

Project Management

Concept of service level agreements

Service level agreement (SLA) — An agreement in writing between 2 organisations for one to provide the other with a quality service.

Components:

- Time period
- Who it is between
- Signers of each
- Data
- What services to be offered
- Times available

Examples:

- *NBN service providers (iiNet, Optus, Telstra)*
- *Cloud computing services (iCloud, Dropbox)*
- *Streaming media subscription services (Netflix, Stan)*

Features of service level agreements, including:

- Availability of service
- Contracted delivery time
- Price
- Responsibilities
- Services and quality of service
- Quantities

Purpose of outsourcing data management & advantages of local and global outsourcing compared with in-house production

In-house production — a service produced and operated internally rather than obtained from a third party or outside source

E.g. RE Department makes their own textbooks, Bunnings

Advantages - In-House Production	Disadvantages - In-House Production
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<ul style="list-style-type: none"> • Can easily manage the entire project • Utilise existing resources to save on additional expenses • Comes out of operating budget rather than sales budget 	<ul style="list-style-type: none"> • You either need to manage the entire project or find a project manager • Additional resources may be required (designers, developers, testers) • Prone to go over budget
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Outsourcing — the process of assigning a company’s business procedures to an external agency with the aim of enhancing service quality, driving innovation or deriving benefits of lower labour costs (to improve revenue)

Offshore outsourcing / ‘offshoring’ — when outsourcing is to organisations located in other countries

E.g. CCC uses Coneqt/Seqta, CCC outsources email to CEWA

Advantages - Outsourcing	Disadvantages - Outsourcing
<ul style="list-style-type: none"> • Better revenue • Lower labour costs —> no need to hire professionals or project managers • Increases speed and quality of outsourced activities 	<ul style="list-style-type: none"> • Possible loss of control over a company’s business procedures • Problems related to quality • Lower than expected costs and benefits • Sluggish response times

Evaluation of software, including usability

- Success rate —> whether they complete the task
- Time taken —> usability is good when users are provided enough time to do their task
- User satisfaction —> how they feel

Evaluate the effectiveness of digital solutions

Surveys - surveys of target audience can be used to gauge the effectiveness of the prototypes

Client-feedback - can allow changes to be made to enhance the product

Self-reflection - they can reflect on what went well and improvements that can be made to future products

Impacts of Technology

Data and information security related to personal or sensitive information

Privacy Act — Regulates how entities handle individual's personal information.

Personal information — (Privacy Act) Information or an opinion about an individual whose identity is apparent.

- Information listed that is able to identify a person with

E.g. name and address, medical records, bank account details, criminal record

Sensitive information — Subset of personal information, about an individuals:

- Racial or ethnic group
- Political opinions
- Religious beliefs
- Sexual preferences

Privacy Impact Assessment (PIA) — An assessment tool that examines the privacy impacts of a project and assists in identifying ways to minimise those impacts.

- Describe the personal information flows in a project
- The OAIC expects entities to undertake PIA for any new acts, practises or projects that involve the handling of personal information

OAIC — Office of the Australian Information Commissioner - is responsible for privacy functions that are conferred by the Privacy Act and other laws

Security measures to keep data secure

ICT

- Firewalls

- Passwords
- Encryption
- Biometrics
- Anti-virus software

Physical security

- Locks
- Security guards
- Policies (e.g. how to set up a password)

Purpose of a code of conduct

Code of conduct — an agreement for rules of behaviour for members of a group or organisation

Purpose of a code of conduct — to act as a detailed description of what is the most legal and ethical behaviour expected out of a business.
 — It enhances a company's core values, beliefs and sets the right culture
 — Keeps the company's employees from violating laws and regulations

Elements of a code of conduct, including:

Work hours — they need to be informed of how many hours per week they are expected to work

Employee email use — jokes and inappropriate content should not be sent over network

Employee internet use — rules to define what sites shouldn't be visited

Employee privacy —

Employers monitoring of work emails, internet access and computer use

Online censorship of information in a global context

Online censorship — The control or suppression of what can be accessed, published or viewed on the internet, can be carried out by governments or by private organisations at the behest of the government

How it is done — by controlling Internet Service Providers (e.g. IP address blocking and/or domain name filtering)

As of 2015, only North Korea and Cuba still have total censorship over the internet

Why? — pornography, gambling, terrorism, black market

Issues with the use of cloud computing

Confidentiality of data — Meant to be kept secret

- Data saved in home computer is more safe than data in the cloud
- Hackers may get into data and analyse it
- People need to consider where they place their confidential data

