



**AFRICAN MEDICAL RESEARCH FOUNDATION TRAINING  
MANUAL ON THE UNIT STANDARD: *Apply a Range of  
Project Management tools*: ID No; 10140; Credits 8**

*Developed for the Southern Africa NGO Capacity Building Project with support from:*



**Apply a Range of Project Management tools**

<b>Outcomes</b>	<b>Notional hours</b>
1. Demonstrate an understanding of project management tools	40
2. Use a range of project management tools	40
<b>Total Notional Hours</b>	<b>80</b>

Specific Outcome 1: Demonstrate an understanding of project management tools

Mode of delivery	Assessment method	Assessment Instrument
Classroom presentation Teaching aids	Oral and written questioning	Written assignments/Tests

Projects have a three dimensional objective, which is the simultaneous accomplishment of the performance specification, the time schedule and the cost budget (also known as the Triple Constraint). Successful project management requires that this three dimensional objective is measurable (i.e. it is specific and verifiable) and attainable. Successful project management means accomplishing the performance specification on or before the time limit and within budgeted costs. Every project must begin with a statement of work. The statement of work is that portion of the contract which explicitly enumerates what the contractor will do and deliver to the customer. The statement of work must describe the job to be done by designating any specifications that will be applied. It should identify measurable, tangible, and verifiable acceptance criteria so that there is no uncertainty whether the final item is acceptable. Unfortunately it very difficult to achieve the Triple Constraint because of most of what occurs during the project conspires to pull performance below specification and to delay the project so it falls behind schedule which makes it exceed the budget. Problems that cause project not to meet the Triple Constraint can be grouped into three categories.

- Performance problems- There are many reasons the performance specification is difficult to achieve. (1) Communication between the contractor and the customer may be one problem. The contractor and customer may have different perceptions of the specification or the wording may be ambiguous. (2) A problem may arise because the customers' assumptions are too ambitious and often unrealistic in the given time and budget and (3) a problem may also arise due to a poor design job or when people make mistakes in executing contract performance. Human beings unfortunately make mistakes and such mistakes may cause a performance deficiency
- Time problems- Time problems arise for several reasons. (1)The most insidious reason for time problems is the overemphasis on the performance dimension at the expense of time and the budget. Technical people may tend

to assume that performance specification is sacrosanct and forget that the Triple Constraint ought to be balanced at all times. This imbalance normally results in the required specification but with an overrun budget and late delivery. (2) A second source of difficulty in meeting the time schedule arises when resources are not available when required. (3) A project can also not meet the time schedule because the performance specification is raised. A customer may require additional items that were not part of the original specification. Adding these to the original specification is time consuming (4) A project may not meet the time schedule if those assigned to it are not committed to their tasks and fail to meet set deadlines

- Cost problems- Cost problems arise because of a number of reasons: (1) if the resources are not utilized as efficiently as planned. (2) Cost problems also arise when in the course of negotiating contractors lower prices to attain tenders. Cost reduction without work reduction builds a cost overrun from the very beginning of the project. (3) Cost problems may arise when the mistakes are made when the initial cost estimates are made (4) Cost problems may arise when funding does not occur according to the plan

A range of project management tools for the implementation and completion of successful projects are available. The project plan is the most important tool for the implementation and completion of a successful project. Successful project management starts with a project plan. The project plan is the simulation of a project comprising of the written description of how specification requirements will be met within the given time and within the cost budget. The importance of the project plan lies in the fact that plans aid communication and coordination, provide a basis for monitoring and help to avoid problems that have mentioned above. Plans however relate to future events and there are however uncertainties about the future. The plan helps to reduce uncertainties and provide contingencies for both controllable and uncontrollable future events. Project plans are sometimes created merely created to satisfy requirements imposed by others as part of the project, such plans are seldom adhered to

A project plan is in essence three plans:

- A plan for the performance dimension (i.e. the work breakdown structure)
- A plan for schedule dimension –a network diagram, occasionally a milestone listing or bar chart
- A plan for the cost dimension (i.e. the financial estimate)

**The Work Breakdown Structure (WBS)** - This is convenient method of dividing the project into small work packages, tasks or activities. The WBS is intended to assure that all the required project activities are logically identified and related. The WBS defines the work packages and ties each activity to an attendant schedule and budget for the work performers. The WBS is sometimes problematic in that it is often vague. An example would be instance where the SOW states that “appropriate tests will be performed” without specifying who will decide the tests, when the tests will be performed and what is appropriate. The WBS is also problematic in that it does not take into account revisions that may occur in terms of schedule, cost and other work packages that may be required

**Bar charts** (also referred to as Gantt charts) - In terms of the bar chart, the project is divided into activities with a planned duration of time. Open bars are drawn to represent the planned time span for each activity. The shaded bars represented span of the activities over a time period. Bar charts show graphically which activities are ahead or behind schedule. Whilst bar charts are easy to construct, understand and change they are essentially useless for managing a project. Knowing the status of project activities gives no information about the overall project status because they do not show the interdependence between activities.

