OCR
Oxford Cambridge and RSA

Cambridge **TECHNICALS LEVEL 3**

IT

Cambridge TECHNICALS 2016

Unit 11 – Systems analysis and design

DELIVERY GUIDE

Version 1

ocr.org.uk/it

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INTRODUCTION

This Delivery Guide has been developed to provide practitioners with a variety of creative and practical ideas to support the delivery of this qualification. The Guide is a collection of lesson ideas with associated activities, which you may find helpful as you plan your lessons.

OCR has collaborated with current practitioners to ensure that the ideas put forward in this Delivery Guide are practical, realistic and dynamic. The Guide is structured by learning outcome so you can see how each activity helps you cover the requirements of this unit.

We appreciate that practitioners are knowledgeable in relation to what works for them and their learners. Therefore, the resources we have produced should not restrict or impact on practitioners' creativity to deliver excellent learning opportunities.

Whether you are an experienced practitioner or new to the sector, we hope you find something in this guide which will help you to deliver excellent learning opportunities.

If you have any feedback on this Delivery Guide or suggestions for other resources you would like OCR to develop, please email resources.feedback@ocr.org.uk.

OPPORTUNITIES FOR ENGLISH AND MATHS SKILLS DEVELOPMENT AND WORK EXPERIENCE

We believe that being able to make good progress in English and maths is essential to learners in both of these contexts and on a range of learning programmes. To help you enable your learners to progress in these subjects, we have signposted opportunities for English and maths skills practice within this resource. We have also identified any potential work experience opportunities within the activities. These suggestions are for guidance only. They are not designed to replace your own subject knowledge and expertise in deciding what is most appropriate for your learners.

English

Maths

Work

Please note

The timings for the suggested activities in this Delivery Guide **DO NOT** relate to the Guided Learning Hours (GLHs) for each unit.

Assessment guidance can be found within the Unit document available from www.ocr.org.uk.

The latest version of this Delivery Guide can be downloaded from the OCR website.

UNIT AIM

All organisations have information systems. This unit will provide you with the knowledge and skills to support the design of formal information systems. These systems provide useful reliable, validated information through the integration of data, hardware, software and humans into processes which enable the organisation to meet its internal goals and its external obligations.

IT technicians are involved in the implementation of systems that have been designed and in many instances assist in their design. Emerging technology practitioners also have to have a knowledge and understanding of how to analyse and design systems that are supported by emerging technologies such as virtual and augmented reality, mobile technologies and the Internet of Everything. In order to effectively develop systems for analysis, it's important to have an understanding of the role of the data analyst and the tasks that they carry out. Data analysts also benefit from having an overview of systems analysis and design in order to support the development of suitable systems on which to work.

This unit is in the IT Infrastructure Technician specialist pathway as well as in the Emerging Digital Practitioner and Data Analyst Specialist pathways.

Unit 11 Systems analysis and design	
LO1	Understanding the role of systems analysis and design in relation to the systems development lifecycle
LO2	Be able to use investigative techniques to establish requirements for business systems
LO3	Be able to develop and document models for business systems
LO4	Be able to create logical and physical designs for specified business systems

To find out more about this qualification please go to: http://www.ocr.org.uk/qualifications/cambridge-technicals-it-level-3-certificate-extended-certificate-introductory-diploma-foundation-diploma-diploma-05838-05842-2016-suite

Cambridge TECHNICALS 2016

2016 Suite

- **New suite for first teaching September 2016**
- **Externally assessed content**
- **Eligible for Key Stage 5 performance points from 2018**
- **Designed to meet the DfE technical guidance**

RELATED ACTIVITIES

The Suggested Activities in this Delivery Guide listed below have also been related to other Cambridge Technicals in IT units/Learning Outcomes (LOs). This could help with delivery planning and enable learners to cover multiple parts of units.

This unit (Unit 11)	Title of suggested activity	Other units/LOs	
LO1	Components of a systems development lifecycle	Unit 6 Application design	LO1 Understand how applications are designed
		Unit 8 Project management	LO1 Understand the project life cycle
		Unit 9 Product development	LO1 Understand the product development life cycle
		Unit 11 Systems analysis and design	LO2 Be able to use investigative techniques to establish requirements for business systems LO3 Be able to develop and document models for business systems
	Feasibility study – terms of reference	Unit 6 Application design	LO2 Be able to investigate potential solutions for application developments
		Unit 8 Project management	LO2 Be able to initiate and plan projects
	Feasibility study – report	Unit 6 Application design	LO2 Be able to investigate potential solutions for application developments
		Unit 8 Project management	LO2 Be able to initiate and plan projects
	Feasibility study – costs	Unit 6 Application design	LO2 Be able to investigate potential solutions for application developments
		Unit 9 Product development	LO1 Understand the product development life cycle
	Life cycle models	Unit 1 Fundamentals of IT	LO3 Understand business IT systems
		Unit 6 Application design	LO1 Understand how applications are designed
		Unit 8 Project management	LO1 Understand the project life cycle
		Unit 9 Product development	LO1 Understand the product development life cycle
LO2	Gathering requirements – interviews	Unit 2 Global information	LO6 Understand the principles of information security
		Unit 6 Application design	LO2 Be able to investigate potential solutions for application developments
		Unit 8 Project management	LO2 Be able to initiate and plan projects
		Unit 9 Product development	LO2 Be able to design products that meet identified client requirements
		Unit 11 Systems analysis and design	LO1 Understand the role of systems analysis and design in relation to the systems development lifecycle
		Unit 12 Mobile technology	LO3 Be able to determine solutions for the use of mobile technologies
		Unit 14 Software engineering for business	LO2 Be able to investigate business requirements for programming solutions
		Unit 18 Computer systems hardware	LO2 Be able to propose a computer system for identified business requirements
	Documentation analysis	Unit 6 Application design	LO2 Be able to investigate potential solutions for application developments
		Unit 8 Project management	LO2 Be able to initiate and plan projects
		Unit 9 Product development	LO2 Be able to design products that meet identified client requirements
	Observation/shadowing	Unit 6 Application design	LO2 Be able to investigate potential solutions for application developments
		Unit 8 Project management	LO2 Be able to initiate and plan projects
		Unit 9 Product development	LO2 Be able to design products that meet identified client requirements

