**STUDY GUIDE FOR MODULE NO. 3**

**ARCHITECTURAL VIEWS AND EA MANAGEMENT PLAN**

**MODULE OVERVIEW**

This module aims to introduce the different architectural views and viewpoints in general in Enterprise Architecture and in TOGAF. It also includes EA management plan and its structure.

**MODULE LEARNING OBJECTIVES**

**By the end of this module, you should be able to:**

* Understand architectural views and viewpoints
* Identify current and future architectural views
* Explain EA management plan and structure

**LEARNING CONTENTS**

A view is a depiction of an entire system from the standpoint of a group of concerns. It's used to describe a system from the perspective of several stakeholders, including end users, project managers, developers, and testers. Hence, a software architecture is modeled and documented using architecture views.

A software architecture can be defined using the following:

* UML (Unified Modeling Language)
* Architecture View Model (4+1 view model)
* ADL (Architecture Description Language)

**UML (Unified Modeling Language)**

An Object-oriented solution from the Object Management Group (OMG) that consists of an integrated set of diagrams for specifying, documenting, and visualizing system artifacts.

Primary Goals of UML (by Page-Jones)

* Provide ready-to-use visual modeling language that allows them to create and share meaningful models
* Extend core concepts by providing extensible and specialized mechanisms
* Be independent of programming languages and development process
* Provide formal and concrete basis for modeling language
* Encourage the growth and use of OO tools
* Support higher-level development concepts that promote collaborations and support frameworks
* Able to integrate best practices

UML Addresses the Concerns of the Following Stakeholders

* Analysts
* Designers
* Coders
* Testers
* QA
* Clients
* Technical Authors

7 Types of Structure Diagrams in UML 2

1. Class Diagram
2. Component Diagram
3. Object Diagram
4. Deployment Diagram
5. Package Diagram
6. Composite Structure Diagram
7. Profile Diagram

7 Types of Structure Diagrams in UML 2

1. Use Case Diagram
2. Activity Diagram
3. State Machine Diagram
4. Communication Diagram
5. Interaction Overview Diagram
6. Timing Diagram

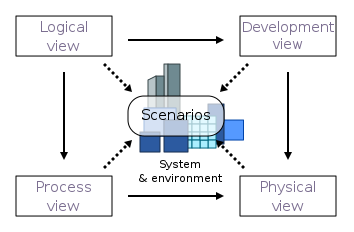
Read: [What is Unified Modeling Language (UML)? (visual-paradigm.com)](https://www.visual-paradigm.com/guide/uml-unified-modeling-language/what-is-uml/)

**Architecture View Model (4+1 view model)**

The “4 + 1 Architectural Views” were proposed in 1995 and represents the functional and non-functional requirements of software applications and architectures.

Separating the architecture into many different perspectives as shown in the figure below had the goal of isolating and illustrating distinct components of the design with information tailored to different stakeholders.

Figure 1:



*From www.devcycles.io*

Architecture Views in the 4+1 View Model

* Logical View

Primarily supports the functional requirements of the system. It illustrates how the system is decomposed into the different areas and how the it should provide in terms of services to its target users.

* Process View

Under the process architecture non-functional requirements such as performance, availability, fault tolerance, and the system’s integrity is considered. The purpose of this view is to illustrate components, actual executables needed by the system, and to capture the flow of information being exchange.

* Development View

In the software-development environment, the development view focuses on the arrangement of the actual software modules. Information and descriptions included in this view is primarily intended for developers, and technical team involved in the development.

* Physical View

Considers the system’s non-functional requirements such as availability, reliability, performance and how the system can be extended. The physical structure such as processing nodes like servers, and networking channels like routers and load balancers are considered in this view to allow designers to compute network capacity, latency and performance.

* Scenario/Use Case View

Scenario or the use case view combines the 4 views, working together seamlessly. It acts as the driver on determining architectural elements and what is to include in the physical, development, process, and logical view.

Graphical user interface, text, application

Description automatically generatedFigure 2:

*From www.tutorialspoint.com*

**ADL (Architecture Description Language)**

ADL defines the software architecture formally and semantically. ADL may be any modeling language that provides notation and rules to define system architectures in visualizations such as flow diagrams and organization charts. Visualizations are often supported by EAM tools and are used to address concerns of EAM stakeholders.

**Common ADL Constructs**

* Components
* Connectors
* Systems
* Ports
* Representations
* Rep-maps

**ADL Characteristics**

* It should be able to depict most typical building styles
* It should be able to support analytical capabilities or generate prototype implementations quickly.
* It should be suitable for information all concerned parties
* It should be suited for tasks such as creation, refinement, and validation of the architecture
* It should be able to provide basis for further implementation

**Mainstream Languages in ADL**

* UML
* ArchiMate

**Other ADL**

* ACME
* Rapide
* Wright
* Unicord
* ABACUS

Read: [Architecture Description Language (ADL) - CIO Wiki (cio-wiki.org)](https://cio-wiki.org/wiki/Architecture_Description_Language_(ADL)#cite_note-4)

**Architecture Views in TOGAF**

Included are concepts on architecture views and viewpoint in TOGAF.

