Information Systems

Business & The Information Age

- Computerising shops change the concepts of shopping
- Businesses put themselves online / start online to attract more customers with:
  - Larger selections
  - Searching
  - Speed
  - Customer Reviews
  - Cheaper

Definitions

- **Information Age** = infinite facts widely available to computer users
- **Fact** = confirmed/validated information/data
- **Management information systems (MIS)**
  - Solve business problems with people, technology, procedures

Core Drivers of Info Age

1. **DATA**
   - Raw facts / characteristics of events/objects
   - *Truck drivers: monitoring their average speed, max speed, no. times stopped at lights*

2. **INFORMATION**
   - Data *processed* into meaningful context
   - *Truck drivers: whose getting to their destinations too quickly?*

3. **BUSINESS INTELLIGENCE**
   - Information *collected* from multiple sources (can be internal or external sources)
     - Suppliers
     - Customers
     - Competitors (via Ratings & Analysts)
     - Partners
     - Industries
   - Analysis of Business Intel -> Business Performance => Strategic Decision Making
   - *Truck Drivers: Cost of fuel + amount speeding of truck drivers = Costing more fuel*

4. **KNOWLEDGE**
Skills, experience, expertise + information/intel = Knowledge
Helps us not to misunderstand information
Business analysts are knowledge workers
- Interpret and analyse information
- Being able to deliver knowledge to others and make it ‘make sense’
- Truck Drivers: Costing more fuel based on these figures only
  - Knowledge could be that the trucks are v8 and thats why they guzzle fuel etc.
  - So we don’t blame the truck drivers for driving too fast (info vs knowledge)

Efficiency and Effectiveness
- IT makes business more efficient
  - Changed the speed at which people work
    - Lower error rates
    - Increased validation
    - Faster throughput (crunching numbers easier)
- IT makes businesses more effective
  - Changed the way people worked
    - Paper forms replaced with computerised forms
    - Shared data across multiple departments
    - Increased communications (email!)
- ==> IT reduces costs, improves productivity, and generates growth

Departmentalised Companies
- Functional areas (departments) work independently to each other
  - Little communication, data sharing, flow of information
  - Fragmented systems decrease efficiency
- How?
  - Different software / hardware / systems
  - Old systems - reluctant to upgrade (some departments fall behind)
  - Systems made without other departments in mind
  - Companies merge (both having different software/data)
  - Too much money to upgrade/replace with new system
- Problem?
  - Hard to transfer data + not seeing the big picture --> minimal business intel & knowledge
The Swinburne HR IS records personal details but the Library IS does not pull personal details for overdue books - has duplicate data

Systems Thinking

- What is it?
  - Monitors an entire system so that the MIS is at the centre focus of the business
  - View multiple IPO, constantly monitoring the IPO for feedback to structure information better

- What does it do?
  - Helps companies see the big picture
  - Every system becomes/leads into one, core system
  - Independent functional areas to work interdependently
    - Seamless transfer of data
    - Data from all departments gathered centrally
    - Improved Business Intel + Knowledge --> Business Decisions
  - All employees must be involved in System Thinking since it incorporates all department’s work

- Why?
  - Allows us to make better business decisions in the long run
  - People use IT to work better with information --> BUSINESS SUCCESS

Business Strategy

Goals

- Organisations can have plans that achieves goals or objectives:
  - developing new products
  - entering new markets
  - increasing customer loyalty (existing customers)
  - attracting new customers
  - increasing sales

Competitive Advantages

- Competitive advantage
- **Customers** see a company’s product having more value than the competitor’s similar product
- **First-mover advantage**
  - Companies take a **risk** to innovate and be the first to have competitive advantage
  - May lead to larger market share or absolute waste and failure (risk)
- **Competitive intelligence**
  - Gather information about competitive environment --> improve competitive success

3 Competitive Intelligence Tools
- Helps us develop/analyse competitive advantage/intelligence
- **(1) Five Forces Model**
  - What? Evaluates opportunities, industry attractiveness, deterring potential rivalry

![Diagram of Five Forces Model]

- **Supplier Power**
  - Number of suppliers
  - Size of suppliers
  - Uniqueness of service
  - Your ability to substitute
  - Cost of changing

- **Threat of Substitution**
  - Substitute performance
  - Cost of change

- **Competitive Rivalry**
  - Number of competitors
  - Quality differences
  - Other differences
  - Switching costs
  - Customer loyalty
  - Costs of leaving market

- **Threat of New Entry**
  - Time and cost of entry
  - Specialist knowledge
  - Economies of scale
  - Cost advantages
  - Technology protection
  - Barriers to entry
  - etc.
- **Buyer Power**
  - Power reflected by buyers ability to directly affect price willing to pay
    - CHOICE = HIGH = Pay Less
    - NO CHOICE = LOW = Pay More
  - Reduce buyer power by:
    - Switching costs
      - Further costs customers will need to pay for an item --> reluctant
      - *Training needed if we buy this* ==> *More Cost* ==> *More Reluctant*
    - Loyalty programs
      - Rewards customers based on their spending
      - To keep more existing customers rather than attracting new customers ==> costs more

- **Supplier Power**
  - A supplier’s influence in the prices they charge for a product
    - HIGH when supplier has MORE market power
      - Higher raw material price drives the retail price
    - LOW when supplier has SIMILAR/SAME g&s (Product Costs Less)

