6

Managing project organization

6.1 Introduction

I now turn to the second mandatory project management function – managing organization. Without an organization there are no resources to undertake the project. Through the organization, the manager defines the type and level of resource input and how they are to be managed to achieve the project's objective. Once the organization has been defined, the project team can determine how much the project will cost and how long it will take, thus providing a baseline for managing quality, cost and time. The definition of scope and organization together make a contract between the project and the parent organization, that is between the contractor and owner in Figure 3.1. It is through the contract that project managers negotiate their authority.

6.2 Principles of project organization

The purpose of project organization is *to marshal adequate resources (human, material and financial), of an appropriate type to undertake the work of the project, so as to deliver its objectives successfully.* The use of the word 'adequate' implies that the resources should be of sufficient number, but only just sufficient: too few, and the organization will be ineffective and the project will flounder; too many, and the organization will be inefficient. This chapter focuses primarily on human resources, although material resources are considered at the end. Negotiating financial resources is beyond the scope of this book.[1]

In the next section, I recall the principles of managing the project organization, and the processes of negotiating a contract between project and business. I describe types of project organization available, including a range of line, matrix and versatile approaches. I shall introduce the *responsibility chart* as the primary tool for defining the project organization

124

and negotiating the contract, and show that this satisfies the principle of single-page reporting. In order to agree the contract, the responsibility chart requires the manager to identify both the type of resource input and the level of effort, the *work content*. I shall describe how to incorporate estimates of work content and close the chapter by explaining the use of equipment and drawing registers to manage non-human resources.

Three of the five principles of good project management, introduced in Section 4.5, relate to managing the project organization:

– negotiate a contract between parties involved
– assign roles and responsibilities at all levels of work breakdown
– adopt a clear and simple reporting structure.

Organizing a contract

The organization breakdown structure (OBS) runs in parallel to the PBS. Table 6.1 shows the parties involved at the three fundamental levels. The project manager must organize a contract between the parties involved at all levels (Figures 1.14 and 3.1), that is:

– between the owner and contractor at the project level: the contract
– between the parties making up the contractor at the strategic level
– between the members of the project team at the tactical level.

It is also in the project manager's interest to ensure there is cooperation between the parties which make up the owner. This is usually beyond their responsibility, but not beyond their influence. The project manager negotiates the contract by building a clear mission or vision for the project, and cascading that mission down to objectives at each level of the OBS. Cooperation can then be gained by building a commitment to the objectives. The negotiation should go something like this:

– Do you believe that the purpose of the project is worth while?
– Do you believe that to achieve that purpose we need to achieve the identified end and intermediate objectives?
– Do you believe that it is the responsibility of your group to deliver some or all of those objectives?

Table 6.1   Three fundamental levels of organization breakdown

No.	Level	Resource type
1	Integrative	Company, department or group
2	Strategic	Function, discipline or section
3	Tactical	Named person, group of people or skill type

If the answer to the first question is 'no', the project manager needs to find some way of making the project of value to the people concerned. If the answer to the second question is 'no', you can involve the group of people in the planning process to gain their views. If the answer to the third question is 'no' then you can gain their opinion on whose responsibility it might be. If you cannot gain agreement on the second and third question, then you must doubt the groups answer to the first, and work further on making the project beneficial to them.

Defining roles and responsibilities

The contract is defined by defining roles and responsibilities of the parties involved for the work elements at each level of breakdown. Many project management systems focus on just one role: Who is to do the work? There are several roles and responsibilities on a project as listed in Table 6.2.

Table 6.2   Roles and responsibilities

Responsibility	*Role*
For work	Who is to undertake the project's tasks?
For management	Who is to take decisions? Who is to manage progress? Who is to guide and coach new resources?
For communication	Who must provide information and opinions? Who may provide information and knowledge? Who must be informed of outcomes?

Keep it simple

Below, I introduce the responsibility chart as a single-page document to define resources and their input. It defines the contract at all levels of breakdown (Figure 1.14), and is the document against which it is negotiated and agreed. The responsibility chart can be used to build cooperation and to ensure the novel organization of a project is brought into operation quickly and effectively. However, before describing the responsibility chart more fully, I describe the types of organization which can be used for managing a project.

6.3 Types of project organization

Selecting the type of project organization is the first step in its management, and is the step by which we develop the concept (Section 5.1). I consider

first the overlapping of a project organization on a functional line management organization (Sections 3.4 and 3.5). There are two key issues when selecting a project organization in this environment:

– isolated vs integrated resources
– line vs matrix structure.

I shall then describe the trend towards versatile project organizational models. The Project Definition Report (Chapter 11), is used to define the type of project organization to be adopted, and to detail the organization breakdown structure.

Isolated vs integrated resources
The first issue is where to locate the project resources. There are two extremes (Figure 6.1), each of which have their advantages and disadvantages. Resources can be:

– isolated from operations by being placed in a task force
– integrated with operations by working on the project from their normal place of work.

Isolated: The advantages are that the project team member can work without distraction and on secret work. The disadvantages are that users seconded to the team lose contact with normal operations, users not seconded mistrust the project, operational managers are reluctant to release their best people, and it is inflexible (Example 6.1).

● Project members released full time to   ● Project members work in their normal
  a separate project room   environment

           (a) Isolated   (b) Integrated
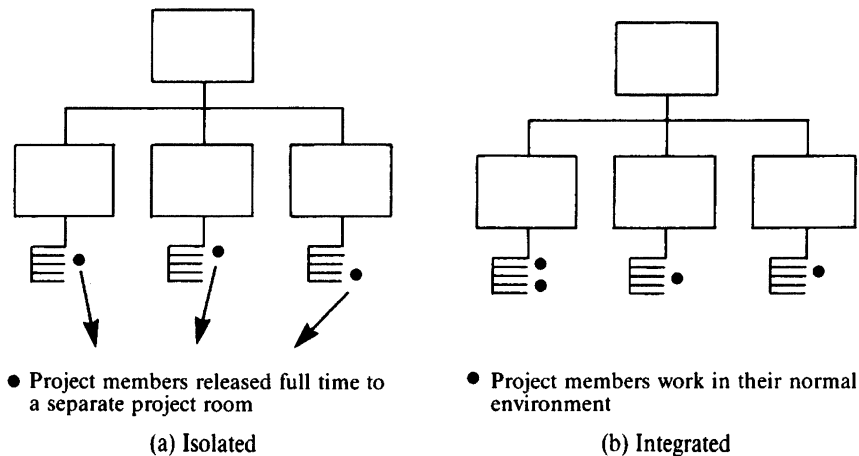
Figure 6.1   Locating resources

Integrated: The advantages and disadvantages above are reversed. To be successful this requires the manager to give his subordinate space to work on project tasks, the individual to focus on the task at hand without distraction, and the environment not to impose on the individual while working on project tasks.

Intermediate positions are possible, giving advantages of both models. Individuals seconded part time to a project can be given a quiet room, close to their normal place of work, to use while working on the project.

