AYMAN AMER
TOGAF 9.2®, OCEB®, PMP®, SIX SIGMA®

TOGAF 9.2
SUMMARY

How to Pass TOGAF Exam in 3 Days

TOGAF FINAL SUMMARY

1- ADM

1-1-Preliminary Phase:

Objectives:

- Determine Architecture Capabilities (Context – Scope – Framework – Maturity assessment)
- Establish Architecture Capability (Organization Model – Governance – Tools – Principles)
- Architecture Principles
- Business Principles, goals, and drivers
- Tailor TOGAF framework with other frameworks
- Request for Architecture Work

Inputs:

- Reference Material External to the enterprise (TOGAF – Zachman – DODAF - ..)
- Non - Architecture Inputs (Board strategy – Business strategy – IT strategy – Business Principles - …)
- Architecture Inputs (Organization Model for Enterprise Architecture)

Steps: (6)

1- Scope the enterprise organization Impacted:

    a. Core → Most affected and most value
    b. Soft → Not directly affected – see the changes – work with core unit
    c. Extended → Outside the scoped enterprise and affected in their own Arch.
    d. Communities → Stakeholders who will be affected (Customers)
    e. Governance → Legal frameworks and geographic

2- Confirm Governance and Support Frameworks:

    a. Determine how the architecture document and material is brought under governance and how to adhere changes
    b. Assess the current Governance Model

3- Define and Establish the Architecture team:

    a. Determine the existing enterprise and business capability
    b. Conduct Maturity assessment (Factors and weights)
    c. Identify Gaps
    d. Allocate Roles and Responsibilities (RACI Diagram)
    e. Request for change for existing project:

      i. Inform for stakeholder requirements

      ii. Request assessment of impact and of interest

      iii. Identify any critical differences and conflicts of interest

      iv. Produce request for change for stakeholder activities

  f. Determine constraints

  g. Review and agree with sponsors and board

  h. Assess budget requirements

4- Identify and Establish Architecture Principles:

- Architecture principles are general rules and guidelines that inform the ways in which organization fulfills its mission

- Architecture Principles are developed by (Enterprise Architects and stakeholders) and Approved by (Architecture Board)

- Architecture Principles are influenced by:

  - Mission – Strategies – Constraints – Current system and technology – Market factors – quality management – Computer Industry trend - ..)

- Using the principles:

  - Decision making
  - Product selection
  - Support business strategies and goals
  - Provide values
  - Provide key tasks, resources, and potential costs
  - Support the Architecture governance

- Each principle must be considered in the context of "All other things being equal"

- Violation of principles generally cause operational problems (No penalties)

- Principles Catalog:

Name	
Statement	
Rational	
Implications	
Mandatory	

- Quality of Principles (URCCS)

  - Understandable – Robust (Solid) – Complete – Consistence - Stable)

5- Tailor TOGAF with other selected frameworks:

- Terminology tailoring (Glossary)
- Process tailoring (Touch points)
- Content tailoring (Architecture content framework – deliverables)

6- Implement Architecture Tools:

Outputs: (7)

1- Organization Model for Enterprise Architecture:

(Scope → Maturity assessment → Roles and Responsibilities → Constraints → Budget → Governance)

2- Tailored Architecture Framework (Method – content – deployed tools)

3- Architecture repository (Architecture framework – Standard Information Based (SIB) – Reference Architecture – Governance log)

4- Business principles, Drivers, and goals

5- Architecture Governance Framework

6- Architecture Principles

7- Request for Architecture Work: (from sponsoring to architecture organization)

Output of (Preliminary phase – result of approved architecture change request – from migration planning)

- Organization Sponsors
- Organization's mission
- Business goals and success criteria
- Business drivers (Change in business environment)
- Strategic plans and the business (SMART)
- Time limits
- Organizational Constraints, External Constraints, Business Constraints
- Budget information, financial constraints
- Current business system, IT description
- Resource available
- ❖ The Interoperability:

    It is the ability to share information and services

    - Enterprise Operating Model:

        It drives the design of the foundation of execution (Delivering goods and services to the customers)

- Degrees of Interoperability:
  - Unstructured data exchange → Free data
  - Structured data exchange → Manual or automated or message
  - Seamless data exchange → Automated sharing based on common exchange model
  - Seamless sharing of information → Internet

❖ **Capability Based-Planning (CBP): (Top – Down approach) focus on business outcomes rather than technical deliverables**

Vision should be derived by the corporate strategic direction

It frames all phases of the architecture development in the context of business outcomes, clearly linking the IT vision, ABB & SBBs, and the implementation and migration plans with the corporate strategic, business, and line of business plan

Scenario analysis → What do we need to be able to do → What capabilities → Plan

❖ **Architecture Maturity Level: (Capability Maturity Model) (CMM)**

- Used to improve process of organization
- Organize practices into levels, every level representing an increased ability to control and manage the development environment
- The main issues addressed by this model:
  - Process implementation and audit
  - Quality measurements
  - People competencies
  - Investment management
- Maturity levels:
  - Non → no EA (Architecture process)
  - Initial → Informal EA process (Architecture development)
  - Under development → (Business linkage – Scenario management)
  - Defined → (Operating – Architecture communication)
  - Managed → Mange and measured (IT security and governance)
  - Measured → Continuous improvement
- Capability Maturity Models:
  - IPD -CMM (Integrated Product Development)
  - SA-CMM (Software Acquisition)
  - P-CMM (People)
  - SE-CMM (System Engineering

Catalogs → Principles Catalo

1-2-Architecture Vision Phase:

Objectives:

- Develop a high-level vision of the capabilities and business value
- Define the scope and constraints
- Define and manage stakeholders
- Create the communication plan
- Perform capability assessment
- Create statement of Architecture work & obtain approval for it

Inputs:

- Populated Architecture repository
- Organization model for Enterprise Architecture
- Request for Architecture work
- Tailored Architecture Framework
- Business principles, business goals, and business drivers

Steps: (11)

1	2	3	4	5	6	7	8	9	10	11
Arch. Project	Stakeholder	Business Principles, Goals and drivers	Capability	Readiness	Scope	Arch. Principles	Arch. Vision	KPI	Risk	Statement of Arch. Work

1- Establish the Architecture Project:

- Endorsement by corporate management
- Provide how this project relates to other frameworks

2- Identify stakeholders, Concerns, and business requirements:

Stakeholder → Anyone who is impacted by and/or have an interest in the outcome of an Enterprise initiatives

Stakeholder communication and management are the key function to Enterprise Architecture

❖ **Stakeholder engagement for:**

- Identify vision - Identify scope boundaries - Identify stakeholder concerns

- **Concerns, Views and Viewpoints:**
  - o **Concerns** → Interests in a system relevant to one or more of its stakeholders They may pertain to any aspects of the system's functioning, development, or operation, including consideration such as performance, security, and reliability.
  - o **Architecture View** → It is representation of a system from the perspective of a related set of concerns
  - o **Architecture viewpoint** → It is a specification of the conventions for a particular kind of Architecture view, it represents and angle or a perspective, it is expressed and articulated through views
  - o Views represent the Architecture from a given viewpoint, and realize the Architecture representations that are tailored to a target audience

	View (Finance)	View (Operation)
Concern (CEO)	Viewpoint (Model kind)	Viewpoint
Concern (Engineer)	Viewpoint	Viewpoint
Concern (Customer)	Viewpoint	Viewpoint
	Create a Model	Create a Model

❖ **Stakeholder Management:**

A- <u>Benefits of stakeholder management:</u>

For Architecture	For the Team
▪ Shape the Architecture ▪ More resources	▪ Fully understand the Architecture process ▪ Effectively reactions to the Arch. Models and reports ▪ Resolving the issues and conflecting

B- <u>Creation of Stakeholder maps steps:</u>

Identify stakeholder → Sample stakeholder anaylsis → Classify stakeholder → Determine management stakeholder approach → Tailor engagement deliverables

1- Identify Stakeholders:

Who gains, who lose / Who control change management / Who design new system / Who will make decisions / Who control resources

2- Sample stakeholder analysis:

Five board categories (Corporate Functions – System operation – Project organization – End-user Organization – External)

22 types

3- Classify Stakeholder Positions:

Assess the readiness of each stakeholder to behave in a supportive manner

High – medium – Low

4- Determine Stakeholder Management Approach:

Power / Interest Matrix

Power	High	Keep Satisfied (C)	Key Players (D)
	Low	Minimal Effort (A)	Keep Informed (B)
		Low	High
		Interest	

5- Tailor Engagement Deliverables: (Stakeholder Map Matrices)

Identify catalogs, metrices, and diagrams that the architecture engagement needs to produce and validate with each stakeholder group

Stakeholder	Involvement	Class	Power	Level of Interest	Concerns	Communication plan	Viewpoints / Relevant Artifact
		Keep satisfied Keep Informed	High Medium Low	High Medium Low			

3- Confirm and Elaborate Business Goals, Business Drivers, and Constraints:

4- Evaluate Business Capabilities: Spider Model

Enterprise Capability Assessment

- Any gaps identified in the Architecture Capability will require iteration between Architecture Vision and Preliminary Phase to ensure that the Architecture Capability is suitable to address the scope of the Architecture Project

- Capability Based Planning:
  o It ensures that the corporate strategic plan drives the enterprise from a to-down approach
  o It focuses on delivery of busines outcomes rather than technical deliverables
  o Phase A, B, C and D → Develop Architecture

- o Phase E → Deliver Capabilities
- o It is recommended to break a capability into capability increments driving the transition Architecture in the Phase (E)

- **Business Capability Assessment:**
- Baseline state assessment of the performance level of each capability
- Future state for performance level
- Baseline of capability is realized
- Future of capability should be realized
- Impacts to the business organization

- **IT Capability Assessment:**
- Baseline and Target maturity level of the change process
- Baseline and Target maturity level of operational process
- Baseline capability and capacity assessment
- Impacts to IT organization

- **Architecture Maturity Assessment:**
- Architecture Governance process, organization, roles, and responsibilities
- Architecture skills assessment
- Breadth depth, and quality of landscape, standard definition, and reference model
- Assessment of re-use potential

5- Assess Readiness for Business Transformation:

- Evaluate and qualify the organization's readiness to undergo a change
- Joint between corporate staff, lined of business, and IT planners
- The readiness factors must be determined and presented using maturity model
- The risks for each readiness factor should be assessed and improvement actions to mitigate the risk identified
- Documented into Capability Assessment
  A- Readiness factors:

Vision	Desire	Need	Business Case (Benefits)	Funding	Sponsoring and leadership
Governance	Accountability	IT capacity	Workable approach	Enterprise capacity	Enterprise ability to implement

B- Present the readiness factors: (Maturity level)
- Each factor is converted into maturity model

C- Assess the readiness factors:

- Readiness factor vision:

    The factors should be assessed with respect to its base state and then its target state (Maturity level and models)

- Readiness factor rating:

    o Urgency or not

    o Readiness status (Low – Fair – Acceptable – Good – High)

    o Degree of difficulty to fix (No action needed – Easy – Moderate – Difficult)

- Readiness factor risks and actions:
    Newly identified actions should be formally incorporated into the emerging implementation and migration plan

D- Readiness and migration planning:

- The assessment exercise will be a key input into the strategic migration planning that will be defined in phase (E) and completed in phase (F)
- The readiness factors will have to be continuously monitored in phase (G)

6- Define Scope:

- Breadth of coverage
- Level of details
- The partitioning characteristics
- The specific architecture domains to be covered
- Schedule the project milestones

7- Confirm and elaborate Architecture principles, including business principles:

8- Develop Architecture Vision:

Create a high level of the baseline and target architecture

Business scenario are an appropriate technique to discover and document business requirements, and to produce Architecture vision:

1- Identify, document, and rank the problem

2- Document the business and technical environment where the problem is occurring

3- Identify and document the desire objectives

4- Identify human actors

5- Identify computer actors

6- Identify roles and responsibilities

7- Check for fitness for purpose of inspiring architecture work

9- Define the Target Architecture Value proposition and KPIs:

- Develop the business case for the architecture and changes required
- Produce the value proposition for each group of the stakeholders
- Assess and define the procurement requirements
- Review and agree on the value proposition with the sponsor
- Define the performance metrics
- Assess the business risk

10- Identify the Business Transformation Risks and Migration Activities:

- Initial level of risks: prior to implementation
- Residual level of risks: After to implementation

Risk classification → Risk identification → Initial risk assessment → Risk mitigation → Risk monitoring

1- Risk classification:

(Time, cost, scope,…)

2- Risk identification:

- o Transformation readiness
- o Capability Maturity Model (CMM)

3- Initial risk assessment:

Effect	Frequently				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic (ROI)	E	E	H	H	M
Critical	E	H	H	M	L
Managerial	H	M	M	L	L
Negligible	M	L	L	L	L

E → Extremely High   H → High   M → Medium   L → Low

4- Risk Mitigation and residual risk assessment:

5- Risk monitoring and governance:

- o The residual risk have to be approved by the IT governance framework and business acceptance
- o Kept up to date in phase (G)

Outputs: (9)

1- Statement of Architecture Work: (Form the basis for a contractual agreement)

- Title
- Architecture Project request and background
- Architecture project description and scope
- Overview of Architecture vision
- Strategic alignment
- Objectives and scope (Objectives / Business requirements / Solution concept diagram → Highlight the most important aspects of the target Arch., showing how requirements are derived in achieving business objectives)
- Change of scope procedures
- Roles and responsibilities (Governance structure/ Project process/ RACI)
- Architecture approach
- Relevant methodology and industry standards
- Support the Enterprise continuum
- Work plan and schedule
- Approvals and sign off (Consensus) (Sponsor)

