Project Scope Management

Project Skills

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Preface

Any planning or work activity which is not directly focused on completing the specified project objective represents a waste of resources and should not be undertaken. Many projects fail because of difficulties in trying to control the scope of the project. This e-book will cover the processes and requirements involved in project scope management.

You will learn:

- How project scope management relates to the successful delivery of a project
- Why 'scope creep' and 'gold plating' represent real and risks to the project
- How to confirm that only specified work is completed in accordance with the project scope statement
- To apply scope definition in order to reduce the probability of scope creep within the project
- Why project scope management is treated as a distinct knowledge area within project management

The Free Management eBooks 'Project Skills' series are structured around the ten key knowledge areas of project management detailed in the 'Project Management Institute, A Guide to the Project Management Body of Knowledge, (PMBOK® Guide)—Fifth Edition, Project Management Institute Inc., 2013'. ISBN-13: 978-1935589679.

The eBooks in this series follow the structure of the PMBOK® Guide because it represents a tried and tested framework. We have tried to ensure full alignment of our eBooks with the Guide by using the numbering convention as well as the naming convention.

If you need more detailed explanation of a particular subject then you can simply refer to the related chapter and paragraph number in the PMBOK® Guide. Remember, many of the generic project management methodologies available refer to the PMBOK® Guide as a basic framework.

A knowledge of the PMBOK® processes will go a long way towards giving you an understanding of almost any project management methodology that your organization may use.

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About this Knowledge Area

The knowledge area of Scope Management includes the processes required to ensure that the project includes all the work, and only the work required to complete the project successfully. It is primarily concerned with controlling what is and what is not included the scope.

The Project Scope Management knowledge area includes 6 of the 47 process groups recognized by the PMBOK.

Process	Project Group	Key Deliverables
5.1 Plan Scope Management	Planning	Scope Management Plan
5.2 Collect Requirements	Planning	Requirements Document
5.3 Define Scope	Planning	Project Scope Statement
5.4 Create WBS	Planning	WBS, WBS Dictionary
5.5 Validate Scope	Monitoring & Controlling	Acceptance Deliverables
5.6 Control Scope	Monitoring & Controlling	Change Requests

The first four of these: Plan Scope Management, Collecting Requirements, Define Scope and Creating the Work Breakdown Structure form part of the Planning process group and Verifying and Controlling the Scope form part of the Monitoring and Controlling process group.

One could ask why Project Scope is not considered during the initiation phase of the project. The answer is that it is, but only in the broadest sense of deciding on the overall objective of the project. At this stage scope is defined in a fairly approximate way that can be changed as necessary during the planning phase.

Introduction

There is a well-known saying that states that:

'Projects don't fail at the end, they fail at the beginning'.

There is a great deal of truth in this and whilst failure may not appear obvious until the final stages of a project, the post-implementation review often finds that there were known issues with the project which could and should have been addressed at project inception.

These issues often turn out to be to do with the 'scope' of the project. The word 'scope' has two distinct uses in project management. Project scope refers to 'the work that needs to be accomplished to deliver a product, service, or result with the specified features and functions' and Product Scope refers to the 'features and functions that characterize a product, service, or result'. Project Scope is more work-oriented, (the 'how',) while Product Scope is more oriented toward functional requirements. (the 'what').

Project Scope	Product Scope
The 'How'	The 'What'
Work-orientated	Orientated to functional requirements
Work that needs to be done to deliver a product or service	*Features & functions that characterize a product or service*
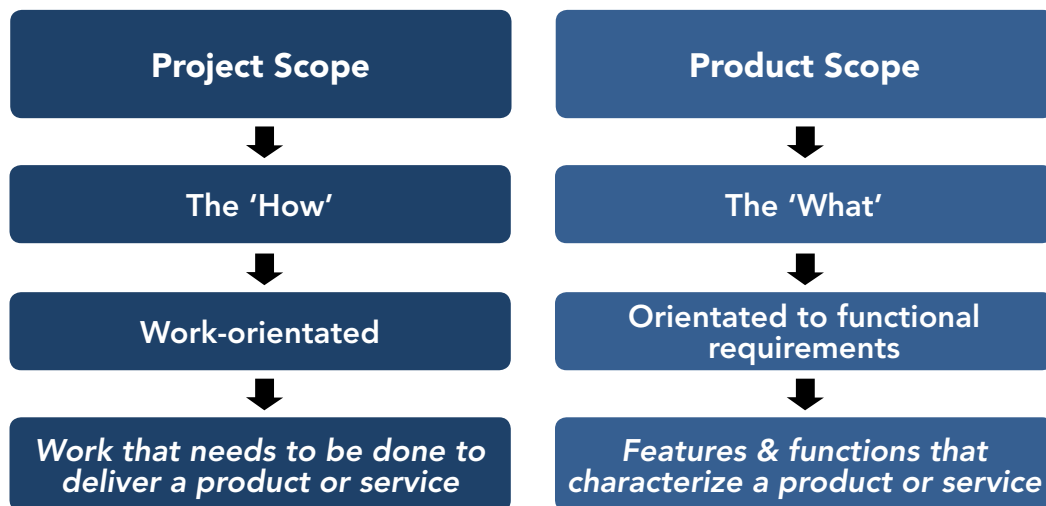
In both instances 'defining scope' is an exercise in fact finding, documenting and gaining agreement about what needs to be done and how. This can be a time consuming process and those project team members involved in the scoping exercise can find it frustrating because stakeholders whose input is needed may not always be available for interviews and meetings and often assign these things a lower priority than their own day-to-day work. This is quite understandable because many of them will not be part of the project

team as such and they are unlikely to have had sufficient time allocated in their already busy schedules for this additional work.
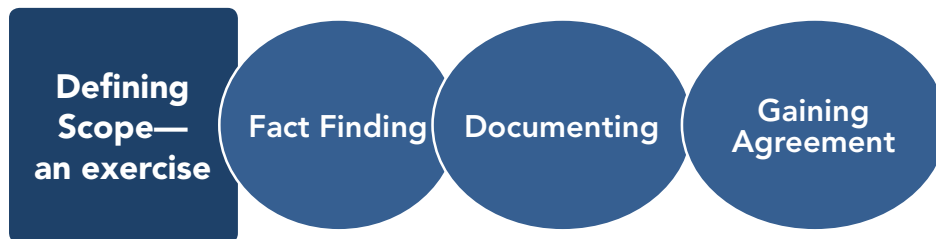
To fully appreciate this problem you need to be aware of the distinction between 'allocated time' and 'elapsed time'. Even if sufficient time has been allocated for meetings with stakeholders and they are able to find this time in their schedules, there may be delays in 'when' these meetings happen. These delays tend to accumulate so that instead of having 20 hours of meetings over two weeks, you end up with 20 hours of meetings over three and a half weeks. In this example, the allocated time has not been exceeded but the elapsed time has overrun significantly.
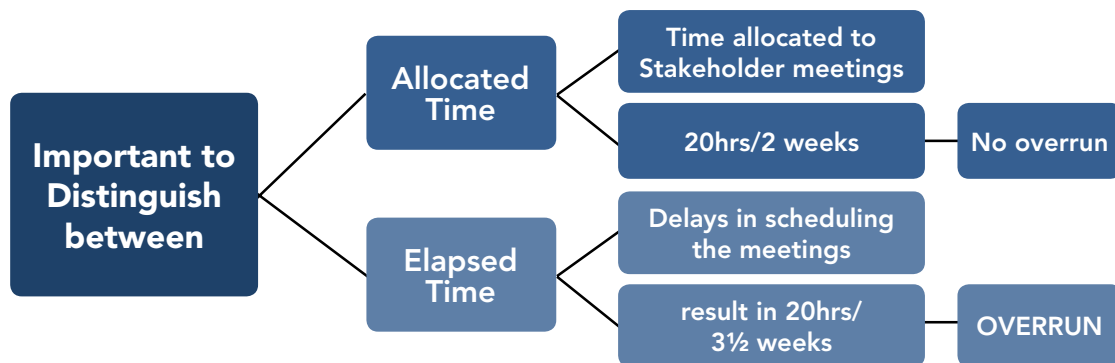
This can lead to a situation where the project appears to be slipping almost from the very beginning because project team members cannot get sufficient face time with stakeholders outside of the project or cannot get these people into the same meeting where a consensus about what is required could be worked out.

There is also the problem of how to occupy project team members during this elapsed time. A common response to this situation is to gloss over the importance of the scoping exercise based on the feeling that:

'Everybody seems to pretty much agree, and we really need to get on and produce some deliverables'.

This scenario is more common than most books on project management would admit and represents the biggest single problem with the scoping aspect of the project—very seldom is enough time allowed for it to be done properly.

Differences in perception of what was meant when the client specified project deliverables can lead to vastly different understandings of what exactly is required. Not only must the scope be agreed up front, it needs to be constantly monitored throughout the project to avoid it changing in a way that will break the budget or timescale, or will contravene stakeholder's expectations of the final deliverable.

Scope must be constantly monitored to avoid:	Exceeding Project Budget	Overrun Project Timescale	Contravene Stakeholders Expectations
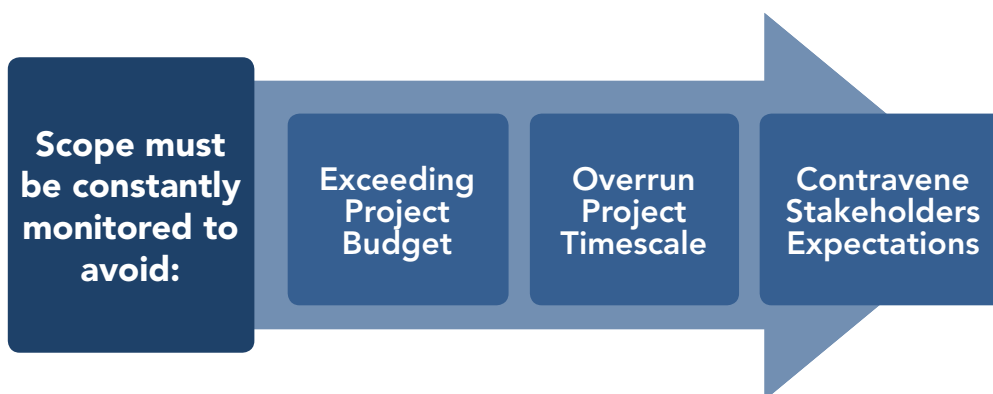
You will need to define those things that are out of scope as well as those things that are within the scope of the project because it cannot be taken for granted that everyone involved understands where the scope of the project ends unless they are specifically told that information.

Most experienced project managers would agree that the scope of the project needs to be decided on and documented before any real work begins. However, in the real world this ideal is often compromised because insufficient elapsed time has been allocated for it.

Remember, the principal challenge of project management is to accomplish the project goals and objectives while respecting the constraints of scope, time and cost. One of the most effective ways of balancing these constraints is by developing clear and comprehensive scope statement.

Why Ongoing Scope Management is Necessary

As well as defining the scope of the project in the planning stage it is also necessary to actively manage it. This is because there are two groups of stakeholders that will almost invariably apply pressure to change the scope of the project throughout its life cycle.

The first group can be thought of as essentially external and include project sponsors and end-users. These groups may not have got everything they wanted included in the initial project specification and use the 'requested change' route to incorporate elements that were not included during the initial development of the project scope statement. This can also happen when stakeholders become aware of the potential of the new system and mistakenly believe that adding incremental improvements during the course of the project will create a better solution without increasing risk or cost.

