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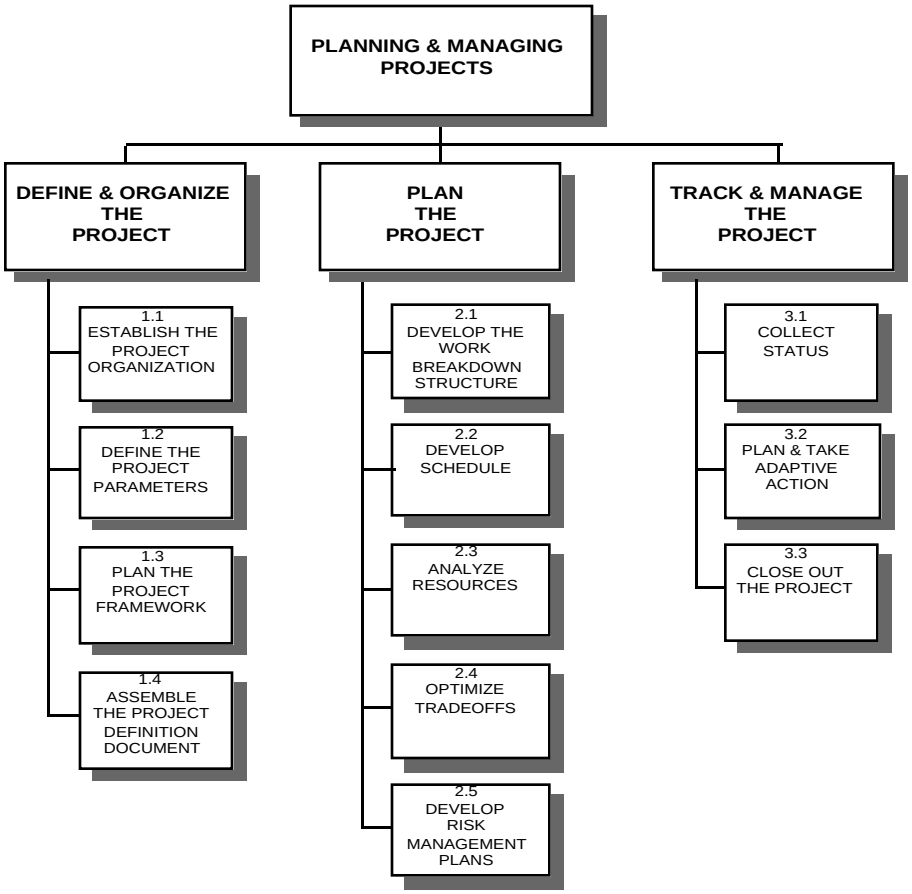
Project Management Manual



Harvard Business School prepared this manual from materials developed by IPS Associates, Inc. as the basis for class discussion rather than to illustrate either effective or ineffective handling of an administrative situation. IPS Associates, Inc. is located at 1680 Bayport, San Carlos, California, 94070.

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BRIEF HISTORY OF PROJECT MANAGEMENT

Imagine that an important customer in your firm commissions you to complete a sophisticated worldwide market study that will form the basis of a global expansion strategy. Or that you are responsible for the development of the product which will determine your firm's ability to go public. Or that you are in charge of handling the merger of your firm with another. Further imagine that in these situations you receive a strict budget and a precise schedule. You are, as such, involved in a project—and, moreover, you are involved in *managing a project*. Deliverables must be completed according to a schedule, which is usually aggressive, and within a budget, which is usually fixed.

Because project management focuses on specific results (deliverables), time and (schedule), resources (money, people, etc.), a series of techniques and processes has evolved to help people efficiently manage these undertakings. This module will introduce these to you.

The Origins Of Project Management

"Work" was first scientifically studied by Frederick Taylor (1856-1915), who also was the first to consider process design. But not until the early 1950s were many project management techniques assembled into a single, coherent system: the focus of that enormously complex effort was the U.S. Defense Department's development of the Polaris missile. The techniques, which included Henry Gantt's chart, which he created to manage Army logistics, were essential to managing the intricacies of how work among an array of specialists would be handed off, and how the schedule itself would be managed. At the center of this effort was literally a project "war room," which prominently displayed huge Program Evaluation Review Techniques (PERT) charts.

Following quickly in the military's footsteps were the automotive and movie industries, and private and public engineering organizations. All shared the need for creating unique outcomes, and they found that project management techniques helped cross-functional teams define, manage, and execute the work needed to accomplish these ends. Along with such techniques as histograms and network diagrams, early practitioners of project management also employed the concept of a project life cycle and began to incorporate that thinking when generating more complex Work Breakdown Structures (WBSs). A WBS comprehensively identifies the *individual tasks* required to achieve an objective.

More recently, new project management techniques (e.g., for creating cross-functional schedules, managing shared resources, and aligning project portfolios), the widespread use of personal computers, and the growing sophistication and availability of project management software tools have all increased the effectiveness of a *methodology* for addressing a variety of project problems.

The Emerging Importance of Projects

But it is not simply the improvement of project management effectiveness that we are examining; other forces combined to cause the use of these techniques to explode. Powerful competitive pressures to manage and reduce product cycle time are increasing, as is the globalization of many markets and the recognition of projects as a key link between the strategic goals of the organization and the tactical work being performed by discrete functions. As a result, industries as diverse as computer manufacturing, consulting services, pharmaceuticals, photography, and natural resource management have aggressively implemented project management. These industries, and a myriad of others, are using project management as a way to create the future, by better understanding both customer requirements and solutions to meet them. Moreover, project management has a potent effect on a firm's bottom line.

An international study found that "when companies increased their predevelopment emphasis, they increased the predictability of successful new-product commercialization by a 2-to-1 ratio." When predevelopment activities, primarily project definition and planning, increased, so did the likelihood of product success. Some key factors separating success from failure were:

- "Winners spent more than twice as many resources on predevelopment activities as did losers.
- Seventy-one percent of new-product development was delayed due to poor definition and understanding of customer requirements.
- Changing product requirements induced more delays in product development than any other cause." (Boznak, 1994)

Project management also affects the bottom-line because it helps cross-functional teams to work smarter. It enables teams to better draw upon the individual strengths of members by providing an efficient infrastructure for defining, planning, and managing project work, regardless of the structure of the firm's organization. It is particularly useful in specialized functional environments or highly matrixed environments, since it channels specialization into clearly defined project cooperation and contribution activities and clarifies ambiguous roles and responsibilities. Thus, as one author observed, "Team members derive value from the summary data for project planning, estimation of tasks, and identifying improvement opportunities, such as activities that ought to have more (or less) time devoted to them. The data provides a quantitative understanding of the group's development process as well as a way to monitor of the process over time. It has been enlightening to many team members to compare where they think they spend their time with where they actually spend their time" (Wiegers, 1994).

Similarly, "Successful firms have mastered the art of melding the power of human will and organization. But the key to their vitality is their world class capabilities in selecting, guiding, and completing development projects, which are the building blocks of renewal and change. The companies that can repeat this process again and again have discovered the manufacturer's perpetual motion machine" (Bowen, Clark, Holloway and Wheelwright, 1994, p. 14).

As yet a further example of this impact, Integrated Project Systems conducted two studies (unpublished) in which one computer manufacturer gained a 500% return on investment in project management by creating a project plan template for repetitive projects, and another had an estimated 900% return on investment through an early cancellation of a troubled project. ROI on implementing project management appears to be quite significant.

Project Management Process Overview

Project management is a formal management discipline in which projects are planned and executed using a systematic, repeatable, and scaleable process. A project is defined as:

> **A unique set of activities that are meant to produce a defined outcome, with a specific start and finish date, and a specific allocation of resources.**

Because a project is bounded by its results, time, and resources, we often need to make tradeoffs among these three elements, or project "parameters." *Thus, project management is the process of developing substantive, systematic data about each parameter so that the tradeoff decision making between parameters is more effective.* The project management process, in turn, is a series of steps, typically represented by a "project management process model."

The model we use at HBS for project management appears in **Figure 1**. It consists of three global sets of activities (Define and Organize the Project, Plan the Project, and Track and Manage the Project). Within each set of global activities is a series of steps for actually defining, planning, and managing the project.

1. Define and Organize the Project

The success of a project is usually based on the clarity of its objectives and how well team members will coordinate project activities. We would assume, therefore, that in order to be effective in completing a project we need to know the objectives, the people who will work as a team to achieve them, and something about how they will be working. Much lies behind this assumption, however.

While there is universal agreement across all industries that it is essential to define the objectives and organization for a project before beginning it, an astounding proportion of projects fail because the desired outcome is poorly defined and the organization and procedures to accomplish it are ill understood. With dismaying frequency, people complete the "wrong" project, producing at best a somewhat less than desired result or, at worst a complete waste of time and resources. Tales of unclear assignments, unproductive meetings, poor communication, and interpersonal conflict are rampant in most project environments. Consequently, even a short time spent clearly defining and organizing the project generates tremendous benefits. The key steps are: Establish the Project Organization, Define the Project Parameters, and Plan the Project Framework, Assemble the Project Definition Document. These steps define the "who," "what," and "how" of the project. They will be treated in detail in subsequent sections.

2. Plan the Project

A source of considerable conflict in nearly every project is the tension between "when" the project will be completed and the risks involved in shortening that time. Managers outside the project team seem continually to demand that the project schedule be aggressive, while those within the team are aware of the difficulties in doing so. The solution is a *credible* project plan.

