PROJECT MANAGEMENT PROCESSES

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Project management is an integrative endeavor—an action, or failure to take action, in one area will usually affect other areas. The interactions may be straightforward and well-understood, or they may be subtle and uncertain. For example, a scope change will almost always affect project cost, but it may or may not affect team morale or product quality.

These interactions often require trade-offs among project objectives—performance in one area may be enhanced only by sacrificing performance in another. Successful project management requires actively managing these interactions.

To help in understanding the integrative nature of project management, and to emphasize the importance of integration, this document describes project management in terms of its component processes and their interactions. This chapter provides an introduction to the concept of project management as a number of interlinked processes and thus provides an essential foundation for understanding the process descriptions in Chapters 4 through 12. It includes the following major sections:

3.1 Project Processes
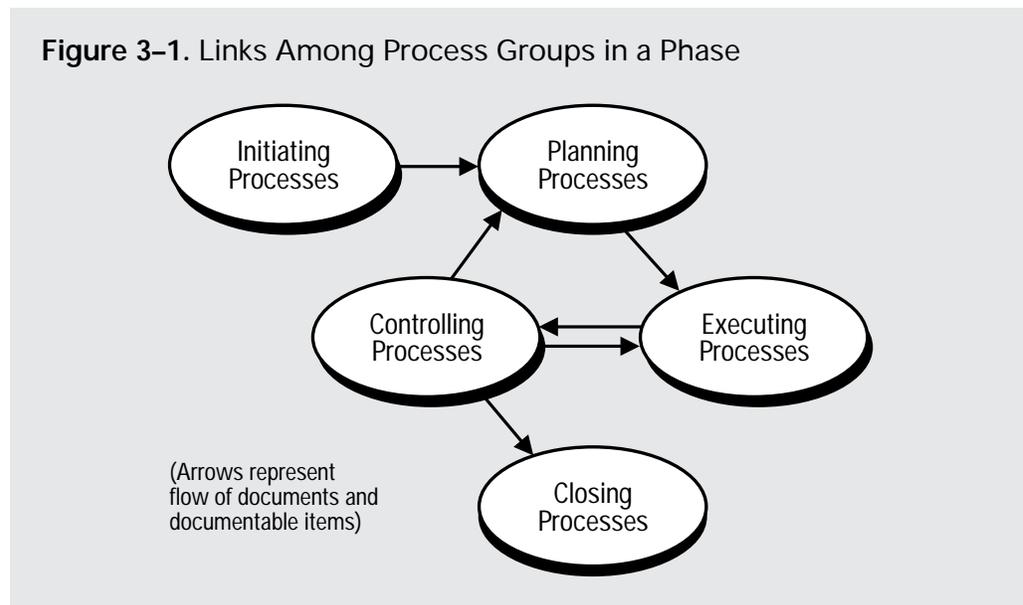**3.2 Process Groups**
3.3 Process Interactions
3.4 Customizing Process Interactions

3.1 PROJECT PROCESSES

Projects are composed of processes. A *process* is "a series of actions bringing about a result" [1]. Project processes are performed by people and generally fall into one of two major categories:

- *Project management processes* are concerned with describing and organizing the work of the project. The project management processes that are applicable to most projects, most of the time, are described briefly in this chapter and in detail in Chapters 4 through 12.

- *Product-oriented processes* are concerned with specifying and creating the project product. Product-oriented processes are typically defined by the project life cycle (discussed in Section 2.1) and vary by application area (discussed in Appendix F).

Project management processes and product-oriented processes overlap and interact throughout the project. For example, the scope of the project cannot be defined in the absence of some basic understanding of how to create the product.

FIGURE 3–1   A GUIDE TO THE PROJECT MANAGEMENT BODY OF KNOWLEDGE

Figure 3–1. Links Among Process Groups in a Phase

(Arrows represent flow of documents and documentable items)

3.2 PROCESS GROUPS

Project management processes can be organized into five groups of one or more processes each:

- Initiating processes—recognizing that a project or phase should begin and committing to do so.
- Planning processes—devising and maintaining a workable scheme to accomplish the business need that the project was undertaken to address.
- Executing processes—coordinating people and other resources to carry out the plan.
- Controlling processes—ensuring that project objectives are met by monitoring and measuring progress and taking corrective action when necessary.
- Closing processes—formalizing acceptance of the project or phase and bringing it to an orderly end.