  E.g.:
  **Microsoft** has HIGH Supplier Power and Dell/HP are buyers of Windows
  - The price of Windows goes up
  - Dell/HP cannot increase prices without jeopardising sales,
  - Dell/HP have lower profits (they pay more for Windows but can’t increase PC Price)

- **Supply Chain**
  - Parties involved in producing product (from raw materials --> product)
  - IS helps to increase **communication (flow of info)** in the supply chain
    - Lowers the costs for raw materials --> buy cheaper
- **Threat of Substitution**
  - HIGH when MORE alternatives
  - LOW when LESS alternatives

- **Threat of New Entrants**
  - HIGH when EASY for new competitors to enter market
    - A small coffee shop
  - LOW when HARD for new competitors to enter market (entry barriers)
    - An airline
  - Entry barriers
    - Costly features that customers come to expect in the product
    - New competitors must offer these features for survival
    - Small coffee shop = easy = barista, renting a shop etc.
    - Airline = hard = airline infrastructure, planes etc.

- **Competitive Rivalry**
  - HIGH in a FIERCE market
    - Woolworths purchasing all of ALDI’s potential property so that they physically cannot enter the market even if that Woolworths doesn’t make enough money... at least the money we do make isn’t ALDIs...
  - LOW in a COMPLACENT market
  - Also influenced by product differentiation
    - Developing unique differences in your product to intently influence demand

In summary:

<table>
<thead>
<tr>
<th>Force</th>
<th>High when...</th>
<th>Low when...</th>
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<tbody>
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Three Generic Strategies

- IT and these strategies
  - Jetstar = Cost Leadership
    - Making customers manually do all the work = lower costs
  - Qantas = Product Differentiation
    - ‘Staffing’ a product where people can call in for support = higher costs
(3) Value Chain Analysis
- Determines how to create the greatest value for customers
- Organisations viewed as a series of Business Processes
  ▪ = Standardised set of activities (procedures) to accomplish a task (product)
  ▪ What processes to add value to to create competitive advantage?
- Each process adds values to the product
  ▪ **Primary** activities **directly** affect product
    ▷ Inbound logistics = acquire raw materials
    ▷ Operations = transforms raw materials -> product
    ▷ Outbound logistics = distribution to retailers
    ▷ Marketing/sales = promotes product to retailers & end users
    ▷ Service = customer support
  ▪ **Support** activities **indirectly** affect the product (**support** primary activities)
    ▷ Firm infrastructure
    ▷ HR
    ▷ MIS
    ▷ Procurement (purchasing raw materials, equipment, supplies)
Technology

Attitudes
- **Digital Darwinism**: organisations that do not adapt to new technology are doomed
  - Can backfire: *Domino’s Pizza’s Social Media hype that went a flop* (Square Pizza)
- **Disruptive Technology**: technology for businesses where there is no initial use for
  - Internet: *no initial use for it*
- **Sustaining Technology**: improved products that customers are eager to buy
  - *Faster car, larger HDD*

Networks
- Enable exchange of data/information
- Internet is now the most easiest way to do this:
  - ease of use
  - richness of content
  - reach more people
  - multiple devices

Sharing Resources Internally
- **Intranet**: Very much like the internet except all resources are available within that organisation
- **Extranet & VPN**: Allows an intranet to be accessed from outside an organisation’s internal network
  - **Supply Chain Use**: Suppliers can see if the buying company needs raw materials directly by logging into the buying company’s VPN and seeing their needs for resources
  - The VPN acts like a one-to-one connection with company servers
    - It is encrypted
    - It runs over the internet
Web 1.0 to Web 3.0

- Buzzwords/phrases (not technical web upgrades) that describe how the web has been used:
  - **Web 1.0:**
    - Static webpages (*an information page about dogs*)
    - No user-generated content (*only authors upload their information*)
    - One-way information flow
  - **Web 2.0:**
    - Webpages dynamically update (*click on ‘like’ and the amount of ‘likes’ increase*)
    - User-generated content (*think of eBay and Facebook*)
    - Two-way information flow (*Commenting*)
    - RIA (rich internet apps)
      - *Google Docs*
      - Software which runs in the browser
      - Everything is stored on the cloud
      - Updates automatically
    - For businesses:
      - Content sharing
      - User-contributed
      - Collaboration inside/outside the organisations
  - **Web 3.0:**
    - Semantic web -> direct access to content
    - Natural interface with machine learning
      - *What will the weather be like on my holiday?* is an example

Sharing Systems

- **Open system:** software and hardware that are freely available, based on public standards, and allows third party add ons into the system
- **Open source:** software whose source code is freely available to review and modify by anyone

Challenges

- Networks allow for dynamic and global connection by eliminating time and distance
- Challenges exist in security (hacking in), restrictions in what's available for viewing and what's not, and social, ethical political issues (*call in centres*) and abuse.
- Digital divide between the haves and have notes
  - Worldwide gap between those who have technology & advantages and those who don't
eBusiness (Electronic)

Benefits

▸ To Information
  - Easy compilation and use
    ▪ Search for organisations and people easier
    ▪ Access to information on prices, products, customers, suppliers easier
  - Richer
    ▪ Depth and breadth of information higher: Hyperlinks
  - More reach
    ▪ Greater number of people to access: Internet Banking
  - Better content
    ▪ More dynamic and relevant content: Web 2.0