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                    │  Stakeholder Groups │
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      │         │  │         │  │ Members │  │         │
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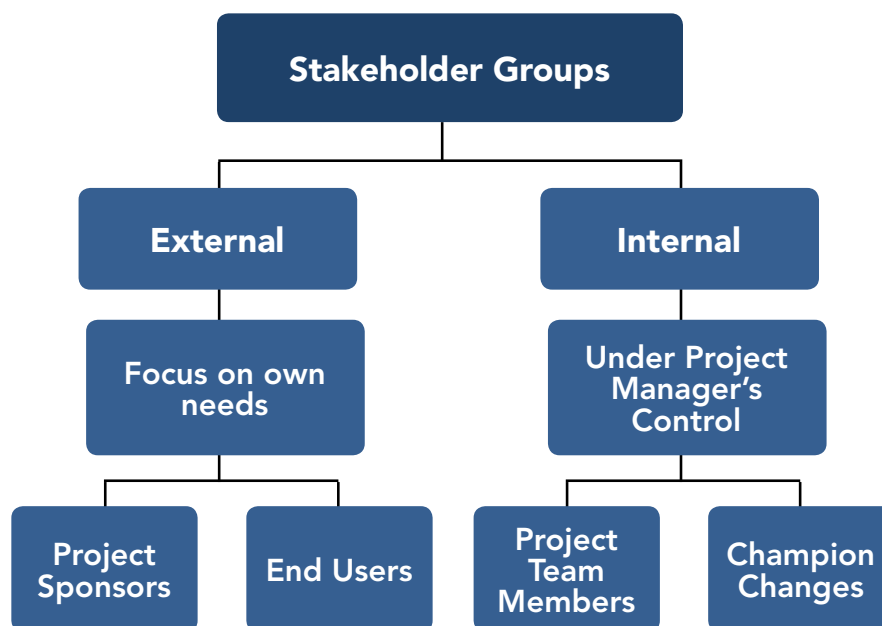
Project managers must always be aware that stakeholders are almost always tempted to increase the project scope via the back door once the project gets underway. They can justify this to themselves by believing that these changes are relatively small and yet will add a great deal of value to the completed project. Unfortunately this tends to prevent them from being totally objective when considering the additional resources required implementing these incremental improvements. This phenomenon is known as 'scope creep' and is endemic in project work to the extent that it is a major cause of project failure.

The second group who may champion changes to the scope of the project can be thought of as internal. These are project team members who are usually under the direct control of the project manager, for example engineers or analysts. Their motivation is quite different from the first group and usually has more to do with professional pride or intellectual curiosity than purely functional factors.

Their arguments for extending the scope of a particular deliverable usually begin with the words 'wouldn't it be great if…' and then go on to explain that the effort involved would be negligible. These suggestions can get a lot of support from within the project team from people who think that delivering extra or higher quality than was specified is a desirable thing to do because of the recognition that it will bring.

Doing unnecessary work in this way is usually referred to as 'gold plating' and it is a very bad idea because it always brings with it additional risk and cost beyond what has been agreed. Anyone who wishes to impress their superiors by over-delivering should realize that it is far better to deliver early or under budget than to deliver more than was originally specified.

Scope creep and gold plating can become intertwined when end users and developers get together because both see their interests aligned in producing something that goes beyond the agreed functionality with perceived minimal risk. It can be very difficult for a project manager to persuade a team that real risks are involved and that the scope of the project has been defined the way it has for good reasons.

In addition, end-users can easily introduce scope creep through their feedback on early reviews of the project outputs. Non-specialists can have genuine difficulty envisaging a solution before the project starts and so despite the best efforts of everyone during

project definition, users sometimes only realize what they want when they eventually get their hands on a trial version.

Remember, the biggest problem with scope creep is that the suggestions made to increase the scope of the project may be very good ones. The problems arise because accepting them implies changing something about the project objectives; the plan, resources and all of the things that have been so carefully matched to the original objectives are suddenly incompatible with the new ones.

Scope creep leads to problems in one of two ways:

1. The suggestion is accepted and the project is committed to do things that were not in the plan, which inevitably leads to cost and time overruns.
2. The suggestion is automatically rejected and this has implications for project team morale.

After all, people may have put a lot of thought and effort into devising what they see as major improvement that have (in their opinion) minimal associated costs and risks. Team members who make these suggestions invariably have a sincerely held belief that they are helping the end-users and by extension they are helping the organization itself.

This means that not only do you need an effective scope management system in place; the reason for it needs to be made clear to everyone on the project team if you want them to stay motivated even when they feel that their efforts in 'improving' the project are being rejected out of hand.

Process Overview

At the point where the project scope statement is authorized, the scope of the project is frozen. Anything that implies that the actual project and what is defined in the scope management statement will be materially different should trigger the scope management process.

This process starts whenever an action is proposed to consider whether it constitutes a change to the project scope. This can be determined by looking at the project charter and the scope statement.

Once approved Project Scope is frozen.
To make ANY change this process must be followed

⬇

Decide if an 'action' constitutes a change

⬇

Originator to write a full description of proposed change

⬇

Look at Project Plan to determine consequences of change

⬇

Discuss these consequences with originator

⬇

If change accepted, update relevant project documents
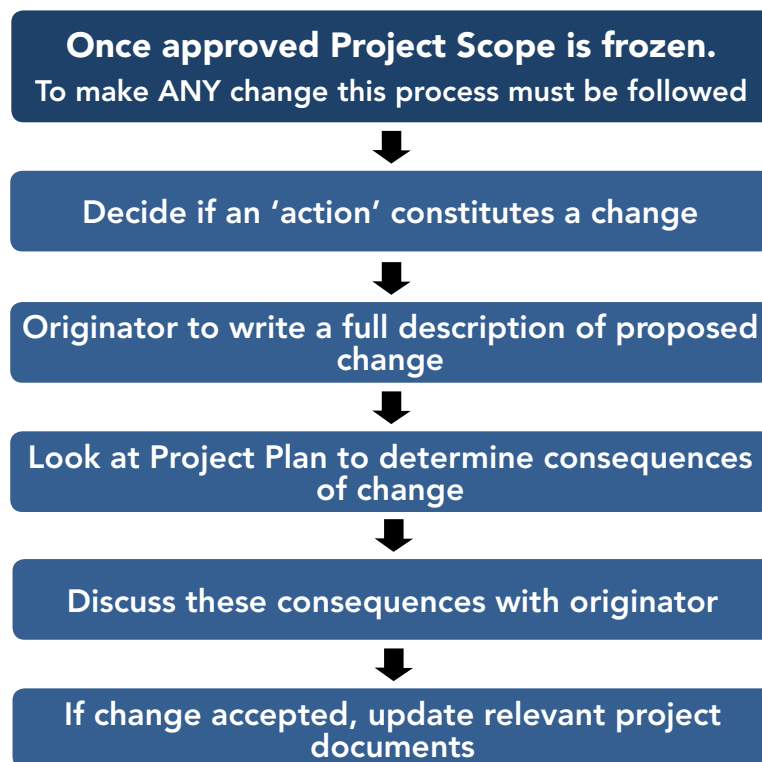
Get a written description of the proposed change with as much clarity as possible. The originator should describe the new objective but you may have to ask them to write this down in exact and neutral terms. Make sure that you do not suggest that this means that their idea is going to be adopted only that it is going to be seriously considered.

Go back to the project management plan and work out the consequences of accepting or rejecting the change. This should be done with reference to timescales costs and perfor-

mance of deliverables as well as risk. There is always the option of revisiting these ideas once the core project is finished with a view to implementing them as part of a new project.

Discuss the results of the re-planning exercise with the originator of the idea and make sure they understand the consequences of their request. This is particularly important if the request has been rejected, as at least they will understand the reasons why this has happened even though their idea may fundamentally be a good one and confer advantages to the end-users and to the organization.

If the requested changes going to be approved for implementation then it will impact certain documents which need to be updated and reissued. If the change is sufficient to require a revision to the project charter then this may need to be submitted to a higher level for approval. If a major change is accepted then you will need to re-launch the project ensuring that all team members and all of the stakeholders know about the new objectives and plan.

The PMBOK® Project Scope Management Processes

As previously stated, the scope of the project is concerned with what exactly the project will deliver and the function of Project Scope Management is to define and control the work required producing these deliverables.
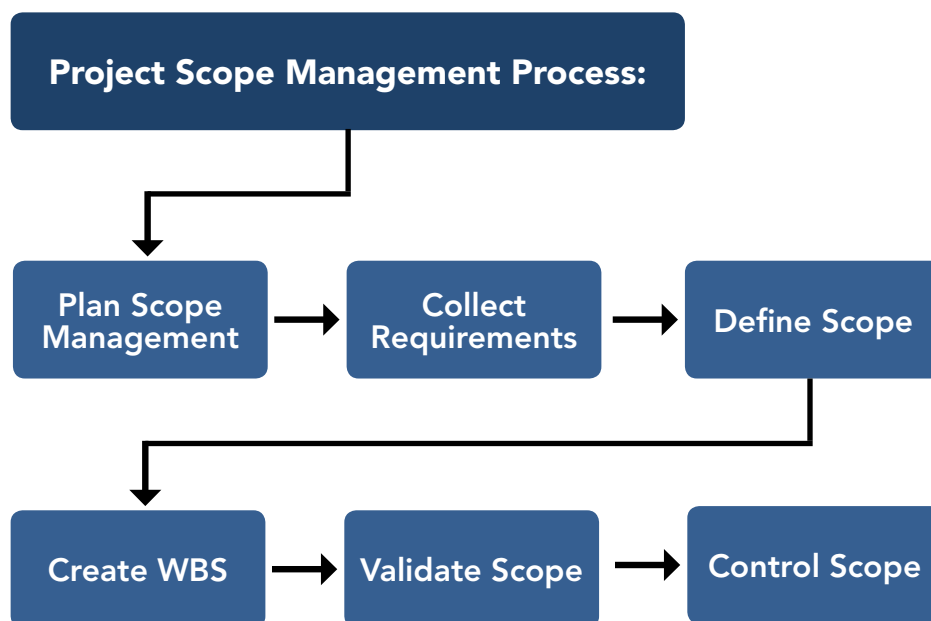
There are six Project Scope Management processes:

> 5.1 Plan Scope Management
> 5.2 Collect Requirements
> 5.3 Define Scope
> 5.4 Create Work Breakdown Structure
> 5.5 Validate Scope
> 5.6 Control Scope

These are dealt with in detail in the following chapters of this eBook.

5.1 Plan Scope Management

This process involves creating a Scope Management Plan that describes how the scope of the project will be defined, validated and controlled so that it can be managed throughout the life of the project.
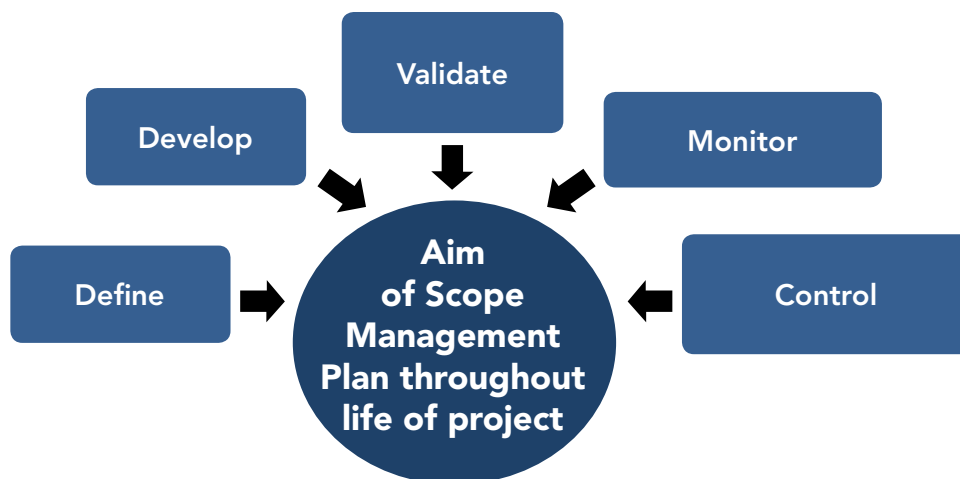
The main input to this process is the project charter, and by using expert judgment in conjunction with project team meetings, the two main outputs are the Scope Management Plan itself and the Requirements Management Plan. The inputs, tools and techniques, and outputs of this process are summarized in the table below.

