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empowering the advancement of knowledge

TOGAF 9.2 Foundation - Level 1

TOGAF 9.2 Certified - Level 2



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Workbook Contents

Section 1: Level 1 (Foundation) Course slides

Section2: Level 2 (Certified) Course Slides

Section3: Case Study & Optional Exercises

Section4: Course Practice Questions

Section5: Diagrams

Section6: TOGAF Document extracts

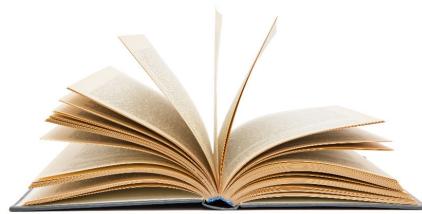
Section7: Open Group L1 Mock Exams

Section8: Open Group L2 Mock Exam

Section9: Technical Notes

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TOGAF® 9.2 Training Course Level 1



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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 (Level 1)

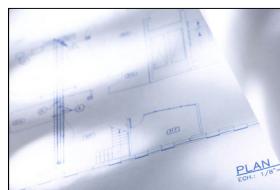
- Course Introduction
- Module F13: The TOGAF Certification for People Program
- Module 1: Management Overview
- Module 2: Introduction to the Architecture Development Method
- Module 3: The Enterprise Continuum and Tools
- Module F6: ADM Phases Level 1
- Module F7: ADM Guidelines and Techniques
- Module 4: Architecture Governance
- Module 5: Architecture Views and Viewpoints and stakeholders
- Module 6: Stakeholder Management
- Module 7: Building Blocks
- Module F11: ADM Deliverables Level 1
- Module F12: TOGAF® Reference Models

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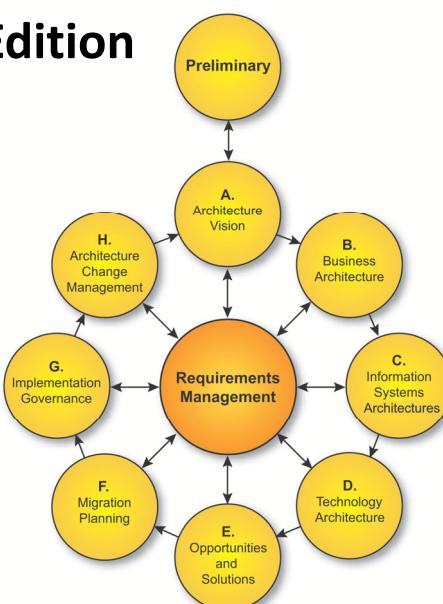
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3

TOGAF® Standard Courseware Version 9.2 Edition



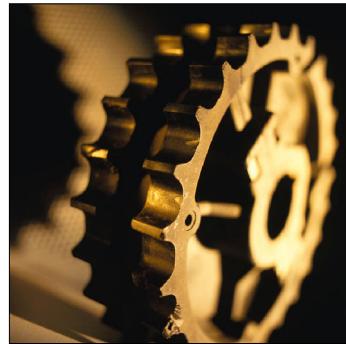
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About this Course

- 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



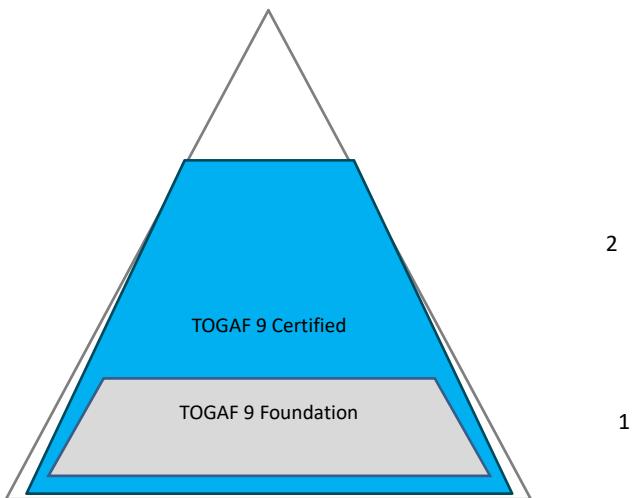
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TOGAF 9 Certification Levels

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">• 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 standard• Architects who want to achieve Level 2 certification in a stepwise approach
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">• 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

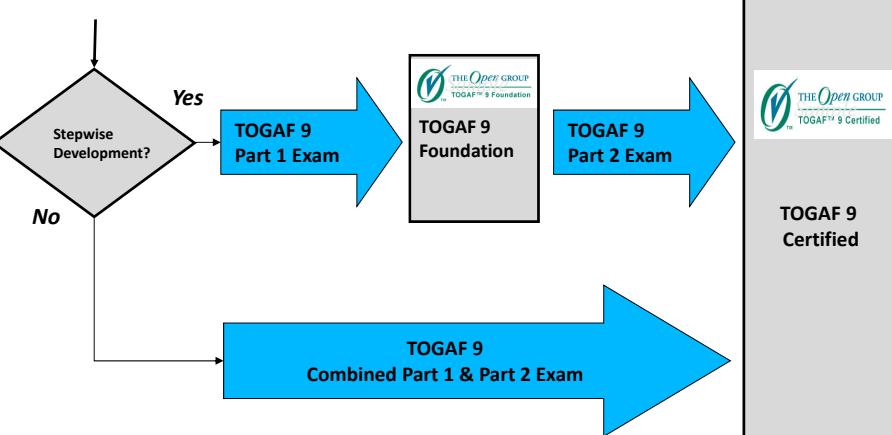
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Level 2 is a Superset of Level 1



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Paths to Certification



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Exam Details

- Email exambookings@theknowledgeacademy.com 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)

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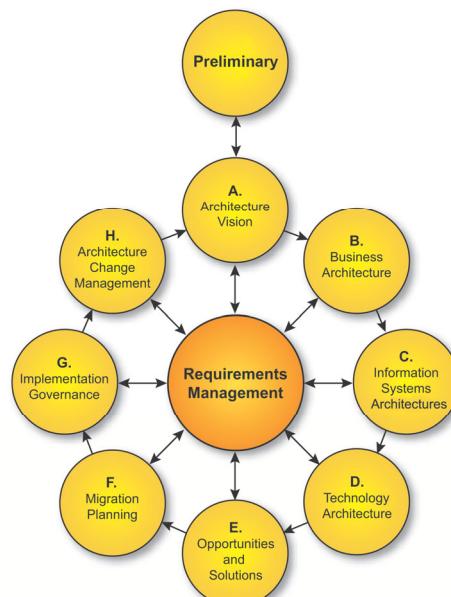
9

Module F13: The TOGAF® Certification for People Program

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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>	<p>Exam Type: Multiple Choice 40 Questions / 60 minutes Supervised: Yes Open Book: No</p>
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	TOGAF 9 Certified	<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>Section 2: 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>

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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)

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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 *

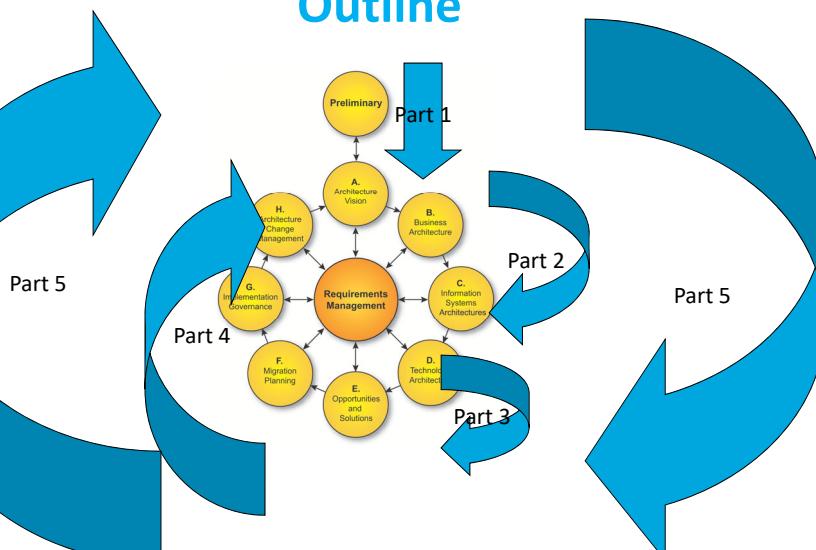
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TOGAF 9 Certified Training Course

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
- ADM Phases Level 1
- ADM Guidelines and Techniques
- Preliminary Phase
- Architecture Governance
- Architecture Views, Viewpoints and Stakeholders
- Building Blocks
- ADM Deliverables Level 1
- TOGAF Reference Models

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Course Content – Part 2

- ADM Phases: Project Establishment (phases Preliminary, A, Requirements Management)
- ADM Phases: Architecture Definition (phases B,C,D)
- ADM Phases: Transition Planning (phases E and F)
- ADM Phases: Governance (phases G and H)
- Adapting the ADM
- Architecture Content Framework
- TOGAF Reference Models
- Architecture Capability 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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Case Study Exercise

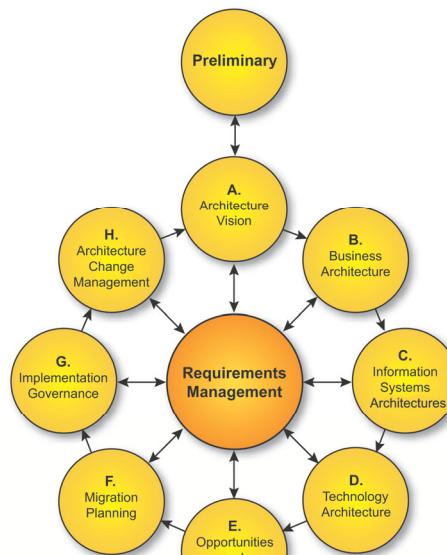
The Elevator Pitch

Exercise #1



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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]

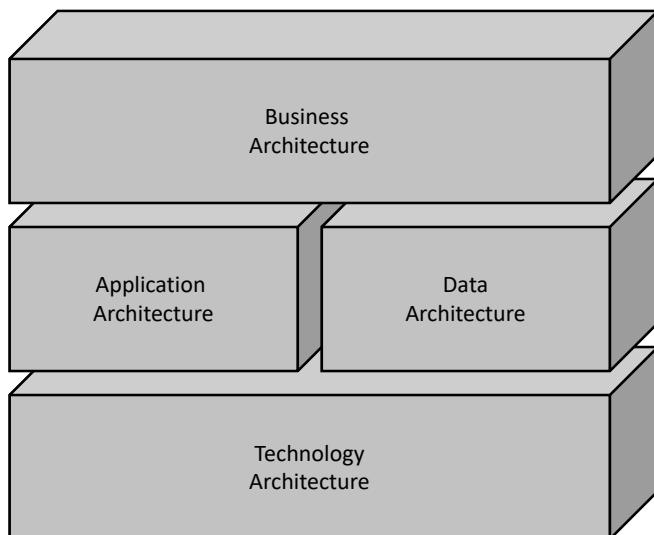


[1] MIT Center for Information Systems Research

[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

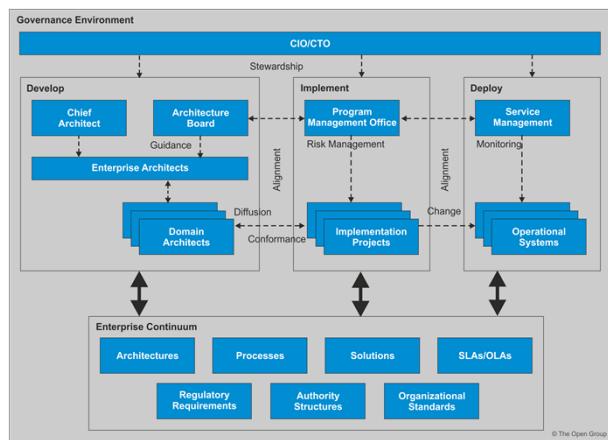
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The Importance of Governance

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?

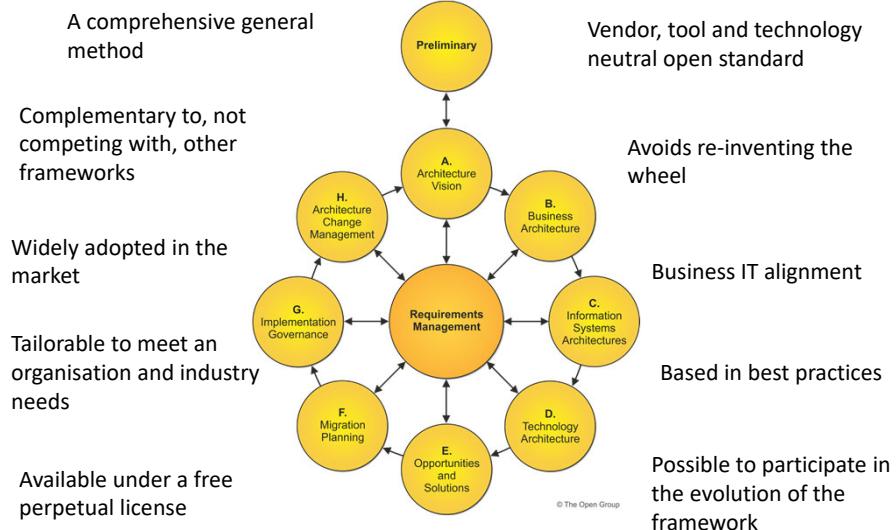
- TOGAF Standard Definition: Architecture Framework
 - A conceptual structure used to develop, implement, govern, and sustain an architecture
- It should describe a method for designing target state of the enterprise in terms of a set of building blocks, and for showing how the building blocks fit together
- 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



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TOGAF Origins

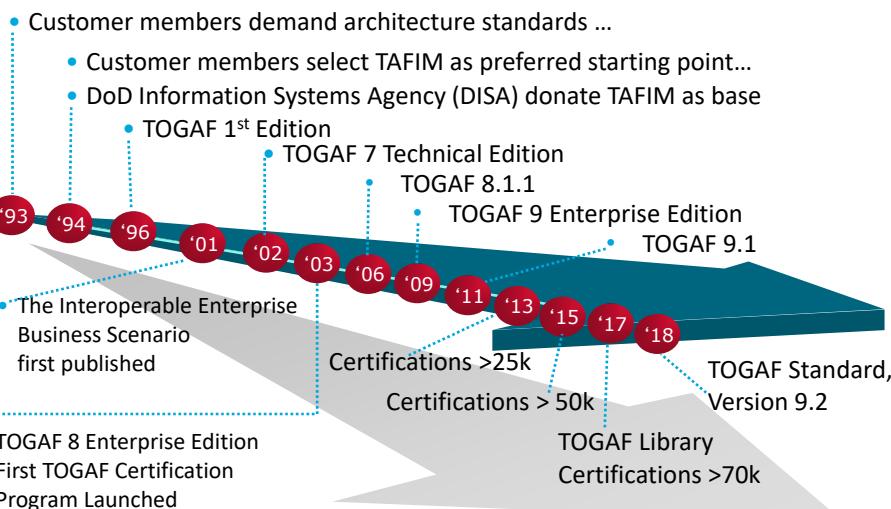
- A customer initiative
- A framework, not an architecture
 - A generic framework for developing architectures to meet different business needs
 - Not a “one-size-fits-all” architecture
- Originally based on TAFIM (U.S. DoD)

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

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Member (End User) Driven



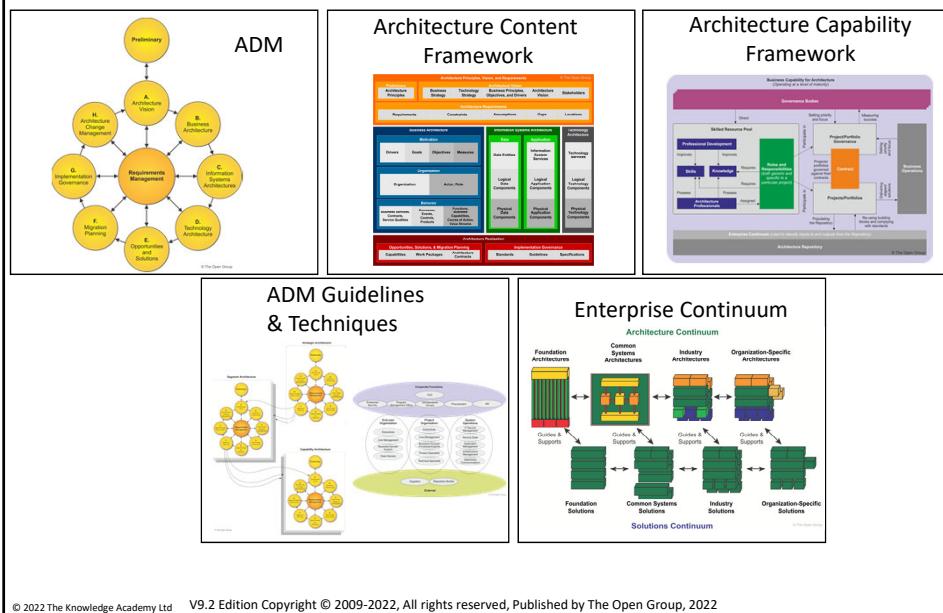
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TOGAF Long-Term Goals

- 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

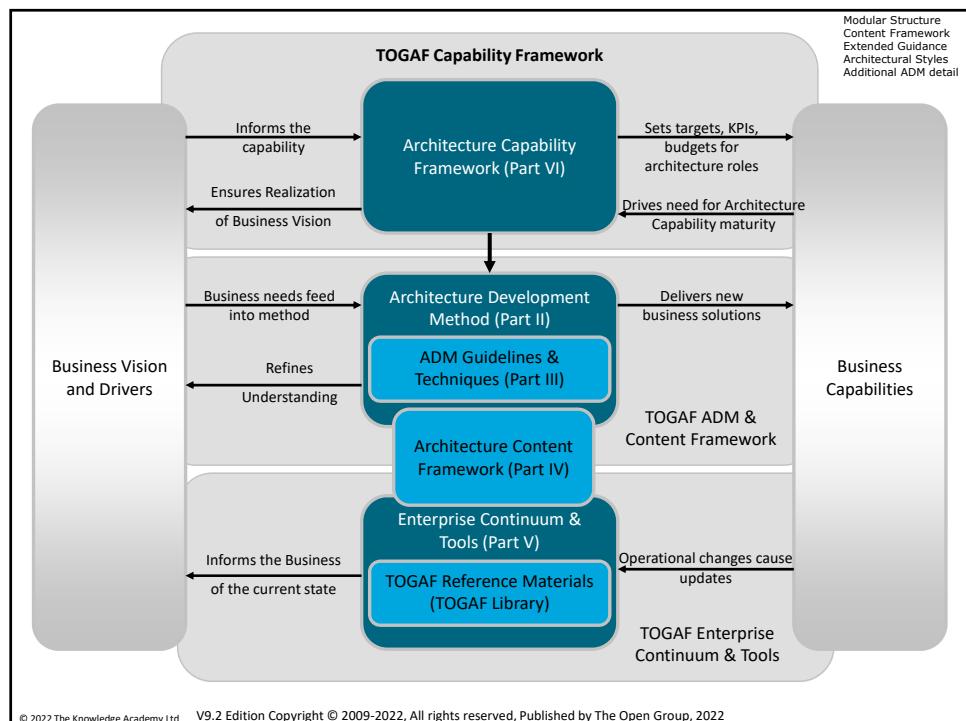
Part I - Introduction
Preface, Executive Overview, Core Concepts, Definitions
Part II – Architecture Development Method
Introduction to ADM
ADM Phase Narratives
Part III – ADM Guidelines and Techniques
Guidelines for Adapting the ADM Process
Techniques for Architecture Development
Part IV – Architecture 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

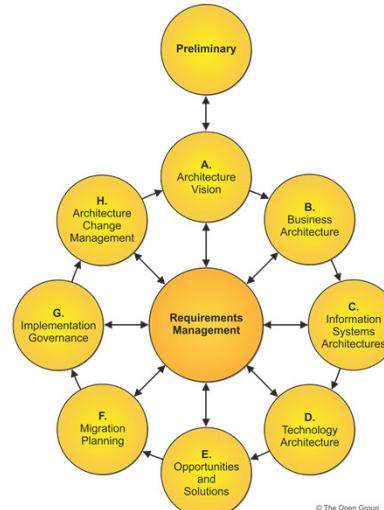
Architecture asset re-use:

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

Decisions based on:

Competence / resource availability
Value accruing to the enterprise.

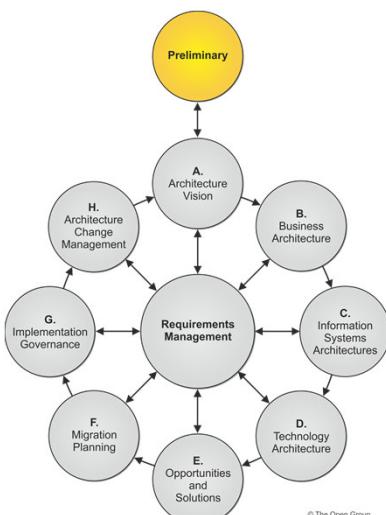
Every phase is validated against and validates
the current requirements of the business.



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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

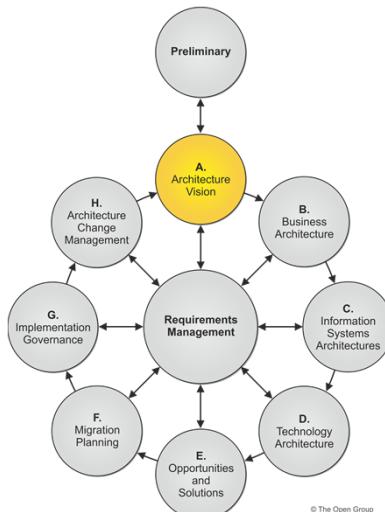


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Phase A: Architecture Vision

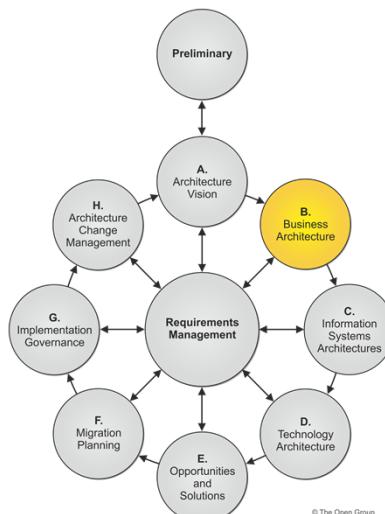
- Initiates one iteration of the architecture process
 - Sets scope, constraints, expectations
 - Required at the start of every architecture cycle
- Creates the Architecture Vision
- Validates business context
- Creates the Statement of Architecture work



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Phase B: Business Architecture

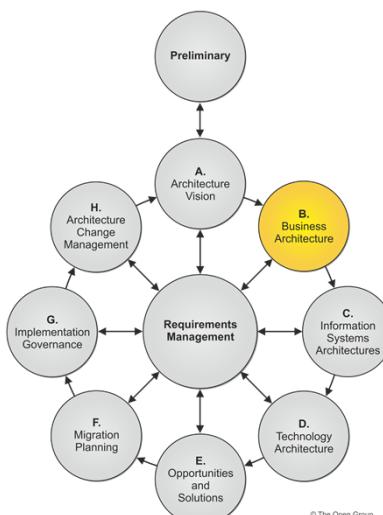
- The fundamental organisation of a business, embodied in
 - its business processes and people,
 - their relationships
 - to each other and the environment,
 - and the principles governing its design and evolution
- Shows how the organisation meets its business goals



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Business Architecture - Contents

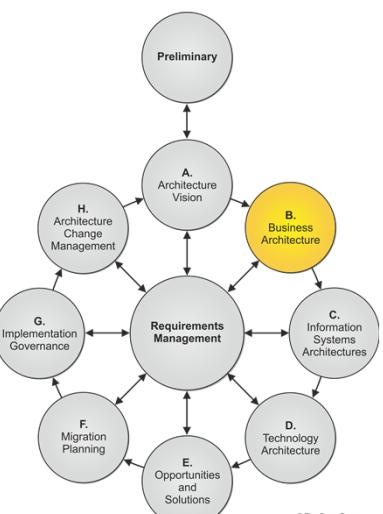
- Organisation structure
- Business goals and objectives
- Business functions
- Business services
- Business processes
- Business roles
- Business data model
- Correlation of organisation and functions



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Business Architecture - Steps

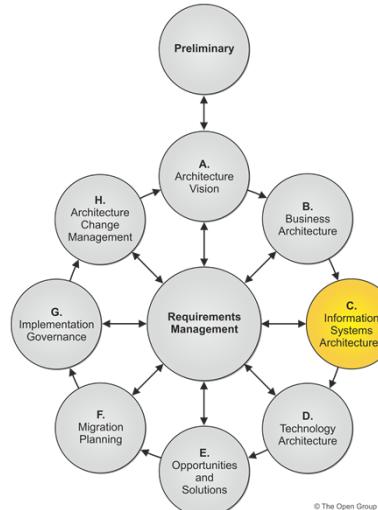
1. Select reference models, viewpoints and tools
2. Define Baseline Architecture Description
3. Define Target Architecture Description
4. Perform gap analysis
5. Define candidate roadmap components
6. Conduct formal stakeholder review
7. finalise the Architecture
8. Create Architecture Definition Document



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Phase C: Information Systems Architectures

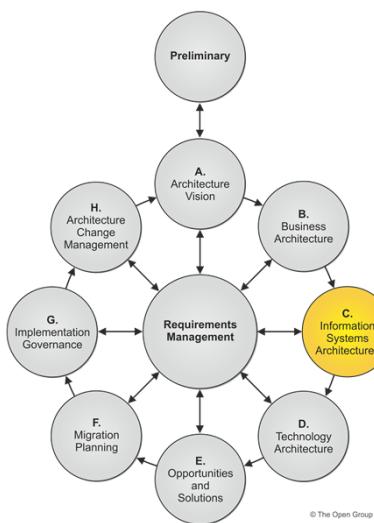
- Documenting the Information Systems Architecture for a project including development of Data and Application Architectures addressing:
 - The major types of information and applications that process them
 - relationships to each other and the environment, and the principles governing its design and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



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Data or Applications first?

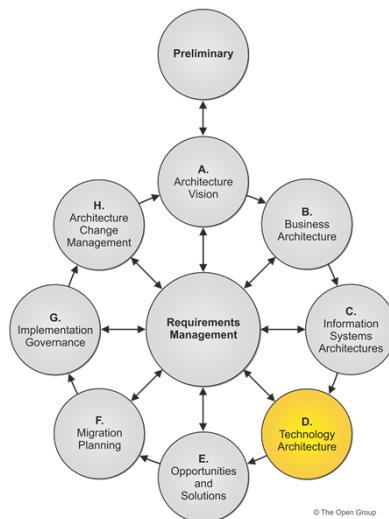
- It is usually necessary to address both
 - Not always the case, depending on project scope and constraints
- May be developed in either order, or in parallel
 - Theory suggests Data Architecture comes first
 - Practical considerations may mean that starting with Application Architecture may be more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



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Phase D: Technology Architecture

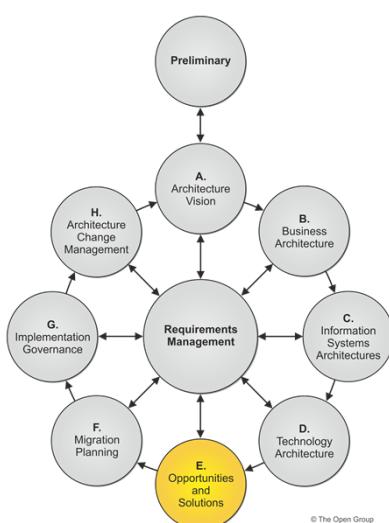
- The fundamental organisation of an IT system, embodied in
 - its hardware, software and communications technology
 - their relationships to each other and the environment,
 - and the principles governing its design and evolution



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Phase E: Opportunities and Solutions

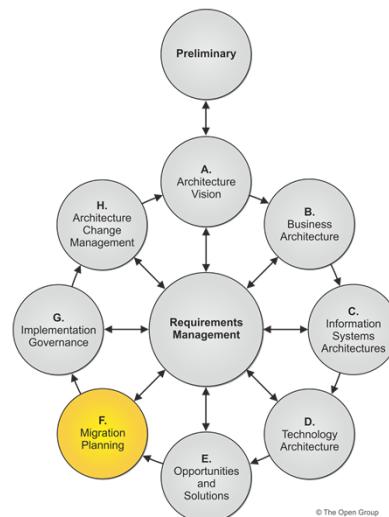
- Perform initial implementation planning
- Identify the major implementation projects
- Determine if an incremental approach is required, if so define Transition Architectures
- Decide on approach
 - Make v Buy v Re-Use
 - Outsource
 - COTS
 - Open Source
- Assess priorities
- Identify dependencies



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Phase F: Migration Planning

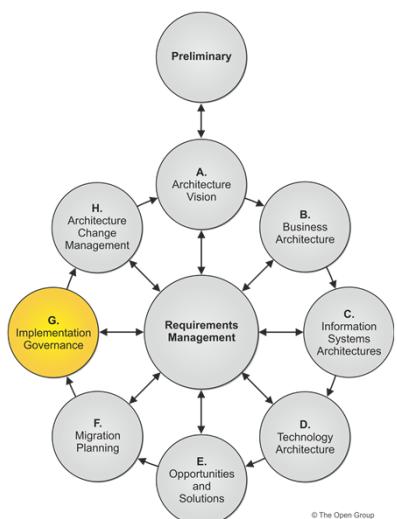
- For work packages and projects identified in Phase E perform
 - Cost/benefit analysis
 - Risk assessment
- finalise a detailed Implementation and Migration Plan



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Phase G: Implementation Governance

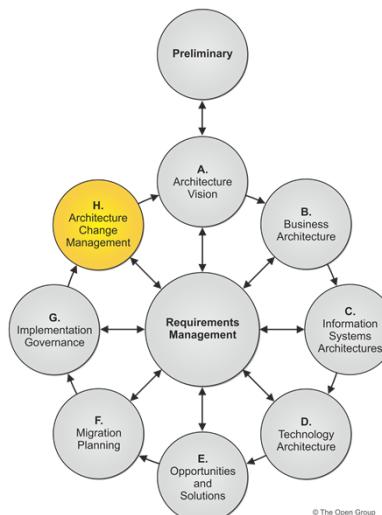
- Provide architectural oversight for the implementation
- Defines architecture constraints on implementation projects
- Govern and manage an Architecture contract
- Monitors implementation work for conformance
- Produce a *Business Value Realization*



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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 2021)
- 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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Case Study Exercise

Architecture Landscape

Exercise #2



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Module 2:

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

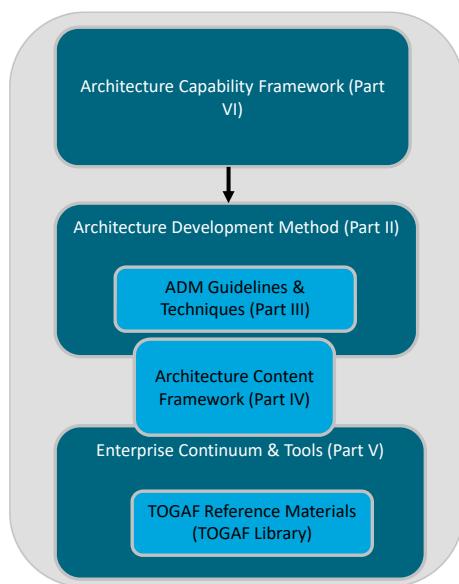
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What is the TOGAF ADM?

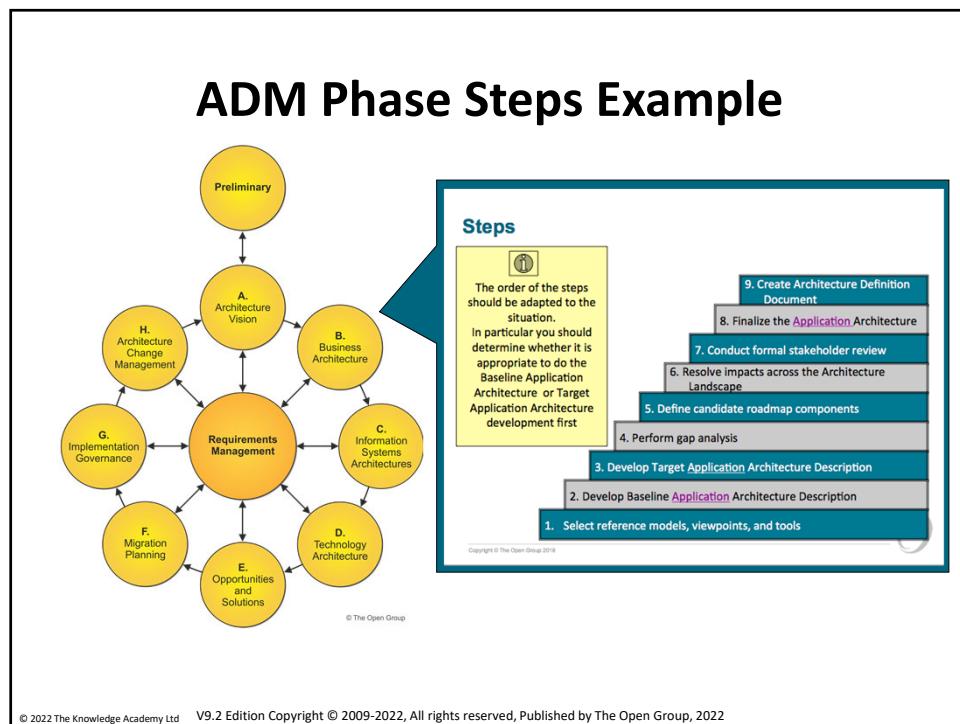
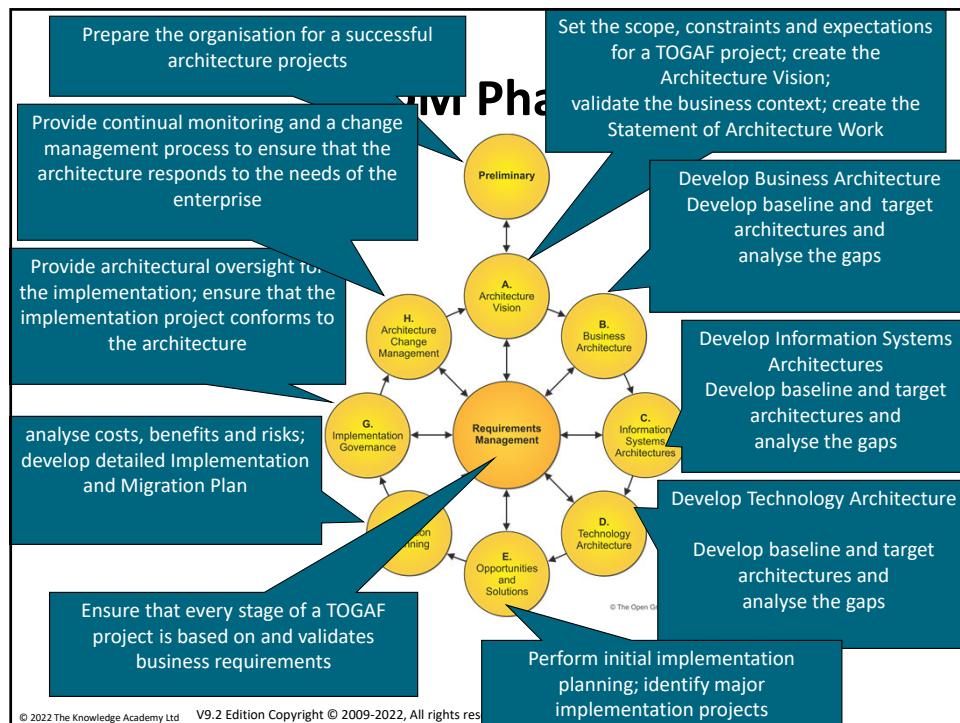
- The ADM forms the core of the TOGAF framework
- The result of contributions from many architecture practitioners
- A process for developing an enterprise architecture
- Integrates all the elements within the TOGAF standard
- Designed to address enterprise's business and IT needs by providing:
 - A 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 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
 - A convention is used to illustrate the evolution of deliverables
 - 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

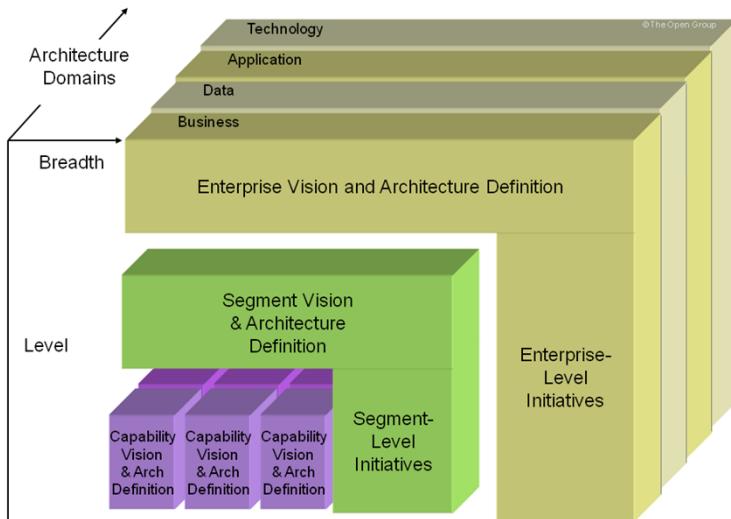
- The organisational authority of the team producing the architecture
- The objectives and stakeholder concerns to be addressed within the architecture
- The availability of people, finance, and other resources

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



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

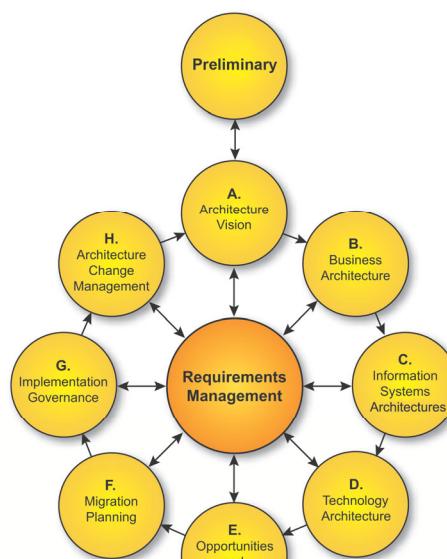
Module 3:

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
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

- 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

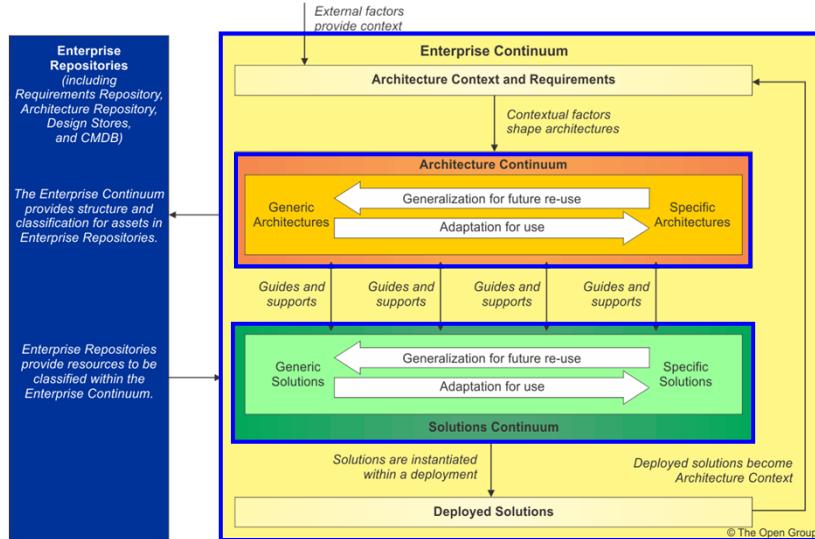
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Architecture Reuse

- 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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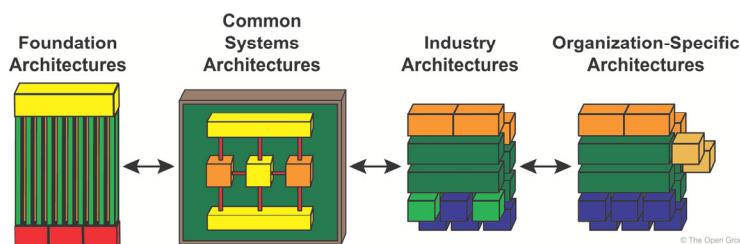
Enterprise Continuum: Constituents



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The Architecture Continuum

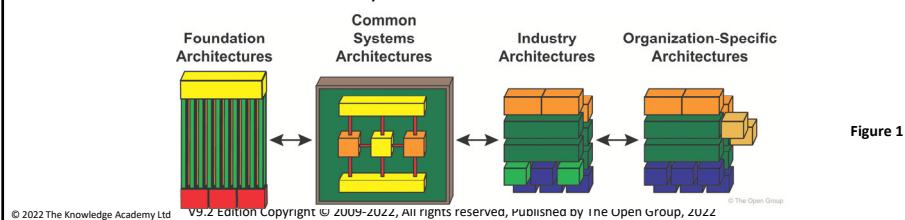
- Architectures range from Foundation Architectures through Common Systems Architectures, and Industry Architectures to an enterprise's own organisation-Specific architecture
- Arrows represent bi-directional relationship between the different architectures
 - Left to right: meeting enterprise needs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



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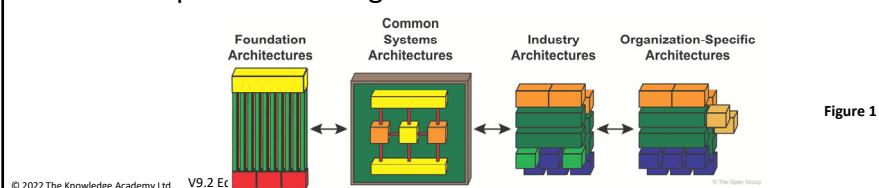
The Architecture Continuum

- 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



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



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

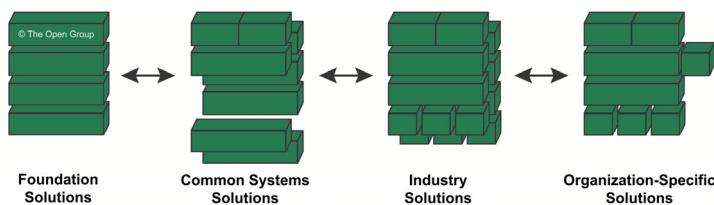


Figure 2

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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

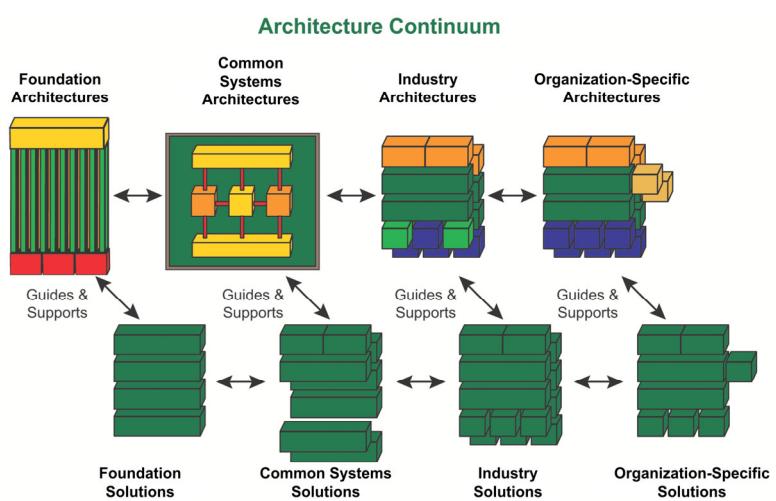


Figure 3: Best case for leveraging of architecture and solution components

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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

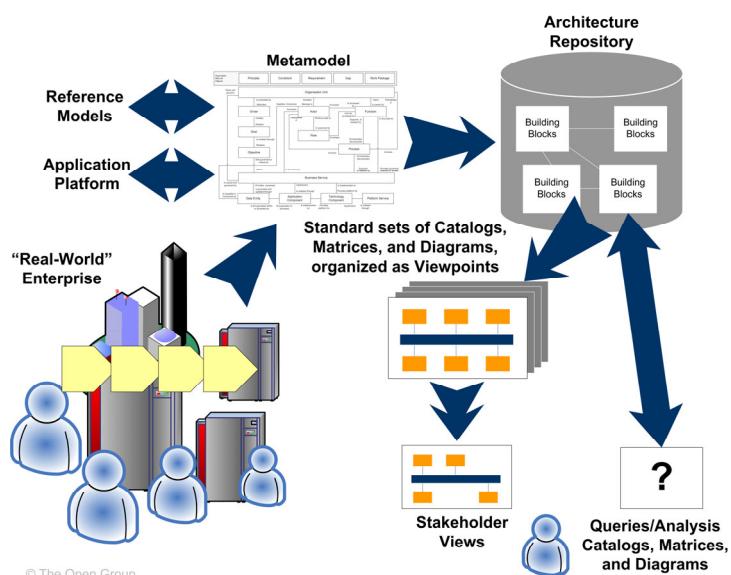
- Tools are needed to manage and control the artifacts within the Enterprise Continuum
 - To promote re-use
 - To enable sharing of architecture information within an organisation
 - To facilitate easier maintenance of the architecture
 - To ensure common terminology is used
 - To provide stakeholders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



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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.

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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 It 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 F6:

ADM Phases

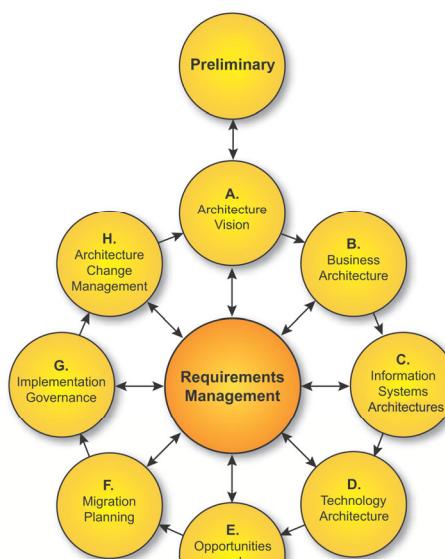
Level 1

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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
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

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



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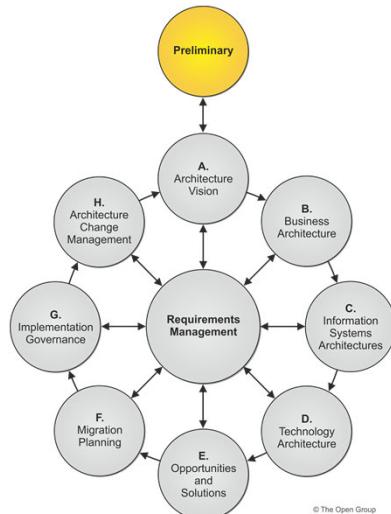
Module Objectives

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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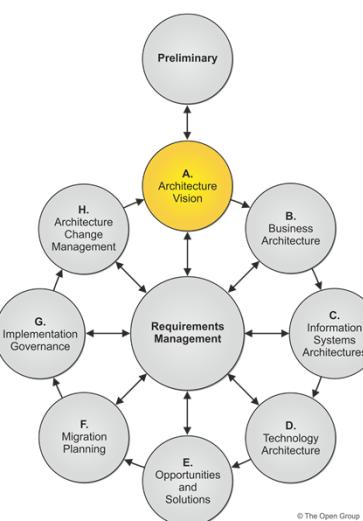
Approach



- 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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Case Study Exercise

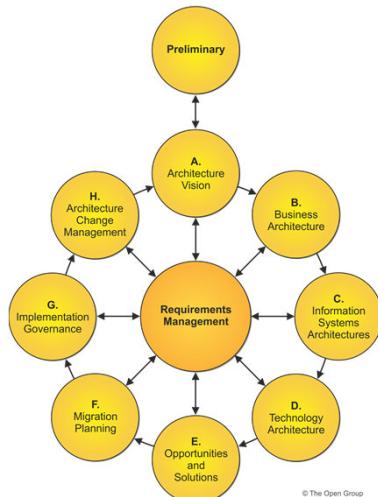
Business Scenario

Exercise #3



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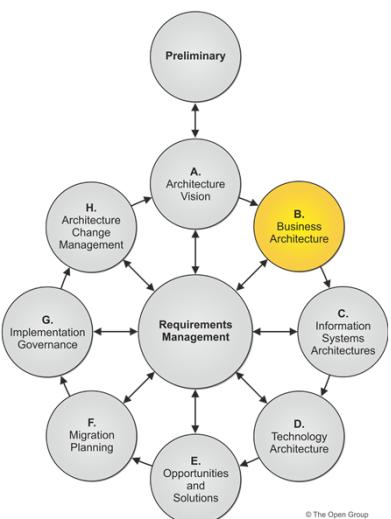
Business Scenarios and the ADM



- 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

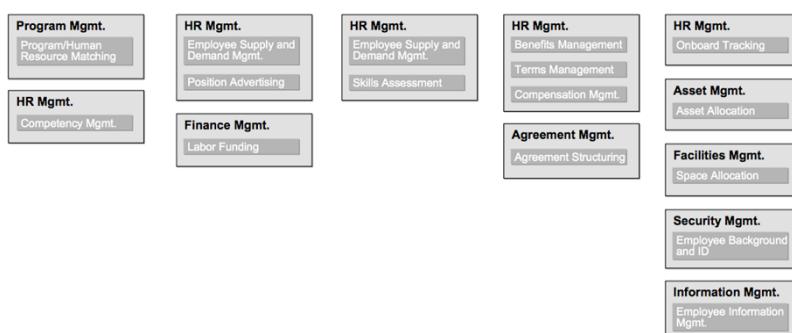
- If an enterprise has existing architecture descriptions, they should be reused as the basis for the Baseline Description
- Where no such descriptions exist, information will have to be gathered and architecture descriptions developed.
- Techniques for developing architecture descriptions include:
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

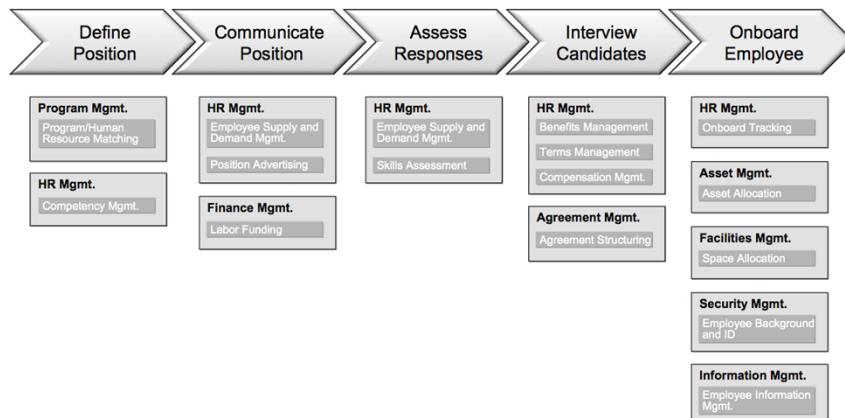


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Mapping Value Streams



- These provide context into why the organisation needs business capabilities

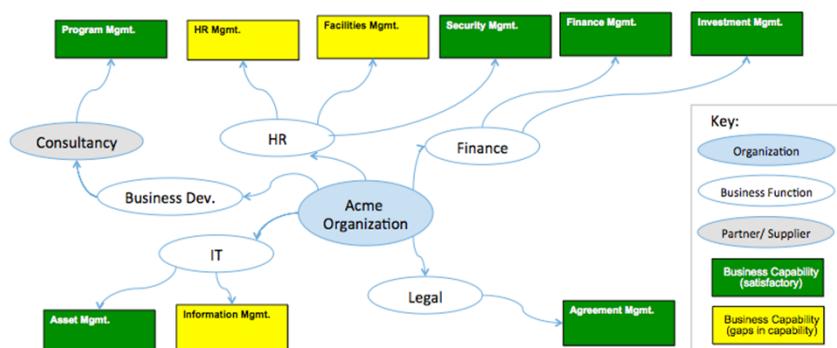


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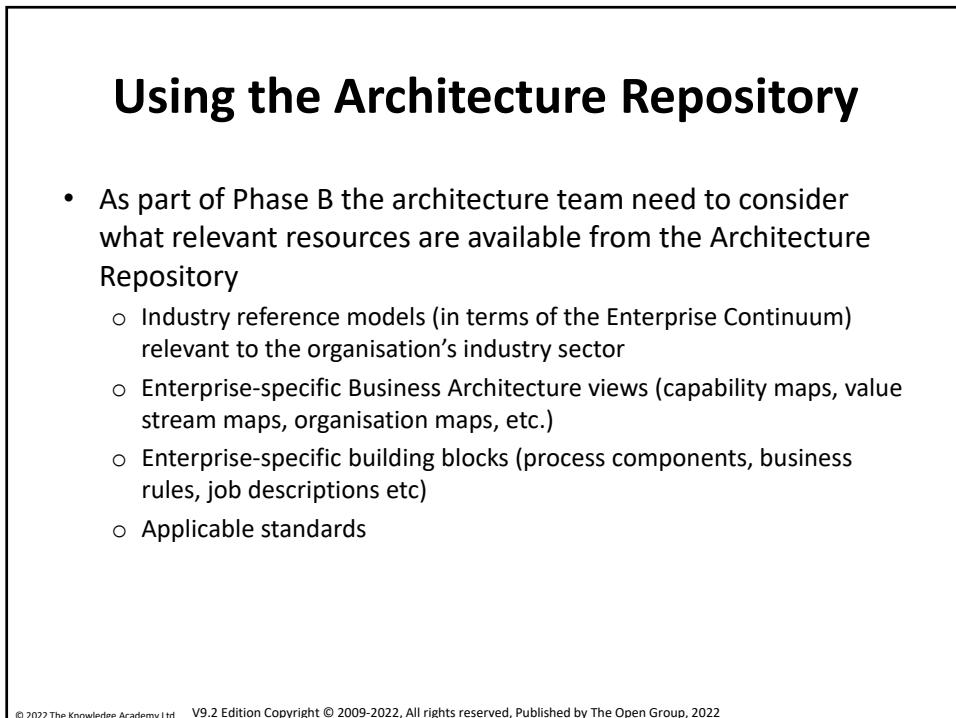
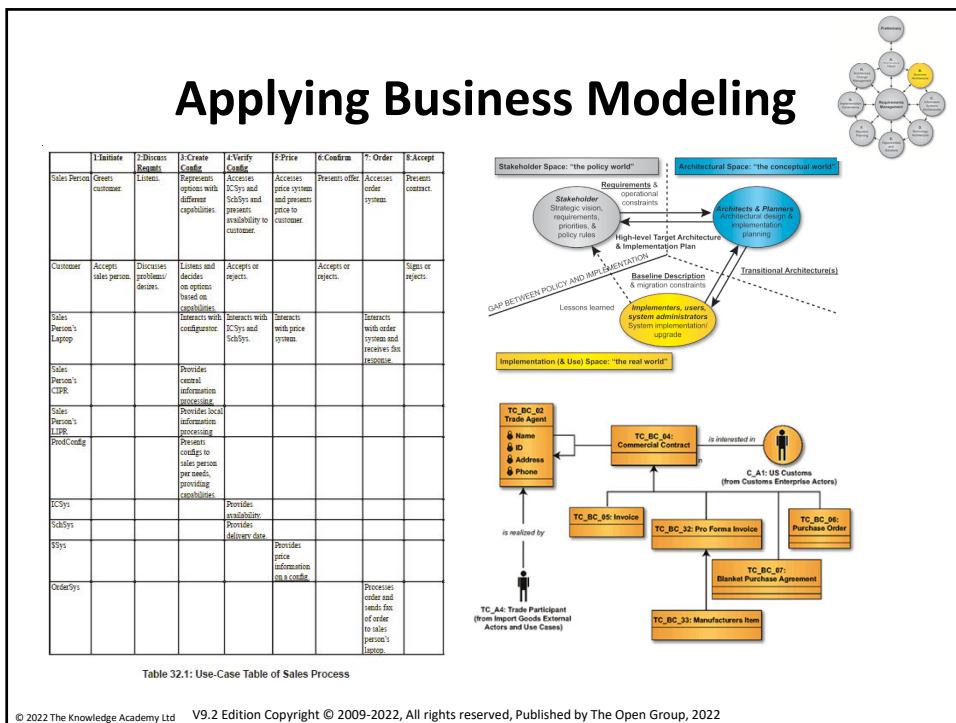
Applying the Organisation Map



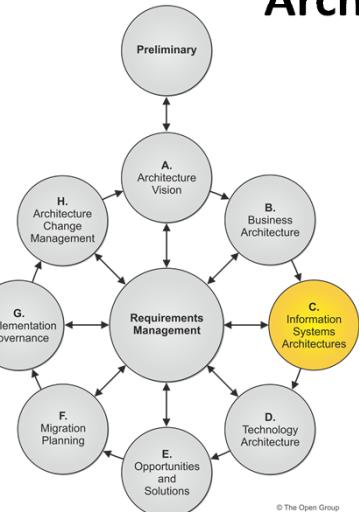
- The organisation map identifies the business units or third parties that possess or use those capabilities and which participate in the value streams.



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Phase C: Information Systems Architectures

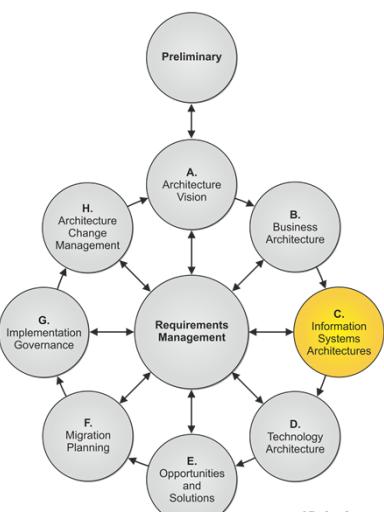


- Documenting the Information Systems Architecture for a project including development of Data and Application Architectures addressing:

- 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



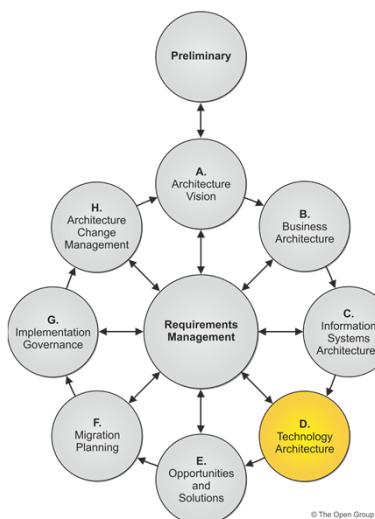
- Consider generic models relevant to an organisation's industry vertical
 - Data Architecture Resources
 - Generic data models, for example the ARTS data model (Retail industry), Energistics data model (Petrotechnical industry)
 - Application Architecture Resources
 - Generic application models, for 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

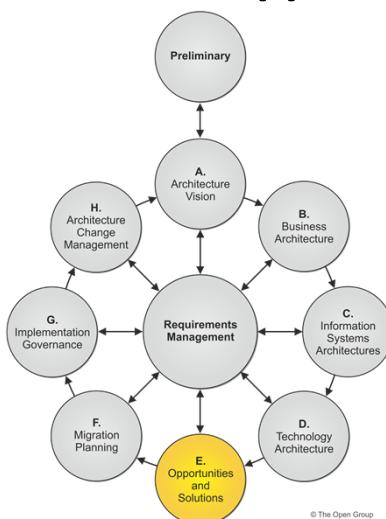


Approach

- 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



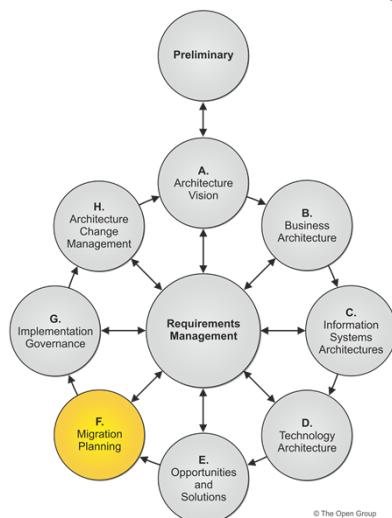
- This is the first phase concerning implementation
- It takes into account the complete set of gaps between the Target and Baseline Architectures in all architecture domains
- It logically groups changes into work packages
- It builds a best-fit roadmap based upon:
 - Stakeholder requirements
 - The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



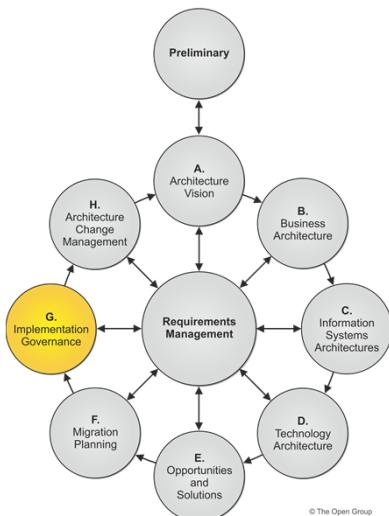
- Finalise the Architecture Roadmap and the supporting Implementation and Migration Plan
- Ensure that the Implementation and Migration Plan is coordinated with the enterprise's approach to managing and implementing change in the enterprise's overall change portfolio
- Ensure that the business value 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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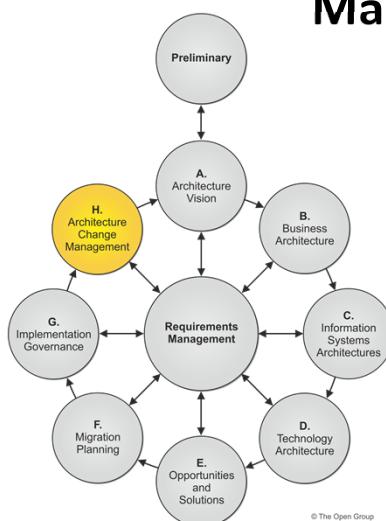
Approach



- 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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Case Study Exercise

Handling Change

Exercise #4



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Case Study Exercise

Principles

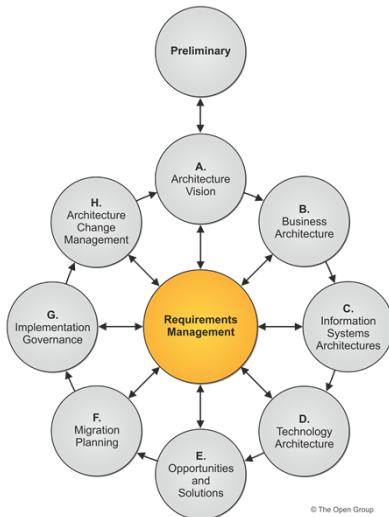
Exercise #5

Exercise #6



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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.

