White Paper

Using Progress and Performance to Successfully Manage Capital Projects

Abstract

Progress measurement involves determining and reporting on task, activity and project progress. Performance measurement compares this progress against defined criteria, targets, or benchmarks to assess whether a project is over or under-performing. It involves six key metrics: CV, SV, CPI, SPI, VAC and TCPI. The outcomes of these measurements allow project managers to manage projects and improve projects' success rates more proactively. There are five key processes involved in progress and performance measurement:

- Progress measurement planning
- Performance measurement planning
- Progress and performance measurement execution
- Monitoring and control
- Measurement closure

Performance measurement software, such as Contruent Enterprise, enables businesses to efficiently track, analyze and report progress and performance measurement to improve decision-making and response time.

> " In the monitoring process, project managers and other stakeholders will review performance metrics and determine whether action is required. "

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Introduction

Progress and performance measurement are key components of the monitor and control phase of a project life cycle. Progress measurement enables project stakeholders to understand project progress, while performance measurement empowers stakeholders to evaluate whether progress is on track.

This whitepaper includes the following sections:
- **Section 1:** Defines progress measurement and the most common methods for conducting it.
- **Section 2:** Delves into performance measurement and the essential formulas involved.
- **Section 3** Introduces the processes involved in successful project measurement.
- **Section 4:** Focuses on the key metrics to track.
Section 5/6: Covers the importance and benefits of project organizations adopting progress and performance management.
- **Section 7:** Discusses how Contruent Enterprise can help conduct progress and performance management.

1 What is Progress Measurement?

Progress measurement is the practice of assessing and recording the progress made on a task or project. It is a qualitative (numerical) measurement that can be calculated in multiple different ways. The means used to calculate progress will depend on the type of work, the progress measurement tools available, business or client preferences and other factors. There are more than 35 different methods for calculating progress within Contruent Enterprise, but the eight most common methods for progress measurement are:

- **Manually.** Making a subjective assessment and manually entering a percentage based on that assessment.
- **Cost-based.** Using the actual costs spent to date divided by the forecasted total spend to arrive at a percentage.
- **Deliverable-based.** Dividing the number of completed and/or client-accepted deliverables by the total number of planned deliverables.

- **Milestone-based.** Each project, phase, or task may have milestones with percentage complete assumptions tied to them. For instance, completing the detailed design drawings may be a milestone that equates to being 25% complete on the overall project.
- **Hours-based.** Dividing actual hours completed to date by the total expected or planned hours.
- **Commitment-based.** This method calculates percentage progress based on costs committed, such as Purchase Orders authorized.
- **Quantities-based.** Progress can be measured based on units or volume of materials used or delivered divided by total project units or volume contracted.
- **Composite calculation.** Using a sophisticated solution like Contruent Enterprise, project managers can assign different calculation methods to each control account. Then, to get the overall percentage complete, the software rolls up the lower-level detail for them.

The goal of progress measurement is to provide project organizations and their teams with a quantifiable number (usually a percentage) that indicates how far along their team has progressed. However, progress measurements alone offer minimal value.

Suppose a project is reported to be at 40% complete. Without greater context, such as what percentage complete it was expected to be at this point in the schedule, it is impossible to know whether 40% is acceptable or not. This is where performance measurement becomes important.

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2 What is Performance Measurement?

Performance measurement is the practice of analyzing project progress and understanding what it means within the context of the overall project plan and goals.

Performance measurement enables project professionals to compare task or project progress against trends and benchmarks, such as past performance and expected progress. The practice of performance variance analysis allows them to pinpoint which areas of the project are behind or ahead and where their focus is needed.

The most common way to conduct performance measurement is through Earned Value Management (EVM). EVM compares cost and schedule progress against project baselines, budgets and expected future outcomes.

3 Five Key Processes Involved with Progress and Performance Measurement

The following five processes are required for successful progress and performance measurement:

- **Progress measurement planning.** This process involves determining the level and type of progress measurement. It generally includes answering the following questions:
  - Will the project team measure progress at the task level, cost control level, or higher?
  - Which method will be used to assess progress on each aspect of the project? (cost-based, hours-based, etc.)
  - How often will progress be gathered? (weekly, bi-weekly, or monthly)
  - Who will be responsible for reporting it? (team members, supervisors, department heads)
  - What tools will they need? (Will it require actual-hours reports, do they need to visually inspect product completion, will they input progress directly into the software or send it to someone else?)