**Milestones** – Milestones are schedule notes of key events on a calendar bar chart. Milestones are events clearly verifiable by other people or requiring approval before proceeding further. When milestones have been defined, listing them helps in preparing the project plan. Having milestones with attendant schedules and budgets adds extra emphasis to the few key points of the project. Like bar charts, milestones do not clarify activity or task dependence.

### **Network diagrams**

A network diagram is any display that links project activities and events to one another to portray interdependencies. A single activity may have interdependencies with predecessor, successor or parallel activities. Network diagrams are the recommended approaches to planning the schedule dimension for any project because they identify the precedent conditions and the sequential constraints for each activity. There are many forms of network diagrams but the Program Evaluation and Review Technique (PERT), the Precedence Diagramming Method (PDM) and the Arrow Diagramming Method (ADM) are the most common. The facilitator will show examples of the different network diagrams. The most effective network diagrams have time scaled tasks with explicit task interdependency linkages (TSTETIL) schedules which portray both interdependency and time sequence.

### **Computer software**

Computer project management software is readily available to assist a project manager in many important parts of the job. All aspects of the Triple Constraint that are embodied in the project plan can be captured through readily available software. Computer software will help in planning the work to accomplish performance goals even though it will not assure successful completion of the work. Whilst the software is useful, it is not the panacea especially when it is not used effectively. Another problem with software is that project managers may spend more time at a computer instead of spending sufficient time with the human resources of the project thus impeding the ability to carry out the leading activity. Another problem with software is that its use requires time to train personnel.

Project plans require activation. Activation begins by obtaining approval for implementation. Once approval has been approved, the project plan has to be disseminated to all personnel involved in the project. In large projects dissemination may require a chart room in which walls are covered with charts displaying the plans for and the status of the various activities including financial progress and resource allocation. Smaller projects do not require chart rooms. Project plans vary from simple one page statements to records with overwhelming levels of detail.

Once the project has been activated, the project manager has to control the project. The purpose of project controls is to monitor progress towards the project objectives, evaluate what needs to be done to reach these objectives and take corrective action to achieve the objectives. The first control is a well publicized project plan for all three dimensions of the Triple Constraint. Any deviation from this three dimensional plan indicates the need for corrective action. There are several restrictive control tools available for use by project managers but for now only two will be mentioned. (1) Discretionary authority is one of the restrictive tools a project manager may use to control the project. A manager may require that expenditure in excess of X amount to receive his/her specific approval. This kind of control goes beyond the project plan in that they make workers on the project seek out the project manager's approval during the performance of each project activity. This kind of control can bog down a manager especially in big projects where she/he will have to examine a myriad of documents. (2) A far better approach is for the manager to examine the work done under the direct control of the project team and support teams. These examinations are accomplished by reading reports and conducting project reviews.

### **Reports**

Reports fall into three broad categories: those concerned with the accomplishments along the performance axis, those concerned with schedule progress and those concerned with costs. Reports may be written summaries to provide an overview or be detailed. Reports may be strictly for internal to the contractor performing the project or be intended for people outside such as the customer. A project manager cannot depend entirely on reports. In the first place they may be inaccurate and thus misleading. Reports are one way communication and lack the give and take that is possible in a meeting thus it is hard to judge the status of a project on the basis of written data.

### **Project reviews**

As mentioned, it is very hard to judge the status of a project on the basis of written reports. Reviews are a means of monitoring in the form of meetings where the project personnel report on the status of activities. The project manager learns to ask questions at project reviews. Questions are not asked to embarrass anyone but rather to gather information and to find out how the project is deviating from the plan so that corrective action can be taken. Reviews can be periodic (e.g. monthly, quarterly or yearly) or be based on a topic. Reviews are plagued by three common problems. First, there is always a concern whether the information presented is accurate. The project manager is not at the site of each project activity and thus has to rely on the person who presents the information. The second problem is the poorly conducted review. Aimless discussion does not present an accurate picture of what is actually happening. A third problem is that some project personnel fail to meet deadlines but do not consider this to be a problem.

### **Project lifecycles**

Because projects are unique and involve a certain degree of risk, organizations performing projects will generally subdivide their projects into several project phases to provide better management and control. Collectively these project phases are called project life cycles. Normally projects have 4 phases namely: (1) Concept or

initiation phase (2) Design or planning phase (3) Implementation or construction phase (4) Closing out or delivery phase

### *Concept or initiation phase*

The focus of this phase is to establish a need or opportunity for the product, a facility or a service. It is at this stage where the customer requirements are defined and clarified. The feasibility of proceeding with the project is investigated and a go or no go decision has to be made to determine the next step. It is at this stage where the stakeholders are identified, and their expectations of the objectives of the project are captured. A detailed plan for the definition phase and the preliminary plan for the project are developed.

