

# Contents

<b>Acknowledgments . . . . .</b>	<b><i>xiii</i></b>
<b>1 Introduction . . . . .</b>	<b>1</b>
1.1 Project portfolio management, project management, and line management	4
1.2 The project portfolio	5
1.3 The project office	6
1.3.1 <i>Making the case for the PO</i>	8
1.3.2 <i>Obstacles to successful deployment</i>	11
1.4 Summary	12
References	14
<b>2 The multiproject challenge . . . . .</b>	<b>17</b>
2.1 Introduction	17
2.1.1 <i>Project uncertainty</i>	17
2.1.2 <i>Project interference</i>	18
2.1.3 <i>Complex behaved system</i>	19
2.2 The multiproject environment	21
2.3 Self-fulfilling prophecies	22
2.4 Common responses to project delays	23
2.4.1 <i>Cutting back or eliminating low-visibility tasks</i>	24
2.4.2 <i>Effects on product quality and decision making</i>	27
2.4.3 <i>Rework</i>	30
2.4.4 <i>Overtime</i>	31

2.4.5	<i>Fatigue</i>	32
2.4.6	<i>Management attention</i>	34
2.4.7	<i>Multitasking</i>	35
2.4.8	<i>Head count increases</i>	38
2.4.9	<i>Scope reductions</i>	39
2.5	Summary	41
	References	41
<b>3</b>	<b>The project office . . . . .</b>	<b>45</b>
3.1	The PO context	46
3.2	PO information structures	48
3.3	PO processes	50
3.3.1	<i>Project life-cycle process</i>	52
3.3.2	<i>Portfolio-management process</i>	57
3.3.3	<i>Support processes</i>	60
3.4	PO roles	70
3.4.1	<i>PO manager</i>	70
3.4.2	<i>Project controller</i>	72
3.4.3	<i>Project auditor and quality assurance personnel</i>	72
3.4.4	<i>Project manager</i>	73
3.4.5	<i>Project coordinators</i>	74
3.4.6	<i>Configuration management personnel</i>	74
3.5	Relationships among the PO, the line functions, the project sponsors, and other project stakeholders	75
3.6	Summary	75
	References	75
<b>4</b>	<b>Processes . . . . .</b>	<b>81</b>
4.1	PO process definitions	82
4.1.1	<i>Project life-cycle management</i>	83
4.1.2	<i>Project portfolio management</i>	87
4.1.3	<i>Estimation</i>	89
4.1.4	<i>Budgeting</i>	90
4.1.5	<i>Requirements management</i>	92
4.1.6	<i>Risk and opportunity management</i>	94
4.1.7	<i>Project audits</i>	96

4.1.8	<i>Quality assurance</i>	99
4.1.9	<i>Procurement management</i>	100
4.1.10	<i>Project accounting</i>	101
4.1.11	<i>Measurement process</i>	102
4.1.12	<i>Configuration management</i>	103
4.1.13	<i>Human-resources management</i>	104
4.1.14	<i>Process management</i>	105
4.2	Summary	106
	References	107
<b>5</b>	<b>Tools . . . . .</b>	<b>111</b>
5.1	Information needs	112
5.2	Characteristics of a PO information system	113
5.3	Functionality of a PO information system	114
5.3.1	<i>Portfolio management</i>	115
5.3.2	<i>Task scheduling</i>	118
5.3.3	<i>Resource scheduling</i>	118
5.3.4	<i>Project tracking</i>	120
5.3.5	<i>Document management</i>	120
5.3.6	<i>Risk management</i>	121
5.3.7	<i>Finances and budgeting</i>	122
5.3.8	<i>Action item management</i>	123
5.3.9	<i>Time reporting</i>	123
5.4	Commercial tools	124
5.5	Summary	128
	References	128
<b>6</b>	<b>Balancing the project portfolio . . . . .</b>	<b>129</b>
6.1	Introduction	129
6.2	Project formulation	131
6.2.1	<i>Producing a rough estimate</i>	132
6.2.2	<i>Calculating contingency allowances</i>	136
6.2.3	<i>Evaluating individual projects' contribution to benefits (project concept definition)</i>	139
6.2.4	<i>Establishing project dependencies (updating dependency matrix)</i>	145
6.3	Portfolio balancing	146

6.3.1	<i>Forecasting resource needs</i>	146
6.3.2	<i>Forecasting revenues</i>	151
6.3.3	<i>Eliminating less valuable alternatives</i>	152
6.3.4	<i>The portfolio approach</i>	155
6.3.5	<i>Building visual maps</i>	156
6.3.6	<i>Ranking projects</i>	157
6.4	Net present value and the gated project approach	160
6.5	Real options	167
6.6	Summary	169
	References	169
<b>7</b>	<b>Quantitative management . . . . .</b>	<b>171</b>
7.1	Measurement fundamentals	173
7.1.1	<i>Validity and reliability</i>	173
7.1.2	<i>Levels of measurement</i>	174
7.1.3	<i>Measures of dispersion as an expression of risk</i>	176
7.1.4	<i>Relationships between measurement variables</i>	177
7.1.5	<i>Aggregating measurements</i>	179
7.1.6	<i>Time series</i>	183
7.1.7	<i>Sources of data</i>	185
7.1.8	<i>Intrusive nature of measurement</i>	186
7.2	Using metrics	187
7.2.1	<i>Controlling and steering projects</i>	187
7.2.2	<i>Estimating</i>	187
7.2.3	<i>Process improvement</i>	189
7.3	Selecting metrics	192
7.3.1	<i>Progress metrics</i>	193
7.3.2	<i>Performance metrics</i>	195
7.3.3	<i>People</i>	197
7.3.4	<i>Product</i>	199
7.3.5	<i>Product quality</i>	200
7.3.6	<i>Customer satisfaction</i>	201
7.4	Summary	201
	References	202
<b>8</b>	<b>Deploying the project office . . . . .</b>	<b>205</b>

8.1	Layers of change	205
8.1.1	<i>Reward structure</i>	206
8.1.2	<i>Organizational culture</i>	208
8.1.3	<i>Power structure</i>	209
8.1.4	<i>Mental models</i>	211
8.2	Where to start	213
8.3	Incremental deployment	215
8.4	Maturity models	217
8.5	Communication strategy	218
8.6	Limiting bureaucracy	223
8.7	The need for the line function: How much project management is enough?	224
8.8	Summary	225
	References	226
<b>Appendix A: IDEF0 notation . . . . .</b>		<b>227</b>
<b>About the author . . . . .</b>		<b>229</b>
<b>Index . . . . .</b>		<b>231</b>



## CHAPTER

# 3

### Contents

- 3.1 The PO context
- 3.2 PO information structures
- 3.3 PO processes
- 3.4 PO roles
- 3.5 Relationships among the PO, the line functions, the project sponsors, and other project stakeholders
- 3.6 Summary
- References

## The project office

In the previous chapter we saw that decisions made in the context of one project can impact other projects in the portfolio in unforeseen and often detrimental ways, and this, coupled with a lack of resource slack, can eventually bring the projects-based organization to a halt. To address these problems, the establishment of a business function responsible for the coordination of all project work across the organization and for providing the infrastructure and competence necessary to manage multiple projects is proposed. We will call this function the project office, or PO.<sup>1</sup>

The PO objective, in contrast with those of a single project, is to complete all projects to best achieve the goals of the organization [11]. The PO's responsibilities include project portfolio management, strategic resource planning, interproject coordination, overall project oversight, cost estimation, contingency planning, quality assurance, external provisioning, project managers' professional development, process management, and tool support.

The PO is an operational function, not a policy-making one. The PO acts as an agent for senior management, providing advice, coordination, and oversight, and although accountable with respect to the execution of the project portfolio, it does not replace either management or the project sponsors with

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1. This corresponds to the "managerial" type of project office introduced in Chapter 1.

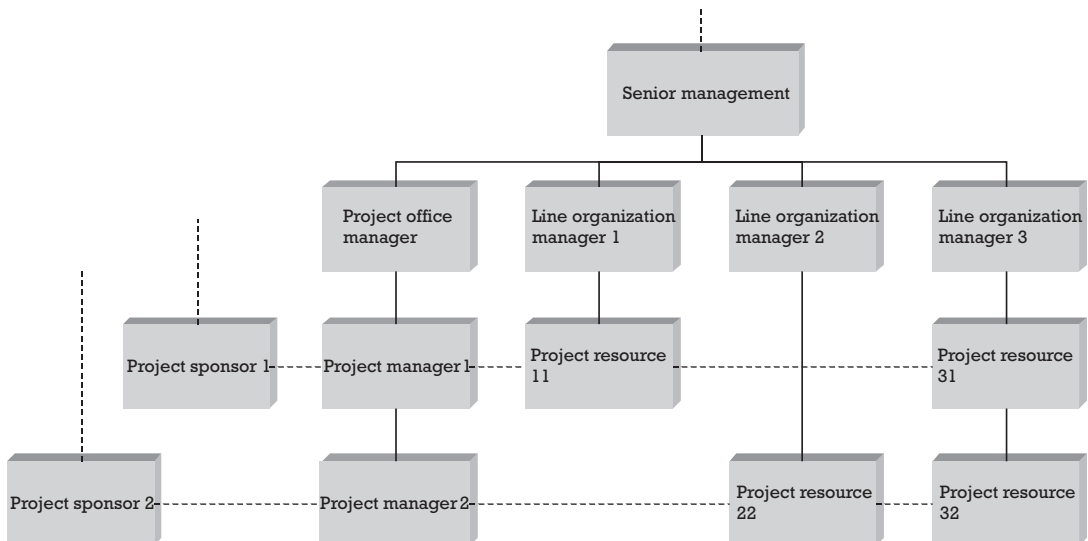
respect to the prioritization of projects and their ultimate disposition.

In this chapter, we will identify the PO's main outputs, its processes and interfaces, and the different competencies or roles necessary to execute them. In subsequent chapters we will address in more detail the process definition, methods, and tools necessary to deploy an effective PO.

