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PROJECT SCHEDULING

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3.1 DEVELOPING THE PROJECT SCHEDULE

Can you imagine starting a long car trip to an unfamiliar destination without a map or navigation system? You're pretty sure you have to make some turns here and there, but you have no idea when or where, or how long it will take to get there. You may arrive eventually, but you run the risk of getting lost, and feeling frustrated, along the way.

Essentially, driving without any idea of how you're going to get there is the same as working on a project without a schedule. No matter the size or scope of your project, the schedule is a key part of project management. The schedule tells you when each activity should be done, what has already been completed, and the sequence in which things need to be finished.

Luckily, drivers have fairly accurate tools they can use. Scheduling, on the other hand, is not an exact process. It's part estimation, part prediction, and part 'educated guessing.'

Because of the uncertainty involved, the schedule is reviewed regularly, and it is often revised while the project is in progress. It continues to develop as the project moves forward, changes arise, risks come and go, and new risks are identified. The schedule essentially transforms the project from a vision to a time-based plan.

Schedules also help you do the following:

- They provide a basis for you to monitor and control project activities.
- They help you determine how best to allocate resources so you can achieve the project goal.
- They help you assess how time delays will impact the project.
- You can figure out where excess resources are available to allocate to other projects.
- They provide a basis to help you track project progress.

Project managers have a variety of tools to develop a project schedule - from the relatively simple process of action planning for small projects, to use of Gantt Charts and Network Analysis for large projects. Here, we outline the key tools you will need for schedule development.

2.2 3.1.1. Schedule Inputs:

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You need several types of inputs to create a project schedule:

- **Personal and project calendars** - Understanding working days, shifts, and resource availability is critical to completing a project schedule.
- **Description of project scope** - From this, you can determine key start and end dates, major assumptions behind the plan, and key constraints and restrictions. You can also include stakeholder expectations, which will often determine project milestones.
- **Project risks** - You need to understand these to make sure there's enough extra time to deal with identified risks - and with unidentified risks (risks are identified with thorough Risk Analysis).
- **Lists of activities and resource requirements** - Again, it's important to determine if there are other constraints to consider when developing the schedule. Understanding the resource capabilities and experience you have available - as well as company holidays and staff vacations - will affect the schedule.

A project manager should be aware of deadlines and resource availability issues that may make the schedule less flexible.

2.4 3.1.2. Scheduling Tools:

Here are some tools and techniques for combining these inputs to develop the schedule:

- **Schedule Network Analysis** - This is a graphic representation of the project's activities, the time it takes to complete them, and the sequence in which they must be done. Project management software is typically used to create these analyses - Gantt charts and PERT Charts are common formats.
- **Critical Path Analysis** - This is the process of looking at all of the activities that must be completed, and calculating the 'best line' - or critical path - to take so that you'll complete the project in the minimum amount of time. The method calculates the earliest and latest possible start and finish times for project activities, and it estimates the dependencies among them to create a schedule of critical activities and dates.

- **Schedule Compression** - This tool helps shorten the total duration of a project by decreasing the time allotted for certain activities. It's done so that you can meet time constraints, and still keep the original scope of the project. You can use two methods here:
- **Crashing** - This is where you assign more resources to an activity, thus decreasing the time it takes to complete it. This is based on the assumption that the time you save will offset the added resource costs.
- **Fast-Tracking** - This involves rearranging activities to allow more parallel work. This means that things you would normally do one after another are now done at the same time. However, do bear in mind that this approach increases the risk that you'll miss things, or fail to address changes.

3.2 PROJECT MANAGEMENT SOFTWARE TOOLS

There are many project scheduling software products which can do much of the tedious work of calculating the schedule automatically, and plenty of books and tutorials dedicated to teaching people how to use them. However, before a project manager can use these tools, he should understand the concepts behind the work breakdown structure (WBS), dependencies, resource allocation, critical paths, Gantt charts and earned value. These are the real keys to planning a successful project.

2.5 3.2.1. Allocate Resources to the Tasks:

The first step in building the project schedule is to identify the resources required to perform each of the tasks required to complete the project. A resource is any person, item, tool, or service that is needed by the project that is either scarce or has limited availability.

Many project managers use the terms “resource” and “person” interchangeably, but people are only one kind of resource. The project could include computer resources (like shared computer room, mainframe, or server time), locations (training rooms, temporary office space), services (like time from contractors, trainers, or a support team), and special equipment that will be temporarily acquired for the project. Most project schedules only plan for human resources—the other kinds of resources are listed in the resource list, which is part of the project plan.

One or more resources must be allocated to each task. To do this, the project manager must first assign the task to people who will perform it. For each task, the project manager must identify one or more people on the resource list capable of doing that task

and assign it to them. Once a task is assigned, the team member who is performing it is not available for other tasks until the assigned task is completed. While some tasks can be assigned to any team member, most can be performed only by certain people. If those people are not available, the task must wait.

