AIT Unit 3

1.0 Design Concepts

1.0 Design Elements

Texture
Line
Colour
Tone
Shape
Space
3D Form

1.1 Design Principles

Balance
Emphasis
Dominance
Pattern
Unity
Movements

1.3 Relationship Between Elements & Principles

Design Elements are used to create Design Principles: Elements > Principles

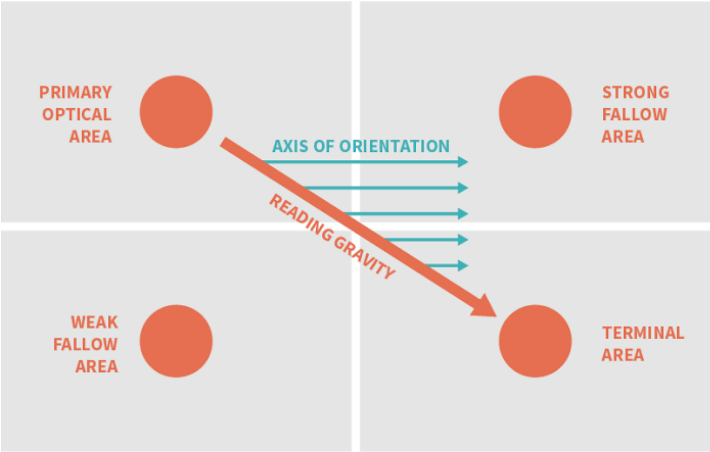
1.4 Features Of A User Interface

Logical And Hierarchical Organization Of Content

Readers of a website will not read all the content of a page. The order of elements placed on a page should be carefully considered to meet the usability needs of the user as well as the design brief

- **Logical** - Grouped by relevant categories (e.g. dropdown menus)
- **Hierarchical** - In order of importance from top to bottom

Content should also be organized with rules of composition such as the rule of thirds and most importantly reading gravity (i.e. logo of company should be top left) and the organization of content should be predictable and familiar to the user (such as having the website title at the top of the page).



The Gutenberg Diagram

Features of a Graphical User Interface (GUI)

Input Components	Navigation Components	Information Components
• Buttons • Text Input Boxes • Check Boxes • Drop Down Lists	• Breadcrumbs • Sliders • Search Bar	• Tool Tips • Progress Bars • Tutorials

Graphical User Interface (GUI) Suitable For Target Audience

Graphic User Interfaces allow users to interact through visual elements such as icons and buttons, and thus the target audience should match the function and appearance of the user interface.

For example, if the target audience is younger children (5 years old), it should include large pictures, minimal text and bright colours, while an older target audience (55 years old) would include standard pictures, primarily text and a basic colour scheme.

Relevant Help Features Of A Graphical User Interface

Usability

Usability refers to the ease of use of a digital product/solution and ensures that users can achieve their desired goals easily (effectiveness) as quick as possible (efficiency)

- Search Function
- Site Map
- Breadcrumbs
- Logical/Predictable Menu Headings
- User Feedback (i.e. loading wheel)
- Simple and Consistent Design

Inclusivity

Inclusivity refers to designing a digital product/solution so that it can be accessed and used by as many people as possible, regardless of age, gender, software, hardware, language and geographic location.

- Language Translator
- Currency Converter
- Low Resolution Thumbnails
- Avoid Colour Blind Sensitive Colours
- Icon Navigation
- Font Enlarger

Accessibility

Accessibility refers to implementing features in a digital product/solution so that those with disabilities (sight, hearing, physical mental) can effectively use the digital production/solution and allows for an equal experience.

- Alternate Tags for Images
- Video Captions
- Text to Speech
- Speech to Text
- Color Changer
- Resizable Font

2.0 Hardware

2.1 Specifications of Digital Devices and Their Impact Upon Usability

Central Processing Unit (CPU)

The CPU is the brains of a computer and has two primary tasks; processing data and executing instructions. The CPU contains 'cache' memory (volatile) which stores frequently used data and instructions for faster execution

Random Access Memory (RAM)

Primary memory of a computer that stores short term information for programs that is currently in use and demanded by the operating system. RAM is volatile meaning that data is loss when the computer system is shut down.

Hard Disk Drive (HDD)/Solid State Drive (SSD)

Second memory of a computer that stores programs and data that are kept on a long term basis. This memory is non-volatile meaning that it is permanent and is not lost when the computer system is shut down

Graphics Processing Unit (GPU)

A GPU is responsible for rendering graphics for display on a computer system. It is responsible for all graphic content such as rendering of images, animations and videos. GPU's can either be dedicated (separate component) or integrated (built into another component)

Motherboard

The body of the computer that connects all external and internal computers together. The motherboard connects internal components such as RAM or the CPU and external components such as USBs. Most information of a computer passes through the motherboard

Network Interfacing Card (NIC)

The NIC provides a computer with wired and/or wireless networking capabilities.

Specifications of Digital Devices and Impact on Usability

Component/Characteristic	Factors
CPU	• Speed (Ghz) • # of Cores • Model (i5 vs i7)
RAM	• Speed (Ghz) • Capacity (Gigabytes) • DDR4 • DRR3
Storage	• Capacity (Gigabytes) • SSD vs HDD
GPU	• Dedicated • Integrated • Speed (Ghz) • VRAM (Gigabytes)
Networking	• Wireless (Gigabit) • Wired (802.11xx)
Display	• Resolution • Size • Touchscreen • Aspect Ratio
Form Factor	• Mobile • Desktop
Power Supply	• Power (Watts) • Battery Life

2.2 Characteristics of Development Trends In Emerging Mobile Devices

1. **Improved Processing –** Computing power will double every year, as the number of transistors double (Moore's Law)

2. **Faster Memory** – DDR4 memory will make mobile devices 50% faster

3. **Increased Screen Resolution** – More pixels per inch to produce a sharper image

2.3 Suitability Of Emerging Mobile Devices To Meet Client (User) Needs

The client needs…

Wireless Capabilities	Users can access the internet via Wi-Fi or mobile data to download apps
Fingerprint Scanners	Fingerprint scanners are a new trend amongst mobile phones, used to provide a quick and secure unlocking mechanism for unlocking phones, entering passwords or even purchasing items.
Personalization	Most users have their own device, settings designed to meet exact needs of user, i.e. changing the layout of the user interface and configuring settings
Location-based Services (LBS)	Real time geo-data from a mobile device or smartphone to provide information, entertainment or security. For example, store locators, proximity-based marketing
Near Field Communication (NFC)	Standardization of paying for goods with a mobile device (e.g. Apple Pay)
Integration with the Home	Have the ability to control TV, play music, turn off/on lights etc.

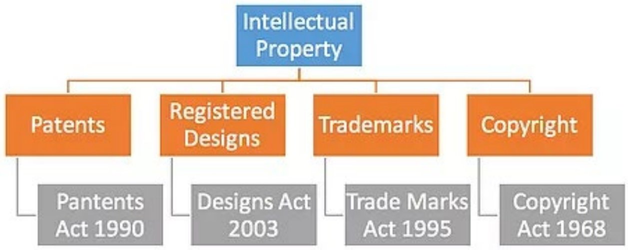
2.4 Usability Of Digital Devices For Specified Client Requirements

The functions that a digital device will be used to perform should be reflected in the device's specifications. For example, a primary school student using word processing will have different needs in terms of processing power, screen resolution, memory capacity etc. in comparison to a professional video editor.

3.0 Impacts Of Technology

3.1 The Concept Of Intellectual Property (IP)

Intellectual property (IP) refers to creations of the mind, such as inventions; literary and artistic works; designs; and symbols, names and images.



