



# TOGAF®

Version 9.2

The world's largest global training provider

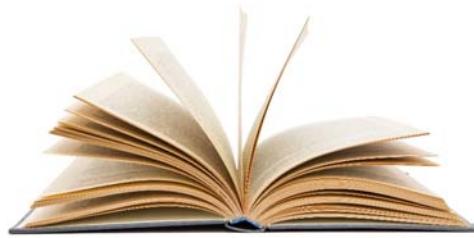
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## TOGAF® 9 Training Course



THE  
*Open*  
GROUP

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## About The Knowledge Academy

- World Class Training Solutions
- Subject and Topic Experts
- High Quality Training Materials
- Accelerated Learning Techniques
- Leading Provider of PRINCE2®, MSP®, Project Management, Change Management, & ITIL® Certifications
- Bespoke Training Solutions



Project Management & Leadership

Business Architecture & Systems Design

Technical & Programming

Computer Software

Business & Corporate

Web, Marketing, PR & Social

Legal, Finance & Accounting

Workplace Requirements

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## Course Outline

- Course Introduction
- Module F13: The TOGAF Certification for People Program
- Module 1: Management Overview
- Module F6: ADM Phases Level 1
- Module F7: ADM Guidelines and Techniques
- Module F11: ADM Deliverables Level 1
- Module F12: TOGAF Reference Models
- Module 2: The TOGAF Framework Components
- Module 3: Introduction to the Architecture Development Method
- Method 4: The Enterprise Continuum and Tools
- Module 5: Architecture Repository
- Module 6: Architecture Content Framework
- Module 7: TOGAF Content Metamodel
- Module 8: Preliminary Phase
- Module 9: Architecture Governance

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## Course Outline

- Module 10: Business Scenarios
- Module 11: Stakeholder Management
- Module 12: Architecture Views and Viewpoints
- Module 13: Building Blocks
- Module 14: Architecture Implementation Support Techniques
- Module 15: Phase A: Architecture Vision
- Module 16A: Phase B: Business Architecture – Catalogs, Matrices and Diagrams
- Module 16: Phase B: Business Architecture
- Module 17: Phase C: Information Systems Architectures – Overview
- Module 18A: Phase C: Data Architecture – Catalogs, Matrices and Diagrams
- Module 18: Phase C: Data Architecture
- Module 19: The Integrated Information Infrastructure Reference Model
- Module 20A: Phase C: Application Architecture – Catalogs, Matrices and Diagrams
- Module 20: Phase C: Application Architecture

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# Course Outline

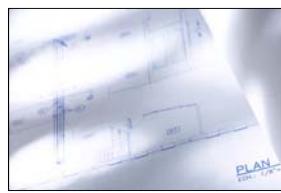
- Module 21: TOGAF Foundation Architecture: the TRM
- Module 22A: Phase D: Technology Architecture – Catalogs, Matrices and Diagrams
- Module 22: Phase D: Technology Architecture
- Module 23: Migration Planning Techniques
- Module 24: Phase E: Opportunities and Solutions
- Module 25: Phase F: Migration Planning
- Module 26: Phase G: Implementation Governance
- Module 27: Phase H: Architecture Change Management
- Module 28: ADM Architecture Requirements Management
- Module 29: Architecture Partitioning
- Module 30: Adapting the ADM: Iteration and Levels
- Module 31: Adapting the ADM: Security
- Module 33: Architecture Maturity Models
- Module 34: Architecture Skills Framework

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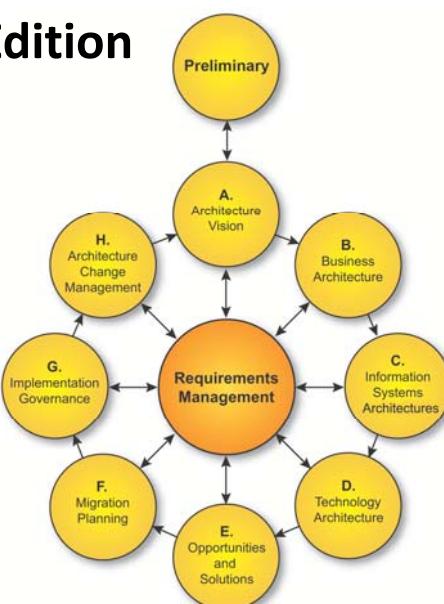
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## TOGAF® Standard Courseware Version 9.2 Edition



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## About this Course

- This is a modular course
- It can be assembled into many configurations
- It can be further customised
- It is expected to be tailored to the audience
- This modular course can be given in a number of configurations:
  - TOGAF 9 Foundation training
  - TOGAF 9 Certified training
  - TOGAF 9 Foundation to Certified Upgrade training



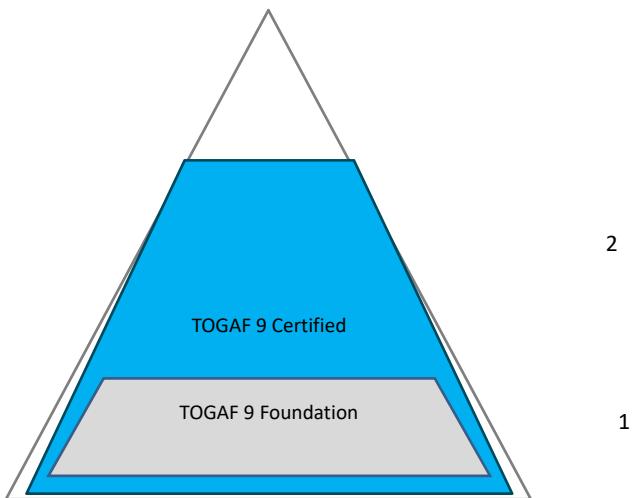
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## TOGAF 9 Certification Levels

Level	Tag	Purpose	Audience
1	<i>TOGAF 9 Foundation (Level 1)</i>	To provide validation that the candidate has gained knowledge of the TOGAF terminology, structure, and basic concepts, and understands the core principles of Enterprise Architecture and the TOGAF standard	<ul style="list-style-type: none"><li>• Individuals who require a basic understanding of the TOGAF 9 standard</li><li>• Professionals who are working in roles associated with an architecture project such as those responsible for planning, execution, development, delivery and operation</li><li>• Architects who are looking for a first introduction to the TOGAF standard</li><li>• Architects who want to achieve Level 2 certification in a stepwise approach</li></ul>
2	<i>TOGAF 9 Certified (Level 2)</i>	To provide validation that in addition to knowledge and comprehension, the candidate is able to analyse and apply knowledge of the TOGAF standard	<ul style="list-style-type: none"><li>• Individuals who require a deeper understanding of the TOGAF 9 standard</li><li>• Professionals who are working in an organisation where the TOGAF 9 standard has been adopted and who need to participate in architecture projects and initiatives</li><li>• Architects who will be responsible for developing architecture artifacts</li><li>• Architects who wish to introduce the TOGAF 9 standard into an architecture practice</li><li>• Architects who want to achieve a recognized qualification to demonstrate their detailed knowledge of the TOGAF 9 standard</li></ul>

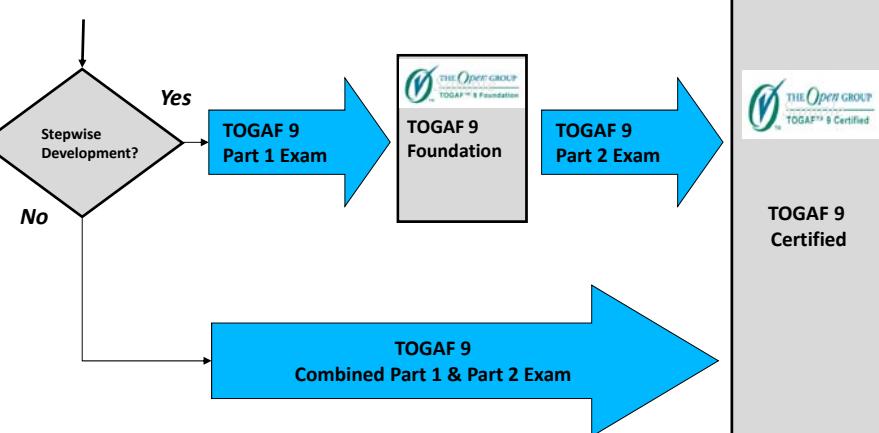
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## Level 2 is a Superset of Level 1



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## Paths to Certification



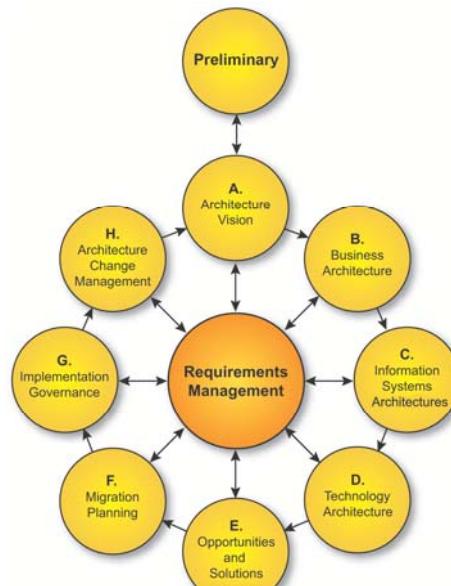
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## Exam Details

- Email [exambookings@theknowledgeacademy.com](mailto:exambookings@theknowledgeacademy.com) to obtain an electronic voucher for the Direct (combined) exam
  - Voucher valid for approximately **one year**
- Use this voucher to book an exam slot via
  - <http://pearsonvue.com/theopengroup>
- Do not forget the **two** forms of ID needed to take the exam
  - See pearsonvue.com website
- Remember all exams are subject to change
- You cannot resit an exam within the month
- You cannot attempt Level 2 without passing Level 1 (unless attempting Direct exam)

## Module F13: The TOGAF® Certification for People Program

# The TOGAF® Certification for People Program



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## Module Objectives

**The objectives are to:**

- Describe The Open Group Certification for People program for the TOGAF Standard
- Understand the levels for certification
- Understand the paths for certification
- Understand the requirements for certification

### TOGAF Certification for People

- Ensures that individuals are knowledgeable about the TOGAF standard
- Is a common baseline of knowledge
- Provides a visible trust mark
- Is a foundation for the emerging profession

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## ***Level 1 – TOGAF 9 Foundation***

### **Target Audience**

- Individuals requiring a basic understanding of the TOGAF 9 standard
- Professionals working in roles associated with an architecture project such as those responsible for planning, execution, development, delivery and operation
- Architects looking for a first introduction to the TOGAF 9 standard
- Architects who want to achieve Level 2 certification in a stepwise approach.

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## ***Level 2 – TOGAF 9 Certified***

### **Target Audience**

- Individuals requiring a deeper understanding of the TOGAF 9 standard
- Professionals working in an organisation where the TOGAF 9 standard has been adopted and who need to participate in architecture projects and initiatives
- Architects who will be responsible for developing architecture artifacts
- Architects who wish to introduce the TOGAF 9 standard into an architecture practice;
- Architects who want to achieve a recognized qualification to demonstrate their detailed knowledge of the TOGAF 9 standard.

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## Level 1 Learning Units

- Basic Concepts
- Core Concepts
- General Definitions
- Introduction to the ADM
- Enterprise Continuum and Tools
- ADM Phases (Level 1)
- ADM Guidelines and Techniques
- Architecture Governance (Level 1)
- Architecture Views, Viewpoints and Stakeholders
- Building Blocks
- ADM Deliverables (Level 1)
- TOGAF Reference Models (Level 1)
- TOGAF Certification Program

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## Level 2 Learning Units

- [Level 1 Units +](#)
- Preliminary Phase
- Architecture Governance (Level 2)
- Business Scenarios Technique
- Phase A: Architecture Vision
- Architecture Content Framework
- Stakeholder Management
- TOGAF Content Metamodel
- Architecture Implementation Support Techniques
- Phase B: Business Architecture
- Phase C: Information Systems Architectures – Data Architecture
- Phase C: Information Systems Architectures – Application Architecture
- TOGAF Foundation Architecture: The TRM (Level 2)
- The Integrated Information Infrastructure Reference Model (Level 2)
- Phase D: Technology Architecture
- Migration Planning Techniques
- Phase E: Opportunities & Solutions
- Phase F: Migration Planning
- Phase G: Implementation Governance
- Phase H: Architecture Change Management
- ADM Architecture Requirements Management
- Architecture Partitioning
- The Architecture Repository
- Guidelines for Adapting the ADM: Iteration and Levels
- Guidelines for Adapting the ADM: Security
- Architecture Maturity Models
- Architecture Skills Framework

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## Level 1 Exam Requirements

Level	Tag	Requirements
1	<i>TOGAF 9 Foundation</i>	Exam Type: Multiple Choice 40 Questions / 60 minutes Supervised: Yes Open Book: No
2	<i>TOGAF 9 Certified</i>	<p><u><i>Either Stepwise Development:</i></u> Level 2 requires passing two examinations. Exam 1 is identical to the Level 1 examination (leads to TOGAF 9 Foundation as an intermediate step)</p> <p><u><i>Or Direct to Level 2:</i></u> Passing the single exam: TOGAF 9 Combined Part 1 and 2 (leads only to TOGAF 9 Certified)</p>

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## Level 2 Stepwise Development

Level	Tag	Requirements
2	<i>TOGAF 9 Certified</i>	<p><u><i>Exam 1:</i></u> Exam Type: Multiple Choice 40 Questions / 60 minutes Supervised: Yes Open Book: No</p> <p><u><i>Exam 2:</i></u> Exam Type: Complex Multiple Choice Scenario-based 8 Questions / 90 minutes Supervised: Yes Open Book: Yes</p>

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## Level 2 Direct

Level	Tag	Requirements
2	<i>TOGAF 9 Certified</i>	<p><u>TOGAF 9 Combined Part 1 and 2</u></p> <p>Exam Type: Two sections in a single exam corresponding to the TOGAF 9 Part 1 and 2 exams:</p> <p>Section 1: Multiple Choice 40 Questions / 60 minutes</p> <p>Section2: Complex Multiple Choice Scenario-based 8 Questions / 90 minutes</p> <p>Total 150 minutes</p> <p>Supervised: Yes</p> <p>Open Book: Dependent on section. Section 1 No, Section 2: Yes.</p>

## Certification

### Combined Part 1 and 2 Examination

- Each section must be passed in order to obtain an overall pass mark
- If you fail a section then no certification is awarded, however you only need retake the Examination(s) corresponding to the failed section(s)
- You must wait one month before a retake
- Within 6 working days of receipt of the exam results you will receive an email from The Open Group and be invited to login to complete your certification
- You may download and print your certificate
- You can adjust your register entry to make it public (the default is to be confidential)
- You will be invited to opt-in to The Open Group Badging program to receive a digital credential (in addition to the certificate)

# **TOGAF 9 Foundation**

## **Training**

### ***Applicable Modules \****

\* See Checklist for requirements for Accreditation

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# **TOGAF 9 Foundation**

## **Course Content**

- Course Introduction
- Management Overview
- The TOGAF Framework Components
- An Introduction to the Architecture Development Method
- The Enterprise Continuum
- The Architecture Repository
- Architecture Governance
- Architecture Views and Viewpoints
- Building Blocks and the ADM
- The ADM Phases
- ADM Guidelines and Techniques
- Key ADM Deliverables
- TOGAF Reference Models
- TOGAF Certification Program

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# **TOGAF 9 Certified**

## **Training**

### ***Applicable Modules \****

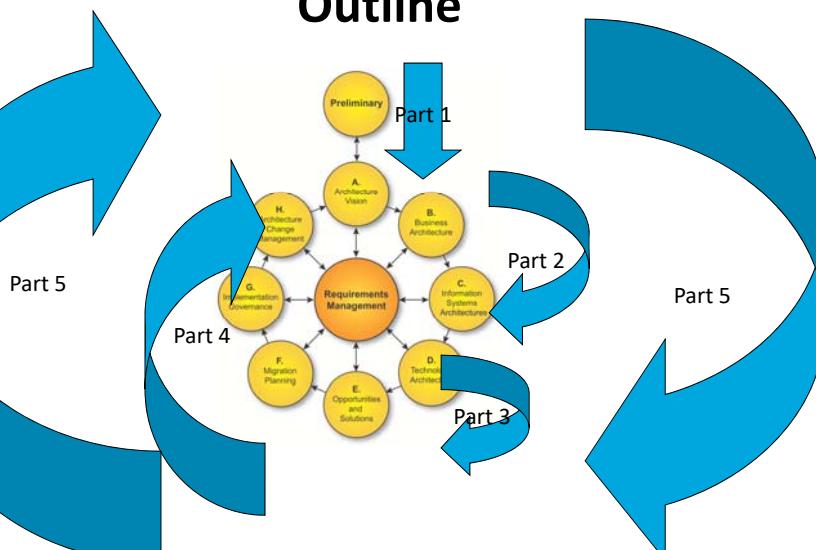
\* See Checklist for requirements for Accreditation

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## **TOGAF 9 Certified Training Course**

### **Outline**



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# TOGAF 9 Certified

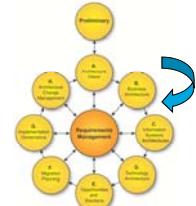
## Course Content – Part 1



- Course Introduction
- Management Overview
- The TOGAF Framework Components
- An Introduction to the Architecture Development Method
- The Enterprise Continuum
- The Architecture Repository
- The Architecture Content Framework
- The Architecture Content Metamodel
- The Preliminary Phase
- Architecture Governance

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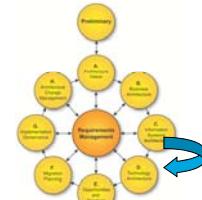
## Course Content – Part 2



- Business Scenarios
- Stakeholder Management
- Architecture Views and Viewpoints
- Building Blocks and the ADM
- Architecture Implementation Support Techniques
- Phase A: Architecture Vision
- Phase B: Business Architecture
- Phase B: Business Architecture – Catalogs, Diagrams and Matrices
- Phase C: Information Systems Architectures

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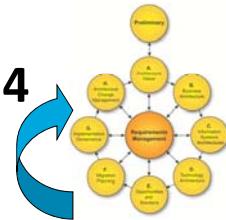
## Course Content – Part 3



- Phase C: Data Architecture
- Phase C: Data Architecture – Catalogs, Matrices and Diagrams
- The Integrated Information Infrastructure Reference Model
- Phase C: Applications Architecture
- Phase C: Applications Architecture – Catalogs, Matrices and Diagrams
- TOGAF Foundation Architecture: the TRM
- Phase D: Technology Architecture
- Phase D: Technology Architecture – Catalogs, Matrices and Diagrams

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## Course Content – Part 4

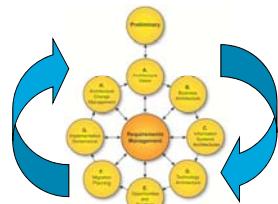


- Migration Planning Techniques
- Phase E: Opportunities and Solutions
- Phase F: Migration Planning
- Phase G: Implementation Governance
- Phase H: Architecture Change Management
- ADM Requirements Management

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## Course Content – Part 5

- Architecture Partitioning
- Guidelines for Adapting the ADM: Iteration and Levels
- Guidelines for Adapting the ADM: Security
- Architecture Maturity Models
- Architecture Skills Framework



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## TOGAF 9 Foundation to TOGAF 9 Certified Upgrade Training *Applicable Modules*

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## **TOGAF 9 Foundation to TOGAF 9 Certified Upgrade**

- Course Introduction
- The Architecture Repository
- The Architecture Content Framework
- The Architecture Content Metamodel
- The Preliminary Phase
- Business Scenarios
- Stakeholder Management
- Architecture Implementation Support Techniques
- Phase A: Architecture Vision
- Phase B: Business Architecture
- Phase B: Business Architecture – Catalogs, Diagrams and Matrices
- Phase C: Information Systems Architectures
- Phase C: Data Architecture
- Phase C: Data Architecture – Catalogs, Matrices and Diagrams

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## **TOGAF 9 Foundation to TOGAF 9 Certified Upgrade**

- The Integrated Information Infrastructure Reference Model
- Phase C: Applications Architecture
- Phase C: Applications Architecture – Catalogs, Matrices and Diagrams
- TOGAF Foundation Architecture: the TRM
- Phase D: Technology Architecture
- Phase D: Technology Architecture – Catalogs, Matrices and Diagrams
- Migration Planning Techniques
- Phase E: Opportunities and Solutions
- Phase F: Migration Planning
- Phase G: Implementation Governance
- Phase H: Architecture Change Management
- ADM Requirements Management

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## **TOGAF 9 Foundation to TOGAF 9 Certified Upgrade**

- Architecture Partitioning
- Guidelines for Adapting the ADM: Iteration and Levels
- Guidelines for Adapting the ADM: Security
- Architecture Maturity Models
- Architecture Skills Framework

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## **Prerequisite Knowledge**

- A prior knowledge of Enterprise Architecture is advantageous but not required
- During the course students will become familiar with the current *TOGAF* body of knowledge
- **Note: Certification is separate to training and achieved by passing an examination**

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## Course Objectives

- To instruct students in the basic concepts of enterprise architecture and the TOGAF 9 standard
- To familiarize students with the features of the TOGAF standard and its methodology
- To enable students to take best advantage of how to use the TOGAF approach in their work
- To gain an understanding of the necessary body of knowledge to achieve certification by examination at Level 1 (TOGAF 9 Foundation) or Level 2 (TOGAF 9 Certified)

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## Target Audience Objectives

- **TOGAF 9 Foundation training**
  - Individuals who require a basic understanding of the TOGAF 9 standard
  - Professionals who are working in roles associated with an architecture project such as those responsible for planning, execution, development, delivery and operation;
  - Architects who are looking for a first introduction to the TOGAF 9 standard
  - Architects who want to achieve Level 2 certification in a stepwise approach.
- **TOGAF 9 Certified training**
  - Individuals who require a deeper understanding of the TOGAF 9 standard
  - Professionals who are working in an organisation where the TOGAF 9 standard has been adopted and who need to participate in architecture projects and initiatives
  - Architects who will be responsible for developing architecture artifacts
  - Architects who wish to introduce the TOGAF 9 standard into an architecture practice
  - Architects who want to achieve a recognized qualification to demonstrate their detailed knowledge of the TOGAF 9 standard

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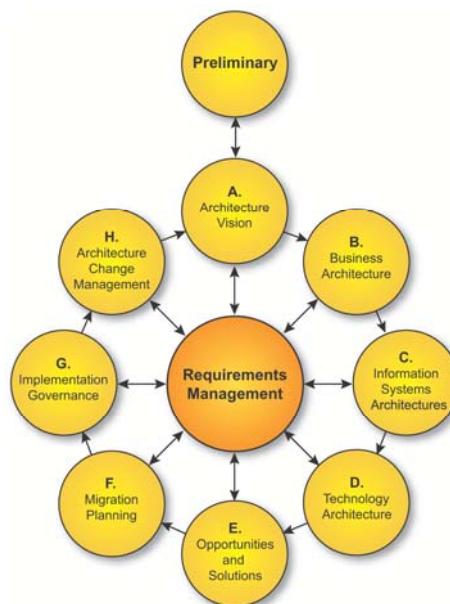
# **Module 1:**

## **Management Overview**

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## **Management Overview**



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## Module Objectives

- To provide a management overview of the TOGAF Standard and its ecosystem
  - The Open Group
  - The Architecture Forum
  - Why Enterprise Architecture?
  - Why a framework?
  - The TOGAF Standard, Version 9.2
  - The TOGAF Library
  - TOGAF 9 Certification
  - Summary

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## The Open Group

### About The Open Group

- The Open Group is a global consortium that enables the achievement of business objectives through technology standards
- Its diverse membership of more than 500 organisations includes customers, systems and solutions suppliers, tool vendors, integrators, academics, and consultants across multiple industries

### The Open Group Vision

Boundaryless Information Flow™

Achieved through global interoperability  
In a secure, reliable, and timely manner

“Boundaryless does not mean there are no boundaries – it means that boundaries are permeable to enable business.”

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## The Open Group Mission

The mission of The Open Group is to drive the creation of Boundaryless Information Flow™ achieved by:

- Working with customers to capture, understand and address current and emerging requirements, establish policies, and share best practices
- Working with suppliers, consortia and standards bodies to develop consensus and facilitate interoperability, to evolve and integrate specifications and open source technologies
- Developing and operating the industry's premier certification service and encouraging the procurement of certified products



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## Architecture Forum – Mission

- The mission of The Open Group Architecture Forum is to advance The Open Group vision of *Boundaryless Information Flow*, for and between enterprises,
- Through a set of programs that focus on all architectural aspects, including:
  - Providing broad and deep leadership to the EA community
  - Validating, publishing, fostering, and maintaining best practices for EA
  - Developing, organizing, researching, and publishing thought leaders in EA
  - Initiating and managing programs and projects to support these activities

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## What is an Enterprise?

- A collection of organisations that share a common set of goals
  - Government agency
  - Part of a corporation
  - Corporation
- Large corporations may comprise multiple enterprises
- May be an “extended enterprise” including partners, suppliers and customers

## What is an Architecture?

- An Architecture is the fundamental concepts or properties of a system in its environment embodied in:
  - its elements
  - their relationships to each other and the environment
  - and the principles governing its design and evolution

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## What is Enterprise Architecture?

**Enterprise Architecture** is:

- The organising logic for business processes and IT infrastructure reflecting the integration and standardization requirements of the firm’s operating model.[1]
- A conceptual blueprint that defines the structure and operation of an organisation. The intent of an Enterprise Architecture is to determine how an organisation can most effectively achieve its current and future objectives. [2]

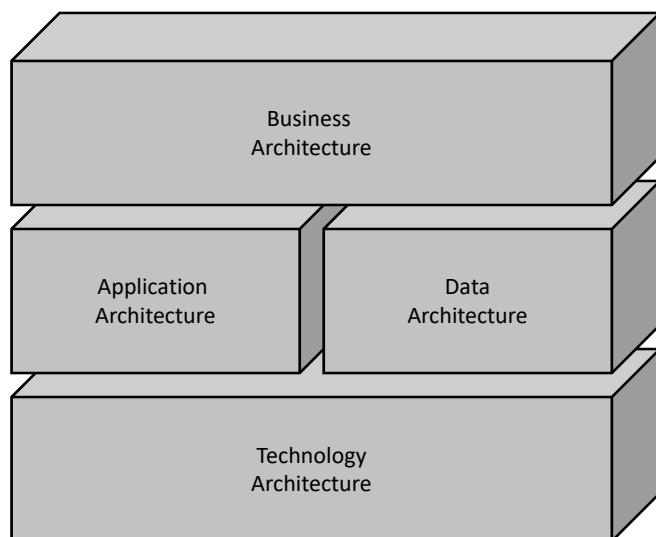


[1] MIT Center for Information Systems Research

[2] SearchCIO.com

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## Architecture Types



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## Why Enterprise Architecture?

- Effective management and exploitation of information and Digital Transformation are key to business success
- Good information management = competitive advantage
- Current IT systems do not really meet the needs of business
  - Fragmented, duplicated
  - Poorly understood
  - Not responsive to change
- Investment in Information Technology
  - Focussed on system maintenance
  - Tactical developments rather than a strategic plan
- Two key reasons why you need an Enterprise Architecture:
  - A means to achieve competitive advantage
  - Enables managed innovation within the enterprise

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## **Pressure to Develop Enterprise Architecture**

- Laws and regulations
  - Clinger-Cohen Act (US Information Technology Management Reform Act 1996)
  - EU Directives on the Award of Public Contracts
  - Sarbanes-Oxley
- More extended enterprises
- More co-operative IT operations
- Greater publicity to failures
- Increase in litigation
- Audit requirements

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## **Business Benefits of Enterprise Architecture**

- It helps an organisation achieve its business strategy
- Faster time to market for new innovations and capabilities
- More consistent business processes and information across business units
- More reliability and security, less risk
- A more efficient business operation
- A more efficient IT operation
- Better return on existing investment,
- Reduced risk for future investment
- Faster, simpler, and cheaper procurement

Source: "Why Enterprise Architecture Matters?", The Open Group White Paper, W076

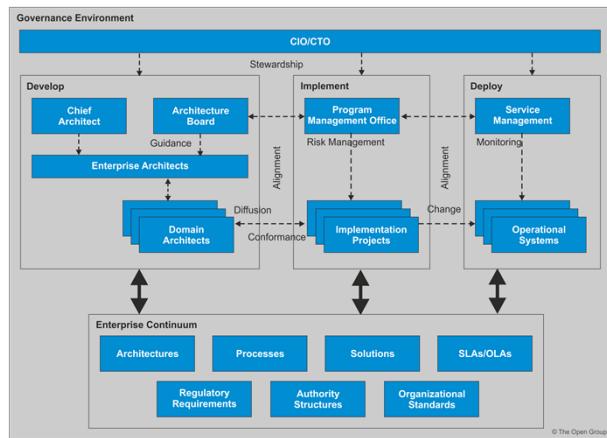
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# The Importance of Governance

Governance = The way in which decisions are made

Who is responsible? Who is involved? Who is accountable?

- An Enterprise Architecture is only as good as the decision making framework that is established around it → "governance" framework
- The Governance Framework depends on
  - Clear authority structure
  - The right participants



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# What is an Architecture Framework?

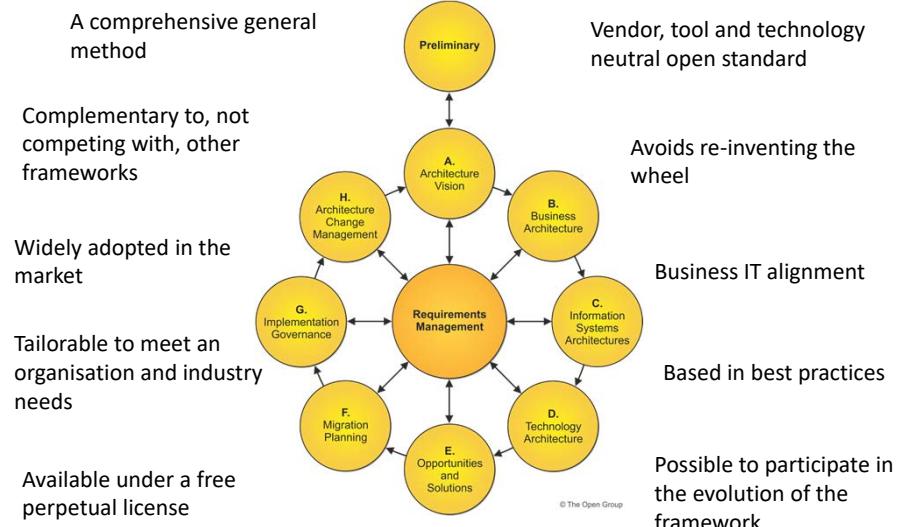
- TOGAF Standard Definition: Architecture Framework
  - A conceptual structure used to develop, implement, govern, and sustain an architecture
- It should describe a method for designing target state of the enterprise in terms of a set of building blocks, and for showing how the building blocks fit together
- It should contain a set of tools and provide a common vocabulary
- It should also include a list of recommended standards and compliant products that can be used to implement the building blocks

## The Value of a Framework

- Provides a practical starting point for an Architecture Project
  - Avoids the initial panic when the scale of the task becomes apparent
  - Systematic – "Codified common sense"
  - Captures what others have found to work in real life
  - Contains a Baseline set of resources for reuse

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# Architecture Development Method



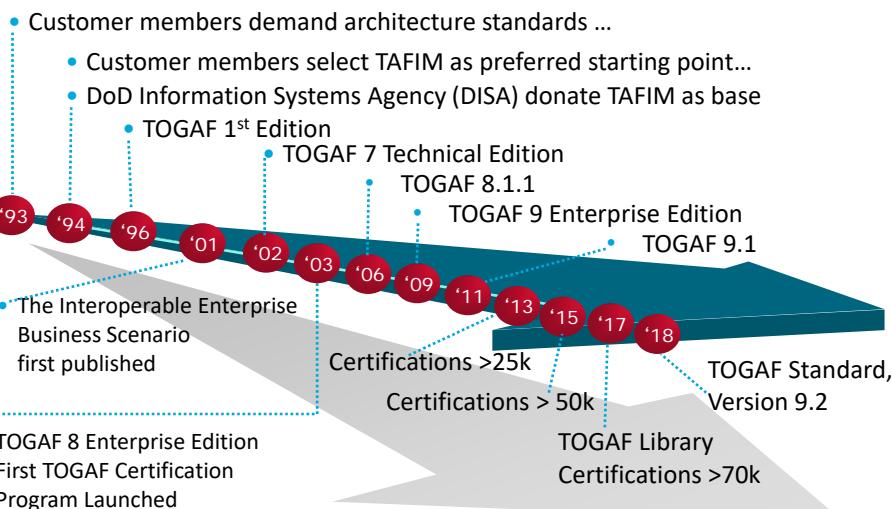
## TOGAF Origins

- A customer initiative
- A framework, not an architecture
  - A generic framework for developing architectures to meet different business needs
  - Not a “one-size-fits-all” architecture
- Originally based on TAFIM (U.S. DoD)

## TOGAF Scope

- The TOGAF standard emphasizes business goals as architecture drivers, and provides a set of best practices, including:
  - TOGAF Architecture Development Method (ADM)
  - ADM Guidelines & Techniques
  - TOGAF Architecture Content Framework
  - Enterprise Continuum
  - TOGAF Capability Framework
- In addition, the TOGAF Library provides a portfolio of guidance material to support the standard

## Member (End User) Driven



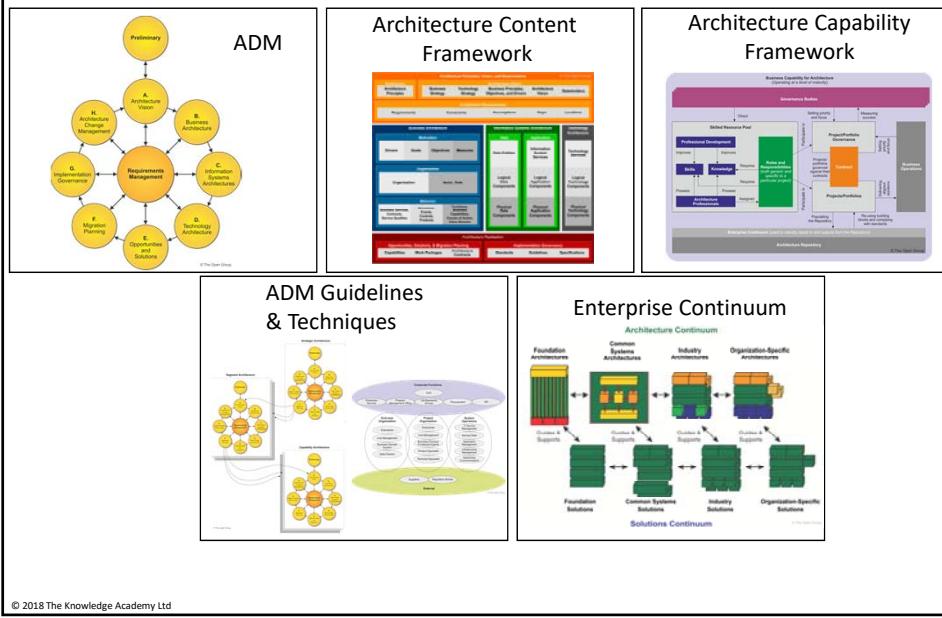
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## TOGAF Long-Term Goals

- An industry standard, generic Enterprise Architecture method....
- ....usable on its own or in conjunction with frameworks having products relevant/specific to particular sectors.
  - Several frameworks have mind share:
    - Zachman, DODAF, MODAF, FEAf, TEAF, ...
  - Almost all focus on products, not method
  - The TOGAF method and.... (not the TOGAF method or....)

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## Structure of the Standard



## The TOGAF Standard, Version 9.2 Table of Contents

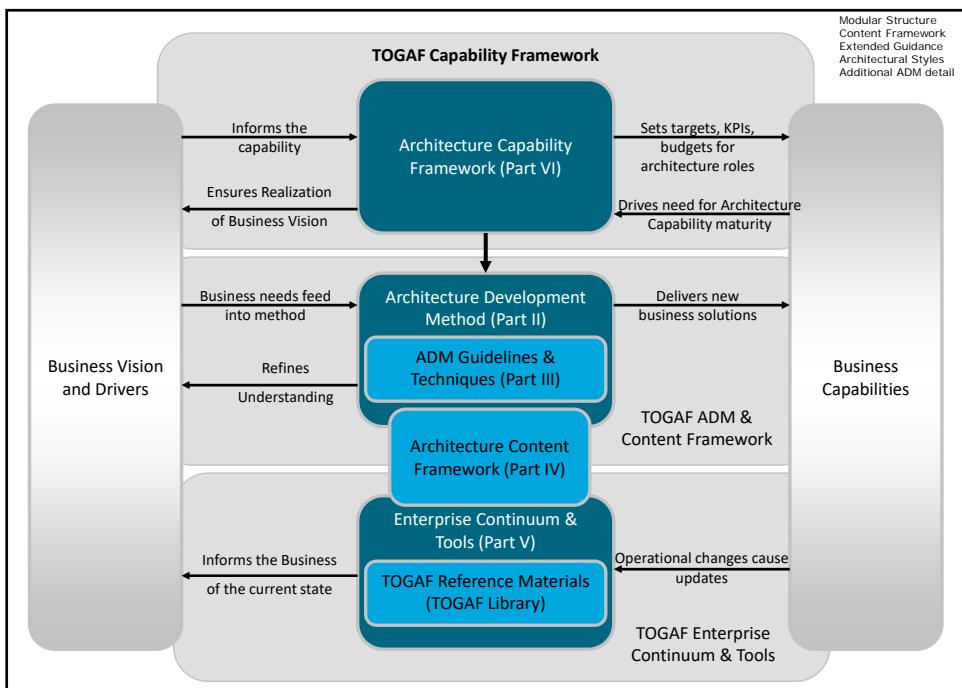
Part I - Introduction
Preface, Executive Overview, Core Concepts, Definitions
Part II – Architecture Development Method
Introduction to ADM
ADM Phase Narratives
Part III – ADM Guidelines and Techniques
Guidelines for Adapting the ADM Process
Techniques for Architecture Development
Part IV – Architecture Content Framework
Content Metamodel
Architectural Artifacts
Architecture Deliverables
Building Blocks
Part V – Enterprise Continuum and Tools
Enterprise Continuum
Architecture Partitioning
Architecture Repository
Tools for Architecture Development
Part VI – Architecture Capability Framework
Architecture Board
Architecture Compliance
Architecture Contracts
Architecture Governance
Architecture Maturity Models
Architecture Skills Framework

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# TOGAF Components

- Architecture Development Method (ADM)
  - An iterative sequence of steps to develop an enterprise-wide architecture
- ADM Guidelines and Techniques
  - Guidelines and techniques to support the application of the ADM
- Architecture Content Framework
  - A detailed model of architectural work products, including deliverables, artifacts within deliverables, and the Architecture Building Blocks (ABBs) that deliverables represent.
- The Enterprise Continuum
  - A model for structuring a virtual repository and methods for classifying architecture and solution artifacts
- The Architecture Capability Framework
  - A structured definition of the organisations, skills, roles and responsibilities to establish and operate an Enterprise Architecture.
- The TOGAF Library
  - A supporting element separate to the Standard
  - A reference library containing guidelines, templates, patterns, and other forms of reference material to accelerate the creation of new Enterprise Architectures.

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## ADM – Basic Principles

An iterative method, over the whole process, between phases and within phases

Each iteration = new decisions:

Enterprise coverage

Level of detail

Time horizon

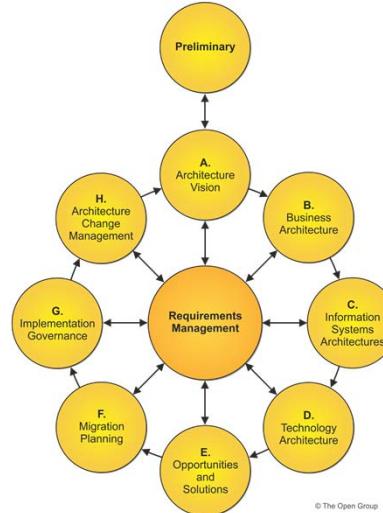
Architecture asset re-use:

previous ADM iterations  
other frameworks, system models,  
industry models,...

Decisions based on:

Competence / resource availability  
Value accruing to the enterprise.

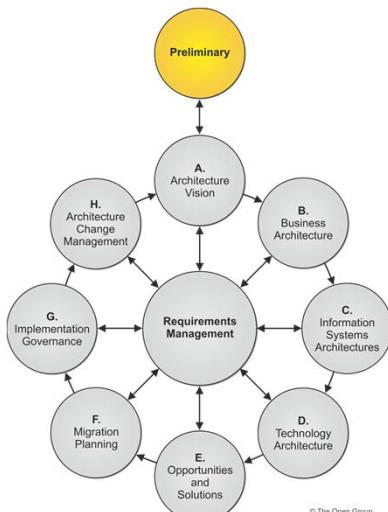
Every phase is validated against and validates  
the current requirements of the business.



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## Preliminary Phase

- This phase includes the preparation and initiation activities to create an Architecture Capability
  - Understand business environment
  - High level management commitment
  - Agreement on scope
  - Establish principles
  - Establish governance structure
  - Customization of the TOGAF framework

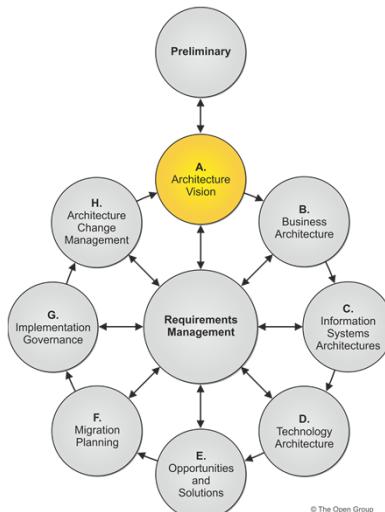


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## Phase A: Architecture Vision

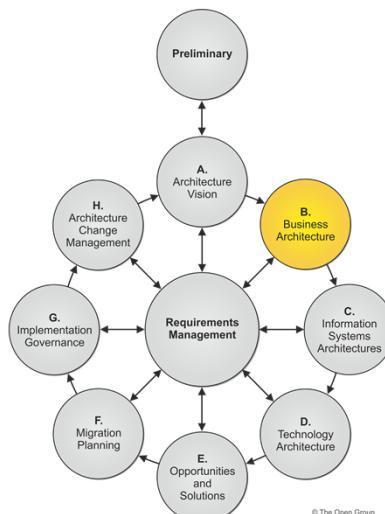
- Initiates one iteration of the architecture process
  - Sets scope, constraints, expectations
  - Required at the start of every architecture cycle
- Creates the Architecture Vision
- Validates business context
- Creates the Statement of Architecture work



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## Phase B: Business Architecture

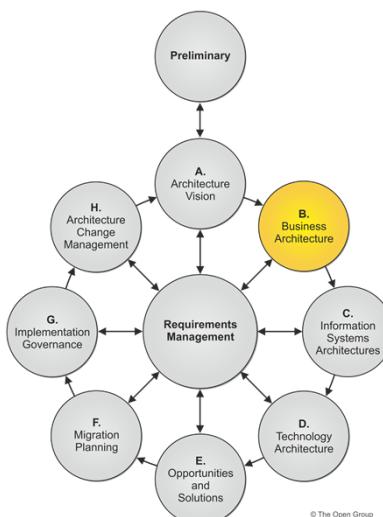
- The fundamental organisation of a business, embodied in
  - its business processes and people,
  - their relationships
    - to each other and the environment,
  - and the principles governing its design and evolution
- Shows how the organisation meets its business goals



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## Business Architecture - Contents

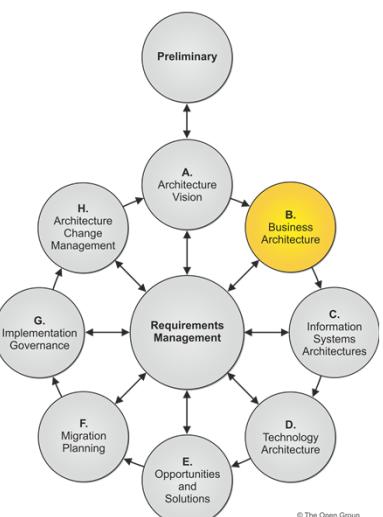
- Organisation structure
- Business goals and objectives
- Business functions
- Business services
- Business processes
- Business roles
- Business data model
- Correlation of organisation and functions



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## Business Architecture - Steps

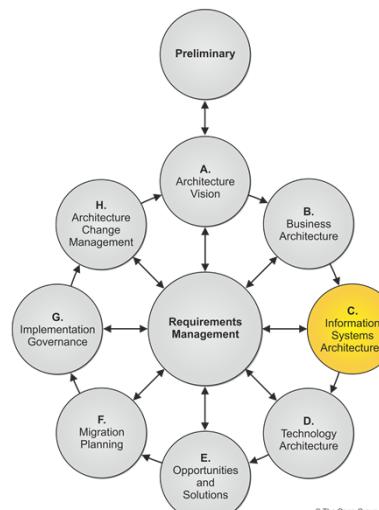
1. Select reference models, viewpoints and tools
2. Define Baseline Architecture Description
3. Define Target Architecture Description
4. Perform gap analysis
5. Define candidate roadmap components
6. Conduct formal stakeholder review
7. finalise the Architecture
8. Create Architecture Definition Document



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## Phase C: Information Systems Architectures

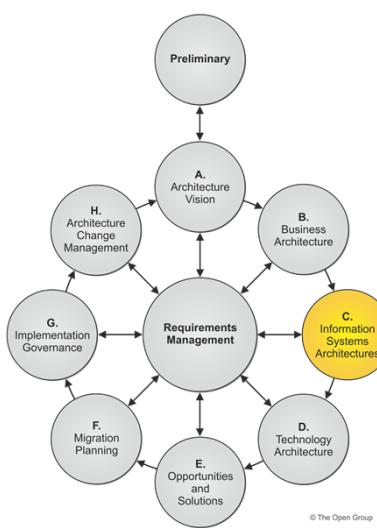
- Documenting the Information Systems Architecture for a project including development of Data and Application Architectures addressing:
  - The major types of information and applications that process them
  - relationships to each other and the environment, and the principles governing its design and evolution



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## Data or Applications first?

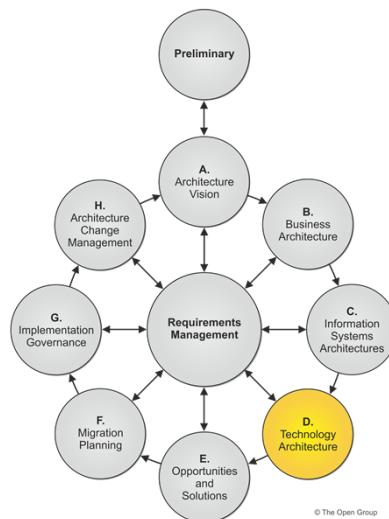
- It is usually necessary to address both
  - Not always the case, depending on project scope and constraints
- May be developed in either order, or in parallel
  - Theory suggests Data Architecture comes first
  - Practical considerations may mean that starting with Application Architecture may be more efficient
- There will need to be some iteration to ensure consistency



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## Phase D: Technology Architecture

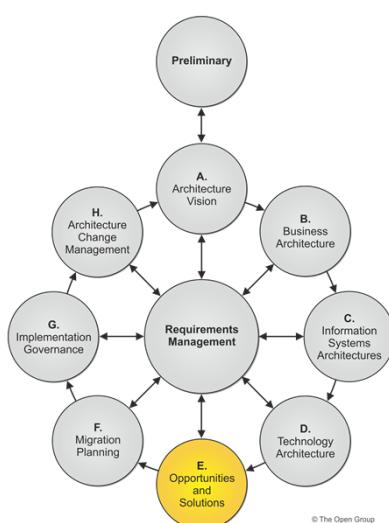
- The fundamental organisation of an IT system, embodied in
  - its hardware, software and communications technology
  - their relationships to each other and the environment,
  - and the principles governing its design and evolution



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## Phase E: Opportunities and Solutions

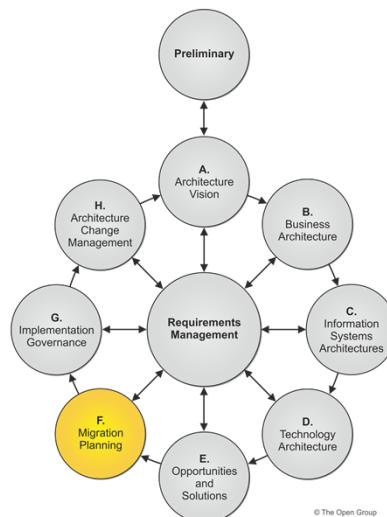
- Perform initial implementation planning
- Identify the major implementation projects
- Determine if an incremental approach is required, if so define Transition Architectures
- Decide on approach
  - Make v Buy v Re-Use
  - Outsource
  - COTS
  - Open Source
- Assess priorities
- Identify dependencies



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## Phase F: Migration Planning

- For work packages and projects identified in Phase E perform
  - Cost/benefit analysis
  - Risk assessment
- finalise a detailed Implementation and Migration Plan

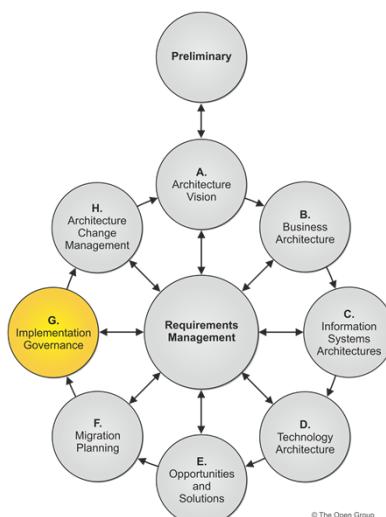


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## Phase G: Implementation Governance

- Provide architectural oversight for the implementation
- Defines architecture constraints on implementation projects
- Govern and manage an Architecture contract
- Monitors implementation work for conformance
- Produce a *Business Value Realization*

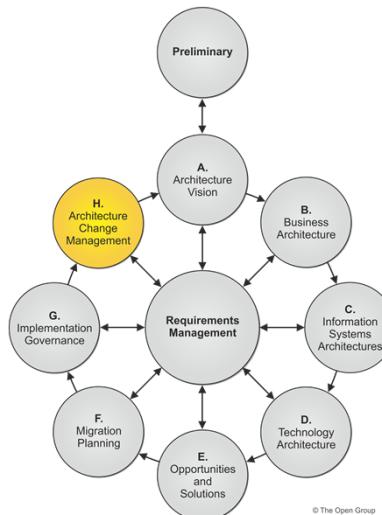


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## Phase H: Architecture Change Management

- Provide continual monitoring and a change management process
- Ensures that changes to the architecture are managed in a cohesive and architected way
- Establishes and supports the Enterprise Architecture to provide flexibility to evolve rapidly in response to changes in the technology or business environment
- Monitors the business and capacity management.



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## TOGAF Library – Structure

- A portfolio of guidance material to support practical application of the TOGAF standard
- It contains guidelines, templates, patterns and other forms of reference material
- Over 80 documents (as of April 2018)
- Section 1: Foundation Documents
  - Broadly applicable information relating to the subject of the TOGAF framework or Enterprise Architecture
- Section 2: Generic Guidance and Techniques
  - Information describing architecture styles and how the TOGAF framework and Enterprise Architecture can be adapted to exploit the characteristics of a more specific context
- Section 3: Industry-Specific Guidance and Techniques
  - Information describing how the TOGAF framework and Enterprise Architecture can be applied to meet the specific needs of a vertical industry segment
- Section 4: organisation-Specific Guidance and Techniques
  - Information describing how the TOGAF framework and Enterprise Architecture have been applied to meet the needs of specific enterprises

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## **Summary**

The TOGAF® Standard is...

- An effective, industry standard framework and method for Enterprise Architecture.
- Complementary to, not competing with, other enterprise frameworks
- A repository of best practice
  - It “demystifies” architecture development
- Vendor, tool, and technology neutral
- A framework and method for achieving the “Boundaryless Information Flow” vision

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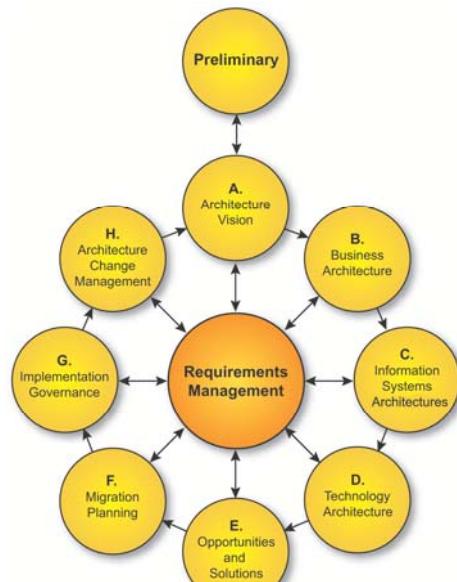
## **Module F6: ADM Phases Level 1**

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# ADM Phases

## Level 1



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# Roadmap

Part I - Introduction
Preface, Executive Overview, Core Concepts, Definitions
Part II – Architecture Development Method
Introduction to ADM
<b>ADM Phase Narratives</b>
Part III – ADM Guidelines and Techniques
Guidelines for Adapting the ADM Process
Techniques for Architecture Development
Part IV – Architecture Content Framework
Content Metamodel
Architectural Artifacts
Architecture Deliverables
Building Blocks
Part V – Enterprise Continuum and Tools
Enterprise Continuum
Architecture Partitioning
Architecture Repository
Tools for Architecture Development
Part VI – Architecture Capability Framework
Architecture Board
Architecture Compliance
Architecture Contracts
Architecture Governance
Architecture Maturity Models
Architecture Skills Framework

- **Part II, Architecture Development Method, Chapters 5-16**



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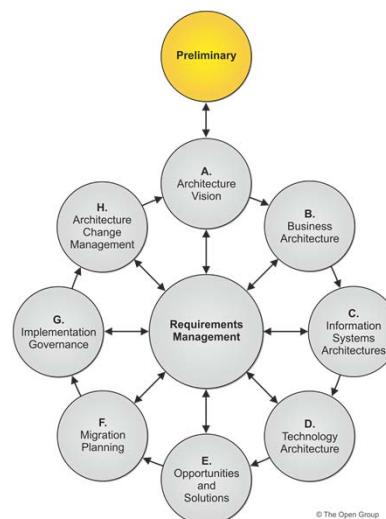
## Module Objectives

The aim of this module is to introduce the ADM Phases:

- How each ADM Phase contributes to the success of Enterprise Architecture:
  - An understanding of the *objectives*
  - An understanding of the *approach*

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## Preliminary Phase



- This phase includes the preparation and initiation activities to create an Architecture Capability
  - Understand business environment
  - High level management commitment
  - Agreement on scope
  - Establish Architecture Principles
  - Establish governance structure
  - Customization of the TOGAF framework

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## Objectives in Detail

- Determine the Architecture Capability desired by the organisation:
  - Review the organisational context for conducting Enterprise Architecture
  - Identify and scope the elements of the enterprise organisations affected by the Architecture Capability
  - Identify the established frameworks, methods, and processes that intersect with the Architecture Capability
  - Establish a Capability Maturity target
- Establish the Architecture Capability:
  - Define and establish the organisational Model for Enterprise Architecture
  - Define and establish the detailed process and resources for architecture governance
  - Select and implement tools that support the Architecture Capability
  - Define the Architecture Principles

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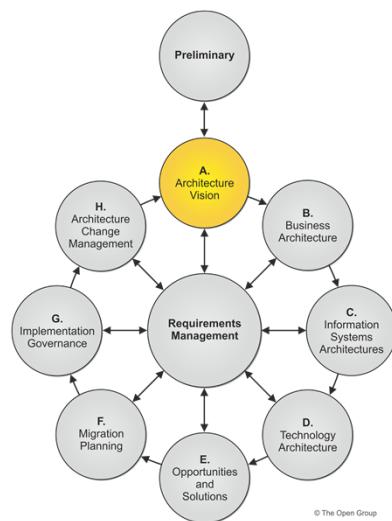


## Approach

- Define the Enterprise
- Identify key drivers and elements in the organisational context
- Define the requirements for architecture work
- Define the Architecture Principles that will inform any architecture work
- Define the framework to be used
- Define the relationships between management frameworks
- Evaluate the Enterprise Architecture maturity

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## Phase A: Architecture Vision



- Initiates one iteration of the architecture process
  - Sets scope, constraints, expectations
  - Required at the start of every architecture cycle
- Creates the Architecture Vision
- Validates business context
- Creates Statement of Architecture work

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## Objectives



- Develop a high-level aspirational vision of the capabilities and business value to be delivered as a result of the proposed Enterprise Architecture
- Obtain approval for a Statement of Architecture Work that defines a program of works to develop and deploy the architecture outlined in the Architecture Vision

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# Approach



- Phase A defines what is in and what is outside of the architecture effort, and the constraints
- Constraints are informed by principles, business goals and strategic drivers
- Creates the Architecture Vision document
  - Clarifying and agreeing the purpose of the architecture
  - Demonstrating how it will be achieved
  - A first-cut high-level description of the Baseline and Target architectures
  - The business scenarios technique can be used to develop the Architecture Vision

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# Business Scenarios



Key factors in the success of any Enterprise Architecture are:

- the extent to which it is linked to business requirements, and
- its support for business objectives.

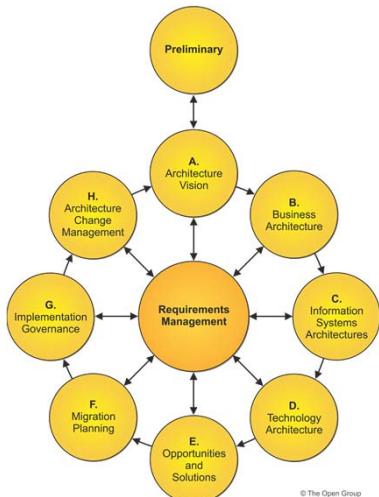
Business scenarios help us to identify and understand the business requirements that the architecture development must address.

A business scenario describes:

- a business process, application or set of applications that can be enabled by the architecture
- the business and technology environment;
- the people and computing components (the “actors”) who execute it;
- the desired outcome of proper execution.

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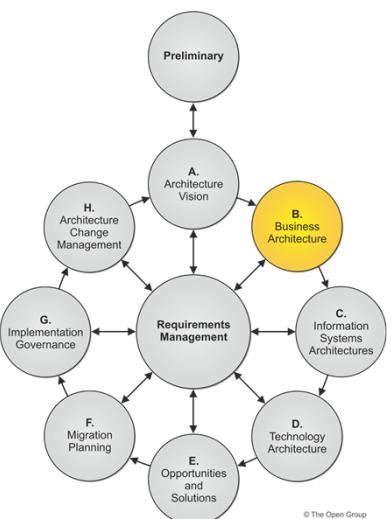
## Business Scenarios and the ADM



- Used prominently in Phase A (Architecture Vision) and iteratively in Phase B (Business Architecture)
- Business Requirements are referred to throughout all phases of the ADM

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## Phase B: Business Architecture



- The fundamental organisation of a business, embodied in
  - its business processes and people,
  - their relationships
    - to each other and the environment,
  - and the principles governing its design and evolution
- Shows how the organisation meets its business goals

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# Objectives



The objectives of Phase B are to:

- Develop the Target Business Architecture that describes how the enterprise needs to operate to achieve the business goals, and respond to the strategic drivers set out in the Architecture Vision, in a way that addresses the Statement of Architecture Work and stakeholder concerns
- Identify candidate Architecture Roadmap components based upon gaps between the Baseline and Target Business Architectures

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# Approach – General



- Knowledge of the Business Architecture is a prerequisite for architecture work in the other domains (Data, Applications, Technology)
  - and so is the first activity that needs to be undertaken.
- Business Strategy defines *what* to achieve
- Business Architecture describes *how* to achieve it
- This Phase is often required to demonstrate business value of subsequent work to key stakeholders.

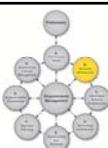
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## Developing the Baseline Description

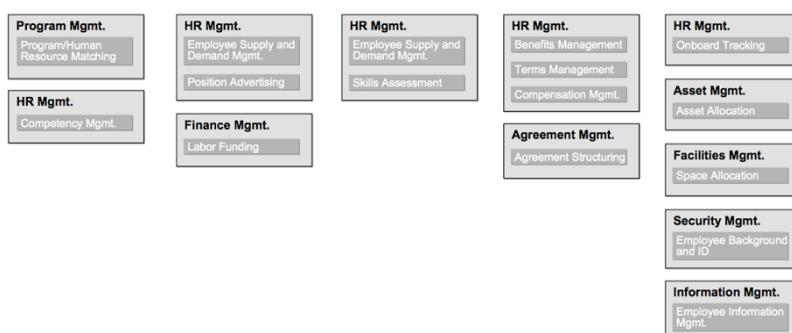
- If an enterprise has existing architecture descriptions, they should be reused as the basis for the Baseline Description
- Where no such descriptions exist, information will have to be gathered and architecture descriptions developed.
- Techniques for developing architecture descriptions include:
  - Business Capability maps
  - Value Streams
  - organisation Maps

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## Applying Business Capabilities



- The business capability map from Phase A provides a self-contained view of the business that is independent of the current organisational structure, business processes, information systems and applications

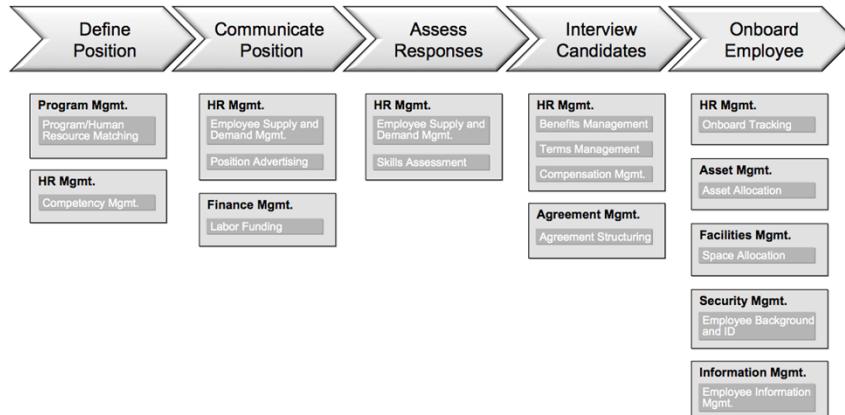


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## Mapping Value Streams



- These provide context into why the organisation needs business capabilities

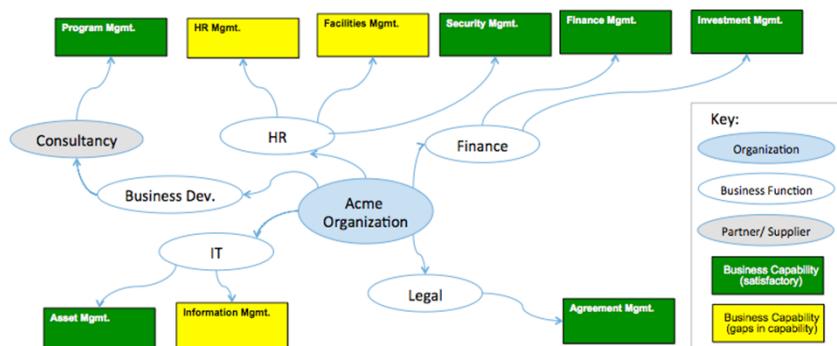


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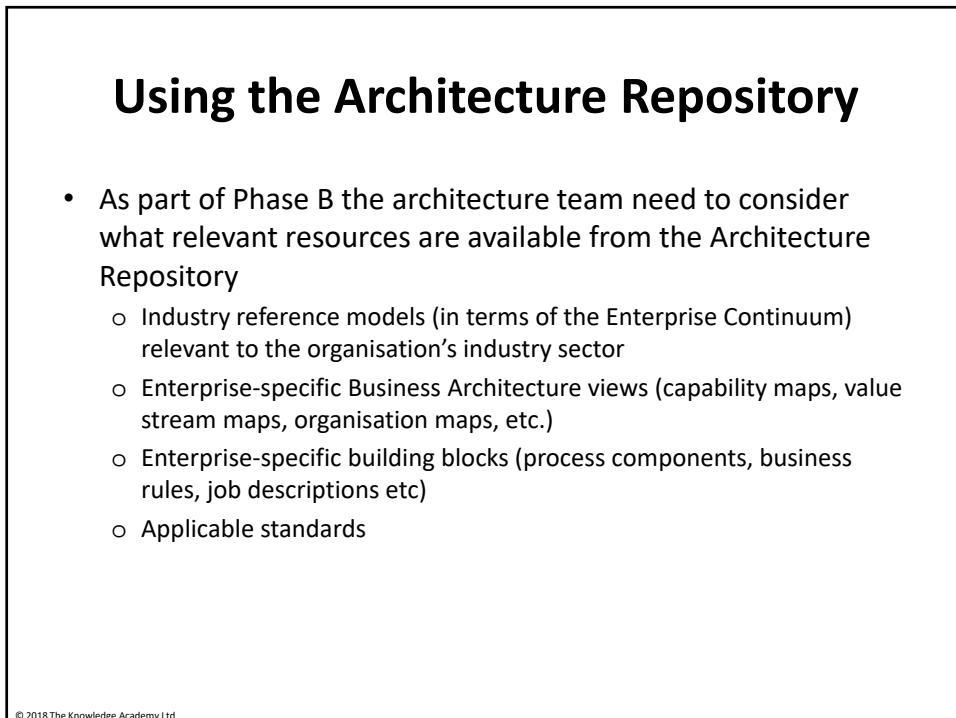
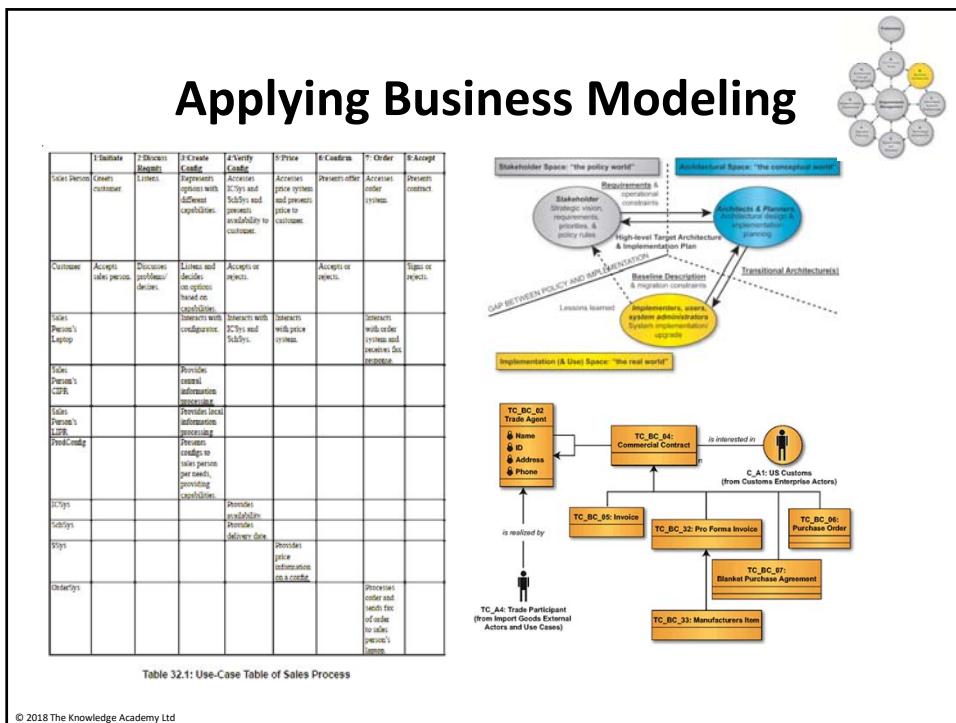
## Applying the Organisation Map



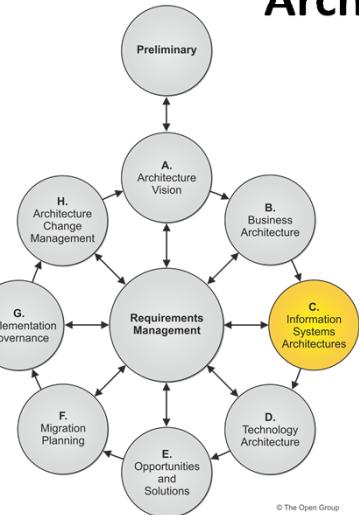
- The organisation map identifies the business units or third parties that possess or use those capabilities and which participate in the value streams.



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## Phase C: Information Systems Architectures



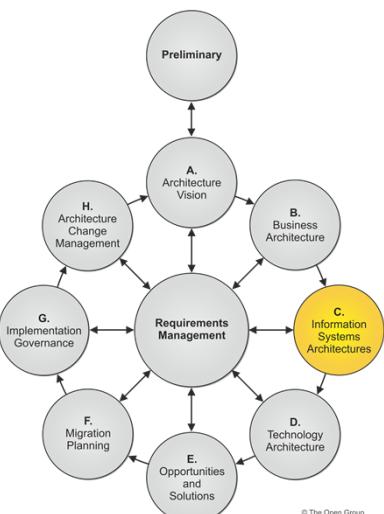
- Documenting the Information Systems Architecture for a project including development of Data and Application Architectures addressing:

- The major types of information and applications that process them
- relationships to each other and the environment, and the principles governing its design and evolution

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## Data or Applications first?



- It is usually necessary to address both
  - Not always the case, depending on project scope and constraints
- May be developed in either order, or in parallel
  - Theory suggests Data Architecture comes first
  - Practical considerations may mean that starting with Application Architecture may be more efficient
- There will need to be some iteration to ensure consistency

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# Information Systems Architectures – Objectives



- Develop the Target Information Systems (Data and Application) Architecture, describing how the enterprise's Information Systems Architecture will enable the Business Architecture and the Architecture Vision, in a way that addresses the Statement for Architecture Work and stakeholder concerns
- Identify candidate Architecture Roadmap components based upon gaps between the Baseline and Target Information Systems (Data and Application) Architectures

## Approach

Phase C involves Data and Applications Architecture, in either order.

Advocates exist for both sequences:

- Spewak's *Enterprise Architecture Planning* recommends a data-driven sequence.
- Major applications systems (ERP, CRM, ...) often combine technology infrastructure and application logic.  
An application-driven approach takes core applications (underpinning mission-critical business processes) as the primary focus of the architecture effort.
- Integration issues often constitute a major challenge.

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# Top-Down Design vs Bottom-Up Implementation



## Design:

1. Business Architecture
2. Data (or Applications) Architecture
3. Applications (or Data) Architecture
4. Technology Architecture

## Implementation:

1. Technology Architecture
2. Applications (or Data) Architecture
3. Data (or Applications) Architecture
4. Business Architecture

## Data-Driven Sequence Implementation

- First implement application systems that create data
- Then applications that process the data
- Finally, applications that archive data

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# Architecture Repository



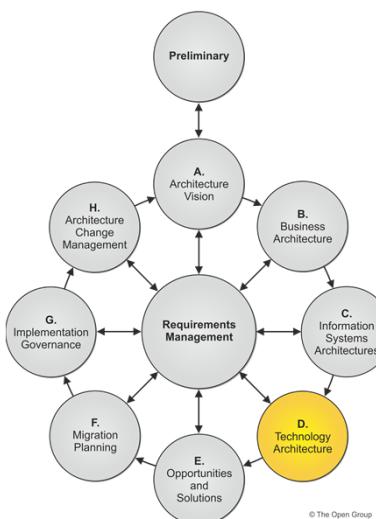
- Consider generic models relevant to an organisation's industry vertical
  - Data Architecture Resources
    - Generic data models, for example the ARTS data model (Retail industry), Energistics data model (Petrotechnical industry)
  - Application Architecture Resources
    - Generic application models, for example the TeleManagement Forum (telecommunications industry), the OMG has a number of software models for specific verticals (Healthcare, Transportation, Finance etc.)

## Considerations for the Data Architecture

- Data Management
- Data Migration
- Data Governance

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# Phase D: Technology Architecture



- The fundamental organisation of an IT system, embodied in
  - its hardware, software and communications technology
  - their relationships to each other and the environment,
  - and the principles governing its design and evolution

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# Objectives



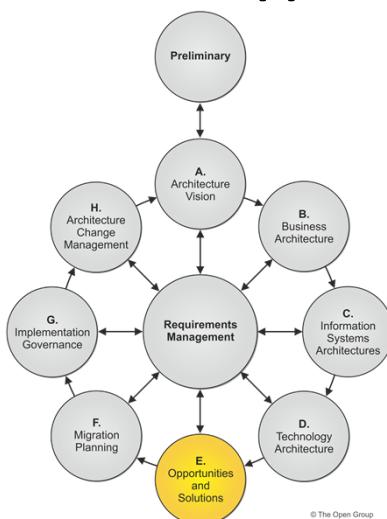
- Develop the Target Technology Architecture that enables the Architecture Vision, target business, data, and application building blocks to be delivered through technology components and technology services, in a way that addresses the Statement of Architecture Work stakeholder concerns
- Identify candidate Architecture Roadmap components based upon gaps between the Baseline and Target Technology Architectures

## Approach

- New Technologies are a major driver for change
  - The Technology Architecture needs to capture the transformation opportunities available to the enterprise through the adoption of new technology.
- Review the Technology Architecture Resources available in the Architecture Repository
  - Existing IT Services in the IT Repository or IT Service Catalog
  - The TOGAF TRM
  - Technology models relevant to the organisation

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## Phase E: Opportunities and Solutions



- Perform initial implementation planning
- Identify the major implementation projects
- Determine if an incremental approach is required, if so define Transition Architectures
- Decide on approach
  - Make v Buy v Re-Use
  - Outsource
  - COTS
  - Open Source
- Assess priorities
- Identify dependencies

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## Objectives



- Generate the initial complete version of the Architecture Roadmap, based upon the gap analysis and candidate Architecture Roadmap components from Phases B, C, and D
- Determine whether an incremental approach is required, and if so identify Transition Architectures that will deliver continuous business value
- Define the overall Solution Building Blocks (SBBs) to finalise the Target Architecture based on the Architecture Building Blocks (ABBs)

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## Approach



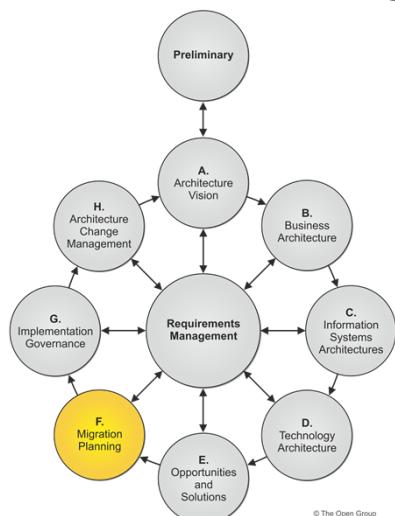
- This is the first phase concerning implementation
- It takes into account the complete set of gaps between the Target and Baseline Architectures in all architecture domains
- It logically groups changes into work packages
- It builds a best-fit roadmap based upon:
  - Stakeholder requirements
  - The enterprise's business transformation readiness
  - Identified opportunities and solutions
  - Identified implementation constraints

Four concepts are key to transitioning from developing to delivering a Target Architecture:

- Architecture Roadmap
- Work Packages
- Transition Architectures
- Implementation and Migration Plan

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## Phase F: Migration Planning



- For work packages and projects identified in Phase E perform
  - Cost/benefit analysis
  - Risk assessment
- finalise a detailed Implementation and Migration Plan

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## Objectives



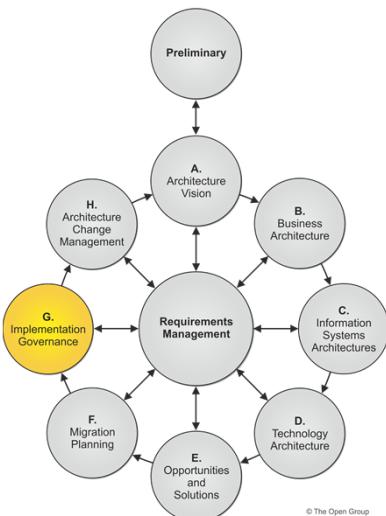
- Finalise the Architecture Roadmap and the supporting Implementation and Migration Plan
- Ensure that the Implementation and Migration Plan is coordinated with the enterprise's approach to managing and implementing change in the enterprise's overall change portfolio
- Ensure that the business value and cost of work packages and Transition Architectures is understood by key stakeholders

### Approach

- The focus is creation of the Implementation and Migration plan in co-operation with project and portfolio managers
- Activities include the dependencies, costs, and benefits of the various migration projects within the context of the enterprise's other activity

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## Phase G: Implementation Governance



- Provide architectural oversight for the implementation
- Defines architecture constraints on implementation projects
- Govern and manage an Architecture contract
- Monitors implementation work for conformance
- Produce a *Business Value Realization*

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## Phase G Objectives



- Ensure conformance with the Target Architecture by implementation projects
- Perform appropriate Architecture Governance functions for the solution and any implementation-driven architecture Change Requests

### Approach

- Phase G relates the architecture to the implementation through the Architecture Contract
- The information for successful management of the projects must be brought together
- The development happens in parallel with Phase G
- Establish an implementation program that will enable the delivery of the Transition Architectures agreed for implementation during the Migration Planning phase
- Adopt a phased deployment schedule that reflects the business priorities embodied in the Architecture Roadmap
- Follow the organisation's standard for corporate, IT, and architecture governance
- Use the organisation's established portfolio/program management approach, where this exists
- Define an operations framework to ensure the effective long life of the deployed solution

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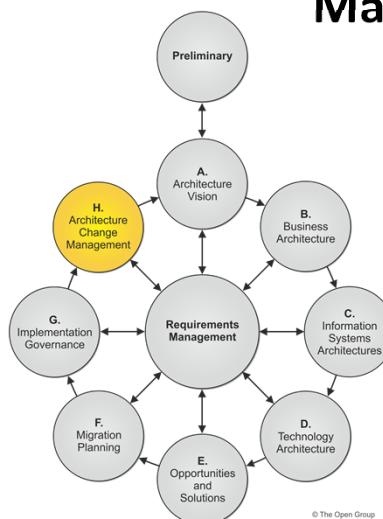
## Approach



- Establish the connection between the architecture and implementation organisation through the Architecture Contract
- Project details are developed, including:
  - Name, description, and objectives
  - Scope, deliverables, and constraints
  - Measures of effectiveness
  - Acceptance criteria
  - Risks and issues

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## Phase H: Architecture Change Management



- Provide continual monitoring and a change management process
- Ensures that changes to the architecture are managed in a cohesive and architected way
- Establishes and supports the Enterprise Architecture to provide flexibility to evolve rapidly in response to changes in the technology or business environment
- Monitors the business and capacity management.

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# Objectives



- Ensure that the architecture lifecycle is maintained
- Ensure that the Architecture Governance Framework is executed
- Ensure that the enterprise Architecture Capability meets current requirements

## Approach

- The goal of an architecture change management process is to ensure that the architecture achieves its original target business value.
- This can be done by:
  - ensuring that changes to the architecture are managed properly
  - supporting a dynamic architecture
- The process will determine the circumstances under which:
  - The architecture will be permitted to change after deployment, and the process for this
  - The ADM will be used again

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## Exercise: Drivers for Architecture Change

1. Brainstorm as many examples of technology-related drivers for change as you can.
2. Brainstorm as many examples of business-related drivers for change as you can.

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# Change Management Process



There are three main categories of architecture change:

1. **Simplification:** this can be handled via change management techniques.
2. **Incremental:** this may be handled via change management techniques, or it may require partial re-architecting.
3. **Re-architecting:** this requires putting the whole architecture through the architecture development cycle again.

Exercise: why might each of these changes occur?

To determine whether a change is simplification, incremental, or re-architecting:

1. Register all events that may impact the architecture
2. Allocate resources and management for the architecture tasks
3. The process (or role) responsible for resources has to make an assessment of what should be done
4. Evaluate the impact

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# Maintenance versus Redesign



## If the change:

- Impacts 2 stakeholders or more, then it is likely to require an architecture redesign and re-entry to the ADM
- Impacts only 1 stakeholder, then it is likely to be a candidate for change management
- Can be allowed under a dispensation, then it is likely to be a candidate for change management

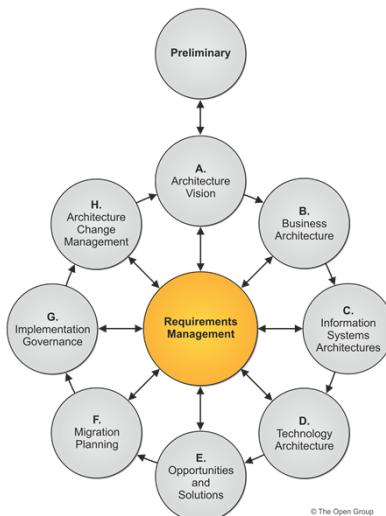
## Change Impact Exercise

Determine the change impact of the following scenarios:

1. The impact of the change is significant for the business strategy
2. A new technology or standard emerges
3. The change is at an infrastructure level; for example, 10 systems are reduced to 1 system
4. The Foundation Architecture needs to be re-aligned with the business strategy
5. Substantial change is required to components and guidelines for use in deployment of the architecture

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# ADM Requirements Management



The process of managing architecture requirements:

- Applies to all phases of the ADM cycle
- Is central to the ADM process
- Is a dynamic process addressing the identification of requirements, their storage and delivery to the phases

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## Objectives



- Ensure that the Requirements Management process is sustained and operates for all relevant ADM phases
- Manage architecture requirements identified during any execution of the ADM cycle or a phase
- Ensure that the relevant architecture requirements are available for use by each phase as the phase is executed

## Resources

- The TOGAF standard specifies generic needs for requirements, not specific tools or processes
- It recommends use of:
  - Business Scenarios
  - Commercial off the shelf tools (see next slide for an example)

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## Approach

- The ability to deal with changes in the requirements is crucial to the ADM process since architecture deals with uncertainty and change
- Architecture bridges the divide between the aspirations of the stakeholders and a practical solution
- The Requirements Management process does not dispose of, address or prioritize requirements; this is done within the phases of the ADM
- It is recommended that an Architecture Requirements Repository is used to record and manage all architecture requirements

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## Volère Requirements Specification Template

- This is an example of a suitable requirements template
- **The “Waiting Room”**
  - This is a repository for requirements that are beyond the planned scope, or the time available, for the current iteration. Having the ability to store future requirements helps avoid the perception that they are simply being discarded, while at the same time helping to manage expectations about what will be delivered.

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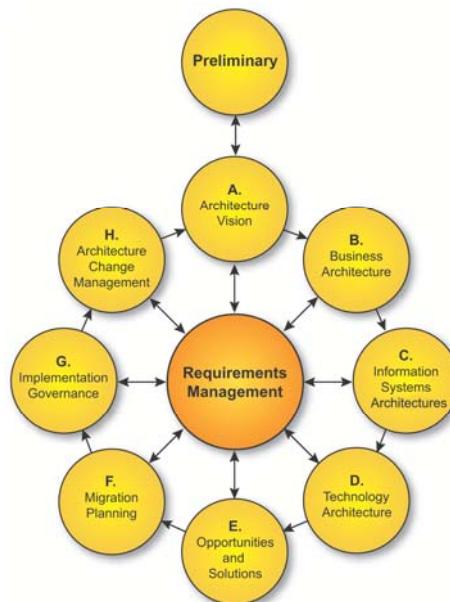
# **Module F7:**

## **ADM Guidelines and Techniques**

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## **ADM Guidelines and Techniques**



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# Roadmap

Part I - Introduction
Preface, Executive Overview, Core Concepts, Definitions
Part II – Architecture Development Method
Introduction to ADM
ADM Phase Narratives
Part III – ADM Guidelines & Techniques
Guidelines for Adapting the ADM Process
Techniques for Architecture Development
Part IV – Architecture Content Framework
Content Metamodel
Architectural Artifacts
Architecture Deliverables
Building Blocks
Part V – Enterprise Continuum & Tools
Enterprise Continuum
Architecture Partitioning
Architecture Repository
Tools for Architecture Development
Part VI – Architecture Capability Framework
Architecture Board
Architecture Compliance
Architecture Contracts
Architecture Governance
Architecture Maturity Models
Architecture Skills Framework

- Part III, ADM Guidelines and Techniques
- A collection of guidelines and techniques for use in applying TOGAF and the ADM



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# Module Objectives

The objectives of this module are to describe:

- How to use the TOGAF Framework with different architectural styles
- The contents of Part III: ADM Guidelines and Techniques
  - The difference between *guidelines* and *techniques*
- The use of Architecture Principles
- The use of Business scenarios in the ADM
- The gap analysis technique
- The use of interoperability requirements in the ADM
- The Business Transformation Readiness Assessment
- Risk Management in the ADM
- Capability based planning

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## Using the TOGAF ADM in the Context of a Specific Architectural Style

- The TOGAF framework is designed to be flexible and readily adapted to a number of architectural styles.
- The TOGAF Standard defines *Architectural Style* as:
  - “*The combination of distinctive features related to the specific context within which architecture is performed or expressed; a collection of principles and characteristics that steer or constrain how an architecture is formed.*”
- Example guidance for adaptations included in the TOGAF Library are:
  - Risk and Security
  - Service-Oriented Architectures

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## Using the TOGAF ADM in the Context of a Specific Architectural Style (Cont'd)

- The practitioner must take into account the combination of distinctive features in which architecture is performed or expressed.
- As a first step, the distinctive features of a style must be identified
  - For example, for SOA it is based on the design of the service which mirror business activities
- The second step is determining how these distinctive features will be addressed
  - It should not call for significant changes, but instead should adjust models, viewpoints and tools

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## Guidelines and Techniques

- Guidelines for Adapting the ADM Process
  - Ways to apply iteration to the ADM,
  - Applying the ADM at different levels of the enterprise,
  - Security considerations for the different phases
- Techniques for Architecture Development,
  - Architecture Principles
  - Stakeholder Management
  - Architecture Patterns
  - Business Scenarios
  - Gap Analysis
  - Migration Planning Techniques
  - Interoperability Requirements
  - Business Transformation Readiness Assessment
  - Risk Management
  - Capability-Based Planning

**Question:** What the difference is between a Guideline and a Technique?

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## Architecture Principles

- An initial output of the Preliminary Phase
- A set of general rules and guidelines for the architecture being developed
- The TOGAF standard contains guidelines for developing principles and a detailed set of generic principles
- Principles are generally established in two key domains:
  - **Enterprise** principles provide a basis for decision-making throughout an enterprise and dictate how the organisation fulfills its mission
  - **Architecture** principles are a set of principles that relate to architecture work.

### The need for Architecture Principles

- They inform and support the way in which an organisation sets about fulfilling its mission
- Often they are one element in a structured set of ideas that collectively define and guide the organisation, from values through to actions and results

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## Template

<b>Name</b>	Should represent the essence of the rule and be easy to remember
<b>Statement</b>	Should be succinct and unambiguously communicate the rule
<b>Rationale</b>	Should highlight the business benefits of adhering to the principle using business terminology.
<b>Implications</b>	Should highlight the requirements, both for the business and IT for carrying out the principle, in terms of resources, costs, and activities/tasks.

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## Example: Primacy of Principles

<b>Statement</b>	Principles apply throughout the enterprise and override all other considerations when decisions are made
<b>Rationale</b>	The only way we can provide a recognized, consistent and measurable level of operations is if all parts of the enterprise abide by the principles when making decisions
<b>Implications</b>	Without this principle, short-term consideration, supposedly convenient exceptions, and inconsistencies would rapidly undermine the management of information. Information management initiatives will not be permitted to begin until they are examined for compliance with the principles. A conflict with a principle will be resolved by changing the conflicting initiative, which could delay or prevent the initiative.

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## Example: Self-Serve

<b>Statement</b>	Customers should be able to serve themselves
<b>Rationale</b>	Applying this principle will improve customer satisfaction, reduce administrative overhead, and potentially improve revenue.
<b>Implications</b>	There is an implication to improve ease-of-use and minimize training needs; for example, members should be able to update their contact details, etc. and be able to buy additional membership products online.

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## What makes a good set of Architecture Principles?

A good set of principles will be founded in the beliefs and values of the organisation.

It must be:

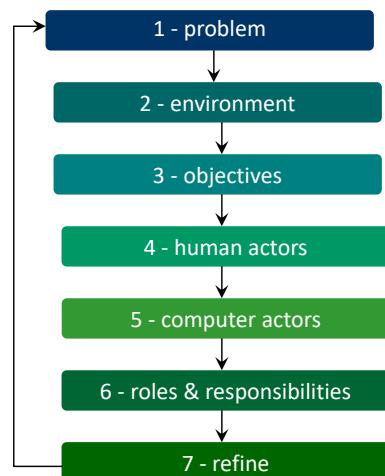
- **Understandable:** the underlying tenets can be quickly grasped
- **Robust:** principles must be definitive and precise to support consistent decision-making
- **Complete:** principles must cover every situation perceived
- **Consistent:** principles should not be contradictory
- **Stable:** principles should be enduring, yet able to accommodate change

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## What is a Business Scenario?

Business scenarios are a method used to help identify and understand the business requirements that the architecture must address. A business scenario describes:

- A business process, application, or set of applications
- The business and technology environment
- The people and computing components (“actors”) who execute the scenario
- The desired outcome of proper execution



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## What is a good Business Scenario?

A good business scenario represents a significant business need or problem, and enables vendors to understand the value of a solution to the customer.

A good business scenario is also ‘‘SMART’’:

- Specific, by defining what needs to be done
- Measurable, through clear metrics for success
- Actionable, by clearly segmenting the problem and providing the basis for a solution
- Realistic, in that the problem can be solved within the bounds of physical reality, time, and cost constraints
- Time-bound, in that there is a clear statement of when the opportunity expires

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## The use of Business Scenarios in the ADM

- Business scenarios figure most prominently in the initial phase of the ADM, Architecture Vision,
  - when they are used to define relevant business requirements
  - and to build consensus with business management and other stakeholders
- They may also be used in other phases, particularly during Business Architecture
  - to derive the characteristics of the architecture directly from the high-level requirements of the business

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## Gap Analysis

Gap analysis is widely used in the ADM to validate an architecture that is being developed. The basic idea is to spot gaps between the Baseline Architecture and the Target Architecture; that is, items that have been deliberately omitted, accidentally left out, or not yet defined. Gap Analysis is used in Phases B, C, D, and E.

Target Architecture Baseline Architecture ↓	Video Conferencing Services	Enhanced Telephony Services	Mailing List Services	Eliminated Services ↓
Broadcast Services				Intentionally eliminated
Video Conferencing Services	Included			
Enhanced Telephony Services		Potential match		
Shared Screen Services				Unintentionally excluded - a gap in Target Architecture
New →		Gap: Enhanced services to be developed or produced	Gap: To be developed or produced	© The Open Group

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# Interoperability

- Interoperability is “the ability to share information and services”.
- Defining the degree to which information and services are to be shared is very important, especially in a complex organisation and/or extended enterprise.

The determination of interoperability occurs throughout the ADM:

- Architecture Vision: the nature and security considerations of information and service exchanges are found using business scenarios.
- Business Architecture: information and service exchanges are defined in business terms.
- Data Architecture: the content of information exchanges is detailed using the corporate data and/or information exchange model.
- Application Architecture: the way applications are to share information and services is specified.
- Technology Architecture: appropriate technical mechanisms to permit information and service exchanges are specified.
- Opportunities & Solutions: actual solutions are selected.
- Migration Planning: interoperability is implemented logically.

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# Examples

Phase B: Inter-stakeholder Information Interoperability Requirements  
(Using degrees of information interoperability)

Stakeholders	A	B	C	D	E	F	G
A		2	3	2	3	3	3
B	2		3	2	3	2	2
C	3	3		2	2	2	3
D	2	2	2		3	3	3
E	4	4	2	3		3	3
F	4	4	2	3	3		2
G	2	2	3	3	3	3	

Phase C: Inter-system Interoperability Requirements

	System A	System B	System C	System D	System E	System F	System G
System A		2A	3D	2B	3A	3A	3B
System B	2E		3F	2C	3A	2B	2C
System C	3E	3F		2B	2A	2A	3B
System D	2B	2B	2B		3A	3A	3B
System E	4A	4B	2B	3A		3B	3B
System F	4A	4A	2B	3B	3A		2D
System G	2B	2B	3A	3A	3B	3B	

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## **The Business Transformation Readiness Assessment**

- Enterprise architecture often involves considerable change.
- Understanding the readiness of an organisation to accept change, identifying the issues, and dealing with them in the Implementation and Migration Plans is key to successful architecture transformation in Phases E and F. An initial assessment is carried out in Phase A.
- This is a joint effort between corporate (especially human resources) staff, lines of business and IT planners.

