



LEONARDO DA VINCI - TRANSFER OF INNOVATION

PROJECT MANAGEMENT



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PROJECT MANAGEMENT

1 SME 1.0: Project Management conclusions

Projects and project management in SMEs make a significant contribution to the economy. SMEs represent a significant proportion of the private sector economy in most European countries, and on average SMEs spend one-third of their turnover on projects. Thus, projects in SMEs represent a high proportion of the private sector economy in Europe.

It is important that this money should be well spent.

From the analysis of the use of projects, project management and project tools, the SME 1.0 Project concluded that:

- SMEs do require "lite" versions of project management;
- simplified tool sets easier to use than the more traditional versions designed for medium-sized or large projects;
- different versions of these tools for medium, small and micro projects.

The Project also identified that for all firms the important success factors are client consultation; planning, monitoring and control; and resource allocation. In firms, from the service industry, senior management support and risk management are also important.

This is of interest to researchers, trainers and consultants challenged with the development of "lite" versions of project management for SMEs. Different versions may also be required for different industries.

This conclusion will also be of interest to practitioners, since it may confirm what they already know, that they should be selective with respect to the level of project management required, dependent on the size of their projects and the industry they come from.

The results form the basis of suggested SME 1.0 research, to develop a "lite" version of project management capable of specialisation.

The following lecture notes focus on the main elements of project management from an SME's project manager's point of view.

2 Definition of project

A Project has distinctive attributes, which distinguish it from ongoing work or business operations.

Projects are temporary in nature. They are not an everyday business process and have definitive start dates and end dates. This characteristic is important because a large part of the project effort is dedicated to ensuring that the project is completed at the appointed time. To do this, schedules are created showing when tasks should begin and end. Projects can last minutes, hours, days, weeks, months or years.

Projects exist to bring about a product or service that hasn't existed before. In this sense, a project is unique. Unique means that: this is new; this has never been done before. Maybe it's been done in a very similar fashion before but never exactly in this way.

In contrast with Projects, Operations are ongoing and repetitive. They involve work that is continuous, without an ending date, and you often repeat the same processes and produce the same results. The purpose of Operations is to keep the organization functioning while the purpose of a Project is to meet its goals and to conclude. Therefore, Operations are ongoing while Projects are unique and temporary.

The project is completed when its Goals and Objectives are accomplished.

It is these Goals that drive the project and all the planning and implementation efforts undertaken to achieve them. Sometimes projects end when it is determined that the Goals and Objectives cannot be accomplished or when the product or service of the project is no longer needed and the project is cancelled.

The temporary nature of projects indicates a definite beginning and end. The end is reached when the project's Objectives have been achieved or when the project is terminated because its objectives will not or cannot be met, or when the need for the project no longer exists.

Examples of projects:

- A project might involve establishing a new product or service, developing an existing product or service or discontinuing a product or closing a service that is no longer required.
- A project might arise from recognition of new needs of customers or service users or from an opportunity that is expected to deliver benefits to the organisation.
- Projects might also arise from a new organisational requirement, for example, as a response to a change in legislation that requires changes in employment systems or in health and safety procedures. In such a case, the project could be investigating the extent of change necessary and reporting recommendations to a decision-making body or the implementation of the change to the point where routine working could be resumed. (The routine work that followed the change would no longer be a project.)

3 What is Project Management?

Project Management is the application of knowledge, skills, tools, and techniques applied to project activities in order to meet the project requirements. Project management is a process that includes planning, putting the project plan into action, and measuring progress and performance.

Managing a project includes:

- identifying your project's requirements;
- writing down what everyone needs from the project.

What are the objectives for your project? When everyone understands the goal, it's much easier to keep them all on the right path. Make sure you set goal and the objectives that everyone agrees on to avoid team conflicts later on. Understanding and addressing the needs of everyone affected by the project means the end result of your project is far more likely to satisfy your stakeholders, and last but not least, as project manager you will also be balancing the many competing project constraints.

On any project, you will have a number of competing project constraints that are competing for your attention. They are cost, scope, quality, risk, resources and time.

- Cost is budget approved for the project including all necessary expenses needed to deliver the project. Within organizations, project managers have to balance between not running out of money and not under spending because many projects receive funds or grants that have contract clauses with an "use it or lose it" approach to project funds. Poorly executed budget plans can result in a last minute rush to spend the allocated funds. For virtually all projects, cost is ultimately a limiting constraint; few projects can go over budget without eventually requiring a corrective action.
- Scope is what the project is trying to achieve. It entails all the work involved in delivering the project outcomes and the processes used to produce them. It is the reason and the purpose of the project.
- Quality is the standards and criteria to which the project's products must be delivered for them to perform effectively. First, the product must perform to provide the functionality expected, and to solve the problem, and deliver the benefit and value expected of it. It must also meet other performance requirements, or service levels, such as availability, reliability and maintainability, and have acceptable finish and polish. Quality on a project is controlled through quality assurance (QA) that is the process of evaluating overall project's performance on a regular basis to provide confidence that the project will satisfy the relevant quality standards.
- Risk is defined by potential external events that will have a negative impact on your project if they occur. Risk refers to the combination of the probability the event will occur and the impact on the project if the event occurs. If the combination of the probability of the occurrence and the impact to the project is too high, you should identify the potential event as a risk and put a proactive plan in place to manage the risk.
- Resources are required to carry out the project tasks. They can be people, equipment, facilities, funding, or anything else capable of definition (usually other than labor) required for the completion of a project activity.
- Time is defined as the time to complete the project. Time is often the most frequent project oversight in developing projects. This is reflected in missed deadlines and incomplete deliverables. Proper control of the schedule requires the careful identification of tasks to be

performed, an accurate estimation of their durations, the sequence in which they are going to be done, and how people and other resources are allocated. Any schedule should take into account vacations and holidays.

There are three key dimensions to a project:

- cost or budget;
- time;
- quality;

and these have to be balanced to manage a project successfully.

In this triangle, each side represents one of the constraints (or related constraints) wherein any changes to any one side cause a change in the other sides. The best projects have a perfectly balanced triangle. Maintaining this balance is difficult because projects are prone to change. For example, if scope increases, cost and time may increase disproportionately. Alternatively, if the amount of money you have for your project decreases, you may be able to do as much, but your time may increase.

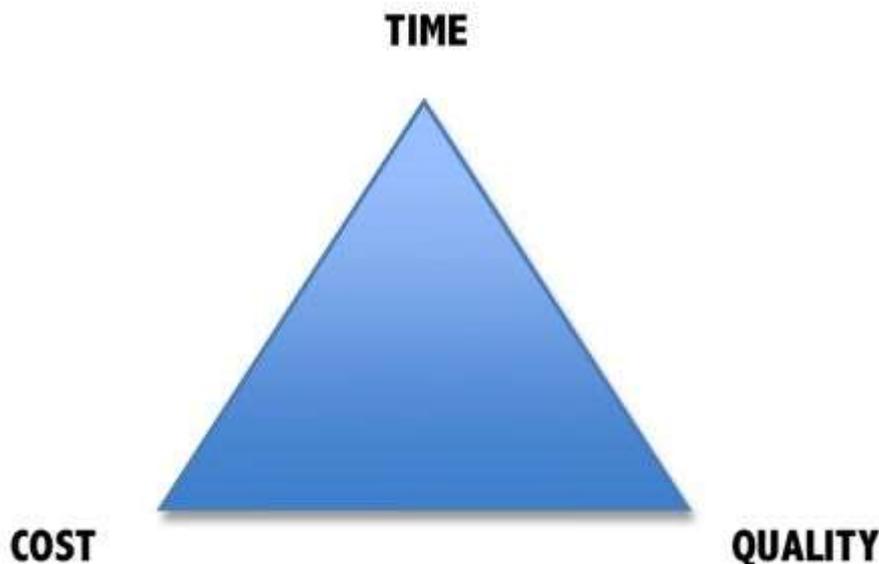


Figure 1 A schematic of the triple constraint triangle

4 Project Stakeholders

A project is successful when it achieves its objectives and meets or exceeds the expectations of the stakeholders.

But who are the stakeholders? Stakeholders are individuals who either care about or have a vested interest in your project. They are the people who are actively involved with the work of the project or have something to either gain or lose as a result of the project.

Project managers have to deal with people external to the organization as well as the internal environment, certainly more complex than what a manager in an internal environment faces. For example, suppliers who are late in delivering crucial parts may blow the project schedule. To compound the problem, project managers generally have little or no direct control over any of these individuals.

Let's take a look at these stakeholders and their relationships to the project manager.

4.1 Top Management

Top management may include the president of the company, vice presidents, directors, division managers, the corporate operating committee, and others. These people direct the strategy and development of the organization.

On the plus side, with top management support it will be easier to recruit the best staff to carry out projects, and to acquire needed material and resources. Visibility can also enhance a PM's professional standing in the company.

However, failure can be quite dramatic and visible to all, and if the project is large and expensive (most are), the cost of failure will be more substantial than for a smaller less visible project.

Some suggestions in dealing with top management are:

- Develop in-depth plans and major milestones that must be approved by top management during the planning and design phases of the project.
- Ask top management associated with your project for their information reporting needs and frequency.
- Develop a status reporting methodology to be distributed on a scheduled basis.
- Keep them informed of project risks and potential impacts at all times.

