Enterprise Architecture

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Enterprise Architecture Methods

Lecture 2

Week 3 Slides
King AbdulAziz University - FCIT

Overview

- **Enterprise architect's Role & Responsibilities**

- **Enterprise architecture planning**

- **Developing an Enterprise Level Architectural Description**

- **Enterprise Architecture Methods**

- **The Zachman Framework**

- **The Open Group Architecture Framework – TOGAF**

- **OMG's Model-Driven Architecture (MDA)**

Enterprise Architect - Responsibilities

Enterprise architects are practitioners of enterprise architecture; an information technology management discipline that operates within organizations.

- Works with stakeholders

- Build holistic view of organization's strategy, processes, information, and information technology assets

- Ensures business and IT alignment

- Links business mission, strategy, to IT strategy

- synchronization with ever changing business needs

Enterprise Architect - Skills and knowledge

- Systems thinking - to see how parts interact (big picture)

- Knowledge of the business

- Interpersonal and leadership skills

- Ability to explain complex technical issues

- Knowledge of IT governance and operations

- Comprehensive knowledge of hardware, software, application, and systems engineering

- Project management planning and organizational skills

- Knowledge of financial modeling as it pertains to IT investment

- Customer service orientation

- Time management and prioritization

Enterprise Architecture – *Birdseye View*
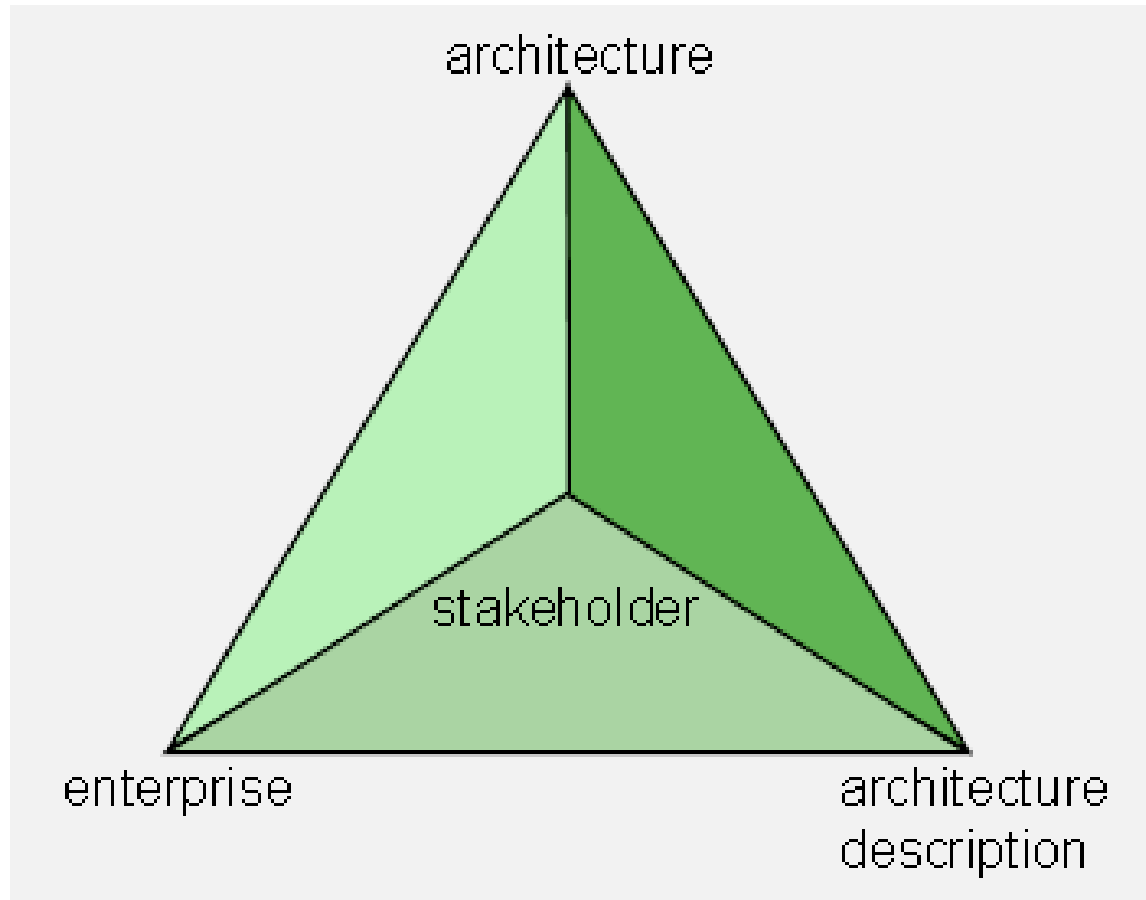
Relationship b/w enterprise, stakeholder, architecture, and architecture description

Enterprise Architecture – Symbols and Semantics

- A **symbolic model** expresses properties of architectures of systems by means of symbols that refer to reality.

- A **semantic model** is an interpretation of a symbolic model, expressing the meaning of the symbols in that model.
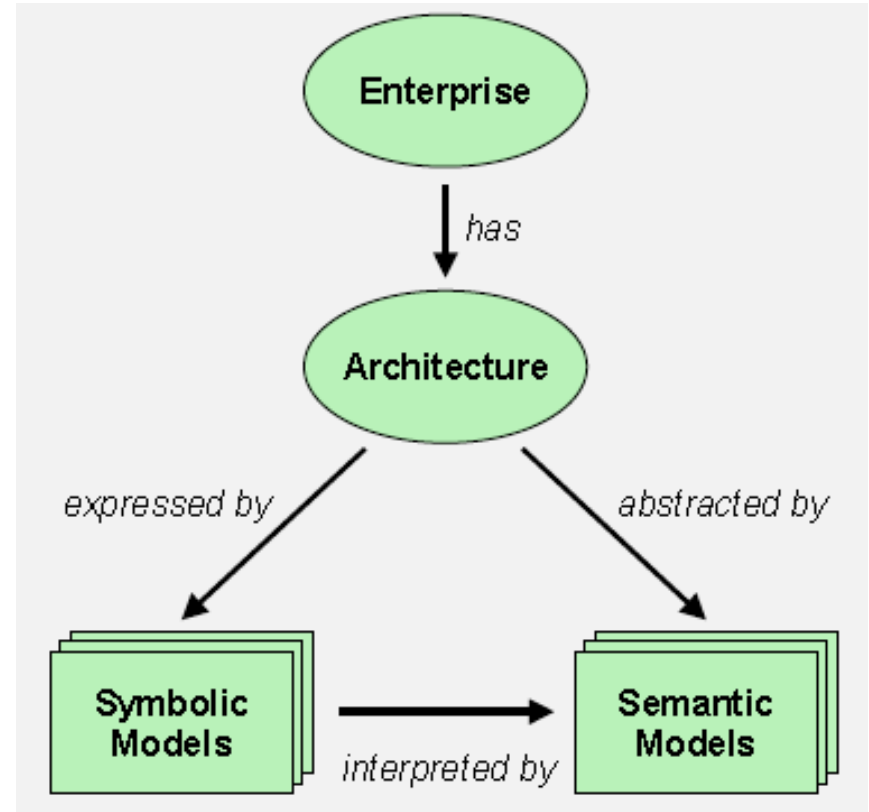
The enterprise, its architecture, symbolic and semantic models

