

Networks

A number of computers that are connected for the purpose of sharing data, information and resources.

- Sharing a printer among a number of users will save money.
- Workers can share common files over a network allowing them to operate more efficiently.
- Employees can communicate internally and externally using email on a network.

A local area network (LAN) operates within an organisation on a single site. A wide area network (WAN) uses external communications media and operates over a large area.

A network interface card is used to link a computer to a network.

Data is transmitted over a network in packets. The packet contains the sender's and receiver's details, as well as the information being sent.

The network **protocol** determines how the packets of data are built. The Internet uses the **TCP/IP** protocol. This protocol produces small packets of data ideal for the multiple pathways data can travel on the web.

A **client-server** network uses a server to perform designated tasks such as file sharing or data to other computers (clients). Common servers include file, print, web, domain and proxy. Client-server networks are common in medium to large organisations.

On a **peer-to-peer (P2P)** network, all connected devices are able to share files and resources. P2P networks are used in small networks such as the home.

A **star** network is the most common topology (physical arrangement). It uses a central hub with workstations connected by individual wires. If one device is out of action, there is no impact on other devices.

A **bus** network connects each device in turn along a central *backbone* cable with a terminator attached to each end. If a break occurs in any wire, the whole network is affected.

A **hybrid** network is a combination of different topologies. E.g. several star networks might be connected via a central bus.

Coaxial cable carries data at 10 Mbits per second. CAT 5 unshielded twisted-pair cable transfers data at 100 Mbits per second. Fibre-optic cable transmits light pulses and is capable of gigabit speeds. Transmission is not affected by electrical interference. Wireless transmission is used where the workstations are portable (notebooks) or the passing of wires through walls is to be avoided.

A **hub** receives a signal and rebroadcasts it down all available connections. (Rarely used these days)

A **switch** stores the address of all attached devices and sends incoming signals only down the connection that contains the addressed device.

A **router** determines the best pathway for data to travel through connected networks.

Issues in using information systems

Employee monitoring – should employers have access to workers' emails?

Privacy and encryption – encryption allows us to keep private information to ourselves and designated second parties. Criminals, however, could use encryption to hide their activities from authorities.

Telecommuting – many workers are now working from home by using networks to communicate with head office. This practice cuts out travel time, reduces the organisation's office space requirements, and allows workers to live in areas remote from the organisation's base. Telecommuters,

however, do not have regular face-to-face contact and can become isolated.

Deskilling- a worker with a set of skills that are valued by the individual and organisation can find that a move to a computer-based system could render those skills redundant. The worker is deskilled in that his or her role in the organisation must change and his or her expertise is no longer valid.

Downsizing – this is the process of reducing the labour force within an organisation, usually through the adoption of automated processes.

Data and Information

Data refers to raw, unorganised facts. When data is manipulated into a meaningful form it becomes information.

Information is used by individuals and organisations to inform, persuade, educate and entertain.

Information systems

An information system consists of hardware, software, people, procedures and data.

Hardware includes the physical components of a system. It includes things like the central processing unit, keyboard, printer, network interface cards, routers and so on.

Operating system software controls the operation of a computer system and subsequently performs a number of functions. These include managing the memory, controlling the hardware and peripherals (printers, DVD drives), loading of application software and providing an interface between the user and the application software.

Application software is created to achieve a specific purpose. Examples include word processing, database, spreadsheet and web authoring applications. Application software can be customised to suit the needs of individual users.

The people part of a system includes system analysts, programmers, network administrators and users. A user or end-user, of an information system is a person who uses a computer directly (data entry operator, web-page designer, manager accessing data on a spreadsheet) or who uses the information provided by a computer (student researching on the internet)

A procedure is a set of steps that a user follows to accomplish a particular task.

Data can include text, numbers, sounds and images.

Qualities of useful data and information

The characteristics of useful data are suitability, reliability, accuracy, timeliness and freedom from bias.

Information must be relevant, complete, timely, accurate, clear and unbiased. The authority of an information source (such as a website) should be used to determine the quality of the information it contains.

