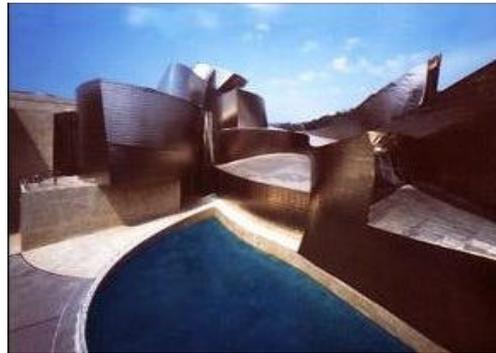# *Implementing Enterprise Architecture with MDA*

Mike Rosen

CTO, M²VP

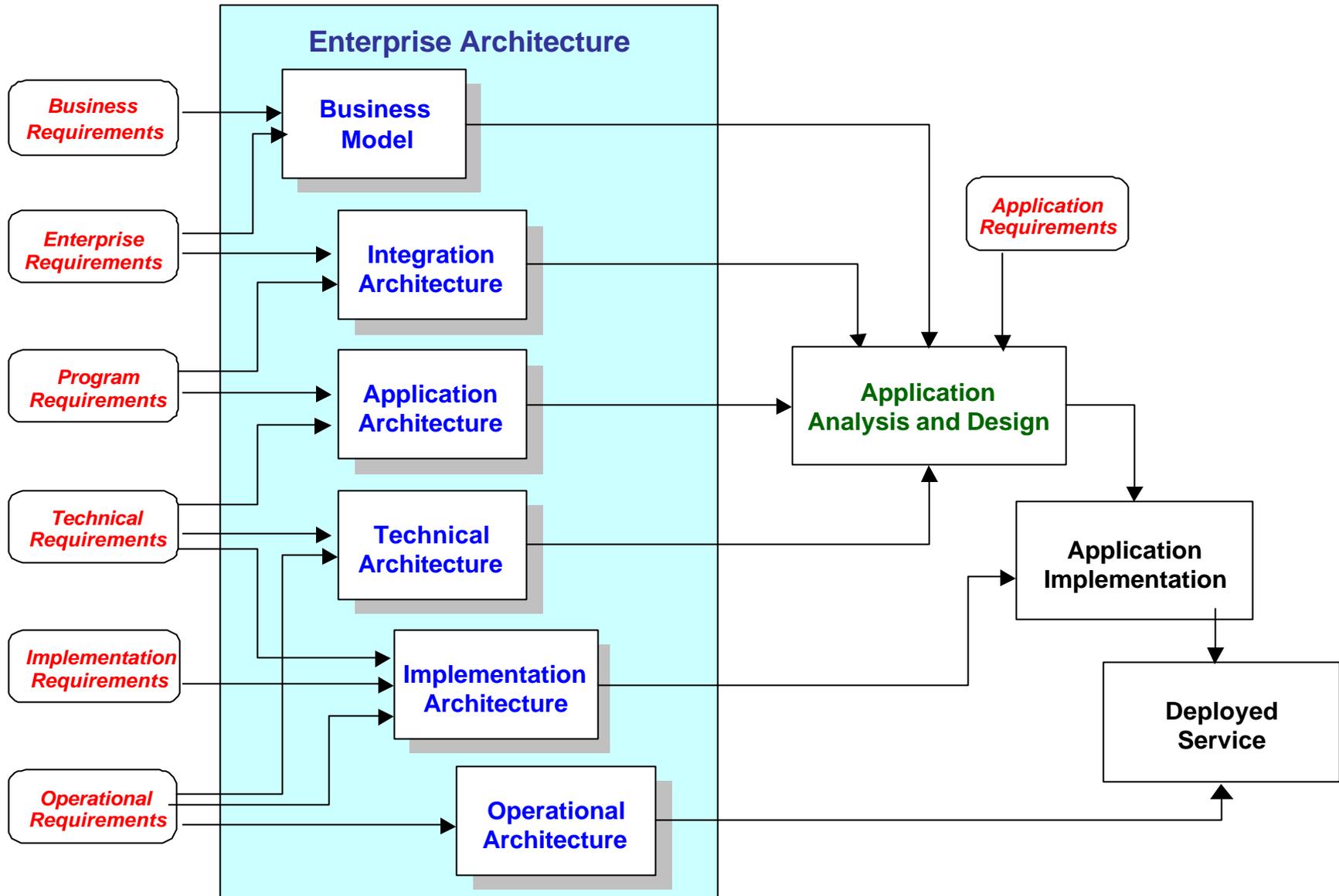*Mrosen @m2vp.com*

Agenda

- What is Enterprise Architecture?

- What does it mean to implement it?

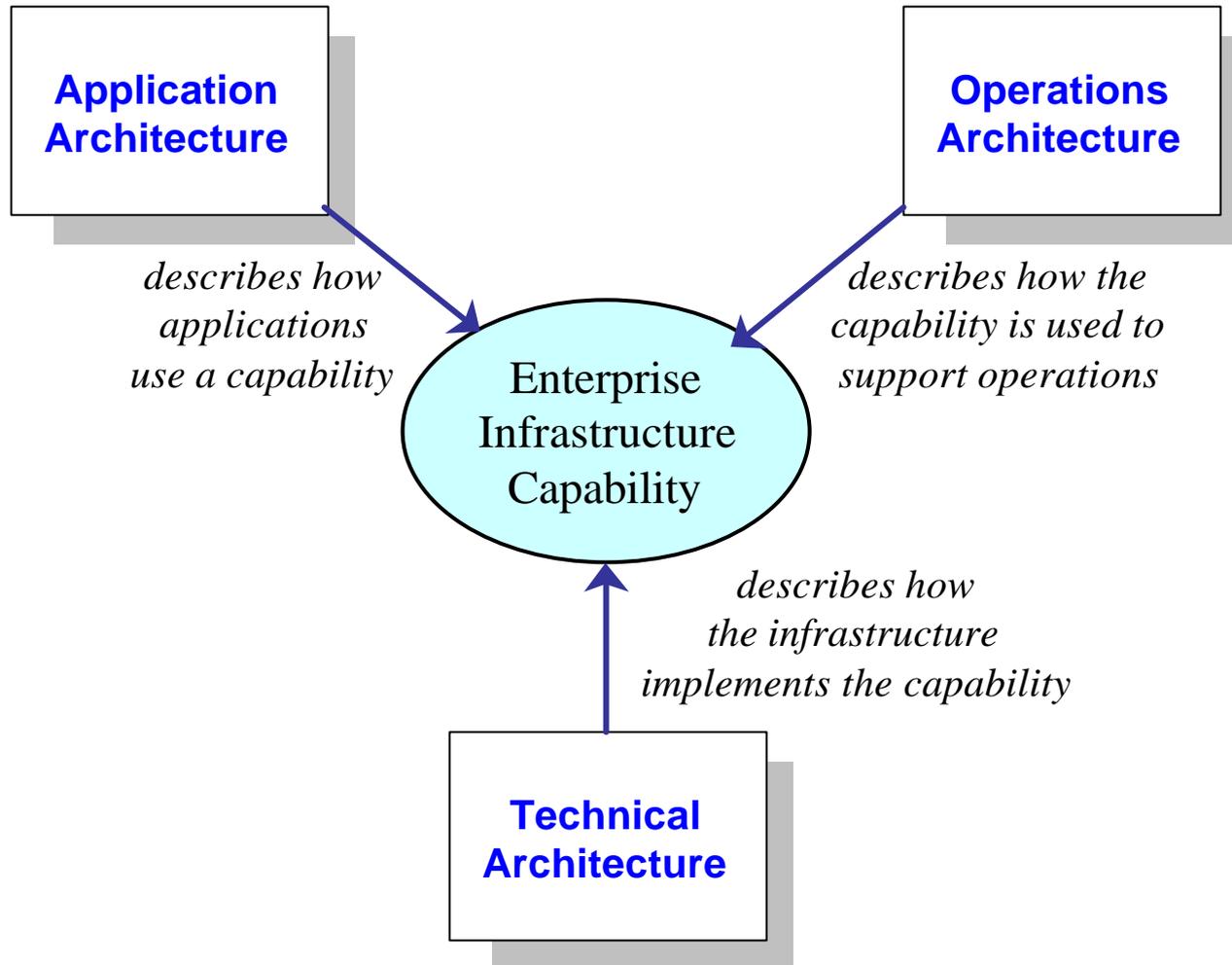- How does MDA help?

