

Learning Objectives

At the end of this lecture you should aim to discuss:

- How organisational goals can be achieved via BIS
- The impact of BIS on organisations
- How organisations realise the benefits of BIS

Outline of lecture

- **Data, information, and knowledge**
- Definition of business information systems (BIS)
- Benefits, success, & management of BIS
- Components of BIS
- Brief history of BIS
- Business functional areas and BIS
- Why study BIS? Interesting career prospects?

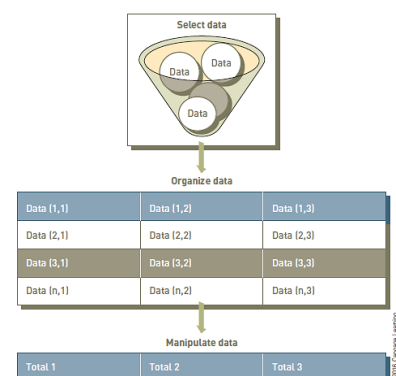
Data, Information and Knowledge

- **Data:** raw facts
- **Information:** collection of facts organized in such a way that they have value beyond the facts themselves
- **Process:** set of logically related tasks performed to achieve a defined outcome
- **Knowledge:** awareness and understanding of a set of information and the ways it can be made useful to support a task

Types of Data

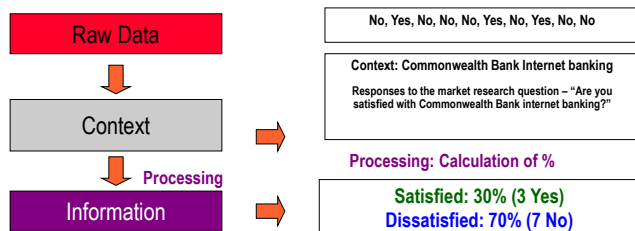
Data	Represented By
Alphanumeric data	Numbers, letters, and other characters
Audio data	Sounds, noises, or tones
Image data	Graphic images and pictures
Video data	Moving images or pictures

Process of Transforming Data into Information

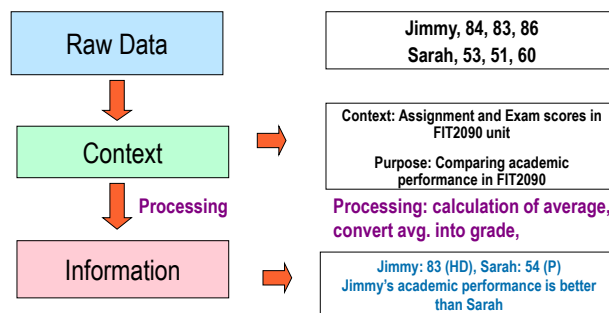


Information: Example 1

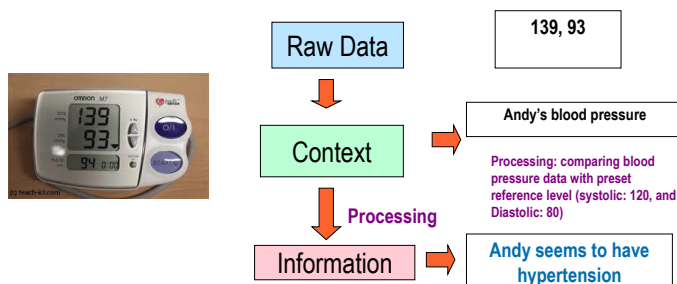
- Data that have been processed within a context to give it meaning
- OR
- Data that have been processed into a form that gives it meaning



Information: Example 2



Information: Example 3



The Value of Information

- Correct, quality information helps people in their organizations perform tasks more efficiently and effectively
 - Inaccurate data can result in loss of potential new customers and reduced customer satisfaction

The Characteristics of Valuable Information

- If an organization's information is not accurate or complete:
 - People can make poor decisions, costing thousands, or even millions, of dollars
- Depending on the type of data you need:
 - Some characteristics become more important than others

