CHAPTER 1

1-1 Each of the causes can produce each of the effects. Some students have commented that these cause and effect relationships look like their last project. This is the reason why project managers must continuously replan projects.

1-2 There is no correct answer to this problem, just preferred choices.

1. a, b, c, d, f, g, i, k, m, n, p
2. b, d, e, h, i, j, k, m, n, o, p
3. a, c, d, f, g, i, j, m, n, p
4. b, d, e, h, i, j, k, m, n, o, p
5. b, d, h, i, l, m, n, p

Moral: Even in the best companies, differing views of project management are possible.

1-3 Organizations should be restructured in order to get better control of resources. Therefore, those individuals who directly control the resources, namely the middle and lower level managers, should have first insight that organizational restructuring is necessary. Labors are too involved in the details of the task to realize the resource problems, and executives are too involved with top management functions.

1-4 Project managers do not control resources directly and therefore have to rely on their own interpersonal skills in negotiations with the line managers. Project managers cannot rely upon executives for help because executives prefer not to interfere and tell their line managers how to control and assign resources.

1-5 Project management is designed for industries which have complex (as opposed to simple) tasks and which operate in an ever changing, dynamic (as opposed to static) environment. These include aerospace, defense, construction, computers, high technology, electrical instrumentation, etc. . . . Companies which have highly repetitive tasks, such as low technology manufacturing companies, do not need formal project management but can use informal project management for activities such as capital equipment projects. Furthermore, project management works best in situations where activities require the involvement of more than one functional group.

1-6 Project managers believe that since they control total project costs, they are the only ones that contribute to profits, since in "project driven" organizations all profits must come out of the projects. Line managers, on the other hand, believe that they are the ones who contribute to profits by assigning the right

salaried personnel at the right time to meet schedule commitments. Both groups are correct. Both project managers and line managers contribute to profits. It is a team effort.

1-7 In general, the most important attributes of a project manager are communicative skills and interpersonal skills. Individuals cannot be trained to be a project manager simply by taking courses or attending seminars. Project managers can only be developed by on-the-job training. Some companies prefer to train project managers by first rotating them through the various line organizations (say two weeks to two months each) and then assigning them as an assistant project manager. The question, of course, is how much they can learn in such a short period of time. Promoting from within is best because the first few project managers must know the total organization. If functional employees see promotions from within, then they feel that there are several career paths in the company. However, the new project managers must be able to divorce themselves from the functional organization. It is often best to hire from the outside so that you will have a project manager who does not have any functional ties and does not owe any favors.

1-8 Functional managers can make good project managers if they can divorce themselves from the functional details of the project and act as generalist managers worrying about time and cost as well as performance. The exception to the rule would be an R & D project manager. Generally speaking, line managers do not make good project managers if they have to wear two hats at the same time; a line manager and a project manager. In this case, the line manager may save the best resources for his project. His project will be a success at the expense of every other project that he has to supply resources for.

1-9 Functional managers would prefer to manage projects which stay within their functional groups. This greatly reduces authority problems. Sometimes, however, the line manager may be asked to manage an entire project even though only 60% of the work stays within his group. This can work if the line manager has good interpersonal skills and must interface with only one or two other departments.

1-10 All three items are more important on the horizontal line than on the vertical line. Because the project manager is under a time constraint, time management is vital. Communications are important because the project manager may be working with functional employees that he has never worked with before. Motivation is important because the project manager must try to motivate functional employees without the leverage of controlling their salaries and pay raises.

1–11 This definitely applies to project management since the project manager may have to negotiate for all resources on the project.

1–12 All are basic characteristics of project management.

1–13 Either executives or line managers usually look over the shoulder of the project manager. If the project is a high priority, then executives may get actively involved and act as a project sponsor. And even if there exists a project sponsor, line managers should still look over the shoulders of the project managers to verify that all decisions are in the best interest of the company as well as the best interest of the project.

1–14 In most organizations, power rests with the individuals that control the resources. If the project manager has to negotiate for all resources, and the resources are still attached administratively to the line manager, then project management may very well make line managers more powerful than before. Of course, senior management still retains the right to "glorify" the project management position.

