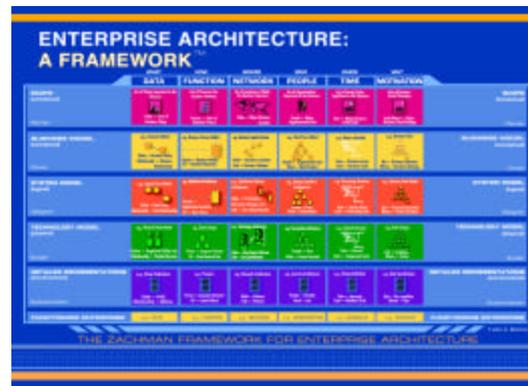# *MDA and the Zachman Framework*

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Agenda

- Zachman Framework Overview
- MDA and Meta-model Overview
- Zachman and UML Mapping
- Zachman and MDA Mapping
- Another Approach
- Conclusion

Zachman and Architecture

- Enterprise Architecture – A set of architectures, which taken together, provide a complete view of an organization

- The Zachman Framework
  - A popular way of conceptualizing how the more specific architectures of an organization can be integrated into a comprehensive picture.
  - An analytic model. It does not describe an implementation process and is independent of specific methodologies.

- "The Framework for Enterprise Architecture is a two dimensional classification scheme for descriptive representations of an Enterprise."

The Zachman Framework

ENTERPRISE ARCHITECTURE: A FRAMEWORK™

THE ZACHMAN FRAMEWORK FOR ENTERPRISE ARCHITECTURE

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Framework Overview

- The rows describes the *perspectives* of those who use the models or descriptions.
  - The top row represents the most generic perspective of an organization while lower rows are successively more concrete.

- The columns describes the abstractions that define each perspective.
  - Based on the historical questions that people have asked when they sought understanding.
  - (Who, What, When, Where, Why, How)

Zachman Perspectives

- **SCOPE: (Contextual)**
  - The Planner's Perspective.
- **BUSINESS MODEL: (Conceptual)**
  - The Owner's Perspective.
- **SYSTEM MODEL: (Logical)**
  - The Designer's Perspective.
- **TECHNOLOGY MODEL: (Physical)**
  - The Builder's Perspective.
- **DETAILED REPRESENTATIONS: (Out-of-Context)**
  - A Sub-Contractor's Perspective.
- **THE FUNCTIONING ENTERPRISE.**

Zachman Abstractions

- **DATA: What is it made of?**
  - Thing—Relationship—Thing
- **FUNCTION: How does it work?**
  - Process—Input/Output—Process
- **NETWORK: Where are the elements located relative to one another?**
  - Node—Line—Node
- **PEOPLE: Who does what work?**
  - People—Work—People
- **TIME: When do things happen?**
  - Event—Cycle—Event
- **MOTIVATION: Why do things happen?**
  - End—Means—End

MDA Distilled

Model Types and Zachman

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Abstractions (Columns)

Perspectives (Rows)

The Zachman Framework	DATA *What (Things)*	FUNCTION *How (Process)*	NETWORK *Where (Location)*	PEOPLE *Who (People)*	TIME *When (Time)*	MOTIVATION *Why (Motivation)*
SCOPE (Contextual) *Planner*	List of things important to the business	List of processes the business performs	List of Locations in which the business operates	List of Organizations Important to the Business	List of Events Significant to the Business	List of Business Goals/Strategies
BUSINESS MODEL (Conceptual) *Owner*	Semantic Model	Business Process Model	Business Logistics System	Work Flow Model	Master Schedule	Business Plan
SYSTEM MODEL (Logical) *Designer*	Logical Data Model	Application Architecture	Distributed System Architecture	Human Interface Architecture	Processing Structure	Business Rule Model
TECHNOLOGY MODEL (Physical) *Builder*	Physical Data Model	System Design	Technology Architecture	Presentation Architecture	Control Structure	Rule Design
DETAILED REPRESENTATIONS (Out-of-Context) *Sub-Contractor*	Data Definition	Program	Network Architecture	Security Architecture	Timing Definition	Rule Specification

Computation-Independent Model (CIM)

Platform-Independent Model (PIM)

Platform-Specific Model (PSM)

CODE

MDA and Meta-models

- MDA is built on an underlying architectural infrastructure based on MOF

- MOF based meta-models are used to define all MDA models

- Meta-models provide the rules for how to build a correct model for a particular purpose

- UML Profile
  - Provides a targeted subset of UML
  - Standard mechanism for extending UML
  - Supported by UML tools
  - Frequent complement to a meta-model

