CHAPTER 3 - PROJECT PLANNING

Gerrit van der Waldt

In this chapter we discuss the following:

- The significance of planning within the project life-cycle
- Planning tools and techniques
- Types of project planning
- Detailed steps of the project planning process

3.1 INTRODUCTION

The key to successful project execution is in the planning. Project planning is the phase in the project life-cycle that provides the means to translate the specifications of the project into action. This includes answers to questions about 'what' should happen at a tactical level, and answers to questions about 'how' it should happen at an operational level. The completed plan is an explicit statement of all the resource requirements, cost implications, and intended schedule for completion. Planning can further be considered as a proactive endeavor to anticipate potential problems and design interventions into the plan to prevent them.

Planning can be regarded as a process. This implies that the project team can follow a well-defined process map from start to completion of the plan. Various methodologies are aimed at exactly this: providing a step-by-step roadmap for the project team to plan. These methodologies are generally aimed at maximizing benefits and minimizing cost. The detailed plan should be a working tool providing the blueprint for project implementation.

There are many planning tools and techniques available in the field. These tools and techniques differ in terms of complexity and sophistication. Some are also more applicable to certain types of projects than others. It should be noted that project planning should be aligned with organisational planning on all its levels, including strategic planning (i.e. longer term, portfolio planning); tactical planning (i.e. medium term, programme planning); and operational planning (i.e. shorter term, functional area planning). Different tools and techniques are applicable to each level.

The purpose of this chapter is to focus on the significance of planning within the project life-cycle and to highlight some of the most common planning tools and techniques. The chapter will further explore different types of project plans and outline typical steps in the project planning process.

3.2 PLANNING WITHIN THE LIFE-CYCLE

In the previous chapter, we outlined the phases in the project life-cycle. Planning is the second phase in this cycle. At this stage of the life-cycle the following should be in place to provide a sound platform for planning:

- The need for and the objective(s) of the project are clear and a project charter is signed.
- It has been established that the project is in line with the strategic objectives of the host organisation.
- A stakeholder analysis identified all appropriate role-players and stakeholders.
- A project governance structure such as the project sponsor, steering committee, or project management office has been established.
- The project has clear reporting arrangements in place.
- A project manager and a dedicated and competent project team have been appointed.
- A project proposal has been approved indicating the feasibility of the project.

Once the planning phase is completed, it is expected that a detailed business plan will be submitted to the governance structures for approval. Once the business plan is approved, a resource will be assigned, and the project team can commence with the third phase in the life-cycle, namely project execution or implementation.

As stated, project planning can be regarded as a process. It requires certain input (information, feasibility studies, impact assessments, specifications, etc.) to develop the actual plan as output. Planning as a process is illustrated in Figure 3.1.
3.3 PROJECT PLANNING TOOLS AND TECHNIQUES

As stated, a wide variety of planning tools and techniques is available in the field of general management. With the arrival of project management as a specific management application, some of these tools and techniques were made available to project managers, but some were designed as a direct result of the uniqueness and specific demands placed on the project team to plan projects. It is up to the project team to decide which planning tool or technique will be utilized for purposes of the specific project, but the project team should use criteria such as relevance, cost, data requirements and versatility when selecting such tools and techniques.

Typical tools utilized for general management planning decisions include:
- brainstorming
- Delphi-technique
- nominal group technique (NGT)
- SWOT analysis
- force-field analysis
- logical framework approach (LFA)
- fish-bone diagrams
- decision trees.

For longer-term, strategic planning, the following tools are typically available:
- scenario development
- trend extrapolation
- historical analogy.

For effective project planning, however, not all of these tools identified above are relevant and appropriate. Therefore specific planning tools and techniques were designed and refined since the advent of project management. These tools and techniques can be grouped in the following categories:

- **Scope planning tools and techniques**: Work Breakdown Structure (WBS), dictionary, traceability matrix, deliverables deployment, impact assessments, etc.
- **Schedule planning tools and techniques**: milestone chart, Gantt chart, task list, network diagrams, Critical Path Diagram (CPD), Program Evaluation and Review Technique (PERT) analysis, resource levelling, float and slack, crashing, etc.

In section 3.3 further planning process detail is provided.
• **Resource and budget planning tools and techniques:** team list, Responsibility Assignment Matrix (RAM), staffing management plan, trend analysis, project spend plan, project budget, project appropriations requests, etc.

• **Project estimating planning tools and techniques:** dependent activities, uncertain activities, cost-benefit analysis, earned-value analysis, analogous estimating, parametric model estimating, expert judgment, vendor bid analysis, project simulation, etc.

• **Project risk management planning tools and techniques:** risk register, risk identification, qualitative and quantitative risk analysis, risk response techniques, risk monitoring and control, etc.

• **Project communication planning tools and techniques:** communication technology assessment, communication planning, stakeholder analysis, etc.

• **Project team development and leadership planning tools and techniques:** team-building exercises, participatory leadership, etc.

• **Project monitoring and control planning tools and techniques:** tol-gate or phase-gate reviews, quality planning, etc.

If falls outside the scope of this chapter to provide a detailed exposition of each of these tools and techniques. The serious reader should conduct self-study to fully explore the nature and applications of these different tools and techniques. However, some of the most prominent planning tools and techniques are briefly highlighted below.

### 3.3.1 Work Breakdown Structure (WBS)

The most important method of organizing project tasks is called the Work Breakdown Structure (WBS). This is a kind of organizational chart for the project. The same project can be organized in different ways. The WBS uses a top-down method of planning. A structured view of the project is created, starting from the top with the overall project goal; moving to the clarification of objectives and milestones; and thereafter planning the details of activities, resources, and assignments. This allows you to manage the present and to plan the future.