4.2 The Project Team

The project team is those people dedicated to the project or borrowed on a part-time basis. As project manager you need to provide leadership, direction, and above all, the support to team members as they go about accomplishing their tasks. Working closely with the team to solve problems can help you learn from the team and build rapport. Showing your support for the project team and for each member will help you get their support and cooperation.

Some difficulties in dealing with project team members include.

- In the case where project team members are 'borrowed' and they don't report to you, their priorities may be elsewhere.
- They may be juggling many projects as well as their full time job, and hence have difficulty meeting any deadline.
- Personality conflicts may arise. These may be caused by differences in social style or values or they may be the result of some bad experience when people worked together in the past.
- You may find out about any deadlines missed when it is too late to recover.

Managing project team members requires interpersonal skills. Here are some suggestions that can help.

- Involve team members in project planning.
- Arrange to meet privately and informally with each team member at several points in the project, perhaps for lunch or coffee.
- Be available to hear team members' concerns at any time.
- Encourage team members to pitch in and help others when needed.
- Complete a project performance review for team members.

4.3 The Manager

Typically the boss decides what our assignment is and who can work with us on our projects. Keeping your manager informed will help ensure that you get the necessary resources to complete your project.

- If things go wrong on a project, it is nice to have an understanding and supportive boss to go to bat for you if necessary. By supporting your manager, you will find your manager will support you more often.
- Find out exactly how your performance will be measured.
- When unclear about directions, ask for clarification.
- Develop a reporting schedule that is acceptable to your boss.
- Communicate frequently.

4.4 Peers

Peers are people on the project team or not, who are at the same level in the organization as you. These people will, in fact, also have a vested interest in the product. However, they will have neither the leadership responsibilities nor the accountability for the success or failure of the project that you have.

Peer support is essential. Because most of us serve our self-interest first, use some investigating, selling, influencing and politicking skills here. To ensure you have cooperation and support from your peers.

Get the support of your project sponsor or top management to empower you as the project manager with as much authority as possible. It's important that the sponsor makes it clear to the other team members that their cooperation on project activities is expected.

4.5 Resource Managers

When project managers are in the position of having to borrow resources, other managers control their resources. Hence, their relationships with other people are particularly important. If their relationship is good, they may be able to consistently acquire the best staff and the best equipment for their projects. If relations aren't so good, they may find themselves not able to get good people or equipment needed on the project.

4.6 Internal Customers

Internal customers are individuals within the organization who have projects that meet the needs of internal demands.

4.7 External customer

External customers are the customers for projects that are to be marketed outside of the organization.

The customer holds the power to accept or reject your work. Early in the relationship, the project manager will need to negotiate, clarify, and document project specifications and deliverables. After the project begins, the project manager must stay tuned in to the customer's concerns and issues and keep the customer informed.

4.8 Government

Project managers working in certain heavily regulated environment may have to deal with government regulators and departments. These can include all or some levels from city, through county, state, and federal, to international.

4.9 Contractors, subcontractors, and suppliers

There are times when organizations don't have the expertise in-house or available resources, and work is farmed out to contractors or subcontractors. Managing contractors or suppliers requires many of the skills needed to manage full-time project team members.

Any number of problems can arise with contractors or subcontractors:

- quality of the work;
- cost overruns;
- schedule slippage.

Many projects depend on goods provided by outside suppliers. If the supplied goods are delivered late or in short supply or of poor quality or if the price is greater than originally quoted, the project may suffer.

5 Risk assessment and impact analysis

Risk assessment involves measuring the probability that a risk will become a reality. Impact analysis involves measuring the sensitivity of the project to each identified risk.

The key questions to consider here are:

- What is the risk – how will I recognise it if it becomes a reality?

- What is the probability of it happening – high, medium or low?
- How serious a threat does it pose to the project – high, medium or low?
- What are the signals or triggers that we should be looking out for?

A risk assessed as 'highly likely' to happen and as having a 'high impact' on the project will obviously need closer attention than a risk that is low in terms of both probability and impact.

Strategies for dealing with risks in project management include:

- risk avoidance – for example, where costs outweigh benefits, you may decide to refuse a contract;
- risk reduction – for example, regular reviews can reduce the likelihood of an end-product being unacceptable;
- risk protection – for example, taking out insurance against particular eventualities;
- risk management – for example, making use of written agreements in areas of potential disagreement;
- risk transfer – passing the responsibility for a difficult task within a project to another organisation with more experience in that field.

A risk log should be started for the project at an early stage. This is a list of all the identified risks, together with an assessment of their probability and impact, and contingency plans for dealing with them should they become a reality.

6 Overview of Project Planning

All projects are different, and the planning for each will subsequently be different.

The difficulty with planning a unique activity is that there is no prototype from which to predict all the work that will need to be done, so the plan must evolve as work proceeds. Reviewing any similar projects that have been completed within the same organisation, or in a similar setting, to identify lessons that could be applied in a new project can be helpful.

Planning can be approached by asking a series of questions:

- What actions are needed?
- By when are these actions needed?
- Who is going to do them?
- What resources are required?
- What other work is not going to be done?
- How shall we know if it is working?

The planning process aims to demonstrate how the project outcomes will be achieved successfully within both the required timescale, the agreed budget and the required quality. As each project is different, there are a number of ways of taking an overview of a project. Two of these are:

- the project life-cycle, which is a useful way of understanding the different phases of a project as it progresses, and
- the classic six-stage project management model, which helps us to identify the key stages and to integrate them through the processes of the project.

6.1 The project life-cycle modell

Although all projects are different, any project can be considered to have a life-cycle consisting of five phases. The phases are usually referred to collectively as the life-cycle of a project because they provide an overview of the life of the project from its beginning to its end.

Each phase is marked by a completion which is often one of the deliverables of the project:

- Phase 1 – project definition – is completed by the production of the agreed project brief.

- Phase 2 – planning – is completed as a project plan, although this remains flexible in many ways and is revised during the progress of the project.
- Phase 3 – implementation – leads to an achievement of the project outcomes.
- Phase 4 – closure
- Phase 5 – evaluation.

These phases can also be used as evaluation points, so that as each phase is completed a review is held to determine whether the project is succeeding in its overall performance and whether key deliverables are being achieved. There are options at these review stages to revise the plans and improve performance or even to discontinue the project.

As each project is different, so each life-cycle varies also. Real life is more chaotic than the simple model shown in the communications matrix would suggest, but it can be used to provide a structure that helps to reduce the chaos by putting some boundaries around different stages of the project.

Projects can often change as they progress. This is particularly so in service organisations such as health or educational services, where projects are usually defined by needs and problems rather than by tangible outputs such as factories or cars. Projects often take place in rapidly-changing contexts and the impact of the changing environment on the life-cycle of a project has to be managed. Flexibility is one of the keys to successful project management.

6.2 The classic six-stage project management model

This model also consists of stages, but, unlike the sequential flow of the project life-cycle, the six-stage model assumes that some stages are carried out simultaneously. In particular, the model assumes that communications will take place throughout the project. It also assumes that team building, leading and motivation will take place once the project has been defined and continue until it ends.



Figure 2 Classic six-phase project management model (<http://openlearn.open.ac.uk>)

The six phases are:

- Define: The project is discussed fully with all the stakeholders and the key objectives are identified. The costs and timescales are also established at this stage and there is often a feasibility study as well. This stage is complete when the project brief has been written and agreed.

- **Plan:** An initial plan is developed. Planning is an ongoing activity because the plan is the basis for reviews and revision when necessary, depending on how the project progresses.
- **Team:** The team members are usually involved in developing the plan and are often able to contribute specialist knowledge and expertise. The building of this team and its motivation and leadership also continue until the project is finished.
- **Communications:** should take place continuously, both within the project team and between the project team and stakeholders in the project, including anyone who contributes to achievement of the outcomes. Some communications will be through formal reporting procedures but many will be informal.
- **Control:** Implementation takes place during the control stage (stage 4 in the model). During this stage, the tasks and activities of the team will be monitored against the plan to assess the actual progress of the project against the planned progress. Control is essential to ensure that the objectives are met within the scheduled timescales, budgeted costs and quality. Regular reviews are usually held to enable the plan to be revised and for any difficulties that emerge to be resolved.
- **Review and exit:** The review is held to evaluate whether all the intended outcomes of the project have been met. It is also important because it enables information to be gathered about the processes used in carrying out the project from which lessons can be learned for the future. The exit from the project has to be managed to ensure that:
 - any outstanding tasks are completed,
 - all activities that were associated with the project are discontinued,
 - all resources are accounted for, including any that remain at the end and have to be transferred or sold to someone else.

Many projects evolve through a series of loops of planning, acting, reviewing and re-planning.

It is important to think of planning as a continuous activity rather than something that can be completed once and used without change for the duration of the project. Expect change and allow for scope to change or modify the plan.

Although there are many approaches to planning a project, there are seven elements that are normally included in a project plan:

- a work breakdown structure to show separate tasks and activities,
- the team structure and responsibilities of key people,
- an estimate of effort and duration for each task,
- a schedule to show the sequence and timing of activities,
- details of resources to be allocated to each task,
- details of the budget to be allocated to each cost identified,
- contingency plans to deal with risks identified.

The ways in which planning can be approached usually fall in one of the following:

- bottom-up – identify all the small tasks that need to be done and then group them into larger, more manageable blocks of work;
- top-down – start by mapping out the major blocks of work that will need to be carried out and then break them down into their constituent tasks;
- work backwards from the completion date if that is a given point in time, for example, 1 January, and then fill in the intermediate stages that will enable you to get there.

