# ICT Project Management

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# Unit 5: Project Scope Management

## What is Project Scope Management?

- ✓ Project scope management is a process that helps in determining and documenting the list of all the project goals, tasks, deliverables, deadlines, and budgets as a part of the planning process
- ✓ i.e. project scope management gives a clear idea about the time, labor, and cost involved in the project.
- ✓ It helps to distinguish between what is needed and what isn't needed for accomplishing the project.
- ✓ Scope in project management also establishes the control factors of the project to address elements that might change during the project life cycle.

## Importance of Scope Management

With the definite project scope, Project managers can easily stay on track and ensure that all the deadlines are being followed throughout the project life cycle.

A well-defined project scope management helps avoid common issues like:

- ✓ Constantly changing requirements
- ✓ Pivoting the project direction when you are already mid-way
- ✓ Realizing that the final outcome isn't what was expected
- ✓ Going over the discussed budget
- ✓ Falling behind the project deadlines

## Key Concepts for Scope Management

In the project context, the term "**scope**" can refer to

### 1. Product scope.

- ✓ The features and functions that characterize a product, service, or result.

### 2. Project scope.

- ✓ The work performed to deliver a product, service, or result with the specified features and functions.
- ✓ The term "project scope" is sometimes viewed as including product scope.

**Difference between Project scope and Product scope**

| S.N | Project Scope | Product scope |
|---|---|---|
| 1. | The work performed to deliver a product, services or result with the specific features and functions. -PMBOK | The features and functions that characterize a product, service or result. - PMBOK |
| 2. | project scope is oriented towards the "how" (work-related) | Product scope is oriented towards the "what" (functional requirements) |
| 3. | Project scope is totally defined by the project manager. | Product scope is defined by the business analyst, though the project manager may have a role. |
| 4. | Project scope involves all the works, processes, methods required to deliver the project deliverables. | Product scope involves technical specifications, features, functions required to represent a product itself. |
| 5. | Project scope focuses on the work needed to deliver the product. | Product scope focuses on the features of the end product. |
| 6. | **For Example**: In order to build the mansion, you will create the project schedule, prepare the budget and hire employees. You will perform all the construction work and related processes such as health, safety and quality management.<br><br>All the works and processes that you will perform to construct the mansion are the scope of the project | **For Example**: Suppose that you will build a mansion for your client. The client defines the requirements such as the size of the rooms, number of bathrooms, floor covering materials, door colors, and other features.<br><br>The mansion is the product and the client's requirements are the scope. You received the product scope from the client. |
| 6.1 | **E.g.** An example of the project scope is constructing a bridge | **E.g.** product scope might be its technical specifications such as length, width, and the amount of load it has to withstand. |

**Scope Creeping & Gold Plating**

**Scope creep** is when extra features are added to a project at the request of a client.

- ✓ This can occur when the scope is hazily defined or agreed upon informally.
- ✓ Scope creep can cause costs to spiral and should be avoided.

**Gold plating**, on the other hand, is when a project team adds on features that were not requested by the client.

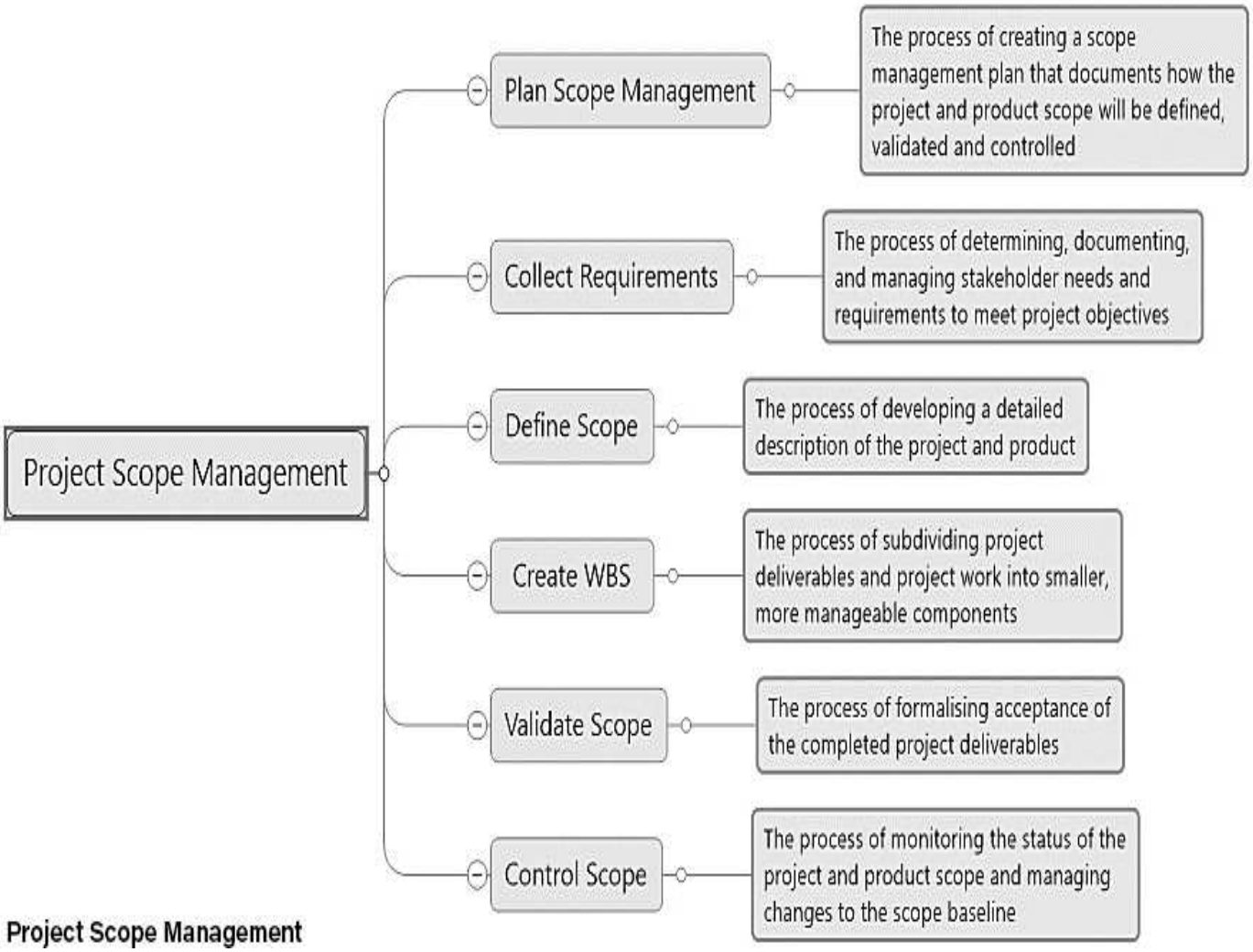
- ✓ The reasons for gold plating can vary.
- ✓ Sometimes this is done to gain the approval of a client or internal management.