2- Communication Plan:

- Stakeholder communication requirements (Group – Name – Information need)
- Communication Matrix

Info need	Purpose of communication	Provider of information	Where is information collected	How is information collected	Output (Report)

- Delivery vehicle (Email – verbal – meeting – memo)

3- Capability Assessment: (Living documentation)
4- Architecture Vision
5- Refined statement of business principles, business goals, and business drivers
6- Architecture principles
7- Tailored Architecture framework
8- Architecture repository
9- Draft Architecture Definition document (V.01)

Matrix → Stakeholder Map

Diagrams → Value chain / Solution concept

1-3-Business Architecture Phase:

Objectives:

- This document packages the baseline of business architecture
- Develop the target business architecture to achieve the business goals, and respond to the strategic drivers set out in the architecture vision
- Perform gap analysis
- Identify Candidate Architecture Roadmap

Inputs:

- Architecture reference materials (Architecture Repository)
- Request for Architecture Work
- Business principles, business goals, and business drivers
- Capability assessment
- Architecture principles
- Communication plan
- Tailored Architecture Framework
- Approved statement of Architecture work
- Organization model for Enterprise Architecture
- Draft Architecture definition document

Steps: (9)

1	1.1. Determine overall modeling process	2	3	4	5	6	7	8	9
Select Reference Models, Viewpoints and Tools	1.2. Identify required service granularity level	Develop baseline	Develop Target	Perform Gap analysis	Define candidate roadmap	Resolve impact	Conduct formal stakeholder review	Finalize the business Arch.	Create Arch. Definition Document
	1.3. Identify required catalog, matrices, and diagrams								
	1.4. Identify types of requirement to be collected								

1- Select Reference Models, viewpoints, and Tools:

- Select relevant business Architecture repository
- Select relevant business Architecture Viewpoints
- Identify appropriate tools and techniques to be used

1.1. Determine overall modeling process:

- Using Business Scenario to articulate the business capabilities, organization structure, and value stream.
- Business Scenario: (Iterative process)

	Gather	Analyze	Review
1- Problem			
2- Environment			
3- Objectives (SMART)			
4- Human Actors			
5- Computer Actors			
6- Roles and responsibilities			
7- Refine			

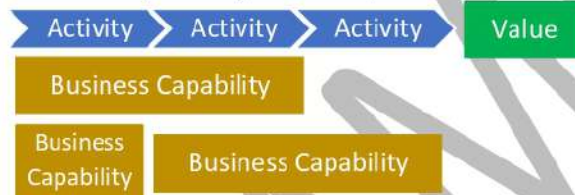### A- Applying Business Capabilities: (Capability Mapping)

- o Defining Business Capabilities (Name and description)
- o Components of Business Capabilities (Roles / Process / Info/ Tools)
- o Business Capability Model (Top Down)
  - Organization Structure
  - Structuring Business capability model
  - 1- Top tier → Related to strategy
  - 2- Middle tire → Customer
  - 3- Bottom tire → Supporting
  - Leveling
  - Mapping Business Capability to other business perspectives:
  - a- Heat mapping

(Top Tire) Strategic	Need immediate attention			
(Middle Tire) Core				
	Have some issues (Lower priority)			
(Bottom Tire) Support		New capability		

b- Relationship mapping: (Value stream/ Organization)

- Capability / Value stream:

Which capability are required to deliver value

Activity	Activity	Activity	Value

Business Capability

Business Capability   Business Capability

- Capability / Organization:

Capabilities across organization

	Organization unites		
Capabilities	HR	Finance	IT
Capability 1			
Capability 2			

B- Applying Organization Map: (Enterprise Eco system)

Stakeholders group and the relationship between organization entities

C- Applying Value Stream: (Value Stream Mapping)

Value Chain	Economy value perspective (primary and support activities to create value)
Value Network	Identify participants involved in creating and delivering value
Lean Value stream	Business process to produce and deliver services to the customer in function of Time. Identify opportunities for waste reduction
The business Architecture value stream	End – to – End collection of value adding activities from one stage to the next and create an overall result for a customer, stakeholder, or end-user

- Value stream Mapping Scenario:

    1- Define value stream (Name – Description – Stakeholder – Value)

    2- Decompose Value Stream into sequence of value stages (Name – Description – Stakeholder – Entrance criteria – Exit criteria – value item)

    3- Heat mapping scenario (with business capabilities)

D- Structure Analysis: (Business Functions / Organization units)
E- Use-Case Analysis: (Business Functions / Actors)
F- Process Modeling: (Business Services / Processes)

1.2. Identify Required Service Granularity Level, boundaries and constraints:

- ❖ Micro – Level → Boundaries – No Governance (Just process) (Sending monthly invoices)
- ❖ Services → Boundaries & Governance (Customer wants Website)
- ❖ Macro – Level → No Boundaries – Governance (HR functions)

1.3. Identify Required Catalogs, Matrices, and Diagrams:

Catalogs (10)	Matrices (5)	Diagrams (13)
Core Assets and decomposition of Building Blocks (BBs)	Core relationships between related model	Present the information (Viewpoints)
1- Value stream	1- Capability / Value stream	1- Value stream map
2- Value stream stages	2- Capability / Organization	2- Organization map
3- Business capabilities	3- Capability / Strategy	3- Business capability map
4- Organization / Actor	4- Business interaction matrix	4- Business model diagram
5- Business services / functions	5- Role/Actor matrix (RACI)	5- Process flow diagram
6- Role Catalog		6- Business footprint diagram (Links between goals/ process/ functions)
7- Drivers, goals, and objectives		7- Product life cycle diagram (development – interaction – Growth – Maturing – Decline)
8- Control/Event/Product/Process		8- Goals, objectives, services
9- Location Catalog		9- Event diagram
10- Contract /Measure Catalog		10- Business/ services info
		11- Function decomposition
		12- Organization decomposition
		13- Business use-case diagram

1.4. Identify types of requirements to be collected:

Any requirements or change in requirements that is outside the scope defined in the statement of architecture work must be submitted to the requirements repository for management through the governed requirements management process

2- Develop baseline Business Architecture: (Support Target Arch.)

Conceptual →

- Business function
- Business services (Artifact – security – organization structure – user roles)

Logical →

- Actors / Roles
- Process
- Principles

Physical →

- Process / Location
- Role / Actor Location
- Physical organization model
- Physical business components (RACI)

3- Develop Target Business Architecture: (Support Arch. Vision)

Conceptual →

- Business function
- Business services (Artifact – security – organization structure – roles – Capability – Governance)

Logical →

- Actors / Roles
- Process (business process – process mapped to (Environment / people) – Information flow – Process view)
- Principles

Physical →

- Process / Location
- Role / Actor Location
- Physical organization model
- Physical business components (RACI)

Activity model: BPM

Describe the functions associated with activities, the data/information exchanged between activities and with other activities

One technique for creating BPM is (IDEF) (Integrated Computer Aided Manufacturing (ICAM) DEFinition) modeling techinque

4- Perform GAP analysis:
1- Verify the Architecture model for internal consistency and accuracy
2- Perform trade-off analysis to resolve conflicts
3- Check the model support the goals, principles, and constraints
4- Test Architecture models against requirements
5- Identify Gaps between baseline and target using gap analysis techniques

❖ Business domain gaps:
   o People - Process – Tools – Information – Measurement – Financial – Facilities

Baseline ╲ Target	BBs1	BBs2	BBs4	Eliminated BBs
BBs1	Included			
BBs2				
BBs3				Eliminated
New		Enhanced	Developed	

5- Define Candidate Roadmap Components:
List of work packages that will realize the Target Architecture on a timeline
Highlight the value at each stage
Incremental development
The work packages (Programs – Projects – Tasks)
1- Work packages portfolio:
A-List:

Name	Description	Function	Dependencies between work packages	Relationships	Value	Cost

B- Objectives
C- Benefits
D- Prioritized of impacted
2- Implementation factor assessment and deduction matrix:
(Risks – issue – Assumptions – Actions – Dependencies – Inputs)
3- Consolidation Gap, solutions, and dependencies matrix:
4- Time oriented Migration plan
5- Recommendations

6- Resolve impact Across the Architecture Landscape:
• Impacted on Any pre-existing Arch. / on other projects
• Impacted by any other projects
• Re-use work in any other organization areas

7- Conduct formal stakeholder review:
Check the original motivation for the architecture project and statement against the proposed business architecture.

8- Finalize the Business Architecture:
1- Select standards for each of the building blocks, reusing as much as possible from the reference models selected from the Architecture repository
2- Fully document each building blocks
3- Conduct a final cross-check of all architecture against business goals
4- Document the rationale for building block decisions in the Architecture document
5- Document the final requirements traceability report
6- Document the final mapping of the Architecture within the Arch. repository

9- Create the Architecture Definition Document:

Outputs:

- Update:
  - Statement of Architecture work
  - Architecture principles and business principles
  - **Architecture definition document: (Qualitative view of the solution)**
    - Scope – Goals, objectives, and drivers – Principles – Baseline Arch. – Arch. Models – Mapping to Arch. Repository – Gap – Impact assessment
    - Business Architecture components:
      Baseline and target – organization structure – business goals, objectives, and drivers – business functions – business services – business process – business roles – business data model
- New:
  - **Architecture requirement specifications: (Quantitative view of the solutions)**
    - Architecture requirements (Domain requirements – Interoperability – Assumptions – Constraints – Success measures)
    - Service Contract (Business – Application)
    - Implementation (Guidelines – specifications – standards)

  - Architecture Roadmap

Main of Business Principles
1- Maximize benefits to the Enterprise
2- Information management is everyone's business
3- Business continuity
4- Common use application (Similar)
5- Service orientation (Real world business activities)
6- Compliance with law
7- IT responsibility
8- Protection of intellectual property

1-4-Information Architecture Phase: (Data and Application)

Objectives:

- This document packages the baseline of data and information architecture
- Develop the target data and information architecture to enable business Architecture and Architecture vision
- Perform gap analysis
- Identify Candidate Architecture Roadmap

Inputs:

- Architecture reference materials (Architecture Repository)
- Request for Architecture Work
- Data and application principles
- Capability assessment
- Architecture vision
- Communication plan
- Tailored Architecture Framework
- Approved statement of Architecture work
- Organization model for Enterprise Architecture
- Draft Architecture definition document
- Draft Architecture requirements specification

Steps: (9)

1	1.1. Determine overall modeling process	2	3	4	5	6	7	8	9
Select Reference Models, Viewpoints and Tools	1.2. Identify required catalog, matrices, and diagrams 1.3. Identify types of requirement to be collected	Develop baseline	Develop Target	Perform Gap analysis	Define candidate roadmap	Resolve impact	Conduct formal stakeholder review	Finalize the business Arch.	Create Arch. Definition Document

1- Select Reference Models, viewpoints, and Tools:

- Review and validate the set of data and application principles
- Select relevant data and application architecture resources (Reference models, patterns) on the basis of the business drivers, stakeholders, concerns, and business architecture
- Select relevant data and application architecture viewpoints
- Identify appropriate tools and techniques.

1.1. Determine overall modeling process:

For Data	For Application
1- Collect data related from Application and business architecture 2- Rationalize data requirements 3- Update the develop matrices and relating data to the business services and functions 4- Elaborate Data Arch. Views (Created/ Distributed, Migrated, Secured, Archived) (C-D-M-S-A)	1- List of applications components 2- Decompose applications 3- Removing duplicated functionality 4- Identify logical and physical applications 5- Develop matrices relating to business services and functions 6- Elaborate application Arch. Views (Function / Capturing / Integration / Migration / Development / Operational)

1.2. Identify required Catalog, Matrices, and Diagrams:

FOR DATA		
Catalogs (1)	Matrices (2)	Diagrams (6)
Logical data component / Physical data component / Data Entity (Core)	How data is created, maintained, transformed, and passed to Apps	Relationship between data entity and their attributes Data modified and extended over time
1- Data Entity / Data component catalog	1- Data entity / Business Functions 2- Data / Applications	1- Conceptual data diagram (Entity relationship model (ERD)) data and information relationship 2- Logical data diagram 3- Data dissemination diagram (Data entity / business services / application components) 4- Data security diagram (CRUD) (Create / Read / Update / Delete) 5- Data migration diagram 6- Data lifecycle diagram

FOR APPLICATION		
Catalogs (2)	Matrices (4)	Diagrams (8)
Logical application components (Core)/ Physical application components / Information system services	Relationships between related models	How the application should be best structured to meet its requirements
1- Application portfolio catalog 2- Interface catalog (Interface between applications) Logical and physical application component map	1- Application / Function 2- Application / Role 3- Application / Organization 4- Application interaction matrix	1- Application communication (Between app components) 2- Application user location 3- Use case diagram (Actor and applications) 4- Enterprise Manageability diagram (Management and Applications) 5- System process diagram 6- Software engineering diagram (Management and Developers) 7- Software distribution diagram 8- Application Migration diagram

1.3. Identify types of requirements to be collected:

- The requirements may:
  o Related to the domain
  o Provide requirements input to other phases
  o Provide details guidance to be reflected during design and implementation of solutions architecture

2- Develop baseline Data and Application Architecture: (Support Target Arch.)

