PROJECT MANAGEMENT

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1. INTRODUCTION

GENERAL

1.01 The purpose of this section is as follows:

(a) Define the role of project management within the context of system development

(b) Define general project management responsibilities and characteristics

(c) Describe specific project management functions and products

(d) Identify some of the tools and techniques that can be used for project management

(e) Provide general information, via checklists and references, that will assist in performing project management functions

(f) Specify how other sections relating to system development should be used by project management personnel.

1.02 Whenever this section is reissued, the reason for reissue will be given in this paragraph.

1.03 This guideline has been developed by a multicompany project team under the direction of American Telephone and Telegraph (AT&T) Technical Support and Standards and the GUARDSMAN Steering Committee.

SCOPE OF APPLICATION

1.04 This section should be utilized as follows:

(a) For all projects related to either the development, installation, or maintenance of information systems. (The terms "data system" and "system" may be used interchangeably with information systems within this practice.) While many of the principles contained herein do apply in general to all types of project efforts, these guidelines are not intended for direct application with noninformation system projects.

(b) By any and all personnel who have managerial, supervisory, and/or administrative responsibilities.

(c) For systems developed locally, centrally, or by a group of operating companies. The project management functions are necessary regardless of mode of development. However, the assignment of specific functions and responsibilities may differ depending upon the company's organization structure or the development agencies involved.

PROJECT MANAGEMENT DEFINITIONS

1.05 ***Project:*** A project is a one-time effort with a specific objective and an identifiable termination point. It is planned, staffed, and controlled as a unique entity. More specifically, projects are formed to:

- Develop new systems or subsystems
- Install centrally developed or vendor provided systems
- Perform change and/or improvement maintenance.

1.06 ***Management and Project Management:*** Each project manager is first and foremost a manager of the business in the most traditional sense. It is assumed that any ***project*** manager has the basic managerial skills requisite for the level of authority and responsibility that has been assigned. Therefore, any description of ***project*** management should focus on the functions that are unique to the management and administration of systems projects. For that reason, such topics as motivation, delegation, performance appraisal, and so on, are only mentioned in passing within this practice.

1.07 ***Project Management and System Development:*** The purpose of ***project management*** is to plan, organize and control the system development, installation, and maintenance process from an administrative standpoint. ***System development*** is the specification, construction, and installation of an information system from a technical standpoint. Simply stated, the project manager manages people, ie, technical specialists such as application experts, analysts, designers, etc; the technical specialists develop the system. Unfortunately, the difference between these two concepts is not always properly represented. However, there are great differences between the activities, products, procedures, and skills required for project management and system development.

1.08 ***Project Manager:*** In this practice, for the sake of clarity, the project manager is portrayed as a single individual. While only one person will have that specific title, project management functions can be, and usually are, shared among project members. This may occur through normal delegation to the next management level or through assignment of personnel to specific project activities, such as planning, resource acquisition, or project control.

PROJECT MANAGEMENT RESPONSIBILITIES

1.09 Every project will have a ***project manager,*** by title. The project manager has direct, day-to-day responsibility for project activities, products, personnel, and budgets.

1.10 Depending on project size and organization structure, ***project leaders*** may be assigned to administer specific portions of the project. A project leader may report to the project manager either directly or on a dotted-line basis. Not every project will have or require project leaders.

1.11 For very large projects or interdepartmental projects involving multiple development groups, a ***project director*** may be appointed for overall coordination. Though the director may have an administrative staff, development personnel typically will not reside within the project director's organization. The project manager will usually report to the project director on a dotted-line basis. Based on size and interdepartmental complexity

criteria, very few projects should require a project director.

1.12 ***Project Director Responsibilities:*** If a project director is required, the following functions should be the responsibility of that individual. If there is no director, these functions will be performed by the project manager.

(a) Acquires project approvals and funding

(b) Establishes general project mission and direction

(c) Obtains general resource commitments

(d) Negotiates overall schedules and priorities

(e) Coordinates the various development organizations

(f) Assures adequate user representation and involvement during development

(g) Develops an administrative organization and reporting structure

(h) Establishes major project milestones and approval points

(i) Monitors overall project progress and expenditures

(j) Monitors the nature and impact of system change activity

(k) Approves system definitions/requirements

(l) Approves operating agreements and project completion agreements or trial agreements with trial companies.

1.13 ***Project Manager Responsibilities:*** The following functions are the responsibility of the project manager.

(a) Establishes scope and development objectives for the project

(b) Obtains specific resources required for project

(c) Develops detailed work plans and estimates

(d) Controls project schedules and costs

(e) Reports project status to review/approval bodies and client organization

(f) Responsible for overall direction and technical quality of the system produced

(g) Administers system change procedures

(h) Assures conformance to all applicable standards

(i) Establishes developmental and administrative procedures for project

(j) Conducts appropriate technical and design reviews

(k) Coordinates system installation and acceptance.

1.14 ***Project Leader Responsibilities:*** If a project leader(s) is required, the following functions should be the responsibility of that individual(s). If there is no project leader, these functions will be performed by the project manager.

(a) Supervises certain project personnel

(b) Makes specific personnel assignments and performs resource load-leveling

(c) Develops detailed work plans and schedules, provides manager detailed status and utilization data

(d) Coordinates with other project leaders/managers

(e) Responsible for technical development of designated portion of system/project

(f) Evaluates product quality (requirements, specifications, deliverables) and assures conformance to applicable standards

(g) Performs technical evaluation of system change requests and estimates resource requirements.

PROJECT MANAGER CHARACTERISTICS

1.15 Typically, the project manager should come from the sponsoring or client department. The project manager should have these basic skills and knowledge.

(a) General managerial expertise

(b) Detailed knowledge of the application area

(c) Experience and/or training in project management and system development methods

(d) General knowledge of computer subsystem technology and development methodologies

(e) General knowledge of personnel subsystem technology and development methodologies.

1.16 In addition to the above characteristics, there are some other attributes that are valuable in a project manager/leader.

(a) Systematic approach to decision-making, careful and orderly approach to fact-finding, evaluation and selection among alternatives.

(b) Capability to adapt methods necessary to meet project objectives.

(c) Ability to function effectively with a minimum of direct supervision.

(d) Capability to make decisions under stress in a basically unstructured environment.

(e) Ability to successfully function in situations where the expected outcome is only generally known at the outset, thus requiring the individual to formulate and negotiate concrete long-term project goals and objectives, consistent with corporate goals and objectives.

(f) Solid general management capabilities, with emphasis on the ability to successfully plan a sequence of activities, communicate orally and in writing, negotiate within the project team as well as with departmental and interdepartmental coordinates, delegate work and responsibility with suitable follow-up and progress monitoring. Requires a "goal setter" with ability to translate corporate goals and objectives into specific project objectives. Must be able to motivate others—act as catalyst to make things happen.

1.17 Obviously, each project manager/leader will have a unique set of skills and abilities, strengths and weaknesses. However, by utilizing available training and technical support services, and through the judicious selection of project personnel, the project manager should be able to compensate for areas of inexperience or lack of expertise.

USE OF RELATED BELL SYSTEM PRACTICES

1.18 These practices must be used in concert with other sections in the system development area.

007-200-310	Functional Roles in a Systems Environment
007-220-200	System Development Procedures
007-227-305	Developmental Documentation
007-227-310	Developmental Documentation Specifications

1.19 Each of these practices is referenced in this guideline, and it is assumed that the project manager is familiar with them and will be utilizing these procedures during the course of the project.

2. OVERVIEW

GENERAL

2.01 The function of project management is to plan, organize and control a systems project.

2.02 In general, there are five aspects of the project that must be managed.

- Quality
- People and resources
- Cost
- Time
- Technology.

2.03 In doing project and/or phase planning, the project manager should evaluate the requirements and constraints on each of these "manageables" and develop a plan that permits an optimum balance among them. Then as the project moves forward, the manager must provide the organization and controls necessary to maintain the equilibrium between quality, resources, cost, time, and technology.

2.04 The purpose of this practice is to describe how these basic project management functions can best be accomplished within the context of the Bell System development methodology.

APPROACH TO PROJECT MANAGEMENT

2.05 There are two types of planning that are done during development.

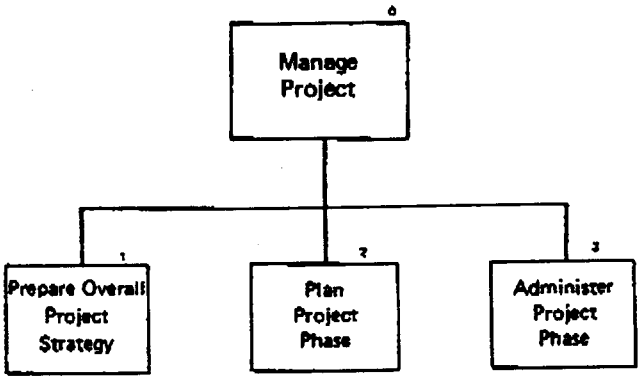
- Overall project planning
- Detailed phase planning.

2.06 ***Overall Project Planning:*** Overall project planning is done during the feasibility phase as an input to the cost/benefit analysis of the system. Also, general developmental objectives and strategies are established at that time. While these overall plans are typically refined as the project progresses, the initial plan becomes the roadmap for project direction.

2.07 ***Project Phase Planning:*** Detailed phase planning is usually done only for the immediate next phase of development. In planning for a specific phase, the manager must determine the development activities and products that will be required, how the project must be organized to accomplish that work, and how the project should be controlled during the phase. Once these issues are decided, detailed work plans, schedules, personnel assignments, etc, can be developed.

2.08 ***Project Phase Administration:*** Once a specific project phase has begun, the project manager becomes involved in actually implementing the phase plan. The traditional managerial functions come into play as the manager directs the project team and solves the day-to-day problems. The manager must also obtain the necessary project resources and control the various aspects of the project, such as quality, cost, schedule, etc.

2.09 ***Structure of the Practice:*** Thus the approach taken in this practice is to management of a project as consisting of these three major functions.



2.10 Since it is "functions" that are being described, a hierarchical approach has been used. Using the three functions as the first hierarchy level, project management functions have been defined down to the fourth level of the hierarchy.

2.11 Within this part, the three major functions are discussed in fairly general terms. Part 3 provides backup detail in the form of function descriptions.

2.12 A complete functional hierarchy is provided in Part 4.

2.13 For some functions, additional supportive information has been provided in the form of checklists. The checklists are referenced within the function descriptions and can be found in Part 5.

2.14 A list of reference material is provided in Part 6 of this section.

2.15 It must be noted at the outset that while three distinct functions and a set of subfunctions have been identified for descriptive purposes, these functions are in practice highly interdependent and interrelated. This is the case because plans are and must be dynamic. Once an overall project plan is developed, it will likely be alerted as the project progresses, as more detailed

planning occurs and developmental objectives become more explicit. Likewise, during the conduct of a specific phase, problems may arise that require significant phase replanning efforts. Thus each function can impact the others and there will probably be continual activity in each of these areas throughout the life of the project.

2.16 Further, these functions generally overlap in time. For example, during feasibility the project manager is administering the feasibility phase (Function 3), preparing the overall project plan (Function 1), and doing detailed planning for the definition phase (Function 2).

2.17 For these reasons, the methodology presented in this section must be viewed as a ***model*** for project management. The need for and timing of project management activities will depend on the unique characteristics of the individual project.

PREPARING OVERALL PROJECT STRATEGY

2.18 ***Prime Movers/Approvers/Departmental Coordinates:*** A project exists in a business environment and the project manager must understand that environment and work effectively within it. As a start, the manager should identify the "prime movers" for the project. These are the people, usually in the client/user organization(s), that initiated or sponsored the project. The manager should determine the real reasons for the project, as seen by these prime movers, and determine how the proposed system fits into overall organizational plans and business goals. Also, the person(s) who will have approval authority over the project must be defined. If the project has interdepartmental impact, the key decision-making personnel in other organizations must be identified. In order to have effective day-to-day liaison with all affected organizations, a single point of contact should be established for each group. These individuals should be informed and/or involved in all major project/system decisions.

2.19 ***Formal Approval Bodies:*** Most major projects operate under the authority of formal approval bodies. The manager should know how these bodies work and what demands they will place on the project: end-of-phase reports, design reviews, cost analysis and budgets, status reports, approval checkpoints, etc. Usually, there is a staff group that supports these approval committees. The manager should work with this group to clarify the specific reporting requirements for the project.

2.20 ***Budget:*** Project expenses are allocated via normal departmental budgets. The manager should understand budget and chargeback procedures and should seek assistance from budget personnel in solving technical problems related to the budget or cost estimation. Chargeback and resource rates can usually be obtained from this group. Interface with the budget group becomes critical when the method for estimating costs differs from the calculation of actuals as it does in many companies.

2.21 ***Project Control:*** Some companies have established central project control groups to track project progress and cost, monitor or chair design reviews, and assure performance review of the system. If such a group exists, the manager should determine its specific role and identify any special reporting requirements. This group may also be able to provide assistance in the use of general project management tools.

2.22 ***Project Support/Standards:*** Project support is also available from data systems support. These people can offer advice on system development procedures, design strategies, project planning, etc. The data systems standards group can provide assistance in standards application and interpretation. They are usually responsible for standard enforcement. Because of the help that can be gained from these support groups, the manager should begin working with them early in the project.

2.23 ***Departmental and Data Systems Planning:*** Planning organizations in both the operating departments and data systems will have an interest in the project and a need for information about the system as the project progresses. They can usually assist in the evaluation of alternate courses of action. They can also place contraints on the project's options. Therefore, close coordination with these planning groups is very important.

2.24 In summary, there are a great many entities that together form the environment for the project.

- Prime movers/approvers

- Departmental coordinates
- Formal approval bodies
- Budget
- Project control
- Project support
- Standards
- Departmental and data systems planning.

2.25 The project manager must develop a harmonious working relationship with each of these entities in order to do an effective job and minimize unanticipated outside forces that can impact the project effort. This coordination, while time consuming, usually has a significant payoff in terms of the support and commitment that can be gained for the project. Section 007-200-310, Functional Roles in a Systems Environment, should be consulted to determine additional interface entities.

2.26 ***Development Plan in the Feasibility Phase:*** Preparing the overall development plan for the project is highly interactive with the system analysis function during feasibility. The project team as a whole will investigate system alternatives and their associated cost/benefit characteristics. Obviously, each alternative will create unique variations in the basic development plan. In addition to guiding and participating in this analysis effort, the project manager provides some specialized input into the process. One area of specific concern is project sizing.

2.27 ***Project Sizing:*** For potentially large projects the project manager should investigate possibilities for phased development or breaking the project into more manageable, functionally independent subprojects. Informal data collection around the Bell System indicates that projects of 1 year or less have the best chance of being completed on time and within budget. As development time increases, the project becomes exposed to slippages and overruns resulting from such factors as:

(a) Environmental changes that require revisions to system requirements and specifications (legal, regulatory, new systems, etc)

(b) Technological advances that can affect system architecture and design

(c) Increasing numbers of system "enhancements" to keep the developing system current with operating practices

(d) Alterations in user commitment or priorities

(e) Force turnover

(f) Economic, funding, or budgetary changes.

2.28 If project duration is estimated to exceed 1-1/2 to 2 years, the manager must take positive steps to minimize the influence of these factors: assure high-level commitment to the project, work closely with clients and technical support to forecast environmental and technical changes, invoke a rigid change management system, provide for cross-training and the orderly intake of new personnel, and so on.

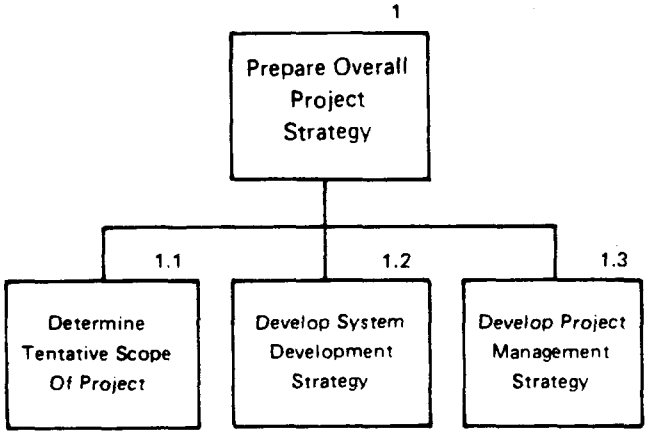
2.29 ***Project/System Interfaces:*** Another area for attention is project/system interfaces. Once the team has identified the necessary system interfaces, the project manager must determine whether any changes will be required to existing systems. If modifications are needed, the manager must coordinate with other affected managers to assure that the effort is properly defined, funded/approved, and that proposed schedules are acceptable.

2.30 ***Project Estimates:*** In developing the project plan, the size of the work effort, cost, and schedules must be estimated. Unfortunately, there are few tools to assist the manager in this area. Experience, estimation by analogy, and a good understanding of the system development process seem to be the only effective aids currently available. The manager will have to draw heavily on the skill and experience of project team members in developing these estimates. Because of the lack of precision inherent in this early planning effort, estimates should be stated as ranges, with supportive information provided when possible as to why time, cost, etc, might run higher or lower.

2.31 ***Development and Management Strategies:*** The project strategy also includes the determination of the general development and project management methods to be employed. Section 007-220-200, System Development Procedures,

should be consulted to identify development requirements.

2.32 ***Subfunctions of Prepare Overall Project Strategy:*** The three subfunctions of PREPARE OVERALL PROJECT STRATEGY are as follows:



PLANNING PROJECT PHASE

2.33 ***Phase Plan:*** The overall project plan reflects the general activities that will go on in each of the developmental phases. This plan is revised as phases are completed and more information becomes available concerning the system development requirements. As was stated previously, a detailed work plan is typically developed only for the immediate next phase.

2.34 A detailed phase plan is necessary for several fairly obvious reasons.

(a) To assure that development requirements are met

(b) To inform project personnel of specific work assignments, schedules, and interface requirements

(c) To communicate outside the project

(d) To obtain approvals or resource commitments

(e) To measure status and progress

(f) To evaluate the impact of change requests.

2.35 ***Plans By Level:*** For moderate to large projects there will usually be plans at several levels of detail at least one for each management level. For example, a project manager would have a phase plan showing total team activity. A project leader would have a more detailed plan for the specific portion of the work being done with that group. Finally, each team member would have an individual work plan.

2.36 Development of these plans is a combination of top-down and bottom-up planning. General product and activity requirements are developed at the top. However, the technical people, who know the specific methodologies to be employed, must translate those general requirements into actual activities and tasks. The two inputs must be merged to form a realistic work plan.

2.37 ***Phase Product Requirements:*** To start phase planning, the manager and team must determine the product requirements for the phase. Section 007-227-305, Developmental Documentation, defines the general types of information/documentation that will be required for each phase. Additionally, every project will have unique requirements that must be identified.

2.38 ***Phase Activity Requirements:*** To determine actual development activities, Section 007-227-310, Developmental Documentation Specifications, should be used. Also, the various specialist on the team should be able to define specific technical procedures, particularly for the design phases. Technical support may also be able to assist in determining activity requirements.

2.39 ***Resource Requirements:*** With general product and activity requirements set, the

manager must determine the resources required for the phase: personnel, technical support, equipment and facilities, etc. In developing people requirements, Section 007-200-310, Functional Roles in a Systems Environment, will be useful in identifying function/skill classifications.

2.40 ***Project Organization:*** Project organization requirements typically change over the life of the project. During the early phases (feasibility and definition) it is usually best to have a small cadre of highly-experienced people working as nearly as possible in a peer relationship. The smallness of the group will foster easy communication and team decision making.

