Project Management

I n this chapter we explore a concept and a practice that has grown in importance as organizations have become more complex and are continuously evolving and implementing new ideas, products, and services or seek to improve existing ones. An organization will create a project as a way to focus resources on an opportunity or issue and to serve as a way to effectively organize its efforts to achieve a specific goal or objective. In a small firm, practice, or business, a project may be the installation of a new accounting software system or the introduction of a new product or service. In large, complex organizations, several projects may be in play at the same time, with some midlevel managers whose only responsibility is the management of a stream of these short-term assignments. In the dynamic nature of today's organizational environment, project management is an important concept and tool to understand and effectively implement.

According to the Project Management Institute (PMI), 74 percent of all projects fail. The projects can fail from a processes standpoint (initiation, planning, executing, controlling, or closing), or they can fail from a weakness in project dynamics (scope, time cost management, quality management, human resources management, communications, or risk). Project management covers a wide range of topics and issues and is defined as the application of knowledge, skills, tools, and techniques to a broad range of activities to reach a predetermined goal or objective. (See Figure 11.1.)
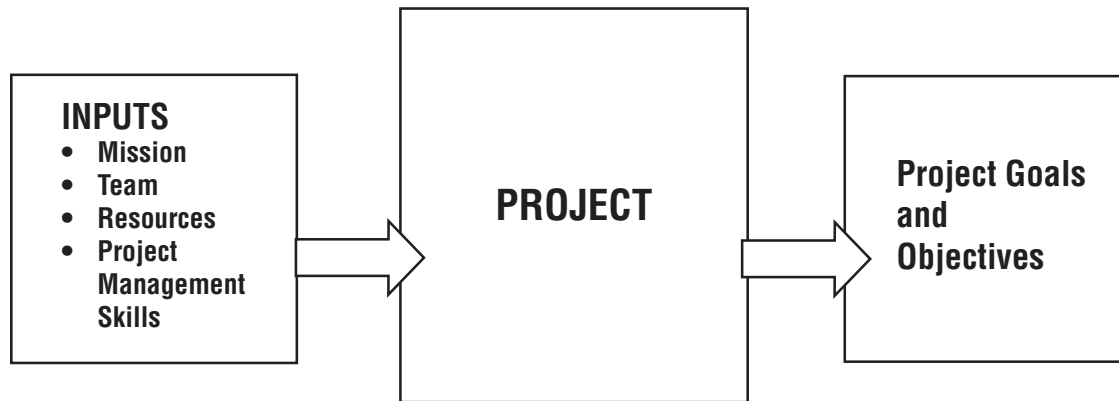
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│ INPUTS          │      │             │      │ Project Goals│
│ • Mission       │      │   PROJECT   │ ───▷ │ and          │
│ • Team          │ ───▷ │             │      │ Objectives   │
│ • Resources     │      │             │      │              │
│ • Project       │      │             │      │              │
│   Management    │      │             │      │              │
│   Skills        │      │             │      │              │
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FIGURE 11.1   Simple Project Management Process

ROLE OF PROJECT MANAGER

It may also be concluded that a considerable number of projects fail from not having a skilled and experienced project manager to manage the process. This hole is quickly being filled, however, as companies recognize that successfully managed projects increase productivity, yield a greater return on investment, increase profits, and improve customer service.

But project management isn't new. Project management coordination and planning skills have been used for centuries—even as far back as the Roman Empire. Project management has also almost always dealt with the same elemental challenges: incomplete project specifications and scope definition, insufficient labor, unforeseen challenges, or unsure funding. The role and job title of the person responsible for managing these elements, however, the project manager, was not recognized until the twentieth century.

Another reason for the importance of the role of a project manager is the increasing rate of change in the workplace. Project management skills transcend corporations and industries; with change happening at such rapid rates, whether in technology, business, or construction, project managers are increasingly in demand.

It is important, however, for all project participants to understand the process of project management. As project-based change increases, every project participant from part-time team member to executive

sponsor will be more effective in their role if they understand the process of project management.

PROJECT SCOPE AND WORK BREAKDOWN STRUCTURE

Let's begin with a discussion of the vocabulary and processes that encompass project management. The project scope involves subdividing the major project deliverables into smaller, more manageable components. Often this includes the work breakdown structure (WBS). The project scope is a deliverable-oriented grouping of project elements that define the total scope of the project. The WBS is almost like a giant task list of what needs to get done to successfully complete the project. It is often used to help confirm a common understanding of what the project scope is. It has the ability to transform one large, unique, and sometimes mystifying job into many small, more manageable tasks.