A public utility adopted this approach for the design and development of their integrated customer database system. People were seconded from the districts into a central design team. The development process took two years, at the end of which time the design was two years out of date. Furthermore, many users seconded to the development team were given temporary promotions. When they returned to operations they expected their promotions to be made substantive, but were often less use to their districts than before they left as their experience was now also two years out of date. However, the alternative, the integrated team, is extremely unlikely to have delivered the design in anything like two years, so the isolated approach was the only option.

When I described this story to a group of Russian managers on a course at Henley Management College, they said the people should have taken greater responsibility for managing their own careers! When I described it to a group of managers from the utility, one of them said he had been a member of the task force, and he had tried to manage his career, but still his earlier boss did not want to know. He changed districts.

Example 6.1 Isolated project teams

Line vs matrix structure
There are two extremes for creating an OBS. At one extreme an existing functional hierarchy within the parent organization is used, and the PBS is massaged so that responsibility for delivering products falls wholly within the realm of resource units within the line management structure. This gives a project organization in which the OBS, PBS and WBS are aligned with the functional hierarchy (Figure 6.2(a)). At the other extreme a natural WBS is developed, independent of the organization with dedicated multi-discipline resources assigned to the delivery process – production in the PBS. This gives a project organization in which the OBS and WBS are both aligned with a project hierarchy (Figure 6.2(b)). Both of these structures are inflexible.

Overlapping the two structures gives a matrix structure in which people have both project and functional responsibility (Figure 6.3). It is now common to consider five types of project organization,[2] with three types of

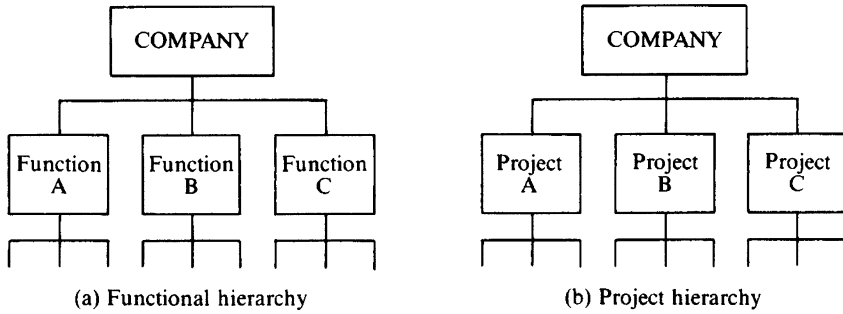(a) Functional hierarchy   (b) Project hierarchy

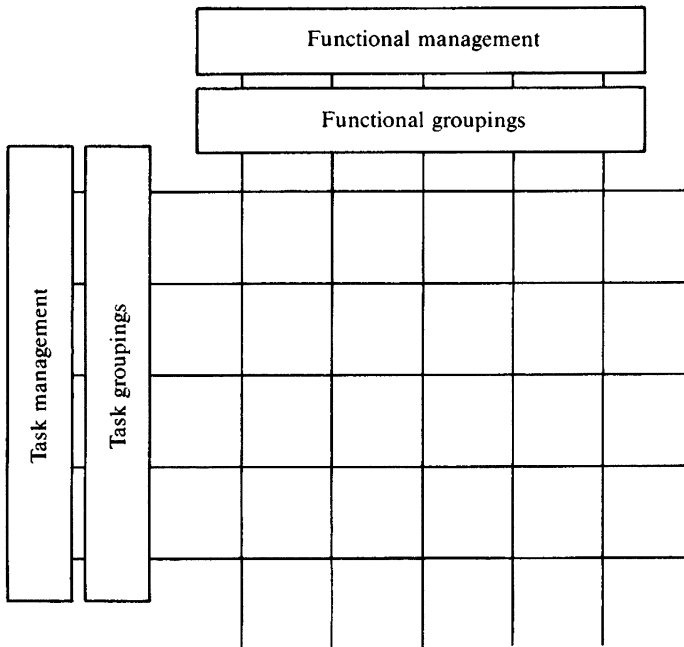**Figure 6.2** Line organizations

Figure 6.3 Matrix structures

matrix structure between the two extremes (Figure 6.4):

– functional hierarchy
– functional matrix
– balanced matrix
– secondment matrix
– project hierarchy.
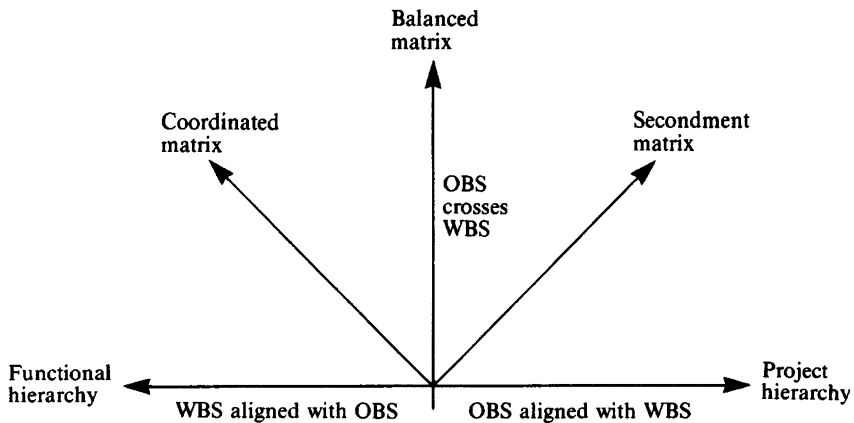
Figure 6.4   Range of matrix structures

Functional hierarchy: Project tasks are assigned to relevant operational areas, whose managers take responsibility for achieving tasks in their area. Unfortunately, different managers may have different views on the priority of the project, and so one area may be delayed by lack of support from another.

Coordinated matrix: Functional managers assign work to people day by day. A project controller is appointed with responsibility for coordinating tasks between functions, but with limited authority for ensuring priority is given for resources. Having responsibility but no authority is an impossible position.

Balanced matrix: A project manager is appointed to oversee the project and they share responsibility with the operational managers. The project manager is responsible for time and cost, the operational manager for scope and quality. The balanced matrix is probably difficult to maintain, depending on the relative strengths of the project and operational manager. By default it may become either a functional or a secondment matrix.

Secondment matrix: The project manager has primary responsibility for resources, and assigns their work day by day. The operational managers second personnel, full- or part-time to the project as required, and oversee the quality of the work done. The project manager now has more effective control, but the users begin to lose influence over the project's outcome.

Project hierarchy: The project manager manages a dedicated project team, and the operational managers have no involvement. The project manager

now has total control, but the users have lost all influence, and this structure is inflexible.

You may have an idea about which of these five structures gives the most successful outcome of projects in your industry. The balanced matrix is probably the ideal, giving the project manager control, while maintaining user involvement. However, it depends on the relative strengths of the project and operational managers. Gobeli and Larson[2] surveyed a large number of projects, and, subject to the discussion of Chapter 4, judged whether or not they were successful. Their results are illustrated diagrammatically in Figure 6.5. They split projects into two types: development projects and implementation projects.