Each of these approaches has advantages and disadvantages and you will need to choose the one that best fits your circumstances. Ideally, you should then use one of the other approaches to check that nothing has been missed out. It is important to record your thinking and to keep any diagrams or charts produced as these will help to provide detail in the initial plan.

Contingency plans indicate what to do if unplanned events occur. They can be as simple as formalising and recording the thought processes when you ask 'what if ...?' and decide which options you would

follow if the 'what if?' situation happened. The key points in contingency planning can be summarised as follows.

- Note where extra resources might be obtained in an emergency and be aware of the points in your plan where this might be required.
- Identify in advance those dates, which if missed, will seriously affect your plans, e.g. gaining financial approval from a committee that meets only once every six weeks.
- Know your own plan very well; probe for its weak points and identify those places where there is some 'slack' which only you know about ...
- Keep all those involved (including yourself) well informed and up-to-date on progress so that problems can be addressed before they cause too much disruption.
- Recognise the key points in your plan where there are alternative courses of action and think through the possible scenarios for each one.
- Learn from experience – sometimes the unpredictable peaks and troughs in activity follow a pattern – it's just that we have yet to recognise it.

The following suggestions for dealing with contingencies were all made by practising managers:

- Break key tasks down to a greater level of detail to give better control.
- Be prepared to overlap phases and tasks in your plan in order to meet time-scales, but give the necessary extra commitment to communication and co-ordination this will require.
- Spend time at the start in order to pre-empt many of the problems.
- Learn from experience, e.g. develop a list of reliable contractors, consultants, etc.
- Try and leave some slack before and after things which you cannot directly control, to minimise the knock-on effect of any problems prior to, or during, such tasks.

6.3 Using a logic diagram to identify key stages

To use a bottom-up approach to planning, the activity schedule is best compiled by drawing on the collective experience and knowledge of the project team that is going to carry out the tasks.

Grouping their ideas into related tasks will remove duplication and you can then start to identify activities which have to run in series and those that could run concurrently. Some tasks have to be sequential because they are dependent on one another: you can't put the roof on a house until you have walls strong enough to take the weight. Other tasks can run concurrently and the overall plan needs to make the most of these opportunities: the most successful project plans tend to be those that optimise concurrency because this reduces the project length and intensifies the use of valuable resources.

From the clusters of activities and tasks, you can begin to identify key stages by creating a logic diagram.

This exercise can be approached by writing the key stages on cards or coloured self-adhesive notepads, so that you can move the notes around and then arrange them on a whiteboard or a large sheet of paper. Put cards labelled 'start' and 'finish' on the board first and then arrange the key stages between them in the appropriate sequence.

Finally draw arrows to link the stages in a logical sequence. The arrows indicate that each stage is dependent on another and sometimes more than one.

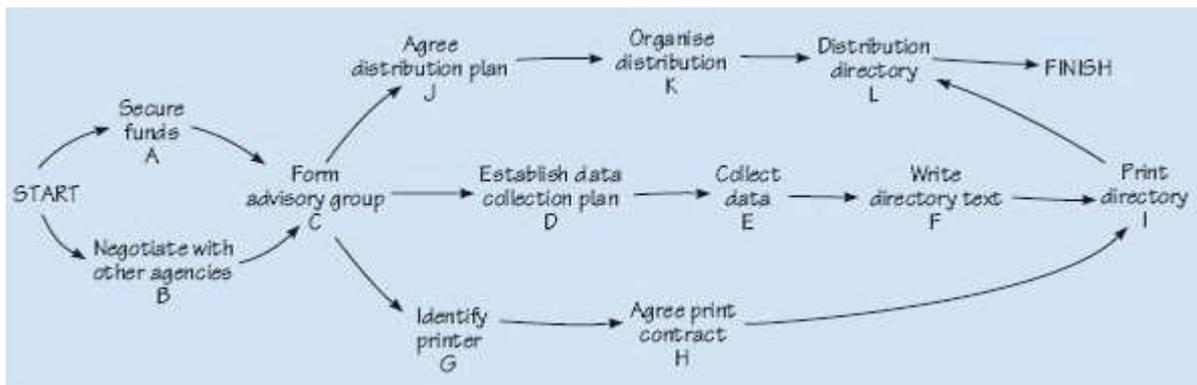


Figure 3 A logic diagram to develop a directory of services (<http://openlearn.open.ac.uk>)

The following conventions might be helpful in drawing a logic diagram:

- time flows from 'start' on the left to 'finish' on the right, but there is no time-scale;
- each key stage must be described separately;
- the duration of key stages is not relevant yet;
- different coloured cards can be used for different kinds of activities;
- debate the position of each card in the diagram;
- show the dependency links with arrows;
- when your diagram is complete, try working backwards to check whether it will work;
- don't assign tasks to people yet;
- keep a record of any decisions made and keep the diagram for future reference.

6.4 Identifying deliverables

The project brief will identify the goals of the project and may express some of these as key objectives. At an early stage of planning you will need to identify all of the project objectives and the deliverables that are implied or required from each objective.

Each objective will identify a clear outcome. The outcome is the deliverable. In some cases, the outcome will be some sort of change achieved and in other cases it will be the production of something new. In either case, the project deliverables should be identified so that it will be easy to demonstrate that they have been achieved.

Outputs can be defined when there is a distinctly identifiable product but outcomes are more holistic and can imply a changed state that might not be evident for some time. In some situations it may be difficult to demonstrate outcomes, for example, where cause and effect are uncertain. It is still important in such settings to identify goals and to define them in a way that will enable an appraisal of the extent to which the aims of the project have been achieved. 'How shall we know if we have been successful?' and identify the indicators that will help in making that judgement.

Deliverables:

- need to be handed over to someone authorised to receive them;
- at the handover, there should be a formal acknowledgement that the specification has been fully met and each item has been 'signed off' as fully acceptable;
- the deliverable will be something for which users will need some training to use or something that needs to be implemented in some way. In these cases, once the deliverable has been identified, it is important to agree who will be responsible for the ongoing training or implementation, so that there are no misunderstandings about the boundary of the project.

6.5 Work breakdown

A work breakdown structure enables:

- the work of a project to be divided into 'packages';
- these 'packages' can be further subdivided into 'elements';
- these elements are then divided into individual 'tasks'.

This structure provides a basis for estimating the time and effort required. In a large project, the work breakdown structure might allow packages of work to be allocated to teams or team members so that they could identify and schedule the subtasks.

The deliverables can be identified in the work breakdown structure so that all the activities can be seen to contribute towards achieving the deliverables. Involving the project team in constructing the work breakdown structure can be one of the initial team-building tasks and can provide the first opportunity to develop an understanding of the whole project.

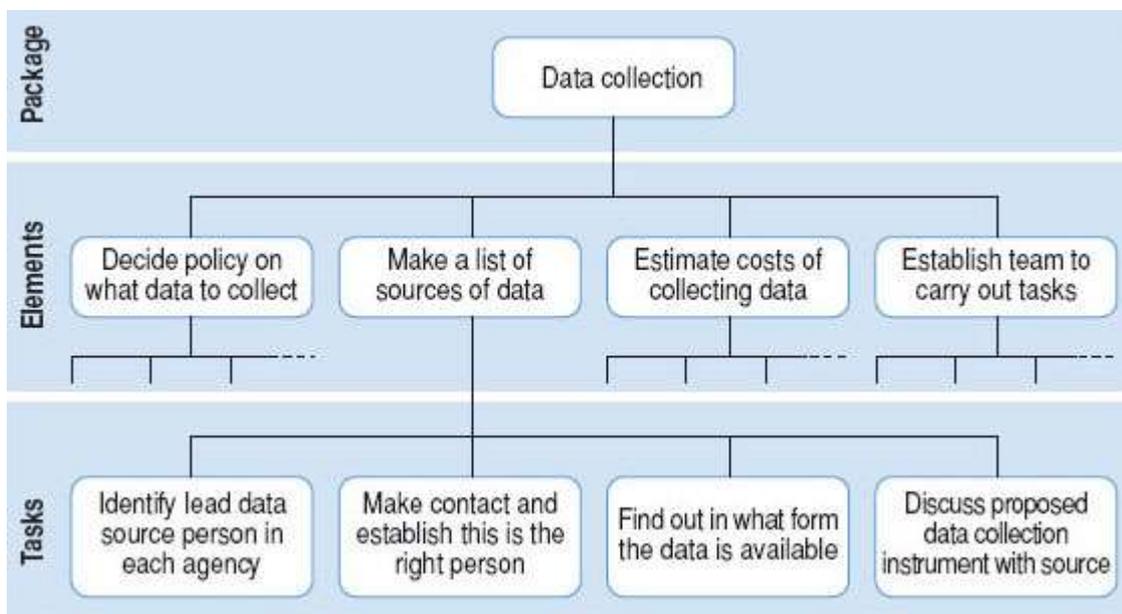


Figure 4 Work breakdown structure for data collection package

As the work breakdown is considered, groups of activities might be identified that could be considered as mini projects in themselves. These can offer useful staff development opportunities for team leaders in appropriate areas of work.

Although the work breakdown structure should be kept simple by identifying substantive tasks rather than all of the subtasks, it is important to consider the team or staffing structure and key responsibilities at this stage.

6.6 Scheduling

Scheduling is about deciding the time that each task will take to do and the sequence in which the tasks will be carried out.