MDA Metamodels and Profiles M²VP

MOF Meta Meta-model

Meta-models

- Common Warehouse Metamodel (CWM)
- UML Metamodel
- Web Services *
- Business Process Metamodel **
- Business Rules Metamodel **

Profiles

- CORBA Profile
- EJB Profile
- EAI Profile
- EDOC Profile
- Scheduling Profile
- .NET Profile *
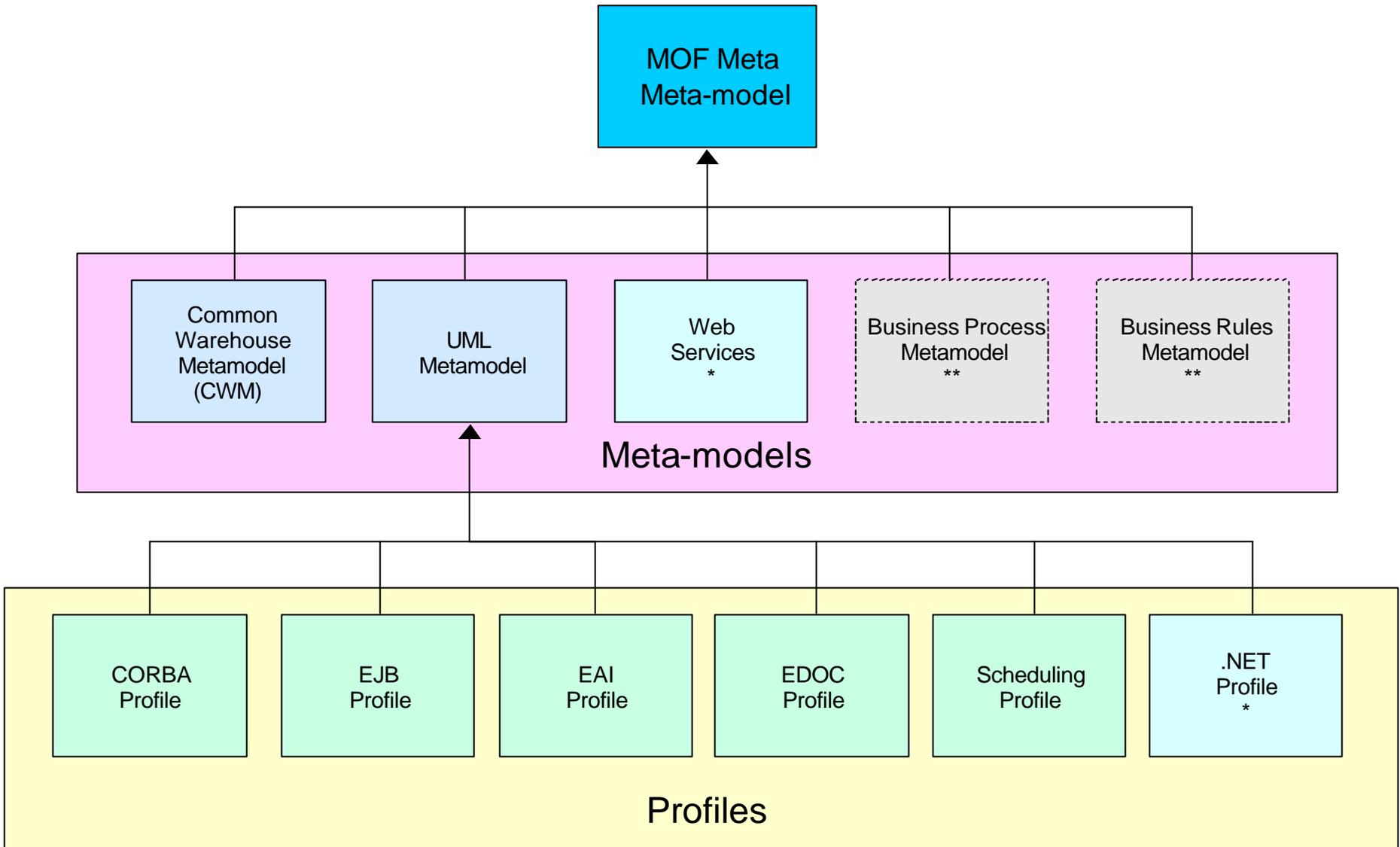
MDA Metamodels and Zachman

M²VP

Abstractions (Columns)

Perspectives (Rows)

