecture, and data – governance, management, standards, access, quality, and integration. Prior to Burton Group, Joe was chief data officer at Visa responsible worldwide for information interoperability. He also served as Visa's chief enterprise architect and resident entrepreneur covering risk systems and business intelligence. Prior to Visa, Joe was CEO of Triada, a business intelligence software provider. Before Triada, Joe managed engineering information systems for Ford Motor Company. Joe is a noted researcher with four patents and twenty-two peer-reviewed publications.

Master Data Management (MDM)
Improves Information Quality and Value

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USD $2 Billion Revenue Recovered by Master Data Management (MDM) Program!*

* Bugajski & Grossman, "An Alert Management Approach To Data Quality: Lessons Learned From The Visa Data Authority Program" 12th International Conference on Information Quality, MIT, Boston MA, November 2007

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Agenda

- Master data is business critical
- Liabilities in poor quality master data
- MDM is a pivotal IT process
- Governance for MDM
- MDM solution architecture
- A roadmap for MDM success
- Recommendation and conclusion

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Master Data is Business Critical

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Examples of master data

- Customers
- Products
- Suppliers
- Status codes tables
- Metrics (derived master data)

Master Data is Business Critical

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Customer data
- Names
  - Joe – Joseph – J. – Jo
  - Bugajski – Bugagski – Bugjsky
  - Appellation?
- Roles
  - Businessman
  - IT Analyst
  - Customer
  - Patient
- Identities
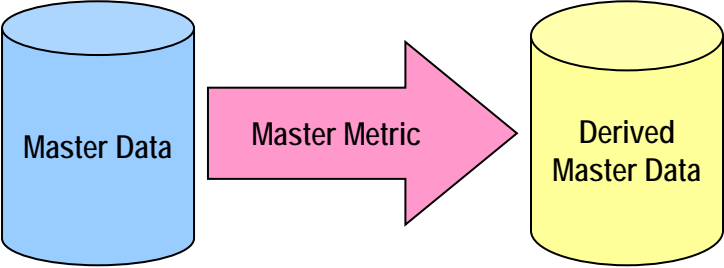 - Janet's husband
  - jbugajski@burtongroup.com
  - DetroiterJoe

Part 1: Understanding MDM

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Derived master data – master metrics operating on master data

Master Data → **Master Metric** → Derived Master Data

- Data value increases after transformation
- Transforming data is a large cost for systems
- Analytical tools provide common metrics
- Standards help to express metrics (e.g., PMML)

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Liabilities in Poor Quality Master Data

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Examples of poor quality master data

- Locations: geographical errors result in poor fraud controls, higher shipping costs, and logistics mistakes
- Codes tables: miscalculation when bit shifted in load data resulting in > $100 million bad credit loaned and lost
- Metrics – derived master data
  - Misleading consolidated financial reports leads to lawsuits
  - Potential criminal charges for regulatory reporting errors
  - Customer profitability miscalculation leads to board firing of CFO
  - Underfunded tax obligations results in controller being jailed
  - Sales calculation errors lead to incorrect commission payments
  - Wrong ratios (e.g., ROI, IRR, and EBIT) misleads shareholders