Inputs	Tools & Techniques	Outputs
Project Management Plan	Expert Judgment	Scope Management Plan
Project Charter	Meetings	Requirements Management Plan
Enterprise Environmental Factors		
Organizational Process Assets		

5.1.1 Plan Scope Management: Inputs

This process requires the following inputs:

5.1.1.1 Project Management Plan

The project management plan is the document that describes how the project will be executed, monitored, and controlled. It integrates and consolidates all of the subsidiary plans and baselines from the planning processes.

Approved subsidiary plans of the project management plan are used to create the scope management plan and influence the approach taken for planning scope and managing project scope.

5.1.1.2 Project Charter

The project charter provides a preliminary definition of roles and responsibilities and the project objectives. It is usually a fairly short document that refers to more detailed documents.

Project Charter → Initial definition of roles & responsibilities → Project Objectives

The purpose of the project charter is to document the reasons for undertaking the project:

- Objectives
- Constraints
- Main stakeholders
- In-scope items

- Out-of-scope items
- High-level Risk Management Plan
- Communication Plan
- Target Project Benefits
- High-level Budget
- Spending Authority

5.1.1.3 Enterprise Environmental Factors

These include the organization's culture, infrastructure, personnel administration, and marketplace conditions.
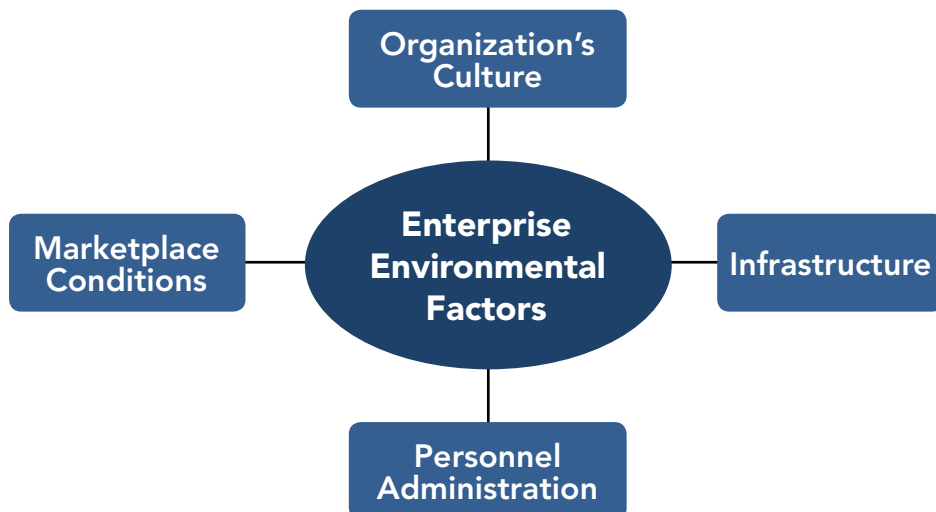
5.1.1.4 Organizational Process Assets

There are two categories of these, the first being policies and procedures, and the second being historical information and the lessons learned database.

5.1.2 Plan Scope Management: Tools and Techniques

There are two interrelated techniques that can be used.

5.1.2.1 Expert Judgment

This can involve any member of the project management team with expertise in creating a Scope Management Plan.

5.1.2.2 Meetings

These involve people who are responsible for scope management including the project manager, the project sponsor, selected project team members, selected stakeholders, anyone with responsibility for any of the scope management processes, and others as needed.

To learn more on how to run efficient meetings visit our online library area dedicated to 'Meeting Skills' **http://www.free-management-ebooks.com/skills-meeting.htm**

5.1.3 Plan Scope Management: Outputs

This process will create the following outputs:

5.1.3.1 Scope Management Plan

This describes the contents of the other five scope management processes. That is, how the scope will be defined, developed, monitored, controlled, and verified.

Key Elements of Scope Management Plan

- Details project scope statement
- Creates a Work Breakdown Structure (WBS)
- Describes how WBS will be approved & maintained
- Defines formal acceptance process
- Defines request for changes process
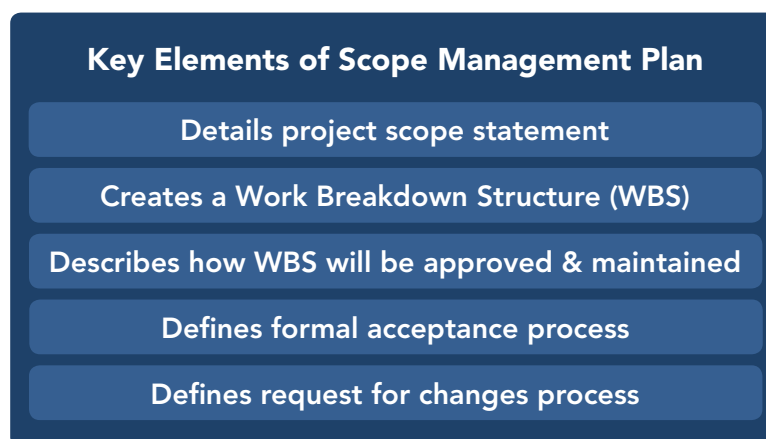
Key elements include processes that detail how:

1. A detailed Project Scope Statement will be prepared
2. The WBS will be created from the detailed Project Scope Statement
3. How the WBS will be approved and then maintained
4. How formal acceptance will be obtained
5. How requests for changes to the Project Scope Statement will be accepted and handled

5.1.3.2 Requirements Management Plan

Requirements include quantified and documented needs and expectations of the sponsor, customer and other stakeholders. This plan describes how requirement activities will be planned and tracked. Key elements include:

1. Methods to identify requirements
2. How to analyze, prioritize, manage, track changes to them
3. Configuration management activities
    ○ How changes will be initiated
    ○ How impacts are analyzed
    ○ Authority levels required to approve changes
4. Product metrics that will be used and the rationale for using them
5. Traceability structure to reflect which requirement attribute will be captured on the traceability matrix