This unit (Unit 11)	Title of suggested activity	Other units/LOs	
LO2	Designing questionnaires and surveys	Unit 6 Application design	LO2 Be able to investigate potential solutions for application developments
		Unit 8 Project management	LO2 Be able to initiate and plan projects
		Unit 9 Product development	LO2 Be able to design products that meet identified client requirements
	Requirements specification	Unit 6 Application design	LO2 Be able to investigate potential solutions for application developments
		Unit 8 Project management	LO2 Be able to initiate and plan projects
		Unit 9 Product development	LO2 Be able to design products that meet identified client requirements
		Unit 11 Systems analysis and design	LO1 Understand the role of systems analysis and design in relation to the systems development lifecycle
LO3	Functional diagrams – DFDs	Unit 6 Application design	LO3 Be able to generate designs for application solutions
		Unit 11 Systems analysis and design	LO4 Be able to create logical and physical designs for specified business systems
	Functional diagrams – flow charts	Unit 6 Application design	LO3 Be able to generate designs for application solutions
		Unit 11 Systems analysis and design	LO4 Be able to create logical and physical designs for specified business systems
	Static data diagrams	Unit 6 Application design	LO3 Be able to generate designs for application solutions
		Unit 11 Systems analysis and design	LO4 Be able to create logical and physical designs for specified business systems
	UML – diagrams	Unit 6 Application design	LO3 Be able to generate designs for application solutions
		Unit 11 Systems analysis and design	LO4 Be able to create logical and physical designs for specified business systems
LO4	Logical and physical designs – introduction	Unit 3 Cyber security	LO3 Understand measures used to protect against cyber security incidents
		Unit 6 Application design	LO3 Be able to generate designs for application solutions
		Unit 9 Product development	LO2 Be able to design products that meet identified client requirements
		Unit 11 Systems analysis and design	LO3 Be able to develop and document models for business systems
		Unit 12 Mobile technology	LO3 Be able to determine solutions for the use of mobile technologies
		Unit 14 Software engineering for business	LO3 Be able to develop software solutions to meet business requirements
		Unit 18 Computer systems hardware	LO2 Be able to propose computer systems for identified business requirements
	Virtualisation	Unit 1 Fundamentals of IT	LO3 Understand business IT systems
		Unit 11 Systems analysis and design	LO1 Understanding the role of systems analysis and design in relation to the systems development lifecycle
		Unit 18 Computer systems hardware	LO1 Understand the components of a computer system

This unit (Unit 11)	Title of suggested activity	Other units/LOs	
LO4	Logical and physical designs	Unit 3 Cyber security	LO3 Understand measures used to protect against cyber security incidents
		Unit 6 Application design	LO3 Be able to generate designs for application solutions
		Unit 9 Product development	LO2 Be able to design products that meet identified client requirements
		Unit 11 Systems analysis and design	LO3 Be able to develop and document models for business systems
		Unit 12 Mobile technology	LO3 Be able to determine solutions for the use of mobile technologies
		Unit 14 Software engineering for business	LO3 Be able to develop software solutions to meet business requirements
		Unit 18 Computer systems hardware	LO2 Be able to propose computer systems for identified business requirements
	Presenting to stakeholders	Unit 6 Application design	LO4 Be able to present application solutions to meet client and user requirements
		Unit 10 Business computing	LO4 Be able to present data analysis outcomes
		Unit 12 Mobile technology	LO4 Be able to present solutions for the use of mobile technologies
		Unit 14 Software engineering for business	LO4 Be able to propose software solutions to meet business requirements
		Unit 18 Computer systems hardware	LO2 Be able to propose a computer system for identified business requirements
	Responding to feedback	Unit 6 Application design	LO4 Be able to present application solutions to meet client and user requirements
		Unit 12 Mobile technology	LO4 Be able to present solutions for the use of mobile technologies
		Unit 14 Software engineering for business	LO4 Be able to propose software solutions to meet business requirements

