Metamodels 101

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Agenda
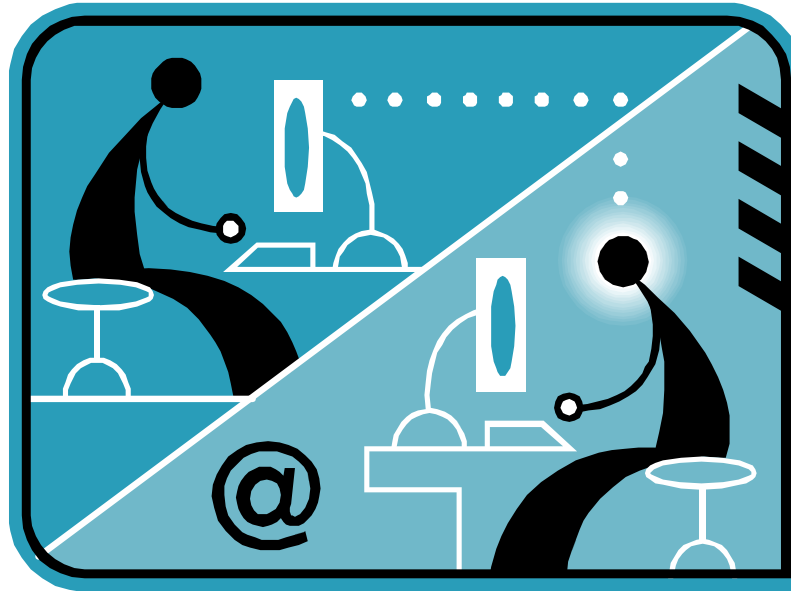
➢ The Issues

➢ What is XMI (XML Metadata Interchange)?

➢ What are Metamodels?

➢ What is MOF (Meta Object Facility)?

➢ Tying It All Together!

➢ Conclusions

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The Issues

Background

- IT (should) support the Business.
- IT data = "metadata"
- Full comprehension of one another remains difficult.

Business Problems

- Inaccurate information impacts decisions.
- Inability to run comprehensive reports.
- Relationships are not obvious.
- No/Meager "full view" of the enterprise.

Technical Problems

- Numerous metadata languages.
- Difficult to process, store, or exchange this metadata.
- No standard metadata format.
- Difficulty supporting business needs.
- Relationships are not obvious.

What is XMI (XML Metadata Interchange)?

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Background

- XMI = XML Metadata Interchange standard

- Developed by the OMG

Purpose

Enables *metadata <u>exchange</u>* and *metadata <u>storage</u>* in a variety of different languages.

How XMI Achieves This

1. Gives the same general structure to metadata.

2. Ignores the "language" (e.g. relational DBs, business processes, application interfaces).

3. Each metadata language has a *metamodel* to constrain it.

4. Each language's *metamodel* is described in a standardized format.

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What are Metamodels?

3 Definitions

- "A model which describes a model."
  - (source: *www.wikipedia.org*)

- "An explicit model of the constructs and rules needed to build specific models."
  - (source: *http://www.metamodel.com/article.php?story=20030115211223271*)

- "A model that defines the components of a conceptual model, process, or system."
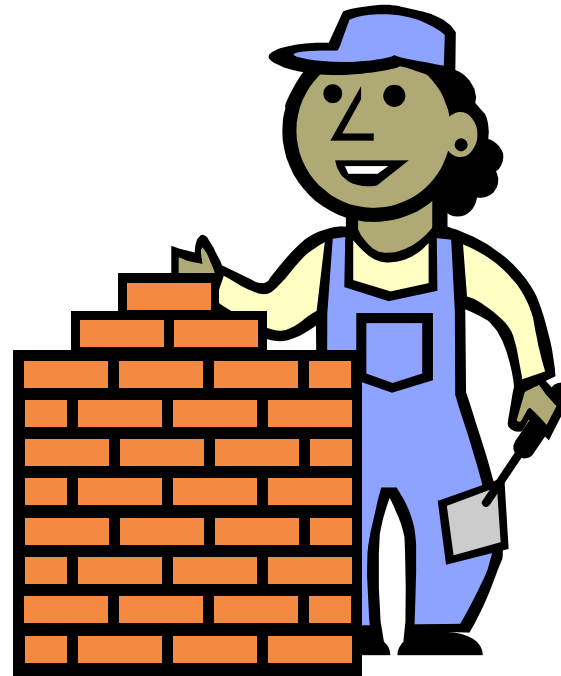 - (source: *www.dictionary.com*)

Typical Uses

- Define *types* of structures of IT and architecture.

- Define *cross-references* of IT and architecture.

- Reflected in repository structure.

Repositories

- Metamodels are stored in a universal (metadata) repository.

- The repository is always open to accept new metadata formats.

What is MOF (Meta Object Facility)?

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Background

- MOF = **M**eta **O**bject **F**acility
- OMG metamodeling standard
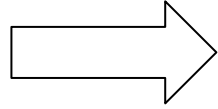- Closely based on UML (Unified Modeling Language)

MOF & Metamodels

- MOF is technically a *meta-metamodel*

- Meta-metamodel = a mechanism for building metamodels
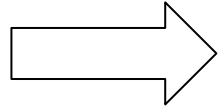
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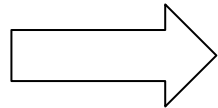
Tying It All Together!