▸ To Business
  - Expanding global reach: more consumers waiting online for you
  - Opening New markets:
  - Reducing costs: no more telephone switchboards 24/7; use live chat
  - Improving effectiveness: better marketing tracking through web metrics
  - Improving operations
  - (OfficeWorks eBay Store = Free!)
Kinds of eBusiness models

- A plan detailing how companies creates, delivers and generates revenue via Internet
  - **Business-To-Business (B2B)**
    - Business buying from and selling to other business via internet
    - Suppliers communicating to transport companies
  - **Business-To-Customer (B2C)**
    - Business selling G&S to customers via internet
    - Amazon (pure plays), Jetstar online (bricks and clicks)
  - **Customer-To-Business (C2B)**
    - Customer sells a G&S to a business via internet
    - Photographer selling photos to businesses via iStock Photo
  - **Customer-To-Customer (C2C)**
    - Sites that provide G&S for customers to interact via internet
    - eBay

- Possible to have a hybrid of the above models
  - Changes when who buys the goods and who sells the goods! *Cust or Bus?*
Opening New Markets

- **Mass Customisation**
  - Tailor products to customer specifications

- **Personalisation**
  - When enough information is based on trends of customers
    - Offer more ‘appealing’ products based on their consuming trends
    - Better service provided at expense of ethics (tracking customer for info!)

- **Long Tail (on Sales Curve)**

![Sales Curve Diagram]

- Traditionally:
  - **Head of sales curve = popular brands**
    - High turnover products, higher visibility on shelves
  - **Long tail = less popular brands**
    - Low turnover products, lower visibility on shelves (if any)
    - High costs to keep at head of sales curve if poor performance
      - Sacrificing for good products!

- **Online Stores:**
  - No shelf exists!
  - All items (even those on long tail) have visibility!
  - Why?
    - Customers have access to the WHOLE warehouse, not just the shopfront
    - So every item is accessible
Supply Chain
- Every stakeholder on the supply chain wants income

Intermediary
- An agent, software or business whose trading infrastructure brings sellers and buyers together
- Retailers!

Disintermediation
- Removing an intermediary by selling direct to the customer usually online
- Dell Direct in the example above!

Reintermediation
- Steps added to Value Chain when new players find ways to add value to Business Process

Cybermediation
- New kinds of intermediaries created that could not have existed before eBusiness
- ISPs?

Revenue Model
- Not just from product
- Also available from:
  - ads
- licence fee
- subscription fee
- value-added services
- transaction fees
- affiliate programs (royalties)
- viral marketing (saves $ when customers pass on marketing messages)
  - Depends on relationship between customer and business

Web Metrics
- Analyse information about user’s engagement with website
- Counting number of hits ≠ number of sales
  - Need to consider more importantly interactions (clickstream data):
    - Where they go,
    - How long they spent,
    - How they got here (Google?),
    - How many times they went back,
    - Number of pages viewed
    - Pattern of websites visited,
    - Date and time when visited,
    - Customers with (abandoned) shopping carts?

Forms of eBusinesses
- **Content Providers**: provider of any web content: anyone!
- **Infomediaries**: provider of specific web content: WebJet, ZDNet
- **Online Marketplaces**: bring together buyers and sellers: eBay
- **Portals**: centralised websites that offers access to specialised content/services: MSN
- **Service Providers**: provide services (media sharing, RIA): YouTube, Google Docs
- **Transaction Brokers**: processes online sales: PayPal

Financial Services and eBusiness
- **EDI (Electronic Data Interchange)**: standard formats for exchanging business data
- **Financial EDI**: standard electronic format for processing purchase payments (B2B)
- **VAN (Value Added Network)**: private third party networks exchanging info. through high capacity connections
- Always need to be automated and 100% accurate and 100% complete! (esp. $$$)
Procurement

- **Maintenance, repair, operation (MRO) materials**: necessary materials for running an organisation but not relating to business' primary activity: *stationery*
- **eProcurement**: B2B purchase of supplies and services over internet
  - Electronic catalogues available
  - Authorised users can only use this (*you have a $50 spending limit*)
  - Usually seamless with *enterprise/accounting* systems

Problems with eBusinesses

- How do you protect customers?
- How do you provide security?
- How do you adhere to laws, which if global?
mBusiness (Mobile)

- Purchase G&S through wireless internet devices
- **KNOW YOUR PAN, WLAN, WMAN, WWANs**
- **RFID (Radio Frequency Identification)**
  - Electronic tags used to label and identify objects wirelessly over short distances
  - *Myki, Packaging, Library Books*
- **GIS (Geographic Information Systems)**
  - Analysis of GPS data
  - Hardware and software data that provides location-specific information
  - *Our customers are buying from Greensborough and Eltham. Focus on Watsonia?*
- Benefits of mBusiness
  - Mobile
  - Immediate access to information
  - Location monitoring (of customers, stock)
  - Improved workflow
- Challenges of mBusiness
  - BYOD (BYO Device) Problems
    - Incompatibilities
    - Poor Security
  - Theft of mDevices
  - Protecting Wireless Connections from outsiders
  - Preventing viruses on mobile devices
  - Privacy issues for RFID and Location-Based Services
Decision Making

