LEVEL 5

PROFESSIONAL ISSUES IN IT

Lecturer Guide

Modification History

Version	Date	Revision Description
V1.0	October 2011	For issue
V1.1	November 2015	Assessment Methodology Updated

CONTENTS

1. Module Overview and Objectives

The purpose of this unit is to equip the user with knowledge and skills in the professional issues that impact on the development, deployment, maintenance and use of computer systems. The aims of the unit are to give the learner:

- a working knowledge of the social, ethical and legal issues applicable to the IT field;
- the ability to construct, follow and adapt project plans for software development and maintenance;
- a working knowledge of software quality.

2. Learning Outcomes and Assessment Criteria

Learning Outcomes; The Learner will:	Assessment Criteria; The Learner can:
1. Understand the social, ethical and professional issues essential to the IT profession	1.1 Identify and explain common legal, social and professional standards issues applicable to a professional working in the IT industry 1.2 Appraise the ethical aspects of various scenarios in the development, deployment and use of IT systems 1.3 Explain the social, legal and professional standards issues in the context of various scenarios in the development, deployment and use of IT systems
2. Understand a project management life cycle and associated techniques	2.1 Explain the project management lifecycle in the context of an IT project 2.2 Identify the key phases of the project management lifecycle in relation to a given scenario 2.3 Develop project management strategies for specified software development and maintenance projects
3. Understand how to deploy a software application	3.1 Explain the need for structured and planned deployment of a software application 3.2 Analyse the potential risks and problems of deploying a software application in a given scenario 3.3 Specify a software deployment process for a given scenario
4. Understand risks and the management of them in software projects	4.1 Explain the need for detailed risk analysis in a software engineering context 4.2 Explain risk management techniques 4.3 Analyse risks and risk management strategies in the context of an IT project

5. Understand the principles and techniques of IT service management	5.1 Analyse an IT service case study in respect to management requirements
	5.2 Analyse objectives in an IT service case study
	5.3 Apply management techniques to a problem situation in order to achieve objectives
6. Be able to design software quality policies and procedures	6.1 Define and explain the concept of software quality
	6.2 Explain the use of metrics for software quality management and apply these to a given scenario
	6.3 Evaluate the requirements for software quality policies and procedures in a problem context
	6.4 Design software quality policies and procedures and apply these to a given scenario

3.   Syllabus

Syllabus			
Topic No	Title	Proportion	Content
1	Understanding IT Standards and Issues	1/12 2 hours of lectures 1 hour of seminars 2 hours of tutorials	• Introduction to the module • Ethics – What are ethics and why are they relevant? • Social, legal and professional issues in IT and their potential impact • Why understanding standards and issues is so important ***Learning Outcome: 1***
2	Applying IT Standards and Issues	1/12 1 hour of lectures 2 hours of seminars 2 hours of tutorials	• Applying social, ethical, legal and professional standards and issues to the IT profession and projects • Analysing the effects of such issues and standards on the IT industry ***Learning Outcome: 1***
3	IT Project Management	1/12 2 hours of lectures 1 hour of seminars 2 hours of tutorials	• What is IT project management and why is it necessary? • Identifying and understanding project management lifecycles and phases • Understanding project management strategies ***Learning Outcome: 2***

4	Applied IT Project Management	1/12 1 hour of lectures 2 hours of seminars 2 hours of tutorials	• Identifying and applying project management lifecycle phases and strategies to IT projects • Analysing, evaluating, concluding and reporting findings *Learning Outcome: 2*
5	Software Application Deployment	1/12 2 hours of lectures 1 hour of seminars 2 hours of tutorials	• What is software application deployment? • Its place within an IT project's lifecycle • How to identify potential issues • Software application deployment standards *Learning Outcome: 3*
6	Applying Software Application Deployment to Projects	1/12 1 hour of lectures 2 hours of seminars 2 hours of tutorials	• Identifying deployment risks and issues • Creating a software deployment procedure for an IT project • Explanation of software deployment procedure *Learning Outcome: 3*
7	IT Risk Management	1/12 2 hours of lectures 1 hour of seminars 2 hours of tutorials	• What is risk? • Risk management and the techniques employed • Risk identification and analysis in IT projects • The consequences of not planning for risk • Reactive vs. proactive *Learning Outcome: 4*
8	Applying, Evaluating and Managing Risk Analysis	1/12 1 hour of lectures 2 hours of seminars 2 hours of tutorials	• Applying risk analysis and risk management to an IT project • Evaluating findings • Reporting results *Learning Outcome: 4*

9	IT Service Management (ITSM)	1/12 2 hours of lectures 1 hour of seminars 2 hours of tutorials	• What is IT service management? • Where is ITSM focused? • Why is ITSM important? • ITSM International Standards *Learning Outcome: 5*
10	Analysing and Applying IT Service Management	1/12 1 hour of lectures 2 hours of seminars 2 hours of tutorials	• Analysing and applying IT service management • Evaluation of ITSM – advantages and disadvantages *Learning Outcome: 5*
11	Software Quality Policies and Procedures	1/12 2 hours of lectures 1 hour of seminars 2 hours of tutorials	• Understanding quality within IT • What are quality procedures and policies? • Why software quality procedures are important • Measuring quality • Theory of applying quality procedures to IT projects • External standards *Learning Outcome: 6*
12	Applying Software Quality and Module Review	1/12 1 hour of lectures 2 hours of seminars 2 hours of tutorials	• Writing a software quality policy • Applying software quality procedures • Revision of module content • Assessment Clinic *Learning Outcome: 6*

4.   Resources

Lecturer Guide: This guide contains notes for lecturers on the organisation of each topic, and suggested use of the resources. It also contains all of the suggested exercises and model answers.

PowerPoint Slides: These are presented for each topic for use in the lectures. They contain examples which can be used to explain the key concepts. Handout versions of the slides are also available; it is recommended that these are distributed to students for revision purposes as it is important that students learn to take their own notes during lectures.

Student Guide: This contains the topic overviews and all of the suggested exercises. Students will need to bring this to all of the teaching hours for this module.

5. Pedagogic Approach

Suggested Learning Hours					
Lecture:	Tutorial:	Seminar:	Laboratory:	Private Study:	Total:
18	24	18	-	90	150

The teacher-led time for this module is comprised of lectures, tutorials and seminars. The breakdown of the hours is given at the start of each topic. Unless stated on the topic overview pages, the order of delivery for each topic is lecture(s), seminar(s), private study then tutorial(s).

5.1 Lectures

Lectures are designed to start each topic and PowerPoint slides are presented for use during these sessions. Students should also be encouraged to be active during this time and to discuss and/or practice the concepts covered. Lecturers should encourage active participation wherever possible and for students to apply what they are learning to their personal/cultural experiences.

5.2 Tutorials

Tutorials are designed to follow both the lecture(s) and seminar(s) for each topic and are designed to deal with any questions arising from the lectures and seminars. They also include additional exercises to develop individual's subject knowledge.

5.3 Seminars

Seminars are designed to follow the lecture(s) for each topic. Seminars are designed to provide practical topic tasks. Working in informal groups should be actively encouraged by lecturers. The sharing of knowledge between group members should develop individuals' investigation skills and deepen understanding of topics. Seminars are integral to the learning taking place throughout this module.

5.4 Private Study

In addition to the taught portion of the module, students will also be expected to undertake private study. Exercises are provided in the Student Guide for students to complete during this time. Teachers will need to set deadlines for the completion of this work. These should be before the tutorial session for each topic, when private study exercises are usually reviewed.

6. Assessment

This module will be assessed by means of an an examination worth 100% of the total mark. This assessments will be based on the assessment criteria given above and students will be expected to demonstrate that they have met the module's learning outcomes. Samples assessments are available through the NCC Education Campus (http://campus.nccedu.com) for your reference.

7. Further Reading List

A selection of sources of further reading around the content of this module must be available in your Accredited Partner Centre's library. The following list provides suggestions of some suitable sources:

Bott, F. (2005). *Professional Issues in Information Technology*. British Computer Society.
ISBN-10: 9781902505657
ISBN-13: 978-1902505657

Cadle, J. and Yeates, D. (2007). *Project Management for Information Systems, 5th Edition.* Financial Times/ Pearson Prentice Hall.
ISBN-10: 0132068583
ISBN-13: 978-0132068581

Hughes, B. and Cotterell, M. (2009). *Software Project Management, 5th Edition*. McGraw Hill.
ISBN-10: 0077122798
ISBN-13: 978-0077122799

Quinn, M. (2010). *Ethics for the Information Age: International Version, 4th Edition*. Pearson Education.
ISBN-10: 0132134853
ISBN-13: 978-0132134859

Schwalbe, Kathy. (2009). *Managing Information Technology Projects, 6th Edition*. Course Technology; International Edition.
ISBN-10: 032478855X
ISBN-13: 978-0324788556

Online Resources:

The British Computer Society
http://www.bcs.org

Journal of Information Technology
http://www.palgrave-journals.com/jit/index.html

Project Management Institute
http://www.pmi.org/

Electronic Journal of Information Systems in Developing Countries
http://www.ejisdc.org/ojs2/index.php/ejisdc

Association of Project Management
www.apm.org.uk

Topic 1: Introduction to PIIT/ Understanding IT Standards and Issues

1.1 Learning Objectives

This topic provides an overview of the PIIT module, and the social and legal issues and standards facing an IT professional. On completion of the topic, students will be able to:

- Describe ethics and explain the importance of them;
- Identify other social and legal issues affecting IT professionals in industry;
- Understand the impact that social and legal issues have;
- Generate codes of ethics based on knowledge gained.

1.2 Pedagogic Approach

Information will be transmitted to the students during the lectures. They will then practise the skills during the tutorial and seminar sessions.

1.3 Timings

Lectures: 2 hours

Seminars: 1 hour

Private Study: 7.5 hours

Tutorials: 2 hours

1.4   Lecture Notes

The following is an outline of the material to be covered during the lecture time. Please also refer to the slides.

The structure of this topic is as follows:

- Introduction to the PIIT module
- Social issues affecting the IT professional
- Legal issues affecting the IT professional
- Workplace enforcement

1.4.1   Guidance on the Use of the Slides

Slides 2-3:   These slides present the scope, coverage and learning outcomes of the lecture.

Slide 4:   The Professional Issues in IT module will give students the opportunity to gain an understanding of key topic areas that are useful to IT professionals. As students of a Level 5 module, they will be required to not only gain knowledge, but also develop the skills of identification, analysis, evaluation and reporting. Although studying these issues in an educational environment, students will be required to approach the topics and seek to apply the skills from the position of being an IT professional. During tutorial and seminar sessions, students will be expected to conduct the exercises acting in the role of an IT professional.

Slides 5-6:   There are six key subject areas within the module. Each subject area will be covered over two topics; for example, social, legal and professional issues will form the content of both Topic 1 (this topic) and Topic 2. Throughout each subject area, students will build both their theoretical knowledge and their applied practical skills through a series of exercises.

Interaction between you and the students, as well as interaction between the students themselves, is encouraged throughout the module. The subject areas within Professional Issues for IT are generally subjective – there is often no right or wrong answer; it is rather a case of professional interpretation and justification. Interaction will thus allow the students to build a wider understanding of the issues.

Slide 7:   Even when policies within organisations exist, often it falls to the individual to assume responsibility for social issues. Ask the students to take a few minutes to think of situations they have been in throughout their life (IT or non-IT related) where they based their decisions or actions on their moral code. Where possible, encourage students to share their experiences with the class. The purpose of this exercise is to get each student thinking about who they really are and what their underlying values are.

Slide 8:   This slide introduces ethics with a very simplistic generic definition. You may want to elicit some possible definitions (and examples?) from the students before showing the slide.

Examples are not meant to take up a great amount of time here, merely to get students thinking about the subject of ethics and as a way of introducing ethics in IT.

Slide 9:   This question is to allow students to apply their ideas and consider the correct decision. You may know that it is wrong to download music illegally, but will you act against those ethics? This question is not looking for a right or wrong answer, but is to encourage the students to question their own ethical code. Ask the students to share their thoughts as they work through the process.

Now to add to the students' dilemma, ask the following:

- If you said no to the previous question, that you would not download music for your manager, have you ever downloaded music or movies from an unauthorised source or shared software without licensing? Is there a difference between doing it for yourself and doing it for your manager, at home and at work?

Slide 10:   Ethics within the IT industry, just as in other industries, is an incredibly subjective area. Organisations are becoming more aware of the serious impact ethical or unethical behaviour can have, not only within their organisation (e.g. workforce issues), but also externally (e.g. market share reduction, legal ramifications). Organisations are becoming ever more proactive regarding ethics and conscious of being perceived as ethical, so they are investing time, money and resources. As more and more organisations are being held accountable for the impact of unethical business practise on the economy and on the consumer/investor, even more organisations are formalising what is acceptable ethical behaviour.

Examples of organisations whose unethical business practises have resulted in far reaching consequences: Enron, Novartis, Boeing (noted not all IT specific ethical misconduct). You may wish to ask your students if they know about any of these famous cases or can suggest any others.

Slide 11:   Organisations are appointing individual ethics officers whose sole responsibility is the promotion, documentation and enforcement of ethical codes of practise. Promotion of ethics is an important role in an organisation; as an employee, it is vital that you understand your responsibilities and boundaries. The ethics officer must be accessible to all individuals, regardless of their position within the organisation.

The ethics officer will often chair a corporate ethics board within an organisation. This board is where all internal and external ethical issues, including industry development (within an ethical context) should be raised. It will then usually fall to the ethics officer to ensure that any resulting actions are carried out. An ethics officer is usually higher management as it is necessary for them to have enough 'power' to be heard.

Part of an ethics officer's role will be the production and enforcement of a 'Code of Ethics' which will be discussed in detail on Slide 13.

Ethics training, although not always deemed necessary by organisations, can provide vital continuity to an organisation's approach and enforcement of its ethical code by ensuring that all employees know the policy.

Slide 12:   Kallman & Grillo's ethical framework is given here as an example of a procedure that could be followed within an IT organisation when faced with an ethical dilemma - a four step framework that focuses on action consequences (known as a deontological approach within formal pure ethics).

Obviously, this is a rather simplistic explanation of a complex ethical framework; however, the overlying value of such an approach should be clear. It enables organisations to approach ethical issues in a clear, ordered approach. If students wish to gain further understanding of this framework, they can research it further.

Slide 13: An organisational code of ethics often contains two distinct sections: aim section and constraint section. The aim section is used to give guidance on the organisation and the individual ideals. Whereas the constraint section will give clear guidance on what is and what is not acceptable. Ideally, there should be a good balance between the two sections so that employees feel inspired to adopt the policy freely, rather than them feeling it is being forced upon them.

Many considerations are made when formulating a Code of Ethics, as shown on the slide. It is important that each organisation has its own code; it is good practise to research existing codes of ethics within the IT industry and outside of the industry (for balance and to potentially gain new ideas/prospective). However, to be effective, it should be tailored to the unique requirements of every organisation. Employees are more likely to embrace a code that they know has been written expressly for their organisation and them rather than a generic one size fits all code which invariably does not. Stakeholders (e.g. Customers, investors) are also more likely to respect a bespoke code. It should be remembered that the people that know an organisation best are its staff, so where at all possible the code should be developed in-house. When implementing their code, organisations should also consider how to raise awareness of its existence and ensure that all employees understand their responsibilities and are able to conform to its requirements (enforcement) – this can be achieved through an organisation wide training programme, distribution and feedback approach or given responsibility to middle management. Finally, any code of ethics should be reviewed regularly – annually is often the easiest and most efficient approach.

Slide 14: This slide has links to the code of ethics for 3 organisations. Google and 3D Systems are examples from within the IT industry, and to balance student perspective, Walt Disney is included as a non-IT organisation example. You can show the codes to students briefly during the lecture and students will be asked to read them during their private study time.You can point out that they should note any consistencies through the 3 codes.

Slide 15: As well as organisation-based codes of ethics, most international industry bodies have their own codes of ethics. Great as a research source for organisations and essential for those IT professionals who join the institutions, these codes most often follow the two section approach (Slide 13) with good balance between aims and constraints. Of course, these institutes have the advantage of being able to draw on some of the brightest minds within the industry!

Slides 16-17: Green IT is a 'newer' issue to affect the IT profession. We will not be concentrating on legal legislation, but rather focusing on what students,as IT professionals, can contribute to this incredibly important issue. The success of green IT begins with awareness – awareness of the importance of each individual contributing in whatever way they can. To introduce these concepts you could ask students to discuss the following questions:

- How many of your friends and family recycle?
- How many people do you know who buy recycled, environmentally friendly and/or ethical products?

- Do you think that the practise of reduce, reuse and recycle should apply in every organisation? Why/why not?

Green IT policies are evolving much in the same way as ethical codes have evolved and are now gaining much needed momentum. Many IT organisations are realising that green credentials can attract a potential customer in their direction when competing against a 'non-green' organisation, which thus creates the opportunity to increase their market share. Green IT policies can save companies money and can also be attractive to employees.

Point out to students that as an employee, there are many practical steps that can be taken and many suggestions that they can make to apply green IT ideas; the list given on the slides is non-exhaustive but comprehensive. Ask students to brainstorm any other green IT initiatives that as an IT professional they could look to introduce or contribute to within an IT organisation.

Slide 18: Legal issues in IT are unlike social issues where responsibility can lie with an individual's commitment. Legal policies are non-negotiable and highly consequential. So many legalities exist within the IT sector that it is not feasible to incorporate them all, so the focus for legal issues in this module, will be on the IT professional, ownership & data.

Slides 19-20: Intellectual property is an umbrella term used to describe several distinct areas of invention. Intellectual property rights focus on the corresponding legal rights for each distinct area. IT professionals must take time to understand which intellectual property laws affect them and work within the regulations. Failure to do so can result in severe consequences for both the staff member and their organisation.

As the IT industry continues to progress, so does the need for intellectual property rights (IPR). The IT industry has embraced IPR wholeheartedly. Focusing on software as an example, software is a commodity that is extremely difficult (near on impossible in fact) to control. Although all software producers and distributors implement all technical safeguards available to them, including encryption, watermarking and license codes, software is still incredibly easy to copy and distribute. Thus software companies place huge weighting on IPR laws as a way to gain 'excludability'. Excludability exists to varying extents in all markets and refers to the 'don't pay don't get' philosophy of businesses. If you do not pay for the software, you do not get to have the software!

IPR laws vary from country to country; stress to students that it is important to understand the IPR laws for the country in which you are working.

IPR laws can also be controversial due to their ability to enforce excludability, and the controversy focuses on goods (including software) that if available to all, would be for the greater good. IPR laws can discriminate against less affluent countries/producers.

Slide 21: Although IPR laws exist worldwide, there is no overall international governing authority. Each individual country chooses which of several current organisations' agreements to which they wish to sign. The World Intellectual Property Organisation (WIPO) are the secretary organisation behind the Berne Convention and the World Trade Organisation (WTO) and they work to ensure co-operation between international agencies; WIPO, which covers over 90% of the world's countries, also assist developing countries to protect their intellectual property.

Slides 22-24:   There are several areas of study within the field of intellectual property, including trade marking, industrial design rights and trade secrets. For this topic, we will be concentrating on copyright. Copyright affects any IT professional involved in the generation of ideas and the production of new material (e.g. software code, database design, creation of a new framework, an invention). Highlight to students that employee contracts usually include a section confirming that the organisation is the owner of all ideas, materials, code, documentation etc. that you invent, generate or produce during your employment. If you do not wish to have these clauses in your contract, you must try and negotiate before signing. An example of software copyright is then presented on Slide 24; this can be used to show students that even things that may be considered their standard style such as screen formatting can be subject to copyright rules.

Slide 25:   This slide looks at the reproduction aspect of copyright. There is usually a legal stipulation over the percentage of work (frameworks, published papers, book content, software material etc) that may be reproduced before permission is required from the copyright owner, often known as Fair Use. Fair use is a rule allowing a proportion of original work to be reproduced without permission.

In the software environment working with a system the IT professional learns how it works. When the professional moves employers that knowledge and experience moves as well, even though the code is not copied – this is why those wishing to copy Microsoft products, for example, want to 'poach' their staff.

Highlight to students that a good rule to follow is that if you are in any doubt over needing permission, then do not do it/use the material without it. If you require permission, you need to leave yourself plenty of time and energy to get it. Identifying owner(s) can be a lengthy process, especially as copyright is an automatic gain and does not have to be legally filed.

Slides 26-27:   Students are given one definition of Data Protection, which is a key law for any IT professional working with personal data. Such data may have been collected as a research initiative or it may have come from access to personal data via organisational databases.

Data protection seems to be in the news very often. You can ask the students for example of when they last heard about a data protection issue affecting an organisation (IT or non-IT). This will also allow you to check their understanding before proceeding.

Data protection laws focus on personal data- the collection, use, management and storage of it. Due to the nature of computerisation personal data, it can be argued is becoming less and less secure.There are certainly many more opportunities for it to be hacked due to how and where it is stored and transmitted (electronically).

Data protection is taken very seriously and can have huge legal consequences for organisations who fail in their duty of care.

Slide 28:   This slide provides a listing of where data protection focus lies. This is not meant to be an exhaustive list but will give clear insight into why data protection exists.

Slide 29:   Privacy is a very important subject for an IT professional to be familiar with.. You may like to introduce the topic by asking students which social networking sites they use and whether they have ever stopped to think who could, besides their loved ones, be accessing all of the personal data they are posting. It has become

commonplace for organisations when researching job applicants to access their social network pages, google their names (and their friends) and in fact to use the internet to gain as much knowledge about the applicant as possible. While you may not believe this is ethical, and depending on the country you are in, it may not be legal, it is important to realise that it still happens.

Slide 30:   This is a question designed to bring together what students have been taught to this point. They may raise ethical, moral and legal points and obviously their knowledge will vary. There is no right or wrong answer; it is rather designed to allow discussion and answers will depend on their viewpoints.

Slide 31:   Examples of potential arguments that the students may or may not have raised in attempting to answer the question from previous slide are given here, along with the introduction of some existing industry codes to aid organisations.

Slides 32-33:   These slides provide some further detail on the two privacy protection industry codes mentioned on Slide 29. Students will not be required to learn the detail of these but an awareness that industry codes exist is essential for them to build an overall picture of privacy. If they wish, students can research these and other codes in their own time. You may also want to add any local examples.

Slide 34:   Its is now commonplace for organisations to monitor which websites you visit, emails that you send and calls that you make, with time codes enabling them to analyse employees' productivity. Monitoring can take many forms and with the advancements in IT, the process keeps getting easier and easier for organisations. Whilst some organisations will generate official policies stating what is and what is not an acceptable use of time, resources and behaviour, others will initiate enforcement on the quiet; often the first employees know about it is when they are questioned over their actions.

                 As far as workers and their representatives are concerned, the main danger lies in the new capacity that exists for monitoring and surveillance. New technology may allow employees' work and productivity to be monitored, and also aspects of their personal lives, while their use of the internet and e-mail can be subject to monitoring (not least because of the traces any such use leaves). This raises questions of both privacy and the relationship of control at the workplace. These dangers can be even greater, and the surveillance technology even more advanced, in situations where there is a physical distance between the worker and the employer.

                 From the viewpoint of the organisation, their ability to monitor, and if necessary enforce, employees' actions brings the potential benefits of increased productivity and associated cost savings. However, not all organisations consider the negative impact that workplace enforcement can have on their employees – not only on goodwill and the potential for lowered productivity (as a form of protest) but also psychological impacts on individuals.

                 Ask the students whether they think this is acceptable practise and if so, why?

Slide 35-36:   References

Slide 37:   Ask the students if they have any questions. Remind them that if they come across information that they are unsure about, they will have an opportunity to ask about it during the tutorial and seminar sessions.

1.5   Seminar Notes

The time allocation for the seminars for this topic is 1 hour.

Lecturers' Notes:

Students have copies of the seminar activities in the Student Guide. Answers are not given in their guide.

Activity 1 below is designed to serve as an introduction to the seminar and should be kept short (no longer than 15 minutes) and on topic.

Activity 1: Discussion of Lecture Material

This class discussion time is an opportunity for you to raise any questions you have that have arisen since the lecture(s). Keep the discussion brief and where at all possible no longer than 15 minutes duration.

Activity 2

Scenario

A stock brokering organisation introduced a 'fob' entry code system. (A fob is a type of programmable token that can be worn by employees on a keychain or necklace.) They used this to track the times of employees entering and exiting the premises through a wall mounted swipe machine.

On wishing to enter or exit the organisation and then any department, an employee had to swipe their fob on the scanner. If they had authorised access, they were allowed to enter. All swipes of all fobs recorded the date, time, employee code and whether access was granted or denied. To leave a department also required staff to swipe their fob, once again all data was recorded.

The organisation then also placed fob swipe machines on the bathrooms. To enter the bathroom an employee must swipe their fob and to exit must swipe the fob again. Additionally the organisation then programmed the hours each employee was able to gain entry to departments (and bathrooms) with their contracted hours (e.g. 8am -6pm).

Task

Work in a small group and debate the scenario above based on what you have learnt in the lecture(s) for this topic and your own personal experiences and opinions.

Do you think the organisation acted:

- Ethically?
- Legally?
- With 'reasonable' workforce enforcement?

Suggested Answer:

It is expected that the students are likely to agree that introducing the fob system to departments fits within ethical, legal and reasonable workforce enforcement. It is common practise for organisations to track their employees' movements and the availability of suitable technology simply makes that an easier process. Although the students may not personally 'like' the idea of being tracked, realistically this is something they should be prepared to accept.

However, it is expected that the students will disagree with the second part of the scenario where the organisation introduces swipe machines to the bathrooms on both ethical and reasonable workforce enforcement grounds. Legally this move by an organisation can be a grey area and will depend on the laws of the country. This scenario is a real life scenario which really did take place in the United Kingdom.

1.6   Private Study

The time allocation for private study in this topic is expected to be 7.5 hours.

Lecturers' Notes:

Students have copies of the private study exercises in the Student Guide. Answers are not provided in their guide. You should remind students that the answers to these exercises will be discussed during the tutorial session for this topic.

Exercise 1:

Read the Codes of Ethics (conduct) of Google and 3D Systems.

- Google: http://investor.google.com/corporate/code-of-conduct.html
- 3D Systems:
  http://www.3dsystems.com/investors/datafiles/Code_of_Conduct_FINAL_Approved_11_30_06.pdf

What do you think of the codes of ethics produced? Note any points on the codes you particularly agree with/ disagree with and why.

How balanced do you think the codes are between Aims & Constraints (see Lecture Slide 13)?

Suggested Answer:

There is no real right or wrong answer to this exercise. Some examples of points that students may make are given below:

The codes of ethics of these two companies are both written in a more informal 'friendly' language than traditional 3rd party language. Both codes create a caring impression rather than a 'you can do that but not this' telling approach. Both codes are detailed and bespoke for their own company.

3D Systems has written their code in a letter format addressed to the employee to encourage the employee to feel included. Although Americanized in its reference to laws, states etc, this is a good example of a company that has invested time and thought into the process of producing their Code of Ethics (conduct) and it shows that an alternative format is possible.