Sensitivity of documents

- Data stored in the cloud is important
- Some are more important than others
 - *e.g. Holden's top secret plans for its newest model Commodore*
- The more sensitive the document is, the more care must be taken to keep it safe

Level of accessibility — Who can see the data

- Many cloud computing solutions use **login method** (Google, Facebook)
- The more valuable it is, the more care needs to be taken to keep it safe
- People need to be trained to have secure passwords
- Businesses need to consider reliable and secure cloud computing services

Availability of online applications

- The more online applications we have, the more online data we have
- We can use online applications such as social network to keep us in touch with family

Impact of digital technologies and global markets on:

Productivity — increases productivity and reduces need for professors as people can study in their own time

Access to knowledge or resources — 24/7 access to resources such as online bookshelves, emails, cloud storage

Outsourcing — Digital technologies and global markets assist with outsourcing

Impact of Web 2.0/Web 3.0 on the use of digital technologies

Web 2.0 — the “writable” phase of the World Wide Web with interactive data. It allows web users and sites to interact more freely with each other. It encourages participation, collaboration and information sharing.

Web 3.0 — the “executable” phase of the World Wide Web with dynamic applications, interactive services and “machine-to-machine” interaction. Semantic web → a web where all information is categorised and stored in such a way that a computer can understand it as well as humans — Google searching will become much more easy to navigate and more advanced

Web 3.0 technology - targeted promotion - builds preferences of user based on previous search results

Networks

A **network** is created when 2 or more computers are connected in order to share data between computers.

Advantages	Disadvantages
<ul style="list-style-type: none">• Share files• Communication• Share internet and devices	<ul style="list-style-type: none">• Hardware is expensive• Reliance on network resources• Risk of viruses• Specialist staff often required

Three Common Used Network Topologies

Bus Network:

All workstations are joined to 1 cable - “the bus”

Advantages	Disadvantages
<ul style="list-style-type: none"> • Easy and cheap to install (very little cabling) 	<ul style="list-style-type: none"> • If main cable is damaged, whole network will fail • Slower performance due to all workstations connected • Security risk - every workstation "sees" data

Ring Network:

Each device is connected in a ring formation (each device is connected to 2 other devices). Each data packet travels in 1 direction.

Advantages	Disadvantages
<ul style="list-style-type: none"> • Quick data transfer • No data collisions (due to all data packets travelling in 1 direction) 	<ul style="list-style-type: none"> • If main cable is damaged, whole network will fail

Star Network:

Each device has its own cable that connects to a **switch** or **hub**

Advantages	Disadvantages
<ul style="list-style-type: none"> • Reliable • If cable fails, network continues to run • High performing 	<ul style="list-style-type: none"> • Expensive due to extra hardware required • If hub or switch fails, network connection from the affected computer will be disrupted

Types of Network Connections

Clients - computers that request information
e.g. tablet, PC, laptop, smartphone

Servers - computers that provide information. The server stores data and responds to requests for data or files such as web pages.

E.g.

- **Web servers**
- **Application servers**
- **NAS (Network Attached Storage)**

- **Print servers**
- **Mail servers**

CS (Client Server) -

- Relationship between 2 computers
 - Client is dependent on the server to provide and manage the information
 - **E.g. Email, World Wide Web**

P2P (Peer to Peer) -

- No single provider is responsible for being the server. Each computer has equal responsibility for providing data
- **E.g. Skype**

Types and characteristics of communication protocols, including:

Transmission Control Protocol/Internet Protocol (TCP/IP)

—> Manages transmission of data by dividing it up into small chunks called packets. Each packet carries the information that will help it get to its destination. The packets carry the data in the protocols that the internet uses: TCP/IP. Each packet contains 1000 or 1500 bytes. Each packet is sent off to its destination by the best available route

Hypertext Transfer Protocol (HTTP)

—> HTTP functions as a request-response protocol in the client-server computing model. e.g. a web browser acts as a client while an application running on a computer hosting a website acts as a server. The client submits a HTTP request message to the server. The server provides resources such as HTML files, it also returns a response message from the client.
Every web server responds to HTTP protocol

Hypertext Transfer Protocol Over Secure Socket Layer (HTTPS)

—> A combination of HTTP with SSL/TLS protocol. It provides encrypted communication and secure identification of a network web server. HTTPS connections are often used for payment transactions on the World Wide Web.