- Reliant on data and information
  - Data must be relevant and timely
  - Information dependent on knowledge of user (novices require more info etc.)
- Difficulties in Decision Making:
  - Large amounts of data to be analysed
  - Need to be made quickly
  - Sophisticated analysis techniques for better decisions

Metrics - How Businesspeople Measure Success

- Businesses undertake projects/activities
  - Each project/activity has many goals
  - Use metrics to measurably evaluate results (see if it’s meeting results)

- Critical Success Factors (CSFs) - Effectiveness
  - Qualitative metrics
    - Create high quality products
    - Reduce product costs
    - Increase customer satisfaction
    - Hire and retain the best professionals
  - Crucial steps performed to:
    - implement strategies
    - achieve goals & objectives
  - Evaluated with many KPIs (below)

- Key Performance Indicators (KPIs) - Efficiency
  - Quantifiable metrics (more specific than CSFs)
    - No. new customers
    - No. product returns
    - Average customer spending
    - Turnover rates for employees
  - Evaluates CSFs based on Business Intelligence
  - Either external or internal:
    - External: market share
    - Internal: return on investment (how much is made from a venture?) or returning power of a project

Metrics - How IT measures success
Efficiency: performance of IT systems, throughput, speed, availability

Effectiveness: impact of IT systems, customer satisfaction, conversion rates

Benchmarks: baseline values system seeks to attain

- Benchmarking: consistent measuring & comparison of system results to benchmarks

**Efficiency metrics**

- **Throughput** — the amount of information that can travel through a system at any point in time.
- **Transaction speed** — the amount of time a system takes to perform a transaction.
- **System availability** — the number of hours a system is available for users.
- **Information accuracy** — the extent to which a system generates the correct results when executing the same transaction numerous times.
- **Response time** — the time it takes to respond to user interactions such as a mouse click.

**Effectiveness metrics**

- **Usability** — the ease with which people perform transactions and/or find information.
- **Customer satisfaction** — measured by satisfaction surveys, percentage of existing customers retained and increases in revenue dollars per customer.
- **Conversion rates** — the number of customers an organisation ‘touches’ for the first time and persuades to purchase its products or services. This is a popular metric for evaluating the effectiveness of banner, pop-up and pop-under ads on the internet.
- **Financial** — such as return on investment (the earning power of an organisation’s assets), cost–benefit analysis (the comparison of projected revenues and costs including development, maintenance, fixed and variable), and break-even analysis (the point at which constant revenues equal ongoing costs).
Levels of Decision Making

- **Operational**
  - Day-to-day routine decisions
  - Business won’t **run** if these decisions fail
  - **Structured Decisions**: Relies on **data** and **information** (answer easily calculable)
  - Metrics used: KPIs ==> efficiency
  - How many employees are sick?
  - How many products need to be made today?
  - How much inventory is in stock?

- **Managerial**
  - S/T to M/T impacting decisions about <12 month view
  - Budgets, schedules etc.
  - **Semistructured Decisions**: Relies on **information** and **knowledge** (not always calculated answers)
  - Metrics used: KPIs ==> Efficiency; CSFs ==> Efficiency
  - Who are our best customers by region?
  - Forecast of sales for the next month?
  - Impact of the last 12 month advertising campaign?

- **Strategic**
  - Long term decisions about >12 month outlook of **strategies, goals, objectives**
  - **Unstructured Decisions**: No procedures or rules exist (answers impossible to calculate)
  - Metrics used: CSFs ==> Effectiveness
  - What changes in employment levels should occur?
  - What industry trends are worth analysing?
Kinds of Systems

- **Operational Level; assists structured decisions**
  - **Transaction Processing System (TPS):**
    - IT system to capture each kind of transaction: *sales, inventory, library book loans*
    - **Batch TPS:**
      - all transactions manually inputted into IS in a batch
    - **OnLine Transaction Processing (OLTP):**
      - Transactions recorded ASAP; computer system instantly updated

- **Managerial Level; assists semistructured decisions**
  - **Decision Support Systems (DDS):**
    - Supports decision-making in:
      - rapidly changing environments
      - models cannot be easily specified in advance
    - What-if, sensitivity, goal-seeking, optimisation analyses
    - *Excel is a simple DDS tool*

- **Strategic Level; assists in unstructured decisions**
  - **Executive Information Systems (EIS) / Business Intelligence Systems (BIS):**
    - Senior decision support
    - Brings together data from many sources
      - **Internal sources:** *multiple divisions of Wesfarmers*
      - **External sources:** *BOM, industry trends, research*
    - Information presented as drill-down dashboards (i.e. click to zoom in why) ^^
In the future (there will be flying cars)

- Artificial Intelligence
  - Expert Systems
    - Imitates the reasoning process of experts
    - 'Backs up' expert’s knowledge to a computer system
    - Ask it for general questions that are difficult
  - Intelligent Agents
    - Special purpose knowledge-based IS
    - Accomplishes a specific task
    - *Shopping bots that scan for web for best price of a particular product*
Business Process Modelling (BPM)

- Gain **competitive edge** when **minimise costs** and **streamline** processes
- More processes = more $$$ = higher costs
- Kinds:
  - **Customer-facing Business Processes:**
    - Business processes directly used by customer
    - *Marketing campaign*
      - New products
      - Order processing
  - **Business-facing Business Processes:**
    - Business processes invisible to customer but essential for effective management (indirectly affecting customers)
    - *Internal training*
      - Purchasing raw materials

- **Process Model/Activity Diagram**
  - Graphical representation of process
  - Swim lanes: one per participant

○ This example has **two** swim lanes. Customer & Clerk.