There are several formulas involved in EVM analysis. These include:

- **Earned Value (EV):** % complete (from progress measurement) x BAC (budget at completion) or the sum of PV of all completed tasks to date.
- **Planned Value (PV):** The authorized budget assigned to scheduled work (usually at the control account level).
- **Cost Variance (CV):** This is EV – AC. AC stands for actual cost.
- **Schedule Variance (SV):** Calculated as EV - PV.
- **Schedule Performance Index (SPI):** EV/PV.
- **Cost Performance Index (CPI):** EV/AC.
- **Variance at Completion (VAC):** BAC (Budget at Completion) - EAC (Estimate at completion).
- **Estimate to Completion (ETC):** Calculated as EAC - AC or by creating a new bottom-up estimate of all work remaining.
- **Estimate at Completion (EAC):** This value can be calculated many ways, including:
  - AC (actual costs to date) + Bottom-up ETC (new estimates for costs remaining).
  - BAC / Cumulative CPI, to forecast based on efficiency so far.
  - AC + (BAC - EV), to calculate actual costs so far plus the remaining value of work to be completed.
  - AC + (BAC - EV/(Cumulative CPI * Cumulative SPI)), to find actual to date plus the remaining budget adjusted for project efficiency rates so far.
  - Using simulation software to predict when a project will be complete and how much it will cost based on performance so far and predictions about whether performance may improve, drop, or stay on-trend.
- **To Complete Performance Index (TCPI):** TCPI is used to calculate the cost performance that must be achieved to hit the cost target. Using EAC the formula is (BAC - EV) / (EAC - AC).

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- **Performance measurement planning.** During this process, project managers will plan out how performance measurement is input, analyzed and reported. Key aspects of this process are:
  - Determining how frequently performance will be analyzed and reported on.
  - Deciding metrics to be analyzed and tracked. For example, measuring against benchmarks or only tracking CPI & SPI, etc.
  - Setting guidelines around the level of analysis and reporting. (CPI & SPI reported weekly, EAC updated monthly, etc.)
  - Documenting criteria around acceptable and ideal performance metrics. (If performance drops below a certain threshold, will it trigger an action? For example, if cumulative SPI dips below 0.75, will overtime be assigned to help catch up?
- **Executing progress and performance measurement.** In the execution process, the people in charge of tracking and reporting progress (as per the plan) will follow the steps to assess and input the data. The person or people in charge of analysis will ensure all data is provided, run analytics and report on performance in accordance with the set plan.
- **Monitoring progress and performance and implementing control actions.** In this process, project managers and other stakeholders will review performance metrics and determine whether action is required. They may be required to manage expectations around expected completion dates,

Performance measurement data enables project managers and stakeholders to set key performance metrics (KPIs) and benchmarks to measure future performance against.

request more funding or resources, or simply provide assurances that everything is on track. If there are rewards tied to achieving targets, they should be provided as part of this process.
- **Closure of progress and performance measurement activities.** At the end of the project, after the final progress and performance results are reported, the project data may be analyzed for lessons learned. Then, as the project is closed, the data will be stored so that teams can use it in the future to improve estimates and forecasts for similar projects.

4 Key Tracking Metrics for Progress and Performance Measurement

Key performance measurements and their meanings:
- Cost variance (CV): If the CV is negative, it indicates an overspend.
- Schedule variance (SV): If the SV is negative, it indicates the task or project is behind schedule.
- Cost Performance Index (CPI): If CPI is less than 1.00, it means more costs have been spent to date than expected to attain the current level of progress.
- Schedule Performance Index (SPI): If SPI is less than 1.00, it means progress is behind schedule compared to where it is expected to be at this time.
- Variance at Completion (VAC): If VAC is negative, it implies the project will end up being over budget upon completion unless something changes.
- To Complete Performance Index (TCPI): If TCPI is above 1.00, it means the current cumulative CPI is below one, and to remain within the total overall budget, the project will need to be more cost-efficient than planned for the remainder of the term.

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TCPI is often one of the more difficult ratios to grasp, so an illustration may be helpful. If a TCPI of 1.20 is calculated, it means that to spend no more than the overall project budget, the project needs to earn a CPI of 1.20 for the remainder of the project.

Then, compare this to the cumulative CPI so far to make predictions about whether this is feasible. For instance, if the cumulative CPI is 0.76, one may determine the TCPI is unrealistic, and that more money will need to be requested to finish the project.

Note: CPI, SPI and TCPI are more common than CV, SV and VAC as they are more easily comparable across tasks, activities and projects. A CV of -$5,000 may be much worse than a CV of -$25,000 if the total budget for the task or cost control account is significantly lower. Therefore, dollar values alone are only marginally useful when making comparisons.

5 Why Are Progress Management and Performance Measurement Important?

Progress measurement enables project professionals to track and monitor how close to completion a job, activity, or project is. When this progress is analyzed using performance measurement metrics, it provides insights into how the project is going.