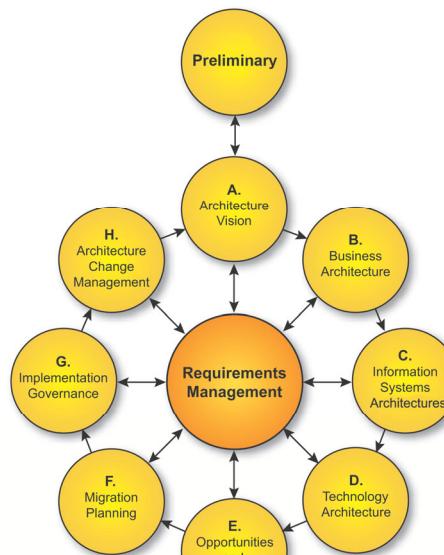
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Module F7: ADM Guidelines and Techniques

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ADM Guidelines and Techniques



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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

Name	Should represent the essence of the rule and be easy to remember
Statement	Should be succinct and unambiguously communicate the rule
Rationale	Should highlight the business benefits of adhering to the principle using business terminology.
Implications	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

Statement	Principles apply throughout the enterprise and override all other considerations when decisions are made
Rationale	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
Implications	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

Statement	Customers should be able to serve themselves
Rationale	Applying this principle will improve customer satisfaction, reduce administrative overhead, and potentially improve revenue.
Implications	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:

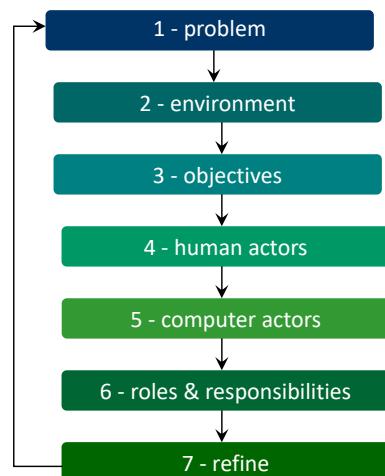
- **Understandable:** the underlying tenets can be quickly grasped
- **Robust:** principles must be definitive and precise to support consistent decision-making
- **Complete:** principles must cover every situation perceived
- **Consistent:** principles should not be contradictory
- **Stable:** principles 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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Case Study Exercise

Gap Analysis

Exercise #7



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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:

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:

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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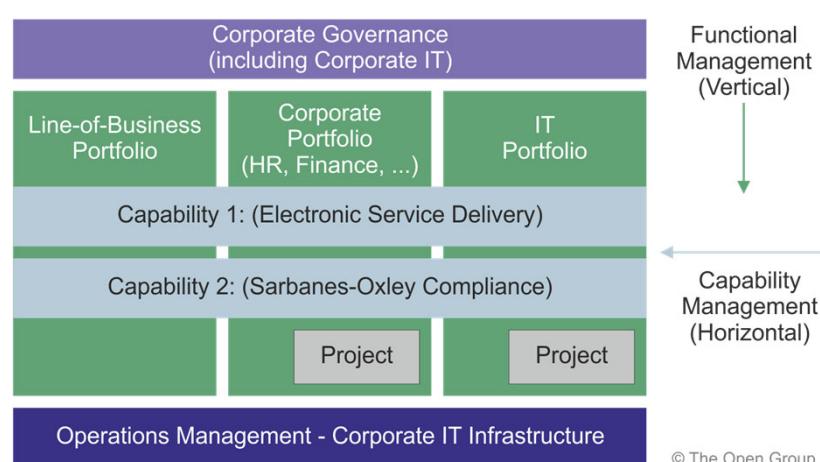
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Capability Based Planning

- 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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Case Study Exercise

Going Forward

Exercise #8



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Module 4: 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.

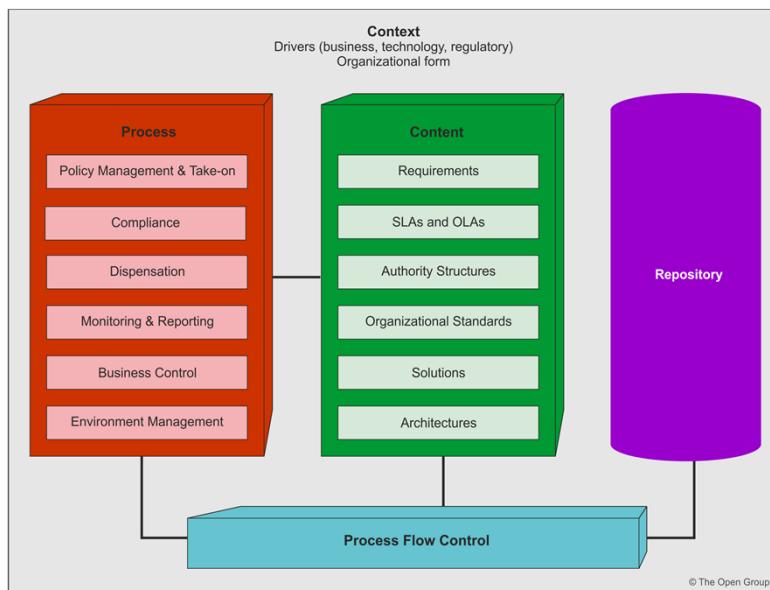
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TOGAF Architecture Governance Framework

- 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



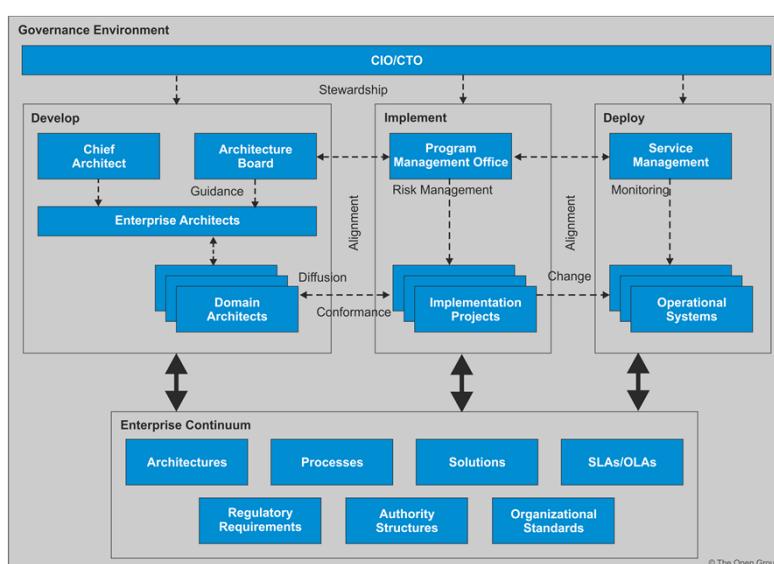
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Architecture Governance Framework - Conceptual Structure

- 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

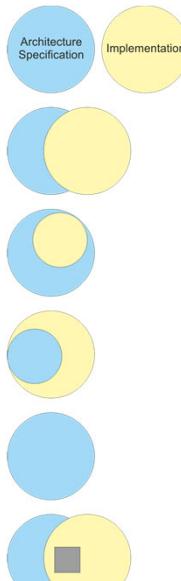
- Use of Architecture Contracts ensures
 - Continuous monitoring to check integrity, changes, decision-making, and audit of all architecture-related activities
 - Adherence to the principles, standards, and requirements of the existing or developing architectures
 - Identification of risks
 - A set of 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*

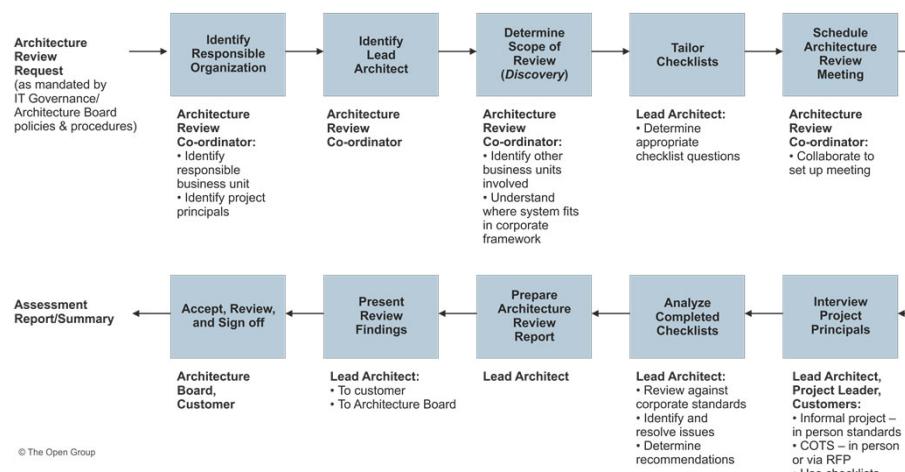
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Architecture Compliance Reviews

- 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 5: 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



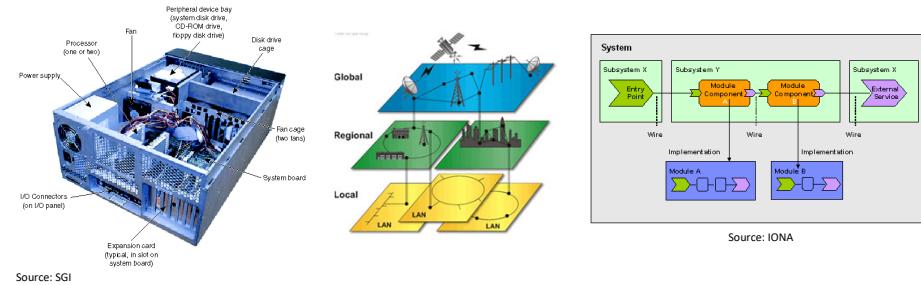
Concepts and Definitions

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

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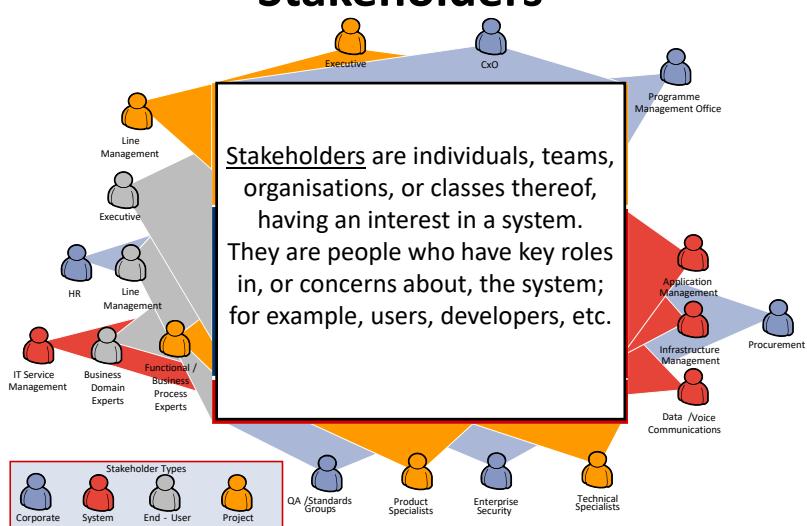
System

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

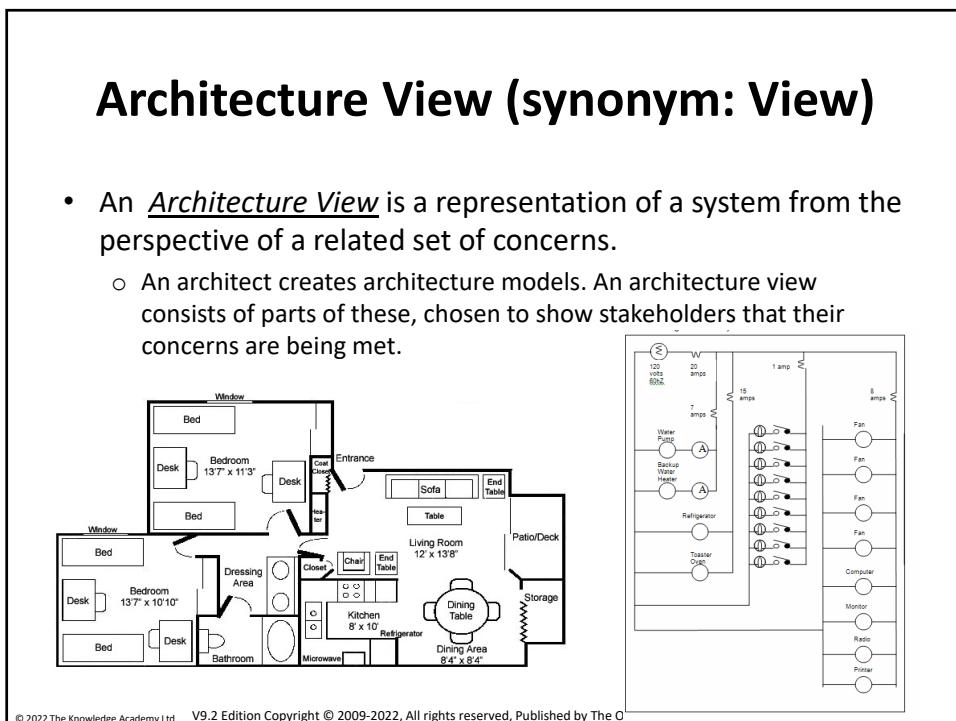
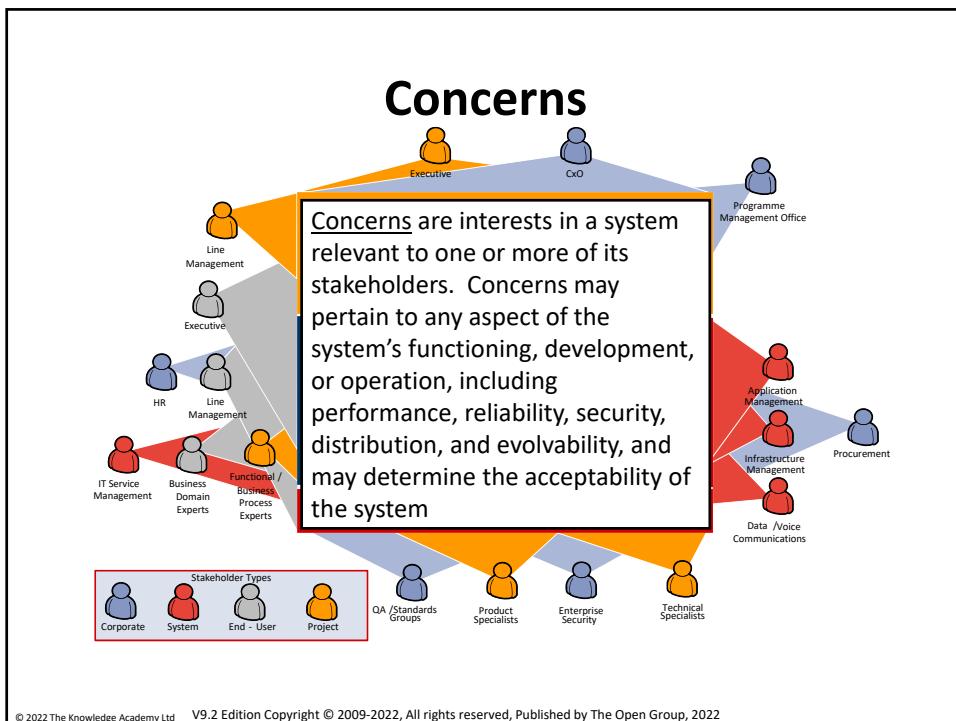


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Stakeholders



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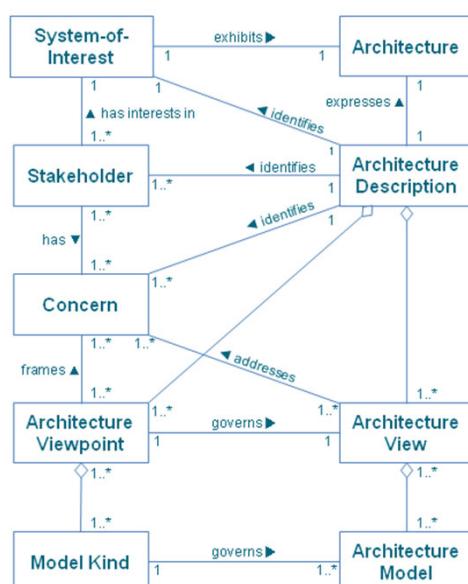


Architecture Viewpoint (synonym: Viewpoint)

- 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.

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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

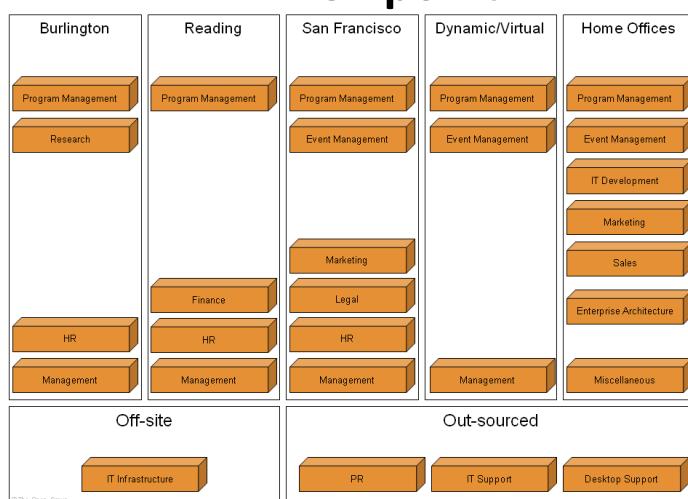


Figure 1: Example View - The Open Group Business Domains

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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

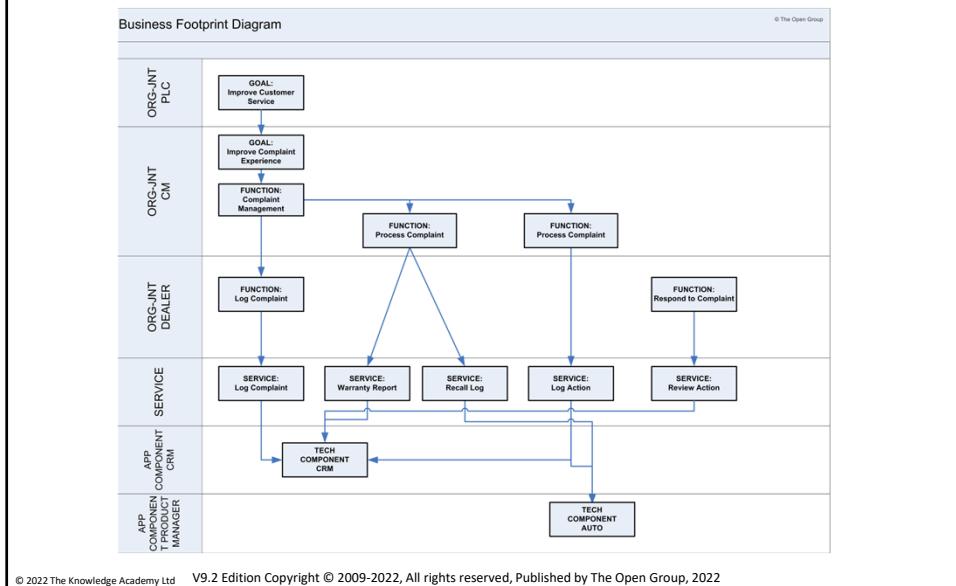
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Diagrams

- 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



Summary

In general, TOGAF embraces the concepts and definitions of ISO/IEC/IEEE 42010: 2021, 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

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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Case Study Exercise

Explaining a View

Exercise #9



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Module 6: Stakeholder Management

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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 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

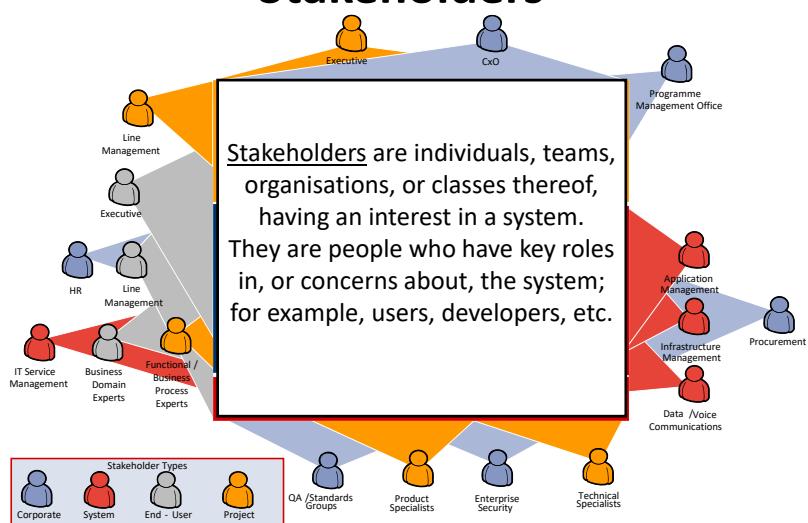
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Benefits

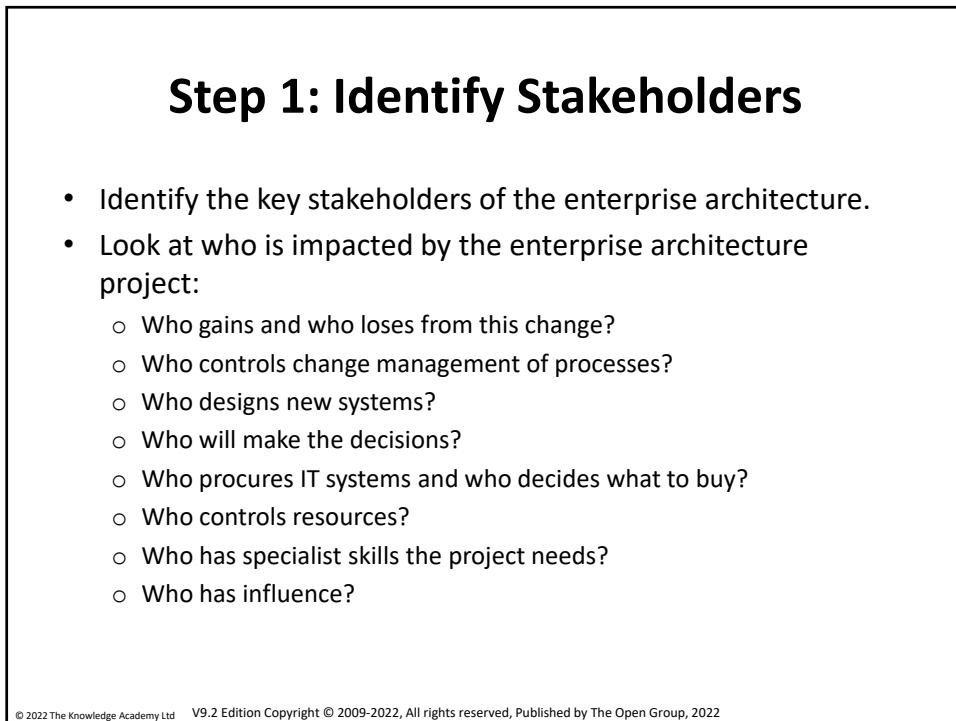
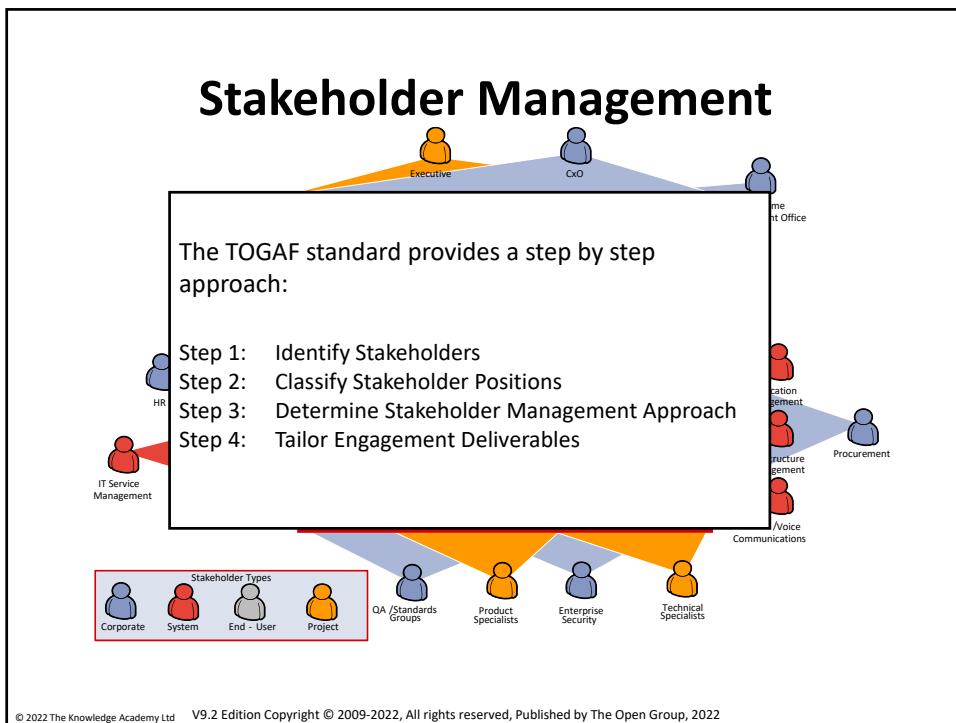
- Identifies the most powerful stakeholders early and ensures their input is used to shape the architecture
- Achieving support from the most powerful stakeholders can help achieve necessary resources
- Early communication with stakeholders helps with ensuring all understand the architecture process 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

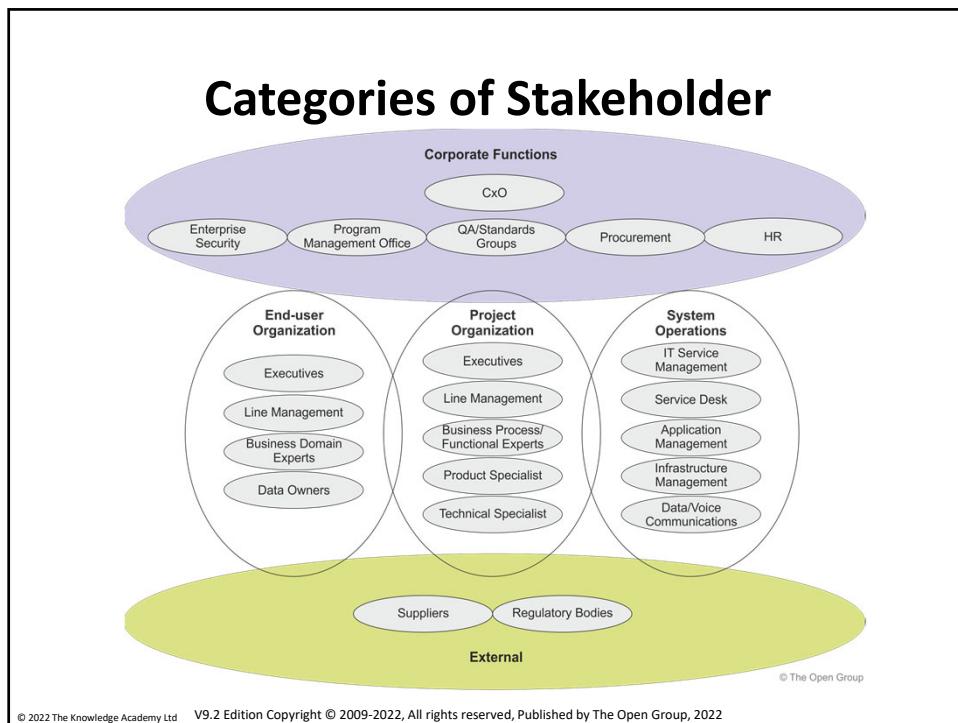
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Stakeholders



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Step 2: Classify Stakeholder Positions

- Classify and record positions in a Stakeholder Analysis Matrix

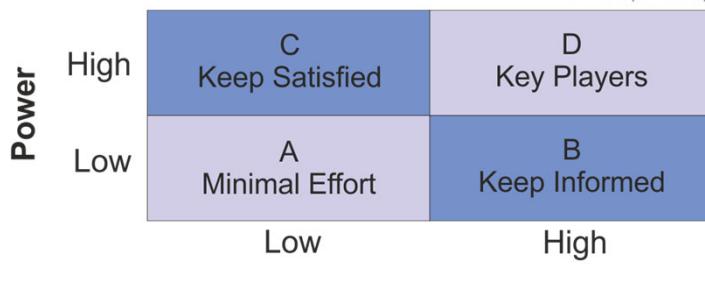
Stakeholder Group	Stakeholder	Ability to Disrupt the change	Current Understanding	Required understanding	Current commitment	Required commitment	Required support
CIO	John Smith	H	M	H	L	M	H
CFO	Jeff Brown	M	M	M	L	M	M

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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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Case Study Exercise

Managing Stakeholders

Exercise #10



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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 7: Building Blocks

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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 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

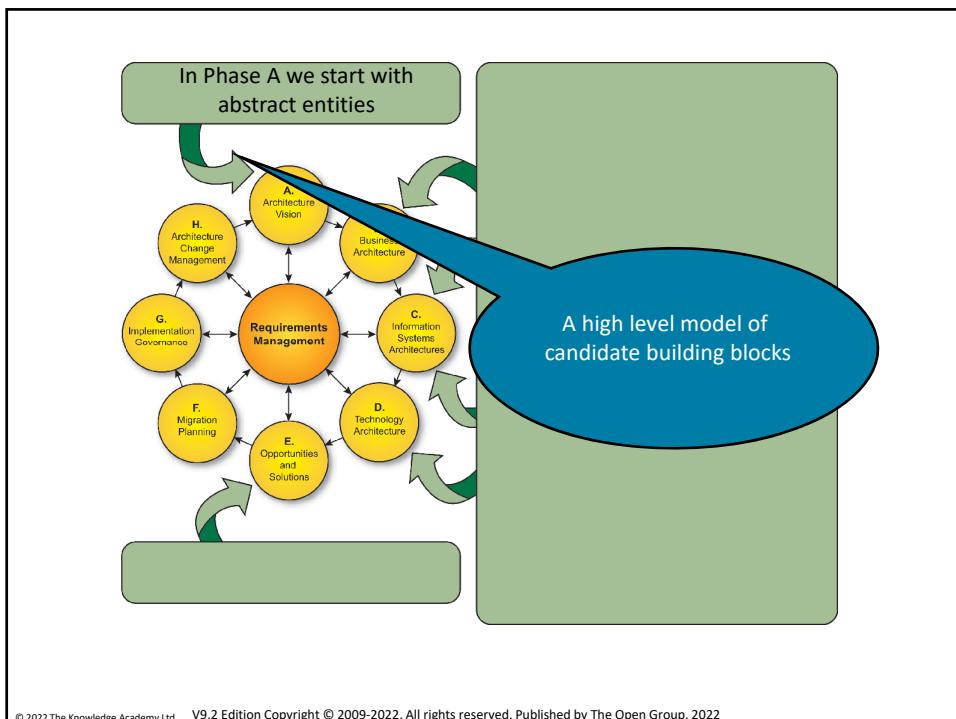
- An architecture is a set of building blocks
 - Depicted in an architectural model
 - A specification of how those building blocks are connected to meet the overall requirements of an information system
- The various building blocks in an architecture specify the services required in an enterprise specific 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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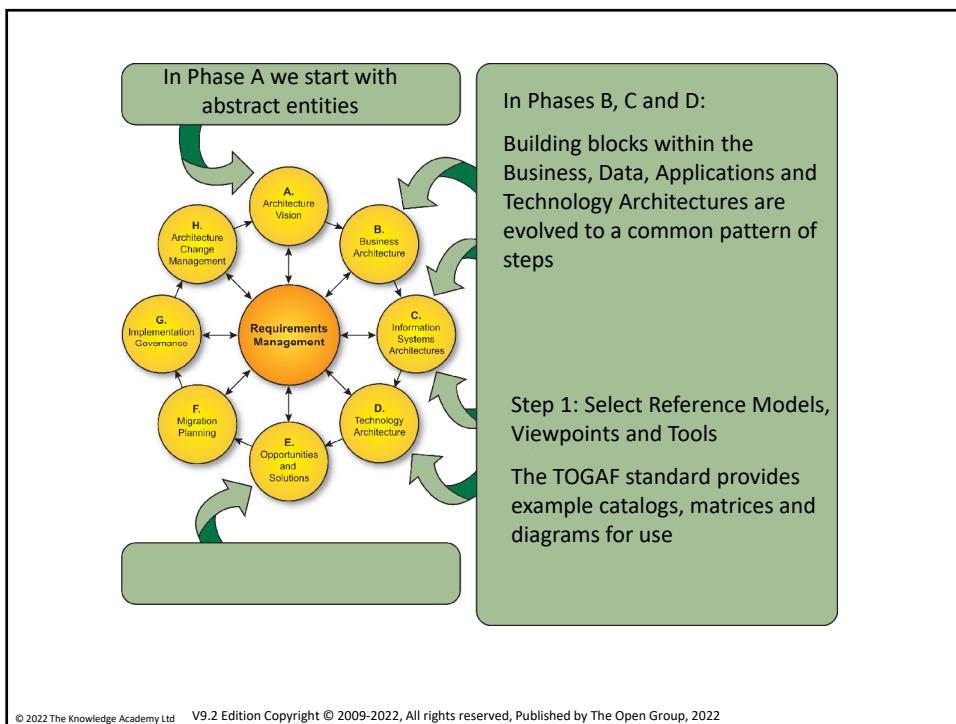
Building Block Design

- 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

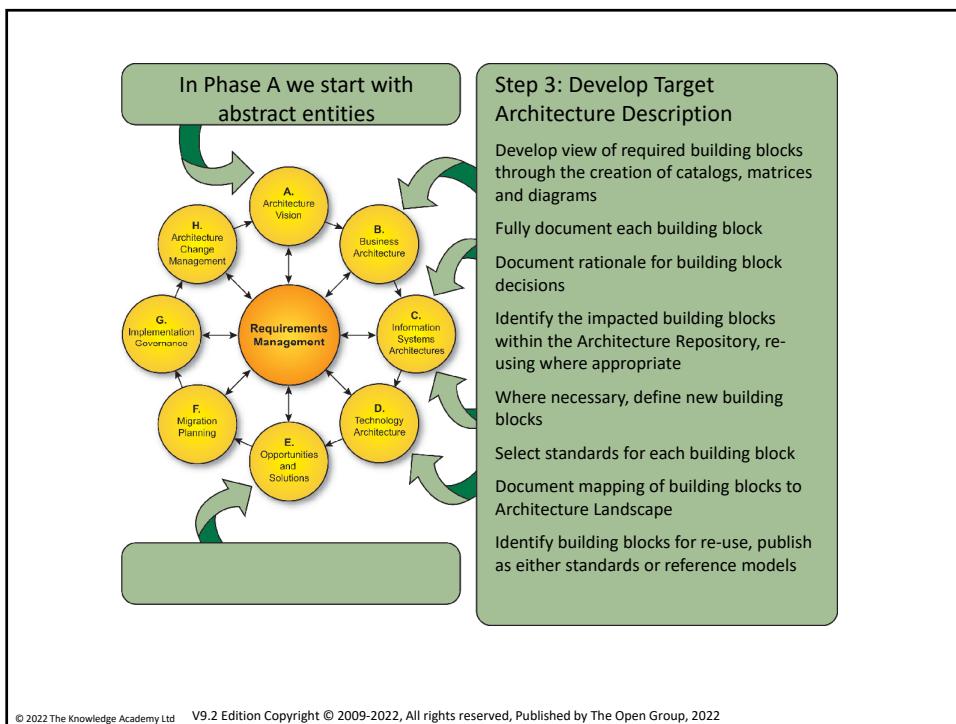
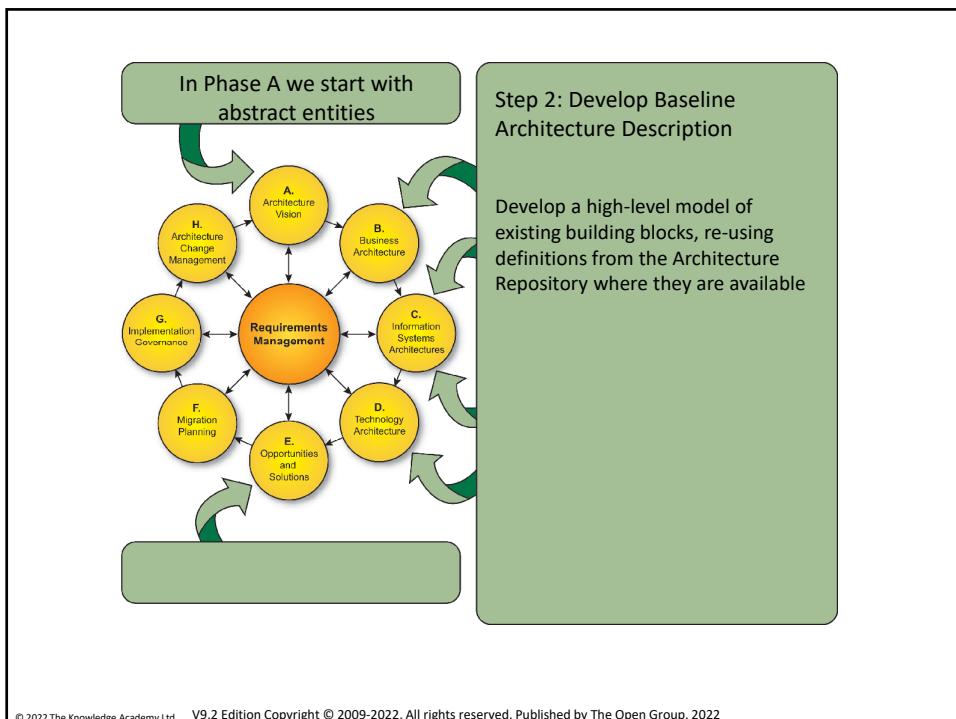
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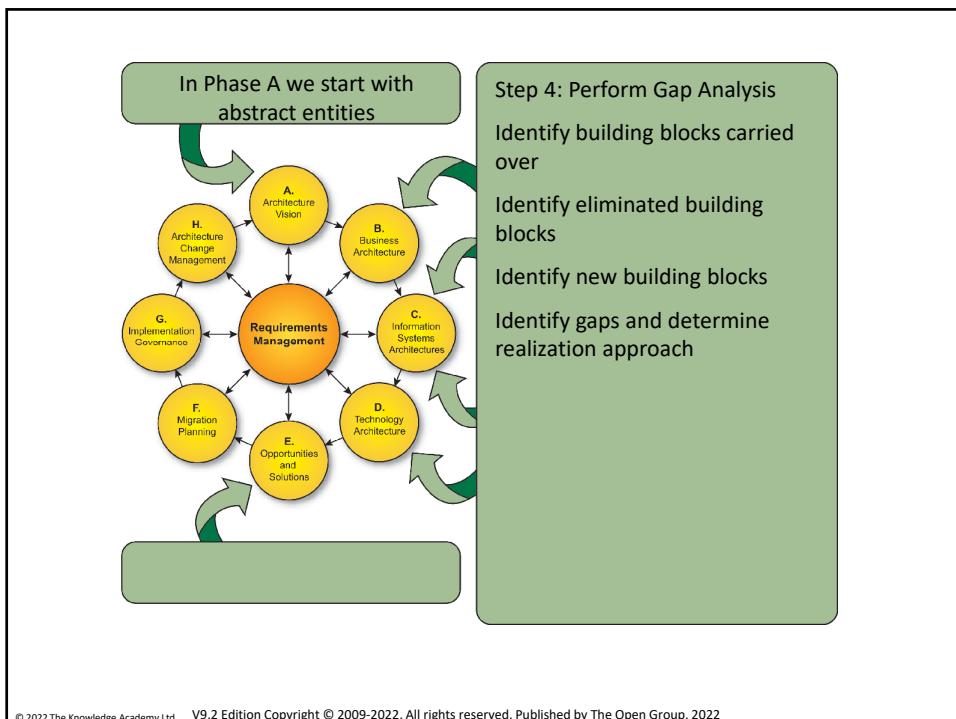


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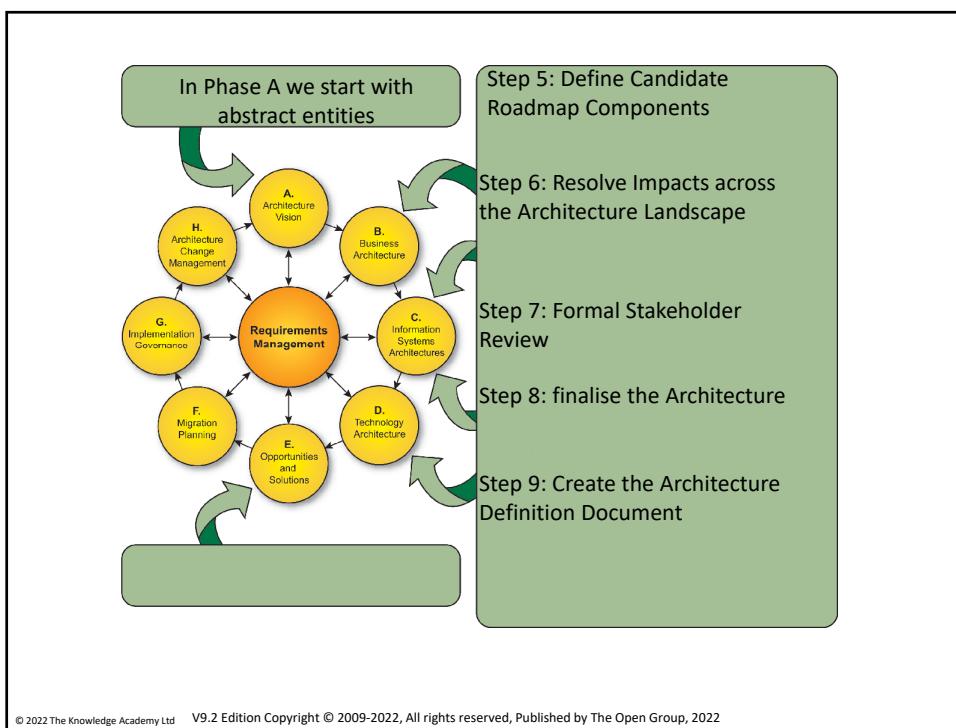


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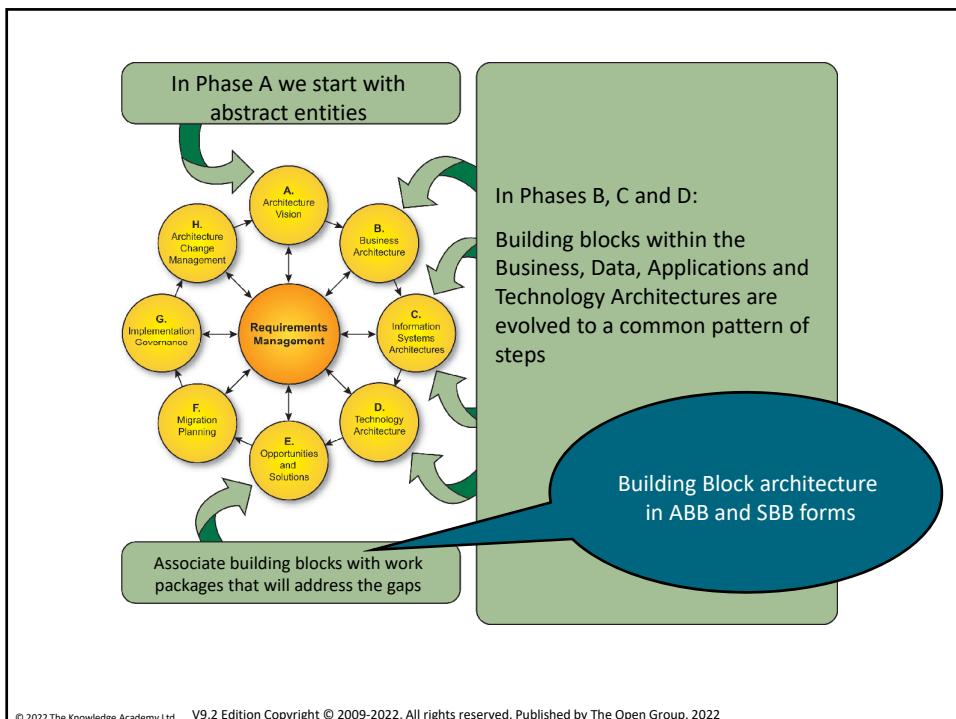




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Architecture Patterns

- 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.

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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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Case Study Exercise

Building Blocks

Exercise #11



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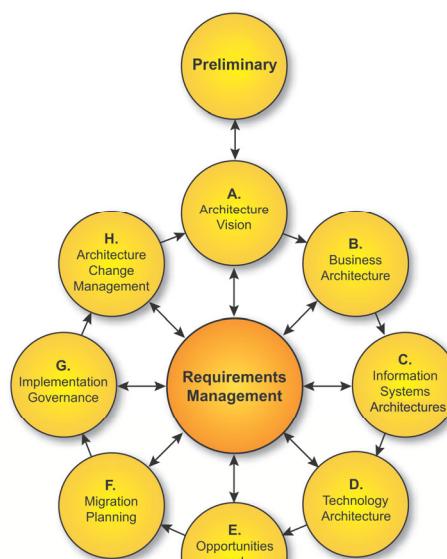
Module F11:

ADM Deliverables Level 1

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ADM Deliverables Level 1



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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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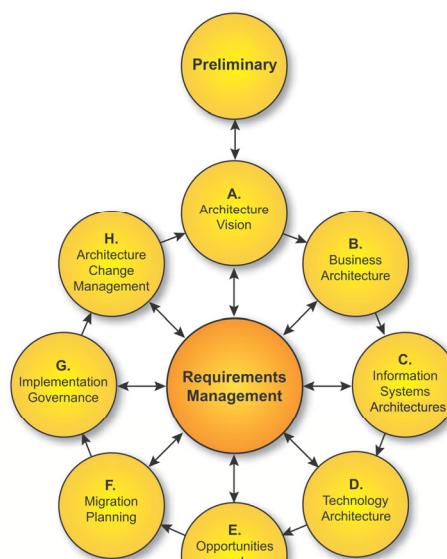
Module F12:

TOGAF® Reference Models

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TOGAF® Reference Models



TOGAF is a registered trademark of The Open Group in the United States and other countries

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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

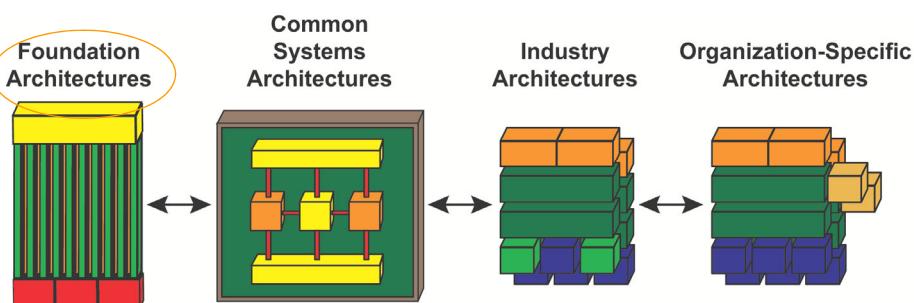
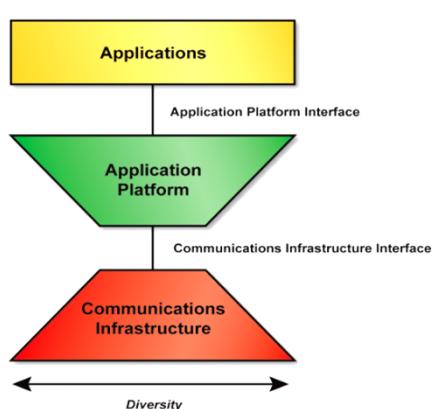


Figure 1

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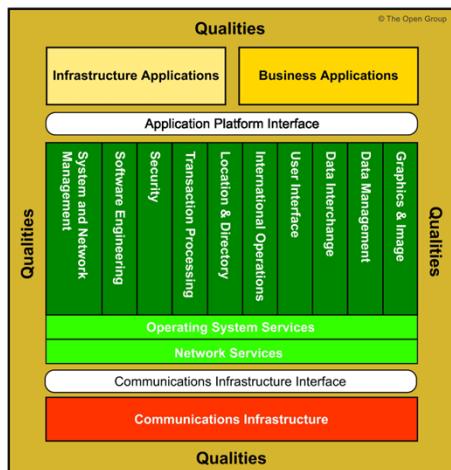
TRM Components



- 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

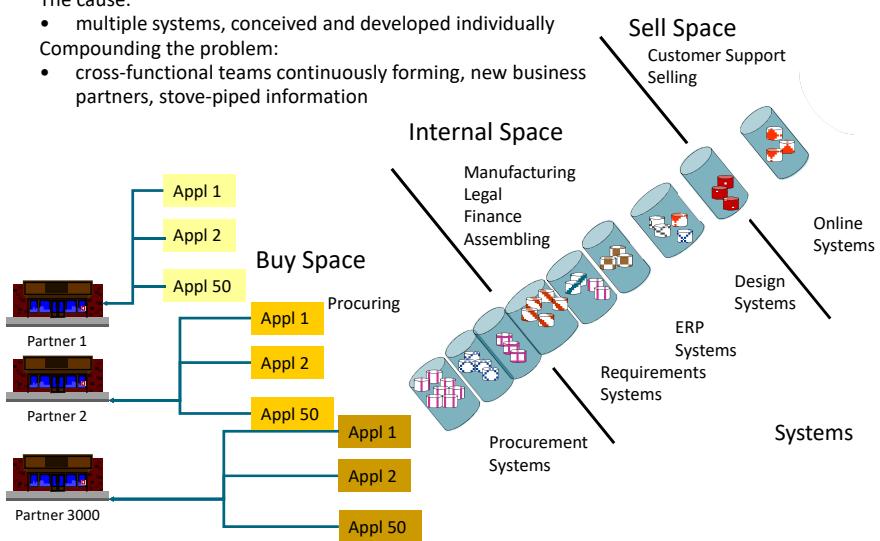
- It is a Foundation Architecture
- It can be used to build any system architecture
- A taxonomy defines consistent terminology

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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



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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

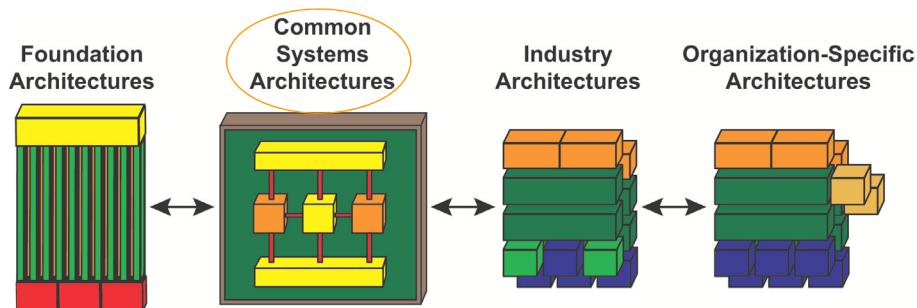
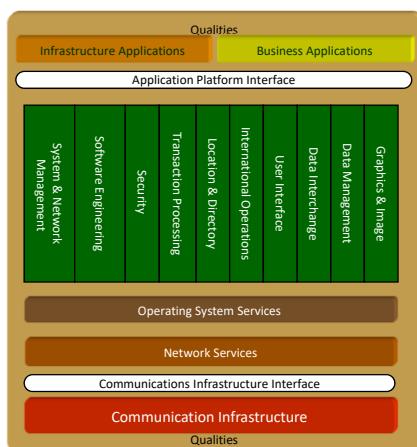


Figure 1

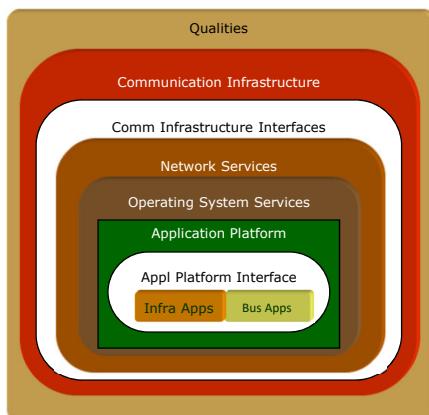
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TOGAF TRM Orientations

Side View



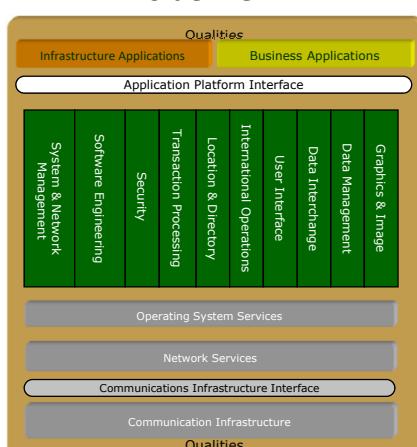
Top Down View



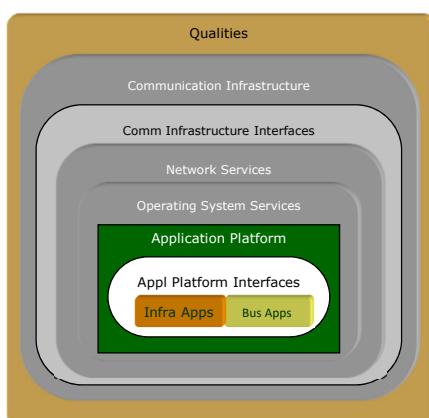
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Boundaryless Information Flow Focus

Side View

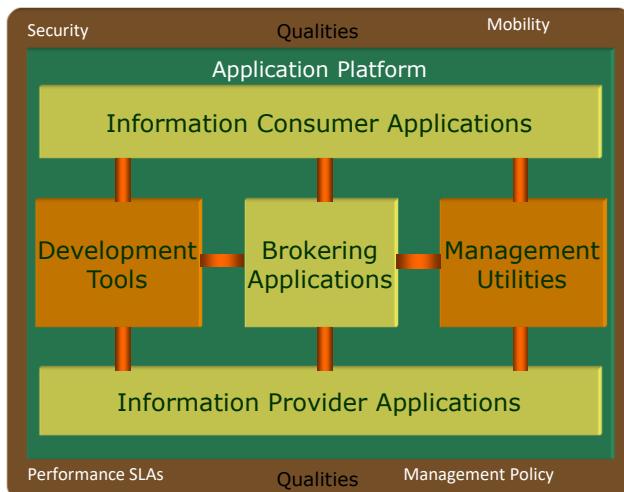


Top Down View



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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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Congratulations



Congratulations on completing this course!

Keep in touch

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Thank you

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TOGAF® 9.2 Training Course Level 2



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Course Outline (Level 2)

- Module 8: Preliminary Phase
- Module 9: Phase A: Architecture Vision
- Module 10 ADM Architecture Requirements Management
- Module 11A Phase B: Business Architecture – Catalogs, Matrices and Diagrams
- Module 11B Phase B: Business Architecture
- Module 12 Phase C: Information Systems Architectures – Overview
- Module 13A Phase C: Data Architecture – Catalogs, Matrices, and Diagrams
- Module 13B Phase C: Data Architecture
- Module 14: The Integrated Information Infrastructure Reference Model
- Module 15A Phase C: Application Architecture – Catalogs, Matrices and Diagrams
- Module 15B Phase C: Application Architecture
- Module 16 TOGAF® Foundation Architecture: the TRM
- Module 17A Phase D: Technology Architecture – Catalogs, Matrices and Diagrams
- Module 17B Phase D: Technology Architecture
- Module 18: Migration Planning Techniques

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Course Outline (Level 2)

- Module 19: Phase E: Opportunities and Solutions
- Module 20: Phase F: Migration Planning
- Module 21: Phase G: Implementation Governance
- Module 22: Phase H: Architecture Change Management
- Module 23: Architecture Partitioning
- Module 24: Adapting the ADM: Iteration and Levels
- Module 25: Adapting the ADM: Security
- Module 26: Architecture Maturity Models
- Module 27: Architecture Skills Framework

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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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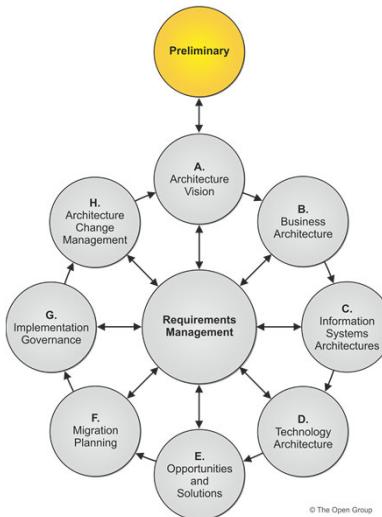
Approach

- 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

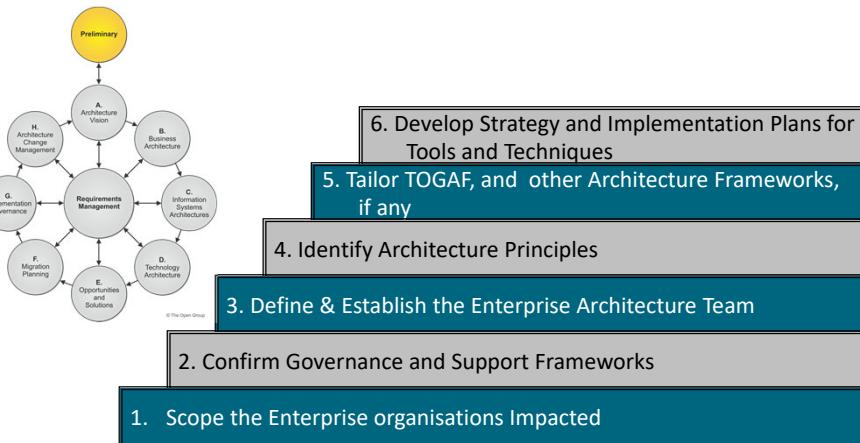


- The TOGAF Library
 - Other architecture frameworks
 - Business strategies and board business plans, IT strategy
 - Business principles, business goals, and business drivers
 - Major frameworks operating in the business
 - Governance and legal frameworks
- Any existing:**
- organisational model
 - Architecture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

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Steps



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1. Scope the Enterprise organisations Impacted

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

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.