2.6 3.2.2. Identify Dependencies:

Once resources are allocated, the next step in creating a project schedule is to identify dependencies between tasks. A task has a dependency if it involves an activity, resource, or work product that is subsequently required by another task. Dependencies come in many forms: a test plan can't be executed until a build of the software is delivered; code might depend on classes or modules built in earlier stages; a user interface can't be built until the design is reviewed. If Wideband Delphi is used to generate estimates, many of these dependencies will already be represented in the assumptions. It is the project manager's responsibility to work with everyone on the engineering team to identify these dependencies. The project manager should start by taking the WBS and adding dependency information to it: each task in the WBS is given a number, and the number of any task that it is dependent on should be listed next to it as a predecessor. The following figure shows the four ways in which one task can be dependent on another.

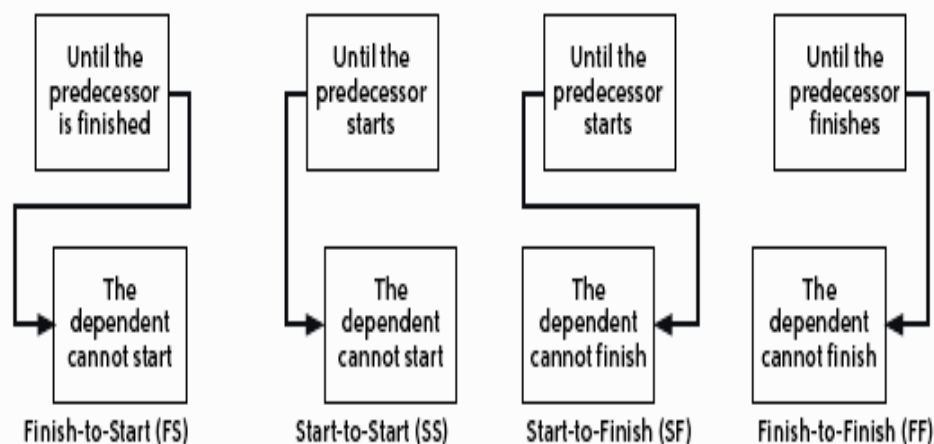


Figure 3.1: Task Dependency

2.7 3.2.3 Create the Schedule:

Once the resources and dependencies are assigned, the software will arrange the tasks to reflect the dependencies. The software also allows the project manager to enter effort and duration information for each task; with this information, it can calculate a final date and build the schedule.

The most common form for the schedule to take is a Gantt chart. The following figure shows an example:

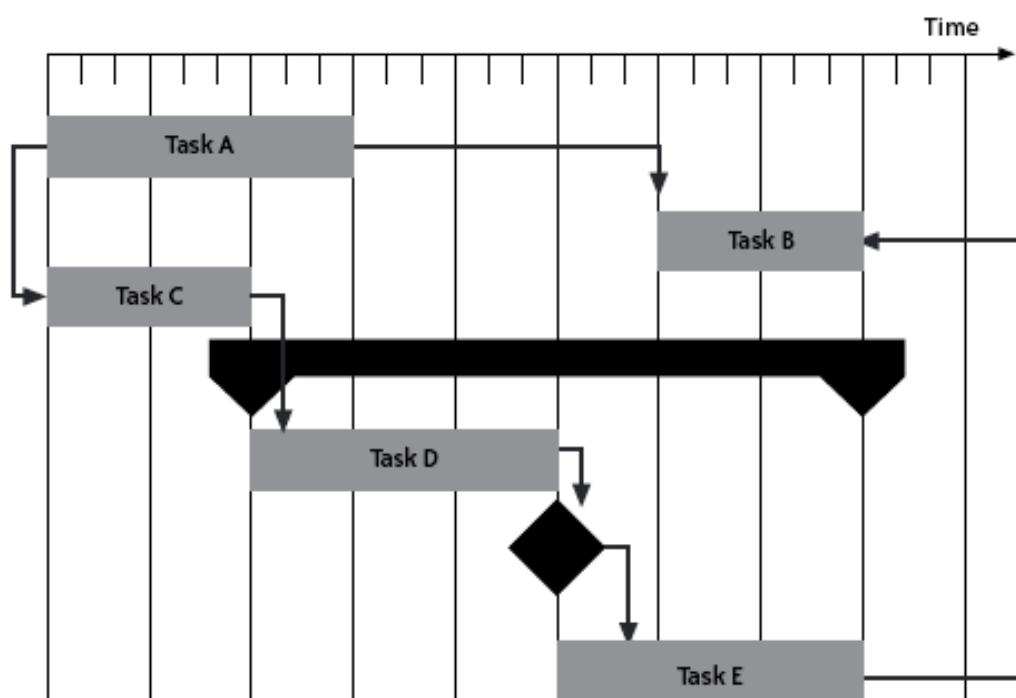
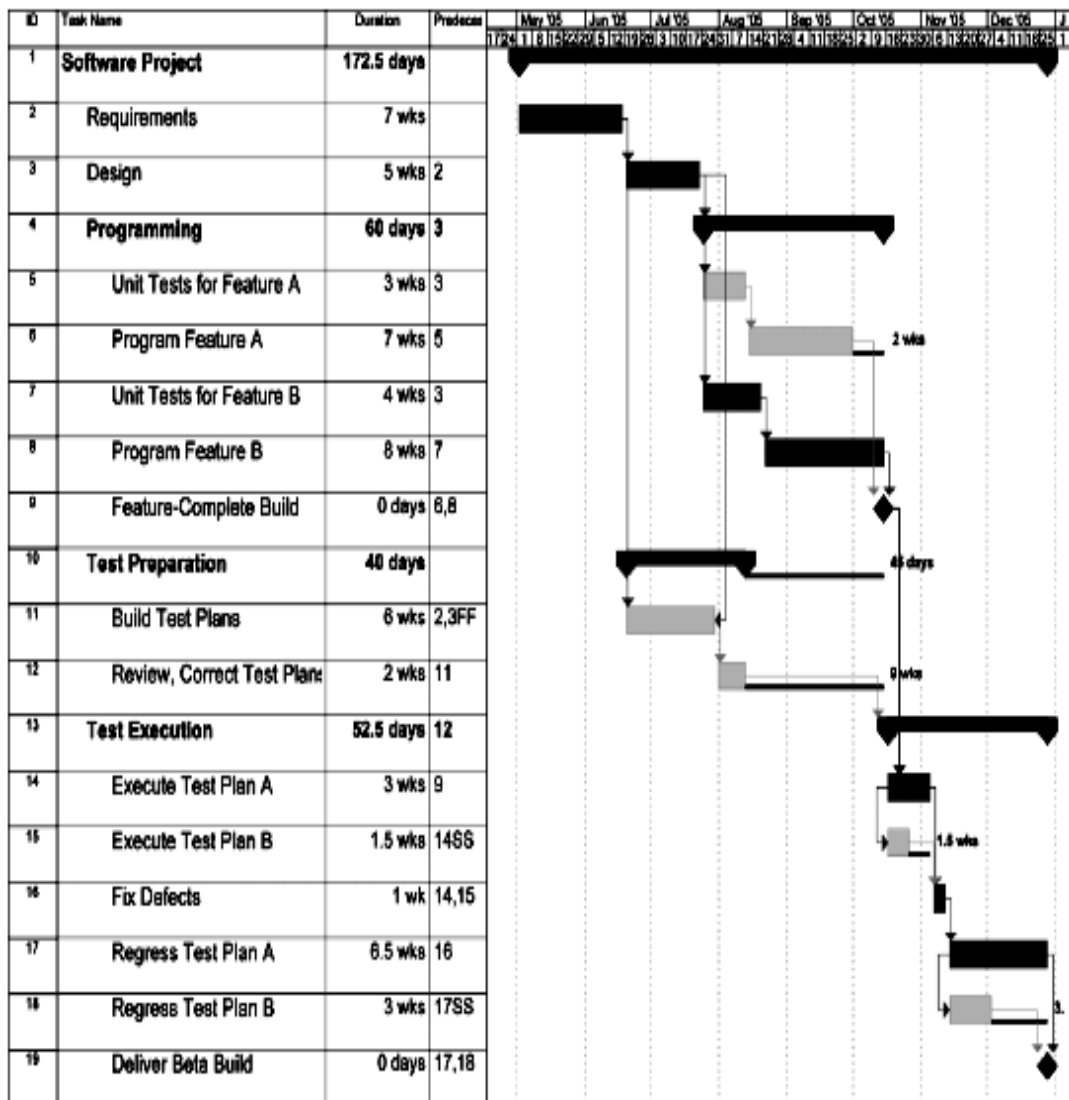


Figure 3.2: Gantt Chart

Each task is represented by a bar, and the dependencies between tasks are represented by arrows. Each arrow either points to the start or the end of the task, depending on the type of predecessor. The black diamond between tasks D and E is a milestone, or a task with no duration. Milestones are used to show important events in the schedule. The black bar above tasks D and E is a summary task, which shows that these tasks are two subtasks of the same parent task. Summary tasks can contain other summary tasks as subtasks. For example, if the team used an extra Wideband Delphi session to decompose a task in the original WBS into subtasks, the original task should be shown as a summary task with the results of the second estimation session as its subtasks.

The following figure shows an example of a Gantt chart created in Microsoft Projects :



6 3.2.4 RISK PLAN

A *risk plan* is a list of all risks that threaten the project, along with a plan to mitigate some or all of those risks. Some people say that uncertainty is the enemy of planning. If there were no uncertainty, then every project plan would be accurate and every project would go off without a hitch. Unfortunately, real life intervenes, usually at the most inconvenient times. The risk plan is an insurance policy against uncertainty.