Enterprise Architecture – Observing Domains
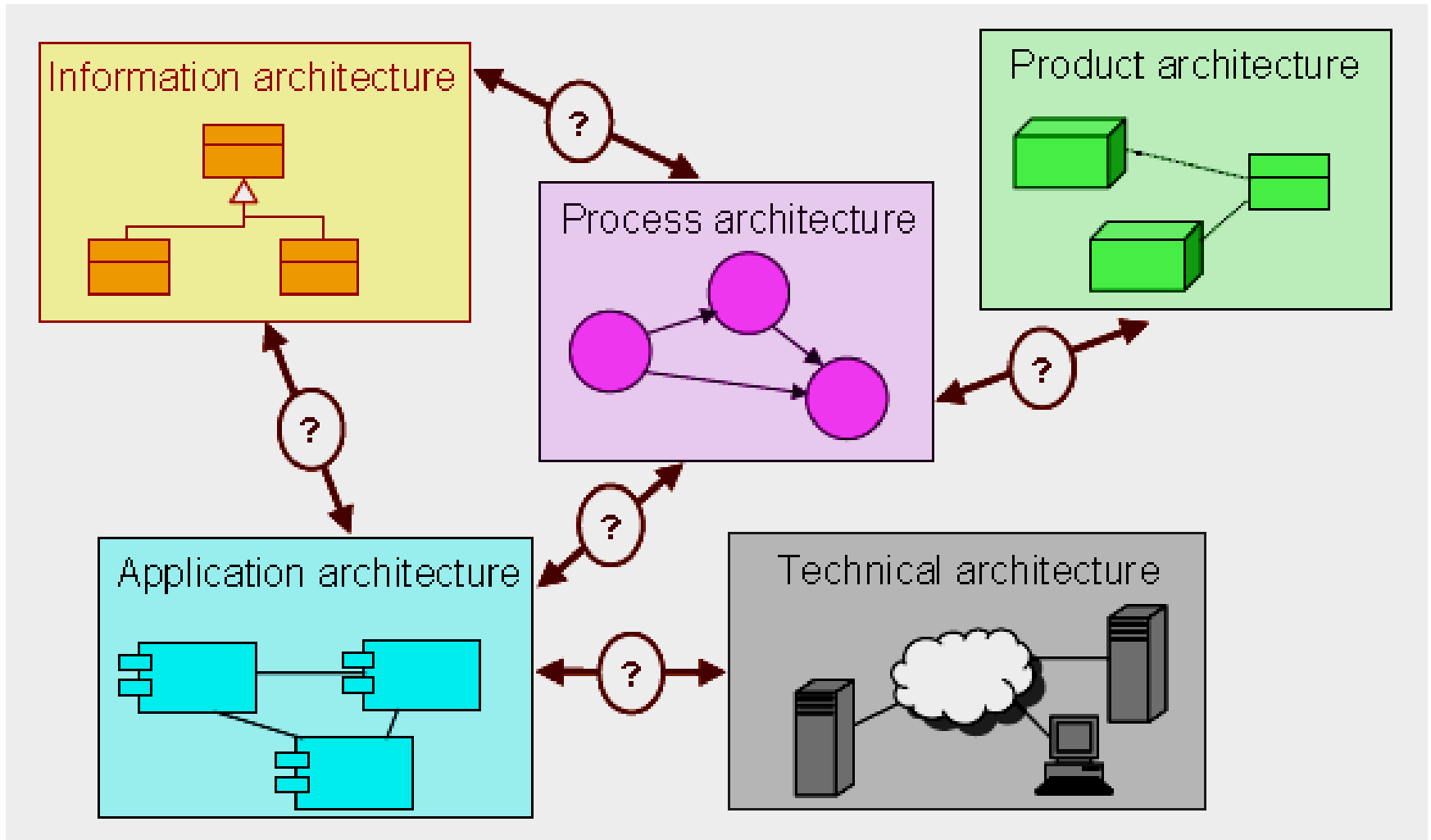
Heterogeneous architectural domains

Enterprise architecture planning

Objectives:

❖ *Improved Planning*

   ✓ Help make more informed IT decisions

❖ *Reduce Complexity*

   ✓ Lifecycle management – To establish a process that is focused on building, maintaining, acquiring, and retiring technology

❖ *Improve IT to Business Alignment*

   ✓ Facilitate the adaption of technology to changing business needs and pressures in administration

   ✓ Which technology solution solves which business need, and how?