- ✓ This is also occasionally done to draw attention away from project defects.

## 5.2. Project Scope Management Process

6 key processes involved in effective scope management

1. **P**lan Scope Management
2. **C**ollect Requirements
3. **D**efine Scope
4. **C**erate WBS
5. **V**alidate Scope
6. **C**ontrol Scope




**Project Scope Management**

## 5.3 Planning Project Scope Management Process

- ✓ Plan Scope Management is the process of creating a scope management plan that documents how the project and product scope will be defined, validated, and controlled.
- ✓ The key benefit of this process is that it provides guidance and direction on how scope will be managed throughout the project.
- ✓ This process is performed once or at predefined points in the project

In the planning phase, input from all of the project stakeholders are gathered. Together you will decide and document how you want to define, manage, validate, and control the project's scope. The scope management plan also includes information on how you will handle unforeseen circumstances throughout the project, how the deliverables will be accepted, and how you will come up with some of the other key elements including a work breakdown structure (WBS) and a scope statement.

**Input, Tools and Technique, and output of Plan Scope Management**

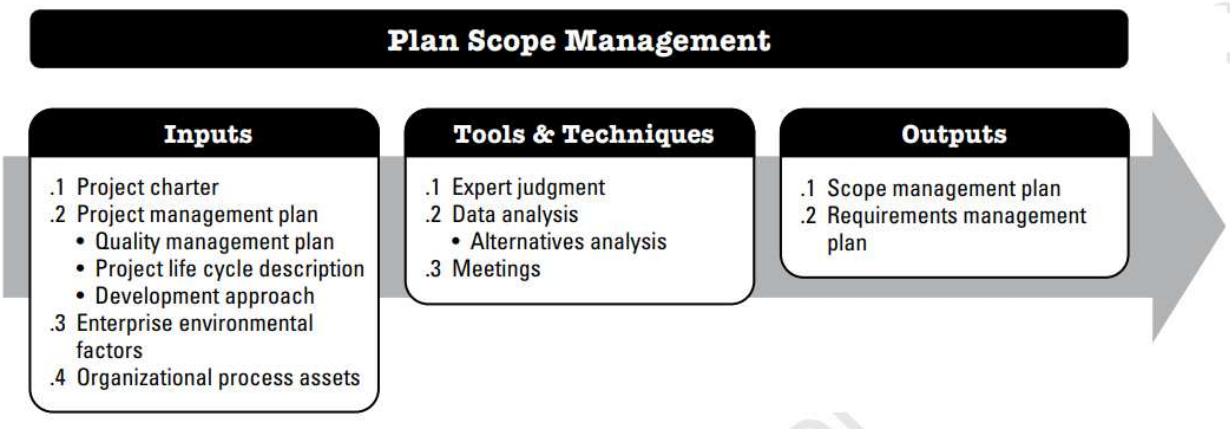



**Figure:** Input, Tools and Technique, and output of Plan Scope Management [figure: PMBOK Guide]

## 5.4. Collect Requirements

- ✓ Collect Requirements is the process of determining, documenting, and managing stakeholder needs and requirements to meet objectives.
- ✓ Benefit of this process is that it provides the basis for defining the product scope and project
  scope
- ✓ Collect Requirements and documenting them is important because stakeholders can have unrealistic requirements or expectations and the project managers would be required to step in to find a solution that is acceptable by everyone from avoiding project delays.
- ✓ This process is performed once or at predefined points in the project.