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

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

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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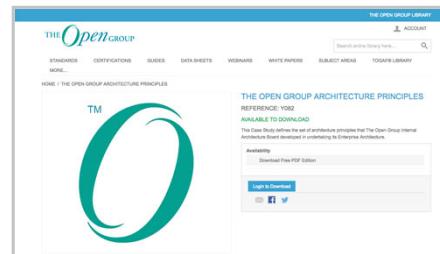
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An Example Statement of Principles

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

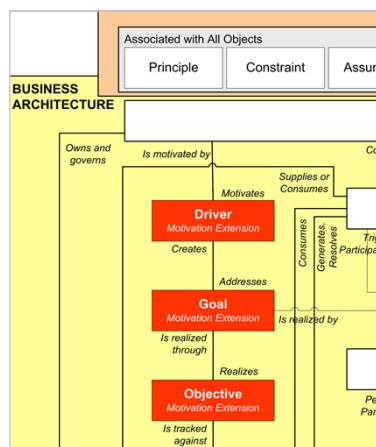
1. Understandable: they can be quickly grasped. Intent is clear and unambiguous.
2. Robust: they enable good decisions about architectures and plans, and enable enforceable policies and standards to be created. A principle must be precise to support consistent decision making in complex situations.
3. 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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Case Study Exercise

Metamodel Extensions

Exercise #12



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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

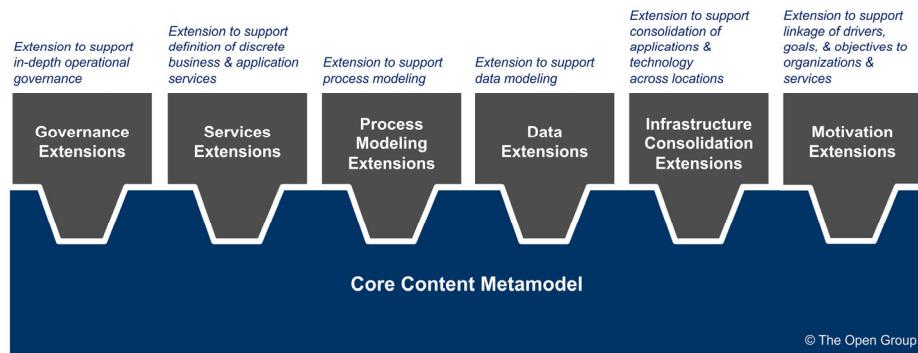
Process Tailoring

- 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

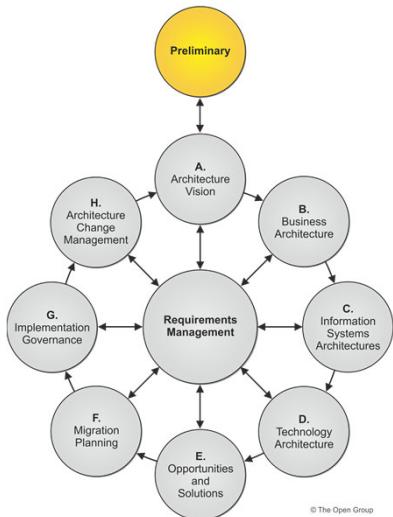
Develop a tools strategy to support the architecture activity.

- 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

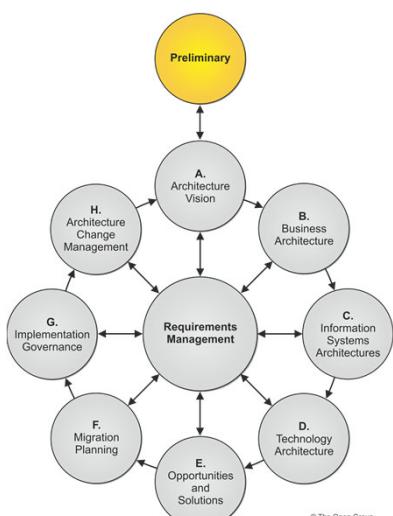


- organisational model for Enterprise Architecture
- Tailored Architecture Framework, including Architecture Principles
- Initial Architecture Repository
- Restatement of business principles, goals and drivers
- Request for Architecture Work
- Architecture Governance Framework

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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"> 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 Capability Maturity target <p>Establish the Architecture Capability:</p> <ul style="list-style-type: none"> 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 	<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"> Architecture method Architecture content Configured and deployed tools Architecture Principles Architecture Repository </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

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> <p>* Principle</p>

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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

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

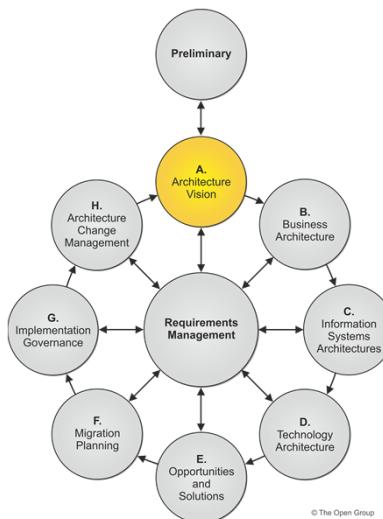
Architecture Vision Objectives

- 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

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

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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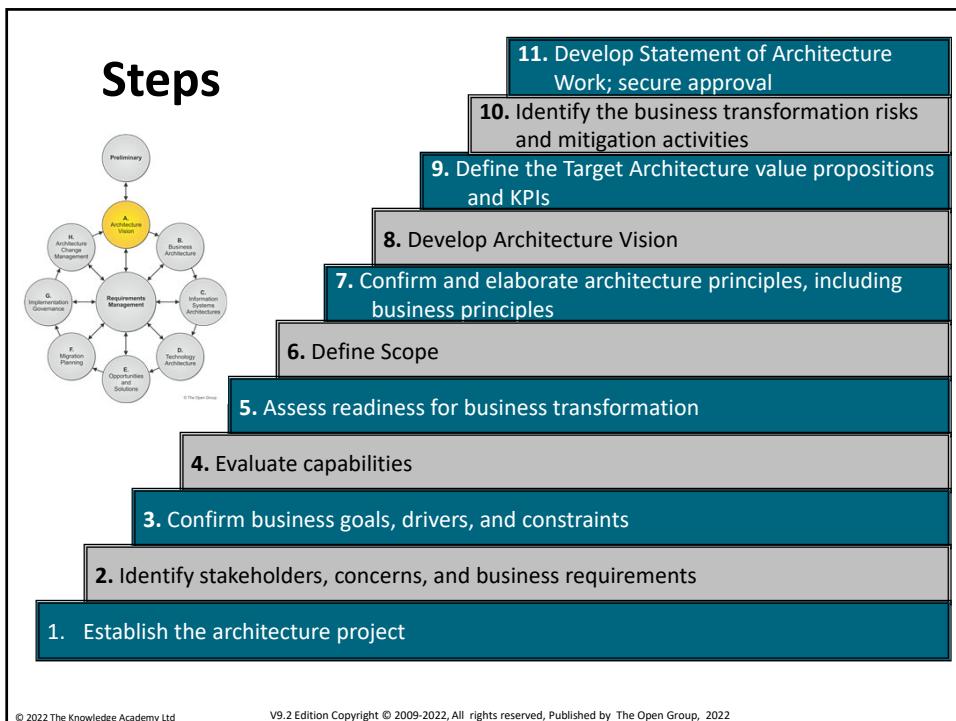
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Request for Architecture Work

- 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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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

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.

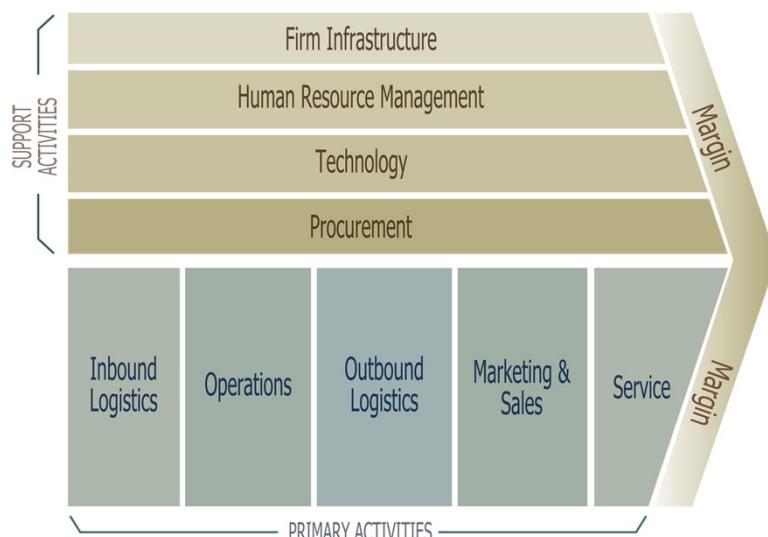
Define any constraints that must be dealt with.

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

Value Chain Diagram



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Case Study Exercise

Value Chain Diagram

Exercise #13



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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

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...

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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Case Study Exercise

Architecture Vision

Exercise #14

Exercise #15

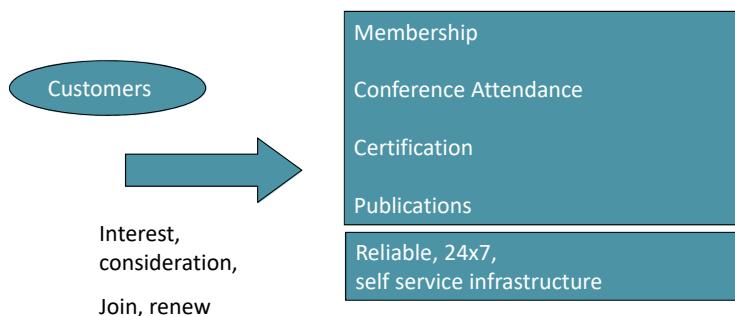


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Solution Concept Diagram

- 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

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

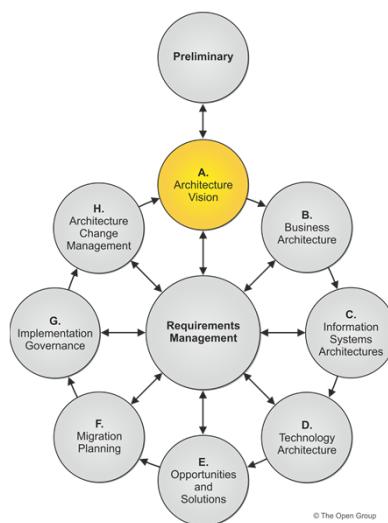
Statement of Architecture Work

- 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</p> <p>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"> • Refined key high-level stakeholder requirements <p>Draft Architecture Definition Document, including (when in scope):</p> <ul style="list-style-type: none"> • Baseline Business Architecture (high-level) • Baseline Data Architecture (high-level) • Baseline Application Architecture (high-level) • Baseline Technology Architecture (high-level) • Target Business Architecture (high-level) • Target Data Architecture (high-level) • Target Application Architecture (high-level) • Target Technology Architecture (high-level) <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 10

ADM Architecture

Requirements Management

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Module Objectives

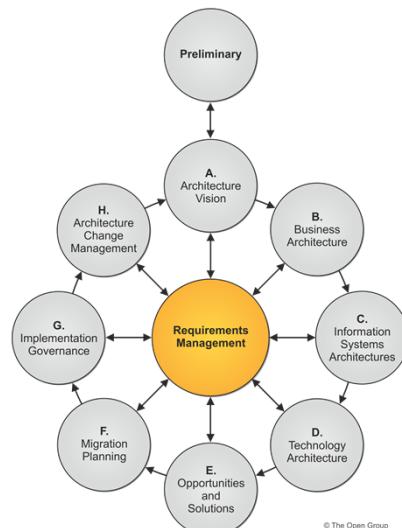
The objectives of this module are to understand:

- 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

Resources

- TOGAF specifies generic needs for requirements, not specific tools or processes
- It recommends use of
 - Business Scenarios
 - Commercial off the shelf tools

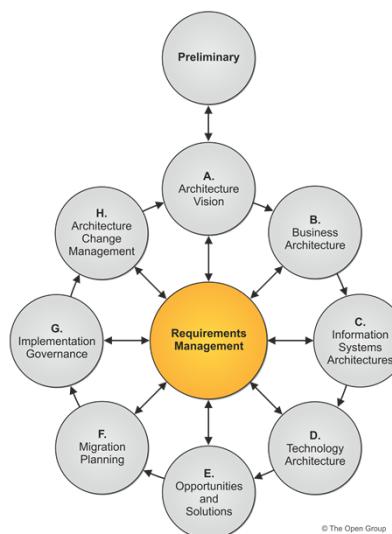
Volère Requirements Specification Template

- 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

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*)

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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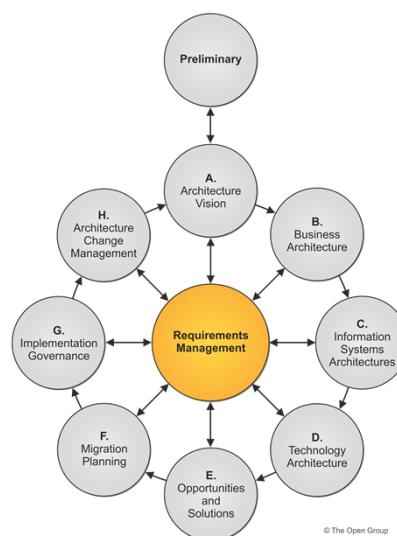
Steps in Detail

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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Case Study Exercise

Requirements

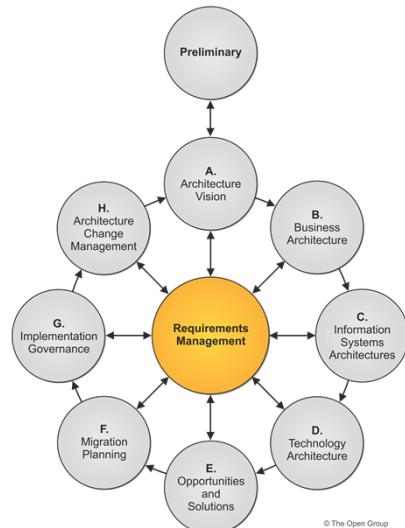
Exercise #16



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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
<p>Ensure that the Requirements Management process is sustained and operates for all relevant ADM phases</p> <p>Manage architecture requirements identified during any execution of the ADM cycle or a phase</p> <p>Ensure that relevant architecture requirements are available for use by each phase as the phase is executed</p>	<p>Identify/document requirements</p> <p>Baseline requirements</p> <p>Monitor baseline requirements</p> <p>Identify changed requirement; remove, add, modify, and re-assess priorities</p> <p>Identify changed requirement and record priorities; identify and resolve conflicts; generate Requirements Impact Statements</p> <p>Assess impact of changed requirements on current and previous ADM phases</p> <p>Implement requirements arising from Phase H</p> <p>Update the Architecture Requirements Repository</p> <p>Implement change in the current phase</p> <p>Assess and revise gap analysis for past phases</p>	<p>The inputs to the Requirements Management process are the requirements-related outputs from each ADM phase.</p> <p>The first high-level requirements are produced as part of the Architecture Vision.</p> <p>Each architecture domain then generates detailed requirements. Deliverables in later ADM phases contain mappings to new types of requirements (for example, conformance requirements).</p>	<p>Changed requirements</p> <p>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).</p>

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 11A

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

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
Business Capabilities Catalog	A definitive listing of particular abilities that a business may possess or exchange to achieve a specific purpose.
Value Stream Catalog	A definitive listing of end-to-end collections of value-adding activities that create an overall result for a customer, stakeholder, or end user.
Value Stream Stages Catalog	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
Organisation/ Actor Catalog	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">•organisation Unit, Actor Location (may be included in this catalog if an independent Location catalog is not maintained)
Driver/Goal/ Objective Catalog	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">•organisation Unit, Driver, Goal, Objective, Measure (may optionally be included)
Role Catalog	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">•Role

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Catalogs

Catalog	Purpose
Business Service/ Function Catalog	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">•organisation Unit,Business Function, Business Service, Information System Service (may optionally be included here)
Location Catalog	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">•Location
Process/ Event/ Control/ Product Catalog	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">•Process, Event, Control, Product

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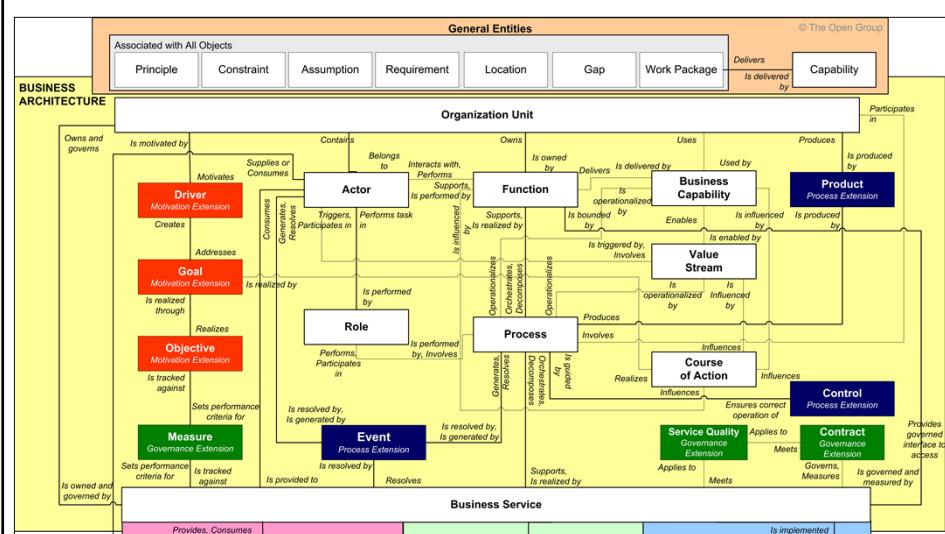
Catalogs

Catalog	Purpose
Contract/ Measure Catalog	<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"> •Business Service •Information System Service (optionally) •Contract •Measure

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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

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

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
<i>Engineering</i>						
<i>Procurement</i>						
<i>Manufacturing</i>		Contract for supply of materials			Contract for supply of sales forecasts	
<i>Sales and Distribution</i>		Contract for supply of product specification		Contract for supply of product		
<i>Customer Service</i>					Contract for fulfillment of customer orders	

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Actor/Role Matrix

- This matrix show 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	
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															
Strategy Lifecycle Roles															
Architecture Refresh	I	R	A	I	C	C	R	C	C	I	I	R	I	C	C
Architecture Roadmap	I	C	A	I	R	C	I	C	R	I	I	R	C	C	I
Benefits Assessment	I	I	I	I	I	I	I	I	I	R	R	I	C	A	
Change Management	C		I	A	I	I	R	I	I	I	R	R	C		
Framework Refresh	C	C	C	C	I	C	A	I	I	I	R	C	C	I	
Project Lifecycle Roles															
Solution Architecture Vision	I	I	I	A	I	I	C	C	I	I	R	I	C	R	
Logical Solution Architecture				A	I	I	C	C	I	I	R	I	C	C	
Physical Solution Architecture				A	I	I	C	C	I	I	R	I	C	R	
Design Governance				A	I	I	C	C	I	I	R	I	C	R	
Architecture Configuration Management	C						I	I	R	R	R		A		

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Diagrams

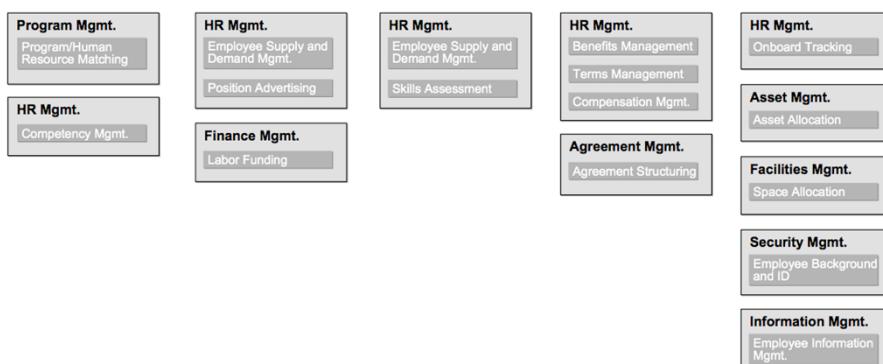
- Business Capability Map
- Value Stream Map
- organisation Map
- Business Footprint diagram
- Business Service/Information diagram
- Functional Decomposition diagram
- Product Lifecycle diagram
- Goal/Objective/Service diagram
- Use-Case diagram
- organisation Decomposition diagram
- Process Flow diagram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

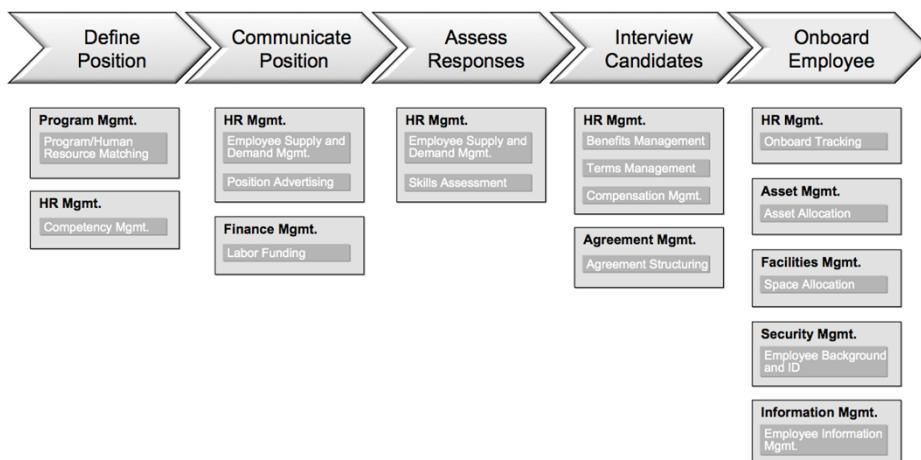
- A family of diagrams representing a definitive listing of end-to-end collections of value-adding activities that create an overall result for a customer, stakeholder, or end user.



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Mapping Value Streams to Business Capabilities

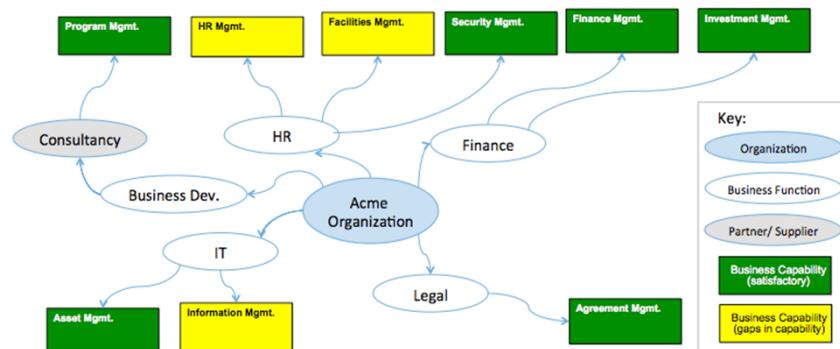


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Organisation Map

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



Key:

- Organization
- Business Function
- Partner/ Supplier
- Business Capability (satisfactory)
- Business Capability (gaps in capability)

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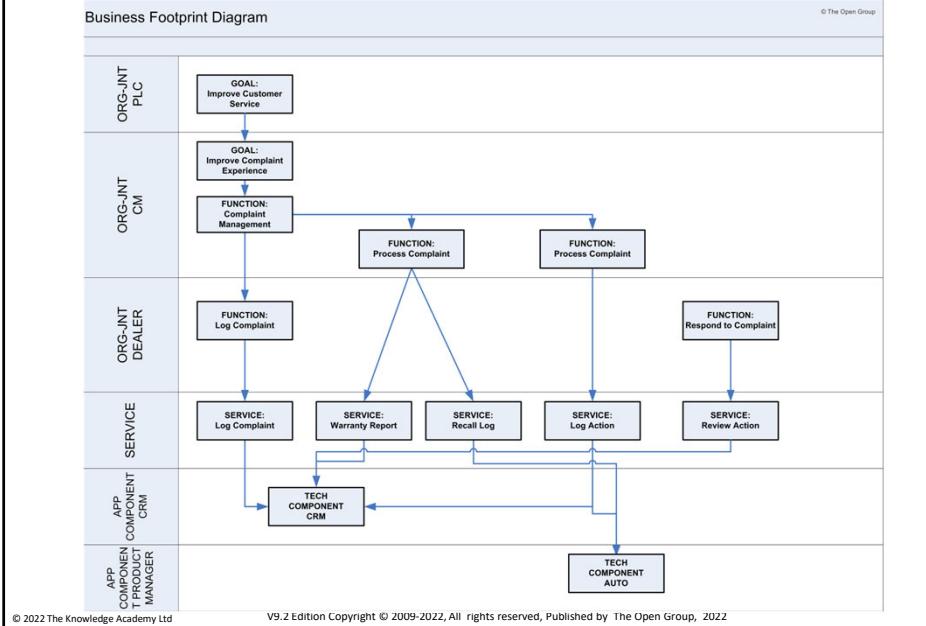
Business Footprint Diagram

- 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

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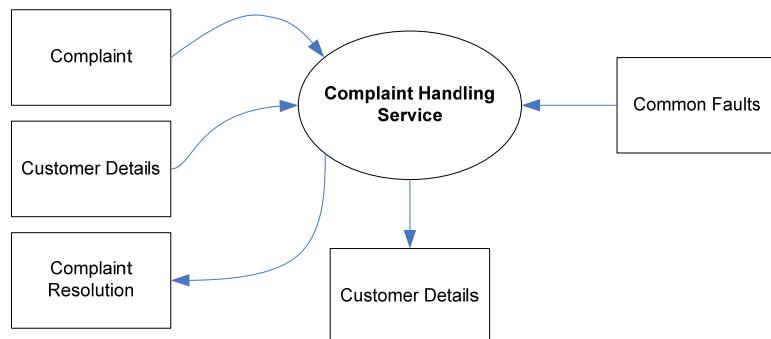
Example Business Footprint Diagram



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

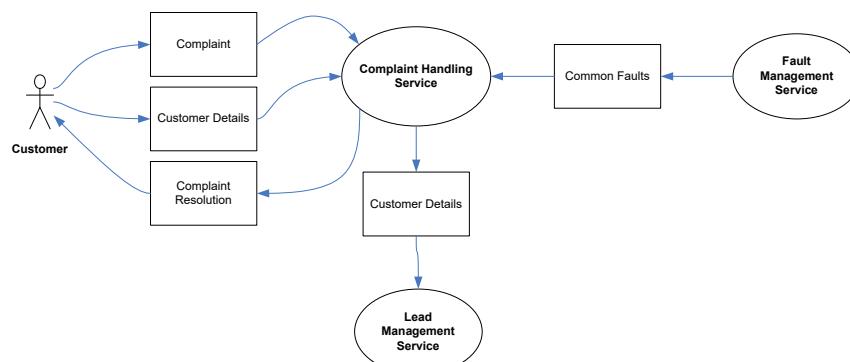


Basic example

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Example Business Service/Information Diagram



Extended example showing actors and service interactions

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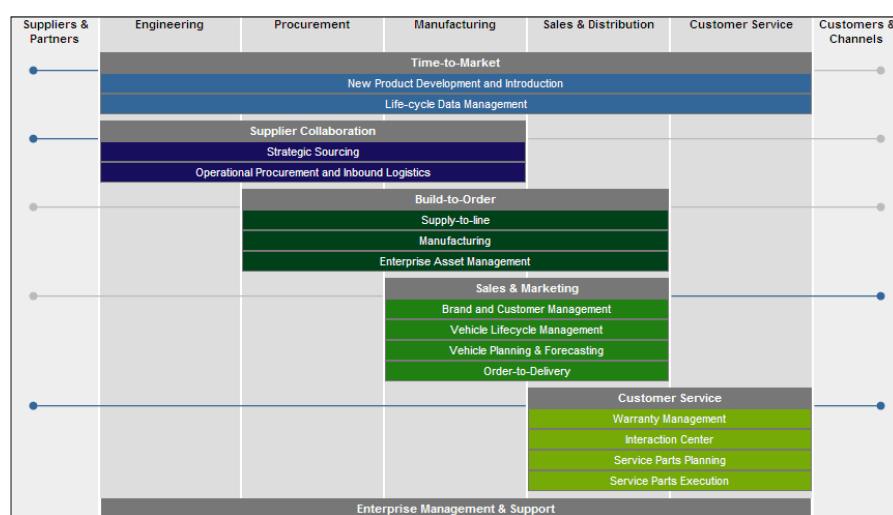
Functional Decomposition Diagram

- 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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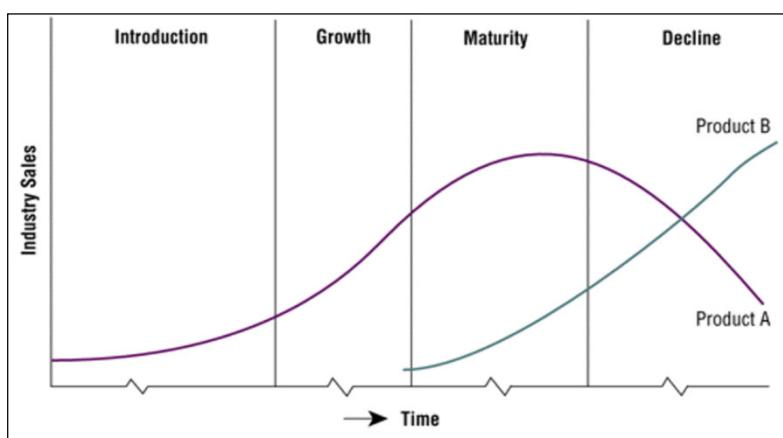
Product Lifecycle Diagram

- 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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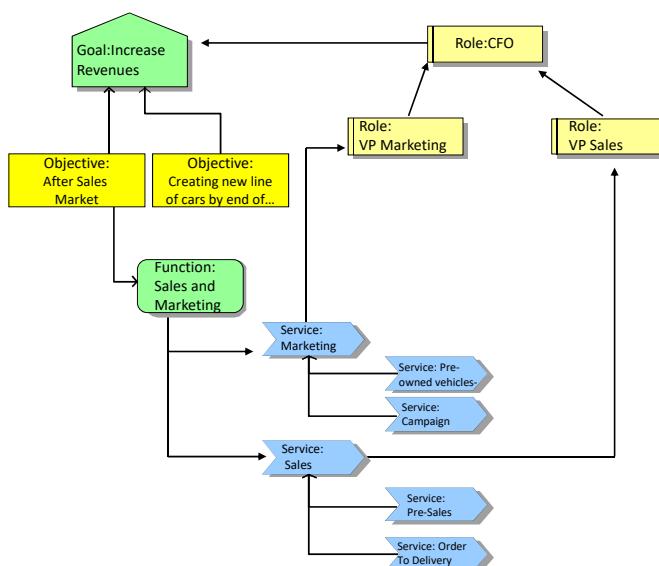
Goal/Objective/Service Diagram

- 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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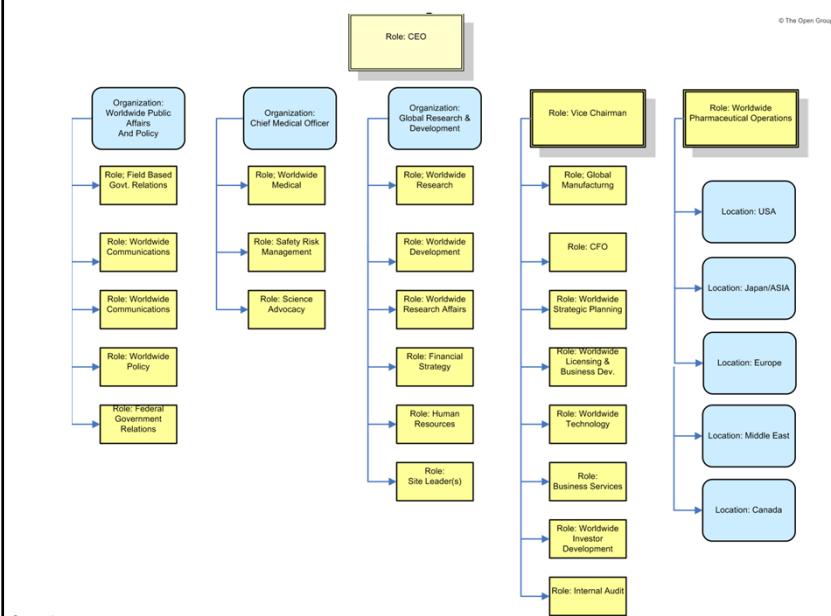
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Organisation Decomposition Diagram

- 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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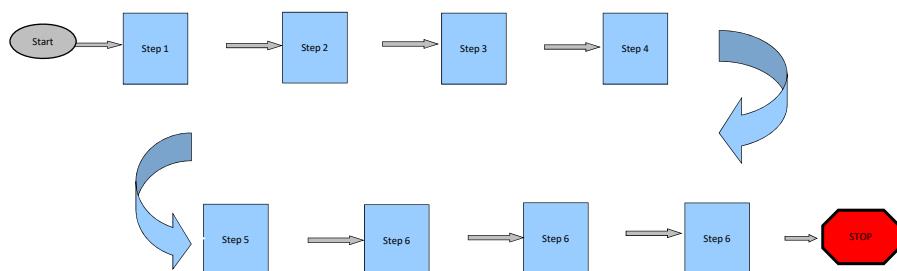
Process Flow Diagram

- 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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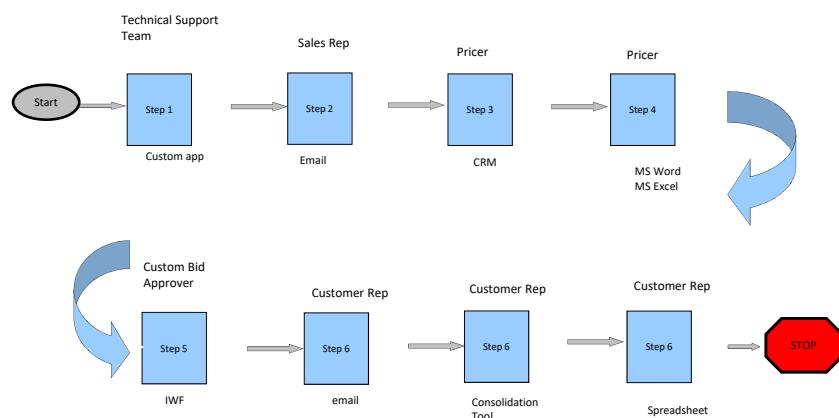
Example Process Flow Diagram



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Example Process Flow Diagram



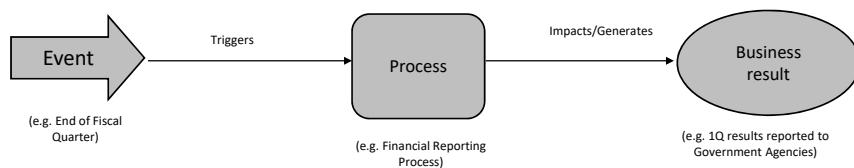
Process Flow (w/Roles & Applications)

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

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Module 11B 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

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.

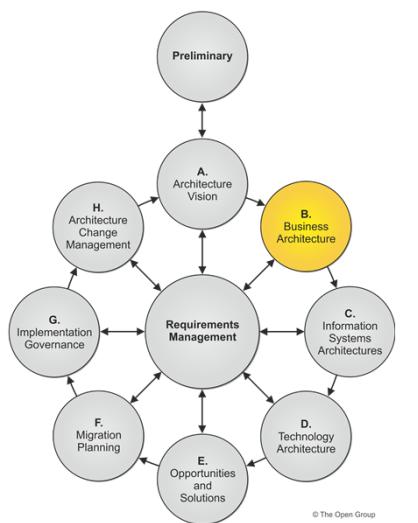
Approach

- 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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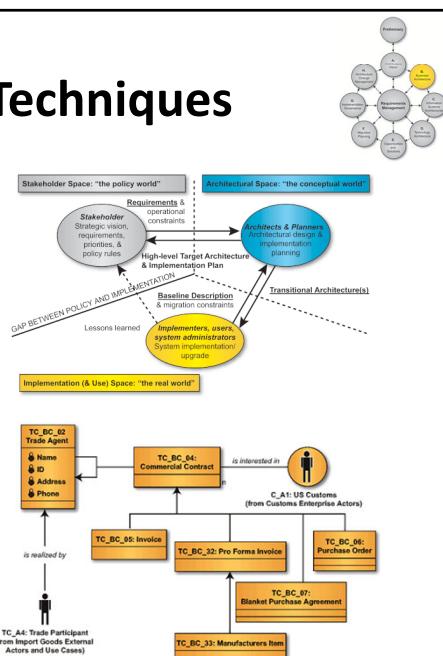
Additional Techniques

	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.	Accesses IC Sys and Sales sys and presents price to customer.	Accesses price system and presents price to customer.	Presents offer.	Accesses order system.	Presents contract.
Customer	Accepts sales person's decisions.	Discusses problems/decisions.	Linen and decides on options based on capabilities.	Accepts or rejects.	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.					
ProdCrdng			Provides catalog 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 of order to sales person's laptop.			

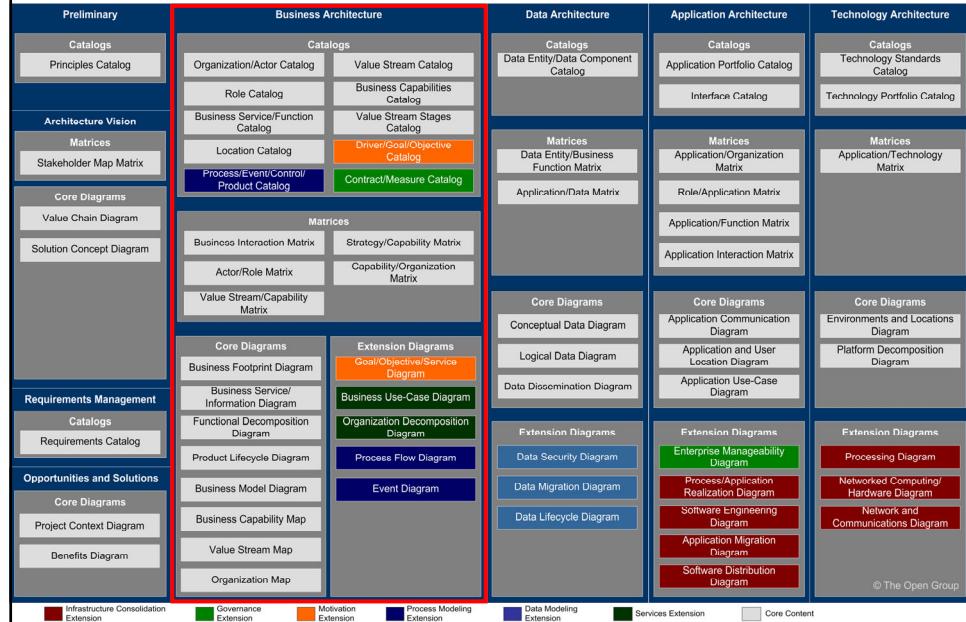
Table 32.1: Use-Case Table of Sales Process

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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

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

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

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.

Gap Analysis: Answer

Target Architecture →	Video Conferencing Services	Enhanced Telephony Services	Mailing List Services	Eliminated Services ↓
Current Architecture ↓				
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?

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.

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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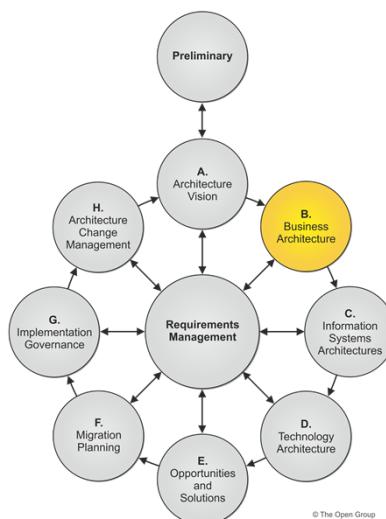
Summary of Building Block usage in Phase B

- 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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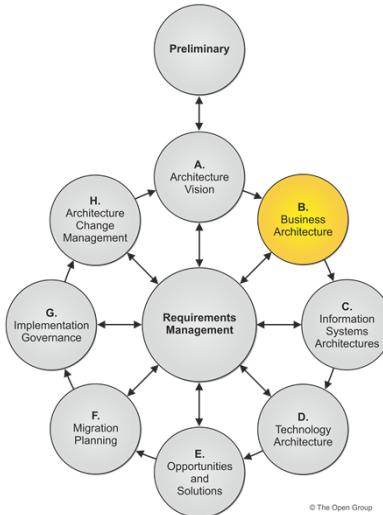
Architecture Requirements Specification – Business Architecture Components

- 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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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 Organisational Plan 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">Refined key high-level stakeholder requirements Draft Architecture Definition Document, including: <ul style="list-style-type: none">Baseline Business Architecture (high-level)Baseline Data Architecture (high-level)Baseline Application Architecture (high-level)Baseline Technology Architecture (high-level)Target Business Architecture (high-level)Target Data Architecture (high-level)Target Application Architecture (high-level)Target Technology Architecture (high-level)	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">Baseline Business Architecture (detailed), if appropriateTarget Business Architecture (detailed with Business Capabilities, Value Streams, and Organisation Map as core artifacts)Views corresponding to selected viewpoints addressing key stakeholder concerns Draft Architecture Requirements Specification including content updates: <ul style="list-style-type: none">Gap analysis resultsTechnical requirementsUpdated business requirements 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

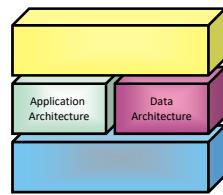
Identify five sources of information within your organisation that could be used to draw up a Baseline Business Architecture Description.

Module 12

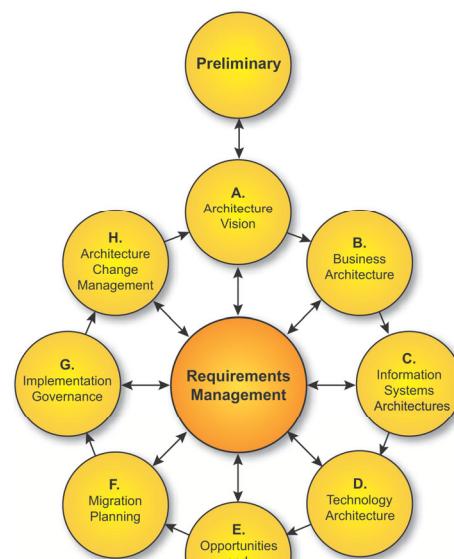
Phase C:

Information Systems Architectures – Overview

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

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.

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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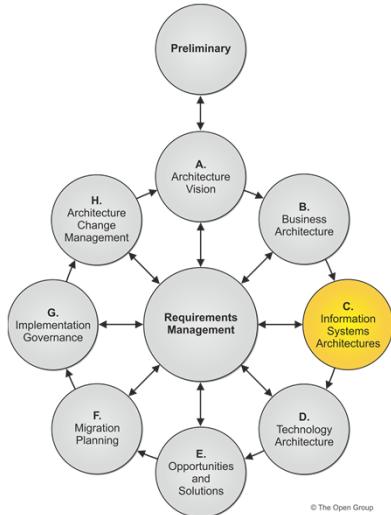
Approach: Architecture Repository

- 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)

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

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

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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

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Module 13A

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 159

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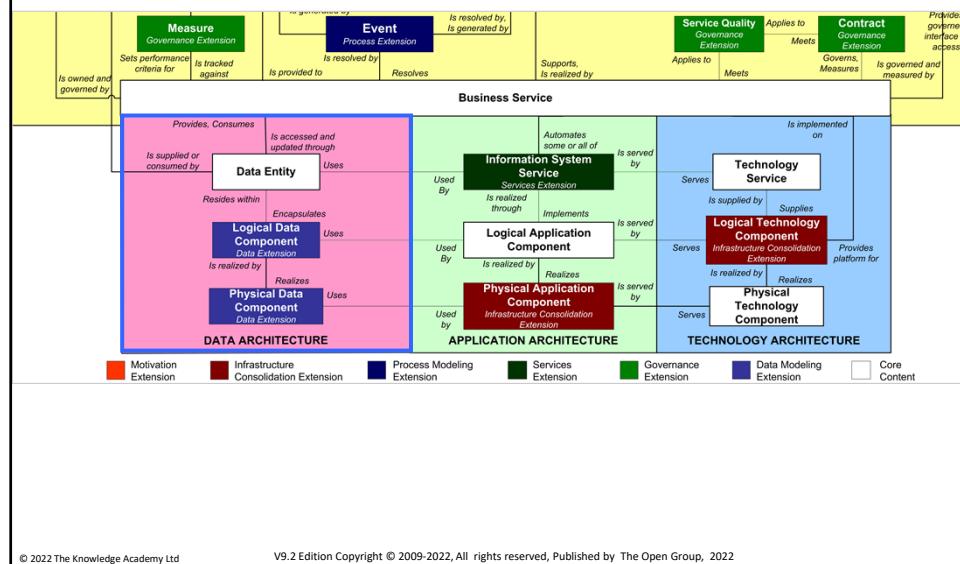
Catalogs

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">•Data Entity•Logical Data Component•Physical Data Component

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

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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

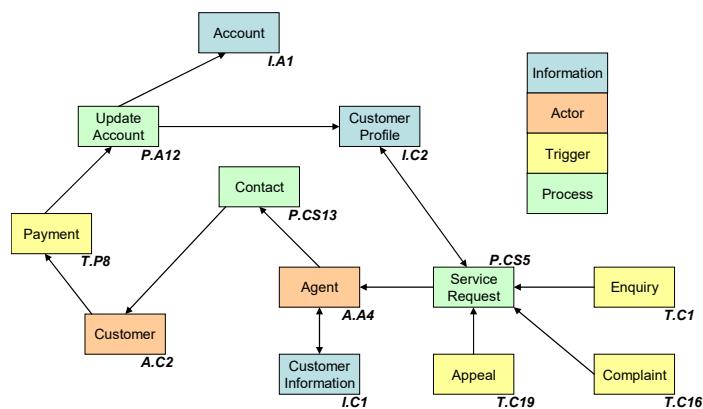
- Conceptual Data diagram
- Logical Data diagram
- Data Dissemination diagram
- Data Security diagram
- Data Migration diagram
- Data Lifecycle diagram

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Conceptual Data Diagram

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



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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

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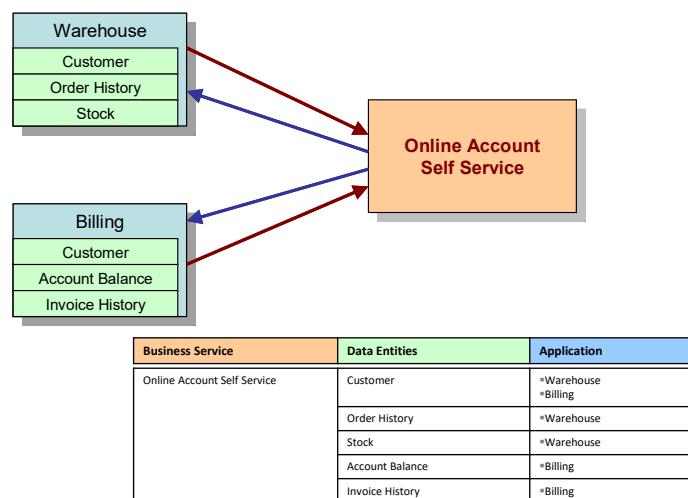
Data Dissemination Diagram

- 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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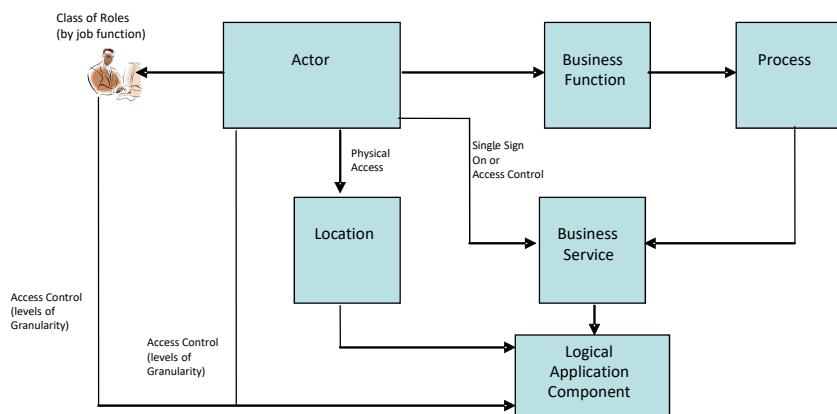
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Data Security Diagram

- 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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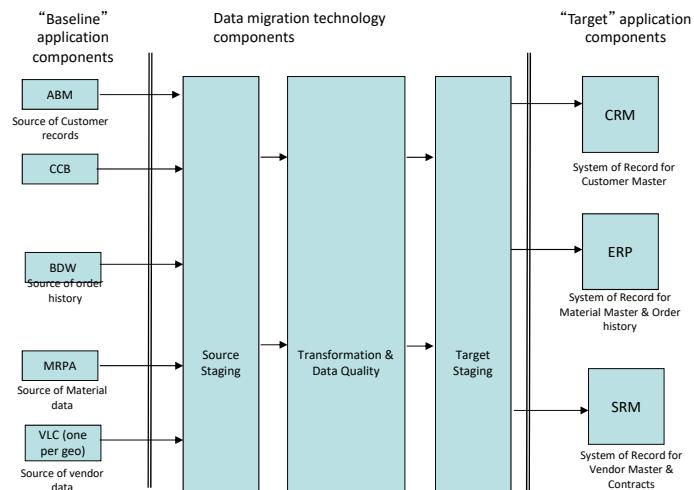
Data Migration Diagram

- 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

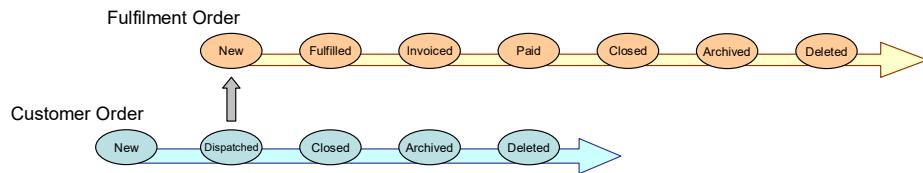
SOURCE LOGICAL APPLICATION COMPONENT	SOURCE DATA ELEMENT	TARGET LOGICAL APPLICATION COMPONENT	TARGET DATA ELEMENT
ABM	Cust_Name	CRM	CUSTNAME
	Cust_Street_Addr		CUSTADDR_LINE1
	Cust_Street_Addr		CUSTADDR_LINE2
	Cust_Street_Addr		CUSTADDR_LINE3
	Cust_ContactName		CUSTCONTACT
	Cust_Tele		CUSTTELEPHONE

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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 13B Phase C: Data Architecture

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Module Objectives

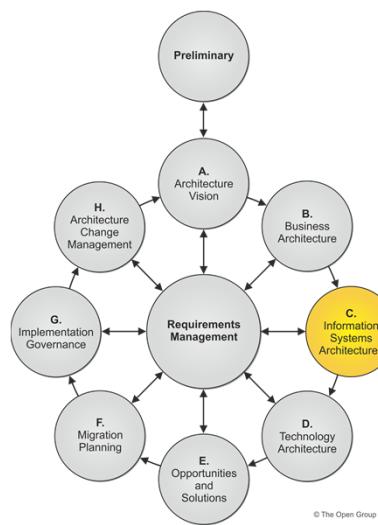
The aim of this module is to understand:

- 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

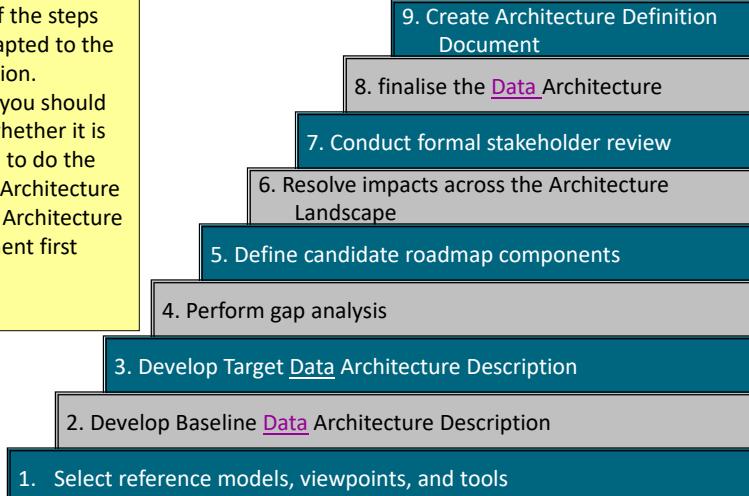
Phase C – Data: Inputs



- 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

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



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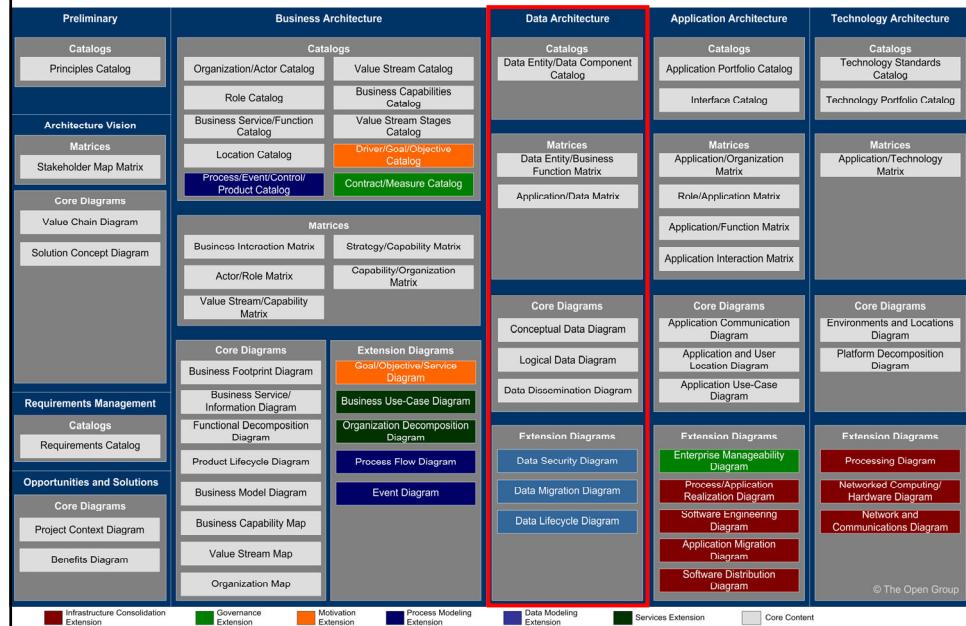
Step 1: Select Reference Models, Viewpoints, and Tools

- 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

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.

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?

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.

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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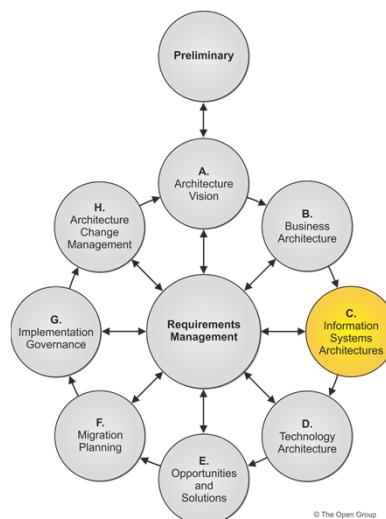
Step 9: Create Architecture Definition Document

- 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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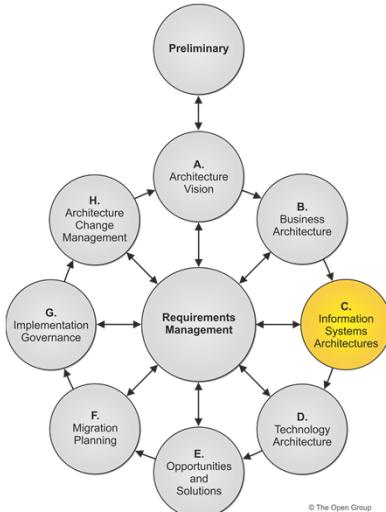
Architecture Requirements Specification – Data Architecture Components

- 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"> Baseline Business Architecture (detailed) Target Business Architecture (detailed) Baseline Data Architecture (high-level) Target Data Architecture (high-level) Baseline Application Architecture (detailed or high-level) Target Application Architecture (detailed or high-level) Baseline Technology Architecture (high-level) Target Technology Architecture (high-level) <p>Draft Architecture Requirements Specification including:</p> <ul style="list-style-type: none"> Gap analysis results Relevant technical requirements <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"> Baseline Data Architecture Target Data Architecture Data Architecture views corresponding to the selected viewpoints, addressing key stakeholder concerns <p>Draft Architecture Requirements Specification including content updates:</p> <ul style="list-style-type: none"> Gap analysis results Data interoperability requirements Relevant technical requirements that will apply to this evolution of the architecture development cycle Constraints on the Technology Architecture Updated business requirements Updated application requirements <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.

Module 14: The Integrated Information Infrastructure Reference Model

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

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”.