KEY TERMS

Explanations of the key terms used within this unit, in the context of this unit	
Key term	**Explanation**
Activity diagram	Activity diagrams are UML diagrams that are used for process and system modelling. These diagrams provide an illustration of the activities that relate to a business system and how the data moves between the processes. Activity diagrams and use-case diagrams are logical models so they will not show whether the system is computerised or manual. An activity diagram can be used to illustrate the processes in the current system or those of an updated or new system that is being developed. Basic activity diagrams show the activity state, transitions, decisions and synchronization bars in their annotation. Advanced activity diagrams can show conditional threads, partition bars and also nested activities within active states by the use of sub-graphs. A UML activity diagram might be used to show how a business processes an order.
Agile methodologies	Agile methodologies are based on the Agile Manifesto which was formulated in 2001 and contains 12 principles. It makes the systems development process more efficient by reducing the modelling and documentation. It uses iteration and the feedback provided to enable the software or system to be refined. The agile methodology is usually used in conjunction with object-orientated technologies. Developers work in teams and there are few rules which makes the agile methodology easy to follow. Scrum is an example of one of the many agile methodologies.
Constraints	Constraints are limitations placed on the required changes. They might specify what software is to be used, what the budget is, the time limit for completion and specific dates that the changes need to be implemented on. Constraints are generally fixed and will limit the solutions that can be suggested. An example of a constraint is – the new system must be operational by 5 June 2018.
Data flow diagrams (DFD)	A DFD is a visual representation of how data flows between different processes, entities and storage devices. The number of the level represents the amount of detail shown on the DFD, e.g. Level 0 is not as detailed as Level 1. Standard symbols are used to represent internal and external entities, processes, data stores and arrows indicate the direction of the flow of data from one entity to another. The arrows are usually labelled to indicate what information is being transferred. A boundary line is drawn to show the extent of the system and external entities, like customers, are shown outside the boundary.
Entity Life History (ELH)	The birth, middle life events and death of an entity. By documenting the process and drawing the ELH diagram the system analyst can see all the parts and easily identify anything that has been omitted. An entity is something in the real world such as a legal document, a product like a bicycle or piece of machinery. As well as the three main events that the entity is involved in there are often sub-divisions which expand on these in the diagram. For example, the birth of a bicycle might show an order, delivery, payment and a warranty. Another example of an ELH could be to show membership of a gym. The birth being when a person joins the gym, the middle life event being when and what sessions they attend, and the death being when they leave the gym by not renewing their membership and their details are deleted from the system.
Entity Relationship Diagram (ERD)	A diagram that shows how the entities in a database or information system relate to each other, e.g. one to many, one to one, many to many. The ERD is used as a tool when planning a new information system or database or as a way of recording relationships in a current system or database. By describing the relationship between entities it shows what actions can take place between them. For example, a car hire firm might have one car (identified by its registration number) which in the course of its life is hired to many customers giving a one to many relationship.
Evolutionary methodologies	A systems development life cycle that is circular in shape and shows a continuous process of development or improvement of a system.
Feasibility study	An initial feasibility study is done at the start of the development life cycle to assess whether the proposed changes to a system should be carried out. It will look at what options are available to solve the problem, the costs involved, the time needed, etc and make recommendations.
Flow chart	A diagram that shows the steps followed in sequence to complete a task and the options available at each step. It can be used to show the sequence of actions performed in processing information in an information system or computer program. Standard symbols are used to show start/end, data, decisions, process, input, etc.

Explanations of the key terms used within this unit, in the context of this unit	
Key term	**Explanation**
Functional requirements	These are the functions and processes that the user requires the system to be able to perform. These could be: validate data, perform calculations, transfer or transform data, print an invoice.
Implementation	This is a phase of the systems development life cycle and follows the design specification stage. The implementation phase involves converting the software designs into code, testing the code and installing it on the system, installing new hardware and testing it, training staff in the use of the new system. Implementation can take place in a number of ways. Direct implementation is when an old system is replaced by the new system in one step and at a particular time. Parallel implementation is where the old and new systems both run for a while until the new system has been checked and found to be working properly. Phased implementation is when the change to the new system is done gradually in stages. Pilot implementation is when only a small sector uses the new system until it is working properly and then it is used by everyone in the company. There are advantages and disadvantages of choosing each of the different approaches to implementation.
Interaction diagram	A diagram that shows how entities interact with each other. This could be by what means they communicate information, e.g. how customers' orders are communicated to the sales, accounts and warehouse departments. In UML both sequence and collaboration diagrams are interaction diagrams.
Logical design	Logical design takes place before the physical design of a new system in the systems development life cycle. Logical designs could be referring to either a paper-based or a computerised system as they are not concerned with platforms that the system will use. Instead they use designs/models to show the inputs, data flows and outputs of a system. Logical designs will identify entities and how they relate to each other and their environment in inputs and outputs. An ERD is a logical design because it shows the relationships between the entities in an abstract way.
Models	Usually shown as visual representations of systems or processes. They require documentation to provide more details. Models allow systems analysts to see and understand systems and processes and to present their designs to stakeholders.
Non-functional requirements	These are the user requirements that are not concerned with the functioning of the new system. They are usually the limitations or constraints and as such are fixed, e.g. the software to be used, the hardware, what programming language is to be used, how much time will be allowed for the new system to be developed, when it is to be implemented by, and the costs allowed for within the budget that has been set.
Object-orientated	This is where the system is broken down into smaller objects that interact with one another for the whole system to work. Object-orientated systems analysis and design provides a three view approach to the system that is being developed. There is a functional view, a static view and a dynamic view. It is a useful approach for systems analysts to use for large complex systems and suits particular system development methodologies, such as agile and iterative phased development.
Physical design	The physical design will relate to the non-functional requirements. It will show how the logical design will be implemented. For example it will show the detail of how data is to be input into the system.
Platform dependent	Software applications that will only work on particular operating systems and sometimes only a particular series of hardware. This could be because a particular operating system or browser is required for the software to work correctly.
Platform independent	Hardware and software that can run on any operating system. Sometimes this is because a device is virtual rather than actual, so it does not rely on the capacity of the computer being used or the operating system on the computer being used; it can appear and perform as a real device but does not have the limitations. These can include applications, such as Office 365, storage such as the Cloud, or audio and video players. Sometimes it is because the software used to write an application can be used on many different systems and devices, such as Java applications.