Progress and performance measurement are essential tools that enable project teams to stay on top of project performance and improve future project

Without these tools, it becomes difficult to predict whether a project will be completed on time or within budget. Project managers and executives will be reliant on subjective judgment and their own experience, which limits the consistency, objectiveness and accuracy of one's progress management.

Progress and performance measurement also improve the project team's knowledge of what is currently occurring and strengthens their ability to predict what will occur in the future. It can act as an early warning sign for potential issues and provides data to help improve future project estimates and planning.

Performance measurement data also enables project managers and stakeholders to set key performance metrics (KPIs) and benchmarks to measure future performance against.

6 Benefits of Using Progress and Performance Measurement

According to a survey by PMI, only slightly more than half of projects finish within their planned schedule (52%) and budget (57%).

Leading causes of project failure were inaccurate estimates, limited resources, poor forecasting and a general lack of visibility and communication.

By measuring performance, project teams gain greater insights into what is required to complete their ongoing projects, thereby improving visibility and forecasting.

By being able to see performance trends early on and monitor changes, project teams can become more proactive about communicating progress and requesting additional resources that they may need.

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7 How Can Contruent Enterprise Help Organizations with Progress and Performance Measurement?

Progress and performance measurement involve a significant amount of data and analysis, especially on larger and lengthier projects. For this reason, a system capable of storing the data and automating the analysis is essential.

Contruent Enterprise provides a centralized location for the input, storage and analysis of all project data. The project software enables project teams to pull in their schedule and financial data or targets from other systems to streamline comparison against benchmarks and targets. It offers full integration with other essential project and business tools such as Oracle, Primavera P6, Microsoft Project and even Microsoft Excel in case data needs to be imported.

Contruent Enterprise includes the ability to set variance analysis thresholds to help streamline analysis and reporting. For instance, users can define a CPI or SPI threshold of 0.90, so only tasks or cost centers that slip below that value are reported on. Or they can set thresholds so that anything in the 0.90–1.00 range is reported as yellow, anything below 0.90 is red, and anything above 1.00 is green.

The project controls software also enables project teams to roll up reporting and then drill down further into areas that appear to be behind schedule or over budget. Users can also enter explanations into the software, so that when management is reviewing variances, they can quickly see the cause for numbers below target.

There are more than 200 standard reports in Contruent Enterprise to help slice and dice performance data in different ways. For instance, users can choose to see performance by project phase, by time, by cost control center, by functional department and more.

Meanwhile, stakeholders can opt to only see high-level project overviews and executive summaries and include narratives and graphs, or solely the numbers. They can also create their own custom reports if they

The forecasting for the remainder of the project will also improve, as it will be based upon quantitative data, and not just subjective assessments.

Additionally, by measuring and storing progress data, project managers improve their ability to create more realistic project estimates in the future. This practice will result in a greater chance of success for those projects and a better ability to proactively plan for the number of resources that will be needed in the long term.

In short, progress and performance measurement are essential tools that enable project teams to stay on top of project performance and improve future project planning. In the long term, this enables them to be more proactive and results in a higher project success rate.

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wish to see the data displayed or delivered another way. Contruent Executive Dashboards is another tool offered by Contruent that allows for monitoring overall performance and drill down into the breakdown whenever a potential concern is spotted.

Contruent Enterprise was designed to enable its users to see and understand the project data in whichever way works best for them. This level of customization and flexibility means that regardless of project size, number of stakeholders, or variety of customer concerns, project teams will have the means to report on only the information the report recipients care about.

To see more of what Contruent Enterprise can do, watch our Progress and Performance Measurement and Performance Variance Analysis webinar.

Conclusion

Progress and performance measurement are essential elements of the monitor and control phase of any project. Progress measurement enables key stakeholders to understand how close to completion tasks, activities and projects are. Performance measurement allows management to understand how the project is performing in comparison to the project plan and other relevant targets.

Together, progress and performance information grant the ability to discover potential issues early and be proactive about ensuring deadlines and goals are hit. Performance data also improves future project estimates and forecasts.

Project controls software such as Contruent Enterprise provides a centralized, easy-to-use database to input, store, analyze, and report on progress and performance measurement. To learn more, request a demo.

ARES PRISM
Becomes Contruent

In 2023, ARES PRISM was reborn as Contruent, launching a new name with an industry-leading new product, Contruent Enterprise. Contruent Enterprise is a culmination of our award-winning project controls software, full of industry best-practices built in, with the innovation and world-class capabilities of a capital project management software.

Building on its 25-year history, Contruent is the premier capital project management software that is faster to deliver across the entire project lifecycle for complex, mega-construction projects.

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