    Conceptual – Logical – Physical

3- Develop Target Data and Application Architecture: (Support Target Arch.)
    Conceptual – Logical – Physical – Cross reference

4- Perform GAP analysis:
  6- Verify the Architecture model for internal consistency and accuracy
  7- Perform trade-off analysis to resolve conflicts
  8- Check the model support the goals, principles, and constraints
  9- Test Architecture models against requirements
  10- Identify Gaps between baseline and target using gap analysis techniques

5- Define Candidate Roadmap Components:
  List of work packages that will realize the Target Architecture on a timeline
  Highlight the value at each stage
  Incremental development
  The work packages (Programs – Projects – Tasks)

6- Resolve impact Across the Architecture Landscape:
  - Impacted on Any pre-existing Arch. / on other projects
  - Impacted by any other projects
  - Re-use work in any other organization areas

7- Conduct formal stakeholder review:
  Check the original motivation for the architecture project and statement against the proposed data and application architecture.

8- Finalize the Data and Application Architecture:
  1- Select standards for each of the building blocks, reusing as much as possible from the reference models selected from the Architecture repository
  2- Fully document each building blocks
  3- Conduct a final cross-check of all architecture against business goals
  4- Document the rationale for building block decisions in the Architecture document
  5- Document the final requirements traceability report
  6- Document the final mapping of the Architecture within the Arch. repository

9- Create the Architecture Definition Document:

Outputs:

- **Update statement of Architecture work**
- **Validate data and application principles**
- **Draft Architecture definition document**
  - For data:
    - Baseline data model
    - Logical data model
    - Data management process
    - Data entity / Business function matrix
    - Data interoperability requirements
  - For App:
    - Baseline app
    - Target app (process / place / time / people) system model

- **Draft Architecture Requirements specification:**
  - Gap analysis
  - Data and application interoperability requirements
  - Areas where business architecture will need to change in order to comply with changes in the data architecture
  - Relevant technical requirements that will apply to this evolution of the Architecture development cycle
  - Constraints on the technology architecture about to be designed
  - Update business requirements
  - Update data and application requirements

Data Architecture Approach:

- Data management:
  - Define which of the application components in the landscape will serve as the system record for the enterprise master data
  - How data entities are utilized by business functions, process, and services
  - How and where data entities are created, stored, transported, and reported
  - What is the level of complexity of the data transformation required to support the information exchange between applications
  - What will be requirement for software in supporting data integration
- Data Migration: (Application replaced)
- Data Governance: (Structure – Management - People)

Main of Data Principles
1- Data trustee
2- Common vocabulary and Data definitions
3- Data security

Main of Application Principles
1- Technology independencies
2- Ease of use

1-5-Technology Architecture Phase:

Objectives:
- This document packages the baseline of Technology architecture
- Develop the Technology architecture to enable the logical and physical application and data components and Architecture vision
- Perform gap analysis
- Identify Candidate Architecture Roadmap

Inputs:

- Architecture reference materials (Architecture Repository)
- Request for Architecture Work
- Technology principles
- Capability assessment
- Architecture vision
- Communication plan
- Tailored Architecture Framework
- Approved statement of Architecture work
- Organization model for Enterprise Architecture
- Draft Architecture definition document
- Business, data, and application Architecture components of an Arch. Roadmap
- Draft Architecture requirements specifications

Steps: (9)

1	1.1. Determine overall modeling process	2	3	4	5	6	7	8	9
Select Reference Models, Viewpoints and Tools	1.2. Identify required catalog, matrices, and diagrams 1.3. Identify types of requirement to be collected 1.4. Select services	Develop baseline	Develop Target	Perform Gap analysis	Define candidate roadmap	Resolve impact	Conduct formal stakeholder review	Finalize the business Arch.	Create Arch. Definition Document

1- Select Reference Models, viewpoints, and Tools:

- Review and validate the set of Technology principles
- Select relevant Technology architecture resources (Reference models, patterns) on the basis of the business drivers, stakeholders, concerns, and business architecture
- Select relevant Technology architecture viewpoints

- Identify appropriate tools and techniques.

1.1. Determine overall modeling process:

- For each viewpoint, select the model needed
- Recommended process to develop technology Architecture:
  - Define Technology services and components
  - Identify relevant locations where technology is deployed
  - Carryout a physical inventory of deployed technology
  - Look at Application and Business requirements
  - Is the Technology fit to new requirements
  - Determine configuration of selected technology
  - Determine impact
  - The areas where the technology Architecture may be impacted:
    - Performance → Service granularity
    - Maintainability → Service granularity
    - Location and latency → Service communication
    - Availability → Product selection

1.2. Identify required Catalog, Matrices, and Diagrams:

Catalogs (2)
Catalogs are hierarchical in nature:
• Collect a list of products in use
• If requirements identified in the application Architecture are not met by existing products extended the product list by examining products available in the market that provide the functionality and meet the required standards.
• Classify products against to the technology
• Apply technology standards to the technology components catalog
1- Technology standard 2- Technology portfolio

Matrices (1)
Relationships between related models
Mapping business services to technology platform through the applications
1- Application / Technology matrix

Diagrams (5)
Links between platform requirements and hosting requirements
Where multiple applications are hosted on the same infrastructure, produce a stack diagram showing how hardware, operating system, software infrastructure, and package applications combined.
Showing the contents of the environment and logical communication between components (Capacity), and proceed the physical diagram of communication such as routers, switches, and network links.
1- Environment and location diagram
2- Platform decomposition diagram
3- Processing diagram
4- Communication engineering diagram
5- Networked / computing / hardware diagram

1.3. Identify types of requirements to be collected:

- The requirements may:
  - Related to the domain
  - Provide requirements input to other phases
  - Provide details guidance to be reflected during design and implementation of solutions architecture

1.4. Select services:

- The set of services must be checked to ensure that the functionality provided meets application requirements

- Develop baseline Technology Architecture: (Support Target Arch.)

    Conceptual →
    - Infrastructure services (Server- Storage – security – network)
    - Technology services (Artifacts – user satisfaction - contracts)

    Logical →
    - Infrastructure services (Desktop – Integration hub – Data center)
    - Technology services

    Physical

- **Develop Target Technology Architecture: (Support Target Arch.)**

  Conceptual →
  - Infrastructure services (Server- Storage – security – network)
  - Technology services (Artifacts – user satisfaction - contracts)
  - Governance services

  Logical →
  - Infrastructure services (Desktop – Integration hub – Data center)
  - Technology services

  Physical

  Cross reference

  Security Architecture model

3- Perform GAP analysis:
  1- Verify the Architecture model for internal consistency and accuracy
  2- Perform trade-off analysis to resolve conflicts
  3- Check the model support the goals, principles, and constraints
  4- Test Architecture models against requirements
  5- Identify Gaps between baseline and target using gap analysis techniques

4- Define Candidate Roadmap Components:
  List of work packages that will realize the Target Architecture on a timeline
  Highlight the value at each stage
  Incremental development
  The work packages (Programs – Projects – Tasks)

5- Resolve impact Across the Architecture Landscape:
  - Impacted on Any pre-existing Arch. / on other projects
  - Impacted by any other projects
  - Re-use work in any other organization areas

6- Conduct formal stakeholder review:
  Check the original motivation for the architecture project and statement against the proposed data and application architecture.

7- Finalize the Data and Application Architecture:
  1- Select standards for each of the building blocks, reusing as much as possible from the reference models selected from the Architecture repository
  2- Fully document each building blocks
  3- Conduct a final cross-check of all architecture against business goals
  4- Document the rationale for building block decisions in the Architecture document
  5- Document the final requirements traceability report
  6- Document the final mapping of the Architecture within the Arch. repository

8- Create the Architecture Definition Document:

Outputs:

- **Update statement of Architecture work**
- **Validate Technology principles**
- **Draft Architecture definition document**
    - o Baseline technology architecture
    - o Target technology architecture
        - ▪ Technology components and their relationships
        - ▪ Technology platform and their decomposition "Stack"
        - ▪ Environmental and location
        - ▪ Expected processing load
        - ▪ Physical (Network) communication
        - ▪ Hardware and network specifications
- **Draft Architecture Requirements specification:**
    - o Gap analysis
    - o Update Technology Requirements

Technology Architecture Approach:

- ❖ Emerging technologies:
    - o Change technology to become a driver and strategic resource rather than a recipient of change request
    - o The Technology Architecture may both:
        - ▪ Drive business capabilities
        - ▪ Respond to information system requirements

Main of Technology Principles
1- Requirements – based change
2- Responsive change management
3- Control technical diversity → Cost of maintenance
4- Interoperability

1-6-Oportunities and Solution Phase:

Objectives:

- It describes the process of identifying delivery vehicles (Project/ Program/ portfolio) that effectively deliver the target Architecture identified in previous phases:
  - **Work packages** → what are changes required to realize the target Architecture
  - **Transition Architecture**
  - **Implementation and migration plan** → The schedule of delivery
- Generate the initial complete version of Architecture Roadmap.
- Determine within an incremental approach is required, and if so, identify transition Architecture.
- Define the overall solution Building Blocks to finalize the target Architecture.

Inputs:

- Product Information
- Request for Architecture Work
- Capability assessment
- Planning Methodologies
- Communication plan
- Organization model for Enterprise Architecture
- Governance Models and Frameworks
- Statement of Architecture Work
- Tailored Architecture Framework
- Architecture Vision
- Architecture Repository
- Draft Architecture definition document
- Draft Architecture requirements specifications
- Candidate Architecture Roadmap Components from Phases B,C, and D
- Change requests for existing programs and projects

Steps: (11)

1	2	3	4	5	6	7	8	9	10	11
Change Attributes	Constraints	Gap	Requirements	Interoperability	Dependencies	Readiness and Risk	Implementation Strategy	Work packages	Transition Architecture	Roadmap and Implementation and migration plan

1- Determine key corporate change Attributes: (Implementation factor Assessment and Deduction Matrix)

It includes Assessment of:
- Transition capability of the organization units involved
- Enterprise (Including culture and skills)

❖ Implementation Factor Assessment and deduction matrix:
  Factors includes (Risks, Issues, Assumptions, Dependencies, Actions, …)

Factor	Description	Deduction plan

2- Determine Business Constraints for implementation:

Review business strategies and Enterprise Architecture Maturity Assessment

3- Review and consolidate Gap analysis results from phase "B" to phase "D": (Gaps, solutions, and dependencies Matrix)

- o Identification of solution building blocks (SBBs) and their associated ABBs
- o Determine dependencies by using set of views such as the business interaction matrix, Data entity/Business functions matrix, and the Application/Function matrix
- o Rationalize the consolidated gaps, solutions, and dependencies matrix, re-organize the gap list, and place similar item together.
- o When grouping the gaps, refer to the implementation factor assessment and deduction matrix.
- o This matrix can be used as a planning tool when creating work packages

Architecture	Gap	Potential solution	Dependencies

4- Review Consolidated requirement Across related business functions:

- o Assess requirements, gaps, solutions, and factors to identify a minimal set of requirements whose integration into work packages would lead to more efficient

5- Consolidate and reconciling interoperability requirements: (COTS)

- o Architecture vision / Target Arch./ Implementation factor assessment and deduction matrix/ consolidated gaps, solutions, and dependencies matrix should be consolidated to identify any constraints on interoperability

- o Minimize interoperability conflict by:
    - 1- Reusing BBs.
    - 2- Commercial of the shelf products
    - 3- Third party services providers
- o There are two approaches:
    - 1- Create a building block transformer between conflict building blocks
    - 2- Make changes to the specifications of the conflicting building blocks

6- Refine and Validate Dependencies: (Capability based planning)

- o Determine the sequence of implementation:
    - 1- Grouping the Activities together
    - 2- Creating a basis for projects
    - 3- Examine the relevant projects and logical increments of deliverables

7- Confirm readiness and risks for business transformation:

- o Review the business transformation readiness assessment conducted in phase (A) and determine their impact to the Architecture Roadmap

8- Formulate implementation and migration strategy:

1- Determine overall strategic approach to implementing the solutions, by three approaches:

Greenfield
•New implementation

Revolutionary
•Radical change (Switch on / Switch off)

Evolutionary
•A strategy of convergence, such as parallel running to introduce new capability

2- Determine overall strategic direction that will address and migrate the risks, through the following:

Quick win "snapshot" - Achievable target – Value chain method

9- Identify and group major work packages:

1- Assess the missing business capabilities

2- Group various Activities into work packages

3- Fill in the "solutions" column in the consolidate Gaps, solutions, and dependencies matrix (New / Existing product / purchased)

4- Determine the work should be conducted in-house or contract

5- Classify every current system as:

- Mainstream → Part of the future information system
- Contain → replaced or modified in the planning horizon (next three years)
- Replace → to be replaced in the planning horizon

6- Decompose work packages into increments

7- Analyze and refine these work packages with respect to their business transformation issues, and the strategic implementation approach

8- Group work packages into portfolio and projects taking into consideration the dependencies and strategic approach

10- Identify transition Architecture:

- Provide measurable business value
- The time span between successive transition Architecture doesn't have to be uniform duration
- Depends on the Enterprise capacity for creating change
- Implement the easy activities first

11- Create the Architecture roadmap and implementation and migration plan:

- Architecture Roadmap:
  - Consolidate the work packages and transition architecture into the Architecture Roadmap
  - It frames the migration planning in phase F
- Implementation and Migration planning:
  - Demonstrate the activities and resources required for the basis of the migration planning
  - There are many approaches to consider such as data – driven sequence, where application systems that create data are implemented first, the applications that process the data.

