UNIT 3: PLANNING AND MANAGEMENT OF COMPUTING PROJECTS

Delivery guidance

Approaching the unit

This externally assessed unit will give learners the transferable skills associated with project planning and management: task scheduling, budgeting, risk management, time management, quality management and communication with stakeholders throughout the life cycle of the project. There are many opportunities to engage in practical work using case study projects and industry standard software tools. Learners should be comfortable with the terminology and be able to extract key information from detailed scenarios.

Learners are likely to work as part of project teams throughout their working life, whether as part of a technical team delivering the product or in the role of project manager. They need to be familiar with a range of tools and techniques to plan and control a project, have an appreciation of the way in which a project serves the business and have a good understanding of the more technical aspects of computing projects. Therefore, it is important to emphasise the links with all aspects of the specification. Guest speakers from local employers would also broaden learners' understanding of project management in the workplace.

This delivery guide does not cover everything that needs to be delivered for completion of this unit but gives examples of delivery methods. You should refer to the specification for full details of all the content that needs to be covered.

In the external assessment, learners may be tested on all content in the specification. Learners must practise the correct and full completion of any templates given in the sample assessment materials (SAMs) or past papers in preparation for their external assessment task.

Delivering the topics

For topic A, start with some well-known examples of successful projects and compare them with failed or poorly managed projects. Discuss the constraints on a project, such as time, cost and quality. Learners also need to consider the benefits and risks of project management for an organisation and its stakeholders.

Once learners understand what triggers the setting-up of a project and how the eventual outcome is measured, they should look in more detail at the project life cycle. Each stage of the life cycle is studied in greater depth as the unit progresses. Learners must understand the need for professionalism and so end the topic by considering codes of conduct and their influence on project management activities.

Topic B covers the start-up phase of the life cycle and thus focuses heavily on the organisation and the drivers for a computing project. Use a detailed case study, following a similar style to the SAMs, to help learners identify common themes and terminology used in project management.

Present the business case using the template in the SAMs for this unit, so that learners can familiarise themselves with the format of the document. It should set out business reasons for undertaking the project (eg streamlining the business to save money), options that should be considered (eg doing nothing, supplying a minimal solution or suppplying a full solution), expected business benefits, timescale (including the major milestones), the budget available and the major risks that have been identified. You should also guide learners to identify the document's target audience and their requirements, including the tone and the level of detail required.

In addition to considering major risks, learners should identify significant assumptions, such as all resources being available when needed. They should also be able to identify key constraints that will impose limits on the project, such as project funds or technical expertise within the team.

Learners should also be familiar with the range of project stakeholders and the roles they have within a typical project.

Using this information, the learners must be able to complete a project initiation document (PID) using the template given in the SAMs and past papers. Learners should complete this through a series of practical activities.

Use case studies to contextualise the content of topic C. Learners will need plenty of practice in scheduling and budgeting using an industry standard project management application. If your centre does not have access to project management software, learners can create Gantt charts, resource lists and cost plans using a standard spreadsheet application. Alternatively, learners can use open source software, but it must be capable of producing the detail required to achieve the highest grade bands. Learners must be able to use a simple function point analysis approach to estimate the time required for planning software development tasks.

When considering risk management, learners should be given examples of potential risks and discuss their likelihood and impact. They should also be able to identify the more obvious risks in the given scenarios and know that if a risk occurs it is referred to as an issue. You could then move on to discussing quality management in the context of computing projects. Learners need to understand software testing in terms of the time required, when it should happen in the life cycle and how frequently it should occur. Learners should consider the importance of quality standards and their use.

Communication strategies are a crucial topic in this unit, so discuss these with learners in relation to the different stakeholders and the information they require. Ask learners to think about the communication methods that they would choose to use in different scenarios, and why it is important to make the right choice. Learners should also understand the timing of communication in terms of the project life cycle and the frequency of communication for a given task duration.

Topic D is about managing a live project and should be delivered through practical activities. Static case studies may not give opportunities for issue management and change management, so you may need to think creatively to give learners the opportunity to experience these elements of project management.

In your introduction to the waterfall model, you may want to link back to topic C1 (scheduling and milestones), in order to explain the model in the context of scheduling. Learners are not expected to run a project in which they deliver a product, so the waterfall model is used to help with time planning only. However, you could encourage them to use the model to manage their assignment work for other units.

