

### 4.4.3.2 PROJECT MANAGEMENT PLAN UPDATES

Any change to the project management plan goes through the organization's change control process via a change request. Any component of the project management plan may be updated as a result of this process.

### 4.4.3.3 ORGANIZATIONAL PROCESS ASSETS UPDATES

All projects create new knowledge. Some of this knowledge is codified, embedded in deliverables, or embedded in improvements to processes and procedures as a result of the Manage Project Knowledge process. Existing knowledge can also be codified or embedded for the first time as a result of this process; for example, if an existing idea for a new procedure is piloted in the project and found to be successful.

Any organizational process asset can be updated as a result of this process.

## 4.5 MONITOR AND CONTROL PROJECT WORK

Monitor and Control Project Work is the process of tracking, reviewing, and reporting the overall progress to meet the performance objectives defined in the project management plan. The key benefits of this process are that it allows stakeholders to understand the current state of the project, to recognize the actions taken to address any performance issues, and to have visibility into the future project status with cost and schedule forecasts. This process is performed throughout the project. The inputs, tools and techniques, and outputs of the process are depicted in Figure 4-10. Figure 4-11 depicts the data flow diagram for the process.

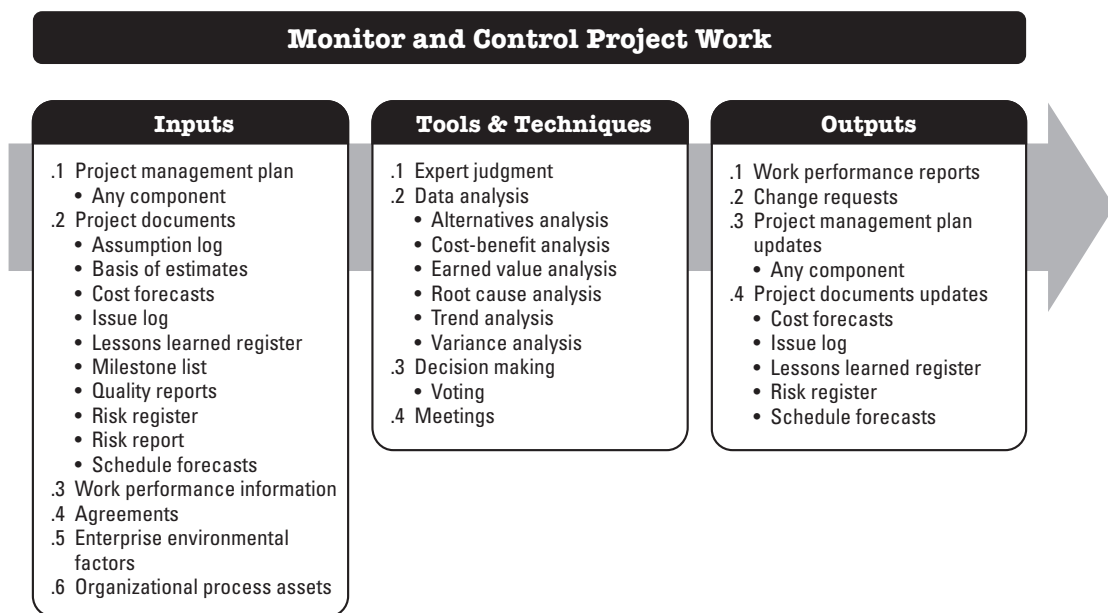


Figure 4-10. Monitor and Control Project Work: Inputs, Tools & Techniques, and Outputs