5.2 Collect Requirements

This process is concerned with assessing, documenting, and managing stakeholder needs to meet project objectives. All requirements should be gathered at the start because it is costly to make changes as the project progresses. Gathering requirements from all stakeholders will also ensure that their opinions are taken into consideration, which will lead to higher rates of project acceptance.

```
Collect
Requirements          Documented  ➡️  Managed
Process
    ⬇️                      ⬆️           ⬇️
way
Stakeholders'  ➡️  Assessed       To meet
needs are                         Project
                                  Objectives
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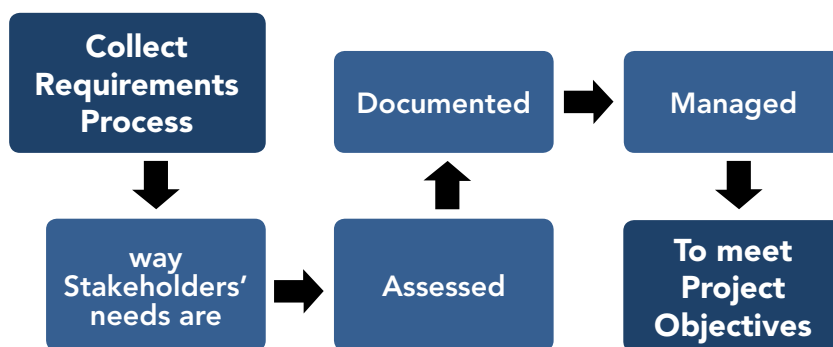
The development of requirements should begin by analyzing information the project Scope Management Plan, Requirements Management Plan, Project Charter and the Stakeholder Register.

The important thing to note is that the needs and requirements of the customer and other key stakeholders need to be translated from high-level requirements to more detailed requirements that eventually will turn into the deliverables that comprise the Work Breakdown Structure.
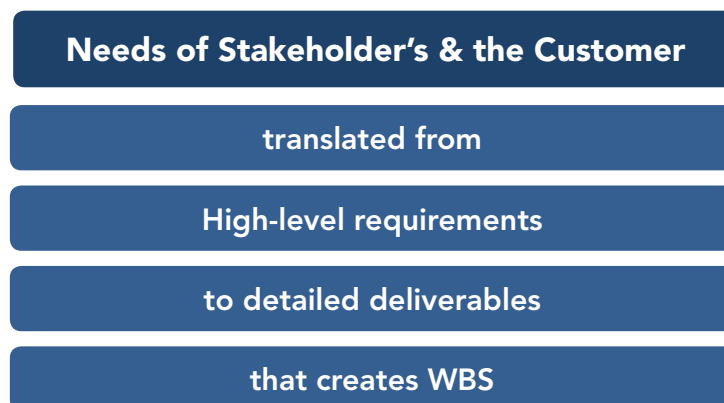
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Needs of Stakeholder's & the Customer

translated from

High-level requirements

to detailed deliverables

that creates WBS
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The inputs, tools and techniques, and outputs of this process are summarized in the table below.

Inputs	Tools & Techniques	Outputs
Scope Management Plan	Interviews	Requirements Documentation
Requirements Management Plan	Focus Groups	Requirements Traceability Matrix
Stakeholder Management Plan	Facilitated Workshops	
Project Charter	Group Creativity Techniques	
Stakeholder Register	Group Decision Making Techniques	
	Questionnaires and Surveys	
	Observations	
	Prototypes	
	Benchmarking	
	Context Diagrams	
	Document Analysis	

5.2.1 Collect Requirements: Inputs

This process requires the following inputs:

5.2.1.1 Scope Management Plan

This is an output from the previous process 5.1 Plan Scope Management. It describes the contents of the other five scope management processes. That is, how the scope will be defined, developed, monitored, controlled, and verified.

5.2.1.2 Requirements Management Plan

This is an output from the previous process 5.1 Plan Scope Management. It describes how requirement activities will be planned and tracked.

5.2.1.3 Stakeholder Management Plan

The stakeholder management plan is a component of the project management plan and identifies the management strategies required to effectively engage stakeholders. It is

used to understand stakeholder communication requirements and the level of stake-holder engagement in order to assess and adapt to the level of stakeholder participation in requirements activities.

5.2.1.4 Project Charter

This is described in the previous process 5.1 Plan Scope Management. It provides a pre-liminary definition of roles and responsibilities and the project objectives.

5.2.1.5 Stakeholder Register

Project stakeholders are those entities within or outside an organization who have an interest in the project. They may be actively involved or their interests may be affected as a result of project execution or project completion. They may also exert influence over the project's objectives and outcomes. The project management team must identify the stakeholders, determine their requirements and expectations, and, to the extent possible, manage their influence in order to ensure a successful outcome.

The following are examples of project stakeholders:

- Project Manager
- Project Team Members
- Senior Management
- Project Customer
- Resource Managers
- Line Managers
- Product User Group
- Project Testers

There are narrower views of the term stakeholder, focusing on the influencers and de-cision makers of a business or technological change. In this context, stakeholders are managers who have the organizational authority to allocate resources (people, money, services) and set priorities for their own organizations in support of a change.

5.2.2 Collect Requirements: Tools and Techniques

There are various techniques that can be used including: interviews, workshops, group activities, questionnaires, user observation, and prototyping.

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                                    ┌──────────────────┐
                                    │    Workshops     │
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    │   Collect    │                │ Group Activities │
    │ Requirements │                └──────────────────┘
    │   Tools &    │                ┌──────────────────┐
    │  Techniques  │                │  Questionnaires  │
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                                    │   Prototyping    │
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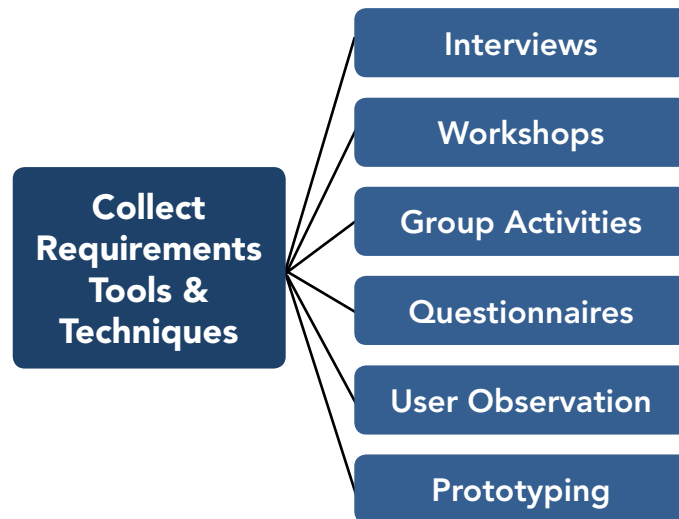
5.2.2.1–5.2.2.5 Interviews, Workshops and Group Activities

All of these approaches involve meeting interested parties face-to-face to discuss requirements and deliverables. During these interactions you can use visual tools and diagrams that help others to identify particular deliverables. It also categorizes the latter showing the high-level relationships between these deliverables. This type of aid is often referred to as a 'deliverables diagram'. This makes it much easier for people to see these things quickly and will save you a lot of time describing them in words or trying to overcome misconceptions about how things are going to fit together.

Whether you are interviewing someone one-to-one or running a workshop or group event, you will need to plan exactly what is required from the participants. It is all too easy for these types of interactions to stray into areas that are not strictly within the bounds of the project or to get bogged down in areas of disagreement.

Obviously, where there are significant differences of opinion then these will need to be resolved but it is vital that these meetings are kept 'on track' by a nominated chairperson or facilitator who has the authority to terminate discussions that are going nowhere and to keep the meetings as productive as possible.

If you would like to know more about taking charge of meetings and ensuring that they are as productive as possible then you should download our free 'Meeting Skills eBooks' from our online library **http://www.free-management-ebooks.com/skills-meeting.htm**.

5.2.2.6 Questionnaires and Surveys

These can prove to be an effective way of getting information quickly because most people can more easily be persuaded to find the time to complete a questionnaire than to attend a meeting. The results of a questionnaire can be compared to see if there is common ground between the different stakeholders and where this is the case it can save a lot of time in face-to-face meetings, which can then be used to discuss and agree areas of contention.

There are some industry specific questionnaires available online and you may be able to find one that you can modify and use for your own project. Obviously, if there are areas where there is general agreement about the scope of particular products or deliverables then these are candidates for utilizing project resources whilst other more controversial areas are still being discussed.

In an ideal world, the scope of the whole project would be agreed before any real work began but in reality you may find yourself in a situation where you are waiting for stake-holder meetings and you have people who are assigned to your project who are becoming frustrated at the lack of progress and are keen to get started producing something. Some members of the project team may become disillusioned if they cannot get on with productive work and you will need to balance this with your desire to do things 'by the book'.

5.2.2.7 User Observation

Some types of project lend themselves to user observation and prototyping more than others. Software interfaces are a good example of those that do and could represent an opportunity to engage team members in useful work even in cases where the scope of some aspects of the project is still under discussion.

User observation is particularly useful where stakeholders have been unable to articulate their requirements. Remember, not everyone is good at describing exactly what it is that they do in a way that can be easily understood by others. Assigning an experienced business analyst to shadow someone for a day or two will often produce far more usable and accurate documentation then asking that same person to document it themselves.

5.2.2.8 Prototyping

Prototyping aims to implement a working model of a project deliverable to see how well it fulfils its requirements. Prototyping can provide early feedback on suitability and provided that prototypes can be produced quickly enough this can be a very powerful tool that can highlight unforeseen problems that could otherwise prove expensive to remedy later on.
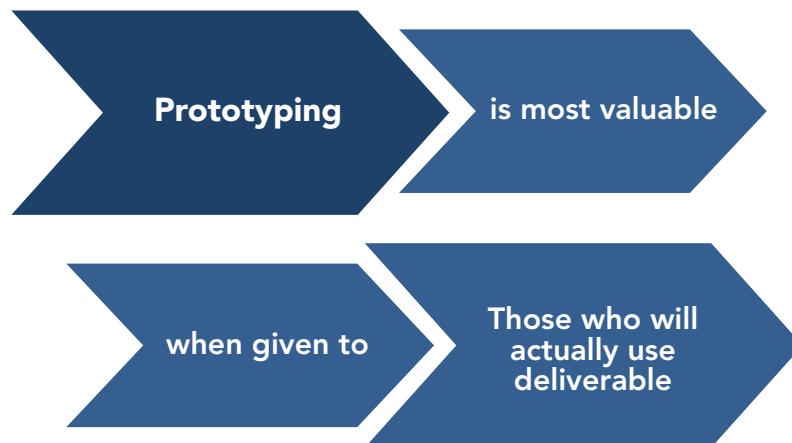
This technique has most value when the prototype is given to the people who will actually be using the deliverable. This may sound obvious but in the real world deliverables are sometimes specified by supervisors or managers, people who have not actually 'done the job' for some time and may be out of touch with the day-to-day task the deliverable is designed to accomplish or facilitate.

5.2.2.9 Benchmarking

Benchmarking involves comparing actual or planned practices, such as processes and operations, to those of comparable organizations to identify best practices, generate ideas for improvement, and provide a basis for measuring performance.
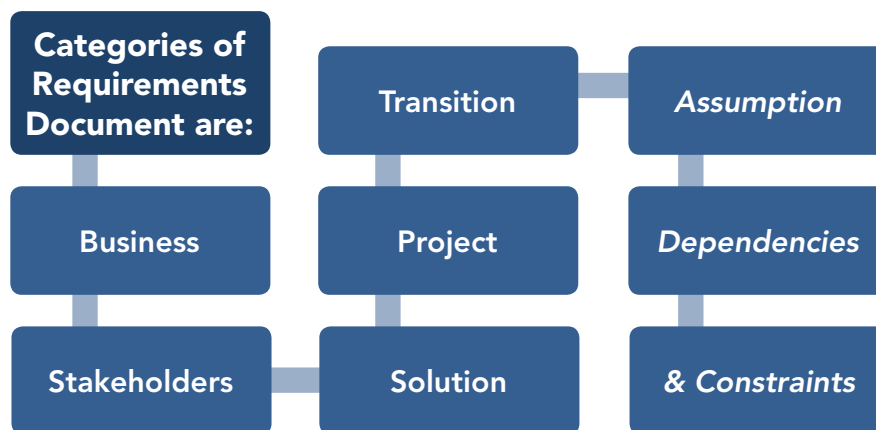
5.2.2.10 Context Diagrams

Context diagrams visually depict the product scope by showing a business system (process, equipment, computer system, etc.), and how people and other systems interact with it.

5.2.2.11 Document Analysis

This involves analyzing existing documentation and identifying information relevant to the requirements. It could include documents like: business plans, marketing literature, agreements, requests for proposal, current process flows, logical data models, business rules repositories, application software documentation, etc.

5.2.3 Collect Requirements: Outputs

This process will create the following outputs:

Categories of Requirements Document are:	Transition	*Assumption*
Business	Project	*Dependencies*
Stakeholders	Solution	*& Constraints*

5.2.3.1 Requirements Documentation

Requirements documentation describes how individual requirements meet the business need for the project. This consists of the following categories of requirements:

1. Business requirements

2. Stakeholder requirements

3. Solution requirements

4. Project requirements

5. Transition requirements

6. Requirements assumptions, dependencies, and constraints.

Requirements may start out at a high level and become progressively more detailed as more is known. Before being baselined, requirements must be unambiguous (measurable and testable), traceable, complete, consistent, and acceptable to key stakeholders.