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## **Business Transformation Readiness and the ADM**

Recommended activities when assessing readiness for business transformation are:

- Determine the readiness factors
- Present the readiness factors using maturity models
- Assess the readiness factors, and determine the readiness factor ratings
- Assess the risks for each readiness factor and identify mitigating actions
- Work these actions into Phase E and F Implementation and Migration Plan

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## Example

Business Transformation Readiness Assessment - Maturity Model							
Factor 2: Need for Enterprise Information Architecture			Class	Organizational Context			
			BTEP Readiness Factor	YES			
Definition		There is recognition by the organization that information is a strategic corporate asset requiring stewardship. There is also recognition that the data is not universally understandable, of requisite quality, and accessible.					
Maturity Model Levels							
0 Not defined	1 Ad Hoc	2 Repeatable	3 Defined	4 Managed	5 Optimized		
Information is not recognized as an asset.  There is no clear stewardship of data.	Data Management (DM) concepts are intuitively understood and practiced on an <i>ad hoc</i> basis.  Stewardship of the data is informal.  Data is recognized by certain internal experts and senior management as being of strategic importance to the organization.  Focus is primarily on technically managing redundant data at the applications level.	Many parts of the organization value information/data as a strategic asset.  Internal DM experts maintain clear lines of responsibility and stewardship of the data, organized along lines of business and at all senior levels.  Staff put into practice DM principles and standards in their daily activities.	Data is recognized as a strategic asset in most parts of the organization, and throughout most levels from operations to senior management.  Resources are committed to ensuring strong stewardship of data at the lower management and information expert levels.	Data is recognized as a strategic asset in all parts of the organization, and throughout most levels from operations to senior management.  Resources are committed to ensuring strong stewardship of data at the senior management and information expert levels.	Data is treated in all levels throughout the organization as a strategic asset to be exploited and re-used.  Data products and services are strongly integrated with the management practice of the organization.  All staff are empowered and equipped to take stewardship of information, and are seen as "knowledge workers".		
				Recommended Target State			

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## Risk Management in the ADM

There are two levels of risk that should be considered:

- Initial Level of Risk:** Risk categorisation prior to determining and implementing mitigating actions.
- Residual Level of Risk:** Risk categorisation after implementation of mitigating actions

The process for risk management:

1. Risk classification
2. Risk identification
3. Initial risk assessment
4. Risk mitigation and residual risk assessment
5. Risk monitoring

- Risks are identified in Phase A as part of the initial Business Transformation Readiness Assessment
- The risk identification and mitigation assessment worksheets are maintained as governance artifacts and are kept up-to-date in Phase G (Implementation Governance) where risk monitoring is conducted
- Implementation governance can identify critical risks that are not being mitigated and might require another full or partial ADM cycle

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## Example

Corporate Risk Impact Assessment					
Effect	Frequency				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

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Risk ID	Risk	Preliminary Risk			Mitigation	Residual Risk		
		Effect	Frequency	Impact		Effect	Frequency	Impact

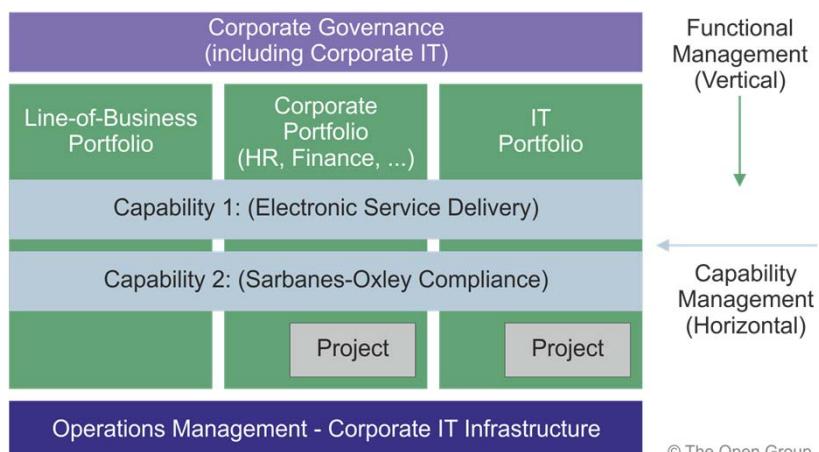
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## Capability Based Planning

- Capability-based planning is a technique that focuses on the planning, engineering and delivery of strategic business capabilities
- It frames all phases of the architecture development in the context of business outcomes, clearly linking the IT vision, architectures (ABBs and SBBs), and the Implementation and Migration Plans with the corporate strategic, business, and line of business plans

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# Capabilities



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# Summary

- This module has introduced how to adapt the ADM for different Architectural Styles
- It has described the two different types of content in Part III: Guidelines and Techniques
- It has briefly described:
  - Architecture Principles
  - Business Scenarios
  - Gap Analysis
  - Interoperability
  - Business Transformation Readiness
  - Risk Management
  - Capability-Based Planning

## Exercise:

- Select 7 principles at random from the Example Set of Architecture Principles in the TOGAF standard, Chapter 20
- For each selected principle state whether it applies to your organisation or not, and give your reasons

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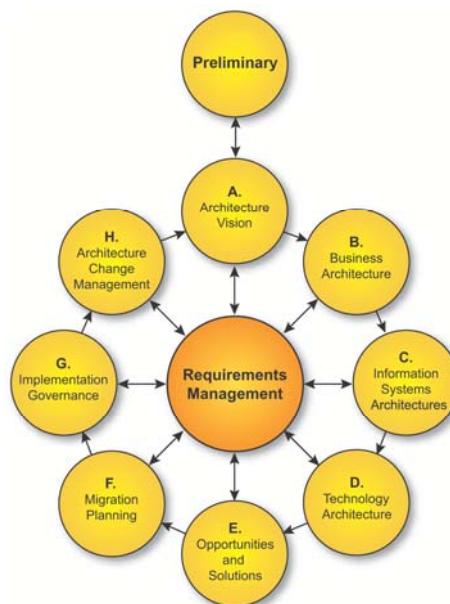
# **Module F11:**

## **ADM Deliverables Level 1**

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## **ADM Deliverables Level 1**



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# Roadmap

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Architectural Artifacts
<b>Architecture Deliverables</b>
Building Blocks
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Enterprise Continuum
Architecture Partitioning
Architecture Repository
Tools for Architecture Development
Part VI – Architecture Capability Framework
Architecture Board
Architecture Compliance
Architecture Contracts
Architecture Governance
Architecture Maturity Models
Architecture Skills Framework

- **Part IV, Architecture Content Framework, Chapter 32**



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# Module Objectives

The aim of this module is to introduce the key deliverables of the ADM cycle:

- The role of Architecture Deliverables
- The purpose of key deliverables

## Architecture Deliverables

- The contractual or formal work products of an architecture project
- The definition of deliverable provided by the TOGAF standard is a baseline
- It is thus a starting point for tailoring

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## Architecture Deliverables

- Architecture Building Blocks
- Architecture Contract
- Architecture Definition Document
- Architecture Principles
- Architecture Repository
- Architecture Requirements
- Architecture Roadmap
- Architecture Vision
- Business Principles, Business Goals and Business Drivers
- Capability Assessment
- Change Request
- Communications Plan
- Implementation and Migration Plan
- Implementation Governance Model
- organisational model for Enterprise Architecture
- Request for Architecture Work
- Requirements Impact Assessment
- Solution Building Blocks
- Statement of Architecture Work
- Tailored Architecture Framework

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## Request for Architecture Work

- Sent from the Sponsor to the Architecture organisation
- This initiates a cycle of the ADM
- Created as an output from the Preliminary Phase or an approved architecture Change Request

### Statement of Architecture Work

- A deliverable output from Phase A
- A response to the Request for Architecture Work
- A plan for the architecture work

### Architecture Vision

- Produced in Phase A
- An aspirational view of the end architecture product
- Its purpose is to agree the desired outcome for the architecture

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## Communications Plan

- Produced in Phase A
- Allows for a planned and managed process for communication about a new architecture

### Architecture Definition Document

- The deliverable container for the core artifacts
  - Business, Data, Application, and Technology architectures
  - Includes baseline, transition and target architectures
  - Developed through phases A, B, C, and D
  - It provides a *qualitative* view of the solution

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## Architecture Requirements Document

- The deliverable container for the requirements for an architecture
- A companion to the Architecture Definition Document
- It contains measurable criteria – a *quantitative* view
- Often used as a component of the Architecture Contract

### Architecture Roadmap

- Incrementally developed throughout phases E and F
  - Informed by the Candidate Roadmap Components identified in phases B, C, and D
- This lists individual increments of change
- Shows progression from Baseline to Target

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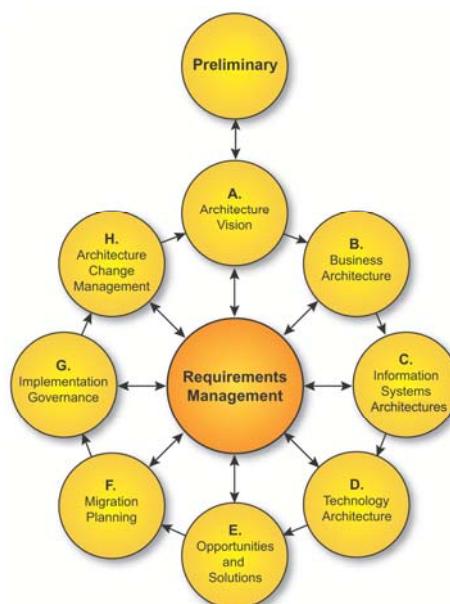
# Module F12

## TOGAF® Reference Models

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## TOGAF® Reference Models



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## Module Objectives

The aim of this module is to introduce two TOGAF Reference models from the TOGAF Library:

- The TOGAF Technical Reference Model (TRM)
- The Integrated Information Infrastructure Reference Model (III-RM).

And the relationship of the III-RM to the concept of *Boundaryless Information Flow™*

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## TOGAF Foundation Architecture

- A Foundation Architecture is an architecture of building blocks and corresponding standards that supports all the Common Systems Architectures and, therefore, the complete enterprise operating environment
- The TOGAF Library provides the TOGAF TRM as an example Foundation Architecture
- This TRM is “Platform-centric”
- It is an example of an architecture of generic services and functions on which other, more specific architectures can be based

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## The Architecture Continuum

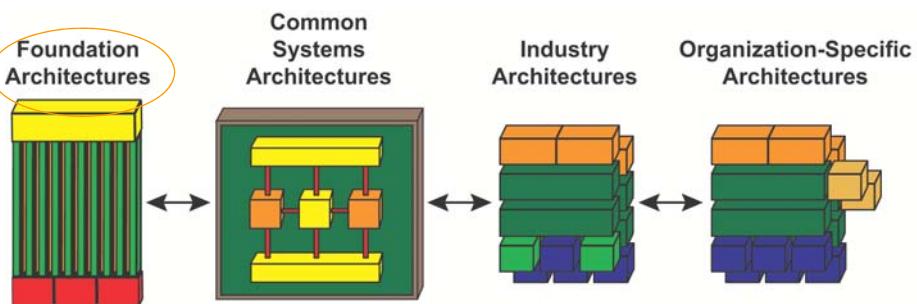
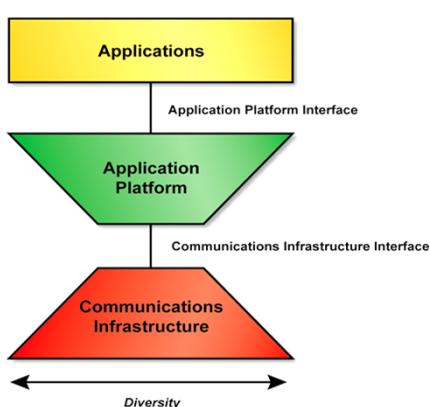


Figure 1

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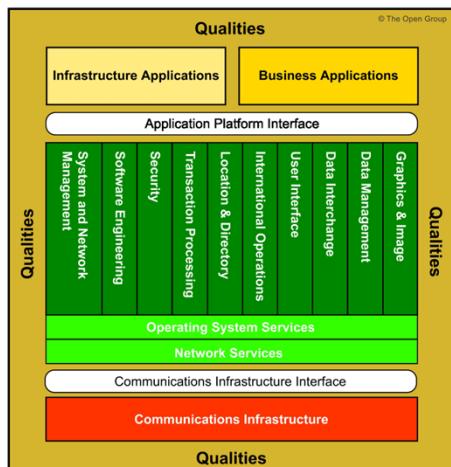
## TRM Components



- The TRM has two main components:
  - A taxonomy that defines terminology and provides a coherent description of the components and conceptual structure of an information system
  - An associated TRM graphic that provide a visual representation as an aid to understanding

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## Summary of the TRM



The TOGAF Technical Reference Model provides a model and core taxonomy of generic platform services

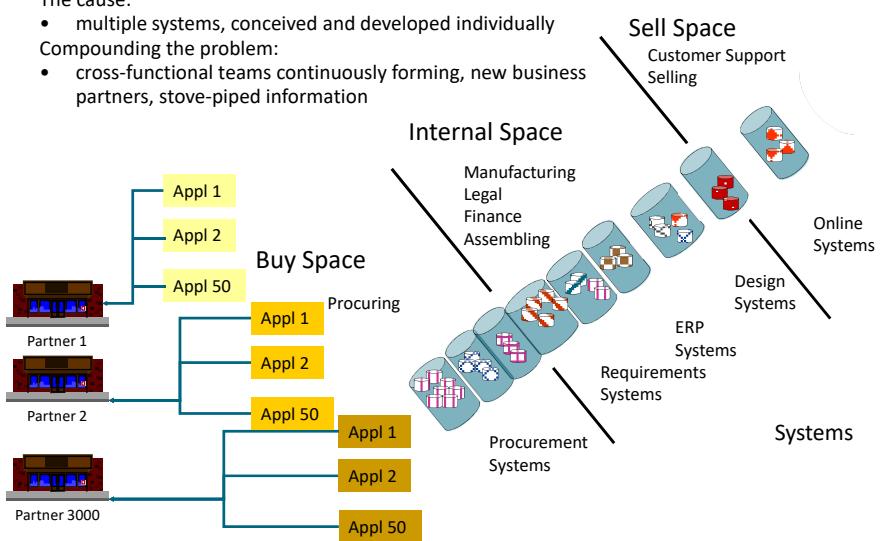
- It is a Foundation Architecture
- It can be used to build any system architecture
- A taxonomy defines consistent terminology

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## A Common Problem

The cause:

- multiple systems, conceived and developed individually
- Compounding the problem:
- cross-functional teams continuously forming, new business partners, stove-piped information



## Customer Problem Statement

- “I could run my business better if I could gain operational efficiencies improving
  - the many different business processes of the enterprise
    - both internal, and
    - spanning the key interactions with suppliers, customers, and partners using
  - integrated information, and access to that information.”

Source: “The Interoperable Enterprise”  
<http://www.opengroup.org/cio/iop/index.htm>

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## How Important...

- Not having Boundary less Information Flow where systems interoperate, i.e. easily exchange information and use that information to improve operations, is causing organisations real pain \*
  - 100s of millions in lost opportunities
  - Billions spent to make systems interoperate or to recover from mistakes
  - *The risks are not only financial but deal with lost lives*
    - Hospitals, 911/999 systems, Critical infrastructure, Air Traffic Control...

\* respondents to survey taken at conference

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# Integrated Information Infrastructure Reference Model

- A model of the key components for developing, managing, and operating an integrated information infrastructure.
  - Supporting “*Boundaryless Information Flow™*”
- A model of a set of applications that sit on top of an application platform.
- An expanded subset of the TOGAF Technical Reference Model, using different orientation.

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## The Architecture Continuum

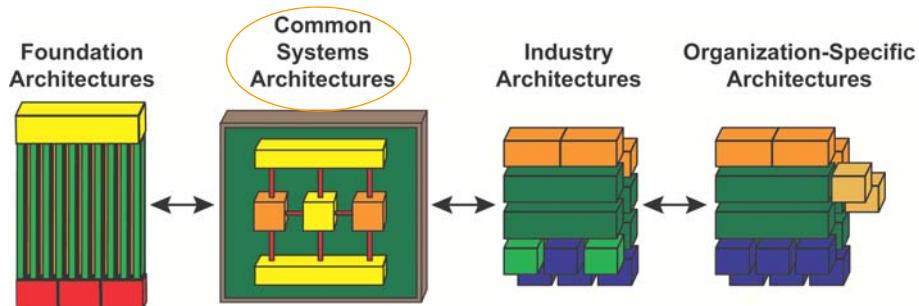
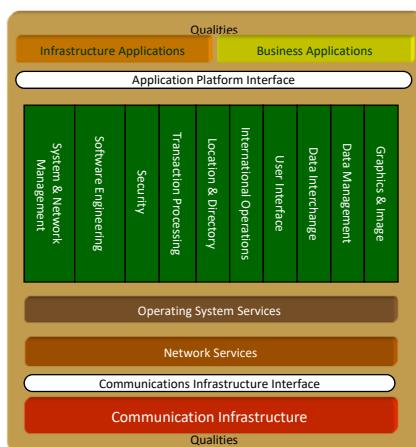


Figure 1

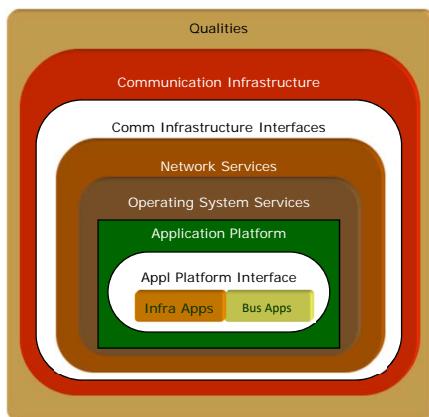
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# TOGAF TRM Orientations

## Side View



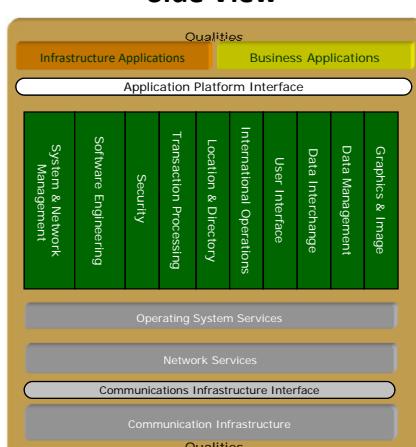
## Top Down View



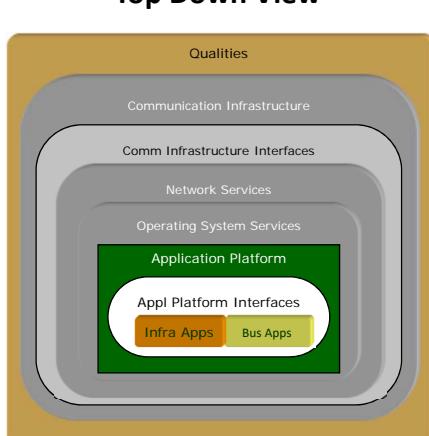
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# Boundaryless Information Flow Focus

## Side View

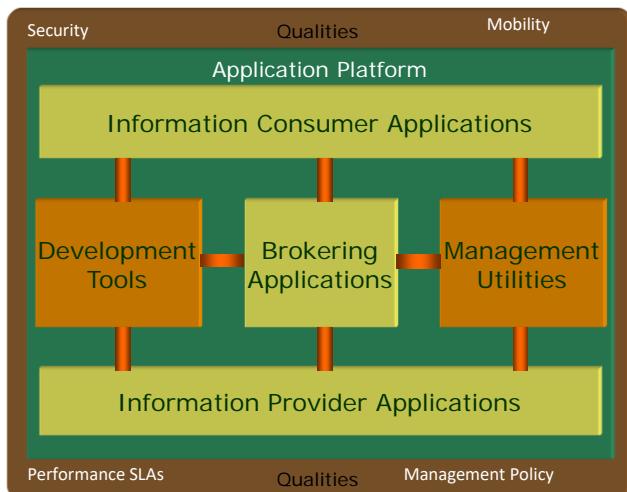


## Top Down View



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# Integrated Information Infrastructure Reference Model – High-Level Model



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## Components of the III-RM

**The III-RM has 2 main components:**

- A taxonomy, which defines terminology, and provides a coherent description of the components and conceptual structure of an integrated information infrastructure
- An associated III-RM graphic, which provides a visual representation of the taxonomy, and the inter-relationship of the components, as an aid to understanding

### Summary

- The III-RM is an example of a Common Systems Architecture
- The focus is on applications
- The III-RM has 2 main components: a taxonomy, and an associated graphic.
- A key driver for the III-RM is the Need for Boundaryless Information Flow: getting information to the right people at the right time in a secure, reliable manner
- The infrastructure that enables this vision is called the “integrated information infrastructure”

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## **Test Yourself Question**

- Which of the following best describes the purpose of the TRM?
  - A. To provide a framework for IT governance
  - B. To provide a visual model and taxonomy for an information system
  - C. To provide a list of standards
  - D. To provide a software development method
  - E. To provide a system engineering viewpoint in a possible solution

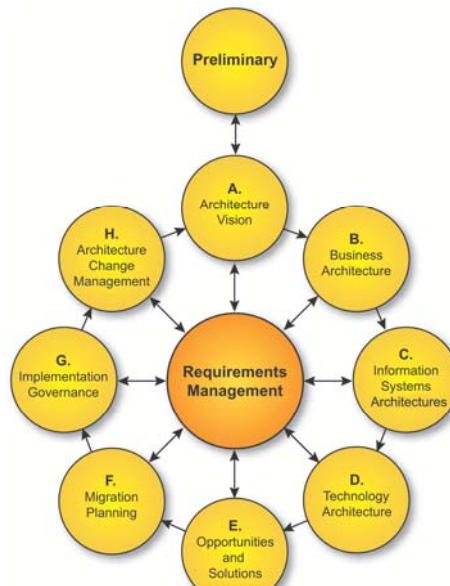
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## **Module 2: The TOGAF Framework Components**

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# The TOGAF Framework Components



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## Module Objectives

- To highlight and introduce the main components and key concepts of the TOGAF framework
  - The Architecture Development Method (ADM)
  - ADM Guidelines and Techniques
  - Architecture Content Framework
    - Deliverables, artifacts, building blocks
  - The Enterprise Continuum
    - The Architecture Repository
  - The Architecture Capability Framework
    - Establishing an EA Capability
  - The TOGAF Library

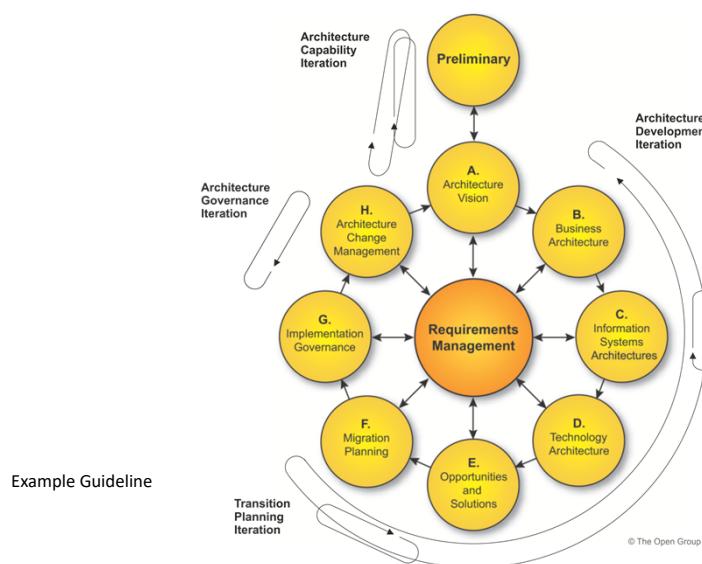
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## ADM Guidelines and Techniques

- A set of guidelines and techniques to support the application of the ADM
- The guidelines help to adapt the ADM to deal with different scenarios, including different process styles (e.g. the use of iteration) and also specific requirements (e.g. security).
- The techniques support specific tasks within the ADM (e.g. defining principles, business scenarios, gap analysis, migration planning, risk management, etc.)

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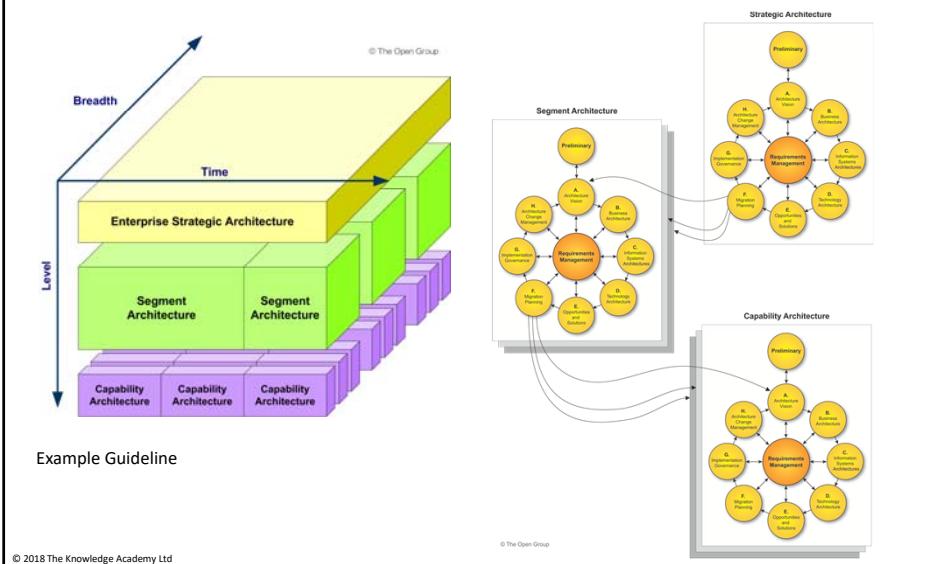
## Applying Iteration to the ADM



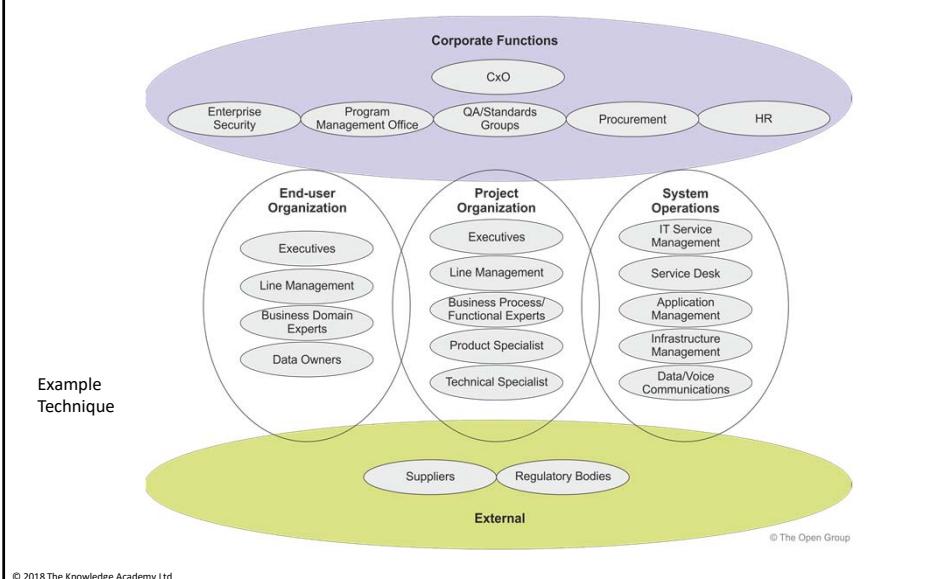
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# Applying the ADM Across the Architecture Landscape



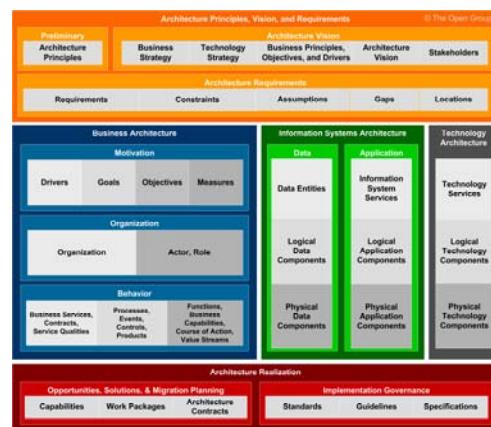
# Categories of Stakeholder



# Architecture Content Framework

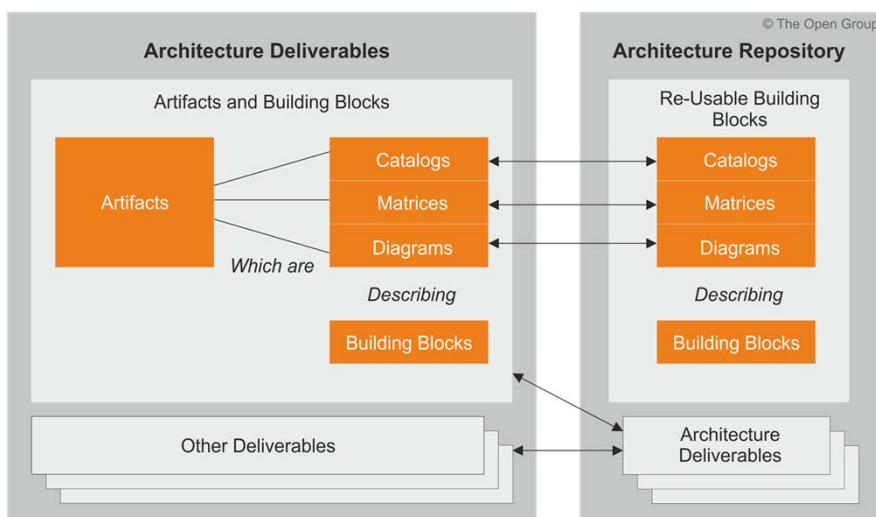
Provides a detailed model of architectural work products, including **Deliverables**, **Artifacts** within deliverables, and the **Architecture Building Blocks** (ABBs) that deliverables represent.

- It drives for greater consistency in the outputs of the TOGAF ADM
- It provides a comprehensive checklist of architecture outputs
- It promotes better integration of work products
- It provides a detailed open standard for how architectures should be described
- It includes a detailed metamodel



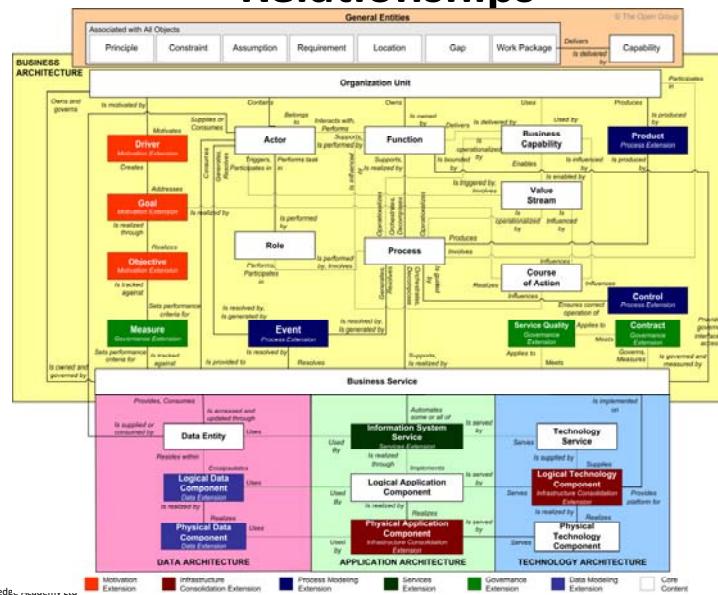
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## Deliverables, Artefacts, and Building Blocks

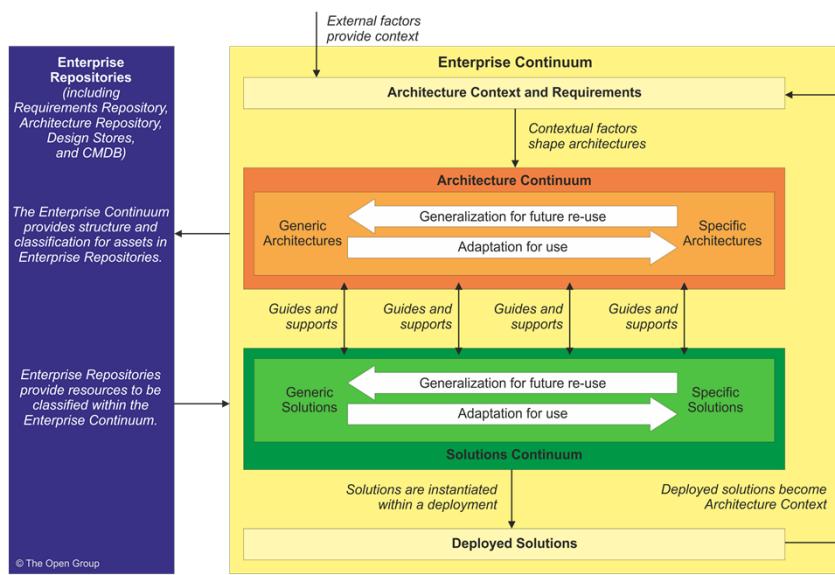


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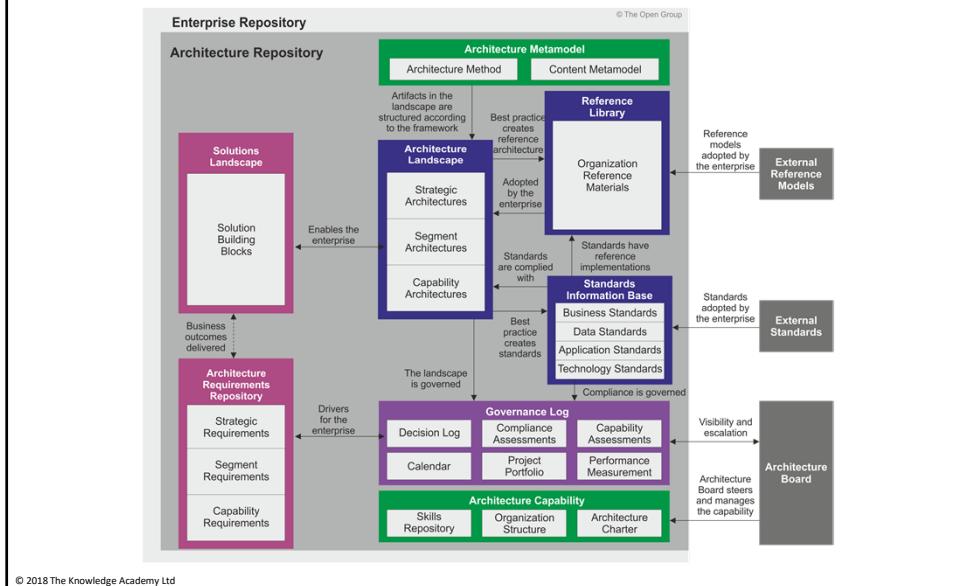
# Full Content Metamodel with Relationships



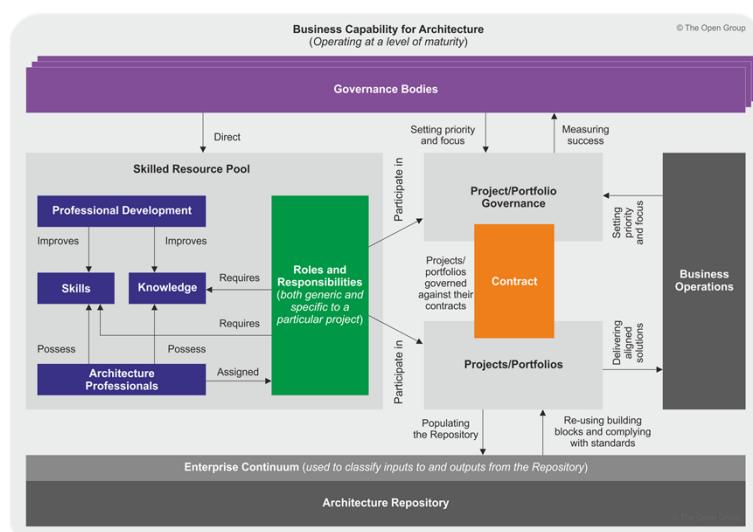
# The Enterprise Continuum



# Architecture Repository



# Capability Framework

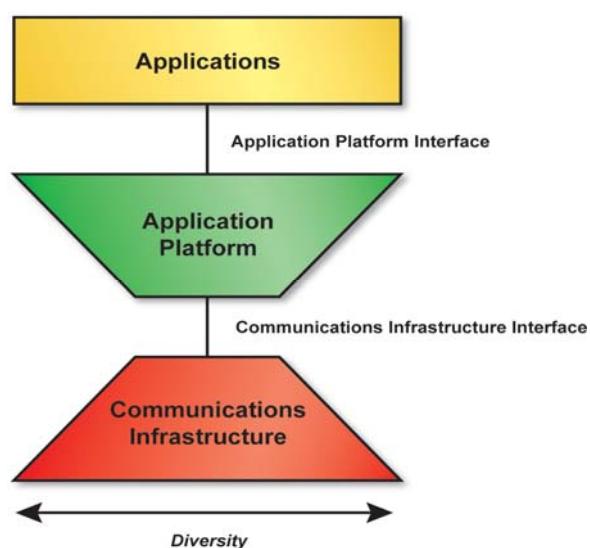


## Establishing the Architecture Capability as an Operational Entity

- The Architecture Capability Framework provides guidance on establishing an operational enterprise architecture practice
- It recommends they include capabilities such as:
  - Financial Management
  - Performance Management
  - Service Management
  - Risk Management
  - Resource Management
  - Communications and Stakeholder Management
  - Quality Management
  - Supplier Management
  - Configuration Management
  - Environment Management

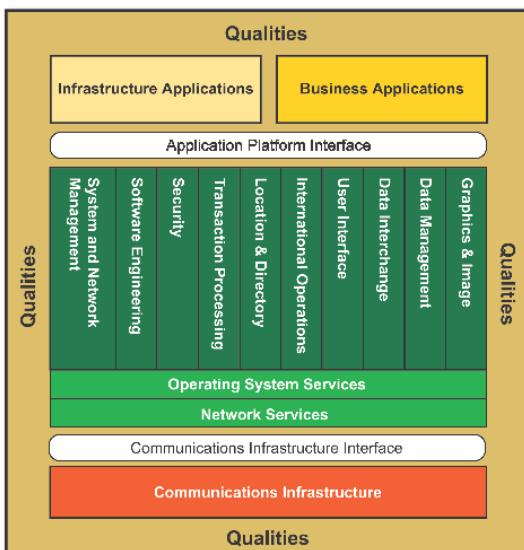
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## High-Level TRM



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## Detailed TRM



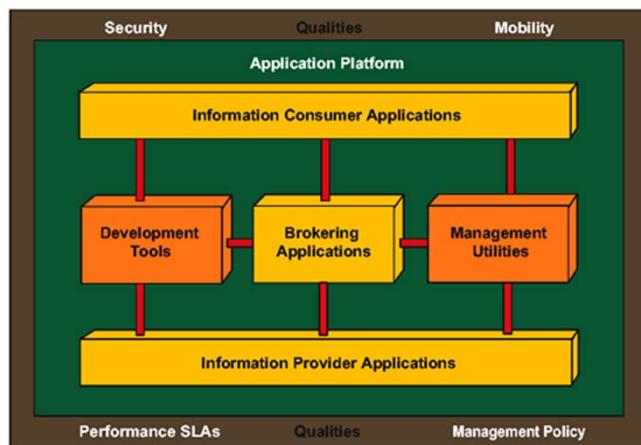
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## ***Boundaryless Information Flow™***

- A trademark of The Open Group
- Access to integrated information to support business process improvements
- An infrastructure that provides Boundaryless Information Flow has open standard components that provide services in a customer's extended enterprise that:
  - Combine multiple sources of information
  - Securely deliver the information whenever and wherever it is needed, in the right context for the people or systems using that information

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# The Integrated Information Infrastructure Reference Model (III-RM)



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## Summary

- Architecture Development Method (ADM)
  - An iterative sequence of steps to develop an enterprise-wide architecture
- ADM Guidelines and Techniques
  - Guidelines and techniques to support the application of the ADM
- Architecture Content Framework
  - A detailed model of architectural work products, including deliverables, artifacts within deliverables, and the Architecture Building Blocks (ABBs) that deliverables represent.
- The Enterprise Continuum
  - A model for structuring a virtual repository and methods for classifying architecture and solution artifacts.
  - Supported by the Architecture Repository, a model for a physical repository
- The Architecture Capability Framework
  - A structured definition of the organisations, skills, roles and responsibilities to establish and operate an Enterprise Architecture.
- The TOGAF Library
  - A reference library containing guidelines, templates, patterns, and other forms of reference material to accelerate the creation of new Enterprise Architectures.

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## **Test Yourself Question**

- Q: Which of the following is not considered one of the main parts of the TOGAF standard?
- A. Architecture Development Method
  - B. Enterprise Continuum
  - C. TOGAF Reference Models
  - D. TOGAF Resource Base

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## **Module 3: Introduction to the Architecture Development Method**

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## **Module Objectives**

The objectives of this module are to describe:

- The TOGAF ADM
- Its relationship to other parts of the TOGAF standard
- The phases of the ADM
- How and why to adapt the ADM
- How to scope an architecture activity
- The need for an integration framework

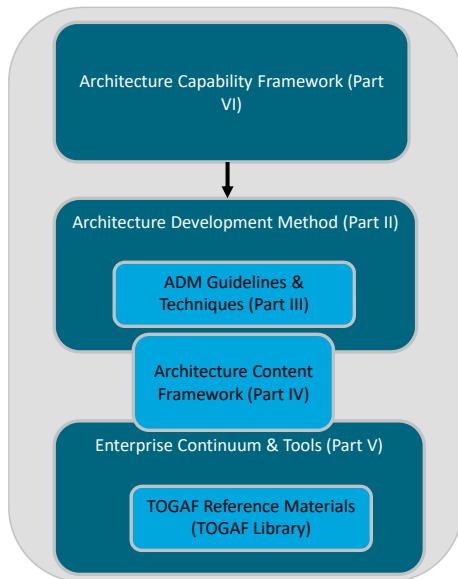
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## **What is the TOGAF ADM?**

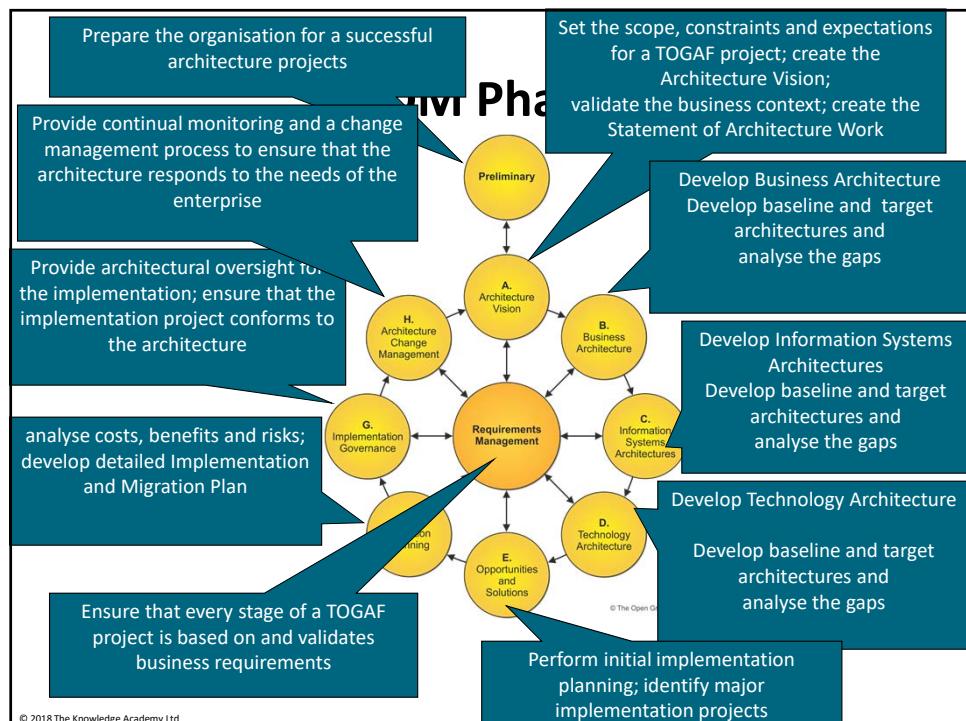
- The ADM forms the core of the TOGAF framework
- The result of contributions from many architecture practitioners
- A process for developing an enterprise architecture
- Integrates all the elements within the TOGAF standard
- Designed to address enterprise's business and IT needs by providing:
  - A set of architecture views (business, data, application, technology)
  - A set of recommended deliverables
  - A method for managing requirements
  - Guidelines on tools for architecture development

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## Relationship to Other Parts of the TOGAF Standard

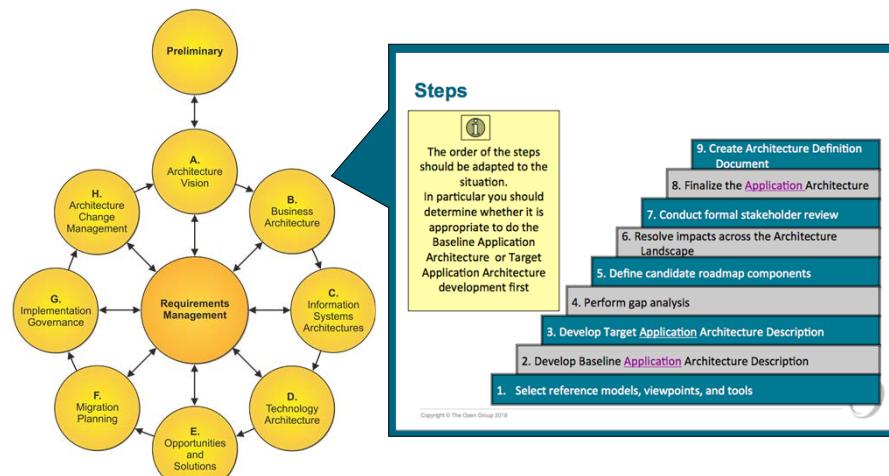


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## ADM Phase Steps Example



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## ADM Inputs and Outputs

- The TOGAF standard defines a number of input and output deliverables for each ADM phase
  - These are suggestions and need not be followed exactly
  - Output of an early phase may be modified in a later phase
  - Version numbers are used to manage the output
    - 0.1 – a high level outline deliverable
    - 1.0 – a formally reviewed detailed deliverable

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## Adapting the ADM

- Generic methodology intended for variable:
  - Geographies
  - Vertical sectors
  - Industry types
- Usable with deliverables of other frameworks such as Zachman, DODAF, ...
- It is usual to modify or extend the ADM to suit specific needs

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## Governing the ADM

- The ADM, whether adapted or used as is, is a key process to be managed and governed
- The Architecture Board should be satisfied that the method is being applied correctly
- The management of all architectural artifacts, governance and related process should be supported by a controlled environment such as a repository

### **Governance Repository**

- Reference Data
- Process Status
- Audit Information

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# Reasons to Constrain the Scope of Architectural Activity

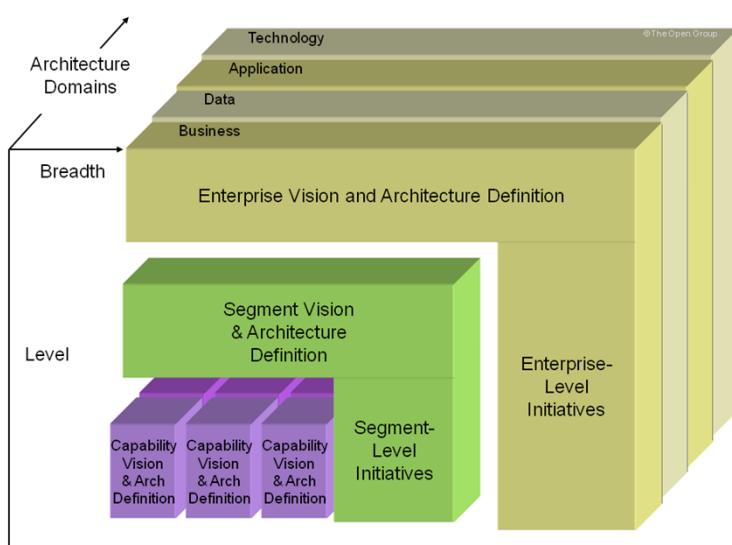
- The organisational authority of the team producing the architecture
- The objectives and stakeholder concerns to be addressed within the architecture
- The availability of people, finance, and other resources

## Scoping the Architecture Activity

- There are four dimensions in which scope may be limited:
  - Breadth
  - Depth
  - Time Period
  - Architecture Domains

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# Architecture Integration



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## **Summary**

- The ADM is a comprehensive, general method
- It recommends a sequence for various phases and steps involved in developing an architecture
- It is an iterative method
- It draws on the other parts of the TOGAF framework for assets and processes
- It can be used with other deliverables from other frameworks

## **Test Yourself Question**

The following statements describe the phases of the ADM, except ?

1. They are cyclical
2. They are iterative
3. Each phase refines the scope
4. Each phase is mandatory
5. The phases cycle through a range of architecture views

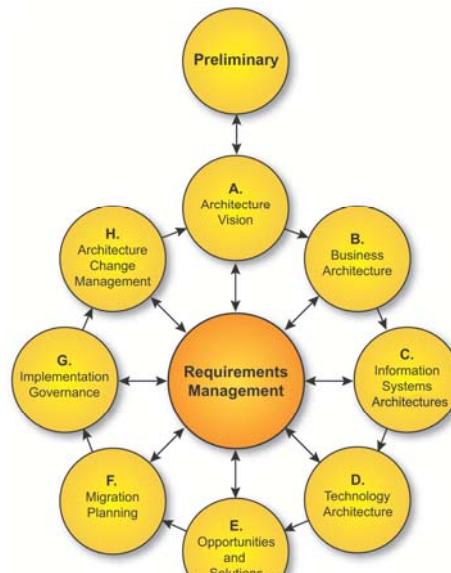
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## **Module 4: The Enterprise Continuum and Tools**

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# The Enterprise Continuum and Tools



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## Roadmap

Part I - Introduction
Preface, Executive Overview, Core Concepts, Definitions
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Introduction to ADM
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Techniques for Architecture Development
Part IV – Architecture Content Framework
Content Metamodel
Architectural Artifacts
Architecture Deliverables
Building Blocks
Part V – Enterprise Continuum and Tools
Enterprise Continuum
Architecture Partitioning
Architecture Repository
Tools for Architecture Development
Part VI – Architecture Capability Framework
Architecture Board
Architecture Compliance
Architecture Contracts
Architecture Governance
Architecture Maturity Models
Architecture Skills Framework

- Part V, Enterprise Continuum and Tools



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## Module Objectives

- To provide an introduction to the Enterprise Continuum.
- The purpose of the Enterprise Continuum
- The constituent pieces of the Enterprise Continuum
- To explain high-level issues with Tool Standardization

### Definition of ‘Continuum’

- Noun: a continuous extent of something, no part of which is different from any other

*Source: Wiktionary.org*

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## Overview

- A model for structuring a virtual repository and methods for classifying architecture and solution artifacts
- Based on architectures and solutions:
  - Models, patterns, architecture descriptions
  - Deliverables produced in this iteration of the ADM
  - Deliverables produced in other iterations of the ADM
  - Assets from the industry at large
  - Showing how artifacts evolve
- The practical implementation of the Enterprise Continuum takes the form of an Architecture Repository
- The Enterprise Continuum is a combination of two complementary concepts: the Architecture Continuum and the Solutions Continuum
- It enables effective use of COTS products.
- It improves engineering efficiency
- It aids organisation of reusable architecture and solution assets
- It provides a common language:
  - Within enterprises
  - Between customer enterprises and vendors

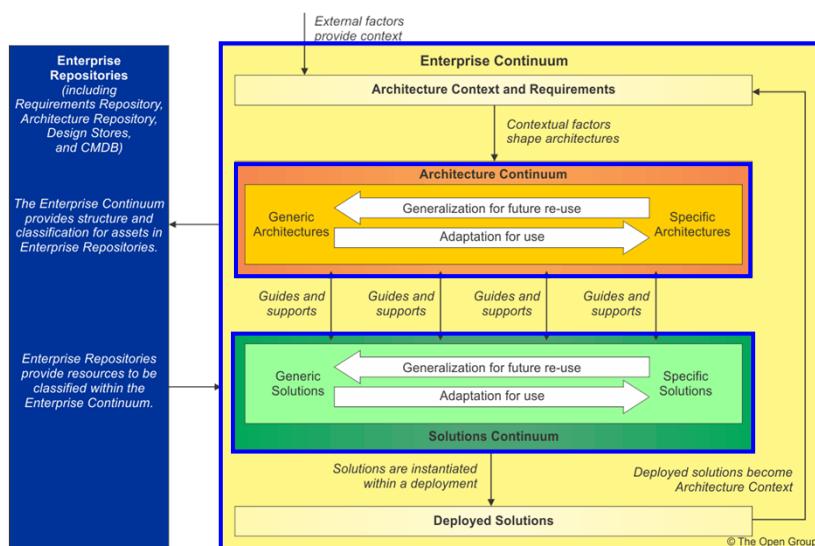
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# Architecture Reuse

- The Enterprise Continuum consists of all architecture assets: models, patterns, architecture descriptions, etc.
- External assets include:
  - Generic reference models (eg TOGAF's TRM, Zachmann...)
  - IT-specific models (eg a web services architecture)
  - Information Processing-specific models (eg e-Commerce, supply chain management ...)
  - Vertical-Industry-specific models (eg TMF, ARTS, POSC...)
- The architecture governance function decides which assets an enterprise considers part of its own Enterprise Continuum

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## Enterprise Continuum: Constituents



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## The Architecture Continuum

- Architectures range from Foundation Architectures through Common Systems Architectures, and Industry Architectures to an enterprise's own organisation-Specific architecture
- Arrows represent bi-directional relationship between the different architectures
  - Left to right: meeting enterprise needs and business requirements
  - Enterprise needs and business requirements increase in detail from left to right
  - Right to left: leveraging architectural components and building blocks

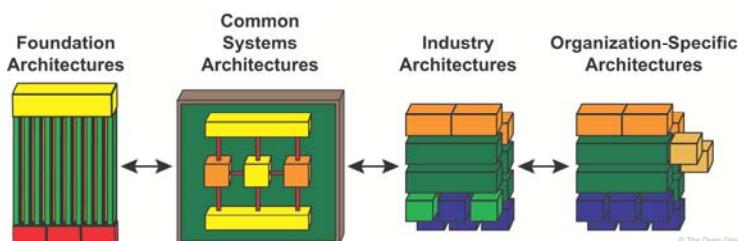


Figure 1

## The Architecture Continuum

- The architectural elements furthest left are the most reusable
- Requirements for missing elements are passed to the left of the continuum for inclusion
- Enterprises can use the same continuum models, specialized for specific businesses
- Figure 1 shows the different architectures that may be developed:
  - these are not fixed stages in a process
  - different architectures may exist as well

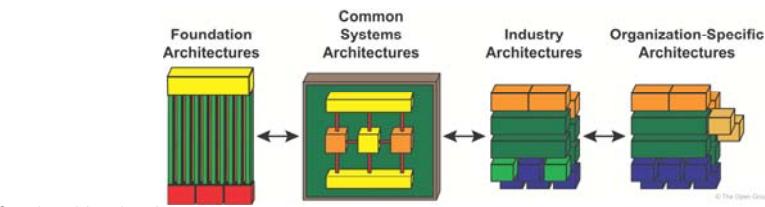


Figure 1

## The Architecture Continuum

- Figure 1 does not represent a formal process but represents a progression occurring at several levels:
  - Logical → Physical
  - Horizontal (IT technology-focused) → Vertical (business-focused)
  - Generalization → Specialization
  - Taxonomy → Architecture Specification
- At each point, an architecture is designed in terms of the design concepts and building blocks available

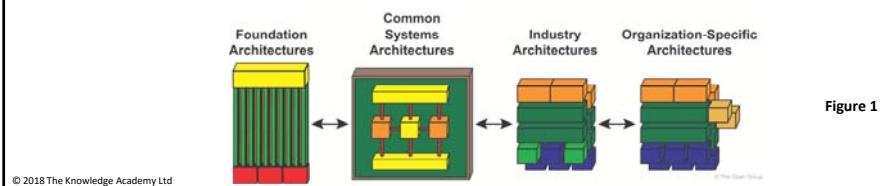


Figure 1

## The Solutions Continuum

- The most specific architectures are on the right:
  - Foundation solutions help to create common systems solutions
  - Common systems solutions are used to create industry solutions
  - Industry Solutions are used to create organisation-specific solutions
- The most generic concepts are on the left
- The entire spectrum is important when balancing cost and value

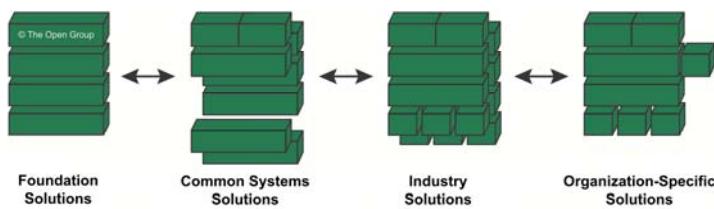


Figure 2

## The Solutions Continuum

- Represents the implementations of the architectures at the corresponding levels of the *Architecture Continuum*
- Is a population of the architecture with Solution Building Blocks, either purchased products or built components, that represent a solution to the enterprise's business need
- Forms a *Solutions Inventory* or *Reuse Library*, which adds significant value to the task of managing and implementing improvements to the IT environment

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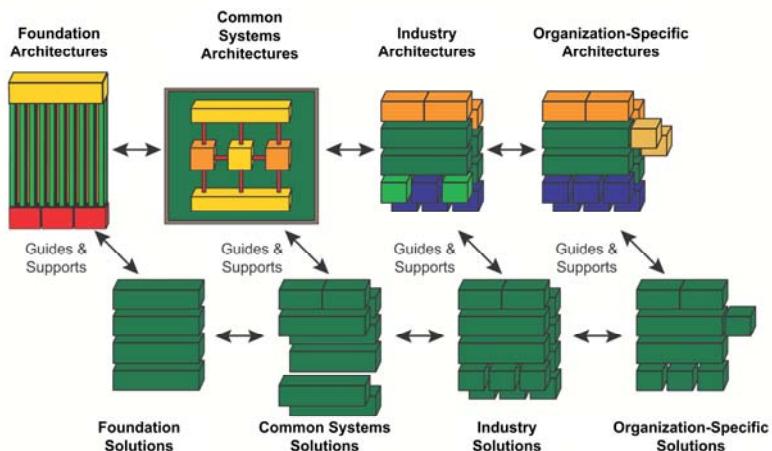
## Relationships

- The Architecture and Solutions Continuum are related by guidance, direction, and support
- E.g. the Foundation Architecture:
  - is an architecture of building blocks and corresponding standards
  - supports all the Common Systems Architectures and, therefore, the complete enterprise operating environment
- The Open Group Technical Reference model (TRM) is a Foundation Architecture
- The Open Group III-RM is a Common Systems Architecture

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## The Enterprise Continuum

Architecture Continuum



Solutions Continuum

Figure 3: Best case for leveraging of architecture and solution components

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## Using the Continuum

- The TOGAF ADM describes the process of developing an enterprise-specific architecture by adopting and adapting generic architectures and solutions
- The Continuum:
  - contains complete and work-in-progress solutions
  - is a "framework-within-a-framework"
  - has few internal assets, at first
  - grows by adding reusable building blocks

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## **Relationships**

- The Solutions Continuum assists understanding of products, systems, services, and solutions
- The Enterprise Continuum improves productivity through leverage
- The Enterprise Continuum does not represent strictly chained relationships:
  - enterprise architectures may have components from a Common Systems Architecture
  - enterprise solutions may contain a product or service

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## **The Need for Tools**

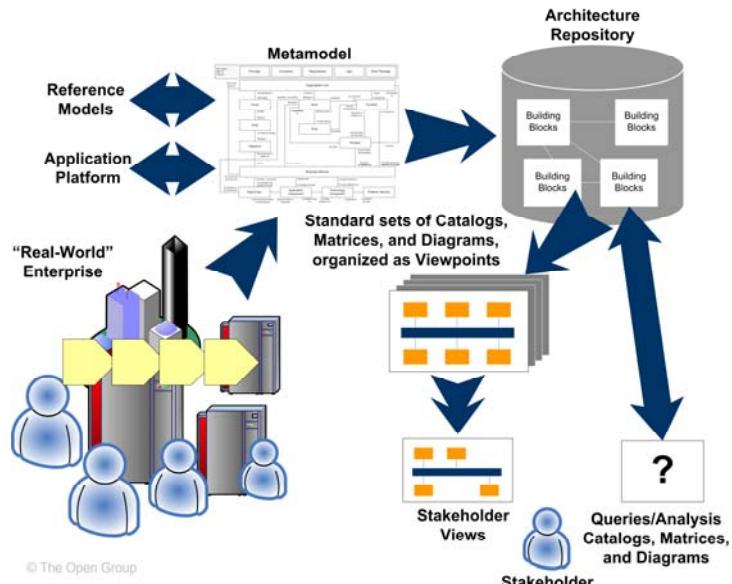
- Tools are needed to manage and control the artifacts within the Enterprise Continuum
  - To promote re-use
  - To enable sharing of architecture information within an organisation
  - To facilitate easier maintenance of the architecture
  - To ensure common terminology is used
  - To provide stakeholders with relevant models

### **Issues in Tools Standardization**

- A single “one size fits all” tool versus multiple tools
- Can a single tool address all needs, all maturity levels?
- The Open Group recognizes the complexity in this area and is developing a TOGAF 9 Tools Certification program to assist with the evaluation

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## Tools can model the Enterprise Architecture



## Summary

- The Enterprise Continuum is
  - a model for structuring a virtual repository and methods for classifying architecture and solution artifacts
  - It enables the organisation of reusable architecture and solution assets.
  - It is also an aid to communication between all architects involved in building and procuring an architecture by providing a common language and terminology.
  - This in turn enables efficiency in engineering and effective use of COTS products.

## Summary

- The Enterprise Continuum
  - provides an overall context for architectures and solutions and classifies assets that apply across the entire scope of the enterprise.
- The Architecture Continuum
  - provides a classification mechanism for assets that collectively define the architecture at different levels of evolution from generic to specific.
- The Solutions Continuum
  - provides the classification for assets to describe specific solutions for the organisation that can be implemented to achieve the intent of the architecture.
- Tools are needed to manage artifacts within the Enterprise Continuum
- The TOGAF standard provides an introduction to Issues in Tools Standardization

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## Test Yourself Question

- Q. According to TOGAF, all the following statements apply to the Enterprise Continuum, *except* \_\_\_\_\_:
- A It is a virtual repository of all known architecture assets and artifacts in the IT industry
  - B It is a virtual repository of all architecture assets and artifacts which the enterprise is considering in its own architecture project
  - C It provides a taxonomy for classifying architecture assets
  - D Its is an important aid to communication for architects on both the buy and supply side
  - E It helps to organize reusable and solution assets

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## **Test Yourself Question**

- Q. According to TOGAF, all of the following are examples of ‘assets within the IT Industry at large’ from the Architecture Continuum, *except* \_\_\_\_\_
- A The TOGAF TRM
  - B The Zachman Framework
  - C IT-specific models, such as web services
  - D The ARTS data model
  - E Deliverables from previous architecture work

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## **Module 5: Architecture Repository**

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# Roadmap

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Architecture Board
Architecture Compliance
Architecture Contracts
Architecture Governance
Architecture Maturity Models
Architecture Skills Framework

- Part V, Enterprise Continuum and Tools



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# Module Objectives

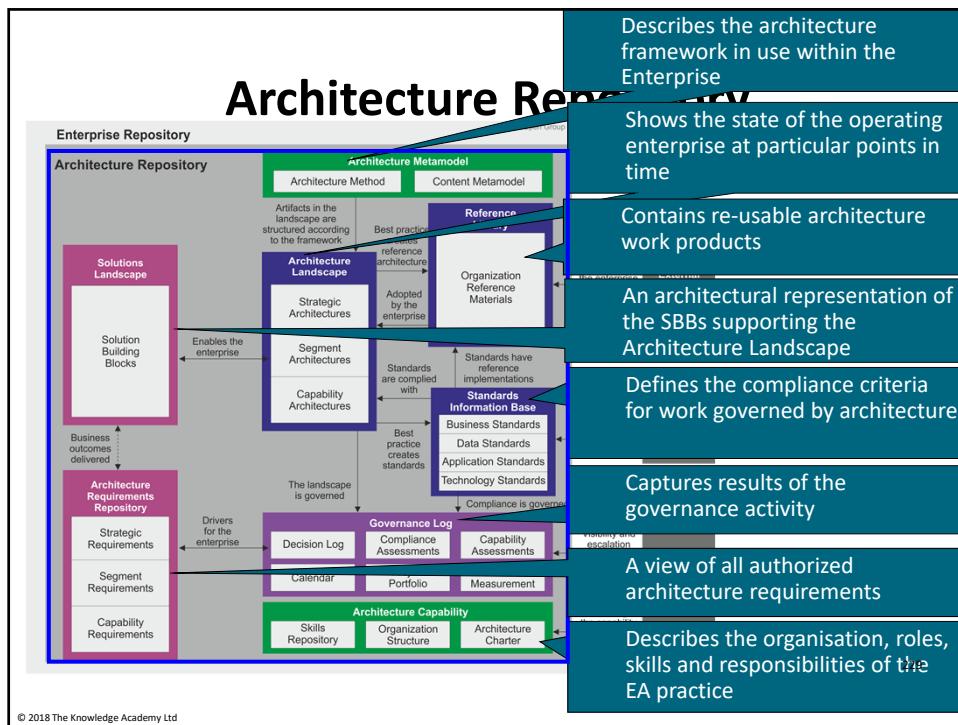
The objectives of this module are to describe:

- The purpose of the Architecture Repository
- Its constituent parts
- Its relationship to other parts of the TOGAF standard

## Purpose

- Effective management and leverage of architectural output requires a formal taxonomy for different types of architectural asset
- TOGAF provides a structural framework for an Architecture Repository
- This is one part of a wider Enterprise Repository

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## Architecture Landscape

1. **Strategic Architectures:**
  - show a long-term summary view of the entire enterprise.
  - provide an organizing framework for operational and change activity and allow for direction setting at an executive level.
2. **Segment Architectures:**
  - provide more detailed operating models for areas within an enterprise
  - can be used at the program or portfolio level to organize and operationally align more detailed change activity.
3. **Capability Architectures:**
  - show in a more detail how the enterprise can support a particular capability.
  - used to provide an overview of current capability, target capability, and capability increments and allow for individual work packages and projects to be grouped within managed portfolios and programs.





## Reference Library

- A repository area to hold best practice or template materials that can be used to construct architectures within an enterprise.
- Reference materials held in the Reference Library are typically obtained from a variety of sources, including:
  - Standards bodies
  - Product and service vendors
  - Industry communities or forums
  - Corporately defined templates
  - Best practice resulting from project implementation

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## Standards Information Base

- A repository area to hold a set of specifications, to which architectures must conform.
- Establishment of a Standards Information Base provides an unambiguous basis for architectural governance since:
  - The standards are easily accessible to projects and therefore the obligations of the project can be understood and planned for
  - Standards are stated in a clear and unambiguous manner, so that compliance can be objectively assessed

### Types of Standard

- Legal and Regulatory
- Industry
- organisational

### Standards Lifecycle

- Trial
- Active
- Deprecated
- Obsolete

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# Standards Classification



- **Business Standards:**
  - Standard shared business functions
  - Standard role and actor definitions
  - Security and governance standards for business activity
- **Data Standards:**
  - Standard coding and values for data
  - Standard structures and formats for data
  - Standards for origin and ownership of data
  - Restrictions on replication and access
- **Applications Standards:**
  - Standard/shared applications supporting specific business functions
  - Standards for application communication and interoperation
  - Standards for access, presentation, and style
- **Technology Standards:**
  - Standard hardware products
  - Standard software products
  - Standards for software development

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# Governance Log

- A repository area to hold shared information relating to the ongoing governance of projects.
- Maintaining a shared repository of governance information is important, since:
  - Decisions made during projects (such as standards deviations or the rationale for a particular architectural approach) are important to retain and access on an ongoing basis.
  - Many stakeholders are interested in the outcome of project governance (e.g., other projects, customers of the project, the Architecture Board, etc.).

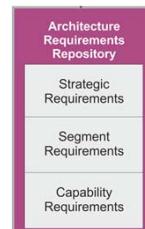
**Governance log contents**



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# Architecture Requirements Repository

- A repository area used by all phases of the ADM to record and manage all information relevant to Architecture Requirements
- The Architecture Requirements Phase is responsible for managing the contents of this repository



## Solutions Landscape

- A repository area used to hold architectural representations of all Solution Building Blocks (SBBs) supporting Architecture Building Blocks (ABBs) specified, developed, or deployed

## Relationship to Other Parts of the TOGAF Standard

- The TOGAF ADM has reminders when to use assets from the Architecture Repository
- The Architecture Repository is a model for a physical instance of the Enterprise Continuum

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# Summary

- The TOGAF standard provides a structural framework for a repository
- It is a logical information store for ADM outputs with the following repository areas defined:
  - **Architecture Metamodel:** describes the architecture framework in use within the Enterprise
  - **Architecture Landscape:** shows the state of the operating Enterprise at particular points in time
  - **Reference Library:** contains re-usable architecture work products
  - **Standards Information Base:** defines the compliance criteria for work governed by architecture
  - **Governance Log:** captures results of governance activity
  - **Architecture Capability:** describes the organisation, roles, skills and responsibilities of the Enterprise Architecture practice
  - **Architecture Requirements Repository:** provides a view of all authorized architecture requirements which have been agreed with the Architecture Board
  - **Solutions Landscape:** presents an architectural representation of the SBBs supporting the Architecture Landscape which have been planned or deployed by the enterprise

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## **Exercise**

1. What are the advantages and disadvantages of using Reference Models that are derived from:
  - a) within the enterprise
  - b) outside the enterprise?

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## **Module 6: Architecture Content Framework**

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## Part IV: Architecture Content Framework

Part I - Introduction
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ADM Phase Narratives
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Tools for Architecture Development
Part VI – Architecture Capability Framework
Architecture Board
Architecture Compliance
Architecture Contracts
Architecture Governance
Architecture Maturity Models
Architecture Skills Framework

- This part describes
  - a structured metamodel for architectural artifacts,
  - use of architecture building blocks
  - an overview of typical architecture deliverables



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## Module Objectives

The objectives are to:

- Explain the purpose of the Architecture Content Framework
- Describe the main components of the Content Metamodel
- Describe the relationship between the Architecture Content Framework and the TOGAF ADM
- The Framework has 3 categories for describing work products:
  - **Deliverables**
  - **Artifacts**
  - **Building blocks**

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# Introduction

- The Architecture Content Framework is a significant part of the overall TOGAF framework
- It provides a detailed model of architectural work products
- It helps to improve the consistency of the TOGAF outputs
  - Presents outputs in a consistent and structured way
  - Helps to reference and classify them

## Benefits of the Architecture Content Framework

- It provides a comprehensive checklist of architecture outputs
- It promotes better integration of work products if adopted across an enterprise
- It provides a detailed open standard for how architectures should be described

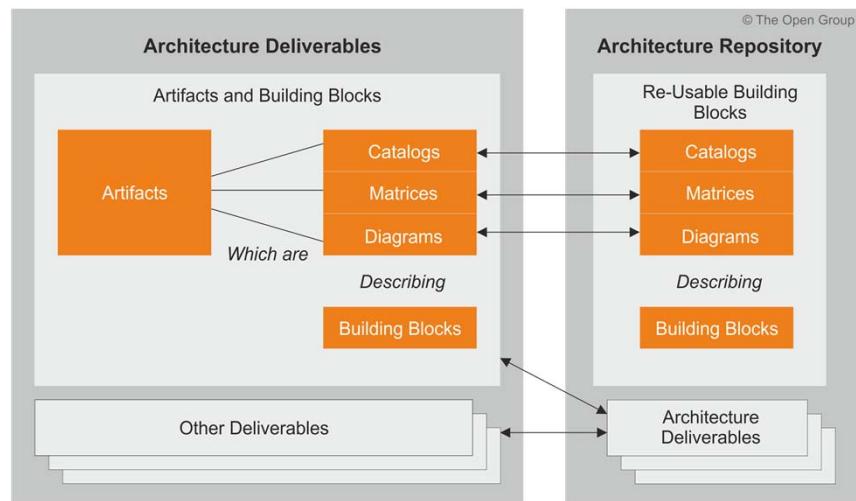
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# Deliverables, Artifacts, and Building Blocks

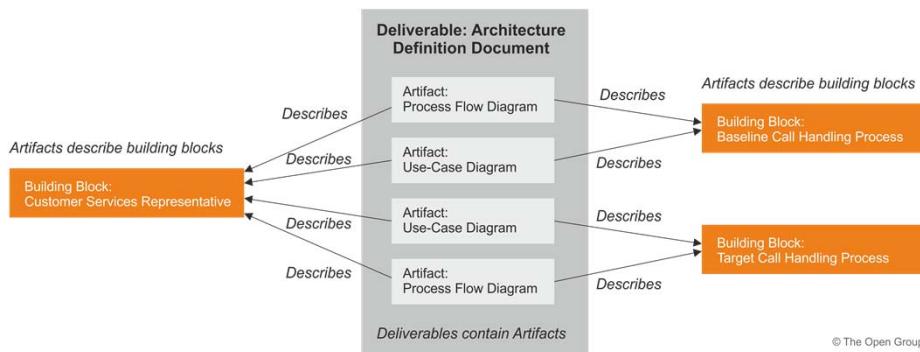
- **Deliverables**
  - Formal products
  - Contractually specified
  - Outputs from a project
  - A deliverable can contain many artifacts
- **Building blocks**
  - components that can be combined with other building blocks to deliver architectures and solutions
- **Artifacts**
  - fine grained products that describe an architecture from a specific viewpoint
  - For example: use-case specifications, architectural requirements, network diagrams, etc.
  - Classified as:
    - Catalogs (lists of things),
    - matrices (showing relationships between things) or
    - diagrams (pictures of things).
  - Artifacts make up the content of the Architecture Repository

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# Relationship between Deliverables, Artifacts, and Building Blocks



## Example – Architecture Definition Document



# Architectural Artifacts

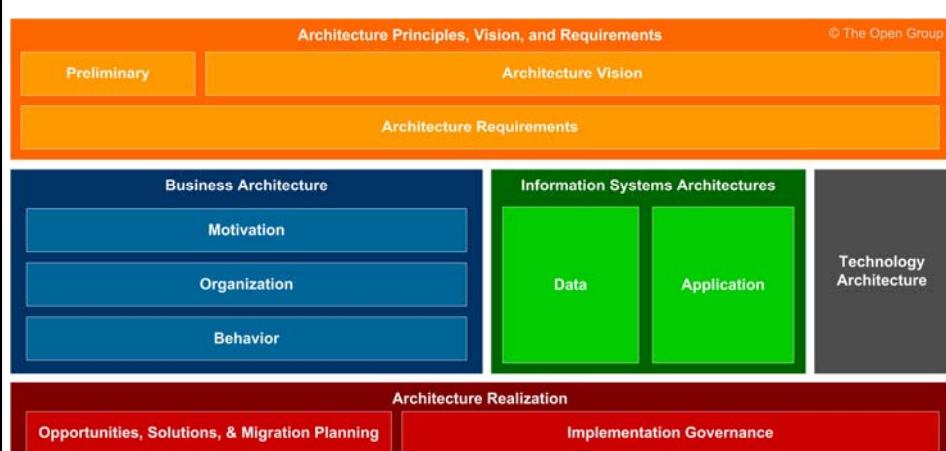
- Artifacts are products that are created when developing an architecture
- An artifact is distinct from a deliverable, which is a contracted output from a project
- Usually deliverables contain many artifacts and each artifact may exist in many deliverables

## Content Metamodel

- The framework is based on a standard content metamodel that defines all the types of building blocks in an architecture
  - Showing how these building blocks can be described
  - How they relate to one another
- The content model consists of a core and extensions
- Catalogs, matrices and diagrams are used to present the architectural information

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# Content Metamodel Overview



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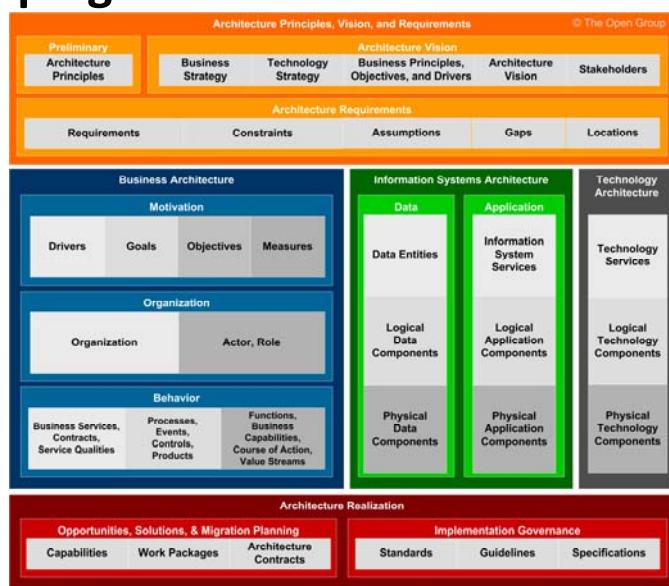
# Mapping the Framework and the ADM

There is a mapping from the Architecture content framework to the TOGAF ADM phases:

- **Architecture Principles, Vision, and Requirements** entities should capture the context of the architecture models, including general architecture principles, strategic context and requirements.
- **Business Architecture** entities capture architectural models of business operations, specifically factors that motivate the enterprise, how the enterprise is structured and its functional capabilities.
- **IS Architecture** entities capture architecture models of IT systems, specifically applications and data.
- **Technology Architecture** entities capture procured technology assets used to implement and realize IS solutions.
- **Architecture Realization** entities capture the transitions between architecture states and are used to steer and govern the implementation.

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# Mapping the Framework and the ADM



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## **Content Framework and the TOGAF ADM**

- The ADM addresses a business need through a process of vision, definition, planning and governance. At each stage the ADM takes information as inputs and creates outputs
- The content framework provides a structure for the ADM that defines inputs and outputs in detail and puts each deliverable into the context of the architecture
- So the content framework is a companion to the ADM
- The ADM describes what needs to be done to create an architecture and the content framework describes what it should look like in the end

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## **Summary**

- The Architecture Content Framework presents outputs in a consistent and structured way
  - It has 3 categories of work products: deliverables, artifacts and building blocks
- The content metamodel consists of a core and some extensions
- Catalogs, matrices and diagrams are used to present the architectural information
- There is a mapping from the Architecture content framework to the TOGAF ADM phases

### **Exercise**

- What other content frameworks do you know of?
- What are the advantages and disadvantages of opting to use an external framework in conjunction with the ADM instead of the TOGAF Architecture Content Framework?

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# Module 7: TOGAF Content Metamodel

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## Roadmap

Part I - Introduction
Preface, Executive Overview, Core Concepts, Definitions
Part II – Architecture Development Method
Introduction to ADM
ADM Phase Narratives
Part III – ADM Guidelines and Techniques
Guidelines for Adapting the ADM Process
Techniques for Architecture Development
Part IV – Architecture Content Framework
<b>Content Metamodel</b>
Architectural Artifacts
Architecture Deliverables
Building Blocks
Part V – Enterprise Continuum and Tools
Enterprise Continuum
Architecture Partitioning
Architecture Repository
Tools for Architecture Development
Part VI – Architecture Capability Framework
Architecture Board
Architecture Compliance
Architecture Contracts
Architecture Governance
Architecture Maturity Models
Architecture Skills Framework

- **Part IV, Architecture Content Framework, Chapter 30**



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## Module Objectives

The objectives of this module are to describe:

- What a *metamodel* is and why it is needed
- Key concepts of the Core Metamodel
- The division of the metamodel into Core and Extensions
- Key concepts of the Core Metamodel Entities
- The components of the TOGAF Content Metamodel

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## What is a Metamodel?

- A metamodel is a precise definition of the constructs and rules needed for creating models
  - Source [www.metamodel.com](http://www.metamodel.com)
- A model that describes how and with what the architecture will be described in a structured way.
  - TOGAF Standard, Version 9.2, Chapter 3 *Definitions*

### Benefits of the Metamodel

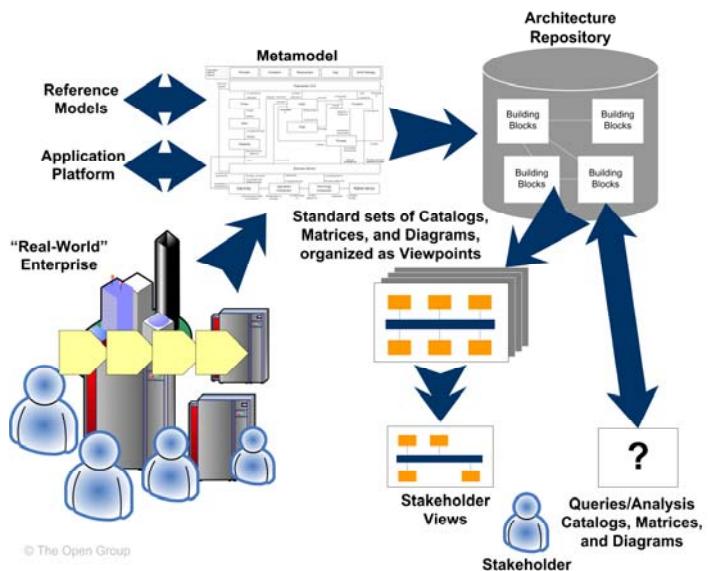
The content metamodel provides a number of benefits:

- It formalises the definition of an Enterprise Architecture
- It formalises the relationship between objects
- It enables an EA tool mapping

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## Why a Metamodel?



## Formal and Informal Modeling

- When defining architecture content there are choices to be made on the level of structure and formality
- In some cases very formal specific language is needed in order to articulate and govern in a precise or detailed way
- In other cases the use of formal engineering discipline will result in architecture content that is:
  - inappropriate for the audience
  - difficult to communicate

## Core Content Metamodel Concepts

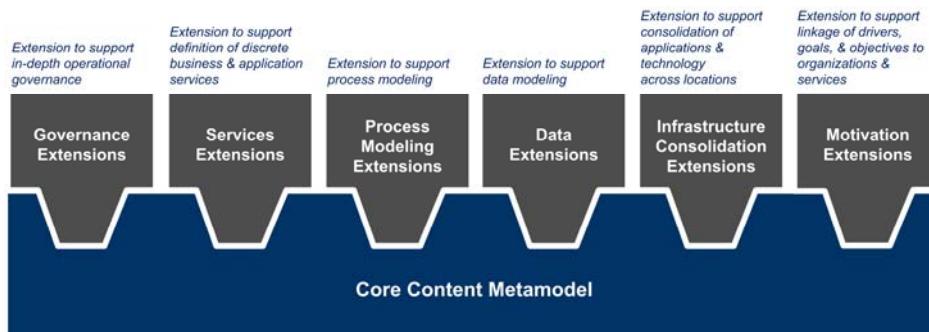
- A TOGAF architecture is based on
  - Defining architectural building blocks within architecture **catalogs**
  - Specifying the relationships between those building blocks in architecture **matrices**
  - And presenting communication **diagrams** that show in a precise way what the architecture is
- The metamodel is structured into **Core** and **Extension** content
  - Core content is designed not to be altered

### Core and Extension Content

- In order to support many scenarios the metamodel has been partitioned into **core** and **extension** content
- The **core** provides a minimum set of architectural content to support traceability across artifacts
- The **extension** content allows for more specific or more in-depth modeling

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## TOGAF Content Metamodel and its Extensions



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## Core Metamodel Entities

- **Actor:** A person, organisation, or system that is outside the consideration of the architecture model, but interacts with it.
- **Application Component:** An encapsulation of application functionality that is aligned to implementation structuring.
- **Business Capability:** A particular ability that a business may possess or exchange to achieve a specific purpose
- **Business Service:** Supports business capabilities through an explicitly defined interface and is explicitly governed by an organisation.
- **Course of Action:** Direction and focus provided by strategic goals and objectives, often to deliver the value proposition characterized in the business model
- **Data Entity:** An encapsulation of data that is recognized by a business domain expert as a discrete concept. Data entities can be tied to applications, repositories, and services and may be structured according to implementation considerations.
- **Function:** Delivers business capabilities closely aligned to an organisation, but not explicitly governed by the organisation.

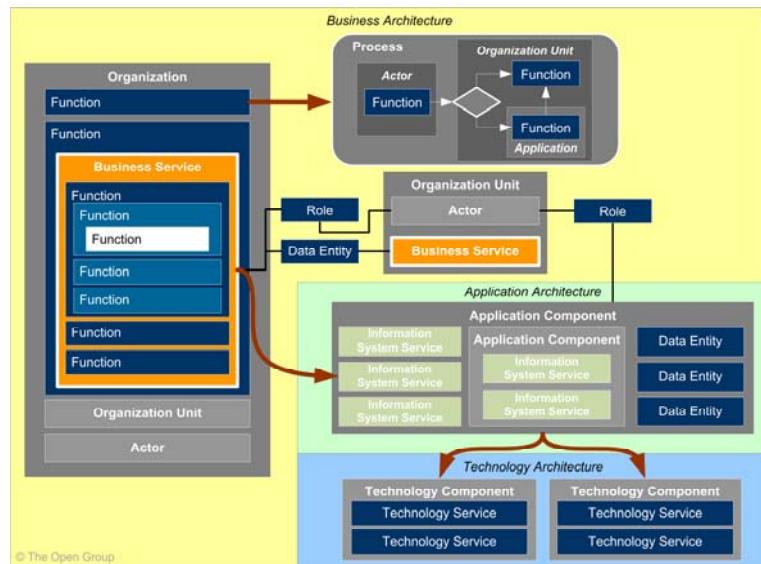
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## Core Metamodel Entities

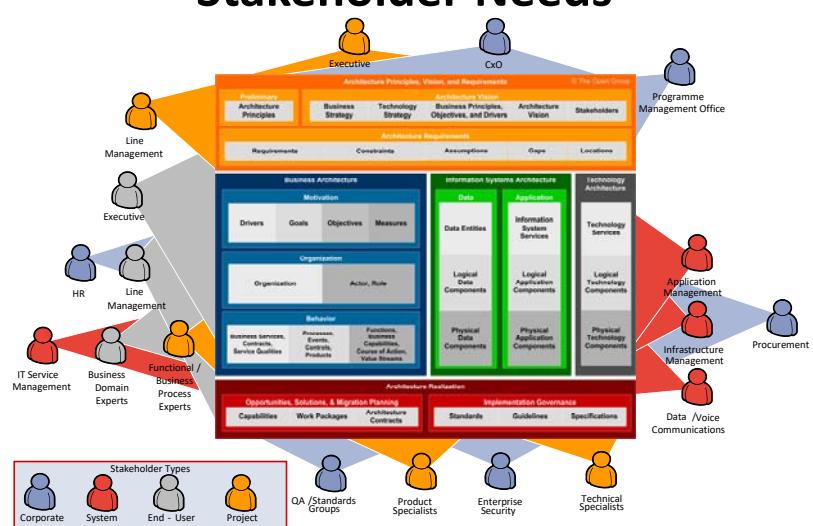
- **Information System Service:** The automated elements of a business service. An information system service may deliver or support all of one or more business services.
- **organisation Unit:** A self-contained unit of resources with line management responsibility, goals, objectives, and measures. organisation units may include external parties and business partner organisations.
- **Role:** An actor assumes a role to perform a task.
- **Technology Component:** An encapsulation of technology infrastructure that represents a class of technology product or specific technology product.
- **Technology Service:** A technical capability required to provide enabling infrastructure that supports the delivery of applications.
- **Value Stream:** a representation of an end-to-end collection of value-adding activities that create an overall result for a customer, stakeholder, or end-user

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## Core Entities and their Relationships



## Stakeholder Needs



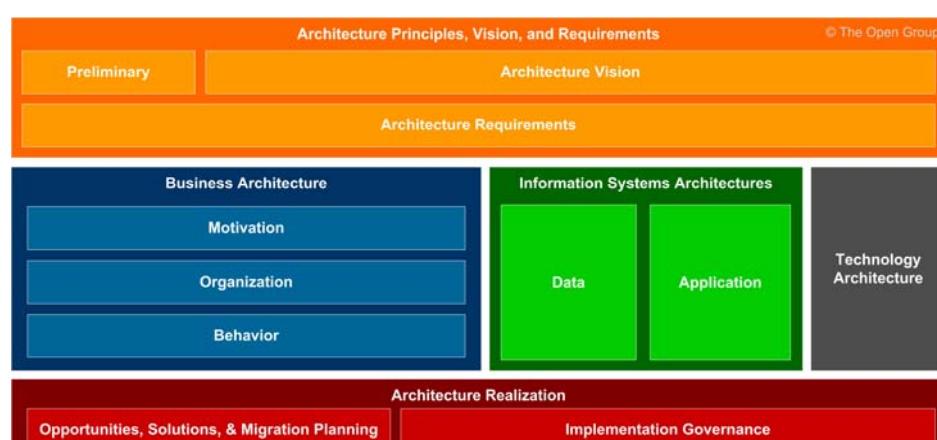
## The Content Metamodel

The content metamodel provides definitions of all the types of building blocks that may exist, showing how they can be described and related to one another.

- When creating and managing architectures, it is necessary to consider concerns such as business services, actors, applications, data entities, and technology.
- The metamodel highlights these concerns, shows their relationships and identifies artifacts that can be used to represent them in a consistent way.
- The metamodel can also be used to provide guidance to organisations that wish to implement their architecture using an architecture tool.