A credible project plan is based on a reliable, systematic process that allows senior managers to understand and trust the schedule and make better management decisions about project tradeoffs. Thus, because it had both a credible schedule and a risk management plan, a consulting firm, in close cooperation with its client, was able to systematically narrow the scope of its reengineering initiative when it learned that the effort would miss a critical corporate date. Not only was this flexibility important to the particular effort, it saved the relationship between the firm and its client.

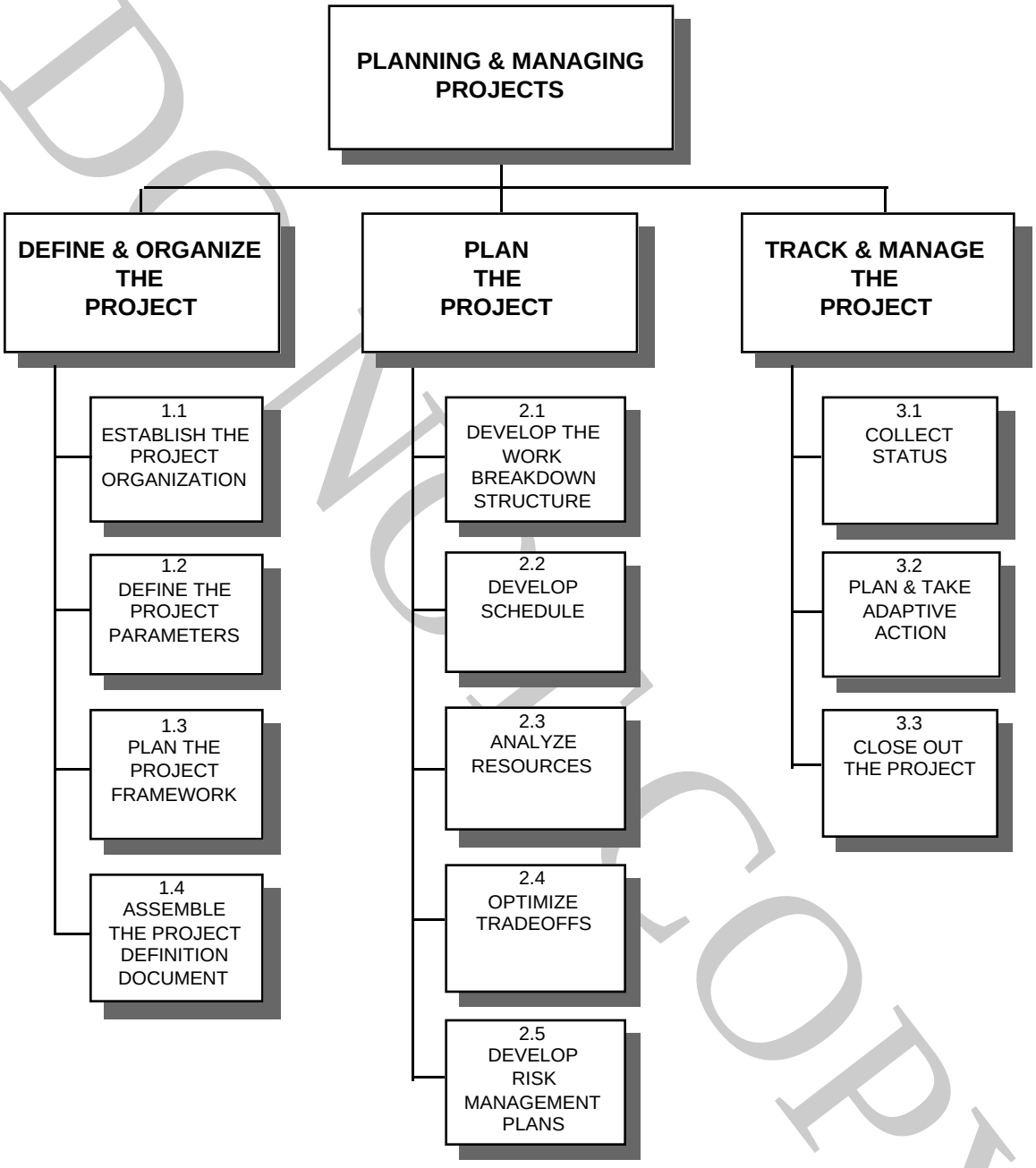
Conversely, unreliable and unpredictable schedules, based on guesswork, top-down pressure, or failure to account for risk, can lead to financial disaster. At one company a poorly conceived schedule caused a new product to be prematurely announced. Consequently purchases of the old product dried up 18 months before the new product was ready. The result? The company, which had been first in market share prior to the announcement, experienced *10* consecutive quarters of losses and dropped to third in share.

A systematic planning process makes senior management decision making more effective because it provides specific data for the decision makers. The key steps in Plan the Project are: Develop the Work Breakdown Structure, Develop the Schedule, Analyzing Resources, and Develop Risk Management Plans. These steps enable the project manager and team to identify the tasks required to meet the project objectives, how long each task will take, the optimal sequence for the tasks, how long the project will take, how resources will affect the schedule, and what major risks the project entails. As a result, all members of the team know not only their own project work, but the tasks and schedules of their teammates as well. These steps will also be treated in detail in subsequent sections.

3. Track and Manage the Project

"Managing to the plan" seems a simple enough notion. Yet most of the time, as soon as the plan is done (if a plan is done), project management typically ceases, as the propulsion to "get the work

Figure 1 - Project Management Process Model



done" takes over. The momentum of the project itself dominates. Team members find it easier to work on discrete tasks producing tangible results than to manage an intangible process. But by not tracking the project, both the project manager and the team itself miss the opportunity to collect critical project data and take timely actions that will be crucial to success. A common result is a reduction in the team's ability to control the project and thereby, indirectly, a reduction in their authority and status. Conversely, tracking and managing a project, which is often seen as "extra work" by project personnel, actually improves morale by providing project management and team members with more control: hence more status and authority.

Moreover, once the *credible* plan is in place, not only does the team now have something that provides efficiencies, members have a way of systematically tracking and managing the work they perform in comparison to original expectations—thereby generating still more project efficiencies. It is possible to know, with great precision but little bureaucratic overhead, what work has been performed in a project, what *planned* work still needs to be done to achieve the objectives, and what actions need to be taken to respond to the natural dynamics of project work. This is possible because tracking and managing processes provide the project manager and team with highly specific data that enables highly focused, discrete interventions into project work.

The key steps in tracking and managing the project are: Collect Status and Close-out the Project. These steps focus the project manager on the information needed to realign the project effort if necessary, keep key participants informed of progress, and use the learning from one project to improve the performance of the next. Again, these steps will be treated in detail in a subsequent section.

Key Process Points

The process model in **Figure 1**, though presented linearly, should be conceptualized cyclically: it is meant to be iterative and self-checking. For example, if the schedule completed in the Develop the Schedule step exceeds the schedule objective established in the Define the Parameters step, it may be appropriate to return to and modify the objective or to change the definition of a major deliverable to shorten the schedule. Similarly, Specification of Task sequences in the Develop the Schedule step often highlight omitted tasks, causing an iteration back to the Develop the Work Breakdown Structure step. The process model naturally checks the plan and promotes its increasing refinement, with a correlated increase in its reliability and credibility.

We now turn to a full description of each section of the model, looking at its characteristics and activities.

1. Define and Organize the Project

1.1 Establish the Project Organization

In any project, knowing who is going to do what is essential. The purpose of the Establish the Project Organization step is to ensure that all roles and responsibilities are clearly understood and that all members of the team are identified and committed to the project effort. In particular, this step ensures that a leader (the project manager) is identified and that his or her authority and responsibilities are specified.

Key Questions for Establishing the Team Organization

- Who is the project manager?
- What are the project manager's responsibilities?
- In which areas does the project manager have decision-making authority?
- Has the project manager's responsibilities and authority been agreed to, written down, and distributed to the team?
- Who is on the team?
- What is each team member's expertise?
- Is everyone who is performing work for the project identified?
- What are the team's responsibilities?
- Has a team roster been completed?
- Who sponsors the team? To whom does it report?

Determining the project manager is the official beginning of most projects. The best project managers are:

- Good motivators and leaders, coaching, and teaching others on the team.
- "Big picture-oriented."
- Effective communicators.
- Good organizers.
- Goal-oriented.

- Knowledgeable about and committed to the use of project management procedures.

Effective project managers do not have to be technical specialists; indeed, specialization can often be an impediment to project management success if the technical specialist gets involved primarily in the content of the project and loses focus on managing the project management process. Effective project management unleashes the *team* to do the content of the project.

In particular, the project manager is responsible for seeing that the project management process, as shown in **Figure 1**, is effectively executed. The project manager, therefore:

- Assures that team members understand and practice project management.
- Assures that all team members understand and accept their responsibilities.
- Keeps team resources focused on developing and executing the plan.
- Makes timely adjustments to the plan.
- Maintains the project file.
- Arbitrates and resolves conflicts.
- Reports to team members and others on project status.
- Maintains the issues log.

The project manager should be officially announced in writing, with a complete description of the particular role and responsibilities involved. For instance, the announcement from senior management should indicate whether or not the project manager has the authority to make decisions if there is a dispute between team members, or to declare a "breakdown" that invokes assistance from others with authority.

Example: A "mission critical" project for a television production equipment division of a Fortune 500 company was slipping and would miss the needed market window. Senior corporate management had told divisional management that if the project was not completed by a particular date, the division would be closed and all personnel laid off.