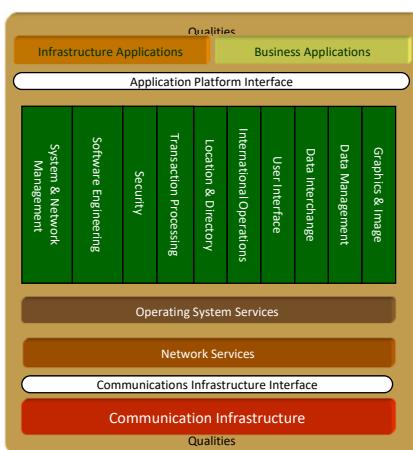
Integrated Information Infrastructure Reference Model

- 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



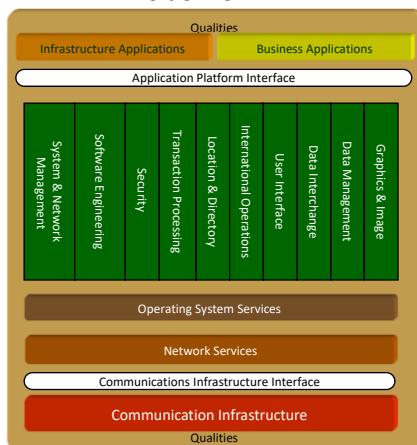
- Fundamentally a layered view, major layers being
 - Application
 - Application platform
 - Communications

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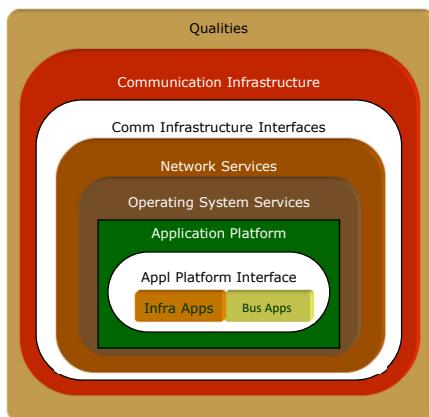
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TOGAF TRM Orientations

Side View



Top Down View

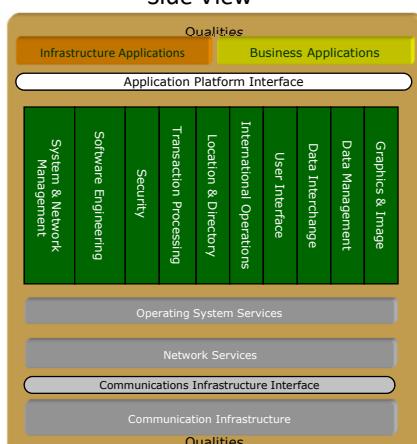


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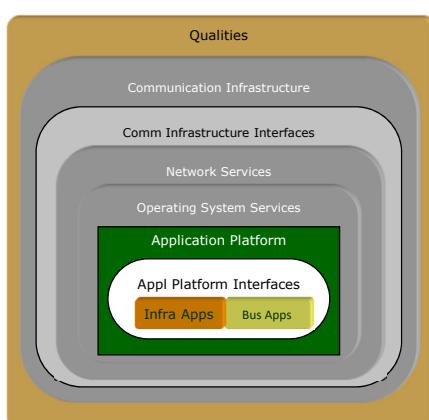
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Boundaryless Information Flow Focus

Side View



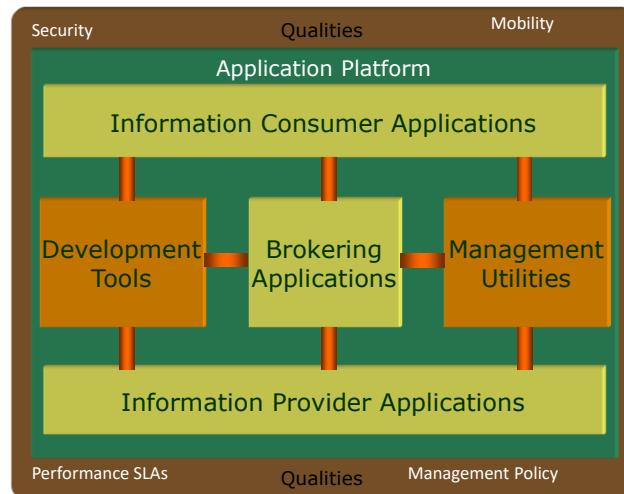
Top Down View



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Integrated Information Infrastructure Reference Model – High-level Model



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Components of the III-RM

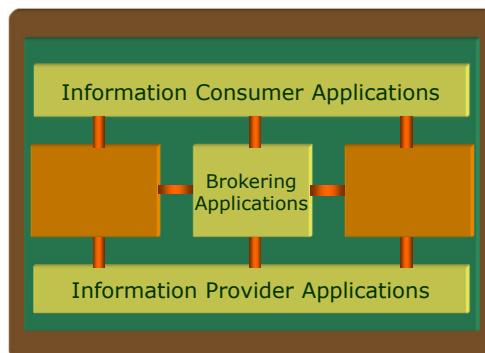
The III-RM has 2 main components:

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

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Components of the High-Level III-RM



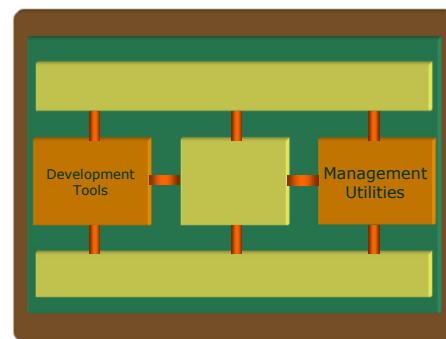
- **Business Applications:**

- **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:**

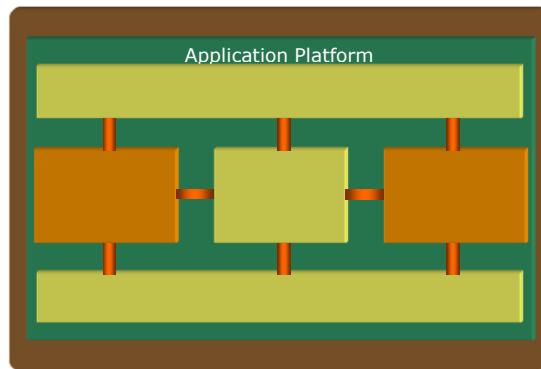
- **Development Tools**, to develop and deploy applications that require access to the integrated information infrastructure
- **Management Utilities**, to understand, operate, tune, and manage the run-time system in order to meet the demands of an ever-changing business

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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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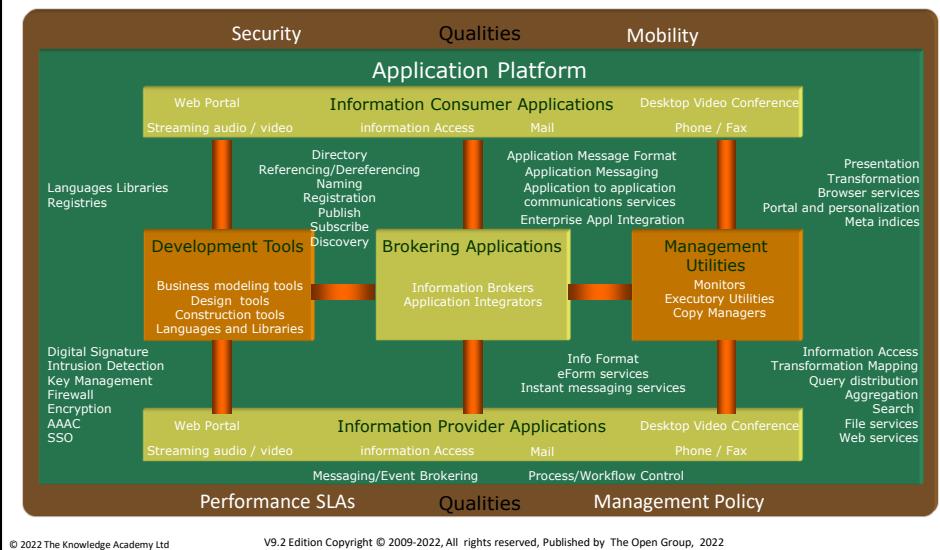
Components of the High-Level III-RM

- 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 15A

Phase C:

Application Architecture –

Catalogs, Matrices

and Diagrams

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Module Objectives

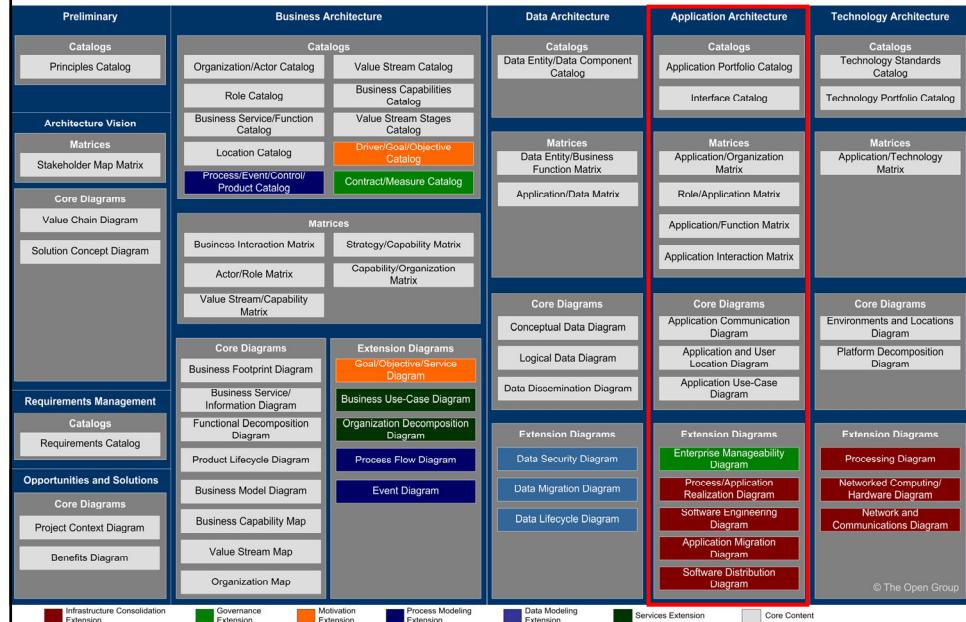
The objectives of this module are to understand:

- 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

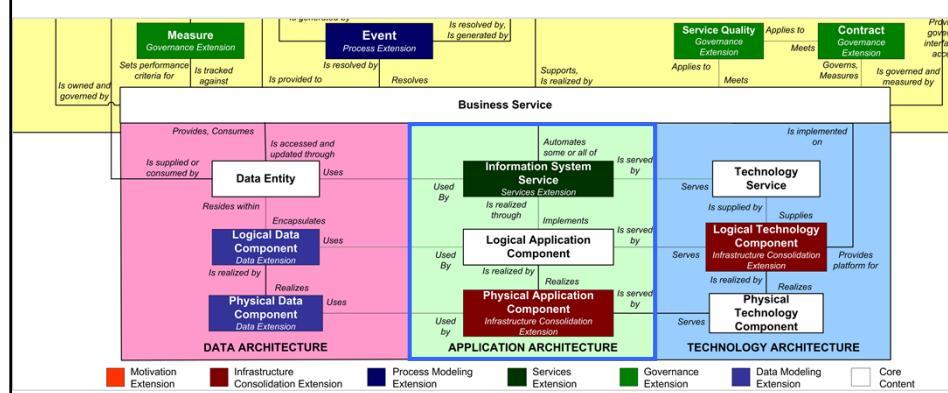
- Application Communication diagram
- Application and User Location diagram
- Application Use-Case diagram
- Enterprise Manageability diagram
- Process/Application Realization diagram
- Software Engineering diagram
- Application Migration diagram
- Software Distribution diagram

Catalogs

Catalog	Purpose
Application Portfolio Catalog	<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"> •Information System Service •Logical Application Component •Physical Application Component
Interface Catalog	<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"> •Logical Application Component •Physical Application Component •Application <i>communicates with</i> application relationship

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Exercise



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Matrices

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

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

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
PROCURESOFT	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 ST 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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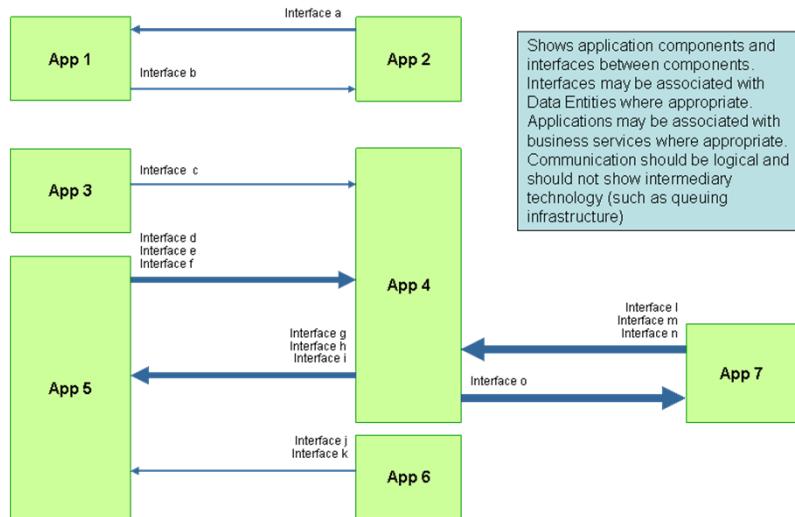
Diagrams

- 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

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.

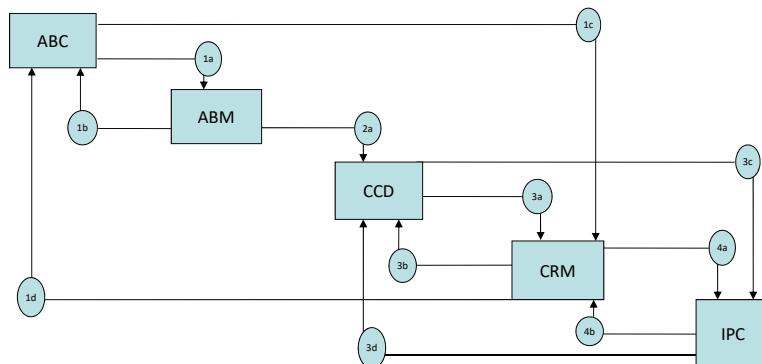
Application Communication Diagram



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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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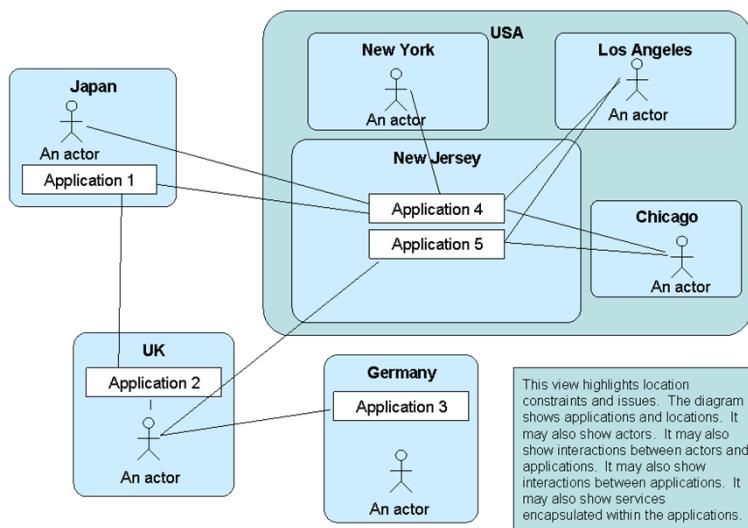
Example Application & User Location Diagram (part 1)

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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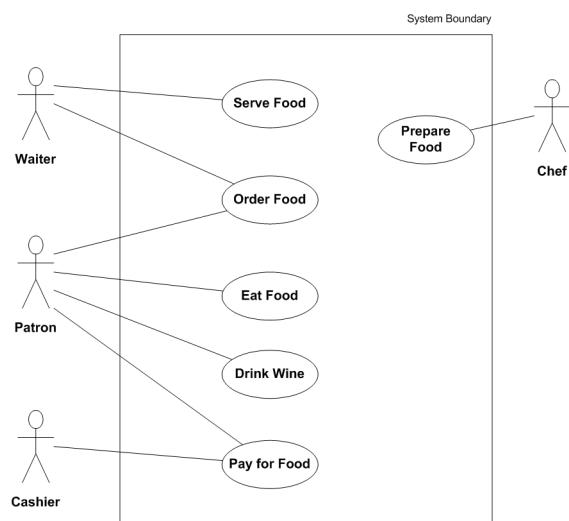
Example Application & User Location Diagram (part 2)



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Application Use Case Diagram



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Source: wikipedia.org

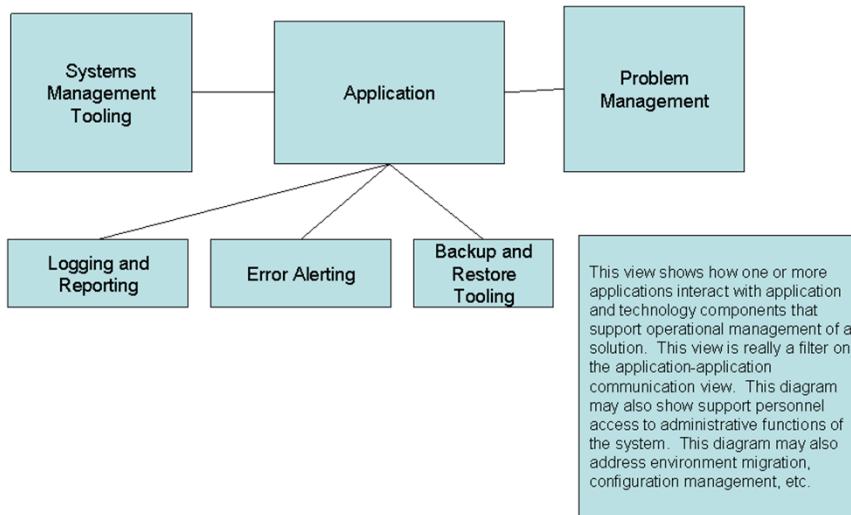
Enterprise Manageability Diagram

- 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.

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Example Enterprise Manageability Diagram



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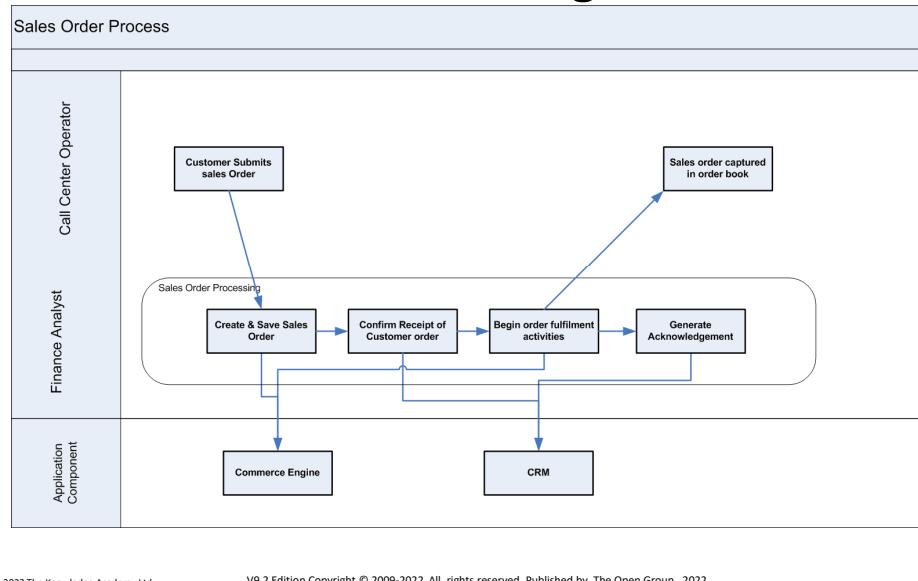
Process/Application Realisation Diagram

- 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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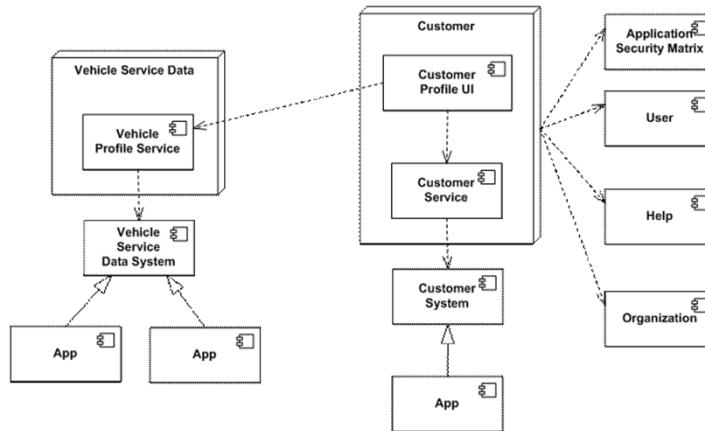
Example Process/Application Realisation Diagram



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



Breaks applications into packages, modules, services and operations from a development perspective. May show dependencies between functional components

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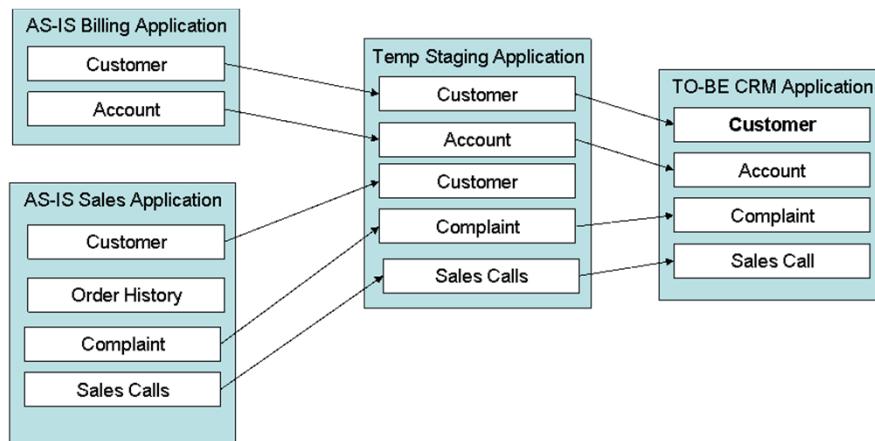
Application Migration Diagram

- 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

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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 15B

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

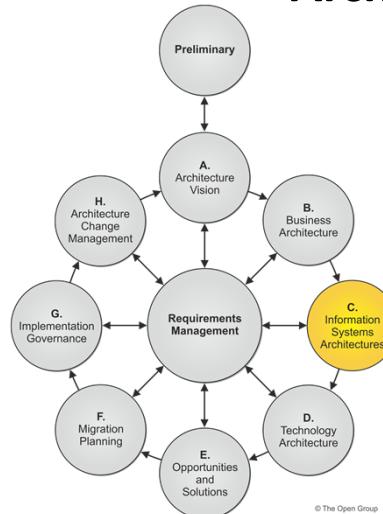
Develop the Target Application Architecture that enables the Business Architecture and the Architecture Vision, in a way that addresses the Statement of Architecture Work and stakeholder concerns.

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

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Phase C: Inputs: Application Architecture

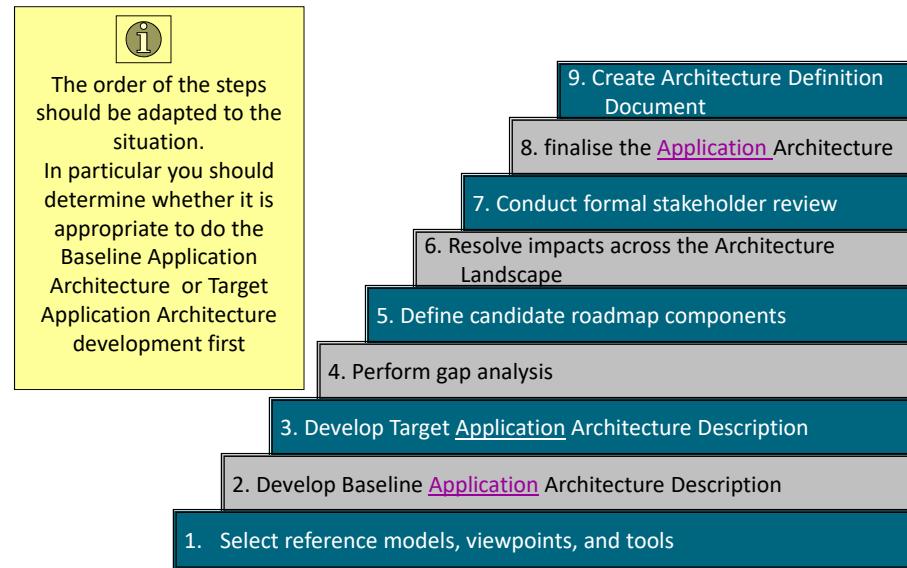


- Request for Architecture Work
- Capability Assessment
- Communications Plan
- organisation model for enterprise architecture
- Tailored Architecture Framework
- Application principles
- Statement of Architecture Work
- Architecture Vision
- Architecture Repository
- Draft Architecture Definition Document
- 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



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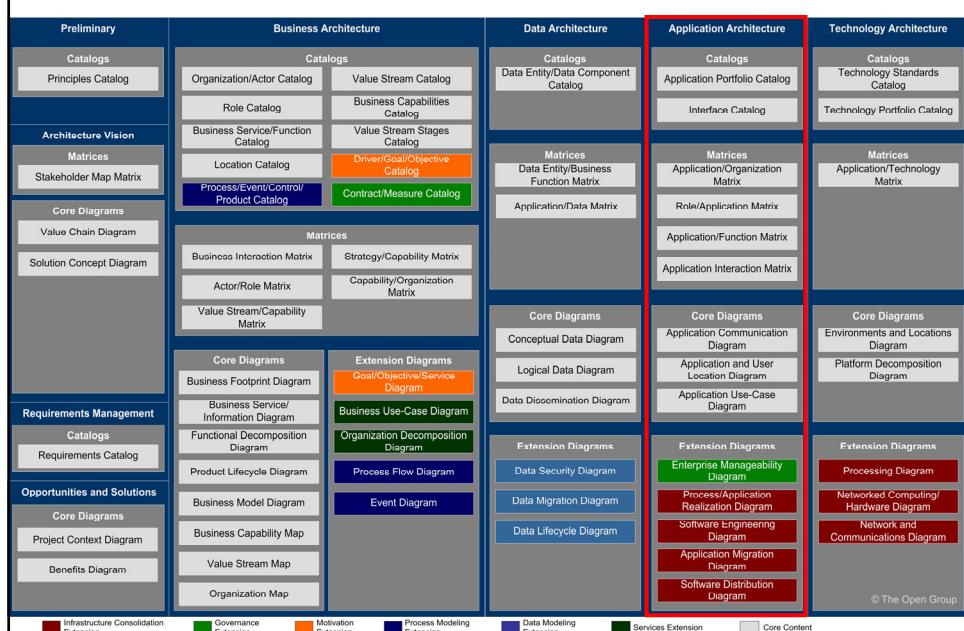
Step 1: Select Reference Models, Viewpoints, and Tools

- 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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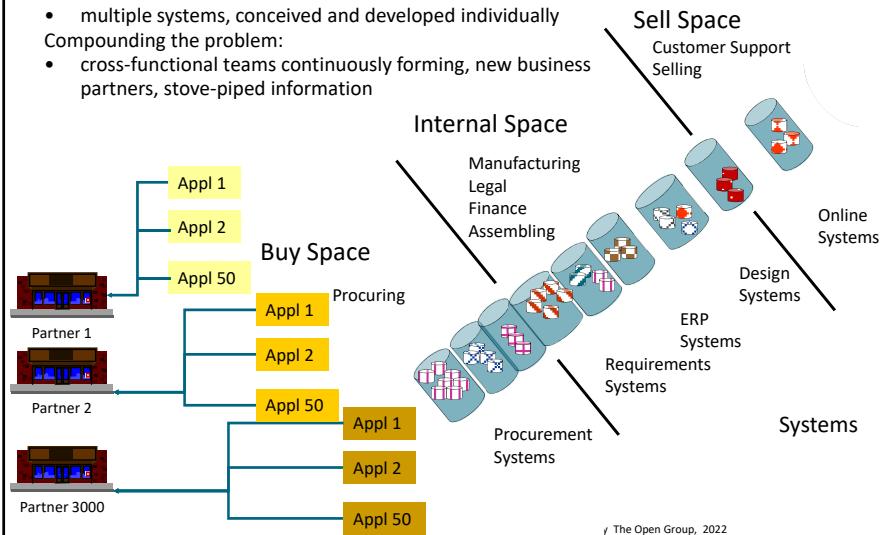
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III-RM

Business and Technical Drivers

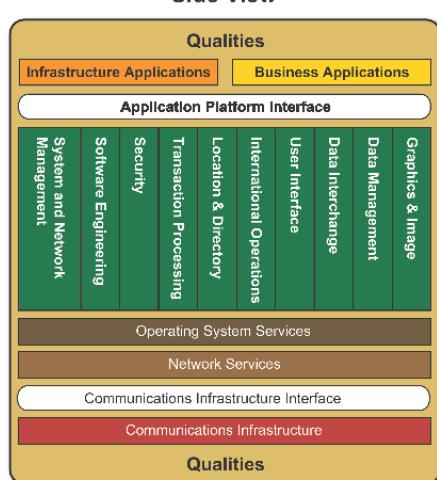
The cause:

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

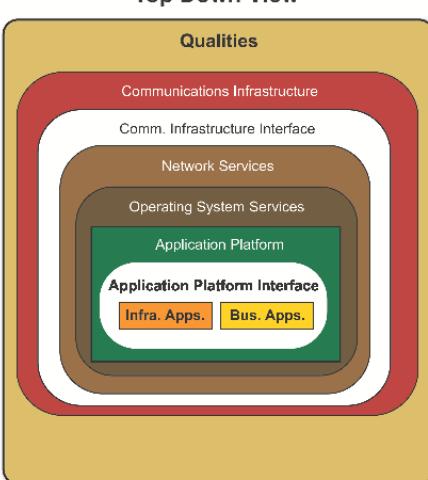


III-RM Focus

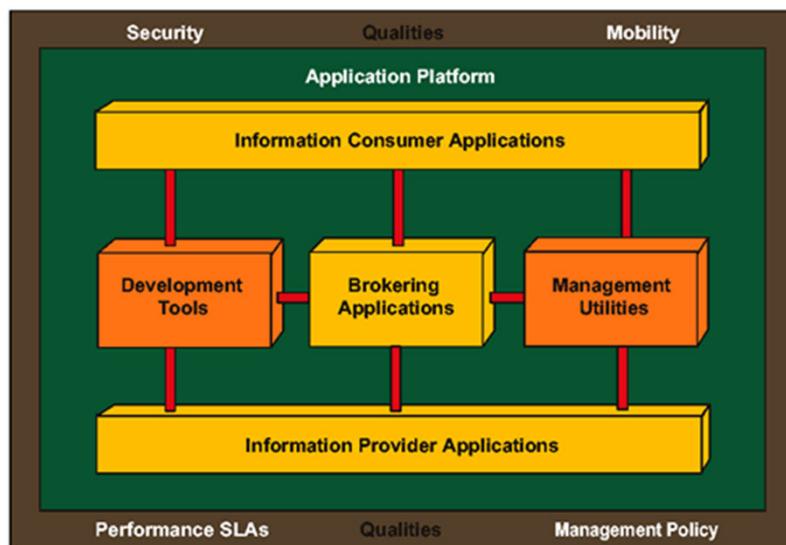
Side View



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.

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?

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.

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

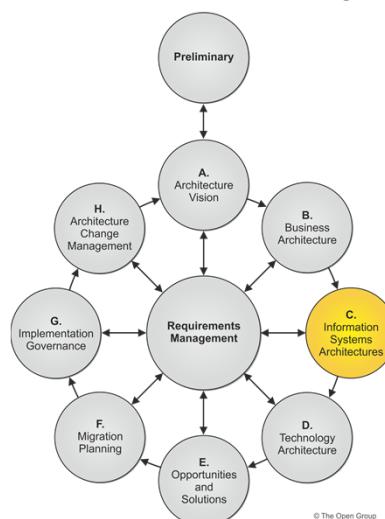
Step 9: Create Architecture Definition Document

- 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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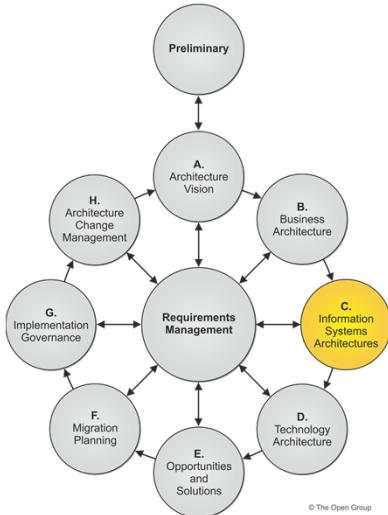
Architecture Requirements Specification – Application Architecture Components

- 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"> Baseline Business Architecture (detailed) Target Business Architecture (detailed) Baseline Data Architecture (detailed or high-level) Target Data Architecture (detailed or high-level) Baseline Application Architecture (high-level) Target Application Architecture (high-level) Baseline Technology Architecture (high-level) Target Technology Architecture (high-level) <p>Draft Architecture Requirements Specification including:</p> <ul style="list-style-type: none"> Gap analysis results Relevant technical requirements <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"> Baseline Application Architecture Target Application Architecture Application Architecture views corresponding to the selected viewpoints, addressing key stakeholder concerns <p>Draft Architecture Requirements Specification including content updates:</p> <ul style="list-style-type: none"> Gap analysis results Application interoperability requirements Relevant technical requirements that will apply to this evolution of the architecture development cycle Constraints on the Technology Architecture Updated business requirements Updated data requirements <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 16

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

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.

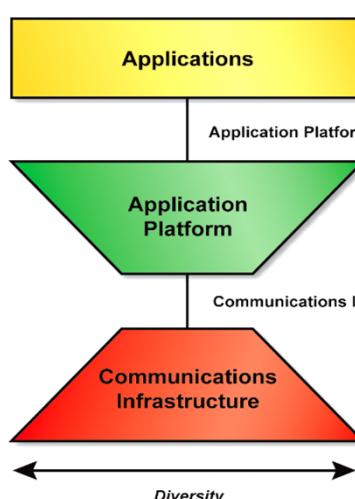
TRM Components

- 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

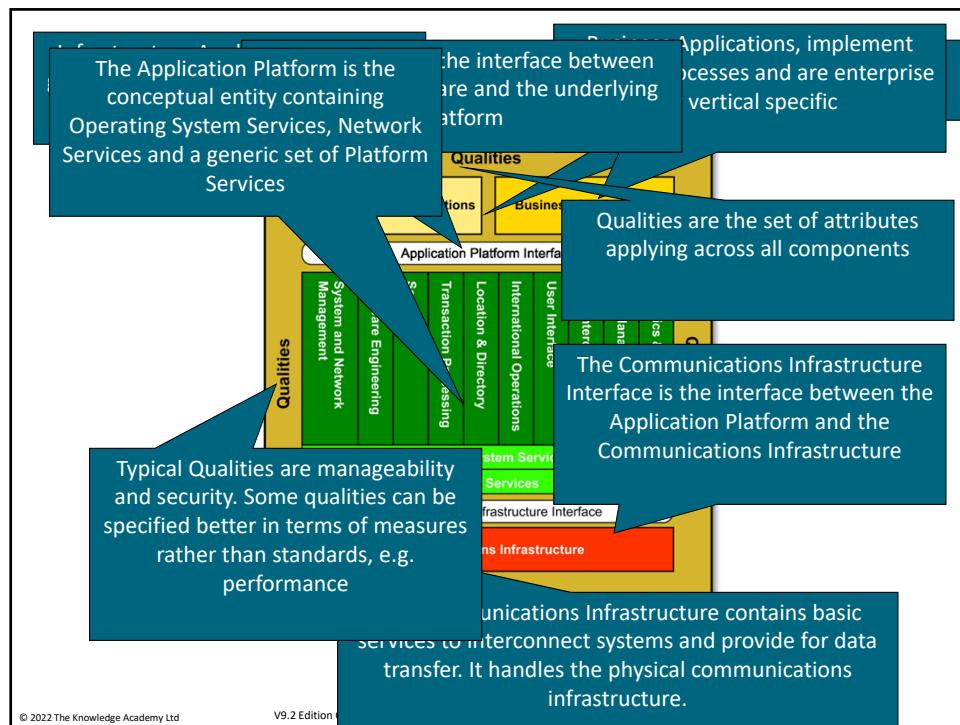


Application Portability is achieved via the Application Platform Interface, identifying the set of services that are to be made available in a standard way to applications via the platform

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:

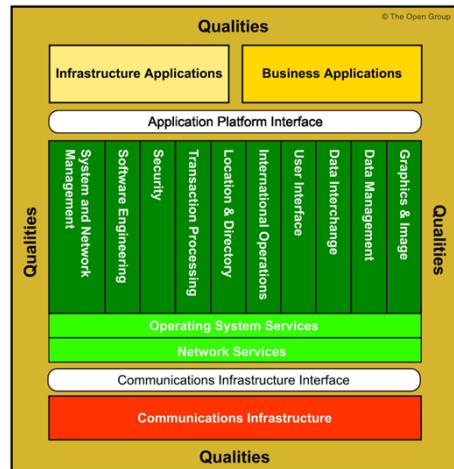
- International operation, including multilingual and multicultural abilities

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

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 17A

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

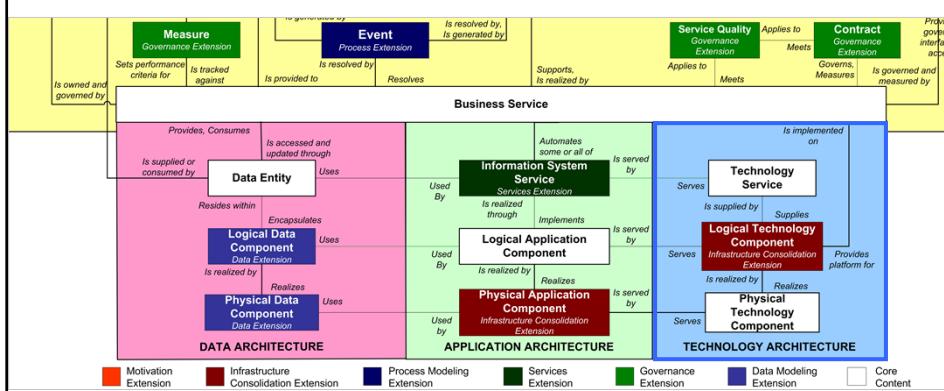
Catalogs

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"> •Technology Service, Logical Technology Component, Physical Technology Component
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"> •Technology Service, Logical Technology Component, Physical Technology Component

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

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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 (d03lb001@host.com)
=Commerce pages	<ul style="list-style-type: none"> =HTML code =Applets =JSP 	=Web Server cluster (d03ws001@host.com, d03ws002@host.com, d03ws003@host.com)
=Commerce Engine	<ul style="list-style-type: none"> =Order Entry (both installation and execution code) =Shopping Cart (both installation and execution code) 	<ul style="list-style-type: none"> =Application Server (d03as001@host.com, d03as002@host.com)

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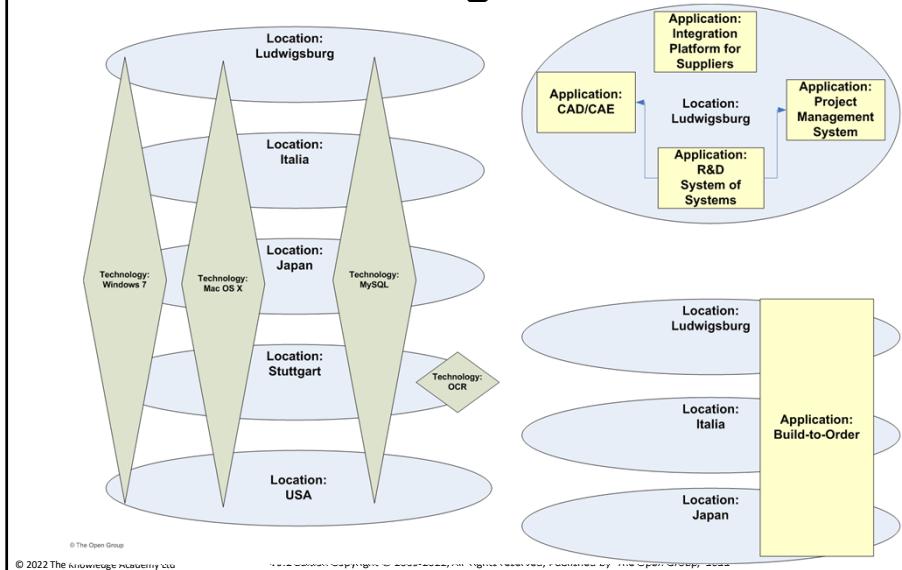
Diagrams

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

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.

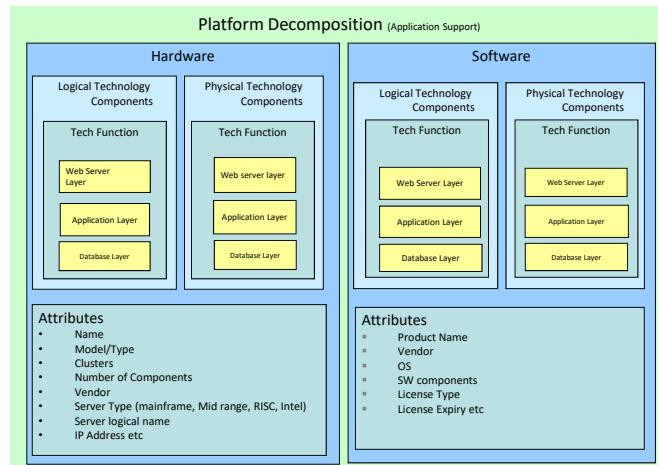
Example Environments and Locations Diagram



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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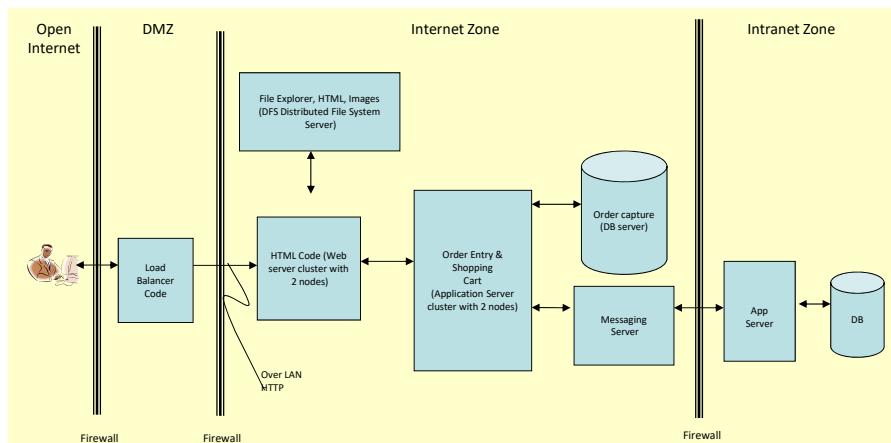
Processing Diagram

- 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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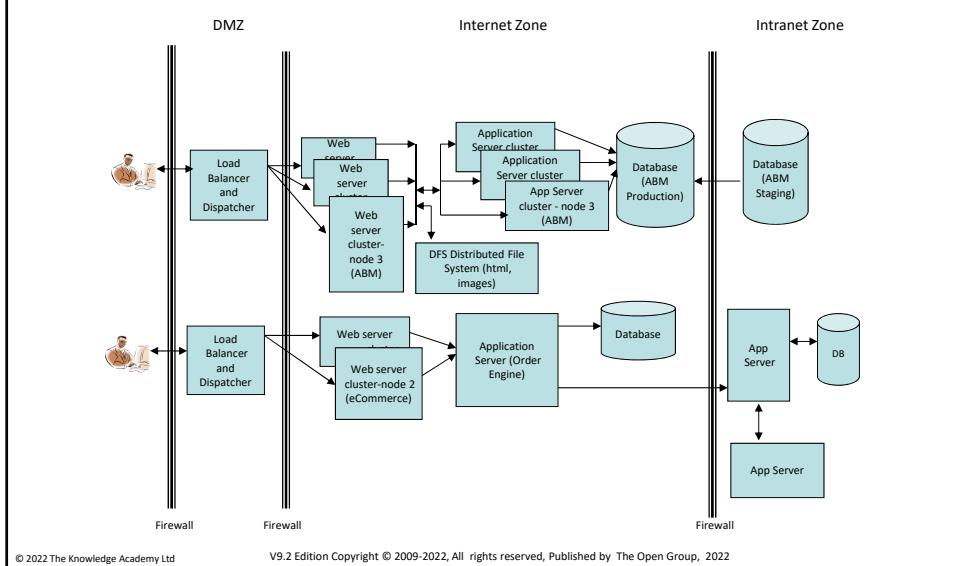
Network Computing Hardware Diagram

- 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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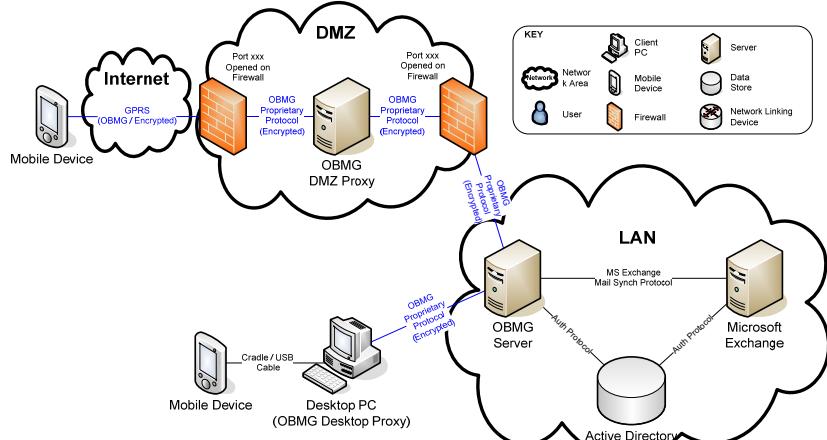
Example Network Computing Hardware Diagram



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 17B

Phase D: Technology Architecture

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Module Objectives

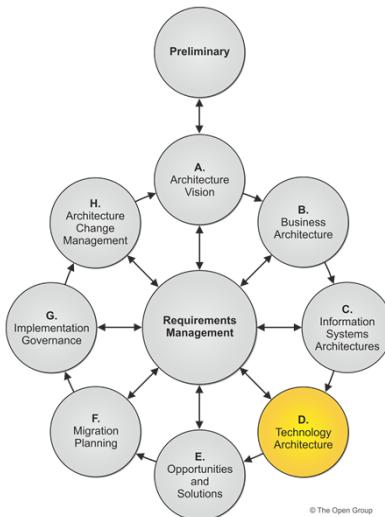
The objectives of this module are to understand:

- 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

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

Technology Architecture: Inputs

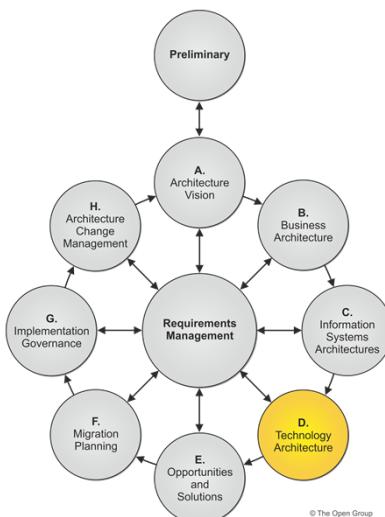


- Request for Architecture Work
- Capability Assessment
- Communications Plan
- organisation model for enterprise architecture
- Tailored Architecture Framework
- Technology principles
- Statement of Architecture Work
- Architecture Vision
- Architecture Repository

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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

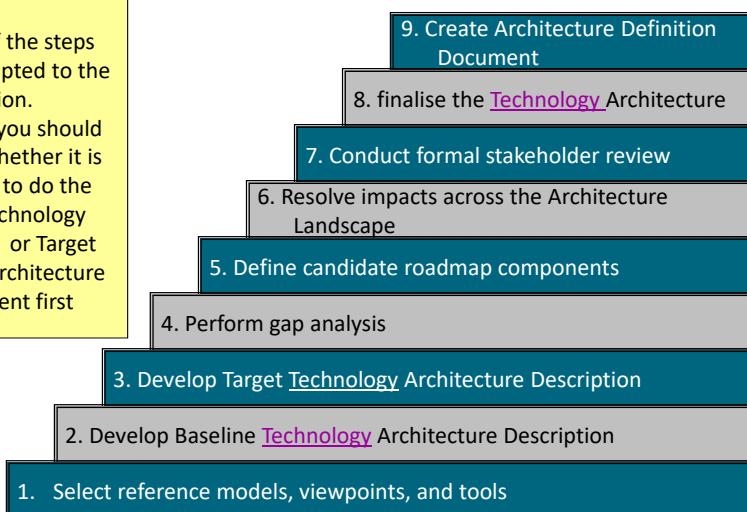
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Steps



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



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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

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.

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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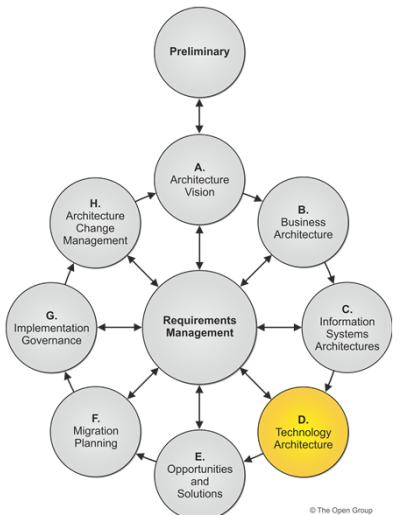
Step 9: Create Architecture Definition Document

- 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

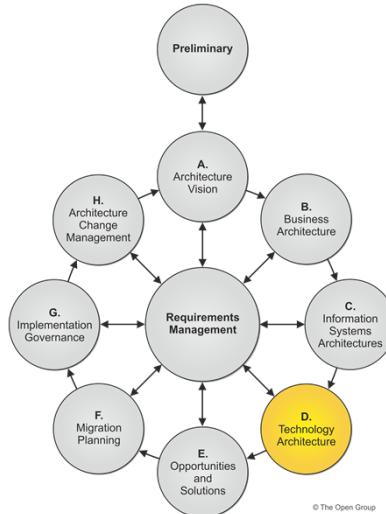
Architecture Requirements Specification – Technology Architecture Components

- 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

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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"> • 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) <p>Draft Architecture Requirements Specification including content updates:</p> <ul style="list-style-type: none"> • Gap analysis results • Requirements output from Phases B and C • Updated technology requirements <p>Technology Architecture components of an Architecture Roadmap</p>

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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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Case Study Exercise

Selecting Artefacts

Exercise #17



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Module 18:

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*

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

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">• Need for personnel training, re-assignment• Email has major personnel savings and should be given priority
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

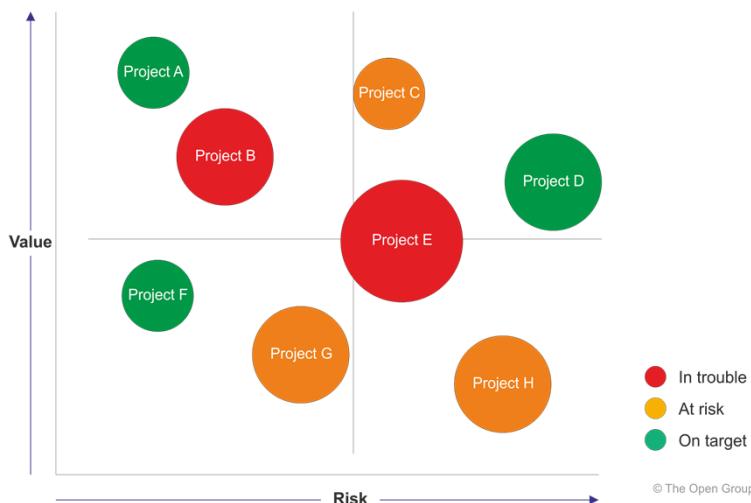
- This technique to assess business value includes drawing up a matrix with value and risk index dimensions
- It is used in Phase F to develop an estimated value to the business for each project
- The value index should include criteria such as compliance to principles, financial contribution, strategic 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.)



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*)

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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Case Study Exercise

Business Value Assessment

Exercise #18



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Module 19

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

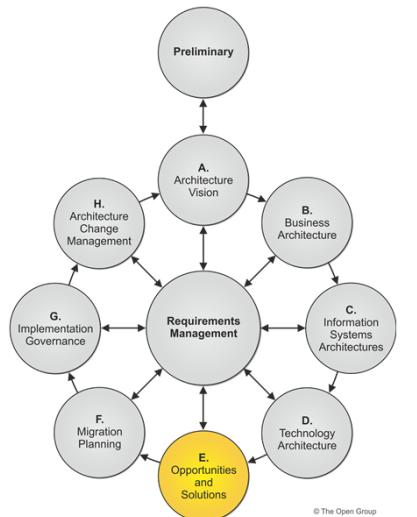
Approach

- 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

Phase E: Inputs

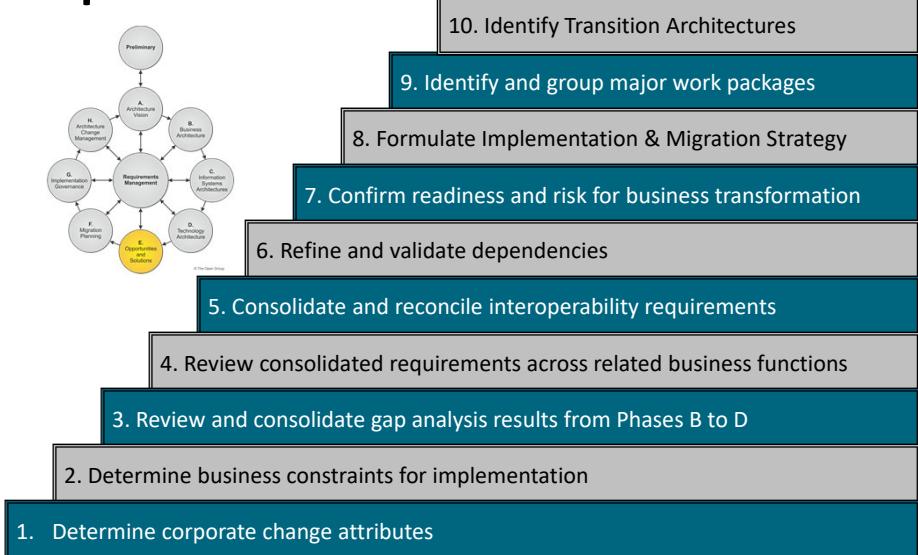


- Product Information
- Request for Architecture Work
- Capability Assessment
- Communications Plan
- Planning Methodologies
- Governance models and frameworks
- Tailored Architecture Framework
- Statement of Architecture Work
- Architecture Vision
- Architecture Repository
- Draft Architecture Definition 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

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

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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Case Study Exercise

Business Transformation Capability

Exercise #19

Exercise #20



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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

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

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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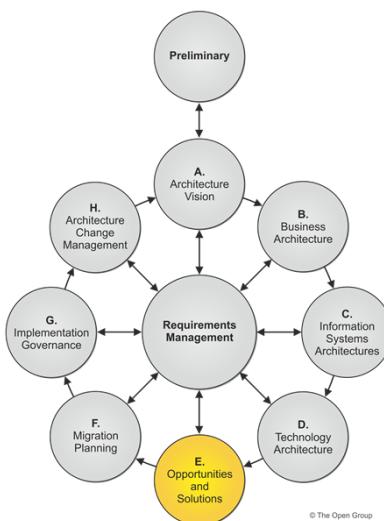
Step 11: Create the Architecture Roadmap & Implementation and Migration Plan

- 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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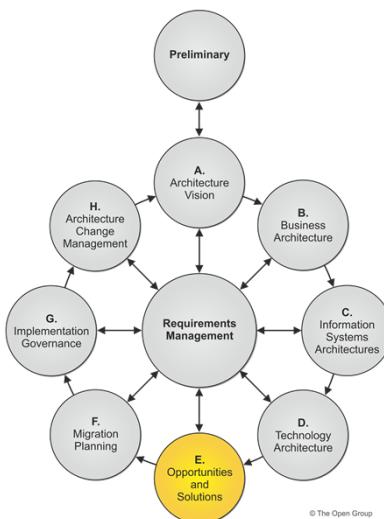
Phase E Outputs



- 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

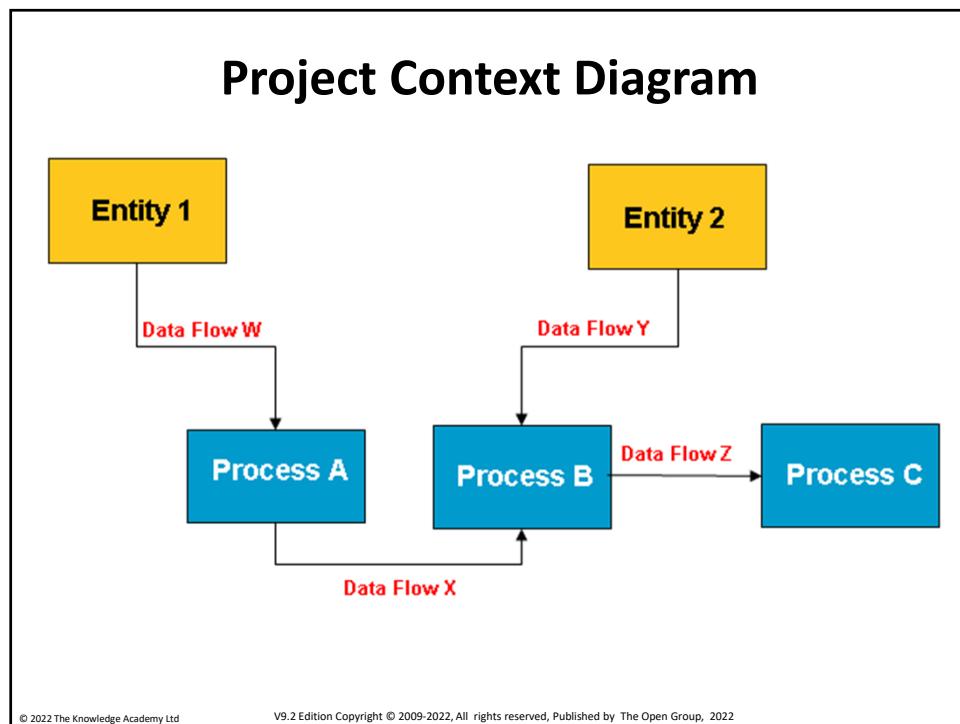
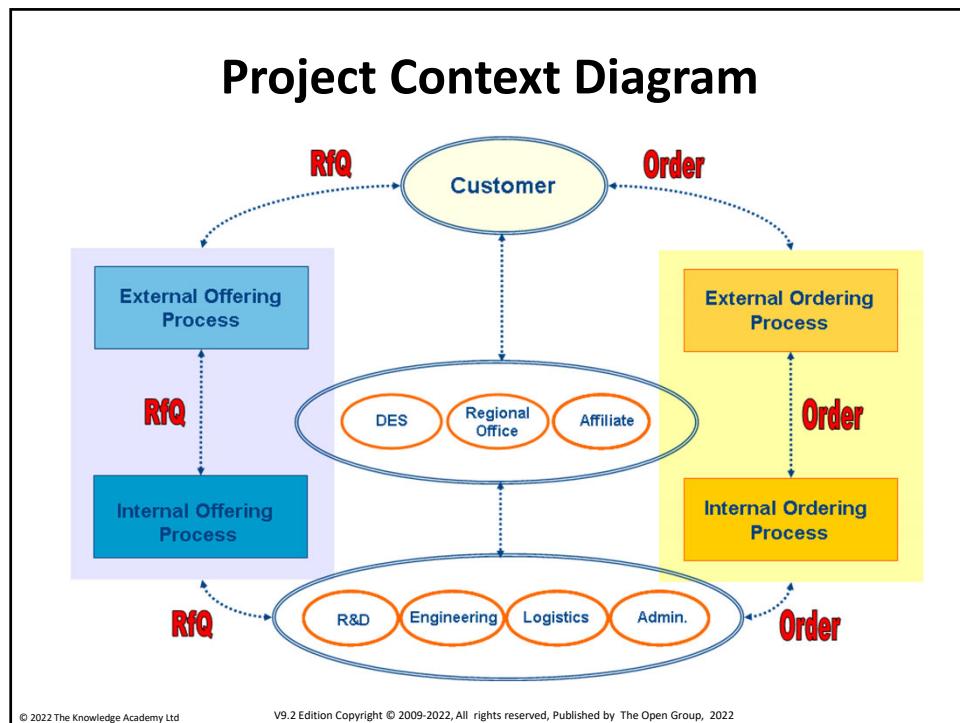
Phase E: Opportunities & Solutions			
Objectives	Steps	Inputs	Outputs
<p>Generate the initial complete version of the Architecture Roadmap, based upon the gap analysis and candidate Architecture Roadmap components from Phases B, C, and D</p> <p>Determine whether an incremental approach is required, and if so identify Transition Architectures that will deliver continuous business value</p> <p>Define the overall solution building blocks to finalise the Target Architecture based on the Architecture Building Blocks (ABBs)</p>	<p>Determine/confirm key corporate change attributes</p> <p>Determine business constraints for implementation</p> <p>Review and consolidate gap analysis results from Phases B to D</p> <p>Review consolidated requirements across related business functions</p> <p>Consolidate and reconcile interoperability requirements</p> <p>Refine and validate dependencies</p> <p>Confirm readiness and risk for business transformation</p> <p>Formulate Implementation and Migration Strategy</p> <p>Identify and group major work packages</p> <p>Identify Transition Architectures</p> <p>Create Architecture Roadmap & Implementation and Migration Plan</p>	<p>Product information</p> <p>Request for Architecture Work</p> <p>Capability Assessment</p> <p>Communications Plan</p> <p>Planning methodologies</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</p> <p>Draft Architecture Requirements Specification</p> <p>Change Requests for existing programs and projects</p> <p>Candidate Architecture Roadmap components from Phases B, C, and D</p>	<p>Statement of Architecture Work, updated if necessary</p> <p>Architecture Vision, updated if necessary</p> <p>Draft Architecture Definition Document, including:</p> <ul style="list-style-type: none"> Transition Architecture, number and scope, if any <p>Draft Architecture Requirements Specification, updated if necessary</p> <p>Consolidated and validated Architecture Roadmap</p> <p>Capability Assessment, including:</p> <ul style="list-style-type: none"> Business Capability IT Capability <p>Architecture Roadmap, including:</p> <ul style="list-style-type: none"> Work Package portfolio Identification of Transition Architectures, if any Impact analysis – project list Implementation Recommendations <p>Implementation and Migration Plan (outline), including:</p> <ul style="list-style-type: none"> Implementation and Migration Strategy

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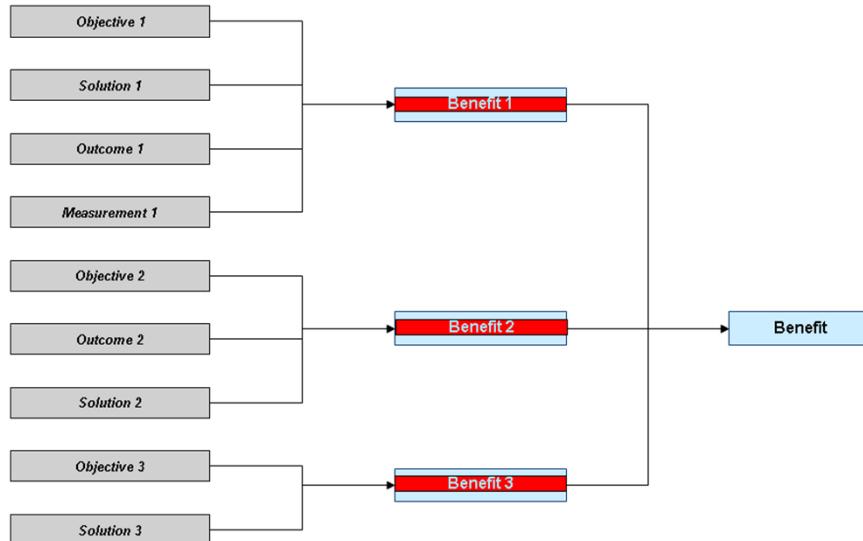
TOGAF Version 9.2 Artifacts





E

Benefits Diagram

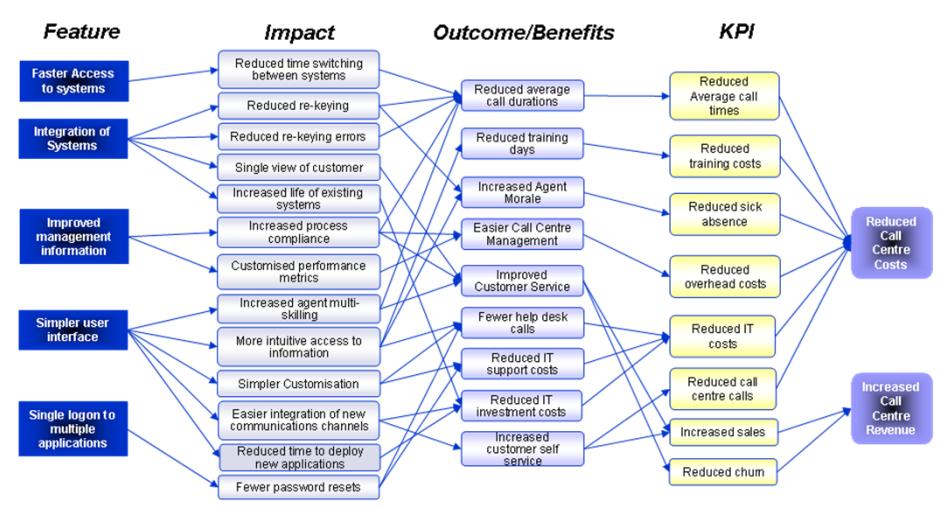


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E

Benefits Diagram



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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