2.41 As system/project requirements are better defined, the team can expand and work can become a bit more specialized and independent. This would be true during the design phases, although a high level of interaction is still required.

2.42 Once system specifications are completed, even more team growth and work independence can be accommodated. A true hierarchical management structure is usually utilized during the implementation and conversion phases.

2.43 A critical factor in any organization structure is the reporting relationships direct versus dotted line. If a dotted line organization is employed, it is vital that the authority of the project manager and the accountability of the reporting person or group be clearly defined.

2.44 Whenever possible, it is advisable to collocate all project personnel. No amount of paperwork can replace effective day-to-day, face-to-face communication. When project members must reside in separate locations, the manager must make special provision for the necessary communication and coordination.

2.45 ***Phase Control Plan:*** In doing phase planning, creating a good control plan is of vital importance. For each of the "manageables" there should be performance targets and procedures for controlling them. These controls are necessary to assure progress and quality inside the project, as well as budget and schedule commitments to management.

2.46 ***Change Control:*** One area of special importance is the control of change during the project. As noted earlier, the longer the duration of the project the higher the exposure to requests for change. A formal published change procedure should be developed for the project if one does not already exist within the company.

2.47 ***Detailed Work Plans:*** Thus far in phase planning the project manager has only been developing the basic phase requirements: product, activity, personnel, resource, organization, and control. With this information in hand, detailed work plans can be developed.

2.48 The size of the work effort must be determined, in terms of person-days or weeks. Again, there are no "formulas" for doing this kind of work estimation. Even historical data, when it is available, will have to be tailored for the specific project. We have to fall back on the skill and experience of project management and technical personnel.

2.49 It is strongly recommended that management by objectives and identification of short, discrete activities be used in estimating the work effort and making personnel assignments. A work plan cannot be effective if it is forced on the team members or it does not reflect their actual ability levels.

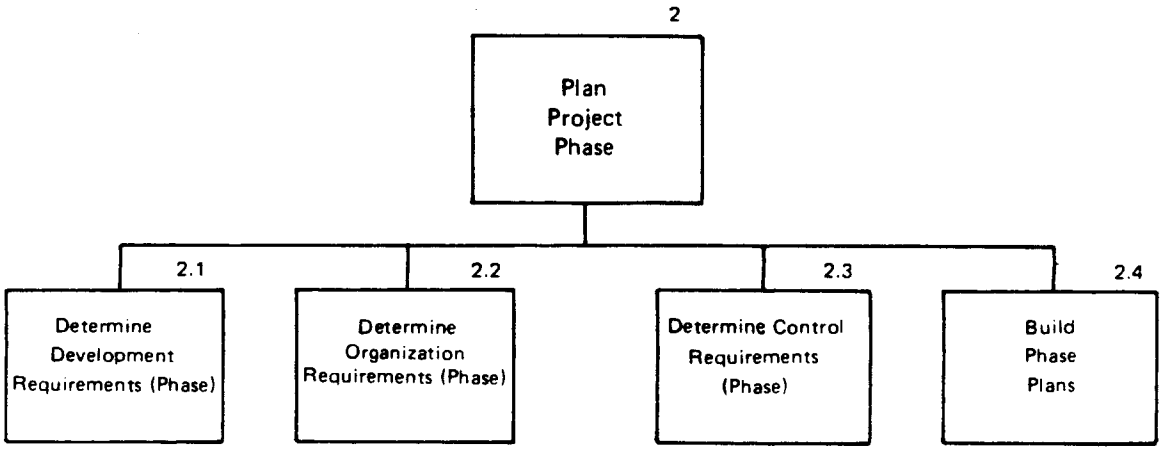
2.50 Most managers will find it best to use some type of charting or networking to portray the phase activities and schedules. Many good techniques exist, many of which are manual. If a mechanized system is available in the company, its use would be valuable in minimizing the effort required to update the plans.

2.51 ***Items Identified During Phase Planning:*** At the completion of phase planning the manager should have identified all of these items.

- Products
- Activities
- Support requirements
- Resource requirements
- Organization requirements
- Work effort estimates

- Personnel assignments
- Schedules
- Cost estimates.

2.52 ***Subfunctions of Plan Project Phase:*** The four subfunctions of PLAN PROJECT PHASE are as follows:



2.53 In actually performing the phase planning function, the project manager will find that the process is seldom as sequential as it has been portrayed in the functional hierarchy. Many of the functions are done simultaneously. Difficulties encountered in one area of planning, eg, cost, personnel, training, etc, may require earlier steps to be repeated. This is normal and should be expected. However, regardless of sequence, most of the functions and activities will be required in order to do an effective planning job.

ADMINISTERING PROJECT PHASE

2.54 Administering the project phase is really the implementation of the phase plans developed in the previous function. However, since few plans unfold exactly as envisioned, this administration function is not trivial.

2.55 ***Phase Resources:*** In terms of organization activities, the project manager must obtain all the resources necessary for the project, both at the start of the phase and as special requirements demand throughout the phase. This includes personnel, equipment and facilities, computer resources, administrative and technical support.

2.56 ***Project Communications:*** Communications inside and outside the project must be set up. Also, all project team procedures, both general and specific to the project, must be established.

2.57 These organizational activities can create quite an administrative load, especially if resource commitments and agreements have not been sufficiently formalized. The manager should be sensitive to any problems in this area to obtain rapid resolution and avoid a negative impact on project progress.

2.58 ***Activity Control:*** Control of project activity should be of primary concern to the project manager during actual conduct of phase work. The performance of each individual must be monitored in terms of status and activity/product completions. Resource expenditures must also be closely tracked. Typically this type of information will have to be evaluated in two ways: (1) against the internal plans, and (2) against external time reporting, chargeback, and budget commitments. The ease or difficulty of this aspect of control is dependent upon the extent to which these two mechanisms are different. In most companies such a discrepancy will exist because the manager usually controls on schedules and person-day or week estimates versus actuals, whereas most departmental tracking systems utilize loaded cost figures only.

2.59 ***Quality Control:*** Quality control is becoming more and more important in systems work. Several mechanisms should be used for this purpose.

(a) Technical walk-throughs within the teams for all phases, coding walk-throughs as deemed necessary

(b) Review of documentation for completeness, accuracy, and technical quality

(c) Technical reviews and design reviews for involved personnel outside the project: user, computer operations, technical support, eg, hardware, software, data base, network, and so on

(d) Standards compliance reviews inside the project and/or with the standards group

(e) Operational review and acceptance of "deliverable" products.

2.60 While such quality control activities are time consuming, data from the Bell System indicates that they do pay off in terms of smoother conversion, system acceptance, operational reliability, and ease of system maintenance. Although each individual specification or portion of the system may not require a detailed review, the manger should have a firm quality control plan and should assure that quality is not sacrificed because of other project work and schedules.

2.61 ***Phase/Project Overall Status:*** Periodically the manager and other supervisory personnel should review overall status for the phase/project. This ought to occur at least once a month, more often if necessary. Detailed activity status should be accumulated and progress evaluated against more general milestones and schedules. Total resource utilization should be determined both for the reporting period and for the phase. As a result of this review, deviations from the plan and specific problem areas can be identified. This "early warning" of problems will permit the manager to either remedy the problem immediately or minimize its impact on subsequent activity.

2.62 ***Change Requests:*** Before making any adjustments to the plan based on the type of analysis above, the manager must also evaluate any requests for change that have been submitted. As requests for change occur, they should be evaluated either singly or in related sets to determine whether they will be accepted. Criteria such as cost, schedule impact, technical considerations, appropriateness, urgency, and so on will be used in this evaluation. For those requests that are accepted alteration to the plan in terms of activities, schedules, and dollars will nearly always be necessary.

2.63 ***Modifications to the Plan:*** In resolving existing or potential deviations from the plan, the manager should identify the specific nature of the problem(s) and evaluate the possible solutions. The manager may need to take one or more of the following actions.

(a) Improve personnel performance or reassign responsibilities

(b) Provide technical training

(c) Obtain more resources or use overtime

(d) Create better procedures

(e) Renegotiate schedules or budgets

(f) "Freeze" system design to control change requests

(g) Develop more detailed plans and/or better controls

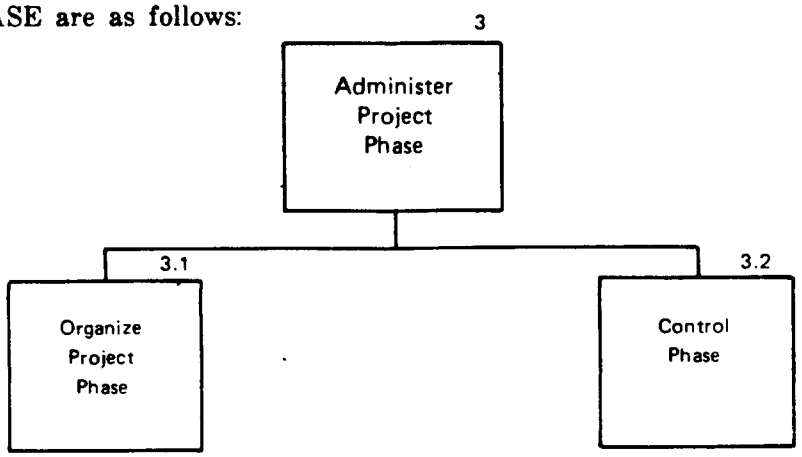
(h) Obtain a higher level of commitment on support services

(i) Other actions.

2.64 Once a specific plan of action has been selected, the phase plan should be updated to reflect these new conditions. Since the plan is the performance target for the entire project, it should be maintained to show current responsibilities and commitments; an out-of-date plan is of little use in determining real status and progress.

2.65 ***Support Group Feedback:*** One final administrative function deserves mentioning, that is, the sharing of project experiences in order to improve subsequent project efforts. If problems or areas for improvement have been identified in existing training, standards, or procedures, this should be communicated to the personnel responsible. Likewise, if the project team has developed a new method or methods, these should be reviewed with the support group for possible use by other projects. Also, any data that has been collected on work estimation or actual resource utilization may be of benefit to other projects. This type of information exchange is important in improving both the project management and system development technologies.

2.66 The two subfunctions of ADMINISTER PROJECT PHASE are as follows:



PROJECT MANAGEMENT DURING SYSTEM INSTALLATION AND MAINTENANCE

2.67 Most of this section has dealt with project management primarily as it would relate to full system development projects. Though maintenance projects and projects formed to install centrally developed systems are somewhat different, the difference lies more in the application of system development procedures than in the project management methods employed. Consult Section 007-220-200, System Development Procedures (Section 10, Maintenance) for additional information.

2.68 These types of projects may or may not use eight developmental phases; it really depends on the nature of the work to be done. This selection of project phases and milestones would occur normally in the process of preparing the overall project strategy. In regard to phase planning, the number and types of development activities, products, and deliverables will usually be more limited. Maintenance work may only require revision to existing documentation. However, there will still be a need to plan the installation or maintenance activities, products, and so on. With respect to project administration, the control of project activities would be identical for any project effort.

2.69 Some of the project management functions may not apply for installation and maintenance projects. Because of project variations, it would be impossible to compile a list of those functions that would always or never be required. It is recommended instead that the installation or maintenance manager use the functional hierarchy as a checklist for any specific project, performing those functions that are needed and deleting those that are not. When used as a checklist, this "model" can be applied to any number of different and unique project endeavors.

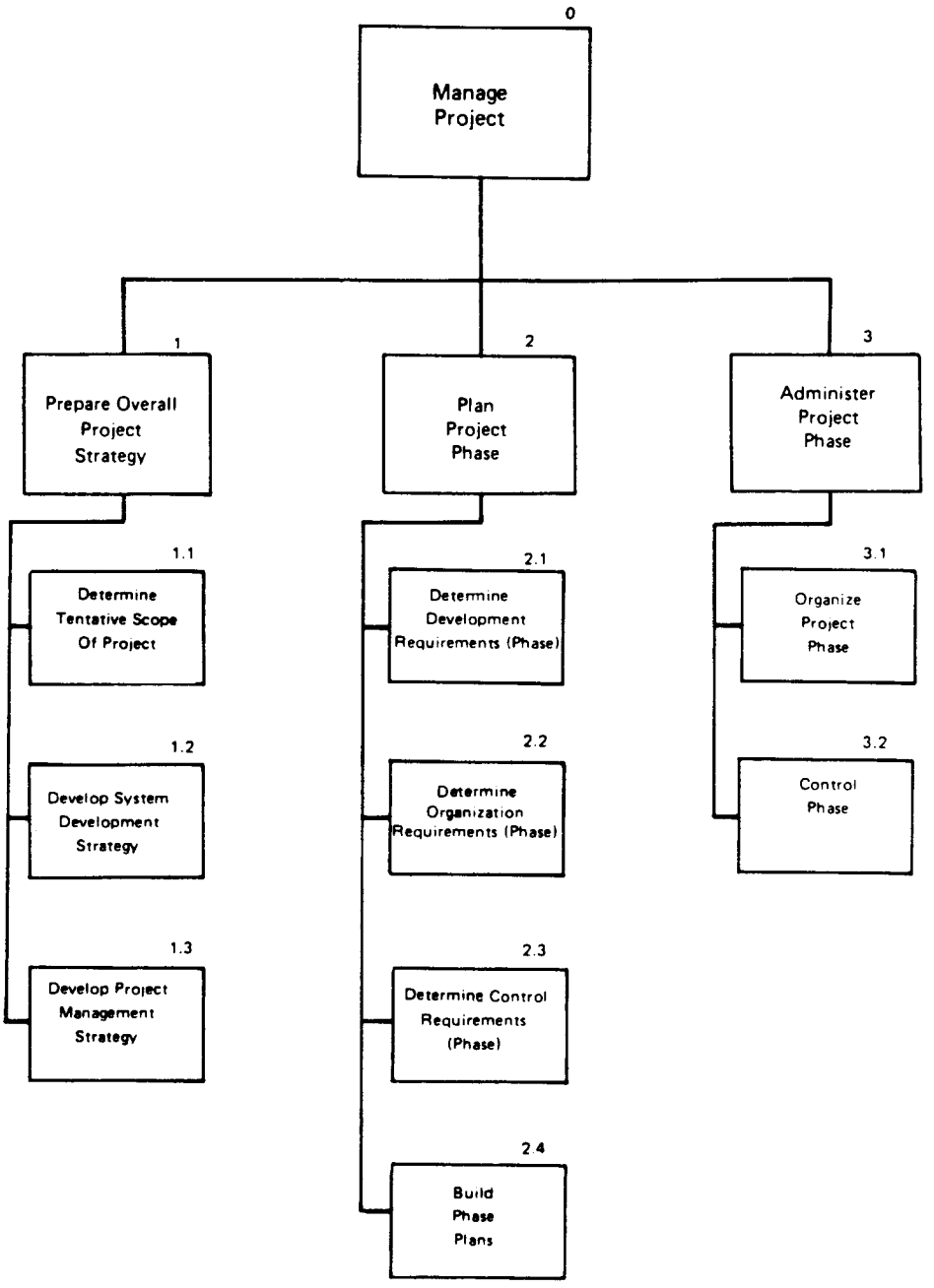
3. PROJECT MANAGEMENT FUNCTION DESCRIPTIONS

GENERAL

3.01 This part provides additional detail about the project management functions in the form of function descriptions. Included in these function descriptions is the information the manager will need to perform the function (input) and the information that should be produced (output).

3.02 The function descriptions are arranged in groups by second level hierarchy functions (1.1, 2.1, etc). A guide to the location of the subfunctions within each second level function is provided at the beginning of this part.

3.03 The first page of each second level function description is also a hierarchy which references the location of the third level function descriptions within the second level function (1.11, 2.11, etc). Fourth level functions are not shown on separate pages, but are found on the third level function descriptions.

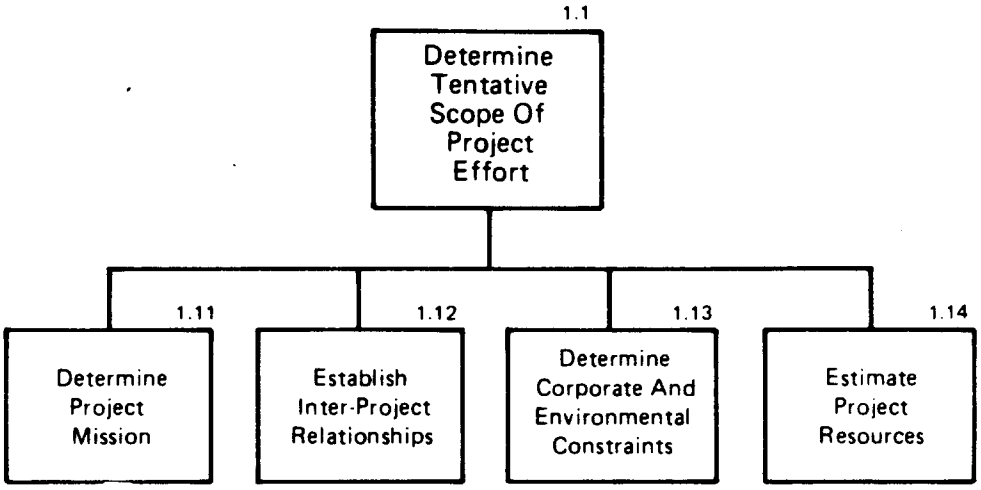


FUNCTION PREPARE OVERALL PROJECT STRATEGY DIAGRAM 1

INPUT	PROCESS	OUTPUT
Data Systems Plans Project Charter Data Systems Philosophy and Procedures Proposal Phase Components Feasibility Phase Components Administrative Procedures Project Constraints Approved Budget	1.1 Determine Tentative Scope of Project Effort 1.2 Develop System Development Strategy 1.3 Develop Project Management Strategy	General Project Management Plan General System Development Plan — Project Definition — System Development Plan — General Resource Estimates

EXTENDED DESCRIPTION

During feasibility, the emerging conceptual design will provide a framework for planning the overall direction of the project. The conceptual design itself is developed by the system analysis/application expertise roles. However, given the nature of the system to be developed, the Project Management (PM) must determine project boundaries and general staffing requirements. The PM must then select the system development and project management approaches that will be most effective for that particular project configuration. Some techniques may serve over the entire development lift-cycle; others may be appropriate only for a specific phase of phases. Major decisions concerning the use of TSD/PSS, top-down, on-line development, PM systems, and other such technologies must be made at the very beginning of the project planning process.


1.1
Determine Tentative Scope Of Project Effort
1.11
Determine Project Mission
1.12
Establish Inter-Project Relationships
1.13
Determine Corporate And Environmental Constraints
1.14
Estimate Project Resources

FUNCTION DETERMINE TENTATIVE SCOPE OF PROJECT EFFORT DIAGRAM 1.1

INPUT	PROCESS	OUTPUT
Data Systems Plans Project Charter Prior Phase Components Budget Information Personnel Information Resource Inventories	1.11 Determine Project Mission 1.12 Establish Inter-Project Relationships 1.13 Determine Corporate and Environmental Constraints 1.14 Estimate Project Resources	Project Definition — Project Mission Statement — Development Interface Requirements — Project Constraints General Resource Estimates

EXTENDED DESCRIPTION

Planning and staffing a project must begin with a clear understanding of the project's purpose. The development effort must conform to the project charter given by management, and to the short-range and long-range plans of data systems.

No two project efforts are alike in all characteristics. The project will vary depending on the kind of system to be developed, the nature of the development effort (eg, original development versus installation of a centrally developed system) and the number and kind of technical personnel required for the project. The PM must also clarify project boundaries, project constraints, and evaluate resource availability (personnel, facilities, services, funding) before proceeding with overall project planning.