3.2 Intention And Purpose Of IP In Australia In Relation To Copyright And/Or Design Of Digital Products

Patents - Patents are a legal document, under the Patents Act 1990, that grants the user exclusive commercial rights to exploit a new product or process for commercial gain.

Registered Designs - Registered designs is a legal document, under the Designs Act 2003, that grants the owner exclusive commercial rights to exploit a unique visual appearance of a product.

Trademarks - Trademarks are a legal document, under the Trade Marks Act 1995, that grants the owner exclusive commercial rights to a keyword or phrase of keywords. A trademark is used to separate business from one another and is widely used to recognize and represent the company itself.

Copyright - Under the copyright act 1968, copyright is applied automatically to all works (literary, dramatic, musical and artistic) and no legal application and approval is required. Copyright gives the owner exclusive rights for fair dealing, private use and moral rights to a product.

3.3 The Concept Of Online Defamation In Australia

Online Defamation is the process of publishing untruths about someone on the internet with the purposes of intentionally causing harm and damage to a person's reputation.

Defamation Act 2005 - Action for legal defamation can be taken under the '*Defamation Act 2005*' which includes legal action for all types of defamation. Victims have the right to sue perpetrators for compensation for damage to a reputation.

Problems with Online Defamation - Online defamation is challenging in a web environment. The anonymity of the internet has allowed users to defame others without the perpetrator being acknowledged. Users can post and share defaming material anonymously on social networks, forums, chatrooms and cloud storage services.

Examples of Online Defamation

- Someone posts publicly a sexually explicit photo of you without your permission
- Someone states online that you are a criminal despite not having a criminal record

- Someone falsely accuses you of harassing them by posting an online social media status

3.4 Legal Action Available In Australia To Counteract Online Defamation

Since online defamation is illegal, civil fines can apply. To counteract online defamation, you can do the following...

1. Record all evidence of online defamation
Recording evidence of online defamation provides legal security in the event legal action is required to take place. Evidence can be used as grounds for legal action and demands for compensation.

2. Block User
Victims of online defamation should immediately block the user. However, blocking does remove the ability to record evidence of further online defamation.

3. Report Content
Online defamation victims should report the content to website administrators who should remove the content.

4. Contact Legal Advice
Victims can contact legal advice for further information on combating online defamation. Victims have the right to sue, and in some cases criminally charge, perpetrators under the *Defamation Act 2005.*

3.5 The Concept Of Freedom Of Information (FOI) In Australia

The Freedom of Information Act of 1982 allows an individual the right to access personal documents or documents in the public interest held by government minister and government agencies

Exceptions
Freedom of Information requests can be rejected under the following reasons:

- **National Security Ris**k - any sensitive information that is regarded as a national security risk, such as documents held by the Australian Defense Force and ASIO, cannot be released under freedom of information
- **Trade Secrets** - any sensitive information that contains details about trade and foreign economic affairs are excluded, such as exclusive DFAT information.
- **Private documents** - Freedom of Information only applied to government documents. Private documents held by private entities cannot be accessed.

3.6 Key Provisions Of FOI In Australia In Relation To Digital Products

Why is it Important?

- Ensures government transparency
- Encourages active individual participation with government

- Taxpayers money is spent to produce government documents; therefore, it is a public good and should be made available to the public.

Examples of Items that can be Requested Under FOI
- Medical records
- Non-confidential government documents
- Personal documents relating to the individual – e.g. credit rating/history

Health professionals and other businesses are required, by law, to keep sensitive information secure.

3.7 Advantages, Disadvantages And Implications Of Virtual And Physical Collaboration

Virtual Collaboration
Using online technologies to allow for communication between two or more people in different geographical locations.

What are Some Examples?
- Skype
- Google Docs
- Email
- Facetime

Advantages of Online Collaboration
- **Reduced costs** - managers do not have to rent meeting rooms
- **Increased productivity** - employees do not have to travel to meeting areas
- **Delayed Communication** - employees can start a conversation at one time, stop and resume it at another time
- **Technological freedom** – Employees can work from virtually any device in any location

Disadvantages of Online Collaboration
- **Misinterpretations** - communication could be misinterpreted due to the limits on emotions and body language in virtual collaboration
- **Security vulnerabilities** - easier to record or hack virtual communication. A user of virtual collaboration could use a screen recorder to record meetings without knowledge of other users.
- **Work-life Balance** – As work can be done from essentially any device, it can impact a work and life balance causing overworking or stress
- **Digital divide** - Communication is limited to internet speeds and bandwidths
- **Learning process** - Additional training may be required to teach employees how to use virtual collaboration software and technology

Implications
- People will become more reliant on technology e.g. power supply and bandwidth

Physical Collaboration
Refers to people within the same geographical location, such as a building to work together on the same project.

Advantages

- Face to Face communication: reduces the amount of information that may be misinterpreted

Disadvantages

- More expensive than digital collaboration

3.8 Impact Of Convergence Trends In Contemporary Digital Technologies

Digital convergence refers to combining two or more technologies into one device.

Convergence examples include:

- **Smartphone** - Functions include communications device, camera, internet messenger, portable gaming device, email communicator and web browser
- **Smart Television** - Functions include television, web browser and media streamer
- **Smartwatch** - Functions include watch, fitness tracker, notifications reader and camera

Impacts of Convergence Trends

- **Lower volume of household devices** - for example, smartphones reduce the need to have separate cameras and phones
- **Increased rate of obsolescence** - rate of digital convergence has posed older devices with less functions as obsolete, increasing volumes of environmental waste
- **Cost savings** - households do not have to purchase multiple devices and can purchase one device for all, usually at a lower cost
- **Increased dependency on a single device** - the smartphone's ability to perform multiple functions has led to increased dependency on the single device for our digital lives.
- **Greater connectivity (Internet of Things)** - Convergence has generally seen devices get smarter with internet connectivity. Greater connectivity of devices has seen smarter homes and workplaces with automated and smart functions, improving standards of living.

4.0 Application Skills

4.1 Online Software Tools

Software you can use directly connected to the internet and working from the internet

What are some Examples?

- Google Docs
- Word Online

- Quizlet

Advantages of Online Software Tools

- Work from home or anywhere - workers can work at home, on the bus, or while in a cafe on mobile devices
- Reduced file space - no need to download and install any software
- Collaboration - Work with peers, clients, friends etc.
- Free software - Due to the nature of online software, majority are free or have free versions

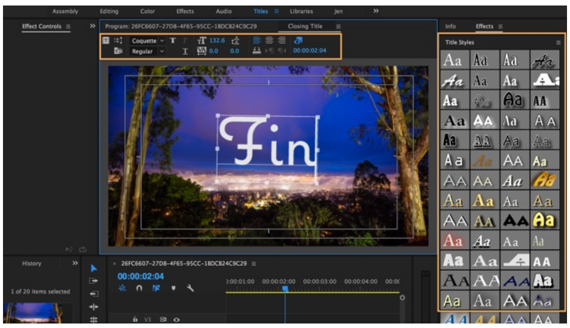
Disadvantages of Online Software Tools

- Dependent on internet connection - poor internet connectivity or none will stop online work
- Less features - some online software doesn't have the same features as the locally installed software
- Privacy - Software may be not be secure and can lead to privacy issues.

4.2 Video Application Features

Multi-Layer Track Editing - refers to arranging media across several tracks. Used for organisational reasons such as using separate audio/video tracks or different media types and for technical reasons such as if you want to add music over a video track.

Titles - Allows you to overlay information/text on a video



Transitions - What is shown between two shots or clips. Can be an instant scene change, audio fade, fade to black, dissolve etc.

