

Smart Security System and Its Applications
Project



Group (6017)

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Chapter 1: Strategy, Governance, Structure, and Process

Who We Are?

We are a Saudi company that specializes in security system design, supply, installation, and maintenance. These systems are tailored to the specific needs of the customer. Because we specialize in video surveillance systems, we have a thorough understanding of the latest technologies, allowing us to design systems and source products that best meet the specific needs of our customers and the industry.

1.1 Strategy

1.1.1 Project Vision:

Our vision is to maintain and enhance our business, raise its active engineering and technology standards and respond to the changing complexity of projects and customer needs to play a major role in the development and success of industries in the Kingdom of Saudi Arabia

1.1.2 Project Mission:

Our Company protects our customers' property and businesses by providing innovative, dependable security systems and services. Our history is based on deep commitment and meaningful relationships with long-term customers, and we are committed to providing exceptional service, responsiveness, and attention to detail to meet your specific security requirements.

1.1.3 Develop and identify the objectives in a SMART model

Initial Goal	The goal is to elevate and promote the wellbeing for Alraabia residential Villas in Riyadh city by focusing on the security level.
Specific	Due to theft cases have increased in the last year, an immediate action toward this issue would be taken in this project. This would happen by focusing to improve four critical areas: Access controlling, outside yard of the villa, alarming time in case of a breach and network firewall
Measurable	Meeting the goal would be measured by designing and installing high quality security products in line with Saudi Standards, Metrology and Quality Organization
Achievable	Designing and installing three major systems under access control area, two systems for monitoring outside of the villa and two systems for alarming.

Relevant	By focusing on the four major areas the security level would be promoted
Time Framed	The goal is to completed all project phases including closing phases within one year.
SMART	The project has established due to the need to promote and elevate the wellbeing for Alraabia residential Villas in Riyadh city by focusing on the security level. Four major areas are so critical to cover which are Access controlling, outside yard of the villas, the alarming time and network firewall. Three systems would be designed and installed within one year to cover access controlling need, two systems for outside yard of the villa and two systems to increase the response time for the alarming. The design and the selection of the security systems shall be in line with Saudi Standards, Metrology and Quality Organization

Table 1: Smart Goal Model

1.1.4 Key Performance Measurement (KPIs)

We have developed our KPIs based on: Leading Indicator: looks forward at future outcomes and events. it gives early indications of performance Typically, leading indicators are metrics that will help keep you on track so that you hit your strategic objectives.

Lagging Indicator: A lagging indicator looks back at whether the intended result was achieved. typically, easy to identify, measure and compare against elsewhere in your industry, which makes lagging indicators very useful. (Bernardmarr)

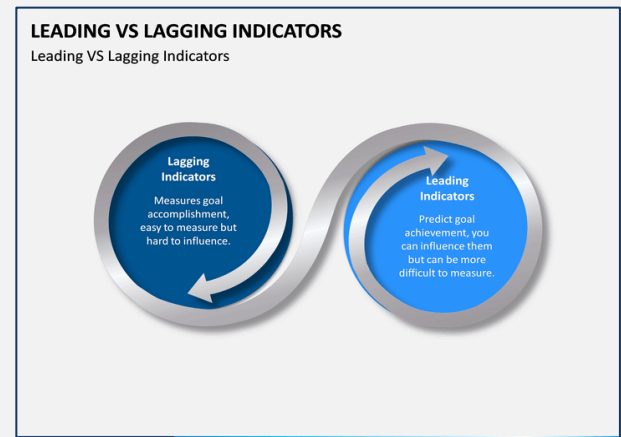


Figure 1: Lead and Lag Indicators

Strategic Objectives	Lead Measure	Lag Measure
1. Improve return on investment	Add three more product this year	Return on investment
2. Decrease customer Attrition	Improve customer service	Number of customers
3. Create innovation products	Product development cycle	New product/ service revenue
4. Improve the knowledge base	Number of submitted lesson learned report	Knowledge base in place
5. Reduce operational problem	Hours spent with customer	Product/ service error rate
6. Better strategic communication	Information availability	Employee satisfaction

Table 2: Lead and Lag Measures

1.1.5 Project Charter

The project charter is defined as a document issued by the project sponsor that formally authorizes the existence of a project and provides the project manager with the authority to apply organizational resources to project activities. (PMBOK 6th Edition)

PROJECT IDENTIFICATION	
Name	Alraabia Residence Villas
Description	Design and Installation of Smart Controlling and Security Systems
Sponsor	Vice President
Project Manager	Mohammed Salem
BUSINESS REASONS FOR PROJECT	
Home or office automation can be defined as a system that allows connected devices or appliances to be operated more easily. During active hours, most commercial environments consume large amounts of energy resources as a result this could be reduced to a bare minimum by smartly monitoring and managing the resources. The Internet of Things (IoT) makes this a feasible solution at a reasonable cost, however the network security becomes a critical factor to be strongly protected as well corresponding to home automation development movement. Therefore, the need of high level controlling and protection system becomes our goal to fulfill this demand by developing, designing and installing entire security and control system for residential houses	
PROJECT OBJECTIVES (PURPOSE)	
To develop and install high secured smart system for 3 blocks in Alraabia Residence district using 4 new technologies for security monitoring system finishing one villa per week with one year target.	
PROJECT BUDGET	
The project has initial budget which is 700,000 SR	
PROJECT SCOPE	
• Accesses Security System • Monitoring System	

- Alarming System
- Firewall and Network Security System

MILESTONE DATES

Item	Major Events / Milestones	Dates
1.	Finalizing The Purchasing Orders	01/02/2023
2.	1 st Phase delivery	01/05/2023
3.	2 nd Phase delivery	01/08/2023
4.	3 rd Phase delivery	01/01/2024

ASSUMPTION AND CONSTRAINTS

Assumption ID	Assumption	Description
AST-001	Material delivery Delay	Material delivery may delay and will impact in not meeting project target which would lead to customer dissatisfaction
AST-002	Increase in the Product Cost	Due to the Contractors availability Lack in the market may lead to high contracting price
AST-003	Change in the Transportation Cost	Transportation Cost is subjected to Oil Price and any increase in Oil market would impact transportation Cost
AST-004	Customer satisfaction of chosen technology	Chosen Technologies might not satisfy Customer Expectation
AST-005	Design alignment with other disciplines	Villas are under Construction and the cable conduit design may not meet security system design

Table 3: Assumption Log

Constraint ID	Constraint	Description
CNS-001	One Year Delivery	Target for Completing the 50 Villas is very tight and missing that would lead the company to miss future project with current customers
CNS-002	Limited Budget	Budget is limited with no more than 15% increase

1.2 Governance, Structure, and Process

1.2.1 organizational structure for the teams and units of the project

An organizational structure that has many levels, a rigid reporting structure, and substantial bureaucracy frequently uses a predictive approach. Projects that use adaptive methods tend to have a flat structure and may operate with self-organizing project teams. (PMBOK 7th). In our project the organization structure has been selected to be project-oriented type.

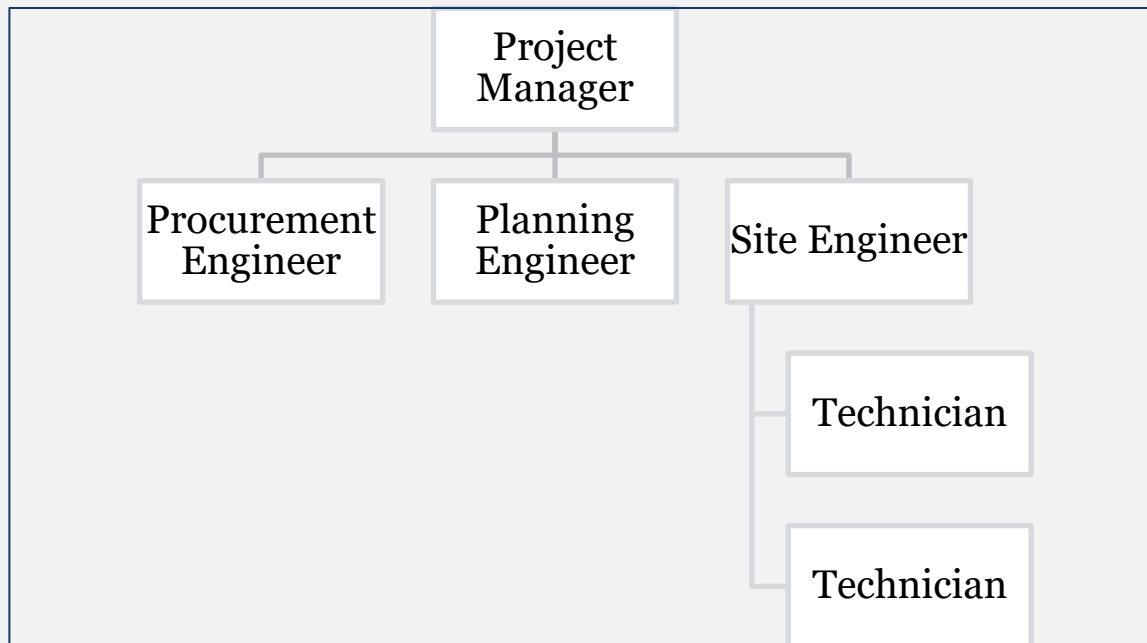


Figure 2: Organization Structure

1.2.2 Adopted Practical and Scientific Bases

In our many different roles in private, public and not-for-profit organizations, whether as leaders, as customers, as shareholders, as employees or as recipients of services, there are many reasons why we should care that organizations are designed well and redesigned appropriately to reflect change. ‘A great wind is blowing, and that gives you either imagination or a headache’ – Catherine the Great. Organization design can ease the headache

and stimulate the imagination to build a more effective organization for the future. Whatever the drivers, the considerations from an organization design perspective are:

- Defining the organizational purpose and strategic intent;
- Establishing the preliminary ideas and examining them
- Producing the preliminary sketches of the future state organization, or any part of it, that forms the basis on which the organization can be built.
- Defining the combination of details that will make up the organization and defining their arrangement (including the target capabilities and the characteristics of the organization)
- Laying out the result being aimed at (the design blueprint)
- Forming the implementation plan
- Realizing the idea (Organization Design: A Guide to Building Effective Organizations 1st edition)

Practical Selection Bases	
Roles	Project Needs
Project Manager	Monitor Project Progress and Set Deadlines, facilitate issue resolution, Manage and Ensure Stakeholder Satisfaction, Lead the team in working through project changes, Managing the project's budget, Work with the client to get formal sign-off that the project is complete, Archive project files for future reference and use and ensuring that key milestones are reached
Procurement Engineer	Analyze the Supplier to select high quality products at competitive pricing, negotiating responsibility, perform regular performance review of the suppliers, Ensure commercial, legal and contractual compliances in the procurement transactions, Coordination responsibility between the suppliers and project team
Planning Engineer	Prepare various strategies for all planning activities for projects, prepare required presentation for all regulatory agencies, develop required to enhance performance of planning projects, deciding on the most appropriate engineering techniques and sequences of activities for each project stage., Drawing plans using specialized design software packages, ensuring plans meet the client's specifications, making estimations for timescales and costs and organizing the transportation of materials.
Site Engineer	Checking technical designs and drawings to ensure that they are followed correctly, supervising contracted staff, ensuring project packages meet agreed specifications, budgets and/or timescales, preparing site reports and filling in other paperwork, ensuring that health and safety and sustainability policies and legislation are adhered to.
Technician	Perform required site installation, repair, maintenance and test tasks

Table 5: Practical Selection Bases

1.2.3 Project Management Office

A project management office (PMO) is an organizational structure that standardizes the project-related governance processes and facilitates the sharing of resources, methodologies, tools, and techniques. The responsibilities of a PMO can range from providing project management support functions to the direct management of one or more projects. A study has been conducted to select PMO types:

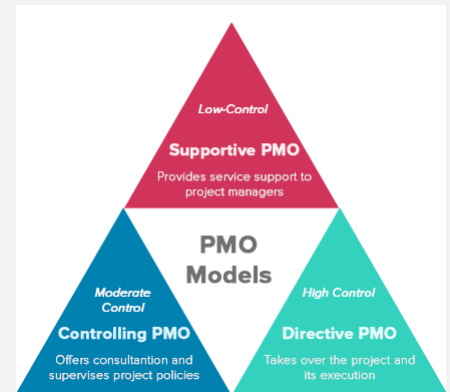


Figure 3: PMO Types

- 1– **Supportive PMOs** provide a consultative role to projects by supplying templates, best practices, training, access to information, and lessons learned from other projects. This type of PMO serves as a project repository. The degree of control provided by the PMO is low.
- 2– **Controlling PMOs** provide support and require compliance through various means. The degree of control provided by the PMO is moderate. Compliance may involve:
- 3– **Directive PMOs** take control of the projects by directly managing the projects. Project managers are assigned by and report to the PMO. The degree of control provided by the PMO is high. (PMBOK 6th Edition)

As a result, since project organization structure is established to have dedicated full-time team, the need for the PMO would be to limit PMO inference, support the project by providing supplying template, best practices, support the project by providing essential training availing the access to organization process base for project team members. Additionally, the project manager may need additional support by accessing the supplier's data base to select best option in terms of quality, supplier readiness and amongst them.

Chapter 2:

Compliance, Standards, Regulations, Power and Interest, Culture and Values

2.1 Compliance, Standards and Regulations

2.1.1 Check Compliance Model for project outputs

In the last two decades, the concept of compliance has become increasingly intertwined with the governance of our modern complex organizations. The failure of organizations, from Enron to the Red Cross, to comply with laws, regulations, codes of conduct, and ethical standards of good practice have heightened our awareness of these critical issues. Indeed, accountability, transparency, adherence to laws and regulations, ethical conduct, and standards of conduct and behavior have become as much a part of how organizations manage their affairs as their primary mission and operations. This simple fact applies to organizations in the public, private, and nonprofit sectors of our economy. (Compliance Management for Public, Private, or Nonprofit Organizations)

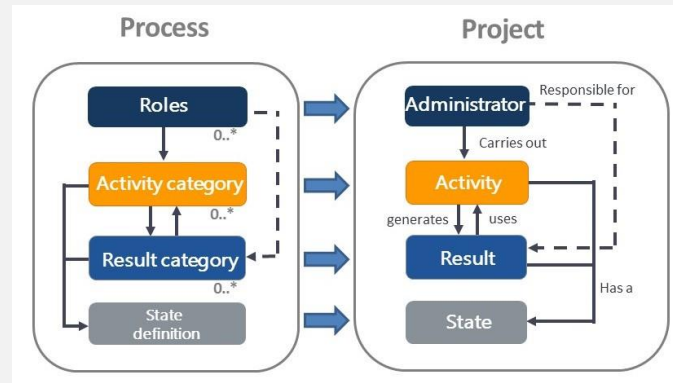


Figure 4: Compliance Model Process

Time Frame	Goal	Activities	Expected Outcomes	Measures of Success
Feb-22	Finalized and Approved Project Charter	Development of business needs statement, Identify the full project scope, Prepare Project Milestones, Identify Project assumption and constraints and Specify Project Critical Success Factors	Project Charter and Assumption Log	Sponsor Approval
Feb-22	Stakeholder Identification	Identify the parties that are impacted or will impact the project negatively or positively, Access Organization Knowledge Base and Gather Data about Project Stakeholders, Conduct a Meeting with Project Stakeholder and identify their expectations', Develop stakeholder register along with their impact and interest and Update Project documents and plans if needed	Stakeholder Registers and Updated Project Documents and Plans	Stakeholder Support
Feb-22	Project Structure	Identify the project human resource needs, Identify the suitable structure, Checking the availability of required human resources within the organization, Start acquiring the employees	Project Structure and Required Human Resource Assignment	Project Human Resource Needs Fulfillment

Feb-22	Scope Finalization	Identify how the scope shall be defined, Collect the requirements to meet the project objectives using data gathering technique, Develop requirement traceability matrix, and Create Project WBS	Scope Management Plan, Requirements documentations, Scope Baseline, Requirement Traceability Matrix and Scope Statement	Finalized Scope Statement aligned with project objectives and Customer Requirement fulfillment
Mar-22	Schedule Finalization	Identify how schedule shall be developed, Decomposition the WBS to defines the activities, Sequence defined activities, Use analogous, parametric, three points and bottom-up estimates to estimate activities duration	Schedule Management Plan, Activity list and attributes, Project Network Diagrams and Project Schedule	Schedule meeting the milestones target
Mar-22	Budget Determination	Identify how the cost shall be managed, Use analogous, parametric, three points and bottom-up estimates to estimate activities cost, Identify Funding requirement, Estimate the contingency reserves along with management reserves, and Finalize Project Budget	Cost Management Plan, Cost Baseline, Contingency and Management Reserves, Project Funding Requirements, Project Budget	Budget with not more than 20% of initial budget
Mar-22	Resource requirement	Identify how the resource shall be managed, Develop Team Charter, and Estimate activity resources	Resource Breakdown Structure	Fulfillment for project needs
Apr-22	Risk Identification	Plan how the risk should be identified, analyzed and managed, Use Delphi technique, conduct brain storm session and have a support from expert judgment to identify project risk, Sensitivity analysis, and Plan responses for identified risk	Risk Management Plan, Risk register, Risk Report	Effective risk response throughout project life cycle
Mar-22	Stakeholder Management	Plan Stakeholder Engagement	Stakeholder engagement plan	Meeting stakeholder expectation and satisfaction
Apr-22	Procurement Management	Identify how the procurement should be managed, Determine suitable procurement strategy, Prepare procurement Statement of work, and Identify the selection criteria	Procurement Management Plan, Procurement Strategy, and Source selection criteria	High quality products and low price
Mar-22	Communication Requirements	Analyze communication requirements, Select communication technology, and Design communication model	Communication Model, Communication Management Plan, Communication Technology	Effective Communications

Table 6: Compliance Model

2.1.2 Check List model for the project stages

Phase	Process	Outputs	✓	Date	Comments
Initiation Phase	Develop Project Charter	Project Charter			
		Assumption Log			
	Identify Stakeholders	Stakeholder Register			
Planning Phase	Develop Project Management Plan	Project Management Plan			
	Plan Scope Management	Scope Management Plan			
		Requirement Management Plan			
	Collect Requirement	Requirement Documentation			
		Requirement Traceability Matrix			
	Define Scope	Project Scope Statement			
	Create WBS	Scope Baseline			
	Plan Schedule Mana	Schedule Management Plan			
	Define Activities	Activity List			
		Activity Attributes			
		Milestones list			
	Sequence Activity	Project Schedule Network Diagrams			
	Estimate activity duration	Duration estimates			
		Basis of estimates			
	Develop Schedule	Schedule Baseline			
		Project Schedule Network Diagrams			
		Schedule data			
		Project Calendars			
	Plan cost	Cost Management Plan			
	Estimate Costs	Cost estimates			
		Basis of estimates			
	Determine budget	Cost Baseline			
		Funding Requirement			
	Plan Quality Management	Quality Management Plan			
		Quality Metrics			
	Plan Resource Management	Plan Resource Management			
		Team Charter			
		Resource Requirement			
		Basis of estimates			
		Resource Breakdown Structure			
	Plan Communication Management	Communication Management Plan			
	Plan Risk Management	Risk Management Plan			