DEVELOPMENT PROJECTS
The three project structures are almost equally successful, with the secondment matrix slightly ahead. The purpose of development projects is to define the products of future projects and of the organization as a whole. Therefore, user involvement is also important to gain their acceptance of the end product. It is also difficult to predict the resource requirements and so flexibility is important. The secondment matrix allows greater user involvement than the project team, and provides some flexibility while still maintaining control.
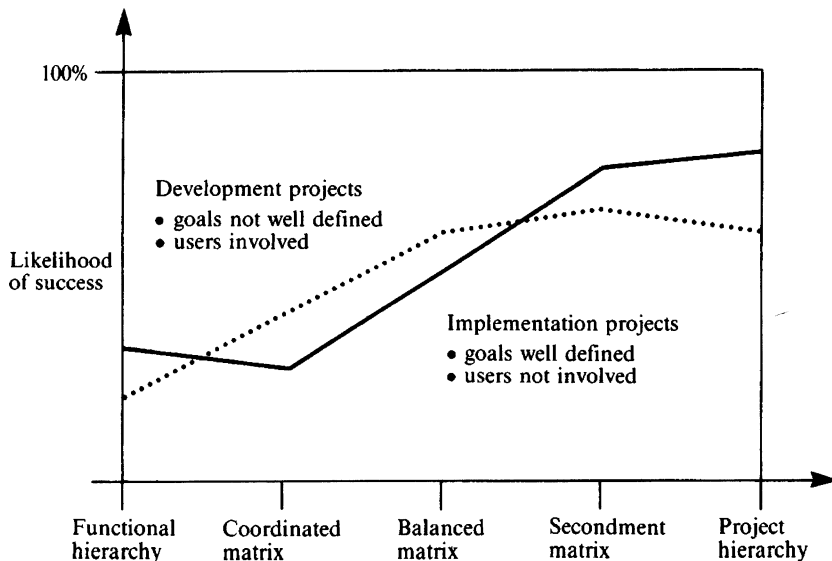

Figure 6.5 Project success rates

IMPLEMENTATION PROJECTS

The project hierarchy is very successful, with the secondment matrix close behind. On implementation projects the size of the team can be accurately forecast, so inflexibility does not matter, and the product is defined so user involvement is reduced. Furthermore, the project team can build a commitment to a common goal. This commitment may also explain the rise in effectiveness of the functional hierarchy. I also think that the straight line from the functional matrix to the secondment matrix shows that the balanced matrix will become one or other depending on the relative strengths of the project and operational managers.

In spite of this, Example 6.1 is a case where the project approach was used for development stage and the functional approach for implementation. However, that was appropriate in those particular circumstances.

The versatile organization

The foregoing discussion has described how to overlay a project organization on to an existing functional, hierarchical, line-management structure. Up until the early 1990s, this represented the vast majority of organizations. It may still represent a simple majority of them, but many are now project based, and some have adopted flexible, versatile approaches.[3,4,5] Indeed, Gareis[5] has argued that matrix organization structures will not work for reasons outlined in Sections 3.4 and 17.5.

In the pure project-based organization, the firm does away with the functional hierarchy, and people belong to project teams only. This was a popular approach in the late 1980s, and many people presenting papers at the IPMA World Congress in Vienna described how their organizations had adopted this approach and reported great success. However, I wondered at the time how many would still be reporting success one or two years later. For reasons outlined below, it is not possible to do away completely with the functional hierarchy, as many of the speakers claimed to have done. There is a syndrome, called the 'Hawthorne effect', that says if you make a change, efficiency will improve because people will be learning the new ways of working, and taking an interest.[3] You can only judge the true impact of a change after a new equilibrium has been reached, which may take several months.

Peymai and I suggested[3] the adoption of a versatile organization (Figure 6.6) based on Peymai's experience implementing total quality management in a medium-sized construction company, and IBM's experience changing their organization structure at their European headquarters in La Defense, Paris. In the versatile organization, most people belong either to process teams or project teams. Both types of team are the primary medium by

Customers   Customers

Processes for   Projects for
routine work   novel work

Functional
support   Committee for
                                    strategic direction

—————— Control
— — — — — Communication
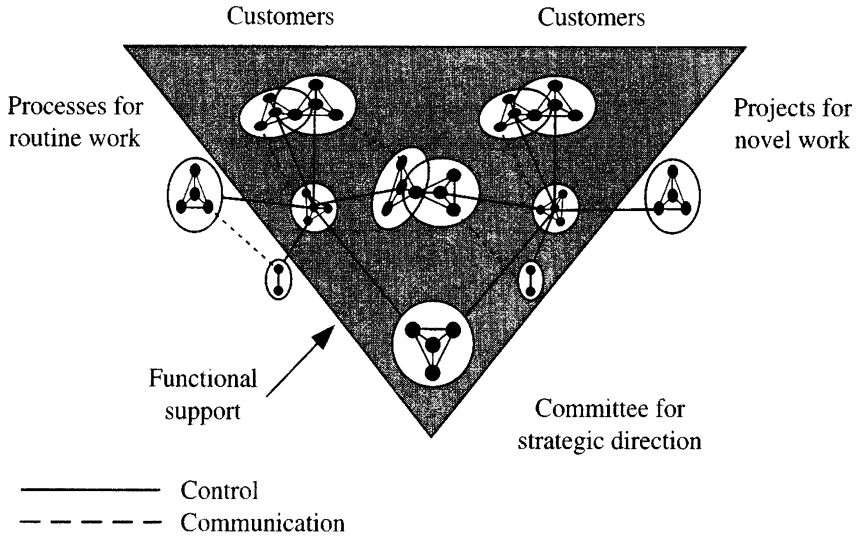
Figure 6.6   The versatile organization

which work is done for and products delivered to customers. Process teams
do fundamentally routine work, whereas project teams do fundamentally
novel work. However, the size and composition of both types of team is
constantly changing. The project teams are unique, novel and transient. But
even the process teams need to change as customers' requirements, though
fundamentally repetitive, can still vary. The idea of some quality advisers
that an organization's procedures can be unchanging is quite absurd
(Chapter 7). Different customers have different requirements and hence
processes and procedures need to constantly adapt, and, indeed, since
quality is about continuous improvement, they must be constantly
enhanced. As the size and composition of teams change, people move
between them. In the versatile organization, the process teams effectively
operate as a coordinated matrix and the project teams as a secondment
matrix. However, essentially in the versatile organization people have only
one boss; they either belong to a team, in which case they take their
instructions from the team leader, or they are in the functional organization,
in which case they take their instructions from the functional manager. The
advantages of the versatile approach are:

– the size and composition of the teams can be changed in response to
  changing customer requirements, enabling the organization to re-engineer
  its capabilities quickly
– it provides a process focus; the organization's procedures are written to

describe how it processes products to satisfy customers' requirements, not how functions perform, again enabling responsiveness to changing customer requirements

– people have one boss, avoiding the problems of split loyalties outlined in Sections 3.4 and 17.5
– it retains the functional organization, avoiding the problems outlined below which arise with the pure project-based approach.

