

IT AS NOTES

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Chapter 1 - Data, Information, knowledge and processing

Data, Information and knowledge

Data – raw facts and figures before they have been processed.

Information – Data + [structure] + [context] + Meaning

Structure – how the data is presented? Are the numbers actually numbers or should they be read as text?

Context – an environment where our prior knowledge and understanding can make sense of the data.

Meaning – data in the correct structure and placed within the context.

Knowledge – the application of information to a situation.

Data on its own is meaningless. When we add context, structure and meaning to data we get information. Knowledge is the application of that information to a situation – in other words, putting the information to use.

Example:

Data: 46, 54

Information: Scores for team 1 and team 2, respectively, in a pub quiz.

Knowledge: Team 2 won

Representation methods

- Text (including writing)
- Graphics (including pictures)
- Sound (including voice)
- Moving pictures (animation or video)
- Light-Emitting Diode (LED)

Representation	Advantages	Disadvantages
Text	<ul style="list-style-type: none"> • Clear to understand • Lots of detail 	<ul style="list-style-type: none"> • Need to be able to read • Need to understand the language • Can be confusing – level of language • Lots of texts cannot be read quickly – road signs

Graphics	<ul style="list-style-type: none"> • Multilingual – do not need language to understand an image. E.g. male or female • Can match what you see – physical signs 	<ul style="list-style-type: none"> • Can be confusing if you do not know the symbols – does everyone know the road signs? • Some symbols do not mean the same thing in different countries
Sound	<ul style="list-style-type: none"> • No fixed position • No line of sight required • Good for visually impaired people 	<ul style="list-style-type: none"> • No good in large areas – distortion of sound • Usually language based • May not know the sound – e.g. different alarms have different sounds • Need to be able to hear
Moving pictures	<ul style="list-style-type: none"> • Lots of information conveyed • Not language dependent • Can exemplify text 	<ul style="list-style-type: none"> • Linear – if you do not see the beginning you may not understand • Problems if sound attached
LED	<ul style="list-style-type: none"> • Can allow data to be kept secure • Can be used in noisy places • Similar to graphics 	<ul style="list-style-type: none"> • Need to be able to see the lights • Combinations of lights may need to be known to be understood

Data types

- Boolean - can contain only one of two values. True / false.
 - Male / female
 - Yes / no

Often phrased as a question:

- Is the motorway open yet?
- Does the property have a garden?
- Are you male?

- Real – contains numbers with decimal places.
 - 45.78
 - 123.456
 - 12.00

Used to hold numbers where precision is important:

- Measurements in a house / building – 2.7m wide
 - Prices of goods - £1.75
 - Height of people – 1.82m
- Integer – contains whole numbers with no decimal places.
- 45
 - 125
 - 1250

Used where accuracy may not be vital importance or the value allocated is specifically a whole number:

- TV Channels
 - Large amounts of money
- Text / string – alphanumeric character. Includes numbers, text and symbols.
- 12345
 - Examination
 - 123GD56
 - M10RDY

Text / strings can used to convey basic information.

- Forename of a person – Yuda
 - Postcode – NW11 0HU
 - Telephone number – 07583 588 146
- Date / time – contains numbers and letters which depending on the format used, displays the date or the time to different degrees of accuracy.
- 01:52:46
 - 1997
 - 11 June 1997

Sources of data

- Direct and indirect data

Direct (primary) – collected form an original source. Often easiest to think of it as data that has been physically collected by you.

Indirect (secondary) – has two interpretations:

- Data that has been used for a purpose different to that for which it was collected. For example, collecting data on how many tickets have been sold for a particular film, and then using that data to find the most popular film.
- People / companies involved in collecting the data are different to those using the data. For example, people who conduct market surveys and then sell the results to other companies who use it in advertising.

	Advantages	Disadvantages
Direct	<ul style="list-style-type: none"> • The source and collection method is known and verified • The exact data required can be collected • The data being collected can change in response to answers 	<ul style="list-style-type: none"> • May not get a large range of data • Data may not be available – location / time
Indirect	<ul style="list-style-type: none"> • Large range of data is available that could not have been collected directly • Data can be available from different locations and time periods • Analysis might already have been completed on some of the data 	<ul style="list-style-type: none"> • Don't know if any bias was placed on the collection • Cannot be certain of accuracy of recording of data • May not have all the information about how, where and when it was collected • If the information was not originally collected, may not be able to get hold of it

Static and Dynamic data

- Static data – data once created does not change. For example, CD-ROM.
- Dynamic – data can be changed and updated once created. For example, a Website.

CD-ROM	Website
Limited amount of information available	Provides large volume of information
Doesn't require internet access	Can only be accessed with internet access
More reliable source of information	Information not always reliable
Requires a computer with CD-ROM drive	Doesn't need computer – can access from any device with internet access – mobile / tablet
Data can't be updated very quickly	Data can be updated quickly
Can be scratched / broken or lost / stolen	Internet access can be down. May be difficult to access certain pages
Software to search the data can be included together with any additional software	User may not have correct browser software

If there are errors, corrections would have to be sent out	Provides many different opinions
Cost involved – making and sending	Can potentially reach everybody
Can take time to arrive	People go to a website rather than a website going to them
Several may need to be looked at to find required information	Hyperlinks can lead the individual to related sites
In a single location – have to possess it to look at it	Can be accessed by anyone, everywhere, as long as address is known

Quality of information

- Accuracy – has to be accurate or cannot be relied on. E.g. if you are given incorrect price for house then it is worthless.
- Relevance – information must be relevant or else worthless. E.g. if you ask for a distance from point A to point B and you are given the distance from point E to F then it is irrelevant.
- Age – the information might be too old. Information can change over time. E.g. if you ask for price of house and you are given a price of what is cost 5 years ago it's worthless.
- Completeness – if you only have part of the information then it is worthless. E.g. if you are going to view a house and only given the house number, not the street, then it is worthless.
- Presentation – if the information is presented in such a way that you can understand or to find what you want. E.g. pictures of a property make it easier for house brochures to digest.
- Level of detail – you can be given too much or too little information. Balance is difficult to get. E.g. being told how many bedrooms there are in a house but no details is too little.

Encoding data

Taking the original data and storing it in a different a different representation. E.g. shorthand or putting it into code.

Advantages	Disadvantages
Less memory requirement – storing less information therefore less memory is required	Precision of data coarsened – for example, light blue encoding as blue
Security – if not apparent, then difficult to know and understand the meaning of the codes – not encryption	Encoding of value judgements – encoding can be encoded different by different people and makes comparisons difficult

Speed of input – takes less time to enter, therefore quicker to enter large amounts	The user needs to know the codes used – if not, they cannot be used
Data validation – since they follow a strict set of numbers and letters, easy to validate	Limited number of codes – if made up of numbers and letters, options are limited
Organisation of data – if data standardised, can be compared and organised	Difficult to track errors – validation will ensure code is entered correctly, but will be difficult to see if code is actually correct

Validation

Ensures that entered data is:

- Sensible
- Reasonable
- Within acceptable boundaries
- Complete

The checks that can be applied fall into several categories:

- Range checks – checks the upper and lower boundaries for the data. Data entered must lie between these two boundaries, e.g. a school student must be between 3 (lower boundary) – 18 (upper boundary).
- Type checks – checks that data entered is correct type. E.g. if you try to enter text into numeric field it will be rejected.
- Presence checks – i.e. required field on a website.
- Length checks – when data is entered it has a length. Ensures that data cannot be more than a set number of characters.
- Lookup checks – this is where data is cross-referenced against a list to make sure that it is valid and acceptable. E.g. a postcode can be checked against a list of properties.
- Picture checks (format checks) – some data might be a combination of numbers and letters and therefore the type check could not be applied. However, the location of the letters or the numbers may be in the same position every time. E.g. a postcode.
- Check digit – used to calculate and verify the barcode. The check digit is the last digit.