- **BPM is neither a Business Role nor a IS role**
  - IS and Business work together as one
  - Implemented by IS
  - Owned by business
  - Confusion begins when selecting a new BPM; jobs may become redundant with a new BPM - is this because of a business decision or an IS decision? (2 diff depts!)
Business Process Improvement
- Measures current processes to improve performance
- Automation (Operational):
  - Computerises manual tasks
  - Making them more efficient and effective
  - Dramatically lowering operational costs
  - Continuous improvement
- Examine Workflow:
  - Process: What is it now? --> How good is it? --> Perform Task --> Measure Results? --> How can we fix?
  - Streamlining (Managerial):
    - Improves business processing efficiencies by simplifying or eliminating
    - Bottleneck: resources reached full capacity; cannot handle additional demands
    - Redundancy: Occurs once a task or activity is unnecessarily repeated
- Business Process Re-Engineering (BPR)
  - Throw out everything you have now
  - Start from scratch
  - Analysis and redesign of workflow
Hardware Basics

Know the following hardware terms:
- CPU, Parallel CPUs (multiple cores)
- Primary/Volatile Storage: RAM
- Secondary/Nonvolatile Storage: HDD, SSD, USB, ROM, Optical (CD)
- Input Devices: Keyboard, Mouse, Barcode Scanner, Touch Screen
- Output Devices: Screen, Printer, Speakers
- Communication Devices
  - Telecommunication system enables transmission of data over networks
  - Differentiate kinds of networks with their:
    ▶ Category: LAN, MAN, WAN
    ▶ Architecture: P2P, Client/Server
    ▶ Topology: Bus, Star, Ring, Hybrid, Wireless
    ▶ Protocol: Ethernet, TCP/IP, FTP, SMTP, HTTP
    ▶ Media: Coax, Twisted Pair, Fibre Optic

Know the following software terms:
- OSes
- Applications
- Utility Software: Encryption, Spyware Remover, Uninstaller etc.
- Virtual OSes: Win will run slower in OS X because OS X still controls Mac

Costs With Technology

Cost of Hardware

- Mostly hidden
  - Installation: Hardware itself, lighting)
  - Network Access: Cabling/Wifi Hotspots)
  - Security: Stop from stealing, unauthorised access)
- Hardware breaks down
  - Warranties: Replace whole system vs replace parts of system?
    ▶ Post warranty period
      ▶ Time & Materials
        ○ Repair when needed
        ○ Random fees, happens at any time, wait in queues = hard to budget
    ▶ Hardware Maintenance Period
- **Annual servicing fee**
- Agreed service time & fee = know when/how much to budget
  - Who will repair it: *Internal or external?*
  - Time to repair: *Are there spare parts available while repairing?*
  - Lifetime of hardware

**Cost of Software**

- Mostly **hidden**
  - Software selection is limited by:
    - Hardware/OS/Other Software Compatibility
  - Creation of **SOEs (Standard Operating Environments)**
    - Every employee should be able to swap to a new PC as if its their own
  - **Staff training**
    - Training courses: $$$ for substitute employees
    - Support manuals: In-house of off shelf
    - Help Desk: In-house or outsourced (ongoing costs/one off costs?)
  - **Upgrades**
    - Bugs and fixes, cost to install upgrade to 100 PCs
  - **Versions**
    - Come out with new features/due to gov’t regulations
    - Compatibility issues
    - New software = More training
    - S.O.E updates
    - Industry Standard updating while you’re not?
  - **Licensing Fees**
    - 1:1 - Licence:Device/User
    - Can’t use ‘cracked’ software — **reputation** undermined
Informations Systems Development

- Why are IS's so important?
  - Increases productivity
  - Enhances decision making
- Because of this, a bad IS is catastrophic

Implementing a new IS

- Why?

  - **Management buy-in** is always necessary to implement a new IS
    - It should always reflect broader support for **organisational goals**
  - **System Analyst**
    - A new system is used by many people and stakeholders
    - To integrate all the work, a systems analyst understands both the technical side and the business side
      - Business knowledge/knowledge of business activities
      - Management skills
      - Technical skills
      - HR skills
      - Change management skills (people fear change!)
Never off the shelf (software may be)
- Always custom built to a company
- An IS is an entire solution
  - **Assess feasibility**
    - Cost - approximate to eliminate infeasible ideas
    - Schedule - Rough estimate
    - Technical - Is it even technically possible?
    - Organisational - Does it fit the culture/charter/law?
  - **Identify goals**
    - This leads into the requirements analysis in the development stage
- Compromised of
  - **Hardware**
  - **Software**
  - **People**
  - **Processes (stakeholders, users, BAs, SAs, programmers)**

**Software Packages**
- Search software which meets requirements
- Multiple vendors with multiple packages, each with strengths and weaknesses
  - Rank organisations requirements *(important, imperative, can live without?)*
  - Compare them to the package’s *(assess suitability and score rank by rank)*
  - Vendors may be able to customise the software
    - This is costly and timely (ADDE required!)
- Off the shelf IS packages are costly
  - **Have due diligence**
    - Investigate people using the IS
    - Media search
    - Speak with other vendors about a potential IS package
    - Find out about future IS updates
  - **Understand decision making process**
    - Is it for political gain of a particular employee?
    - Is it for an addiction to the 'latest-and-greatest'?
    - **Decisions must be justified and scrutinised for valid reasons!**

