A Framework for the proper implementation, best practices, outlines, and the expected value of the Enterprise Architecture

by

Harun S. Alrasheed

A research project submitted for the requirements of the degree of Executive Master of Cybersecurity

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XXX 1442 H - February 2022 G

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Dedication

To...
My Family for sparing no time or effort to educate me, and for their continuous support.

Acknowledgments

I like to acknowledge ...

The Governmental and non-governmental organizations (STC, TCC, DGA, MCIT, NIC, SDAIA, SEU) for their valued contributions to collect the required information to reach for the current market situation and how they managed to succuss the Enterprise Architecture deployment.

Abstract

The technological applications on the real life have been tested during the COVID-19 era, which demanded nearly every commercial or non-profit institutions for the technological transitioning to survive the time and continue providing their services or products. Such a demand on technological infrastructure may overlay the need to perform a restructuring within the internal institution structure of the institution. Basic search and you will find out that the scientific literature indicate that the enterprise architecture is a trending concept between technological because of its unique added value to the institution at such cases especially when the institution decided that the information technology department became a primary stakeholder when it comes to setting the institutional strategy and the way to achieve it.

Key Word: *Enterprise Architecture, Information Technology, Framework, Implementation, Methodology.*

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institution Governmental or non-governmental organization.

CEx Any Chief Executive. 1

NORA National Overall Reference Architecture. 6

Chapter1

Executive Summary

1.1 Summary

Strategically, Enterprises race to promotes the IT department, regarding to the department size or the activity of the enterprise due the information technology value that is added to everything that the information technology become part of it. It revealed the capabilities of their organization and where information technology can carry them to.

For every organization to build a healthy strategy, it is crucial for them to include information technology executives in the process of building the organization strategy. Because no strategy can be built without drawing the boundaries of its limitations and knowing the capabilities with the limitations. Other thing that modern strategist depends on is the Key performance Indicators (KPIs) and Objectives and Key Results (OKRs). It can provide accurate assessment and measures if it has been developed and implemented by the information technology solutions, and it is working beside the Decision Support Systems for a journey toward the strategic vision with a credible visibility of all transitionary phases of it.

So, it turns out that information technology is a major factor of the success or the fail

of any modern organization and not only playing a supportive role as it was considered before Because of the large budget to implement it and maintain it and the huge advantages that it can provide.

Chapter2

Introduction

2.1 Introduction

It is well known that structuring a framework that helps the institutions to get the perfect added value of the Enterprise Architecture demands us to recognize the current situation of the local businesses market in the business field itself, and in the information technology field.

Information Technology Area:

Governmental institutions were looking to technology as a burden and there is no value that information technology solutions can add to their framework, so they tend to stand still at their traditional way of processing the workloads manually [1][2].

Another point that Governmental and Non-Profitable organizations make about information technology solution that it is really hard to maintain the solutions' security and keeping it up and running effectively as a part of the availability mission, and it is hard to ensure the solutions integrity for the non-IT professionals.

While most of the information technology companies does not use the solutions for roles that it provides mor then being supportive. Yes, it is true, most of the

institutions are using information technology solutions as a supportive system.

To be fair, some of the organizations were realistic about their situation and realized that the need to improve the IT solutions and its department is a necessity to keep up the technological transformation in the world.

Unfortunate events of COVID-19 Led to a fortunate reaction all around the globe specially in Saudi Arabia, with the beginning of the quarantine all of those institutions faced a dreaded test to embrace the information technology as a savior to the hole institutions through the Business Continuity solutions, the remote access, E-commerce, Self-Services, Workflow, Approval engine, Enterprise Resources Planning systems, and other systems that helped institutions to overcome the pandemic with the least loses possible.

Business Area:

Although the information technology where available at a reasonable price and satisfying variety of options, many organizations choose to conduct their businesses traditionally. It is the convenient way to ignore the calls for improvements if the services or the products are delivered with acceptable rate and satisfaction about the organization performance leads to neglecting the need for development. Going after the reinforcement of the information technology and its solutions were in need to a visionary decision to invest a lot of the resources in particular way for the future of the organization. It was viewed as step that have been walked by a small portion of the governmental and private sectors[2][3].

2.2 A Step further

Although that the Enterprise Architecture may be the elixir to the institution, but it is a very complicated procedure to restructure the information technology department according to the Enterprise Architecture principles, and it is more difficult to make the IT professional and the other departments to accept its essence and believe in its value. Of course, such an atmosphere will develop a deformation to change the right scope of the Enterprise Architecture. That for sure if it is not properly mitigated at the beginning it will result a defected form of Enterprise Architecture and will impact the institution negatively.

Chapter3

Review of Related Work

3.1 Clustered Problems

The obvious issue that relates to the EA implementation appeared as a clusterated issues, one help to bring up another one with its own cascade of issues. The issues take a clusterated form as if it is an issue that lead to another issue. While categorizing the issues that were collected from different institutions a symmetrical pattern was revealed **(Figure 1)**.

The problems tracking process started from the early stages of Planning to design the proper EA model to the enterprise until the Benefits of it begins.

3.1.1 Harmony

Disagreements over the control of the final decision between the Businesses Unites and the Information Technology Units is often will lead to a deviation in sorting and assigning the roles and the responsibilities in a righteous way [1][2].

a) Business:

There is a reasonable perspective for both Businesses units' representatives, where they try to seize an opportunity or meeting a necessity. It is basically

an outdoor point of view [2].

b) IT:

While the Information Technology profissionals protecting from the inside to the outside [1][2].

3.1.2 Adaptivity

Realizing the need for Enterprise Architecture usually begins with a good example of it, a practical deployment of the Enterprise Architecture literature behind it. That may form an idealistic picture about how every organization should conduct the work processes or create an urgent need of some of the Enterprise Architecture tools.

a) Imitation:

A state of dispersion happens when the leaders of an organization try to imitate the Enterprise Architecture experience of another organization without considering the need for adaptability to the organization nature [3].

b) Dilution:

Another distorted form of Enterprise Architecture implementation occurs when the leaders of an organization try to use some of the Enterprise Architecture tools and discard the rest of it, or to abuse the Enterprise Architecture structure to provide fair solutions or settle a compromise [2].

3.1.3 Scale

One of the most failing factors getting the proper scale wrongfully. It is about executing the Enterprise Architecture principles within the organization limitation otherwise it will create an extra burden on the information technology and the business personals, or it will be with a limited or low efficiency.

a) Exaggeration:

Enlarging the Enterprise Architecture unit defiantly will burden the institution with unnecessary precise practices without tangible value. It will become overwhelming for the organization [3][4][5][6].

b) Destitution:

Neglecting the right scale to cover all of the organization aspect will create a shortage of the Enterprise Architecture role in the organization which may lead to Enterprise Architecture malfunction [1][2][7].

3.1.4 Resistance

Usually, any strategy or a new structure are confronted with some form of Resistance. In the case of the resistance of Enterprise Architecture that could develop a polarity form where one side represents the positive resistance while the other comes in a negative way [3][4][5][6][7].

a) Hijacking the Structure:

Enterprise Architecture sometimes divide the workload into multiple levels depending on the experience and the consumption of knowledge that every personal have. It is dangerous to assign roles within the Enterprise Architecture otherwise [3][6][7].

b) Rejection for Change:

Many employees refuse to comply to the changes that touch their daily work processes, and the reason behind that is the fear of losing the ability of conducting the work at an efficient level or losing their value and being expandable. It is a necessary step must be considered to involve all the stakeholders of a change in developing the form of the change, but the participation should be acceptable to certain limit [1][2][5].

3.1.5 Coordination

Before announcing the Enterprise Architecture, the roles of every section, department, even every desk related to Enterprise Architecture should be clear. Due the absence of roles is a threatening factor for the healthy deployment of the Enterprise Architecture.

a) Fall Behind:

One of the most important aspects of Enterprise Architecture is the proper utilization of the organization resources, that lead to assigning the right responsibility to the right competencies. So, from that point of view, when

the leaders layout the Enterprise Architecture plan it should be clear for each employee what is his role and what is expected from him or he will not attend to his duties to the organization [5][7].

b) Carry out Extra Tasks:

For the same points in the previous point, some of the employee could suffer the endurance of his duties beside the pre-structure responsibilities. That happens usually because the high competence of that employee or of the department itself.

Overloading an employee or a department could overwhelm their performance [1][2][3][5][7].

3.1.6 Exceptions

A form of a loose Enterprise Architecture could be the result when it is easy for many of the processes to override the Enterprise Architecture principles and guidelines. Another way is being stiff form when it is uncapable to encounter a situation that demand flexibility.

a) Transcendence:

Implementing Enterprise Architecture in an organization without understanding what the value that it could add would encourage the employee to override it, that would weaken the Enterprise Architecture contribution to the organization [3][4][5].

b) Spasm:

Systematic workflow and automated approval engines made it easy for the organization to enforce its employees to follow certain processes with certain form that the employee cannot override it without an executive permission. That could decrease the flexibility of the organization reacting to opportunities that demand a quick response [1][2][7].

3.2 Delugement in Executing side and Negligence of the other sides

Many Enterprise Architecture offices take care of some of their responsibilities and leave the rest behind, such as the technical architecture for the information technology solution while the validation of the business model in comparison to the cost of the solution is overlooked [1][2].

Another field is paying too much attention the assessment process, they usually assess the solutions providers offers instead of assessing the technical assessment of the technologies and the solutions that are provided [2][7].

3.3 Redundancy

Enterprise Architecture comes with its need for the control over some of the roles in the organization such as Governance and Procurements. The

intersection with other department such as the information security and strategy for helping the with Governance, and with the financial department to participate int the procurement processes can lead to Conflict in the responsibilities and the roles with Enterprise Architecture [1][2][3][4][5][6].