There are a number of approaches to estimating the time and effort (and, therefore, cost) required to complete a project. Some estimates may be based on past experience but, because each project is essentially unique, this alone may not be sufficient. A clearer picture can be obtained by measuring each task in terms of the content of the work, the effort required to carry it out, and its duration. This should enable you to estimate resource requirements in order to begin scheduling, taking account of the current workloads of the members of the project team and their capacity to carry out the work.

Usually there are some things that must be completed before others can be carried out. This is called dependency. When one task is dependent on another, the sequence needs to be planned, but there is also the possibility of delay if the dependent task cannot be started until the previous task is completed.

The Gantt chart and critical path analysis are two useful techniques that will help you to plan for each of these issues.

6.6.1 Gantt chart

The Gantt chart enables you to establish the sequence of tasks and subtasks and to estimate a timescale for each task. It will allow you to block out periods of time throughout the duration of the project to ensure that it is completed on time. The Gantt chart is not so useful in demonstrating the dependencies and the impact of delay if any of the foundation tasks are not completed as scheduled. A technique called Critical Path Analysis (CPA) is frequently used to plan the implications of dependencies. We shall look at each in turn.

Gantt charts show all the key stages of a project and their duration as a bar chart, with the time-scale across the top. The key stages are placed on the bar chart in sequence, starting in the top left-hand corner and ending in the bottom right-hand corner. A Gantt chart can be drawn quickly and easily and is often the first tool a project manager uses to provide a rough estimate of the time that it will take to complete the key tasks. Sometimes it is useful to start with the target deadline for completion of the whole project, because it is soon apparent if the timescale is too short or unnecessarily long.

The detailed Gantt chart is usually constructed after the main objectives have been determined.

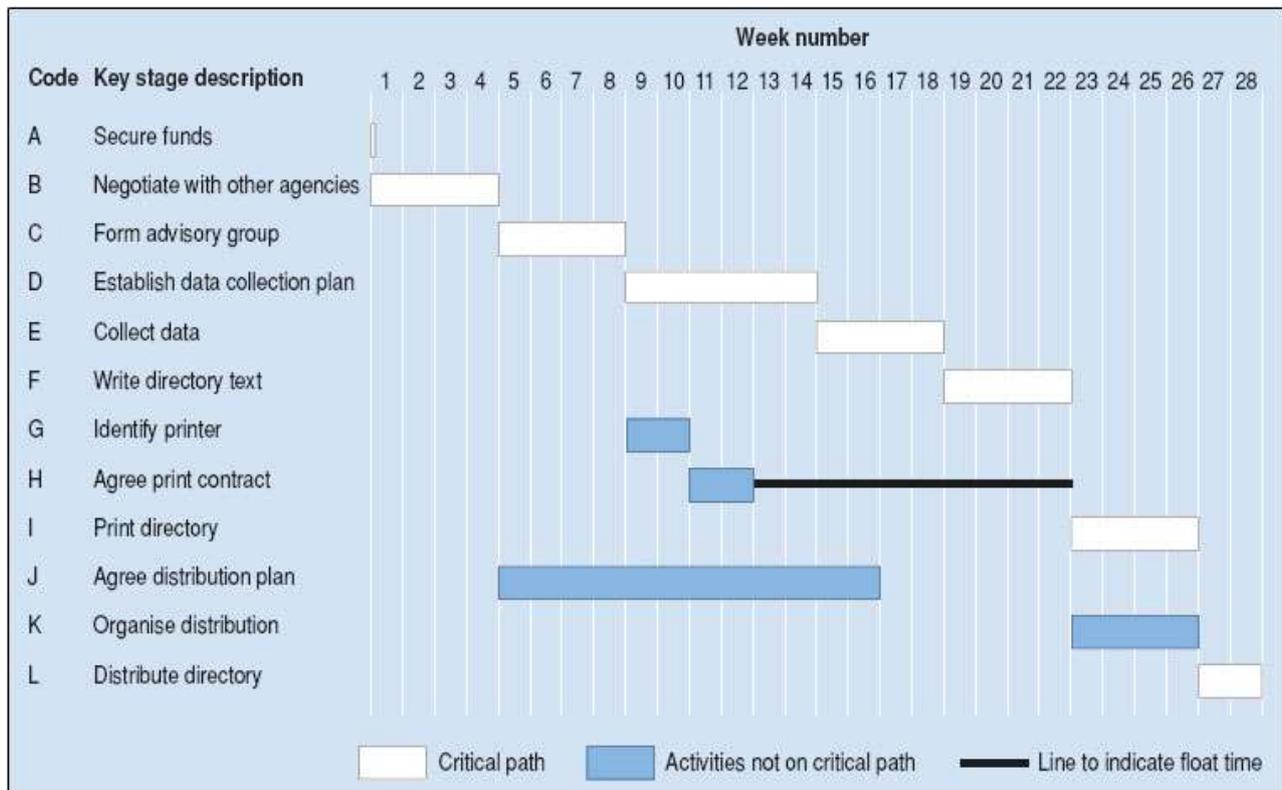


Figure 5 Gantt chart for directory production

In the example above:

- key stage K ('organise distribution') starts at week 23 so that its end-point coincides with key stage L ('distribute directory'). However, K could begin as early as week 17, as soon as key stage J is completed.
- Key stage K is therefore said to have slack.
- Key stage H ('agree print contract'), has been placed to end at week 12. However, it could end as late as week 22, because key stage I ('print directory'), does not begin until week 23.

- Key stage H is therefore said to have float. Float time can be indicated on the chart by adding a line ahead of the bar to the latest possible end-point. Slack and float show you where there is flexibility in the schedule, and this can be useful when you need to gain time once the project is up and running.

You can add other information to a Gantt chart, for example:

- milestones – if you have special checkpoints, you can show them by using a symbol such as a diamond or triangle,
- project meetings could be indicated by another symbol such as a circle,
- reviews of progress could be indicated by a square.

For a complex project you may decide to produce a separate Gantt chart for each of the key stages. If you do this shortly before each key stage begins, you will be able to take any last-minute eventualities into account. These charts provide a useful tool for monitoring and control as the project progresses.

Gantt charts are relatively easy to draw by hand, but this doesn't offer the same level of flexibility during monitoring that you would get from a software package. Various programmes are available to assist project managers in scheduling and control. Once the data have been entered, a programme helps you to work on 'what if' scenarios, showing what might happen if a key stage is delayed or speeded up. This is more difficult if you are working manually.

6.6.2 Identifying the critical path

The critical path describes the sequence of tasks that would enable the project to be completed in the shortest possible time. It is based on the idea that some tasks must be completed before others can begin. A critical path diagram is a useful tool for scheduling the dependencies and controlling a project. In order to identify the critical path the length of time that each task will take must be calculated.

We will use the logic diagram for production of the directory of services for carers as a starting point, because it is usual to complete a logic diagram before making a critical path analysis. The length of time in weeks for each key stage is estimated:

	Key stage	Estimated time in weeks
A	Secure funds	0
B	Negotiate with other agencies	4
C	Form advisory group	4
D	Establish data collection plan	6
E	Collect data	4
F	Write directory text	4
G	Identify printer	2
H	Agree print contract	2
I	Print directory	4
J	Agree distribution plan	12
K	Organise distribution	4
L	Distribute directory	2

We have given the key stage 'secure funds' an estimated time of zero weeks because the project cannot start without the availability of some funding, although estimates would provide detail at a later stage. The stages can now be lined up to produce a diagram that shows that there are three paths from start to finish and that the lines making up each path have a minimum duration.

If we now trace each of the possible paths to the 'Finish' point, taking dependencies into account, the route that has the longest duration is known as the critical path. This is the minimum time in which it is going to be possible to complete the project.

In this example the critical path is A-B-C-D-E-F-I-L, and the earliest completion date for the project is the sum of the estimated times for all the stages on the critical path – 28 weeks – from the point of securing the funding. All the key stages on the critical path must be completed on time if the project is to be finished on schedule.

If the projected total time is a long way off the project sponsor's expectations, you will need to renegotiate the time-scale. Mapping the critical path helps to identify the activities that need to be monitored most closely.

We have used a relatively straightforward example to illustrate this technique, but a more complex project may have several lines of key stages operating at first in parallel but later converging, so that several critical activities may have to be completed before another can start.

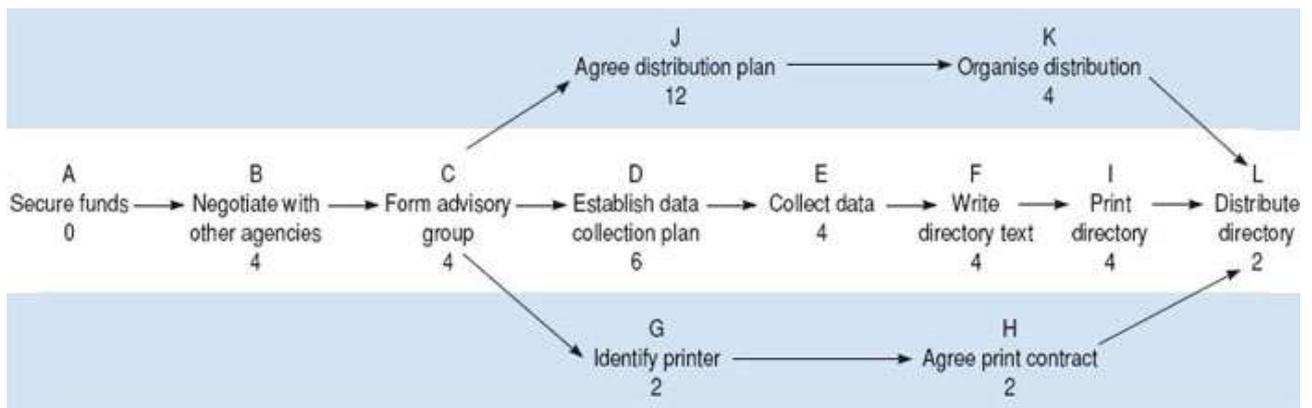


Figure 6 Critical path for directory production

A key event list is a statement of identifiable key points along the path of the project together with their scheduled dates. Such a listing may be useful as a concise guide for senior managers. A key events list should always be derived from a more detailed plan, preferably critical path based, to ensure that the dates stated are achievable. (Note: the terminology of 'milestones' is sometimes used for, and/or confused with, key events.)