**Systems Development**
- **Creating and maintaining** an IS
Systems Development Life Cycle (SDLC):

- (1) **Planning**
  - Plan the intended project
  - Determine project goals

- (2) **Analysis**
  - Analysis end-user business requirements
  - Refine project goals to suit end-user

- (3) **Design**
  - Descriptions of desired features
  - Operations of the system

- (4) **Development**
  - Transforming a design into something functional

- (5) **Testing**
  - Eliminate bugs
  - Verify that it meets business requirements

- (6) **Implementation**
  - Place the system into production so that end users can use it

- (7) **Maintenance**
  - Performing changes/corrections/additions/upgrades so that the system continues to meet its goals
Software Development Methodologies

▸ **Waterfall Methodology**
  - Each SDLC phase’s output is passed onto the next phase as input
  - One delivery of software
  - **Assumes** all planning, analysis and design is correct and stable
    ▪ Use it only to upgrade a system.
  - Not flexible and doesn’t cope with change
    ▪ Difficult today to specify every element of design before it is built
      ▷ So many of the possible changes in first picture in future!

▸ **Agile Methodology** (RAD, RUP, Extreme Programming, Scrum)
  - Whole project broken into smaller projects
  - Continuous delivery of useful software components
    ▪ Many iterations of software at more increments
      ▷ Each iteration has its own SDLC
    ▪ Software developers **learn as they build**;
      ▷ functionality added from user feedback
      ▷ consistent communication with users
    ▪ Use of prototyping
      ▷ **Get valuable user** feedback early in the project
      ▷ **Gives greater insight** earlier on (see diagram->)
  - Focuses less on
    ▪ documentation, plans,
    ▪ processes, tools,
    ▪ no change
  - Focuses more on
    ▪ individuals and interactions
    ▪ working software (useful software)
    ▪ customer collaboration
    ▪ responding to change

▸ **Communications is vital**
  - Different interpretations between different people = different skills = different product (**Swing Analogy**)
    ▪ Consistent review and feedback is **vital**
Outsourcing of IS Projects

Pros
- Increased quality and efficiency of primary business processes (don’t have to worry about it)
- Reduced operating expenses (no need to have many IT staff)
  - Cheaper employees offshore
- Quality of IS is probably better
  - A company whose expertise is building IS will build it for you!
  - A company whose focus is updating the IS; faster response to IS change
  - Internal IS staff may not be able to do this

Cons
- Direct control diminishes with distance
  - Better suited for little communicative tasks: programming
  - Bad for highly face-to-face tasks: analysis, interviewing etc.
- Contract negotiation: are they providing the job as agreed?
- Management of outsourcing companies: what are they delivering?
- Reforming IT department once the contract is finished: do we know how to modify it without them?
- Loss of confidentiality: they know our stuff?
Enterprise Architecture

- Three kinds: Information, Infrastructure, Sustainable

Information Architecture - OPERATION

- Supports operations of business
  - Backup and Recovery
    - Routine process
      - Copy of system info.: mirrored, backup device
      - Always test recovery
    - Disaster Recovery
      ▶ Process to follow in the event of a catastrophe (fire, flood)
      ▶ Balance between
        - Is it too costly to backup?
        - Is it too costly to lose data (too slow)?
  - Business Continuity Planning (BCP)
    - Plan in an emergency
      ▶ Notification to clients (downtime)
      ▶ Change of workflow
    - Multiple plans in case of unexpected disruptions (e.g. supplier of emergency hardware out of business)
    - Consider temporary sites:
      ▶ Hot Site: Exact mirroring of IS ready to go, all set up (Costly but fast!)
      ▶ Warm Site: Equipment ready to be installed, not ready to go but there
      ▶ Cold Site: No equipment, just a place staff can go to (Costly to business)
Infrastructure Architecture - CHANGE

- **Supports changes** within a business

  - **Accessibility**
    - Users require access to the IS depending on their role (data and functionality)
    - A promotion means more access, a demotion means less access?
    - Administrators have unrestricted access

  - **Availability**
    - Time frames when the IS is operational

  - **Maintainability**
    - How flexible is the IS to a new environment
      - Cost more to have flexibility at beginning (when not needed)
      - Better to have a barebones system and add flexibility when needed
        - Downside: How long will this take?

  - **Portability**
    - Can the IS run on different OSes, devices etc.?

  - **Reliability/Accuracy**
    - Functioning correctly and providing accurate information
    - As a metric, measures effectiveness

  - **Scalability**
    - Adapt for increased demands of growth
    - What if we wanted to double all our clients--> will IS cope?