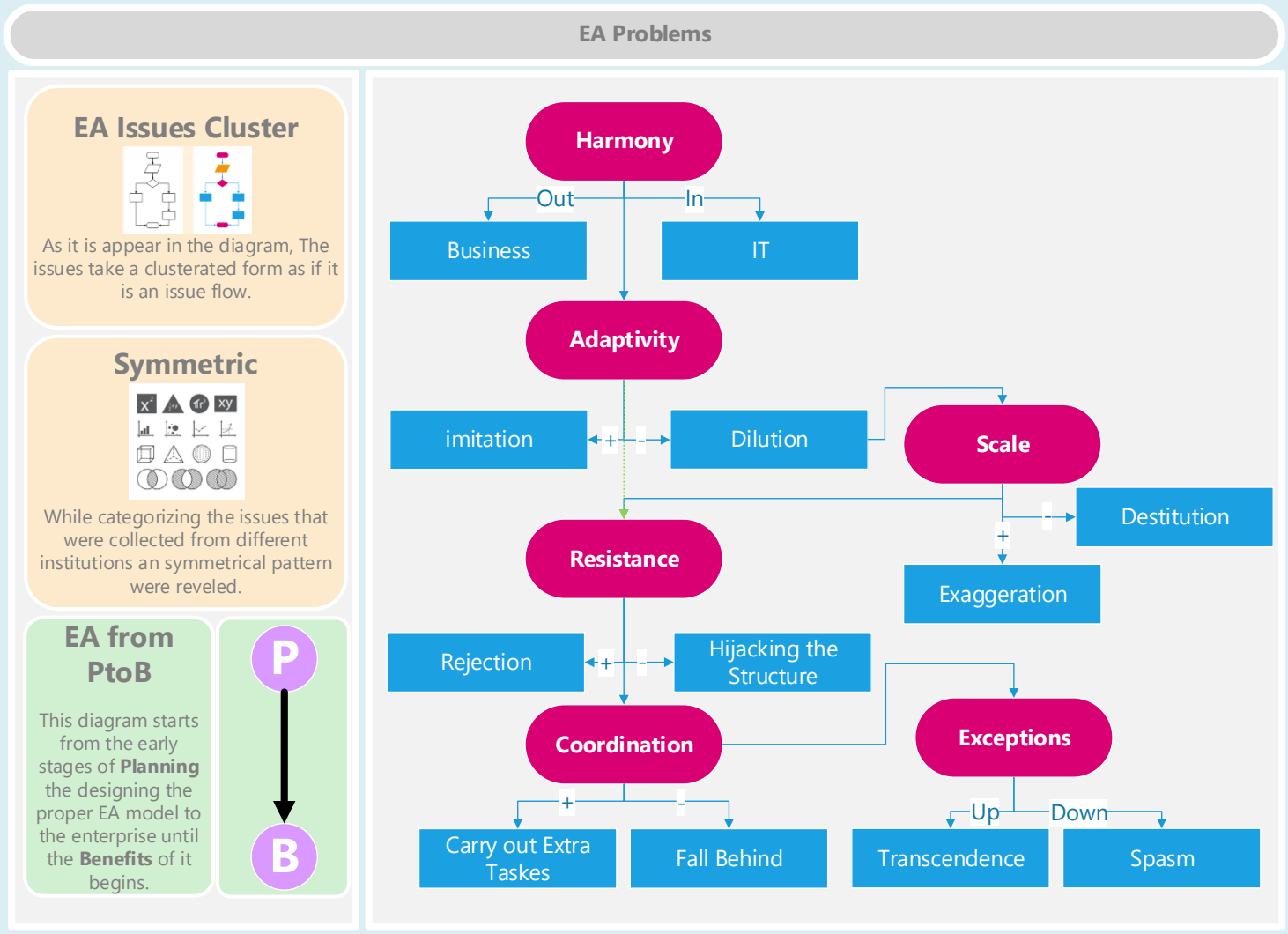


Figure 1 (Enterprise Architecture Problems)

Chapter4

Methodology

4.1 Working with tools

Implementing the best form of Enterprise Architecture for cerine institution should be bound by applying some tools that may help to evade or encounter any Enterprise Architecture problems. These tools' development was based on the diagram of the EA Problems above:

1st Tool (Workshops):

Workshops are vital characteristic of healthy work environment which gains its value by open a dialog about certain subject to reach a solution, understanding, or mutual plan to reach a point. It may be in form of a usual meeting, or it can be huge public access event to share or earn knowledge or resources within a mutual interest between the participants parties. Awareness is one of the must common ways to spread knowledge about an idea or about initiatives. Another way to reinforce acceptance in organizations is through the training, while one of the most critical points that create resistance is the fear of losing the ability to perform under the new restructuring. Training encounter that fears by providing new skills to the employees. So, wither it is meeting, Awareness sessions, or Training, all the forms of workshops

work well in solving enterprise architecture implementation issues [8][10].

2nd Tool (Restructuring)

Whenever an institution intends to implement Enterprise Architecture methodology, it is necessary to bring professionals on a department that have the capacity to be considered as the Enterprise Architecture Office at least. Housing those professionals on that new department should follow specific way of creating the vacancies. It is two-side process, the first side depends on functionality and the other depends on practice [9][10].

That augments brought to me by many of the institutions that I discussed this topic with, they insisted on creating a new job family to specify their functional level in the organization depending on their position.

The purpose of the jobs in the Technology Architecture and Performance job family is to lead as-is architecture and migration strategies to to-be architecture of all the Organization systems and applications (data, application, infrastructure, core architecture), ensure alignment between architectural solutions with business needs and strategy, drives research activities on emerging technologies, and ensure compliance with policies, procedures, laws and regulations related to Technology Architecture. This job family also constitutes jobs responsible for iidentifying & ensuring implementation of all lead indicators / KPI's to monitor performance of technology assets, conduct root cause analysis on potential deterioration and manage risks [1][2][3][5][6].

Typical Value Contribution Areas:

- Timeliness and accuracy in defining Technology/Enterprise Architecture roadmap
- Timeliness and accuracy in aligning technology strategy & roadmap with organization and business strategy
- Adherence of Enterprise Architecture to globally established standards
- Percentage of business requirements fulfilment through Technology/Enterprise Architecture
- Accuracy in designing the integration of all Technology/Enterprise Architecture requirements
- Timeliness in developing the migration and new technology mapping implementation accurately and on time
- Efficient review of application, information, business, data architecture requirements for compliance with Enterprise Architecture
- Percentage of satisfaction and performance level on the functionality of the solutions
- Timeliness and accuracy in data collection, analysis and reporting
- Timeliness and accuracy in system enhancements
- Percentage of costs optimized through effective planning, deployment and implementation
- Timeliness and Quality of documentation of all artefacts in the Architecture repository

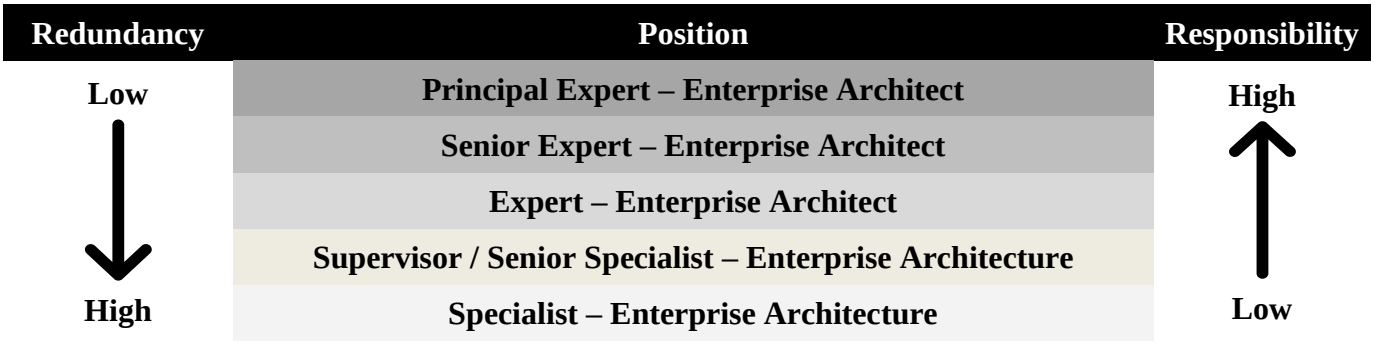


Figure 2 (Enterprise Architects Job Family) [1][2]

1. **Principal Expert – Enterprise Architect:**

Experts at this level are responsible for providing architectural expertise, insights, and experienced counsel in the area of Technology/Enterprise Architecture, achieving effectiveness, efficiency, agility and durability, and implementing companywide architecture. Also, they are responsible for advising on strategic mandates to minimize architectural and operational risks and leverage potential opportunities and monitor the performances of technology assets.

Enterprise Architecture Role:

- Verify the gaps between the as-is and to-be architectures and defines transition strategies for addressing those gaps.

- Map current architecture landscape to develop the to-be architecture.

- Advise on the development of coherent and integrated technology

roadmap for the organization including data, applications, infrastructure, core support systems, data analytics and cyber security.

- Advise on the compliance with organizational and technology policies, procedures and quality standards across all Technology/Enterprise Architecture domains.

- Collaborate with relevant stakeholders to create architectural principles, standards and guidelines.

- Advise on the simplification of architecture component to drive operational efficiency and cost optimization.

- Guide the changes to be made in the Architecture for the application(s)/infrastructure/data/core to align it accurately with business requirements.

- Demonstrate the business value of Enterprise Architecture as an enabler of strategy formulation, and as support for technology innovation.

- Construct technology-enabled operating models and provide viable options and visibility into implementation and execution issues.

- Support documentation of technology related artefacts in line with approved standards and methodologies.

Technology Performance Role:

- Provide expert advice on setting and implementing adequate governance and process interfaces to coordinate with respective stakeholders on managing performance trends for technology assets and implementing corrective actions on areas of improvements identified.

- Provide expert advice on the implementation of all lead indicators / KPI's to monitor performance of technology assets.

- Advise on timely analysis of all performance KPIs and metrics to identify degradations or deteriorations in services and predicting potential areas of concern.

- Define the deployment and implementation philosophy and standards for Enterprise Architecture and monitors their performance to drive efficiencies.

- Verify architectural models, performance reports and optimization requirements are communicated to all key internal stakeholders.

- Act as an advisor, providing expertise on operational work processes, policies and compliance guidelines pertaining to Technology/Enterprise Architecture.

- Shape the formulation of Technology/Enterprise Architecture initiatives and ensures communication and implementation the same.

Generic Role:

- Act as an advisor, providing expertise on work processes, performance philosophy and compliance standards pertaining to deployment and implementation.

- Advise and resolves highly complex escalations as reported within the area of developing, deploying and implementing Enterprise Architecture.

- Evaluate market and internal trends and changes to proactively drive improvements in developing and deploying Enterprise Architecture and in other strategic work processes in order to mitigate long term technical and business risks.

- Drive an 'outside in' approach, ensuring that a world class system encompassing all practices for the deployment and implementation of Enterprise Architecture are adopted, instituted and complied with.

2. Senior Expert – Enterprise Architect

Experts at this level are responsible for providing architectural expertise and insights in the area of Technology/Enterprise Architecture, achieving effectiveness and efficiency and implementing the same across the Organization. Also, they are responsible for advising on strategic mandates to minimize architectural and operational risks and leverage potential

opportunities and monitor performances of technology assets.

Enterprise Architecture Role:

- Verify the gaps between the as-is and to-be architectures and defines transition strategies for addressing those gaps.

- Advise on the development of integrated technology roadmap for the Organization including data, applications, infrastructure, core support systems, data analytics and cyber security.

- Advise on the compliance of technology policies, procedures and quality standards across all Technology/Enterprise Architecture domains.

- Collaborate with relevant stakeholders to create architectural principles, standards and guidelines.

- Provide expert advice on data sources architecture and how data flows into the Metadata layer within & across online transaction processing (OLTP) systems.