Key Event

Project brief agreed
Design new system
Project review (when most of initial work is done)
Handover

Timing

project start
completed by 2nd July
19th July
21st August

Formally, logic diagram is very similar to the much complicated CPM diagram which was developed for complex but fairly routine projects with minimal uncertainty.

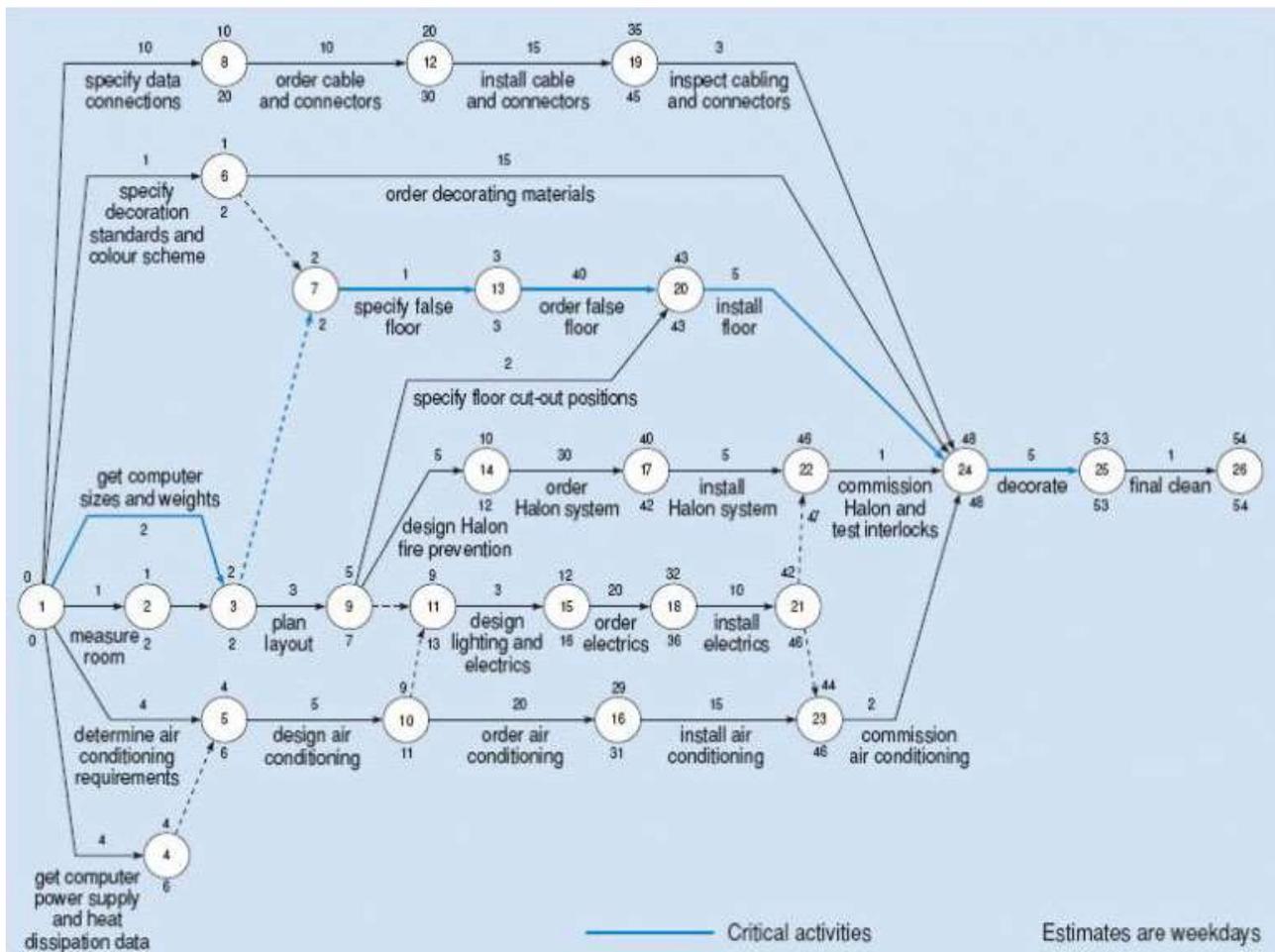


Figure 7 A critical path network (CPM) diagram of converting a room into a computer suite (Lock, 1993, p. 538)

6.7 Estimating costs, revenues and intangible benefits

Planning a project includes preparation of financial and related projections. Frequently, these will be used to:

- weigh up the economic feasibility of the project,
- obtain approval from a higher authority in the organisation for the project to proceed,
- set boundaries of delegation or empowerment in a formal budget,
- provide the basis for accounting for project revenues and costs,
- provide a means of diagnostic and, possibly, interactive control of the project.

At the project preparation and planning stages, your focus is on understanding and shaping the future. Among important questions you should be addressing are those along the lines of:

- What resources will we require and what will they cost the organisation?
- What products will be produced, in what quantity and of what quality?
- Depending on the type of organisation, either:
 - for what prices can our for-profit organisation sell these products and how much revenue will they generate?
 - how much must our non-profit organisation charge users for these products if these charges are to cover resource costs?

- In producing these products or offering these services, how much economic, political and/or social value will our governmental organisation confer on their direct beneficiaries, and on other citizens and other taxpayers generally; and by doing so, what private costs will our governmental organisation impose on citizens and other taxpayers?
- What cost savings will accrue to our organisation from these products or what fines/penalties will our organisation avoid by producing these products?

Planning a project is an iterative process, involving:

- developing ideas;
- trying them out;
- formulating them into something coherent enough to call an outline proposal for a project.

All these activities result in an opportunity cost, mainly of staff time (spent on thinking, corridor discussions, meetings, etc.) that is not, therefore, being devoted to other valuable activities. As soon as most of these costs are incurred, however, they are sunk, irrecoverable and, therefore, irrelevant to analysis of the future, at least in economic terms.

One trap to watch out for is to be sucked further and further into a project on the political grounds that the organisation has invested (or sunk) so much money and effort in it so far that it can't afford to pull out now.

Projected benefits and costs need to be calculated at an early stage in the life of the project, working as far ahead as possible, preferably until the project would be completed. There must be a case that shows that the benefits exceed the costs by a large enough margin to warrant spending more planning time on the project, instead of working on alternative organisational activities.

Estimates are the best guess that you can make given the information available at the time of estimating. It provides a way of testing the extent to which the desired aims are likely to be achieved by the organisation within the financial resources it can make available internally or raise externally. It is only when you have a detailed breakdown of work and a schedule of timing that you can be more specific about the revenues and costs involved.

Few projects are genuinely unique. Many are look-alikes and a prime source of estimates is similar activities, past or present, elsewhere in the organisation. Data, published and otherwise, should be available from other organisations, especially those that aren't direct competitors. Often you just have to telephone or email the right person as you can make use of networking to establish useful contacts.

It helps to distinguish between development and operational costs, and to analyse these further into stages or components of the project, based on Gantt and/or critical path charts.

These components will each require effort and resources, and these inputs can be analysed and translated into monetary values simply by applying unit prices or rates. Revenue and intangible benefit estimates can be approached in a similar way, based on other experiences and components of your market. Be aware, however, of monetary amounts being assigned to intangible benefits because these may give rise to an impression of objectivity that is not deserved.

6.8 Drawing up the implementation plan

Once the detailed planning and risk assessments have been carried out, you are ready to assemble your implementation plan. A typical implementation plan, including diagrams and charts where appropriate, will contain:

- a description of the background to the project,
- its goals and objectives in terms of intended outputs and/or outcomes,
- the resource implications (budget, personnel – including any training requirements – and facilities),
- the project schedule,
- how action will be taken and by whom,
- a description of how the project will be managed,

- the reporting and review arrangements,
- the evaluation plan – how success will be measured,
- the risks and contingency plans.

The project plan should also include an executive summary, providing the basic information and main goals and objectives in a few paragraphs.

7 Implementing the project

7.1 The transition from planning to action

In working on a project, it is sometimes difficult to make the transition from planning to action.

It usually falls to the manager, as leader of the project, to make sure that activities are started; but not before it is clear who should carry out which tasks, and when. The first step for the project manager is to ensure that the plan is communicated to those who will be working on the project. It is not always safe to assume that others will understand the plan or its implications, particularly in terms of what they should be doing to make it happen. Plans are often focused on time-scales and schedules.