371

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Module 20

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

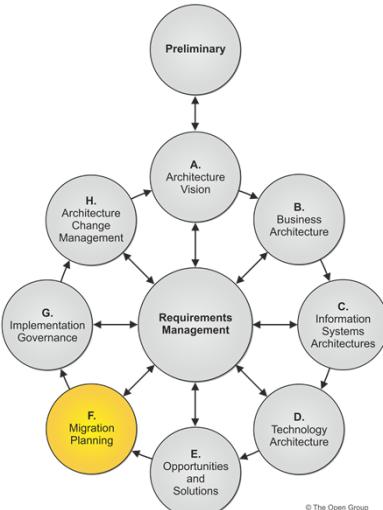
Phase F Objectives

- 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

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

Phase F: Inputs

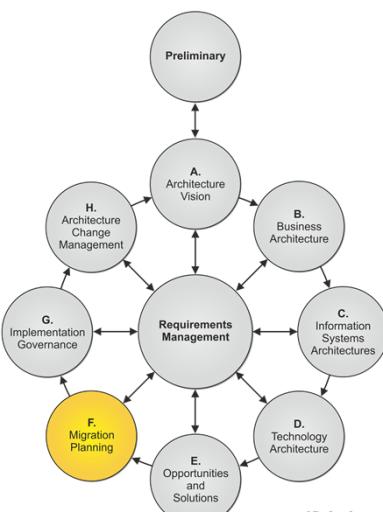


- Request for Architecture Work
- Communications Plan
- Organisational model for Enterprise Architecture
- Governance Models and Frameworks
- Tailored Architecture Framework
- Statement of Architecture Work
- Architecture Vision
- Architecture Repository

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Phase F: Inputs

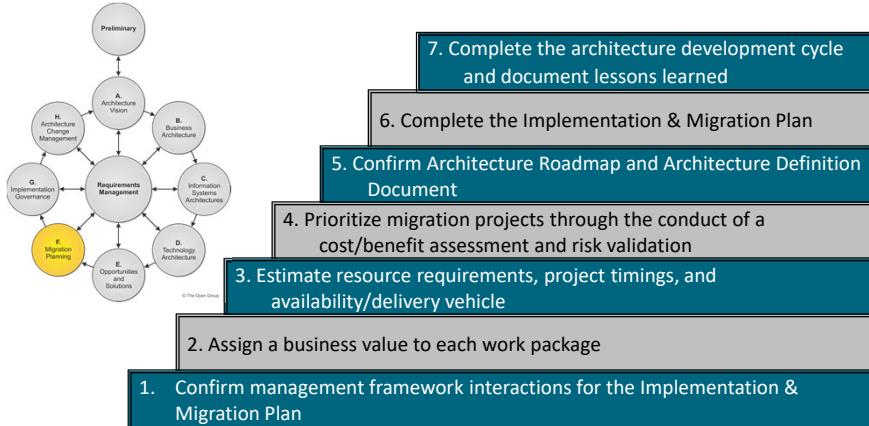


- Draft Architecture Definition Document, including:
 - Transition Architectures, if any
- Draft Architecture Requirements Specification
- Change Requests for existing programs and projects
- Architecture Roadmap, including:
 - Identification of work packages
 - Identification of Transition Architectures
 - 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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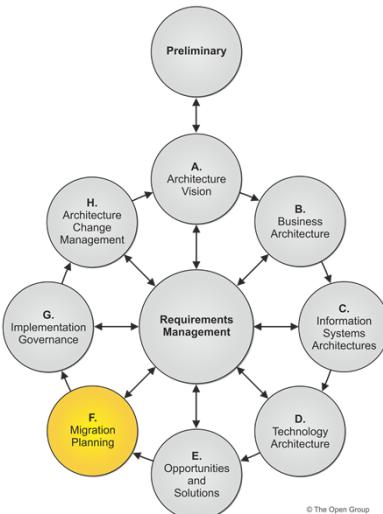
Step 6: Generate the Implementation & Migration Plan

- 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

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

Phase F Outputs

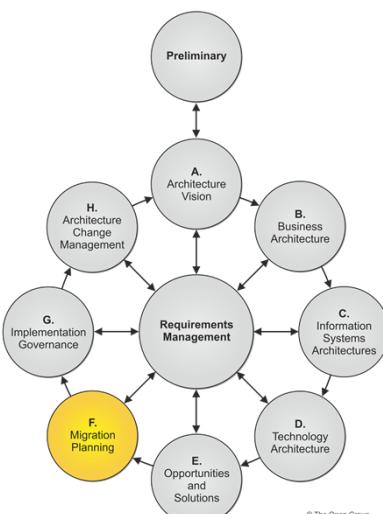


- Implementation and Migration Plan (detailed)
- finalised Architecture Definition Document, including:
 - finalised Transition Architectures, if any
- finalised Architecture Requirements Specification
- finalised Architecture Roadmap
- Re-Usable ABBs
- Requests for Architecture Work for a new iteration 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 Communications Plan organisational Model for Enterprise Architecture Governance models and frameworks Tailored Architecture Framework Statement of Architecture Work Architecture Vision Architecture Repository</p> <p>Draft Architecture Definition Document, including:</p> <ul style="list-style-type: none"> • Transition Architectures, if any <p>Draft Architecture Requirements Specification Change Requests for existing programs and projects</p> <p>Architecture Roadmap</p> <p>Capability Assessment, including:</p> <ul style="list-style-type: none"> • Business Capability • IT Capability <p>Implementation and Migration Plan (outline), including:</p> <ul style="list-style-type: none"> • High-level Implementation and Migration Strategy 	<p>Implementation and Migration Plan (detailed), including:</p> <ul style="list-style-type: none"> • Implementation and Migration Strategy • Project and portfolio breakdown of the implementation • Project charters (optional) <p>finalised Architecture Definition Document, including:</p> <ul style="list-style-type: none"> • finalised Transition Architectures, if any <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 21

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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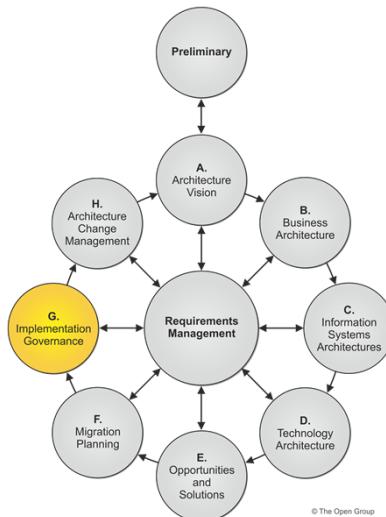
Approach

- 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

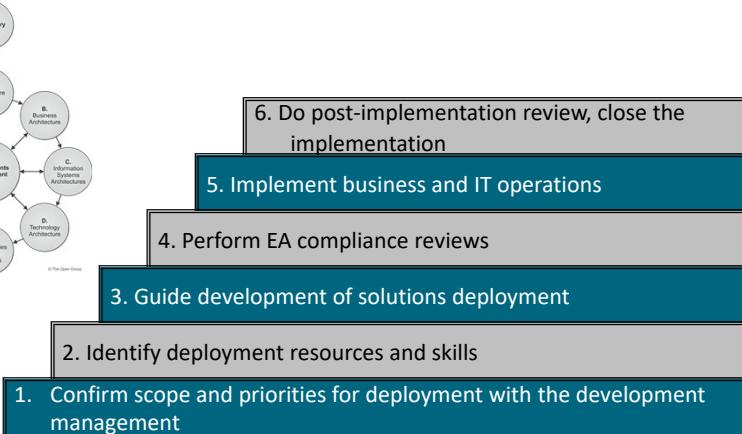


- Request for Architecture Work
- Capability Assessment
- organisational model for EA
- Tailored Architecture Framework
- Statement of Architecture Work
- Architecture Vision
- Architecture Repository
- Architecture Definition Document
- Architecture Requirements Specification
- Architecture Roadmap
- Implementation Governance Model
- Architecture Contract
- Request for Architecture Work from E and F
- Implementation and Migration Plan

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Steps



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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

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

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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Case Study Exercise

Architecture Contract

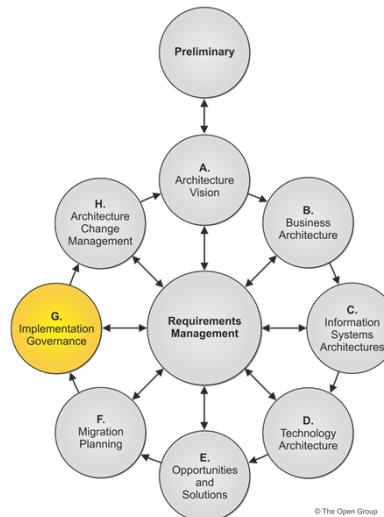
Exercise #21



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Phase G Outputs

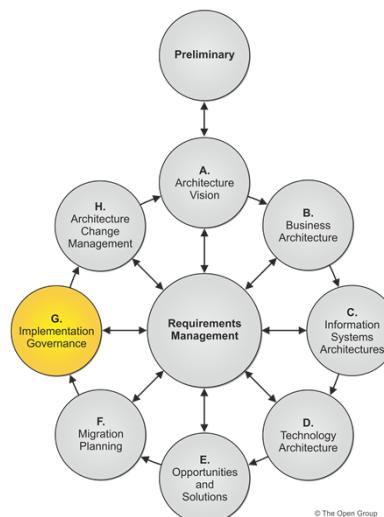


- Architecture Contract (signed)
- Compliance Assessments
- Change Requests
- Architecture-compliant solutions deployed, including:
 - Implemented system
 - Populated Architecture Repository
 - Recommendations and dispensations
 - Service delivery requirements
 - Performance metrics
 - SLAs
 - Architecture Vision
 - Architecture Definition Document
 - Transition Architecture
 - Business and IT operating models

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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

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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">• The architecture-compliant implemented system• Populated Architecture Repository• Architecture compliance recommendations and dispensations• Recommendations on service delivery requirements• Recommendations on performance metrics• Service Level Agreements (SLAs)• Architecture Vision, updated post-implementation• Architecture Definition Document, updated post-implementation• Business and IT operating models for the implemented solution

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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

404

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Module 22

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.

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.

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?

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

Maintenance versus Redesign

If the change:

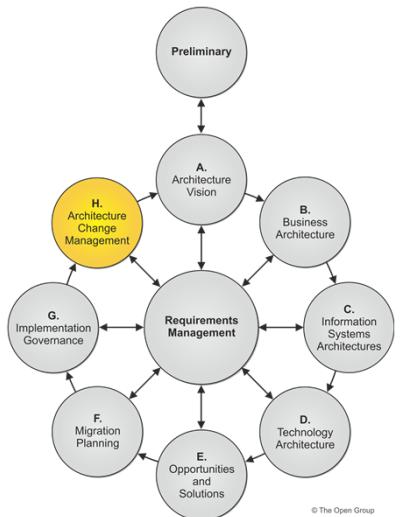
- Impacts 2 stakeholders or more, then it is likely to require an architecture redesign and re-entry to the ADM
- Impacts only 1 stakeholder, then it is likely to be a candidate for change management
- Can be allowed under a dispensation, then it is likely to be a candidate for change management

Change Impact Exercise

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.

Phase H: Inputs



- Request for Architecture Work
- organisational model for EA
- Tailored Architecture Framework
- Statement of Architecture Work
- Architecture Vision
- Architecture Repository
- Architecture Definition document
- Architecture Requirements Specification
- Architecture Roadmap
- Change Requests (due to technology changes, business changes, lessons learned)
- Implementation Governance Model
- Architecture Contract
- Compliance Assessments
- Implementation and Migration Plan

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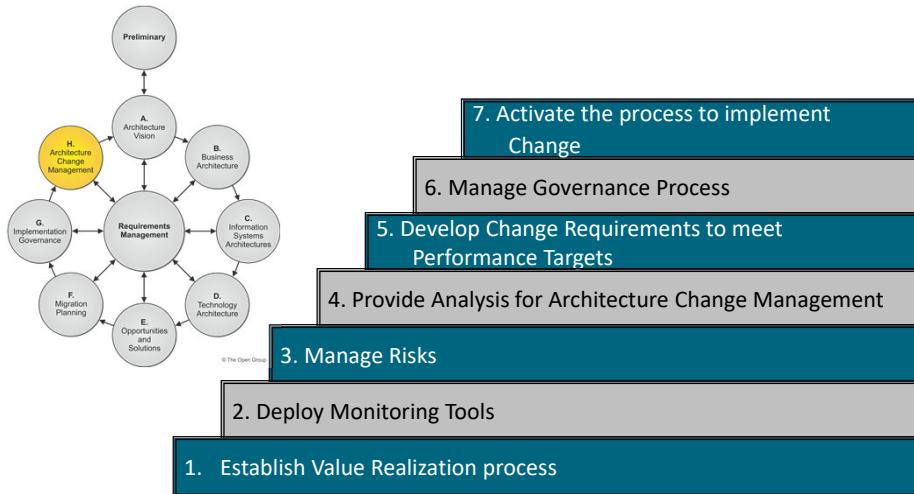
Change Requests

- 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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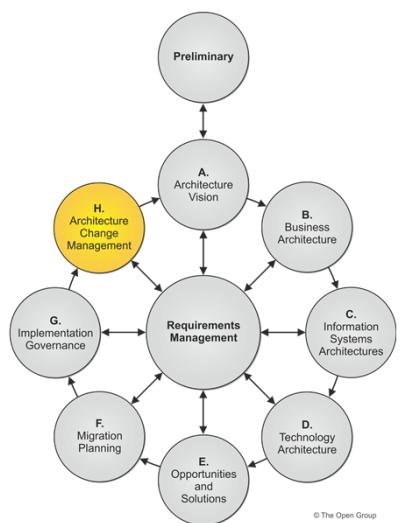
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Step 7. Activate the Process to Implement Change

- 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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Case Study Exercise

Transition Planning

Exercise #22



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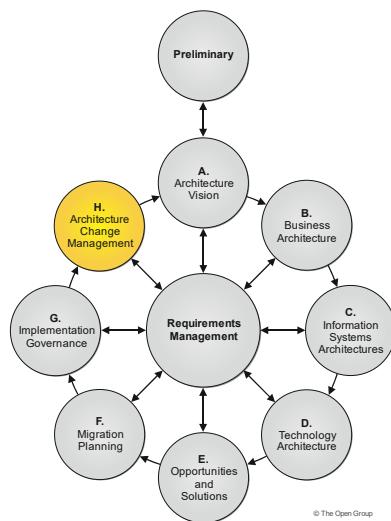
Request for Architecture Work

- 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 Manage risks Provide analysis for architecture change management	organisational Model for Enterprise Architecture Tailored Architecture Framework Statement of Architecture Work Architecture Vision Architecture Repository Architecture Definition Document	Changes to architecture framework and principles New Request for Architecture Work, to initiate another cycle of the ADM
Ensure that the Enterprise Architecture Capability meets current requirements	Develop change requirements to meet performance targets Manage governance process Activate the process to implement change	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	Statement of Architecture Work, updated if necessary Architecture Contract, updated if necessary Compliance Assessments, updated if necessary

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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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Case Study Exercise

Building in Security

Exercise #23



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Module 23: 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
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

- Chapter 36 in Part V, Enterprise Continuum and Tools



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Module Objectives

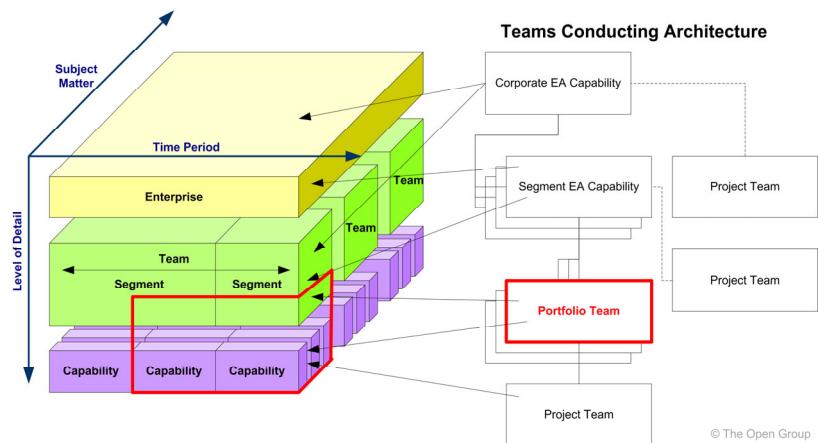
The objectives of this module are to describe:

- 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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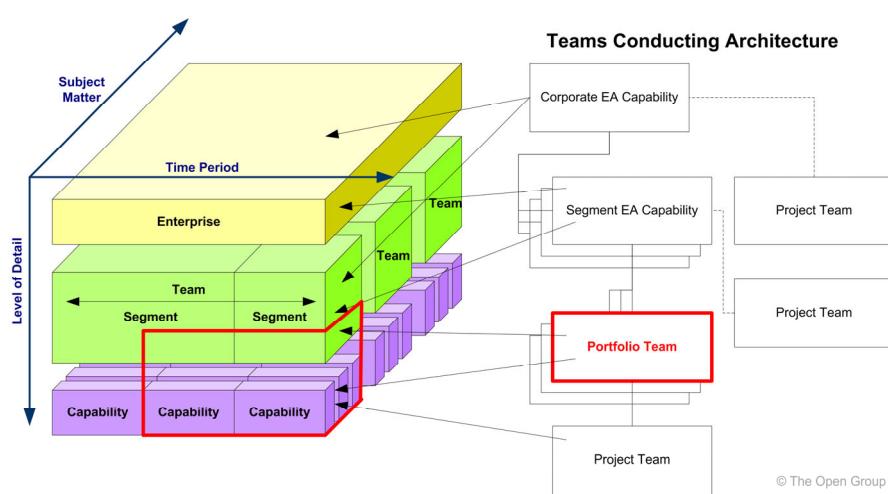
Preliminary Phase

- 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 24: **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
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 III, ADM Guidelines and Techniques, Chapters 18 and 19**



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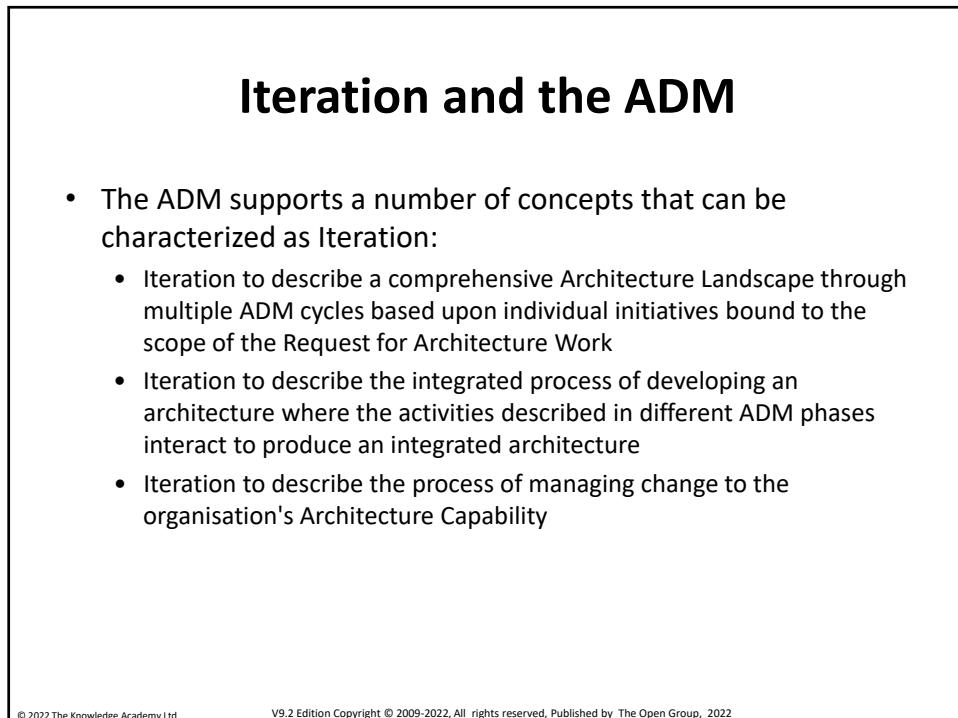
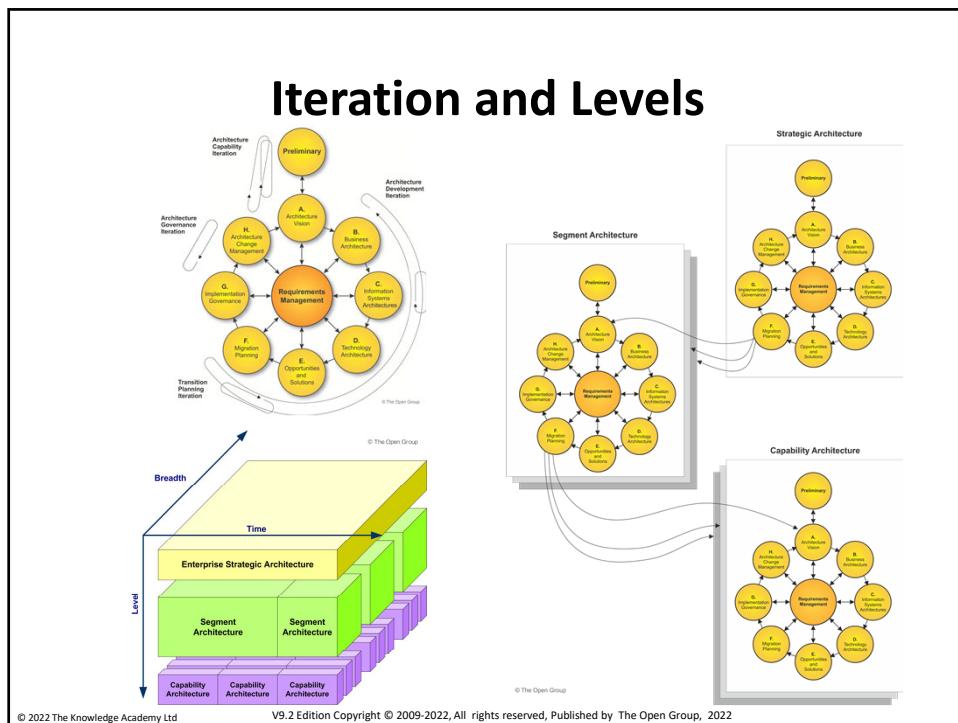
Module Objectives

The objectives of this module are:

- How to adapt the ADM using iteration and different levels of architecture engagement

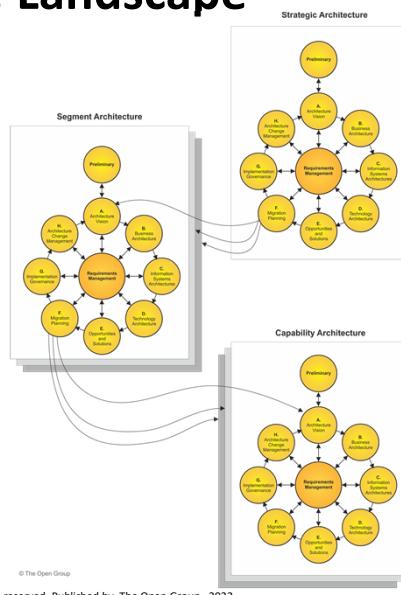
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Iteration to Develop a Comprehensive Architecture Landscape

- 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.

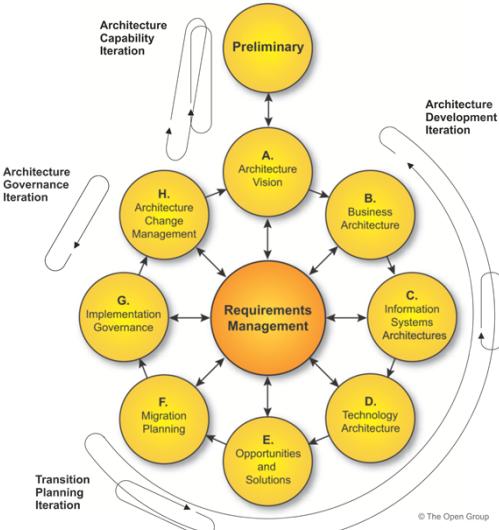


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Iteration within an ADM Cycle

- 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

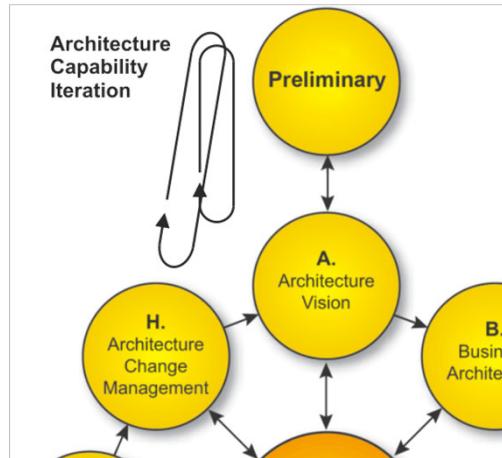


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Iteration to Manage the Architecture Capability

- 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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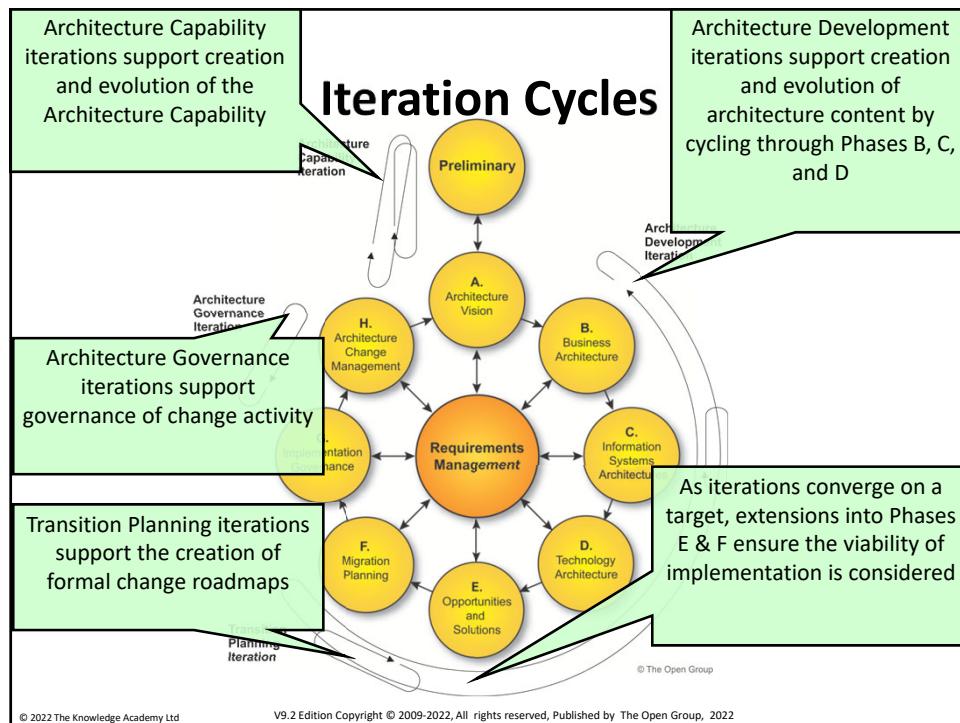
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Factors Influencing the Use of Iteration

- 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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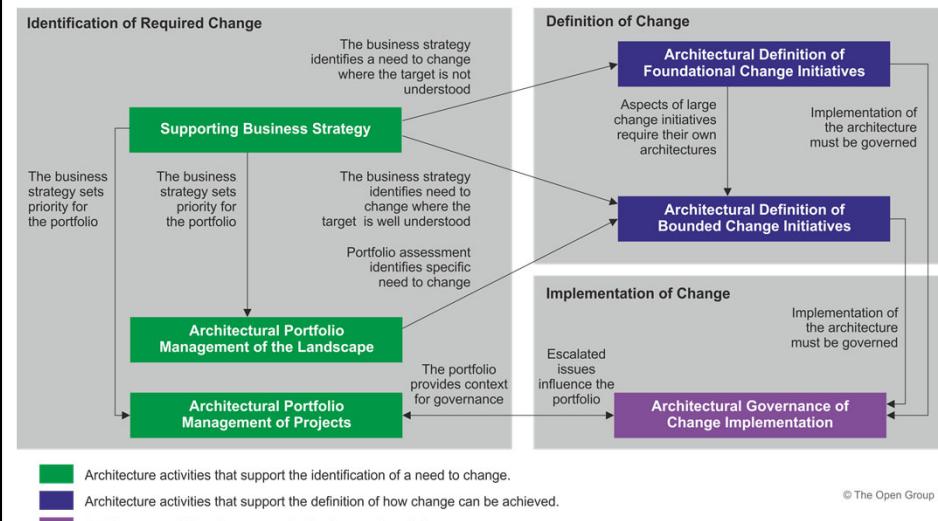
Approaches to Architecture Development

- 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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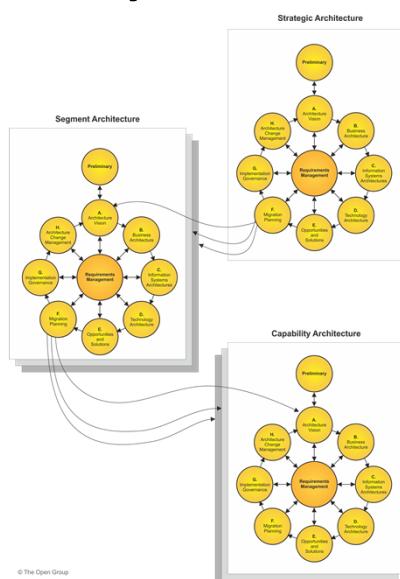
Iteration Considerations

- 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

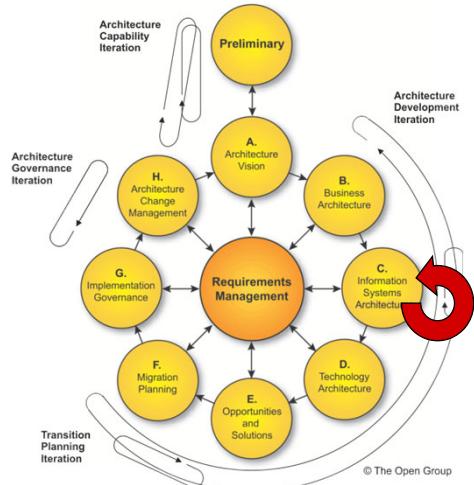
□ Informal: potential activity for the iteration, not formally mentioned in the method

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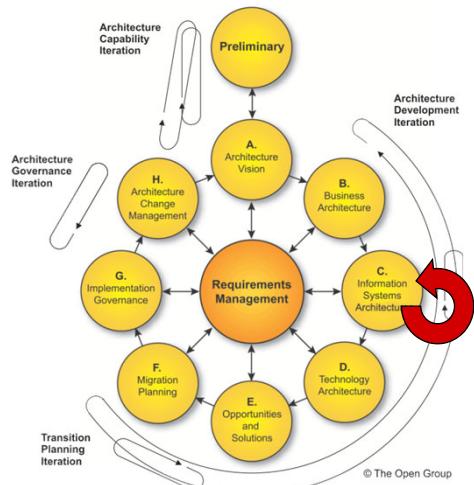
Architecture Development Iteration “Baseline First”



- **Iteration 1**
 - Define the Baseline Architecture
- **Iteration 2**
 - Define the Target Architecture and gaps
- **Iteration n**
 - Refine the Baseline Architecture, Target Architecture, and gaps

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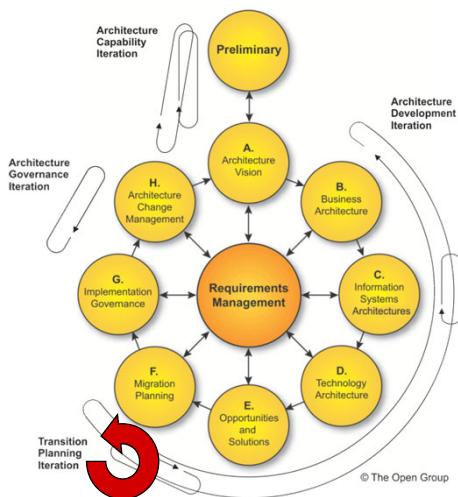
Architecture Development Iteration “Target First”



- **Iteration 1**
 - Define the Target Architecture
- **Iteration 2**
 - Define the Baseline Architecture and gaps
- **Iteration n**
 - Refine the Baseline architecture, Target Architecture, and gaps.

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Transition Planning



- **Iteration 1**

- Define and agree a set of improvement opportunities, aligned against a provisional Transition Architecture

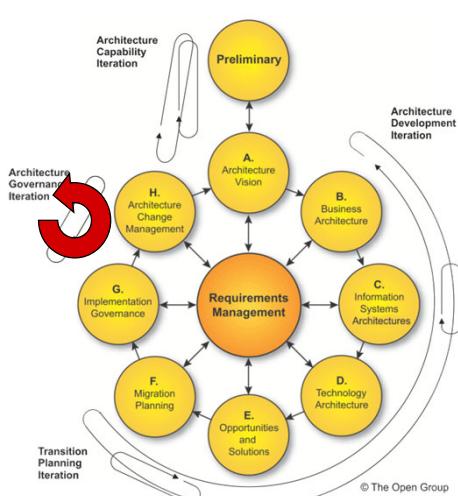
- **Iteration n**

- 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.

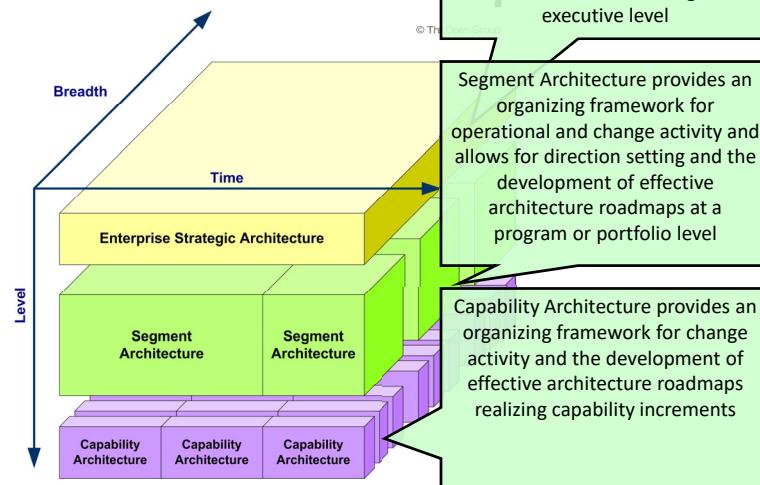
- **Iteration n**

- Carry out architecture governance and change control

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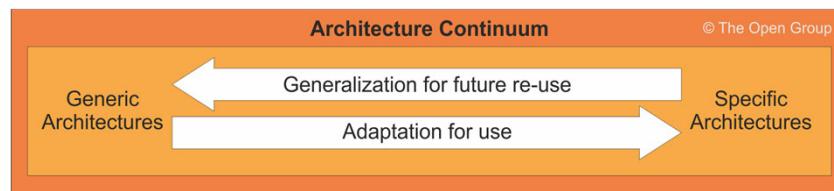
Applying the ADM Across the Architecture Landscape



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Applying the ADM Across the Architecture Landscape

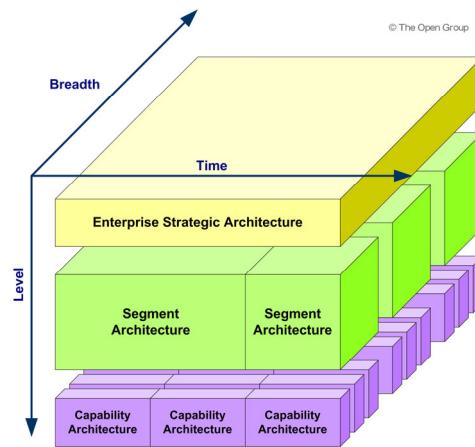


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Organising the Architecture Landscape

- The following characteristics can be used to organise the Architecture Landscape
 - Breadth (subject matter)
 - Depth
 - Time
 - Recency



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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

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Module 25:

Adapting the ADM:

Security

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Module Objectives

The objectives of this module are:

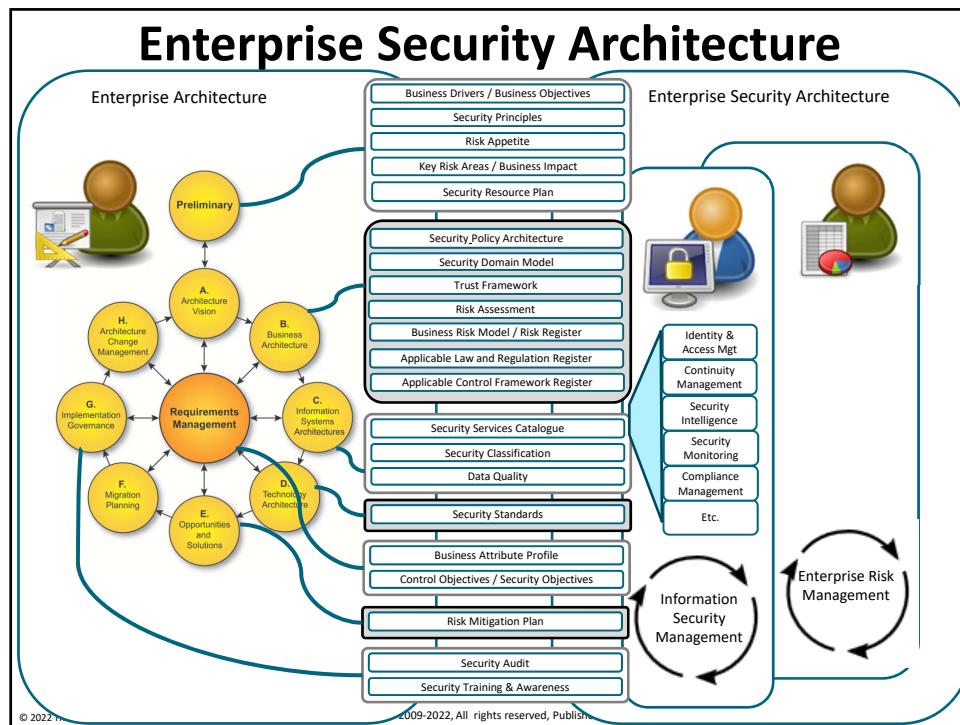
- Obtain an understanding of the security considerations that need to be addressed during application of the ADM

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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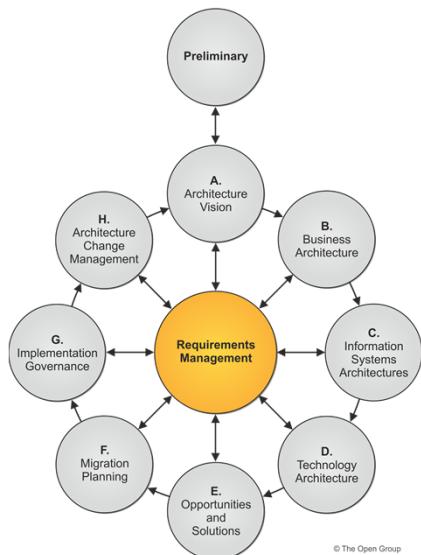
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Security as a Cross-Cutting Concern



ADM Requirements Management

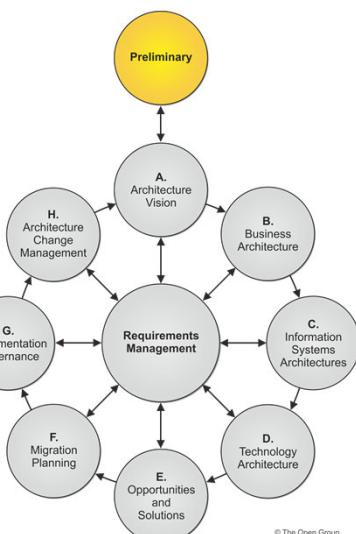


- Use Business Attribute Profiling, a requirements engineering technique from The SABSA® Institute
- Advantages:
 - Executive communication in non-IT terms
 - Traceability mapping between business drivers and requirements
 - Performance measurement against business-defined targets
 - Grouping and structuring of requirements, which facilitates understanding and oversight by architects

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Preliminary Phase

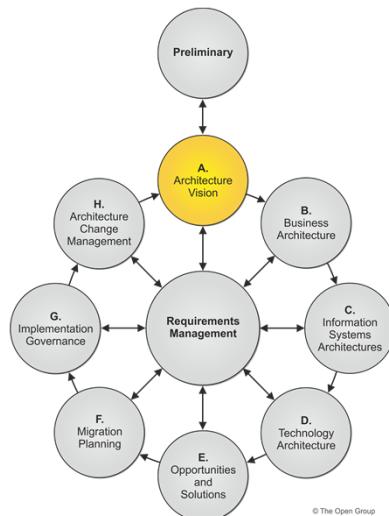


- The following security artifacts should be integrated into architecture documentation:
 - Business Drivers/Business Objectives affecting security
 - Security Principles
 - Risk Appetite
 - Key Risk Areas/Business Impact Analysis
 - Security Resource Plan

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Phase A: Architecture Vision

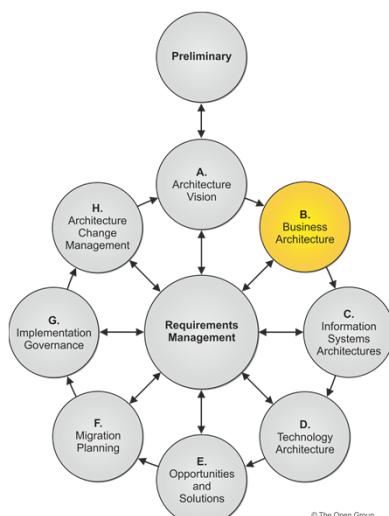


- Identify the complete list of all stakeholders, their concerns, and associated requirements for approval of the architecture
- Satisfy security stakeholders
- Satisfy business stakeholders

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Phase B: Business Architecture

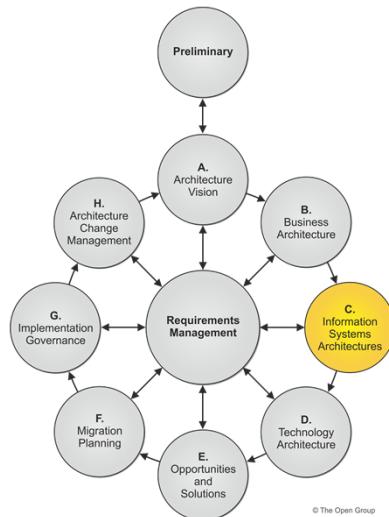


- The security elements of Phase B comprise business-level trust, risk, and controls, independent from specific IT or other systems within the specific scope of the architecture engagement.
- Artifacts include:
 - Security Policy Architecture
 - Security Domain Model
 - Trust Framework
 - Risk Assessment
 - Business Risk Model/Risk Register
 - Applicable Law and Regulation Register
 - Application Control Framework Register

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Phase C: Information Systems Architectures

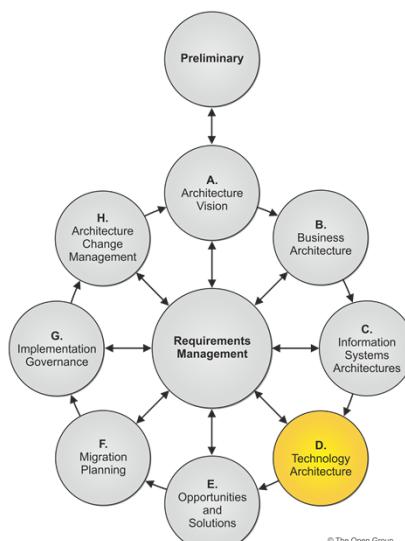


- The security elements of Phase C comprise functional security services and their security classification.
- Artifacts include:
 - Security Services Catalog
 - Security Classification
 - Data Quality

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Phase D: Technology Architecture

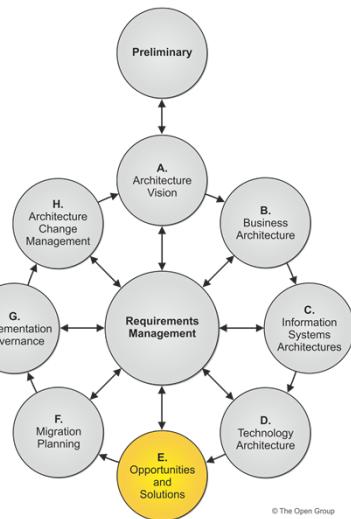


- The Security Architect must ensure that the required controls are included in the Technology Architecture and verify whether the controls are used in an effective and efficient way
- A security stakeholder may request the creation of a specific Technology Architecture security view or deliverable that describes all security-related technology components and how they inter-relate

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Phase E: Opportunities and Solutions

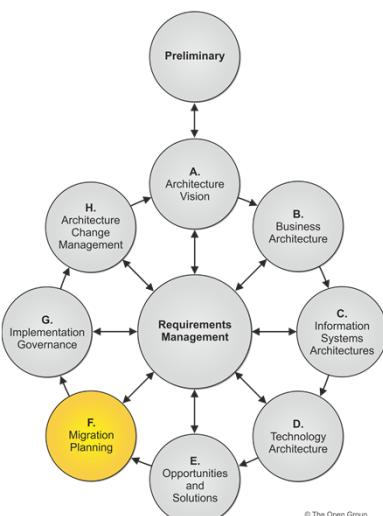


- In defining the roadmap, it is imperative that security and risk are evaluated
- The security building blocks defined in the previous phases become SBBs in this phase
- This phase should include a Risk Mitigation Plan

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Phase F: Migration Planning

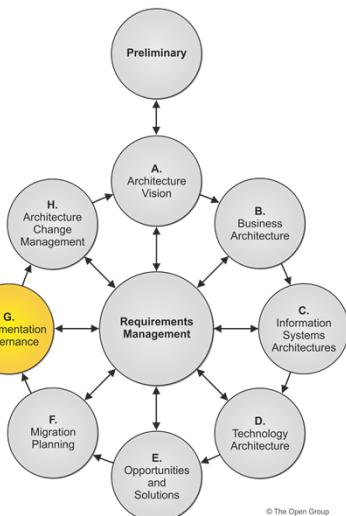


- Migration is itself a business process that needs to be secured
- The migration strategy should include a risk assessment and a Risk Mitigation Plan
- In addition, migration planning should include a security impact analysis to understand any security impacts of the target state of the change.

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Phase G: Implementation Governance

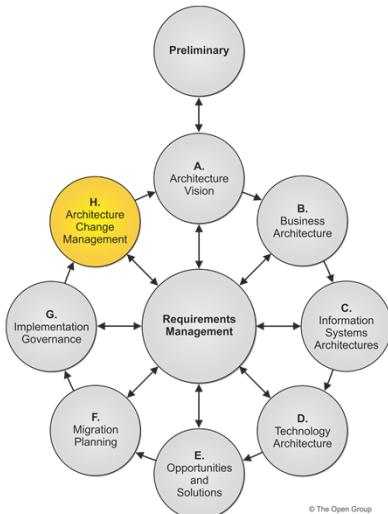


- Security Architecture implementation governance provides assurance that the detailed design and implemented processes and systems adhere to the overall Security Architecture
- This ensures that deviations from Architecture Principles and implementation guidelines don't create any unacceptable risk

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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

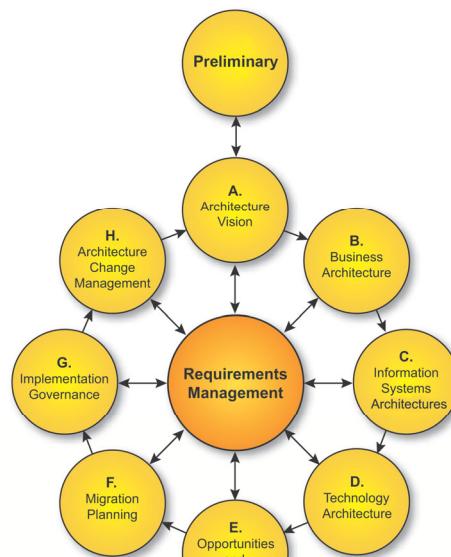
Exercise

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

Module 26: Architecture Maturity Models

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 Metamodelling
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, Chapter
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

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

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

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

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)

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.

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 27:

Architecture

Skills Framework

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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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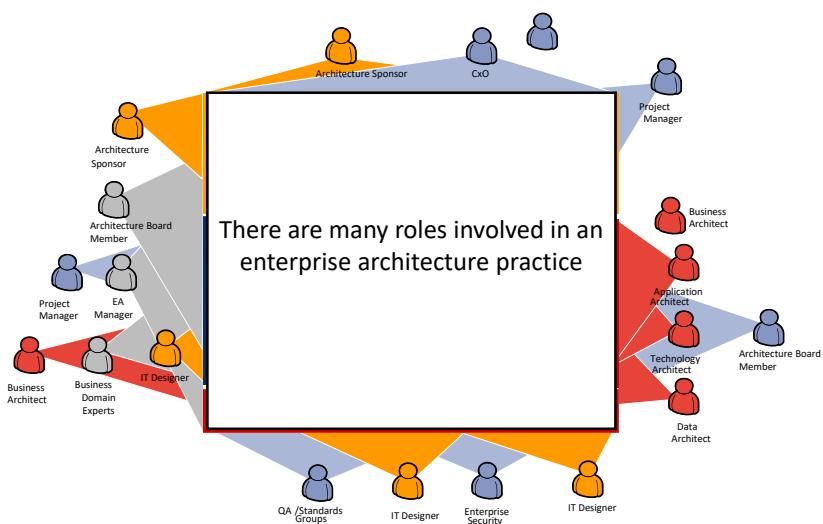
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Module Objectives

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

Roles



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

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

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
Generic Skills									
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



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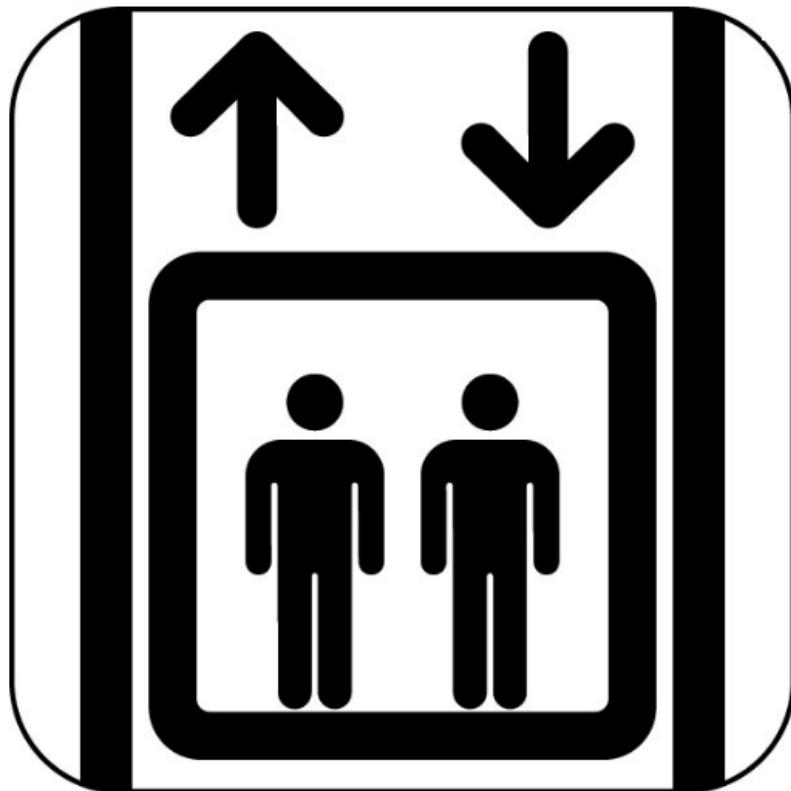
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Case Study: Challenge Lifts



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.

Table of Contents

- Scenario:** Challenge Lifts
- Exercise 1: Elevator Pitch
- Exercise 2: Architecture Landscape
- Exercise 3: Business Scenario
- Exercise 4: Handling Change
- Exercise 5: Writing a Principle
- Exercise 6: Selecting Principles
- Exercise 7: Gap Analysis
- Exercise 8: Going Forward
- Exercise 9: Explaining a View
- Exercise 10: Managing Stakeholders
- Exercise 11: Building Blocks
- Exercise 12: Metamodel Extensions
- Exercise 13: Value Chain Diagram
- Exercise 14: Creating the vision
- Exercise 15: Developing the Vision
- Exercise 16: Requirements
- Exercise 17: Selecting Artefacts
- Exercise 18: Business Value Assessment
- Exercise 19: BTRA
- Exercise 20: Assessing the Enterprise Capability
- Exercise 21: Architecture Contract
- Exercise 22: Transition Planning
- Exercise 23: Building in Security

Scenario: 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 duplicating 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 3rd 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 based 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 what 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 10th 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

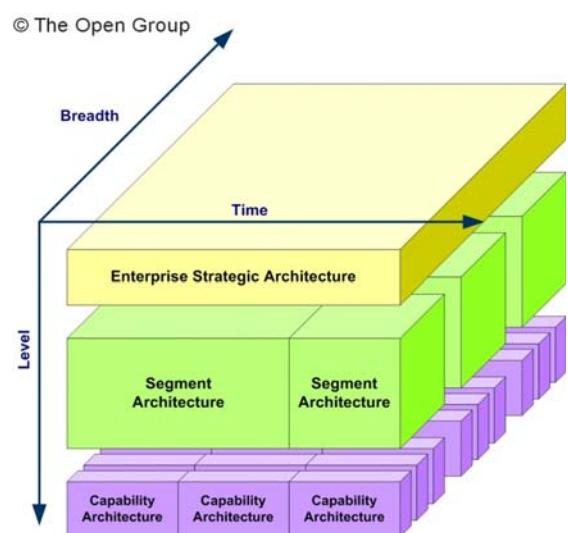
Prepare a 30 second explanation of what Enterprise Architecture is and the benefits to a company. Present this to the class.

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: 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 Document 24.4 and 35.6 will give guidance on artefacts)

Business scenario problem description	We are worried that a centralised ERP system will not be capable of handling regional variations
Detailed objectives	
Views of environments and processes <i>(Select Artifacts from Section 35.6 of the TOGAF document)</i>	
Actors, their roles and responsibilities	Regional procurement managers
Principles and constraints <i>(Select standard TOGAF principles)</i>	
Requirements <i>(What do they need?)</i>	
Next steps	
Glossary of terms and abbreviations	
References	

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 Delegate Hand-out section 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: 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 8: 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 9: 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 10: 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 11: 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 12: 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.

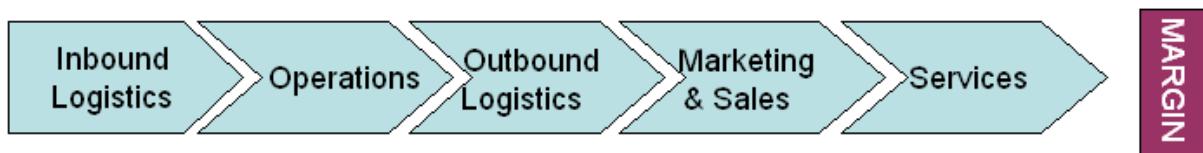
Additionally, in order to consolidate applications across several data centres, it will be necessary to model the location of IT assets so that the end goal of a single ERP application running in a single data centre is achieved.

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 13: 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 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

Note: *The steps are for guidance, in this exercise you will not be going past step 1*

Exercise 14: Creating the Vision

Request for Architecture Work (abstract)	
Organization Sponsors	
Organization's mission statement	To become the world-wide supplier of choice to major construction projects
Strategic plans of the business	Improve our cost base by understanding our processes better Improve customer perception of our capability and professionalism
Time limits	2 years maximum
Changes in the business environment	New Global Help Desk New centralized ERP system
Organizational constraints	Need to be aware of impending new regulations which will require us to keep track of parts installed.
Budget information, financial constraints	Total for all work no more than £3M
External constraints, business constraints	Existing building space must be utilised wherever possible
Current architecture/IT system description	Chaotic, de-centralised, uncontrolled, out of date
Description of developing organization	The company is moving towards a more federated manufacturing and sales structure with a centralised design and support capability
Description of resources developing organization has available	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 15: 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 16: 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 17: 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?
Phase 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?		
Phase C: Data Architecture		
What systems have we that access and update Data?		
Who or what has access to Challenge's data		
Phase C: Application Data		
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?		
Phase D: Technology Architecture		
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 18: 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 19: Business Transformation Readiness Assessment

The ERP project is underway and has reached phase E

Using the information below and the scenario – 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	Enterprise Capacity to Execute				
12	Enterprise Ability to Implement & Operate				

Exercise 20: 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 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: 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 Train, 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 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.

Advice/ Answers for Case Study

Many Exercises are open activities - have class justify decision. I tend to divide large classes into groups, give them wall space, then get them to post up their answers - class then goes for look see

In class discussions encourage quick/ short responses (Elevator Pitches), EA need to make quick pitches to C class Executives and many in the classroom have difficulty in this area.

EX1: Elevator Pitch

Class of 11 gave 20mins for this – broke into groups of 2 or 3

An ice breaking session to be performed early in course. Class should base this on pre-course. Restrict pitch to 30 secs

EX2: Architecture Landscape

Simplified this from the previous version. One aim of this is to have class read Case Study others are to continue getting them to team build and to present them with some easy wins.

Three projects presented first is horizontal (across whole enterprise) second is segment (Commercial Lifts Division) the last one is capability architecture

Sketching out is optional

EX3: Business Scenario

Views of environments and processes	Example artefacts Application/ Function Matrix P393 Data Entity/ Business Function Matrix P388 Application/ Data Matrix P389
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EX4: Handling Change

Individual exercise or set in groups about 10 mins followed by 10 min discussion

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.	If the impact is significant for the business strategy, then there may be a need to redo the whole EA — thus a re-architecting approach.
In a separate initiative Challenge has decided to offer I-Pads to their staff instead of the traditional lap-top. 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	If a new technology or standards emerge, then there may be a need to refresh the Technology Architecture, but not the whole EA — thus an incremental change. No additional resources also pointer
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	Security to be considered as well! Extra funding for this probably re-architect

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	If the change is at an infrastructure level — for example, ten systems reduced or changed to one system — this may not change the architecture above the physical layer, but it will change the Baseline Description of the Technology Architecture. This would be a simplification change handled via change management techniques.
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	Prob partial re-architecting (Incremental) as Business Vision unchanged etc
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	The Business strategy has changed so method suggests re-architecting
Due to a change in regulations, the implementation of the new data-centre will require addition components. Guidelines for the new components will also be required	Substantial change is required to components and guidelines for use in deployment of the architecture could be re-arch or Incremental (partial re-architecting). New principles needed

Answers based on Open Group viewpoint - if re-architecting new Request For Work MUST be issued

EX5: Writing a Principle

Could use this as a group exercise but could also be given evening work if pushed for time.

EX6: Selecting Principles

B=5

A=3

D=1

C= Distracter

Asked to meet only TWO concerns: Security & Reliability NOT to redefine the complete list of principles needed.

THOSE THAT MEET

- Data is accessible
- Data security
- Business Continuity

Data is Shared is a possible (manual says linked to the other Data principles) makes no different to the answers

B has 3 (or 4) correct

A has 2 (or 3) correct

D has only 1

C has zero (don't believe Inf Mgt is everybody's business meets stated needs)

EX7: Gap Analysis

Various answers gave about 20 mins do this on day 2 PM

Can do this L1 or L2

EX8: Going Forward

Aim: to have delegates appreciate the EA perspective

Can be used in the class (have them work in groups) to get them communicating or as evening work day one

Have them present as written bullet points then stick to classroom walls so that opinion can be shared. Suggested classroom time 15 mins. Interesting to see how different areas start building together – one class we linked mobile phones to health centres and fitness centres: it was possible to see future interlinkages evolving

EX9: Explaining a View

Suggest use as L1 after View/ Viewpoint discussion or L2 if subject not covered until AM day 3.

EX10: Managing Stakeholders

This consolidates the stakeholder tools useful as L2 exercise at end of stakeholder section This is a very subject exercise. If you wish a more ‘objective’ exercise, Q4 Talk Is Cheap L2 question in section 4 can be done in addition to or instead of this exercise.

EX 11: Building Blocks

Various answers suggest L1

Exercise 12: Metamodel Extensions

Asked for three objectives:

1. Model process compliance
2. Model processes (that are event driven)
3. Model location of IT assets

A=5, Seems to do all three

Process Modelling: event driven processes & compliance
Infrastructure Consolidation: Location of IT assets

B=3, Does two of the three

Process Modelling: event driven processes & compliance
Gov extension not relevant

D=1, The Data & Services may provide a bit of clarity but do not focus on the concerns raised. The best you can say about this is it is a bit better than C

C=0, Think distracter. Neither Governance nor Motivation will help achieve objectives

ALL THESE IN THE SLIDES ALSO SECTION 34.4.1

The governance extension is intended to allow additional structured data to be held against objectives and business services, **supporting operational governance of the landscape**

Pete: I don't think that this extension is useful as we have NOT been asked to consider Op Governance as part of the solution. The document does say it should be used in large complex transformation type projects which the ERP project is however.

This extension should be used in the following situations:

- When an organization is considering IT change that will result in a significant impact to existing operational governance models
- When an organization has granular requirements for service levels that differ from service to service
- When an organization is looking to transform its operational governance practice

The process modeling extension is intended to allow detailed modeling of process flows by adding events, products, and controls to the metamodel. Typically, enterprise architecture does not drill into process flow, but in certain process-centric or event-centric organizations it may be necessary to elaborate process in a much more formal manner using this extension module.

