



Project Budget Management

PROJECT MANAGEMENT FOR
DEVELOPMENT ORGANIZATIONS

PROJECT MANAGEMENT FOR DEVELOPMENT ORGANIZATIONS

A methodology to manage development projects for international humanitarian assistance and relief organizations

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PROJECT BUDGET MANAGEMENT

A project budget is the total sum of money allocated for the particular purpose of the project for a specific period of time. The goal of budget management is to control project costs within the approved budget and deliver the expected project goals.

Our definition of a successful project is one that meets four success criteria: that the project's scope is delivered on schedule, it is delivered within budget and, once delivered, it meets the quality expectations of the donor and the beneficiaries. For project managers to be truly successful they must concentrate on meeting all of those criteria.

The reality is that most project managers spend most of their efforts on completing the project on schedule. They spend most of their time on managing and controlling the schedule and tend to forget about monitoring and controlling the budget.

The focus of this chapter is on managing and controlling the project budget throughout the entire project life cycle while relating budget control to the other success criteria.

Budget management consists of a series of tasks and steps designed to help manage the costs of the project, the steps are:

- Defining the Budget
- Executing the Budget
- Controlling the Budget
- Updating the Budget

Inputs: Inputs for the project budget management include the following documents or sources of information:

- WBS
- Project contract or initial budget
- Resource requirements
- Resource cost estimates
- Activity duration estimates
- Historical information
- Market conditions
- Donor and organization policies

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- Chart of accounts structure (COA)

Outputs: The project team will use the above information to develop three important documents for the project:

- Cost estimates by activity
- The Project Budget
- The Budget Variance Report

Inputs	Process	Outputs
<ul style="list-style-type: none">• WBS• Resource requirements• Cost estimates• Schedule• Historical information• Market conditions• Policies	<ul style="list-style-type: none">• Plan - Define and estimate the resource requirements and develops a budget• Do – Obtain approval, and publish budget, authorize expenses• Check –Budget control and performance analysis• Adapt – Update budget, set corrective actions	<ul style="list-style-type: none">• Project Budget Baseline• Budget variance report• Budget updates

Project Budgeting is performed on the initial stages of project planning and usually in parallel with the development of the project schedule. The steps associated with budgeting are highly dependent to both the estimated lengths of tasks and the resources assigned to the project.

Budgeting serves as a control mechanism where actual costs can be compared with and measured against the budget. The budget is often a fairly set parameter in the execution of the project. When a schedule begins to slip, cost is proportionally affected. When project costs begin to escalate, the project manager should revisit the Project Plan to determine whether the scope, budget, or schedule needs adjusting.

To develop the budget, the applicable cost factors associated with project tasks are identified. The development of costs for each task should be simple and direct and consist of labor, material, and other direct costs. The cost of performing a task is directly related to the personnel assigned to the task, the duration of the task, and the cost of any non-labor items required by the task.

DEFINING THE BUDGET

The project manager is responsible to estimate the budget required to complete project activities. The Project Manager should allocate all costs to project activities, and all aspects of the project, including the cost of internal and external human resources, equipment, travel, materials and supplies, should be incorporated. The budget should be much more detailed and more accurate than it was on the project proposal. In the case the project manager starts her job with a contracted budget, the project manager needs to review the assumptions made during the project proposal stage and verify that the agreed on the scope can be accomplished in the contract budget.

The Project Manager can use manual or automated tools to generate the budget estimate. The budgeting tools may be simple spreadsheets or complex budget estimating tool. For historical purposes, and to enable the budget to be refined, the Project Manager should always maintain notes on how this budget was derived. Cost estimating checklists help to ensure that all preliminary budgeting information is known and all bases are covered. The Project Manager must also include in the budget the cost of both the human resources and the equipment and materials required to perform the work. The method by which staff and products will be acquired for the project will directly affect the budgeting process.

A number of constraints, financial, political, and organizational, may dictate the methods by which resources such as personnel, equipment, services and materials are acquired. The Project Manager needs to be aware of existing resources acquisition policies, guidelines, and procedures. In addition, the preferences of the beneficiaries and/or the donor representatives may influence acquisition decisions. Information from similar past projects can be used to gain an understanding of budgeting strategies; those that were successful and applicable may be considered for implementation for the current project.

As the budget estimate is being developed, additional tasks may be identified because the work is being further defined. It may be necessary to update the WBS and the project schedule to include the activities identified during the budget estimating, such as equipment, materials, and other non-human resources.

The budget management plan is a description of the method for how expenses will be managed, including a preliminary disbursement

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schedule. For example, the accounting, expense verification, and purchase payment procedures should all be explained in the budget management plan. The plan may be formal or informal based on the needs of the project stakeholders. The budget management plan can describe the authorization levels for purchasing, donor regulations or expenses not authorized by the donor.