Google's code is also written in a less formal business language. However it does at times (e.g. page 1: "if you have a question or concern, don't just sit there") feel too personal. We may speak in this way but as an official document, this kind of statement is questionable.

Google's code, although certainly comprehensive, may be considered to be somewhat over the top in content. Of the two organisations, 3D systems code appears the more balanced; Google's has a lot of constriction.

Exercise 2:

In Section V (a) of Google's Code of Ethics (Conduct), they talk about 'Open Source' and the organisations commitment to it. What is 'Open Source' and how does it affect software?

Suggested Answer:

Open Source as a concept originated in the 1980s and was made known by Richard Stallman who began the Free Software Foundation. His philosophy was that software should be free and it should be the users' right to decide how to use, copy, distribute and improve the software.

To be open source software, the source code has to be made available and no constraints must be made on the software use. With the growth of the Internet and the advancement of technologies, more and more open source software is coming to market.

Exercise 3:

Here are two examples of Codes of Ethics (conduct) produced by International Institutes:

- IEEE (US-based): http://www.ieee.org/about/corporate/governance/p7-8.html
- Council of European Professional Informatics Societies (CEPIS): http://www.cepis.org/index.jsp?p=637&n=741

1. Make notes on any similarities and differences between the two codes.

2. Having read these codes and those in Exercise 1 above, which approach do you favour and why?

Suggested Answer:

Again, there is no right or wrong answer. The aim of these exercises is for the students to familiarise themselves with the different approaches realising that there is no standard for a code, and to form their own opinions on what they do and don't find acceptable in approach, language and content.

1. The CEPIS code is extremely short and to the point in fact it is not a code as such rather a mission statement. This is in stark contrast to IEEE whose preamble alone is longer than the CEPIS whole statement.

   IEEE code is mostly written in professional 3rd party language, detailed bullet points breaking down exactly what is required of the individual.

2. Students are expected to rationalise their preferred choice of approach. It is expected they will include their preferred use of language (professional /informal), preferred layout (letter/formal report/mission statement) and any other personal preferences they have.

Exercise 4

Consolidate and extend your knowledge on corporate ethics, social & legal Issues and Green IT using any sources available to you. You should consult textbooks in your centre library and make notes on any useful information which you find.

You may find the following website a useful starting point: http://www.bcs.org/category/8620

1.7   Tutorial Notes

The time allowance for tutorials in this topic is 2 hours.

Lecturers' Notes:

Students have copies of the tutorial activities in the Student Guide. Answers are not provided in their guide.

Exercise 1 below is expected to last around 30-45 minutes. It is suggested that you chair a discussion on your students' findings. You may prefer for them to discuss these in small groups first to build their confidence, before holding a whole class discussion session. Encourage all of the students to participate. You may like to also use the following questions:

- How many of you prefer the 3D Systems' approach to a code of ethics? How many prefer Google's approach? Why?
- What alterations would you make to Google's policy? What about the 3D Systems' policy?
- Do you think CEPIS statement is comprehensive enough?
- Is the IEEE statement too detailed?

Students can then work in small groups to complete Exercise 2 below. Guide them to use their lecture, seminar and private study materials to generate their codes. They can use the examples of IEEE, CEPIS, Google and 3D systems to brainstorm their aims and constraints. You may like to display the codes around the room for peer review or collect them in for marking.

Exercise 1:   Review of Private Study Exercises

Discuss your findings from the private study exercises as a class. You are expected to contribute your findings and opinions to the class.

Record others' findings alongside your own to build up alternative view points and to give you an alternate viewpoint to your own.

Suggested Answer:

All answers will vary. This exercise is designed to encourage students to stand by their opinions as would be expected of them as an IT professional within an organisation.

Exercise 2:   Producing a Code of Ethics

You are required to write a Code of Ethics (conduct) for a company with which you are familiar. This may be a company you are currently employed by or have previously worked for.

If you do not have work experience, you are required to instead write a Code of Ethics (conduct) for the students of your college/school. The same approach of aims and constraints is fitting for a student code.

Choose whether you will write your code in professional or informal language and what format you would like to take (e.g. Report / letter). There is no minimum length your code must be but it must be a comprehensive guide.

Topic 2: Applying IT Standards and Issues

2.1 Learning Objectives

This topic provides an overview of Professional issues that affect IT professionals in industry.

On completion of the topic, students will be able to:

- Identify professional issues affecting an IT professional;
- Explain own professional insight and reasoning behind it;
- Identify and analyse an international standard and report findings;
- Identify and analyse a National Standards organisation and report findings;
- Identify, analyse and compare Anti-Discrimination regulations and report findings.

2.2 Pedagogic Approach

Information will be transmitted to the students during the lectures. They will then practise the skills during the tutorial and seminar sessions.

2.3 Timings

Lectures: 1 hour

Seminars: 2 hours

Private Study: 7.5 hours

Tutorials: 2 hours

2.4 Lecture Notes

The following is an outline of the material to be covered during the lecture time. Please also refer to the slides.

The structure of this topic is as follows:

- Professional issues in IT
- What is a professional?
- Professional institutes and codes
- Health and safety and ergonomics
- Standards
- Anti-Discrimination

2.4.1 Guidance on the Use of the Slides

Slides 2-3:   These slides present the scope, coverage and learning outcomes of the lecture.

Slide 4:   Introduction to professional issues in IT.

Slide 5:   This slide provides two definitions of a professional. Two different definitions are given to demonstrate the variety of definitions available and the fact that there is no standardised definition, regardless of industry.

Ask students to brainstorm their own definitions of a 'professional' either individually or with the person they are sat next to and share with the class.Limit this exercise to a maximum of 10 minutes: 5 minutes brainstorming, 5 minutes sharing definitions. The idea is to build students' understanding of how diverse definitions can be and how individuals' opinions and values can impact upon them.

Slides 6-7:   A definition of a professional body is given here. Inform students that professional bodies are varied in the IT industry. The majority of them specialise in one or more areas within the umbrella of IT, but BCS Chartered Institute for IT has remained an umbrella organisation and although originating in the United Kingdom has gained world wide acknowledgement for its work and standards.

Many organisations choose to follow the BCS code of conduct (ethics) as professional guidance to their employees.

Unlike in other industries (e.g. Medicine, Vetinary) there is no legal requirement within the IT industry for its employees to be registered. This means that the quality and standard of employees differs vastly as the onus lies with the individual (or the organisation if it chooses to take responsibility) to reach and then maintain a level of competence.

Slide 8:   Ask students to familiarise themselves with the codes of conduct for BCS and APM before the seminar for this topic. The BCS code of conduct is adopted by many organisations as either their whole code, or as part of a general code of conduct that they then construct around the original BCS code.

Slide 9:   Health and Safety is included under the professional issues heading rather than legal because of the vast difference in coverage and priority the subject receives depending on the country you work in.   So rather than focusing on specific laws

which may or may not be applicable to you, this is about raising awareness that it is the individual's responsibility to take care of their own and others welfare.

Health and Safety legislation is vast and at times can be all encompassing leaving little room for manoeuvre. Opinions of course vary on whetherthe legislation is or is not excessive.

Slide 10:   An example of a health and safety law in the United Kingdom governing the use of visual display units (VDUs/screen monitors), the Display Screen Equipment Regulations (1993) aim to reduce any and all risk associated with the use of relevant equipment. It is assumed that IT professionals will spend a large amount of time using a computer and these regulations are intended to ensure wellbeing. Its introduction introduced the requirement for organisations to provide eye sight tests for all their employees although the employee must actually request one – they do not have to be volunteered by the employer.

Ensuring a work environment meets minimum requirements includes assessing lighting, heating and ergonomics.

Slide 11:   Ergonomics is always closely linked to health and safety. By ensuring good ergonomics an organisation can pre-empt many health and safety issues including repetetive stress injury, eyesight issues, and physical effects of employees being sat at workstations for long periods.

Ergonomics is a scientific approach to how people and their work fit together. Approached from the human perspective ergonomics always places the person before the work. Ergonomists will consider both physical and psychological aspects of a person before suggesting how best to fulfil their work environment requirements.Although it is a key component of health and safety, there is still variation in how importantly it is viewed by organisations..

Following on from previous slide where we introduced the Display Screen Equipment Regulations, ergonomics can be utilised to identify:

- poor screen positioning which could lead to employee eyesight issues

- incorrect mouse placement potentially resulting in repetitive strain injury

- ill fitting chair furniture resulting in poor posture which could lead to sick time, physiotherapy bills, lowering morale

- enforcement of employee breaks reducing strain and boosting morale

Slides 12-13:   Standards as an IT professional are essential and as there are many with which to be familiar. Advise students that much of this depends on your chosen speciality. However, even when a standard does not apply to you directly, if it affects your organisation in its business then it is worth having at least an awareness of why, even if you choose not to learn the details.

Taking software as an example, multiple, standards exist within the term software' alone, including sub-catagories such as development and usage. Software deployment standards will be covered in Topic 5.

Standards range from international level through national to in-house standards, all of which have a valid place in the IT industry. The key producer of international

standards is the International Organisation for Standardization (ISO). A non-governmental consortium consisting of multiple national standards organisations, the ISO has produced many IT related standards ranging from software to project management and quality, with many of its standards being adopted as laws around the world.

National standards organisations exist world-wide with some countries creating their own standards, while others choose to adopt standards from the ISO or those of other countries' standards.

In-house standards are at the discretion of the organisation and although many similar standards exist across organisations in the IT industry, the in-house standards are where a company's philosophy and strategic goals (long-term goals) impact the standard of their product/service. It is an IT professional's responsibility to keep up to date on all in-house standards and if appropriate, to offer insights on how these standards can continually be improved. In-house standards should always be subject to regular and rigerous evaluation with reworking taking place as necessary.

Slide 14-16: Anti-discrimination is a very important issue for IT professionals today. In recent years new discrimination laws have been introduced and rigerously enforced.

Although discrimination could easily have been placed in the legal issues section, it has instead been included in professional issues because, despite strong laws existing in some countries, others still offer much less protection to their workers.This means that it often falls to the individual to take personal responsibility for combatting discrimination and to act if and when discrimination does occur.

Ask the students if they think current local discrimination laws are effectively protecting employees and perspective employees, or whether they think that current laws protect the organisations. Students' opinions may of course differ. You may need to have some local examples available in case students are unfamiliar with the details.

Slide 17: Conclusions

Slide 18: References

Slide 19: Ask the students if they have any questions. Remind them that if they come across information that they are unsure about, they will have an opportunity to ask about it during the tutorial and seminar sessions.

2.5   Seminar Notes

The time allocation for the seminars for this topic is 2 hours.

Lecturers' Notes:

Students have copies of the seminar activities in the Student Guide. Answers are not given in their guide.

You may want students to work initially in small groups to discuss the debate questions below, before holding a whole class discussion. Students should share their opinions and be able to demonstrate sound reasoning as would be expected of them as an employee within an organisation. You should direct students to finish writing up the points from the debate during their private study time if necessary.

Activity 1

Read the two definitions taken from the lecture of a professional below:

> "person who has attained an acclaimed level of proficiency…"

> "person formally certified by a professional body of belonging to a specific profession…whose competence can usually be measured against an established set of standards"

(Source: www.businessdictionary.com/definition/professional.html)

Now debate the following questions based on what you have learnt in Topic 1 and this topic to date, as well as drawing on your own personal experiences and opinions.

1.   Which definition do you think is more appropriate and why?

     Within the IT industry there is no legal governance regarding professionalism and what does or does not constitute a professional. Any individual working in the IT industry therefore can (and usually does) consider themselves an IT professional.

2.   Do you think the IT industry should alter its approach to professionalism and align itself with the second definition, or do you believe that the IT industry's current approach is sufficient?

3.   Would it make a difference to the perception of those (including you) working in the IT industry if all professionals had to be certified with an industry body?

4.   Would you, as an employee in the IT industry, be prepared to pay a yearly registration fee to be listed with an industry body?

5.   Would you be willing to have your competence assessed on a regular basis?

6.   Do you think that having compulsory registration and measurable competence would redefine the IT industry?

7.   How would compulsory registration redefine the industry – enhance or destroy?

Record all main points from the debate including your own and those opinions of others (even if you disagree with them!).

Suggested Answer:

Student opinions will vary. The important thing is that students can defend their arguments and discuss ideas approrpriately.

Activity 2

Scenario

You work for a 'blue chip' management consulting company. You have been asked to handle a new account for them in a developing country. You are aware that this account is very important to your organisation, hopefully (if successful) opening up further opportunities in an emergent marketplace. However you have some serious misgivings about the way in which your new client appears to do business. There are many concerns:

- You will be managing a technical project that may result in hundreds of job losses. The company appears to be making no attempt to consider the welfare of these employees.
- The company does not offer any measure of data protection for either its customers or suppliers information.
- The company has little in the way of firewalls or protection against either computer fraud or software viruses.
- While none of these concerns falls directly within the scope of the project you have been asked to lead you feel you need to highlight the problem areas. However you must be careful not to alienate your client and cannot be seen to criticise the way the client does business.

Task

Discuss the ethical dilemmas and make suggestions for a way forward.

Suggested Answer:

This is designed to get students really thinking about some very everyday problems faced by those managing projects in the IT sector. The actual student response to the prospect of job losses through the introduction of technology will vary widely. The political, cultural and economic influences on the student will be considerable. However this study program is offered on a worldwide basis to help prepare all students to work in an international domain so it is reasonable to expect students to put forward a balanced viewpoint.

Issues relating to data protection again vary widely from country to country and the student should consider both local and international approaches to data protection.

The third aspect of concern is less controversial and does require the consultant/project manager to act in a professional manner. There is a clear requirement to alert the client to possible security breaches and the vulnerability of the systems. However the client may decide that the penetrative costs are too high in relation to the likelihood of risk. This idea is explored later in the course within the risk assessment topic.

2.6 Private Study

The time allocation for private study in this topic is expected to be 7.5 hours.

Lecturers' Notes:

Students have copies of the private study exercises in the Student Guide. Answers are not provided in their guide.

Exercise 1:

1. Identify an existing International Organisation for Standardization (ISO) IT related standard. A great place to start is the official ISO website www.iso.org.

2. For your chosen standard, identify its ISO code, the year it was launched and its key objectives and attributes plus any further information you think adds value to the standard.

3. Write a one page summary report on your findings.

Note: the ISO website is useful for identifying a standard but it will expect you to pay for further information. Instead use a search engine to search for your standard. There is plenty of information available for free on the internet.

Remember to check out any other sources of information that may be available to you including textbooks.

Suggested Answer:

The choice of standard lies with the student so that they can develop their discrimination skills. There are many standards available to them but some standards will have more information available for the students which will make it easier for them to write their summary report.

Exercise 2:

Research the name(s) of National Standards Organisations within your country. These may be organisations that specialise in IT or that are more multidiscipline but that include IT within their remit.

1. You are expected to identify what year the organisation(s) formed, their mission statement and their code of conduct (ethics) if possible.

2. Identify at least one IT related standard and research as to whether this standard is law or benchmark, and how widely adopted in industry this standard is.

3. Write a one page summary report on your findings.

Suggested Answer:

This is designed for the students to broaden their knowledge base and apply the lecture 'theory' to their own environment. There is no right or wrong answer; the value of this exercise is in the process.

Exercise 3

Research the anti-discrimination regulations that are applicable to the country you reside in and compare these to the anti-discrimination laws currently enforced in the United Kingdom. For those based in the United Kingdom, compare UK laws with another country of your choice.

Write a one page summary report of your findings.

Exercise 4

Use your college's library to find textbooks which cover standards within IT, Health & Safety, and anti-discrimination in the workplace. Read the relevant chapters.

2.7   Tutorial Notes

The time allowance for tutorials in this topic is 2 hours.

Lecturers' Notes:

Students have copies of the tutorial activities in the Student Guide. Answers are not provided in their guide.

For the review of the private study exercises, you may want to ask students to work in small groups to share their findings, before asking the groups to report back to the whole class. Depending on the number of students in your class, you may want each group to present their findings on only one topic to the rest of the class. You may wish to also collect in students' reports for marking and more formal feedback.

Exercise 1:   Review of Private Study Exercises

You are required to report your findings from the Private Study exercises to the class.

You will have produced three separate one page summary reports on the three topics: ISO standard, National Standard Organisations and anti-discrimination regulations. You are required to report on at least one topic, as directed by your teacher.

Suggested Answer:

Answers will vary and students should be encouraged to make notes on any interesting findings. The purpose of the feedback here is for students to orally report their written report findings as is often required of an IT professional. They

Exercise 2

Look again at the Code of Ethics (conduct) that you produced during the Topic 1 Tutorial session. Rework your original code to include the additional knowledge on social, legal and professional issues you have gained during Topic 2.

Suggested Answer:

Students are expected to incorporate detail from this topic into their rework. It may be a good idea to prepare an exemplar code of ethics for the students to see (from a school or college, for example) and to discuss and highlight key aspects of this code. Students' reworks should be discussed and wherever possible the tutor should encourage constructive criticism of students' proposed codes.

Topic 3: IT Project Management

3.1 Learning Objectives

This topic provides an overview of Project Management within the context of IT.

On completion of the topic, students will be able to:

- Explain what IT project management is;
- Identify the project management lifecycle, its phases and key stages;
- Understand the project management lifecycle, its phases and key stages.

3.2 Pedagogic Approach

Information will be transmitted to the students during the lectures. They will then practise the skills during the tutorial and seminar sessions.

3.3 Timings

Lectures: 2 hours

Seminars: 1 hour

Private Study: 7.5 hours

Tutorials: 2 hours

3.4   Lecture Notes

The following is an outline of the material to be covered during the lecture time. Please also refer to the slides.

The structure of this topic is as follows:

- An introduction to IT project management
- Why project management is important
- The project management lifecycle
- Project management lifecycle phases
- Key stages within the project management lifecycle phases

3.4.1   Guidance on the Use of the Slides

Slides 2-3:   These slides present the scope, coverage and learning outcomes of the lecture.

Slide 4:   Two definitions of IT project management are presented on this slide. Before continuing to Slide 5 ask students to consider why project management exists, and why it is important. Encourage the students to brainstorm this question and share their opinions. After they have contributed their opinions turn to the examples on Slide 5.

Slide 5:   This slide provides some examples are provided here of why project management is important.

Slide 6:   Draw students' attention to Method123 which is the approach that will be considered in more detail throughout this lecture. Ensure students are clear that a methodology is different to a project management lifecycle in that a methodology is tools and techniques to enable an organisation to manage a project throughout its life. Also students need to be aware that there is a difference between a project management lifecycle and a systems (or software) development lifecycle. A systems development lifecycle (SDLC) encompasses issues such as ongoing maintenance once a project is launched. A project management lifecycle is concerned with the management of the project until launch.

Slide 7:   This slide gives a visual representation of the Project Management Lifecycle 4 Phase approach, which is the minimum phase approach. The lifecycle begins with the Project Initiation phase and as the arrows show continues in a clockwise direction.

Slide 8:   Some key points to consider on project management phases are presented here.

Slide 9:   The Project Initiation phase is where the basis for project management and assessment takes place, a framework for the measurement of overall success. The documentation produced during this phase should be updated and realigned with the project objectives at the end of each phase as a minimum. However, the original documentation which is signed off as authorisation for the project to proceed should always be preserved – it is this original documentation that the project's 'success' should be measured against at the Closure Phase.

Slide 10:   The business case is all about the organisation making a decision on whether the proposed project is viable. This is the document that will potentially gain

management committment and investment approval. It is not only concerned with the project and its viability but also the proposed project's contribution to the overall business strategy of the organisation.

Throughout the project lifecycle, its ongoing viability will be measured against the business case so it is vital that the business case is thorough, realistic and measurable.

In large projects, the business case is often a 3-part development process:

1. Preliminary Business Case: maximum 2 pages concentrated on business need and potential strategic business contribution.

2. Outline Business Case: further detail including documented support of recommended solution.

3. Full Business Case: fully documented stage with maximum detail and supporting documentation

The amount of detail contained within the business case will be dependent on the organisation's requirements and scope/size of proposed project.

Slide 11: A project charter formally recognises that a project exists and summarises a project's management/objectives. It can take many forms, from a basic letter format of one page to multi-layered contract format documentation. It is an organisation's choice, often based on the scale of the organisation itself, as to how they approach and generate a project charter. Common consensus is that whatever format the project charter takes, it is an integral part of any project management approach.

Within every project charter, a sign off section should exist where all key stakeholders to the project acknowledge their commitment to the commencement of the project by formal signatures.

Slide 12: The Draft Project Plan is part of the project charter. It may include the project name, start/end dates, budget information, name of project manager, proposed project team members, project objectives, approach chosen, sign off and comments.

Slide 13: Phase review is a review of the achievements of the project to date. Ideally the review should be a meeting of all interested parties; however this is not always achieveable or realistic. A report should be generated for the review. Formats vary from formal reports to official forms, and should be distributed to all relevant parties.

Slide 14: Project Planning (Phase 2) is widely acknowledged in industry to be the most complicated, most difficult and most overlooked phase of project management. It is very important to have a strong project manager leading by example. The purpose of project planning is to enable the Project Execution (Phase 3) phase to be achievable. Project planning is about being realistic, reliable and appropriate.

Slide 15: This slide presents a list of the key stages of the Project Planning phase, which we will look at in more detail in the following slides. These stages are not necessarily undertaken in this order or in isolation. There is in fact usually a considerable amount of cross over between stages throughout phase 2.

Slide 16: A dynamic document, the Project Plan must be flexible to change throughout a project's lifetime. It is an essential document for any project manager which if done

correctly will allow the manager to both lead their team effectively and also manage a project's ongoing status.

A project plan is a unique document to every project. Although overlap between similar projects may exist a new project plan should be generated for each and every project. The content of each project plan however will differ. For example, a small project with a timescale in months will have a project plan that varies considerably from that of a multinational organisation undertaking a project with a timescale of 2 years. To be effective in project management, flexibility is a necessity. Effective project plans should guide a project to completion so they should be tailored accordingly, only containing as much detail as is needed.

A key component of any project plan is the work breakdown structure (WBS). This is where the defining and controlling of project content takes place, i.e. decidingwhat work will or will not be included in a specific project (the overall project scope). Work breakdown structure format varies, suitable either as a graphical (organisational chart) approach or as a listing (tabular) format. The WBS forms the basis for scheduling project activities, their timescales and project milestones. We will look at this in more detail during seminar and tutorial time.

Slide 17: To estimate project activity timescales and milestones with as much accuracy as possible you must be familiar with the resources available, their type and quantity. This is where a resource plan becomes necessary. To be an effective part of a project the resource plan must be generated by individuals who have skill and experience in similar projects to the one being undertaken. They should also be familiar with similar organisations.

A resource plan is often generated following a brainstorming exercise involving as many skilled, multi-disciplined individuals as reasonably possible. This is to try to identify as many resource related opportunities and alternatives as possible. It should be updated as and when additional information becomes available throughout the project's life.

Slide 18: Having generated rough costings contained within the business case in the Initiation phase, now, during the Planning phase, is when more detailed cost estimates are essential to the potential success of a project. With more detailed information available (through the project plan – including the WBS) the cost estimates must be updated. If these new cost estimates are found to be substantially different to the originals (what is deemed 'substantial' is subjective and at the discretion of the organisation to determine) then new budget negotiations must be undertaken before commencement of the Execution phase.

Additional, more detailed cost estimates regarding the new costings must be recorded. These may include any new assumptions, known changes resulting in the reworking of an estimate, details of what the estimates are based on (e.g. WBS) and detailed explaination of which tools or techniques were invoked to generate the estimates.

To generate accurate cost estimates it is essential to liase with other organisation departments (unfortunately, in reality this does not always take place). Departments that should be consulted include accounting – to accurately estimate labour costs for a project's duration is a complicated affair requiring as much real information as possible.   Labour costs for a project are often broken down into flat rate payments, benefits and overheads to produce overall costing, with each team member often on different rates based on their role and importance to the project.

Achieving an accurate cost estimation can be complicated and to aid the process many tools and techniques have been created. Which approaches are adopted is very much down to an organisation's preference and is usually predetermined at organisational level rather than chosen at this stage by any individual. Example names of cost estimation tools and techniques include top down estimation and bottom up estimation.

Slide 19: When putting together a Quality Plan, which should receive regular updates throughout a project's life, there should be measures of quality (quality metrics) and checklists. For a project to meet or exceed client requirements and expectations, those responsible for quality within a project must seek to build a clear understanding of what client expectations are before the Execution phase of the project (although in reality this is not always done).

A potential cause of project failure is not taking into consideration the client's expectations.These can be difficult to define, time consuming and easy to ignore in favour of the simpler option of focusing on actual, 'real' and defined requirements. However, these always impact the project so stress their importance to students.

A quality plan must also identify any quality standards applicable to the project and define how to fulfil said standards. The style and depth of a quality plan varies dependant on the type and size of project and also on an organisation's attitude to quality.

Slide 20: Ideally generated through brainstorming, a Risk Plan should contain as many possible and existing risks identifiable as possible. Risk management will be covered in detail during Topics 7 and 8 of this module. For now, recognise that risk and its management are vitally important to the chances of a project being deemed a success.

Slide 21: An Acceptance Plan (also known as a Success Plan) takes project objectives and deliverables identified during the Initiation phase and provides measureable terms for a project to be judged against. Often in checklist format, questions may include: Are all success criteria measureable? Are criteria realistic? Does the success criteria listed define total criteria that project success will be measured against?

Slides 22-24: Industry consensus is that failure to communicate is the greatest threat to project success. Although this is agreed upon, many project managers still fail to actively plan project communication.

Communication plan content always varies dependant on factors such as project size and organisation's attitude but generic content includes: client communication requirements, the format communication must take, roles and responsibilities for generating and reporting communication, communication timescales and any common communication terminology.

In the past, communication plans were not always formally recorded in writing. Nowadays a written plan should always be produced. You can now use the next two slides to introduce and show students one such written plan (a Gantt chart), which is a simple communication tool. This type of chart is like a horizontal histogram or bar chart. It is both very read to construct and to read by non technical staff. This makes it an ideal communication tool to help all understand and visualise the project plans. A separate set of quality, risk and hardware resource plans can be drawn up in addition to detailed project task scheduling plans. The screen shot

on Slide 24 is from MS Project which is a software tool to help with project management.

Slide 25:   A Procurement Plan is generated to aid the acquisition of goods and services required for a project solely from external sources. Organisations are no longer forced to source goods and services locallly which, although taking more time and effort, can result in a greater chance of project success. However, for this strategy to be effective, forward planning must take place and this is where a procurement plan is so effective. To have identified in the Planning phase what is required to be 'bought in' to a project and to be able to act accordingly in a timely manner enables the developers to have what they require when they require it during the Execution phase, thus resulting in not only cost savings but also time and quality savings – the 3 key measures when determining project success.

Slide 26:   Planning a phase review is vital to confirm the progress of a project, to flag any issues arising and to invoke any measures required at this stage to get a project 'back on track'.

Slides 27-28:   The Project Execution phase has been and likely always will be the most highly thought of phase of project management. The success of project execution is built on the foundations of the Project Planning phase, but however great the project planning unless project execution is undertaken to maximum ability a project can never be successful.