Once the project team has generated a final set of risks, they have enough information to estimate two things: a rough estimate of the probability that the risk will occur, and the potential impact of that risk on the project if it does eventually materialize. The risks

must then be prioritized in two ways: in order of probability, and in order of impact. Both the probability and impact are measured using a relative scale by assigning each a number between 1 and 5.

These numbers are arbitrary; they are simply used to compare the probability or impact of one risk with another, and do not carry any specific meaning. The numbers for probability and impact are assigned to each risk; a priority can then be calculated by multiplying these numbers together. It is equally effective to assign a percentage as a probability (i.e. a risk is 80% likely to occur) and a real duration for impact (i.e. it will cost 32 man-hours if the risk occurs). However, many teams have trouble estimating these numbers, and find it easier to just assign an arbitrary value for comparison.

Many people have difficulty prioritizing, but there is a simple technique that makes it much easier. While it's difficult to rank all of the risks in the list at once, it is usually not hard to pick out the one that's most likely to occur. Assign that one a probability of 5. Then select the one that's least likely to occur and assign that one a probability of 1. With those chosen, it's much easier to rank the others relative to them. It might help to find another 5 and another 1, or if those don't exist, find a 4 and a 2. The rest of the probabilities should start to fall in place. Once that's done, the same can be done for the impact.

After the probability and impact of each risk have been estimated, the team can calculate the priority of each risk by multiplying its probability by its impact. This ensures that the highest priority is assigned to those risks that have both a high probability and impact, followed by either high-probability risks with a low impact or low-probability risks with a high impact. This is generally the order in which a good project manager will want to try to deal with them: it allows the most serious risks to rise to the top of the list.

This can be very easily done using tools like Microsoft Project or even by using any spreadsheet package that provides some basic statistical functions.

3.3 DEVELOPING THE PROJECT BUDGET.

If scheduling is an art then costing could be considered a black art. Some projects are relatively straightforward to cost but most are not. Even simple figures like the cost per man/hour of labour can be difficult to calculate.

Accounting, costing and budgeting are extensive topics in themselves. Some fundamental principles to keep in mind are derived from accounting practices:

- The concept of 'prudence' – you should be pessimistic in your accounts (“anticipate no profit and provide for all possible losses”). Provide yourself with a margin for error and not just show the best possible financial position. It's the old maxim: promise low-deliver / high once again
- The 'accruals' concept- revenue and costs are accrued or matched with one another and are attributed to the same point in the schedule. For example if the costs of hardware are in your budget at the point where you pay the invoice, then ALL the costs for hardware should be “accrued” when the invoice is received.
- The 'consistency' concept. This is similar to accruals but it emphasises consistency over different periods. If you change the basis on which you count certain costs you either need to revise all previous finance accounts in line with this or annotate the change appropriately so people can make comparisons on a like-for-like basis.

Note that the principles are listed in order of precedence. If the principle of consistency comes into conflict with the principle of prudence, the principle of prudence is given priority.

3.3.1 Costing:

At a basic level the process of costing is reasonably simple. You draw up a list of all your possible expenditure and put a numerical value against each item; the total therefore represents the tangible cost of your project. You may also however need to consider “intangible” items.

Tangible costs:

- **Capital Expenditure** – any large asset of the project which is purchased outright. This usually includes plant, hardware, software and sometimes buildings although these can be accounted for in a number of ways.
- **Lease costs** – some assets are not purchased outright but are leased to spread the cost over the life of the project. These should be accounted for separately to capital expenditure since the project or company does not own these assets.
- **Staff costs** – all costs for staff must be accounted for and this includes (but is not limited to): salary and pension (superannuation)

costs; insurance costs; recruitment costs; anything which can be tied directly to employing, training and retaining staff.

- **Professional services** –all large-scale projects require the input of one or more professional groups such as lawyers or accountants. These are normally accounted for separately since a close watch needs to be kept upon expenditure in this area. Without scrutiny the costs of a consultant engineer, accountant or lawyer can quickly dwarf other costs.

- **Supplies and consumables** – regular expenditure on supplies is often best covered by a single item in your budget under which these figures are accrued. They are related to overhead below.

- **One-off costs** – one-off costs apply to expenditure which is not related to any of the above categories but occurs on an irregular basis. Staff training might be an example. While it might be appropriate to list this under staff costs you might wish to track it independently as an irregular cost. The choice is yours but the principles of prudence and consistency apply.

- **Overheads** – sometime called indirect costs, these are costs which are not directly attributable to any of the above categories but never-the-less impact upon your budget. For example it may not be appropriate to reflect the phone bill for your project in staff costs, yet this still has to be paid and accounted for. Costing for overheads is usually done as a rough percentage of one of the other factors such as “staff costs”.