### *Design or planning phase*

If the decision in the initial phase was to go ahead, this phase uses the guidelines set by the feasibility study to design the product, outline the method to be used in building the product and develop detailed schedules and plans for making or implementing the product. Work Breakdown Structures are defined, project team members are appointed and assigned tasks, cost and duration estimates to complete each work package are established. The plan to mitigate risk identified in the previous phase should be developed.

### *Implementation or construction phase*

In this phase the project is executed according to the baseline plan developed in the previous phase. The essence of this stage is to execute work packages. In executing these packages, the project manager should monitor, forecast and control the scope, quality, time and cost. One of the critical aspects of this phase is enforcement of communication and motivation of team members.

### *Closing out or delivery phase*

This phase confirms the completion of the project. That the project has been implemented or built according to initially set design and guidelines. Hence the product can be handed over to its users and the project can be closed.

### Suggested tasks for the learner to attain competence against this specific outcome

1. Explain the dimensional objective of any project.
2. List and explain the tools that can be used by a project manager
3. Explain the limitation/problems associated with each of the tools you have listed
4. Name and explain two restrictive control tools available for use by project managers
5. List and explain project lifecycles

### Evidence that the learner has achieved competence against this specific outcome:

1. The three dimensional objective of any project is explained
2. A range of tools used in project management is explained
3. Limitations of project management tools are explained

4. The two restrictive control tools that are used by project managers are named and explained
5. Project lifecycles are listed and explained

**Specific Outcome 2:** Use a range of project management tools

Mode of delivery	Assessment method	Assessment Instrument
Classroom presentation Teaching aids	Oral and written questioning	Written assignments/Tests

A schedule for any project requires knowledge of how long the each activity will take. To know the time it will take to accomplish each activity project management makes use of two time estimating techniques, the PERT and pragmatic estimations. PERT estimations require three time estimates for each activity:

1. The most probable activity time.
2. The optimistic activity time
3. The pessimistic activity time

Having these three time estimates allows for a PERT calculation which gives the estimated time for the activity. The basis of this calculation is the rule applied in PERT networks and is in fact a reasonable way to estimate. The facilitator will demonstrate the pert time estimation.

In terms of the pragmatic time estimation, the task leader, the project leader and three others should discuss the task and arrive at a judgement as to what the schedule should be. The goal of such a group estimating meeting is to arrive at a sensible consensus for how long the task will take when it is run the intended way. The logical sequence for estimating a new task is (1) to determine how many days the previous, similar task required and how many people worked on it by consulting existing company project records (2) decide how much more complex the present project is to arrive at a time duration and personnel multiplier and (3) determine the costs of the new task by multiplying the person days by the appropriate labour rates. This assumes that such records exists and underscores the importance of retaining project histories. Learners will be given the task of pragmatically estimating a schedule for project and be required to estimate time for the project.

It is also important to estimate how much the project is going to cost. Costs are usually made in currency. Cost estimates can be made top down or bottom up. Using as much detail as possible is known the bottom up method. The major project is divided into work packages small enough to allow accurate estimation. The project estimate is the sum of the estimates for all the individual packages. The top down estimate is done first quickly and judgementally, and then it is set aside. The two estimates are judged against each other as the role of the top down estimate is to provide a point of view from which to scrutinize the bottom up estimate. The facilitator will demonstrate cost estimation

It is also crucial to allocate resources for the project being undertaken. A network diagram is useful in clarifying resource allocation. There are three reasons for resource allocation. Forecasted use of some key resources may firstly indicate that there will be surplus personnel at some future period. This information helps to alert managers to utilize surplus resources or to reassign the involved personnel. Another reason for resource allocation is to avoid inconsistencies for instance using the same resource on two tasks at the same time. A network diagram can help reveal latent inconsistencies. Resource allocation can also be useful for planning purposes. A division which does a number of functions in a large company that has been provided with resource allocation information can plan to even out its workload. Each activity, critical path and project has a time versus cost trade off. Computer software to estimate costs is readily available but care must be taken to avoid entering incorrect data and making programming errors. The facilitator will demonstrate how a network diagram can be used to allocate resources.

Suggested tasks for the learner to attain competence against this specific outcome

Your facilitator will give you a hypothetical project. You are required to:

1. Demonstrate the use of a PERT time estimation using times given to you by your facilitator
2. Arrive at a cost estimate by using the bottom up estimate to scrutinize the top down estimate.
3. Draw up a network diagram showing the allocation of resources for the same project

Evidence that the learner has achieved competence against this specific outcome:

1. Project management tools (time estimates and cost estimates) are used in accordance with established standards
2. A diagram network is drawn up demonstrating resource allocation