Resource Requirements

Resource requirements involve determining what resources (people, equipment, services, and material) and the quantities of those resources are required to complete the project.

The projects' WBS, scope statement, historical information, resource information, and policies are inputs used to determine the resources for the project. The main output is a list of resource requirements that provide the basis for budget estimating and budget controls, and provide valuable information to the project resource management process. There are four typical types of resources under which all requirements can be grouped:

- **Human or Labor resources;** including consulting services, consist of the right people with the expertise and skills needed to complete the activities on the project schedule. People may come from the organization, or hired for the duration of the project. People skills also include consultants who bring a high level technical expertise that is not found in the organization or in the local labor market. The project will develop a list of the human resource requirements detailing the expertise level, areas of experience, education and language requirements. This information will be used in the Resource management process to acquire or contract the right people. For example the following list the human resources needed by a project:

Project – Human Resource Requirements

Personnel	Units	Months
Project manager	1	12
Project staff	2	11
Administrator	1	12
Driver	1	10
Technical Advisor	1	8
M&E specialist	1	10
	Total	7

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- **Equipment and Material resources;** equipment include all the specialized tools needed by the project, from water pumps to electrical generators that will be used by the project or delivered to the beneficiaries, it also includes the need for vehicles and office equipment such as computers and printers. The materials include a wider category of requirements such as utility services such as electricity, telephone lines, access to the internet, office material, office space and used by the project. The material may also include building materials that will be used to build facilities, or food and medicines that will be delivered to the beneficiaries

As a final output of this exercise the project will have a complete list of all the requirements needed for the project, this can be in the form of a spreadsheet organized by either the order that came from the WBS or by the organization's or donor's chart of accounts.

Example of a requirements list using a COA or all the construction materials needed by the project

Account 5300 - Training Materials

Material	# of Units
Books and Manuals	100
Writing instruments	100
Notebooks	100

Account 5101 – Consulting Fees

Consulting	# of Units
Monitoring and Evaluation Consultant	30 days
EPI Info Consultant for data analysis	40 days
Nutritionist Trainer	20 days

A popular format used to capture and facilitate the identification of requirements and estimate the project budget is the use of Unit Cost Analysis (UCA) which is essentially a worksheet for each activity on the WBS that lists the labor, equipment and materials needed. The example below shows the requirements for a training activity.

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Code No TR-121 -Activity name: Classroom Training for 20-30 people

Requirement	Unit	Description	Units Required
Labor	Day	Trainer	1
	Day	Facilitator	1
Equipment	Day	Transportation	2
Material	Piece	Manuals	20
	Piece	Pencils	20
	Piece	Notebooks	40

One advantage of the above format is that the project can track the expenses by activities and can develop a better estimate of the project costs for each objective.

Budget Estimate

Once all project requirements have been documented, the next step is to determine the costs of each requirement which will result in the creation of the project budget. A cost estimate, which is the process to approximate the costs that the project will spend to get or use the project resources

Budget estimates are obtained from the people responsible for managing the work efforts. They provide the required expertise to make the estimate and provide buy-in and accountability during the actual performance of the activities. The team members identify people or labor categories required to perform the work and multiply the cost of the labor by the number of hours or days required to complete the task, as discussed in schedule management. Determining how long the task performance takes is the single most difficult part of deriving a cost estimate. The labor costs should factor in vacation time, sick leave, breaks, meetings, and other day-to-day activities. Not including these factors jeopardizes both schedule and cost estimates. Non-labor charges include such items as material costs, travel, computer equipment, and vehicle costs.

As with developing a project schedule, documenting assumptions made while developing the project budget are critical to the success of the project. Without a clear documentation of these assumptions, tracking the budget is not only difficult but risky.

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If, for example, a budget assumed that the material would be acquired at one price, but months after the project has started the cost of the material has increased due to market, which creates a budget problem. If the assumption is not documented, the project manager may inadvertently increase project costs and unknowingly and may jeopardize the chances for the project's success.

Development of project budgets typically requires more than one person. A good process is to have the same people who reviewed the WBS activity list and schedule review the budget. Upon completion of a draft budget, interview the team and determine if the work descriptions, schedule, and associated budgets are complete and accurate.

In addition to estimating the budget the project needs to take into account all corresponding taxes, fees or other expenses don't relate to resources. This will help give a total view of the project budget.

There are three types of budget estimates that occur during the project cycle, these estimates – rough order of estimate, contract and definitive, vary primarily on when they are done, how they are used and how accurate they are.