Intangible costs

It has become fashionable to account for “intangible” assets on the balance sheets of companies and possibly also projects. The argument goes like this: some contributions to a project are extremely valuable but cannot necessarily have a tangible value associated with them. Should you then account for them in the budget or costing? The “prudence” principle says yes but practicality says “no”. If you are delving this murky area of accountancy you should seek professional help and advice.

Typical things you might place in the budget under intangibles are “goodwill” and “intellectual property”. Personnel-related figures are a frequent source of intangible assets and so you might find things like “management team”, “relationships” and “contacts” on an intangibles balance sheet.

3.3.2 Budgeting:

Once you have costed your project you can then prepare an appropriate budget to secure the requisite funds and plan your cash

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flow over the life of the project. An accurate cost model will of course entail a fairly detailed design or at the very least requirement specification so that you can determine your scope of work. This is normally completed well into the design phase of the project.

You must be extremely careful with initial estimates and always follow the “promise low / deliver high” commandment.

Costing and budgeting follow the iterative life cycle as do other tasks within the project. As you refine your design, so you will need to refine the costing which is based upon it.

As in scheduling, you need to build in adequate contingency (reserves) to account for unexpected expenditure. For example, if due to a failure in the critical path a task is delayed and a milestone (like software purchase) falls due in the month after it was scheduled. This can wreck your carefully planned cash flow. But if you have carefully budgeted your project then variations should be relatively easy to spot and cope with as they arise.

Just as in scheduling you should have regular budget reviews which examine the state of your finances and your expenditure to date and adjust the planned budget accordingly.

Regardless of circumstance, a number of basic philosophies can help your budgeting immensely by protecting it from subjective review. By understanding concepts, and making sure that everyone involved understands them, you'll be on the right track to an accurate projection:

- Project costs and project budgets are two different things. Always start by identifying project costs.
- Project costs are not defined solely in monetary amounts. Include actual amounts, with shipping and taxes, for software or hardware purchases that must be made. If you're pro-rating the costs of using pre-existing hardware and software tools, include it in number of hours. Likewise, developer effort costs are recorded in hours, not dollars.
- Once you've laid out your costs, identify your risks and assign a percentage reflecting how much each risk factor may affect the project as a whole, or a portion of the project. Each development team should have a risk value assigned to it, to cover reasonable costs such as hiring the occasional contractor to get a timeline under control, unforeseen overtime, and so on.
- Your budget, then, is the total of the costs, as transcribed into a monetary figure, plus the total risk percentage of that

cost. Define conversion values that you use to represent equipment pro-rating and development times.

- Your budget is not an invoice. Once you've determined the hard figures involved, leave it up to your company's business representatives to make adjustments for profits. Make sure they understand your figures reflect actual costs.
- A budget should always be labeled as an estimate, until it is finalized and approved. This helps to manage expectations and prevent miscommunications from being written in stone.
- A single person does not create a budget. At the very least, all of the following should be consulted: lead developer, project manager, and a business-side driver.

3.4 MONITORING AND CONTROLLING THE PROJECT

To appreciate how project control works you must first understand that, despite all the effort devoted to developing and gaining commitment to a plan, there is little chance that the resulting project will run precisely according to that plan.

This doesn't mean that you will fail to achieve the objectives of the plan – on the contrary, you must have a very high level of confidence that you can achieve those objectives and deliver the full scope, fit for purpose, on time and to budget.

The plan describes what you would like to do but it models just one of the infinite number of routes from where you are now to where you want to be. In practice your project will follow a different route to the one shown in your plan, you don't know which one, but you will need control to make sure it is a route that takes you to where you need to be, when you need to be there, and at a cost you can afford.

The power of the plan is that it gives you a baseline against which you can compare actual achievement, cost and time and determine the amount of deviation from plan and hence take corrective action if required.

The essential requirement for control is to have a plan against which progress can be monitored to provide the basis for stimulating management action if the plan is not being followed. Control then becomes a regular, frequent iteration of: Creating the right environment for control.

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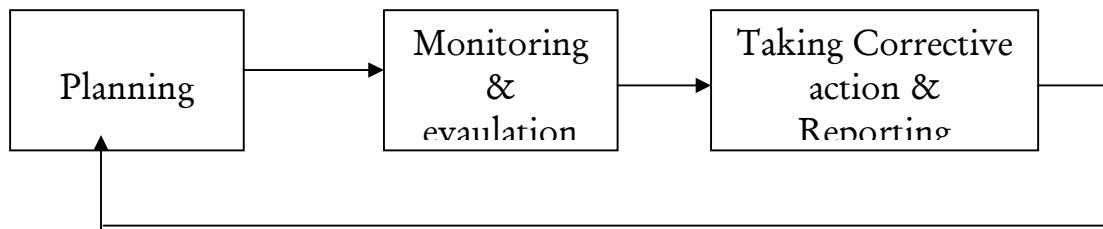