The WBS can be utilized to assign project task responsibilities, construct the budget and detect tasks that require excessive amounts of capital. It may also be used to build the schedule and the time required, but scheduling for large projects can be made more accurate when priorities are identified and a network diagram is used. Consider the following example.

---

**Outline of the WBS for a newsletter project**

1.0 NEWSLETTER PROJECT FINALISED

2.0 Masthead and design complete
   2.1 Designer appointed
   2.2 Concepts submitted
   2.3 Design approved

3.0 Stories and photographs complete
   3.1 Articles finalised
     3.1.1 Ideas assembled
     3.1.2 Ideas approved
     3.1.3 First draft of outlines
     3.1.4 Stories reviewed
     3.1.5 Final draft

3.2 Photographs and illustrations completed
   3.2.1 Ideas assembled
   3.2.2 ...
when building a 500-unit housing complex. The following is an example of a list of the levels when breaking down the work in a project:
- the total project
- sub-projects or major milestones
- milestones
- main activities (also called summary tasks)
- tasks, work elements or work packages.

If this method cannot be applied practically to a specific project, a similar result can be accomplished using an outline method. Applied to the newsletter project, the WBS could be outlined as shown in Figure 3.2 (see Baker & Baker, 2000:99).

The smallest unit in the WBS should be the smallest unit of work to be tracked, namely the task level. It is the task level that is actually assigned an estimate and a cost. Everything else in the WBS is merely an organisational device to summarise how the tasks combine to complete components of the project. The levels of the project will assist you to control work at each level. A suitably organised WBS or task list can help in identifying the right time to ask and answer resource and staffing questions.

Another way to ascertain the lowest-level task you should include in the WBS is to attempt budget and time criteria. In this regard Baker and Baker (2000:99) maintain that the lowest-level task should require at least 0.25 to 2 per cent of the total budget or of the total project time. Segments, such as half or full days, may also be used to define the smallest task levels. These approaches may initially appear ill-defined, but they establish a guideline for the lowest-level tasks in the project. However, including too many elements in the WBS can be seen as micro-management. Also, the team members may think that you are attempting to manage their lives as well as the project.

There is no hard and fast rule for organising a WBS. Taking the newsletter as an example, the WBS is based on the category of tasks. As an alternative, it may be based on any of the aspects below. This is not an exhaustive list and there may be many other ways.
- Technological or functional disciplines: The question is what the requirements are for each phase of the project. For example, the marketing specialist could be scheduled separately from the machine operators.
- Organisational structure: In a clearly divided organisation or a set of separate organisations in a co-operative venture, the WBS could be established according to the reporting structure. If outside vendors are involved they may be included in this type of planning.

- Physical location: When working with separate facilities the WBS can be based on the geographical locations instead of on the people.
- Systems and sub-systems: When there is clear differentiation between several aspects of the project, the WBS can be put together to reflect this.

The so-called ‘wrap-up approach’ can also be used (Baker & Baker, 2000:100). In this approach, you start at the bottom, listing each item, and then work up from there. Each layer moving upwards contains a wrap-up of all the elements of the layer beneath it. Some of the other methods of creating a WBS, especially a complex WBS, are the following:
- Each element of work should be assigned to only one level of effort. An element should never be repeated in another part of the diagram.
- The WBS should be accompanied by clarification. Each box should be labelled with a number that refers to a page in the general overview document to provoke more detail.
- Related tasks should be clearly identified in the WBS.
- At all levels, the WBS should provide measurable deliverables for each aspect of the project. In the newsletter example, the selection of a masthead designer is a deliverable at the low level. At the high level of the same project, the completion and approval of the masthead is also a deliverable.
- The WBS should be assembled in a format that allows changes should the project shift in direction.

As the WBS develops, there needs to be some way of determining whether a task has been done and that it has been done correctly (i.e. quality control). This can be done through determining measurable quality levels based on the standards within the industry or sector involved. Monitoring quality control could also be done by establishing standard quality checklists and formal testing procedures, which is common practice in engineering projects. Another way of maintaining quality is through peer or stakeholder reviews during the implementation phase of the project.

A way to document these quality criteria is to develop an outline of the WBS with the quality criteria and review process noted next to each appropriate task or milestone. Completion and evaluation criteria improve the understanding of each task and the ultimate quality of the project plan. This is necessary because it is much more efficient to correct a problem or task description during the planning phase than during implementation.
A software program such as Microsoft Project can be used to further organise, analyse and fine-tune the WBS. This also paves the way for the processes of estimating task duration and sequencing the work in the planning phase. The WBS can be loaded into MS Project by following these steps:

1. Open MS Project and open a file for the project. The Gantt chart and entry table must be shown; otherwise the Gantt chart view should be selected.

2. Click the first empty field under ‘task name’. On selection the field will be highlighted with a dark outline. This shows that it is ready for data entry.

3. Enter the first item of the WBS. This may be the project name, a phase of the project, a workgroup or a task. After entering the data press 'enter'.

4. The programme sets the task’s duration to one day and the date to the current date (unless the start date has been entered earlier). The start and finish dates are automatically adjusted as data such as tasks, duration and workflow sequences are entered. The data could, however, be manually adjusted at a later stage depending on aspects such as availability of resources and schedule conflicts.

5. Continue entering all the items of the WBS until all the required work is listed.

6. Make sure that nothing has been left out and that others will understand the descriptions. Recheck the list for content and clarity, insert items that may have been missed and delete those items that are no longer needed.

