Trends in Metadata/Data Management

Peter Aiken

- Full time in information technology since 1981
- IT engineering research and project background
- University teaching experience since 1979
- Research Areas
  - reengineering, data reverse engineering, software requirements engineering, information engineering, human-computer interaction, systems integration/systems engineering, strategic planning, and decision support systems
- Director
  - George Mason University/Hypermedia Technologies Laboratory (1989-1993)
- DoD Computer Scientist
  - Reverse Engineering Program Manager/Office of the Chief Information Officer (1992-1997)
- Visiting Scientist - Software Engineering Institute/Carnegie Mellon University
- Published Papers
- Research Director - Institute for Data Research
- DAMA International Advisor - Since 1999
  - Winner 2001 DAMA International Individual Achievement Award
XML-based Metadata

Business Rules

Business Processes

Data Assets

Organizational metadata extracted and understood via metadata reverse engineering

Improved, XML-based organizational metadata

Reverse engineering tools & techniques

Web-based metadata delivery applications supporting business and systems engineering

Integrated business and systems engineering tools & techniques

Reused metadata

Integrated business and systems components including metadata repositories, data warehouses, ERP implementations

Evidence Type

Evidence Model

Decomposition

Information User Type

Location Process

System Component

Component Element

Logical Data Entity System Component Type

Logical Data Attribute

System Component

Evidence Type

Website paiken: home

http://fast.to/peteraiken
Acknowledgments

- Clive Finkelstein
- John Zachman
- Elliot Chikofsky
- David Allen
- Anthony Danielsen
- Bill Girling
- Burt Parker
- Jon Bosak
- Tim Bray

Overview

Trends in Metadata/Data Management

- Research basis
- DM Trends Survey
  - Who was surveyed
  - Survey results
- Data Management Maturity Measurement (DM3) Survey
- Practical uses of this material
Take Aways
Trends in Metadata/Data Management

Understand:

- The reasons that CASE tool usage has stagnated
- Specific motivations to address information quality challenges and the significance of non-traditional approaches
- Inherent inefficiencies in current approaches to data warehousing and ERP implementation
- Self reported, industry-wide lack of "mature" approaches to data management
- Missed opportunities offering alternative to traditional organizational cost savings
The new economy is
the data economy

Three quarters of all organizations have benefited from effective data management

Reduced processing costs, eq fewer reconciliations

Increased sales through better analysis of data

Winning a significant contract through better analysis of data

Increased sales through better analysis of customer data

None of these

The new economy is the data economy

I was, am, am planning to become a DAMA member
Well distributed geographically

Geographic Distribution

- Eastern USA: 30%
- Western USA: 29%
- Central USA: 30%
- Canada: 5%
- Other Countries: 6%

Corporate IT is well represented

IT Sector Representation

- Corporate IT: 77%
- Government IT: 12%
- Vendor: 5%
- Consultant: 4%
- Nonprofit IT: 2%
Small percentage of consultants

Are you an employee or a consultant?

- Employee: 86%
- Consultant: 14%

Number Responding=156

Well distributed organizationally

Size of the organization?

- Large Multinational: 10%
- Medium-sized Multinational: 4%
- Multinational: 28%
- Large: 26%
- Small: 9%
- Medium: 23%

Number Responding=128
The number of unique titles worn by practitioners is:

- **A:** 0.378 titles
- **B:** 3.78 titles
- **D:** 3780 titles

Well Distributed Title-ically

Data Source: Wilshire Conferences www.wilshireconferences.com
More than 2/3rds have formal data management training

Have you or have you not had formal data management training?

- Has: 71%
- Has Not: 29%

This is a very positive development

Number Responding=139

Slightly over two-thirds of organizations used or were planning to apply formal metadata management

My organization used or is planning to use a formal approach to metadata management

Number Responding=126
Less than 1/2 manage their metadata using repository technologies

Do you use any metadata catalog tools?

- Yes: 47%
- No: 53%

This is interesting considering that 2/3rds are planning to manage their metadata formally.