Verification

If you have collected some information on paper, at some point it will need to be entered into a computer.

Paper-based copy is known as the source document.

The copy on the computer is known as the object document.

Verification is making sure that the information on the source document is the same as the information as the object document.

There are two main methods of verification:

- Double entry – entering the data twice. The computer then compares the two sets of data and if it finds any differences it informs the user who can then make appropriate changes. E.g. a password.
- Manual verification – proof-reading the data. Involves visually comparing the source data with the entry typed into the computer. Not reliable and difficult to transfer attention from paper to screen.

Difference between backing-up and archiving

Backing up is making a copy of the current data so if there is a system failure you have copy of all the data. Back-devices include:

- External memory – floppy disk, memory card, etc.
- External hard drive
- Tape
- Making a second copy on a different disk, possibly storing it off-site

Archiving is for long term storage that is not required immediately and is often not required at all and therefore deleted off the system. This process is done when the files are no longer needed, but should be readily available if needed so they cannot be permanently deleted. Example of these types of files may include:

- Last year's financial or sales records
- Completed projects
- Other materials not required on a day to day basis

Cost of producing information

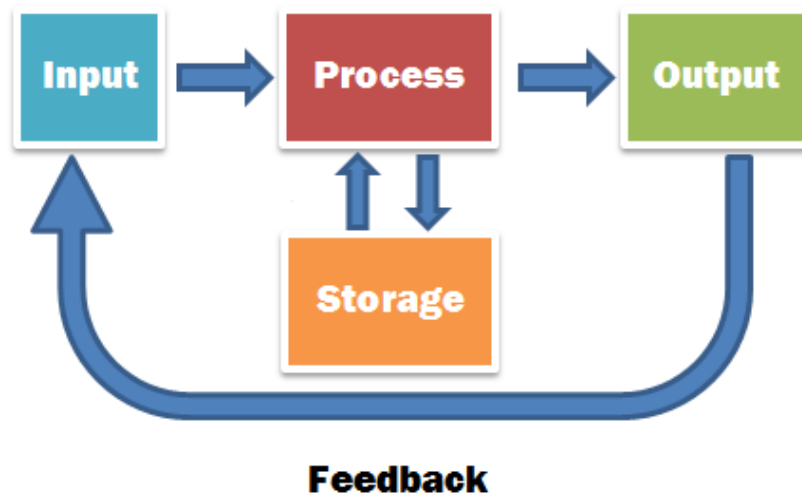
Information needs to be produced. Doesn't just appear and neither is it free to make it appear. There are four main areas where costs incurred in the production of information:

- Hardware – can be used to collect; process and store the information. It may be necessary for an organisation to purchase items of hardware. There are also additional costs of repair and maintenance.
- Software – software licenses need to be purchased. This will include the operating system and utilities as well as used to produce the information. Might also require

technical support agreement. There also may be training costs associated with the software. Overtime the software may be upgraded and will also cost.

- Consumables – such as, electricity, paper, ink and toner.
- Personal – related to people working in the organisation.

Generic ICT system



- Input – external data placed into the system. E.g. through a keyboard.
- Process – manipulating, changing the data or performing calculations to the data.
- Storage – holding the data for later use.
- Output – data being passed outside the system. E.g. screen or print-out.
- Feedback – output influencing the input.

Example of ICT System:

1. Teacher takes register for their class – input.
2. The data is processed. The student is found on the system and the correct response marked by their name: present, absent etc. data is then stored.
3. System can then generate an absence list – output.
4. The teacher can then look at the absence list at a later time and question the student why he or she was absent. The teacher then updates the system with the reason – feedback.

Chapter 2 – Software and hardware components of an information system

Difference between hardware and software

Hardware is something that you can physically touch. E.g. a printer.

Software is the programs used on the computer.

Examples must not be a manufacture. For example, if you are talking about word processing you must NOT give an example and say Microsoft word as it is not the correct term

Standardisation and its impacts

Standardisation is the imposition, by a third part, or with agreement, of a set of rules on manufacturers.

There are many incompatibilities and cost implications that impact standardisation. For example there are many different standards and they are not always compatible. If you purchase a computer that is not part of the global standard, then all subsequent upgrades and parts may have to come from specific sources and are likely to be very expensive.

Takeovers

When a company takes over another company there are likely to be incompatibilities between the two systems.

Input devices

- Keyboard – set of type-writer style keys that are used to input data and control commands to the computer. Three main layouts: QWERTY, Alphabetic and Dvorak. Concept keyboards are programmable where you can create your own keys.
- Mouse – pointing device that can be used to select items on a screen.
- Scanner – translates information into a form that a computer can use. For example:
 - Bar-code – translates bars into numbers.
 - Optical Mark Reader (OMR) – detects the presence or absence of a mark and translates it into values.
 - Magnetic card reader – takes information from a magnetic strip and converts it to usable data.
- Graphics tablet – A flat screen on which it has got hidden beams, place the paper on it, and draw over the paper with a special pen and that way it sends it to the computer.
- Digester – any device that converts analogue data into digital data is a digester. E.g. a scanner.

Output

- Monitor – takes signals from a computer and displays them on a screen.
- Printers:
 - Dot Matrix – impact printer. This means there is physical contact between print head and the paper through an inked ribbon. Colour and black & white.
 - Inkjet – spray ink on paper and are relatively quiet. Colour and black & white. Cheap to run. Used in homes and offices.
 - Laser – high resolution non-impact. Quality in both colour and black & white. Running costs are high. Used mainly in businesses and often found in homes.
- Plotters – mechanical device which produces printout using vector or coordinate graphics. E.g. maps and building plans.

Storage

- Hard disks – main storage device for a computer. They hold the programs and the data.
- Optical disks:
 - CD-ROM – storage of about 700MB
 - DVD – storage of about 4.7GB or more.
- Tape drive – tape cassettes to store data and have very high storage capacity. Used for backing up.
- Memory sticks – large storage capacity.

Specialist hardware

- Devices to help visually impaired:
 - A braille keyboard – a keyboard with braille dots on the keys.
 - A microphone – input device used with voice recognition software.
 - A loudspeaker – an output device for texts or signals.
 - A braille printer – an impact printer which can create braille on a page.
- Devices to help physically disabled:
 - A mouth-stick – a stick to control input with the mouth.
 - A puff-suck switch (blow-suck tube) – a tube placed in the mouth and blown / sucked through.
 - An eye-typer – when the eyes move a pointer on the screen is also moved.
 - A foot mouse – a mouse that is controlled by the foot.

Specialist software

- Text-to-speech system – takes the written texts and outputs it using a speech synthesiser. Useful for those who are visually impaired.
- Speech-to-text system – takes spoken words and inputs them into the computer where they can be used to run commands.
- Magnifier – can zoom in on portions of the screen. Used for visually impaired.
- Predictive texts – suggests the required word as the letters are typed so the user doesn't have to type the whole word.
- Sticky keys – allows keys to be pressed once and the system to act as if been held down.

Different types of software

Provides instructions enabling the computer hardware to work.

- Operating system – controls the allocation and use of hardware resources, such as, memory, CPU time hard disk space and peripheral devices. E.g. Microsoft Windows, Apple.
- User interface – means which user can interact with an application or operating system.

There are different types:

- Menu – on screen list of options.
- Form – an on-screen form in which to type data.
- Command line – a space to type instructions.
- Natural language – a voice-based interface.

A user interface is often termed as; GUI and WIMP interface.

- Utility software – small program that assists in the monitoring and the maintaining of the computer system. E.g. virus checks.
- Application software – allow computer to be used to solve particular problems and perform particular tasks for the end user. E.g. spreadsheets and databases.