Enterprise architecture planning

Enterprise Architecture Planning (EAP) is the planning or a process of defining architectures for the use of information, in support of the business and the plan for implementing those architectures.
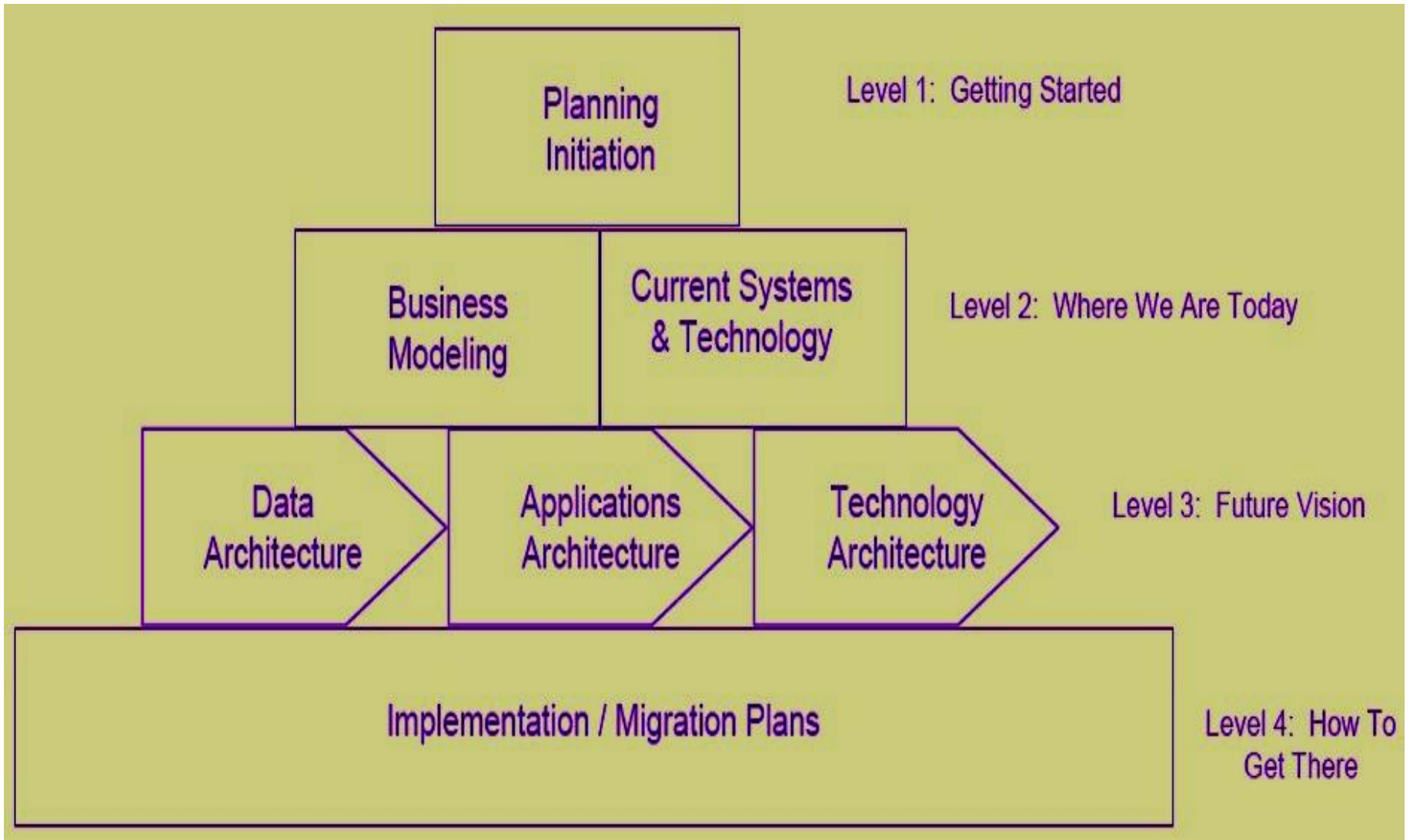
EAP components:

Layer-1: *Getting Started (EAP Work plan)*

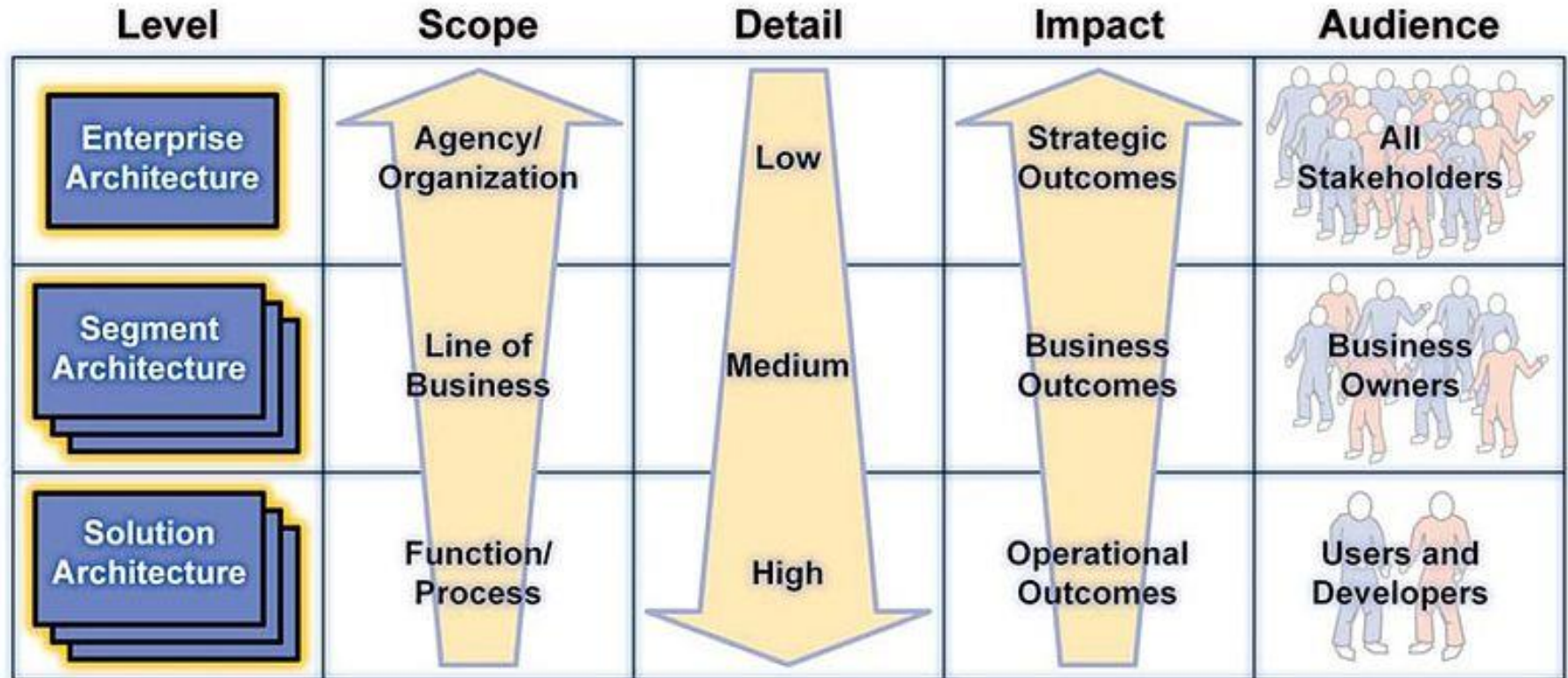**Layer-2:** *Where we are today (Defining a baseline)*