Outputs:

- **Update the Architecture vision**
- **Draft Architecture definition document**
- **Draft Architecture requirements specifications**
- **Capability assessment**
- **Architecture road map**

- **Transition Architecture:**
    - <u>Opportunity portfolio</u>
    - <u>Work package portfolio</u>
    - <u>Milestones and milestones transition Architecture</u>
    - <u>Implementation factor assessment</u>
    - <u>Consolidate gaps and solutions</u>
- **Implementation and migration plan: (Cost – time – resources – benefits)**
    - <u>Implementation and migration strategy</u>
    - <u>Project charters</u>
    - <u>Implementation plan</u>

1-7-Migration Planning Phase:

Objectives:

- Finalize a detailed implementation and migration plan, by ensure that it is coordinated with Enterprise's approach to ==managing== and implementing change
- Finalizing the Architecture Roadmap
- Ensure that the ==business value==, ==cost of work packages== and transition Architecture understood by key stakeholders.

Inputs:

- Request for Architecture Work
- Capability assessment
- Communication plan
- Organization model for Enterprise Architecture
- Governance Models and Frameworks
- Statement of Architecture Work
- Tailored Architecture Framework
- Architecture Vision
- Architecture Repository
- Draft Architecture definition document
- Draft Architecture requirements specifications
- ==Candidate Architecture Roadmap (Work packages/ Transition Architecture/ Implementation factor assessment and deduction matrix)==
- Change requests for existing programs and projects
- Implementation and migration plan (outlines)

Steps: (7)

1	2	3	4	5	6	7
Management Framework	Business value	Cost – Time – Resources	Prioritize Projects	Complete Roadmap	Complete Implementation and Migration plan	Complete the Architecture Development Cycle

1- Confirm management framework interactions for the implementation and migration plan:

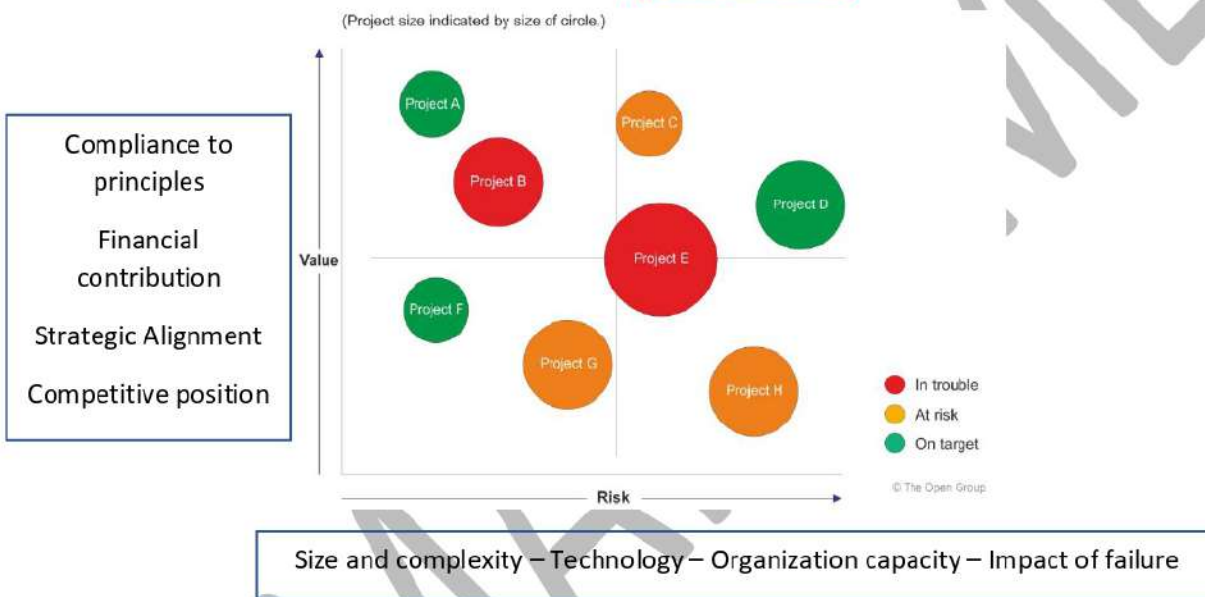| Business Planning	Enterprise Architecture	Project/ portfolio management	Operation Management

2- Assign Business Value to each Work Package:

1- Apply these steps for each project increments" If using CBP – business value associated with capability increments"

Evaluation Criteria	ROI	Busines value	Critical sucess factors (CSFs)	Measure of Effectivness (MOE)	Strategic fit

2- Risks should be assigned to the projects by identifying risks in the consolidated, gaps, solution, and dependencies matrix

3- Business value assessment (Value/ Risks)

(Project size indicated by size of circle.)

Compliance to principles

Financial contribution

Strategic Alignment

Competitive position

Project A
Project C
Project B
Project D
Project E
Project F
Project G
Project H

Value
Risk

● In trouble
● At risk
● On target

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Size and complexity – Technology – Organization capacity – Impact of failure

3- Estimate Resources requirements, Projects timeline, and availability vehicle:
- The cost should be breaking down into (Capita / Operation and maintenance)
- Opportunities should be identified when the costs associated

4- Prioritize the Migration Projects through the conduct a cost/benefit Assessment and risk validation:
- Prioritize the projects by their business value against the cost delivery (Benefits – Risks – and Consensus)
- Prioritization criteria – High priority for critical deliverables

5- Confirm Architecture Roadmap and update Architecture Definition document: (Architecture Definition Increments table) → Projects
- Allow the Architect to plan a series of transition Architecture outlining the state of the Enterprise Architecture at specific time.

Project	Transition 1	Transition 2	Tranistion3	Comments
	Time 1	Time 2	Time 3	

6- Complete the Implementation and Migration Plan:

(Transition Architecture State Evolution table) → Architecture Domain

- Allow the Architect to show the proposed state of the Architecture at various levels
- All SBBs should be identified with respect to their delivery and impact to those services
- This should include integrating all the projects, project increments, and activities as well as dependencies into a project plan.
- Any transition Architecture will act as portfolio milestones (TRM)

Architecture Domain	Transition 1	Transition 2	Transition 3	Transition 4
	New	Replace	New	Transition

7- Complete the Architecture development cycle and Document lesson learned:

- This step transitions governance from the development of the architecture to the realization of the architecture
- Lesson learned should be documented and captured by the appropriate governance process in phase (H) as inputs to managing the Architecture Capability

Outputs:

- **Implementation and Migration Plan:**
  - Implementation and Migration strategy
  - Projects and portfolio breakdown of implementation
    - Work packages
    - Capabilities
    - Milestones and timing
    - Work breakdown structure
  - Project charters (Work packages – Business value – Risks – issues – assumptions – dependencies – Resources – costs – benefits)

- **Implementation Governance model:**
  - o Governance process
  - o Governance organization structure
  - o Governance roles and responsibilities
  - o Governance checkpoints and CSFs
- **Finalize Architecture definition document including transition architecture**
- **Finalize Architecture requirements specifications**
- **Architecture road map**
- **Re-usable Building blocks**
- **Change request for the Architecture capability arising from lesson learned**
- **Request for Architecture work**

1-8-Implementation Governance Phase:

Objectives:

- Architecture Oversight of the implementation.
- Ensure conformance with the Target Architecture by implementation projects.
- Performance appropriate Architecture Governance functions for the solution and implementation driven Architecture change request.
- Confirming the scope and prioritize for development
- Guiding development and solution deployment

Inputs:

- Request for Architecture Work
- Capability Assessment
- Organization model for Enterprise Architecture
- Tailored Architecture Framework
- Statement of Architecture Work
- Architecture vision
- Architecture roadmap
- Architecture Contract
- Architecture repository
- Architecture definition document
- Architecture requirements specifications
- Implementation Governance model

Steps: (6)

1	2	3	4	5	6
Confirm Scope and priorities for deployment	Identify deployment resources and skills	Guidance development of solution deployment	Perform Enterprise Architecture Compliance	Implement Business and IT operations	Perform post – implementation and close implementation

1- Confirm Scope and priorities for deployment with development management:

Review migration planning	Identify E.A Priorities for development team	Identify depoyment issues	Identify BBs for replacement or updated	Perform Gap analysis on EA

2- Identify Deployment resources and skills: (System development methods)

3- Guide development of solution deployment:

- For each separate implementation and deployment project:
  - Document scope / strategic requirements / Change request / rules to conformance / timeline requirements)
- Document Architecture contract
- Update enterprise continuum – Guide development of business and IT operations
- Provide service requirements
- Carry out gap analysis
- Produce implementation plan

4- Perform Enterprise Architecture Compliance Review:

❖ Architecture Compliance:

The purposes:

Catch errors – Ensure best practices – Mandate standards – Identify services – Document strategies for collaboration – Communicate to management – Identify gaps – Guide decisions – Measurable deliverables – Ensure alignment of IT to Business

Timing:

- For smaller scale projects → Service of questions that the project Architects or project leaders pose to themselves, collecting the answers and report them to the manager
- Where the project under review has not involved a practicing or full-time Architect to-date → The Enterprise Architecture function would be organizing, leading, and conducting the review with the involvement of business domain experts
- In large scale projects → The review will be coordinated by the Lead Enterprise Architect who will assemble a team of business and technical domain experts.
  - The review might be led by a representative of an Architecture Board

Risks:

The risk identification and mitigation assessment worksheets created at that stage will have become governance artifacts, and part of the compliance review process should include risk monitoring to ensure that any residual risks accepted are being mitigated to an acceptable level. For critical risks that are not being mitigated, a Change Request should be generated that might require another full or partial ADM cycle.
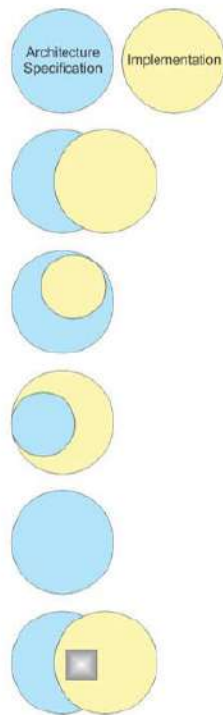
Irrelevant:
The implementation has no features in common with the architecture specification (so the question of conformance does not arise)

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.

Action	Who
Request Architecture Review	Anyone
Identify responsible Organization	Architecture review coordinator
Identify Lead Architecture	Architecture review coordinator
Determine scope of review	Architecture review coordinator
Tailor checklist	Lead Enterprise Architecture
Schedule Architecture Review Meetings	Architecture review coordinator with Lead Enterprise Architecture
Interview project principles	Lead Enterprise Architecture / Project leader / customer
Analyze complete checklist	Lead Enterprise Architecture
Prepare compliance review report	Lead Enterprise Architecture
Present review findings	Lead Enterprise Architecture
Accept review and sign off	Architecture Board / customer
Send assessment to Architecture review coordinator	Lead Enterprise Architecture

5- Implement Business and IT operations:

Publish new baseline

6- Perform post-implementation review and close the implementation:

Outputs:

- **Architecture contracts:**

  ==**"It is the joint agreement between development partners and sponsors on the deliverables, quality, and fitness for purpose of the Architecture"**==