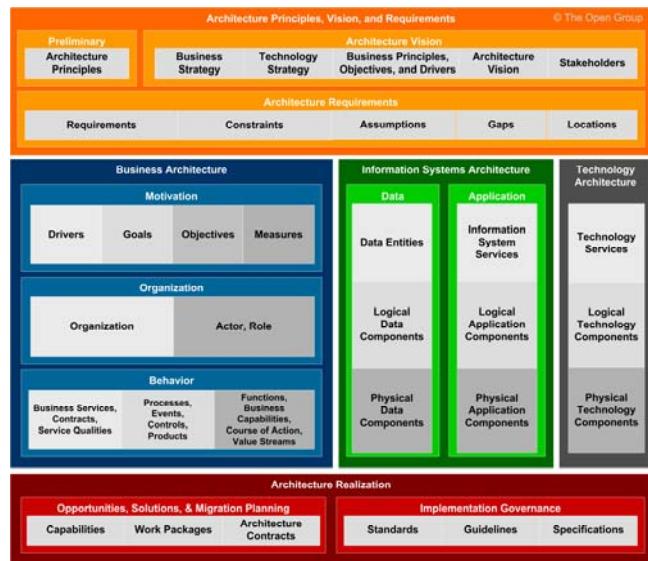
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## Content Metamodel (Simplified)



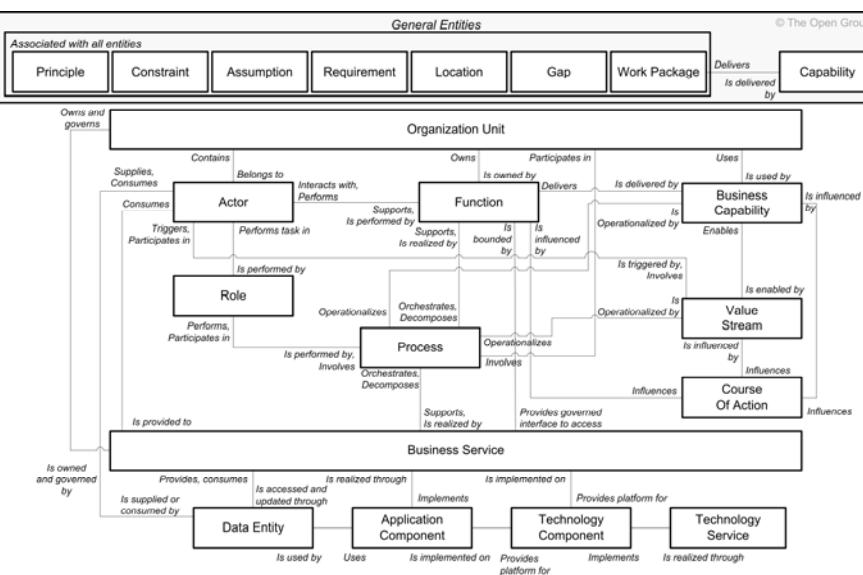
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## Content Metamodel (Detailed)



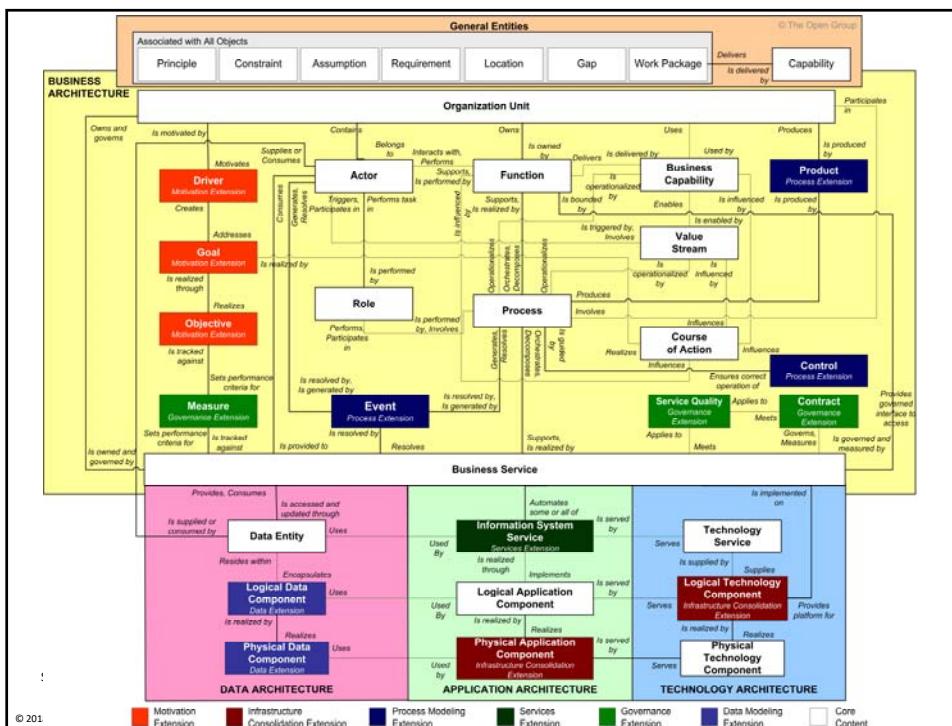
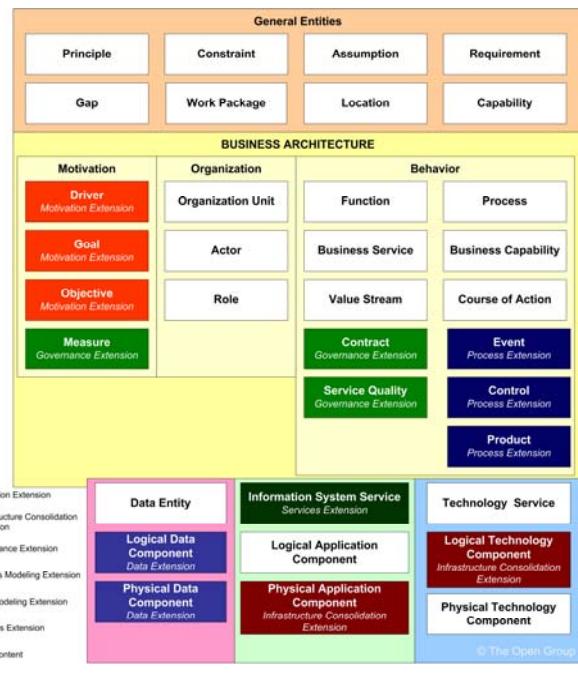
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## Core Content Metamodel

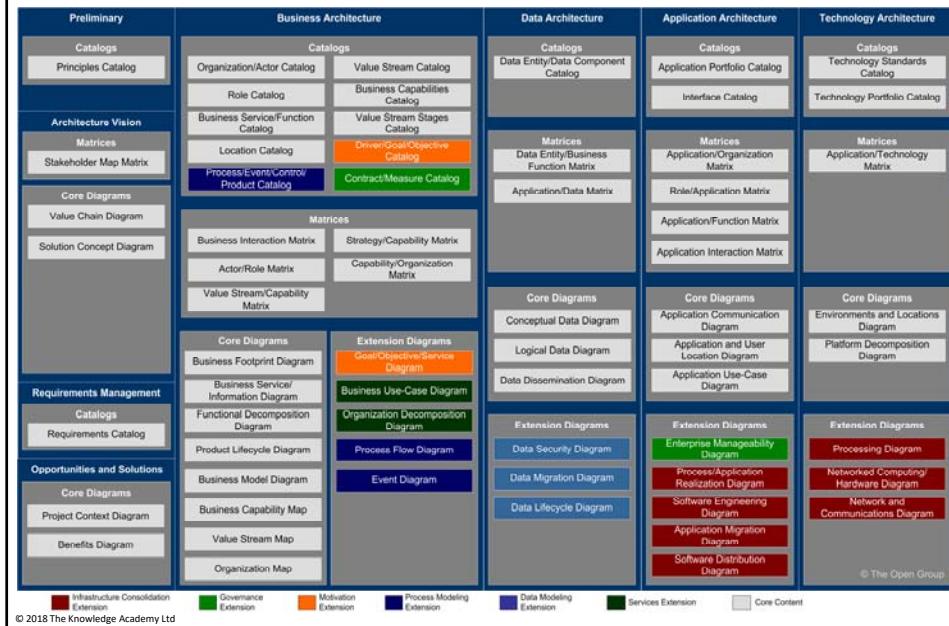


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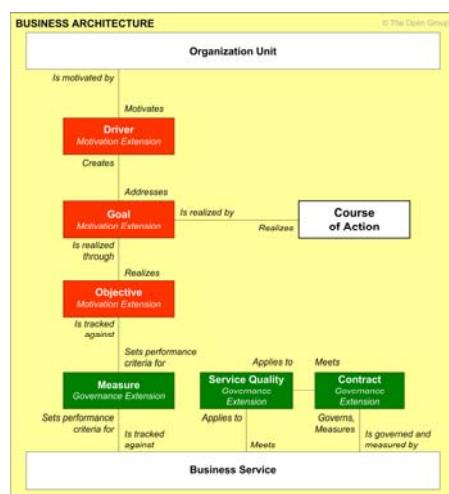
# Full Content Metamodel



# Full Content Metamodel Artifacts

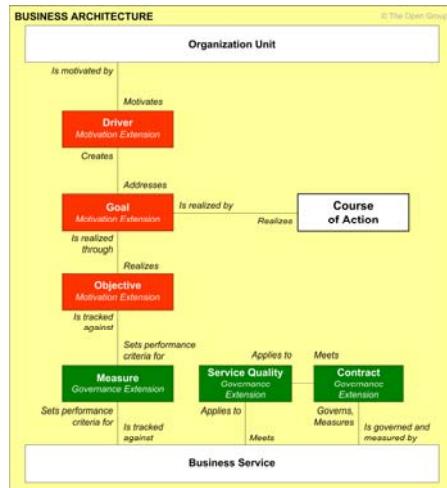


## Governance Extension



- **Scope:**
  - The ability to apply measures to objectives and then link those measures to services
  - The ability to apply contracts to service communication or service interactions with external users and systems
  - The ability to define re-usable service qualities defining a service-level profile that can be used in contracts
  - Creation of additional diagrams to show ownership and management of systems
- **Additional diagrams to be created:**
  - Enterprise Manageability diagram

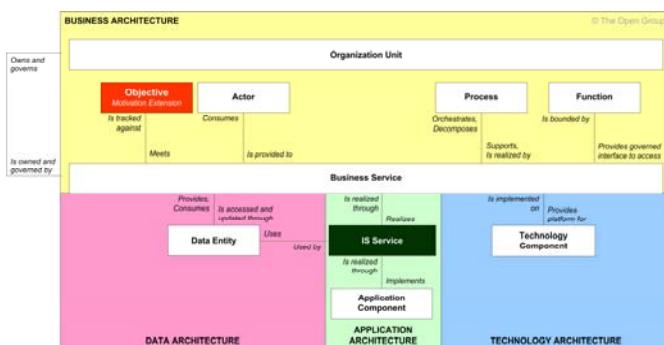
## Governance Extension



- This extension should be used in the following situations:
  - When an organisation is considering IT change that will result in a significant impact to existing operational governance models
  - When an organisation has granular requirements for service levels that differ from service to service
  - When an organisation is looking to transform its operational governance practice

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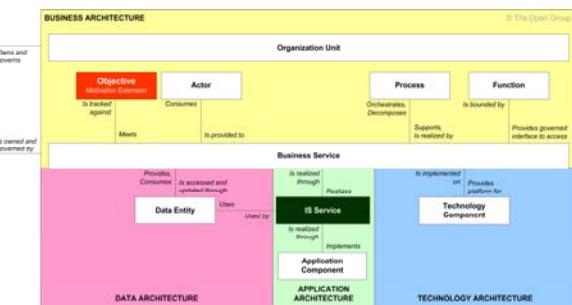
## Services Extension



- Scope:
  - Creation of IS services as an extension of business service
- Additional diagrams to be created:
  - Business Use-Case Diagram
  - organisation Decomposition Diagram

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## Services Extension



- This extension should be used in the following situations:
  - When the business has a preset definition of its services that does not align well to technical and architectural needs
  - When business and IT use different language to describe similar capabilities
  - Where IT service is misaligned with business need, particularly around the areas of quality of service, visibility of performance, and management granularity
  - Where IT is taking initial steps to engage business in discussions about IT architecture

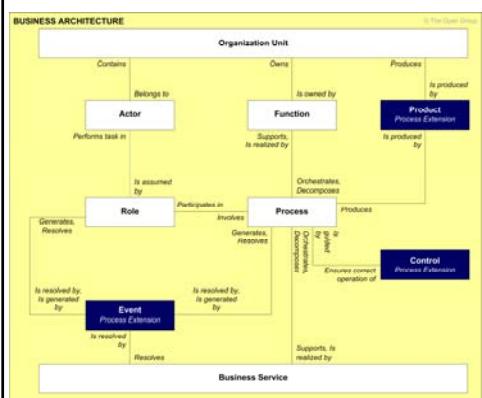
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## Process Modeling Extension

- Scope:**
  - Creation of events as triggers for processes
  - Creation of controls that business logic and governance gates for process execution
  - Creation of products to represent the output of a process
  - Creation of event diagrams to track triggers and state changes across the organisation
- Additional diagrams to be created:**
  - Process Flow diagrams
  - Event diagrams

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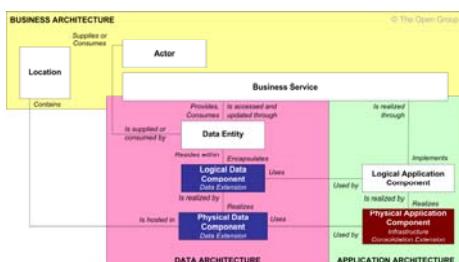
# Process Modeling Extension



- This extension should be used in the following situations:
  - Where the architecture must pay specific attention to state and events
  - Where the architecture is required to explicitly identify and store process control steps; for example, to support regulatory compliance
  - Where the architecture features critical or elaborate process flows

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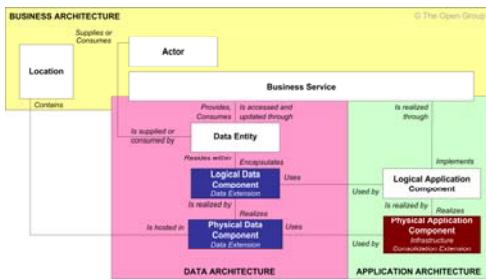
# Data Extension



- Scope:
  - Creation of logical data components that group data entities into encapsulated modules for governance, security, and deployment purposes
  - Creation of physical data components that implement logical data components; analogous to databases, registries, repositories, schemas, and other techniques of segmenting data
  - Creation of data lifecycle, data security, and data migration diagrams to show data concerns in more detail
- Additional diagrams to be created:
  - Data Security diagram
  - Data Migration diagram
  - Data Lifecycle diagram

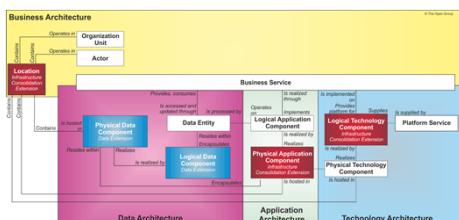
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## Data Extension



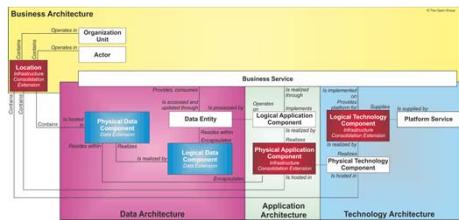
- This extension should be used in the following situations:
  - Where the architecture features significant complexity and risk around the location, encapsulation, and management of or access to data

## Infrastructure Consolidation Extension



- Additional diagrams to be created:
  - Process/System Realization diagram
  - Software Engineering diagram
  - Application Migration diagram
  - Software Distribution diagram
  - Processing diagram
  - Networked Computing/Hardware diagram
  - Network and Communications diagram
- Scope:
  - Creation of logical and physical application components to abstract the capability of an application away from the actual applications in existence
  - Creation of logical and physical technology components to abstract product type from the actual technology products in existence
  - Creation of additional diagrams focusing on the location of assets, compliance with standards, structure of applications, application migration, and infrastructure configuration

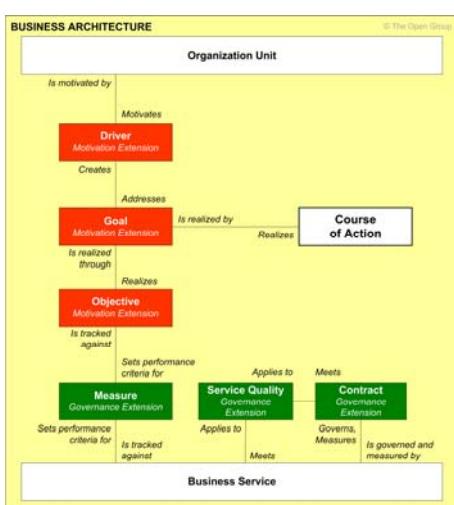
# Infrastructure Consolidation Extension



- This extension should be used in the following situations:
  - Where many technology products are in place with duplicate or overlapping capability
  - Where many applications are in place with duplicate or overlapping functionality
  - Where applications are geographically dispersed and the decision logic for determining the location of an application is not well understood
  - When applications are going to be migrated into a consolidated platform
  - When application features are going to be migrated into a consolidated application

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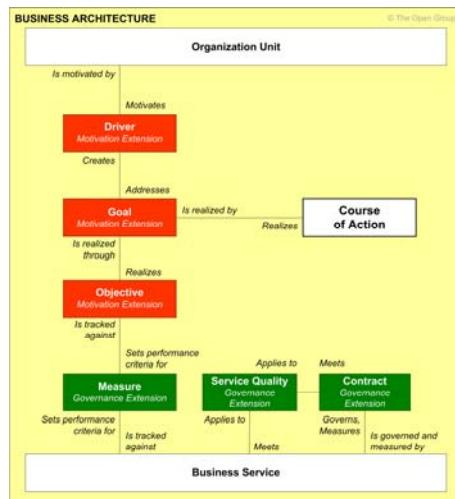
# Motivation Extension



- The scope of this extension is as follows:
  - Creation of a new metamodel entity for Driver that shows factors generally motivating or constraining an organisation
  - Creation of a new metamodel entity for Goal that shows the strategic purpose and mission of an organisation
  - Creation of a new metamodel entity for Objective that shows near to mid-term achievements that an organisation would like to attain
  - Creation of a Goal/Objective/Service diagram showing the traceability from drivers, goals, and objectives through to services
- Additional diagrams to be created:
  - Goal/Objective/Service diagram

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## Motivation Extension



- This extension should be used in the following situations:
  - When the architecture needs to understand the motivation of organisations in more detail than the standard business or engagement principles and objectives that are informally modeled within the core content metamodel
  - When organisations have conflicting drivers and objectives and that conflict needs to be understood and addressed in a structured form
  - When service levels are unknown or unclear

## Summary

- The TOGAF standard provides a rich metamodel
- This provides a number of benefits:
  - It supports both formal and informal modeling
  - It formalises the definition of an Enterprise Architecture
  - It formalises the relationship between objects
  - It enables an EA tool mapping

### Exercise

Determine which of the Metamodel extensions is most appropriate for the following situations:

1. Where organisations have conflicting objectives
2. Where service levels are unknown
3. Where many applications are in use with overlapping functionality
4. Where management of information is complex
5. Where business process has to support regulatory compliance

# **Module 8: Preliminary Phase**

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## **Module Objectives**



The objectives of this module are to understand the Preliminary Phase:

- Objectives
- Approach
- Steps
- Inputs
- Outputs

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## Preliminary Phase: Objectives in Detail

- Determine the Architecture Capability desired by the organisation:
  - Review the organisational context for conducting Enterprise Architecture
  - Identify and scope the elements of the enterprise organisations affected by the Architecture Capability
  - Identify the established frameworks, methods, and processes that intersect with the Architecture Capability
  - Establish a Capability Maturity target
- Establish the Architecture Capability:
  - Define and establish the organisational Model for Enterprise Architecture
  - Define and establish the detailed process and resources for architecture governance
  - Select and implement tools that support the Architecture Capability
  - Define the Architecture Principles

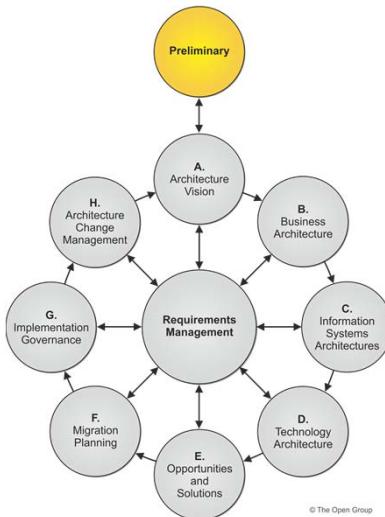
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## Approach

- Define the Enterprise
- Identify key drivers and elements in the organisational context
- Define the requirements for architecture work
- Define the Architecture Principles that will inform any architecture work
- Define the framework to be used
- Define the relationships between management frameworks
- Evaluate the Enterprise Architecture maturity

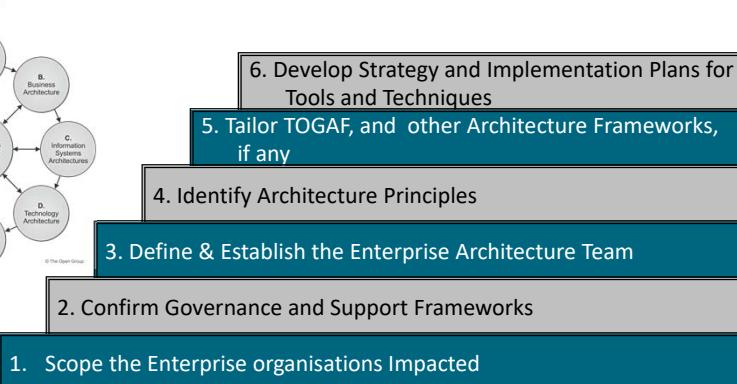
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## Preliminary Phase: Main Inputs



- The TOGAF Library
  - Other architecture frameworks
  - Business strategies and board business plans, IT strategy
  - Business principles, business goals, and business drivers
  - Major frameworks operating in the business
  - Governance and legal frameworks
- Any existing:
- organisational model
  - Architecture framework
  - Architecture Principles
  - Architecture Repository

## Steps



## **1. Scope the Enterprise organisations Impacted**

- Identify core enterprise
- Identify soft enterprise
- Identify extended enterprise
- Identify communities
- Identify governance involved

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## **2. Confirm Governance and Support Frameworks**

- The major output of this phase is a framework for architecture governance
- The existing governance and support models of an organisation will probably need to change
- The current governance and support models need to be assessed to understand their content
- Sponsors and stakeholders will need to be consulted concerning the potential impact

As a result of Step 2 the architecture touch-points and likely impacts should be understood and agreed by relevant stakeholders.

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### **3. Define the Team and organisation**

- Determine existing enterprise and business capability
- Conduct an architecture/business change maturity assessment
- Identify gaps in existing work areas
- Allocate key roles and responsibilities for Enterprise Architecture capability management and governance
- Write requests for change for existing projects
- Scope new Enterprise Architecture work
- Determine constraints on Enterprise Architecture work
- Review and agree with sponsors and board
- Assess budget requirements

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### **4. Identify and Establish Architecture Principles**

- Principles are rules and guidelines that say how an organisation fulfils its mission.
- Enterprise principles enable decision-making
- Architecture principles relate to architecture work, and include:
  - Architecture process principles
  - Architecture implementation principles

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## Defining Architecture Principles

- Why
  - Architecture principles provide a framework for decision making
- Who
  - Developed by the Enterprise Architects
  - In conjunction with key stakeholders
    - The Enterprise CIO
    - Architecture Board
    - Other key business stakeholders

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## TOGAF Template for Principles

### Name

- Should represent the essence of the rule, and be memorable
- Should not mention specific technology platforms
- Should avoid ambiguous words

### Statement

- Should succinctly and unambiguously communicate the fundamental rule

### Rationale

- Should highlight the business benefits of adhering to the principle, using business terminology
- Should describe the relationship to other principles

### Implications

- Should highlight the requirements for the business and for IT for carrying out the principle.
- Should state the business impact and consequences of adopting the principle

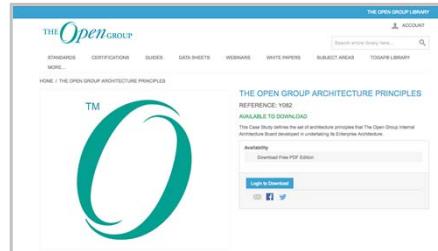
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# An Example Statement of Principles

The following set of principles have been approved by the Internal Architecture Board.

## Business Principles:

1. Primacy of Principles
2. Maximize Benefit to the Enterprise
3. Compliance with the Law
4. Availability at Anytime from Anywhere
5. Business Continuity
6. Citizenship
7. Custodianship
8. De-Customization
9. Painless User Experience
10. Self-Serve
11. Sharing of Information



The Open Group Case Study: Y082

<https://publications.opengroup.org/y082>

## Architecture Principles:

1. De-Skill
2. One Source
3. Content Management

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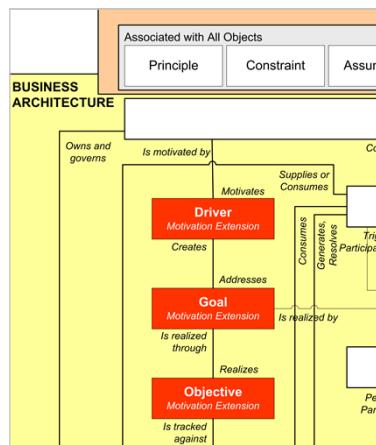
# Five Qualities of Principles

1. Understandable: they can be quickly grasped. Intent is clear and unambiguous.
2. Robust: they enable good decisions about architectures and plans, and enable enforceable policies and standards to be created. A principle must be precise to support consistent decision making in complex situations.
3. Complete: every potentially important principle governing the management of IT is defined. Principles cover every situation perceived.
4. Consistent: strict adherence to one principle may require loose interpretation of another. Principles must be expressed in a way that allows a balance of interpretations and should not be contradictory.
5. Stable: Principles must be enduring, yet able to accommodate change.

An amendment process should be established for adding, removing, or altering principles after they are ratified.

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## Principles and the Metamodel



- Information related to Principles can be modeled, if the right information is captured
- The metamodel relates Principles back to specific drivers, goals and objectives

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## 5. Tailor the TOGAF Framework and, if any, other Selected Architecture Frameworks

- **Terminology Tailoring:** it is best to use terminology that is understood across the enterprise.
- **Process Tailoring:** the ADM is a generic process. Process tailoring allows us to remove tasks that are done elsewhere, add organisation-specific tasks and align the ADM processes with external process frameworks.
- **Content Tailoring:** using the TOGAF Architecture Content Framework, this allows adoption of third-party content frameworks and customization of the framework to support organisation-specific requirements

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# Terminology & Process Tailoring

## Terminology Tailoring

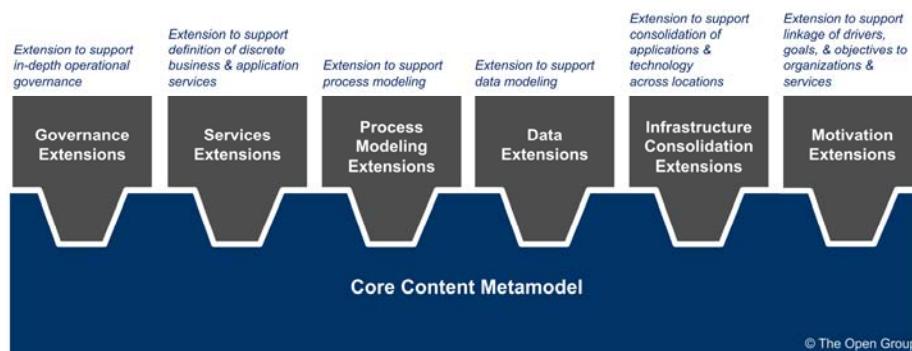
- Lack of agreement on the precise meanings of terms can cause problems of communication during the Architecture Engagement.
- Define and agree standard terminology
- Provide a Glossary, if appropriate

## Process Tailoring

- Re-order the phases of the ADM
- Only use a subset of the phases
- Complete the Information Systems or Technology Architecture first

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# Content Tailoring



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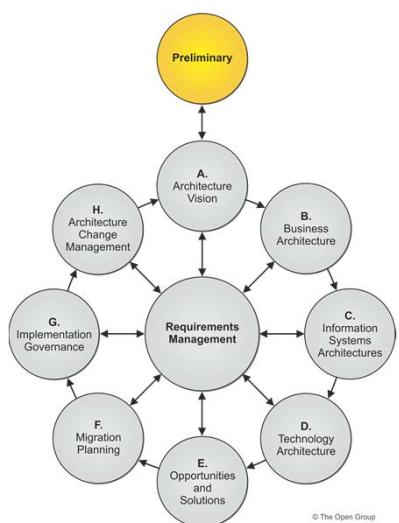
## 6. Develop Strategy and Implementation Plans for Tools and Techniques

Develop a tools strategy to support the architecture activity.

- This should reflect the understanding and level of formality required by the enterprise's stakeholders.
- The implementation of the tools may range from a trivial task to a more involved system implementation activity utilizing the TOGAF Content Metamodel

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## Preliminary Phase: Outputs

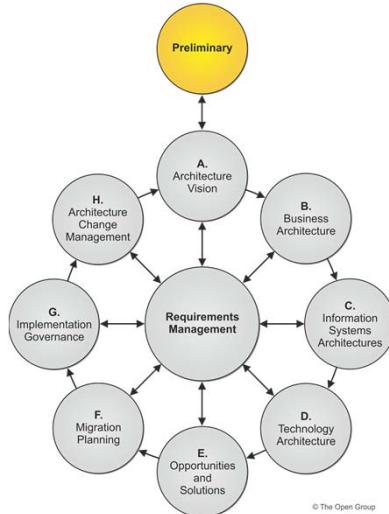


- organisational model for Enterprise Architecture
- Tailored Architecture Framework, including Architecture Principles
- Initial Architecture Repository
- Restatement of business principles, goals and drivers
- Request for Architecture Work
- Architecture Governance Framework

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# Summary



- The main objective of the preliminary phase is to prepare an organisation for a successful Enterprise Architecture project by defining “how we do architecture”

Continued...

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# Summary

Preliminary Phase			
Objectives	Steps	Inputs	Outputs
<p>Determine the Architecture Capability desired by the organisation:</p> <ul style="list-style-type: none"> <li>• Review the organisational context for conducting Enterprise Architecture</li> <li>• Identify and scope the elements of the enterprise organisations affected by the Architecture Capability</li> <li>• Identify the established frameworks, methods, and processes that intersect with the Architecture Capability</li> <li>• Establish Capability Maturity target</li> </ul> <p>Establish the Architecture Capability:</p> <ul style="list-style-type: none"> <li>• Define and establish the organisational Model for Enterprise Architecture</li> <li>• Define and establish the detailed process and resources for architecture governance</li> <li>• Select and implement tools that support the Architecture Capability</li> <li>• Define the Architecture Principles</li> </ul>	<p>Scope the enterprise organisations impacted</p> <p>Confirm governance and support frameworks</p> <p>Define and establish the Enterprise Architecture team and organisation</p> <p>Identify and establish Architecture Principles</p> <p>Tailor the TOGAF framework and, if any, other selected Architecture Frameworks</p> <p>Develop strategy and implementation plans for tools and techniques</p>	<p>The TOGAF Library Other architecture framework(s) Board strategies, business plans, business strategy, IT Strategy, business principles, business goals, and business drivers Major frameworks operating in the business Governance and legal frameworks Architecture capability Partnership and contract agreements Existing organisational model for Enterprise Architecture Existing architecture framework, if any, including:           <ul style="list-style-type: none"> <li>• Architecture method</li> <li>• Architecture content</li> <li>• Configured and deployed tools</li> <li>• Architecture Principles</li> <li>• Architecture Repository</li> </ul> </p>	<p>organisational Model for Enterprise Architecture Tailored Architecture Framework, including Architecture Principles Initial Architecture Repository Restatement of, or reference to, business principles, business goals, and business drivers Request for Architecture Work Architecture Governance Framework</p>

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# Catalogs

P

Catalog	Purpose
Principles Catalog	<p>The Principles catalog captures principles of the business and Architecture Principles that describe what a "good" solution or architecture should look like. Principles are used to evaluate and agree an outcome for architecture decision points. Principles are also used as a tool to assist in architectural governance of change initiatives.</p> <p>The Principles catalog contains the following metamodel entities:</p> <ul style="list-style-type: none"><li>* Principle</li></ul>

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# Exercises

- Select 7 principles at random from the *Example Set of Architecture Principles* in the TOGAF Standard, Version 9.2 Chapter 20
- For each selected principle state whether it applies to your organisation or not, and give your reasons

**1) Which one of the following is completed during the Preliminary Phase of the TOGAF ADM?**

- A. Architecture Principles
- B. Gap Analysis
- C. Impact Analysis
- D. Statement of Architecture Work
- E. Requirements Gathering

**2) Which one of the following is a reason to adapt the ADM?**

- A. The use of TOGAF is being integrated with another framework
- B. The ADM is being used for a purpose other than Enterprise Architecture
- C. The enterprise is a large federated organisation
- D. The IT Governance model needs to be tailored.
- E. All the above

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# **Module 9: Architecture Governance**

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## **Module Objectives**

This module will help you to understand:

- Architecture Governance
- The main components that make up an Architecture Governance Framework
- The TOGAF Architecture Governance Framework
- Architecture Governance in Practice
- Why Architecture Governance is beneficial
- Guidelines for establishing an EA Capability

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## **Introduction to Governance**

Governance is the practice by which Enterprise Architectures are managed and controlled.

This includes:

- controls on the creation and monitoring of components and activities – ensuring introduction, implementation, and evolution of architectures
- ensuring compliance with internal and external standards and regulatory obligations
- supporting management of the above
- ensuring accountability to external and internal stakeholders

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## **Governance and the ADM**

- Governance should be established in the Preliminary Phase
  - Usually an adaptation of existing governance and support models
- The Architecture Board should ensure that the ADM is being applied correctly
  - Compliance to the ADM is fundamental to the governance of the Architecture
- Governance plays a key role in Phases G and H
  - The implementation and then change management activities

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## Nature of Governance

- Governance ensures business is conducted properly.
- It is about effective and equitable usage of resources to ensure sustainability of strategic objectives.
- Basic principles of corporate governance:
  - Focus on the rights, roles and equitable treatment of shareholders
  - Disclosure and transparency
  - Accountability of the Board to the shareholders
- Responsibilities of the board:
  - Reviewing and guiding corporate strategy
  - Setting and monitoring management's performance objectives

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## Governance – Basic Principles

[Governance is] "... the system by which business corporations are **directed** and **controlled**.

The corporate governance structure specifies the distribution of rights and responsibilities among different participants [...] and spells out the rules and procedures for making decisions on corporate affairs. [...] it also provides the structure through which company objectives are set, and the means of attaining those objectives and monitoring performance" [OECD (1999)].

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## Levels of Governance

The hierarchy of governance domains includes:

- Technology Governance
- IT Governance
- Architecture Governance

Each domain may exist at multiple geographic levels:

- Global
- Regional
- Locals

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## An IT Governance Framework - COBIT

- COBIT is an open standard for control of IT.
- It was developed and promoted by the IT Governance Institute.
- COBIT provides a generally accepted standard for good IT security and control practices
- There is also a set of Management Guidelines for COBIT, including Maturity Models, Critical Success Factors, Key Goal Indicators, and Key Performance Indicators.
- The framework can help managers to control and measure IT resources.

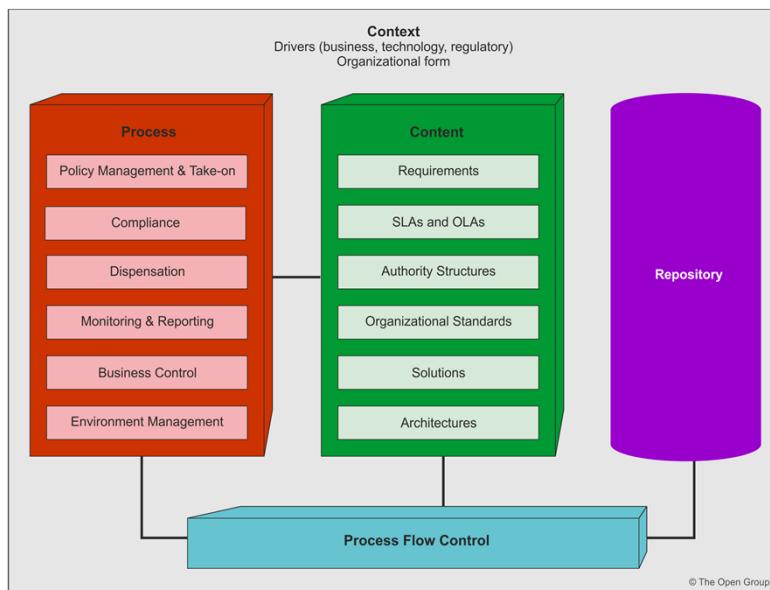
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# TOGAF Architecture Governance Framework

- Phase G of the *TOGAF ADM* is about *Implementation Governance* - the realization of architecture through change projects.
- Architecture Governance covers management and control of *all* aspects of the development and evolution of Enterprise Architectures
- The Architecture Governance Framework is generic and can be adapted to an existing governance environment. It helps to identify effective processes and organisational structures, so that the business responsibilities can be elucidated, communicated, and managed.

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## Conceptual Structure



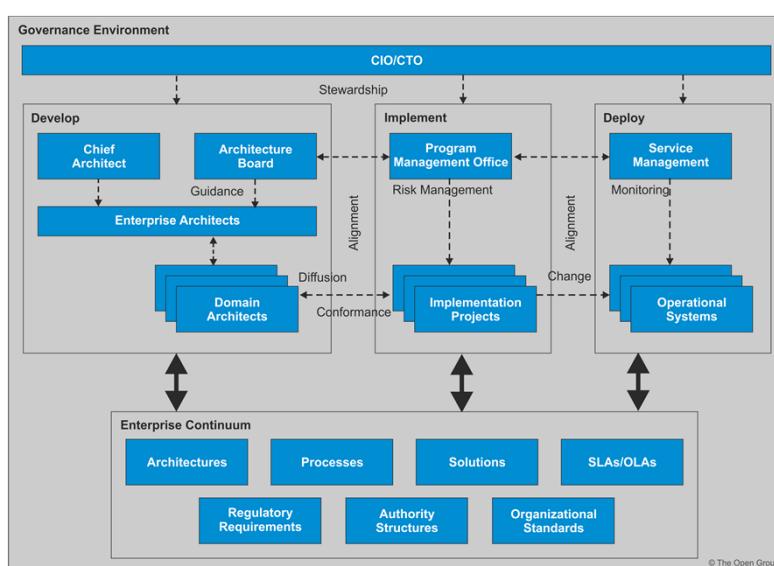
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## Architecture Governance Framework - Conceptual Structure

- Architecture Governance is an approach, a series of processes, a cultural orientation and a set of responsibilities that ensure the integrity and effectiveness of architectures.
- The split of **process**, **content** and **context** is key to supporting an architecture governance initiative. It allows introduction of new governance material without impacting the processes and ensures framework flexibility.
- The Architecture Governance Framework is integral to the Enterprise Continuum, and manages all content for both the architecture and the architecture governance processes.

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## Organisational Structure



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## **Organisational Structure**

- Governance is the management and control of architectures.
- To ensure effective control, it is necessary to have the correct organisational structures to support all governance activities.
- Effective implementation requires IT governance processes, organisational structures, and capabilities including (e.g.):
  - Global governance board
  - Local governance board
  - Design authorities
  - Working parties

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## **Benefits of Architecture Governance**

- Links processes, resources, and information to organisational strategies and objectives
- Integrates and institutionalizes best practices
- Aligns with industry frameworks
- Enables the organisation to take full advantage of its assets
- Protects the underlying digital assets of the organisation
- Supports regulatory and best practice requirements
- Promotes visible risk management

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## **Architecture Governance in Practice**

Key success factors include:

- Best practices for submission, adoption, reuse, reporting, and retirement of architecture policies, procedures, roles, skills, organisational structures, and support services
- organisational responsibilities and structures to support the architecture governance processes and reporting requirements
- Tools and processes to procedurally and culturally promote take-up
- Management of criteria to control architecture governance processes, dispensations, compliance assessments, SLAs, and OLAs
- Meet internal and external requirements for effectiveness, efficiency, confidentiality, integrity, availability, compliance, and reliability of architecture governance-related information, services, and processes

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## **Architecture Board**

- The Board oversees implementation of the governance strategy
  - Board comprises of representative stakeholders responsible for review and maintenance of architecture typically at 2 levels:
    - Local (domain experts, line responsibility)
    - Global (organisation-wide responsibility)
- Board has identifiable and articulated:
- Responsibilities and decision-making capabilities
  - Remit and authority limits

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## **Architecture Board Value**

- Cost is offset by preventing one-off solutions and unconstrained developments which lead to:
  - High costs of development, operation and support, due to numerous run-time environments, languages, interfaces, protocols ...
  - Lower quality
  - Higher risk
  - Difficulty in replicating and re-using solutions

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## **Architecture Board Responsibilities**

- Providing the basis for all decision-making with regard to changes to the architectures
- Ensuring consistency between sub-architectures
- Establishing targets for re-use of components
- Ensuring flexibility of Enterprise Architecture:
  - To meet changing business needs
  - To leverage new technologies
- Enforcement of Architecture Compliance
- Improving the architecture maturity level within the organisation
- Ensuring that the discipline of architecture-based development is adopted
- Supporting a visible escalation capability for out-of-bounds decisions

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## Architecture Board Operations

- TOGAF provides guidance on operations of the Board
- These are primarily focused on best practice for meeting management
- For example:
  - Meetings should be conducted with clearly defined agendas
  - Each participant attending a meeting should be fully prepared
- TOGAF provides a sample outline agenda

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## Architecture Contracts

Joint agreements between development partners and sponsors on the deliverables, qualify and fitness-for-purpose of an architecture

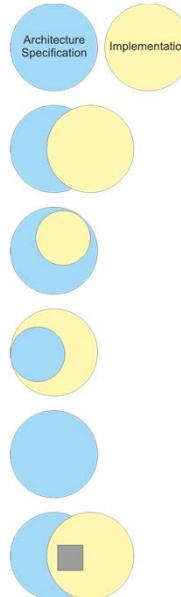
- Use of Architecture Contracts ensures
  - Continuous monitoring to check integrity, changes, decision-making, and audit of all architecture-related activities
  - Adherence to the principles, standards, and requirements of the existing or developing architectures
  - Identification of risks
  - A set of processes and practices that ensure accountability, responsibility, and discipline with regard to the development and usage of all architectural artifacts
  - A formal understanding of the governance organisation

Architecture Contracts and the ADM

- The Statement of Architecture Work created in Phase A
- Architectures Domains (Business, Data, Application, Technology)
- Phase G
- Implementation projects

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## Architecture Compliance: Terminology



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**Irrelevant:**  
The implementation has no features in common with the architecture specification (so the question of conformance does not arise).

**Consistent:**  
The implementation has some features in common with the architecture specification, and those common features are implemented in accordance with the specification. However, some features in the architecture specification are not implemented, and the implementation has other features that are not covered by the specification.

**Compliant:**  
Some features in the architecture specification are not implemented, but all features implemented are covered by the specification, and in accordance with it.

**Conformant:**  
All the features in the architecture specification are implemented in accordance with the specification, but some more features are implemented that are not in accordance with it.

**Fully Conformant:**  
There is full correspondence between architecture specification and implementation. All specified features are implemented in accordance with the specification, and there are no features implemented that are not covered by the specification.

**Non-conformant:**  
Any of the above in which some features in the architecture specification are implemented not in accordance with the specification.

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## Architecture Compliance

Two processes are defined to ensure compliance of projects with the Enterprise Architecture:

1. Prepare *Project Impact Assessments* - project-specific views that illustrate how the *Enterprise Architecture* impact a project
2. Perform an *Architecture Compliance Review*

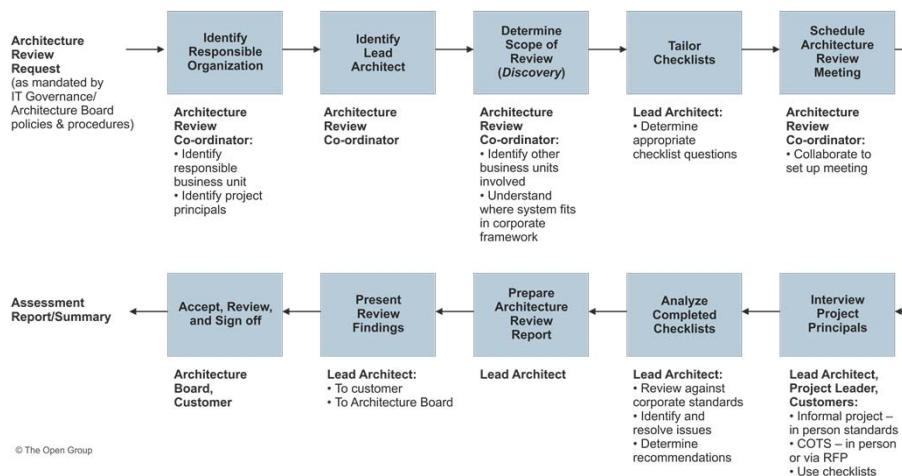
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# Architecture Compliance Reviews

- Catch errors in the project architecture early,
- Ensure the application of best practices to architecture work.
- Provide an overview of the compliance to mandated standards.
- Identify where the standards themselves may require modification.
- Identify services that are currently application-specific but might be provided as part of the enterprise infrastructure.
- Document strategies for collaboration, resource sharing, and other synergies across multiple architecture teams.
- Take advantage of advances in technology.
- Communicate to management the status of technical readiness of the project.
- Identify key criteria for procurement activities
- Identify and communicate significant architectural gaps to product and service providers.

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# Architecture Compliance Review Process



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# Establishing an Architecture Capability

- TOGAF provides guidelines to establish an EA capability
  - Use of the ADM
  - Treat it as an ongoing practice
  - Address the four domain architectures
    - **Business Architecture** : the architecture governance, architecture processes, architecture organisational structure, architecture information requirements, architecture products, etc.
    - **Data Architecture** : the structure of the organisation's Enterprise Continuum and Architecture Repository
    - **Application Architecture**: the functionality and/or applications services required to enable the architecture practice
    - **Technology Architecture**: infrastructure requirements and deployment in support of the architecture applications and Enterprise Continuum

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## Summary

Architecture governance is the practice and orientation by which Enterprise Architectures and other architectures are managed and controlled at an enterprise-wide level. It includes:

- Implementing a system of controls over the creation and monitoring of all architecture components and activities, to ensure the effective introduction, implementation, and evolution of architectures within the organisation.
- Implementing a system to ensure compliance with internal and external standards and regulatory obligations.
- Establishing processes that support effective management of these processes.
- Developing practices that ensure accountability to identified stakeholders, inside and outside the organisation.

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## **Test Yourself Question**

- Which of the following are NOT included in Architecture Governance?
- A. Implementing a system of controls over expenditure within the enterprise
  - B. Implementing a system of controls over the creation and monitoring of all architecture components and activities
  - C. Implementing a system to ensure compliance with internal and external standards and regulatory obligations
  - D. Establishing processes that support effective management of the architecture governance process
  - E. Developing practices that ensure accountability to stakeholders

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## **Test Yourself Question**

- Q. Which of the following is an example of an IT governance framework?
- A. ITIL
  - B. Prince 2
  - C. COBIT
  - D. TOGAF
  - E. ATAM

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# Module 10: Business Scenarios

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## Introduction

### Module Objectives

- To understand how to apply the Business Scenarios technique
- To understand where it is used in the TOGAF standard
- Key factors in the success of any enterprise architecture are:
  - the extent to which it is linked to business requirements,
- and
  - its support for business objectives.

Business scenarios help us to identify and understand the business requirements that the architecture development must address.

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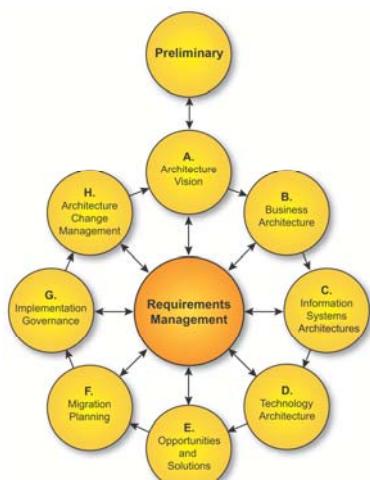
## What is a Business Scenario?

A business scenario describes:

- a business process, application or set of applications that can be enabled by the architecture
  - the business and technology environment;
  - the people and computing components (the “actors”) who execute it;
  - the desired outcome of proper execution.
- 
- The *TOGAF Series Guide: Business Scenarios (G176)* defines a method for developing Business Scenarios
    - It is positioned as a “*method within a method*”

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## Business Scenarios and the ADM



Used prominently in Phase A  
(Architecture Vision) and  
iteratively in Phase B  
(Business Architecture)  
Business Requirements are  
referred to throughout all  
phases of the ADM

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## What is a Good Business Scenario?

A good business scenario:

- Is representative of a significant business need or problem
- Enables vendors to understand the value of a developed solution to a customer.
- Is “**SMART**”
  - Specific**  
defines what needs to be done to done in the business;
  - Measurable**  
has clear metrics for success;
  - Actionable**  
clearly segments the problem, and provides the basis for finding a solution;
  - Realistic**  
defines the bounds of technology capability and cost constraints;
  - Time-bound**  
gives a clear understanding of when a solution expires

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## The Benefits of Business Scenarios

A business scenario should be a *complete* description of a business problem

Without this:

- There is danger that the requirements will not be complete
- The business value to solving the problem will be unclear
- The relevance of potential solutions will be unclear

A scenario:

- can play an important role in engaging the stakeholders
- can help to establish good communication with vendors early on.

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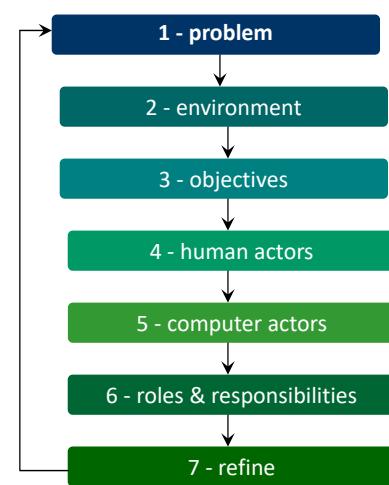
## Who Contributes to a Business Scenario?

- The creation of a business scenario is not solely the province of the architect.
- Business line management and other stakeholders for the enterprise must be involved
- It may also involve an organisation's IT vendors
- Typically involvement of management is greatest in the early stages whereas the involvement of the architect is greatest in later stages

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## Developing a Business Scenario

- 1 - Identify, document and rank the problem driving the scenario
- 2 - Identify the business and technical environment of the scenario and document it in models
- 3 - Identify and document desired objectives - the results of handling the problems successfully - using SMART
- 4 - Identify the human actors and their place in the business model
- 5 - Identify computer actors (computing elements), and their place in the technology model
- 6 - Identify and document roles, responsibilities and measures of success per actor
- 7 - Check for "fitness for purpose" and refine if necessary



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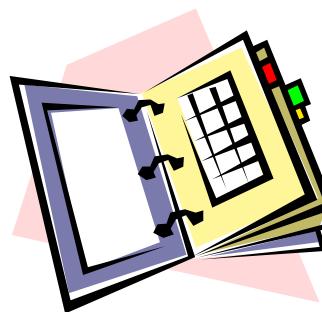
## Getting Business Scenarios Right

- Customers almost always know what they want
  - But it is often not written down, especially the link to business
  - So we help write it down
- Customers sometimes do not know what they really need
  - So we observe and probe to help discover what's needed
  - We help bring out critical business rules
  - We also focus on the “what” not the “how”
- Business Scenarios are part of a larger process. They are a technique, not an end in themselves.

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## Contents of a Business Scenario

- Business Scenario *models* should:
  - Capture business and technology views graphically to help comprehension
  - Provide a starting point for requirements,
  - Relate actors and interactions
- Business Scenario *descriptions* should:
  - Capture the critical steps between actors in the right sequence
  - Partition the responsibility of the actors
  - List pre-conditions that have to be met prior to proper system functionality, and
  - Provide technical requirements to ensure the service is of acceptable quality



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## Template for a Business Scenario

- Business scenario problem description
- Detailed objectives
- Views of environments and processes
- Actors, their roles and responsibilities
- Principles and constraints
- Requirements
- Next steps
- Glossary of terms and abbreviations
- References



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## Exercise

Write a scenario describing how you would choose a new car.  
Include the following in your answer:

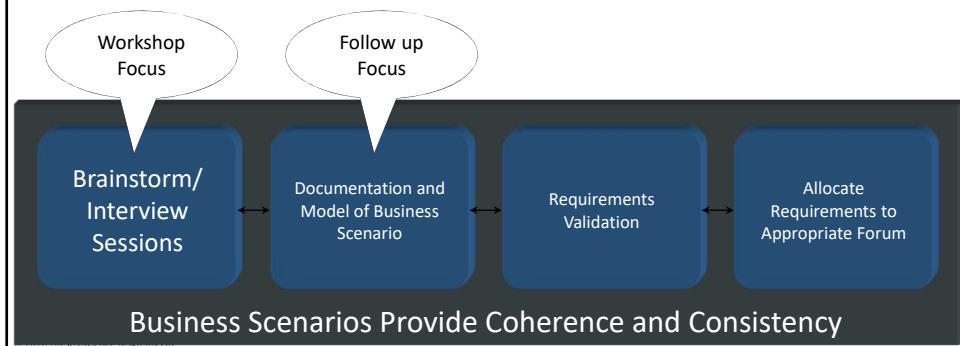
- Problem description
- Detailed objectives
- Views of environments and processes
- Actors, their roles and responsibilities
- Principles and constraints
- Requirements
- Next steps

Make the objectives SMART.

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## Some Reminders

- Business Scenarios are a part of (and enable) a larger process
- Business Scenarios are just a technique, not an objective
- Use them, don't get lost in them



## Summary

- Business scenarios help address one of the most common issues facing businesses
  - Aligning the IT with the business
- Business scenarios help to identify and understand business needs
  - And thereby derive business requirements
- They are just a technique, not the goal
  - They are part of the larger process of architecture development

### Resources

- The Open Group Library (<http://publications.opengroup.org>)
  - The TOGAF Series Guide: Business Scenarios
  - Examples of completed Business Scenarios

## **Exercises**

- Consider the following objective: “The system’s security should be improved. This will reduce the loss of revenue which results when our system is accessed by unauthorized users”.
- How could this be re-phrased to make it into a SMART objective?
- Select a scenario (a business problem) from your own organisation
- Identify the stakeholders (human actors) and their place in the business model, the human participants and their roles
- Identify computer actors, and their place in the technology model, the computing elements and their roles
- For the stakeholders, identify the stakeholder concerns

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## **Exercise**

- Consider the Vehicle Licensing Bureau (or equivalent in your country), that handles car registrations, driving licenses, car taxes and insurance records.
- Identify the stakeholders (human actors) and their place in the business model, the human participants and their roles
- Identify computer actors, and their place in the technology model, the computing elements and their roles
- For the stakeholders, identify the stakeholder concerns

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# **Module 11: Stakeholder Management**

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## **Roadmap**

Part I - Introduction
Preface, Executive Overview, Core Concepts, Definitions
Part II – Architecture Development Method
Introduction to ADM
ADM Phase Narratives
Part III – ADM Guidelines & Techniques
Guidelines for Adapting the ADM Process
<b>Techniques for Architecture Development</b>
Part IV – Architecture Content Framework
Content Metamode
Architectural Artifacts
Architecture Deliverables
Building Blocks
Part V – Enterprise Continuum & Tools
Enterprise Continuum
Architecture Partitioning
Architecture Repository
Tools for Architecture Development
Part VI – Architecture Capability Framework
Architecture Board
Architecture Compliance
Architecture Contracts
Architecture Governance
Architecture Maturity Models
Architecture Skills Framework

- Part III, ADM Guidelines and Techniques, Chapter 21



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# Module Objectives

The objectives are to:

- Explain how to apply the stakeholder management technique
- Understand the steps in developing a stakeholder map and how to use the map
- Understand the benefits for creating views and relating those to stakeholder and their concerns

## Overview

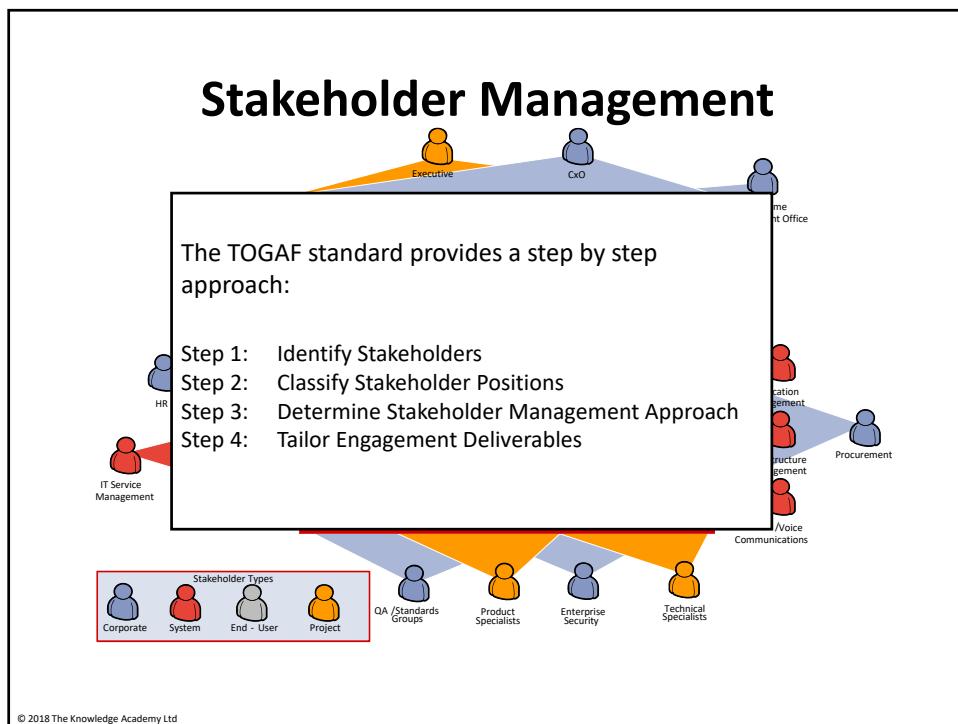
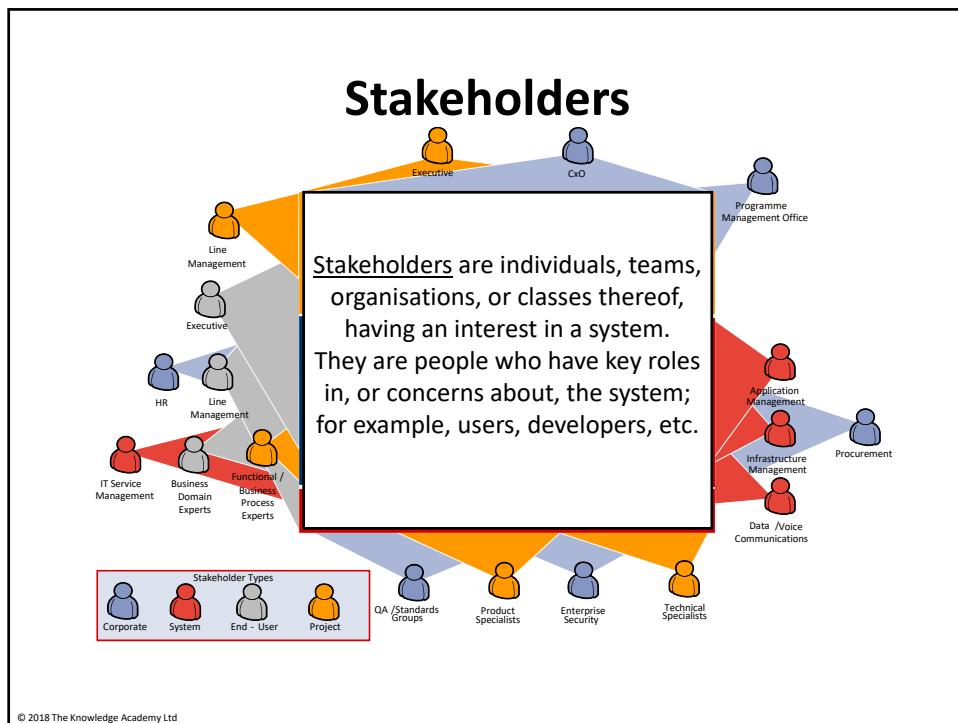
- Stakeholder Management is an important discipline that successful architecture practitioners can use to win support from others
- This technique should be used in Phase A to identify key players and updated throughout each phase
- The output of this process forms part of the Communications Plan

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# Benefits

- Identifies the most powerful stakeholders early and ensures their input is used to shape the architecture
- Achieving support from the most powerful stakeholders can help achieve necessary resources
- Early communication with stakeholders helps with ensuring all understand the architecture process and are engaged in it
- Can be used to anticipate likely reactions and develop a strategy to address them
- Can be used to identify conflicting or competing objectives amongst stakeholders and develop strategies to manage

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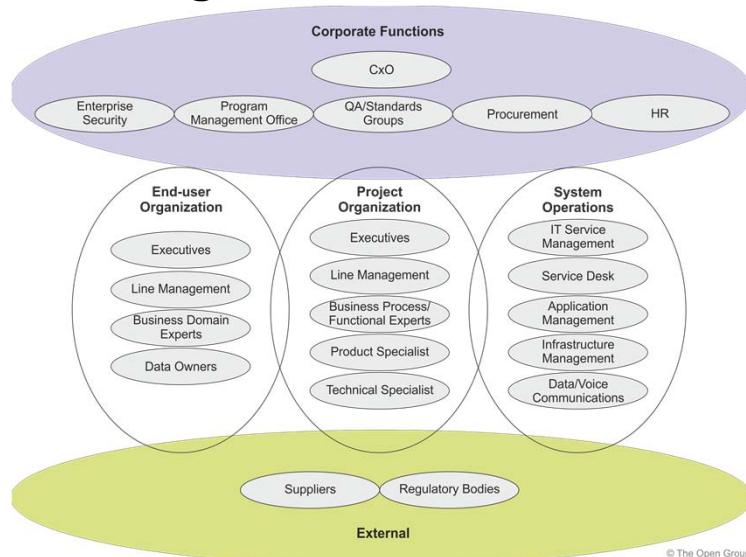


## Step 1: Identify Stakeholders

- Identify the key stakeholders of the enterprise architecture.
- Look at who is impacted by the enterprise architecture project:
  - Who gains and who loses from this change?
  - Who controls change management of processes?
  - Who designs new systems?
  - Who will make the decisions?
  - Who procures IT systems and who decides what to buy?
  - Who controls resources?
  - Who has specialist skills the project needs?
  - Who has influence?

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## Categories of Stakeholder



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## Step 2: Classify Stakeholder Positions

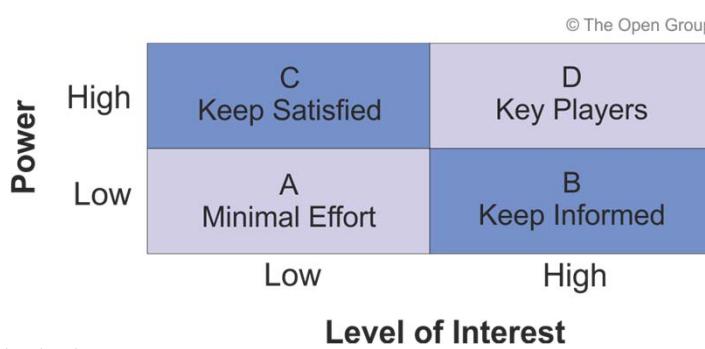
- Classify and record positions in a Stakeholder Analysis Matrix

Stakeholder Group	Stakeholder	Ability to Disrupt the change	Current Understanding	Required understanding	Current commitment	Required commitment	Required support
CIO	John Smith	H	M	H	L	M	H
CFO	Jeff Brown	M	M	M	L	M	M

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## Step 3: Determine Stakeholder Management Approach

- Work out stakeholder power, influence and interest, so as to focus the engagement on the key individuals.
- These can then be mapped onto a power/interest matrix, which is used to determine the strategy for engaging with them.
- Develop a Power/Interest Matrix and place Stakeholder groups within it



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## Step 4: Tailor Engagement Deliverables

- For each Stakeholder Group:
  - Identify the viewpoints that the architecture engagement needs to produce and validate with each stakeholder group
  - Define specific viewpoints, matrices, and views of the enterprise architecture model..

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## Example: Stakeholder Map

STAKEHOLDER GROUP	CLASS	EXAMPLE ROLES	KEY CONCERNs	CLASS	Catalogs, Matrices and Diagrams
Corporate Functions	CxO	CEO, CFO, CIO, COO	The high level drivers, goals and objectives of the organisation, and how these are translated into an effective process and IT architecture to advance the business.	KEEP SATISFIED	Business Footprint diagram Goal/Objective/Service diagram organisation Decomposition diagram Business Capabilities catalog Capability/organisation matrix Strategy/Capability Map
Corporate Functions	Program Management Office	Project Portfolio Managers	Prioritizing, funding and aligning change activity. An understanding of project content and technical dependencies between projects adds a further dimension of richness to portfolio management decision making.	KEEP SATISFIED	Requirements Catalog Business Footprint diagram Application Communication diagram Functional Decomposition diagram
Corporate Functions	Procurement	Acquirers	Understanding what building blocks of the architecture can be bought, and what constraints (or rules) exist that are relevant to the purchase. The acquirer will shop with multiple vendors looking for the best cost solution while adhering to the constraints (or rules) applied by the architecture, such as standards. The key concern is to make purchasing decisions that fit the architecture, and thereby to reduce the risk of added costs arising from non-compliant components.	KEY PLAYERS	Technology Portfolio catalog Technology Standards Catalog

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## Summary

- Stakeholder Management is an important discipline that successful architecture practitioners can use to win support from others
- Identifies the most powerful stakeholders early and ensures their input is used to shape the architecture
- Explicitly identifies viewpoints to address stakeholder concerns

### Exercise

- Develop a stakeholder map for the following individuals and groups:
  - Infrastructure Architect
  - Program Manager
  - Human Resources function
- For the example view from Chapter 31 (TOGAF 9.2 section 31.4.1)
  - Describe the stakeholders and their concerns
  - Define a Stakeholder Map

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# Module 12: Architecture Views and Viewpoints

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# Module Objectives

- To understand the concepts of Architecture Views and Architecture Viewpoints
- To understand the role of Architecture Views
- To introduce some TOGAF resources



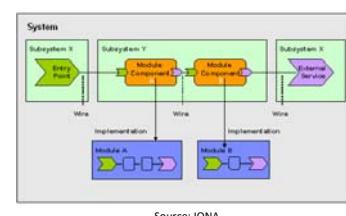
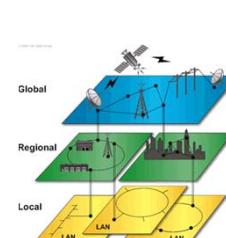
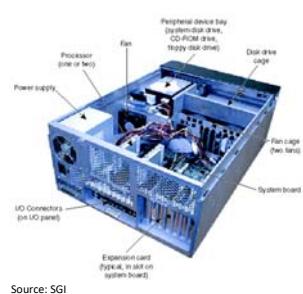
## Concepts and Definitions

- System
- Stakeholder
- Concern
- Architecture View
- Architecture Viewpoint

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# System

- A system is a combination of interacting elements organized to achieve one or more stated purposes.



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# Stakeholders

**Stakeholders** are individuals, teams, organisations, or classes thereof having an interest in a system. They are people who have key roles in, or concerns about, the system; for example, users, developers, etc.



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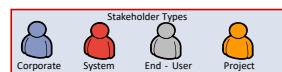
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# Concerns

**Concerns** are interests in a system relevant to one or more of its stakeholders. Concerns may pertain to any aspect of the system's functioning, development, or operation, including performance, reliability, security, distribution, and evolvability, and may determine the acceptability of the system



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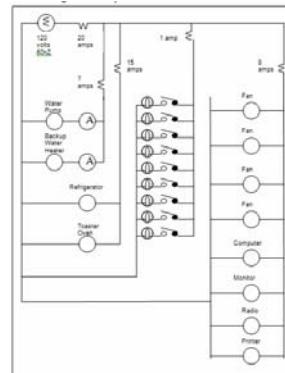
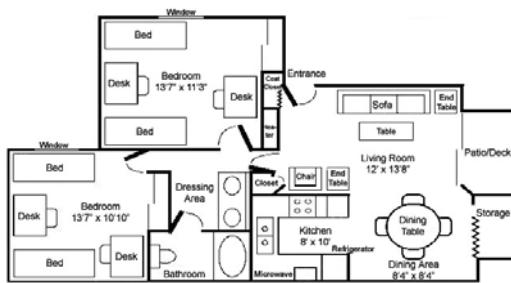
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## Architecture View (synonym: View)

- An Architecture View is a representation of a system from the perspective of a related set of concerns.
  - An architect creates architecture models. An architecture view consists of parts of these, chosen to show stakeholders that their concerns are being met.



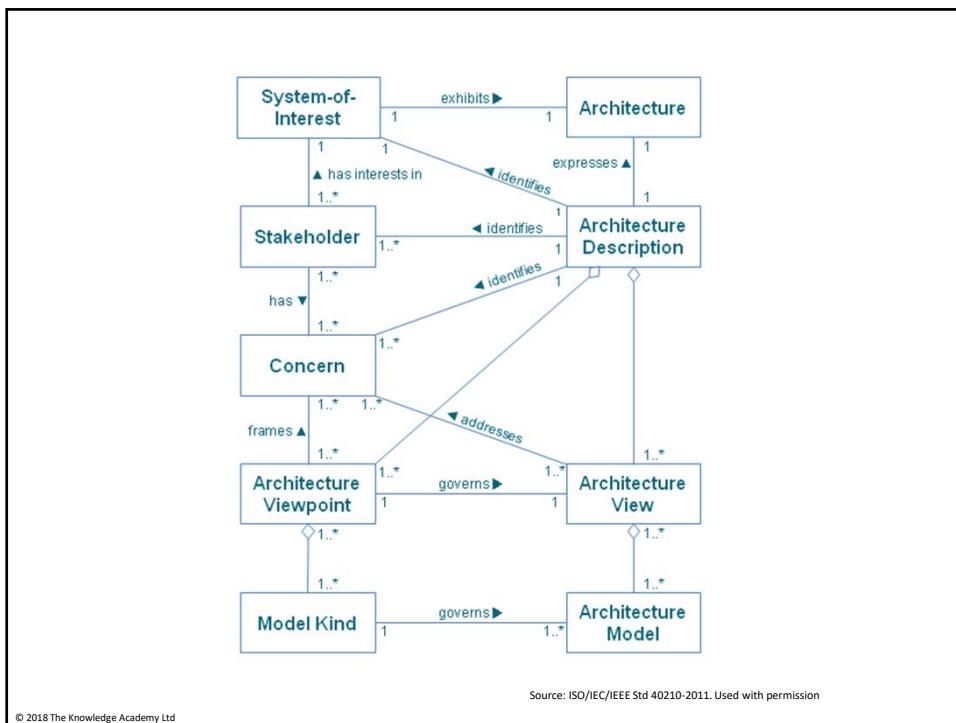
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## Architecture Viewpoint (synonym: Viewpoint)

- An Architecture Viewpoint defines the perspective from which an architecture view is taken.
  - It defines how to construct and use an architecture view, the information needed, the modeling techniques for expressing and analyzing it and a rationale for these choices (e.g. by describing the purpose and intended audience of the view).



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## Architecture Views and Viewpoints

The architect uses architecture views and architecture viewpoints in phases A to D for developing architectures for each domain (business, data, application, technology).

- An *architecture view* is what you see.
- An *architecture viewpoint* is where you are looking from, the vantage point or perspective that determines what you see
- Every architecture view has an associated architecture viewpoint that describes it, at least implicitly.
- Architecture viewpoints are generic, and can be stored in libraries for reuse. An architecture view is always specific to the architecture for which it is created.

## What is an Architecture View?

- A representation of an overall architecture with meaning to one or more stakeholders in the system
- For example: a building architect might create wiring diagrams, floor plans, and elevations to describe different facets of a building to its different stakeholders (electricians, owners, planning officials etc.)
- An enterprise architect might create physical and security views of an IT system

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## A Simple Example of an Architecture Viewpoint

Architecture Viewpoint Element	Description
Stakeholders	Management Board, CEO
Concerns	Show the top-level relationships between US/UK geographical sites and business functions
Modeling Technique	Nested boxes diagram. technique Outer boxes = locations; Inner boxes = business functions. Semantics of nesting = functions performed in the locations.

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## A Simple Example of an Architecture Viewpoint

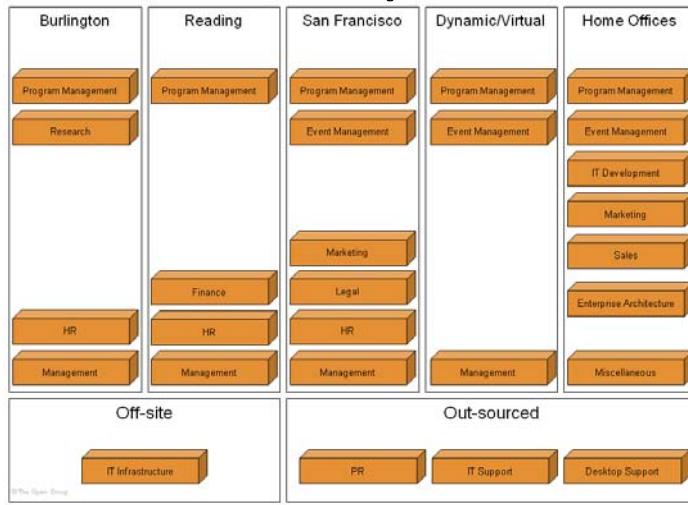


Figure 1: Example View - The Open Group Business Domains

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## Developing Architecture Views in the ADM

The choice of which particular architecture views to develop is one of the key decisions that the architect has to make.

The architect has a responsibility for ensuring:

- the completeness of the architecture
  - does it address all the concerns of its stakeholders?
- the integrity of the architecture
  - can the architecture views be connected to each other?
  - can the conflicting concerns be reconciled?
  - what trade-offs have been made (e.g. between security and performance)?

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## Exercise: Views and Viewpoints for a Simple Airport System

The pilot has one view of the system, the air traffic controller has another. Neither view represents the whole system - the perspective of each stakeholder constrains how they see the overall system.

Questions:

1. Name some elements in the pilot's view not viewed by the controller
2. Name some elements in the controller's view not viewed by the pilot
3. Name some shared elements
4. Describe 2 viewpoints for this system
5. Why is using viewpoints helpful?

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## The Architecture View Creation Process

1. Refer to any existing libraries of architecture viewpoints
2. Select key stakeholders
3. Analyse their concerns and document them
4. Select appropriate architecture viewpoints (based on the stakeholders and their concerns)
5. Generate architecture views of the system using the selected architecture viewpoints as templates

### Benefits

- Less work for the architects (the viewpoints have already been defined and so the views can be created faster)
- Better comprehensibility for stakeholders (the viewpoints are already familiar)
- Greater confidence in the validity of the views (their viewpoints have a known track record)

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## The Architecture View Creation Process

If no libraries of architecture viewpoints exist then:

1. Select key stakeholders
2. Analyse their concerns and document them
3. Develop new architecture viewpoints (based on the stakeholders and their concerns)
4. Generate views of the system using the new architecture viewpoints as templates

Alternatively create an *ad hoc* architecture view and then consider whether a generalised form of the implicit viewpoint should be defined explicitly and saved.

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## Using TOGAF Artifacts

- The TOGAF standard includes an example set of recommended artifacts that can be adopted, enhanced and combined to produce architecture views
- Three classes of artifacts are defined:
  - Catalogs
  - Matrices
  - Diagrams

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# Catalogs

- Catalogs are lists of building blocks of a specific type, or of related types
- For example
  - Principles Catalog created in the Preliminary Phase
  - Organisation/Actor Catalog created in Phase B
  - Driver/Goal/Objective Catalog

## Matrices

- Matrices show the relationships between building blocks of specific types
- Matrices are used to represent list-based rather than graphical-based relationships
- For example
  - The Stakeholder Map Matrix created in Phase A

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# Stakeholder Map Matrix

STAKEHOLDER	KEY CONCERNS	CLASS	Catalogs, Matrices and Diagrams
CxO – CEO, CFO, CIO, COO	The high level drivers, goals and objectives of the organisation, and how these are translated into an effective process and IT architecture to advance the business.	KEEP SATISFIED	Business Footprint diagram Goal/Objective/Service diagram organisation Decomposition diagram
Program Management Office – Project Portfolio Managers	Prioritizing, funding and aligning change activity. An understanding of project content and technical dependencies between projects adds a further dimension of richness to portfolio management decision making.	KEEP SATISFIED	Requirements Catalog Business Footprint diagram Application Communication diagram Functional Decomposition diagram
Procurement - Acquirers	Understanding what building blocks of the architecture can be bought, and what constraints (or rules) exist that are relevant to the purchase. The acquirer will shop with multiple vendors looking for the best cost solution while adhering to the constraints (or rules) applied by the architecture, such as standards. The key concern is to make purchasing decisions that fit the architecture, and thereby to reduce the risk of added costs arising from non-compliant components.	KEY PLAYERS	Technology Portfolio catalog Technology Standards Catalog

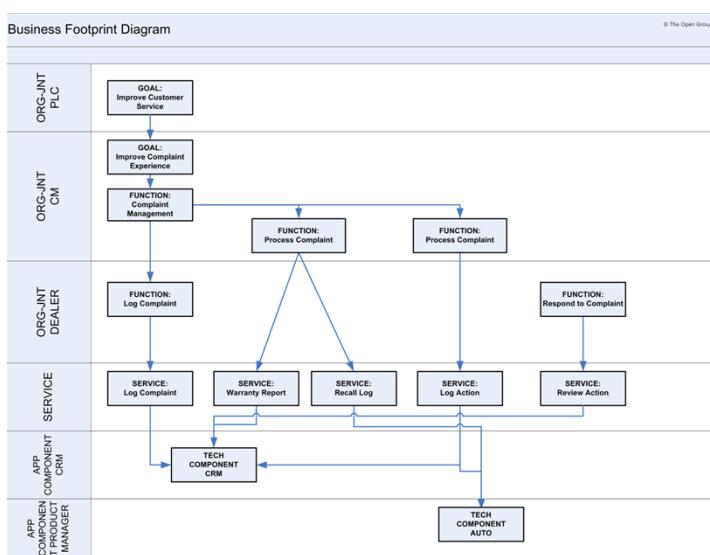
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# Diagrams

- Diagrams representing building blocks in a rich and visual way, especially suited to stakeholder communication.
- For example
  - Value Chain diagram created in Phase A
  - Business footprint diagram created in Phase B

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## Example Business Footprint Diagram



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## Summary

In general, TOGAF embraces the concepts and definitions of ISO/IEC/IEEE 42010: 2011, specifically those that guide the development of an architecture view and make the view actionable, such as:

- Selecting key stakeholders
- Analysing their concerns and documenting them
- Understanding how to model and deal with those concerns

The language used to depict the architecture view is the architecture viewpoint. Viewpoints provide architecture concepts from different perspectives, including components, interfaces, and allocation of services critical to the view.

When applying the TOGAF framework a number of tailoring steps should occur:

- The architecture viewpoints provided should be customized to create a set of architecture views that ensure all stakeholder concerns are met
- New architecture viewpoints and architecture views should be created to address specific needs

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## Test Yourself Question

Views and viewpoints are used by an architect to capture or model the design of a system architecture. Which of the following statements is true?

1. A view is the perspective of an individual stakeholder
2. Different stakeholders always share the same views
3. Some views do not have associated viewpoints
4. A viewpoint is the perspective of an individual stakeholder
5. Views and viewpoints are rarely used in TOGAF

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## **Exercises**

Select a scenario (i.e. a business problem) from your own organisation.

- Identify two stakeholders (i.e. human actors) and their place in the business model.
- State the views and viewpoints for each stakeholder.

For a Vehicle Licensing Bureau, which has the following stakeholders:

licensing authority, individual car driver, tax authority, car insurance firms, vehicle roadworthiness authority, law enforcement

- Identify two stakeholders (i.e. human actors) and their place in the business model.
- State the views and viewpoints for each stakeholder.

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## **Module 13: Building Blocks**

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# Roadmap

Part I - Introduction
Preface, Executive Overview, Core Concepts, Definitions
Part II – Architecture Development Method
Introduction to ADM
ADM Phase Narratives
Part III – ADM Guidelines and Techniques
Guidelines for Adapting the ADM Process
Techniques for Architecture Development
Part IV – Architecture Content Framework
Content Metamodel
Architectural Artifacts
Architecture Deliverables
<b>Building Blocks</b>
Part V – Enterprise Continuum and Tools
Enterprise Continuum
Architecture Partitioning
Architecture Repository
Tools for Architecture Development
Part VI – Architecture Capability Framework
Architecture Board
Architecture Compliance
Architecture Contracts
Architecture Governance
Architecture Maturity Models
Architecture Skills Framework

- Part IV, Architecture Content Framework, Chapter 33



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## Module Objectives

- To understand the concepts of Building Blocks within TOGAF
  - Architecture Building Blocks
  - Solution Building Blocks
- To understand their role within application of the ADM
- A comparison with Architecture Patterns

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## **Building Block Characteristics**

- A package of functionality defined to meet the business needs across an organisation
- A building block has published interfaces to access functionality
- A building block may interoperate with other, inter-dependent building blocks

### **A Good Building Block**

- Considers implementation and usage and evolves to exploit technology and standards
- May be assembled from or a subassembly of other building blocks
- Is reusable and replaceable

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## **Building Blocks**

- The way in which functionality, products and custom developments are assembled into building blocks varies widely
- Every organisation must decide for itself the arrangement
- A good choice can lead to improvements in system integration, interoperability and flexibility
- Systems are built from collections of building blocks
- They can be defined at many levels of detail
  - Groupings at the functional such as a customer database are known as Architecture Building Blocks
  - Real products or specific custom developments are known as Solutions Building Blocks

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## **Architecture Building Blocks (ABBs)**

- Architecture documentation and models from the enterprise's Architecture Continuum.
- They are defined or selected during application of the ADM
  - Mainly in Phases A, B, C and D
- The characteristics are as follows
  - They define what functionality will be implemented
  - They capture business and technical requirements
  - They are technology-aware
  - They direct and guide the development of Solution Building Blocks

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## **ABB Specifications**

- Fundamental functionality and attributes: semantics, unambiguous, including security capability and manageability
- Interfaces: chosen set, supplied (APIs, data formats, protocols, hardware interfaces, standards)
- Dependent building blocks with required functionality and named interfaces
- Map to business/organisations entities and policies

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## **Solution Building Blocks (SBBs)**

- Solutions Building Blocks relate to the Solutions Continuum
- They can either be procured or developed
- The characteristics are as follows:
  - They define what products and components will implement the functionality
  - They define the implementation
  - They fulfil business requirements
  - They are product or vendor-aware

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## **SBB Specifications**

- Specific functionality and attributes
- Interfaces: the implemented set
- Required SBBs used with required functionality and names of interfaces used
- Mapping from the SBBs to the IT topology and operational policies
- Specifications of attributes shared such as security, manageability, scalability
- Performance, configurability
- Design drivers and constraints including physical architecture
- Relationships between the SBBs and ABBs

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## **Building Blocks and the ADM**

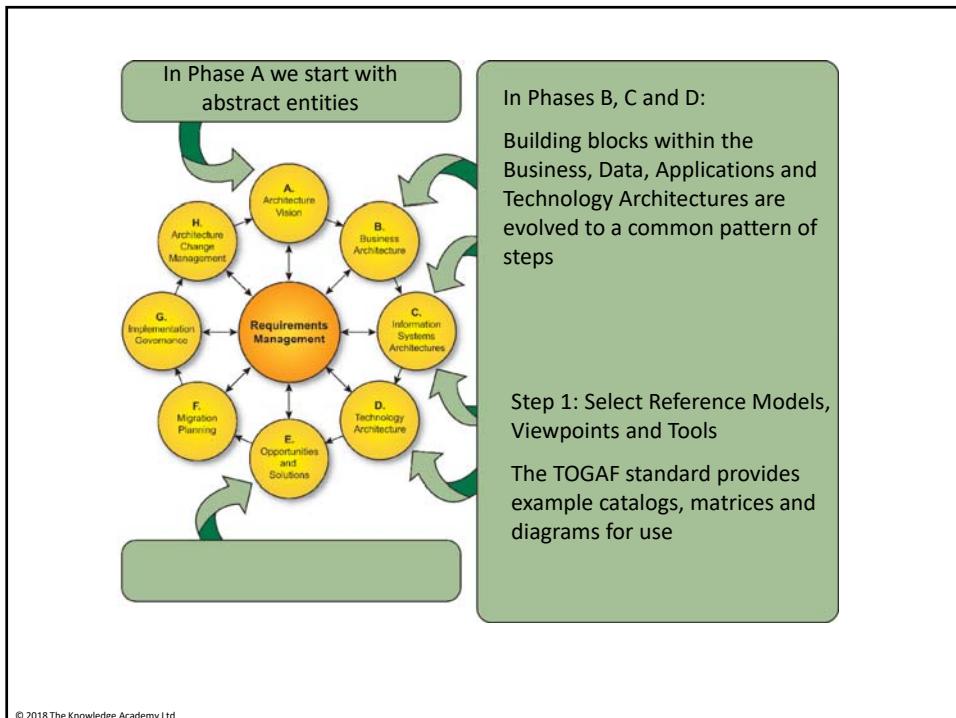
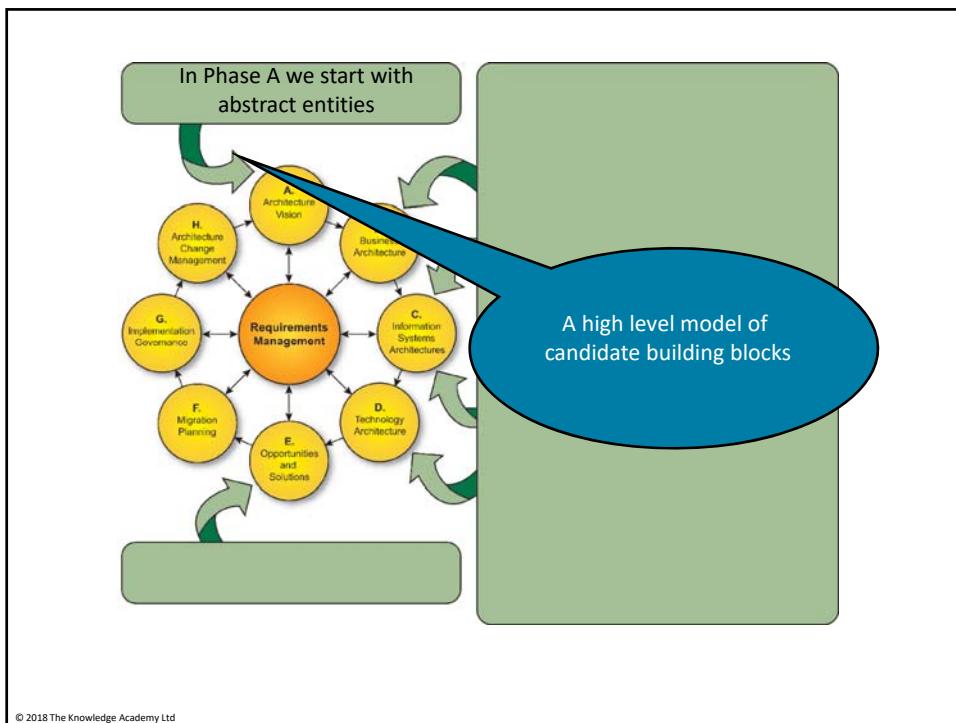
- An architecture is a set of building blocks
  - Depicted in an architectural model
  - A specification of how those building blocks are connected to meet the overall requirements of an information system
- The various building blocks in an architecture specify the services required in an enterprise specific system
- The following general principles should apply:
  - An architecture need only contain building blocks to implement those services it requires
  - Building blocks may implement one, more than one, or only part of a service identified in the architecture
  - Building blocks should conform to standards

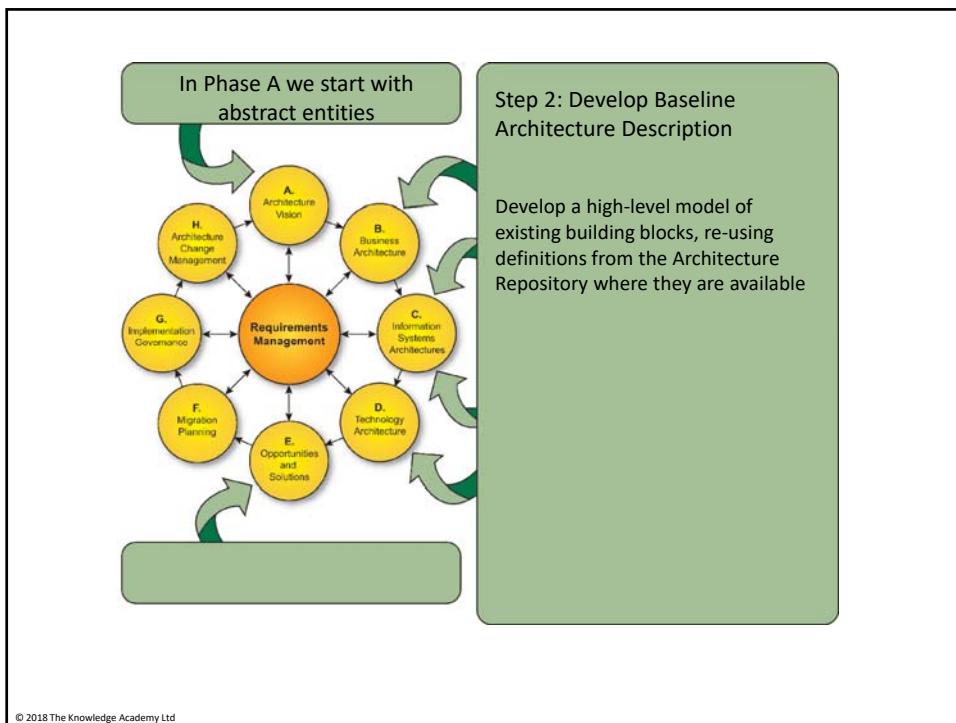
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## **Building Block Design**

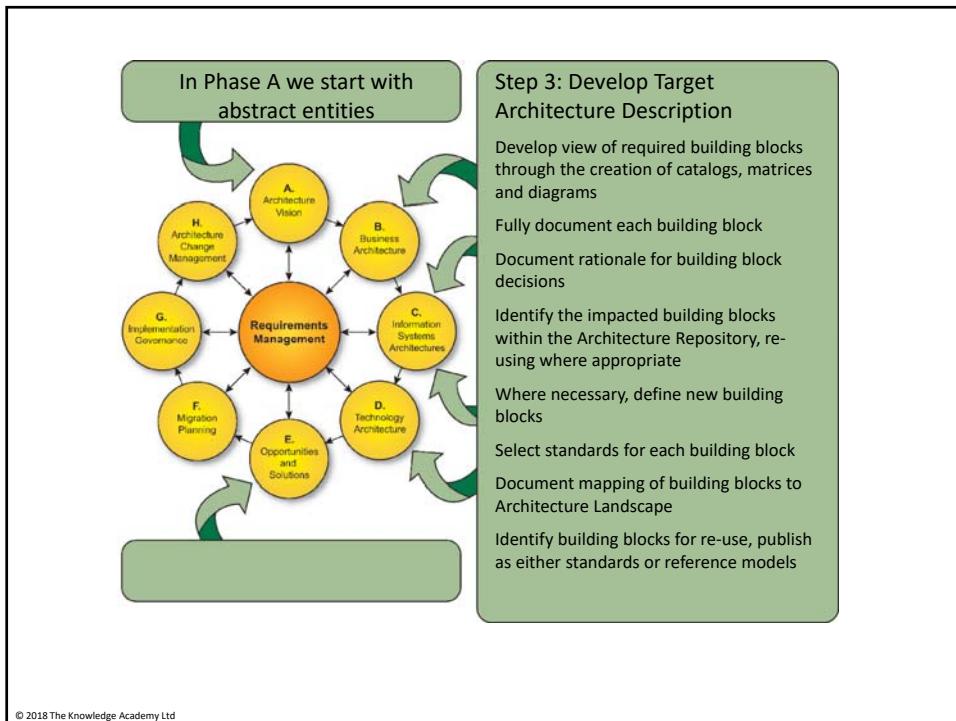
- The process of identifying building blocks includes looking for collections of functions which require integration
- Consider three classes of building blocks:
  1. Re-usable building blocks such as legacy items
  2. Building blocks to be developed (new applications)
  3. Building blocks to be purchased (COTS applications)
- Use the desired level of integration to decide how to bind functions into building blocks

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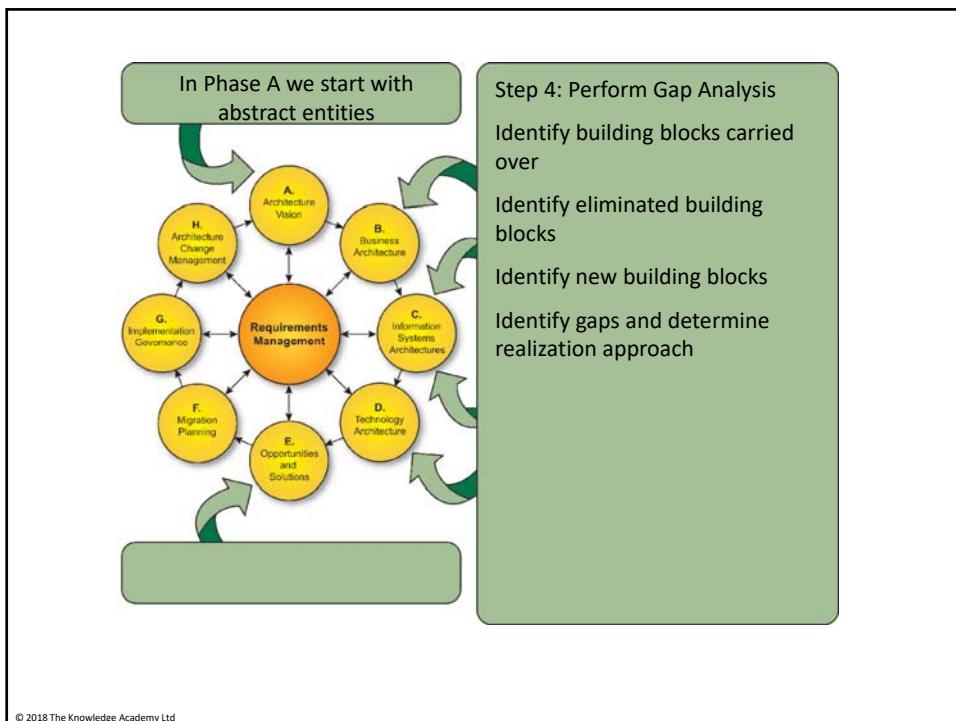




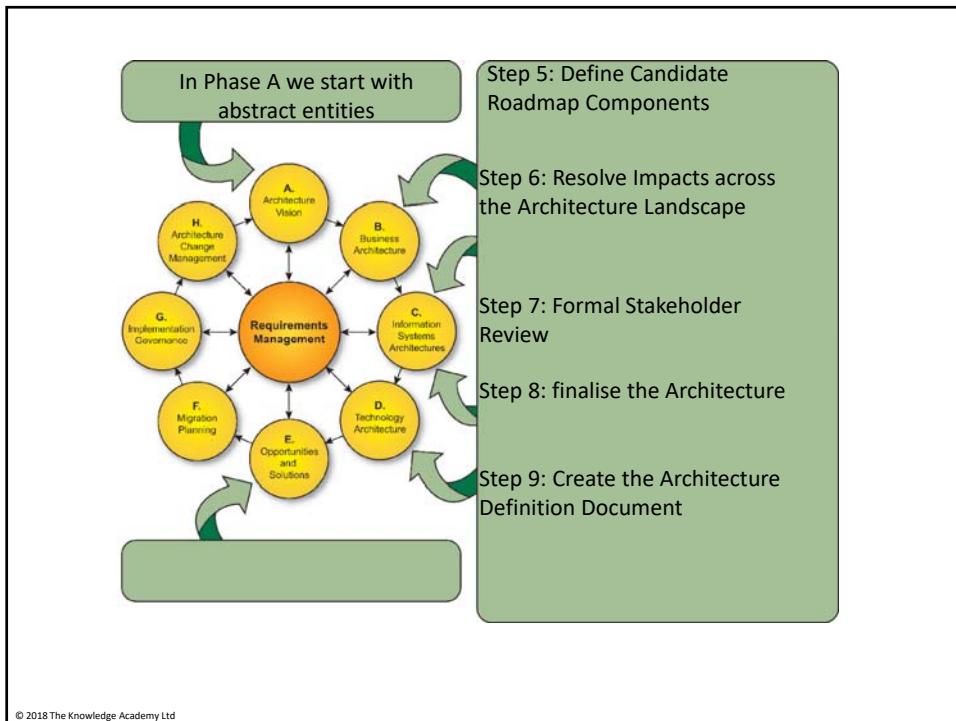
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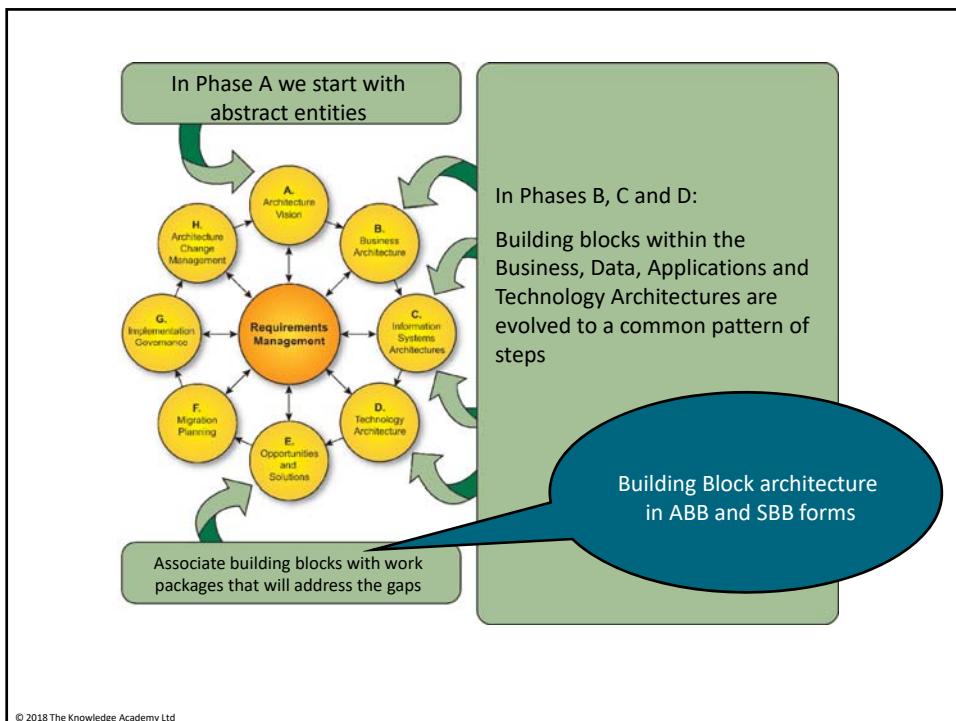
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## Architecture Patterns

- Pattern: defined as “*an idea that has been useful in one practical context and will probably be useful in others*”
- In the TOGAF standard, patterns are considered to be a technique for putting building blocks into context; for example, to describe a re-usable solution to a problem.
- Building blocks are what you use: patterns can tell you how you use them, when, why, and what trade-offs you have to make in doing so.

## **Test Yourself Question**

- Q. Which of the following statements describe generic building blocks?
- A. A building block is a package of functionality defined to meet the business needs.
  - B. A building block has published interfaces to access the functionality.
  - C. A building block may be assembled from other building blocks.
  - D. A building block may have multiple implementations.
  - E. All of these

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## **Module 14: Architecture Implementation Support Techniques**

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Architecture Repository
Tools for Architecture Development
Part VI – Architecture Capability Framework
Architecture Board
Architecture Compliance
Architecture Contracts
Architecture Governance
Architecture Maturity Models
Architecture Skills Framework

- **Part III, ADM Guidelines and Techniques**
- **Chapters 25, 26, 28 and 28**



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# Module Objectives

The objectives are to:

- Obtain an understanding of the following techniques provided with the TOGAF standard to assist in Architecture Development
  - Managing Interoperability Requirements
  - Business Transformation
  - Risk Assessment
  - Capability Planning

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## Interoperability

- Interoperability is “*the ability to share information and services*”.
- The TOGAF standard provides techniques for
  - Defining interoperability
  - Refining interoperability
  - Determining interoperability requirements
- The determination of interoperability occurs throughout the ADM cycle

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## Interoperability and the ADM

The determination of interoperability occurs throughout the ADM:

- Architecture Vision: the nature and security considerations of information and service exchanges are found using business scenarios.
- Business Architecture: information and service exchanges are defined in business terms.
- Data Architecture: the content of information exchanges is detailed using the corporate data and/or information exchange model.
- Application Architecture: the way applications are to share information and services is specified.
- Technology Architecture: appropriate technical mechanisms to permit information and service exchanges are specified.
- Opportunities & Solutions: actual solutions are selected.
- Migration Planning: interoperability is implemented logically.

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Phase B: Inter-stakeholder Information Interoperability Requirements  
(Using degrees of information interoperability)

Stakeholders	A	B	C	D	E	F	G
A		2	3	2	3	3	3
B	2		3	2	3	2	2
C	3	3		2	2	2	3
D	2	2	2		3	3	3
E	4	4	2	3		3	3
F	4	4	2	3	3		2
G	2	2	3	3	3	3	

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Phase C: Inter-system Interoperability Requirements

	System A	System B	System C	System D	System E	System F	System G
System A		2A	3D	2B	3A	3A	3B
System B	2E		3F	2C	3A	2B	2C
System C	3E	3F		2B	2A	2A	3B
System D	2B	2B	2B		3A	3A	3B
System E	4A	4B	2B	3A		3B	3B
System F	4A	4A	2B	3B	3A		2D
System G	2B	2B	3A	3A	3B	3B	

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## Interoperability Requirements and Solutions

The architect must ensure that there are no interoperability conflicts, especially if re-using existing SBBs or using COTS which have their own business processes and information architectures.

Changes to the business processes will be the most difficult.

The workflow between the various systems must also be taken into account.

The enterprise architect must also ensure that any change to the business interoperability requirements is agreed by the business architects and sponsors in a revised Statement of Architecture Work.

To find interoperability constraints consider:

- the Architecture Vision
- the Target Architecture
- the Implementation Factor Assessment and Deduction matrix
- the Consolidated Gaps, Solutions, and Dependencies matrix

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## **Business Transformation Readiness Assessment**

- Enterprise architecture often involves considerable change.
- Understanding the readiness of an organisation to accept change, identifying the issues, and dealing with them in the Implementation and Migration Plans is key to successful architecture transformation in Phases E and F. An initial assessment is carried out in Phase A.
- This is a joint effort between corporate (especially human resources) staff, lines of business and IT planners.