Layer-3: *The vision of where we want to be -* definition of process flow, data architecture, applications architecture, and technology architecture

Layer-4: *How we plan to get there -* Implementation / Migration Plans , cost/benefit analysis, and a clear path for migration

Levels of Enterprise Architecture Planning

Planning Initiation

Level 1: Getting Started

Business Modeling

Current Systems & Technology

Level 2: Where We Are Today

Data Architecture

Applications Architecture

Technology Architecture

Level 3: Future Vision

Implementation / Migration Plans

Level 4: How To Get There

Relationship b/w EA, segment and Solution architecture

| Level	Scope	Detail	Impact	Audience
Enterprise Architecture	Agency/ Organization	Low	Strategic Outcomes	All Stakeholders
Segment Architecture	Line of Business	Medium	Business Outcomes	Business Owners
Solution Architecture	Function/ Process	High	Operational Outcomes	Users and Developers

Enterprise architecture – Methods & Frameworks

History :

- Started with the **Zachman Framework** in 1987

- Another early implementation **"Technical Architecture Framework for Information Management"** (TAFIM). Drafted in 1991 (TAFIM TRM)

- The **TOGAF TRM** was originally derived from (TAFIM), which in turn was derived from the IEEE model 1003.0 or POSIX Open System Environment
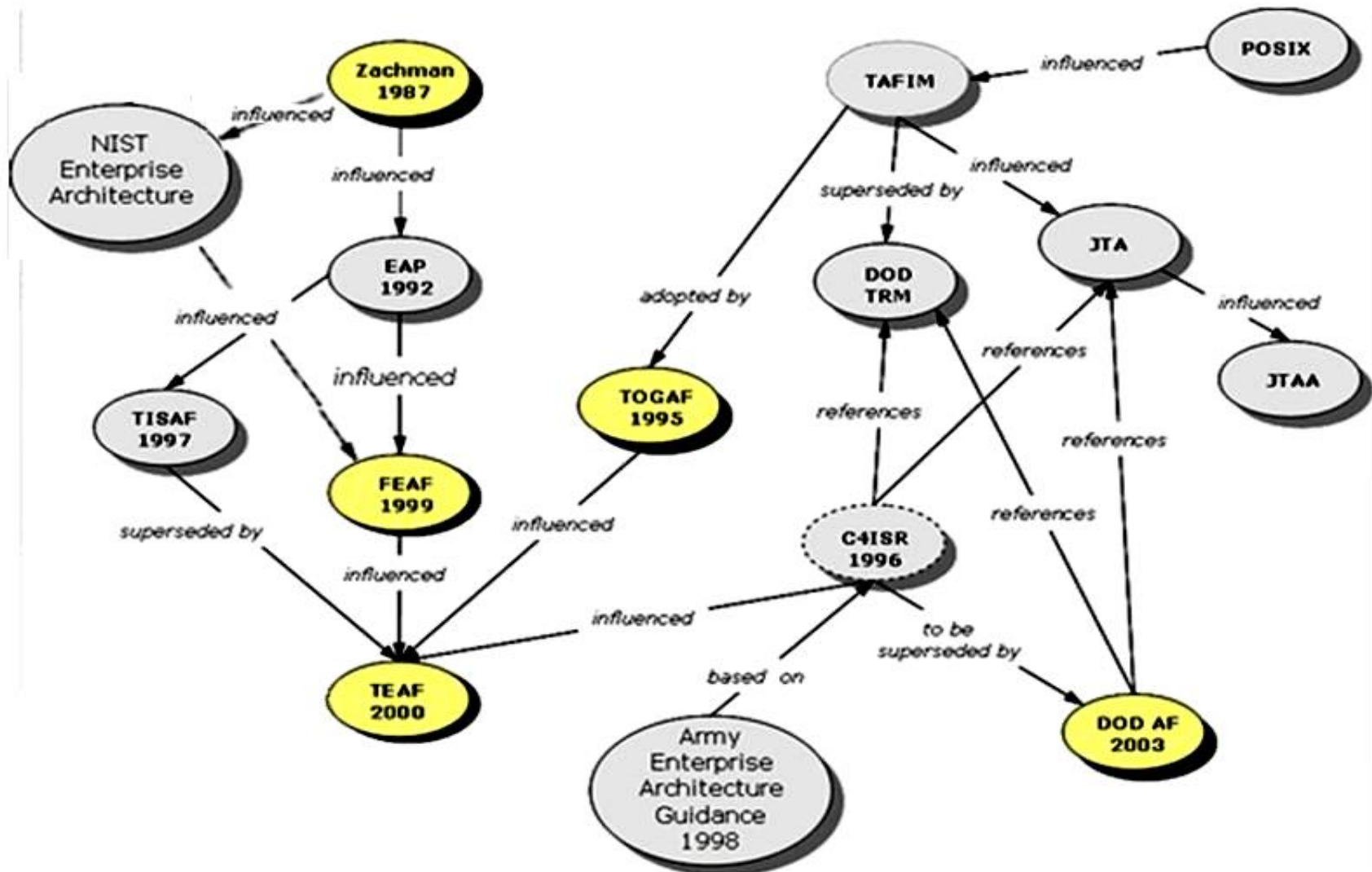
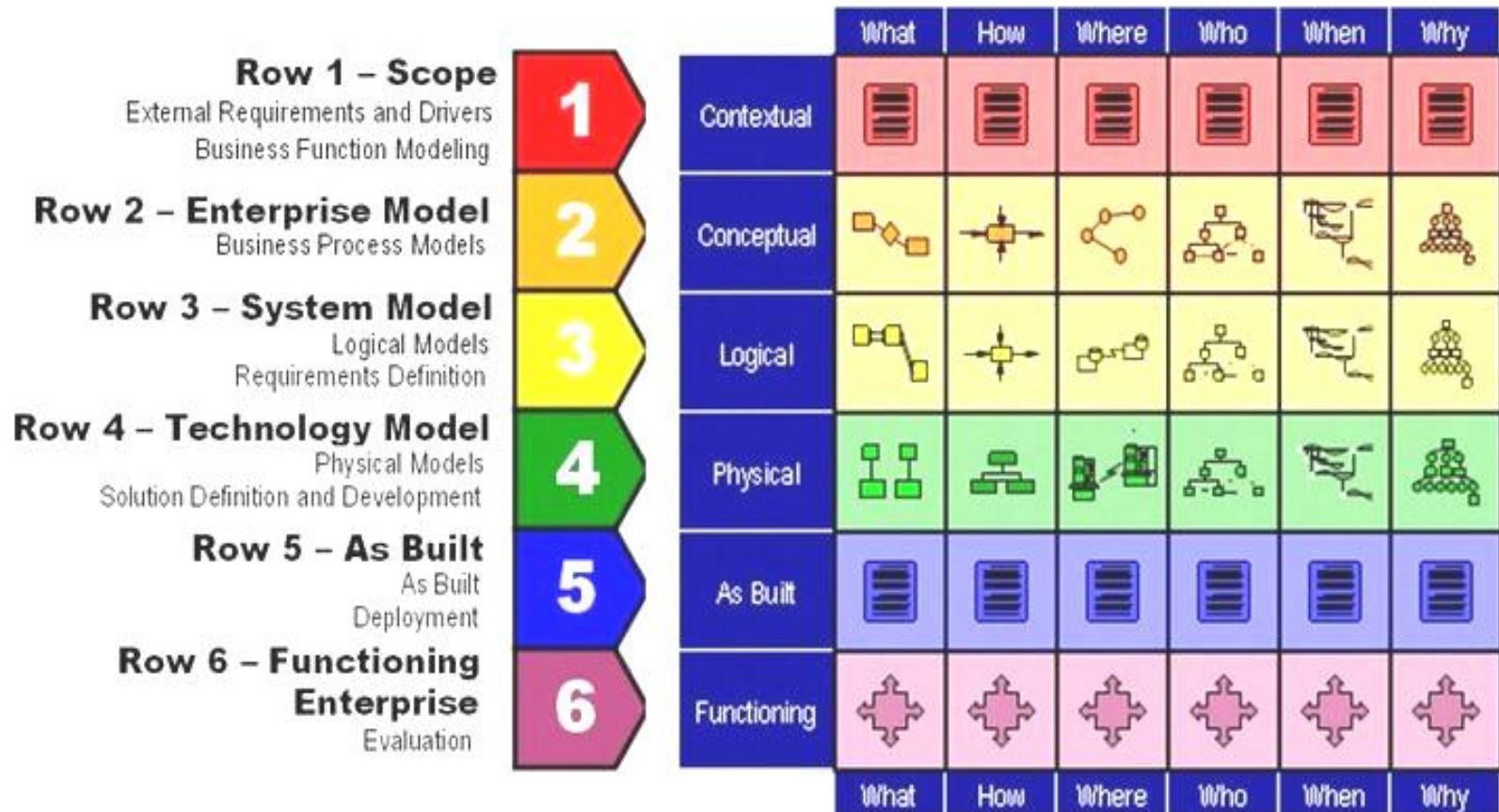# EA – Methods & Frameworks (**The Zachman Framework**)