### 3.1 The PO context

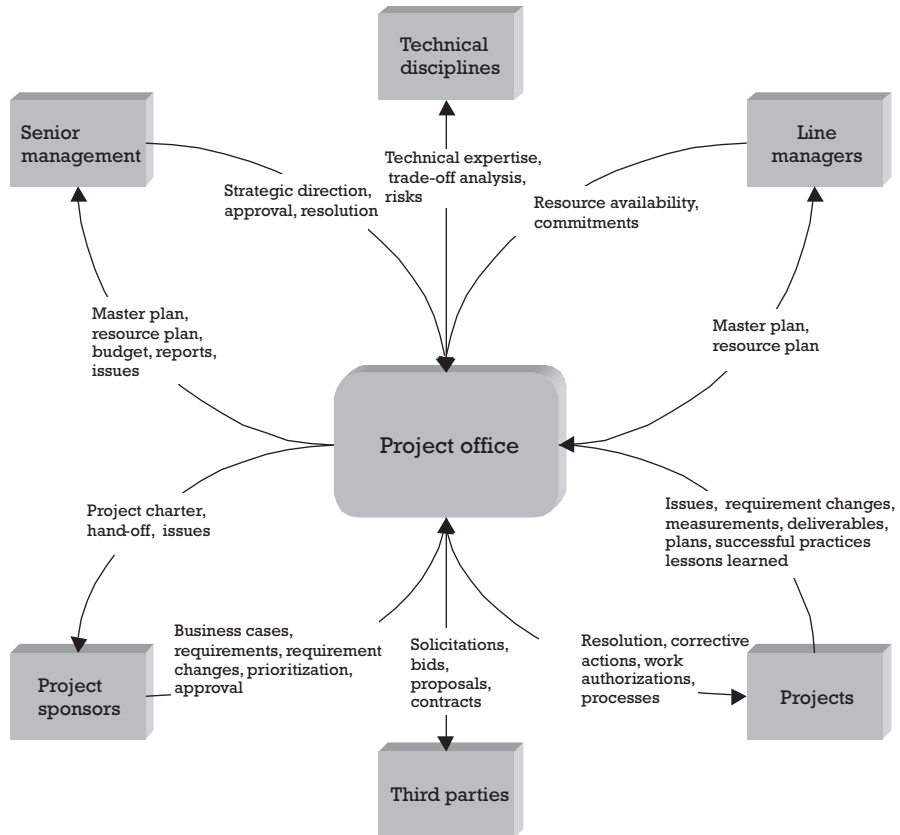
A PO can be set up at the business unit level, the product unit level, or at any level at which there arises a need to coordinate multiple projects. Whatever the level within the organizational hierarchy at which the PO is located, it is important that the PO manager has direct access to the same management level as the resource owners. This will help maintain the PO's focus on the interests of the organization as a whole rather than on the interests of any particular functional group, while ensuring that the PO manager has the authority and the access necessary to resolve the conflicts that arise between projects competing for common resources. Figure 3.1 shows the proposed PO reporting relationships. The PO interfaces are shown in Figure 3.2.

Senior management refers to the highest level of management within the organization of which the PO is a part. Senior management is responsible for formulating strategies; it has overall business responsibilities, and



**Figure 3.1** PO reporting relationships.





**Figure 3.2** PO interfaces.

provides the ultimate decision in the resolution of conflicts. Common titles for senior management are director, vice president, and department head.

Project sponsors are those who request the project work; they have ultimate approval power over expenditures and deliverables. Depending on the business situation, these could be “paying customers,” sales representatives, product managers, or any number of internal customers.

Line managers are responsible for the resources to be used in the execution of the projects. They are in general responsible for a function or discipline within the organization. Common titles for line managers are department or section managers.

The technical disciplines entity represents the domain specialists that do not belong to the PO, but who perform work, such as tradeoff studies, on its behalf. These resources usually belong to the line functions.

Third parties are subcontractors, vendors, and other external partners with which the projects are involved in commercial transactions.

In Figure 3.2, the execution of the projects is depicted as external to the PO to emphasize that the day-to-day decisions and the work of the project itself are outside the scope of control of the PO, which intervenes only in case of major deviations and to prevent disruptions to the project portfolio. To do otherwise and involve the PO in every single project decision would result in the establishment of a grinding bureaucracy likely to kill any advantage that might be created by instituting a PO.

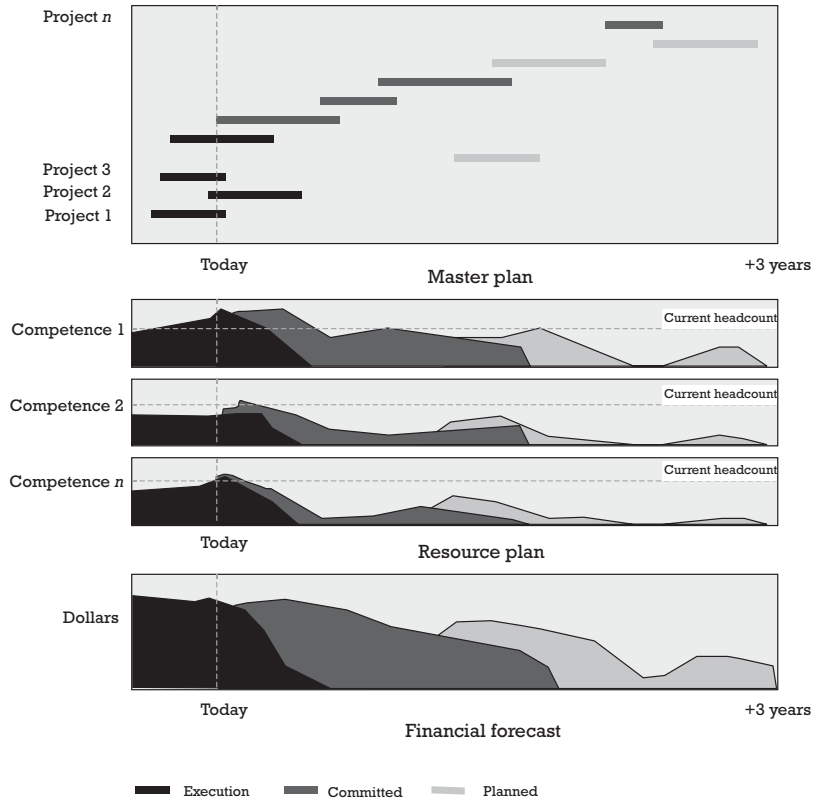
### **3.2 PO information structures**

The work of the PO is organized around four fundamental information structures: the master plan, resource plan, financial forecast (see Figure 3.3), and requirements dependency matrix (see Figure 3.4).

The master plan is a time-scaled view of all the projects included in the project portfolio covering a planning horizon of 2 to 3 years. The projects in the plan are portrayed as single tasks characterized by their tentative start dates, their duration, their required effort, their funding needs, and their effort spending profiles. Additional information about the projects could include the degree of commitment to the project (i.e., whether the project is in execution, planned, or envisioned) for those under execution, the status (i.e., whether the project is on time or delayed, and the technologies or products they support). The master plan might also include relationships between projects and links to technology and product road maps.

The resource plan is a forecast, over the planning horizon, of the resources necessary to execute the projects included in the master plan. The resource plan covers the current availability of resources (head count), their competencies, a recruiting plan, and periods during which excess capacity might exist. The resource plan shows whether the resource utilization is based on current, planned, or envisioned work. At this level, the resource plan is prepared based on the competence of the resources and not by assigning specific individuals to the projects. Plans for resources such as test benches, laboratories, and computing equipment are better taken care of by the line organizations that own them.

The financial forecast depicts the cash flows, expenses, and revenues arising from the execution of the projects in the master plan, with the purpose of helping senior management and project sponsors choose the portfolio configuration that best meets the objectives and capabilities of the



**Figure 3.3** Master plan, resource plan, and financial forecast.

organization. The financial information contained in the forecast includes labor costs, nonlabor costs, management reserves, volume allowances, and funding sources. In addition to the financial forecast, the PO also prepares detailed quarterly or annual budgets for the projects in execution and for those beginning in the next budgeting period.

The requirements dependency matrix is an important tool for organizations working on product lines or whose products evolve through successive reincarnations of added functionality. The matrix links the requirements or features to be developed in future projects to those in previous projects that will serve as a foundation upon which the latest will be built. The matrix allows tracing the consequences of postponing or canceling the implementation of any feature through the entire project portfolio. Additionally, the matrix might contain financial and effort information that allows calculating the impact—in terms of lost revenues and extra development effort—that

Projects	Where used	Project 1	Project 1	Project 2	Project 2	...	Project 2	...	Project n
Where developed	Requirements	Feature 1-1	Feature 1-2	Feature 2-1	Feature 2-2		Feature 2-n		Feature n-1
Project 1	Feature 1-1			▲		▲			▲
Project 1	Feature 1-2			▲			▲		
Project 2	Feature 2-1								
Project 2	Feature 2-2								
⋮							▲		
Project 2	Feature 2-n								▲
⋮									
Project n	Feature n-1								

Feature  $n-1$  in Project  $n$  requires the implementation of Features 1-1 and 2- $n$  by projects 1 and 2 respectively. Feature 2- $n$  requires feature 1-2 to be developed by Project 1. Therefore, if Feature 1-2 is dropped from Project 1, Project 2, and Project  $n$  will be impacted.

**Figure 3.4** Requirements dependency matrix.

such decisions would have over subsequent projects. The mechanism for this will be explained in detail in Chapter 6.

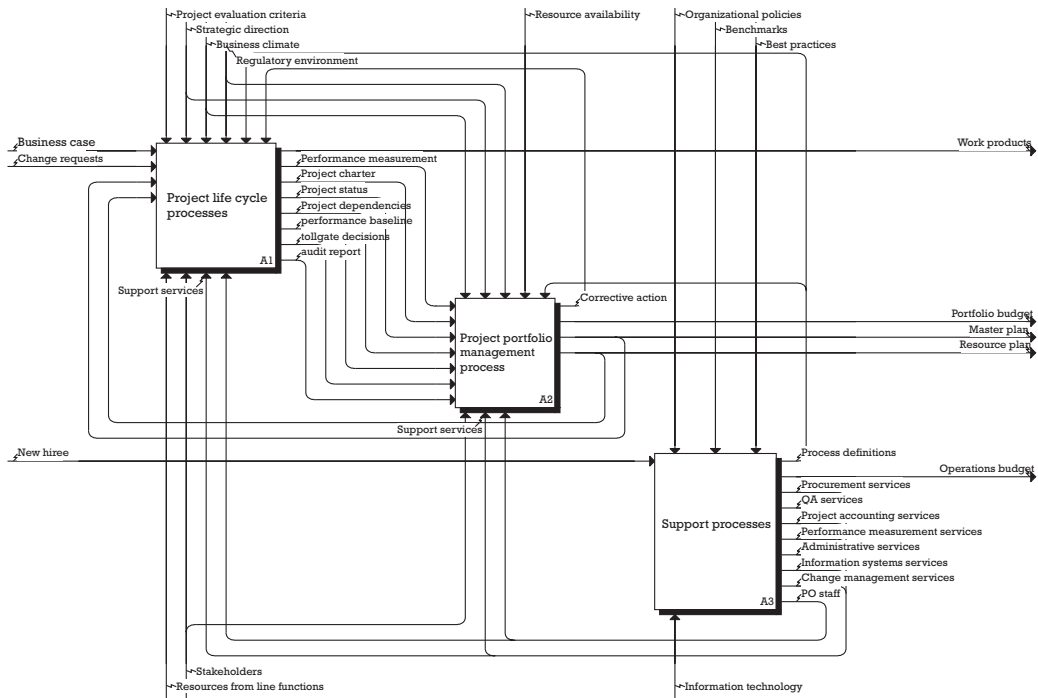
### 3.3 PO processes

The processes performed by a managerial type of PO revolve around three main themes:

1. Project life-cycle management;
2. Project portfolio management;
3. Support functions.

The most important of these, the one that provides the justification for a heavyweight PO like the one proposed here, is the second item, project portfolio management, shown at the center of Figure 3.5.<sup>2</sup> If the organization does not adhere to the portfolio concept or if the portfolio is small, then probably all that the organization needs is a “repository” or “coach” type of

2. The PO processes have been described using IDEF0 notation. See Appendix A for an explanation of this notation.



**Figure 3.5** PO main processes.

PO (see Section 1.3), with the rest of the responsibilities shared between senior management and line functions.