Liabilities in Poor Quality Master Data

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Master data errors propagate through systems and reports
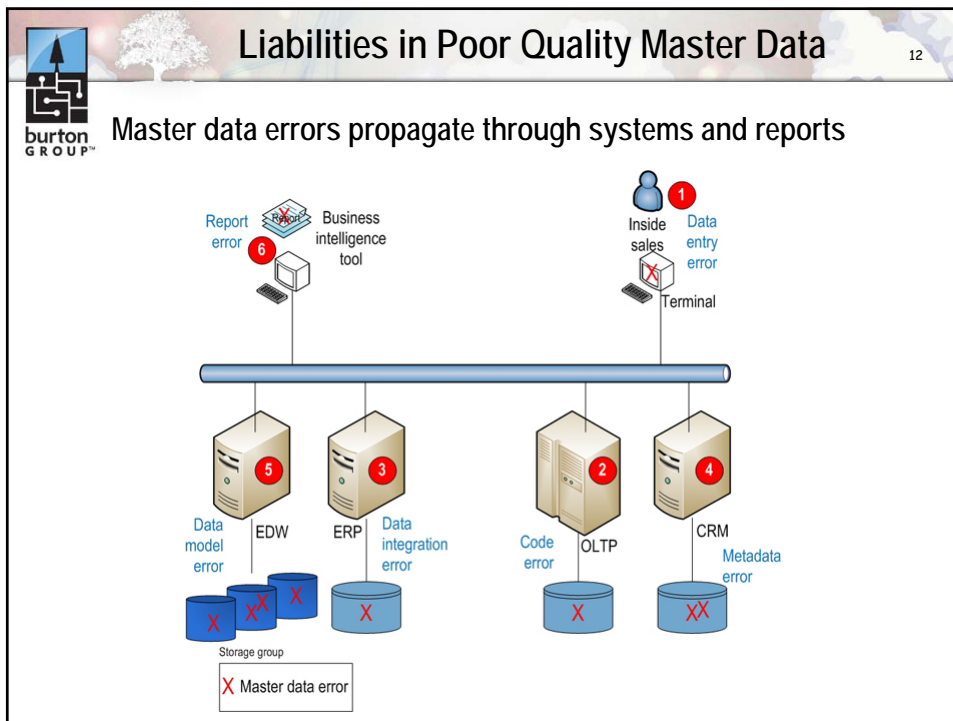
Liabilities in Poor Quality Master Data

Location errors lead to $millions lost revenue

Telephone Number	Country Code
+1-800-224-76	7⊘
+1-800-255-78	2⊘

Liabilities in Poor Quality Master Data

Codes data

Definition of Field Element	Field Code
Field not applicable or acquirer did not specify	
Non-Authenticated Security Transaction	07
Single transaction for a mail or telephone order	01
Recurring transaction	02
Non-secure transaction	08
Installment payment	03
Unknown classification/other mail order	04
Non-Authenticated Transaction merchant tried to authenticate using 3-D Secure	06
Secure Electronic Commerce Transaction	05
Non-Authenticated Security Transaction at a SET-capable merchant	09
Same as Non-Authenticated Transaction that merchant tried to authenticate using 3-D Secure	6
Same as Secure Electronic Commerce Transaction	5
Not applicable	00
? Undefined	5T
? Undefined	7T
? Undefined	2E
? Undefined	7P

Liabilities in Poor Quality Master Data

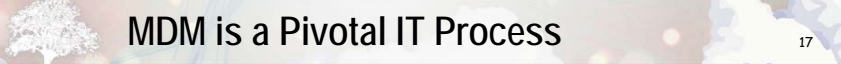**Erroneous master data raises risks**

- Attack surface grows linearly with the number of applications that copy low quality master data
- Likelihood of finding and protecting valuable master data decreases with higher numbers of copies
- Probability of unintentional exposure of valuable master data is higher with increasing numbers of users

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- MDM solution architecture
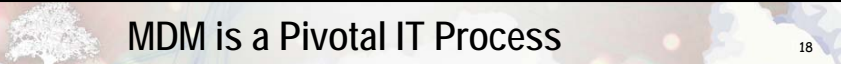- A roadmap for MDM success
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MDM is a Pivotal IT Process

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Steps to MDM

- Model master data: conceptual, logical, and physical
- Build a business case and measure progress to it
- Collect concrete master data examples to show how MDM generates revenue, saves costs, and reduces risks
- Assess master data architecture and quality
  - Use MIT IQ survey to understand data quality issues
  - Select problematical systems (sources and targets) for analysis
  - Analyze master data sources for correct metadata and code
  - Collect statistically valid data samples of master data
  - Determine root causes
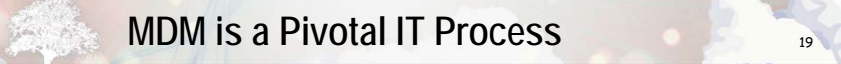- Decide which MDM architectural styles to use