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## **The Business Transformation Readiness Assessment**

Recommended activities when assessing readiness for business transformation are:

1. Determine the readiness factors
2. Present the readiness factors using maturity models
3. Assess the readiness factors, and determine the readiness factor ratings
4. Assess the risks for each readiness factor and identify mitigating actions
5. Work these actions into Phase E and F Implementation and Migration Plan

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# Readiness Factors

Typical factors that may affect the business transformation include:

- Vision - the ability to clearly define and communicate what is to be achieved.
- Desire, Willingness, and Resolve
- Need
- Business Case
- Funding
- Sponsorship and Leadership
- Governance
- Accountability
- Workable Approach and Execution Model
- IT Capacity to Execute
- Enterprise Capacity to Execute
- Enterprise Ability to Implement and Operate

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# Assess the Readiness Factors

Business Transformation Readiness Assessment - Maturity Model					
Factor 2: Need for Enterprise Information Architecture		Class	Organizational Context		
		BTEP Readiness Factor	YES		
Definition	There is recognition by the organization that information is a strategic corporate asset requiring stewardship. There is also recognition that the data is not universally understandable, of requisite quality, and accessible.				
Maturity Model Levels					
0 Not defined	1 <i>Ad Hoc</i>	2 Repeatable	3 Defined	4 Managed	5 Optimized
Information is not recognized as an asset.  There is no clear stewardship of data.	Data Management (DM) concepts are intuitively understood and practiced on an <i>ad hoc</i> basis.  Stewardship of the data is informal.  Data is recognized by certain internal experts and senior management as being of strategic importance to the organization.  Focus is primarily on technically managing redundant data at the applications level.	Many parts of the organization value information/data as a strategic asset.  Internal DM experts maintain clear lines of responsibility and stewardship of the data, organized along lines of business and at all senior levels.  Staff put into practice DM principles and standards in their daily activities.	Data is recognized as a strategic asset in most parts of the organization, and throughout most levels from operations to senior management.  Resources are committed to ensuring strong stewardship of data at the lower management and information expert levels.	Data is recognized as a strategic asset in all parts of the organization, and throughout most levels from operations to senior management.  Resources are committed to ensuring strong stewardship of data at the senior management and information expert levels.	Data is treated in all levels throughout the organization as a strategic asset to be exploited and re-used.  Data products and services are strongly integrated with the management practice of the organization.  All staff are empowered and equipped to take stewardship of information, and are seen as "knowledge workers".
Recommended Target State					© The Open Group

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## Readiness Factor Rating

Business Factor Assessment Summary				
Ser	Readiness Factor	Urgency	Readiness Status	Degree of Difficulty to Fix
1	Vision			
2	Desire/willingness/resolve			
3	Need			
4	Business case			
5	Funding			
6	Sponsorship and leadership			
7	Governance			
8	Accountability			
9	Workable approach and execution model			
10	IT capacity to execute			
11	Departmental capacity to execute			
12	Ability to implement and operate			

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## Readiness Factor Risks & Actions

- Assess each factor using Risk Management techniques
- Identify a series of improvement actions
- Incorporate into the Implementation and Migration Plan

### Risk Management

- A technique used to mitigate risk when implementing an architecture project
- It is important to identify, classify, and mitigate these risks before starting so that they can be tracked throughout the transformation effort

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## Risk Management in the ADM

There are two levels of risk that should be considered:

1. **Initial Level of Risk:** Risk categorisation prior to determining and implementing mitigating actions.
2. **Residual Level of Risk:** Risk categorisation after implementation of mitigating actions

The process for risk management is:

- Risk classification
- Risk identification
- Initial risk assessment
- Risk mitigation and residual risk assessment
- Risk monitoring

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## Risk Management in the ADM

Risks are identified in Phase A as part of the initial Business Transformation Readiness Assessment

The risk identification and mitigation assessment worksheets are maintained as governance artifacts and are kept up-to-date in Phase G (Implementation Governance) where risk monitoring is conducted.

Implementation governance can identify critical risks that are not being mitigated and might require another full or partial ADM cycle.

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## Initial Risk Assessment

The initial risk assessment is done by classifying risks with respect to effect and frequency.

Effect can be assessed as:

- **Catastrophic:** critical financial loss that could result in bankruptcy.
- **Critical:** serious financial loss in more than one line of business leading to a loss in productivity and no ROI
- **Marginal:** minor financial loss in a line of business and a reduced ROI on the IT investment.
- **Negligible:** minimal impact on services and/or products.

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## Initial Risk Assessment

Frequency can be assessed as:

- **Frequent:** Likely to occur very often and/or continuously.
- **Likely:** Occurs several times over the course of a transformation cycle.
- **Occasional:** Occurs sporadically.
- **Seldom:** Remotely possible and would probably occur not more than once in the course of a transformation cycle.
- **Unlikely:** Will probably not occur during the course of a transformation cycle.

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## Initial Risk Assessment

The assessments of effect and frequency can then be combined:

- **Extremely High Risk (E):** The transformation will most likely fail with severe consequences.
- **High Risk (H):** Significant failure of parts of the transformation resulting in certain goals not being achieved.
- **Moderate Risk (M):** Noticeable failure of parts of the transformation, threatening the success of some goals.
- **Low Risk (L):** Some goals will not be wholly successful.

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## Risk Classification Scheme

Corporate Risk Impact Assessment					
Effect	Frequency				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

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## Risk Identification and Mitigation Worksheet

Risk ID	Risk	Preliminary Risk			Mitigation	Residual Risk		
		Effect	Frequency	Impact		Effect	Frequency	Impact

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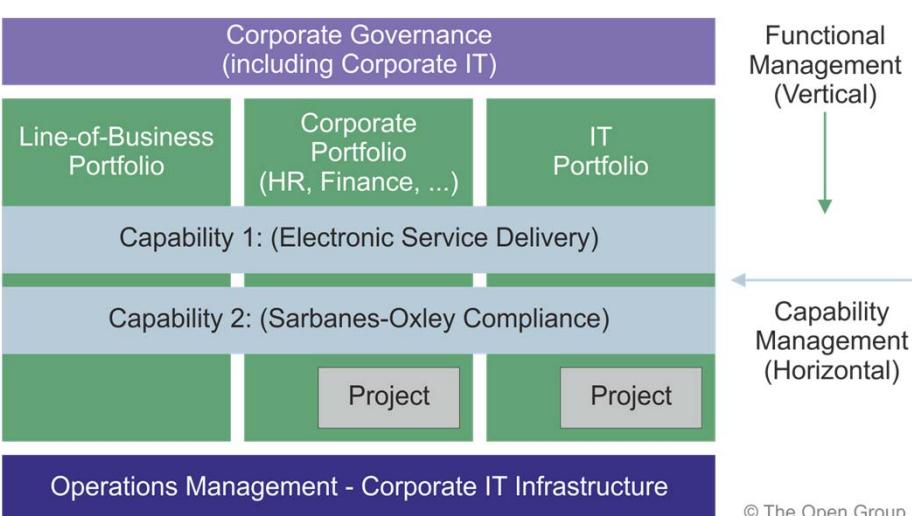
# Capability Based Planning

Capability-based planning is a technique that focuses on the planning, engineering and delivery of strategic business capabilities.

It frames all phases of the architecture development in the context of business outcomes, clearly linking the IT vision, architectures (ABBs and SBBs), and the Implementation and Migration Plans with the corporate strategic, business, and line of business plans.

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# Capabilities



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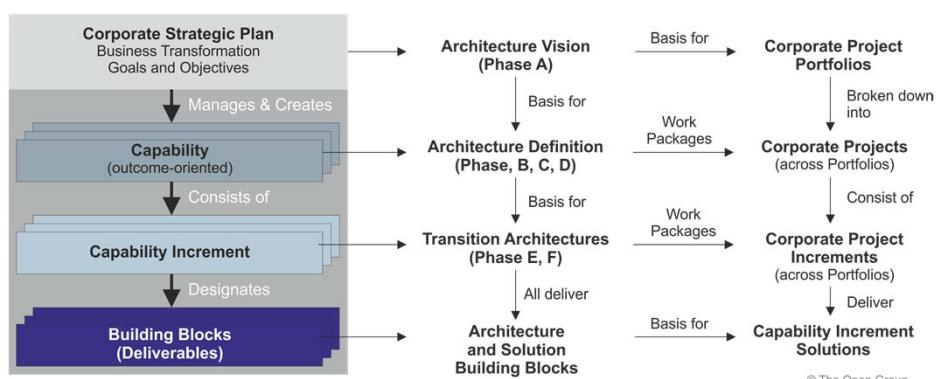
# Capability Based Planning

Capabilities are directly derived from the corporate strategic plan. They must satisfy the enterprise goals, objectives, and strategies. Most organisations will also have an annual business plan.

- All of the architectures will be expressed in terms of business outcomes and value.
- Phase A: the corporate strategic direction must drive this
- Phases B, C, and D: specific capabilities must be targeted for completion.
- Phase E: the capability increments must drive this.

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# Capability Based Planning



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## Summary

This module has explained how to apply different techniques to help with the implementation of the architectures defined in the ADM phases, including:

- Interoperability requirements
- The factors that influence business transformation readiness
- How to perform an initial risk assessment
- How capability based planning can be applied

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## Exercise

- Draw a capability increment radar diagram to communicate the current capability of an enterprise which has reached capability increment 2 and has obtained the following scores for 5 capability dimensions:

Professional Development	70%
Business processes	80%
Research & development	60%
Information management	70%
Equipment	60%

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# **Module 15**

## **Phase A: Architecture**

### **Vision**

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## **Module Objectives**



The objectives of this module are to understand Phase A:

- Objectives
- Approach
- Steps
- Inputs
- Outputs

### **Architecture Vision Objectives**

- Develop a high-level aspirational vision of the capabilities and business value to be delivered as a result of the proposed Enterprise Architecture
- Obtain approval for a Statement of Architecture Work that defines a program of works to develop and deploy the architecture outlined in the Architecture Vision

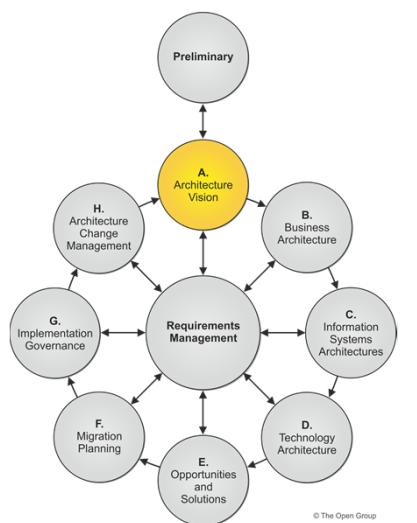
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# Approach

- Phase A defines what is in and what is outside of the architecture effort, and the constraints
- Constraints are informed by principles, business goals and strategic drivers
- Creates the Architecture Vision document
  - Clarifying and agreeing the purpose of the architecture
  - Demonstrating how it will be achieved
  - A first-cut high-level description of the Baseline and Target architectures
  - Integral to the Architecture Vision is an understanding of emerging technologies and potential impact
  - Business models and the business scenarios technique can be used to develop the Architecture Vision

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## Phase A: Inputs



- Request for Architecture Work (see next slide)
- Business principles, business goals and drivers
- organisation Model for Enterprise Architecture
- Tailored Architecture Framework, including Architecture Principles
- Populated Architecture Repository

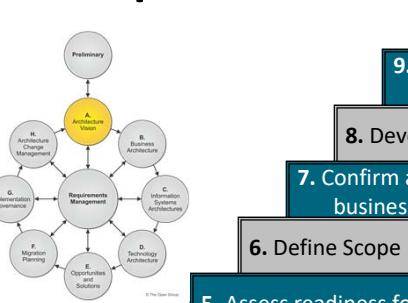
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# Request for Architecture Work

- Organisation Sponsors
- Organisation's mission statement
- Business goals and changes
- Strategic plans of the business
- Time limits
- Changes in the business environment
- Organisational constraints
- Budget information, financial constraints
- External constraints, business constraints
- Current business system description
- Current architecture/IT system description
- Description of developing organisation
- Description of resources developing organisation has available

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## Steps



1. Establish the architecture project
2. Identify stakeholders, concerns, and business requirements
3. Confirm business goals, drivers, and constraints
4. Evaluate capabilities
5. Assess readiness for business transformation
6. Define Scope
7. Confirm and elaborate architecture principles, including business principles
8. Develop Architecture Vision
9. Define the Target Architecture value propositions and KPIs
10. Identify the business transformation risks and mitigation activities
11. Develop Statement of Architecture Work; secure approval

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## **Step 1: Establish the Architecture Project**

Conduct the necessary procedures to secure:

- Recognition of the project
- Endorsement of corporate management
- Support and commitment of line management

Refer to other management frameworks:

- Explain how this project relates to those frameworks

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## **Step 2: Identify Stakeholders, Concerns, and Business Requirements**

- Here we must identify:
  - Candidate vision components and requirements
  - Candidate scope boundaries for the engagement
  - Stakeholder concerns, issues, and cultural factors
  - The concerns and viewpoints that are relevant to this project
  - The stakeholders that are involved with the project
  - The key roles and responsibilities within the project

Another key task will be to consider which architecture views and viewpoints need to be developed to satisfy the various stakeholder requirements.

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## Stakeholder Map

Stakeholder	Key Concerns	Class	Catalogs, Matrices and Diagrams
CxO	The high-level drivers, goals and objectives of the organisation, and how these are translated into an effective process and IT architecture to advance the business	Keep Satisfied	Business Footprint diagram Goal/Objective/Service diagram organisation Decomposition diagram
Program Management Office	Prioritizing, funding, and aligning change activity. An understanding of project content and technical dependencies adds a further dimension of richness to portfolio management and decision making.	Keep Satisfied	Project Context diagram Business Footprint diagram Application Communication diagram Functional Decomposition diagram
HR	The roles and Actors that support the functions, applications, and technology of the organisation. HR are important stakeholders in ensuring that the correct roles and actors are represented.	Keep Informed	organisation Decomposition diagram organisation/Actor catalog Location catalog

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## Step 3: Confirm Business Goals, Drivers, and Constraints

Identify the business goals and strategic drivers of the organisation.

- If these have been defined elsewhere ensure that the definitions are current, and clarify any areas of ambiguity.
- Otherwise, define the goals and secure their endorsement by management.

Define any constraints that must be dealt with.

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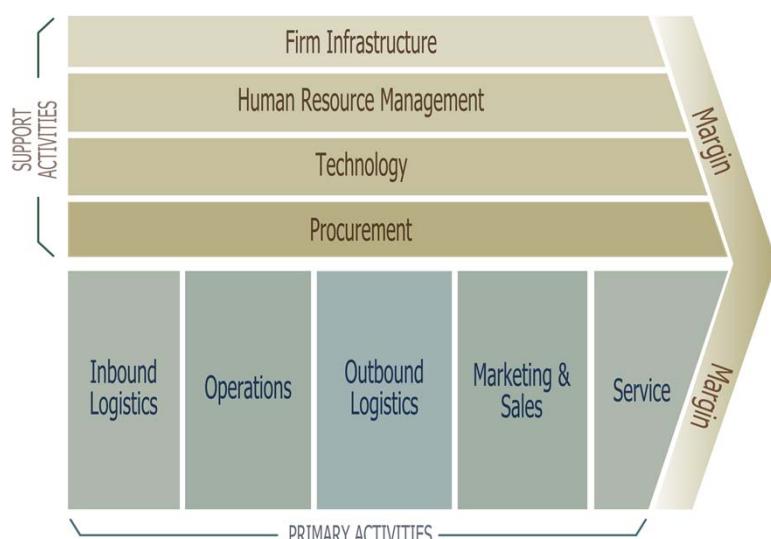
## Step 4: Evaluate Capabilities

In this step we:

- Seek to understand the capabilities and desires of the business
- Identify options to realize those capabilities
- Assess the implications for the organisation's architecture capability
- Create an initial picture of the new capability that will be required
- Document the results in a Capability Assessment

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## Value Chain Diagram



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Source: Wikipedia.org

## **Step 5: Assess Readiness for Business Transformation**

This assessment is based upon the determination and rating of a series of readiness factors

These results are then used to:

- shape the scope of the architecture,
- identify activities required within the architecture project, and to
- identify risk areas to be addressed

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## **Step 6: Define the Scope**

Define:

- Breadth of coverage
- Level of detail
- The partitioning characteristics of the architecture
- Domains to be covered
- Schedule project milestones
- Identify Enterprise Continuum assets for use:
  - Created from previous ADM cycles
  - Existing reference frameworks, models, and so on...

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## **Step 7: Confirm and Elaborate Architecture Principles, including Business Principles**

- Ensure that any existing definitions are current, and clarify any areas of ambiguity.
- If principles do not exist, go to the body responsible for architecture governance and together define the principles.
- Secure their endorsement by management.

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## **Step 8: Develop Architecture Vision**

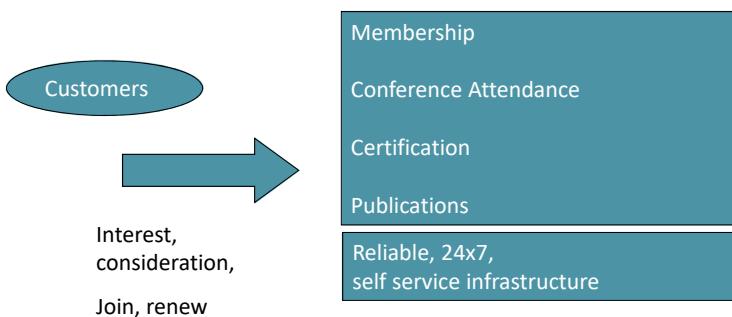
Create a high-level view of the Baseline and Target Architectures.

- Informal techniques are often used e.g. a simple solution concept diagram can illustrate the main components of the solution and its advantages.
- Business scenarios are useful here for discovering and documenting business requirements.
- The result is the first, very high-level definition of the baseline and target environments, from a business, IS and technology perspective.
- This should be stored in the Architecture Repository.

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## Solution Concept Diagram

- A high-level representation of the solution envisaged
- A *pencil sketch* of the expected solution at the outset of the engagement



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## Step 9: Define the Target Architecture Value Propositions and KPIs

- Develop the business case for the architectures and changes required
- Produce the value proposition for each of the stakeholder groupings
- Assess and define the procurement requirements
- Review and agree the value propositions with the sponsors and stakeholders
- Define the performance metrics
- Assess the business risk
- Incorporate the outputs in the Statement of Architecture Work

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## **Step 10: Identify the Business Transformation Risks and Mitigation Activities**

- Identify the risks associated with the Architecture Vision, assess the initial level of risk and its potential frequency. There are two levels of risk to consider:
  - Initial Level of Risk: Risk categorisation prior to determining and implementing mitigating actions
  - Residual Level of Risk: Risk categorisation after implementation of mitigating actions (if any)
- Assign a mitigation strategy for each risk. These should be considered for inclusion within the Statement of Architecture Work

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## **Step 11: Develop Statement of Architecture Work; Secure Approval**

Assess the work products that are required to be produced against the set of business performance requirements.

Activities will include:

- Identify new work products that need to be changed
- Provide direction on which existing work products, including building blocks, need to be changed. Ensure that all dependencies are coordinated
- Identify the impact of change on other work products
- Choose which architecture domains to develop, depending on purpose, focus, scope, constraints

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## **Step 11: Develop Statement of Architecture Work; Secure Approval**

- Assess the resource requirements
- Estimate the resources needed, develop a roadmap and schedule for the proposed development and document in the Statement of Architecture Work
- Define the performance metrics
- Develop the specific Enterprise Architecture Communications Plan
- Review and agree the plans with the sponsors, and secure formal approval of the Statement of Architecture Work under the appropriate governance procedures
- Gain sponsor's sign-off

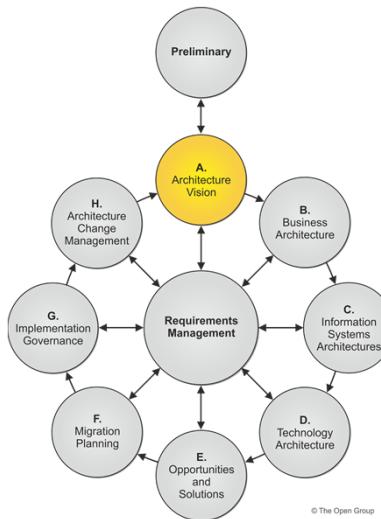
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## **Statement of Architecture Work**

- Title
- Architecture project request and background
- Architecture project description and scope
- Overview of Architecture vision
- Change of scope procedures
- Roles, responsibilities and deliverables
- Acceptance criteria and procedures
- Architecture project plan and schedule
- Approvals

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## Phase A: Outputs



- Approved Statement of Architecture Work including:
  - Project description and scope
  - Overview of Architecture Vision
  - Project plan and Schedule
- Refined statements of business principles, goals, and drivers
- Architecture Principles including business principles
- Capability Assessment
- Tailored Architecture Framework
- Architecture Vision
- Draft Architecture Definition Document
- Communications Plan
- Additional content populating the Architecture Repository

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## Summary

Phase A: Architecture Vision			
Objectives	Steps	Inputs	Outputs
<p>Develop a high-level aspirational vision of the capabilities and business value to be delivered as a result of the proposed Enterprise Architecture</p> <p>Obtain approval for a Statement of Architecture Work that defines a program of works to develop and deploy the architecture outlined in the Architecture Vision</p>	<p>Establish the architecture project</p> <p>Identify stakeholders, concerns, and business requirements</p> <p>Confirm and elaborate business goals, business drivers, and constraints</p> <p>Evaluate business capabilities</p> <p>Assess readiness for business transformation</p> <p>Define scope</p> <p>Confirm and elaborate Architecture Principles, including business principles</p> <p>Develop Architecture Vision</p> <p>Define the Target Architecture value propositions and KPIs</p> <p>Identify business transformation risks and mitigation activities</p> <p>Develop Statement of Architecture Work; secure approval</p>	<p>Request for Architecture Work</p> <p>Business principles, business goals, and business drivers</p> <p>organisational Model for Enterprise Architecture</p> <p>Tailored Architecture Framework, including tailored architecture method, architecture content, Architecture Principles, configured and deployed tools</p> <p>Populated Architecture Repository; that is, existing architecture documentation (framework description, architecture descriptions, existing baseline descriptions, etc.)</p>	<p>Approved Statement of Architecture Work</p> <p>Refined statements of business principles, business goals, and business drivers</p> <p>Architecture Principles</p> <p>Capability Assessment</p> <p>Tailored Architecture Framework</p> <p>Architecture Vision, including:</p> <ul style="list-style-type: none"> <li>◦ Refined key high-level stakeholder requirements</li> </ul> <p>Draft Architecture Definition Document, including (when in scope):</p> <ul style="list-style-type: none"> <li>• Baseline Business Architecture (high-level)</li> <li>• Baseline Data Architecture (high-level)</li> <li>• Baseline Application Architecture (high-level)</li> <li>• Baseline Technology Architecture (high-level)</li> <li>• Target Business Architecture (high-level)</li> <li>• Target Data Architecture (high-level)</li> <li>• Target Application Architecture (high-level)</li> <li>• Target Technology Architecture (high-level)</li> </ul> <p>Communications Plan</p> <p>Additional content populating the Architecture Repository</p>

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## **Summary**

- Phase A is about project establishment
- It initiates an iteration of the architecture process
- It sets the scope, constraints and expectations for this iteration
- It validates the business context
- It creates the Statement of Architecture Work

### **Exercise**

Complete the following sentence: Phase A Architecture Vision is intended to do all the following except:

- A. Validate the business principles and goals of the organisation
- B. Ensure that the architecture principles are correct
- C. Establish IT Governance
- D. Clarify and correct ambiguities in the architecture principles
- E. Define the specific architecture domains to be addressed

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# **Module 16A**

## **Phase B:**

### **Business Architecture –**

### **Catalogs, Matrices**

### **and Diagrams**

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# Module Objectives

The objectives of this module are to understand:

- The Catalogs, Matrices and Diagrams of Phase B, Business Architecture
- What they consist of
- How they can be used

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## TOGAF Standard, Version 9.2 Artifacts



# Catalogs, Matrices and Diagrams

## Catalogs

- Business Capabilities catalog
- Value Stream catalog
- Value Stream Stages catalog
- organisation/Actor catalog
- Driver/Goal/Objective catalog
- Role catalog
- Business Service/Function catalog
- Location catalog
- Process/Event/Control/Product catalog
- Contract/Measure catalog

## Matrices

- Value Stream/Capability matrix
- Strategy/Capability matrix
- Capability/organisation matrix
- Business Interaction matrix
- Actor/Role matrix

## Diagrams

- Business Model diagram (\*)
- Business Capability map
- Value Stream map
- organisation map
- Business Footprint diagram
- Business Service/Information diagram
- Functional Decomposition diagram
- Product Lifecycle diagram
- Goal/Objective/Service diagram
- Use-Case diagram
- organisation Decomposition diagram
- Process Flow diagram
- Event diagram

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# Catalogs

Catalog	Purpose
<b>Business Capabilities Catalog</b>	A definitive listing of particular abilities that a business may possess or exchange to achieve a specific purpose.
<b>Value Stream Catalog</b>	A definitive listing of end-to-end collections of value-adding activities that create an overall result for a customer, stakeholder, or end user.
<b>Value Stream Stages Catalog</b>	A definitive listing of end-to-end collections of the different stages for the value-adding activities that create an overall result for a customer, stakeholder, or end user; it includes the following metamodel entities: Business Capability Value Stream

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# Catalogs

Catalog	Purpose
<b>Organisation/ Actor Catalog</b>	A definitive listing of all participants that interact with IT, including users and owners of IT systems. It contains the following metamodel entities: <ul style="list-style-type: none"><li>•organisation Unit, Actor Location (may be included in this catalog if an independent Location catalog is not maintained)</li></ul>
<b>Driver/Goal/ Objective Catalog</b>	A cross-organisational reference of how an organisation meets its drivers in practical terms through goals, objectives, and (optionally) measures. It contains the following metamodel entities: <ul style="list-style-type: none"><li>•organisation Unit, Driver, Goal, Objective, Measure (may optionally be included)</li></ul>
<b>Role Catalog</b>	The purpose of the Role catalog is to provide a listing of all authorization levels or zones within an enterprise. Frequently, application security or behavior is defined against locally understood concepts of authorization that create complex and unexpected consequences when combined on the user desktop. It contains the following metamodel entities: <ul style="list-style-type: none"><li>•Role</li></ul>

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# Catalogs

Catalog	Purpose
<b>Business Service/ Function Catalog</b>	A functional decomposition in a form that can be filtered, reported on, and queried, as a supplement to graphical Functional Decomposition diagrams. It contains the following metamodel entities: <ul style="list-style-type: none"><li>•organisation Unit,Business Function, Business Service, Information System Service (may optionally be included here)</li></ul>
<b>Location Catalog</b>	A listing of all locations where an enterprise carries out business operations or houses architecturally relevant assets, such as data centers or end-user computing equipment. It contains the following metamodel entities: <ul style="list-style-type: none"><li>•Location</li></ul>
<b>Process/ Event/ Control/ Product Catalog</b>	The Process/Event/Control/Product catalog provides a hierarchy of processes, events that trigger processes, outputs from processes, and controls applied to the execution of processes. This catalog provides a supplement to any Process Flow diagrams that are created and allows an enterprise to filter, report, and query across organisations and processes to identify scope, commonality, or impact. It contains the following metamodel entities: <ul style="list-style-type: none"><li>•Process, Event, Control, Product</li></ul>

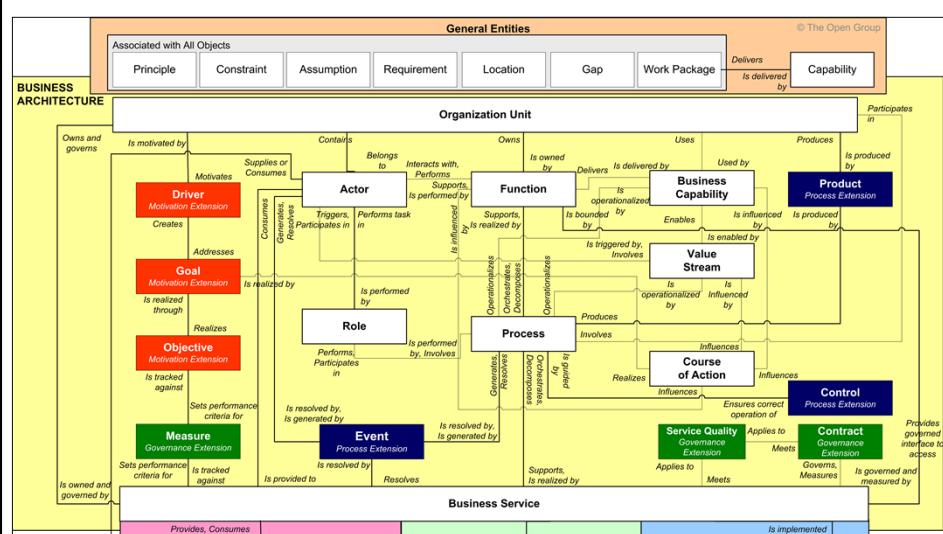
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# Catalogs

Catalog	Purpose
<b>Contract/ Measure Catalog</b>	<p>A listing of all agreed service contracts and (optionally) the measures attached to those contracts. It forms the master list of service levels agreed to across the enterprise.</p> <p>It contains the following metamodel entities:</p> <ul style="list-style-type: none"> <li>•Business Service</li> <li>•Information System Service (optionally)</li> <li>•Contract</li> <li>•Measure</li> </ul>

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# Exercise



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## Matrices

- Capability/organisation matrix
- Strategy/Capability matrix
- Value Stream/Capability matrix
- Business Interaction matrix
- Actor/Role matrix

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## Capability/Organisation Matrix

- The purpose of this matrix is to show the organisation elements that implement each capability.

Business Capability	Value Stream	organisation Unit
Program Management	Define Position	Business Development
HR Management	Interview Candidates	Human Resources
Finance Management	Communicate Position	Finance

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## Strategy/Capability Matrix

- The purpose of this matrix is to show the capabilities required to support specific strategy statements

Strategy Statement	Business Capabilities
Leverage brand names and strategically link businesses for synergy	Legal services, Marketing management, Product development
Invest to accelerate growth of the company	Finance Management, Mergers and Acquisitions

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## Value Stream/Capability Matrix

- The purpose of this matrix is to show the capabilities required to support each stage of a value stream.

Value Stream Stage	Business Capabilities
Define Position	Program Management, HR Management
Communicate Position	HR Management, Finance Management
Assess Responses	HR Management
Interview Candidates	HR Management, Agreement Management
Onboard Employee	HR Management, Asset Management, Facilities Management, Security Management, Information Management

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## Business Interaction Matrix

- The purpose of this matrix is to depict the relationship interactions between organisations and business functions across the enterprise.

		Providing Business Services				
Consuming Business Services		Engineering	Procurement	Manufacturing	Sales and Distribution	Customer Service
Engineering						
Procurement						
Manufacturing		Contract for supply of materials			Contract for supply of sales forecasts	
Sales and Distribution		Contract for supply of product specification		Contract for supply of product		
Customer Service					Contract for fulfillment of customer orders	

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## Actor/Role Matrix

- This matrix shows which actors perform which roles, supporting definition of security and skills requirements.

	Office of CIO Actors		Steering Group Actors		Business Unit Actors		Strategy and Architecture Actors		Infrastructure Implementation Actors		IT Operations	Project Manager	External Vendors / Suppliers		
	CIO	Enterprise Architect	Enterprise Design Authority	Technical Design Authority	IT Management Forum	Business Unit Head	Business Unit Service Owner	Business Unit Application Architect	Head of Strategy and Architecture	Infrastructure Strategist	Infrastructure Solution Architect	Architecture Configuration Mgr	Enterprise Infrastructure Architect	Head of Implementation	Infrastructure Designer
<small>R = Responsible for carrying out the role A = Accountable for actors carrying out the role C = Consulted in carrying out the role I = Informed in carrying out the role</small>															
Strategy Lifecycle Roles	I	R	A	I	C	C	R	C	C	I	I	R	I	C	C
Architecture Refresh	I	C	A	I	R	C	I	C	R	I	I	R	C	C	I
Architecture Roadmap	I	I	I	I	I	I	I	I	I	R	I	R	I	C	A
Benefits Assessment	I	I	I	I	I	I	I	I	I	R	I	R	I	C	A
Change Management	C	I	A	I	I	I	R	I	I	I	R	R	R	C	I
Framework Refresh	C	C	C	C	I	C	A	I	I	I	R	C	C	I	I
Project Lifecycle Roles	I	I	I	A	I	I	C	C	I	I	R	I	C	C	R
Solution Architecture Vision	I	I	I	A	I	I	C	C	I	I	R	I	C	C	R
Logical Solution Architecture				A	I	I	C	C	I	I	R	I	C	C	R
Physical Solution Architecture				A	I	I	C	C	I	I	R	I	C	R	C
Design Governance				A	I	I	C	C	I	I	R	I	C	R	C
Architecture Configuration Management	C						I	I	R	R	R		A		

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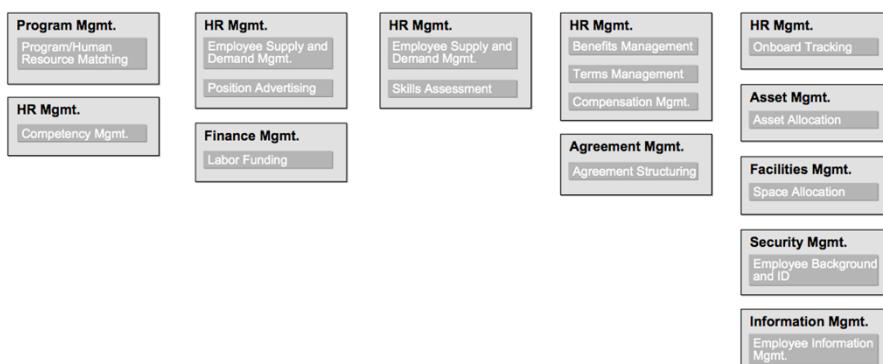
# Diagrams

- Business Capability Map
- Value Stream Map
- organisation Map
- Business Footprint diagram
- Business Service/Information diagram
- Functional Decomposition diagram
- Product Lifecycle diagram
- Goal/Objective/Service diagram
- Use-Case diagram
- organisation Decomposition diagram
- Process Flow diagram
- Event diagram

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## Business Capability Map

- A family of diagrams representing a definitive listing of the particular abilities that a business may possess or exchange to achieve a specific purpose.



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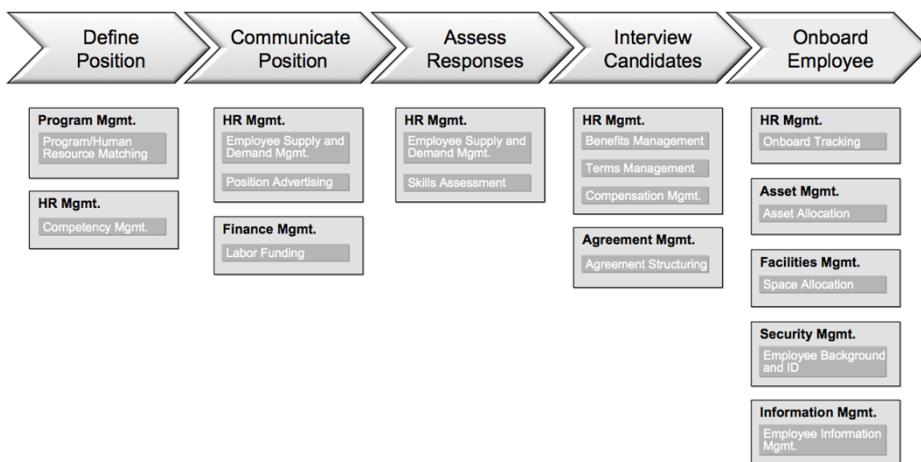
## Value Stream Map

- A family of diagrams representing a definitive listing of end-to-end collections of value-adding activities that create an overall result for a customer, stakeholder, or end user.



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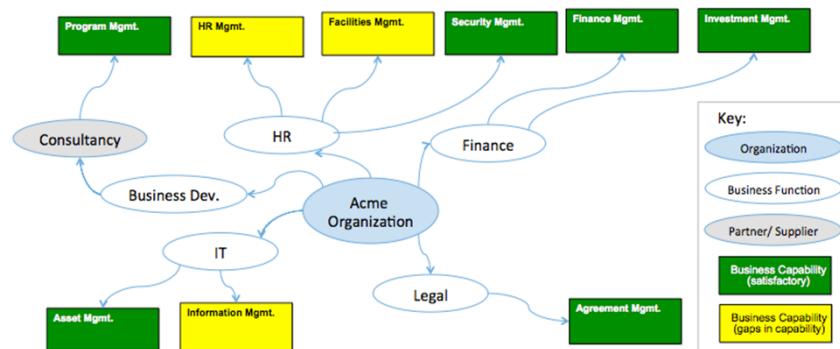
## Mapping Value Streams to Business Capabilities



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## Organisation Map

- A diagram showing the relationships between the primary entities that make up the enterprise, its partners, and stakeholders



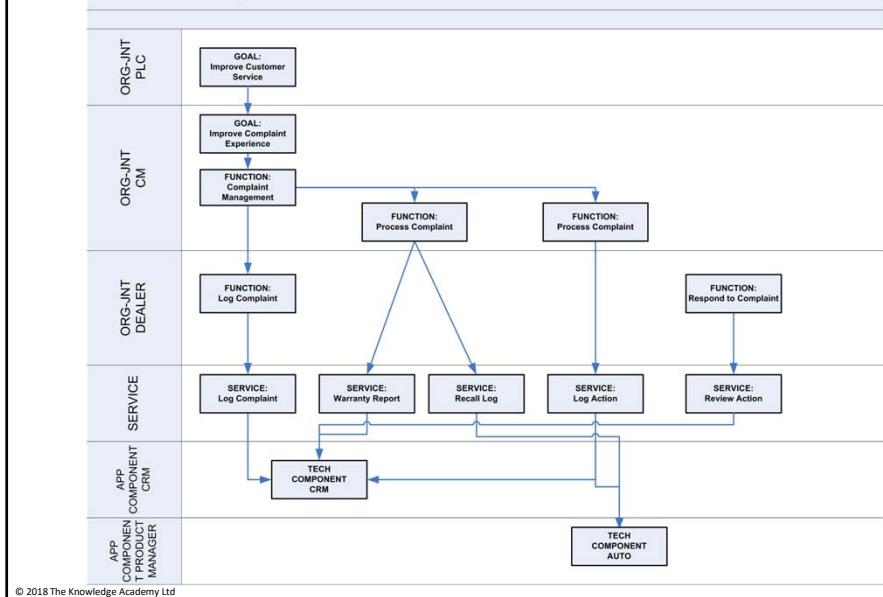
## Business Footprint Diagram

- Describes the links between business goals, organisational units, business functions, and services, and maps these functions to the technical components delivering the required capability.
- Demonstrates only the key facts linking organisation unit functions to delivery services and is utilized as a communication platform for senior-level (CxO) stakeholders

## Example Business Footprint Diagram

Business Footprint Diagram

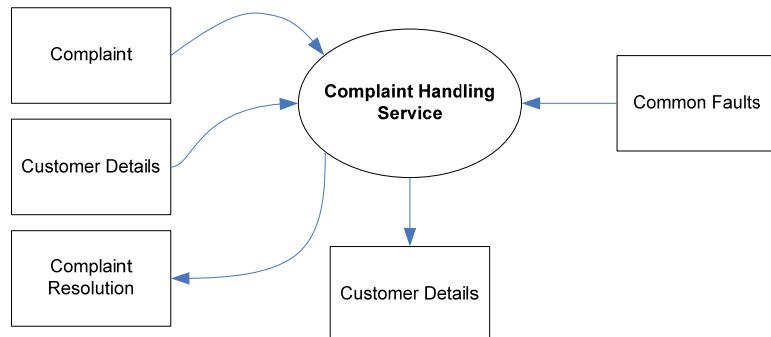
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## Business Service/Information Diagram

- Shows the information needed to support one or more business services.
- Shows what data is consumed by or produced by a business service and may also show the source of information.
- Shows an initial representation of the information present within the architecture and therefore forms a basis for elaboration and refinement within Phase C (Data Architecture).

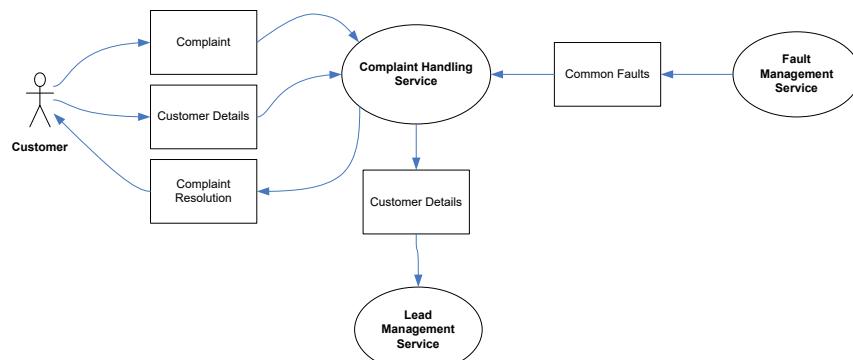
## Example Business Service/Information Diagram



Basic example

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## Example Business Service/Information Diagram



Extended example showing actors and service interactions

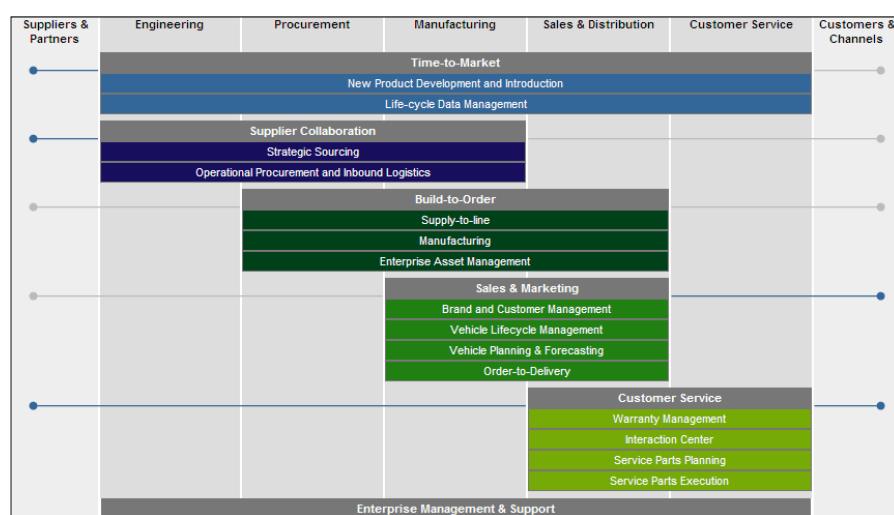
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## Functional Decomposition Diagram

- It shows on a single page the capabilities of an organisation that are relevant to the consideration of an architecture.
- By examining the capabilities of an organisation from a functional perspective, it is possible to quickly develop models of what the organisation does without being dragged into extended debate on how the organisation does it.

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## Example Functional Decomposition Diagram



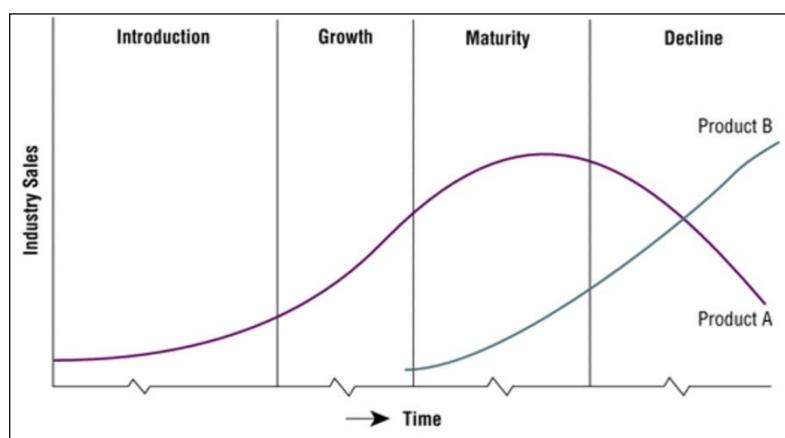
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## Product Lifecycle Diagram

- This assists in understanding the lifecycles of key entities within the enterprise.
- Understanding product lifecycles is becoming increasingly important with respect to environmental concerns, legislation, and regulation where products must be tracked from manufacture to disposal.
- Equally, organisations that create products that involve personal or sensitive information must have a detailed understanding of the product lifecycle during the development of Business Architecture in order to ensure rigor in design of controls, processes, and procedures. Examples of this include credit cards, debit cards, store/loyalty cards, smart cards, user identity credentials (identity cards, passports, etc.).

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## Example Product Lifecycle Diagram



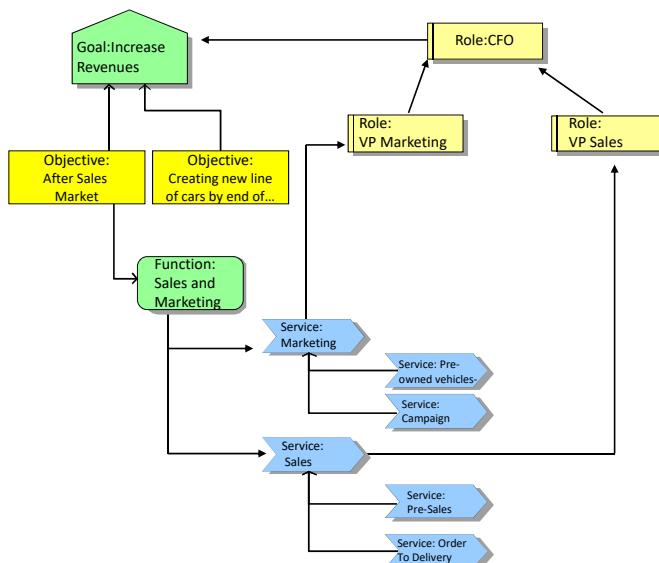
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## Goal/Objective/Service Diagram

- This defines the ways in which a service contributes to the achievement of a business vision or strategy.
- Services are associated with the drivers, goals, objectives, and measures that they support, allowing the enterprise to understand which services contribute to similar aspects of business performance.
- This also provides qualitative input on what constitutes high performance for a particular service.

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## Example Goal/Objective/Service Diagram



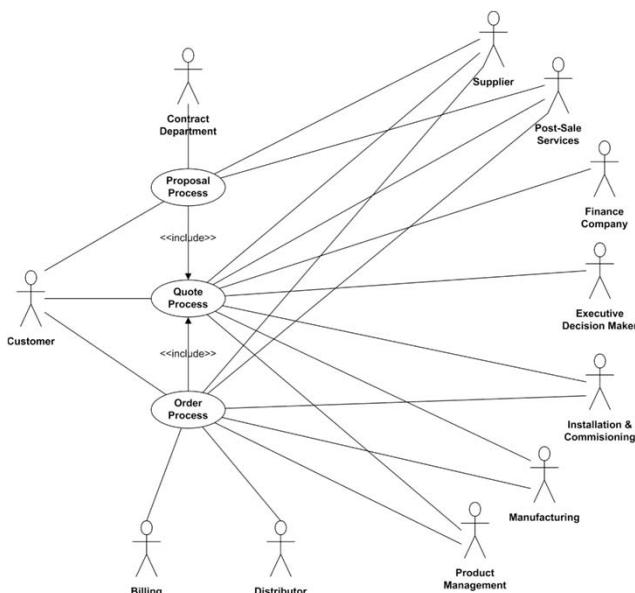
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## Business Use-Case Diagram

- This displays the relationships between consumers and providers of business services.
- Business services are consumed by actors or other business services and the Business Use-Case diagram provides added richness in describing business capability by illustrating how and when that capability is used.
- They help to describe and validate the interaction between actors and their roles to processes and functions.
- As the architecture progresses, the use-case can evolve from the business level to include data, application, and technology details. Architectural business use-cases can also be re-used in systems design work.

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## Example Business Use-Case Diagram



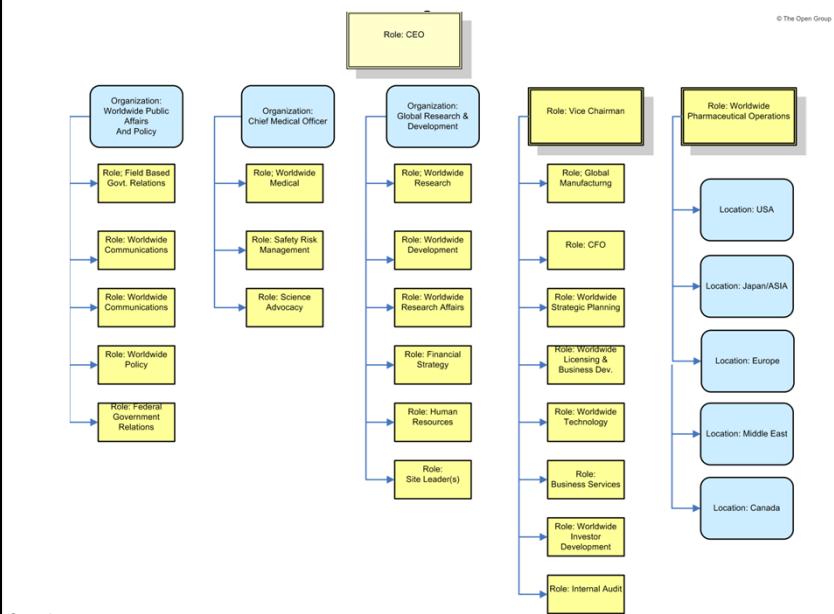
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## Organisation Decomposition Diagram

- This describes the links between actor, roles, and location within an organisation tree.
- An organisation map should provide a chain of command of owners and decision-makers in the organisation.

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## Example Organisation Decomposition



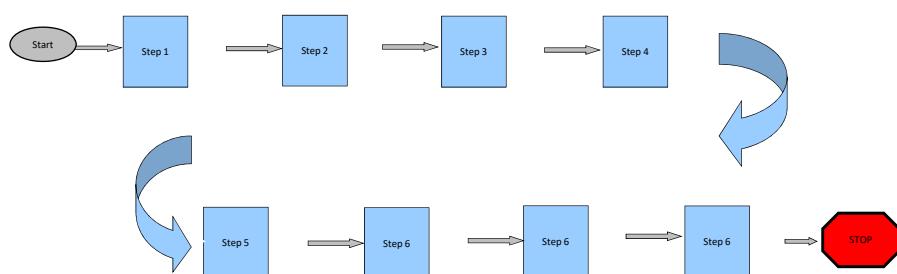
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## Process Flow Diagram

- This depicts all models and mappings related to the process metamodel entity.
- It shows sequential flow of control between activities and may utilize swim-lane techniques to represent ownership and realization of process steps.
- In addition to showing a sequence of activity, process flows can also be used to detail the controls that apply to a process, the events that trigger or result from completion of a process, and also the products that are generated from process execution.

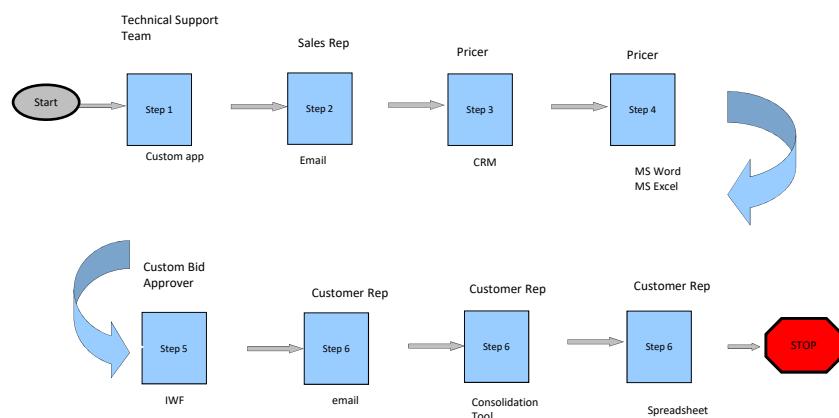
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## Example Process Flow Diagram



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## Example Process Flow Diagram

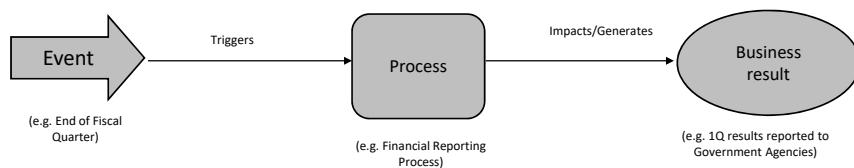


Process Flow (w/Roles & Applications)

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## Events Diagram

- This depicts the relationship between events and process.
- Certain events - such as arrival of information (e.g. a customer's sales order) or a point in time (e.g. end of fiscal quarter) cause work and actions to be undertaken within the business.



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## Example Events Matrix

EVENT	PROCESS TRIGGERED	BUSINESS RESULT(S)
Customer submits sales order	Sales order processing <ul style="list-style-type: none"><li>▪ Create &amp; save sales order</li><li>▪ Generate acknowledgement</li><li>▪ Confirm receipt of customer order</li><li>▪ Begin order fulfillment activities</li></ul>	<ul style="list-style-type: none"><li>▪ Sales order captured in order book</li></ul>
Customer submits request for custom product	Custom product configuration <ul style="list-style-type: none"><li>▪ Capture requirements from customer</li><li>▪ Define custom specifications</li><li>▪ Price custom configuration</li><li>▪ Negotiate with customer</li><li>▪ Secure approval from customer regarding configuration and price</li></ul>	<ul style="list-style-type: none"><li>▪ Custom product configured</li><li>▪ Customer contract signed</li></ul>
End of quarter	Financial reporting process	<ul style="list-style-type: none"><li>▪ Financial report generated</li></ul>

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## Module 16 Phase B: Business Architecture

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# Module Objectives

The objectives of this module are to understand Phase B:

- Objectives
- Approach
- Steps
- Inputs
- Outputs

## **Business Architecture Objectives**

- Develop the Target Business Architecture that describes how the enterprise needs to operate to achieve the business goals, and respond to the strategic drivers set out in the Architecture Vision in a way that addresses the Statement of Architecture Work and stakeholder concerns
- Identify candidate Architecture Roadmap components based upon gaps between the Baseline and Target Business Architectures

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# Approach

- Knowledge of the Business Architecture is a prerequisite for architecture work in the other domains (Data, Applications, Technology)
  - and so is the first activity that needs to be undertaken.
- Business Strategy defines *what* to achieve
- Business Architecture describes *how* to achieve it
- This Phase is often required to demonstrate business value of subsequent work to key stakeholders.

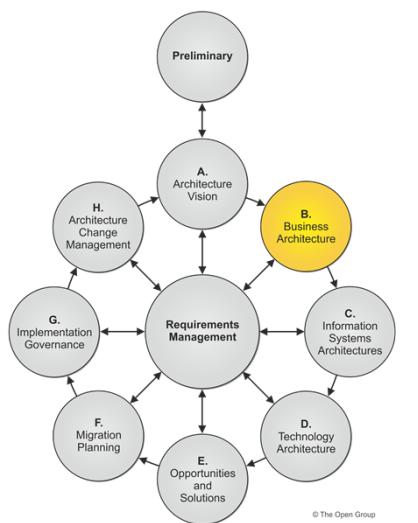
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# Approach

- Scope depends on existing strategy and planning
  - Update and verify
  - bridge between high-level business drivers, strategy, and
  - goals on the one hand, and specific business requirements
  - Existing architecture discovery must include all relevant detail
- If there is no existing strategy or planning:
  - Identify any existing architecture definitions, then verify and update
  - New process definitions may require detailed work
- In both cases, use business scenarios to identify key business objectives and processes

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## Phase B: Inputs



- Request for Architecture Work
- Business principles, business goals and business drivers
- Capability Assessment
- Communications Plan
- organisation Model for Enterprise Architecture
- Tailored Architecture Framework
- Approved Statement of Architecture Work
- Architecture Principles
- Enterprise Continuum
- Architecture Repository
- Architecture Vision
- Draft Architecture Definition Document

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# Steps



The order of the steps should be adapted to the situation.

In particular you should determine whether it is appropriate to do the Baseline Business Architecture or Target Business Architecture development first

1. Select reference models, viewpoints, and tools
2. Develop Baseline **Business** Architecture Description
3. Develop Target **Business** Architecture Description
4. Perform gap analysis
5. Define candidate roadmap components
6. Resolve impacts across the Architecture Landscape
7. Conduct formal stakeholder review
8. finalise the **Business** Architecture
9. Create Architecture Definition Document

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## Step 1: Select Reference Models, Viewpoints, and Tools

- Select relevant Business Architecture resources from the Architecture Repository, on the basis of the business drivers, stakeholders and concerns.
- Select relevant Business Architecture viewpoints that will enable the architect to demonstrate how the stakeholder concerns are being addressed.
- Identify appropriate tools and techniques to be used for capture, modeling, and analysis with the viewpoints.
- Determine Overall Modeling Process
  - Techniques include:
    - Capability Mapping
    - organisation Mapping
    - Value Stream Mapping
    - Structured Analysis
    - Use-Case Analysis
    - Process Modeling

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# Step 1: Select Reference Models, Viewpoints, and Tools

- Identify Required Service Granularity Level, Boundaries, and Contracts
- Identify Required Catalogs. Matrices, and Diagrams
  - See next slide
- Identify Types of Requirement to be Collected
  - Identify requirements to be met by the Architecture
  - Formalize the business-focused requirements
  - Provide requirements input for Data, Application and Technology Architectures
  - If applicable, provide detailed guidance to be reflected during design and implementation

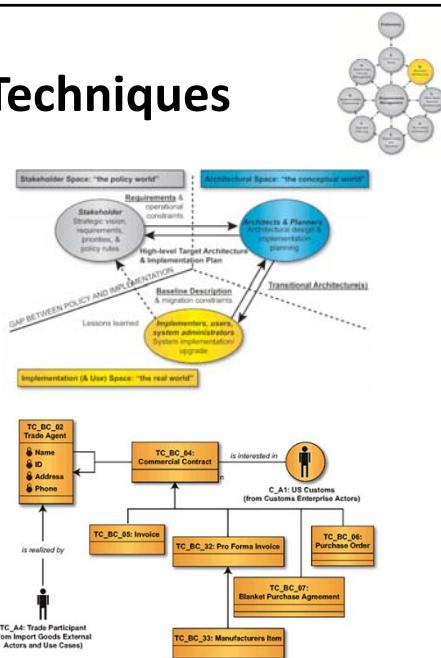
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# Additional Techniques

	1. Initiate	2. Discuss Requirements	3. Create Contract	4. Verify Contract	5. Price	6. Confirm	7. Order	8. Accept
Sales Person	Greets customer	Linen	Discusses options with different capabilities	Accepts price quote from IC Sys and Sales Sys and presents delivery to customer	Accesses price system and presents price to customer	Accesses order system	Presents contract	
Customer	Accepts sales person's products	Discusses problems/decisions	Linen and decides on options based on capabilities	Accepts or rejects	Accepts or rejects			Signs or rejects
Sales Person's Laptop			Interacts with configurator	Interacts with IC Sys and Sales Sys	Interacts with price system	Interacts with order system and receives fax response		
Sales Person's CDR			Provides central information processing					
Sales Person's LDR			Provides local information processing					
ProdConfig			Provides config to sales person per needs, providing capabilities					
IC Sys			Provides availability					
SaSys			Provides delivery date					
B Sys			Provides price information in a config					
OrderSys					Processes order and sends fax order to sales person's laptop			

Table 32.1: Use-Case Table of Sales Process

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## TOGAF Standard, Version 9.2 Artifacts



## Step 2: Develop Baseline Business Architecture Description

- Must be complete, but without unnecessary detail
- If possible, identify the relevant Business Architecture building blocks, drawing on the Architecture Repository
- If not, develop a new architecture description:
  - use the models identified within Step 1 as a guideline

## **Step 3: Develop Target Business Architecture Description**

- If possible, identify the relevant Business Architecture building blocks, drawing on the Architecture Repository
- If not, develop a new architecture description:
  - use the models identified within Step 1 as a guideline

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## **Step 4: Perform Gap Analysis**

Verify the architecture models for internal consistency and accuracy:

- Perform trade-off analysis to resolve conflicts (if any) among the different views
- Validate that the models support the principles, objectives, and constraints
- Note changes to the viewpoint represented in the selected models from the Architecture Repository, and document
- Test architecture models for completeness against requirements
- Identify gaps between the baseline and target using Gap Analysis technique

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## Step 4: Perform Gap Analysis

Gap analysis highlights services and/or functions that have been omitted or are yet to be developed; these are the gaps. They should be marked as ‘correctly eliminated’ or as ‘to be addressed by reinstating, developing or procuring’.

1. Create a matrix of business ABBs:
  - Put ‘Current architecture’ + ‘New Services’ on the vertical axis
  - Put ‘Target Architecture’ + ‘Eliminated Services’ on the horizontal axis
2. Mark ABBs that are common to both as ‘Included’
3. Review blocks missing from current:
  - Confirm as ‘Eliminated’
  - Else mark for ‘Review’
4. Mark any ‘New Services’ as gap to be filled by acquiring function by either:
  - Development
  - Procurement

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## Gap Analysis Exercise

Given the following ABBs in the baseline architecture:

- Broadcast services, Video conferencing services, Enhanced telephony services, Shared screen services.

And the following ABBs in the target architecture:

- Video conferencing services, Enhanced telephony services, Mailing list services.

Assume that ‘Shared screen services’ has been unintentionally excluded and that the ‘Enhanced telephony services’ of the baseline may match those needed.

Draw the gap analysis matrix.

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## Gap Analysis: Answer

Target Architecture → ↓ Current Architecture	Video Conferencing Services	Enhanced Telephony Services	Mailing List Services	Eliminated Services ↓
Broadcast Services				Intentionally Eliminated
Video Conferencing Services	Included			
Enhanced Telephony Services		Potential Match		
Shared Screen Services				Unintentionally excluded - a gap in target architecture
New →		Gap: Enhanced services to be developed or produced	Gap: to be developed or produced	

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## Step 5: Define Candidate Roadmap Components

- The initial Business Architecture roadmap will be used as raw material to support more detailed definition of a consolidated, cross-discipline roadmap within the Opportunities & Solutions phase.

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## **Step 6: Resolve Impacts Across the Architecture Landscape**

- Architecture artifacts in the Architecture Landscape should be examined to identify:
  - Does this Business Architecture create an impact on any pre-existing architectures?
  - Have recent changes been made that impact on the Business Architecture?
  - Are there any opportunities to leverage work from this Business Architecture in other areas of the organisation?
  - Does this Business Architecture impact other projects ?
  - Will this Business Architecture be impacted by other projects?

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## **Step 7: Conduct Formal Stakeholder Review**

- This is a formal review of the model and building blocks selected.
- The purpose is to compare proposed business architecture against the SOW.
- It is possible to loop back to earlier steps if necessary.

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## **Step 8: Finalise the Business Architecture**

- Select standards for each of the ABBs, reusing where possible from the Architecture Repository.
- Fully document each ABB.
- Cross check the overall architecture against the business goals.
- Document final requirements traceability report.
- Document final mapping of the architecture within the Architecture Repository. From the selected ABBs, identify those that might be reused and publish via the architecture repository.

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## **Step 9: Create Architecture Definition Document**

- Document the rationale for all building block decisions in the architecture definition document.
- Prepare the Business sections of the architecture definition document report.
- If appropriate, use reports and/or graphics generated by modeling tools to demonstrate key views of the architecture. Route the document for review by relevant stakeholders, and incorporate feedback.

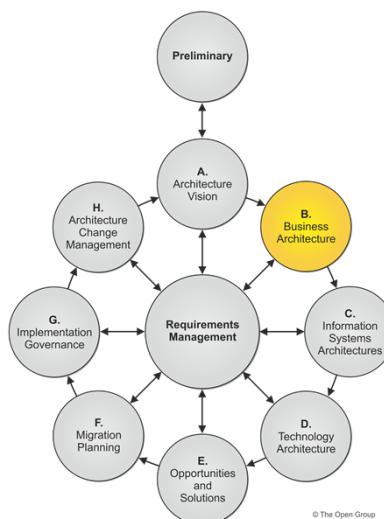
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## Summary of Building Block usage in Phase B

- When creating the Baseline and Target Architecture descriptions, the architect should identify relevant Business Architecture building blocks
  - Drawing from the Architecture Repository
  - TOGAF includes example catalogs, matrices and diagrams that can be used to model the decomposition of a building block
- Gap Analysis is used to identify building blocks to carry over to the target; eliminated building blocks; and new, required building blocks
- When finalizing the Business Architecture, standards are selected for each building block
  - each building block is documented
  - those which look likely to be re-usable are published in the Architecture Repository

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## Phase B: Outputs



- Statement of Architecture Work
- Validated business principles, goals and drivers
- Refined and updated Business Architecture Principles
- Draft Architecture Definition Document
- Draft Architecture Requirements Specification
- Business Architecture components of an Architecture Roadmap

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# Architecture Definition Document

- Scope
- Goals, objectives, and constraints
- Architecture Principles
- Baseline Architecture
- Architecture models (for each state to be modeled):
  - Business Architecture models
  - Data Architecture models
  - Application Architecture models
  - Technology Architecture models
- Rationale and justification for architectural approach
- Mapping to Architecture Repository:
  - Mapping to Architecture Landscape
  - Mapping to reference models
  - Mapping to standards
  - Re-use assessment
- Gap analysis
- Impact assessment
- Transition Architecture

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## Architecture Definition Document – Business Architecture Components

- Baseline Business Architecture, if appropriate – this is a description of the existing Business Architecture
- Target Business Architecture, including:
  - organisation structure – identifying business locations and relating them to organisational units
  - Business goals and objectives – for the enterprise and each organisational unit
  - Business functions – a detailed, recursive step involving successive decomposition of major functional areas into sub-functions
  - Business services – the services that the enterprise and each enterprise unit provides to its customers, both internally and externally
  - Business processes, including measures and deliverables
  - Business roles, including development and modification of skills requirements
  - Business data model
  - Correlation of organisation and functions – relate business functions to organisational units in the form of a matrix report
- Views corresponding to the selected viewpoints addressing key stakeholder concerns

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# **Architecture Requirements Specification**

- Success measures
- Architecture requirements
- Business service contracts
- Application service contracts
- Implementation guidelines
- Implementation specifications
- Implementation standards
- Interoperability requirements
- IT service management requirements
- Constraints
- Assumptions

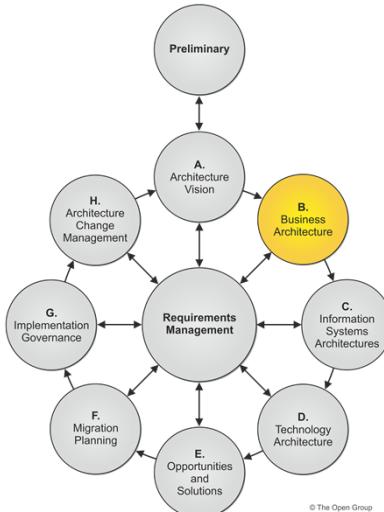
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## **Architecture Requirements Specification – Business Architecture Components**

- Gap analysis results
- Technical requirements
- Updated business requirements

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# Summary



- Phase B is about the development of the Business Architecture:

- a holistic representation of business capabilities, end-to-end value delivery, information, and organisational structure, along with the relationships to strategies, products, policies, initiatives, and stakeholders.

- It should show how the organisation meets its business goals.

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# Summary

Phase B: Business Architecture			
Objectives	Steps	Inputs	Outputs
Develop the Target Business Architecture that describes how the enterprise needs to operate to achieve the business goals, and respond to the strategic drivers set out in the Architecture Vision in a way that addresses the Statement of Architecture Work and stakeholder concerns	Select reference models, viewpoints, and tools  Develop Baseline Business Architecture Description  Develop Target Business Architecture Description  Perform gap analysis  Define candidate roadmap components  Resolve impacts across the Architecture Landscape  Conduct formal stakeholder review  finalise the Business Architecture  Create Architecture Definition Document	Request for Architecture Work Business principles, business goals, and business drivers  Capability Assessment Communications Plan organisational Model for Enterprise Architecture Tailored Architecture Framework Approved Statement of Architecture Work Architecture Principles, including business principles, when pre-existing Enterprise Continuum Architecture Repository Architecture Vision, including: <ul style="list-style-type: none"><li>• Refined key high-level stakeholder requirements</li></ul> Draft Architecture Definition Document, including: <ul style="list-style-type: none"><li>• Baseline Business Architecture (high-level)</li><li>• Baseline Data Architecture (high-level)</li><li>• Baseline Application Architecture (high-level)</li><li>• Baseline Technology Architecture (high-level)</li><li>• Target Business Architecture (high-level)</li><li>• Target Data Architecture (high-level)</li><li>• Target Application Architecture (high-level)</li><li>• Target Technology Architecture (high-level)</li></ul>	Statement of Architecture Work, updated if necessary Validated business principles, business goals, and business drivers Refined and updated Architecture Principles, if applicable Draft Architecture Definition Document containing content updates: <ul style="list-style-type: none"><li>• Baseline Business Architecture (detailed), if appropriate</li><li>• Target Business Architecture (detailed with Business Capabilities, Value Streams, and organisation Map as core artifacts)</li><li>• Views corresponding to selected viewpoints addressing key stakeholder concerns</li></ul> Draft Architecture Requirements Specification including content updates: <ul style="list-style-type: none"><li>• Gap analysis results</li><li>• Technical requirements</li><li>• Updated business requirements</li></ul> Business Architecture components of an Architecture Roadmap
Identify candidate Architecture Roadmap components based upon gaps between the Baseline and Target Business Architectures			

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## **Exercise**

**Q. Choose the correct ending for the following phrase:  
“Business Architecture is the first architecture activity undertaken because  
...”**

- A. It is often necessary to demonstrate the business value of the overall architecture activity
- B. It provides knowledge that is a prerequisite for undertaking architecture work in the other domains (data, applications, technology)
- C. It can be used to demonstrate the return on investment to key stakeholders
- D. It embodies the fundamental organisation of a business and shows how an organisation meets its business goals
- E. All of the above

**Identify five sources of information within your organisation that could be used to draw up a Baseline Business Architecture Description.**

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## **Module 17**

### **Phase C:**

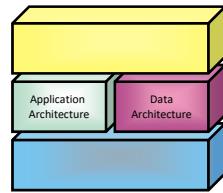
### **Information Systems**

### **Architectures – Overview**

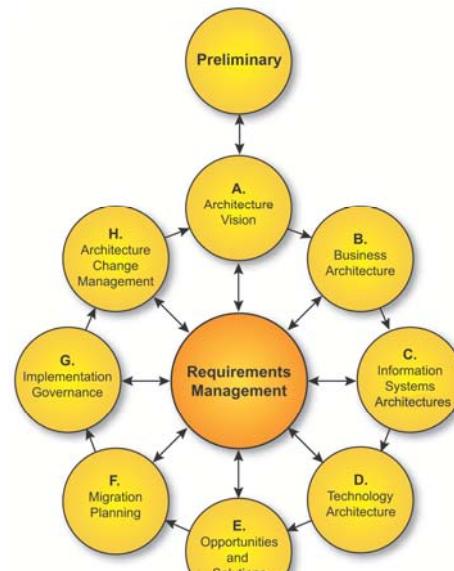
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# Phase C: Information Systems Architectures – Overview



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## Module Objectives

The aim of this module is to understand:

- The objectives of Phase C, Information Systems Architectures
- The Approach
- A brief overview of the inputs and outputs

This module is an introduction to the next two modules that look at the two Information Systems Architectures

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## Information Systems Architectures – Objectives

- Develop the Target Data/Application Architecture that enables the Business Architecture and the Architecture Vision, in a way that addresses the Statement of Architecture Work and stakeholder concerns
- Identify candidate Architecture Roadmap components based upon gaps between the Baseline and Target Information Systems (Data and Application) Architectures

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## Approach

Phase C involves Data and Applications Architecture, in either order.

Advocates exist for both sequences:

- Spewak's *Enterprise Architecture Planning* recommends a data-driven sequence.
- Major applications systems (ERP, CRM, ...) often combine technology infrastructure and application logic.  
An application-driven approach takes core applications (underpinning mission-critical business processes) as the primary focus of the architecture effort.
- Integration issues often constitute a major challenge.

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## **Top-Down Design – Bottom-up Implementation**

- **Design:**
  1. Business Architecture
  2. Data (or Applications) Architecture
  3. Applications (or Data) Architecture
  4. Technology Architecture
- **Implementation:**
  1. Technology Architecture
  2. Applications (or Data) Architecture
  3. Data (or Applications) Architecture
  4. Business Architecture

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## **Alternative Approach: Data-Driven Sequence Implementation**

1. First implement application systems that **create** data
2. Then applications that **process** the data
3. Finally, applications that **archive** data

### **Considerations for Data Architecture**

- Data Management
- Data Migration
- Data Governance

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## Approach: Architecture Repository

- Consider generic models relevant to an organisation's industry
  - Data Architecture Resources
    - Generic data models, for example the ARTS data models (Retail industry), Energistics Data Exchange Standards (Petrotechnical industry)
  - Application Architecture Resources
    - Generic application models, for example from the TM Forum (telecommunications industry), the OMG has a number of software models for specific verticals (Healthcare, Transportation, Finance etc)

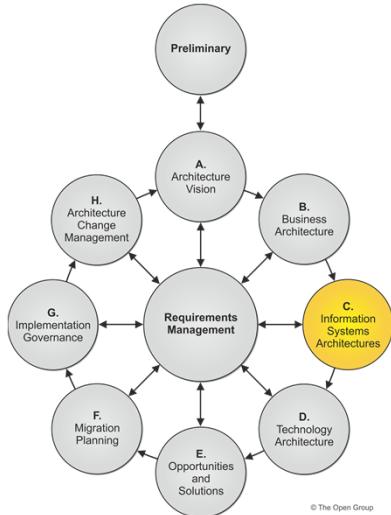
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## Phase C: Inputs

- Request for Architecture Work
- Capability Assessment
- Communications Plan
- organisation model for enterprise architecture
- Tailored Architecture Framework
- Data/Application principles
- Statement of Architecture Work
- Architecture Vision
- Architecture Repository
- Draft Architecture Definition Document
- Draft Architecture Requirements Specification, including:
  - Gap analysis results
  - Relevant technical requirements
- Business Architecture components of an Architecture Roadmap

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## Summary



- The objective of Phase C is to document the fundamental organisation of an organisation's IT System
  - Embodied in the major types of information and the application systems that process them
  - Their relationships to each other and the environment
  - The principles governing its design and evolution
  - It should document how the IT systems meets the business goals of the organisation

## Test Yourself Question

- Q. Which of the following describes the order of steps in Phase C?
- A Data Architecture first
  - B Applications Architecture first
  - C Either Data Architecture or Applications Architectures first, as long as both are done
  - D Data Architecture and Applications Architecture must be carried out in parallel
  - E Either Data Architecture or Applications Architecture first, or both in parallel depending on the project scope and the best fit with the Business Architecture

# **Module 18A**

## **Phase C: Data Architecture – Catalogs, Matrices, and Diagrams**

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## **Module Objectives**

The objectives of this module are to understand:

- The Catalogs, Matrices and Diagrams of Phase C, Data Architecture
- What they consist of
- How they are used

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# Catalogs, Matrices and Diagrams

## Catalogs

- Data Entity/Data Component catalog

## Matrices

- Data Entity/Business Function matrix
- Application/Data matrix



The exact format of the catalogs, matrices and diagrams will depend on the tools used

## Diagrams

- Conceptual Data diagram
- Logical Data diagram
- Data Dissemination diagram
- Data Security diagram
- Data Migration diagram
- Data Lifecycle diagram

Slide 541

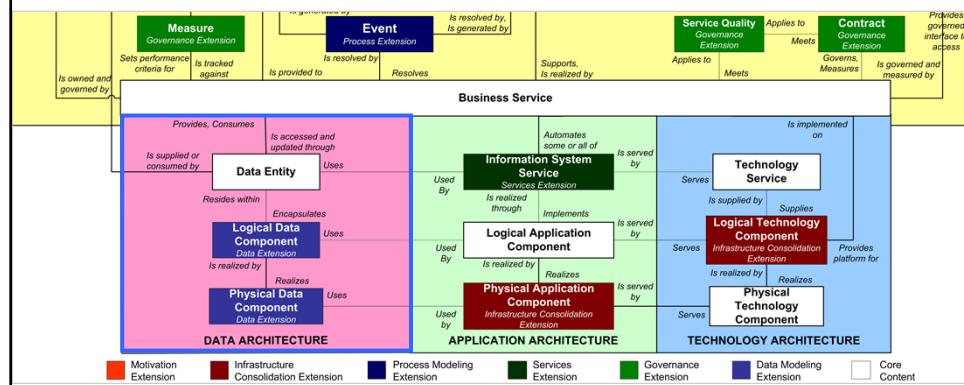
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## Catalogs

Catalog	Purpose
Data Entity/Data Component Catalog	To identify and maintain a list of all the data use across the enterprise, including data entities and also the data components where data entities are stored.  It contains the following metamodel entities: <ul style="list-style-type: none"><li>•Data Entity</li><li>•Logical Data Component</li><li>•Physical Data Component</li></ul>

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## Exercise



## Data Entity/Business Function Matrix

Matrices:

- Data Entity/Business Function matrix
- Application/Data matrix
- The Data Entity/Business Function matrix depicts the relationship between data entities and business functions within the enterprise.
- The mapping of the Data Entity-Business Function relationship enables:
  - Assignment of ownership of data entities to organisations
  - Understand the data and information exchange requirements business services
  - Support the gap analysis and determine whether any data entities are missing and need to be created
  - Define system of origin, system of record, and system of reference for data entities
  - Enable development of data governance programs across the enterprise (establish data steward, develop data standards pertinent to the business function, etc.)

## Example Data Entity/Business Function Matrix

BUSINESS FUNCTION (Y-AXIS) / DATA ENTITY (X-AXIS)	CUSTOMER MASTER	BUSINESS PARTNER	CUSTOMER LEADS	PRODUCT MASTER
Customer Relationship Management	<ul style="list-style-type: none"> <li>▪ Business partner data management service</li> <li>▪ Owner – Sales &amp; Marketing business unit executive</li> <li>▪ Function can Create, read, update and delete customer master data</li> </ul>	<ul style="list-style-type: none"> <li>▪ Business partner data management service</li> <li>▪ Owner of data entity (person or organisation)</li> <li>▪ Function can Create, read, update and delete</li> </ul>	<ul style="list-style-type: none"> <li>▪ Lead Processing Service</li> <li>▪ Owner – Customer Relationship Manager</li> <li>▪ Function can only Create, read, update customer leads</li> </ul>	<ul style="list-style-type: none"> <li>▪ N/A</li> </ul>
Supply Chain Management	<ul style="list-style-type: none"> <li>▪ Customer Requirement Processing Service</li> <li>▪ Owner – Supply Chain Manager</li> </ul>	<ul style="list-style-type: none"> <li>▪ N/A</li> </ul>	<ul style="list-style-type: none"> <li>▪ N/A</li> </ul>	<ul style="list-style-type: none"> <li>▪ Product data management service</li> <li>▪ Owner – Global product development organisation</li> </ul>

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## Application/Data Matrix

- The Application/Data matrix depicts the relationship between applications and the data entities that are accessed and updated by them.
- Applications will create, read, update, and delete specific data entities that are associated with them.
  - For example, a CRM application will create, read, update, and delete customer entity information.

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## Example Application/Data Matrix

APPLICATION (Y-AXIS) AND DATA (X-AXIS)	DESCRIPTION OR COMMENTS	DATA ENTITY	DATA ENTITY TYPE
CRM	=System of record for customer master data	=Customer data	=Master data
Commerce Engine	=System of record for order book	=Sales orders	=Transactional data
Sales Business Warehouse	=Warehouse and data mart that supports North American region	=Intersection of multiple data entities (e.g. All sales orders by customer XYZ and by month for 2006)	=Historical data

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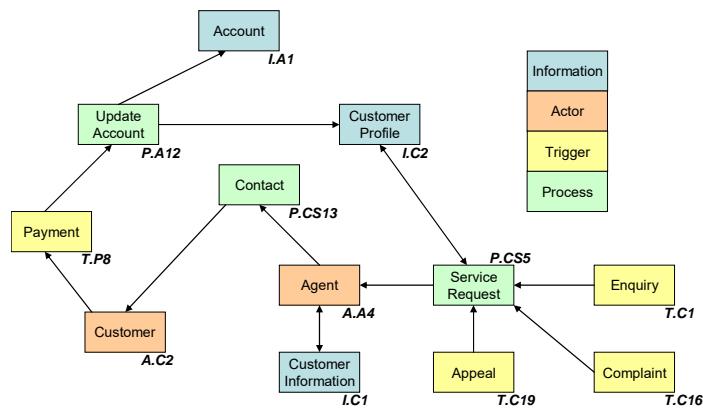
## Diagrams

- Conceptual Data diagram
- Logical Data diagram
- Data Dissemination diagram
- Data Security diagram
- Data Migration diagram
- Data Lifecycle diagram

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## Conceptual Data Diagram

- It depicts the relationships among the critical data entities (or classes) within the enterprise.



## Logical Data Diagram

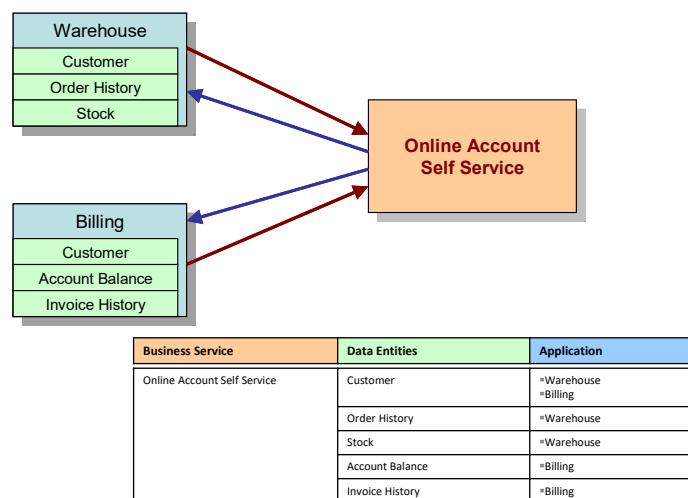
- It depicts logical views relationships among the critical data entities (or classes) within the enterprise.
- The audience is
  - Application developers
  - Database designers

## Data Dissemination Diagram

- The Data Dissemination diagram shows the relationship between
  - data entity
  - business service
  - application components
- The diagram should show how the logical entities are to be physically realized by application components.
- Additionally, the diagram may show data replication and system ownership of the master reference for data.

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## Example Data Dissemination Diagram



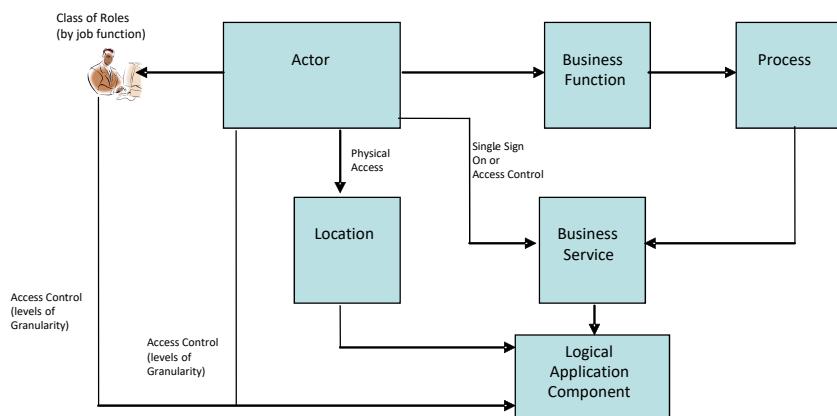
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## Data Security Diagram

- The Data Security diagram depicts which actor (person, organisation, or system) can access which enterprise data.
- This relationship can also be shown in a matrix form between two objects or can be shown as a mapping.

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## Example Data Security Diagram



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## Example Data Security Matrix

ACTOR	CLASS OF ROLES (JOB FUNCTION)	FUNCTION	BUSINESS SERVICE	LOCATION	TYPE OF ACCESS
Financial Analyst	SOA Portfolio Financial Analyst	Financial Analysis	SOA portfolio service	= NA (US, CA) = EMEA (UK, DE) = APJ	= Physical Access Control (tables xyz only)
Procurement & Spend Analyst	Procurement Management and Control	WW Direct Procurement	Supplier portal Service	= NA (US Midwest)	= Access control
WW Contracts System (application)	Not applicable	WW Direct Procurement	Supplier Portal Service	= LA	= Access control (system to system)
WW Product Development (Org Unit)	Geo Brand Managers	WW Direct Procurement	Supplier Portal Service	= WW (all Geos)	= Access Control

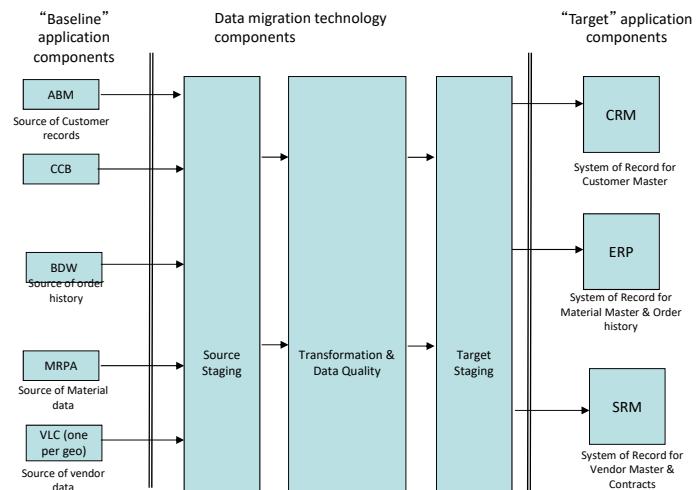
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## Data Migration Diagram

- The Data Migration diagram shows the flow of data from the source to the target applications.
- The diagram provides a visual representation of the spread of sources/targets and serve as a tool for data auditing and establishing traceability.

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## Example Data Migration Diagram



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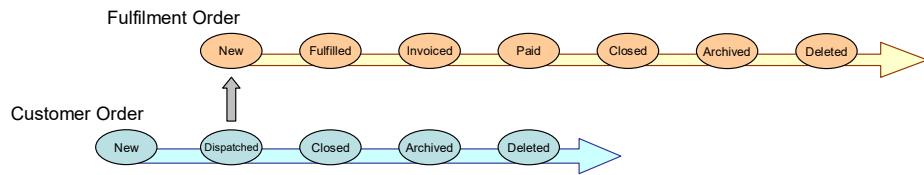
## Example Data Migration Mapping

SOURCE LOGICAL APPLICATION COMPONENT	SOURCE DATA ELEMENT	TARGET LOGICAL APPLICATION COMPONENT	TARGET DATA ELEMENT
ABM	Cust_Name	CRM	CUSTNAME
	Cust_Street_Addr		CUSTADDR_LINE1
	Cust_Street_Addr		CUSTADDR_LINE2
	Cust_Street_Addr		CUSTADDR_LINE3
	Cust_ContactName		CUSTCONTACT
	Cust_Tele		CUSTTELEPHONE

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## Data Lifecycle Diagram

- The Data Lifecycle diagram is an essential part of managing business data throughout its lifecycle from conception until disposal within the constraints of the business process.



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## Module 18 Phase C: Data Architecture

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# Module Objectives

The aim of this module is to understand:

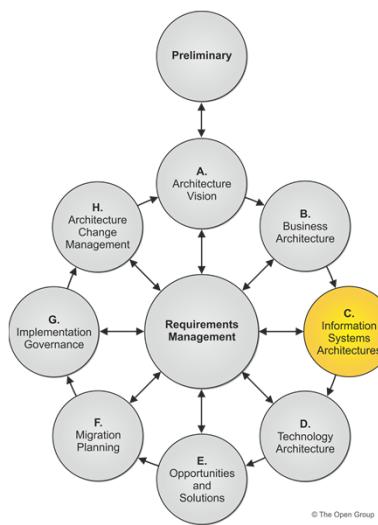
- The objectives of the Data Architecture part of Phase C
- What it consists of
- What inputs are needed for it
- What the outputs are

## Data Architecture Objectives

- Develop the Target Data Architecture that enables the Business Architecture and the Architecture Vision, in a way that addresses the Statement of Architecture Work and stakeholder concerns
- Identify candidate Architecture Roadmap components based upon gaps between the Baseline and Target Data Architectures

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# Phase C – Data: Inputs



- Request for Architecture Work
- Capability Assessment
- Communications Plan
- organisation model for enterprise architecture
- Tailored Architecture Framework
- Data principles
- Statement of Architecture Work
- Architecture Vision
- Architecture Repository
- Draft Architecture Definition Document
- Draft Architecture Requirements Specification, including:
  - Gap analysis results
  - Relevant technical requirements
- Business Architecture components of an Architecture Roadmap

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# Steps

 The order of the steps should be adapted to the situation.  
In particular you should determine whether it is appropriate to do the Baseline Data Architecture or Target Data Architecture development first

1. Select reference models, viewpoints, and tools
2. Develop Baseline Data Architecture Description
3. Develop Target Data Architecture Description
4. Perform gap analysis
5. Define candidate roadmap components
6. Resolve impacts across the Architecture Landscape
7. Conduct formal stakeholder review
8. finalise the Data Architecture
9. Create Architecture Definition Document

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## Step 1: Select Reference Models, Viewpoints, and Tools

- Review/generate and validate data principles – see Architecture Principles
- Select Data Architecture resources (reference models, patterns, ...)
- Select relevant Data Architecture viewpoints
- Identify appropriate tools and techniques (including forms) to be used for data capture, modeling, and analysis, in association with the selected viewpoints.
- Examples of data modeling techniques are:
  - Entity-relationship diagram
  - Class diagrams

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## TOGAF Standard, Version 9.2 Artifacts



## Step 1: Select Reference Models, Viewpoints, and Tools

- Determine Overall Modelling Process
  - For each viewpoint, select the models needed to support the specific view required, using the selected tool or method. Examples of logical data models include:
    - the DODAF Logical Data Model
    - the ARTS Data Model for the Retail Industry and
    - the Energistics Data Models for the Petrotechnical industry
  - Confirm all stakeholders' concerns are addressed. If not, create new models to address concerns not covered, or augment existing models
- Identify Required Catalogs of Data Building Blocks
  - The organisation's data inventory is captured as a catalog within the Architecture Repository..

## **Step 1: Select Reference Models, Viewpoints, and Tools**

- Identify Required Matrices
  - Matrices show the core relationships between related model entities.
- Identify Required Diagrams
  - Diagrams present the Data Architecture information from a set of different viewpoints
- Identify Types of Requirements to be Collected
  - Identify requirements to be met by the Architecture
  - Formalize the data-focused requirements
  - Provide requirements input for the Application and Technology architectures

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## **Step 2: Develop a Baseline Data Architecture Description**

If possible, identify the relevant Data ABBs, drawing on the Architecture Repository.

- If not, develop new architecture models:
  - use the models identified within Step 1 as a guideline

## **Step 3: Develop Target Data Architecture Description**

- If possible, identify the relevant Data Architecture building blocks, drawing on the Architecture Repository
- If not, develop a new architecture model:
  - use the models identified within Step 1 as a guideline

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## **Step 4: Perform Gap Analysis**

- Verify the architecture models for internal consistency and accuracy
- Note changes to the viewpoint represented in the selected models from the Architecture Repository, and document
- Test architecture models for completeness against requirements
- Identify gaps between the baseline and target using the standard Gap Analysis technique

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## **Step 5: Define Candidate Roadmap Components**

- This initial Data Architecture roadmap will be used as raw material to support more detailed definition of a consolidated, cross-discipline roadmap within the Opportunities & Solutions phase.

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## **Step 6: Resolve Impacts across the Architecture Landscape**

- Architecture artifacts in the Architecture Landscape should be examined to identify:
  - Does this Data Architecture create an impact on any pre-existing architectures?
  - Have recent changes been made that impact on the Data Architecture?
  - Are there any opportunities to leverage work from this Data Architecture in other areas of the organisation?
  - Does this Data Architecture impact other projects ?
  - Will this Data Architecture be impacted by other projects?

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## **Step 7: Conduct Formal Stakeholder Review**

Check the original motivation for the architecture project and the Statement of Architecture Work against the proposed Data Architecture. Conduct an impact analysis to:

- Identify any areas where the Business and Application Architecture may need to change to cater for changes in the Data Architecture. If the impact is significant revisit the Business Architecture.

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## **Step 7: Conduct Formal Stakeholder Review**

- Identify any areas where the Application Architecture may need to change to cater for changes in the Data Architecture (or to identify constraints on the Application Architecture about to be designed). If the impact is significant revisit the Application Architecture.
- Identify any constraints on the Technology Architecture.
- Refine the proposed Data Architecture if necessary.

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## **Step 8: Finalise the Data Architecture**

- Select standards for each of the ABBs, reusing as much as possible.
- Fully document each ABB.
- Cross check the overall architecture against the business requirements.
- Document the final requirements traceability report.
- Document the final mapping of the architecture within the Architecture repository. Identify the ABBs that might be reused and publish them via the architecture repository.
- finalise all the work products

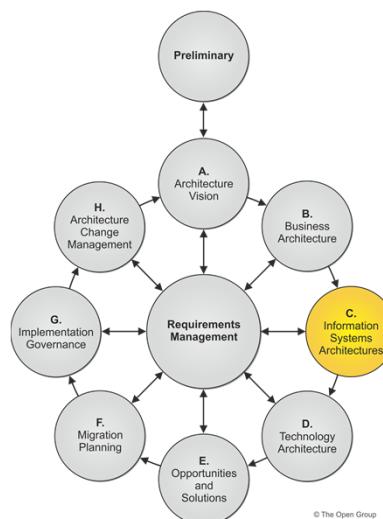
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## Step 9: Create Architecture Definition Document

- Document the rationale for all building block decisions in the architecture definition document.
- Prepare the Data Architecture sections of the architecture definition document report.
- If appropriate, use reports and/or graphics generated by modeling tools to demonstrate key views of the architecture. Route the document for review by relevant stakeholders, and incorporate feedback.

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## Phase C: Outputs: Data Architecture



- Statement of Architecture Work
- Validated data principles, or new data principles
- Draft Architecture Definition Document
- Draft Architecture Requirements Specification
- Data Architecture components of an Architecture Roadmap

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## **Architecture Definition Document – Data Architecture Components**

- Baseline Data Architecture, if appropriate
- Target Data Architecture, including:
  - Business data model
  - Logical data model
  - Data management process models
  - Data Entity/Business Function matrix
- Data Architecture views corresponding to the selected viewpoints addressing key stakeholder concerns

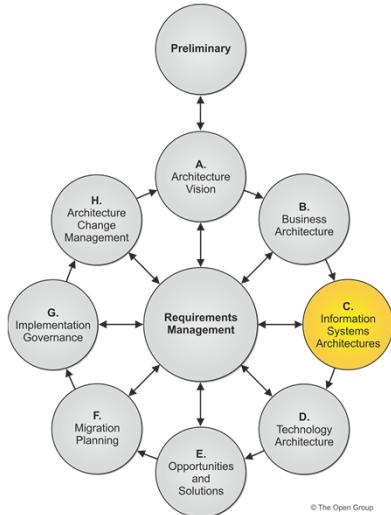
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## **Architecture Requirements Specification – Data Architecture Components**

- Gap analysis results
- Data interoperability requirements
- Areas where the Business Architecture may need to change in order to comply with changes in the Data Architecture
- Constraints on the Technology Architecture about to be designed
- Updated business/application/data requirements, if appropriate

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# Summary



- The Data Architecture phase defines the types and sources of data needed to support the business, in a way that can be understood by stakeholders.
- The architecture team should consider existing relevant data models, such as the ARTS and Energistics models.

