Implementing and Executing Data Governance & Quality Strategy at Northern Trust

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The Northern Trust Difference

Our History, Ownership, Organic Growth and Culture

- A more than 125 year heritage undiluted by large mergers or acquisitions with a focus on organic growth
- Employees have a keen interest in the success of our business with 44% of employees owning Northern Trust stock
- As part of our commitment to be a leading corporate citizen, Northern Trust annually awards substantial financial support to nonprofit organizations worldwide. The majority of funds are directed to social welfare initiatives that provide critical services to low and moderate income families, such as housing, food, education and health care

Our Financial Strength and Stability

- Strong Capital Position - We continue to be significantly above the ratios that are a requirement for the regulatory classification of "well capitalized"
- Strong Liquid Balance Sheet - high-quality, low-risk securities portfolio, high liquidity and low loan-to-asset ratio and exceptionally high quality loan portfolio
- The long-term ratings of both Northern Trust Corporation and our main bank subsidiary, The Northern Trust Company, are the highest assigned by Standard & Poor’s and Fitch Ratings to any comparable U.S.-based banking institution.
The Northern Trust Difference

<table>
<thead>
<tr>
<th>Our Sharp Business Focus</th>
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<tr>
<td>- Two highly targeted distribution channels: personal and institutional</td>
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<td>- Focus on asset servicing, asset management and banking solutions</td>
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<td>- We have resisted the temptation to change our business or risk profile to capitalize on temporarily shifting cycles</td>
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<td>- Differentiated, conservative business model</td>
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<table>
<thead>
<tr>
<th>Integrated Wealth Management Solutions</th>
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<tr>
<td>- A full spectrum of wealth management capabilities few firms can match</td>
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<tr>
<td>- Provide fresh thinking and innovative solutions tailored to you</td>
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<td>- Draw on an integrated team of wealth specialists</td>
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<td>- Work closely with your other advisors to develop and implement a coordinated strategy</td>
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<thead>
<tr>
<th>Our Client Centric Focus</th>
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<tr>
<td>- Global reach and power resources delivered locally</td>
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<tr>
<td>- Providing access, expertise and service where you live, work and travel</td>
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<tr>
<td>- Overall client satisfaction levels with Northern Trust are very high and we continue to improve year-over-year</td>
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Your Life. Your Goals.

Proactive, expert advice supported by a broad array of wealth management capabilities few firms can match.

Funding your lifestyle today and tomorrow
- Maximizing your cash flow
- Hedging against market risk
- Having confidence that you will fully enjoy your retirement lifestyle

Pursuing your next dream
- Purchasing a home or investment property
- Funding a major purchase
- Starting a new business or investing in a start-up

Exploring your philanthropic legacy
- Supporting causes you are passionate about through structured charitable giving
- Allocating wealth between charities and beneficiaries
- Creating a family charitable giving mission

Investing in your family’s future
- Providing a college education for children or grandchildren
- Transferring wealth to the next generation
- Educating your family about the responsibilities of wealth

YOUR GOALS

Life

Philanthropy

Family

Capital Assets

Life Driven Wealth Management
Life Driven Wealth Management

Investing
- Full Array of Investment Capabilities
- Custom Asset Allocation
- Portfolio Management
- Equity Investing
- Fixed Income Investing
- Alternative Investments
- Broad Menu of Outside Managers
- Brokerage Services

Trust & Estate Services
- Personal Trust Services
- Trust Consulting
- Specialized Trust Services DE/NV
- Oil, Gas and Minerals
- Real Estate and Agricultural Services
- Estate Administration and Settlement
- Guardianship Services
- Asset Servicing

Wealth Planning
- Financial Planning
- Family Education and Governance
- Tax and Wealth Transfer Strategies
- Philanthropy
- Business Owner Services

Banking
- Personal Deposit and Credit Services
- Art, Aircraft and Yacht Lending
- Margin and Stock Option Lending
- Working Capital and Corporate Loans
- Equipment Finance and Leasing
- Private Equity and Premium Finance
- Treasury Management

Our online financial management suite is a powerful tool that provides clients access to their complete financial picture. Advisors can also be granted access.

1™ Northern Trust Company are Member FDIC – Equal Housing Lender
2Securities products and brokerage services are sold by registered representatives of Northern Trust Securities, Inc. (member FINRA, SIPC), wholly owned subsidiary of Northern Trust Corporation. Investments, securities products and brokerage services are:
NOT FDIC INSURED | MAY LOSE VALUE | NO BANK GUARANTEE
Trusted
Stakeholders trust the information they consume or created

Relevant
Information consumed or created by stakeholders is fit for use and relevant

Governed
Data within NT Wealth Management is monitored, measured and controlled

Information Quality: Fundamental Concepts

Direction / Confirmation

Strategy

Policy, Rules, Quality

Execution:
Profiling Terms
What, How, Why
Data Quality Governance Program

IBM Information Governance Unified Process

1) Define Business Problem
2) Obtain Executive Sponsorship
3) Conduct Maturity Assessment
4) Build Roadmap
5) Establish Organizational Blueprint
6) Build Business Glossary
7) Understand Data
8) Create Metadata Repository
9) Define Metrics
10) Govern Data Quality
11) Govern Master Data
12) Govern Lifecycle of Information
13) Govern Security & Privacy
14) Govern Analytics
15) Measure Results