**Input, Tools and Technique, and output of Collect Requirements Process**

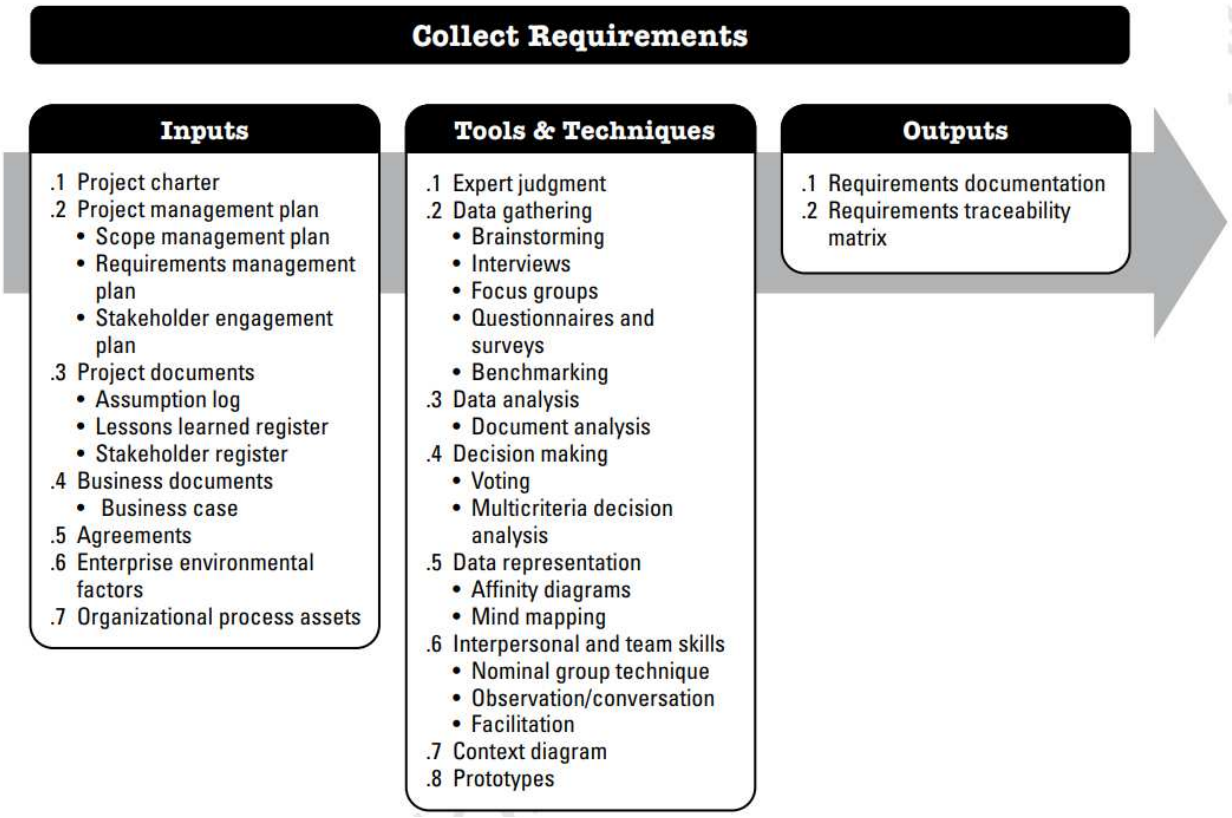



**Figure**: Input, Tools and Technique, and output of Collect Requirements Process

## Requirements Traceability Matrix

- ✓ A **requirement traceability matrix (RTM)** shows the relationship between requirements and artifacts (e.g., test cases, defects, etc.).
- ✓ An RTM guarantees that all requirements are validated through test cases, and no functionality is skipped throughout the testing process.
- ✓ This results in an excellent finished product.
- ✓ A requirement traceability matrix documents requirements, tests, test results, and issues.
- ✓ Often known as the **Traceability Requirement Matrix**.
- ✓ The traceability **matrix is in the form of an Excel spreadsheet**, and it includes the requirements, test cases, their priorities, and the execution status (pass or failed). This ensures that every criterion is put through its paces.
- ✓ A requirements traceability **matrix is useful for** any industry that involves software development or hardware production. Particularly in highly regulated businesses to satisfy compliance requirements.
- ✓ **For example**, maintaining high-quality standards in the aerospace industry for flight data software is essential. A traceability matrix is required to guarantee that all standards will be satisfied.

## Types of Requirements Traceability Matrix

- 3 Types

1. **Forward Traceability:**

   - ✓ Test cases are mapped according to the requirements.
   - ✓ It ensures that all requirements are tested.
   - ✓ It checks if requirements are designed, developed, and tested until the product is completed.

2. **Backward or Reverse Traceability:**

   - ✓ Requirements are mapped according to the test cases.
   - ✓ Sometimes initial design or code changes, in such situations, test cases are frozen, and then the requirements are back mapped to ensure that the scope is unaffected.

3. **Bi-directional (Forward + Backward) Traceability:**

   - ✓ It tracks the requirements "forward" by looking at the deliverables and "backward" by examining the requirements.
   - ✓ It ensures that all the test cases can be tracked to requirements, and each requirement has a valid test case.
   - ✓ This matrix is useful when requirements are constantly changing.

## Parameters for Creating a Requirements Traceability Matrix

- ✓ No guidelines define what parameters are included in the requirements traceability matrix.
- ✓ However, the following parameters help trace requirements properly:

  - ♦ Requirement ID
  - ♦ Requirement Type and Description
  - ♦ Priority
  - ♦ Test Case with Status

## Steps for Creating a Requirements Traceability Matrix

The following steps are required to create a requirements traceability matrix:

1. Define Objectives and Milestones
2. Gather Required Documents
3. Create a Traceability Matrix
4. Validate the Final Result

## 1. Define Objectives and Milestones:

Consider an example of a retail application for online shopping. The goal is to make the user's purchase experience as simple as possible. It requires a login module, product listing module, and payment gateway module.

You can define these modules in the RTM as below:

- **BR_001 Login Module:** It should allow users to log in.
- **BR_002 Product Listing Module:** It should allow users to browse different products with advanced filters.
- **BR_003 Payment Gateway Module:** It should allow users to make payments through wallets, credit cards, debit cards, etc.

## 2. Gather Required Documents:

Gather all required documents for building an effective traceability matrix. Documents include Business Requirements Document (BRD), Functional Requirements Document (FRD), Technical Requirements Document (TRD), and Test Case Scenarios Documents as prepared by the testing team.

Let's take functional requirements, which are as follows:

**BR_001 Login Module:**

- **FR_001 with Mobile Number:** It should allow users to sign up with a mobile number and OTP.
- **FR_002 with Email ID:** It should allow users to sign up with an email id.

**BR_002 Product Listing Module:**

- **FR_003 Sort by:** It should allow users to sort products by different prices, customer ratings, popularity, discounts, etc.
- **FR_004 Filters:** Based on the size, color, and brand, users should be able to apply filters.

**BR_003 Payment Gateway Module:**

- **FR_005 by Wallet:** It should allow users to make payments with wallets like eswea,khalti, paypal, google pay, etc.
- **FR_006 by Credit Card:** It should allow users to make payments with different credit cards.
- **FR_007 by Debit Card:** It should allow users to make payments with different debit cards.