In deciding which processes to include under the responsibility of the PO, there are two important criteria to consider: First, the PO should be accountable and have authority over those processes that clearly fall under its area of responsibility, such as portfolio and project management. Second, the PO should have responsibility over those processes that allow it to stay “in the loop.” The justification for the second requirement is simple: In order to assure that the PO has the necessary power to exercise its authority effectively and that it is not bypassed when important decisions need to be made, the PO must have a hand in such processes as change management, vendor selection, career and professional development for project managers, and budgeting.

Although the PO must be given responsibility for the execution of these functions, the work to be performed is not limited to the PO staff. For example, formulating a project charter would require the involvement of personnel from the sponsoring organization as well as specialists borrowed from the different technical disciplines. This is necessary not only because the PO

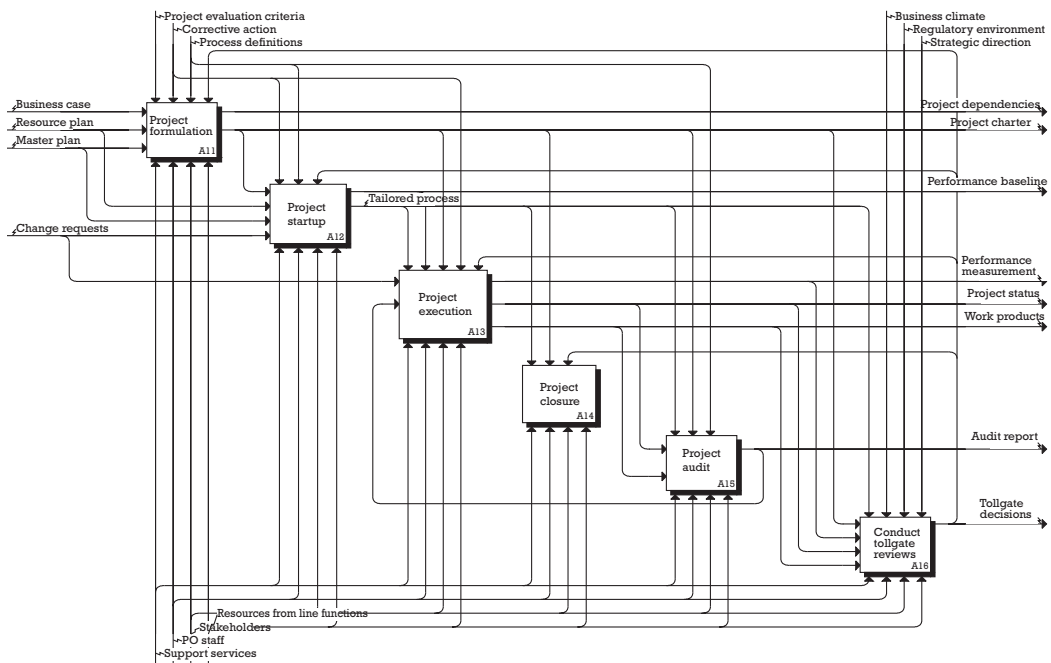
does not have all the technical resources needed to accomplish the task, but because such involvement helps foster consensus among the stakeholders. Another example is the portfolio planning process, where the PO manager acts as a convener and facilitator, with the final decisions taken by senior management in conjunction with the project sponsors.

### 3.3.1 Project life-cycle process

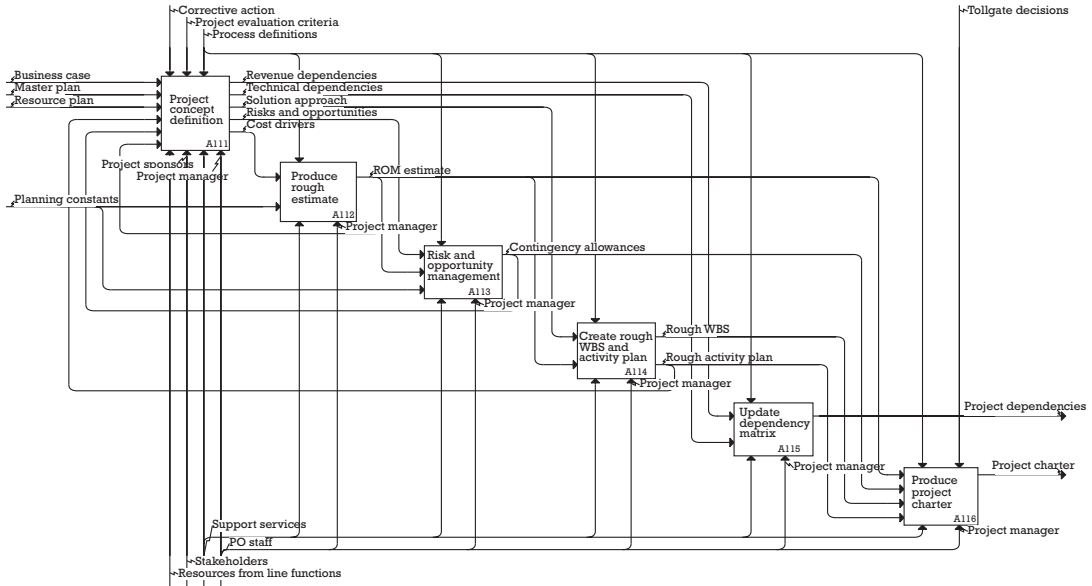
The project life-cycle process addresses the formulation, planning, execution termination, and review of individual projects (see Figure 3.6).

#### 3.3.1.1 Project formulation

Upon receiving a request for a new project or a major change to an existing one, the PO conducts a preliminary study to establish its scope, work approach, duration, effort required, and other business aspects. The extent of the work to be performed at this point is limited to that necessary to make an informed decision with regards to whether or not to include the request in the portfolio mix (see Figure 3.7).



**Figure 3.6** Project life cycle processes.

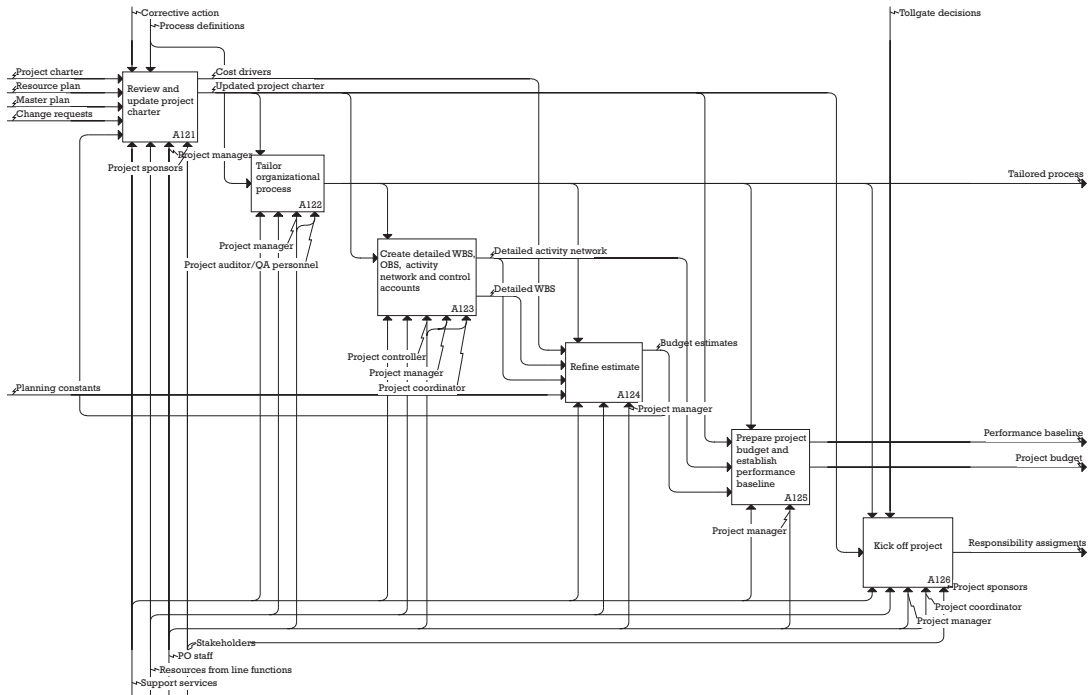


**Figure 3.7** Project formulation process.

To support this activity, the PO will typically set up a multidisciplinary team with the participation of specialists from various departments and representatives of the sponsor. The main output of this activity is a project charter, which specifies the scope of work, the time frame in which the work is to be performed, the effort and other resources necessary for the execution, the major risks that could derail the project, and links to other projects in the portfolio. The project charter will be refined as work progresses. Contingency funds are evaluated at this time, with the purpose of minimizing costs by spreading the risks across all projects, much in the way that an insurance company will do with respect to its policyholders.

### 3.3.1.2 Project startup

The project core team is assembled. The project scope, the initial estimates, the assumptions, and the work approach proposed during the project formulation phase are revisited. Resource coverage is verified and necessary changes agreed to with the project sponsor. Changes that might have an impact on other projects are submitted for review and approval in the context of the master plan. The WBS is refined, work packages defined, and cost accounts set up. A performance baseline, against which performance will be measured, is established. Project staffing and work is then begun according to the project plan (see Figure 3.8).



**Figure 3.8** Project startup process.

It is during this phase that the organizational project management method and other processes are adapted or tailored to the circumstances and needs of the project.

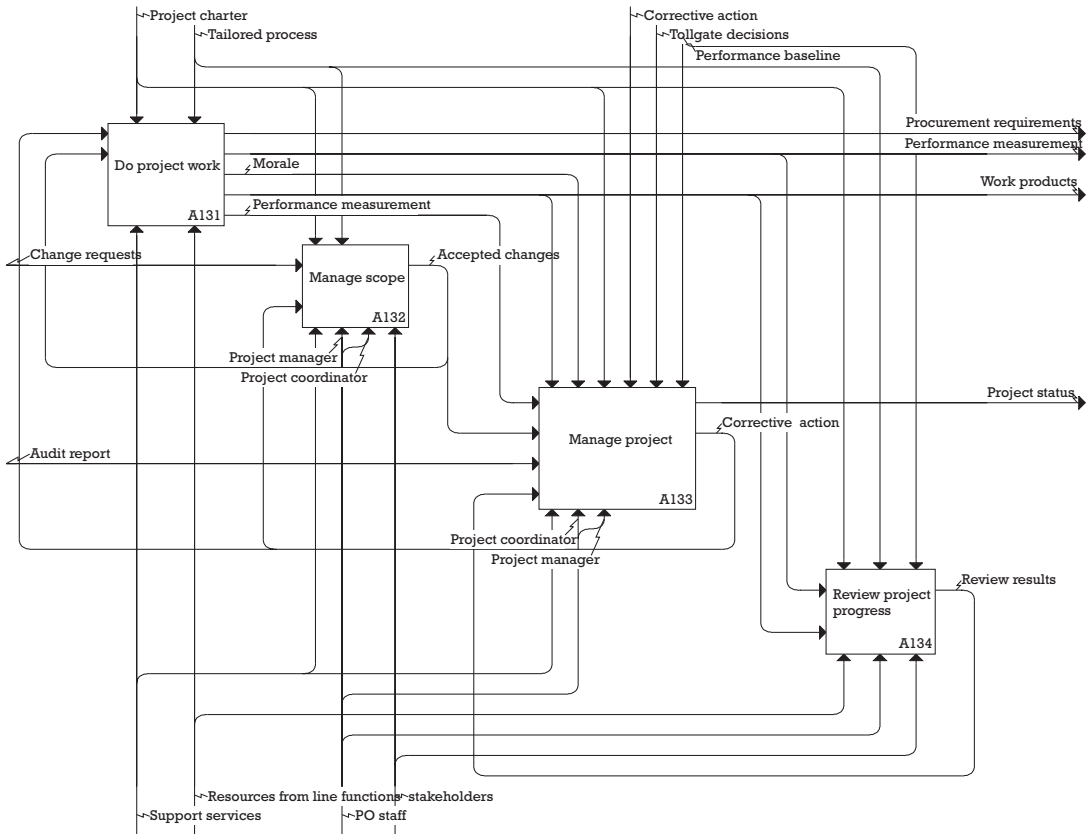
### 3.3.1.3 Project execution

It is at the project-execution stage (see Figure 3.9) that the actual project work gets done. The project-execution process brings together, into a temporary organization, the resources belonging to different line functions to work in a common endeavor, in accordance with the specifications contained in the project charter. The responsibility of the PO is exercised through the project manager, who is responsible for producing the desired results on time and within budget, for encouraging teamwork and commitment, and for ensuring that the processes, methods, and standards of the larger organization are adhered to.