- **Rough estimate**, Project managers develop the first budget estimate used before or during the project initiation phase; to get a quick estimate of what would the costs of the project be to see if there is an interest in the organization or donor. It provides a rough idea of the project budget, estimates are based on high-level objectives, provides a quick view of the project deliverables, Most rough estimates, depending on the project, have a range of variance from -25% to +75%. The project manager shouldn't invest too much time in creating these initial estimates. Rough estimates, are simply used to have a good look at the project's initial perceived costs, and should not be used as a definitive estimate or an estimate for RFP purposes
- **Contract estimate**, is more accurate, it is formulated late in the project's initiation stage, it's done either from the donor's RFP requirements, which sometimes includes conditions and formats on how to present a budget – such as an account code. It is based on analogous estimating—taking budget lessons learned from a similar project and applying them to the current project. The contract estimate, starts from objectives and works its way down into the project details. Like the rough estimate, this estimate should include

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conditions, a range of variance, and any assumptions that went into the calculations. A contract estimate is quick, but not very accurate. The range of variance in the budget estimate is from -10 percent to +25 percent. This is the estimate that most of the time goes into a proposal and it's the basis for project negotiations between the donor and the organization.

- **Definitive Estimate**, is the most accurate of the estimate types, but takes the most time to create. The definitive estimate makes use of the *work breakdown structure* (WBS); which is a deliverables-oriented decomposition of the project scope. This type of estimate is usually made during the planning phase of the project to get detailed information on all the project costs and it uses the organization chart of accounts to track costs in the accounting system. The definitive estimate is used to for estimating final project costs and used for making purchase decisions where the actual costs are required before making payments. The definitive estimate is used throughout the project life cycle and updates as soon as new information is made available. The accuracy of this estimate is normally -5 percent to +10 percent, meaning the actual costs could be 5 percent less or 10 percent more than the definitive estimate.

Type of Estimate	When	Why	Accuracy
Rough Estimate	Pre-proposal	Get a quick idea of the project costs	Low -25%, +75%
Contract Estimate	Initiation Phase	RFP responses and donor negotiations	Medium -10%, +25%
Definitive Estimate	Planning Phase	Monitor actual costs and purchases	High -5%, +10%

There are four basic methods to estimate a budget: analogous, top-down, bottom-up and parametric estimating.

- **Analogous**, this estimate technique uses the actual costs of a previous, similar project for the basis for estimating the costs of the current project. This method is generally less costly than others, takes less time but is less accurate. Analogous estimates are most reliable when a previous project is similar in the objectives and activities to the current one. Additionally the people preparing the estimates must have the required expertise to determine if certain activities will be more or less expensive on the new project.
- **Top-down** estimate, it is a budget estimate when the total project budget is known and the project needs to know the costs of each

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individual activity, in this scenario the project determines the number of activities or outputs the project can produce with a given budget. A fixed budget is broken down using the WBS to determine the number or quantity of activities that can be achieved with the budget. The project may decide to reduce or increase certain activities or reduce the number of WBS levels to fit the budget limitations. Top down uses actual budgets from activities in similar past projects.

- **Bottom Up** estimate requires estimating the individual activities and the cost of each input and is adding them up to get the project total. A detailed WBS is needed to determine all the activities in the project and determine all required resources such as personnel, equipment and materials. Staff responsible for an activity or with expertise in a specific area develops the estimates of the lowest level of the WBS and all estimates are added to create estimates for each higher level of the WBS and finally for the entire project. In this technique the estimate starts with a fixed number of activities and the estimate calculates the total budget.
- **Parametric** estimates use standardized parameters that define the costs of an activity or task for a specific rate or output. For example the costs of training one person are a rate that can include people, material and equipment costs that once it is multiplied for the required number of people that need to be trained, gives the total budget for the activity. For this example the parameter may include the type of location, length of the training. Parametric model is quite popular in construction projects, costs can be estimated based on square meters of construction to arrive at the total cost for a building. The accuracy of this method depends on the data available and whether or not the model can be scalable to different conditions.

Budget Development

This step involves putting it all together, including information from the organization about cost recovery fees, shared cost pools, taxes, fees, and donor regulations or restrictions.

This step also includes the creation of a document that defines budget authority and control mechanisms; the project budget management plan.

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The project budget is used to communicate what amounts will be spent on categories of resources within a given time period. Most project budgets are broken down by month.