                 This phase is where most of a project's budget gets used, so it is imperative to get it right. A list of the key stages appears on Slide 27. Ensure that students notice that most are the same as in the Planning phase – we planned them and now we action them.

Slide 29:   Time management is often described as the least flexible project variable – it is always changing no matter what you are or aren't undertaking/achieving. A project manager may find that many individuals have an opinion regarding timescale and although on the surface a project can be judged based on the following equation:

                 • allocated time – actual time = performance

                 In reality many of those with opinions fail to take into account other variables that impact a project timescale e.g. changes to project scope.

                 Time, unlike many project variables, can also be highly impacted by cultural attitudes. When working on a project that spans different cultures or countries conflict can arise around perception of time and its importance.

Slide 30:   Cost management includes cost control, cost performance, cost revision and when necessary cost re-negotiation. For a project to have any chance of being delivered on budget, cost management must be taken very seriously indeed.

                 One issue that can and does arise often is the revision of project costs. Those responsible must maintain a strict policy of revision based on approved changes only. What is not needed is a reflex action of cost revision until client/management approval has been achieved.

                 Revised cost estimates are common in any project given that an estimate is simply an informed guess. Additionally, as a project progresses there may be need to evaluate alternate solutions.

Tools available for cost management within a project include cost control, project management software e.g. Microsoft Project and review meetings.

Slide 31:   Within quality management the key focus is usually quality control which encompasses: the ensuring and improvement of quality, identification of acceptance decisions, rework and adjustments.

Ensuring and improving quality is an ongoing process. It is not restricted to an individual project but is a learning process that must be shared organisation wide. Continually evaluated and updated amounts of time must be taken over quality in order to guarantee as much as possible that the deliverables will be acceptable by either matching or exceeding client expectation. Any findings must be recorded for future reference.

Acceptance decisions encompass whether a deliverable is acceptable or rejectable. Acceptable and a deliverable will be validated, rejected and a deliverable moves into rework.

Rework involves taking a rejected deliverable and 'reworking' it until it is up to specification or expectation. It is a potentially expensive process that project managers try to avoid (can sometimes be even more expensive than 'throwing away' a deliverable and starting again!)

Adjustment is the term used when corrective measures are taken to prevent further quality issues. It involves the use of quality control measures, e.g. cause and effect diagrams and control charts, to update the approach taken to quality.

Slide 32:   Change occuring throughout a project is unavoidable. How it is managed can make the difference between success and failure. Change Management involves identifying, evaluating and managing those changes to a project.

Change to a project even after it has begun can be beneficial and where possible should be viewed as a good thing.

It is however essential to be able to identify when a change has occured and act accordingly. Documentation, e.g. a project plan, must be updated, budgets must be reworked if neccessary, and work reallocated. Small changes do not necessarily require reporting to client, management or other stakeholders, however 'significant' change must be (what significant means is down to the interpretation and skill of the project manager).

Slide 33:   In the Execution phase, risk management involves responding to risk events as they occur. It must be continuous throughout the phase and responsibility must be taken by all members of the project team. Where necessary, the project manager must be willing to redistribute project resources to handle the impact of risk(s).

Slide 34:   Procurement management focusses on contract administration, making sure that those suppliers contracted for the project are meeting the requirements of their contracts.

Liasons with legal departments are common during procurement management due to the legal complexities that can occur. An organisation may use any number of techniques to measure the performance of their suppliers. These include: inspections and audits, performance reviews, and staggered payment plans.

Procurement management is a documentation heavy stage. Each supplier will have their own contract plus documented evidence of change requests, renegotiations and any new agreed contract changes.

Procurement management requires careful understanding of legal implications and complexities and where possible should be undertaken by knowledgeable team member.

Slide 35:   Throughout a project's life interested parties (stakeholders) including the client will require regular updates on how resources are being utilised. Communications management is where this takes place, it is known as performance reporting and stakeholder management. Performance reporting can be further broken down into reporting and forecasting.

Performance reporting is based on 'point in time', meaning the reporting of project and project team status up to a particular moment in time (often linked to the project schedule milestones within the project plan). Performance reporting is linked to cost, time and quality and project team members are often required to generate weekly or monthly reports documenting their progress. These reports are often consolidated into one report by the project manager before being forwarded to stakeholders.

Performance forecasting takes the performance reports and predicts how the project and the team are likely to progress based on performance to date. It includes forecasts such as when project will reach completion and how much more the project will cost.

Stakeholder management is exactly as it sounds – a formal approach to the management of all interested parties. The organisation's approach to stakeholder management should be standardised throughout the company for the project to draw on. A key component of stakeholder management is the controlling of who receives what information. Not all information generated throughout a project is suitable for the eyes of all stakeholders. Filtering this information and reporting it accordingly is a skill.

Slide 36:   Both meeting-based and report-based reviews should form part of of Execution phase.

Slides 37-39:   The Closure phase is where everything is wrapped up and the project is put to bed. This phase is very administration heavy, including final file updates, archieving, contract close out and formal project acceptance (with all the legal documentation that accompanies handover, payment and ownership issues).

Slide 40:   References

Slide 41:   Ask the students if they have any questions. Remind them that if they come across information that they are unsure about, they will have an opportunity to ask about it during the tutorial and seminar sessions.

3.5   Seminar Notes

The time allocation for the seminars for this topic is 1 hour.

Lecturers' Notes:

Students have copies of the seminar activities in the Student Guide. Answers are not given in their guide.

You will need to ensure that the students are working in suitable groups for the activity below. The ideal number in a group is four; however you are aiming for multiple groups so if the class numbers are small, work with smaller groups.

The time taken to feedback the findings of this activity will depend on your class size. You may want to ask student to type their list onto a PowerPoint slide which you can show through your projector, or to record their ideas on flipchart paper so that the other groups can write them down. After all of the groups have presented their ideas, encourage the class to come to a consensus on the top 10 from all the ideas.

Activity 1

Work in a small group. Select one member to be your team leader. Team leaders will be responsible for providing feedback on your findings.

You have 20 minutes to generate a list of what you think are the 10 most important points of IT project management and to rank these points in order of importance. The table below can be used to record your findings.

Example: IT project management allows organisations to actively manage a project.

Your team leader will then be required to feedback your list to the class, with your rankings. All other groups will be invited to rank your points from 1 to 10 (1 being most important). Record the other groups' opinions in your table.

Top 10 points	Our Team Ranking	Group:_____ Ranking	Group:_____ Ranking	Group:_____ Ranking

	Overall Top 10 Points
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	

10.	

Suggested Answer:

Answers will vary. The salient outcome is that students can come up with suitable ideas and debate their relative importance.

3.6 Private Study

The time allocation for private study in this topic is expected to be 7.5 hours.

> **Lecturers' Notes:**
>
> Students have copies of the private study exercises in the Student Guide. Answers are not provided in their guide.

Exercise 1:

Make a list of all the skills and abilities you think an IT project manager should have and why. Your list should be as thorough as possible.

Suggested Answer:

There are many attributes that an IT project manager should have including:

- People management skills
- Highly organised
- Self-motivating
- Attention to detail
- Specialised IT skills
- Good maths skills
- Understanding of finances and budgets
- Honesty and diligence

Exercise 2:

Why is the Project Initiation phase of the project management lifecycle so important to the success of a project?

Write a short summary of your ideas.

Suggested Answer:

The Project Initiation phase is where all the initial research takes place. It is where a project's viability is assessed against the organisation's strategic goals. It is where the initial negotiations over contracts, budgets and resources take place. It sets the scene for the whole project and is the basis for the Planning phase which in turn effects the Execution phase. A great initiation phase gives a project a basis for success, while a poor Initiation phase means a project is fighting the odds before it even gets off the ground.

Exercise 3:

Why is estimating in IT project management such a difficult process to get right?

Suggested Answer:

An estimation is an informed guess. You can apply knowledge of the subject area, prior experience and skill to the process but it is always still just an informed guess.

Exercise 4:

Why is it important to close out a project with an official project closure phase, and what documentation would you expect to find in this phase?

Suggested Answer:

It is vital to close out every project – this is where official handover and approval of deliverables takes place. Until a client has officially and legally accepted the deliverables a project is still open to negotiation, rework and any number of potential actions that can threaten its ability to be seen as a success.

Documentation expected to be found in this phase includes: official sign off form, closure of contracts, completed updated project plan documentation, budget vs. actual costings with analysis and a 'what we have learnt' evaluation document.

Exercise 5:

Use your college library to find a textbook(s) which covers IT-related project management. Read the relevant chapter(s) to build your knowledge base on the topic.

3.7 Tutorial Notes

The time allowance for tutorials in this topic is 2 hours.

> **Lecturers' Notes:**
>
> Students have copies of the tutorial activities in the Student Guide. Answers are not provided in their guide.
>
> Students can work in small groups to complete each of the activities below. You should then run a class feedback session.

Exercise 1

Within a project plan produced in the Planning phase, a project can be broken down into individual activities known as a Work Breakdown Structure (WBS). A WBS can be produced in two different styles: an organisational chart and/or a tabular list. Often organisations use both styles, the chart to identify the activities and then the tabulated list to formalise the process by assigning identification numbers.

a. Working from the project management lifecycle outlined during the lecture, complete the following organisation chart layout:

| Project Title | Level 0 |

| Initiation | Level 1 |

| Business Case | Level 2 |

| Costs/ Benefits document | Level 3 |

Level 0 is the top level of the chart. Level 1 will contain all the phases. Level 2 will contain all the identified stages. Level 3 will be a breakdown of all individual activities (or documentation) that make up Level 2.

Suggested Answer:

The students should produce an organisational style chart containing all the information available to them from the lecture.

```
                          ┌─────────────────┐
                          │  Project        │
                          └────────┬────────┘
           ┌───────────────────────┼──────────────┬──────────────┐
   ┌───────┴───────┐       ┌────────┴───────┐ ┌────┴──────┐ ┌─────┴────┐
   │  Initiation   │       │  Planning      │ │ Execution │ │ Closure  │
   └───────┬───────┘       └────────────────┘ └───────────┘ └──────────┘
   ┌───────┼──────────────┬──────────────┬──────────────┐
┌──┴──────────┐ ┌─────────┴─────┐ ┌──────┴──────┐ ┌──────┴──────────┐
│Business Case│ │Project Charter│ │Phase review │ │Draft project plan│
└──┬──────────┘ └───────────────┘ └─────────────┘ └─────────────────┘
   │
   │    ┌──────────────────────┐
   ├────│ Cost/benefit analysis│
   │    └──────────────────────┘
   │    ┌──────────────────────┐
   ├────│ Solutions document   │
   │    └──────────────────────┘
   │    ┌──────────────────────────┐
   │    │ Opportunity  Identification│
   ├────│ document                 │
   │    └──────────────────────────┘
   │    ┌──────────────────────────┐
   ├────│ Project start-up document│
   │    └──────────────────────────┘
   │    ┌──────────────────────┐
   └────│ Recommendation       │
        │ document             │
        └──────────────────────┘
```

The chart above shows the beginnings of the chart that the students should produce. For the other three phases there will be multiple Level 2 and Level 3 activities. All the answers the students need are available in the lecture material.

Exercise 2

Having completed your WBS as an organisational chart, now transfer it to the tabular format. This has been started for you below.

Note that you are now required to identify each activity with an identification code. The layout below is the standard layout - you will see this if you use a project management software programme, e.g. Microsoft Project.

0   Project

1   Initiation Phase

        1.1 Business Case

                        1.1.1   Cost/Benefit analysis

                        1.1.2

        1.2 Project Charter

Suggested Answer:

0   Project

1   Initiation phase

        1.1 Business Case

                        1.1.1   Cost/Benefit Analysis

                        1.1.2   Solutions document

                        1.1.3   Opportunity identification document

                        1.1.4   Project start up document

                        1.1.5   Recommendation document

        1.2 Project Charter

        1.3 Draft Project Plan

                        1.3.1   Project team document

                        1.3.2   Resource document

                        1.3.3   Scheduling document

                        1.3.4   Assumptions list

1.4 Phase Review

      1.4.1   Achievements to date report

      1.4.2   Issues identification report

      1.4.3   Project approval signoff

2   Planning phase

    2.1 Project Plan

      2.1.1   Baseline monitoring document

      2.1.2   Project schedule & milestones

      2.1.3   Assumptions

      2.1.4   Budget

      2.1.5   Resource document

    2.2 Resource Plan

      2.2.1   Team roles & responsibilities

      2.2.2   Equipment identification

      2.2.3   Materials requirements

    2.3 Financial Plan

The tabular list the students produce should continue through to 4.0 Closure with 4.1 Project Closure and 4.2 Project review.

If students undertook the previous exercise correctly, then the tabular exercise is not difficult. The key to a successful WBS is attention to detail. Although not a difficult process, it will take time to complete correctly.

Exercise 3

Share your findings from your private study work with the other students in your group. Take notes on any interesting ideas which others suggest.

Topic 4: Applied IT Project Management

4.1 Learning Objectives

This topic provides an overview of the strategic approach to IT project management. On completion of the topic, students will be able to:

- Define strategy and give examples of strategic approaches;
- Discuss observation and four stage pyramid approach;
- Name the techniques and tools available for a strategic approach;
- Explain differences between programs of projects and individual projects;
- Explain the basis of PRINCE2 within strategy.

4.2 Pedagogic Approach

Information will be transmitted to the students during the lectures. They will then practise the skills during the tutorial and seminar sessions.

4.3 Timings

Lectures: 1 hour

Seminars: 2 hours

Private Study: 7.5 hours

Tutorials: 2 hours

4.4 Lecture Notes

The following is an outline of the material to be covered during the lecture time. Please also refer to the slides.

The structure of this topic is as follows:

- Strategy and Project Management Strategy: What it is and why it is important
- Strategic approaches
- Observation & Pyramid Approach
- Techniques and tools
- PRINCE2

4.4.1 Guidance on the Use of the Slides

Slides 2-3:   These slides present the scope, coverage and learning outcomes of the lecture.

Slide 4:   Before applying strategy to any project, students are introduced to a concept of strategy. You can point out that many different definitions of strategy exist and you may want to share other definitions with the group.

Based on the definition of strategy shown, a project would be described as a component within an organisation's plan, which contributes to goals, policies and actions.

Slides 5&6   Well-organised observation processes can be extremely powerful and creative strategies for identifying potential projects. In an organisation, people regularly experience different scenarios, learn about competitors, industry standards, review publications, face and resolve problems. There can also be changes within IT: infrastructure, products and software. All these factors can influence potential projects. Observation strategy should not be underestimated and a smart organisation will have in place standard procedures for its employees to follow.

Slide 7:   Organisations have a primary focus which is strategic or organisational. A strategically focused organisation will focus on long term issues and gains and will have a company vision and direction for the future. An organisational focused business will have a short term focus on immediate opportunities and aim to meet immediate business needs.

For long term success and longevity, strategic focus is always necessary. However, balancing both short term business needs and long term strategic needs is the ideal. Due to this, the four stage selection pyramid has been chosen. A key factor in the potential success of projects comes before any deliverables have been generated. It comes in deciding which proposed projects are viable, which projects will contribute to the primary focus of the organisation, and which projects will add value to the organisation.

Slide 8:   The pyramid of four stages should always be approached top-down. It is very easy to jump straight to the second or third stage but for a project to contribute to effective organisational strategy, discipline is required. Stress to students that they must start at stage 1, Strategic Planning.

Slide 9:   Stages 1 and 2 are explained here. Strategic Planning asks whether the initial project proposal aligns with, contributes to, and potentially adds value to the organisation's long term strategic objectives and goals. To do this, a comparison of the organisation's strategic plan (this should be a written strategy but could be the tacit understanding within the organisation) must be made against each proposed project. This stage should not be missed out.

The Business Analysis stage is where the proposed project is analysed against the organisation's key business processes. Does this proposed project contribute to, build on or add value to any of these key business processes?

Slide 10:   Stage 3 of the project selection process is to gather further details on any of the proposed projects that have 'survived' the previous 2 stages. By completing stages 1 and 2, the number of potential projects should have been reduced considerably. Detailed project scope, timing and cost must now be researched and measured against the organisation's philosophy regarding projects - Do they only undertake projects of low cost high return? Are they risk takers willing to gamble on unproven technology in the hope of bigger payouts?

For proposed projects which have successfully passed the first stages, stage 4 is where the final decision on which projects to authorise takes place. No project proposals should be discarded at this stage but rather kept for later use or development. Those proposals authorised are now allocated resources, although the resources may need to be reviewed/renegotiated once the project has started.

Slides 11-12:   Many industry tools and techniques exist to aid an organisation in determining which proposed projects it will eventually authorise and proceed to develop. Again it is hoped that an organisation has made a decision on which tools and techniques it favours, based on its philosophy and style. It is recognised that there is no one technique (or combination of techniques) that will fit all proposed projects all of the time.   However, it is highly recommended that every organisation adopts a 'standard' technique, which it will use regularly, where possible. A number of different tools and techniques are listed. You could try to elicit some from the students before showing the slide. Remind students that not all of the tools will be discussed in this lecture but that the references included at the end of this lecture should be used for students wishing to research these tools further.

One of the most commonly used analysis tools is SWOT (Strengths, Weaknesses, Opportunities, Threats). A traditional analysis tool used to analyse an organisation's current situation, SWOT can also be used as a predictive tool to identify the internal (S,W) and external (O,T) value that a proposed project is likely to bring to an organisation.

Porter's 5 Forces model was traditionally developed to allow organisations to assess competitive forces within their chosen industry (e.g. IT software development). It has now transitioned into a model that can be predictive in nature and applied to proposed projects.

A weighted scoring model is a tool for choosing proposed projects when there are mulitple criteria to consider. Having identified the criteria which an organisation may use (e.g. strategic goals, business objectives, known risks, timescales, financial implications), the criteria are then weighted according to the organisation's priorities (totalling 100%). Each proposed project is valued according to its ability to meet the criteria. On totaling the results, a mathmatical projection of which project(s) should be considered further is produced.

Slide 13:   This slide gives the typical 5 categories for approved or authorised projects when they have been fully analysed and reported on.

Slides 14-16:   Having implemented project strategy to make the decision on which project(s) are to be authorised, project strategy continues throughout the lifecycle. This is also known as project management strategy. A project will either be managed as part of a 'program of projects' or individually. It is recognised that depending on the size of an organisation, the option of a program may not be available. However, where it is available (e.g. when more than one software development project is being developed at same time), it is highly recommended that the program approach is adopted.

Grouping these common projects together under one umbrella greatly reduces the risk of overlap, or the unfortunate situation (which can even affect multinational organisations) where multiple projects run with the same outcome. Greater control is achievable and a program manager can also monitor to ensure that all projects still fulfil the organisation's strategy.

Where neccessary (due to organisation's size, resources or attitude), a project may be undertaken as an individual. The advantage here is that the project manager does not have a program manager overseeing the details of the project. Disadvantages include less opportunity to gain knowledge from other subject related projects, being isolated, that it may be harder to measure deliverables and progress.

Slide 16 also refers to the benefits of ongoing observation throughout the project and the reasons why this is important.

Slide 17-18:   Many organisations choose to adopt a project management methodology - a series of tools and techniques which aid the production of project deliverables whilst still maintaining the strategy of the organisation, business and the project itself.

PRINCE2 is a government-developed approach, which has now been widely adopted throughout the international project management community. Unlike many project management methodologies, PRINCE2 is focused throughout a project on the organisation and the original business rationale for approving the project. It is a formal, structured approach with 6 phases, 7 principles and 7 themes. PRINCE2 allows for a proactive yet structured process to managing a project.

Slide 19:   References

Slide 20:   Ask students if they have any questions. You may also want to remind them that they will have the opportunity to ask questions and discuss the topic content in the seminar and tutorials.

4.5   Seminar Notes

The time allocation for the seminars for this topic is 2 hours.

Lecturers' Notes:

Students have copies of the seminar activities in the Student Guide. Answers are not given in their guide.

Activity 1

Work in groups of four. Design an appropriate form that an organisation could implement to record potential projects submitted by employees through observation (see Lecture slide 6).

Write or type up your form – you will require it for the tutorial session.

Suggested Answer:

Students should produce a one page standardised form that is generic enough for an organisation to implement throughout all its departments, yet can be tailored to fit any proposed project.

Activity 2

Generate a SWOT analysis for the following scenario; remember that strengths and weaknesses are internal to the project, opportunities and threats are external factors affecting the project:

> *You work for a UK-based IT software company which specialises in quick turnaround projects that take off the shelf software products and rework the code to provide clients with bespoke solutions. Since the company began in 2004 they have always worked in this specialised area of the IT industry and have built a reputation for delivering high quality solutions, fast. By concentrating on what they do best, the company has grown from 3 founders to 18 employees and has a number of high profile clients. In 2009 the company began accepting contracts worldwide.*
>
> *The company has been offered the opportunity by one of their high profile clients to develop a bespoke software product unlike anything that is currently on the market; a project estimated to take 18 months to complete, which means rather than following the company tradition on 'coding up' an existing software product they would have to start from scratch.*

You can use the table below to record your results:

Strengths	Opportunities
Weaknesses	**Threats**

Suggested Answer:

It is expected that the students will generate many different factors for their SWOT analysis. Below is an example of some factors.

Strengths	Opportunities
Strong project ethos	Stakeholder confidence
Proven project record of coding software	New type of project
Proven record of delivering what clients want	Potential new client market
Skilled workforce	
World wide contacts	
Weaknesses	**Threats**
Unproven ability for pure bespoke contracts	Risk losing high profile client
No similar previous projects to base estimates on	Risk undermining current market position by re focusing business activity
Previously concentrated on short project contracts	Does this project fulfil company strategic goals?
Possibility of not having enough resources for this type of project	

4.6   Private Study

The time allocation for private study in this topic is expected to be 7.5 hours.

> **Lecturers' Notes:**
>
> Students have copies of the private study exercises in the Student Guide. Answers are not provided in their guide.

Exercise 1:

Is it important that a project aligns with an organisation's business strategy? Justify this opinion.

Suggested Answer:

It is vital that any project an organisation undertakes aligns with the overall strategy of the business. This is one way that a company can build market share, build its portfolio of investors and clients and strategically align itself with its mission statement and future goals.

Exercise 2:

Write a one page summary report on the advantages and disadvantages of running a project in isolation (rather than within a program of projects).

Suggested Answer:

Students should be able to generate a good list of advantages and disadvantages which they should back up with sound reasoning. Some advantages and disadvantages include:

Advantages

- Potentially less waiting time for consultation.
- Under control of the project manager who will be an expert in area. A programme manager may not be 'expert' in particular project area.
- The project may progress more quickly/easily because the project manager does not have to confirm decisions with programme manager (one less managerial level to negotiate).

Disadvantages

- Potential of overlap with other existing projects – doing the same thing twice.
- Insular view of project. A programme approach is more likely to provide 'a bigger picture'.
- Less checkpoints. Checking that a project continues to align with the organisation's business strategy is integral to a programme approach.

Exercise 3:

Research the advantages of adopting PRINCE2 as a methodology approach to managing a project through its lifecycle. Write a report summarising your findings.

Suggested Answer:

Students are expected to research PRINCE2 and provide further information than that given in the lecture. Examples of advantages include:

- PRINCE2 is a world renowned, internationally adopted and established approach to managing a project throughout its lifetime. It provides the project manager with a structured and well organised step by step approach that is both reactive and proactive. PRINCE2 is adaptable to individual projects' requirements and maintains a business focus throughout.
- The phases are broken down into manageable stages with guidance throughout.
- PRINCE2 has a proven track record and there is established support and qualifications available to a project manager.

Exercise 4:

Use your centre's library to find out more about project management strategy. This will widen your knowledge base.

4.7   Tutorial Notes

The time allowance for tutorials in this topic is 2 hours.

Lecturers' Notes:

Students have copies of the tutorial activities in the Student Guide. Answers are not provided in their guide.

The review of the private study work should take a maximum of 30 minutes. You may prefer that students to work in small groups initially, before running a whole class plenary.

Exercise 1:   Review of Private Study Exercises

Work in a group to share your experiences and findings from the private study exercises.

Suggested Answer:

The answers provided in the private study sectionection above can be used as a basis for discussion. The main purpose of this review is to identify any problems the students may have had in understanding and completing the exercises.

Exercise 2:

Complete the form you generated in Activity 1 during the seminar session for the organisation scenario you looked at in Activity 2:

> *You work for a UKbased IT software company which specialises in quick turnaround projects that take off the shelf software products and rework the code to provide clients with bespoke solutions. Since the company began in 2004 they have always worked in this specialised area of the IT industry and have built a reputation for delivering high quality solutions, fast. By concentrating on what they do best the company has grown from 3 founders to 18 employees and has a number of high profile clients. In 2009 the company began accepting contracts worldwide.*

> *The company has been offered the opportunity by one of their high profile clients to develop a bespoke software product unlike anything that is currently on the market, a project estimated to take 18 months to complete, which means rather than following the company tradition on 'coding up' an existing software product they would have to start from scratch.*

Exercise 3:

Here is some further information on the scenario from Exercise 2:

> *The contract being offered to your organisation is worth a potential £1 million. This figure is based on the initial development contract plus additional future rollouts and upgrades which your company would be signed into (locked into) by the initial contract.*

Generate a new SWOT analysis based on your original SWOT (from Activity 2 in the Seminar), including this additional information. Be prepared to rework your original findings based on this new information.

Strengths	Opportunities
Weaknesses	**Threats**

Suggested Answer:

It is expected that the students will generate many different factors for their SWOT analysis. Below is an example of some.

Strengths	Opportunities
Strong project ethos	Stakeholder confidence
Proven project record of coding software	New type of project
Proven record of delivering what clients want	Potential new client market
Skilled workforce	Considerable contribution to company future
World wide contacts	Market dominance
Huge investment	
Weaknesses	**Threats**
Unproven ability for pure bespoke contracts	Risk losing high profile client
No similar previous projects to base estimates on	Risk undermining current market position by re focusing business activity
Previously concentrated on short project contracts	Does this project fulfil company strategic goals?
Enough resources?	Project failure – huge potential impact on company
Connected with one client for a long time period	
Restricted on which other projects can be accepted due to resource allocation	
Over reliance on one client	

Exercise 4

Based on your SWOT analysis, conclude and make recommendations to your organisation as to whether they should accept or reject their client's project offer.

Suggested Answer:

Students should be able to justify their decisions based on the work completed so far. If there is enough time, you may want to exploit differences of opinion in the group in order to generate further discussion and also to highlight the point about projects ultimately being agreed based on individual organisations' philosophies and attitudes to risk.

Topic 5: Software Application Deployment

5.1 Learning Objectives

This topic provides an overview of software deployment within the IT industry. On completion of the topic, students will be able to:

- Define and describe software deployment;
- Identify and explain key stages within software deployment;
- Name ISO standards associated with software deployment;
- Form opinions and communicate those opinions on software deployment.

5.2 Pedagogic Approach

Information will be transmitted to the students during the lectures. They will then practise the skills during the tutorial and seminar sessions.

5.3 Timings

Lectures: 2 hours

Seminars: 1 hour

Private Study: 7.5 hours

Tutorials: 2 hours

5.4   Lecture Notes

The following is an outline of the material to be covered during the lecture time. Please also refer to the slides.