1–15 In project-driven organizations, the fastest career path is in project management, with project engineering second and line management third. The major reason for this is because project management and project engineering may be viewed as having direct control and input to corporate profitability since each project has its own profit and loss statement. In non-project-driven organizations, where the profit is measured vertically, the career path opportunities are reversed.

1–16 Placing highly technical people in charge of a project can lead to micromanagement and over-design with very little regard for budget and schedule.

1–17 This is a very common situation. The project manager must be made to realize that he is now a generalist.

CHAPTER 2

2-1 All organizational charts are examples of closed, dynamic systems as shown in Figure 2-2.

2-2 The major item here is time. Projects generally have severe time constraints whereas systems are ongoing entities (perhaps composed of several projects) with more flexible time requirements.

2-3 R & D is a system with feedback to top management, engineering, manufacturing, and marketing.

2-4 a. Open, closed, or extended
b. Extended
c. Closed
d. Closed
e. Closed

2-5 Organizations are static, schematic models although we would like them to be dynamic. Generally, the change is so slow that they cannot be considered as dynamic.

2-6 Projects can be subdivided into smaller elements such as tasks, subtasks, and work packages. This will be discussed in Chapter 11.

2-7 People can have "tunnel vision" and not realize how their efforts fit into the big picture, thus making integration more difficult.

2-8 People try to optimize each major or minor activity rather than the total package.

2-9 A cost-benefit analysis or feasibility study is generally easier in a horizontal structure because many diverse groups can pool their knowledge toward the achievement of a single objective.

2-10 Project management can be made to work effectively on short duration activities (i.e. short life cycles). For long life cycle activities, product rather than project management may be more applicable.

2-11 Usually this entails the establishment of major decision-making milestones, such as budget approval, project approval, schedule approval, and critical design reviews.

2-12 Because the project manager is under time, cost, and performance constraints, he often has to take risks and cut corners in order to get the task accomplished.

2-13 Yes, as long as the projects have some degree of similarity between them. But once a totally new project comes along, especially if it has some degree of complexity, the company may be in trouble.

2-14 This is usually an executive decision based upon how much control the executives want to have over the project management processes. It is also based upon how much trust they have in the project managers.

2-15 Assuming that maturity is accompanied by trust, the number of phases should decrease.

2-16 Executives are afraid that they may lose control and authority if they support project management. This is a serious fear that must be overcome.

2-17 If the corporate culture is based upon trust, cooperation and effective communications, the cost of implementation can be lessened.

2-18 If you discover early on in the project that the objectives are unrealistic and cannot be achieved, the project might be seen as a failure because the objectives are unreachable and also seen as a success because it clearly shows that you were going in the wrong direction and are no longer squandering resources.

2-19 With informal project management, there is generally less paperwork because the organization has faith in the project managers and their ability to perform.

2-20 Generally speaking, formalized project management comes first. Then, after trust is achieved, an informal project management approach is possible.

CHAPTER 3

3-1 Grinnell and Apple are correct in that a matrix would eliminate these problems provided that the problems are the result of poor interaction between diverse functional groups. If these problems are common to projects which stay within one line organization, then the problems rest with the line managers.

3-2 Converting from a traditional to a project structure may take between two to three years if employees feel that they cannot effectively report to more than one boss, or if they feel that they will not be evaluated effectively. Any organizational structural change must be married to the wage and salary administration program. Once employees learn how to report to multiple managers, a company can convert from one project organizational form to another, virtually overnight.

3-3 People should undergo therapy sessions both during conversion and for some time after, say two to three years. The follow-up sessions are designed to obtain feedback from the employees and their recommendations as to how the system can be improved. This should be done regardless of the form.

3-4 A matrix structure is well suited for each of these.

3-5 Not all project managers have the same amount of project authority. Furthermore, the project manager, by virtue of his ability to establish his own project policies and procedures, can delegate as much authority as he wishes. Everything must be documented so that all players understand the ground rules. This will be discussed in more depth in Section 5.3.

3-6 Under special circumstances, each of these factors can be used as the criteria for selecting an organizational form. In general, the only good reason for changing the organizational form is to get better control of resources. However, since customers may consider your organization as an extension of their own company, they may wish to have some say as to the organizational structure for a project.