## 3. Create a Traceability Matrix:

It is possible to construct and maintain it using a spreadsheet written in Excel, a document written in Word, or an automated project management application.

Below are the test cases listed down in excel.

| Test Case ID | Test Case Description |
|---|---|
| TC_001 | Verify if user can log in with mobile number |
| TC_002 | Verify if user can log in with email id |
| TC_003 | Verify if user can order single product |
| TC_004 | Verify if user can order multiple products |
| TC_005 | Verify if user can apply single or multiple filters |
| TC_006 | Verify if user can sort products with different criteria |
| TC_007 | Verify if user can make payment using wallets |
| TC_008 | Verify if user can make payment using credit card |
| TC_009 | Verify if user can make payment using debit card |

By consolidating these all, a RTM will be like:

| Business Requirement Document (BRD) | | Functional Requirement Document (FRD) | | Test Case Document | | | |
|---|---|---|---|---|---|---|---|
| BR ID# | BR Use Case | FR ID# | FR Use Case | Priority | TC ID# | Status | Comments |
| BR_001 | Login | FR_001 | With Mobile# | High | TC_001<br>TC_003<br>TC_004 | Finished | Jan 1: Testing Started<br>Jan 6: Defect Reported<br>Jan 10: Defect Fixed<br>Jan 12: Pass |
| | | FR_002 | With Email Id | High | TC_002<br>TC_003<br>TC_004 | In Progress | Jan 10: Testing Started |
| BR_002 | Product Listing | FR_003 | Sort By | High | TC_006 | Finished | Jan 1: Testing Started<br>Jan 6: Defect Reported<br>Jan 10: Defect Fixed<br>Jan 12: Pass |
| | | FR_004 | Filters | High | TC_005 | Finished | Jan 1: Testing Started<br>Jan 6: Defect Reported<br>Jan 10: Defect Fixed<br>Jan 12: Pass |
| BR_003 | Payment Gateway | FR_005 | With Wallet | Medium | TC_007 | Not Started | |
| | | FR_006 | With Credit Card | High | TC_008 | In Progress | Jan 12: Testing Started |
| | | FR_007 | With Debit Card | High | TC_009 | In Progress | Jan 12: Testing Started |

## 4. Validate the final result:

Once the requirements traceability matrix is created, you must verify that all modules and test scenarios are developed and tested:

**Example of RTM**

**Requirements Traceability Matrix**

**Project Name:** Movie Ticketing App
**Project Number:** 52234
**Project Manager:** Ram Sharma

**Purpose:** To mange requirements throughout the software development lifecycle. The Traceability Matrix ensures that requirements are captured in the design, implemented in the code, and verified by testing.

| Use Case | Requirement Number | Requirement Description | Status | Release | Test Case | Design Component / Module | Comments |
|---|---|---|---|---|---|---|---|
| Login of the application | MTA_001 | Login of the web application should be enabled | Approved | MVP | Check login of web both postive and negative | Login Module | |
| Login of the application | MTA_002 | Login of the Android app should be enabled | Proposed | V1 | Check login of Android app both postive and negative | Login Module | |
| Login of the application | MTA_003 | Login of the iOS app should be enabled | Proposed | V2 | Check login of iOS app both postive and negative | Login Module | |

**Advantages of Requirements Traceability Matrix**

- ✓ Identify Extra Requirements:
- ✓ Streamlines the Testing Process:
- ✓ Better Change Management:
- ✓ Helps Prioritize Defects:
- ✓ Guaranteeing Project Success:
- ✓ Ease of Compliance and Audits

## 5.5 Define Scope

- ✓ Define Scope is the process of developing a detailed description of the project and product.
- ✓ The key benefit of this process is that it describes the product, service, or result boundaries and acceptance criteria.
- ✓ Once you've collected requirements from stakeholders, turn that information into a well-defined scope and a detailed product description. This document clarifies the expectations and deliverables for the project so that all team members know what they must accomplish.
- ✓ It is important to list what is in the scope of the project, it is just as important to note down what is out of the project scope.
- ✓ Any kind of inclusions to the scope would then have to go through the entire change control process to ensure the team is only working on things that they are supposed to work on.

- ✓ With a defined scope, you get a reference point for your project team and anyone else involved. In case there is something that is not involved in the scope, it doesn't need to be completed by the team.