  - By applying the governance approach to the contract, we ensure that:
    - Continuous monitoring to check integrity, changes, decision making and audit
    - Adherence to the principles and standards requirements
    - Identification risk
    - Set of processes and practices
    - Level of governance authority and scope the Architecture

```
                    ┌─────────────┐
                    │  Contracts  │
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│ Statement of │ │ Contract between │ │ Contract between │
│ Architecture │ │ Architecture     │ │ Architecture     │
│ Work         │ │ design and       │ │ Function and     │
│              │ │ development      │ │ Business user    │
│              │ │ partners         │ │                  │
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- **Compliance Assessment:**

  (Project progress and status / complete checklist)

- **Change request:**

  Change request submitted to kick start a further cycle of Architecture work, it consists of:
  - Description of the proposed change
  - Rational for the proposed change
  - Impact assessment
  - Repository reference number

- **Architecture compliant solution deployed:**
  - Architecture compliant system
  - Populated Architecture repository
  - Recommendation of service delivery

- SLA
- Architecture vision
- Business and IT operating model for implementation solutions

- **Solution Building Blocks:**

    Be product / vendor aware:

    1- BBs

    2- Interface

    3- Mapping

❖ To ensure that the Architecture contract is effective and efficient, the following aspects of the governance framework should be introduced:

  ➢ Simple process
  ➢ People – Centered authority
  ➢ Strong communication
  ➢ Timely responses and effective escalation process
  ➢ Supporting organization structure

1-9-Architecture Change Management Phase:

Objectives:

- Manage change to the new Architecture (Dynamic Environment)
- Ensure that:
    - The Architecture lifecycle is maintained
    - The Architecture Governance framework is executed
    - The Enterprise Architecture Capability meets current requirements

Inputs:

- Request for Architecture work
- Organization model for enterprise architecture
- Tailored Architecture framework
- Architecture repository
- Architecture definition document
- Architecture vision
- Architecture requirements specifications
- Architecture roadmap
- Architecture contract
- Compliance assessment
- Implementation and migration plan
- Implementation governance model
- Change request for (Technology – Business – lesson learned)

Steps: (7)

1	2	3	4	5	6	7
Establish value realization process	Deploy monitoring tools (3 Monitor and 4 tracks)	Manage risks	Analyze Architecture change management	Develop change requirements	Manage governance process	Active the process to implement change

1- Establish value realization process:

Ensure that the business projects realize value from the Enterprise Architecture

2- Deploy monitoring tools:

- Monitor (Technology – Business – Capability) changes
- Track (Qos – Value – asset management program – Business continuity)

3- Manage risks

4- Analyze Architecture change management:

Analyze performance	Conduct performance with service management	Assess change request to the value and SLA	Gap analysis	Governance
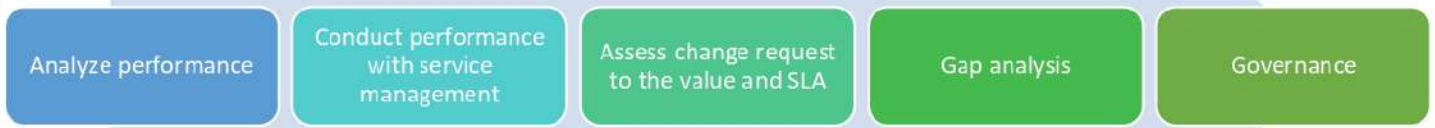
5- Develop change requirements to meet performance target

6- Manage governance process (Holding meetings of Architecture board)

7- Active the process to implement change:

❖ Approach of Change Management:

- While the Architecture specification may not change, the solutions or their operational contents may change
- Avoid "Creeping elegance"
- Drivers of changes:
  - o Top – down → Enhance or create new capability
  - o Bottom – up → Correct or enhance capability
- Enterprise Architecture change management process:

	Simplification change	**Incremental change**	**Re-Architecting change**
Driven by	Reduce investment	Additional value	Increase investment Create new value
Handle by	Change management	Change management + require partial re-architecting	Put the whole Architecture through ADM cycle
Example	Reduce ten systems to one system	New technology	Impact business strategy

- When determine which type of changes will be applied:

Change management	Redesign Architecture
One stakeholder	Two or more stakeholders
Can be allowed under dispensation	End user impact
Technology change	Business strategy change

New request of Architecture Work is needed

Outputs:

- **Architecture Update**
- **Change to Architecture framework and principles**
- **Update request for Architecture work**
- **Update statement of Architecture work**
- **Update Architecture contract**
- **Update compliance assessment**
- **Architecture change request**

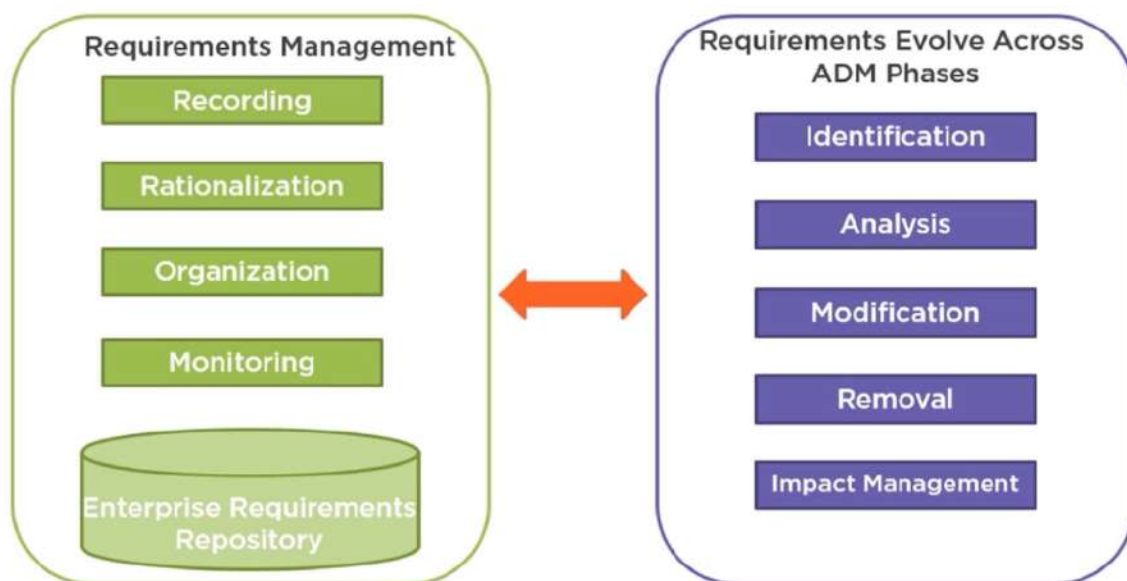# 1-10-Architecture Requirements Management Phase:

Objectives:

- Managing Architecture requirements through ADM
- Ensure that the requirements management process is sustained and operated for all relevant ADM phases
- Manage Architecture requirements identified during any execution of the ADM cycle or phase
- Ensure that relevant Architecture requirements are available for use by each phase as the phase executed
- (Identify / store / fed in / fed out / analyze / reviewed / produce) of requirements
- Do not (Dispose / address / prioritize) requirements

Requirement is "A quantitative statement of business need that must be met by a particular architecture or work package"

ADM phase	Requirements
Preliminary and Architecture Vision Phase	• Change policies • New Architecture capability • Scope • Requirement specification document • Requirement repository
Phase B	• Requirements related to the business domain • Draft Architecture requirement specifications • Requirement repository
Phase C	• Information system • Application requirements • Data storage • Budgeting requirements
Phase D	• Security requirements • Continuity requirements • Availability requirements • Capacity requirements • Maintainability requirements • Budgets requirements • Performance requirements
Phase E	• Collaboration requirements • Attendance at change meetings

	• Creation of work packages requirements • Budget requirements • IT service requirements
Phase F	• Success measures • Architecture requirements • Business service contracts • Application service contracts • Implementation guidelines • Implementation specifications • Implementation standards • Assumptions • Constraints
Phase G	• Budget and time requirements • Deployment requirements • Operation requirements
Phase H	• Polices • Change Requirements

Function requirements	Non function requirements
• Data must be entered before a change request can be approved • Clicking the approve button moves to the request to the approval "Workflow" • All personnel using the system will be trained	• Performance • Capacity • Availability • Serviceability

Outputs:

- **Update Architecture requirements specifications**
- **Update Architecture requirements repository**
- **Requirement impact assessment:**

A Requirements Impact Assessment assesses the current architecture requirements and specification to identify changes that should be made and the implications of those changes. It documents an assessment of the changes and the recommendations for change to the architecture. The statement goes through various iterations until the final version, which includes the full implications of the requirements (e.g., costs, timescales, business metrics) on the architecture development. The recommended contents are as follows:

- 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

These are often produced as a response to a Change Request.

2- Iterations and Levels:

❖ **Concepts of iteration:**

1- Multiple ADM cycles (Creating comprehensive Architecture Landscape):

- Projects will exercise through the entire ADM cycle
- Bound each cycle with request for architecture work
- The output will populate the Architecture landscape

2- Between ADM phases

- Projects may operate multiple ADM phase concurrently
- Projects may cycle between ADM phases
- Projects may return to previous phases in order to circle back

3- Process managing change to the organization's Architecture capabilities

- Projects may require a new iteration of the preliminary phase to adjust the organization Architecture Capability as a result of identifying new or changed requirements for Architecture Capability as a result of change Request in Phase (H)

❖ **Factors influencing the use of iteration:**

- The formality and nature of established process checkpoints
- The level of stakeholder involvement
- The number of teams involved and the relationships between different teams
- The maturity of the solution area
- Attitude to risk
- The class of engagement

❖ **Style of Architecture definition:**

- Baseline first → Identify problem areas and opportunities for improvement, when baseline is complex
- Target first → Solution is elaborated in detail then come back to the baseline, if the target approach is agreed at a high level

❖ Classes of Architecture Engagement:
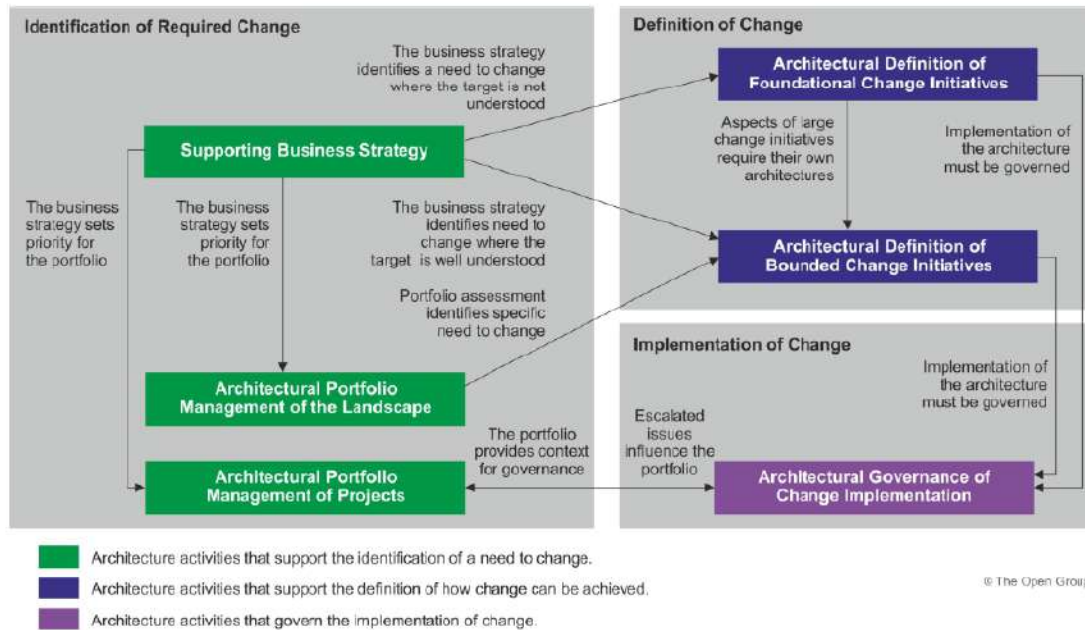
Area of Engagement	Class of Engagement	Iteration focus	Focus
Identification of required change	Supporting Business strategy	Architecture capability and Architecture development iteration	Baseline first
	Architecture portfolio management of the landscape	Architecture capability and Architecture development iteration	Baseline first
	Architecture portfolio management of the projects	Transition planning and Architecture Governance Iteration	
Definition of change	Architecture definition foundation change initiatives	Architecture development iteration Transition planning and Architecture Governance Iteration	Baseline first
	Architecture definition Bounded change initiatives	Architecture development iteration Transition planning and Architecture Governance Iteration	Target first
Implantation of change	Architecture governance of change implementation	Architecture governance iteration	

❖ Iteration between ADM Cycles

In this approach each iteration completes an ADM cycle at a single level of Architecture Description with Phase F (Migration Planning) being used to initiate new more detailed architecture development projects. This type of iteration highlights the need for a higher-level architecture to guide and constrain more detailed architecture(s) and is a method to develop the complete Architecture Landscape for a project in multiple iterations.