On average, less than half (48%) have plans to use repositories

- The number of 1 & 2 year commitments is not increasing.
Slightly over half of repository builders use a structured approach to repository development

If yes, does your organization use a structured or formal approach to repository technology?

![Validation Point?]

Yes 52%
No 48%

Almost half the repository projects are proceeding ad hoc (ref. B. Kirkpatrick's 'Shoe-String Operations')

Repository Technologies in Use

What tools do you use?

- Almost one in two organizations (45%) doesn't use repository technology
- Almost one in four organizations (23%) is building their own repository technology
- The "traditional" players (CA & Rochade) are in use in 16% of organizations

None 45%
Home Grown 23%
Other 13%
CA Platinum 9%
Rochade 7%
Universal Repository 2%
Design Bank 1%
DW Guide 1%
Info Manager 1%
Interface Metadata Tool 1%

Number Responding=181
On average, just over half (52%) are currently using CASE tools.

The number of 1 & 2 year commitments is dropping.

28% seem to be repeat (proficient) users.

Most (77%) practice good data modeling.

Does your organization utilize a structured or formal approach to data modeling?

Yes 77%
No 23%

Number Responding=127

Number Responding=164
Implications?

Do you use any data modeling tools?

- **Yes**: 97%
- **No**: 3%

Number Responding: 169

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**Changing Model of CASE Tool Usage**

Everything must “fit” into one CASE technology

- Limited access from outside the CASE technology environment
- Limited additional metadata use

A variety of CASE-based methods and technologies can access and update the metadata

- Additional metadata uses accessible via: web; portal; XML; RDBMS

XML Integration
ERWin seems to be a common denominator

If yes, what tools?

- Homegrown 0.5%
- CoolBiz 1%
- Rose 1%
- Silverrun 1.5%
- PowerDesigner 3.5%
- Visio Professional 15.5%
- Designer/2000 16%
- Erwin 53%

The new economy is the data economy

- How confident are you in the quality of the data?
  - "Only one in three companies are very confident in the quality of their own data"

E-business 54%

- Very confident
- Fairly confident
- Not very confident
- Not at all confident
- Depends on area

Traditional 37%
The new economy is the data economy

- How confident are you in the quality of the data your company receives from third parties in its e-business activities?
  - "Only 15% of companies are very confident of the data received from other organizations"

The new economy is the data economy

Have we suffered significant problems, costs or losses in any area because of poor data quality?"
Information Quality

My organization addressed, is addressing or plans to address information quality issues

Two-thirds do not have a formal approach to information quality

Does your organization utilize a structured or formal approach to information quality?

This suggests untapped potential

Yes 33%

No 67%

Number Responding=166

Less then 20% appear to be sustained efforts

Number Responding=131
Most organizations (62%) do not use modeling and/or tools to support information quality efforts

Do you use metadata models and/or modeling tools to support your information quality efforts?

- **No**: 62%
- **Yes**: 38%

This suggests more effective approaches to IQ can be yet applied

Number Responding=154

More than half IQ technologies are "outsiders"

If yes, what tools?

- vality: 3%
- I.D.Centric: 5%
- Data Clustering Engine/SSA-Name: 5%
- Trillium Software System: 7%
- CODE-1 Plus: 8%
- Oracle PureIntegrate: 10%
- Informix: 10%
- homegrown: 14%
- Evoke Axio: 17%
- SAS: 20%

Number Responding=59
If you have any estimation or actual knowledge of the number of lost user/machine productive days on average per year due to poor data quality, please provide it here:

- **A:** 0.187 days
- **B:** 1.87 days
- **D:** 187 days

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**Traditional Quality Life Cycle**

![Figure 9-8: Levitan and Redman's Data Acquisition and Usage Cycles (Levitan and Redman 1993).](image)

- Data acquisition activities
- Data storage
- Data usage activities
Data warehousing appears to be maturing

My organization used or plans to data warehousing technologies

The number of 1 & 2 year commitments is not increasing
Interesting Warehouse Technologies Responses

Please list the data warehouse technologies employed

- Brio
- SAP
- SAS
- NCR Teradata
- db2
- Cognos
- home-grown
- ETL
- Informatica
- Oracle

Please note: This survey was of DAMA-I/ Metadata Conference attendees and users were not asked to pick from a list but instead fill in a blank line. It might represent impressions as opposed to reality - several vendors are conspicuously absent from the list provided. This might also indicate significant audience differentiation from other events.