	Identify Risk	Risk Register			
		Risk Report			
	Plan Procurement Management	Procurement Management Plan			
		Procurement Strategy			
		Bid Documents			
		Procurement statement of the Work			
		Source Selection Criteria			
		Make or Buy decisions			
		Independent Cost Estimates			
	Plan Stakeholder Management	Stakeholder Engagement Plan			
Execution and Monitoring Phase	Acquire Resources	Physical resource assignments			
		Project team assignments			
		Resource calendars			
	Develop Team	Team performance assessments			
	Manage Quality	Quality reports			
		Test and evaluation documents			
	Direct and Manage Project Work	Deliverables			
		Work performance data			
	Manage Project Knowledge	Lessons learned register			
	Conduct Procurements	Selected sellers			
		Agreements			
	Manage Communications	Project communications			
	Validate Scope	Accepted deliverables			
	Control Scope	Work performance information			
	Monitor and Control Project Work	Work performance reports			
	Perform Integrated Change Control	Approved change requests			
	Control Schedule	Schedule forecasts			
	Control Costs	Cost forecasts			
	Control Procurements	Closed procurements			
	Control Quality	Quality control measurements			
		Verified deliverables			
Closing	Close Project or Phase	Final product, service, or result			
		transition			
		Final report			
		Project documents updates			
		Organizational process assets updates			

Table 7: Check List Model

2.2 Power and Interest

2.2.1 Stakeholder Register

The main output of the Identify Stakeholders process is the stakeholder register. This document contains information about identified stakeholders that includes but is not limited to:

- Identification information. Name, organizational position, location and contact details, and role on the project.
- Assessment information. Major requirements, expectations, potential for influencing project outcomes, and the phase of the project life cycle where the stakeholder has the most influence or impact.
- Stakeholder classification. Internal/external, impact/influence/power/interest, upward/downward/outward/sideward, or any other classification model chosen by the project manager. (PMBOK 6th Edition)

NO	Stakeholder	Role	Internal/ External	Contact Information (Email/ Phone Number)	Influence	Interest	Expectations
Internal Stakeholders							
1	Project Manager	Project Manager	Internal		High	High	Finalized and Signed Project Charter, Sponsor support, Full Access to Organization Process Assets
2	Project Team	Project Team	Internal		High	High	Supportive Environment, Informal Interactive and Full Delegation, Finalized Team Charter, Centralized leadership, Individual Development Plan, Incentive Plan, On time Salary
3	PMO	PMO	Internal		Low	Low	Project Status Report, Update Project Lessons learned and Best Practices in PMO Database, Formal request to obtain access of organization process assets for the project team
4	Financial Director	Financial Director	Internal		High	Low	Fund Requirement Plan

5	Vice President	Sponsor	Internal		High	High	Project completion and delivery within budget and on schedule
6	CEO	CEO	Internal		High	Low	material delay, High quality work, Failure to deliver on time, Update the weekly report, follow it up and know the risks
External Stakeholders							
7	Transportation Company	Providing transportation for the project	External		High	medium	Signing of the contract official email or documents and shipment details Commitment to the due date payment
8	Suppliers	Supplying project materials	External		High	medium	Signing of the contract, Samples approval, Commitment to the due date payment
9	Customer	access to the company's tasks in implementation	External		High	High	Commitment to the schedule Providing easy-to-use systems
10	Customs	Provide standards and specification	External		High	Low	Compliance with standards and specification

Table 8: Stakeholder Register

2.2.2 The two networks: (Strength/Interest) and (Influence/ Strength)

Each of these techniques supports a grouping of stakeholders according to their level of authority (power), level of concern about the project's outcomes (interest), ability to influence the outcomes of the project (influence), or ability to cause changes to the project's planning or execution. These classification models are useful for small projects or for projects with simple relationships between stakeholders and the project, or within the stakeholder community itself. (PMBOK 6th Edition)

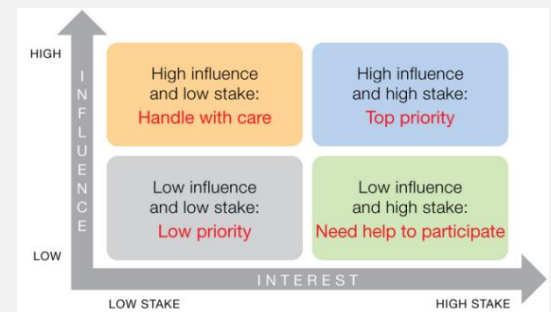


Figure 5: Interest and Influence Diagram

2.2.3 The logical diagrams for the register of the stakeholder

The Salience Model of Stakeholder Classification helps to identify the prominence of project stakeholder by classifying them according to 3 attributes:

- 1– Power / Authority and influence in the organization and on the project outcomes.
- 2– Legitimacy: their involvement is appropriate (morally, legally, etc.). Legitimate stakeholders are the once who “really count”.
- 3– Urgency: calls for immediate attention, or pressing need.

Urgency is based on 2 attributes.

- Time– sensitivity: when stakeholder’s need is time sensitive in nature
- Criticality: when the need is important or critical to stakeholder

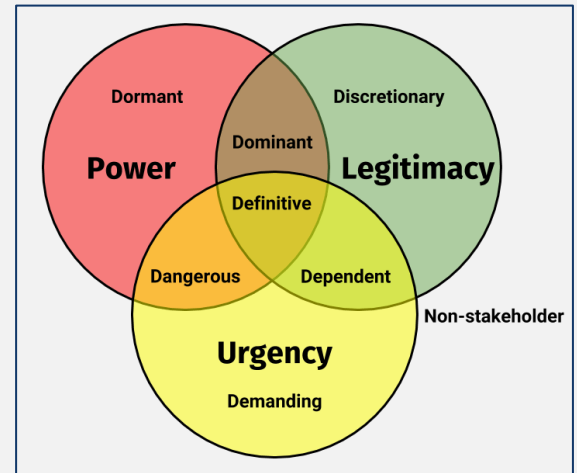


Figure 6: Logical Diagram

2.3 Culture and Values

2.3.1 Identify the culture of the organization

Organizational culture should be how the firm achieves its vision and mission by living its values and beliefs on a daily basis. Fostering the right organizational culture is one of the most important responsibilities of the CEO, HR managers, and other corporate executives. Any group of people that gather together anywhere at any point in time create a unique group culture. They have their own group standards, called norms, which create pressure for the group’s members to conform. Social groups have societal cultures, nations have national cultures, and organizations have their own distinct organizational cultures.

Organizational culture consists of the values, beliefs, and assumptions about appropriate behavior that members of an organization share. Culture describes how employees do what they do (standards of behavior) and why they do what they do (values, profits, customers, employees, society). Every organization has a culture, and success depends on the health and strength of its culture. (*Fundamentals of Human Resource Management, by Robert N. Lussier, John R. Hendon*)

Security culture refers to the set of values, shared by everyone in an organization, that determine how people are expected to think about and approach security. The benefits of an effective security culture include:

- A workforce that are more likely to be engaged with, and take responsibility for, security issues.
- Increased compliance with protective security measures.
- Reduced risk of insider incidents.
- Awareness of the most relevant security threats.

2.3.2 Provide proposals of the organization's values that can be adopted.

In addition to protects our customers' property and businesses by providing innovative, dependable security systems and services. we provide exceptional service, responsiveness, and attention to detail to meet your specific security requirements. Among the services, the high quality of service and simple access to employees, both direct and indirect, are important to note.

Chapter 3:

Self-reflection and Self-management, Personal integrity and reliability and Personal communication

3.1 Self-reflection and Self-management

3.1.1 Personal behaviors that can influence the project.

People different behaviors are based on their cultures, and the values they learned during their lives. Although, it seems at the first look that it is personal issue, but people behaviors directly impact the projects, and accordingly the organizations performance. In this week discussion, I will discuss the different behaviors and its impact on the project performance.

- 1– Culture
- 2– Individual versus community orientation
- 3– Impact of different generations in the workforce

3.1.2 Personal behaviors Study.

1– **Culture** is the main factor which affect the human values, and accordingly the behaviors. In construction projects, we cannot ignore or underestimate the culture effect on the individuals, and accordingly, the project.

Knight, (2009) defined five culture dimensions that “distinguish one culture from another”. Example: “Uncertainty Avoidance”, workers from certain countries do not prefer to be managers. They always need to be instructed rather than giving instructions. In my opinion, they like to completely avoid risks and uncertainty.

2– **Individual versus community orientation** According to Pettinga, and Flatto, (2010) “Recognizing that people do not operate in a vacuum that they work and interact with those around them many organizations have utilized personality typing to evaluate the work and decision-making styles of their members.” Wong, (2007, p154) said that organizations are hiring people based in their individual skills to work in teams. However, it is still challenging to manage a team consist of individuals with different skills and with different cultures. The people culture could affect their interdependence performance, some cultures prefer individuals works, while others more

interdependence. At the end of the day, the project performance is measured by the team overall performance, therefore, project manager role is to motivate the project team and encourage team work.

3– Impact of different generations in the workforce Different generations have different way of thinking, different methods of doing things, and different expectations in team work. The variance between generations could be observed by applying the following points:

- Knowing the characteristics of generations.
- Identify the value of each generation.
- Understand how to communicate with different generation.
- Win the respect of each generation.

Mann, (2011) stated that “The next time you find yourself muttering in disbelief over a colleague’s work habits, stop and consider the generational attributes at play. It may provide you with the insight you need to successfully manage the situation.”

3.1.3 SWOT model

- **Purpose of SWOT analysis:** we have adopted this model to help decision makers share and compare ideas, bring a clearer common purpose and understanding of factors for success, organize the important factors linked to success and failure in the business world, analyze issues that have led to failure in the past, provide linearity to the decision-making process allowing complex ideas to be presented systematically
- **Action plans towards SWOT analysis:** we have developed high level strategic action plans toward different aspect of the SWOT analysis which would be protect and leverage for the strengths, address and improve for the weaknesses, strategically size for the opportunities and minimize and eliminate for the threads.



Figure 7: SWOT Analysis

3.2 Personal integrity and reliability

3.2.1 Behaviors that contradict moral integrity

- **Outdoor activities:** All persons concerned with the company are prohibited from engaging in any “independent” or “additional” activity or work outside the working hours that would negatively affect the quality or quantity of the work performed, or to carry out activities to compete company activities or an activity that involves sponsorship or support from the company for any use or External organization, or negatively affects the reputation of the company Group, or uses or interferes with the company Group's time, facilities, resources or supplies

- **Harassment:** All concerned persons are obligated to ensure that the work environment is free from any kind of harassment, discrimination, persecution, abuse or bullying, and others so that the dignity of the individual is preserved and preserved. So, all concerned persons are responsible for providing assistance to ensure that all individuals within the company do not suffer from any form of harassment
- **Intellectual property:** The systems, software and any other intellectual property developed for the Company (whether developed by the employee himself in the course of his job or by external third parties) are the property of the Company. The employee may not keep or transfer these materials outside the company even after leaving the company. In return, the company is obligated not to use non-public intellectual property owned by companies or individuals without obtaining the prior consent of the legal owner of such property

3.2.2 Behavior Influences

After conducting the analysis to overcome the behaviors that contradict moral integrity we came up with below analysis:

Behavior	Financial Influence	Social Influence	Technical Influence
Outdoor activities	Na	1– Lead to poor physical health 2– Employee wellbeing gets negatively impacted	Impact job productivity over long term
Harassment	Company reputation	Poor relation between the employee	1– Negative and uncooperative work environment 2– Low level of trust
Intellectual property	Law breaking (copyright)	Encourage unethical action	Create unencouraging and uncreative work.

Table 9: Behaviors Contradict Moral Integrity Analyses

3.3 Personal communication

3.3.1 Prepare the register of the stakeholder.

The stakeholder register has been developed early in Section 4.1 including all required information within such as list of stakeholders involved in the project, their contact details, their influence and interest and their expectations.

3.3.2 Personal communication and the effective communication.

- **What is effective communication?**

The concept of effective communication skills refers to a set of special strategies and methods that are followed during the communication process with other parties to ensure the achievement of the desired goals of the communication process:

- **Select the right time:** Selecting the appropriate time is one of the most important effective communication skills, as it allows the other party to interact with what is being presented because the time is appropriate for dialogue and discussion. As a result, he is free to agree to communicate on time.
- **Choose the right place:** As choosing the right place to communicate with individuals makes the process of communicating with them effectively easy. For example, it may be difficult to communicate in some public areas that do not fit with the sensitive discourse through which individuals are informed of some bad news, and it also falls under this to be a place comfortable; In terms of lighting, air conditioning, availability of public facilities, and appropriate seats, they are all important matters that may cause distraction, or boredom of the audience and not listening.
- **Removing sources of interference:** Removing sources of interference helps to achieve effective communication away from everything that distracts attention and cuts the rope of ideas between the interlocutors, such as phone calls or other things. Transient and unintended interference may occur from the speaker, such as the passing of an airplane, for example; Here it is necessary to stop

speaking until the source of the disturbance ends, then to continue the conversation with a simple reminder of the content of the speech before the source of the disturbance.

- **Good preparation before communication:** Organizing ideas and knowing the appropriate method of presentation contributes greatly to the effective communication of individuals with each other through good preparation that paves the way for the sequence of ideas and not to be dispersed, so that the dialogue does not go out to countless sub-topics, as it is desirable to put the same person takes the place of the listeners, and writes down the questions expected of them with their answers.
- **Use of body language:** The use of body language is one of the most prominent skills that reflects the presence of effective communication with others, through gestures, facial expressions, hand movements, and looking into the eyes of the person speaking to them, all of which makes the other party feel important, and contributes to the effective communication with him, how much communication is over Just a movement made by the speaker, and understood as an abuse of the listener, and indifference to it.
- **Briefness and clarity:** It is necessary to stay away from ambiguous phrases or that carry more than one meaning, as well as to use short and understandable words and to stay away as much as possible from duplicate information that is useless and does not give a new meaning. Where you should start talking directly without elaborating on introductions, as well as using familiar and common words.
- **Avoid complex terms:** In order for the other party to understand the content of the message, the sender must use simple terms appropriate to the level of the future, his understanding, and his educational attainment. Complex scientific terms or that are difficult to understand should not be used except by specialists, as each position has an article; Whereas, if the speech is directed at different groups together, we consider this by mentioning the difficult term, and following it with an explanation or alternative in simpler language.

- **Speaking realistically:** Providing evidence and arguments that support the speech would enhance the speaker's argument, and ease of convincing others of the different point of view and acceptance of the other opinion, and the use of explanatory means appropriate to the topic is desirable; Such as graphs, statistics, tables, and pictures, and there is no objection to making comparisons and clarifying the differences if necessary.
- **Speak kindly:** Undoubtedly, the speaker's style has a major role in the acceptance of others for the content of his message, and good listening to it, and the introduction of humor in speech attracts attention and makes the conversation interesting and entertaining, and eliminates the stagnation that dominates the beginnings of situations, while being careful to keep the seriousness in Dialogue in matters that require it; So that the dialogue does not lose its purpose, and the speaker loses his prestige. (*Project Team Leadership and Communication by Samuel Malachowsky & Effective Communication Skills by Dalton Kehoe*)

- **What are the obstacles to effective communication?**

Despite the existence of effective communication skills, there are a number of obstacles that prevent communication between individuals from being positive, and achieving the goals for which the communication process was carried out. The following is a statement of the most prominent of these obstacles.

- **Acoustic obstacles:** which are represented in the presence of noise in the place of communication with others, which makes it difficult to communicate with them.
- **Health obstacles:** which are represented in the presence of some diseases that people in contact with each other suffer from, such as: hearing impairment or blindness.

- **Linguistic obstacles:** which are represented in the presence of a barrier due to language, whether at the level of multilingualism or at the level of a defect in the use of the language due to grammatical or linguistic errors.
- **Cultural obstacles:** which are represented in the presence of some assumptions on each side of the communication, which are built as a result of various cultural backgrounds.

3.3.3 Shapes, models, and channels of personal communication.

Analysis of communication requirements determines the information needs of the project stakeholders. These requirements are defined by combining the type and format of information needed with an analysis of the value of that information. In this section communication models, channels, technologies and methods would be identified.

- **COMMUNICATION TECHNOLOGY:** The methods used to transfer information among project stakeholders may vary significantly. Common methods used for information exchange and collaboration include conversations, meetings, written documents, databases, social media, and websites. However, the choice of communication technology is impacted by:
 - A. Urgency of the need for information.
 - B. Availability and reliability of technology
 - C. Ease of use
 - D. Project environment
 - E. Sensitivity and confidentiality of the information (PMBOK 6th Edition)
- **COMMUNICATION MODELS:** Communication models can represent the communication process in its most basic linear form (sender and receiver), in a more interactive form that encompasses the additional element of feedback (sender, receiver, and feedback), or in a more complex model that incorporates the

human elements of the sender(s) or receiver(s) and attempts to show the complexity of any communication that involves people.

