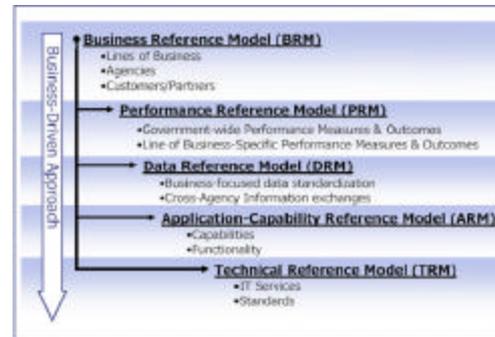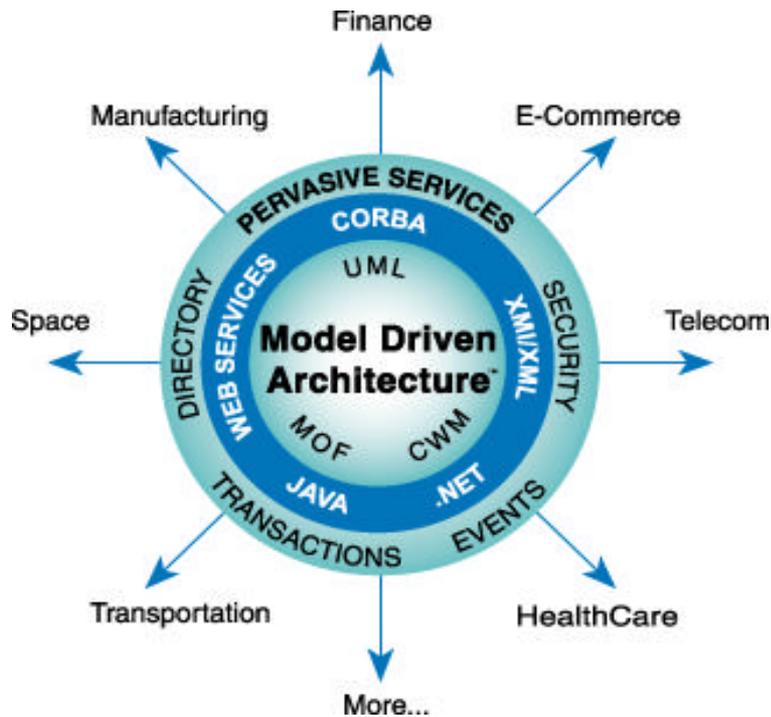# *MDA in the Federal Government*

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Model Driven Architecture

- An architecture-based process for integrating models into the development process
- A set of standards defining the scope, content, creation and usage of models
- Formally separates business and technology concerns