Characteristics of Quality Information

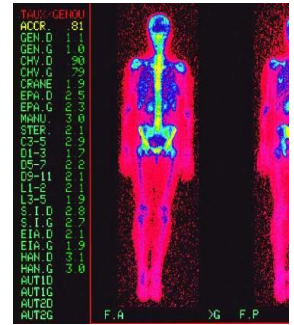
Characteristics	Definitions
Accessible	Information should be easily accessible by authorized users so they can obtain it in the right format and at the right time to meet their needs.
Accurate	Accurate information is error free. In some cases, inaccurate information is generated because inaccurate data is fed into the transformation process. This is commonly called garbage in, garbage out (GIGO).
Complete	Complete information contains all the important facts. For example, an investment report that does not include all important costs is not complete.
Economical	Information should also be relatively economical to produce. Decision makers must always balance the value of information with the cost of producing it.
Flexible	Flexible information can be used for a variety of purposes. For example, information on how much inventory is on hand for a particular part can be used by a sales representative in closing a sale, by a production manager to determine whether more inventory is needed, and by a financial executive to determine the total value the company has invested in inventory.
Relevant	Relevant information is important to the decision maker. Information showing that lumber prices might drop might not be relevant to a computer chip manufacturer.

Characteristics of Quality Information (cont'd.)

Characteristics	Definitions
Reliable	Reliable information can be trusted by users. In many cases, the reliability of the information depends on the reliability of the data-collection method. In other instances, reliability depends on the source of the information. A rumor from an unknown source that oil prices might go up might not be reliable.
Secure	Information should be secure from access by unauthorized users.
Simple	Information should be simple, not complex. Sophisticated and detailed information might not be needed. In fact, too much information can cause information overload, whereby a decision maker has too much information and is unable to determine what is really important.
Timely	Timely information is delivered when it is needed. Knowing last week's weather conditions will not help when trying to decide what coat to wear today.
Verifiable	Information should be verifiable. This means that you can check it to make sure it is correct, perhaps by checking many sources for the same information.

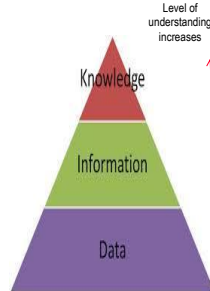
Use of data in Expert systems

- Because many rules are based on probabilities, computers can be programmed with "subject knowledge" to mimic the role of experts
- A common use of expert systems is in medicine
 - The **ONCOLOGY** system collects data from CT-SCAN devices shown here
 - analyses patient data to help doctors for the:
 - choice, prescription and follow-up of chemotherapy



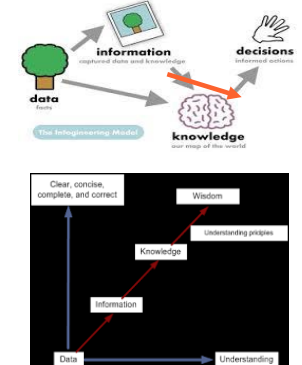
Knowledge

- Knowledge
 - Understanding rules to interpret information
 - relationship between pieces of information
- Examples
 - From demographics data, the marketing manager may understand which age group of customers are dissatisfied with web site (e.g. customers over 65 years – senior citizens) and based on further interviews with them find out why they are dissatisfied
 - FIT2090 Lecturer could understand (when additional demographic data are also collected) – why Jimmy received higher grade than Sarah (Perhaps, Sarah has no prior job experience whereas Jimmy has 10 years of analyst experience etc.)
 - Sustained blood pressure suggests lack of exercise perhaps. Try to understand diet and daily work routines



Difference between data, information and knowledge

- Information and knowledge are used by managers to make decisions
- Level of understanding improves as managers gain knowledge based on processing of data through BIS



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- Definition of business information systems (BIS)
- Benefits, success, & management of BIS
- Components of BIS
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- Business functional areas and BIS
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Defining IT and BIS

- IT and BIS are two closely correlated but represent different concepts
- IT is not the same as BIS
- According to Huff and Munro (1985):
 - IT represents a broad range of technologies involved in information processing and handling
- Lai et al (2007) give examples of technologies that represent IT:
 - Hardware
 - Software
 - Networking
 - Office automation
 - Databases
 - etc.