A. Sample basic sender/receiver communication model:

This model describes communication as a process and consists of two parties, defined as the sender and receiver. This model is concerned with ensuring that the message is delivered, rather than understood. The sequence of steps in a basic communication model is:

- **Encode.** The message is coded into symbols, such as text, sound or some other medium for transmission (sending).
- **Transmit message.** The message is sent via a communication channel. The transmission of this message may be compromised by various physical factors such as unfamiliar technology or inadequate infrastructure. Noise and other factors may be present and contribute to loss of information in transmission and/or reception of the message.
- **Decode.** The data received is translated by the receiver back into a form useful to the receiver. (PMBOK 6th Edition)

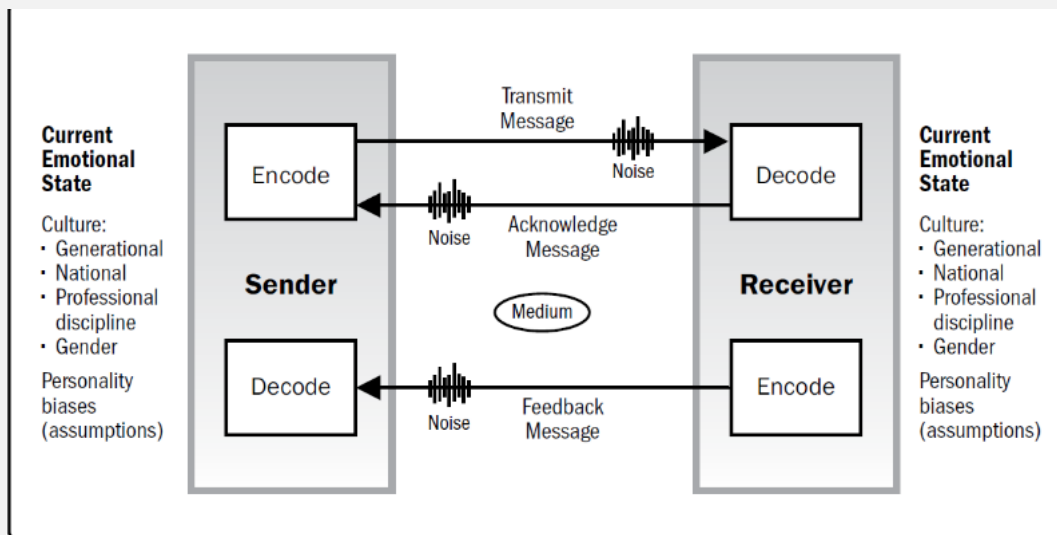


Figure 8: Communication Model

B. Sample interactive communication model:

This model also describes communication as a process consisting of two parties, the sender and receiver, but recognizes the need to ensure that the message has been understood. In this model, noise includes any interference or barriers that might compromise the understanding of the message, such as the distraction of the receiver, variations in the perceptions of receivers, or lack of appropriate knowledge or interest. The additional steps in an interactive communication model are:

- **Acknowledge.** Upon receipt of a message, the receiver may signal (acknowledge) receipt of the message, but this does not necessarily mean agreement with or comprehension of the message—merely that it has been received.
 - **Feedback/response.** When the received message has been decoded and understood, the receiver encodes thoughts and ideas into a message and then transmits this message to the original sender. If the sender perceives that the feedback matches the original message, the communication has been successful. In communication between people, feedback can be achieved through active listening, (PMBOK 6th Edition)
- **COMMUNICATION METHODS:** There are several communication methods that are used to share information among project stakeholders. These methods are broadly classified as follows:
 - **Interactive communication.** Between two or more parties performing a multidirectional exchange of information in real time. It employs communications artifacts such as meetings, phone calls, instant messaging, some forms of social media, and videoconferencing.
 - **Push communication.** Sent or distributed directly to specific recipients who need to receive the information. This ensures that the information is distributed but does not ensure that it actually

reached or was understood by the intended audience. Push communications artifacts include letters, memos, reports, emails, faxes, voice mails, blogs, and press releases.

- **Pull communication.** Used for large complex information sets, or for large audiences, and requires the recipients to access content at their own discretion subject to security procedures. These methods include web portals, intranet sites, e-learning, lessons learned databases, or knowledge (PMBOK 6th Edition)

3.3.4 Communication matrix.

- **What is a communication matrix?**

It's simple: A communication matrix is just an easy way to keep key players in the loop. It details things like project owners, deadlines, project status, objectives, and so on.

- **Why do you need a communication matrix?** Here are just a few benefits:

- **Improved communication across departments.** When all elements of a project are laid out right there in a matrix document, everyone is plugged in and knows what's going on. As a result, it's much easier for team members in different departments to communicate and work together.
- **More efficient use of resources.** When team members can quickly identify who is doing what, they can get right to fixing an issue. That means more time correcting problems and less time trying to figure who to talk to or what the status of a project is. That's what happens when communication channels open.
- **Faster decision-making.** Stakeholders and leaders have all the information they need at all times, so decision-making is much smoother, more efficient, and faster. If approvals are still lagging behind, you can be sure it's for reasons on the approver's end—not because of the communications matrix.

(Global Project Management Communication, Collaboration and Management Across Borders by Jean Binder)

- **How to use a communication matrix for your projects:**

- Communication: This would be things like meetings, status reports, project newsletters, etc.
- Purpose: Be as succinct as possible. Now's not the time to prove you're the next Shakespeare.
- Medium: Is the communication going out via email, conference call, or an in-person meeting?
- Deliverable: What tangible item will be the end result of that particular part of your project? Possibilities include an agenda, a slide deck, a project schedule, and a status report.

NO	COMMUNICATION	PURPOSE	MEDIUM	FREQUENCY	AUDIENCE	OWNER
1	Project status preparation	Prepare project status report	In person / Face-to-face	daily	Project team Planning engineer	Project manager
2	Project Team Meetings	Review status of project	Face-to-face or Conference call	Weekly	Project team	Project manager
3	Technical & Creative Design Meetings	Discuss, review technical & design problems and solutions.	In person / Face-to-face	As needed	Technical team	Technical lead Creative lead
4	Monthly Project Status Meetings	Update leadership on project status.	Face-to-face or Conference call	Monthly	Project manager Stakeholders	Project manager
5	Project Status Reports	Detailed report on project status including progress, costs, and problems.	Email	Monthly	Project manager Stakeholders	Project manager

Table 10: Communication Matrix

3.3.5 Wrong scenarios of communication

No business runs perfectly but the way people communicate and work through problems can be a sign of a company's overall wellbeing. Healthy communication in the workplace is critical for driving results while also creating a positive work environment. However, bad communication can begin to cripple an organization and have

a negative impact on the entire staff. Learning to detect poor communication habits and replace them with healthy ones will have a positive effect on productivity and even financial success. Here are three wrong scenarios may happen in the company:

- Senior management devotes weeks or even months to crafting a new strategy, and the strategy is a glorious thing. But it exists only at the level of the enterprise or the division. It has not been translated or interpreted to its practical implications, so employees and their supervisors don't know what to do with it. Mystified, they naturally ignore it. It's dead-on arrival, but management doesn't realize it for months to come. So, leaders continue talking about something that is a mere historical footnote in the minds of employees.
- Not uncommonly, a leadership team relies on cascading to "get the word out" about a new policy, program, or priority. By cascading, we mean disseminating strategic information through an organization one level at a time. Cascading spawns rumors and creates a tangled web of misinformation and misunderstanding. It never works, and worse, it teases leadership into thinking that it has communicated when it actually has only miscommunicated.
- Perhaps a leader has been taciturn in the past and then realizes she must communicate a new business strategy. She may assume that employees have a depth of knowledge about the company's competitive situation that they actually do not. She speaks about the strategy as if it is a foregone conclusion, and she fails to explain its rationale. Employees can only wonder what she is talking about and why the particular strategy has found favor.

3.3.6 Stakeholder assessment matrix

- **Levels of stakeholder engagement:** Stakeholder's engagement is a continuous process throughout the whole life cycle of the project, by which an organization establishes a constructive discussion and a productive communication with its key stakeholders. The purpose of involvement is to convey the

stakeholders' interests and expectations to decision makers and providing input to management processes and to evaluate the impact of the decisions on them, the engagements are different from one stakeholder to another according to their interest, they range from just having limited information to full collaboration.

(PMBOK 6th Edition)

- The stakeholder's engagement could be as follow (*):

Inform	Listen	Consult	Involve	Collaborate
One-way communication: Organization to stakeholder, there is no need to reply	One-way communication : Stakeholder to organization	Limited two-way engagement: Organization asks questions, stakeholders answer	Two-way or multiway engagement: Learning on all sides but stakeholders and organization act independently	Two-way or multi-way engagement: Joint learning, decision making and actions

Table 11: Stakeholder Engagement

The stakeholder's engagement might need to be changed from their current level of engagement to the desired level as necessary during the different phases of the project.

NO	Stakeholder	Inform	Listen	Consult	Involve	Collaborate
1	Project Manager					C,D
2	Project Team					C,D
3	PMO					C,D
4	Financial Director			C	D	
5	Vice President				C	D
6	CEO				C	D
7	Transportation Company	C			D	
8	Suppliers		C	D		
9	Customer	C	D			
10	Customs	C	D			

Table 12: Stakeholder Engagement Matrix

C: current engagement

D: desired engagement

Chapter 4: Leadership, Teamwork, Conflict and Crisis

4.1 Leadership

4.1.1 Leadership Model

A leader has to be aware of different leadership styles and decide which is appropriate for his or her nature, for the project, for the team being managed and for other interested parties, in all types of situations. The leadership style adopted includes patterns of behavior, communication methods, attitudes towards conflicts, ways of controlling team members' behaviors, decision-making processes and the amount and type of delegation.

Leadership is important throughout the full lifecycle of the project, and becomes especially important when change is required or when there is uncertainty about a course of action. (*Project Team Leadership and Communication*)

- **Leadership Styles:** Every individual has a preferred leadership style; every team does, too (part of their culture, a concept covered later in this chapter). As individuals, leaders also migrate towards a particular style. In addition to the mechanics of the leadership style itself, all leadership experiences also emphasize one of three things: the leader, the team, or the individual team members, as well as an approach that prioritizes productivity or harmony. In their book on leadership, Goleman, Boyatzis, and McKee define several key styles:

- i. **Affiliative:** This style emphasizes connection, harmony, and conflict resolution above all else. It's especially effective when conditions have left a team in need of "repair." Though affiliative leadership is often effective at boosting morale, it leaves a potential for abuse; poor performance can go uncorrected and team members may begin to perceive that mediocrity is acceptable as long as harmony is present. This type of leadership works best in combination with others.
- ii. **Authoritarian / Commanding / Autocratic:** When many think of leadership and authority, this style usually comes to mind. Classically used by the military and often portrayed across media, authoritarian leadership is most effective when a team is in crisis or drastic remediation is needed. Because it relies heavily on criticism and rarely focuses on achievement, it can undercut morale

and cause some of the best team members to seek options elsewhere. In most organizational structures, it's best to avoid this leadership style or to only implement it temporarily.

- iii. **Coaching:** Coaching focuses on connecting individual goals with those of the team, which shows team members how to improve their productivity. This style of leadership works best with individuals who are receptive, show initiative, and want to grow as professionals. If applied heavily, team members can feel “micromanaged,” and will feel that their self-confidence is undermined. Finally, unmotivated individuals may not even respond to coaching, which requires a strategy change.
- iv. **Democratic:** Relying on the skills and knowledge of each team member, democratic leadership effectively fosters the group's commitment to its goals. This style works best when options or decisions are unclear and the group has mature professionals who are comfortable making decisions collectively. But, when a crisis or deadline warrants a quick, decisive decision, this consensus-building technique may take too long (making another technique more appropriate).
- v. **Laissez-faire:** In a laissez-faire environment, team members have complete freedom to make decisions concerning their work assignments, their pace, and how work is completed. In this situation, the leader should offer guidance or support (materials, resources, etc.) when requested or when their need is apparent. This leadership style works best when team members are extremely proficient and properly self-motivated. Though “guided freedom” is appealing to most, it requires leaders and team members to be honest about whether this style is most effective for them, and once implemented, whether it's working.
- vi. **Pacesetting:** A pacesetter leader has a high, almost obsessive standard for their own performance and expects team members to follow suit. Simply stated, they “lead by example.”

Unfortunately, this type of leadership has the potential to make others feel like they're constantly failing if they can't keep up all the time. This style works best with a highly motivated team

vii. Transformational / Visionary: A transformational leader focuses on creating and communicating a vision for the future, challenging and inspiring team members with a sense of purpose and excitement. Because they're less likely to feel limited by current perceptions, these leaders are often effective when a recent failure has negatively affected the team, as they push the team to take ownership of their future success. What's more, these leaders are highly effective at addressing the mundane, stabilizing everyday situations gone awry. It's important for a transformational leader to have a realistic view of the strengths and weaknesses of each team member, which helps avoid disenchantment. *(Project Team Leadership and Communication)*

- **Influences:** Influence is the ability of an individual to transform and shape the opinions of others.

Influencing at the workplace, then, is a process of transforming the behaviors of employees. For example, a team leader can influence subordinates through his communication, policies and actions. Influencing is one of the important soft skills required for every individual, irrespective of their hierarchical position at the workplace. A leader must display several influencing skills, including integrity and transparency, impeccable communication, ability to give constructive feedback and emotional intelligence. It takes time, focus, practice and experience to acquire influencing skills. Mainly, studies have classified the influence into the following types: *(Project Team Leadership and Communication)*

- | | |
|------------------------|-------------|
| 1. Formal / Legitimate | 4. Expert |
| 2. Penalty / Coercive | 5. Referent |
| 3. Reward | |

- **Motivation:** is about the ways a business can encourage staff to give their best. Motivated staff care about the success of the business and work better. A motivated workforce results in: increased output caused by extra effort from workers. improved quality as staff takes a greater pride in their work.
- **Behavior pattern:** Professional discipline and ethics should be considered as accepted behavior pattern. The other use of the word “discipline” refers to the domain of self-control –controlling your behavior while you manage a project in terms of choosing a leadership style, properly influencing others and considering the culture of an organization or team. Each of these requires you to consider outside factors, apply knowledge, and make decisions as best as you can in order to move forward. As a leader or team member there are six importance considerations have to be considered. Individual qualification including the skills and ability to complete the duties associated with it. Accepting work beyond your capability presents a risk to the project and your team. Project information protection is the second point which is mainly focusing be ethical in terms of not releasing any confidential information. Confronting conflict head on rather than avoiding it is third point which is mainly about directly dealing with conflict. A conflict of interest is a situation where the concerns or motivations of two parties may be incompatible which is fallen under disclosing conflict of interest consideration. Considering all other parties within the organization when making decision related to your work to maintain an attitude of mutual cooperation would be the fifth point. Finally, “viewing from the outside” due to projects complexity of these project can that may have a very real – even detrimental– effect on the careers of the team members. Are you taking credit for the work of others? Are team members being recognized for their hard work? Are people being unjustly blamed for failure? Considering abovementioned questions would lead to achieve fairly and successfully advocating for team member.
- **Communication Model:** have been detailly explained in section 8.3 in this report.

- **Conflict Management:** For many leaders and team members, the “nightmare scenario” at their workplace involves coworkers engaged in conflict. Common sources of conflict include schedules, project priorities, resources, technical options or tools, administrative procedures, cost, personalities, along with hundreds of others based on your context. These conflicts may simply involve clashing personalities; they may be genuinely complex disagreements regarding the work at hand. Either way, many workers would rather avoid conflict in the first place. Therefore, the conflict management need would be satisfied based on conflict situation by following seven conflict techniques as stated below:

1. **Confronting / Problem Solving**
2. **Compromising**
3. **Withdrawal / Avoidance**
4. **Smoothing / Accommodating**
5. **Collaborating**
6. **Forcing** (*Project Team Leadership and Communication*)

- **Decision making:** The process by which managers/leaders respond to opportunities and threats by analyzing options, and making decisions about goals and courses of action. There are several styles of the decision making a leader must be aware about some are represented below:

1. **Consensus Decision:** Consensus decision making is a creative and dynamic way of reaching agreement in a group. Instead of simply voting for an item and having the majority getting their way, a consensus group is committed to finding solutions that everyone actively supports – or at least can live with. By definition, in consensus no decision is made against the will of an individual or a minority. If significant concerns remain unresolved, a proposal can be blocked and prevented from going ahead. This means that the whole group has to work hard to find win–win solutions that address everyone's needs. Consensus is used widely by people around the world working towards

a more just and equitable society: from small voluntary groups, co-operatives and campaign networks to businesses, local communities and, in some cultures, across much wider regions.

2. **Democratic Decision:** This type of process is also referred to as a 'leadership style.' In order for a process to be democratic, it must be conducted with equality and fairness in mind. There are pre-existing rules and procedures that allow for a mainstream resolution to the issue. Also, there is not one person responsible for making a decision rather, the decision is made by a group of people. Therefore, democratic decision-making is dependent on a group, instead of one leader.
3. **Majority vote:** Majority vote works best when there are larger groups because it is often difficult or impossible to gain 100% approval on an issue when there are so many people involved in the decision-making process. Therefore, a majority vote happens when everyone is asked to cast a vote
4. **Compromise Decision:** Teams may use a compromise approach to making a decision when they can't agree on a single answer. The facilitator helps the team identify all points that they agree on to form the basis of the decision. Then, focusing only on the specific areas of disagreement, the team seeks an alternate approach, or compromise, that everyone can live with.
5. **Autocratic decision:** making involves one person making a decision. Autocratic leadership is vital in many workplace environments. This style is necessary within organizations and companies that demand error-free outcomes. The decision-maker evaluates possibilities, chooses a plan, and then the organization implements the plan with no input from other people. Autocratic decision making is when the leader maintains total control and ownership of the decision. The leader is also completely responsible for the good or bad outcome as a result of the decision. The leader does not ask for any suggestions or ideas from outside sources and decides from his or her own internal information and perception of the situation

4.1.2 Preferred Leadership Model

The selection for effective and suitable model would be situationally taking into account the two traps to be avoided while choosing a leadership style. Inflexibility is the first trap which some leaders choose a style and never change and this can be out of habit or a fear of change. It's important to be flexible and to choose the appropriate style when it's needed. Second trap to be avoided is circumstance. In many cases, a leader feels that a style is preferred either because it's the best fit for their team or because they think it's superior to other styles. However, in the face of deadlines, conflict, or personal difficulties, leaders may be forced to suddenly switch to a less preferred style. Remember each leadership style is useful with certain people and circumstances, but at all times, it's important to deliberately choose to change styles and to never let your circumstances force you into a less effective style. After considering into account all project aspect it has been found that most effective leadership model for this project is Pacesetting Leadership. This model has been selected due to the following:

- 1– The need for short term results
- 2– The need for centered and high–performance leader
- 3– The need to raise up team performance
- 4– The leader is most knowledgeable about project and company objectives

4.1.3 Motivation methods

Since the leadership model has been established along with all knowledge that would support the leader to apply the leadership effectively and efficiently here are five methods can be used to motivate the employee:

- **Share profits to improve performance:** By offering a profit–sharing program, employees will recognize that they have a stake in the financial success of the organization. Profit–sharing gives employees a sense of pride in what they have accomplished and a feeling of accomplishment seeing their earnings increase. It can improve performance and reduce turnover as well.