Agenda

- The new government and IT landscape
- MDA context
- FEA Overview
- Using MDA to support FEA
- Sample Profiles
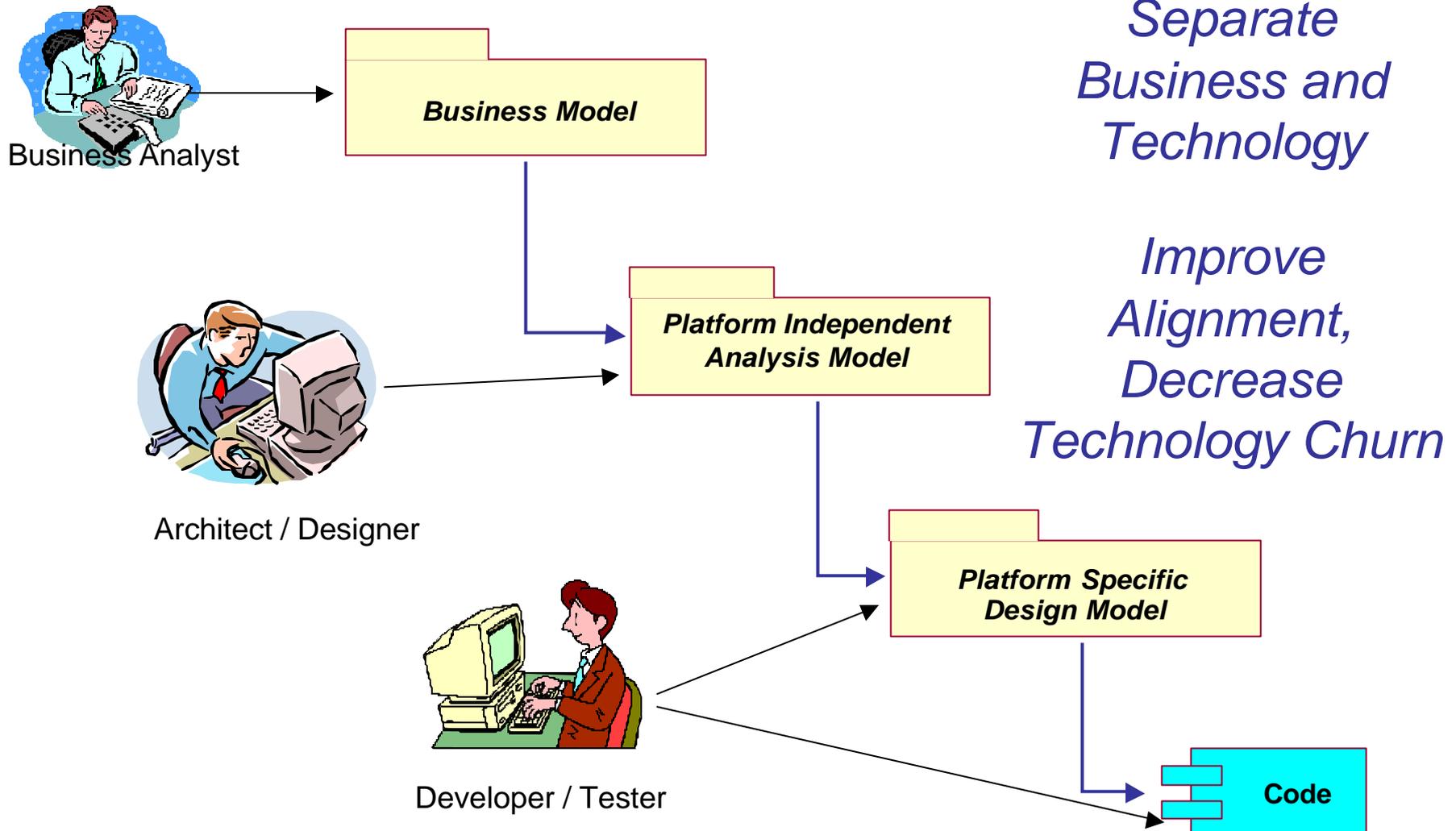
E-Government History

- E-Government is a key element of President's Management Agenda and Performance Plan (August 2001)

- E-Government Act of 2002 (PL 107-347) establishes Federal CIO in OMB

- Development of Federal Enterprise Architecture begins at OMB (Feb 6, 2002)

- Business Reference Model Published (July 22, 2002 - document, August 13 - XML)

- E-Gov Enterprise Architecture Guidance published (Oct 24, 2002)

So Who Cares?

- For FY 2004, All IT appropriations will have to demonstrate compliance with the FEA

- For FY2004, the IT budget for Department of Homeland Security will be..
  - $4,000,000,000