What is an Information System?

- An information system (IS) is a set of interrelated elements that:
 - Collect (input)
 - Manipulate (process)
 - Store
 - Disseminate (output) data and information
 - Provide a corrective reaction (feedback mechanism) to meet an objective

Definition of BIS

- According to Business Information Systems Association (bisa), BIS refers to:
"The ways in which information, knowledge, databases and enterprise information systems can be used strategically for business process improvement and innovation"
- <http://www.bisa.org.au/>

Definition of BIS

- Business Information systems (IS) deal with systems for delivering information and communication services (using IT) in a business organisation (Davis, 2000)
- IT represents a technical component of IS (Lai et al, 2007)

In this unit, we will use the following terms interchangeably to mean IT-based IS:

- Information technology
- (Business) Information systems
- IT-enabled IS

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Benefits of BIS

- Operational efficiency
 - Time savings
 - Cost savings
 - Improved data quality
 - Error reduction
 - Timeliness
- Effectiveness
 - BPI (Business Process Improvement)
 - Improved decision making
- Strategic
 - Greater revenue
 - Improved relationship
 - Trendy and caring image

Success of BIS

- Success is a Multi-Dimensional concept
 - Employees (stakeholders) must accept and use BIS
 - BIS use must produce desirable outcomes
 - User satisfaction with BIS
- Example
 - Commonwealth bank has 5 million customers
 - Based on demographic profile, bank expects 40% of its customer community to use Internet Banking application
 - Expected business outcomes/impact
 - Reduction in tellers in bank branches
 - Survey questionnaire indicates customer satisfaction is at 85%

Key Issues in Managing BIS

- Considerable managerial efforts are associated with managing BIS introduction and use in organisations
- Management of BIS includes the following 4 functions:
 - Planning (e.g. Setting IT goals, strategy, aligning IT strategy with business goals)
 - Organising (e.g. Identifying and allocating resources to execute IT processes, IT strategy, IT sourcing)
 - Leading (e.g. Motivating and supporting IT staff to implement IT plans, strategy)
 - Controlling (e.g. Evaluating and monitoring performance like KPIs of the IT function, and IT staff)

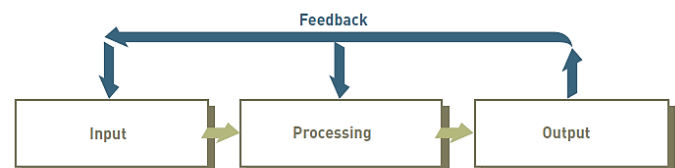
Business manager involvement in BIS

- Successful management of BIS is not the sole responsibility of the IT/IS managers
- Business managers must not delegate their responsibilities to the IT managers
- Planning
 - Clarify business expectations to the IT team
 - Ensure that IS/IT strategy aligns with business goals
- Organising
 - Involve in IS/IT outsourcing decision making process
- Leading
 - Act as Ambassadors of organisational change (caused by IT)
- Controlling
 - Verify and participate in IT budget approval process
 - Set Key Performance Indicators (KPIs) for measuring IT success and IT people

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Components of an Information System



Input, Processing, Output, Feedback

- Input: activity of gathering and capturing raw data
- Processing: converting data into useful outputs
- Output: production of useful information
 - Usually in the form of documents and reports
- Feedback: information from the system
 - Used to make changes to input or processing activities

Components of a Computer-based BIS



Telecommunications, Networks, and the Internet

- Telecommunications: electronic transmission of signals for communications
- Networks connect computers and equipment enabling electronic communication
- Internet: world's largest computer network
 - Thousands of interconnected networks

Cloud-Computing and the Web

- Cloud-computing environment:
 - Provides software and data storage via the Internet in order to:
 - Run services on another organization's computer hardware
 - Easily access software and data
- The Web
 - Network of links on the Internet to documents containing text, graphics, video, and sound

