A2 ICT Unit 3 Learning Objectives

1 Networks

Choosing a network for a company

Candidates should understand the factors which influence choice:

- cost of network
- size of organisation
- how the system will be used
- existing systems
- performance required
- security issues

Types of networks available and the use of associated hardware

Candidates should understand the advantages and disadvantages of:

- client server networks
- peer to peer networks

| Network topologies | Bus/Ethernet Ring Star Suitable topologies for LAN and WAN Advantages and disadvantages of different network topologies |
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| Wireless networking | Advantages and disadvantages of wireless networks |

Software components

| Network management, administration and problem solving strategies | User accounts and logs; security strategies; configuration management; remote management; disaster planning (backup and restoration); auditing (keeping logs). |
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2 The Internet

Candidates should recognise the Internet as a network of networks.

The Impact of the Internet upon Business

Candidates should understand the use of associated hardware and the advantages and disadvantages of:

| (i) FTP | Distribution of information between business and other organisations. |
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| (ii) E-commerce | The requirements of interactive shopping, for example maintaining a company website, catalogue of stock, methods of secure payment, database of customer orders. Advantages and disadvantages to both the customer and business. |
| (iii) Online databases | How to access online information. How a search engine works, how web pages are added to search engine lists. Define and explain how the following can be used to access information: URL's Web crawlers Boolean searches Hyperlinks |
| (iv) Distributed | Shared processing across the Internet and its advantages and disadvantages |

| computing using the | e.g. WHO's 'Popular Power' influenza research; music distribution; SETI research |
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| Internet | into radio signals. |

Connecting to the Internet

Candidates should be able to:

| Cable access to the Internet | describe the use of and the advantages and disadvantages of Dialup and Broadband; |
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| Mobile access to Internet | describe the use of and the advantages and disadvantages of mobile access to the Internet. |

Moral, Social and Ethical Issues associated with the Internet

Candidates should show an awareness and understanding of:

- censorship
- accuracy of information
- privacy
- effects upon communities
- ownership and control

3 Human Computer Interface

The factors to be taken into account when designing a good user interface.

Candidates should understand the importance of:

- consistency of signposting and pop up information
- on screen help
- layout appropriate to task
- differentiation between user expertise
- clear navigational structure
- use by disabled people

4 Working with ICT

Telecommuting

| Teleworking | 'Working from home using computer networks'. |
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| | Use and associated hardware. |
| | Advantages and disadvantages for the organisation and individual. |
| Video- conferencing | Use and associated hardware. |
| | Advantages and disadvantages for the organisation and individual. |

Codes of Conduct

| Definition | An agreement made by an employee to obey the rules of the organisation and work within |
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| | specified guidelines as regards use of ICT and the Internet. |
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| Potential Problems | Introduction of viruses. Misuse of ICT such as using an organisation's printers for personal work. Using the Internet and running up telephone bills for own purposes, using company time for personal email. |
| | Distribution of material that is racially or sexually offensive. |
| | Misuse of data for illicit purposes. |
| | Inappropriate use of mobiles phones – in restaurants, schools, public transport. |
| | Blackmail, computer fraud or selling to other organisations. |
| | Violating terms of copyright or software agreements. |
| Contents of a | Responsibilities |
| code of conduct | Respecting rights of others |
| | Abiding by current legislation |
| | Protecting hardware and software from malicious damage |
| | Complying with licensing agreements |
| | Authorisation |
| | Permissions on data access |
| | Security defining rules about password disclosure, personal use of emails and the Internet and data transfer rules |
| | Penalties for misuse |
| | informal warnings |
| | written warnings |
| | • dismissal |
| | prosecution |
| Difference | Disinformation |
| between Legal and Moral issues with | Not fully informing potential customers or clients of all available facts concerning products or services e.g. imminent introduction of new models. |
| respect to codes | Privacy |
| or conduct | Informing data subjects of their legal rights and processes for complying with those rights. |
| | Monitoring company emails. |
| | Employment patterns |
| | Effects upon the workforce. |
| | Personal empowerment. |
| | Equity |
| | Information poor and information rich societies and the consequences of such. |
| | Intellectual property rights |
| | Ownership rights to data. |

5 ICT Security Policies

Candidates should understand the potential threats and consequences for data misuse and understand the need for backup procedures

Threats

- Terrorism
- Natural disasters
- Sabotage
- Fire
- Theft

Consequences

- Loss of business and income
- Loss of reputation
- Legal action
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| deliberate crimes | |
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| Prevention of | Methods for controlling access to computer rooms |
| | Backing up program files. |
| | Grandfather, Father, Son systems |
| accidental misuse | RAID systems – mirror discs (Redundant Array of Inexpensive Disc) |
| | Standard backups to floppy disc |
| Prevention of | Backup and recovery procedures |
| | Set up auditing procedures (Audit trails) to detect misuse. |
| | Establish a disaster recovery programme |
| | Establish security rights for updating web pages |
| | Define procedures for downloading from the Internet, use of floppy discs, personal backup procedures |
| procedures for preventing misuse | Routines for distributing updated virus information and virus scanning procedures |
| Operational | Screening potential employees |
| | Disciplinary procedures. |
| | Staff code of conduct and responsibilities |
| | Operational procedures including disaster recovery planning and dealing with threats from viruses |
| | Personnel administration |
| | System Access - establishing procedures for accessing data such as log on procedures, firewalls |
| | Continuous investigation of irregularities |
| designing security policies | Audit trails for detection |
| | Prevention of misuse |
| The factors to take | Physical security |