The process groups are linked by the results they produce—the result or outcome of one becomes an input to another. Among the central process groups, the links are iterated—planning provides executing with a documented project plan early on, and then provides documented updates to the plan as the project progresses. These connections are illustrated in **Figure 3–1**. In addition, the project management process groups are not discrete, one-time events; they are overlapping activities which occur at varying levels of intensity throughout each phase of the project. **Figure 3–2** illustrates how the process groups overlap and vary within a phase.

Finally, the process group interactions also cross phases such that closing one phase provides an input to initiating the next. For example, closing a design phase requires customer acceptance of the design document. Simultaneously, the design document defines the product description for the ensuing implementation phase. This interaction is illustrated in **Figure 3–3**.

Repeating the initiation processes at the start of each phase helps to keep the project focused on the business need it was undertaken to address. It should also help ensure that the project is halted if the business need no longer exists or if the project is unlikely to satisfy that need. Business needs are discussed in more detail in the introduction to Section 5.1, Initiation.

Figure 3–2. Overlap of Process Groups in a Phase
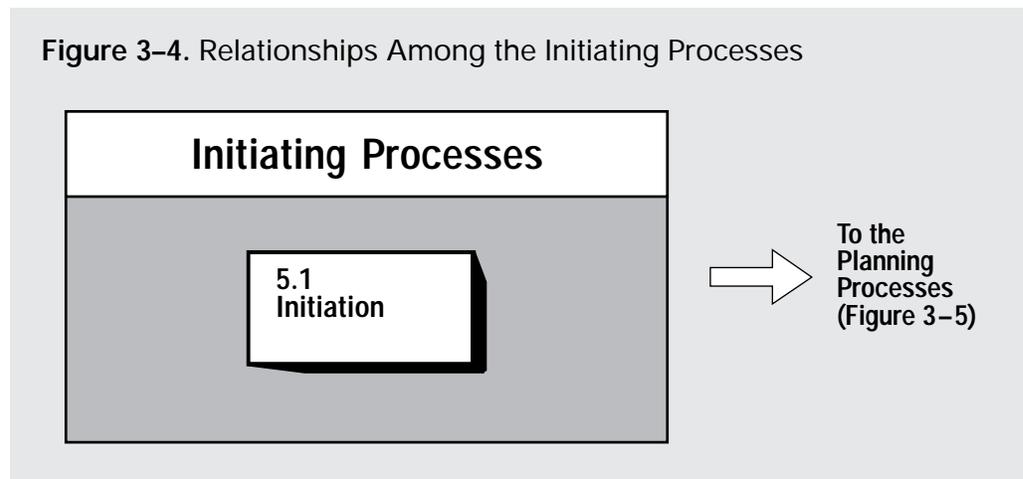