Intranets and Extranets

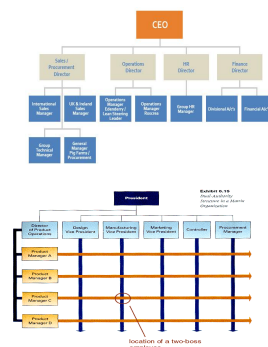
- Intranet: internal network that allows people within an organization to exchange information and work on projects
- Extranet: network based on Web technologies
 - Allows selected outsiders, e.g., business partners and customers, to access authorized resources of a company's intranet

People and Procedures

- People are the most important element in most computer-based information systems
- Procedures: strategies, policies, methods, and rules for using a CBIS

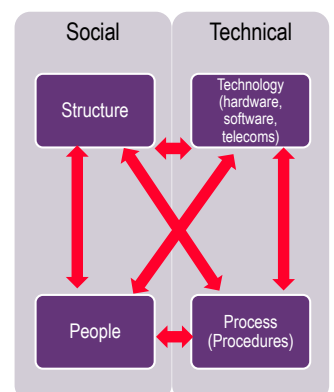
Structure

- Organisational structure component refers to:
 - Organisational design (e.g. Hierarchy, decentralised, loose coupling)
 - Reporting mechanisms (functional, matrix)
- Understanding structure component is crucial because:
 - Introduction of IT systems may bring changes in organisational structures
 - Some people may lose authority
 - Hence, user resistance is likely to occur
 - Incentive systems are to be developed to minimise resistance



Relationships between components of BIS

- BIS components (grouped into 2 sub-systems) must work together to deliver the information processing functionalities that an organisation requires to address its information needs
- Technical sub-system (does not contain human elements)
 - Technology (IT)
 - Process
- Social sub-system (represents the human element of IS)
 - People
 - Structure
- As BIS impact business functions, business managers would need to have a solid understanding of the interactions of these 4 component



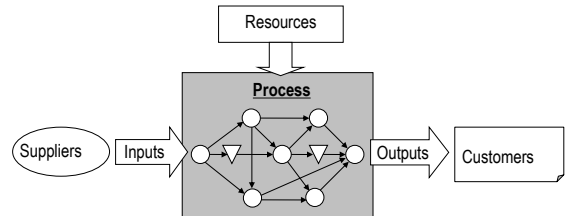
What is a Business Process?

- A new IS can introduce changes in business processes
- Business processes are the HEART of business operations
- **Definition:**
 - A process is a set of logically related activities that takes INPUT(S), transforms them, and creates an OUTPUT that is of VALUE to the customers' (Hammer & Champy, 1993)
 - A process requires resources (people, technology, money, IT systems)
- **Explanation:**
 - Activities may cross multiple functional areas of a business
 - Value is something for which:
 - customer appreciate the merit of a product/service (e.g. good taste, less calorie content, comfort, Internet Speed)
 - and are willing to pay for the product/service
 - Type of customers:
 - Internal: e.g. Shipping department
 - External: e.g. Distributor

What is a Business Process?

A more comprehensive process definition

A business process is a network of connected activities and buffers with well defined boundaries and precedence relationships, which utilize resources to transform inputs into outputs with the purpose of satisfying customer requirements



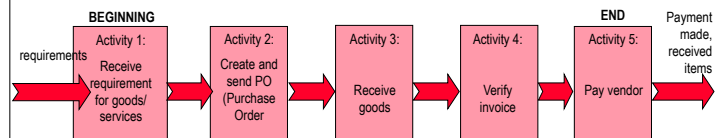
Examples of business processes

- It is easier to identify production and manufacturing processes – as processes
- The following are also business processes
 - Accounts payable and receivable
 - Admissions (hospitals, universities)
 - Billing
 - Credit approval
 - Inventory management
 - Order fulfillment
 - Product development
 - Shipping

An Example of Business Process: Procurement Process

A procurement process has:

- a beginning and an end;
- inputs (i.e., requirements for goods and services);
- outputs (i.e., receipts of goods, payment issued);
- As a series of activities (i.e., filling out a PO, verifying invoice)



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- Components of BIS
- **Brief history of BIS**
- Business functional areas
- Why study BIS? Career prospects?