MDM is a Pivotal IT Process

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Identify master data

1. Build conceptual models of master data
2. Logically model master data
3. Use metadata discovery tools on applications
4. Use data quality and data analysis tools to learn syntactical and semantic reliability
5. Compare conceptual and logical models (steps 1 and 2) with discovered metadata and data (steps 3 and 4)
6. Use source code analysis to learn business logic
7. Repair problems found in master data sources
8. Understand unique uses of master data in systems that should be left intact
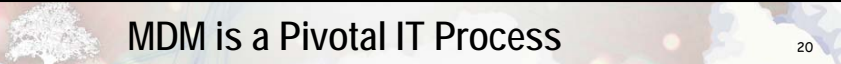
MDM is a Pivotal IT Process

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Standardize master data transformations

- Standardize statistical measures for data reliability, accuracy, interoperability, and consistency
- Standardize transformations and measures for master data and master derived data
- Set a data quality standard threshold below which master data cannot fall
- Establish a formal master data quality control program
- Work with standards organizations to assure industry-wide support of master data in trade messages

MDM is a Pivotal IT Process

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Components of an MDM solution

- IT does not need to buy new tools for MDM but it:
  - Minimally requires senior management to reassert controls
  - Demands critical business data of measurably high quality and reliability
  - Concentrates on effective data management processes
- IT can build internal MDM processes:
  - Simple MDM (e.g., use existing data management technologies)
  - Local MDM (e.g., limit simple MDM to a single business unit)
  - Federated MDM (e.g., use data integration or purchase an MDM product)
- Start with one master data category
  - Customer: accurate and readily available customer data is money
  - For narrower scope apply MDM to transaction codes or locations
- Develop governance processes so master data stays fixed

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Governance for MDM 22

Master data must be governed

- Find the five stories for business value of MDM
- Establish data governance and measure MDM success
- Seek ITG executive council's approval to launch MDM
- Build effective master data governance :
  - Appoint a data governance launch team and team leader
  - Start talking about data value with business units and executives
  - Develop initial precepts for data governance - seek board directive requiring business to manage master data as a material asset
  - Form a data governance council

Governance for MDM

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Data Governance is a Component of IT Governance