The benefits of using this extension are as follows:

- This extension allows detailed process modeling and the cataloging of process artifacts.
- May be used to support **regulatory compliance activities**.
- May be used to re-purpose legacy or non-architectural process decomposition analysis.

Use process modelling extension:

- 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

The motivation extension is intended to allow additional structured modeling of the drivers, goals, and objectives that influence an organization to provide business services to its customers. This in turn allows more effective definition of service contracts and better measurement of business performance.

The benefits of using this extension are as follows:

- Highlights misalignment of priorities across the enterprise and how these intersect with shared services (e.g., some organizations may be attempting to reduce costs, while others are attempting to increase capability)
- Shows competing demands for business services in a more structured fashion, allowing compromise service levels to be defined

Ex 13: Value Chain Diagram

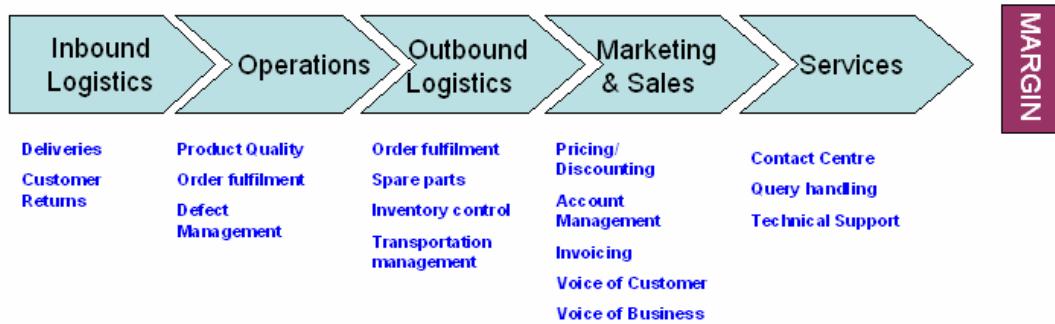
Give class 10 mins Group exercise. discuss about 10 mins

This is a practical activity

Additional info about VCD is in the technical notes section of the workbook.

Suggest perform in L2 after VCD slide

Answer



CLASS DISCUSSION : METAMODEL EXTENSIONS

1. Motivation (p354)
2. Motivation (p354)
3. Infrastructure (p352)
4. Data (p350)
5. Process Modeling (p348)

Taken from slide notes Open Group interpretation

EX14: Creating the vision

Starts class thinking about artefacts

EX15: Developing the Vision

CAN GIVE THIS AS HOMEWORK

Which phase are we in? Team just formed, Architecture Governance Board in place, asked to develop Arch Vision therefore most likely to be in Phase A

C: 5

Correct answer we need to develop a high level vision first, fix the scope and get requirements Section 7.4 (specifically 7.4.6). B Scenarios are the favoured technique here as this will allow us to determine what the business needs. This answer is the most comprehensive (compared to B) solution to meet the needs stated in the question

B 3

We need to understand the current functionality that is to be duplicated. Challenge operates a de-centralised IT support framework so the current baseline is probably vague. So it makes sense to baseline first however the stakeholders are worried about the new solution not meeting their needs so it is important to collect their requirements. Also B is describing Transition Architectures which are really a concern of Phase E we are in phase A. Despite this I think it is a bit better than A

A: 1 does not cover the baseline important here also is vendor instead of business focused. This is focussing on vendor aware products which is the focus of phase E not something that should really be a primary focus at the beginning of the cycle. Worth one mark as better than D

D: distracter : re written 30/8/12 we do not move directly to Implementation planning should conduct BTRA in Phase A first.

EX 16: Requirements

May have to explain functional & non-functional (refer to technical notes section of workbook)
List chosen so all delegates should have some they are familiar with

EX 17: Selecting Artefacts

Consolidation for Phases B-D. Best run individually I think – probably give as evening work

EX18: Business Value Assessment

Perform L2 after Migration tools section

EX 19: BTRA –

Can be done in class as a group exercise or given as day 3 homework to be discussed next day – the risk slide example (Risk ID & Mitigation Worksheet) uses this for its examples so if performed as homework the Risk slides come first – might like to mention this when you give out the homework or when discussing the slide

EX20: Assessing the Enterprise Capability

Based on Grub & Co V1.2.4

This is about Enterprise Capability Assessment so A is the main phase seeing as we are just leaving Primary
To assess ent capability we need to ideally perform a BTRA and assess risks probably by a Business Scenario

C (5) BTRA is major to what is being asked it is used in Phase A and phase E (ref 7.4.5) and chapter 30 (BTRA) BTRA includes a risk assessment (possibly generated by B Scenarios mentioned in D)

D (3) poss, This takes us part of the way there but a BTRA is more comprehensive

A (1) Phase B is concerned with Business so will identify some risks but not all (are the business prepared to accept the latest version of Office?) Also is later than C & D

B(0) distracter Implementation Factor Assessment & Deduction Matrix in Phase E (slide & Manual)

EX 21: Architecture Contract

Dispensation P590

Concerns:

Securing trade secrets: Some of the work will use external contractors so for these a formal contract (with an NDA) a good point

Standard way of building: but unfortunately changes need to be made to accommodate compliance regulations

The project is about implementing a new process NOT about checking that the process is delivering good output (this is stated obliquely in the scenario text “standard approach for panel creation”)

According to the manual Dispensation is a temporary affair so in theory it cannot be used for accepting local compliance changes. In this version I have amended ans A to have the AGB amend the contract – can’t prove this from the book but logical

I think this question groups the answers into pairs – A & D correct, B&C not very good at all. B & C have correct elements in them but not very many. C has a trap in that the inspection work is for Business as Usual not the implementation of the new process which is the focus of the EA. The ranking of B & C is open to challenge, the ranking of A & D a bit more obvious

A: 5

D: 3

No need to re-create the contracts as they already exist but you should review them (as in A)
No mention of compliance reviews (as in A) this makes D less comprehensive than A

B: 1

1st paragraph weak as per D 2nd Para talks about an automatic dispensation effectively removing control from Chief Engineer and AGB also dispensation wrong

C: Distracter

“You use issued contracts” not told contracts issued just prepared so review far better option. As an EA you are not interested in monitoring the quality of each panel you want to make sure the implementation projects are running correctly

2nd para is overkill – why would you wish to do this for **every** change request?

EX22: Transition Planning

V1.5.6A changed wording in question to indicate that Draft Imp & Mig plan only just being started – this moves activity back a bit – answers tweaked as well

There is a problem here as someone has jumped the gun and decided on three transitions. This may have been proposed at the Vision stage and the idea has “stuck” as ideas often do. This should be revisited in Phase E which is when Implementation Transitions should be made (on the basis of a consolidated Gap and a BTRA)

Stakeholder concerns the EA is asked to satisfy:

- 1) Is work too ambitious (for enterprise to cope with?) is there a risk here? a capability assessment/Business Transformation Readiness Assessment will help
- 2) Are projects going to give value? For this we need Business Value assessment technique

C: 5 (I think as meets needs)

A: 3. Meets Option 1 Asses transitions so should schedule for ent capability and also assesses risk OK (but should be done before DRAFT Imp & M plan. However this is grammar). Also this answer does not address the risk question or the Value. The State Evolution Table does not really cover value or risk and anyway the answer says use it to identify only Transition Architectures.

According to the book (P294) A consolidated Gaps wis not the planning tool for working out transitions – that is the Architecture Definition Increments table

D: (1) Meets 1 (option 2) need after a fashion. No mention of consolidation for gap analysis. Information about potential solutions probably B C D if you take book literally. Value Realisation will help option 2 however this occurs in Phase G and tests whether benefits achieved worry is should we starts so BVA better. Think this answer is weaker than A which is why relegated to third place

According to the book it is the **Architecture Definition Increments Table NOT the State Arch Evolution Table** which allows you to plan transitions. The SAET illustrates the BBs evolution

B: Distractor interoperability is not mentioned as a concern what about Value for Money etc?

EX23: Building in Security

Had a re-think on this one in V7 and re-drafted

The way I teach the security slides is that I take class through general (unhidden) intro slides then show them the Preliminary & Phase A slides. By this time the class have usually had enough and really don't want to go through the ADM cycle again. I tell them to read up on Chapter 23 before taking the exam then give them Ex 23 as the last exercise (I have done the 3 mock L2 exams by this time). One of the reasons for re-drafting this question is that now the information needed to handle it is all based on Preliminary & Phase A

This illustrates how we could be tested on adapting the ADM. For this knowledge of the additional security tasks in each stage is important (chapter 21). In the course we cover both SOA and Security very lightly – recommend that students read up on the chapters in the manual as part of their pre-exam study. This is based on the preliminary stage (guided by scenario) so could show relevant slides as an example

A=5 marks , Allocation of Sec A to implementation team premature

This now maps to the security requirements in the Preliminary phase

- Scope the enterprise organization units impacted by the security architecture
- Define and document applicable regulatory and security policy requirements
- Define the required security capability as part of the Architecture Capability
- Implement security architecture tools

Surprisingly the TOGAF document states that the EA can update the corp security policy in Preliminary Stage (P202 section 21.5 second para frm the bottom second line from the bottom)

“You identify and record the requirements needed to address the Board’s concerns”. Everywhere else we are firmly told that requirements gathering starts in Phase A however P202 has a title in bold about requirements. These, I think, are slightly different requirements viz “regulatory & security policy requirements” so this statement in the answer is probably OK (as it mentions the requirements in conjunction with the “Board’s concerns”)

D=(3) Starts well need to understand Snr Stakeholder perspective. Allocating a team probably not envisaged for liaison role and all work in progress excessive. According to the book “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” is a correct activity for Preliminary (paraphrased some of the bullet points on P202)

While these are correct answers A has more correct answers (actually the best solution comes from combining both A & B)

C: (1) OK as far as it goes but no mention of adding security capability to the team etc. Securing endorsement occurs in phase A (p204 top para) . Again best we can say is that it is better than B the distractor

B: Distractor . Board not concerned with Time and Costs in this question.

“Based on your understanding, you then define necessary security-related management sign-off milestones for phases A to D” according to the book this takes place in Phase A (P204)

“Finally you hold a series of workshops to obtain management support for your security measures” as in C this takes place in Phase A (P204)

Practice L2 Questions (section 4 of workbook) answers

Q1 ACME Car Corp

Typically given as day 3 homework. If done in class usually done after exercise 18 before starting Phase E

3.3.1

Baseline or target first? - scenario talks about business but nothing else, also specifically states few architectural assets in repository (ie few BBs). Given that the company wish to reuse assets wherever possible we need to take a look at what we currently have. This means that we need to establish Baseline first if possible – question lists three points that need to be addressed

A:5 All three points covered (some with multiple artefacts) & baseline first

C:3 Only covers points 1 & 2 & baseline first

D:1 Wrong way round (Target first) covers 2 points (2 & 3)

B:0 Distracter artefacts do not exist & Target first

Ref manual section 35.6

			A	B	C	D
Application/Function Matrix	<p>depict relationship between applications & business functions</p> <ul style="list-style-type: none"> Assign usage of apps to business functions that are supported by them (apps that is) Support gap analysis & determine if any apps missing and will need to be created 	1	x		x	
Application Communications diagram	depicts all models & communication mappings between them	2?	x			
Application interactive matrix	depict communications relationships between applications	2	x	r	x	x
Application diagrams	not exists (Application Migration diagram??)	D		x		
Application & User diagram	not exists (Application & user Location diagram?) not support any requ anyway suggest rename	D		x		
Application Portfolio catalogue	List of all applications in Enterprise foundation for other matrices - done first (baseline)	D			x	
Application/Organisation Matrix	Depict relationships between applications & organisation units within the enterprise	D		x		
Data Entity/ Data Component catalogue	Identify & maintain list of all data use across Enterprise supports definition & application of information management & data governance policies & also encourages effective data sharing & re-use	3	x			x
Data dissemination diagram	Show relationship between data entity, business service & application components can show data replication				x	
Data Entity/ Business Function matrix	depict relationship between data entities & business functions within the Enterprise	3	x			x
System/data matrix	does not exist	D		x		
System/Technology matrix	does not exist	D			x	

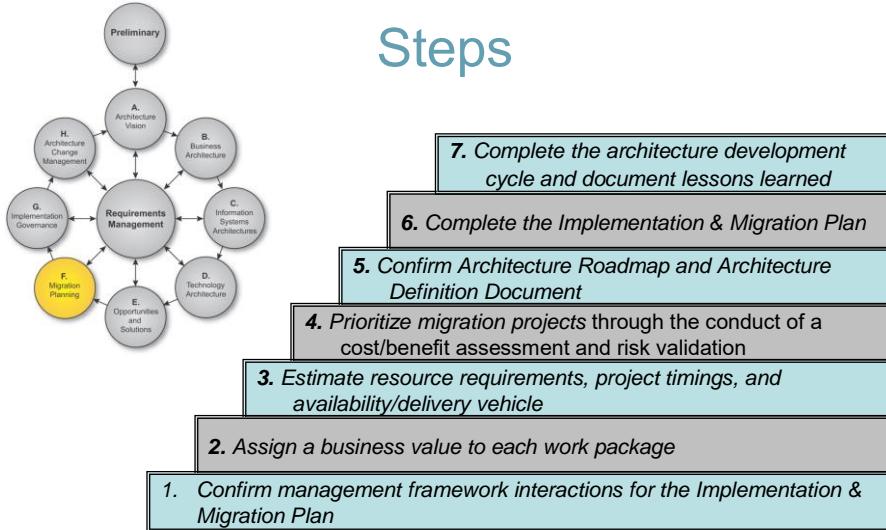
D= Distracter (not answers any requirement)

X is a change in v3.3.1 not present in previous workbook, r removed in V3.3.1

Q2 ACME Components

Typically done in class after Phase F has been covered.

We are at phase F



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T9.1 CERT L2 v1.0 - Slide 295 of 577

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A:5 marks

Describes three activities in phase F

B 3 marks

B is very close but not as comprehensive as A also Imp Factor & Deduction Matrix in E (already done)
time-lines Implementation & Migration Plan is this the draft plan (phase E)

C distracter

C is describing phase G

D 1 mark

Covers part of the tasks but only a small amount
Implementation Governance model in in phase F

Q3 Sunrise Hotels

Typically done in class after having covered adapting the ADM for iteration.

The company is up against a strict time limit so they do not want to go over work done previously

The target business process has been defined as have the applications & data domains (using COTS so they are pre-selected for us)

Nothing except the hardware is carried forward and the state of this is not clear. So we should start with understanding the hardware, we know the rest so into implementation planning

D (5)

Time is really short for this (100 hotels less than a year). The scenario tells us that the only thing being carried forward is the current hardware (which may need enhancing). We are told that the Business process is well understood and will not change. We are told that we will be using COTS so we have to accept the databases that come with the applications (according to TOGAF). As these are understood it makes sense in theory to work out what hardware upgrades are necessary (the only unknown) then consider how to implement the new architecture.

C (3)

A good answer but a lot of the work already done there is no need to go through B as business process already covered. Also no mention of the need for Baseline Technology in phase D

A (1)

As we are using COTS then the Data & Applications are fixed for us. Skipping B is OK theoretically as we have the target Business Process but we are still wasting time which is in short supply

Requirements already established

While this will provide a solution it will take waste more time than D & C.

B distracter: The one thing being carried forward is the existing technology so we need to visit D before moving to phase E

Q4 Talk Is Cheap

This can be done in addition to or instead of Exercise 15

The key to this question is that the stakeholder map matrix starting on page 256 of the TOGAF is the reference data for the assessment. It is not a subject exercise based on students experience/opinions. Even though the TOGAF document refers to it as an example Matrix, for exam purposes, it is the only source available.

Sue is a member of both Human Resources (Keep satisfied) and the Board (keep Informed) From the power interest matrix if someone is both classifications, their combined/resultant classification will be Key Player (high power and interest)

Bill is part of Procurements and according to the matrix is therefore a Key Player.

Kate is a Program manager and therefore part of the PMO. This makes her classification according to the document as Keep Satisfied. She is NOT a project executive, and the entry in the document that some students might incorrectly refer to (Project Executive eg Program Manager) just means that that role could be fulfilled by a ProgMan, not that it IS always filled by a ProgMan.

Based on the above

A = 1

B = 5

C = 0

D = 3

Day 1 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 relationships 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 best practice templates.?

- A. Architecture Metamodel
- B. Standards Information Base
- C. Governance Log
- D. Reference Library
- E. Architecture Capability

Q10

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.

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 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

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 _____?

- F. Baseline
- G. Solution
- H. Strategic
- I. Target
- J. 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 fundamental architecture upon which more specific architectures can be based
- D. It is a model of application components and application services software, including brokering applications

Q18

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 define technology components into a set of technology platforms
- 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

Q19

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

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 Questions Answers

Q1 B

Q2 A

Q3 B

Q4 D

Q5 B

Q6 E

Q7 E

Q8 B

Q9 D

Q10 D

Q11 A

Q12 D

Q13 E

Q14 C

Q15 C

Q16 C

Q17 C

Q18 B

Q19 B

Q20 D

Day 2 Questions

Q1

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

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 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

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

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 identity and understand business requirements
- E. It is used to describe how an architecture addresses stakeholder concerns

Q10

Which one of the following statements best describes the purpose of a Compliance Assessment?

- 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

In which section of the Architecture Repository would you find most of the re-useable architecture assets ?

- A. Governance Log
- B. Reference Library
- C. Architecture Landscape
- D. Architecture Capability
- E. Architecture Metamodel

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

According to TOGAF, which one of the following best describes the next step in an Architecture Compliance Review once the scope of the review has been determined?

- A. Tailor the checklists to address the business requirements
- B. Interview the project principals to obtain background information
- C. Send the assessment report to the Architecture Review co-ordinator
- D. Schedule the Architecture Review meeting
- E. Prepare the Architecture Compliance Review report

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 Questions Answers

Q1 D

Q2 E

Q3 C

Q4 D

Q5 B

Q6 E

Q7 D

Q8 C

Q9 A

Q10 C

Q11 B

Q12 D

Q13 E

Q14 A

Q15 D

Q16 B

Q17 A

Q18 D

Q19 C

Q20 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 perform 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, Thus 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 take on 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

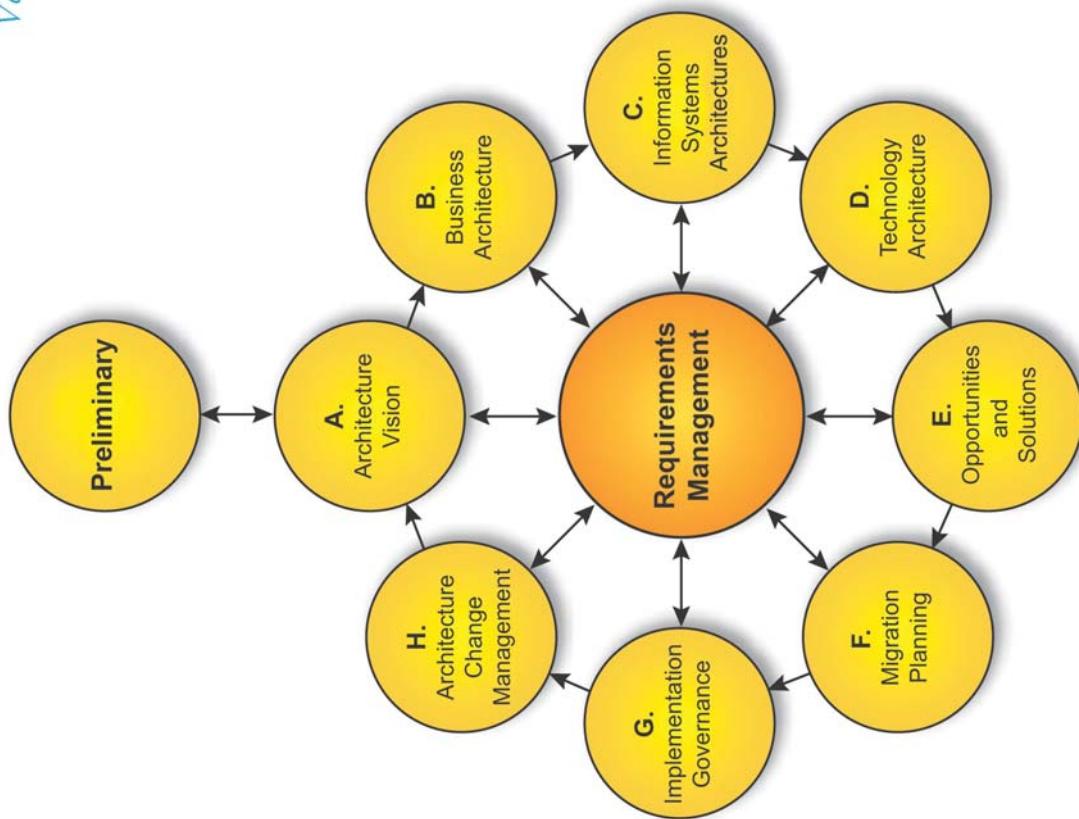
According to the guidance provided in the TOGAF document, which is the best answer that indicates the classification of these 3 stakeholders.

- 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

TOGAF 9 Architecture Development Cycle

TOGAF™

Version 9 Enterprise Edition



Preliminary Phase	Prepare the organization for successful TOGAF architecture projects. Undertake the preparation and initiation activities required to meet the Business directive for a new enterprise architecture, including the definition of an Organization-Specific Architecture framework and tools, and the definition of architecture principles.
Requirements Management	Ensure that every stage of a TOGAF project is based on and validates business requirements.
Phase A: Architecture Vision	Set the scope, constraints, and expectations for a TOGAF project. Create the Architecture Vision. Define stakeholders. Validate the business context and create the Statement of Architecture Work. Obtain approvals.
Phase B: Business Architecture Phase C: Information Systems Architectures Phase D: Technology Architecture	Develop architectures at three levels: 1. Business 2. Information Systems 3. Technology In each case, develop the Baseline and Target Architecture and analyze gaps.
Phase E: Opportunities and Solutions	Perform initial implementation planning and the identification of delivery vehicles for the building blocks identified in the previous phases. Identify major implementation projects and group them into Transition Architectures.
Phase F: Migration Planning	Analyze cost benefits and risk. Develop detailed Implementation and Migration Plan.
Phase G: Implementation Governance	Provide architectural oversight for the implementation. Prepare and issue Architecture Contracts (Implementation Governance Board). Ensure that the implementation project conforms to the architecture.
Phase H: Architecture Change Management	Provide continual monitoring and a change management process to ensure that the architecture responds to the needs of the enterprise, and maximizes the business value.

Structure of TOGAF 9

TOGAF™

Version 9 Enterprise Edition

TOGAF 9 is divided into seven sections as follows:

PART I: Introduction

A high-level introduction to the key concepts behind enterprise architecture and in particular the TOGAF approach. It contains the definitions of terms used throughout TOGAF and release notes detailing the changes between this version and the previous version of TOGAF.

PART II: Architecture Development Method

The core of TOGAF. It describes the TOGAF Architecture Development Method (ADM) – a step-by-step approach to developing an enterprise architecture.

PART III: ADM Guidelines and Techniques

A collection of guidelines and techniques available for use in applying TOGAF and the TOGAF ADM.

PART IV: Architecture Content Framework

The TOGAF content framework, including a structured metamodel for architectural artifacts, the use of re-usable architecture building blocks, and an overview of typical architecture deliverables.

PART V: Enterprise Continuum & Tools

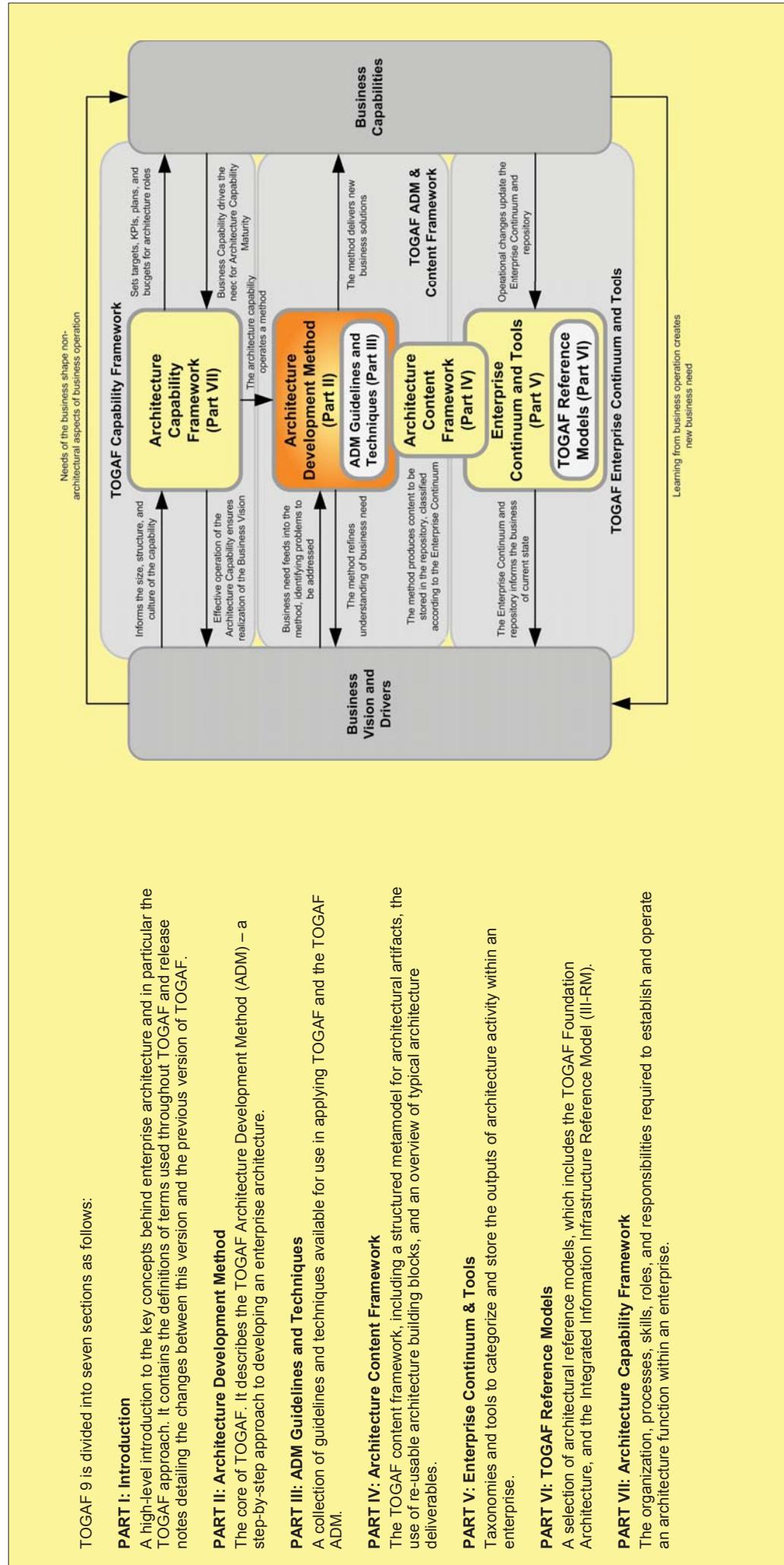
Taxonomies and tools to categorize and store the outputs of architecture activity within an enterprise.

PART VI: TOGAF Reference Models

A selection of architectural reference models, which includes the TOGAF Foundation Architecture, and the Integrated Information Infrastructure Reference Model (III-RM).

PART VII: Architecture Capability Framework

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



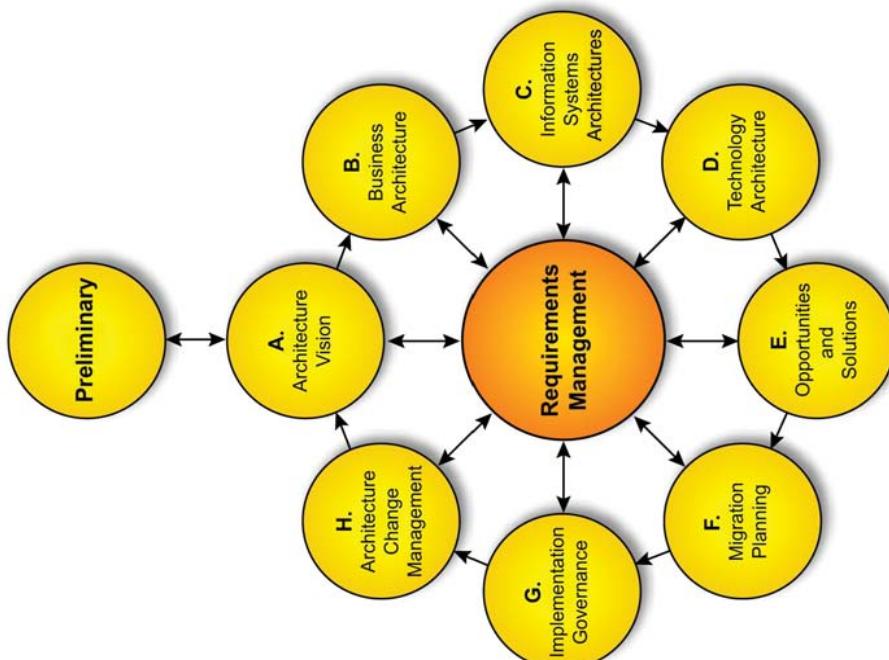
TOGAF 9.1 ADM Steps Reference

TOGAF®

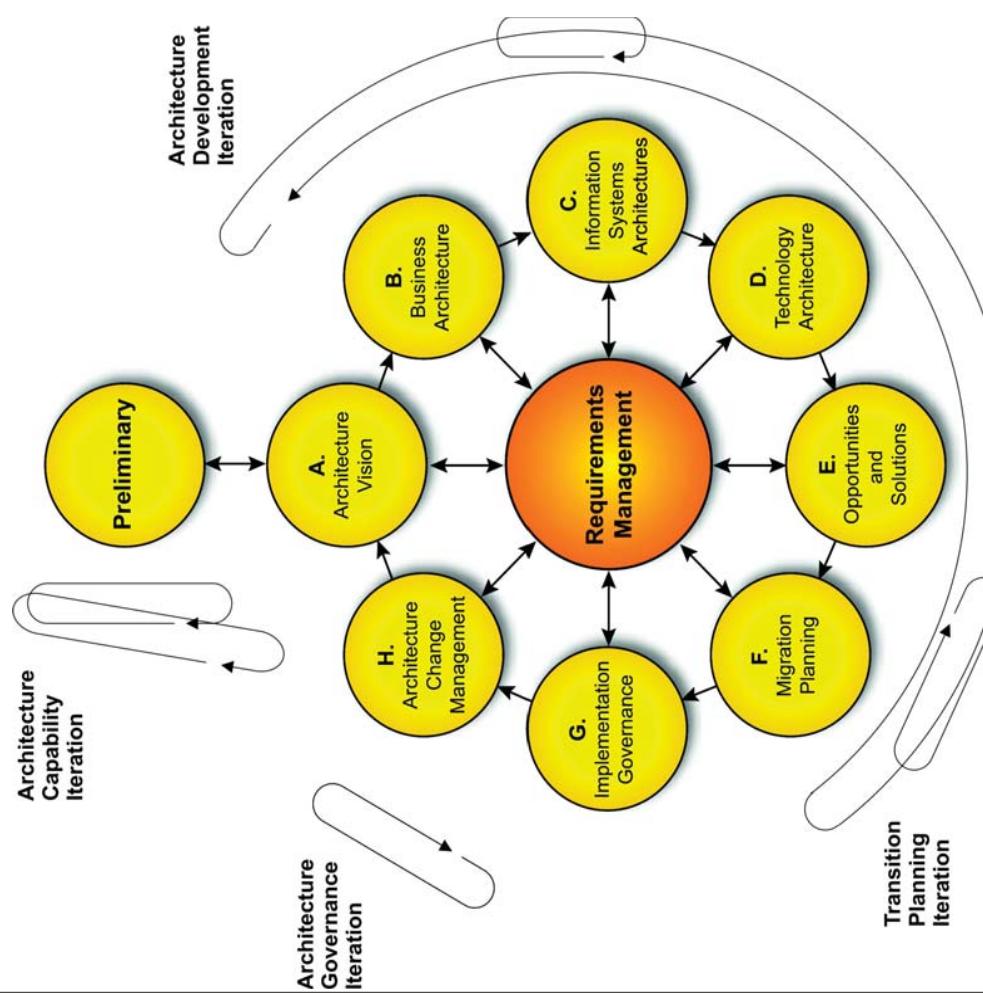
<p>Preliminary Phase</p> <ol style="list-style-type: none"> Scope the enterprise organizations impacted Confirm governance and support frameworks Define and establish enterprise architecture team and organization Identify and establish architecture principles Tailor TOGAF and, if any, other selected architecture frameworks Implement architecture tools 	<p>Phase A: Architecture Vision</p> <ol style="list-style-type: none"> Establish the architecture project Identify stakeholders, concerns, and business requirements Confirm and elaborate business goals, business drivers, and constraints Evaluate business capabilities Assess readiness for business transformation Define scope Confirm and elaborate architecture principles, including business principles Develop Architecture Vision Define the Target Architecture value propositions and KPIs Identify the business transformation risks and mitigation activities Develop Statement of Architecture Work; secure approval 	<p>Phase B: Business Architecture</p> <p>Phase C: Information Systems Architectures</p> <p>Phase D: Technology Architecture</p> <ol style="list-style-type: none"> Select reference models, viewpoints, and tools Develop Baseline Architecture Description Develop Target Architecture Description Perform gap analysis Define candidate roadmap components Resolve impacts across the Architecture Landscape Conduct formal stakeholder review Finalize the Architecture Create Architecture Definition Document 	<p>Phase E: Opportunities and Solutions</p> <ol style="list-style-type: none"> 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 Create Architecture Roadmap & Implementation and Migration Plan
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Version 9.1 Enterprise Edition

<p>Phase F: Migration Planning</p> <ol style="list-style-type: none"> Confirm management framework interactions for Implementation and Migration Plan Assign a business value to each work package Estimate resource requirements, project timings, and availability/delivery vehicle Prioritize the migration projects through the conduct of a cost/benefit assessment and risk validation Document Confirm Architecture Roadmap and update Architecture Definition Document Complete the Implementation and Migration Plan Complete the development cycle and document lessons learned 	<p>Phase G: Implementation Governance</p> <ol style="list-style-type: none"> Confirm scope and priorities for deployment with development management 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 	<p>Phase H: Architecture Change Management</p> <ol style="list-style-type: none"> Establish value realization process Deploy monitoring tools Manage risks Provide analysis for architecture change management Develop change requirements to meet performance targets Manage governance process Activate the process to implement change 	<p>Requirements Management</p> <ol style="list-style-type: none"> 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 requirement on current and previous ADM phases Implement requirements arising from Phase H Update the requirements repository Implement change in the current phase Assess and revise gap analysis for past phases
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Applying Iteration to the ADM



TOGAF Phase	Architecture Development		Transition Planning		Architecture Governance	
	Iteration 1	Iteration 2	Iteration n	Iteration 1	Iteration n	Iteration 1
Preliminary	Informal	Informal	Informal	Informal	Informal	Light
Architecture Vision	Core	Light	Core	Core	Core	Light
Business Architecture	Baseline	Target	Core	Core	Core	Light
Application Architecture	Baseline	Target	Core	Core	Core	Light
Data Architecture	Baseline	Target	Core	Core	Core	Light
Technology Architecture	Baseline	Target	Core	Core	Core	Light
Opportunities and Solutions	Light	Light	Light	Core	Core	Light
Migration Planning	Light	Light	Light	Core	Core	Light
Implementation Governance	Informal	Informal	Informal	Core	Core	Core
Change Management	Informal	Informal	Informal	Core	Core	Core

Baseline First Architecture Definition

■ 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

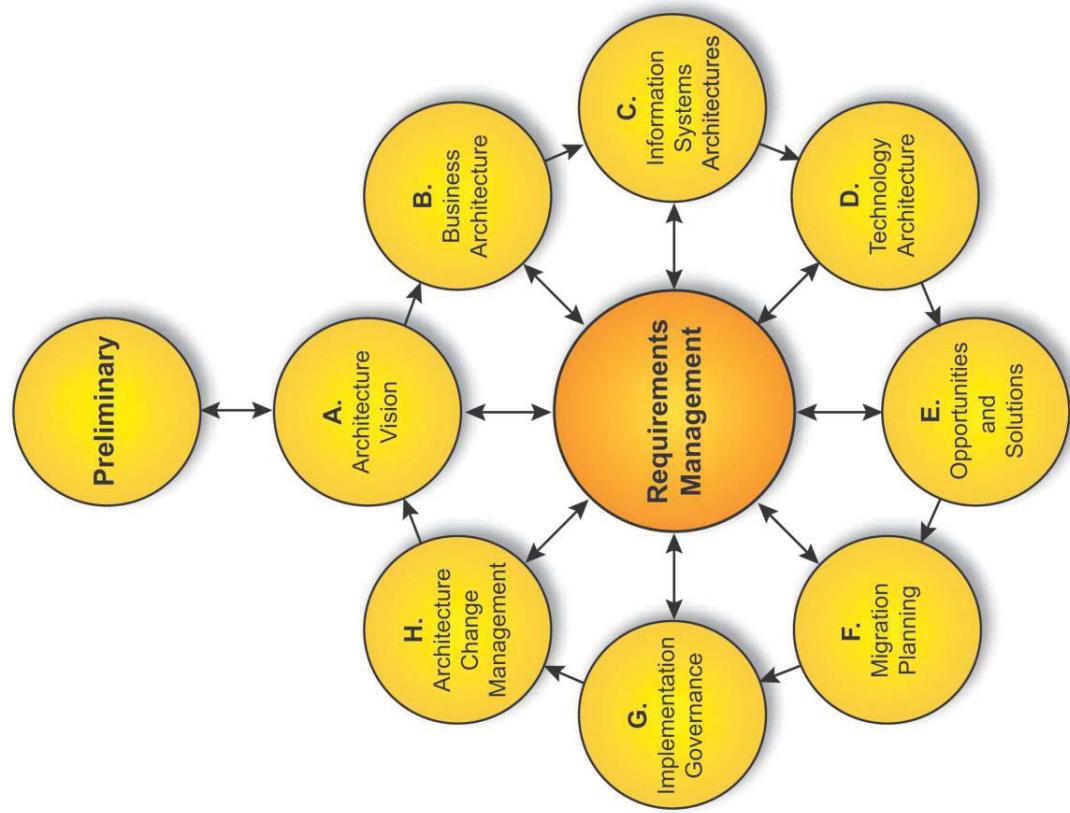
TOGAF Phase	Architecture Development		Transition Planning		Architecture Governance	
	Iteration 1	Iteration 2	Iteration n	Iteration 1	Iteration n	Iteration 1
Preliminary	Informal	Informal	Informal	Informal	Informal	Light
Architecture Vision	Core	Core	Core	Core	Core	Light
Business Architecture	Baseline	Target	Light	Core	Core	Light
Application Architecture	Baseline	Target	Core	Light	Core	Light
Data Architecture	Baseline	Target	Core	Core	Core	Light
Technology Architecture	Baseline	Target	Core	Core	Core	Light
Opportunities and Solutions	Light	Light	Light	Core	Core	Light
Migration Planning	Light	Light	Light	Core	Core	Light
Implementation Governance	Informal	Informal	Informal	Core	Core	Core
Change Management	Informal	Informal	Informal	Core	Core	Core

Target First Architecture Definition

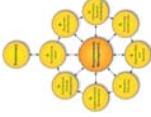
■ Core: primary focus activity for the iteration
 ■ Light: secondary focus activity for the iteration
 □ Informal: potential activity for the iteration, not formally mentioned in the method

ADM

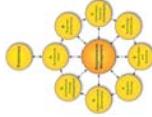
The Architecture Development Method



P Preliminary Phase



Preliminary Phase		Objectives	Steps	Inputs	Outputs
Determine the Architecture Capability desired by the organization:	<ul style="list-style-type: none"> • Review the organizational context for conducting enterprise architecture • Identify and scope the elements of the enterprise organizations affected by the Architecture Capability • Identify the established frameworks, methods, and processes that intersect with the Architecture Capability • Establish Capability Maturity target • Establish the Architecture Capability: • Define and establish the Organizational Model for Enterprise Architecture • Define and establish the detailed process and resources for architecture governance • Select and implement tools that support the architecture activity • Define the Architecture Principles 	Scope the enterprise organizations impacted Confirm governance and support frameworks Define and establish enterprise architecture team and organization Identify and establish architecture principles Tailor TOGAF and, if any, other selected Architecture Frameworks Implement architecture tools	TOGAF Other architecture framework(s) Board strategies, business plans, business strategy, IT Strategy, business principles, business goals, and business drivers Governance and legal frameworks Architecture capability Partnership and contract agreements Existing organizational model for enterprise architecture	Organizational 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	

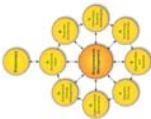


R Requirements Management

Requirements Management

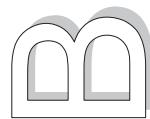
Objectives	Steps	Inputs	Outputs
<p>Ensure that the Requirements Management process is sustained and operates for all relevant ADM phases</p> <p>Manage architecture requirements identified during any execution of the ADM cycle or a phase</p> <p>Ensure that relevant architecture requirements are available for use by each phase as the phase is executed</p>	<ul style="list-style-type: none"> 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 requirements repository Implement change in the current phase Assess and revise gap analysis for past phases 	<p>The inputs to the Requirements Management process are the requirements-related outputs from each ADM phase.</p> <p>The first high-level requirements are produced as part of the Architecture Vision.</p> <p>Each architecture domain then generates detailed requirements.</p> <p>Deliverables in later ADM phases contain mappings to new types of requirements (for example, conformance requirements).</p>	<p>Changed requirements</p> <p>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).</p>

A Architecture Vision

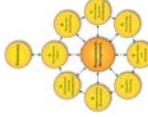


Phase A: Architecture Vision

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>Organizational 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"> • Refined key high-level stakeholder requirements <p>Draft Architecture Definition Document, including (when in scope):</p> <ul style="list-style-type: none"> • Baseline Business Architecture (high-level) • Baseline Data Architecture (high-level) • Baseline Application Architecture (high-level) • Baseline Technology Architecture (high-level) • Target Business Architecture (high-level) • Target Data Architecture (high-level) • Target Application Architecture (high-level) • Target Technology Architecture (high-level) <p>Communications Plan</p> <p>Additional content populating the Architecture Repository</p>



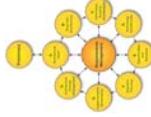
Business Architecture



Phase B: Business Architecture

Objectives	Steps	Inputs	Outputs
<p>Develop the Target Business Architecture describing how the enterprise needs to operate to achieve the business goals, responds to the strategic drivers set out in the Architecture Vision, and addresses the Request for Architecture Work and stakeholder concerns</p> <p>Identify candidate Architecture Roadmap components based upon gaps between the Baseline and Target Business Architectures</p>	<p>Select reference models, viewpoints, and tools</p> <p>Develop Baseline Business Architecture Description</p> <p>Develop Target Business 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>Finalize the Business Architecture</p> <p>Create Architecture Definition Document</p>	<p>Request for Architecture Work</p> <p>Business principles, business goals, and business drivers</p> <p>Capability Assessment</p> <p>Communications Plan</p> <p>Organizational Model for Enterprise Architecture</p> <p>Tailored Architecture Framework</p> <p>Approved Statement of Architecture Work</p> <p>Architecture principles, including business principles, when pre-existing</p> <p>Enterprise Continuum</p> <p>Architecture Repository</p> <p>Architecture Vision, including:</p> <ul style="list-style-type: none"> • Refined key high-level stakeholder requirements <p>Draft Architecture Definition Document, including:</p> <ul style="list-style-type: none"> • Baseline Business Architecture (high-level) • Baseline Data Architecture (high-level) • Baseline Application Architecture (high-level) • Baseline Technology Architecture (high-level) • Target Business Architecture (high-level) • Target Data Architecture (high-level) • Target Application Architecture (high-level) • Target Technology Architecture (high-level) 	<p>Statement of Architecture Work, updated if necessary</p> <p>Validated business principles, business goals, and business drivers</p> <p>Elaborated Business Architecture principles</p> <p>Draft Architecture Definition Document containing content updates:</p> <ul style="list-style-type: none"> • Baseline Business Architecture (detailed), if appropriate • Target Business Architecture (detailed) <p>Views corresponding to selected viewpoints addressing key stakeholder concerns</p> <p>Draft Architecture Requirements Specification including content updates:</p> <ul style="list-style-type: none"> • Gap analysis results • Technical requirements • Updated business requirements <p>Business Architecture components of an Architecture Roadmap</p>

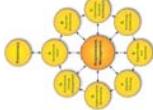
Data Architecture

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, while addressing the Request for 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>Finalize the Data Architecture Create Architecture Definition Document</p>	<p>Request for Architecture Work</p> <p>Capability Assessment</p> <p>Communications Plan</p> <p>Organizational 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"> Baseline Business Architecture (detailed) Target Business Architecture (detailed) Baseline Data Architecture (high-level) Target Data Architecture (high-level) Baseline Application Architecture (detailed or high-level) Target Application Architecture (detailed or high-level) <p>Baseline Technology Architecture (high-level)</p> <ul style="list-style-type: none"> Target Technology Architecture (high-level) <p>Draft Architecture Requirements Specification including:</p> <ul style="list-style-type: none"> Gap analysis results Data interoperability requirements Relevant technical requirements that will apply to this evolution of the architecture development cycle Constraints on the Technology Architecture Updated business requirements Updated application requirements Data Architecture components of an Architecture Roadmap 	<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"> Baseline Data Architecture Target Data Architecture Data Architecture views corresponding to the selected viewpoints, addressing key stakeholder concerns <p>Draft Architecture Requirements Specification including content updates:</p> <ul style="list-style-type: none"> Gap analysis results Data interoperability requirements Relevant technical requirements that will apply to this evolution of the architecture development cycle Constraints on the Technology Architecture Updated business requirements Updated application requirements Data Architecture components of an Architecture Roadmap

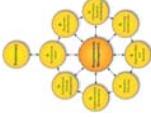
C Application Architecture



Phase C: Information Systems Architectures – Application Architecture

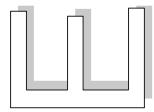
Objectives	Steps	Inputs	Outputs
<p>Develop the Target Application Architecture that enables the Business Architecture and the Architecture Vision, while addressing the Request for Architecture Work and stakeholder concerns</p> <p>Identify candidate Architecture Roadmap components based upon gaps between 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>Finalize 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>Organizational 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"> Baseline Business Architecture (detailed) Target Business Architecture (detailed) Baseline Data Architecture (detailed or high-level) Target Data Architecture (detailed or high-level) <p>Draft Architecture Requirements Specification including:</p> <ul style="list-style-type: none"> Gap analysis results Relevant technical requirements Business and Data Architecture components of an Architecture Roadmap 	<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"> Baseline Application Architecture Target Application Architecture Application Architecture views corresponding to the selected viewpoints, addressing key stakeholder concerns <p>Draft Architecture Requirements Specification including content updates:</p> <ul style="list-style-type: none"> Gap analysis results Application interoperability requirements Relevant technical requirements that will apply to this evolution of the architecture development cycle Constraints on the Technology Architecture Updated business requirements Updated data requirements Application Architecture components of an Architecture Roadmap

D Technology Architecture

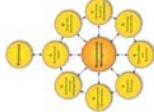


Phase D: Technology Architecture

Objectives	Steps	Inputs	Outputs
<p>Develop the Target Technology Architecture that enables the logical and physical application and data components and the Architecture Vision, addressing the Request for 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>Finalize 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>Organizational 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>Draft Architecture Definition Document containing:</p> <ul style="list-style-type: none"> 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) <p>Draft Architecture Requirements Specification including:</p> <ul style="list-style-type: none"> Gap analysis results Relevant technical requirements Business, Data, and Application Architecture components of an Architecture Roadmap 	<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"> Baseline Technology Architecture Target Technology Architecture Technology Architecture views corresponding to the selected viewpoints, addressing key stakeholder concerns <p>Draft Architecture Requirements Specification including content updates:</p> <ul style="list-style-type: none"> Gap analysis results Requirements output from Phases B and C Updated technology requirements Technology Architecture components of an Architecture Roadmap



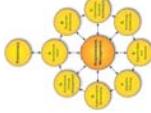
Opportunities & Solutions



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 whether an incremental approach is required, and if so identify Transition Architectures that will deliver continuous business value	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 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">• Transition Architecture, number and scope, if any Draft Architecture Requirements Specification, updated if necessary Consolidated and validated Architecture Roadmap Capability Assessment, including: <ul style="list-style-type: none">• Business Capability• IT Capability Architecture Roadmap, including: <ul style="list-style-type: none">• Work Package portfolio• Identification of Transition Architectures, if any• Impact analysis – project list• Implementation Recommendations Implementation and Migration Plan (outline), including: <ul style="list-style-type: none">• Implementation and Migration Strategy

M² Migration Planning

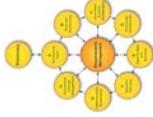


Phase F: Migration Planning

Objectives	Steps	Inputs	Outputs
<p>Finalize 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>Request for Architecture Work Communications Plan</p> <p>Organizational 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"> • Transition Architectures, if any <p>Draft Architecture Requirements Specification</p> <p>Complete the Implementation and Migration Plan</p> <p>Complete the development cycle and document lessons learned</p>	<p>Implementation and Migration Plan (detailed), including:</p> <ul style="list-style-type: none"> • Implementation and Migration Strategy • Project and portfolio breakdown of the implementation • Project charters (optional) • Finalized Architecture Definition Document, including: <ul style="list-style-type: none"> • Finalized Transition Architectures, if any <p>Finalized Architecture Requirements Specification</p> <p>Finalized 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</p> <ul style="list-style-type: none"> • Business Capability • IT Capability <p>Implementation and Migration Plan (outline), including:</p> <ul style="list-style-type: none"> • High-level Implementation and Migration Strategy



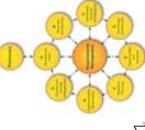
Implementation Governance



Phase G: Implementation Governance

Objectives	Steps	Inputs	Outputs
<ul style="list-style-type: none"> Ensure conformance with the Target Architecture by implementation projects Perform appropriate Architecture Governance functions for the solution and any implementation-driven architecture Change Requests 	<ul style="list-style-type: none"> Confirm scope and priorities for deployment with development management 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 	<ul style="list-style-type: none"> Request for Architecture Work Capability Assessment Organization Model for Enterprise Architecture 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 	<ul style="list-style-type: none"> Architecture Contract (signed) Compliance Assessments Change Requests Architecture-compliant solutions deployed, including: <ul style="list-style-type: none"> The architecture-compliant implemented system Populated Architecture Repository Architecture compliance recommendations and dispensations Recommendations on service delivery requirements Recommendations on performance metrics Service Level Agreements (SLAs) Architecture Vision, updated post-implementation Architecture Definition Document, updated post-implementation Business and IT operating models for the implemented solution

Architecture Change Management



Phase H: Architecture Change Management

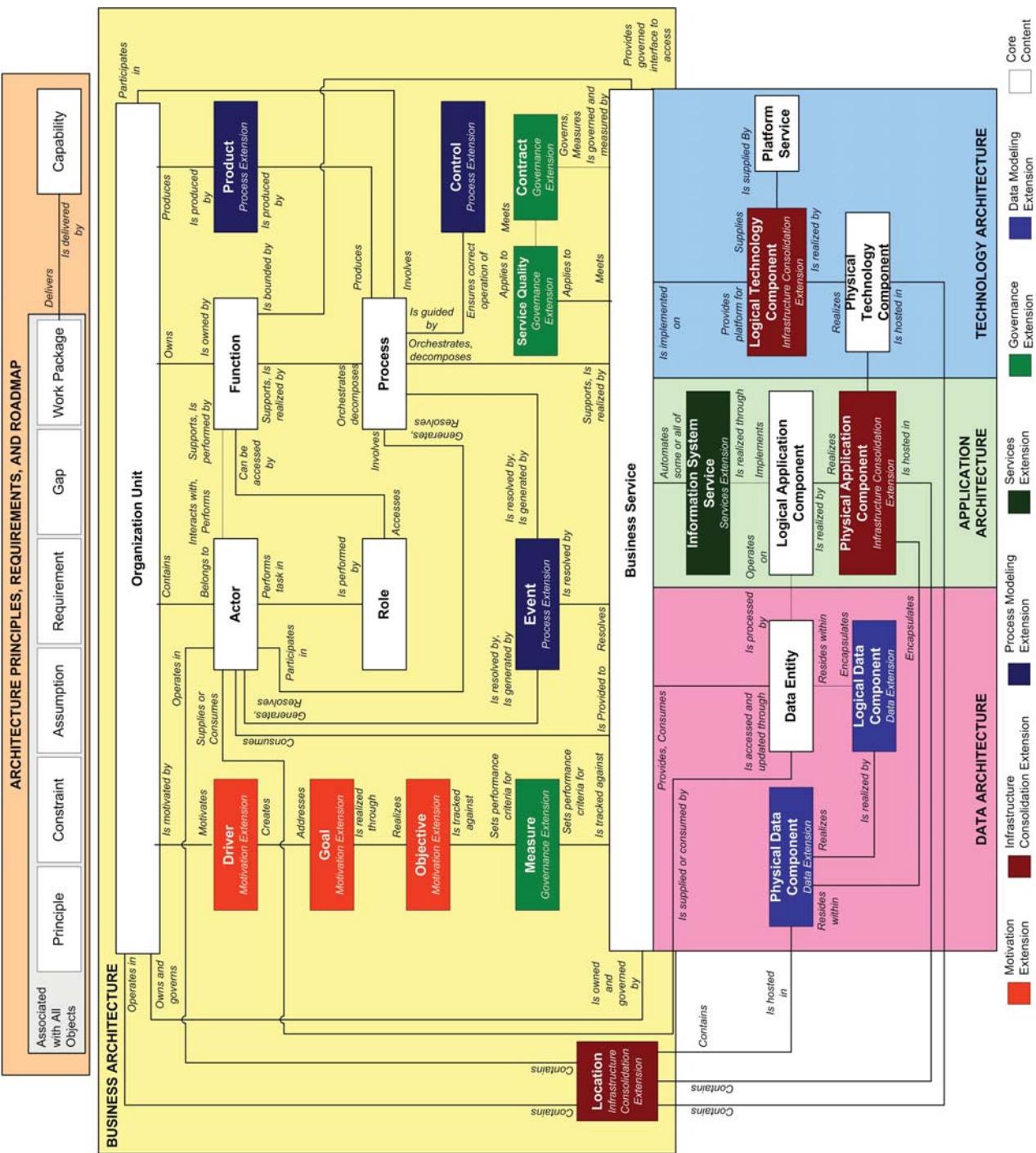
Objectives	Steps	Inputs	Outputs
<ul style="list-style-type: none"> Ensure that the architecture lifecycle is maintained Ensure that the Architecture Governance Framework is executed Ensure that the enterprise Architecture Capability meets current requirements 	<ul style="list-style-type: none"> Establish value realization process Deploy monitoring tools Manage risks Provide analysis for architecture change management Develop change requirements to meet performance targets Manage governance process Activate the process to implement change 	<ul style="list-style-type: none"> Request for Architecture Work Organizational Model for Enterprise Architecture Tailored Architecture Framework Statement of Architecture Work Architecture Vision Architecture Repository Architecture Definition Document Architecture Requirements Specification Architecture Roadmap Change Requests due to technology changes 	<ul style="list-style-type: none"> Architecture updates Changes to architecture framework and principles New Request for Architecture Work, to initiate another cycle of the ADM Statement of Architecture Work, updated if necessary Architecture Contract, updated if necessary Compliance Assessments, updated if necessary Implementation Governance Model Architecture Contract (signed) Compliance Assessments Implementation and Migration Plan

TOGAF 9.1 Metamodel Reference with Relationships

TOGAF®

THE *Open* GROUP

Version 9.1 Enterprise Edition



TOGAF 9.1 Artifacts Associated with the Content Metamodel

TOGAF®

Version 9.1 Enterprise Edition

THE **Open** GROUP

Preliminary	Catalogs	Principles Catalog	Matrices	Stakeholder Map Matrix	Value Chain Diagram	Core Diagrams	Solution Concept Diagram
	Catalogs	Organization/Actor Catalog	Matrices	Data Entity/Data Component Catalog	Application Portfolio Catalog	Catalogs	Technology Architecture Catalogs
Business Architecture	Catalogs	Driver/Goal/Objective Catalog	Catalogs	Data Entity/Actor Catalog	Interface Catalog	Application Architecture Catalogs	Technology Architecture Catalogs
	Catalogs	Process/Event/Control/ Product Catalog	Matrices	Data Entity/Business Function Matrix	Application/Organization Matrix	Technology Standards Catalog	Technology Portfolio Catalog
	Role Catalog	Contract/Measure Catalog	Matrices	Application/Data Matrix	Role/Application Matrix	Technology Portfolio Catalog	Technology Architecture Catalogs
	Business Service/Function Catalog	Business Footprint Diagram	Matrices	Data Dissemination Diagram	Application/Function Matrix	Platform Decomposition Diagram	Core Diagrams
Core Diagrams	Location Catalog	Actor/Role Matrix	Core Diagrams	Business Interaction Matrix	Conceptual Data Diagram	Environments and Locations Diagram	Core Diagrams
	Process/Event/Control/ Product Catalog	Business Footprint Diagram	Core Diagrams	Product Lifecycle Diagram	Logical Data Diagram	Platform Decomposition Diagram	Core Diagrams
	Contract/Measure Catalog	Business Footprint Diagram	Core Diagrams	Extension Diagrams	Data Security Diagram	Processing Diagram	Core Diagrams
	Business Service/Information Diagram	Business Footprint Diagram	Core Diagrams	Functional Decomposition Diagram	Data Migration Diagram	Networked Computing/ Hardware Diagram	Core Diagrams
Extension Diagrams	Functional Decomposition Diagram	Product Lifecycle Diagram	Core Diagrams	Data Lifecycle Diagram	Data Migration Diagram	Communications Engineering Diagram	Core Diagrams
	Product Lifecycle Diagram	Extension Diagrams	Core Diagrams	Extension Diagrams	Enterprise Manageability Diagram	Extension Diagrams	Core Diagrams
	Extension Diagrams	Goal/Objective/Service Diagram	Core Diagrams	Extension Diagrams	Process/Application Realization Diagram	Process/Application Realization Diagram	Core Diagrams
	Goal/Objective/Service Diagram	Business Use-Case Diagram	Core Diagrams	Extension Diagrams	Software Engineering Diagram	Software Engineering Diagram	Core Diagrams
Requirements Management	Organization Decomposition Diagram	Requirements Management	Core Diagrams	Extension Diagrams	Application Migration Diagram	Software Distribution Diagram	Core Diagrams
	Process Flow Diagram	Catalogs	Core Diagrams	Extension Diagrams	Opportunities and Solutions	Project Context Diagram	Core Diagrams
	Event Diagram	Requirements Catalog	Core Diagrams	Extension Diagrams	Benefits Diagram	Project Context Diagram	Core Diagrams

 Infrastructure Consolidation Extension
 Motivation Extension
 Governance Extension
 Services Extension
 Data Modeling Extension
 Process Modeling Extension
 Core Content

Introduction

Note: This handout is derived from Chapter 1 of TOGAF 9.1. It is intended to be used for TOGAF 9 Level 1 training.

TOGAF is a framework — a detailed method and a set of supporting tools — for developing an enterprise architecture. It may be used freely by any organization wishing to develop an enterprise architecture for use within that organization.

TOGAF is developed and maintained by members of The Open Group, working within the Architecture Forum (refer to www.opengroup.org/architecture). The original development of TOGAF Version 1 in 1995 was based on the Technical Architecture Framework for Information Management (TAFIM), developed by the US Department of Defense (DoD). The DoD gave The Open Group explicit permission and encouragement to create TOGAF by building on the TAFIM, which itself was the result of many years of development effort and many millions of dollars of US Government investment.

Starting from this sound foundation, the members of The Open Group Architecture Forum have developed successive versions of TOGAF and published each one on The Open Group public web site.

If you are new to the field of enterprise architecture and/or TOGAF, you are recommended to read the Executive Overview (refer to [Section 1.2](#)), where you will find answers to questions such as:

- What is an enterprise?
- Why do I need an enterprise architecture?
- Why do I need TOGAF as a framework for enterprise architecture?

1.1 Structure of the TOGAF Document

The structure of the TOGAF documentation reflects the structure and content of an Architecture Capability within an enterprise, as shown in [Figure 1-1](#).