The format of a requirements document may range from a simple document listing all the requirements categorized by stakeholder and priority, to more elaborate forms containing executive summary, detailed descriptions, and attachments.

5.2.3.2 Requirements Traceability Matrix

This is a table that links requirements to their origin and traces them throughout the project life cycle. 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.

This process includes, but is not limited to tracing:

1. Requirements to business needs, opportunities, goals, and objectives
2. Requirements to project objectives
3. Requirements to WBS deliverables
4. Requirements to product design
5. Requirements to product development
6. Requirements to test strategy and test scenarios
7. High-level requirements to more detailed requirements

Attributes associated with each requirement can be recorded in the requirements traceability matrix. These attributes help to define key information about the requirement. Typical attributes used in the requirements traceability matrix may include:

- Unique identifier,
- Textual description of the requirement,
- Rationale for inclusion,
- Owner,
- Source,
- Priority,
- Version,
- Current status (such as active, cancelled, deferred, added, approved)
- Date completed.

Additional attributes to ensure that the requirement has met stakeholders' satisfaction may include stability, complexity, and acceptance criteria.

5.3 Define Scope

This process involves creating a detailed description of the project and it's deliverables using the Scope Management Plan, Project Charter and the Requirements Documentation.

This process takes the high-level product descriptions, assumptions and constraints, which were documented in the process 4.1 Develop Project Charter during the initiating process group, and creates from them a more detailed description of the scope in the Project Scope Statement.

Defining a Project Scope
is an iterative process
As high-level requirements
become more detailed translating into deliverables
new risks, assumptions & constraints may come to light
which in turn requires a new definition of requirements

This process may need to be done more than once because it may not be possible to fully define the scope of a complex project in one pass. As high-level requirements are refined into more detailed requirements and as these are translated into deliverables this can bring additional risks, assumptions and constraints to light, which can in turn affect the scope of the project.

The inputs, tools and techniques, and outputs of this process are summarized in the table below.

Inputs	Tools & Techniques	Outputs
Scope Management Plan	Expert Judgment	Project Scope Statement
Project Charter		
Requirements Documentation	Product Analysis	Project Document Updates
Organizational Process Assets	Alternative Identification	
	Facilitated Workshops	

5.3.1 Define Scope: Inputs

This process requires the following inputs:

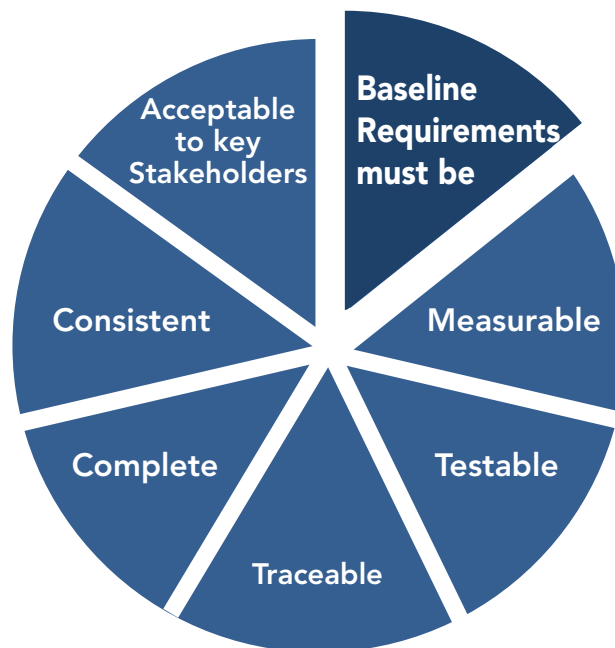### 5.3.1.1 Scope Management Plan

This is an output from the previous process 5.1 Plan Scope Management. It describes the contents of the other five scope management processes. That is, how the scope will be defined, developed, monitored, controlled, and verified.

5.3.1.2 Project Charter

The project charter provides the high-level project description and product characteristics. It also contains project approval requirements. The project charter is described above. If a project charter is not used in the performing organization, then comparable information needs to be acquired or developed, and used as a basis for the detailed project scope statement.

5.3.1.3 Requirements Documentation

Requirements documentation describes how individual requirements meet the business need for the project. Requirements may start out at a high level and become progressively more detailed as more is known. Before being baselined, requirements must be unambiguous (measurable and testable), traceable, complete, consistent, and acceptable to key stakeholders.

The format of a requirements document may range from a simple document listing all the requirements categorized by stakeholder and priority, to more elaborate forms containing executive summary, detailed descriptions, and attachments.

5.3.1.4 Organizational Process Assets

Examples of organizational process assets that can influence the Define Scope process include: policies, procedures, and templates for a project scope statement, project files from previous projects, and lessons learned from previous phases or projects.

5.3.2 Define Scope: Tools and Techniques

There are various techniques that can be used including:

5.3.2.1 Expert Judgment

Expert judgment is often used to analyze the information needed to develop the project scope statement. Such judgment and expertise is applied to any technical details and is provided by any group or individual with specialized knowledge or training, and is available from many sources, including:

1. Other units within the organization
2. Consultants

3. Stakeholders, including customers or sponsors
4. Professional and technical associations
5. Industry groups
6. Subject matter experts

5.3.2.2 Product Analysis

For projects that have a product as a deliverable, as opposed to a service or result, product analysis can be an effective tool. Each application area has one or more generally accepted methods for translating high-level product descriptions into tangible deliverables. Product analysis includes techniques such as product breakdown, systems analysis, requirements analysis, systems engineering, value engineering, and value analysis.

5.3.2.3 Alternatives Generation

Identifying alternatives is a technique used to generate different approaches to execute and perform the work of the project. A variety of general management techniques can be used such as brainstorming, lateral thinking, pair wise comparisons, etc.

5.3.2.4 Facilitated Workshops

Requirements workshops are focused sessions that bring key cross-functional stakeholders together to define product requirements. Workshops are considered a primary technique for quickly defining cross-functional requirements and reconciling stakeholder differences.

Because of their interactive group nature, well-facilitated sessions can build trust, foster relationships, and improve communication among the participants, which can lead to increased stakeholder consensus. Another benefit of this technique is that issues can be discovered and resolved more quickly than in individual sessions.

5.3.3 Define Scope: Outputs

This process will lead directly to the project scope statement, which documents the project deliverables and the activities required to create them. Based on this statement, the project team can undertake more detailed planning.

It also serves as a benchmark against which requests for change or additional work can be considered. Specifically it will answer the question whether these requests within the projects original scope or outside of it.

5.3.3.1 Project Scope Statement

The project scope statement includes:
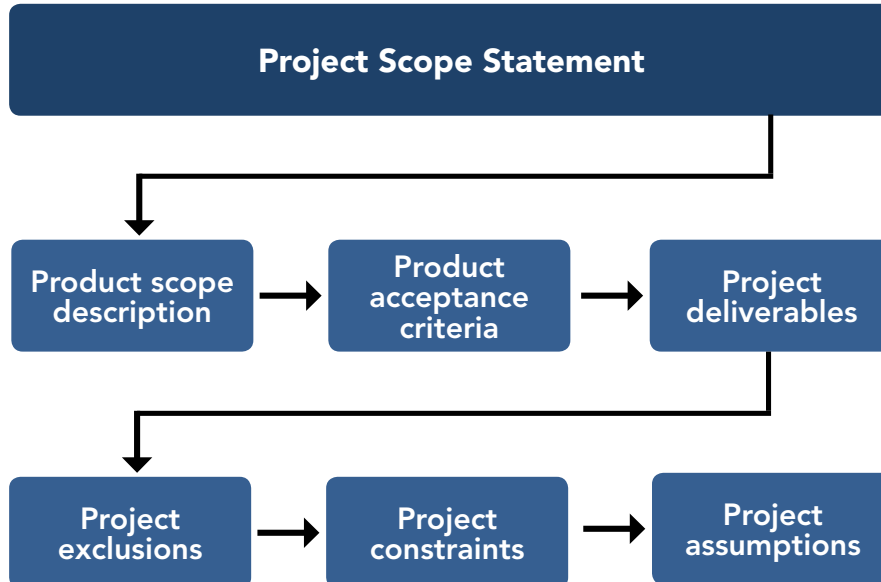
Product Scope Description

This details the features and functions of the deliverables your project will produce. It answers the question of what is being produced rather than why or how.

Product Acceptance Criteria

These are the standards required to satisfy the customer's quality expectations and gain acceptance of the final product. This can be summarized as the process and criteria for accepting completed products, services, or results. These criteria include things like: major function, capacity, accuracy, availability, running costs and repair times.

Project Deliverables

These could be could be any of the building blocks of a project including project documents, software of physical objects.

Project Exclusions

These represent things that outside of the project boundaries.

Project Constraints

There are three types of project constraints:

- Technological constraints relate to the sequence in which individual project activities must be completed.
- Resource constraints relate to the lack of necessary resources that may force parallel activities to be performed in sequence.
- Physical constraints may be caused by contractual or environmental conditions.
- The reason for identifying them is to highlight possible delays to the completion of the project.

Project Assumptions

Assumptions presume that what you're planning or relying on is true, real, or certain. For example, your project might require someone with specific technical skills and your assumption is that this person will be available when needed.

As the project stakeholders provide more information, which can then be analyzed a better understanding of the project needs will emerge which in turn allows for the definition and expansion of the preliminary project scope statement.

Once the scope boundaries are set for the deliverables what is and is not included with the product and project scope can be determined. The final output produces the project scope statement, which is a full and detailed document able to describe all of the deliv-

erables, the work required to achieve them, product acceptance criteria in the approval of acquirements to meet the project objectives.

The project management team are responsible for the refinement of the preliminary scope statement, which is achieved by canvassing the stakeholders and then translating their expectations and objectives into specific deliverables.

This process should also determine the priorities assigned to the project requirements which can then can be used to feed in to the decision-making process where trade-offs need to be made.

Product analysis may be required to determine what problems exist with a previous product and then to decide on the requirements how to improve it. The final stage of product analysis is to specify the work necessary to achieve the improved requirements.

Project Scope Statement ensures

ALL Stakeholders have same understanding of scope & objectives
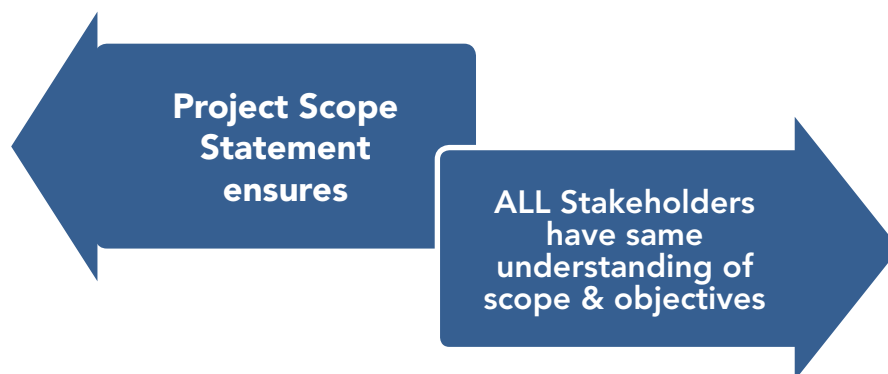
The project scope statement must ensure that all stakeholders have a common understanding of the project scope and its objectives. The link between individual requirements within the project charter and project scope statement should be maintained to show the justification of every requirement included in it. The project charter is the key document in which the entire project requirements are traced back to because it states the sponsor's needs.
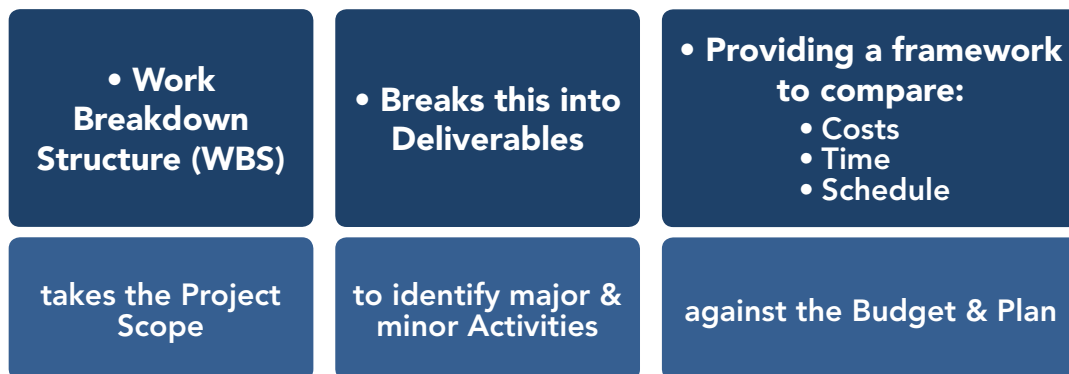
5.3.3.2 Project Document Updates

The following project documents may be updated as a result of this process:

1. Stakeholder register
2. Requirements documentation
3. Requirements traceability matrix

5.4 Create Work Breakdown Structure

The work breakdown structure (WBS) takes the scope as outlined in the project scope statement and breaks it down into more manageable components called deliverables. It serves as a graphical illustration of the structure of the project and is thus useful as a communication tool for explaining the project to key stakeholders.