- **Take benefits to the next level:** Employees generally expect standard benefits like paid time off, health insurance and even flexibility. You can motivate employees by taking your benefits to the next level. Add game rooms to help employees de-stress throughout the day, a snack bar to keep energy levels up or even implement a work-from-home day each week or month. Childcare or wellness compensation plans are also a great way to incentivize employees. These kinds of benefits boost health, increase team motivation and encourage people to stay with your company longer.
- **Offer an incentive program:** Create an incentive program that rewards employees for consistently working hard—separate from celebrating milestones or successes. You could implement non-financial incentives like extra vacation days, compressed work weeks or a choice of parking spots. Your incentive program doesn't even have to be connected to performance. For example, you could use it to encourage your team to participate in training programs—the team members who watch the most videos each week could receive a reward.
- **Create a mentorship program:** A good mentor can offer encouragement, advice and understanding about the trials and successes employee encounter. If your employees work in a specialized field that friends and family do not understand well, a mentor can be invaluable in helping them sort through concerns and appreciate their successes. Create a mentorship program within your department where you pair more experienced employees with ones who have less experience to guide them along their career journey and offer words of advice and encouragement daily
- **Celebrate milestones and achievements:** Particularly if a project has a long-term goal, celebrating smaller milestones along the course of the project can help everyone on the team stay connected to the work and focused on the larger goal. Gratitude and validation are an important part of recognizing those milestones, but tangible rewards can also help. Financial bonuses, a lunch party, time off or a gift certificate for meeting milestones can motivate everyone.

4.2 Teamwork

4.2.1 RACI model

NO	Task	Project Manager	Project Team	PMO	Financial Director	Vice President	CEO	Transportation Company	Suppliers	Customer	Customs
1	Conduct Needs assessment	A	C	R	C	I	I				
2	Prepare project charter	R/A	C	C		I	I				
3	Financial study	C	C	C	R	I	A	C	C	C	C
4	Feasibility study	R	C	C	C	I	A	C	C	C	C
5	Budget approval	C	C	C	R	I	A				
6	Call for tenders	R/A	C	C		I	I				
7	Prepare contract	R/A	C	C		I	I				
8	Sign contract	A	C	C		I	R				
9	Create schedule	R/A	C	C		I	I				
10	Risk assessment	R/A	C	C		I	I				
11	Time Schedule	R/A	C	C	C	I	I				
12	Change management	R/A	C	C		I	I				
13	Customer negotiations	R/A	C	C	C	I	I			I	
14	Stakeholder communication	R/A	C	C	C	I	I	C	C	C	C
15	Prepare status reports	R/A	C	C	C	I	I				
16	Documentation	R/A	C	C	C	I	I				
17	Create lessons learned	R/A	C	C	C	I	I				
18	Project closure report	R	C	C		I	A				

Table 13: RACI Model

4.3 Conflict and crisis

4.3.1 Identify the conflict and crisis

- **Conflict:** We can define conflict, then, as a process that begins when one party perceives that another party has negatively affected, or is about to negatively affect, something that the first party cares about. (Organizational Behavior by Stephen Robbins). Organizational or workplace conflict, is a state of conflict caused by actual or perceived opposition to the needs, values, and interests of people who work together. Conflict takes many forms in organizations and might come up due to Personalities, project cost, administrative policies and procedures, technical belief, resources priorities or schedules.
- **Crisis:** IPMA has defined the crisis as may be the outgrowth of a conflict, or it may be the result of a sudden, abrupt or decisive change in a situation that threatens to thwart the realization of the goals of the project, either directly or indirectly (Individual Competence Baseline for Project, Program & Portfolio Management)

4.3.2 Scenarios of the conflict events in the project

- **Scenario 1:** The team might be felt by a presence of different and opposing emotions related to each other or a situation that has recently taken place or is in process of being unfolded. It also may be accompanied at times by a physical discomfort, especially when a functional disturbance has become associated with tension headaches 'expressing a state of inner tension or caused by an unconscious conflict'. This type of conflict is called emotional conflict and the best proposed conflict resolution would be addressed in the following section.
- **Scenario 2:** The team may start conflict in something considered as trivial, insignificant, immoral opinion by other party or unrelated interest to the project. It also might extent the impact to other colleagues or work environment making the spirit of team become less effective due to the negativity environment These

stated reason might happen when the project is in a critical stage or tight schedule is present. The best way to deal with this kind of conflict would be recommended in the next section.

- **Scenario 3:** Conflict might take place when ambiguity is there in terms of defining the problem, lack of information for the analysis, different solutions are in the table or no clear role toward the implementation for the solution. This kind of conflict happened during no tightness for project deadline the best way to deal with would be proposed in next section.

4.3.3 Strategies to deal with each conflict and reason

What are the conflict resolution types that can be deployed to handle team conflict? This section has defined the different strategies that can be deployed in the project to oversight any such conflict that may lead to negatively impact and exploit any positive conflict that might support the project. All following information are obtained from two sources which are (PMBOK 6th edition / and Project Team Leadership and Communication) Finally, at the end of this section there are a proposed conflict resolution that can be usefully adopted for the aforementioned scenarios.



Figure 9: Conflict Resolution Approaches

- **Conflict Resolution:** is a daily occurrence at work that can either propel or disrupt the momentum for a leader, a team or the entire organization. The workplace can become a toxic environment when leaders allow conflict to fester rather than confront it head-on. Managing conflict can be a tricky thing – especially when a leader is not familiar with the larger ecosystem in which the particular individual or department creating the conflict, and how efforts to resolve conflict will reverberate throughout that ecosystem. There are five conflict resolution approaches:
 - **Forcing, Competing or Commanding:** Authority resolves the conflict and decide in which way the team should be headed by forcing all parties to end their conflict. This type is effective when the conflict is petty, unimportant or one party's opinion is unethical. Worth mentioning, this type may not resolve the conflict which can reappear at another time in the future
 - **Compromising:** Each party makes concessions to the other, and a mutually-accepted conclusion is reached. This type also works best with issues that can be divided as well as considered a quickest solution. Because everyone gets only a subset of what they want it may result in a 'Lose-Lose'.
 - **Collaboration / Problem Solving:** Often considered the optimal solution, directly confronting conflict is a method of problem solving. It is effectively workable when conflict needs to be resolved once and for all. Would non-useful when project deadlines are tight, or immediate response is required because this type is time consuming.
 - **Smoothing / Accommodating:** Emphasizing areas of agreement rather than areas of difference; conceding one's position to the needs of others to maintain harmony and relationships. Smoothing also can allow time for both parties to think over the situation at hand. Accommodating, like

compromise, leaves at least one party unsatisfied. This could damage the project down the line, and there's also the potential for the accommodated party to abuse the other party.

- **Withdrawal / Avoidance:** Retreating from an actual or potential conflict situation; postponing the issue to be better prepared or to be resolved by others. This technique works best when the conflict is personality-based or trivial rather than an actual, significant debate pertinent to the project. In some cases, postponement may be beneficial such as time to change emotional states, intervention by another party is needed, or a cooling off period all may help.

- **Proposed Approaches**

- **Scenario 1:** the best approach to deal with a such case would be the Avoidance. The reason behind selecting this approach is because the conflict is considered as emotional conflict, postponement the interference to give time for changing the emotional state of a person and the triviality of a such conflict.
- **Scenario 2:** after going through previous section, we found that the best approach to be adopted in a such case is Forcing approach. Due to project criticality stage, schedule tightness, unrelated subject to the project and environment impact aforementioned approach is selected.
- **Scenario 3:** the need for precise problem definition, the lack of the information to support analysis stage different untested or unproved solution are in the table, no clear roles are identified toward the solution implantation and the no tight or critical project schedule or stage are the reason behind selection of Problem-Solving approach. (PMBOK 6th edition / and Project Team Leadership and Communication)

4.3.4 Develop Root Cause Analysis

- **What Is a Root Cause Analysis?**

Root cause analysis (RCA) is a process to help people understand the real causes behind a problem in order to learn why that problem arose in the first place. By digging deeper using different analysis techniques to collect data, you can then form an action plan that will enable you to identify the contributing factors of your problem in order to prevent it from occurring again. The simplest way to think about root cause analysis is to imagine a common problem you may experience in life, like if your home Internet suddenly stopped functioning. If this occurred, you could drive to a coffee shop and use their Internet instead, but that solution would not only fail to take any corrective action but would also ignore the underlying causes of your problem. A better solution would be to call your Internet provider and ask them to find the real cause of the problem.

- **What Is the Purpose of a Root Cause Analysis?**

The primary purpose of the root cause analysis process is to analyze a problem or sequence of events in order to identify what happened, why it happened, and what can be done to prevent it from happening again.

- **Basic Types of Root Causes**

There are three basic types of root causes that can have a potential impact on a problem:

1. **Physical causes:** A tangible item fails for whatever reason, e.g. if an MRI machine at a hospital stops working and prevents a patient from receiving the proper health care.
2. **Human causes:** One person or several team members did something incorrectly. Human error will often lead to a physical cause, e.g. if a hospital's quality management team didn't perform an MRI machine's scheduled inspection, which caused it to fail.

3. **Organizational causes:** When a system or process that an organization uses to do their jobs is faulty, e.g. if a hospital's quality control department mistakenly thought it was the patient safety department's responsibility to inspect the MRI machine and nobody corrected them.

- **How to Perform a Root Cause Analysis in 5 Steps**

In order to go through the RCA process, you must be familiar with the following five steps:

1. Define the problem. Analyze what you see happening, and identify the precise symptoms so that you can form a problem statement.
2. Gather data. Before you can move on to identifying the underlying problems, you must collect and evaluate all aspects of the situation. Performing a case study, incident investigation, or accident analysis are a few common ways to accomplish this step.
3. Identify causal factors. Now with your data in hand, it's time to look for as many causal factors as possible that could have led to your problem.
4. Determine the root cause(s). Use some of the root cause analysis tools in the next section to discover the root causes of each causal factor.
5. Recommend and implement solutions. Once you know the root cause, you can recommend a preventative action to ensure the problem never happens again and then develop a timeline and plan for implementing your solution. The tools in the next section can also be used to help you spot potential flaws in your solution before they happen. (PMBOK 6th edition)

- **Popular Root Cause Analysis Methods**

The goal of RCA is to recognize all the underlying causes of a problem. Using an analysis method is a useful tool to accomplish this task. Five popular root cause analysis methods are:

1. The five whys: The five whys are a problem-solving strategy that consists of asking “Why did this problem happen?” and then following the answer up with a series of additional “But why?” questions until you get to the root cause of the problem.
2. Change analysis: This method meticulously examines all the changes leading up to an event in hopes of discovering risk management strategies. This is particularly useful when there are a large number of possible causes.
3. Failure mode and effects analysis: One of the first systematic methods of failure analysis, FMEA a step-by-step guide for recognizing all potential failures in a product, business process, or service. Once you’ve pinpointed each individual failure in a system, you then can assess the effects of those failures one by one.
4. Fishbone diagram: Also called an “Ishikawa Diagram” or a “Cause and Effect Diagram,” this RCA tool is a visual way to map cause and effect. The spine of the fish skeleton in the middle of the diagram represents the specific problem, and then the rib bones of the skeleton that branch out from the spine represent potential causes.
5. Pareto analysis: This type of analysis is a statistical way of solving problems. It involves identifying a few fundamental causes of problems that must be addressed in order to solve the majority of complications. Pareto analysis assumes the 80/20 rule, which says that about 80 percent of problems are produced by only a few serious causes (20 percent). (PMBOK 6th edition)

In our project we have conducted Root analysis for one problem the project may face using Fishbone diagram as shown below:

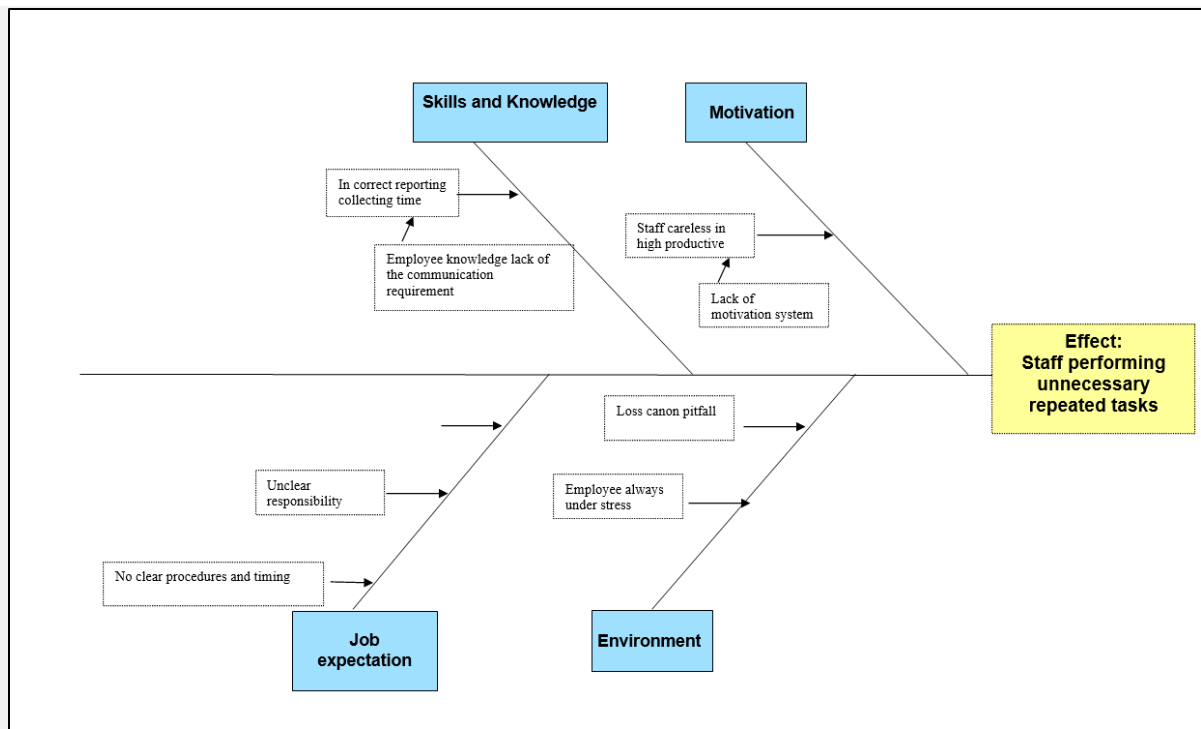


Figure 10: Root Cause Analysis

Chapter 5: Resourcefulness and Negotiations

5.1 Resourcefulness

Introduction: Resourcefulness is about making optimal use of what to work with. It is not just about creating something new; it also applies to making existing things work better, faster or cheaper. The individual acquires capable resources and foster an attitude of resourcefulness within the team to stimulate, evaluate and act upon ideas that can benefit the process, results or goals. Ideas must often be ‘sold’ to the team before they are accepted. A team atmosphere that is open to creativity and innovation is a prerequisite for acceptance. Others in the team will then often champion the idea and refine it so that it gains greater acceptance.

5.1.1 Human resources on the functions

A well-managed human resources department can assist your company in meeting its objectives through effective people management. In this section, we will go over the six main functions of an HR department and how each serves the needs of a business. After conducting many research using multiple sources stated at the end of this section, we conclude that there are six main functions of human resource:

- 1. Performance management:** When assessing employee performance, HR's primary responsibility is to ensure that employee assessments are conducted in a standardized, fair and accurate manner. Old HR management focused on goal setting and linear results of “achieved” or “unachieved”, but in recent years, in the field of performance management, related employee performance such as productivity and quality of work. Focus on results. Performance management software also plays a role in performance management by providing 360-degree feedback loop capabilities, access to key HR metrics, self-assessment capabilities, and goal setting based on more specific and realistic criteria. Strengthened.
- 2. Recruitment, Placement, and Talent Management:** This is arguably the most important function of the human resources department. The HR department is in charge of planning how to attract, select, and onboard candidates for the organization. Because employees are an organization's lifeblood, ensuring that the right caliber of candidates is hired is critical for future success. Each employee's contribution is critical

to a company's growth. In essence, a bad hire is bad for business. Recruiting and identifying new potential candidates is only the first step. Once the position has been advertised, it is the HR department's responsibility to guide candidates through the hiring and onboarding processes. In short, human resources is in charge of the entire talent acquisition process.

3. **Benefits and compensation:** Human resources departments are also in charge of employee benefits administration and compensation. This includes assisting in the establishment of salary ranges for open positions, developing competitive benefit packages to attract quality employees, adjusting pay for promotions and accomplishments, and implementing performance incentives such as bonuses and commissions.
4. **Human resource planning:** Human resource planning is the practice of preparing a business for its future staffing requirements. It's a process similar to workforce planning in that it involves not only ensuring that the organization has the right people for the right jobs, but also anticipating future vacancies due to retirements, promotions, resignations, and terminations. Human resource planning is an essential component of strategic human resource management, which is the process of aligning HR practices with the overall business strategies of the company.
5. **Training and development:** Human resources invest heavily in how companies manage their talents and how training and development programs support both departmental and organizational goals. Investing in employee development is important to support the development of skills that will support future business growth. Employees value the opportunity to learn new skills, so effective training and development have also been shown to be important for employee retention and productivity.
6. **Employee engagement:** Studies show that engaged employees perform better and are more productive than non-engaged colleagues, and companies with highly engaged employees generate higher profits than less engaged companies. In addition, organizations with high levels of engagement tend to have lower

turnover rates. The HR plays an important role in deciding how to increase employee engagement by coordinating processes and programs that are appropriate for your organization. Initially, the focus was on understanding and measuring an organization's commitments to identify areas of potential improvement.

(Human Resource Management 13th Edition, & Human Resource Management Functions, Applications, and Skill Development)

5.1.2 Influence of conducting crashing and fast-tracking process

Fast tracking and schedule crashing are two techniques used in schedule compression. PMI has defined schedule compression as the need to shorten or accelerate the schedule duration without reducing the project scope in order to meet schedule constraints, imposed dates, or other schedule objectives.

- **Fast tracking:** A schedule compression technique in which activities or phases normally done in sequence are performed in parallel for at least a portion of their duration.
 - **Influence:** 1) Reducing project duration by running two activities parallelly
 - 2) Influences the project by exposing it to high risk resulting in rework
 - 3) Increase coordination effort between the activities
- **Schedule crashing:** is another technique used to shorten the schedule duration for the least incremental cost by adding resources.
 - **Influence:** 1) Increases project cost
 - 2) Increase project risk
 - 3) Decrease project duration
 - 4) adding new project resources (overtime, manpower. etc.)

5.2 Negotiations

5.2.1 General rules for the negotiation process

The Strategic Negotiation Process essentially consists of four steps: (1) Estimating the Blueprint, (2) Validating the Estimation, (3) Using the Blueprint to Create Value, and (4) Using the Blueprint to Divide Value. Before you take the first step, though, it's important for you to establish a goal for any negotiation in which you may be involved. One of the mistakes people often make is trying to plan how to get there before they've even determined where they want to go. Establishing a goal, or not doing so, can have an impact, not only on the planning and execution of a negotiation, but also on any long-term relationship between you and your customer. Interestingly, our research has shown that, more often than not, even when people do have goals in their negotiations, those goals are often inappropriate and, ultimately, counterproductive. In the next chapter I show you how to establish a value creating goal that is appropriate for any negotiation. In the meantime, following are the four steps of our process.