Wireless Application Protocol (WAP)

—> A specification for a set of communication protocols to standardise the way wireless devices, such as cellular telephones and radio transceivers, can be used for network access. WAP is a technical standard for accessing information over a mobile wireless network

Data packet —

A unit of data made into a single package that travels along a given network path, used in Internet Protocol (IP) transmissions for data that navigates the Web, and in other kinds of networks

Types and characteristics of communication standards, including:

802.11x (wireless: current - ac)

- Medium - radio waves and frequency
- Speed and distance
- Communication standard developed for wireless LAN
- Communication between wireless client and a base station or two wireless clients
- Communication in 2.4, 2.6, 5 and 60 Ghz frequency bands
- It functions at the MAC and physical layer

802.3 (ethernet: LAN)

- 100mbps or 1000mbps
- Medium - copper or optic fibre
- Speed and distance

3 main types

1) Ethernet

- 10Mbps, 10BASE-T

2) Fast Ethernet

- 100Mbps, 100BASE-T

3) Gigabit Ethernet

- 1 Billion bps (one gigabit)
- Used as **backbone** in many enterprise networks carried primarily on optic fibre

Types of network security measures

Firewalls

- System designed to prevent unauthorised access to a private network

Passwords

Intrusion Protection System (IPS)

- Helps detect and inhibit the action of malware

Physical security

- Biometrics (fingerprint, iris, voice recognition)
- Security guards, cameras, locks, alarms

Multi-Factor Authentication

- The act of using multiple methods to secure information by requiring 2 or more different ways of security, for example, a password and a fingerprint.

Types of networks

LAN (Local Area Network)

- A network of computers located on a single site
e.g. School or Home

WAN (Wide Area Network)

- Is created when LAN's are connected and can connect up organisations based in different geographical locations
e.g. The Internet

VPN (Virtual Private Network)

- Hosted securely on another network to provide connectivity
 - Encrypts all data sent across the network
- Often used when working on securing information

WPAN (Wireless Personal Area Network)

- Allows people to connect devices to a desktop machine
e.g. connecting a smartphone via Bluetooth to a car

PAN (Wired Personal Area Network)

Managing Data

Security techniques for the management of data

Disaster recovery plan

- Having a plan that details how the company will recover from losing all of the data stored on their system
 - Involves having a set of policies and procedures to enable the recovery or continuation of vital technology infrastructure and systems following a natural or human-induced disaster
- It will include plans for coping with the loss of key member of staff, loss of hardware or loss of data
- Disasters can include terrorist attacks, fire or flood

Audit trail

- A set of records that can be used to automatically track every action taken by users on a network
 - Can record what time a user logged on, which files they opened, what they changes and even which key strokes they used
- Can be used as proof if an employee is not using the system as they are supposed to
- **Advantage** —> very handy for a team to understand how a problem happened by accident

Types of backup techniques and archiving of data

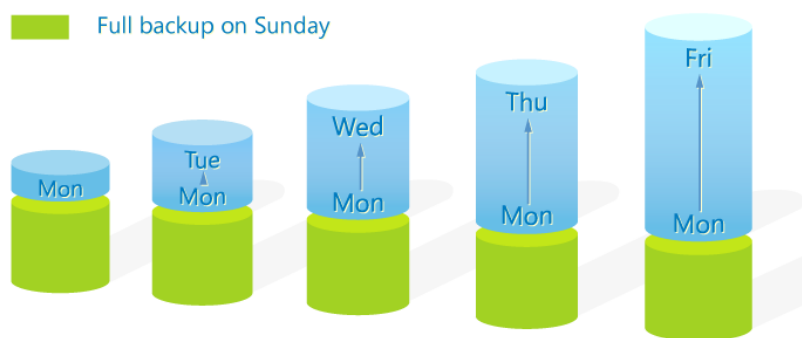
Full

- Stores all data selected for backup
- Underlines any archive and forms the base for incremental and differential backups
- Slowest to do but fastest to restore
- Full backup is useful when:
 - You need to roll back the system to its initial state
 - Its initial state does not change often, so there is no need for regular backup

e.g. a University lab where administrator often undoes changes made by students or guests but rarely updates the reference backup. Backup time is not crucial and the recovery time will be minimal when recovering the systems from the full backup.

Differential

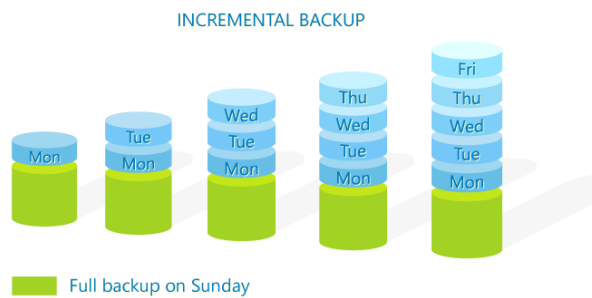
- Suitable for large amount of data that is constantly growing or changing on a daily basis —> full backup impossible
- Differential backups take a copy of all items that were changed since the last full backup (e.g. full backup performed on Sunday, Monday differential backup takes a copy of items changed or added since Sunday. Tuesday... since Sunday etc)
- Useful when you are interested in saving only the most recent data state
- Data changes tend to be small as compared to the total data size