The WBS helps to define deliverables and figure out the tasks that need to get done. The WBS is also a useful tool to help monitor the progress, verify the schedule estimates, and build project teams necessary to complete the project. It lists the tasks that need to get done in a prioritized, hierarchical structure in relation to what needs to get done in the overall project. Each task should be specific enough to be able to put a person's name next to it who will be able to execute the given activity.

Some of the items on the list will be open-ended tasks. Open-ended tasks include activities that we are familiar with doing, but don't have a specific deliverable or hard product being produced. Examples of open-ended activities that might appear in a WBS are things such as "research," "perform analysis," or "interview." Another type of task might be on the list to perform but need more clarification. "Database" might be listed, but what does that really mean? Does it mean sort the database? Clean the database? Load the database? Test the database? You can see that just putting the word "database" on the list could refer to numerous activities; therefore, a greater level of detail about the task needs to be achieved.

The WBS should include a plan for the project and output quality.

Be sure to take the time necessary to get the quality high enough to meet expectations. It is cheaper to design and produce a product correctly the first time than it is to go in after development is in process and fix it. Steve McConnell, in his book *Rapid Development,* pointed out that if a defect caused by incorrect requirements is fixed in the construction or maintenance phase, it can cost 50 to 200 times as much to fix as it would have in the requirements phase. Each hour spent on quality assurance activities such as design review saves 3 to 10 hours on downstream costs.

Product scope and project scope have different qualities. The product scope can remain constant throughout the process of the project, while the project scope can change and evolve and expand. The project may also focus on the creation and delivery of a service. If there is no detailed product description, then creating one should be the sole deliverable for a project. Defining what the project constraints are (costs, schedule, resources, material, etc.) won't have any meaning unless the product specification is complete. This makes sense because if the project team doesn't have a clear idea of the product specification, they don't know what they're building or what they're working toward.

Given that a product scope is understood, then, it is important to define what the deliverables are. What is being produced? Is it a product? A service? A new design? Fixing an old problem? It is critical that the team know what they are working toward and it helps to create boundaries and focus the team on the outcome.

Deliverables can be either end deliverables or intermediate deliverables. The end deliverable is what the final outcome of the project is expected to be. The intermediate deliverables are the small pieces of the puzzle that help the team get there. An intermediate deliverable, for example, could be the creation and description of a target market, when the end deliverable is the mass media advertising campaign for a product or service.

Setting project objectives is critical. They serve as quantifiable criteria that must be met in order for the project to be deemed successful. Project objectives should be specific and measurable so that they can provide the basis for agreement on the project. Measurability provides supporting detail that may be necessary to make a strong case for a particular outcome.

PROJECT SCOPE MANAGEMENT PLAN

When the product scope is understood, a project scope management plan needs to be created. This plan describes how the project scope will be managed and, therefore, any changes in scope will be integrated into the project. It also serves as an assessment of the anticipated stability of the project scope. In other words, it documents the characteristics of the product or service that the project was undertaken to create. As shown in Figure 11.2, the project scope management plan begins at initiation of the project and moves through scope planning, scope definition, scope verification, and scope change control (should this be needed).

The initiation phase includes beginning to develop the scope statement. The scope statement serves to put some boundaries on the project and keeps the scope from increasing as you delve into the meat of the project, which is a common phenomenon. The scope statement should describe the major activities of the project so clearly that it can be used to assess if extra work is necessary as the project process gets going. More simply, it serves to detail exactly what has been agreed to from the beginning. It is understood that changes in the project scope require changes in the cost, schedule, and resource projections as these assumptions are made during the project planning and scope writing. Additionally, the scope statement can be used to help define where the project's placement is in a larger picture. This is the ideal place to clarify the relationship of this project to other projects in the total product development effort.
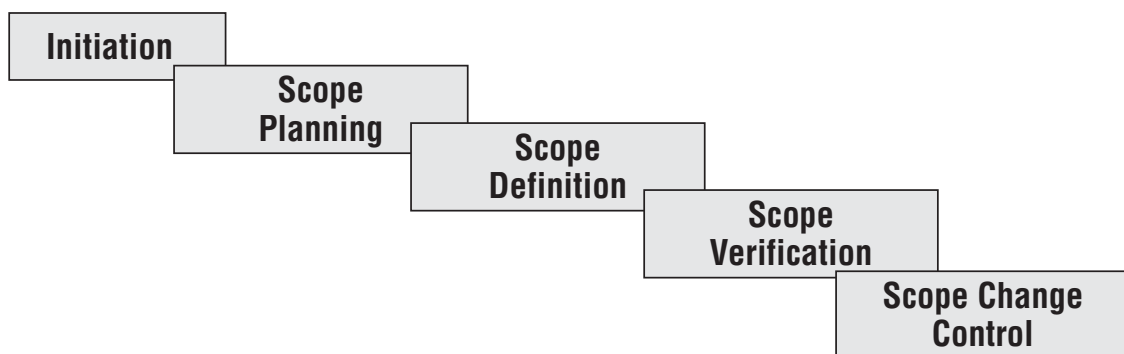