Jurisdiction's Statutes, Ordinances, and Orders

Corporation By-Laws and Legal Framework

Board Policies & Principles

IT Governance Precepts

Data Principles

Data Standards

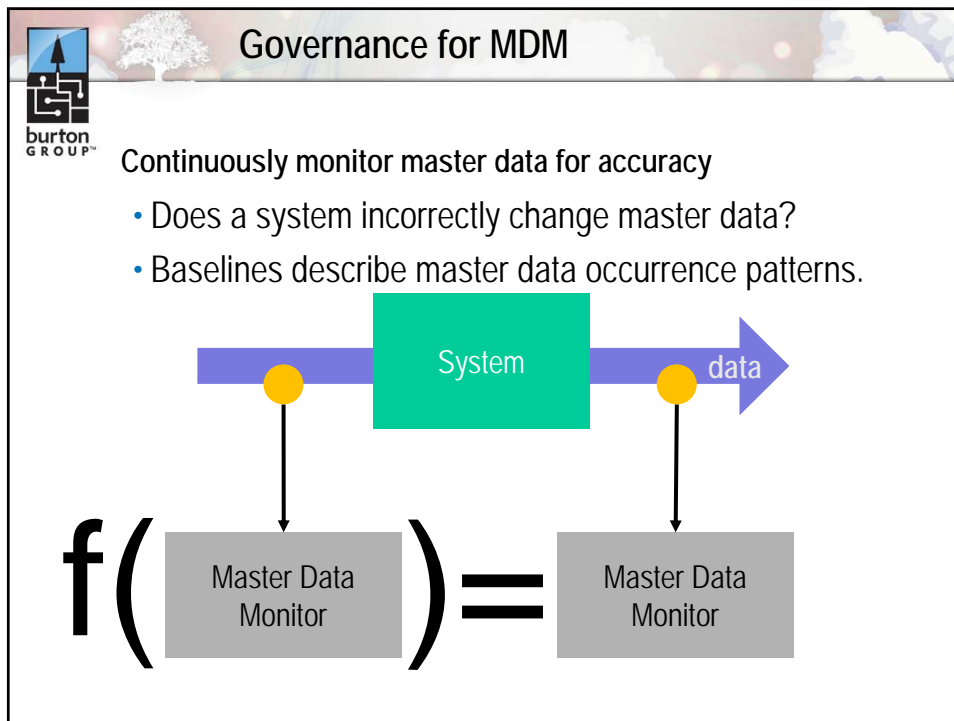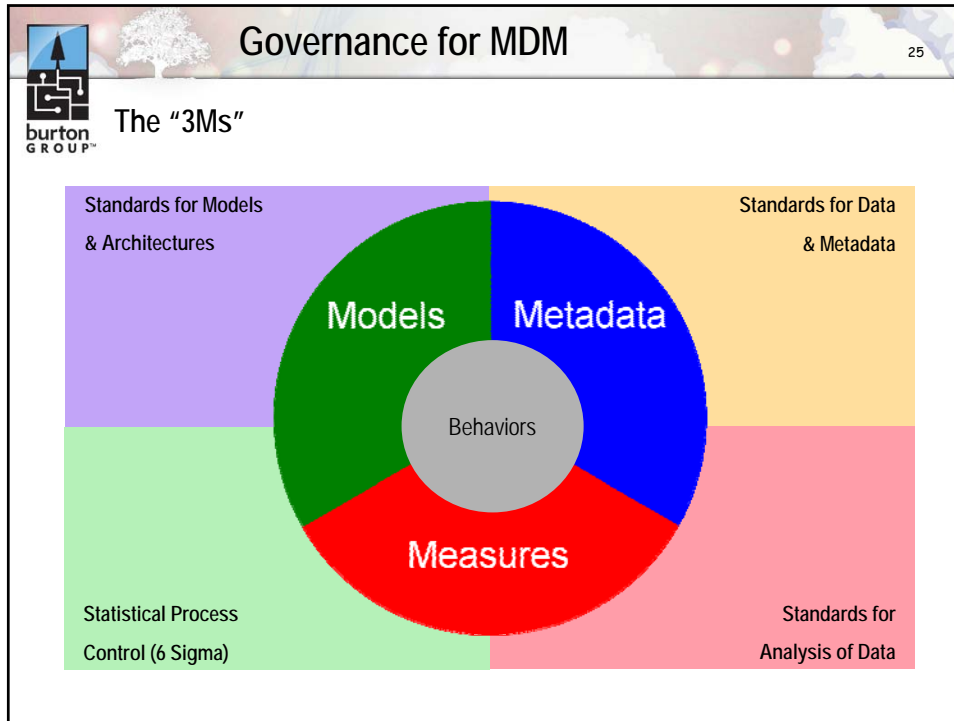Data Policies

Data Guidelines

Governance for MDM

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The Goldilocks Principle of Governance

Policies are too restrictive

Policies are too loose

Governance for MDM

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The "3Ms"

Standards for Models & Architectures

Standards for Data & Metadata

Models

Metadata

Behaviors

Measures

Statistical Process Control (6 Sigma)

Standards for Analysis of Data

Governance for MDM

Continuously monitor master data for accuracy

- Does a system incorrectly change master data?
- Baselines describe master data occurrence patterns.