Enterprise Architecture

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

- 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

Architecture Principles

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- Separation of Concerns - The architecture should separate the requirements and concerns of different constituents.
  - Business
  - Enterprise Integration
  - Technical Infrastructure
  - Applications and Products
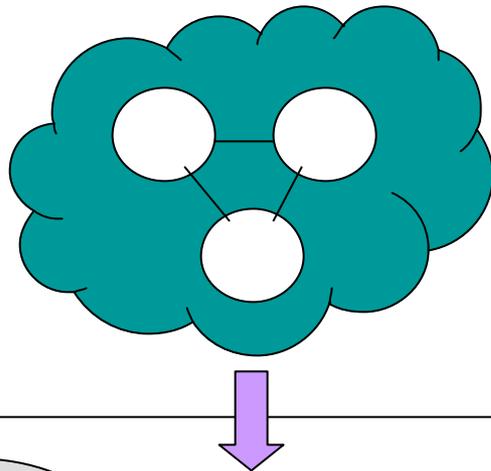 - Operations
  - Implementation

Architecture Driven Design

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Enterprise Architecture

Business Requirements → Business Model

Enterprise Requirements → Integration Architecture

Program Requirements → Application Architecture

Technical Requirements → Technical Architecture

Implementation Requirements → Implementation Architecture

Operational Requirements → Operational Architecture

Application Requirements

Application Analysis and Design

Application Implementation

Deployed Service

Architectural Relationships

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Application Architecture

Operations Architecture

describes how applications use a capability

describes how the capability is used to support operations

Enterprise Infrastructure Capability

describes how the infrastructure implements the capability

Technical Architecture

Architecture Scope

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Enterprise Architecture:
Describes concerns and guidelines
for integration of process and data
across the entire enterprise.
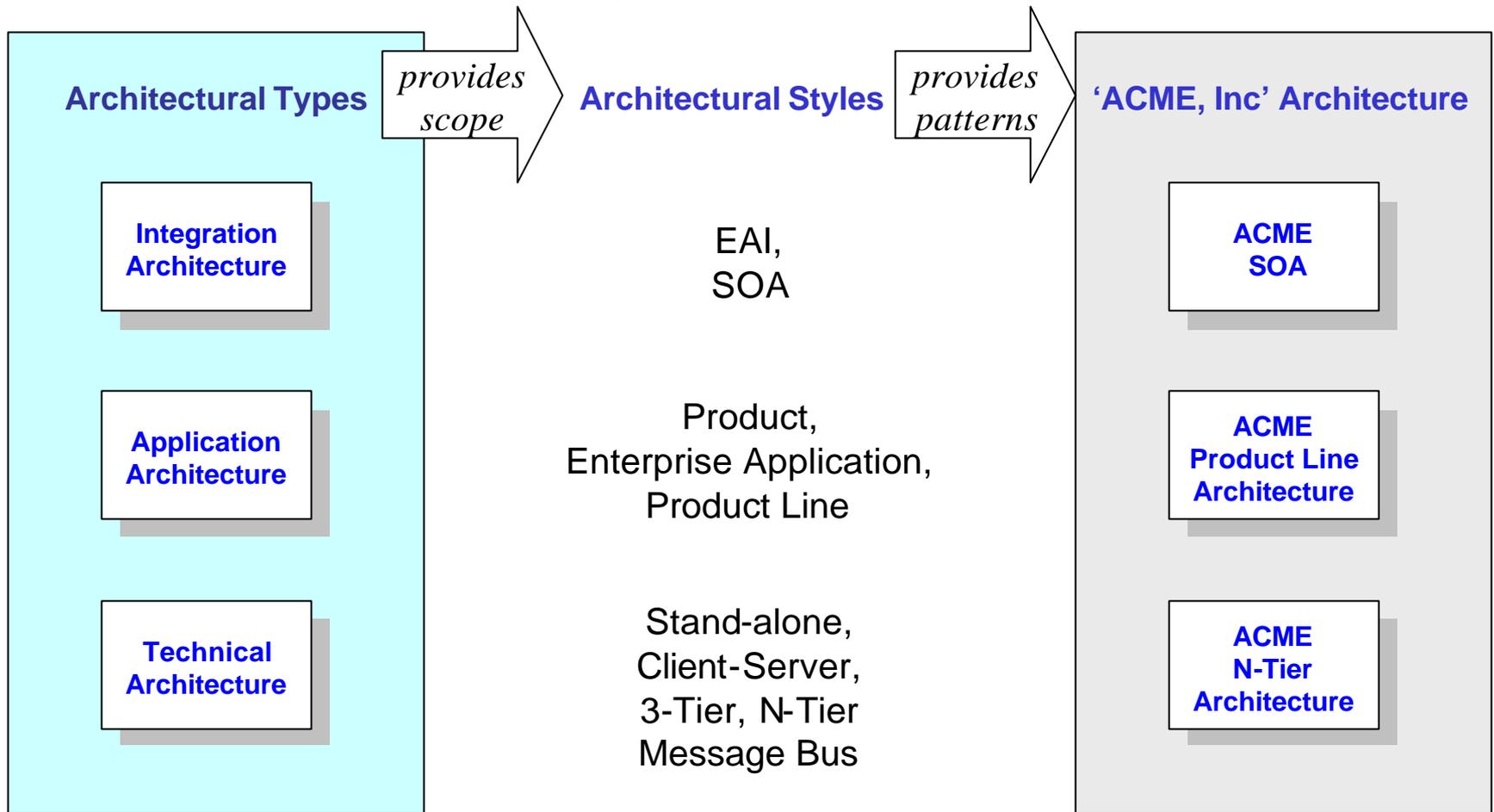Applied to many application domains.