**Inputs, Tool & Techniques, Output of Define Scope Process**

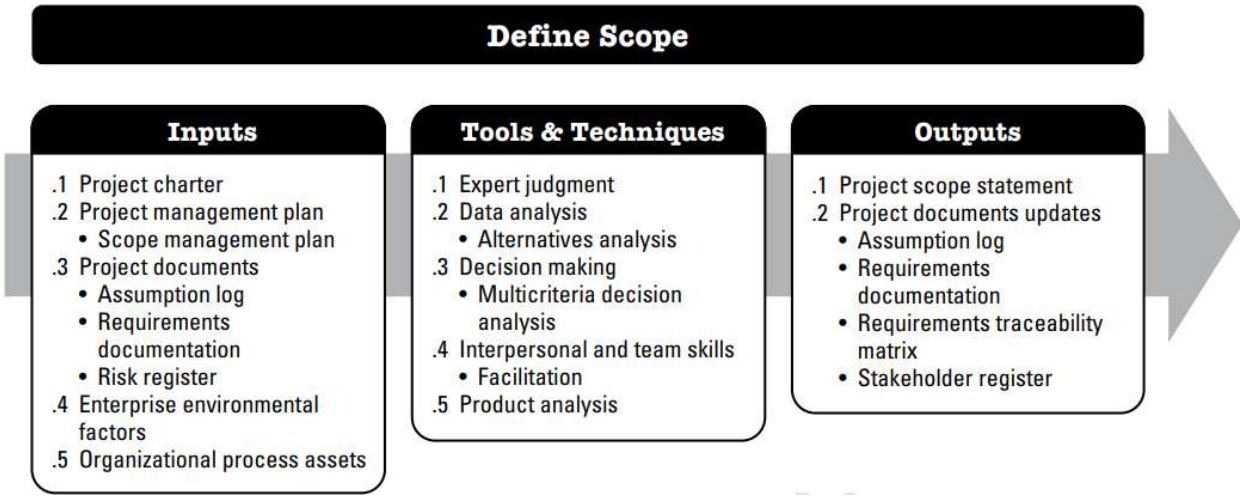



**Figure:** Inputs, Tool & Techniques and Output of Define Scope Process [IS: PMBOK Guide]

## 5.6. Creating Work Breakdown Structure

- ✓ WBS (Work Breakdown Structure)
- ✓ The process of subdividing project deliverables and project work into smaller, more manageable components is WBS
- ✓ 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.
- ✓ A WBS structure may be created through various approaches. Some of the popular methods include the top-down approach, the use of organization-specific guidelines, and the use of WBS templates.

There are two types of WBS:

1) Deliverable-Based
   - ✓ The most common and preferred approach is the Deliverable-Based approach
2) Phase-Based

The main difference between the two approaches are the **Elements** identified in the first Level of the WBS.

## How to create WBS?

### 1. Gather Critical Requirements

Identify content containing project deliverables, such as the Project Charter, Scope Statement and Project Management Plan (PMP) subsidiary plans.

### 2. Identify Key Team Member

Identify the appropriate project team members and analyze the documents and identify the deliverables.

### 3. Define the Level 1 Elements:

Level 1 Elements are summary deliverable descriptions that must capture 100% of the project scope. Verify 100% of scope is captured. This requirement is commonly referred to as the 100% Rule.

### 4. Breakdown Elements

Begin the process of breaking the Level 1 deliverables into unique lower Level deliverables. This "breaking down" technique is called Decomposition. Continue breaking down the work until the work covered in each Element is managed by a single individual or organization. Ensure that all Elements are mutually exclusive.

Ask the question, would any additional decomposition make the project more manageable? If the answer is "no", the WBS is done.

### 5. Create WBS Dictionary

Define the content of the WBS Dictionary. The WBS Dictionary is a narrative description of the work covered in each Element in the WBS. The lowest Level Elements in the WBS are called Work Packages.

Create the WBS Dictionary descriptions at the Work Package Level with detail enough to ensure that 100% of the project scope is covered. The descriptions should include information such as, boundaries, milestones, risks, owner, costs, etc.

### 6. Create Gantt chart Schedule

Decompose the Work Packages to activities as appropriate.

Export or enter the Work Breakdown Structure into a Gantt chart for further scheduling and project tracking.

