Projects in Computing and Information Systems

A Student's Guide

Third Edition

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Projects in Computing and Information Systems

4.3.7 Rolling wave planning

A technique that can help you when your project is not all that clear is *rolling wave planning*. Rolling wave planning means that, rather than compiling a detailed plan at the project's inception, you construct a *skeleton plan,* which only identifies the key stages of your project. Your project planning is thus performed 'on the fly' as your project progresses. You make decisions as to where you are actually heading and what work you will have to perform in the subsequent stages of your project, as you complete the previous stages. Thus, your planning detail ebbs and flows (like a rolling wave) as your project progresses and you make decisions on where to go and what to do next.

As a skeleton plan is relatively broad it can be suitable for many projects. Although it is of little use if you don't have *any* idea of what you want to do, it can help you to identify universal milestones that you must adhere to – for example, complete a literature survey, hand in your final report, etc. – whatever these turn out to be. Figure 4.9 provides an example of a typical rolling wave, skeleton plan – in this case a software development-type project that lasts for about six months. Although this plan does not provide explicit detail about what this project is really about, it does identify the significant tasks that need to be completed and by when.

4.3.8 Project initiation document

A project initiation document (PID) is a term that originates from the PRINCE II project management methodology (OGC, 2009), the content of which aims to answer four fundamental questions about the proposed project.

- What is the project aiming to achieve?
- Why is it important to achieve it?
- Who will be involved and what are their responsibilities?
- How and when will the project be undertaken?

To address these questions the PID draws together a number of sections in one place, representing a definitive overview of the project – its purpose, objectives, outline, plan, risks, etc. It can form a contract in terms of defining what the project will achieve. PIDs come in various shapes and sizes with different content requirements, and many companies have their own definitions of what should be included. It is always a good idea to put together a PID at the start of your project. The components used in the project proposal (see Section 3.3) can form the basis of your PID, namely:

- title
- aim and objectives
- expected outcomes/deliverables
- introduction/background/overview
- project type
- related research
- research question/hypothesis
- methods

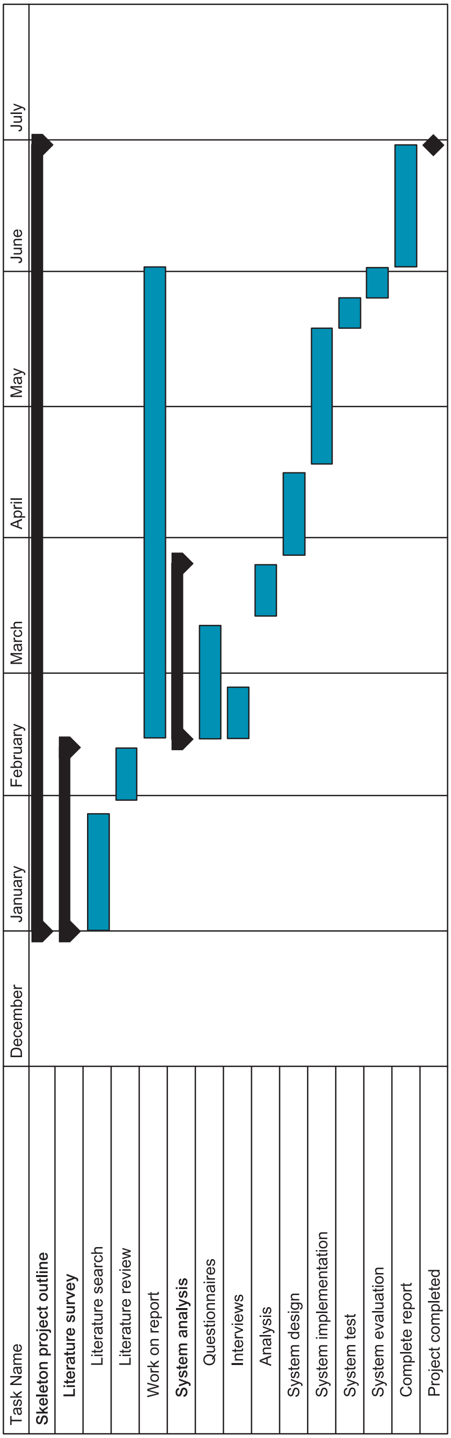

Figure 4.9 Example rolling wave skeleton plan for a software development project

- resource requirements
- project plan

These may need some updating once your project is accepted as you may have made some progress and made some changes since the proposal was put together. In addition, it would be worthwhile including the following three sections in the PID.