TOGAF Phase		Architecture Development			Transition Planning		Architecture Governance	
		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

Gain buy-in to a portfolio of solutions opportunities

Seek for agree of transition Architecture

Establish a process for the governance of change

Reviews of changes and resolve issues and ensure complaince

❖ **The Architecture landscape:**

Strategic Arch. → Organization framework at an executive level

Segment Arch. → Portfolio level

Capability Arch. → Project level

❖ **The Architecture Continuum:**

The Architecture continuum provides a method of dividing each level of the Architecture landscape by abstraction

It offers a consistent way to define and understand the generic rules, representations, and relationships in an Architecture, including traceability and derivation relationships

The classification methods of the Architecture Continuum can be used to partition and organize the Architecture landscape into a set of related architectures with:

- Manageable complexity for each individual architecture or solution
- Define grouping
- Define hierarchies and navigation structure
- Appropriate processes, roles, and responsibilities attached to each grouping
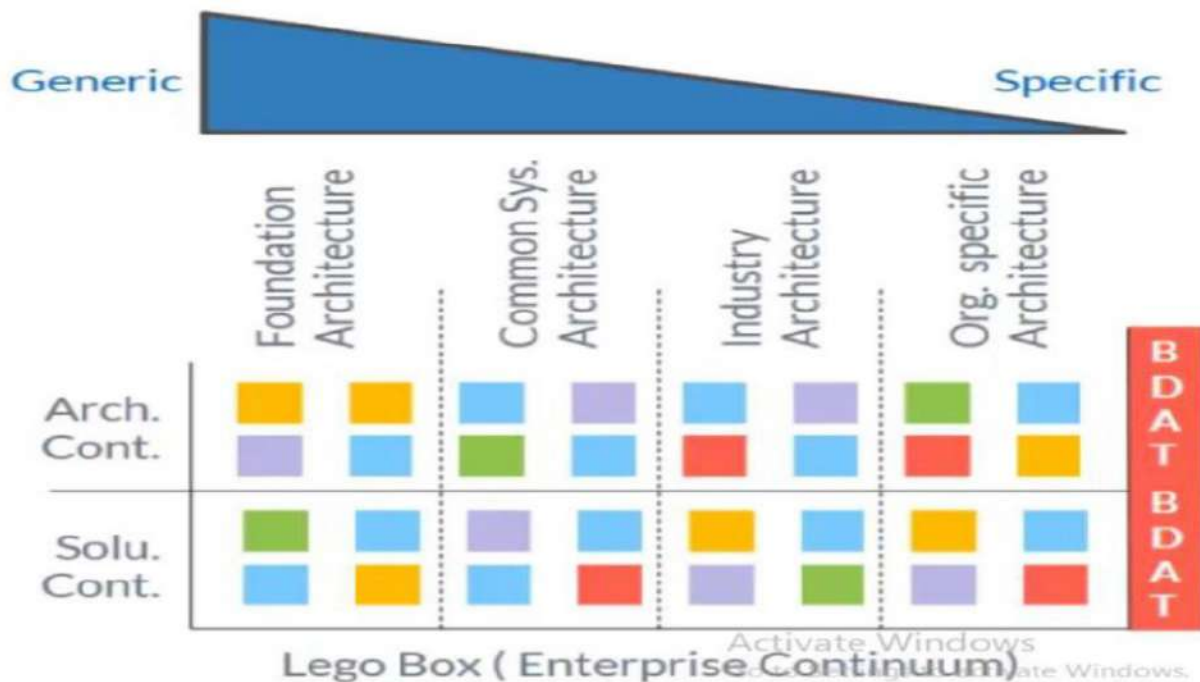
Foundation → Standard information base / Technical reference model
Common system → ERP / III-TRM
Industry → Oil and gas / Retail / Hospitals
Organization specific → NBE Bank / Your organization

❖ **Organizing The Architecture landscape:**

BREADTH → subject matter (Business / Technology / Data / Application)

DEPTH → level of details

TIME → baseline and target

RECENCY → Accuracy increasing

3- Enterprise Security Architecture:

A security Architecture is:

"A <mark>structure of organizational, Conceptual, Logical, and Physical components</mark> that <mark>interact</mark> in a coherent fashion in order <mark>to achieve and maintain</mark> a state of managed <mark>risk and security</mark> (or information security)"

It is both driver and enabler of secure, safe, resilient, and reliable behavior, as well as addressing risk areas throughout the enterprise.

Information Security Management (ISM)

Enterprise Risk Management (ERM)

Security Architecture is a cross-cutting concern
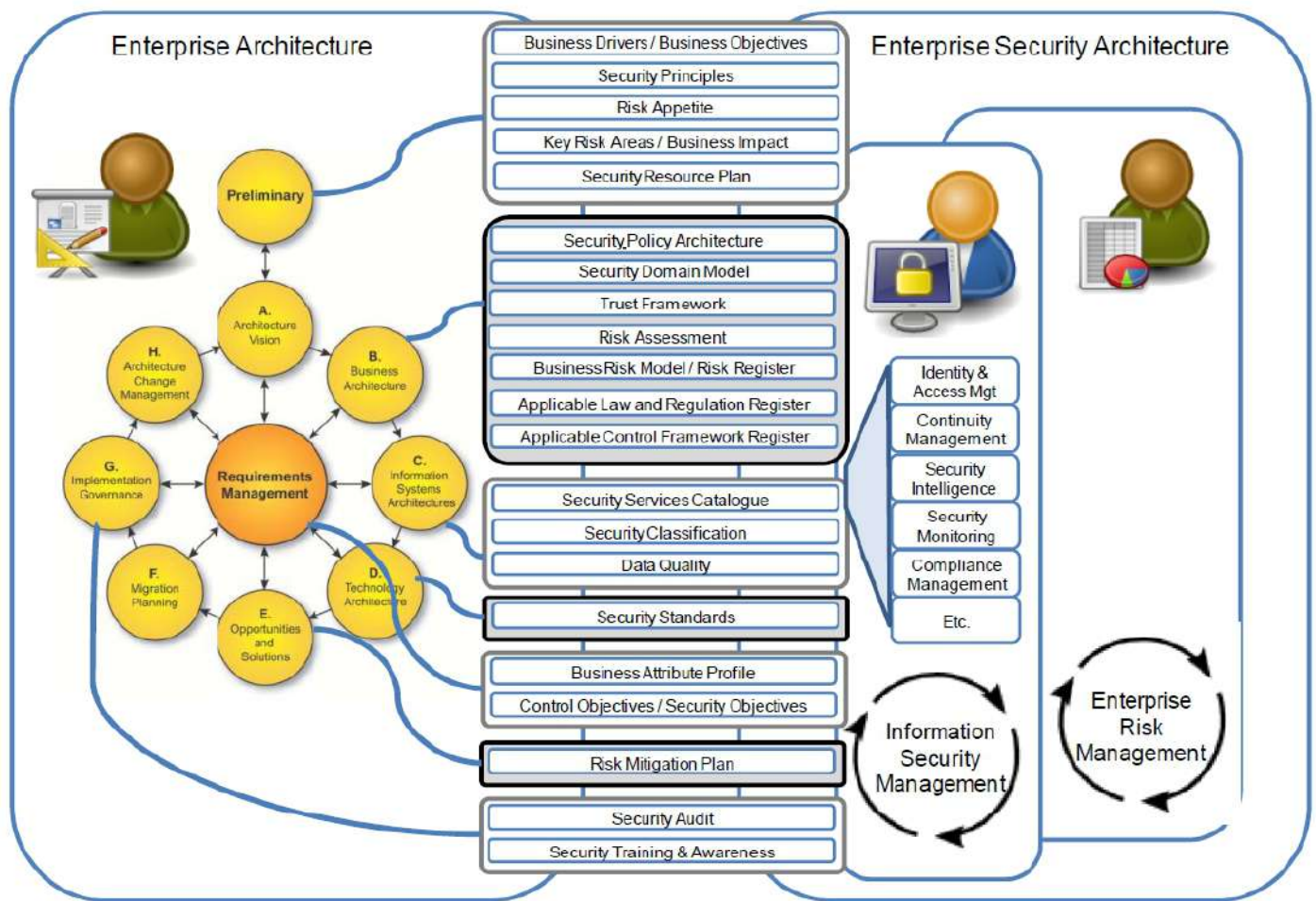
Adapting the ADM for Security:

Phase	Guidance
ADM requirements management	Requirements engineering technique from (SABSA) institute, which translate business goals and drivers into requirements using a risk-based approach • Executive communication in non-IT terms • Traceability mapping between business drivers and requirements • Performance measurement against business defined target • Grouping and structuring of requirements
Preliminary Phase	• Business drivers / business objectives affecting security • Security principles • Risk appetite • Key risk areas/ business impact analysis • Security resource plan
Architecture vision	• Safety and security stakeholders (Unexpected risk) • Safety business stakeholders (Budget) • Stakeholder concerns about safety and security
Business Architecture	• Security policy Architecture • Security domain model • Trust framework • Risk Assessment • Business risk model / risk register • Applicable law and regulation register • Application control framework register
Information Architecture	• Security service catalog • Security classification • Data quality
Technology Architecture	• A security stakeholder requests the creation of specific technology
Opportunities and solution	• Security and risks are re-evaluated • Security building blocks • Risk mitigation plan
Migration planning	• Migration is itself a business process that needs to be secured • Security impact analysis
Implementation governance	• Security Audit • Security training and awareness
Architecture change management	• The risk management process: "Continuously evaluated regarding changes to business opportunities and security threat, based on results of this process, the current Architecture might deem it unsuitable to mitigate changed or new risks, or it might constraint the business too much in exploiting new opportunities. In that case, a decision on architecture change must be made" • 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. Changes related to risk and security should be an explicit part of that framework. Large changes to the Architecture should include a security impact analysis"

4- Architecture Content Framework:

The Architecture Content Framework provides a detailed model of architectural work products, including deliverables, artifacts within deliverables, and the Architecture Building Blocks (ABBs) that artifacts represent. It helps to improve the consistency of the TOGAF outputs by presenting outputs in a consistent and structured way, and also helps to reference and classify them.

The benefits of using the Architecture Content Framework include that it provides a comprehensive checklist of architecture outputs, it promotes better integration of work products, and it provides a detailed open standard for how architectures should be described.

What is the metamodel?

"A model that describes how and with what the architecture will be describes in a structured way"
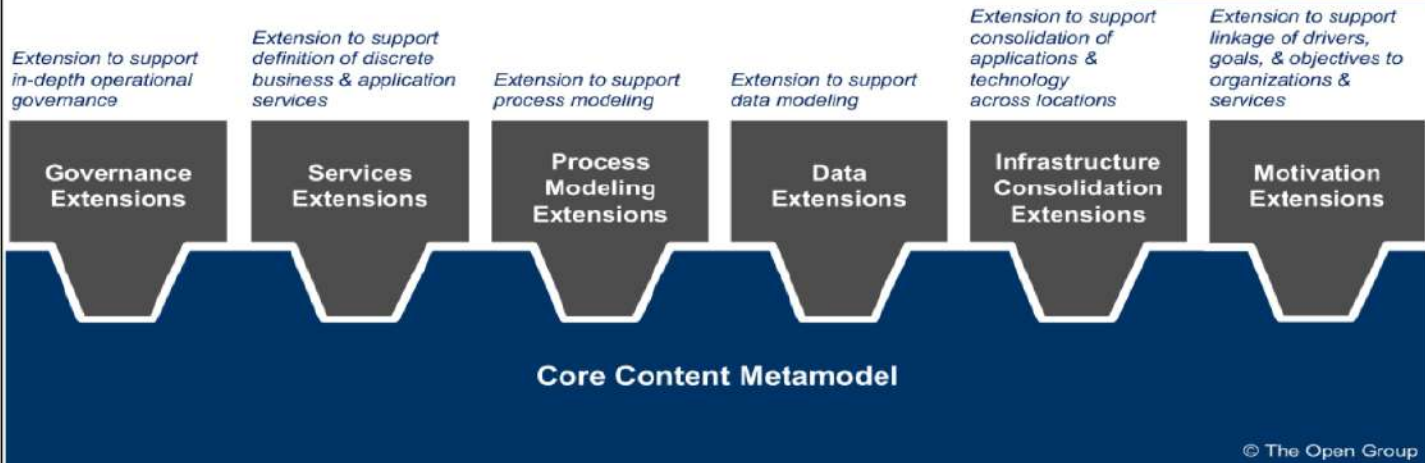
Why do we need Metamodel?

- Formalize the definition of an enterprise architecture
- Structuring architecture information
- Data schema mapping for Enterprise Architecture

Components of Metamodel

The Architecture Content Framework is based on a standard content metamodel that defines all the types of building blocks in an architecture, showing how these building blocks can be described and how they relate to one another. For example, when creating an architecture, an architect will identify applications, data entities held within applications, and technologies that implement those applications. These applications will in turn support particular groups of business users or actors and will be used to fulfill business services.

The content metamodel identifies all of these entities (i.e., application, data entity, technology, actor, and business service), shows the relationships that are possible between them (e.g., actors consume business services), and identifies artifacts that can be used to represent them.

Extension to support in-depth operational governance	Extension to support definition of discrete business & application services	Extension to support process modeling	Extension to support data modeling	Extension to support consolidation of applications & technology across locations	Extension to support linkage of drivers, goals, & objectives to organizations & services
Governance Extensions	Services Extensions	Process Modeling Extensions	Data Extensions	Infrastructure Consolidation Extensions	Motivation Extensions

Core Content Metamodel

© The Open Group

Core Metamodel:

Actor	A person, organization, or a system that has a role that interact with activities
Role	An Actor assume a role to perform a task
Organization unit	A self-contained unit of resources with goals, objectives, and measures. May include external parties and business partner organization
Business capabilities	It is ability that business may poses to achieve a specific purpose
Business services	Support business capabilities through an explicitly defined interfaces and governed by organization
Functions	Delivers business capability closely aligned to organization, and not governed by the organization
Course of Actions	Direction and focus provided by strategic goals and objectives to deliver value proposition characterized in a business model
Value stream	An end-to-end collection of value adding activities
Data Entity	An encapsulation of data that is organized by a business domain experts
Information System services	The Automated elements of business services
Application components	An encapsulation of application functionality
Technology components	An encapsulation of technology infrastructure
Technology services	A technical capability required to provide enabling infrastructure that support the delivery of applications

- Process should be used to describe flow (All processes should describe the flow of execution for a function) – (An application implements a functions that have a process)
- Function describes unites of business capability at all level of granularity
- Business services support organizational objectives and are defined at a level of granularity consistent with the level of governance needed (A business services operates as a boundary for one or more functions)

- Business services → Deployed onto → Application components →Deployed onto →Technology component

Building Blocks:

"Building blocks are entities or package of functionality defined to meet business need"

Such as "Purchase order"

The deliverables describe the BBs – usable and replaceable

Catalog → Listing of building blocks of specific or related types

Matrices → Relationships between two or more models

Diagrams →Architecture content in a graphical format

Architecture Partitioning:

The main purposes of Architecture Partitioning are:

- Manage complexity
- Manage conflicts
- Manage parallel development
- Manage re-use

Applying classification to partitioned Architecture:

- Subject matter (Breadth) → Solutions are naturally organized into groups to support operational management and control
- Time → Solutions lifecycle are organized around timeline
- Maturity / Volatility → Impact the speed of execution required for solution lifecycle, shape investment priorities.
  Solution existing in a volatility environment may be better suited to rapid, agile development techniques
  Volatility also reduce the historic architecture over time, as the organization changes and adapts to a new circumstance
- Depth → The level of details

Partitioning segments:
- Partitioning along business areas
- Partitioning along product lines or service area
- Partitioning along functional boundaries
- Partitioning along physical boundaries (Location...)
- Partitioning along sub pattern

Project → Schedule of activities that will implement an initiative
Initiative → Collection of resources aimed to achieve some aspect of a solution

❖ It is preferable to apply partitioning to the Architecture until each Architecture has one owing team

Steps within the preliminary phase to support Architecture Partitioning:

1- Determine Organization structure
2- Determine the responsibilities for each Architecture team