To facilitate the transfer of planning information into MS Project, a planning template could be used. The team then first populates the planning template by means of brainstorming sessions and then a person may capture this information into MS Project’s planning window. Such a planning template could entail the following components:

<table>
<thead>
<tr>
<th>Activity (title and No.)</th>
<th>Duration (start and stop dates)</th>
<th>Cost (budget)</th>
<th>Responsible person</th>
<th>Performance indicators</th>
<th>Performance standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Plan</td>
<td>5 days (1 Aug-5 Aug)</td>
<td>R12 300</td>
<td>Eth</td>
<td>A detailed operational plan</td>
<td>97% compliance with design specifications</td>
</tr>
</tbody>
</table>

Figure 3.3 An example of a planning template

The project plan should be easily understood by everyone who relies on it for information. Some important guidelines include:

- use consistent naming conventions throughout the task list
- list the tasks in their general sequence of workflow
- add summary tasks and milestones to the list to make the project easier to understand and to manage.

3.3.2 Gantt charts

A Gantt chart, originating from Henry Gantt (1861-1919), is a visual portrayal of all the milestones of a project. On the x-axis of the chart the duration of the milestones are indicated and on the y-axis the respective milestones are reflected. Figure 3.4 illustrates a simple Gantt chart.

![Figure 3.4 An example of a Gantt chart](image)

It should be noted that a Gantt chart can only be drawn once the project schedule is completed. The schedule will have to identify all the dependencies between activities to logically sequence them. Some activities can run parallel, whilst other can only be executed once a predecessor is completed. In the construction of a house, for example, the roof is dependent on the walls (i.e. the walls are the predecessor of the roof) and the walls, in turn, are dependent on the foundation.

When a software program such as MS Project is used, these milestones can be rolled up or down to indicate all the activities associated with the milestones. MS Project has a default Gantt view, which uses both text and graphics to indicate the tasks, durations and workflow sequence. The graphic depiction is created on a timescale where each task is represented as a bar on which the length indicates the duration of the task. The right side is displayed as a Gantt chart and the left side as a table. The table provides
3.3.3 Network diagrams and the Critical Path Method (CPM)

Network diagrams rival the Gantt chart in general application, but are more useful for projects with higher levels of complexity. Projects usually require a higher degree of sophistication to enable thorough analysis. Rather than illustrating an activity as a bar on a bar chart (such as a Gantt chart), it can be represented by means of a network. Network diagrams display the logical sequence of workflow and task dependencies as a network of nodes (boxes) and arrows. A network diagram is useful for understanding complex workflow sequences since it graphically illustrates how tasks relate to the rest of the project. It is also useful in locating strategically important tasks, such as those that have to be accomplished before several other paths of work can begin.

The clarification of dependencies, as far as the sequencing of activities is concerned, is critical before a network diagram can be constructed. There are four types of dependencies, namely:

1. finish-to-start (FS) (until the predecessor is finished, the dependant cannot start)
2. start-to-start (SS) (until the predecessor starts, the dependant cannot start)
3. start-to-finish (SF) (until the predecessor starts, the dependant cannot finish)
4. finish-to-finish (FF) (until the predecessor finishes, the dependant cannot finish).

Based on these dependencies and the information contained in the WBS, network diagrams are then constructed. As such, it provides a graphic flow chart of the entire project plan. The network depicts the project activities that must be completed, the logical sequence, the interdependencies of the activities to be completed, and the duration for the activities to start and finish along with the longest path through the network—the so-called Critical Path. The Critical Path is the path with the longest duration through the network. If an activity on this path is delayed, the whole project is delayed by the same amount of time. In order to be able to determine the Critical Path and the limited time for the Critical Path, a network diagram must be developed.

There are generally two types of network diagrams available, namely an activity-on-arrow (A-O-A) diagram and an activity-on-node (A-O-N) diagram. An ‘arrow’ indicates the direction of workflow and a ‘node’ indicates the project activity or event. ‘The most common information shown in a node is the activity name, the duration (time), the activity’s early start time (ES), early finish time (EF), late start time (LS) and late finish time (LF). The arrow runs from left to right indicating the duration. All arrows start and end at an event (node). The node should be given a unique identifier or label. The
following information is typically indicated in a node:

![Task Data Table]

**Figure 3.5 Network diagram information**

To create an A-N diagram, one usually starts with a node named 'start'. This 'activity has a duration of zero (0). The next step is to draw each activity that does not have a predecessor activity (A and B in the example below) and connect them with arrows from 'start' to each node. Next, since both C and D are predecessor activities, their nodes are drawn with arrows coming from A and B respectively. This process is repeated to finally end with a node labelled 'finish' as can be seen in Figure 3.6.

![Network Diagram]

**Figure 3.6 A simple A-N diagram**

The network diagram reflects activities that must be done to complete the project. Not every item on the WBS, however, needs to be on the network diagram. Only those activities with dependencies need to be shown on the network diagram.

3.3.4 Program Evaluation and Review Technique (PERT)

There are some other related systems of network diagramming and scheduling techniques in use. The most common is probably the Program Evaluation and Review Technique (PERT). This technique is similar to what has already been discussed. The differences lie in how the projects display information and deal with scheduling uncertainties. PERT was developed for engineering projects and therefore many more symbols are used to represent the relationships between tasks in the network.