IBM InfoSphere Business Glossary
IBM Discovery, Information Analyzer, Data Explorer
IBM InfoSphere Metadata Workbench

IBM Information Server, QS, DS, CDC, FastTrack
IBM InfoSphere Master Data Management
IBM Optim TDM, Archiving
IBM Optim Masking, Guardium
IBM Cognos/SPSS
IBM Netezza/IDAA

Northern Trust
Dimensions of Data Quality

Other Considerations:

1. Usability of the data - Is it understandable, simple, relevant, accessible, maintainable and at the right level of precision?

2. Timing issues with the data (beyond timeliness itself) - Is it stable, yet responsive to legitimate change requests?

3. Flexibility of the data - Is it comparable and compatible with other data? Does it have useful groupings and classifications? Can it be repurposed, and is it easy to manipulate?

4. Confidence in the data - Are Data Governance, Data Protection and Data Security in place? What is the reputation of the data, and is it verified or verifiable?

5. Value of the data - Is there a good cost/benefit case for the data? Is it being optimally used? Does it endanger people’s safety or privacy or the legal responsibilities of the enterprise? Does it support or contradict the corporate image or the corporate message?
**Data Ecosystem (Data Foundation)**

**Gather business data requirements and expand profiling and analysis**

**Expand InfoSphere Information Governance Catalog**
- Workflow management for data governance and data stewardship
  - Wealth Management
  - Enterprise
- Business Glossary
  - Hosting working sessions with Enterprise Data Services
  - Aligning terms with Enterprise Information Architecture Information Modeling and ISO 20022
  - Establishing cadence
- Data Lineage
  - Business Data Lineage
    - Information Models
    - Conceptual and Logical Data Models
  - Technical Data Lineage
    - Physical Data Models
    - DataStage
- QualityStage Exceptions
- IBM FastTrack
  - Link Business Glossary with Source-to-Target Mapping
How does it all tie together?

Policy

Information Governance Requirements

Business Rule

Category

Business Term

Business Lineage

Data Lineage

Information Asset

Data Rule

Technical Metadata
InfoSphere Information Analyzer – Business Rules

![Screenshot of the InfoSphere Information Analyzer with details on a rule set definition for DEATH_DATE. The screenshot includes fields for Name, Short Description, Long Description, and options for Validity Benchmark with conditions for date validity, and options for Confidence Benchmark and Baseline Comparison Benchmark.](image)
InfoSphere Information Governance Catalog

Account

Accounts are a manifestation of a legal agreement with clients or legal entities for products and services. It contains account identifiers, legal agreements, descriptors, key account attributes, key accounting activities, etc.

Parent Category: Northern Trust, Wealth Management, Data Requirements

Labels: (1)

Versions (1)

Terms (185)

Account Admin Department Handler
Account Allow Buy
Account Allow Negative Cash
Account Allow Sell
Account Backed Code
Account Backed Code Class
Account Capacity
Account Class Code
Account Country Code

Created by: David Fishbach
Created on: 2015-06-18 16:44:14
Modified by: Arik Maza
Modified on: 2015-03-23 13:44:11

Notes
Account Number

The number on the account, which uniquely identifies the account within the source system in question. If there is Sub Account linked to the Parent Account, i.e. CD Number, Commitment Number, Note Number, the number will be stored as separate Accounts.

Long Description
References the number associated to the account. Character make-up of the account number is specific to each source system and can be numeric or alphanumeric.

Parent Category
Wealth Management, Business Data Domains, Account Domain

Referencing Categories (12)
- Wealth Management
- Business Data Domains
- Account Domain

Other Links
- SM 1 - Audit - SIS 2 - Audit the Opportunity
- SM 1 - Audit - EP 2 - Audit the Opportunity
- SM 1 - Audit - EP 1 - Audit the Opportunity internal audit dashboard in SDOC
- SM 1 - Audit - EP 1 - Audit the Opportunity - User Story 1 - view a Super User audit dashboard in SDOC
- SM 1 - Audit - EP 1 - Audit the Opportunity - User Story 2 - view a Super User audit dashboard in SDOC
- SM 1 - Audit - EP 1 - Audit the Opportunity - User Story 3 - view a Super User audit dashboard in SDOC
- SM 1 - Audit - EP 1 - Audit the Opportunity - User Story 4 - update the status of an opportunity from Won - Not Funded to Won - Funded
- SM 1 - Audit - EP 1 - Audit the Opportunity - User Story 5 - view a Super User audit dashboard in SDOC
- SM 1 - Audit - EP 1 - Audit the Opportunity - User Story 6 - view a Super User audit dashboard in SDOC
- SM 1 - Audit - EP 1 - Audit the Opportunity - User Story 7 - view a Super User audit dashboard in SDOC
- SM 1 - Audit - EP 1 - Audit the Opportunity - User Story 8 - view a Super User audit dashboard in SDOC
- SM 1 - Audit - EP 1 - Audit the Opportunity - User Story 9 - view a Super User audit dashboard in SDOC
- SM 1 - Audit - EP 1 - Audit the Opportunity - User Story 10 - view a Super User audit dashboard in SDOC
- SM 1 - Audit - EP 1 - Audit the Opportunity - User Story 11 - view a Super User audit dashboard in SDOC
- SM 1 - Audit - EP 1 - Audit the Opportunity - User Story 12 - view a Super User audit dashboard in SDOC
Best Practice: Use an iterative process to set data standards

Achieving business outcomes with building a metadata repository for information governance is an iterative process, but can be started at different steps.