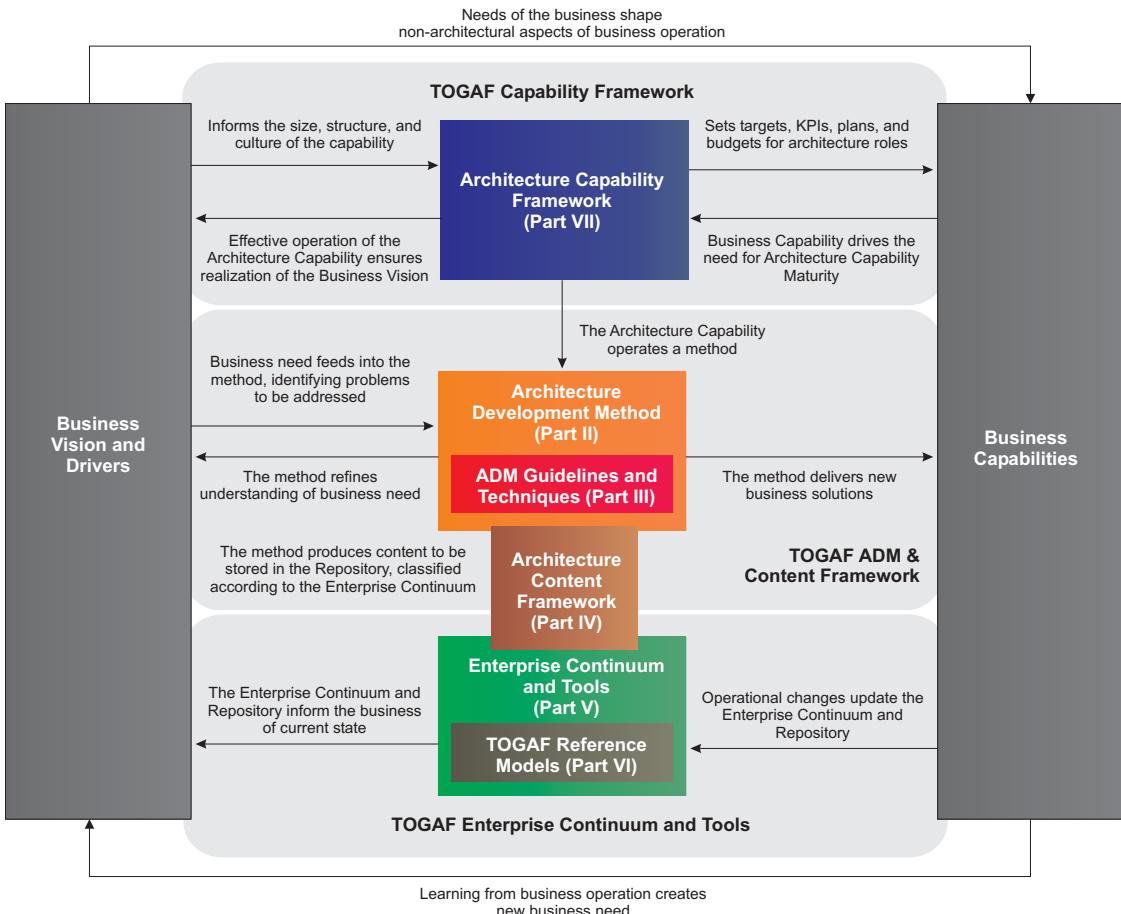


Figure 1-1 Structure of the TOGAF Document

There are seven parts to the TOGAF document:

- PART I (Introduction) This part provides a high-level introduction to the key concepts of enterprise architecture and in particular the TOGAF approach. It contains the definitions of terms used throughout TOGAF and release notes detailing the changes between this version and the previous version of TOGAF.
- PART II (Architecture Development Method) This part is the core of TOGAF. It describes the TOGAF Architecture Development Method (ADM) — a step-by-step approach to developing an enterprise architecture.
- PART III (ADM Guidelines and Techniques) This part contains a collection of guidelines and techniques available for use in applying TOGAF and the TOGAF ADM.
- PART IV (Architecture Content Framework) This part describes the TOGAF content framework, including a structured metamodel for architectural artifacts, the use of re-usable architecture building blocks, and an overview of typical architecture deliverables.

- | | |
|----------|--|
| PART V | (Enterprise Continuum & Tools) This part discusses appropriate taxonomies and tools to categorize and store the outputs of architecture activity within an enterprise. |
| PART VI | (TOGAF Reference Models) This part provides a selection of architectural reference models, which includes the TOGAF Foundation Architecture, and the Integrated Information Infrastructure Reference Model (III-RM). |
| PART VII | (Architecture Capability Framework) This part discusses the organization, processes, skills, roles, and responsibilities required to establish and operate an architecture function within an enterprise. |

The intention of dividing the TOGAF specification into these independent parts is to allow for different areas of specialization to be considered in detail and potentially addressed in isolation. Although all parts work together as a whole, it is also feasible to select particular parts for adoption while excluding others. For example, an organization may wish to adopt the ADM process, but elect not to use any of the materials relating to Architecture Capability.

As an open framework, such use is encouraged, particularly in the following situations:

- Organizations that are new to TOGAF and wish to incrementally adopt TOGAF concepts are expected to focus on particular parts of the specification for initial adoption, with other areas tabled for later consideration.
- Organizations that have already deployed architecture frameworks may choose to merge these frameworks with aspects of the TOGAF specification.

1.2 Executive Overview

This section provides an executive overview of enterprise architecture, the basic concepts of what it is (not just another name for IT Architecture), and why it is needed. It provides a summary of the benefits of establishing an enterprise architecture and adopting TOGAF to achieve that.

What is an enterprise?

TOGAF defines “enterprise” as any collection of organizations that has a common set of goals. For example, an enterprise could be a government agency, a whole corporation, a division of a corporation, a single department, or a chain of geographically distant organizations linked together by common ownership.

The term “enterprise” in the context of “enterprise architecture” can be used to denote both an entire enterprise — encompassing all of its information and technology services, processes, and infrastructure — and a specific domain within the enterprise. In both cases, the architecture crosses multiple systems, and multiple functional groups within the enterprise.

Confusion often arises from the evolving nature of the term “enterprise”. An extended enterprise nowadays frequently includes partners, suppliers, and customers. If the goal is to integrate an extended enterprise, then the enterprise comprises the partners, suppliers, and customers, as well as internal business units.

The business operating model concept is useful to determine the nature and scope of the enterprise architecture within an organization. Large corporations and government agencies may comprise multiple enterprises, and may develop and maintain a number of independent enterprise architectures to address each one. However, there is often much in common about the information systems in each enterprise, and there is usually great potential for gain in the

use of a common architecture framework. For example, a common framework can provide a basis for the development of an Architecture Repository for the integration and re-use of models, designs, and baseline data.

Why do I need an enterprise architecture?

The purpose of enterprise architecture is to optimize across the enterprise the often fragmented legacy of processes (both manual and automated) into an integrated environment that is responsive to change and supportive of the delivery of the business strategy.

Today's CEOs know that the effective management and exploitation of information through IT is a key factor to business success, and an indispensable means to achieving competitive advantage. An enterprise architecture addresses this need, by providing a strategic context for the evolution of the IT system in response to the constantly changing needs of the business environment.

Furthermore, a good enterprise architecture enables you to achieve the right balance between IT efficiency and business innovation. It allows individual business units to innovate safely in their pursuit of competitive advantage. At the same time, it ensures the needs of the organization for an integrated IT strategy are met, permitting the closest possible synergy across the extended enterprise.

The advantages that result from a good enterprise architecture bring important business benefits, which are clearly visible in the net profit or loss of a company or organization:

- A more efficient business operation:
 - Lower business operation costs
 - More agile organization
 - Business capabilities shared across the organization
 - Lower change management costs
 - More flexible workforce
 - Improved business productivity
- A more efficient IT operation:
 - Lower software development, support, and maintenance costs
 - Increased portability of applications
 - Improved interoperability and easier system and network management
 - Improved ability to address critical enterprise-wide issues like security
 - Easier upgrade and exchange of system components
- Better return on existing investment, reduced risk for future investment:
 - Reduced complexity in the business and IT
 - Maximum return on investment in existing business and IT infrastructure
 - The flexibility to make, buy, or out-source business and IT solutions
 - Reduced risk overall in new investments and their cost of ownership

- Faster, simpler, and cheaper procurement:
 - Buying decisions are simpler, because the information governing procurement is readily available in a coherent plan
 - The procurement process is faster — maximizing procurement speed and flexibility without sacrificing architectural coherence
 - The ability to procure heterogeneous, multi-vendor open systems
 - The ability to secure more economic capabilities

What specifically would prompt me to develop an enterprise architecture?

Typically, preparation for business transformation needs or for radical infrastructure changes initiates an enterprise architecture review or development. Often key people identify areas of change required in order for new business goals to be met. Such people are commonly referred to as the “stakeholders” in the change. The role of the architect is to address their concerns by:

- Identifying and refining the requirements that the stakeholders have
- Developing views of the architecture that show how the concerns and requirements are going to be addressed
- Showing the trade-offs that are going to be made in reconciling the potentially conflicting concerns of different stakeholders

Without the enterprise architecture, it is highly unlikely that all the concerns and requirements will be considered and met.

What is an architecture framework?

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.

Why do I need TOGAF as a framework for enterprise architecture?

TOGAF has been developed through the collaborative efforts of over 300 Architecture Forum member companies from some of the world's leading companies and organizations. Using TOGAF results in enterprise architecture that is consistent, reflects the needs of stakeholders, employs best practice, and gives due consideration both to current requirements and the perceived future needs of the business.

Developing and sustaining an enterprise architecture is a technically complex process which involves many stakeholders and decision processes in the organization. TOGAF plays an important role in standardizing and de-risks the architecture development process. TOGAF provides a best practice framework for adding value, and enables the organization to build workable and economic solutions which address their business issues and needs.

Who would benefit from using TOGAF?

Any organization undertaking, or planning to undertake, the development and implementation of an enterprise architecture for the support of business transformation will benefit from use of TOGAF.

Organizations seeking Boundaryless Information Flow can use TOGAF to define and implement the structures and processes to enable access to integrated information within and between enterprises.

Organizations that design and implement enterprise architectures using TOGAF are assured of a design and a procurement specification that can facilitate an open systems implementation, thus enabling the benefits of open systems with reduced risk.

Definitions

This extract from TOGAF 9.1 contains the general definitions required for the Level 1 Syllabus, section 3.1.3, learning unit 3. It is primarily intended for TOGAF 9 Level 1 training.

2.1 Application

A deployed and operational IT system that supports business functions and services; for example, a payroll. Applications use data and are supported by multiple technology components but are distinct from the technology components that support the application.

2.2 Application Architecture

A description of the structure and interaction of the applications as groups of capabilities that provide key business functions and manage the data assets.

2.3 Architecture

1. A formal description of a system, or a detailed plan of the system at component level, to guide its implementation (source: ISO/IEC 42010: 2007).
2. The structure of components, their inter-relationships, and the principles and guidelines governing their design and evolution over time.

2.4 Architecture Building Block (ABB)

A constituent of the architecture model that describes a single aspect of the overall model.

2.5 Architecture Development Method (ADM)

The core of TOGAF. A step-by-step approach to develop and use an enterprise architecture.

2.6 Architecture Domain

The architectural area being considered. There are four architecture domains within TOGAF: business, data, application, and technology.

2.7 Architecture Framework

A conceptual structure used to develop, implement, and sustain an architecture.

2.8 Architecture Principles

A qualitative statement of intent that should be met by the architecture. Has at least a supporting rationale and a measure of importance.

2.9 Architecture Vision

A succinct description of the Target Architecture that describes its business value and the changes to the enterprise that will result from its successful deployment. It serves as an aspirational vision and a boundary for detailed architecture development.

2.10 Baseline

A specification that has been formally reviewed and agreed upon, that thereafter serves as the basis for further development or change and that can be changed only through formal change control procedures or a type of procedure such as configuration management.

Definitions	Building Block
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2.11 Building Block

Represents a (potentially re-usable) component of business, IT, or architectural capability that can be combined with other building blocks to deliver architectures and solutions.

Building blocks can be defined at various levels of detail, depending on what stage of architecture development has been reached. For instance, at an early stage, a building block can simply consist of a name or an outline description. Later on, a building block may be decomposed into multiple supporting building blocks and may be accompanied by a full specification. Building blocks can relate to “architectures” or “solutions”.

2.12 Business Architecture

A description of the structure and interaction between the business strategy, organization, functions, business processes, and information needs.

2.13 Business Governance

Concerned with ensuring that the business processes and policies (and their operation) deliver the business outcomes and adhere to relevant business regulation.

2.14 Capability

An ability that an organization, person, or system possesses. Capabilities are typically expressed in general and high-level terms and typically require a combination of organization, people, processes, and technology to achieve. For example, marketing, customer contact, or outbound telemarketing.

2.15 Concerns

The key interests that are crucially important to the stakeholders in a system, 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.

2.16 Constraint

An external factor that prevents an organization from pursuing particular approaches to meet its goals. For example, customer data is not harmonized within the organization, regionally or nationally, constraining the organization’s ability to offer effective customer service.

2.17 Data Architecture

A description of the structure and interaction of the enterprise's major types and sources of data, logical data assets, physical data assets, and data management resources.

2.18 Deliverable

An architectural 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.

2.19 Enterprise

The highest level (typically) of description of an organization and typically covers all missions and functions. An enterprise will often span multiple organizations.

2.20 Foundation Architecture

Generic building blocks, their inter-relationships with other building blocks, combined with the principles and guidelines that provide a foundation on which more specific architectures can be built.

2.21 Gap

A statement of difference between two states. Used in the context of gap analysis, where the difference between the Baseline and Target Architecture is identified.

2.22 Governance

The discipline of monitoring, managing, and steering a business (or IS/IT landscape) to deliver the business outcome required.

2.23 Information

Any communication or representation of facts, data, or opinions, in any medium or form, including textual, numerical, graphic, cartographic, narrative, or audio-visual forms.

2.24 Information Technology (IT)

1. The lifecycle management of information and related technology used by an organization.
2. An umbrella term that includes all or some of the subject areas relating to the computer industry, such as Business Continuity, Business IT Interface, Business Process Modeling and Management, Communication, Compliance and Legislation, Computers, Content Management, Hardware, Information Management, Internet, Offshoring, Networking, Programming and Software, Professional Issues, Project Management, Security, Standards, Storage, Voice and Data Communications. Various countries and industries employ other umbrella terms to describe this same collection.
3. A term commonly assigned to a department within an organization tasked with provisioning some or all of the domains described in (2) above.
4. Alternate names commonly adopted include Information Services, Information Management, et al.

2.25 Logical

An implementation-independent definition of the architecture, often grouping related physical entities according to their purpose and structure. For example, the products from multiple infrastructure software vendors can all be logically grouped as Java application server platforms.

2.26 Metadata

Data about data, of any sort in any media, that describes the characteristics of an entity.

2.27 Metamodel

A model that describes how and with what the architecture will be described in a structured way.

2.28 Method

A defined, repeatable approach to address a particular type of problem.

See also [Section 2.29](#).

2.29 Methodology

A defined, repeatable series of steps to address a particular type of problem, which typically centers on a defined process, but may also include definition of content.

2.30 Model

A representation of a subject of interest. A model provides a smaller scale, simplified, and/or abstract representation of the subject matter. A model is constructed as a “means to an end”. In the context of enterprise architecture, the subject matter is a whole or part of the enterprise and the end is the ability to construct “views” that address the concerns of particular stakeholders; i.e., their “viewpoints” in relation to the subject matter.

2.31 Modeling

A technique through construction of models which enables a subject to be represented in a form that enables reasoning, insight, and clarity concerning the essence of the subject matter.

2.32 Objective

A time-bounded milestone for an organization used to demonstrate progress towards a goal; for example, “Increase Capacity Utilization by 30% by the end of 2009 to support the planned increase in market share”.

2.33 Physical

A description of a real-world entity. Physical elements in an enterprise architecture may still be considerably abstracted from Solution Architecture, design, or implementation views.

2.34 Reference Model (RM)

A reference model is an abstract framework for understanding significant relationships among the entities of [an] environment, and for the development of consistent standards or specifications supporting that environment. A reference model is based on a small number of unifying concepts and may be used as a basis for education and explaining standards to a non-specialist. A reference model is not directly tied to any standards, technologies, or other concrete implementation details, but it does seek to provide common semantics that can be used unambiguously across and between different implementations.

Definitions	Repository
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2.35 Repository

A system that manages all of the data of an enterprise, including data and process models and other enterprise information. Hence, the data in a repository is much more extensive than that in a data dictionary, which generally defines only the data making up a database.

2.36 Requirement

A statement of need that must be met by a particular architecture or work package.

2.37 Solution Architecture

A description of a discrete and focused business operation or activity and how IS/IT supports that operation. A Solution Architecture typically applies to a single project or project release, assisting in the translation of requirements into a solution vision, high-level business and/or IT system specifications, and a portfolio of implementation tasks.

2.38 Solution Building Block (SBB)

A candidate solution which conforms to the specification of an Architecture Building Block (ABB).

2.39 Stakeholder

An individual, team, or organization (or classes thereof) with interests in, or concerns relative to, the outcome of the architecture. Different stakeholders with different roles will have different concerns.

2.40 Strategic Architecture

A summary formal description of the enterprise, providing an organizing framework for operational and change activity, and an executive-level, long-term view for direction setting.

2.41 Target Architecture

The description of a future state of the architecture being developed for an organization. There may be several future states developed as a roadmap to show the evolution of the architecture to a target state.

2.42 Technology Architecture

A description of the structure and interaction of the platform services, and logical and physical technology components.

2.43 Transition Architecture

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.

2.44 View

The representation of a related set of concerns. A view is what is seen from a viewpoint. An architecture view may be represented by a model to demonstrate to stakeholders their areas of interest in the architecture. A view does not have to be visual or graphical in nature.

2.45 Viewpoint

A definition of the perspective from which a view is taken. It is a specification of the conventions for constructing and using a view (often by means of an appropriate schema or template). A view is what you see; a viewpoint is where you are looking from — the vantage point or perspective that determines what you see.

Architecture Principles

See the course slides for when to consult this handout. This handout is derived from Chapter 23 of TOGAF 9.1. It is intended to be used for TOGAF 9 Level 2 training. It may also be used to introduce Principles at TOGAF 9 Level 1 training.

3.1 Introduction

Principles are general rules and guidelines, intended to be enduring and seldom amended, that inform and support the way in which an organization sets about fulfilling its mission.

In their turn, principles may be just one element in a structured set of ideas that collectively define and guide the organization, from values through to actions and results.

Depending on the organization, principles may be established within different domains and at different levels. Two key domains inform the development and utilization of architecture:

- **Enterprise** principles provide a basis for decision-making throughout an enterprise, and inform how the organization sets about fulfilling its mission. Such principles are commonly found as a means of harmonizing decision-making across an organization. In particular, they are a key element in a successful architecture governance strategy.

Within the broad domain of enterprise principles, it is common to have subsidiary principles within a business or organizational unit. Examples include IT, HR, domestic operations, or overseas operations. These principles provide a basis for decision-making within the subsidiary domain and will inform architecture development within the domain. Care must be taken to ensure that the principles used to inform architecture development align to the organizational context of the Architecture Capability.

- **Architecture** principles are a set of principles that relate to architecture work. They reflect a level of consensus across the enterprise, and embody the spirit and thinking of existing enterprise principles. Architecture principles govern the architecture process, affecting the development, maintenance, and use of the enterprise architecture.

It is common to have sets of principles form a hierarchy, in that segment principles will be informed by, and elaborate on, the principles at the enterprise level. Architecture principles will be informed and constrained by enterprise principles.

Architecture principles may restate other enterprise guidance in terms and form that effectively guide architecture development.

The remainder of this section deals exclusively with architecture principles.

3.2 Characteristics of Architecture Principles

Architecture principles define the underlying general rules and guidelines for the use and deployment of all IT resources and assets across the enterprise. They reflect a level of consensus among the various elements of the enterprise, and form the basis for making future IT decisions.

Each architecture principle should be clearly related back to the business objectives and key architecture drivers.

3.3 Components of Architecture Principles

It is useful to have a standard way of defining principles. In addition to a definition statement, each principle should have associated rationale and implications statements, both to promote understanding and acceptance of the principles themselves, and to support the use of the principles in explaining and justifying why specific decisions are made.

A recommended template is given in [Table 3-1](#).

Name	Should both represent the essence of the rule as well as be easy to remember. Specific technology platforms should not be mentioned in the name or statement of a principle. Avoid ambiguous words in the Name and in the Statement such as: "support", "open", "consider", and for lack of good measure the word "avoid", itself, be careful with "manage(ment)", and look for unnecessary adjectives and adverbs (fluff).
Statement	Should succinctly and unambiguously communicate the fundamental rule. For the most part, the principles statements for managing information are similar from one organization to the next. It is vital that the principles statement be unambiguous.
Rationale	Should highlight the business benefits of adhering to the principle, using business terminology. Point to the similarity of information and technology principles to the principles governing business operations. Also describe the relationship to other principles, and the intentions regarding a balanced interpretation. Describe situations where one principle would be given precedence or carry more weight than another for making a decision.
Implications	Should highlight the requirements, both for the business and IT, for carrying out the principle — in terms of resources, costs, and activities/tasks. It will often be apparent that current systems, standards, or practices would be incongruent with the principle upon adoption. The impact to the business and consequences of adopting a principle should be clearly stated. The reader should readily discern the answer to: "How does this affect me?" It is important not to oversimplify, trivialize, or judge the merit of the impact. Some of the implications will be identified as potential impacts only, and may be speculative rather than fully analyzed.

Table 3-1 Recommended Format for Defining Principles

An example set of architecture principles following this template is given in [Section 3.6](#).

3.4 Developing Architecture Principles

Architecture principles are typically developed by the enterprise architects, in conjunction with the key stakeholders, and are approved by the Architecture Board.

Architecture principles will be informed by principles at the enterprise level, if they exist.

Architecture principles must be clearly traceable and clearly articulated to guide decision-making. They are chosen so as to ensure alignment of the architecture and implementation of the Target Architecture with business strategies and visions.

Specifically, the development of architecture principles is typically influenced by the following:

- **Enterprise mission and plans:** the mission, plans, and organizational infrastructure of the enterprise.
- **Enterprise strategic initiatives:** the characteristics of the enterprise — its strengths, weaknesses, opportunities, and threats — and its current enterprise-wide initiatives (such as process improvement and quality management).
- **External constraints:** market factors (time-to-market imperatives, customer expectations, etc.); existing and potential legislation.
- **Current systems and technology:** the set of information resources deployed within the enterprise, including systems documentation, equipment inventories, network configuration diagrams, policies, and procedures.
- **Emerging industry trends:** predictions about economic, political, technical, and market factors that influence the enterprise environment.

3.4.1 Qualities of Principles

Merely having a written statement that is called a principle does not mean that the principle is good, even if everyone agrees with it.

A good set of principles will be founded in the beliefs and values of the organization and expressed in language that the business understands and uses. Principles should be few in number, future-oriented, and endorsed and championed by senior management. They provide a firm foundation for making architecture and planning decisions, framing policies, procedures, and standards, and supporting resolution of contradictory situations. A poor set of principles will quickly become disused, and the resultant architectures, policies, and standards will appear arbitrary or self-serving, and thus lack credibility. Essentially, principles drive behavior.

There are five criteria that distinguish a good set of principles:

- **Understandable:** the underlying tenets can be quickly grasped and understood by individuals throughout the organization. The intention of the principle is clear and unambiguous, so that violations, whether intentional or not, are minimized.
- **Robust:** enable good quality decisions about architectures and plans to be made, and enforceable policies and standards to be created. Each principle should be sufficiently definitive and precise to support consistent decision-making in complex, potentially controversial situations.
- **Complete:** every potentially important principle governing the management of information and technology for the organization is defined. The principles cover every situation perceived.

- **Consistent:** strict adherence to one principle may require a loose interpretation of another principle. The set of principles must be expressed in a way that allows a balance of interpretations. Principles should not be contradictory to the point where adhering to one principle would violate the spirit of another. Every word in a principle statement should be carefully chosen to allow consistent yet flexible interpretation.
- **Stable:** principles should be enduring, yet able to accommodate changes. An amendment process should be established for adding, removing, or altering principles after they are ratified initially.

3.5 Applying Architecture Principles

Architecture principles are used to capture the fundamental truths about how the enterprise will use and deploy IT resources and assets. The principles are used in a number of different ways:

1. To provide a framework within which the enterprise can start to make conscious decisions about enterprise architecture and projects that implement the target enterprise architecture
2. As a guide to establishing relevant evaluation criteria, thus exerting strong influence on the selection of products, solutions, or solution architectures in the later stages of managing compliance to the enterprise architecture
3. As drivers for defining the functional requirements of the architecture
4. As an input to assessing both existing implementations and the strategic portfolio, for compliance with the defined architectures; these assessments will provide valuable insights into the transition activities needed to implement an architecture, in support of business goals and priorities
5. The Rationale statements within an Architecture Principle highlight the business value of implementations consistent with the principle and provide guidance for difficult decisions with conflicting drivers or objectives
6. The Implications statements within an Architecture Principle provide an outline of the key tasks, resources, and potential costs to the enterprise of following the principle; they also provide valuable inputs to future transition initiative and planning activities
7. Support the architecture governance activities in terms of:
 - Providing a “back-stop” for the standard Architecture Compliance assessments where some interpretation is allowed or required
 - Supporting the decision to initiate a dispensation request where the implications of a particular architecture amendment cannot be resolved within local operating procedure

Principles are inter-related, and need to be applied as a set.

Principles will sometimes compete; for example, the principles of “accessibility” and “security” tend towards conflicting decisions. Each principle must be considered in the context of “all other things being equal”.

At times a decision will be required as to which principle will take precedence on a particular issue. The rationale for such decisions should always be documented.

A common reaction on first reading of a principle is “this is obvious and does not need to be documented”. The fact that a principle seems self-evident does not mean that the guidance in a

principle is followed. Having principles that appear obvious helps ensure that decisions actually follow the desired outcome.

Although specific penalties are not prescribed in a declaration of principles, violations of principles generally cause operational problems and inhibit the ability of the organization to fulfil its mission.

3.6 Example Set of Architecture Principles

Too many principles can reduce the flexibility of the architecture. Many organizations prefer to define only high-level principles, and to limit the number to between 10 and 20.

The following example illustrates both the typical content of a set of architecture principles, and the recommended format for defining them, as explained above.

3.6.1 Business Principles

Principle 1: Primary of Principles

Statement: These principles of information management apply to all organizations within the enterprise.

Rationale: The only way we can provide a consistent and measurable level of quality information to decision-makers is if all organizations abide by the principles.

Implications:

- Without this principle, exclusions, favoritism, and inconsistency would rapidly undermine the management of information.
- Information management initiatives will not begin until they are examined for compliance with the principles.
- A conflict with a principle will be resolved by changing the framework of the initiative.

Principle 2: Maximize Benefit to the Enterprise

Statement: Information management decisions are made to provide maximum benefit to the enterprise as a whole.

Rationale: This principle embodies “service above self”. Decisions made from an enterprise-wide perspective have greater long-term value than decisions made from any particular organizational perspective. Maximum return on investment requires information management decisions to adhere to enterprise-wide drivers and priorities. No minority group will detract from the benefit of the whole. However, this principle will not preclude any minority group from getting its job done.

Implications:

- Achieving maximum enterprise-wide benefit will require changes in the way we plan and manage information. Technology alone will not bring about this change.
- Some organizations may have to concede their own preferences for the greater benefit of the entire enterprise.

- Application development priorities must be established by the entire enterprise for the entire enterprise.
- Applications components should be shared across organizational boundaries.
- Information management initiatives should be conducted in accordance with the enterprise plan. Individual organizations should pursue information management initiatives which conform to the blueprints and priorities established by the enterprise. We will change the plan as we need to.
- As needs arise, priorities must be adjusted. A forum with comprehensive enterprise representation should make these decisions.

Principle 3: Information Management is Everybody's Business

Statement: All organizations in the enterprise participate in information management decisions needed to accomplish business objectives.

Rationale: Information users are the key stakeholders, or customers, in the application of technology to address a business need. In order to ensure information management is aligned with the business, all organizations in the enterprise must be involved in all aspects of the information environment. The business experts from across the enterprise and the technical staff responsible for developing and sustaining the information environment need to come together as a team to jointly define the goals and objectives of IT.

Implications:

- To operate as a team, every stakeholder, or customer, will need to accept responsibility for developing the information environment.
- Commitment of resources will be required to implement this principle.

Principle 4: Business Continuity

Statement: Enterprise operations are maintained in spite of system interruptions.

Rationale: As system operations become more pervasive, we become more dependent on them; therefore, we must consider the reliability of such systems throughout their design and use. Business premises throughout the enterprise must be provided with the capability to continue their business functions regardless of external events. Hardware failure, natural disasters, and data corruption should not be allowed to disrupt or stop enterprise activities. The enterprise business functions must be capable of operating on alternative information delivery mechanisms.

Implications:

- Dependency on shared system applications mandates that the risks of business interruption must be established in advance and managed. Management includes but is not limited to periodic reviews, testing for vulnerability and exposure, or designing mission-critical services to ensure business function continuity through redundant or alternative capabilities.
- Recoverability, redundancy, and maintainability should be addressed at the time of design.
- Applications must be assessed for criticality and impact on the enterprise mission, in order to determine what level of continuity is required and what corresponding recovery plan is necessary.

Principle 5: Common Use Applications

Statement: Development of applications used across the enterprise is preferred over the development of similar or duplicative applications which are only provided to a particular organization.

Rationale: Duplicative capability is expensive and proliferates conflicting data.

Implications:

- Organizations which depend on a capability which does not serve the entire enterprise must change over to the replacement enterprise-wide capability. This will require establishment of and adherence to a policy requiring this.
- Organizations will not be allowed to develop capabilities for their own use which are similar/duplicative of enterprise-wide capabilities. In this way, expenditures of scarce resources to develop essentially the same capability in marginally different ways will be reduced.
- Data and information used to support enterprise decision-making will be standardized to a much greater extent than previously. This is because the smaller, organizational capabilities which produced different data (which was not shared among other organizations) will be replaced by enterprise-wide capabilities. The impetus for adding to the set of enterprise-wide capabilities may well come from an organization making a convincing case for the value of the data/information previously produced by its organizational capability, but the resulting capability will become part of the enterprise-wide system, and the data it produces will be shared across the enterprise.

Principle 6: Service Orientation

Statement: The architecture is based on a design of services which mirror real-world business activities comprising the enterprise (or inter-enterprise) business processes.

Rationale: Service orientation delivers enterprise agility and Boundaryless Information Flow.

Implications:

- Service representation utilizes business descriptions to provide context (i.e., business process, goal, rule, policy, service interface, and service component) and implements services using service orchestration.
- Service orientation places unique requirements on the infrastructure, and implementations should use open standards to realize interoperability and location transparency.
- Implementations are environment-specific; they are constrained or enabled by context and must be described within that context.
- Strong governance of service representation and implementation is required.
- A “Litmus Test”, which determines a “good service”, is required.

Principle 7: Compliance with Law

Statement: Enterprise information management processes comply with all relevant laws, policies, and regulations.

Rationale: Enterprise policy is to abide by laws, policies, and regulations. This will not preclude business process improvements that lead to changes in policies and regulations.

Implications:

- The enterprise must be mindful to comply with laws, regulations, and external policies regarding the collection, retention, and management of data.
- Education and access to the rules. Efficiency, need, and common sense are not the only drivers. Changes in the law and changes in regulations may drive changes in our processes or applications.

Principle 8: IT Responsibility

Statement: The IT organization is responsible for owning and implementing IT processes and infrastructure that enable solutions to meet user-defined requirements for functionality, service levels, cost, and delivery timing.

Rationale: Effectively align expectations with capabilities and costs so that all projects are cost-effective. Efficient and effective solutions have reasonable costs and clear benefits.

Implications:

- A process must be created to prioritize projects.
- The IT function must define processes to manage business unit expectations.
- Data, application, and technology models must be created to enable integrated quality solutions and to maximize results.

Principle 9: Protection of Intellectual Property

Statement: The enterprise's Intellectual Property (IP) must be protected. This protection must be reflected in the IT architecture, implementation, and governance processes.

Rationale: A major part of an enterprise's IP is hosted in the IT domain.

Implications:

- While protection of IP assets is everybody's business, much of the actual protection is implemented in the IT domain. Even trust in non-IT processes can be managed by IT processes (email, mandatory notes, etc.).
- A security policy, governing human and IT actors, will be required that can substantially improve protection of IP. This must be capable of both avoiding compromises and reducing liabilities.
- Resources on such policies can be found at the SANS Institute (refer to www.sans.org/newlook/home.php).

3.6.2 Data Principles

Principle 10: Data is an Asset

Statement: Data is an asset that has value to the enterprise and is managed accordingly.

Rationale: Data is a valuable corporate resource; it has real, measurable value. In simple terms, the purpose of data is to aid decision-making. Accurate, timely data is critical to accurate, timely decisions. Most corporate assets are carefully managed, and data is no exception. Data is the foundation of our decision-making, so we must also carefully manage data to ensure that we know where it is, can rely upon its accuracy, and can obtain it when and where we need it.

Implications:

- This is one of three closely-related principles regarding data: data is an asset; data is shared; and data is easily accessible. The implication is that there is an education task to ensure that all organizations within the enterprise understand the relationship between value of data, sharing of data, and accessibility to data.
- Stewards must have the authority and means to manage the data for which they are accountable.
- We must make the cultural transition from “data ownership” thinking to “data stewardship” thinking.
- The role of data steward is critical because obsolete, incorrect, or inconsistent data could be passed to enterprise personnel and adversely affect decisions across the enterprise.
- Part of the role of data steward, who manages the data, is to ensure data quality. Procedures must be developed and used to prevent and correct errors in the information and to improve those processes that produce flawed information. Data quality will need to be measured and steps taken to improve data quality — it is probable that policy and procedures will need to be developed for this as well.
- A forum with comprehensive enterprise-wide representation should decide on process changes suggested by the steward.
- Since data is an asset of value to the entire enterprise, data stewards accountable for properly managing the data must be assigned at the enterprise level.

Principle 11: Data is Shared

Statement: Users have access to the data necessary to perform their duties; therefore, data is shared across enterprise functions and organizations.

Rationale: Timely access to accurate data is essential to improving the quality and efficiency of enterprise decision-making. It is less costly to maintain timely, accurate data in a single application, and then share it, than it is to maintain duplicative data in multiple applications. The enterprise holds a wealth of data, but it is stored in hundreds of incompatible stovepipe databases. The speed of data collection, creation, transfer, and assimilation is driven by the ability of the organization to efficiently share these islands of data across the organization.

Shared data will result in improved decisions since we will rely on fewer (ultimately one virtual) sources of more accurate and timely managed data for

all of our decision-making. Electronically shared data will result in increased efficiency when existing data entities can be used, without re-keying, to create new entities.

Implications:

- This is one of three closely-related principles regarding data: data is an asset; data is shared; and data is easily accessible. The implication is that there is an education task to ensure that all organizations within the enterprise understand the relationship between value of data, sharing of data, and accessibility to data.
- To enable data sharing we must develop and abide by a common set of policies, procedures, and standards governing data management and access for both the short and the long term.
- For the short term, to preserve our significant investment in legacy systems, we must invest in software capable of migrating legacy system data into a shared data environment.
- We will also need to develop standard data models, data elements, and other metadata that defines this shared environment and develop a repository system for storing this metadata to make it accessible.
- For the long term, as legacy systems are replaced, we must adopt and enforce common data access policies and guidelines for new application developers to ensure that data in new applications remains available to the shared environment and that data in the shared environment can continue to be used by the new applications.
- For both the short term and the long term we must adopt common methods and tools for creating, maintaining, and accessing the data shared across the enterprise.
- Data sharing will require a significant cultural change.
- This principle of data sharing will continually “bump up against” the principle of data security. Under no circumstances will the data sharing principle cause confidential data to be compromised.
- Data made available for sharing will have to be relied upon by all users to execute their respective tasks. This will ensure that only the most accurate and timely data is relied upon for decision-making. Shared data will become the enterprise-wide “virtual single source” of data.

Principle 12: Data is Accessible

Statement: Data is accessible for users to perform their functions.

Rationale: Wide access to data leads to efficiency and effectiveness in decision-making, and affords timely response to information requests and service delivery. Using information must be considered from an enterprise perspective to allow access by a wide variety of users. Staff time is saved and consistency of data is improved.

Implications:

- This is one of three closely-related principles regarding data: data is an asset; data is shared; and data is easily accessible. The implication is that there is an education task to ensure that all organizations within the enterprise understand the relationship between value of data, sharing of data, and accessibility to data.

- Accessibility involves the ease with which users obtain information.
- The way information is accessed and displayed must be sufficiently adaptable to meet a wide range of enterprise users and their corresponding methods of access.
- Access to data does not constitute understanding of the data. Personnel should take caution not to misinterpret information.
- Access to data does not necessarily grant the user access rights to modify or disclose the data. This will require an education process and a change in the organizational culture, which currently supports a belief in “ownership” of data by functional units.

Principle 13: Data Trustee

Statement: Each data element has a trustee accountable for data quality.

Rationale: One of the benefits of an architected environment is the ability to share data (e.g., text, video, sound, etc.) across the enterprise. As the degree of data sharing grows and business units rely upon common information, it becomes essential that only the data trustee makes decisions about the content of data. Since data can lose its integrity when it is entered multiple times, the data trustee will have sole responsibility for data entry which eliminates redundant human effort and data storage resources.

Note: A trustee is different than a steward — a trustee is responsible for accuracy and currency of the data, while responsibilities of a steward may be broader and include data standardization and definition tasks.

Implications:

- Real trusteeship dissolves the data “ownership” issues and allows the data to be available to meet all users’ needs. This implies that a cultural change from data “ownership” to data “trusteeship” may be required.
- The data trustee will be responsible for meeting quality requirements levied upon the data for which the trustee is accountable.
- It is essential that the trustee has the ability to provide user confidence in the data based upon attributes such as “data source”.
- It is essential to identify the true source of the data in order that the data authority can be assigned this trustee responsibility. This does not mean that classified sources will be revealed nor does it mean the source will be the trustee.
- Information should be captured electronically once and immediately validated as close to the source as possible. Quality control measures must be implemented to ensure the integrity of the data.
- As a result of sharing data across the enterprise, the trustee is accountable and responsible for the accuracy and currency of their designated data element(s) and, subsequently, must then recognize the importance of this trusteeship responsibility.

Principle 14: Common Vocabulary and Data Definitions

Statement: Data is defined consistently throughout the enterprise, and the definitions are understandable and available to all users.

Rationale: The data that will be used in the development of applications must have a common definition throughout the Headquarters to enable sharing of data. A common vocabulary will facilitate communications and enable dialog to be effective. In addition, it is required to interface systems and exchange data.

Implications:

- We are lulled into thinking that this issue is adequately addressed because there are people with “data administration” job titles and forums with charters implying responsibility. Significant additional energy and resources must be committed to this task. It is key to the success of efforts to improve the information environment. This is separate from but related to the issue of data element definition, which is addressed by a broad community — this is more like a common vocabulary and definition.
- The enterprise must establish the initial common vocabulary for the business. The definitions will be used uniformly throughout the enterprise.
- Whenever a new data definition is required, the definition effort will be co-ordinated and reconciled with the corporate “glossary” of data descriptions. The enterprise data administrator will provide this co-ordination.
- Ambiguities resulting from multiple parochial definitions of data must give way to accepted enterprise-wide definitions and understanding.
- Multiple data standardization initiatives need to be co-ordinated.
- Functional data administration responsibilities must be assigned.

Principle 15: Data Security

Statement: Data is protected from unauthorized use and disclosure. In addition to the traditional aspects of national security classification, this includes, but is not limited to, protection of pre-decisional, sensitive, source selection-sensitive, and proprietary information.

Rationale: Open sharing of information and the release of information via relevant legislation must be balanced against the need to restrict the availability of classified, proprietary, and sensitive information.

Existing laws and regulations require the safeguarding of national security and the privacy of data, while permitting free and open access. Pre-decisional (work-in-progress, not yet authorized for release) information must be protected to avoid unwarranted speculation, misinterpretation, and inappropriate use.

Implications:

- Aggregation of data, both classified and not, will create a large target requiring review and de-classification procedures to maintain appropriate control. Data owners and/or functional users must determine whether the aggregation results in an increased classification level. We will need appropriate policy and procedures to handle this review and de-classification. Access to information based on a need-to-know policy will force regular reviews of the body of information.

- The current practice of having separate systems to contain different classifications needs to be rethought. Is there a software solution to separating classified and unclassified data? The current hardware solution is unwieldy, inefficient, and costly. It is more expensive to manage unclassified data on a classified system. Currently, the only way to combine the two is to place the unclassified data on the classified system, where it must remain.
- In order to adequately provide access to open information while maintaining secure information, security needs must be identified and developed at the data level, not the application level.
- Data security safeguards can be put in place to restrict access to “view only”, or “never see”. Sensitivity labeling for access to pre-decisional, decisional, classified, sensitive, or proprietary information must be determined.
- Security must be designed into data elements from the beginning; it cannot be added later. Systems, data, and technologies must be protected from unauthorized access and manipulation. Headquarters information must be safeguarded against inadvertent or unauthorized alteration, sabotage, disaster, or disclosure.
- Need new policies on managing duration of protection for pre-decisional information and other works-in-progress, in consideration of content freshness.

3.6.3 Application Principles

Principle 16: Technology Independence

Statement: Applications are independent of specific technology choices and therefore can operate on a variety of technology platforms.

Rationale: Independence of applications from the underlying technology allows applications to be developed, upgraded, and operated in the most cost-effective and timely way. Otherwise technology, which is subject to continual obsolescence and vendor dependence, becomes the driver rather than the user requirements themselves.

Realizing that every decision made with respect to IT makes us dependent on that technology, the intent of this principle is to ensure that Application Software is not dependent on specific hardware and operating systems software.

- Implications:
- This principle will require standards which support portability.
 - For Commercial Off-The-Shelf (COTS) and Government Off-The-Shelf (GOTS) applications, there may be limited current choices, as many of these applications are technology and platform-dependent.
 - Subsystem interfaces will need to be developed to enable legacy applications to interoperate with applications and operating environments developed under the enterprise architecture.
 - Middleware should be used to decouple applications from specific software solutions.

- As an example, this principle could lead to use of Java, and future Java-like protocols, which give a high degree of priority to platform-independence.

Principle 17: Ease-of-Use

- Statement: Applications are easy to use. The underlying technology is transparent to users, so they can concentrate on tasks at hand.
- Rationale: The more a user has to understand the underlying technology, the less productive that user is. Ease-of-use is a positive incentive for use of applications. It encourages users to work within the integrated information environment instead of developing isolated systems to accomplish the task outside of the enterprise's integrated information environment. Most of the knowledge required to operate one system will be similar to others. Training is kept to a minimum, and the risk of using a system improperly is low.
- Using an application should be as intuitive as driving a different car.
- Implications:
- Applications will be required to have a common “look-and-feel” and support ergonomic requirements. Hence, the common look-and-feel standard must be designed and usability test criteria must be developed.
 - Guidelines for user interfaces should not be constrained by narrow assumptions about user location, language, systems training, or physical capability. Factors such as linguistics, customer physical infirmities (visual acuity, ability to use keyboard/mouse), and proficiency in the use of technology have broad ramifications in determining the ease-of-use of an application.

3.6.4 Technology Principles

Principle 18: Requirements-Based Change

- Statement: Only in response to business needs are changes to applications and technology made.
- Rationale: This principle will foster an atmosphere where the information environment changes in response to the needs of the business, rather than having the business change in response to IT changes. This is to ensure that the purpose of the information support — the transaction of business — is the basis for any proposed change. Unintended effects on business due to IT changes will be minimized. A change in technology may provide an opportunity to improve the business process and, hence, change business needs.
- Implications:
- Changes in implementation will follow full examination of the proposed changes using the enterprise architecture.
 - We don't fund a technical improvement or system development unless a documented business need exists.
 - Change management processes conforming to this principle will be developed and implemented.
 - This principle may bump up against the responsive change principle. We must ensure the requirements documentation process does not hinder responsive change to meet legitimate business needs. The purpose of this principle is to keep us focused on business, not technology needs —

responsive change is also a business need.

Principle 19: Responsive Change Management

Statement: Changes to the enterprise information environment are implemented in a timely manner.

Rationale: If people are to be expected to work within the enterprise information environment, that information environment must be responsive to their needs.

Implications:

- We have to develop processes for managing and implementing change that do not create delays.
- A user who feels a need for change will need to connect with a “business expert” to facilitate explanation and implementation of that need.
- If we are going to make changes, we must keep the architectures updated.
- Adopting this principle might require additional resources.
- This will conflict with other principles (e.g., maximum enterprise-wide benefit, enterprise-wide applications, etc.).

Principle 20: Control Technical Diversity

Statement: Technological diversity is controlled to minimize the non-trivial cost of maintaining expertise in and connectivity between multiple processing environments.

Rationale: There is a real, non-trivial cost of infrastructure required to support alternative technologies for processing environments. There are further infrastructure costs incurred to keep multiple processor constructs interconnected and maintained.

Limiting the number of supported components will simplify maintainability and reduce costs.

The business advantages of minimum technical diversity include: standard packaging of components; predictable implementation impact; predictable valuations and returns; redefined testing; utility status; and increased flexibility to accommodate technological advancements. Common technology across the enterprise brings the benefits of economies of scale to the enterprise. Technical administration and support costs are better controlled when limited resources can focus on this shared set of technology.

Implications:

- Policies, standards, and procedures that govern acquisition of technology must be tied directly to this principle.
- Technology choices will be constrained by the choices available within the technology blueprint. Procedures for augmenting the acceptable technology set to meet evolving requirements will have to be developed and put in place.
- We are not freezing our technology baseline. We welcome technology advances and will change the technology blueprint when compatibility with the current infrastructure, improvement in operational efficiency, or a required capability has been demonstrated.

Principle 21: Interoperability

Statement: Software and hardware should conform to defined standards that promote interoperability for data, applications, and technology.

Rationale: Standards help ensure consistency, thus improving the ability to manage systems and improve user satisfaction, and protect existing IT investments, thus maximizing return on investment and reducing costs. Standards for interoperability additionally help ensure support from multiple vendors for their products, and facilitate supply chain integration.

Implications:

- Interoperability standards and industry standards will be followed unless there is a compelling business reason to implement a non-standard solution.
- A process for setting standards, reviewing and revising them periodically, and granting exceptions must be established.
- The existing IT platforms must be identified and documented.

Stakeholder Management

This handout accompanies the Stakeholder Management module. This is extracted from Chapter 24 of TOGAF 9.1. It is primarily intended to be used for TOGAF 9 Level 2 training.

4.1 Introduction

Stakeholder Management is an important discipline that successful architecture practitioners can use to win support from others. It helps them ensure that their projects succeed where others fail.

The benefits of successful Stakeholder Management are that:

- The most powerful stakeholders can be identified early and their input can then be used to shape the architecture; this ensures their support and improves the quality of the models produced.
- Support from the more powerful stakeholders will help the engagement win more resource, thus making the architecture engagement more likely to succeed.
- By communicating with stakeholders early and frequently, the architecture team can ensure that they fully understand the architecture process, and the benefits of enterprise architecture; this means they can support the architecture team more actively when necessary.
- The architecture team can more effectively anticipate likely reactions to the architecture models and reports, and can build into the plan the actions that will be needed to capitalize on positive reaction while avoiding or addressing any negative reactions.
- The architecture team can identify conflicting or competing objectives among stakeholders early and develop a strategy to resolve the issues arising from them.

It is essential in any initiative to identify the individuals and groups within the organization who will contribute to the development of the architecture, identify those that will gain and those that will lose from its introduction, and then develop a strategy for dealing with them.

4.2 Approach to Stakeholder Management

Stakeholder analysis should be used during Phase A (Architecture Vision) to identify the key players in the engagement, and also be updated throughout each phase; different stakeholders may be uncovered as the engagement progresses through into Opportunities & Solutions, Migration Planning, and Architecture Change Management.

Complex architectures are extremely hard to manage, not only in terms of the architecture development process itself, but also in terms of obtaining agreement from the large numbers of stakeholders touched by it.

For example, just as a building architect will create wiring diagrams, floor plans, and elevations to describe different facets of a building to its different stakeholders (electricians, owners, planning officials), so an enterprise architect must create different views of the business, information system, and technology architecture for the stakeholders who have concerns related to these aspects.

TOGAF specifically identifies this issue throughout the ADM through the following concepts:

- Stakeholders
- Concerns
- Views
- Viewpoints

4.3 Steps in the Stakeholder Management Process

The following sections detail recommended Stakeholder Management activity.

4.3.1 Identify Stakeholders

Identify the key stakeholders of the enterprise architecture.

The first task is to brainstorm who the main enterprise architecture stakeholders are. As part of this, think of all the people who are affected by it, who have influence or power over it, or have an interest in its successful or unsuccessful conclusion.

It might include senior executives, project organization roles, client organization roles, system developers, alliance partners, suppliers, IT operations, customers, etc.

When identifying stakeholders there is a danger of concentrating too heavily on the formal structure of an organization as the basis for identification. Informal stakeholder groups may be just as powerful and influential as the formal ones.

Most individuals will belong to more than one stakeholder group, and these groups tend to arise as a result of specific events.

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?

In particular, influencers need to be identified. These will be well respected and moving up, participate in important meetings and committees (look at meeting minutes), know what's going on in the company, be valued by their peers and superiors, and not necessarily be in any formal position of power.

Although stakeholders may be both organizations and people, ultimately the enterprise architecture team will need to communicate with people. It is the correct individual stakeholders within a stakeholder organization that need to be formally identified.

4.3.1.1 Sample Stakeholder Analysis

A sample stakeholder analysis that distinguishes 22 types of stakeholder, in five broad categories, is shown in [Figure 4-1](#). Any particular architecture project may have more, fewer, or different stakeholders; and they may be grouped into more, fewer, or different categories.

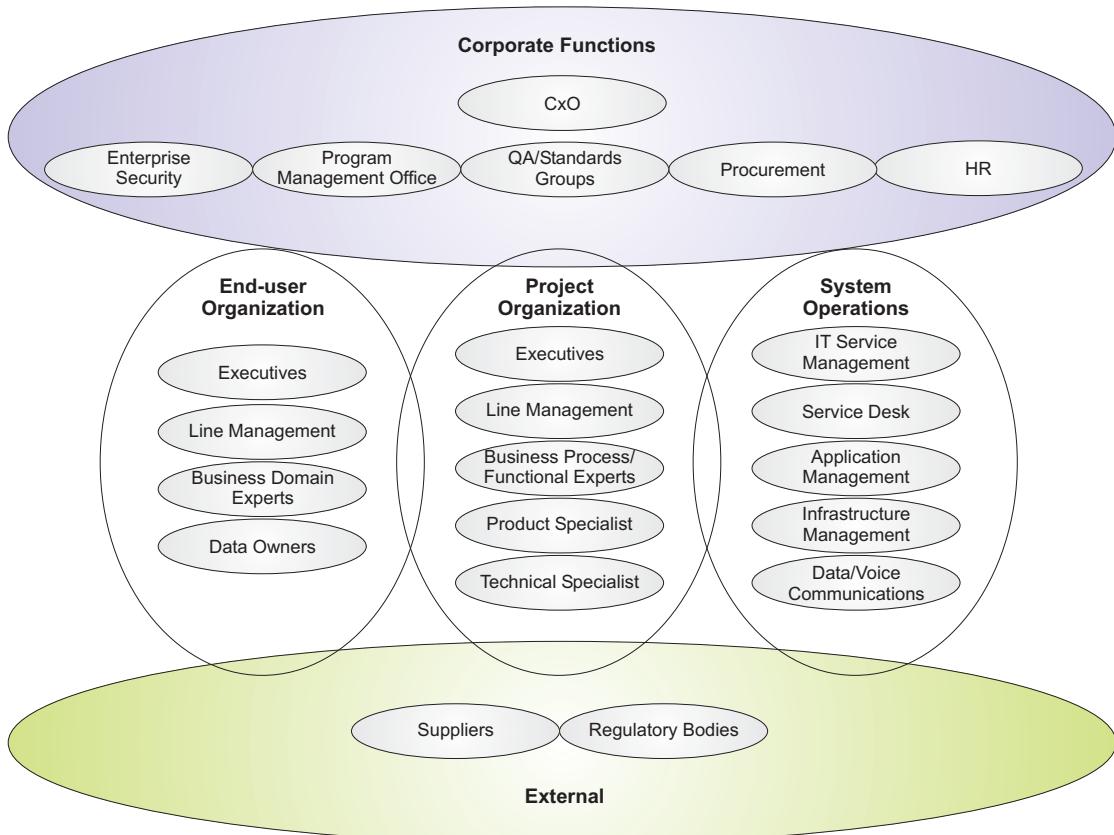


Figure 4-1 Sample Stakeholders and Categories

Consider both the Visible team — those obviously associated with the project/change — and the Invisible team — those who must make a real contribution to the project/change for it to be successful but who are not obviously associated with it (e.g., providers of support services).

4.3.2 Classify Stakeholder Positions

Develop a good understanding of the most important stakeholders and record this analysis for reference and refresh during the project. An example stakeholder analysis is shown in [Table 4-1](#).

Stakeholder Group	Stakeholder	Ability to Disrupt 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

Table 4-1 Example Stakeholder Analysis

It is also important to assess the readiness of each stakeholder to behave in a supportive manner (i.e., demonstrate commitment to the enterprise architecture initiative).

This can be done by asking a series of questions:

- Is that person ready to change direction and begin moving towards the Target Architecture? If so, how ready?
- Is that person capable of being a credible advocate or agent of the proposed enterprise architecture initiative? If so, how capable?
- How involved is the individual in the enterprise architecture initiative? Are they simply an interested observer, or do they need to be involved in the details?
- Has that person made a contractual commitment to the development of the enterprise architecture, and its role in the governance of the development of the organization?

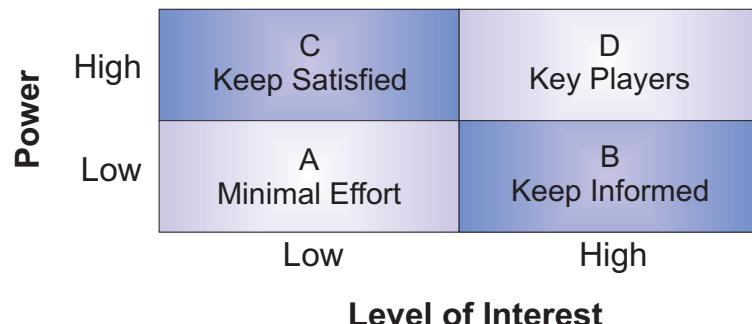
Then, for each person whose commitment is critical to ensure success, make a judgment as to their current level of commitment and the desired future level of commitment.

4.3.3 Determine Stakeholder Management Approach

The previous steps identified a long list of people and organizations that are affected by the enterprise architecture project.

Some of these may have the power either to block or advance. Some may be interested in what the enterprise architecture initiative is doing; others may not care. This step enables the team to easily see which stakeholders are expected to be blockers or critics, and which stakeholders are likely to be advocates and supporters of the initiative.

Work out stakeholder power, influence, and interest, so as to focus the enterprise architecture engagement on the key individuals. These can be mapped onto a power/interest matrix, which also indicates the strategy to adopt for engaging with them. [Figure 4-2](#) shows an example power grid matrix.

**Figure 4-2** Stakeholder Power Grid

4.3.4 Tailor Engagement Deliverables

Identify catalogs, matrices, and diagrams that the architecture engagement needs to produce and validate with each stakeholder group to deliver an effective architecture model.

It is important to pay particular attention to stakeholder interests by defining specific catalogs, matrices, and diagrams that are relevant for a particular enterprise architecture model. This enables the architecture to be communicated to, and understood by, all the stakeholders, and enables them to verify that the enterprise architecture initiative will address their concerns.

4.4 Template Stakeholder Map

The following table provides an example stakeholder map for a TOGAF architecture project which has stakeholders as identified in [Figure 4-1](#).

Stakeholder	Key Concerns	Class	Catalogs, Matrices, and Diagrams
CxO (Corporate Functions); e.g., CEO, CFO, CIO, COO	The high-level drivers, goals, and objectives of the organization, 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 Organization Decomposition diagram

Stakeholder	Key Concerns	Class	Catalogs, Matrices, and Diagrams
Program Management Office (Corporate Functions); e.g., Project Portfolio Managers	Prioritizing, funding, and aligning change activity. An understanding of project content and technical dependencies between projects supports portfolio management decision-making.	KEEP SATISFIED	Requirements catalog Project Context diagram Benefits diagram Business Footprint diagram Application Communication diagram Functional Decomposition diagram
Procurement (Corporate Functions); e.g., Acquirers	Understanding what building blocks of the architecture can be bought, and what constraints (or rules) are relevant to the purchase. Acquirers will shop with multiple vendors looking for the best cost solution while adhering to the constraints (or rules) derived from the architecture, such as standards. The key concern is to make purchasing decisions that fit the architecture.	KEY PLAYERS	Technology Portfolio catalog Technology Standards catalog
Human Resources (HR) (Corporate Functions); e.g., HR Managers, Training & Development Managers	The roles and actors are required to support the architecture and changes to it. The key concern is managing people transitions.	KEEP INFORMED	Organization Decomposition diagram Organization/Actor catalog Location catalog Application and User Location diagram

Stakeholder	Key Concerns	Class	Catalogs, Matrices, and Diagrams
Enterprise Security (Corporate Functions); e.g., Corporate Risk Management, Security Officers, IT Security Managers	Ensuring that the information, data, and systems of the organization are available to only those that have permission, and protecting the information, data, and systems from unauthorized tampering.	KEY PLAYERS	Product Lifecycle diagram Data Dissemination diagram Data Security diagram Actor/Role matrix Networked Computing Hardware diagram Communications Engineering diagram
QA/Standards Group (Corporate Functions); e.g., Data Owners, Process Owners, Technical Standards Bodies	Ensuring the consistent governance of the organization's business, data, application, and technology assets.	KEY PLAYERS	Process/Event/Control/Product catalog Contract/Measure catalog Application Portfolio catalog Interface catalog Technology Standards catalog Technology Portfolio catalog
Executive (End User Organization); e.g., Business Unit Directors, Business Unit CxOs, Business Unit Head of IT/Architecture	The high-level drivers, goals, and objectives of the organization, and how these are translated into an effective process and architecture to advance the business.	KEEP SATISFIED	Business Footprint diagram Goal/Objective/Service diagram Organization Decomposition diagram Process Flow diagram Application Communication diagram

Stakeholder	Key Concerns	Class	Catalogs, Matrices, and Diagrams
Line Management (End User Organization); e.g., Senior Business Managers, Operations Regional Managers, IT Managers	Top-level functions and processes of the organization, and how the key applications support these processes.	KEY PLAYERS	Business Footprint diagram Organization Decomposition diagram Functional Decomposition diagram Process Flow diagram Application Communication diagram Application and User Location diagram
Business Domain Experts (End User Organization); e.g., Business Process Experts, Business/Process Analyst, Process Architect, Process Designer, Functional Managers, Business Analyst	Functional aspects of processes and supporting systems. This can cover the human actors involved in the system, the user processes involved in the system, the functions required to support the processes, and the information required to flow in support of the processes.	KEY PLAYERS	Business Interaction matrix Actor/Role matrix Business Service/Information diagram Functional Decomposition diagram Product Lifecycle diagram Business Use-case diagram Application Use-case diagram Application Communication diagram Data Entity/Business Function matrix

Stakeholder	Key Concerns	Class	Catalogs, Matrices, and Diagrams
IT Service Management (Systems Operations); e.g., Service Delivery Manager	Ensuring that IT services provided to the organization meet the service levels required by that organization to succeed in business.	KEEP INFORMED	Technology Standards catalog Technology Portfolio catalog Contract/Measure catalog Process/Application Realization diagram Enterprise Manageability diagram
IT Operations — Applications (System Operations); e.g., Application Architecture, System & Software Engineers	Development approach, software modularity and reuse, portability migration, and interoperability.	KEY PLAYERS	Process/Application Realization diagram Application/Data matrix Application Migration diagram Software Engineering diagram Platform decomposition Diagram Networked Computing/ Hardware diagram Software distribution Diagram

Template Stakeholder Map

Stakeholder Management

Stakeholder	Key Concerns	Class	Catalogs, Matrices, and Diagrams
IT Operations — Infrastructure (System Operations); e.g., Infrastructure Architect, Wintel support, Mid-range support, Operational DBA, Service Desk	Location, modifiability, re-usability, and availability of all components of the system. Ensuring that the appropriate components are developed and deployed within the system in an optimal manner.	KEY PLAYERS	Platform Decomposition diagram Technology Standards catalog Technology Portfolio catalog Enterprise Manageability diagram Networked Computing/ Hardware diagram Processing diagram Environments and Locations diagram
IT Operations — Data/Voice Communications (System Operations); e.g., Network Management	Location, modifiability, re-usability, and availability of communications and networking services. Ensuring that the appropriate communications and networking services are developed and deployed within the system in an optimal manner.	KEY PLAYERS	Communications Engineering diagram
Executive (Project Organization); e.g., Sponsor, Program Manager	On-time, on-budget delivery of a change initiative that will realize expected benefits for the organization.	KEEP INFORMED	Requirements catalog Principles catalog Value Chain diagram Solution Concept diagram Functional Decomposition diagram Application and User Location diagram

Stakeholder	Key Concerns	Class	Catalogs, Matrices, and Diagrams
Line Management (Project Organization); e.g., Project Manager	Operationally achieving on-time, on-budget delivery of a change initiative with an agreed scope.	KEEP INFORMED	Application Communication diagram Functional Decomposition diagram Environments and Locations diagram
Business Process/Functional Expert (Project Organization); e.g., Financials FICO Functional Consultant, HR Functional Consultant	Adding more detail to the functional requirements of a change initiative based on experience and interaction with business domain experts in the end-user organization.	KEY PLAYERS	Process Flow diagram Business Use-case diagram Business Service/Information diagram Functional Decomposition diagram Application Communication diagram
Product Specialist (Project Organization); e.g., Portal Product Specialist	Specifying technology product designs in order to meet project requirements and comply with the Architecture Vision of the solution. In a packages and packaged services environment, product expertise can be used to identify product capabilities that can be readily leveraged and can provide guidance on strategies for product customization.	KEY PLAYERS	Software Engineering diagram Application/Data matrix

Stakeholder	Key Concerns	Class	Catalogs, Matrices, and Diagrams
Technical Specialist (Project Organization); e.g., Application Architect	Specifying technology product designs in order to meet project requirements and comply with the Architecture Vision of the solution.	KEY PLAYERS	Software Engineering diagram Platform Decomposition diagram Process/Application Realization diagram Application/Data matrix Application Migration diagram
Regulatory Bodies (Outside Services); e.g., Financial Regulator, Industry Regulator	Receipt of the information they need in order to regulate the client organization, and ensuring that their information requirements are properly satisfied. Interested in reporting processes, and the data and applications used to provide regulatory return information.	KEEP SATISFIED	Business Footprint diagram Application Communication diagram
Suppliers (Outside Services); e.g., Alliance Partners, Key Suppliers	Ensuring that their information exchange requirements are met in order that agreed service contracts with the client organizations can be fulfilled.	KEEP SATISFIED	Business Footprint diagram Business Service/Information diagram Application Communication diagram

Business Scenarios and Business Goals

This handout is extracted from TOGAF 9.1 Chapter 26, supporting Business Scenarios, a method for deriving business requirements for architecture and the implied technical requirements. This handout can be used for TOGAF 9 Level 1 and Level 2 training.