Concept:

- Describe complex systems with different types of descriptions (e.g., textual, graphical)

- Provides thirty-six necessary categories

- Deals with complex things like manufactured goods (e.g., appliances), constructed structures (e.g., buildings), and enterprises (e.g., the organization and all of its goals, people, and technologies)

- The framework provides six different transformations of an abstract idea (not increasing in detail, but transforming) from six different perspectives

EA – Methods & Frameworks (The Zachman Framework)

Views of Rows:

- Planner's View (Scope)
- Owner's View (Enterprise or Business Model)
- Designer's View (Information Systems Model)
- Builder's View (Technology Model)
- Subcontractor View (Detailed Specifications)
- Actual System View or The Functioning of Enterprise

EA – Methods & Frameworks **(The Zachman Framework)**

- **Focus of Columns:**

In summary, each perspective focuses attention on the same fundamental questions, then answers those questions from that viewpoint, creating different descriptive representations (i.e., models), which translate from higher to lower perspectives. The basic model for the focus (or product abstraction) remains constant. The basic model of each column is uniquely defined, yet related across and down the matrix.

1. *The data description — What*
2. *The function description — How*
3. *The Network description — Where*
4. *The people description — Who*
5. *The time description — When*
6. *The motivation description — Why*

EA – Methods & Frameworks (The Zachman Framework)

	Why	How	What	Who	Where	When
Contextual	Goal List	Process List	Material List	Organizational Unit & Role List	Geographical Locations List	Event List
Conceptual	Goal Relationship	Process Model	Entity Relationship Model	Organizational Unit & Role Rel. Model	Locations Model	Event Model
Logical	Rules Diagram	Process Diagram	Data Model Diagram	Role relationship Diagram	Locations Diagram	Event Diagram
Physical	Rules Specification	Process Function Specification	Data Entity Specification	Role Specification	Location Specification	Event Specification
Detailed	Rules Details	Process Details	Data Details	Role Details	Location details	Event Details

EA – Methods & Frameworks **(The Zachman Framework)**

Zachman Framework set of rules:

- **Rule 1 The columns have no order :** The columns are interchangeable but cannot be reduced or created