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# Summary

Phase C: Information Systems Architectures – Data Architecture			
Objectives	Steps	Inputs	Outputs
<p>Develop the Target Data Architecture that enables the Business Architecture and the Architecture Vision, in a way that addresses the Statement of Architecture Work and stakeholder concerns</p> <p>Identify candidate Architecture Roadmap components based upon gaps between the Baseline and Target Data Architectures</p>	<p>Select reference models, viewpoints, and tools</p> <p>Develop Baseline Data Architecture Description</p> <p>Develop Target Data Architecture Description</p> <p>Perform gap analysis</p> <p>Define candidate roadmap components</p> <p>Resolve impacts across the Architecture Landscape</p> <p>Conduct formal stakeholder review</p> <p>finalise the Data Architecture</p> <p>Create Architecture Definition Document</p>	<p>Request for Architecture Work</p> <p>Capability Assessment</p> <p>Communications Plan</p> <p>organisational Model for Enterprise Architecture</p> <p>Tailored Architecture Framework</p> <p>Data principles</p> <p>Statement of Architecture Work</p> <p>Architecture Vision</p> <p>Architecture Repository</p> <p>Draft Architecture Definition Document containing:</p> <ul style="list-style-type: none"> <li>• Baseline Business Architecture (detailed)</li> <li>• Target Business Architecture (detailed)</li> <li>• Baseline Data Architecture (high-level)</li> <li>• Target Data Architecture (high-level)</li> <li>• Baseline Application Architecture (detailed or high-level)</li> <li>• Target Application Architecture (detailed or high-level)</li> <li>• Baseline Technology Architecture (high-level)</li> <li>• Target Technology Architecture (high-level)</li> </ul> <p>Draft Architecture Requirements Specification including:</p> <ul style="list-style-type: none"> <li>• Gap analysis results</li> <li>• Relevant technical requirements</li> </ul> <p>Business Architecture components of an Architecture Roadmap</p>	<p>Statement of Architecture Work, updated if necessary</p> <p>Validated data principles, or new data principles</p> <p>Draft Architecture Definition Document containing content updates:</p> <ul style="list-style-type: none"> <li>• Baseline Data Architecture</li> <li>• Target Data Architecture</li> <li>• Data Architecture views corresponding to the selected viewpoints, addressing key stakeholder concerns</li> </ul> <p>Draft Architecture Requirements Specification including content updates:</p> <ul style="list-style-type: none"> <li>• Gap analysis results</li> <li>• Data interoperability requirements</li> <li>• Relevant technical requirements that will apply to this evolution of the architecture development cycle</li> <li>• Constraints on the Technology Architecture</li> <li>• Updated business requirements</li> <li>• Updated application requirements</li> </ul> <p>Data Architecture components of an Architecture Roadmap</p>

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## **Exercise**

**Which of the following is/are logical data model(s) which can be used during Data Architecture?**

- A. DODAF
- B. ARTS
- C. Energistics Data Model for the Petrotechnical industry
- D. Zachman

**Identify five sources of information within your organisation that could be used to draw up a Baseline Data Architecture description.**

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## **Module 19: The Integrated Information Infrastructure Reference Model**

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## Module Objectives

The objectives are to:

- Describe the business and technical drivers for Boundaryless Information Flow that led to the development of the Integrated Information Infrastructure Reference Model (III-RM)
- Describe the main components of the III-RM
- Explain how the III-RM was derived
- Explain the III-RM graphic

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## Key Business and Technical Drivers

Problem Space: The Need for *Boundaryless Information Flow*

- The problem of getting information to the right people at the right time in a secure, reliable manner

Solution Space: The Need for Integrated Information Infrastructure

We need:

- **Integrated information** so that different and potentially conflicting pieces of information are not distributed throughout different systems
- **Integrated access to that information** so that staff can access all the information they need and have a right to, through one convenient interface

The infrastructure that enables this vision is called “integrated information infrastructure”.

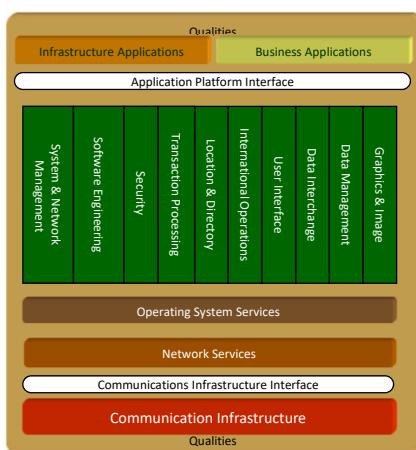
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# Integrated Information Infrastructure Reference Model

- A model of the key components for developing, managing, and operating an integrated information infrastructure.
  - Supporting “Boundaryless Information Flow”
- A model of a set of applications that sit on top of an application platform.
- An expanded subset of the TOGAF Technical Reference Model, using different orientation.

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# TOGAF TRM

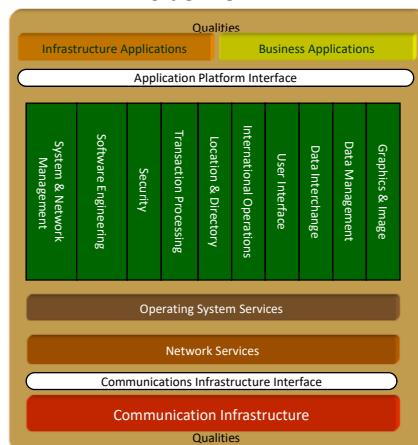


- Fundamentally a layered view, major layers being
  - Application
  - Application platform
  - Communications

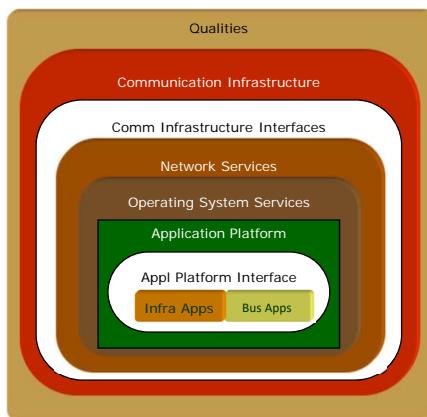
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# TOGAF TRM Orientations

Side View



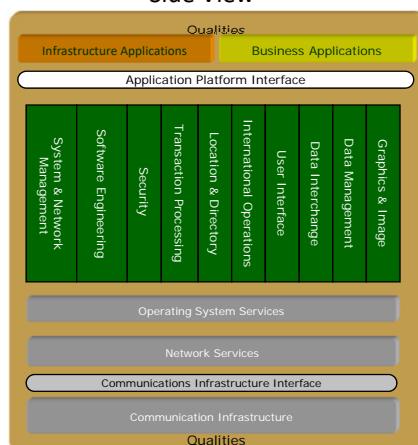
Top Down View



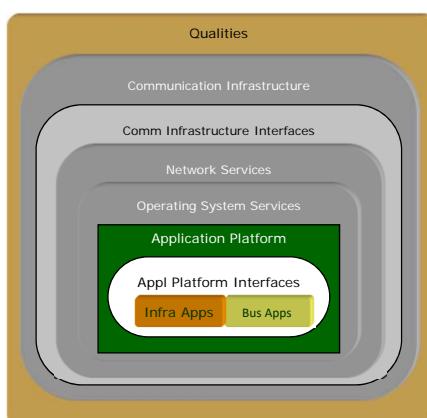
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# Boundaryless Information Flow Focus

Side View

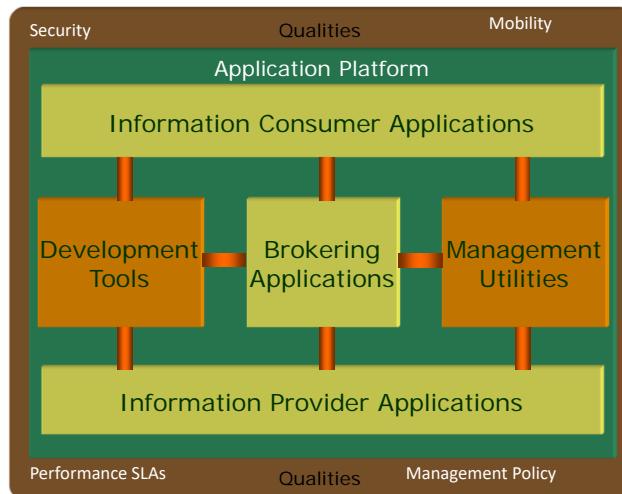


Top Down View



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# Integrated Information Infrastructure Reference Model – High-level Model

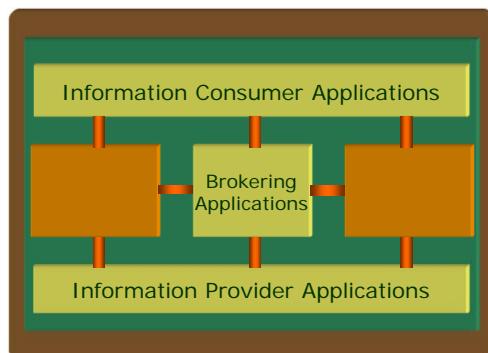


## Components of the III-RM

The III-RM has 2 main components:

1. A **taxonomy**, which defines terminology, and provides a coherent description of the components and conceptual structure of an integrated information infrastructure
2. An associated **III-RM graphic**, which provides a visual representation of the taxonomy, and the inter-relationship of the components, as an aid to understanding

## Components of the High-Level III-RM

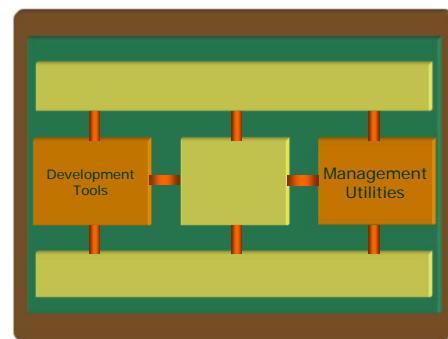


- **Business Applications:**

- **Brokering Applications**, which manage the requests from any number of clients to and across any number of Information Provider Applications
- **Information Provider Applications**, which provide responses to client requests and rudimentary access to data managed by a particular server
- **Information Consumer Applications**, which deliver content to the user of the system, and provide services to request access to information in the system on the user's behalf

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## Components of the High-Level III-RM



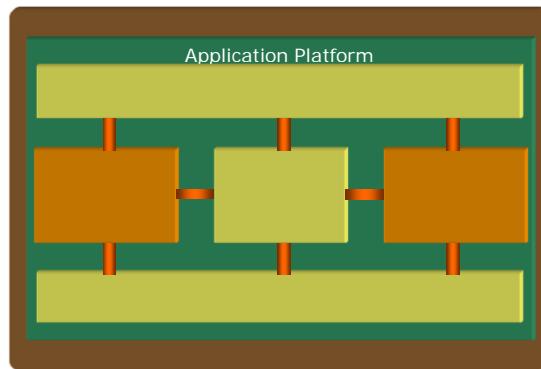
- **Infrastructure Applications:**

- **Development Tools**, to develop and deploy applications that require access to the integrated information infrastructure
- **Management Utilities**, to understand, operate, tune, and manage the run-time system in order to meet the demands of an ever-changing business

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## Components of the High-Level III-RM

- An **Application Platform**, which provides supporting services to all the applications and so provides the ability to locate, access, and move information within the environment.



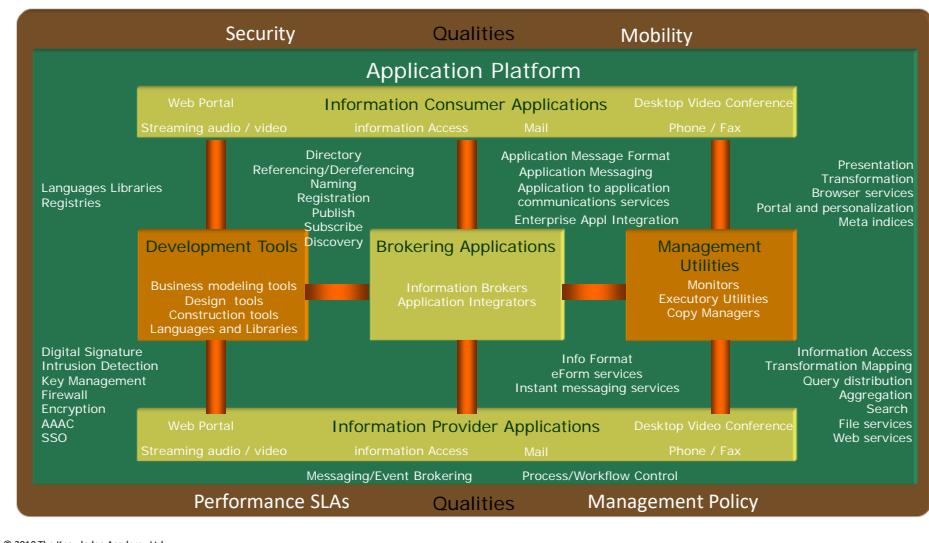
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## Components of the High-Level III-RM

- The **Interfaces** used between the components. Interfaces include formats and protocols, APIs, switches, data values, etc.
- The **Qualities** backplane. The Application Software and Application Platform must adhere to the policies and requirements depicted by the qualities backplane.

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# Integrated Information Infrastructure Reference Model – Detailed Model



## Summary

- The III-RM has 2 main components: a taxonomy, and an associated graphic.
- A key driver for the III-RM is the Need for Boundaryless Information Flow: getting information to the right people at the right time in a secure, reliable manner
- The infrastructure that enables this vision is called the “integrated information infrastructure”.
- The III-RM has Business Applications, Infrastructure Applications, an Application Platform, Interfaces and Qualities

## Exercises

- The use of the I3RM is not mandatory. What other taxonomies and reference models do you know of that could be used in conjunction with the ADM?
- In what situation(s) would the use of another reference model be preferable, and why?

# **Module 20A**

## **Phase C:**

### **Application Architecture –**

### **Catalogs, Matrices**

### **and Diagrams**

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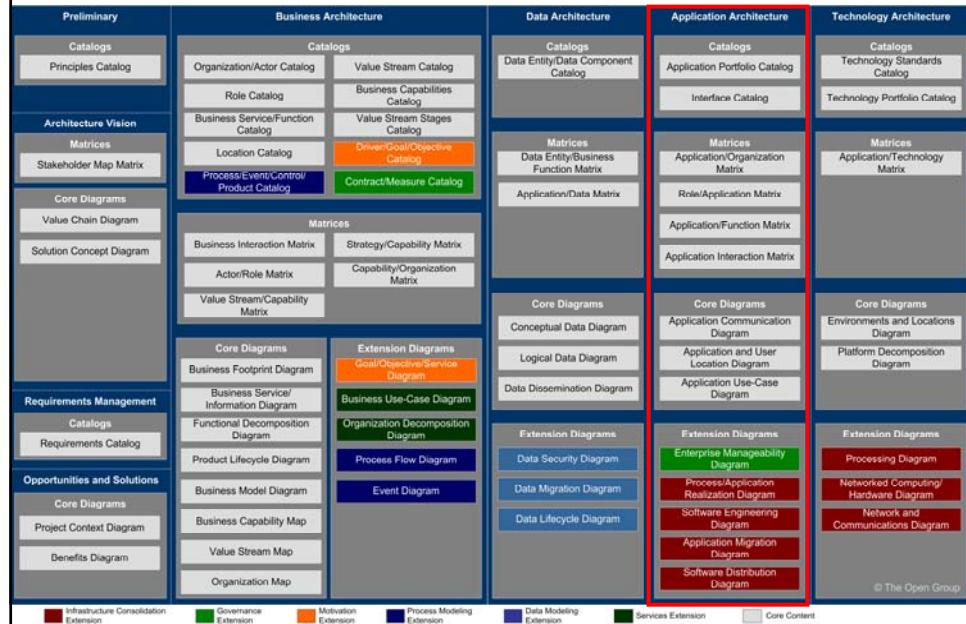
## **Module Objectives**

The objectives of this module are to understand:

- The Catalogs, Matrices and Diagrams of Phase C, Application Architecture
- What they consist of
- How they are used

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# TOGAF Standard, Version 9.2 Artifacts



## Catalogs, Matrices and Diagrams

### Catalogs

- Application Portfolio catalog
- Interface catalog

### Matrices

- Application/organisation matrix
- Role/Application matrix
- Application/Function matrix
- Application Interaction matrix



The exact format of the catalogs, matrices and diagrams will depend on the tools used

### Diagrams

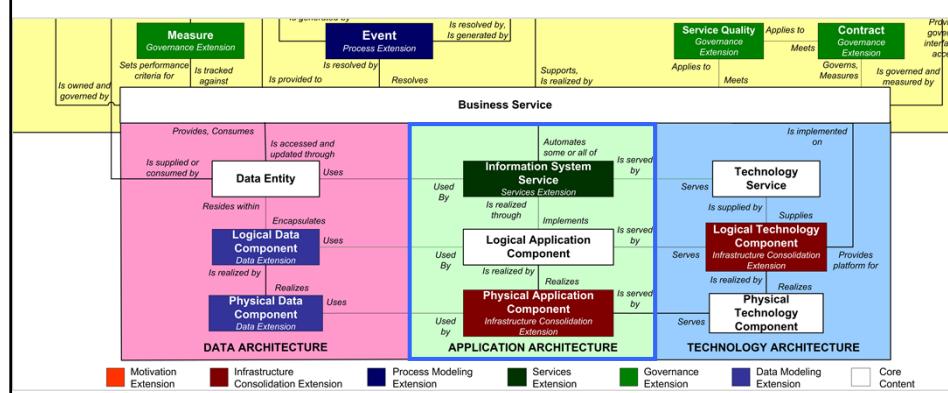
- Application Communication diagram
- Application and User Location diagram
- Application Use-Case diagram
- Enterprise Manageability diagram
- Process/Application Realization diagram
- Software Engineering diagram
- Application Migration diagram
- Software Distribution diagram

# Catalogs

Catalog	Purpose
<b>Application Portfolio Catalog</b>	<p>To identify and maintain a list of all the applications in the enterprise. This list helps to define the horizontal scope of change initiatives that may impact particular kinds of applications. An agreed Application Portfolio allows a standard set of applications to be defined and governed.</p> <p>It contains the following metamodel entities:</p> <ul style="list-style-type: none"> <li>•Information System Service</li> <li>•Logical Application Component</li> <li>•Physical Application Component</li> </ul>
<b>Interface Catalog</b>	<p>The purpose of the Interface catalog is to scope and document the interfaces between applications to enable the overall dependencies between applications to be scoped as early as possible.</p> <p>It contains the following metamodel entities:</p> <ul style="list-style-type: none"> <li>•Logical Application Component</li> <li>•Physical Application Component</li> <li>•Application communicates with application relationship</li> </ul>

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# Exercise



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## **Matrices**

- Application/organisation matrix
- Role/Application matrix
- Application/Function matrix
- Application Interaction matrix

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## **Application/Organisation Matrix**

- This matrix depicts the relationship between applications and organisational units within the enterprise.
- The mapping of the Application Component-organisation Unit relationship enables the following to take place:
  - Assign usage of applications to the organisation units that perform business functions
  - Understand the application support requirements of the business services and processes carried out by an organisation unit
  - Support the gap analysis and determine whether any of the applications are missing and as a result need to be created
  - Define the application set used by a particular organisation unit

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## Example Application/Organisation Matrix

APPLICATION (Y-AXIS) AND ORGANISATION UNIT (X-AXIS)	CUSTOMER SERVICES	PROCUREMENT AND WAREHOUSING	HR	CORPORATE FINANCE
SAP HR	X	X	X	
SIEBEL	X	X		
SAP FINANCIALS	X	X		X
PROCUREROFT	X	X		

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## Role/Application Matrix

- This matrix depicts the relationship between applications and the business roles that use them within the enterprise.
- The mapping of the Application Component-Role relationship enables the following to take place:
  - Assign usage of applications to the specific roles in the organisation
  - Understand the application security requirements of the business services and processes supporting the function, and check these are in line with current policy
  - Support the gap analysis and determine whether any of the applications are missing and as a result need to be created
  - Define the application set used by a particular business role; essential in any move to role-based computing

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## Example Role/Application Matrix

APPLICATION (Y-AXIS) AND FUNCTION (X-AXIS)	CALL CENTRE OPERATOR	CALL CENTRE MANAGER	FINANCE ANALYST	CHIEF ACCOUNTANT
SAP HR	X	X	X	X
SIEBEL	X	X		
SAP FINANCIALS	X	X	X	X
PROCURESOFT	X	X		

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## Application/Function Matrix

- This matrix depicts the relationship between applications and business functions within the enterprise.
- The mapping of the Application Component-Function relationship enables the following to take place:
  - Assign usage of applications to the business functions that are supported by them
  - Understand the application support requirements of the business services and processes carried out
  - Support the gap analysis and determine whether any of the applications are missing and as a result need to be created
  - Define the application set used by a particular business function

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## Example Application/Function Matrix

APPLICATION (Y-AXIS) AND FUNCTION (X-AXIS)	CALL CENTRE 1 <sup>ST</sup> LINE	WAREHOUSE CONTROL	VACANCY FILLING	GENERAL LEDGER MAINTENANCE
SAP HR	X	X	X	X
SIEBEL	X	X		
SAP FINANCIALS	X	X		X
PROCURESOFT	X	X		

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## Example Application Interaction Matrix

	Application 1	Application 2	Application 3	Application 4
Application 1				Consumes
Application 2	Communicates with			
Application 3		Consumes		Communicates with
Application 4				

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## Diagrams

- Application Communication diagram
- N2 model or Node Connectivity diagram
- Application and User Location diagram
- Application Use-Case diagram
- Enterprise Manageability diagram
- Process/Application Realization diagram
- Software Engineering diagram
- Application Migration diagram
- Software Distribution diagram

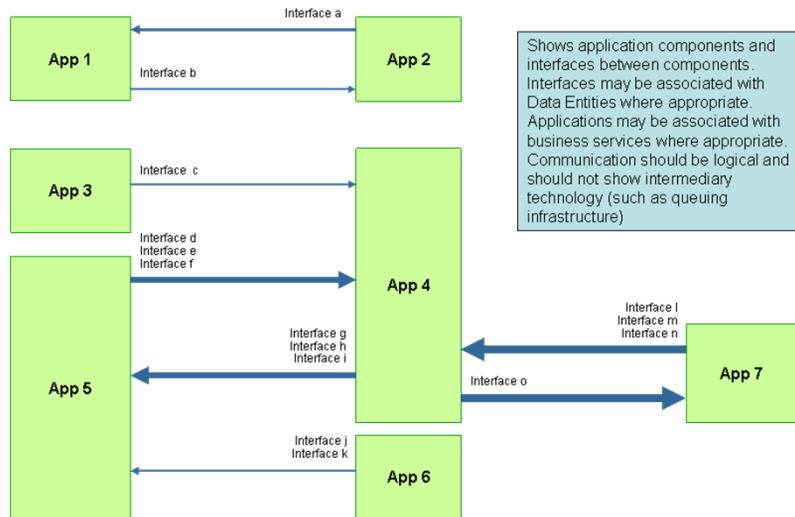
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## Application Communication Diagram

- This diagram depicts all models and mappings related to communication between applications in the metamodel entity.
- It shows application components and interfaces between components.
- Communication should be logical and should only show intermediary technology where it is architecturally relevant.

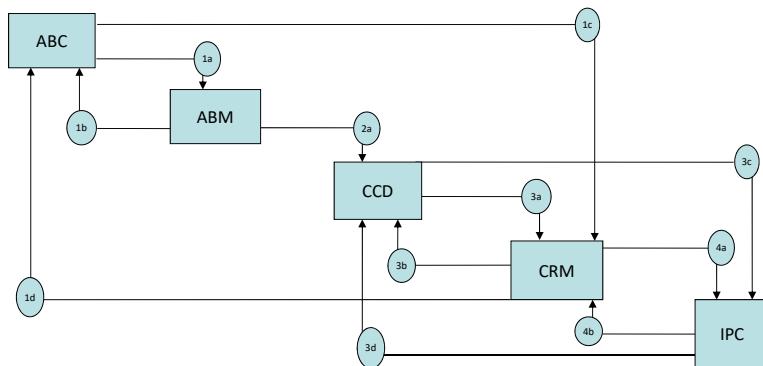
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## Application Communication Diagram



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## Alternate Example: N2 Model



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## Alternate Example: Information Exchange Matrix

LABEL	SOURCE	DESTINATION	DATA ENTITY	EVENT TRIGGERED
1a	■ ABC	■ ABM	■ Sales order (create request)	■ New sales order from front end
1b	■ ABM	■ ABC	■ Sales order (confirm create)	■ Order created in the backend ERP system
2a	■ ABM	■ CCD	■ Product catalog	■ Subscribe/Publish timer

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## Application & User Location Diagram

- This diagram depicts the business locations from which business users typically interact with the applications, but also the hosting location of the application infrastructure.
- The diagram enables:
  - Identification of the number of package instances needed
  - Estimation of the number and the type of user licenses
  - Estimation of the level of support needed
  - Selection of system management tools, structure, and management system
  - Appropriate planning for the technological components of the business
  - Performance considerations while implementing solutions

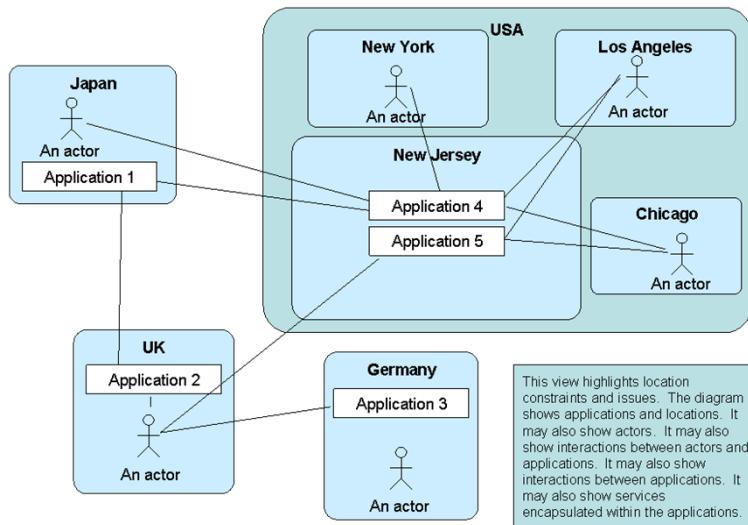
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## Example Application & User Location Diagram (part 1)

APPLICATION	USER TYPE	INTERNAL, CUSTOMER OR PARTNER	USER BUSINESS LOCATION	LOCATION ADDRESS	ORG UNIT (USER BELONGS TO)
CRM	Developer Super User Administrator	Internal	NA Western Region  EMEA Headquarters, UK	Chicago Sears tower office Chicago  Downtown office Middlesex, London	NA Sales & Marketing  EMEA Sales
SAP R/3	Test Engineers Mechanical Engineers Procurement managers	Internal	Beijing Manufacturing Plant		Manufacturing & logistics

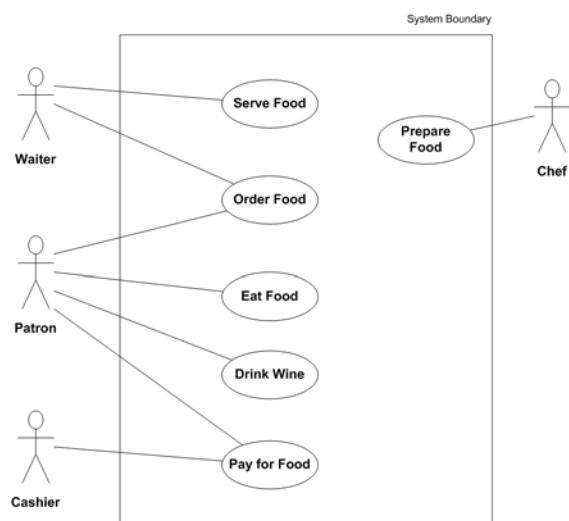
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## Example Application & User Location Diagram (part 2)



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## Application Use Case Diagram

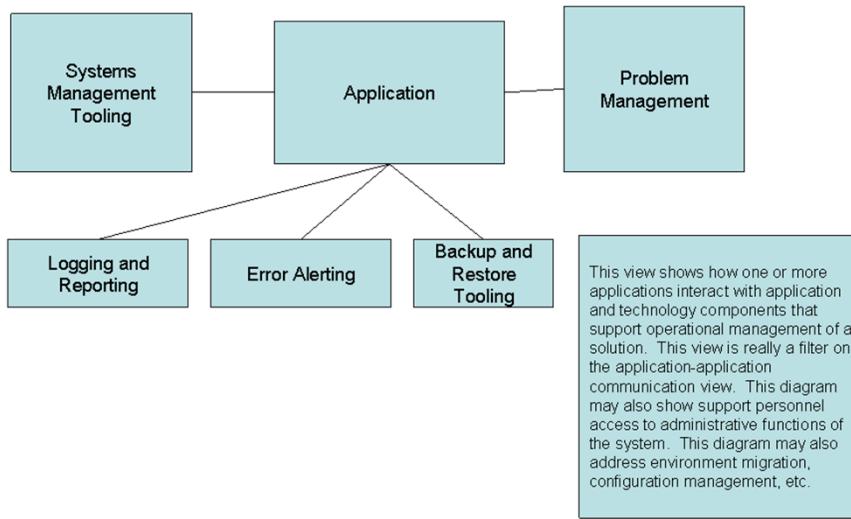


Source: wikipedia.org

## Enterprise Manageability Diagram

- The Enterprise Manageability diagram shows how one or more applications interact with application and technology components that support operational management of a solution.
- Analysis can reveal duplication and gaps, and opportunities in the IT service management operation of an organisation.

## Example Enterprise Manageability Diagram



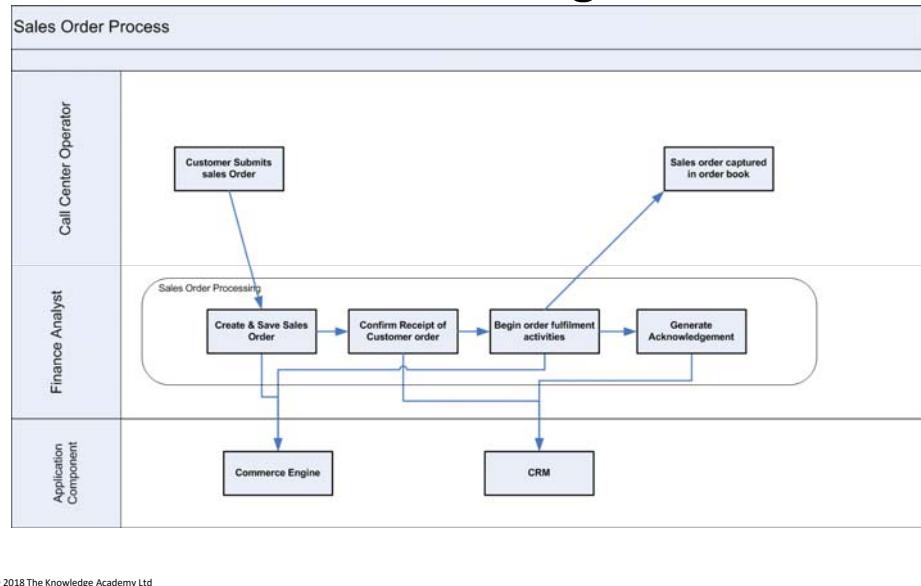
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## Process/Application Realisation Diagram

- This diagram depicts the sequence of events when multiple applications are involved in executing a business process.
- It enhances the Application Communication diagram by augmenting it with any sequencing constraints, and hand-off points between batch and real-time processing.

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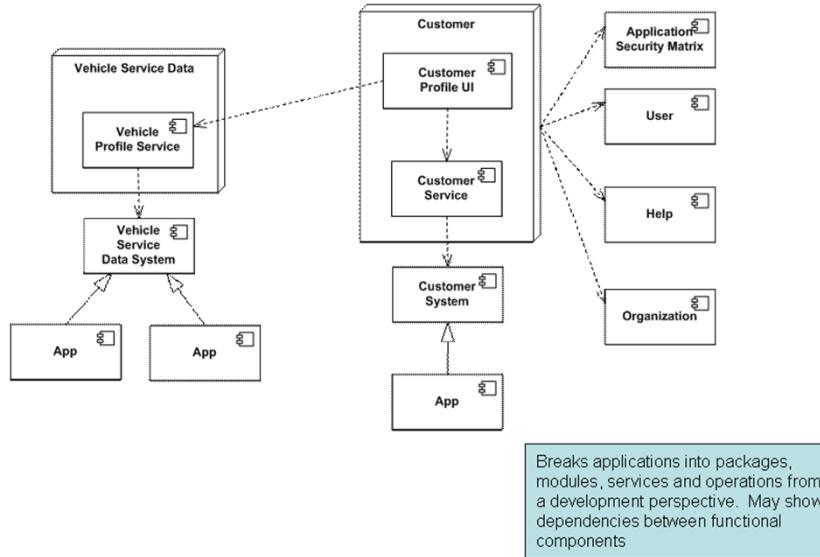
## Example Process/Application Realisation Diagram



## Software Engineering Diagram

- The Software Engineering diagram breaks applications into packages, modules, services, and operations from a development perspective.
- It enables more detailed impact analysis when planning migration stages, and analysing opportunities and solutions.
- It is ideal for application development teams and application management teams when managing complex development environments.

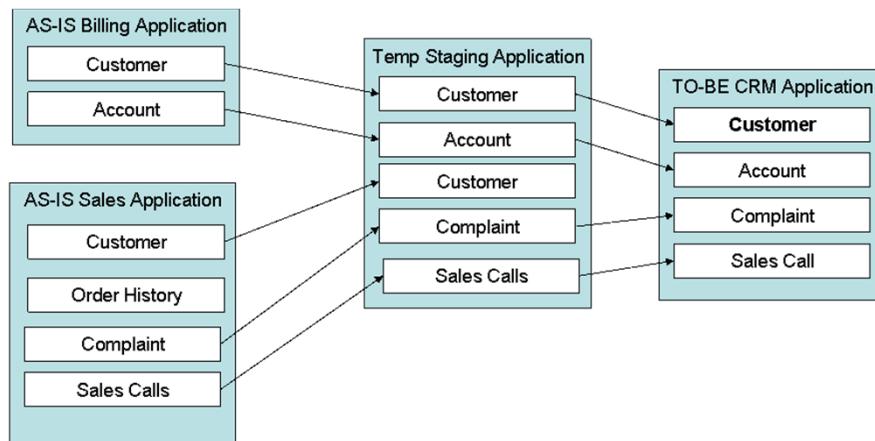
## Example Software Engineering Diagram



## Application Migration Diagram

- The Application Migration diagram identifies application migration from baseline to target application components
- It enables a more accurate estimation of migration costs
- It should be used to identify temporary applications, staging areas, and the infrastructure required to support migrations

## Example Application Migration Diagram



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## Software Distribution Diagram

- This diagram is a composite of the Software Engineering diagram and the Application-User Location diagram.
- Depending on the circumstances, this diagram alone may be sufficient, or may not be needed.

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# **Module 20**

## **Phase C: Application Architecture**

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## **Module Objectives**

The aim of this module is to understand Phase C: Application Architecture:

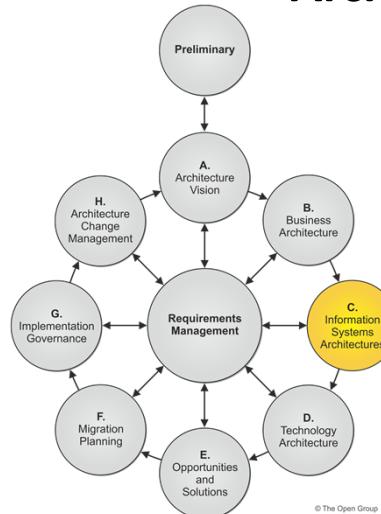
- Objectives
- Inputs
- Steps
- Outputs

Develop the Target Application Architecture that enables the Business Architecture and the Architecture Vision, in a way that addresses the Statement of Architecture Work and stakeholder concerns.

Identify candidate Architecture Roadmap components based upon gaps between the Baseline and Target Application Architectures.

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## Phase C: Inputs: Application Architecture



- Request for Architecture Work
- Capability Assessment
- Communications Plan
- organisation model for enterprise architecture
- Tailored Architecture Framework
- Application principles
- Statement of Architecture Work
- Architecture Vision
- Architecture Repository
- Draft Architecture Definition Document
- Draft Architecture Requirements Specification, including:
  - Gap analysis results
  - Relevant technical requirements
- Business and Data Architecture components of an Architecture Roadmap

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## Steps

 The order of the steps should be adapted to the situation.  
In particular you should determine whether it is appropriate to do the Baseline Application Architecture or Target Application Architecture development first

1. Select reference models, viewpoints, and tools
2. Develop Baseline Application Architecture Description
3. Develop Target Application Architecture Description
4. Perform gap analysis
5. Define candidate roadmap components
6. Resolve impacts across the Architecture Landscape
7. Conduct formal stakeholder review
8. finalise the Application Architecture
9. Create Architecture Definition Document

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# Step 1: Select Reference Models, Viewpoints, and Tools

- Review/generate and validate application principles – see Architecture Principles
- Select Application Architecture resources (reference models, patterns, ...)
- Select relevant Application Architecture viewpoints
- Identify appropriate tools and techniques (including forms) to be used for capture, modeling, and analysis, in association with the selected viewpoints.
- Consider using platform-independent descriptions of business logic (e.g. the OMG's MDA)

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## TOGAF Standard, Version 9.2 Artifacts



## **Step 1: Select Reference Models, Viewpoints, and Tools**

- Determine Overall Modeling Process
  - For each viewpoint, select the models needed to support the specific view required, using the selected tool or method. E.g.: The TM Forum has developed detailed applications models relevant to the Telecommunications industry. The OMG has some vertical Domain Task Forces developing models for specific vertical domains such as Healthcare, Transportation, Finance, etc.
  - Confirm all stakeholders' concerns are addressed. If not, create new models to address concerns not covered, or augment existing models

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## **Recommended Process**

- Understand the list of applications or application components that are required, based on the baseline Application Portfolio, what the requirements are, and the business architecture scope
- Simplify complicated applications by decomposing them into two or more applications
- Ensure that the set of application definitions is internally consistent, by removing duplicate functionality as far as possible, and combining similar applications into one
- Identify logical applications and the most appropriate physical applications
- Develop matrices across the architecture by relating applications to business service, business function, data, process, etc.
- Elaborate a set of Application Architecture views by examining how the application will function, capturing integration, migration, development, and operational concerns

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## **Step 1: Select Reference Models, Viewpoints, and Tools**

- Identify Required Catalogs of Application Building Blocks
  - The organisation's Application portfolio is captured as a catalog within the Architecture Repository.
- Identify Required Matrices
  - Matrices show the core relationships between related model entities.
- Identify Required Diagrams
  - Diagrams present the Application Architecture information from a set of different viewpoints
- Identify Types of Requirements to be Collected
  - Identify requirements to be met by the Architecture
  - Formalize the application-focused requirements
  - Provide requirements input for the Data and Technology architectures

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## **Example – The Integrated Information Infrastructure Model**

- An Applications Architecture reference model
  - a model of the application components and application services software essential for an integrated information infrastructure
- Based on the TRM
- Aimed at the helping the design of architectures to enable and support the vision of Boundaryless Information Flow

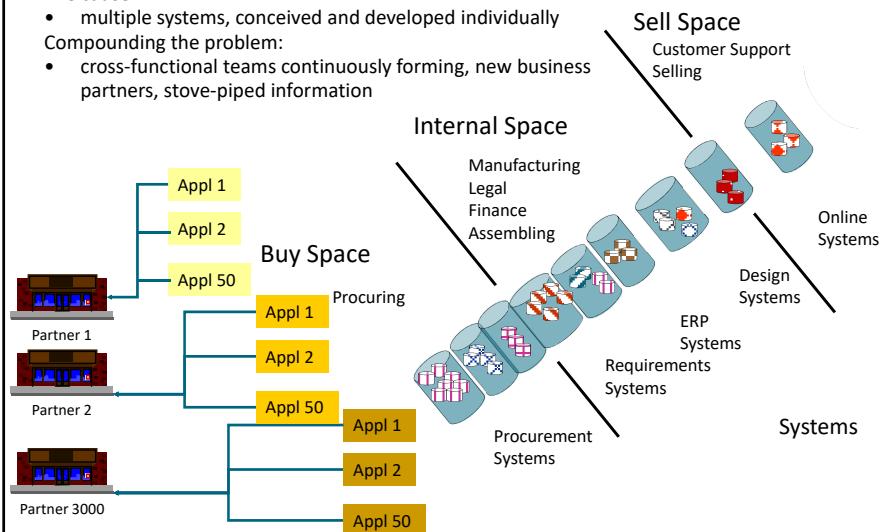
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## III-RM

# Business and Technical Drivers

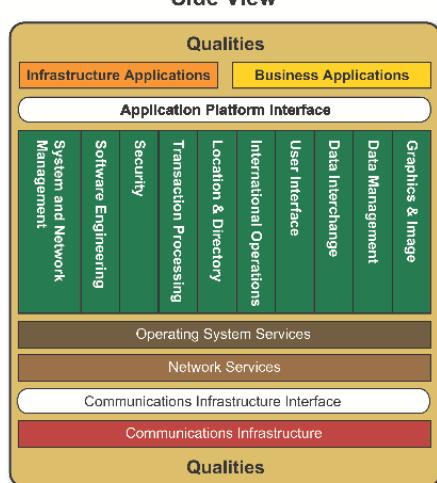
The cause:

- multiple systems, conceived and developed individually
- Compounding the problem:
- cross-functional teams continuously forming, new business partners, stove-piped information

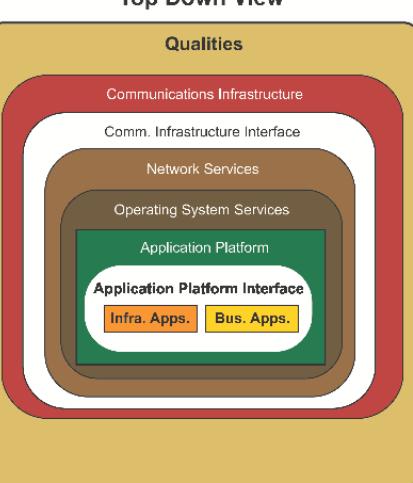


## III-RM Focus

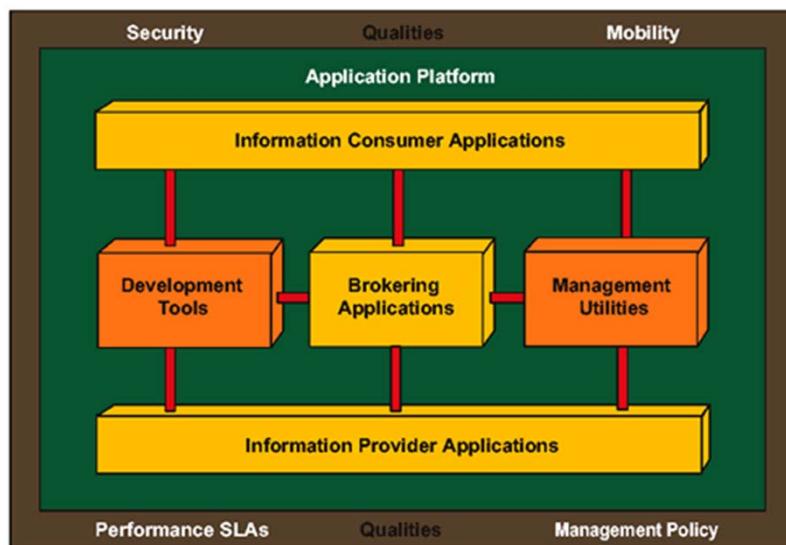
Side View



Top Down View



## III-RM High Level View



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## Step 2: Develop a Baseline Application Architecture Description

- If possible, identify the relevant Application ABBs, drawing on the Architecture Repository
- If not, define each application in line with the Application Portfolio catalog

## Step 3: Develop Target Application Architecture Description

- If possible, identify the relevant Application Architecture building blocks, drawing on the Architecture Repository
- If not, develop a new architecture model:
  - use the models identified within Step 1 as a guideline

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## **Step 4: Perform Gap Analysis**

- Verify the architecture models for internal consistency and accuracy
- Note changes to the viewpoint represented in the selected models from the Architecture Repository, and document
- Test architecture models for completeness against requirements
- Identify gaps between the baseline and target using the standard Gap Analysis Technique

## **Step 5: Define Candidate Roadmap Components**

This initial Application Architecture roadmap will be used as raw material to support more detailed definition of a consolidated, cross-discipline roadmap within the Opportunities & Solutions phase.

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## **Step 6: Resolve Impacts across the Architecture Landscape**

- Architecture artifacts in the Architecture Landscape should be examined to identify:
  - Does this Application Architecture create an impact on any pre-existing architectures?
  - Have recent changes been made that impact on the Application Architecture?
  - Are there any opportunities to leverage work from this Application Architecture in other areas of the organisation?
  - Does this Application Architecture impact other projects ?
  - Will this Application Architecture be impacted by other projects?

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## **Step 7: Conduct Formal Stakeholder Review**

Check the original motivation for the architecture project and the Statement of Architecture Work against the proposed Application Architecture. Conduct an impact analysis to:

- Identify any areas where the Business and Data Architecture may need to change to cater for changes in the Application Architecture. If the impact is significant revisit the Business and Data Architectures.

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## **Step 8: Finalise the Application Architecture**

- Select standards for each of the ABBs, reusing as much as possible.
- Fully document each ABB.
- Cross check the overall architecture against the business requirements.
- Document the final requirements traceability report.
- Document the final mapping of the architecture within the Architecture repository. Identify the ABBs that might be reused and publish them via the architecture repository.
- finalise all the work products

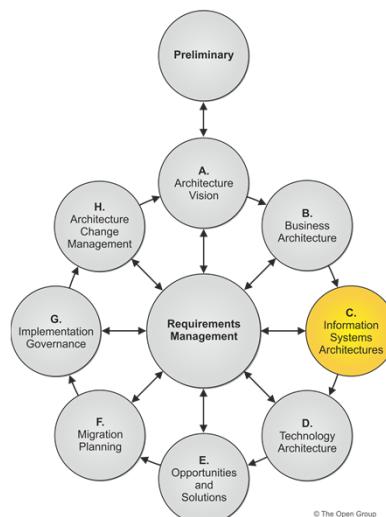
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## Step 9: Create Architecture Definition Document

- Document the rationale for all building block decisions in the architecture definition document.
- Prepare the Application Architecture sections of the architecture definition document report.
- If appropriate, use reports and/or graphics generated by modeling tools to demonstrate key views of the architecture. Route the document for review by relevant stakeholders, and incorporate feedback.

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## Phase C: Outputs: Application Architecture



- Statement of Architecture Work
- Validated application principles, or new application principles
- Draft Architecture Definition Document
- Draft Architecture Requirements Specification
- Application Architecture components of an Architecture Roadmap

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## **Architecture Definition Document – Application Architecture Components**

- Baseline Application Architecture, if appropriate
- Target Application Architecture, including:
  - Process systems model
  - Place systems model
  - Time systems model
  - People systems model
- Application Architecture views corresponding to the selected viewpoints addressing key stakeholder concerns

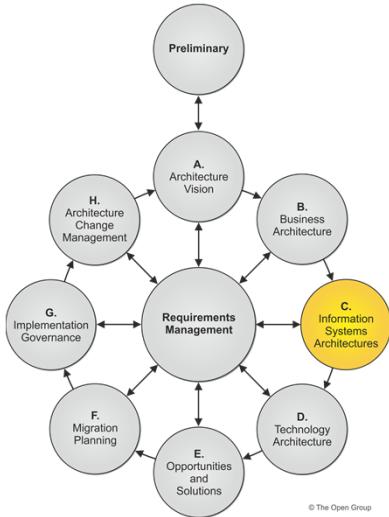
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## **Architecture Requirements Specification – Application Architecture Components**

- Gap analysis results
- Application interoperability requirements
- Areas where the Business Architecture may need to change in order to comply with changes in the Application Architecture
- Constraints on the Technology Architecture about to be designed
- Updated business/application/data requirements, if appropriate

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# Summary



- This phase defines the *kinds* of applications necessary to process the data and support the business.
- The goal is to define what kinds of applications are relevant and what those applications need to do.

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# Summary

## Phase C: Information Systems Architectures – Application Architecture

Objectives	Steps	Inputs	Outputs
<p>Develop the Target Application Architecture that enables the Business Architecture and the Architecture Vision, in a way that addresses the Statement of Architecture Work and stakeholder concerns</p> <p>Identify candidate Architecture Roadmap components based upon gaps between the Baseline and Target Application Architectures</p>	<p>Select reference models, viewpoints, and tools</p> <p>Develop Baseline Application Architecture Description</p> <p>Develop Target Application Architecture Description</p> <p>Perform gap analysis</p> <p>Define candidate roadmap components</p> <p>Resolve impacts across the Architecture Landscape</p> <p>Conduct formal stakeholder review</p> <p>finalise the Application Architecture</p> <p>Create Architecture Definition Document</p>	<p>Request for Architecture Work</p> <p>Capability Assessment</p> <p>Communications Plan</p> <p>organisational Model for Enterprise Architecture</p> <p>Tailored Architecture Framework</p> <p>Application Principles</p> <p>Statement of Architecture Work</p> <p>Architecture Vision</p> <p>Architecture Repository</p> <p>Draft Architecture Definition Document containing:</p> <ul style="list-style-type: none"> <li>Baseline Business Architecture (detailed)</li> <li>Target Business Architecture (detailed)</li> <li>Baseline Data Architecture (detailed or high-level)</li> <li>Target Data Architecture (detailed or high-level)</li> <li>Baseline Application Architecture (high-level)</li> <li>Target Application Architecture (high-level)</li> <li>Baseline Technology Architecture (high-level)</li> <li>Target Technology Architecture (high-level)</li> </ul> <p>Draft Architecture Requirements Specification including:</p> <ul style="list-style-type: none"> <li>Gap analysis results</li> <li>Relevant technical requirements</li> </ul> <p>Business and Data Architecture components of an Architecture Roadmap</p>	<p>Statement of Architecture Work, updated if necessary</p> <p>Validated application principles, or new application principles</p> <p>Draft Architecture Definition Document containing content updates:</p> <ul style="list-style-type: none"> <li>Baseline Application Architecture</li> <li>Target Application Architecture</li> <li>Application Architecture views corresponding to the selected viewpoints, addressing key stakeholder concerns</li> </ul> <p>Draft Architecture Requirements Specification including content updates:</p> <ul style="list-style-type: none"> <li>Gap analysis results</li> <li>Application interoperability requirements</li> <li>Relevant technical requirements that will apply to this evolution of the architecture development cycle</li> <li>Constraints on the Technology Architecture</li> <li>Updated business requirements</li> <li>Updated data requirements</li> </ul> <p>Application Architecture components of an Architecture Roadmap</p>

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## **Test Yourself Question**

Q1. How should the applications best be described?

- A. As computer systems
- B. As logical groups of capabilities
- C. As schemas
- D. As data-flow diagrams
- E. As UML diagrams

### **Exercise**

Identify five sources of information within your organisation that could be used to draw up a Baseline Application Architecture Description.

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# **Module 21**

# **TOGAF® Foundation**

# **Architecture: the TRM**

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## **Module Objectives**

To understand the TOGAF Technical Reference Model.

- The TOGAF Technical Reference Model (TRM) is an example of a Foundation Architecture.
- The Purpose, Structure and Use of the TRM
- The Platform Services Taxonomy
- Application Platform Service Qualities

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## **Foundation Architectures**

- A Foundation Architecture is an architecture of building blocks and corresponding standards that supports all the Common Systems Architectures and, therefore, the complete enterprise operating environment.
- The TOGAF Library includes the TOGAF Technical Reference Model as an example Foundation Architecture.
- The ADM supports specialization of such Foundation Architectures in order to create organisation-specific models.

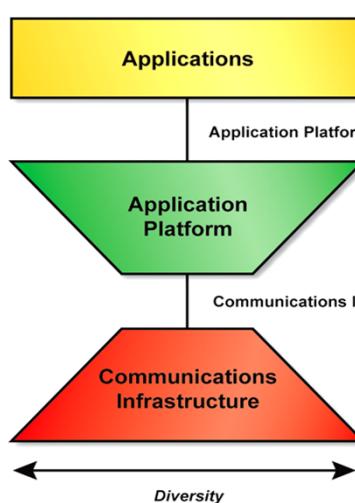
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## TRM Components

- The TRM has two main components:
  - A taxonomy that defines terminology and provides a coherent description of the components and conceptual structure of an information system
  - An associated TRM graphic that provide a visual representation as an aid to understanding

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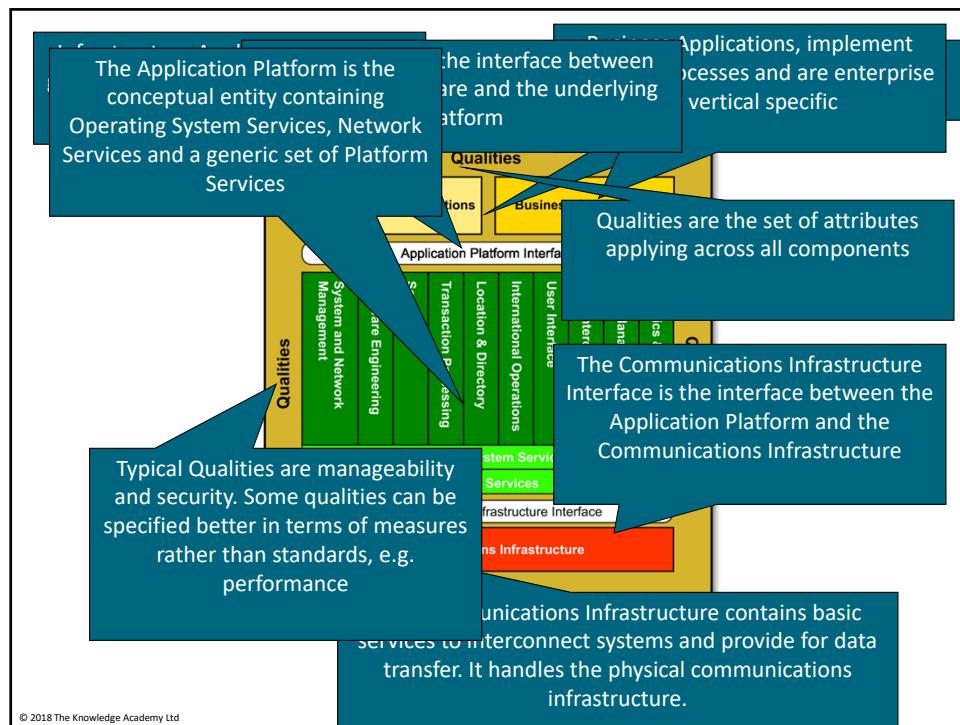
## The TRM



Application Portability is achieved via the Application Platform Interface, identifying the set of services that are to be made available in a standard way to applications via the platform

Interoperability is achieved via the Communications Infrastructure Interface, identifying the set of Communications Infrastructure services that are to be built on in a standard way

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## Using the TRM

- The Application Platform is a single, generic conceptual entity, containing all possible services
- The Enterprise Architect must analyse the services actually needed in order to define the optimal solutions building blocks
- Few enterprises now face the challenge of building their own application platforms, taking it for granted that system and service providers deliver integrated platforms which conform to an established set of standards.
- As a result, other reference models – taxonomies and/or graphics – not only are possible, but may be preferable for the majority of enterprises. The use of the ADM is not dependent on use of the TOGAF TRM taxonomy.

## Taxonomy of Platform Services

- This defines terminology
- Provides a coherent description of an information system:
  - Components termed *service categories*
  - Conceptual structure
- Widely-acceptable useful, consistent, structured definition of the application platform entity
- Not exclusive or optimal definition
- The TOGAF ADM is not dependent on the TRM

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## Taxonomy of Platform Services

- Data Interchange Services
- Data Management Services
- Graphics and Imaging Services
- International Operation Services
- Location and Directory Services
- Network Services
- Operating System Services
- Software Engineering Services
- Transaction Processing Services
- User Interface Services
- Security Services
- System and Network Management Services

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## Taxonomy of Application Platform Service Qualities

- A service quality describes behavior
  - Such as adaptability or manageability
- Service qualities have a pervasive effect on the operation of most or all functional service categories
- During architecture development, the architect must be aware of the desired qualities and the extent of their influence on the choice of building blocks

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## Availability

**Availability** is the degree to which something is available for use. It can be split into 6 criteria:

- **Manageability**, the ability to gather information about the state of something and to control it
- **Serviceability**, the ability to identify problems and take corrective action such as to repair or upgrade a component in a running system
- **Performance**, the ability of a component to perform its tasks in an appropriate time
- **Reliability**, resistance to failure
- **Recoverability**, the ability to restore a system to a working state after an interruption
- **Locatability**, the ability of a system to be found when needed

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## **Assurance**

Assurance can be split into the following criteria:

- Security, the protection of information from unauthorised access
- Integrity, the assurance that data has not been corrupted
- Credibility, the level of trust in the integrity of the system and its data

## **Usability**

Usability is the ease-of-operation by users, including:

- International operation, including multilingual and multicultural abilities

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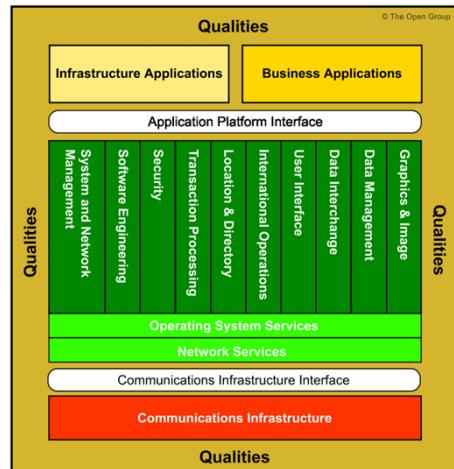
## **Adaptability**

**Adaptability** can be split into 5 criteria:

- **Interoperability**, whether within or outside the organisation (for instance interoperability of calendaring or scheduling functions may be key to the usefulness of a system)
- **Scalability**, the ability of a component to grow or shrink its performance or capacity appropriately to the demands of the environment in which it operates
- **Portability**, of data, people, applications, and components
- **Extensibility**, to accept new functionality
- **Accessibility**, to services in new paradigms such as object orientation

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# Summary



The TOGAF Technical Reference Model provides a model and core taxonomy of generic platform-centric services

- It can be used to build any system architecture
- A taxonomy defines consistent terminology

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## Test Yourself Question

- 1. Which of the following best describes the purpose of the TRM?**
  - To provide a framework for IT Governance
  - To provide a visual model, terminology and coherent description of components and structure of an information system
  - To provide a list of standards
  - To provide a method for architecture development
  - To provide a system engineering viewpoint on a possible solution
- 2. Which of the following statements about the Taxonomy of Platform Services is true?**
  - It provides a description of a specific vertical industry information system
  - It defines a number of service qualities
  - It provides a widely accepted, useful definition of an Application Platform entity
  - It is used in structuring the III-RM
  - It provides a list of standards

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# **Module 22A**

## **Phase D: Technology Architecture – Catalogs, Matrices and Diagrams**

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## **Module Objectives**

The objectives of this module are to understand:

- The Catalogs, Matrices and Diagrams of Phase D, Technology Architecture
- What they consist of
- How they are used

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# TOGAF Standard, Version 9.2 Artifacts



## Catalogs, Matrices and Diagrams

### Catalogs

- Technology Standards catalog
- Technology Portfolio catalog

### Matrices

- Application/Technology matrix

### Diagrams

- Environments and Locations diagram
- Platform Decomposition diagram
- Processing diagram
- Networked Computing/Hardware diagram
- Network and Communications diagram



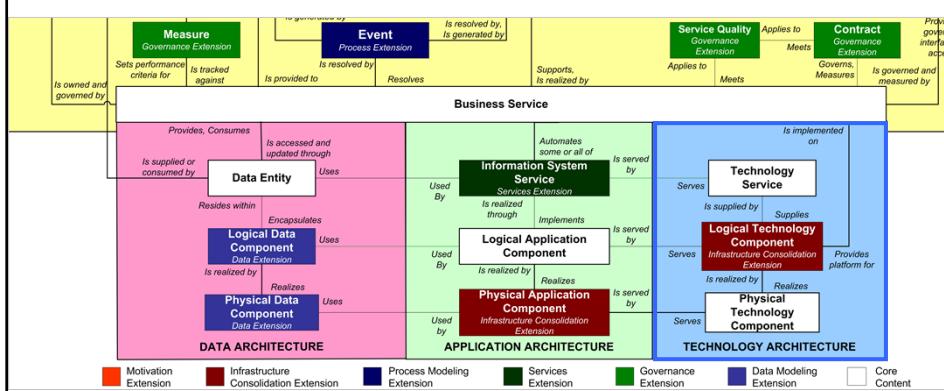
The exact format of the catalogs, matrices and diagrams will depend on the tools used

# Catalogs

Catalog	Purpose
Technology Standards Catalog	<p>This documents the agreed standards for technology across the enterprise covering technologies, and versions, the technology lifecycles, and the refresh cycles for the technology.</p> <p>It can be implemented as an extension to the Technology Portfolio Catalog and thus will share the same metamodel entities:</p> <ul style="list-style-type: none"> <li>•Technology Service, Logical Technology Component, Physical Technology Component</li> </ul>
Technology Portfolio Catalog	<p>This catalog identifies and lists all the technology in use across the enterprise, including hardware, infrastructure software, and application software. An agreed technology portfolio supports lifecycle management of technology products and versions and also forms the basis for definition of technology standards</p> <p>It contains the following metamodel entities:</p> <ul style="list-style-type: none"> <li>•Technology Service, Logical Technology Component, Physical Technology Component</li> </ul>

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# Exercise



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# Application/Technology Matrix

## Matrices

Application/Technology matrix

- The Application/Technology matrix documents the mapping of applications to the technology platform.
- The Application/Technology matrix shows:
  - Logical/Physical Application Components
  - Services, Logical Technology Components, and Physical Technology Components
  - Physical Technology Component *realizes* Physical Application Component relationships

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# Example Application/Technology Matrix

LOGICAL APPLICATION COMPONENT	PHYSICAL TECHNOLOGY COMPONENT	SERVER ADDRESS	IP ADDRESS
ABM	Web server - node 1	F01ws001@host.com	10.xx.xx.xx
	Web server - node 2	F01ws002@host.com	10.xx.xx.xx
	Web server - node 3	F01ws003@host.com	10.xx.xx.xx
	App server – node 1	F02as001@host.com	10.xx.xx.xx
	App server – node 2	F02as002@host.com	10.xx.xx.xx
	App server – node 3	F02as003@host.com	10.xx.xx.xx
	Database server (production)	F02dbp001@host.com	10.xx.xx.xx
	Database server (stating)	F03dbs001@host.com	10.xx.xx.xx
Load balancer and Dispatcher	Dispatcher server	F03nd001@host.com	242.xx.xx.xx

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## Example Application/Technology Matrix

TECH FUNCTION	HARDWARE LOGICAL	HARDWARE PHYSICAL	SOFTWARE LOGICAL	SOFTWARE PHYSICAL
Load balancing	<ul style="list-style-type: none"> <li>=Name – Balancer</li> <li>=Vendor - IBM</li> <li>=Server Type – eServer</li> <li>=Clustered – No</li> <li>=No. of Nodes – N/A</li> <li>=Server logical address - <a href="mailto:d04lb01@host.com">d04lb01@host.com</a></li> <li>=Maintenance Window – Sun 0100 to 0300</li> </ul>	<ul style="list-style-type: none"> <li>=Model/Type – IBM P7xx</li> <li>=Serial Number – 1S4568</li> <li>=Processor Type - RISC Power p5</li> <li>=Number of Processors - 8 way</li> <li>=Memory - 1GB</li> <li>=Hard drive - 40 GB</li> <li>=IP - 11.xx.xx.xx</li> </ul>	<ul style="list-style-type: none"> <li>=Product- IBM Load balance manager</li> <li>=Vendor - IBM</li> <li>=OS – UNIX</li> </ul>	<ul style="list-style-type: none"> <li>=SW Components – LB v3.2 (list all the other components of the SW product)</li> <li>=AIX 10.2.1</li> <li>=License Type - Enterprise wide license</li> <li>=License expiry date - 12/31/2021</li> </ul>

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## Example Application/Technology Matrix

APPLICATION COMPONENT	DEPLOYMENT UNIT	TECHNOLOGY COMPONENT
=Load Balancer	=Smart dispatch v1.2 (both installation and execution code)	=Load balancing server ( <a href="mailto:d03lb001@host.com">d03lb001@host.com</a> )
=Commerce pages	<ul style="list-style-type: none"> <li>=HTML code</li> <li>=Applets</li> <li>=JSP</li> </ul>	=Web Server cluster ( <a href="mailto:d03ws001@host.com">d03ws001@host.com</a> , <a href="mailto:d03ws002@host.com">d03ws002@host.com</a> , <a href="mailto:d03ws003@host.com">d03ws003@host.com</a> )
=Commerce Engine	<ul style="list-style-type: none"> <li>=Order Entry (both installation and execution code)</li> <li>=Shopping Cart (both installation and execution code)</li> </ul>	<ul style="list-style-type: none"> <li>=Application Server (<a href="mailto:d03as001@host.com">d03as001@host.com</a>, <a href="mailto:d03as002@host.com">d03as002@host.com</a>)</li> </ul>

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## Diagrams

- Environments and Locations diagram
- Platform Decomposition diagram
- Processing diagram
- Networked Computing/Hardware diagram
- Network and Communications diagram

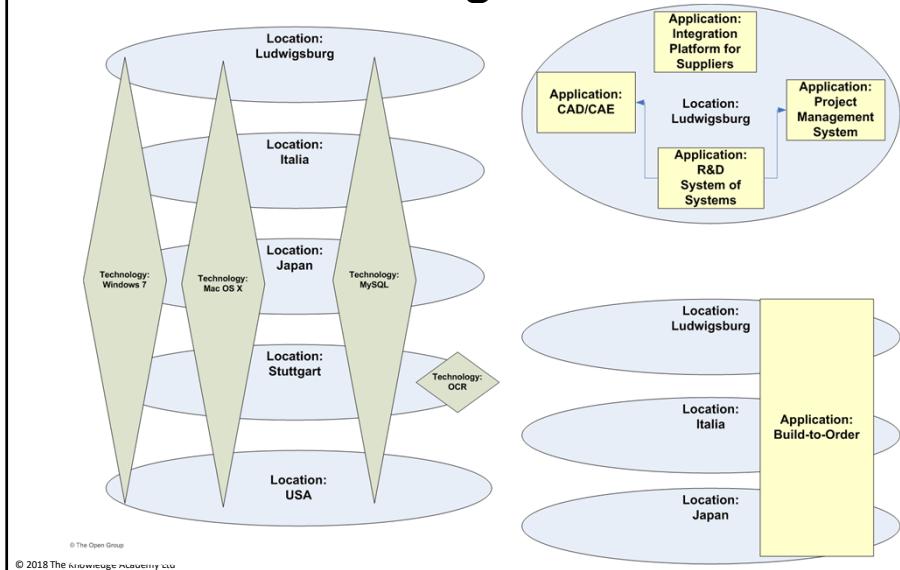
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## Environments and Locations Diagram

- Depicts which locations host which applications
- Identifies what technologies and/or applications are used at which locations
- Identifies the locations from which business users typically interact with the applications.
- It should also show the existence and location of different deployment environments
  - including non-production environments, such as development and pre-production.

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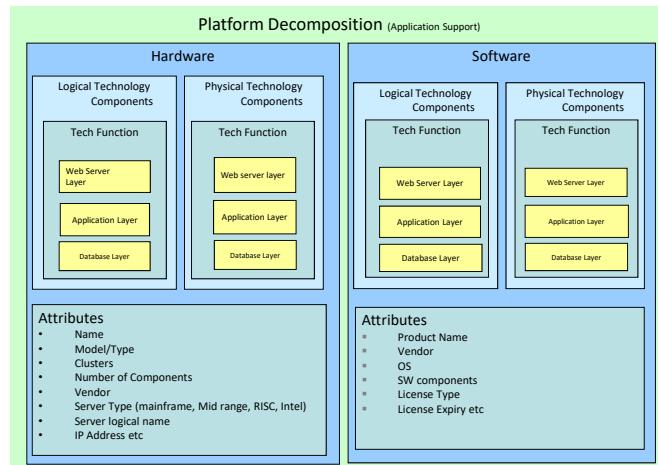
## Example Environments and Locations Diagram



## Platform Decomposition Diagram

- Depicts the technology platform that supports the operations of the Information Systems Architecture.
- Covers all aspects of the infrastructure platform and provides an overview of the enterprise's technology platform.

# Example Platform Decomposition Diagram



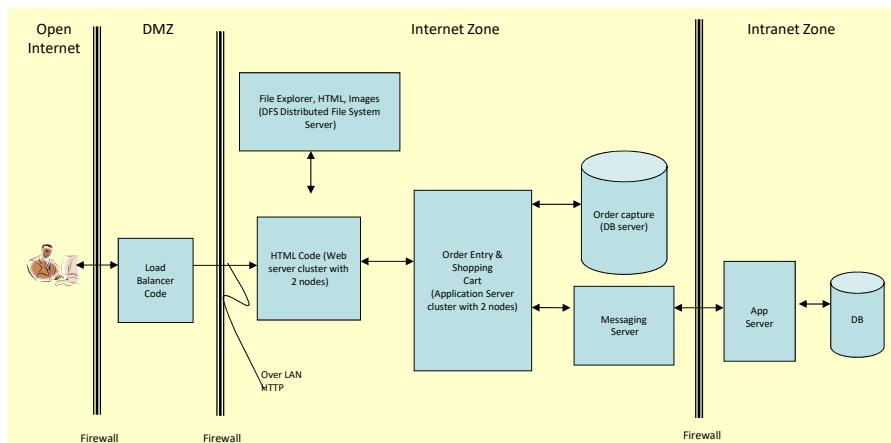
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# Processing Diagram

- Focuses on deployable units of code/configuration and how these are deployed onto the technology platform.
- Addresses the following:
  - Which set of application components need to be grouped to form a deployment unit
  - How one deployment unit connects/interacts with another (LAN, WAN, and the applicable protocols)
  - How application configuration and usage patterns generate load or capacity requirements for different technology components
- The organisation and grouping of deployment units depends on separation concerns of the presentation, business logic, and data store layers and service-level requirements of the components.

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## Example Processing Diagram



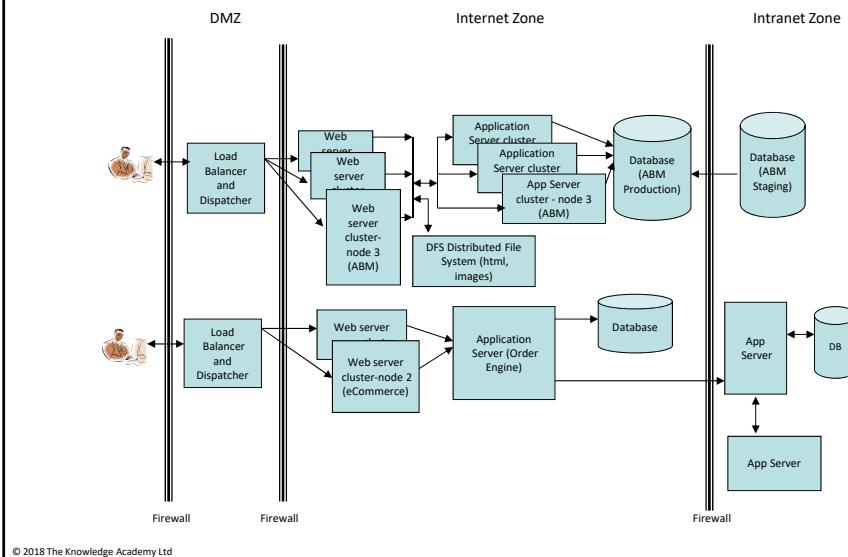
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## Network Computing Hardware Diagram

- This diagram shows the "as deployed" logical view of logical application components in a distributed network computing environment.
- The diagram is useful for the following reasons:
  - Enable understanding of which application is deployed where
  - Establishing authorization, security, and access to these technology components
  - Understand the Technology Architecture that support the applications during problem resolution and troubleshooting
  - Isolate performance problems encountered and perform necessary upgrade to specific physical technology components
  - Identify areas of optimization
  - Enable application/technology auditing and prove compliance
  - Serve as an important tool supporting effective change management

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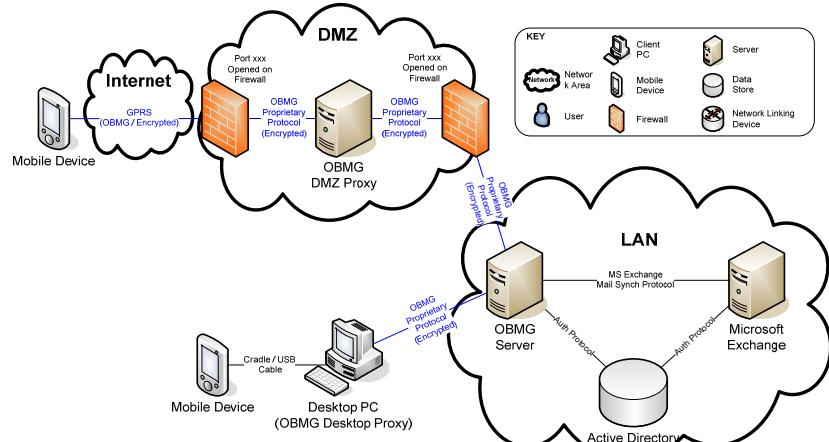
## Example Network Computing Hardware Diagram



## Network and Communications Diagram

- The Network and Communications diagram describes the means of communication between assets in the Technology Architecture
- It takes logical connections between client and server components and identifies network boundaries and network infrastructure required to physically implement those connections.
- It does not describe the information format or content, but addresses protocol and capacity issues.

## Network and Communications Diagram



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## Module 22 Phase D: Technology Architecture

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# Module Objectives

The objectives of this module are to understand:

- The objectives of Phase D, Technology Architecture
- What it consists of
- What inputs are needed for it
- What the outputs are
- Develop the Target Technology Architecture that enables the Architecture Vision, target business, data, and application building blocks to be delivered through technology components and technology services, in a way that addresses the Statement of Architecture Work and stakeholder concerns
- Identify candidate Architecture Roadmap components based upon gaps between the Baseline and Target Technology Architectures

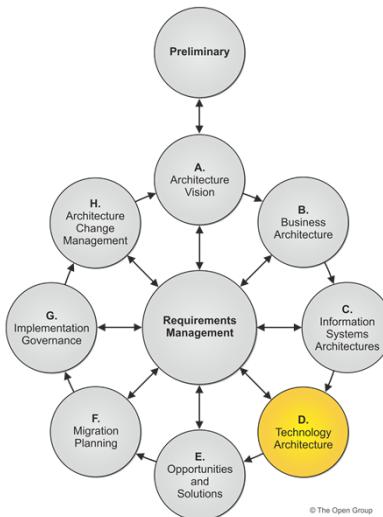
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# Approach

- Consider Emerging Technologies
  - The Technology Architecture needs to capture the transformation opportunities available through the adoption of new technology
- Review the Technology Architecture Resources available in the Architecture Repository
  - Existing IT Services in the IT Repository or IT Service Catalog
  - The adopted technical reference model, if applicable
  - Technology models relevant to the organisation

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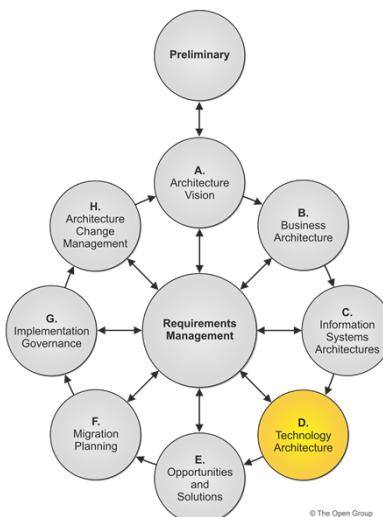
## Technology Architecture: Inputs



- Request for Architecture Work
- Capability Assessment
- Communications Plan
- organisation model for enterprise architecture
- Tailored Architecture Framework
- Technology principles
- Statement of Architecture Work
- Architecture Vision
- Architecture Repository

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## Technology Architecture: Inputs



- Draft Architecture Definition Document, containing:
  - Baseline Business Architecture (detailed)
  - Target Business Architecture (detailed)
  - Baseline Data Architecture (detailed)
  - Target Data Architecture (detailed)
  - Baseline Application Architecture (detailed)
  - Target Application Architecture (detailed)
  - Baseline Technology Architecture (high-level)
  - Target Technology Architecture (high-level)
- Draft Architecture Requirements Specification, including gap analysis results and technical requirements
- Business, Data, and Application Architecture components of an Architecture Roadmap

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# Steps

 The order of the steps should be adapted to the situation.  
In particular you should determine whether it is appropriate to do the Baseline Technology Architecture or Target Technology Architecture development first

1. Select reference models, viewpoints, and tools
2. Develop Baseline Technology Architecture Description
3. Develop Target Technology Architecture Description
4. Perform gap analysis
5. Define candidate roadmap components
6. Resolve impacts across the Architecture Landscape
7. Conduct formal stakeholder review
8. finalise the Technology Architecture
9. Create Architecture Definition Document

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## Step 1: Select Reference Models, Viewpoints, and Tools

- Review/generate and validate technology principles – see Architecture Principles
- Select Technology Architecture resources (reference models, patterns, ...)
- Select relevant Technology Architecture viewpoints
- Identify appropriate tools and techniques to be used for data capture, modeling, and analysis, in association with the selected viewpoints.
- Determine Overall Modeling Process
  - For each viewpoint, select the models needed to support the specific view required, using the selected tool or method. Confirm all stakeholders' concerns are addressed. If not, create new models to address concerns not covered, or augment existing models

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## TOGAF Standard, Version 9.2 Artifacts



## Step 1: Select Reference Models, Viewpoints, and Tools

- Identify Required Catalogs of Data Building Blocks

The following catalogs should be considered for development within a Technology Architecture:

- Technology Standards catalog
- Technology Portfolio catalog

## **Step 1: Select Reference Models, Viewpoints, and Tools**

- Identify Required Matrices
  - Matrices show the core relationships between related model entities.
  - Recommended to develop an Application/Technology Matrix
- Identify Required Diagrams
  - Diagrams present the Technology Architecture information from a set of different viewpoints
  - The following diagrams are recommended
    - Environments and Locations diagram
    - Platform Decomposition diagram
    - Networked Computing /Hardware diagram
    - Communication diagram

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## **Step 1: Select Reference Models, Viewpoints, and Tools**

- Identify Types of Requirements to be Collected
  - Identify requirements to be met by the Architecture
  - Formalize the technology-focused requirements
  - If applicable, provide detailed guidance to be reflected during design and implementation
- Select Services
  - The services portfolios are combinations of basic services from the service categories in the defined taxonomy.
  - For each building block, build up a service description portfolio as a set of non-conflicting services.
  - The set of services must be tested to ensure that the functionality provided meets application requirements.

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## **Step 2: Develop a Baseline Technology Architecture Description**

If possible, identify the relevant Technology ABBs, drawing on the Architecture Repository.

- If nothing exists, define each application in line with the Technology Portfolio catalog
- Where new architecture models need to be developed use the models identified in Step 1 as a guideline for creating new architecture content to describe the Baseline Architecture

## **Step 3: Develop Target Technology Architecture Description**

- If possible, identify the relevant Technology Architecture building blocks, drawing on the Architecture Repository
- Where new architecture models need to be developed use the models identified within Step 1 as a guideline

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## **Step 4: Perform Gap Analysis**

- Verify the architecture models for internal consistency and accuracy
- Note changes to the viewpoint represented in the selected models from the Architecture Repository, and document
- Test architecture models for completeness against requirements
- Identify gaps between the baseline and target using standard Gap Analysis technique

## **Step 5: Define Candidate Roadmap Components**

- This initial Technology Architecture roadmap will be used as raw material to support more detailed definition of a consolidated, cross-discipline roadmap within the Opportunities & Solutions phase.

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## **Step 6: Resolve Impacts across the Architecture Landscape**

- Architecture artifacts in the Architecture Landscape should be examined to identify:
  - Does this Technology Architecture create an impact on any pre-existing architectures?
  - Have recent changes been made that impact on the Technology Architecture?
  - Are there any opportunities to leverage work from this Technology Architecture in other areas of the organisation?
  - Does this Technology Architecture impact other projects ?
  - Will this Technology Architecture be impacted by other projects?

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## **Step 7: Conduct Formal Stakeholder Review**

Check the original motivation for the architecture project and the Statement of Architecture Work against the proposed Technology Architecture.

- Is the Technology Architecture fit for the purpose of supporting subsequent work in the other architecture domains?
- Refine the proposed Technology Architecture only if necessary.

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## **Step 8: Finalise the Technology Architecture**

- Select standards for each of the ABBs, reusing as much as possible.
- Fully document each ABB.
- Cross check the overall architecture against the business goals.
- Document the final requirements traceability report.
- Document the final mapping of the architecture within the Architecture repository. Identify the ABBs that might be reused and publish them via the Architecture Repository.
- finalise all the work products.

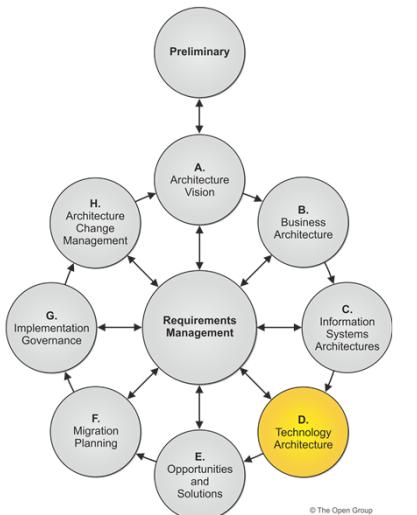
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## **Step 9: Create Architecture Definition Document**

- Document the rationale for all building block decisions in the architecture definition document.
- Prepare the Technology Architecture sections of the architecture definition document report.
- If appropriate, use reports and/or graphics generated by modeling tools to demonstrate key views of the architecture. Send the document to relevant stakeholders for review and incorporate feedback.

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## Technology Architecture Outputs



- Statement of Architecture Work, updated if necessary
- Validated technology principles or new technology principles
- Draft Architecture Definition Document
- Draft Architecture Requirements Specification
- Technology Architecture components of an Architecture Roadmap

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## Architecture Definition Document – Technology Architecture Components

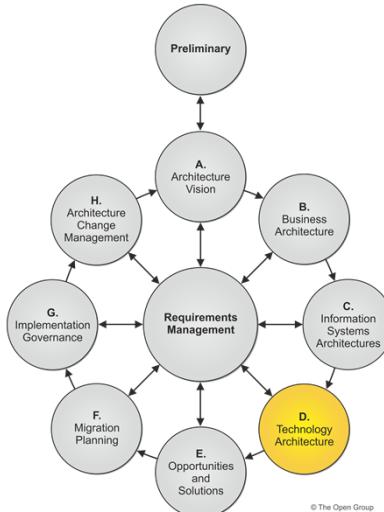
- Baseline Technology Architecture, if appropriate
- Target Technology Architecture, including:
  - Technology components and their relationships to information systems
  - Technology platforms and their decomposition, showing the combinations of technology required to realize a particular technology “stack”
  - Environments and locations – a grouping of the required technology into computing environments (e.g., development, production)
  - Expected processing load and distribution of load across technology components
  - Physical (network) communications
  - Hardware and network specifications
- Views corresponding to the selected viewpoints addressing key stakeholder concerns

### Architecture Requirements Specification – Technology Architecture Components

- Gap analysis results
- Updated technology requirements

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# Summary



- The purpose of Phase D: Technology Architecture is to transform application components into a set of technology components.
- The technology components can be both software and hardware components, available from the market or configured within the organisation

# Summary

Phase D: Technology Architecture			
Objectives	Steps	Inputs	Outputs
<p>Develop the Target Technology Architecture that enables the Architecture Vision, target business, data, and application building blocks to be delivered through technology components and technology services, in a way that addresses the Statement of Architecture Work and stakeholder concerns</p> <p>Identify candidate Architecture Roadmap components based upon gaps between the Baseline and Target Technology Architectures</p>	<p>Select reference models, viewpoints, and tools</p> <p>Develop Baseline Technology Architecture Description</p> <p>Develop Target Technology Architecture Description</p> <p>Perform gap analysis</p> <p>Define candidate roadmap components</p> <p>Resolve impacts across the Architecture Landscape</p> <p>Conduct formal stakeholder review</p> <p>finalise the Technology Architecture</p> <p>Create Architecture Definition Document</p>	<p>Request for Architecture Work</p> <p>Capability Assessment</p> <p>Communications Plan</p> <p>organisational Model for Enterprise Architecture</p> <p>Tailored Architecture Framework</p> <p>Technology principles</p> <p>Statement of Architecture Work</p> <p>Architecture Vision</p> <p>Architecture Repository</p>	<p>Statement of Architecture Work, updated if necessary</p> <p>Validated technology principles or new technology principles (if generated here)</p> <p>Draft Architecture Definition Document containing content updates:</p> <ul style="list-style-type: none"> <li>Baseline Technology Architecture</li> <li>Target Technology Architecture</li> <li>Technology Architecture views corresponding to the selected viewpoints, addressing key stakeholder concerns</li> </ul> <p>Draft Architecture Requirements Specification including content updates:</p> <ul style="list-style-type: none"> <li>Gap analysis results</li> <li>Requirements output from Phases B and C</li> <li>Updated technology requirements</li> </ul> <p>Technology Architecture components of an Architecture Roadmap</p>

## **Exercise**

Identify five sources of information within your organisation that could be used to draw up a Baseline Technology Architecture Description.

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## **Module 23: Migration Planning Techniques**

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# Roadmap

Part I - Introduction
Preface, Executive Overview, Core Concepts, Definitions
Part II – Architecture Development Method
Introduction to ADM
ADM Phase Narratives
Part III – ADM Guidelines and Techniques
Guidelines for Adapting the ADM Process
Techniques for Architecture Development
Part IV – Architecture Content Framework
Content Metamodel
Architectural Artifacts
Architecture Deliverables
Building Blocks
Part V – Enterprise Continuum and Tools
Enterprise Continuum
Architecture Partitioning
Architecture Repository
Tools for Architecture Development
Part VII – Architecture Capability Framework
Architecture Board
Architecture Compliance
Architecture Contracts
Architecture Governance
Architecture Maturity Models
Architecture Skills Framework

- **Part III, ADM Guidelines and Techniques, Chapter 24**



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# Module Objectives

The objectives are to:

- Understand the techniques used in Phases E and F for Migration Planning
- Key areas include:
  - Using the *Implementation Factor Assessment and Deduction Matrix* to document factors impacting the Architecture Implementation and Migration Plan.
  - The purpose of the *Consolidated Gaps, Solutions and Dependencies Matrix*
  - The purpose of an *Architecture Definition Increments table*
  - Using the *Enterprise Architecture State Evolution Table* with the TRM
  - Using the *Business Value Assessment Technique*

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## The Implementation Factor Assessment and Deduction Matrix

- This matrix documents the factors impacting the Implementation and Migration Plan
- It is created in Step 1 of Phase E and updated throughout Phase E
- It is an input to Phase F
- It serves as a repository for architecture implementation and migration decisions
- The matrix should include
  - a list of the factors to be considered
  - their descriptions, and
  - the deductions that indicate the actions or constraints that have to be taken into consideration when formulating the plans

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## Example – Implementation Factor Assessment and Deduction Matrix

Implementation Factor Assessment and Deduction Matrix		
Factor	Description	Deduction
<Name of Factor>	<Description of Factor>	<Impact on Migration Plan>
Change in Technology	Shut down the message centers, saving 700 personnel, and have them replaced by email.	<ul style="list-style-type: none"><li>• Need for personnel training, re-assignment</li><li>• Email has major personnel savings and should be given priority</li></ul>
Consolidation of Services		
Introduction of New Customer Service		

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## The Consolidated Gaps, Solutions and Dependencies Matrix

- This matrix is used when consolidating the gap analysis results from Phases B to D
- It is used to group the gaps identified in the domain architecture gap analysis results and assess potential solutions and dependencies to one or more gaps
- It is first created in Step 3 of Phase E
- It is an input to Phase F
- This matrix can be used as a planning tool when creating work packages
- The identified dependencies will drive the creation of projects and migration planning in Phases E and F

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## Example – Consolidated Gaps, Solutions and Dependencies Matrix

Consolidated Gaps, Solutions, and Dependencies Matrix				
No.	Architecture	Gap	Potential Solutions	Dependencies
1	Business	New Order Processing Process	Use COTS software tool process Implement custom solution	Drives applications (2)
2	Application	New Order Processing Application	COTS software tool X Develop in-house	
3	Information	Consolidated Customer Information Base	Use COTS customer base Develop customer data mart	

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## Architecture Definition Increments Table

- This table allows the architect to plan a series of Transition Architectures outlining the status of the Enterprise Architecture at specified times
- It is created in Phase F
- It consists of listing the projects and then assigning their incremental deliverables across the Transition Architectures

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## Architecture Definition Increments Table

Architecture Definition - Project Objectives by Increment (Example Only)				
Project	April 2018/2019	April 2019/2020	April 2020/2021	Comments
	Transition Architecture 1: Preparation	Transition Architecture 2: Initial Operational Capability	Transition Architecture 3: Benefits	
Enterprise e-Services Capability	Training and Business Process	e-Licensing Capability	e-Employment Benefits	
IT e-Forms	Design and Build			
IT e-Information Environment	Design and Build Information Environment	Client Common Data Web Content Design and Build	Enterprise Common Data Component Management Design and Build	
...	...	...	...	...

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## The Transition Architecture State Evolution Table

- This allows the architect to show the proposed state of the architectures at various levels using the TRM
- This is part of the Implementation and Migration Plan
  - showing proposed state of the architectures as they evolve
- It should be drawn up in Phase F, listing:
  - Services from the TRM used in the enterprise
  - Transition Architectures
  - Proposed transformations,
- All Solution Building Blocks (SBBs) should be described with respect to their delivery and impact on services

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## The Transition Architecture State Evolution Table

Architectural State using the Technical Reference Model				
Sub-Domain	Service	Transition Architecture 1	Transition Architecture 2	Transition Architecture 3
Infrastructure Applications	Information Exchange Services	Solution System A (replace)	Solution System B-1 (transition)	Solution System B-2 (new)
	Data Management Services	Solution System D (retain)	Solution System D (retain)	Solution System D (retain)
...	...	...	...	...

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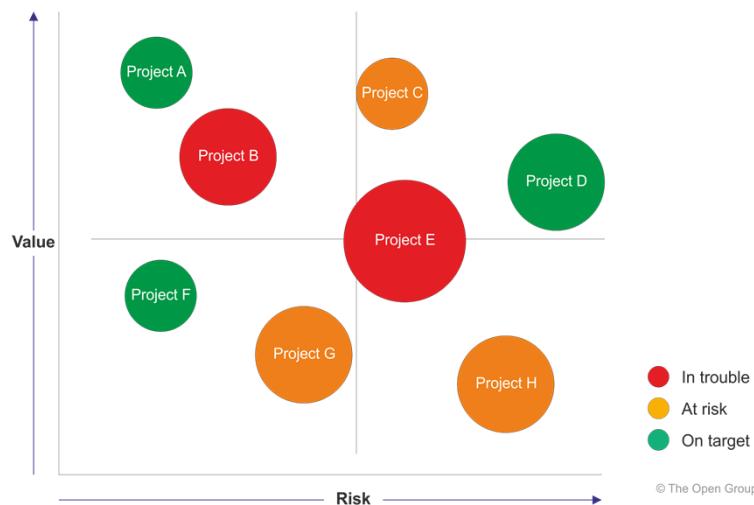
## The Business Value Assessment Technique

- This technique to assess business value includes drawing up a matrix with value and risk index dimensions
- It is used in Phase F to develop an estimated value to the business for each project
- The value index should include criteria such as compliance to principles, financial contribution, strategic alignment, and competitive position
- The risk index should include criteria such as size and complexity, technology, organisational capacity, and impact of a failure. Each criterion should be assigned an individual weight

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## The Business Value Assessment Technique

(Project size indicated by size of circle.)



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## Summary

This module has explained the techniques used in Phase E and F for migration planning. In particular, it has discussed:

- 2 matrices (the *Implementation Factor Assessment and Deduction Matrix* and the *Consolidated Gaps, Solutions and Dependencies Matrix*).
- 2 tables (the *Architecture Definition Increments table* and the *Enterprise Architecture State Evolution Table*).
- 1 technique (the *Business Value Assessment Technique*)

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## Exercise: The Business Value Assessment Technique

- Suppose that you are the Chief Architect of a large project in your enterprise. The project complies with your architecture principles. It will make a considerable financial contribution. It is strategically aligned with your business and it will strengthen your competitive advantage.
- However the project is complex and will use cutting-edge technology. Your organisational capacity is high, but the impact of failure is also high.
- Score each criterion on a scale of 0 to 10 and give each a weighting using this information and your experience and so produce a value index dimension and a risk index dimension for the project.

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# **Module 24**

## **Phase E:**

## **Opportunities and Solutions**

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## **Module Objectives**

**The objectives of this module are to understand:**

- The objectives of Phase E, Opportunities and Solutions
  - Which is the first phase directly concerned with implementation
- What it consists of
- What inputs are needed for it
- What the outputs are
- Generate the initial complete version of the Architecture Roadmap, based upon the gap analysis and candidate Architecture Roadmap components from Phases B, C, and D
- Determine whether an incremental approach is required, and if so identify Transition Architectures that will deliver continuous business value
- Define the overall solution building blocks to finalise the Target Architecture based on the Architecture Building Blocks (ABBs)

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## **Stakeholders**

- Phase E is a collaborative effort
  - Stakeholders required from both the business and IT sides
- It should include those that implement and those that operate the infrastructure
- It should also include those responsible for strategic planning
  - especially for creating the Transition Architectures, if required

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## **Approach**

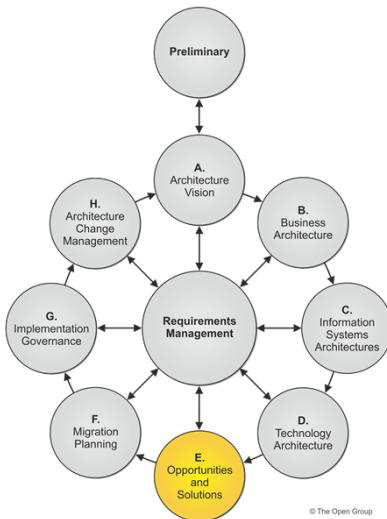
- This is the first phase concerning implementation
- It takes into account the complete set of gaps between the Target and Baseline Architectures in all architecture domains
- It logically groups changes into work packages
- It builds a best-fit roadmap based upon:
  - Stakeholder requirements
  - The enterprise's business transformation readiness
  - Identified opportunities and solutions
  - Identified implementation constraints.