Figure 3.4 : Project Control

The basic requirements for control are:

a plan that is:

- realistic
- credible
- detailed enough to be executed
- acceptable to those who must execute it (Project Manager and Project Teams)
- approved by those who are accountable for its achievement (the SRO/ Project Board);

- a process for monitoring and managing progress and resource usage;
- a project management organisation of appropriately skilled people with sufficient authority and time to plan, monitor, report, take decisions and deal with exceptions;
- a process to make minor corrections and adjustments to deal with minor deviations and omissions from the plan;
- the commitment of those who will provide the resources indicated in the plan (SRO, Project Board, Stakeholders and resource 'owners' in the parent organisation and its related agencies);
- explicit authority to proceed granted by those who are accountable for the project.

In all but the smallest or shortest projects you should think about how to break your project into manageable 'chunks' called stages. Every project will have a minimum of two stages – the first being Project Initiation. A large project may have a number of stages, each of which has its own stage plan. When designing your project's stage structure look for points where the Project manager should:

- review achievements to date and assess project viability
- take key decisions outside the level of authority of the Project Manager

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- approve a more detailed plan for the next phase of work commit resources in accordance with the project or stage plan
- assess the impact of some significant external event that will influence the project (eg: legislation, decision point in other project, review of business operation).

The Project Manager will also be able to identify stage boundaries by thinking about how far ahead is it sensible to plan in the fine detail needed for day to day control. In practice, the detailed plan for a stage will be produced towards the end of the preceding stage, when the information needed for planning is available.

3.4.1 Checkpoints:

Checkpoint reports are produced by team managers / leaders for the Project Manager who needs to have early warning of deviations from plan and other problems affecting the project team. Checkpoints provide regular, frequent comparison of actual progress, resource usage and forecasts against plans. They provide information for the Project Manager to apply control, eg by correcting small deviations from the plan. The basic purpose of a checkpoint is to answer the questions:

- 'What is going according to plan?'
- 'What is not going to plan?'
- 'What is likely not to go to plan?'

Checkpoints are essential controls – missed checkpoints are usually an early sign of a failing project. The information gathered at checkpoints should be documented in Checkpoint Reports and used in the preparation of Highlight Reports.

3.4.1.1 Checkpoint design:

There are many different ways of conducting Checkpoints - they might be, but do not have to be, achieved through written reports and meetings. Each project must use an approach that balances the need for communication and control against too much management interference in work in progress. Checkpoint design will cover:

- Frequency of reporting
- Timing (eg: time and day of week)
- Information required from team members (oral reports, timesheets, written reports)
- Method of conducting checkpoint (eg informal chats, formal meetings, phone, fax, email)

- Participation (Project Manager? Project Assurance? Team Members? Suppliers?)
- Content of a report to be used to communicate the findings of the Checkpoint.

The Project Manager should set Checkpoint frequency depending on the intensity of activity. Checkpoint frequencies ranging from fortnightly (eg during procurement phases) down to daily (eg during implementation and training) are possible within the same project.

3.4.2 Handling significant deviations from plan:

Project Board members are usually senior managers with limited time to devote management of the project. In order to achieve 'management by exception' the Project Manager should be given authority to deal with the inevitable small deviations from plan. For larger deviations, such as those resulting from requests for change, poor estimation, delays in deliveries by external agencies. The Project Manager will require an agreed exception handling process. This will involve:

- Setting delegated limits (eg. cost and time 'Tolerances'): The Project Board should set limits to the allowable deviations from planned cost and schedule so that the Project Manager knows how much delegated authority is available to manage deviations from plan;
- Exception reporting: The Project Manager may use an exceptional Highlight Reports to notify any forecast (or actual) deviations from plan beyond delegated limits. Positive sorts of exception should also be reported in this way eg: finishing work early or using less resource than planned.
- Exception planning and decision making: The management may wish the Project Manager to create a new plan to replace the current one if it is no longer viable. This plan would be submitted for a decision to proceed.

3.4.3 Monitoring System Performance:

A potential problem when software systems are involved is the potential of the systems not being able to handle increased volumes of data in the future. To take care of this, performance monitoring should be a part of all softwares that are likely to grow in size, identifying potential future bottlenecks in the system, including lack of disk space, lack of processing power, approaching transaction limits, long before they become a problem, so corrective action can be taken.

This process is very complex because softwares will grow in size due to systems being installed incrementally (e.g., they may be installed at a pilot location first) and due to future increases in number of customers over time. It is also complex because new technology may become available that handles greater capacity but that will incur additional costs to the organization to implement. It is proposed that information required for this planning be kept in a Performance and Adaptability Plan document that identifies future projections of increases in number of customers handled by the software, bottlenecks identified so far, and contingency plans for resolving anticipated future performance problems. The Performance and Adaptability Plan document would be used by business planners who would project increases in numbers of customers, performance monitors who identify bottlenecks in systems, and capacity planners who would identify requirements for changes to hardware and or system software.