1. **Estimating the Blueprint:** This first step has a twofold purpose and is accomplished through two exercises. The first exercise, the Consequences of No Agreement (CNA) Estimation, enables you to determine what effects—both positive and negative—not reaching an agreement will have on both you and your customer. the second exercise, the Wish List Estimation, you develop lists of all the items you and your customer would ideally like to have in the deal and then determine what's most and least important to each of you.
2. **Validating the Estimation:** it's essentially a fact-finding exercise in which you gather information to determine the accuracy of the estimates you made in Step One. This information is gathered from four different sources: (1) your own knowledge of the customer and your competitors; (2) the knowledge of others in your organization who have worked either for the customer or for your competitor in this deal, (3) publicly available data, such as newspaper articles, annual reports, and the like; and (4) your customer

3. **Using the Blueprint to Create Value:** The purpose of the third step in our process is to create measurable business value for those on both sides of a negotiation. In this step, taking into account all the items you've identified in Step One and validated in Step Two, you structure deals in such a way that both you and your customer can get not just what's of primary importance to you but also other benefits that make the deal even more attractive.
4. **Using the Blueprint to Divide Value:** Using consolidated data gathered from previous steps into a presentation of three or more "Multiple Equal Offers" to your customer. These offers, all of which are equally acceptable to you, provide your customer with more value than he or she had anticipated going into the negotiation, while, at the same time, enabling you to claim as much value as you can without damaging the ongoing relationship. (Strategic Negotiation by Brain Dietmeyer and Robert Kaplan)

5.2.2 Negotiation Plans

We have prepared two Negotiation Plan detailed as below:

1. **Distributive Negotiations:** It is also called distributive bargaining or distributive bargaining. This type of negotiation occurs when each of the negotiating parties has a limited number of resources, and each party believes that if they lose something in the negotiation process, the other party will undoubtedly gain something in return. Thus, instead of both sides seeking to reach a common agreement based on their interests and needs, each is trying to get more benefits from the other.
2. **Management Negotiations:** Administrative management or with management may be a cause for concern and tension. He was felt by one of the highest ranks at work. However, this type of negotiation will often get in the way during the job search process or during the recruitment process. You may need to negotiate the value of your salary, or the benefits or responsibilities of the job. All of these things directly affect your satisfaction with the job. Not only that, negotiating such matters might be a good opportunity to show your

future boss your negotiation skills. You may also need to negotiate with management about your current job title when you are being evaluated, when your contract is renewed or a raise is requested.

Chapter 6:

Project design, requirements and objectives

6.1 Project Design

6.1.1 Triple Constraint of the project

The triple constraint theory is about three elements scope, time, and cost. These 3 elements — referred to as “the iron triangle” — are the traditional constraints considered in a project. Quality is often placed in the center of the triple constraint triangle and is affected by all 3 variables.



Figure 11: Triple Constraint

- 1. Project scope:** the project scope is all the features that need to be delivered to meet the project goal.
Alraabia residential project scope will cover four major areas which are access security system, monitoring system, alarming system and fire and network security system.
- 2. Project time:** is the expected duration of the project. Once the amount of work is understood, project managers can estimate the expected duration of each individual work package or deliverable. The project has limited time framed which is to complete all project phases within one year.
- 3. Project cost:** is the overall cost of the project. You'll need to budget for facilities, materials, labor costs, and any other resources required. The project has initial budget which is 700,000 SR. The acceptable change limit is not more than 15% of the initial budget.

6.1.2 Project success factors

- 1. Experienced Project Managers & Professional Project Team Leaders:** You can understand the theory and methods of project management, but experience is one of the key factors of success in the end. The more experienced a project manager, the more likely he/she will be able to overcome the daily project challenges. To avoid misunderstandings, keep clear roles and responsibilities in mind. Successful project managers are known not only by technical knowledge but also by leadership. Ensure that the team members have the necessary skills to deliver the results required and bring a positive attitude to the project. Also, as a whole, the team must function. So, it is essential to build a team that is motivated to work towards a common goal together.
- 2. Methodic Approach:** For success, the choice of a suitable methodology for project management is crucial. To ensure that your process is clear, reliable, and efficient, follow the trends and techniques of the framework you have chosen. All stakeholders should understand and agree on investing time to define a clear project objective.
- 3. Proper Planning:** Many project managers hurry to the project execution stage and do not take sufficient time for sound planning. Don't make a mistake here. Invest sufficient time and resources in thorough scheduling.
- 4. Adhere to the best practices:** The wheel does not need to be reinvented. Project management itself is a challenge. Use frameworks and best practices wherever possible. Instead of constructing everything from the ground up, draw from the experience of past successes and adapt proven strategies to your individual case. This enables you to concentrate your resources on your project's really distinctive elements that will make all the difference.
- 5. Monitoring & controlling:** Check your progress and regularly evaluate the results. To quickly understand if the project is on track, define key performance indicators (KPI), and use reports. You will

recognize early on when things go sideways and can take countermeasures before greater harm is done.

6. Effective Communication: With proper communication, many undesirable developments in projects could be prevented or at least discovered earlier. Ensure that formal communication processes (meetings, documentation), as well as informal processes, are implemented and used. Communication between members of the team plays an important role. Offer opportunities for your employees to come together outside the official meetings, for example, in your offices in a coffee corner or a chat tool.

6.1.3 Work Breakdown Structure

The WBS is a hierarchical decomposition of the total scope of work to be carried out by the project team to accomplish the project objectives and create the required deliverables. The WBS organizes and defines the total scope of the project and represents the work specified in the current approved project scope statement.

The planned work is contained within the lowest level of WBS components, which are called work packages. A work package can be used to group the activities where work is scheduled and estimated, monitored, and controlled. In the context of the WBS, work refers to work products or deliverables that are the result of activity and not to the activity itself.

- Project Work Breakdown Structure has been developed as below:

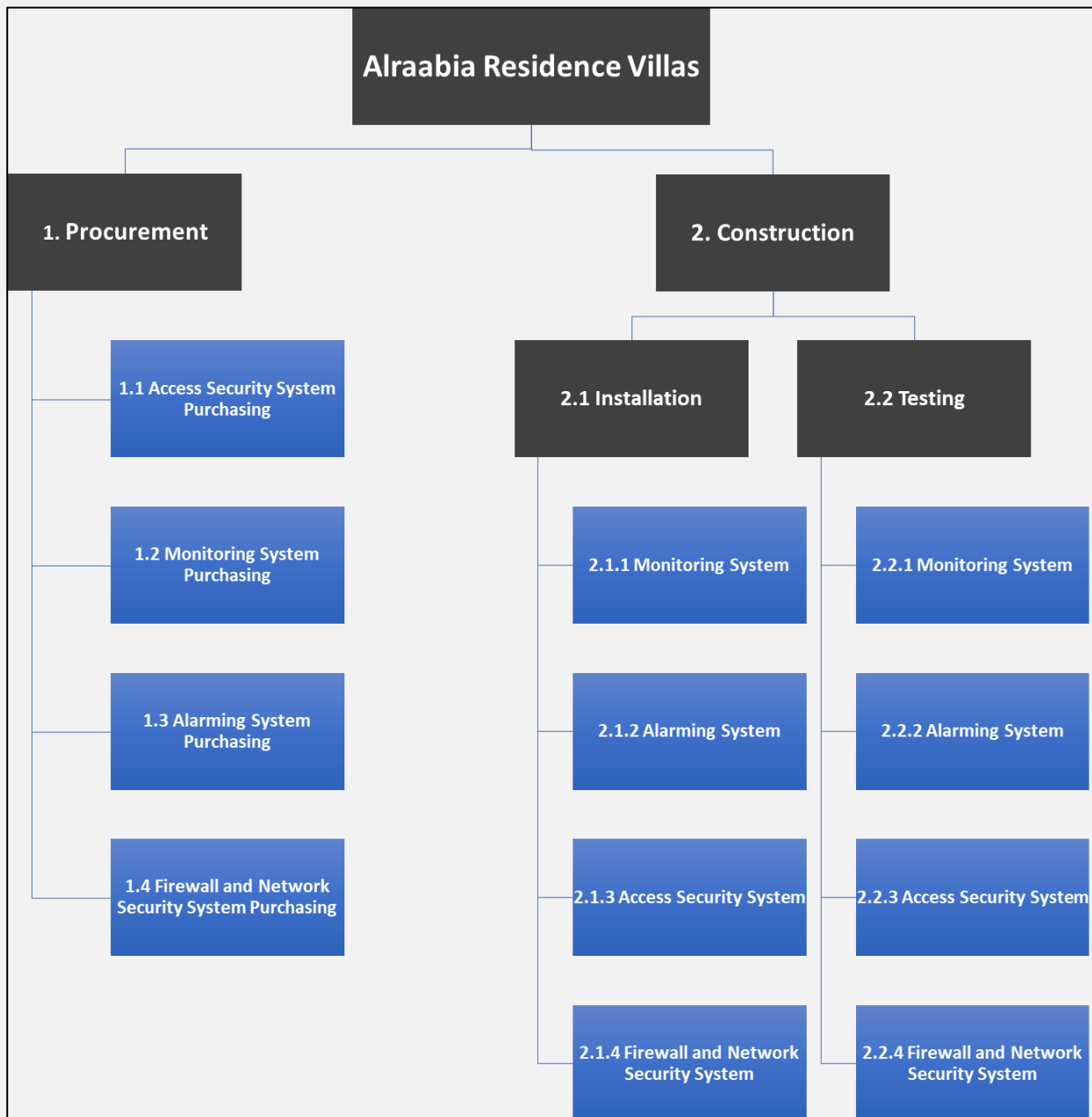


Figure 12: Work Breakdown Structure

6.2 Requirement and objectives

6.2.1 Requirement traceability matrix

The requirements traceability matrix is a grid that links product requirements from their origin to the deliverables that satisfy them. The implementation of a requirements traceability matrix helps ensure that each requirement adds business value by linking it to the business and project objectives. It provides a means to track requirements throughout the project life cycle, helping to ensure that requirements approved in the requirements documentation are delivered at the end of the project. Finally, it provides a structure for managing changes to the product scope. Tracing requirements includes but is not limited to: Business needs, opportunities, goals, and objectives, Project objectives, Project scope and WBS deliverables, Product design, Product development, Test strategy and test scenarios and High-level requirements to more detailed requirements. (PMBOK 6th Edition)

ID	Main Requirement	Sub-Requirement	Motion Detection	Live View on Demand	Night Vision	2-Way Talk	Android and IOS App	Wire Free	Weather resistant	Door Sensor	Smart Auto lock	Fingerprint ID	Door Sensor	Curtain Sensor	Smoke detection	Integration with WIFI or Wired devices
1	Entrance Security	Smart Bell	X	X	X	X	X									
		External Camera	X					X	X							
		Smart Door Lock						X		X	X	X				
		Ring Smart Lighting	X						X							
2	Monitoring	In-Door Cameras	X		X			X								
3	Alarming	Anti-theft Protection					X						X	X	X	
4	Firewall and Network															X

Figure 13: Requirement traceability matrix

6.2.2 Methods and techniques used to collect requirements

- 1. Interviews:** An interview is a formal or informal approach to elicit information from stakeholders by talking to them directly. It is typically performed by asking prepared and spontaneous questions and recording the responses. Interviews are often conducted on an individual basis between an interviewer and an interviewee, but may involve multiple interviewers and/or multiple interviewees. Interviewing experienced project participants, sponsors, other executives, and subject matter experts can aid in identifying and defining the features and functions of the desired product deliverables. Interviews are also useful for obtaining confidential information.
- 2. Questionnaires and surveys:** Questionnaires and surveys are written sets of questions designed to quickly accumulate information from a large number of respondents. Questionnaires and/or surveys are most appropriate with varied audiences, when a quick turnaround is needed, when respondents are geographically dispersed, and where statistical analysis could be appropriate.
- 3. Brainstorming:** This technique is used to identify a list of ideas in a short period of time. It is conducted in a group environment and is led by a facilitator. Brainstorming comprises two parts: idea generation and analysis. Brainstorming can be used to gather data and solutions or ideas from stakeholders, subject matter experts, and team members when developing the project charter. (PMBOK 6th Edition)

6.2.3 hierarchical structure of the objectives of the project

It is important to get early agreement from all stakeholders that the project objectives are the ones that they want and that the enterprise needs. A tool for achieving this is the Hierarchy of Project Objectives. The methodology was developed as a means of clarifying project objectives, both for planning purposes and for post-project evaluation. The hierarchy of objectives serves a number of purposes namely it can be used to:

1. Clarify the need or demand for the project.
 2. Clarify the requirements for meeting the need.
 3. Communicate the project objectives to everyone involved in the project.
 4. Promote appropriate project design by encouraging feedback from the people who are involved in, or affected by, the project.
 5. Enable the post-project evaluators to measure the project's success in attaining its objectives. The hierarchy provides guidance to the evaluators and helps direct their inquiry.
 6. Demonstrate that the project has different levels of objectives, and clarify how the objectives relate to one another in the hierarchy.
 7. Visibly link a project to the enterprise's business strategy.
- **Levels of Objectives:** The hierarchy of objectives is a tool that helps analyze and communicate a project's objectives. The hierarchy of objectives organizes the objectives of a project into different levels of a hierarchy or tree. Different organizations use different names for the various levels and the types of objectives at each level. Otherwise, there is a great deal of similarity in approach. (IPMA)

Chapter 7:

Scope, Time and Quality

7.1 Scope

7.1.1 Scope Statement

The project scope statement is the description of the project scope, major deliverables, assumptions, and constraints. The project scope statement documents the entire scope, including project and product scope. It describes the project's deliverables in detail. It also provides a common understanding of the project scope among project stakeholders. It may contain explicit scope exclusions that can assist in managing stakeholder expectations. It enables the project team to perform more detailed planning, guides the project team's work during execution, and provides the baseline for evaluating whether requests for changes or additional work are contained within or outside the project's boundaries.

The degree and level of detail to which the project scope statement defines the work that will be performed and the work that is excluded can help determine how well the project management team can control the overall project scope. The detailed project scope statement, either directly or by reference to other documents, includes the following:

- **Product scope description:** Progressively elaborates the characteristics of the product, service, or result described in the project charter and requirements documentation.
- **Deliverables:** Any unique and verifiable product, result, or capability to perform a service that is required to be produced to complete a process, phase, or project. Deliverables also include ancillary results, such as project management reports and documentation. These deliverables may be described at a summary level or in great detail.
- **Acceptance criteria:** A set of conditions that is required to be met before deliverables are accepted.
- **Project exclusions:** Identifies what is excluded from the project. Explicitly stating what is out of scope for the project helps manage stakeholders' expectations and can reduce scope creep.

Project Name	Alraabia Residence Villas
Product Scope Description	The project focus on four areas that have to be improved which are entrance security, monitoring system, alarming and firewall and network systems. The products selection is to satisfy aforementioned four area by providing different types product supporting project requirements which are motion detection, live viewer on demand, night vision, 2-way talk, compatibility with IOS and Android software, wire free product, high level of weather resistant, door sensor, door lock with fingerprint ID identification and multiple sensors supporting the alarming requirements.
Project Deliverables	The project should include external camera, smart door lock and bell, ring smart lighting, in-door cameras, antitheft protection alarm and firewall and network.
Product Acceptance Criteria	- Easy Configuration - Free Wired installation - Storage feature - Mobile software compatibility - Motion detection - Night vision
Project Exclusions	The project has limited budget about 700,000 SR and limited time 1 year completion.

Figure 14: Scope Statement

7.1.2 Scope creep

In one of the authors' early days in the Information Technology field in the 1980s, there was no agreed upon use of either the terms scope or scope creep. Today, at least, we have some common definitions of both. Here is our working definition of both terms that we will use in this paper:

- **Scope:** The extent of what a project will produce (product scope) and the work needed to produce it (project scope). A Guide to the Project Management Body of Knowledge (PMBOK® Guide)—Fourth

edition mentions it is the sum of the products, services, and results produced in a project (Project Management Institute, 2008, p. 440). It is often documented using a scope statement and a Work Breakdown Structure (WBS), which are approved by the project sponsor.

- **Scope creep:** Adding additional features or functions of a new product, requirements, or work that is not authorized (i.e., beyond the agreed-upon scope).

Change on projects is inevitable, so the possibility for scope creep is also inevitable. Perhaps this is the reason why taming scope creep is so challenging. We don't mean to imply that additional functionality or work is not desirable on projects. We also don't mean that scope creep occurs just because requirements change. The key part is whether changes are authorized or not. If an expansion of scope is approved, then it is not scope creep.

❖ **Reasons of scope creep**

- Lack of clarity and depth to the original specification document.
- Allowing direct [unmanaged] contact between client and team participants.
- Customers trying to get extra work “on the cheap.”
- Beginning design and development of something before a thorough requirements analysis and cost-benefit analysis has been done.
- Scope creep “where you do it to yourself” because of lack of foresight and planning.
- Poorly defined initial requirements.
- Management promises the sun and the moon, and breaks the backs of the developers to give them just that in impossibly tight time frames.

7.1.3 Product analysis management

Product Analysis for projects that have a product as a deliverable, it is a tool to define scope that generally means asking questions about a product and forming answers to describe the use, characteristics, and other relevant aspects of what is going to be built or manufactured.

Product analysis can be used to define products and services. It includes asking questions about a product or service and forming answers to describe the use, characteristics, and other relevant aspects of what is going to be delivered. Each application area has one or more generally accepted methods for translating high-level product or service descriptions into meaningful deliverable's. Requirements are captured at a high level and decomposed to the level of detail needed to design the final product. Examples of product analysis techniques include but are not limited to:

- **Product breakdown:** is a tool for analyzing, documenting and communicating the outcomes of a project, and forms part of the product-based planning technique. The PBS provides “an exhaustive, hierarchical tree structure of deliverables (physical, functional or conceptual) that make up the project, arranged in a whole-part relationship”. This diagrammatic representation of project outputs provides a clear and unambiguous statement of what the project is to deliver.
- **Requirements analysis:** Requirements analysis encompasses those tasks that go into determining the needs or conditions to meet for a new or altered product or project, taking account of the possibly conflicting requirements of the various stakeholders, analyzing, documenting, validating and managing requirements. Requirements analysis is critical to the success or failure of any project. The requirements should be documented, actionable, measurable, testable, traceable, related to identified business needs or opportunities, and defined to a level of detail sufficient for further planning.
- **Systems analysis:** System analysis is the process of studying a procedure or business to identify its goals and purposes and create systems and procedures that will achieve them in an efficient way”. Another view

sees system analysis as a problem-solving technique that breaks down a system into its component pieces for studying how well those component parts work and interact to accomplish their purpose. System analysis relates closely to requirements analysis or to operations research. It is also “an explicit formal inquiry carried out to help a decision maker identify a better course of action and make a better decision than he might otherwise have made.