FUNCTION DETERMINE PROJECT MISSION DIAGRAM 1.11

INPUT	PROCESS	OUTPUT
Application Plans Project Initiation Request (DC 1.01) System Objectives (DC 2.05) System Model (DC 2.09) System Development BSPs	1.111 Determine Type of Development Effort 1.112 Analyze Probable System Model(s) 1.113 Determine Development Technologies Required 1.114 Establish Project Boundaries CHECKLIST Functional Roles in System Development	Project Mission Statement

EXTENDED DESCRIPTION

There are many types of development efforts: original development of new system, redevelopment of an existing system (either rewrite or redesign of all or a portion of the system), installation of a centrally developed or purchased system, with either major or minor interface requirements, and so on. Each type of effort has unique development requirements in terms of objectives, construction, constraints, development activities and so on.

Development projects are also impacted by the processing mechanisms or models selected for system operation: batch, on-line data base, distributed processing, time-share, etc.

An appraisal of all of these developmental and technological requirements will permit the PM to establish the overall mission and boundaries of the system development project.

FUNCTION ESTABLISH INTERPROJECT RELATIONSHIPS DIAGRAM 1.12

INPUT	PROCESS	OUTPUT
Application Plans Project Mission Statement System Model (DC 2.09) System Output Description (DC 2.06) System Input Description (DC 2.07) System Documentation (Other Systems)	1.121 Identify Dependent or Related Systems 1.122 Determine Interfaces with Existing Systems 1.123 Determine Changes Required to Existing Systems 1.124 Determine Constraints Posed by Other Systems	Development Interface Requirements

EXTENDED DESCRIPTION

Because of the increasing interrelationships among systems, the PM must be sure to identify all interfaces between the system being developed, and other existing or planned systems. A planning organization should be able to provide this kind of information.

If existing systems must be changed to accommodate the new system, interface requirements must be established and an integrated work plan developed. The PM must also determine whether other systems will place any constraints on the project. These constraints may relate to the inputs, outputs, functions, operating characteristics, or development strategy for the system.

The possible project interfaces are numerous: with existing applications, systems being developed in parallel, central developers, vendors, planners, etc. The PM must assure that all such interfaces are defined and that there is an effective working relationship between the project and other organizations.

FUNCTION DETERMINE CORPORATE AND ENVIRONMENTAL CONSTRAINTS DIAGRAM 1.13

INPUT	PROCESS	OUTPUT
Application Plans Project Mission Statement Departmental Budget(s) Personnel Plans Facilities Available Corporate Policies Organization Structure Development Interface Requirements	1.131 Determine Constraints on Completion Date 1.132 Determine Constraints on Resources 1.133 Determine Impact of Corporate Policies or Procedures 1.134 Determine Authority Limits of Project CHECKLIST Policies and Procedures	Project Constraints

EXTENDED DESCRIPTION

External constraints on the project must be identified before project planning can begin. The most familiar constraints are those on time, people, and money. Completion dates may be constrained for a number of reasons: system dependencies, nature of the business cycle, or management directive. Constraints on other resources may exist because of a lack of technically qualified people, inaccurate budgeting, economic conditions, changes in priority, and the like. Finally, corporate policies/procedures may affect the project strategy, primarily in the areas of organization options, personnel acquisition, support services, etc.

All such constraints must be identified and evaluated in terms of project impact. Also, the management/decision-making prerogatives and/or authority limits of the PM and project objectives, the PM must negotiate immediately to resolve these differences.

FUNCTION ESTIMATE PROJECT RESOURCES DIAGRAM 1.14

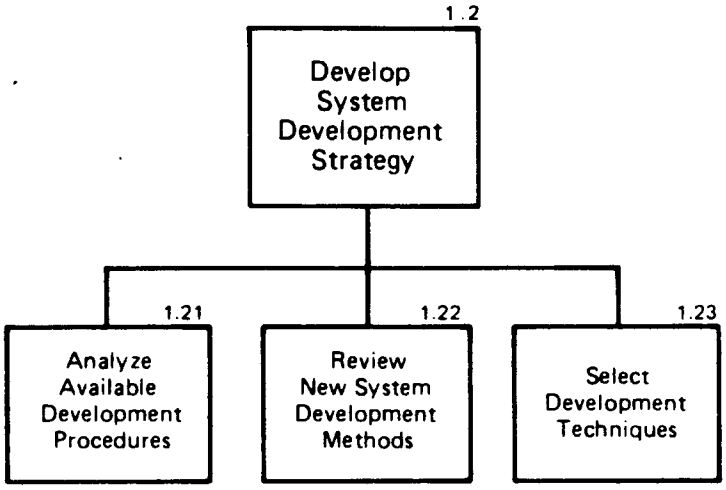
INPUT	PROCESS	OUTPUT
Project Mission Statement Development Interface Requirements System Model (DC 2.09) System Objectives (DC 2.05) Project Constraints Departmental Budget(s) Personnel Inventory Facilities Inventory Support Inventory System Development BSPs	1.141 Determine General Developmental Requirements 1.142 Estimate Size and Composition of Project Force 1.143 Estimate Physical Resource Requirements 1.144 Determine Resource Availability 1.145 Prepare Staffing, Support, and Facilities Analysis CHECKLIST Functional Roles in System Development	General Resource Estimates

EXTENDED DESCRIPTION

Most management or approval bodies want a gross estimate of project requirements fairly early in development (feasibility phase). The PM, as well, needs to guage the size and complexity of the project undertaking. Though these initial estimates can only be tentative (and should therefore be stated as ranges or probable values), the experienced PM should be able to provide a reasonable approximation of project requirements.

A general system development plan should be produced, describing the project structure (phasing), major development objectives and activities, significant milestones and schedules, etc. Using this plan, project resource estimates can be developed: types of technical skills, personnel numbers, physical facilities, computer resources, technical support, and project expenses.

The PM must also determine what types of resources will be available to the project. It may be necessary to alter the plan, or escalate the decision, if commitments for critical resources cannot be obtained. An analysis of general staffing, support, and facilities requirements should then be forward (as required) for review and/or approval.


1.2
Develop System Development Strategy
1.21
Analyze Available Development Procedures
1.22
Review New System Development Methods
1.23
Select Development Techniques

FUNCTION DEVELOP SYSTEM DEVELOPMENT STRATEGY DIAGRAM 1.2

INPUT	PROCESS	OUTPUT
Project Definition Data Systems Philosophy and Procedures System Development References	1.21 Analyze Available Development Procedures 1.22 Review New System Development Methods 1.23 Select Development Techniques	System Development Plan — Evaluation of Existing Local Procedures — Evaluation of New System Development Methodologies — Project's System Development Technology

EXTENDED DESCRIPTION

There is a Bell System Practice (BSP) for system initiation and development (Section 007-220-200). The PM must also be fully acquainted with local systems procedures, training, and support available to the project team. Some procedures may be mandatory, and must therefore be accommodated within the project plan. Some examples might be standard project phases, required end-of-phase reports, use of certain development techniques (TSO, HIPO, etc), and so on.

Procedures seldom keep pace with the state-of-art. PMs frequently wish to "trial" some of the newer techniques; in other instances, the project configuration may demand use of better technologies. However, the PM must analyze and select among the various development techniques options, in light of specific company and project requirements.

FUNCTION ANALYZE AVAILABLE DEVELOPMENT PROCEDURES DIAGRAM 1.21

INPUT	PROCESS	OUTPUT
OTC Standards and Procedures OTC/DSEC Training Catalog Other Training Information Support Inventory Other Project's Experiences Development Effort Evaluations (DC 8.04)	1.211 Evaluate Available Standards and Procedures 1.212 Evaluate Available Development Training 1.213 Determine Development Support Capability 1.214 Determine Adequacy of Current Development Technology	Evaluation of Existing Local Procedures

CHECKLIST

Policies and Procedures

System Development Information Sources

EXTENDED DESCRIPTION

Bell System Companies utilize total system development concepts for data system projects. In addition, many companies have established detailed procedures, training curriculums, and support organizations in order to provide better guidance in the system development technologies.

The PM should be experienced in systems techniques, and familiar with the system development procedures and standards used in the company. (If this requirement is not met, the PM should be given the orientation and training necessary for adequate understanding and/or skill development in systems procedures.) The PM should evaluate the existing systems standards, training, and support capability to determine their adequacy for the current project. It may also be useful to review the experiences of other projects in order to identify the procedures that have been used most effectively and the areas where improvement seems necessary.

FUNCTION REVIEW NEW SYSTEM DEVELOPMENT METHODS DIAGRAM 1.22

INPUT	PROCESS	OUTPUT
System Development BSPs Bell System Training Courses Technical Literature Vendor Courses Other OTCs Experiences Cost/Benefit Studies	1.221 Review Available Information 1.222 Evaluate State-of-the-Art Innovations 1.223 Determine Benefit/Cost of New Procedures **CHECKLIST** System Development Information Sources Programming Productivity Techniques	Evaluation of New System Development Methodologies

EXTENDED DESCRIPTION

New or improved systems procedures are continually being developed. Current examples include TSO, top-down design, programmer productivity techniques, programmer workbench, data dictionary, personnel subsystem development, etc. All of these techniques are aimed at improving personnel performance and system quality. Typically, the evaluation and installation of such procedures is the responsibility of the support organization. However, the PM should be aware of these kinds of innovations and work with support to determine their potential usefulness for the project.

Few techniques of this sort can be implemented without considerable staff work. Their use may require equipment, computer facilities, procedures, training and so on. If this is the first project to use the technique, a "trial" may be set up, which will probably involve additional project overhead for data collection purposes.

Most new systems techniques have real merit. However, the PM should be somewhat cautious (especially with a large project) in deciding to use untried procedures. The benefits and costs of implementation should be analyzed to determine whether the technique will provide a real advantage to the project.

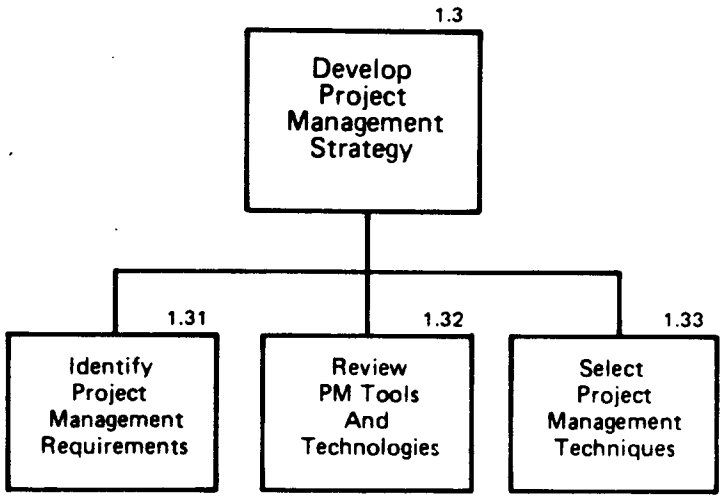
FUNCTION SELECT DEVELOPMENT TECHNIQUES DIAGRAM 1.23

INPUT	PROCESS	OUTPUT
Project Mission Statement Project Constraints General Resource Estimates Evaluation of Existing Local Procedures Evaluation of New System Development Methodologies	1.231 Determine Project Requirements 1.232 Determine Appropriate Development Procedures 1.233 Determine Support, Training, and Facilities Requirements	Project's System Development Technology

EXTENDED DESCRIPTION

With information in hand on the effectiveness of existing system development procedures and the merit of new techniques, the PM should now be able to establish an overall development strategy for the project. A number of project factors will influence this decision: costs and benefits of the technique, type of development effort, type of system being constructed, technical expertise required, project size, project constraints, and so on. The PM's objective should be to select the development techniques that will best support the project's mission, while not burdening the project team with overly sophisticated procedures. At a minimum, a basic phasing scheme should be produced (based on Section 007-220-200) along with some general guidelines for each of the functional roles represented on the project.

Once the development strategy is selected, the support, training, and facilities required to properly implement that strategy should be identified and reviewed with the appropriate organizations.


1.3
Develop Project Management Strategy
1.31
Identify Project Management Requirements
1.32
Review PM Tools And Technologies
1.33
Select Project Management Techniques

FUNCTION DEVELOP PROJECT MANAGEMENT STRATEGY DIAGRAM 1.3

INPUT	PROCESS	OUTPUT
System Development Plan General Resource Estimates Data Systems Philosophy and Procedures Administrative Procedures Project Definition Budget Information Project Management References	1.31 Identify Project Management Requirements 1.32 Review PM Tools and Technologies 1.33 Select Project Management Techniques	General Project Management Plan — Project Management Requirements — Evaluation of Project Management Techniques — Project Management Methodology

EXTENDED DESCRIPTION

Each project will have unique requirements for planning, organization, and/or control. It is possible to tailor an overall project management strategy, based on the conceptual design of the system, the type of system development technology, and the size and type of project force. PM requirements must also take into account any standard or mandatory procedures utilized within the company or department. These might include planning mechanisms, time-reporting procedures, personnel procedures, and the like.

Aside from the basic planning/control functions, the size, complexity, or technical characteristics of the project may necessitate some additional PM procedures. Specialized planning/tracking tools, work facilities, internal project standards, or project control procedures may be needed.

There is danger in either too little or too much planning and control. Therefore, the PM must carefully establish PM objectives/requirements and select the proper tools for their accomplishment, by phase, in order to maximize project effectiveness.

FUNCTION IDENTIFY PROJECT MANAGEMENT REQUIREMENTS DIAGRAM 1.31

INPUT	PROCESS	OUTPUT
Project Mission Statement Development Interface Requirements Departmental Budget(s) Project Constraints General Resources Estimates OTC Standards and Procedures Project's System Development Technology System Development BSP's Other Project's Experiences	1.311 Evaluate Project Staffing Characteristics 1.312 Determine General Control Requirements 1.313 Determine Mandatory Project Management Requirements **CHECKLIST** Policies and Procedures	Project Management Requirements

EXTENDED DESCRIPTION

Every project requires a strategy for planning, organizing, and control. However, the formality and sophistication of PM procedures depends to a great extent on the project characteristics. Requirements will differ depending on the project size, technical make-up, duration, constraints, etc. For example, a small project composed of technical experts may require minimal PM procedures, whereas a large project may require a planning/control group.

The PM must decide what aspects of the project need to be controlled, and how closely: quality, cost, schedule, resources, and project technology. If any of these variables are fixed by management directive or constraints, special care must be taken to identify the control's necessary for satisfactory conformance.

Many companies have developed standard PM procedures, such as IPAC, management by objectives, short-interval scheduling, PERT, and so on. In addition, the PM may identify other areas where PM procedures may be required.

FUNCTION REVIEW PM TOOLS AND TECHNOLOGIES DIAGRAM 1.32

INPUT	PROCESS	OUTPUT
OTC Standards and Procedures System Development BSP's Bell System Training Courses Technical Literature Other OTC's Experiences Cost/Benefit Studies Project's System Development Technology	1.321 Analyze Available Project Management Procedures 1.322 Evaluate Additional Project Management Procedures 1.323 Determine Benefit/ Cost of New Procedures CHECKLIST Project Management Tools	Evaluation of Project Management Techniques

EXTENDED DESCRIPTION

There are any number of tools, both manual and mechanized, to aid the Project Manager. Readily available procedures should be reviewed to determine their appropriateness for the project. The PM should also investigate the usefulness of some of the newer PM techniques: chief programmer, team librarian, short-interval scheduling, mechanized planning and control systems, walk-throughs, work estimators, and so on.

Any new techniques should be analyzed in terms of their potential benefit and cost to the project. The benefits must be measured against the PM requirements established previously. The cost of the technique must include both the expense for installation, and the cost (personnel and expense) required to utilize the procedure. It should be recognized, however, that the benefits of PM techniques are frequently intangible in terms of value or savings; the relative concreteness of costs versus benefits should not be allowed to bias the analysis.

FUNCTION SELECT PROJECT MANAGEMENT TECHNIQUES DIAGRAM 1.33

INPUT	PROCESS	OUTPUT
Project Management Requirements Project Constraints Evaluation of Project Management Techniqués	1.331 Determine Appropriate Procedures 1.332 Determine Support, Training, and Facilities Requirements	Project Management Methodology — Planning — Organizing — Control

EXTENDED DESCRIPTION

PM tools, both available and new, should be reviewed to determine which can best satisfy project requirements. If the proper tool does not exist, it may be possible to design one. Existing procedures should be favored slightly, as their use will require less project orientation time. Once the techniques are selected, any necessary support, training, and facilities requirements must be identified; for example, assistance in use of a mechanized system, training in PERT or MBO, conference space to hold walk-throughs, and so on.

In selecting a project management methodology, the PM should also consider his/her own (and subordinates) managerial preferences. Most experienced managers develop a set of skills and techniques that are most effective for them. By the same token, there may be other procedures that are absolutely contrary to a manager's personal style. The PM should be aware of these preferences and select procedures that optimize both managerial and project effectiveness.

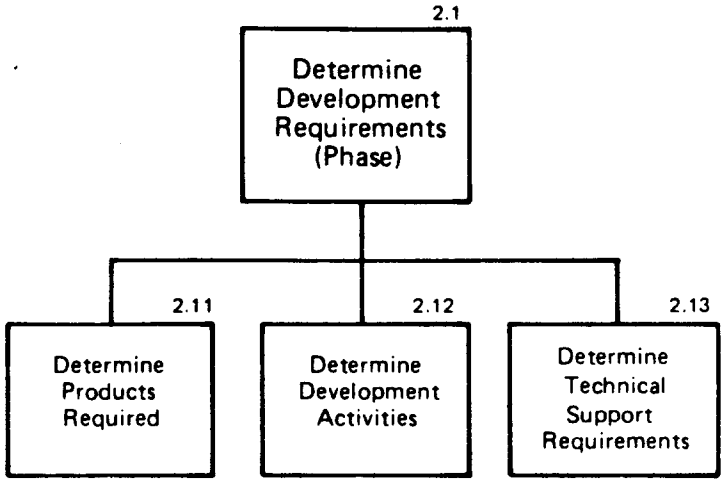
FUNCTION PLAN PROJECT PHASE DIAGRAM 2

INPUT	PROCESS	OUTPUT
General Project Management Plan General System Development Plan Approved Budget Project Documentation from Prior Phases	2.1 Determine Development Requirements (Phase) 2.2 Determine Organization Requirements (Phase) 2.3 Determine Control Requirements (Phase) 2.4 Build Phase Plans	Detailed Plan for next Phase — Phase Activity/ Product List — Technical Support Requirements List — Organization Requirements — Control Requirements — Approved Phase Plans

EXTENDED DESCRIPTION

Accurate detailed planning can only be done for the immediate next phase of development. While the general plans provide overall guidance for each phase, the specific activities to be accomplished within the next phase are dependent upon a variety of project related factors: status of development, nature of the system under development, technologies being utilized, resource availability, etc.

All activities for the phase must be planned: developmental, organizing, control, support, training, etc. Any activity that requires resources (people, time, or money) must be identified so that it can be scheduled and controlled. Also, the products of each of these activities must be known so that completion of an activity (progress) can be objectively measured. The assignment of personnel to activities should optimize the skill/knowledge available, personnel development plans, and work force stability during the phase.