The following four concepts are key to transitioning from developing to delivering a Target Architecture:

- Architecture Roadmap
- Work Packages
- Transition Architectures
- Implementation and Migration Plan

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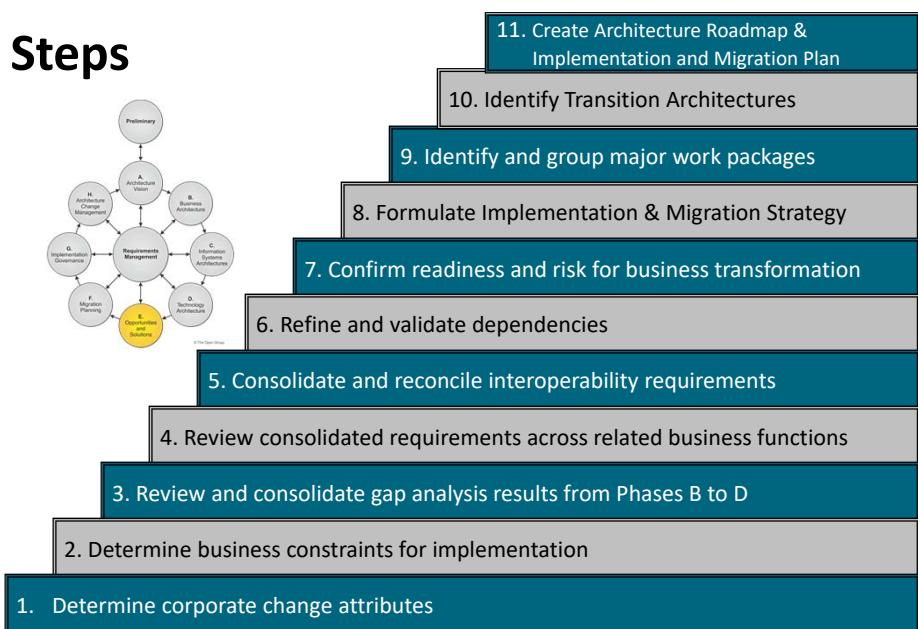
## Phase E: Inputs



- Product Information
- Request for Architecture Work
- Capability Assessment
- Communications Plan
- Planning Methodologies
- Governance models and frameworks
- Tailored Architecture Framework
- Statement of Architecture Work
- Architecture Vision
- Architecture Repository
- Draft Architecture Definition Document
- Draft Architecture Requirements Specification
- Change Requests for existing programs and projects
- Candidate Architecture Roadmap components from Phases B,C, and D

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## Steps



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## **Step 1: Determine Corporate Change Attributes**

- Create an Implementation Factor Assessment and Deduction Matrix
- Assess Transition Capabilities of Corporate and Partner organisations
- Assess Transition Capabilities of the Enterprise and IT organisation

## **Step 2: Determine Business Constraints for Implementation**

- Review Corporate Strategic Plan
- Review Corporate Line-of-Business Strategic Plans
- Review the Enterprise Architecture Maturity Assessment

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## **Step 3: Review and Consolidate Gap Analysis Results from Phases B to D**

- Create a Consolidated Gaps, Solutions, and Dependencies Matrix
- Review the Phase B, C, and D Gap Analysis Results
- Rationalise the Consolidated Gaps, Solutions, and Dependencies Matrix

## **Step 4: Review Consolidated Requirements Across Related Business Functions**

- Assess the requirements, gaps, solutions and factors to identify a minimal set of requirements for work packages
- This functional perspective leads to the satisfaction of multiple requirements through the provision of shared solutions and services

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## **Step 5: Consolidate and Reconcile Interoperability Requirements**

- Consolidate Interoperability Requirements identified in previous phases
- Identify any constraints on Interoperability required by the potential set of solutions

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## **Step 6: Refine and Validate Dependencies**

- Refine the initial dependencies ensuring any constraints on the Implementation and Migration Plans are identified
- Key dependencies include:
  - Existing implementations of Business Services
  - Existing implementations of Information Systems Services
- Dependencies should be used to determine the sequence of implementation and coordination required
- They can also be used to identify logical increments of deliverables and when they can be delivered
- Once complete document as part of the Architecture Roadmap and any necessary Transition Architectures

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## **Step 7: Confirm Readiness and Risk for Business Transformation**

- Review the Business Transformation Readiness Assessment previously conducted in Phase A
- Determine the impact on the Architecture Roadmap and the Implementation and Migration Strategy
- It is important to identify, classify, and mitigate risks associated with the transformation effort
- Risks should be documented in the Consolidated Gaps, Solutions, and Dependencies matrix

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## **Step 8: Formulate Implementation and Migration Strategy**

- Determine an overall strategic approach to implementing the solutions and/or exploiting opportunities
  - Greenfield
  - Revolutionary
  - Evolutionary
- Determine an Implementation Approach
  - Quick win (snapshots)
  - Achievable targets
  - Value chain method (e.g. NASCIO methodology)
- These approaches and identified dependencies should become the basis for creation of work packages

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## **Step 9: Identify and Group Major Work Packages**

- Use the Consolidated Gaps, Solutions, and Dependencies matrix together with the Implementation Factor Assessment and Deduction matrix, to logically group activities into work packages
- Fill in the "Solution" column in the Consolidated Gaps, Solutions, and Dependencies matrix to recommend the proposed solution
- Indicate for every gap/activity whether the solution should be a new development, or based on an existing product, and/or a solution that can be purchased
- Classify every current system
  - Mainstream Systems
  - Contain Systems
  - Replace Systems
- analyse the Work Packages with Respect to Business Transformation and group into portfolios and projects

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## **Step 10: Identify Transition Architectures**

- Applicable when the scope of change to implement the Target Architecture requires an incremental approach
- Identifies one or more clear targets along the roadmap to realizing the Target Architecture
- Development must be based upon the preferred implementation approach, the Consolidated Gaps, Solutions, and Dependencies matrix, the listing of projects and portfolios, as well as the enterprise's capacity for creating and absorbing change

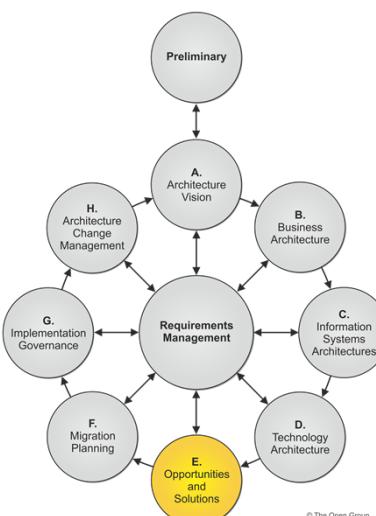
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## Step 11: Create the Architecture Roadmap & Implementation and Migration Plan

- Consolidate the work packages and Transition Architectures into the Architecture Roadmap, Version 0.1
  - The Architecture Roadmap must demonstrate how the selection and timeline of Transition Architectures and work packages realizes the Target Architecture
- The Implementation and Migration Plan, Version 0.1 must be aligned to the Architecture Roadmap and sufficient to identify the necessary projects and resource requirements to realize the roadmap
- Update the Architecture Vision, Architecture Definition Document, and Architecture Requirements Specification, if necessary

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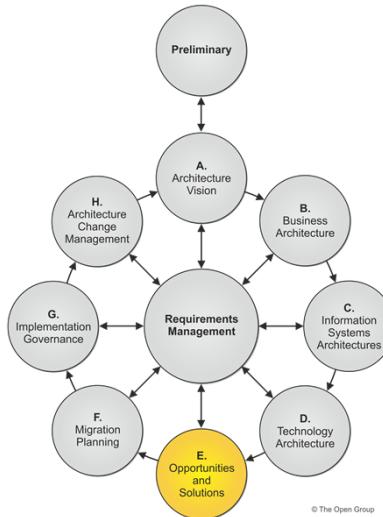
## Phase E Outputs



- Statement of Architecture Work
- Architecture Vision
- Draft Architecture Definition Document, including:
  - Transition Architectures, if any
- Draft Architecture Requirements Specification, including:
  - Consolidated Gaps, Solutions and Dependencies Assessment
- Capability Assessment, including:
  - Business Capability Assessment
  - IT Capability Assessment
- Architecture Roadmap, including:
  - Work Package portfolio
  - Identification of Transition Architectures, if any
  - Implementation Recommendations
- Implementation & Migration Plan (outline)

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# Summary



- Phase E is the first phase concerned with implementation
- It identifies the parameters of change, the phases and necessary projects
- The output forms the basis of the Implementation Plan

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# Summary

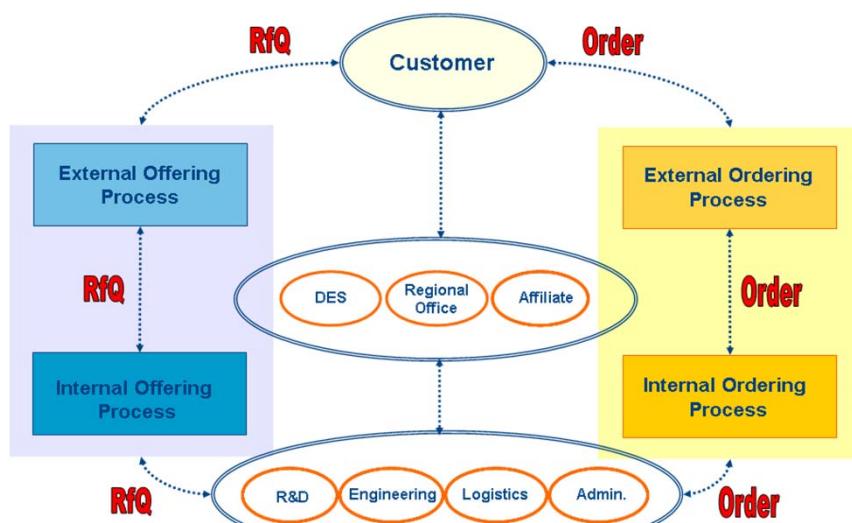
Phase E: Opportunities & Solutions			
Objectives	Steps	Inputs	Outputs
Generate the initial complete version of the Architecture Roadmap, based upon the gap analysis and candidate Architecture Roadmap components from Phases B, C, and D	Determine/confirm key corporate change attributes  Determine business constraints for implementation  Review and consolidate gap analysis results from Phases B to D  Review consolidated requirements across related business functions  Consolidate and reconcile interoperability requirements  Refine and validate dependencies  Confirm readiness and risk for business transformation  Formulate Implementation and Migration Strategy  Identify and group major work packages  Identify Transition Architectures  Create Architecture Roadmap & Implementation and Migration Plan	Product information  Request for Architecture Work  Capability Assessment  Communications Plan  Planning methodologies  organisational model for Enterprise Architecture  Governance models and frameworks  Tailored Architecture Framework  Statement of Architecture Work  Architecture Vision  Architecture Repository  Draft Architecture Definition Document  Draft Architecture Requirements Specification  Change Requests for existing programs and projects  Candidate Architecture Roadmap components from Phases B, C, and D	Statement of Architecture Work, updated if necessary  Architecture Vision, updated if necessary  Draft Architecture Definition Document, including: <ul style="list-style-type: none"><li>• Transition Architecture, number and scope, if any</li></ul> Draft Architecture Requirements Specification, updated if necessary  Consolidated and validated Architecture Roadmap  Capability Assessment, including: <ul style="list-style-type: none"><li>• Business Capability</li><li>• IT Capability</li></ul> Architecture Roadmap, including: <ul style="list-style-type: none"><li>• Work Package portfolio</li><li>• Identification of Transition Architectures, if any</li><li>• Impact analysis – project list</li><li>• Implementation Recommendations</li></ul> Implementation and Migration Plan (outline), including: <ul style="list-style-type: none"><li>• Implementation and Migration Strategy</li></ul>

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## TOGAF Version 9.2 Artifacts

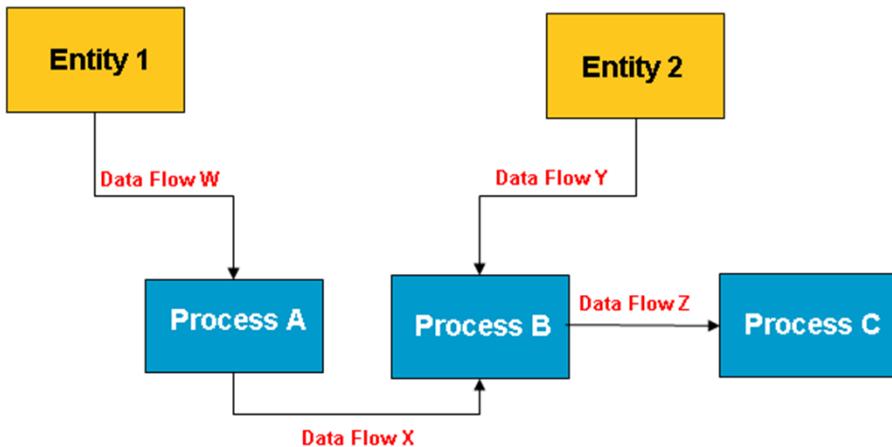


## Project Context Diagram



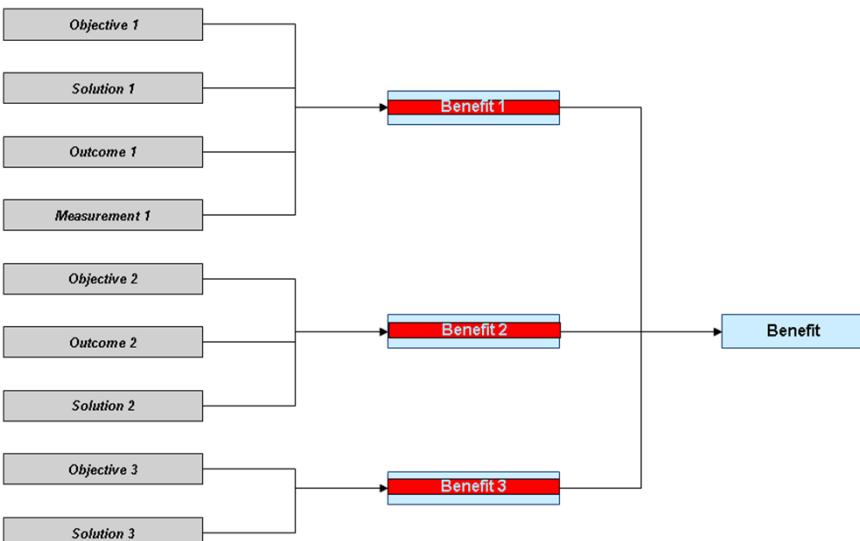
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## Project Context Diagram



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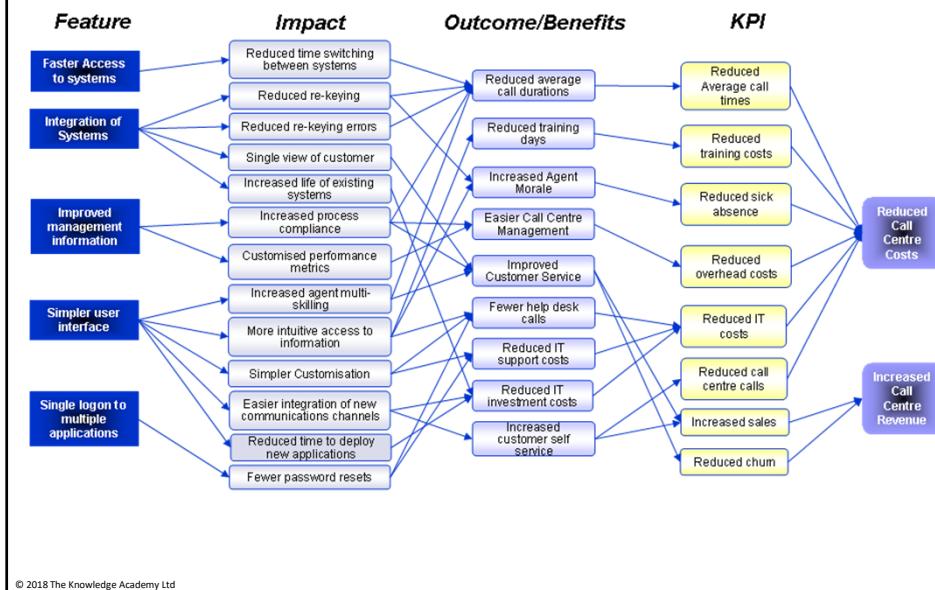
## Benefits Diagram



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# E

## Benefits Diagram



## Test Yourself Question

- Q. Which of the following is the most successful strategy for Phase E?
- A Focus on the application systems that are relevant to the enterprise
  - B Focus on projects that will deliver short-term payoffs
  - C Focus on top-down development
  - D Reverse engineering
  - E Trial and error

# **Module 25**

## **Phase F:**

### **Migration Planning**

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## **Module Objectives**

The objectives of this module are to understand:

- The objectives of Phase F, Migration Planning
- What it consists of
- What inputs are needed for it
- What the outputs are

### **Phase F Objectives**

- Finalise the Architecture Roadmap and the supporting Implementation and Migration Plan
- Ensure that the Implementation and Migration Plan is coordinated with the enterprise's approach to managing and implementing change in the enterprise's overall change portfolio
- Ensure that the business value and cost of work packages and Transition Architectures is understood by key stakeholders

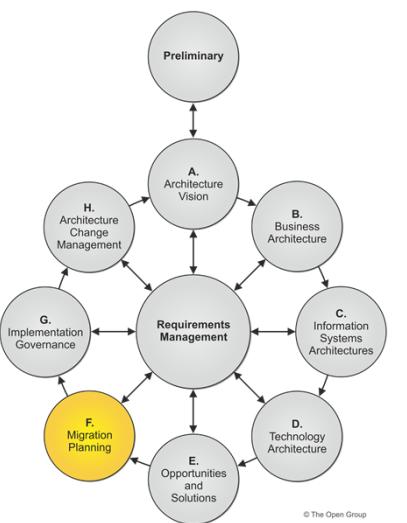
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# Approach

- The focus is creation of the Implementation and Migration plan in co-operation with project and portfolio managers
- Activities include the dependencies, costs, and benefits of the various migration projects within the context of the enterprise's other activity

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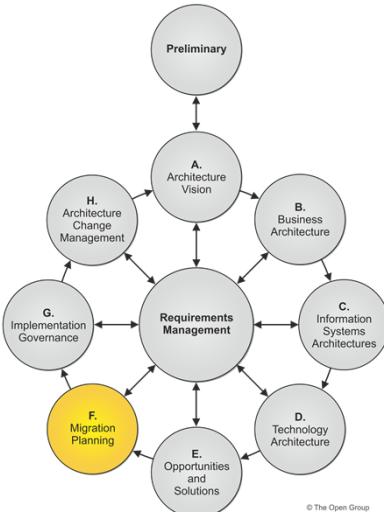
## Phase F: Inputs



- Request for Architecture Work
- Communications Plan
- Organisational model for Enterprise Architecture
- Governance Models and Frameworks
- Tailored Architecture Framework
- Statement of Architecture Work
- Architecture Vision
- Architecture Repository

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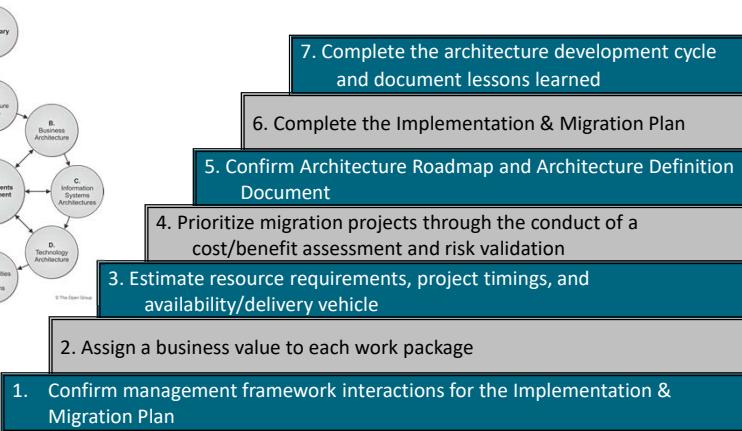
## Phase F: Inputs



- Draft Architecture Definition Document, including:
  - Transition Architectures, if any
- Draft Architecture Requirements Specification
- Change Requests for existing programs and projects
- Architecture Roadmap, including:
  - Identification of work packages
  - Identification of Transition Architectures
  - Implementation Factor Assessment and Deduction Matrix
- Capability Assessment
- Implementation and Migration Plan (outline)

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## Steps



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## **Step 1: Confirm Management Framework Interactions for the Implementation and Migration Plan**

- Coordinate the Implementation and Migration Plan with the management frameworks in use within the organisation
  - Business Planning
  - Enterprise Architecture
  - Portfolio/Project Management
  - Operations Management
- The outcome of this step may well be that the Implementation and Migration Plan could be part of a different plan produced by another one of the frameworks with Enterprise Architecture participation

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## **Step 2: Assign a Business Value to Each Work Package**

- Establish what constitutes business value within the organisation, how value can be measured, and then apply this to each one of the projects and project increments
- If Capability-Based Planning is in use, then business values associated with the capabilities and associated capability increments should be used to assign the business values for deliverables
- Use the work packages as a basis of identifying projects that will be in the Implementation and Migration Plan
- Risks should be assigned to the projects by aggregating risks identified in the Consolidated Gaps, Solutions, and Dependencies Matrix
- Estimate the business value for each project using the Business Value Assessment Technique

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### **Step 3: Estimate Resource Requirements, Project Timings, and Availability/Delivery Vehicle**

- Determine costs to create the capability
- Determine costs to run and sustain the capability
- Identify opportunities to offset costs by decommissioning existing systems
- Assign resources to each activity and aggregate them at the project increment and project level

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### **Step 4: Prioritise the Migration Projects through the Conduct of a Cost/Benefit Assessment and Risk Validation**

- Prioritize the projects by ascertaining their business value against the cost of delivering them
- Determine the net benefit of all of the SBBs delivered by the projects
- Verify that the risks have been effectively mitigated and factored in
- Gain the requisite consensus to create a prioritized list of projects that will provide the basis for resource allocation

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## **Step 5: Confirm Architecture Roadmap and Update Architecture Definition Document**

- Update the Architecture Roadmap including any Transition Architectures
  - Review the work to date to assess what the time-spans between Transition Architecture should be, taking into consideration the increments in business value and capability and other factors, such as risk.
  - Once the capability increments have been finalised, consolidate the deliverables by project.
  - A Transition Architecture State Evolution Table can be used to show the proposed state of the domain architectures
- If the implementation approach has shifted as a result of confirming the implementation increments, update the Architecture Definition Document.

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## **Step 6: Generate the Implementation & Migration Plan**

- Integrate all of the projects and activities as well as dependencies and impact of change into a project plan
- Any Transition Architectures will act as portfolio milestones
- All external dependencies should be captured and included, and the overall availability of resources assessed
- Project plans may be included within the Implementation and Migration Plan

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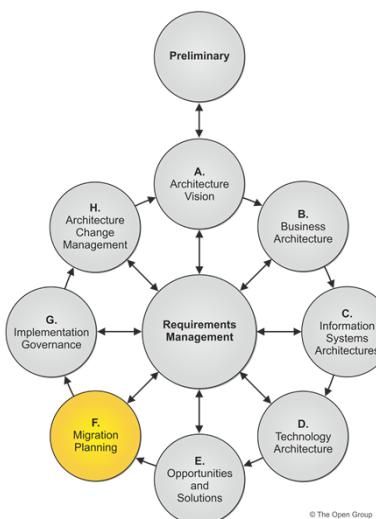
## Step 7: Complete the Architecture Development Cycle and Document

### Lessons Learned

- This step transitions governance from the development of the architecture to the realization of the architecture
- Lessons learned during the development of the architecture should be documented and captured by the appropriate governance process in Phase H as inputs to managing the Architecture Capability

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## Phase F Outputs

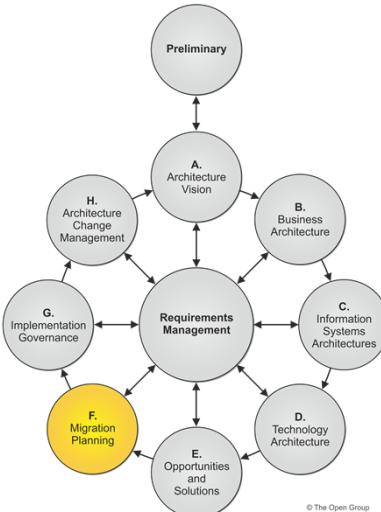


- Implementation and Migration Plan (detailed)
- finalised Architecture Definition Document, including:
  - finalised Transition Architectures, if any
- finalised Architecture Requirements Specification
- finalised Architecture Roadmap
- Re-Usable ABBs
- Requests for Architecture Work for a new iteration of the ADM (if any)
- Implementation Governance Model
- Change Requests

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# Summary



- Phase F addresses migration planning – how to move from the Baseline to the Target
- It includes creating the finalised Architecture Definition Document, Architecture Roadmap and the detailed Implementation & Migration Plan
- At the completion of this phase the preparation for implementation has been completed

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# Summary

Phase F: Migration Planning			
Objectives	Steps	Inputs	Outputs
<p>finalise the Architecture Roadmap and the supporting Implementation and Migration Plan</p> <p>Ensure that the Implementation and Migration Plan is coordinated with the enterprise's approach to managing and implementing change in the enterprise's overall change portfolio</p> <p>Ensure that the business value and cost of work packages and Transition Architectures is understood by key stakeholders</p>	<p>Confirm management framework interactions for implementation and Migration Plan</p> <p>Assign a business value to each work package</p> <p>Estimate resource requirements, project timings, and availability/delivery vehicle</p> <p>Prioritize the migration projects through the conduct of a cost/benefit assessment and risk validation</p> <p>Confirm Architecture Roadmap and update Architecture Definition Document</p> <p>Complete the Implementation Roadmap and Migration Plan</p> <p>Complete the architecture development cycle and document lessons learned</p>	<p>Request for Architecture Work</p> <p>Communications Plan</p> <p>organisational Model for Enterprise Architecture</p> <p>Governance models and frameworks</p> <p>Tailored Architecture Framework</p> <p>Statement of Architecture Work</p> <p>Architecture Vision</p> <p>Architecture Repository</p> <p>Draft Architecture Definition Document, including:</p> <ul style="list-style-type: none"> <li>• Transition Architectures, if any</li> </ul> <p>Draft Architecture Requirements Specification</p> <p>Change Requests for existing programs and projects</p> <p>Architecture Roadmap</p> <p>Capability Assessment, including:</p> <ul style="list-style-type: none"> <li>• Business Capability</li> <li>• IT Capability</li> </ul> <p>Implementation and Migration Plan (outline), including:</p> <ul style="list-style-type: none"> <li>• High-level Implementation and Migration Strategy</li> </ul>	<p>Implementation and Migration Plan (detailed), including:</p> <ul style="list-style-type: none"> <li>• Implementation and Migration Strategy</li> <li>• Project and portfolio breakdown of the implementation</li> <li>• Project charters (optional)</li> </ul> <p>finalised Architecture Definition Document, including:</p> <ul style="list-style-type: none"> <li>• finalised Transition Architectures, if any</li> </ul> <p>finalised Architecture Requirements Specification</p> <p>finalised Architecture Roadmap</p> <p>Re-usable Architecture Building Blocks</p> <p>Requests for Architecture Work for a new iteration of the ADM cycle (if any)</p> <p>Implementation Governance Model</p> <p>Change Requests for the Architecture Capability arising from lessons learned</p>

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## **Test Yourself Question**

- Q. When preparing the detailed Migration Plan, which of the following should not be a consideration?
- A Risk Assessment
  - B Project Priorities
  - C Availability of Resources
  - D Cost/benefit assessment
  - E Choice of target platform

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## **Module 26**

### **Phase G:**

### **Implementation Governance**

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# Module Objectives

The objectives of this module are to understand:

- The objectives of Phase G, Implementation Governance
- What it consists of
- What inputs are needed for it
- What the outputs are

## Phase G Objectives

- Ensure conformance with the Target Architecture by implementation projects
- Perform appropriate Architecture Governance functions for the solution and any implementation-driven architecture Change Requests

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# Approach

- Phase G relates the architecture to the implementation through the Architecture Contract
- The information for successful management of the projects must be brought together
- The development happens in parallel with Phase G
- Establish an implementation program that will enable the delivery of the Transition Architectures agreed for implementation during the Migration Planning phase
- Adopt a phased deployment schedule that reflects the business priorities embodied in the Architecture Roadmap
- Follow the organisation's standard for corporate, IT, and architecture governance
- Use the organisation's established portfolio/program management approach, where this exists
- Define an operations framework to ensure the effective long life of the deployed solution

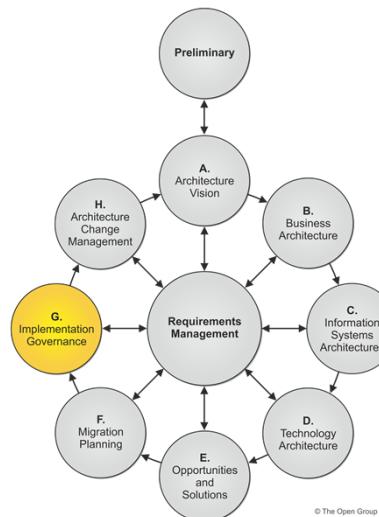
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# Approach

- Establish the connection between the architecture and implementation organisation through the Architecture Contract
- Project details are developed, including:
  - Name, description, and objectives
  - Scope, deliverables, and constraints
  - Measures of effectiveness
  - Acceptance criteria
  - Risks and issues

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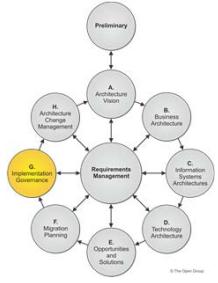
## Phase G: Inputs



- Request for Architecture Work
- Capability Assessment
- organisational model for EA
- Tailored Architecture Framework
- Statement of Architecture Work
- Architecture Vision
- Architecture Repository
- Architecture Definition Document
- Architecture Requirements Specification
- Architecture Roadmap
- Implementation Governance Model
- Architecture Contract
- Request for Architecture Work from E and F
- Implementation and Migration Plan

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# Steps



1. Confirm scope and priorities for deployment with the development management
2. Identify deployment resources and skills
3. Guide development of solutions deployment
4. Perform EA compliance reviews
5. Implement business and IT operations
6. Do post-implementation review, close the implementation

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## Step 1: Confirm Scope and Priorities

- Review migration planning outputs and produce recommendations on deployment
- Identify Enterprise Architecture priorities for development teams
- Identify deployment issues and make recommendations
- Identify building blocks for replacement, update, etc.
- Perform gap analysis on Enterprise Architecture and solutions framework
- Produce a gap analysis report

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## **Step 2: Identify Deployment Resources and Skills**

- Identify system development methods required for solutions development
- Ensure that the systems development method enables feedback to the architecture team on designs

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## **Step 3: Guide Development of Solutions Deployment**

- Formulate project recommendations
- Document Architecture Contract
- Update Enterprise Continuum directory and repository for solutions
- Guide development of business & IT operating models for services
- Provide service requirements derived from EA
- Guide definition of business & IT operational requirements
- Carry out gap analysis: Solution Architecture vs. operations
- Produce Implementation Plan

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## **Step 4: Perform EA Compliance Reviews**

- Review ongoing implementation governance and architecture compliance for each BB
- Conduct post-development reviews
- Close development part of deployment projects

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## **Step 5: Implement Business and IT Operations**

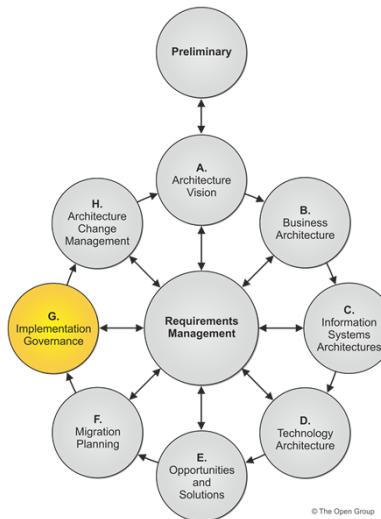
- Carry out deployment projects including: IT services delivery implementation; business services delivery implementation; skills development & training implementation; communications documentation publication
- Publish new Baseline Architectures in the Architecture Repository and update other repositories, such as operational configuration management stores

### **Step 6: Do Post-Implementation Review, Close the Implementation**

- Conduct post-implementation reviews
- Publish reviews and close projects

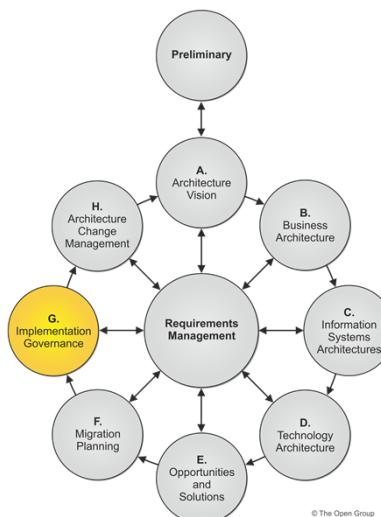
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## Phase G Outputs



- Architecture Contract (signed)
- Compliance Assessments
- Change Requests
- Architecture-compliant solutions deployed, including:
  - Implemented system
  - Populated Architecture Repository
  - Recommendations and dispensations
  - Service delivery requirements
  - Performance metrics
  - SLAs
  - Architecture Vision
  - Architecture Definition Document
  - Transition Architecture
  - Business and IT operating models

## Summary



- Phase G defines architecture constraints on the implementation projects and constructs and obtains signatures on an Architecture Contract
- The contract and documentation is delivered to the implementation team
- The phase includes governing the architecture through implementation by compliance reviews and by risk monitoring

## Summary

Phase G: Implementation Governance			
Objectives	Steps	Inputs	Outputs
Ensure conformance with the Target Architecture by implementation projects	Confirm scope and priorities for deployment with development management	Request for Architecture Work Capability Assessment organisational Model for Enterprise Architecture	Architecture Contract (signed) Compliance Assessments Change Requests
Perform appropriate Architecture Governance functions for the solution and any implementation-driven architecture Change Requests	Identify deployment resources and skills Guide development of solutions deployment Perform Enterprise Architecture compliance reviews Implement business and IT operations Perform post-implementation review and close the implementation	Tailored Architecture Framework Statement of Architecture Work Architecture Vision Architecture Repository Architecture Definition Document Architecture Requirements Specification Architecture Roadmap Implementation Governance Model Architecture Contract Request for Architecture Work identified in Phases E and F Implementation and Migration Plan	Architecture-compliant solutions deployed, including: <ul style="list-style-type: none"><li>• The architecture-compliant implemented system</li><li>• Populated Architecture Repository</li><li>• Architecture compliance recommendations and dispensations</li><li>• Recommendations on service delivery requirements</li><li>• Recommendations on performance metrics</li><li>• Service Level Agreements (SLAs)</li><li>• Architecture Vision, updated post-implementation</li><li>• Architecture Definition Document, updated post-implementation</li><li>• Business and IT operating models for the implemented solution</li></ul>

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## Test Yourself Question

- Q. Which one of the following provides a foundation for governing the implementation of the recommended projects?
- A Impact Analysis  
B Principles  
C Strategic Plan  
D Architecture Contracts  
E Risk Assessment

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# **Module 27**

## **Phase H:**

## **Architecture Change**

## **Management**

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## **Module Objectives**

The objectives of this module are to understand:

- The objectives of Phase H, Architecture Change Management
- What it consists of
- What inputs are needed for it
- What the outputs are

### **Phase H Objectives**

- Ensure that the architecture lifecycle is maintained
- Ensure that the Architecture Governance Framework is executed
- Ensure that the enterprise Architecture Capability meets current requirements

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## **Approach**

- The goal of an architecture change management process is to ensure that the architecture achieves its original target business value.
- This can be done by:
  1. ensuring that changes to the architecture are managed properly
  2. supporting a dynamic architecture.
- The process will determine the circumstances under which:
  1. The architecture will be permitted to change after deployment, and the process for this.
  2. The ADM will be used again.

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## **Exercise: Drivers for Architecture Change**

1. Brainstorm as many examples of technology-related drivers for change as you can.
2. Brainstorm as many examples of business-related drivers for change as you can.

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## Change Management Process

There are three main categories of architecture change:

1. **Simplification:** this can be handled via change management techniques.
2. **Incremental:** this may be handled via change management techniques, or it may require partial re-architecting.
3. **Re-architecting:** this requires putting the whole architecture through the architecture development cycle again.

Exercise: why might each of these changes occur?

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## Change Management Process

To determine whether a change is simplification, incremental, or re-architecting:

1. Register all events that may impact the architecture
2. Allocate resources and management for the architecture tasks
3. The process (or role) responsible for resources has to make an assessment of what should be done
4. Evaluate the impact

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## Maintenance versus Redesign

If the change:

- Impacts 2 stakeholders or more, then it is likely to require an architecture redesign and re-entry to the ADM
- Impacts only 1 stakeholder, then it is likely to be a candidate for change management
- Can be allowed under a dispensation, then it is likely to be a candidate for change management

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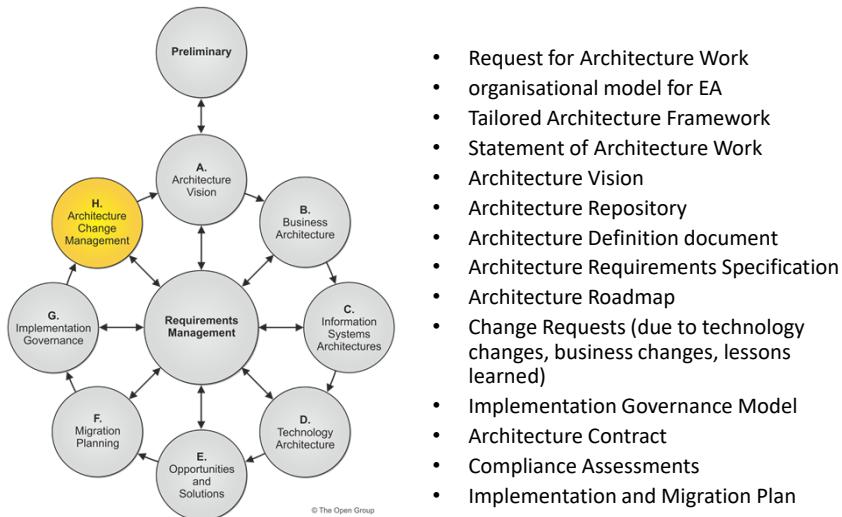
## Change Impact Exercise

Q. Determine the change impact of the following scenarios:

1. The impact of the change is significant for the business strategy.
2. A new technology or standard emerges.
3. The change is at an infrastructure level; for example, 10 systems are reduced to 1 system.
4. The Foundation Architecture needs to be re-aligned with the business strategy.
5. Substantial change is required to components and guidelines for use in deployment of the architecture.

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## Phase H: Inputs



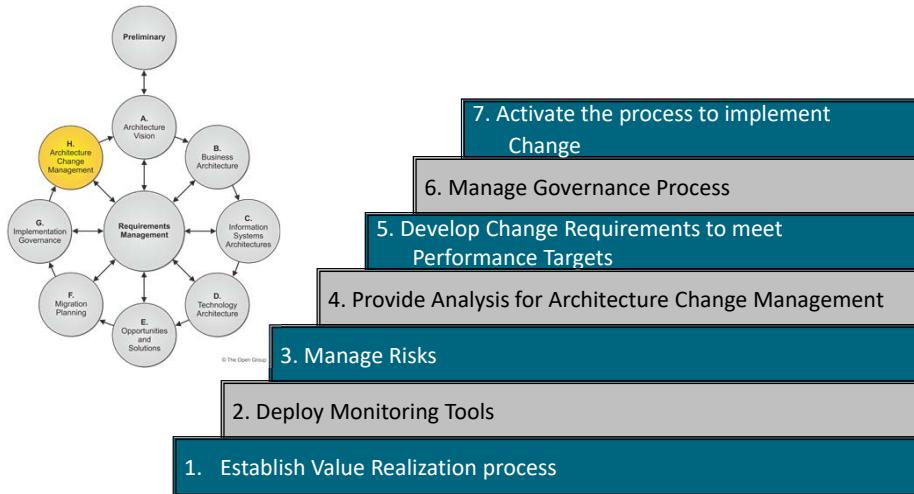
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## Change Requests

- Description of the proposed change
- Rationale for the proposed change
- Impact assessment of the proposed change, including:
  - Reference to specific requirements
  - Stakeholder priority of the requirements to date
  - Phases to be revisited
  - Phase to lead on requirements prioritization
  - Results of phase investigations and revised priorities
  - Recommendations on management of requirements
- Repository reference number

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# Steps



## Step 1. Establish Value Realisation Process

- Influence business projects to exploit the Enterprise Architecture for value realisation (outcomes)

## Step 2. Deploy Monitoring Tools

- Monitor technology changes which could impact the Baseline Architecture
- Monitor business changes which could impact the Baseline Architecture
- Business value tracking; e.g., investment appraisal method to determine value metrics for the business objectives
- Monitor enterprise Architecture Capability maturity
- Track and assess asset management programs
- Track the QoS performances and usage
- Determine and track business continuity requirements

## **Step 3. Manage Risks**

- Manage Enterprise Architecture risks and provide recommendations
- See Chapter 31 Risk Management

## **Step 4. Provide Analysis for Architecture Change Management**

- Analyse performance
- Conduct Enterprise Architecture performance reviews with service management
- Assess Change Requests and reporting to ensure that the expected value realisation and Service Level Agreement (SLA) expectations of the customers are met
- Undertake a gap analysis of the performance of the Enterprise Architecture
- Ensure change management requests adhere to the Enterprise Architecture governance and framework

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## **Step 5. Develop Change Requirements to Meet Performance Targets**

- Make recommendations on change requirements
  - To meet performance requirements
  - To develop a position to act

## **Step 6. Manage Governance Process**

- Arrange meeting of Architecture Board (or other Governing Council)
- Hold meeting of the Architecture Board with the aim of the meeting to decide on handling changes (technology and business and dispensations)

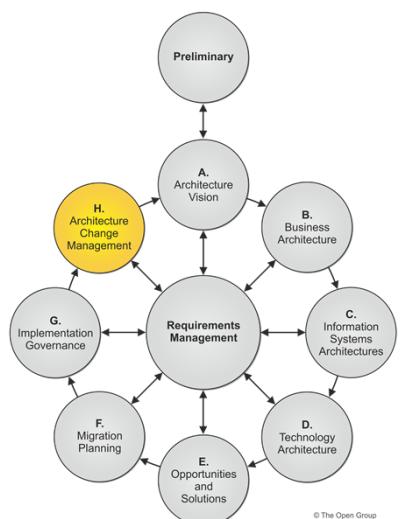
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## Step 7. Activate the Process to Implement Change

- Produce a new Request for Architecture Work and request for investment
- Ensure any changes implemented in this phase are captured and documented in the Architecture Repository

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## Phase H Outputs



- Architecture updates
- Changes to architecture framework and principles
- New Request for Architecture Work, to initiate another cycle of the ADM
- Statement of Architecture Work
- Architecture Contract
- Compliance Assessments

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## **Business Users' Architecture Contract**

- Introduction and background
- The nature of the agreement
- Scope
- Strategic requirements
- Conformance requirements
- Architecture adopters
- Time window
- Architecture business metrics
- Service architecture (includes Service Level Agreement (SLA))

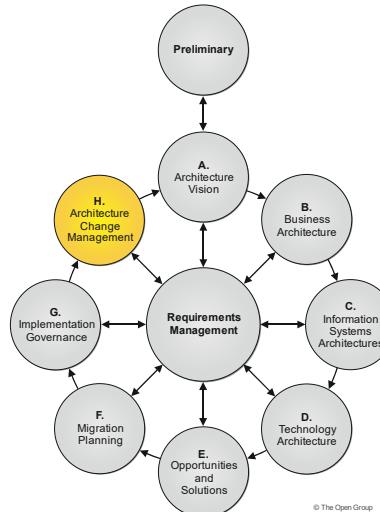
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## **Request for Architecture Work**

- Organisation sponsors
- Organisation's mission statement
- Business goals (and changes)
- Strategic plans of the business
- Time limits
- Changes in the business environment
- Organisational constraints
- Budget information, financial constraints
- External constraints, business constraints
- Current business system description
- Current architecture/IT system description
- Description of developing organisation
- Description of resources available to developing organisation

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# Summary



- Phase H Change Management
  - Ensures that changes to the architecture are managed in a cohesive and controlled manner
  - Establishes and supports the architecture to provide flexibility to evolve the architecture rapidly in responses to changes in technology and business

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# Summary

Phase H: Architecture Change Management			
Objectives	Steps	Inputs	Outputs
Ensure that the architecture lifecycle is maintained	Establish value realization process	Request for Architecture Work	Architecture updates
Ensure that the Architecture Governance Framework is executed	Deploy monitoring tools	organisational Model for Enterprise Architecture	Changes to architecture framework and principles
Ensure that the Enterprise Architecture Capability meets current requirements	Manage risks	Tailored Architecture Framework	New Request for Architecture Work, to initiate another cycle of the ADM
	Provide analysis for architecture change management	Statement of Architecture Work	Statement of Architecture Work, updated if necessary
	Develop change requirements to meet performance targets	Architecture Vision	Architecture Contract, updated if necessary
	Manage governance process	Architecture Repository	Compliance Assessments, updated if necessary
	Activate the process to implement change	Architecture Definition Document	
		Architecture Requirements Specification	
		Architecture Roadmap	
		Change Requests due to technology changes	
		Change Requests due to business changes	
		Change Requests from lessons learned	
		Implementation Governance Model	
		Architecture Contract (signed)	
		Compliance Assessments	
		Implementation and Migration Plan	

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## **Test Yourself Question**

- Q. Which of the following is part of an architecture change management process?
- A Ensuring that business continues as usual
  - B Determining whether a change warrants an update to the architecture
  - C Determining whether a change requires a new cycle of the ADM
  - D Managing change properly
  - E Establishing criteria for judging change requests

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# **Module 28**

# **ADM Architecture**

# **Requirements Management**

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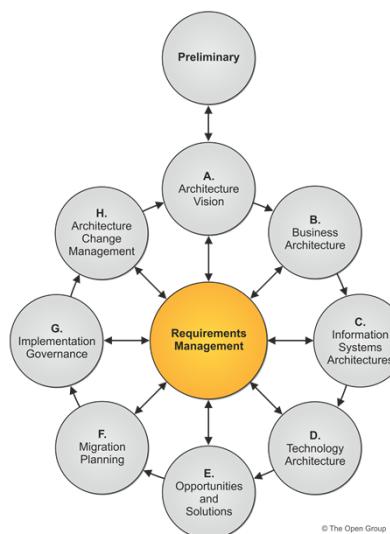
## Module Objectives

The objectives of this module are to understand:

- The process of managing Architecture Requirements during application of the ADM
- What it consists of
- What inputs are needed for it
- What the outputs are

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## ADM Requirements Management



The process of managing architecture requirements:

- Applies to all phases of the ADM cycle
- Is central to the ADM process
- Is a dynamic process addressing the identification of requirements, their storage and delivery to the phases

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## Objectives

- Ensure that the Requirements Management process is sustained and operates for all relevant ADM phases
- Manage architecture requirements identified during any execution of the ADM cycle or a phase
- Ensure that the relevant architecture requirements are available for use by each phase as the phase is executed

## Approach

- The ability to deal with changes in the requirements is crucial to the ADM process since architecture deals with uncertainty and change
- Architecture bridges the divide between the aspirations of the stakeholders and a practical solution
- The Requirements Management process does not dispose of, address or prioritize requirements; this is done within the phases of the ADM
- It is recommended that a Requirements Repository is used to record and manage all architecture requirements

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## Requirements Development

- The first high level requirements are developed in the Architecture Vision
- For each ADM phase, from Preliminary to Phase H
  - Select the approved requirements for that phase as held in the Requirements Repository and Architecture Requirements Specification
  - At the completion of a phase the status of all such requirements needs to be updated
- During phase execution
  - New requirements generated for future architecture work within the scope of the current Statement of Architecture Work need to be documented within the Architecture Requirements Specification
  - New requirements which are outside of the scope of the current Statement of Architecture Work must be input to the Requirements Repository for management through the Requirements Management process

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## Resources

- TOGAF specifies generic needs for requirements, not specific tools or processes
- It recommends use of
  - Business Scenarios
  - Commercial off the shelf tools

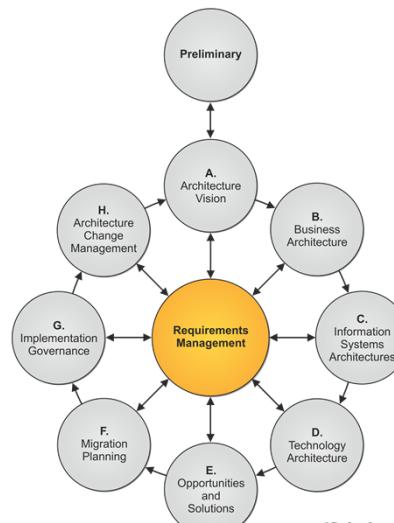
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## Volère Requirements Specification Template

- This is an example of a suitable requirements template
- **The “Waiting Room”**
  - This is a repository for requirements that are beyond the planned scope, or the time available, for the current iteration. Having the ability to store future requirements helps avoid the perception that they are simply being discarded, while at the same time helping to manage expectations about what will be delivered.

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# Requirements Management: Inputs



- Requirements-related outputs from each ADM phase.
- The first high-level requirements are produced as part of the Architecture Vision.
- Each architecture domain then generates detailed requirements.
- Deliverables in later ADM phases contain mappings to new types of requirements

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# Steps Overview

## Requirements Management Steps

2. Baseline requirements
3. Monitor baseline requirements
5. Identify changed requirement and record priorities
8. Update the Architecture Requirements Repository with information relating to the changes requested, including stakeholder views affected

## ADM Phase Steps

1. Identify/document requirements
4. Identify changed requirement
6. Assess impact of change
7. Implement changes arising from Phase H
9. Implement change in the current phase
10. Assess and revise gap analysis for past phases

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## Steps in Detail

1. Identify/document requirements (*ADM Phase Step*)
  - Use Business Scenarios or an equivalent technique
2. Baseline requirements (*Requirements Management Step*)
  1. Determine priorities arising from current phase of ADM
  2. Confirm stakeholder buy-in to resultant priorities
  3. Record requirements priorities and place in Requirements Repository.
3. Monitor baseline requirements (*Requirements Management Step*)

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## Steps in Detail

4. Identify changed requirement (*ADM Phase Step*)
  1. Remove or re-assess priorities
  2. Add requirements and re-assess priorities
  3. Modify existing requirements
5. Identify changed requirements and record priorities (*Requirements Management Step*)
  1. Identify changed requirements and ensure the requirements are prioritized by the architects and the stakeholders
  2. Record new priorities
  3. Ensure that any conflicts are identified and managed through the phases to a successful conclusion and prioritization
  4. Generate Requirements Impact Statement for steering the architecture team

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## Steps in Detail

6. Assess impact of changed requirements on *(ADM Phase Step)*
  1. Current phase
  2. Previous phases
  3. Decide whether to:
    - Implement change (requires schedule for change management implementation)
    - Defer to future ADM cycle
  4. Issue new version of Requirements Impact Statement
7. Implement requirements arising from Phase H (Architecture Change Management) *(ADM Phase Step)*
  - The architecture can be changed through its lifecycle by Phase H. The Requirements Management process ensures that new or changing requirements are managed accordingly

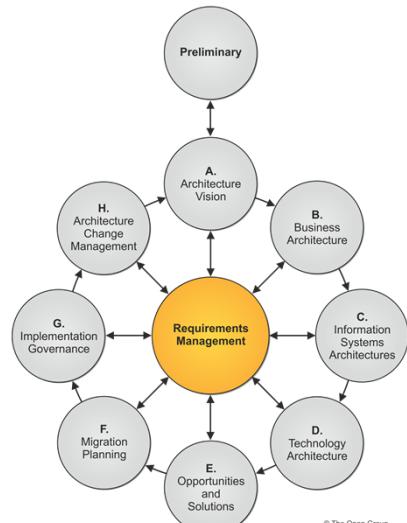
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## Steps in Detail

8. Update the Architecture Requirements Repository with information relating to the changes requested, including stakeholder views affected *(Requirements Management Step)*
9. Implement change in the current phase *(ADM Phase Step)*
10. Assess and revise gap analysis for past phases *(ADM Phase Step)*
  - If the gap analysis generates gap requirements, then this step will ensure that they are addressed, documented, and recorded in the requirements repository, and that the Target Architecture is revised accordingly.

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## Requirements Management: Outputs



- Updated Architecture Requirements Specification
- Requirements Impact Statement

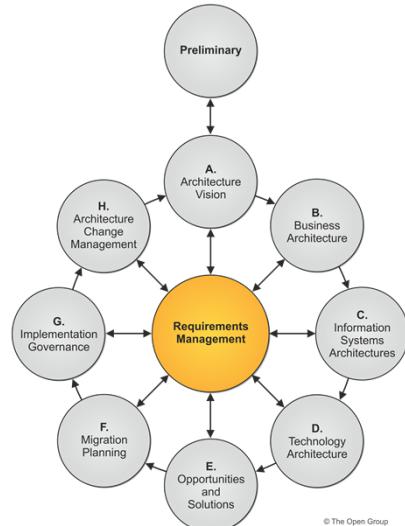
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## Requirements Impact Assessment

- When new requirements arise, or existing ones are changed, a Requirements Impact Statement is generated
- It identifies the phases of the ADM that need to be revisited to address the changes
- The statement goes through various iterations until the final version, which includes the full implications of the requirements (e.g., costs, timescales, and business metrics) on the architecture development
- Once requirements for the current ADM cycle have been finalised then the Architecture Requirements Specification should be updated

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# Summary



- Requirements Management is an ongoing activity of the ADM.
- The Requirements Repository contains the current requirements for the Target Architecture.
- When new requirements arise, or existing ones are changed, a Requirements Impact Statement is generated that identifies the phase of the ADM to be revisited. This goes through various iterations until a final version is produced.

# Summary

Requirements Management				
Objectives	Steps	Inputs	Outputs	
Ensure that the Requirements Management process is sustained and operates for all relevant ADM phases	Identify/document requirements Baseline requirements Monitor baseline requirements Identify changed requirement; remove, add, modify, and re-assess priorities Identify changed requirement and record priorities; identify and resolve conflicts; generate Requirements Impact Statements Assess impact of changed requirements on current and previous ADM phases Implement requirements arising from Phase H Update the Architecture Requirements Repository Implement change in the current phase Assess and revise gap analysis for past phases	The inputs to the Requirements Management process are the requirements-related outputs from each ADM phase.  The first high-level requirements are produced as part of the Architecture Vision.  Each architecture domain then generates detailed requirements. Deliverables in later ADM phases contain mappings to new types of requirements (for example, conformance requirements).	Changed requirements  Requirements Impact Assessment, which identifies the phases of the ADM that need to be revisited to address any changes. The final version must include the full implications of the requirements (e.g., costs, timescales, and business metrics).	
Manage architecture requirements identified during any execution of the ADM cycle or a phase				
Ensure that relevant architecture requirements are available for use by each phase as the phase is executed				

## **Test Yourself Question**

- Q. Which of the following is not a resource recommended for Requirements Management?
- A Business Scenarios
  - B Gap Analysis
  - C Volère Requirements Specification template
  - D Requirements Tools
  - E Volère “waiting toom” template

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## **Module 29:** **Architecture Partitioning**

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# Roadmap

Part I - Introduction
Preface, Executive Overview, Core Concepts, Definitions
Part II – Architecture Development Method
Introduction to ADM
ADM Phase Narratives
Part III – ADM Guidelines and Techniques
Guidelines for Adapting the ADM Process
Techniques for Architecture Development
Part IV – Architecture Content Framework
Architectural Artifacts
Architecture Deliverables
Building Blocks
Part V – Enterprise Continuum and Tools
Enterprise Continuum
<b>Architecture Partitioning</b>
Architecture Repository
Tools for Architecture Development
Part VI – Architecture Capability Framework
Architecture Board
Architecture Compliance
Architecture Contracts
Architecture Governance
Architecture Maturity Models
Architecture Skills Framework

- Chapter 36 in Part V, Enterprise Continuum and Tools



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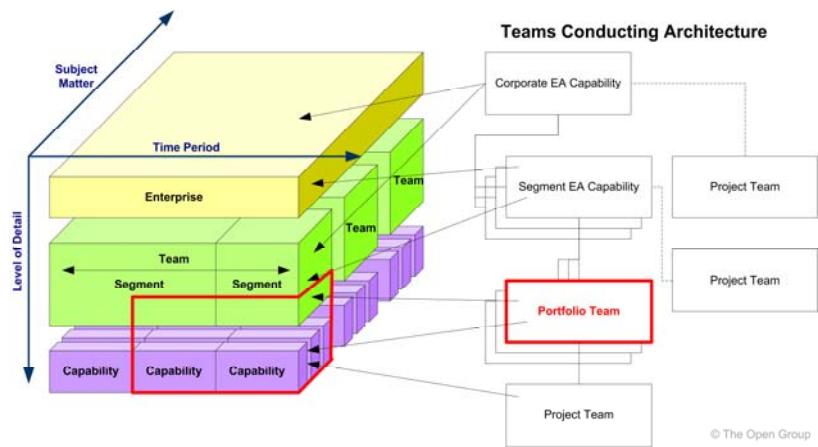
# Module Objectives

The objectives of this module are to describe:

- How an overall Enterprise Architecture can be partitioned to meet the specific needs of the organisation
- Key learning outcomes:
  - The purpose of Architecture Partitioning
  - The classification criteria for solutions and architectures when considering partitioning
  - How Architecture Partitioning can be employed in the Preliminary Phase of the ADM

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## Partitioning



Allows for management of costs and complexity by dividing up the Enterprise and assigning appropriate roles and responsibilities to each partition

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## The Need to Partition

- Managing Complexity
- Managing Conflicts
- Managing Parallel developments
- Managing Re-use

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## **Applying Classification to Partitioned Architectures: Solution Partitioning**

- Subject Matter (breadth)
  - Its content, structure and function
- Time
  - All solutions exist for a period of time
- Maturity/Volatility
  - The extent to which subject matter and environment of a solutions are likely to change over time

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## **Applying Classification to Partitioned Architectures: Architecture Partitioning**

- Depth (Level of detail)
  - The level of detail has a strong correlation to the stakeholder groups interested
  - Typically, less detailed architectures are of interest to executive level stakeholders
  - As architectures increase in detail, their relevance to implementation and operational personnel increases

### **Applying Partitioning to the ADM**

- The Preliminary phase supports the identification of appropriate architecture partitions and establishment of governance relationships between related architecture partitions.

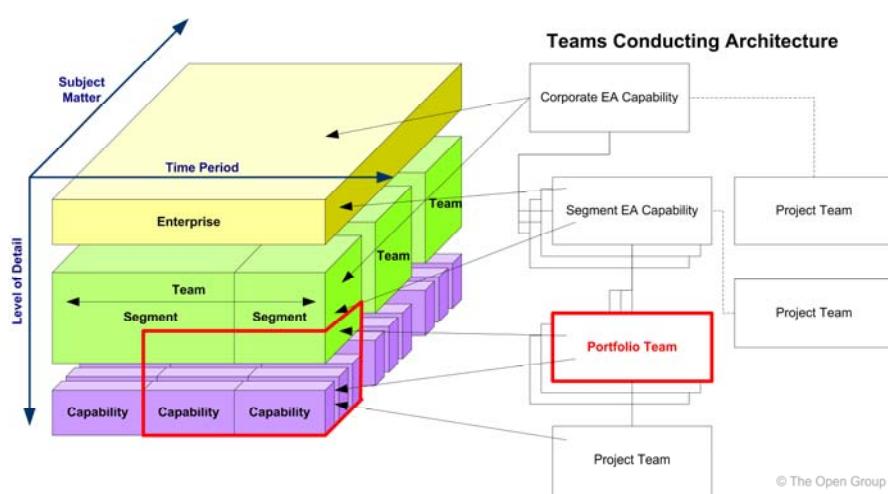
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## Preliminary Phase

- Determine the organisation structure for architecture within the enterprise
  - Identify the teams
- Determine responsibilities for each architecture team
  - Subject matter areas
  - Level of detail
  - Time period
  - Stakeholders
- Determine the relationship between architectures
  - Where do architectures overlap?
  - What are the compliance requirements between architectures?

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## Example Teams Allocated



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## **Summary**

- Architecture Partitioning can be used to manage complexity, parallel developments, conflicts and reuse
- Classification criteria are defined for architectures and, solutions
- TOGAF provides guidance on how to use partitioning in the Preliminary Phase of the ADM cycle

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## **Module 30: Adapting the ADM: Iteration and Levels**

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# Roadmap

Part I - Introduction
Preface, Executive Overview, Core Concepts, Definitions
Part II – Architecture Development Method
Introduction to ADM
ADM Phase Narratives
<b>Part III – ADM Guidelines and Techniques</b>
Guidelines for Adapting the ADM Process
Techniques for Architecture Development
Part IV – Architecture Content Framework
Content Metamodel
Architectural Artifacts
Architecture Deliverables
Building Blocks
Part V – Enterprise Continuum and Tools
Enterprise Continuum
Architecture Partitioning
Architecture Repository
Tools for Architecture Development
Part VI – Architecture Capability Framework
Architecture Board
Architecture Compliance
Architecture Contracts
Architecture Governance
Architecture Maturity Models
Architecture Skills Framework

- **Part III, ADM Guidelines and Techniques, Chapters 18 and 19**



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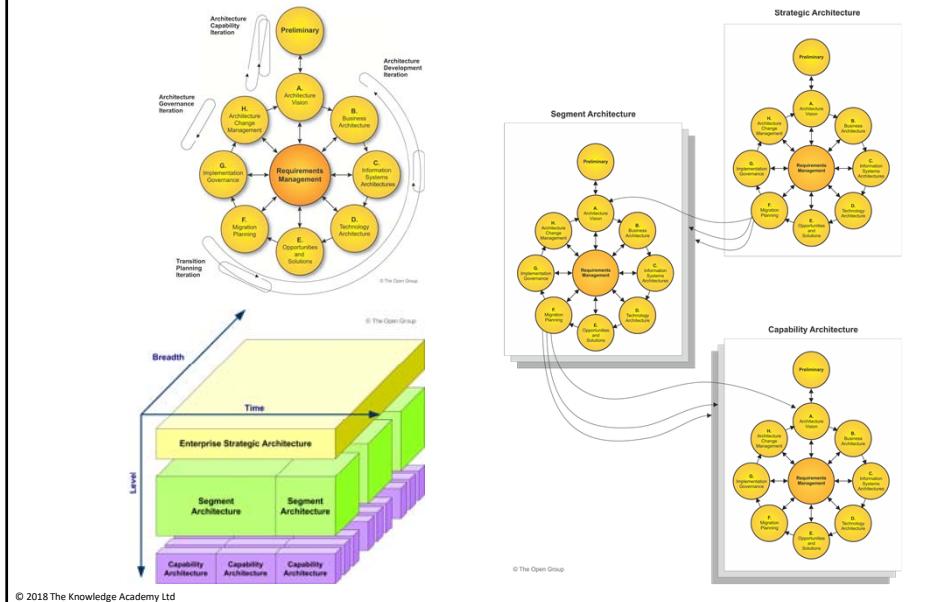
# Module Objectives

The objectives of this module are:

- How to adapt the ADM using iteration and different levels of architecture engagement

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## Iteration and Levels

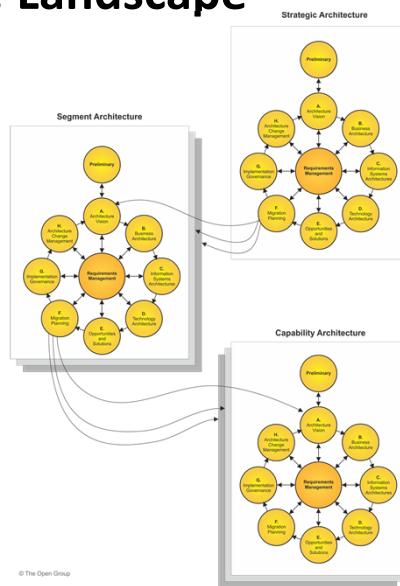


## Iteration and the ADM

- The ADM supports a number of concepts that can be characterized as Iteration:
  - Iteration to describe a comprehensive Architecture Landscape through multiple ADM cycles based upon individual initiatives bound to the scope of the Request for Architecture Work
  - Iteration to describe the integrated process of developing an architecture where the activities described in different ADM phases interact to produce an integrated architecture
  - Iteration to describe the process of managing change to the organisation's Architecture Capability

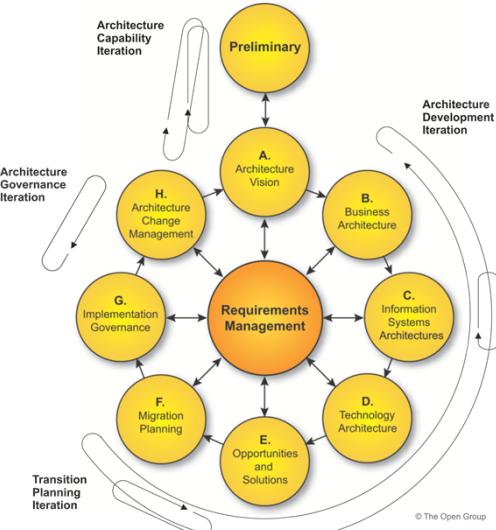
# Iteration to Develop a Comprehensive Architecture Landscape

- Projects will exercise through the entire ADM cycle, commencing with Phase A.
  - Each cycle of the ADM is bounded by a Request for Architecture Work
  - The output populates the Architecture Landscape, either extending or changing the landscape
- Separate projects may operate their own ADM cycles concurrently, with relationships between them
- One project may trigger the initiation of another project.



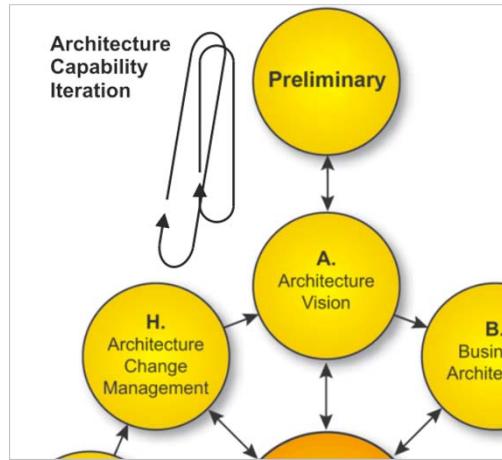
## Iteration within an ADM Cycle

- Projects may operate multiple ADM Phases concurrently
  - Typically uses to manage the inter-relationship between the Business Architecture, Information Systems Architectures and Technology Architecture
- Projects may cycle between phases to converge on a Target Architecture
- Projects may return to previous phases in order to update work products with new information



## Iteration to Manage the Architecture Capability

- Projects may require a new iteration of the Preliminary Phase to establish aspects of the Architecture capability identified in Phase A to address a Request for Architecture work
- Projects may require a new iteration of the Preliminary Phase to adjust the organisation's Architecture Capability as a result of new or changed requirements as a result of a change request in Phase H

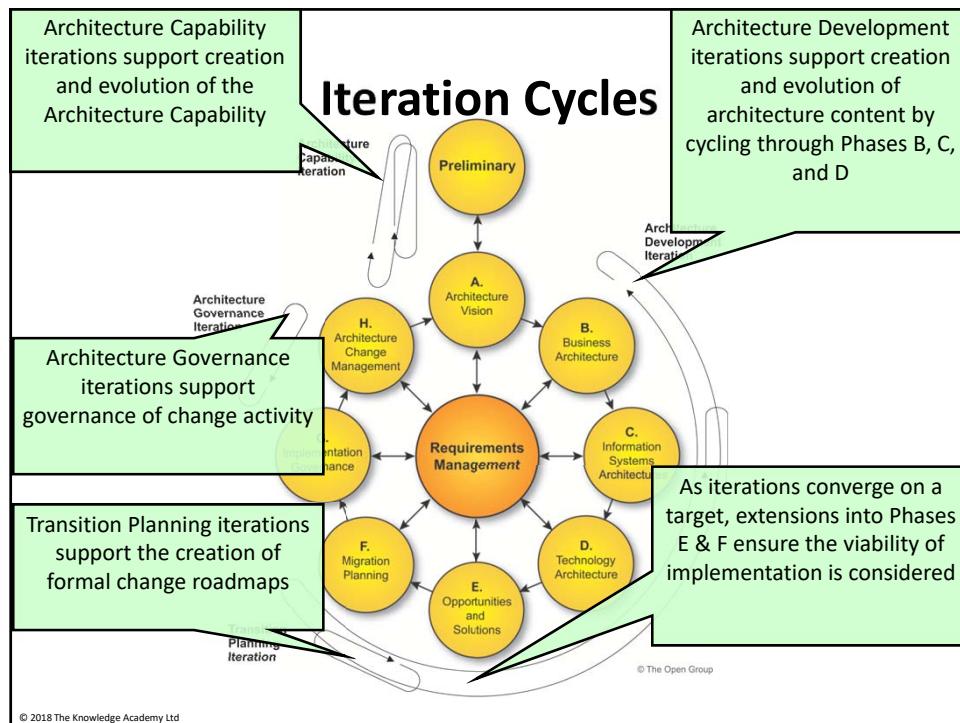


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## Factors Influencing the Use of Iteration

- The formality and nature of established checkpoints within the organisation
- The level of stakeholder involvement expected within the process
- The number of teams involved and the relationships between different teams
- The maturity of the solution area and expected rework to arrive at an acceptable solution
- Attitude to risk

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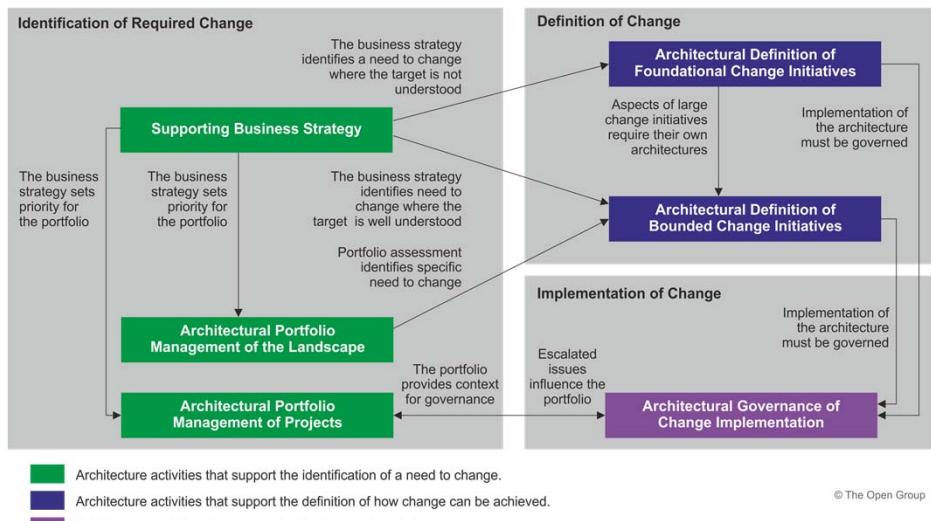
## Approaches to Architecture Development

- Baseline First
  - An assessment of the baseline landscape is used to identify problem areas and opportunities for improvement
  - A suitable approach for when baseline is complex or not clearly understood
- Target First
  - The target solution is elaborated in detail and then mapped back to the baseline
  - A suitable approach for when the target state is agreed at a high level and where the enterprise wishes to effectively transition to the target model

### Classes of Architecture Engagement

- TOGAF defines three typical areas of engagement:
  - Identification of Change Required
  - Definition of Change
  - Implementation of Change

# Classes of Architecture Engagement



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## Iteration Focus for Classes of Architecture Engagement (Extract)

Engagement	Iteration Focus	Scope
Supporting Business Strategy	Architecture Capability Architecture Development (Baseline First)	Broad, shallow consideration given to the Architecture Landscape in order to address a specific strategic question and define terms for more detailed architecture efforts to address strategy realization.
Architectural Portfolio Management of the Landscape	Architecture Capability Architecture Development (Baseline First)	Focus on physical assessment of baseline applications and technology infrastructure to identify improvement opportunities, typically within the constraints of maintaining business as usual.
Architectural Portfolio Management of Projects	Transition Planning Architecture Governance	Focus on projects, project dependencies, and landscape impacts to align project sequencing in a way that is architecturally optimized.

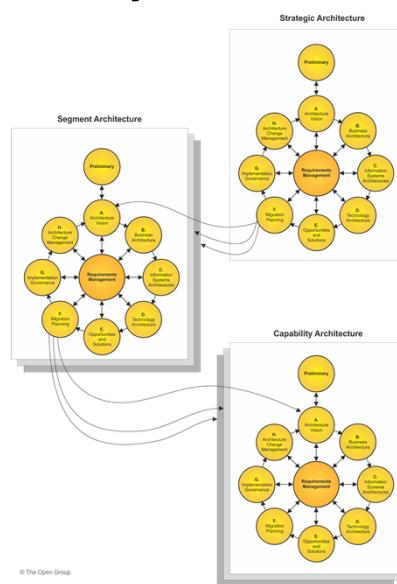
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# Iteration Considerations

- Iteration between ADM Cycles
  - Suitable where a higher level architecture guides and constrains a more detailed architecture
  - This approach uses the Migration Planning phase of one ADM cycle to initiate new projects which will also develop architectures
  - It is a method to develop a complete architecture landscape in multiple iterations

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# A Hierarchy of ADM Processes



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## Iteration within the ADM Cycle – Baseline First

		Architecture Development			Transition Planning		Architecture Governance	
TOGAF Phase		Iteration 1	Iteration 2	Iteration n	Iteration 1	Iteration n	Iteration 1	Iteration n
Preliminary		Informal	Informal	Informal				Light
Architecture Vision		Informal	Informal	Informal	Informal	Informal		Light
Business Architecture	Baseline	Core	Light	Core	Informal	Informal		Light
	Target	Informal	Core	Core	Informal	Informal		Light
Application Architecture	Baseline	Core	Light	Core	Informal	Informal		Light
	Target	Informal	Core	Core	Informal	Informal		Light
Data Architecture	Baseline	Core	Light	Core	Informal	Informal		Light
	Target	Informal	Core	Core	Informal	Informal		Light
Technology Architecture	Baseline	Core	Light	Core	Informal	Informal		Light
	Target	Informal	Core	Core	Informal	Informal		Light
Opportunities and Solutions		Light	Light	Light	Core	Core	Informal	Informal
Migration Planning		Light	Light	Light	Core	Core	Informal	Informal
Implementation Governance					Informal	Informal	Core	Core
Change Management		Informal	Informal	Informal	Informal	Informal	Core	Core

■ Core: primary focus activity for the iteration

■ Light: secondary focus activity for the iteration

□ Informal: potential activity for the iteration, not formally mentioned in the method

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## Iteration within the ADM Cycle – Target First

		Architecture Development			Transition Planning		Architecture Governance	
TOGAF Phase		Iteration 1	Iteration 2	Iteration n	Iteration 1	Iteration n	Iteration 1	Iteration n
Preliminary		Informal	Informal	Informal				Light
Architecture Vision		Informal	Informal	Informal	Informal	Informal		Light
Business Architecture	Baseline	Informal	Core	Core	Informal	Informal		Light
	Target	Core	Light	Core	Informal	Informal		Light
Application Architecture	Baseline	Informal	Core	Core	Informal	Informal		Light
	Target	Core	Light	Core	Informal	Informal		Light
Data Architecture	Baseline	Informal	Core	Core	Informal	Informal		Light
	Target	Core	Light	Core	Informal	Informal		Light
Technology Architecture	Baseline	Informal	Core	Core	Informal	Informal		Light
	Target	Core	Light	Core	Informal	Informal		Light
Opportunities and Solutions		Light	Light	Light	Core	Core	Informal	Informal
Migration Planning		Light	Light	Light	Core	Core	Informal	Informal
Implementation Governance					Informal	Informal	Core	Core
Change Management		Informal	Informal	Informal	Informal	Informal	Core	Core

■ Core: primary focus activity for the iteration

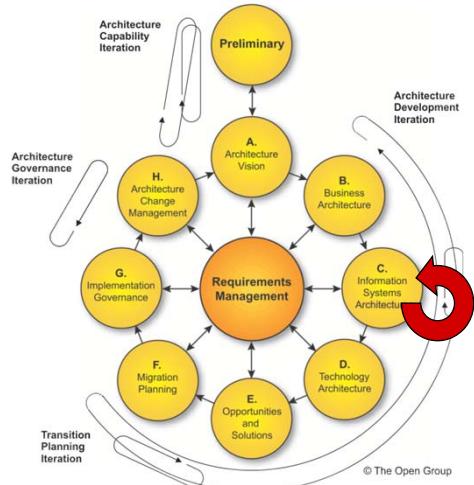
■ Light: secondary focus activity for the iteration

□ Informal: potential activity for the iteration, not formally mentioned in the method

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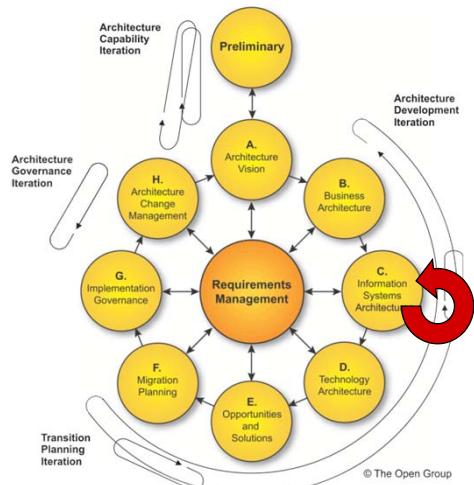
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# Architecture Development Iteration “Baseline First”



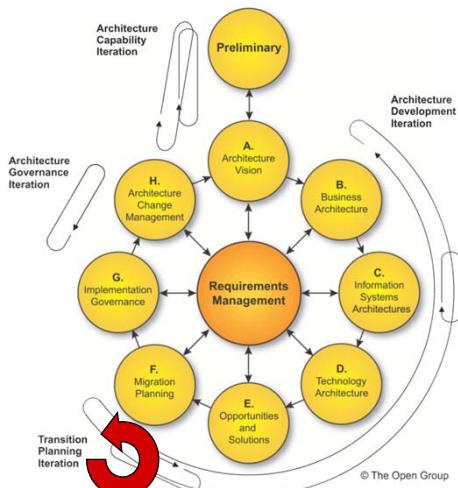
- **Iteration 1**
  - Define the Baseline Architecture
- **Iteration 2**
  - Define the Target Architecture and gaps
- **Iteration n**
  - Refine the Baseline Architecture, Target Architecture, and gaps

# Architecture Development Iteration “Target First”



- **Iteration 1**
  - Define the Target Architecture
- **Iteration 2**
  - Define the Baseline Architecture and gaps
- **Iteration n**
  - Refine the Baseline architecture, Target Architecture, and gaps.

## Transition Planning



- **Iteration 1**

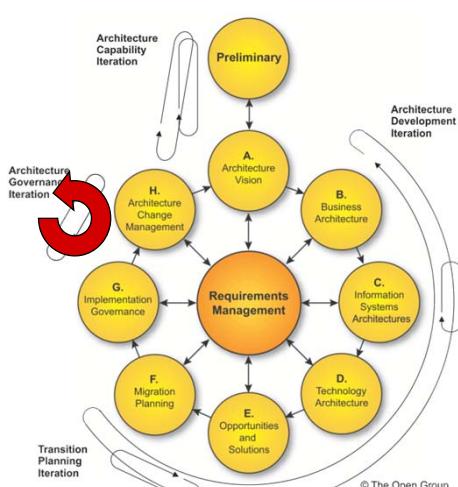
- Define and agree a set of improvement opportunities, aligned against a provisional Transition Architecture

- **Iteration n**

- Agree the Transition Architecture, refining the identified improvement opportunities to fit

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## Architecture Governance



- **Iteration 1**

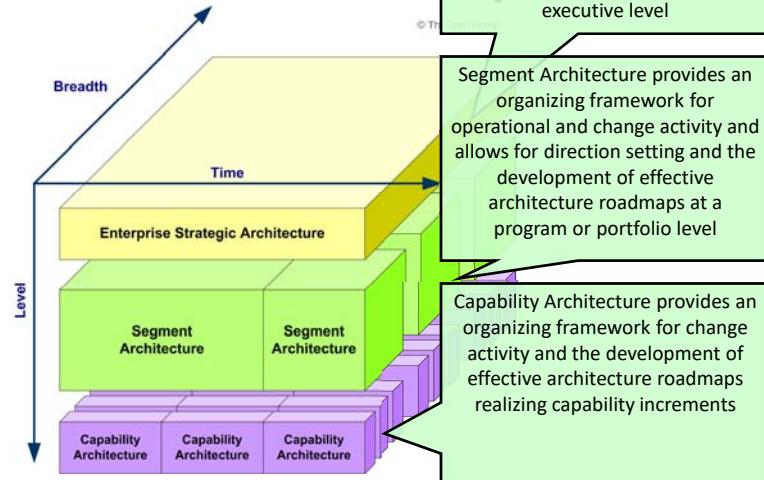
- Mobilize architecture governance and change management processes.

- **Iteration n**

- Carry out architecture governance and change control

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## Applying the ADM Across the Architecture Landscape

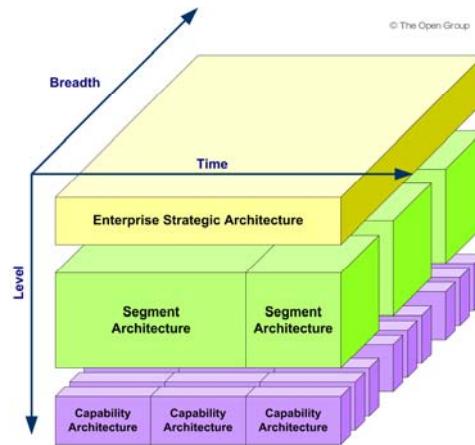


## Applying the ADM Across the Architecture Landscape



# Organising the Architecture Landscape

- The following characteristics can be used to organise the Architecture Landscape
  - Breadth (subject matter)
  - Depth
  - Time
  - Recency



## Summary

- TOGAF provides guidelines for adapting the ADM for iteration
- This includes proposed iteration cycles for different classes of architecture engagement
- Guidance is also provided for the use of levels for architecture development across the Architecture Landscape

### Exercise

- Describe two examples when applying iteration to the ADM where the Baseline First is most appropriate
- Describe two examples when applying iteration to the ADM where the Target First is most appropriate

# **Module 31:**

## **Adapting the ADM:**

### **Security**

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## **Module Objectives**

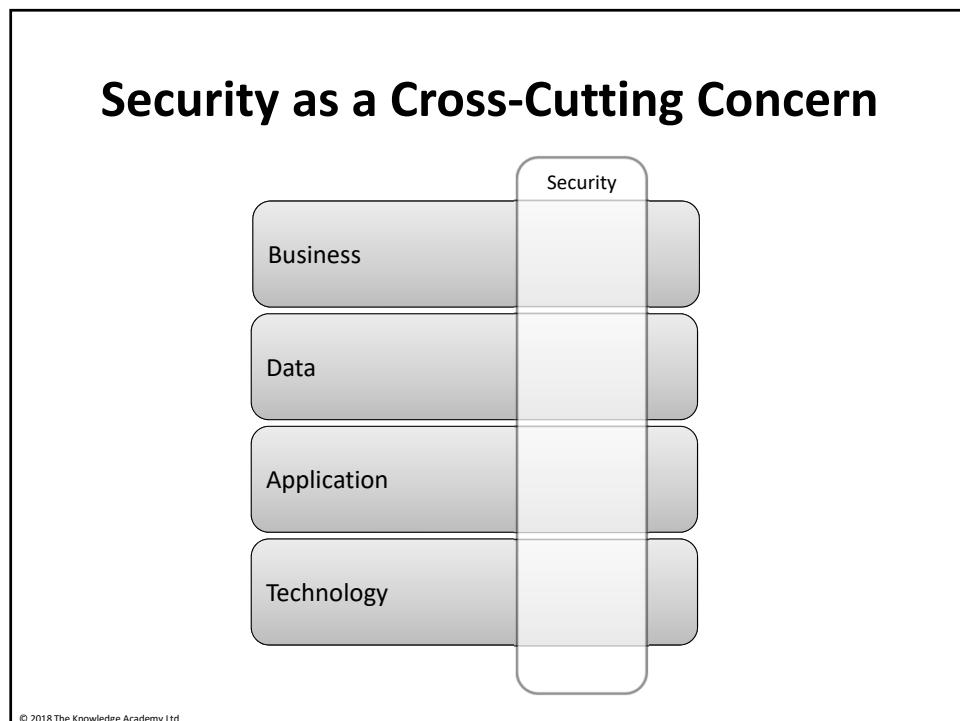
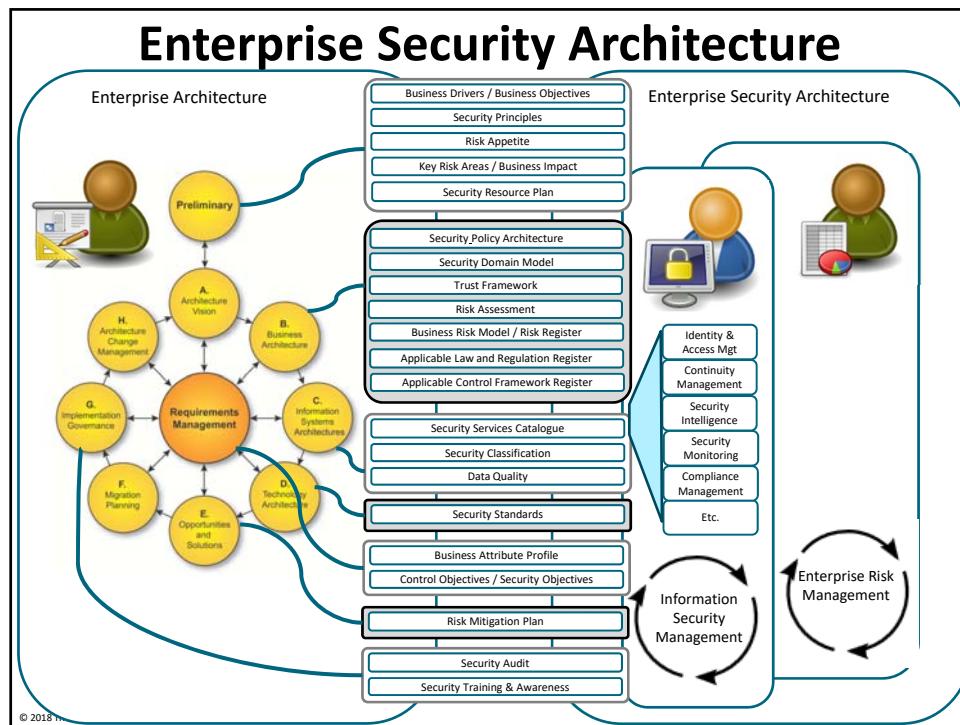
The objectives of this module are:

- Obtain an understanding of the security considerations that need to be addressed during application of the ADM

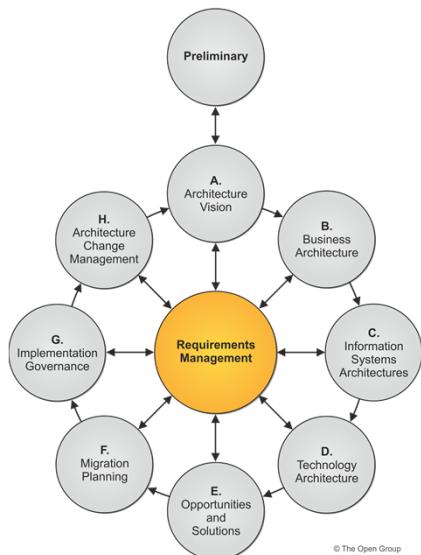
### **The Open Group Guide: Integrating Risk and Security within a TOGAF® Enterprise Architecture**

- Provides guidance for security practitioners and Enterprise Architects who need to work with the TOGAF standard to develop an Enterprise Architecture.
- Explains how the TOGAF method and framework can be tailored to make use of an existing Enterprise Security Architecture in order to address security and risk properly.

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# ADM Requirements Management



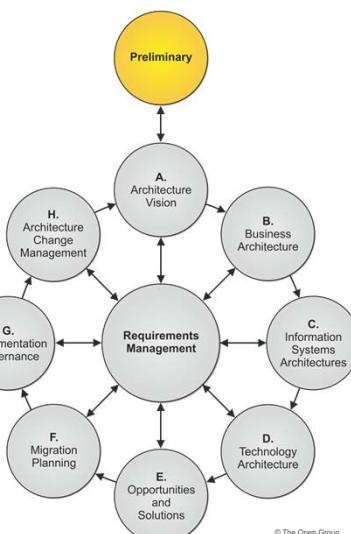
- Use Business Attribute Profiling, a requirements engineering technique from The SABSA® Institute

- Advantages:

- Executive communication in non-IT terms
- Traceability mapping between business drivers and requirements
- Performance measurement against business-defined targets
- Grouping and structuring of requirements, which facilitates understanding and oversight by architects

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## Preliminary Phase

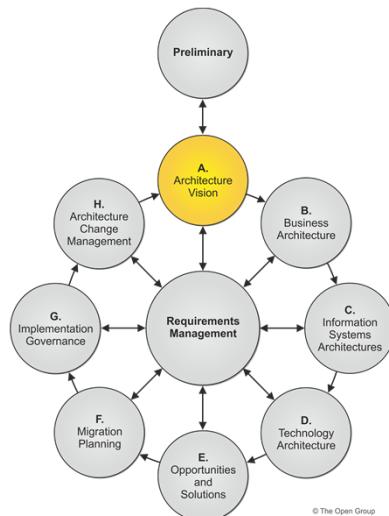


- The following security artifacts should be integrated into architecture documentation:

- Business Drivers/Business Objectives affecting security
- Security Principles
- Risk Appetite
- Key Risk Areas/Business Impact Analysis
- Security Resource Plan

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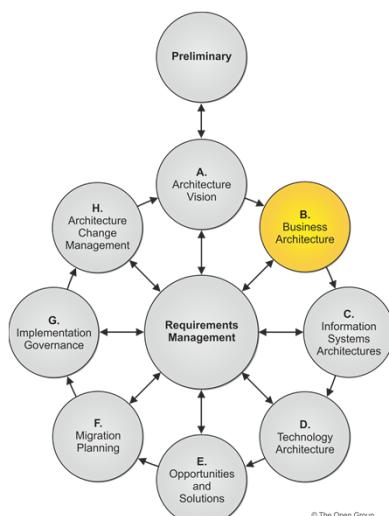
## Phase A: Architecture Vision



- Identify the complete list of all stakeholders, their concerns, and associated requirements for approval of the architecture
- Satisfy security stakeholders
- Satisfy business stakeholders

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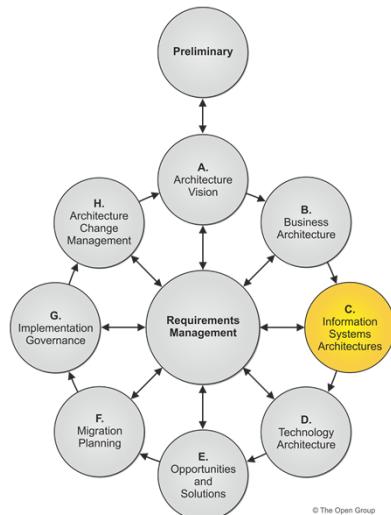
## Phase B: Business Architecture



- The security elements of Phase B comprise business-level trust, risk, and controls, independent from specific IT or other systems within the specific scope of the architecture engagement.
- Artifacts include:
  - Security Policy Architecture
  - Security Domain Model
  - Trust Framework
  - Risk Assessment
  - Business Risk Model/Risk Register
  - Applicable Law and Regulation Register
  - Application Control Framework Register

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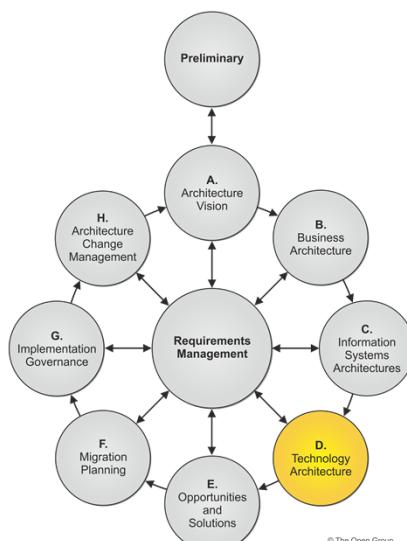
## Phase C: Information Systems Architectures



- The security elements of Phase C comprise functional security services and their security classification.
- Artifacts include:
  - Security Services Catalog
  - Security Classification
  - Data Quality

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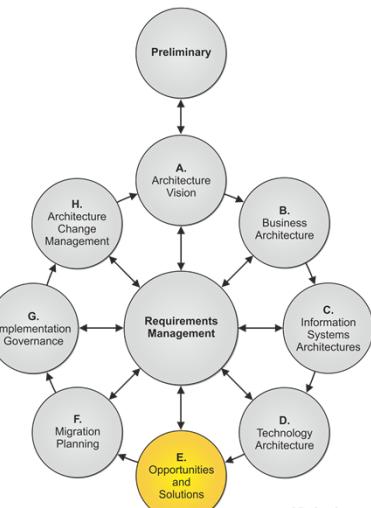
## Phase D: Technology Architecture



- The Security Architect must ensure that the required controls are included in the Technology Architecture and verify whether the controls are used in an effective and efficient way
- A security stakeholder may request the creation of a specific Technology Architecture security view or deliverable that describes all security-related technology components and how they inter-relate

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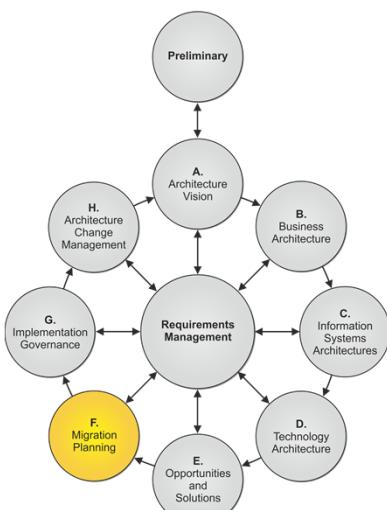
## Phase E: Opportunities and Solutions



- In defining the roadmap, it is imperative that security and risk are evaluated
- The security building blocks defined in the previous phases become SBBs in this phase
- This phase should include a Risk Mitigation Plan

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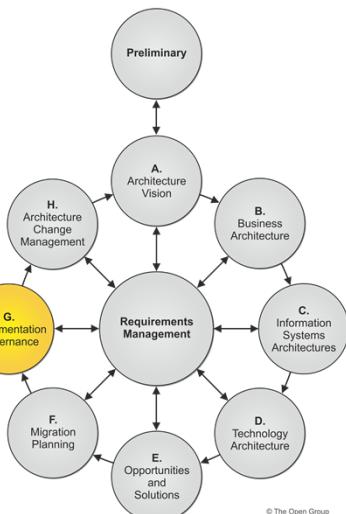
## Phase F: Migration Planning



- Migration is itself a business process that needs to be secured
- The migration strategy should include a risk assessment and a Risk Mitigation Plan
- In addition, migration planning should include a security impact analysis to understand any security impacts of the target state of the change.