An analysis of the project showed that the team consisted of project "leads" (i.e., people representing many different functions—marketing, engineering, and manufacturing, etc.) but there was no single project manager. Each project lead reported to a different functional manager, each of whom held a different view of the project's priority and expected outcomes. The project leads were having an extremely difficult time agreeing on objectives, resolving issues, establishing schedules, and managing hand-offs between functions. The project was completely chaotic, with no one person in charge.

Once senior management recognized the problem, the vice president of the division formally appointed a well-regarded manager as the project manager, providing explicit authority to that manager to resolve differences. The project manager aggressively informed all leads that further conflict was not acceptable, and then led a two-day planning workshop. During that session, the manager and the team clarified and refined the project objective, revised and agreed upon a project schedule, and developed and approved an issues-management process. Through rigorous use of project management, the manager and the team were able to complete the project six weeks prior to the deadline.

The project team should also be clearly identified, along with specific roles and responsibilities. This ensures that all work is "owned" by someone, that redundant work is minimized, and that role conflicts are reduced. Everyone who performs work for the project should be included on the project

team, though of course, some people will perform considerably more work than others. The primary responsibilities of the project team include:

- Understanding project management processes and tools.
- Helping to create the project plan.
- Being committed to project success.
- Performing project tasks.
- Reporting on project progress, risks, issues, and problems.
- Making effective adjustments to project changes.

A Project Team Roster (**Figure 2**) should be completed for each project. This powerful tool identifies team members and their roles and responsibilities. It is also a convenient and efficient way to keep logistical information about the team, such as telephone numbers and e-mail addresses. Typically, when a team roster is first completed, the team is surprised by how many different people and roles are involved in a project, how many redundancies there are between people, and how some key responsibilities have been overlooked. Completing a roster forces members to be more comprehensive in defining their team. It should be done for every project.

Figure 2 - Project Team Roster

Name & Title	Role(s)	Organization	Phone & Fax Numbers	E-Mail Address	Location/ Maildrop

Example: The project manager for a large, complex software development project was feeling overwhelmed by the amount of work he faced. He was constantly racing between meetings and communicating with diverse groups. Yet he was being increasingly criticized for leaving key people and departments out of his communication. An analysis of his situation indicated that he did not know who was actually participating on the project.

In response to the analysis, he completed a team roster, discovering that he was dealing with 64 different departments and more than 200 people! He had been trying to manage the project by, in effect, "brute force," with few designations of team responsibilities. Once the team roster was completed, he was able to impose more structure on the project, explicitly defining a core team of 12 people with responsibilities for representing the other functions and people. The team became much more effective and soon produced a drastic and timely re-scoping of the project.

Key Actions for Establishing the Project Organization

- Appoint, in writing, a project manager.
- Describe, in writing, the project manager's role, authority and responsibilities.
- Identify the project team with roles and responsibilities.
- Create and publish a team roster.

1.2 Define the Project Parameters

Perhaps the most important element of any project plan is knowing the project's objectives and deliverables. The purpose of the Define the Project Parameters step is to ensure that the "right" project is being done. The "right" project is defined in terms of the expected outcomes or scope, the schedule, and the resources expended. These data are captured in the Project Objective Statement (POS) and the Major Deliverables, which include the powerful "Is/Is Not" process.

The first pass at these data establish the targets for the project. But these targets should not be finalized until the complete detailed plan, including the risk management plan, are finished, since the detailed plan provides substantive information about the feasibility of achieving the objectives.

Key Questions for Defining the Parameters

- What is the scope of the project?
- When will the project be completed?
- What resources will be allocated to the project?
- Is there a clear and concise Project Objective Statement of 25 words or less?
- What are the major deliverables or outcomes of the project?
- Have the major deliverables been well defined?
- Is there a written Is/Is Not list for each major deliverable?
- Do the major deliverables have target completion dates?

The *Project Objective Statement* (POS) describes what the project is to accomplish, when it is to be accomplished, and how much it will take to accomplish it. These are referred to respectively as the scope, schedule, and resources of the project. All POS's should have these three parameters.

The *scope* portion of the POS captures the essence of the desired results. Thus, the scope of NASA's Moonshot project was: "Put a man on the moon and return him safely." If a portion of this were omitted, e.g., the part about returning safely, the project could have accomplished the defined result, put a man on the moon, but would hardly have been perceived as successful. The scope statement must capture the essence of the successful outcome to be effective.

The *schedule* portion of the POS captures the desired completion date for the project (remember, this is only a target until the full schedule is developed). Thus, the schedule portion of the Moonshot POS was: "by the end of the decade." While this captured people's imagination, as a schedule target for a project it is a little too vague. "By the end of the decade" could mean a year early, or six months early, or the very last day of the decade. Similarly, schedule targets such as, "by Q2, 1998" might mean, for some people, the beginning of the quarter, while for others the end of the quarter. An exact date for the project, such as "by June 30, 1998," should be used for the schedule component of the POS.

The *resources* portion of the POS captures the allocation of resources to the project. This may be included as a dollar figure (e.g., "at a cost of $3M"), a figure in person months or full-time equivalents (e.g., "using 32 person months"), or a combination of these. The resource portion of the Moonshot, for instance, was $531M in 1961 and $7-$9B by the end of the decade. It is important that the metric used is commonly accepted in the relevant environment. Beware of such statements as "with existing resources." This phrase assumes that these resources are available for this project, while that might not, in fact, be the case. Also, such a statement does not provide useful information for later tradeoff decisions. The resource portion of the POS should reflect the *total* target amount of resources needed for the project.

In addition to the three parameters (scope, schedule, resources), a good POS contains several other important characteristics including:

- It is captured in 25 words or less (this restriction forces precision).
- It uses plain language, avoiding jargon and acronyms.
- It is clear and concise.
- Ideally, it is visionary, creating a challenge and some excitement.

Using the Moonshot again as an example, a good, complete POS looks like this:

Put a man on the moon and return him safely by December 31, 1969 at a cost of $9B.

The POS is clear, concise, and quite effective.

Example: In large medical products company, the senior manager responsible for a key project asked the team to craft a POS to ensure that they all agreed on the objectives. The team initially wrote a 65-word statement that included multiple dates and several variations on the resources. With a significant amount of effort, the team reduced the POS to 25 words and brought it to the senior manager.

She was stunned. The team was embarking on the wrong project! Buried in the original 65 words were at least three possible alternative projects. The team had focused on the wrong alternative. The senior manager and team were able to quickly re-focus, and the project was completed early and considered a great success. The senior manager estimated that use of the POS saved her department three months of potentially lost work for a 40-person team, or, at a full load of $750 per person per day, about $1.8M. A good POS can directly affect the bottom line.

The *major deliverables* refine the definition of the scope as stated in the POS. Major deliverables are the primary project outcomes or results that are the central focus of management attention. For example, the first draft of an financial analysis may be a major deliverable of a merger project; clinical trials may be a major deliverable of a pharmaceutical project; or the market strategy definition may be the final deliverable of a marketing department's research project. Such major deliverables typically become the basis for judging project success.

Because major deliverables serve primarily as a tool for focusing management attention on key project results, there are few specific guidelines about what they should be and how often they should occur. The basic "rule of thumb" is: the project manager and team should decide in advance about the key tangible outcomes they wish to concentrate on. For instance, in creating a new and complex production line, the "first pass" design of the shop floor may be a good major deliverable; if, however, the line is simple, the complete design may be a better major deliverable. The team should select those outcomes that facilitate their planning and management of the project.

Since major deliverables are so central to project success, it makes sense to systematically ensure that they are well defined and clearly understood. A simple, but amazingly powerful technique for defining major deliverables is the *Is/Is Not* technique.

Consider this common situation. You turn on the TV and get a picture but no sound. You then might turn up the volume. If you still get no sound, you then might switch channels. If at that point you receive sound, you have learned something about the boundary condition. Since you get sound on the second channel, the problem Is Not the television; the problem Is the transmission. Likewise, the Is/Is Not process clarifies deliverables by explicitly defining boundary conditions. When compared to more formal specification processes, or no specifications at all, the Is/Is Not process is a tremendously efficient means of defining major deliverables.

To use the Is/Is Not process, the team lists (usually on a flipchart with an Is and an Is Not column) all of the things that are included in the project (Is) or excluded from the project (Is Not). The lists are generated by rapid brainstorming. Is's are everything that comes to mind when you think: What is this deliverable? Thus, if the deliverable is a consulting report, the Is list may include such items as length (it *Is* 5 pages), packaging (it *Is* spiral bound), content (it *Is* 2 sections on marketing and finance), and anything else that will clarify the expected outcomes.

The Is Nots are all of those things someone might reasonably expect to be included in the deliverable, but that will NOT be included. Thus, examples of Is Not's for the consulting report might be: *Not* including a formal presentation, or *Not* performing certain statistical analyses. The Is Not's restrict and focus the major deliverable, thereby better defining the project effort.

Is/Is Not lists display some consistent patterns that create management challenges. Typically, the Is list is quite long and immediately leads to the recognition that something must be removed from that list to make the project feasible. On the other hand, invariably something on the Is Not list bothers one or more team members. They strongly assert that the item is of critical importance and should not be excluded. Moving things between the Is and Is Not columns is the essence of management tradeoffs, since every switch simultaneously changes the focus of or expands the project, offends or excites people, and directly impacts the schedule and resource requirements. Is/Is Not provides the team, the project manager, and senior management with a tool to make extremely discrete decisions about the project.

Example: A human resources department of a Fortune 500 company was starting a major reengineering project. The HR team conducted a two-day workshop in which the major deliverables from the reengineering initiative were identified and defined using Is/Is Not. The major deliverables included, among other things:

- Analysis of all current key corporate processes.
- Process redefinition for these processes.
- A formal implementation plan.
- A separate staffing plan.