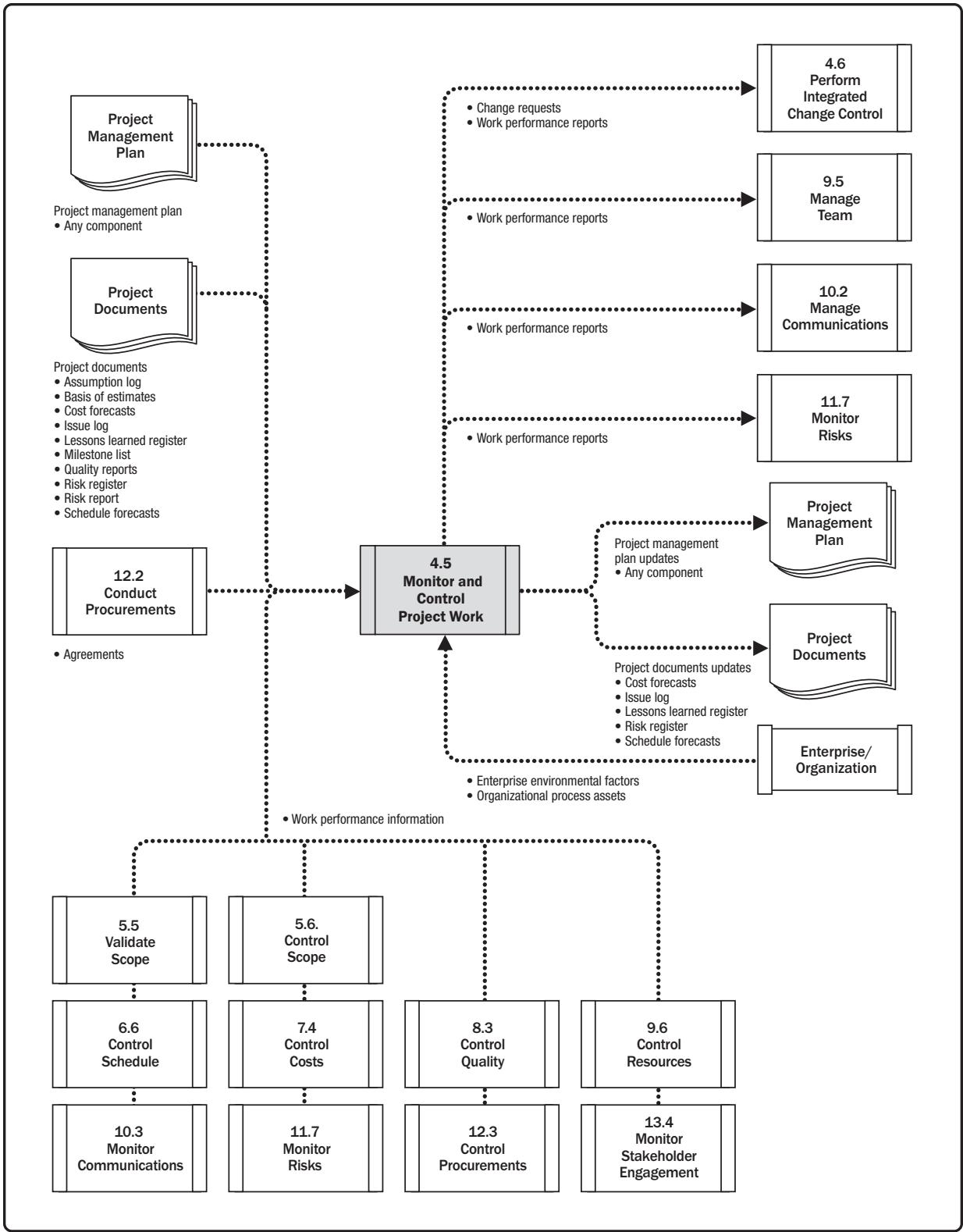


Figure 4-11. Monitor and Control Project Work: Data Flow Diagram

Monitoring is an aspect of project management performed throughout the project. Monitoring includes collecting, measuring, and assessing measurements and trends to effect process improvements. Continuous monitoring gives the project management team insight into the health of the project and identifies any areas that may require special attention. Control includes determining corrective or preventive actions or replanning and following up on action plans to determine whether the actions taken resolved the performance issue. The Monitor and Control Project Work process is concerned with:

- ◆ Comparing actual project performance against the project management plan;
- ◆ Assessing performance periodically to determine whether any corrective or preventive actions are indicated, and then recommending those actions as necessary;
- ◆ Checking the status of individual project risks;
- ◆ Maintaining an accurate, timely information base concerning the project's product(s) and their associated documentation through project completion;
- ◆ Providing information to support status reporting, progress measurement, and forecasting;
- ◆ Providing forecasts to update current cost and current schedule information;
- ◆ Monitoring implementation of approved changes as they occur;
- ◆ Providing appropriate reporting on project progress and status to program management when the project is part of an overall program; and
- ◆ Ensuring that the project stays aligned with the business needs.

## 4.5.1 MONITOR AND CONTROL PROJECT WORK: INPUTS

### 4.5.1.1 PROJECT MANAGEMENT PLAN

Described in Section 4.2.3.1. Monitoring and controlling project work involves looking at all aspects of the project. Any component of the project management plan may be an input for this process.