In the standard PERT methodology, the accepted formulae for computing the most likely estimate of a task's duration is: $T_e = 0.6M + P + 0.4O$

Where:
- $O$ = optimistic time, i.e., the minimum possible time required to accomplish a task
- $P$ = pessimistic time, i.e., the maximum possible time required to accomplish a task
- $M$ = most likely time, i.e., the best estimate of the time required to accomplish a task
- $T_e$ = expected time, i.e., the best estimate of the time required to accomplish a task.

The weighting factors indicate the relative likelihood of each duration occurring in a project. Traditionally, the optimistic and pessimistic weighting factors are set to 1 and the most likely weighting factor is set to 4. Most project management systems will allow you to set the weighting factors for PERT estimations and may then assign the resource durations based on these calculations.

Just like in a network diagram, a PERT chart presents a graphic illustration of a project as a network diagram. It also consists of numbered nodes (either circles or rectangles) representing events or milestones linked by labelled vectors' (directional lines) representing tasks in the project. Circles represent completion of tasks, with linking lines showing the time taken to achieve the tasks. A task is represented by a box and is connected to other tasks by lines to show dependencies. Figure 3.7 illustrates a simple PERT Chart.

<table>
<thead>
<tr>
<th>Obtain specifications</th>
<th>Tender process</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1 2 weeks</td>
<td>2.2 3 weeks</td>
</tr>
<tr>
<td>27/9/15 11/10/15</td>
<td>28/10/15 27/10/15</td>
</tr>
<tr>
<td>Precum</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 3.7 An example of a PERT chart**
Tasks that must be completed in sequence are called ‘dependent’ or ‘serial’ tasks. Tasks that are not dependent on the completion of another task can be undertaken simultaneously. These tasks are called ‘parallel’ or ‘concurrent’ tasks.

The direction of the arrows on the lines indicates the sequence of tasks. Tasks that must be completed in sequence but that do not require resources or completion time are considered to have ‘event dependency’. These are represented by dotted lines with arrows and are called ‘dummy activities’.

3.4 TYPES OF PROJECT PLANNING

As stated, a wide variety of plans and associated tools and techniques are at the disposal of the project team to facilitate their planning efforts. The more complex the project, the more important the application of these different types of planning becomes. These plans are often referred to as support plans and are generally attached to the final project plan as specialised annexures. The final project plan should thus typically include the sub-plans shown in Table 3.1.

Table 3.1 The elements of a project plan

<table>
<thead>
<tr>
<th>Project plan</th>
<th>Sub-plans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schedule</td>
<td>Communication management plan</td>
</tr>
<tr>
<td>Work Breakdown Structure (WBS)</td>
<td>Cost management plan (CMP) (budget)</td>
</tr>
<tr>
<td>Risk management plan (RMP)</td>
<td>Procurement plan</td>
</tr>
<tr>
<td>Quality management plan (QMP)</td>
<td>Human resource management plan (HRMP)</td>
</tr>
</tbody>
</table>

Below, some of the most common types of project planning are briefly highlighted.

3.4.1 Risk management plan (RMP)

Risks are inherent in all projects. The likelihood that the project is executed without any adjustments to the original scope and deviations from the original schedule due to unforeseen circumstances is very low. The key, however, is to minimise potential problems with proper planning and proactive actions. This is the art of risk management, which concerns identifying, analysing and planning a response to potential threats to the project. A risk management plan (RMP) is primarily about the design and implementation of a monitoring and proactive contingency strategy for the entire project. When things go wrong the team can react and adapt the scope and schedule to compensate. An RMP is thus a proactive instrument to resolve potential problems before they occur.

A RMP supplements the project plan by seeking answers to questions such as ‘what if?’ and ‘what can go wrong?’. A good starting point to manage risk is during the feasibility stage of the project when a force-field analysis and SWOT analysis are typically conducted. The ‘weaknesses’ and ‘threats’ of the SWOT analysis will already reveal inherent risks associated with the project. Risk management planning then occurs again during the planning phase of the life-cycle when the WBS is compiled. The project team should consider everything that might go wrong during the execution of each activity listed on the WBS.

A risk register is a useful tool in risk planning as it helps the team with:
- risk identification, i.e. what are the risks?
- risk quantification, i.e. what is the likelihood of the risk occurring?
- risk response development, i.e. what will we do to prevent the risks from occurring?
- risk response control, i.e. what will we do to recover if it happens?

It should be noted that the risk plan and the risk register are subject to changes. Issues will arise during the life-cycle and therefore these plans need to be adjusted as and when needed. A monitoring and review process should be put in place to constantly identify potential issues and to facilitate proactive actions to mitigate or minimise the potential threat thereof on the project.

Contingency planning is part of the RMP. A contingency plan can be regarded as an alternative plan that will be followed if a possible unforeseen risk event becomes a reality. Contingency plans are aimed at reducing or mitigating the negative impact of risk events. Contingency reserves, including budget and resource reserves, should also be put in place to cover errors in assumptions, incorrect estimates, emissions in planning and uncertainties. Table 3.2 contains an example of a comprehensive RMP.
Table 3.2 An example of an RMP

<table>
<thead>
<tr>
<th>Ref No</th>
<th>Possible risk</th>
<th>Risk analysis</th>
<th>Risk rating</th>
<th>Risk mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>All stakeholders are not identified</td>
<td>3 2 2 12</td>
<td>Low</td>
<td>Proper stakeholder analysis</td>
</tr>
<tr>
<td>0.2</td>
<td>Not all project elements included in the specifications</td>
<td>4 2 2 16</td>
<td>Low</td>
<td>Arrange planning session</td>
</tr>
<tr>
<td>0.3</td>
<td>Unqualified service providers tendered</td>
<td>4 2 3 24</td>
<td>Low</td>
<td>Utilise vendor database</td>
</tr>
<tr>
<td>0.4</td>
<td>Lengthy procurement process may cause project delays</td>
<td>5 2 3 30</td>
<td>Medium</td>
<td>Steering Committee to streamline procurement process</td>
</tr>
</tbody>
</table>