(1 in 10 is a home grown data warehouse)

Half the data warehouses built, required multiple builds

My organization's data warehouse required x builds before the business began to use it as it was envisioned

Number Responding=48
Business Intelligence (BI) has been an area of focus

My organization has, is implemented, is considering a formal approach to implementing business intelligence

Please describe your approach and/or any tools used

- SAP
- Home grown, neural networks - expert
- What's that? Duh!
- Activeworks backend - XML middle under com
- Has not been consistent across broad organization but some small initiatives
- Oracle dbms, brio, informatica
- RFP + demos
- polls: 10%, 20%, 30%
- Open end arch: interview: That's why we are very interested in analytics. Our partners are brio + hyperion. Also, we use progagena (ICAM)
- Data warehousing/business objects
- Roll your own
- SGI minions
- Business objects, Cognos, microstrategy
- Create services around use of Cognos tools
- Not decided, but will employ data marts
- Military intelligence
- Cognos - impromptu, Powerplay
- Roxio + business objects
- Cognos, Microstrategy, SAS
- SAS, Business Objects
- Currently working on BI strategy
- Currently oracle discoverer looking for thin client OLAP tool
- Cognos
- Centralized management using business objects + Crystal reports
- Oracle discover, Oracle Reports 6i java
- We have a centralized team that works with business units to define requirements and then implements them. We use Cognos Impromptu, Powerplay & Essbase
- Business objects, Sybase
- Unknowna - we're in the process of selecting package(s) to replace our legacy systems
- Being analyzed
- Cognos - bi apps ex. Sales/inventory/financial templates also, Powerplay
- Cognos suite of tools
- BI-query, Cognos, DSS-agent
- Brio
- Cognos transformer/Powerplay/Impromptu - using balanced scorecard methodology but not formally
- Ad hoc environment setup (BusinessObjects), in-house training; EIS (sales reporting) in BusinessObjects
- Brio enterprise - Cognos Powerplay retrieving data from iW
- Internally built, considering others. Also, currently use Microstrategy
- ISO 11179 metadata registry w/extensions, software developed by oracle for census metadata
- Business objects
- Cognos Powerplay/Impromptu
- KM organization
- Business Objects, discoverer, qmf
- E-integration solution, web methods, home-made integration solution/data mate
- Build the practice (methodology) employing services, tool enable practitioners, & maintain practice manage
- Cognos prototype
- Pilot (COGNOS) E DW strategy
- Business objects
- Custom web portals; crystal reports, Holos
- Business objects
- Nquire, brio portal, brio enterprise
- Cognos part of data warehouse
- Business object and own built tools
- To build metadata driven et process to integrate corporate data into a DDS x DW environment. Use XML/API to present data to the end user.
- Micro strategy
- Portal project just started
- PWC

Number Responding=154

Value

0% 10% 20% 30% 40% 50% 60%

Number Responding=154

2000 2001 2002

Value

0% 10% 20% 30% 40% 50% 60%

Number Responding=55
Integration of Unstructured Data

- Properties selection under the file menu of MS-Office 2000 +
- Queries can be run for slide titles or other other document structures

ETL market has untapped potential

*Does your information quality strategy incorporate ETL (extract/transform/load) technologies as part of that strategy?*

- Yes: 50%
- No: 50%

Number Responding=129
ETL tool usage appears to be maturing

My organization used or plans to use ETL tools

ETL market place

If yes, what tools do you use?

- Informatica: 31%
- Oracle Warehouse Builder: 15%
- ETI: 14%
- Warehouse Toolkit for SAP: 9%
- Data Migration Tools: 11%
- SAS/Warehouse Administrator: 8%
- PowerStage: 6%
- Data Mapper: 3%
- Abinitio: 4%
- Visual Warehouse: 4%

80 Total Responses
Business intelligence appears maturing

My organization has, is implemented, is considering a formal approach to implementing business intelligence

Number Responding=154

More than half (57%) desire to learn more about CRM

Which of these phrases comes closest to your opinion about Customer Relationship Management (CRM) software?