3-7 Combining organizational forms is designed to obtain the best of two worlds. For example, the matrix is a combination of the horizontal and traditional structure. The idea is to obtain an organizational structure where the advantages grossly outweigh the disadvantages.

3-8 Obviously, the capabilities of all levels of management are important. However, if the middle and lower-level managers have demonstrated the ability to manage resources, then more authority can be delegated to them and the company can be run on a day-to-

day basis by cooperation between the project and functional managers.

3-9 Companies will always be willing to accept organizational restructuring if they really want or need the customer's business. Once a company accepts project management, the company becomes dynamic and can usually adapt to a changing environment very quickly because individuals learn how to report effectively to multiple managers. Management must consider the feasibility of the change, the impact on the existing organization, and especially the possibility that this might become a precedent for the future.

3-10 Generally speaking, life cycles are used on long term projects where each life cycle phase can be measured in weeks or months. Organizational structures, although they must be able to adapt to a changing environment, are designed for a stable flow of work. Companies should not design organizational forms based upon the individual life cycle phases but rather the total project life cycle. There are exceptions, however, as in the situation where the first phase is R & D and the remaining phases include selling in the market. (See Problem 3-11)

3-11 R & D is one of the best applications of the matrix structure because the best technical resources can be shared between projects and the general atmosphere fosters teamwork.

3-12 The company has been very successful in the past using informal project management where people appear to be talking to one another and making decisions which are in the best interest of the project. This type of structure cannot work effectively for large organizations or large projects which span several departments. However, many companies find this organizational structure effective because they get the advantages of formal project management without the disadvantages of the necessity for formally defined authority and a massive flow of paperwork. Personnel resent organizational change unless they are convinced that the new structure will give them more authority, responsibility, opportunity for advancement, ability to build an empire, more status, more pay, and other such arguments.

3-13 Both statements are correct.

3-14 All three statements are correct.

3-15 The first concern in selecting an organizational form for a small company is to minimize the overhead rate. This is usually accomplished by minimizing the number of top-level managers while trying to delegate the minimum amount of authority (especially for decision-making) to lower-level personnel. Therefore, although some companies may wish to have an informal matrix, the usual selection is the formal, traditional structure.

3-16 Project managers believe that they report to every executive in

the organization and the customer even though they may be attached to one line group. In addition, some project managers believe that they must report to every line manager as well since only the line managers control resources. Function team members report formally to their line manager and informally to all project managers. Some line employees try to avoid the "horizontal" informal reporting by asserting that they have only one boss. Functional managers report to only one person, their functional executive.

3-17 If a project organization were large enough to control its own resources on a full-time basis, then a project organizational form may not be acceptable. Most of the time, when this occurs, the project is shown as a vertical line on the organizational chart, perhaps as a separate division, rather than a horizontal line.

3-18 Yes. There is a tendency to create more upper-level management slots when first going to a matrix in order to obtain better control. However, there comes a point where the matrix becomes mature and less top-level personnel are required.

3-19, 3-20 A matrix organizational form is that structure which best fosters teamwork and communications. The reason for this is because it forces people in each one of the functional disciplines to communicate with one another, and if the project manager gives these people more information than they have to have (i.e. the total picture), then this has a tremendous bearing on how well people will communicate with one another and work together.

3-21 Yes. The matrix structure can be used in banks to create banking general managers. Branch managers are often regarded as banking general managers performing in a matrix.

3-22 A separate project management division would alleviate many of the problems. However, line managers may perceive this new division as a threat to their power base and authority, and may not provide the support needed. A training program will be necessary to convince the line managers that the new structure is in the best interest of the company.

3-23 Project-driven industries identify all corporate profitability and loss on a project-by-project basis since the entire function of the organization is to support projects. Such industries would be aerospace, defense, construction, and divisions within larger companies, such as the MIS groups. Matrix structures are ideal for project-driven industries.

3-24 It is always better to have one individual who is dedicated and committed (perhaps through full-time assignment) than to fragment the responsibility among several people who must share their loyalties among several projects.

3-25 The major reasons are usually attributed to the responsibility

for profit and loss. The greater one's influence on profit or loss, the higher one usually reports. Another reason for reporting high is customer interfacing.

