# AIA Best Practices:
# Monitoring earned value: A key management tool

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**Summary**

This Best Practice describes techniques to monitor the earned value of a project, a necessary aspect of successful project management. Project managers can better monitor and control a project if they are aware of its financial status.

## Determining earned value

Earned value is a calculation to evaluate how much work has been completed on a project. Knowing this can help a project manager determine the need for operational changes on a project. It also helps determine how much can be appropriately invoiced on stipulated-sum or not-to-exceed contracts.

Consider this simple example: A project has a budget of 1,000 hours and a schedule of 10 weeks; 400 hours have been used and six weeks have passed. How much has been earned or what percent complete is the project?

One can imagine a range of answers. Intuitively you might expect that the project is about 50% complete. Or you might guess that if 400 hours had been used, the project must be 40% complete; or, more optimistically, you might assume that if 60% of the scheduled time has passed then the project must be 60% complete—or more!

The real answer is that there is not enough information to know the project's status or percentage of completion. This is an important realization. Hours spent does not represent work completed on a project, nor does time passed (especially if you have not monitored work effort). To realistically know the completion percentage, you must analyze the level of completion of the work effort—you must determine your earned value.

## Monitoring a project

A 10-week project should be monitored weekly. Projects or phases that are months long could be monitored every two to four weeks.

The best way to monitor the earned value of a project is to divide the work effort into tasks. Each task should be measurable and should have a budget for its value.

It is easier to measure the level of completion of smaller tasks that make up the project than to evaluate a project as a whole. As you determine the percent complete of each task, keep in mind that because you have divided the project into smaller pieces, you do not need to be precise in the evaluation of each task. If you are close in the evaluation of each task, you will get a good indication of the earned value of the project.

First, divide the project into phases, and, then, establish the tasks that need to be accomplished to complete each phase. Remember that each task should be measurable and have a budget relating to its value. Hours have been used as the unit of value in our example. Let's consider it:

| | Budgeted Hours per Task / Drawing | % of the Project | % Complete | Earned Value in hours | Estimated hours to Complete | % Complete based on hours to complete |
|---|---|---|---|---|---|---|
| Title sheet | 5 | 0.5% | 100% | 5 | 0 | 100% |
| General information | 5 | 0.5% | 100% | 5 | 0 | 100% |
| Site plan | 40 | 4.0% | 50% | 20 | 16 | 60% |
| First floor plan | 60 | 6.0% | 50% | 30 | 35 | 42% |
| Second floor plan | 60 | 6.0% | 40% | 24 | 35 | 42% |
| Exterior elevations | 40 | 4.0% | 30% | 12 | 28 | 30% |
| Building sections and wall profiles | 40 | 4.0% | 25% | 10 | 30 | 25% |
| Exterior details | 60 | 6.0% | 20% | 12 | 50 | 17% |
| Exterior details | 60 | 6.0% | 20% | 12 | 60 | 0% |
| Roof details, entrance details | 40 | 4.0% | 20% | 8 | 32 | 20% |
| Stair sections and details | 60 | 6.0% | 25% | 15 | 45 | 25% |
| Elevator section and details | 40 | 4.0% | 20% | 8 | 30 | 25% |
| Loading area enlarged plan and details | 40 | 4.0% | 25% | 10 | 35 | 13% |
| Lobby enlarged plan | 40 | 4.0% | 25% | 10 | 36 | 10% |
| Lobby details | 40 | 4.0% | 10% | 4 | 36 | 10% |
| Enlarged toilet room plan and elevations | 40 | 4.0% | 25% | 10 | 36 | 10% |
| Room finish schedules and color coders | 40 | 4.0% | 20% | 8 | 32 | 20% |
| Door schedule, types and details | 40 | 4.0% | 20% | 8 | 32 | 20% |
| Consultant coordination | 40 | 4.0% | 10% | 4 | 36 | 10% |
| Checking and coordination | 10 | 1.0% | 0% | 0 | 10 | 0% |
| **Drawing Total** | 800 | 80% | | 215 | | |
| Project Management | 100 | 10.0% | 30% | 30 | 70 | 30% |
| Design | 100 | 10.0% | 20% | 20 | 65 | 35% |
| **Total** | **1000** | **100%** | | **265** | **749** | |
| **Percent Complete** | | | | **27%** | **25%** | **25%** |

Suppose that this 1,000 hour, 10-week assignment is the production of construction documents for a small office building, and that the hours are budgeted per drawing and task as indicated in the table. The level of completion of each task is determined by the project manager's (PM) and project architect's (PA) best judgment after direct review of each of the 18 drawings and the four other tasks.

In this example, the PM and PA determined the level of completion using two methods, as shown in the table. One review was based on their assessment of the level of work completed on each drawing. The number of hours budgeted for each sheet is then multiplied by the assessed percentage of completion of each drawing and other tasks. The resulting earned value was estimated to be 275 of the allocated 1,000 total hours budgeted, or about 28% complete. Note that there is no mention of, or comparison to, actual hours recorded to this project. Only the level of satisfactorily completed work is being assessed.

A second approach is to estimate the hours to complete – in other words, work effort still needed for each sheet and task – and then back into the percentage of completion or the earned value. If a task had a budget for 40 hours and the PM and PA estimate that it will still take 35 hours to complete the task, then the task is considered 13% complete. Using this approach, the project is only 25% complete because 749 hours are still needed to complete the work compared to the 1,000-hour budget. (Note that this estimate was made separate from the previous estimate; it does not matter whether the other estimate for the task was 25% or 13% complete.) Even considering the other tasks, the percent of completion is still 25.

Based on the analysis of each task using two approaches, we now know with fairly high certainty that the earned value of the project is only between 25% and 27%, or about 26%.

## Controlling the project

The reason to measure project results is not just to determine a percentage of completion for billing purposes. Monitoring progress determines whether there is a need to do things differently, a need for action—preferably early enough that there is still time.

As already noted, this project has used 40% of its budgeted hours and 60% of the scheduled time. It seems to be headed for a very poor result. There are other informative indicators that the PM also might have noticed:

- Little or no time has gone into either of the coordination tasks. This may be an indicator of impending drawing changes.
- Project management time and effort – at only 30%, compared to the 40% of hours and 60% of schedule used–may indicate insufficient PM attention to the project.
- Required or requested design changes may be necessitating rework.

This project manager needs to take immediate and effective action to bring the project on track. With no intervention, it will take about 20 weeks and require more than 1,150 total hours to complete.

Assuming that other resources are available, some actions that could be taken include:

- add trained and experienced staff to project team
- add senior staff to increase effectiveness and bring the hours in better alignment with the budget and back on schedule.
- review the scope of work in the contract and ensure that the staff working on the project is doing the contracted scope of work and no more.
- communicate with the team to make sure that everyone is working towards a common goal.
- reduce the number of tasks or combine tasks to lower the number of hours still required

Understanding and monitoring project effort and progress—the earned value of a project— signals the PM when it is necessary to take action to correct the course. It allows a PM a chance to influence the outcome of a project's financial success.

## About the contributor

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