The structure of this topic is as follows:

- What is software deployment?
- Key stages within software deployment
- Product release
- Installation
- Documentation
- Training
- Maintenance
- Monitoring
- Reviewing
- Updating
- ISO standards

5.4.1   Guidance on the Use of the Slides

Slides 2-3:   These slides present the scope, coverage and learning outcomes of the lecture.
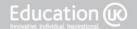
Slide 4:   Definition of software deployment by IBM.

Slide 5:   Software deployment is an overview term within the IT industry to encompass any processes that result in software systems utilisation. Therefore software deployment includes product release, installation, training, documentation, maintenance, monitoring, reviewing and updating.

A common complaint amongst software development organisations is the lack of understanding their clients have regarding the commitment needed to successfully acomplish software deployment. Many client companies wrongly believe that the responsibility lies solely with their developers, whereas in reality it takes considerable commitment from both the supplier and client to successfully achieve integrated software deployment.

A formal software deployment strategy should be generated before the time of deployment, ideally during the planning phase, that ties both parties to a proactive approach.

Due to time pressures, deadlines and over runs in the software industry, deployment is often rushed. Professionals in the software industry have traditionaly underestimated the importance of a formal software deployment strategy and its significance to the subsequent success/acceptance of the new system. The mentality of the software industry has traditionally been one that considers deployment to be a formality.

Slides 6-7:	Product release exists within release management. Release management incorporates all the facets of software release including integration, faults, upgrades and requirement changes and as this area continues to become increasingly technical, distributed, specialised and complex. It is an area expected to continue to grow.
	Two criticial success factors of release management are the ability to control the release of software and the ability to control the timing of that release.
	ITIL, the Information Technology Infrastructure Library, responsible for many IT related best practise approaches and frameworks, has a release management framework available to organisations. This assists in protecting an organisation's live environment during release through a series of support tools. Although ITIL's release management approach is only adopted for major changes it has many potential benefits.
Slide 8:	The installation of new software systems has traditionally been extremely resource heavy; in manpower, time and cost, requiring technicians to switch over each client machine. To achieve this, installations had to be scheduled in quiet business periods (e.g. bank holidays), to reduce business and technical dissruption.
	One common problem for software installation has been the lack of installation scripting. The coding (scripting) necessary for the software to get from the developers' machines to the client organisation's machines may have been overlooked. This kind of error results in installation delays, and therefore additional costs, and can also undermine the business relationship with the client organisation. The client organisation may be unsure how the developers can overlook such a fundamental deliverable and the developers realise that because it was not specified in the project requirements, it has not been done.
	Traditionally it was necessary to delete previous software systems to install the new system, or risk having multiple versions running at any one time. Four current approaches to software installation are pilot, parrallel, big bang and web. You may want to elicit from students a suitable description for each approach, before showing the following slides.
Slide 9:	Pilot installation is the term given to a software installation where it is introduced in isolation. One or perhaps two departments will receive the new system and run it, while it undergoes fault and integration checks. Integration here refers to the new installation'sacceptance by users.
	Once proven to run successfully (with initial faults identified and corrected) the software is then launched organisation wide. The advantage of this approach is that although the software being introduced in to a department may cause issues within that particular environment, the software's impact on the whole organisation is contained and minimised.
Slide 10:	Parallel installation is a common approach to introducing new software, where both the new and old software systems run side by side for a determined period of time. During that time period the new system is measured against the old system, to identify its ability to operate as intended. For switchover to occur the new system has to outperform, equal or be within agreeable parameters when measured against the old system.

As with pilot installation parallel installation can minimise organisation wide impact due to its running with the old. Any faults identified that cause the new system to crash, although essential to rectify, do not result in an organisation-wide failure, the old system can continue.

This approach also enables organisations to introduce workbased training as the software is present and accessable and employees can familiarise themselves prior to the new system going fully live.

Slide 11: Big bang installation is the approach taken when switch over is undertaken with no preparatory observation. The example often used is switching the old system off on a Friday afternoon and switching the new system on the following Monday morning. You may want to ask students about the possible rationale behind this approach before revealing each point on the slide. To be successful detailed, planning must have occured prior to switchover and every eventuality anticipated.

Big bang, as its name suggests, often has dramatic results. It has devastating results if the new system fails. There is no trial run with big bang because only the new version will run. This means that any faults identified must be corrected as soon as possible. The worst case scenario would be that the organisation is unable to operate for a period of time, resulting in potential (heavy) losses. Organisations which undertake a big bang switch over tend to be business risk takers prepared to 'gamble to gain'.

Slide 12: A web-based installation approach is increasingly common in today's software industry because in effect there is no installation. The developer generates an application web server that the client then points to, enabling the installation to occur without the need for a (human) resource heavy switchover.

Slide 13: When compiling documentation for the deployment of software there are many considerations. The structure of the documentation along with the individual pieces is often governed by the chosen project methodology, or lifecycle. For example, if software is developed in a Rapid Application Development (RAD) approach where iterative prototyping is employed, then little documentation is produced. However, a Structured Systems Analysis and Design Method (SSADM) approach is documentation intensive.

The philosophy of the organisation also impacts on documentation and whether it prefers a paperless or paper based approach. Target audiences for the documentation will also affect its delivery method and content. What is the spectrum of ability, the audience's specialism and its prior knowledge of the product (upgrade deployment)?

There will be several layers of documentation, including design and marketing. Deployment documentation can be categorised as 'user' and 'technical'.

Slide 14-15: User documentation assists the user in gaining the maximum they can from the software. Written for a diverse audience (e.g. end user, line management, middle management, higher management), user documentation must use the right level of language to be effective. In addition to identifying the features of the software it should also instruct the reader how to implement and maximise each feature.

The ideal documentation is laid out in a logical, usable format rather than a user version of technical documentation (which is what can happen). It should contain a

thorough troubleshooting section, pre-empting potential user problems with easy to follow instructions. Not all user documentation contains troubleshooting.

There are three common user documentation formats, tutorial, themed and reference:

- Tutorial documentation is where the documentation is written primarily for a new user (perfect for new software deployment products), guiding them through each process with detail on what they are aiming to achieve at the end of each section.

- Themed documentation is documentation that is chapter based, with each chapter concentrating on key topics. This would be perfect for an able new user or once software is familiar. This documentation is like a book with index and chapter headings and it is the most common approach for software deployment, being a practical way of communicating information.

- Reference documentation is ideal for the expert user who simply requires the ability to index topics as required, with no additional wordage than is necessary.

As the IT industry continues to develop, online help is becoming more the norm. This enables the end user to access help the moment it is needed, as opposed to looking for paper based documentation. Online help is becoming more extensive and developing in its own right. This would be perfect for an organisation with a green philosophy and they would see paperless online help as the future of user documentation.

Slide 16:   Technical documentation has evolved since its introduction. Original documentation was known to contain vast data dumps of source code which was ineffective and added little or no value for those tasked with interpreting it. Now technical documentation still contains vast quantities of code but also accompanying descriptive text to guide the user. There needs to be a balance between source code and descriptive text. Without documentation it is dificult to fully understand the software code when modifying or updating the system. However, every time a modification is made it may change what the software does and so the documentation needs to be modified too – the more detailed the documentation the less likely a developer is to take the time to modify it and it then becomes out of date and can be misleading.

A key ability, therefore, with the addition of description is to balance the technical and descriptive content.

Traditionally produced post development, auto generation is favoured by many in the industry. This is where the technical documentation is generated during the development of the software by the project programmers, enabling a seemless transition from product to documentation. The obvious disadvantage of this approach however, is that updates to the material often require the abilities of programmers.

Of all the documentation produced, technical documentation is the least appreciated and most overlooked, generally receiving the minimum resources necessary to produce.

Slide 17:   When deploying a new software system, is training essential? You may want to ask students to consider if they received any formal training in MsWord, or Powerpoint. Did they have formal training for Excel? You may want to ask the students for their own answers on training for a new software system before showing the rest of the slide.

For a software system to be accepted by a client's workforce and integrated into its business framework, training is vital. How training is achieved is varied and if undertaken it should be tailored to both the organisation and individual's requirements; cost, existing workforce capabilities, work approach and organisation mentality are all key considerations when deciding how to train (or if to train) the workforce.

Slide 18:   Cascade training is where an organisation invests in official expert training for a percentage of its staff. These staff members, on receiving the standardised training, are then made responsible for the training of the remaining workforce. One example would be an organisation paying for 20 personnel to receive expert training. Those 20 are then each allocated a group of employees to train. The 20 groups are then all allocated their own employee group and so on until all required employees have received training.

You may want to elicit from students the obvious problem with this training method, before giving the information and example which follows. The major problem with this approach is loss of integrity of the original expertise as the training filters (cascades) down through the organisation. Imagine a whisper being passed from one person to another and so on, through hundreds of people. The original whisper becomes more and more dilluted and changed until it fails to resemble the original message.

Organisations which implement this approach often argue that the decision is based on cost and time. It is much more cost effective to pay for 20 personnel to receive expert training than the whole workforce and only a proportion of employees will be away from their duties at any one time.

However, how does the organisation measure cost and time? In reality the lack of integrity of the training content and its standard often results in far greater time and cost implications becauseemployees struggle to apply their dilluted (and sometimes incorrect) knowledge to real life situations. The decision to use cascade training may therefore be a false saving.

Slide 19:   Workbased training is popular in the IT industry. Often known as 'on the job training', employees will be informed of when training will take place and will, depending on how many of them require training, be trained in groups often including their line managers.

Workbased training takes place within the real environment, i.e. the environment where the software will be implemented. This means, however, that employees must take time out from their existing duties to attend, so there should be provision made by the organisation to take into account this reduction in productivity. Organisations can fail to do this and expect their employees to make the time up. If a large amount of training is given this can be perceived as unfair and can result in added stress and a reduction in staff morale.

As previously stated workbased training will often include the line manager or other management. This may result in employees feeling pressure not only to perform well throughout the training process but also to ask fewer questions at this time (when they should be asking all the questions they need to, however basic, to be able to use the software correctly). Employees may want to give the impression to management that they understand the new software system well straight away and as a result this may create an incomplete knowledge base and reduce the effectiveness of the training.

Against the above disadvantages, the cost benefits of workbased training have to be noted. The benefits of having employees on site if they are needed elsewhere, the reduced overheads from not having to hire another facility and all the staff receiving the same standard of training is balanced against the reduced productivity from pulling multiple individuals from their posts and paying for expert training.

Slide 20:   The user manual approach to training is where an organisation issues the software user manual to its employees with the instruction to 'learn it!'

You may want to ask students to provide some advantages and disadvantages of this approach. One advantage is that it allows employees to learn at their own speed and in their own way. From the organisation's perspective - apart from the cost of producing multiple manuals - little or no cost is incurred. Users sign the manual on completion as proof that they have completed this training.

Problems with the user manual approach include that the organisation has no control over the standard of learning. Just because it is written in the manual does not equate to knowledge. In addition, a signature is not proof that the individual has worked through the manual – it is human nature to only take note of what applies to you and it is common for individuals to skip sections they believe are not relevant to their work.

Slide 21:   The concept of having no training may seem odd. However, organisations still opt for this approach (or non approach!) in some situations. Many factors can influence this decision, from both the business and technical sides. For instance, there may be no financing available to invest in training or due to the nature of the software (its level of technicality, importance, being introduced in parallel with the existing system, for example) employees are able to transfer their existing skills to using the new software without the need for training provision.

Slides 22-25: Software maintenance (also called evolution or support) occurs due to changes that occur in the environments that the software operates in.

Software should always be viewed as an asset and as such should be invested in, just as with the maintenance of machinery in an engineering environment. As an organisation's business evolves so should its software. The word maintenance is often related to fault repair. However, maintenance in software also encompasses usability and compatibility. The ability to update and rework software so that it can be adaptive to its environment is an essential component.

In the early 1980s Leintz & Swanson developed a four classification approach to software maintenance, believing that every change falls within a category.

- Corrective maintenance is the identification and fixing of any and all errors both minor and major, including original design defects.

- Perfective maintenance is the evolution of new functionality and/or the reworking of existing functionality.

- Preventive maintenance is the management of the software to increase overall software lifetime.

- Adaptive maintenance is carried out in response to changes to the software's environment, for example changes to hardware/software configuration or business focus.

Maintenance should have boundaries. Not all changes should be categorised as 'maintenance'. Boundaries are usually based on either size or cost. The supplier should always make clear to clients when a change stops becoming maintenance and instead becomes a new project.

In relation to size, maintenance changes should be 'minor' and localised; what constitutes minor and localised is for the supplier to define.

Maintenance, in terms of cost, would mean that the cost (time and money) of implementing a change should also be 'minor'. Again what constitutes 'minor' is for the supplier).

If changes being requested by clients fall outside these definitions, suppliers should insist on a new project to fulfil the requirements. This is often beneficial to the client also in that it can be a shorter and more straighforward process to generate a new software product than continually reworking an existing one.

Slides 26-27:   These slides introduce the Evolution Software Lifecycle, designed by Bennett and Rajilch. The reasoning behind the lifecycle is that once launched (Stage 1), software travels through 5 individual stages during its lifetime. Having the ability to distinguish where a piece of software falls in the lifecycle allows the organisation to tailor their management approach.

- The initial stage refers to the software launch.

- The next stage after launch is termed 'evolution'. The evolution lifecycle stageoften requires much fault fixing, reworking and enhancing of the software.

- The servicing stage follows. As software ages and has received multiple enhancements it moves from evolution to servicing. This is often when software has received so many add ons that it becomes ineffective to continue reworking /enhancing. During servicing only essential maintenance operations (to keep the software working) are to take place. However, planning for replacement software should be taking place at this stage in the lifecycle.

- The phase out stage occurs when a system is phased out and replaced, being beyond even continuing maintenance. Software in this phase may continue being utilised but will receive no maintenance support.

- Close down completes the lifecycle and is the complete shut down of software.

Slide 28:   After going live with a software installation the system should be observed on an on-going basis; first by the installation team and then by the organisation who have adopted the new system.

The aim of observation is to track the software's performance, immediately identify any issues or faults, pre-empt any organisation wide impact and resolve any conflict at the earliest possible opportunity. Observation should also provide understanding of whether the software fulfils all of the the organisation's requirements. It may be necessary following observation, to negotiate rework or even upgrades. Observation is an integral part of any software deployment.

Slide 29:   Reviewing should be an ongoing process driven by the client providing feedback. This feedback may include issues but can also be the result of an organisation refocusing its business, or a change in operational standards or new legislation.

Slide 30:   Updating and upgrading are two distinctly different actions. Updating takes place within the existing contract if the software delivered fails to fulfil the requirements outlined in the original agreement.

Upgrading occurs when the delivered software fulfils the original client specified requirements but it is discovered (through ongoing, live use) that what was requested is not actually what is required. This is quite a common occurance in software development.

It should be noted that both updating and upgrading software is a limited process. There does reach a time when all the changes made (code alterations or add ins) affect the integrity and overall effectiveness of the software system. This would signal a required change to the next phase of the software cycle.

Slides 31-33:   ISO 12207 is the systems and software engineering internationally adopted standard for software lifecycle processes. Originally launched in 1995, it was relaunched in 2008 due to progress in the industry.

The aim of ISO 12207 is to provide a generic framework for software lifecycle that can be adapted for any specialism. Through a series of processes, activities, tasks and a common language definition it guides an organisation through the life cycle, from acquision or development through operation, maintenance and finally disposal.

We are interested in the maintenance part of this standard, which was issued its own ISO number in 2006, ISO 14764. The introduction of ISO 14764 established definitions for a variety of maintenance options adopted from Leintz & Swanson's 4 classification approach. ISO 14764 offers a thorough approach to the lifecycle of maintenance.

Slides 34-36:   References

Slide 37:   Ask the students if they have any questions. Remind them that if they come across information that they are unsure about, they will have an opportunity to ask about it during the tutorial and seminar sessions.

5.5   Seminar Notes

The time allocation for the seminars for this topic is 1 hour.

Lecturers' Notes:

Students have copies of the seminar activities in the Student Guide. Answers are not given in their guide.

For Activity 1, split the class into two groups. One group will argue that the statement is correct. The other group will argue that the statement is incorrect. Students should be allowed some time to prepare with their arguments with their group before the debate begins. You should chair the debate and ensure that all students participate.

Activity 1

As a class debate the following statement:

> 'Paper based user manuals still have a place in current software society'.

You lecturer will put you into a group and you should debate for your group's view whether you personally agree or not.

Suggested Answer:

This debate is to encourage students to have an opinion on the information they received on documentation during the lecture(s). Debating for their group, whether they believe the statement to be true or false will enable them to all see both sides of the argument more clearly.

Activity 2

Work in pairs or small groups. Suggest a suitable training method for introducing new Intranet software into a successful recruitment company, with around 100 employees located at a Head Office and 3 regional centres. Most employees use the old software well and training on this has traditionally been quite informal (new staff shown quickly at induction and voluntary options on staff training days) and ongoing (more experienced users helping others when they can or as they are asked).

You should identify the issues which would affect delivering training on the new software in this type of organisation and say why your training method is most suitable. Present your suggestion to the rest of your class.

Suggested Answer:

Answers may vary but students would be expected to pick out most of the relevant factors affecting the choice of training method, such as the company being split over 4 sites, its traditional approach to training for this type of software, the possibility of newer or less experienced staff feeling pressure and not asking for help with the software, the number of employees who need to be trained and the possible impact on the business (particularly in recruitment) of taking those people off their main duties in order to receive training.

Students should say how their suggested method deals with any of the problems they identify. It may be the case that students decide that a combination of methods is required, and this option (combining approaches to create a unique standard approach) will be explored further in the tutorial activity.

5.6 Private Study

The time allocation for private study in this topic is expected to be 7.5 hours.

Lecturers' Notes:

Students have copies of the private study exercises in the Student Guide. Answers are not provided in their guide.

Exercise 1:

Locate an example of a software products user manual that is currently in circulation. This can be from a textbook, online or an actual paper copy distributed with some software. Analyse your manual and identify the following:

- What positives can you take from the manual (e.g. its content is organised)?
- What negatives can you identify in your manual (e.g. no troubleshooting section)?
- What would you add or remove from the manual to improve it?
- Are there any other recommendations you would make?

Suggested Answer:

This exercise will produce commonalities within the student's answers. Regardless of the manual they choose the same documentation issues and benefits usually apply (there will be variation in their answers but a common thread will be present).

Examples of what the students' analysis may produce:

Positives or negatives

- Well organised structure/poorly organised structure
- Appropriate use of language/ Poor language use
- Covers all key topics/ misses key topics
- Includes troubleshooting section/missing troubleshooting
- Has local contacts for additional help/ the help is through international telephone numbers
- Is concise in content/ is the size of a book
- Is aimed at the user/ is like reading a technical manual

Add or remove from manual

- Structured topic chapters
- Troubleshooting
- Code and description
- More additional help locations

Other Recommendations

- Rewrite documentation for user with no technical knowledge
- Rework if upgrade occurs

Exercise 2:

Identify the advantages (if there are any) of an online user help approach and make notes to report on your findings.

Suggested Answer:

Students should apply what they learnt during the lecture regarding a paperless approach. Advantages include instant access and fulfilling a green philosophy / credentials.

Exercise 3:

When does a software project become large enough to require a technical manual? Discuss

Suggested Answer:

The answers produced will depend on the students' grasp of the topic to date. However

a. If there is only one individual employed on the project, would technical documentation be necessary?

b. If the project budget is below £5000 is there any money available for the documentation process

c. Dependant on the methodology approach chosen (and any ISO standards adopted) documentation may be specified, in which case it does not matter how large a project is, its existence means that documentation is essential.

5.7   Tutorial Notes

The time allowance for tutorials in this topic is 2 hours.

Lecturers' Notes:

Students have copies of the tutorial activities in the Student Guide. Answers are not provided in their guide. It is recommended that the private study review takes a maximum of 30 minutes. Students can then work in small groups to complete the other exercises. You should hold feedback sessions on each exercise for students to share their responses with the rest of the class.

Exercise 1:   Review of Private Study Exercises

Review your private study work with the rest of your group. If you have any questions or comments that have arisen during private study, please share them.

Exercise 2:

Is social media an acceptable training medium? For example: uploading YouTube videos or online discussion forums/ blogs.

Analyse this statement from both a yes and no perspective. Form your opinion based on your findings and write a short summary detailing your conclusion and explaining your reasons.

Suggested Answer:

This is a subjective question that will enable the students to consider their current and future approaches to gaining greater subject knowledge.

Social media is becoming more and more integrated into society in general and many students look to it for additional information, guidance and at times answers.

Social media could be viewed as a perspective tool within training. However it must be considered that the accuracy of the information provided and how up to date the material is open for debate. For example, You Tube contains many training videos related to databases but there is nobody checking these videos to ensure credibility, accuracy or reliability.

The most likely arguement would be that social media has its place but currently cannot take the place of tailored training.

Exercise 3:

Basing your answer on a stock broking organisation that is preparing to install a new client records database, what would your ideal training approach include?

Remember that any training approach can be undertaken in isolation or combined together to form a unique standard approach.

Suggested Answer:

It is expected that the students will use the lecture notes on different training approaches, plus their knowledge from previous topics (e.g. data protection from Topics 1 and 2) to decide which approach or combination of approaches to training they would choose as an organisation standard.

Based on the scenario it would be expected that the students would discount No Training as an option, especially with the existence of data protection issues. You would ideally be looking for the students to combine approaches and produce a unique mix of training.

Exercise 4:

Based on the previous exercise, what would your <u>minimum</u> training approach recommendation be for the stock broking organisation?

Suggested Answer:

This answer will be based on the students' previous decisions but as a minimum you should expect them to recommend a user manual approach. No Training as a recommendation would need to be backed by sound reasoning.

Topic 6: Applying Software Deployment to Projects

6.1 Learning Objectives

This topic provides an overview of applied software deployment. On completion of the topic students will be able to:

- Identify, analyse and discuss IBM's Software Deployment Model;
- Apply and recommend approaches to resolving potential issues.

6.2 Pedagogic Approach

Information will be transmitted to the students during the lectures. They will then practise the skills during the tutorial and seminar sessions.

6.3 Timings

Lectures: 1 hour

Seminars: 2 hours

Private Study: 7.5 hours

Tutorials: 2 hours

6.4 Lecture Notes

The following is an outline of the material to be covered during the lecture time. Please also refer to the slides.

The structure of this topic is as follows:

- IBM Software Deployment Model
- Phases & Steps
- Phase 0
- Phase 1
- Phase 2
- Checklists
- Best practise
- Global software deployment
- Software deployment resources

6.4.1 Guidance on the Use of the Slides

Slides 2-3:   These slides present the scope, coverage and learning outcomes of the lecture.

Slide 4:   This slide presents IBM's premise for generating a software deployment model. Explain that this lecture will go on to give an overview of an established software deployment method created by IBM to assist their clients through the process. However, inform the students that you will start by eliciting their ideas first.

Slide 5:   Give the students a few minutes to brainstorm the slide question and allow a short period of time in the lecture for them to suggest a suitable structure. They should, based on their knowledge from the previous topic, be able to rough map an overall phased approach with multiple steps within each phase. They should include release, installation, documentation, training, maintenance, observation, review and updating.

Slide 6:   IBM generated a software deployment method based on the understanding that deployment should be treated as a lifecycle in its own right. A three phase approach, the SDM is an iterative overlapping approach adoptable by any software development organisation, although it was originally developed to guide clients through IBM's approach to achieving software deployment success.

Slide 7:   Phase 0 is the beginning and this is when a software deployment team, consisting of both supplier and client employees, should be created. The role of these individuals is to oversee the software deployment, focusing on a successful integration. They will identify essential process documentation and review existing project development documents, including original contracts, requirements and delivery plans.

From this information the team will formulate a high level deployment plan that will specify processes, ownership and timelines against existing best practice. This will then be formally agreed through an official meeting of both supplier and client representatives. Any unresolved issues should also be worked through and agreed.

Slide 8:   Phase 1 covers refining and promoting the plan. Following formal agreement between all invested parties, a review of all vital criteria will take place to ensure any final alterations during final negotiation are encompassed. The deployment plan will then be reworked if necessary and a 'kick-off' meeting will take place. The meeting (or multiple meetings if necessary) will gather those involved with deployment (include the project manager, team and management staff) and communicate the final plan, therefore increasing awareness and understanding.

Slide 9:   Phase 2 is where the software is deployed and the plan envoked. The management of phase 2 is critical for the whole deployment cycle. IBM has the philosophy 'quick deployment wins' and 'demonstrates success'.

                  This phase is also where previously unidentified business needs will come to light. However, these 'new' needs do not have to be incorporated into the current software being deployed. Often they should form a new project.

Slide 10:   Within their software deployment model method IBM also provides generic checklists for each step of the process. Each step has multiple checks that can guide the supplier and client through deployment. Each check must be agreed and signed off with any relevant notes. These checklists will be included in the deployment plan documentation and if revision is required must be reagreed, redesignated and resigned.

Slide 11:   Example of Step 5's checklist. You may wish to point out that 'Owner(s) is about identifying those taking ownership of each step, which helps drive the process forward more quickly.

Slide 12:   IBM identifies 8 key best practise principles within its model and they believe if applied consistently, these principles will produce deployment success.

                  1. Identify sponsor and stakeholders is the princilple which recognises that deployment ownership can involve people at many levels of an organisation. The stated benefits are alignment of business with software, establishing ownership (responsibility) for software value, progress tracking and resource coordination.

                  2. Centralise software fulfilment refers to assigning an individual responsible for receiving and the tracking of software, plus actual (or overseeing) software distribution. The benefits of this include efficient and effective software deployment achievement, greater monitoring and control.

                  3. The princilple Implement licence management tool and process is to gain knowledge and understanding of organisational software usage and prove software licensing compliance. Benefits of this include enhanced version management control, upgrades and maintenance tracking as well as efficient and up-to-date software usage assessments.

                  4. Hire deployment services is the principle to invest in experienced software deployment manpower, as this can drastically improve the rate of deployment success, provided that the individuals employed have relevant expertise.

                  5. Determine deployment readiness refers to reducing assumptions and managing expectations, which throughout a software project's evolvement and deployment, will creep in. IBM created a 'Readiness Plan' to highlight new risks and assess how prepared for deployment a team are.

6. Commit to self sufficiency is the principle of enabling the client to reduce their reliance on IBM (or on another supplier) when moving through the deployment process, ideally through the development of client organisations' own expertise.

7. Define time to value and return on investment establishes common goals and a timeline for long term goals. This principle of best practise offers measurement approaches to value.

8. Communicate and market vision is the principle of integrating software products with business vision, through an internal marketing strategy.

Slide 13: Global software deployment is a term that describes 'the landscape of the business'. This does not just mean on an international stage, but can also apply to software deployment in two seperate buildings or two (or more) cities. The power of 'global' software deployment lies in the planning process. If undertaken correctly it can result in maximised output.

Slide 14: Software deployment resources are available to enable an organisation to map the best practises previously discussed. Tools and techniques should be combined by an organisation to create a unique, specific combination which will maximise software deployment.