5.1 Developing Business Scenarios

5.1.1 General Guidelines

The stakeholders (e.g., business managers, end users) will tell you what they want, but as an architect you must still gain an understanding of the business, so you must know the most important actors in the system. If the stakeholders do not know what they want:

- Take time, observe, and record how they are working today
- Structure information in such a way that it can be used later
- Uncover critical business rules from domain experts
- Stay focused on what needs to be accomplished, and how it is to be accomplished

This effort provides the anchor for a chain of reason from business requirements through to technical solutions. It will pay off later to be diligent and critical at the start.

5.1.2 Questions to Ask for Each Area

The business scenario workshops mentioned above in the Gathering phase are really structured interviews. While there is no single set of appropriate questions to ask in all situations, the following provides some guidance to help business scenario consultants in asking questions.

Identifying, Documenting, and Ranking the Problem

Is the problem described as a statement of *what* needs to be accomplished, like steps in a process, and not *how* (with technology “push”)?

If the problem is too specific or a “how”:

- Raise a red flag
- Ask “Why do you need to do it that way?” questions

If the problem is too vague or not actionable:

- Raise a red flag
- Ask “What is it you need to do, or will be able to do if this problem is solved?” questions

Ask questions that help to identify where and when the problem exists:

- Where are you experiencing this particular problem? In what business process?
- When do you encounter these issues? During the beginning of the process, the middle, the end?

Ask questions that help to identify the costs of the problem:

- Do you account for the costs associated with this problem? If so, what are they?
- Are there hidden costs? If so, what are they?
- Is the cost of this problem covered in the cost of something else? If so, what and how much?
- Is the problem manifested in terms of poor quality or a perception of an ineffective organization?

Identifying the Business & Technical Environment, and Documenting in Models

Questions to ask about the business environment:

- What key process suffers from the issues? What are the major steps that need to be processed?
- Location/scale of internal business departments?
- Location/scale of external business partners?
- Any specific business rules and regulations related to the situation?

Questions to ask about the current technology environment:

- What technology components are already presupposed to be related to this problem?
- Are there any technology constraints?
- Are there any technology principles that apply?

Identifying and Documenting Objectives

Is the “what” sufficiently backed up with the rationale for “why”? If not, ask for measurable rationale in the following areas:

- Return on investment
- Scalability
- Performance needs
- Compliance to standards
- Ease-of-use measures

Identifying Human Actors and their Place in the Business Model

An actor represents anything that interacts with or within the system. This can be a human, or a machine, or a computer program. Actors initiate activity with the system, for example:

- Computer user with the computer
- Phone user with the telephone
- Payroll clerk with the payroll system
- Internet subscriber with the web browser

An actor represents a role that a user plays; i.e., a user is someone playing a role while using the system (e.g., John (user) is a dispatcher (actor)). Each actor uses the system in different ways (otherwise they should be the same actor). Ask about the humans that will be involved, from different viewpoints, such as:

- Developer
- Maintainer
- Operator
- Administrator
- User

Identifying Computer Actors and their Place in the Technology Model

Ask about the computer components likely to be involved, again from different points of view. What must they do?

Documenting Roles, Responsibilities, Measures of Success, Required Scripts

When defining roles, ask questions like:

- What are the main tasks of the actor?
- Will the actor have to read/write/change any information?
- Will the actor have to inform the system about outside changes?
- Does the actor wish to be informed about unexpected changes?

Checking for Fitness-for-Purpose, and refining if necessary

Is there enough information to identify who/what could fulfil the requirement? If not, probe more deeply.

Is there a description of when, and how often, the requirement needs to be addressed? If not, ask about timing.

5.2 Business Scenario Documentation

5.2.1 Textual Documentation

Effective business scenario documentation requires a balance between ensuring that the detail is accessible, and preventing it from overshadowing the results and overwhelming the reader. To this end, the business scenario document should have the main findings in the body of the document and the details in appendices.

In the appendices:

- Capture all the important details about a business scenario:
 - Situation description and rationale
 - All measurements
 - All actor roles and sub-measurements
 - All services required
- Capture the critical steps between actors that address the situation, and sequence the interactions
- Declare relevant information about all actors:
 - Partition the responsibility of the actors
 - List pre-conditions that have to be met prior to proper system functionality
 - Provide technical requirements for the service to be of acceptable quality

In the main body of the business scenario:

- Generalize all the relevant data from the detail in the appendices

5.2.2 Business Scenario Models

- Remember the purpose of using models:
 - Help comprehension
 - Give a starting point to confirm requirements
 - Relate actors and interactions
- Keep drawings clear and neat:
 - Do not put too much into one diagram
 - Simpler diagrams are easier to understand
- Number diagrams for easy reference:
 - Maintain a catalog of the numbers to avoid duplicates

5.3 Guidelines on Goals and Objectives

5.3.1 Importance of Goals

One of the first steps in the development of an architecture is to define the overall goals and objectives for the development. The objectives should be derived from the business goals of the organization, and the way in which IT is seen to contribute to meeting those goals.

Every organization behaves differently in this respect, some seeing IT as the driving force for the enterprise and others seeing IT in a supporting role, simply automating the business processes which already exist. The essential thing is that the architectural objectives should be very closely aligned with the business goals and objectives of the organization.

5.3.2 Importance of SMART Objectives

Not only must goals be stated in general terms, but also specific measures need to be attached to them to make them SMART, as described above.

The amount of effort spent in doing this will lead to greater clarity for the sponsors of the architecture evolution cycle. It will pay back by driving proposed solutions much more closely toward the goals at each step of the cycle. It is extremely helpful for the different stakeholders inside the organization, as well as for suppliers and consultants, to have a clear yardstick for measuring fitness-for-purpose. If done well, the ADM can be used to trace specific decisions back to criteria, and thus yield their justification.

The goals below have been adapted from those given in previous versions of TOGAF. These are categories of goals, each with a list of possible objectives. Each of these objectives should be made SMART with specific measures and metrics for the task. However, since the actual work to be done will be specific to the architecture project concerned, it is not possible to provide a list of generic SMART objectives that will relate to any project.

Instead, we provide here some example SMART objectives.

Example of Making Objectives SMART

Under the general goal heading “Improve User Productivity” below, there is an objective to provide a “Consistent User Interface” and it is described as follows:

“A consistent user interface will ensure that all user-accessible functions and services will appear and behave in a similar, predictable fashion regardless of application or site. This will lead to better efficiency and fewer user errors, which in turn may result in lower recovery costs.”

To make this objective SMART, we ask whether the objective is specific, measurable, actionable, realistic, and time-bound, and then augment the objective appropriately.

The following captures an analysis of these criteria for the stated objective:

- **Specific:** The objective of providing “a consistent user interface that will ensure all user accessible functions and services will appear and behave in a similar, predictable fashion regardless of application or site”. is pretty specific. However, the measures listed in the second sentence could be more specific . . .

- **Measurable:** As stated above, the objective is measurable, but could be more specific. The second sentence could be amended to read (for example): “This will lead to 10% greater user efficiency and 20% fewer order entry user errors, which in turn may result in 5% lower order entry costs”.
- **Actionable:** The objective does appear to be actionable. It seems clear that consistency of the user interface must be provided, and that could be handled by whoever is responsible for providing the user interface to the user device.
- **Realistic:** The objective of providing “a consistent user interface that will ensure all user accessible functions and services will appear and behave in a similar, predictable fashion regardless of application or site” might not be realistic. Considering the use today of PDAs at the user end might lead us to augment this objective to ensure that the downstream developers don’t unduly create designs that hinder the use of new technologies. The objective could be re-stated as “a consistent user interface, across user interface devices that provide similar functionality, that will ensure . . .” etc.
- **Time-bound:** The objective as stated is not time-bound. To be time-bound the objective could be re-stated as “By the end of Q3, provide a consistent . . .”.

The above results in a SMART objective that looks more like this (again remember this is an example):

“By the end of Q3, provide a consistent user interface across user interface devices that provide similar functionality to ensure all user accessible functions and services appear and behave in a similar way when using those devices in a predictable fashion regardless of application or site. This will lead to 10% greater user efficiency and 20% fewer order entry user errors, which in turn may result in 5% lower order entry costs.”

5.3.3 Categories of Goals and Objectives

Although every organization will have its own set of goals, some examples may help in the development of an organization-specific list. The goals given below are categories of goals, each with a list of possible objectives, which have been adapted from the goals given in previous versions of TOGAF.

Each of the objectives given below should be made SMART with specific measures and metrics for the task involved, as illustrated in the example above. However, the actual work to be done will be specific to the architecture project concerned, and it is not possible to provide a list of generic SMART objectives that will relate to any project.

Goal: Improve Business Process Performance

Business process improvements can be realized through the following objectives:

- Increased process throughput
- Consistent output quality
- Predictable process costs
- Increased re-use of existing processes
- Reduced time of sending business information from one process to another process

Goal: Decrease Costs

Cost improvements can be realized through the following objectives:

- Lower levels of redundancy and duplication in assets throughout the enterprise
- Decreased reliance on external IT service providers for integration and customization
- Lower costs of maintenance

Goal: Improve Business Operations

Business operations improvements can be realized through the following objectives:

- Increased budget available to new business features
- Decreased costs of running the business
- Decreased time-to-market for products or services
- Increased quality of services to customers
- Improved quality of business information

Goal: Improve Management Efficacy

Management efficacy improvements can be realized through the following objectives:

- Increased flexibility of business
- Shorter time to make decisions
- Higher quality decisions

Goal: Reduce Risk

Risk improvements can be realized through the following objectives:

- Ease of implementing new processes
- Decreased errors introduced into business processes through complex and faulty systems
- Decreased real-world safety hazards (including hazards that cause loss of life)

Goal: Improve Effectiveness of IT Organization

IT organization effectiveness can be realized through the following objectives:

- Increased rollout of new projects
- Decreased time to rollout new projects
- Lower cost in rolling out new projects
- Decreased loss of service continuity when rolling out new projects
- Common development: applications that are common to multiple business areas will be developed or acquired once and re-used rather than separately developed by each business area.
- Open systems environment: a standards-based common operating environment, which accommodates the injection of new standards, technologies, and applications on an organization-wide basis, will be established. This standards-based environment will provide the basis for development of common applications and facilitate software re-use.

- Use of products: as far as possible, hardware-independent, off-the-shelf items should be used to satisfy requirements in order to reduce dependence on custom developments and to reduce development and maintenance costs.
- Software re-use: for those applications that must be custom developed, development of portable applications will reduce the amount of software developed and add to the inventory of software suitable for re-use by other systems.
- Resource sharing: data processing resources (hardware, software, and data) will be shared by all users requiring the services of those resources. Resource sharing will be accomplished in the context of security and operational considerations.

Goal: Improve User Productivity

User productivity improvements can be realized through the following objectives:

- Consistent user interface: a consistent user interface will ensure that all user-accessible functions and services will appear and behave in a similar, predictable fashion regardless of application or site. This will lead to better efficiency and fewer user errors, which in turn may result in lower recovery costs.
- Integrated applications: applications available to the user will behave in a logically consistent manner across user environments, which will lead to the same benefits as a consistent user interface.
- Data sharing: databases will be shared across the organization in the context of security and operational considerations, leading to increased ease-of-access to required data.

Goal: Improve Portability and Scalability

The portability and scalability of applications will be through the following objectives:

- Portability: applications that adhere to open systems standards will be portable, leading to increased ease-of-movement across heterogeneous computing platforms. Portable applications can allow sites to upgrade their platforms as technological improvements occur, with minimal impact on operations.
- Scalability: applications that conform to the model will be configurable, allowing operation on the full spectrum of platforms required.

Goal: Improve Interoperability

Interoperability improvements across applications and business areas can be realized through the following objectives:

- Common infrastructure: the architecture should promote a communications and computing infrastructure based on open systems and systems transparency including, but not limited to, operating systems, database management, data interchange, network services, network management, and user interfaces.
- Standardization: by implementing standards-based platforms, applications will be provided with and will be able to use a common set of services that improve the opportunities for interoperability.

Goal: Increase Vendor Independence

Vendor independence will be increased through the following objectives:

- Interchangeable components: only hardware and software that have standards-based interfaces will be selected, so that upgrades or the insertion of new products will result in minimal disruption to the user's environment.
- Non-proprietary specifications: capabilities will be defined in terms of non-proprietary specifications that support full and open competition and are available to any vendor for use in developing commercial products.

Goal: Reduce Lifecycle Costs

Lifecycle costs can be reduced through most of the objectives discussed above. In addition, the following objectives directly address reduction of lifecycle costs:

- Reduced duplication: replacement of isolated systems and islands of automation with interconnected open systems will lead to reductions in overlapping functionality, data duplication, and unneeded redundancy because open systems can share data and other resources.
- Reduced software maintenance costs: reductions in the quantity and variety of software used in the organization will lead to reductions in the amount and cost of software maintenance. Use of standard off-the-shelf software will lead to further reductions in costs since vendors of such software distribute their product maintenance costs across a much larger user base.
- Incremental replacement: common interfaces to shared infrastructure components allow for phased replacement or upgrade with minimal operational disturbance.
- Reduced training costs: common systems and consistent Human Computer Interfaces (HCIs) will lead to reduced training costs.

Goal: Improve Security

Security can be improved in the organization's information through the following objectives:

- Consistent security interfaces for applications: consistent security interfaces and procedures will lead to fewer errors when developing applications and increased application portability. Not all applications will need the same suite of security features, but any features used will be consistent across applications.
- Consistent security interfaces for users: a common user interface to security features will lead to reduced learning time when moving from system to system.
- Security independence: application deployment can use the security policy and mechanisms appropriate to the particular environment if there is good layering in the architecture.
- A 25% reduction in calls to the help desk relating to security issues.
- A 20% reduction in "false positives" detected in the network (a false positive is an event that appears to be an actionable security event, but in fact is a false alarm).

Goal: Improve Manageability

Management improvement can be realized through the following objectives:

- Consistent management interface: consistent management practices and procedures will facilitate management across all applications and their underlying support structures. A consistent interface can simplify the management burden, leading to increased user efficiency.
- Reduced operation, administration, and maintenance costs: operation, administration, and maintenance costs may be reduced through the availability of improved management products and increased standardization of the objects being managed.

Architecture Deliverables

This amended extract from TOGAF 9 provides descriptions of architecture deliverables for Level 1 Syllabus, section 3.1.11, learning unit 11. This handout is intended to be used for TOGAF 9 Level 1 training. It can also be used for TOGAF 9 Level 2 training.

This handout describes the purpose of deliverables that will typically be consumed and produced across the TOGAF ADM cycle. As deliverables are typically the contractual or formal work products of an architecture project, it is likely that these deliverables will be constrained or altered by any overarching project or process management for the enterprise (such as CMMI, PRINCE2, PMBOK, or MSP).

The deliverables described are intended to provide 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.

6.1 Deliverables

The following sections provide example descriptions of deliverables referenced in the ADM.

6.1.1 Architecture Building Blocks

Architecture documentation and models from the enterprise's Architecture Repository.

6.1.2 Architecture Contract

Architecture Contracts are the 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. By implementing a governed approach to the management of contracts, the following will be ensured:

- A system of continuous monitoring to check integrity, changes, decision-making, and audit of all architecture-related activities within the organization
- Adherence to the principles, standards, and requirements of the existing or developing architectures
- Identification of risks in all aspects of the development and implementation of the architecture(s) covering the internal development against accepted standards, policies, technologies, and products as well as the operational aspects of the architectures such that the organization can continue its business within a resilient environment

- 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 organization responsible for the contract, their level of authority, and scope of the architecture under the governance of this body

6.1.3 Architecture Definition Document

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).

A Transition Architecture shows the enterprise at an architecturally significant state between the Baseline and Target Architectures. Transition Architectures are used to describe transitional Target Architectures necessary for effective realization of the Target Architecture.

The Architecture Definition Document is a companion to the Architecture Requirements Specification, with a complementary objective:

- The Architecture Definition Document provides a qualitative view of the solution and aims to communicate the intent of the architects.
- The Architecture Requirements Specification provides a quantitative view of the solution, stating measurable criteria that must be met during the implementation of the architecture.

6.1.4 Architecture Principles

Principles are general rules and guidelines, intended to be enduring and seldom amended, that inform and support the way in which an organization sets about fulfilling its mission.

In their turn, principles may be just one element in a structured set of ideas that collectively define and guide the organization, from values through to actions and results.

6.1.5 Architecture Repository

The Architecture Repository acts as a holding area for all architecture-related projects within the enterprise. The repository allows projects to manage their deliverables, locate re-usable assets, and publish outputs to stakeholders and other interested parties.

6.1.6 Architecture Requirements Specification

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. An Architecture Requirements Specification will typically form a major component of an implementation contract or contract for more detailed Architecture Definition.

As mentioned above, the Architecture Requirements Specification is a companion to the Architecture Definition Document, with a complementary objective:

- The Architecture Definition Document provides a qualitative view of the solution and aims to communicate the intent of the architect.

Architecture Deliverables	Deliverables
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- The Architecture Requirements Specification provides a quantitative view of the solution, stating measurable criteria that must be met during the implementation of the architecture.

6.1.7 Architecture Roadmap

The Architecture Roadmap lists individual work packages that will realize the Target Architecture and lays them out on a timeline to show progression from the Baseline Architecture to the Target Architecture. The Architecture Roadmap highlights individual work packages' business value at each stage. Transition Architectures necessary to effectively realize the Target Architecture are identified as intermediate steps. The Architecture Roadmap is incrementally developed throughout Phases E and F, and informed by readily identifiable roadmap components from Phase B, C, and D within the ADM.

6.1.8 Architecture Vision

The Architecture Vision is created early on in the ADM cycle. It provides a summary of the changes to the enterprise that will accrue from successful deployment of the Target Architecture. The purpose of the Architecture Vision is to provide key stakeholders with a formally agreed outcome. Early agreement on the outcome enables the architects to focus on the detail necessary to validate feasibility. Providing an Architecture Vision also supports stakeholder communication by providing a summary version of the full Architecture Definition.

6.1.9 Business Principles, Business Goals, and Business Drivers

Business principles, business goals, and business drivers provide context for architecture work, by describing the needs and ways of working employed by the enterprise. Many factors that lie outside the consideration of architecture discipline may nevertheless have significant implications for the way that architecture is developed.

6.1.10 Capability Assessment

Before embarking upon a detailed Architecture Definition, it is valuable to understand the baseline and target capability level of the enterprise. This Capability Assessment can be examined on several levels:

- What is the capability level of the enterprise as a whole? Where does the enterprise wish to increase or optimize capability? What are the architectural focus areas that will support the desired development of the enterprise?
- What is the capability or maturity level of the IT function within the enterprise? What are the likely implications of conducting the architecture project in terms of design governance, operational governance, skills, and organization structure? What is an appropriate style, level of formality, and amount of detail for the architecture project to fit with the culture and capability of the IT organization?
- What is the capability and maturity of the architecture function within the enterprise? What architectural assets are currently in existence? Are they maintained and accurate? What standards and reference models need to be considered? Are there likely to be opportunities to create re-usable assets during the architecture project?

- Where capability gaps exist, to what extent is the business ready to transform in order to reach the target capability? What are the risks to transformation, cultural barriers, and other considerations to be addressed beyond the basic capability gap?

6.1.11 Change Request

During implementation of an architecture, as more facts become known, it is possible that the original Architecture Definition and requirements are not suitable or are not sufficient to complete the implementation of a solution. In these circumstances, it is necessary for implementation projects to either deviate from the suggested architectural approach or to request scope extensions. Additionally, external factors — such as market factors, changes in business strategy, and new technology opportunities — may open up opportunities to extend and refine the architecture.

In these circumstances, a Change Request may be submitted in order to kick-start a further cycle of architecture work.

6.1.12 Communications Plan

Enterprise architectures contain large volumes of complex and inter-dependent information. 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 for architecture allows for this communication to be carried out within a planned and managed process.

6.1.13 Compliance Assessment

Once an architecture has been defined, it is necessary to govern that architecture through implementation to ensure that the original Architecture Vision is appropriately realized and that any implementation learnings are fed back into the architecture process. Period compliance reviews of implementation projects provide a mechanism to review project progress and ensure that the design and implementation is proceeding in-line with the strategic and architectural objectives.

6.1.14 Implementation and Migration Plan

The Implementation and Migration Plan provides a schedule of the projects that will realize the Target Architecture. The Implementation and Migration Plan includes executable projects grouped into managed portfolios and programs. The Implementation and Migration Strategy

Architecture Deliverables	Deliverables
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identifying the approach to change is a key element of the Implementation and Migration Plan.

6.1.15 Implementation Governance Model

Once an architecture has been defined, it is necessary to plan how the Transition Architecture that implements the architecture will be governed through implementation. Within organizations that have established architecture functions, there is likely to be a governance framework already in place, but specific processes, organizations, roles, responsibilities, and measures may need to be defined on a project-by-project basis.

The Implementation Governance Model ensures that a project transitioning into implementation also smoothly transitions into appropriate architecture governance.

6.1.16 Organizational Model for Enterprise Architecture

In order for an architecture framework to be used successfully, it must be supported by the correct organization, roles, and responsibilities within the enterprise. Of particular importance is the definition of boundaries between different enterprise architecture practitioners and the governance relationships that span across these boundaries.

6.1.17 Request for Architecture Work

This is a document that is sent from the sponsoring organization to the architecture organization to trigger the start of an architecture development cycle. Requests for Architecture Work can be created as an output of the Preliminary Phase, a result of approved architecture Change Requests, or terms of reference for architecture work originating from migration planning.

In general, all the information in this document should be at a high level.

6.1.18 Requirements Impact Assessment

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.

6.1.19 Solution Building Blocks

Implementation-specific building blocks from the enterprise's Architecture Repository.

6.1.20 Statement of Architecture Work

The Statement of Architecture Work defines the scope and approach that will be used to complete an architecture development cycle. The Statement of Architecture Work is typically the document against which successful execution of the architecture project will be measured and may form the basis for a contractual agreement between the supplier and consumer of architecture services.

6.1.21 Tailored Architecture Framework

TOGAF provides an industry standard framework for architecture that may be used in a wide variety of organizations. However, before TOGAF can be effectively used within an architecture project, tailoring at two levels is necessary.

Firstly, it is necessary to tailor the TOGAF model for integration into the enterprise. This tailoring will include integration with project and process management frameworks, customization of terminology, development of presentational styles, selection, configuration, and deployment of architecture tools, etc. The formality and detail of any frameworks adopted should also align with other contextual factors for the enterprise, such as culture, stakeholders, commercial models for enterprise architecture, and the existing level of Architecture Capability.

Once the framework has been tailored to the enterprise, further tailoring is necessary in order to tailor the framework for the specific architecture project. Tailoring at this level will select appropriate deliverables and artifacts to meet project and stakeholder needs.

Architecture Skills Framework

This handout is extracted from chapter 52 of TOGAF 9.1 and provides a set of role, skill, and experience norms for staff undertaking enterprise architecture work. This handout is used for TOGAF 9 Level 2 training.

7.1 Introduction

Skills frameworks provide a view of the competency levels required for specific roles. They define:

- The roles within a work area
- The skills required by each role
- The depth of knowledge required to fulfil the role successfully

They are relatively common for defining the skills required for a consultancy and/or project management assignment, to deliver a specific project or work package. They are also widely used by recruitment and search agencies to match candidates and roles.

Their value derives from their ability to provide a means of rapidly identifying skill matches and gaps. Successfully applied, they can ensure that candidates are fit for the jobs assigned to them.

Their value in the context of enterprise architecture arises from the immaturity of the enterprise architecture discipline, and the problems that arise from this.

7.2 Need for an Enterprise Architecture Skills Framework

7.2.1 Definitional Rigor

“Enterprise Architecture” and “Enterprise Architect” are widely used but poorly defined terms in industry today. They are used to denote a variety of practices and skills applied in a wide variety of architecture domains. There is a need for better classification to enable more implicit understanding of what type of architecture/architect is being described.

This lack of uniformity leads to difficulties for organizations seeking to recruit or assign/promote staff to fill positions in the architecture field. Because of the different usages of terms, there is often misunderstanding and miscommunication between those seeking to recruit for, and those seeking to fill, the various roles of the architect.

7.2.2 Basis of an Internal Architecture Practice

Despite the lack of uniform terminology, architecture skills are in increasing demand, as the discipline of architecture gains increasing attention within industry.

Many enterprises have set up, or are considering setting up, an enterprise architecture practice, as a means of fostering development of the necessary skills and experience among in-house staff to undertake the various architecting tasks required by the enterprise.

An enterprise architecture practice is a formal program of development and certification, by which an enterprise formally recognizes the skills of its practicing architects, as demonstrated by their work. 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 be performed.

The role and skill definitions on which such a program needs to be based are also required, by both recruiting and supplying organizations, in cases where external personnel are to be engaged to perform architecture work (for example, as part of a consultancy engagement).

An enterprise architecture practice is both difficult and costly to set up. It is normally built around a process of peer review, and involves the time and talent of the strategic technical leadership of an enterprise. Typically it involves establishment of a peer review board, and documentation of the process, and of the requirements for internal certification. Time is also required of candidates to prepare for peer review, by creating a portfolio of their work to demonstrate their skills, experiences, and contributions to the profession.

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.

Because of the complexity, time, and cost involved, many enterprises do not have an internal enterprise architect certification program, preferring instead to simply interview and recruit architecture staff on an *ad hoc* basis. There are serious risks associated with this approach:

- Communication between recruiting organizations, consultancies, and employment agencies is very difficult.
- Time is wasted interviewing staff who may have applied in all good faith, but still lack the skills and/or experience required by the employer.
- Staff that are capable of filling architecture roles may be overlooked, or may not identify themselves with advertised positions and hence not even apply.
- There is increased risk of unsuitable personnel being employed or engaged, through no-one's fault, and despite everyone involved acting in good faith. This in turn can:
 - Increase personnel costs, through the need to rehire or reassign staff
 - Adversely impact the time, cost, and quality of operational IT systems, and the projects that deliver them

7.3 Goals/Rationale

7.3.1 Certification of Enterprise Architects

The main purpose behind an enterprise setting up an internal enterprise architect certification program is two-fold:

1. To formally recognize the skill of its practicing architects, as part of the task of establishing and maintaining a professional architecting organization
2. To ensure the alignment of necessary staff skills and experience with the architecture tasks that the enterprise wishes to be performed, whether these are to be performed internally to the enterprise or externally; for example, as part of a consultancy engagement

7.3.2 Specific Benefits

Specific benefits anticipated from use of the TOGAF Architecture Skills Framework include:

- Reduced time, cost, and risk in training, hiring, and managing architecture professionals, both internal and external:
 - Simplifies communication between recruiting organizations, consultancies, and employment agencies
 - Avoids wasting time interviewing staff who may have applied in all good faith, but still lack the skills and/or experience required by the employer
 - Avoids staff who are capable of filling architecture roles being overlooked, or not identifying themselves with advertised positions and hence not even applying
- Reduced time and cost to set up an internal architecture practice:
 - Many enterprises do not have an internal architecture practice due to the complexity involved in setting one up, preferring instead to simply interview and recruit architecture staff on an *ad hoc* basis.
 - By providing definitions of the architecting skills and proficiency levels required of personnel who are to perform the various architecting roles defined within TOGAF, the Architecture Skills Framework greatly reduces the time, cost, and risk of setting up a practice for the first time, and avoids “re-inventing wheels”.
 - Enterprises that already have an internal architecture practice are able to set enterprise-wide norms, but still experience difficulties as outlined above in recruiting staff, or engaging consultants, from external sources, due to the lack of uniformity between different enterprises. By aligning its existing skills framework with the industry-accepted definitions provided by The Open Group, an enterprise can greatly simplify these problems.
- Reduced time and cost to implement an architecture practice helps reduce the time, cost, and risk of overall solution development:
 - Enterprises that do not have an internal architecture practice run the risk of unsuitable personnel being employed or engaged, through no-one’s fault, and despite everyone involved acting in good faith. The resultant time and cost penalties far outweigh the time and cost of having an internal architecture practice:

- Personnel costs are increased, through the occasional need to rehire or reassigned staff.
- Even more important is the adverse impact on the time, cost, and quality of operational IT systems, and the projects to deliver them, resulting from poor staff assignments.

7.4 Enterprise Architecture Role and Skill Categories

7.4.1 Overview

This section describes the role of an enterprise architect, the fundamental skills required, and some possible disciplines in which an enterprise architect might specialize.

TOGAF delivers an enterprise architecture, and therefore requires both business and IT-trained professionals to develop the enterprise architecture.

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

The value is in providing a rapid means of identifying skills and gaps. Successfully applied, the Framework can be used as a measure for:

- Staff development
- Ensuring that the right person does the right job

7.4.2 TOGAF Roles

A typical architecture team undertaking the development of an enterprise architecture as described in TOGAF would comprise the following roles:

- Architecture Board Members
- Architecture Sponsor
- Architecture Manager
- Architects for:
 - Enterprise Architecture (which for the purpose of the tables shown below can be considered as a superset of Business, Data, Application, and Technology Architecture)
 - Business Architecture
 - Data Architecture

- Application Architecture
- Technology Architecture
- Program and/or Project Managers
- IT Designer
- And many others ...

The tables that follow show, for each of these roles, the skills required and the desirable level of proficiency in each skill.

Of all the roles listed above, the one that needs particularly detailed analysis and definition is of course the central role of enterprise architect. As explained above, “Enterprise Architecture” and “Enterprise Architect” are terms that are very widely used but very poorly defined in industry today, denoting a wide variety of practices and skills applied in a wide variety of architecture domains. There is often confusion between the role of an architect and that of a designer or builder. Many of the skills required by an enterprise architect are also required by the designer, who delivers the solutions. While their skills are complementary, those of the designer are primarily technology focused and translate the architecture into deliverable components.

The final subsection below therefore explores in some detail the generic characteristics of the role of enterprise architect, and the key skill requirements, whatever the particular architecture domain (Enterprise Architecture, Business Architecture, Data Architecture, Application Architecture, Technology Architecture, etc.).

7.4.3 Categories of Skills

The TOGAF team skill set will need to include the following main categories of skills:

- **Generic Skills:** — typically comprising leadership, teamworking, inter-personal skills, etc.
- **Business Skills & Methods:** — typically comprising business cases, business process, strategic planning, etc.
- **Enterprise Architecture Skills:** — typically comprising modeling, building block design, applications and role design, systems integration, etc.
- **Program or Project Management Skills:** — typically comprising managing business change, project management methods and tools, etc.
- **IT General Knowledge Skills:** — typically comprising brokering applications, asset management, migration planning, SLAs, etc.
- **Technical IT Skills:** — typically comprising software engineering, security, data interchange, data management, etc.
- **Legal Environment:** — typically comprising data protection laws, contract law, procurement law, fraud, etc.

The tables that follow illustrate each of these categories of skills.

The tables that follow show, for each of these skills, the roles to which they are relevant and the desirable level of proficiency in each skill.

7.4.4 Proficiency Levels

The TOGAF Architecture Skills Framework identifies four levels of knowledge or proficiency in any area:

Level	Achievement	Description
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.

7.5 Enterprise Architecture Role and Skill Definitions

7.5.1 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
Generic Skills									
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

7.5.2 Business Skills & Methods

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
Business Skills & Methods									
Business Case	3	4	4	4	4	4	4	4	2
Business Scenario	2	3	4	4	4	4	4	3	2
Organization	3	3	4	3	3	3	4	3	2
Business Process	3	3	4	4	4	4	4	3	2
Strategic Planning	2	3	3	3	3	3	4	3	1
Budget Management	3	3	3	3	3	3	3	4	3
Visioning	3	3	4	3	3	3	4	3	2
Business Metrics	3	4	4	4	4	4	4	4	3
Business Culture	4	4	4	3	3	3	3	3	1
Legacy Investments	4	4	3	2	2	2	2	3	2
Business Functions	3	3	3	3	4	4	4	3	2

7.5.3 Enterprise Architecture 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
Enterprise Architecture Skills									
Business Modeling	2	2	4	3	3	4	4	2	2
Business Process Design	1	1	4	3	3	4	4	2	2
Role Design	2	2	4	3	3	4	4	2	2
Organization Design	2	2	4	3	3	4	4	2	2
Data Design	1	1	3	3	4	3	3	2	3
Application Design	1	1	3	3	3	4	3	2	3
Systems Integration	1	1	4	4	3	3	3	2	2
IT Industry Standards	1	1	4	4	4	4	3	2	3
Services Design	2	2	4	4	3	4	3	2	2
Architecture Principles Design	2	2	4	4	4	4	4	2	2
Architecture Views & Viewpoints Design	2	2	4	4	4	4	4	2	2
Building Block Design	1	1	4	4	4	4	4	2	3
Solutions Modeling	1	1	4	4	4	4	4	2	3
Benefits Analysis	2	2	4	4	4	4	4	4	2
Business Interworking	3	3	4	3	3	4	4	3	1
Systems Behavior	1	1	4	4	4	4	3	3	2
Project Management	1	1	3	3	3	3	3	4	2

7.5.4 Program or Project Management 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
Program or Project Management Skills									
Program Management	1	2	3	3	3	3	3	4	2
Project Management	1	2	3	3	3	3	3	4	2
Managing Business Change	3	3	4	3	3	3	4	4	2
Change Management	3	3	4	3	3	3	4	3	2
Value Management	4	4	4	3	3	3	4	3	2

7.5.5 IT General Knowledge 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
IT General Knowledge Skills									
IT Application Development Methodologies & Tools	2	2	3	4	4	4	2	3	3
Programming Languages	1	1	3	4	4	4	3	2	3
Brokering Applications	1	1	3	3	4	4	3	2	3
Information Consumer Applications	1	1	3	3	4	4	3	2	3
Information Provider Applications	1	1	3	3	4	4	3	2	3
Storage Management	1	1	3	4	4	2	2	2	3
Networks	1	1	3	4	3	2	2	2	3
Web-based Services	1	1	3	3	4	4	2	2	3
IT Infrastructure	1	1	3	4	3	2	2	2	3
Asset Management	1	1	4	4	3	3	3	2	3
Service Level Agreements	1	1	4	4	3	4	3	2	3
Systems	1	1	3	4	3	3	2	2	3
COTS	1	1	3	4	3	4	2	2	3
Enterprise Continuums	1	1	4	4	4	4	4	2	3
Migration Planning	1	1	4	3	4	3	3	2	3
Management Utilities	1	1	3	2	4	4	2	2	3
Infrastructure	1	1	3	4	3	4	2	2	3

7.5.6 Technical IT 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
Technical IT Skills									
Software Engineering	1	1	3	3	4	4	3	2	3
Security	1	1	3	4	3	4	3	2	3
Systems & Network Management	1	1	3	4	3	3	3	2	3
Transaction Processing	1	1	3	4	3	4	3	2	3
Location & Directory	1	1	3	4	4	3	3	2	3
User Interface	1	1	3	4	4	4	3	2	3
International Operations	1	1	3	4	3	3	2	2	2
Data Interchange	1	1	3	4	4	3	2	2	3
Data Management	1	1	3	4	4	3	2	2	3
Graphics & Image	1	1	3	4	3	3	2	2	3
Operating System Services	1	1	3	4	3	3	2	2	3
Network Services	1	1	3	4	3	3	2	2	3
Communications Infrastructure	1	1	3	4	3	3	2	2	3

7.5.7 Legal Environment

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
Legal Environment									
Contract Law	2	2	2	2	2	2	2	3	1
Data Protection Law	3	3	4	3	3	3	3	2	2
Procurement Law	3	2	2	2	2	2	2	4	1
Fraud	3	3	3	3	3	3	3	3	1
Commercial Law	3	3	2	2	2	2	3	3	1

7.6 Generic Role and Skills of the Enterprise Architect

Of all the roles listed above, the one that needs particularly detailed analysis and definition is, of course, the central role of enterprise architect. As explained above, “Enterprise Architecture” and “Enterprise Architect” are terms that are very widely used but very poorly defined in industry today, denoting a wide variety of practices and skills applied in a wide variety of architecture domains.

This section therefore explores in some detail the generic characteristics of the role of enterprise architect, and some key skill requirements, whatever the particular architecture domain (Enterprise Architecture, Business Architecture, Data Architecture, Application Architecture, Technology Architecture, etc.).

7.6.1 Generic Role

Enterprise architects are visionaries, coaches, team leaders, business-to-technical liaisons, computer scientists, and industry experts.

The following is effectively a job description for an enterprise architect:

“The architect has a responsibility for ensuring the completeness (fitness-for-purpose) of the architecture, in terms of adequately addressing all the pertinent concerns of its stakeholders; and the integrity of the architecture, in terms of connecting all the various views to each other, satisfactorily reconciling the conflicting concerns of different stakeholders, and showing the trade-offs made in so doing (as between security and performance, for example).”

The choice of which particular architecture views to develop is one of the key decisions that the enterprise architect has to make. The choice has to be constrained by considerations of practicality, and by the principle of fitness-for-purpose (i.e., the architecture should be developed only to the point at which it is fit-for-purpose, and not reiterated *ad infinitum* as an academic exercise). ”

The role of the enterprise architect is more like that of a city planner than that of a building architect, and the product of the enterprise architect is more aptly characterized as a planned community (as opposed to an unconstrained urban sprawl), rather than as a well-designed building or set of buildings.

An enterprise architect does not create the technical vision of the enterprise, but has professional relationships with executives of the enterprise to gather and articulate the technical vision, and to produce the strategic plan for realizing it. This plan is always tied to the business plans of the enterprise, and design decisions are traceable to the business plan.

The strategic plan of the enterprise architect is tied to the architecture governance process for the enterprise, so design decisions are not circumvented for tactical convenience.

The enterprise architect produces documentation of design decisions for application development teams or product implementation teams to execute.

An architect is involved in the entire process; beginning with working with the customer to understand real needs, as opposed to wants, and then throughout the process to translate those needs into capabilities verified to meet the needs. Additionally, the architect may present different models to the customer that communicate how those needs may be met, and is therefore an essential participant in the consultative selling process.

However, the architect is not the builder, and must remain at a level of abstraction necessary to ensure that they do not get in the way of practical implementation.

The following excerpt from *The Art of Systems Architecting* depicts this notion:

"It is the responsibility of the architect to know and concentrate on the critical few details and interfaces that really matter, and not to become overloaded with the rest."

The architect's focus is on understanding what it takes to satisfy the client, where qualitative worth is used more than quantitative measures. The architect uses more inductive skills than the deductive skills of the builder. The architect deals more with guidelines, rather than rules that builders use as a necessity.

It also must be clear that the role of an architect may be performed by an engineer. A goal of this document is to describe the role — what should be done, regardless of who is performing it.

Thus, the role of the architect can be summarized as to:

- **Understand and interpret requirements:** probe for information, listen to information, influence people, facilitate consensus building, synthesize and translate ideas into actionable requirements, articulate those ideas to others. Identify use or purpose, constraints, risks, etc. The architect participates in the discovery and documentation of the customer's business scenarios that are driving the solution. The architect is responsible for requirements understanding and embodies that requirements understanding in the architecture specification.
- **Create a useful model:** take the requirements and develop well-formulated models of the components of the solution, augmenting the models as necessary to fit all of the circumstances. Show multiple views through models to communicate the ideas effectively. The architect is responsible for the overall architecture integrity and maintaining the vision of the offering from an architectural perspective. The architect also ensures leverage opportunities are identified, using building blocks, and is a liaison between the functional groups (especially development and marketing) to ensure that the leverage opportunities are realized. The architect provides and maintains these models as a framework for understanding the domain(s) of development work, guiding what should be done within the organization, or outside the organization. The architect must represent the organization view of the architecture by understanding all the necessary business components.
- **Validate, refine, and expand the model:** verify assumptions, bring in subject matter experts, etc. in order to improve the model and to further define it, adding as necessary new ideas to make the result more flexible and more tightly linked to current and expected requirements. The architect additionally should assess the value of solution-enhancing developments emanating from field work and incorporate these into the architecture models as appropriate.
- **Manage the architecture:** continuously monitor the models and update them as necessary to show changes, additions, and alterations. Represent architecture and issues during development and decision points of the program. The architect is an "agent of change", representing that need for the implementation of the architecture. Through this development cycle, the architect continuously fosters the sharing of customer, architecture, and technical information between organizations.

7.6.2 Characterization in Terms of the Enterprise Continuum

Under certain circumstances, the complexity of a solution may require additional architects to support the architecture effort. The different categories of architects are described below, but as they are architects, they all perform the tasks described above. Any combination of enterprise, enterprise solution, and solution architects may be utilized, as a team. In such cases each member may have a specific focus, if not specific roles and responsibilities, within the phases of the development process. In cases where a team of architects is deemed necessary, a lead enterprise architect should be assigned to manage and lead the team members.

- The **Enterprise Architect** has the responsibility for architectural design and documentation at a landscape and technical reference model level. The Enterprise Architect often leads a group of the Segment Architects and/or Solution Architects related to a given program. The focus of the Enterprise Architect is on enterprise-level business functions required.
- The **Segment Architect** has the responsibility for architectural design and documentation of specific business problems or organizations. A Segment Architect re-uses the output from all other architects, joining detailed technical solutions to the overall architectural landscape. The focus of the Segment Architect is on enterprise-level business solutions in a given domain, such as finance, human resources, sales, etc.
- The **Solution Architect** has the responsibility for architectural design and documentation at a system or subsystem level, such as management or security. A Solution Architect may shield the Enterprise/Segment Architect from the unnecessary details of the systems, products, and/or technologies. The focus of the Solution Architect is on system technology solutions; for example, a component of a solution such as enterprise data warehousing.

7.6.3 Key Characteristics of an Enterprise Architect

7.6.3.1 Skills and Experience in Producing Designs

An enterprise architect must be proficient in the techniques that go into producing designs of complex systems, including requirements discovery and analysis, formulation of solution context, identification of solution alternatives and their assessment, technology selection, and design configuration.

7.6.3.2 Extensive Technical Breadth, with Technical Depth in One or a Few Disciplines

An enterprise architect should possess an extensive technical breadth through experience in the IT industry. This breadth should be in areas of application development and deployment, and in the areas of creation and maintenance of the infrastructure to support the complex application environment. Current IT environments are heterogeneous by nature, and the experienced enterprise architect will have skills across multiple platforms, including distributed systems and traditional mainframe environments. Enterprise architects will have, as a result of their careers, skills in at least one discipline that is considered to be at the level of a subject matter expert.

7.6.3.3 *Method-Driven Approach to Execution*

Enterprise architects approach their job through the consistent use of recognized design methods such as the TOGAF Architecture Development Method (ADM). Enterprise architects should have working knowledge of more than one design method and be comfortable deploying parts of methods appropriate to the situation in which they are working. This should be seen in the body of design work the enterprise architect has produced through repeated successful use of more than one design method. Proficiency in methodology use is in knowing what parts of methods to use in a given situation, and what methods not to use.

7.6.3.4 *Full Project Scope Experience*

While enterprise architects are responsible for design and hand-off of the project to implementors, it is vital that they have experience with all aspects of a project from design through development, testing, implementation, and production. This scope of experience will serve to keep enterprise architects grounded in the notion of fitness-for-purpose and the practical nature of system implementation. The impact of full project scope experience should lead the enterprise architect to make better design decisions, and better inform the trade-offs made in those decisions.

7.6.3.5 *Leadership*

Communication and team building are key to the successful role of the enterprise architect. The mix of good technical skill and the ability to lead are crucial to the job. The enterprise architect should be viewed as a leader in the enterprise by the IT organization, the clients they serve, and management.

7.6.3.6 *Personal and Professional Skills*

The enterprise architect must have strong communications and relationship skills. A major task of the enterprise architect is to communicate complex technical information to all stakeholders of the project, including those who do not have a technical background. Strong negotiation and problem-solving skills are also required. The enterprise architect must work with the project management team to make decisions in a timely manner to keep projects on track.

7.6.3.7 *Skills and Experience in One or More Industries*

Industry skill and experience will make the task of gathering requirements and deciding priorities easier and more effective for the enterprise architect. Enterprise architects must understand the business processes of the enterprise in which they work, and how those processes work with other peer enterprises in the industry. They should also be able to spot key trends and correct flawed processes, giving the IT organization the capability to lead the enterprise, not just respond to requests. The mission of the enterprise architect is strategic technical leadership.

7.7 Conclusions

The TOGAF Architecture Skills Framework provides an assessment of the skills required to deliver a successful enterprise architecture.

It is hoped that the provision of this Architecture Skills Framework will help reduce the time, cost, and risk involved in training, recruiting, and managing IT architecture professionals, and at the same time enable and encourage more organizations to institute an internal IT architecture practice, hopefully based on (or at least leveraging) the role and skill definitions provided.

TOGAF® Certification for People

TOGAF 9.2 Part 1 Practice Test



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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Study Guide

TOGAF 9 Part 1 Practice Test

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CONTENTS

1	Instructions	4
2	Examination.....	4
3	Answers	4
4	Bonus Test.....	17
5	Bonus Answers.....	24

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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 points¹ 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.

2 EXAMINATION

Question:

Which one of the following best describes TOGAF?

- A. A framework and method for architecture development
- B. An architecture pattern
- C. A business model
- D. A method for developing Technology Architectures
- E. A method for IT Governance

Item 2

Question:

Which part of the TOGAF document provides a number of architecture development phases, together with narratives for each phase?

- A. Part I: Introduction
- B. Part II: Architecture Development Method (ADM)
- C. Part III: ADM Guidelines and Techniques
- D. Part IV: Architecture Content Framework
- E. Part V: Enterprise Continuum and Tools

Item 3

Question:

According to TOGAF, 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

¹ Note that this pass mark may differ from the live TOGAF 9 Part 1 Examination. Consult The Open Group certification web site for the latest information on examination pass marks.

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 TOGAF, 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 TOGAF, which of the following is the reason why the first execution of an ADM cycle will be more difficult than later cycles?

- A. Because management is not familiar with the ADM process
- B. Because there are few architecture assets available
- C. Because of lack of governance

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- D. Because of insufficient trained architecture practitioners
- E. 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 TOGAF suggest tracking the changes?

- A. Change control committee
- B. Document checkpoints and journaling
- C. Publish and subscribe system
- D. Version numbers
- E. 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. Strategic Architectures
- B. Foundation Architectures
- C. Industry Architectures
- D. Common Systems Architectures
- E. Organization-Specific Architectures

Item 11

Question:

According to TOGAF, 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. Conceptual Models
- C. Foundation Architectures
- D. Reference Models
- E. 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 organizations' Industry-Specific Architecture
- D. Detailed pricing information about the purchased products
- E. Product 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 Implementation and Migration Plan
- E. 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 TOGAF, 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
- E. relevant to IT architecture

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 TOGAF 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 TOGAF, which of the following best describes why an Architecture Board should be established?

- A. To conduct performance appraisals on the enterprise architecture team
- B. To conduct source code design reviews
- C. To ensure that new systems are introduced in a managed change process
- D. To facilitate the adoption of advanced technologies
- E. To oversee the implementation of the governance strategy

Item 30

Question:

TOGAF 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 does TOGAF Part VII recommend defines the structure of the organization's Architecture Repository?

- A. Application Architecture
- B. Business Architecture
- C. Data Architecture
- D. Preliminary Phase
- E. Technology Architecture

Item 33

Question:

Views and 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. A view is the perspective of an individual stakeholder
- B. A viewpoint is the perspective of an individual stakeholder
- C. Different stakeholders always share the same views
- D. Different stakeholders always share the same viewpoints

Item 34

Question:

Stakeholders and their concerns are key concepts in TOGAF. Which one of the following statements is false?

- A. Concerns are key interests that are crucially important to 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 TOGAF 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 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 ANSWERS

Item 1 A

This is the best answer. TOGAF 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 B

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 TOGAF, as well as the IT industry at large, that could be leveraged in support of the effort.

Item 9 D

Output is generated throughout the ADM process, and output in an early phase may be modified in a later phase. TOGAF 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 E

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 E

The Solutions Continuum defines what is available in the organizational environment as re-usable Solution Building Blocks (SBBs).

Item 13 E

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 E

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

TOGAF 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 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 key interests that are crucially important to the stakeholders in the system, 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

TOGAF 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

TOGAF 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 twenty-four 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 16 or more points out of a maximum of 24 to pass this test.

Item 41

Question:

Which section of the TOGAF document describes the processes, skills and roles to establish and operate an architecture function within an enterprise?

- A. Part II: Architecture Development Method
- B. Part III: ADM Guidelines and Techniques
- C. Part IV: Architecture Content Framework
- D. Part VI: TOGAF Reference Models
- E. Part VII: Architecture Capability Framework

Question 42

Question:

Complete the sentence. To promote effective architectural activity within the enterprise, TOGAF 9 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 TOGAF, 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 document 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
- E. TOGAF Reference Models

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
- E. The Technical Reference Model provides a direct mapping to the Zachman Framework

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. An evaluation tool to select vendors to conduct a proof of concept demonstration
- C. To calculate detailed cost estimates
- D. To project plan the implementation activities
- E. 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 on-going 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 analysis is outside the scope of enterprise architecture projects
- D. Risk is pervasive in all enterprise architecture activity and should be managed in all phases of the ADM
- E. 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 TOGAF, 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
- E. The program management office

Item 57

Question:

Which one of the following is documented in TOGAF Part VII as a guideline for how to establish an Enterprise Architecture Capability?

- 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
- E. Semantic Web

Item 61

Question:

According to TOGAF, 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 the 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

5 BONUS ANSWERS

Item 41 E

Part VII: 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 TOGAF, 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

TOGAF 9 Part III contains a collection of guidelines and techniques for use in applying TOGAF 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 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 E

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

TOGAF 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 D

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

TOGAF Part VII recommends applying the ADM with the specific Architecture Vision to establish an enterprise architecture capability 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

The main components of the Architecture Repository are the Architecture Metamodel, Architecture Capability, Architecture Landscape, SIB, Reference Library, and Governance Log.

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.

TOGAF® Certification for People

TOGAF 9.2 Part 2 Practice Test



This Practice Test is representative of the content covered in the TOGAF 9 Part 2 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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TOGAF 9 Part 2 Practice Test

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CONTENTS

1.	Instructions	4
Examination		5
1.1	Question 1.....	5
1.2	Question 2.....	6
1.3	Question 3.....	7
1.4	Question 4.....	8
1.5	Question 5.....	10
1.6	Question 6.....	11
1.7	Question 7.....	12
1.8	Question 8.....	14
2.	Answers	16

1. INSTRUCTIONS

This Practice Test is an open book test. The permitted reference text is the TOGAF 9 specification¹.

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 TOGAF 9 while taking this test.

Please note that when taking the examination at a **Pearson Vue** test center that a pdf version of TOGAF 9 is provided built into the test and available on the REFERENCE button.

If you are taking the examination with an Accredited TOGAF Training Course Provider then they will provide instructions as how to access a copy of TOGAF 9.

¹ This version of this Practice test can be used with either TOGAF 9 or TOGAF 9.1.

EXAMINATION

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 TOGAF 9, 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 or more out of a maximum of 40 points (70%).

1.1 Question 1

SCENARIO 1:

You are serving as the Lead Architect in a multinational 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 TOGAF 9 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 TOGAF 9, which of the following is the best answer?

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Answers

- A. You recommend that a Risk Aversion Assessment be conducted in the Implementation Governance phase to determine the implementation organization's degree of risk aversion with regard to the proposed business transformation. 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.

1.2 Question 2

SCENARIO 2:

You are serving as a consultant to the Chief Architect of 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 TOGAF 9 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.

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 TOGAF 9, 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. You would identify the most relevant 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 to ensure they are aware of the key features of the architecture and have the opportunity to comment.
- C. You would conduct a pilot project in Phase A to demonstrate to the stakeholders the technical feasibility of the approaches that are available from your preferred suppliers. 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 Atlas Airlines 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 viewpoints for each stakeholder and validate that their concerns are being addressed.

1.3 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 TOGAF 9 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 TOGAF 9, which of the following is the best answer?

Answers

A. You recommend that the EA team leverage all of the existing projects and their deliverables to address the findings from the gap analysis results for the architecture domains. The EA 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.

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 EA 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.

1.4 Question 4

SCENARIO 4:

You are working as the Lead Enterprise Architecture 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 TOGAF 9 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 TOGAF 9, Chapter 23. The CIO has highlighted the importance of adhering to the following principles:

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- 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 TOGAF 9, 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/Data² matrix, and Data Security diagram.

Describe the Application Architecture with an Interface catalog.

Describe the Technology Architecture with a Network 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 Communications Engineering 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.

² This artifact is named the System/Data matrix in TOGAF 9

Describe the Technology Architecture with a Network 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 Network Computing/Hardware diagram.

1.5 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 TOGAF 9 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 TOGAF 9, which of the following is the best answer?

Answers

A. You work with the Architecture Board to develop and tailor TOGAF 9, 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 TOGAF 9 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.

1.6 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 TOGAF 9, 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 secretariat for circulation before the 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 GANT 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 EA 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 EA work.

1.7 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 recently adopted TOGAF 9 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 TOGAF 9, 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 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.

1.8 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.

TOGAF 9 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 TOGAF 9, 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.

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. 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. The checklists that the team has prepared for the interviews should be reviewed to ensure they meet the criteria for the program and the business objectives. The responses to the interviews should be compiled into a formal report.

2. ANSWERS

Question 1

Topic:	TOGAF 9: Risk Assessment	
Scenario	1	
Subjects	15.4, 31.7-1	
Rationale	It is important that the candidate understand 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	TOGAF 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. There is no such thing as a Risk Aversion Assessment in TOGAF. Putting in place a parallel solution would seem excessive and have its own risks.

Question 2

Topic		TOGAF 9: Stakeholder Analysis
Scenario		2
Subjects		24-1
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 TOGAF 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 TOGAF 9 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. TOGAF 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.

Question 3

Topic		TOGAF 9 Level 2: ADM Phases Architecture Definition; Phase E: Opportunities and Solutions
Scenario		3
Subjects		13.*
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 architecture. 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.

Question 4

Topic		TOGAF 9: Artifact Selection
Scenario		4
Subjects		35, 19
Rationale		This question tests the ability of the candidate to reference TOGAF 9 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 ³ matrix address concern 2 (the sharing of data). The Data Security diagram and Network 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 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.

³ This artifact is named the System/Data matrix in TOGAF 9

Question 5

Topic		TOGAF 9: ADM Preliminary Phase
Scenario		5
Subjects		6.4-1
Rationale		This question checks that the candidate understands that TOGAF 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.

Question 6

Topic	TOGAF 9 Level 2: ADM Phases Architecture Definition Phase F: Migration Planning	
Scenario	6	
Subjects	14.*, 28.*	
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 TOGAF is to provide detailed guidance to the projects so that they can focus on operational design issues rather than strategic ones.

Question 7

Topic	TOGAF 9 Level 2 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 the 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>

Question 8

Topic		TOGAF 9: Conducting Compliance Reviews
Scenario		8
Subjects		15.4, 48.6
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 EA 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.
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.

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.

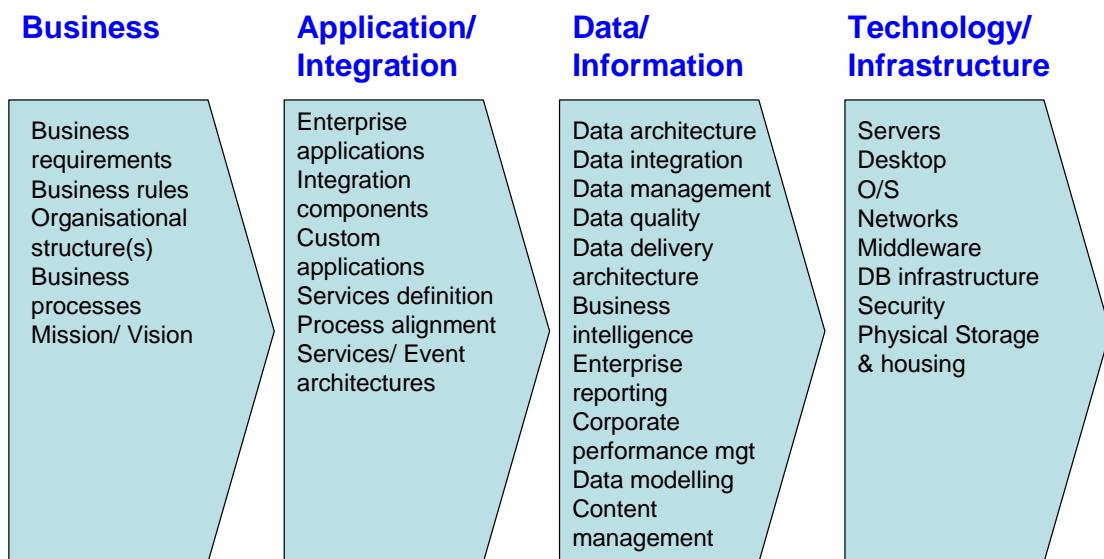
TOGAF Architecture Domains

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

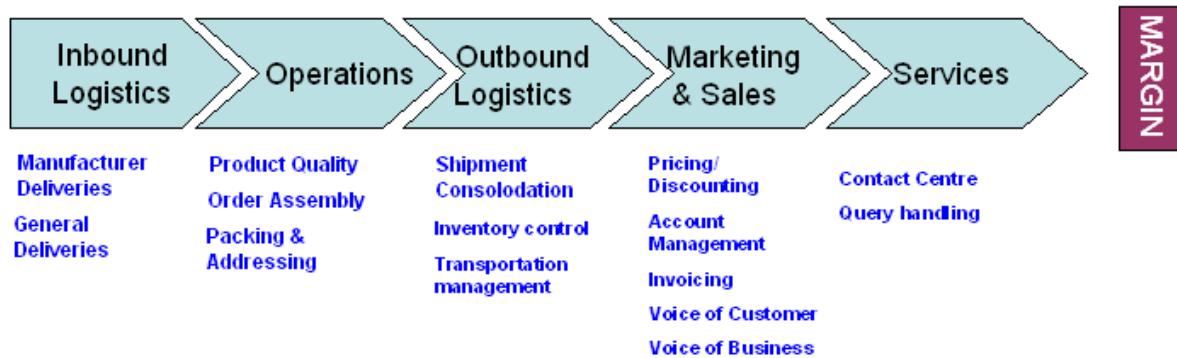
Value Chain Analysis was first described by Michael Porter in his 1985 book *Competitive Advantage* so it has been around for some time and is well understood by Senior Managers, as such you will probably use the VCA diagram as part of your Views for CxOs.

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
Inbound logistics	All those activities concerned with receiving and storing externally sourced materials
Operations	The manufacture of products and services - the way in which resource inputs (e.g. materials) are converted to outputs (e.g. products)
Outbound logistics	All those activities associated with getting finished goods and services to buyers
Marketing and sales	Essentially an information activity - informing buyers and consumers about products and services (benefits, use, price etc.)
Services	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
Procurement	This concerns how resources are acquired for a business (e.g. sourcing and negotiating with materials suppliers)
Human Resource Management	Those activities concerned with recruiting, developing, motivating and rewarding the workforce of a business
Technology Development	Activities concerned with managing information processing and the development and protection of "knowledge" in a business
Infrastructure	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

Use Case

Use Case Diagram

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Changes

Simplification Change	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
Incremental Change	A change driven by a requirement to derive additional value from the existing investment
re-architecting change	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

Strategic	Long term summary view of entire enterprise
Segment	More detailed operating models for areas within the enterprise
Capability	more details showing how an enterprise can support a particular capability