Effects - Illusions or visual tricks used in the film, television, theatre, video game and simulator industries to simulate the imagined events in a story or virtual world

4.3 Sound Application Features, Including Sound Effects

Sound Effects – Reverb, delay, chorus etc

Equalizer – Boost and cut frequencies

Volume Control

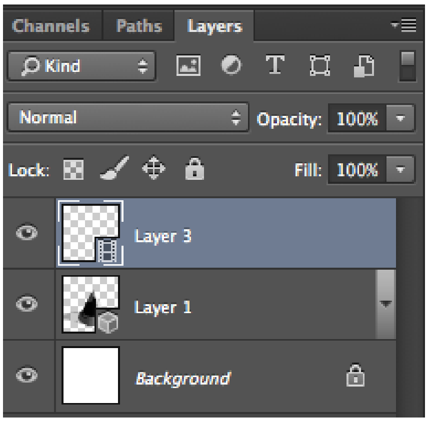
Maniuplate/Change Tempo, Pitch and Speed

Note – many features (such as multi-layer track editing, transitions and effects) are also prevalent in sound editing applications

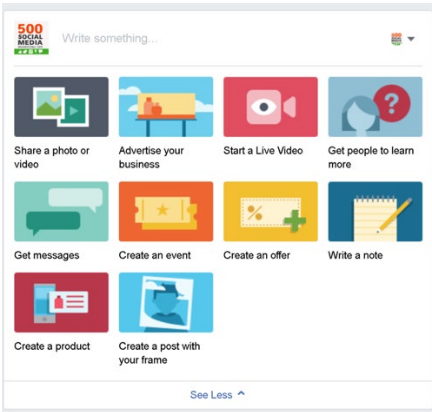
4.4 Publishing Features

Colour Schemes - The choice of colours used in design for a range of media. For example, a colour scheme can be contrasting, complementary etc

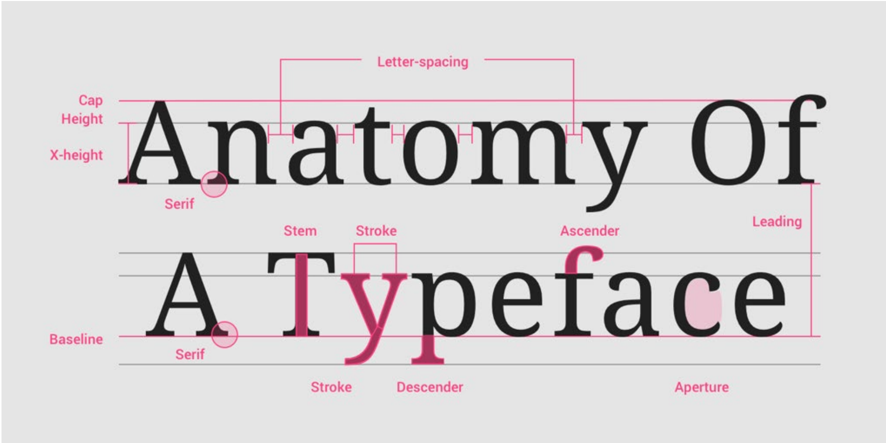
Layers - Placing objects on different depths, this is done by putting one object over another. For example, software *such as Photoshop and Illustrator* use layers as a means of moving items around for effect. Layers can help the illusion of 3D form



Frames - Containers to hold text and images. This help positions images and text to stay in parts of a page, especially webpages.

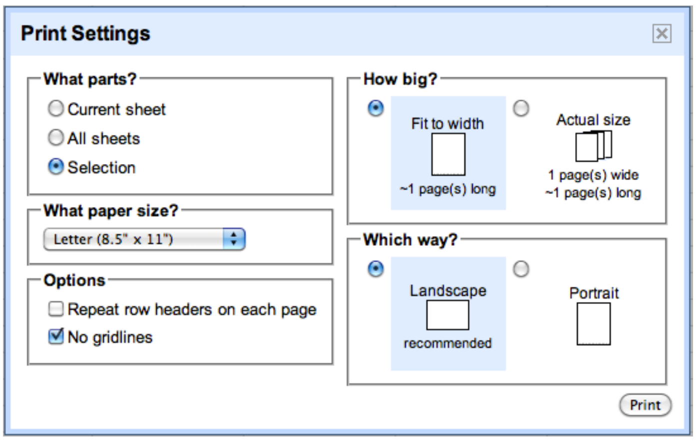


Typography – The appearance of text, includes font (typeface), font size and alignment. Serif is for printed formats (newsletters) and Sin Serif is for digital formats (websites)



Templates - A sample document that has already certain details in place such as backgrounds and headings that only requires users to change any text and add images.

Print/Display Options - What the final product will look like. For example, CMYK vs RGB, landscape vs portrait, A3 vs A4, scaling, content/page selection etc.



4.5 Types Of Digital Publications

ePUB
The EPUB file format (short for electronic publication) is an e-book format with the extension .epub. You can download EPUB files and read them on your smartphone, tablet, e-reader, or computer.

PDF
A file format for capturing and sending electronic documents in exactly the intended format.

Advantages	Disadvantages
• reduced cost due to printing paper, printer cartridges, printers, specialised machinery etc not being required and less labour intensive processes • easier distribution as transport of printed material will be not required, digital publications can be emailed or shared on cloud storage • universally accessible documents can be uploaded on a website and available 24/7 • reduced need for physical storage of hard copy documents e.g. filing cabinets not required as documents are saved digitally.	• additional cost due to requiring a device e.g. tablet, phone, laptop or desktop to access or read the digital publication • additional cost and organisation of a specific application to open the digital document e.g. Adobe Reader • additional cost and organisation of extra electronic storage to save digital publications.

4.6 Advantages And Disadvantages Of Different Types Of Digital Publications

ePUB	Advantages	Disadvantages
	• Delivered as one .zip file • Easy to unpack • Very user friendly • Not owned by any large corporations	• Difficult to create/publish • Must compress (.zip) file

PDF	Advantages	Disadvantages

	• Can be opened on most computers with no additional software • Can be made several ways (not just through Acrobat DC) • Reader software (Acrobat DC) is free • Can 'lock' files so edits cannot be made	• Can sometimes not display correctly on smaller screens (scaling issues) • Not free to edit PDFs • Editing PDFs is not easy

5.0 Project Management

5.1 Project Management Approaches

Prototype

Prototype project management approach is where a limited working model or draft of a final product is made to allow the client and/or users to evaluate the prototype and provide feedback.

Advantages	Disadvantages
• Client/Users have a tangible model and can better explain and talk about product • Cheap to produce • Gives users a feel for the final product • Helps to sell the idea of a proposed product • Errors can be recognized and addressed early on	• Leads people to believe the final product will follow directly after • Gives no indication of performance under operational conditions • Final product may be different from the prototype which will lead in user dissatisfaction • Increased development time from constant user feedback

Structured

A structured approach involves the project going through a number a phases characterised by a distinct set of activities or tasks that take the project from start to conclusion, this will ensure breaking the task down into manageable stages and the monitoring of resources and timelines.