It is essential to retain the functional organization. IBM at their European headquarters reduced the size of the functional organization by 90 per cent, not by making people redundant, but by assigning them to teams. IBM at their South African headquarters in Johannesburg tried to do away with the functional organization completely and suffered for it. British Telecom, as the result of an organizational change they called Project Sovereign, adopted a project-based organization structure.[3] However, in their new structure 70 per cent of the work is project based, and 30 per cent functionally based. (When you investigate what they mean by project based it includes process teams (Example 1.1).)

The reasons for retaining the functional organization are:

– it provides a career structure; transient teams cannot provide a career, just learning experiences as part of one's development
– it retains the knowledge of the organization
– it develops new systems and procedures; systems and procedures are an overhead, and each project manager will try to minimize the cost of his or her project and so not develop new systems
– it can share people between projects when they are only partly utilized
– it can provide a resting place between projects; the chance of one project starting as another ends is slight, and so between projects people can spend time capturing their knowledge.

Without a functional organization structure, in time the organization loses its knowledge and culture, and withers and dies.

6.4 Responsibility charts

The use of responsibility charts to define the project organization is now widespread.[6,7] Typically a chart is a matrix with deliverables shown as rows and organizational units as columns (Figure 6.7). Symbols are placed in the body of the matrix to represent the involvement of each resource type in the work element required to produce the deliverable. The matrix can be used at any level of breakdown. This provides a one-to-one correspondence between the levels in the PBS and the OBS (as one might expect). Even

PROJECT RESPONSIBILITY CHART

Companies/Departments/Functions/Type of resource

X – eXecutes the work
D – takes Decision solely
d – takes decision jointly
P – manages Progress
T – provides Tuition on the job
C – must be Consulted
I – must be Informed
A – available to Advise

Project:

Period:

Issue/Date:

Approved by:

Work
Cont.
H/D/W

No. | Principle/Milestone name:

Figure 6.7   Blank responsibility chart

though the responsibility chart is a matrix, it can be used to describe any one of the five organization types, or any mixture of them or it can be used with the versatile organization. The use of a responsibility matrix does not imply a matrix organization. I have often encountered mixed organization types, but particularly a project line surrounded by a coordinated matrix.

Use of symbols to describe types of involvement

Cleland and King[7] give examples of the use of numbers, letters or geometric shapes to represent the type of involvement. When Grude and Haug[6] first developed their chart they used geometric shapes, but found eventually that the use of letters was more natural. When facilitating project launch and definition workshops (Chapter 11), I find the use of letters which suggest the role or responsibility helps aid communication. I would therefore recommend the use of the eight letters developed by Grude and Haug[6] to represent eight types of roles and responsibilities (Table 6.3). I find that these cover most requirements.

Table 6.3 Types of role and responsibility

Letter	Role or responsibility
X	eXecutes the work
D	takes Decision solely or ultimately
d	takes decision jointly or partly
P	controls Progress
T	provides Tuition on the job
C	must be Consulted
I	must be Informed
A	available to Advise

The symbols are used as follows:

1. *Responsibility for work*
   X: eXecutes the work: this is self explanatory.

2. *Management roles*
   D: takes Decision solely or ultimately
   d: takes decision jointly or partly

   There are various modes of decision making (Table 6.4). An example of D2 might be the selection of a financial management system. The financial manager agrees it meets the company's financial requirements. The IT manager agrees it meets the company's systems strategy. If they fail to agree, the decision is referred to the financial director, their joint

Table 6.4 Four modes of decision taking

Decision mode	Person			Description
	A	B	C	
D1	D	–	–	A takes the decision alone.
D2	–	d	d	B and C share the decision. If they agree, the decision stands. If not, it is referred up the usual management channels.
D3	D	d	d	B and C close options and recommend. A has the ultimate authority.
D4	D	d	C	C's opinion must be sought (but can be ignored). B closes options and A has the ultimate authority.

boss. In decision D3, there can be a fine line between being consulted, C (as shown in decision D4), and truly closing options, d. This may be the case with the trade union representatives with no authority but significant disruptive power. You have to use the symbols to represent the way you want to manage your project.

P: controls **P**rogress: this is the person responsible for ensuring that the work is planned, organized, implemented and controlled. The project manager is ultimately responsible, but uses the symbol to delegate responsibility at lower levels of the WBS.

T: provides **T**uition on the job: this assumes that the people doing the work do not have sufficient skill, so they are coached on the job. As their skill grows the 'T' may change to a 'P'.

3. *Communication channels*
   C: must be **C**onsulted. These people must be consulted in the course of the work. They have information or opinions which the project must take account of in doing the work and taking decisions. However, they do not have decision-taking responsibility: their opinions can be ignored.

   I: must be **I**nformed. These people must be provided with information about the outcome on one part of the project to enable them to do work or take a decision on another part.

   A: available to **A**dvise. These people may have information or opinions which the project team may want to use, but cannot know until they reach that part of the project. In effect, the symbol represents 'may be consulted'.

'C', 'I' and 'A' control the flow of information. If people feel they
should be consulted or informed that is negotiable as part of the contract.

The symbols must be used flexibly and imaginatively. Nothing is served by
being pedantic. The project team paint the picture they want, and use the
chart as a communication tool. For instance, in a training course is the
trainer 'T' and the tutee 'X', or is the trainer 'X' and the tutee 'I'? It does
not matter as long as everybody understands.

Use of the responsibility chart

The responsibility chart can be used at all levels of the breakdown. In
particular it can be used at the three fundamental levels as follows:

PROJECT LEVEL: PROCEDURAL RESPONSIBILITY CHART
At this level the chart is used to define procedures, principles or policies for
managing the project. For example that may be:

– procedures for monitoring and control
– change control procedures
– quality control procedures
– configuration management procedures.

Figure 6.8 is a procedure for monitoring and control. A time chart is used to
define a regular cycle throughout the project. The resources at this level are
companies, organizational units (departments, groups, sections), or
management functions (finance director, IT manager, project manager). It is
important that people are described by their roles. If the R&D manager is
also project manager, and has responsibilities as both, they should appear as
both. If they leave part way through the project, they may be replaced by
one person as R & D manager, and another as project manager. Procedural
responsibility charts may be included in the Project Definition Report and
Manual (Chapter 11).

STRATEGIC LEVEL: MILESTONE RESPONSIBILITY CHART
At this level the chart is used to define roles and responsibilities for
achieving milestones. Figure 6.9 is a chart for the CRMO Rationalization
Project. The resources at this level are the same as above. This leads us to
using the same version of the form for both, and calling it a project
responsibility chart. Sometimes both milestones and procedures are
included on the same page. This is why these two levels were merged into a
single, management level in Figure 1.14. Figure 6.9 also includes a time
schedule. I discuss scheduling in Chapter 9.