FIGURE 11.2 Project Stages

Also considered in the initiation phase is the overall strategic plan of the organization. All projects should be supportive of the performing organization's goals, and having a strategic plan helps to make this possible. The project selection criteria are also very important to clarify in this phase. This is a good time to look at historical information and look to the results of previous project selection and performance.

The elements included in the initiation phase may include creating a project charter. The project charter is the product description and business needs the project addresses. Identifying and assigning the project manager should also be one of the results of the initial phase. It is important as well during this phase to identify constraints that will limit the project team's options and also identify the assumptions. The assumptions can include factors that will be considered true, real, or certain during the planning process and that will be more rigorously examined in the risk analysis phase of project planning.

The scope planning phase includes the scope statement (scope justification, project product description, project deliverables, project objectives, and supporting detail).

When the major project deliverables are subdivided into small, more manageable components, the phase is called scope definition. The scope definition phase is also where you'll see the creation of the WBS.

The scope verification portion of the system is what may be used to determine if the job is complete. The process can actually proceed as soon as a deliverable is complete and can be measured, examined, and tested. Once verification is attained, you can move on to the next component of the project.

After formal acceptance of the scope (scope verification), scope change control takes place. It is likely that changes will occur after a project is under way. This phase influences factors that create scope changes to ensure that the changes being made are beneficial.

A change control system will include:

✔ Recognizing that a change is needed.

✔ Reviewing all requested changes.

✔ Ensuring that any change is beneficial.

✔ Evaluating the benefits of the requested change.

✔ Identifying alternatives that would achieve the same result.

✔ Identifying all impacted tasks.

✔ Analyzing these impacts and how they affect project performance in terms of time, money, and scope.

✔ Approving or rejecting the request.

✔ Communicating the approved changes to all stakeholders.

✔ Changing the baselines for performance monitoring.

✔ Updating the project scope definition.

✔ Implementing the change.

✔ Documenting the change.

It is critical that all change gets documented by the client prior to the change taking place. The agreement should detail not only what changes need to take place, but also how each change will occur and what the impact of the change will be on the overall scope.

Jeb Riordan created a useful flowchart to describe the typical change control process. It is easier to picture how the decision flows through question points on a diagram, and it makes the change control process seem a lot more intuitive.

Once a need for a change has been identified, the request for change needs to be reviewed. If it is deemed a bad idea to make the change suggested at that time, the issue is registered but there is no change order created or acted upon. If it is deemed a good idea to make the change at the time, it must be determined if the impending change will impact the project plan. If it will not impact the project plan, you can go ahead and make the change. If it will impact the plan, the impact must be assessed and clearly identified, a change order must be prepared outlining the anticipated changes, and then that change order must be approved before the change can be made.

PROJECT SCHEDULE

In order to adjust for things such as scope changes, we need to be sure that there is a solid project schedule in place. The project scheduling process needs to include the activity definition, activity

sequencing, activity duration estimating, schedule development, and the schedule control.

Examples of the primary tools used for project scheduling are Gantt charts, or Critical Path Method (CPM), PERT (Program Evaluation and Review Technique). Critical Path Method and PERT are powerful tools that help you to schedule and manage complex projects. They were developed in the 1950s to control large defense projects, and have been used routinely since then.

Gantt charts are simply a visual look at the major activities involved in a project, arranged so that the viewer will see the time-based relationships of the component parts of the project. Figure 11.3 is a Gantt chart showing the activities involved in the purchase and implementation of a new accounting software system.