Brief history of BIS

- First era (mid 1960s to mid 1970s)
- Second era (mid 1970s to mid 1980s)
- Third era (mid 1980s to mid/late 1990s)
- Fourth era (late 1990s to today)
- What has changed since mid-1960s?
 - Management/Governance
 - Technology
 - IT literacy of users
 - Sourcing/Provisioning practices

First Era (mid 1960s to mid 1970s) ...

- Technology: 3rd generation mainframe (IBM 360)
 - Use of proprietary operating systems
 - Languages: Assembler, Fortran, COBOL, database, Ethernet
- Users: mostly in
 - engineering departments
 - accounting departments
- Early adopters: banks and military
- Sourcing/Provisioning: developed internally by corporate programming staff (with assistance of vendor personnel)
 - Highly technical, took very long to develop, and very costly
- Special IS groups/departments began to emerge in organisations
- Beginning of MIS/IS as a discipline

Second Era (mid 1970s to mid 1980s)

- Technology
 - Emergence of Personal Computer (PC)
 - Hardware cost much cheaper compared to mainframes
 - Organisations began to replace mainframes with PCs, distribute computing/processing powers across organisations
- Management/Governance
 - Steering committees formed to address user requirements
 - Involve users in systems development projects
 - Corporate level strategies for IS not very well developed
 - No discussion about alignment of IS with business strategy
- Users: broadened
 - Business units other than accounting and engineering departments compete for computer resources
- Sourcing/Provisioning
 - Organisations continue to develop systems in-house
 - Some commercial, externally developed software packages become available

Third Era (mid 1980s to mid/late 1990s) ...

- Technology
 - Large scale computer networking, over both private and public networks
 - Leading to the emergence of the Internet
 - Widespread adoption of TCP/IP
- Users: All business units resorted to purchasing own hardware and software to suit departmental needs
- Sourcing/Provisioning:
 - Look to outside vendors for IS solutions – outsourcing
- Management/Governance
 - Personal computing gives rise to department computing (e.g., decentralisation)
 - Emergence of CIO
 - Began to align IS strategies with corporate strategies
 - Concerns about legacy systems and what to do about them

Fourth Era (late 1990s to today) ...

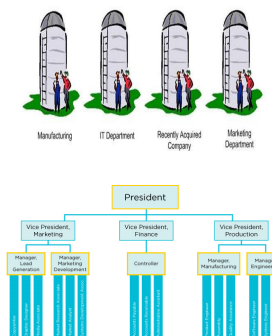
- Technology
 - E-commerce due to Internet age
 - Ubiquitous computing (laptops, tablets, smart-phones) – allow people to extend work beyond formal workplace
 - Search engines (e.g., Google) affects how individuals find info.
 - Social media (revolutionise interactions)
- Sourcing/Provisioning
 - Offshore outsourcing
- Rise of open source community – challenge traditional development paradigm
- Management/Governance
 - Management of widely distributed technologies, IS personnel (including offshore vendor staff), and users

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Business functional areas

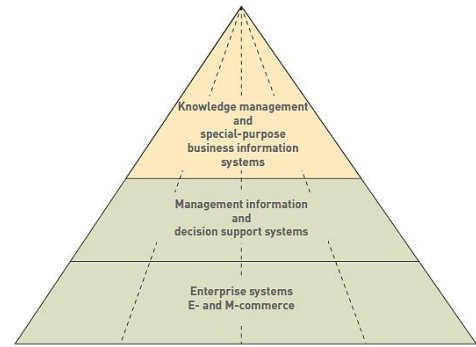
- Organisations typically operate by functional areas/silos BUT
- Functional areas are interdependent
 - E.g., Sales must rely on information from Operations to understand inventory, place orders, calculate transportation costs, and gain insight into product availability based on production schedules
- For an organisation to succeed, every department or functional area must work together sharing common information and not be a 'silo'
- IS/IT can enable departments to more efficiently and effectively perform their business operations by facilitating:
 - communication and increasing business intelligence