- **Chart of Accounts**, The budget is usually managed in two formats, a donor format that follows the accounting reporting requirements set by the donor and the organization's own accounting reporting formats to use to help aggregate accounting information. A chart of accounts is a list of all accounts tracked by a single accounting system; it is designed to capture financial information to make good financial decisions. Each account in the chart is assigned a unique identifier, typically an account number. Each account in the chart is classified into one of the five categories: Assets, Liabilities, Equity, Income and Expenses. A project budget will use the Expense accounts to track project expenses. The organizations accounting department is more interested in tracking the other accounts such as assets, liabilities, and income. An organization has the flexibility to tailor its chart of accounts to best suit its needs, including adding accounts as needed.
- **Budget Reports Requirements**, reporting requirements come from three sources: the donor, management and the project. The donor has specific reporting requirements of the project budget; these include reporting on the donor's chart of accounts, following the donor's fiscal year and the current reporting requirements. The organization's management also has some similar reporting requirements, requiring the use of the organization's COA so that all project financial information can be aggregated; a specific fiscal year and reporting in the currency used by the host country and the currency used by the organization's headquarters, For example, Pesos and Euros. Finally he project must determine the reports it will need to properly manage the budget and ensure that all activities are using the assigned budget resources as planned. A good practice is to develop a table that lists all budget reporting requirements internal and external to the project and the dates or periods when these reports need to be available.
- **Budget Management Plan**, is a document that describes how budget variances will be managed at the project, the level of authority for approving changes to the budget and the process to request changes to the budget. The plans can be as simple as a one page document or complicated to include detailed policies and

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procedures. Each organization must follow its own internal processes to define the who, when and how to manage the project budget.

Budget Approval

The final steps in estimating the budget are getting approval. The completed project budget should be reviewed by the project team and be reviewed by the representative from the finance department. Once the project budget has been completed the next steps is to get approval for the project budget, this occurs at three times during the project lifecycle, During project negotiations with the donor which leads to the contact budget, during the planning phase of the project when the project budget is developed in more detail, following the organization chart of accounts, and becomes the baseline budget.

Approval of the project budget can result in negotiations between the organization and the donor, depending on the size of the budget these negotiations can take some time before the budget is approved and a contract is signed.

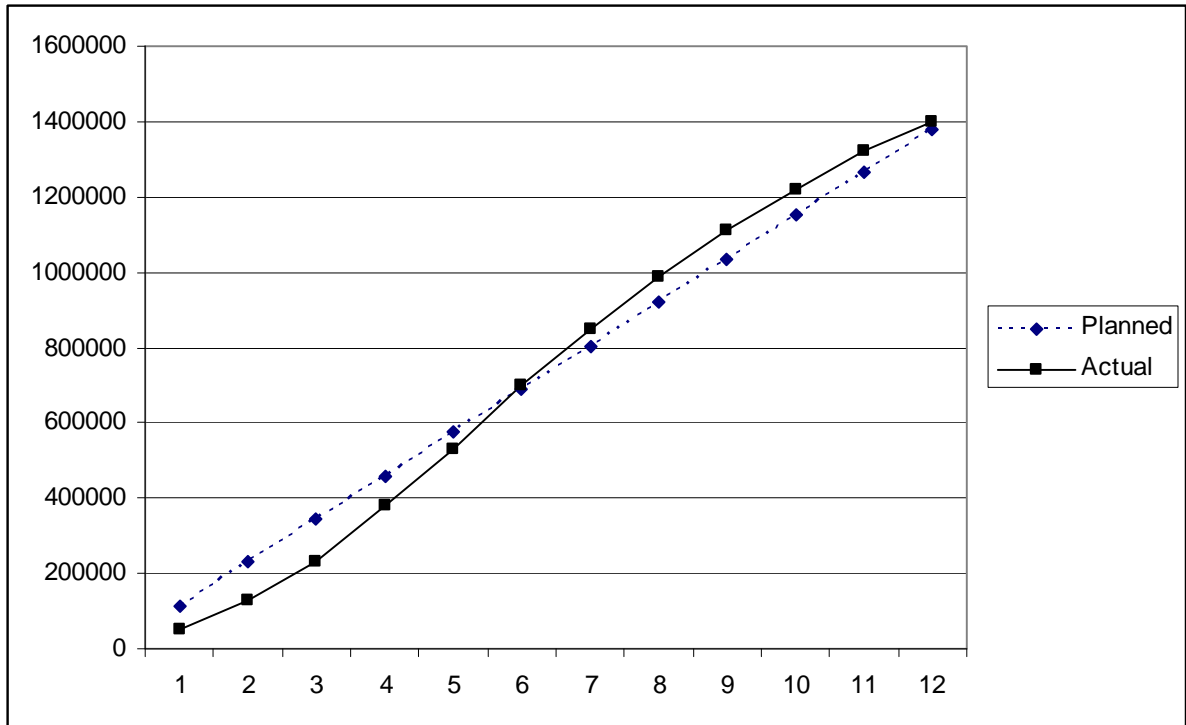
EXECUTING THE BUDGET

Budget Baseline

Once the project budget has been reviewed and approved the next step is to create a budget baseline, the baseline is a time-phased budget that project managers use to measure and monitor budget performance. The baseline will be used to compare with the actual costs incurred by the project as it makes progress, every month new data come from the expenses in personnel, purchases of goods and services and other project expenses such as benefits and shared costs.