To calculate the total risk rating of a risk event as indicated in Table 3.2, the following steps should be followed:

- **Step 1**: assign a category (1–5) to the frequency of occurrence of the risk
- **Step 2**: assign a category (1–5) to the severity of the risk
- **Step 3**: assign a category (1–5) to the probability of the risk
- **Step 4**: multiply the frequency value from step 1 by the severity value from step 2 and the probability value of step 3
- **Step 5**: prioritise the ratings for all risks (low, medium or high)
- **Step 6**: identify appropriate mitigation strategies, especially for high-value risks.

3.4.2 Quality management plan (QMP)

As a Project Management Body of Knowledge (PMBOK) knowledge domain, Project Quality Management is aimed at ensuring that the project will satisfy its specifications and includes quality planning, quality control, quality assurance and quality improvement. Quality planning is thus one of the elements of Project Quality Management and involves identifying which quality standards are relevant to the project and determining how to satisfy them. It is one of the key facilitating processes during project planning and should be performed regularly and in parallel with the other project planning processes. Quality planning is facilitated by the use of quality metrics, performance indicators, quality standards, benchmarks and a quality management system. In the South African Department of Public Service and Administration, for example, Project Quality Management should be closely aligned with the comprehensive performance management system (PMS) of the specific institution hosting the project.

The quality management plan (QMP) should clarify the acceptable level of quality and indicate how this level of quality will be maintained in the execution of all work processes. The QMP should also outline how non-conformance to quality standards will be identified and what type of corrective actions will be taken to remedy it. The QMP should contain the following elements:

- project quality objectives
- key project deliverables and applicable quality metrics
- quality standards
- quality monitoring, control and assurance mechanisms and actions
- roles and responsibilities of those involved in quality control and assurance
- quality tools, instruments and techniques
- quality reporting arrangements.

The ultimate aim of the QMP is to meet customer expectations and to help the project team to determine whether project deliverables are completed to an acceptable level of quality.

3.4.3 Communication management plan

Project stakeholders are individuals or organisations whose interests may be positively or negatively affected as a result of the project. Stakeholders may be divided into different categories such as internal and external, owners and funders, suppliers and contractors, team members, government agencies, the media, individuals, temporary or permanent lobbying organisations and society at large. The naming or grouping
of stakeholders is primarily an aid to identifying which individuals and organisations view themselves as stakeholders. The project management team must identify the stakeholders, determine what their particular needs and expectations are and then manage and influence those expectations to ensure a successful outcome.

A project communication plan (PCP) is primarily about managing stakeholders’ often conflicting expectations and to keep everybody abreast of the latest developments regarding the project. The PCP thus facilitates stakeholder involvement in the project. The project team should meet and talk with them regularly, keep them informed, identify the nature of their interests, develop a stakeholder register and plan for how their involvement will be managed throughout the life-cycle.

Communication has many dimensions in a project. These dimensions include internal and external, formal and informal, and vertical and horizontal aspects. The PCP should make provision for these dimensions to facilitate networking, collaboration, interaction and co-ordination. To summarise: a PCP should provide for the methods and procedures for the collection, storage and dissemination of project information (status reports, schedules, meetings, technical documentation, etc.) among stakeholders. Refer to Table 5.3 in chapter 5 for an example of a PCP.

3.4.4 Cost management plan (CMP)

Project cost management plans are generally compiled by financial experts or by quantity surveyors in the case of the construction industry. Cost management plans are adjusted throughout the life-cycle of the project. It usually starts off with general cost estimates during the compilation of the project proposal, but becomes far more specific and accurate for purposes of business planning and the approval of the final budget.

The plan contains various support processes and documents including:
- Initial cost estimates and appraisals, especially during the feasibility stage of the project
- An approximate quantities cost plan
- Pre-tender estimates prepared in conjunction with tender specifications
- Contract sums, usually negotiated with the contractor or supplier during the tender process.

It should be noted that there are wider project costs involved such as research, telephone, printing, travel, subsistence and so forth. These costs should also be absorbed in the final cost plan.

Figure 3.8 reflects how costs are allocated per activity in the WBS to form the overall cost plan and project budget.

3.4.5 Procurement plan

The project procurement plan contains the resource requirements per phase of the project and how these will be obtained. The procurement plan must be consistent with the project proposal. Approval should be obtained prior to proceeding with procurement and confirming the availability of funding and resources for managing the procurement process. A Procurement Plan is a prerequisite if the project will procure any products from an external supplier.

The procurement process followed depends on the organisation and its procurement policy. Procurement processes in government, for example, differ vastly from similar processes in the private sector. The project team cannot move outside the particular supply-chain management and preferential procurement policies and procedures of the organisation. The procurement process is further influenced by the complexity of the project, its scope, timing constraints, market capabilities and the impact thereof on the host organisation’s internal systems and resources. The procurement approach
may include tender processes, contracting, service-level agreements, outsourcing and public-private partnerships. The procurement plan could thus be highly complex.