  - **Usability**
    - Degree to which specific users can use the system to achieve specific goals with efficiency, effectiveness and satisfaction

  - **Performance**
    - Speed of processing transactions etc.
    - As a metric, efficiency measure
Sustainable Architecture - SHARE RESOURCES

- **Supports sustainability of business**
  - **Grid computing**
    - Idle computer power for each idle PC coordinated together
    - Coordinated computer power utilised for another, constructive task
  - **Cloud computing**
    - Use of resources and applications hosted remotely on the Internet
      - Infrastructure
        - *Cloud storage, networking, servers etc.*
      - Software
      - Platform
        - *Both hardware and software provided (Google Docs + Drive)*
  - **Virtualisation**
    - Multiple OSes on ONE device
    - Can be stored in one **data centre**
      - Saves floorspace
      - Saves energy
      - Better use for buildings

**Increasing MIS: Bad Side Affects**

- Increased electronic waste
  - Paying more for less
- Increased energy consumption
  - Paying more for bills
- Increased CO2
  - Being taxed
- ALL LEADS TO MORE $$$ BEING SPENT :(
Kinds of Databases

- **Operational/Production Databases**
  - Formed from OLTP systems
  - Day to day operations
  - Very detailed

Data Warehouses

- **An aggregation of operational databases**

  **Why?**
  - Aggregate information for overall decision-making purposes.
  - Overall assessment
  - Running very large queries

  **Helps with:**
  - **Performance**
    - Don’t have to run a large query on the operational database
    - This would slow production databases
    - This would slow down operations
  - **Overall Assessment**
    - Lots of data from fragmented OLTP systems
    - Brought together as one whole collection
    - Only important, summative details brought together
    - More useful for Trend Analysis

  **How?**
  - **ETL (Extraction, Transformation and Loading)**
    - **A standardisation process**
    - *Extracts* from Internal/External Databases
    - *Transforms* into homogenous data
    - *Load* onto one system

- **Data Mart**
  - A subset database from the data warehouse
  - So that an internal division can assess itself overall
    - **Note:** *NOT* it wouldn’t use the OLTP system since that contains everyday info.

*Think As:*

- Raw Data —ETL—> Warehouse Storage —ETL—> Sold at Market

ETL Process: Cleansing/Scrubbing
Maintain **high quality** by cleansing it before it enters the warehouse

Part of the ETL process!

We want to **align all of the data together so as standardised as possible**

**Why?**
- Different software packages storing under different PKs
- Mismatches in emails (mistyped info in one internal database but OK in others?)

**How? ISOLATE PROBLEMS!** In one internal database but not the other...
- Missing records/attributes?
- Redundant records?
- Missing PKs?
- Bad relationships between one entity? *Alex Smith* vs *Alexander Smith*...
- Inaccurate or incomplete data?

**Benefits:**
- Costly to get perfect @ start.........

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**Multidimensional Analysis**

- A series of 2D tables for 3D analysis:
  - *Which of our stores have a quantity that increased most by our marketing promo*
Terms:
- **Dimensions**: Static information: *Name*, *Type*, *Cost*, *Qty*
- **Cubes**: Common form of representing multiple dimensions
- Cut, slice and dice through a 3D analysis to see information collection from 3 dimensions.

Data Mining
- **Analysing data to extract information (that is not offered from source data alone)**
  - Analysis of a warehouse system
- **Tools - how can we find patterns?**
  - Classification
  - Estimation
  - Affinity Grouping
  - Clustering
- **Trends - what patterns can we find?**
  - **Structured data** — *Spreadsheets, Databases*
  - **Unstructured data** — *PDFs, Voice Messages, Emails*
  - **Textual data** — Patterns in *Words and sentences*
  - **Web data** — Patterns in *website navigation etc.*
- **Analysis kinds**
  - 1 ) **Cluster** - data in mutually exclusive groups
    - *Age group of people buying PCs (and not Macs...)*
  - 2 ) **Association** - relationships between data and frequency of relationships
    - *Summer = Incr. Ice Creams*
  - 3 ) **Statistical** — Correlations, variance etc.
    - *Forecasts, time series info.*

Business Intelligence
- Business Intelligence helps us make rich data (but poor info) better...
- Improving BI improves decisions which improves costs/revenue
- Allows for analysis with ease, clarity and consistent/reliable
▸ Allows us to drill down deeper into questions:
▸ Business Analysts = BI => Knowledge
  ▪ BAs create knowledge for
    ▷ Competitive Advantages
  ▪ BAs do this by attending divisional meetings
    ▷ Create knowledge of interest!
Supply Management Chain (SMC)

- Managing the communication between multiple systems in the supply chain
- Two kinds of steams/integration:
  - **UPSTREAM**: Towards customer (end of sale)
  - **DOWNSTREAM**: Closer to raw materials (start of sale)
- Information is automatically pulled downstream and brought back upstream.
  - How? **Integration between systems**
    - Information becomes instantly available
    - Automate manual entry to multiple systems
      - Reduces data redundancy & inconsistency
    - Use of macros—automation
- Build connections between systems by **foreign keys** referencing original system
  - Compromise between:
    - slowness of multiple middleware between endpoints
    - reducing redundancy of duplication
- **Management of SC**
  - Managing the way information flows
  - **Maximises total effectiveness and profitability:**
  - Useful for making forecasts
    - **Supplier can check if retailer needs more stock**
    - **Stockist can check where their stock is (logistics tracking)**
    - All **direct access** along each supply chain’s system
  - Improving a supply chain improves the 5 forces model (See Week 2/3)
- **SCM 5 Steps:**
  - Plan,
  - Source (partners who have same product but cheaper),
    - Best quality parts/cheapest price
  - Make,
  - Deliver,
  - Return
- **Benefits:**
  - **View** up/down the supply chain in real time
- Planning/forecasting
- **Automation** of execution of tasks (don’t call retailer if delivery sent; *auto done*)
- Demand **planning**
- Reduces **bottlenecks**
  - Identify weak links earlier on to kill them
    - Why? Slows the supply chain down—weakens the chain.
  - Use supply chain metrics to do this: backorder, inventory cycle time etc.