System

data

$$f\left(\begin{array}{c} \text{Master Data} \\ \text{Monitor} \end{array} \right) = \begin{array}{c} \text{Master Data} \\ \text{Monitor} \end{array}$$

Governance for MDM

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Executives and managers must assure that MDM works well

- Care about information quality
- Communicate with peers
- Assure business participation in governance actions
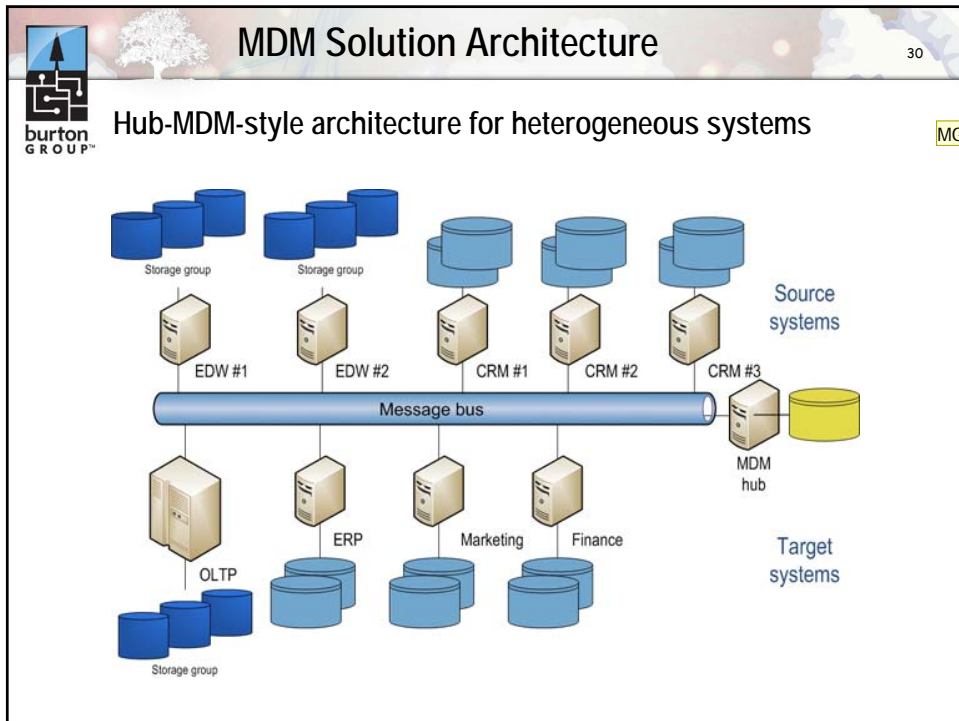- Business case support
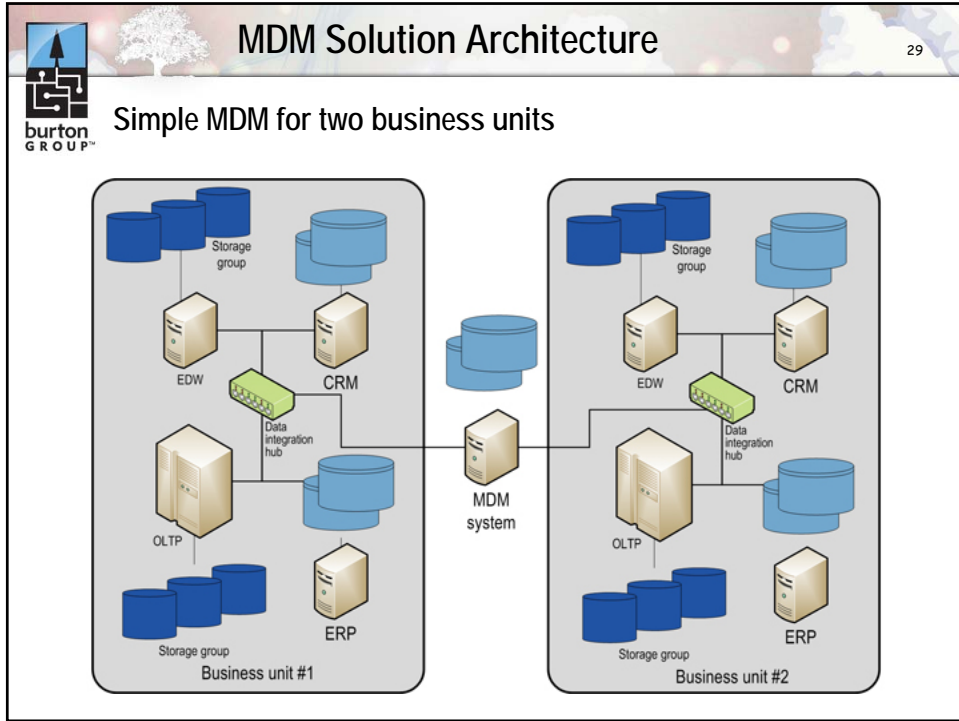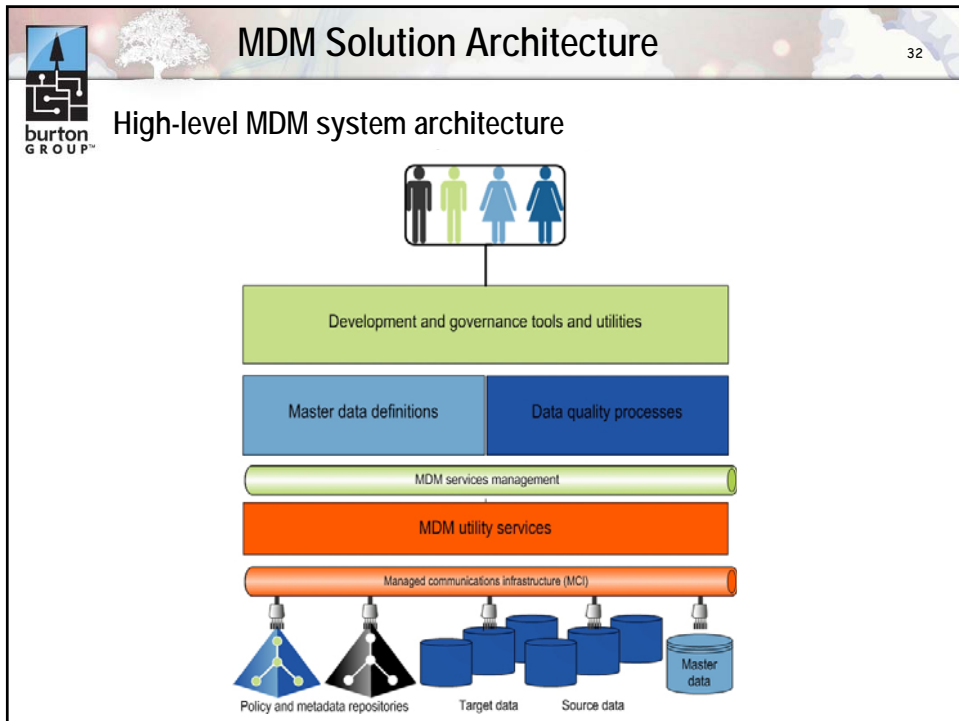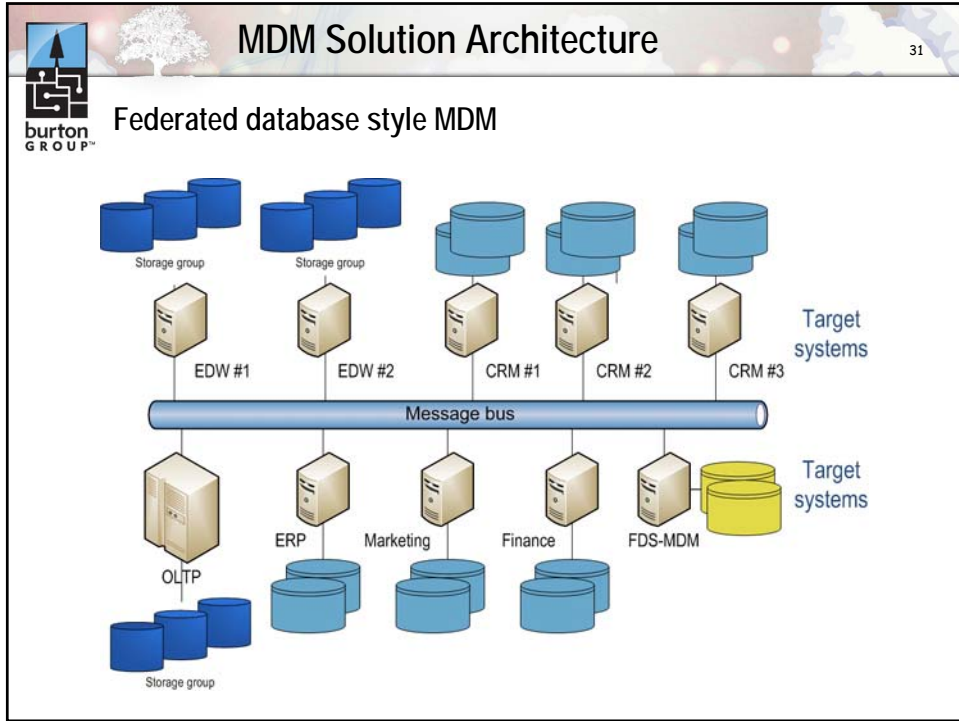- Team assignments
- Quarterly reports