**Role of Architecture Views**

Architecture views are representations of the overall architecture based on the different stakeholders in the system. It may include one or more architecture models that are aligned with each other, providing a meaningful description of the system’s architecture. In TOGAF, the term “architecture” is replaced with the term “view”, in accordance with ANSI/IEEE Std 1471-2000.

**Basic Concepts-4d**

* System – a collection of components organized to perform a common or set of functions
* Architecture – the system’s fundamental organization
* Architecture Description – collection of artifacts that document an architecture
* Stakeholders – people who have concerns or have key roles in the system
* Concerns – an area of interest
* View – representation of the system from a specific perspective
* Viewpoint – defines the perspective

**Core Taxonomy of Architecture Views**

TOGAF’s core taxonomy of architecture views define the minimum set of views to be considered in the development.

1. **Stakeholders**
   * Users
   * System and Software Engineers
   * Operators, Administrators, and Managers
   * Acquirers
2. **Views/Viewpoints**

Example of specific views that may be created in accordance to the following views (business architecture, data architecture, etc.) are tabulated in Table 1.

* + Business Architecture Views

Respond to the user concern and explain the flow of business data between individuals and processes.

* + Data Architecture Views

Addresses the problems of database designers, administrators, and system engineers who are in charge in integrating the system to its numerous database components.

* + Application Architecture Views

Views that focus on resolving issues of system and software developers in charge of the creation and integration to different application software components.

* + Technology Architecture

Addresses the concerns in procurement of COTS software and hardware by operations staff, acquirers, system administrators and managers.

Table 1: Example Taxonomy of Architecture Views

Table

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*From www.opengroup.org*

Table 2: Mapping of “Table 1” to Zachman Framework

Chart, table, treemap chart

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*From www.opengroup.org*

1. **Description**

Here are some of the views indicated in Figure 1 with brief description of its concentration.

* + **Business Architecture Views**

It addresses concerns of users and includes functional aspects from the perspective of the different users involved in the system such as planners and business managers.

* + 1. People View – focuses on human actors in the system
    2. Business Process View – deals with user processes
    3. Business Function View – deals with required functions
    4. Business Information View -deals with required information
    5. Usability View – considers usability aspects
    6. Business Performance View – focused on the usability aspect
  + **Data Architecture Views and Applications Architecture Views**

Addresses concerns regarding databases and focused on how it will be implemented from the perspective of engineers responsible for security, software, data and others.

* + 1. Data Flow View – deals with storage, retrieval, processing and security of data
    2. Software Engineering View – concentrates on the software development considerations such as constraints and possible opportunities
    3. System Engineering View – provides different ways on how software and hardware components can be assembled into a system
  + **Technology Architecture Views**
    1. Communications Engineering View – deals on structuring effective communications facilities
    2. Acquirer’s Views – provides appropriate guidance for purchasing (Includes the 1) Cost View and, 2) Standards View
  + **Composite Views**
    1. Enterprise Manageability View – addresses the concerns in operations, administration, and management of the system
    2. Enterprise Security View – focuses on the security of the system

**Developing the Different Views in TOGAF**

* **Developing a Business Architecture View**

The Business Architecture View is concentrated with addressing the concerns of user.

* **Stakeholder and Concerns**

This developed for the users and must include considerations on the following:

* + - People
    - Process
    - Function
    - Business Information
    - Usability
    - Performance
* **Modeling the View**

Different business scenarios may be used as inputs to the development of Business Architecture view to identify business needs and requirements.

**Key Issues**

Refers to the existing environment and system that may affect the new system. Constraints that may affect the system may be of the following sources:

* Existing internal specification and products
* Goals and objectives
* Business process
* Changes in technology

Business architecture view also addresses the concerns in usability; hence the following are to be considered:

* Ease-of-use and intuitive UI
* Access of data and applications
* Ease-of-management
* Application interoperability
* Online help facilities
* Clarity of documentation
* Security and password protection
* **Developing an Enterprise Security View**

The Enterprise Security View is concentrated with the security aspects of the system.

* **Stakeholders and Concerns**

This type of view should be developed for security engineers of the system and focuses on the implementation of the system based on the perspective of security

* **Modeling the View**

Subjects include components that provide security services.

* **Developing a Software Engineering View**

This view is concentrated with the development of software systems. The following are the major concerns in this view:

* + **Development Approach**

Refers to the lifecycle models of the different software development approaches such as waterfall, prototyping and others

* + **Software modularity and re-use**

The term modularity refers to the division of a piece of software into number of discrete and logically cohesive sub-units that delivers services via a well-defined interface.

* + **Portability**

A concept that concentrates on the ability to take software to a different environment.

* + **Migration and Interoperability**

Interoperability refers to the ability of the new system to operate with the existing or legacy systems.

**Key Issues under the Software Engineering View**

* + Data-intensive and Information-Intensive Software Systems
  + Software Tiers
  + Data Access Tier
  + Distribution
  + Interoperability
* **Developing a System Engineering View**

The system engineering view shows how software and hardware components can be integrated into a working system in a variety of ways. This architecture's perspective also includes proper computing models for a distributed computing environment to assist legacy system migration.