2.1
Determine Development Requirements (Phase)
2.11
Determine Products Required
2.12
Determine Development Activities
2.13
Determine Technical Support Requirements

FUNCTION DETERMINE DEVELOPMENT REQUIREMENTS (PHASE) DIAGRAM 2.1

INPUT	PROCESS	OUTPUT
System Development Plan Prior Phase Components System Development References Support Inventory	2.11 Determine Products Required 2.12 Determine Development Activities 2.13 Determine Technical Support Requirements	Phase Activity/ Product List — Product/User List — Development Activities List Technical Support Requirements List

EXTENDED DESCRIPTION

The project team must enter each phase of development with a clear and precise understanding of what is to be accomplished during the phase. In planning for the phase, the PM (usually working with technical experts from the team or elsewhere) must identify all products and documents that will be required from the phase, the developmental activities that must be performed, and any outside technical expertise that will be required to support those activities or products.

Development requirements for the phase should be produced at several levels of detail: (1) overall project, (2) group, and (3) individual level. Both project planning, and eventually, project control should occur at each management level of the project.

FUNCTION DETERMINE PRODUCTS REQUIRED DIAGRAM 2.11

INPUT	PROCESS	OUTPUT
Project's System Development Technology Project Management Methodology Development Interface Requirements OTC Standards and Procedures Documentation BSP's	2.111 Identify Information Needs/Users 2.112 Determine Documentation Requirements 2.113 Determine Decisions to be made 2.114 Identify Milestone/ Checkpoint Requirements **CHECKLIST** Developmental Documentation Components Deliverable Documentation	Product/User List

EXTENDED DESCRIPTION

For each phase the PM must determine what information is needed from the project and who will use it. This information can be provided by means of documents, decisions, or milestone events.

Documents are usually divided into three classes: developmental (interim or final), management (such as end-of-phase reports), or deliverable (run book, position documentation, etc). Typical developmental documentation is described in the system documentation BSP's; each project, however, will have its unique requirements. The need for phase reports and specific deliverable packages will depend on project characteristics, local procedures, and user requirements.

The PM must also determine whether any major decisions (eg, selection of a vendor) or milestones (eg, design review) will be required during the phase. This identification is important, as these events must be supported by some kind of project activity.

Together, the requirements for documentation, decisions, and milestones make up the total production plan for the phase.

FUNCTION DETERMINE DEVELOPMENT ACTIVITIES DIAGRAM 2.12

INPUT	PROCESS	OUTPUT
Project's System Development Technology Product/User List Technical Procedures OTC Standards and Procedures Development Interface Requirements	2.121 Determine Product Content 2.122 Analyze Developmental Procedures/ Processess 2.123 Identify Development Activities 2.124 Identify Coordinating Activities **CHECKLIST** Programming Productivity Techniques	Development Activities List — Project — Group — Individual

EXTENDED DESCRIPTION

The specific form of each product must be established before the necessary developmental activities can be identified. The general content of developmental products has been defined in Section 007-227-310. However, some tailoring may be required and/or specific formats selected. To determine the form of additional or interim products, the PM should also be familiar with the various technical procedures that can be employed in system development (analysis, data collection, data base design, position development, etc).

Based on the product requirements and the kind of technologies that will be needed, the PM must identify all the developmental activities that must occur during the phase. Short interval scheduling concepts should be employed in order to define individual work activities of manageable duration (about 2 weeks). In addition, all necessary coordinating activities (those that do not directly lead to project products) must be identified. Coordinating activities are usually required for any dynamic project interface: with a maintenance group, another project, the user, AT&T/BTL, etc. These activities are time-gobblers and account for much of the project overhead; their identification is critical to good planning.

FUNCTION DETERMINE TECHNICAL SUPPORT REQUIREMENTS DIAGRAM 2.13

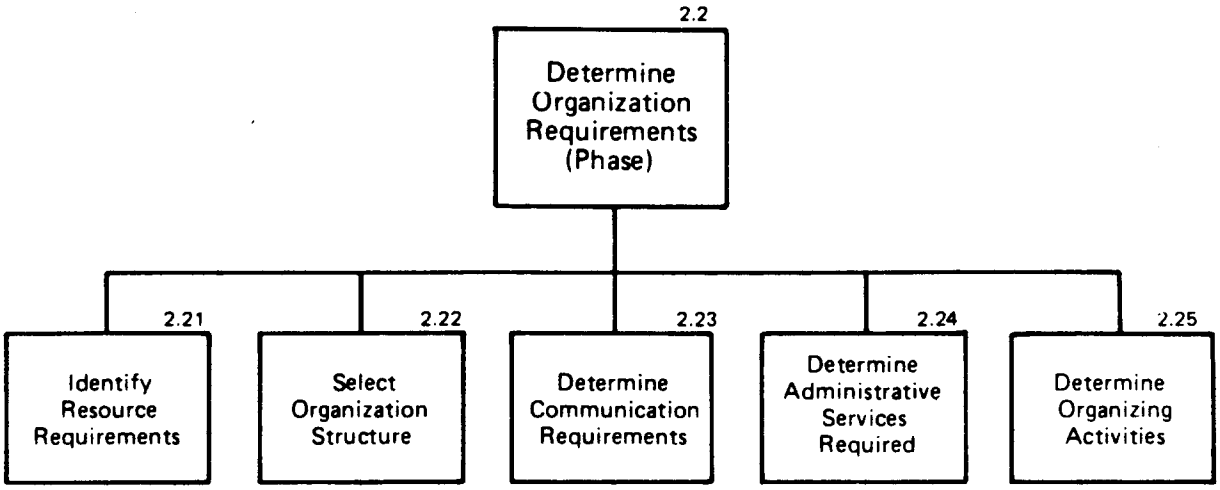
INPUT	PROCESS	OUTPUT
Project's System Development Technology Development Activities List Product/User List OTC Standards and Procedures General Resource Estimates Support Inventory	2.131 Determine Activities Requiring Technical Support 2.132 Determine Types of Support Required 2.133 Determine Technical Support Availability **CHECKLIST** Functional Roles in System Development Assistance Organizations	Technical Support Requirements List

EXTENDED DESCRIPTION

Once the developmental activities have been defined, the PM must evaluate each activity to determine if its performance is within the potential technical capability of the project team. Any activity that requires technical assistance, or even completion by support personnel, must be identified.

In addition, the PM must establish the developmental responsibilities of support vis-a-vis the project. More and more, EDP support organizations such as planning, TP support, DBA, etc, are actually performing design functions and getting involved in application decision-making. The PM must clarify the project/support boundaries in these technical areas.

After the various support requirements/responsibilities are determined, the PM should explore the availability of support services: within the organization, the company, or from an outside vendor. In most organizations an adequate support capability exists. However, the PM must make sure that support personnel will actually be available in the necessary time-frames. If outside support is required, this is usually negotiated through the support organization.


2.2
Determine Organization Requirements (Phase)
2.21
Identify Resource Requirements
2.22
Select Organization Structure
2.23
Determine Communication Requirements
2.24
Determine Administrative Services Required
2.25
Determine Organizing Activities

FUNCTION DETERMINE ORGANIZATION REQUIREMENTS (PHASE) DIAGRAM 2.2

INPUT	PROCESS	OUTPUT
General Resource Estimates System Development Plan Phase Activity/Product List Personnel Information Administrative Procedures Facilities Inventory Services Inventory Project Management References Budget Information	2.21 Identify Resource Requirements 2.22 Select Organization Structure 2.23 Determine Communication Requirements 2.24 Determine Administrative Services Required 2.25 Determine Organizing Activities	Organization Requirements — Phase Resource Requirements — Procedures Requirements — Project Organization Structure — Communication Requirements — Administrative Requirements — Organizing Activities List — Organizing Support Requirements

EXTENDED DESCRIPTION

Organizing the project team can be a time-consuming process. The PM must first determine the kind and numbers of project personnel that will be required during the phase. Then, all of the resources needed to support their work activities must be identified: furniture, equipment, procedures, standards, materials, computer facilities, and so on. Effective organization and communication structures must also be established. These structures will likely change from phase to phase, as the project team increases in size or changes its technical composition. In addition, the reporting structure of the team numbers (direct, loaded, part-time, dotted-line) will have a significant impact on organization/communication requirements. Adequate administrative services are vital to any project effort: typing, filing, word processing, graphics, reproduction, and so on. Phase activities and products should be analyzed in order to determine these administrative requirements (nature and volume).

All of the activities required to organize for the phase must be identified, along with any assistance that may be required for their accomplishment.

FUNCTION IDENTIFY RESOURCE REQUIREMENTS DIAGRAM 2.21

INPUT	PROCESS	OUTPUT
General Resource Estimates Development Activities List Product/User List Technical Support Requirements List Personnel Inventory Facilities Inventory OTC Standards and Procedures Project's System Development Technology Project Constraints	2.211 Analyze Phase Activities/Products 2.212 Estimate Personnel Types and Numbers 2.213 Determine Procedures Required 2.214 Determine Work Location Requirements 2.215 Determine Computer Resource Required **CHECKLIST** Functional Roles in System Development Company Services Office Supplies and Equipment Policies and Procedures	Phase Resource Requirements Procedures Requirements

EXTENDED DESCRIPTION

All the resources required for phase completion should be determined. While some of these requirements may be modified as plans are finalized, the lead time on many resources demands early identification of these needs.

The phase activities/products should be analyzed to determine what kind of people, and how many, will be required for the phase. The PM should also determine the procedures (development, personnel, administrative, etc) that will be needed to support the various project functions. Necessary work facilities should be identified, including desks, chairs, storage facilities, telephones, manuals, conference space, etc. The computer resources that are required may include devices (terminals, printers, etc), computer time, special hardware/software configuration, or testing services.

Many companies have procedures for planning/requesting these various resources. The PM should be acquainted with all such procedures, so that requirement specifications will be understandable and usable by the receiving organizations.

FUNCTION SELECT ORGANIZATION STRUCTURE DIAGRAM 2.22

INPUT	PROCESS	OUTPUT
Organization Structures (Departmental) Corporate Policies Project's System Development Technology Project Management Methodology Phase Resource Requirements Development Interface Requirements Other Project's Experiences Project Constraints	2.221 Determine Decision Makers 2.222 Determine Authority Levels 2.223 Determine Area of Responsibility 2.224 Analyze Possible Organization Structures 2.225 Construct Optimum Organization Structure	Project Organization Structure — Charts — Job Descriptions, etc

EXTENDED DESCRIPTION

The organization structure of a project has a great impact on the overall effectiveness of the work group, primarily in the areas of communication and control. In selecting the best structure, the PM should determine who the primary decision makers will be (eg, between user and project, specialist and technician, interface group and project, etc). Given the kind of decisions that must be made, the PM should also determine what authority levels (or skill levels, if on a technical ladder) must be represented on the project. In addition, the functional organization of work must be established (by subsystem, by technical area, etc).

The PM may have a number of organizational options, from the traditional solid line management hierarchy, to a completely dotted-line project structure. The PM can also consider structures that will support chief designer programmer and team librarian concepts. Typically, the options and organizational requirements will differ from phase to phase. The PM must evaluate the project size, skill levels represented, nature of the work, personnel interfaces, and control requirements in order to select an optimum organization structure for any given phase.

FUNCTION DETERMINE COMMUNICATION REQUIREMENTS DIAGRAM 2.23

INPUT	PROCESS	OUTPUT
Product/User List Project Organization Structure Procedure Requirements OTC Standards and Procedures Corporate Policies Development Interface Requirements Available Communication Facilities	2.231 Analyze Phase Activities/Organization 2.232 Review Procedure Requirements 2.233 Determine Internal Communication Requirements 2.234 Determine External Communication Requirements CHECKLIST Communication Mechanisms	Communications Requirements

EXTENDED DESCRIPTION

Based on the organization structure selected and the kind of procedures that will be used, project communication requirements can be determined. Communication must occur both within the project and with other organizations that in any way interface with the project.

Internal and external communication is needed for many kinds of information: technical data, status, decisions made, plans, responsibilities, and so on. One way to determine technical communication requirements is to examine the phase product/user list; specific individuals or organizations requiring information should be identifiable.

The PM should select the best mechanisms for providing internal communication; transmission of general news from outside the project should not be neglected. Whenever possible a single mechanism should be used for both internal and external purposes, to reduce project overhead. However, special cases may exist for communication with upper level management, approval bodies, or outside organizations.

FUNCTION DETERMINE ADMINISTRATIVE SERVICES REQUIRED DIAGRAM 2.24

INPUT	PROCESS	OUTPUT
Development Activities List Product/User List Procedures Requirements Phase Resource Requirements Project Organization Structure Service Inventory OTC Standards and Procedures Project Constraints	2.241 Analyze Phase Activities/Products 2.242 Identify Administrative Requirements 2.243 Determine Support Availability and Constraints CHECKLIST Company Services	Administrative Requirements

EXTENDED DESCRIPTION

Administrative services are required primarily to support project correspondence, documentation, and reports, and to provide typical secretarial functions (telephone service, travel arrangements, record keeping, etc). The kind and volume of administrative service work depends greatly on project size, development procedures, and documentation requirements.

Phase activities and products should be analyzed to determine documentation production requirements. Also, procedure requirements should be reviewed to identify what kind of clerical or administrative functions must be performed. As a result of this analysis, the type and magnitude of all administrative work should be known.

Administrative service are typically provided in one of three ways: by dedicated project personnel, by departmental pools, or by specialized service organizations (eg, work-processing, reproduction, drafting, etc). The PM should determine what services are available, what constraints might exist (on volume, type of work, or schedule), and how the work should best be divided among the various organizations.

FUNCTION DETERMINE ORGANIZING ACTIVITIES DIAGRAM 2.25

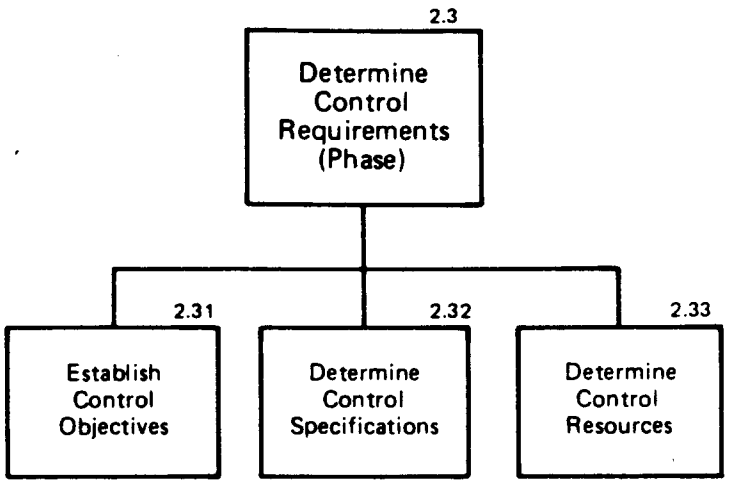
INPUT	PROCESS	OUTPUT
Phase Resource Requirements Personnel Plans OTC Standards and Procedures Project Organization Structure Communication Requirements Administrative Requirements	2.251 Identify Resource Acquisition Activities 2.252 Identify Organizational Activities 2.253 Identify Communication Activities 2.254 Identify Administrative Acquisition Activities 2.255 Determine Organizing Support Required	Organizing Activities List

EXTENDED DESCRIPTION

Each of the organizing functions will require some amount of project time. Therefore, all the activities required for organization must be identified, so that time and personnel can be allocated to them.

Resource acquisition activities may include anything from job interviews to contract preparation; they often require assistance of other organizations. Company procedures should be very helpful in identifying such acquisition requirements. Depending on the amount of organization change from the last phase, organization activities may be minimal, or may require a total restructure of the work group. The same will be true for communication and administrative acquisition activities. The specific phase requirements will have to be examined to determine if existing organization activities should be continued or dropped, or new ones added.

Many of these activities may require support from outside the project: from personnel, planning, facility engineers, administrative services, support, and so on. All such support requirements should be identified so that those kinds of services can be requested and obtained as needed.


2.3
Determine Control Requirements (Phase)
2.31
Establish Control Objectives
2.32
Determine Control Specifications
2.33
Determine Control Resources

FUNCTION DETERMINE CONTROL REQUIREMENTS (PHASE) DIAGRAM 2.3

INPUT	PROCESS	OUTPUT
General Project Management Plan System Development Plan Budget Information Project Management References Administrative Procedures Project Definition Phase Activity/ Project List Organization Requirements	2.31 Establish Control Objectives 2.32 Determine Control Specifications 2.33 Determine Control Resources	Control Requirements — Phase Control Objectives — Control Procedures Specifications — Control Resource Requirements

EXTENDED DESCRIPTION

After determining the developmental and organizational activities/products for the phase, the PM must determine how these activities and products are to be controlled. The variables that can be controlled are: quality, cost, schedule, resources, and the project's technology. Each of these variables can be measured in a number of ways.

The priority of these control variables must be determined and control objectives established for each phase. Based on these objectives, the PM can determine the specific procedures and resources that will be required to accomplish the control function. Some of the typical control procedures include design reviews, expense accounting/vouchering, time reporting, personnel evaluations, and the like.

The importance of the control plan cannot be overemphasized. It serves as a performance guideline for project team members, it allows measurement of progress and detection of problems, and it provides the basis for decision-making when project difficulties arise.

FUNCTION ESTABLISH CONTROL OBJECTIVES DIAGRAM 2.31

INPUT	PROCESS	OUTPUT
Project Management Methodology Project Management Requirements Project Constraints Development Interface Requirements Departmental Budget(s) Personnel Plans Project's System Development Technology Phase Resource Requirements Corporate Policies	2.311 Identify Policies and Constraints 2.312 Priorities Control Variables 2.313 Determine Performance Objectives CHECKLIST Policies and Procedures Cost Categories	Phase Control Objectives

EXTENDED DESCRIPTION

The PM must identify any policies or constraints that apply to the particular phase being planned. One such policy might be that the phase completion date must be met, regardless of resource expenditure. There may be other constraints, unforeseen during overall project planning.

Each phase tends to have unique control requirements, because project resource requirements vary throughout development. For example, training expenses grow, peak, and decline during development; whereas computer utilization is minimal until implementation, then grows continually through conversion. Typically, the more a resource is utilized, the tighter the control should be.

For each phase, a priority should be established for each control variable: quality, cost, schedule, resource, technology. Based on these priorities, specific control objectives should be developed. Because these objectives serve as performance targets for the entire project team, they must be clearly stated and communicated, and obviously, capable of accomplishment.

FUNCTION DETERMINE CONTROL SPECIFICATIONS DIAGRAM 2.32

INPUT	PROCESS	OUTPUT
Phase Control Objectives Product/User List OTC Standards and Procedures Project's System Development Technology Project Management Methodology Project Organization Structure Development Activities List Other Project's Experiences	2.321 Determine Quality Control Procedures 2.322 Determine Cost Control Procedures 2.323 Determine Schedule Control Procedures 2.324 Determine Resource Control Procedures 2.325 Determine Change Management Procedures CHECKLIST Project Management Tools	Control Procedures Specifications

EXTENDED DESCRIPTION

To assure that control objectives are met, some kind of procedure(s) will likely be required. These procedures, too, will probably vary depending on phase requirements and work activities.

The PM must decide what is to be measured, how, and when. Project functions can generally be measured in a variety of ways. However, to measure everything results in overkill; a few definitive, diagnostic measures are usually preferable. The actual measurement techniques must be determined, and it should be possible to use a single control procedure to perform a number of the data collection/measurement functions. If data collection is periodic, the report cycle must be established. The cycle should be short enough to detect problems in a timely fashion, but not so short that more data is produced than anyone has time to analyze. The condition for use of periodic measures must also be specified.

A procedure to control system change is mandatory. No project is immune to requests for changes in requirements or the modification or addition of functions, data, etc. Such requests should be expected and a formal procedure utilized to process and manage these changes.