When the team came to the Is/Is Not (see below) for the first major deliverable (Analyze all current corporate processes), they quickly discovered that senior management really meant "all" of the corporate processes simultaneously.

Is	Is Not
• Product Development • Order Fulfillment • Marketing • Customer Service	• A strategic plan • A computer simulation

The Is list of processes to be addressed was quite extensive, while the Is Not list was tiny. This led to a substantive discussion of what was possible and, ultimately, to the prioritization of "order fulfillment" as the initial focus of the project. The major deliverables were modified to reflect the focus on order fulfillment. The Is list defined what was meant by "all" in a way that promoted more effective decision making about the scope of the project.

Key Actions for Define the Project Parameters

- Write a Project Objective Statement.
- List the major deliverables.
- Create an Is/Is Not list for each major deliverable.

1.3 Plan the Project Framework

Team members in many projects typically complain about two things: that there are far too many meetings, and that it is difficult to make decisions. Both are indications of poorly defined operational procedures. Conversely, projects that have well-defined operational procedures tend to be

more efficient and have better morale—people often describe them as "well run." The purpose of the Plan the Project Framework step is to define how the project team will operate. Agreement on this issue had a direct impact on project success.

Key Questions for Plan the Project Framework

- Has the team specified when it will meet, where it will meet, who will attend, and what topics will be discussed?
- Have attendance rules been established?
- Have participation guidelines been established?
- Is the team regularly logging all issues?
- Is the issues log being regularly updated and reviewed?
- How will the team resolve disagreements and conflicts?
- Is there an escalation path for unresolved issues?
- Who owns and maintains the project file?
- Where will the file be stored?
- How will the team communicate (e-mail, telephone, etc.)?
- Have these agreements been written down and stored in the project file?

While there are a wide variety of possible operational procedures possible, a few are particularly important for most projects. These are:

- Meetings and their management.
- Issues management (including "escalation").
- Maintenance and storage of the project file.
- Communication processes.

Meetings represent both the primary means of communication and the work itself for most project teams; unfortunately, they are also the bane of most people's existence. Defining some simple aspects of meetings can make them much more productive and positive. For example, establishing a standard project meeting time, a meeting agenda, and attendance policy are invaluable. Also, aggressively and *consciously* managing issues during the meeting, logging them but not trying to solve them at that point, and establishing decision-making procedures (e.g., decisions reached by consensus, by a majority vote, by the project manager alone) are all important contributors to project success.

Formal *issues management* has a similar impact. Systematic logging of all issues in an issues log (see **Figure 3**) makes decision making about the issues easier since the process of logging itself tends to focus the issue. The issues log is typically initiated and maintained by the project manager and used to

identify any problems that cannot be immediately resolved. The person who raises the issue (the originator) records the issue and its potential impact. The team or project manager identifies an "owner" of that issue and a date by which it will be resolved. The log itself is made available to everyone on the team and is reviewed during status meetings so that all are informed.

In addition, a process of assigning "owners" to issues, due dates for their resolution, and then logging the resolution, creates pressure to close issues quickly and in a manner acceptable to others. This is particularly true if there is an escalation path for open, i.e. unresolved issues. This escalation path, which is defined by the team at the beginning of the project, identifies when and to whom open issues will be "escalated."

Escalating open issues to someone in authority tends to motivate people to resolve their disagreements. Team members are often reluctant to resolve an issue because of potential conflicts with their functional responsibilities; they may also be unwilling to risk making mistakes or be concerned that the issue is really the responsibility of a senior manager.

Figure 3 - Issues/Action Items Tracking Form

Issues Tracking Form

Issue #	Date	Originator	Description and Impact	Owner	Due Date	Status or Resolution

On a more mechanical level, the team should designate someone to maintain a *project file* in a particular location. The project file is the repository for all project documents and is extremely useful at settling disputes that arise in the heat of project work. It can be kept in a binder or as an on-line file, but its ownership, location, and access should be formally designated.

All projects generate a large volume of *communication*. Proactively determining how the team members will communicate with each other using which types of media and how often is an important time saver. Thus, some teams agree to use e-mail for formal status reports and messages that are not time sensitive, while using voice mail for short-term needs. Other teams discuss this issue in terms of who would communicate what information to senior managers, and how often. Each team should establish its own communication strategy.

Example: A project team of a consortium of 14 companies was in trouble. Because the team combined personnel from all the companies, each of which had its own approach to decision making, project issues would get quickly raised but slowly resolved. Team members really did not know how to talk to each other, and many project issues would get escalated to the Chief Operating Officer's staff, where departmental needs always seemed to take priority.

In response to these difficulties in resolving issues, the project team developed a formal issues-management process that included time-tracking of how long issues were open, and an automatic escalation process that would operate if an issue remained unresolved two weeks after it had been raised. The first step of the escalation was the project manager; the second was the COO. Almost immediately, two trivial issues were escalated to the COO—who made it clear that he expected the team to work more cooperatively in resolving issues before escalating them.

Soon thereafter, issue resolution time dropped drastically. As a result of this and other project management processes, the project, which had been expected to be three months late, actually finished six weeks early. Effective framework processes can significantly speed project work and improve team work.

Key Actions for Plan the Project Framework

- Agree to, and write up, meeting management procedures.
- Manage issues aggressively including using a formal issues log.
- Designate the owner and location for the project file.
- Define, and write up, the communication strategy.

1.4 Assemble the Project Definition Document

Once the project is organized, the parameters defined, and the framework specified, the information from these steps is combined into a Project Definition Document (PDD). The PDD becomes the compendium of Define and Organize information and is used throughout the project as a reference tool that facilitates understanding and helps both focus decision making and anchor it. An example of a PDD is found in the **Appendix**.

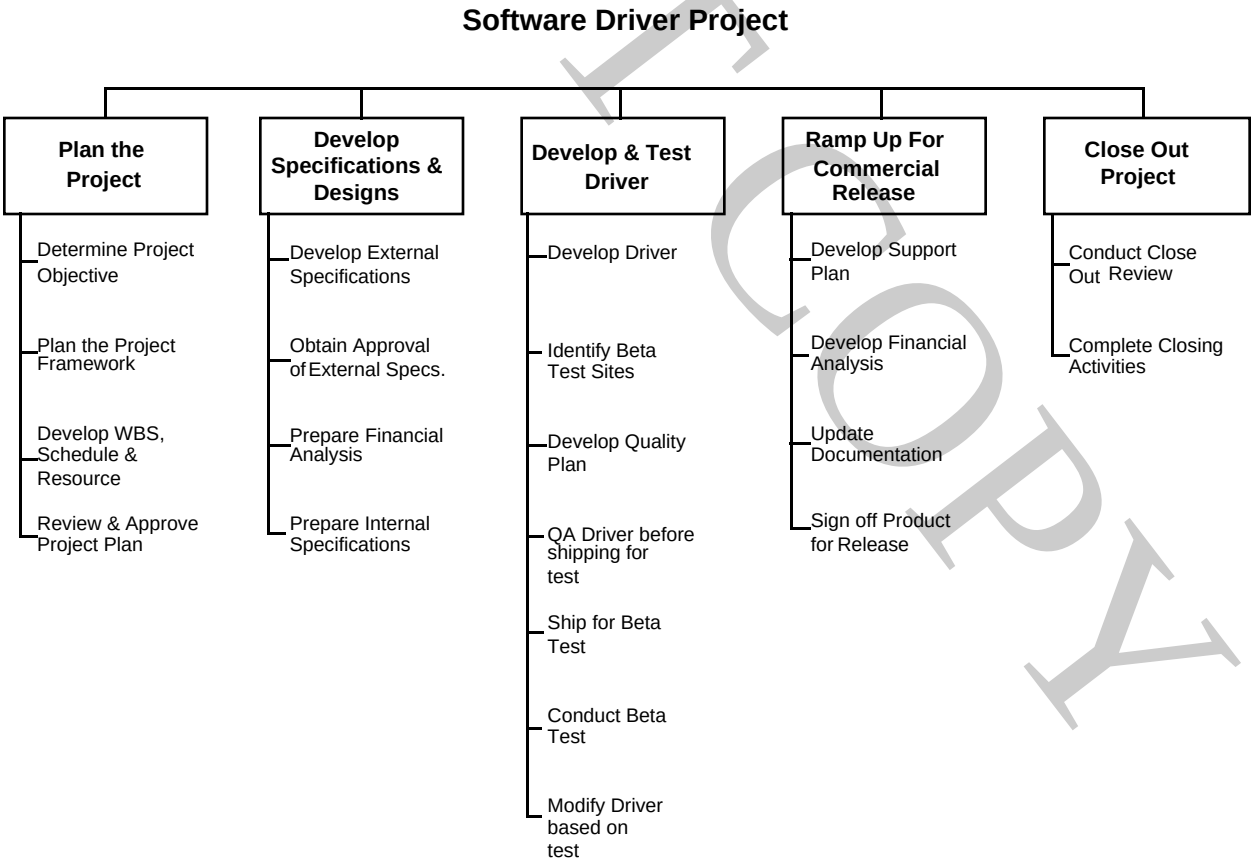
2. Plan the Project

2.1 Develop the Work Breakdown Structure

The single greatest source of project delays is work that is inadvertently forgotten or omitted. To be credible, a project plan must account for every task required to achieve the objective, not just a portion of it. The purpose of the Work Breakdown Structure (WBS) step is to systematically identify *all* the work required for the project. In turn, specific identification of tasks allows the people responsible for the work to be assigned to tasks, and these "owners" can define criteria for completing the specific task.