- **Systems engineering:** Systems engineering is a field of engineering and engineering management that focuses on how to design and manage complex systems over their life cycles. At its core, systems engineering utilizes systems thinking principles to organize this body of knowledge. Issues such as requirements engineering, reliability, logistics, coordination of different teams, testing and evaluation, maintainability and many other disciplines necessary for successful system development, design, implementation, and ultimate decommission become more difficult when dealing with large or complex projects. Systems engineering deals with work-processes, optimization methods, and risk management tools in these projects.
- **Value analysis:** Systematic analysis identifies and selects the best value alternatives for designs, materials, processes, and systems. It proceeds by repeatedly asking “can the cost of this item or this step be reduced or eliminated, without diminishing the effectiveness, required quality, or customer satisfaction?”
- **Value engineering:** Value engineering (VE) is a systematic method to improve the “value” of goods or products and services by using an examination of function. Value, as defined, is the ratio of function to cost. Value can therefore be altered by either improving the function or reducing the cost. It is a primary tenet of value engineering that basic functions be preserved and not be reduced because of pursuing value improvements.

7.2 Time

7.2.1 Activities in each work packages

ID	WBS	Task Name	Duration	Start	Finish	Pred
0		Alraabia Residence Villas	183 days	Thu 9/1/22	Mon 5/15/23	
1	1	Procurement	22 days	Thu 9/1/22	Fri 9/30/22	
2	1.1	Access Security System purchasing	22 days	Thu 9/1/22	Fri 9/30/22	
3	1.1.1	RemoBell S Purchasing order Placing	2 days	Thu 9/1/22	Fri 9/2/22	
4	1.1.4	RemoBell S Purchasing Order Delivery	20 days	Mon 9/5/22	Fri 9/30/22	3
5	1.1.2	Arlo Pro 4 Spotlight Purchasing order Placing	2 days	Thu 9/1/22	Fri 9/2/22	
6	1.1.5	Arlo Pro 4 Spotlight Delivery	20 days	Mon 9/5/22	Fri 9/30/22	5
7	1.1.3	Ultraloq U-Bolt Pro Wi-Fi Smart Lock Purchasing order Placing	2 days	Thu 9/1/22	Fri 9/2/22	
8	1.1.6	Ultraloq U-Bolt Pro Wi-Fi Smart Lock Delivery	20 days	Mon 9/5/22	Fri 9/30/22	7
9	1.2	Monitoring System purchasing	22 days	Thu 9/1/22	Fri 9/30/22	
10	1.2.1	Eufy Indoor Cam 2K Pan & Tilt P24 Purchasing order Placing	2 days	Thu 9/1/22	Fri 9/2/22	
11	1.2.3	Eufy Indoor Cam 2K Pan & Tilt P24 Delivery	20 days	Mon 9/5/22	Fri 9/30/22	10
12	1.2.4	Ring Smart Lighting System Delivery	20 days	Mon 9/5/22	Fri 9/30/22	13
13	1.2.2	Ring Smart Lighting System Purchasing order Placing	2 days	Thu 9/1/22	Fri 9/2/22	
14	1.3	Alarming System purchasing	22 days	Thu 9/1/22	Fri 9/30/22	
15	1.3.2	KERUI Domestic Anti-theft Alarm System Kit Purchasing order Placing	2 days	Thu 9/1/22	Fri 9/2/22	
16	1.3.1	KERUI Domestic Anti-theft Alarm System Kit Delivery	20 days	Mon 9/5/22	Fri 9/30/22	15
17	1.4	Firewall and Network System	22 days	Thu 9/1/22	Fri 9/30/22	
18	1.4.2	Dream Machine Purchasing order Placing	2 days	Thu 9/1/22	Fri 9/2/22	
19	1.4.1	Dream Machine Delivery	20 days	Mon 9/5/22	Fri 9/30/22	18
20	2	Construction	161 days	Mon 10/3/22	Mon 5/15/23	
21	2.1	Access Security System	131 days	Mon 10/3/22	Mon 4/3/23	
22	2.1.1	Villas 1 to 15	111 days	Mon 10/3/22	Mon 3/6/23	
23	2.1.1.1	Installation Phase	15 days	Mon 10/3/22	Fri 10/21/22	
24	2.1.1.1.1	RemoBell S Installation	5 days	Mon 10/3/22	Fri 10/7/22	4
25	2.1.1.1.2	Arlo Pro 4 Spotlight Installation	5 days	Mon 10/10/22	Fri 10/14/22	6
26	2.1.1.1.3	Ultraloq U-Bolt Pro Wi-Fi Smart Lock Installation	5 days	Mon 10/17/22	Fri 10/21/22	8
27	2.1.1.2	System testing	10 days	Tue 2/21/23	Mon 3/6/23	
28	2.1.1.2.1	RemoBell S Testing	3 days	Tue 2/21/23	Thu 2/23/23	24
29	2.1.1.2.2	Arlo Pro 4 Spotlight Testing	3 days	Fri 2/24/23	Tue 2/28/23	25

30	2.1.1.2.3	Ultraloq U-Bolt Pro Wi-Fi Smart Lock Testing	4 days	Wed 3/1/23	Mon 3/6/23	26
31	2.1.2	Villas 15 to 30	101 days	Mon 11/14/22	Mon 4/3/23	
32	2.1.2.1	Installation Phase	15 days	Mon 11/14/22	Fri 12/2/22	
33	2.1.2.1.1	RemoBell S Installation	5 days	Mon 11/14/22	Fri 11/18/22	4
34	2.1.2.1.2	Arlo Pro 4 Spotlight Installation	5 days	Mon 11/21/22	Fri 11/25/22	6
35	2.1.2.1.3	Ultraloq U-Bolt Pro Wi-Fi Smart Lock Installation	5 days	Mon 11/28/22	Fri 12/2/22	8
36	2.1.2.2	System testing	10 days	Tue 3/21/23	Mon 4/3/23	
37	2.1.2.2.1	RemoBell S Testing	3 days	Tue 3/21/23	Thu 3/23/23	33
38	2.1.2.2.2	Arlo Pro 4 Spotlight Testing	3 days	Fri 3/24/23	Tue 3/28/23	34
39	2.1.2.2.3	Ultraloq U-Bolt Pro Wi-Fi Smart Lock Testing	4 days	Wed 3/29/23	Mon 4/3/23	35
40	2.1.3	Villas 30 to 50	33 days	Mon 12/26/22	Wed 2/8/23	
41	2.1.3.1	Installation Phase	20 days	Mon 12/26/22	Fri 1/20/23	
42	2.1.3.1.1	RemoBell S Installation	20 days	Mon 12/26/22	Fri 1/20/23	4
43	2.1.3.1.2	Arlo Pro 4 Spotlight Installation	20 days	Mon 12/26/22	Fri 1/20/23	6
44	2.1.3.1.3	Ultraloq U-Bolt Pro Wi-Fi Smart Lock Installation	20 days	Mon 12/26/22	Fri 1/20/23	8
45	2.1.3.2	System testing	13 days	Mon 1/23/23	Wed 2/8/23	
46	2.1.3.2.1	RemoBell S Testing	13 days	Mon 1/23/23	Wed 2/8/23	42
47	2.1.3.2.2	Arlo Pro 4 Spotlight Testing	13 days	Mon 1/23/23	Wed 2/8/23	43
48	2.1.3.2.3	Ultraloq U-Bolt Pro Wi-Fi Smart Lock Testing	13 days	Mon 1/23/23	Wed 2/8/23	44
49	2.2	Alarming System	160 days	Mon 10/3/22	Fri 5/12/23	
50	2.2.1	Villas 1 to 15	135 days	Mon 10/3/22	Fri 4/7/23	
51	2.2.1.1	Installation Phase	25 days	Mon 10/3/22	Fri 11/4/22	
52	2.2.1.1.1	KERUI Domestic Anti-theft Alarm System Kit Installation	25 days	Mon 10/3/22	Fri 11/4/22	16
53	2.2.1.2	System testing	5 days	Mon 4/3/23	Fri 4/7/23	
54	2.2.1.2.1	KERUI Domestic Anti-theft Alarm System Kit	5 days	Mon 4/3/23	Fri 4/7/23	52
55	2.2.2	Villas 15 to 30	105 days	Mon 11/28/22	Fri 4/21/23	
56	2.2.2.1	Installation Phase	25 days	Mon 11/28/22	Fri 12/30/22	
57	2.2.2.1.1	KERUI Domestic Anti-theft Alarm System Kit Installation	25 days	Mon 11/28/22	Fri 12/30/22	16
58	2.2.2.2	System testing	5 days	Mon 4/17/23	Fri 4/21/23	
59	2.2.2.2.1	KERUI Domestic Anti-theft Alarm System Kit	5 days	Mon 4/17/23	Fri 4/21/23	57
60	2.2.3	Villas 30 to 50	80 days	Mon 1/23/23	Fri 5/12/23	
61	2.2.3.1	Installation Phase	30 days	Mon 1/23/23	Fri 3/3/23	
62	2.2.3.1.1	KERUI Domestic Anti-theft Alarm System Kit Installation	30 days	Mon 1/23/23	Fri 3/3/23	16
63	2.2.3.2	System testing	10 days	Mon 5/1/23	Fri 5/12/23	62
64	2.2.3.2.1	KERUI Domestic Anti-theft Alarm System Kit	10 days	Mon 5/1/23	Fri 5/12/23	62
65	2.3	Monitoring System	146 days	Mon 10/24/22	Mon 5/15/23	
66	2.3.1	Villas 1 to 15	105 days	Mon 10/24/22	Fri 3/17/23	

67	2.3.1.1	Installation Phase	15 days	Mon 10/24/22	Fri 11/11/22	
68	2.3.1.1.1	Eufy Indoor Cam 2K Pan & Tilt P24 Installation	15 days	Mon 10/24/22	Fri 11/11/22	11
69	2.3.1.1.2	Ring Smart Lighting System Installation	15 days	Mon 10/24/22	Fri 11/11/22	12
70	2.3.1.2	System testing	9 days	Tue 3/7/23	Fri 3/17/23	67
71	2.3.1.2.1	Eufy Indoor Cam 2K Pan & Tilt P24	5 days	Tue 3/7/23	Mon 3/13/23	68
72	2.3.1.2.2	Ring Smart Lighting System	5 days	Mon 3/13/23	Fri 3/17/23	69
73	2.3.2	Villas 15 to 30	101 days	Mon 12/5/22	Mon 4/24/23	
74	2.3.2.1	Installation Phase	15 days	Mon 12/5/22	Fri 12/23/22	
75	2.3.2.1.1	Eufy Indoor Cam 2K Pan & Tilt P24 Installation	15 days	Mon 12/5/22	Fri 12/23/22	11
76	2.3.2.1.2	Ring Smart Lighting System Installation	15 days	Mon 12/5/22	Fri 12/23/22	12
77	2.3.2.2	System testing	86 days	Mon 12/26/22	Mon 4/24/23	
78	2.3.2.2.1	Eufy Indoor Cam 2K Pan & Tilt P24	15 days	Tue 4/4/23	Mon 4/24/23	75
79	2.3.2.2.2	Ring Smart Lighting System	15 days	Mon 12/26/22	Fri 1/13/23	76
80	2.3.3	Villas 30 to 50	81 days	Mon 1/23/23	Mon 5/15/23	
81	2.3.3.1	Installation Phase	20 days	Mon 1/23/23	Fri 2/17/23	
82	2.3.3.1.1	Eufy Indoor Cam 2K Pan & Tilt P24 Installation	20 days	Mon 1/23/23	Fri 2/17/23	11
83	2.3.3.1.2	Ring Smart Lighting System Installation	20 days	Mon 1/23/23	Fri 2/17/23	12
84	2.3.3.2	System testing	61 days	Mon 2/20/23	Mon 5/15/23	
85	2.3.3.2.1	Eufy Indoor Cam 2K Pan & Tilt P24	7 days	Fri 5/5/23	Mon 5/15/23	82
86	2.3.3.2.2	Ring Smart Lighting System	6 days	Mon 2/20/23	Mon 2/27/23	83
87	2.4	Firewall and Network Security System	112 days	Mon 11/7/22	Tue 4/11/23	
88	2.4.1	Villas 1 to 15	22 days	Mon 11/7/22	Tue 12/6/22	
89	2.4.1.1	Installation Phase	15 days	Mon 11/7/22	Fri 11/25/22	
90	2.4.1.1.1	Dream Machine Installation and Configuration	15 days	Mon 11/7/22	Fri 11/25/22	19
91	2.4.1.2	System testing	7 days	Mon 11/28/22	Tue 12/6/22	

92	2.4.1.2.1	Dream Machine Testing	7 days	Mon 11/28/22	Tue 12/6/22	90
93	2.4.2	Villas 15 to 30	22 days	Mon 1/2/23	Tue 1/31/23	
94	2.4.2.1	Installation Phase	15 days	Mon 1/2/23	Fri 1/20/23	
95	2.4.2.1.1	Dream Machine Installation and Configuration	15 days	Mon 1/2/23	Fri 1/20/23	19
96	2.4.2.2	System testing	7 days	Mon 1/23/23	Tue 1/31/23	
97	2.4.2.2.1	Dream Machine Testing	7 days	Mon 1/23/23	Tue 1/31/23	95
98	2.4.3	Villas 30 to 50	27 days	Mon 3/6/23	Tue 4/11/23	
99	2.4.3.1	Installation Phase	20 days	Mon 3/6/23	Fri 3/31/23	
100	2.4.3.1.1	Dream Machine Installation and Configuration	20 days	Mon 3/6/23	Fri 3/31/23	19
101	2.4.3.2	System testing	7 days	Mon 4/3/23	Tue 4/11/23	
102	2.4.3.2.1	Dream Machine Testing	7 days	Mon 4/3/23	Tue 4/11/23	100

Figure 15: Activities in Each Work Packages

7.2.2 Relationships between the activities

The precedence diagramming method (PDM) is a technique used for constructing a schedule model in which activities are represented by nodes and are graphically linked by one or more logical relationships to show the sequence in which the activities are to be performed. PDM includes four types of dependencies or logical relationships. A predecessor activity is an activity that logically comes before a dependent activity in a schedule. A successor activity is a dependent activity that logically comes after another activity in a schedule.

These relationships are defined below:

- **Finish-to-start (FS):** A logical relationship in which a successor activity cannot start until a predecessor activity has finished. For example, installing the operating system on a PC (successor) cannot start until the PC hardware is assembled (predecessor).
- **Finish-to-finish (FF):** A logical relationship in which a successor activity cannot finish until a predecessor activity has finished. For example, writing a document (predecessor) is required to finish before editing the document (successor) can finish.

- **Start-to-start (SS):** A logical relationship in which a successor activity cannot start until a predecessor activity has started. For example, level concrete (successor) cannot begin until pour foundation (predecessor) begins.
- **Start-to-finish (SF):** A logical relationship in which a successor activity cannot finish until a predecessor activity has started. For example, a new accounts payable system (successor) has to start before the old accounts payable system can be shut down (predecessor).