FUNCTION DETERMINE CONTROL RESOURCES DIAGRAM 2.33

INPUT

Control Procedures Specifications

OTC Standards and Procedures

Facilities Inventory

Support Inventory

PROCESS

2.331 Determine Personnel Resource Requirements

2.332 Identify Facilities Requirements

2.333 Determine Support Requirements

CHECKLIST

Functional Roles in System Development

Assistance Organizations

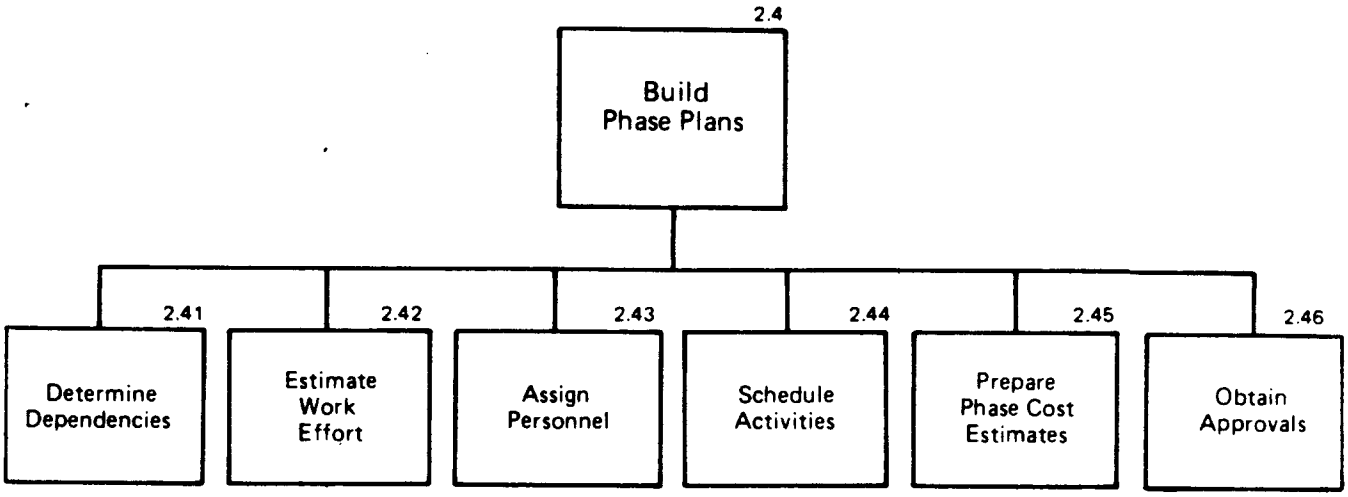
OUTPUT

Control Resource Requirements

EXTENDED DESCRIPTION

Depending on the PM strategy and the procedures utilized, specific control functions can be allocated to a variety of people: the PM, supervisors, control group, team personnel, or support organizations (support, measurements, auditing, user, etc). The PM will have to determine how the control functions should best be assigned, and review these requirements with any nonproject personnel that will be involved.

All control facilities must be identified: software packages, computer facilities, equipment (eg, calculator), forms, etc. Also, technical support requirements should be determined. Support may be needed for data collection/data analysis, preparation for reviews, training or assistance in control procedures, and the like.


2.4
Build Phase Plans
2.41
Determine Dependencies
2.42
Estimate Work Effort
2.43
Assign Personnel
2.44
Schedule Activities
2.45
Prepare Phase Cost Estimates
2.46
Obtain Approvals

FUNCTION BUILD PHASE PLANS DIAGRAM 2.4

INPUT	PROCESS	OUTPUT
Data Systems Plans Budget Information Project Definition Phase Activity/Product List Technical Support Requirements List Organization Requirements Control Requirements Project Management References General Resource Estimates	2.41 Determine Dependencies 2.42 Estimate Work Effort 2.43 Assign Personnel 2.44 Schedule Activities 2.45 Prepare Phase Cost Estimates 2.46 Obtain Approvals	Approved Phase Plans — Activity Dependency Chart — Activity/Work Effort List — Activity Skill/Knowledge Requirements — Activity/Assignment List — Training Requirements — Phase Activity Schedule — Phase Cost Estimates — Project Approvals

EXTENDED DESCRIPTION

Once the developmental, organizing, control, and support (technical and administrative) requirements are established, an integrated plan for the phase can be constructed. All activity and product dependencies must be identified. The magnitude of the work effort required for each activity must be estimated (in work units such as person-days). Once specific personnel are assigned to each activity (development, organizing, or control) a calendar schedule can be established.

With the phase plan and schedule established, cost estimates for the phase can be derived. Local procedures usually dictate the form of this cost estimate. Ideally, however, all costs (personnel, facilities, support, expenses) to be incurred by the project should be identified. All plans and costs should be approved (as required) before the phase begins. Modifications to cost, schedule, and/or personnel can have a significant impact, and any necessary replanning should be done before extensive work in the phase begins.

FUNCTION DETERMINE DEPENDENCIES DIAGRAM 2.41

INPUT	PROCESS	OUTPUT
Product/User List Development Activities List Technical Support Requirements List Administrative Requirements Development Interface Requirements OTC Standards and Procedures Documentation BSPs Technical Procedures Communication Requirements	2.411 Determine Activity Dependencies 2.412 Determine Support Dependencies 2.413 Determine Product Dependencies CHECKLIST Developmental Documentation Components	Activity Dependency Chart

EXTENDED DESCRIPTION

Before a phase plan can be developed, all activity and product dependencies must be identified. Activity start or completion dates may be dependent on personnel or other resource availability, a decision to be made, completion of certain products or activities, approvals being obtained, support availability, and so on. The PM should also determine whether any products will be dependent upon a decision being made, on the completion of any other product, or the availability of support services. Informational dependencies between documentation components are defined in Section 007-227-310.

Knowing these dependencies will allow the PM to schedule phase activities in the best manner possible. For example, many activities can be performed in parallel, while others must be performed sequentially. If these requirements are identified, the PM should be able to optimize phase schedules, personnel utilization, and overall flow of work.

FUNCTION ESTIMATE WORK EFFORT DIAGRAM 2.42

INPUT	PROCESS	OUTPUT
Development Activities List Technical Procedures System Development BSPs Job Descriptions Historical Data Estimation Procedures Loading Factors Activity Dependency Chart Technical Support Requirements List	2.421 Determine Skills/ Knowledge for each Activity 2.422 Estimate Base Work Effort for each Activity 2.423 Apply Work Loading Factors	Activity/Work Effort List

EXTENDED DESCRIPTION

The work effort required for each activity must be estimated, in work units such as person-days, months, etc. Generally, there are three ways to derive these estimates: based on historical data, experience, or estimation formulas. The appropriateness of each of these techniques depends on the phase being planned.

The PM should begin by determining the skills and knowledge that will be required to perform an activity; this will allow the PM to assign a tentative skill level to the activity. After the base work effort has been determined, other activity characteristics or loadings should also be identified: complexity, overhead (administrative or due to nature of the work), adequacy of input information, and so on. Using all these factors, the work effort required for an "average" person of a defined skill level can be determined. (Obviously, these estimates may have to be modified after actual personnel assignments are made.)

Individual work effort estimates, can be summated to determine the total work unit requirements for the phase. The ratio of estimated personnel and work-units can be examined to determine whether major scheduling problems may exist.

FUNCTION ASSIGN PERSONNEL DIAGRAM 2.43

INPUT	PROCESS	OUTPUT
Work Experience Information Personnel Evaluations Training Records Career Path Plans Training Path Plans Activity Skill/Knowledge Requirements Phase Resource Requirements	2.431 Determine Skills/ Knowledge of People Available 2.432 Match Personnel to Activities 2.433 Apply Personnel Weighting Factors 2.434 Determine Training Needs	Activity/Assignment List

EXTENDED DESCRIPTION

The PM should be familiar with the skills and knowledge of each member of the project team. Previous work experience, performance, and training records should be reviewed in order to form a complete picture of the individual's ability and potential. The PM will want to match personnel to the various activities in a fashion that will make optimum use of the skills available. At the same time, the total assignment for each person should provide a challenge and an opportunity for growth. Opportunities for personnel development and cross-training must not be neglected in the rush to get the job done as quickly as possible.

Once a specific assignment is made, the original work effort estimates must be modified (weighted) to reflect the actual skill levels that will be utilized. The PM must also identify any training the individual will need in order to properly perform the assignment.

There are any number of trade-offs to be made in establishing personnel assignments, based on activity criticality, personnel factors (ability, preferences, growth), training requirements, other assignments, and so on. The assignment structure should strike as good a balance as possible between project requirements and personnel needs.

FUNCTION SCHEDULE ACTIVITIES DIAGRAM 2.44

INPUT	PROCESS	OUTPUT
Training Requirements Training Schedule Personnel Availability Information Activity Dependency Chart Phase Resource Requirements Technical Support Requirements List Activity/Assignment List	2.441 Schedule Training/ Nonproject Activities 2.442 Schedule Development/Organizational/ Control Activities 2.443 Schedule Support Activities 2.444 Perform Personnel Load Leveling CHECKLIST Project Management Tools	Phase Activity Schedule — Personnel Assignments — Activity Start/ Completion Dates — Training — Development —Organizational — Control — Support Nonproject Activities — Vacations — Other

EXTENDED DESCRIPTION

In establishing the phase calendar schedule, activities with fixed dates should be identified first: critical milestones (due dates, equipment delivery, interface requirements, etc), training courses, vacations, meetings, and so on. Scheduling should start with these kinds of activities, as they may act as contraints on other activity schedules.

All other project activities (development, organizing, and control) should then be scheduled. Dependencies, critical path activities, and personnel assignments must all be considered during the scheduling process. Based on the project activity schedule, support functions should also be given start and completion dates.

After an initial schedule has been developed, the PM should examine the work activities and assignments to make sure that there is a good distribution of work among project personnel. This load leveling is an important step in assuring that specific individuals will not be overburdened or under utilized as the phase progresses. If problems exist, the PM will have to modify some of the decisions made earlier in the planning process (personnel numbers, due dates, assignments, etc).

FUNCTION PREPARE PHASE COST ESTIMATES DIAGRAM 2.45

INPUT	PROCESS	OUTPUT
Activity/Work Effort List Technical Support Requirements List Administrative Requirements Phase Resource Requirements — Personnel — Procedures — Facilities — Computer Services Phase Activity Schedule Cost Estimating Procedures — Personnel Rates — Loadings — Facility Rates — Support Rates	2.451 Determine Development Cost 2.452 Determine Project Management Cost 2.453 Determine Support Cost CHECKLIST Cost Sources Company Services Office Supplies and Equipment	Phase Cost Estimates

EXTENDED DESCRIPTION

In developing phase cost estimates, it is useful to separate the costs by function: Development, Project Management, and Support. This kind of subdivision will permit the PM to evaluate specific project expenses against the objectives and requirements for each function. If the expense outweighs the vaule in any of these areas, some planning adjustments are indicated. In each functional area, all expenses should be identified: personnel, voucher, equipment and facilities, etc. Most companies have standard rates for personnel and facilities costs, as well as procedures for determining expense categories (capital, expense, etc), and handling charge-back information. The PM must be familiar with these various accounting procedures in order to prepare cost estimates that are consistent with other projects date.

Depending on the company, some expenses are not identified in the cost estimate, because they are absorbed or not directly allocated to the project; certain kinds of support and administrative expenses are handled in this way. However, unless there are specific exceptions, the cost estimate should identify *all* the corporate resources that will be expended during the project phase.

FUNCTION OBTAIN APPROVALS DIAGRAM 2.46

INPUT	PROCESS	OUTPUT
Phase Activity Schedule Product/User List Technical Support Requirements List Training Requirements Phase Resource Requirements Administrative Requirements Phase Cost Estimates Project's System Development Technology	2.461 Obtain Approval for Development Plan 2.462 Obtain Approval for Support/Training Portion of Plan 2.463 Obtain Approval for Facilities Portion of Plan 2.464 Obtain Approval for Phase Expenditures CHECKLIST Policies and Procedures	Project Approvals

EXTENDED DESCRIPTION

The phase plan is now complete. The dependencies, schedule, personnel assignments, and resource requirements for each activity have been established. Cost estimates for each functional area of the plan have also been developed. At this point, all necessary reviews can be conducted and approvals obtained.

Regardless of phase, some type of planning review should be held with affected organizations: user, planning, support, interface projects, operations, etc. The review should address phase objectives and activities, interfaces, and resource demands on nonproject groups. Also, commitments or approvals should be obtained for support services or facilities required for the phase. Upper management will also want to review and plan; depending on the phase and local practice, certain planning information may have to be submitted to approval bodies for review/approval. These upper level groups will be primarily interested in the general development plan, schedules, and cost estimates.

If needed commitments and approvals cannot be obtained (at whatever level), or if phase plans are modified, the PM will have to do the negotiation and replanning necessary to accommodate these approval constraints.

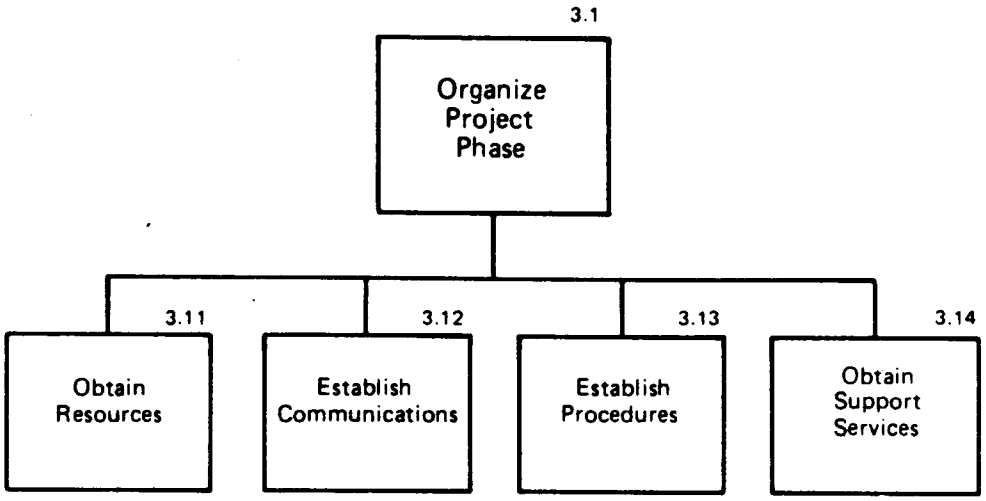
FUNCTION ADMINISTER PROJECT PHASE DIAGRAM 3

INPUT	PROCESS	OUTPUT
Detailed Plan for Phase Approved Budget	3.1 Organize Project Phase 3.2 Control Project Phase	Overall Project Status — Operational Project Team — Status Information — Revised Plan

EXTENDED DESCRIPTION

For project (phase) success, the PM must provide effective management and an adequate working environment. Basic facilities must be obtained and must be available for project personnel: work station equipment, materials, procedures, administrative services, support, training, computer facilities, communication mechanisms, and so on. These resources must be acquired as scheduled so that project progress will not be impeded.

As the phase progresses, project control functions are necessary in order to evaluate activity/project accomplishment against the plan. The actual progress and status of the project should be known at any point in time, and the PM must identify deviations from the plan in sufficient time to implement necessary remedial actions. This control, problem solving, and replanning represent the primary functions of the PM during the phase.


3.1
Organize Project Phase
3.11
Obtain Resources
3.12
Establish Communications
3.13
Establish Procedures
3.14
Obtain Support Services

FUNCTION ORGANIZE PROJECT PHASE DIAGRAM 3.1

INPUT	PROCESS	OUTPUT
Approved Phase Plans Organization Requirements Company Standards Technical Support Requirements List	3.11 Obtain Resources 3.12 Establish Communications 3.13 Establish Procedures 3.14 Obtain Support Services	Operational Project Team — Available Resources — Communications — Functioning Procedures — Available Support Services

EXTENDED DESCRIPTION

Once the phase plans have been approved, the PM must organize the resources needed to complete the phase activities. Project personnel must be given their work assignments. If new personnel are added, all personnel procedures must be completed and any necessary project orientations given. Technical training for team members must be arranged. Physical facilities must be obtained and installed. Using the communication requirements developed earlier, the PM and personnel assigned communications responsibilities must establish the specific methods, forms, and schedule for information flow.

A project will utilize any number of procedures: development, control, administrative, personnel, and so on. Some of these procedures will be standard within the company; others may have to be developed within the project.

Finally, all support services, both in-house and external, must be contracted for and obtained. Specific support requirements and schedules should be negotiated in order to assure that support services will be available as required.

FUNCTION OBTAIN RESOURCES DIAGRAM 3.11

INPUT	PROCESS	OUTPUT
Project Approvals Phase Activity Schedule Phase Resource Requirements Administrative Requirements	3.111 Acquire Personnel 3.112 Acquire Computer Facilities 3.113 Acquire Work Location Facilities 3.114 Acquire Administrative Facilities	Available Resources

EXTENDED DESCRIPTION

The acquisition of resources is generally quite time consuming. Obtaining and installing personnel may require interviews, preparation of job descriptions (and may involve job evaluation), orientation sessions, giving personnel assignments, and so on. In some cases transfers and/or promotions may have to be arranged. Personnel matters always seem to require significant negotiation, and the PM must allot adequate personal time for this function.

Most companies require projects to estimate computer facility requirements in advance of actual need. As the phase begins, however, actual usage requirements must be communicated, along with any special needs such as a unique operating configuration, off-hours testing, and the like. If problems are to be avoided, commitments should be obtained for resource availability.

There is a significant lead time for acquiring work facilities (site, furniture, equipment, telephones, etc). The PM must complete requisitions early, and assure that these items are available when needed by project personnel. Administrative facilities such as files, supplies, typewriters, etc, must also be obtained.

FUNCTION ESTABLISH COMMUNICATIONS DIAGRAM 3.12

INPUT	PROCESS	OUTPUT
Communication Requirements Project Organization Structure Phase Activity Schedule Product/User List Communication Facilities	3.121 Set Up Internal Communications 3.122 Set Up Interface Communications 3.123 Develop External News Flow	Communications

EXTENDED DESCRIPTION

Internal communications can be handled in a number of ways: staff and team meetings, written status/progress reports, product interchange, memos for file, correspondence summaries, etc. For whatever mechanism is selected, the schedule, form vehicle, and responsibility for the communication must be established.

The PM must also provide communications to organizations that interface with the project. Though frequent contact may occur in the normal course of work, joint staff meetings, periodic review meetings, or written progress reports may also be necessary to provide adequate information flow. Again, a form and schedule should be developed so that essential interfaces are not neglected under the presure of other project work.

Occasionally a project will be of a scope and magnitude that its progress will be of interest to other departments, companies, or AT&T. If this occurs, the project manager may find it appropriate to provide newsletters or progress reports outside the normal project boundaries. If this task is delegated, review by the project manager should be mandatory prior to release.

FUNCTION ESTABLISH PROCEDURES DIAGRAM 3.13

INPUT	PROCESS	OUTPUT
OTC Standards and Procedures Project's System Development Technology Technical Procedures Control Procedures Specifications Administrative Requirements Project Organization Structure Communications	3.131 Obtain Available Procedures 3.132 Develop Specialized Procedures 3.133 Provide Procedures Orientation	Functioning Procedures — Development — Control — Communication — Personnel — Administrative

EXTENDED DESCRIPTION

Each project utilizes a large number of company procedures, whether related to administration, personnel, support services, system development, or so on. The PM must make sure these procedures are properly defined and documented for use by the project team.