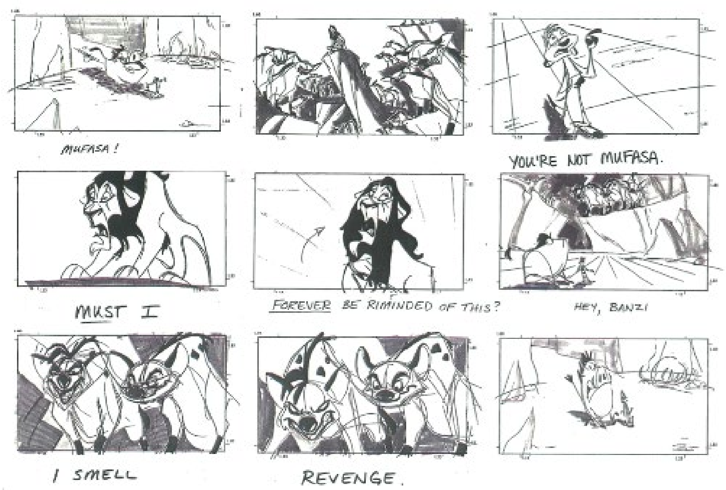
Advantages	Disadvantages

• Business goal and client requirements is clear from the beginning • Controlled use of resources (time and money) • Minimal delays due to initial planning	• Limited client involvement in the project • More expensive than a prototype approach • Generally rigid, process does not change or adapt along the way • More expertise is required • Takes longer compared to a prototype approach

5.2 Project Planning Tools

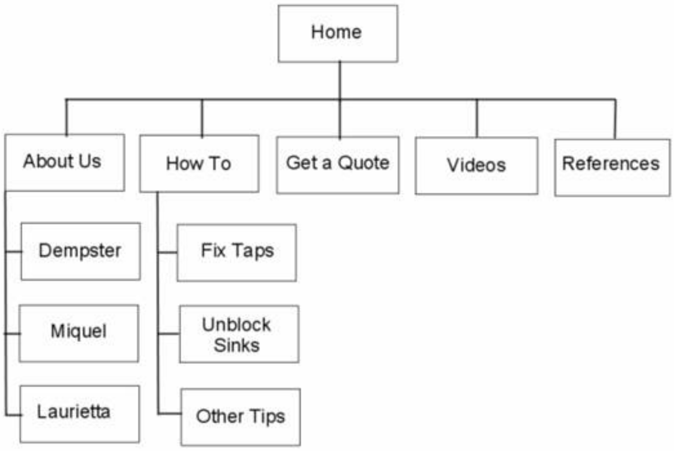
Storyboards

A graphic organizer in the form of illustrations or images displayed in sequence for the purpose of pre-visualizing a digital product. Gives an outline of the design approach and define the elements that go on each page



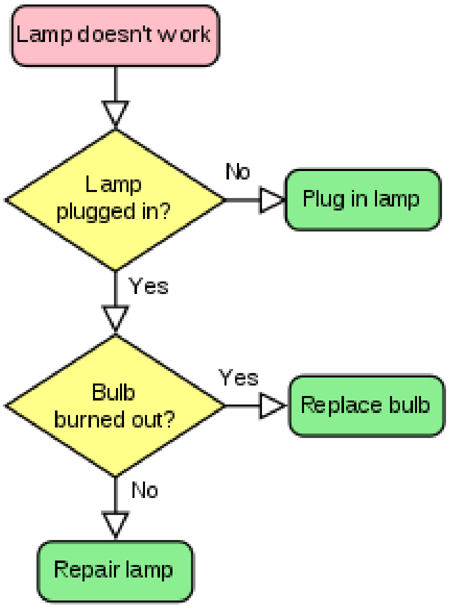
Site Maps

Site maps are a planning tool that allows a user to visualize the flow of a website. Helps plan what web pages are required, what purposes they serve and how the web pages relate to one another



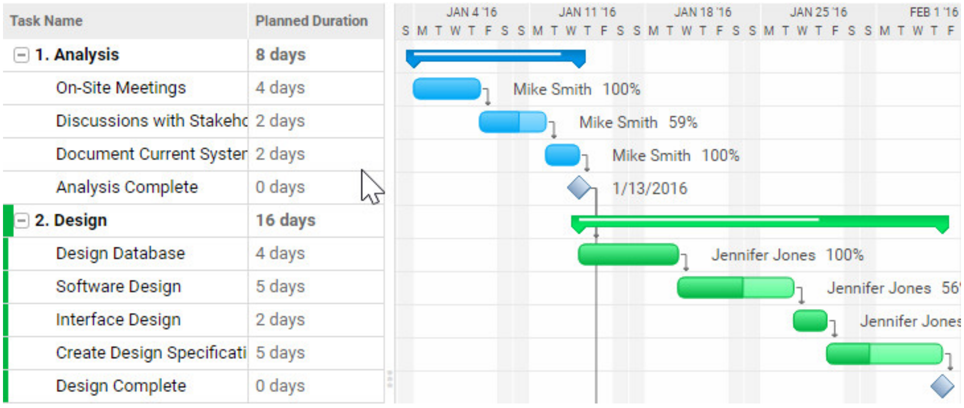
Flow Charts

A diagram used to explain a workflow or process. Used to show the steps in a project and the relationship between the steps



Gantt Charts

Gantt Charts are horizontal bar charts that list the tasks of a project and their approximate competition date. It also compares actual progress to estimated progress to allow project managers to clearly evaluate project performance.



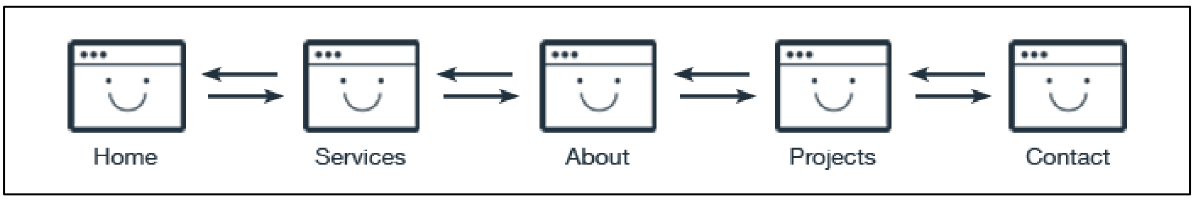
Project Management Software
Programs designed to assist project managers in creating charts etc. and managing a team of people more easily. E.g, Microsoft Project

5.3 Appearance Considerations For A Digital Product And/Or Digital Solution

<u>**Structure**</u>
The arrangement and organization of elements in a digital product/solution

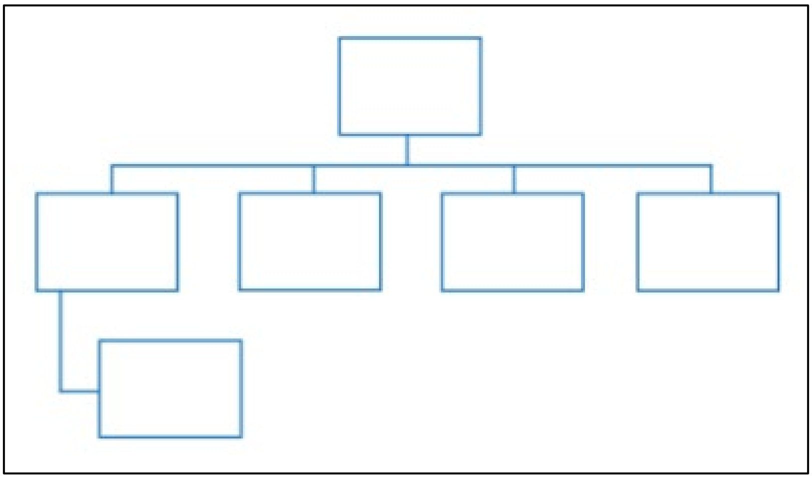
<u>Linear</u>

Organizing data in a logical manner, such as; chronologically, alphabetically (objective) or by subject/genre (subjective). For example, books and magazines have a linear structure



Hierarchical

Organizing data in multiple levels, usually from the most important (e.g. home page) to least important (e.g. about us page) in a direct chain. Hierarchical structure is the most effective way to organize complex information, so it is easy to understand and not cluttered



Usability

Usability is ensuring that users of an ICT product can achieve their desired goals easily (effectiveness) and in as little time as possible (efficiency). The ease of use and learnability of a product

How can it be achieved?