Figure 3–3. Interaction Between Phases
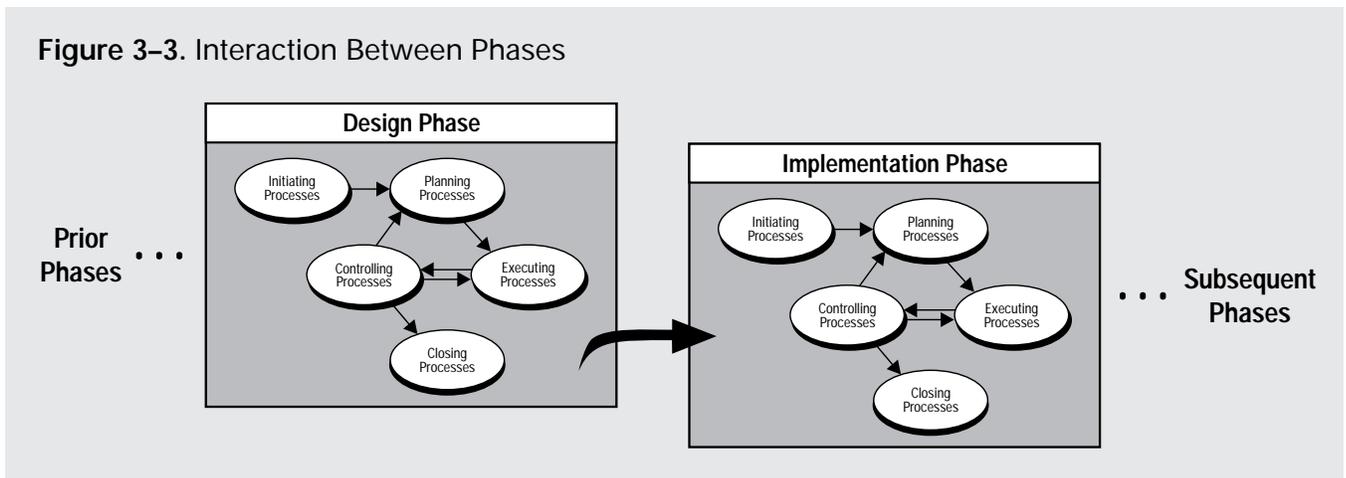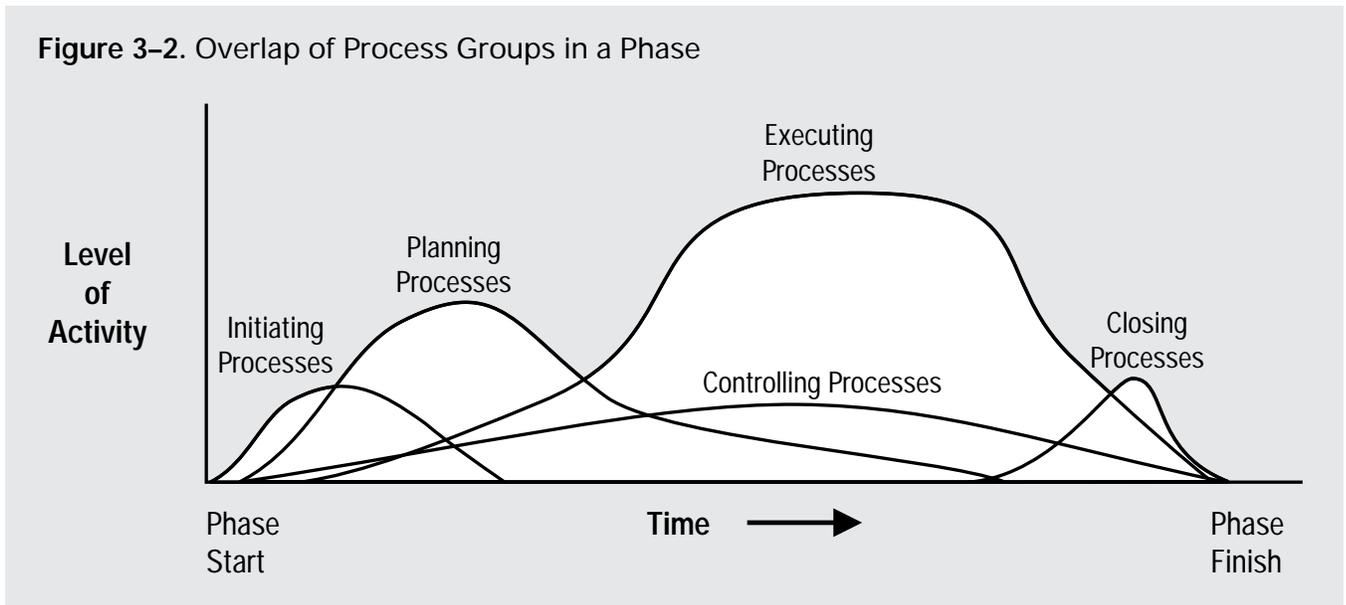
Although **Figure 3–3** is drawn with discrete phases and discrete processes, in an actual project there will be many overlaps. The planning process, for example, must not only provide details of the work to be done to bring the current phase of the project to successful completion but must also provide some preliminary description of work to be done in later phases. This progressive detailing of the project plan is often called *rolling wave planning*.

3.3 PROCESS INTERACTIONS

Within each process group, the individual processes are linked by their inputs and outputs. By focusing on these links, we can describe each process in terms of its:

- Inputs—documents or documentable items that will be acted upon.
- Tools and techniques—mechanisms applied to the inputs to create the outputs.
- Outputs—documents or documentable items that are a result of the process.

Figure 3–4. Relationships Among the Initiating Processes

Initiating Processes

5.1
Initiation

To the
Planning
Processes
(Figure 3–5)

The project management processes common to most projects in most application areas are listed here and described in detail in Chapters 4 through 12. The numbers in parentheses after the process names identify the chapter and section where it is described. The process interactions illustrated here are also typical of most projects in most application areas. Section 3.4 discusses customizing both process descriptions and interactions.