The procurement plan should outline which products, services and goods will be acquired from external suppliers as well as when and how they will be acquired. The plan should also contain:

- a breakdown and detailed description of the products, services and goods
- an overview of the availability of these products, services and goods in the supply market and whether suppliers can actually provide it within the time and budget constraints
- a schedule (timeframes) for procuring these products, services and goods
- an indication of how these products, services and goods will be acquired (i.e. tender or direct purchasing)
- the composition of a tender evaluation and adjudication panel and which performance indicators will be used
- compliance with organisational procurement policies and procedures.

The design and use of a procurement plan template is always useful. Such a template may be designed like the example below.

<table>
<thead>
<tr>
<th>WBS ID No.</th>
<th>Product</th>
<th>Detailed description of the product and justification for its use</th>
<th>Quantity</th>
<th>Budget</th>
</tr>
</thead>
</table>

![Figure 3.9: Procurement plan template](image)

It should be noted that the plan should provide sound reasoning as to why these products must be acquired from external suppliers. Each product should thus be justified in terms of its significance to successfully complete the project.

### 3.4.6 Human resource management plan (HRMP)

The successful execution of projects ultimately depends on people. One of the key lessons to be learned about a managing-by-projects approach, is that people management in projects has been expanded dramatically in significance and importance. The way people are led currently in projects differs vastly from the old, more mechanistic conceptions of management.

All project team members must have a clear understanding of their roles and responsibilities, and it is mainly the project manager's responsibility to define these roles and responsibilities. The development of a human resources management plan (HRMP) is primarily about how the project will be staffed, how the team will be built and managed, and how this will be performed iteratively and interactively with other aspects of project planning such as time, cost, quality and scope.

There are mainly three inputs to the HRMP: namely activity resource requirements, organisational and environmental settings, and organisational processes and procedures. Activity resource requirements will outline the specific time when team members should be available to execute the activity and what particular type of skill will be required to successfully perform the function. Organisational and environmental settings are about information regarding the particular organisational structure and arrangements and exactly where the project will fit into these structures and arrangements. Environmental factors include information regarding political aspects, market and economic conditions as well as the availability and utilisation of technology. The last input to the HRMP concerns organisational processes and procedures, especially those pertaining to human resources, such as recruitment, discipline, remuneration, office hours, leave arrangements and other benefits that are relevant for the compilation of the HRMP. With detailed information pertaining to these three inputs, the project manager is now in a position to develop the plan.

The content of the HRMP is also dependent on the organisation and the specific project, but should contain the following elements:

- **Team roles and responsibilities:** This should include members' names, positions, level of authority and their knowledge, skills and level of competency in terms of project requirements.

- **The organisational structure:** This must show from which organisational unit specific team members will be sourced. This structure should include a graphical diagram to indicate the authority and reporting lines between the project and the functional areas.
• **The staffing management plan:** This should describe how and when the project will be staffed, how the staff will be trained, and how and when the staff will be released. It should also indicate the availability of team members.

• **Health and safety requirements:** These may include the appointment of evacuation officers and the identification of assembly points in the case of fires, the installation of first-aid kits on the project site, and guidelines for the safe use of potentially dangerous equipment.

The plan may also be extended to make provision for the three key dimensions of Project Human Resource Management as a knowledge domain, namely:

• **Organisational planning:** identifying, documenting and assigning project roles, responsibilities and reporting relationships.

• **Staff acquisition:** getting the human resources needed assigned to and working on the project.

• **Team development:** developing individual and group skills to enhance project performance.

These three dimensions are interrelated and interdependent. As far as team development is concerned, it should be noted that the development and cohesion of the team is a critical success factor and therefore team building exercises throughout the project should remain a priority.

### 3.5 DETAILED STEPS TO BE TAKEN DURING PLANNING

Various models and methods exist to guide the project team towards a comprehensive and detailed plan. Depending on the nature and type of project, some host organisations prefer to develop a process map with supporting documentation, whilst others simply ask the right questions such as:

- Where are we? (situation and SWOT analysis)
- What does the market/customer want? (market survey)
- Can we deliver? (feasibility study)
- How would it look? (master plan outlining the scope)
- Can we afford it? (financial projections)
- Shall we do it? (approval by board of directors or senior management).

The planning process can also be regarded as a value chain in a project. This value chain starts with the establishment of specific inputs (i.e. project specifications and requirements) and ends with specific outputs (i.e. a detailed project plan and completed business plan). Irrespective of how organisations approach planning in general and the particular planning methodology project teams utilise, there are a couple of generic steps to be applied. Table 3.3 briefly identifies these generic steps and also indicates the specific outcomes expected in each step.

<table>
<thead>
<tr>
<th>Planning steps</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Determining the purpose</td>
<td>Purpose statement</td>
</tr>
<tr>
<td>2. Project scoping</td>
<td>Scope statement and project charter</td>
</tr>
<tr>
<td>3. Identifying and grouping project activities</td>
<td>WBS; all work packages</td>
</tr>
<tr>
<td>4. Estimating duration and sequencing</td>
<td>Project schedule; Gantt chart (i.e. milestone plan); network diagram; Critical Path Diagram (CPD)</td>
</tr>
<tr>
<td>5. Assigning resources</td>
<td>Human resource plan; materials; tools; tenders; procurement and contracts</td>
</tr>
<tr>
<td>6. Planning the budget</td>
<td>Cost estimates; accumulative cost plan; detailed financial requirements; budget</td>
</tr>
<tr>
<td>7. Documenting the plan</td>
<td>Project business plan</td>
</tr>
</tbody>
</table>

Each step is briefly highlighted below.