- We use it: 24%
- Investigating: 44%
- Require more info: 13%
- Messed it up: 4%
- Unnecessary: 4%
- Other: 11%
"Other" responses:

- Not yet on horizon
- Don't understand CRM
- We make CRM software
- No business drivers
- Part of the company
- We use our own CRM software
- We develop CRM software
- RFP 2001/2002
- Unknown
- In house written system
- We're trying to get business to spell CRM
- Business process not really ready
- Implementing CRM
- In Development
- SAP backend with Lotus Notes application user interface for finance only

Number Responding = 15

CRM Appears Well Established

What, if any, is your time frame for implementing a CRM solution?
ERP Implementation

Which of the following phrases closely reflect your opinion regarding enterprise resource planning (ERP) software?

- (Presumed) without ERP
- Like More Info
- Still Researching
- Currently Use

ERP is a pervasive concern to more than half (55%) of the attendees.
Reported Technology Use

ERP Implementation

- SAP
- PeopleSoft
- J.D. Edwards
- Oracle
- Baan
- Lawson
- Other

Number Responding=144

Accounting and HR are most popular modules

If yes, what modules have/will by implemented?

- Financial Accounting
- Human Resources
- Plant Maintenance
- Quality Management
- Production Planning
- Materials Management
- Sales and Distribution
- Industry Solutions
- Project System
- Asset Accounting
- Controlling

Each, more than twice the next most popular module

Number Responding=248
Data management was consulted on 1/3 of ERP Implementations

Data Management Consulted?

- Was consulted: 33%
- Was not consulted: 67%

Number Responding=84

Almost half (45%) of ERP implementations are not going well

ERP Implementation

- According to plan: 54%
- Behind schedule: 15%
- Over budget: 15%
- About to be restarted: 3%
- About to be cancelled: 0%
- Behind schedule & over budget: 12%
ERP Implementation Success

- Most ERP implementations today result in cost and schedule overruns; courtesy of the Standish Group

Why?
Data Management Maturity Measurement (DM3)

- On-going research
- Collaboration with Burt Parker and CMU's Software Engineering Institute (SEI)
- Attempt to determine data management's "state of the practice"

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- Follows form of a structured interview
- 15-20 minutes required to complete
- Examines organizational data management practices in five areas
- Interview is complete by asking interviewee five general questions

- Practice Areas
  1. Data Program Coordination
  2. Enterprise Data Integration
  3. Data Stewardship
  4. Data Development
  5. Data Support Operations
  6. General Questions
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Data Management Maturity Measurement (DM3)

- Preliminary results from a survey of 39 organizations

- 24 Public Companies
- 5 State Government Agencies
- 7 Federal Government
- 3 International Organizations
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The chart represents the average scores presented on the previous slide - interesting that none have apparently reached level-3
Data Management Maturity Measurement (DM3)

Next Steps:

• More than 100 organizations surveyed - more needed to validate this initial sample:
  - Survey volunteers please contact IDR at: dm3surveyinformation@idatar.com (for automated signup)

• Require a dozen or so 1/2 day structured interviews to validate portions of the survey instrument and results
  - Follow-up validation interview volunteers please contact me directly at: peter@idatar.com

Practical uses for this material

• Educating management
• Coordinating organizational efforts
• Building the case for "repository-first" strategies
• Sources of budget savings
• System sharing opportunities
• Integration-based cost savings
• Consolidating/coordinating IT planning
• Making the case for development of an organizational data strategy
The new economy is the data economy

- Do you believe that senior management of your company places sufficient importance on data management issues?

| E-business | 76% Yes | 24% No |
| Traditional | 56% Yes | 44% No |

XML Adoption Rates

My organization used or plans to use XML tools and/or technologies

2001 Cutter Consortium poll indicates:
- 26% are using XML
- 24% are testing XML
- 33% are studying XML
- 17% committed to extensive XML use
XML Component Architecture Overview