PROJECT RESPONSIBILITY CHART

X – eXecutes the work
D – takes Decision solely
d – takes decision jointly
P – manages Progress
T – provides Tuition on the job
C – must be Consulted
I – must be Informed
A – available to Advise

PROCEDURE FOR PROJECT MONITORING & CONTROL

Project:

Issue/Date: Approved by:

Period: Six Weekly Cycle

Companies/Departments/Functions/Type of resource

No.	Principle/Milestone name:	Project Manager	Team Leaders	Project Members	Project Support Office	Steering Committee	Project Sponsor
	Develop milestone plan	PX	X		I	d	D
	Create high-level network	PX		X	X		
	Develop new activity schedules	DP	X	X	I		
	Update network	P	C	C	X		
	Issue work-to lists			I	X		
	Do work	P	PX	X	I		
	Return turn-around documents	I	P	X			
	Activity review meeting	I	PX	X			
	Identify variances (activities)	I	PX	X			
	Plan recovery	DP	X	X	I		
	Issue activity progress reports	PI	X	X			
	Review progress against milestones	PX			X	I	
	Milestone progress meeting	PX			X	X	
	Identify variances (milestones)	PX			X	DX	
	Plan recovery	PX	X		X	D	
	Issue milestone progress report	PX			X	C	
	Approve progress						D

Figure 6.8   Procedural responsibility chart for monitoring and control

PROJECT RESPONSIBILITY CHART

Project: CRMO RATIONALIZATION

X – eXecutes the work
D – takes Decision solely
d – takes decision jointly
P – manages Progress
T – provides Tuition on the job
C – must be Consulted
I – must be Informed
A – available to Advise

Period: 199X — 199Y
Issue/Date: _____   Approved by: _____

No.	Principle/Milestone name	Regional Board	Operations Director	CRMO Managers	CRMO Team Leader	CRMO Staff	Project Manager	Project Support Office	Estates Manager	Estates	Network Manager	Networks	IT	Operations	Personnel	Suppliers
P1	Project Definition	D	d	dX	dX	I	PX	X	X	I	X	I	C	C	C	
O1	Communication plan	I	D	d	PX								C	C		
T1	Technology design	I				C					PX	X	C	C		A
O2	Operational procedures	I	D	d	PX	X								C		
O3	Job/Management design	I	D	d	PX	C									TX	
T2	MIS Functional spec.	I	D	d	dX						PX	X	X			
O4	Staff Allocation	I	D	d	PX	C									TX	
A1	Estates roll-out plan	D	d	C	X	I	C	X	XP	X	C	I	I	I	I	C
T3	Technology roll-out plan	D	d			I	C	X	C	I	PX	X	X	I		C
P2	Financial approval	D	d	I	C	I	PX	X	C		C	X	C	A	A	C
O5	Management changes	I	DX	X	PX	I										
A2	Sites 1 and 2 available		I		I				PX	X						
O6	Redeployment/Training		D	D												
T4	Systems in sites 1 and 2	I	I	I	I	X	P			X	PX	X	X	I	TX	X
A3	Sites 1 and 2 ready			I	X	X	P		X	X		A				X
T5	MIS delivered	I	D	I	X				X		P	X	A	I		X
O7	Procedures implemented	D	d	PX	X	X	PX	X	A		A	A	A	I	X	X
P3	Intermediate review	D	d	C	C		PX	X	I	X	I	A	A	A	A	A
A4	Roll-out implemented	I	D	dX	dX	X	PX	X		X	X	X	X	I	X	X
P4	Post completion audit (benefits)	D	d	C	C		PX	X						C		

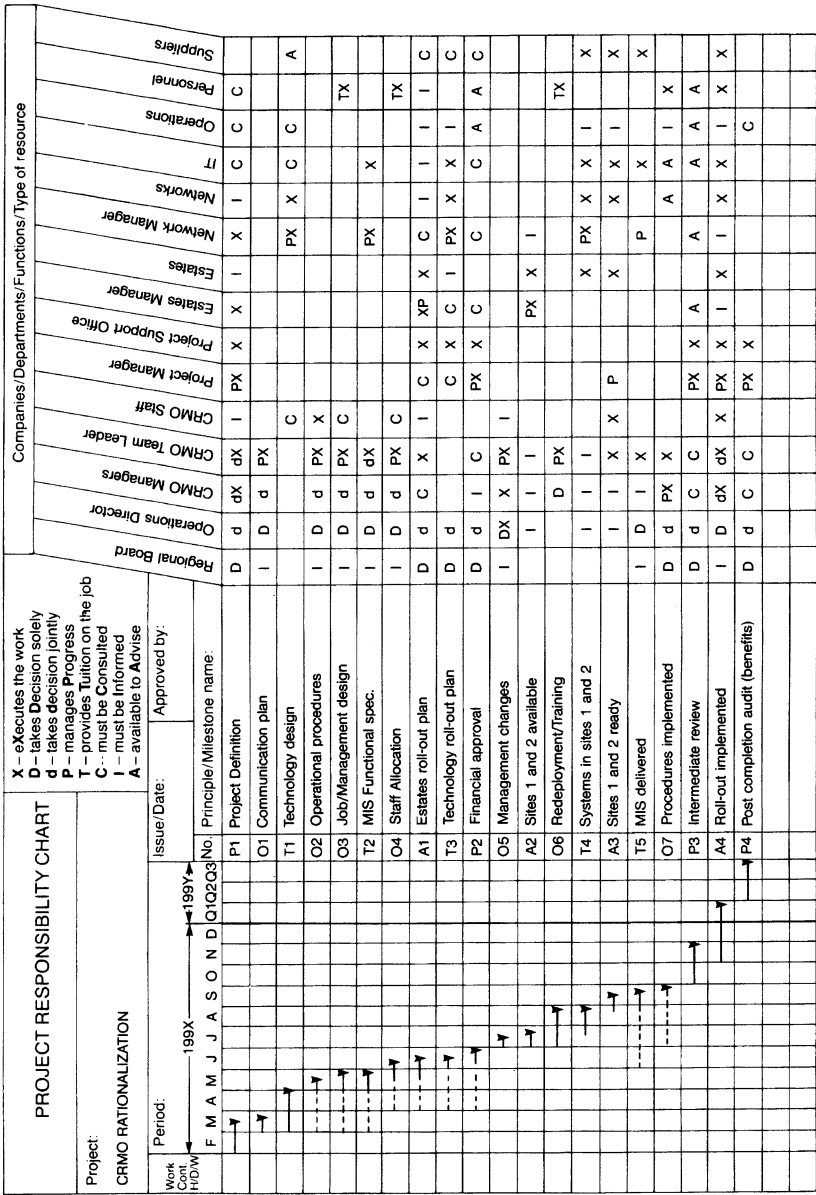Companies/Departments/Functions/Type of resource

Figure 6.9   Project responsibility chart for CRMO Rationalization Project

TACTICAL LEVEL: ACTIVITY SCHEDULE

At this level the chart defines the roles and responsibilities of named people to do work to achieve a milestone. Because Activity Schedules are prepared on a rolling-wave basis during implementation planning, the people involved can now be named. They are unlikely to change on the time scale of a work package, and if they do the work should be replanned. Furthermore, because the activities are now more certain, more effort can be put into ensuring that the chart is correct. Figure 6.10 is an activity schedule for milestone P1 in the CRMO Rationalization Project.