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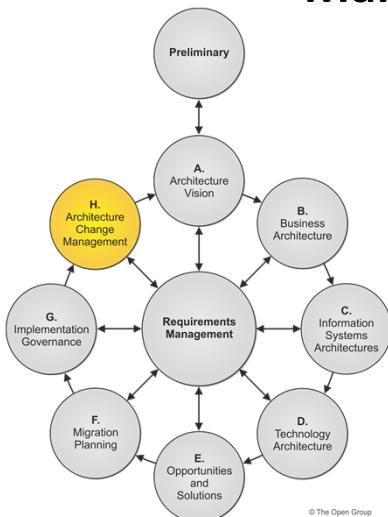
## Phase G: Implementation Governance



- Security Architecture implementation governance provides assurance that the detailed design and implemented processes and systems adhere to the overall Security Architecture
- This ensures that deviations from Architecture Principles and implementation guidelines don't create any unacceptable risk

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## Phase H: Architecture Change Management



- This phase defines two essential processes:
  - Risk Management: the process in which the existing architecture is continuously evaluated regarding changes to business opportunity and security threat
  - Architecture Governance: the process in which decisions are made on changes to the existing architecture, either by minor changes in the current iteration or by means of a completely new iteration. This is explained in the TOGAF Architecture Governance Framework

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## **Summary**

- The Open Group Guide: Integrating Risk and Security within a TOGAF® Enterprise Architecture introduces guidance on Security and the ADM to help practitioners avoid missing a critical security concern
- It is intended to inform the enterprise architect of how the TOGAF method and framework can be tailored to address security and risk properly

## **Exercise**

New security requirements arise from many sources:

- A new statutory or regulatory mandate
- A new threat realised or experienced
- A new Enterprise Architecture initiative discovers new stakeholders and/or new requirements
- For each of these discuss its impact on the ADM

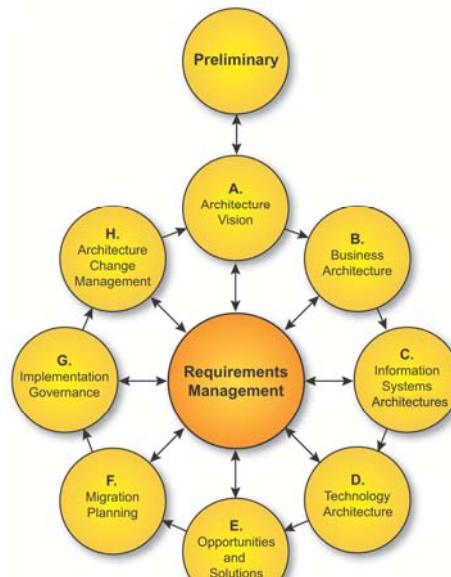
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# **Module 33: Architecture Maturity Models**

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# Architecture Maturity Models



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# Roadmap

Part I - Introduction
Preface, Executive Overview, Core Concepts, Definitions
Part II – Architecture Development Method
Introduction to ADM
ADM Phase Narratives
Part III – ADM Guidelines & Techniques
Guidelines for Adapting the ADM Process
Techniques for Architecture Development
Part IV – Architecture Content Framework
Content Metamodel
Architectural Artifacts
Architecture Deliverables
Building Blocks
Part V – Enterprise Continuum & Tools
Enterprise Continuum
Architecture Partitioning
Architecture Repository
Tools for Architecture Development
Part VI– Architecture Capability Framework
Architecture Board
Architecture Compliance
Architecture Contracts
Architecture Governance
Architecture Maturity Models
Architecture Skills Framework

- Part VI – Architecture Capability Framework, Chapter



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## Module Objectives

The objectives are to:

- Explain the role of a Capability Maturity Model
- Explain the CMMI process improvement approach development by CMU
- Describe the structure and levels of the ACMM developed by CMU for the US DoC
- Explain the role of Maturity Assessments in the ADM

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## Capability Maturity Models

- Capability Maturity Models (CMMs) provide an effective method for control and improvement of change processes
- Benefits of such models include:
  - They describe the practices that any organisation must perform in order to improve its processes
  - They provide measures for improvement
  - They provide a framework for managing the improvement efforts
  - They organize the various practices into levels, each level representing an increased ability to control and manage the development environment
- An evaluation of the organisation's practices against the model (an "assessment") is performed to find the current level at which the organisation currently stands
- This shows the organisation's maturity and the areas to focus on for the greatest improvement and the highest ROI

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## Capability Maturity Models

- The original CMM was developed in the early 1990s by CMU and is still widely used today.
- CMMs have also been developed for other areas such as:
  - People: the P-CMM (People Capability Maturity Model), and the IDEAL Life Cycle Model for Improvement
  - Systems Engineering: the SE-CMM (Systems Engineering Capability Maturity Model)
  - Software Acquisition: the SA-CMM (Software Acquisition Capability Maturity Model)
  - CMMI: Capability Maturity Model Integration

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## Capability Maturity Models

There are templates available to assess:

- The state of the IT architecture process
- The IT architecture
- The organisations buy-in to both

CMM models can also be used to assess a wide range of domains:

- e-Commerce maturity
- Process implementation and audit
- Quality measurements
- People competencies
- Investment management

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## The CMMI

- CMMI stands for Capability Maturity Model Integration.
- CMMI is a framework used to manage the complexity of multiple different models:
  - IPD-CMM (Integrated Product Development Capability Maturity Model)
  - P-CMM (People Capability Maturity Model)
  - SA-CMM (Software Acquisition Capability Maturity Model)
  - SE-CMM (Systems Engineering Capability Maturity Model)
  - SW-CMM (Capability Maturity Model for Software)

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## The CMMI

According to the SEI, the use of the CMMI models improves on best practices by enabling organisations to:

- Explicitly link management and engineering activities to business objectives
- Expand the scope of and visibility into the product lifecycle and engineering activities
- Incorporate lessons learned from additional areas of best practice (e.g., measurement, risk management etc.)
- Implement more robust high-maturity practices
- Address additional organisational functions
- Comply with ISO standards

CMMI has been adopted worldwide.

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## The CMMI

- SCAMPI, the Standard CMMI Appraisal Method for Process Improvement, is used to identify strengths, weaknesses, and ratings relative to CMMI reference models.
- It incorporates best practice and is based on the features of several appraisal methods.
- It is applicable to a wide range of appraisal usage modes, including both internal process improvement and external capability determinations.

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## US Department of Commerce ACMM

The enterprise Architecture Capability Maturity Model (ACMM) was developed for conducting internal assessments. It is a framework that represents the key components of a productive EA process. The goal is to identify weak areas and provide a way to improve the overall architecture process.

The ACMM has 3 sections:

- The enterprise architecture maturity model
- EA characteristics of processes at different maturity levels
- The EA CMM scorecard

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## ACMM Maturity Levels



- The DoC ACMM consists of
  - 6 maturity levels
  - 9 architecture elements

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## ACMM Enterprise Architecture Elements

1. Architecture process:
  - *Is there an established Enterprise Architecture process?*
2. Architecture development:
  - *To what extent is the development and progression of the Operating Units' Enterprise Architecture documented?*
3. Business linkage:
  - *To what extent is the Enterprise Architecture linked to business strategies or drivers?*
4. Senior management involvement:
  - *To what extent are the senior managers of the Operating Unit involved in the establishment and ongoing development of an IT Architecture?*
5. Operating unit participation
  - *To what extent is the Enterprise Architecture process accepted by the Operating Unit?*
  - *To what extent is the Enterprise Architecture process an effort representative of the whole organisation?*

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# ACMM Enterprise Architecture Elements

6. Architecture communication
  - *To what extent are the decisions of Enterprise Architecture practice documented?*
  - *To what extent is the content of the Enterprise Architecture made available electronically to everybody in the organisation?*
  - *To what extent is architecture education done across the business on the Enterprise Architecture process and contents?*
7. IT security
  - *To what extent is IT Security integrated with the Enterprise Architecture?*
8. Architecture governance
  - *To what extent is an Enterprise Architecture governance (governing body) process in place and accepted by senior management ?*
9. IT investment and acquisition strategy
  - *To what extent does the Enterprise Architecture influence the IT Investment and Acquisition Strategy?*

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## Example: ACMM Scoring Criteria

Score	Element	Architecture Process
0	No EA	Not established or does not exist.
1	Initial	Exists in ad-hoc or localized form or early draft form may exist. Some Enterprise Architecture processes are defined. There is no unified architecture process across technologies or business processes. Success depends on individual efforts.
2	Developing	Being actively developed. Basic Enterprise Architecture Process program is documented based on OMB Circular A-130 and Department of Commerce Enterprise Architecture Guidance. The architecture process has developed clear roles and responsibilities.
3	Defined	The architecture is well defined and communicated to IT staff and business management with Operating Unit IT responsibilities. The process is largely followed.
4	Managed	Enterprise Architecture process is part of the culture, with strong linkages to other core IT and business processes. Quality metrics associated with the architecture process are captured. These metrics include the cycle times necessary to generate Enterprise Architecture revisions, technical environment stability, and time to implement a new or upgraded application or system.
5	Measured	Continuous improvement of Enterprise Architecture processes.

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## Maturity Assessments in the ADM

- Maturity Assessments are referred to in the Preliminary Phase, Phase A, and Phase E of the ADM
- The approach to the Preliminary Phase recommends their use as part of developing the organisational Model for Enterprise Architecture
- In Phase A, a maturity assessment is part of the Capability Assessment used to determine the baseline and target capability of the enterprise
- This Capability Assessment is also revisited in Phase E, when preparing the Implementation and Migration Plan
- When using CMMs with the ADM, it is recommended that they be customized and discussed in workshops involving the major stakeholders within the organisation
- The actual levels of maturity can provide a strategic measure of the organisation's ability to change, as well as a series of sequential steps to improve that ability

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## Summary

- This module has explained the role of Architecture Capability Maturity Models in enabling an enterprise to determine the state of its Enterprise Architecture process and to evaluate risks and options during the development of the Enterprise Architecture
- Performing a maturity assessment may involve the use of a number of models. The assessment focuses on measuring business benefits and return on investment

## Exercise

- Provide an assessment of your own company's EA process maturity, on a scale from Level 0 to Level 5 using the templates provided with the DoC ACMM 1.2 document (provided as a handout)

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# **Module 34:**

## **Architecture**

### **Skills Framework**

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## **Roadmap**

Part I - Introduction
Preface, Executive Overview, Core Concepts, Definitions
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Architecture Partitioning
Architecture Repository
Tools for Architecture Development
Part VI – Architecture Capability Framework
Architecture Board
Architecture Compliance
Architecture Contracts
Architecture Governance
Architecture Maturity Models
Architecture Skills Framework

- Part VI – Architecture Capability Framework, Chapter



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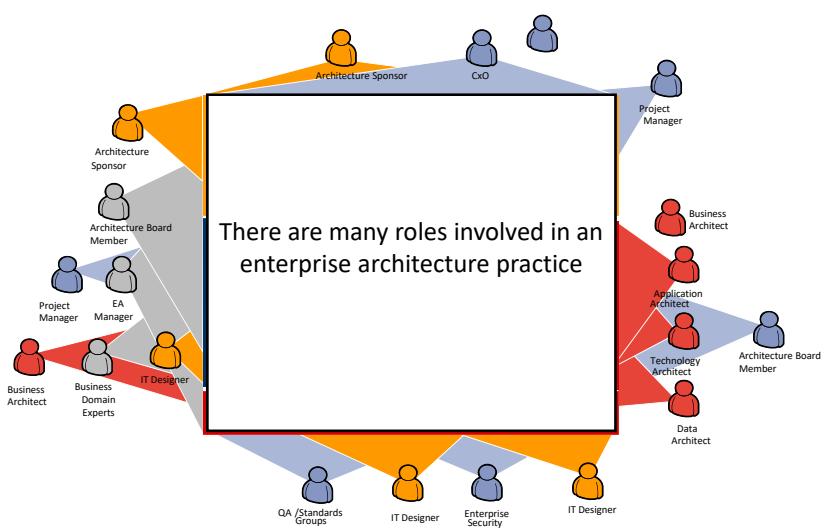
# Module Objectives

The objectives are to:

- Explain the purpose of the Architecture Skills Framework and why it is needed
- Describe the benefits of using the Architecture Skills Framework
- Describe the structure of the Architecture Skills Framework, including roles, skills and proficiency levels

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# Roles



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# Purpose

## Definitional Rigor

- “Enterprise Architecture” and “Enterprise Architect” are widely used but poorly defined terms.
- There is a need for clearer definitions.

## Basis of an Internal Architecture Practice

- An enterprise architecture practice is a formal program of development and certification by which an enterprise recognizes the skills of its architects
- Such a program is essential in order to ensure the alignment of staff skills and experience with the architecture tasks that the enterprise wishes to perform

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# Purpose

- An enterprise architecture practice is both difficult and costly to set up
- The TOGAF Architecture Skills Framework attempts to address this need
  - By providing definitions of the architecting skills and proficiency levels required of personnel, internal or external, who are to perform the various architecting roles defined within the TOGAF Framework

## Benefits of using the Architecture Skills Framework

Specific benefits anticipated include:

- Reduced time, cost, and risk in training, hiring, and managing architecture professionals, both internal and external.
- Reduced time and cost to set up an internal architecture practice
- This in turn helps reduce the time, cost and risk of overall solution development

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# The Structure of the Architecture Skills Framework

The TOGAF Architecture Skills Framework provides a view of the competency levels for specific roles within the enterprise architecture team.

The Framework defines:

- The roles within an enterprise architecture work area
- The skills required by those roles
- The depth of knowledge required to fulfil each role successfully

A typical architecture team undertaking the development of an enterprise architecture comprises the following roles:

- Architecture Board Members
- Architecture Sponsor
- Architecture Manager
- Architects for :
  - Enterprise Architecture
  - Business Architecture
  - Data Architecture
  - Application Architecture
  - Technology Architecture
  - Program and/or Project Managers
  - IT Designer
  - Etc...

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# The Structure of the Architecture Skills Framework

## Categories of Skills

The TOGAF team skill set will need to include the following main categories of skills:

- **Generic Skills:** leadership, team working, inter-personal skills, etc.
- **Business Skills & Methods:** business cases, business process, strategic planning, etc.
- **Enterprise Architecture Skills:** modeling, building block design, applications and role design, systems integration, etc.
- **Program or Project Management Skills:** managing business change, project management methods and tools, etc.
- **IT General Knowledge Skills:** brokering applications, asset management, migration planning, SLAs, etc.
- **Technical IT Skills:** software engineering, security, data interchange, data management, etc.
- **Legal Environment:** data protection laws, contract law, procurement law, fraud, etc.

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# The Structure of the Architecture Skills Framework

- Proficiency Levels

Level	Achievement	Description	© The Open Group
1	Background	Not a required skill, though should be able to define and manage skill if required.	
2	Awareness	Understands the background, issues, and implications sufficiently to be able to understand how to proceed further and advise client accordingly.	
3	Knowledge	Detailed knowledge of subject area and capable of providing professional advice and guidance. Ability to integrate capability into architecture design.	
4	Expert	Extensive and substantial practical experience and applied knowledge on the subject.	

- Skills Matrices – Example Generic Skills

Roles	Architecture Board Member	Architecture Sponsor	Enterprise Architecture Manager	Enterprise Architecture Technology	Enterprise Architecture Data	Enterprise Architecture Applications	Enterprise Architecture Business	Program/ Project Manager	IT Designer
<b>Generic Skills</b>									
Leadership	4	4	4	3	3	3	3	4	1
Teamwork	3	3	4	4	4	4	4	4	2
Inter-personal	4	4	4	4	4	4	4	4	2
Oral Communications	3	3	4	4	4	4	4	4	2
Written Communications	3	3	4	4	4	4	4	3	3
Logical Analysis	2	2	4	4	4	4	4	3	3
Stakeholder Management	4	3	4	3	3	3	3	4	2
Risk Management	3	3	4	3	3	3	3	4	1

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## Summary

- This module has introduced the Architecture Skills Framework, a classification model for architect roles.

### Exercise

Place yourself within the Architecture Skills Framework and write a brief summary of your role, your skills, and proficiency level.

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# Congratulations



Congratulations on completing this course!

Keep in touch

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Thank you

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## The Open Group® Certification for People

# TOGAF® 9 Part 1 Practice Test

Version 1.0.8r  
July 2018



The Part 1 Practice Test is representative of the content covered in the TOGAF 9 Part 1 Examination. It includes question formats found in the actual examination. It also includes questions of varying difficulty. A candidate's performance on this Practice Test does not guarantee similar performance on the actual examination.

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## **The Open Group® Certification for People: TOGAF® 9 Part 1 Practice Test**

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5.	Bonus Test Answers .....	30

## **1. Instructions**

This is a simple multiple-choice test. This test should be taken as a closed book test. There is one correct answer for each question, scoring 1 point. You need to score 24 or more points<sup>1</sup> out of a maximum of 40 to pass this test.

Please read each question carefully before reading the answer options. Be aware that some questions may seem to have more than one right answer, but you are to look for the one that makes the most sense and is the most correct.

---

<sup>1</sup> Note that this pass mark may differ from the live TOGAF 9 Part 1 Examination. Consult The Open Group certification website for the latest information on examination pass marks.

## **2. Examination**

### **Item 1**

Question:

Which one of the following best describes the TOGAF standard?

- A. A framework and method for architecture development
- B. An architecture pattern
- C. A method for developing Technology Architectures
- D. A method for IT governance

### **Item 2**

Question:

Which part of the TOGAF standard provides a number of architecture development phases, together with narratives for each phase?

- A. Introduction
- B. Architecture Development Method (ADM)
- C. ADM Guidelines and Techniques
- D. Architecture Content Framework
- E. Enterprise Continuum and Tools

### **Item 3**

Question:

According to the TOGAF standard, all of the following are suggested characteristics of an architecture framework, *except* \_\_\_\_\_

- A. A common vocabulary
- B. A list of recommended standards
- C. A method for designing a target state of the enterprise in terms of building blocks
- D. A set of structures which can be used to develop a broad range of architectures
- E. A software development lifecycle method

### **Item 4**

Question:

Which of the TOGAF architecture development phases includes the development of Data and Application Architectures?

- A. Phase A
- B. Phase B
- C. Phase C
- D. Phase D
- E. Phase E

**Item 5**

Question:

Which one of the following does the Architecture Content Framework describe as a work product that is contractually specified, formally reviewed, and signed off by the stakeholders?

- A. An artifact
- B. A building block
- C. A catalog
- D. A deliverable
- E. A matrix

**Item 6**

Question:

Which of the following best completes the sentence: The Enterprise Continuum \_\_\_\_\_

- A. describes a database of open industry standards
- B. is an architecture framework
- C. is a technical reference model
- D. provides a method for architecture development
- E. provides methods for classifying artifacts

**Item 7**

Question:

According to the TOGAF standard, in which ADM phase does the initial implementation planning occur?

- A. Phase A: Architecture Vision
- B. Phase B: Business Architecture
- C. Phase C: Information Systems Architectures
- D. Phase D: Technology Architecture
- E. Phase E: Opportunities and Solutions

**Item 8**

Question:

According to the TOGAF standard, which of the following is the reason why the first execution of an ADM cycle will be more difficult than later cycles?

- A. Because there are few architecture assets available
- B. Because of lack of governance
- C. Because of insufficient trained architecture practitioners
- D. Because the Baseline Architecture must be fully defined across the enterprise

**Item 9**

Question:

As architecture deliverables and work products created in one ADM phase are modified by subsequent phases, how does the TOGAF standard suggest tracking the changes?

- A. Change control committee
- B. Document checkpoints and journaling

- C. Version numbers
- D. Workflow management system

**Item 10**

Question:

Complete the sentence: The architectures that address the detailed enterprise needs and business requirements within the Architecture Continuum are known as \_\_\_\_\_

- A. Foundation Architectures
- B. Industry Architectures
- C. Common Systems Architectures
- D. Organization-Specific Architectures

**Item 11**

Question:

According to the TOGAF standard, which one of the following is described as a view of the Architecture Repository and provides methods for classifying architecture and solution artifacts as they evolve?

- A. Architecture Landscape
- B. Architecture Governance Repository
- C. Enterprise Continuum
- D. Governance Log
- E. Standards Information Base

**Item 12**

Question:

Which one of the following represents the detailed construction of the architectures defined in the Architecture Continuum?

- A. Architecture Building Blocks
- B. Foundation Architectures
- C. Reference Models
- D. Solution Building Blocks

**Item 13**

Question:

An organization has bought a large enterprise application. As a result, which of the following could be included in the organization's Solutions Continuum?

- A. A reference implementation of the Foundation Architecture
- B. A reference implementation of the Technical Reference Model for the organization
- C. Architecture Building Blocks for the organization's Industry-Specific Architecture
- D. Information for purchased products

**Item 14**

Question:

Complete the sentence: All of the following are technology-related drivers for architecture Change Requests, *except* \_\_\_\_\_

- A. asset management cost reductions
- B. new technology reports
- C. standards initiatives
- D. strategic change
- E. technology withdrawal

**Item 15**

Question:

Complete the sentence: In Phase C, when an existing application is to be replaced, the Data Architecture should \_\_\_\_\_

- A. be re-factored to align with the technology infrastructure
- B. describe how this change impacts other projects
- C. identify the data migration requirements
- D. include the application interoperability requirements
- E. estimate the effort required to overcome any issues

**Item 16**

Question:

The approach of the Preliminary Phase is about defining “where, what, why, who, and how we do architecture” in the enterprise concerned. Which one of the following statements is *not* correct?

- A. “Where” can be seen as scoping the enterprise concerned
- B. “Why” can be seen as the key drivers and elements in the context of the organization
- C. “Who” can be seen as defining the sponsor responsible for performing the architectural work
- D. “How” is determined by the frameworks selected and the methodologies that are going to be used

**Item 17**

Question:

In which phase of the ADM are the gap analysis results from the four architecture domains taken into account?

- A. Phase E
- B. Phase F
- C. Phase G
- D. Phase H
- E. Requirements Management

**Item 18**

Question:

In Phase D, which of the following resources from the Architecture Repository should be considered in the development of the Technology Architecture?

- A. Architecture Vision
- B. Business rules, job descriptions
- C. Implementation and Migration Plan
- D. Stakeholder Map
- E. TOGAF Technical Reference Model

**Item 19**

Question:

Complete the sentence: All of the following are part of the approach to the Preliminary Phase, *except*

- 
- A. defining the enterprise
  - B. identifying key drivers and elements in the organizational context
  - C. defining Architecture Contracts
  - D. defining the framework to be used
  - E. defining the requirements for architecture work

**Item 20**

Question:

In which phase of the TOGAF ADM do activities include assessing the dependencies, costs, and benefits of the migration projects?

- A. Phase E
- B. Phase F
- C. Phase G
- D. Phase H
- E. Requirements Management

**Item 21**

Question:

Complete the sentence: Phase A is initiated upon receipt of \_\_\_\_\_

- A. approval from the Chief Information Officer
- B. a directive from the Chief Executive Officer
- C. a Request for Architecture Work from the sponsoring organization
- D. the Requirements Analysis document

**Item 22**

Question:

Complete the sentence: Business Architecture is the first architecture activity undertaken since \_\_\_\_\_

- A. it focuses on identifying and defining the key applications used in the enterprise
- B. it provides knowledge that is a prerequisite for undertaking work in the other architecture domains
- C. it defines the physical realization of an architectural solution
- D. it finalizes the Architecture Vision and Architecture Definition Documents
- E. it mobilizes supporting operations to support the ongoing architecture development

**Item 23**

Question:

Complete the sentence: According to the TOGAF standard, Capability-Based Planning is \_\_\_\_\_

- A. a tactical planning technique that enhances system performance
- B. focused on technical capabilities
- C. focused on staffing and human resource management issues
- D. focused on business outcomes

**Item 24**

Question:

In which phase of the ADM is an initial assessment of Business Transformation Readiness performed?

- A. Preliminary Phase
- B. Phase A
- C. Phase B
- D. Phase E
- E. Phase F

**Item 25**

Question:

Which of the following is defined as the risk categorization after the implementation of mitigating actions?

- A. Actual Level of Risk
- B. Initial Level of Risk
- C. Residual Level of Risk
- D. Strategic Level of Risk

**Item 26**

Question:

Which one of the statements about Architecture Principles is *not* correct?

- A. A good set of principles is complete.
- B. A principle is a general rule or guideline.
- C. A principle is transient and updated frequently.

- D. A principle statement should be succinct and unambiguous.
- E. They are described in a standard way.

#### **Item 27**

Question:

What technique does the TOGAF standard recommend for identifying and understanding the requirements that an architecture must address?

- A. Stakeholder Management
- B. Risk Management
- C. Gap Analysis
- D. Business Scenarios
- E. Architecture Principles

#### **Item 28**

Question:

Gap analysis is a key step in validating the architecture in Phase B: Business Architecture. Which one of the following statements is true?

- A. Gap analysis highlights services that are available.
- B. Gap analysis highlights the impacts of change.
- C. Gap analysis highlights services that are yet to be procured.
- D. Gap analysis identifies areas where the Data Architecture needs to change.
- E. Gap analysis can be used to resolve conflicts amongst different viewpoints.

#### **Item 29**

Question:

According to the TOGAF standard, which of the following best describes why an Architecture Board should be established?

- A. To conduct source code design reviews
- B. To ensure that new systems are introduced in a managed change process
- C. To facilitate the adoption of advanced technologies
- D. To oversee the implementation of the governance strategy

#### **Item 30**

Question:

The TOGAF standard defines levels of architecture conformance. Which of the following describes a situation where some features in an architecture specification have not been implemented, but those that have are in accordance with the specification?

- A. Compliant
- B. Conformant
- C. Consistent
- D. Irrelevant
- E. Non-conformant

**Item 31**

Question:

Which Architecture Governance process ensures that regulatory requirements are being met?

- A. Business control
- B. Compliance
- C. Dispensation
- D. Environment management
- E. Policy management

**Item 32**

Question:

When applying a cycle of the ADM with the Architecture Vision to establish an Architecture Capability, which phase defines the structure of the organization's Architecture Repository?

- A. Application Architecture
- B. Business Architecture
- C. Data Architecture
- D. Technology Architecture

**Item 33**

Question:

Architecture views and architecture viewpoints are used by an architect to capture or model the design of a system architecture. Which one of the following statements is true?

- A. An architecture view is the perspective of an individual stakeholder.
- B. An architecture viewpoint is the perspective of an individual stakeholder.
- C. Different stakeholders always share the same architecture views.
- D. Different stakeholders always share the same architecture viewpoints.

**Item 34**

Question:

Stakeholders and their concerns are key concepts in the TOGAF standard. Which one of the following statements is false?

- A. Concerns are key interests relevant to one or more stakeholders.
- B. Stakeholders can be individuals, teams, or organizations.
- C. Stakeholders have key roles in, or concerns about, the system.
- D. Concerns should be SMART and have specific metrics.

**Item 35**

Question:

Which of the following is considered by the TOGAF standard as an attribute of a good building block?

- A. A building block that is re-usable
- B. A building block meeting business needs
- C. A building block with public interfaces
- D. A building block that guides the development of solutions

- E. A building block that is product-aware

#### **Item 36**

Question:

Which one of the following best describes the content of an Architecture Building Block?

- A. Defined implementation
- B. Fundamental functionality
- C. Products and components used to implement the functionality
- D. Product or vendor-aware
- E. Specific functionality

#### **Item 37**

Question:

Which one of the following statements does *not* correctly describe architecture deliverables?

- A. They are consumed and produced across the ADM cycle.
- B. They are defined to avoid tailoring the inputs and outputs of the ADM cycle.
- C. They are typically contractual work products of an architecture project.
- D. They are usually reviewed and signed off by the stakeholders.

#### **Item 38**

Question:

What TOGAF deliverable identifies changes that are needed to the current architecture requirements and specification, and also documents the implications of change?

- A. Requirements Impact Assessment
- B. Architecture Vision
- C. Gap Analysis Results
- D. Architecture Landscape
- E. Architecture Roadmap

#### **Item 39**

Question:

Which of the following best describes the purpose of the TOGAF TRM?

- A. To provide a generic framework for IT governance
- B. To provide a list of standards
- C. To provide a method for architecture development
- D. To provide a system engineering viewpoint on a possible solution
- E. To provide a visual model, and core terminology for generic platform services

**Item 40**

Question:

Where does the Integrated Information Infrastructure Reference Model fit in terms of the Enterprise Continuum?

- A. Common Systems Architectures
- B. Foundation Architectures
- C. Industry Architectures
- D. Organization-Specific Architectures

### **3. Examination Answers**

#### **Item 1 A**

This is the best answer. The TOGAF standard is a framework – a detailed method and a set of supporting tools – for developing an Enterprise Architecture.

#### **Item 2 B**

Part II: Architecture Development Method describes the TOGAF Architecture Development Method (ADM) – a step-by-step approach to developing an Enterprise Architecture in a number of phases.

#### **Item 3 E**

An architecture framework is a foundational structure, or set of structures, which can be used for developing a broad range of different architectures. It should describe a method for designing a target state of the enterprise in terms of a set of building blocks, and for showing how the building blocks fit together. It should contain a set of tools and provide a common vocabulary. It should also include a list of recommended standards and compliant products that can be used to implement the building blocks.

#### **Item 4 C**

Phase C: Information Systems Architectures describes the development of Information Systems Architectures for an architecture project, including the development of Data and Application Architectures.

#### **Item 5 D**

A deliverable is a work product that is contractually specified and in turn formally reviewed, agreed, and signed off by the stakeholders. Deliverables represent the output of projects and those deliverables that are in documentation form will typically be archived at completion of a project, or transitioned into an Architecture Repository as a reference model, standard, or snapshot of the Architecture Landscape at a point in time.

#### **Item 6 E**

The Enterprise Continuum is a model providing methods for classifying architecture and solution artifacts as they evolve from generic Foundation Architectures to Organization-Specific Architectures. The Enterprise Continuum comprises two complementary concepts: the Architecture Continuum and the Solutions Continuum.

#### **Item 7 E**

Phase E: Opportunities & Solutions conducts initial implementation planning and the identification of delivery vehicles for the architecture defined in the previous phases.

**Item 8 A**

The first execution of the ADM will often be the hardest, since the architecture assets available for re-use will be relatively scarce. Even at this stage of development, however, there will be architecture assets available from external sources such as the TOGAF Library, as well as the IT industry at large, that could be leveraged in support of the effort.

**Item 9 C**

Output is generated throughout the ADM process, and output in an early phase may be modified in a later phase. The TOGAF standard recommends that the versioning of output is managed through version numbers. In all cases, the ADM numbering scheme is provided as an example. It should be adapted by the architect to meet the requirements of the organization and to work with the architecture tools and repositories employed by the organization.

**Item 10 D**

Organization-Specific Architectures are viewed as being at the right end of the Architecture Continuum, and are the most relevant to the IT customer community, since they describe and guide the final deployment of solution components for a particular enterprise or extended network of connected enterprises.

**Item 11 C**

The Enterprise Continuum provides a view of the Architecture Repository that shows the evolution of these related architectures from generic to specific, from abstract to concrete, and from logical to physical.

**Item 12 D**

The Solutions Continuum defines what is available in the organizational environment as re-usable Solution Building Blocks (SBBs).

**Item 13 D**

The Solutions Continuum is a population of the architecture with reference building blocks – either purchased products or built components – that represent a solution to the enterprise's business need expressed at that level.

**Item 14 D**

Strategic change is a business driver.

**Item 15 C**

When an existing application is replaced, there will be a critical need to migrate data (master, transactional, and reference) to the new application. The Data Architecture should identify data migration requirements and also provide indicators as to the level of transformation, weeding, and cleansing that

will be required to present data in a format that meets the requirements and constraints of the target application.

**Item 16 C**

“Who” is to identify the sponsor stakeholder(s) and other major stakeholders impacted by the business directive to create an Enterprise Architecture and determine their requirements and priorities from the enterprise, their relationships with the enterprise, and required working behaviors with each other. Note in this answer it incorrectly suggests that the sponsor performs the work.

**Item 17 A**

In Phase E the gap analysis results from all architecture domains are taken into account.

**Item 18 E**

The TOGAF TRM should be considered in the development of the Technology Architecture in Phase D.

**Item 19 C**

Architecture Contracts are prepared and issued in Phase G.

**Item 20 B**

Phase F activities include assessing the dependencies, costs, and benefits of the various migration projects.

**Item 21 C**

Phase A starts with receipt of a Request for Architecture Work from the sponsoring organization to the architecture organization.

**Item 22 B**

A knowledge of the Business Architecture is a prerequisite for architecture work in any other domain (Data, Application, Technology), and is therefore the first architecture activity that needs to be undertaken, if not catered for already in other organizational processes (enterprise planning, strategic business planning, business process re-engineering, etc.).

**Item 23 D**

Capability-Based Planning is a business planning technique that focuses on business outcomes. It focuses on the planning, engineering, and delivery of strategic business capabilities to the enterprise. It is business-driven and business-led and combines the requisite efforts of all lines of business to achieve the desired capability. Capability-Based Planning accommodates most, if not all, of the corporate business models and is especially useful in organizations where a latent capability to respond (e.g., an emergency preparedness unit) is required and the same resources are involved in multiple capabilities.

**Item 24 B**

Business Transformation Readiness is first assessed in Phase A, so actions can be worked into Phases E and F in the Implementation and Migration Plan.

**Item 25 C**

The risk categorization after implementation of mitigating actions is known as “Residual Level of Risk”.

**Item 26 C**

Principles are intended to be enduring and seldom amended.

**Item 27 D**

Business scenarios are an important technique that may be used at various stages of the Enterprise Architecture, principally the Architecture Vision and the Business Architecture, but in other architecture domains as well, if required, to derive the characteristics of the architecture directly from the high-level requirements of the business. They are used to help identify and understand business needs, and thereby to derive the business requirements that the architecture development has to address.

**Item 28 C**

A key step in validating an architecture is to consider what may have been forgotten.

**Item 29 D**

A key element in a successful architecture governance strategy is a cross-organization Architecture Board to oversee the implementation of the strategy.

**Item 30 A**

The TOGAF standard describes “compliant” as a situation where some features in an architecture specification have not been implemented, but those that have are in accordance with the specification.

**Item 31 B**

The Compliance process ensures regulatory requirements are being met.

**Item 32 C**

The Data Architecture phase would define the structure of the organization’s Enterprise Continuum and Architecture Repository.

**Item 33 B**

A view is what you see. A viewpoint is where you are looking from – the vantage point or perspective that determines what you see.

**Item 34 D**

“Concerns” are the interests in a system relevant to one or more of its stakeholders, and determine the acceptability of the system. Concerns may pertain to any aspect of the system’s functioning, development, or operation, including considerations such as performance, reliability, security, distribution, and evolvability. The terms “concern” and “requirement” are not synonymous. Concerns are the root of the process of decomposition into requirements. Concerns are represented in the architecture by these requirements. Requirements should be SMART (e.g., specific metrics).

**Item 35 A**

The TOGAF standard considers re-usability an attribute of a good building block.

**Item 36 B**

An ABB has fundamental functionality and attributes: semantic, unambiguous, including security capability and manageability.

**Item 37 B**

The TOGAF standard provides a typical baseline of architecture deliverables in order to better define the activities required in the ADM and act as a starting point for tailoring within a specific organization.

**Item 38 A**

Throughout the ADM, new information is collected relating to an architecture. As this information is gathered, new facts may come to light that invalidate existing aspects of the architecture. A Requirements Impact Assessment assesses the current architecture requirements and specification to identify changes that should be made and the implications of those changes.

**Item 39 E**

The TOGAF Foundation Architecture is an architecture of generic services and functions that provides a foundation on which more specific architectures and architectural components can be built. This Foundation Architecture is embodied within the Technical Reference Model (TRM), which provides a model and taxonomy of generic platform services.

**Item 40 A**

The TOGAF Integrated Information Infrastructure Reference Model (III-RM) is a Common Systems Architecture that focuses on the requirements, building blocks, and standards relating to the vision of Boundaryless Information Flow.

## **4. Bonus Test**

The following 40 questions are provided for further practice. They can be taken as a closed book test. There is one correct answer for each question, scoring 1 point. You need to score 24 or more points out of a maximum of 40 to pass this test.

### **Item 41**

Question:

Which section of the TOGAF standard describes the processes, skills, and roles to establish and operate an architecture function within an enterprise?

- A. Architecture Development Method
- B. ADM Guidelines and Techniques
- C. Architecture Content Framework
- D. Architecture Capability Framework

### **Item 42**

Question:

Complete the sentence. To promote effective architectural activity within the enterprise, the TOGAF standard recommends the establishment of a(n) \_\_\_\_\_

- A. Enterprise Architecture Capability
- B. IT Governing Board
- C. Program Management Office
- D. Quality Assurance department
- E. Service Management department

### **Item 43**

Question:

Which phase of the ADM is used to finalize a set of transition architectures that will support implementation?

- A. Phase D
- B. Phase E
- C. Phase F
- D. Phase G
- E. Phase H

### **Item 44**

Question:

Which one of the following statements best describes the ADM Guidelines and Techniques?

- A. Guidelines address different usage scenarios including different process styles and specialist architectures that can be adapted in the ADM.
- B. Guidelines address different usage scenarios that cannot be adapted directly into the ADM iteration process.

- C. Techniques support different usage scenarios that can be adapted directly into the ADM iteration process.
- D. Techniques support different usage scenarios including different process styles and specialist architectures that can be adapted in the ADM.

#### **Item 45**

Question:

According to the TOGAF standard, the recommended dimensions used to define the scope of an architecture include all the following, *except*:

- A. Architecture Domains
- B. Breadth
- C. Depth
- D. Subject Matter
- E. Time Period

#### **Item 46**

Question:

Which of the following classes of architectural information within the Architecture Repository defines processes that support governance of the Architecture Repository?

- A. Architecture Capability
- B. Architecture Landscape
- C. Architecture Metamodel
- D. Governance Log
- E. Reference Library

#### **Item 47**

Question:

In which ADM phase are the business principles, business goals, and strategic drivers validated?

- A. Preliminary Phase
- B. Phase A, Architecture Vision
- C. Phase B, Business Architecture
- D. Phase H, Architecture Change Management
- E. Requirements Management Phase

#### **Item 48**

Question:

Which section of the TOGAF standard describes the purpose of deliverables produced as outputs from the ADM cycle?

- A. ADM Guidelines and Techniques
- B. Architecture Capability Framework
- C. Architecture Content Framework
- D. Architecture Governance Framework

**Item 49**

Question:

Which of the following best describes the TOGAF Technical Reference Model?

- A. The TOGAF Architecture Development Method mandates the use of the Technical Reference Model for large complex architecture projects.
- B. The Technical Reference Model is an integral part of the TOGAF Architecture Development Method.
- C. The Technical Reference Model should not be modified.
- D. The Technical Reference Model includes a set of graphical models and a corresponding taxonomy.

**Item 50**

Question:

Which one of the following best describes a primary use of the Architecture Vision document?

- A. A checklist for compliance reviews
- B. To calculate detailed cost estimates
- C. To project plan the implementation activities
- D. To describe the benefits of the proposed capability to stakeholders

**Item 51**

Question:

Which of the following could be considered for potential use in Phase C: Application Architecture?

- A. The ARTS data model
- B. The Integrated Information Infrastructure Reference Model
- C. The Resource-Event-Agent model
- D. The STEP framework
- E. The TOGAF Technical Reference Model

**Item 52**

Question:

In Phase G, what document establishes the connection between the architecture organization and the implementation organization?

- A. Architecture Contract
- B. Architecture Landscape
- C. Architecture Roadmap
- D. Requirements Impact Statement
- E. Transition Architecture

**Item 53**

Question:

Which phase of the ADM is an ongoing activity that is visited throughout a TOGAF architecture project?

- A. Architecture Change Management
- B. Implementation governance

- C. Migration planning
- D. Preliminary Phase
- E. Requirements Management

#### **Item 54**

Question:

Which of the following statements is true about risk management in the ADM?

- A. Risk analysis is best conducted in the Architecture Vision phase so that the risk is eliminated in subsequent phases.
- B. Risk analysis should be carried out first in the Migration Planning phase.
- C. Risk is pervasive in all Enterprise Architecture activity and should be managed in all phases of the ADM.
- D. The only risks that are within the scope of Enterprise Architecture are technological risks.

#### **Item 55**

Question:

Which of the following best describes Capability-Based Planning?

- A. A business planning technique that focuses on business outcomes
- B. A business planning technique that focuses on horizontal capabilities
- C. A business planning technique that focuses on vertical capabilities
- D. A human resource planning technique that focuses on capable architects

#### **Item 56**

Question:

According to the TOGAF standard, which one of the following is the practice by which the Enterprise Architecture and other architectures are managed and controlled at an enterprise level?

- A. Architecture governance
- B. Corporate governance
- C. IT governance
- D. Technology governance

#### **Item 57**

Question:

Which one of the following is recommended to achieve a customer-focused, value-adding, and sustainable architecture practice?

- A. Develop an Architecture Roadmap
- B. Populate the Architecture Repository
- C. Populate the Enterprise Continuum
- D. Use the Architecture Development Method
- E. Use the Implementation Governance Phase

**Item 58**

Question:

Which of the following statements best describes the purpose of the Architecture Requirements Specification?

- A. A document that triggers the start of an architecture development cycle
- B. A qualitative view of the solution to communicate the intent of the architect
- C. A quantitative view of the solution to measure the implementation
- D. A record of deviations from the planned architectural approach to identify changes to be made

**Item 59**

Question:

Which one of the following best describes the purpose of the Communications Plan?

- A. To ensure that architecture information is communicated to the right stakeholders at the right time
- B. To support Boundaryless Information Flow
- C. To evangelize the architecture to the end-user community
- D. To keep the Architecture Review Board apprised of changes to the architecture
- E. To ensure that the outcomes of a Compliance Assessment are distributed to the members of the Architecture Review Board

**Item 60**

Question:

Complete the sentence. The statement, “Getting information to the right people at the right time in a secure, reliable manner in order to support the operations that are core to the extended enterprise” describes the concept of \_\_\_\_\_

- A. Boundaryless Information Flow
- B. Interoperability
- C. Portability
- D. Service-Oriented Architecture

**Item 61**

Question:

According to the TOGAF standard, where should architecture governance artifacts be stored?

- A. In the Architecture Repository
- B. In the Foundation Architecture
- C. In the Integrated Infrastructure Reference Model
- D. In the Requirements Repository
- E. In the Standards Information Base

**Item 62**

Question:

Which architecture domain describes logical software and hardware capabilities?

- A. Application Architecture
- B. Business Architecture

- C. Data Architecture
- D. Information Systems Architecture
- E. Technology Architecture

#### **Item 63**

Question:

Which of the following lists components within the Architecture Repository?

- A. Organizational Metamodel, Architecture Capability, Architecture Landscape, Best Practices, Reference Library, Compliance Strategy
- B. Architecture Metamodel, Organizational Capability Model, Application Landscape, SIB, Reference Library, Governance Model
- C. Business Metamodel, Architecture Capability, Architecture Landscape, SIB, Reference Library, Governance Log
- D. Architecture Metamodel, Architecture Capability, Architecture Landscape, SIB, Reference Library, Governance Log

#### **Item 64**

Question:

Which of the following reasons best describes why the ADM numbering scheme for versioning output is an example and not mandatory?

- A. To show the evolution of deliverables
- B. To permit adaptation as required
- C. To enable use with the Architecture Content Framework
- D. To support change management

#### **Item 65**

Question:

Which of the following is *not* one of the domain architectures produced by the TOGAF ADM process?

- A. Application Architecture
- B. Business Architecture
- C. Data Architecture
- D. Pattern Architecture
- E. Technology Architecture

#### **Item 66**

Question:

Which of the TOGAF ADM phases is considered to be the initial phase of an Architecture Development Cycle?

- A. Preliminary Phase
- B. Phase A
- C. Phase B
- D. Phase E
- E. Phase G

**Item 67**

Question:

Which one of the following is defined as describing the state of an architecture at an architecturally significant point in time during the progression from the Baseline to the Target Architecture?

- A. Capability Architecture
- B. Foundation Architecture
- C. Segment Architecture
- D. Solution Architecture
- E. Transition Architecture

**Item 68**

Question:

Which one of the following best describes ADM Phase F?

- A. Prepare the organization for successful architecture projects
- B. Develop architectures in four domains
- C. Perform initial implementation planning
- D. Develop detailed implementation plan
- E. Provide architecture oversight for the implementation

**Item 69**

Question:

Complete the sentence: The TOGAF Integrated Information Infrastructure Reference Model (III-RM) is classified in the Architecture Continuum as an example of a(n) \_\_\_\_\_

- A. Common Systems Architecture
- B. Industry Architecture
- C. Enterprise Architecture
- D. Foundation Architecture

**Item 70**

Question:

Which of the ADM phases includes the objective of establishing the organizational model for Enterprise Architecture?

- A. Preliminary
- B. Phase A
- C. Phase B
- D. Phase D
- E. Phase E

**Item 71**

Question:

Which of the following is a technique that can be used to discover and document business requirements in Phase A?

- A. Business Scenarios
- B. Business Transformation Readiness Assessment
- C. Capability-Based Planning
- D. Gap Analysis
- E. Stakeholder Management

**Item 72**

Question:

Complete the sentence. The Transition Architectures defined in Phase E are confirmed with the stakeholders in \_\_\_\_\_

- A. Phase E
- B. Phase F
- C. Phase G
- D. Phase H

**Item 73**

Question:

Complete the sentence. A good business scenario should be “SMART”. The letter “S” stands for \_\_\_\_\_

- A. Solution-oriented
- B. Specific
- C. Strategic
- D. Stakeholder-oriented

**Item 74**

Question:

Which of the following best describes the Business Transformation Readiness Assessment technique?

- A. A technique to define the degree to which information and services are to be shared
- B. A technique used to validate an architecture
- C. A technique used to identify and understand the business requirements an architecture must address
- D. A technique used to develop general rules and guidelines for the architecture being developed
- E. A technique used to understand the readiness of an organization to accept change

**Item 75**

Question:

Which of the following best describes the Capability-Based Planning technique?

- A. A technique used to plan the degree to which information and services are to be shared
- B. A technique used to validate an architecture

- C. A technique used for business planning that focuses on business outcomes
- D. A technique used to develop general rules and guidelines for the architecture being developed

#### **Item 76**

Question:

Which one of the following best describes an Architecture Contract?

- A. An agreement between the development partners and stakeholders on the acceptable risks and mitigating actions for an architecture
- B. An agreement between development partners and sponsors on the deliverables, quality, and fitness-for-purpose of an architecture
- C. An agreement between the lead architect and the development partners on the enforcement of Architecture Compliance for an architecture
- D. An agreement between development partners and sponsors on how best to monitor implementation of the architecture

#### **Item 77**

Question:

The TOGAF standard defines a set of terms to describe Architecture Compliance. Which one of the following applies to the case where an implementation has no features in common with the architecture specification?

- A. Compliant
- B. Conformant
- C. Irrelevant
- D. Non-conformant

#### **Item 78**

Question:

Which of the following terms does the TOGAF standard use to describe people who have an interest in a system?

- A. Architect
- B. Consumer
- C. Sponsor
- D. Stakeholder

#### **Item 79**

Question:

Which of the following ADM phases is where SBBs first appear in the ADM cycle?

- A. Phase A
- B. Phase B
- C. Phase D
- D. Phase E
- E. Phase G

**Item 80**

Question:

Which of the following documents acts as the deliverable container for the Business, Data, Application, and Technology architectural artifacts?

- A. Architecture Contract
- B. Architecture Definition Document
- C. Architecture Requirements Specification
- D. Architecture Roadmap
- E. Architecture Vision

## **5. Bonus Test Answers**

### **Item 41 D**

The Architecture Capability Framework discusses the organization, processes, skills, roles, and responsibilities required to establish and operate an architecture practice within an enterprise.

### **Item 42 A**

An Enterprise Architecture capability (or architecture capability), in the context of the TOGAF standard, is the ability for an organization to effectively undertake the activities of an Enterprise Architecture practice.

### **Item 43 C**

Phase F confirms the Transition Architectures defined in Phase E with the relevant stakeholders and finalizes them.

### **Item 44 A**

Part III of the standard contains a collection of guidelines and techniques for use in applying the TOGAF standard and the ADM. The guidelines document how to adapt the ADM process and specialist architecture styles, whereas the techniques are used when applying the ADM process.

### **Item 45 D**

The recommended dimensions to define the scope of an architecture activity are breadth, depth, time period, and architecture domains.

### **Item 46 A**

The Architecture Capability defines the parameters, structures, and processes that support governance of the Architecture Repository.

### **Item 47 B**

Phase A: Architecture Vision includes the validation of business principles, goals, strategic drivers, and also Key Performance Indicators (KPIs).

### **Item 48 C**

The Architecture Content Framework provides a detailed model of architectural work products, including deliverables and their purpose, artifacts within deliverables, and the Architecture Building Blocks (ABBs) that deliverables represent.

**Item 49 D**

The TOGAF TRM has two main components:

1. A taxonomy that defines terminology, and provides a coherent description of the components and conceptual structure of an information system.
2. A model, with an associated TRM graphic, that provides a visual representation of the taxonomy, as an aid to understanding.

**Item 50 D**

The Architecture Vision provides the sponsor with a key tool to sell the benefits of the proposed capability to stakeholders and decision-makers within the enterprise. It describes how the new capability will meet the business goals and strategic objectives and address the stakeholder concerns when implemented.

**Item 51 B**

The TOGAF Library includes the Reference Model for Integrated Information Infrastructure (III-RM) that could be considered for use in this phase. It focuses on the application-level components and services necessary to provide an integrated information infrastructure.

**Item 52 A**

Architecture Contracts are the joint agreements between development partners and sponsors on the deliverables, quality, and fitness-for-purpose of an architecture. They are produced in Phase G.

**Item 53 E**

The process of managing architecture requirements applies to all phases of the ADM cycle. As shown by its central placement in the ADM cycle diagram, this process is central to driving the ADM process.

**Item 54 C**

Risk is pervasive in any Enterprise Architecture activity and present in all phases within the ADM.

**Item 55 A**

Capability-Based Planning is a business planning technique that focuses on business outcomes. It is business-driven and business-led and combines the requisite efforts of all lines of business to achieve the desired capability. It accommodates most, if not all, of the corporate business models and is especially useful in organizations where a latent capability to respond (e.g., an emergency preparedness unit) is required and the same resources are involved in multiple capabilities.

**Item 56 A**

Architecture Governance is the practice by which Enterprise Architectures and other architectures are managed and controlled at an enterprise-wide level.

**Item 57 D**

The Architecture Capability Framework recommends applying the ADM with the specific Architecture Vision to establish a sustainable architecture practice within an organization.

**Item 58 C**

The Architecture Requirements Specification provides a set of quantitative statements that outline what an implementation project must do in order to comply with the architecture.

**Item 59 A**

Effective communication of targeted information to the right stakeholders at the right time is a critical success factor for Enterprise Architecture. Development of a Communications Plan in Phase A for the architecture allows for this communication to be carried out within a planned and managed process.

**Item 60 A**

Boundaryless Information Flow is essentially the problem of getting information to the right people at the right time in a secure, reliable manner, in order to support the operations that are core to the extended enterprise.

**Item 61 A**

Architecture governance artifacts should be stored in the Architecture Repository.

**Item 62 E**

The Technology Architecture includes the software and hardware capabilities that are required to support the deployment of business, data, and application services. This includes IT infrastructure, middleware, networks, communications, processing, and standards.

**Item 63 D**

Components of the Architecture Repository are the Architecture Metamodel, Architecture Capability, Architecture Landscape, SIB, Reference Library, and Governance Log. In addition, the TOGAF 9.2 standard includes the Architecture Requirements Repository and the Solutions Landscape.

**Item 64 B**

The numbering scheme provided in the TOGAF ADM for its outputs is intended as an example. It should be adapted by the architect to meet the requirements of the organization and to work with the architecture tools and repositories employed by the organization.

**Item 65 D**

Pattern Architecture is not one of the four domain architectures, which are BDAT: Business, Data, Application, and Technology Architecture.

**Item 66 B**

Phase A: Architecture Vision is the initial phase of a cycle. Note that the Preliminary Phase is a preparatory phase. Phase A: Architecture Vision describes the initial phase of an Architecture Development Cycle. It includes information about defining the scope, identifying the stakeholders, creating the Architecture Vision, and obtaining approvals.

**Item 67 E**

A Transition Architecture is defined as a formal description of one state of the architecture at an architecturally significant point in time. One or more Transition Architectures may be used to describe the progression in time from the Baseline to the Target Architecture.

**Item 68 D**

Phase F: Migration Planning develops the detailed Implementation and Migration Plan that addresses how to move from the Baseline to the Target Architecture.

**Item 69 A**

The III-RM is a Common Systems Architecture. The TOGAF Integrated Information Infrastructure Reference Model (III-RM) is a reference model that supports describing Common Systems Architecture in the Application domain that focuses on the requirements, building blocks, and standards relating to the vision of Boundaryless Information Flow.

**Item 70 A**

The Preliminary Phase has as part of its objectives establishment of the Architecture Capability; it includes defining and establishing the Organizational Model for Enterprise Architecture.

**Item 71 A**

Business scenarios are an appropriate and useful technique to discover and document business requirements in Phase A, and to articulate an Architecture Vision that responds to those requirements.

**Item 72 B**

The Transition Architectures are confirmed in Phase F. An objective of Phase F is to ensure that the business value and cost of work packages and Transition Architectures is understood by key stakeholders.

**Item 73 B**

The S in SMART stands for Specific. SMART is defined as follows:

- **Specific**, by defining what needs to be done
- **Measurable**, through clear metrics for success
- **Actionable**, by clearly segmenting the problem and providing the basis for a solution

- **Realistic**, in that the problem can be solved within the bounds of physical reality, time, and cost constraints
- **Time-bound**, in that there is a clear statement of when the opportunity expires

**Item 74 E**

The Business Transformation Readiness Assessment technique is used for determining the readiness of an organization to accept change. Enterprise Architecture often involves considerable change. It provides a technique for understanding the readiness of an organization to accept change, identifying the issues, and dealing with them in the Implementation and Migration Plan. It is based on the Canadian Government Business Transformation Enablement Program (BTEP).

**Item 75 C**

Capability-Based Planning is a business planning technique that focuses on business outcomes. It is business-driven and business-led and combines the requisite efforts of all lines of business to achieve the desired capability. It accommodates most, if not all, of the corporate business models and is especially useful in organizations where a latent capability to respond (e.g., an emergency preparedness unit) is required and the same resources are involved in multiple capabilities. Often the need for these capabilities is discovered and refined using business scenarios.

**Item 76 B**

The agreement is between development partners and sponsors. Architecture Contracts are joint agreements between development partners and sponsors on the deliverables, quality, and fitness-for-purpose of an architecture. Successful implementation of these agreements will be delivered through effective Architecture Governance. Taking a governed approach to contract management ensures a system that continuously monitors integrity, changes, decision-making, and audit, as well as adherence to the principles, standards, and requirements of the enterprise. The architecture team may also be included in product procurement, to help minimize the opportunity for misinterpretation of the Enterprise Architecture.

**Item 77 C**

Where no features are in common then it is termed Irrelevant.

**Item 78 D**

Stakeholders are people who have interests in a system; for example, users, developers, etc. Stakeholders can be individuals, teams, organizations, etc.

A system has one or more stakeholders. Each stakeholder typically has interests in, or concerns relative to, that system.

**Item 79 D**

SBBs appear in Phase E of the ADM where product-specific building blocks are considered for the first time. SBBs define what products and components will implement the functionality, thereby defining the implementation.

**Item 80 B**

The Architecture Definition Document is the deliverable container for the core architectural artifacts created during a project and for important related information. The Architecture Definition Document spans all architecture domains (Business, Data, Application, and Technology) and also examines all relevant states of the architecture (baseline, transition, and target).

## The Open Group® Certification for People

# TOGAF® 9 Part 2 Practice Test

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The Part 1 Practice Test is representative of the content covered in the TOGAF 9 Part 1 Examination. It includes question formats found in the actual examination. It also includes questions of varying difficulty. A candidate's performance on this Practice Test does not guarantee similar performance on the actual examination.

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### **The Open Group® Certification for People: TOGAF® 9 Part 2 Practice Test**

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## 1. Instructions

This Practice Test is an open book test. The permitted reference text is the TOGAF standard.<sup>1</sup>

You should spend no more than 90 minutes on this test.

### **Open Book Examinations**



This Practice Test is representative of the content covered in the TOGAF 9 Part 2 Examination and is designed as an open book test. You should refer to the TOGAF standard while taking this test.

Please note that when taking the examination a PDF version of the TOGAF standard is provided built into the test and available on the REFERENCE button.

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<sup>1</sup> This version of this Practice Test should be used with the TOGAF Standard, Version 9.2.

## **2. Examination Questions**

This section consists of eight gradient scored, multiple-choice, single response questions. In order to answer each question you will need to read the related scenario fully. On the basis of the information provided in the scenario, and the guidance in the TOGAF standard, which one of the four possible answers is the best answer?

There is a maximum of five (5) points per question.

The CORRECT answer scores five (5) points.

The SECOND BEST answer scores three (3) points.

The THIRD BEST answer scores one (1) point.

The DISTRACTER (the incorrect answer) scores zero (0) points.

**In order to pass this section, you must achieve a total of 28 points<sup>2</sup> or more out of a maximum of 40 points (70%).**

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<sup>2</sup> Note that this pass mark is higher than the live TOGAF 9 Part 2 Examination. Consult The Open Group certification website for the latest information on examination pass marks.

## 2.1 Question 1

### SCENARIO 1

You are serving as the Lead Architect in a multi-national company that operates production facilities in 24 countries and sells its products in over 100 countries. It has three sectors: Transportation, Energy Systems, and Automation. Each sector has several business units that operate independently. An Executive Vice-President heads each of the business units. Traditionally, each business unit has acted independently with few shared customers or suppliers. They were expected to share financial and human resource information from the corporate headquarters.

A consultancy firm has recommended a realignment that will enhance sharing of product information across business units. The implementation of this strategic realignment will require the development of integrated customer information systems and product information systems.

The company has a mature Enterprise Architecture practice and uses the TOGAF standard as the basis for its method and deliverables. An architecture development program has been created to address the development of these capabilities and is about to commence. The Enterprise Architecture program is sponsored by the CIO.

At the most recent meeting of the Corporate Board, the Chairman of the Board expressed a concern about the risk to the business while a potentially disruptive program is being rolled out across the company. He noted that several competitors had tried similar initiatives with poor results. The Corporate Board agreed that this concern must be satisfactorily addressed before this program can commence.

### Question 1

#### *Refer to the Scenario*

You have been asked to recommend an approach to address the concerns raised.

Based on the TOGAF standard, which of the following is the best answer?

### Answers

A. You recommend that risk mitigation activities be conducted in the Technology Architecture phase to determine the implementation organization's degree of risk aversion with regard to the proposed business transformation prior to deployment. Based on that, if the Corporate Board is not willing to accept a reasonable amount of risk, then you recommend they put in place a set of parallel systems to mitigate the risks.

B. You recommend that techniques be used throughout the program to manage risk including risk monitoring. This will enable you to identify, classify, and mitigate the risks associated with the proposed transformation and ensure suitable business continuity plans are in place. In the Implementation Governance phase, you ensure a residual risk assessment is conducted to determine the best way to manage risks that cannot be mitigated.

C. You recommend classifying the risks in terms of time, cost, and scope during the Architecture Vision phase. This will enable you to ensure that certain risks with certain types of impact are managed by the right individuals. You would then ensure that the Architecture Contracts issued in the Implementation Governance phase address those initial risks and include adequate risk monitoring actions to confirm they have been addressed.

D. You recommend that a risk management framework is used in Phase G, the Implementation Governance phase. This would include a risk classification scheme and completion of worksheets for risk assessment. This will enable you to assess the risks associated with the proposed business transformation. You then ensure that the initial level of risk is well understood before issuing the Architecture Contracts.

## 2.2 Question 2

### SCENARIO 2

You are serving as a consultant to the Chief Architect of a low-cost airline. The airline was formed in 2002 and has its main base at a major international airport on the east coast of North America. It currently serves 65 destinations in 20 US states, and nine countries in the Caribbean, South America, and Latin America.

The airline has received approval to acquire a smaller regional carrier that will extend the market it reaches and enable it to feed its primary routes with connecting flights from smaller cities.

In order to integrate the new acquisition, an Enterprise Architecture program has been initiated, using the TOGAF standard as the method and guiding framework. The CIO is the sponsor of the activity. The Chief Architect has indicated that this program should make use of iteration with the ADM.

As the program moves into Phase A within the initial iteration of an Architecture Capability cycle, the CIO has emphasized the need to ensure that the architecture is embraced across the enterprise. She noted that past acquisitions have failed to engage the key players, and this needs to be fully addressed.

### Question 2

#### *Refer to the Scenario*

You have been asked to explain how you would identify and engage the stakeholders at this stage of the program.

Based on the TOGAF standard, which of the following is the best answer?

### Answers

A. You would conduct a series of business scenarios with the stakeholders impacted by the acquisition, and determine which stakeholders are likely to block the initiative and which are likely to support it. This would let you identify and understand business needs, and derive the business requirements that the architecture development has to address. You would identify the most relevant architecture viewpoints and validate with the stakeholders.

B. You would focus on communications with the stakeholders at the regional carrier as effective communication of targeted information to the right stakeholders at the right time is a critical success factor for such a merger. You would develop a Communications Plan, which would allow you to plan and manage the process. It would ensure that stakeholders are aware of the key features of the architecture and have the opportunity to comment.

C. You would conduct a pilot project as part of Phase A to demonstrate to the stakeholders the technical feasibility of the approaches that are available from your preferred suppliers. You would map the possible solutions to a viewpoint library. Once the stakeholders confirm the approach meets their requirements you would then complete a Statement of Work and issue an Architecture Contract to your suppliers.

D. You would identify key stakeholders across both the current airline and the new acquisition. You would classify their positions and influence, recording the results in a stakeholder map. You would then focus on key stakeholders ensuring that you identify the most relevant architecture viewpoints for each stakeholder and validate that their concerns are being addressed. You would communicate with stakeholders early and frequently, ensuring that they fully understand the architecture process.

## 2.3 Question 3

### SCENARIO 3

You are serving as the Lead Enterprise Architect for a major bank, leading a group of domain architects as well as working with the corporate project management office, strategic planners, and operations management planners. The bank has been in business for over 60 years, growing through a series of acquisitions with other financial institutions. It has a large IT service department and routinely has over 100 infrastructure and service projects in progress. The Governing Board has decided that a more structured approach to its infrastructure and services is necessary to safeguard the business, especially given the recent turmoil in the financial markets.

As a result, the CIO has sponsored the creation of an Enterprise Architecture group. This group has adopted the TOGAF 9 standard as the basis for its Enterprise Architecture, developed an Architecture Vision, which has been approved, and defined a set of domain architectures. The time has come to consolidate the domain architectures and review the current initiatives and projects in the corporate portfolio as well as potentially create new projects in order to realize the vision.

The CIO has stated that the implementation approach must accommodate the constantly occurring changes to the technology and business landscapes. Shareholders want to see not just a vision but want to know that there is a flexible, integrated Implementation and Migration Plan that has the best chance of realizing the vision in these uncertain times.

### Question 3

#### *Refer to the Scenario*

A meeting has been scheduled with the stakeholders and you have been asked to recommend the best approach to address the concerns raised.

Based on the TOGAF standard, which of the following is the best answer?

### Answers

A. You recommend that the Enterprise Architecture team leverage all of the existing projects and their deliverables to address the findings from the gap analysis results for the architecture domains. The Enterprise Architecture team will request from the stakeholders all of the existing project charters and architectures so that the architects can integrate them together in a coherent manner. They will inform the operations management staff of their plans so that they can prepare to support the deliverables. Each of the domain architects will then come up with specific projects to address their gaps and then consider whether existing projects need to have their scope revised. The sum of the work required in each of the domains will then be consolidated into the Implementation and Migration Plan. The timeline for progression of deliverables will be documented in the Architecture Roadmap.

B. You recommend that the domain architectures are implemented immediately and all ongoing projects have their scopes revised to align with the new architectures. In order to save time you will then take the requirements from Phases B through D and create new IT projects for each one of the requirements that will enable the projects to create their individual requirements-based project architectures. The projects

will work together through the creation of new point-to-point interfaces following defined interoperability architecture guidelines. The project plans will then be consolidated into the Implementation and Migration Plan.

C. You recommend development of a series of Transition Architectures. This can then deliver continuous business value in an incremental manner, achieved by all the projects delivering their increments in a coordinated approach based on capability planning. You will consolidate the gap analysis results from each of the domain architectures and analyze the dependencies so as to come up with a work-breakdown structure. You will examine what is achievable and identify logical work packages that can become the basis for projects or the leveraging of existing projects. You will then hold a series of facilitated sessions to seek consensus on the Implementation and Migration Strategy.

D. You recommend that the stakeholders provide input on what has to be done to implement the defined domain architectures. The intent is to ensure that all stakeholders will be allowed to contribute to the Enterprise Architecture planning. The joint analysis will then result in a detailed list of work activities that will be rolled into an IT portfolio plan that will eventually give rise to a series of projects. The intent is to create a comprehensive Target Architecture that will include the detailed technology choices for the organization for the next five years. A full report will be completed highlighting what was done including a detailed dependencies and factors assessment.

## 2.4 Question 4

### SCENARIO 4

You are working as the Lead Enterprise Architect for a global manufacturing firm. The firm has decided to improve the efficiency of its sales force by replacing its legacy fax and paper-based configuration and ordering systems with a hand-held device solution. This will impact both the firm and its suppliers.

The firm uses the TOGAF framework for the internal Enterprise Architecture and uses an iterative approach to applying the ADM. The Enterprise Architecture team has established the Architecture Capability for this project and also completed the first iteration of the Architecture Definition cycle, using a Baseline First approach. The CIO is the sponsor of the Enterprise Architecture program.

The initial iteration has established the approach, the scope, and vision for the project. A set of Architecture Principles has been established based on the example set provided in the TOGAF standard. The CIO has highlighted the importance of adhering to the following principles:

- Data is an asset
- Data is shared
- Data is accessible

The initial iteration has also established a number of business goals and objectives for the new target system. The principal goal is to give the sales force in the field direct access to the sales process, allowing sales staff to create and verify product configurations, check pricing and availability, and to place an order while still on the client site with the customer.

As part of achieving this goal, the architectures developed will need to address the following stakeholder concerns:

- What changes to existing business processes are needed?
- What data will need to be shared?
- How will distributed data be secured?
- What non-sales applications will need to be integrated with any new sales applications?

### Question 4

#### *Refer to the Scenario*

You have been asked to identify the most appropriate artifacts (catalogs, matrices, and diagrams) for the second iteration of the Architecture Development Cycle.

Based on the TOGAF standard, which of the following is the best answer?

## **Answers**

A. Describe the Business Architecture with a Process/Event/Control/Product catalog and Role catalog.

Describe the Data Architecture with a Data Entity/Data Component catalog, Application/Data matrix, and Data Security diagram.

Describe the Application Architecture with an Interface catalog.

Describe the Technology Architecture with a Networked Computing/Hardware diagram.

B. Describe the Business Architecture with a Location catalog and Business Interaction matrix.

Describe the Data Architecture with a Data Migration diagram and Data Lifecycle diagram.

Describe the Application Architecture with a Software Engineering diagram.

Describe the Technology Architecture with a Processing diagram.

C. Describe the Business Architecture with a Location catalog and Business Footprint diagram.

Describe the Data Architecture with a Application/Data matrix, Data Migration diagram, and Data Lifecycle diagram.

Describe the Application Architecture with an Application Communication diagram.

Describe the Technology Architecture with a Networked Computing/Hardware diagram.

D. Describe the Business Architecture with a Location catalog and Role catalog.

Describe the Data Architecture with a Data Entity/Business Function matrix, Application/Data matrix, and Data Security diagram.

Describe the Application Architecture with an Application Interaction matrix.

Describe the Technology Architecture with a Networked Computing/Hardware diagram.

## 2.5 Question 5

### SCENARIO 5

You are serving as the Lead Architect for a European Insurance company. The company has grown substantially over the last 15 years. Due to the many mergers and acquisitions, the application portfolio of the enterprise has grown significantly with little consideration for consolidation or rationalization. Each business unit has managed its own applications, with no coordination between them. In the last two years the competition in the insurance industry has increased with the advent of many Internet-based comparison sites leading to increased pressure to reduce the operational expenses including IT.

The Corporate Board has approved the directive to establish an Enterprise Architecture program within the company to integrate and rationalize the application portfolio and introduce a company-wide customer information management system. The Corporate Board has also given a strategic direction that the company should expand its markets significantly to cover all the member country states of the European Union in the next 24 months.

The company has no existing Enterprise Architecture. The CIO is the sponsor of the program and has mandated the TOGAF standard for the architecture method and deliverables. The CIO has established an Architecture Board and called the first meeting.

### Question 5

*Refer to Scenario*

You have been asked how you will establish the Enterprise Architecture program.

Based on the TOGAF standard, which of the following is the best answer?

### Answers

- A. You work with the Architecture Board to develop and tailor the TOGAF framework, so it can be integrated with the existing procedures established by the Program Management Office. In addition, you examine the relationship to other processes and frameworks for systems development, operations management, and governance. You then conduct a study to determine the footprint of the Enterprise Architecture.
- B. You issue a Request for Architecture Work so that the necessary resources needed to define an Architecture Vision can be allocated. You then conduct a business scenario that addresses the Board's mandate upon expansion. Based on that, you define a Common Systems Architecture that will guide the selection of Solutions Building Blocks for integrating the systems across business units.
- C. You ensure that there is agreement on the scope of the Enterprise Architecture, and identify the key business drivers. You document and validate the requirements for architecture work. You develop a set of Architecture Principles with the Architecture Board to guide the architecture work. You then consider how to best tailor the TOGAF framework for use, and identify tools for supporting the program.

D. You start by conducting an Architecture Maturity Assessment to assess the ability of the company to undergo change. Using that input you then apply the TOGAF ADM to define the overall requirements for integrating a new company information management system into the enterprise. You then work with the Architecture Board to define the business goals that will drive the Enterprise Architecture program.

## 2.6 Question 6

### SCENARIO 6

You are serving as the Lead Architect for a telecommunications company that recently formed through the merging of three other telecommunication companies. The business operating model has been unified, and an Enterprise Architecture program has been put in place as part of the integration of the three organizations.

The company has adopted the TOGAF 9 Architecture Development Method. The Architecture Board has approved the outline Implementation and Migration Plan and they are now at the stage of conducting detailed migration planning. A working group has been formed that involves all the key architects and the stakeholders from the corporate matrix (those who will work on the project).

It is recognized that others outside the Enterprise Architecture team will have the responsibility to fund, build, support, and use what is put in place based on the Enterprise Architecture. For the company, getting this right is critical especially as the competition in the marketplace has been fierce and the lines of business have been resistant to implementing any new business model.

The CIO is the sponsor of the program and has mandated an increment approach to rollout the integration program.

### Question 6

*Refer to the Scenario*

You have been asked to describe:

- How you would conduct migration planning
- What you would be implementing
- Who you would involve
- What would be the major deliverable(s)

Based on the TOGAF standard, which of the following is the best answer?

### Answers

A. Migration planning should be conducted by the Chief Architect, his direct reports, and shared with the domain architects. When complete, the Implementation and Migration Plan will be sent to the Architecture Board for approval at their next meeting. The plan will include a prioritized list of projects, their approximate cost, and the recommended way ahead. Comments from the Board (and their staff) would be incorporated into the plan and then the individual projects would have to go in front of the Board to secure approval for project resources for the next project increment. The Implementation and Migration Plan would include a high-level GANTT chart that could be used as the Architecture Roadmap.

B. Migration planning should be conducted by the Enterprise Architecture team. The approach should be confirmed and coordinated with the corporate management frameworks involved. Detailed resource estimates should be created for the work to be completed and the business value identified for all deliverables. A series of Transition Architectures should be planned that take into account the priorities. When this is completed the Implementation and Migration Plan can be finalized. The Business Planning, Portfolio Management, and Operations Management groups should all be involved in the development of the major deliverables. Once the deliverables have been completed, the Architecture Development Cycle should be completed.

C. Migration planning should be conducted by the Project Managers using the Implementation and Migration Strategy from Phase E to create project plans focusing on scope, budget, and time. Project Management best practices can then be used to conduct more detailed analysis and come up with business value on a project by project basis. Project Managers will assign business value and prepare submissions to the IT Governance Board for funding. The Chief Architect will sit as a member of the Board and advise members with respect to the criticality of the project and its relative importance. Over time the projects will continuously come forward for renewed funding and approval to proceed. The sum of the project plans and roadmaps will serve as the detailed Implementation and Migration Plan.

D. Migration planning should be conducted by the Enterprise Architecture team, in particular the domain (Business, Application, Data, Technology, and Security) architects who would look at implementing a series of Transition Architectures using sound project management techniques. The Enterprise Architecture team will then create a prioritized list of activities and place the high-level Architecture Building Blocks in an Implementation and Migration Plan and Architecture Roadmap. These deliverables would be circulated around the organization for comments that would be selectively integrated. The circulation would be to the lines of business and the members of the Executive Board so that they would be ready to fund the proposed Enterprise Architecture work.

## 2.7 Question 7

### SCENARIO 7

You are serving as the Lead Architect for a business unit within a major logistics company. The business unit has selected a Commercial Off-The-Shelf (COTS) Market Analytics solution in order to improve its capability to respond to market demands for its new rail-based freight delivery service. It has been identified that the current system does not provide the required functionality to support the marketing activities. Its performance limitations cause unacceptable delays and missed opportunities to meet market targets. Clearly, the current system is costing the business unit in terms of lost revenue.

The company has a mature Enterprise Architecture capability spanning all of its business units and has adapted the TOGAF framework as the basis for its ongoing program. The CIO is the sponsor of the Enterprise Architecture practice.

The Enterprise Architecture team initiated a project with the business unit that has defined the business vision and requirements for the new system. It includes a detailed business process analysis. A solution has been proposed that can support the existing applications and technologies currently in place. The proposed solution requires a non-standard operating system platform to support the business application and also requires different web server software to the current supported web server solutions. The Architecture Board has held a review, and it was noted that some of these project requirements were not consistent with the company's current infrastructure standards.

After discussions with several senior executives, the CIO feels that he must support the business unit's urgent need to deploy the Market Analytics package. He has approved the implementation. A project manager has been chosen, and a feasibility meeting has been held with a decision to move forward. The project is critical and must be completed as quickly as possible; a contract has been signed with the software vendor to implement the solution.

The vendor has provided a statement of work that has passed through the migration planning phase, and major impacts to existing systems and the infrastructure have been documented.

The CIO has asked the Enterprise Architecture team to prepare for Phase G, ensuring that the key performance indicators for system performance and security are met, and the project remains within budget.

### Question 7

#### *Refer to the Scenario*

You have been asked to recommend a plan to implement the direction from the CIO.

Based on the TOGAF standard, which of the following is the best answer?

### Answers

A. Based on the review held by the Architecture Board, you recommend the vendor modify the web server software and hardware components in the product so they can meet the current infrastructure

standards. You recommend development of an in-house prototype of the product to investigate coding change options.

You would then obtain the approval of the development leads for supporting the development effort, develop an Architecture Contract, and provide the project plan to the project manager, emphasizing adherence to schedule. After implementation, you schedule frequent operational reviews to monitor performance of the solution.

B. You review the output from the Architecture Board and recommend the co-existence of a second web server standard, noting the additional hardware and support skills issues. You add this technology to the currently supported inventory of standard products in the company Standards Information Base.

You direct the project architects to construct an Architecture Contract with the development team. You emphasize the importance of using appropriate architecture compliance reviews in addition to the test plans required for performance, and monitor the testing results. You establish agreements with the business unit for Service-Level Agreements (SLAs) and delivery dates. After implementation, you identify re-usable objects and procedures.

C. Based on the recommendations of the Architecture Board, you would eliminate the non-standard web server from the solution. You create a revised plan and Architecture Contract for the development of a replacement application and server environment using standard re-usable components and internal development resources.

You would inform the CIO that in the long term the development of this standardized version is the lower-cost option. You ensure that the budget implications to these recommendations are presented to the finance committee. You hold frequent project management meetings to monitor compliance to standards and the revised schedule.

D. You prepare an expanded risk analysis and inform the development team of the required deliverables and the dates. You prepare a detailed impact analysis of the use of a “non-standard” web and hardware solution. You construct an Architecture Contract. You obtain approval from the CIO prior to implementation.

You schedule a test of the solution just prior to implementation according to user performance requirements. You deliver the required artifacts and archive them when implementation is completed.

## 2.8 Question 8

### SCENARIO 8

You are serving as the Chief Architect for an online grocer, headquartered in Los Angeles, California. After several years of continued profitable operations, the Board of Directors has approved a strategic plan to expand operations to major cities in the Southwestern United States.

To realize this strategy, management has an Enterprise Architecture program in place to plan and implement the rollout which is estimated to take five years to complete. The program needs to consider how to take the current organization, physical plant, and information systems and transform them to support expanded operations.

The TOGAF standard has been adopted as the methodology and framework for the Enterprise Architecture program. The CIO is the sponsor.

A major concern that must be addressed is how to migrate from a “best-of-breed” logistics system that was built in the early days. It is not expected that this system will be able to scale to support the expanded operations. The CIO recognizes this and has an option to purchase a packaged solution from an industry leader in online sales and fulfillment. One disadvantage of this solution is that the terminology and definitions of its services do not align well to the current Enterprise Architecture.

This is now being piloted in a major fulfillment center in Southern California. It is a large-scale project and members of your Enterprise Architecture team have been deeply involved with the pilot program.

As part of the pilot program, the Architecture Board has requested a compliance review be held at the fulfillment center to determine the status of the implementation. The timing of the compliance review is such that there is still time to correct any major shortcomings with the proposed solution.

### Question 8

#### *Refer to the Scenario*

What approach should you adopt to ensure that the compliance reviews are conducted successfully?

Based on the TOGAF standard, which of the following is the best answer?

### Answers

A. You delegate the review to the lead Enterprise Architect. You request that she organizes, leads, and conducts the review. Where possible she should involve the appropriate business domain experts. The review should follow the established 12-step process and deliver an assessment report at completion. The report should be presented at the next Architecture Board meeting for acceptance, review, and sign-off.

B. You meet with the project architect and check she clearly understands the purpose of the review. You ask her to run a lightweight review process where the architects and team leaders pose a series of questions to themselves highlighting their observations on the performance and scalability of the pilot system. The responses should be aggregated into a report.

C. You assign the Enterprise Architecture team to manage the review. You request they ensure that the review covers the development methods. You ask them to identify where any modifications are needed to the standards being used in the project and to come up with a list of alternatives. You ask them to document the strategies being used by the implementation team for collaboration with the external supplier.

D. You assign the lead Enterprise Architect to coordinate the review. You request that she assemble a team of business and domain experts to conduct the interviews for the review. She should review the checklists that the team has prepared for the interviews to ensure they meet the criteria for the program and the business objectives. She should analyze the completed checklists. The responses to the interviews should then be compiled into a formal report together with recommendations.

### **3. Bonus Questions**

This section contains four bonus questions derived from the scenarios and questions used in the Practice Test.



#### **Practice Tip**

An alternative technique when using these questions for practice purposes is to place the four answers in order of correctness from best answer to worst answer.

### **3.1      Question 9**

#### **SCENARIO 9**

You are serving as the Lead Architect for a European Insurance company. The company has grown substantially over the last 15 years. Due to the many mergers and acquisitions, the application portfolio of the enterprise has grown with little consideration for consolidation or rationalization. Each business unit has managed its own applications, with no coordination between them. In the last two years the competition in the insurance industry has increased with the advent of many Internet-based comparison sites leading to increased pressure to reduce the operational expenses including IT.

An Enterprise Architecture program has been underway within the company to integrate and rationalize the application portfolio and introduce a company-wide customer information management system. A recent review has identified shortcomings within the Enterprise Architecture practice at the company. This has highlighted concerns about the lack of buy-in to the architecture processes and the Enterprise Architecture program. Concerns have also been raised about lack of appropriate staff skills and experience in key roles.

The CIO is the sponsor of the Enterprise Architecture program and the TOGAF standard has been adopted for the architecture method and deliverables. It has been tailored by the Enterprise Architecture team.

#### **Question 9**

*Refer to the Scenario*

The CIO has asked you to recommend an approach to improve the performance of the Enterprise Architecture practice within the company.

Based on the TOGAF standard, which of the following is the best answer?

#### **Answers**

A. You would ensure that the IT vision, principles, business linkages, Baseline, and Target Architectures are identified and that a set of architecture standards are being followed. You would recommend that the senior management team are briefed regularly and support the Enterprise Architecture processes. You would ensure that performance metrics associated with the Enterprise Architecture practice are captured and analyzed regularly.

B. You recommend conducting an Architecture Maturity Assessment as this will identify the practices on which the company should focus to see the greatest improvement. You also recommend that a skills framework be introduced, based on that of the TOGAF Architecture Skills Framework. This will provide a clear definition of skills and proficiency levels for roles within the team.

C. You recommend developing an automated skills assessment tool based on the TOGAF Skills Framework. The tool will provide a rapid means of identifying skills and gaps. The results from running the tool can then be used to determine the training and development needs of the Enterprise Architecture team members and also used when recruiting new team members.

D. You recommend engaging the services of an external consultant to evaluate the tailored Architecture Development Method to ensure that it is fit for purpose. A set of interviews should then be held with the Lead Enterprise Architect and other architects. A report should then be prepared and presented to the Architecture Board detailing the actions necessary to improve the performance of the Enterprise Architecture practice.

## 3.2 Question 10

### SCENARIO 10

You are serving as the Lead Architect for a telecommunications company that recently formed through the merging of three other telecommunication companies. The business operating model has been unified, and an Enterprise Architecture program has been put in place to manage the integration of the three organizations.

The company has adopted the TOGAF 9 Architecture Development Method. It has successfully completed the architecture definition phases of an ADM cycle and has identified a large collection of candidate roadmap components. The CIO is the sponsor of the program. She is concerned about the risks to the existing revenue lines and would also like to ensure that the most cost-beneficial projects are undertaken first.

The Architecture Board has approved the draft Architecture Definition Document and they are now at the stage of conducting migration planning. A working group has been formed that involves all the key architects and the stakeholders from the corporate matrix (those who will work on the project).

### Question 10

#### *Refer to the Scenario*

You have been asked to recommend how they can identify and prioritize the projects from these roadmap components, taking account of the CIO's concerns.

Based on the TOGAF standard, which of the following is the best answer?

### Answers

- A. Use the Implementation Factor Assessment and Deduction matrix to document factors impacting the Migration Plan; use the Consolidated Gaps, Solutions, and Dependencies matrix to consolidate the gaps from Phases B, C, and D; use the Transition Architecture State Evolution Table to show the proposed state of the architectures at various levels; use the Business Value Assessment Technique to analyze the relative value and risk of each proposed project; and use the Architecture Definition Increments Table to show the proposed series of Transition Architectures.
- B. Determine the key corporate change attributes; determine the business constraints; review and consolidate gap analysis results from Phases B, C, and D; review requirements; consolidate interoperability requirements; refine and validate dependencies; confirm readiness and risk for business transformation; formulate the Implementation and Migration Strategy; identify and group major work packages; identify Transition Architectures; create roadmap and plan.
- C. Review and consolidate the gap analysis results from Phases B, C, and D by making use of the Consolidated Gaps, Solutions, and Dependencies matrix. Rationalize the gap analysis and identify dependencies. Group the activities into a coherent set of projects. Use the Business Value Assessment Technique to assign a business value to each project, taking account of value and risk factors. Prioritize the projects into a Migration Plan taking account of dependencies, cost/benefit analysis, and risk.

D. Create a list of all possible projects from the gap analysis results of Phases B, C, and D. Use the Business Value Assessment Technique to assign a business value to each project, taking account of value and risk factors. Prioritize the projects into a Migration Plan, taking account of dependencies, cost/benefit analysis, and risk. Create an Architecture Definition Increments Table showing how a series of Transition Architectures may be implemented to achieve the Migration Plan.

### 3.3 Question 11

#### SCENARIO 11

You are serving as a consultant to the Chief Architect of a low-cost airline. The airline was formed in 2002 and has its main base at a major international airport on the east coast of North America. It currently serves 65 destinations in 20 US states, and nine countries in the Caribbean, South America, and Latin America.

The airline has received approval to acquire a smaller regional carrier that will extend the market it reaches and enable it to feed its primary routes with connecting flights from smaller cities.

In order to integrate the new acquisition, an Enterprise Architecture program has been initiated to manage the restructuring of the organization, using the TOGAF standard as the method and guiding framework. The CIO is the sponsor of the activity.

The CIO has stated that the following need to be addressed in the restructuring:

- The airline needs to provide a seamless travel experience for customers
- The airline needs low operating costs
- The airline needs increased revenue and optimized resources
- The airline needs a business-driven integration approach rather than simply integrating the IT systems

The Chief Architect has indicated that as this is the first acquisition a review should be undertaken of the Architecture Principles.

#### Question 11

*Refer to the Scenario*

*[Note: You should assume that the company has adopted the example set of principles that are listed and defined in the Architecture Principles chapter of the TOGAF standard.]*

You have been asked to identify the most relevant Architecture Principles for this situation.

Based on the TOGAF standard, which of the following is the best answer?

#### Answers

A. Common Use Applications, Service-Orientation, Responsive Change Management, Information Management is Everybody's Business

B. Compliance with Law, Protection of Intellectual Property, Technology Independence, Data is Accessible

C. Common Vocabulary and Data Definitions, Data Security, Requirements-based Change, IT Responsibility

D. Control Technical Diversity, Interoperability, Ease-of-Use, Maximize Benefit to the Enterprise

### 3.4 Question 12

#### SCENARIO 12

You are serving as the Lead Architect to a multi-national coffeehouse company. The company is the second largest coffeehouse chain in the world and the largest in the United Kingdom. It currently has over 10,000 stores in 31 countries. The company has a long tradition of innovation, offering its customers a wide range of products and services to attract them to stay longer in their stores. They were one of the first stores to offer free Wi-Fi Internet access across their whole chain.

The company has recently received approval to acquire the fourth largest coffeehouse chain. In order to integrate the new acquisition, an Enterprise Architecture program has been initiated, using the TOGAF standard as the method and guiding framework.

The CIO is the sponsor of the activity. The Chief Architect has indicated that this program should make use of iteration with the ADM. As the program moves into Phase A within the initial iteration of an Architecture Capability cycle, the CIO has emphasized the need to ensure that the architecture is embraced across the enterprise, especially amongst powerful stakeholders across both organizations.

#### Question 12

##### *Refer to the Scenario*

You have been asked to explain how you would ensure that the Architecture Vision responds to the requirements of the stakeholders.

Based on the TOGAF standard, which of the following is the best answer?

#### Answers

- A. You would identify all the stakeholders involved in the merger activity, their concerns, and any cultural factors. You would classify their positions and influence, recording the results in a Stakeholder Map. You would then focus on the most influential stakeholders ensuring that you identify the most relevant architecture viewpoints for each stakeholder and validate that their concerns are being addressed.
- B. The effective communication of targeted information to the powerful stakeholders at the right time is a critical success factor for such a merger. Therefore, you would develop a Communications Plan to ensure that they are engaged in the program, are made aware of the key features of the architecture, and have the opportunity to check that their requirements are being addressed.
- C. You would select one area of the business affected by the merger and conduct a pilot project to demonstrate to the stakeholders the technical feasibility of the approaches that are available. Once all stakeholders confirm the approach meets their requirements you would then complete a Statement of Work and issue an Architecture Contract to your suppliers.
- D. You would conduct a series of business scenarios with the stakeholders impacted by the acquisition. This will enable you to discover and document the business requirements for the merger activity and determine which stakeholders are likely to support or block the initiative. It will also enable validation of

the scope for the activity. Based on the input you would develop a high-level description of the Baseline and Target Architectures.

## 4. Examination Answers

### 4.1 Question 1

Topic	Risk Assessment	
Scenario	1	
Subjects	14.3, 27.7-1	
Rationale	It is important that the candidate understands how the risks associated with an architecture activity can be identified, categorized, and mitigated.	
Most Correct	B	This is the best answer. It summarizes the approach recommended in the TOGAF chapter on Risk Management. It recognizes that risk has to be managed through all phases, and that you need to identify, classify, and mitigate risk before starting a transformation. In the Implementation Governance phase, those residual risks should be understood and managed to the extent possible.
Second Best	D	This choice is less correct since it performs no Risk Assessment prior to the Implementation Governance phase. It provides good guidance on managing the risks using worksheets. However, this answer does not address risk monitoring or the management of residual risks.
Third Best	C	The TOGAF standard does recommend conducting risk classification in Phase A; however, the classifications being proposed do not address the concerns being put forward. Also this answer does not address the mitigation of risks or residual risk assessment.
Distracter	A	This answer is incorrect. Risk mitigation does not measure aversion to risk. The TOGAF standard does not recommend such an activity as part of Phase D. Putting in place a parallel solution would seem excessive and have its own risks.

## 4.2 Question 2

Topic	Stakeholder Analysis	
Scenario	2	
Subjects	21-1	
Rationale	It is important for the candidate to be able to describe the TOGAF approach to Stakeholder Management and recognize that it is a key technique for engaging stakeholders.	
Most Correct	D	This is the best answer. Stakeholder analysis and the development of a Stakeholder Map is the technique that the TOGAF standard recommends for identifying and engaging the key stakeholders in Phase A. The Stakeholder Map is a major product output and used to support other outputs in this phase.
Second Best	A	This answer is less correct since it omits the Stakeholder Map approach recommended by the TOGAF standard to explicitly identify stakeholders. Business scenarios are an appropriate technique to develop the Architecture Vision and can accomplish some of the engagement. This answer also lacks the identification of key players and the active engagement policy of stakeholder analysis.
Third Best	B	This answer is less correct since it focuses on stakeholders at the regional carrier only, thus omitting key stakeholders that should be involved. The Communications Plan is produced from the work done by the Stakeholder Management approach suggested in answer A.
Distracter	C	This answer is incorrect. The TOGAF standard does not recommend implementing pilot projects in Phase A to assess solution feasibility. This also does not follow the recommended approach for creation and approval of a Statement of Architecture Work.

### 4.3 Question 3

Topic	ADM Phases Architecture Definition; Phase E: Opportunities and Solutions	
Scenario	3	
Subjects	12.*	
Rationale	This question determines whether the candidate understands the implications of architecture transformation especially in an existing environment.	
Most Correct	C	This is the best answer. It recommends the use of Transition Architectures and capability increments to deliver business value which addresses the concern that the implementation has the ability to accommodate changes to technology and business landscape. It describes the migration planning techniques to deliver Transition Architectures, as well as seeking consensus input on the Implementation and Migration Strategy rather than going straight to an Implementation and Migration Plan.
Second Best	A	This is a less correct approach that addresses the deliverables of the architectures but in an uncoordinated way. It looks at rolling up the work in each domain rather than consolidating the gaps and creating projects as a function of capability management. It also does not directly describe the use of Transition Architectures. It does describe the role of the Implementation and Migration Plan and the Architecture Roadmap accurately.
Third Best	D	This is less correct as it focuses on a detailed technology-based Implementation and Migration Plan, negating the impact of using Transition Architectures to deliver incremental business value that could absorb technology and business environment change.
Distracter	B	This answer is incorrect. This approach does not address the concerns, nor follow TOGAF guidance. Most likely it would produce IT-centric architectures and plans that ignore proper documentation and coordination with other stakeholders in order to deliver IT infrastructure as soon as possible.

#### 4.4 Question 4

Topic	Artifact Selection	
Scenario	4	
Subjects	31, 18	
Rationale	This question tests the ability of the candidate to reference the TOGAF standard in order to select appropriate artifacts to address specific concerns.	
Most Correct	A	This is the best answer. The Process/Event/Control/Product catalog allows an enterprise to identify the full chain of impacts resulting from changing a high-level process (addressing concern 1). The Data Entity/Data Component catalog and Application/Data matrix address concern 2 (the sharing of data). The Data Security diagram and Networked Computing/Hardware diagram would address concern 3 (securing of distributed data). A Role catalog can be used also to support the security definition for the enterprise (addressing concern 3). The Interface catalog allows the interaction between applications to be developed and so will address concern 4.
Second Best	D	This choice is less good since it does not address concern 1 explicitly. The architecture viewpoints selected address the other concerns. Note that the Application Interaction matrix is the matrix equivalent of the Interface catalog.
Third Best	C	This choice as well as not addressing concern 1, falls short on defining roles to aid security (concern 3), Data Sharing (concern 2), and Data Security (concern 3) compared to the most correct answer.
Distracter	B	This answer is incorrect as it does not directly address the concerns.

## 4.5 Question 5

Topic	ADM Preliminary Phase	
Scenario	5	
Subjects	5.3-1	
Rationale	This question checks that the candidate understands that the TOGAF standard has a Preliminary Phase and that they can identify the appropriate procedures and steps given the situation.	
Most Correct	C	This is the best answer. It follows the procedures outlined in the Preliminary Phase. As this is establishing the program, these are the key steps for this phase.
Second Best	A	This choice is less correct as it misses out scoping, identifying drivers, and developing principles that would be very much needed in this establishment situation.
Third Best	D	This choice can be performed as part of the Preliminary Phase, but it is not the immediate priority as the scenario is program establishment. This omits key items, such as scoping the enterprise and establishing principles, and moves forward to apply the ADM before that program establishment is completed.
Distracter	B	This answer is incorrect because it skips past the program establishment that would be provided in the Preliminary Phase into Phase A activities, and begins execution of an architecture project focused on the Solution Architecture.

## 4.6 Question 6

Topic	ADM Phases Architecture Definition; Phase F: Migration Planning	
Scenario	6	
Subjects	13.*, 24.*	
Rationale	This question determines whether the candidate understands the implications of architecture transformation especially in an existing environment in Phase F: Migration Planning.	
Most Correct	B	This is the best answer. The answer is concise and complete as per Phase F, with an emphasis on building corporate consensus and ensuring that the Transition Architectures are solidly based upon business value.
Second Best	D	This is a less correct approach, as it is incomplete, missing key steps of Phase F. This also lacks the collaborative planning in close cooperation with the stakeholders within and outside of the organization.
Third Best	A	The approach is also incomplete. Phase F emphasizes collaborative planning in close cooperation with the stakeholders within and outside of the organization, and this lacks that approach.
Distracter	C	This is a wrong answer. The intent of Enterprise Architecture using the TOGAF standard is to provide detailed guidance to the projects so that they can focus on operational design issues rather than strategic ones.