Cover monitoring and tracking progress using project management software to record progress and compare it with the project baseline. Discuss how the project manager can collect progress information and link this to the communication plan.

Learners must be able to record project progress using a checkpoint report. They need to be clear that the report has two parts – the work completed and the work planned for the next phase. Learners should also be clear about the difference between the product and the project. Learners do not need a detailed understanding of change management, but they should appreciate the importance of keeping changes under control and how badly managed changes can lead to the failure of a project.

You could cover implementation strategy, such as the waterfall model, as part of project scheduling, as the strategy chosen will affect project duration.

Link topic E back to topic A in terms of evaluating the success of the project. Learners should be aware of the process of closing down a project. They should discuss the lessons learned from the various case studies used. What went wrong and what went well? Did the contingency plans deal with issues effectively? Where the project ran well, what enabled that success? Lessons learned should also be evaluative.

Finally, learners should consider how additional feedback could be gathered from stakeholders and the methods that could be employed to do this efficiently.

Assessment guidance

This unit is externally assessed through a task set and marked by Pearson. The set task will be completed under supervised conditions in two sessions during the assessment period timetabled by Pearson. Part A will last three hours and Part B will last two hours.

The set task will assess learners' ability to plan and manage a computing project. Information about the project is released to learners at the start of each session, including background information on the organisation and the proposed project. In Part A, learners will use this scenario to complete various project documentation. They will have to apply a broad range of project planning and communication techniques using the information that they extract from the scenario.

The second part of the assessment uses the same project scenario and the documents that the learners produced in Part A (although these are for reference only and will not be editable). Additional information will be given on the progress of the project up to one of the main milestones. Learners will use this information along with their PID (and plans) to complete a milestone or checkpoint report, which reflects the progress up to that point. Finally, they will produce a short project closure report, in the form of an email, using the additional information given. They should consider the three main success criteria (time, cost and quality), the project management (including planning, risk management and communication), and summarise all the lessons learned from the project.

Getting started

This gives you a starting place for one way of delivering the unit.
Activities are suggested in preparation for the external assessment.

Unit 3: Planning and Management of Computing Projects

Introduction

Whether you are building a new website for a small business or rolling out a new patient management system across the entire NHS, the same underlying principles to manage projects are used. The aims of a computing project are to deliver the finished product on time, within budget and to meet the client's requirements. The approach to this unit should maintain a focus on the needs of the organisation that drive a computing project, as well as giving practical experience of using project management tools.

Topic A – Project management concepts

Begin the unit by discussing what defines a project. This should lead to the conclusion that a computing project is usually a one-off piece of work, which can be coordinated using well-established project planning and management techniques to keep it on track.

- Use plenty of real examples and devised case studies throughout the unit. Initially, learners could spend a short amount of time finding examples of real projects to discuss, either by looking online or at handouts. At this very early stage, these examples do not need to be IT-focused, so, for example, learners with an interest in football might enjoy investigating the Wembley Stadium rebuild. From this initial research, aim to draw out the common factors for the success or failure of projects and the three metrics used to evaluate the project: time, cost and quality. Examples of well-known IT project failures could include Sainsbury's warehouse automation in 2005, which cost £150 million before the project was written off. Another example is the UK National Offender Management Information System project (NOMIS) which had similar costs and failed for many reasons. Other similar projects will allow opportunity for investigation and discussion.

- Learners must be able to identify and plan for risks. They could analyse examples of failed projects to establish why they failed and whether, with better planning, these issues could have been avoided. Try to give some examples where serious issues were controlled and overcome by the use of good project management strategies. Learners must have practical experience of quantifying risk in terms of impact and probability to calculate an overall severity score (1–9). Here, you could discuss a project that they can relate to, such as moving house (or upgrading a system such as a product management system, to keep the business focus).

- Understanding the benefits of a successfully delivered project is equally important for the initial business proposal and the final evaluation of the project. You could supply learners with brief descriptions for a number of projects and a list of typical benefits, which they should be able to match up and justify. They should also gain some experience of calculating a return on investment, using a spreadsheet to determine whether a proposed project (given time and cost) will give a financial return over a given period.