Developing the responsibility chart

I described in Section 5.5 how the milestone plan is best developed in a group working session, specifically at a project launch or definition workshop, Chapter 11. The same applies to the responsibility chart. It is very effective to copy the blank form on to an acetate, project it on to a white board, and then complete it with the team participating. Entering the symbols directly on to a paper form can isolate members of the group, with the result that they may not accept the end product. However, I find that if everyone is involved, then when they allow a symbol to remain under their name, they internalize the result, and accept that as their responsibility. Estimates and schedules can be entered on the projected form in the same way.

6.5 Incorporating work content

In negotiating the contract between project and business, it is necessary to include estimates of the resource requirements. Functional managers cannot commit to releasing resources without knowing what the requirement is. I explain here what consumes resource, describe how to communicate the estimates as part of the contract, and end with a cautionary remark about accounting for lost time. Estimating work content, and using that to calculate duration, is covered in Chapters 8 and 9.

Consumption of resources

Two of the eight roles and responsibilities primarily consume resource:

X: eXecutes the work
C: must be Consulted.

Many project management methodologies only include estimates of the former. However, the latter can consume as much if not more resource and must therefore be included in the estimate. The four management responsibilities are overhead resources and are considered to be part of the

ACTIVITY SCHEDULE

Project: CRMO RATIONALIZATION
Milestone No./Name: P1: PROJECT DEFINITION
Issue/Date: A/2 Jan
Approved by: JRT
Period: 199X Week Number

Key:
X – eXecutes the work
D – takes Decision solely
d – takes decision jointly
P – manages Progress
T – provides Tuition on the job
C – must be Consulted
I – must be Informed
A – available to Advise

No.	Activity/Task name	Regional Board	Operations Director	CRMO Managers (2)	CRMO Team Leader	CRMO Staff	Project Manager	Project Support Office	Estates Manager	Estates	Network Manager	Networks	IT	Operations	Personnel
	Produce project proposal	C	D	d	dX		PX	A	A		A		A	A	A
	Hold project definition workshop		DX	d	X		PX	X							
	Define required benefits	C	D	d	dX		PX	X	I		I		I	I	I
	Draft project definition report	C	D	d	dX		PX	X	X		X		X		
	Hold project launch workshop			X	X		PX	X	X		X		X		
	Finalize milestone plan		D	d	d		PX	X	C		C		C	A	C
	Finalize responsibility chart		D	d	d		PX	X	C		C		C	A	A
	Prepare estimates – time				A		P	X	A		A		A	A	A
	Prepare estimates – cost		A	A	A		P	X	A		A		A	A	A
	Prepare estimates – revenue		A	A	A		P	X	A		A		A	A	A
	Assess project viability		D	d	d		PX								
	Assess risks		D	d	dX		PX	C	C		C		C	C	C
	Finalize project definition report	D	d	d	d		PX	X	C		C		C	C	C
	Mobilize team		D	d	dX	I	PX	X	I		X		IX		I

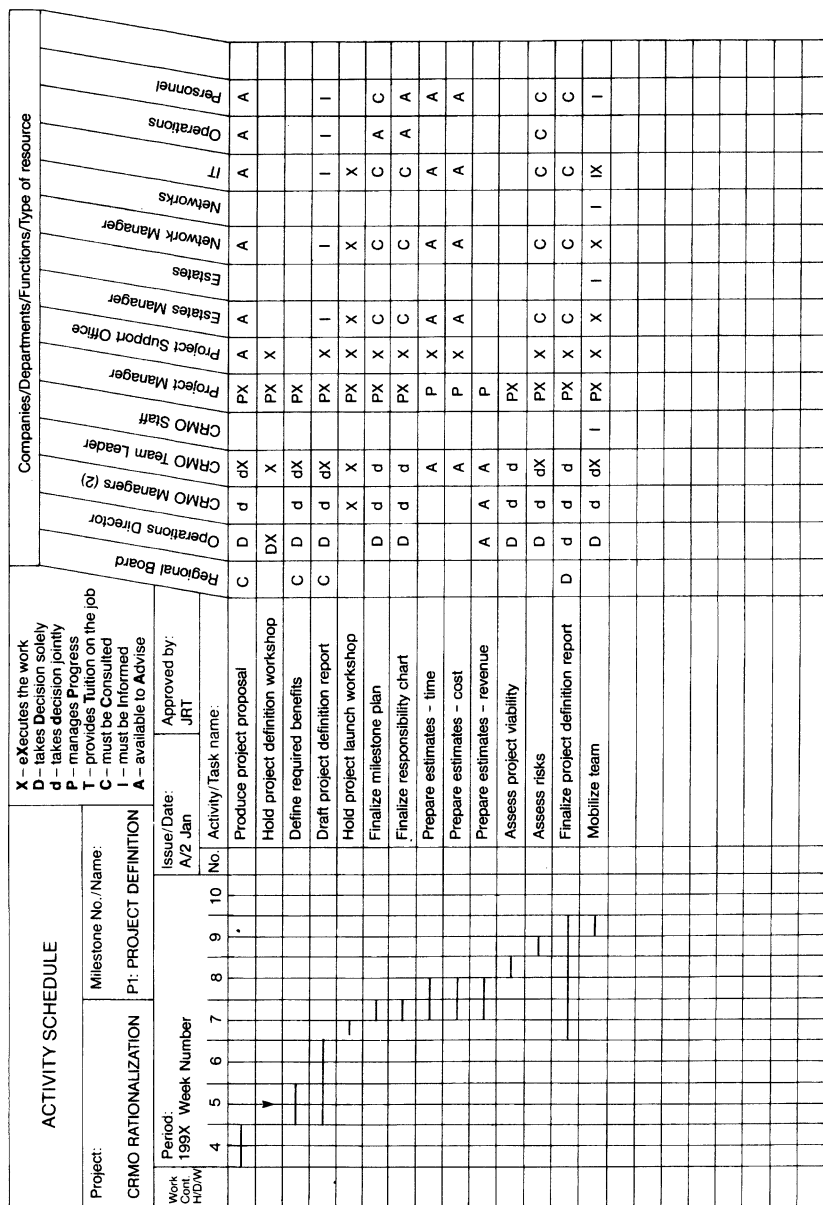Companies/Departments/Functions/Type of resource

Figure 6.10   Activity schedule for milestone P1

holders' day-to-day duties. Therefore, estimates will usually not be included. The main exceptions to this will be where T refers to the involvement of a trainer, or an external consultant whose bill will be charged to the project. D and d should consume little time if they are limited to decision taking as opposed to decision making. Unfortunately, I often come across decision takers who want to repeat the decision-making process. With the other two communication roles, it should consume little time until the person starts work, especially if the reports are well constructed, and A is not certain to consume resource. An allowance may be made.

