### 5 Capabilities and Limitations of ICT

 Advantages of ICT over manual methods of processing data

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2. Factors affecting the efficiency of data processing systems

#### Learning Objectives

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- 1. Advantages of ICT over manual methods of processing data
  - a. You should be able to give an application and explain each of the following: repetitive processing, speed of processing, data storage capacity, speed of searching, accuracy and speed of data communications, the ability to produce different output formats.
- 2. Factors affecting the efficiency of data processing systems
  - a. You should understand the effects of: hardware, software, suitability of the operating system, communication and input (GIGO);
  - b. Understand the nature of computer software, change in circumstances during development, speed of implementation, compatibility, insufficient testing, poor communications with user, abilities of the user, poor post-implementation procedures, maintenance procedures, cost, hardware, support.

#### ICT or manual methods

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- A system can be defined as a set of activities that involve input, processing and output.
- Systems can be computer based or manual
- ICT systems uses digital technology, hardware and software to store data and produce outputs.
- Manual systems do not involve a computer. The processing is carried out by humans, as are the outputs.
- How can we store data manually?

#### ICT or manual methods

- ICT systems have become increasingly important due the reasons below:
  - They carry out repetitive tasks
  - Speed of processing
  - Storage capacity

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- Speed of searching for data
- Greater accuracy and speed of data communication
- Easy to produce different output formats
- For one of the areas above, produce an information sheet advising people of the advantages of ICT systems over manual methods.

#### **Example exam question**

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ICT systems process data faster then manual systems. Describe two additional advantages of ICT over manual methods of data processing using suitable examples in each case. [2 × 2]



### a r t i S m e

#### Limitations of ICT

- The ability of an ICT information system can be affected by a number of factors including:
  - Hardware
  - Software
  - Suitability of the operating systems
  - Communication
  - Input
- Create a presentation that can be placed on the website.

#### Hardware limitations

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- As advanced as technology is there are constraints on what we can do
- This can be due to not having the funds to purchased the required equipment, not having access to the equipment, or the features you need just not being there yet.
- For example, it would be difficult for the average home user to use designs to create 3D printouts due to availability and cost.
- The hardware needs to be reliable. If a company's computer system is consistently breaking down, customers are not going to trust them leading to lost sales.

#### Hardware limitations

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- The faster a processor on a computer, the quicker it can process data. If a company only has access to old machines then data processing will be slow. This would reduce efficiency.
- Input and output devices may be too slow or the computer be find it difficult to handle the data from them. For example, a OMR may read thousands of forms which would take a long time and lots of memory. The computer may not have the memory to cope.



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- It is vital that the software is appropriate for the task
- Off-the-shelf software maybe less expensive than bespoke but is less likely to contain all the features needed, and will have unneeded features.
- If bespoke software is poorly written it may not take the needs of the user into account and maybe inefficient.
- Interfaces maybe poorly designed meaning using the system could be frustrating and time consuming.

# Suitability of operating system

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- The operating system can limit the software and hardware that can be used.
- If the system only requires text inputs then a command-line operating system may do. If the system is intended for novice users then GUI would be more appropriate.
- If there is a need for quick, up-to-date information then a batch-processing system would not be effective.
- For example, if all the orders for flights were all processed together at the end of the week, people would not know if they had tickets or not. Instead a real-time system would be more appropriate.



#### Communication

- What is the available or capacity of communication?
- If the systems requires lots of transmission of data using the Internet and the bandwidth available is small, the system would not run efficiently.
- Conference calls may not be possible due to the limits in band-width.



#### Input

- We have talked about this before. An information system is only as good as the data held.
- If poor, inaccurate data is collected, the information provided will be unreliable.

#### **Computer systems**

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- At some point all the software we use now had to be created by someone, usually a team of programmers
- Large companies pay a lot of money to have software specifically made for them (bespoke or custom written software).
- The team of developers who make the software will go through a long process of analysis, design, implementation, testing, installation and maintenance.

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- The process of making a system is long. During this time circumstances may have changed that are not reflected in the system. They may have changed their business operations.
- The **speed of implementation** my be increased in order to meet customer needs or to release commercial software before a rival. The resulting software may have errors and not perform as expected.
- Some system go over the proposed development time. This could increase costs, reduce customer confidence and may no longer be relevant.

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- New software, or upgraded software, may have **compatibility** issues. The data produced by the new system may not be compatible with existing systems. The new system may not run on existing hardware.
- Insufficient testing may have taken place leading to errors be missed. End user testing may have been left end. Real users have a way of causing software to work in unexpected ways and in different situations with different hardware.

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- The developers may have had **poor communication with the client and users**. If the developers have misunderstood what the client and end user want from the system, they may create a solution that does not meet their needs. It is important that communication occurs all through the development of the system with the client agreeing or suggesting improvements.
- The ability of the user is a factor as without the skills or training, they will not be able to use the system effectively. The developers should take into account the abilities of the users when creating a system and ensure training is provided if necessary.

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- **Post-implementation** procedures include training staff and the transfer from the old ways to the new. If these procedures are poorly planned and carried out the new system is unlikely to run as efficiently.
- When the system is in place, good **maintenance** must be followed. Regular backing-up and archiving of data must happen. If data is not backed-up regularly then if there is a problem there is nothing to go back to. If archiving does not happen then unneeded data will remain in the main system, slowing down searches and increasing storage requirements.

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- Other maintenance activities include checking that the software is running efficiently, fixing bugs with patches, improving hardware if needed, and maintaining virus protection.
- Changes to the system would be due to:
  - Problems needing to be fixed (corrective)
  - Changes to the way the business operates (adaptive)
  - Improving the system due to new technology or ideas (perfective)



#### Summary

- ICT systems have the following advantages over manual for processing data:
  - Repetitive processing
  - Speed of processing
  - Vast storage capacity
  - Speed of searching for data
  - Greater accuracy and speed of data communication
  - Ability to produce different output formats

- Factors that affect the efficiency of data processing include:
  - Hardware
  - Software
  - Suitability of operating system
  - Communication
  - Quality of input

#### **Example exam question**

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Efficient data processing systems offer many advantages when processing large amounts of data.

Other than *hardware* and the *quality of data being entered*, describe **three** factors affecting the efficiency of data processing systems. [3]