#### 3.5.1 Determining the purpose

It is crucial that the project's stakeholders and role-players are identified to ascertain their specific needs, aspirations, requirements, demands and expectations as far as project deliverables are concerned. A project charter should document the purpose, aims and objectives to ensure that all parties are fully aware of what is to be delivered.

It is further important to prioritise objectives. Sometimes some stakeholders will express needs that are not specifically relevant to delivering the benefits or addressing the need for the project. Such needs can then be documented and set as a low priority.
A well-defined and detailed project statement is the outcome of this step and provides the foundation for project scoping.

3.5.2 Project scoping

The project scoping is about the size of the project. Some project managers specialise exclusively in projects of a certain scope, regarding small ones as too petty for their talents or massive ones as too long-lived or problematic with which to get involved. Project scope can include one or more of the following considerations (Baker & Baker, 2000:70):

- all that is to be achieved by the project
- when the project should start and when it should be completed
- the total obligation of resources (money, people, supplies and equipment).

Except for uncomplicated projects, compressing the scope often has additional sub-projects as offshoots. Making it too broad adds complexity, as too many unrelated elements have to be managed simultaneously. When establishing a new project the scope has to be clearly defined and agreed upon. It is the scope that defines the assumptions for making all the schedule, cost and resource projections when planning the project.

The scope determined for the project puts boundaries on the planning process and the deliverables. When defining the scope, the specific outcomes or deliverables should be outlined, as well as those activities and deliverables outside the scope of the project. Scope 'creep' is a term used for describing the process of adding work to a project, little by little, until the original schedule and cost estimates become meaningless. Project managers must make sure that any 'creep' in the project plan or Statement of Work (SOW) is agreed to in writing, together with the budget and schedule changes.

Scope management includes the following processes:

- **Initiation:** committing the organisation to start the following phase of the project
- **Scope planning:** developing a written scope statement as the basis for future project decisions
- **Scope definition:** subdividing the major project variables into smaller, more manageable components
- **Scope verification:** formalising acceptance of the project scope
- **Scope change control:** controlling changes to the project scope.

On all projects, no matter how large or small, a simple announcement of the project should be made to clearly establish the project manager's right to make decisions and lead the project. In larger projects the project charter indicates that the project manager has the authority to start assembling the significant organisational resources necessary to realise the goals and objectives of the project.

3.5.3 Identifying project activities

As explained above, the identification of project activities is done by means of a WBS. The complexity of project activities will dictate the level of detail required in a WBS. The WBS consists of layers or levels to reflect the activities, tasks, and sub-tasks. Consider the following example to appreciate these levels:

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Arrange workshop (Level 1)</td>
</tr>
<tr>
<td>2.1</td>
<td>Invitations (Level 2)</td>
</tr>
<tr>
<td>2.1.1</td>
<td>Design invitations (Level 3)</td>
</tr>
<tr>
<td>2.1.2</td>
<td>Print invitations (Level 3)</td>
</tr>
<tr>
<td>2.1.3</td>
<td>Send invitations (Level 3)</td>
</tr>
<tr>
<td>2.2</td>
<td>Book venue (Level 2)</td>
</tr>
<tr>
<td>2.3</td>
<td>Arrange refreshments (Level 2)</td>
</tr>
<tr>
<td>2.3.1</td>
<td>Obtain dietary requirements (Level 3)</td>
</tr>
<tr>
<td>2.3.1.1</td>
<td>Insert requirements in invitations (Level 4)</td>
</tr>
</tbody>
</table>

![Figure 3.10 An example of the levels in a WBS](image)

One should generally stop unpacking (detailed) the project once:

- a particular activity does not significantly influence the calculation of time and cost
- the person responsible for the execution of the activity knows exactly what it entails and how to successfully execute it.

Remember, these activities will become the 'job description' of individual team members and they need to know exactly how, when, at what cost and what is needed to execute these activities.

All the activities identified are ultimately absorbed in a Statement of Work (SOW). The SOW lists and defines the objectives, constraints, scope, communication guidelines and success criteria for a project. Once written, the SOW becomes a document subject to negotiation and adaptation by the stakeholders. Once finally approved, the SOW becomes the 'official rules' for the project. The SOW can range from a one- or two-page
memo in small projects, to a 100-page document of understanding for a major technical endeavour. The terms ‘Statement of Work’ and ‘project charter’ are sometimes used interchangeably. However, a project charter should be used as a simple announcement that recognises the project manager’s authority to clarify the scope of the project as well as the responsibilities of all stakeholders. The usual minimum content of a SOW includes the aspects discussed below.

- **Statement of purpose:** The basic question revolves around the reasons for the project, and this should be clearly answered at this stage. In addition, the business plan for the project is referenced but not necessarily detailed. If a detailed business plan is required for a project, this is typically done in a separate document, often called a cost-benefit analysis.

- **Scope statement:** The scope statement defines what the project will and will not do. The link of the project to other priorities or business endeavours should be included here as well, especially when the project is a sub-project of a larger project.

- **Deliverables:** This part defines what the project is supposed to produce and focuses the team on producing outcomes. The intermediate, as well as the final deliverables, should be pertinent listed. Even standard status reports, requests for change and other reports should be specified as part of the deliverables of the project. The management as well as the project deliverables should be listed in the SOW. This ensures that the basic communications within the project are clearly understood.

- **Goals and objectives:** This part defines the criteria for success. Not only the on-time and within-budget criteria should be specified, but also the other objectives that were derived from the project. Some of the objectives may include those that protect the customer’s business or those that measure specific outcomes.