User interfaces

Method by which the user communicates with the computer.

- Command-based – the user types instructions at a command prompt to control what the computer does.
- Forms – limited area on screen with boxes to fill in.
- Menus – series of related items that can be selected. Either pop-up or pull-down. Usually categorised. Can be cascaded (one menu leads to another). Can be context sensitive. Can use GUI or text-based. Part of a WIMP.

- Natural language – allows users to use their own language to communicate with the computer. Either spoken or written.

Chapter 3 – Characteristics of standard applications software and application areas

Application software

- Word-processing – allows entry, editing and formatting of text to create a range of documents. For example:
 - Letters
 - Memos
 - Reports

Most word processing packages have WYSIWYG (What You See Is What You Get).

- Desktop publishing (DTP) – allows users to combine images and text to create publications. For example:
 - Flyers
 - Brochures
 - Posters
 - Business cards
- Spreadsheet – enables the user to produce both mathematical and financial models, and to produce graphs to diagrammatically represent data.
- Database – enables the user to handle data, such as sorting and searching. Data can be split into tables and relationships created between the tables to allow the data to be joined together.
- Web authoring – the creation of web pages.
- Presentation – produce presentations to be shown, on print-outs or by using a computer and projector to a target audience.

Uses of systems

- Personnel – provide information about the personnel who work in the organisation and are usually used by the Human Resources department or staff. Collected information may include: full name; address; DOB; gender; marital status; education and qualifications; employment history. A personnel system must:
 - Allocate a unique employee number to each employee.
 - Store the employees' details.
 - Enable edits / updates to be completed on the employee details.
 - Search / sort employees' record based on specified criteria.

- Prepare / produce reports.
- Link to other systems such as payroll and training.

Day to Day | My Employees | My Organisation | Processes | Reports | Documents | Health & Safety | Croner-i


Employee Information

Home > My Employees > Abi Andrews

Summary | Work | Benefits | Attendance | Performance Management | Health & safety | Employee Management | Documents

Abi Andrews

Accounts Assistant



Salutation
 Ms.
Known as
 Abi
Abi

Gender
 Female
Employee ID
 524525
Marital Status
 Single
Dependents
 0

Date of Birth
 2 March 1989
NI Number
 QQ 23 42 66 Y
Contract Started
 1 January 2009
Length of Service
 2 Years 1 Month

Attendance
Holiday
 20 of 20 days used
Sick Leave
 15 days taken in last 12 months
[Book a Holiday](#) [Record an Absence](#) [View Details](#)

Contact Details
Email address
 abi.andrews@mycompany.com
Address
 13 Meadow St
 Riverside
 Cardiff
 CF11 9DF
Telephone numbers
Home
 020 1435 4354
Mobile
 07786 344 362

Ongoing Processes 0

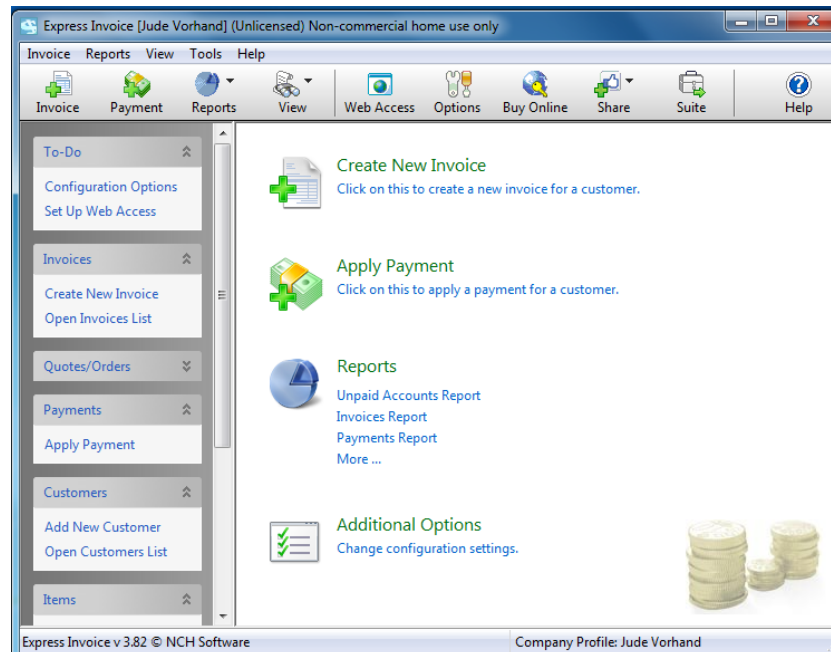
Upcoming Changes 2

Data changed	From	To	Effective from
Salary	£24,500	£28,500	2nd February 2012
Bank Details	Invalid	Invalid	9th July 2012

Next of Kin
Charlotte Andrews
Sister
Contact numbers
Main
 020 1435 4354
Other
 0778 634 432
Address
 28 Milford Rd
 Morpeth
 Northumberland
 NE51 1FG

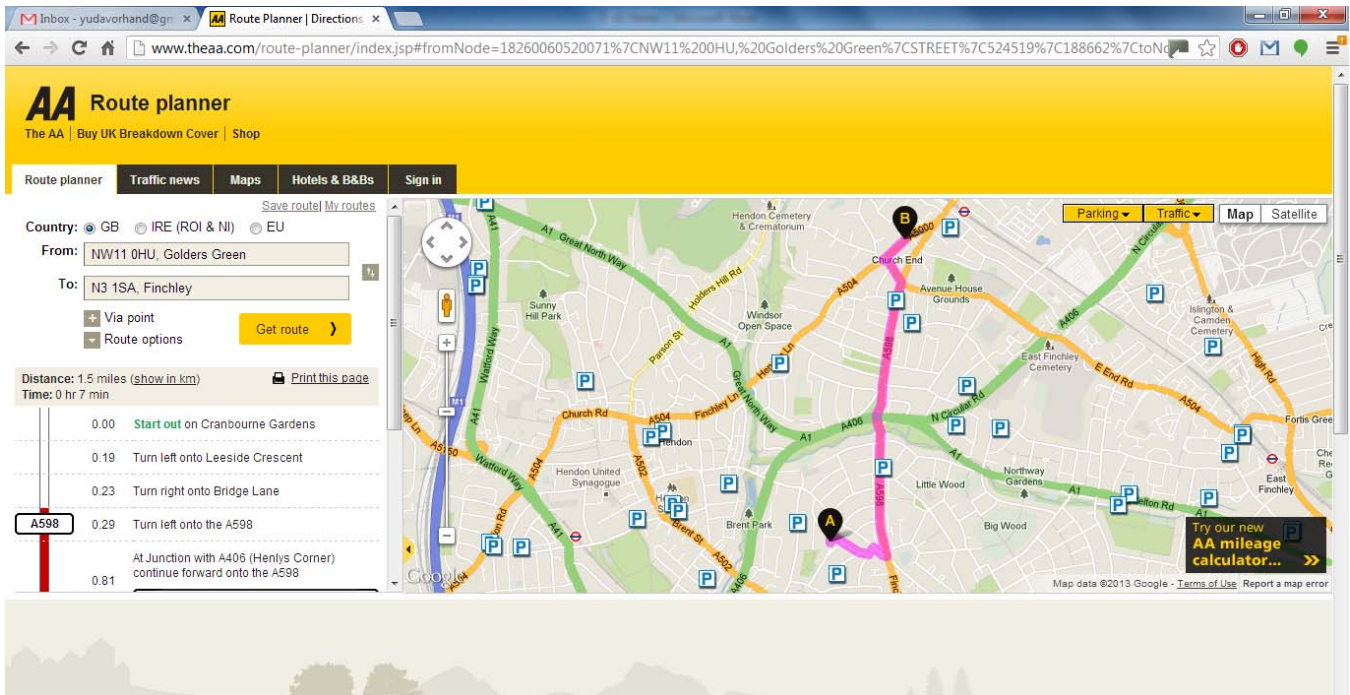
- Stock Control – system that knows how much of each item is in stock, when orders are due and how much stock is required on certain days. Systems must:
 - List all stock items and suppliers
 - List all the components for the item if it is self-manufactured
 - Know the min and max stock levels
 - Work out how much to order
 - Know the delivery times for stock items that have been ordered
 - Links to orders database
 - Update stock records when delivery received
 - Link with the budgeting system
 - Store previous sales figures
 - Predict stock requirements based on previous sales
 - Manual override on items being ordered
- Invoicing – document issued by an organisation to a customer. Usually shows the products, quantities and agreed prices for products or services. System must:
 - Generate invoice / credit notes for orders
 - Calculate delivery and VAT costs
 - Calculate any discounts which may be available