The budget baseline will be used to control the budget using the Earned Value calculations to determine how the project is performing according to the progress made. Usually the total project is divided the total months/years of the project duration. One of the problems with this approach is that project seldom follow a linear progression. Most project budgets follow an S curve progression in which the initial months the project doesn't incur in many expenses, the chart below shows an example of a project budget chart in which the planned budget is a dotted line and the actual budget is shown as a solid line.

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Figure, the project S chart

The problem with the above baseline is that the project will have times when the funds are requested but not used and times when the project spends more than what has been requested from the donor, this can lead to variances in the project cash flow that only organizations with large pockets can sustain until all project costs have been recovered. The idea is to use a baseline that most closely approximates an S curve to reduce the variances in cash flow

Publish Budget

The approved budget needs to be communicated to all people that will use it to monitor, control and make decisions based on the information about the budget. The list of people comes from the stakeholder communication needs developed in the project communication management plan. Not all project stakeholders need to have a copy of the budget and in some instances the organizations or the donors regulations may dictate who has access to the budget information, as these may contain private information such as salaries or benefits.

An important element of publishing the budget is to include information on the assumptions that were made to estimate the budget, it is important that the donor, management and the project team understand these assumptions as they will be revised as the

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project makes progress and if not treated accordingly can create unnecessary risks to the project. For example, the donor may require the purchase of a specific brand of vehicle and the costs is based on the assumption that the vehicle can be acquired in the country at the cost quoted by a vendor, but if the vendor is not able to provide the same vehicle at the costs originally quoted, due to changes in market conditions, then the project will need to incur in additional expenses to import the required vehicle as requested by the donor. BY making the assumptions explicit the project has a better opportunity to negotiate alternatives and propose solutions.

Budget Execution

Executing the budget is the action of authorizing the expenses approved in the project budget, the project manager then initiates to carry the activities that lead to hiring project staff, purchase of equipment, materials and services, all according to a project procurement plan developed during the resource management process. This step occurs after the budget has been approved and the project authorized to start its activities according to the project plan. At this moment the finance department of the organization and the donor has established the disbursement schedule that will put financial resources on a bank account available for the project.

Budget Targets

Project budgets are usually set against finance department guidelines to track against established targets such as a fiscal year, but the project may need its own targets to monitor for specific areas of activities of the project. One of these areas is the project milestones set in the project schedule and its corresponding set of activities. By setting budget targets against a schedule the project will be able to have a better opportunity to monitor and control the budget. For example a phase target is set at \$60,000 for starting March 1st for three months. On May 30 the budget monthly reports that \$55,000 were spent, which may indicate the project is on track, but a revision of the activities for that phase shows that only 60% have been completed, and with only \$ \$5,00 left the project will not be able to complete the activities of the phase. The project manager needs to set budget targets to monitor the performance of the project work.

Authorize Expenses

Authorizing expenses follow the organization's policies that determine who can authorize expenses on behalf of the project and the limits of the authorizations, based on the amount some organizations choose to have different levels of authorization, for large amounts two or three signature may be needed to ensure the donor that proper controls are applied to safeguard the correct use and application of the funds received from the donor. The project manager usually approves the purchase orders for all project expenditures for material, equipment and services following the project schedule plan and the resource requirements list.

The project will usually rely on the financial and accounting procedures that the organization has in place for purchasing good and services, especially when purchasing items of high costs. The section Resource management discusses the procurement plans in more details and the processes the project gets involved to obtain vendor quotes and manage vendor contracts.

BUDGET CONTROL

Monitoring and controlling the project budget ensures that only the appropriate project changes are included in the budget baseline, that information about authorized changes are communicated and corrective actions are taken by those in charge. The action of budget control is also a process of managing the budget.

Budget management is the process by which costs or expenses incurred on the project are formally identified, approved and paid. Purchase order forms are completed for each set of related project expenses such as consulting services, equipment and material costs. Depending on the authorization level the purchase order forms are approved by the project manager and recorded by the finance unit for tracking, donor reporting and auditing purposes.