### 3.3.1.4 Project closure

As the project draws to a close, the PO must ensure that all the work is completed, that the people finalizing their assignments are recognized for their





**Figure 3.9** Project execution process.

contributions, and that the lessons learned are incorporated into the project-management processes.

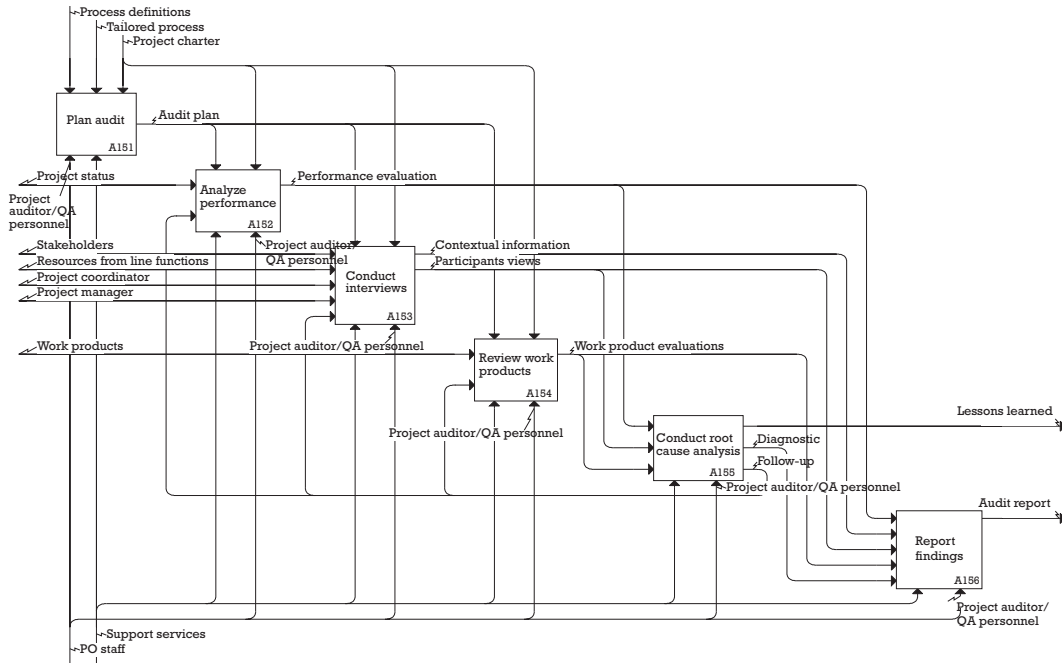
The key activities at this stage are work completion, transferring ownership of the deliverables, closing contracts with subcontractors and suppliers, debriefing the project team, conducting a lessons-learned exercise, rewarding achievement, and disbanding the project team (see Figure 3.10).

#### 3.3.1.5 Project audit

A project audit is an in-depth evaluation of the “true and fair” state of a project conducted by a person not belonging to the project team. A project audit has as its purpose one or more of the following:

- To ensure that the work is being performed in accordance with established procedures;





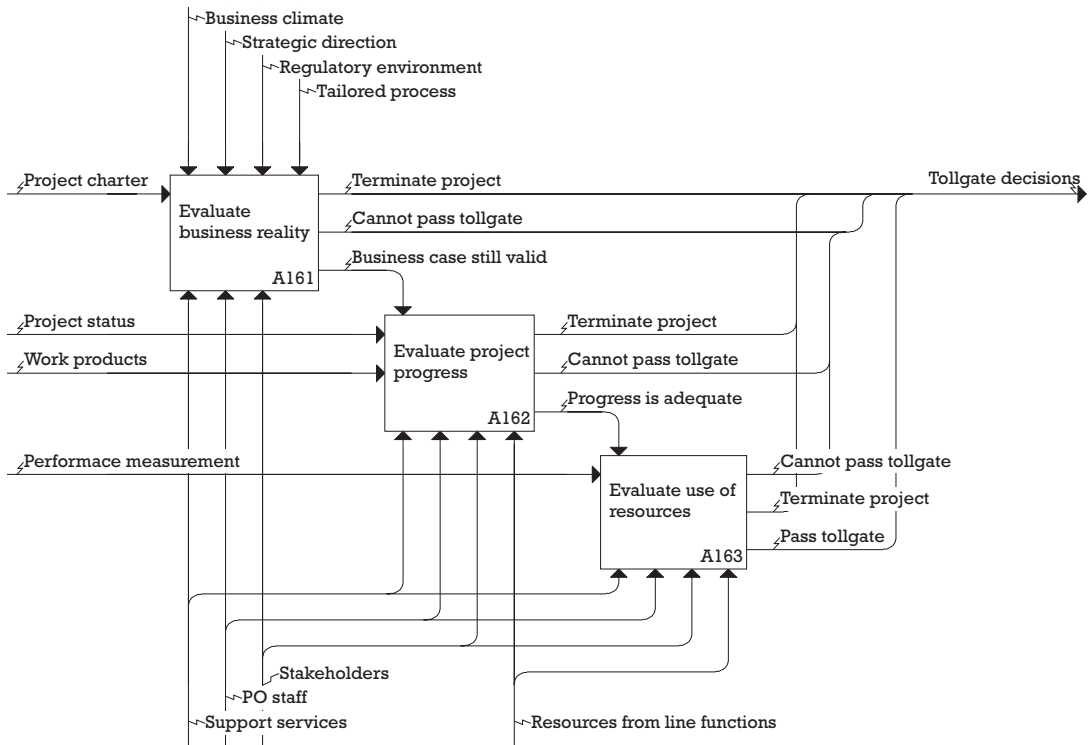
**Figure 3.11** Project audit process.

At each tollgate, a project will be reviewed from at least three different perspectives: business, progress, and cost. Representative questions are as follows: Are the justifications for this project still valid? Is the project making progress as expected? Are solutions appearing faster than problems, or vice versa? Are resources being used efficiently? What will be the cost at completion?

An effective tollgate process, one with the ability to discriminate between bad and good projects and a willingness to terminate the losers, is a key factor distinguishing “best-in-class” organizations from the rest.

### 3.3.2 Portfolio-management process

The portfolio-management process comprises portfolio planning, project oversight, and portfolio control (see Figure 3.13). The portfolio management process seeks to maximize the benefits that can be attained, with a given level of risk, from all of the projects currently undertaken by the organization and those envisioned for the years to come.

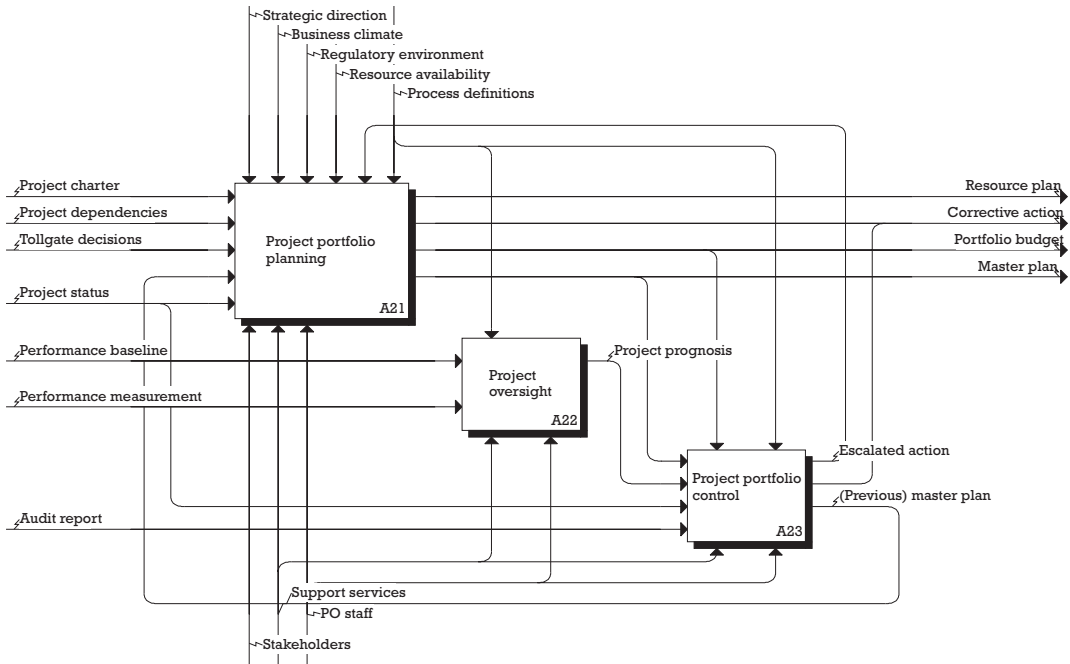


**Figure 3.12** Tollgate process.

### 3.3.2.1 Project portfolio planning

Project portfolio planning is the point at which projects and business come together. The outcome of this process is a plan that balances work, results, resources, and risk according to the objectives of the organization. It involves deciding which projects to execute and when, forecasting the resources needed to execute the selected projects, and projecting the resulting cash flows.