- ebXML (e-business XML): a framework, or set of guidelines, for using XML to create schemas, which define commonly used business forms
- XML Schema: define commonly used business forms
- DTD (Document Type Definition): be used to define a custom set of rules that set the structure for the elements of an XML document
- XPointer: extends Path and can be used in conjunction with XLink. It allows you to identify specific data within a resource described in an XLink
- XLink (XML Linking Language): a specification that allows elements to be inserted into an XML document in order to create and describe links between resources
- DOM (Document Object Model): provides standardized access to parts of an XML document e.g., use of code and ways to interface with that code in programs
- XML (eXtensible Markup Language)
- XSL (eXtensible Stylesheet Language): used to transform XML content into HTML
- XSLT (XSL Transformations): High level language for defining XML transformation generally taking one XML document and producing another
- XSD (XML Schema Definition)
- XPointer (XML Pointer): allows you to identify specific data within a resource described in an XLink
- XLink (XML Linking Language)
- SOAP (Simple Object Access Protocol): 1. Platform independent component instantiation and remote procedure calls 2. Provides envelopes to provide document meta information 3. Delivers XML documents over existing HTTP channels
- HTML
- The Web
- ADML (Architecture Description Markup Language)
- EAI (Enterprise Application Integration)
- XHTML
- XForms
Global Spending on IT, Forecast to Increase at 15% annual rate
(Numbers in Billions)

Global IT Spending Forecast

Statistics courtesy International Data Corp. via Intelligent Enterprise (.com) 10/4/01

Which comes first – the Chicken of the Egg?

- I agree with David Marco calling for
  - the development of a metadata repository before building any data warehouses

- Let's go one better and call it
  - an "industry best practice"

- Establish data management best practices to give us codes of conduct to adhere to and to help our guide our (perhaps unknowing) organizations toward good data management investment practices

Quote from David Marco. via DM Review (.com) September 2001
What is missing from this list?

How do CIOs demonstrate reduction in IT expenses?

- Reducing Head Counts & IT Staff: 25.2%
- Instituting Hiring Freezes: 26.2%
- Consolidating technology vendors & products: 35.7%
- Negotiating tougher vendor and contract agreements: 38.4%
- Postponing IT Projects: 40.1%

The new economy is the data economy

- Does your company have a shared information system or is information kept within individual departments?

  - E-business: 65% have a shared information system, 35% keep info in depts
  - Traditional: 72% have a shared information system, 28% keep info in depts

Quote from L.C. Ware & B. Worthen, via CIO (.com) 8/1/01
Global Spending on Integration, Forecast to Increase at 169% annual rate

The new economy is the data economy

Today responsibility of driving data strategy lies mainly with IT professionals in traditional companies, and is more fragmented in e-business

PriceWaterhouseCoopers, Global Risk Management Solutions, Global Data Management Survey 2001: the new economy is the data economy, 5/23/01 accessed on 8/01
http://www.pwcglobal.com/Extweb/service.nsf/8b9d788097dff3c9852565e00073c0ba/0cae4d32ccbaba2380256a0d004e454b/$FILE/Data+Management+brochure.pdf

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The new economy is the data economy

• Majority of companies do not have a documented board approved data strategy

Traditional

- 37% company-wide strategy - formally documented or approved by the board
- 21% company-wide strategy - not formally documented or approved by the board
- 2% no company-wide strategy
- 37% no company-wide strategy - not known if formally documented or approved by the board

E-business

- 40% company-wide strategy - formally documented or approved by the board
- 27% company-wide strategy - not formally documented or approved by the board
- 32% no company-wide strategy
- 41% no company-wide strategy - not known if formally documented or approved by the board

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PriceWaterhouseCoopers, Global Risk Management Solutions, Global Data Management Survey 2001: The new economy is the data economy, 5/23/01 accessed on 8/8/01
http://www.pwcglobal.com/Extweb/service.nsf/8b9d788097dff3c9852565e00073c0ba/0cae4d32ccbaba2380256a0d004e454b/$FILE/Data+Management+brochure.pdf

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