A

N
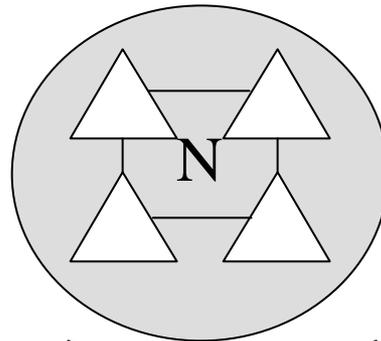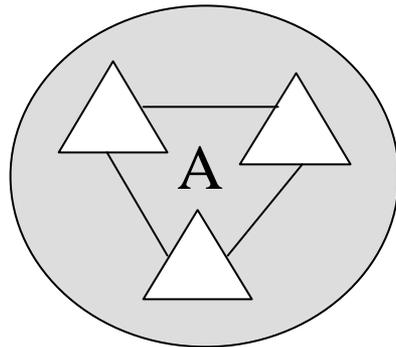
Application Architecture:
Describes abstract concepts,
things and relationships within
the application domain.
Applies to many products
or applications.

A1

N1

Nn
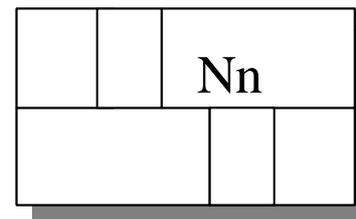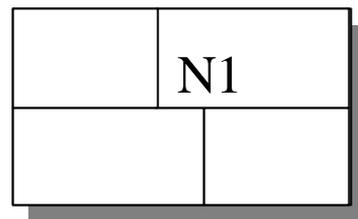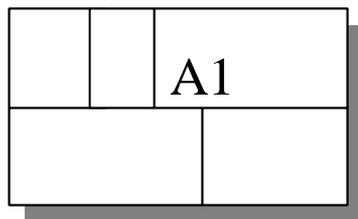
Design: Describes specific
items and relationships,
Applies to a single product
or application.

Architectural Style

- Architectural Style – A set of principles, elements, patterns, and constraints designed to meet a specific set of requirements within a specific scope.

- Typical Styles:
  - Client / Server, 3-tier, n-tier
  - Product Line
  - EAI

- Two companies in the same line of business using the same development and deployment platforms will have different architectures conforming to the same architectural style.
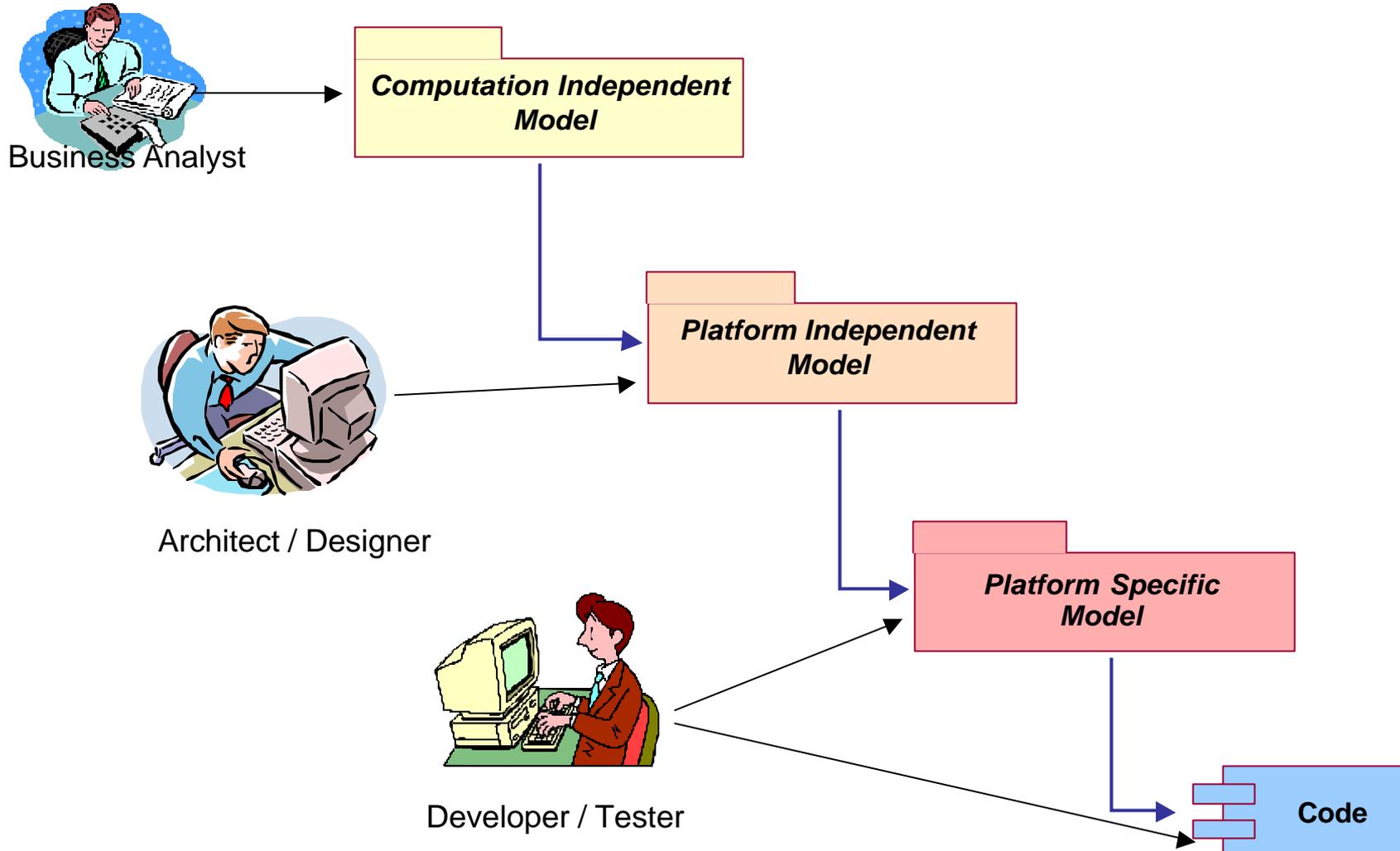
Architectural Styles