- Record and store payments against the invoice number
- Produce customer statements showing details of paid and outstanding invoices
- Flag any outstanding payments to the finance department of the organisation



- Booking – e.g. theatre tickets, football tickets, doctor appointments etc. three main way of booking: telephone; internet; person / fax / post. Must allow the user to:
 - Select a time and date
 - Select an event
 - Specify a number (adults, children)
 - Check availability of event for time, date and number
 - Check price of selected booking
 - Change options
 - Confirm and pay (via email or booking number)
- Timetabling – enable the end user to enter a date to find, for example, train or plane times which meet specified criteria. Require inputs from user. They may include:
 - Start and destination (end) points
 - Day of travel
 - Time of departure / arrival including depart after / arrive before times
 - Single or return journey
- Route finding – allows user to enter a variety of information about the starting and destination places and plot a route between the two as shown below. System must enable user to:

- Specify location you are leaving from and going to
- Specify places and roads you want to pass through or avoid
- Specify type of journey, for example, scenic, fastest or cheapest
- Save and print a route in a number of formats. For example text and map



- Training – imparting of knowledge and skills to achieve a designated task. Usually through the use of multi-media. The system must be able to:
 - Provide question at an appropriate level for the user
 - Provide a positive approach to learning
 - Incorporate simple and intuitive screens
 - Enable the user to move from one question to the next based on responses
 - Allow intervention by the trainer / teacher at any time – could be remotely

Purpose and characteristics

- Wizard – assists the user to produce the final product. E.g. document, mail merge.

Advantages	Disadvantages
Save time for inexperienced	No individuality to end result. All documents end up looking the same
Ensure no important information is forgotten	End result may not fully meet the needs
Standard formats can be used	Harder for documents to be tailored
User friendly	

- Style sheets – similar to templates and are used to set out layouts. Can also be referred to as master documents. Elements include:
 - Font size
 - Font style – bold, underline etc.
 - Margin size
 - Alignment

Advantages	Disadvantages
Lack of confusion from document writers / creators as the different elements required have been clearly identified	It needs to be developed before it can be set as template
Different parts of the document can be worked on by different people but style will be the same	Can be restrictive and not fully meet the needs of the document being produced

- Templates – provides standard pre-set layouts and formats. Includes:
 - Character formatting – font size, colour, type etc.
 - Page formatting – margins, size, layout etc.
 - Text inserts – standard words, date, time etc.
 - Graphic inserts – standard logo, position etc.
- Macros – set of stored commands that can be replayed by pressing a combination of keys or by pressing a button.

Advantages	Disadvantages
Repetitive task can be done by click of a button	Errors may occur if conditions in the macro are different when run and when recorded
Errors may be reduced since macro run automatically and are the same every time	Inflexibility – macro may not do exactly what the user wants
Inexperienced users can perform complex tasks by pre-recorded macro	If macro run from different starting point then intended it may go wrong
	To correct errors user must have some knowledge of how macro was recorded

Design considerations for data entry screens

- Consistent layout / house style
- Clear font styles, font, size and colour
- Colours / graphology
- Help / error messages

- Logical flow of information
- Validation of information
- On-screen help such as pop-ups and clear exits

Customising applications

- Buttons – take user to specified page or run specific commands. Macro can be run when clicked.
- Forms – used to assist in entry of data give user guidance as to what data should be input. Error messages and instruction can be included. As well as data validation. Forms may include drop-down boxes, option boxes and automatic fill-in boxes.
- Form controls
- Macros

House styles

- Recognition by clients and customer
- Pre-defined colours / fonts style and sizes
- Consistency across all company documentation
- Achieved by using:
 - Master documents / slide – enables a team of people to work on the same presentation separately.
 - Styles – help user apply formatting to a document.
 - Style sheets – used to describe the format that should be applied to a document.
 - Templates – produce the different documents that can be used by the company.

Chapter 4 – Spreadsheet concepts

Characteristics of modelling software

- Virtual representation – model large things like buildings and look at them from different external influences
- Use of layers – external view, electrical wiring view, basic frame etc.
- Questions can be asked – to change certain things and see how it would react

Characteristics of financial modelling

- Based on functions and formulae – allow numbers to be input into the spreadsheet and for any changes to be automatically recalculated.
- Variables (changeable value) and constants (cannot be changed) can be used.

- “What if?” questions can be asked – allow a user to change values and see what the effect would be on the end result.

Variables, formulae, rules and functions

- Variables – identifier associated with a particular cell and within the cell there will be a value.
- Formulae – calculation which uses numbers, addresses of cells and mathematical operators. E.g. $A12+(A12*VAT_RATE)$
- Rules – set of procedures that must be followed and can also be the sequence of events required for the calculation to work.
- Functions – represents a complex formula that uses reserved words. E.g. =SUM – adds a range of cells and gives the total.

Worksheets, workbooks, rows, columns, cells and ranges

- Worksheet – consists of all of the cells on a sheet. Called a sheet or spreadsheet.
- Workbook – collection of worksheets.
- Row – a range of cells, denoted by numbers that go across a spreadsheet.
- Column – a range of cells, denoted by letters that go down a spreadsheet.
- Cell – individual data source.
- Range – a group of cells denoted by either a name or cell references.

Absolute and relative referencing

Absolute referencing is the cell referenced in a formula remains exactly the same when the formula is copied to other cells. Achieved through adding the “\$” before the column letter and before the row number.

Relative referencing is the cell referenced in a formula changes when the formula is copied to other cells.

Chapter 5 – Relational database concepts

Database terminology

- Tables – contains data about ‘things’. E.g. students, orders etc. must have the following to be called a table:
 - The table must have a unique name.
 - Each field / column must have a unique name.
 - Each record / row must be unique.
 - Each data item within a field must contain only a single data item.

- Record – a single row within a table. Collection of data about a single item or event. Made up of fields.
- Field – individual data item within a record. Each field within a record should have a unique name. Should only contain a single data item.
- Keys – several different keys that can be applied to a table.
 - Primary key – a field in the table that allows each record to be uniquely identified. Every value of the primary key must be unique. Can be two types:
 - Simple – which is made up of a single field only, like ID shown below:

ID	Forename	Surname
1	Yuda	Vorhand
2	Aryeh	Broder
3	Dovi	Weltscher
4	Josh	Smus

- Compound or composite – one which combines more than one field to make a unique value. As in an example shown below, a student can be in one place at a time, therefore combining the student name, date and period gives a unique value. These three fields could be combined to make a composite primary key:

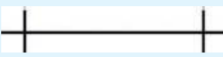


Student	Date	Period	Present
Y Vorhand	28/05/2013	1	Y
A Broder	28/05/2013	1	Y
D Weltscher	28/05/2013	1	N
J Smus	28/05/2013	2	Y

- Secondary key – identified as being suitable for indexing the data. A table can have many secondary keys – every field could be a secondary key.
- Foreign key – used to link tables together. A field in one table that is linked to a primary key in another table. Data types of linked cells must be the same.