- **Rule 2 Each column has a simple generic model :** column can have its own meta-model

- **Rule 3 The basic model of each column must be unique :** The basic model of each column, the relationship objects and the structure of it is unique. Each relationship object is interdependent but the representation objective is unique

- **Rule 4 Each row describes a distinct, unique perspective :** Each row describes the view of a particular business group and is unique to it. All rows are usually present in most hierarchical organizations

- **Rule 5 Each cell is unique**

- **Rule 6 The composite or integration of all cell models in one row constitutes a complete model from the perspective of that row**

- **Rule 7 The logic is recursive :** The logic is relational between two instances of the same entity

EA – Methods & Frameworks **(The Zachman Framework)**

Rule 1:
Columns have no order

Rule 2:
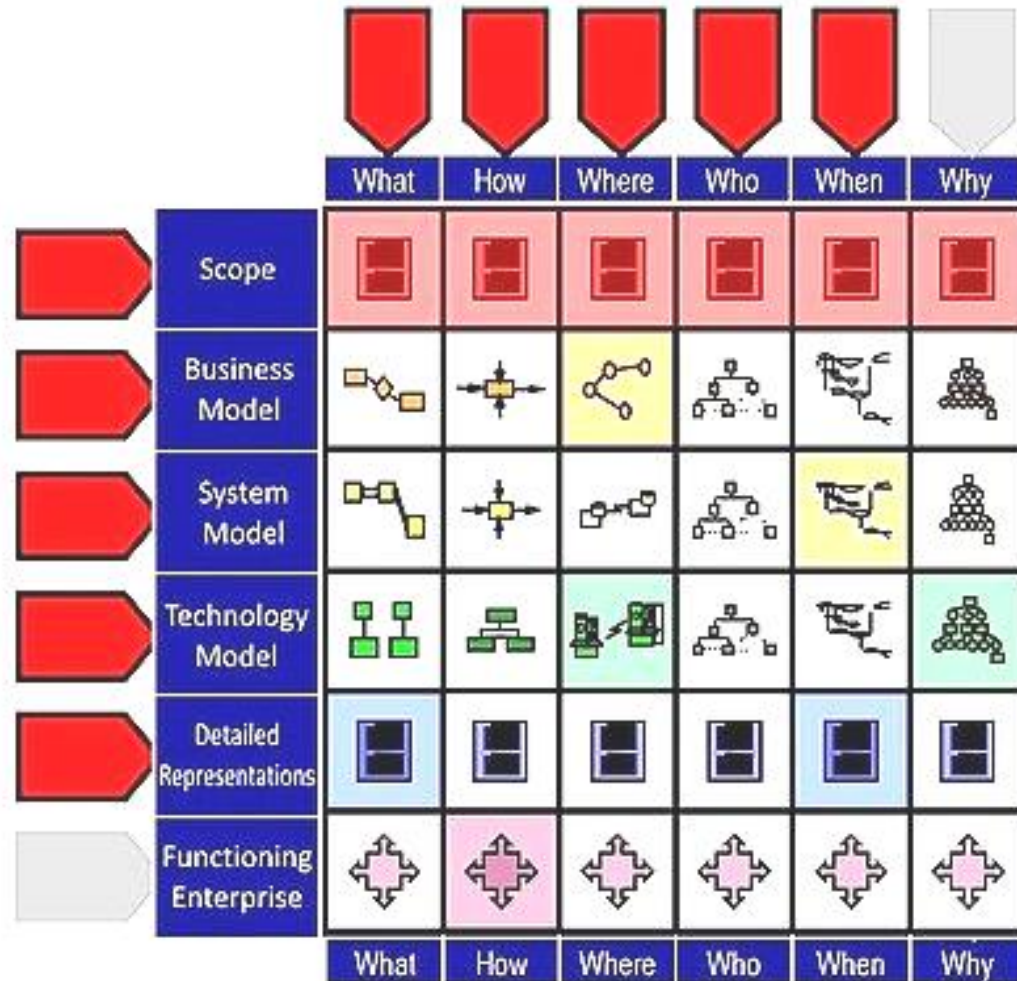Each column has a simple, basic model

Rule 3:
Basic model of each column is unique

Rule 4:
Each row represents a distinct view

Rule 5:
Each cell is unique

Rule 6:
Combining the cells in one row forms a complete description from that view