Explanations of the key terms used within this unit, in the context of this unit	
Key term	**Explanation**
Requirements	Initially what the user requires the system to do and its characteristics. Referred to as business requirements or user requirements because they are written from the user's perspective. Later in the project they become requirements which provide details of the business capabilities and the technical capabilities. Functional requirements relate to the processes the system must perform. Non-functional requirements include limitations or constraints such as the budget available and the time allowed for implementing the changes.
Scrum	As the word suggests this brings ideas from the game of rugby to the systems development life cycle. Scrum is a type of agile systems development life cycle. A scrum meeting takes place at the start of each working day. Progress needs to be continuous, so any blocks identified at the meeting need to be dealt with straight away. Work is managed in sprints which last 30 working days after which the software or system is demonstrated to the client. Developers work in self organising teams without team leaders. The results of a sprint will enable a new plan to be developed for the start of the next sprint.
Sequence diagrams	Sequence diagrams are one of the interaction diagrams in UML. They enable the systems analyst to show the sequence of processes and are useful to show stakeholders the sequence of the implementation of a new system.
Spiral methodology	This is an evolutionary systems development life cycle. The life cycle goes through four phases that are repeated for each of the problems it is trying to solve. The risk is therefore reduced because of the frequent checking within each round of the spiral. The ability to reduce risks makes the spiral methodology suitable for large scale projects.
Stakeholders	Groups that have a 'stake' or interest in a project. They could be internal to a business, such as workers, owners and managers, or external to the business, such as customers, suppliers, financiers and the local community. A large business might also have shareholders who would be stakeholders.
Systems analyst	An IT professional who analyses a business information system to determine what changes need to be made and then designs and plans the implementation of the agreed changes. Systems analysts use a variety of analysis and design techniques to help them solve the problems with a business system. They use a variety of diagrams and designs to communicate information to stakeholders and users and to document the current system and the proposed new system.
Systems development life cycle	These are the processes that are involved in the development of a new or updated system. The phases are the same but different methodologies will affect the way they are done, e.g. whether some phases are repeated to refine a solution or to test the system as it is developed. There are three main structures: linear, evolutionary and agile. These are subdivided into other models, e.g. a V model within the linear structure. The type of project will influence the model chosen, e.g. a V model might be chosen for a project where the risks need to be kept low as the V model involves testing at each stage of the development process and this helps to reduce the risks. It is possible to combine models and use, for instance, an incremental waterfall lifecycle.
Testing	This is an important phase of the systems development life cycle. Some methodologies increase the amount of testing throughout the project and this limits the risks, e.g. V model. The requirements and design specification will form the basis of the test plan. Client or user acceptance testing also forms part of the test plan. Each set of tests will need to be formally signed off.
Unified Modelling Language (UML)	A standard notation for the development of models for business systems. UML provides a set of diagrams that provide sufficient detail from the analysis to the implementation stages of a system that is being developed. There are two groups within UML: diagrams that show structure and those that show behaviour. Use case, activity, interaction overview, sequence, communication and timing are all behaviour diagrams.
Use case diagram	A diagram, which looks rather like a flowchart, which shows a system boundary, actors, input, validation, processing and output for a system. It will show which actors need access to different parts of a system. It shows the interaction between the different parts of the system.

Explanations of the key terms used within this unit, in the context of this unit	
Key term	**Explanation**
Viable	There are two types of viability in relation to systems design. The first looks at whether a proposed systems development is economically viable, i.e. whether the benefits will outweigh the costs, and this is related to how quickly the company can recover the money it has spent on the new or improved system. The second looks at whether it is physically viable, i.e. whether the changes can be made to the current system. The answer to both of these needs to be 'yes' for the decision to go ahead to be reached. If it is not economically viable then a recommendation in the feasibility report might be to limit the scope of the changes proposed to make it cheaper.
Virtualisation	Hardware, software, storage, networks and devices which are virtual rather than physical. Virtualisation of hard disk storage space, processing power and RAM enables a lightweight computer to replace desktop computers with a significant saving in costs.
Waterfall methodology	This is a linear systems development life cycle where the different phases are done in sequence with each phase flowing into the next. Sometimes this model is combined with another.