- **Challenges**
  - Cost — management buy in: convince with KPIs and how SMC will help
  - Globalisation — everyone needs to be a part of the SMC
    - *Small cheese supplier without a computer system will lose Coles’ business*

**Middleware**
- Software which integrates one software package from one supplier’s system with another
- Modules allow for custom interfaces / rules that translates input of system A and converts it to suit system B

**Enterprise Systems Applications**
- One, large scale package for enterprise-wide support—*The ‘one-stop-shop!’*
  - Every module will seamlessly talk with each other: *Accounting, Sales, Manufact.*
- Can be **configured** (via modules) to suit a business
- Can’t suit very specific modules though
- Doesn’t work well in takeovers (one ESA vs another ESA)
  - Need ESA Middleware for that!
Customer Relationship System (CRM)

- Like a supply chain, except for customer information
- Keeps a track/profile of every customer along the line
  - Collates all information from different sources of a customer to one central repository:
- Benefits:
  - increases customer loyalty, retention and \( \Rightarrow \) increases org’s profits
  - analysis of customers = find valuable customer:
    - Recency of purchases
    - Frequency of purchases
    - Monetary value of purchases
- Technologies: Reporting, Analysis and Prediction
  - Each have their own part for operational/analytical CRM tools
- Sales / Operational CRM
  - Salesforce helps sell to existing customers better
    - Easier to sell to existing customers than to new customers!
    - If you know more about a customer’s buying habits, you can up-sell them
      - Upgrading a customer to a supersize meal.
    - If you think your customer will benefit with another product, you cross-sell
      - Send their information to another part of the business of interest to cust.
      - Would you like fries with that?
    - Automatically keeps everything about the sale up-to-date
  - Operational helps customer service
    - Call centre scripting
    - Website personalisation: you bought X, you might like Y.
- Analytical CRM
  - Aggregate, analyse customer information throughout the organisation
  - Gain insight into consumer behaviour
  - Helps for market research, trends in the industry
Enterprise Resource Planning

- ERP = ES (Enterprise System)
  - It integrates all functions and departments of an organisation into one system
    - Not segmented by many smaller legacy systems
  - Enterprise-wide decisions supported by enterprise-wide information
  - It is powerful because:
    - It solves incompatibility
    - Global across other businesses
    - Avoids having to fix/maintain old/outdated legacy systems

- ERP components are either:
  - core (for internal operations) or
  - extended (for external operations)
  - Mixture of ERP components are made to do different things for different people
    - ERP can contain a SCM and CRM built-in

- ERPs do have their issues:
  - Inflexible
  - Difficult to move away from a ERP
  - Costly to change an ERP
  - A more fragmented system is safer

- ERP is built on ‘best-practice’
  - Rather than reengineer the ERP, it’s probably safer to reengineer your business
    - DANGER: reengineering business process to fit an ERP =
      - Divert focus
      - Damage competitive advantages

Legacy Systems

- No matching module in a standard ERP but still required in business
  - Library Loan System

- Reasons not to build a ERP module based on a legacy system:
  - Too costly
  - Application is too specialised; not possible in an ERP
Measuring Success of ERP

- Use **metrics** for
  - Strategic feedback (impacts decisions)
  - Diagnostic feedback (impacts operations)
  - Trends in performance (impacts analysis)

- Use a **balanced scorecard**
  - Enables organisations to clarify their mission statements, goals, visions into action
  - A balanced scorecard reviews a business from:
    - **Learning and growth:** ability for change
    - **Internal business processes:** improving business efficiency
    - **Customer perspectives:** improves business image
    - **Financial perspectives:** improves business image (to shareholders)

Choosing an ERP

- Implementation is an enormous task
  - Involves **experts of ERPs + people / processes of business + software**

Challenges of ERP

- **Complex components** that are:
  - **Expensive** to purchase
  - **Expensive** to implement

- **Bad to customise:**
  - Uses up way too many resources (time / cost) whilst undermining operations

Other Systems

- **Collaboration systems**
  - Getting people from multiple locations and connecting them together
  - Why? Collective intelligence (more people = more knowledge)

- **Knowledge Management Systems**
  - Capturing, organisation, dissemination and sharing of knowledge
  - What is knowledge?
    - **Explicit:** Recorded (*A textbook*)
    - **Tacit:** Inside people’s heads (*Social skills*)
    - **Shadowing:** Less experience staff observing more experienced staff
    - **Joint:** Less experienced staff working with more experienced staff
Content Management System
- Provides tools to manage creation, storage and editing of collaborative documents

Workflow Management System
- Facilitates automation of business processes (E.g. sending Texts for deliveries)

Groupware
- Supports team interaction and dynamics
  - Calendaring, scheduling, videoconferencing.
- Time (synchronous/asynchronous) vs. Place (local/distant)
- Advantages
  - Enables telecommuting
  - Reduces travel costs
  - Shares expertise