Entities

- Single object or processes
- Information about things
- Each entity becomes a table
- Entities linked by relationships

Relationships

Relationship	Symbol used
One-to-one	
One-to-many	
Many-to-many	

- One-to-one – where one record in a table is linked to only one record in another table. E.g. a school and a headteacher – a school can only have one headteacher and a headteacher can only be a headteacher of one school.
- One-to-many – one record in a table is linked to many records in a second table. E.g. a mother and a child – a mother can have several children, but every child has only one mother.
- Many-to-many – the table link goes both ways between two tables. E.g. a film and an actor – a film has many actors and an actor can be in many films.

Entity Relationship Diagrams (ERD)

An ERD is an abstract way of describing a database. In the case of a relational database, which stores data in tables, some of the data in these tables point to data in other tables - for instance, your entry in the database could point to several entries for each of the phone numbers that are yours. The ERD would say that you are an entity, and each phone number is an entity, and the relationship between you and the phone numbers is 'has a phone number'. Diagrams created to design these entities and relationships are called entity-relationship diagrams or ERD's.

Steps in creating an ERD:

1. Read and re-read the narrative
2. Make assumptions
3. Identify the entities
4. Define the relationships between the entities.

Referential integrity

Ensuring that for every record in a table with a foreign key, there is a record in the corresponding table with a primary key.

Normalisation

Normalisation is a process applied to the data structures which decreases redundancy and increases integrity.

Student No	Student Name	School Code	School Name	School Location	Exam ID	Exam Name	Exam Date	Exam Result
3061	Yuda Vorhand	12269	PHGS	Finchley	ENGB3	English GCE	03/06/2013	A*
3062	Aryeh Broder	12269	PHGS	Finchley	G063	IT GCE	11/06/2013	A
3063	Dovi Weltscher	12269	PHGS	Finchley	G061	IT GCE	03/06/2013	B
3064	Josh Smus	12269	PHGS	Finchley	ENGB1	English GCE	24/05/2013	A

- First normal form (1NF) – a table is in 1NF if every data value in a field is atomic (means that the data value cannot be broken down any further) and each record does not contain repeating data. For each row to be uniquely identified it needs a primary key. This is achieved by putting a * next to the field name

Student No	Student Forename	Student Surname	School Code	School Name	School Location	Exam ID	Exam Name	Exam Level	Exam Date	Exam Result
3061	Yuda	Vorhand	12269	PHGS	Finchley	ENGB3	English	GCE	03/06/2013	A*
3062	Aryeh	Broder	12269	PHGS	Finchley	G063	IT	GCE	11/06/2013	A
3063	Dovi	Weltscher	12269	PHGS	Finchley	G061	IT	GCE	03/06/2013	B
3064	Josh	Smus	12269	PHGS	Finchley	ENGB1	English	GCE	24/05/2013	A

Checks for 1NF:

- Does the table have a primary key?
 - Is each field name unique?
 - Are there any repeating fields in a single record?
 - Is all the data within a field atomic?
- Second normal form (2NF) – must be in 1NF where the non-key attributes are dependent on the entire primary key. One large table can be split into a few smaller ones using VLOOKUP from the Primary key as seen below:

Student No*	Exam ID*	Exam Date	Exam Result
3061	ENGB3	03/06/2013	A*
3062	G063	11/06/2013	A*
3063	G061	03/06/2013	B
3064	ENB1	24/05/2013	A

Exam ID*	Exam Name	Exam Level
ENGB3	English	GCE
G063	IT	GCE
G061	IT	GCE
ENB1	English	GCE

Student No*	Student Forename	Student Surname	School Code	School Name	School Location
3061	Yuda	Vorhand	12269	PHGS	Finchley
3062	Aryeh	Broder	12269	PHGS	Finchley
3063	Dovi	Weltscher	12269	PHGS	Finchley
3064	Josh	Smus	12269	PHGS	Finchley

- Third normal form (3NF) – must be in 2NF where there is no functional dependency between the non-key items. In the example above the schools could also be separate:

Student No*	Student Forename	Student Surname	School Code
3061	Yuda	Vorhand	12269
3062	Aryeh	Broder	12269
3063	Dovi	Weltscher	12269
3064	Josh	Smus	12269

School Code*	School Name	School Location
12269	PHGS	Finchley
12269	PHGS	Finchley
12269	PHGS	Finchley
12269	PHGS	Finchley

Advantages and disadvantages of normalisation:

Advantages	Disadvantages
Removes redundancy	Reduced database performance
Increases consistency	Problems with historical calculations
Increases integrity	
Easier maintenance	
Flexibility for further expansion	

Data dictionary

- Database about a database
- Contains design details about the database
- Includes:
 - Tables name
 - Field name
 - Data type
 - Length
 - Validation

- Relationships
- Security.

Data types

- Text / string – anything not requiring a calculation
- Integer – whole numbers only. Not telephone numbers
- Real – numbers with decimal places
- Boolean – one of two values
- Date / time – store age, dates and times.

Parameters

Return fields from tables where the value of the parameter is matched. Used by the query to select records.

- Simple query – a query where there is only one parameter.
- Complex query – a query with more than one parameter. Makes use of AND, OR and NOT to join parameters.
- Static – parameter is hard coded into the query and cannot be changed by the end user.
- Dynamic – request for the parameter given to the end user at run time, usually by a dialogue box.

Chapter 6 – Application software used for presentation and communication of data

Characteristics of documents

- Character – any letter, number or symbol used in a document.
- Paragraph – used when a long document is being created. May have a pre-defined style.
- Section – portion of a document in which page-formatting options can be set. A new section can be created when things like line numbering and header and footers need to be changed. Until breaks are inserted the word-processing package will treat a document like a single section.
- Frame – area of a page that can contain text or graphics. Can be positioned anywhere on the page. A DTP usually makes use of frames.
- Header and footer – a header is text which appears on a document in the top margin of every page. Such as on this page “IT AS Notes”. A footer is text that appears in the bottom margin of every page. Such as on this page, “Page 22”. When inserting page

numbers to a footer or even a header it automatically puts the next number on every page.

- Footnote – used to briefly explain a word or phrase without including the explanation in the body of the text. A reference number is placed next to the word or phrase and the explanation is placed at the ‘foot’ of the page by the same reference number.
- Page – each printed side of a paper containing the components of a document. Each page contains a pre-defined amount of content.

Mail merge

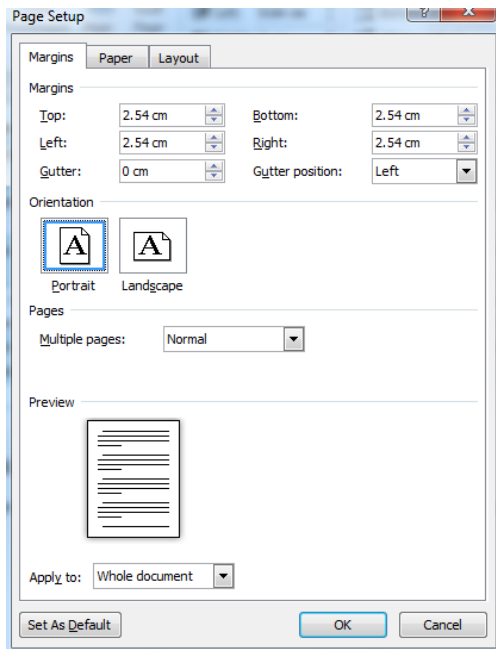
It allows the user to create and send a personalised version of the same document to many different people. Generally done with a wizard. A data source is created containing all the information to be included in the document. The document / template is then produced including mail merge field which are based on the spreadsheet e.g. Dear <first_name> <last_name>. Check mail merge fields with the data in the data source – spreadsheet or database. Complete merge by sending it to printer which prints out the number of records held in the data source.