MISCONCEPTIONS

Some common misconceptions and guidance on how they could be overcome		
What is the misconception?	**How can this be overcome?**	**Resources which could help**
The difference between flow charts and DFDs	Show the difference in the symbols used and explain that flow charts show a process of decisions or rules being applied during a series of steps to complete a task or process, whereas DFDs have different symbols and are concerned with what happens to information within a system – the input, process, storage and output that takes place during a process.	Organisation: Teach-ICT.com Resource Titles: Data Flow Diagrams (DFD); What is a flowchart? Website Links: http://www.teach-ict.com/as_a2_ict_new/ocr/A2_G063/331_systems_cycle/analysis_tools/miniweb/pg10.htm http://www.teach-ict.com/as_a2_ict_new/ocr/A2_G063/331_systems_cycle/analysis_tools/miniweb/pg19.htm Description: Theory and diagrams of DFDs and flow charts. A wide range of resources for teachers of ICT from Key Stage 3 to Key Stage 5.
The difference between logical and physical designs	Sometimes it is difficult to know where the logical designs end and the physical designs begin. Some physical designs are more detailed versions of the logical design and some items like output, input and data can occur in both logical designs and in more detail in the physical designs. One way to distinguish the difference is to identify logical designs as not relating to software or platforms, so a logical design of data will show the entity relationships and attributes but not the data dictionary which tables fields and field types. With input the logical design will identify what information is input in a data flow diagram but not the design of input screens. So anything which identifies the software, hardware, and environment such as a web browser will be physical design and anything which cannot be identified as either a paper-based or computerised system is logical design.	Organisation: Wikipedia Resource Title: Systems design Website Link: https://en.wikipedia.org/wiki/Systems_design Description: Article on systems design with sections on logical and physical design. Organisation: Dixit, J.B. and Kumar, R. Resource Title: Structured System Analysis and Design Website Link: http://www.laxmipublications.com/servlet/lpgetbiblio?bno=001056 Description: Book on structured systems analysis and design which has clear explanations and illustrations. Available as an eBook.

SUGGESTED ACTIVITIES

LO No:	1		
LO Title:	**Understanding the role of systems analysis and design in relation to the systems development lifecycle**		
Title of suggested activity	**Suggested activities**	**Suggested timings**	**Also related to**
Why develop new systems?	Tutors could introduce the topic by asking learners to think about what makes businesses want to change existing systems or create new ones. Learners, working in pairs, could share their thoughts and write each reason on a sticky note. These could be displayed to the larger group. Learners would be able to read what the other groups had written. Tutors could then ask learners as a group if they can put these items into categories. Tutors could name each category. Learners in their pairs would move each item they had written into a relevant category. Tutors could summarise the findings at the end of the session. A suggested resource: Organisation: Ian Linton, Demand Media Resources title: Five Reasons Organizations Develop IT Systems Website Link: http://smallbusiness.chron.com/five-reasons-organizations-develop-systems-23853.html Description: An article in the Houston Chronicle by a UK based author.	30 minutes	
Components of a systems development lifecycle	Learners' previous knowledge of development lifecycles might be quite varied. Tutors could ask learners open questions regarding phases of a systems development lifecycle to find out what they know. Learners' answers could be written on a whiteboard. Tutors will need to raise sufficient questions to obtain all the phases from the group. Tutors could ask learners if there is a particular order that the components need to be in. Tutors could relate their questions to units where learners have created a product. Tutors could ask learners if they can identify what phases a systems analyst works on. Learners could identify the phases from those that have been listed on the whiteboard.	30 minutes	Unit 6 LO1 Unit 8 LO1 Unit 9 LO1 Unit 11 LO2, LO3

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Feasibility study – terms of reference	Tutors could introduce the learners to the feasibility stage. This could be related to a real life situation learners might have come across in a work setting, an educational setting or a personal project. Tutors could ask learners to get into groups and tutors could provide a case study for each group. Learners could be asked to discuss the case study and record their findings using the following headings: • The objectives of the proposed system • The scope of the new system • Identity of the project supervisor • Any constraints. Learners' groups could provide feedback to tutors by summarising what they have found under these headings. Suggested sources for a case study could be: Organisation: Kevin Bowman Resource Title: Systems Analysis: A Beginner's Guide Website Link: http://www.amazon.co.uk/Systems-Analysis-A-Beginners-Guide/dp/033398630X Description: Provides 2 case studies in the book and a further case study at the end for teachers to use. Organisation: George M. Marakas Resource Title: Systems Analysis and Design: An Active Approach Website Link: http://www.amazon.com/Systems-Analysis-Deisgn-Active-Approach/dp/0130225150 Description: Contains role play case scenarios supported by multi-media via a website. Organisation: FreeTutes Resource Title: Library Management System Website Link: http://www.freetutes.com/systemanalysis/sa3-preliminary-analysis-case-study.html Description: Case study with preliminary analysis and economic analysis already completed. Organisation: David Avison and Hanifa Shah Resource Title: The Information Systems Development Life Cycle: A First Course in Information Systems Website Link: https://books.google.co.uk/books/about/The_Information_Systems_Development_Life.html?id=RuVQAAAAMAAJ Description: Case study at the end of each chapter which has the same scenario; Chapter 4, on the Feasibility Study, has a short case study and exercise at the end of it.	45 minutes	Unit 6 LO2 Unit 8 LO2