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Architectural Types	*provides scope* →	Architectural Styles	*provides patterns* →	'ACME, Inc' Architecture

Integration Architecture

Application Architecture

Technical Architecture

EAI,
SOA

Product,
Enterprise Application,
Product Line

Stand-alone,
Client-Server,
3-Tier, N-Tier
Message Bus

ACME SOA

ACME Product Line Architecture

ACME N-Tier Architecture

Provides scope which defines separation of concerns, responsibilities, stakeholders

Provides a common solution to a common set of requirements within a specific scope

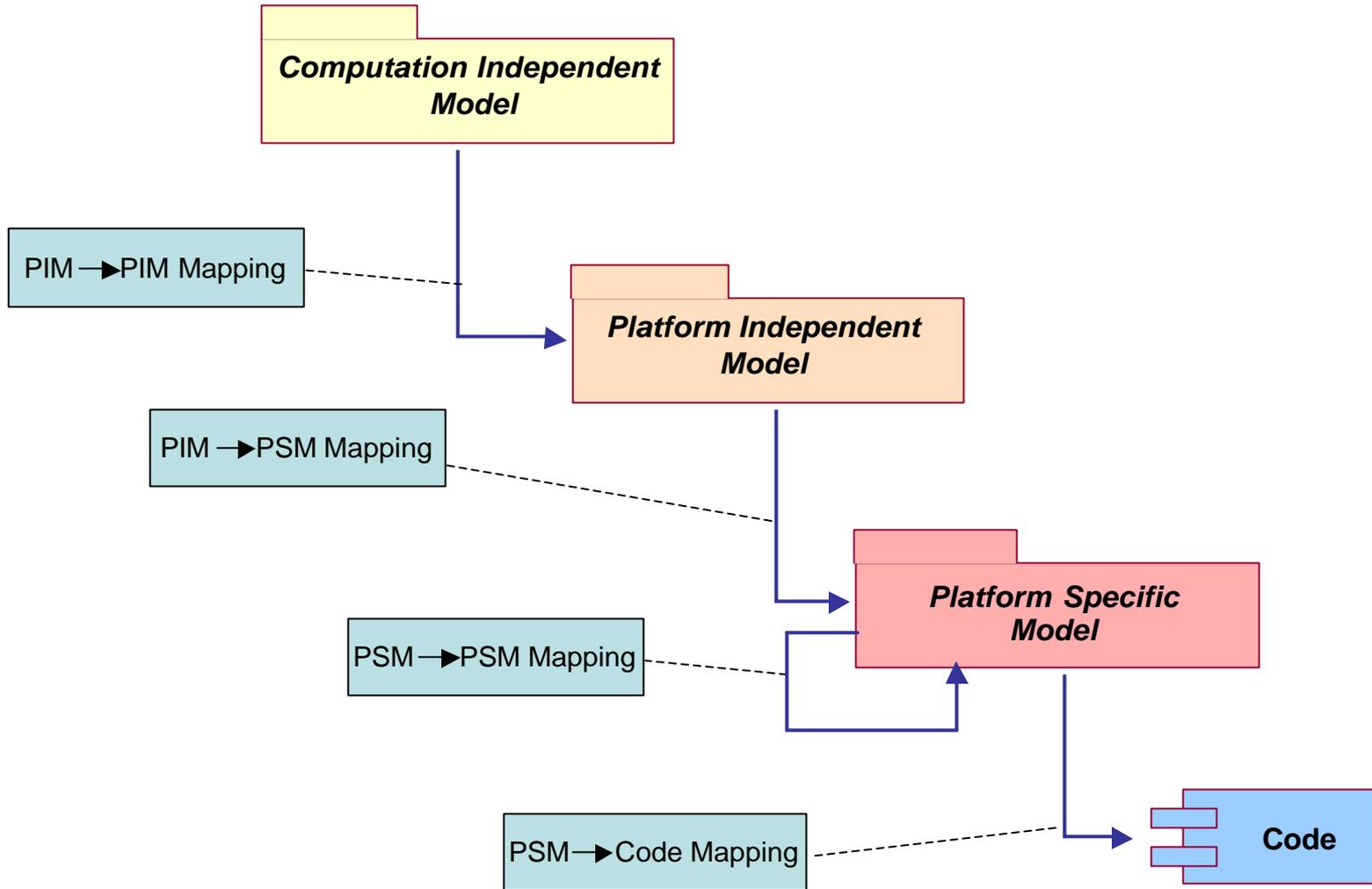*Provides a specific solution to a specific set of requirements for a specific enterprise*
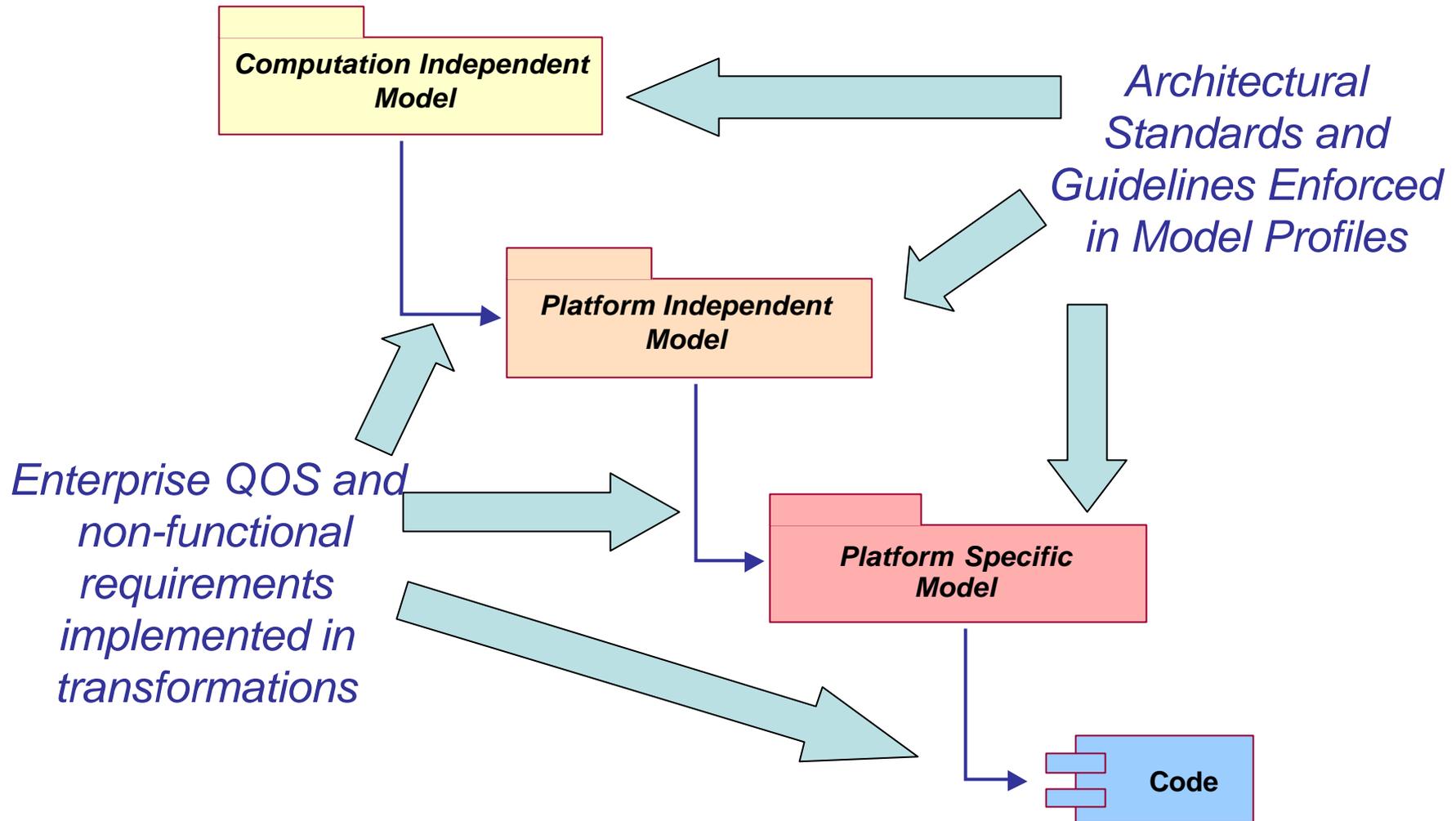
MDA Distilled