#### 4.5.1.2 PROJECT DOCUMENTS

Project documents that can be considered as inputs for this process include but are not limited to:

- ◆ **Assumption log.** Described in Section 4.1.3.2. The assumption log contains information about assumptions and constraints identified as affecting the project.
- ◆ **Basis of estimates.** Described in Sections 6.4.3.2 and 7.2.3.2. Basis of estimates indicates how the various estimates were derived and can be used to make a decision on how to respond to variances.
- ◆ **Cost forecasts.** Described in Section 7.4.3.2. Based on the project's past performance, the cost forecasts are used to determine if the project is within defined tolerance ranges for budget and to identify any necessary change requests.
- ◆ **Issue log.** Described in Section 4.3.3.3. The issue log is used to document and monitor who is responsible for resolving specific issues by a target date.
- ◆ **Lessons learned register.** Described in Section 4.4.3.1. The lessons learned register may have information on effective responses for variances, and corrective and preventive actions.
- ◆ **Milestone list.** Described in Section 6.2.3.3. The milestone list shows the scheduled dates for specific milestones and is used to check if the planned milestones have been met.
- ◆ **Quality reports.** Described in Section 8.2.3.1. The quality report includes quality management issues; recommendations for process, project, and product improvements; corrective actions recommendations (includes rework, defect/bugs repair, 100% inspection, and more); and the summary of findings from the Control Quality process.
- ◆ **Risk register.** Described in Section 11.2.3.1. The risk register provides information on threats and opportunities that have occurred during project execution.
- ◆ **Risk report.** Described in Section 11.2.3.2. The risk report provides information on the overall project risks as well as information on specified individual risks.
- ◆ **Schedule forecasts.** Described in Section 6.6.3.2. Based on the project's past performance, the schedule forecasts are used to determine if the project is within defined tolerance ranges for schedule and to identify any necessary change requests.

#### 4.5.1.3 WORK PERFORMANCE INFORMATION

Work performance data is gathered through work execution and passed to the controlling processes. To become work performance information, the work performance data are compared with the project management plan components, project documents, and other project variables. This comparison indicates how the project is performing.

Specific work performance metrics for scope, schedule, budget, and quality are defined at the start of the project as part of the project management plan. Performance data are collected during the project through the controlling processes and compared to the plan and other variables to provide a context for work performance.

For example, work performance data on cost may include funds that have been expended. However, to be useful, that data has to be compared to the budget, the work that was performed, the resources used to accomplish the work, and the funding schedule. This additional information provides the context to determine if the project is on budget or if there is a variance. It also indicates the degree of variance from the plan, and by comparing it to the variance thresholds in the project management plan it can indicate if preventive or corrective action is required. Interpreting work performance data and the additional information as a whole provides a context that provides a sound foundation for project decisions.

#### 4.5.1.4 AGREEMENTS

Described in Section 12.2.3.2. A procurement agreement includes terms and conditions, and may incorporate other items that the buyer specifies regarding what the seller is to perform or provide. If the project is outsourcing part of the work, the project manager needs to oversee the contractor's work to make certain that all the agreements meet the specific needs of the project while adhering to organizational procurement policies.

#### 4.5.1.5 ENTERPRISE ENVIRONMENTAL FACTORS

The enterprise environmental factors that can influence the Monitor and Control Project Work process include but are not limited to:

- ◆ Project management information systems such as scheduling, cost, resourcing tools, performance indicators, databases, project records, and financials;
- ◆ Infrastructure (e.g., existing facilities and equipment, organization's telecommunications channels);
- ◆ Stakeholders' expectations and risk thresholds; and
- ◆ Government or industry standards (e.g., regulatory agency regulations, product standards, quality standards, and workmanship standards).

#### 4.5.1.6 ORGANIZATIONAL PROCESS ASSETS

The organizational process assets that can influence the Monitor and Control Project Work process include but are not limited to:

- ◆ Organizational standard policies, processes, and procedures;
- ◆ Financial controls procedures (e.g., required expenditure and disbursement reviews, accounting codes, and standard contract provisions);
- ◆ Monitoring and reporting methods;
- ◆ Issue management procedures defining issue controls, issue identification, and resolution and action item tracking;
- ◆ Defect management procedures defining defect controls, defect identification, and resolution and action item tracking; and
- ◆ Organizational knowledge base, in particular process measurement and the lessons learned repository.