Rule 7:
The logic is recursive
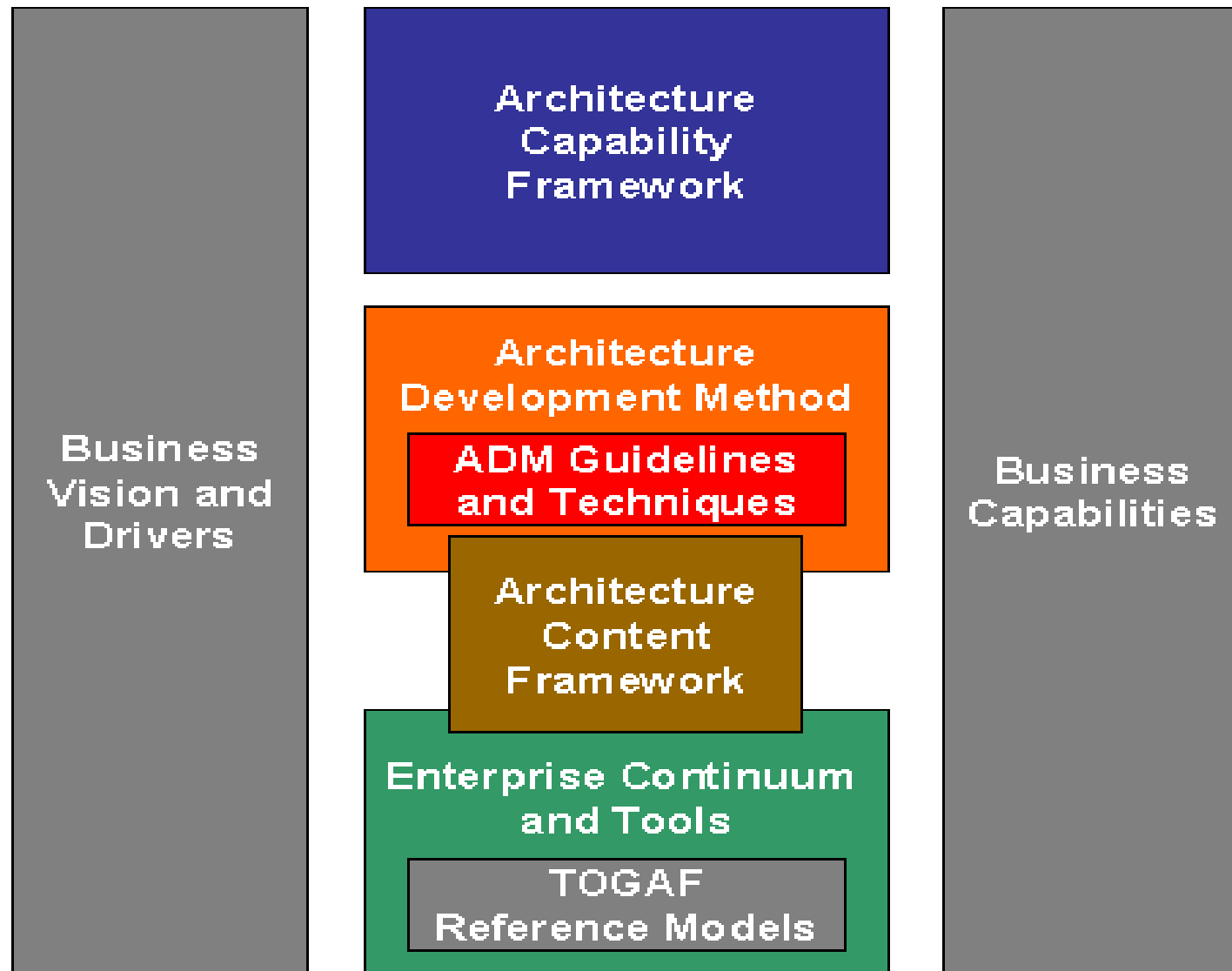
EA – Methods & Frameworks (TOGAF)

The Open Group Architecture Framework :

A comprehensive approach for an enterprise information architecture, which addresses:

- TOGAF is a high level and holistic approach to design

- Planning

- Implementing

- Governing

- A Registered trademark of The Open Group in United States

EA – Methods & Frameworks (TOGAF)

Business Vision and Drivers

Architecture Capability Framework

Architecture Development Method

ADM Guidelines and Techniques

Architecture Content Framework

Enterprise Continuum and Tools

TOGAF Reference Models

Business Capabilities

A high level TOGAF framework representation

EA – Methods & Frameworks   (TOGAF)

TOGAF has the following main components:

- *An Architecture Capability Framework:*

   Addresses the organization, processes, skills, roles and responsibilities required to establish and operate an architecture function within an enterprise

- *The Architecture Development Method (ADM):*

   - ❖ Provides a 'way of working' for architects
   - ❖ The ADM is considered to be the core of TOGAF, and consists of a stepwise cyclic approach for the development of the overall enterprise architecture

EA – Methods & Frameworks   (TOGAF)

TOGAF has the following main components:

- *The Architecture Content Framework:*

  *C*onsiders an overall enterprise architecture as composed of four closely interrelated architectures:

  - ❖ Business Architecture

  - ❖ Data Architecture

  - ❖ Application Architecture

  - ❖ Technology (IT) Architecture

EA – Methods & Frameworks   (TOGAF)

**TOGAF has the following main components:**

- *The Enterprise Continuum:*

    Which comprises various reference models:

    - ❖ Technical Reference Model
    - ❖ The Open Group's Standards Information Base (SIB)
    - ❖ Building Blocks Information Base (BBIB)

    The idea behind the Enterprise Continuum is to illustrate how architectures are developed across a continuum ranging from foundational architectures, through common systems architectures and industry- specific architectures, to an enterprise's own individual architecture.

EA – Methods & Frameworks   (TOGAF)
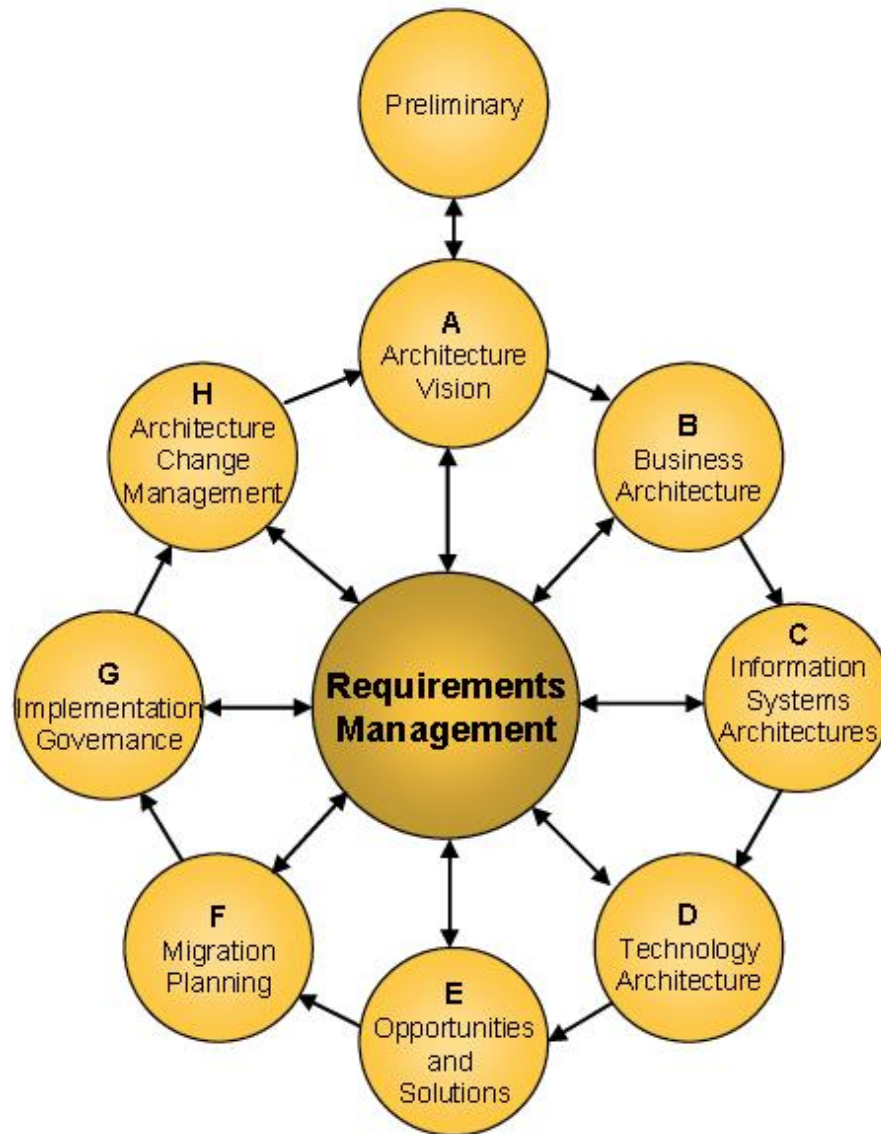
**The Architecture Development Method (ADM) of TOGAF**