- In this unit, learners only need to understand the project life cycle in terms of the framework it allows for structuring a project. Learners should understand that a project process could end as a result of a feasibility study as the decision could be made at that stage not to move forward. This can occur when, during investigation, it becomes clear that the problem is not what was first thought, but something relatively easily fixed. You should stress that taking each step in the life

cycle seriously and ensuring it is done properly will reduce the likelihood of problems later in the process. For example – a badly designed solution that has been rushed will probably result in a badly implemented solution.

- Learners could produce a poster or something similar to track their progress through the unit – by either ticking off the stages as they are covered, or adding further explanations to demonstrate their learning. You could also encourage learners to discuss examples from their project work on internally assessed units and to use these projects to practise and develop their project management skills.

- Introduce professionalism so that learners can see that project management is a well-regulated profession with many opportunities. Direct learners to websites, such as the British Computer Society (BCS) recruitment site, to research IT project management jobs. They should also read, compare and discuss the professional codes of conduct from the Association of Project Management (APM), BCS or Project Management Institute (PMI), to understand that, along with the rewards of this work, there is responsibility. Discuss communication as a professional, transferable skill and ensure that learners understand the importance of using suitable methods of communication and appropriate tone in documentation.

Topic B – Starting up a computing project

Topic B's focus is on the activities associated with the start of the project life cycle that result in the initiation of the project, once it has been established that the project is feasible and could deliver the benefits required.

- Working in groups, learners should put together a business case, which could initially be presented as a gapped handout or matching exercise. From a given business case, they must be able to interpret the expected business benefits, timescales, major milestones, budget and the major risks. Throughout the remainder of the unit, learners should refer back to these points in each business case for the various case study project scenarios that they work with.

- Once you have given an overview of the various stakeholders and their roles within a computing project, learners should construct organisation charts for project teams, showing the range of stakeholders and the relationships between them. Discuss other stakeholders in terms of their contribution to the project or why their views must be taken into account (in particular, the general public, who could be affected by large-scale projects). It could be enlightening for groups of learners to debate project benefits against the concerns of stakeholders for a given case study.

- Learners should be able to identify both assumptions and constraining factors for a given project. Consider assumptions as very low-severity risks which are not captured as part of the risk management process, so they should be documented elsewhere. Give examples of assumptions (eg that the latest version of software will be available to developers) and ask learners to discuss the implications for the project. Learners should understand that assumptions do carry a degree of risk as mistakes made through incorrect assumptions may result in extra work being needed in the long run to resolve. Recap on risk planning. Learners must be able to identify constraints from a given scenario. You could set this as a reading comprehension exercise, leading to another group discussion on the possible effects of the constraints identified.

- The main emphasis of this topic should be the completion of a PID, using the template given in the SAMs. Using the project information covered so far, learners should put together a number of PIDs, based on case studies. They must be able to clearly state project objectives, making them specific, measurable, achievable, results-oriented and time-constrained. This is a significant activity and it would be best to approach it, initially, as a group or paired task, leading up to an individual task. Make sure that learners understand the decisions they need to make about the way in which they communicate through the PID (eg the requirements of the

target audience, the tone, the level of detail and depth of explanation).

- As completing a PID forms a key component of the assessment, learners should also practise completing one under exam conditions. This could form the basis of a formal mock assessment, in which learners could peer assess each other's work and give feedback on strengths and areas for improvement.

Topic C – Project planning

Topic C covers the practical (and transferable) project management skills that learners will use to produce the project plans (for time, cost, quality, risk and communications). This naturally lends itself to practical work using industry standard applications – specialised project management applications and general-purpose office applications such as spreadsheets.

- Introduce learners to a work breakdown structure, as this will give a good starting point for understanding time planning, although learners are not required to produce such a structure. Learners should then work individually to produce comprehensive Gantt charts, using appropriate software. These should show tasks running in sequence (and in parallel where appropriate), indicating milestones using the standard (diamond) symbol and using critical path analysis to identify the critical tasks in the plan. They should identify float (spare time) which could be incorporated into contingency plans.

- Learners should be able to identify all the resources required for a project (staff, equipment and materials) and their associated costs, such as pro-rata costing. A good starting point is to devise a simple spreadsheet for estimating project costs given the quantity of each resource required (or the duration of each task). Once learners have understood how the budget is calculated (bottom up), they could use project management software to set up resource lists and assign these to project tasks. This is a complex and time-consuming process, so allow ample time for learners to become familiar with the software.