If you have used computer-based packages to develop a plan, at a high level of detail, that plan can be difficult for others to interpret. Make sure that the key people responsible for taking action on the first tasks understand what is needed. You may need to check that all the procedures have been gone through to secure their commitment to the project, and it might be necessary to issue a formal instruction to start work.

7.2 Defining team responsibilities

Depending on the size of a project, responsibility for each key stage may need to be allocated to a member of the project team.

Clear allocation of roles and responsibilities for tasks and key stages ensures that each piece of work is 'owned' by a particular person, and that overall responsibility for the work is spread appropriately between members of the team. Establishing clear lines of accountability for each team member is important to give them:

- a role in the overall plan;
- authority to act on behalf of the project;
- a sense of commitment;
- an understanding of your expectations;
- responsibility to report to you on progress.

7.2.1 Target dates

The overall plan will indicate the start dates for each group of activities, or each task. A useful way of focusing activities on achieving outcomes is to provide clear dates for completion of stages and of final outcomes. If there are a number of different types of team, these may start and finish tasks at different times.

Where the work of one team depends on another having completed in time, there are important issues to consider. Although a good control system will provide information about progress on the tasks, the relationships between the people in the teams can have a profound influence on the process, with the potential to add considerable value or to cause considerable disruption.

7.3 Resourcing the project

Work will be delayed if the necessary materials and equipment are not readily available, or if the accommodation for the project has not been arranged. Although the project manager is responsible for overall resource allocation and utilisation, much of the work can be delegated. By conferring responsibility to achieve an outcome within the budget, more direct links between costs and outcomes are established. In most projects there will be organisational internal controls and statutory requirements to manage resources, for example in handling money or other materials.

In setting up the project responsibilities it may be necessary to identify people with particular qualifications or experience to manage specialist areas of work. Even when all the necessary physical resourcing has been agreed and planned with a sufficient budget to enable it all to happen, it will often fall to a project manager to take care of practical details and to encourage everyone to take action.

7.4 Controlling the project

7.4.1 Unique problems and constraints

In an ideal world, projects would be completed on time, within specified budgets and to the standards set out in the plans.

In practice, any project involves a set of unique problems and constraints that inevitably create complexity and risk. Plans are liable to change as work progresses, and each stage in the process may have to be revisited several times before completion. Projects do not exist in a vacuum: they often take place in rapidly changing contexts, and the impact of the changing environment on the life-cycle of the project has to be managed. In projects, new issues will emerge as activities evolve.

7.4.2 Monitoring as control

To control you need a plan that indicates what should happen and information that tells you what is actually happening. This is monitoring activity. By comparing the information about actual progress against the plan, you will be able to identify any variations.

Control is an important part of project management. It involves:

- reporting the progress of the project against the plan,
- analysing the reasons for variance between progress and plan,
- taking action to eliminate variance.

7.4.2.1 Gathering information

Successful control of a project depends on the flow of information, so it is important to have systems in place to make sure that you get feedback on what is happening.

If the project team is meeting regularly to review progress, monitoring becomes more dynamic and changes to the plan can be achieved by consensus. Involving the team not only helps to keep everyone on target – it also builds commitment.

Monitoring is the most important activity during the implementation phase of a project, because it is the only way in which you can control the work to be sure that the objectives of the project will be met. To keep track of what is happening you may have to consider gathering information on two levels:

- macro levels – to include overall business objectives, time, budget, quality,
- micro levels – to include tracking individual tasks; that they have been initiated, that they are running on track and that they are due to complete as planned.

Project status reports and project status meetings are formal reporting structures that enable you to collect and collate this information. However, if you rely on others to provide all of your information you may miss early signs of difficulties – many experienced project managers make a point of 'walking the project' to keep in touch with the day-to-day issues that emerge as work progresses.

Control is only possible if you have a plan against which to measure progress. If the plan is clear about what should be achieved and when, it is possible to monitor progress to be sure that each outcome is of the right quality and achieved at the right time.

7.4.2.2 Milestones

Milestones are measuring points that are used in reviewing the progress of a project.

Milestones can be set in different ways, to reflect different purposes. For example, milestones are often used to provide an agenda for regular meetings which review the project. These reviews should take place, weekly, monthly or quarterly, depending on the nature of the project.

Another approach is to set the milestones to reflect key phases of the project. Sometimes such milestones are established in this way to enable reviews to consider whether the project should be continued or should stop at this stage. Some organisations take a more challenging approach and inquire at each review whether the project should be terminated, expecting an adequate defence to be made in terms of the continuing value of the project to the organisation.

7.4.3 Interdependency of systems

The control system approach to project control provides a simple overview of the process of planning, measuring against the plan and taking action to bring things back into line if necessary.

This suggests that events will move in a fairly linear way. Life is messier than this, however, and every time that something happens it will have an impact on everything else around it – so the interdependency of systems is important to consider.

7.4.4 Project status reports

Project status reports are regular and formal. You will need to decide how often they are necessary – depending on the size and nature of the project, this might be weekly, monthly or quarterly. In some situations reports might need to be hourly if a problem is causing serious concern and has the potential to delay progress seriously. Daily reports might be necessary if there are implications for arranging work for the following day.

What guides are there for deciding the frequency of reporting? Two of the biggest influences are:

- the degree of risk involved;
- the time it would take to recover from failure to complete important milestones.

Other considerations might include:

- how quickly the project could get out of control;
- the time it would take to implement contingency plans.

The project sponsor may have a preference about the frequency of reports and review meetings.

To prepare the report, you will need to have information from the members of the project team on:

- completion of delegated tasks;
- completion of key stages;
- any work that is behind schedule (and why);
- any issues that need to be resolved (as soon as they arise);
- any difficulties anticipated in the near future.

Once you have set up a system for regular reporting you will probably have to make sure that it happens, at least in the early stages. Be prepared to chase up reports and to insist that they are necessary and must be presented on time.

The information gained from project status reports will be helpful in compiling reports to stakeholders, but different types of report may be appropriate for stakeholders with different concerns. For example, the project sponsor may be most concerned with the overall progress against goals, but stakeholders concerned with only one group of project objectives may only want information about these. There may be confidential information to be shared within a limited group of stakeholders. Some stakeholders will only have an interest in the overview and the implications for the organisation.

7.4.5 Project meetings schedule

You need to decide early on what meetings are essential to the monitoring process. All your stakeholders will expect to receive reports at regular intervals, whether formally or informally. So you need to ask yourself:

- Who needs to be informed?
- About what?
- How often?
- By what means?

Effective communication involves giving information, collecting information and listening to people. To ensure the smooth running of your project, you might need any or all of the following:

- formal minuted meetings which probably run to a schedule which is outside your control,
- meetings with your sponsor (which might be on a one-to-one basis),
- progress meetings with the project team,
- individual meetings on a one-to-one basis with team members,
- ad hoc problem-solving meetings when particular issues need to be resolved.

Meetings need a clear purpose and focus, and they should be recorded on project schedules. They should be time-limited and given proper priority in diaries, so that time is not wasted by waiting for inputs from key people. Meetings will only be respected if they are managed to avoid wasting time and effort.

7.4.6 Maintaining balance

Monitoring is also concerned with achieving a balance of the three dimensions of the project:

- cost – the resources available;
- time – the schedule;
- quality – the scope and appropriateness of the outputs or outcomes.

Many of the difficulties in implementing a project are caused by poor time management. This will have a direct effect on the costs of the project, as well as on the quality of what is achieved. So there need to be systems for monitoring:

- the time spent on project tasks;
- the resources used (people, materials and equipment);
- compliance with applicable quality standards.

These are the three dynamics that are always key to keeping a balance in managing a project. There are a number of options for how you might take action to maintain this balance, once monitoring has provided you with information that suggests that action is needed.

- Splitting the key stages to avoid each following another when there is no necessity to have one in place before the next: If it is possible to carry out two or more key stages concurrently, you will speed the project up, but you will need to resource all the concurrent stages rather than waiting for one to finish so that staff can be moved to the next stage.
- Making savings by removing or reducing contingencies from estimates: as the project work progresses you could review the contingency time and budgets that had been estimated. You will be in a better position to judge how much contingency is likely to be needed as the project progresses.
- Re-evaluating the dependencies in the logic diagram: You may have been over-cautious in making the first judgements about the sequence of activities. As some outcomes are achieved, you may find that you can avoid some of the dependencies.
- You may find that you can make more use of slack time to speed up completion of tasks.
- Avoiding duplication of effort: If you can minimise duplication you can make savings of time and effort.
- Re-negotiating lengthened time-scales if an unanticipated problem causes a delay that cannot be recovered: If this is the situation, it is worth calculating whether lengthening the time-scale would be more cost-effective than increasing the resources to enable completion on time.
- Increasing the resources available will usually increase the costs, so this should be considered alongside other options. It may be possible to increase resources at a limited cost by reviewing

the use of existing staff. For example, instead of getting new people with appropriate expertise assigned to a key stage which is falling behind schedule, you may already have such people within the team but carrying out activities that have less need of that expertise.

- If a project is facing serious delays or is running over budgeted costs, it is worth considering the quality targets. Reducing the quality or scope of specified outputs or outcomes may be possible. In considering this option, it is worth reviewing what quality means to each of the key stakeholders. Additional features may have been included in the project and these add very little value for the majority of stakeholders.

Monitoring expenditure is usually exercised through regular reports. In many organisations the financial aspects of a project would be subject to their usual financial procedures. There may be decisions to make about the number and levels of budgets, and about how frequently budget-holders should receive information about expenditure and reports on their current position.