- Advise on data integrity, accuracy by avoiding any redundancy and optimize data storage and reduce costs.

- Advise on Enterprise Architecture governance processes requirements related to Enterprise Architecture.

- Advise on the specifications of the Servers Consolidation and Operations technology.

- Innovate in design engineering, and deployment of the Cloud Infrastructure in the most cost - effective manner.

- Advise on the provision of fixed/mobile, integrated, reliable, high-quality services for the Organization in areas such as backbone and local area networking, network facilities and infrastructure, internet access, high-performance networking, network security, and telecommunications.

- Advise in the design, monitoring and optimization of architecture components for applications, business architecture, technology and information elements and ensures compliance with leading frameworks.

- Support in design of Architecture related standards and methodologies

- Support in documentation of all architecture related documentation in approved repositories and tools

Technology Performance Role:

- Advise on architectural models, performance reports and optimization requirements are communicated to all key internal stakeholders.

- Advise on mid-term to long-term wireless, fixed access network, optical, microwave and routing/ switching performance trends and deteriorations identification including any chief executive (CEx).

- Monitor technology related CEx and service performance trends based on the customer journeys received from the “business analyses and customer journeys” or “analyses” functions.

- Act as an advisor, providing expertise on work processes, performance philosophy and compliance standards.

- Defines the way of deployment, implementation philosophy and standards & solutions and monitors their performance.

Generic Role:

- Advise recommends, remedial actions and measures for course correction on specific complex escalations.

- Drive an ‘outside in’ approach, ensuring that a world class system encompassing all practices for the deployment and implementations are adopted, instituted, and complied with.

- Analyze internal trends and patterns to identify potential issues and undertakes preventive measures to mitigate medium term technical and business risks.

- Analyze market best practices to identify potential areas of improvement on critical work processes and makes recommendations.

- Produce weekly and monthly reports on a timely manner and share with

relevant parties for decision making purpose.

- Evaluate reports and metrics, identifying potential issues and undertakes preventive measures to mitigate relevant technical and operational risks.

3. **Expert – Enterprise Architect**

Experts at this level are responsible for providing technical expertise pertaining to designing, deploying, and implementing Enterprise Architecture across the company in order to ensure business continuity. Also, they are responsible for advising in the development, control, and optimization of architectural components (business architecture, technology, information, network, and application elements).

Enterprise Architecture Role:

- Collaborate with relevant stakeholders to create architectural principles, standards and guidelines.

- Advise on data integrity, accuracy by avoiding any redundancy and optimize data storage and reduce costs.

- Advise on the specifications of the Servers Consolidation and Operations technology.

- Advise on the provision of fixed/mobile, integrated, reliable, high-quality services for the Organization in areas such as backbone and local area

networking, network facilities and infrastructure, internet access, high-performance networking, network security, and telecommunications.

- Advise in the design, monitoring and optimization of architecture components for applications, business architecture, technology and information elements and ensures compliance with frameworks such as Service Oriented Architecture (SOA), TMF Framework etc.

- Evaluate the gaps between the as-is and to-be architectures and defines transition strategies for addressing those gaps.

- Act as an advisor, providing expertise on operational work processes, policies and compliance guidelines pertaining to IT Architecture.

- Advise on the formulation of IT Architecture initiatives and ensures communication and implementation the same.

- Evaluate changes to be made in the Architecture for to align accurately with business requirements.

- Support the development of the project lifecycle and provides technical leadership for every aspect of the architecture being developed and deployed.

Technology Performance Role:

- Ensure that architectural models, performance reports and optimization requirements are communicated to all key internal stakeholders.

- Guide the definition of standards for Architecture Components for applications, business architecture, technology and information elements) to drive efficiency.

- Advise on mid-term to long-term wireless, fixed access network, optical, microwave and routing/ switching performance trends and deteriorations identification including CEx.

- Monitor technology related CEx and service performance trends based on the customer journeys received from the “business analyses and customer journeys” or “analyses” functions.

Generic Role:

- Act as an advisor, providing expertise on operational work processes, policies and compliance guidelines pertaining to the deployment and implementation architecture.

- Provide an ‘outside in’ perspective and ensures that a world class system encompassing all practices for the deployment and implementation.

- Review work processes to identify potential areas of improvement and supervises their implementation.

- Provides recommendations, remedial actions and measures for course correction on specific complex escalations.

- Advise on the formulation, deployment and implementation initiatives and ensures communication and implementation of the same.

- Suggest remedial actions and measures for course correction on unresolved escalations.

- Analyse reports and metrics, identifying potential issues and undertakes preventive measures to mitigate relevant technical and operational risks.

4. **Supervisor / Senior Specialist – Enterprise Architecture**

Jobs at this level are responsible to supervise the design, deployment, and implementation of Enterprise Architecture across the company in order to ensure business continuity. Also, they are responsible for development, control, and optimization of architectural components (business architecture, technology, information, network, and application elements).

Enterprise Architecture Role:

- Work with relevant stakeholders to create architectural principles, standards and guidelines.

- Ensure data integrity, accuracy by avoiding any redundancy and optimize data storage and reduce costs.

- Supervise the specifications of the Servers Consolidation and Operations

technology.

- Make provision of fixed/mobile, integrated, reliable, high-quality services for the Organization in areas such as backbone and local area networking, network facilities and infrastructure, internet access, high-performance networking, network security, and telecommunications.

- Ensure optimization of architecture components for applications, business architecture, technology and information elements and ensures compliance with frameworks such as Service Oriented Architecture (SOA), TMF Framework etc.

- Contribute in evaluating the gaps between the as-is and to-be architectures and support in defining transition strategies for addressing those gaps.

- Supervise operational work processes, policies and compliance guidelines pertaining to IT Architecture.

- Supervise formulation of IT Architecture initiatives and ensures communication and implementation of the same

- Evaluate changes to be made in the Architecture for to align accurately with business requirements.

- Support the development of the project lifecycle and provides technical leadership for every aspect of the architecture being developed and deployed.

Technology Performance Role:

- Contribute in building architectural models, performance reports and ensure optimization requirements are communicated to all key internal stakeholders.

- Contribute in defining standards for Architecture Components for applications, business architecture, technology and information elements) to drive efficiency.

- Supervise mid-term to long-term wireless, fixed access network, optical, microwave and routing/ switching performance trends and deteriorations identification including CEx.

- Monitor technology related CEx and service performance trends based on the customer journeys received from the "business analyses and customer journeys" or "analyses" functions.

Generic Role:

- Supervise operational work processes, policies and compliance guidelines pertaining to the deployment and implementation architecture.

- Maintain external awareness of developments in technology in order to develop system improvement plans for use in the design, development and modifications.

- Coordinate across a number of work units within the specified area of work, to

ensure efficient work flows and accurate outputs.

- Manage projects and initiatives, as may be required by the reporting senior.

- Implement "best practice" solutions and processes, in compliance with relevant quality standards.

- Supervise work teams, if needed, to ensure work continuity.

- Liaise with other supervisors to build effective working relationships and identifies synergies.

- Develop and supervise respective team members, if needed, for undertaking higher responsibilities.

- Analyse reports and metrics, identifying potential issues and undertakes preventive measures to mitigate relevant technical and operational risks.

5. **Specialist - Enterprise Architecture**

Jobs at this level are responsible to support the design, deployment, and implementation of Enterprise Architecture across the company in order to ensure business continuity. Also, they are responsible to support in the development, control, and optimization of architectural components (business architecture, technology, information, network, and application elements).

Enterprise Architecture Role:

- Support in ensuring data integrity, accuracy by avoiding any redundancy and optimize data storage and reduce costs.

- Ensure specifications of the Servers Consolidation and Operations technology.

- Support in providing fixed/mobile, integrated, reliable, high-quality services for the Organization in areas such as backbone and local area networking, network facilities and infrastructure, internet access, high-performance networking, network security, and telecommunications.

- Work to optimize architecture components for applications, business architecture, technology and information elements and ensuring compliance with frameworks such as Service Oriented Architecture (SOA), TMF Framework etc.

- Participate in evaluating the gaps between the as-is and to-be architectures and support in defining transition strategies for addressing those gaps.

- Participate in operational work processes, policies and compliance guidelines pertaining to IT Architecture.

- Work on the formulation of IT Architecture initiatives and ensures communication and implementation of the same.

- Support in evaluating changes to be made in the Architecture for to align accurately with business requirements.

- Participate in the development of the project lifecycle and provides technical leadership for every aspect of the architecture being developed and deployed.

Technology Performance Role:

- Participate in building architectural models, performance reports while ensuring optimization requirements are communicated to all key internal stakeholders.

- Participate in defining standards for Architecture Components for applications, business architecture, technology and information elements to drive efficiency.

- Ensure technology related CEx and service performance trends based on the customer journeys received from the “business analyses and customer journeys” or “analyses” functions.

Generic Role:

- Manages day-to-day team operations within a specified scope, by undertaking related work processes and ensuring accuracy.

- Perform Technology Architecture & Performance dimensioning and capacity planning for new services.

- Conduct vulnerability tests in order to assist senior management in assessing

security risks to the systems and equipment.

- Maintain external awareness of developments in technology in order to develop infrastructure & system improvement plans for use in the design, development and modifications.

- Evaluate existing and potential systems/equipment, in order to identify irregularities/discrepancies.

- Support team members and resolves routine queries to ensure work continuity.

Cluster		Effectiveness				Giving Direction & Support				Building Relations			
Competency		Strategic Orientation	Analytical thinking	Achievement	Investment Thinking	Integrity	Teamwork	Leadership	Developing Others	Flexibility	Building Relationships	Impact & Influence	Customer centricity
Proficiency	**Principal Expert**	4	4	4	4	4	5	4	4	4	4	4	4
	Senior Expert	3	3	3	3	3	4	3	4	3	3	3	3
	Expert	2	3	3	3	2	3	2	3	2	2	2	2
	Senior Specialist	-	2	2	-	1	2	-	1	2	2	-	2
	Specialist	-	2	2	-	1	2	-	-	1	2	-	2

1	2	3	4	5
Adapting, Coping, Organizing, Executing.	Creating, Conceptualizing, Analyzing, Interpreting.	Interacting, Presenting.	Supporting, Cooperating.	Leading, Deciding

Figure 3 (Enterprise Architects positioning Proficiency) [1][2][7]

From the functionality point of view its focuses on the role of the Enterprise Architects and how they should contribute [8]:

1. **Information Communication Technology (ICT) Steering Committee:**

Top-Level Governance for the whole procedures and for detraining priorities and approve budgets in a comparison to technical solution.

2. **Business Customers:**

For the different businesses unites point of view, they are the top representatives.

3. **Engagement managers:**

They are the interface of the Enterprise Architecture Department and usually encounter Businesses Customers.

4. **Solution consultants:**

Group of solutions architects that are looking for high-level business requirements for the projects from potential users.