| or misuse | Methods of securing integrity of transmitted data e.g. encryption methods including private and public keys. Call back procedures for remote access |
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| | Establish firewalls |
| | Proxy servers |
| | Methods to define security status and access rights for users |
| | Methods for physical protection of hardware and software |
| | Security of document filing systems. |
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Factors determining how much a company spends to develop control minimising risk

| Identify potential risks |
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| Likelihood of risk occurring |
| Short and long term consequences of threat |
| How well equipped is the company to deal with threat |
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| 6 Database systems | |
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| Databases | Explain the terms data consistency, data redundancy, data integrity and data independence. |
| | Explain the terms relational database organisation and data normalisation. |
| | Restructure data into normalised form. |
| | Describe the use of primary keys, foreign keys and links. |
| | Describe the advantages of different users having different views of data. |
| | Database security. Recognise that the individual user of a database may be prevented from accessing particular elements of the information. |
| | Data warehousing and data mining. |
| | The purpose of a database management system (DBMS), query languages and data dictionaries. |

Distributed databases

Candidates should be able to define a distributed database and discuss their advantages and disadvantages with reference to suitable examples.

| 7 Management of Change | | |
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| Consequences of change | Candidates should be aware of the effects upon; | |
| | the skills required and not required | |
| | organisational structure | |
| | work patterns | |

| internal procedures |
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| • • the workforce (fears introduced by of change) |

8 Management Information Systems Candidates should: recognise Management Information Systems as organised collections of people procedures and resources designed to support the decisions of managers;

| Features of an effective Management Information System | appreciate that Management Information Systems should: |
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| | include data that is relevant and accurate |
| | give information when required |
| | be accessible to wide range of users |
| | present data in the most appropriate format |
| | • • be flexible |
| Understand the flow of information between external and internal components of an MIS | be able to draw and interpret data flow diagrams. |
| Features of good MIS | To include; |
| | accuracy of the data |
| | flexibility of data analysis |
| | providing data in an appropriate form |
| | accessible to a wide range of users and support a wide |
| | range of skills and knowledge |
| | improve interpersonal communications amongst |
| | management and employees |
| | allow individual project planning |
| | avoid information overload |
| Factors which can lead to poor MIS | To include; |
| | complexity of the system |
| | inadequate initial analysis |
| | lack of management involvement in initial design |
| | inappropriate hardware and software |
| | lack of management knowledge about computer systems |
| | and their capabilities |
| | poor communications between professionals |
| | lack of professional standards |
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9 System Development Life Cycle (SDLC) Candidates should understand the main components of the SDLC and how they may be applied to the development of a computerised solution as listed below.

| System Investigation | Analysis of existing system and feasibility report |
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| | (a) Existing Hardware and Software |
| | (b) Definition of the scope of the present system |
| | Organisational chart |
| | Define sources of data |
| | Methods of data capture |
| | (c) Major data processing functions and processes |
| | High level (contextual view) data flow |
| | (d) Identification of problems with the present system |
| | (e) Identify user requirements for the new system |
| | (f) Analysis of costs and benefits of the new system |
| System Analysis | Identify and understand tools and techniques used to analyse a system. |
| | Identify external and internal components to a system and the flow of data between them including Data Flow Diagrams (DFDs), including High level (contextual view) DFDs and low level (detailed view) DFDs, decision tables and systems diagrams. |
| | Candidates must be able to use all of the elements of a Data flow diagram correctly including: |
| | flow direction line |
| | • process |
| | • entity |
| | data store |
| | Data dictionaries. |
| | Entity Relationship diagrams. |
| | Candidates should understand that a 'Data Model' includes an: |
| | Entity - Places, object or people represented by data in a spreadsheet or database |
| | Attribute - Information of facts about an entity |
| | Entity relationship modelling - candidates should be able to draw and interpret ERM diagrams: one to one, one to many, many to many. |
| System Design | Design of hardware, software, data and file structures, information systems, network and data transmission issues, personnel issues and security processes and procedures. |
| System Implementation | Acquisition and installation of hardware and software re-training. |
| | Appropriateness of different changeover strategies including 'direct' and 'parallel running'. |
| System Maintenance | Technical and User Documentation. |
| | Maintenance issues including identification of errors, security issues, changes in the |

| | business environment, dissatisfaction with hardware and software, updating the system |
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| | Perfective, Adaptive, Corrective maintenance |
| System Evaluation | Criteria for evaluating a system. |
| | Understand the tools and their appropriateness for gathering information for the evaluation report including quantitative test, Error Logging Interviews, Questionnaires |
| | Methods of avoiding post implementation cost. |