Controlling the budget is a critical responsibility of the project manager, and it is equally important that the organization defines the roles and responsibilities of all parties involved in budget control. Usually the finance department's responsibility is to record, track and monitor the budget from a cost accounting perspective and generates reports for the organization management and the donor as part of the

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compliance requirements such as ensuring the correct accounts are properly used and recorded.

The finance unit is not responsible for monitoring if the project budget follows the project goals and targets, that is the responsibility of the project manager who needs to use the reports and monitors the budget and determine if the resources are used according to plan and identify any deviations, changes or modifications to the budget.

The emphasis on project budget control is fundamentally different from the traditional cost accounting. Cost accounting deals with issues involved in reporting the expenses to the correct components of the established budget cost centers and account codes and focuses on collecting accurate actual cost information with specific attention to the elements of the code of accounts. On the other hand project budget control, on the other hand, focuses on areas of described in the WBS.

Cost accounting is not the main concern of the project manager it is the expenditure related to the specific deliverables of the project. Cost accounting usually focuses on historical information, whereas a project budget control focus on improving performance and predicting the future.

Small projects may work through the procurement and accounting unit of the organization's main financial function. The project manager usually maintains basic information as part of the project's control and reporting activities.

Larger projects may need their own finance function capability. Large, complex or joint-partnership projects might even need a professional accountant and a team to deal with the volume of work. Some projects under a joint partnership are run as entirely separate units requiring their own legal, financial and organizational structure. The project may even use accounting software to manage the project's finances independently of the organization's overall accounting, but the data would be consolidated into the parent organizations' books.

Budget Reporting

Reports from the finance unit, request for purchase approval from the procurement unit, and reports from the project team are used to track the project budget and provide a picture of how the project spending is tracked with the budget. The project will need to determine the format

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and the content of the budget reports it needs to control project expenses.

The typical report contains a list of all budget accounts (COA) and columns that list the budget baseline, the cumulative expenses to date, the balance to date and the burn ration or how the budget is spent according to the yearly budget plan. Below is a simple example of a budget report:

- **Expense Reports**, reports provide the expenses to date by account, project number and funding code.
- **Variance Reports**, show the difference between what has been expensed and the approved budget, the balance for each account.
- **Burn Ratio Reports**, show the rate at which the project is using the budget according to the original plan, a quick method to see if the project budget is on track.

Project reports contain direct project expenses, administrative or overhead expenses and personnel costs including benefits.

Budget Performance

Budget performance is the activity to see if the project expenses are being executed according to the budget plan and helps identify deviations and develop corrective actions. The method uses to monitor the performance of the budget depend on the accounting system used by the organization to track costs expenses. If the project only uses the accounting system to record what funds are available, the picture may not be completed as the accounting system may only show actual expenses and doesn't take into account the contracts, purchase orders and other monetary commitments that are still not accounted for on the general ledger.

Accounting reports typically report on invoices that have been paid to date. The project manager needs to track actual expenditures and all monetary commitments made to vendors or consultants in the form of contracts or purchase orders that will only be recorded in the accounting system once the invoices are paid. Otherwise, by just looking at the accounting reports may give the impression that the project has more money that what is actually available.

Earned Value Management

Earned Value Management (EVM) is a project management technique that measures project progress objectively. EVM combines measurements of scope performance, schedule performance, and cost performance, within a single integrated methodology. EVM provides an early warning of performance problems while there is time for corrective action.

EVM improves the definition of project scope, prevents scope creep, communicates objective progress to stakeholders, and keeps the project team focused on achieving progress.

EVM emerged as a financial analysis specialty in the United States Government programs in the 1960s, but it has since become a significant branch of project management. EVM can be scaled to fit projects of all sizes and complexity.

One of the most powerful aspects of EVM comes when a project measures actual costs to earned value. For example: as of 10/1/07, a project, having a budget of \$1,000,000, is planned to be 50 percent complete. The organization's finance manager, looking at the financial data that show that \$400,000, or 40% has been spent on the project to date, can report to management that the project is in good financial shape. However, the project manager, measuring actual percent complete, knows that they have only accomplished 30% of the project scope. The project is not only behind schedule, but has spent \$400,000 to only do \$300,000 worth of work. The finance manager is using only the accounting view of the project progress and its data don't take into account the work accomplished. The project financial condition (the cost variance) must be measured against the actual accomplishment, not the planned accomplishment. This is the basis of cost variance measurement and reporting in EVM

EVM involves calculating three values for each activity or objective from the project's WBS (it can also be used on the total project value)

- **Planned Value (PV)**, is the total budget for an activity or the planned budget to be spent on an activity during a give period. If an activity is scheduled to last 5 days and will have a total cost of \$1000, then each day costs \$200. To get the planned value at a given date one needs to compare the value between the start date

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and the status date, For example, on the third date the planned value of the activity is \$600 or \$200 times 3.