- **A search function**: allows for quick access to desired content (efficiency)
- **A site map**
- Breadcrumbs
- **Logical/predictable menu headings**
- **Provide user feedback** (i.e. loading wheel, countdown timer)
- **Simple and consistent design**
- **Use of thumbnails**: speeds of loading time (efficiency)
- **Use of icon navigation**: makes it easier to navigate (effectiveness)

Accessibility

To allow people with disabilities to benefit from the same service

How can it be achieved?

- **Font resizable** (for people with bad eye sight)
- **Alternate text for images, and captions for videos** (For blind people)
- **Screen readers** (software that vision impaired people buy to be able to 'read' the screen)
- **Choose colour blind friendly colours** (not red and green together)
- **Saved Login Credentials** - assists users with memory problems to login into member only areas

User Experience (UX)

User Experience refers to a person's emotions and attitudes about using a product, system or service. UX design focuses on creating products that provide meaningful and personally relevant experiences.

How is it achieved?

- Use of typography
- Choices of principles of design
- Layout and structure
- Feedback components (i.e. loading wheel)
- Menu system
- Search function

User Interface (UI) add to

The means in which a user and a computer system interact. This can include display screens, keyboards, a mouse and the appearance of a desktop. It is also the way through which a user interacts with an application or a website. Can be graphical (GUI) or command line

How is it achieved?

- Use typography to create hierarchy and clarity
- Simple navigation
- Use a clear consistent layout
- Input components (checkboxes, data fields)
- Navigation components (breadcrumbs, drop down menus)
- Information components (FAQ's, help)

Layout and Structure

- Header (company name & logo), Body (main bulk of content), Footer (copyright, social media etc)
- Reading Gravity (left to right, top to bottom)
- Hierarchical (most important is most prominent, followed by the next etc. The most effective way to organize complex info so it is easy to understand)
- Orientation (horizontal and vertical)
- Visual Hierarchy
- Grid and Alignment

Organisation of Content Suitable for the given Digital Medium

- Subjective (under categories and titles) or Objective (chronologically, alphabetical)
- Menus and Icons
- Hierarchical (most important is most prominent, followed by the next etc. The most effective way to organize complex info so it is easy to understand)
- Headings, subheadings, frames (holds text and images)

Navigation Components

- Search fields
- Breadcrumbs
- Hamburger Slider
- Arrow Sliders
- Drop down menus
- Buttons
- Sitemaps

AIT Unit 4

1.0 Managing Data

1.1 Security Techniques for The Management of Data

Disaster Recovery Plan

A documented process or set of procedures to execute an organization's disaster recovery processes and recover and protect a business IT infrastructure in the event of a disaster.

It includes the steps to restore areas of ICT equipment such as web servers as well as procedures to restore data from backups. Two important aspects of a disaster recovery plan are; Recovery Time Objective (RTO) and Recovery Point Objective (RPO).

Audit Trails

Audit trails are an electronic or paper log that records details about a user's access to a file.

Audit trails allow administrators to review who has been accessing data and identify any unusual behaviour which can be investigated further. When files are moved or modified, audit trails can be used to identify who was responsible for such actions.

1.2 Types of Backup Techniques and Archiving of Data

Full Backup
A backup that makes a copy of the entire contents of a system onto an external source.

Differential
A backup that makes a copy of all new or modified files since the last full backup.

Incremental
A backup that makes a copy of all new or modified files since the last full, differential or incremental backup.

Daily
A backup that makes a copy of all new or modified files on the day of the backup. Daily backups are performed each day.

1.3 Online Data Storage Methods

Data Warehouses

A facility where all of an organisation's data is stored into a central repository so that data can be shared with different stakeholders for analysis and decision-making purposes

Data Mart
Data marts are a subsection of a data warehouse that hold data relating to a specific function or department of a business.

Data in the Cloud
Data in the cloud refers to online cloud storage, where data is stored offsite of business premises, onto internet connected servers located around the world, often for disaster recovery, data backup and archiving

1.4 Purpose of Data Mining

Data mining is extracting patterns, trends or information from data sets.

The main purpose of data mining is for marketing purposes to which this information is collected to a build a profile about a user, with personal information including their name, age, interests, sex, interests, dislikes and geographical location.

The idea is that once marketers know who you are, they can better promote products and services based on your interests and personal attributes. Marketers use algorithms to detect and identify certain patterns in online activity to build a customer profile.

An organisation may use data mining…

- to identify interesting and useful patterns and relationships in large volumes of data
- to identify and predict patterns based on trends and behaviour analysis
- to identify relationships between price, product and customer demographics
- to determine impacts on sales, customer satisfaction and profits

1.5 Processing of Data Through Data Security Measures

Passwords
A combination of characters, linked to an username (often an email), used to unlock access to certain computer resources.

Firewall
A hardware, software or router, that checks the incoming and outgoing data packets of a network and rejects any unauthorised data packets entering or leaving the network.

Biometrics
Unique human characteristics, used to verify the user to unlock access to certain computer resources. Biometrics can include:

- Fingerprints
- Iris
- Voice

- Facial recognition

Anti-Virus Software
A computer program used to prevent, detect, and remove malware. Anti-Virus Software protects data of users from malicious intent and prevents corruption/loss of data.

Digital Signatures
An electronic code, embedded in a document via public key cryptography, that validates the authenticity of a message. Digital Signatures serve the purpose of verifying the contents of the document and the sender's identity.

Digital Certificates
An electronic passport, that uses public key infrastructure, to secure transmit data between a website and a user's device. A Digital Certificate contains serial number, name of certificate holder, expiration dates, copy of certificate holder's public key and digital signature of certificate-issuing authority

Encryption
Encryption is the process of encoding data, through algorithms, so it can only be read by the sender and its intended recipient. Encryption uses public key infrastructure, which consists of two keys, a public key that anyone can obtain off the web, and a private key known only by the sender and the intended recipient, increasing the security of data while in transit

1.6 The Concept of User-Generated Content

User-Generated Content is any form of content, such as images, videos, text and audio, that have been posted by users on online platforms such as social media and wikis

1.7 Advantages and Disadvantages of User-Generated Content

Advantages

- Free - the website owner does not have to pay staff to produce content
- Keeps Users Engaged - users often participate with discussions with one another, keeping users engaged and increasing the number of returned users
- Build Trust – people trust their peers more than they trust an organization promoting themselves. Having real people show your impact is an asset that builds legitimacy.

Disadvantages

- Bias - users often hold strong opinions about a topic and often don't contribute a balance perspective
- Lack of reliability and creditability - anyone can publish content from a 5 year old to a University professor, therefore, user generated content has to be taken with a pinch of salt. There's no guarantee that information presented in user generated

content is factual and is why Wikipedia has a poor reputation and often avoided in referencing

- Difficult To Moderate – As the amount of user generated content produced each day is substantially more than traditional content, it is difficult to moderate the content for appropriateness (i.e. no swearing, pornographic images etc)

1.8 Concept of Hypertext Markup Language

Hypertext Markup Language is a markup language used for the structuring and presentation of websites. HTML consists of plain text and HTML tags.

1.9 Concept of Web 2.0 and Web 3.0

Web 2.0

Web 2.0 is the term given to describe a second generation of the World Wide Web that is focused on the ability for people to collaborate and share information online. Examples of Web 2.0 applications are Youtube, Wiki, Flickr, Facebook, and so on.

Features

- **Folksonomy** - Free classification of information; allows users to collectively classify and find information (e.g. "tagging" of websites, images, videos or links)
- **Rich User Experience** - Dynamic content that is responsive to user input (e.g., a user can "click" on an image to enlarge it or find out more information)
- **User Participation** - Information flows two ways between site owner and site users by means of evaluation, review, and online commenting. Site users also typically create user-generated content for others to see (e.g., Wikipedia, an online encyclopedia that anyone can write articles for or edit)

Web 3.0

Web 3.0 is the third generation of internet services for websites and applications that will focus on using a machine-based understanding of data to provide a data-driven and semantic web. The ultimate goal of Web 3.0 is to create more intelligent, connected and open websites. An example of Web 3.0 is Apple's artificial intelligence Siri.