3.3.1 Initiating Processes
Figure 3–4 illustrates the single process in this process group.
- Initiation (5.1)—committing the organization to begin the next phase of the project.
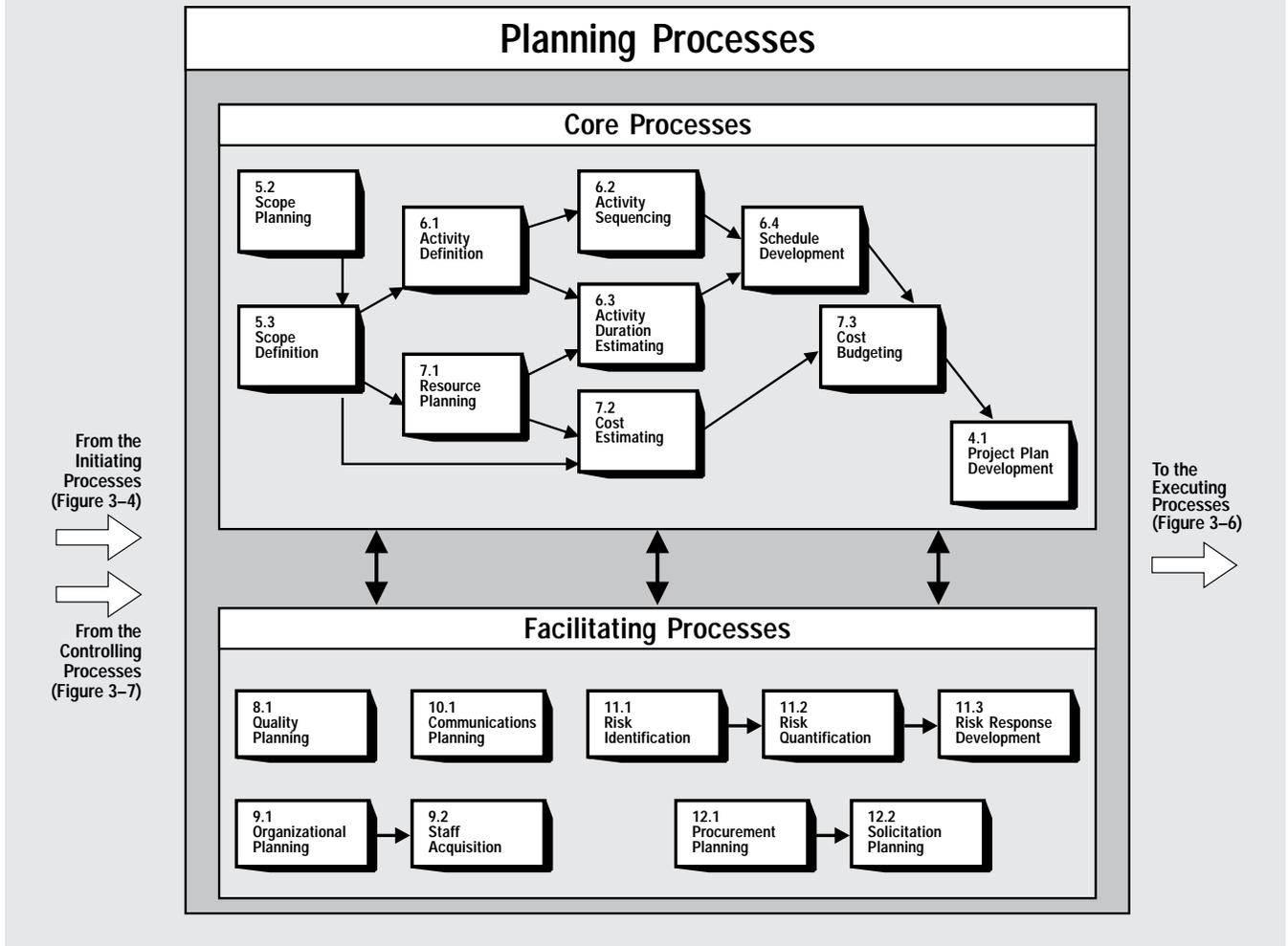
3.3.2 Planning Processes
Planning is of major importance to a project because the project involves doing something which has not been done before. As a result, there are relatively more processes in this section. However, the number of processes does not mean that project management is primarily planning—the amount of planning performed should be commensurate with the scope of the project and the usefulness of the information developed.