CPM helps you to plan out all tasks that must be completed as part of a project, and it acts as a basis both for preparation of a schedule and for resource planning. When you are managing a project, this tool can help you monitor the achievement of your project goals to date. It also helps you to see where you can take action to put a project back on track if it has fallen behind or deviated from its course.

	March	April	May	June Weeks 1–2	June Weeks 3–4	July	August	September	October	–	January	June	December	Person/Team Responsible
Assessment of the needs and tasks the new software would perform	X													Joan lead/ accounting team and managers
Research the programs available in the market	X													Accounting team
Request proposals from software vendors		X												Joan
Evaluate proposals			X											Joan/ accounting team
Reassess needs given capacity of software packages			X											Joan lead/ accounting team and managers
Make selection			X											Joan lead/ accounting team and managers
Install software				X										Sam/IT team
Train staff on use of software					X									Sam/IT team

FIGURE 11.3 Sample Gantt Chart

CPM is useful because it:

✔ Identifies tasks that must be completed on time for the whole project to be completed on time.

✔ Identifies which tasks can be delayed if necessary if resources need to be allocated somewhere else to catch up on missed tasks.

✔ Helps to identify the minimum length of time needed to complete the project.

PERT is a variation on CPM that takes a slightly more skeptical view of time estimates made for each project stage. To use it, you estimate the shortest possible time each activity will take, the most likely length of time, and the longest time that might be taken if the activity takes longer than expected.

Project scheduling essentially takes the definition of what the project is and breaks it down into smaller, more manageable tasks. It also identifies the relationships of each of the tasks to the other tasks. It illuminates in complete detail the actions that need to take place in order for the project to get accomplished. It then ensures the necessary order by using information about the activity duration as well as any external constraints that might exist. Finally, the project schedule ensures that the deadlines are met given the identified constraints such as labor, materials, and other resources.

PROJECT BUDGET

The next step is figuring out the project budget. Project budget estimates can be derived by using a variety of techniques ranging from pure estimation based on experience and knowledge to complicated financial models. An accurate, detailed cost estimate is necessary as soon as the project concept gets approval. The cost estimate created will become the standard for keeping the project costs in line and can be used by the client, the management team, the project manager, and the project management team.

A detailed and accurate budget also helps forecast the project

funding needed and during which phase it will be needed. As the project progresses, the cost information will also be used to help control the project, monitor the progress, identify potential problems, and help to find solutions.

The calculation of the budget isn't what's difficult. We all know that it's just a matter of adding up the numbers that we have associated with the costs of performing different tasks. The trick is getting those numbers to be as accurate as possible before the expenses have been incurred. The source of data for the budget, then, is where most of the time will be spent when it comes to the budgeting process.

The first thing to think about is the internal labor costs. One of the biggest oversights that occur during the budgeting process is leaving out the cost of internal staff. This can be derived by using the detailed planning model to figure how much of each person's time is going to be needed to get the job done. Then you can use the burdened labor rate. Although the hourly rate of each salaried employee may vary, you can look to your finance department to create a standard burdened labor rate. This rate is calculated by taking the average cost of an employee to the firm. It includes the costs for wages, benefits, and overhead. Most company finance departments keep this established rate on record so it is not necessary to calculate and recalculate it from the project manager's point of view.

Getting an accurate cost for internal equipment used can be more complicated. If you will be purchasing and using equipment for a single project, then it is fairly straightforward to add up the cost of each piece and add it to the budget. If, however, you will be using equipment that gets used on multiple projects, you should use a unit cost approach to estimate how much of the equipment will be used for a specific project. One way to do this is to spread the cost over the time period of the expected use. Do you expect to use the equipment on 5 projects? 10? 50? Based on these assumptions you can create a unit cost, or hourly rate, for using the equipment, which can be applied to a project estimate.

External labor cost and equipment costs are usually simpler to figure out. This is because contractors have already calculated their costs for products or services ahead of time. Sometimes these rates can be negotiated. Under a cost-plus contract, the labor and equipment rates are written into the contract and the vendor bills the project for

the amount of labor, equipment, and materials supplied to the project. Once this has been figured out, you just add it to the overall cost estimate for your budget.

The final piece to consider is the cost of materials. Material costs will vary widely depending on the nature of the project that you are working on. The range can expand from materials needed to construct a building to the materials needed to develop software. The percentage of the total costs attributed to materials varies just as widely. The first place to look for the expected costs of materials is in the product specification or service plan.