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Business Analyst → Computation Independent Model

Architect / Designer → Platform Independent Model

Developer / Tester → Platform Specific Model → Code

MDA Mappings

M²VP

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

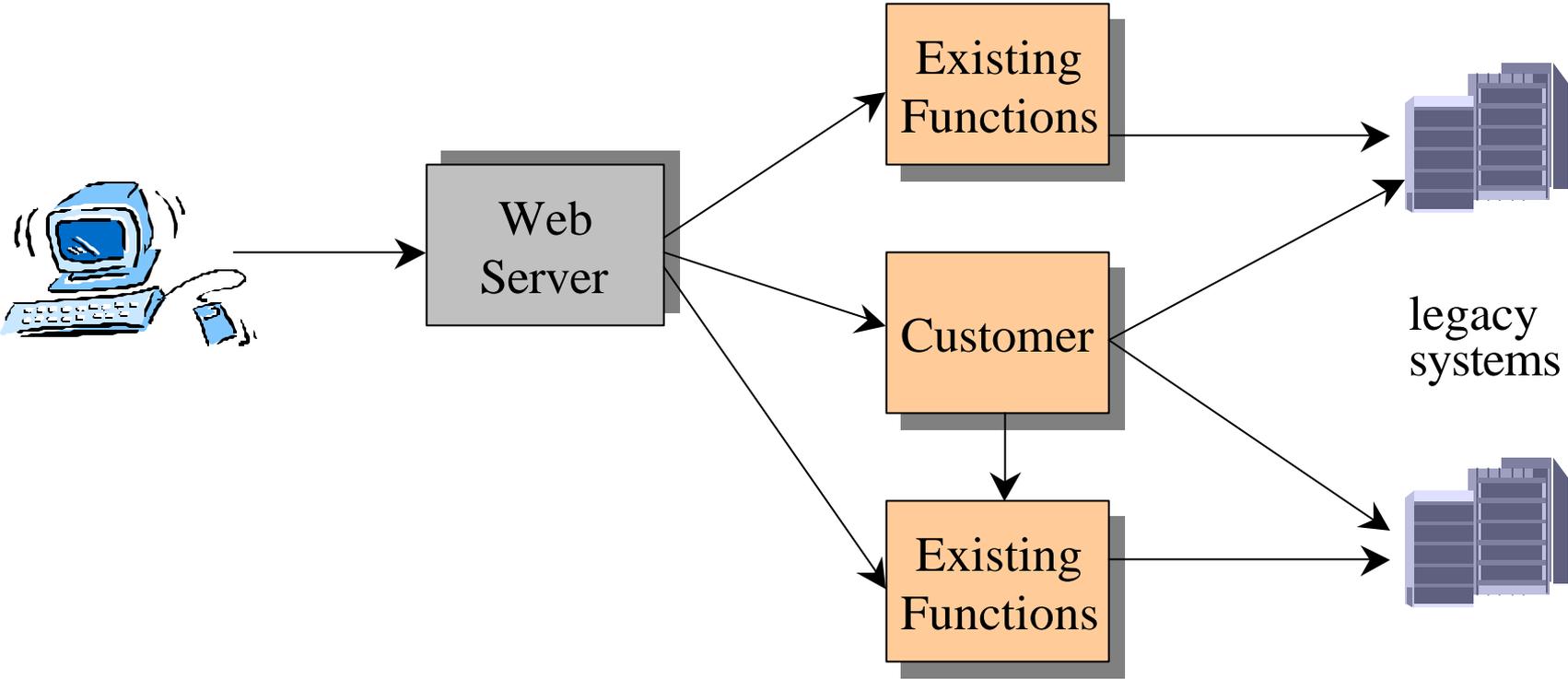*Enterprise QOS and non-functional requirements implemented in transformations*