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Feasibility study – report	Learners could be asked to continue their work in groups using the case study and record their findings in response to the following questions: • What are the causes of the current problems? • What must the new system be able to do? • What are the possible solutions? • How do the possible solutions compare in terms of the hardware and software needed, the time required to implement the changes and the costs involved? Learners could provide feedback to the tutors by summarising what they have found.	45 minutes	Unit 6 LO2 Unit 8 LO2
Feasibility study – costs	Tutors could introduce the topic of costs associated with systems development by asking learners to brainstorm on the costs that might be involved in the development and the likely benefits that could be used to offset these costs. Tutors could produce a mind map to record the outcomes of the brainstorming exercise. Tutors could relate the different costs to the relevant stages of the development of a new system. Tutors could provide figures for learners to compare the costs of development, the payback period required, and the net present value for three proposed solutions to a systems development. Learners could then rate the solutions in order of their economic viability.	30 minutes	Unit 6 LO2 Unit 9 LO1
Life cycle models	Tutors could introduce different life cycle models by showing learners a short video that compares the Waterfall and Agile models. Available at: https://www.youtube.com/watch?v=1r-BNaR_TDc Learners could be asked to research two life cycle models from each type of life cycle – linear, evolutionary and agile – and to produce a short presentation showing a diagram for each life cycle and the advantages and disadvantages for each model.	1.5 hours	Unit 1 LO3 Unit 6 LO1 Unit 8 LO1 Unit 9 LO1

SUGGESTED ACTIVITIES

LO No:	2		
LO Title:	Be able to use investigative techniques to establish requirements for business systems		
Title of suggested activity	**Suggested activities**	**Suggested timings**	**Also related to**
Gathering requirements – interviews	Tutors could begin by explaining how requirements differ depending on the role of the person providing the information. Tutors could ask learners to carry out a range of role play activities. Learners could be given time to prepare their questions and responses before carrying out each role play activity. Suggestions for scenarios that could be role played and form the basis of whole group or small group discussions are: Scenario 1 – end-user in Human Resources, details of current system and requirements interview with systems analyst. Scenario 2 – company boss interested in improving efficiency and reducing staffing, requirements interview with systems analyst. Scenario 3 – network manager concerned about any downtime and effects on the system while it is being updated, current system and requirements interview with systems analyst. Scenario 4 – financial director/accountant concerned about the accuracy of data, interview to provide details of current system and requirements with the systems analyst.	1 hour	Unit 2 LO6 Unit 6 LO2 Unit 8 LO2 Unit 9 LO2 Unit 11 LO1 Unit 12 LO3 Unit 14 LO2 Unit 18 LO2
Documentation analysis	Tutors could introduce the topic of documents as a means of investigating what information is currently collected and what it is used for. Learners could be provided with a set of internal and external documents for a business, to look at and make notes about and then discuss in groups of three or four. Learners could create a table to record the details of each document and what information is being captured, whether there is any duplication, the flow of the information and how many different people are likely to use the same information.	30 minutes	Unit 6 LO2 Unit 8 LO2 Unit 9 LO2
Observation/shadowing	Tutors could introduce observation/shadowing to learners as something that often happens on work placements or the tutors could provide a video of some relevant tasks being performed. Learners could practise their observation skills by shadowing/observing someone in a work situation. Learners could write up their observations covering the tasks observed, the flow of information, any documents or files used and the amount of time spent on each task.	30 minutes to 1 hour	Unit 6 LO2 Unit 8 LO2 Unit 9 LO2

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Designing questionnaires and surveys	Tutors could begin the topic by asking learners to complete a short online survey (or paper-based questionnaire). Tutors could then explain to learners how they had carefully chosen the type of question and responses to gather appropriate information. Useful resources for creating an online survey could be: Organisation: SurveyMonkey Resource Title: Free online survey software & questionnaire tool Website Link: https://www.surveymonkey.com Description: Surveys of 10 questions can be distributed to 100 people for free. Organisation: SmartSurvey Resource Title: Online Survey Software & Questionnaire Tool Website Link: https://www.smartsurvey.co.uk/ Description: Surveys of 15 questions can be distributed to 100 people for free. An alternative source could be a VLE where it might be possible to create questionnaires and distribute them to learners who have access to the VLE. Learners could design their own short survey/questionnaire to gather some requirements for a new system. Other learners could complete the survey so that all learners have some data that they can analyse. Tutors could demonstrate using tools to analyse the information gathered to inform decision-making.	1.5 - 2 hours	Unit 6 LO2 Unit 8 LO2 Unit 9 LO2
Qualities needed by a systems analyst	Tutors could ask learners to reflect on the skills that a systems analyst needs to have to be able to perform their role during the requirements investigation stage. Learners could then share their thoughts with the whole group by writing the qualities on sticky notes and sticking them on a flipchart. Learners would be given an opportunity to read what others had written and the tutors could pick out a few good examples for learners to reflect on.	20 minutes	
Requirements specification	Tutors could explain the importance of the requirements specification and go through an example requirements specification with the whole group. Learners could be provided with a template to use for their requirements specification. Learners could be provided with sufficient information in various formats which they need to put into their requirements specification. Suggested resource: Organisation: Teach-ICT Resource Title: The Requirements Specification Website link: http://www.teach-ict.com/as_a2_ict_new/ocr/A2_G063/331_systems_cycle/specifications/miniweb/pg4.htm Description: An example of a well-structured requirements specification.	1 hour	Unit 6 LO2 Unit 8 LO2 Unit 9 LO2 Unit 11 LO1