5. **Business analysts:**

Eliciting and collecting the business requirements with details for information technology projects from potential future users.

6. **Project managers:**

Supervise the implementation of project activities and connections with users

and other business stakeholders of information technology projects.

7. Project implementers:

Technical teams and members.

3rd Tool (Reengineering

The Enterprise Architecture Office has an important role in implementing the government entity's strategy and achieving the target architecture through the transformation roadmap. In order to enable the office to carry out its roles effectively, the structure of Enterprise Architecture Office is built and positioned in the organizational structure based on the direction and requirements of the government entity.

It's recommended that the Enterprise Architecture Office should be positioned on the business side (Strategic Planning/Governance etc.) in order to enable the office to serve all entity's sectors

As much it is important for the executive level empowerment for the Enterprise Architecture as much it is important to find the appropriate positioning for the Enterprise Architecture unit. It is acceptable for the Enterprise Architecture to be part of the Information Technology structure for definite reasons, such as when the institution looks for a precis development on its technological wings which inevitably will improve the businesses for that

institution or to be presented as an office with a clear affiliation to the CEO office [9].

Enterprise Architect Layers	Association	Field of interest
Eco-systemic	Executives	**Business Follows IT:** • Focus on resilience. • Value innovation.
Socio-Technical	Flexible	**IT Enables Business:** • Focus on validity. • Engineering futuristic values.
Technical	Information Technology Dept.	**IT Follows Business:** • Focus on reliability. • Present day value realization.

Figure 4 (Enterprise Architecture Layers) [9]

These Tripartite would help effectively with the right positioning and scaling of the Enterprise Architecture unite and how to be embedded in the organization. Further knowledge in this regard, is how the affection of the Enterprise Architecture unite location in the organization structure would be on the functionality and the characteristics of it.

	Under IT	Under CEO
Characteristics	EWITA (Enterprise-Wide IT Architecture)	EA
Affection	Restructuring	Reengineering
Area	Resource Area	Organizational Level
Earnings	Resources	Competency

Strategy of Designing	Focused on the number of objects and connections	Changing the position of objects or connections
Governance Scope	Operational systems	Transformation systems
Outcomes	Reliability and Efficiency	Validity and Effectiveness
Complexity	Statical	Dynamical
Modeling Vision	Functionalist	Constructivist
Ontology	Objectivist	Subjectivist
Epistemology	Empirical inquiry, scientific model, inductive logic	Based on systemic models

Figure 5 (Enterprise Architecture Position) [9]

4th Tool (Resources, Competencies, Capability)

Enterprises fundamentally stand on its resources which may be in form of skills, hardware, software, infrastructure, or even the knowledge that build it. Utilizing these resources to come up with processes, roles, or structures can provide the capabilities to conduct the business. In that multi-leveled structure, the executives may find it easier to measure where and how the enterprise architecture unit may be most effective when it is on the Resources>Competencies>Capabilities sequence [9][11][12].

5th Tool (Enterprise Architecture **Documents)**

Defining the architectural work by documentations is the optimal way to create clear and stable Enterprise Architecture unit, at this field there are so many

pre-defined documents that is widely used, and it is can be categories in four categories [8][11][13]:

1. **Investment and Planning Documents** are the documents that helps business managers in planning and making decisions regarding investments (*The Roadmap document, Business Capability Model (BCM), and Program of work*).
2. **Consultation Documents** for the technical architects to understand the possibility options in projects implementation (*One Page Diagram, and Technology Reference Model (TRM)*).
3. **Governance Documents** which draw the enterprise rules that are applicable to every project (*Standards, Maxims, and Principles*).
4. **Project Documents** the type of documents that describes the designs of IT projects individually beside their alignments and how to fit to the overall architecture (*Solution Designs, and Conceptual Architecture*).
5. **Enterprise Architecture Artifacts** is considered as a core element of the enterprise architecture practices, the materialistic and the tangible aspect of an enterprise architecture with its typical informational contents and representation forms, usage with development also considered as a part of the enterprise architecture practices to apply the practical roles and its organizational context purposes.

The Considerations Standards Vision Landscapes Outlines Designs (CSVLOD) Model describes the value of each type and the artifacts that comes with it in details:

- **Consideration** represents the important and fundamental consideration for the business and its

relevance to the Information technology point of view. It is mostly viewed as planning for decisions about how an institution would work from information technology perspective.

Principles

Principle 1: Standardized Business Processes
Statement: .....
Rationale: .....
Implications: .....

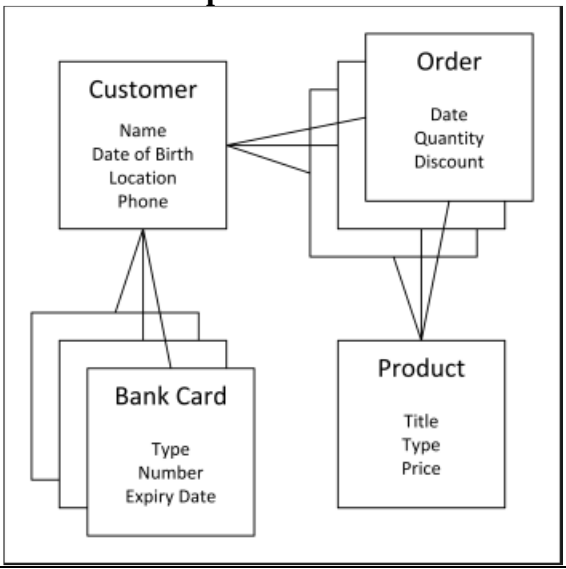
Principle 2: Single Customer View
Statement: .....
Rationale: .....
Implications: .....

Principle 3: Business Continuity
Statement: .....
Rationale: .....
Implications: .....

Policies

External	National Privacy Policies	Policy 1: Personal Data Must Be Stored Onshore Description: .....
		Policy 2: Destroy Personal Data When Not Needed Description: .....
	Sarbanes-Oxley Policies	Policy 3: Log All Accesses to Accounting Systems Description: .....
		Policy 4: Retain Audit Trails and Emails for 5 Years Description: .....
Internal	Data Security Policies	Policy 5: No Sensitive Data on Mobile Devices Description: .....
		Policy 6: Store Credit Cards in Encrypted Formats Description: .....
	Data Exchange Policies	Policy 7: Do Not Share Key Data with Third Parties Description: .....
		Policy 8: Share Client Data with Trusted Partners Description: .....
	Cloud Hosting Policies	Policy 9: Use Only the PCI DSS Compliant Cloud Description: .....
		Policy 10: Do Not Store Health Data in the Cloud Description: .....

Conceptual data models

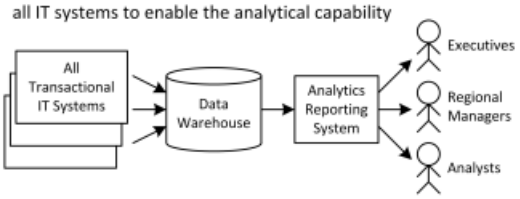


Direction statements

1. Current Business Strategy
.....

2. Identified IT Capability Gaps
Inability to provide a timely and comprehensive trends analysis to relevant business stakeholders

3. Recommended Strategic Direction for IT
Introduce a data warehouse aggregating relevant data from all IT systems to enable the analytical capability



4. Anticipated Outcomes
.....

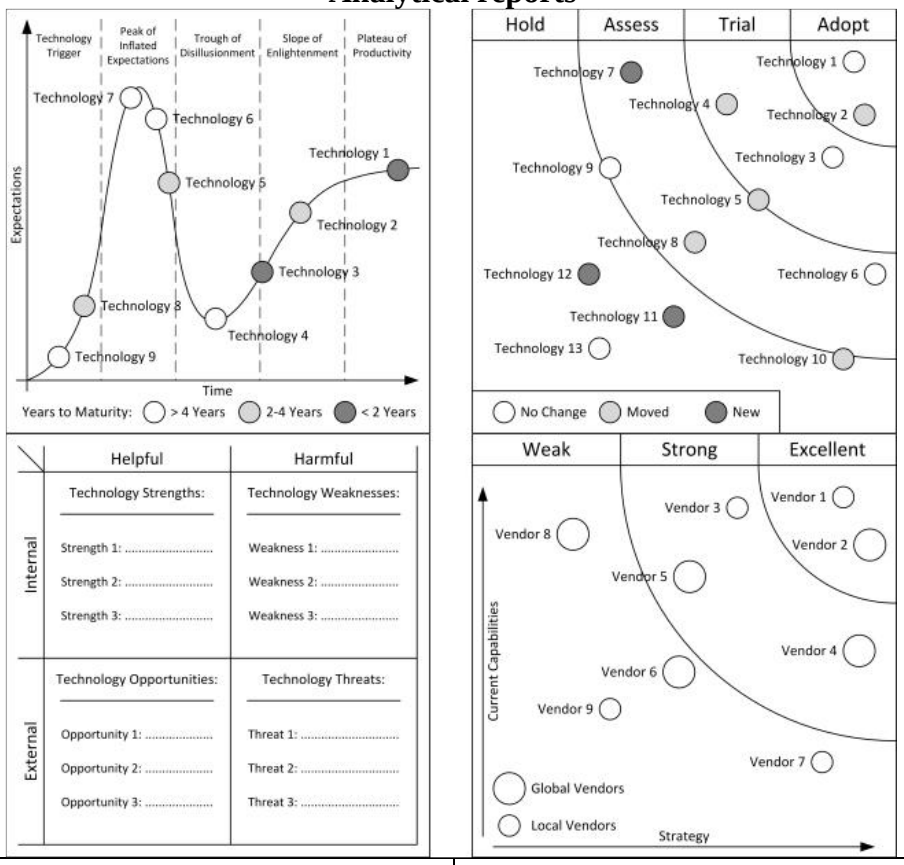
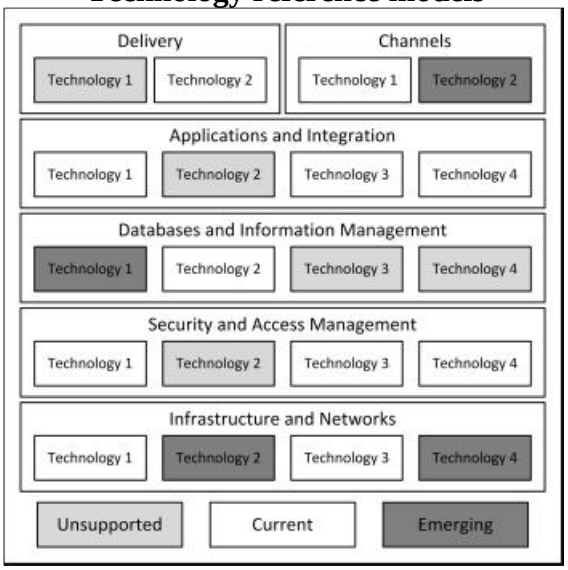
Analytical reports 	
Maxims	• Expectations for IT investments. • Data access and use. • Hardware and software resources. • Communications capabilities and services. • Architecture and standards approach.