Advantages	Disadvantages
Only one letter needs to be created	Editing the data source can cause the mail merge to fail
Only one letter to be checked / proofread	Data source must be kept up to date if it's going to be useful
Data source can be used for many documents	Unlikely that every letter produced will be checked and is likely that an error can creep in
The data source only needs checking for accuracy once	Inexperienced user can use a simple one but a complex one may require training
The standard letter / template can be saved and be reused	Used for creating junk mail. Difficult to personalise it
	Lack personal touch

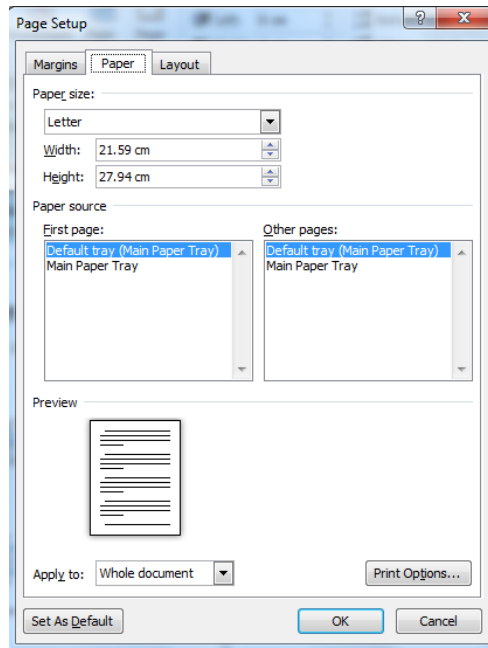
Formatting documents

- Page size, settings and orientation – these can all be selected by the user.

Setting the margins and orientation



Setting page size in Microsoft Word



- Text position (alignment), size and style.

Images and graphics

- Clip art – Advantages and disadvantages of using clip art images

Advantages	Disadvantages
Readily available	Limited to what is available
Available immediately	Quality of image ranges from very poor to good
Reduce cost of design process	Not original or unique
Extra equipment such as scanners or cameras do not have to be purchased	If from internet may be subject to copyright

- Thumbnail images / libraries:
 - Based around a topic
 - When preview clicked image is shown
 - Lots of thumbnail images can be shown at one time

- Quality of actual image may be poor
 - If image library is large may take a while to load
- Bitmap images – images which are made up of pixels. Formats of bitmapped files:

Format	Description
BMP	Windows Bitmap. Standard file format used with windows applications
GIF	Graphics Interchange Format. Often used on websites especially as animated GIF's. They have 256 colour limits. Uses a lossless compression algorithm to save on the amount of memory used
JPEG	Joint Photographic Experts Group. Also frequently used on websites. Used when good quality graphic images need to be stored. Can store 16 million colours. Different JPEG formats relate to the level of compression used
TIF / TIFF	Tagged Image File Format. File format is more complex than some of the other formats but can be used on several different platforms

- Vector graphics – stored as geometric-based data. Mathematical data that defines the key properties of every element in the graphic (length, colour thickness etc.).

Vector	Bitmap
Can be resized / enlarged / rescaled with no loss of definition	Picture quality lost when resizing
Size of file relatively small compared to bitmap graphic file for the same size image	Can be very large as each pixel in the image has to be saved
Every component in the image is described by its features (length, colour thickness etc.)	Components of graphic only stored as pixel with their attribute
Can be grouped	More consistent with the general computing environment. i.e. display and printing devices tend to use series of dots to define images and text
Facility for producing simple-vector based graphics often included as part of a word-processing program e.g. squares and lines	Popular as they deal with highly detailed images such as photographs
Files cannot be compressed	Files can be compressed
Processing power required to display a vector based graphic on display equipment is high	Screen resolution can affect the image quality
Individual elements can be edited independently	Editing relates changing the properties of the pixels in the graphic as a whole or an area of it

- Graphics libraries – provide images and symbols that are often used in an application. Graphics software:

- Interior design
- Landscaping
- Cartography
- Network design

Main problem of graphic libraries is keeping them up to date.

Features of a presentation

- Text – must meet the needs of the audience. Fancy texts should be avoided.
- Images – can help convey a message relating to the presentation or an aide memoire for the presenter. Important that should be kept to a minimum. Size so that could be seen by audience
- Sound – can be set of animation effects e.g. clapping, drum roll, chime. Can be used to emphasise an important piece of information and add impact to the slide. Can be used in other forms such as speech and music e.g. company jingle.
- Video – can be inserted into presentation, for example, part of a company's advertising commercial. Can be played automatically or can be started by presenter e.g. by pressing a button. Don't use too many – can draw attention away from presentation content.
- Animation – visual effects that can be added to text or other objects. Emphasises important points. Controls the flow of the slide in the presentation
- Slide transition – can be applied to a slide to make the presentation more interesting. Governs how the presentation moves from one slide to the next.
- Hyperlinks – coloured and underlined text, or a graphic, which, when clicked, takes the user to a file, location in a file, or a website.
- Hotspots – area of the screen which responds to a mouse click. Normally used in multimedia presentations.
- Buttons – can be used to move from one slide to the next. When used makes the presentation interactive – user interacting with the presentation.

Presentation delivery

Computer and projector presentations:

Advantages	Disadvantages
Has use of all the above features. Doesn't have to be followed in slide sequence	Temptation to overuse special features
Once developed and saved, it's easy to edit the slides and the slides are ready to be shown	Requires a computer and a projector. Both expensive. And not all places have projector
Slides don't deteriorate with repeated use	Special software to allow presenter to annotate in real time

	Cannot be given in event of power cut
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Printed acetate presentations:

Advantages	Disadvantages
Easy to write – annotate	Special effects cannot be used
An overhead projector is the only thing needed – cheap	Cannot alter sequence of slides
In event of power cut the presenter can read it out from print-out	When slide edited, need new print out
	Slides can become unreadable with repeated handling
	High use of colour can quickly use up ink / toner

Presentation navigation modes

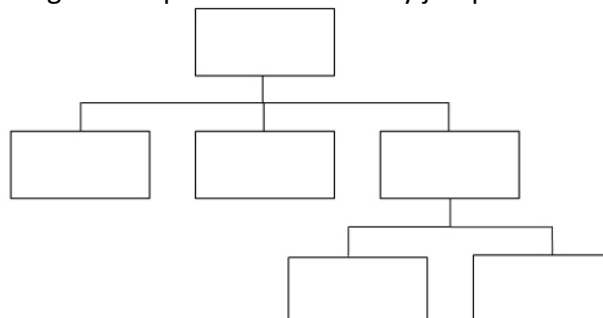
- Manual transition – action from presenter – clicking a button: space bar, mouse click. Presenter can determine speed.
- Automatic transition – set up to run automatically. Set before presented. Timings must be set to give the audience enough time to read the content. Suitable for presentation where no presenter is involved.

Structure of presentation

- Linear presentation – slides are shown in a pre-determined order and in which any jump out of this sequence is not allowed. Follow ordered line from the beginning to end.



- Hierarchical presentation – allows different, but pre-determined, slides to be jumped to from a slide depending on an option selected. Only jump to those in path.



Chapter 7 – The role and impact of ICT

Describe the main aspects, purpose and implications of the...