1. **Risks.** Include a list of critical risk factors and means of dealing with these risks should they occur. How might you reduce their impact or limit their chances of occurring in the first place? Risk management is covered in the following section and this will give you some ideas of what to include in the PID.
2. **Organisation.** If you are undertaking a group project it would be worthwhile outlining how your team will be organised; who is the team leader, secretary, spokesperson; how often the team will be meeting; communication arrangements (email addresses, website, etc.); configuration management, etc. Team organisation is discussed in Chapter 7.
3. **Milestones.** Now that your project plan is completed you can identify the major milestones within the PID. These milestones should include both project-specific ones (i.e. any deliverables you are producing) and generic, course-related ones (for example, deadlines for interim reports, final reports, presentations, etc.).

You might like to keep your PID in a project folder so that you can refer to it easily as your project progresses. Sections such as the project plan and risk plan may need to be readily available and accessible. The idea of establishing a project folder is covered in Section 7.1.2 when project initiation is discussed.

4.4 Risk management

4.4.1 Introduction

Risk management is a process that is inexorably linked to project management; it runs in parallel with project management and follows a very similar process. Just as project management involves the development of a project plan and control of the project using that plan as the project progresses, risk management involves the identification of risks at the project's outset and the control of those risks as the project unfolds. As you undertake the stages of project management you will also be incorporating the activities of the risk management process. In this section we introduce a risk management process that you can use to manage and control risks within your own project. The four main stages of this risk management process are:

1. *identify risks;*
2. *assess impact of risks;*
3. *alleviate critical risks;*
4. *control risks.*

4.4.2 Identify risks

As you are putting together your project plan, you should also be identifying any *sources* of risk to your project. These risks can be individual events (*event-driven risks – acute*) that might have an impact on your project (for example, your supervisor leaving, hardware failure, etc.) or they may be longer term risks that evolve over time (*evolving risks – chronic*) before eventually coming to a head (for example, underestimating the time it will take you to develop part of your system, deteriorating relationship with your client, etc.).

Whether the risks to your project are *event-driven* or *evolving*, they can be further classified as either *technical* or *non-technical* risks. Technical risks refer to any risks that are associated with the hardware or software you might be using. For example, will there be problems interfacing the components of the software and hardware system you are developing? How well do you know the programming language and platform you are going to work with? Is your project dependent on the development of an algorithm that may be difficult, if not impossible, to develop? Is the specification for the system clear? Are the requirements likely to change? Is the project beyond your technical ability? What are the chances of your disk crashing and you losing all your data?

Non-technical risks are all other risks associated with your project. These can include such things as losing your client, your user or your supervisor, illness, over-running your time estimates, discovering work during your literature search that already covers (in depth) what you intended to do; and so on.

As well as identifying potential risks to your project it is also useful to identify risk *triggers* (sometimes called risk *symptoms*) at this stage too. Risk triggers are events or things that happen during the course of your project (not necessarily 'bad' things) that might give an indication that something is wrong or that one of the risks you have identified is increasingly likely to occur. They are useful in that they give you warning, ahead of time, that something will happen and you can be better prepared to deal with it when it does. For example, missing preliminary milestones in your project is a good indication that your project is going to over-run; struggling with a straightforward implementation of a component in a new programming language will probably mean you will encounter severe implementation difficulties later on; having difficulty in arranging a meeting with your client early on may be a good indicator that s/he may be difficult to contact and meet later when you are desperate for feedback towards the end of your project.

All projects encounter problems to some extent, so don't be disheartened if some of the risks you identify during this stage of the risk management process occur. The point of risk management is to reduce risks or ensure you are in a position to deal with these risks if they do occur and you are not facing them ill-prepared.

4.4.3 Assess impact of risks

Having identified the risks associated with your project in the first stage of the risk management process, you should then calculate their *impact*. The impact of any risk on your project is given by the following equation:

$$\text{Risk impact} = \text{likelihood} \times \text{consequence} \tag{4.1}$$

Thus, although a risk may be highly likely to occur, if its consequences are low its impact will also be low. Similarly, if a risk has severe consequences for your project but its chances of happening are very low, its impact is also calculated as low. The risks you need to worry about are those that are highly likely to occur and have significant consequences to your project if they do.