The *WBS* is a hierarchical breakdown of all the work required to achieve the scope portion of the objective (see **Figure 4**). The hierarchy can be created either by starting with the largest work groupings of the project, known as the major components or Level 1 and breaking them into progressive smaller tasks; or by brainstorming the smallest tasks and forming them into larger groupings. These are called, respectively, top-down and bottom-up. Both work equally well. The team should decide which approach it prefers.

Figure 4 - Work Breakdown Structure for a Software Application Driver



Key Work Breakdown Structure Questions

- Are all the tasks identified?
- Are often-forgotten tasks such as planning the project, approval cycles, testing, printing, etc. included?
- How long will the tasks take? Hours? Days? Weeks?
- Have owners been assigned to the lowest level tasks?
- Is there only one owner per task?

How refined should the level of task identification be? There are some common rules of thumb. The "lowest level" tasks (those tasks that are the bottom of any given branch) should:

- Be approximately 2 days to 2 weeks for typical projects (this would scale to 1 hour to half a day tasks for student projects).
- Have a single owner.

An effective way to create a WBS is to gather the entire team, provide each member with a packet of Post-Its®, and asked the following question: "What is all of the work needed to accomplish the major deliverables?" As the primary components and tasks are identified, they are written on a Post-Its®, and placed on the wall in various groupings. This process generates animated discussion, and by its end, the *entire* team has a far better understanding of the project work needed to meet the objective.

Example: A division of a major test equipment manufacturer decided to completely re-vamp its product line, assigning a project team to do so. As the team created its WBS, members realized that they had identified only what had to be done at divisional headquarters, and that more than half the work required to achieve the objective—work that needed to be done in 20 field service repair centers scattered around the world—had been omitted. Once that additional work was sequenced and added to the project schedule, the team then realized that its expectations for completing the project were substantially off, and began to take corrective actions. First, members reformulated the team to include field personnel. Second, they restructured the project into phases, with the most important changes to the product line being introduced sooner and less important changes deferred indefinitely. In other words, creating a WBS changed their *view* of the project itself.

"Whose job was that anyway?" is a frequent question of the project manager. Tasks without owners don't get done. The team must have a formal process for assigning (by consensus or by the project manager) *task ownership*. Not only does task ownership eliminate much project confusion, it seriously reduces subsequent "finger-pointing" and blame. Naturally, assigning task ownership also increases accountability and may therefore be resisted at times.

Once tasks have been identified, a single task owner is assigned to each lowest level. Because tasks owners actually do the work, they should be the best qualified people available to perform the task. It is critical that task owners define the project outputs, commit to performing the task and to reporting progress on their work. Recording the owner's name on the Post-It® ensures that information is retained with the task itself during development of the plan.

Example: A large information systems project for a major telecommunications company was floundering. A plan had been developed by a central project management group but little progress was being made. While the plan included tasks, these had been assigned to departments, not individuals. Consequently, when asked about their work for the project, many team members were surprised to learn that their efforts were not advancing the project.

In response, the project manager called a team meeting and led the group through an exercise whereby each team member identified a task and committed to "owning" its completion. Team members with specific technical expertise quickly signed up for areas matching their skills. But some team members signed up for tasks they had never done before, helping them develop new skills. Still others took on time-sensitive tasks they had performed in other projects and were certain they could accomplish by the deadline. All team members wrote their names next to the tasks on the project board, thereby committing to them. The group then had a brief discussion about which tasks depended upon another team member's completion of his or her tasks. Almost immediately the rate of progress improved.

Key Actions for Develop the WBS

- Use Post-Its® with the team to create a Work Breakdown Structure (WBS).
- Assign owners to lowest level tasks.

2.2 Develop the Schedule

The central question for most projects is "when will it be done?" The purpose of the Develop the Schedule step is to embark on a systematic process for creating the project schedule, since schedules developed using a systematic process are more likely to be predictable and credible. They promote effective management by illuminating specific, tactical decisions about the tasks, sequence, and time required to meet the objectives.

Key Questions for Develop the Schedule

- Have all the "dependencies" been identified?
- Were any new tasks identified that need to be added to the plan?
- Was a network diagram created?
- Were durations assigned to all lowest level tasks?
- Were estimates for longer or more ambiguous tasks reviewed by the team?
- Was a Gantt Chart created?

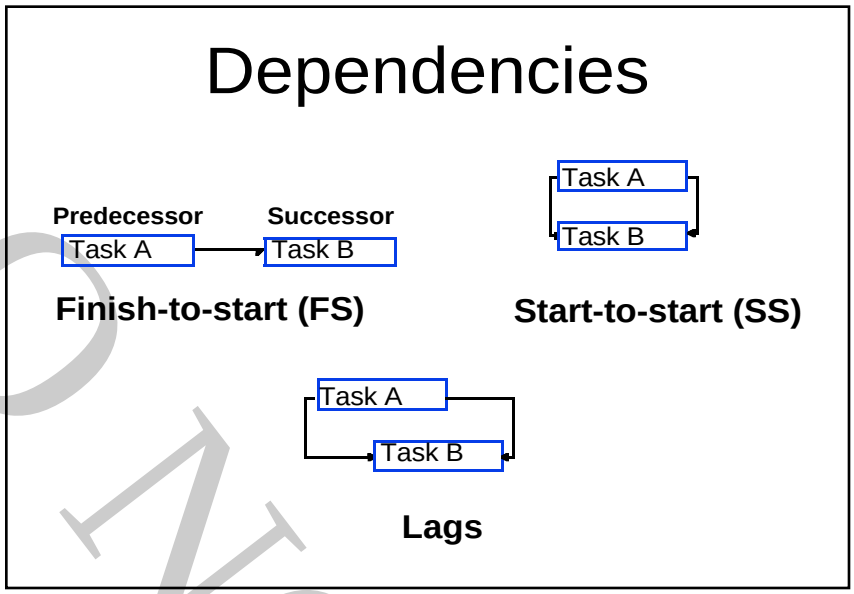
A *schedule* is created from two elements: logical relationships between tasks (what are called *dependencies*) and time estimates for each task. When combined, these two pieces of data can be placed against a time line, which is the actual project schedule.

Logical relationships (i.e., PERT, Network Diagrams, Dependencies and Logical Diagrams) are the sequence or flow of work in the project. They are usually displayed in a "dependency diagram" (**Figure 5**). The classic example of a logical relationship is putting on socks before putting on shoes. There is a logical flow to the effort: socks before shoes. (Of course, it is physically possible to put on shoes before socks, but doing so introduces a risk of public embarrassment over the result—appearing with one's socks over one's shoes. Such a risk of changing the logical relationship is a key tradeoff decision that will be considered subsequently.) Sequencing of the lowest level tasks is a key step in creating a project schedule. In addition, sequencing tasks will often reveal omitted work, causing an iteration back to the work breakdown structure (WBS) step.

While there are many types of logical relationships between tasks, a few of the more useful and common relationships are:

- Finish-Start
- Start-Start
- Start-Start with a Lag

Figure 5 - Dependencies



The most common and easiest to use logical relationship is a "finish-start (FS)." In an FS relationship, a dependent or "successor" task (Task B) cannot begin until a previous or predecessor task (Task A) has been completed. For example, students cannot begin work on an assignment until they have received directions for it. There is a finish-to-start relationship between receiving the directions (the predecessor) and actually beginning the assignment (the successor). One task cannot be started until another is finished. An FS relationship is very linear and therefore easy to manage. Of course, because not all work is neatly linear, some other logical relations are needed to model the desired work flow.

A more difficult-to-use relationship between tasks is a "start-start (S-S)." This models work that can be done in parallel, but with a relationship between the *starts* of the activities. In a S-S relationship, the work cannot begin on one task until the work has begun on another. Once begun, however, both tasks can *proceed* in parallel. For instance, in some merger and acquisition projects, a preliminary list of acquisition targets is drawn up but not finalized. However, as soon as some names are on the list, the financial analyses of those targets can begin. Here, the beginning of the financial analysis (the successor) is dependent on the start—but not the finish—of the listing task (the predecessor). But once both tasks have been started, they can proceed simultaneously, resources permitting. The schedule thus displays a S-S relationship between these tasks.

A variation of the S-S relationship is a "S-S with a lag." A lag is a delay between tasks, in this case a delay between the start of tasks (other types of lags are possible but not often used). For instance, in developing a new computer, software development typically has a "S-S with a lag" relationship with hardware development: the software team needs at least a hardware design to begin its work, but once that exists, it can proceed in parallel with the development of the hardware. "Lags," therefore, model delays between tasks.

While "S-S with lags" have the advantage of allowing for parallel work and delays, they have the disadvantage of being ambiguous about *when* the successor task actually begins. As such, it is usually better to convert "S-S with lags" to FS relationships by splitting the larger parallel tasks into smaller ones that can be modeled as FS.

The actual process for creating a dependency diagram (**Figure 6)** that displays logical relationships by having the team move around the Post-Its® for the lowest level tasks from the WBS until they are aligned in the desired sequence. Expect to move them around many times before the team can agree on the flow.

Example: A project team at a distribution company was sequencing its WBS when it discovered that a key portion of the project was dependent on work done by a vendor. In the middle of its dependency diagram were tasks labeled "Vendor Does Stuff." Since the team had not previously recognized the extent of its dependence on the vendor's work, the vendor's contribution had not been very visible. Once it was, the team contacted the vendor and asked about its expectations and progress—only to discover that the vendor did not intend to perform even the minimal tasks listed in the plan. The team was able to restructure the project, eliminating the vendor's tasks, well before they became a problem. The Dependency Diagram highlighted a significant, previously hidden risk in the plan.