If there is a need for procedures not available from company sources, it is the PM's responsibility to see that they are created. Frequently, special procedures are required for new development techniques, handling of project correspondence and documentation, or for the administration of certain project groups (such as control or test groups). There is one procedure that should be mandatory for every project, a change control procedure. No project can function effectively without a mechanism for controlling system change.

All procedures should be indexed and documented. A procedure's orientation should be provided for all team members, so they will understand the purpose and mechanics of each procedure that must be used.

FUNCTION OBTAIN SUPPORT SERVICES DIAGRAM 3.14

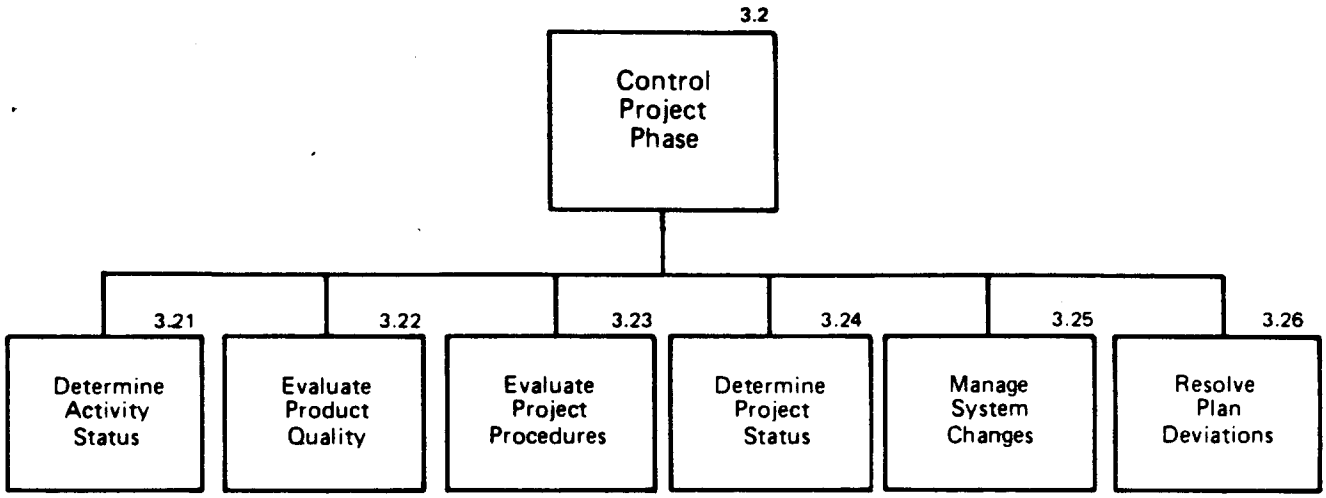
INPUT	PROCESS	OUTPUT
Technical Support Requirements List Administrative Requirements OTC Standards and Procedures Functioning Procedures Phase Activity Schedule	3.141 Obtain In-House Technical Support 3.142 Obtain Outside Technical Support 3.143 Obtain Administrative Support	Available Support Services

EXTENDED DESCRIPTION

Support requirements must be finalized and firm personnel commitments obtained. For each significant support service, the PM should get an agreement on exactly what functions will be provided, when, and for how long. While this formality is not always needed, support personnel are frequently overburdened, and the lack of critical support can have serious project consequences.

Occasionally support is needed from outside the company. AT&T and Bell Labs provide a variety of consulting services; vendors may be utilized to perform special studies, system design activities, or software development. Whether or not a formal contract is required, the PM should make sure that the scope and purpose of the consulting service, and the conditions of performance, are clearly documented so that the possibility of noncompliance can be minimized.

Administrative service requirements should also be reviewed and agreed to by affected organizations: personnel, stenographics, key entry, word processing, etc. If existing staffs are not able to handle the volume, the PM should consider the acquisition of additional project personnel or the use of outside firms.


3.2
Control Project Phase
3.21
Determine Activity Status
3.22
Evaluate Product Quality
3.23
Evaluate Project Procedures
3.24
Determine Project Status
3.25
Manage System Changes
3.26
Resolve Plan Deviations

FUNCTION CONTROL PROJECT PHASE DIAGRAM 3.2

INPUT	PROCESS	OUTPUT
Approved Phase Plans General Project Management Plan · Control Requirements System Development Plan Phase Activity/ Product List Technical Support Requirements List Phase Components Organization Requirements	3.21 Determine Activity Status 3.22 Evaluate Product Quality 3.23 Evaluate Project Procedures 3.24 Determine Project Status 3.25 Manage System Changes 3.26 Resolve Plan Deviations	Status Information — Activity Status — Resource Utilization — Satisfactory Products — Remedial Action Requirements — Procedures Evaluation — Overall Project Performance — Items for Resolution Revised Plan — System Change Evaluation — Problem Causes — Changes to Plan

EXTENDED DESCRIPTION

As phase activities begin, control mechanisms must be initiated. Status variables (as identified in the control plan) are reported by the individual or team assigned to each activity. Upon completion of any activity that produces a product, an evaluation should be performed to assure that the product meets the requirements of original specification and/or standards. On a periodic basis, all project procedures should also be evaluated to assure that they are providing the desired results.

Activity and product status should be accumulated, on a scheduled basis, to determine overall status for the project phase. Comparisons can be made against the phase plan and deviations identified. Also, requests for system changes must be investigated, their project impact evaluated, and the disposition of each determined.

With change requests and complete status information in hand (activity, product, procedural, and overall project) the PM must evaluate the magnitude and significance of any changes, problems or deviations, and select a course of action that will rectify project difficulties.

FUNCTION DETERMINE ACTIVITY STATUS DIAGRAM 3.21

INPUT	PROCESS	OUTPUT
Phase Activity Schedule Activity Products/Documentation Components Deliverable Documentation Activity/Assignment List Accounting Records/ Vouchers Phase Cost Estimates Training Records	3.211 Determine Activity Completion/Status 3.212 Determine Resources Expended 3.213 Identify Deviations from Plan	Activity Status Resource Utilization

EXTENDED DESCRIPTION

An activity is completed only when the required product has been produced. Completion may be communicated by way of a Completion Notice or actual receipt of the product.

Ideally, activity status should be measured only in terms of tangible products. The inaccuracies and dangers of reporting "percentage complete" are known to all managers. However, the use of short-interval scheduling (activity duration of about 2 weeks) and production of interim products can significantly improve the accuracy of status reporting. "Percentage complete" status should be used only when no logical product can be identified for the control period that has been selected.

The resources expended to perform the activity should be identified: time, expenses, machine utilizations, administrative services, etc.

Actual activity status (schedule and resources) should be compared to the detailed phase plan, and deviations identified.

FUNCTION EVALUATE PRODUCT QUALITY DIAGRAM 3.22

INPUT	PROCESS	OUTPUT
Activity Products/Documentation Components Deliverable Documentation OTC Standards and Procedures Walk-Through Results Design Review Results Technical Review Results	3.221 Assure Product has been Produced 3.222 Determine if Stand- 3.223 Analyze Results of Quality Review 3.224 Identify Action Required	Satisfactory Products Remedial Action Requirements

EXTENDED DESCRIPTION

Quality control is one of the most difficult PM functions, usually because of a lack of product evaluation criteria. However, project control can evaluate quality in a number of ways, the most obvious of which is to assure that a product has indeed been produced. If standards do exist, product conformance should be determined. This may be accomplished by supervisor or standards review, or by mechanized means if the product is machine readable. For example, test data can be examined to determine program performance characteristics. To evaluate design or content quality, walk-throughs, technical reviews (with technical experts), or design reviews (with support, operations, or users) can be used.

The role of project control in quality assurance can be passive (monitor events but not participate) or active (participate and become involved in technical decision making). The amount of involvement will have to be determined by the PM. At a minimum, the actions required as a result of quality reviews must be identified.

FUNCTION EVALUATE PROJECT PROCEDURES DIAGRAM 3.23

INPUT	PROCESS	OUTPUT
Functioning Procedures Activity Status Satisfactory Products Remedial Action Requirements Project's System Development Technology Project Management Methodology	3.231 Evaluate Quality Control Procedures 3.232 Evaluate Status Reporting Procedures 3.233 Evaluate Administrative Procedures 3.234 Evaluate Development Technology	Procedures Evaluation

EXTENDED DESCRIPTION

From the very first control cycle, the procedures used to execute the development and control plans can be evaluated for their effectiveness. Quality control procedures should be examined to determine whether technical evaluations are effective, particularly in terms of problem identification.

Data collection procedures for monitoring time, cost, and resources should be reviewed to assure that data accuracy is acceptable, and that outputs are useful and utilized.

Administrative and development procedures should be evaluated to make sure they are understood, properly used, and are, in fact, helpful to the project team in getting their work accomplished.

Nearly all procedures (even the most beneficial) result in some imposition on team members. Therefore, the PM must continually monitor all procedures to make sure there is a need for them, and that they are as effective as possible.

FUNCTION DETERMINE PROJECT STATUS DIAGRAM 3.24

INPUT	PROCESS	OUTPUT
Phase Activity Schedule Phase Cost Estimates Activity Status Resource Utilization Satisfactory Products Accounting Records/ Vouchers Remedial Action Requirements Procedures Evaluation	3.241 Determine Schedule Realization 3.242 Determine Resource Utilization 3.243 Determine Cost Estimate Realization 3.244 Identify Deviations from Plan	Overall Project Performance Items for Resolution

EXTENDED DESCRIPTION

The activity status information should be summarized to determine the overall status for the project team. Schedule realization can be determined in two ways: actual versus planned work accomplishment for the report period (based on activity completions), and achievement of major calendar milestones. Total resource utilization should be calculated and compared to planned requirements for the phase. The cost equivalents of all resources must be determined in order to determine actual cost status (salaries, services, expenses, etc).

To assist in determining real status most projects also maintain a list of items for resolution. This list represents those technical issues that require further investigation/negotiation before definitive system-related decisions can be made.

Once overall status is known (for the report period and the total phase) deviations from the phase plan should be identified and analyzed against control objectives to determine whether the deviations are significant. The PM should also review previous status information in order to detect trends that may be developing.

FUNCTION MANAGE SYSTEM CHANGES DIAGRAM 3.25

INPUT	PROCESS	OUTPUT
Change Management Procedures System Change Request . Overall Project Performance Items For Resolution	3.251 Investigate Change Request 3.252 Determine Impact on Project 3.253 Determine Disposition of Request	System Change Evaluation

EXTENDED DESCRIPTION

During the life cycle of a project, there may be requests to change the original system or project objectives. While good system analysis and definition will minimize the volume of after-the-fact requirements, legitimate change requests may still occur, particularly for large or long projects.

Each change request must be investigated to determine the type of need (mandatory versus discretionary), the priority and value of the change to the requestor, and its relevance to the current project. Once the nature of the request is understood, the potential impact on the project must be evaluated (modification to requirements or specifications, cost, schedule, resources, etc). Obviously, as the project progresses, the impact of change will become more severe, as technical directions are set and specifications are solidified.

The disposition of each or a related set of change requests must be decided: accept, defer, forward to another development/maintenance group, reject, or hold in abeyance pending other decisions. The requestor should be notified of this decision and an appeal process specified in case the disposition is challenged.

FUNCTION RESOLVE PLAN DEVIATIONS DIAGRAM 3.26

INPUT	PROCESS	OUTPUT
Activity Status	3.261 Identify Cause of Deviations/Problems	Problem Causes
Remedial Action Requirements (Quality)	3.262 Determine Possible Solutions	Administrative
Overall Project Performance	3.263 Consider Trade-Offs	— Personnel
System Change Evaluation	3.264 Determine Course of Action	— Estimation
Resource Utilization	3.265 Replan as Required	— Activity Delays
Procedures Evaluation		— Procedural
Phase Activity Schedule		— Support Services
Personnel Evaluations		— Outside Influences
Project Constraints		Changes to Plan
Activity/Assignment List		
Activity Dependency Chart		
Project Organization Structure		

EXTENDED DESCRIPTION

Project difficulties can arise for any number of reasons: poor estimation of the work effort, poor management, unsatisfactory personnel performance, poor communication, changes in project objectives, impact of system change requests, lack of resources, and on and on. Even the best plan can fall prey to these factors. When such problems arise, the PM must take action to solve them.

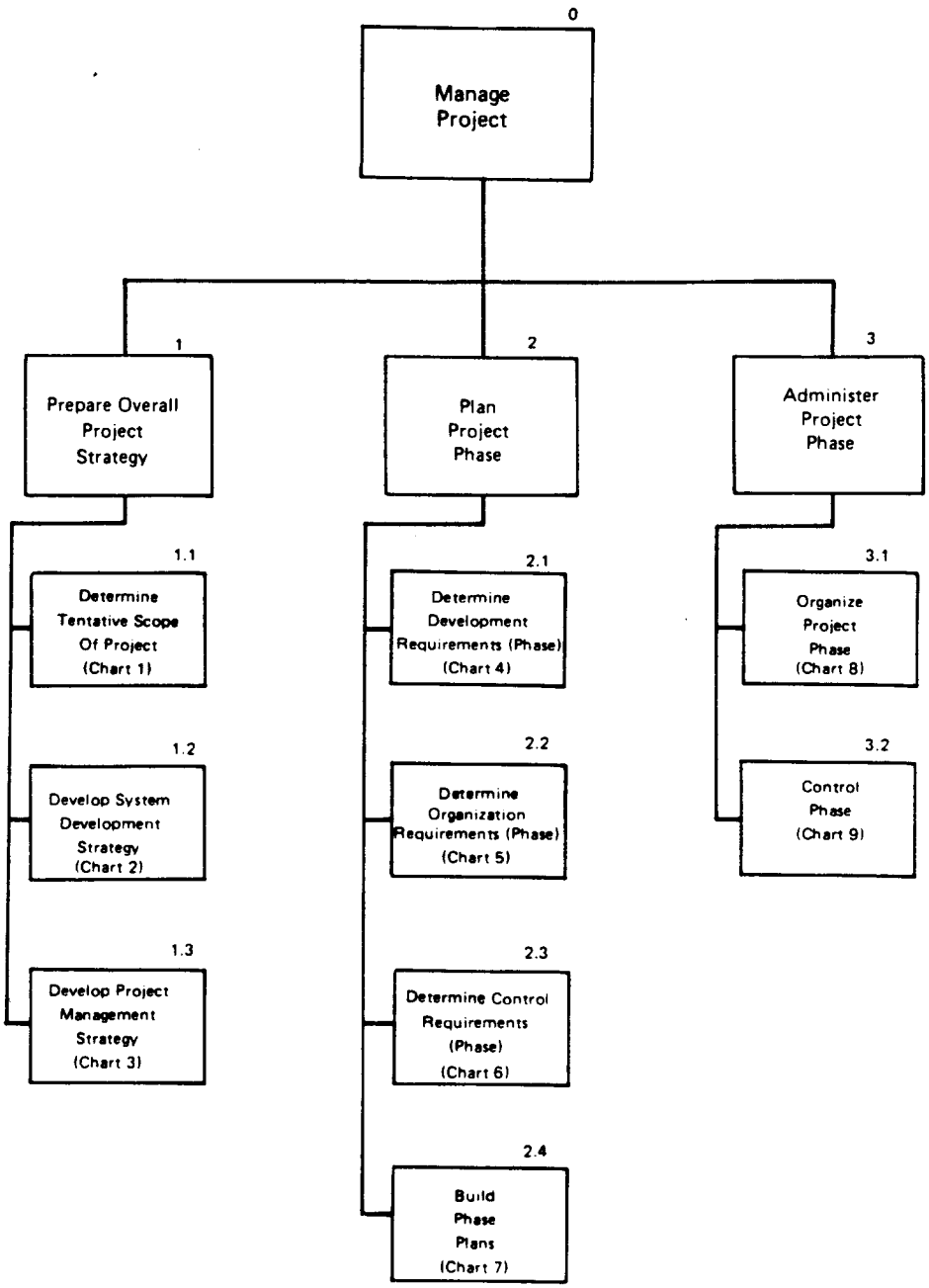
Depending on the severity of the problem, a number of solutions are possible: personnel consultation, training, personnel reassignment, more people, overtime, better procedures, renegotiation of commitments, quality reduction, schedule slippage, or even project redefinition. Selecting among possible alternatives usually involves some trade-off between cost, time, resources, or quality. It is the PM's responsibility to maintain as effective balance as possible among all of these variables.

Once a remedial course of action is selected (and approved if necessary), the PM must alter the phase plan to reflect the new requirements.