The Zachman Framework	DATA *What (Things)*	FUNCTION *How (Process)*	NETWORK *Where (Location)*	PEOPLE *Who (People)*	TIME *When (Time)*	MOTIVATION *Why (Motivation)*
SCOPE (Contextual) *Planner* **UML**	List of things important to the business	List of processes the business performs	List of Locations in which the business operates	List of Organizations Important to the Business	List of Events Significant to the Business	List of Business Goals/Strategies
BUSINESS MODEL (Conceptual) *Owner*	Semantic Model **Common Warehouse Metamodel**	Business Process Model	Business Logistics System **Business Process Definition (Planned)**	Work Flow Model	Master Schedule	Business Plan **Business Rules (Planned)**
SYSTEM MODEL (Logical) *Designer*	Logical Data Model	Application Architecture **EDOC**	Distributed System Architecture **EAI Profile** **EDOC**	Human Interface Architecture **UML Web Profile**	Processing Structure **Scheduling Profile**	Business Rule Model
TECHNOLOGY MODEL (Physical) *Builder*	Physical Data Model **(CWM)**	System Design **NET EJB CORBA**	Technology Architecture **NET EJB CORBA**	Presentation Architecture	Control Structure	Rule Design
DETAILED REPRESENTATIONS (Out-of-Context) *Sub-Contractor*	Data Definition	Network Architecture	Network Architecture	Security Architecture	Timing Definition	Rule Specification

UML Models and Zachman

M²VP

Abstractions (Columns)

Perspectives (Rows)

The Zachman Framework	DATA *What* *(Things)*	FUNCTION *How* *(Process)*	NETWORK *Where* *(Location)*	PEOPLE *Who* *(People)*	TIME *When* *(Time)*	MOTIVATION *Why* *(Motivation)*
SCOPE (Contextual) *Planner*	List of things important to the business *Package and Class Diagrams* *Use Case Diagrams*	List of processes the business performs *Activity Diagrams*	List of Locations in which the business operates	List of Organizations Important to the Business	List of Events Significant to the Business	List of Business Goals/Strategies
BUSINESS MODEL (Conceptual) *Owner*	Semantic Model *Class and Composite Structure Diagrams*	Business Process Model *Activity. State, and Interaction Diagrams*	Business Logistics System	Work Flow Model	Master Schedule	Business Plan
SYSTEM MODEL (Logical) *Designer*	Logical Data Model *Class, Package, and Component Diagrams*	Application Architecture *Activity. State, and Interaction Diagrams*	Distributed System Architecture *Deployment Diagram*	Human Interface Architecture	Processing Structure	Business Rule Model
TECHNOLOGY MODEL (Physical) *Builder*	Physical Data Model *Class, Package, and Component Diagrams*	System Design *Activity. State, and Interaction Diagrams*	Technology Architecture *Deployment Diagram*	Presentation Architecture	Control Structure	Rule Design
DETAILED REPRESENTATIONS (Out-of-Context) *Sub-Contractor*	Data Definition	Program	Network Architecture	Security Architecture	Timing Definition	Rule Specification

Issues with Zachman

- Zachman Framework cells represent *primitives*. Primitives are reusable and combinable into *composites*.

- Software development is focused on creating composites. For example, a use case is a composite of who and what.

- It is extremely difficult to bridge the gap between EA according to Zachman, and implementation models and artifacts.

MDA Under the Hood

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Computation Independent Model