Communicating the estimate

There are several ways of communicating resource estimate, using:

– the responsibility chart
– estimating sheets
– resource histograms.

The responsibility chart: This can be used in one of two ways. There is a column at the extreme left-hand end of the chart, and this has been used in Figures 6.9 and 6.10. This will refer to the X and C resource. Alternatively, the estimates can be written in the body of the matrix (Figure 6.11).

Estimating sheets: These are commonly used for preparing the resource estimates. Figure 6.12 is an estimating sheet for the work package P1: Project Definition from the CRMO Rationalization Project, prepared on a PC using a spreadsheet. These can also be used to communicate the estimates. The use of estimating sheets is described further in Chapter 8.

Resource histograms: These provide a visual picture of the estimates (Figure 6.13). However, they require a schedule for the work elements, and so are discussed further in Chapter 9 where examples are given.

Accounting for lost time

When agreeing resource availability, the project managers and resource providers must have the same understanding of how much time is actually required. It is quite clear that one man-day means a day's work by one person. But how much work is a man-year, 260 days or something less? Figures quoted in man-weeks, man-months and man-years are usually interpreted as a statement of both resource requirement and duration; that is how many people are needed for how long. They therefore should include an allowance for the fact that somebody working on a project full time is not available 5 days per week for 52 weeks per year. Time is lost through sickness, holidays, training, group meetings, etc. This lost time is said, on average, to be 30 per cent of the
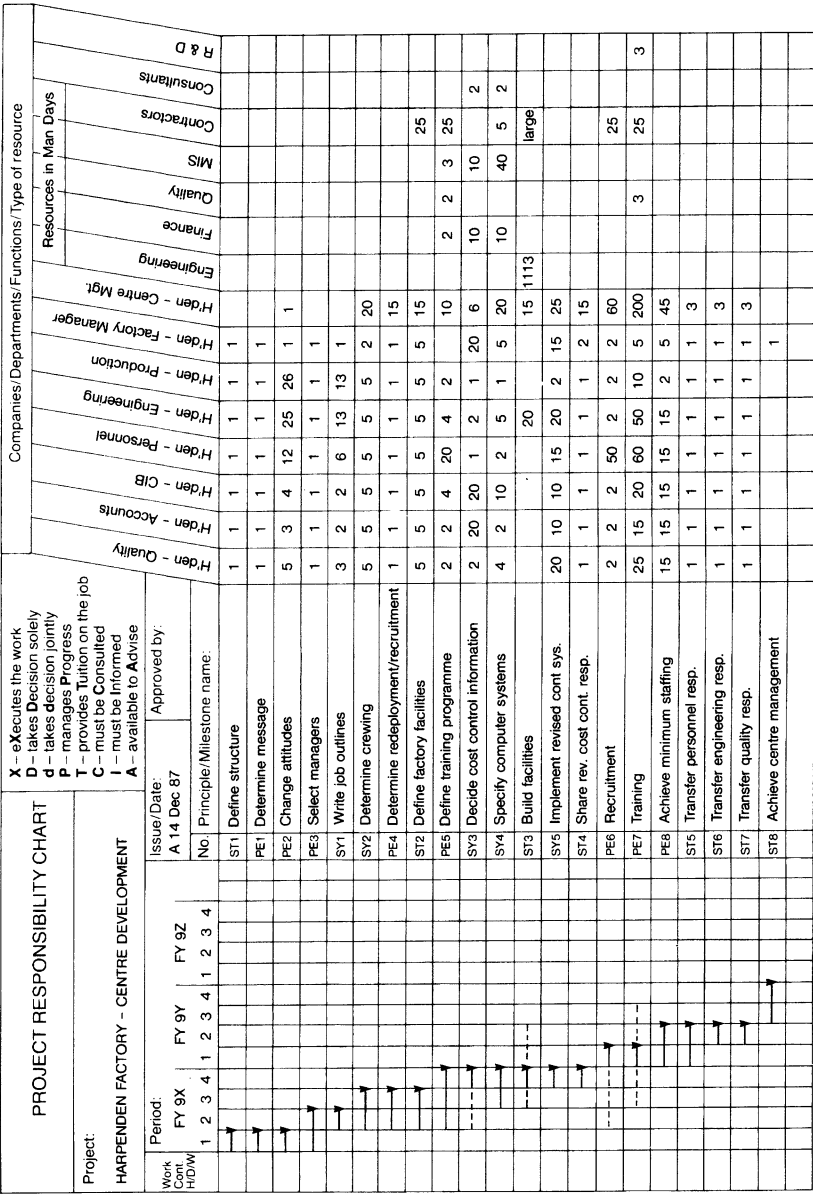
PROJECT RESPONSIBILITY CHART

Project: HARPENDEN FACTORY – CENTRE DEVELOPMENT

Issue/Date: A 14 Dec 87 Approved by:

Key:
X – eXecutes the work
D – takes Decision solely
d – takes decision jointly
P – manages Progress
T – provides Tuition on the job
C – must be Consulted
I – must be Informed
A – available to Advise

Companies/Departments/Functions/Type of resource — Resources in Man Days

No.	Principle/Milestone name	H'den Quality	H'den Accounts	H'den CIB	H'den Personnel	H'den Engineering	H'den Production	H'den Factory Manager	H'den Centre Mgt.	Engineering	Finance	Quality	MIS	Contractors	Consultants	R & D
ST1	Define structure	1	1	1	1	1	1	1								
PE1	Determine message	1	1	1	1	1	1	1								
PE2	Change attitudes	5	3	4	12	25	26	1	1							
PE3	Select managers	1	1	1	1	1	1	1								
SY1	Write job outlines	3	2	2	6	13	13									
SY2	Determine crewing	5	5	5	5	5	5	2	20							
PE4	Determine redeployment/recruitment	1	1	1	1	1	1	1	15							
ST2	Define factory facilities	5	5	5	5	5	5	5	15					25		
PE5	Define training programme	2	2	4	20	4	2	1	10		2	2	3	25		
SY3	Decide cost control information	2	20	20	1	2	1	20	6		10		10		2	
SY4	Specify computer systems	4	2	10	2	5	1	5	20		10		40	5	2	
ST3	Build facilities					20			15	1113				large		
SY5	Implement revised cont sys.	20	10	10	15	20	2	15	25							
ST4	Share rev. cost cont. resp.	1	1	1	1	1	1	2	15							
PE6	Recruitment	2	2	2	50	2	2	2	60					25		
PE7	Training	25	15	20	60	50	10	5	200					25		
PE8	Achieve minimum staffing	15	15	15	15	15	2	5	45							
ST5	Transfer personnel resp.	1	1	1	1	1	1	1	3							
ST6	Transfer engineering resp.	1	1	1	1	1	1	1	3							3
ST7	Transfer quality resp.	1	1	1	1		1	1	3			3				
ST8	Achieve centre management							1	1							