- In the previous activities, learners will have seen budget planning examples with clear timescales. Introduce a discussion about how timescales for task completion are estimated. Use examples that are relatively easy to calculate, such as how long it takes to build a wall of a given length and height (knowing the size of a brick and how many bricks can be laid per hour). Explain how the complexity of making such calculations affects software development and introduce the idea of function point analysis as a solution. Ideally, learners should also be encouraged to build in recovery points in the project that allow for unforeseen occurrences such as IT or other technical problems or project team issues such as sickness. Learners should build a spreadsheet to estimate task duration, based on the number of function points required and the rate of development (hours per function point) for different staff.

- Recap risk management, which learners will have covered earlier in the course. In addition to risk analysis, learners should now create contingency plans for any risk with a calculated severity score of 4 or above. Risks with a score of 9 must be avoided or the severity of the risk should be reduced. Learners should revisit their time plans to identify the float available for contingency. They should also consider the impact on the budget and plan for 5 per cent budget contingency.

- You do not need to teach defect removal and testing techniques in depth, but learners will need to understand how these techniques are used and applied, so that they will know when these activities should take place and how to estimate the time required. A simple rule of thumb is that for every hour of development time, plan for an hour of testing. Once again, learners should revisit their time plans to ensure that ample time has been allowed for quality management and testing.

- Learners should discuss the various communication methods used within

organisations (traditional as well as modern electronic communication methods). They should refer back to their organisation chart and list of stakeholders, and consider the best methods of communication and the ideal frequency of communication. Initially, this might be a tutor-led activity, it will not be easy to extract this information from case-study scenarios because it requires a different perspective. Consider the main reasons for the communication: so that the project team know what they have to do, so the project manager knows how work is progressing, so the client knows how the project is progressing and so that any issues can be dealt with to ensure that the project stays on track.

- Using project management software such as Freedcamp, Basecamp or Microsoft® Project (or any other suitable alternative), could be introduced particularly to support communication. This will avoid endless trails of emails and give an auditable trail of communication through using project message boards and discussion threads, alongside automated email updates when there is activity.

- As the planning activity is the single largest part of the assessment, learners must have plenty of practice at it, some under exam conditions. They should analyse a scenario, and then devise a time and cost plan using standard software, along with supporting risk and communication plans.

Topic D – Executing and monitoring a project

Learners do not need to manage a live project for this unit. However, they must be aware of the process. In particular, they will be expected to record project progress in a checkpoint report, capture details of issues arising in an issues log and be able to summarise project status in a professional-standard communication. You could encourage them to apply their project management skills to their projects for internally assessed units.

- When you introduce the waterfall model (or recap, if it has already been covered elsewhere in the course), you may wish to link back to topic C1. A standard approach for project planning is to allow 15 per cent of execution time for analysis, 30 per cent for design, 25 per cent for development, 25 per cent for testing and quality, and 5 per cent for implementation (delivery/roll-out). Using this model, learners should revisit their project plans and compare their time allocations.

- Explain the features of the chosen project management software and how to use it. Give learners plenty of time to practise using scenarios containing the necessary information, so that they become familiar with using the software.

- Learners should revisit their communication plan. Discuss how the project manager will use this to track progress of the project tasks and how they will report progress to the project sponsor and the client. Ensure that learners have plenty of opportunities to practise their communication skills, including use of plain English and technical language, using appropriate tone, selecting appropriate information for checkpoint (milestone) reports etc.

- Learners must complete a checkpoint report for a simulated project, using the template from Pearson (included in the SAMs). It is important that they understand the difference between the two sections – first, reporting on what has been done up to the milestone, and, second, the work that is planned up to the next milestone. Learners should be aware of how to track project progress against a baseline. If they are using a project management application, this feature of it may be introduced, although it is advanced and is not necessary for the assessment.

- Learners should also be familiar with the process of recording issues (risks that have arisen). The PRINCE2:2009 issue register is too complicated for this level, so the assessment will use the template included in the SAMs, which incorporates a simple table in the standard checkpoint report. It is important that learners are able to identify lessons learned from dealing with issues and that these are recorded in

the checkpoint report. The lessons learned will form a significant part of the project evaluation.

- Change management should only be outlined in this unit. Learners should be aware that in a real project any change has to be properly documented, evaluated and authorised, as it will have an impact on time, cost and quality. Emphasise links with quality and testing, as dealing with faults falls into the scope of change management. Discuss the change management process in terms of the communication plan, although learners will not be expected to have practical experience of managing change. Learners should however understand that there needs to be stakeholder buy-in and that not all future users will welcome the proposed changes. Finding ways to encourage participation and give reassurance is part of the project management process.