• Work Breakdown Structure (WBS)	• Breaks this into Deliverables	• Providing a framework to compare: • Costs • Time • Schedule
takes the Project Scope	to identify major & minor Activities	against the Budget & Plan

The creation of the WBS should be one of the first steps in the planning process, once the requirements specification for the project has been written. It should reflect the way the work will be performed and the way in which project costs and data will be summarized and reported.

It provides the framework on which costs, time and schedule performance can be compared against the budget. It also enables the work to be broken down into smaller elements and this should result in the identification of all the major and minor activities required by the project.

The inputs, tools and techniques, and outputs of this process are summarized in the table below.

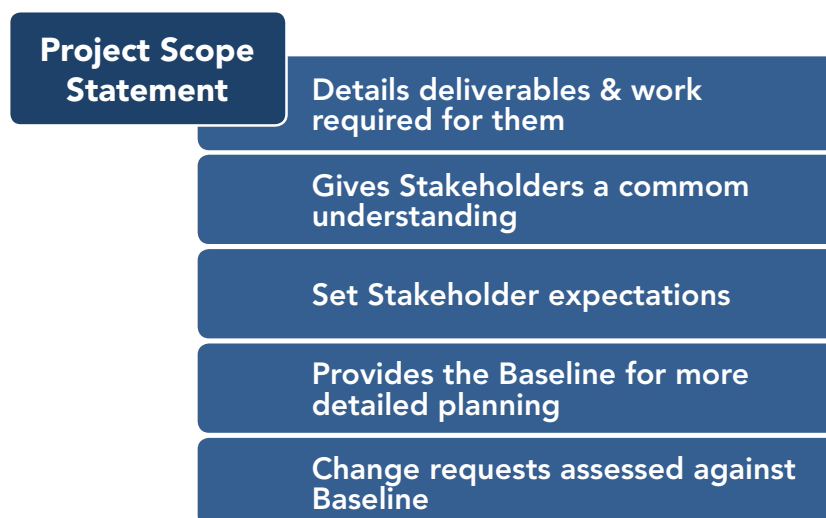| Inputs	Tools & Techniques	Outputs
Scope Management Plan	Decomposition	Scope Baseline
Project Scope Statement	Expert Judgment	Project Document Updates
Requirements Documentation		
Enterprise Environmental Factors		
Organizational Process Assets		

5.4.1 Create WBS: Inputs

This process requires the following inputs:

5.4.1.1 Scope Management Plan

This is an output from the previous process 5.1 Plan Scope Management. It describes the contents of the other five scope management processes. That is, how the scope will be defined, developed, monitored, controlled, and verified.

5.4.1.2 Project Scope Statement

The project scope statement describes, in detail, the project's deliverables and the work required to create those deliverables. The project scope statement 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.

Project Scope Statement

- Details deliverables & work required for them
- Gives Stakeholders a commom understanding
- Set Stakeholder expectations
- Provides the Baseline for more detailed planning
- Change requests assessed against Baseline

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.

5.4.1.3 Requirements Documentation

Requirements documentation describes how individual requirements meet the business need for the project. Requirements may start out at a high level and become progressively more detailed as more is known. Before being baselined, requirements must be unambiguous (measurable and testable), traceable, complete, consistent, and acceptable to key stakeholders.

The format of a requirements document may range from a simple document listing all the requirements categorized by stakeholder and priority, to more elaborate forms containing executive summary, detailed descriptions, and attachments.

5.4.1.4 Enterprise Environmental Factors

These include WBS standards relevant to the nature of the project.

5.4.1.5 Organizational Process Assets

These include policies, procedures, and templates for the WBS, project files from previous projects, and lessons learned from previous projects.

5.4.2 Create WBS: Tools and Techniques

The tools and techniques that can be used include:
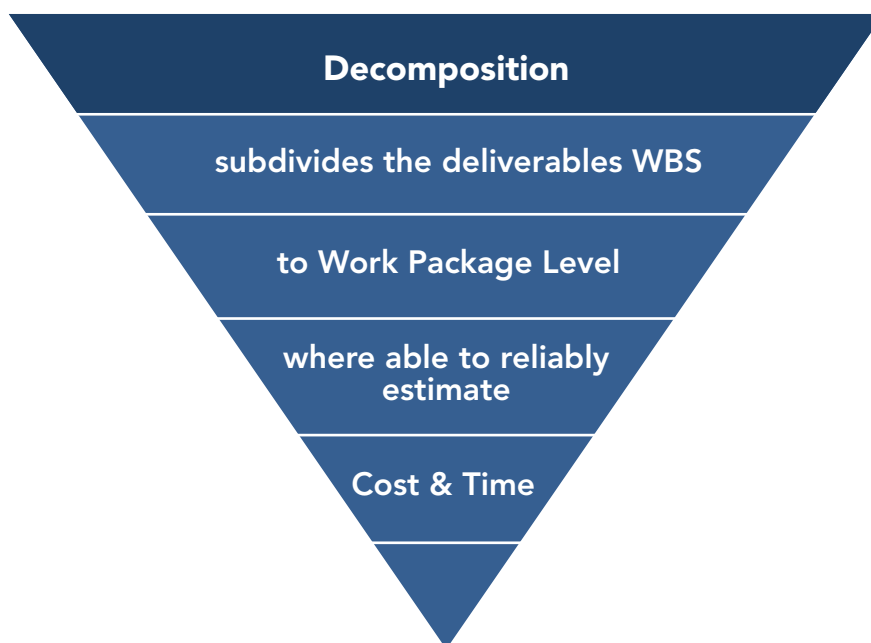
5.4.2.1 Decomposition

Decomposition is the subdivision of project deliverables into smaller, more manageable components until the work and deliverables are defined to the work package level. The work package level is the lowest level in the WBS, and is the point at which the cost and activity durations for the work can be reliably estimated and managed. The level of detail for work packages will vary with the size and complexity of the project.

Decomposition of the total project work into work packages generally involves the following activities:

1. Identifying and analyzing the deliverables and related work
2. Structuring and organizing the WBS

3. Decomposing the upper WBS levels into lower level detailed components

4. Developing and assigning identification codes to the WBS components

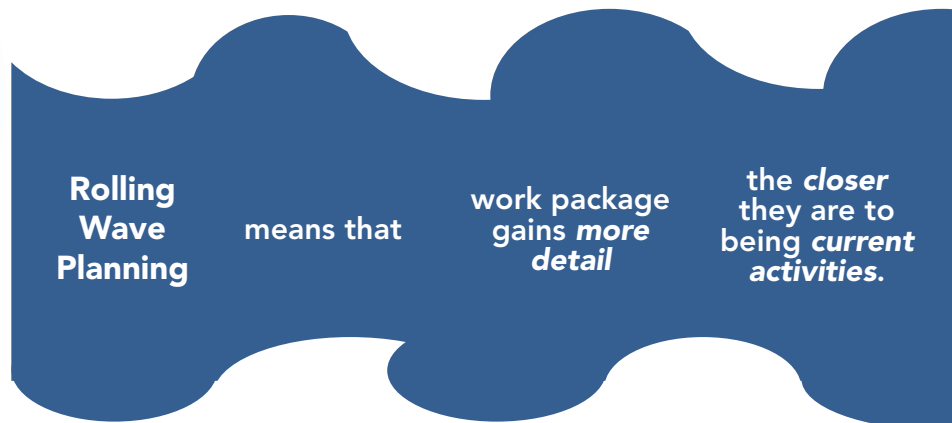5. Verifying that the degree of decomposition of the work is sufficient

Decomposition of the upper level WBS components requires subdividing the work for each of the deliverables or subprojects into its fundamental components, where the WBS components represent verifiable products, services, or results.

Decomposition

subdivides the deliverables WBS

to Work Package Level

where able to reliably estimate

Cost & Time

The WBS can be structured as an outline, an organizational chart, a fishbone diagram, or other method. Verifying the correctness of the decomposition requires determining that the lower-level WBS components are those that are necessary and sufficient for completion of the corresponding higher-level deliverables.

Different deliverables can have different levels of decomposition. To arrive at a work package, the work for some deliverables needs to be decomposed only to the next level, while others need additional levels of decomposition. As the work is decomposed to greater levels of detail, the ability to plan, manage, and control the work is enhanced. However, excessive decomposition can lead to non-productive management effort, inefficient use of resources, and decreased efficiency in performing the work.

Decomposition may not be possible for a deliverable or subproject that will be accomplished far into the future. The project management team usually waits until the deliverable or subproject is clarified so the details of the WBS can be developed. This technique is sometimes referred to as rolling wave planning.

Rolling Wave Planning means that **work package gains *more detail*** the *closer* they are to being *current activities.*

The WBS represents all product and project work, including the project management work. The total of the work at the lowest levels must roll up to the higher levels so that nothing is left out and no extra work is completed. This is sometimes called the 100% rule.

The PMI Practice Standard for Work Breakdown Structures—Second Edition provides guidance for the generation, development, and application of work breakdown structures. This standard contains industry-specific examples of WBS templates that can be tailored to specific projects in a particular application area.

5.4.2.2 Expert Judgment

This is used to analyze the information needed to decompose the project deliverables down into smaller, more manageable parts. It is applied to technical details of the project's scope and used to reconcile differences in opinion on how to best break it down.

Expert judgment can come in the form of subject area experts or predefined templates that provide guidance on how to effectively break down common deliverables. These may be industry specific or may come from experience gained in similar projects. The project manager, in collaboration with the project team, then determines the final decomposition of the project scope into the discrete work packages that will be used to effectively manage the work of the project.

5.4.3 Create WBS: Outputs

This process will create the following outputs:
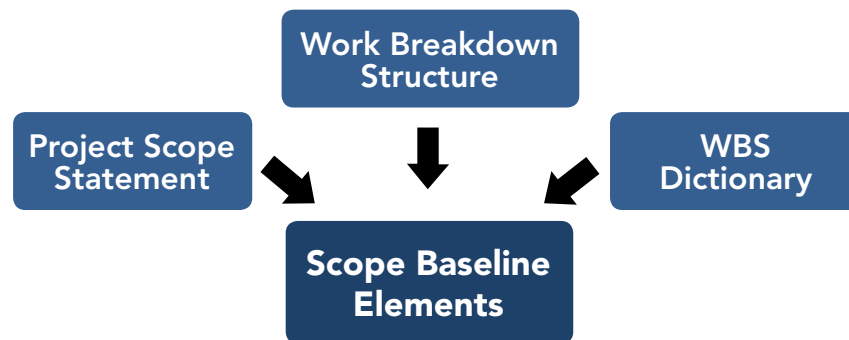
5.4.3.1 Scope Baseline

The scope baseline is a component of the project management plan. It consists of three elements:
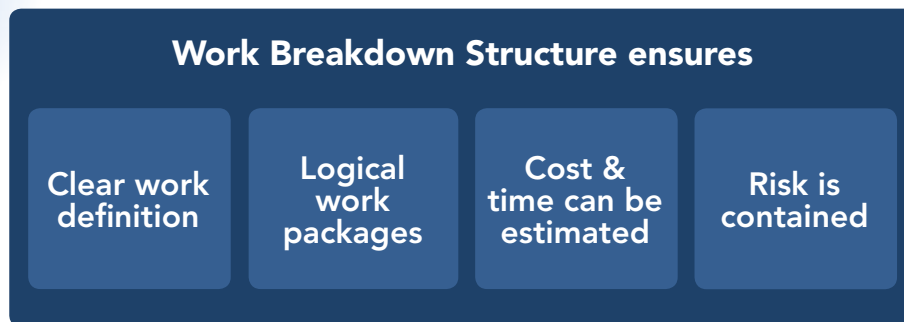
1. Project scope statement
2. WBS
3. WBS dictionary

Project Scope Statement

This is a document prepared for the customer that describes what the project will deliver and that outlines generally at a high level all work required to complete it. It must also contain an explicit statement about what is excluded from the scope in order to ensure that the expectations of the stakeholder's are realistic.

Work Breakdown Structure (WBS)

The WBS is a hierarchical decomposition of the work to be completed in order to achieve the project deliverables. It defines and structures the total scope of the project because it starts from the deliverables as stated and then decomposes the work and the smaller sections. The number of levels through which this breakdown occurs will be determined by the project size and complexity.

Work Breakdown Structure ensures

Clear work definition	Logical work packages	Cost & time can be estimated	Risk is contained

This is a key output from project scope management because it determines what work needs to be completed to deliver the objectives of the project. Breaking the work down in a systematic way using the project team reduces the chance of missing anything.

The output produces a graphical representation of the work specified in the project scope statement. The WBS is a unique decomposition of the work generated for each project but a previous WBS can be used as a template for a comparable project because the required deliverables are likely to be similar.

The reason for breaking down the project into manageable and defined sections is to enable a project team to estimate the time and costs for each activity or work package. The review and assessment of smaller work packages will provide a better estimate for the overall cost of the project.

The WBS serves to:

1. Ensure better control of the work definition
2. Allow the work to be delegated in coherent packages
3. Allow the work to be defined at the right level for estimating and control
4. Allow the containment of risk

Projects are sub-divided in this way for ease of control. Having sub-divided the project, in order to devise a suitably detailed WBS, the project manager will then need to act as the integrator to ensure the practical and timely delivery of the various work elements required.

The WBS should be designed and developed carefully as it will typically form the basis for a variety of other aspects of the project environment—for example : project costing,

the validation of organizational responsibilities, risk analysis, the coordination of objectives and project control.

Project managers normally manage at the top three levels of the WBS and also provide management reports at this level. Some organizations have attempted to standardize management reports by imposing a generic structure to the top three levels of the structure diagram across all projects. This approach may work in cases where an organization runs a large number of very similar projects—but it is not well suited to the majority of organizations—that run a variety of projects that differ fundamentally in some way.

The WBS typically supports different types of managerial actions at different levels. For example:

Authorization and release of work is generally carried out at level 1

Budgets are normally prepared at level 2

Schedules at level 3

Other characteristics that can normally be applied to different levels of the work breakdown structure include:

1. The top three levels reflect project-wide efforts and should not be related to specific departments, whose efforts should be addressed at lower levels. Each element of work should be assigned to only one level of effort. At the lowest levels the work packages should be identifiable and homogeneous.

2. The term work package is a generic name for a low-level task or job assignment—it describes a discrete piece of work and facilitates the monitoring and reporting of work in progress.
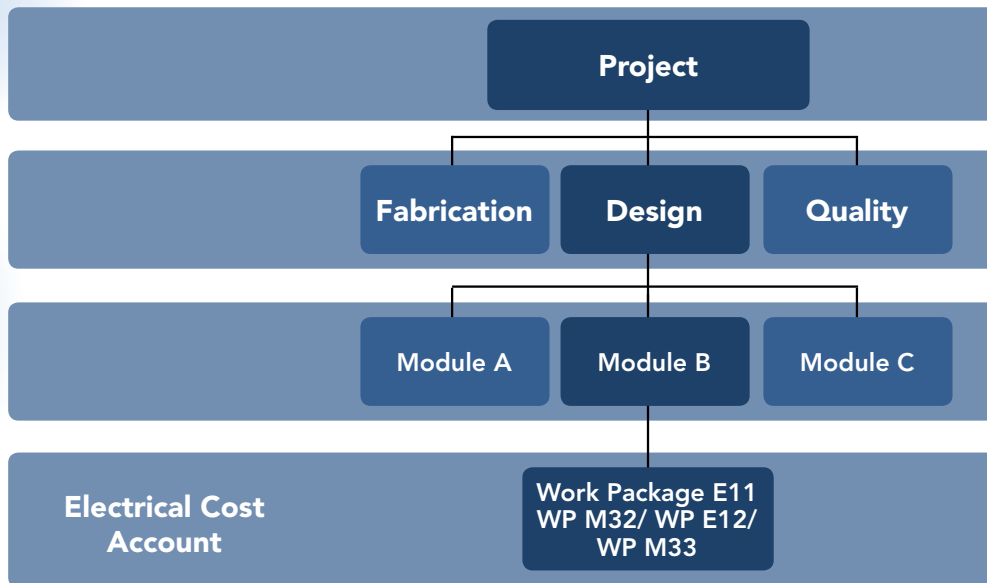