3- Determine the relationships between Architectures

Federated Architecture:

Are Enterprise Architecture assembled or made up from separately developed Architectures of the Enterprise's component parts

ARCHITECTURE REPOSITORY:

"It is a logical information store for outputs of executing the ADM"

It provides a structural framework for an Architecture to distinguish between different types of an architectural assets that exist at different levels of abstraction in the organization"
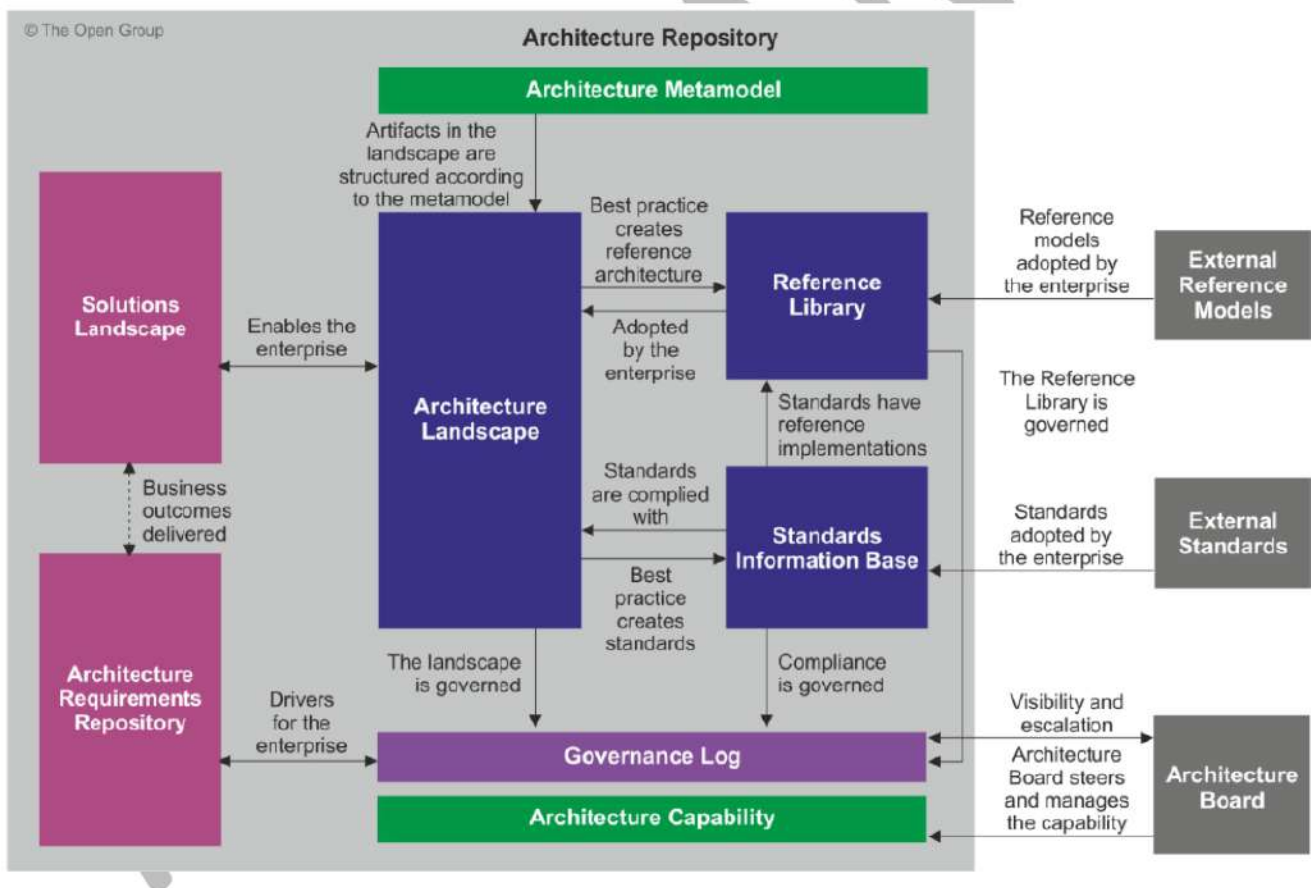
1- Architecture Metamodel:
2- Architecture landscape: An Architecture at particular points in time (Strategic – Segment – Capability)

3- <u>Reference library:</u> It provides guidelines, templates, patterns, other forms of reference material that can be leverage in order to accelerate the creation of new Architecture.

4- <u>Standard Information Base (SIB):</u>

It captures the standards with which the new Architecture must comply (Legal standard – Industry standard – organization standard)
  - o Proposed standard → identified but not evaluated
  - o Provisional standard → Identified but not tested
  - o Active standard → Should be used
  - o Phasing out standard → Deprecated
  - o Retired standard → No longer accepted

5- <u>Governance log:</u>

It provides a record of governance activity across the enterprise
Consists of:
  - o Decision log
  - o Compliance assessment → Key checkpoints milestone
  - o Capability assessment
  - o Performance measurements
  - o Calendar
  - o Project portfolio

6- <u>Architecture Capability:</u>
(Roles / skills / responsibilities)

7- <u>Solution landscape:</u> SBBs

8- <u>Architecture Requirements repository:</u>

It provides a view of all authorized Architecture requirements which have been agreed with the Architecture board through (ADM)
The business outcomes from Architecture requirement phase will be reflected to the solution landscape overtime

ARCHITECTURE PATTERN:

It is an "Idea" that has bee useful in one or more partial content and may be used in others

Name	
Problem	
Forces	
Resulting	
Example	
Relation	
Related pattern	
Known uses	

An Architecture pattern → Schema of software system
A design pattern → Schema for refining the subsystem or components of a software
An Idiom→ It is a low-level pattern specific to a programming language

5- Architecture Governance:

"It is a practice of monitoring and directing architecture related-work. The goals are to deliver desired outcome and adhere to relevant principles, standards, and roadmap"

- Preliminary phase → How to govern the Architecture framework, and how to integrate it with the existing governance and support models for organization
- Phase F → Ensure that a project transitioning to implementation smoothly transitions into the appropriate Architecture governance for phase G
- Phase G → Production of Architecture contract to ensure compliance and drive changes, also risk monitoring
- Phase H → Mange the governance process and framework for Architecture, this include scheduling and holding meetings of the Architecture board to handle the request for change

Key success factors:

Best practices	Organization responsibility	Tools	SLAs / OLAs	Requirements
• Submission, adoption, re-use, reporting • Retirement of policies, procedures, roles, skills, structures, and supportive services	• Correct • Reporting requirements	• Integration of tools	• Compliance assessment	• Meeting internal and external requirements, integraty, availability, compliance, realiability

Setting up Architecture Board: (Sponsor body)
- ❖ Factors to set up (Size, structure, relationship to other organization groups, and responsibilities)
- ❖ The size between 4 to 10
- ❖ Rotate the membership (Terms expire at different times)
- ❖ Structure (Global governance board – Local governance board – design Authority – Working parties)

Operating an Architecture Board:

1- These meetings will provide key direction in:
- Supporting the production of quality governance material and activities

- Providing a mechanism for formal acceptance through consensus and authorized publication

- Providing a fundamental ==control mechanism== for ensuring the effective implementation of the architectures

- Establishing and maintaining the ==link between== the implementation of the architectures and the stated strategy and objectives of the organization ==(business and IT)==

- Identifying ==divergence== from the ==contract== and planning activities to realign with the contract through dispensations or policy updates

2- Preparation:
  - Each participant should receive an agenda and any supporting documents
  - Each participant must confirm their availability and attendance

3- Agenda:
  - Minutes of previous meeting
  - Request of change
  - ==Dispensation → A dispensation is used as the mechanism to request a change to the existing architectures, contracts, principles, etc. outside of normal operating parameters; e.g., exclude provision of service to a subsidiary, request for unusual service levels for specific business reasons, deploy non-standard technology or products to support specific business initiatives.==
  - Compliance Assessment → SLAs and OLAs (Accepted or rejected the assessment) – (Compliance assessment reports)
  - Dispute resolution → Disputes that have not been resolved through the Architecture Compliance and dispensation processes are identified here
  - Architecture strategy and direction document
  - Actions Assigned →
    This is a report on the actions assigned at previous Architecture Board meetings, An action tracker is used to document and keep the status of all actions assigned during the Architecture Board meetings and should consist of:
      - Reference
      - Priority
      - Action Owner
      - Action details
      - Data raised
      - Due date
      - Status
      - Type
      - Resolution date
  - Contract Documentation management → formal acceptance of update and changes
  - Any other Business (AOB) → Description issues that not covered
  - Schedule of meeting

Architecture Maturity Models:

- Capability Maturity Models:
  Capability Maturity Models (CMMs) address this problem by providing an effective method for an organization to gradually gain control over and improve its change processes. Benefits of such models include:
  - They describe the practices that any organization must perform in order to improve its processes
  - They provide measures for improvement
  - They constitute a proven framework within which to manage the improvement efforts
  - They organize the various practices into levels, each level representing an increased ability to control and manage the development environment

- The assessment:
  (E-commerce / People competencies / Investment / Quality measurements / Process measurements and audit)
- Capability Maturity Model Integration (CMMI): (CMU) – (Carnegie Mellon Uni)
  - More explicitly link management and engineering activities to business objectives
  - Expand the scope of and visibility into the product lifecycle and engineering activities to ensure that the product or service meets customer expectation
  - Incorporate lesson leaned and best practices
  - Implement high maturity practices
  - Address additional organizational functions critical to products and services
  - Comply ISO standards
- Architecture Capability Maturity Model (ACMM): (DoC) The US department of commerce (3-6-9)
  Three (3) sections:

Architecture Maturity Model	Characteristics of Processes	Architecture CMM scorecard

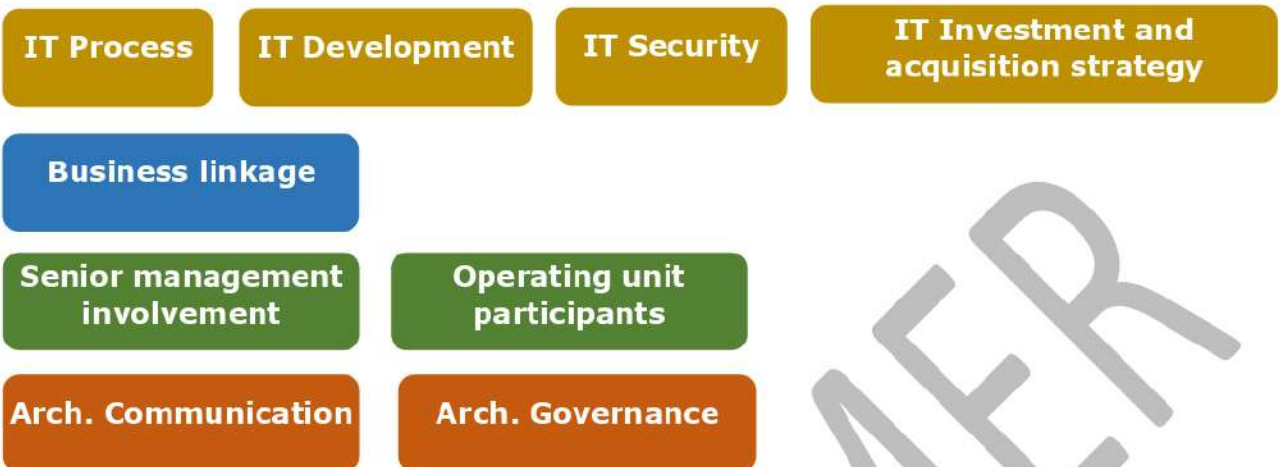Six (6) Levels

- None
- Initial
- Under development
- Defined
- Manged
- Mesured

Nine (9) Characteristics

| IT Process | IT Development | IT Security | IT Investment and acquisition strategy |

Business linkage

| Senior management involvement | Operating unit participants |

| Arch. Communication | Arch. Governance |

Preliminary phase → Use capability maturity assessment as a part of organization model for Enterprise Architecture

Phase A → Capability assessment to determine the baseline and target capability

Phase E → Revisited for preparing the implementation

Architecture Skills Framework:

Benefits:

Reduce time, cost, and risk of:

1- Training, Hiring, and managing architecture professionals, both internal and external
2- Setup up an internal Architecture practice
3- Overall solution development

TOGAF Roles:
- Architecture Board Members
- Architecture sponsor
- Architecture Manager
- Architects for Enterprise Architecture (Business, Data, Application, Technology)
- Program or project manager
- IT designer

Skills Categories:
- Generic skills → leadership / team working / inter-personal skills
- Business skills → Business case / business process / strategic planning
- EA Skills → Modeling, building block design. App and role design,..
- Program or project management skills
- IT General knowledge skills
- Technical IT skills
- Legal Environment

Professionally levels:
1- BACKGROUND
2- AWAENESS
3- KNOWLEDGE
4- EXPERT

The role of Architect:
- The Architect is planner not a builder
- The Architect use ductive skills that deductive skills
- Understand requirements
- Create useful model
- Validate, refine, and expand the model
- Manage the Architecture

6- The TOGAF Technical Reference Model (TRM) & (III-TRM)

The TRM has two main components:

1- A taxonomy that defines the terminology, and describe a coherent description of the components and conceptual structure of an information system

2- A model, with an associated TRM graphic, that provides visual representation of a taxonomy

- Application Portability → Via application platform interface, identifying the set of services
- Interoperability → visa communication infrastructure interface
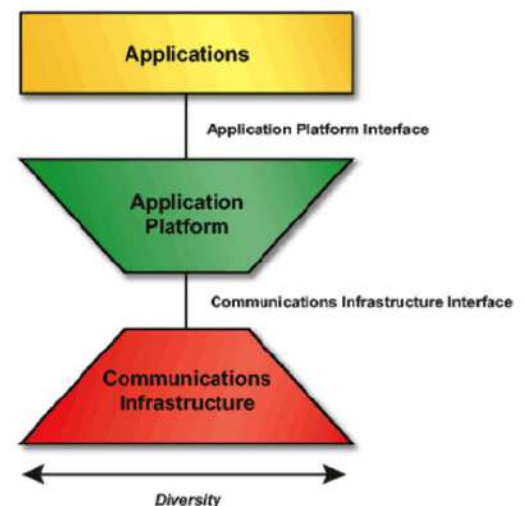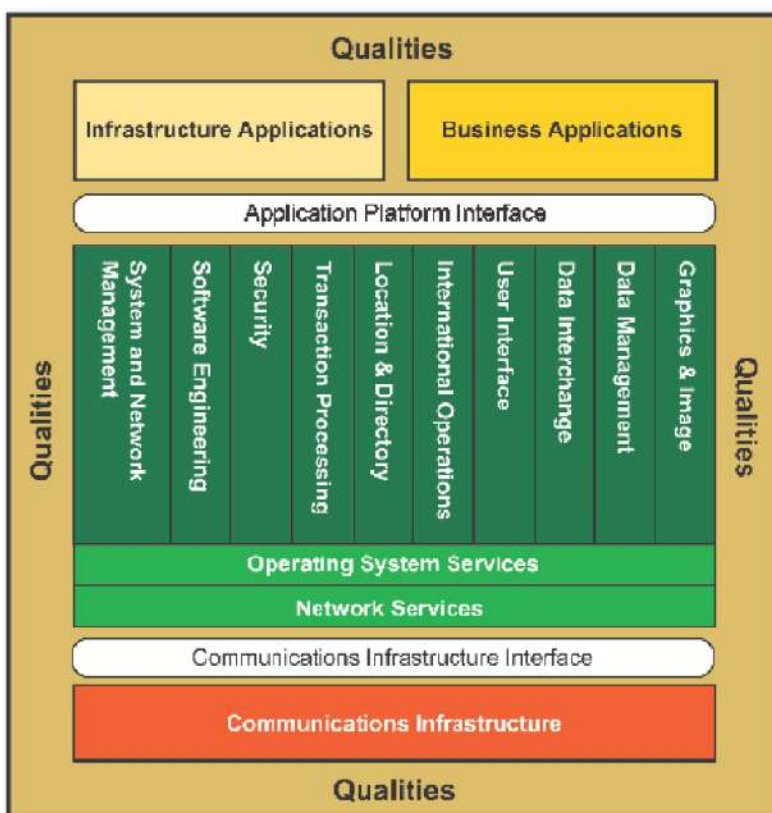
Business Applications:

Implement business process (Patient record management system)

Infrastructure Applications:

Provide general purpose business functionality (Commercial off the shelf) (Calendaring)

Application Platform Interface: (API)

The Application Platform Interface specifies a complete interface between the Application Software and the underlying Application Platform across which all services are provided.

Application Platform: (Operating system services)

The Application Platform is a single conceptual entity that includes Operating System Services, Network Services, and a generic set of platform services.