3-26 For projects internal to the department, this works well. However, when interfacing with other departments becomes necessary, Ralph may find a greater need for interpersonal skills.

3-27 As long as the other divisions are willing to provide support, this situation can work. The other divisions must be allowed to participate in planning and decision-making. Using the project management division would be easier, but not necessarily more practical. Not all projects must flow through the project management division.

3-28 Project management advocates that there is no one best way to organize under all conditions. Organizations must be dynamic in order to respond rapidly to an ever-changing environment. The needs of the organization should determine the structure and, as needs change, so should the structure.

3-29 This situation can do more harm than good. Organizational charts do not necessarily indicate the balance of power in the organization. The line managers may be upset about seeing project managers drawn in higher positions on the organizational charts.

3-30 Both statements are true and should be considered in developing matrix structures.

3-31 With this many project managers, it is best to set up a line group for project managers. It is not uncommon for 15 project managers to report to one manager of project managers. The reason for this is that project managers should not require any direct supervision.

3-32 Project management can work here, but a matrix is not practical. Departmental project management may be best.

3-33 Project task forces generally have full-time membership whereas pure project management advocates sharing resources on several projects which can support full-time membership.

3-34 It is highly unlikely that both formal and informal project management can be in use at the same time and yet share the same resources.

3-35 The best application of such a structure is for multinational corporations and multinational projects.

3-36 Informal project is designed for non-project-driven organizations. The characteristics are (1) low need to define authority of the project manager, (2) low need to bury the project in paperwork, and (3) free flow of information among company personnel.

3-37 Yes. It is possible to have one matrix for the flow of work and a second matrix for communications or authority.

3-38 Project-driven organizations are used to these problems and cope

well. Some companies may have 50–100 projects going on at the same time. If the company has a severe problem because of too many projects, then executives must be willing to delay approval or startup of projects in order to match availability of resources.

3–39 The problem is not necessarily with matrix design as much as it is with security. Going to a matrix may make priority information available to more people than necessary.

3–40 Implementation can be done in stages, say from division to division. However, this will take much longer than implementing project management across the entire organization simultaneously. Partial implementation may result in having to solve the same problems over and over again.

3–41 As long as both categories of projects are prioritized from the same list, the line managers may find it easier to allocate resources. Without common priorities, short-term thinking together with immediate profits may become more important than long-term thinking and long-term profits.

3–42 The corporate engineering function is designed to supply a professional project manager to any line group needing service. The project manager reports "solid" to corporate engineering and "dotted" to whichever manager requires the services.

CHAPTER 4

4-1 The situations described here can occur in any organizational structure, not necessarily a project form. However, the relative intensity of this situation can vary. These situations are usually more pronounced in a matrix than in any other organizational form.

4-2 If the project manager must direct an activity which requires the establishment of a project team, then the project manager must have the authority to obtain (or at least request) manpower as necessary provided that the project constraints are not violated.

4-3 All three statements are true. The first statement, however, may have a flaw. Generally speaking, if there exists an atmosphere of trust, there may not be any need for a close customer-contractor working relationship. This, of course, may depend upon who the customer is.

4-4 Project management is designed to make effective utilization of resources. This is accomplished by sharing key personnel as needed, thus fostering an atmosphere of variable manpower loading. Performance evaluation is complex only if the line manager does not have sufficient time to observe his people in action, and therefore must rely upon the project manager for input. The project manager utilizes this input as a leverage tool to motivate his personnel (see Journal of Systems Management, February 1980 for the author's article, "Personnel Evaluation in Project Management"). In project management, it is often impossible to distinguish between the various grade levels of project management and project engineering. Although these grade levels may be possible in a functional department, functional employees are often asked to work both above and below their normal pay grades, thus questioning the validity of using pay grades. Training in a project environment requires that people learn how to report and interact horizontally as well as vertically at the same time. Morale problems may be greater in a project environment because both project and functional managers may be competing for the loyalty of the employee.

4-5 According to the description given here, project managers appear to be grossly underpaid medical doctors. The job descriptions are the same except that only the life and death of the project is at stake.

4-6 Paul should pick up these employees early if they are that necessary for success and if the increased costs are not a problem. Trade-off analyses may be required. This is a common technique