3. Different industries and organizations have a variety of strangely named documents for authorizing and assigning work. However, whatever it is called, the work package is the critical component that facilitates management of the WBS. Work packages should be natural subdivisions of effort planned according to the way the work will be carried out.

4. Work packages may be supported by additional documentation, which is generically termed a work package description to ensure that those carrying out, supervising and monitoring the work in progress are clear about exactly what is intended.

WBS for New Model Project		
Project: New Model		01-00-00
Sub-project 1	Analysis Task 1: Marketing Study Task 2: Cost Benefit Analysis	01-01-00 01-01-01 01-01-02
Sub-project 2	Design Task 1: Concept Sketches Task 2: Engineering Drawings	01-02-00 01-02-01 01-02-02
Sub-project 3	Prototype Task 1: Fabrication Task 2: Installation Task 3: Safety Testing Task 4: Efficiency Testing	01-03-00 01-03-01 01-03-02 01-03-03 01-03-04

This illustration shows a simple WBS and its associated numbering system. The first number represents the total project, the second represents the first sub-project, the third identifies a task within it, and so on. From this table it is easy to see that:

Component numbered 01-03-03 represents task 3 of sub-project 3.

Because so many other aspects of the project depend on the work breakdown structure care should be taken to create an accurate and workable diagram. One of the most important tasks is to ensure that it contains the right number of levels—the consequences of having too many or too few should be apparent.

There are some basic rules to consider when producing a WBS because the resultant diagram achieves a clear indication of the work involved together with an improved level of buy-in from team members due to their involvement with the work and estimation process.

- Ensure that team members assist in drafting the WBS in a systematic way
- Make sure that only the work required to meet project deliverables is included
- Any work not included in the WBS must fall outside of the scope of the project
- The WBS and its support documentation should be easy to understand
- Work should not be subdivided arbitrarily to the lowest possible level. WBS elements at the lowest control level should typically range from 0.5% to 2.5% of total project budget.
- No task should be less than 8 hours or more than 80 hours.

The WBS is absolutely critical document and the success of the project depends upon it being done thoroughly.

WBS Dictionary

The WBS dictionary is a document generated by the Create WBS process that supports the WBS. It provides more detailed descriptions of the components in the WBS, including work packages and control accounts.

The WBS is input to most of the planning processes, for example:

- Cost Estimating
- Cost Budgeting

- Scope control
- Activity Definition
- Plan Purchases and Acquisitions

Furthermore, you should be aware that the WBS can be developed to reflect the trust that you have in specific line groups, by leaving them the autonomy over specific areas of work. Finally, always remember that projects are dynamic working environments, so try to maintain flexibility wherever possible.

A great deal of work is required to produce a comprehensive WBS but the benefits of using this approach mean there is less chance of work being missed. The project team will also have a better understanding of the work together with the knowledge of whether element fits into the overall scheme.

Dissemination of the WBS to all stakeholders will maintain the cooperation and communication link, which may in turn help manage the project and expectations. Another vital benefit is the team's buy into the document for the opportunity to ensure everyone remains focused on the output of the project.

| Work Breakdown Structure | is a critical document | for a Project's Success |
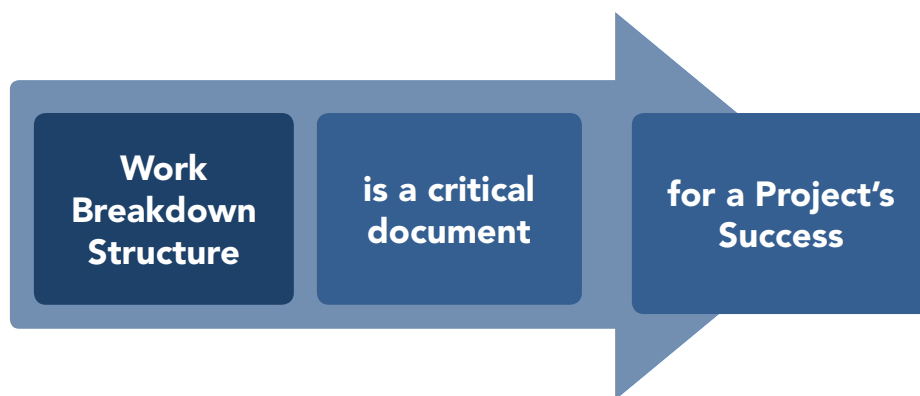
Once the WBS has been completed it then becomes a valuable tool for the overall management of the project. It is of particular use when you need to evaluate the impact of a requested change in scope and also when reassessing the scope of the project due to an approved change. The WBS is critical in controlling the scope because if something is not within the WBS then it is outside of the scope of the project.

5.4.3.2 Project Documents Updates

These include the requirements documentation because if approved change requests result from the Create WBS process, then the requirements documentation may need to be updated to include them.

5.5 Validate Scope

This process involves taking the deliverables which have been internally checked in process 8.3 Control Quality to see whether they meet the customer's requirements, and then actually present them to the customer for formal acceptance. Note that these are only the interim deliverables because the final deliverables are formally accepted as part of the 4.7. Close Project or Phase Process.
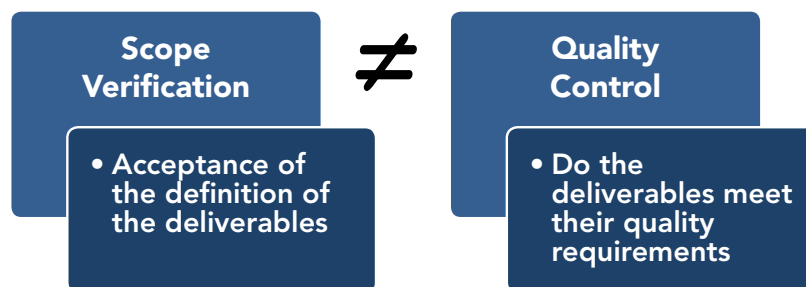
This differs from quality control because scope verification is concerned with the acceptance of the definition of the deliverables while quality control is concerned with whether or not the deliverables meet their quality requirements.

Scope validation confirms that the work being considered matches the details in the WBS, project scope management plan and project management plan. This is done using reviews or audits and user trials.

If a project has to be terminated early for any reason the process of scope verification is still required to determine the degree of project success. The verification report document should document what was achieved up to the point of termination because this information could establish the start point for follow up action.

Once the approval of a deliverable is formally declared, documentation should be generated to state acceptance of this fact. Sometimes confirmation of acceptance may need

to be signed off by both the sponsor and customer before formal compliance is granted. If a deliverable is not accepted then a formal document stating noncompliance should be produced instead.

In other words, if the deliverables are accepted, then the project continues as before; however, if the deliverables are not accepted, then change requests are generated which will bring the deliverables in line with the customer's requirements. The inputs, tools and techniques, and outputs of this process are summarized in the table below.

Inputs	Tools & Techniques	Outputs
Project Management Plan	Inspection	Accepted Deliverables
Requirements Documentation	Group Decision Making Techniques	Change Requests
Requirements Traceability Matrix		Work Performance Information
Verified Deliverables		Project Document Updates
Work Performance Data		

5.5.1 Validate Scope: Inputs

There are five inputs to the Validate Scope process:

5.5.1.1 Project Management Plan

This set of documents includes the scope baseline consisting of the work breakdown structure and the work breakdown structure dictionary accompanied by the project scope statement. Since this is the agreement of what the project is to create, it acts as the benchmark against which the deliverable is measured.

5.5.1.2 Requirements Documentation

This key document describes the stakeholder requirements for the product, and therefore provides important information to be used when comparing what was documented with the actual product, service, or result.

5.5.1.3 Requirements Traceability Matrix

This identifies the source of each individual requirements and can therefore be helpful when performing the verify scope process since it provides background information on who requested the requirements and why.

5.5.1.4 Validated Deliverables

The process of verify scope is the activity of comparing the actual deliverables against what was documented within the scope baseline, and to ensure that all products have been delivered. Because of the nature of this process, validating deliverables may occur many times throughout a project.

5.5.1.5 Work Performance Data

This can include the degree of compliance with requirements, number of nonconformities, severity of the nonconformities, or the number of validation cycles performed in a period of time.

5.5.2 Validate Scope: Tools and Techniques

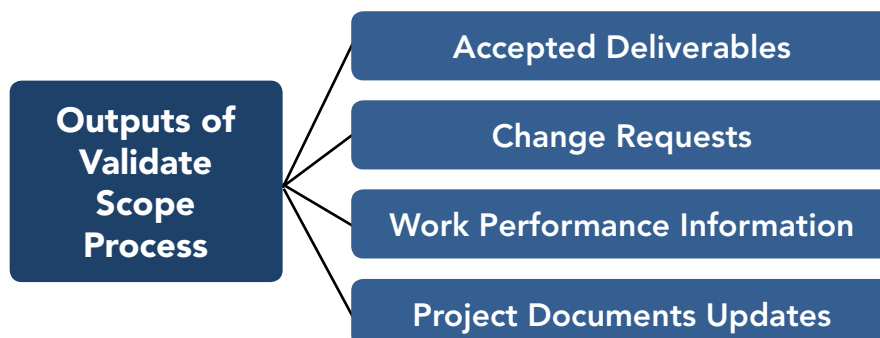The tools and techniques that can be used include:

5.5.2.1 Inspection

Inspection includes activities such as measuring, examining, and verifying to determine whether work and deliverables meet requirements and product acceptance criteria. Inspections are sometimes called reviews, product reviews, audits, and walkthroughs. In some application areas, these different terms have narrow and specific meanings.

5.5.2.2 Group Decision Making Techniques

These are used to reach a conclusion when the project team and other stakeholders perform the validation.

5.5.3 Validate Scope: Outputs

There are four outputs for the Validate Scope process:

Outputs of Validate Scope Process
- Accepted Deliverables
- Change Requests
- Work Performance Information
- Project Documents Updates

5.5.3.1 Accepted Deliverables

This is the primary outputs of this process and is normally performed by the project manager, the customer, the sponsor, and the functional or operational managers. The product of accepted deliverables is normally a formal written acceptance by the appropriate stakeholder.

5.5.3.2 Change Requests

Since this process is all about verify and the scope of the actual deliverables against what was originally planned, then change requests are a normal result resulting from any such inspection, as change requests will often result from such inspection.

5.5.3.3 Work Performance Information

This is information about how much progress has been made towards the completion of each deliverable.

5.5.3.4 Project Documents Updates

As a result of verifying the project scope, there may be many updates to project documentation, in terms of schedule, budget, or scope.

5.6 Control Scope

This is the process of managing the changes to the scope baseline. There will inevitably be changes to this but it is important to ensure that these changes do not build upon each other incrementally. This is something referred to as scope creep and always produces unacceptable risks because the combined effects of these incremental changes are seldom considered in total.

The inputs, tools and techniques, and outputs of this process are summarized in the table below.

Inputs	Tools & Techniques	Outputs
Project Management Plan	Variance Analysis	Work Performance Information
Requirements Documentation		Change Requests
Requirements Traceability Matrix		Project Management Plan Updates
Organizational Process Assets		Organizational Process Assets Updates
Work Performance Data		Project Document Updates

5.6.1 Control Scope: Inputs

There are five inputs to the Control Scope process:

5.6.1.1 Project Management Plan

The project management plan contains the following components to control scope:

- *Scope Baseline*—this represents the approved project scope and is used during scope change management to determine and prevent scope creep. The scope baseline comprises the project scope statement, work breakdown structure and WBS dictionary.