Advantages	Disadvantages
<ul style="list-style-type: none"> - Process is much quicker than full backup since it only takes a copy of what was changed - Backup copy itself takes up far less storage than when full copy is created on each day 	<ul style="list-style-type: none"> - Size of data differences part grows with each cycle - If the cycle is long, (e.g. full backup performed once a month and differential daily) at the end of it the size of the archive might be big, and the process lengthy

Incremental

- Takes a copy of items changed or added since last incremental backup job (e.g. full backup on Sunday, Monday incremental backup takes data between Sunday and Monday, Tuesday incremental backup takes data between Monday and Tuesday etc etc).



Advantages	Disadvantages
<ul style="list-style-type: none"> - Faster than differential job, so can be performed every hour or minute - Small amount of storage needed because it only copies changed data 	<ul style="list-style-type: none"> - If one piece of missing, restore is impossible - Restore takes some time as software needs to rebuild data from separate incremental pieces

These can be done in two ways:

1) Daily

Backups every 24 hours

2) Cloud

Data is backup up to a remote site through the internet

Online data storage methods

Data warehouses:

- A database used for reporting and analysis. Data in its denormalised form (2NF)
- A system for storing and delivering massive quantities of data

Purpose:

- To provide aggregate data which is in suitable format for decision making

Steps:

1. **Extraction** —> data stored in the warehouse is **uploaded** from the operational systems (e.g. marketing, sales)
2. **Transformation** —> data is **copied** and passes through an **operational data store/integration/staging layer** for additional

operations before they are used in the DW for reporting (converted from different formats, e.g. pounds to dollars)

3. **Loading** → data is **cleaned, transformed, catalogued and made available for use** by managers and other business professionals

Who would use data warehouse?

- Company's (CEWA) that have many databases attached to it (Corpus, Seton, Urzila Frayne)

Data warehouses can be divided into data marts.

Big data:

Redundancies in your data set

Data marts:

Data marts store subsets of data from a warehouse
Copied smaller data set

Data mining:

Data mining is the process that attempts to discover patterns in large data sets. The overall goal of data mining is to extract information from a data set and transform it into an understandable structure for further use

Purpose of data mining

To extract information from a data set and transform it into an understandable structure for further use

Common uses of data mining

- Used by governments to get information to stop terrorists
- Shops e.g. *H&M that has sold silk dresses will **have data on how many were sold**. They also would keep data on who bought silk dresses and also bought a hat at the same time. From this data they can match up the products they put into the shop window based on the data*

Data management checklist:

- **Verifiable** → data able to be **checked** and **corrected** to be error free (e.g., Fiona Stanley's Data warehouse should have a facility for

patients to check their details such as address and correct them if they change)

- **Accurate** -> **data reflects the truth** (e.g., Fiona Stanley's Data warehouse should have a facility to check whether the recorded address job is the same as the Ambulance's build-in GPS location from when patients are picked up by Ambulance)
- **Current** -> data in the **data warehouse is the same as in the data marts** (e.g., All data related to any patient over the age of 65 inside Fiona Stanley's Data warehouse has been copied out to create a data mart called 'elderly' for mining purposes. The data in 'elderly' should be same as data in the Hospital's Data warehouse for patient details.)

Processing of data considering security of data through the use of:

Passwords	<p>For access to devices: The use of a username and password provide the most common form of authentication. You enter your name and password when prompted by the device</p> <p>For access to certain parts of the information system or certain locations of data Locking out certain users from parts of information that has no relevance to them, or certain locations</p>
Firewalls	<ul style="list-style-type: none">- Software or hardware- Purpose —> to filter traffic between two or more networks (e.g. the organisations local network and the internet)- By filtering traffic the firewall protects the data on the network from being sabotaged or corrupted by unauthorised elements
Biometrics	<ul style="list-style-type: none">- Relies on unique biological characteristics of individuals to verify identity for secure access to electronic systems