A site maintained by a government authority or a recognised university is more likely to contain reliable data than a site kept by an individual or little known organisation.

Information must be suited to the audience – this includes the format of the information, the balance between the use of graphics and text, and the level of language used.

A primary source of data is obtained by first-hand observation, survey, interview or measurement.

A secondary source of data is one that relies on the published work of someone else.

Data security

A full backup involves copying all of the files to a backup medium.

A differential backup copies only the files that have been altered or created since the last full backup.

An incremental backup copies files that have been changed since the last incremental backup.

Backup files should be stored in a remote location.

Modern techniques allow for backups from a server in one city to be stored on a device in another city.

When a document is archived it is copied to a long-term storage device (eg DVD or tape) and the original file is deleted from the hard disk.

A **disaster recovery plan** outlines the steps that must be followed to restore information systems in the event of some disaster. The steps include:

- Emergency plan – system shut down, evacuate building, notify relevant managers
- Backup plan – location of backup data, availability of replacement equipment
- Recovery plan – restore operating system software and application software, restore data from backups, enter transactions since last backup
- Test plan – simulated disaster to test that procedures are adequate and workable

Threats to **data security** come from viruses, hackers, data theft or tampering, accidental error, theft of hardware, equipment failure.

Networks are protected by user identification and passwords. Users are assigned an appropriate access level that allows them to be productive but not to access areas they have no reason to access.

Biometric equipment can increase security. Examples include voice recognition, hand geometry, iris recognition, signature verification, facial recognition.

Other security equipment includes firewalls (hardware and software that allows access from one network to another to authorised users only), anti-virus software and encryption software.

Legal obligations of organisations and individuals

The *Privacy Act 1988* prohibits Federal government departments from giving private information (details of personal life, medical, financial and so on) about an individual to anyone else. This includes safeguards against accidental or criminal access. An amendment in 2000 extended the privacy provisions to private organisations. It also has provisions to restrict the use of personal data for direct marketing via email and governs the use of data collected by websites.

The *Information Privacy Act 2007* covers the same broad areas of the Privacy Act 1988, but it only applies to the West Australian public sector.

The *Copyright Act 1968* protects intellectual property from unauthorised reproduction and use. It was amended in 2000 and again in 2005 to deal specifically with digital works.

Ethical considerations in the use of information systems include:

- Free speech on the Internet
- Employee monitoring
- Codes of conduct

A structured approach to managing the planning and development of a solution to an information problem. It often applies to the establishment of a new information system.

A Gantt chart represents each task with a bar, where the length corresponds to the time required. Task dependency is shown by arrows – an arrow from one task to another indicates that the second task cannot begin until the first task is completed.

Creative application of information design principles

Using **lines** you can effectively:

- Direct the reader's eye
- Highlight or stress words
- Connect, separate or organise information
- Outline an object to set it apart from others
- Create pattern or rhythm
- Create a sense of motion

You can use **size** to:

- Attract attention
- Show importance of one element over others
- Create contrast between two elements
- Provide a sense of scale

By creating **space** you can effectively:

- Create a focal point in a layout
- Give the eye a rest and create a sense of calm
- Lead the eye
- Create contrast
- Separate information

Using **shapes** you can effectively:

- Crop a graphic in an interesting manner
- Make a block of text more interesting
- Attract attention
- Highlight information

Contrast can be used to effectively:

- Make one element stand out from another
- Enhance the readability and legibility of text
- Give a design layout more impact

Colour

- Colour has the power to attract attention, affect feelings or moods and convey messages.
- Limit the use of colour to achieve maximum effect.
- Combinations of colour should be carefully considered to achieve harmony.

Balance

- Each element has a 'weight' determined by its size, shape, colour and tone.
- Symmetrical balance is easy to achieve, but can be boring.
- Asymmetry creates a dynamic modern layout, however it is not so straightforward to achieve.

Unity, repetition and sequence

- Consistency creates unity
- Unity makes every page of a document feel as if it belongs to the document.
- Repetition enforces unity
- The sequence of a document should be logical for a viewer to find what they are looking for easily and not get lost or miss information.

Project management