The project-portfolio-planning process (see Figure 3.14) is performed at regular intervals, usually quarterly, or when special circumstances such as major deviations in individual projects, reorganizations, or new opportunities impose a revision of existing plans. At this level, projects are viewed as a single task. The selection and prioritization of projects is made with the objective of striking a balance between criteria such as the projects' strategic position, probability of technical success, probability of commercial success, sociopolitical and regulatory consequences, costs, rewards, stage of



**Figure 3.13** Portfolio-management process.

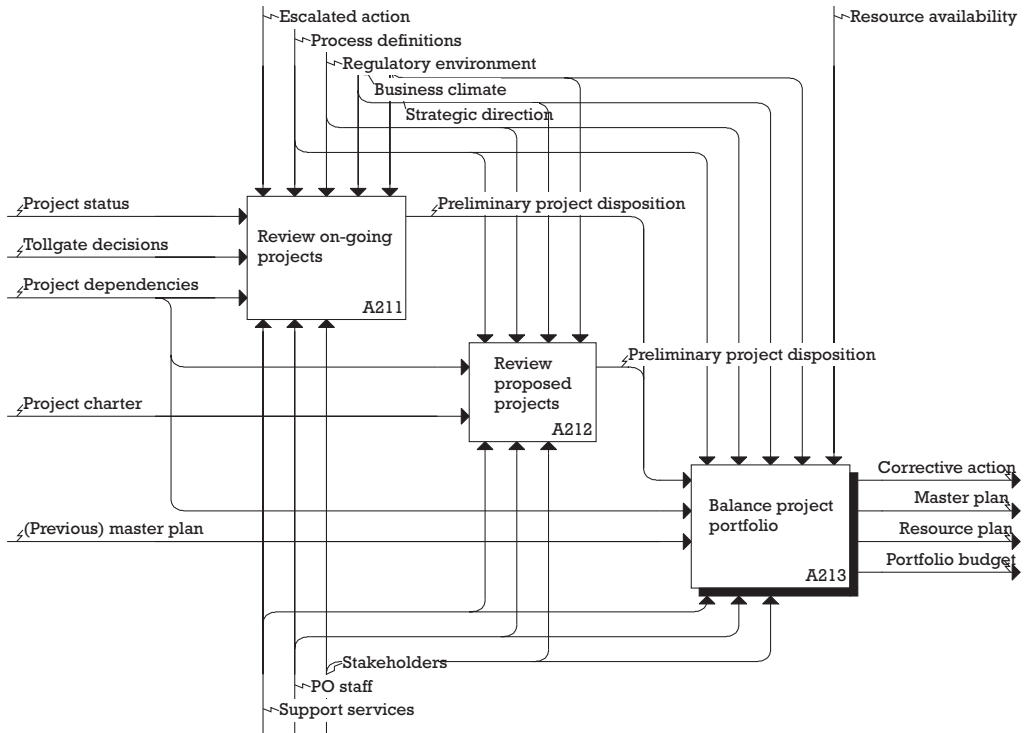
innovation, and resource constraints. Specific techniques for balancing the project portfolio will be dealt with in Chapter 6.

### 3.3.2.2 Project oversight

The purpose of project oversight is to provide early warnings about the performance of individual projects so that management can act before local issues spread to the entire portfolio.

To provide early warnings (see Figure 3.15), the project's performance must be assessed against its performance baseline and against the output of forecasting models built out of measurements collected from previous endeavors. The output of the process is a prognosis of the project's health, assessed by doing "checkups" on the following areas: progress, cost, quality, and staff morale. Specific quantitative techniques will be provided in detail in Chapter 7.

Quantitative oversight is not a substitute for, but a complement to, direct observation. The project manager and the PO manager must walk around to corroborate, in the field, whatever the indicators might be saying and to pick up signals overlooked by the current process.



**Figure 3.14** Project portfolio-planning process.

### 3.3.2.3 Portfolio control

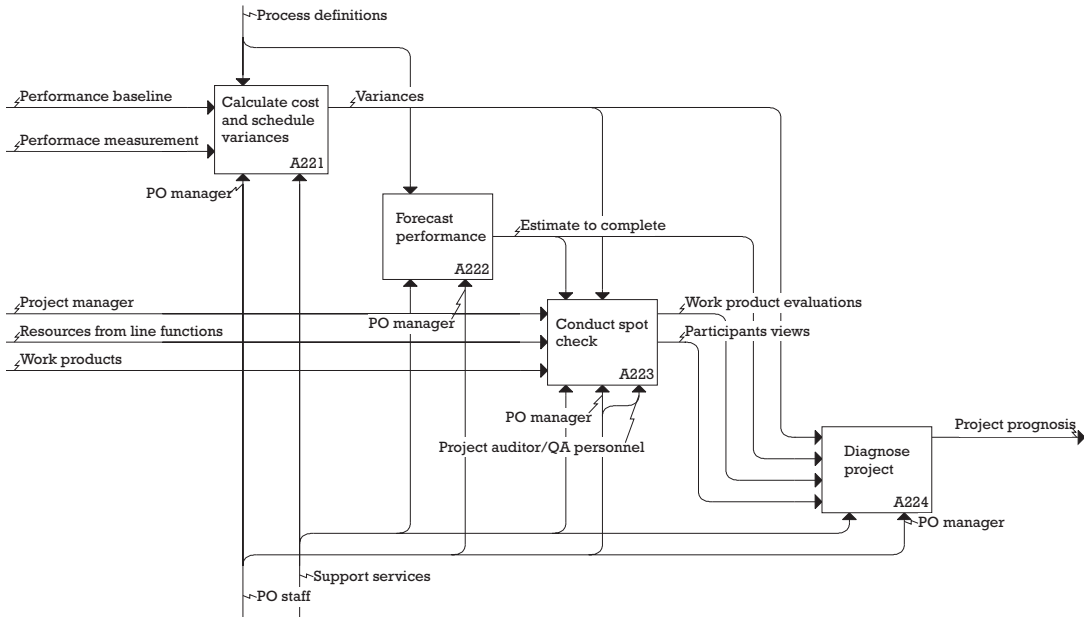
Portfolio control is the process by which the PO takes action to compensate or minimize the impact of project deviations over the entire portfolio.

Estimates are reviewed to ascertain that all projects will be completed in the allocated time frames, that resources will be freed on time, and that the impacts of cross-project delays are minimized. Appropriate corrective actions are decided in the context of the master and resource plans and not on the basis of the affected project alone (see Figure 3.16).

The PO manager will take action by rebalancing the portfolio within the time-resource window defined for each project. Beyond those parameters, conflicts would need to be referred to senior management for resolution.

### 3.3.3 Support processes

The support processes provide the foundation on top of which all the other processes operate (see Figure 3.17). Despite their low visibility, these



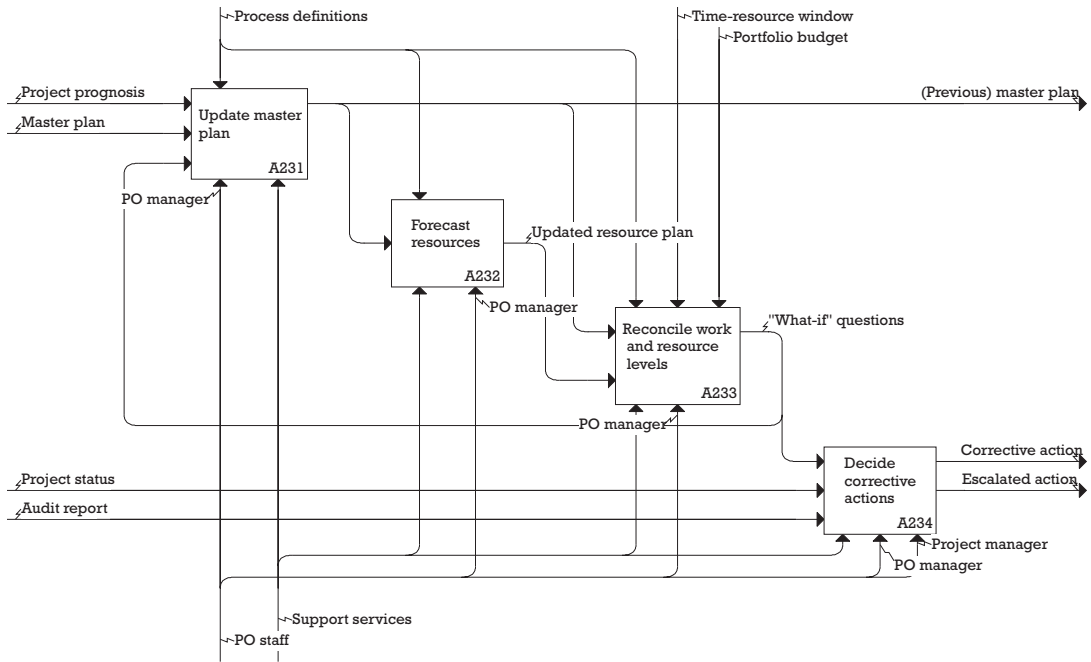
**Figure 3.15** Project oversight process.

processes are an essential component of the PO. Furthermore, in the case of the PO as repository or coach, the support processes are the only processes specifically assigned to it.

The importance of these processes resides in the fact that it is through them that the PO can ascertain project and activity progress without interfering with the project work. For example, by examining the activity logs of the configuration management system it is possible to determine the status of the work in process or the number of changes requested by a sponsor—of course, the system must first be designed to provide this information. Similarly, if the training and evaluation of project managers were not under the control of the PO, it would be very difficult for the PO manager to exercise authority over them.

There are eight fundamental support processes:

1. Processes and information systems management;
2. Measurement process;
3. Change management;
4. Procurement management;
5. Quality assurance;



**Figure 3.16** Portfolio control process.

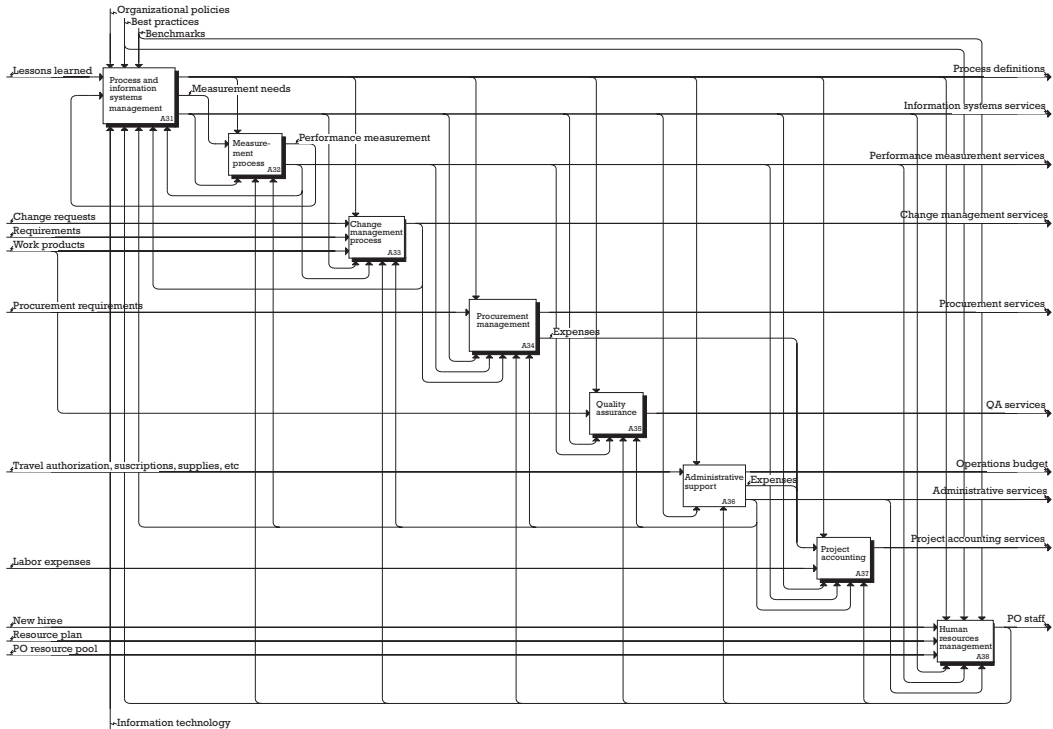
6. Administrative support;
7. Project accounting;
8. Human-resources management.