7.4.7 Tracking progress

Gantt charts and critical path diagrams are useful for tracking project activity and for making necessary changes to the project plan. Project-planning software may also be used; the original chart is kept as the standard and any modifications are superimposed.

7.4.8 Controlling changes to the project

Sometimes an addition or change to the project will be requested.

This can be difficult for those who manage the project, because you will want both to maintain good relations with your client and to protect your profit margin and budget for resources. The first step is to assess the extent to which this will cause a need for additional time or resources. Perhaps the change can be accommodated in the project plan within the existing time-scale and budget, for example by altering some of the tasks in the later stages. Once the implications for time and cost of the requested change are known, you can decide how to respond to the client.

The change might be agreed without any charge to the client. There might be a case for making an additional charge, and you will have the full costing for the modification to support your claim. You may want to negotiate with the client to achieve a solution that suits both of you, again with full understanding of the implications. Whatever is decided, you will need to be fully informed of the cost and time implications of the proposed change before you enter discussions about how it could be managed.

Once any change has been agreed, it is usual to review the project documentation, making a formal amendment to the project brief, and amending the schedules and budgets and noting changes in the plan. You will also have to communicate the changes to anyone who needs to know in order to take appropriate action.

8 Dealing with risk

Projects are high-risk activities, and it is in the early stages that uncertainty is greatest.

Some of this uncertainty can be removed during design and planning, but in practice a great deal may remain. Risks can be ranked according to their probability and likely impact, and a risk log can be kept detailing this information. Throughout the progress of the project you will need to review your risk log, to check whether any risks have become either more or less probable, or whether any new risks have appeared.

Formal risk review should be a team activity, and could be included as a regular agenda item at every team meeting. Discussing this issue with the project team helps ensure that rankings are realistic, and that ways are found of dealing with potential crises. If everyone is aware of the triggers for each risk, difficulties are more likely to be spotted early on before too much damage is done.

When monitoring project risks and adjusting activities you need to pay particular attention to:

- tasks inside key stages;
- points at which several people are involved in one task;
- tasks following a merge in the logic diagram;
- key stages or tasks which will take a long time to complete;

- the relationship between each key stage and the next;
- any point at which the people involved are doing a task for the first time;
- tasks involving new or unfamiliar technology;
- key stages where there is very little or no slack or float in the schedule.

When a risk becomes reality, its implications must be assessed, including:

- the effect on costs and resources;
- possible consequences if the problem is not addressed;
- which aspects of the project are affected;
- how serious the problem is thought to be.

Depending on the reporting arrangements you have in place, you may need to notify your sponsors of any problems immediately. It is more likely, however, that you would want to identify possible solutions first, so that you can make recommendations for action at the same time.

9 Completing the project

9.1 Formal handover

The outputs of a project should be defined at the planning stage, including any conditions that will be required for a smooth transfer. Each outcome should be formally handed over to the sponsor who should confirm their delivery ('sign them off') so that there is no dispute about whether outcomes have been completed.

A closure list is likely to have sections to include the following groups of tasks, but each project will have different features to consider. A list of suggested areas to consider can be seen below:

- handover complete for all deliverables;
- client or sponsor has signed off all deliverables as accepted;
- responsibility for future maintenance agreed;
- final project status reports complete;
- all financial processes and reports complete;
- project review complete;
- staff performance evaluations and reports completed;
- terminate staff employment on project;
- terminate all supply contracts and processes;
- close down site operations and accommodation used for project;
- dispose of equipment and materials;
- announce completion of project (internal, external and public relations contacts);
- complete project file and store appropriately.

Not all handovers are at the completion of a project. In some projects there might be several different types of handover, happening at different stages.

If the project involves preparation and handover of a physical object, there may be a number of contributing components and, possibly, subcontracted elements. The project plan should have identified the various elements and the details of handover arrangements for each stage, if there is a sequence of tasks. The schedule will have identified the sequence in which tasks need to be completed. Hopefully, the risk register will have identified the risks associated with each handover and a contingency plan will have been made for each major risk. Handovers should be identified as key stages on the Gantt chart.

Acceptance criteria for 'hard' projects, where the output is highly specific, may be fairly straightforward. These arrangements can be quite similar to common routine arrangements for confirming receipt of items by matching delivery notes with order forms. For example, the delivery and instalment of a new

computer system should have been tested under normal conditions, as evidenced by signed-off documentation.

Acceptance criteria for 'soft' projects may be more problematic.

To illustrate this, let us consider a voluntary organisation setting up an initiative in secondary schools to do preventive work on bullying. The project plans to run a series of events intended to develop awareness and to establish a new procedure for dealing with bullying. The handover phase in projects of this kind may include activities and processes that enable the project's sponsor to take over responsibility on a long-term basis. A definition of completion for this type of project might be 'achieving the active, successful management of the activity by the project's owners, users or stakeholders and withdrawal of the project team'.

Any support that will be required as part of the project completion should be planned, and the person responsible for providing it should be identified. In some projects (for example, many IT projects) there may be an integration or configuration period, in which the client gradually takes over the long-term maintenance of the project outcomes. Again, it is important to have clear agreement about how the project itself will be concluded and handed over, even if there is a separate agreement about future support or training related to the outcome.

Once a handover process has been agreed, a meeting of the project team to prepare for the handover should be arranged. This is the time to make sure you haven't forgotten anything that might lead your sponsor to withhold acceptance. It is helpful to draw up a list of outstanding tasks, and to make sure that someone is responsible for doing each of them within a specified time-scale. These might include minor tasks from early stages of the project which were not critical to progress and have been left on one side.

9.2 Closing the project

Closing a project can be quite an emotional experience for team members who have worked together for some time, particularly if close bonds have developed.

The manager of a project has some obligations to staff who have worked for some time on it. Build into the plan a closure interview with each member of staff, so that their contribution can be formally recognised and recorded. Staff may need help to recognise the skills and experience that they have gained and how these have been evidenced in their contribution and achievements. They may welcome a signed record of their achievements, and some will need references to progress to their next jobs. Some staff will need to leave before the project is fully finished, and some will not have jobs to go to.

The project is not finished until the closure has been managed and it is helpful if the person managing these final activities is not worried about his or her own future. Once again, planning well in advance can reduce the stress of the final stages.

9.2.1 Project debriefing

Individual interviews with key members of the project team, for example the managers of key stages, can encourage them to evaluate their performance and identify what they have learned. A structured debriefing process can be helpful, to include stakeholders as well as all the project team. This may take the form of a series of meetings, which draw conclusions about overall project performance and constraints, identify and review any new ways of working that were developed, and consider what could have been done differently. These can take the form of after action reviews.

9.2.2 The closure meeting

The final meeting is a time for celebrating successful completion. It could have a similar format to the launch meeting, and involve many of the same people. It might include:

- reviewing the outputs or outcomes;
- confirming the arrangements for any follow-up work;
- thanking the team, the sponsor(s) and the stakeholders for their support;
- presenting the completion report for approval and sign-off;

Closure events may vary according to the nature of the project.

9.2.3 Problems with closure

Projects do not always go according to plan. If problems develop during the closure period there are particular difficulties.

If the project outcomes include technological systems that need to be used by people who were not part of the project team, the handover needs to include a strategy to ensure that users can operate the new system. The new system also has to work effectively alongside any other systems in use.

9.2.3.1 Project drift

Project drift is a common problem when one project leads into another without a clear break, or when extra tasks, which were not identified at the beginning, are added to a project.

If possible, significant changes of the latter kind should be treated separately as a follow-on project: otherwise they may not be properly resourced and this can have adverse consequences for motivation of the project team.

10 Evaluation

10.1 Evaluating at different stages of the project

A project is often shaped through discussion among those developing the vision and direction of the project. They may agree in general terms about what is to be achieved, but have to make a number of choices before deciding how to proceed. It may be important to allow time for different views to be heard and considered, and for attitudes to change and – hopefully – converge.

Many stakeholders may become involved in evaluation in the early stages of a project, in imagining what it might mean for them and how it might present advantages or disadvantages. The anticipated impact of the project can be usefully evaluated in the early stages, to ensure that the investment of energy and resources can be expected to achieve the intended results.

10.1.1 Evaluation during the planning stage

Evaluation at this stage is usually concerned with whether plans represent good value for money.

It may be appropriate to evaluate inputs to the project, to ensure that their quality and quantities are sufficient to achieve the objectives. In large building projects, many specialist tasks are subcontracted. Specifications are developed, and potential contractors are invited to tender for work. The element of competition can lead to problems if some tenderers are over-anxious to win contracts. They may be tempted to offer very low prices or attractively fast times, making no allowance for setbacks or delays outside their control. If they fail to meet their deadlines there may be a knock-on effect, when other tasks cannot start till they finish.

Those evaluating tenders need to be able to estimate the budget and timing required for a particular piece of work: the cheapest is not necessarily the best, nor the one that promises the fastest completion.

Even when a tendering process is carried out with care, to ensure that the contract results in a partnership that will be successful for everyone, it is impossible to predict all the potential risks. Some contingency sum might be agreed, but many contracts also incorporate a process for negotiating liability for additional costs, when these arise unexpectedly.

Risk is the chance of something occurring that has an adverse effect on the project. Many risks can be foreseen and identified. For example, if the project involves development of computer-based systems, time needs to be allowed for 'de-bugging' once the systems are installed.