The relationships among the project planning processes are shown in **Figure 3–5** (this chart is an explosion of the ellipse labeled "planning processes" in **Figure 3–1**). These processes are subject to frequent iterations prior to completing the plan. For example, if the initial completion date is unacceptable, project resources, cost, or even scope may need to be redefined. In addition, planning is not an exact science—two different teams could generate very different plans for the same project.

Core processes. Some planning processes have clear dependencies that require them to be performed in essentially the same order on most projects. For example, activities must be defined before they can be scheduled or costed. These *core planning processes* may be iterated several times during any one phase of a project. They include:
- Scope Planning (5.2)—developing a written scope statement as the basis for future project decisions.
- Scope Definition (5.3)—subdividing the major project deliverables into smaller, more manageable components.
- Activity Definition (6.1)—identifying the specific activities that must be performed to produce the various project deliverables.

Figure 3–5. Relationships Among the Planning Processes

Planning Processes

Core Processes

- 5.2 Scope Planning
- 6.1 Activity Definition
- 6.2 Activity Sequencing
- 6.4 Schedule Development
- 5.3 Scope Definition
- 6.3 Activity Duration Estimating
- 7.3 Cost Budgeting
- 7.1 Resource Planning
- 7.2 Cost Estimating
- 4.1 Project Plan Development

From the Initiating Processes (Figure 3–4)

From the Controlling Processes (Figure 3–7)

To the Executing Processes (Figure 3–6)

Facilitating Processes

- 8.1 Quality Planning
- 10.1 Communications Planning
- 11.1 Risk Identification
- 11.2 Risk Quantification
- 11.3 Risk Response Development
- 9.1 Organizational Planning
- 9.2 Staff Acquisition
- 12.1 Procurement Planning
- 12.2 Solicitation Planning

- Activity Sequencing (6.2)—identifying and documenting interactivity dependencies.
- Activity Duration Estimating (6.3)—estimating the number of work periods which will be needed to complete individual activities.
- Schedule Development (6.4)—analyzing activity sequences, activity durations, and resource requirements to create the project schedule.
- Resource Planning (7.1)—determining what resources (people, equipment, materials) and what quantities of each should be used to perform project activities.
- Cost Estimating (7.2)—developing an approximation (estimate) of the costs of the resources needed to complete project activities.
- Cost Budgeting (7.3)—allocating the overall cost estimate to individual work items.
- Project Plan Development (4.1)—taking the results of other planning processes and putting them into a consistent, coherent document.

Facilitating processes. Interactions among the other planning processes are more dependent on the nature of the project. For example, on some projects there may be little or no identifiable risk until after most of the planning has been done and the team recognizes that the cost and schedule targets are extremely aggressive and thus involve considerable risk. Although these *facilitating processes* are performed intermittently and as needed during project planning, they are not optional. They include:

- Quality Planning (8.1)—identifying which quality standards are relevant to the project and determining how to satisfy them.
- Organizational Planning (9.1)—identifying, documenting, and assigning project roles, responsibilities, and reporting relationships.
- Staff Acquisition (9.2)—getting the human resources needed assigned to and working on the project.
- Communications Planning (10.1)—determining the information and communications needs of the stakeholders: who needs what information, when will they need it, and how will it be given to them.
- Risk Identification (11.1)—determining which risks are likely to affect the project and documenting the characteristics of each.
- Risk Quantification (11.2)—evaluating risks and risk interactions to assess the range of possible project outcomes.
- Risk Response Development (11.3)—defining enhancement steps for opportunities and responses to threats.
- Procurement Planning (12.1)—determining what to procure and when.
- Solicitation Planning (12.2)—documenting product requirements and identifying potential sources.
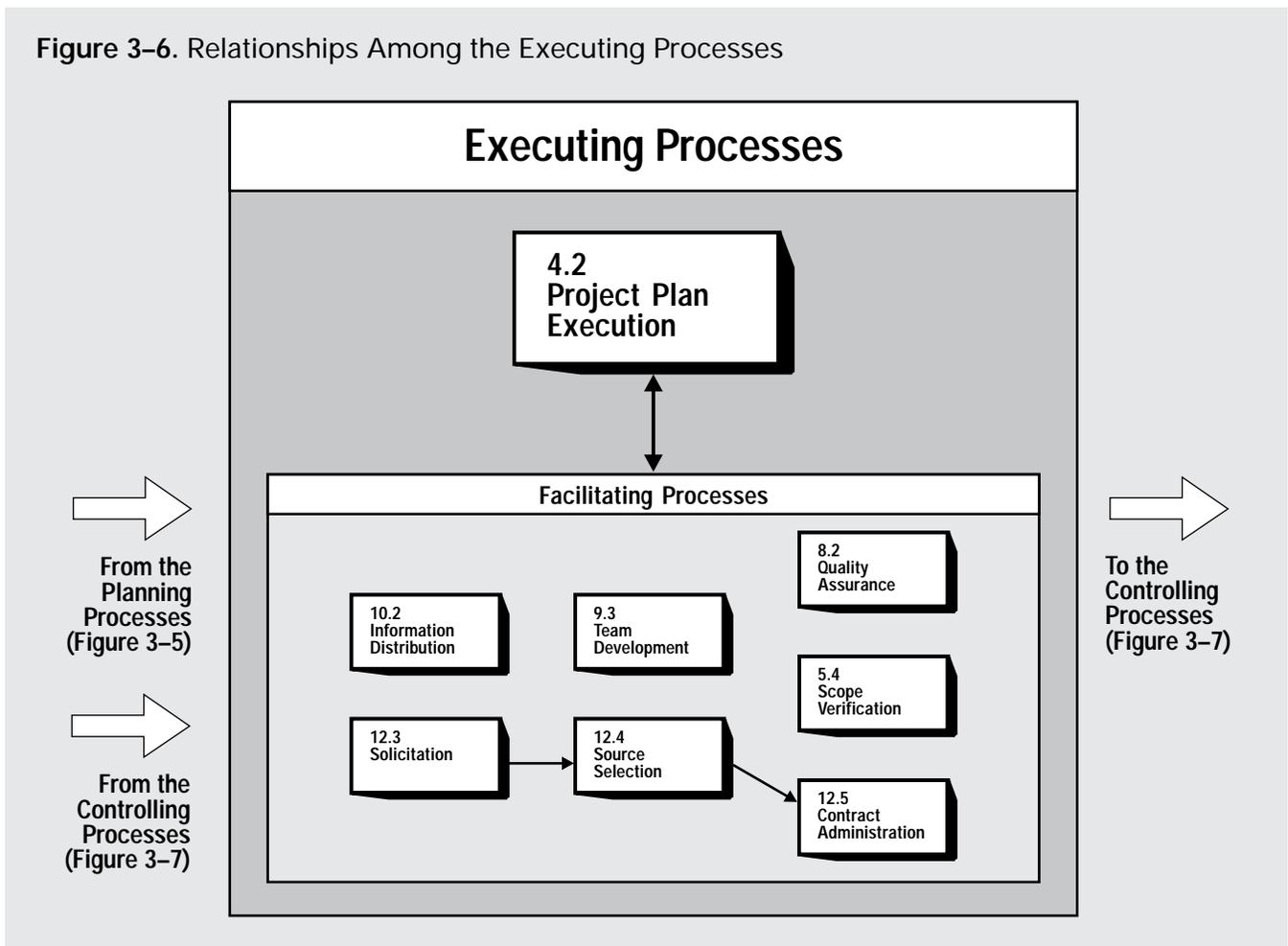
3.3.3 Executing Processes

The executing processes include core processes and facilitating processes as described in Section 3.3.2, Planning Processes. **Figure 3–6** illustrates how the following processes interact:

- Project Plan Execution (4.2)—carrying out the project plan by performing the activities included therein.
- Scope Verification (5.4)—formalizing acceptance of the project scope.
- Quality Assurance (8.2)—evaluating overall project performance on a regular basis to provide confidence that the project will satisfy the relevant quality standards.
- Team Development (9.3)—developing individual and group skills to enhance project performance.
- Information Distribution (10.2)—making needed information available to project stakeholders in a timely manner.
- Solicitation (12.3)—obtaining quotations, bids, offers, or proposals as appropriate.
- Source Selection (12.4)—choosing from among potential sellers.
- Contract Administration (12.5)—managing the relationship with the seller.

3.3.4 Controlling Processes

Project performance must be measured regularly to identify variances from the plan. Variances are fed into the control processes in the various knowledge areas. To the extent that significant variances are observed (i.e., those that jeopardize the project objectives), adjustments to the plan are made by repeating the appropriate project planning processes. For example, a missed activity finish date may require adjustments to the current staffing plan, reliance on overtime, or trade-offs between budget and schedule objectives. Controlling also includes taking preventive action in anticipation of possible problems.