Figure 6 (Consideration Documents) [10][15]

- **Standards** as it is described, it is the global technical standards and the best practices with rules and patterns relevant to information technology systems. It is usually

not about focusing on specific point in time or focus on current status.

Technology reference models



Guidelines

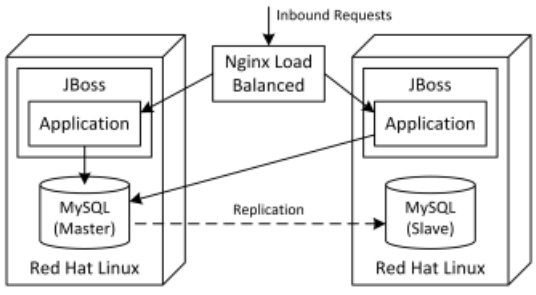
Server Deployment Standards	Guideline 1: Run Applications as OS Services Description: .....
	Guideline 2: Store Deployment Packages in VCS Description: .....
Network Protocol Standards	Guideline 3: Avoid Using UDP Multicast Description: .....
	Guideline 4: Prefer REST Over SOAP Description: .....
Data Encryption Standards	Guideline 5: Use 256-Bit Encryption Keys Description: .....
	Guideline 6: Store MD5 Hashes of Passwords Description: .....
Interface Design Guidelines	Guideline 7: Use Web-Safe Colours Description: .....
	Guideline 8: Place Menu in the Top Right Corner Description: .....
Secure Coding Guidelines	Guideline 9: Initialize Variables to Safe Defaults Description: .....
	Guideline 10: Validate All Incoming Data Description: .....

Patterns

1. Description: Simple Failover Cluster
.....

2. Applicability
.....

3. Rationale
.....



IT principles

Applications	IT Principle 1: Prefer Open Source Solutions Description: .....
	IT Principle 2: Log All Main Operations Description: .....
Data	IT Principle 3: Use Scalable Storage Description: .....
	IT Principle 4: Backup All Permanent Data Description: .....
Integration	IT Principle 5: Use Middleware for Integration Description: .....
	IT Principle 6: Avoid Binary Integration Protocols Description: .....
Infrastructure	IT Principle 7: Host in the Cloud Description: .....
	IT Principle 8: Dedicated Server for Each System Description: .....
Security	IT Principle 9: Place Public Systems in DMZ Description: .....
	IT Principle 10: Secure by Default Description: .....

Logical data models

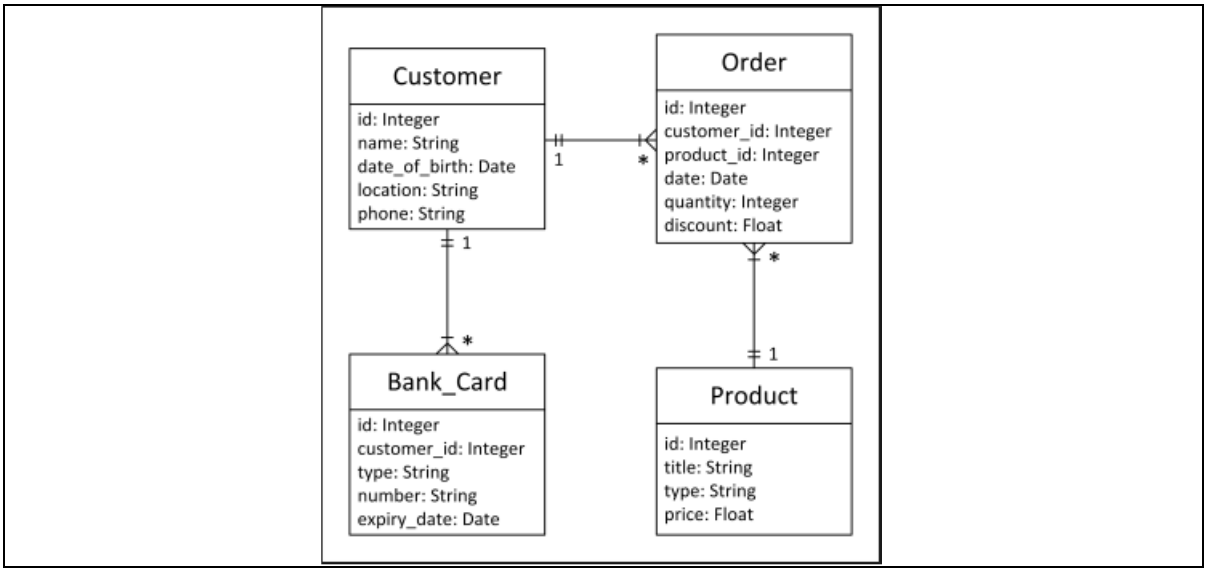
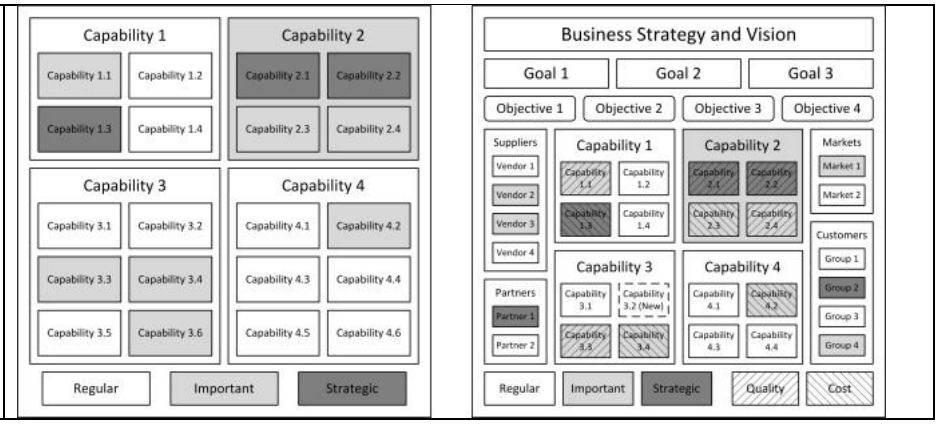
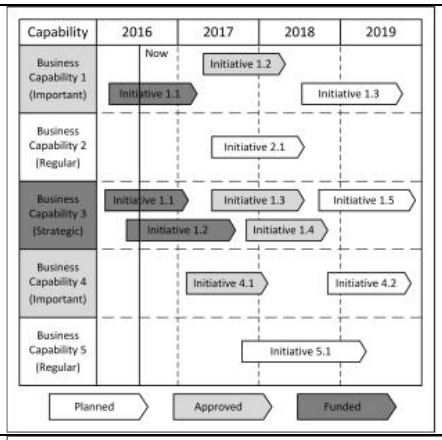
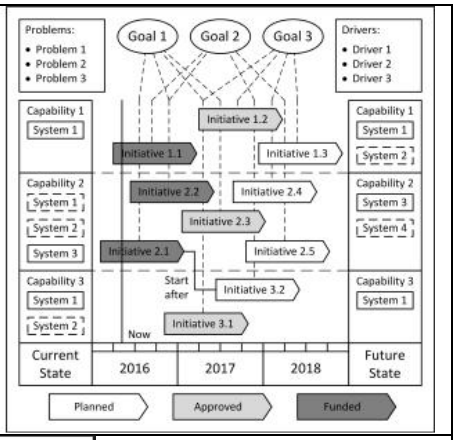
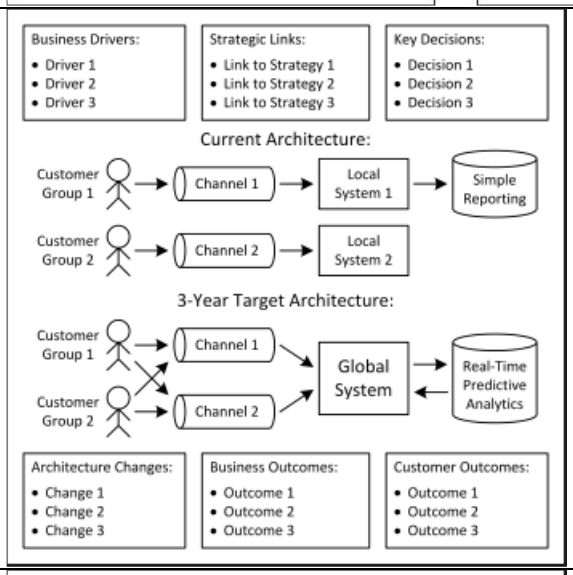
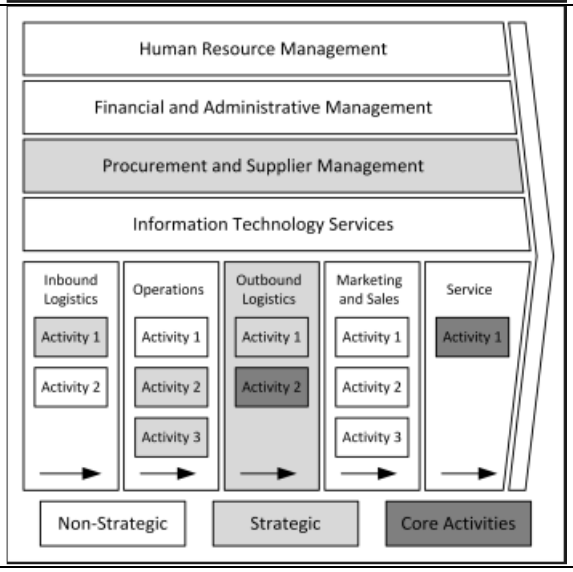


Figure 7 (Standards Documents) [10]

- **Visions** from business perspective, it is about looking for high level conceptual architecture of an organization.