* + **Stakeholders and Concerns**

This perspective should be designed for the system's systems engineering personnel, and it should focus on how the system is implemented from the hardware/software and networking perspectives. System engineers are typically responsible for determining the location, and concerns on modifiability, re-usability, and availability of the components.

* + **Key Issues**

One of the major concerns of this view to migrate legacy systems to a distributed computing environment. The following are the different models used for a centralized environment:

* Client/Server Model
* Master/Slave and Hierarchic Models
* Peer-to-peer Model
* Distributed Object Management Model
* **Developing a Communications Engineering View**

This view focuses on structuring communications and networking elements to simplify and create an effective networking plan.

* + **Stakeholders and Concerns**

This view should be designed for the system's communications engineers, and it should concentrate on how the system is implemented from the communications engineer's perspective. It includes concerns on network and communications requirements.

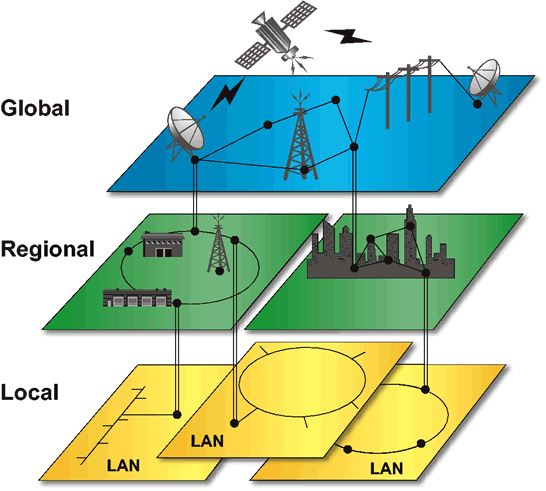
Communications engineers are responsible for the location, modifiability, availability, and re-usability of all communications and networking services.

* + **Key Issues**

The following should be put into consideration as the communications architecture should be with respect to geography, reference model and framework

* Communications Infrastructure
* Communications Model
* OSI Reference Model
* Communications Framework
* Allocation of Services to Components

Figure 3: Communications Infrastructure



*From www.opengroup.org*

Figure 4: OSI Reference Model-4a

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*From www.opengroup.org*

* **Developing a Data Flow View**

This view is concerned with the storing, processing, retrieving, archiving, as well as the security of data and is developed for database engineers.

* **Stakeholders and Concerns**

Stakeholders for this area is concerned with assuring ubiquitous and appropriate access of data for the right people.

* **Modeling the View**

Modeling of the database is usually done using ERD, schema and document type definitions.

* **Key Issues**

The following are important aspects under database management:

* Database Management Systems
* Database Models
* Distributed DBMSs
* Distributed Heterogeneous DBMSs
* Data Dictionary/Directory Systems
* Data Administration
* Repository
* Database Administration
* Data Security
* **Developing an Enterprise Manageability View**

This view is concerned with the operations, administration, and management of the system.

* Stakeholders and Concerns

Focuses on the understanding on how the system and its components will be and can be managed. It also includes predicting and identifying necessary preventive maintenance. Components that will be managed may include the following:

* Security Components
* Data Assets
* Software Assets
* Hardware Assets
* Networking Assets
* Modeling the View

Business scenarios may be considered to predict preventive maintenance for unplanned events.

* Key Issues

The following are key issues that architects may consider in constructing or identifying business scenarios:

* Policies, procedures, and guidelines
* System availability
* Required management services and utilities
* Quantity, quality, location of management and support personnel
* Ability of users to system management tasks and maintenance
* Manageability of existing and planned components
* Identifying whether management is centralized or distributed
* Determining whether security is assigned to system managers or separate group
* **Developing Acquirer’s View**

This view is for personnel involve or in charged with the acquisition.

* **Stakeholders and Concerns**

Major concerns of stakeholders in this area involves proper understanding identifying the appropriate components or building blocks of the architecture. It also includes knowledge on constraints that may arise to purchases of necessary or possible products.

* **Modeling the View**

This view is typically represented as SBBs or Solution Building Blocks that are guided with standards.

* **Key Issues**

The following the procurement process steps that is important to be considered:

1. Acquisition Planning
2. Concept Exploration
3. Concept Demonstration and Validation
4. Development
5. Production
6. Deployment

Read: [Developing Architecture Views (opengroup.org)](https://pubs.opengroup.org/architecture/togaf8-doc/arch/chap31.html)

**EA Management Plan**

The enterprise's performance gaps, resource requirements, planned solutions, a sequencing plan, and a review of the existing and future architecture are all documented in the EA Management Plan which is also updated at regular intervals that will serve as guides for current and plans. It also includes the governance process, implementation of the methodology, and the documentation of the framework.

A picture containing timeline

Description automatically generatedFigure 5: Diagram of EA Management Plan (from www.coggle.it/amazonaws.com)

**LEARNING ACTIVITY**