Communication tools, from relatively simplistic email to specialist online portals, have never been in greater use. Building a constant line of communication throughout software deployment is recommended, not just for reporting problems but also in order to build on and strengthen working relationships.

Slide 15: References

Slide 16: Ask the students if they have any questions. Remind them that if they come across information that they are unsure about, they will have an opportunity to ask about it during the tutorial and seminar sessions.

6.5   Seminar Notes

The time allocation for the seminars for this topic is 2 hours.

Lecturers' Notes:

Students have copies of the seminar activities in the Student Guide. Answers are not given in their guide.

Students should work in small groups to complete the activity below. They should then present their ideas to the rest of the class.

Activity 1

You work for an international Stock broking organisation that conducts business with the European, Asian and US stock markets, in effect 24 hour business.

Your organisation is planning a new software installation and you have been asked to recommend the installation approach. Prepare a presentation detailing your recommendations to the company.

- Remember to include the following:
- When you would schedule the installation
- Which installation approach you would recommend and why
- Any issues you foresee and suggested solutions

Suggested Answer:

The stock brokers is operating 24 hours a day due to the markets it has business with, leaving it difficult to schedule an installation without issues.

One recommendation would be to schedule during weekends or bank holidays but due to the time zone impacts and the varying holidays this could still prove a time and cost issue.

The web based 'no installation' approach is the most appropriate for this organisation, provided extensive planning ahead of the scheduled installation takes place. Students could go on to talk about the planning required.

This is a subjective activity and therefore one which may lead to a variety of student answers, which provided they have sound reasoning, are acceptable.

6.6   Private Study

The time allocation for private study in this topic is expected to be 7.5 hours.

Lecturers' Notes:
Students have copies of the private study exercises in the Student Guide. Answers are not provided in their guide.

Exercise 1:

In order to consolidate your knowledge of software deployment, read IBM Redbook 'The Software Deployment Mystery – Solved'. This is a free, IBM published book available via:

www.redbooks.ibm.com/redbooks/pdfs/sg246070.pdf

Make notes on any additional useful points and any questions you want to ask.

6.7   Tutorial Notes

The time allowance for tutorials in this topic is 2 hours.

Lecturers' Notes:

Students have copies of the tutorial activities in the Student Guide. Answers are not provided in their guide.

Before beginning Exercise 1, you may want to give students the opportunity to discuss any questions they have noted during their private study reading.

Exercise 1:

You work for a software development organisation that is responsible for the software upgrade installation within your client's current system. Half way through the installation the process crashes. This is a big bang installation and there is now no old system (having removed it) and no new system (due to its crashing).

What would your recommendations be for resolving this critical situation? Write some notes detailing your assumptions and recommendations, describing what the best and worst outcomes from each recommendation would be. You should be prepared to present your notes to the group and answer any follow up questions about the recommendations you have made.

Suggested Answer:

Recommendations could include:

- Buying in deployment expertise (as recommended by IBM's method)
- Temporarily moving to a paper based approach (provided this is an option)
- Attempt to reinstall

Whilst these recommendations are considered, what is also important is constant liaison with the client; providing them with reassurance and proactive choices for resolving the situation as quickly and effectively as possible.

Topic 7: IT Risk Management

7.1 Learning Objectives

This topic provides an overview of IT risk management and the key stages necessary to be proactive in approach to risk management.

On completion of the topic, students will be able to:

- Define risk and risk management;
- Understand that not taking risk seriously can have significant consequences;
- Name the key stages of IT risk management;
- Describe each stage's purpose;
- State the difference between proactive and reactive approaches to risk management;
- Generate risk identification lists (and assumption lists) for an IT project case study scenario.

7.2 Pedagogic Approach

Information will be transmitted to the students during the lectures. They will then practise the skills during the tutorial and seminar sessions.

7.3 Timings

Lectures: 2 hours

Seminars: 1 hour

Private Study: 7.5 hours

Tutorials: 2 hours

7.4   Lecture Notes

The following is an outline of the material to be covered during the lecture time. Please also refer to the slides.

The structure of this topic is as follows:

- An introduction to risk
- Introduction to risk management
- The stages of risk management within an IT project
- Risk planning
- Risk identification
- Risk analysis
- Risk response
- Risk databases
- Risk action

7.4.1   Guidance on the Use of the Slides

Slide 2:   This slide is an explaination of topic content for IT risk management. The focus of this topic is the understanding of what risk is, what risk management is and how, within IT risk management, risk is broken down into stages. This topic will also give examples of approaches taken within risk management and encourage the student to build practical skills within risk managment.

Slide 3:   This slide informs the student what they are aiming to attain by the end of topic 7.

Slides 4-5:   This slide encourages the students not to get subject fixation at this early stage of the topic. To understand risk management, they must first understand what risk is and apply it to their everyday lives.

The students are asked what 'risk' means to them. You can open the discussion and encourage the students to brainstorm a list, and discuss what risk means to them in their own lives. The question is further broken down in to sub-sections to aid discussion and you are encouraged to use these sub-sections to further expand the discussion. Students should write down all the risks shared during this time.

The next question students are asked to share their opinion on is the definition of risk. After eliciting students' responses, you can show them the definition and examples on Slide 5.

Slide 6-7:   This slide starts to consider risk within an IT environment. Ask students to quickly brainstorm possible IT project risks. This is designed to shift students into thinking of risk specifically within IT. You can also use this to guage students' prior knowledge of subject specific risk. During the feedback, you may like to share your own examples and to encourage the students to write down the examples shared - the list will be useful during seminar/tutorial exercises. You can then show students the examples on Slide 7.

Slide 8:   This slide introduces some of the potential strategic (organisation level) effects on a business if it were to underestimate risk and the neccessity of risk management.

Slide 9:   This continuation from the previous slide introduces potential operational level effects that risk can have and why risk management is such an important process.

Slide 10:   The question on this slide does not require a discussion – it is a question to get students thinking about how much risk within an IT work environment they would be willing to take, without spending time working the question through in their minds.

Slides 11-12:   These slides can be used to outline the three risk tolerance categories.

                At the end of this slide, you can ask the students to consider themselves in the role of Project Manager and to raise their hands to show which category they think they fall into. This may give an insight into the personality of the group!

Slide 13:   This slide introduces the term 'risk management' with a definition. Elicit any other definitions of risk management from students.

Slides 14-15:   This slide introduces the students to why risk management is so important and some key considerations. Emphasise that risk management is a pro-active approach within projects when undertaken correctly. Risk management, where at all possible, should never be re-active.

Slide 16:   This slide has examples of processes available to risk managers/project managers in their approach to risk management.

                It names the approach chosen to introduce the subject of Risk Management Process – the Cadle and Yeates approach. Also provided are two further alternative approaches. The alternate approaches listed are given as a guide for the student to, if they wish, research in their own time. Three approaches are given also to remind students that there is no one approach adopted in industry and that flexibility on their part is important.

Slide 17:   The Cadle & Yeates Risk Management Process breaks down mapping risk into 5 essential steps. It is chosen for its simple approach to risk management and is a great approach to learn the key details. You can explain that the rest of the lecture for this topic will focus on each of these 5 stages, so by the end of the lecture, the students will have been provided with an overview of risk management and will be able to start building their practical skills through the seminar and tutorial work.

Slide 18:   The first of the risk management stages to look at, risk planning, is exactly as it sounds. It is where the initial planning takes place. You can encourage students to offer additional reasons why a risk plan should be adopted.

                Ask the students whether a risk plan would be created for each project a company undertakes or do they think having one detailed risk plan for a whole organisation is sufficient? Students should be encouraged to discuss positive and negative points for both options.

                Answer: Either approach could be correct. It would depend on the organisation itself and whether the company preferred an umbrella approach where every project, regardless of what it was, was to be treated the same or whether the company preferred to give risk management/project management greater power in deciding what fits each project on its merits.

                This question and answer demonstrates to the students that there is not one correct answer, rather that to be flexible in their thinking is hugely important.

Students should be made aware that different 'experts' use different terminology within risk management and risk planning is often described as a risk policy stage. This is nothing to be concerned about; it is just something to be aware of. For students, either terminology is acceptable, but once they have decided which to use (i.e. either planning or policy), they must remain consistant in the use of language and not swap between the use of the two terms.

Slide 19: Remind students that every organisation will, if they have a risk plan, have a variation on the theme. As each organisation is different, their priorities will also differ.

Draw the students' attention to the assumption list. An assumption list is exactly as it sounds, a list of assumed knowledge on which the risk manager/ project manager will base their risk identification.

Slide 20: Stage 2 of the risk management process diagram; this slide explains that it is not until this stage that the process of identifying existing and potential risks takes place. Emphasise that for each project, literally hundreds of risks can exist and ask the students to consider how long this process could take.

Ask the students why it is essential that the Risk Manager or Project Manager (whoever is responsible for this process) is honest in their identification of all possible risks. Can they think of any circumstances where, if it were their job, they would NOT record an identified risk? Why?

Answer: If the person responsible is not honest and omits any identified risks, the effect on a project and how 'successful' it is could be under threat before it even begins. The manager may not want to record an identified risk in the following circumstances:

- When an identified risk on paper would mean being Risk Seeking, yet the manager knows the organisation is Risk Averse.

- When an identified risk would mean that scheduled deadlines would be thrown and bonus payments would be revoked.

Slide 21-22: These slides list potential ways of gathering the information required to identify risks. Students could be asked here if they can name any other ways of gathering the information, although the list is already quite extensive.

Slide 23: This slide gives three primary risks and one secondary risk. Ask the students what other risks to a project they can identify. Encourage them to share their ideas so that they can all add to the example list – this list will be useful for the seminar/tutorial work.

Slides 24-25: Stage 3 of the risk management process diagram is presented here. Draw students' attention to the fact that again there is a choice of terminology – analysis and assessment are often interchanged in textbooks. Students are to be made aware that as long as they are consistent with their language choice, either analysis or assessment is acceptable. Also remind students that as with many IT subject areas, there are many options and opinions from 'experts' as to how to approach and measure risk.

Slide 26: This slide introduces the analysis approach chosen to teach students how to analyse risk – risk assessment mapping.

Slide 27: This is a risk assessment map. The horizontal axis represents the likelihood of a risk occuring through the project duration as a percentage. The vertical axis represents the potential impact a risk will have should it occur, again represented as a percentage of 100. The risk assessment map is not complicated. Encourage the students to understand that the approach does not have to be complicated.

Note: The students will gain further understanding during the example which is to come.

Slide 28: This slide shows how each sector of the map breaks down.

Slide 29: This slide introduces the students to actually being able to use the map. Before being able to use the risk assessment map to plot risks identified in the previous stage (risk identification), the process of actually rating each risk with a percentage of likely occurrence and scale of impact must take place.To successfully estimate for each risk, many considerations should be taken into account. The slide gives some examples – you could also ask the students if they can identify any additional considerations.

Additional examples: Prior projects both inhouse and by competitors, current knowledge of available staff for project and their areas of expertise, time constraints.

Slide 30: This table shows four identified general risks that exist for the majority of software projects with estimated percentages for likelihood of occurrence and potential scale of impact.

Ask students to comment on whether these percentages generally seem realistic – do they agree with the estimates or do they disagree? A show of hands would be interesting at this point.

This is meant to be a basic exercise on how they immediately feel about the figures and is not meant to go into detail about clarifying risk. You should not get into clarifying 'how inexperienced the project team is' for example.

Slide 31: This slide emphasises that how accurately the risks are plotted on the map is totally down to how carefully the risk manager/project manager performs the task. The greater the accuracy, the more useful the approach.

The map is simply a graphic representation of the table from the previous slide where the actual decisions on the importance of the risks take place. It is possible to stop at the table and not use the map, but many individuals and organisations like working from diagrams.

Slide 32: This slide shows the plotted risk assessment map with the four identified risks from slide 29. The number corresponds with the number given to the risk in slide 29, i.e. number 1 represents the risk 'Availability of Software Required'.

Ask the students how accurately they believe the risks are plotted on the map.

Answer: Not particularly accurate.

Ask the students what they gain from looking at the map with the risks plotted.

Answer: It is expected that the students will think they have gained or could gain a greater understanding of the risk now they are plotted graphically.

The map enables you to see at a glance where attention/effort should predominantly be focussed. The top left sector of the map is the most important, because it indicates that any risk plotted here has a high likelihood of occuring and if it does it would have a large potential impact on the project and by extension the organisation.

The example shows that from the four risks identified, risk 2 is registering as a priority risk. Under the percentage breakdowns (slide 29) risk 2 is greater than 30% on both axis = priority. From the example, risk 4 is of least concern.

Slide 33:   This slide informs the students how the decisions on the risk percentages were made.

Ask the students how the original estimates of percentages would alter, if at all, if the project team had not already been allocated.

Answer: Both percentages possibly would have been lower.

Ask the students what they would have estimated the percentages at, if the project team had not been allocated.

Answer: There is no right or wrong answer – the answer each gives is based on their experience and understanding, just as it would be in an actual situation.

Slide 34:   This slide identifies downfalls of this approach to analysing risk. Ask the students if they can identify any further negatives.

Answer: Process is very open to interpretation – the manager responsible MUST be honest in their estimation, if they are trying to detract attention from any risk, this process would allow it to occur.

Slide 35:   This slide explains Stage 4 of the risk management process diagram. This is the stage concerned with how to respond to all the risks identified and analysed. The previous stages are very useful, but without a thorough risk response approach, they are no longer pro-active but become re-active. Risk response is where the opportunity to be very pro-active takes place. To have actions in place should a risk occur (go live) makes a project's approach to risk management proactive.

Four basic response strategies are introduced here. Like risk management as a whole and risk analysis, there are more strategies offered by 'experts' but four key strategies are concentrated on here. All four strategies are straight forward and hold no hidden meanings.

Slide 36:   The first strategy is prevention - simply the prevention of a risk occuring. To achieve prevention requires all involved (manager/organisation) to be highly proactive in their approach and delivery. It is one thing to approach risk management proactively and another to actually take the action required with just as much proactiveness.

Slide 37:   The second strategy is reduction - reducing either the likelihood of occurrence or impact of a risk or even both. A proactive approach is neccessary.

Two examples are given. Ask the students to contribute further examples of how they could reduce a risk.

Slide 38:   The third strategy is acceptance - a more risky approach to risk response. This is only appropriate for risks that during the analysis stage have been identified as being smaller/lower risk to the project.

Unfortunately for organisations who do not take risk management seriously, this strategy is more common and can be the downfall of the project and by extention even the organisation itself.

Slide 39:   Transference is a strategy that involves third parties. If a risk occurs, the responsibility and consequences of the risk are handed off to a third party.This is a common approach when technology hardware is involved.

Slide 40:   During risk response, it is common to identify yet further risks to the project, which then requires the manager to return to the risk identification stage. This then leads into the analysis stage and then risk response again and so the cycle continues.

Slide 41-42:   Through the risk identification, analysis and response stages, what should be created is what is known as a 'risk database'. Emphasise to students that the word database does not neccessarily mean database in software terms.

A risk database can be a paper based file, spreadsheet, wordprocessed document or an actual database. It can take any form that the organisation chooses; however, what it has in common is that it should be the central repository for all the data and information generated.

Slide 43-45:   These slides give the common content of a risk database, with explanations. Remind students that just as the format of a risk database varies so too does its content. Although the list given is the ideal, organisations all have their own ideas.

Slide 46:   Risk action is the stage where action takes place – where all the hard work and hours pay off. In reality, risk identification, risk analysis, risk response and risk action can be revisited on a daily basis and once the initial identification, analysis and response have taken place, it falls to the whole project team to take responsibility.

Slide 47:   References

Slide 48:   Ask the students if they have any questions. Remind them that if they come across information that they are unsure about, they will have an opportunity to ask about it during the tutorial and seminar sessions.

7.5   Seminar Notes

The time allocation for the seminar for this topic is 1 hour.

Lecturers' Notes:

Students have copies of the seminar activities in the Student Guide. Answers are not given in their guide. Activity 1 below is designed to serve as an introduction to the seminar and should be kept short and on topic.

Activity 1:   Short Review of Lecture Material

Use this time to ask any questions that have arisen since the lecture.

Activity 2:   Case Study

Lecturers' Notes:

Students should work in small groups. The activity is designed for students to share information, initially within their small groups and at the end of the seminar as a whole group. By the end of the activity, all of the students will have the same information.

While students work through the activity in their groups, check in with each group to assess their progress. If you think it is necessary, you could prompt groups by sharing a risk from the model answer or by encouraging the students to refer to their lecture notes.

Once students have had sufficient time to work on the questions, run a class feedback session. Ask each group to contribute 3 of the risks they have identified in question 1 to the discussion. If any groups still have identified risks that have not been shared, they can then add these at the end. You may wish to write the risks on a board as they are suggested or ask the students to write down each risk as it is contributed, so they build a thorough risk and assumption list. All students need to leave the seminar with the same list of risks.

Remind students that the power of information is in its sharing and the class discussion is like one big project team brainstorming.

The Bottled Water Company

The Bottled Water Company is a local company to your location that began trading in 2009. As its name suggests, it specialises in supplying bottled water to a variety of clients. When it began trading, the only clients the company had were local to their base and business was very straight forward.

A client would place an order by post, telephone or face-to-face, based on the Bottled Water Company's list of products. The invoices would be typed into a word processor and printed, the order would be filled and delivered and the invoice would be handed to the client at the same time. A copy of the invoice would be saved on the word processor and a paper copy would be filed.

While this approach has been employed since the beginning, the company has identified that clients are not paying within the required time period. Despite this, the company has successfully grown

and has now expanded its client list to include larger companies, restaurants, and clients from outside of the local area.

The current system is a combination of paper, word processor and spreadsheet. The company does not have a computerised database.

With the expansion of clients and the opportunity to become more efficient the management has decided it is time to upgrade. They want to computerise their systems and automate certain key processes.

To save money, the company has decided to develop the new system(s) in-house with no external consultancy.

Task

Work with your group to:

1. Identify any risks that The Bottled Water Company face with such a project and create a risk list. If necessary, you will also need to create an assumption list.

2. Identify any additional information missing from the scenario that would enable you to create a more in-depth risk list for the project.

Suggested Answers:

1. It is hoped that the students will create a risk list and an assumption list. An acceptable number of actual accurate risks listed would be five. Five or more would indicate that the team understands what is required of them. Less than five and it is recommended that you question the team as to why they have identified so few risks, especially as an assumption list allows students to think more laterally.

   Example risks include: Lack of technical expertise, budget constraints, management not having realistic expectations, the company not fully understanding what they require from the project, unrealistic time scales, and necessity of project.

2. There is an amount of information missing that would enable the students to create a more detailed risk list. Student suggestions could include: Detail on clients, company location, client locations, order details, product details, staffing, budget, skill base, software approach (bespoke/off the shelf).

7.6   Private Study

The time allocation for private study in this topic is expected to be 7.5 hours.

Lecturers' Notes:

Students have copies of the private study exercises in the Student Guide. Answers are not provided in their guide. They should work on these exercises individually. Students are also expected to use some of their private study time to revise the content of the topic and ensure they have sufficient understanding to meet the learning outcomes.

Private study exercises follow on from the seminar exercise based on the case study scenario.
The aim is for the students to gain a thorough understanding and practical ability of identifying risks. The risk and assumption lists produced during the seminar and private study sessions will form the basis of the tutorial work, so students will need to complete these exercises prior to the Topic 1 tutorial.

As stated in the lecture(s) it is virtually impossible to identify all risks associated with any project and as such the suggested answers given are merely a guide.

Exercise 1:

Using the case study scenario for the Bottled Water Company and the risk and assumption lists created during the seminar for this topic, create a new risk and assumption list based on the Bottled Water Company hiring an external software development company to deliver the project:

Suggested Answer:

It is hoped that the students will think 'outside the box' and consider risks such as: the software development company not being local to the Bottled Water Company, so risks such as communication, availability for meetings and miscommunication of requirements are identified.

Other risks the students may identify are budget constraints, unrealistic client expectation, timescales and cost.

Exercise 2

Using the same case study scenario for the Bottled Water Company, which was introduced during the seminar and Exercise 1 of your private study, create a new risk and assumption list based on the Bottled Water Company buying an off-the-shelf software package to fulfil their project requirements.

Suggested Answer:

There should be risks that were identified for the seminar activity and exercise 1 that are also listed as risks for this exercise.

Additional risks the students may identify include: The company's expertise in adapting an off the shelf package to fit their requirements, and if the package does fit project requirements, the time/cost of adapting the package.

Exercise 3

Revisit all three risk and assumption lists. Recheck the lists for additional risks that may now be identifiable. These may be new risks not previously identified, or may be risks already on the lists that now require further breakdown to be measurable. Additionally, there may now be identifiable secondary risks that can be added to the lists.

Update the three risk lists, so that each list is as complete as possible.

Suggested Answer:

If undertaken correctly, any risk list will have risks that require breaking down into more manageable and measurable sizes.

Examples of such risks include:

Risk	Breakdown of identified risk into more manageable state
Staffing	Contract staff
	Company short staffed
	Inexperienced staff
	Staff morale
Budget Constraints	Projected budget insufficient
	Client unwilling to pay software development company until completion
	Lack of funds

Examples of secondary risks include:

Risk	Secondary Risk
Lack of experienced project staff	Hiring of contract staff
Hiring of Contract staff	Differing working contracts to company employees
Differing working contracts	Friction between project staff

Exercise 4

Read any chapter on risk management from an available project management textbook(s).

As explained in the lecture(s), each 'expert', and by extension textbook, will have differing ideas and content, so this task will enable you to build a broader understanding of the topic of IT Risk Management.

7.7   Tutorial Notes

The time allowance for tutorials in this topic is 2 hours.

Lecturers' Notes:

Students have copies of the tutorial activities in the Student Guide. Answers are not provided in their guide.

Begin the tutorial with a review of the work students' have undertaken during private study time. Chair a discussion (maximum 45 minutes) on the students' experiences in the format of a project team meeting. If possible, the room should be reorganised so that no student has their back to another as would be the situation in a 'real world' project meeting. As 'Chair of the Meeting', you can invite feedback from students and aim to create an environment where all feel free to share their experiences.

The tutorial exercise follows on from the private study exercises based on the case study scenario. Students should work in small groups to complete this. This exercise, if undertaken correctly by the students, is expected to take the remainder of the tutorial session following the review of the private study work. However, if groups finish early, they can continue on to the other two risk lists that they generated during private study, repeating the process of discussion and decision. You will need to monitor the activity carefully and encourage the students to form their own opinions (reminding them that there is no right or wrong answer).

Exercise 1

You are going to review the work you carried out during your private study time. Your tutor will chair the discussion.

Exercise 2

Work in a small group.

Working with the first risk and assumption lists (based on in-house development) generated during the seminar, create a risk assessment map table (refer to lecture notes for example).

- Use 4 table columns: Risk identity number, risk name, likelihood of occurrence (%) and potential impact (%).
- Work through the seminar risk list, discussing each identified risk and agreeing on figures for occurrence and impact columns.

Suggested Answer:

Answers will vary for this exercise but students should be able to demonstrate sound reasoning behind the figures suggested. The emphasis of this exercise is for students to understand and practically apply the process of risk assessment estimation, rather than what actual figures they arrive at.

Topic 8: Applying, Evaluating and Managing Risk Analysis

8.1 Learning Objectives

This topic provides an overview of Analysis, Evaluation and Management of Risk.

On completion of the topic, students will be able to:

- Name and discuss international standards for risk management;
- Name and discuss institutes concerned with risk management;
- Analyse, evaluate, conclude and report findings on IT case study scenarios.

8.2 Pedagogic Approach

The purpose of the lecture is to impart information to the students. Where possible, you are encouraged to share your own knowledge.

Students will then continue the practise and development of skills introduced during Topic 7 during the following seminar, private study and tutorial sessions. Private study requires individual work, and tutorials will be a combination of group and individual work.

8.3 Timings

Lectures: 1 hour

Seminars: 2 hours

Private Study: 7.5 hours

Tutorials: 2 hours

8.4   Lecture Notes

The following is an outline of the material to be covered during the lecture time. Please also refer to the slides.

The structure of this topics lecture is as follows:

- International standards for risk management
- ISO 3100
- Risk management standard
- International institutes for risk management
- Institute of risk management (IRM)
- Chartered institute for IT (BCS)
- Project management institute (PMI)

8.4.1   Guidance on the Use of the Slides

Slide 2:   This slide introduces the topic's three key areas; first, the continuation of practical skills development that began in Topic 7, which will take place throughout this topic's seminar, private study and tutorial sessions. You can inform students that the seminar work will continue from the last topic's tutorial work, so they would be advised to complete Topic 7 work, before attending the Topic 8 seminar. Secondly, this topic will introduce the students to international risk management standards that they may encounter in industry. Finally, students will be introduced to some of many risk management institutes and special interest groups.

Slide 3:   A list of learning outcomes for Topic 8. Emphasise that Topic 8 focuses on the development of skills associated with risk analysis and management as a whole. In addition, international standards and institutes are considered to enable students to gain a more rounded understanding of risk management.

Slide 4:   This slide introduces three risk management international standards. If students want to, they can research COSO2 in their own time. This lecture will look at ISO 31000 and Risk Management Standard as examples. A European risk management benchmarking survey for 2010 undertaken by the Federation of European Risk Managment Associations (FERMA), recognised that of the companies they surveyed, there is no leading risk management framework standard and many companies (47%) do not refer to any standard, but of those that do, 13% follow ISO 31000, 23% follow Risk Management Standard and 30% follow COSO2. This survey is available at http://www.ferma.eu/Portals/2/documents/benchmarking-survey/ferma-european-risk-management-benchmarking-survey-2010.pdf

ISO 31000 and the Risk Management Standard have been chosen as examples due to ISO 31000 being launched recently in 2009. The Risk Management Standard, although published in 2002, was reassessed after the publication of ISO 31000.

Slide 5-8:   Introduce ISO 31000 as a risk management standard.

ISO 31000 is a generic standard to risk management and these slides cover the basics. You can reassure students that they do not have to know everything about the standard – it is enough, at this level, to be aware of its existance and be aware

that it can be very useful as it is a set of frameworks, in checklist format, that enable a risk manager to double check that they have covered risk management as thoroughly as possible. As checklists, these can be adapted to fit each individual industry and project and if not required, omitted all together.

A key aim of ISO 31000 is to enable all organisations, regardless of their size, the opportunity to take risk and risk management seriously through aiming to attain the benchmark that ISO 31000 sets down.

Slide 9:   This slide gives three examples of checklists available through ISO 31000. There is one example from each of the three frameworks – developing, implementing and monitoring. Further examples can be found on the website that is listed at the bottom of the slide - riskmanagementtemplates.com

Slide 10-13:   These slides provide an overview of Risk Management Standard, the second of the risk management standards being covered. Reviewed after the publication of ISO 31000, Risk Management Standard was re-worked and re-published as 'A structured approach to Enterprise Risk Management (ERM) and the requirements of ISO 31000'. This new publication took into account both ISO 31000 and also COSO2, and although changes were made, the three creating bodies: IRM, AIRMIC and ALARM all claim loyalty to Risk Management Standard.