3.5. THE PROJECT COMMUNICATION PLAN

Good communications among all stakeholders is key for the success of a project. It's important to ensure your project team develops a communication plan so that lack of communication does not derail your goals.

Even though you may have identified and analyzed your stakeholders and determined the most effective communications vehicles – without a well developed and implemented communication plan, you may have a recipe for disaster. So how do you develop a communication plan to ensure your project's success?

Following are the two types of communication plans to support and enhance communications throughout your project. As discussed in previous installments, the first step in building your plan is to identify your project stakeholders and determine the best communications vehicle. Next, you build your plan.

3.5.1 Two Types of Communications Plans for Your Project:

For all sized projects, a well-structured communications plan is a must from the beginning. Projects offer multiple opportunities for communications to your key stakeholders, and we recommend exploring two types of communication plans for your project to exploit these opportunities.

1. Regular or Ongoing Communication Plan
2. One-time or Event-driven Communication Plan

3.5.2 Building Your Plan:

Regular or Ongoing Communications:

Regular, or ongoing, communications include those opportunities you have to communicate to your project team members, sponsors, steering committee members, and other key stakeholders on a regular basis. These types of communication could include your regular status reports, scheduled project team meetings, monthly updates with the steering committee, or regularly scheduled campus updates on a project. Use your stakeholder analysis to develop these routine and ongoing communications for the project.

Review this plan at regular intervals (quarterly) to ensure that you are adequately communicating to those stakeholders who are closest to the project. The chart on the next page provides an example of the types of communications to consider for your regular and ongoing communications. Don't forget to include your regular meetings and even one-on-ones that you may have with your sponsor.

Communications	Purpose	Audience	Author	Communication vehicle location	Frequency
Monthly status reports to management	To keep senior leadership informed about the projects progress	Steering committee Executive committee	Project Manager	- E-mails - Website postings	Monthly
Weekly schedule	Monitor the progress and report.	Project management team	Project Manager	-E-mails - postings on website - meetings	Weekly
Project Team calendar	Keep project participants aware of the key project deadlines to help them manage their schedule	Project participants Steering committee	Project coordinator	Postings in the respective members folder	As and when needed.

Figure 3.5 : Sample communication plan

One-time or Event-driven Communications:

During the life of any project, opportunities arise for one-time or event-driven communications. Work with your project team to identify those opportunities, like the example timeline. This plan could also include critical issues sessions, vendor meetings, training schedules, and roll-out schedules.

To gain the most advantage from the communications opportunities for your project, review this portion of your communication plan every month with your project team. Review the past month, and then look forward at least six months to ensure that as your project plan changes, you are able to capitalize on every communication opportunity.

When developing your communications plan keep in mind that the key is to always have the receiver as the focal point—not the sender. Make your communications deliberate and focused. By making sure that your plan is clear and thoroughly outlined, you can help reduce the number of problems and surprises that pop-up and have a project as successful as a perfect soufflé.

3.6 PROJECT METRICS

Metrics are a set of quantifiable parameters which are used to measure the effectiveness of a project or undertaking. Values are obtained for the parameters for multiple instances of the same entity and they are compared and interpreted as to the change in the effectiveness. For example, if there are multiple versions of a product, one metric could be the user satisfaction level (say 1 to 5, 1 being least happy and 5 being very happy) with the user interface for each of the versions. The effectiveness of the changes in the user interface can be measured by the satisfaction level of the users with each of the versions.

Project metrics are in-process or project execution measures that are collected, analysed and used to drive project process improvement.

6.1.1 3.6.1 Reasons for Project Metrics:

Project metrics require time and effort and so that work is done for usually one of these reasons:

- To provide clear and tangible project status information about project schedule and cost
- To identify areas for project process improvement
- To demonstrate the results of process improvement efforts

- To collect a database of project metrics to analyse trend information or provide historic comparators and perhaps used for parametric estimates

To collect project metrics without a clear plan of future action to use those metrics is simply wasting time and effort. In short, only collect project metrics that will be used to drive project process improvements.

6.1.2 3.6.2 Key Project Metrics:

Senior management will often wish to see regular reports of project progress against time and cost measures. Some project management methodologies go into some detail with these metrics including planned versus forecast, cost variance, schedule variance and earned value. However, more generally, key project management metrics include:

- Schedule - delivery date and slippage in days from original delivery date
- Cost - actual budget versus original budget
- Resource - effort, how much time people have used on the project
- Scope - changes to project as measured through number and type of controlled changes made
- Quality - quality defects and documentation
- Software - a specialised subject with many potential measures such as lines of code, code complexity and function point
- Defects - number and type of problems or issues recorded for the technology project during its test stage and warranty period or a defined time period

Other metrics associated with normal operation such as availability, performance or support call resolution properly belong with service metrics rather than project metrics.