Metamodels

- Provide rules for how to build a correct model for a particular purpose, e.g. "business integration metamodel"
- UML Profile
  - Provides a targeted subset of UML
  - Standard mechanism for extending UML
- Refinement and Constraint
  - Metamodels refine the definition of modeling elements by placing constraints on their behavior through the use of stereotypes
- Stereotypes
  - Standard UML Stereotypes
    - <<boundary>>, <<control>>, <<entity>>
  - Extending the UML Stereotypes
    - Inheritance used to extend and refine the meaning of stereotypes
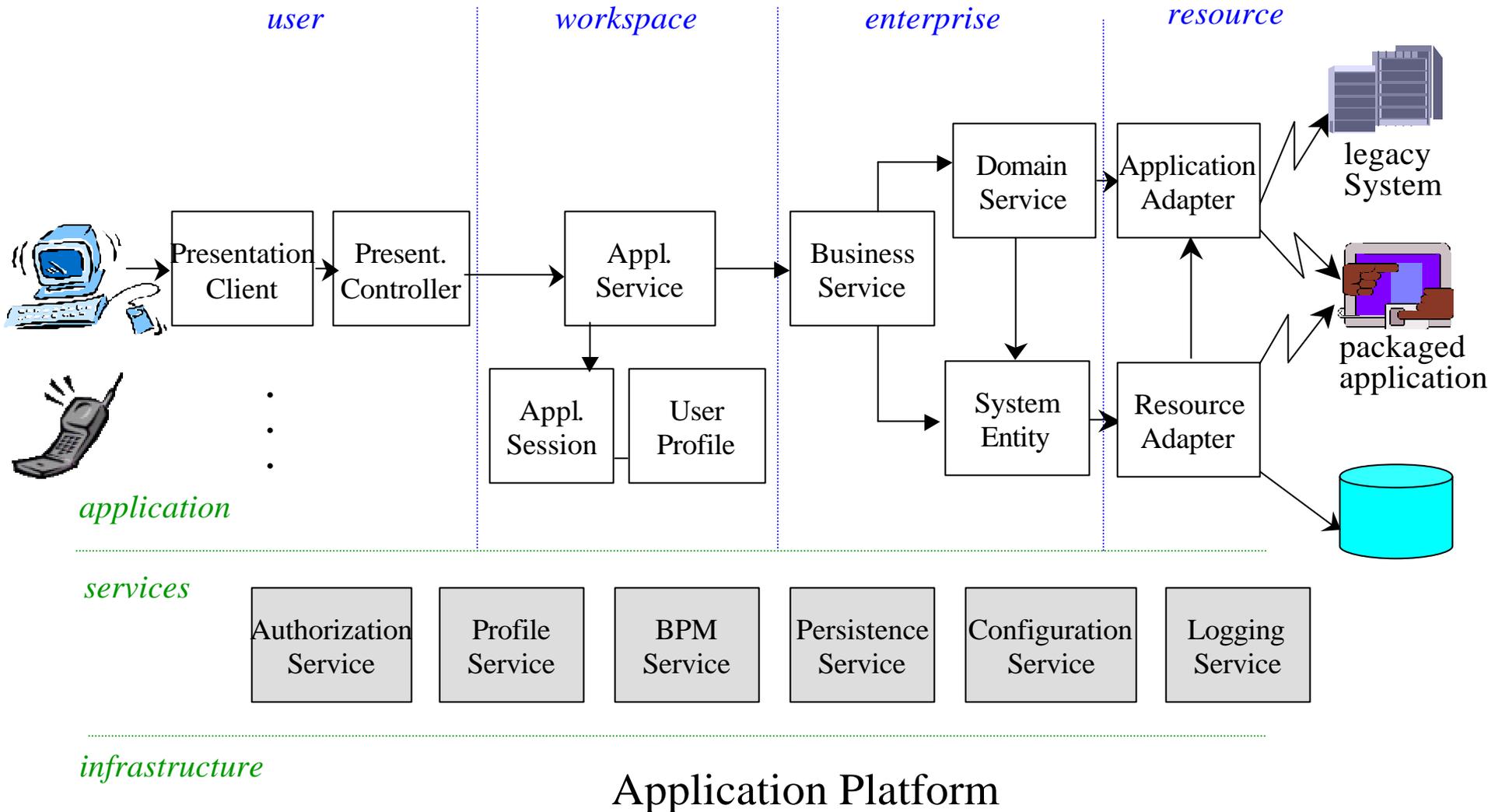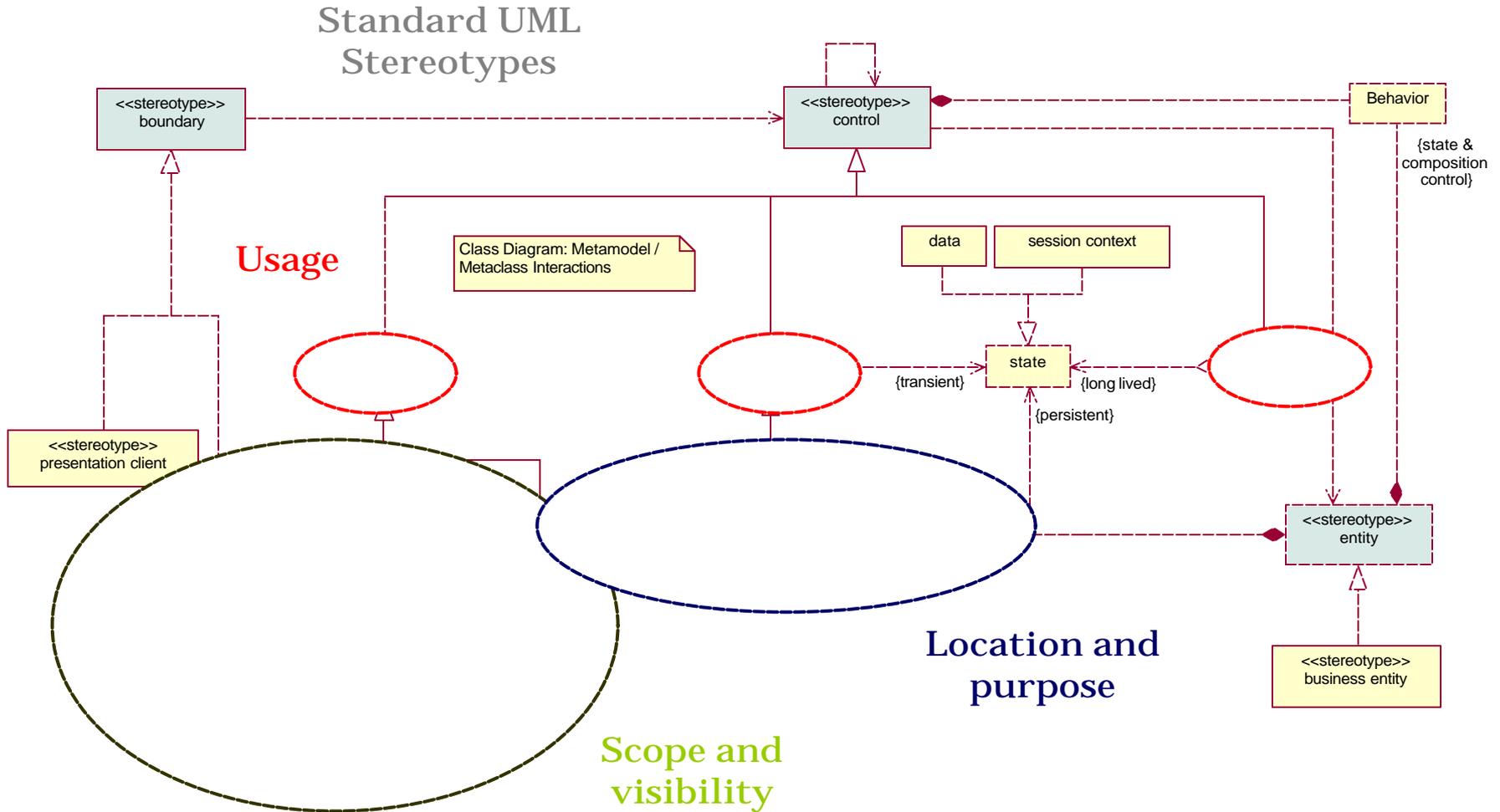   - Tagged Values use to apply specific properties
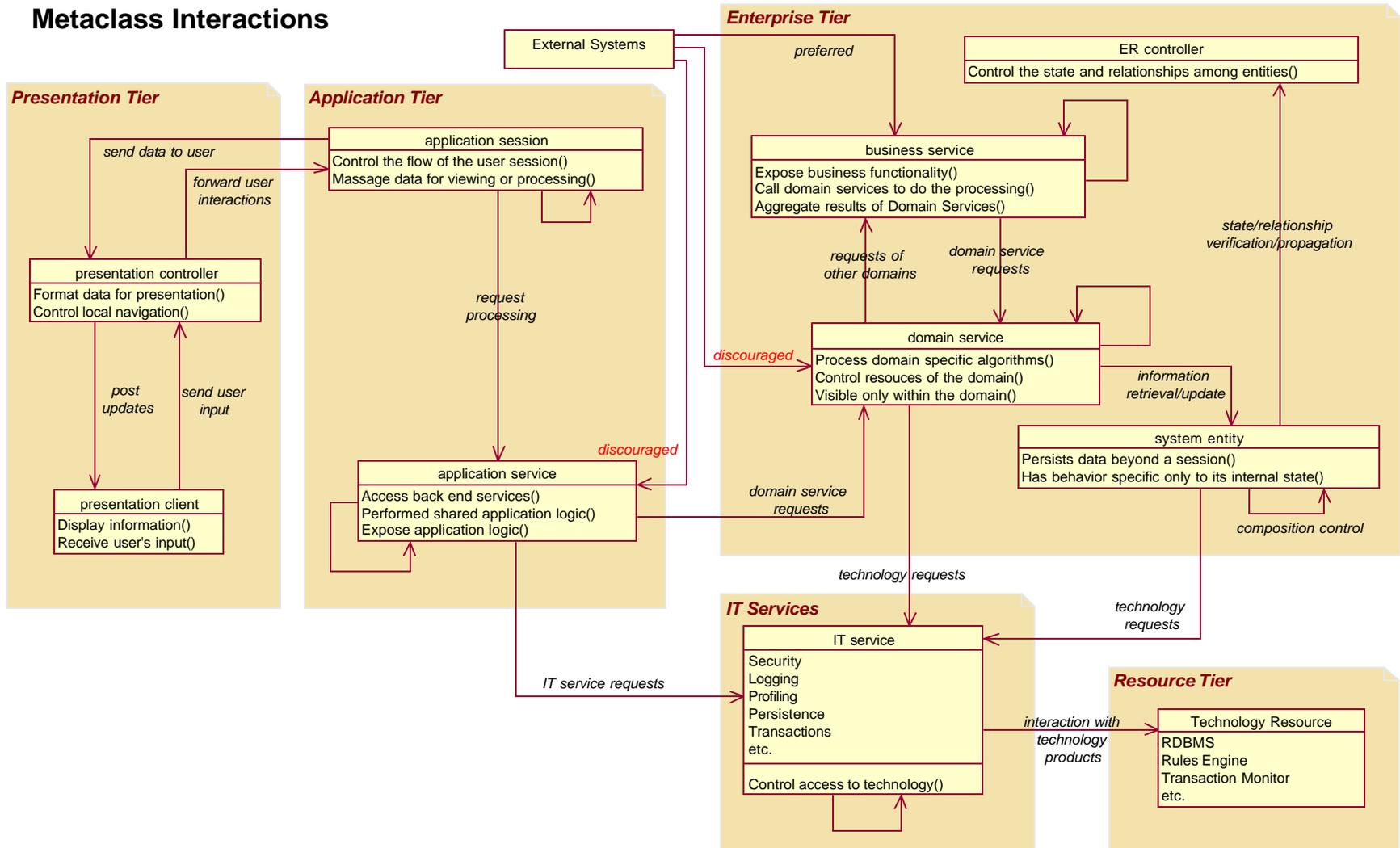
Sample Web Implementation