Slide 14:   Just a few of the many risk management institutes and special interest groups (SIG) that exist worldwide are introduced here. Students do not need to memorise this information for the purpose of the assessment. Considering there are not many risk management standards and that those that do exist are not necessarily widely adopted, there are a vast number of risk management institutes. You can encourage your students to research which institutes or SIGs are national / local to them for information purposes only. There is further information on a selected few institutes and groups in following slides.

Slide 15-16:   The international federation of risk and insurance management associations (IFRIMA) has been chosen, because rather than being a traditional risk management institute, it has developed itself into being an 'Association of Assocations'. As an umbrella organisation which risk management institutes have the opportunity to join, IFRIMA has placed itself at the forefront of enabling risk management institutes to develop their own codes of conduct/pratice and to develop standards and initiatives in their own countries; it is an overseer. Based in the USA, it meets at least twice a year throughout the world.

Slide 17-18:   The project management institute has been chosen, because it has published its own project management standard of which risk management is recognised as a key component. Named the project management book of knowledge, or PMBOK for short, this standard is in excess of 340 pages in length and gives a whole chapter to risk management.

Slide 19-20:   These slides introduce the BCS, which you should mention is now no longer named the British Computer Society, although it may take many years for individuals and organisations to cease calling it so. It is highlighted here because of its special interest group (SIG) in risk management, which has been in existance since 1965. This indicates that awareness of risk and the management of it has been around for many decades. Thus, it is appropriate for industries, organisations and individuals to recognise this fact and start taking risk seriously.

Slide 21:   References

Slide 22:   Ask the students if they have any questions. Remind them that if they come across information that they are unsure about, they will have an opportunity to ask about it during the tutorial and seminar sessions.

8.5   Seminar Notes

The time allocation for the seminars for this topic is 2 hours.

Lecturers' Notes:

Students have copies of the seminar activities in the Student Guide. Answers are not given in their guide.

Seminar work should be undertaken in groups (project teams) or as a minimum, pairs. Through teamwork, it is hoped that the students will develop a greater understanding of the topic content and identify factors that as an individual they may not have necessarily considered.

Throughout the activities, you should move between the groups checking their progress. If necessary, encourage the students to revisit the Topic 7 materials to assist them. You are also encouraged to share your own understanding and/or experiences with the students during the feedback sessions for each activity.

Accuracy is key to Activity 1 below. Monitor the teams carefully as they progress through the activity, reminding them of the need for accuracy and if necessary, prompting them to re-plot their risks.

Activity 1:

You will work in a project team throughout the seminar activities (these can be the same small groups as in Topic 7 or different).

In Topic 7, IT Risk Management, you generated a risk assessment map table for the Bottled Water Company, based on the in-house development case study scenario. Using this risk assessment map table, draw a risk assessment map and plot the risks from the table onto the map.

Remember to be as accurate as possible when plotting the risks.
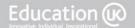
Suggested Answer:

There is no right or wrong answer to this exercise; the teams will plot their risks based on their estimations, which they will have made depending on their assumptions and understanding. Encourage students to justify their answers by questioning each group about where their assumptions and decision-making process. This will encourage the teams to continually assess the decisions they are making.

Activity 2:

Using the existing risk list, risk table and the newly created risk assessment map, generate a new risk table, ranking the risks in order of priority. Your highest priority risk is risk rank 1.

Suggested layout for the new risk table:

Risk Rank	Risk Identity Number	Risk Name	Occurrence %	Impact %

Suggested Answer:

Risks will be ranked from 1 downwards, based on where on the risk map they appear. It is expected that teams will have ranked risks that appear in the top left sector of the map as most important and that these risks will appear first on the new risk list. All risks must be listed, although the order in which they appear is at the team's discretion. Some of the stronger teams may consider urgency as a factor – this is not reflected in the map plotting, but which would have an effect on the ranking of risks; this is more detailed level of analysis which can be encouraged but is not essential at this stage.

Activity 3:

In order of the risk priority generated during Activity 2, list potential risk responses for each risk.

After generating a list, check that your potential responses fulfil the following requirements:

- Must be realistic

- Must be accurate

- Must be achievable

Eliminate any potential responses that do not fulfil the three requirements. You are aiming to have at least two potential responses for each risk.

Suggested Answer:

The aim of this activity is for the teams to generate more than one potential response for each risk. It is expected that teams will generate some common responses, but that they will also come up with some very individual answers. Provided that the responses fulfil the three requirements, they are acceptable.

Activity 4:

As a project team, agree which of the potential responses listed in Activity 3 will be adopted as the risk response for each of the risks listed in the risk list.

There must be clear evidence recorded as to the reasons behind your team decisions.

Suggested Answer:

Provided the teams provide clear evidence that the proposed risk responses fulfil the three requirements from Activity 3, then this activity is deemed a success. The purpose of this exercise is for the teams to agree on the most favourable responses and be able to provide sound reasoning to back up their decisions.

8.6   Private Study

The time allocation for private study in this topic is expected to be 7.5 hours.

Lecturers' Notes:

Students have copies of the private study exercises in the Student Guide. Answers are not provided in their guide.

Private study exercises follow on from the seminar exercises based on the case study scenario from Topic 7. The material generated in the seminar session(s) forms the basis of the private study exercises.

The aim of the private study exercises is for the students to continue to build their understanding and practical skill base within risk analysis. The work produced during the seminar and private study sessions will form the basis of the tutorial work.

As risk analysis and management is subjective, there are no correct or incorrect answers to the exercises, the emphasis should always be on the students' learning and understanding of the processes involved.

Exercise 1:

Based on the risk list and table created in Topic 7, and the risk assessment map and risk response list generated in this topic's seminar, create a risk database for this in-house option of the proposed project.

This database can be written on paper; you are not required to create a computerised database. You can use your Topic 7 lecture notes for reference.

Suggested Answer:

Students should refer to Topic 7 Lecture Slides 43-45 for direction on risk database content.

Exercise 2:

Generate and plot a risk assessment map (and associated tables if not already created during Topic 7) for the Bottled Water Company, based on these additional two options available to the project:

- Hiring of an external software development company
- Purchasing an 'off the shelf' software package

Suggested Answer:

Once again, there is no right or wrong results to this exercise, emphasis should be placed on the process

This exercise is to reinforce the skills and understanding that the students began developing in Topic 7. They will use the risk lists and tables that they have generated in Topic 7 and continue the analysis process. You can remind them to plot the risks with accuracy on the maps. The greater the accuracy the more useful the map becomes.

Exercise 3:

Using the two risk assessment maps generated in Exercise 2, create two new risk ranking assessment map tables. The order of your risk rank will be dependent on where each individual risk appears on your risk map.

Rank each risk in order of priority, the highest priority risk being given the ranking 1.

Suggested layout for new risk tables:

Risk Rank	Risk Identity Number	Risk Name	Occurrence %	Impact %

Suggested Answer:

Students should rank the risks based on where on the risk map they sit. A risk that sits in the top left sector should be of highest priority. Where there is more than one risk in the top left sector, you can encourage students to revisit the risk map tables if necessary to aid their decisions. However, if risks have been plotted accurately, students should be able to identify which order the risks should appear on the ranking. The students may or may not incorporate urgency into their ranking of the risks (at this stage it is not necessary for students to consider urgency) – urgency is not incorporated into the risk map plotting, but would have an affect on the rankings if considered. Students who do incorporate urgency into their rankings are showing a more detailed understanding of risk analysis.

Exercise 4:

Identify and record potential risk responses for each risk listed in the two new risk tables based on the priority of the risks. Remember the three requirements a risk response must fulfil – realistic, accurate and achievable.

Suggested Answer:

Students are aiming to identify as many responses as possible for this exercise. If they are unsure whether a response fulfils the three requirements, they should record it as a potential response. They will have the opportunity to finalise their decisions in the following exercise.

Exercise 5:

For all risks in both risk map tables, finalise which risk response is to be adopted.

Suggested Answer:

The finalised risk responses must fulfil the three requirements of being realistic, accurate and achievable. If a potential response does not obviously fulfil the requirements, students will need to spend some time looking in more detail.

On completion of this exercise, there will be one risk response for each risk that is listed in the risk table.

Exercise 6:

Generate a risk database for both the external software development company option and for the 'off the shelf' option. Your risk database can be in written paper form; you are not required to create a computerised database.

Suggested Answer:

Two risk databases will be created for the two options, and as in Exercise 1, this can be paper written. You can encourage the students to be as professional as possible in filling in their databases.

8.7 Tutorial Notes

The time allowance for tutorials in this topic is 2 hours.

Lecturers' Notes:

Students have copies of the tutorial activities in the Student Guide. Answers are not provided in their guide.

To complete the tutorial exercises, students must have previously completed all seminar and private study exercises. Exercise 4 is a short, time constrained exercise (suggested time - 10 minutes). Run a short class feedback session with this exercise, where students can comment on their experience.

Exercise 1:   Review of Private Study Exercises

This is an opportunity to ask any questions that have arisen during the private study session. Your lecturer will also ask for feedback on your findings.

Exercise 2:

Reunite with your seminar group and using your seminar (group) and private study (individual) findings, discuss and evaluate all the information that has been generated for the Bottled Water Company, based on the three available scenarios. After discussion and evaluation is complete, answer the following question:

- Choosing from the three available scenarios: in-house, external or 'off the shelf' development of the project, which approach do you recommend that the company adopts and why?

Your answer must be backed up by sound reasoning.

Suggested Answer:

There is no right or wrong answer provided that the students are able to backup their decision with sound reasoning based on their findings from the risk list through the processes, to the risk database. You are looking for their ability to form reasoned decisions.

Exercise 3:

Nominate a spokesperson from your group (Risk Manager) to present to the class your team recommendation of which approach - in-house, external or 'off the shelf' - the Bottled Water Company should adopt. This is a short presentation and should include your recommendation and the reasons for that recommendation.

Note: You are not required to produce any visual aids or write a presentation script, you are required to very simply present your recommendation and reasoning.

Suggested Answer:

Dependent on the number of groups in class, recommended presentation time is 5 to 10 minutes. There is no right or wrong answer as to which approach should be adopted but rather students should demonstrate that there is valid reasoning behind their decision. This series of exercises is designed to enable the students to develop their practical skills and understanding of the processes involved.

Exercise 4:

As an individual, evaluate your performance as a Risk Manager having completed your responsibility for this project. The following questions require answers:

- What have you learnt?
- What would you do differently next time?
- Is there any work you want to go back to and alter? Why?
- How did your team (group) perform throughout the process?
- Is there any member of your group that you could see being a Risk Manager in the future? Why?
- Would you consider becoming a Risk Manager?

Topic 9: IT Service Management (ITSM)

9.1 Learning Objectives

This topic provides an overview of IT service management within the IT industry

On completion of the topic, students will be able to:

- Explain what IT service management is and its place within the IT industry;
- Discuss in-house and outsourcing ITSM;
- Identify key documentation associated with ITSM;
- Name and discuss ITSM institutes.

9.2 Pedagogic Approach

Information will be transmitted to the students during the lectures. Where possible, you are encouraged to share your own knowledge and observations on ITSM. Students will then practise the skills during the tutorial and seminar sessions.

9.3 Timings

Lectures: 2 hours

Seminars: 1 hour

Private Study: 7.5 hours

Tutorials: 2 hours

9.4   Lecture Notes

The following is an outline of the material to be covered during the lecture time. Please also refer to the slides.

The structure of this topic is as follows:

- What is Service Management
- IT Service Management
- In-house ITSM
- ITSM Outsourcing
- ITSM Provider
- Service Management Policy
- Service Level Specifications
- Service Level Agreements
- Web Service Level Agreements
- ITSM Metrics
- ITSM Institutes

9.4.1   Guidance on the Use of the Slides

Slides 2-3:   These slides present the scope, coverage and learning outcomes of the lecture.

Slide 4:   This slide introduces the idea of service management in general, in order to get students thinking about what generic service management is, rather than simply starting with it in an IT context.

Slides 5-6:   ITSM is customer focused (at least it should be) and as such overlaps with organisations' business service management approaches. Traditionally IT service providers have concentrated on their technical abilities with little focus on the client. ITSM is different, providing IT services from the perspective of the client and their business needs.

                  Within the IT industry ITSM is often interchanged with the acronim ITIL (Information Technology International Library), which you may remind students, will be discussed in Topic 10.

                  ITSM is focused on aligning the strategic needs of the organisation with the delivery of IT services. An underlying belief within ITSM is that it should always be a continuous process based on the collection and interpretation of relevant measurements.

                  ITSM is often combined with PRINCE2 methodology, when including ITSM in a project lifecycle.

Slide 7:   ITSM does exist within organisations often as informal agreements between departments rather than formal legal contracts. In-house ITSM does require internal IT department expertise, which unfortunately may not be prioritised. This can result in a lack of resources (both time and people).

Slides 8-9:   ITSM outsourcing moves an organisation's responsibility for IT service management to another company. Often this process is undertaken due to a lack of resources or expertise in the original organisation. Outsourcing should not however be seen as a means of removing responsibility for ITSM from an organisation. Responsibility for ITSM should always remain within the organisation and the fact that ITSM is being handled externally often requires more attention by the client than if they delivered it in-house.

Potential benefits of outsourcing include:

- The ability to reduce costs; a specialist IT service management organisation, due to its expertise and the scale of its ITSM provision, is usually able to provide ITSM at a lower cost than a non specialist IT company.

- Organisational refocus; when an organisation outsources its ITSM provision it frees up resources to be allocated elsewhere. By doing so it is able to focus with more intensity on its key strategic growth areas.

- Upgrading service; outsourcing to an ITSM provider can result in offering clients a better service. By passing ITSM to a specialist provider, the organisation can upgrade the service it is able to offer.

Potential problems of outsourcing include:

- Quality; how do you know that the provider will fulfil your organisation's quality requirements? You dont! By outsourcing you can open your organisation up to unnecessary risk which could impact market share, goodwill and the organisation's strategic long term wellbeing.

- Client perception; an organisation must consider how outsourcing will be perceived by their clients. Within IT it is considered more acceptable to outsource but still each organisation should consider the possible effects of such a move, including the possible undermining of relationships and the dissatisfaction of clients.

- Ownership and offshore outsourcing; if you decide to not only outsource ITSM but offshore outsource (which is where the provider is overseas) greater risks are associated. You may want to elicit some possible risks before providing examples to the group. An offshore (overseas) outsource ITSM provider will be governed by different intellectual property rights, data security laws, time zones and work ethics.

Slide 10:   As an ITSM provider an organisation can offer many advantages to a client, at both strategic and business levels. Strategically, a provider can aid a client in their competitive advantage within the market through identifying possible market opportunities that have previously been unidentified or unproven. In terms of the business advantage, a provider can enable a client organisation to refocus its resources, allowing that client to streamline their business processes. The contract between the client and the provider is visibly demonstrated through the SLA – the service level agreement. Explain that SLAs will be introduced in the coming slides.

Slide 11:   Service Management policy is a formal, strategic approach to acquiring or providing IT service management. It must identify the scope of the service requirement and

identify the management and monitoring approachs chosen to allow for continuous growth in knowledge and service provision.

Within the policy there are two key pieces of documentation, the Service Level Specification (SLS) and the Service Level Agreement (SLA).

Slides 12-13:   Service level specifications (SLS) are documents that define minimum levels of service standards required by a client and form part of a contract between a client and the service supplier.

Often a prerequisite to a Service Level agreement (SLA), the service level specification should where possible include detail on quality requirements, performance targets, department standards and any external legal requirements (e.g. ISO 20000 conformance, health & safety).

A service level specification is not a fixed (forever) service agreement. It should in fact be reviewed on a regular basis and allowed to be reworked as and when either the client or the service provider's requirements alter. This is an essential component of SLSs because with experience comes knowledge and the ability to adapt an SLS to gain greater value is imperative.

When altering an existing SLS both the client and provider should be involved.

Slides 14-17:   Service level agreements (SLAs) are part of a service contract that stipulates specified service level requirements between clients and IT service providers. Clients will always have expectations and it is the service provider's role to agree suitable, realistic targets from these requirements.

Terminating a service provider's contract should always be written into an agreement, including the conditions under which it can take place and the process that will be followed should such action be deemed necessary.

The content of an SLA is open to negotiation but would usually include:

- Service provider's name and client's name

- Roles and responsibilities

- Service Scope

- Targets: performance, quality and time

- Agreed payment amounts and conditions of payment

- Required resources and who is providing them

- Communication process: method of communication, timing(s) and content

- Agreed processes for changes and termination of agreement

- Frequency and scope of Reviews (baseline and performance)

Slide 18:   This slide presents a diagram of the SLA process.

Slide 19:   WSLAs tackle Service Level Agreement issues within web service based organisations. Generated by IBM a WSLA seeks to provide clear, consise, monitorable specifications, generic templates for SLA content and a monitoring framework, to enable organisations and service providers to proceed with measurable and supervisory activities.

WSLAs, according to IBM, aim 'to provide proactive management of a service environment.

Slide 20:   What is a metric? You may wish to ask students for a concise definition and then to provide one or two general, non IT examples. You could define a metric to the students as a quantitative measure of an attribute of any system or a quantitative measure derived by combining measures of a number of attributes of any system.

Run through some more non IT metrics (in addition to the ones the students may already have contributed), such as degrees centigrage, the FTSE 100 index in the UK, a person's age, speed (kph or mph), distance (kilometres or miles) etc. You may now want to ask students to think of some IT metrics. Answers could include the average number of days taken to write SQL script, average error rates, average number of coders required to generate 1000 lines of visual basic. FP (Function Points), which are a measure of the size of a IT system derived from a number of attributes of a systems design such as number of files, inputs, outputs and complexity. This slide introduces and outlines two ITSM metrics, CSFs and KPIs.

Slide 21:   Critical success factors are employed by organisations as a means of identifying key factors necessary for the organisation to achieve its goals (objectives). CSF can be both essential to an organisation's current activities and/or its future achievements.
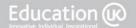
Slides 22-24:   Key performance indicators are measurements of performance. KPI are used to measure the success of critical success factors. Many hundreds if not thousands of KPIs exist throughout all industries and there are many relevant to the IT industry. Within ITSM many KPIs are recognised and new ones can be identified regularly.

The ability to identify relevant and value adding KPIs is a skill which all organisations should invest time and effort in developing. To enable organisations to identify KPIs a management framework can be applied, for which the Balanced Scorecard is one such approach.

Key performance indicators are often catagorised as: Quantitive, Practical, Direction, Action and Financial.

- Quantitive: KPIs represented as a number

- Practical: KPIs that align with current organisation processes

- Direction: measure organisational progress

- Action: controlled by organisation so change is achievable

- Financial: performance measurements

It is important to remember that for a key performance indicator to be useful it must be understandable, meaningful and measureable. The linking of KPI to targets and

the timescales involved with KPI should be mentioned, before going through the examples. From a project management prospective, setting KPI's for a project at the outset enables success to be demonstrated on delivery when the KPI's are achieved. Again you may wish to elicit students' own examples before showing the slide.

Issues associated with implementing key performance indicators usually center around resourcing. Resourcing the implementation and review of KPIs can be both expensive and labour intensive.

Slide 25:   This slide presents several options available to an organisation for reporting metrics findings. Dashboards are web style pages that, by entering raw data, will collate into a graphical representation. Dashboards can often provide a very visual representation of data greatly reducing the time needed for analysis and interpretation. This is because organisations can turn this data into valuable information by applying organisation wide knowledge.

Scorecards are strategic planning and management techniques to align business activity with organisational strategy. They take the strategic, non-financial performance measures and combine these with financial metrics, to enable organisations to gain a rounded perspective of overall performance.

Process control mapping is a tool used to monitor both performance levels and provide quality control. By providing immediate statistical data bottlenecks and problem areas can be identified. By providing longer term trend data general patterns of quality control such as level of customer complaints or volume of returned goods can be monitored and traced back to the problem area.

Metric trends mapping allows an organisation to identify efficiency and effectiveness opportunities within their ITSM profile.

Casual mapping provides a tool to review and overview how different aspects of the organisation fit together. Usually, a series of maps are produced focusing on identifying central issues and their connections with other peripheral issues within the 'global' organisation.

Slides 26-27:   Many international and national institutes exist within the ITSM environment. The itSMF was the first to launch an organisation certification scheme in 2003, under the BS15000 umbrella.

The Institute of IT Service Management (ISM) is one of two founder members (the other being itSMF) of the international credit programme for ITSM, named priSM.

Slides 28-29:   Aimed at ITSM professionals, priSM (professional recognition for IT Service Management) hopes to provide an offical body of knowledge for ITSM (similar to that of PMBOK for project management) and a framework for career advancement.

Individuals will be required to agree to the priSM code of conduct/ethics and will have available to them a best practice approach, which together aim to create a professional standard within ITSM professionals.

From the organisation standpoint priSM aims to deliver a professional level of competence that companies can utilise when hiring staff and developing industry growth through expertise.

Slides 30-31:   References

Slide 32:   Ask the students if they have any questions. Remind them that if they come across
                  information that they are unsure about, they will have an opportunity to ask about it
                  during the tutorial and seminar sessions.

Lecturers' Notes:

Students need to have completed Private Study Exercise 1 before attempting Seminar Activity 2.
You should ensure that students are aware of this at this stage.

9.5 Seminar Notes

The time allocation for the seminars for this topic is 1 hour.

Lecturers' Notes:

Students have copies of the seminar activities in the Student Guide. Answers are not given in their guide.

For Activity 1, the ideal group size is four. However, dependent on class size readjust this figure to give you at least two groups. Ask each group to nominate a team spokesperson to share their definition. Give groups a maximum of 15 minutes to generate their definitions.

For Activity 2, students should have completed the Private Study Exercise 1 research and be able to provide good examples and justification for their comments. Try to encourage debate with your own 'reflections' and anecdotes from ITSM and encourage students to comment on the mechanisms (dispute resolution, for example) that may be negotiated into an outsourcing deal.

Activity 1:

As a group write a definition for IT service management based on your knowledge to date. Share your definition with the class.

Suggested Answer:

"The implementation and management of quality IT services that meet the needs of the business."

(http://www.itil.org/en/glossar/glossarkomplett.php?filter=I)

The above definition can be shared with the class on completion of this activity. You could ask them if they prefer the ITIL definition, or their own.

Activity 2:

Non-strategic systems development is increasingly outsourced to reduce the IS costs of IT projects. Any project or sub-project which is outsourced must have very clearly stated requirements, scope, and source of expected benefits, costs and metrics for measuring performance. There will always be additional contract, vendor selection and knowledge transfer costs incurred.

Based on your research from Private Study Exercise 1, prepare for a class discussion and debate on the following:

- Outsourcing is becoming increasingly lower risk because of the professionalism of providers in developing countries and it will continue to expand in the medium term.

Suggested Answer:

Students would be expected to relay the information they have gathered in their research (private study) for this discussion. Some students may want to discuss the importance of having good dispute resolution mechanisms and you may inform then that this will be looked at further in Topic 10.

9.6   Private Study

The time allocation for private study in this topic is expected to be 7.5 hours.

Lecturers' Notes:

Students have copies of the private study exercises in the Student Guide. Answers are not provided in their guide.

Exercise 1:

In your seminar you are going to participate in a discussion on outsourcing. You should research the following:

- One of India's largest outsourcing firms is WIPRO. Details of the services they can provide can be found at their website, www.wipro.com.
- Explore this website to gain an understanding of the services this organisation can offer.
- Click on INVESTOR on the top of the home page and from the next screen select OPERATIONAL METRICS. This will give insight to both the use of performance metrics and the business operating performance.

CIO magazine regularly reviews the outsourcing industry sector and many articles predict that cloud computing will mean the end of traditional outsourcing, or at the very least significantly change its nature and character.

Explore these ideas. The following article may assist you:

- Overby, S. (2010). The End of IT Outsourcing. *CIO Magazine*. [Available Online] http://www.cio.com/article/603075/The_End_of_IT_Outsourcing_As_We_Know_It

Exercise 2:

Identify and compare the advantages and disadvantages of an IT organisation developing:

- an in-house IT service management approach;
- an outsourcing ITSM approach.

Document your findings. You should write a minimum of 150 words and be prepared to present your findings in the tutorial.

Suggested Answer:

It is expected that the students will refer to the lecture material. However it is hoped that they will also identify additional advantages and disadvantages of their own.

In-house advantages include in-house resourcing, the ability to align ITSM with strategic business requirements, potential reduced time taken to develop due to not needing to source potential service providers and negotiate contract terms, knowing that any legislation that must be adhered to will be and consistent client service.

In-house disadvantages should include having to resource ITSM (especially if the organisation is already stretched), a lack of sufficient expertise and potentially reduced service to clients.

Outsourced ITSM service advantages would certainly include expertise, and should mention the higher quality of service, reduced risk of using incorrect KPIs and reduced resource costs.

Outsourced disadvantages that may be the lack of service provider understanding, a breakdown of the client relationship due to various different issues, service provider location, contract negotiation, ownership of data and quality issues.

Exercise 3:

Under what circumstances, if any, would you recommend an IT organisation choose overseas outsourcing for their ITSM?

Record all of your reasoning (making notes) so that you can present your answer (i.e. your 'circumstances') to the rest of your class during the tutorial.

Suggested Answer:

The key circumstances where an organisation would look at overseas outsourcing include the cost advantage; if the budget is tight, sourcing overseas can be the only way an organisation can provide ITSM (not taking into account ethics over salary and working conditions in some countries).

Client location may also influence this decision. If the organisation's client base is also overseas it can make sense, from a cultural prospective, to also outsource ITSM.

Exercise 4:

Is priSM a viable professional industry standard for ITSM professionals?

Do you believe priSM will attain international credibility within the IT industry? Why?

Include in your responce the views about priSM which you have discovered through researching these questions (remember to reference this correctly) and which have influenced your own answers.

Suggested Answer:

Based on information available priSM appears promising as an ITSM professional accreditation. However its launch in 2011 means it is too early to tell if it will reach international recognition. The students can answer either yes or no to this question provided they demonstrate sound reasoning.

It is expected that the students will have researched priSM and have more detail and references by the end of this excercise than that contained in the lecture material.

Exercise 5:

Using the resources available from your centre's library, read any chapter on IT service management from an available textbook, or research ITSM online to build your knowledge base.

9.7 Tutorial Notes

The time allowance for tutorials in this topic is 2 hours.

Lecturers' Notes:

Students have copies of the tutorial activities in the Student Guide. Answers are not provided in their guide.

For Exercise 1, dependant on class size, ask as many students as possible to share their findings. In order for Exercise 3 to work effectively, you should establish whether there is a split in opinion before starting the activity. If there is no difference of opinion it may be necessary to conduct a more simple feedback session on Private Study Exercice 3, or to nominate some more confident students to take the opposite view, for the purpose of the running the exercise.

Exercise 1:

You are required to report your findings from Private Study Exercise 2 to the class:

Note any additional advantages and disadvantages identified by other students and the lecturer:

In-house ITSM

Advantages	Disadvantages

Outsourced ITSM

Advantages	Disadvantages

Suggested Answer:

Students should have a complete table of the pros and cons of in-house ITSM by the end of this activity.

Exercise 2:

Share your answer to Private Study Exercise 3 with the rest of the class.