The concept of the *milestone* is closely related to that of logical relationships. A milestone refers to a point in time and is typically used both to signify important events in the project and to focus management attention on them. Thus, "Complete Pilot Test" is a common milestone for many manufacturing companies, and "Complete First Draft Report" is a common milestone for many consulting companies. Milestones are important because they often signify the culmination point for many dependent relationships. As such they provide key data on project progress.

There are many different types of milestones, including:

- The start and finish of a project.
- Completion of major deliverables.
- Formal reviews.
- Key events such as presentations or trade shows.
- Dependencies on or deliverables to organizations outside the project environment.

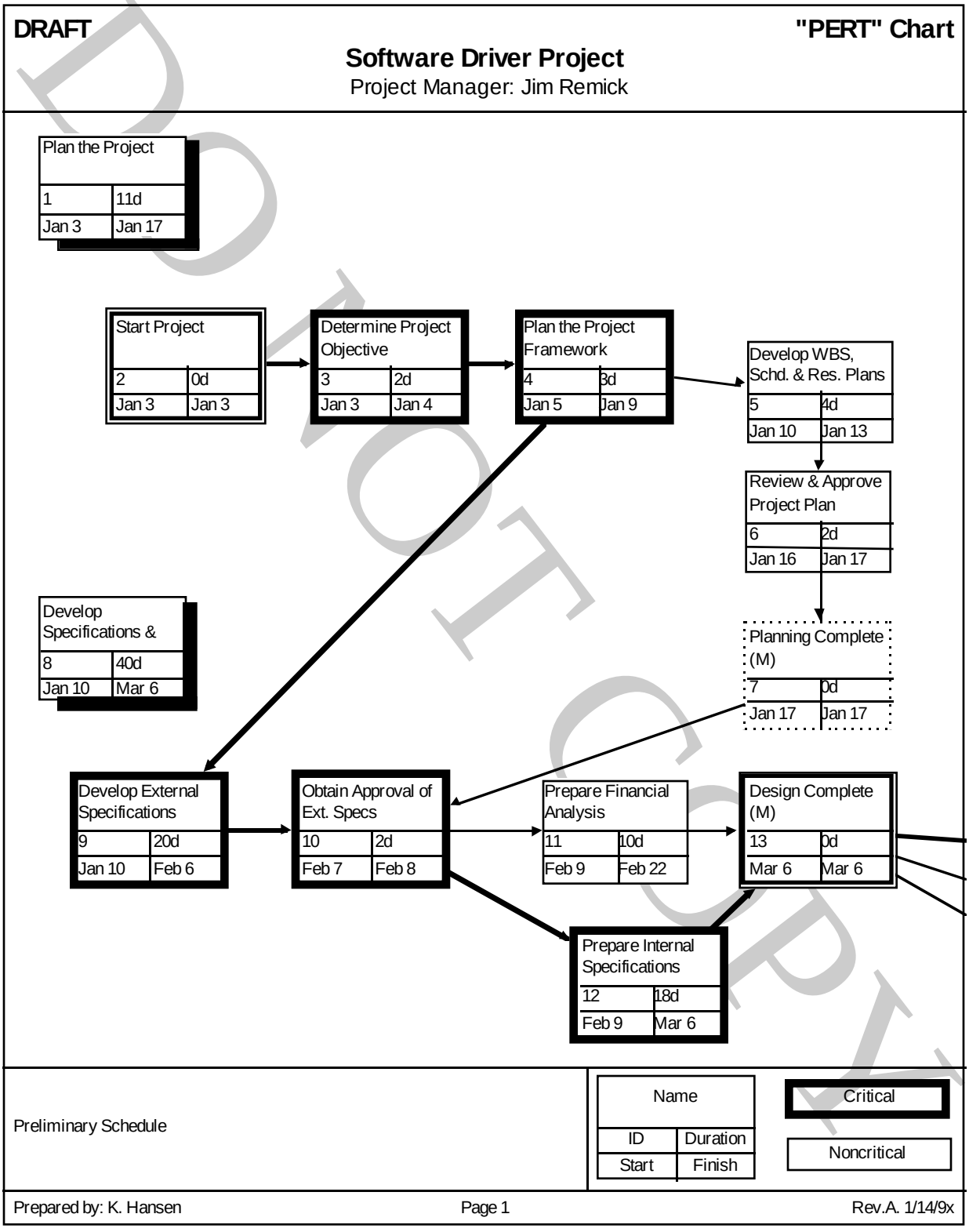
Example: One project at a small ($50M) medical equipment company included a milestone for "Gain FDA Approval" in its plan for introducing a new respirator. Although the tasks in the other parts of the plan were well specified and sequenced, the tasks for actually gaining FDA approval had not been as completely defined. As the project progressed, senior management began to focus increasing attention on the FDA milestone, asking the team to detail the plan and more consistently articulate the completion date for the milestone. In response to the aggressive management of this milestone, the team discovered that it had omitted an essential element of the clinical trials from the plan, which would have caused significant delays. The team was able to correct the oversight and eventually brought the project in two months ahead of schedule. The use of milestones, therefore, highlighted critical project information.

Task-length estimation is often the focal point of much—and vehement—project criticism, even though research (and experience) indicates that "omitted tasks" are much more of a problem. Therefore, the best process for effective task estimation is:

- Completing a WBS.
- Quickly approximating task durations for lowest level tasks.

Duration, which is different from "effort" or "schedule," is the number of work periods (hours, days, weeks, etc.) required to complete the task. A good WBS typically gives enough preliminary duration information about task length that a "quick and dirty" estimate of duration at this stage of the

Figure 6 - Pert Chart ("PERT" Chart)

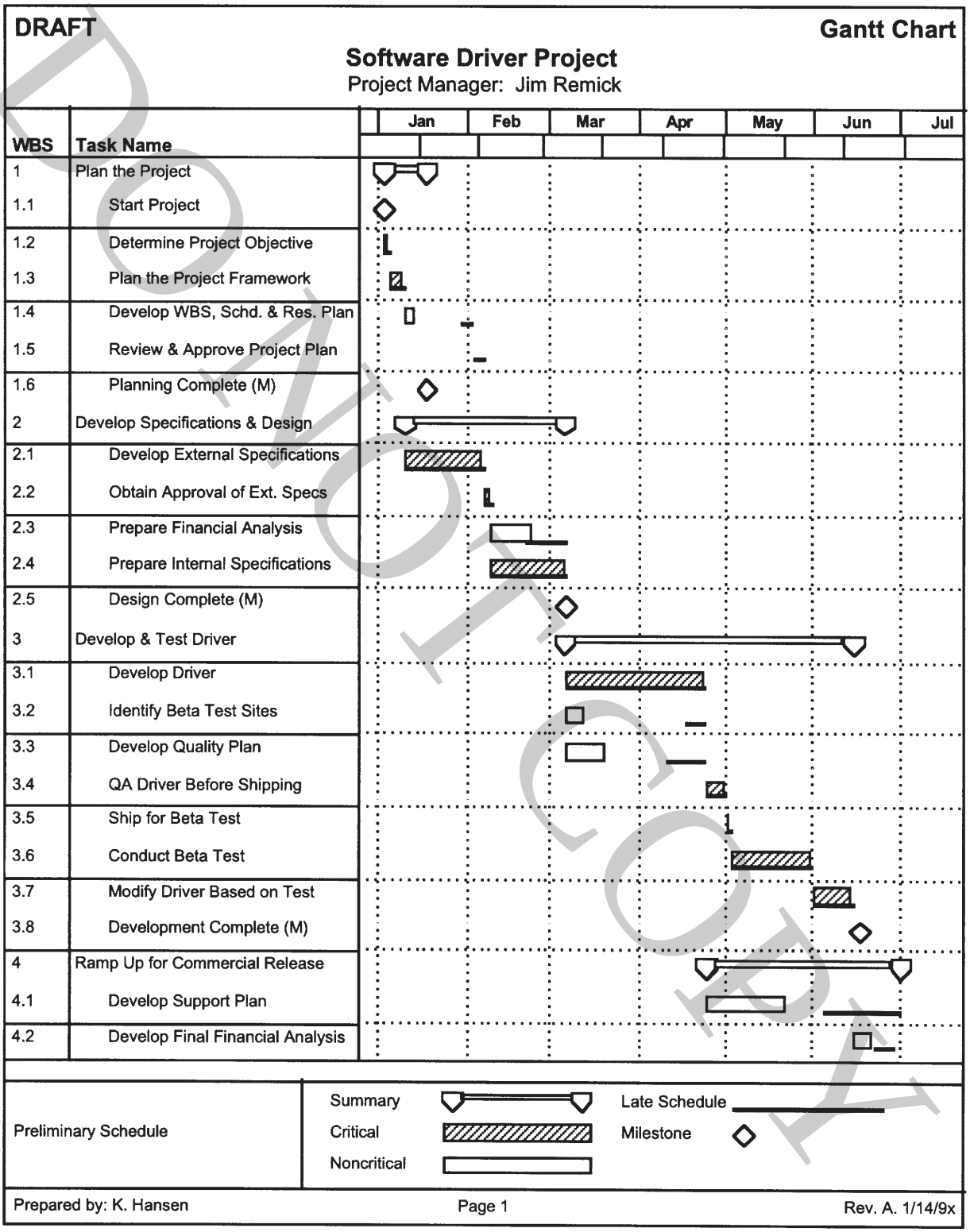


process is sufficient for most project needs. The task owner should quickly write a best estimate for how long a task takes on the task Post-It® itself.