Business capability models	

Roadmaps		
Target states		
Value chains		

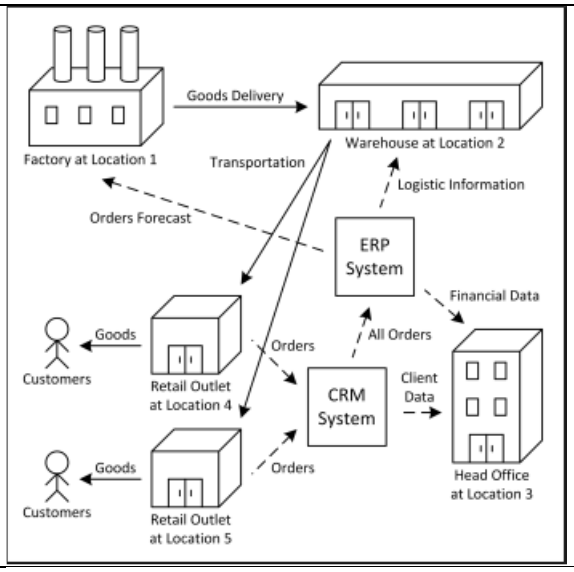
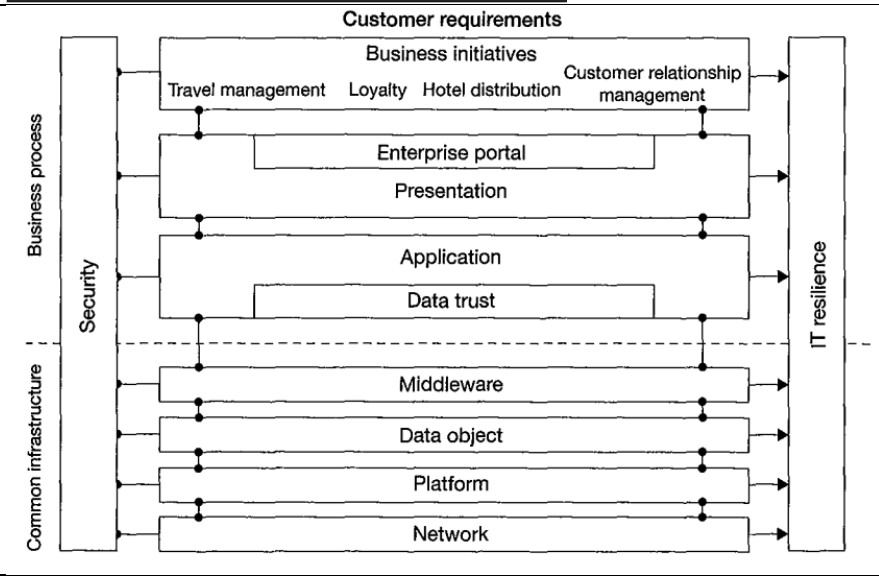
Context diagrams	
Core diagrams	

Figure 8 (Vision Documents) [10][16]

- **Landscapes** is the area where enterprise architactes provide high level descriptions from technical point of view of the organizational information technology landscape.

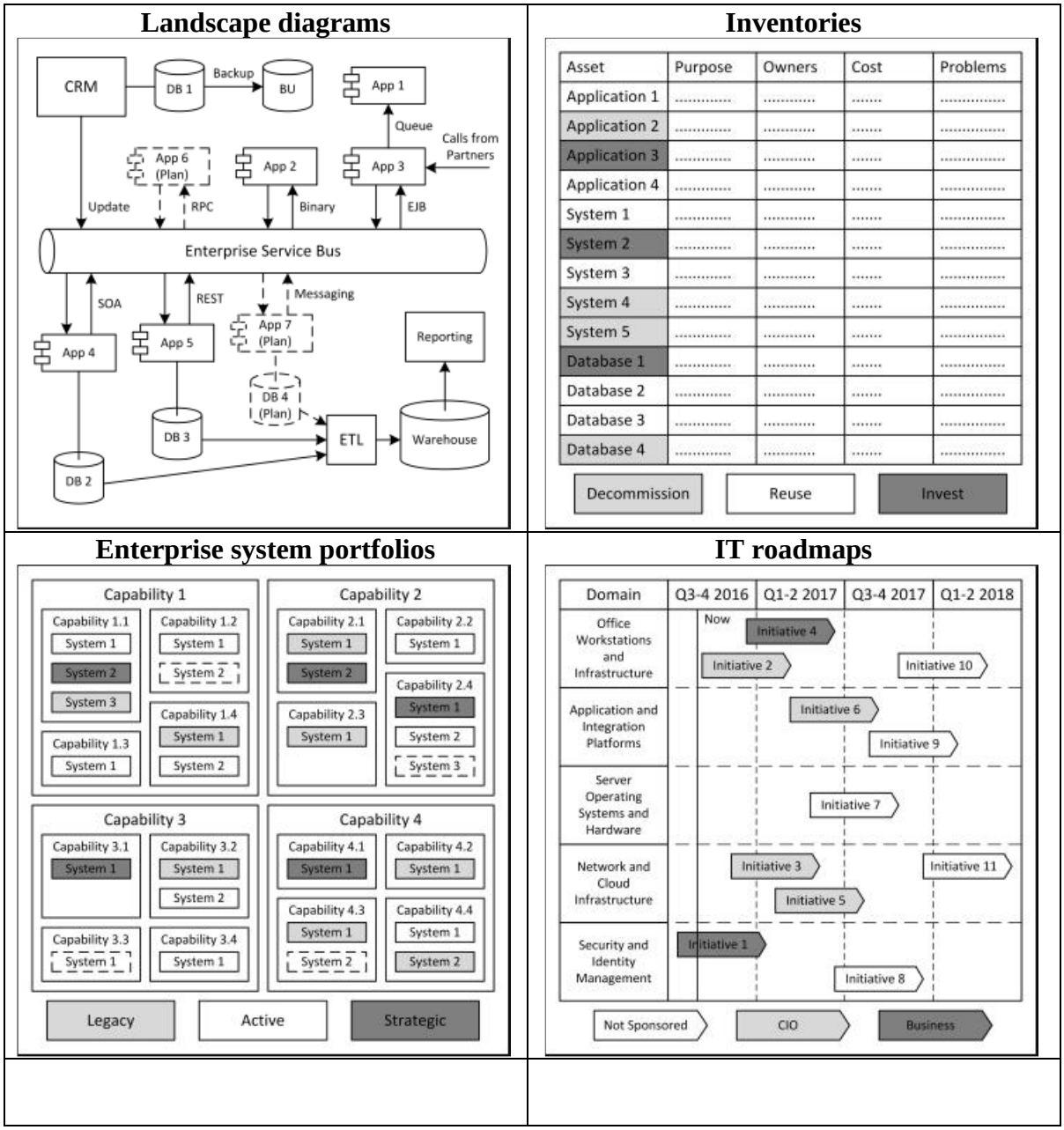


Figure 9 (Landscapes Documents) [10]

- **Outlines** it is what provide a specific description of a high level for information technology initiatives with an understandable description to the business leaders.

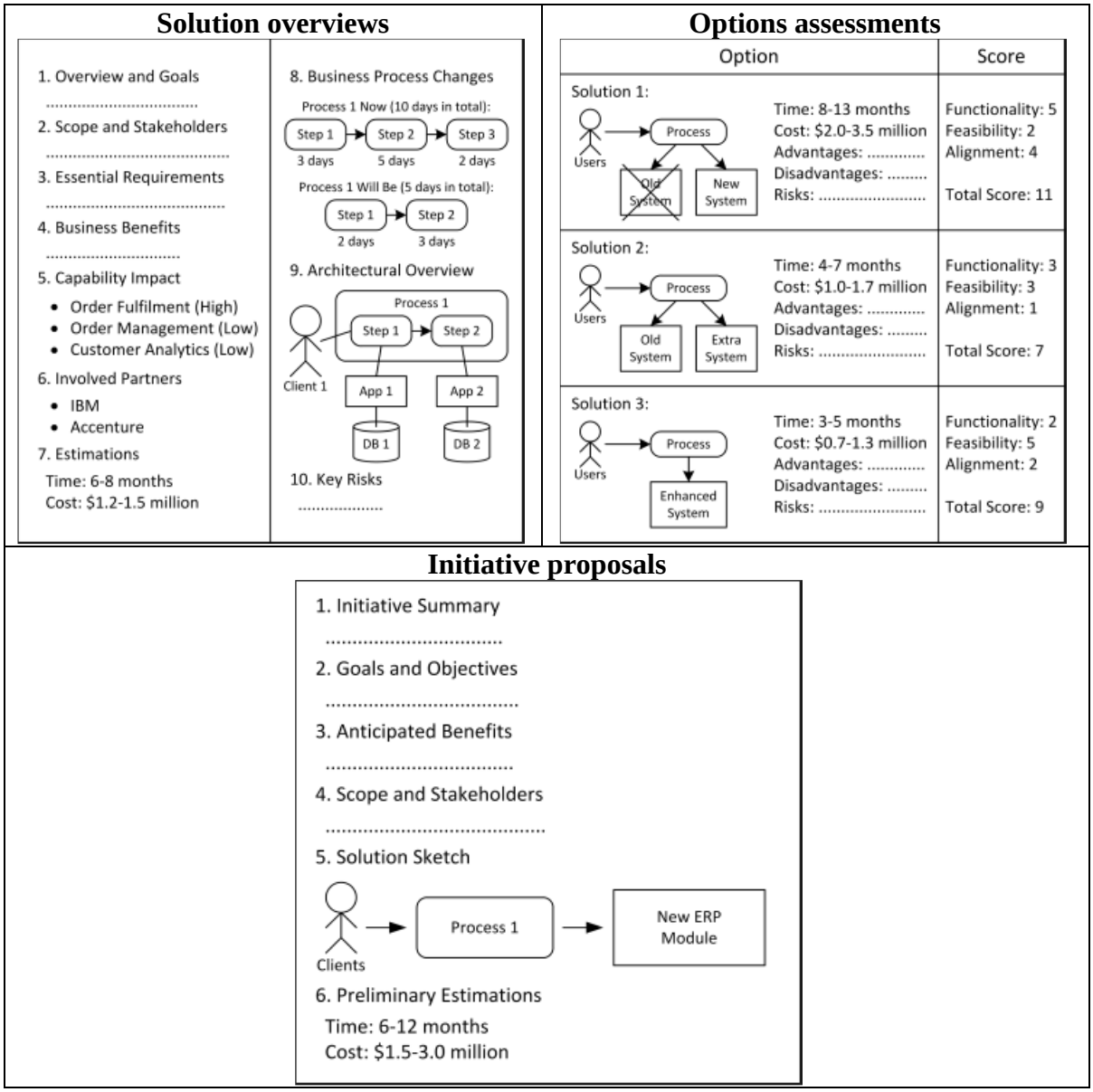


Figure 10 (Outlines Documents) [10]

- **Designs** it is what helps project teams by providing technical and functional detailed description of a specific information technology projects.