**Inputs, Tool & Techniques, Output of Create WBS Process**

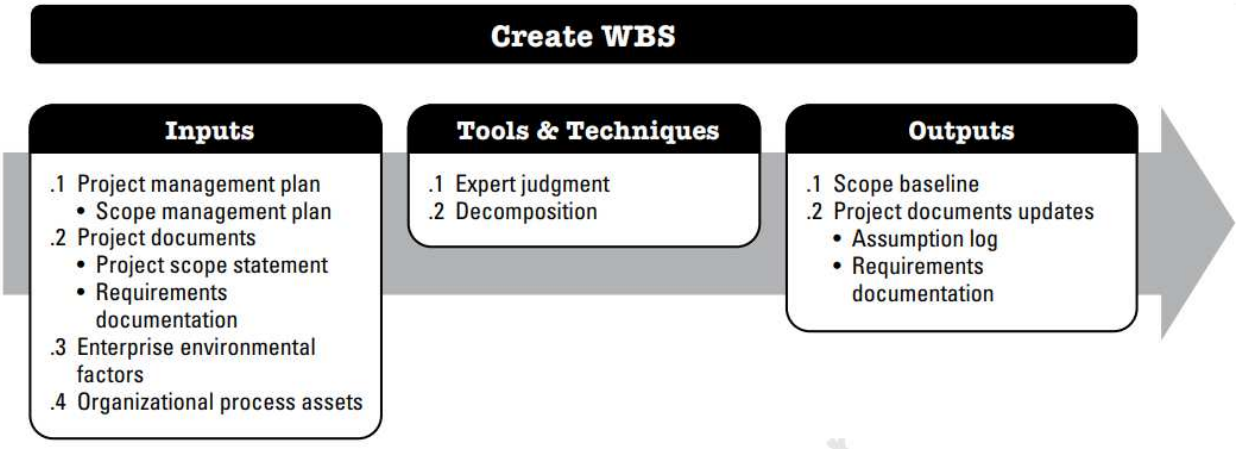



**Figure:** Inputs, Tool & Techniques, Output of Create WBS Process

**Example of WBS:**

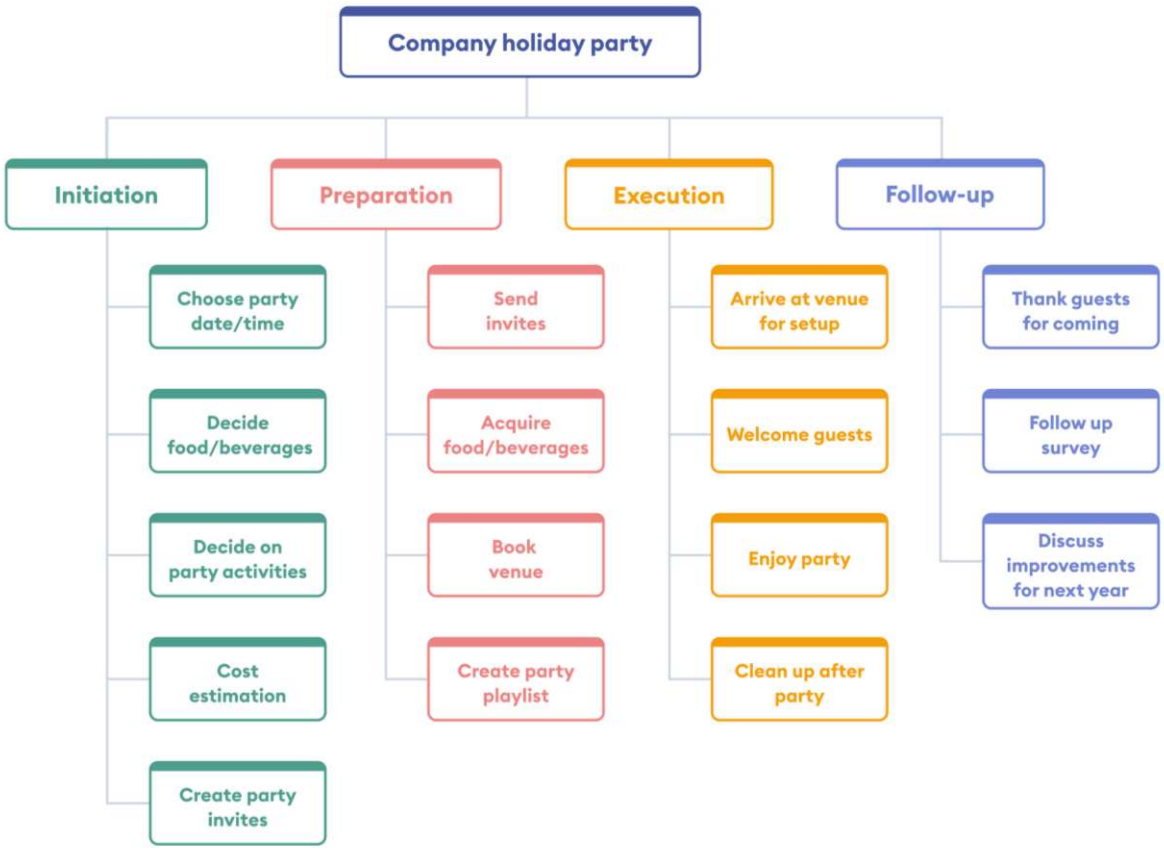



**Figure:** WBS Example of Company Holiday Party [IS: Forbes Advisor]

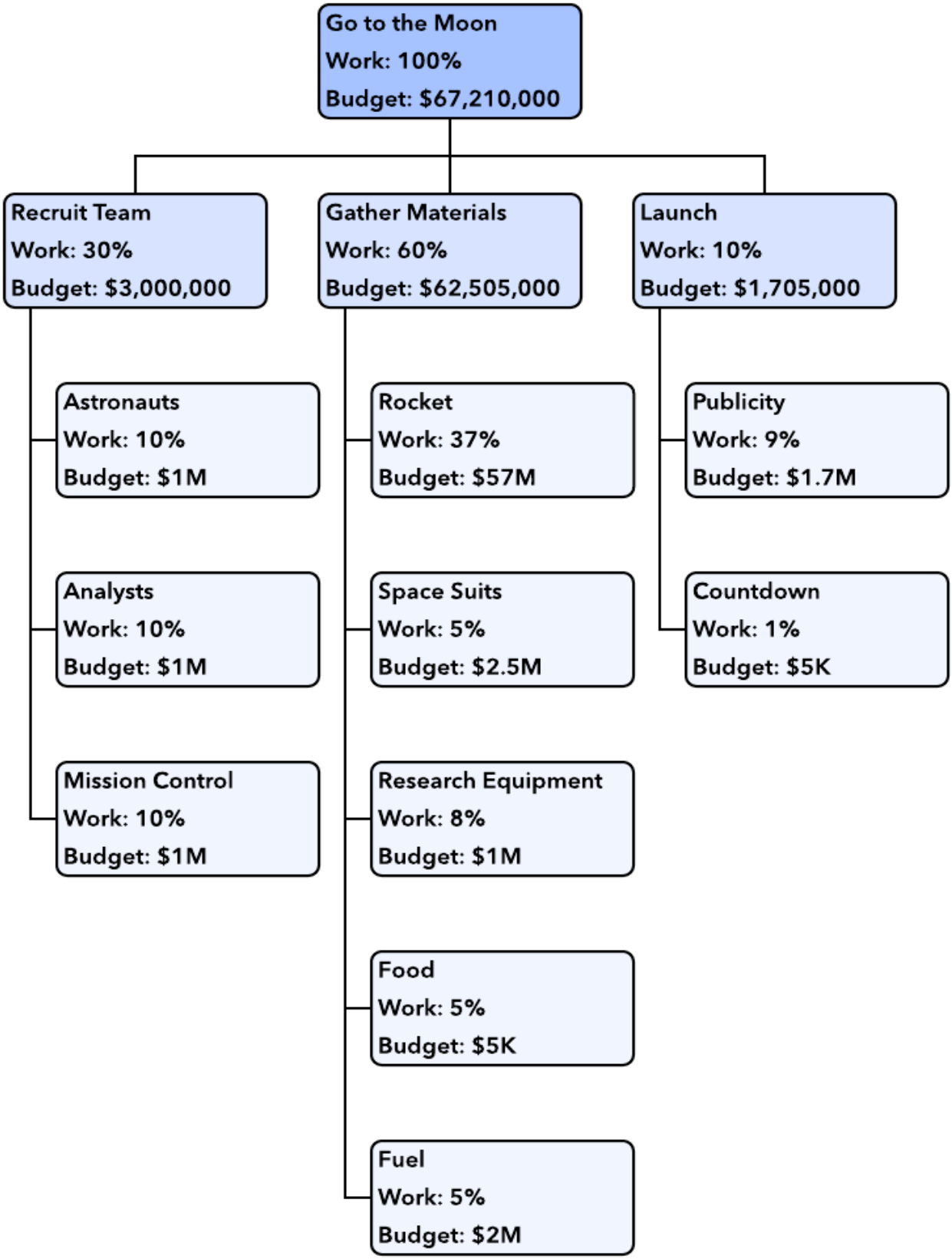



**Figure:** WBS Example of Mission to moon [Image Reference: Lucid chart]

**Example-**3

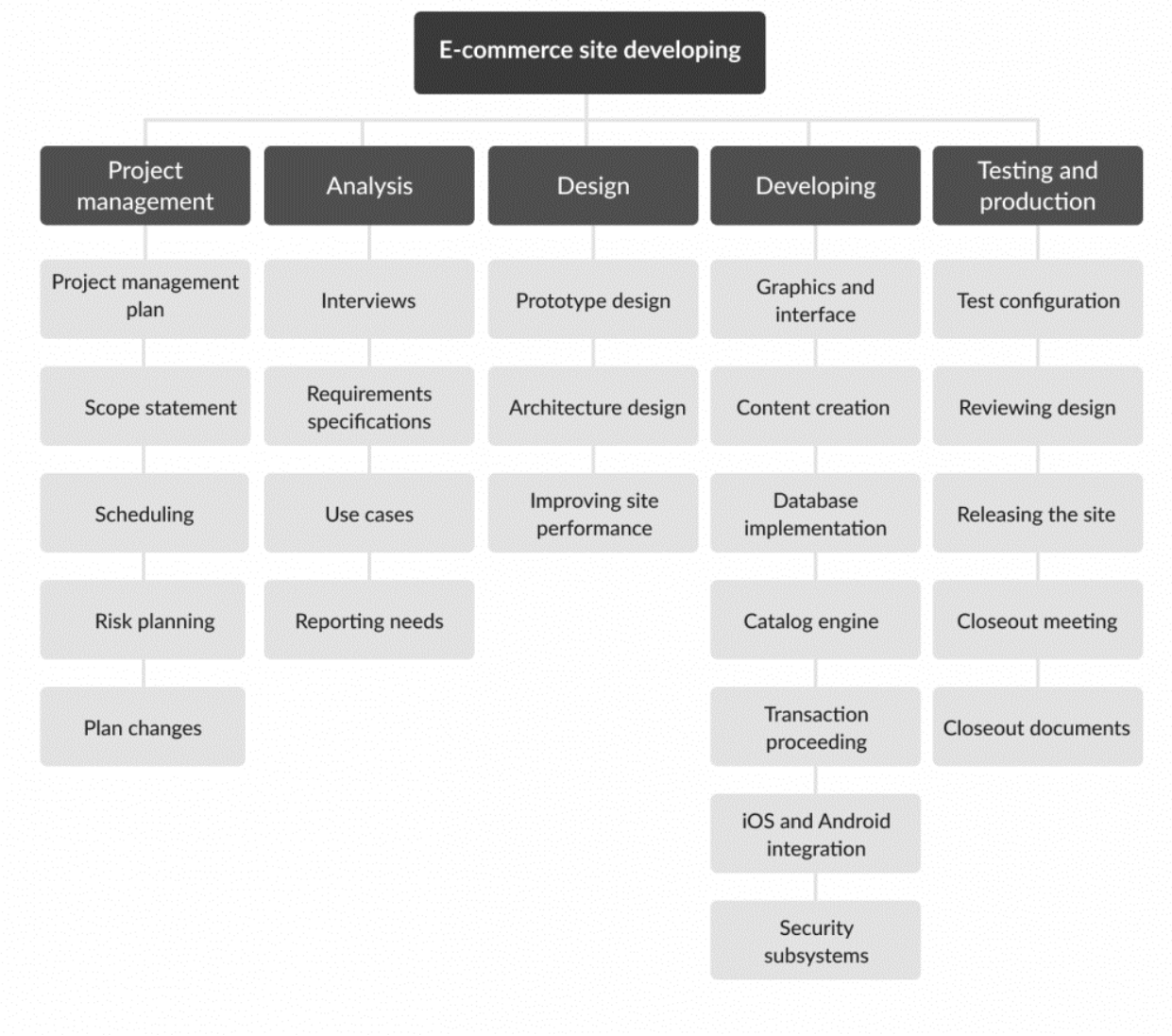



**Figure:** WBS Example of an e-commerce Site

## 5.7. Scope Validation

- Validating scope simply means getting sign-off from all stakeholders involved in the project.
- Make sure stakeholders clearly understand your project deliverables to avoid future scope creep.
- If possible, get feedback or advice on any changes and improvements.
- The point of this phase is to avoid stakeholders deciding that things should have been done differently *after* the project has been completed.
- This process is performed periodically throughout the project as needed.
- The Validate Scope process differs from the Control Quality process in that the former is primarily concerned with acceptance of the deliverables, while the latter is primarily

concerned with correctness of the deliverables and meeting the quality requirements specified for the deliverables.

- Control Quality is generally performed before Validate Scope, although the two processes may be performed in parallel