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MDM Solution Architecture

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Simple MDM for two business units

MDM Solution Architecture

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Hub-MDM-style architecture for heterogeneous systems

MDM Solution Architecture

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Federated database style MDM

MDM Solution Architecture

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High-level MDM system architecture

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A Roadmap for MDM Success 34

Organize for MDM success

- Accept ownership and leadership for MDM
- Establish a strategic vision for master data
- Earn executive support for the MDM vision
- Assemble a team of master data business and IT experts
- Align MDM goals with influential business and IT units
- Conduct the MIT-IQ data quality (DQ) survey
  - Analyze results to identify master data issues and potential business value losses or gains

A Roadmap for MDM Success

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Conduct the master data architecture and quality analysis study

- Use the DQ survey and business value to select master data source systems (i.e., targets) for a deeper study
- Solicit buy-in of the system owners in business and IT
- Complete a master data architecture and data quality analysis study (i.e., the baseline-state measurements)
- Validate survey findings about validity, reliability, consistency, structure, and security of master data
- Learn enough about the state of master data in the systems to assign priorities for remedial actions

A Roadmap for MDM Success

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Perform between 1 and 3 analysis study passes

- 1-pass study simply follows the steps of the study
- 2-pass study fills in gaps in understanding business value; here, pass 1 yielded a high-level overview of potential target systems
- 3-pass study is required if the team is new to the IT operation (e.g., immediately after a major acquisition or reorganization)

A Roadmap for MDM Success 37

Analyze the results of the target system study

- Reveal strengths, weaknesses, opportunities, and threats (SWOT) relative to the MDM program's vision.
- Find five or six cases that illustrate the business value of reliable master data (i.e., the "stories")
- Organize the MDM program to accomplish these goals:
  1. Develop information architecture and data governance to define master data models and metadata;
  2. Define risks that subvert or degrade those master data;
  3. Establish controls to assure that master data conforms to the MDM program vision and information architecture.

A Roadmap for MDM Success 38

Plan, organize, and conduct a 3-phase MDM program

- Phase 1: a pilot program to remediate a subset of master data (e.g., customers, vendors, or products)
  - Implement MDM architecture and governance
  - Correct root causes of master data problems at 1 to 3 data sources
  - Work to gain business's agreement that master data is controlled
  - Raise awareness of issues to be addressed during phase 2
- Phase 2: roll-out MDM and governance to additional systems and master data
- Phase 3: develop and improve change controls for master data, metadata, and models.