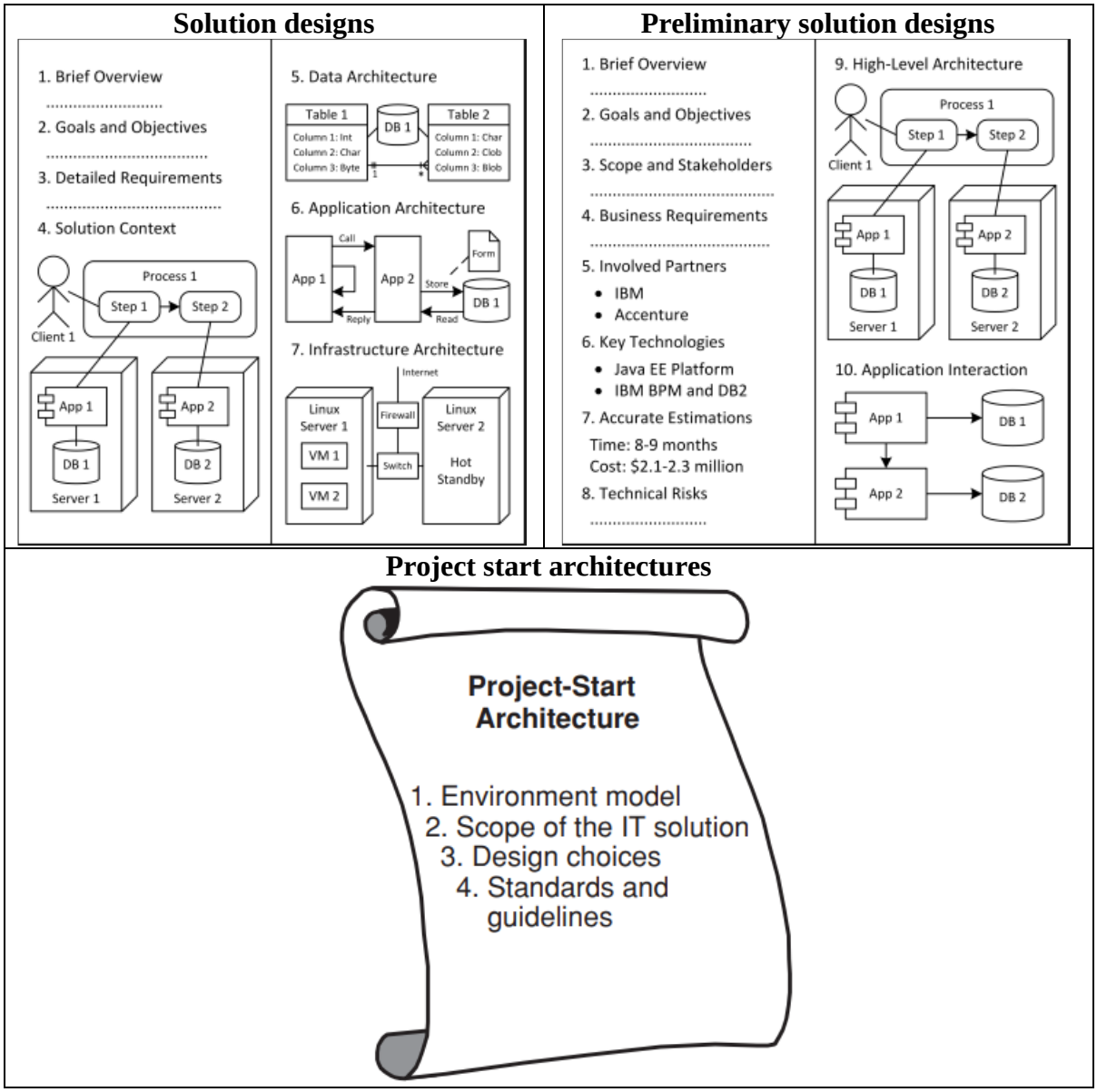


Figure 11 (Designs Documents) [10][17]

Selecting the required documentation for the enterprise architecture unit framing the shape and the definition of its scope of work, and that is why the documentation considered as a tool that help for forming the right framework.

6th Tool (NORA)

For the high importance of the enterprise architecture with the digital transformation that currently derived by the Saudi government, the Digital Government Authority (DGA) has developed a referencing methodology that is the most convenient to the local business industry, the National Overall Reference Architecture (NORA), it is extremely helpful in every step of building the enterprise architecture to the recognition of the expectation and the deliverables at these steps [3][4][6].

The enterprise architecture Framework describes the areas of the enterprise architecture by providing a set of principles, models, standards, and KPIs' metrics related to the enterprise architecture. It aims to organize the activity of the enterprise architecture and provide a comprehensive perspective on the enterprise architecture's areas according to government entities' needs. The Meta Model should be defined to describe the elements of the enterprise architecture and the relationships between them in detail. There are different types of enterprise architecture frameworks, such as Zachman, FEAF (Federal enterprise architecture Framework) and TOGAF (The Open Group Architecture Framework). However, the Digital Government Authority has developed NORA (National Overall Reference Architecture) based on the best international practices and experiences as a general framework and methodology to raise the adoption of enterprise architecture in government entities and to ensure the quality of implementation and use of enterprise architecture.

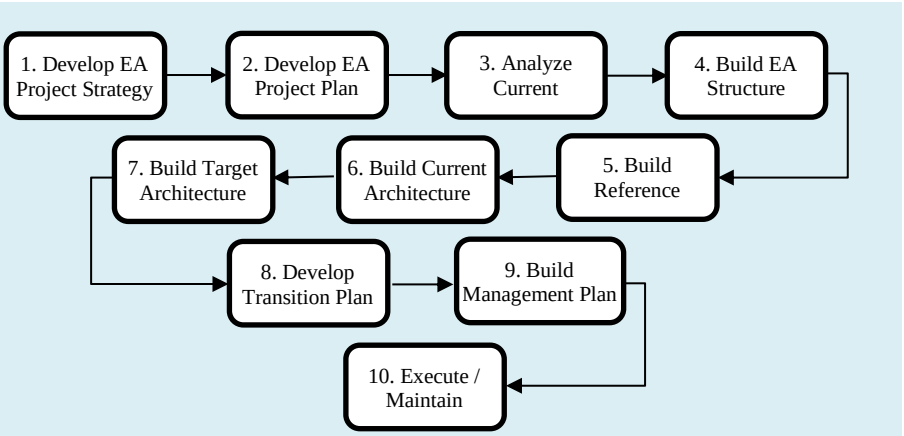


Figure 12 (Enterprise Architecture Framework)

It is noticed that is the NORA model commonly considered as a framework, while it is only a referencing model.

7th Tool (Governance)

Architectural Governance considered as the recommended patterns as an approach to shape the guidance, control mandate at architectural function, and the direction of it. It should separate governing from practicing responsibilities. It should create and dictate policies and procedures. Governance in Enterprise architecture draw its characteristics from the main three enterprise architecture components [3][4][14].

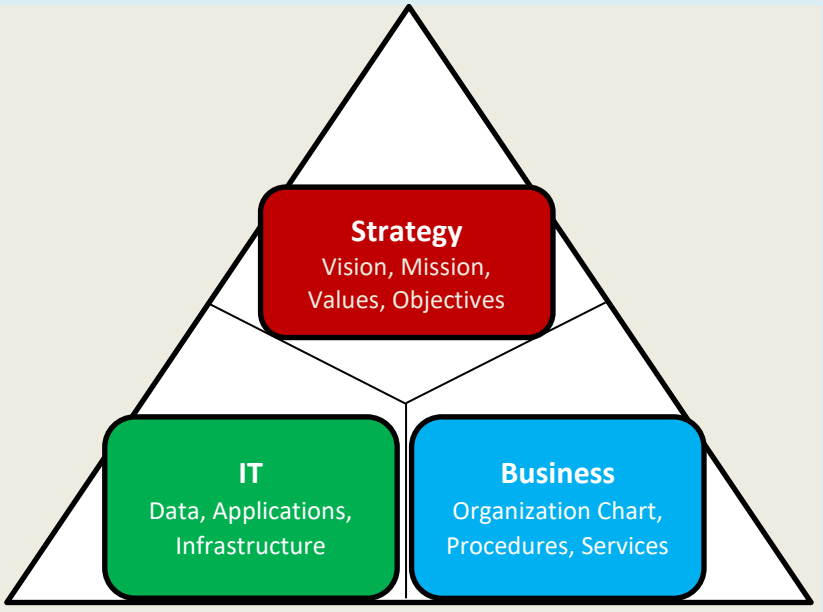


Figure 13 (Enterprise Architecture Characteristic) [3]

As the figure shows, the Information Technology and Business work simultaneously according to achieve the Strategy [3][10][13].

Chapter5

Results

5.1 Current Architecture Analysis

During this phase, the government entity should study the requirements and analyze in detail the current architecture for both business and IT. It should also identify main challenges, stakeholder needs, perform a SWOT analysis (Strengths, Weaknesses, Opportunities and Threats), and conduct benchmarking studies. Based on the output of this phase Enterprise Architecture scope and objectives should be defined.

5.2 Enterprise Architecture requirements and objective

Enterprise Architecture objectives and requirements should be defined based on stakeholders' needs, and current architecture analysis of business and information technology and trends. The figure below describes the Enterprise Architecture objectives, requirements and effective factors to be determined.

It is suggested to follow the workflow in figure 1, which will present the challenges but this time the enterprise architecture planning team will be equipped

with proper tools to overcome these challenges.