### 3.3.3.1 Processes and information systems management

The success of the PO relies on the existence of common processes and tools. Without them, the system is unmanageable. But as important as the role that processes and tools play in developing a common vocabulary is their value as intellectual capital and as a source of competitive advantage. Processes and tools are the embodiment of the collective knowledge developed by the organization.

The notion of process improvement embraced here is based on the notion of bottlenecks [2]. Bottlenecks are activities or mechanisms that limit the throughput of systems along a given dimension: time to market, quality, and so on. Improvements in areas other than the bottleneck do not result in a performance increase at the system level. Of course, once we have removed a given constraint, a bottleneck will appear elsewhere and the process will be repeated. By focusing the improvement work where it





**Figure 3.17** Support processes.

really matters, not only do we reduce cost but we also minimize disturbance to the ongoing work, which in turn results in less variability. So by improving the improvement process we could achieve an improvement in the overall process.

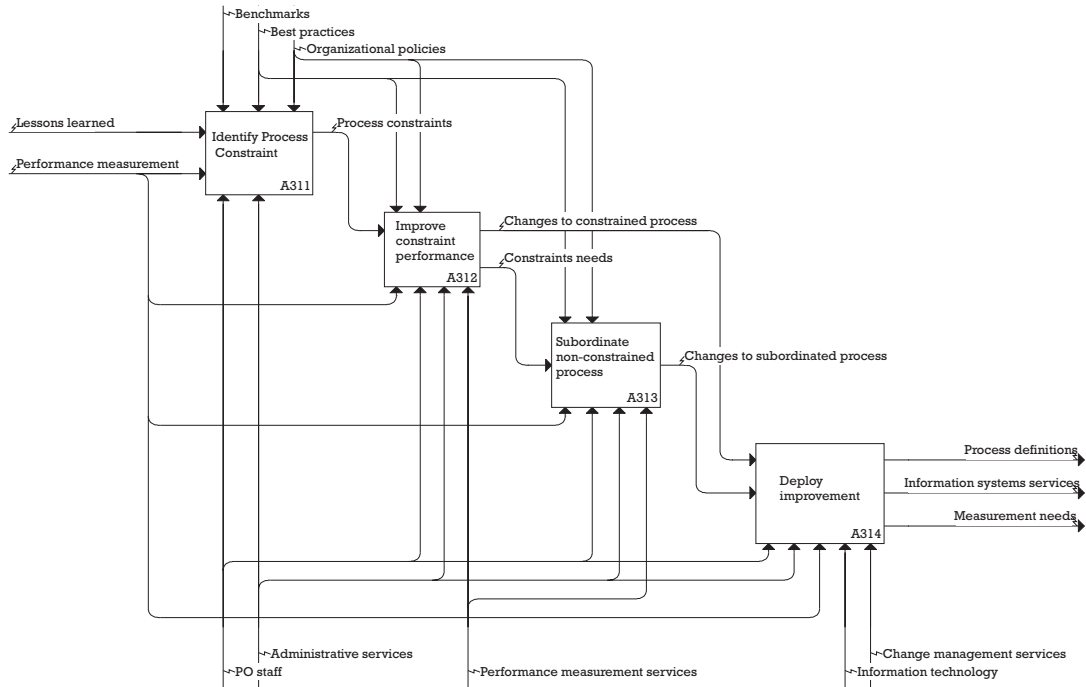
Processes and tools are improved based on information coming from industry, academia, experience gained from the execution of projects, and from the insights of PO personnel (see Figure 3.18).

### 3.3.3.2 Measurement process

The measurement process involves three activities (see Figure 3.19):

1. Planning the measurements;
2. Performing the measurements;
3. Producing performance statistics.

A detailed explanation of this process is given in Chapter 7.



**Figure 3.18** Process and information systems management.

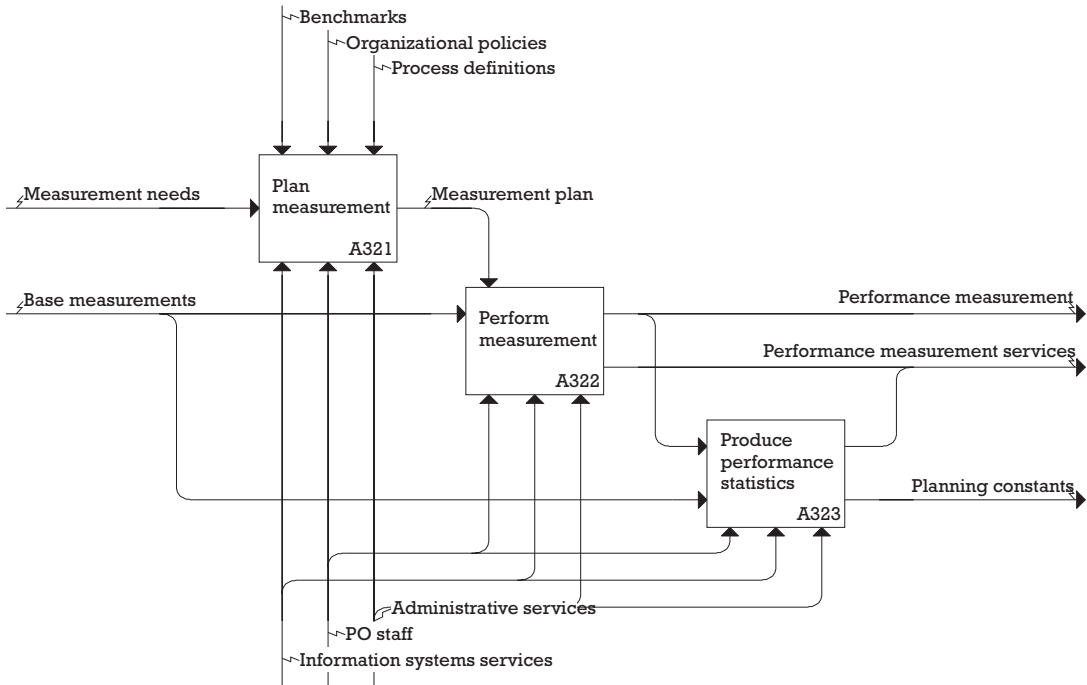
### 3.3.3.3 Change management process

Change and project work are inseparable. Change occurs naturally as part of the work that is done within the project, in response to changes in the business environment and to changes in the wishes and needs of the project sponsors.

Change management is a pervasive process that touches on every aspect of the project work. With respect to the project sponsor, it deals with changes to the project scope; within the project it deals with the evolution of the project's work products. Simply stated, the purpose of change management is to maintain in a congruent state plans, contracts, requirements, and specifications.

Change management involves three interrelated efforts (see Figure 3.20):

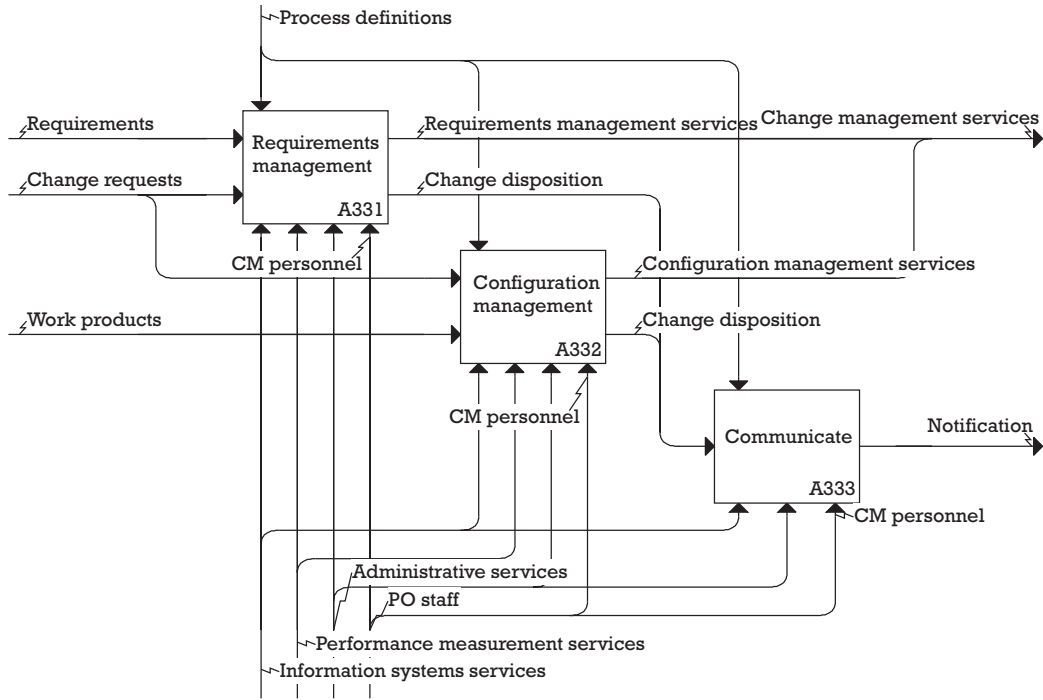
1. *Requirements management*: The purpose of the requirements management process is to manage the requirements of the project's products and product components and to identify inconsistencies between those requirements and the project's plans and work products. The



**Figure 3.19** Measurement process.

management of requirements involves documenting requirements changes and rationales and maintaining bidirectional traceability between source requirements and all product and product-component requirements [3].

2. *Configuration management (CM)*: The purpose of the CM process is to establish and maintain the integrity of project work products—including products that are delivered to the customer, designated internal work products, acquired products, tools, and other items that are used in creating and describing these work products—and of organization work products, such as standards, procedures, and reuse libraries. The CM process involves identifying the configuration of selected work products that compose the baselines at given points in time, controlling changes to configuration items, building or providing specifications to build work products from the configuration management system, maintaining the integrity of baselines, and providing accurate status and current configuration data to developers, end users, and customers [3].



**Figure 3.20** Change management process.

3. *Communications*: The purpose of this effort is to ensure that all parties are informed of the disposition and consequences of proposed changes.

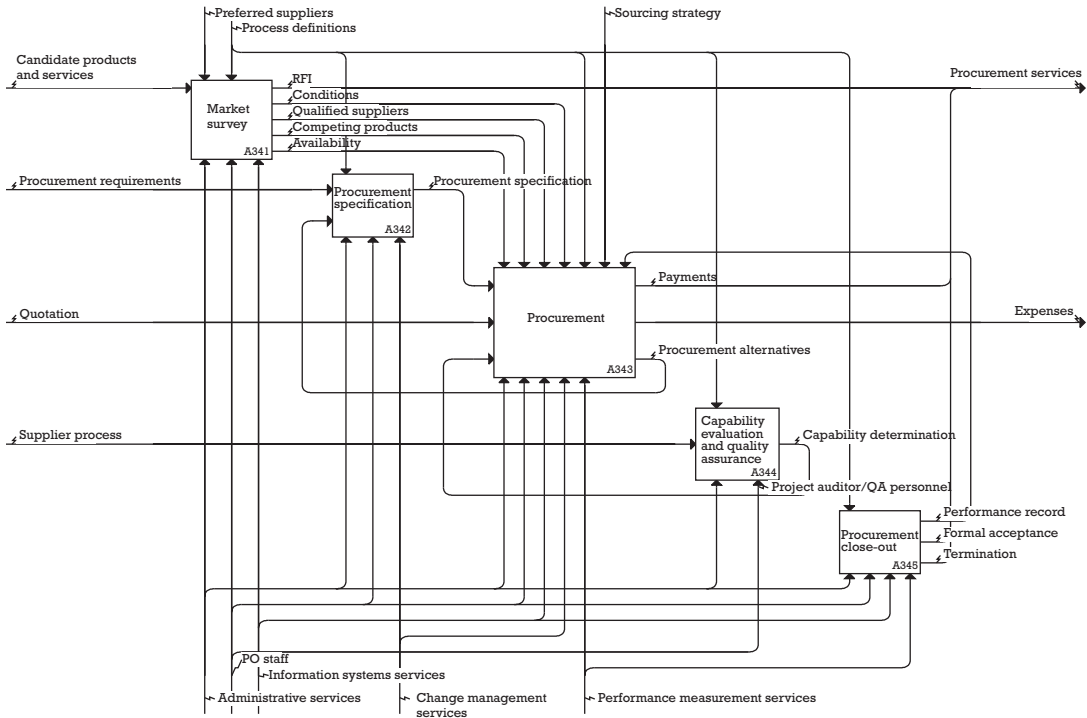
#### 3.3.3.4 Procurement management

The purpose of this activity is to support project managers in dealing with third parties, vendors, and subcontractors involved in their projects.