- For FY2004, the IT budget for the US Government will be $56B

MDA Distilled

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Business Analyst

Business Model

Architect / Designer

Platform Independent Analysis Model

Developer / Tester

Platform Specific Design Model

Code

Separate Business and Technology

Improve Alignment, Decrease Technology Churn

Basic Concepts

- **Separation of Concerns** – insulate business and technology matters from each other
  - Simplifies / Clarifies business specification and technical implementation
- **Business Model** – the business specification of a desired IT system
  - Defines the problem in business terms, independent of technology
- **Platform** – the technology implementation of a running system, e.g. J2EE, .NET
  - Refers to technological and engineering details that are irrelevant to the business functionality of a software component.
- **PIM** - *Platform-Independent Model*
  - A formal specification of the structure and function of a system that abstracts away technical detail.
- **PSM** – *Platform-Specific Model*
  - A refinement of a PIM which expresses the system in terms of the *specification model* of the target platform.
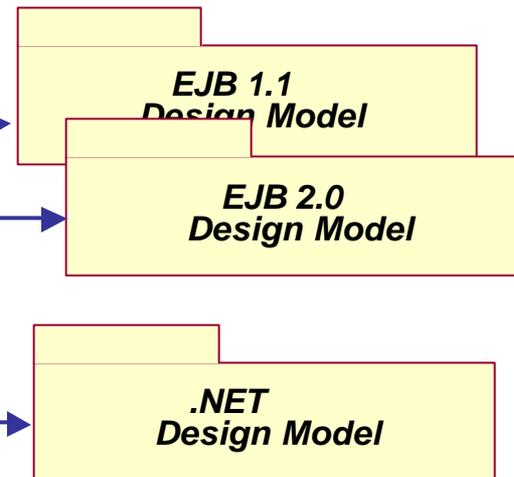
Technology Independence

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Business Analyst

Business Model

Architect / Designer

Platform Independent Model

Developer

EJB 1.1 Design Model

EJB 2.0 Design Model

.NET Design Model
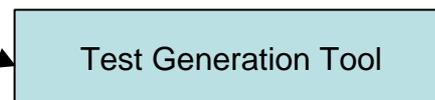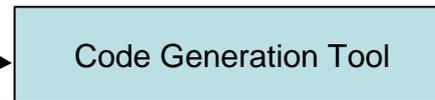
- Applications are "Future-Proof" against technology churn
- When technology evolves, a new PSM can be generated rather than rewriting it
- Artifacts can be generated for multiple platforms from the same design