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Which Describes Which

Metadata $\implies$ Data

Metamodels $\implies$ Metadata

MOF $\implies$ Metamodels

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The Metadata "Stack"

M3

Meta-Metamodel

The MOF standard

M2

Metamodel
Defines *types* of structures and cross-references of IT and architecture – reflected in structure of repository

M1

Metadata

Defines actual IT structures – specific schemas, interfaces, interdependencies

M0

Data

Instance data, messages, specific interactions

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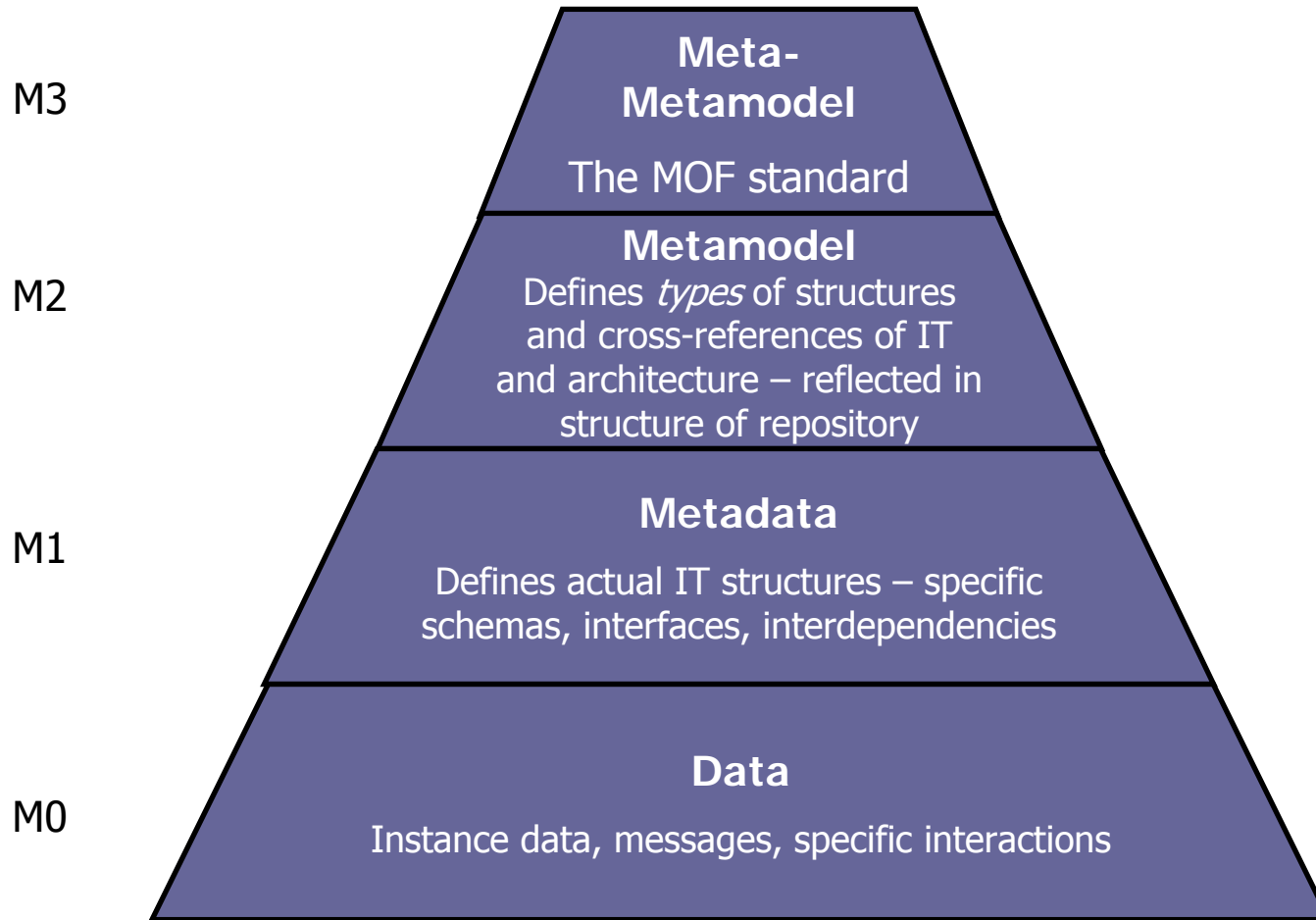
Levels

M0	M1	M2	M3
Instance Data	Metadata	Metamodel	MOF
90032	"ZipCode column"	A MySQL relational database	A MySQL relational database has tables; each table has zero or more columns.

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Users & Frequencies

"Level"	M0	M1	M2
Common Name	Instance Data	Metadata	Metamodel
Users	Used by the business	Used by IT	Used by metadata repositories
# Times	Millions	Hundreds	A few

Architectural Diagram

Manual Editing · Browsing · Reporting · Visualization

API

Universal Repository

Relational Views

Metamodel

Ontological Repository

RDBMS

Scanner

Scanner

Semantic Mappings

Application Asset · Enterprise Architecture

Data Asset · Enterprise Architecture

Application Management · Security Management

Database Management · Operations Management

Infrastructure Management · Service Management

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Conclusions

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Conclusions

- Metadata exchange is increasingly important.

- Metadata needs to relate to real-life IT needs.

- Metamodel-driven automation of metadata processing becomes a reality.

- Metadata understanding becomes:
  - More predictive
  - More accurate
  - More consistent:
    - Across an organization
    - Across an industry

Questions?

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