Anti-virus software	<ul style="list-style-type: none"> - To prevent, detect and fix malware infections on an individuals computing device - Prevention against malware (worms, trojan horses, spyware, key loggers, ransomware and adware)
Digital signatures	<ul style="list-style-type: none"> - Mathematical scheme for demonstrating the authenticity of a digital message/document - Valid digital signature gives the user reason to believe that the message was created by a known sender
Digital certificates	<ul style="list-style-type: none"> - Implementation of public key encryption on a large scale, a bit of information that says the Web Server is trusted by an independent source known as the Certificate Authority
Encryption	<ul style="list-style-type: none"> - The process of encoding messages or information in such way that only authorised parties can access it - Denies message content to the interceptor - Private key encryption <ul style="list-style-type: none"> - Each device has a secret key (code) that can be used to encrypt a packet of information before it is sent over the network to another computer - Public key encryption <ul style="list-style-type: none"> - A combination of private and public key - Public key given by your computer to any - computer that wants to communicate securely, whereas private key is only known to your computer

Concept of user-generated content

User generated content:

Any form of content and media that is created by users of an online system or service, often made available via social media websites

Examples:

- Videos → Youtube, Vimeo, Dailymotion

- Blogs —> Facebook, Twitter, Instagram
- Audio files —> Spotify, Soundcloud

Advantages and disadvantages of user generated content

Advantages	Disadvantages
<ul style="list-style-type: none"> • Voice • Upcoming trends • Share stories • Easily accessible 	<ul style="list-style-type: none"> • Bias • Credibility • Moderation • Ownership

Concept of hypertext markup language (.html)

HTML (Hypertext Markup Language):

Tells the browser how to set up text, images etc

HTTP / Hyper Text Transfer Protocol:

A set of rules for how computers talk to each other on the web

CSS (Cascading Style Sheet):

A style sheet language used for describing the presentation of a document written with .html

Concept of Web 2.0 and Web 3.0

Web 2.0 — the “writable” phase of the World Wide Web with interactive data. It allows web users and sites to interact more freely with each other. It encourages participation, collaboration and information sharing.

e.g. Youtube, Facebook

Web 3.0 — the “executable” phase of the World Wide Web with dynamic applications, interactive services and “machine-to-machine” interaction.

Semantic web —> a web where all information is categorised and stored in such a way that a computer can understand it as well as humans

— Google searching will become much more easy to navigate and more advanced

Features related to Web 3.0:

- Dynamic applications
- Data mining
- Semantic searches

e.g. Tivo, a digital recorder. Its recording program can search the web and read what it finds to you based on your preferences

Purpose and features of content management systems (CMS)

Content management system — a software application or set of related programs that are used to create and manage digital content

- A web-based software or website that allows users to interact with a website for a specific purpose
- A web-based solution that makes it easy for a company or individual to manage website updates internally

Purpose —

- User involvement i.e. user can get course outlines, assignments, quizzes etc
- It allows users to update website content with little knowledge of web design
- Good for those who aren't 'tech wiz'
- Increased user involvement

Features —

- **Publishing** - user can create content, select category and save drafts
- **Typography** - built-in text editors with is automatically formatted to produce HTML
- **Organisation** - content is stored in one location online and is accessible from any computer
- **Member management** - web admin has control over how many people can access website
- **Security** - prevent multiple users from accessing your website with the same login details at once

Examples —

- Wordpress

- SEQTA
- Weebly
- iTunesU
- Wix

Purpose of world wide web consortium (W3C)

W3C — The main international standards organisation for the World Wide Web (W3). W3C tries to enforce compatibility and agreement among industry members in the adoption of new standards defined by W3C. It tries to get all vendors to implement a set of core principles which are chosen by W3C

Purpose of W3C conventions

The web is constantly evolving very quickly, the W3C standards are in place to ensure that the WWW evolves only in one direction, rather than in multiple directions

Purpose of the Web Design and Applications standards from the W3C standards

HTML and CSS	- All web pages to be built using HTML and CSS
Graphics	- Always use .PNG for raster - Always use .SVG for vector
Audio and Video	- Formats that enable audio and video presentations
Accessibility	- Web Content Accessibility Guidelines to help authors create content for people who have disabilities - P erceivable - O perable - U nderstandable - R obust
Internationalisation	- Remove cultural bias - Have ability to change language

Mobile Web	- Create apps that can be used on a variety of devices
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Validation techniques for online forms

Data Validation:

Ensures that the user provided necessary and properly formatted information needed to successfully complete an operation

Validation methods:

User's inputs can be validated on the server and on the client (web browser)

Server-side validation

- Information is being sent to the server and validated using one of server-side languages, then sent back to the user

Advantages

- Method works if JavaScript is turned off
- Can't be easily bypassed by hackers

Disadvantages

- Slow response time

Client-side validation

- Done on the client side using script languages such as JavaScript

Advantages

- Better user experience
- Using script language allows user's input to be validated as they type
—> more responsive
- Visually rich validation

Disadvantages

- Relies on JavaScript —> if JavaScript turns off, they can bypass the validation