Exercise 3:

Form two debate teams; one team for those of you **believe** that priSM will become an internationally adopted industry standard (Private Study Exercise 4) and one team for those of you who **do not**.

Each team will take turns debating your findings and arguments.

Topic 10: Analysing and Applying IT Service Management

10.1 Learning Objectives

This topic provides an overview of IT service management standard and frameworks. On completion of the topic, students will be able to:

- Identify and describe International ITSM standard;
- Identify and describe ITSM frameworks;
- Have developed practical ITSM skills.

10.2 Pedagogic Approach

Information will be transmitted to the students during the lectures. They will then practise the skills during the tutorial and seminar sessions.

10.3 Timings

Lectures: 1 hour

Seminars: 2 hours

Private Study: 7.5 hours

Tutorials: 2 hours

10.4 Lecture Notes

The following is an outline of the material to be covered during the lecture time. Please also refer to the slides.

The structure of this topic is as follows:

- ITSM Standard & Frameworks
- ISO 20000
- ITIL
- COBIT
- ITSM 2.0

10.4.1 Guidance on the Use of the Slides

Slides 2-3:   These slides present the scope, coverage and learning outcomes for this lecture.

Slide 4:   This slide introduces students to ITSM international standard ISO 20000 and ITSM recognised frameworks, namely ITIL, COBIT and ITSM 2.0.

Slide 5-7:   ISO 20000 is an internationaly adopted IT standard, enabling organisations to be accredited for industry standard and best practise in IT service management. ISO 20000 allows companies to adopt proven benchmarks and show evidence of accredited service. More and more potential clients look for ISO 20000 as a means of differentiating between potential suppliers.

Jointly produced by the ISO and the International Electrotechnical Commission (IEC), the certification and qualification scheme is now owned and operated by APMG International, a global examination institute that includes ITIL and PRINCE2 in its portfolio.

ISO 20000 follows in the wake of other ISO standards, including ISO 90001, with its same process driven approach.

At first glance ISO 20000 may look overly general but there are specific guidelines that bring the broadness of the standard into context. In the small print it specifies that 'management control' must be achieved, 'management control' being definition, knowledge, measurement and review of service.

The BCS Chartered Institute of IT, within its Information Systems Examination Board (ISEB) - which is an internationally recognised examination body - offers three levels of individual certification in ISO 20000. Aimed at ITIL qualified or industry experienced individuals it offers IT professionals the opportunity to be qualified in the industry standard.

The opportunity for an organisation to be both certified in the industry standard and have employee certified individuals, does give optimism to the future of IT Service management within the IT industry.

Another objective of ISO 20000 is to provide clients and suppliers with common ITSM language and terminology, reducing miscommunication and allowing for greater efficiency throughout the relationship lifetime.

Slide 8:   ISO 20000 also encompasses the Plan-Do-Check-Act (PDCA) cycle that is implemented in other ISO standards.

The PDCA cycle is an operating principle of ISO, also known as the Deming cycle (after W. Edwards Deming) or the Shewhart cycle (after Walter Shewhart). The two were said to be friends. The cycle follows the following principles:

- Plan objectives & set organisational targets then develop a planned approach to achieving said targets.

- Implement planned approach.

- Measure results against appropriate metrics

- Adjust and improve on initial plans and implementation procedures and action new approach.

A recursive process, PDCA is expected to be repeated over and over, each time employing greater knowledge then the last. As an approach it allows for large gains in understanding and breakthroughs in application and is appropriate to all sizes of organisation.

A very simple approach to improving ITSM provisions, PDCA is easy to grasp. However there is debate over how effective it is.

Slide 9:   In June 2011 a new version of ISO 20000, part 1 was lauched. Part 1 is the IT service management requirements section and is applicable to all initiation, implementation or maintainence of ITSM within an organisation. It is known as the Specification.

Applicable to both internal and external clients, part 1 enables requirements to be officially recognised and the definition of quality standards acceptable to both the supplier and the client.

The overall aim of part 1 is the implementation of an approach and system that provides organisation accountability throughout the whole IT service management lifecycle.

Slide 10:   Recognised as the Code of Practice for ISO 20000, part 2 is a collection of guidance material sourced from industry, and is aimed at improving current ITSM. For any organisation wishing to be audited to gain or retain the ISO 20000, it is vital documentation.

Slide 11-13:   ITIL is an industry established best practise framework based on the premis that IT services must align with business needs. Although version 1 was launched in the 1980s it was not until version 2's launch in 2000 that IT service management was specifically added, having been recognised as a rapid growth area within the IT industry.

ITIL, with the launch of version 2, defined itself as process orientated and with the introduction of guidelines on how to use ITIL it became the international standard framework for IT service management.

In 2007, version 3 of ITIL included the lifecycle approach, ensuring that IT service management was seen as an ongoing iterative process incorporating organisations' business needs. ITIL v3 also introduced Service Strategy (stage 1 of the lifecycle) as a concept within ITSM.

- Service Strategy focuses on business objectives, policies and guidelines, emphasising that IT value lies with the added value it brings to an organisation (rather than the individual IT service); providing detail on design, development, implementation and maintenance of IT service management.

- Service Design concentrates on the best practise approach to the design of IT service management and associated aspects. Service design considers how IT service management interfaces with current business emphasis. Within this phase ITIL introduces Service Design Packages (SDP) which have additional information cover processes, including IT service continuity, supplier management, service level management and risk management.

- Service Transition focuses on the delivery of IT service management

- Service Operation is a best practice approach to providing service management, where the SLAs are envoked and actually delivered. Service operation also encompasses service monitoring and problem identification.

- Continual Service Improvement (CSI) is where the updating of existing provision is made, based on the findings from service operation phase and the changing requirements of the organisation's business requirements. Processes included in CSI are Service Level Management, Measurement and Reporting, and Service Improvement.

ITIL is aligned with IBM's Tivoli Unified Process (ITUP) approach which was developed to provide an integrated service management approach for use with IBM specific products.

As an IT professional ITIL qualifications are available which go some way to providing an industry standard for the employee within ITSM.

Slide 14: This slide can be used to remind students where they can access a complete visual overview of the ITIL lifecycle phases, discussed in the previous slide.

Slide 15: COBIT is a support framework for IT service management and governance and is often implemented alongside ITIL, and more recently ISO 20000. Originally released in 1996 as a joint production between ISACA and IT Governance Institute (ITGI), COBIT provides governance of IT by enabling organisations to define and align their business goals with their IT goals.

A best practise framework, COBIT identifies suitable metrics and maturity models and aligns with ITIL, COSO & PMBOK.

Of those organisations that adopt COBIT within their approach, more and more are realising that investment in qualified personnel is necessary.

Slide 16-17: Launched by Fox IT, the aim of the ITSM 2.0 framework is to change the way current and next generation services are managed. Fox IT is an independent

service management organisation. Most organisations that launch frameworks or standards tend to be institutes.

A combination of best practises and new technology, ITSM 2.0 is attempting to transform IT service delivery and management in the 21st century by embracing cloud infrastructure.

ITSM 2.0 maps to existing frameworks ITIL and COBIT.

Slides 18-19:   References

Slide 20:   Ask the students if they have any questions. Remind them that if they come across information that they are unsure about, they will have an opportunity to ask about it during the tutorial and seminar sessions.

Lecturers' Notes:

Students need to have completed Private Study Exercise 1 before Seminar Activity 4. You should ensure that students are aware of this.

10.5 Seminar Notes

The time allocation for the seminars for this topic is 2 hours.

Lecturers' Notes:

Students have copies of the seminar activities in the Student Guide. Answers are not given in their guide. The seminar activities (and tutorial, private study) intentionally draw on material and ideas from the previous topic(s), in order for students to start to develop more practical skills.

Ideal group size for the seminar activities is four. However, dependent on class size, readjust this figure to give you at least two groups. For Activity 3, depending on class size, allocate 10 to 30 minutes for this feedback session. Students are required to write down any CSFs or KPIs that are mentioned in addition to the ones they have. You may want to feedback student answers onto the board during these activities and also to organise the groups so that the spokesperson for each group is different from the person taking notes in the activities.

Activity 1:

As a group, identify the critical success factors (CSFs, as introduced to you in Topic 9) relevant to a software development organisation which is in the process of negotiating a contract with an outsourcing ITSM service provider.

Suggested Answer:

Critical success factors the students may identify, in addition to the ones provided in the lecture, are:

- Speed of problem resolution
- Improvement of IT and business productivity
- User satisfaction

Activity 2:

In your group make a list of Key Performance Indicators (KPIs) that could be implemented as measurements by the software development organisation and service provider, based on the critical success factors identified in Activity 1.

Suggested Answer:

Students could identify the following KPIs, in addition to those provided in the lecture:

- Customer complaint/satisfaction rate
- Number of incidents
- Incident resolution rate
- Incident reoccurrence rate
- Average time of resolution

Encourage students to remember that KPIs must be measurable.

Activity 3:

You are required to share your findings from Activity 1 and 2 with the class. Nominate a spokesperson from you team.

Suggested Answer:

The aim of this exercise is for all students to begin the private study session with the same base information.

Activity 4:

The outsourcing of IT development or support services often runs into difficulties. Just recently in the UK a major systems development for the Health Service has been abandoned, wasting tax payers money and causing issues for the companies contracted in to provide the new systems. More common are minor disputes which occur as a reflection of changing factors external to the project.

Work in groups to decide how you think disputes between an organisation and a service provider should be handled.

Decide if any mechanisms can be built into the initial contract to help.

Suggested Answer:

The article students read during Private Study Exercise 1 contains a list of suggested solutions, including keeping written records of all disbutes which are seen by both parties and including arbitration clauses in the initial contract to deal with who has responsibility on both sides to address issues.

- Overby, S. (2011). IT Outsourcing: How to Resolve Minor Disputes with Your Provider. CIO Magazine. [Available Online]
  http://www.cio.com/article/686147/IT_Outsourcing_How_to_Resolve_Minor_Disputes_with_Your_Provider

10.6 Private Study

The time allocation for private study in this topic is expected to be 7.5 hours.

> **Lecturers' Notes:**
>
> Students have copies of the private study exercises in the Student Guide. Answers are not provided in their guide.

Exercise 1:

Following on from the research you carried out for your seminar discussion on outsourcing in Topic 9, read at the following articule, which you will need to refer to for Seminar Activity 4:

- Overby, S. (2011). IT Outsourcing: How to Resolve Minor Disputes with Your Provider. CIO Magazine. [Available Online]
  http://www.cio.com/article/686147/IT_Outsourcing_How_to_Resolve_Minor_Disputes_with_Your_Provider

Exercise 2:

Research which metric reporting method (or methods) you would recommend to the client/service provider from Seminar Activity 1, based on the findings from the seminar.

Write a brief summary detailing your choice and reasons, which you should be prepared to discuss at tutorial.

Suggested Answer:

This answer is very much dependant on where students have focused their attentions within the previous activities. If they want a colourful graphical representation, they are likely to recommend dashboards, whereas if they want to incorporate a detailed approach, that considers both financial and non financial value adding, they will recommend balanced scorecards.

Expect the students to include a comparison of the methods named in the lecture as a minimum and encourage them to investigate any additional methods that are available.

Exercise 3:

Your software development organisation wishes to adopt an ITSM standard or framework and your line manager has asked you to research and prepare a report, detailing which approach or combination of approaches you recommend and why? The approaches the organisation is considering are ISO 20000, ITIL and one other framework 'of your choice'.

Include the advantages and disadvantages you have identified through your research. If necessary generate an assumption list that your findings are based on.

Your report (findings and recommendations) should be a minimum of two pages.

Suggested Answer:

There is no right or wrong answer to this exercise. The recommendations made by the students, provided they are based on sound reasoning and clear assumptions, are sufficient. The aim of this exercise is for the students to gain a deeper understanding of the standard and frameworks available to IT based organisations and to draw conclusions based on their findings.

10.7 Tutorial Notes

The time allowance for tutorials in this topic is 2 hours.

Lecturers' Notes:

Students have copies of the tutorial activities in the Student Guide. Answers are not provided in their guide. Students can work in small groups throughout.

Exercise 1:

Share your answers from the private study exercises with the other students in your group.

Suggested Answer:

A short review of the exercises giving the students the opportunity to talk about any problems they had and ask further questions as necessary. You may also wish to collect in their written reports for marking and more formal feedback.

Exercise 2:

Write a Service Level Agreement for the software development organisation from the private study exercises. Based on all your previous seminar, private study and tutorial work from both this topic and Topic 9, the SLA will be between the organisation and an outsource service provider. The software development organisation wants a one year initial contract, with scope to renegotiate when required. You are encouraged to also consult your lecture notes.

Making realistic assumptions where necessary, your SLA will take the form of a written document and the following content is recommended:

- Purpose of SLA
- Objectives of SLA
- Who the contract is between & duration of contract
- Services included
- Delivery of services
- Changes to service
- Delays
- Monitoring of service
- Standards, frameworks, targets & metrics agreed
- Reporting
- Review of service
- Compensation agreement
- Termination agreement

The SLA you produce should be professional in tone, comprehensive and realistic to the IT industry.

Suggested Answer:

Having had suggested titles for content, the SLA the students produce should be detailed and cover multiple pages. Throughout Topic 9 and 10, they have built their understanding and knowledge and should draw on all previous materials when writing.

To generate a realistic SLA they will need to produce an assumption list, which they will map to the SLA content.

An example of what may be produced is provided here, although it is expected that the students' SLAs will have greater detail and may vary from this example, due to their assumptions:

Purpose of SLA

To contractually agree terms of service level agreement between software house and outsourcing provider.

Objectives of SLA

To provide a comprehensive, legally binding contract between client and provider, to which both parties adhere to.

Who the contract is between and duration of the contract

The duration of the contract will be one calendar year from date of signing by both parties.

Services included

IT service collation, measurement and monitoring in line with client's strategic business requirements as at date of signature.

Delivery of services

Services will be on a daily basis with weekly assessment

Changes to service

No changes to the agreed service can take place without prior authorisation and signature from both parties.

Delays

Delays of service or reporting of service will result in compensation to affected party.

Standards, frameworks, targets and metrics agreed

The provider acknowledges that the client is committed to ISO 20000 registration and as such agrees to work within the parameters of said standard.

Reporting

Weekly reporting will be carried out by the provider, on a Friday. Reporting will take the form of a written professional report.

A monthly oral presentation will also be provided by said service provider to the client, at a mutually agreed time.

Review of service

The SLA will be in constant review. However, if changes are required the instigating party must inform the other in writing and an agreed period of time will be allowed for consultation and renegotiation.

Compensation agreement

The client agrees to reimburse all essential expenses associated with the providers work in this capacity. The provider agrees to gain prior approval from the client before incurring said costs. Where prior approval is not agreed the client is within their rights to refuse payment of all non essential expenses.

Termination agreement

The termination of this SLA contract by either party before the end of its one year duration will result in negotiation over termination fees.

Topic 11:   Software Quality Policies and Procedures

11.1 Learning Objectives

This topic provides an overview of software quality, its rationale, policies and procedures. On completion of the topic, students will be able to:

• Understand, define and discuss software quality;
• Identify appropriate software quality measurements /metrics;
• Compare & contrast Software Quality approaches;
• Understand quality procedures.

11.2 Pedagogic Approach

Information will be transmitted to the students during the lectures. They will then practise the skills during the tutorial and seminar sessions.

11.3 Timings

Lectures: 2 hours

Seminars: 1 hour

Private Study: 7.5 hours

Tutorials: 2 hours

11.4 Lecture Notes

The following is an outline of the material to be covered during the lecture time. Please also refer to the slides.

The structure of this topic is as follows:

- Software quality
- Software quality factors
- Measurements/metrics in software quality
- Quality approaches
- Quality through testing
- Software quality plans

11.4.1 Guidance on the Use of the Slides

Slides 2-3:   These slides present the scope, coverage and learning outcomes of the lecture.

Slide 4:   This slide gives students a straightforward definition of software quality. The ISO definition of software quality is more rigorous, "....the degree to which a set of inherent characteristics fulfils requirements" (ISO 9000). The truth is that like a lot of IT related areas software quality definitions vary and one overriding definition is hard to reach.

Due to this variation professionals have sought to define software quality in other ways – Conformance to requirements and fitness for use are the two most common.

Conformance to requirements means that the process and product fulfils written specifications and fitness for use refers to the product (software) being usable as intended.

Slides 5-6:   The quality of particular software can have massive positive or negative effects – even dangerous - for an organisation. What would happen, for example, if hospital radiation equipment was mis-programmed? It is still the case that not all software has formal development requirements that it must adhere to.

For software to be reliable it must fulfil its intended purpose and be measureable (metrics). The problem with it fulfiling its intended purpose is that often it is difficult to predict how software should operate until launched, by which time it can be too late. All changes during development, as well as possibly being positive and necessary, have the potential to reduce the reliability of software when it is finally launched.

Software quality should be considered from both technical and human perspectives. Either perspective in isolation will not provide a thorough understanding of quality. When trying to achieve software quality organisations always have a juggling act to perform. They must always balance positives against negatives. You may want to ask the group what these balances could be, before revealing the three examples on the slide.

Organisations should consider the time taken compared to the detail achieved; how much time should an organisation invest against how much detail, functionality and client satisfaction is achievable.

Another consideration is costs compared to benefits. This is always high on any organisation's list of priorities. Do the potential benefits of reworking a section of code that fails 2 in every 50,000 hits warrant the cost of the rework? Ask the students what they think about this. Would they proceed with this reworking?

Is it worth an organisation pushing for extensive features, especially if unproven or currently unwarranted, at the risk of creating additional faults? Again you may want to elicit the students' views on this.

Overall software quality is achieved through the testing process. Testing is where all the work to date is proven or unproven. Testing in software is essential and should be extensive in terms of both time and financial investment.

Slides 7-8: Quality factors are the result of industry attempting to measure software quality. Having identified that software quality cannot be directly measured it was decided that by breaking down software quality into managable and measurable 'quality factors', measuring could occur. Explain to students that the factors listed on these slides are recognised as quality factors and are all possible to define. Depending on the group and timing, you may want to ask students to expand on or explain each of the factors presented on the slide, before including the following information:

Technical Factors

- Correctness: does the software meet the specification(s)?

- Efficient: is the software efficient in its execution, speed and space allowance?

- Testable: can the software be tested whenever it is required? Overly complex software design can result in an inability to test sufficiently.

- Portable: is the software transferable between hardware and software environments, e.g. will it work on pc, mac and linux?

- Reliable: does the software perform set functions to the required level?

- Reusable: can the software be reused in other applications, either in whole or in part?

- Secure: how effective are the software firewalls, data protection and security methods?

- Connectability: is software exchange available with other systems?

Human Factors

- Useable: how easily can the software be learnt, used and interpreted? How effective is the human computer interface (screen design)?

- Maintainable: can the software be altered, added to or rewritten as required (i.e. maintained)? Is the software system well documented to facilitate this?

- Consistent: in language, presentation, coding and documentation.

Slide 9: Getting industry professionals to agree on software quality factor measurements is as likely as them agreeing on one definition! Industry concensus ranges from regarding quantitive measures as essential to seeing them as of little use, through to prefering qualitive over quantitive measures. As a professional you will form your own opinions; just be prepared to justify them.

Measuring software is highly complex. Multiple software development approaches are employed. Varied objectives are identified and there is no concensus on the value of particular measurement. To review the terms, point out (as a reminder to students) that:

- *Quantitve measurements* provide numerical data, such as percentages and average scores.

- *Qualitative measurements* produce non numerical data, such as feedback comments by employees' on using their new software.

Slide 10: Software measurement falls into two distinct categories, quantitive and qualitative. Quantitive measures are numeric, 'yes or no' based metrics and are used to test software from a technical perspective. Additional examples include COCOMO and Cyclomatic complexity, which you can explain to students are not covered here but may be interesting to research in their own time.

Qualititve metrics are non numeric data collection measures based on data collected. Often giving greater flexibility to the measurement of software quality, they could include the colour choices for screen designs, the usability of software documentation and the interpretation of a quantitive metric, for example program load time.

Adopting a combination of quantitive and qualitative measures will allow an organisation to gather both statistical data and interpretative information.

Slide 11: This slide poses a question which may appear straightforward at first but is given in order to introduce to students the issue of 'weighting' in software quality measurement. Huge impact faults, even if there are few, can have massive effects on an organisation whereas a lot of small issues may have only a relatively small effect. You may want to ask students to provide a few examples of large and small impact faults in order to highlight this point.

Slide 12: Conformance is producing and delivering software that fits requirements and is fit for use. Conformance costs include quality plan development costs and testing costs. Non conformance is the cost of failure of ownership and unfulfilled quality requirements.

- Cost of quality factors (COQ) breaks down into 3 components; prevention, appraisal and failure.

- Prevention includes quality planning, training, quality research and reviews.

- Appraisal cost is evaluation of processes and deliverables via inspection, testing and reporting.

Failure is further broken down into internal costs representing reworking of software before client delivery and external costs which encompass providing ongoing support and fixing client faults on non detected errors prior to client delivery.

To successfully reduce non conformance costs an organisation must embrace conformance at senior management level and invest in the production of software that conforms to client requirements and is within acceptable error parameters. A typical reason for high non conformance costs is senior management driving project teams to launch software that has not fulfilled conformance criteria.

Slide 13:   Maturity models are frameworks that can be followed step by step to assess current approaches to software quality, through the identification of current levels of achievement and the levels required to achieve, and then taking action to improve performance. The process of recording current quality levels can take place in-house (as self assessment) or an independent (external) auditor can be used. Either approach is appropriate but depending on the organisation and the individuals employed, external auditing can often produce a more realalistic picture of the situation.

Slide 14:   There are a number of maturity models available to organisations and like any framwork approach it is for the organisation to decide which fits its requirements best. This can be difficult for an organisation that is new to this approach, which is where external assistance (an external auditor) can be beneficial.

                 Most maturity models break down the process into five levels (although there can be a sixth level, level zero which represents total unawareness!) and the levels are presented to the students on the slide.

                 All organisations aim to work at the level that enables their strategic goals to be met as efficiently as possible. This may occur before level 5.

Slide 15:   The software quality function deployment model (SQFD) provides an approach to design and action of quality into software development that ultimately enables organisations to fulfil client requirements and technical necessities. This often includes a 'house of quality' matrix as a graphical model of data representation. A house of quality matrix enables a graphical comparison of client requirements and expectations with the technical fulfilment.

Slides 16-17:   The Capability Maturity Model Integration (CMMI) replaced the original capability maturity model with the latest CMMI version 1.3 and was launched to market in November 2010. Developed by SEI in the USA, it provides a best practise approach which means organisations are not certified in CMMI but can be audited and rated.

                 CMMI's two version approach includes 'staged' and 'continuous'. The staged approach is similar to the original CMM, with 5 maturity classifications against which the organisation is assessed. The organisation, knowing which classification it falls into, can then work on improving its processes to move through the stages.

                 The continuous approach is a more detailed, complementary version of the staged approach, which provides 4 groups of 24 processes to the organisation. The guidance, goals and practices are incorporated and then measured against the 5 classifications from the staged version. Rather than the whole organisation receiving one classification, with the continuous approach individual processes will be classified, resulting in a collection of maturity levels allowing an organisation to

identify where further work is required and which processes already fulfil the chosen level.

It falls to the individual organisation to choose which version they undertake. However, as assistance to ISO standards, a more detailed indepth approach of continuous is more effective.

Slides 18-19:   TQM (Total Quality Management) is a long established philosophy to the management of long term strategic organisational success, achieved through the fulfilment of client requirements. More recently the United States has prefered to drop the Total (T) part and simply call it 'Quality Management'.

TQM also recognises that quality management requires the commitment of a whole organisation and that preventing faults and errors in the first place is far preferable to inspection after they have occured.

Within TQM many techniques and tools have been created to contribute to the overall philosophy of quality-based organisational management. There is no one approach for an organisation to implement. However, through the introduction and implementation of the many tools and techniques, an organisation can force change in both process and practise.

W. Edwards Deming, an American academic, is recognised as a key contributor to TQM through his work in Japan and the USA. He challenged the mindset that to increase quality meant increasing costs, and he proposed a new approach that resulted in improved quality and productivity, whilst actually reducing organisations' costs. Deming (as introduced to students previously through his Plan-Do-Check-Act model) is also the author of 'Deming's 14 Points', a noted component of TQM. You can explain to students that Deming's 14 points are not given here because they will be part of their private study exercises.

On Slide 19, several examples are given of the techniques and tools available to an organisation adopting the TQM philosophy. You can explain to students that there are many more.

Slide 20:   Pareto is one example of a TQM tool. The principle behind it being the 80:20 rule; that 20% of the processes account for 80% of the problems. Therefore, if the organisation focuses on the 20% that account for the problems (but also hold the solutions), then 80% of the issues are solved. Represented as a bar graph, Pareto can accommodate cumulative impact, to give even wider understanding.

Slide 21:   The cause and effect diagram, the Fishbone diagram, or the Ishikawa diagram (named after Kaoru Ishikawa, who created the tool), enables quality issues to be traced to the cause.

Often used during brainstorming sessions, the diagram identifies the possible causes of the quality issue, although it can become overcomplex and difficult to recognise interdependencies.

Slide 22:   Issues that arise from the introduction of the TQM philosophy usually center on a few key factors. A common reason for an organisations failure to integrate TQM is senior management's underestimation of the time taken to fully understand, incorporate and benefit from TQM. They may therefore not commit to its full integration from the beginning.

Another reason TQM implementation may fail is if (or when) the organisation decides it wants recognition for its efforts. It may then focus too much on collecting certification as proof of its deeds. TQM is a philosophy, not a standard and therefore does not give 'pieces of paper' as proof.

Organisation wide lack of trust in the philosophy can be another downfall, especially if TQM is rolled out across an organisation without proper explaination or allowance of the time it will take individuals, departments and the organisation as a whole to adapt.

Slides 23-24: Six Sigma is an approach for managing business that was launched to the market in 1986 by the technology company Motorola.

Its proponents claim that Six Sigma is the way of the future and that it has overtaken and effectively replaced the old TQM philosophy. However, many organisations still favor TQM as a philosophy and believe that Six Sigma is actually based on the principles of TQM. Like many topics within the IT industry there is much opinion but little consensus.

Six Sigma is number (statistical) based in its approach to identifying, measuring and improving an organisation's approach, with little to no time for intuitive workings.

Six Sigma is undertaken within organisations by individuals that have received training in the approach. Depending on how detailed your contribution you will receive training based on the martial arts' colour belts – yellow, green, black etc. This of course requires investment by the organisation in the required training, to enable individuals to receive the understanding necessary to initiate Six Sigma.

Motorola classes Six Sigma at three levels, which you can now outline for the students:

- Metric: Six Sigma states that no more than 3.4 defects per million opportunities are permissable.

- Methodology: Two methodologies exist within Six Sigma; the DMAIC and the DMADV. Note that although Six Sigma itself calls these 'methodologies', throughout this approach language is interchanged and these are also refered to as 'strategies' and 'processes'. This is again a good opportunity to remind students to try not to get too confused with interchangeable terminology but instead to choose the term they prefer and stay consistant.