## 4.7 Question 7

Topic	ADM Phases: Governance (Phase G)	
Scenario	7	
Subjects	Implementation Governance	
Rationale	This question deals with the need for Implementation Governance of development projects.	
Most Correct	B	<p>This is the best answer. All of the criteria fall within Phase G. The architect accepts the mandate of the CIO and decides that a second standard is an acceptable compromise, since time is of the essence and a contract has already been signed with the vendor per his product design. The architect then works with the development team to draw up an Architecture Contract. The architect emphasizes use of compliance reviews, the testing of the performance as the solution is developed (a critical user requirement), and gets buy-in and visibility of Service Level Agreements (SLAs) and schedule with the business unit. Finally, after implementation, re-useable artifacts and objects are collected and are available for future projects.</p>
Second Best	A	<p>This answer is less correct as the response (to recommend the vendor change the product) may take time and, as noted in the scenario, this is a time-critical project. Performing a prototype would reduce the risk, but again at the expense of time and perhaps budget.</p> <p>The project plan should be drawn up by the project manager not the architect.</p> <p>Finally, performance is paramount, yet the architect is suggesting monitoring the performance after implementation, rather than testing the product's performance before implementation.</p>
Third Best	D	<p>This approach follows the CIO direction but focuses on risk rather than co-existence. There is no negotiation with the implementation team – just a handover of schedules – or with the business unit regarding service levels.</p> <p>The suggestion to test the solution just prior to implementation is too late, since the solution has already been constructed and any surprises will likely impact schedule and budget. The attention to artifacts is superfluous.</p>
Distracter	C	<p>This answer is incorrect. The scenario states that the decision has already been made, and a contract put in place. This proposed solution does not address the CIO mandate which stated that this is time-critical and approval had been given to move ahead with the selected vendor. The consultation with the finance committee is irrelevant. Holding frequent project management meetings is not the Enterprise Architect's job, but the job of the project manager.</p>

## 4.8 Question 8

Topic		Conducting Compliance Reviews
Scenario		8
Subjects		14.3, 42.6
Rationale		It is important for the candidate to be able to manage the process of conducting compliance reviews that are appropriate to the situation.
Most Correct	D	This is the best answer. It is most appropriate to the situation – it is a large-scale project and the Enterprise Architects have been heavily involved. In this approach the lead Enterprise Architect coordinates the review and assembles domain experts to manage the reviews. This response includes the mention of checklists and them being reviewed as well as a formal report being produced together with recommendations.
Second Best	A	This answer is less correct. This is a reasonable approach, usually best done when the architects are not involved in the project; however, in this case they are. It also omits specific mention of the checklists.
Third Best	B	This answer is less correct. This approach is more suited to smaller-scale projects and the informality is not suitable to such an important project. The aggregation of responses to create the report is incorrect.
Distracter	C	This answer is incorrect. It fails to appoint a specific coordinator, and asks that the review focus on the development methods being used, rather than whether the solution meets any business criteria. It also focuses on collaboration and standards which are not of prime concern.

## 5. Bonus Answers

### 5.1 Question 9

Topic	Architecture Maturity and Skills Framework	
Scenario	9	
Subjects	KLP 45.3-*, 46.4-1	
Rationale	The candidate should be able to identify techniques in the TOGAF standard that can be used to properly manage the Enterprise Architecture capability.	
Most Correct	B	This answer is best because it examines the Enterprise Architecture using a technique explicitly designed for assessing process improvement for Enterprise Architectures. Second, it focuses on assessing the skill levels of the staff by creating an organization-specific skills inventory.
Second Best	C	This answer is less correct, as it only examines the staff skill levels.
Third Best	A	This answer is less correct because it focuses on specific actions to address improving the architecture processes, but lacks application of any techniques to evaluate the processes. It also fails to address staff skills.
Distracter	D	This answer is incorrect. The TOGAF standard does not recommend the proposed course of action

## 5.2 Question 10

Topic:	Use of Migration Planning Techniques	
Scenario	10	
Subjects	24.2, 24.5, 12.3, 12.4, 13.3	
Rationale	To show that the candidate understands how to use some of the TOGAF migration planning techniques to prioritize projects.	
Most Correct	C	This is the most straightforward approach, selecting just two of the migration planning techniques, relevant to project identification and prioritization, risk, and cost/benefit analysis. This most addresses the CIO concern of risk and cost/benefit.
Second Best	D	This is similar to answer C; C is slightly better because the Consolidated Gaps, Solutions, and Dependencies matrix identifies possible duplicated projects earlier and is a more rigorous approach than just creating a list of the projects. It also addresses the concerns of risk and cost/benefit analysis.
Third Best	A	This is less correct – it uses all the migration planning techniques available but without showing understanding of what each technique is used for. It is just a list of the techniques.
Distracter	B	This is incorrect. It is just a list of the steps of Phase E but fails to demonstrate application to the specific scenario which requires use of techniques from Phase F as well as Phase E.

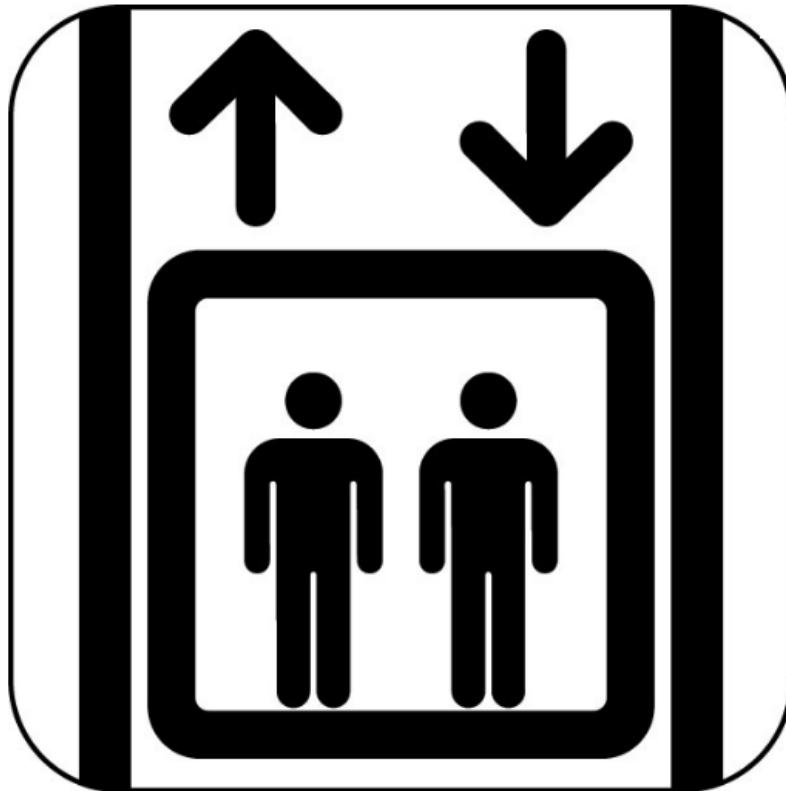
### 5.3 Question 11

Topic	Applying Principles	
Scenario	11	
Subjects	5.3.4-1, 20.4-1, 20.5-1, 20.6-1, 32.2-2	
Rationale	The candidate should be able to apply Architecture Principles, such as the example ones that are provided in the TOGAF standard.	
Most Correct	D	This is the most appropriate set of principles. Those selected match specific concerns: Control Technical Diversity can help in reducing costs and optimizing resources as will the principle of Interoperability. Ease-of-Use can help address the aim to provide a seamless user experience. Maximize Benefit to the Enterprise addresses ensuring a business-driven approach is taken.
Second Best	A	This is less correct. Information Management is Everybody's Business will help to ensure that efforts are aligned with the business. The other principles do not directly address the scenario but may help.
Third Best	B	This set of principles is less correct. Compliance with Law, Protection of Intellectual Property, and Data is Accessible are good practices but do not directly address the scenario. It is possible that Technology Independence will increase running costs and lead to less than optimal resources.
Distracter	C	This set of principles is incorrect as they are primarily IT-focused and do not address the scenario.

## 5.4 Question 12

Topic	Business Scenarios	
Scenario	12	
Subjects	Business Scenarios	
Rationale	The candidate should be able to describe the TOGAF technique of business scenarios and recognize that it is a key technique for identifying and validating requirements with key stakeholders.	
Most Correct	D	This is the best answer. Business scenarios are the recommended technique for developing the Architecture Vision and ensuring that requirements are identified and validated.
Second Best	A	This is less correct. Stakeholder analysis and the development of a Stakeholder Map is the technique that the TOGAF standard recommends for identifying and engaging the key stakeholders in Phase A. However, running a business scenario would then enable identification and validation of requirements from the stakeholders.
Third Best	B	This answer is less correct since it focuses only on the powerful stakeholders, and thus could omit key stakeholders that should be involved. The Communications Plan is produced from the work done by the Stakeholder Management approach suggested in answer A.
Distracter	C	This answer is incorrect. The TOGAF standard does not recommend implementing pilot projects in Phase A to assess solution feasibility. This also does not follow the recommended approach for creation and approval of a Statement of Architecture Work.

# Case Study: Challenge Lifts



## **Please don't take us literally!!**

Scenarios are only simplifications and cannot contain the detail and background so necessary in real life. Our aim is to allow you to practice some of the tools and techniques you will be learning on this course and demonstrate how they could be used in a real life setting. Unfortunately not every tool is used on every project which creates a problem as we wish to demonstrate the most important. Additionally, unless you know all the background knowledge that the project team would be aware of, the reason why a tool was used, or a decision made, is often open to challenge. Don't waste time debating whether the scenario runs counter to your common sense or experience, just accept it as a tool to help develop your skills and forgive us taking liberties from time to time.

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## Case Study: Challenge Lifts

Challenge Lifts is a company which manufactures and installs elevators. The company has a world-wide reach, with manufacturing and support facilities located across the globe. In broad terms Challenge deals with two types of lift:

**Commercial Lifts:** The original business, commercial lifts are multi-capacity multi-story lifts usually sold into public buildings such as blocks or flats or offices. Each building is unique so the solution must be independently designed and installed. To minimise cost Challenge tends to use standard parts wherever possible.

**Domestic Lifts:** A relatively new venture dealing with personal lifts usually fitted into Domestic Houses (often called "Stair Lifts"). Challenge bought out a medium sized company in this area several years ago and after re-organisation and integration the unit has now started to grow.

The company is divided into a number of self-contained service portfolios including manufacturing, installation, maintenance & refurbishment for commercial product, domestic (stair) lifts and financial services. Commercial lifts has developed commercial territories based on its manufacturing plants. The separate, domestic lifts division uses different territories and is slowly expanding world-wide. Financial Services is based in the London and provides finance to Customers (both commercial and domestic) who wish to purchase lifts from the company (there is a persistent rumour that the Financial Division is to be sold off to a major Finance House). With numerous practice areas and a multitude of diverse engagements underway at any given time, overall engagement management within the company has become challenging. The company does not want to risk its outstanding reputation or its international certifications and CMM ratings.

The Domestic Lifts division operates on a Franchise model wholesaling to local independent retailers. Challenge has a large dealer base in the UK and Italy, growing networks in the rest of Europe, and they have recently started penetrating the North American market. Challenge offers its dealers Training (both Technical and Sales), spare parts, and second line technical support. Dealers sell the products, survey the end customers and install in the customers dwelling. Dealers also offer a maintenance service to their customers. Challenge manufactures the customised installation to order, using a standardised set of parts wherever possible. The company has embraced lean principles so has a very close relationship with its dealers. Dealers provide confidential information about profit and sales forecasts and feedback improvement suggestions and performance issues. In return, Challenge exposes manufacturing costs and regional sales expectations and involves dealers in the design of future models. Both sides need to protect this very sensitive commercial information.

New European safety regulations are in the pipeline and are expected to come into force within the next twelve months. As the company performs a significant amount of business within the EEC, manufacturing compliance is a major concern.

For commercial lifts, Challenge has satellite manufacturing plants in India, North America, South America and the Far East as well as the main plant (in Sunderland United Kingdom). Some of the plants were taken over as going concerns, others were started from scratch. At present Australia & New Zealand are managed from North America however Challenge is looking for a company to partner with in this region. Satellite plants are responsible for a specific sales area. Each region is semi-autonomous selling, assembling, installing and maintaining lifts in their area. The parts for assembly are either manufactured locally or sourced from the Sunderland main plant. Each Satellite has responsibility for making sure that the lifts sold comply with safety regulations in their allocated area. R&D is co-ordinated from Sunderland, most R&D work is conducted at the main site however occasionally "virtual teams" are formed across regions to tackle specific objectives.

The firm has traditionally allowed each manufacturing plant to operate its own production planning system. As a result there has been a proliferation of diverse systems, with each plant having their own custom Materials Requirements Planning, Master Production Scheduling, Bill of Materials, and Shop Floor Control systems in place. Each satellite manufacturing plant has its own IT team charged with maintaining and upgrading the local systems in use and also is responsible for customer support for their area. One result of this diverse technical landscape is that timely and detailed production and stock information is not available to the Corporate Management team. While they do receive some information it is often of doubtful providence and frequently delayed.

Challenge Lifts is keen to reduce costs and standardise their production processes thus minimising waste caused by excessive inventory and work in progress. A crack team of consultants has recommended that significant savings could be affected if the company replaced the current planning and scheduling systems with a common Enterprise Resource Planning (ERP) system and a Global Help Desk (GHD) both located in Sunderland. This central system would provide support to each of the satellites by replicating the current functionality. It would also allow detailed data to be obtained. The proposed solution should reduce the number of local servers needed in the satellites and thus reduce the numbers of support staff needed. In some cases it might be possible to outsource the local IT support to 3<sup>rd</sup> Party maintenance organisations. The MD has become excited by this prospect. The consultants have produced an Outline Business Case which demonstrated significant value. The Finance Director has reluctantly agreed to provisionally reserve funding for the estimated cost of the project.

The Enterprise Architecture department has been operating for about a year, so parts of the Enterprise are understood and work has commenced on modelling the future Enterprise. Challenge has chosen to use TOGAF 9 as their EA methodology. The Corporate Board of Directors strongly supports the EA activity partly because they see TOGAF as a platform to accelerate the Lean Manufacturing philosophy.

## ***Manufacturing Stair Lifts***

The Domestic Lifts division of Challenge sells through an approved dealer network, who in turn sells to the public. As far as the public is concerned they are buying from the Dealership. Challenge support their Dealers with national marketing campaigns including web and phone based lead generation. Enquiries for domestic lifts are fed by Challenge to the nearest dealer who handles the sale from that point onwards.

Each lift is made up out of a number of standardised parts such as curves, brackets, and motors. Lengths can be customised (e.g. runs cut to length) however this adds to costs. The company provide their Dealers with a custom software package that calculates the optimum construction schedule for a given set of dimensions. The output is a set of parts which will be created by Challenge then delivered to the Dealer for fitting.

Challenge order material from several suppliers. The material is used to create the parts ordered by a Dealer. Part assembly takes place as part of the manufacturing process (for example the motor, gears and control electronics are combined into one drive unit. Electrical assemblies are tested pre-packed).

The complete kit of parts are then packed and combined into one shipment which includes assembly guides and an operator's manual. At this stage a final quality check is performed on the whole kit. Challenge then arranges shipment of the kit to the dealer.

Dealers place orders through their sales contact. Sales use the orders received to forecast manufacturing demand – this forms a basis on the decision to hold marketing initiatives such as discount offers etc.

## **Projects**

There are three Architectural Definition projects underway at present:

### **Enterprise Resource Planning (ERP)**

The ERP project is designed to centralise the manufacturing and production stock holding of the Industrial Lifts capability. It is world-wide in scope covering all manufacturing plants although the system will be located and maintained centrally from Sunderland.

### **Global Help Desk**

At present Challenge maintain many regional based Help Desks as the initial contact point for their customers. Help Desks allow customers to purchase spares or book service calls, the Help Desk personnel also assist with pre-sales support. Each region has set their own SLA's and have their own unique business flows for handling calls. Business intelligence is poor. The company is planning to consolidate all the regional Help Desks into a single Business Unit providing a single contact point, and a standardised set of SLAs. The GHD is to be located in the Head Office in Sunderland. To reflect the multi-national scope of Challenge the MD has stated that existing language support needs to be maintained.

### **Lift Cabin Panels**

Every commercial lift has a cabin to hold people. Traditionally this has been constructed on metal which makes the lift, installation of the lift, and running costs, expensive. To gain competitive advantage, Challenge's manufacturing division has developed a new way of constructing cabins using low weight but tough carbon-fibre moulded panels. This is an exciting development which will give the company a strong lead over its rivals. In particular using this construction method will go a long way towards meeting the new European regulations. This process is unique to Challenge and the industrial secrets must be guarded rigorously. Patents have been granted but there is still the risk of the technology being acquired by rival lift concerns.

## Exercise 1: The Elevator pitch

Imagine that you get into a lift at work to go to the 10<sup>th</sup> floor. Just before the doors close the Managing Director joins you. He says "Hello" then asks "so tell me - why do we need to have an Enterprise Management team in this company?"

### Your Task

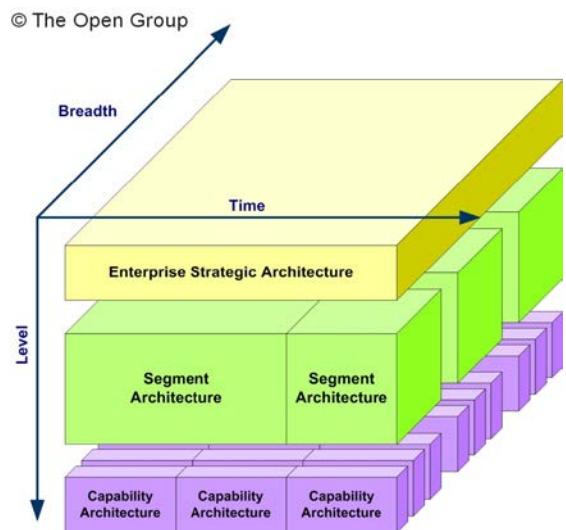
Prepare a 30 second explanation of what Enterprise Architecture is and the benefits to a company. Present this to the class.

## Exercise 2: Architecture Landscape

Using the Scenario, describe the architecture landscape of Challenge Lifts. Questions you might consider:

- Do you think they are monolithic, vertically segmented or federated? If so in what way
- Can you identify any capability applications?

Sketch out your view of the Landscape



### **Exercise 3: Going Forward**

Here is a list of Enterprises, Industries or Technologies:

- Consumer Shopping (purchasing groceries and/or household goods)
- Physical Mail (letters & postcards and small packages)
- Small Vans
- GP Surgeries
- Mobile Phones
- Business Clothing
- Fitness Centres
- House construction

#### **Your Task**

Select **one** of the above and provide a brief forecast of how you expect the technology to evolve over time. Your presentation should consist of between three – five bullet points on how you see the evolution at 3 years, 7 years and 20 years.

## Exercise 4: Handling Change

The following is a list of change requests received during the Architectural Project. For each of the following situations establish the most likely change response necessary. Select from:

- Simplification
- Incremental
- Re-architecting:

Situation	Response
The EA team is asked to include the provision of a centralised Compliance Management System into their project. This will cover all the areas sold into by the company detailing compliance with local regulations. The impact of the change is significant for the business strategy.	
In a separate initiative Challenge has decided to offer I-Pads to their staff instead of the traditional laptop. Staff members who opt for the new technology will also need to access the ERP system. This extra functionality needs to be completed within the current budget	
The team has received a request from senior management to provide access to the ERP system on Android based devices and the Kindle. These devices are popular with many staff members who have purchased them privately (at their own expense) and want to use them for work functions. Senior Management is keen to promote the business use of personal devices and is willing to provide extra resources to enable this	
Because of improvements in computer architecture, the installation team suggest decreasing the size of the ERP host cluster from 8 to 6 servers. This will save money with no decrease in performance	
A mistake has been discovered. It seems that the Baseline Architecture identified in phases B-D was not sufficiently rigorous. This is causing problems with the implementation	
In order to penetrate the North American market, Challenge has decided to merge with a US based rival. A new company is to be established and new working practices will be needed	
Due to a change in regulations, the implementation of the new data-centre will require additional components. Guidelines for the new components will also be required	

## **Exercise 5: Writing a Principle**

The following is a list of business goals embraced by Challenge Lifts:

- Very Senior Management need to concentrate on making decisions (there are too many distractions)
- We need to minimise wasted staff time (i.e. any time when staff are not engaged in productive, profitable, business activities)
- The company needs to obtain a competitive advantage over rivals making use of timely, high quality, performance and production information
- We need to grow our business by becoming recognised by customers and potential customers as an efficient, high quality business

### **Your Task:**

Select **one** from the above list and using this as a basis create an Architecture Principle (in the TOGAF format)

## **Exercise 6: Selecting Principles**

At a recent meeting, the Architecture Review Board approved a Request for Architecture Work from the project sponsor. The request covered the initial architectural investigations and the development of a comprehensive architecture to plan the transformation.

During the meeting, several satellite plant managers expressed concern about the security and reliability of driving their planning and production scheduling from a centralised remote system. This has upset the Project Sponsor, who wants to know how these concerns can be addressed.

One of the earliest initiatives in the Enterprise Architecture program was the definition of a set of architecture principles. As part of the response to the Project Sponsor you have decided that an update is needed.

Based on TOGAF 9, and in particular the example set of principles that are listed and defined in Section 23.6 of the TOGAF 9 document (also duplicated in the Section 6:TOGAF document extracts, of your course manual), rank the following suggestions in their effectiveness for providing the most appropriate answer to your Project Sponsor

- A** Common-use Applications, Control Technical Diversity, Ease of Use, Interoperability, Data is Shared, Data is Accessible, Data Security
- B** Business Continuity, Common-use Applications, Maximise Benefit to the Enterprise, Data is Shared, Data is Accessible, Data Security
- C** Technology Independence, Data Trustee, Information Management is Everybody's business, IT Responsibility, Responsive Change Management
- D** Service-orientation, Responsive Change Management, Common Use Applications, Requirements Based Change, Data Security, Maximise Benefit to the Enterprise

## Exercise 7: Business Scenario

The Architecture project is in Phase B and you are gathering Business Scenarios to identify Stakeholder concerns. You have been work-shopping the regional manufacturing plant management teams. This stakeholder group has raised a number of concerns about the proposed ERP solution. Stakeholders want to know the relationship between the ERP Modules (applications) and their Business Functions. They are also worried about the underlying data and want to understand who will own the data, and which data entities the ERP package will be able to create data in. You are helping the stakeholders sketch out a draft Business Scenario. Complete the following template (use standard TOGAF artefacts etc. where necessary) (TOGAF 35.6 will give guidance on artefacts)

<b>Business scenario problem description</b>	We are worried that a centralised ERP system will not be capable of handling regional variations
<b>Detailed objectives</b>	
<b>Views of environments and processes</b> <i>(Select Artifacts from Section 35.6 of the TOGAF document)</i>	
<b>Actors, their roles and responsibilities</b>	Regional procurement managers
<b>Principles and constraints</b> <i>(Select standard TOGAF principles)</i>	
<b>Requirements</b> <i>(What do they need?)</i>	
<b>Next steps</b>	
<b>Glossary of terms and abbreviations</b>	
<b>References</b>	

## Exercise 8: Gap analysis

The New Global Help Desk (GHD) will be established in Sunderland and will supersede the European Help Desk which is active at the present moment. At the moment, support for the commercial lifts is fragmented across the regional manufacturing plants, each with their own SLAs (Service Level Agreements) and recording systems. Regional Help Desks are currently active for the following regions:

Region	Based	Additional Languages
Europe	Sunderland	French, German, Italian
North America	New Orleans	Spanish (S American dialect)
South America	Rio de Janeiro	Spanish (S American dialect), Portuguese
Asia/ Pacific	Hong Kong	Cantonese, Mandarin
India/ Africa	Mumbai	Urdu, Hindi

Regional Help Desks provide first and second line support to Customers and the companies mobile Service Engineers, they also provide pre-sales support to their Sales Units (passing back highly technical work to Sunderland). Each regional Help Desk can handle calls in English and some additional languages (as shown on the above table). Statistics vary and little information is passed on to the Head Office (all that is received is the number of calls per month, and the maximum response time). The intention is to add to this information so the new GHD will have a sophisticated phone system capable of conferencing, and automatic call logging. The new phone system and the new help desk software will allow the following data to be captured centrally in Sunderland:

- Number of calls per months by region
- Categories of calls
- Call Queue statistics
- Response time statistics (time to site, time on site, repeat calls, no fault founds)
- Parts used
- Diagnosis

The new Help Desk Software will store its data on a dedicated database thus facilitating long term storage which will allow trends to be captured.

For many years now maintenance engineers have used a standard code system to categorise faults. This will be maintained as it is robust and well understood. The system will automatically provide Help Desk Operators with first line trouble-shooting scripts, which traditionally have been provided in printed format. These are to be expanded as part of the upgrade.

GHD support will be provided in English, Spanish (Castilian and South American) and French. The GHD will be responsible for receiving and Logging calls from Customers, initial diagnosis and rectification where possible. If the GHD cannot quickly rectify a problem they then allocate and schedule a regional Service Engineer with the correct skill set. Where possible they also arrange for any identified parts to be shipped direct to the customer's site to await the Service Engineer. As maintenance is a product sold by the regional divisions Challenge has no intention of creating a standard "SLA" but intends to share best practice between regions.

## Your Task

Using the above information perform a Gap Analysis, identifying Building Blocks which are New, Amended and Missing (either deliberately or accidentally)

- 1) Discuss and identify the baseline architecture in terms existing building blocks
- 2) Discuss and identify the target architecture in terms of new and existing building blocks
- 3) Use the Gap Analysis technique to identify what has been lost and what has been added

### TIPs

*You will need to identify the level of detail in the building blocks to show on your Gap Analysis, for example is each language a building block or would you just have "English" & "Others". The decision depends on what you are trying to do so consider the eventual outcome.*

*Do not get confused by this exercise, TOGAF describes using a Gap Analysis four times (once for each Architectural Domain) followed up by a consolidation in Phase E. To conserve time and avoid you having to do some serious consulting with Challenge, we are asking you to do something cruder and stick to functionality so think of this as more like the "High Level" Gap performed in Phase A. The aim is to allow you to have a first play with this useful tool.*

*You will need a large sheet of paper for this (at least A3) however you may find it useful to create a rough draft first*

## Exercise 9: Building Blocks

The EA team are focusing on the proposed Global Help Desk (GHD).

1. Create a simple high level Diagram of the GHD detailing functionality and interfaces  
*You need to create a very high level Building Block here so make sure your focus is at the Enterprise Level. You are aiming to describe the complete functionality of the GHD in between 3-5 bullet points.*
2. Identify 3 sub ABBs (Architectural Building Blocks) which would form part of the GHD.



## Exercise 10: Explaining a View

Views are made up of artefacts of which TOGAF supplies a large library for you to build upon.

Examine the table in Section 24.4 of the TOGAF document.

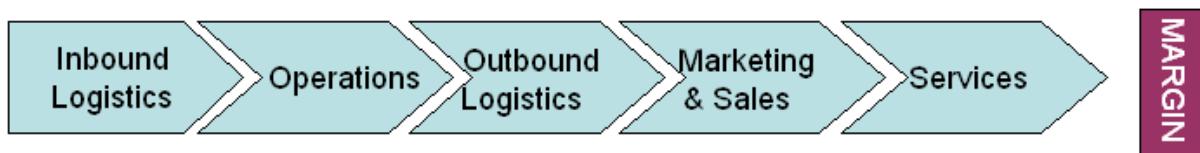
Select **ONE** stakeholder

Research and prepare a 2 minute presentation of why the artefacts associated with that stakeholder will meet their viewpoint

**Note:** *You will find that Section 35.6 of the TOGAF Document describes the Artefacts identified in Section 24.4*

## Exercise 11: Value Chain

You are creating a View to satisfy the concerns of a number of senior stakeholders in Challenge Lifts. You have decided to include a Value Chain Diagram describing the Domestic Lifts division. Draw up a value chain for this stream using the five primary blocks only. Describe the activities each block is likely to contain. Base your answer on the information in the scenario and your experience.



### Steps in Value Chain Analysis

Value chain analysis can be broken down into three sequential steps:

- (1) Break down a market/organisation into its key activities under each of the major headings in the model;
- (2) Assess the potential for adding value via cost advantage or differentiation, or identify current activities where a business appears to be at a competitive disadvantage;
- (3) Determine strategies built around focusing on activities where competitive advantage can be sustained

**Note:** *The steps are for guidance, in this exercise you will not be going past step 1*

## Exercise 12: Creating the Vision

Request for Architecture Work (abstract)	
<b>Organization Sponsors</b>	
<b>Organization's mission statement</b>	To become the world-wide supplier of choice to major construction projects
<b>Strategic plans of the business</b>	Improve our cost base by understanding our processes better Improve customer perception of our capability and professionalism
<b>Time limits</b>	2 years maximum
<b>Changes in the business environment</b>	New Global Help Desk New centralized ERP system
<b>Organizational constraints</b>	Need to be aware of impending new regulations which will require us to keep track of parts installed.
<b>Budget information, financial constraints</b>	Total for all work no more than £3M
<b>External constraints, business constraints</b>	Existing building space must be utilised wherever possible
<b>Current architecture/IT system description</b>	Chaotic, de-centralised, uncontrolled, out of date
<b>Description of developing organization</b>	The company is moving towards a more federated manufacturing and sales structure with a centralised design and support capability
<b>Description of resources developing organization has available</b>	H/O IT, Regional IT, Project Management Team with awareness of construction and electrics from the perspective of lift manufacture and installation. EA Team

## Your Task

Using the **Request for Architecture Work** abstract and the Case Study scenario, sketch out an **Architectural Vision**. You will not be completing a full document, instead you will concentrate on the sections detailed below:

### Architecture Vision

1. Problem Description
  - a. Stakeholders & Concerns
  - b. List of issues/scenarios to be addressed
2. Objective of the Statement of Architecture Work
3. Solution Concept diagram
4. Mapped Requirements

**NOTE:** *Not all sections of the Vision have been listed*

## **Exercise 13: Developing the Vision**

The ERP project has just started. A team has been formed and put in place. At a recent meeting, the Architecture Review Board approved a Request for Architecture Work from the project sponsor. The request covered the initial architectural investigations and the development of a comprehensive architecture, to plan the transformation.

The Enterprise Architecture team has been asked to develop an Architecture Vision that will achieve the desired outcomes and benefits.

During a recent workshop, several satellite plant managers expressed concern about the security and reliability of driving their planning and production scheduling from a remote system. The Managers are very worried that the outcomes will not meet their needs. In addition, several senior staff members are worried about the wide scope of the initiative as proposed. They are not sure that all the proposed elements are necessary and they are confused, as there seem to be several views on what the scope contains. The Consultant's technical staff have assured management that they have an effective solution, "virtually guaranteed to work," and suggest implementing this straight away.

You are being pressed to provide a way forward for the project that ensures that the team evaluates different approaches to the problem and clarifies the requirements for the architecture.

According to TOGAF 9 which of the following provides the best solution?

- A** The team should exercise due diligence, carefully research vendor literature and conduct a series of briefings with vendors that are on the current approved supplier list. Based on the findings from the research, the team should define a preliminary target Architecture Vision. The team should then use that model to build consensus among the key stakeholders.
- B** The team should create high level Baseline and Target architectures for each of the manufacturing plants. A gap analysis between the architectures will then validate the approach and determine the Transition Architecture needed to achieve the target state. This can then form the basis of the Architecture vision which can be used to re-assure the stakeholders that their needs are being met.
- C** The team should hold a series of workshops at each of the satellite plants using the business scenario technique. This will then enable them to identify and document the characteristics of the architecture from the business perspective. The output from the workshops can be used to help identify the scope of the project and the requirements needed to ensure that delivery meets business needs.
- D** The team should move to phase E and conduct a Business Transformation Readiness Assessment. They should pilot the Consultant's solution as this will allow vendors on the short list to demonstrate potential solutions that will address the stakeholder's concerns.  
Based on the findings of that pilot project, a complete set of requirements can be developed that will drive the finalisation of the Road Map in phase F.

## **Exercise 14: Metamodel Extensions**

Challenge Lifts has traditionally allowed each manufacturing plant to drive its own production planning systems. Each plant has its own custom Materials Requirements Planning, Master Production Scheduling, Bill of Materials, and Shop Floor Control systems. These however will be replaced by the centralised ERP system. The company has just received notice that new European safety regulations concerning the construction of lifts is to be introduced. Manufacturers must be able to demonstrate compliance to these regulations within the year.

The project has just started, the Architecture Governance Board and the EA Team have been assembled and consideration is now being given to Tailoring and the selection of appropriate metamodel extensions. It has been agreed that the program will include formal modelling using the Architecture Content Framework and the TOGAF Content Metamodel. This will enable support for the architecture tooling that the firm uses for its EA program. Because of the need to model the complex manufacturing process it will be necessary to model processes that are event-driven.

Additionally, in order to consolidate applications across several data centres, it will be necessary to model the location of IT assets so that the end goal of a single ERP application running in a single data centre is achieved.

Four lists of extensions have been created by the EA Team. Based on TOGAF 9, rank the lists in order of their ability to meet the requirements listed above (you may find that section 34.4 of the TOGAF document is useful here).

- A** You recommend that the architecture team incorporate the Process Modelling and Infrastructure Consolidation extensions into their tailored Content Metamodel. As the environment is process-centric, this will enable them to model the manufacturing processes and store information to support regulatory compliance. It also includes views useful for managing the consolidation of applications into a single data centre.
- B** You recommend that the architecture team incorporate the Process Modelling and Governance extensions into their tailored Content Metamodel. This is suitable, as this is a significant IT change that will impact its operational models. This will ensure that they include specific entities and attributes that will allow them to model the event-driven nature of the manufacturing processes more precisely.
- C** You recommend that the architecture team incorporates the Governance and Motivation Extensions into their tailored Content Metamodel. This would allow modelling of the target milestones they want to achieve with this consolidation of applications to a single data centre. These extensions will also enable demonstration of regulatory compliance for the manufacturing process.
- D** You recommend that the architecture team incorporate the Data and Services Extensions into their tailored Content Metamodel. This would allow modelling of the location of IT assets and ensure regulatory compliance for the manufacturing process. It will also allow for identification of redundant duplication of capability which will be needed for successful consolidation into a single Data Centre.

## Exercise 15: Managing Stakeholders

Refer to Chapter 35 of the TOGAF document for information on Artifacts See stakeholder map section 24.4

The GHD (Global Help Desk) project has entered Phase A (Architecture Vision) and the team is performing Stakeholder analysis

The following is a partial list of stakeholders with an interest in the project:

Stakeholder	Details
Alice Fernwell HR Director	Alice is a member of the Challenge Lifts Board and is a close friend of the Finance Director. She is responsible for taking on new staff and arranging the transfer of existing staff  Alice is not technical; she does not understand the lift manufacture process. Her previous job was managing HR for a processed food manufacturer.  The HR team will be given the Architectural Contract to engage Call Centre staff during the implementation  Alice intends to allocate several of her people to resourcing Help Desk staff during implementation and needs to know the probable staff take-on dates well in advance.
Mike Summerfield HR Manager	Mike works closely with Alice and will be in charge of the team who will be resourcing staff for the GHD  Mike has experience with contact centres from a previous position and is capable of identifying the numbers and skill sets required to meet the needs of a particular operation.  He will need a firm definition of what the GHD must do (from the staff perspective) and an idea when the GHD will be going live.
Mary Reece HR Assistant	Mary will be one of Mike's team in HR. She will be involved with writing out job descriptions and placing them on employment web sites, performing initial assessments and arranging for interviews.

### Your tasks

Create a **Stakeholder Power Grid** (Section 24.3.3) and map the above stakeholders to it

For **ONE** stakeholder, create a row in the **Stakeholder Map** (Section 24.4) shown below. Include at least one key concern. Select **TWO standard** artefacts from those described in TOGAF and justify your choice of artefact (Section 35.6 will help)

STAKEHOLDER	KEY CONCERNS	CLASS	Catalogues, Matrices and Diagrams

## **Exercise 16: Business Transformation Readiness Assessment**

The ERP project is underway and has reached phase A

Using the information below and the case study – complete the Business Factor Assessment Summary using the rating system described in section 30.4.2 of the TOGAF Document. Then give an opinion on:

1. Is Challenge ready for the change?
2. If not what needs to be done

While Challenge has a strong EA practice with good support from Senior Management the governance of the individual projects has still not been wholly decided. Some of the satellite manufacturing plants have nominated individuals to sit on Project Governance Boards however there are still some that have failed to do so.

Challenge's Board of Directors is still strongly backing the initiative however at the one attempt to explain the project to staff members the best the MD could come up with as an explanation for the change was: "It will strengthen Challenge's standing in the lift construction industry".

It appears that there are enough members of the IT staff to perform the installation and configuration work worldwide. However as it looks like there will need to be a reduction in head count after project completion several IT staff have resigned and probably more will in the near future so it is not clear how many will be still available at the start of the implementation work. The ERP vendor will be supplying consultants to configure the system at Sunderland HQ, they have a good reputation in the industry but there are rumours floating around that they are short of the most highly skilled specialists.

The HR Director has reported that she feels there should be no difficulty in engaging new staff members in Sunderland to manage the GHD although her department have not advertised as yet; she is also talking to several Specialists with a view to engaging a dedicated ERP support staff. There is still no agreement as to who will be in charge of the new capability, The IT Director is adamant that both the GHD and the ERP should be her responsibility while the Director of Manufacturing thinks that because of the Criticality of ERP to Manufacturing, ERP is best under his control.

Business Factor Assessment Summary					
Ser	Readiness Factor	Urgency	Readiness Status	Degree of Difficulty to Fix	
1	Vision				
2	Desire/willingness/resolve				
3	Need				
4	Business case				
5	Funding				
6	Sponsorship and leadership				
7	Governance				
8	Accountability				
9	Workable approach and execution model				
10	IT capacity to execute				
11	<b>Enterprise Capacity to Execute</b>				
12	<b>Enterprise Ability to Implement &amp; Operate</b>				

## **Exercise 17: Assessing Enterprise Capability**

The EA endeavour is at the end of the Preliminary Phase, the “Request for Architecture Work” has been sent to the MD for approval. Although broadly satisfied by the Request for Architecture Work the MD has expressed her concern about the ability of Challenge to adapt to the proposed new architecture structure and wonders if the EA process will be able to handle this risk.

You have been asked to reassure the MD. Which of the following best describes how TOGAF 9 meets the expressed concerns?

- A** In Phase B, the team should create a set of views that will enable them to identify the factors that will influence the successful introduction of the architecture into the organisation. There should then be an assessment of each factor on a maturity scale that will allow the team to gauge the urgency, readiness, and degree of difficulty to fix. These factors can then be used to assess the initial risks associated with the proposed architecture
- B** In Phase A the team should analyse the risk by completing an Implementation Factor Assessment and Deduction Matrix to identify the particular risks associated with the implementation and deployment. The matrix should include a list of factors to be considered, their descriptions, and constraints that should be taken into account. These factors can then be used to assess the initial risks associated with the proposed architecture.
- C** In Phase A the team should use the Business Transformation Readiness Assessment technique to identify the factors that will influence the successful introduction of the architecture into the organisation. The assessment should include determining the readiness rating for each factor based on the maturity scale that will allow the team to gauge the urgency, readiness, and degree of difficulty to fix. These factors can then be used to assess the initial risks associated with the proposed architecture and the Businesses ability to make the change happen.
- D** In Phase A, the team should conduct Business Scenarios to identify stakeholders' concerns and the resulting requirements. Once the requirements have been identified, they can be assessed in terms of their risks. The risks should be evaluated in terms of how they could be avoided, transferred, or mitigated. Any risks that cannot be resolved should be identified as residual risks and their disposition should be decided by the Architecture Board

## Exercise 18: Selecting Artefacts

The following table is a list of concerns which were raised by stakeholders during the development phases of the ADM. For each concern identify relevant artefacts which would be most likely to address them

Concerns	Artifact	Why?
<b>Phase B</b>		
Where does Challenge carry out its business operations?		
We need to identify all the service contracts in place		
What are the relationships between the different business areas and the business functions?		
<b>Phase C: Data Architecture</b>		
What systems have we that access and update Data?		
Who or what has access to Challenge's data		
<b>Phase C: Application Data</b>		
Which business functions within Challenge use which applications?		
We need to identify each and every application we use		
Which staff access which applications and where are they located?		
<b>Phase D: Technology Architecture</b>		
We need to identify the hardware platforms used by Challenge		
Which business applications execute on which of our systems?		
Which locations host which applications?		

## **Exercise 19: Business Value Assessment technique**

The EA Team for the ERP initiative has moved into Phase F of the ADM and has now reached the point where they need to prepare to present the delivery projects to Challenge Lifts Upper Management. The team is assessing the following three projects:

### **Project A: Consolidated Data Centre**

Comprises modifying part of the H/O to build and equip a new data centre plus hiring and training of new operations staff. At the moment the company has several outsourced servers hosted remotely, they are taking this opportunity to consolidate.

- The project complies with Challenge's architecture principles
- It will make a considerable financial contribution forecast profit of £500K/ year for 10 years
- It is felt that the provision of a "Best of Breed", Professional, facility will help strengthen Challenge's competitive advantage by providing a high quality response to customers and providing valuable statistics to the business. The forecast profit is based partly on a comparison of costs to update each regional support effort to the same high level expected of the new Centre.
- The projected implementation cost is £1.6M and the time 8 months

The project will involve a mixture of Building work and IT. Because of their business, Challenge understand construction moderately well, they are less solid on IT. Challenge's organisational capacity is high but the impact of failure is also high.

### **Project B: Install & Configure ERP System**

Comprises: installing a fault-tolerant, clustered server solution into a new server room (created in Project A) in the new Call Centre. Local IT will install the Client Software as needed. Existing communications infrastructure will be used. Training on the New ERP system will be offered to staff – the training will be conducted in the H/O in Sunderland

- The project complies with Challenge's architecture principles
- This project is estimated at providing efficiency savings of £175K per year for 5 years
- It is strategically aligned with the business and it will strengthen Challenge's competitive advantage as it will allow costs to be controlled and accurate world-wide Business Intelligence captured. Both these features are considered vital to the company's medium/long term strategy
- The projected implementation cost is £400K and the time 3 months plus license fee of £10K per annum

This project is complex and will use cutting-edge technology. The impact of failure is also high.

### **Project C: Proposed modification to the ERP Package to assist the Finance Division**

Finance has a unique requirement not offered as part of the chosen vendor's solution. The Vendor has advised that the modification can be made however the work will take 3 months at least.

- The project complies with Challenge's architecture principles
- It will make a modest financial contribution forecast profit of £60K/ year for 10 years as it will automate an existing manual process.
- The projected implementation cost is £50K

This project will only be of benefit to the Finance Division

### **Your Task**

To help Upper Management evaluate the worth of these proposed projects:

1. Estimate the comparative Value, Risk and Size of each project.
2. Create a Value/ Risk Matrix illustrating the Business Value of each of the proposed projects

**Note:** *Because in this case none of the projects have started consider them all to be "on target"*  
*i.e. green*

## **Exercise 20: Transition Planning**

Work is progressing on the flagship ERP project. The Enterprise Architecture team and the correct Governance Board have been established along with a set of architecture principles to govern the architecture work. The EA team have completed an Architecture Vision at a strategic level and laid out Architecture Definitions for the four Architecture Domains. They have set out an ambitious vision of the future of the company over a three-year period; this includes a solution architecture split into three distinct transformations. The end result of this activity will be a tightly integrated production system controlling the supply chain, the manufacturing, and stock handling of the Industrial Lift division. The EA team is starting work on drafting the first version of the Implementation & Migration plan. During discussions with several of the Directors, it became apparent that several of Challenges top management team have reservations as to the value generated by the proposed architecture.

The Director of Manufacturing (acting as the Project Sponsor) has made it clear that prior to the approval of the detailed Implementation & Migration plan, the EA team will need to assess the risks associated with the proposed architecture. He has received concerns from some of the other directors who feel that the proposed architecture may be too ambitious and that they are not sure it can produce sufficient value to warrant the attendant risks

You have been asked to recommend an approach to satisfy these concerns

Based on TOGAF 9, grade the following proposed solutions

- A** You recommend that before preparing the detailed Implementation and Migration plan, the EA team should review and consolidate the gap analysis results from Phases B to D to understand the transformations that are required to achieve the proposed Target Architecture. The EA team should assess the readiness of the organisation to undergo change. Once the Solution Architecture has been assembled, it should be analysed using a Transition Architecture State Evolution Table to determine the Transition Architectures
- B** You recommend that the EA team apply an Interoperability Analysis to evaluate any potential issues across the Solution Architecture. This should include the development of a matrix showing the interoperability requirements. Once all these concerns have been resolved the EA team should finalise the Architecture Roadmap and the Implementation & Migration Plan
- C** You recommend that the EA team use the Business Transformation Readiness Assessment technique to allow any risks associated with the ERP implementation to be identified and mitigation planned. A Business Value Assessment should be used to determine the business value and associated risks for the transformation.
- D** You recommend that the EA team should gather information about potential solutions from the appropriate sources. Once the Solution Architecture has been assembled, it should be analysed using a Transition Architecture State Evolution table to determine the Transition Architectures. A value realisation process should then be established to ensure that the concerns raised are addressed

## **Exercise 21: Architecture Contract**

Traditionally the passenger cabins of lifts have been constructed of metal panels enclosed in a steel frame. While rugged, this design is weighty, requiring the use of heavy lifting gear and the frequent replacement of cables.

Challenge has developed an alternative construction based on light-weight carbon-fibre mouldings; this will decrease the initial costs of their commercial lifts and also reduce running and maintenance costs.

Successful introduction of this new technology will result in the company gaining a strong competitive advantage over its rivals. Patents have been filed to protect the process, but certain trade secrets need to be closely guarded.

Recently, a pilot project was completed at the Sunderland manufacturing plant. This has allowed Challenge to define a standard approach for panel creation. This is important as the quality of the panels depends on the moulding being performed correctly. The Architecture Board has approved the next step of planning the immediate switch to the new carbon-fibre process at each of the other manufacturing plants worldwide.

A standard Architecture Contract has been developed that details the work needed to implement and deploy the new system. Some of the plants will handle the switch themselves while others will need to utilise third party suppliers for some of the work. The Chief Engineer, sponsor of the activity, has expressed concern that a uniform process be employed at each location to make sure that the carbon-fibre panels are correctly created. She is concerned about variance as this process is new to all concerned so she considers consistency to be vital. Unfortunately the manufacturing plants also need to meet safety compliance regulations. These regulations differ depending to the manufacturing region. Accommodation of the regulations is expected to mandate that, in some cases, the Sunderland process be amended slightly. While these changes are not expected to compromise the quality of the new process the Chief Engineer is worried and wants to make sure that there is adequate control.

According to TOGAF 9 which of the following approaches would best meet the concerns voiced by the Chief Engineer?

- A. For each manufacturing plant you review the applicable Architecture Contract, making sure that it addresses the project objectives, acceptance criteria, and the management and escalation of change and risk. In cases where the contract is issued to an external supplier, you ensure that it is a legally enforceable contract.  
You schedule compliance reviews at key points in the implementation process to ensure that the work is proceeding in accordance with the Architecture Definition. You ensure that the Architecture Board reviews all deviations from the Architecture Contract, and considers whether or not to amend the Architectural Contracts.
- B. You create an Architecture Contract to manage and govern the implementation and migration process. In cases where the contract is issued to an external supplier; you ensure that it is a legally enforceable contract. Where all the work is being carried out in-house you recommend that a "memorandum of understanding" between the Architecture Board and plant is all that is needed.  
You recommend that if a deviation from the Architecture Contract is detected, the Architecture Board grant an automatic dispensation to allow the manufacturing plant to customise the process to meet their local requirements.
- C. You use the issued Governance Contracts to manage the architecture governance process for the project across the locations. You deploy monitoring tools to check that the moulded panels meet their quality requirements and develop change requirements if necessary.  
You recommend that if a deviation from the Architecture Contract is detected the Architecture Governance Board should modify the Architecture Contract to allow the manufacturing plant to customise the process to meet their local requirements. As a result you then issue a new Request For Architecture Work to implement the modified Architecture Definition.
- D. You create Architecture Contracts to manage and govern the implementation and migration process. In cases where the contract is issued to an external supplier; you ensure that it is a legally enforceable contract. Where the work is being carried out in-house you recommend that a "memorandum of understanding" between the Architecture Board and the plant is all that is needed.  
You ensure that the Architecture Board reviews all deviations from the Architecture Contract, and considers whether or not to amend the Architecture Contract for the manufacturing plant so that it can meet local regulations

## **Exercise 22: Requirements**

The following is a list of building blocks associated with the Challenge enterprise:

- Help Desk Operator
- Customer Details Database
- Network validation server
- Automatic security lock (to permit authorised access to the Call Centre)
- Staff vending machine (hot & cold beverages)
- Staff car park

### **Your task**

Select **one** of the above and identify three functional and three non-functional requirements that could be linked to it.

## **Exercise 23: Building in Security**

The Corporate Board is concerned that the new ERP system must be able to manage and safeguard customer information in a manner that meets or exceeds the legal requirements of the countries in which the company operates. This will be an increasingly important capability as the company expands its online services offered to clients and trading partners.

The Project Sponsor has let it be known that a primary focus of the EA Team is to coordinate efforts between the ERP implementation team and the business unit personnel who will be involved in the migration process

As the Lead Enterprise Architect, you have been asked to recommend the approach to take in the Preliminary Phase to ensure that the Corporate Board's concern is addressed. These concerns need to be satisfied before the Project Sponsor authorises the Request For Architecture Work.

According to TOGAF 9 which is the best answer?

- A. You evaluate the implications of the Board's concern in terms of regulatory requirements and the impact these concerns will have on business goals and objectives. Based on this understanding, you update the current Corporate Security Policy. You identify and record the requirements needed to address the Board's concerns. You propose including a security architect in the Architecture Team to oversee the implementation of the solution in the ERP system that is being developed.
  
- B. You evaluate the implications of the Board's concern by examining the potential impacts on implementation costs and timescales. Based on your understanding, you then define necessary security-related management sign-off milestones for phases A to D  
Finally you hold a series of workshops to obtain management support for your security measures.
  
- C. You evaluate the implications of the Board's concerns in terms of regulatory and security policy requirements. You then hold a series of workshops explaining the need for enhanced security and thus obtaining management recognition and support for the work.
  
- D. You start by clarifying the intent that the Board has for raising this concern. This enables you to understand the implications of the concern in terms of regulatory requirements. You identify the parts of the business which will be affected by any changes necessitated by increased security as well as those who will not be affected directly but may need to interoperate with the modified systems.

## Day 1 L1 Practice Questions

### Q1

Which of the following phases includes obtaining approval for the Statement of Architecture Work?

- A. Preliminary phase
- B. Phase A (Architecture Vision)
- C. Phase B (Business Architecture)
- D. Phase E (Opportunities & Solutions)
- E. Phase G (Implementation Governance)

### Q2

Which section of the TOGAF Architecture Principles template describes the requirements for carrying out the principle?

- A. Implications
- B. Name
- C. Rational
- D. Statement
- E. Requirements

### Q3

Which ADM phase is triggered by the Request for Architecture Work generated by the enterprise?

- A. Preliminary phase
- B. Phase A (Architecture Vision)
- C. Phase B (Business Architecture)
- D. Phase H (Architecture Change Management)
- E. Phase G (Implementation Governance)

### Q4

The TOGAF Architectural Framework describes a \_\_\_\_\_ as a type of artefact which shows the relationship of things?

- A. Building Block
- B. Catalogue
- C. Diagram
- D. Matrix
- E. Deliverable

**Q5**

Which section of the TOGAF document describes a step-by-step approach to developing an enterprise architecture?

- A. Part I
- B. Part II
- C. Part IV
- D. Part V
- E. Part VI

**Q6**

TOGAF describes which one of the following as “the structure of components, their inter-relationships and the principles guiding their design and evolution over time”?

- A. View
- B. Artefact
- C. Model
- D. Deliverable
- E. Architecture

**Q7**

Which of the following is provided by TOGAF as “a set of reference materials for establishing an architecture function within an organisation?

- A. Architecture Content Framework
- B. Technical Reference Model
- C. III-RM
- D. Architecture Development Method
- E. Architecture Capability Framework

**Q8**

Which ADM phase is the first phase of the architecture development cycle, defines the scope, and identifies stakeholders?

- A. Preliminary phase
- B. Phase A (Architecture Vision)
- C. Phase B (Business Architecture)
- D. Phase D (Technology Architecture)
- E. Phase H (Architecture Change Management)

**Q9**

Which section of the Architecture Repository holds templates for the architecture deliverables.?

- A. Architecture Metamodel
- B. Standards Information Base
- C. Governance Log
- D. Reference Library
- E. Architecture Capability

**Q10**

According to TOGAF, which of the following best describes how the Enterprise Continuum is used in organising and developing an architecture?

- A. It is used to structure re-usable architecture and solutions assets
- B. It is used to co-ordinate with the other management frameworks in use
- C. It is used to provide a system for continuous monitoring
- D. It is used to identify and understand business requirements
- E. It is used to describe how an architecture addresses stakeholder concerns

**Q11**

According to TOGAF, which of the following is true about Guidelines and Techniques?

- A. Techniques support specific tasks within the ADM while Guidelines help to adapt the ADM to deal with different scenarios
- B. Guidelines support specific tasks within the ADM while Techniques help to adapt the ADM to deal with different scenarios
- C. Guidelines and Techniques are described in Part IV of the TOGAF document
- D. Techniques describes a general set of rules and guidelines for the architecture being developed
- E. Guidelines and Techniques are described in Part V of the TOGAF document

**Q12**

Which section of the Architecture Repository describes the architecture framework used by the enterprise ?

- A. Governance Log
- B. Reference Library
- C. Architecture Landscape
- D. Architecture Capability
- E. Architecture Metamodel

**Q13**

TOGAF uses a version numbering convention to identify baseline and target Architecture Definitions. Which version number in this convention indicates a high-level outline of the architecture?

- A. Version 1.0
- B. Version 0.9
- C. Version 0.5
- D. Version 1.5
- E. Version 0.1

**Q14**

Which of the following best describes the “Architecture Vision” document?

- A. A description of individual change increments showing progression from the baseline to target architecture
- B. A detailed schedule for implementation of the target architecture
- C. A high level description of the baseline and target architectures
- D. A joint agreement between the development team and sponsor on the deliverables and quality of an architecture
- E. A set of rules and guidelines to support fulfilling the mission of the organisation

**Q15**

Which one of the following is an objective of the Preliminary Phase of the ADM?

- A. To define the Baseline Architecture for this cycle of the ADM
- B. To define the application systems for the Target Architecture
- C. To define the framework and methodologies to be used
- D. To define the relevant stakeholders and their concerns
- E. To define and prioritise work packages

**Q16**

The Architecture Landscape is divided into three levels which are, Capability, Segment, and \_\_\_\_\_?

- A. Baseline
- B. Solution
- C. Strategic
- D. Target
- E. Transition

**Q17**

Which of the following best describes the TOGAF Technical Reference Model?

- A. It is a detailed data model that can be tailored to specific industries
- B. It is an example of a Common Systems Architecture
- C. It is a foundation architecture upon which more specific architectures can be based
- D. It is a model of application components and application services software, including brokering applications
- E. It is an example of an Industry Architecture

**Q18**

Which document is sent from the Sponsoring Organisation to the EA team to trigger a new cycle of the ADM?

- A. Architecture Requirements document
- B. Architecture Definition Document
- C. Statement of Architecture Work
- D. Request for Architecture Work
- E. Architecture Vision

**Q19**

According to TOGAF which one of the following defines general rules and guidelines for the use of assets across an Enterprise?

- A. Business Scenarios
- B. View
- C. Viewpoint
- D. Architecture Principles
- E. Functional Requirements

**Q20**

Which of the following statements best describes the purpose of enterprise architecture?

- A. To allow an enterprise to exploit the latest trends in technology
- B. To enable the CIO to take effective control of the business units across an enterprise
- C. To ensure compliance in an enterprise to corporate auditing standards
- D. To optimise an enterprise into an environment that is responsive to business needs
- E. To provide a set of standards that all actors must adhere to within an enterprise

## Day 1 L1 Practice Question Answers

Question	Answer	
1	B	
2	A	
3	B	
4	D	
5	B	
6	E	
7	E	
8	B	
9	D	
10	A	
11	A	
12	E	
13	E	
14	C	
15	C	
16	C	
17	C	
18	D	
19	D	
20	D	

## Day 2 L1 Practice Questions

### Q1

In which ADM phase are Gap Analysis results from earlier phases consolidated

- A. Phase D
- B. Phase E
- C. Phase F
- D. Phase G
- E. Phase H

### Q2

Which phase of the ADM has the goal of ensuring that the architecture achieves its original target business value?

- A. Preliminary phase
- B. Phase E (Opportunities & Solutions)
- C. Phase F (Migration Planning)
- D. Phase G (Implementation Governance)
- E. Phase H (Architecture Change Management)

### Q3

Which of the following best describes an Architecture Compliance Review?

- A. A review of the ability to share information and services
- B. A review of plans for transforming the Enterprise
- C. A review of the architecture project against established criteria and business objectives
- D. A review to identify the variation between baseline and target architectures
- E. A review of the readiness of the organisation to accept change

### Q4

Which one of the following best describes a key objective of the “Technology Architecture” phase?

- A. To define the solution architecture needed to support the Application Architecture
- B. To transform application components into a set of technology components
- C. To define the Transition Architectures needed to achieve the Target Architecture
- D. To develop a migration plan to deliver incremental capabilities
- E. To select a set of technology products that will form the basis of a solution architecture

**Q5**

According to TOGAF which of the following best describes the concept of Architecture Governance?

- A. A framework for operational and change activity
- B. The practice by which Enterprise Architectures are controlled from the Enterprise perspective
- C. A mechanism to categorise artefacts
- D. A test to ensure that the Enterprise Architecture practice is capable of controlling the architecture project
- E. A method of detailing an organisation in terms of its building blocks and the relationships between them

**Q6**

When creating views for a particular architecture, what does TOGAF recommended as the first step?

- A. Perform a Gap Analysis
- B. Design a viewpoint to address all stakeholder concerns
- C. Ensure completeness of the architecture
- D. Develop views for the target architecture first
- E. Refer to the existing viewpoint library to determine if there is an existing viewpoint which can be re-used

**Q7**

Which of the following architectures in the Architecture Continuum contains the most re-usable architecture elements?

- A. Common Systems Architectures
- B. Organisation-Specific Architectures
- C. Industry Architectures
- D. Foundation Architectures
- E. Generic Architectures

**Q8**

TOGAF describes the role of an Architecture Contract as \_\_\_\_\_?

- A. a plan to ensure that architecture information is communicated to the right stakeholders at the right time
- B. a trigger for a new cycle of the ADM
- C. an agreement between the developers and the sponsors about the architecture deliverables
- D. a timeline showing progression from the Baseline Architecture to the Target Architecture
- E. a set of general rules and guidelines to support development of the enterprise architecture

**Q9**

Complete the sentence - "The Requirements Management Phase \_\_\_\_\_"?

- A. addresses and resolves requirements between the ADM phases
- B. is a central process which prioritises requirements for the other ADM phases
- C. is used to dispose of resolved requirements for all ADM phases
- D. stores requirements and manages their flow into the relevant ADM phases
- E. All of the above.

**Q10**

Which one of the following statements best describes the purpose of a Compliance Review?

- A. Provides a high level overview of the deliverables
- B. Ensure that major stakeholders receive the correct information at the right time in the architecture cycle
- C. During the Implementation Governance phase Checks that delivery projects are meeting their requirements
- D. Charts progression from Baseline to Target architecture
- E. In the Change Management phase informs the Architecture Board of the status of delivery projects

**Q11**

Which of the following best describes a purpose of the Gap Analysis technique?

- A. To catch errors in a project architecture early
- B. to guide decision making throughout the enterprise
- C. To help identify and understand business requirements
- D. To highlight shortfalls between the baseline and target architectures
- E. To mitigate risk when implementing an architecture project

**Q12**

Which one of the following is **NOT** a responsibility of an Architecture Board?

- A. Enforcing Architecture Compliance
- B. Decision making for changes in the architecture
- C. Production of governance materials
- D. Allocation of project resources
- E. Improving the maturity of the organisation's architecture discipline

**Q13**

Which one of the following best describes the Architecture Vision document?

- A. A description of the scope and approach for completion of the architecture project
- B. An agreement between development partners and the sponsor on architecture deliverables
- C. A set of rules and guidelines to support fulfilling the mission of the organisation
- D. A set of quantitative statements outlining requirements on the implementation
- E. A high-level description of how the new capability will address stakeholder concerns

**Q14**

Which of the following provides the best description of TOGAF?

- A. A process model, best practices, and assets to assist in the creation and update of an Enterprise Architecture
- B. An abstract framework for the development of standards and processes for a business architecture
- C. A collection of components organised to accomplish a specific set of functions
- D. A system development life cycle method for software engineering
- E. A reference model containing taxonomy defining terminology for an enterprise architecture, together with an associated graphic

**Q15**

Which ADM phase establishes the connection between the architecture organisation and the implementation organisation through the Architecture Contract?

- A. Phases B-D
- B. Phase E
- C. Phase F
- D. Phase G
- E. Phase H

**Q16**

Which one of the following statements about the Requirements Management phase is true?

- A. The phase generates the requirements for a given ADM cycle using the Business Scenario technique
- B. The phase manages the flow of requirements, storing them and feeding them in and out of the other ADM phases as required
- C. All requirements fed into the phase are prioritised, and those of low priority will be deferred until the next iteration of the ADM cycle
- D. The phase operates like a waiting room, and all requirements fed in to the phase must be resolved by the end of the current ADM cycle
- E. New requirements are created in this phase

**Q17**

Which of the following best describes a view ?

- A. The perspective of a group of stakeholders
- B. A set of concerns
- C. The representation of a system from a set of concerns
- D. A reusable architectural model
- E. A template

**Q18**

During the implementation of an architecture, if the original Architecture Definition and requirements are not suitable, which one of the following might be submitted to initiate additional architecture work?

- A. Requirements Impact Analysis
- B. Capability Assessment
- C. Draft Data Description document
- D. Change Request
- E. Statement of Architecture Work

**Q19**

Which one of the following does **NOT** describe a purpose of an Architecture Compliance review?

- A. Ensures that best practice is applied
- B. Determines the technical readiness of a project
- C. Identifies business transformation risks associated with the architecture project
- D. identifies where architecture standards need modification
- E. Identifies errors in an architecture project

**Q20**

According to TOGAF, which of the following steps in Phases B, C, and D occurs before development of the baseline or target architectures

- A. Select reference models, viewpoints and tools
- B. Conduct formal stakeholder review
- C. Perform gap analysis
- D. Create Architecture Definition Document
- E. Define Road map components

## Day 2 L1 Practice Question Answers

Question	Answer
1	B
2	E
3	C
4	B
5	B
6	E
7	D
8	C
9	D
10	C
11	D
12	D
13	E
14	A
15	D
16	B
17	C
18	D
19	C
20	A

## **Q1 Acme Car Corp**

Over the years, Acme Car Corp has experienced rapid growth by acquisition and merger and as a result has a complex mixture of procurement processes, and IT infrastructure. There is severe overlapping and duplication leading to a decrease in potential revenue. A new Business Strategy has been formulated to reduce maintenance and purchasing costs by creating an organisation wide “preferred supplier program”.

Some of the Business Architecture concerns have already been addressed and the next goal is to address the IT Infrastructure.

Acme uses TOGAF 9.1 as its Architectural Framework. The Architecture Capability for the project has been established and a number of ADM cycles completed which have addressed some of the Business Architecture issues. Despite this there are few architectural assets in the Architecture Repository so many assets will need to be developed from scratch. The company leans towards COTs packages and performs the minimum customisation consistent with the needs of the organisation. Senior Sponsors have stated that they would prefer to re-use existing assets wherever possible.

The next step is to improve the IT Infrastructure. Stakeholders have voiced the following concerns:

1. Which procurement related business processes are currently supported by zero, one, or many existing applications?
2. Which non-procurement applications will need to be integrated with any new procurement applications?
3. What data will need to be shared?

According to TOGAF 9.1 which of the following is the best answer?

- A** In the early iterations of Architecture development you would describe the Baseline Application Architecture with an Application/Function matrix and describe the Baseline Data Architecture using a Data Entity/Data Component catalogue.  
In later iterations of the Architecture Definition you would describe the Target Application Architecture using Application Communication diagrams and an Application Interaction Matrix and describe the Target Data architecture with a Data Entity/Business Function matrix
- B** In the early iterations of Architecture development you would describe the Target Application Architecture with Application diagrams and describe the Target Data Architecture with a System/Data matrix.  
In later iterations of Architecture development you would describe the Baseline Application Architecture with an Application and User diagram and an Application/Organisation matrix and describe the Baseline Data Architecture with a Data Entity/Data Component catalogue
- C** In the early iterations of Architecture development you would describe the Baseline Application Architecture with an Application/Function matrix and describe the Baseline Data Architecture with a Data Dissemination diagram.  
In later iterations of Architecture development you would describe the Target Application Architecture with a System/Technology matrix, an Application Interaction Matrix and describe the Target Data Architecture with a Data Dissemination diagram
- D** In the early iterations of Architecture development you would describe the Target Application Architecture with Application Communication diagrams and an Application Interaction matrix and describe the Target Data Architecture with a Data Entity/Business Function matrix.  
In later iterations of Architecture development you would describe the Baseline Application Architecture with an Application/Function matrix and describe the Baseline Data Architecture with a Data Entity/Data Component catalogue

## **Q2 Acme Components**

Acme Components Inc. manufactures a variety of small motors for use in electronic equipment. Acme has a mature TOGAF9 based Enterprise Architecture practice. The company is split into several divisions each of which has its own E-Mail system. Concerns over security and the need to drive down costs have identified that it would be advantageous to consolidate the multiple Mail servers onto a single new instance which will be hosted in the company's Data Centre.

Each division has completed the Architecture Definition documentation required to tailor and configure the environment to meet its own specific requirements.

The enterprise architects have analysed the key corporate change attributes and implementation constraints. A consolidated gap analysis has been completed which has identified the gaps across the Business, Data, Application, and Technology domains. Based on the results of the gap analysis, the architects have reviewed the functional requirements and interoperability requirements needed to integrate the new E-Mail environment into the existing environment.

Based on all of these factors, the architects have assessed the organisation's readiness to conduct the business transformation and have produced a risk assessment.

Because of the risks posed by the complexity of the current environment, it has been determined that a phased approach is needed to implement the target architectures. The overall implementation process is estimated to take several years.

### **Your role is consultant to the Lead Architect.**

The Implementation and Migration Plan v0.1, the Transition Architectures v0.1 and the Capability Assessment deliverables are now complete. You have been asked to recommend the next steps to prepare the final Implementation and Migration Plan.

Based on TOGAF 9, which of the following is the best answer?

- A** You would assess how the plan impacts the other frameworks in use. Minimally, the plan should be co-ordinated with the business planning, portfolio/ project management and operations management frameworks. You would then assign a business value to each project and its work packages taking into account available resources and priorities for the projects. Finally you would generate a time-lines Implementation & Migration Plan.
- B** You would apply the Business Value Assessment Technique to prioritise the implementation projects and project increments, This assessment should focus on return on investment and performance evaluation criteria that can be used to monitor the progress of the architecture transformation. You would confirm the Transition Architecture phases using an Architecture Definition Increments Table to list the projects. You would then document the lessons learned and generate the final plan.
- C** You would conduct a set of Compliance Assessments to ensure that the implementation team is implementing the architecture according to the contract(s). The Compliance Assessment should also ensure that the implementation team is using the proper development methodology. It should include deployment of monitoring tools and ensure that performance targets are being met If they are not met, and then changes to performance requirements should be identified and updated in the Implementation and Migration Plan.
- D** You would place the strategic Architecture Definition and Transition Architectures under configuration control as part of the on-going evolution cycle. This will ensure that the architecture remains relevant and responsive to the needs of the enterprise. You would then produce an Implementation Governance Model to manage the lessons learned prior to finalising the plan. You recommend that lessons learned be accepted by the Architecture Board as changes to the architecture without review.

## **Q3 Sunrise Hotels**

Sunrise Hotels is a rapidly expanding national hotel chain. The company is six years old and has grown dramatically by purchasing independent hotels. At present there are over 100 hotels and more are in the pipeline. Each hotel has their own unique suit of applications as Sunrise has always kept the existing systems in place when they acquired a new property. While this worked well for the first few years it has increasingly lead to problems specifically concerning the acquisition and merging of business data. As a result centralised purchasing is impossible and the Senior Management team have a very vague picture of the state of the business.

Some efforts have been made to address this as the company has just recently been installing new computer systems in all their hotels. The cost of the hardware has been significant and is an investment that Sunrise would not wish to loose. New computers were installed in batches of 10 with the specifications changing slightly with each batch. No record has been kept of the hardware specifications for each hotel, all that is known is that they are more than capable of running the old applications which were transferred to them. Most hotels have been upgraded in this way although only 95 systems were purchased.

The CEO has stated his concerns about the inefficiencies of the current approach and identified the need to change. He has defined a new strategic vision that will standardise Front of House, HR, and Stock Ordering operations throughout the Enterprise. The aim is to put in place a brand new solution that will allow the company to make a fresh start. The CEO has stated that he expects results by the end of the current fiscal year.

As part of the planning, a well-known consulting firm that specialises in business strategy was engaged. The consultants helped Sunrise identify the strategic changes needed to implement the CEO's vision and have designed a set of processes which meet the business need. The processes have been trialled (using existing applications) in a pilot and have been signed off by the Senior Management Team. A strategic architecture encompassing the entire firm was created, including detailed requirements and recommendations for the new solution.

Because of the short time scales the consultants recommended using COTS solutions and the MD has expressed a firm wish that Sunrise should adopt a specific suite of integrated applications that is tailored to the needs of the hospitality industry. This will be used "as is" as it supports the new business processes. Because of the wide mixture of applications currently in use, Sunrise has rejected any attempt at data migration; rather the company will make a complete fresh start, utilising existing hardware where possible.

The design project is in Phase A and the Statement of Work is under construction. A project plan is being developed.

Based on TOGAF 9, which of the following best illustrates how the EA team should now proceed once the Statement of Work is signed off?

- A. The team should skip phase B and start with phase C. The Baseline for the current architecture would be established followed by the target followed by gap analysis. This is because the vision is well understood and the strategic architecture agreed. This will ensure that the current problems and inefficiencies of the baseline architecture are not carried forward, and that requirements identified in the initial study are used to design a comprehensive solution
- B. As the Baseline Architecture is not essential, and as the Target Architecture is well understood, the team should focus on planning the implementation by creating a Consolidated Gap Solutions & Dependencies Matrix, a Benefits Diagram and a Project Context diagram. The EA team should ensure that the target architecture addresses non-functional requirements so as to ensure the target architecture is robust and secure.
- C. The team should focus on defining the target architecture by going through the architecture definition phases (B-D). This is because the initial study identified the need to change. This will ensure that the change can be defined in a structured manner and address the requirements needed to realise the vision
- D. The Team should first define the Baseline Technology Architecture in order to assess the current infrastructure capacity and capability to support the new applications followed by a gap analysis. Then the focus should be on transition planning and architecture deployment. This will identify the requirements to ensure that the projects are sequenced in an optimal fashion so as to realise the vision.

## **Q4 Talk Is Cheap**

Talk Is Cheap(TIC) are a company specializing in the provision of help desk services for a number of large finance organisations. At present they provide regionalised Help Desk Support through several geographically dispersed call centres. In an effort to reduce costs and provide a more streamlined service, TIC has decided to move its Help Desk operations to a centralised call centre in Asia.

The architecture project is currently in Phase A and you are conducting stakeholder analysis to determine the most effective way to engage with the projects stakeholders, based on their classification.

Below is information about 3 stakeholders in the project.

### **Sue Blackwell - HR Director**

The HR director sits on the TIC Board and is a close friend of the Operations Director. She is responsible for taking on new staff and arranging the transfer of existing staff. Sue is not technical; she does not understand the Help Desk processes. Her previous job was managing HR for a processed food manufacturer. Sue intends to allocate several of her people to resourcing Help Desk staff during implementation and needs to know the probable staff required on specific dates well in advance.

### **Bill Saunders - Procurements Manager**

Bill has worked for TIC for several years now, and will be involved in procuring resources etc for the new call centre building. As he is also a qualified building architect, he will provide advice and support on the features that will be needed in the new building. He has a great deal of knowledge about the features a building needs to meet to satisfy the requirements of an acceptable working environment (provision of rest rooms, climate control etc)

### **Kate Williams - Programme Manager**

Kate will be involved with running the implementation program so she needs to be kept informed about the projects that will be needed. Kate is TOGAF aware, and comes from an IT background.

According to the guidance provided in the TOGAF document, which is the best answer that indicates the classification of these 3 stakeholders.

- A**      Sue is Keep Satisfied, Bill is Key Player, Kate is Keep Informed
- B**      Sue is Key Player, Bill is Key Player, Kate is Keep Satisfied
- C**      Sue is Keep Satisfied, Bill is Keep Satisfied, Kate is Minimal Effort
- D**      Sue is Key Player, Bill is Key Player, Kate is Keep Informed

# **Technical Notes**

## **Contents:**

- ADM Cycle
- Architectural Domains
- Value Chain Analysis
- Top Down Bottom Up
- Functional & Non-functional requirements
- CRUD matrix
- Use Case
- Changes
- Architecture Landscape

# The ADM Cycle

## Preliminary Phase

You work for a business (an Enterprise) which makes scented candles. Traditionally you sell your products from a string of shops but now your Managing Director (MD) has come up with the proposal to start selling your products on the internet. As an Enterprise Architect (EA) your job is to:

1. Model how the business is now (baseline)
2. Model how the business will need to change to meet the MD's requirements (target)
3. Work out the gap (what needs to change)
4. Then plan a programme of works to accomplish the change (hopefully you will get others to run the projects implementing the change)

As a start you need to do the following:

- Get a team of experts together who can help you with the work (EA team)
- Make sure the EA team is capable of the work asked of them
- Set up a governance structure so that Senior Management have confidence that the EA work is being completed satisfactorily
- Identify the business rules that the changes will need to conform to (the Principles)

At this point you update the Project Sponsor and create a summary of what the project is about (this is the "Request for Architecture Work") TOGAF states this is prepared by the Project Sponsor by the way.

## Phase A: Architecture Vision

Having reached an outline agreement on what should be done, and having formed a team the next phase is to establish the Architecture project.

You need to perform a rigorous stakeholder analysis and work out how you are going to engage with major stakeholders. This will result in a Communications Plan.

You will need to scope the project and identify if the business has the capability to implement the change and make use of it afterwards. For example does our IT dept have the necessary skills to build a web site and will our customers use it once it is available?

You will draft a Project Plan, for the cycle and incorporate this into the Architecture Vision which will describe the eventual benefits of the change once it is implemented.

You will create a container to hold the outcomes of your investigation, primarily the gap analysis of the work; this will evolve as you investigate the changes necessary and is called the Architecture Definition Document.

Finally you will also create the Statement of Architecture Work which defines what you will do and how the work will be controlled.

## **Phase B: Business Architecture**

You sit down through numerous meetings with your business people and identify a business process that your company can use to handle on-line sales (order taking, order fulfilment etc.). You break down the process by dividing it into packets of functionality called “Building Blocks” (BBs). For example your web server is a BB, as is your delivery organisation and the member of staff who assembles the order. You illustrate how your BBs interact together by combining them into diagrams (pictures), catalogues (lists) and matrices (showing relationships); you can use these to illustrate to stakeholders how they work together. You end up with a model showing how your internet shop works from the business process perspective. You will have identified the BBs that exist (we have people who assemble and pack already) and what you need (we will need a process to handle order delivery) and what the differences are – the gaps. You will identify possible ways of filling the gap (we could use a contract packing company or take on extra staff for example).

## **Phase C: Information Systems Architecture**

The next step is to build on the new business process identified in the Business Architecture to model how the information System needs to change to accommodate it. Information Systems is usually split into two parts (or architectures): a Data Architecture and an Application Architecture:

**The Data Architecture:** describes what kind of data you need to take care of for your online shop capability. Customer data, product data, payment data, shipping data, product pictures, and ingredient lists, etc.

It also describes where the data comes from, where it flows to, who needs what data when and so on. We see two types of data here: Structured data (what you'd place into a database) and unstructured data (i.e.: flat files).

**The Application Architecture:** describes what applications you need to handle your data: Web portals, CRM applications, supply chain management applications, shipping and tracking applications, order management applications, payment processing applications, candle personalization and mixing order processing applications etc.

More diagrams, more catalogues and more matrices are created to describe this stage of building your on-line shop.

## **Phase D: Technology Architecture:**

The next step is to translate the Information Systems architecture into a Technology architecture. This is when we describe what systems are needed and where. We map the application BBs and data BBs to systems, the networks they are located on, which servers are connected how at what locations, etc.

At this point the function model of how our business must change and the gap between the present (the baseline architecture) and the future (the target architecture) is complete. However the job is not finished yet, we only know about the required functionality necessary to provide an on-line shop. The functionality needs to be translated into something that can do the job.

## **Phase E: Opportunities and Solutions**

The BBs identified in phases A – D were all generic in as much as they only described the functionality needed ("we need a database server for this"). A database server is a database server, no matter if it stores Candle types or Battleship specifications. The same can be said for a file server, a firewall or a router. A business process to take an order at this stage does not differentiate if the order is for a candle or a battleship. The BBs we have used are called Architecture Building Blocks (ABBs) to identify that they only cover functionality. We have concentrated on functionality at the beginning of the ADM phase to avoid clouding our vision with specific details. In phase E this stops and we need to consider actual physical products. We select the ABBs to use (previous phases may have given us several alternative ABBs for example or database could be on a workstation or a server or even on a card index!) then convert them into Solution Building Blocks (SBBs) by making them Vendor aware.

So in Phase E we will move from the ABB of "Database", for example, to the SBB of an Oracle 11i database running on a SPARC SuperCluster.

Having this information allows us to start combining SBBs into work packages (for example server + installation + configuration) and link the work packages into projects (e.g. data centre project) and time lining them on the Road Map which forms an essential part of the draft Implementation & Migration Plan.

We need to understand the capability of the Enterprise to both implement the change and to use the changes in business so we perform a Business Transformation Readiness Assessment to gain this understanding. The output from the BTRA will influence the number of transitions we will need to meet our objectives plus identify possible mitigation activities to be worked into the projects on our Road Map.

## **Phase F: Migration Planning**

This is where the Implementation & Migration Plan is finalised and an agreement is given by the senior stakeholders that the implementation projects should go ahead. All the projects are costed and risked. Suppliers are found and agreement is reached on delivery details, costs, timescales and escalation & control. The delivery of the projects is not part of the EA brief (as opposed to governance) so hopefully this task is given over to your Project Managers. You write a Lessons Learnt Report about the architecture definition part of the cycle and go off to plan something else

## **Phase G: Implementation Governance:**

In this phase you provide oversight of your Project Managers, you conduct compliance assessments to make sure the implementation projects are meeting your requirements and handle any Request For Changes that the projects generate passing up to phase H as appropriate.

## **Phase H: Architecture Change Management**

This is where the Architectural Governance Board (your boss) sits. The AGB keeps an eye on you to make sure that you are conducting EA correctly and makes decisions on Requests For Change passed to them. RFCs can come from a project (via Phase G), from the Architecture Development phases (B-D), Transition Planning (E & F) or from the Enterprise itself.

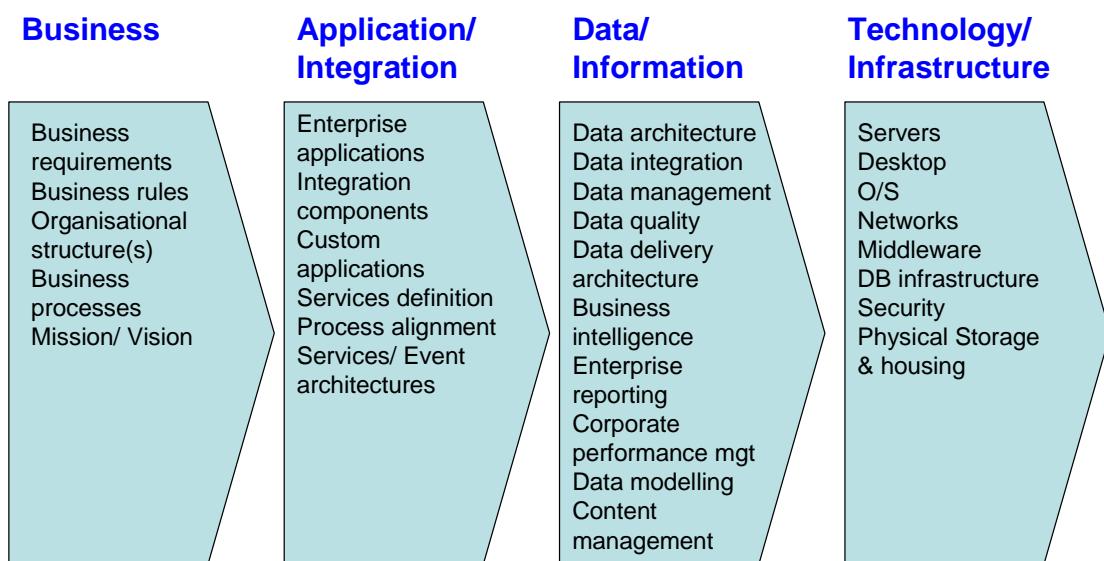
# **TOGAF Architecture Domains**

**Business architecture:** The structure and behaviour of a business system (not necessarily related to computers). Covers business goals, business functions or capabilities, business processes and roles etc. Business functions and business processes are often mapped to the applications and data they need.

**Data architecture:** The data structures used by a business and/or its applications. Descriptions of data in storage and data in motion. Descriptions of data stores, data groups and data items. Mappings of those data artefacts to data qualities, applications, locations etc.

**Applications architecture:** The structure and behaviour of applications used in a business, focused on how they interact with each other and with users. Focused on the data consumed and produced by applications rather than their internal structure. In application portfolio management, the applications are usually mapped to business functions and to application platform technologies.

**Technical architecture:** The structure and behaviour of the technology infrastructure. Covers the client and server nodes of the hardware configuration, the infrastructure applications that run on them, the infrastructure services they offer to applications, the protocols and networks that connect applications and nodes.



# Value chain analysis

## Introduction

Value Chain Analysis is a key tool for Enterprise Architects. Value Chain Analysis describes the activities that take place in a business and relates them to an analysis of the competitive strength of the business. Understanding the business in this way helps us identify:

1. Which activities are best undertaken by a business and which might be better outsourced
2. If the business process is structured correctly
3. If there is any waste in the process which can be removed

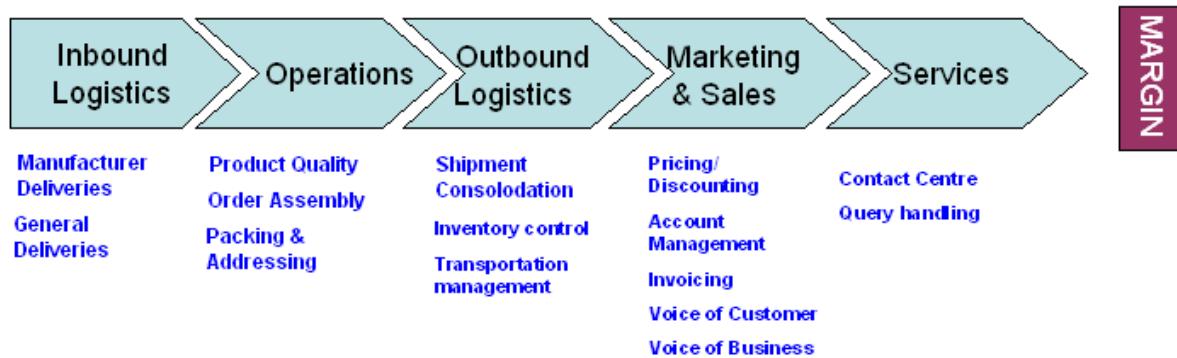
Value Chain Analysis was first described by Michael Porter in his 1985 book *Competitive Advantage* so it has been around for some time and is well understood by Senior Managers, as such you will probably use the VCA diagram as part of your Views for CxOs.

Porter introduced a generic value chain model that comprises a sequence of activities found to be common to a wide range of firms; he identified groups of primary and support activities:

- (1) **Primary Activities** - those that are directly concerned with creating and delivering a product (e.g. component assembly)
- (2) **Secondary (Support) Activities** - which whilst they are not directly involved in production, may increase effectiveness or efficiency (e.g. human resource management)

The goal of these activities is to offer the customer a level of value that exceeds the cost of the activities, thereby resulting in a profit margin. It is rare for a business to undertake all primary and support activities.

## Primary Activities



Value Chain Diagram for a Mail Order company

**Primary value chain activities include:**

Primary Activity	Description
<b>Inbound logistics</b>	All those activities concerned with receiving and storing externally sourced materials
<b>Operations</b>	The manufacture of products and services - the way in which resource inputs (e.g. materials) are converted to outputs (e.g. products)
<b>Outbound logistics</b>	All those activities associated with getting finished goods and services to buyers
<b>Marketing and sales</b>	Essentially an information activity - informing buyers and consumers about products and services (benefits, use, price etc.)
<b>Services</b>	All those activities associated with maintaining product performance after the product has been sold

## How the Value Chain Analysis can be used

- Modelling the business in this ways allows the Enterprise to gain

What activities a business undertakes is directly linked to achieving competitive advantage. So using a diagram that models a process as a series of value generating activities makes sense. The diagram will help leaders identify what needs to be changed to achieve their strategic visions. A competitive advantage could be gained by:

- **Cost advantage:** by better understanding costs and squeezing them out of the value-adding activities.
- **Differentiation:** by focusing on those activities associated with core competencies and capabilities in order to perform them better than do competitors.

For example, a business which wishes to outperform its competitors through differentiating itself through higher quality will have to perform its value chain activities better than the opposition. By contrast, a strategy based on seeking cost leadership will require a reduction in the costs associated with the value chain activities, or a reduction in the total amount of resources used.

Once the value chain is defined, a cost analysis can be performed by assigning costs to the value chain activities. The costs obtained from the accounting report may need to be modified in order to allocate them properly to the value creating activities.

Porter identified 10 cost drivers related to value chain activities:

- Economies of scale
- Learning
- Capacity utilisation
- Linkages among activities
- Interrelationships among business units
- Degree of vertical integration
- Timing of market entry
- Firm's policy of cost or differentiation
- Geographic location
- Institutional factors (regulation, union activity, taxes, etc.)

A firm develops a cost advantage by controlling these drivers better than their competitors.

A cost advantage also can be pursued by reconfiguring the value chain. Reconfiguration means structural changes such a new production process, new distribution channels, or a different sales

approach. For example, FedEx structurally redefined express freight service by acquiring its own planes and implementing a hub and spoke system.

## Linkages Between Value Chain Activities

Value chain activities are not isolated from one another. Rather, one value chain activity often affects the cost or performance of other ones. Linkages may exist between primary activities and also between primary and support activities.

## Differentiation and the Value Chain

A differentiation advantage can arise from any part of the value chain. For example, procurement of inputs that are unique and not widely available to competitors can create differentiation, as can distribution channels that offer high service levels.

Differentiation stems from uniqueness. A differentiation advantage may be achieved either by changing individual value chain activities to increase uniqueness in the final product or by reconfiguring the value chain.

Porter identified several drivers of uniqueness:

- Policies and decisions
- Linkages among activities
- Timing
- Location
- Interrelationships
- Learning
- Integration
- Scale (e.g. better service as a result of large scale)
- Institutional factors

Many of these also serve as cost drivers. Differentiation often results in greater costs, resulting in trade-offs between cost and differentiation.

## Secondary Activities

Secondary activities are necessary activities to support the Primary Value Chain. Secondary Activities include:

Secondary Activity	Description
<b>Procurement</b>	This concerns how resources are acquired for a business (e.g. sourcing and negotiating with materials suppliers)
<b>Human Resource Management</b>	Those activities concerned with recruiting, developing, motivating and rewarding the workforce of a business
<b>Technology Development</b>	Activities concerned with managing information processing and the development and protection of "knowledge" in a business
<b>Infrastructure</b>	Concerned with a wide range of support systems and functions such as finance, planning, quality control and general senior management

## **Steps in Value Chain Analysis**

Value chain analysis can be broken down into a three sequential steps:

- (1) Break down a market/organisation into its key activities under each of the major headings in the model;
- (2) Assess the potential for adding value via cost advantage or differentiation, or identify current activities where a business appears to be at a competitive disadvantage;
- (3) Determine strategies built around focusing on activities where competitive advantage can be sustained

## **Top down/ Bottom up**

Top-down and bottom-up are strategies of information processing and knowledge ordering, mostly involving software, but also other humanistic and scientific theories. In practice, they can be seen as a style of thinking and teaching. In many cases top-down is used as a synonym of analysis or decomposition, and bottom-up of synthesis.

A top-down approach (also known as stepwise design) is essentially the breaking down of a system to gain insight into its compositional sub-systems. In a top-down approach an overview of the system is formulated, specifying but not detailing any first-level subsystems. Each subsystem is then refined in yet greater detail, sometimes in many additional subsystem levels, until the entire specification is reduced to base elements.

A bottom-up approach is the piecing together of systems to give rise to grander systems, thus making the original systems sub-systems of the emergent system. Bottom-up processing is a type of information processing based on incoming data from the environment to form a perception. Information enters the eyes in one direction (input), and is then turned into an image by the brain that can be interpreted and recognized as a perception (output). In a bottom-up approach the individual base elements of the system are first specified in great detail.

During the design and development of new products, designers and engineers rely on both a bottom-up and top-down approach. The bottom-up approach is being utilised when off-the-shelf or existing components are selected and integrated into the product. An example would include selecting a particular fastener, such as a bolt, and designing the receiving components such that the fastener will fit properly. In a top-down approach, a custom fastener would be designed such that it would fit properly in the receiving components. For perspective, for a product with more restrictive requirements (such as weight, geometry, safety, environment, etc.), such as a space-suit, a more top-down approach is taken and almost everything is custom designed. However, when it's more important to minimise cost and increase component availability, such as with manufacturing equipment, a more bottom-up approach would be taken, and as many off-the-shelf components (bolts, gears, bearings, etc.) would be selected as possible. In the latter case, the receiving housings would be designed around the selected components

# **Functional & Non functional requirements**

## **Functional Requirement (Function)**

A Functional Requirement is a requirement that, when satisfied, will allow the user to perform some kind of function. For example:

*"The customer must place an order within two minutes of registering"*

A definition of a functional requirement could be:

"A requirement specifies a function that a system or component must be able to perform."

Typical functional requirements are:

- Business Rules
- Transaction corrections, adjustments, cancellations
- Administrative functions
- Authentication
- Authorization –functions user is delegated to perform
- Audit Tracking
- External Interfaces
- Certification Requirements
- Reporting Requirements
- Historical Data
- Legal or Regulatory Requirements

For the most part, when people are talking about Business Requirements, they are referring to Functional Requirements which are generally referred to as "requirements".

Functional Requirements have the following characteristics:

- uses simple language
- not ambiguous
- contains only one point
- specific to one type of user
- is qualified
- describes what and not how

## **Non-Functional Requirement**

A Non-Functional Requirement is usually some form of constraint or restriction that must be considered when designing the solution. "A non-functional requirement is a statement of how a system must behave; it is a constraint upon the systems behaviour."

Non-functional requirements specify all the remaining requirements not covered by the functional requirements. They specify criteria that judge the operation of a system, rather than specific behaviours.

For example:

*"The customer must be able to access their account 24 hours a day, seven days a week."*

For the most part when people are talking about Constraints, they are referring to Non-Functional Requirements.

Non-Functional Requirements have the same following characteristics:

- uses simple language
- not ambiguous
- contains only one point
- specific to one type of user
- is qualified
- describes what and not how

Non-Functional requirements tend to identify "user" constraints and "system" constraints. Business requirements should be kept pure and not reflect any solution thinking.

A system constraint is a constraint imposed by the system and not dictated by a Business Need. Since system constraints are part of a "solution", they should be documented in the System Specifications document.

For example:

*"The system must be unavailable from midnight until 1:00am for backups."*

This is a restriction imposed by the system and not a user request.

Some people like to further classify the Non-Functional Requirements into such categories as "Performance Constraints, Design Constraints, Quality Constraints, etc..

Typical non-functional requirements are:

- Performance - Response Time, Throughput, Utilization, Static Volumetric
- Scalability
- Capacity
- Availability
- Reliability
- Recoverability
- Maintainability
- Serviceability
- Security / Regulatory
- Manageability
- Environmental
- Data Integrity
- Usability
- Interoperability

Non-functional requirements specify the system's 'quality characteristics' or 'quality attributes'. Potentially many different stakeholders have an interest in getting the non-functional requirements right. This is because for many large systems the people buying the system are completely different from those who are going to use it (customers and users).

### **Requirements Traceability Matrix**

This matrix is used to trace project life cycle activities and work products to the project (or business) requirements. The matrix establishes a thread that traces all requirements from identification through to implementation, that is business requirements to system requirements and if necessary component requirements. Traceability is Bi-directional and so is used to manage change and provides the basis for test planning. Traceability tracks the allocation of each requirement to the following:

## **CRUD Matrix**

A CRUD Matrix is a table with tables for columns, and procedures for rows. Each procedure may perform Create, Read, Update, or Delete operations on one or more tables. If one sees too many operations being performed by a single procedure, that procedure is a target for refactoring (though it's normal to have one procedure change multiple tables -- that's typically the point of using them, so the transaction can be done in the procedure)

**Order Processing System CRUD Diagram 2**

	Customer	Customer Order	Customer Account	Customer Invoice	Vendor Invoice	Product
Maintain Customer Order	U		U		RU	
Terminate Customer Order	U		U		RU	
Receive Customer Order	R	C	CR			
Process Customer Order	CRU		RU		R	
Fill Customer Order	RU		RU		RU	
Invoice Customer	RU		RU	C		
Ship Customer Order			U		C	
Validate Vendor Invoice					R	
Pay Vendor Invoice					RU	
Maintain Inventory						CRUD

# Use case

From Wikipedia, the free encyclopaedia

A UML Use Case Diagram for the interaction of a client (the actor) and a restaurant (the system)

In software and systems engineering, a use case is a list of steps, typically defining interactions between a role (known in UML as an "actor") and a system, to achieve a goal. The actor can be a human or an external system.

In systems engineering, use cases are used at a higher level than within software engineering, often representing missions or stakeholder goals.

**Use case**

- A process in which an actor uses a system: a sequence of transactions
- Usually supports an OPOPOT business process step
- Usually has one main path and several alternative (or exception) paths
  - The details of each step (including any automated services invoked) may be documented separately from the use case itself

Perform ATM Transaction

Reference Model: 7.2.2

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**Use Case Diagrams**

Use case diagrams are used to gather the requirements of a system including actors and illustrate, at a high level, how the actors interact with the use cases

**Actors**



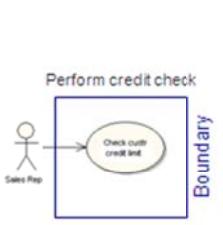
Sales Rep

**Use Case**



Check out credit limit

**Use Case Diagram**



Perform credit check

Sales Rep → Check out credit limit

Boundary

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## Changes

<b>Simplification Change</b>	E.g. consolidation of 20 servers to 3, this can be handled by change control of project A change driven by a requirement to reduce investment Changes at Infrastructure level often can be handled by simplification
<b>Incremental Change</b>	A change driven by a requirement to derive additional value from the existing investment
<b>re-architecting change</b>	Takes us to Phase A to re-plan A change driven by a requirement to increase investment in order to create new value for exploitation

## Architecture Landscape

<b>Strategic</b>	Long term summary view of entire enterprise
<b>Segment</b>	More detailed operating models for areas within the enterprise
<b>Capability</b>	more details showing how an enterprise can support a particular capability

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