Features

- **Artificial Intelligence** - Web 3.0 will be integrated with natural language processing to make computers understand human language and provide faster and better results. This is the key to intelligent computation.
- **Connectivity** - Connectivity is another key feature of Web 3.0. This aims to improve user experience and leverages the usability of all the available information.
- **Ubiquity** - The same content will be accessible using multiple applications. Every service will be available over every device and can be accessed from anywhere.

1.10 Purpose and Features of Content Management Systems (CMS)

A CMS is an online publishing tool that allows users to create, edit and publish online content without the use of development tools or knowledge of HTML. For example, Wix and Wordpress.

Features

- **Search Functionality** - To allow for searching for documents across the database
- **Revision Control** - Placing revision numbers within documents or other files allows users to track history or ensure they are working on the latest file
- **Publishing Facility** - Allows users to work with templates to create content
- **Security -** Group-based permissions to allow restricted access.

1.11 Purpose of World Wide Web Consortium (W3C)

W3C is an international community who develop web standards that promote consistency in the design code which makes up a web page and ensure the web is accessible to all users despite differences in culture, education, ability, resources and physical limitations.

Developing web standards to ensure long term growth of the web and web accessibility to ensure that the web evolves in one direction rather than being split amongst multiple directions by rival groups.

1.12 Purpose of the Web Design and Applications Standard from the W3C Standards

HTML and CSS

HTML (Hypertext Markup Language) and CSS (Cascading Style Sheets) are two of the core technologies for building Web pages. HTML provides the *structure* of the page, CSS the (visual and aural) *layout,* for a variety of devices. Design of a webpage should be adaptable to different types of devices

Graphics

Ensures that the webpage optimises images for different audiences with different needs and expectations

- You should use the .png file format for any raster images on webpages
- You should use the .svg file format for any vector images on webpages

Audio and Video

The use of W3C formats of audio and video codecs that enable authoring audio and video presentations, such as Synchronised Multimedia Intergration Language. The Web content accessibility guidelines recommend to always provide alternatives for time-based media, such as captions, descriptions, or sign language.

- **SMIL -** SMIL is the Synchronized Multimedia Integration Language, an XML-based language for describing interactive multimedia presentations. It combines audio, video, hypertext, images in time and space, allowing visual transitions in between.

Accessibility

Accessibility is essential for developers and organizations that want to create high quality websites and web tools, and not exclude people from using their products and services. Developers should create content that is accessible to people with disabilities such as use of transcripts for podcasts or audio files, screen reader that reads aloud.

Internationalization

The design and development of websites to be inclusive and to work well for any culture, region or language. Can include language translators, unit conversions (metric to imperial or vice versa) and currency conversion.

Unicode is a key component of internationalization – an international encoding standard for use with different languages and scripts that applies across different platforms and programs.

Mobile Web

Mobile Web refers to users' internet experience consistent (i.e. the same) on any device. This can include keeping the layout simple and fluid for different screen sizes and resolutions; allowing input from any form of input device; limiting use JavaScript due to less processing power and memory.

1.13 Validation Techniques for Online Forms

Validation is an automatic computer check to ensure that the data entered is sensible and reasonable. It does not check the accuracy of data.

- **Required Fields** – validation to ensure that the user provides all necessary details in the web form and it has to fail if one of the fields is not provided. Usually indicated with an asterisk
- **Correct Format** – validation has to ensure that users provide information in the correct format. This applies to various cases such as email address, URL, dates, phone numbers and others. If information is not in the correct format, users should be informed and correct format should be suggested
- **Confirmation Fields** – validation that lets the users confirm their input using additional confirmation fields. This way users can be certain that they provided

correct information. A typical case when the confirmation field is used is for passwords, but it can be used in other cases like an email address.

2.0 Networks

A computer network is where a bundle of devices (e.g tablets, phones or computers) are connected together for the purposes of sharing resources (such as the internet) or communication.

2.1 Types and Characteristics of Communication Protocols

A communication protocol is the language used to communicate information between two devices.

Transmission Control Protocol/Internet Protocol (TCP/IP)

TCP/IP is a communication protocol that defines how data packets are communicated between different networks. For example, if you had two separate networks connected together by a router, the connection between the two routers would use TCP/IP to communicate with one another.

IP or Internet Protocol is the address to which data is sent to. Transmission Control Protocol defines how data packets are broken down and communicated between different networks. Think of IP as the address of a house and TCP as the mailman delivering the letters to different houses.

Characteristics of TCP

- Connection-Oriented - TCP requires that devices first establish a connection with each other before they send data.
- Full Duplexing - Once a connection is established, TCP devices send data bidirectionally.
- Reliable - Communication using TCP is said to be reliable because TCP keeps track of data that has been sent and received to ensure it all gets to its destination

Characteristics of IP

- Connectionless - No connection with the destination is established before sending data packets.
- Best Effort (Unreliable) - Packet delivery is not guaranteed
- Media Independent – The operation is independent of the physical medium carrying packets (i.e. copper cable, radio frequencies)

Hypertext Transfer Protocol (HTTP)

HTTP defines how data packets are communicated between a device and a web server and what actions a device and web server should take in response to the data packets. HTTP is standard for transferring hypertext and is the request/response protocol based on the client/server architecture.

Characteristics of HTTP

- Stateless - Each request is considered as a new request. In other words, server doesn't recognize the user by default.
- Connectionless - It is a connectionless approach in which HTTP client (a browser) initiates the HTTP request and after the request is sent the client disconnects from server and waits for the response.
- Media Independent - Any type of media content can be sent by HTTP as long as both the server and the client can handle the data content.

Hypertext Transfer Protocol over Secure Socket Layer (HTTPS)

HTTPS is an extension of the Hypertext Transfer Protocol for secure communication over a computer network and is widely used on the Internet. In HTTPS, the communication protocol is encrypted using Secure Socket Layer (SSL). The main motivation for HTTPS is authentication of the visited website and protection of the privacy and integrity of the exchanged data.

HTTPS Characteristics

- Security – Data passes within a connection encrypted by Secure Socket Layer (SSL)
- Public/Private Key – Based public/private key cryptography, where the public key is used for encryption and the secret private key is required for decryption
- Digital Certificates – A digital certificate which is installed on the web server serves to; authenticate the identity of the website and encrypt the data being transmitted

Wireless Application Protocol (WAP)

Wireless Application Protocol is a technical standard for accessing information over a mobile wireless network. WAP can access all operating systems on any mobile device such as smartphones and tablets.

Characteristics of WAP

- Compatibility – Supported by all operating systems
- WML – The use of Wireless Markup Language (similar to HTTP) to deliver content to smaller display screens
- Standardization – Standardizes the way wireless/mobile devices can be used to access the internet

2.2 Types and Characteristics of Communication Standards

802.11xx (Wireless)

802.11x is generic term to refer to the IEEE 802.11 standard for defining communication over a wireless LAN (WLAN). 802.11, commonly known as Wi-Fi, specifies an over-the-air interface between a wireless client and a base station or between two wireless clients. 802.11 funtions at the MAC and Physical layer

Characteristics of 802.11xx

- Layers – Functions at the MAC (media access control) and physical layer
- Multi-Band – Communicates in 2.4, 3.6, 5 and 60 Ghz frequency bands
- Over The Air – Allows communication between a wireless client and base station or two wireless clients over the air

802.3 (Ethernet)

802.3 specifies the physical and networking characteristics of an Ethernet network, like how physical connections between nodes (routers/switches/hubs) are made through various wired media like copper coaxial or fibre cable.