- **Actual Cost (AC)**, is the total direct and indirect costs incurred in accomplishing work on an activity during a given period. For the example above the actual costs incurred for each day of work, even though the example above showed a cost of \$200 per day, the project may have incurred in \$100 of additional costs, making the actual costs in the third day higher than the planned \$600. Actual cost data comes from the accounting records.
- **Earned Value (EV)**, is the percentage of work actually completed multiplied by the planned value. Using the example above the project estimates a 50% completion, multiplied by \$600 gives a value of \$300 for that activity on the third day.
- **Cost Variance (CV)**, is the value obtained by deducting the project actual costs from the earned value, it shows the difference between the estimated cost of an activity and the actual costs of the activity. A negative number means that the work done cost more than planned, a positive number means the work done cost less than planned. IN the example the Cost Variance will be $\$300 - \$700 = -\$400$ a negative value meaning the work cost more than planned
- **Schedule Variance (SV)**, schedule variance shows the difference between the scheduled completion of an activity and the actual completion of that activity. SV is calculated by deducting planned value from earned value. A negative schedule means it took longer than planned to perform the work of an activity, a positive schedule variance means it took less time than planned to do the work. Using the example the SV will be $\$300 - \$600 = -\$300$ a negative value meaning it took longer to do the activity that originally planned.
- **Cost Performance Index (CPI)**, is the ratio of earned value to actual cost and is used to estimate the projected cost of completing the project. A CPI equal to one or 100% means the planned and actual costs are equal or the costs equal the budget. A value of less than 1 or less than 100% means the project is over budget, if the CPI is greater than one or more than 100% then the project is under budget, a valuable indicator to know if the project budget is being used as planned and helps the project manager avoid surprises at the end of the project.
- **Schedule Performance Index (SPI)**, is similar to the CPI, is used to estimate the projected time to complete the project. A schedule performance index of one or 100% means the project is on schedule, a value greater than one or higher than 100% means the project is ahead of schedule, a value of less than one or less than 100% means the project is behind schedule.

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Negative values on the performance indexes mean the project is either running out of money faster than planned or will take longer than planned, these are the value a project manager needs to monitor. The project manager may choose to calculate the earned value for all activities of the project and then add the values to get the project value. Depending on the size of the project and the need to measure these values the project manager may choose to either use EVM on all project activities or at the objective level of the WBS. It's important that the organization's accounting system is able to report costs by activity or objectives, if not then EVM can only be used at the total project level, making it difficult to identify which activities cost more and which one are costing less or ruing late or is ahead of schedule.

The table below summarizes our example on EVM for an activity that last 5 days, budget at \$100 and performance analysis is done on day three:

Activity	Day 1	Day 2	Day 3	Day 4	Day 5	Total to date
Planned Costs/day	\$200	\$200	\$200	\$200	\$200	\$1000
Planned Value (PV)	\$200	\$400	\$600	\$800	\$1000	
Expenses per day	\$200	\$300	\$200	0	0	\$700
Actual Costs to date			\$700			
% completed			50%			
Earned Value, EV			\$300			
Cost Variance, CV			-\$400			
Schedule Variance, SV			-\$300			
Cost Performance Index, CPI			0.42			
Schedule Performance Index, SPI			0.50			

Term	Formula
Earned Value, EV	$EV = PV \text{ to date } \times \text{percent completed}$
Cost Variance, CV	$CV = EV - AC$
Schedule Variance, SV	$SV = EV - PV$
Cost Performance Index, CPI	$CPI = EV / AC$
Schedule Performance Index, SPI	$SPI = EV / PV$

Example. A 12 month project is in its 4th month (33% of the time has been used), but has accomplished only 25% of its activities and has spent 41% of its financial resources according to the latest financial report. The project is at 33% planned progress. How can a project manager know if his project is on track or not?

The total budget for the projects is \$1,200,000

- A. The cost of activities planned for the 4th month is \$400,000 (33% x 1,200,000), i.e. What we should have spent based on plans. Known as the Planned Value (PV)

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- B. The actual cost of activities completed is \$500,000 (from financial reports). The actual expenditures on month 4. Or Actual Cost – AC
- C. The cost of activities delivered is \$300,000 (25% x 1,200,000), the cost of all activities completed to date. Or Earned Value - EV

The above elements are part of the Earned Value analysis; Earned Value is a performance measure that compares the amount of activities (work) that was planned with what was actually performed to determine if cost and schedule are proceeding as planned.