The main categories of risk can be summarised as follows.

Main categories of risk:

- physical: loss of or damage to information, equipment or buildings as a result of an accident, fire or natural disasters,
- technical: systems that do not work or do not work well enough to deliver the anticipated benefits,

- labour: key people unable to contribute to the project because of, for example, illness, career change or industrial action,
- political/social: for example withdrawal of support for the project as a result of change of government, a policy change by senior management, or protests from the community, the media, patients, service users or staff,
- liability legal action or the threat of it because some aspect of the project is considered to be illegal or because there may be compensation claims if something goes wrong.

10.1.2 Evaluation during implementation of a project

At this stage the project activities are monitored to determine how their timing, quality and cost match the plan. The results of this monitoring are reviewed to see whether the plan needs to be modified.

New environmental conditions may indicate the need to change the organisation's strategic direction. It might be necessary in that case to re-align the project, so that the outcomes relate to the new direction. In some cases it may be necessary to abort the project, if it is no longer appropriate or likely to make a useful contribution.

Incorporating this kind of evaluation as part of the project plan (formative evaluation) can considerably enhance the likelihood of achieving useful outcomes. If formative evaluation is to take place, it should be integral to the project's design. It can facilitate a more organic change process, with testing and refining built in as the project progresses.

However formative evaluation can increase the complexity of a project, because of the need to timetable an extra set of deadlines. It will also add new items to the risk log, particularly the risk of delays. If formative evaluation results in decisions to make significant changes to the project, it may lengthen the time-scale, increase the budget or necessitate additional quality measures.

10.1.3 Evaluation at the end of a project

Different types of evaluation may take place at the end of a project. A common one is determining the extent to which the project outcomes have been achieved.

This is often done in a meeting of the sponsor, key stakeholders and project team leaders, and sometimes informed by reports from key perspectives. An evaluation of this nature may be the final stage of the project, and the main purpose might be to ensure that the project has met all of the contracted expectations and can be 'signed off' as complete.

A different type of evaluation may be a review of the process, with the purpose of learning from experience. This is often done by comparing the project plan with what actually happened, to identify all the variations that occurred, in both processes and outcomes. The aim is to draw out how to avoid such variations in future projects or how to plan more effectively for contingencies.

Although monitoring takes place throughout a project, evaluation based on the information thus gained is likely to happen at the end of the project, in a final summative evaluation which identifies:

- what the project has achieved;
- the aspects of the project that went well;
- the aspects that went less well;
- things that you would do differently next time.

10.1.4 Designing a formal evaluation

Reviews and informal evaluations will often be sufficient, but sometimes a formal evaluation will be needed.

A formal evaluation can be both time-consuming and expensive, and so must be carefully planned. There are many different ways of carrying out such an evaluation, and the process chosen will influence the attitudes of those involved and whether their response to the project is positive or negative.

There are a number of decisions that have to be made in designing an evaluation.

- Decisions about goals: what is the evaluation for? who wants the evaluation?
- Decisions about focus: what is to be evaluated?

- Decision about methods: how and from what sources will the information be gathered?
- Decisions about evaluation criteria: how will criteria be set, and by whom?
- Decisions about process: who will do the evaluation, and who will manage the process?
- Decisions about application: what use will be made of the findings?

All of these decisions relate to the overall purpose of the evaluation; and, if each is considered as part of the design process, the answers will enable the process to be planned.

10.1.5 Collecting and interpreting data

In many projects it can be difficult to make comparisons with other seemingly similar projects. However, there may be quality standards that can be used for one of more of the outcomes, perhaps alongside different targets for time-scales and resource use. Benchmarks are another possible source of comparative data; they have been established for many processes, and data are available from industry, sector and professional support bodies.

A number of potential methods could be used to collect and analyse data:

- records kept for monitoring purposes to make comparisons between activities;
- records of meetings and other formal events can provide useful data on the sequencing of decisions and discussion of issues;
- interviews, questionnaires or focus groups;
- observation or role-play might provide useful insights into how activities are carried out.

The balance between qualitative and quantitative data is important, because each can supplement the other and it is difficult to achieve an overall picture if only one type of data is used. The methods you choose to collect information will be influenced by the availability of resources, taking into account:

- the cost of obtaining the information, in relation to its contribution to the evaluation;
- the number of sources from which information should be obtained if sufficient viewpoints are to be represented to ensure that the results are credible;
- the time it will take to obtain and analyse the information;
- the reliability of the information obtained;
- the political aspects of the process – for example, some ways of gathering information may help build up support for the evaluation.

Direct contact with those involved in the project might be the only way in which sufficient information can be obtained to make the evaluation worthwhile.

10.1.6 Analysing and reporting the results

When planning what data to use in the evaluation it is helpful to consider how the data will be analysed.

Usually, there are a lot of data, perhaps in several different forms. If you have set clear objectives, it should be possible to identify the data that are relevant to each issue. It is usual to follow the steps below:

- consider numbers, for example how much has been achieved at what cost;
- consider quality, whether appropriate and not too high or low;
- seek out both positive and negative evidence;
- make comparisons;
- look for patterns in the evidence.

It can be very time consuming to analyse data from interviews and observations but, if the purpose of the analysis is clear, then it is possible to focus only on the relevant material.

It may be that several different evaluation reports must be prepared on completion of a project:

- the client/sponsor report;

- what has been learnt from the project;
- different types of evaluation report for different stakeholders.

For example, some funding bodies require to be told how their funding contributed to the success of a project, and so need a report relating only to one aspect. It is usually for the manager of a project to identify the number and types of report that are required, and to ensure that they are prepared and presented appropriately.

You need to consider the audience and use language that they will understand, avoiding unfamiliar jargon. The report is likely to include:

- an executive summary;
- an explanation of the background to the project;
- an explanation of how the evaluation was planned;
- the methods that were used to collect and analyse data;
- a presentation of the evidence, and how it has been interpreted;
- a conclusion, and recommendations for future practice.

If some aspects of the work encountered problems, be careful about identifying causes if there is an implication of blame. Sometimes it is better to discuss problems that have implications for contractual relationships in confidential reports or face-to-face meetings. Consider how to present the report in a businesslike and attractive format appropriate for its audience.

10.1.7 Following up the report

The evaluation report will often contain recommendations for further actions and these may lead to new project ideas. Recommendations may relate to processes and procedures within the organisation. Project evaluation and debriefing can be a learning experience for the organisation as a whole, as well as for individuals.

11 Self-development from a project

Managing a project provides considerable opportunities for self-development, but these can be lost if you become too immersed in delivering the project to remember that you will move on to other work once it concludes.

For many managers, taking responsibility for a project is a time-bounded task with clear objectives and a fixed budget. A project usually involves managing staff, finance, operations and information across the boundaries of departments and functions, with complicated interactions and difficult situations. There is usually a strategic dimension, in ensuring that the project continues to align with organisational objectives and directions. Thus the project manager's overview of the project is similar to the chief executive's view of the whole organisation.

There is an opportunity to use the experience of managing a project to develop yourself for a more senior role, and to demonstrate, through successful outcomes and evaluation, that you are prepared for such a role.

11.1 Personal self-evaluation

You could also carry out a personal self-evaluation, to contribute to your own development as a project manager. You can develop a list of questions to evaluate your own performance:

- Were the project objectives achieved?
- Did the project stay within budget?
- How were problems that occurred during the project been resolved?
- What could you have done differently to improve the final result?
- What do your colleagues feel about the results of the project?
- How good is your current sponsor relationship and the relationship with other stakeholders?
- Will your sponsor recommend you to colleagues?

- Has your sponsor asked you to undertake additional work?
- What have I learnt from managing this project?
- What skills/competences could I develop to help me with future projects?

Some of the information you will need might be obtained from your colleagues and project team, such as:

- To what extent did I contribute to achieving the project objectives through the way in which I managed the project?
- What specific actions did I take which helped us to meet the project objectives?
- What did I do that hindered us in achieving the project objectives?
- What might I have done that I didn't do to help us to achieve the project objectives?
- Would you appoint me to a similar role in future?
- Would you choose to work with me in similar roles in future?
- Would you recommend me to colleagues?

Some of these questions can be usefully asked from an early stage in the project to review the working relationships within the team. Other questions relate to the final outcomes and answers will be coloured by the extent to which the project is considered successful. Many of the questions will need to be adapted for use in a particular setting.

It can be lonely managing a project; and it can be difficult to seek feedback about your own performance if the team are new and lack confidence, or if the situation requires you to take a strong lead. Consider asking a senior manager in your organisation to act as your mentor for the duration of the project. This should not be someone who has a strong personal stake in the project, but someone who can help you learn from what happens as the process unfolds. Share with your mentor your plans to use the project for personal development, and ask her or him to help you make the most out of the opportunities the project offers. You might find it helpful to draw up the framework of a personal development plan, indicating some targets for development and identifying how you will know that you have reached them. You might also want to collect evidence of your achievements, to produce as you pursue new career options.

12 Acknowledgements

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Open University course B713_1 Preparing a project:
<http://openlearn.open.ac.uk/course/view.php?id=3548>

Open University course B713_2 Planning a project:
<http://openlearn.open.ac.uk/course/view.php?id=3358>

Open University course B713_4 Implementing the project:
<http://openlearn.open.ac.uk/course/view.php?id=3360>

Open University course B713_5 Completing the project:
<http://openlearn.open.ac.uk/course/view.php?id=3324>

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