IEEE 802.3 is otherwise known as the Ethernet standard and defines the physical layer and the media access control (MAC) of the data link layer for wired Ethernet networks, generally as a local area network (LAN) technology.

Characteristics of 802.3

- Layers – Functions at the MAC (media access control) and physical layer
- BASE – Categorized through BASE which specifies data speed, physical medium and segment length and interface
- LAN – Allows communication through a physical medium within a local area network

2.3 Types of Network Security Measures

Network security is the practice of preventing and protecting against unauthorized intrusion into corporate networks. It involves taking software and physical measures to protect network infrastructure from unauthorized access, malicious intent and misuse.

Firewalls

Firewalls are hardware or software that monitors the incoming and outgoing data packets of a network and rejects any unauthorised data packets.

- Can be a server that filters incoming data from blacklisted IP addresses
- Can be a proxy server, the gatekeeper for what packets of data get in or out
- Can be software on your computer to protect who accesses your computer
- You can ban certain protocols, e.g. File Transfer Protocol (FTP) which can upload dangerous files to computers

Passwords

Passwords are a combination of characters, often associated with a username, used to unlock certain computer resources.

Strong passwords follow guidelines such as:

- Use a minimum of 12 characters
- Include both uppercase and lowercase letters
- Include numbers and symbols
- Uniqueness (not using the same password more than once)
- Not using data about yourself (i.e. pet name, birthdate etc)

Physical Security

Physical security describes security measures that are designed to deny unauthorized access to facilities, equipment and resources and to protect personnel and property from damage or harm.

Some examples of physical security include the use of:

- Locks
- Video Surveillance
- Biometric Security (i.e. fingerprint scanners, facial recognition etc)
- Security Guards

3.0 Impacts of Technology

3.1 Data and Information Security Related to Personal or Sensitive Information

The increase of mobile devices, fibre optic networks and terabytes of data moving around the internet has led to the ability for personal data to be spread into places never before imagined.

Personal Information

Personal information is any information that can be used to identify you. Personal information could be characterised as belonging to you.

Examples of Personal Information include:

- Address
- Date of Birth
- Name
- Email Address

- Phone Number

Sensitive Information

Sensitive information is information that is protected and should not be disclosed unless under specific circumstances. The Privacy Act (1988) defines sensitive information as information or opinion about an individual relating to:

- Race or ethnic origin
- Religious beliefs
- Criminal record
- Health details
- Bank details

Information and Data Security

This information is protected in order to prevent; physical harm, embarrassment, stalking, hacking and most importantly protect the privacy of an individual

Businesses and Government organisation have an obligation to protect the personal and sensitive information collected about their customers. Unauthorised access of personal and sensitive information could lead to identity theft and fraud.

Information and Data can be secured through the following means:

- Physical Security - locks on servers, video surveillance of server rooms and keys or key cards to restrict access
- Electronic Audit Trails - allows administrators to see what files were accessed by which user and at what time. Some audit trails can be programmed to prompt a user to input a reason to why they are accessing certain files
- File Permissions - restrict access of personal and sensitive information to authorised users
- Firewalls - monitors incoming and outgoing data packets and blocks unauthorised data packets
- Anti-Virus Software - detects and removes malware on systems that could be used to discretely access personal and sensitive information

3.2 Purpose of a Code of Conduct

A code of conduct exists to ensure employees of a company acknowledge and comply with the expectations of behaviour and conduct in that workplace. It also outlines any disciplinary actions that will be taken in the event of inappropriate behaviour and conduct. A code of conduct will also outline to employees their obligation to act in accordance with the ethics and values of the organisation.

3.3 Elements of a Code of Conduct

Work Hours

A code of conduct will typically include the expectations of employees to meet their hours as outlined in their contract and may outline the consequences for tardiness (being late) and absenteeism (days off without reason).

Employee Email Use

Under the Code of Conduct, email sent using an official company email address is regarded as official company policy. Employees should be careful when sending emails as it gives the receiver written evidence which could be use to legally enforce contracts or conditions.

Employees are also refrained from sending inappropriate emails, including but not limited to offensive emails or defamatory emails about another person.

Employee Internet Use

Employees can only use business internet resources for business purposes. Employees must not visit websites that could diminish their level of productivity, websites such as social media, pornography, gambling or online games.

Employee Privacy

Employees are allowed a degree of privacy with the right to be trusted when using business equipment and resources. Employees are allowed privacy of confidential and personal information.

While employers have the right to monitor traffic and activities on ICT systems, they must also respect the privacy of confidential and personal information.

Employer's Monitoring of Work Emails, Internet Access and Computer Use

Employers own the business and ICT business resources, including the right to monitor work emails, internet access and personal use. While they have the right to monitor these systems, they should respect the privacy of personal and confidential information. (*For example, an employer should avoid opening personal emails and only checking work related emails).*

Employers have the right to monitor ICT systems as they have the right to:

- Protect the business from legal threats
- Ensure the business reflects a positive reputation
- Ensure workers remain productive
- Protect ICT systems from malware

Employers however, must consider employee's rights to:

- Be trusted
- Take regular breaks
- Confidentiality of own data

3.4 Online Censorship of Information in a Global Context

Online censorship is controlling or suppressing information that can be accessed and published by users on the internet.

It can be used on a small scale such as businesses employing web filters to ensure workers stay productive, or large scale, such as the Great Firewall of China blocking users access to websites such as Facebook.

Methods of Online Censorship

Online censorship is most commonly done by internet service providers (ISP) through the following tactics:

- Internet Protocol (IP) address blocking
- Domain name service (DNS) filtering and redirection
- Uniform Resource Locator (URL) filtering

Online Censorship in Australia

In June 2015, the Copyright Amendment (Online Infringement) Bill passed allows the courts to block websites that are known to cause copyright infringement hosting and distributing content illegally. For example, torrenting websites such as The Pirate Bay

In Australia, there has also been an ongoing debate over mandatory filtering, (a list of websites that all Australian Internet Service Providers must block), arguing a need to block terrorist and crime websites and limit accessibility to adult content.

Online Censorship in China

The Great Firewall of China (GFW) is the combination of legislative actions and technologies enforced by the People's Republic of China to regulate the Internet domestically. Its role in the Internet censorship in China is to block access to selected foreign websites and to slow down cross-border internet traffic.

The effect includes: limiting access to foreign information sources, blocking foreign internet tools (e.g. Google search, Facebook, Twitter, Wikipedia, and others) and mobile apps, and requiring foreign companies to adapt to domestic regulations.

Reasons for Online Censorship

The concept of censoring parts of the internet is controversial. Proponents of free speech and the free flow of information would argue that anyone should be allowed to access all information. However, some argue that there are topics that should be censured as they cause harm to those people accessing the information or those that are affected by that information.

Some examples of this include:

- Pornography / Child Pornography
- Gambling
- The Black Market

3.5 Issues with the use of Cloud Computing

Confidentiality of Data

Confidentiality refers to protecting information from being accessed by unauthorized parties. In other words, only the people who are authorized to do so can gain access to data.

If you have data stored locally on your computer, you can be fairly confident that said data is safe from outside parties as it is only accessible from your device, however the same cannot be said about data that is stored on the cloud as it can be accessed by anyone that has your login credentials and an internet connection – or by those who have created an exploit that gives them access your data.

Sensitivity of Documents

Services that provide data in the cloud will encrypt the data so that it cannot be accessed by outside sources. However, the service provider that encrypts also has the ability to decrypt that data. If sensitive documents are to be stored on the cloud, they should be encrypted prior to being stored in the cloud.