SUGGESTED ACTIVITIES

LO No:	3		
LO Title:	Be able to develop and document models for business systems		
Title of suggested activity	**Suggested activities**	**Suggested timings**	**Also related to**
Functional diagrams – DFDs	Tutors could begin the topic by displaying a DFD to learners and asking open questions as to what it shows and why systems analysts might use DFDs. Tutors could explain each of the symbols and lines drawn on the DFD. Tutors could start a list of rules for drawing DFDs and ask learners if they can discern some of the rules for drawing DFDs from the one displayed. Learners could be provided with an audio recording describing a process (e.g. online orders for furniture) and asked to draw a Level 1 DFD to illustrate this. After drawing their DFDs learners could work in pairs to check the accuracy of one another's DFDs.	1 hour	Unit 6 LO3 Unit 11 LO4
Functional diagrams – flow charts	Tutors could begin by showing learners the symbols used in flow charts and asking them if they know what they signify. Tutors could start a list of the rules that apply to drawing flow charts and invite learners to contribute. Tutors, with group participation, could break down an everyday task into the steps involved and place them in the order they would need to be done in. Tutors, with group participation, could then draw this task as a flow chart. Learners could be asked to break down a computer process into its separate steps and draw a flow chart to illustrate the process. Suggested computer processes could include: printing a document, processing an order for goods, processing an annual leave request, processing applications for a vacancy, handling computer fault reports. Learners' flow charts could be presented to the whole group as a slide show with music at the end of the session.	1 hour	Unit 6 LO3 Unit 11 LO4

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Functional diagrams – structure charts	Tutors could introduce learners to how structure charts are used in systems design to show processes by providing examples and explaining the symbols used. Tutors could then explain how some design tools relate to the programming language that will be used in coding the procedures and lead on to a Jackson structure chart. Learners could be asked to research Jackson structure charts and provide a brief introduction and an example of a Jackson structure chart with an explanation of the symbols and terms used. Some suggested resources on structure charts in general : Organisation: Philip Cooke Resource Title: Introduction to Structure Charts Website Link: https://www.youtube.com/watch?v=SQa5NbUwB-s Description: Explanation of structure charts. Length: 3.21 minutes. Organisation: Audiopedia Resource Title: Structure chart Website Link: https://www.youtube.com/watch?v=yj2ekw0YVpU Description: Structure chart in relation to systems analyses. Length: 4.18 minutes. Organisation: Leon Marsden Resource Title: Structure Chart to Pseudo code – Sequence Website Link: https://www.youtube.com/watch?v=rXK0-N1ZsSM Description: Shows how to read a structure chart. Length: 7.02 minutes.		
Static data diagrams	Tutors could ask learners to divide into three groups to discuss the different types of diagrams for static data in a business system. Each group could be provided with documentation and an example of the diagram they are discussing. Group 1 could discuss Entity Relationship Diagrams and summarise what they show and the advantages and disadvantages of using this type of diagram. Group 2 could discuss hierarchical tree diagrams and summarise what they show and the advantages and disadvantages of using this type of diagram. Group 3 could discuss bubble diagrams and summarise what they show and the advantages and disadvantages of using this type of diagram. The three groups could then provide feedback to the whole class.	1 hour	Unit 6 LO3 Unit 11 LO4

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Events diagrams – ELH	Tutors could direct learners to useful resources about entity life histories as used in modelling business systems. Some suggested resources are listed below: Organisation: theteacher.info Ltd Resource Title: Entity Life History Website Link: http://theteacher.info/index.php/f453-advanced-theory/3-3-9-databases/notes/382-entity-life-history-elh-notes Description: A short explanation with diagrams of an Entity Life History. Organisation: TechnologyUK Resource Title: Entity Life Histories Website Link: http://www.technologyuk.net/computing/sad/entity_life_history.shtml Description: Description with diagrams covering increasingly more complex Entity Life History diagrams. Tutors could question learners about their understanding of entity life history diagrams and agree on a whole group meaning of the term. Learners could be asked to get into small groups and identify as many reasons as they can why they think creating entity life histories is important for systems analysts.	45 minutes	
UML – diagrams	Tutors could introduce UML diagrams by giving a short explanation of what they are. Learners could then be asked to view a selection of resources on different UML diagrams. Learners could be provided with questions to answer about the different diagrams so that they compare them and explain their roles in systems modelling. Learners could be provided with a case study from which they are requested to produce one or two different types of UML diagrams. Suggested resources could include: Organisation: TechnologyUK Resource Title: An Introduction to OOAD Website Link: http://www.technologyuk.net/computing/sad/intro_to_ooad.shtml Description: An introduction to object-orientated analysis and design. Organisation: Business Analysis Excellence Pty Ltd Resource Title: How to draw a UML Use Case Diagram Website Link: https://www.youtube.com/watch?v=UzprPX82Nac Description: The basics of drawing a UML Use Case Diagram. Length: 6.15 minutes.	2 hours	Unit 6 LO3 Unit 11 LO4

Title of suggested activity	Suggested activities	Suggested timings	Also related to
UML – diagrams (continued)	Organisation: Stretch Projects Resource Title: 7 Use Case Diagrams – Intro to Systems Analysis Website Link: https://www.youtube.com/watch?v=oil8CRsc8bg Description: Introduction to drawing use case diagrams. Length: 6.05 minutes. Organisation: Derek Banas Resource Title: UML 2.0 Activity Diagrams Website Link: https://www.youtube.com/watch?v=XFTAIj2N2Lc Description: Talks through an activity diagram, describing the symbols used. Length: 12.23 minutes. Organisation: Mike Murphy Resource Title: UML Activity Diagrams Website Link: https://www.youtube.com/watch?v=yAihwmczqsk Description: Activity diagrams with different activities shown in sequence. Length: 8.12 minutes. Organisation: uml-diagrams.org Resource Title: UML 2.5 Diagrams Overview Website Link: http://www.uml-diagrams.org/uml-25-diagrams.html Description: A useful website for seeing what different UML 2.5 diagrams look like and information about all behavioural and interaction diagrams in the Teaching Content. Organisation: Tutorials Point Resource Title: UML – Interaction Diagrams Website Link: http://www.tutorialspoint.com/uml/uml_interaction_diagram.htm Description: How to draw interaction diagrams – sequence diagrams.		