4. PROJECT MANAGEMENT FUNCTION HIERARCHY

GENERAL

4.01 This part provides an overview of the project management functions in the form of a functional hierarchy.



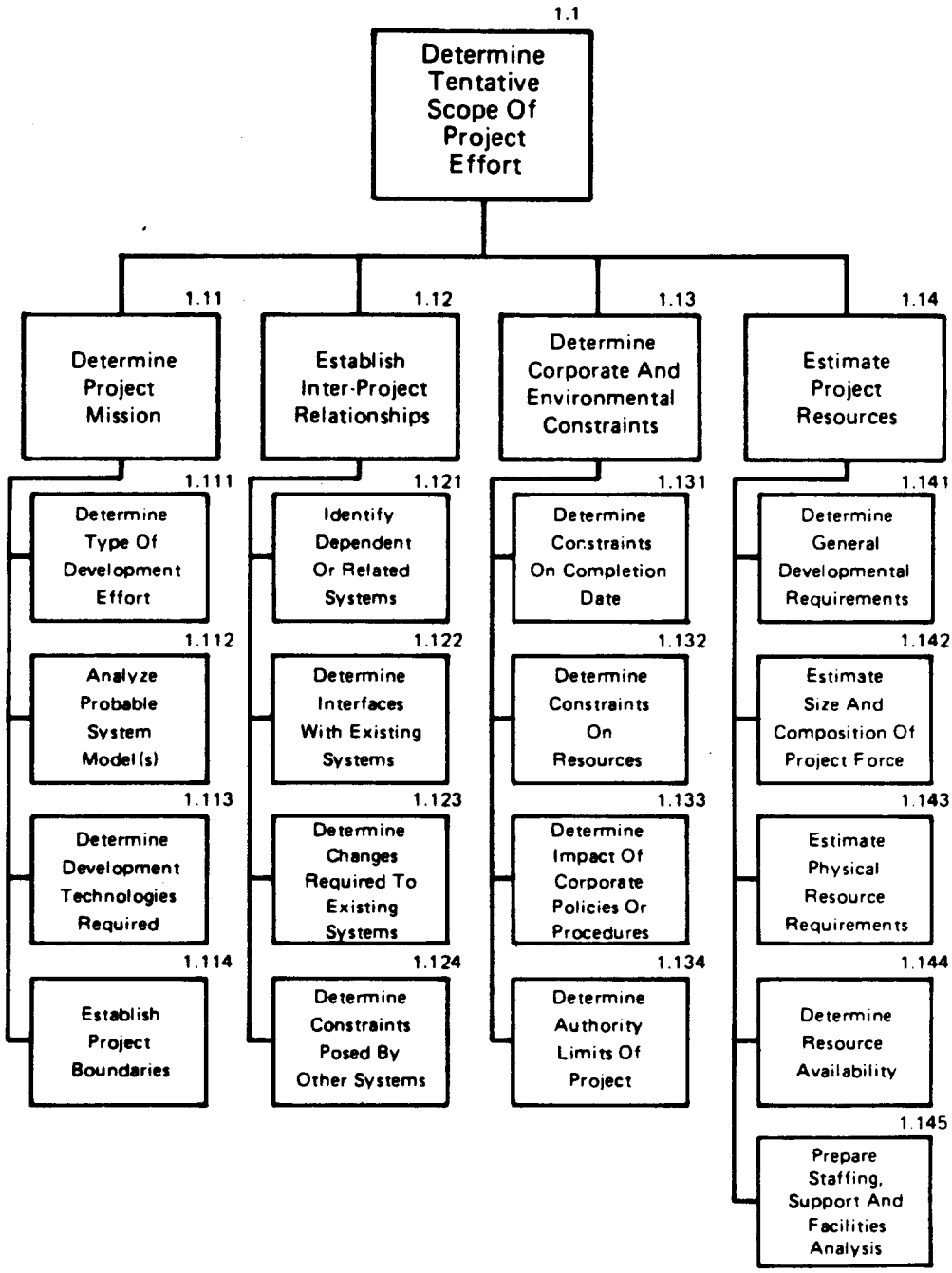


Chart 1—Determine Tentative Scope of Project

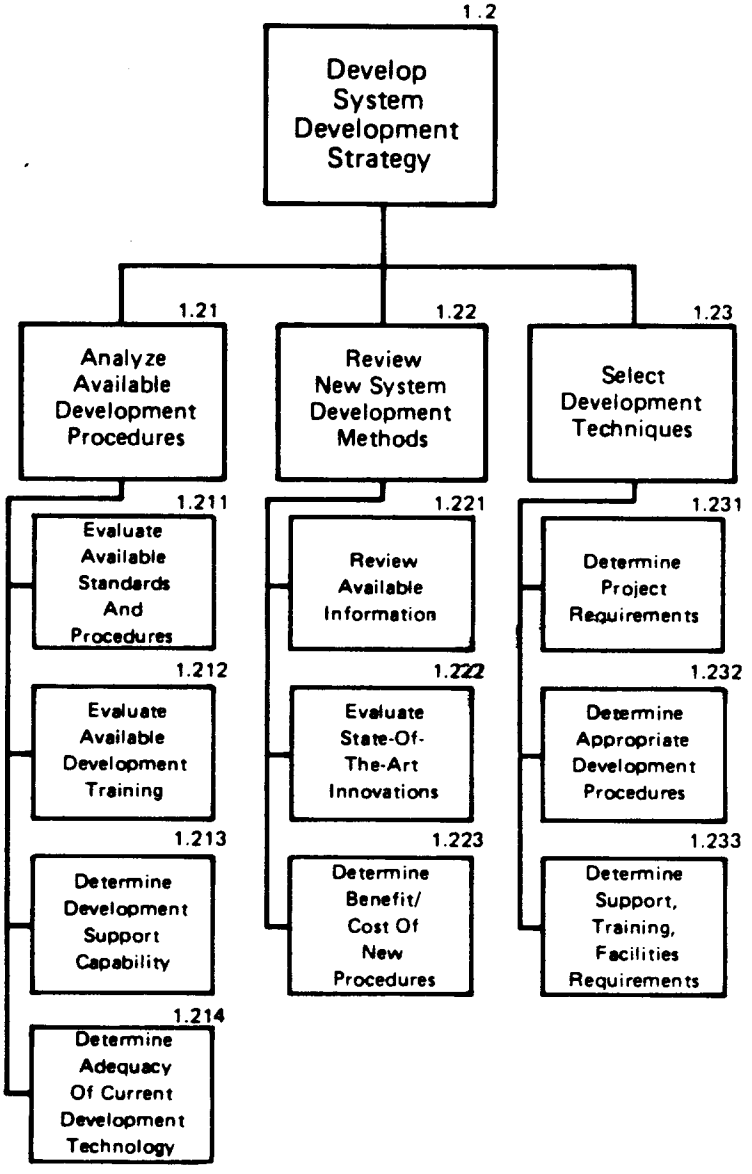


Chart 2—Develop System Development Strategy

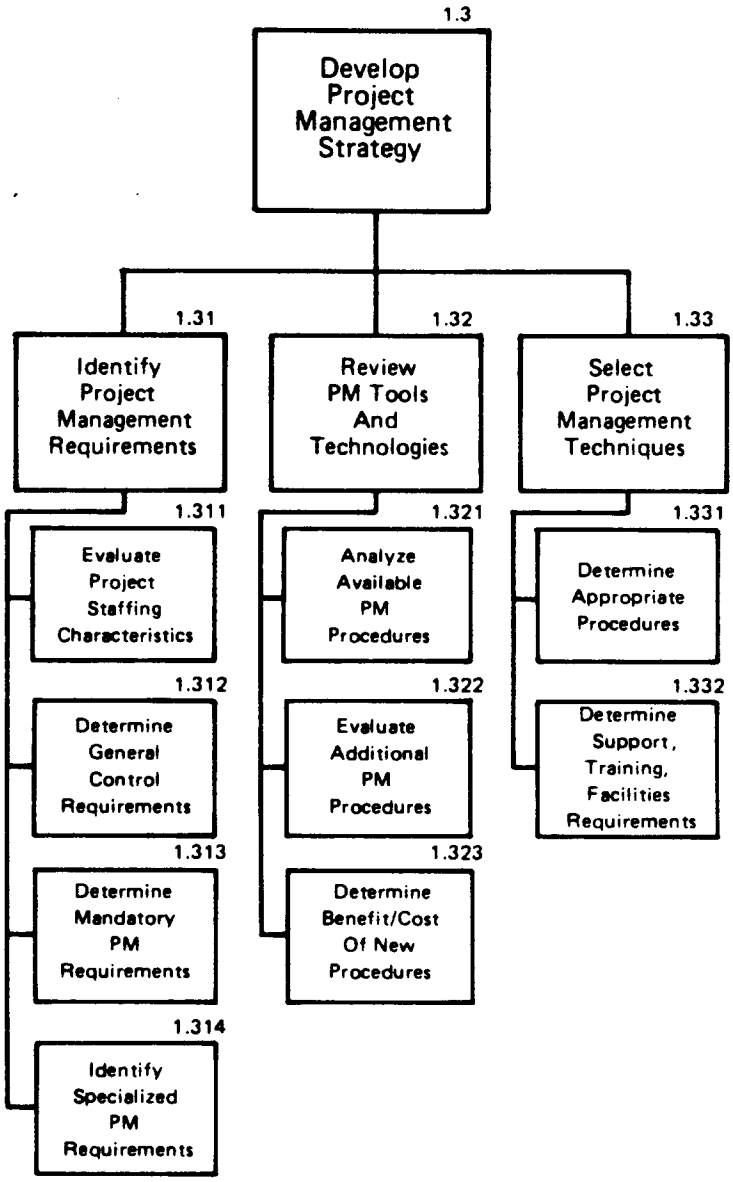


Chart 3—Develop Project Management Strategy

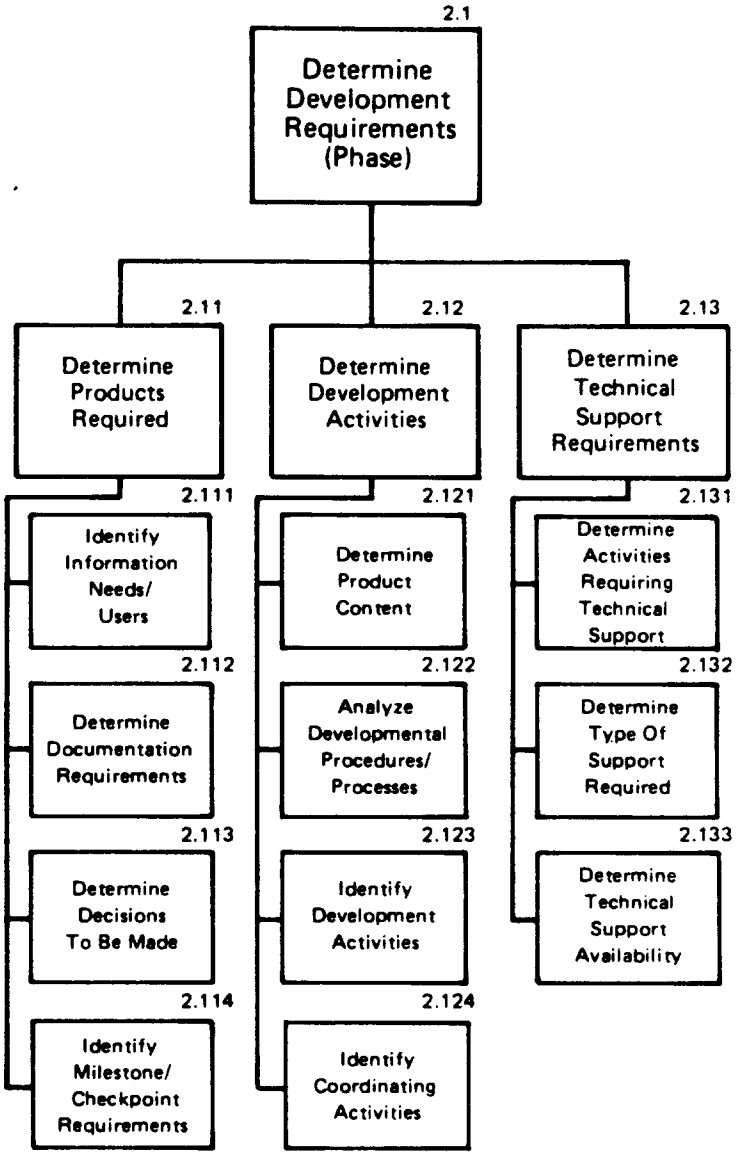


Chart 4—Determine Development Requirements (Phase)

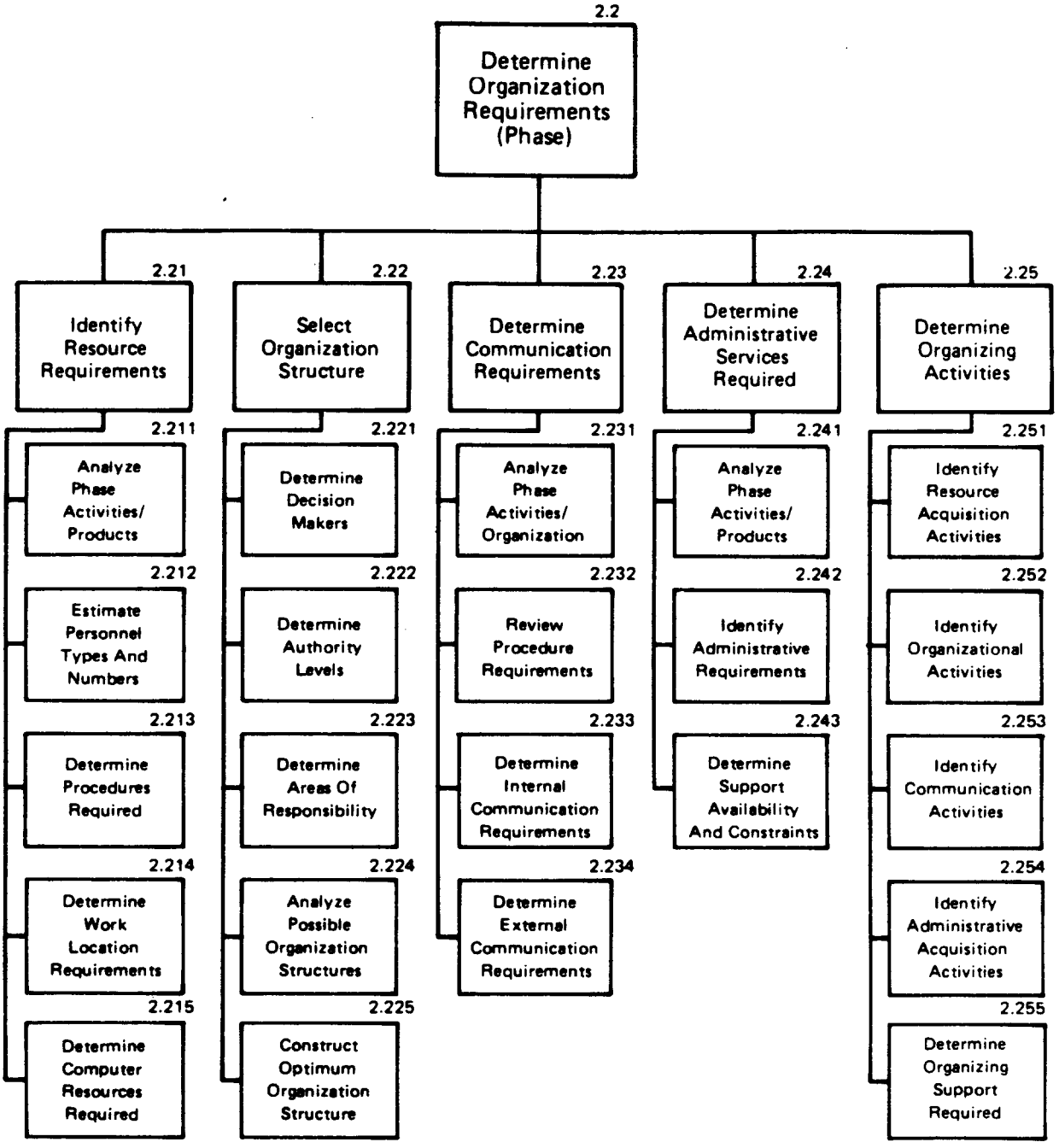


Chart 5—Determine Organization Requirements (Phase)

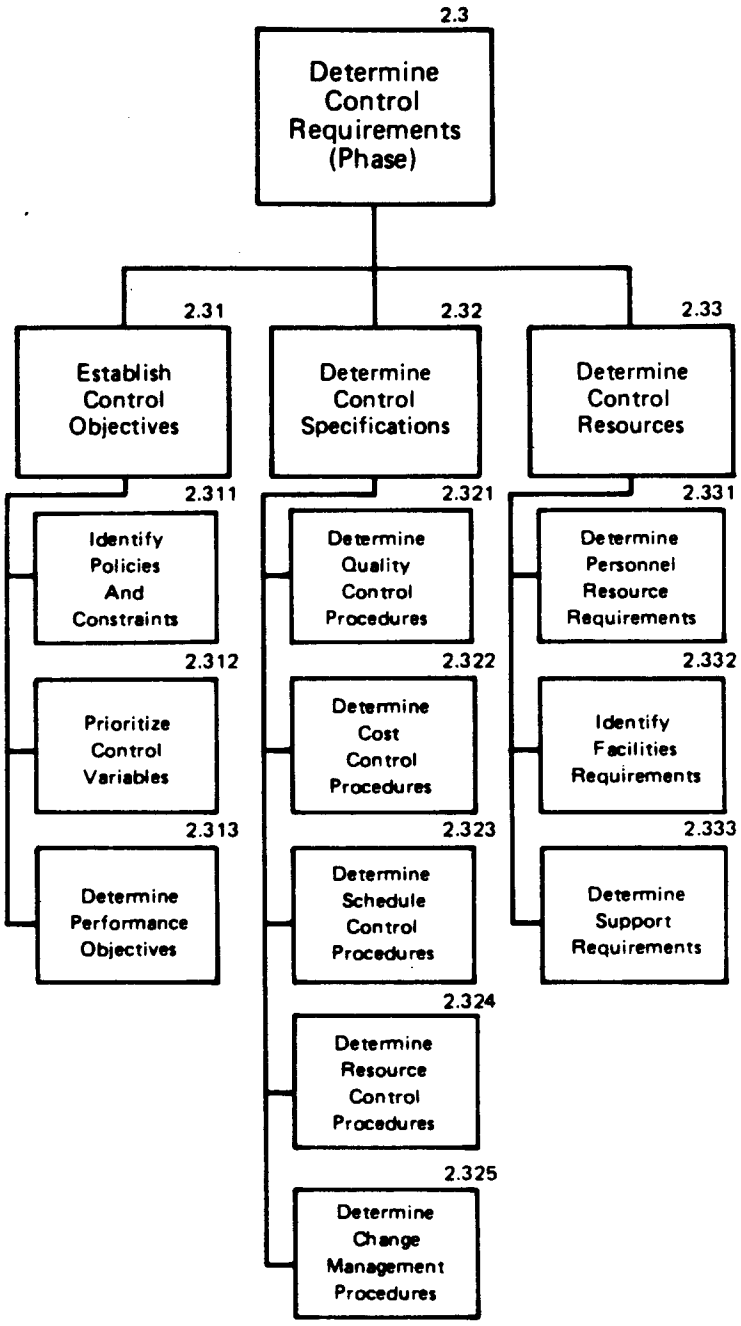


Chart 6—Determine Control Requirements (Phase)