- Data Protection Act (1998) – passed to protect individuals from organisations. Limits the data held by individual organisations to only that which they need. It was meant to stop organisations holding a lot of data about people which they don't need. Terms related to the Data Protection Act:
 - Personal data – data which relates to a living, identifiable individual.
 - Data – anything held that can be part of a record.
 - Processing – obtaining, recording or holding the information or data. Also covers any operation performed on the data or information. Operations include: organising it; changing it; retrieving it; searching; and using it in some ways.
 - Data subject – the individual of whom the data is held.
 - Data controller – the person within the company who is responsible for making sure that all the provisions of the data provisions act is kept to.
 - Data processor – anyone who processes the data on behalf the data controller (excludes the employer of the data controller). For companies who hire third party to process their data for them.
 - Recipient – people who receive the data to form some processing. Usually employees of the data controller.
 - Third party – people who receives the data for processing.
 - Information commissioner – person responsible for ensuring that the data protection Act is being adhered to, by giving advice, running training sessions and investigating complaint.

Rights of an individual:

- Right to subject access – allowed to see what information about you by a company.
- Right to prevent processing likely to cause damage or distress – if the data processing is going to cause you damage and / or distress then you have the right to ask the company to stop.
- Right to prevent processing for the purposes of direct marketing – it is mail sent to you advertising goods and services.
- Rights in relation to automated decision making – some decisions are done by computers; it can be requested that it done by a person.
- Right to compensation if damage or distress is suffered.
- Right to rectify, block or erase incorrect data.

The main aspects of the Data Protection Act:

1. Personal data should be processed fairly and lawfully.
 2. Personal data can only be collected for one or more specified and lawful purposes and the data cannot be further processed.
 3. Personal data shall be sufficient, relevant and not excessive in relation to the purpose it is processed.
 4. Personal data shall be accurate and kept up to date.
 5. Personal data shall not be kept for longer than is necessary.
 6. Personal data shall be processed in accordance with the rights of data subjects under this act.
 7. Appropriate measure shall be taken against unauthorised processing of personal data and against accidental loss of the data.
 8. Personal data cannot be transferred to a country outside the European economic area.
- The Computer Misuse Act (1990) – protecting data from hackers.
 - Main provisions:
 - Unauthorised access to computer material.
 - Unauthorised access which could be gained to access the user account and use it to transmit illegal material.
 - Unauthorised act with intent to make changes.
 - Making or supplying or obtaining articles for use in computer misuse offences – involves software that modifies original code.
 - Benefits – the act allows company's a legal recourse (go back and take action) if their security has been breached.
 - Problems:
 - Has to be intent by the hacker
 - Accidental intrusion not a crime
 - Hard to find who is responsible
 - Only enforced once a crime committed
 - The Copyright, Designs and Patents Act (1988)
 - Main Provision – makes it illegal to steal or create unauthorised copies of software. Also covers manuals, books, CDs and music.
 - Benefits – a lot of time and effort goes into a production of software, books and music. The people who produce it deserve to be rewarded. The act allows individuals and corporations who invest time and money to reap their rewards. Reward is in royalties.
 - Problems – when buying software you don't actually buy the software, you just buy the license which enables you to download, install and use it. Different conditions of licenses: some company's don't allow software to be installed on

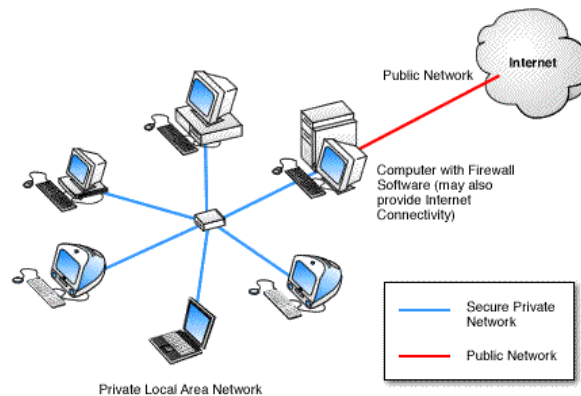
more than one computer; allow on two computers as long as not used at the same time; site and network licenses – specify a maximum of users who can run the software at the same time. Understanding licenses can be hard.

- The Regulations of investigatory powers Act (2000)
 - Main provisions – addresses concerns about the use and misuse of communication interception techniques by public and private organisations. The Act allows legal interception of postal, telecommunications and digital communications. Criminal offence to monitor communications (includes calls, email, post etc.) without lawful authority (when businesses use their own telecommunications for purposes relevant to the business).
 - Benefits (to the business) – monitor what employees are doing.
 - Problems – monitoring may be seen as breach of trust.
- The Electronic Communications Act (2000)
 - Main Provision – legal framework so that people can be sure about the origin and integrity of communications. Allows Government to set up a register of 'approved cryptography suppliers' (cryptography service providers). Recognises digital signatures, which are now admissible law (facilitation of electronic commerce, data storage).
 - Benefits – contracts signed have same legality as those signed by hand. Contracts reached over the internet, therefore, have legal backing.
 - Problems – although trying to remove most laws preventing digital signatures being accepted, this will take time. Wills and buying a house long time to be introduced. High security risk still – hackers.
- The Freedom of Information Act (2000)
 - Main provision – deals with access to official information that is being able to find out information on any topic from any public authority. Act applies to: public authorities; health services; schools and police. Act allows anyone to make a request to see their information. Must send letter with what information you want, name and address, and description of what you want. Usually free, sometimes at a fee.
 - Benefits – information that was not accessible by the public is now available. Increase accountability – public authority can't take and then hide decisions.
 - Problems – some information may be withheld when requested. Act under a set of acts, requesting information under the wrong act will delay the information being received. Public authority doesn't have to confirm or deny

Methods of combating a range of ICT crimes

- Physical:

- Locked rooms
- Cameras
- Biometric (finger prints, iris scanners etc.)
- Logical:
 - Firewalls – hardware and / or software gate between two networks or between a system and a network that filters the data transferred based on security policies. Used on computers that connect to the internet to prevent unauthorised access to the system or network the computer is part of.



- Passwords (authentication)
- User ID's (authentication)
- Up-to-date software (anti-virus, anti-span, anti-spyware)
- Education of users (security)

Understanding the advantages and disadvantages of networking computers

Advantages	Disadvantages
Peripheral sharing – printers, scanners	If network fails, all the services unavailable
Data sharing	Devices required to build network depend on different typologies
Secured with usernames	If a single computer has a virus – all the computers can get the same virus through the network
Application access can be controlled	If network is busy – can slow down the other computers and make the whole network slow
Resourced can be monitored	
Back-up can be controlled centrally	
Users can communicate with email	

Professional body

Formal group that is set up to oversee a particular area of industry. The main professional bodies that oversee ICT industry are: BCS – The Chartered Institute for IT (UK) and the Institute of Electronics Engineers (worldwide). Perform variety of roles and offer their members many benefits. For example, BCS:

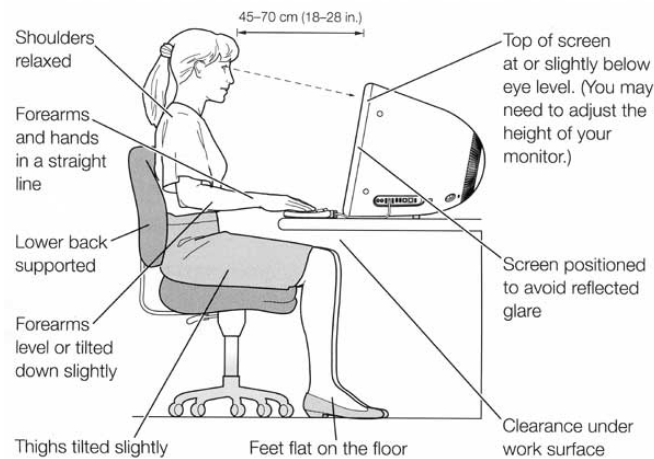
- Promotes education and training. Ensures that skills required are provided by universities.
- Sets standards for the employees within the industry – code of conduct that's its members must uphold to.
- Provides examinations – qualification form BCS is values worldwide.
- Provides publications and discussion papers on a variety of topics, enabling members to keep up to date.
- Holds conferences – where members can meet like-minded individuals and ensure that they are current with any new developments.
- Provides input into legislation and the industry.