- Philosophy: to reduce business variation and make customer focused, data driven decisions.

Slides 25-26: DMAIC (Define Measure Analyse Improve Control) is always used when a process or product (e.g. software) already exists but falls short of fulfilling either client requirements or performance levels.

Generated as a repetitive closed method, it propels the organisation through the five stages from a data specific perspective.

Slides 27-28: DMADV (Define Measure Analyse Design Verify) targets new process opportunities, working from a client requirements perspective.

Still iterative and data driven, DMADV can also be used after DMAIC for an existing process that even after thorough rework, fails to meet requirement standards.

Slides 29-30: For software quality to be possible it is essential that it is validated against realistic criteria. Fulfilling business and technical requirements should not need to be explained any further. Operates as expected includes both internally (inhouse), before software launch, and externally once in the working environment. The software's ability to be transferable, usable and secure are all parameters within 'operates as expected'.

Traditionally software has been tested on completion of development, as a seperate stage outside of the project management lifecycle. However, newer methodology approaches (e.g. Agile) have incorporated software testing during the development process and placed responsibility on the development team, rather than simply specialist testers at the end. This moves software quality management from reactive to proactive.

As in the case of Risk (identification and management) it is unrealistic for an organisation to expect to find all errors and faults. Even with the most rigerous of standards, measurements and compliance issues will arise. However, a proactive approach to testing can improve the detection and fixing rate.

How much testing and the type of testing an organisation undertakes when developing a software product is dependent on many factors, including how vital/critical the software is or will become; how rigerous the client's requirements and expectations are, the contractual obligations agreed and the organisation's choice of approach to the software development project; whether that be traditional test at end of development or a new style (e.g. Agile) test throughout the lifecycle.

The documentation that should exist on completion of testing is:

- Test Plan: a test plan should be produced at the beginning of the project, stipulating testing approaches, execution and parameters to work within.

- Test Scripts: scripts take the place of a user's actions during testing, which allows automation of some processes.

- Test Data: to successfully test software functionality, multiple sets of test data should be generated. The data sets should vary in content, testing the software repeatidly.

Slide 31: This slide presents many of the testing approaches available. You can inform students that several of these will be looked at in this lecture and may want to ask the group which approaches they are most familiar with.

Slide 32: Black box is more of a method than an approach and as such is incorporated into a variety of testing approaches. However, it is one that many people have heard of.

Black box testing is non technical. An individual undertaking black box will not have knowledge of the code or structure of the software. They will be looking to find faults and test the software's functionality.

Based on documented specifications and requirements, a series of test cases will be designed and the software will be tested against these. The tester will not be interested in the code and therefore the idea is that the report will be accurate.

Slide 33:   Where black box tests functionality, white box is all about the internal code, algorithms and structure of the software developed. The tester must be familiar with all of this in order to successfully undertake this approach. They must also possess the relevant technical skills to follow the routing of the testing and be able to check the outputs.

White box is often responsible for detecting many code errors and development faults. However, its lack of regard for the overall software requirements can mean that any requirements not fulfilled may not even be highlighted. As such white box should always be used in conjunction with other testing approaches /methods.

Unit testing is where specific partitions of source code are tested.

Slide 34:   Regression testing occurs when software has undergone coding changes, sometimes due to initial failure to meet original specification and client requirements or failure to manage client expectations. It is also common after a software upgrade, when new code is integrated into old code, or during patching to remove identified errors.

Unfortunately the nature of software code is that when a fix is made it can result in new errors being generated, or in activating previously dormant ones. Regression testing often relies on the original testing where errors were identified, 'fixed' and documented. If documentation is lax this can make regression testing much more time consuming.

Slide 35:   Integration testing takes sections of code, tested during unit testing, and amalgamates them to test their integration. It incorporates performance, reliability and functionality within an integrated test plan and using specially written test cases aims to identify any issues in sections interfacing as they should. Integration testing continues as more code sections are added, until the whole software system is ready for testing.

Slide 36:   Usability testing is invaluable for software development (i.e. to be able to observe how an actual end user interacts with the product). Simulation scenarios do exist but can never recreate real world knowledge.

To be relevant usability testing must take place as observation under controlled conditions. The data collected generally falls into four categories and you can give the students the following information on each category:

- Performance relates to the measurement of 'steps to action'. How many steps were taken to complete a task? For example, creating a new client account would be measured in number of clicks.

- Accuracy refers to the number and frequency of errors made by a user when completing a named task.

- Recall relates to how easily a user recalled the process after an event took place.

- Emotion is about how the user felt about their experience. Did they find the process straight forward or was it stressful? How would they feel if they were asked to repeat the process?

The knowledge gained from usability testing is extremely important to a development organisation. To fulfil both client requirements and expectations a positive outcome from usability testing is essential.

Slide 37: Accessibility testing is concerned with enabling all users, regardless of any imparement(s), to have equal access to the software.

Accessibility has become ever more important to organisations as greater legal enforcements regarding equal opportunities and anti-discrimination are established. For accessibility testing to be useful it requires requirements to be specified before design and development, so that functionality is in-built from the start.

For software to be accessible to all, many imparements must be catered for; hearing, visual, cognitive, dexterity and existing application programming interface (API) tools do exist (e.g. text to speech readers, screen readers, comprehension readers) to aid this accessibility. However, developed software must be compatible and interface with these tools successfully.

Slides 38-39: Software quality plans are formal documents generated during the planning phase of each software project. Consisting of a multi-layered formal report, suitable for use by project teams and management, a software quality plan sets out all the processes, approaches, tools and techniques that will be adopted. Any standards or frameworks that must be adhered to, either due to the organisation's philosophy or the client's requirements, are also included.

All the slides previously discussed contain information that may be included in a software quality plan, as will information contained within Topic 12's lecture.

Slide 40-41: References

Slide 42: Ask the students if they have any questions. Remind them that if they come across information that they are unsure about, they will have an opportunity to ask about it during the tutorial and seminar sessions.

Lecturers' Notes

Students will need to complete Private Study Exercise 1 in preparation for Seminar Activity 3. You should ensure that students are aware of this.

11.5 Seminar Notes

The time allocation for the seminars for this topic is 1 hour.

Lecturers' Notes:

Students have copies of the seminar activities in the Student Guide. Answers are not given in their guide. Students are likely to produce quite different answers to these activities but you should try to press the students to justify their comments/conclusions and also encourage differing points of view where possible, in order to enrich the discussion.

Activity 1:

In groups, discuss and create a comprehensive software quality definition. Nominate a spokesperson and share your definition with the class.

Suggested Answer:

The students are aiming for a definition of between one and three sentences. Their definitions could include reference to standards and client requirements, internal and external market forces.

Activity 2:

As a class, discuss the fact that no enforced industry standard exists that encompasses all software development areas.

Do you think there should be an enforced common standard or do you believe due to the nature of software, that this is unrealistic? You should provide clear reasons for your answer.

Suggested Answer:

There is no right or wrong answer to this discussion. Due to the nature of software it would be extremely difficult to produce one standard that fulfils all specialisms within the software industry. However, lack of governance in the IT industry is becoming more of an issue.

Activity 3:

This activity ties into your study on Quality Assurance with a focus on understanding why projects fail (Private Study Exercise 1).

Reports of project failure are easy to locate and they often make depressing reading. Some studies suggest that 75% of all software projects fail to meet all the expectations of the project sponsor.

1. On what basis should a project be considered a success or failure?

2. The reasons for failure in the article are organised under four main headings;

    - Project initiation and Planning issues

    - Technical and Requirements issues

- Stakeholder Management and Team issues

- Project Management issues

Under each of these headings, think of and list as many reason for failure as you can, without referring to the article.

Suggested Answer:

1. Deciding a project has failed usually means one or more of the following;

   - It has not satisfied the business requirements of the main or primary stakeholders
   - The deliverables were not produced on time and within budget
   - The project did not deliver the business benefits promised when it was justified for expenditure.

2. Lists are given under each heading in the article. Students may also have other ideas. The objective is to raise students' awareness of the many things that can go wrong. The objective is to help them think through what they might need to include in quality planning for a project to help ensure success.

11.6 Private Study

The time allocation for private study in this topic is expected to be 7.5 hours.

Lecturers' Notes:
Students have copies of the private study exercises in the Student Guide. Answers are not provided in their guide.

Exercise 1:

In preparation for Seminar Activity 3, read the following paper:

- Walters, K. (2000). *Most IT Projects Fail – Will Yours?* [Available Online]
  http://www.projectsmart.co.uk/pdf/most-it-projects-fail-will-yours.pdf

Exercise 2:

Using your centre's resources and your own web-based research, identify additional Software Quality Factor measurements that are available to software developing organisations. Your answer must not include those given as examples in the lecture.

Suggested Answer:

There are multiple measurements/metrics available. Examples of ones additional to those given in the lecture are:

- Number of lines of code generated per day
- Quality of testing
- Average time taken to write a menu
- Client feedback

Exercise 3:

Research Software Quality Plans. Identify the purpose of a Research Software Quality Plan and what is included in a plan (content). You will require this information for a future exercise.

Exercise 4:

Research Total Quality Management (TQM) and Six Sigma. Compare and contrast their effectiveness and place in today's software industry.

Write a one page report documenting your findings. Include your conclusions and any recommendations.

Suggested Answer:

Both TQM and Six Sigma are effective within the IT industry. The approach chosen by an organisation will be based on several factors:

Is there a quantitive or qualitative approach to quality management? Six Sigma is quantitive and TQM is qualitative (TQM does employ data but also allows for intuition and soft factors).

Six Sigma could be adopted by organisations new to quality approaches, or organisations which have tried implementing the TQM philosophy and fallen short. This could be the result of management lacking the patience or understanding for TQM and its need to be incorporated throughout all levels of the company. If this is the case Six Sigma will also be a challenge, as it too looks to be encompassed by all parts of an organisation.

As industry looks to become more flexible in its approaches and deliverables, Six Sigma invokes the opposite. Six Sigma is structured, requires employee training to varying levels of ability and is data driven (although it does take a client requirement perspective).

Six Sigma, unlike TQM, does give organisations clear structured guidance, consistent methodology based approaches and set criteria which for an organisation unfamiliar with quality management (or lacking skill sets), enables them to adopt an approach and follow stages.

It could be argued that both TQM and Six Sigma continue to have their place within the software industry and the ideal would probably be the ability to combine key factors from both approaches.

Exercise 5:

Research W. Edwards Deming's 14 points for Management. Identify all 14 points and then compare this to Six Sigma. Which if any of the 14 points are applicable and/or exist within Six Sigma?

Make notes on your findings and conclusions.

Suggested Answer:

The 14 points of W. Edwards Deming are as follows, referenced from the Deming Institute:

1. Create constancy of purpose toward improvement of product and service

2. Adopt the new philosophy

3. Cease dependence on inspection to achieve quality

4. End the practice of awarding business on the basis of price tag

5. Improve constantly and forever the system of production and service

6. Institute training on the job

7. Institute leadership

8. Drive out fear

9. Break down barriers between departments

10. Eliminate slogans, exhortations and targets for the work force

11. Remove barriers that rob the worker of pride of workmanship

12. Remove barriers that rob management of pride of workmanship

13. Institute a vigorous program of education and self improvement

14. Put everybody in the company to work to accomplish the transformation

Of the 14 points, 5 clearly exist within Six Sigma; these are points 1, 2, 3, 5 and 7. Any other points identified by the students as being included should be backed by sound reasoning.

11.7 Tutorial Notes

The time allowance for tutorials in this topic is 2 hours.

Lecturers' Notes:

Students have copies of the tutorial activities in the Student Guide. Answers are not provided in their guide.

For Exercise 2, put the students into pairs or small groups and give them enough time to draw up lists of options, before having a whole class discussion. This will ensure a variety of opinions and a richer, final debate.

Exercise 1:

As a class debate the positives and negatives associated with Total Quality Management and Six Sigma.

Which approach do you believe is more applicable to today's industry? Why?

Suggested Answer:

This is an oral exercise based on the students' private study findings. Their positives and negatives and their belief of which approach is more applicable will be based on their findings, so will vary.

TQM positives

- Qualitative, intuitive approach
- Multiple tools and techniques available – ability to manipulate approach to fit organisation
- Established approach
- Adaptable

TQM negatives

- Time consuming
- No set stages for integration
- Detail overload

Six Sigma positives

- Structured approach
- Set methods & tools
- Removes intuition
- New fresh approach
- Sets conformance standards

Six Sigma negatives

- Data driven
- Specialist training necessary

- Quite inflexible

Overall both approaches are applicable to today's industry due to TQM being more qualitative and Six Sigma being quantitative.

Exercise 2:

As a class you are going to discuss how you would raise software quality standards. Work with the pair/group you lecturer puts you in, to first draw up a list of options (and reasons for each option) for raising quality standards and then order these in terms of preference or importance. You will then feedback and discuss your options with the whole group.

Suggested Answer:

The class should have a variety of opinions which they should back with clear reasoning.

Possibilities include:

- Enforcing a quality standard
- Enforcing standards on IT professionals
- Regular conformance auditing
- Standardised tools and techniques

Topic 12: Applying Software Quality / Module Review and Assessment Clinic

12.1 Learning Objectives

This topic provides an overview of software quality standards and institutes, as well as a module review. On completion of the topic, students will be able to:

• Name and discuss software quality industry standards;

• Name and compare (software) quality institutes;

• Create a software quality plan;

• Research quality standards and form conclusions;

• Report findings.

12.2 Pedagogic Approach

Information will be transmitted to the students during the lectures. They will then practise the skills during the tutorial and seminar sessions.

12.3 Timings

Lectures: 1 hour

Seminars: 2 hours

Private Study: 7.5 hours

Tutorials: 2 hours

12.4 Lecture Notes

The following is an outline of the material to be covered during the lecture time. Please also refer to the slides.

The structure of this topic is as follows:

- International Standards and Institutions
- ISO 9126
- TickIT
- ISO 25010
- CISQ
- EFQM
- ASQ
- QAI
- SEI
- Module Review

12.4.1 Guidance on the Use of the Slides

Slides 2-3:   These slides present the scope, coverage and learning outcomes of the lecture.

Slide 4:   This slide introduces three standards and several institutes related to quality, which will be looked at in more detail in this lecture.

Slide 5:   The International standards for software quality once again fall to ISO. In 1991 the ISO issued ISO/IEC standard 9126, seeking to provide guidance and standards for the quality of software. In 2001 ISO 9126 was reissued as a four part standard (9126-1 through 9126-4), which broke down the standard in to four parts; quality, external metrics, internal metrics and quality in use metrics, with the aim of addressing bias within the development of software.

In 2011 ISO 9126 was replaced with ISO 25010, a standard born from SquaRE which is a process undertaken to develop a more indepth series of standards.

Slide 6:   ISO 9126, although superseeded in 2011 by ISO 25010, is still found in many organisations due to its proven track record and the fact that ISO 25010 is still so new. Software development organisations are often slow to adopt new standards when the old ones work.

ISO 9126 is an internationally adopted industry standard for software quality evaluation. Incorporating a framework approach it seeks to agree priorities before development, so as to reduce human interferance during development. It recognises that due to the nature of software and its relationship with client requirements and expectations, a flexible approach is necessary. Rather than stipulating exact details on attributes and their measurement, it therefore provides a model framework with guidance but does not assign values to data produced.

Slide 7: The first part of the ISO 9126 standard is the Quality Model 9126-1. The quality model divides software quality characteristics into six specific sets. Each set is further subdivided, resulting in a comprehensive model approach.

- Functionality is concerned with achieving identified requirements and expectation. It includes suitability, accuracy and security.

- Reliability sets performance maintainability and includes maturity, fault tolerance and recovery.

- Usability covers user assessment and effort required, and includes 'understandability', 'learnability' and 'operability'.

- Efficiency incorporates software performance and resource requirements. Time behaviour is a key factor of efficiency.

- Maintainability focuses on ability to modify software and includes testability and changability.

- Portability is about software environments and the ability to transfer between them and includes installability and co-existance.

All these sub characteristics within 9126-1 are further subdivided into attributes, which enable an organisation to measure software.

Slide 8: External metrics are provided to support organisations in following the ISO 9126 standard for software quality. The external metrics recommended correspond to the six characteristics identified in part 9126-1: functionality, reliability, usability, efficiency, maintainability and portability. The standard does not stipulate that all these metrics must be used. It recognises the need for organisation flexibility and makes allowances for specialism. External metrics concentrates on measuring how the system performs when the software is incorporated.
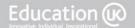
Within 9126-2 there is additional guidance provided on how to implement the metrics through the software development process. Additionally 9126-2 does not assign value ranges corresponding to the metrics, recognising the unique nature of software and its relation to user requirements.

Slide 9: Internal metrics concentrate on measuring the software itself, exluding environmental factors. As with 9126-2 (external metrics), the internal metrics included are recognised as being non exhaustive and allow for specialism specific measurements to be added. Again internal metrics does not assign value ranges.

Slide 10: Quality in use metrics, part four of the ISO 9126 standard recorded as 9126-4, focuses on how the software performs and any effects it has when operated in a specific environment or context (e.g. real life). Again non exhaustive in its given metrics, organisations are encouraged to modify the approach to include specialisms. 9126-4 does include guidance on how to use the recommended metrics and how to apply them to a given situation. In addition it provides guidance on how to evaluate and report findings.

Slides 11-12:	TickIT is a UK developed software development quality certification that provides additional information to companies requiring specific software development guidance working within ISO standards.
	TickIT seeks to encourage organisations to stop and consider what quality in software truly means. It aims to enable organisations to understand that the issue of software quality is an ongoing process, requiring constant rethinking and flexibility in choosing which approaches are most applicable to each individual development.
	Developed to stand alongside ISO 9001 and a generic quality management system standard, TickIT still has its place alongside ISO 9126. Although organisations implementing 9126 may not seek TickIT certification, it still provides a useful framework for consideration.
	Initially supported by the UK and Swedish software industries, TickIT has been adopted internationally. TickIT plus (the updated version of TickIT) was launched in 2011 and as yet it is unknown how the industry will take to the new approach.
Slide 13:	ISO 25010 incorporates system and software quality models, to provide greater coverage of quality than ISO 9126.
	The quality in use model consists of 5 key characteristics (which are then sub divided) covering software products in use (and computer systems in use) and how they interact when used in certain environments.
	The product quality model has 8 key characteristics (which also subdivide), which concentrate on all software products (and computer systems) in static performance.
	ISO 25010 is not specialism specific and can be used for all software. It gives a consistant base of terminology covering software quality and a set of characteristics for measuring quality completeness; characteristics which can be used by professionals with different perspectives.
	ISO 25012 incorporates a data quality model which can be incorporated in addition to the ISO 25010 models, to provide even greater coverage.
Slide 14:	CISQ, or the Consortium for IT Software Quality, is an industry run organisation that aims to maintain software quality as a concern and promote standardised measurement of software product quality as essential for the wellbeing of the industry.
	Drawing on Global 2000 IT organisations, CISQ aims to challenge non standardised IT software quality measurement policy and replace it with a standardised approach throughout the industry. Global 2000 is a Forbes list of world leading organisations (based on their sales, profits, assets and market presence).
Slide 15:	The European Foundation for Quality Management was founded in 1988 by a group of European CEOs. Their purpose was to raise the competitiveness of theirs and other European organisations in the light of the standards being offered by American and Japanese companies.
	Having gained support from the European Commission, the group generated an Excellence model, to encourage European industry to adopt an organisation wide

approach to excellence and quality. Now adopted internationally by many organisations, the EFQM still continues its work offering companies blueprint approaches, recognition schemes, external assessments and training.

Slide 16:   The American Society for Quality is one of the older institutes still championing quality. ASQ undertakes future studies approximately every three years with the goal of identifying the future of quality and how it will shape organisational activity.

ASQ enables any organisation worldwide to access their expertise. It draws on the expertise of many across a variety of industries, prefering to look at the wider picture rather than specialising in one industry. ASQ holds the view that quality is quality, regardless of specialism.

Slide 17:   The Quality Assurance Institute was launched in 1980 in the United States. Concentrating on the IT industry, QAI focuses on the improvement of quality. With a worldwide presense, in 2001 QAI established QAI MEA, which focuses its attention on the Middle East and Africa. Additionally QAI now has the QAI Global Institute, which is a branch providing training, certification and benchmarking for individuals and organisations.

QAI concentrates on the business aspect of IT quality, recognising that IT should be part of the whole organisation and should integrate internally and also externally with clients.

Slide 18:   The Software Engineering Insitute (within Carnegie Mellon University) began in 1984, working initially for the US federal government. Now SEI works within education, government and industry to create software engineering advancements that enable the development of high quality IT systems.

The software engineering measurement and analysis (SEMA) exsists within SEI and offers organisations the ability to work with both CMMI (capability maturity model integration) and Six Sigma, through a method approach with associated tools.

Slide 19:   As a brief module recap, you can use this slide to show students that completing this module will have improved their understanding of professional, ethical and legal issues affecting IT professionals, basic project management skills, understanding of software deployment, risk management, IT service management and also software quality within the IT industry.

Slides 20-21:   References

Slide 22:   Ask the students if they have any questions. Remind them that if they come across information that they are unsure about, they will have an opportunity to ask about it during the tutorial and seminar sessions.

12.5 Seminar Notes

The time allocation for the seminars for this topic is 2 hours.

Lecturers' Notes:

Students have copies of the seminar activities in the Student Guide. Answers are not given in their guide.

For Activity 1 you can ask students to work individually or in pairs, prior to the final write up which should be completed individually. This exercise is expected to take students the whole session. Encourage them to take their time and to discuss the process. The content of the students' Quality Plans will vary considerably, based on their research from the Topic 11 private study and their knowledge to date. It is not expected that they will produce a professional standard plan. However, the content should reflect all that they have learnt throughout the whole module.

Activity 1:

Write a detailed Software Quality Plan for a software development organisation planning a bespoke software project, to be utilised on handover by a financial sector based client (e.g. a Bank).

The following layout has been provided for you as guidance. You may require additional report sections. Where assumptions are required please include a realistic assumption list within your plan.

1.0   Introduction

      1.1 Purpose of report

      1.2 Report objectives

2.0   Management approach

      2.1 Approach chosen

      2.2 Methodology employed

      2.3 Tools & techniques chosen

      2.4 Metrics

      2.5 Risk management

      2.6 Reporting method

      2.7 Client handover

3.0   Documentation

      3.1 Essential documentation

            3.1.1 Content

12.6 Private Study

The time allocation for private study in this topic is expected to be 7.5 hours.

> **Lecturers' Notes:**
>
> Students have copies of the private study exercises in the Student Guide. Answers are not provided in their guide.

Exercise 1:

Within the software industry, identify which specialist areas have to conform to governance standards as law (e.g. Medical).

Suggested Answer:

The answers given are expected to include:

- Medical
- Financial
- Gaming
- Veterinary

In fact any software for any specialism that includes data holding or manipulation will have conformance requirements.

Exercise 2:

Research ISO 9126 and ISO 25010. Compare and contrast the two standards.

Write a one page report on your findings and be prepared to discuss this with the lecturer and other students.

Exercise 3:

There are very many gurus who have contributed to societies knowledge and understanding of quality and quality standards.

The following list gives the names of some of the most respected in this category;

- Feigenbaum
- Deming
- Juran
- Ishikawa
- Taguchi
- Crosby

1. Research a little about the background and work of each of these gurus.

2. For each Guru try to identify both strengths and weaknesses in the approach they took towards achieving the quality objective. Write a short summary for each one.

Suggested Answer:

Feigenbaum

Studied in USA and wrote his first book on TQM in the 1950s. His ideas included the importance of having all staff involved and the importance of management support and adoption of a quality culture. However he did not discriminate between different kinds of quality context, nor did he consider all the different management theories.

Deming

He is considered in Japan to be the founding thinker on quality control. He thinks of quality as very much a company strategy towards both achieving productivity and reducing variability. He identified stages in quality improvement, and stressed that management is more important than technology. He emphasizes statistical and quantitative methods but also is aware that what works in the USA will not necessarily work in Japan and vice-versa. Some criticise his methodologies as being vague.

Juran

He tried to get organisations to move away from the traditional view of quality as conformance to specification. Instead he favoured a more user based approach and the idea of 'fit for purpose'. He tried to get people to think deeper than the quality jargon and stresses the role of the customer, both internal and external. He is criticised for not considering any bottom-up quality improvement possibilities and for undervaluing the worker in organisations.

Ishikawa

He is considered the founder of the quality circle concept and of cause and effect diagrams. He felt that in Japan people had focused too much on statistical process control, which many find difficult and it was turning organisations against quality control. He emphasised the importance of involving people and helping them problem solve. He is criticised for not really explaining how the ideas arising from quality circles can be put into action.

Taguchi

He was the director of the Japanese Academy of Quality and his focus was on engineering-in quality through product design. He adopted the concept of quality in terms of the loss that the lack of quality could cause (QLF, or quality loss function). He recognises quality as a societal issue as well as an organisational one. His methods are geared towards engineers rather than statisticians. Some of his ideas do not work for the service sector, and he views quality as very much a specialist function rather than something for all staff to be involved with.

Crosby

He is best known for his work on the cost of quality. He suggests that few organisations know either how much they spend on getting the quality right or how much it costs when they get the quality wrong. He provides clear methods, which are easy to follow, to achieve quality. He sees the workforce and staff motivation as important. Some think he views quality problems as being down to poor workers and that he is apt to use too many slogans and platitudes, rather than facing difficult situations. Some consider the idea of zero defects as risk avoidance rather than quality.

Exercise 4:

There are very many different types of small team that maybe set up within a TQM (Total Quality Management) environment.

1. Research the nature of Quality circle teams and at least 4 of the following;

    - TQMT
    - QIG
    - CAT
    - QIP
    - PQT
    - QC
    - QIT
    - DPA

2. Explain the nature and function of the teams and suggest examples to illustrate when you think each would be appropriate. These can be in the form of short notes.

Suggested Answer:

Quality circles – set up for improving the quality of a product or perhaps a business function. These are usually set up by the workers themselves in an area where they feel there is room for improvement. Solutions tend to be small, simple and both inexpensive and quick to implement. In some organisations the change team is given a small reward if successful.

PQT   process quality team

DPA   departmental purpose analysis team for reviewing the real purpose of each department

TQMT   is the top level management team

QIG   is a quality improvement group

CAT   is a corrective action team

QIP   a quality improvement process team

QC   is a quality control council

Exercise 5:

Review the material for the module. You should bring any specific questions about the module and revision for the examination to the tutorial session.

12.7 Tutorial Notes

The time allowance for tutorials in this topic is 2 hours.

Lecturers' Notes:

Students have copies of the tutorial activities in the Student Guide. Answers are not provided in their guide.

This tutorial is also designed as an opportunity for students to raise any last questions they may have about the module. You may also like to use the sample examination paper which is available from the NCC Education *Campus* (http://campus.nccedu.com).

Exercise 1:   Review of Private Study exercises

Your lecturer will provide you with the opportunity for a short review of your private study exercises and you should discuss any problems you had and ask questions to clarify points as necessary.

Exercise 2:   Assessment Clinic

This is your opportunity to ask any questions that you have regarding your assessment for this module.