Procurement management involves choosing the acquisition strategy, the selection of suppliers, the negotiation of contracts, and the tracking and auditing of third-party capabilities, performance, and results (see Figure 3.21).

#### 3.3.3.5 Quality assurance

The quality assurance (QA) process concerns the periodic check of work products and work processes employed by the projects and by the PO. Do we do what we say? Do we observe our own procedures? Do we keep the documentation up to date?



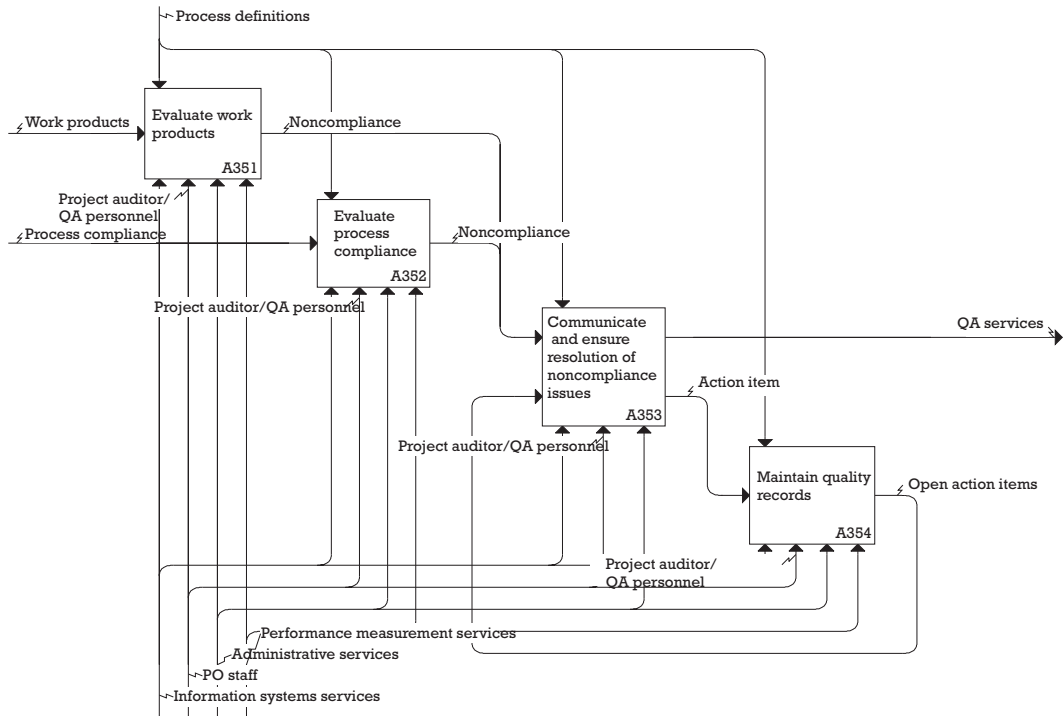
**Figure 3.21** Procurement management process.

The QA process (see Figure 3.22) independently and objectively does the following:

- Evaluates the quality of work products and ensure consistency with specifications;
- Verifies that the work is performed according to the applicable process descriptions and standards;
- Provides feedback to project staff and managers on the results of QA activities;
- Follows up on noncompliances and ensures that all issues are addressed.

#### 3.3.3.6 Administrative support

This process concerns the administration of the internal PO work. Examples of this are requisition of personnel, travel arrangements, budget preparation, and filing and communication.



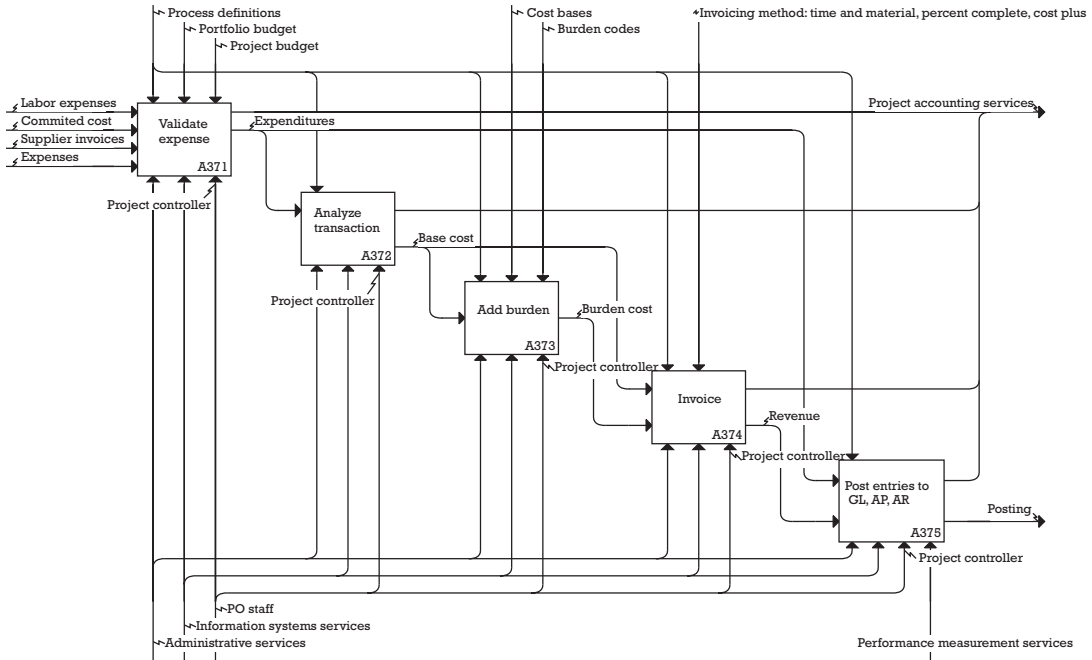
**Figure 3.22** Quality assurance process.

### 3.3.3.7 Project accounting

Project accounting is the process of analyzing, recording, and reporting on all of the financial events originated in a project (see Figure 3.23).

The project accounting process consists of the following activities:

- Validation:** Validation is not the same as approval. Approval refers to an authorization to spend given by the project manager or other responsible party, while validation is an action performed by the project controller or his delegate to verify that an expenditure conforms to organizational policies.
- Transaction analysis:** This is the process of deciding which account or accounts should be debited or credited and in what amounts. This is a critical activity for companies benefiting from tax credits, industrial benefits, or any other government incentive program.
- Burden calculations:** If applicable, a supplement called burden will be added to the base costs for invoicing purposes. Burden costs are



**Figure 3.23** Project accounting process.

calculated by multiplying a burden rate, which depends on the type of expenditure (e.g., labor, material), by the base cost.

- *Invoicing*: This is the task of generating invoices billed to the project sponsor. The invoicing procedure will depend on the type of contract and the modality of payment agreed upon between the sponsor and the performing organization.
- *Posting*: Posting is the process of recording changes in the ledger accounts exactly as specified in the journal entries.

An important but often neglected aspect of project accounting is the definition of account codes useful not only for financial reporting purposes but for managerial reporting as well. For example, time reporting data could be used to determine when a product platform is reaching the end of its useful life by comparing the relative cost of extending its capabilities over successive generations of new products [4]. Chapters 4 and 7 will address this point in greater detail.

#### 3.3.3.8 Human-resources management

The PO is responsible for identifying, acquiring, and developing project management and project support personnel. In order to perform this function, the PO must prepare job descriptions and training programs, and work together with human resources in the establishment of appropriate career paths and rewards mechanisms (see Figure 3.24).

The PO develops the competence of its personnel through job rotation, formal training, self-development, and mentoring and coaching programs.

### 3.4 PO roles

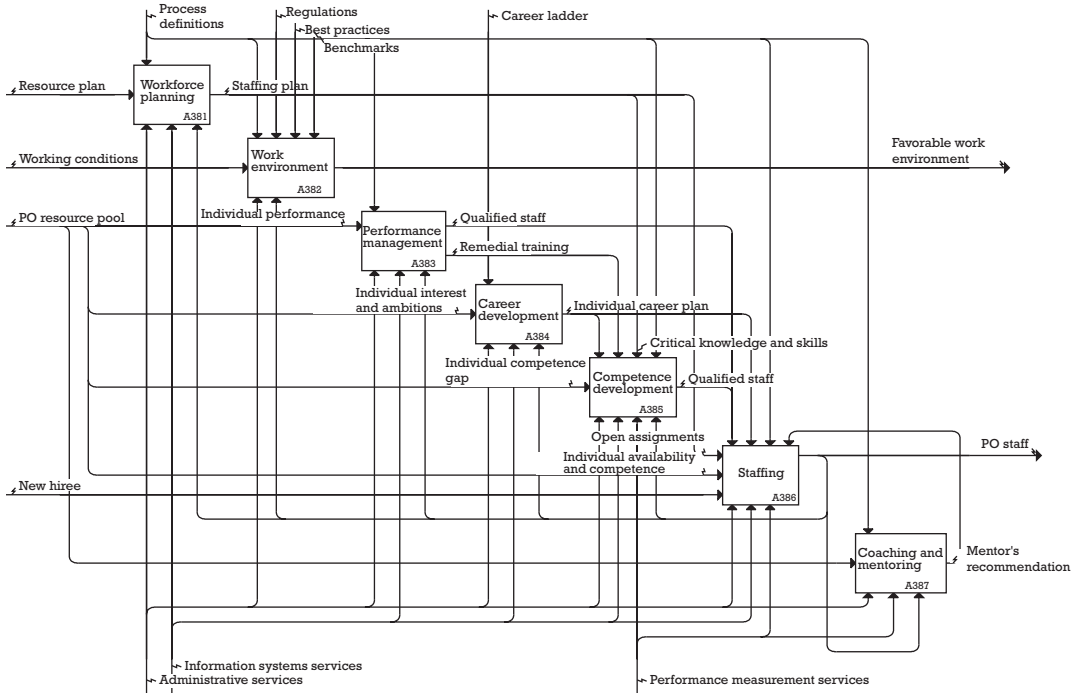
The exact composition of the PO in terms of the number of personnel, their responsibility assignments, their expertise, and whether they each have single roles or wear several hats depends on the number of projects in the project portfolio, the number of projects in execution at a given time, the projects' size, and the type of PO implemented. Responsibility assignments, however, should not be arbitrary; accountability must go hand in hand with authority and involvement in the decision process. Typical roles that have evolved through the practice of project management are presented below.