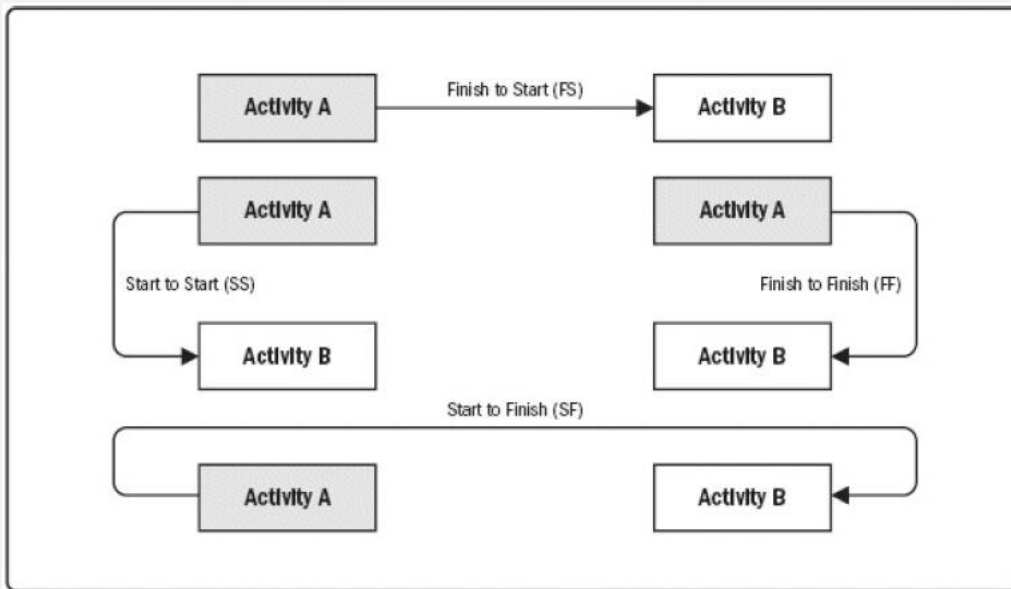
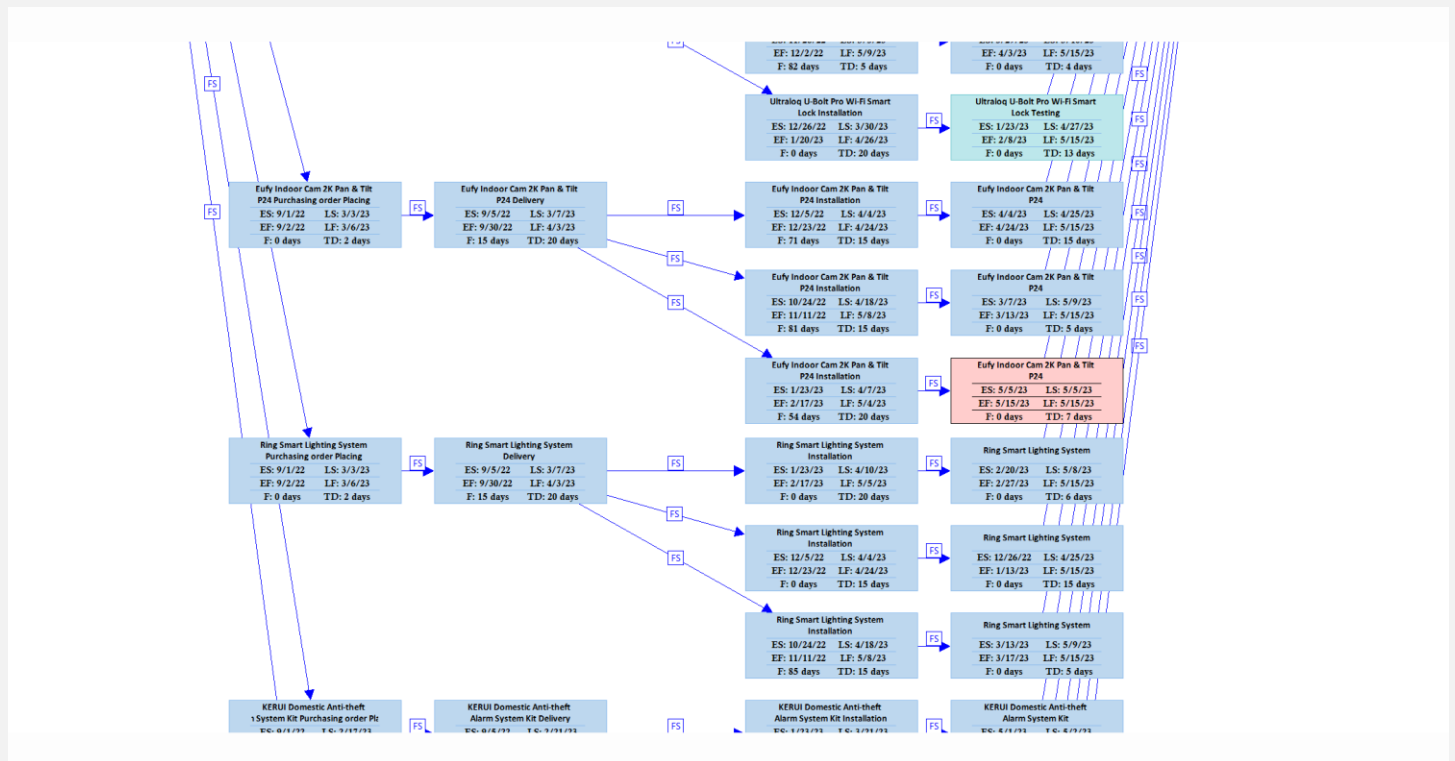
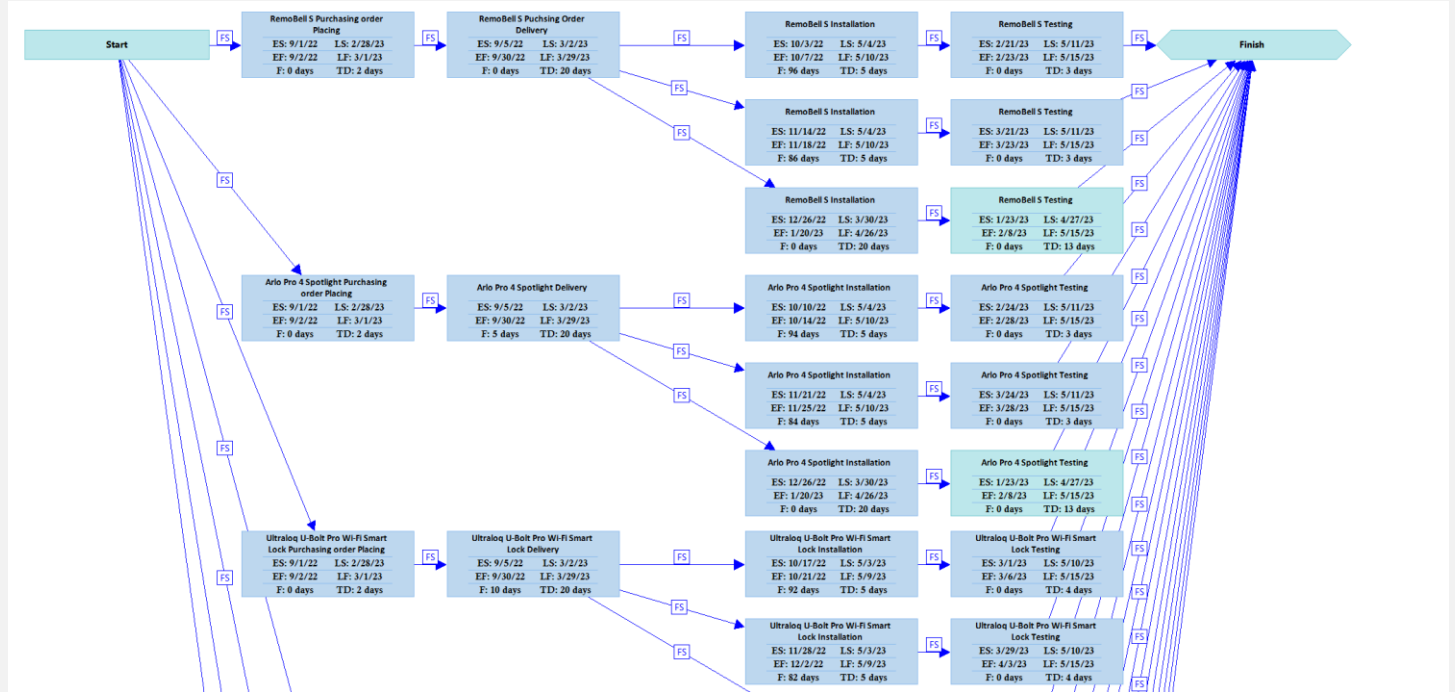


Figure 16: Activity Relationship

In this project there is only one type of the relation which is finish to start (FS) relation and it has been shown in aforementioned section 7.2.1 with WBS.

7.2.3 Logic Diagram of project activities



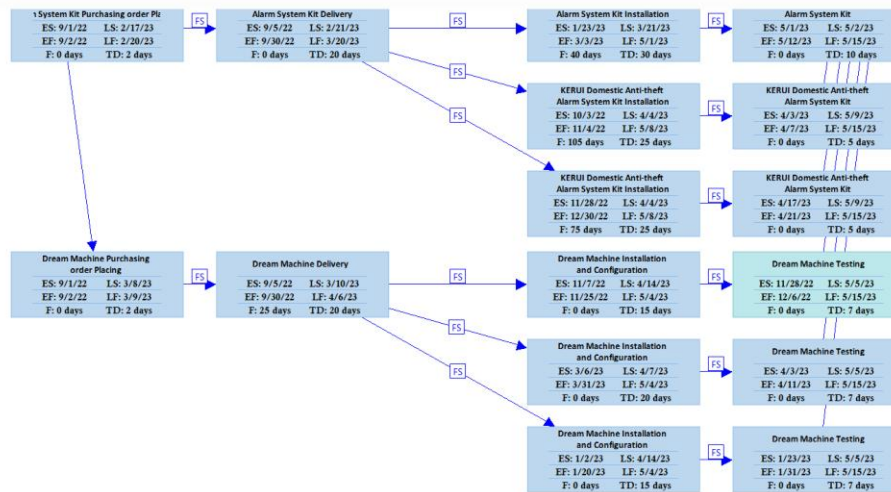


Figure 17: Logical Diagram

7.2.4 Project Gantt Chart and Milestone Model

PMI has defined the Gantt chart as A bar chart of schedule information where activities are listed on the vertical axis, dates are shown on the horizontal axis, and activity durations are shown as horizontal bars placed according to start and finish dates. Also known as bar charts, bar charts represent schedule information where activities are listed on the vertical axis, dates are shown on the horizontal axis, and activity durations are shown as horizontal bars placed according to start and finish dates. Bar charts are relatively easy to read and are commonly used. Depending on the audience, float can be depicted or not. For control and management communications, the broader, more comprehensive summary activity is used between milestones or across multiple interdependent work packages and is displayed in bar chart reports. (PMBOK 6th edition). In the project we have used MS project software to obtain many results part of it the Gant chart as shown below.

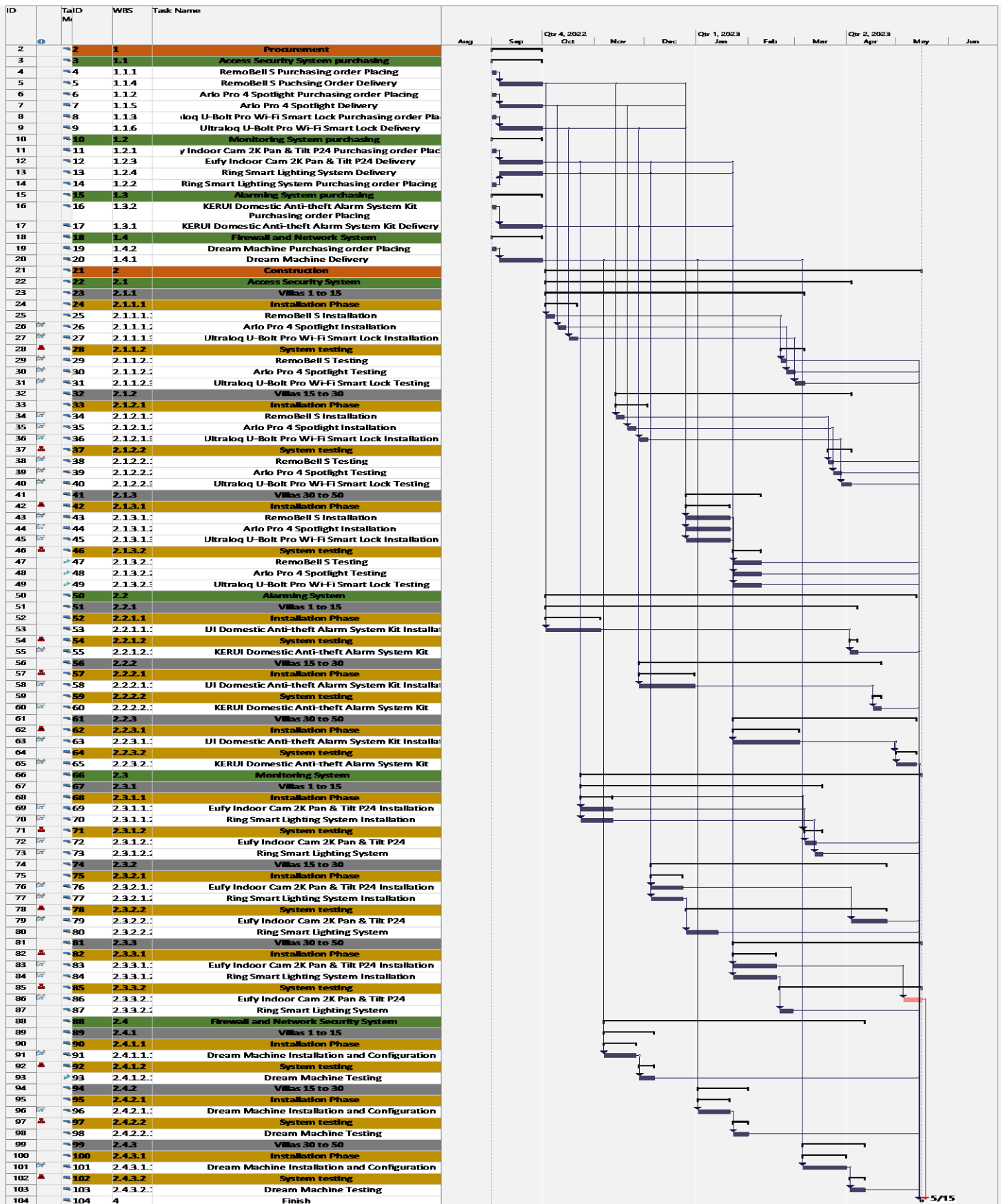


Figure 18: Gantt Chart

7.3 Quality

7.3.1 Deming model for quality (Deming Revisited: The Real Quality Model for Commerce book)

W. Edwards Deming's written works address every element that constitutes a model for conducting commerce. His writing defines the ultimate purpose commerce must serve. It describes the strategic direction and approach an enterprise should use to realize that purpose, the operational focus and methods it should employ, and how it should implement executive functions. Deming defines the ultimate purpose of commerce as maximizing the satisfaction of customer needs and wishes in ways that provide "better living for him in the future". For Deming, the label "quality" means that an offering and its attendant services enabled the customer to realize his/her purposes at least to the degree the customer sought. It also means that the customer was able to install, use, and maintain it in a way that satisfied all the customer's requirements

- **Purpose:** To maximize the satisfaction of customer needs and wishes in ways that provide "better living for him in the future" for Customers, producer, and all other stakeholders by Continuously improving the enterprise's products and services and the processes that produce them
- **Vision:** An interdependent and dynamic system organized around a customer and made up of a producer, its suppliers, and all other stakeholders each of whom is aligned on purpose, teamed in their performance, energized by their personal conviction, capable of leveraging learning to continuously improve everything they do, and pioneering forever in the pursuit of maximizing customer value.
- **Value:** The model has main values as stated below:
 - Provide real utility to customers that enhances their lives
 - Be inclusive in thinking, acting, and benefiting
 - Respect people's inherent striving to learn and achieve and
 - their right to pride of workmanship,
 - Act from a base of knowledge not intuition, and

- Use learning as the means for realizing success.
- **14 Management points:** here are the 14 points as presented in Deming's book (Out of Crisis)
 - Create constancy of purpose toward improvement of product and service, with the aim to become competitive and to stay in business, and to provide jobs.
 - Adopt the new philosophy. We are in a new economic age. Western management must awaken to the challenge, must learn their responsibilities, and take on leadership for change.
 - Cease dependence on inspection to achieve quality. Eliminate the need for inspection on a mass basis by building quality into the product in the first place.
 - End the practice of awarding business on the basis of price tag. Instead, minimize total cost. Move toward a single supplier for any one item, on a long-term relationship of loyalty and trust.
 - Improve constantly and forever the system of production and service, to improve quality and productivity, and thus constantly decrease costs.
 - Institute training on the job.
 - Institute leadership. The aim of supervision should be to help people and machines and gadgets to do a better job. Supervision of management is in need of overhaul, as well as supervision of production workers.
 - Drive out fear, so that everyone may work effectively for the company.
 - Break down barriers between departments. People in research, design, sales, and production must work as a team, to foresee problems of production and in use that may be encountered with the product or service.
 - Eliminate slogans, exhortations, and targets for the work force asking for zero defects and new levels of productivity. Such exhortations only create adversarial relationships, as the bulk of the

causes of low quality and low productivity belong to the system and thus lie beyond the power of the work force.

- Eliminate work standards that prescribe numerical quotas.
 - a. Eliminate work standards (quotas) on the factory floor. Substitute leadership.
 - b. Eliminate management by objective. Eliminate management by numbers, numerical goals. Substitute leadership.
- Remove barriers that rob people of pride of workmanship.
 - a. Remove barriers that rob the hourly worker of his right to pride of workmanship. The responsibility of supervisors must be changed from sheer numbers to quality.
 - b. Remove barriers that rob people in management and in engineering of their right to pride of workmanship. This means, inter alia, abolishment of the annual or merit rating and of management by objective.
- Institute a vigorous program of education and self-improvement.
- Put everybody in the company to work to accomplish the transformation. The transformation is everybody's job.”

7.3.2 SIPOC model and Ishikawa

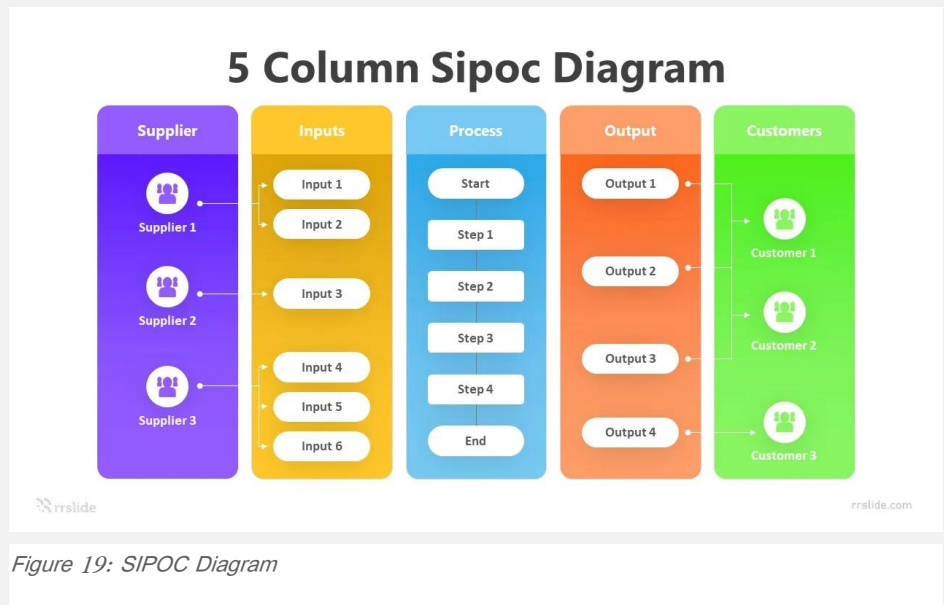
SIPOC is an acronym that stands for Suppliers, Inputs, Process, Outputs and Customers. In practical terms, SIPOC is a process mapping and improvement method that summarizes the inputs and outputs of one or more processes using a SIPOC diagram. Some organizations use the opposite acronym COPIS, which puts the customer requirements first and illustrates the value of the customer to the organization. Cause-and-effect diagrams. Cause-and-effect diagrams are also known as fishbone diagrams, why-why diagrams, or Ishikawa diagrams. This type of diagram breaks down the causes of the problem statement identified into discrete branches, helping to identify the main or root cause of the problem.

- **SIPOC Elements:**

- Suppliers: Providers of inputs into a process.
- Inputs: Resources, such as materials, needed to complete the process.
- Process: Steps that convert inputs to outputs.
- Outputs: Product or service created from the process.
- Customers: Recipients of outputs.