Generation Tools

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Business Analyst

Business Model

Architect / Designer

Platform Independent Model

Model Transformation Tool

Developer / Tester

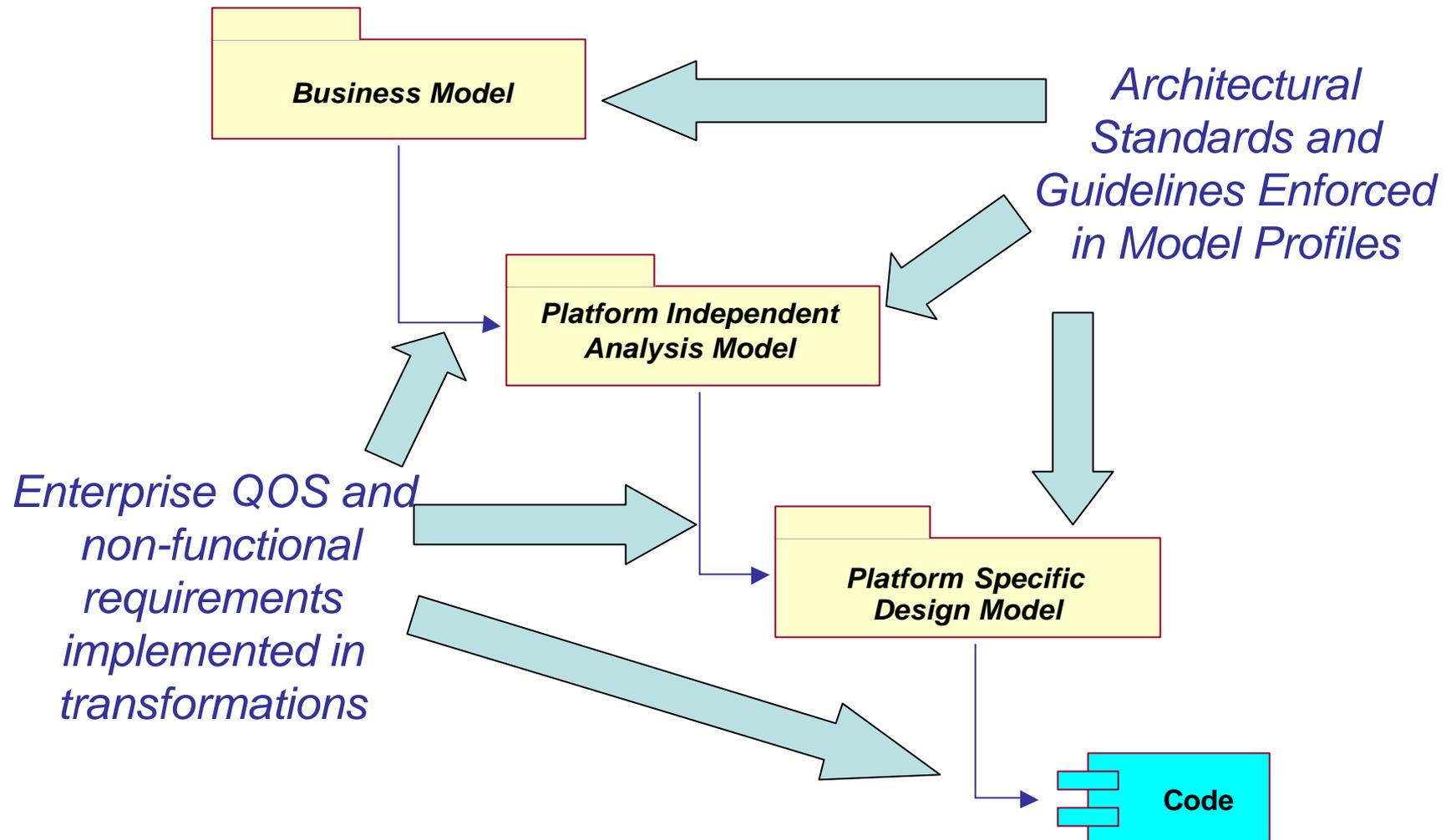**Platform Specific Model**

Code Generation Tool

Test Generation Tool

Code

- Tools are standards based, not proprietary
- Resulting code base runs on standard platforms
- 70-80% of the structural code can be generated
- Test Cases can also be generated

MDA Under the Hood

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Business Model

Architectural Standards and Guidelines Enforced in Model Profiles

Platform Independent Analysis Model

Enterprise QOS and non-functional requirements implemented in transformations
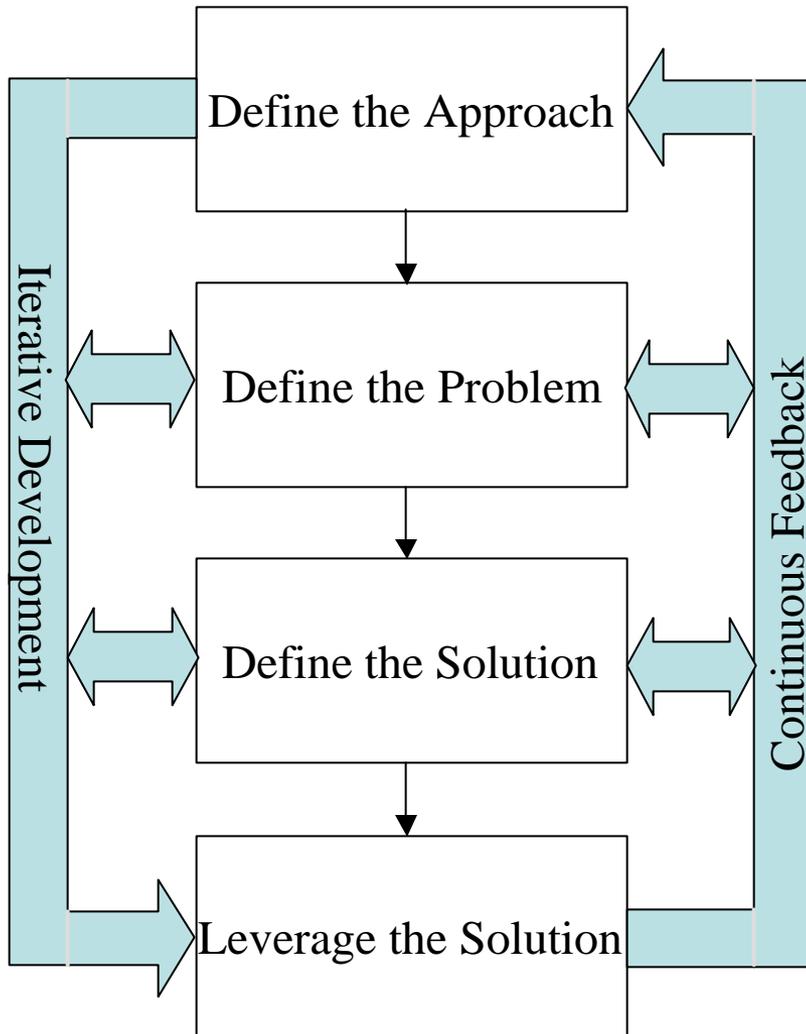
Platform Specific Design Model