Work Cont. H/D/W — Period: FY 9X | FY 9Y | FY 9Z (quarters 1 2 3 4)

Figure 6.11 Responsibility chart showing resource usage

ESTIMATING SHEET	TRIMAGI COMMUNICATIONS BV				02-Jan-9X

		CODE:		ISSUE:	
PROJECT:	CRMO Rationalization	CODE: C1	ISSUE: A		
WORK AREA:	Project	CODE: C1P	AUTHOR: LJN		
WORK PACKAGE:	Project Definition	CODE: C1P1	APPRVD: JRT		
ACTIVITY:	....	CODE:	DATE: 02-Jan-9X		

ACTIVITY/TASK	WORK CONTENT			RESOURCES				9 People	
	No of steps	Effort/ step	Total effort	Prjct Mgr	Prjct Offc	CRMO TL	CRMO Mgrs	Ops Direct	Other Mgrs
Number Description		(days)	(days)	1	1	1	2	1	3
1 Produce project proposal	1	4	4	1	2	1			
2 Hold project definition workshop	1	4	4	1	1	1		1	
3 Define required benefits	1	2	2	1		1			
4 Draft Project Definition Report	1	8	8	2	6				
5 Hold project launch workshop, 1.5 day duration	1	12	12	1.5	1.5	1.5	3		4.5
6 Finalize milestone plan	1	2	2	1	1				
7 Finalize project responsibility chart	1	2	2	1	1				
8 Prepare estimates – time	20	0.1	2		2				
9 Prepare estimates – cost	20	0.1	2		2				
10 Prepare estimates – revenue	1	1	1		1				
11 Assess project viability	1	1	1	1					
12 Assess risks	1	3	3	1	1	1			
13 Finalize Project Definition Report	1	5	5	2	3				
14 Mobilize team	1	3	3	0.5	0.5	0.5			1.5
SUB-TOTAL:			51	13	22	6	3	1	6
ALLOWANCE %			10	10	10	10	10	10	10
TOTAL EFFORT:			56	14	24	7	3	1	7
UNIT RATE:			£K/day	0.5	0.3	0.3	0.5	0.8	0.5
COST:			£K	7.15	7.26	1.98	1.65	0.88	3.30

TOTAL EFFORT: 56 DAYS
TOTAL COST: £K 22.22
DURATION: DAYS
TARGET START:
TARGET FINISH:

Figure 6.12   Estimating sheet for milestone P1: *Project Definition* from the CRMO Rationalization Project
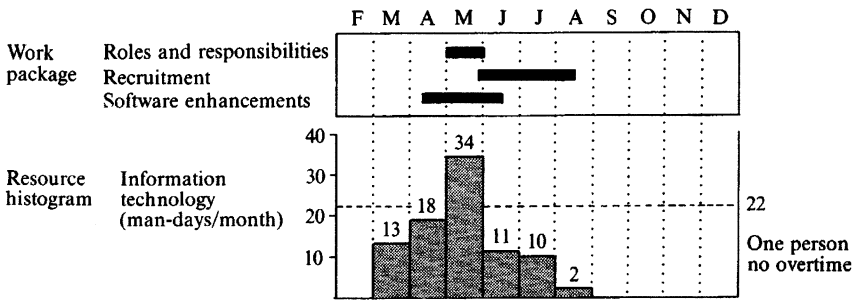
Figure 6.13   Resource histogram

working year. When converting from man-days to man-weeks, man-months or man-years I would suggest you use the following ratios:

- 5 × 0.7 =   3.5 man-days/man-week
- 22 × 0.7 = 15.5 man-days/man-month
- 52 × 3.5 = 180 man-days/man-year.

If you are employing a labourer from a contractor, you can clearly expect a person on every day you want one. If the person you had one day is not available the next, a replacement can be sent. The contractor accounts for lost time in the rates charged. The same is not true for professional people. It is very inefficient for an engineer or software programmer, or training professional to hand over part way through the design of a programme.

You must also not double account. Having used these ratios, an individual is available 260 days per year. For instance, if you have a resource calendar which allows you to account for individual holidays, you should use a ratio of 0.8, which gives 4.0 man-days/man-week, 16.5 man-days/man-month, and 210 man-days/man-year. (A resource calendar is a calendar which identifies working days and rest days during the life of a project. It can also identify the number of hours worked per day. There can be resource calendars for the project as a whole, for individual resources within it, and for different geographical locations.)

6.6 Equipment and drawing registers

Up to this point I have focused on human resources. Other types of resources include:

- drawings representing the designs of material, plant and equipment
- materials to be consumed in the delivery of the facility

– plant and equipment to be used, but not consumed, doing the work of the project
– finance to pay for the project.

Finance is beyond the scope of this book.[1] Drawings, materials, plant and equipment are often managed using lists or registers. These are lists of the resources against each activity in the project. Maintaining these in an electronic database, enables the project manager to monitor the delivery of the resources against the start date of the activity. Often, the resources go through several stages of development before final delivery. For instance, drawings go through:

– functional, systems and detail design
– various iterations and stages of sign-off of the drawings

and materials go through:

– production of drawings
– procurement
– manufacture
– assembly
– delivery
– kit marshalling.

On a small project, these steps may be included as activities in the project plan. However, on larger projects this can be cumbersome. The stages of development are then monitored in the registers, effectively as separate packages of work. Standard or known lead times are used to work out the due date for completion of each step, from the start date of the activity in which the resource is used.

Shortly before the start of an activity, the material register becomes a kit-marshalling list. This is used to check that all the materials required for the activity have been delivered, and to collect them together, so that they are ready for use when the activity starts.

6.7 Summary

1. The purpose of project organization is:
   – to marshal adequate and appropriate resources
   – to undertake the work of the project
   – to successfully deliver its objectives.
2. The principal tools and techniques of organization management are:
   – the contract between the parties involved
   – organization breakdown structure, matching work breakdown

– responsibility charts.
3. There are two issues in choosing a project organization for a functional parent organization:
   – location of resources
   – type of organization structure.
4. The versatile organization provide a more flexible approach to creating project organizations.
5. There are five types of organization structure:
   – functional hierarchy
   – functional matrix
   – balanced matrix
   – secondment matrix
   – project hierarchy.
6. Eight types of role or responsibility are suggested for use in the responsibility chart:
   – **X**   e**X**ecutes the work
   – **D**   takes **D**ecision solely or ultimately
   – **d**   takes **d**ecision jointly or partly
   – **P**   controls **P**rogress
   – **T**   provides **T**uition on the job
   – **C**   must be **C**onsulted
   – **I**   must be **I**nformed
   – **A**   available to **A**dvise.
7. The contract requires recording of estimates of work content, so that resource providers can commit to release of their people.
8. Drawings, materials, plant and equipment are managed using registers, lists against the activities in which they are required.

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