Platform Independent Model

Platform Specific Model

Code

Architectural Standards and Guidelines Enforced in Model Profiles

Enterprise QOS and non-functional requirements implemented in transformations

MDA and Zachman
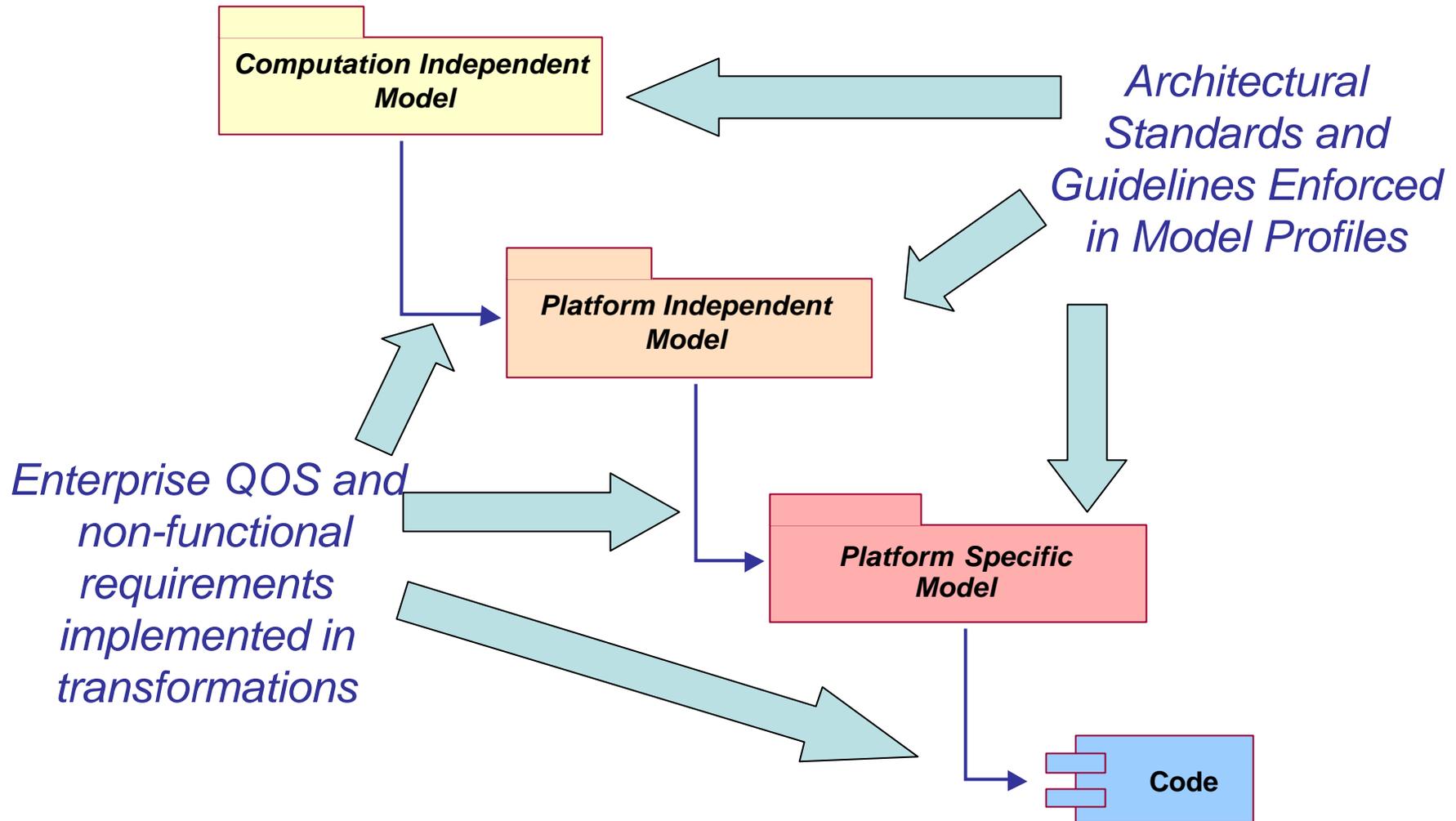
- **MDA can support Zachman explicitly**
  - Each cell in the Zachman framework could be described by a formal MOF meta-model.
  - Mappings between cells could be described with QVT descriptions
  - Composite models could be constructed by transforming two (or more) primitive models together
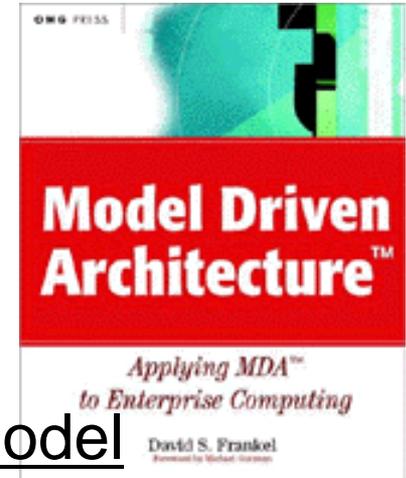
More on Zachman Framework M²VP

- Is a classification schema and framework, no more, no less

- Is not a process or methodology

- Does not identify specific deliverables

- Does not support identification or management of dependencies

- Emphasizes traditional dimensions of: application, data, network…

Apples and Oranges

M²VP

- Zachman is a conceptual framework for classification of enterprise concept, best used in the early (classification) phase of EA

- MDA is an architecture for defining models (with meta-models) and transformation between models, typically used to automate code generation

Just my opinion…

- Architecture must achieve three primary goals:

  1. Describe a solution to a specific set of problems and requirements
  2. Effectively communicate the solution to all stakeholders
  3. Enable the construction of systems that conform to the architecture

- Zachman is good as a conceptual framework, but is it architecture???

References and Bibliography

- *Model Driven Architecture,* David Frankel, Wiley (2003)
- MDA resources available at http://www.omg.org/mda/
- The Zachman Framework and the OMG's Model Driven Architecture,*David Frankel, Paul Harmon, Jishnu Mukerji, James Odell, Martin Owen, Pete Rivett, Michael Rosen, and Richard Mark Soley,* August 2003, Business Process Trends.

Questions

To learn more: **Fast Start** MODEL DRIVEN ARCHITECTURE™ www.omg.org/fast-start