To know whether or not the project is on schedule calculate the following:

Schedule Variance (SV) = EV – PV , SV = \$300,000 - \$400,00 = (\$100,000). A negative number means the project is behind schedule. It has spent more time than planned to deliver the activities

Another way to calculate the variance is by the Schedule Performance Index or SPI = EV/PV, SPI = \$300,000/\$400,00 = 0.75, a value less than 1 means the project is behind schedule.

To know whether or not the project is on budget calculate the following:

Cost Variance (CV) = EV – AC (or the difference between the budgeted costs and the actual costs. For this example. CV = \$300,000 - \$500,000 = (\$200,000). The negative result indicates a budget overrun. Another way is by the Cost Performance Index (CPI) = EV/AC, CPI = \$300,000/\$500,000 = 0.6. A value less than one means the project has a budget overrun, in other words the project has spent more money than the value of the activities delivered to date.

Budget Analysis

Identify the causes for the deviations from plan. Major deviations from the budget baseline need to be analyzed to determine what caused the difference so that steps can be taken to prevent the situation from happening again in the future, or with similar projects.

- **Forecasting**, Earned Value enables the project manager to forecast the probable final cost and schedule results of the project. With Earned Value, the project does not have to wait until it is almost complete to know that it has a cost problem. Earned Value gives a project manager an “early warning” signal in time to take corrective action, in time to influence the final results by taking corrective actions.
- **What if Scenario Analysis**, Scenario analysis uses mathematical models to aid the project manager get results based on different alternative situations; a project manager can use a spreadsheet and to place different values to determine the impact on the budget for different situations that range from increasing personnel to reduce the time to complete the project, to the implications for the project budget based on currency fluctuations.

BUDGET UPDATE

Budget Changes

Updates to the budget come from approved changes to the budget. For most projects changes to the budget need to be approved by the donor, in some instances the donor can give the project a small percentage that the project can use to cover small budget modifications. In other instances the donor may have strict limitations to allow budget changes, for example the donor may specify that any unauthorized project expenses will not be covered by the donor and leaving the organization with the responsibility to absorb those charges.

It is important that the project manager understands the donor contract clauses and monitors, with special attention the accounts or

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budget items that have restrictions. Not doing so may result in losses to the project and the organization.

Other types of changes comes from causes external to the project that may limit the activities or work it needs to perform. Civil unrest or another critical event may cause the cancellation of project activities, in this case the project manager may request that the funds originally budgeted to that activity be reallocated to another activity that the project can still work.

Other changes come from the donor which may reduce the original project budget or changes caused by currency fluctuations that impact the funding available to the project.

Approved changes to the budget will need to be reflected in the accounting system used by the organization and new project budget reports will need to reflect this change.

Corrective Actions

Some project may include a predefined limit by which a project may be under or over budget during the project implementation phase, it is usually set as a small percentage of the total, if the project is above the defined limit then the project manager needs to take corrective actions to bring the budget back on track, these actions may include trade-offs that will need to be discussed with management and the donor, trade-off include reducing the scope or lowering the quality.

Corrective actions may include the use of alternative options to produce the similar output using different inputs, the project manager will implement the corrective actions and monitor their performance to see if they are effective in reducing the project expenses and help bring the project back on track. Corrective actions need to be consulted with the project team and the staff in charge of the activities so that changes are implemented.

Capture Lessons Learned

The lessons can apply to the remainder of the project activities or two future projects. For example, the initial estimates used to develop the budget may have used wrong assumptions about the time it takes one person to collect beneficiary data or poor road conditions increases the

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costs of vehicle maintenance. The lessons captured need to be written as action steps that the project will monitor and evaluate in the next reporting period. It makes no sense for a project to capture lessons if the lessons are not used.

Communicate Changes

Changes to the budget need to be communicated and incorporated in the system that track cost performance. Communicating the changes of the budget to the people that will use the information helps reduce the chances that the work will be done on activities that have been either cancelled or postponed.

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Drawing from our deep understanding of the challenges and the needs for realistic solutions that can improve the way in which projects are managed and services are delivered, PM4DEV offers the only adapted Project Management Methodology for development organizations. Our services include:

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An advanced level, hands-on course, that will give you the skills to ensure your projects are completed on time and on budget while satisfying the needs of stakeholders. You will gain a strong working knowledge on the nine processes of project management, and be able to immediately use that knowledge to effectively manage your project. Participants will work on a case study to complete all exercises. Upon successful completion of the Effective Project Management Online course participants will: Understand the nine process areas of project management, know the steps required to plan and manage each project management process and use the primary planning and monitoring documents of a project.



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It draws on the expertise of Project management professionals and provides a guide to deliver a methodology that increases the chances of project success.

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www.pm4dev.com
info@pm4dev.com