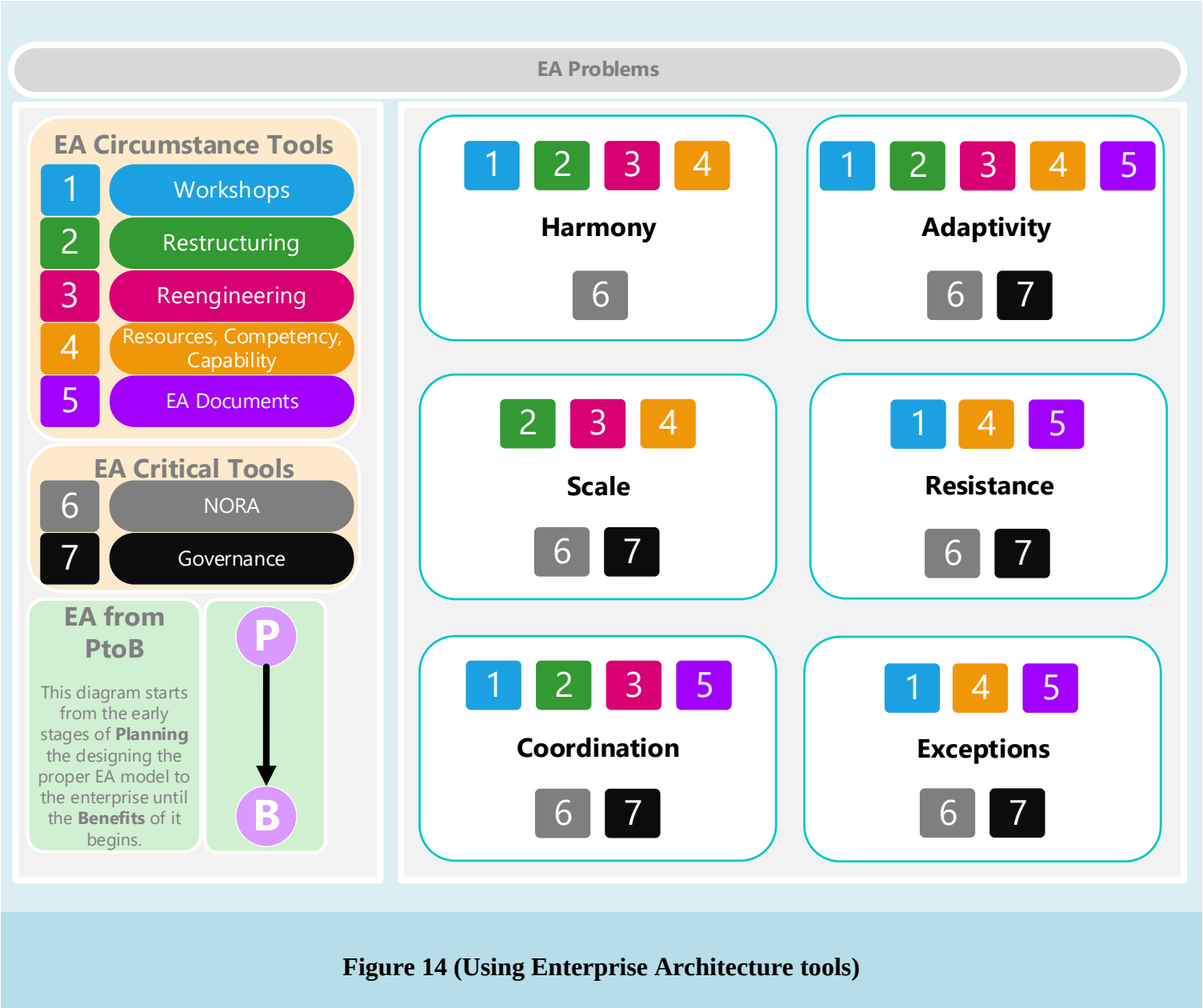


Figure 14 (Using Enterprise Architecture tools)

These tools offer a capability to provide an artifact to contribute to overcome a challenge, if that challenge can be resolved without the tools it may considered as an agility for the institution.

5.3 Framework workflow

It is well known that

Implementing Enterprise Architecture on phases can dramatically enhance the quality of the deployment on the ground by following the literature. It is recommended to use the framework at the second phase, after the enterprise architecture preparation phase which aim to find a definition of the vision with the requirements and what dose drive the enterprise architecture in the government entity.

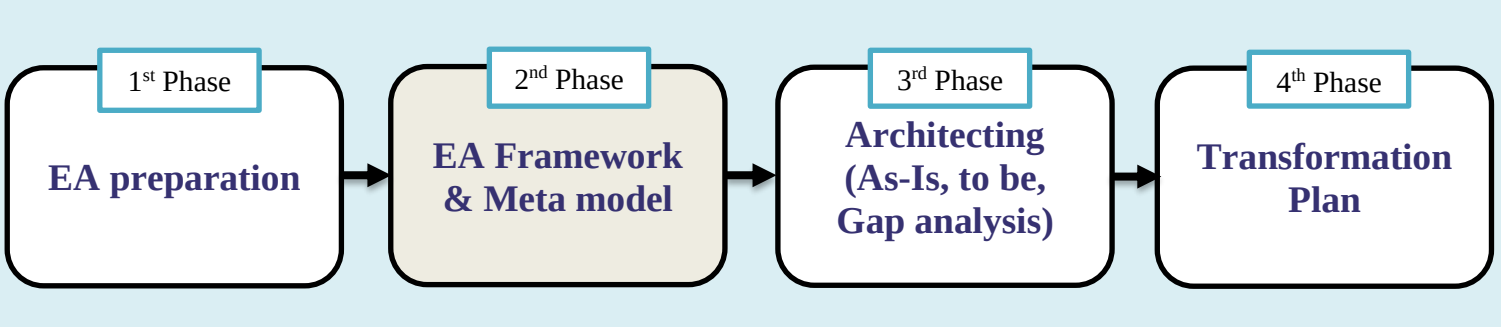


Figure 15 (Continuous Enterprise Architecture Framework)

For the second phase the essential definition is the framework definition. While the third about reading the current situation of the architecture As-is, then developing the targeted form of architecture which known as As-is by the Gap analysis.

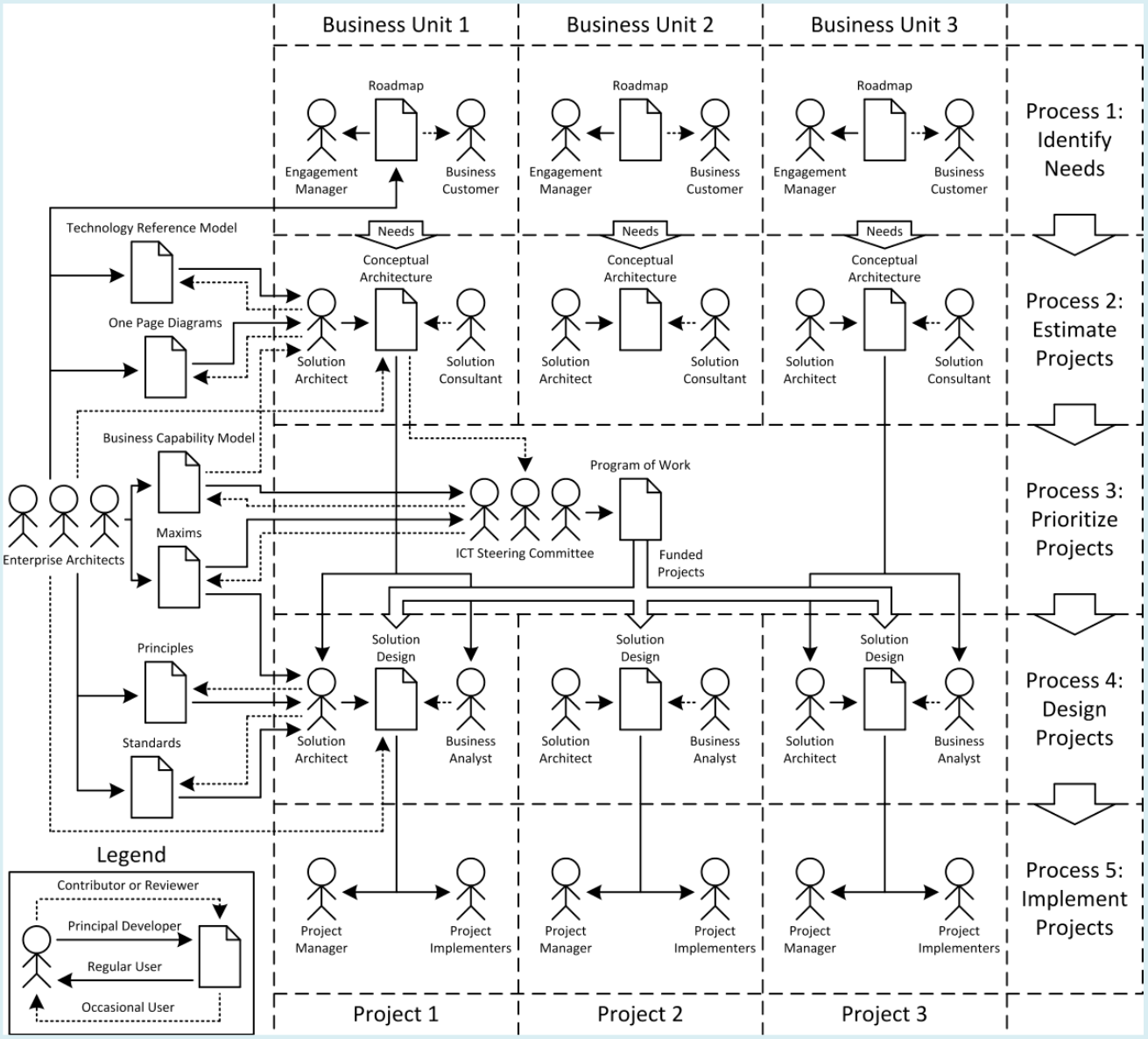


Figure 15 (Continuous Enterprise Architecture Framework)

After that, it comes to the closer phase by starting the planning for the transformation which should be built aiming to achieve objectives strategically of the institution.

Chapter6

Conclusions & Recommendations

6.1 Conclusions

The market is filled with successful Enterprise Architecture implementation stories, but unfortunately in the corner you will also find devastated implementation failures led to disastrous outcomes for the organization. That shows us it is not hard, but it requires a clear and honest self-awareness which will enable it to deal with a proper framework and it can determine its needs effectively, and there for the enterprise architecture scope of work that works the best within it and it will be achieved with precision and punctuality.

From unexciting governance framework to manage and execute a digital transformation plan, Difficulty to identify the strategic and operational needs, Duplication and suboptimal use of resources, Weakness and inefficiency in service delivery, and Weakness of integration and alignment between business and information technology to govern the digital transformation plan from a comprehensive organizational perspective, Defining strategic and operational needs based on, Raising the efficiency of spending and investment in information technology and avoiding duplication and repetition in technical projects gap analysis and prepare transition plan, Improve the quality of existing services or products that the government entities provide

to the beneficiaries, and Achieving integration and interoperability at the entity level by providing a description of the entity's EA and identifying gaps to be solved.

6.2 Recommendations

Business wise, Enterprise Architect keeps their business skills because the continuous practice of that field while conducting the enterprise architecture tasks or when the architect maintains a healthy relation with the stakeholders in every project.

On the other hand, what we should be attention to is the architects being away from technical work may lead to decreasing the proficiency by the lack of practicing on the latest technologies and taking advantage of the new innovations in the implementation and operational level. Another point is to collect the highest levels of information technology engineers and sometime that leave their department to suffer from a shortage to cover the transferred employees' tasks in favor to reinforce the enterprise architecture department.

The IT departments collaborate with enterprise architecture office by designing and developing the necessary application and infrastructure solutions based on the target architecture considering the alignment with the Enterprise Architecture standards and principles. Also, the enterprise architecture office contributes to assessing, and assuring the compatibility delivered systems and solutions against the target architecture.

enterprise architecture contributes to implementing the transformation roadmap, which the initiatives and projects management department can work on it,

providing the knowledge of how the project's contribution is achieving the strategic goals, and giving a holistic view of the linkage between projects, to determine the priority of the proposed projects and utilize resources. The office has an important role to ensure the compliance for specific enterprise architecture standards and requirements that prepare the technical specifications for projects to ensure compliance with enterprise architecture standards, sharing and reusing the organizational resources. During the life cycle of each project, the enterprise architecture office continually coordinates with the Project Management to provide the necessary guidance and support regarding the review of the various deliverables to check for correctness and completeness.

There is an initiative that would solve the issues and get the most benefits from the enterprise architects' knowledge, It is building a technical solution laboratory where they can practice their tests to the proof of concept test (PoC) on all the new technology that are provided to them for stress or functionality testing.

They can also work and help with figuring out the proper technical solution for a business need while the test being conducted on an aggressive environment (the Enterprise Architecture Laboratory)

Chapter7

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