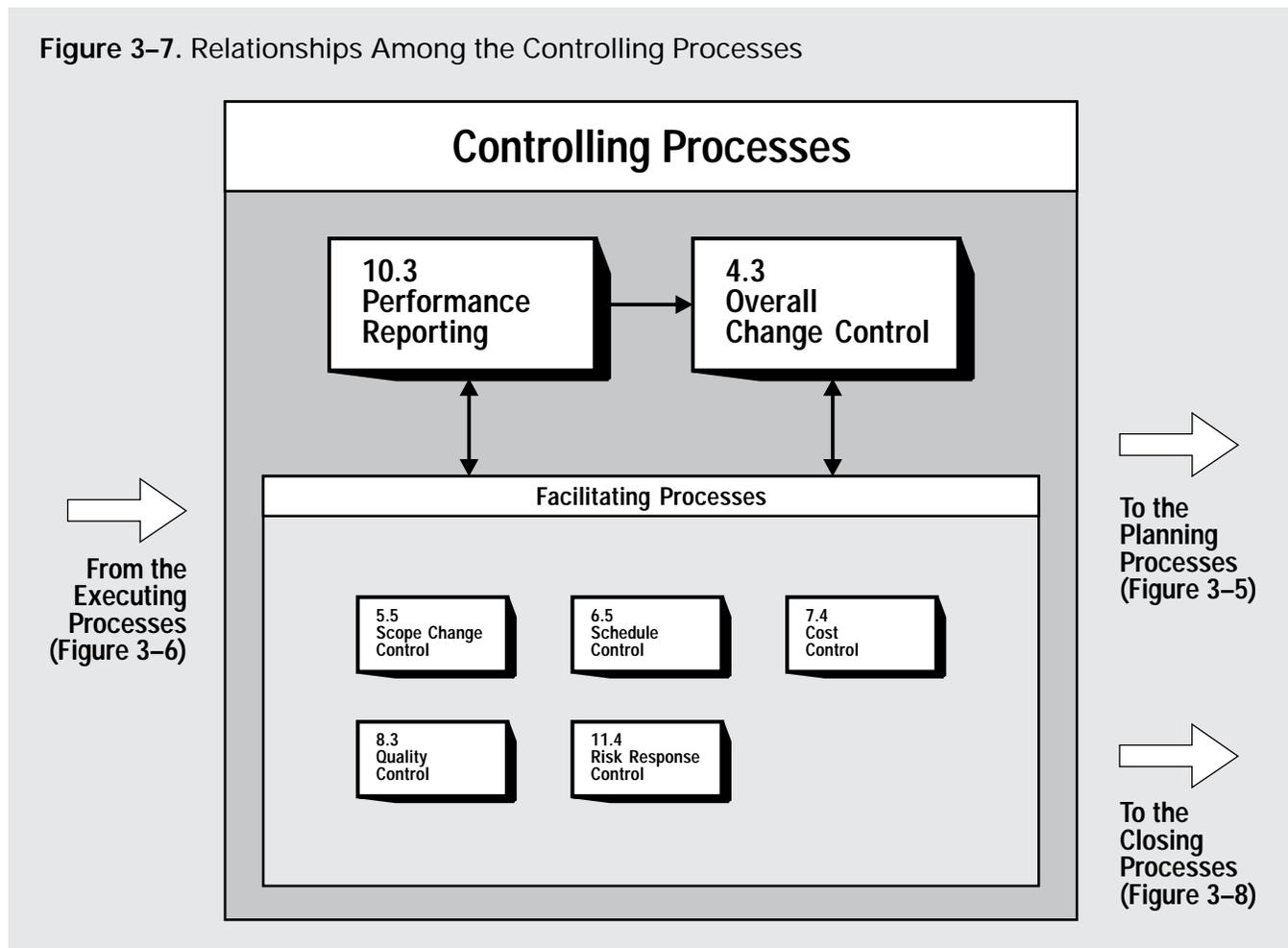**Figure 3–6.** Relationships Among the Executing Processes

The controlling process group contains core processes and facilitating processes as described in Section 3.3.2, Planning Processes.