With dependency diagram in hand and tasks quickly estimated, it is now possible to create a credible schedule. Schedules should be an almost trivial end-product of the preceding Plan the Project processes. That is, if the WBS is well defined and the dependency diagram carefully constructed, it is extremely simple to create a credible schedule. If, however, any of the earlier steps have been omitted, the reliability and predictability of the schedule decreases sharply.

A *schedule* is created by superimposing the dependency diagram, with estimated task length, on a calendar or time line. The most common means of doing this is through the creation of a *Gantt Chart* (**Figure 7**). A Gantt shows tasks in time. These charts are popular because they are easy to create and intuitively obvious to read and understand. Gantts can be created by hand by drawing in the tasks in sequence for the defined durations and drawing in lines to indicate the dependencies against a time line, or they can be created by using project management software packages.

Figure 7 - Gantt Chart



While Gantts themselves are well-accepted tools, the results of a systematic planning process — a longer-than-expected schedule—are consistently less well received. "This is too long!" is the typical reaction (also known as "schedule shock") to a systematically constructed schedule. However, because the schedule has been so carefully constructed, opposition to the projected completion dates soon disappears in favor of making focused tradeoff decisions.

Example: A professional services firm was working with a client to construct a schedule for a major reorganization. The client's goal was to have the reorganization completed by the end of the fiscal year so that the new departments would be correctly aligned with their budgets. Using the scheduling process, the consultants created a schedule that missed the target date by three months. This was "unacceptable" to the client, who insisted that the consultant meet the deadline at the same cost and with no decrease in scope. The consultant patiently walked the client through the WBS, dependency diagram, and task estimation, asking:

- Is there any work here (in the WBS) that does not need to be done to achieve the objective?
- Is there any way to change the sequence of work?
- Is there anything about the task estimates that strikes you as grossly inaccurate?

Soon, the client realized the comprehensiveness of the consultant's work and began to engage in more substantive discussion about the true tradeoffs: accepting the impacts of the schedule slip, adding more resources, or reducing the project's scope. The systematic scheduling process saved the consulting engagement.

Key Actions for Develop the Schedule

- Use the WBS Post-Its® to create a dependency diagram from the lowest level tasks.
- Quickly approximate the task durations (in hours).
- Create a Gantt chart showing the schedule.

2.3 Analyze Resources

"If I only had more resources!" is the traditional cry of the frustrated project manager. Yet even with addition resources, the resource problem itself remains. Simply adding more resources rarely improves project performance. Instead, project managers need to more systematically analyze their resource *requirements*. The purpose of the Analyze Resources step is to provide project managers with better information about the real resource situation, thereby enabling more effective decision making about the three parameters.

Key Questions for Analyze Resources

- Is one resource carrying a disproportionate amount of the work load?
- Are any resources underutilized?
- Are any resources affected by parallel work?
- Are there any other resources available to the project?
- Do all the task owners have the skills to perform the work?

Typical project decisions involve tradeoffs between the three parameters: the scope of the project, the schedule of the project, and the resources available to do the project. Effective resource management, based on a good *analysis of the resources*, is a key element of project success.

While there are many tools available to analyze and manage resources, most are not cost-effective for smaller projects. More informal means of analysis have almost as much utility, at considerably lower cost.

The Gantt chart, with owners assigned, is the basis for this informal resource analysis. The project manager and team scans the Gantt looking for assignment patterns such as:

- The same person is listed as the owner on most of the tasks.
- The same person is listed as owner on several parallel tasks.
- Some people are barely listed.
- Many tasks are stacked up in parallel.
- Some tasks do not have owners.

Since there can be many different patterns, there are no particular guidelines in interpreting the patterns. However, each pattern will naturally suggest a problem or issue that the team must manage. The resource usage patterns will then be consolidated with the scope and schedule data to be used for tradeoff decisions.

Example: The plan for a project in the information systems department of a large auto maker was nearing completion. The scope had been well defined and the schedule completed. When resources were analyzed, however, the team learned that one of the programmers was expected to do more than 80% of the work, and that much of that work was supposed to be done in parallel. Furthermore, the project manager knew that the programmer had recently been working extremely long hours to save another project, had barely seen his spouse and newborn child for the last four weeks, and was becoming disgruntled. She was quite sure that the programmer would not be able to sustain the type of effort required for the project and might well leave the company.

In response to the analysis, the project manager and team restructured the plan. They reduced some of the deliverables that the programmer was responsible for by switching some of the Is's to Is Not's, forced the parallel work into FS relationships, and got some assistance from another department. While these changes created other problems, the resource analysis revealed a severe potential problem that could then be more effectively managed.

Key Actions for Analyze Resources

- Analyze the Gantt chart for resource patterns.

2.4 Optimize Tradeoffs

The primary reason for practicing project management is to generate better data for decision making. Yet the data typically present choices that require a difficult decision. In good project management, it is almost always necessary to give up something desired in order to achieve an optimum overall result. The purpose of the Optimize step is to formalize and legitimize the decision-making process.

Key Questions for Optimizing Tradeoffs

- Are you within the POS?
- Can you reduce scope?
- Can you change the sequence?
- Can you reassign or obtain more resources?
- Is there a way to work better and smarter to achieve the same result?

The essence of effective *optimization* is examining the entire project plan and developing creative means for making it more efficient. Virtually anything about a plan can be changed, but the changes should be done in a systematic way, visible to all project participants. Some of the more common changes are:

- Move items in the Is list to the Is Not list.
- Eliminate one or more of the major deliverables.
- Develop a different way to perform task work.
- Change the dependencies.
- Change the resources.
- Accept the new parameters.

As may be apparent, there is no simple description of the optimizing process. It consists of sensible analysis and reasonable judgment. In that regard, optimizing is, in fact, the essence of project management since it means truly making the hard decisions.

Example: A team building a new specialized parallel processing computer had as one of the Is items that the unit would contain 8 microprocessors. While this was an exceptionally powerful design, it also required substantial technical innovation and development. It was a great idea, but extremely risky. As the team developed the project plan it soon discovered that the project would miss the market window by nearly a year.

Team members tried several different "what if" strategies to optimize the plan, including bringing some of the work into parallel and adding more people. Unfortunately, none of these strategies met the schedule requirement, and they were, moreover, very expensive.

After considerable debate, they reexamined the need for 8 processors. If they reduced the number to just 2 processors, they thought the computer could be introduced on time, and 2 would still be sufficient, though less than ideal, to establish their place in that market segment. They made the difficult decision to reduce the scope of the project and ultimately hit the market window.

Key Actions for Optimizing Tradeoffs

- Analyze the entire project plan.
- Create some "what if" scenarios.
- Make tradeoff decisions.

2.5 Develop a Risk Management Plan

It is a truism that all project involve risks. Yet to an astonishing degree, project personnel ignore the risks. The purpose of the Develop a Risk Management Plan step is to draw attention to project risks and the need to manage them.

Key Questions for Develop a Risk Management Plan

- Have risks to the project been identified?
- Have they been defined by priority?
- Have actions been taken that reduce the probability that a risk will occur?
- Is there a contingency plans if the risk does occur?
- How will you know if the risk has occurred?
- Who is responsible for managing the risks of the project?

If team members are asked at the beginning of a project, virtually everyone can describe some key risks to the effort's success. Similarly, in projects that have failed people will almost always state that the reason for the failure was known to be a distinct possibility in advance but that no actions were taken to prevent it. People know there are project risks but are rarely proactive at managing them.

This paradox seems to stem from several causes:

- People do not believe the risk will occur for them.
- There is no time to consider and manage risk.
- People are sufficiently self-confident that they believe they can recover if the risk occurs.
- People do not like to manage risks.

A risk management scheme must, therefore, be seen as consistent with both the optimism latent in the above causes and the time available to manage risks. Such a scheme is presented here. It has two components:

- Risk Assessment
- Risk Management

In *risk assessment*, the team spends a few minutes brainstorming possible risks to the project. Members informally select the top two or three risks that present the greatest threat to the project and develop a plan for managing these.

The *risk management* plans should address both actions that can be taken to reduce the probability that a risk will occur (preventive actions), and actions that can be taken if the risk occurs (contingency plans). Preventive actions may require that more tasks be added to the plan. Contingency plans require a triggering metric that informs the team that the risk plan needs to be invoked. For example, a 10%

slippage to the end date of a project may invoke a contingency plan to reduce the scope of the project. The specific amount of slippage is the trigger for the contingency plan.

Typically, the risk management plans are briefly written up and included in the project file. In many cases, someone from the project team is assigned responsibility for monitoring the trigger metrics and informing the project team of the need to invoke the contingency plan.

Example: A company had a project to wire an entire school system with fiber optic cable so computers could be installed in all the classrooms and offices. The job had to be finished before the start of school.

Literally miles of cable would be needed. The risk assessment indicated that availability of cable from the primary vendor was a substantial risk since demand for fiber optic cable was extremely high and the vendor had just settled an acrimonious labor dispute. The project manager and team took the following preventive actions:

- Visited the vendor to determine the true state of their capability.
- Stockpiled extra cable (at considerable additional expense).
- Established relationships with other vendors, including placing small orders.
- Set aside some "emergency" funds for late, premium-priced purchases of cable.

Unfortunately, shortly before the schools were to open, the vendor was not able to deliver all the needed cable. The project manager invoked the contingency plan for using emergency funds to purchase cable from some other vendors. While the company lost some profit margin, the loss was fairly small and the project was completed the day before school opened. The risk management plan directly promoted project success.