Project metrics selected should reflect the voice of the customer (customer needs), as well as ensure that the internal metrics selected by the organization are achieved. Metrics selected should be simple and straightforward and meaningful. Metrics selected should create a common language among diverse team members.

When drafting metrics for a particular project one should consider how the metrics are connected and related to key

business metrics. Typically there is no one metric that fits all the requirements for a particular situation.

3.6.3 Developing Project Metrics:

The most common approach used by teams is to understand the problem statement, brainstorm metrics, and finally decide what metrics can help them achieve better performance. The team then reviews these metrics with executive management to ensure that they are in synergy with the overall strategy of the business, and an iterative approach may be utilized.

Care should be exercised in determining what is measured. Metrics should be based on what, in fact, needs to be measured to improve the process, rather than what fits the current measurement system. Metrics need to be scrutinized from the value they add in understanding a process.

3.7 REPORTING PERFORMANCE & PROGRESS

Performance reporting involves collecting, processing and communicating information to key stakeholders, regarding the performance of the project. Performance reporting can be conducted using various tools and techniques, most of which have been already described in the previous paragraphs. The most widely used techniques for performance reporting are:

Performance review meetings that take place to assess the project's progress or/and status

Variance analysis which is about comparing actual project results (in terms of schedule, resources, cost, scope, quality and risk) against planned or expected ones.

Earned Value Analysis (EVA) used to assess project performance in terms of time (schedule) and cost (or resources).

Financial and Output Performance Indicators used to measure financial and physical progress of the project

Information of project's performance is usually communicated via **Progress Reports** and **Project Status Reports** which are described in the paragraphs below.

The Progress Report is a document prepared by the Project Team members (in case of in-house production) or by the Management Team of the Contractor (in case that the implementation of the project is totally outsourced) to provide

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regular feedback to the Project Manager regarding the progress of the project. Progress reports should be submitted on a regular basis to enable the Project Manager to update the Activities Schedule, identify any schedule problems or potential problems and act proactively for their resolution. Progress Reports are usually asked to be submitted every two weeks or every month, when the project is implemented with own resources. However, in case that the project is implemented by a Contractor, the progress reports are usually asked every three or six months. Generally, a Progress Report should include the following information:

- Reporting period to which it refers
- Project Title
- Project Manager's name
- Authors of the report
- Date of submission
- Project synopsis (i.e. project goals and objectives, expected results, project activities, duration, etc.)

Project progress in the reporting period (i.e. activities/ tasks executed, actual work accomplished, deliverables submitted, deviations for baseline schedule, estimation of the effort required to complete activities/ tasks)

Work programme for the following reporting period (i.e. activities/ tasks to be executed, deliverables to be submitted, schedule estimates for key milestones, etc.)

Updated/ revised Activities Schedule showing the percentage of work completed so far and the estimated start or finish dates for activities/ tasks.

It should be noted that in case of small projects with only few team members, the Progress Report can be substituted by personal judgment and observations of the Project Manager or by day-to-day discussions with the team members on the progress of the deliverables. On the contrary, in case of large and complex projects, where progress reporting is an important aspect of communication management, the Progress Reports should be formally submitted to the Project Manager by the Team Manager(s) (or by the Contractor), who have to prepare them by collecting the relative progress information from individual team members.

3.7.1 Project Status Report:

The **Project Status Report** is a document prepared by the Project Manager - using the information provided by the Progress Reports - to present the status of the project to key stakeholders, including the Project Steering Committee, the Project Owner and

the Funding Agency. Depending on the duration and size of the project, as well as on specific communication requirements of the Project Owner or/and the Funding Agency, the Status Report can be prepared monthly, quarterly or biannually. Usually, Status Reports are prepared with the same or less frequency than Progress Reports since they require input from them.

The aim of the Project Status Report is to:

- Provide an overview of project's progress up to date
- Ensure that the key stakeholders are regularly informed on the progress of the project
- Inform the key stakeholders about issues that require immediate action or resolution

Normally the Status Report becomes the point of discussion for the Status Meeting, which is a regularly scheduled event, where the Project Manager presents the status of the project to the Steering Committee (and maybe to the Project Owner or /and the Funding Agency). In these meetings the Project Manager can invite members of the Project Team who have expertise in a certain area of the discussion. It is, however recommended that the Project Manager invites periodically the Project Team to review the status of the project, discuss their accomplishments and communicate any issues or concerns in an open, honest and constructive forum. On large projects where gathering the entire team is not always possible, the Project Team members can be represented in the meeting by the respective Team Manager(s), who can communicate the status of their team work since they have a better insight into the day-to-day activities of their team members.