for example, a desktop client, file server, print server, Internet server, database server, etc., each of which comprises a specific set of services to support the defined functionality.

Interface between services:

In addition to supporting Application Software through the Application Platform Interface (API), services in the Application Platform may support each other, either by openly specified interfaces or by private, unexposed interfaces.

Communication Infrastructure:

provides the basic services to interconnect systems and provide the basic mechanisms for opaque transfer of data. It contains the hardware and software elements which make up the networking and physical communications links used by a system

networks and the physical Communications Infrastructure, including switches, service providers, and the physical transmission media.

Communication infrastructure interface:

It is the interface between the Application Platform and the Communications Infrastructure.

Qualities: (Attributes)
"Nonfunctional requirements"

Availability	Manageability → Gather information
	Serviceability → Repair or upgrade
	Performance
	Reliability → resistance to failure
	Recoverability → restore the system
	Locatability → Cloud
Assurance	Security
	Integrity
	Credibility → Level of trust
Usability	International Operation
Adaptability	Interoperability
	Scalability
	Portability → For data, people, applications, and components
	Extensibility

Taxonomy of Application Platform Services:

Service Category	Description
Data Interchange Services	Data Interchange Services provide specialized support for the interchange of information between applications and the external environment. These services are designed to handle data interchange between applications on the same platform and applications on different (heterogeneous) platforms.
Data Management Services	Data Management Services provide for the management of data independently of the processes that create or use it, allow data to be maintained indefinitely, and shared among many processes.
Graphics and Imaging Services	Graphics and Imaging Services provide functions required for creating, storing, retrieving, and manipulating images.
International Operation Services	International Operation Services provide a set of services and interfaces that allow a user to define, select, and change between different culturally related application environments supported by the implementation.
Location and Directory Services	Location and Directory Services provide specialized support for locating required resources and for mediation between service consumers and service providers.
Network Services	Network Services are provided to support distributed applications requiring data access and applications interoperability in heterogeneous or homogeneous networked environments.
Object-Oriented Provision of Services	This section shows how services are provided in an object-oriented manner. "Object Services" does not appear as a category in the TRM since all the individual object services are incorporated as appropriate in the other service categories.
Operating System Services	Operating System Services are responsible for the management of platform resources, including the processor, memory, files, and input and output. They generally shield applications from the implementation details of the machine.
Security Services	Security Services are necessary to protect sensitive information in the information system. The appropriate level of protection is determined based upon the value of the information to the business end users and the perception of threats to it.
Software Engineering Services	Software Engineering Services provide the tools for professional system developers appropriate to the development and maintenance of applications.
System and Network Management Services	System and Network Management Services provide for managing a wide variety of diverse resources of information systems.
Transaction Processing Services	Transaction Processing Services provide support for the online processing of information in discrete units called transactions, with assurance of the state of the information at the end of the transaction.
User Interface Services	User Interface Services define how users may interact with an application.

Integrated Information Infrastructure Reference Model (III-RM)

The (III-RM) addresses the solution space for Boundaryless Information Flow (Supplying information to the right people at the right time in a secure reliable manner)

III-RM is a subset of the TOGAF TRM

The III-RM is fundamentally an Application Architecture reference model; that is, a model of the application components and application services software essential for an integrated information infrastructure.
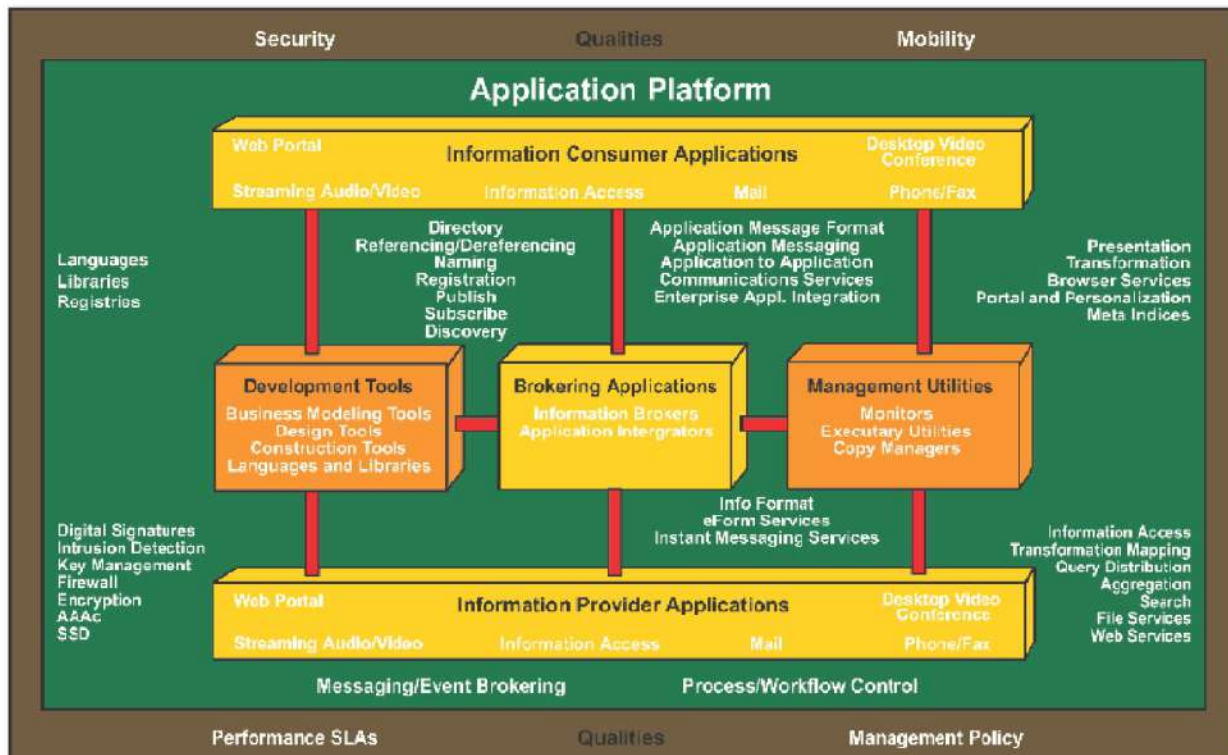
Business Applications

1- Brokering Applications:

which manage the requests from any number of clients to and across any number of Information Provider Applications

2- Information provider Applications:
which provide responses to client requests and rudimentary access to data managed by a particular server

3- 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

Infrastructure Applications

1- Development Tools:

which provide all the necessary modeling, design, and construction capabilities to develop and deploy applications that require access to the integrated information infrastructure, in a manner consistent with the standards of the environment

2- Management Utility:

which provide all the necessary utilities to understand, operate, tune, and manage the run-time system in order to meet the demands of an ever-changing business, in a manner consistent with the standards of the environment

- The Application Platform provides supporting services to all the above applications – in areas such as location, directory, workflow, data management, data interchange, etc. – and thereby provides the ability to locate, access, and move information within the environment
- The Application Software and Application Platform must adhere to the policies and requirements depicted by the Qualities. The Qualities component of the model is supported by services required to maintain the quality of the system as specified in Service Level Agreements (SLAs).

7- Definitions:

❖ Enterprise:

> It is any collection of organizations that has a common set of goals, it could be a government agency, a whole corporation, a division of a corporation, a single department, or a chain of geographically distant organization linked together by a common ownership

❖ Architecture:

> Iso Definition:
>
> It is the fundamental organization of a system, embodied in its components, their relationships to each other and the environmental and the principles governing its design and evaluation

> TOGAF Definition:
>
> 1- It is a formal description of a system, or a detailed plan of a system at a component level to guide its implementation
> 2- It is a structure of components, their inter-relationships, and the principles and guidelines governing their design and evolution over time

❖ Enterprise Architecture:

> The organization logic for business process, and IT infrastructure reflecting the integration and standardization requirements of the firm's operating model to achieve its current and future objectives

❖ Purpose of Enterprise Architecture:

> 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

❖ **Architecture Framework:**

It is a <mark>foundational structure</mark>, which can be used for developing a broad range of different Architecture

Simplify and speedup / Complete coverage / Future growth

ADM – How building blocks fit together – Tools and common vocabulary – List of standards and implement building blocks

❖ **Using TOGAF:**

• Best practice • Risk reduction • Adding value • Worldwide economic solution • Make business information • Iterative process model	• Architecture framework integrated information within and between enterprises • Implement open system • Tool to applying Enterprise Architecture

❖ **Architecture Content Framework:**

It provides a <mark>detailed model of Architecture work product</mark> including deliverables, artifacts, and the Architecture Building Blocks

❖ **Deliverables:**

The <mark>output of projects that is contractually</mark> specified, reviewed, agreed, and signed off by the stakeholders, documented into Architecture repository as a reference model, standard, or snapshot of Architecture landscape at a point of time.

❖ **Artifact:**

It is an Architecture <mark>work product</mark> that <mark>describe an aspect</mark> of the Architecture

❖ **Stakeholders:**

An individuals, teams, organizations, or classes having an interest in a system

❖ **Concerns:**

Are interests in a system relevant to one or more of its stakeholders

❖ **Architecture View: → Iterative process**

> It is a representation of a system from perspective of a related set of concern
>
> It consists of one or more Architecture models of the system

❖ **Architecture Viewpoint:**

> It is a specification of the convention for a particular kind of Architecture view.

❖ **System:**

> Combination of integrating elements organized to achieve one or more stated purpose, specific function or set of functions

❖ **Environment of System:**

> It includes development, technological, business, operational, organizational, political, economic, legal, regularity, ecological, and social influences

❖ **The Architecture of System:**

> It is the fundamental concepts or properties of a system in its environment embodied in its elements, relationships and in the principles of its design and evolution

❖ **Building Blocks:**

> It is simplifying a package of functionality defined to meet business needs
>
> ABBs → Required Capability
>
> SBBs → Implement required Capability

❖ **Enterprise Continuum:**

It provides methods for classifying architecture and solutions artifacts both internal and external to the architecture repository

Foundation → Common system → Industry → Specific

❖ **Architecture Continuum:**

It offers consistent way to define and understand the generic rules, representations, and relationships in an Architecture, including traceability and derivation relationships to show that an organization specific architecture is based on an industry or generic standard

❖ **Solution Continuum:**

It provides consistent way to describe and understand the implementation of the assets defined in Architecture Continuum.