Health and safety problems related to working with ICT and measure to avoid them

Health:

Health Problem	Description	Cause	Prevention
Deep vein thrombosis (DVT)	Blood clot, usually in the leg	Sitting in chair that puts pressure on the back of the knees	Stand up and move around. Ensure correct posture when sitting in a chair
Repetitive strain injury (RSI)	Chronic pain experienced in the arms, shoulder or back	Repetitive actions, poor posture while working, maintaining a fixed forced position	Use correct workstation, keyboard rests, foot stools, adjustable chairs and frequent breaks from continuous activity
Carpel tunnel syndrome	Pressure on the median nerve in the wrist	Repeating wrist movements such as typing	Avoid the repetitive actions. Frequent breaks between the actions.
Ulnar neuritis (cubital tunnel syndrome)	Compression of the ulnar nerve in the elbow	Leaning on the elbow for prolonged periods of time	Use if wrist rests, adjustable height of chairs and correct desk height
Eye strain	Hazy vision, tired eyes	Looking at a monitor for long periods of	Take plenty of fluids and frequent breaks.

		time, dehydration of the eyes	Use correctly adjusted, flicker-free monitor
Back pain / ache	Muscle spasms	Poor posture, sitting in the same position, forced position	Use correct posture and adjustable chair
Fatigue	Tiredness and lethargy	Caused by continued periods of mental work	Take a five-minute break every hour. Vary the type of work
Stress	State of mental strain	Overwork or software / hardware not doing what you expect	Take a five minute break every hour. Train in the software



Safety:

Safety hazard	Description	Prevention
Trailing wires	Wires from computers trailing from desks and along the floors	Cable management systems to cover wires
Fire	Overheating of computers can cause them to catch fire. Overloading of plug sockets can also cause fire	Adequate ventilation and clear space around equipment. Not overloading plug sockets. Correct number of sockets on a breaker. Using the correct type of fire extinguisher CO ₂ for electrical fire
Electric shock	Water and electricity can cause an electric shock (possibly fatal). Bare wires, when touched, can cause electric shock	Bo drinking near computers. No water near computers. All wires to be frequently checked and repaired
Unstable surfaces and	Desks and surfaces that wobble can cause computer equipment	All surfaces to be stable before computer equipment is placed on them

chairs	to fall off	
Food and drink	Liquids can cause shorting and lead to fire. Crumbs from food are a fire hazard	No eating and drinking near computers

Impact of ICT on individuals, organisations and society

- Capabilities and limitations of ICT systems

Advantages	Disadvantages
Computers can perform same action over and over again – quickly and reliable	Speed of hardware is phenomenal. The keyboard is not useful for entering vast amounts of data.
Computers can search large volumes of data and they can do it very quickly.	Software also limits ICT as often require training and software itself can limit what can be done
Can perform tasks that are impossible or dangerous to humans. E.g. control systems	We demand bandwidth to utilise communications available – video on demand, faster download etc. at the moment restricted because of limitation to the bandwidth.

- Communications systems – one of the biggest improvements brought about by technology.
 - Telephone systems – relatively old method of communication but has been digitally upgraded over the past few years. Telephones today allow you to contact other individuals quickly and have an element of personal contact. Now possible to have: conference calls; answer phones; mobile phones; remote access; different ring tones; call forwarding; SMS messaging and many other features. Systems allow you to send documents (attached to an email) and emails and many computers connect to the internet using telephone systems.
 - The internet – a vast collection of interconnected computers for the purpose of sharing data.
 - Outside government control although they attempt to filter some websites.
 - Advantage – cannot be turned off or on.
 - Disadvantage – Security problems and can be used by criminals and terrorists.
 - Used to find information – through websites or downloading files.

- Useful for technical support.
- Drivers can be located as well as software downloads.
- Social interaction – chats, discussion, Facebook, twitter etc.
- Impossible to tell what is true and what is not true.
- Efficient way of transmitting viruses.
- Identification of individuals is difficult on the internet, especially when chatting.
- Breach of copyright is a problem – films, music – easy accessibility.
- Laws regarding tax and purchases using the internet, difficult to enforce.
- Email – electronic message sent using the internet from one person to another person anywhere in the world. Can attach – files, spreadsheets, documents etc.
- How ICT has changed society.
 - Shopping – most high street stores have web presence. Some only online.
 - Advantages for a customer – open 24 / 7 / 365.
 - Disadvantages for a customer – how do you know that a website is genuine? Might just take card details and you may never see the goods – going into shop you have the physical product when you walk out. Also need to be at home for online delivery. Needs computer with internet connection. People will become lazy and unhealthy (no exercise if you can shop without leaving your home).
 - Online food shopping increased allowing customers to keep a weekly list of staple items that is needed every week. However, you are relying on someone else picking your food. Sometimes items out of stock.
 - A web only company doesn't have cost of staff and shop rental but has web designers and tech support and of course people who pack the products.
 - Delivery firms benefited from the increase in posted goods. Less cars driving around – decreases congestion and pollution.
 - Medicine – improvements in treatment and administration. Use of computers in administration enable staff members to access patients notes, treatment records and information on treatments as well as latest research. Computers are used to help people with hearing and seeing disabilities. Improved manufacturing of limbs. Not everywhere has access to medical computing facilities. Not good to become over reliant on technology to the extent that medicine can't be produced without it. ICT and internet made it easier to / share research. Many non-experts use the medical websites as a first port of call for information on

medical conditions. Little knowledge can be dangerous. There are medical experts systems.

- Education – three main areas where ICT has affected education – administration, teachers and students.
 - Administration – electronic registration which is common in many schools. Allows schools to immediately contact parent if child is absent. Details of students, such as, grades, detention and medical information, can also be stored.
 - Teachers – benefit from ICT in lessons by being able to pre-prepare presentation material with hand-outs. Make use of the administration features.
 - Students – benefit from internet access to wide range information, the use of computers to write up and share work given to them and the use of presentations and hand-outs to liven up lessons.
- The effect of ICT on organisations – fear when introducing computers into offices would mean unemployment since less people required to do one job. It has actually been the opposite as the ICT industry is surrounded by: network managers, technicians, website designers, ICT trainers etc. when shop changes from a store to just online change in employees, they now need website designers, packers and delivery people, where as they used to have shop assistants and shelf stackers. Those employees working with ICT in their work have benefited from the advantages of electronic filing systems, the ability to edit a document rather than retype it every time it is needed, and email. Effect on organisation has been to increase communications.
 - Structure of the organisation – has altered. The company's HQ no longer needs to be in a major city – can be located anywhere. Derealisation of the organisation is partly a result of ICT. New ICT directors created.
 - Teleworking – working from home.
 - Advantages for company – a central location for employees to travel is not required. Employees can move out of town to places where rent is cheaper. Building size decreases.
 - Disadvantages for company – employee usually needs some kind of motivation to get the tasks finished. May take longer to finish those tasks.
 - Advantages for employee – no work commuting. Get up later. More family time.
 - Disadvantages for employee – lack of motivation. No social contact. Additional equipment may be required – often provided by company. Need to be aware of keeping commercial and staff information secure,

insurance on equipment and protecting staff from health and safety problems.

- Dependence on ICT – we rely on ICT a lot more than might first be apparent. We have become lazy from it and become less skilled. There are advantages and disadvantages of ICT both have to be considered.
- Future developments in ICT – there have been many predictions. Good place to keep up to date with ICT developments and predictions is the BBC's *Click* weekly programmes supporting sites.

Good Luck in all your exams!!!