- **Steps to Create a SIPOC Diagram**

- Identify Suppliers
- Identify Inputs
- Outline the Process
- Define Outputs
- Identify Customers
- Analyze Customer Requirements



Chapter 8: Cost

8.1 Cost

8.1.1 Cost Breakdown Structure

ID	WBS	Task Name	Cost
2	1	Procurement	222,190.00 ر.س.
3	1.1	Access Security System purchasing	106,310.00 ر.س.
10	1.2	Monitoring System purchasing	30,190.00 ر.س.
15	1.3	Alarming System purchasing	22,770.00 ر.س.
18	1.4	Firewall and Network System	62,920.00 ر.س.
21	2	Construction	73,600.00 ر.س.
22	2.1	Access Security System	13,280.00 ر.س.
23	2.1.1	Villas 1 to 15	4,000.00 ر.س.
24	2.1.1.1	Installation Phase	2,400.00 ر.س.
28	2.1.1.2	System testing	1,600.00 ر.س.
32	2.1.2	Villas 15 to 30	4,000.00 ر.س.
33	2.1.2.1	Installation Phase	2,400.00 ر.س.
37	2.1.2.2	System testing	1,600.00 ر.س.
41	2.1.3	Villas 30 to 50	5,280.00 ر.س.
42	2.1.3.1	Installation Phase	3,200.00 ر.س.
46	2.1.3.2	System testing	2,080.00 ر.س.
50	2.2	Alarming System	16,000.00 ر.س.
51	2.2.1	Villas 1 to 15	4,800.00 ر.س.
52	2.2.1.1	Installation Phase	4,000.00 ر.س.
54	2.2.1.2	System testing	800.00 ر.س.
56	2.2.2	Villas 15 to 30	4,800.00 ر.س.
57	2.2.2.1	Installation Phase	4,000.00 ر.س.
59	2.2.2.2	System testing	800.00 ر.س.
61	2.2.3	Villas 30 to 50	6,400.00 ر.س.
62	2.2.3.1	Installation Phase	4,800.00 ر.س.
64	2.2.3.2	System testing	1,600.00 ر.س.
66	2.3	Monitoring System	32,960.00 ر.س.

67	2.3.1	Villas 1 to 15	3,840.00 ر.س.
68	2.3.1.1	Installation Phase	2,400.00 ر.س.
71	2.3.1.2	System testing	1,440.00 ر.س.
74	2.3.2	Villas 15 to 30	16,160.00 ر.س.
75	2.3.2.1	Installation Phase	2,400.00 ر.س.
78	2.3.2.2	System testing	13,760.00 ر.س.
81	2.3.3	Villas 30 to 50	12,960.00 ر.س.
82	2.3.3.1	Installation Phase	3,200.00 ر.س.
85	2.3.3.2	System testing	9,760.00 ر.س.
88	2.4	Firewall and Network Security System	11,360.00 ر.س.
89	2.4.1	Villas 1 to 15	3,520.00 ر.س.
90	2.4.1.1	Installation Phase	2,400.00 ر.س.
92	2.4.1.2	System testing	1,120.00 ر.س.
94	2.4.2	Villas 15 to 30	3,520.00 ر.س.
95	2.4.2.1	Installation Phase	2,400.00 ر.س.
97	2.4.2.2	System testing	1,120.00 ر.س.
99	2.4.3	Villas 30 to 50	4,320.00 ر.س.
100	2.4.3.1	Installation Phase	3,200.00 ر.س.
102	2.4.3.2	System testing	1,120.00 ر.س.

Figure 20: Cost Breakdown Structure

Chapter 9:

Resource, Procurement, Plan and Control

9.1 Resources

9.1.1 Resource leveling and smoothing

Both techniques are used for a purpose of Resource Optimization which is A technique in which activity start and finish dates are adjusted to balance demand for resources with the available supply. (PMBOK 6th edition)

- **Resource leveling:** A technique in which start and finish dates are adjusted based on resource constraints with the goal of balancing the demand for resources with the available supply. Resource leveling can be used when shared or critically required resources are available only at certain times or in limited quantities, or are over-allocated, such as when a resource has been assigned to two or more activities during the same time period (PMBOK 6th edition)
- **Resource smoothing:** A technique that adjusts the activities of a schedule model such that the requirements for resources on the project do not exceed certain predefined resource limits. In resource smoothing, as opposed to resource leveling, the project's critical path is not changed and the completion date may not be delayed. In other words, activities may only be delayed within their free and total float. Resource smoothing may not be able to optimize all resources. (PMBOK 6th edition)

9.2 Procurement

9.2.1 The procurement execution process, and contractor selection

❖ Procurement Processes:

The Project Procurement Management processes involve agreements that describe the relationship between two parties—a buyer and a seller. Agreements can be as simple as the purchase of a defined quantity of labor hours at a specified labor rate, or they can be as complex as multiyear international construction contracts. The contracting approach and the contract itself should reflect the simplicity or complexity of the deliverables or required effort and should be written in a manner that complies with local,

national, and international laws regarding contracts. PMI has identified three main procurement processes in PMBOK 6th editions which are:

1. **Plan procurement management:** Plan Procurement Management is the process of documenting project procurement decisions, specifying the approach and identifying potential sellers. The key benefit of this process is that it determines whether to acquire goods and services from outside the project and, if so, what to acquire as well as how and when to acquire it. Goods and services may be procured from other parts of the performing organization or from external sources. This process is performed once or at predefined points in the project.
2. **Conduct procurements:** Conduct Procurements is the process of obtaining seller responses, selecting a seller, and awarding a contract. The key benefit of this process is that it selects a qualified seller and implements the legal agreement for delivery. The end results of the process are the established agreements including formal contracts. This process is performed periodically throughout the project as needed.
3. **Control procurements:** Control Procurements is the process of managing procurement relationships; monitoring contract performance, and making changes and corrections as appropriate; and closing out contracts. The key benefit of this process is that it ensures that both the seller's and buyer's performance meet the project's requirements according to the terms of the legal agreement. This process is performed throughout the project as needed.

❖ **Contractor selection criteria**

In choosing evaluation criteria, the buyer seeks to ensure that the proposal selected will offer the best quality for the services required. The source selection criteria may include but are not limited to:

- Capability and capacity
- Product cost and life cycle cost

- Delivery dates
- Technical expertise and approach
- Specific relevant experience
- Adequacy of the proposed approach and work plan in responding to the SOW
- Key staff's qualifications, availability, and competence
- Financial stability of the firm
- Management experience
- Suitability of the knowledge transfer program, including training.

The specific criteria may be a numerical score, color-code, or a written description of how well the seller satisfies the buying organization's needs. The criteria will be part of a weighting system that can be used to select a single seller that will be asked to sign a contract and establish a negotiating sequence by ranking all the proposals by the weighted evaluation scores assigned to each proposal. (PMBOK 6th Edition)

9.3 Plan and Control

9.3.1 Agenda– Invitation and virtual record of a virtual meeting

A virtual meeting is when individuals in various locations connect at the same time using technology to accomplish a shared goal, but they should not be confused for virtual events or webinars. Virtual meetings tend to be somewhat simpler to plan and do not need as much prep time as a virtual event. They are also different than webinars in that they are held with fewer attendees and encourage connection and problem-solving. Below are some major differences between virtual meetings and virtual events.

- **How to Create a Virtual Meeting Agenda:** As with any in-person meeting, it is important for a virtual meeting to have a detailed agenda, as well as plan to effectively follow that agenda. Below are some ideas on how to create the perfect virtual meeting agenda. (Suddenly Virtual: Making Remote Meetings Work)

1. Decide what you want to get accomplished
2. Decide who is leading the conversation
3. Send the agenda ahead of time along with a meeting invite

9.3.2 Performance measurement

It is used to collect and make available measurement data on processes and products. So that in the project has used three main performance measurement and there are many subsidiary measurements derived from these main measurements. The three measurements are:

- **Scope Baseline:** The scope baseline is the approved version of a scope statement, WBS, and its associated WBS dictionary, which can be changed only through formal change control procedures and is used as a basis for comparison.
- **Cost Baseline:** The cost baseline is the approved version of the time-phased project budget, excluding any management reserves, which can only be changed through formal change control procedures. It is used as a basis for comparison to actual results. The cost baseline is developed as a summation of the approved budgets for the different schedule activities.
- **Schedule Baseline:** A schedule baseline is the approved version of a schedule model that can be changed only through formal change control procedures and is used as a basis for comparison to actual results. It is accepted and approved by the appropriate stakeholders as the schedule baseline with baseline start dates and baseline finish dates. During monitoring and controlling, the approved baseline dates are compared to the actual start and finish dates to determine if variances have occurred. The schedule baseline is a component of the project management plan. (PMBOK 6th Edition)

9.3.3 Change Management model

Change management models are concepts, theories, and methodologies that provide an in-depth approach to organizational change. They aim to provide a guide to making changes, navigating the transformation process, and ensuring that changes are accepted and put into practice.

Whether those changes apply to new hires who are learning the company processes, company-wide changes involving internal tools, department-specific changes, or anything in-between, change management frameworks are designed to make the changes easier to implement and, more importantly, to solidify the change as the new norm. Esther Cameron in his book (Making Sense of Change Management book) has listed nine management models we will broadly present four of them as below:

- 1. Lewin, three-step model:** organism, machine: Kurt Lewin (1951) developed his ideas about organizational change from the perspective of the organism metaphor. His model of organizational change is well known and much quoted by managers today. Lewin is responsible for introducing force field analysis, which examines the driving and resisting forces in any change situation. The underlying principle is that driving forces must outweigh resisting forces in any situation if change is to happen.

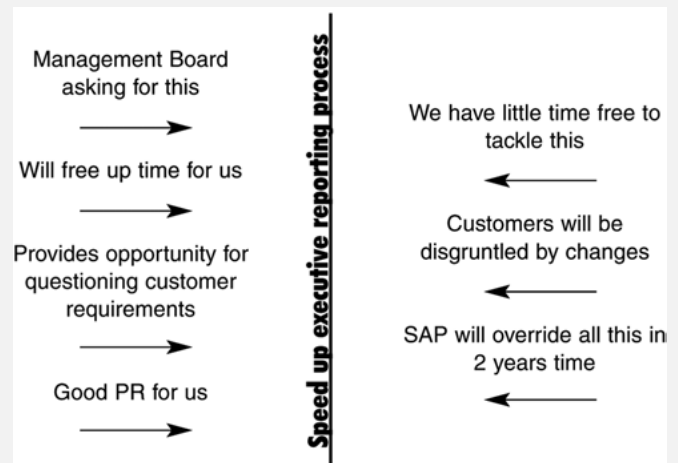


Figure 21: Lewin, three-step model:

- 2. Bullock and Batten, planned change: machine:** Bullock and Batten's (1985) phases of planned change draw on the disciplines of project management. There are many similar 'steps to changing your organization' models to choose from. We have chosen Bullock and Batten's:
 - exploration

- planning
- action
- integration.

3. **Kotter, eight-steps: machine, political, organism:** Kotter's (1995) 'eight steps to transforming your organization' goes a little further than the basic machine metaphor. Kotter's eight-step model derives from analysis of his consulting practice with 100 different organizations going through change. His research highlighted eight key lessons, and he converted these into a useful eight-step model. The model addresses some of the power issues in making change happen, highlights the importance of a 'felt need' for change in the organization, and emphasizes the need to communicate the vision and keep communication levels extremely high throughout the process
4. **Nadler and Tushman, congruence model:** political, organism: Nadler and Tushman's congruence model takes a different approach to looking at the factors influencing the success of the change process. This model aims to help us understand the dynamics of what happens in an organization when we try to change it. This model is based on the belief that organizations can be viewed as sets of interacting sub-systems that scan and sense changes in the external environment. This model sits firmly in the open systems school of thought, which uses the organism metaphor to understand organizational behavior. However, the political backdrop is not ignored; it appears as one of the sub-systems. This model views

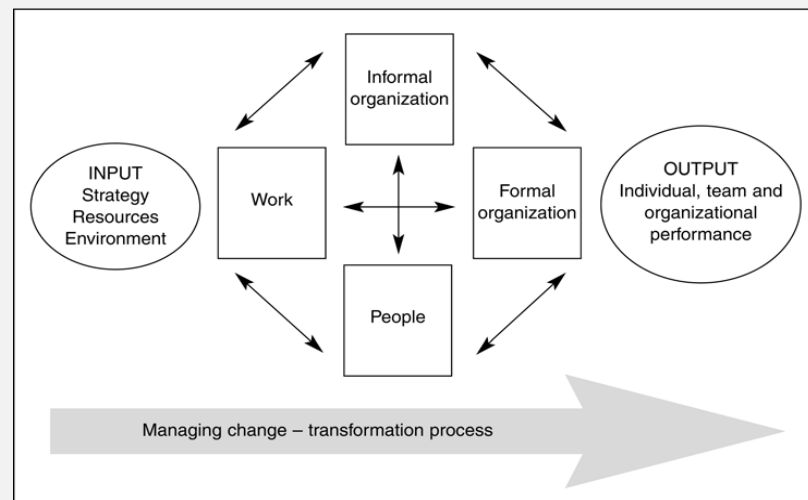


Figure 22: Nadler and Tushman, congruence model

the organization as a system that draws inputs from both internal and external sources (strategy, resources and environment)

Chapter 10:

Risk, opportunities and Stakeholders

10.1 Risk

10.1.1 Threats and Opportunities

PMI has defined both the threats and opportunities in PMBOK 6th edition along with strategies to deal with this type of risk. In this section and the following we would describe and define the threats and opportunities and their strategies.

- **Threats:** A risk that would have a negative effect on one or more project objectives.
 - **EX:** The other security system company can be your competitors who might have better marketing strategies and techniques that would lead to attract current company customers to move from our company to other
- **Opportunity:** A risk that would have a positive effect on one or more project objectives.
 - **EX:** A competitor goes out of business and there is an opportunity to expand into recently underserved markets. Opportunity to create and benefit from new relationships. For example, an opportunity to distribute your products in another country with a sales partnership.

10.1.2 Risk Register

The risk register captures details of identified individual project risks. The results of Perform Qualitative Risk Analysis, Plan Risk Responses, Implement Risk Responses, and Monitor Risks are recorded in the risk register as those processes are conducted throughout the project. The risk register may contain limited or extensive risk information depending on project variables such as size and complexity. (PMBOK 6th Edition)

ID	Risk description	Likelihood of the risk occurring	Impact if the risk occurs	Severity.	Owner.	Mitigating action	Contingent action
1	Project purpose and need is not well-defined.	Medium	High	High	Project Sponsor	Complete a business case if not already provided and ensure purpose is well defined on Project Charter and PID.	Escalate to the Project Board with an assessment of the risk of runaway costs/never-ending project.

2	Project design and deliverable definition is incomplete.	Low	High	High	Project Sponsor	Define the scope in detail via design workshops with input from subject matter experts.	Document assumptions made and associated risks. Request high risk items that are ill-defined are removed from scope.
3	Project schedule is not clearly defined or understood	Low	Medium	Medium	Project Manager	Hold scheduling workshops with the project team so they understand the plan and likelihood of missed tasks is reduced.	Share the plan and go through upcoming tasks at each weekly project progress meeting.
4	No control over staff priorities	Medium	Medium	Medium	Project Manager	The Project Sponsor will brief team managers on the importance of the project. Soft book resources as early as possible and then communicate final booking dates asap after the scheduling workshops. Identify backups for each human resource on the project.	Escalate to the Project Sponsor and bring in back up resource.
7	Unplanned work that must be accommodated	Low	High	Medium	Team Manager	Attend project scheduling workshops. Check previous projects, for actual work and costs. Check all plans and quantity surveys. Document all assumptions made in planning and communicate to the project manager before project kick off.	Escalate to the Project Manager with plan of action, including impact on time, cost and quality.
8	Lack of communication, causing lack of clarity and confusion.	Medium	Medium	Medium	Project Manager	Write a communication plan which includes frequency, goal, and audience of each communication. Identify stakeholders early and make sure they are considered in the communication plan. Use most appropriate channel of communication for audience e.g. don't send 3 paragraph email to Developers, have a call instead.	Correct misunderstandings immediately. Clarify areas that are not clear swiftly using assistance from Project Sponsor if needed.

Figure 23: Risk Register

10.1.3 Qualitative Risk Analysis

Is a process of prioritizing individual project risks for further analysis or action by assessing their probability of occurrence and impact as well as other characteristics. The key benefit of this process is that it focuses efforts on high priority risks. This process is performed throughout the project. In our project the assessment was performed and the result of the assessment was consolidated with the risk register in section 10.1.2

10.1.4 Risk response strategies

Effective and appropriate risk responses can minimize individual threats, maximize individual opportunities, and reduce overall project risk exposure. Unsuitable risk responses can have the converse effect. Once risks have been identified, analyzed, and prioritized, plans should be developed by the nominated risk owner for addressing every individual project risk the project team considers to be sufficiently important, either because of the threat it poses to the project objectives or the opportunity it offers.

- **Strategies for Threats:** (PMBOK 6th Edition)
 - **Escalate:** Escalation is appropriate when the project team or the project sponsor agrees that a threat is outside the scope of the project or that the proposed response would exceed the project manager's authority.
 - **Avoid:** Risk avoidance is when the project team acts to eliminate the threat or protect the project from its impact. It may be appropriate for high-priority threats with a high probability of occurrence and a large negative impact.
 - **Transfer:** Transfer involves shifting ownership of a threat to a third party to manage the risk and to bear the impact if the threat occurs. Risk transfer often involves payment of a risk premium to the party taking on the threat.

- **Mitigate:** In risk mitigation, action is taken to reduce the probability of occurrence and/or impact of a threat. Early mitigation action is often more effective than trying to repair the damage after the threat has occurred.
- **Accept:** Risk acceptance acknowledges the existence of a threat, but no proactive action is taken. This strategy may be appropriate for low-priority threats, and it may also be adopted where it is not possible or cost-effective to address a threat in any other way
- **Strategies for Opportunities: (PMBOK 6th Edition)**
 - **Escalate:** refer to previous section
 - **Exploit:** The exploit strategy may be selected for high-priority opportunities where the organization wants to ensure that the opportunity is realized. This strategy seeks to capture the benefit associated with a particular opportunity by ensuring that it definitely happens, increasing the probability of occurrence to 100%.
 - **Share:** Sharing involves transferring ownership of an opportunity to a third party so that it shares some of the benefit if the opportunity occurs. It is important to select the new owner of a shared opportunity carefully so they are best able to capture the opportunity for the benefit of the project.
 - **Enhance:** The enhance strategy is used to increase the probability and/or impact of an opportunity. Early enhancement action is often more effective than trying to improve the benefit after the opportunity has occurred.
 - **Accept:** Accepting an opportunity acknowledges its existence but no proactive action is taken. This strategy may be appropriate for low-priority opportunities, and it may also be adopted where it is not possible or cost-effective to address an opportunity in any other way.

10.2 Stakeholder

10.2.1 Stakeholder engagement assessment matrix

NO	Stakeholder	Inform	Listen	Consult	Involve	Collaborate
1	Project Manager					C,D
2	Project Team					C,D
3	PMO					C,D
4	Financial Director			C	D	
5	Vice President				C	D
6	CEO				C	D
7	Transportation Company	C			D	
8	Suppliers		C	D		
9	Customer	C	D			
10	Customs	C	D			

Figure 24: Stakeholder Engagement Matrix

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