Code

MDA explicitly supports Enterprise Architecture

APSL Process

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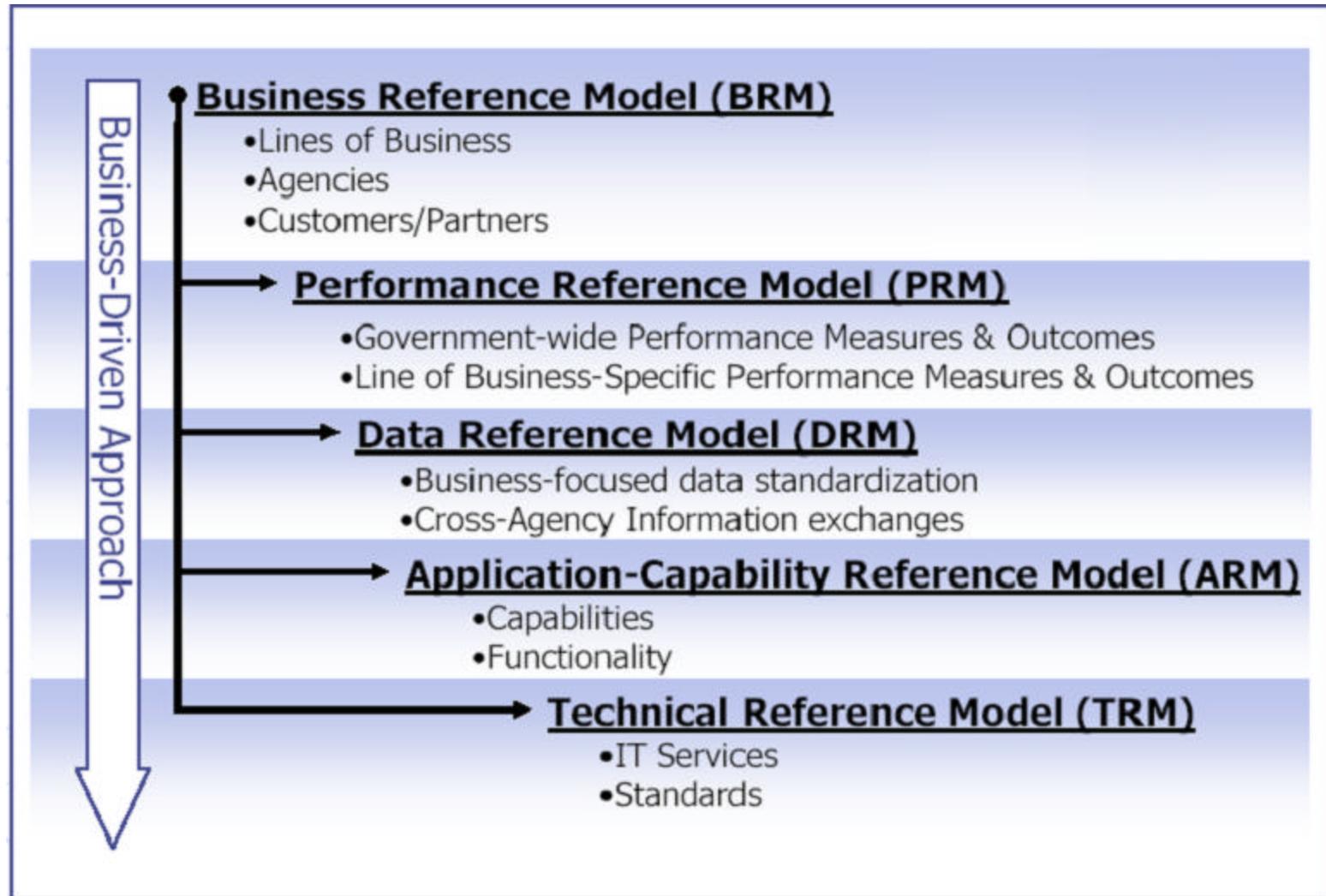   – Integrate enterprise architecture into the development process.
   – Create meta-models and profiles