Existing
Functions

Web
Server

Customer

legacy
systems

Existing
Functions

Sample Web Architecture

M²VP

user *workspace* *enterprise* *resource*

Presentation Client	Present. Controller	Appl. Service	Business Service	Domain Service / Application Adapter → legacy System
		Appl. Session / User Profile		System Entity / Resource Adapter → packaged application

application

services

Authorization Service	Profile Service	BPM Service	Persistence Service	Configuration Service	Logging Service

infrastructure

Application Platform

Metamodel Stereotypes

Courtesy Terry Merriman, ©2003

Web Architectural Style Metamodel "Rules of Engagement"

Metaclass Interactions

Courtesy Terry Merriman, ©2002

MDA Profiles
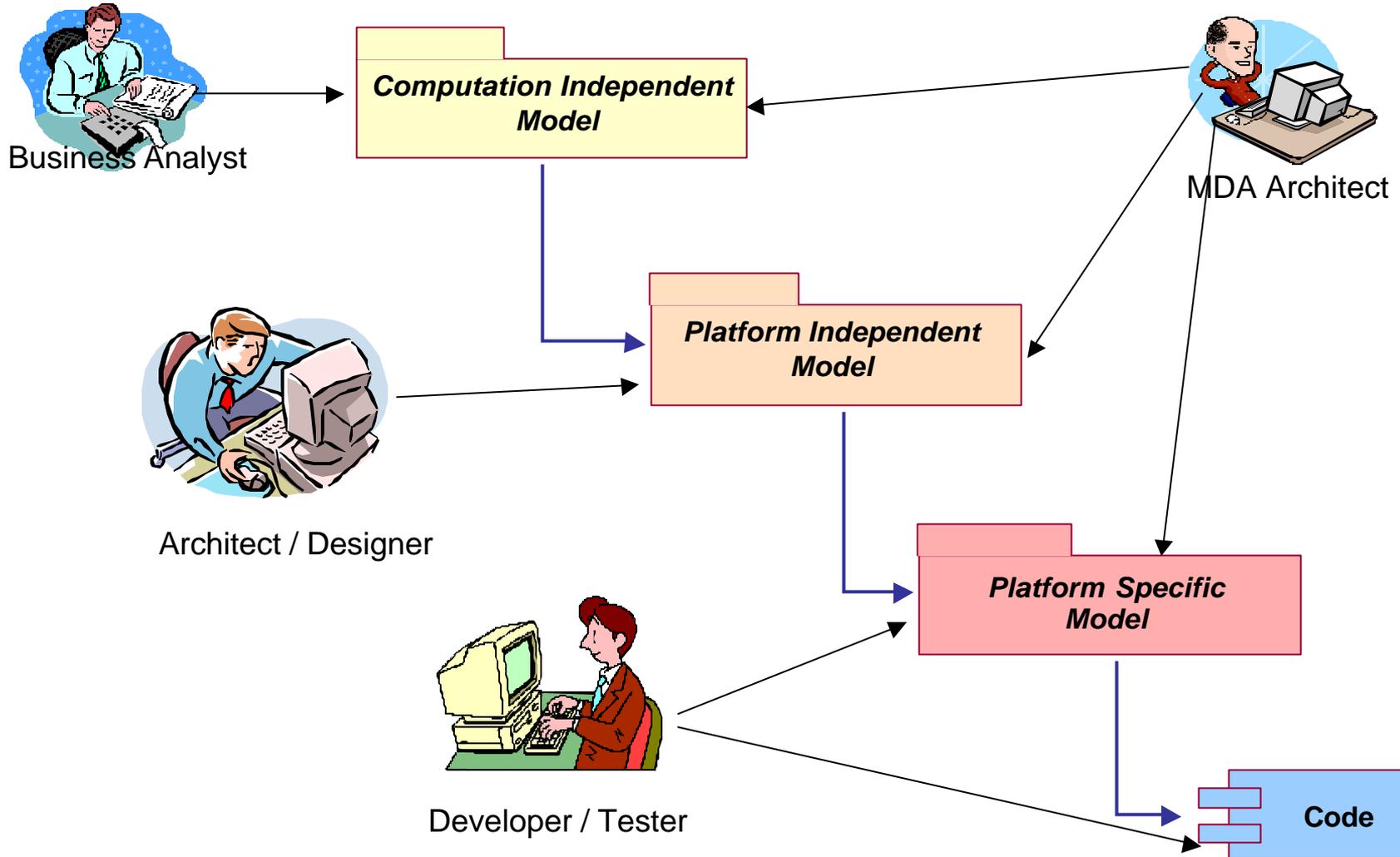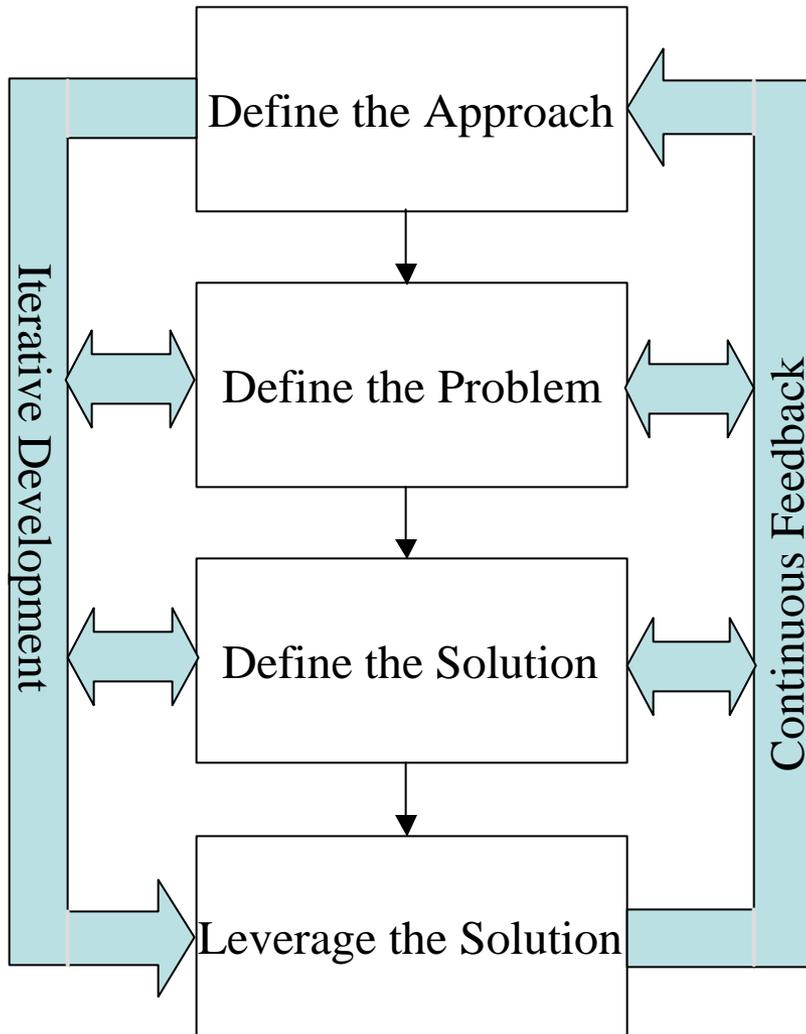
- ## Computational Independent Model
  - Business-oriented non-UML representation. Simplified UML subset appropriate for business analysts.

- ## Platform Independent Model
  - Custom profiles for enterprise architecture and standards
  - Standard based profiles (EDOC, EAI)

- ## Platform Specific Model
  - Standards based profiles (CORBA, EJB, .NET)

MDA Process Revisited

M²VP

Business Analyst

Computation Independent Model

MDA Architect

Architect / Designer

Platform Independent Model

Developer / Tester

Platform Specific Model

Code

APSL Enterprise Process

1. **Define the approach**
   - Integrate enterprise architecture into the development process.
   - ➢ Create meta-models and profiles

2. **Define the problem**
   - ➢ Create Business Models (Domain, CIM, System)

3. **Define the solution**
   - ➢ Refine into PIMs and PSMs

4. **Leverage the results**
   - Integrate assets into a reuse repository
   - Architecture and design accommodates: reuse, customization, enhancements, versioning…

Questions

To learn more: **Fast** **Start**   www.omg.org/fast-start