Figure 3–7 illustrates how the following processes interact:

- Overall Change Control (4.3)—coordinating changes across the entire project.
- Scope Change Control (5.5)—controlling changes to project scope.
- Schedule Control (6.5)—controlling changes to the project schedule.
- Cost Control (7.4)—controlling changes to the project budget.
- Quality Control (8.3)—monitoring specific project results to determine if they comply with relevant quality standards and identifying ways to eliminate causes of unsatisfactory performance.
- Performance Reporting (10.3)—collecting and disseminating performance information. This includes status reporting, progress measurement, and forecasting.
- Risk Response Control (11.4)—responding to changes in risk over the course of the project.

FIGURE 3–7   A GUIDE TO THE PROJECT MANAGEMENT BODY OF KNOWLEDGE

Figure 3–7. Relationships Among the Controlling Processes

Controlling Processes

10.3 Performance Reporting → **4.3 Overall Change Control**

From the Executing Processes (Figure 3–6)

To the Planning Processes (Figure 3–5)

Facilitating Processes

5.5 Scope Change Control

6.5 Schedule Control

7.4 Cost Control

8.3 Quality Control

11.4 Risk Response Control

To the Closing Processes (Figure 3–8)
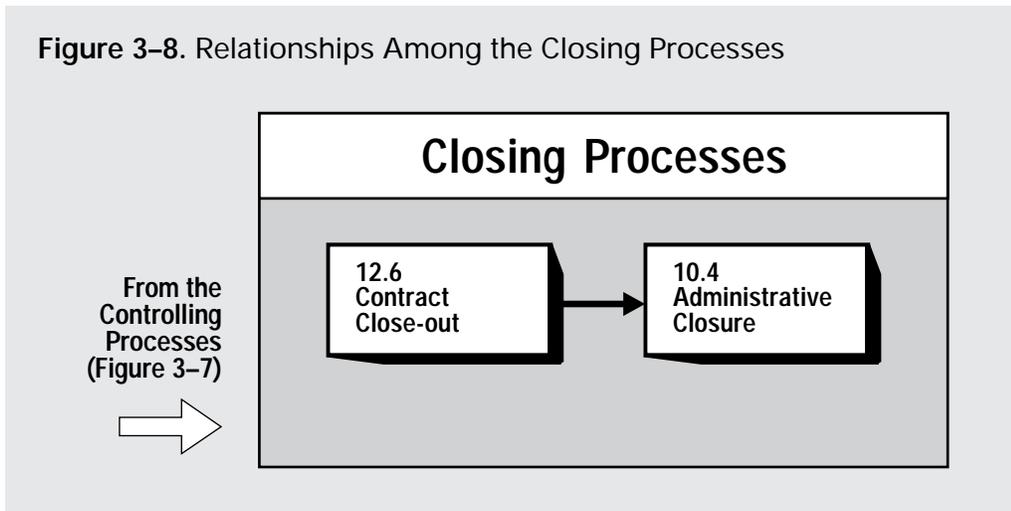
3.3.5 Closing Processes

Figure 3–8 illustrates how the following processes interact:
- Administrative Closure (10.4)—generating, gathering, and disseminating information to formalize phase or project completion.
- Contract Close-out (12.6)—completion and settlement of the contract, including resolution of any open items.

3.4 CUSTOMIZING PROCESS INTERACTIONS

The processes identified and the interactions illustrated in Section 3.3 meet the test of general acceptance—they apply to most projects most of the time. However, not all of the processes will be needed on all projects, and not all of the interactions will apply to all projects. For example:
- An organization that makes extensive use of contractors may explicitly describe where in the planning process each procurement process occurs.
- The absence of a process does not mean that it should not be performed. The project management team should identify and manage all the processes that are needed to ensure a successful project.

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Figure 3–8. Relationships Among the Closing Processes

Closing Processes

From the Controlling Processes (Figure 3–7)

12.6 Contract Close-out → 10.4 Administrative Closure

- Projects which are dependent on unique resources (commercial software development, biopharmaceuticals, etc.) may define roles and responsibilities prior to scope definition since what can be done may be a function of who will be available to do it.
- Some process outputs may be predefined as constraints. For example, management may specify a target completion date rather than allowing it to be determined by the planning process.
- Larger projects may need relatively more detail. For example, risk identification might be further subdivided to focus separately on identifying cost risks, schedule risks, technical risks, and quality risks.
- On subprojects and smaller projects, relatively little effort will be spent on processes whose outputs have been defined at the project level (e.g., a subcontractor may ignore risks explicitly assumed by the prime contractor) or on processes that provide only marginal utility (there may be no formal communications plan on a four-person project).

When there is a need to make a change, the change should be clearly identified, carefully evaluated, and actively managed.