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

3. **Define the solution**
   – Refine into PIMs and PSMs

4. **Leverage the solution**
   – Integrate assets into a reuse repository
   – Architecture and design accommodates: reuse, customization, enhancements, versioning…
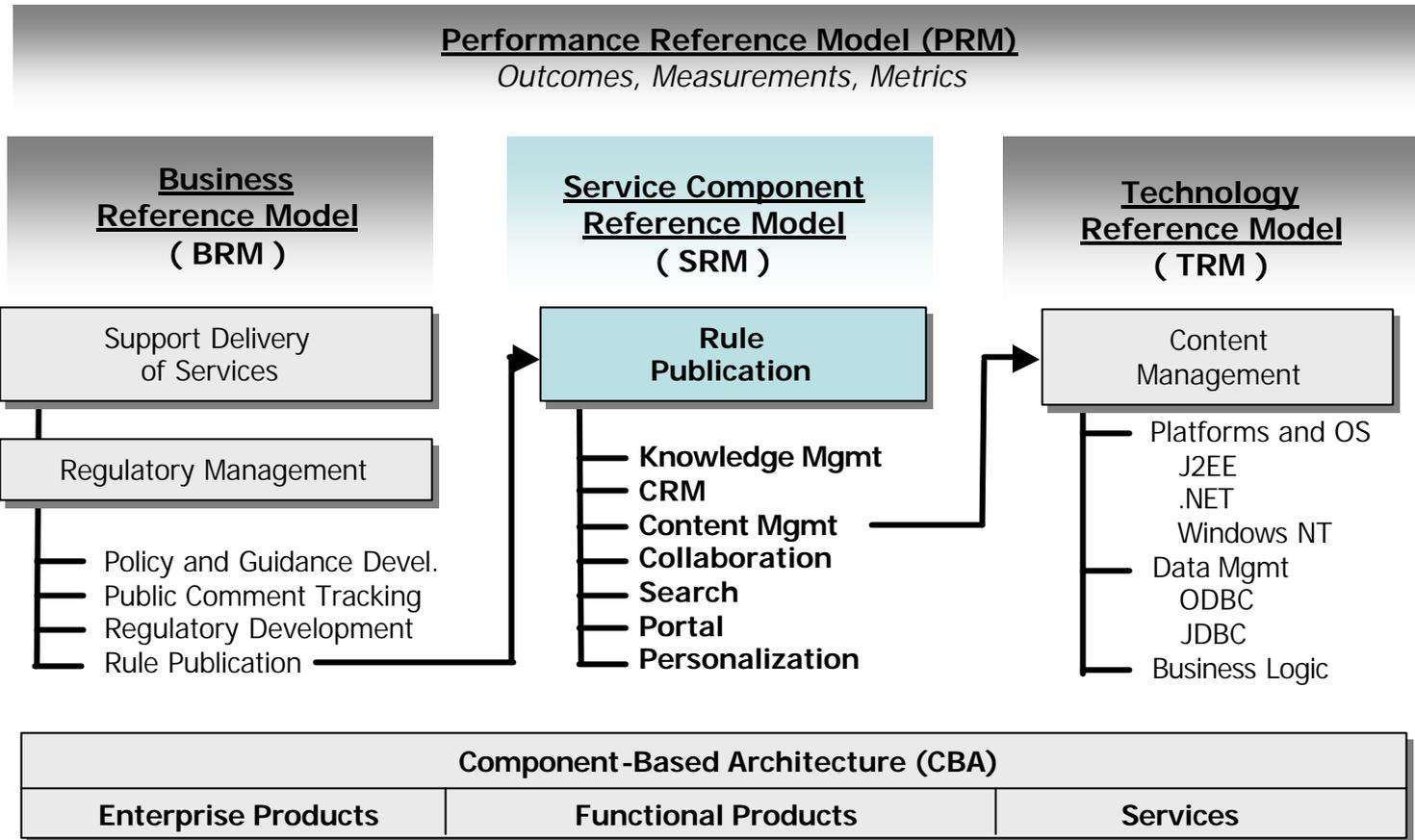
MDA Benefits