Example

Turner (1993: 242) provides an interesting illustration of how the risk impact equation works in practice. If we consider the likelihood of a severe earthquake (say, greater than Force 7 on the Richter scale) occurring in the British Isles, we would probably conclude that the chances of this occurring are small. We then consider the consequences of this risk on two different kinds of building – a car park and a nuclear power station. In the case of a car park the consequences of a severe earthquake are quite small – a few cars may get damaged and (unfortunately) a small number of people may be injured or killed if it collapsed. As the consequences of the risk are relatively low (unless it is your car that gets crushed!) and the likelihood is low, the overall impact of this risk is also deemed to be low. Thus, in the British Isles, car parks are not constructed to be 'earthquake-proof'.

In the case of the nuclear power station however, the consequences of a major earthquake could be catastrophic – hundreds of thousands of people could be killed. In this case, while the likelihood of the earthquake is the same as for the car park, the consequences are much higher – leading to an overall risk impact that is deemed very high. Thus, nuclear power stations within the British Isles are constructed to withstand such events.

Turner (1993: 256) goes on to provide a quantitative measure for assessing the risks to your project. A risk's likelihood is classed according to a three-point scale – Low/Medium/High. Similarly, a risk's consequence is measured on a five-point scale – Very Low/Low/Medium/High/Very High. Turner assigns numbers to these measures, as shown in Tables 4.2 and 4.3.

By assessing each of the risks to your project according to these scales, you can determine a risk's impact as a value between 1 and 15 based on Equation 4.1 (1 × 1 being the lowest score and 3 × 5 being the highest possible score). For example, suppose we feel that there is a small chance that we may lose our client during the course of our project (s/he may have told us in a preliminary meeting that their department may be restructured during the next six months – risk likelihood is *medium*; 2), yet the consequences of this are quite severe (how would we assess our final system?). We might feel the consequences are therefore *high*; 4. The overall risk impact of this risk is 2 × 4 = 8.

Risk likelihood	Score
Low	1
Medium	2
High	3

Table 4.2 Risk likelihood scores

Risk consequence	Score
Very Low	1
Low	2
Medium	3
High	4
Very High	5

Table 4.3 Risk consequence scores

Although this (dimensionless) number doesn't really mean anything as it stands, it does provide us with a *relative* measure that we can use to compare all the risks we identify in our project. We can then rank the risks to our project according to this measure and begin to focus on the 'critical' ones.

Depending on how many risks you identify you can choose to categorise *critical risks* in one of two ways; either the 80/20 rule or by impact factor with *RAG grading*. The 80/20 rule works on the theory that approximately 20% of your risks will cause approximately 80% of your problems. You should therefore focus on these critical risks and be confident of addressing 80% of the problems your project is likely to face.

In reality, your risk list may not partition easily into an 80/20 split, or there may be another natural break point where three or four risks appear significantly 'riskier' than others. You may therefore decide to focus on critical risks by impact factor alone – for example, those that have an impact factor greater than 9 say. One approach you can use here is *RAG grading*. RAG stands for Red, Amber and Green and is used to classify risks according to their impact factor. Those with an impact factor of 1 to 5 are classified as green risks; those with an impact factor of 6 to 10 are amber risks; those with an impact factor greater than 10 are red risks. It is the red risks (critical risks) that you need to focus your attention on. Although not critical, you should keep a wary eye on amber risks, and green risks can generally be ignored.

Whichever approach you use, you will end up with a short list of critical risks that you are going to do something about. How you deal with these critical risks is discussed in the following section.

4.4.4 Alleviate critical risks

There are three ways that you can deal with the critical risks you have identified in your project: *avoidance*, *deflection* (sometimes called *transfer*) and *contingency*. Avoidance means reducing the chances that the risk will occur at all. Deflection means passing the risk onto someone or something else. Contingency means accepting that the risk is going to occur and putting something in place to deal with it when it does.

Example

Pym and Wideman (1987) provide a neat analogy that contrasts these approaches. Take the situation in which someone is about to be shot at. They can avoid this risk by moving quickly to somewhere safe (avoidance). They can deflect this risk by putting something (a shield) or someone between themselves and the assassin (deflection). Or, they can assume they are going to be hit by some bullets and ring the ambulance service in advance (contingency). You may like to think which of these approaches to dealing with this risk *you* prefer!

The nature of the risks within your own project will influence which of these approaches are suitable. Although your supervisor should be able to give you advice in