Some common business functional areas

Department	Description
Accounting	provides quantitative information about the finances of the business, including recording, measuring and describing financial information
Finance	deals with the strategic financial issues associated with increasing the value of the business, while observing applicable laws and social responsibilities
Human Resources (HR)	includes the policies, plans and procedures for the effective management of employees
Sales	is the function of selling a good or service and focuses on increasing customer sales, which increase company revenues
Marketing	is the process associated with promoting the sale of goods or services. The marketing department supports the sales department by creating promotions that help sell the company's products
Operations Management	is the management of systems or processes that convert or transform resources (including human resources) into goods and services
IS/IT	is a general name for the business function and academic discipline covering the application of people, technologies and procedures—collectively called information systems—to solve business problems

Examples of BIS



Electronic and Mobile Commerce

- E-commerce: business transactions executed electronically
 - Business-to-business (B2B)
 - Business-to-consumer (B2C)
 - Consumer-to-consumer (C2C)
 - Between business and the public sector
 - Between consumers and the public sector

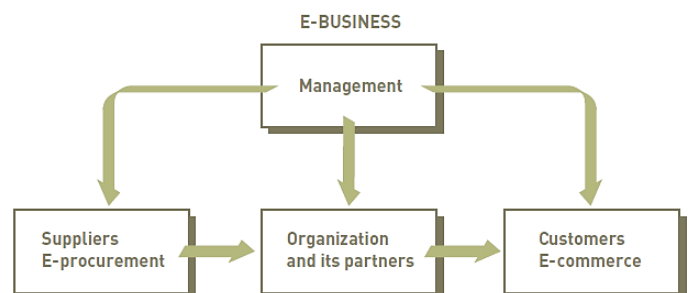
Mobile Commerce and E-Procurement

- Mobile commerce (m-commerce): the use of mobile, wireless devices to place orders and conduct business
- E-procurement: use of information systems and the Internet to acquire parts and supplies

Electronic Commerce and Electronic Business

- E-commerce offers many advantages for streamlining work activities
- Electronic business (e-business) uses information systems and the Internet to perform all business-related tasks and functions

Electronic Business (E-business)



Enterprise Systems: Transaction Processing Systems

- Transaction
 - Any business-related exchange, such as payments to employees and sales to customers
- Transaction processing system (TPS)
 - An organized collection of people, procedures, software, databases, and devices
 - Used to perform and record completed business transactions

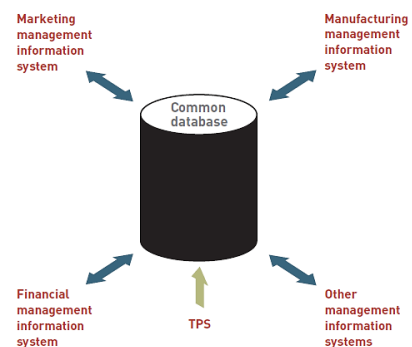
Enterprise Systems: Enterprise Resource Planning

- Enterprise resource planning (ERP)
 - A set of integrated programs
 - Manages the vital business operations for an entire multisite, global organization
- Most ERP systems provide integrated software to support manufacturing and finance

Information and Decision Support Systems

- Management information system (MIS)
 - Organized collection of people, procedures, software, databases, and devices
 - Provides routine information to managers and decision makers
 - Focuses on operational efficiency
 - Provides standard reports generated with data and information from the TPS or ERP

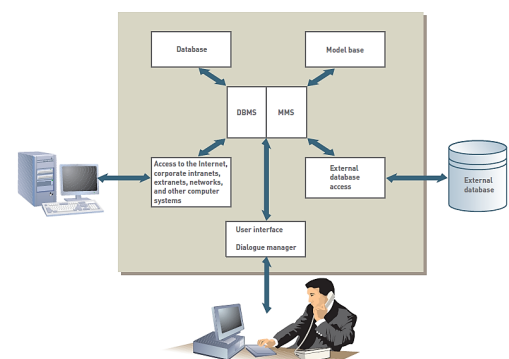
Management Information System



Decision Support System (DSS)