- Improves alignment of Business and IT
- Enforces compliance with architectural and enterprise standards
- Increases IT efficiency: reduced cost and time to market, improved quality
- Increases application longevity: Future proof against technology evolution

FEA Introduction

- On February 6, 2002 the development of a Federal Enterprise Architecture (FEA) commenced. Led by OMB, the purpose of this effort is to identify opportunities to simplify processes and unify work across the agencies and within the lines of business of the Federal Government. The outcome of this effort will be a more citizen-centered, customer-focused government that maximizes technology investments to better achieve mission outcomes.

FEA Overview

- The FEA is being constructed through a collection of interrelated "reference models" designed to facilitate cross-agency analysis and the identification of duplicative investments, gaps, and opportunities for collaboration within and across Federal Agencies. These models are defined as:

  – Business Reference Model (BRM)

  – Performance Reference Model (PRM)

  – Data and Information Reference Model (DRM)

  – Service Component Reference Model (SRM)

  – Technical Reference Model (TRM)

FEA Reference Models

FEA Example

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Performance Reference Model (PRM)
Outcomes, Measurements, Metrics

Business Reference Model (BRM)	Service Component Reference Model (SRM)	Technology Reference Model (TRM)
Support Delivery of Services	**Rule Publication**	Content Management
Regulatory Management		

BRM branch:
- Policy and Guidance Devel.
- Public Comment Tracking
- Regulatory Development
- Rule Publication

SRM branch:
- **Knowledge Mgmt**
- **CRM**
- **Content Mgmt**
- **Collaboration**
- **Search**
- **Portal**
- **Personalization**

TRM branch:
- Platforms and OS
  - J2EE
  - .NET
  - Windows NT
- Data Mgmt
  - ODBC
  - JDBC
- Business Logic

Component-Based Architecture (CBA)		
Enterprise Products	**Functional Products**	**Services**

MDA Supports FEA

Service Component RM

- TBS

Technical RM

- TBS

Profiles

- TBS

Conclusion

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- MDA maps well to FEA reference models
- FEA is process focused, very general
- FEA guidelines can be expressed in UML profiles
- Non-functional FEA requirements can satisfied during mapping
- MDA platform independence supports FEA technology requirements
- MDA complements FEA processes and guidelines

Questions