Key Actions for Develop a Risk Management Plan

- Identify and prioritize project risks.
- Create a risk management plan that includes preventive actions and contingency plans.
- Assign someone to manage project risks.

3. TRACK AND MANAGE THE PROJECT

3.1 Collect Status

3.2 Plan and Take Adaptive Action

Staying on track once a project begins is an even greater challenge than developing the initial project plan. The purpose of the Track and Manage steps is to focus the project manager's and team's attention on the areas that provide the best information about project progress. In turn, with good information, the project manager and team can make better adaptive decisions to the dynamic changes that occur in all projects.

Key Questions for Collect Status

- How often will "collect status" be formally done?
- How will it be done?
- What information will be monitored?
- What decisions will be made?
- What actions will be taken?
- How will these decisions and actions be communicated?

The real payoff for good planning is superb "real time" management of the project. In fact, effective tracking provides so much focus and concentrated energy that teams often become highly enthusiastic and motivated by examining project progress and making timely project decisions. At the same time, not everyone likes to track a project. For them, tracking implies rigid accountability, excessive bureaucracy, and still more time allocated away from the work of the project. Tracking, for these people, is a nuisance and should be minimized or altogether ignored.

Reconciling these two seemingly opposed views is easy, however. If the tracking system is simple enough to take little time to maintain yet is powerful enough to provide the project manager and team with almost all of the data required to make effective decisions, tracking can be made efficient and even enjoyable. Such a simple system must focus only on the data that makes a difference to decision making, and surprisingly, that is not much data at all.

A good tracking system *collects status* information on only three, limited topics—schedule status, open issues, and risks:

Schedule status includes:

- Have tasks scheduled to start in this time period started?
- If not, why not and what can be done to get them started?
- Have tasks scheduled to finish in this time period finished?
- If not, why not and what can be done to get them finished?

Open issues include:

- What is the status of all open issues?
- What can be done to close them?
- Are there any new open issues?

Risks include:

- What is the status of the risk?
- Are there any new risks?

These three areas account for virtually all the project information required to effectively manage the project. And collecting the data for them is easy. They can be collected using voice mail, e-mail, or in meetings (though it is better to collect this information before the meetings and use the meetings to define problems and assign actions). Typically, status is collected weekly, though in short or particularly important projects it can be collected more often and in longer projects less often.

While there are certainly more complex and comprehensive tracking systems available, this one is typically sufficient for most needs.

Obviously, once the status is collected, the plan itself must be adjusted and *adaptive actions* must be taken. The decision making here is exactly like the decision making in the optimizing step. Typically the team can:

- Move items in the Is list to the Is Not list.
- Eliminate one or more of the major deliverables.
- Develop a different way to perform task work.
- Change the dependencies.
- Change the resources.
- Accept the new parameters.

Again, the essence of project management is making the difficult decisions based on substantive project data. These decisions occur throughout the life of the project.

Example: A project team for a consulting company had been commissioned to do a worldwide market study for a client that was introducing a significant new product line. At the time of the commission, a primary market of interest was Eastern Europe and the Soviet Union. But just when the team was supposed to begin the tasks associated with this portion of the project, there was an attempted coup in the Soviet Union, which accelerated the country's breakup. The tasks associated with the Eastern European and Soviet markets were delayed, and upon review, the team concluded that the value of doing the study under those conditions was minimal.

The consulting team and the client reviewed several options and decided to defer the Eastern Europe and Soviet portion of the study and concentrate on the Pacific Rim instead. While this represented a change in scope, schedule, and resources, it was the best business decision possible under the circumstances. The reports of task delays triggered some critical business decision making.

Key Actions For Collect Status and Take Adaptive Action

- Determine how frequently collect status will be collected.
- Determine how it will be collected (e-mail, meetings, etc.).
- Analyze impact of status on project.
- Take adaptive action.

3.3 Close-out the Project

Much learning occurs during a project that, if formally captured, will significantly improve project management in succeeding projects. The purpose of the Close-out the Project step is to formally capture key learning and reflections in the hope of improving future performance.

Key Questions for Close-out the Project

- What aspects of project management were effective?
- What aspects of might be improved?
- How might they be improved?
- Is all of the paperwork complete?
- Has the key learning been recorded in the project file?
- How will the key leanings be used in future projects?
- Has the project file been archived somewhere?
- How will you acknowledge and celebrate?

Project managers and team members are usually too busy with the next project to formally *close-out a project*. Yet this haste represents a lost opportunity for both personal and team growth and improvement. Teams that take the time (it can be as little as a few hours) to formally close-out the project are substantially more efficient in the next project.

Typical project close-out activities include:

- Assessment of practices that promoted project effectiveness.
- Assessment of practices that were not as effective as desired.
- Develop possible process improvements for future projects.
- Acknowledgment of people's contribution.
- Complete project paperwork.
- Archive the project file.

- Celebrate the project's completion.

In particular, the assessment of effective and less than effective practices, possible improvements, and the celebration often have a direct impact on efficiency in the next project.

Example: A project team at a paper company conducted a one-day "close-out" workshop during which members captured key learning on flipcharts, discussed options for improvement, generated an action plan, and had a great party. As a result, during the following week team members were feeling quite positive and began to systematically implement their process improvements.

Key Actions for Close-out the Project

- Conduct a formal debriefing.
- Complete paperwork and archive the project file.
- Acknowledge and reward team members' contributions.
- Celebrate project completion.

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Appendix: All Star Movie -- Project Definition Document

Introduction

This document presents a definition of the All Star Movie Project. It includes the following sections:

Project Objective Statement

Major Deliverables -- Definition

Major Deliverables -- Target Dates

Project Team Roster

Major Risks

Key Framework Processes

Together with the optimized project schedule plan, this Project Definition Document represents the engagement baseline. All changes will be applied to this baseline.

Project Objective Statement

Create and launch an action movie by June 1, 1997 at a cost of $35M.

Major Deliverable(s) -- Definition

Final Deliverable

The final deliverable for this project is a complete, edited, and launched movie. Is and Is Not lists for the final deliverable and each major deliverable are in the appendix.

Major Deliverables

There are three major deliverables for this engagement.

1. Comprehensive pre-production arrangements

The team will analyze all preproduction work required for the film. The team will create a written plan for executing the pre-production work. The plan will be approved by both the director and producer. The team will complete all pre-production work, including signing the "talent," finalizing the script, and hiring the production staff.

2. A rough cut of the movie

The team will complete initial production of the movie including on-location filming, in-studio filming, and initial editing. The producer and the director will both approve the rough cut.

3. A production ready cut of the movie

The team will finalize the movie for production. This will include re-shooting scenes as needed, sound editing, color correction, and testing with audiences. The producer and the director will both approve the final cut.

4. Limited launch of the movie

The team will conduct a limited launch of the movie into select movie theaters. The launch will include: production of 5000 copies, placement of advertisements in key publications, and scheduling of the stars on television "talk" shows. Depending on initial audience response, a more complete launch may follow.

Major Deliverables -- Target Dates

The following are the target dates for major deliverables. They will not be confirmed until the detailed project plan is completed, optimized, and validated by the producer, director and studio.

Major Deliverable	Target Date
Comprehensive pre-production arrangements	10/1/96
A rough cut of the movie	4/30/97
A production ready cut of the movie	7/31/97
Limited launch of the movie	10/31/97

Project Team Roster

Project Team

Clark Kent	Project Manager
Bruce Wayne	Director
Selena Kyle	Pre-production manager
Dick Tracy	Production manager

Sponsors

Erica Kane	Producer

Major Risks

A preliminary risk analysis identified the following "high" risks to the success of the engagement:

- Inability to "sign" a big name talent could reduce box office success.
- Location shooting could be slowed by wet weather.
- The script will not be complete on time.
- The script will have to be rewritten during the "shooting."
- The special effects lab will not be ready on time.

Key Framework Processes

Project File

The project file will be maintained by Clark Kent on location. The file will be backed-up every two weeks, with an archived copy kept at Vue Studios' headquarters.

Issues/Action Item/Change Tracking

The standard issues/action item/change log will be used. All issues/action items/changes will be recorded on the log and reviewed weekly.

Meetings

Meetings will be held the every Monday morning to review the status reports and identify new action items.

Appendix A -- Is and Is Not Lists for Movie Project

Deliverable #1. Comprehensive preproduction arrangements

Is	Is Not
♦ Signing major talent	♦ Signing extras
♦ Completing second draft of script	♦ Final script
♦ Arranging for locations, including travel plans to location	♦ Shipping of equipment to locations
♦ Signing production crew	♦ Starting production
♦ Approved by producer and director	
♦ Written production plan	

Deliverable #2. A rough cut of the movie

Is	Is Not
♦ Complete filming of movie	♦ Shooting of additional scenes
♦ Initial editing	♦ Color correction
♦ Screening by production crew	♦ Final edit
♦ Final script	♦ Audience tested
♦ Approved by producer and director	

Deliverable #3. A production ready cut of the movie

Is	Is Not
♦ Final edit	♦ Launched
♦ Color corrected	
♦ Sound corrected	
♦ Approved by producer, director, studio	
♦ Audience tested	

Deliverable #4. Limited launch of the movie

Is	Is Not
♦ Released to limited numbers of theaters	♦ General release
♦ Advertising in select publications	♦ General advertising
♦ Stars interviewing on talk shows	♦ European release
♦ Screenings for reviewers	
♦ 5000 copies produced	