Once the project's schedule and costs have been determined, you may generate a cash flow projection. Again, it is important to realize that estimating the costs that go into the budget is the responsibility of all of the project stakeholders. A cooperative approach yields more accurate results and it helps to reduce the uncertainty of the project.

RISK MANAGEMENT

Next, it is time to manage the project's risk. Not many project managers realize that managing risk is their primary responsibility, but they tend to do it without even thinking about it. Risk management is the total process to identify, control, and minimize the impact of uncertain events. The objective of the risk management program is to systematically reduce risk to increase the likelihood of having the project objectives met. In effect, as project managers know, all project management is risk management. As mentioned earlier, outside obstacles are assessed and accounted for when planning the project.

The project definition takes into account a lot of risk management activities. The project definition establishes what the goals and constraints for the project will be. In this process it is critical to identify what the risks for your project are. You must identify the sources of risk in your project. You must then develop a response to each risk by examining the potential damage and the degree of likelihood of that risk taking place. Finally, you should implement the strategies that you develop as a response and monitor the effects of whether these changes will impact the project. If there are changes that need to take place, be

sure that all stakeholders are again apprised of the situation and noti-
fied of what changes will take place.

At the end of this whole process, you end up with a solid project
plan. You have identified the key or required staff; the key risks includ-
ing their constraints and assumptions (and have planned responses for
each); the scope and schedule management plans; the project charter;
a description of the project management approach or strategy; a scope
statement that includes project deliverables and the project objectives;
WBS to the level at which control will be exercised; cost estimates,
scheduled start dates, and responsibility assignments that stem from
WBS; performance measurement baselines for schedule and cost; and
finally, major milestones and target dates for each.

PROJECT ESTIMATION

Although estimation, by definition, is making an attempt at forecasting
the future and trying to predict the time and money necessary to pro-
duce the stated result, it is important for your stakeholders that you
get good at accurately estimating when a project will be done and what
will be needed to ensure its completion. This means getting the right
people on board to help make the estimate, making estimates based on
personal or institutional experience, and taking the time and making
the effort required to make good estimates.

One technique used for estimating is called phased estimating.
This means that cost and scheduling commitments need to be given
for only one phase of the project at a time. Not surprisingly, this is a fa-
vorite estimating technique among project managers because it doesn't
require the whole project time line and costs to be determined all at
once, which is considered unrealistic for some; they prefer to base the
future phases of the project on how the first one or two phases go. The
uncertainty that every project faces at the beginning diminishes as
the project progresses. This approach takes place by first making an
order-of-magnitude estimate for the full development life cycle, with
a detailed estimate for the first phase of the project.

The conclusion of the first phase also means the first meeting of
a phase gate. Phase gates specifically refer to decision points for eval-
uating whether the project development should continue. Reaching

the first phase gate also means the beginning of the second cycle or phase of the estimate. Once sign-off has been granted for the first phase, another order-of-magnitude estimate is made, along with a detailed estimate of the second phase. And the cycle continues like this. Through this process, the order-of-magnitude estimate gets more and more accurate and each phase requires assessment and evaluation in order to continue.

Another technique used in project estimation is called apportioning, or top-down, estimating. With this method, a total project estimate is given and then a percentage of the total project is assigned to each of the phases and tasks of the project. The WBS can provide a good solid breakdown for using this estimation technique.

In order for this method to be as accurate as possible, however, it is critical that, first, the overall project estimate is correct; otherwise the project estimates for the smaller pieces won't be accurate. Second, apportioning is based on a formula derived from historical data/experience of other similar projects. Because of this, it is critical that the previous projects be very similar to the project at hand. This technique is rarely as accurate as a bottom-up approach, but can be very valuable when assessing whether to select a project to pursue.

Parametric estimates are made when a basic unit of work is created to be used as a multiplier to size the project as a whole. The estimates are useful for figuring the entire project scope or cost on a smaller scale and applying it to the whole. It is created by using historical data of how long something took or what resources were used, and it requires that the estimator develop a parametric formula. Parametric formulas take into account certain variables that might occur during the working process. Will the process be faster or slower at some times than others due to holidays, seasonal influences, or other projects that need to be worked on? Will there be a shortage or surplus of materials for any reason? Parametric estimates are more accurate when done at lower levels, but they can still be useful when used to measure order-of-magnitude estimates. It is most useful when used during the construction phase of the product life cycle because it allows you to really detail the product specification, and this feeds into a more accurate estimate.