#### 3.4.1 PO manager

The PO manager is responsible for running the PO and for the management of the project portfolio. Typical tasks include the following:

- Preparation and maintenance of the organization's master and resource plans;
- Continuous evaluation of project performance to (1) allow the forecasting of future resource needs and (2) highlight areas of deviation where management action is required;
- Recruitment and evaluation of permanent and temporary PO staff;
- Participation in the project's planning sessions;
- Prioritization of efforts and resolution of issues within area of responsibility;
- Preparation of budget, business cases, scenario analysis, contract reviews, and risk-management strategies within area of responsibility;
- Introduction of new technologies and best practices for project management;





**Figure 3.24** Human-resources management process.

- Participation in project steering groups;
- Mentoring of potential project managers;
- Coaching of PO members in the application of the organization's defined processes, methods, and guidelines, and in the use of the organization's tools;
- Facilitation of team meetings;
- Facilitation of sales support;
- Auditing of projects for compliance with guidelines.

The position of PO manager is a very important one, one that due to its characteristics could be used as a training ground for those being groomed for senior management. Besides the technical competencies and the experience necessary to perform effectively in this role, the PO manager must possess business acumen, a network of contacts, the ability to take the initiative when required, an understanding of the points of view of all project stakeholders, and a system-thinking attitude.

### **3.4.2 Project controller**

The project controller is responsible for all project accounting and cost control within the PO. Typically, the project controller will have two reporting lines: one to the PO manager, the other to the organization's controller. More specifically, the project controller provides financial and accounting guidance to the PO and the project managers, and ensures the integrity of the projects' budgets by controlling scope changes, fiscal changes, and overhead allocations, and by flagging significant project overruns and under-runs. Typical responsibilities include the following:

- Challenging all inputs to assure their validity and appropriateness;
- Authorizing funds disbursements;
- Establishing procedures for financial reporting;
- Preparing financial reports;
- Providing assistance and expertise related to the organization's financial system;
- Verifying that all expenditures are properly recorded;
- Assisting the project manager in developing the WBS structure to identify the tasks or project elements to be controlled;
- Establishing account numbers for the projects;
- Assisting project managers in the preparation of the project's budgets;
- Identifying and reporting current and future deviations from budgets or other financial problems;
- Assisting the project auditor in the conduct of project audits;
- Conducting follow-ups on contract payments.

### **3.4.3 Project auditor and quality assurance personnel**

The project auditor and quality assurance personnel are responsible for verifying the state of the project based on objective evidence, performing QA tasks, and assessing third-party quality systems. Responsibilities include the following:

- Conducting interviews;
- Analyzing project deliverables;
- Analyzing project data;
- Preparing reports;
- Participating in tollgate decisions;

- Defining opportunities for improvement;
- Conducting root-cause analyses;
- Writing and maintaining the projects' quality plan;
- Developing, adapting, and tailoring development processes;
- Coaching members of the team in the application of the project's processes, methods, and guidelines;
- Facilitating team meetings;
- Promoting process adherence;
- Auditing products for compliance with guidelines;
- Writing action items concerning risks and nonconformances with the prescribed guidelines;
- Collecting project metrics;
- Reporting project metrics.

#### **3.4.4 Project manager**

The project manager plans and executes the project on behalf of the project sponsor. To do this, the project manager must coordinate and integrate activities across multiple functional lines. Typical responsibilities include the following:

- Performing key planning work and giving adequate direction to those performing detailed planning;
- Reviewing contracts and proposals;
- Assuring that all goals, plans, and schedules are consistent;
- Establishing and maintaining effective control of the project work and expenses;
- Issuing work guidance;
- Leading the team;
- Promoting a healthy working environment;
- Interfacing with the project sponsor;
- Interfacing with the customer;
- Interfacing with third parties (suppliers and subcontractors);
- Monitoring results to assure that specifications and contract conditions are being met by all parties;
- Controlling changes in the scope of work;

- Participating in risk/opportunity studies;
- Participating in tradeoff studies;
- Authorizing project payments/expenditures;
- Approving project reports.

#### **3.4.5 Project coordinators**

The project coordinator assists the project manager in the administration of the project. This position will usually exist only in medium to large projects where the administrative load would distract the project manager from his primary role, or where the organization uses an apprenticeship approach to develop project management competencies. Typical responsibilities include the following:

- Preparing and maintaining the project schedule;
- Preparing and maintaining all the project's correspondence;
- Preparing and maintaining the project's library;
- Preparing and releasing, on approval of the project manager, work authorization documents;
- Maintaining the project ledgers, verification of invoices and their correct holdback, invoice coding, and allocation;
- Obtaining periodic progress reports from all responsible managers;
- Recording the minutes of the project review meetings;
- Following up on action items.

#### **3.4.6 Configuration management personnel**

Configuration management personnel are responsible for documenting, monitoring, evaluating, controlling, approving, and communicating all changes made to project charters, the requirements dependency matrix, and any other information shared by more than one individual or organization. Typical responsibilities include the following:

- Organizing and facilitating configuration control board meetings;
- Developing, adapting, and tailoring the project's change management processes;
- Conducting configurations audits;
- Entering and maintaining metadata for configuration items;
- Receiving engineering change proposals.

### **3.5 Relationships among the PO, the line functions, the project sponsors, and other project stakeholders**

Whatever the preferred distribution of responsibility among the PO and other project stakeholders, it is important that none of the tasks falls through the cracks and that everybody understands what is expected of him or her in order to minimize conflicts. An excellent vehicle to achieve this is the responsibility matrix [5], which provides, in a compact form, an unequivocal definition of the authority and responsibility of all the project's stakeholders: senior managers, sponsor, project manager, line managers, PO managers, technical and PO support staff, and so on (see Table 3.1). Different responsibilities allocations would lead to different types of PO. The one shown here corresponds to a managerial type of PO.

### **3.6 Summary**

Chapter 3 introduced the processes necessary to coordinate and support project work and assigned responsibility for them to a new line function, the PO. In practice this framework, like any other framework, must be tailored to the needs and culture of the organization in which it is going to be deployed; this can be done through the use of a responsibility matrix in which the key decisions that must be made through the life of a project are listed and responsibility for them assigned to the various stakeholders.

### **References**

- [1] Archibald, R. D., *Managing High-Technology Programs and Projects*, 2nd ed., New York: Wiley, 1992.
- [2] Goldratt, E. M., and J. Cox, *The Goal: A Process of Ongoing Improvement*, 2nd rev. ed., Great Barrington, MA: North River Press, 1992.
- [3] Capability Maturity Model Integration for Systems Engineering and Software Engineering (CMMISM), Version 1.1, Software Engineering Institute, 2001.
- [4] Meyer, M. H., and A. P. Lehnerd, *The Power of Product Platforms: Building Value and Cost Leadership*, New York: Free Press, 1997.
- [5] Reinertsen, D. G., *Managing the Design Factory: A Product Developer's Toolkit*, New York: Free Press, 1997.

**Table 3.1** Responsibility Matrix

	Senior Managers	Project Sponsor	Line Managers	Project Office Manager	Project Manager	Project Office Specialists	Technical Disciplines
<i>Project Formulation</i>				O			
Set project goals		AE			I	I	I
Set project requirements		A			I	I	E
Prepare project schedule		A			E	I	I
Prepare project budget		A			E	I	I
Determine required quality		AE			I	I	I
Determine revenue dependencies		AE			I	I	I
Determine technical dependencies		I			I	I	AE
Determine solution approach		A			A	I	AE
<i>Project Startup</i>				O			
Appoints project manager		A		A			
Modify project requirements	A	AWL		AWL	AWL	I	E
Modify project budget	A	AWL		AWL	AWLE	I	I
Modify project schedule	A	I		AWL	E	I	I
Modify manning plan		I	A	AWL	AWLE	I	I
Select team members			AE	I	I	I	
Select engineering tools			A		I	I	E
Select development methods			A		I	I	E
Make/buy decisions		A			AWL	I	AWLE

**Table 3.1** (continued)

	Senior Managers	Project Sponsor	Line Managers	Project Office Manager	Project Manager	Project Office Specialists	Technical Disciplines
<i>Project Execution</i>				O			
Interface with sponsor/customer					E		
Interface with line managers					E		
Modify project requirements	A	AWL		AWL	AWL	I	E
Modify project budget	A	AWL		AWL	AWLE	I	I
Modify project schedule	A	I		AWL	E	I	I
Modify manning plan		I	A	AWL	AWLE	I	I
Remove team member			A		A		
Authorize the use of overtime	A			AWL	AWL		
Authorize travel					A		
Authorize purchases					A		
Approve payments					A		
<i>Project Closure</i>				O			
Hand-over deliverables					A		
Evaluate team member performance			A		E		
Approve lessons learned		I			A	I	I
Grant rewards		I	A		A		I
<i>Conduct Tollgate Review</i>				O			
Evaluate business reality		E			I	I	I
Evaluate project progress		E		I	I		I
Evaluate resource usage		E	I	I	I		I
Approve tollgate		A	I	I	I		I

**Table 3.1** (continued)

	Senior Managers	Project Sponsor	Line Managers	Project Office Manager	Project Manager	Project Office Specialists	Technical Disciplines
<i>Project Portfolio Planning</i>				O			
Cancel project	A	I	I	I	I		I
Accepts new projects	A	I	I	I			
Decide growth strategy (hire, outsource, hold, downsize)	A	I	E	I			
Prioritize projects	A	I	I	I			
Resolve escalated issues	AE	I	I	I	I		I
<i>Project Oversight</i>				O			
Orders spot check				A	I	E	I
Approves project diagnostic				AE	I	I	I
<i>Portfolio Control</i>				O			
Authorizes the use of more resources			A	AWL	I		I
Authorizes a schedule extension	A	I	I	AWL	I		I
Authorize the use of reserve funds				A	I		I
Orders a project audit		I		A	I	E	I
<i>Procurement Management</i>				O			
Select sourcing strategy	A	I	I		I	E	I
Select contractors	A	I	I		I	AWLE	I
Select vendors	A	I	I		I	AWLE	I
Negotiate	A	I			I	AWLE	I



**Table 3.1** (continued)

	Senior Managers	Project Sponsor	Line Managers	Project Office Manager	Project Manager	Project Office Specialists	Technical Disciplines
<i>Human Resources Management</i>				O			
Recruit PO staff	A			AWL		E	
Evaluate performance of PO staff	A			AWL		E	
Promote PO staff	A			AWL		E	
Terminate PO staff	A			AWL		E	
<i>Project Audit</i>				O			
Process and Information Systems Management				O			
Measurement Process				O			
Change Management				O			
Quality Assurance				O			
Administrative Support				O			
Project Accounting				O			

*Legend:*

O Owns process, is responsible for its execution.

A Approves, is accountable for. More than one A in a row means that it must be agreement.

AWL Approves within limits. If the magnitude of the decision is outside limits, it is referred to A.

I Input, provides information.

E Executes, does the actual work.