SUGGESTED ACTIVITIES

LO No:	4		
LO Title:	**Be able to create logical and physical designs for specified business systems**		
Title of suggested activity	**Suggested activities**	**Suggested timings**	**Also related to**
Logical and physical designs – introduction	Tutors could introduce the topic by providing learners with definitions of both logical and physical designs and ask if they have done any of these designs already. Tutors could ask learners where in the development lifecycle they need to create logical and physical designs. Tutors could ask the whole group to divide into smaller groups to discuss these questions further and make notes of their answers under the headings provided in the Teaching Content under logical and physical designs. Tutors could circulate between the groups to check on what notes they had made.	45 minutes	Unit 3 LO3 Unit 6 LO3 Unit 9 LO2 Unit 11 LO3 Unit 12 LO3 Unit 14 LO3 Unit 18 LO2
Virtualisation	Tutors could introduce virtualisation by providing a definition and some examples. Tutors could use Q&A to discover how much learners already know about this topic. Suggested resources: Organisation: Nezer Jacob Zaidenberg Resource Title: Applications of Virtualization in Systems Design Website Link: https://jyx.jyu.fi/dspace/handle/123456789/38273 Description: Introduction to virtualisation, good coverage of system virtual machines, implementation of system virtual machines, process virtual machines, storage virtualisation, network virtualisation and cloud virtualisation. Organisation: BCS Resource Title: Virtual technology, real results Website Link: http://www.bcs.org/content/conWebDoc/7647 Description: Article on how virtual technology is revolutionising the way servers are used in organisations. Organisation: BCS Resource Title: Virtualisation: yesterday, today and tomorrow Website Link: http://www.bcs.org/content/conWebDoc/36263 Description: Article written in 2010 on the growth of virtualisation. Learners could be asked to research virtualisation in relation to systems analysis and design and then to each produce a presentation on virtualisation. The presentations could be displayed for the whole group to view.	1–1.5 hours	Unit 1 LO3 Unit 11 LO1 Unit 18 LO1

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Logical and physical designs	Tutors could continue the topic of logical and physical designs by asking learners to describe the characteristics (i.e. the components, boundaries, purpose, environment, interfaces, input, output, constraints and any interrelated components), of a current system that learners know, perhaps from work or college. Learners could be asked to produce logical and physical designs for all or part of that system.	1–2 hours	Unit 3 LO3 Unit 6 LO3 Unit 9 LO2 Unit 11 LO3 Unit 12 LO3 Unit 14 LO3 Unit 18 LO2
Organising documentation	Tutors could introduce learners to the documentation that is required for the new system by providing learners with details of each document and a summary of its content, or providing them with examples of each document. Tutors could create a drag and drop computer game or paper-based exercise where learners could indicate by arrows, drag and drop on screen or physically place the document in an appropriate folder. The folders could be named using a layered approach to systems design. Learners could then be asked to write a short article about how documenting the logical and physical designs of a new or updated system forms a basis for testing the system after it has been implemented.	45 minutes	
Presenting to stakeholders	Tutors could introduce presenting to stakeholders by asking learners to watch some short videos of presentations to stakeholders and make notes of their strengths and weaknesses. Suggested sources could be videos of *Dragons' Den* (http://www.bbc.co.uk/dragonsden/entrepreneurs/) and worst and best presentations and presentations to stakeholders from *The Apprentice* (https://www.youtube.com/results?search_query=the+apprentice+pitching+a+product). Tutors could then ask learners to reflect on their own strengths and weaknesses with regard to presentation skills. Learners could then use the GROW model to record what steps they could take to improve their presentation skills. (GROW = Goal, Reality, Options, Will)	1 hour	Unit 6 LO4 Unit 10 LO4 Unit 12 LO4 Unit 14 LO4 Unit 18 LO2
Responding to feedback	Tutors could ask learners to reflect on their personal response to feedback that they have received. Tutors could ask for a show of hands from learners that had responded positively to feedback. Tutors could ask learners what response a systems analyst should have to feedback. Tutors could start a list and learners could participate in completing it giving reasons why systems analysts need feedback from stakeholders. Learners could be asked to form small groups to role play giving and receiving feedback after a presentation to stakeholders. Learners playing the role of stakeholders giving feedback could be asked to use a praise sandwich (good, needs to be changed, praise). Learners playing the role of systems analysts could be asked to respond positively and obtain as much feedback as possible as this will assist them in understanding and making the required improvements to the system.	1 hour	Unit 6 LO4 Unit 12 LO4 Unit 14 LO4

The small print

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