- An organized collection of people, procedures, software, databases, and devices that support problem-specific decision making
 - Focus is on making effective decisions
 - Used when problem is complex and information needed to determine appropriate action is difficult to obtain

Essential DSS Elements



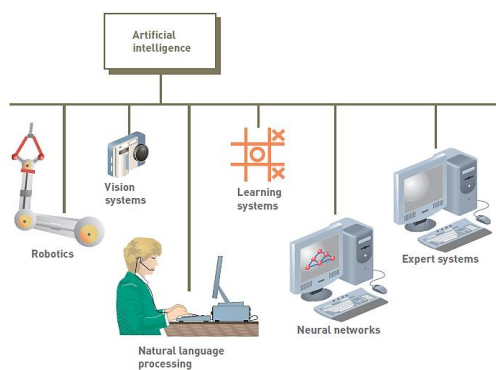
Specialized BIS: Knowledge Management

- Knowledge management systems (KMSs)
 - An organized collection of people, procedures, software, databases, and devices
 - Create, store, share, and use the organization's knowledge and experience

Specialized BIS: Artificial Intelligence (AI)

- A computer system takes on characteristics of human intelligence
- Examples of AI applications: games, medical diagnoses, and automobile operation

Major Branches of Artificial Intelligence



Artificial Intelligence Subfields

- Robotics: machines take over complex, dangerous, routine or boring tasks
- Vision systems allow devices to see, store and process images
- Natural language processing involves computers understanding and acting on verbal or written commands

Artificial Intelligence Subfields (cont'd.)

- Learning systems allow computers to learn from past mistakes or experiences
- Neural networks allow computers to recognize and act on patterns or trends

Expert Systems and Virtual Reality

- Expert systems give computers the ability to make suggestions and function like an expert in a particular field
 - Knowledge base contains data, rules, procedures, and relationships used by expert system
- Virtual reality: simulation of a real or imagined environment that can be experienced visually in three dimensions

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Why Study BIS?

- Students wanting to develop a career in BIS
 - Must recognise that **BIS is an integral part of most industries** (e.g., finance, healthcare)
 - Whatever your position, you will need to be able to work closely with technology providers/personnel in your company and this requires relevant knowledge and understanding in IS/IT
- Studying BIS gives students the opportunity to understand how businesses operate and benefit from using new technologies.
- Learning how to implement, use, and manage various types of information systems equips students with the advantage of knowing how to creatively solve business problems by employing current technologies in new and innovative ways



Careers in BIS

- Range:
 - From managerial (such as CIO who oversees use of information as an important organisational resource) careers
 - To technical (such as network security specialist who develop security and encryption algorithms) careers
- Potential typical positions in IS/IT
 - Business/System Analyst
 - Analyst/Developer
 - Programmer
 - Database Designer/Developer
 - Web Services Expert
 - Network Engineer

Skills for BIS Careers and gaps between IT people and business managers

- Business personnel possess expertise in functional areas such as marketing, accounting, sales, etc.
- IT personnel have the technological expertise
- This typically causes a communications gap between the business personnel and IT personnel
 - Business personnel have their own vocabularies based on their experience and expertise
 - IT personnel have their own vocabularies consisting of acronyms and technical terms
- Effective communication between business and IT personnel is crucial
- **This is where you (with BIS knowledge) can help and contribute**

Global Challenges in Information Systems

- Cultural and language challenges
- Time and distance challenges
- Infrastructure challenges
- Currency challenges
- Product and service challenges

Global Challenges in Information Systems (cont'd.)

- Technology transfer issues
- State, regional, and national laws
- Trade agreements

Summary

- Today, we have discussed:
 - Data, information, knowledge
 - Almost 50 years history of BIS
 - Several definitions of BIS
 - Components of IS/IT
 - An introduction to business functions
 - Why it is important to study BIS
- Next week, we will discuss:
 - More on business driven IS/IT
- Thank you very much for your kind attention
- Please do the recommended readings for this week