#### 4.5.2 MONITOR AND CONTROL PROJECT WORK: TOOLS AND TECHNIQUES

##### 4.5.2.1 EXPERT JUDGMENT

Described in Section 4.1.2.1. Expertise should be considered from individuals or groups with specialized knowledge or training in the following topics:

- ◆ Earned value analysis,
- ◆ Interpretation and contextualization of data,
- ◆ Techniques to estimate duration and costs,
- ◆ Trend analysis,
- ◆ Technical knowledge on the industry and focus area of the project,
- ◆ Risk management, and
- ◆ Contract management.

#### 4.5.2.2 DATA ANALYSIS

Data analysis techniques that can be used include but are not limited to:

- ◆ **Alternatives analysis.** Alternatives analysis is used to select the corrective actions or a combination of corrective and preventive actions to implement when a deviation occurs.
- ◆ **Cost-benefit analysis.** Described in Section 8.1.2.3. Cost-benefit analysis helps to determine the best corrective action in terms of cost in case of project deviations.
- ◆ **Earned value analysis.** Described in Section 7.4.2.2. Earned value provides an integrated perspective on scope, schedule, and cost performance.
- ◆ **Root cause analysis.** Described in Section 8.2.2.2. Root cause analysis focuses on identifying the main reasons of a problem. It can be used to identify the reasons for a deviation and the areas the project manager should focus on in order to achieve the objectives of the project.
- ◆ **Trend analysis.** Trend analysis is used to forecast future performance based on past results. It looks ahead in the project for expected slippages and warns the project manager ahead of time that there may be problems later in the schedule if established trends persist. This information is made available early enough in the project timeline to give the project team time to analyze and correct any anomalies. The results of trend analysis can be used to recommend preventive actions if necessary.
- ◆ **Variance analysis.** Variance analysis reviews the differences (or variance) between planned and actual performance. This can include duration estimates, cost estimates, resources utilization, resources rates, technical performance, and other metrics.

Variance analysis may be conducted in each Knowledge Area based on its particular variables. In Monitor and Control Project Work, the variance analysis reviews the variances from an integrated perspective considering cost, time, technical, and resource variances in relation to each other to get an overall view of variance on the project. This allows for the appropriate preventive or corrective actions to be initiated.

#### 4.5.2.3 DECISION MAKING

A decision-making technique that can be used includes but is not limited to voting. Described in Section 5.2.2.4. Voting can include making decisions based on unanimity, majority, or plurality.

#### 4.5.2.4 MEETINGS

Meetings may be face-to-face, virtual, formal, or informal. They may include project team members and other project stakeholders when appropriate. Types of meetings include but are not limited to user groups and review meetings.

## 4.5.3 MONITOR AND CONTROL PROJECT WORK: OUTPUTS

### 4.5.3.1 WORK PERFORMANCE REPORTS

Work performance information is combined, recorded, and distributed in a physical or electronic form in order to create awareness and generate decisions or actions. Work performance reports are the physical or electronic representation of work performance information intended to generate decisions, actions, or awareness. They are circulated to the project stakeholders through the communication processes as defined in the project communications management plan.

Examples of work performance reports include status reports and progress reports. Work performance reports can contain earned value graphs and information, trend lines and forecasts, reserve burndown charts, defect histograms, contract performance information, and risk summaries. They can be presented as dashboards, heat reports, stop light charts, or other representations useful for creating awareness and generating decisions and actions.

### 4.5.3.2 CHANGE REQUESTS

Described in Section 4.3.3.4. As a result of comparing planned results to actual results, change requests may be issued to expand, adjust, or reduce project scope, product scope, or quality requirements and schedule or cost baselines. Change requests may necessitate the collection and documentation of new requirements. Changes can impact the project management plan, project documents, or product deliverables. Change requests are processed for review and disposition through the Perform Integrated Change Control process (Section 4.6). Changes may include but are not limited to:

- ◆ **Corrective action.** An intentional activity that realigns the performance of the project work with the project management plan.
- ◆ **Preventive action.** An intentional activity that ensures the future performance of the project work is aligned with the project management plan.
- ◆ **Defect repair.** An intentional activity that modifies a nonconforming product or product component.

### 4.5.3.3 PROJECT MANAGEMENT PLAN UPDATES

Any change to the project management plan goes through the organization's change control process via a change request. Changes identified during the Monitor and Control Project Work process may affect the overall project management plan.