A Roadmap for MDM Success
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MDM Program overview

- Goal: Win program funding and personnel support from CIO, CFO, and CEO
- Strategy: Sell MDM architecture and governance to business unit managers and division executives
- Execution: target IT, business unit, and enterprise executives who are likely to support MDM
- Follow-through: deliver program progress updates in person to business managers and executives

A Roadmap for MDM Success
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Implement MDM: architecture, governance, and remediation

- Target one master data concept (e.g., customers)
- Design conceptual and logical master data models
  - Use automation to forward engineer logical from conceptual models
  - Build logical models for enterprise and business unit uses
  - Publish the enterprise's and business unit's master data models
- Implement a master data models repository that is
  - Automatically discoverable by integrated development environments (IDEs) used by developers and DBAs
  - Useful and easily understood by business unit SMEs, data governance council, and data stewards
  - Capable of providing good change-controls
  - Provide training in proper use and control of repository contents

A Roadmap for MDM Success

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Build the master data governance program

- Form a data governance council
  - Ask "C-level" executives to appoint SMEs
  - Align council's reporting relationship to the ITG executive council
  - Charge the council with governing master data semantic and syntactical reliability consistently with business's requirements.
  - The governance council sets master data policy, standards, and approves controls.
  - Note: compliance and enforcement is not the council's responsibility; business unit executives and internal audit have this responsibility

A Roadmap for MDM Success

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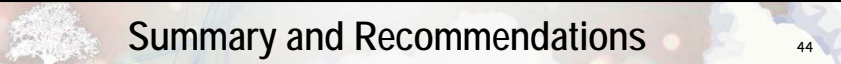**Build master data controls for continual quality improvement**

- Establish a data quality program to routinely measure, evaluate, and correct defective information.
- Encourage master data reuse among IT software architects, developers, and DBAs
- Provide MDM training for SMEs, for council members, and developers
- Periodically validate master data
  - Use techniques employed during the study phase
  - Report results to business executives and data governance council

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Summary and Recommendations 44

Recommendation: start MDM today!

- Assemble the right team
  - Data architects, business analysts, enterprise architects, and systems engineers
- Use existing infrastructure first for MDM before adding new MDM systems
  - Assure that systems are reusable for all data projects and tasks
- Start small – choose one class of master data and no more than three systems
- But, think big. Add more systems and more information types as MDM racks-up successes

Summary and Recommendations 45

Recommendation: build the MDM program

- Choose an MDM architectural style
  - Simple MDM works, it costs very little, and yields benefits
  - Local MDM quickly helps a business unit recover value
  - Use federated MDM if political or infrastructure exigencies require it
  - Strive to centralize MDM into a single source of valid master metadata and master data. Otherwise, use federated MDM.
- Build a business case and measure progress to it
- Assert data governance and change controls
  - Assign data stewards and custodian responsibilities
  - Assign a lead data architect
  - Practice governance to make it perfect

Summary and Recommendations 46
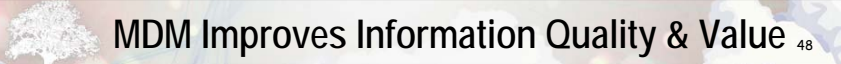
Recommendation: master MDM

- Establish controls for MDM sources and targets
- Designate the fewest master data sources without reducing integrity
- Allow domain-specific master data only where essential for business
- Collect metadata from applications and databases
- Deploy MDM as a data service – select an MDM product or DSP

Summary and Recommendations 47

Recommendations: govern master data

- Build a master data governance program
  - Repurpose an existing IT oversight team
  - Connect master data governance to data security governance and to change control processes
  - Get business units to participate in master data governance
- Assure that MDM delivers the value promised in the business case
- Require standardization of master data controls.
- Institute an MDM control policy

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Conclusion

- MDM is a process that uses existing IT skills, disciplines, and technologies to critical business data—*master data*
- Master data is in a deplorable state at many businesses
- Poor quality master data increases IT costs, results in lost revenues, and raises liability risks
- IT must recognize and remediate master data to lower liability risks, generate revenue, and reduce costs
- IT owns the processes that assure that master data is consistent, reliable, and accurate
- Business owns responsibility for master data value

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THANK YOU!
Q&A

Please write or call me to discuss data issues:
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