- **Cost and schedule estimates:** This part provides the approximate but well-researched estimates of both the cost and the schedule of the project. Questions regarding how the budget was calculated and the deadline determined should be answered here. On large projects, most of the complete planning process may have to be completed before adequate numbers can be produced. In other projects, reasonable schedules and budgets should be set with specific variances that will be detailed further in the project planning process. In either case, realistic expectations should be set for stakeholders. Therefore, the figures have to be reasonable if not yet final.

- **List of stakeholders:** In this part all the key influencers, managers and sponsors for the project should be introduced. The name and role of the project manager, key project team members, the sponsor, managers with an interest in the project as well as the customer contracts, should be identified.

- **Chain of command:** This part defines who reports to whom on the project. This calls for a project organisation diagram (orgogram). Another useful tool is a written Responsibility Assignment Matrix (RAM), which is a table that defines the important roles and responsibilities on the project. This part of the SOW is especially important because projects often cross organisational boundaries and can therefore have their own reporting structure that is outside the functional reporting structure of the overall organisation. If project roles and reporting requirements are not clearly defined and agreed upon in the SOW, conflict about decision-making roles and authority may often disrupt the project when in progress.

- **Assumptions and agreements:** Any assumptions that may limit the project or agreements that form the basis of interactions should be detailed. Nothing should be left out that could affect the future management of the project.

- **Plan of communication:** This part details the basic reports that will be produced and any meetings that will be held during the detailed planning phase. At this point the frequency and audience relating to the status report and basic meetings for the project planning phase should be specified. In large projects, a more detailed communication plan will probably be produced later in the planning phase. Those later communication plans will add more information about the author, content and frequency of reports to be produced and meetings to be held during the later phases of the project. In small projects, more detailed communication plans will probably not be required if the SOW is sufficiently detailed.

Figure 3.11 shows an example of a RAM where each level of communication is assigned a value as follows:
- 1 = primary responsibility
- 2 = general supervision
- 3 = must be consulted
- 4 = may be consulted
- 5 = must be notified
- 6 = approval required.
3.5.4 Estimating duration and sequencing

Duration estimation can be a challenging exercise since so many variables may influence the ultimate time it will take to complete an activity. Team members, for example, may be highly skilled and therefore able to complete a particular activity in a relative short space of time. But, if these team members are not committed and motivated, they will not be productive and therefore the duration may well exceed the original estimate. Furthermore, with no previous experience to act as a benchmark, the team will really struggle to accurately determine the possible duration of an activity. It should be noted that duration has a direct bearing on labour cost. The longer people work on a project, the more labour cost of course will be incurred.

Probably the most common problem as far as project scheduling (including time management and duration estimation) is concerned, is that the project sponsor and the customer generally impose a project deadline that is not realistic based on preliminary estimates. In such a case, the project team may consider various options including:
- renegotiating the delivery date with the sponsor and/or customer
- contracting additional people and procuring more resources (this option will escalate the cost significantly)
- reducing the scope of the project (this option will produce less, but both time and cost will be reduced)
- reducing the quality of the project (this option should only be considered as a last resort since it is highly unlikely that the sponsor and customer will be satisfied with a substandard end result).

3.5.5 Assigning resources

The supporting plans, such as those explained in section 3.4, guide the assigning of resources to the project. These supporting plans could be attached to the final business plans and should include:
- human resource management plan (HRMP)
- communication plan
- risk management plan (RMP)
- procurement plan
- cost management plan (CMP)
- quality management plan (QMP).
3.5.6 Planning the budget

The budget is basically the cost structure attached to each activity and associated resource requirements. Refer to the cost management plan in section 3.4.1 for further detail regarding this process.

3.5.7 Documenting the plan

The last step in the project planning process is the final written document. This document should contain all aspects and dimensions of the project. This document is generally referred to as the business plan. Refer to chapter 9 for an example of a business plan.

When all of these steps are taken the likelihood of successful project planning is greatly enhanced. It is advisable to develop standard operating procedures (SOPs) regarding project planning in the organisation to further guide the planning effort.

3.6 CONCLUSION

The purpose of this chapter was to explore the significance of planning within the project life-cycle with specific reference to the most common planning tools and techniques. Furthermore, the chapter identified the different types of supporting planning documents that should further inform the entire plan. Lastly, detailed steps of the project planning process were explored to act as a roadmap for the project team.

In the next chapter organisational arrangements and project governance will be highlighted. The particular organisational setting and governance structure that is established to oversee a project, will greatly influence the way planning is done. The content of this chapter should thus not be considered in isolation, but should be appreciated within the entire content of the book.

CHAPTER 4 – ORGANISATIONAL ARRANGEMENTS AND PROJECT GOVERNANCE

Gerrit van der Waldt

In this chapter we discuss the following:

- Project-based organisational structures and arrangements
- Interfaces between organisation and projects
- Benefits of a project-based approach
- Typical organisational challenges and considerations
- Typical considerations in establishing a project management office
- Organisational guidelines towards effective governance of projects, with specific reference to project steering committees, project sponsors and project directors
- Challenges associated with temporary project arrangements within permanent hierarchical organisational structures
- Project outsourcing and contractual arrangements

4.1 INTRODUCTION

Increasingly, organisations are implementing formal project management processes and disciplines to deliver their work initiatives on time, within budget and to an agreed level of quality. The ability to execute projects efficiently, faster and more cost-effectively emanates from the organisation’s ability to implement standardised processes and practices across the entire organisation. By using embedded project methodology there is a small learning curve for project managers and team members as they move from one project to another.

Host organisations of projects should facilitate the alignment and integration of the project into existing structures, processes and procedures. This will enhance