1. Define Policies and Information Governance Rules
2. Define Data Elements (DEs) for Information Standards
3. Import Data Models & Information Assets
4. Capture Physical Metadata and Quality Statistics
5. Assign Data Models & Information Assets to Terms
6. Build Lineage
7. Search, Govern, and Conduct Asset Certification

Best practices for building a Metadata Repository is an iterative Process where an organization should start small and grow their metadata repository over time.

Metadata can be built top-down starting at step one and/or bottoms up, where physical metadata is brought in and compared to what is in a business glossary, and the creation of any missing Categories / Terms is decided upon by the Data Architecture and Governance.

IBM has a series of accelerators, best practices guides and project plans for conducting each step including the following:
1. Define Policies and Information Governance Rules
2. Define Data Elements (Des) for Information Standards
3. Import Data Models & Information Assets
4. Gather Physical Metadata and Quality Statistics
5. Assign Data Models & Information Assets to Terms
6. Build Lineage
7. Search, Govern and Conduct Asset Certification

Each of the steps may be found in subsequent modules.

17 Slide credit: David Feshbach, IBM Data Quality Lead for Northern Trust Partner Platform
People, Process, and Technology – Physical View

Business & Technical Data Stewards

Cognos Cockpits

Stewardship Center

Glossary Anywhere

Quality & Exception Consoles

Information Governance Catalog

DataStage/QualityStage

FastTrack

Information Governance Catalog

Information Governance Catalog

Build Lineage

Search, Govern, and Conduct Asset Certification

Define Policies and Information Governance Rules

Define Data Elements (DEs) for Information Standards

Information Governance Catalog

Import Data Models & Information Assets

Assign Data Models & Information Assets to Terms

Capture Physical Metadata and Quality Statistics

Information Governance Catalog

Information Analyzer

Sources

Metadata Asset Manager

Business Users

Business Data Owners

Business Data Stewards

Business Users

Report

1st Qtr
2nd Qtr
3rd Qtr

Custom/No IIS Data Integration

Data Models

Profiler / Analyst / Data Integration team

Business SME + Data Integartion team

Profiler / Analyst / Asset Assigner

Profiler / Analyst / Asset Assigner

Profiler / Analyst / Data & Asset Importer

Profiler / Analyst / Data Rules Analyst

Slide credit: David Feshbach, IBM Data Quality Lead for Northern Trust Partner Platform
Establishing A Process

- Defined a process for data quality identification and remediation

- Utilized the mapping document to determine in-scope systems, tables, and data attributes
  - Party data

- Profiled in-scope systems using IBM InfoSphere Information Analyzer
  - Ran Column Analysis to get a baseline understanding of the data

- Developed business rules to target key “problem” areas
  - Required
  - Character limitations
  - Special Characters
  - Data Type
  - Etc.
Establishing A Process

- Work with business partners to prioritize CDEs
  - What is required to run the business?
  - What data needs to be the “cleanest”?
  - What will have the biggest impact on front-end business partners?
  - What are the underlying dependencies?

- Remediation of the Data
  - Work with Enterprise Partners
  - Refine List
  - Track Progress

- Prevention
  - Evaluate ability to promote business rules for ETL use
  - Stop the problem, before it starts
Refining the Process

- Rerun Rules
  - Incorporate Enhancements
  - Solicit Feedback
  - Develop further based on additional knowledge
  - Compare against similar sources – Cross Domain

- Understand Your Requirements
  - Are there differences across systems?
  - Are you comparing apples to apples?

- Solicit Input
  - Production Issues
  - Business Priorities
  - UAT/SIT Testing Issues
  - Long Term Pain Points
  - System Clean Up
Use Cases

- Last Name

- Duplicate Profiles
  - Within Applications
  - Across Databases
  - Tactical vs. Long Term Approach

- Marital Status
  - Current system limitations
  - ETL corrections

- Date of Death
Appendix
Out of the Box Cognos Cockpits and Dashboards
Out of the Box Cognos Cockpits and Dashboards
Out of the Box Cognos Cockpits and Dashboards
Out of the Box Cognos Cockpits and Dashboards
InfoSphere Information Analyzer - Dashboard

- Customize Data Quality Displays and Scorecards by project
- Organize by results by user-defined folders
- Deploy Standard Charts & Trends for Ongoing Views
- Track Analysis Status, Data Trends, Variances over Benchmarks, and more
InfoSphere Information Analyzer – Column Analysis
InfoSphere Data Architect – Business Glossary Integration