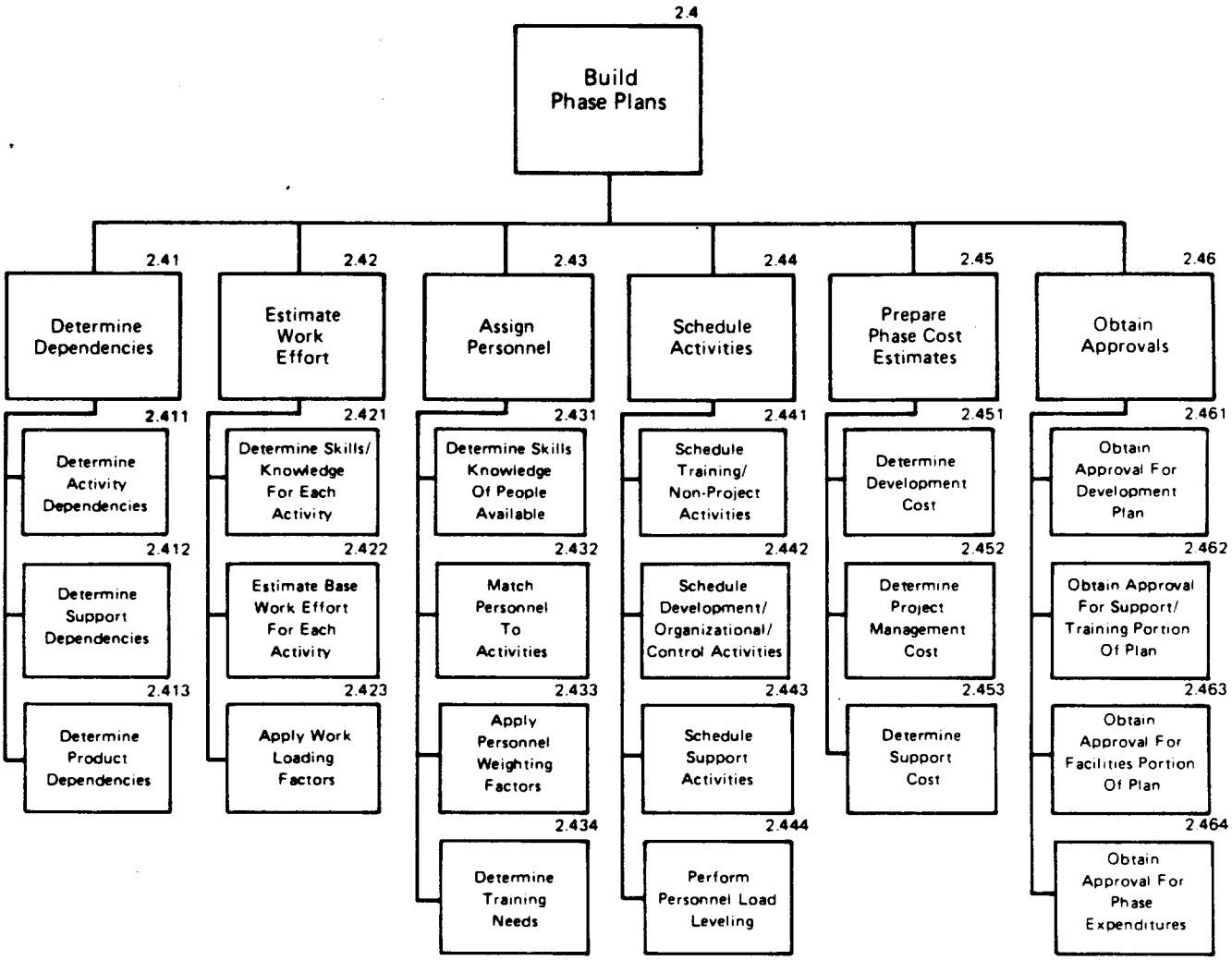


Chart 7—Build Phase Plans

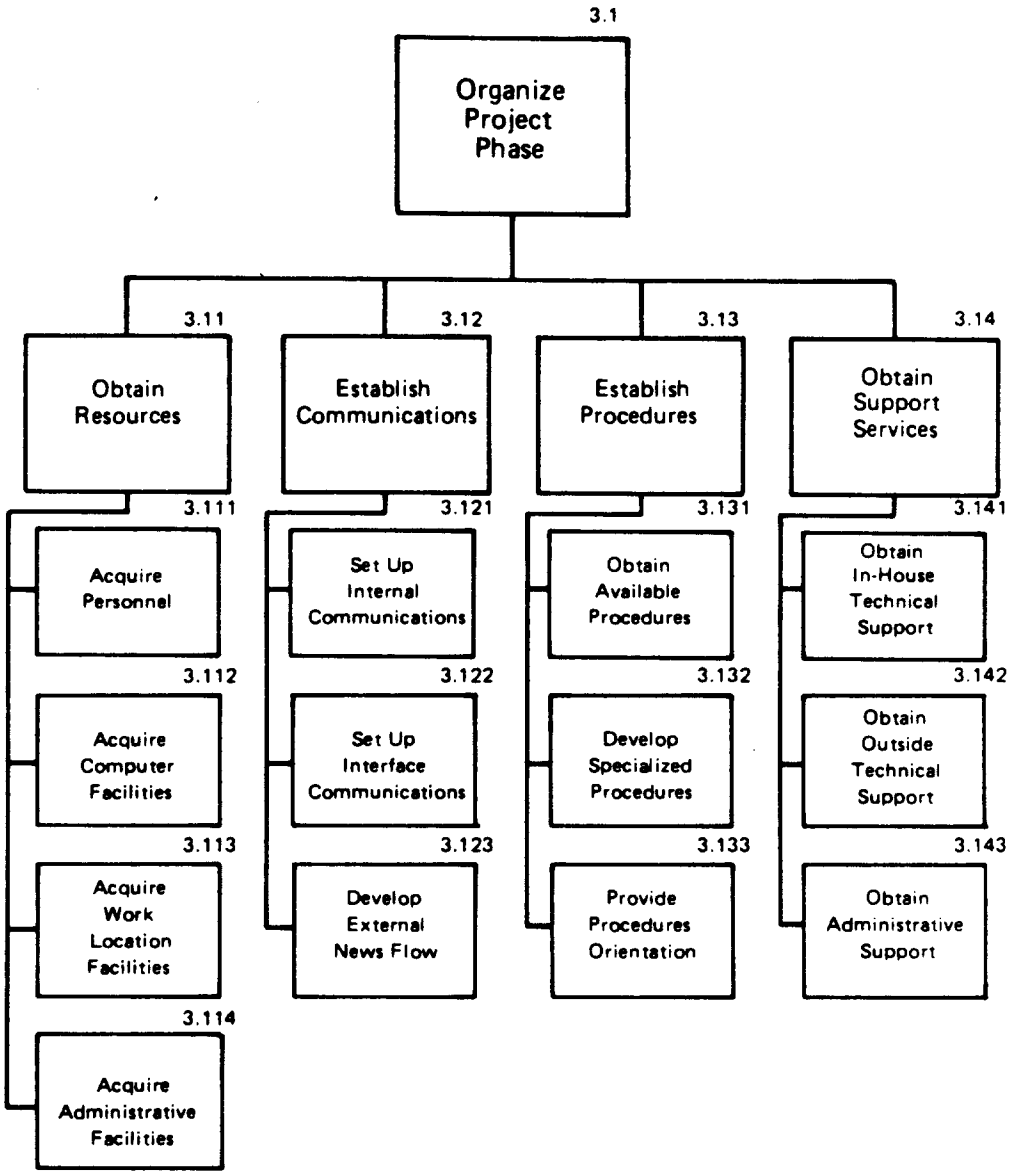


Chart 8—Organize Project Phase

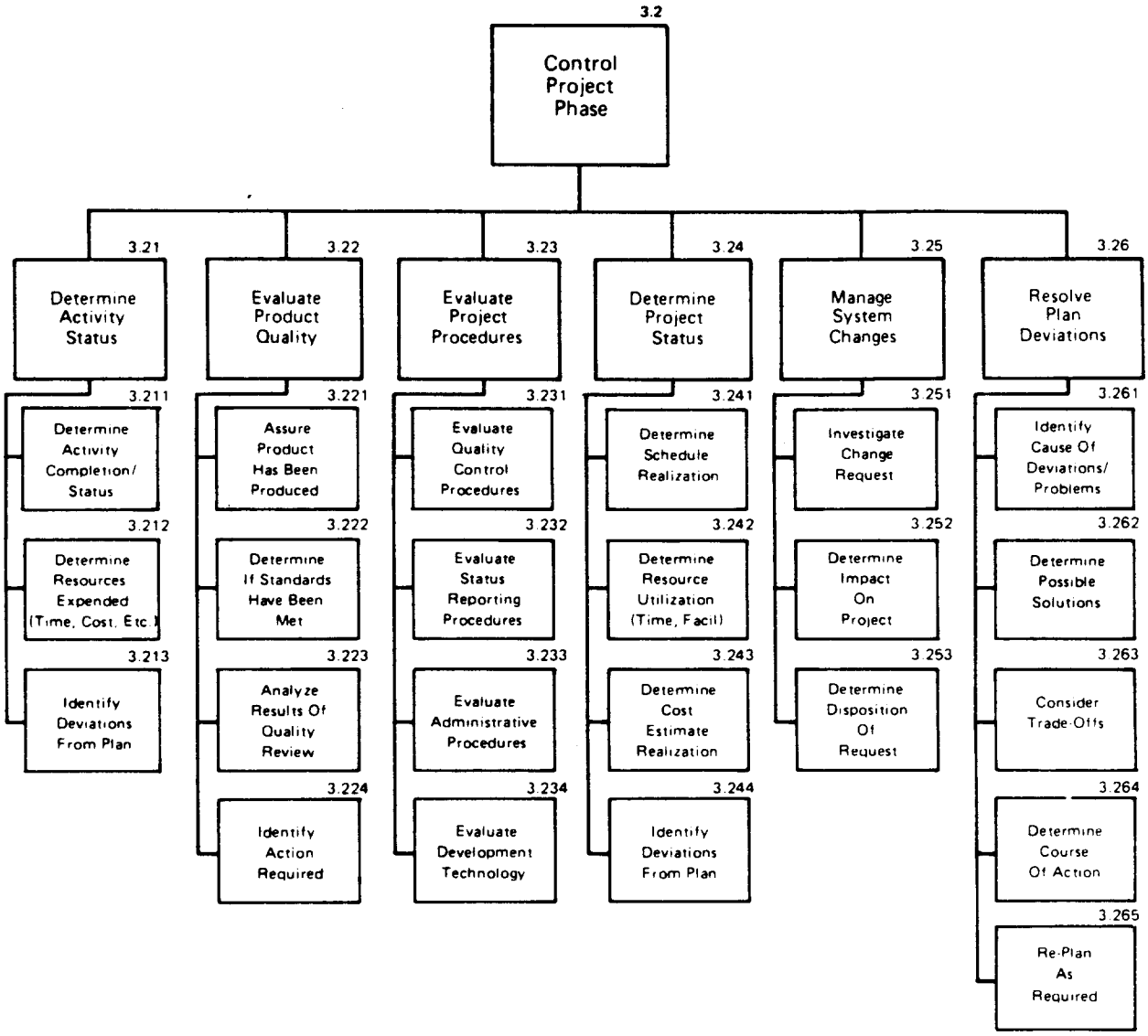


Chart 9—Control Project Phase

5. CHECKLISTS

GENERAL

5.01 The checklists included in this part are intended to be used as performance aids by the project manager while planning and administering the project.

ASSISTANCE ORGANIZATIONS*

____ Administrative Services

____ Business Research

____ Corporate Education Center

____ Economic Analysis

____ Engineering

____ Labor Relations

____ Legal

____ Personnel/Human Resources

____ Public Relations

____ Results and Measurement

____ Statistical/Analytical Support

*Organizations that may be able to provide specialized technical support to the project, if required.

COMMUNICATION MECHANISMS

____ Telephone/Telephone Conference
____ Interview
____ Conference
____ Discussion
____ Meeting (Individual, Staff, Group)
____ Hot-Line
____ Recorded Message
____ TSO Broadcast
____ TWX Broadcast
____ Status Report (Vertical, Lateral)
____ Round-Robin Memo
____ Turn-Around Memo
____ Letter (Correspondence, for File)
____ Log
____ Walk-Through
____ Mechanized Project Management System
____ Bulletin
____ Presentation (Live, Video, Multimedia)
____ Publication
____ Sign-Off Document
____ Developmental Documentation Component
____ Phase-End Report

COMPANY SERVICES

AUDIO/VISUAL

____ Tape Recorder
____ Television Monitor
____ Projector/Screen
____ Easel
____ Video Tape Production
____ Slide/Tape Production

CLERICAL SUPPORT

____ Secretarial Typing
____ Centralized Typing Service
____ Telephone Dictation/Transcription
____ Filing
____ Key-Punch/Key-Entry
____ Text-Editing
____ Calculating
____ Quick-Copy Reproduction
____ Editorial Service

COMMUNICATIONS

____ Mail/Porter Service
____ Delivery Service
____ Telephone Conference
____ PICTUREPHONE® Meeting Service
____ Terminal
____ ADNET
____ Facsimile Transmission
____ BELLBOY®
____ Hot Line

CONFERENCE

____ Travel Bureau
____ Conference Planning
____ Conference Rooms

DRAFTING/GRAPHICS

____ Graphics
____ Posters/Brochures/Booklets
____ Charts/Forms
____ Slides/Vu-Graphs
____ Illustrations
____ Photocomposition

MICROGRAPHICS

____ Microfilm
____ Microfiche
____ Viewer

RECORDS MANAGEMENT

____ Centralized Filing
____ Records Retention/Destruction
____ GL Coordinator
____ BSP Coordinator

REPRODUCTION/DISTRIBUTION

____ Printing/Collating
____ Binding
____ Padding
____ Purchase of Outside Printing
____ Distribution

OTHER

____ Library
____ Security
____ Stock Room/Office Supplies
____ Forms Control
____ Porter Service
____ Building Services
____ Motor Pool

COST SOURCES

____ Salaries

____ Office Supplies and Equipment*

____ Company Services*

____ EDP Resources

____ Training

____ Travel

____ Consulting Services

____ Conferences

____ Moving Allowances

*See company services checklist for details.

DELIVERABLE DOCUMENTATION

_____ Development Letter
_____ System Requirements
_____ System Description
_____ System Index
_____ Installation Planning Guide
_____ System Release Description
_____ Performance Test Requirements
_____ Training Specifications
_____ System Administration Guide
_____ Supervisory Guide
_____ Work Module Instructions
_____ Forms/Displays Catalog
_____ Performance Aid Catalog
_____ System Controls Guide
_____ Computer Operations Guide
_____ User Guide
_____ Instructor Guide
_____ Student Guide
_____ Training Administration Guide
_____ Application Support Guide
_____ System Maintenance Guide
_____ Program Listing
_____ Program Map
_____ Data Base Administration Guide
_____ System Audit Guide
_____ Network Control Guide

FUNCTIONAL ROLES IN A SYSTEMS ENVIRONMENT

REFERENCE:

Section 007-200-310
Functional Roles in a Systems Environment

PLANNING, APPROVAL AND CONTROL

____ Application (Data Systems) Planning
____ EDP Planning
____ Project Approval
____ User Approval
____ Project Control

TECHNICAL SUPPORT

____ Hardware Support
____ Software Support
____ Time-Share Support
____ Data Management
____ Internal Data Network Support
____ Testing Support
____ Performance Analysis
____ Computer Center Support
____ Data Systems Standards
____ System Development Support
____ Computer Subsystem Support
____ Personnel Subsystem Support
____ Data Systems Training
____ Quality Assurance Support
____ Legal Support

DEVELOPMENT TEAM

____ Project Management
____ Application Expertise
____ System Analysis
____ System Design
____ Computer Subsystem Design
____ Personel Subsystem Design
____ Data Base Design
____ Data Communication Design
____ Deliverable Documentation Development
____ Programming
____ Training Development
____ Testing

OPERATIONS AND MAINTENANCE

____ Position Supervision
____ Position Operation
____ Computer Center Supervision
____ Computer Center Operations
____ System User
____ System Management
____ Data Systems Management
____ Applications Specialist
____ Operational DBA
____ User Data Administration
____ Computer Center Technical Support
____ Network Control
____ Maintenance Control
____ CSS Maintenance
____ PSS Maintenance
____ Audit
____ Training Administration
____ Course Instruction
____ Student

OFFICE SUPPLIES AND EQUIPMENT

_____ Address Book
_____ Airline Guide
_____ Ash Tray
_____ IN/OUT Basket
_____ Binder
_____ Board (Chalk, Bulletin, Cork, Status)
_____ Bookcase/Shelf
_____ Bookend
_____ Brief Case
_____ Business Cards
_____ Calculator
_____ Calendar
_____ Chair
_____ Clothes Hanger
_____ Dating Stamp
_____ Desk
_____ Dictionary
_____ Envelopes
_____ File Cabinet
_____ File Folders
_____ Forms
_____ Hole Punch
_____ Labels
_____ Manuals
_____ Microfilm/fiche Viewer
_____ Nameplates
_____ Notebooks
_____ Paper (Bond, Letterhead, Note Pad)
_____ Pencil Sharpener
_____ Periodicals (Subscriptions)
_____ Ruler
_____ Scissors
_____ Stamps/Rack/Pad
_____ Stapler
_____ Table
_____ Tape Dispenser
_____ Tape Recorder
_____ Trash Can
_____ Telephone/CALL DIRECTOR®
_____ Telephone Directories
_____ Template
_____ Terminal
_____ Typewriter

POLICIES AND PROCEDURES

CORPORATE

- ____ General Instructions
- ____ Administrative Procedures
- ____ Personnel, such as:
  - ____ Absence/Leave
  - ____ Accident Reporting
  - ____ Appraisals
  - ____ Benefits
  - ____ EEO
  - ____ Medical
  - ____ Relocation
  - ____ Safety
  - ____ Salary Administration
  - ____ Transfers
- ____ Budget Procedure
- ____ Payroll/Time Reporting
- ____ Vendor Contract Procedure
- ____ Expense Voucher Procedure

SYSTEMS

- ____ System Development Policy
- ____ Project Approval/Initiation
  - ____ Local Development
  - ____ Time-Share
  - ____ Centrally Developed
  - ____ Minicomputer
- ____ Project Tracking/Status Reporting
- ____ Computer Services Acquisition
- ____ System Documentation
- ____ Design Reviews
- ____ Data Systems Standards
- ____ Change Management Procedure
- ____ Systems Release Procedure

PROGRAMMING PRODUCTIVITY TECHNIQUES

REFERENCE:

"Guidelines on Programming Productivity Techniques,"
R.F. Gravemen, Bell Laboratories, 1977

____ Egoless Programming
____ Programming Teams
____ Chief Programmer Team Organization
____ Programming Librarians
____ Walk-Throughs
____ Top-Down Design
____ Structured Design and Composite Design
____ Data Flow Diagrams
____ Structure Charts and Tree Charts
____ HIPO—Hierarchy Plus Input-Output Process
____ Pseudocode
____ Nassi-Shneiderman Diagrams and Chapin Charts
____ Top-Down Implementation
____ Development Support Library
____ Programming Environment and Tools
____ Programming Language Selection
____ Programming Language Standards
____ Structured Programming
____ Incremental Testing
____ Top-Down Versus Bottom-Up Testing
____ Error Prone Modules

SUMMARY OF PROJECT MANAGEMENT FUNCTIONS

PROCESS	
1.1	Project Definition General Resource Estimate
1.2	System Development Plan
1.3	General Project Management Plan
2.1	Phase Activity/Product List Technical Support Requirements List
2.2	Organization Requirements
2.3	Control Requirements
2.4	Approved Phase Plans
3.1	Operational Project Team
3.2	Status Information Revised Plan
1.11	Project Mission Statement
1.12	Development Interface Requirements
1.13	Project Constraints
1.14	General Resource Estimates
1.21	Evaluation of Existing Local Procedures
1.22	Evaluation of New System Development Methodologies
1.23	Project's System Development Technology
1.31	Project Management Requirements
1.32	Evaluation of Project Management Techniques
1.33	Project Management Methodology
2.11	Product/User List
2.12	Development Activities List
2.13	Technical Support Requirements List
2.21	Phase Resource Requirements Procedures Requirements
2.22	Project Organization Structure
2.23	Communication Requirements
2.24	Administrative Requirements
2.25	Organizing Activities List Organizing Support Requirements
2.31	Phase Control Objectives
2.32	Control Procedures Specifications
2.33	Control Resource Requirements
2.41	Activity Dependency Chart
2.42	Activity/Work Effort List Activity Skill/Knowledge Requirements
2.43	Activity/Assignment List Training Requirements
2.44	Phase Activity Schedule
2.45	Phase Cost Estimates
2.46	Project Approvals
3.11	Available Resources
3.12	Communications
3.13	Functioning Procedures
3.14	Available Support Services
3.21	Activity Status Resource Utilization
3.22	Satisfactory Products Remedial Action Requirements
3.23	Procedures Evaluation
3.24	Overall Project Performance Items for Resolution
3.25	System Change Evaluation
3.26	Problem Causes Changes to Plan

PROJECT MANAGEMENT TOOLS

	PLANNING	CONTROL OF			
		SCHEDULE	QUALITY AND TECHNOLOGY	COST	RESOURCES	
Functional Accounting	X	X		X		—
Budget Decision Package	X			X	X	—
IPAC	X	X		X	X	16
Management by Objectives	X	X	X		X	13
Short Interval Scheduling	X	X				—
Standard Resource Rates	X					**
Networking Techniques	X	X				11,12
Gantt Chart	X	X				—
Milestones	X	X				—
CAMP		X		X	X	8
Time Report		X			X	11
Exception Report		X	X			—
Status/Progress Report		X			X	—
Status Review Meeting		X	X		X	10,13
Product Completion		X				—
Sign-Off Agreement		X	X			—
Design Review			X			3
Walk-Through			X			15,17
Modeling			X			—
Standards Compliance			X			—
Component Test			X	X	X	7
Test Statistics			X		X	*
Audit Support			X			—
Consulting Team			X			*
Optimizer			X	X		*
SMF			X		X	*
CARE				X	X	9
Voucher/Billing				X	X	**
Resource Utilization Data				X	X	**

* Consult local Data System Supports group
** Consult local instructions and practices