The most accurate type of estimation is bottom-up estimating. Bottom-up estimating, however, also requires the most amount of

work because it makes an estimation of all of the detailed tasks individually and then adds them all up for the project as a whole. Although the most accurate form of estimating, this level of detail usually isn't available at the very beginning of the project, so it's best used for building the detailed phase estimates.

PROJECT TEAM

During the estimation phase, it is critical that you know the skill sets of the team with whom you will be working. You must know the expertise of others, even if you don't know them personally, and be able to ask for help. It is also important to look at what technology will be required to complete the project. Does it rely on new technology? Will you need members of your team to have a new skill set to accommodate for the technology? What is the reliability of the technology you will be using?

The team of people you will be working with on your project management team is probably the most critical ingredient of the whole process. It is the responsibility of the project manager to motivate and guide the team to complete the project at hand. This may oblige the leader to administer a variety of management techniques to develop a cohesive group. Change in the process must also be aptly managed. Managing the execution of the project requires being constantly aware of the project deliverables, project objectives, project schedule, project costs, and the quality. Monitoring all of this will allow the project manager to quickly assess when the work of the team is deviating from the original plan and allow the manager to bring the team back on track.

Project managers have a large task. They must be able to define and manage quality throughout the project. They must be able to accurately determine the human resource requirements and be able to manage them. They must know how to develop and manage project planning and costs using the techniques discussed in this example. They must be effective communicators with all stakeholders—senior management, team members, clients, outsourced resources, and so on—and they need to be familiar with the supply and contract management techniques.

The most successful leaders, however, create outstanding teams.

A successful team has numerous links between team members and frequent and comfortable communication among them. It is important not to overly rely on one person too much with critical information, and put the project at risk by consolidation of data or information. Just as it is important not to rely too heavily on one individual, it is critical that there isn't someone in the middle who slows down communication or decision making. It is best to allow forums to be created to draw in resources as needed for decision-making purposes. Finally, you should always make an effort to look outside your own beliefs to try to ascertain another perspective on what's going on. True project leadership means looking outside of what your interests and outlook are and trying to approach the project from an unbiased perspective. It might sound simple, but it's more difficult than you might think.

In an effort to communicate effectively, the project team should make responsibility or task assignments and deadlines very clear from the beginning. They need to emphasize, again, the importance of communicating with all of the stakeholders: the managers and clients throughout the execution of the project. Expectations should be stated and effectively managed throughout the process so that surprises or disappointments are kept to an absolute minimum. It is also important that at completion the project is properly closed out.

REPORTING

Close-out reporting is possibly the most neglected activity in project management. When the project is complete, it is tempting to have the final product speak for itself. What has been found, however, is that closing-out activities can bring a high return to the project managers. The closing out of a project can bring closure to the project in the eyes of the stakeholders and can also provide an excellent learning opportunity. It provides an opportune time to take a poll of the project participants and find out how they perceived the process. What can you change/improve next time as the project manager? Did you learn anything about how the estimation process was done? What did the participants perceive to have gone well?

One way to keep all of these learning points from surfacing all at

once at the end of the project is to measure the progress of the project. This is also referred to as project control. Part of successfully controlling a project is to have project performance measures. These measures indicate when tasks have been accomplished. It helps you to measure whether you've completed what you thought you would by the dates previously established.

You can also take a measurement referred to as earned value reporting, or sometimes earned value analysis, which is a method for measuring project performance. The method takes into account the planned and actual costs for all completed tasks and compares them. It combines cost and schedule status to provide a complete current picture of the project. It indicates how much of the budget should have been spent in view of the amount of work done so far, and the baseline cost for the task, assignment, or resource. There are various ways of calculating the earned value reporting that take into account variables such as the budgeting cost of work performed, the actual cost of work performed, the cost variance percentage, and the estimate of completion.

SUMMARY

Project management in its simplest form of understanding is all about planning. Proper planning can be somewhat complicated, and to do it well requires delving into what needs to be done from the very beginning.

Although the practice of project management has been around for centuries, scholars and project management professionals are still studying how to make project management better. The value of face-to-face interaction does not deteriorate, even with the deployment of virtual project management teams. Projects require leaders who are trained in both business and technology and have teams with qualified project management professionals when possible. There are various preferences and cultural values that weigh different communication techniques and interpersonal skills differently. Perceptions of communication techniques will have an impact on the end user and the end result of the project, so it is important to clarify preferences at the beginning.

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