The more sensitive the document, the more care needs to be taken in order to keep it safe. For example, storage and protection practices of patient records in hospital systems will be vastly different from a teenager storing mobile photos on the cloud.

Level of Accessibility

Due to the data in the cloud being networked globally, this makes it more accessible and therefore more prone to cyberattacks. In order to access data on the cloud, all you need is login credentials and an internet connection – however security measures such as two factor authentication (2FA) are slowly becoming the norm making it harder for intruders to access your account.

Availability of Online Applications

Data stored in the cloud requires internet connection from both the service provider and the company trying to access the service. If either of these links are down, then access to the data will not be available.

For example, if the Google web servers were to be unavailable or down, the Google suite (Google Docs, Google Drive etc.) would not be usable at all as they rely on cloud computing.

3.6 Impact of Digital Technologies and Global Markets

Digital technologies have changed the way many businesses operate. The information age and the speed of networked communications means that information spreads very quickly.

Productivity

Through the introduction of connected digital technologies and global markets, businesses have been able to make productivity gains by having access to a global supply chain. Digital technologies have helped facilitate the distribution of goods around the world and access more productive means.

Global businesses are able to work around the clock through digital communication, so production and development can be done 24/7.

Access to Knowledge or Resources

The connectedness of the internet to knowledge and resources is self-evident. Prior to the 1990s, knowledge was siloed and often only shared in person. Access to the internet has allowed people and businesses to share knowledge with the world, as well as access that same shared content. The global market allows people to access resources cheaply and timely from wherever best to access them from.

For instance, the internet gives users the ability to access learning, entertainment, social media etc. 24/7 – in our age everything is easily accessible through a quick Google search.

Outsourcing

The internet has made it easier for businesses to connect with others in the global market who can partake in the workforce. Outsourcing can be achieved at a global level through the ability to find and connect with experts from around the world. IT workers and businesses can sell their services online and connect with companies to acquire their services within to work within their own company. This allows companies to focus on their core business and leave non-core activities to others.

For example, many internet service providers (ISPs) such as iiNet and Optus have outsourced customer support lines to countries like India.

3.7 Impact of Web 2.0/Web 3.0 on the use of Digital Technologies

Web 2.0

- Dynamic User Interfaces that allow customisation and personalisation for each individual user
- Social Networking where users can interact with each other, collaborate and connect
- Advanced Search Engines where users can find the information they want faster and easier

Web 3.0

- Greater Connectivity between internet enabled devices - development of the internet of things where ordinary household devices will be able to communicate wirelessly
- Intelligent Processing of information with web technologies learning from past user activity - for example, eBay learning our interests based off a user's past searches and generating a 'Recommended for You' list of products
- Artificial Intelligence where computers can distinguish information like humans in order to provide faster and more relevant results. They become more intelligent to fulfil the requirements of users.

3.8 How Digital Communication is used for Educational Purposes

Learning Management System

A learning management system (LMS) is a software application for the administration, documentation, tracking, reporting and delivery of educational courses or training programs. Some examples of LMSs that you may be familiar with are Google Classroom and Seqta. Learning Management Systems allow educators to communicate with students through:

- Posting information about learning tasks to learners
- Distribute assessments and communicate feedback/results
- Allowing educators and students to converse through comments
- Avenues to access external resources

The key advantage of using a LMS is that it is an easy way for an educator to manage and collaborate with a large group of learners.

Teachers

- Providing learning to students 24/7 via LMS such as Seqta
- Share collaborative documents i.e. Google Docs
- Share files and resources i.e. past exams, practice tests etc. on Microsoft Teams
- Present digital videos such as those on YouTube to aid in the learning process

Students

- Socialise on social media platforms i.e. WACE Discussion Space on Facebook

- Access digital textbooks via application such as NelsonNetBooks where students can still access information and learning resources without a physical textbook
- Collaborate with peers via platforms such as Google Docs

Advantages of Digital Communication in Education	Disadvantages of Digital Communication in Education
• A large array of learning resources available in the classroom • 24/7 availability of resources • Encourages more discussion and input from students	• Reliant on an internet connection • Students can get distracted by game websites that prevent learning • Those without computing resources are disadvantaged (digital divide)

4.0 Project Management

4.1 Concept of Service Level Agreements

Service Level Agreements are a contract between a service provider and a user of the service (i.e the customer), that defines the expected quality of services to be provided by the service provider.

Service providers need SLAs to help them manage customer expectations and define the circumstances under which they are not liable for outages or performance issues.

4.2 Features of a Service Level Agreement

Availability of Service

This section of the Service Level Agreement outlines the period of time the services will be provided and the quality of service to be provided, including outlining any downtimes such as those from routine maintenance, planned outages or unplanned outages.

As an example, Internet Service Providers (ISPs) will commonly include service level agreements within the terms of their contracts with customers to define how often the service will be available and therefore agreeing to a maximum time the service will be down for in a given timeframe.

Types of Services

Specifies what the nature of the service is, what is included and a general run down on what the service will provide

4.3 Advantages of Local and Global Outsourcing Compared to In-House Production

Outsourcing

Outsourcing is the process to which products/services are provided and contracted by an external provider.

Advantages of Local Outsourcing

- Cost Efficient - Outsourcing producers could have significantly larger production facilities or more specialised equipment to lower the unit cost of production
- Mass Production - Outsourcing can produce large output demanded by businesses. Producing large outputs reduce the unit costs of production.
- Access to Skilled workers – Outsourcing eliminates the need for businesses to recruit and train employees

Advantages of Global Outsourcing

- Lower Company Tax Rates - Businesses may be able to save money by producing elsewhere to take advantage of lower company tax rates such as Ireland at 12.5%, Germany at 15%, Cambodia at 20% while Australia's company tax rate is 30%
- Less Regulation - Other countries can have significant less barriers to production. For example, outsourcing can avoid strict environmental, planning and employee regulation.
- Lower Wage Costs - Australia has relatively high minimum wages. Outsourcing can take advantage of lower wage costs in developing countries.

In-House Production

In-House production is where a product/service is manufactured or provided under the control of the business.

Advantages of In-House Production

- Greater Quality Control - The business is able to examine the quality of the manufacture of goods or providing of services
- Easier Customisation - The business is able to easily modify production to suit special orders or request by customers. Outsourcers may have difficulty understanding the client requirements of special orders.
- No Transport Delays - Businesses have to wait for outsourced production to arrive at the business which is especially long for global outsourcers

4.4 Purpose of Outsourcing Data Management

Offsite data storage and management is one way of distributing the workload of companies' IT resources out of their business to specialist IT companies.

By managing data outside of the business, they can focus on their core business. This can help reduce infrastructure and resource management costs, remove the burden of hiring and training IT specialists in non-IT businesses, and improve productivity.

4.5 Evaluation of Software (Including Usability)

Surveys

Surveys collect user's opinions about the use of an ICT product by filling out a survey. The survey can be used to gather analytics about areas of ICT product that are liked and disliked and any comments or recommendations. The survey results can then be used to refine an ICT product to meet the needs of its users.

Self-Reflection

The creator of an ICT product could critically evaluate aspects of an ICT product for usability, noting down any areas that could be refined and improved.

The creator could also ask others such as co-workers to use the product and ask for feedback from a software development perspective.

Client Feedback

The creator of an ICT product could ask the client to evaluate the product, noting down any areas where features can be added or removed or any barriers they faced during using the product such as glitches or crashes. The ICT product can then be refined to suit the client's needs.

A popular form of this is known as 'beta testing' where the creator will release a free, usually partly unfinished version of the product for a short period of time in which users can use the software and provide feedback to the creator about their experience. This feedback can then be addressed, and the creator is able to solve any issues relating to usability before the final product is released.