**Inputs, Tool & Techniques, Output of Validate Scope Process**

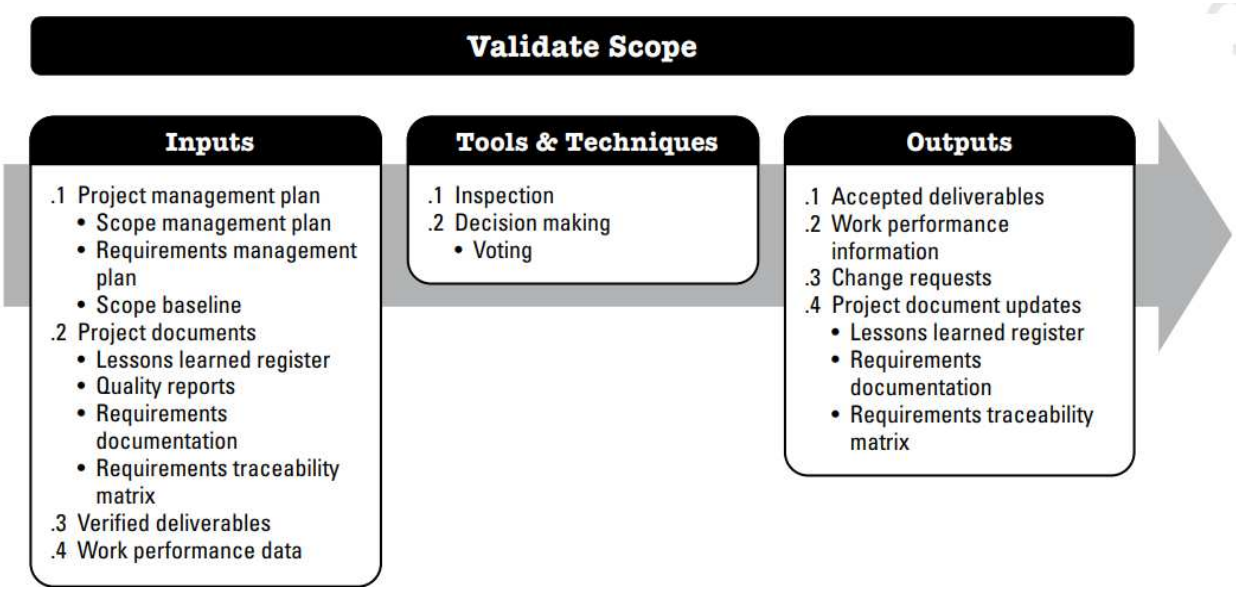



**Figure:** Inputs, Tool & Techniques, Output of Validate Scope Process

## 5.8. Scope Control

- The process of monitoring progress and managing changes that come up during the project.
- It monitors "scope creep," which happens when additional tasks are added/changed, without making the necessary changes to the scope in terms of schedule, costs and resources.
- This is an essential part of the process as changes can result in lost time, cost overruns, and will require the reallocation of assets and manpower.
- A project's status should be monitored from start to finish to ensure that it is being executed according to your project scope management plan. You never know when the scope may need to change or a customer may add new requirements.
- In order to prevent scope creep, project managers should compare performance reports with the project requirements.
- This process is performed throughout the project

**Inputs, Tool & Techniques, Output of Scope Control Process:**

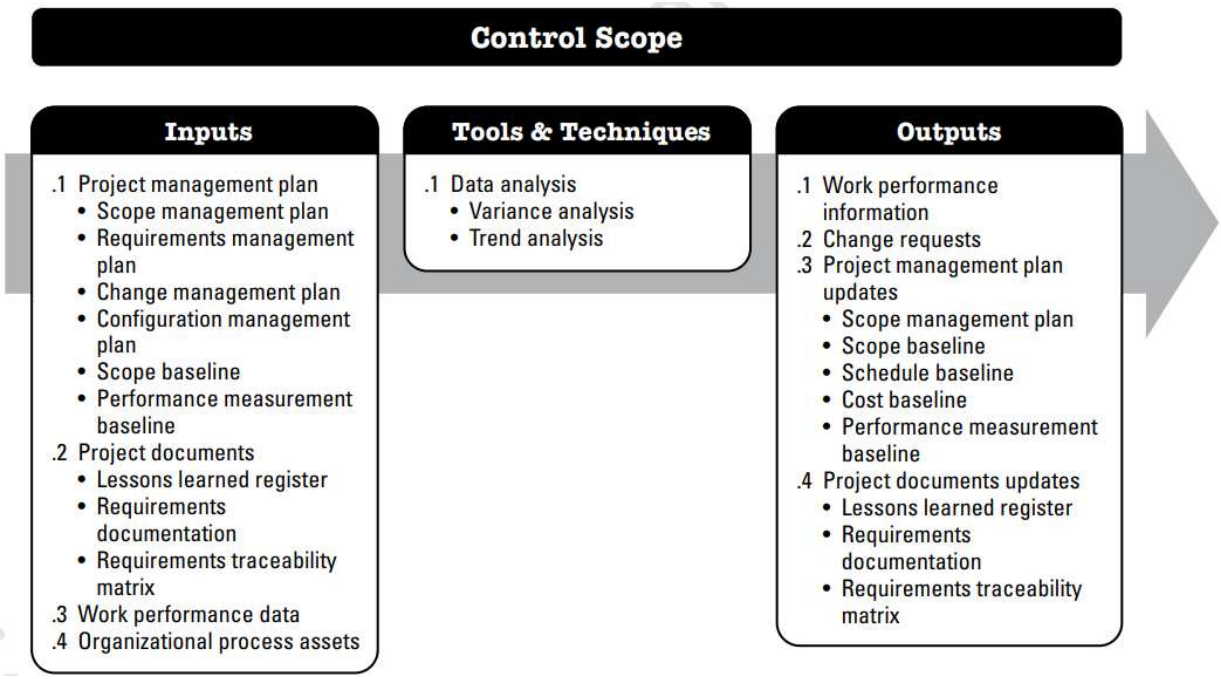



**Figure:** Inputs, Tool & Techniques, Output of Scope Control Process

## Old Questions:

**Q1.** Why ongoing scope management is necessary? Differentiate gold plating and scope creeping with examples. [2015 fall, 2015 spring]

**Q2.** Define project and product scope. What is WBS? Illustrate with example. [2016 fall]

**Q3**.What is WBS? Illustrate a WBS for a project of website design of Pokhara University. [2017 fall]

**Q4.** Define project and Strategic planning. What is WBS? [2017 spring]

**Q5**. What is the main technique used for validating the scope? [2018 fall]

**Q6**. Differentiate project scope and product scope. Explain different tools and techniques to collect requirements. Describe the importance of traceability matrix. [2019 spring]

**End of Unit**