- Introduce the idea of implementation strategies with a range of examples. Use different case studies so that learners appreciate the differences and how this determines the time that should be planned for roll-out, especially where parallel running or pilot changeover is involved. Learners should understand the link with testing and quality management (beta testing and user acceptance). You may want to explain this using a computing project scenario or case study. Learners must also consider the appropriate implementation strategy for their (case study) project and give a rationale. This could be done as a discussion, presentation or written exercise.

Topic E – Project closure and post-project review

This final topic involves detailed written work for the learners and will engage them in critical evaluation.

- Explain the process of closing down a computing project and moving to the operation/maintenance phase. Learners should revisit their (case study) project and draw together the documentation for review, summarising any lessons learned. Discuss the implications of the learners' projects moving into operation/maintenance. What additional planning and resources are required? Who takes responsibility once the project is closed? A good example is a desktop operating system. Once released, it goes into the maintenance phase, in which regular updates and patches are released. This continues until the operating system reaches the end of its life and support is withdrawn.

- Discuss how you would document the closure of a project in an email. You could write a close-down email as a whole group activity to ensure that learners understand that they must consider the communication requirements of this task. They should suggest the appropriate level of detail and tone for the target audience, as well as balancing the need for plain English with the need for technical detail.

- Learners should discuss ways of capturing feedback on the project, starting from the list of stakeholders and the communication plan. They should consider the range of methods used to gather information and justify why one method is more appropriate for a particular stakeholder. They could devise questionnaires or interview plans for their (case study) project.

- Learners must carry out a detailed evaluation of a project. They should consider the final cost, delivery date and quality of product delivered against the client's requirements and the original plan as set out in the PID, along with the project objectives. Review the lessons learned and, from this summary, evaluate the risk management strategy.

- Learners should be able to identify key lessons that could be used to inform future projects. As well as analysing quantitative feedback (eg completion date and total expenditure), they should also be able to extract qualitative feedback from

stakeholders and incorporate this into the final project evaluation. Qualitative feedback could also be used to inform lessons learned (eg a departmental manager may comment on how smoothly a process ran, leading to the conclusion that next time the same approach should be used – this is a significant lesson learned from the project).

Details of links to other BTEC units and qualifications, and to other relevant units/qualifications

Pearson BTEC Level 3 Nationals in Computing (NQF):

- *Unit 1: Principles of Computer Science*

- *Unit 2: Fundamentals of Computer Systems*

Pearson BTEC Level 3 National Extended Diploma in Business (NQF):

- *Unit 4: Managing an Event*

- *Unit 6: Principles of Management*

- *Unit 13: Cost and Management Accounting*

Other qualifications:

- BCS: Foundation Certificate in IS Project Management

Resources

In addition to the resources listed below, publishers are likely to produce Pearson-endorsed textbooks that support this unit of the BTEC Nationals in Computing. Check the Pearson website (http://qualifications.pearson.com/en/support/published-resources.html) for more information as titles achieve endorsement.

Textbooks

- Hughes B *et al. – Project Management for IT-Related Projects: Textbook for the ISEB Foundation Certificate in IS Project Management* (British Computer Society, 2012) ISBN 9781780171180.
  A well-structured book on IT project management, a valuable reference text and quick to read. Suitable for level 3 learners. It is a recommended text for the Foundation Certificate in IS Project Management.

- Jalote P – *Software Project Management in Practice* (Addison Wesley, 2002) ISBN 9780201737219.
  An in-depth study of project management in large-scale software projects which could give useful case study material.

- Lock D – *Project Management*, *Tenth Revised Edition* (Routledge, 2013) ISBN 9781409452690.
  A very in-depth book that goes beyond the scope of this unit, but will give detailed clarification for tutors. Aimed at level 4 learners and above.

- Maylor H – *Project Management*, *Fourth Edition* (Financial Times/Prentice-Hall, 2010) ISBN 9780273704324
  A good introductory text, set out in a learner-friendly style, so worth stocking in the library. Aimed at level 3 learners and above.

- Office of Government Commerce (OGC) – *Managing Successful Projects with PRINCE2, 2009 Edition* (Stationery Office Books, 2009)