OMG's Model-Driven Architecture (MDA)

■ The Model-Driven Architecture (MDA) (Object Management Group Architecture Board 2001, Frankel 2003) aims to provide an open, vendor neutral approach to interoperability. It builds upon the Object Management Group's modeling standards:

■ MDA comprises three abstraction levels with mappings between them:

❖ *Computation-Independent Model (CIM)*

❖ *Platform-Independent Model (PIM)*

❖ *Platform-Specific Model (PSM)*

OMG's Model-Driven Architecture (MDA)

Computation Independent Model (CIM)

Business model
Domain model
Business requirements

↓ mapping ↑ mapping
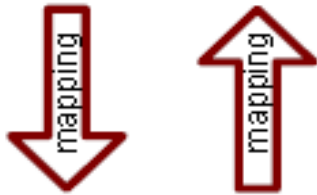
Platform Independent Model (PIM)

BPMN Model independent of workflow engine
UML model independent of computing platform

↓ mapping ↑ mapping

Platform Specific Model (PSM)

UML model for a Java platform
WS-BPEL process model

MDA

Framework

OMG's Model-Driven Architecture (MDA)

- The requirements for the system are modeled in a **Computation-Independent Model (CIM)** describing the situation in which the system will be used. Such a model is sometimes called a domain model or a business model. It hides much or all information about the use of automated data processing systems.

- The **Platform-Independent Model (PIM)** describes the operation of a system while hiding the details necessary for a particular platform. A PIM shows that part of the complete specification that does not change from one platform to another.

- A **Platform-Specific Model (PSM)** combines the specifications in the PIM with the details that specify how that system uses a particular type of platform.

EA – *Other Frameworks*

Consortia-developed frameworks:

- **EABOK** (The Guide to the Enterprise Architecture Body of Knowledge) – a U.S. Federal-funded guide to EA in the context of legislative and strategic business requirements

- Generalized Enterprise Reference Architecture and Methodology **(GERAM)**

- **IDEAS Group** – a four-nation effort to develop a common ontology for architecture interoperability

- **RM-ODP** – the Reference Model of Open Distributed Processing, defines an enterprise architecture framework for structuring the specifications of open distributed systems

- **TOGAF** – The Open Group Architecture Framework – a widely used framework including an architectural Development Method and standards for describing various types of architecture

- **ARCON** – A Reference Architecture for Collaborative Networks – not focused on a single enterprise but rather on networks of enterprises

EA – *Other Frameworks*

Open-source frameworks:

- **TRAK** – a general systems-oriented framework based on MODAF 1.2 and released under GPL/GFDL

- **MEGAF** is an infrastructure for realizing architecture frameworks that conform to the definition of architecture framework provided in ISO/IEC/IEEE 42010

- **Praxeme**, an open enterprise methodology, contains an enterprise architecture framework called the Enterprise System Topology (EST)

- **GOD**, a generalist observation methodology, contains an enterprise architecture framework based on observation, an innovative certified approach provided in the SDFL Department of DUJ

- **SABSA** is an open framework and methodology for Enterprise Security Architecture and Service Management, that is risk based and focuses on integrating security into business and IT management

EA – *Other Frameworks*

Defense industry frameworks:

- **DoDAF** – the US Department of Defense Architecture Framework

- **MODAF** – the UK Ministry of Defence Architecture Framework

- **NAF** – the NATO Architecture Framework

- **AGATE** – the France DGA Architecture Framework

- **DNDAF** – the DND/CF Architecture Framework (CAN)

EA – *Other Frameworks*

Government frameworks:

- Government Enterprise Architecture (GEA) – a common framework legislated for use by departments of the Queensland Government

- FDIC Enterprise Architecture Framework

- Federal Enterprise Architecture Framework (FEAF) – a framework produced in 1999 by the US Federal CIO Council for use within the US Government, not to be confused with the 2002 Federal Enterprise Architecture (FEA) guidance on categorizing and grouping IT investments, issued by the US Federal Office of Management and Budget

- NIST Enterprise Architecture Model

- Treasury Enterprise Architecture Framework (TEAF) – a framework for treasury, published by the US Department of the Treasury in July 2000

- Nederlandse Overheid Referentie Architectuur (NORA) – a reference framework from the Dutch Government E-overheid NORA

EA – *Other Frameworks*

Proprietary frameworks:

- ***Avancier Methods (AM)*** *Processes and documentation advice for enterprise and solution architects, supported* by training and certification

- ***Solution Architecting Mechanism (SAM)*** *– A coherent architecture framework consisting of a set of integral* modules

- **Integrated Architecture Framework (IAF)** – from Capgemini company in 1993

- **CLEAR** Framework for Enterprise Architecture – Atos Origin's Enterprise Architecture Framework

- **OBASHI** – the OBASHI Business & IT methodology and framework

- **Information FrameWork (IFW)** – conceived by Roger Evernden in 1996

- **SAP** Enterprise Architecture Framework

- **Zachman Framework** by John Zachman at IBM in the 1980s