- *Scope Management Plan*—this is a subsidiary of the project management plan that describes how scope will be managed, controlled and details the management and approval procedure for changes to the scope baseline.

- *Change Management Plan*—this represents is an ongoing process and is outlined during the Planning Phase of the project and describes the steps that will be followed to initiate, review, and resolve change requests within the project. Its intended audience is the project manager, project team, project sponsor and any senior leaders whose support is needed to carry out the plan.

- *Configuration Management Plan*—this is designed to ensure that adequate controls are in place over all processes, configuration items and project deliverables.

- *Requirements Management Plan*—this is a subsidiary of the project management plan and describes how requirements will be prioritized, managed, controlled and details the management and approval procedure for changes to the scope baseline.

5.6.1.2 Requirements Documentation

Well-documented requirements make it easier to detect any deviation in the scope agreed for the project or product.

5.6.1.3 Requirements Traceability Matrix

This identifies the source of each individual requirements and can therefore be helpful when performing the verify scope process since it provides background information on who requested the requirements and why.

5.6.1.4 Work Performance Data

This is information about how much progress has been made towards the completion of each deliverable.

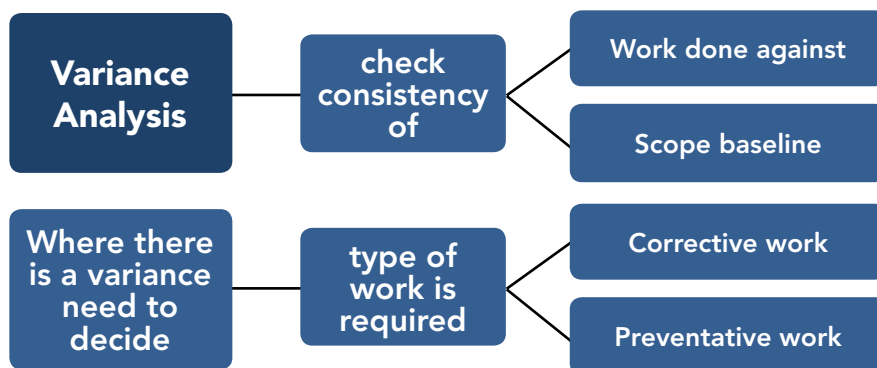### 5.6.1.5 Organizational Process Assets

These include scope-related policies, procedures and guidelines.

5.6.2 Control Scope: Tools and Techniques

The tools and techniques that can be used include:

5.6.2.1 Variance Analysis

Project performance measurements are used to assess the magnitude of variation from the original scope baseline. Important aspects of project scope control include determining the cause and degree of variance relative to the scope baseline and deciding whether corrective or preventive action is required.

Using this information the project manager can check whether there is consistency between the work actually performed and the scope baseline. In case of any differences the project manager can propose corrective or preventative action by issuing change requests, which may lead to updates to the project management plan.

The first stage of this evaluation means that a requested change is thoroughly reviewed against the product scope of the project scope before passing on to the next process. The justification for a change could be generated from variance identified from the work performance information. The outcome could then determine the corrective action is required to eliminate the variance. After completing the first evaluation a requested

change, corrective action can only be considered once it has been through the integrated change control process.

If the action is successfully approved the next step is to return to scope control and update the project management plan and components of the scope baseline. If the approved changes have an affect on the project scope then you may need to revise and reissue the project scope statement, the WBS and the WBS dictionary.

5.6.3 Control Scope: Outputs

There are five outputs for the Control Scope process:

5.6.3.1 Work Performance Information

Measurements can include planned vs. actual technical performance or other scope performance measurements. This information is documented and communicated to stakeholders.

5.6.3.2 Change Requests

Analysis of scope performance can result in a change request to the scope baseline or other components of the project management plan. Change requests can include preventive or corrective actions or defect repairs. Change requests are processed for review and disposition according to the Perform Integrated Change Control process (see above).
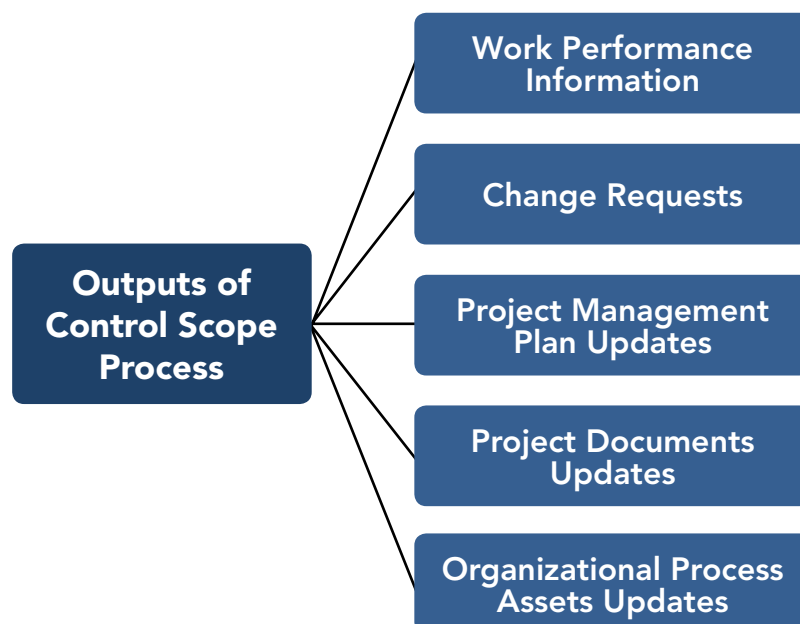
5.6.3.3 Project Management Plan Updates

If the approved change requests have an effect upon the project scope, then the scope statement, the WBS, and the WBS dictionary are revised and reissued to reflect the approved changes. The corresponding cost baseline and schedule baselines are also revised and reissued to reflect the approved changes.

5.6.3.4 Project Documents Updates

These include the Requirements Documentation, and the Requirements Traceability Matrix.

5.6.3.5 Organizational Process Assets Updates

These include: causes of variances, corrective action chosen and the reasons, and other types of lessons learned from project scope control.

Summary

Project Scope Management includes the processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully. Managing the project scope is primarily concerned with defining and controlling what is and is not included in the project. It includes the following processes:

Processes of Project Scope Management
Plan Scope Management
Collect Requirements
Define Scope
Create Work Breakdown Structure
Validate Scope
Control Scope

5.1 Plan Scope Management

This process involves creating a Scope Management Plan that describes how the scope of the project will be defined, validated and controlled so that it can be managed throughout the life of the project.

5.2 Collect Requirements

This process is concerned with assessing, documenting, and managing stakeholder needs to meet project objectives. All requirements should be gathered at the start because it is costly to make changes as the project progresses. Gathering requirements from all stakeholders will also ensure that their opinions are taken into consideration, which will lead to higher rates of project acceptance.

5.3 Define Scope

This process takes the high-level product descriptions, assumptions and constraints, which were documented in the process 4.1 Develop Project Charter during the initiating process group, and creates from them a more detailed description of the scope in the Project Scope Statement.

5.4 Create Work Breakdown Structure

The creation of the WBS should be one of the first steps in the planning process, once the requirements specification for the project has been written. It should reflect the way the work will be performed and the way in which project costs and data will be summarized and reported. It provides the framework on which costs, time and schedule performance can be compared against the budget.

5.5 Validate Scope

This process involves taking the deliverables which have been internally checked in process 8.3 Control Quality to see whether they meet the customer's requirements, and then actually present them to the customer for formal acceptance. Note that these are only the interim deliverables because the final deliverables are formally accepted as part of the 4.7. Close Project or Phase Process.

5.6 Control Scope

This is the process of managing the changes to the scope baseline. There will inevitably be changes to this but it is important to ensure that these changes do not build upon each other incrementally. This is something referred to as scope creep and always pro-

duces unacceptable risks because the combined effects of these incremental changes are seldom considered in total.

These processes interact with each other and with the processes in the other Knowledge Areas. Each process can involve effort from one or more persons, based on the needs of the project. Each process occurs at least once in every project and occurs in one or more of the project phases, if the project is divided into phases. Although the processes are presented here as discrete components with well-defined interfaces, in practice they will overlap and interact in ways not detailed here.

The processes used to manage project scope, as well as the supporting tools and techniques, vary by application area and are usually defined as part of the project life cycle. The approved detailed project scope statement and its associated WBS and WBS dictionary are the scope baseline for the project. This baselined scope is then monitored, verified, and controlled throughout the lifecycle of the project.

Although not shown here as a discrete process, the work involved in performing the five processes of Project Scope Management is preceded by a planning effort by the project management team. This planning effort is part of the Develop Project Management Plan process, which produces a scope management plan that provides guidance on how project scope will be defined, documented, verified, managed, and controlled. The scope management plan may be formal or informal, highly detailed, or broadly framed, based upon the needs of the project.

Completion of the project scope is measured against the project management plan. Completion of the product scope is measured against the product requirements. The Project Scope Management processes need to be well integrated with the other Knowledge Area processes, so that the work of the project will result in delivery of the specified product scope.

Scope creep is the biggest category of threat to a project and you need to manage it firmly. If you are experiencing a number of scope changes then try to identify common cause and resolve the problem in one hit.

The project manager can manage scope by evaluating request changes and then making approved changes to the project scope and then making any required adjust points to the performance baselines and project plans.

The project manager in conjunction with the sponsor may need to communicate changes in the scope to all of the stakeholders promptly. The project manager must manage the expectations of the sponsors and stakeholders because the project deliverables may have altered or their interests may be affected.

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References

Nokes S., & Kelly, S. (2007) 2nd Edition. *The Definitive Guide to Project Management*. Prentice Hill, Financial Times.

Snijders, P., Wuttke, T. & Zandhuis, A. (2013) 5th Edition. *A pocket companion to PMI's PMBOK Guide.* Van Haren Publishing.

Lock, D. (2007). 9th Edition. *Project Management*, MPG Books Ltd.

Billingham, V. (2008) 3rd Edition. *Project management: how to plan & deliver a successful project (studymates),* The Project Management Excellence Centre Inc.

Project Management Institute Global Standard (2008) 4th Edition *A guide to the project management body of knowledge (PMBOK Guide)*, Project Management Institute.

Kerzner, H. Ph.D. (2009). 10th Edition. *Project Management—a systems approach to planning, scheduling & controlling.* John Wiley & Sons Inc.

Larson, E.W. & Gray, C.F. (2010) 5th Edition *Project management: the managerial process,* McGraw-Hill Higher Ed.

Lock, D. (2007). 3rd Edition. *The Essential Project Management*. Gower Publishing Ltd.

Knapp, B.W. (2010) *Essential project management templates,* The Project Management Excellence Centre Inc.

Newton, R. (2007). *Project Management step by step—how to plan & manage a highly successful project*. Pearson Business.

Dr Maylor, H. (2010) 4th Edition. *Project Management (with MS Project CDRom).* Prentice Hill, Financial Times.

Shenhar, A.J. & Dvir, D. (2007). *Reinventing Project Management: the diamond approach to successful growth & innovation*. Pearson Business.