ISYS90048 Managing ICT Infrastructure

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Teaching Session 01a

- Overview of current trends in information & communication technology,
- Concepts behind the commoditisation of technology
- Concepts and impact of technological convergence

Evolution of IT

- Mainframe & minicomputer era: 1959 to present
  - 1958 IBM mainframes introduced, eventually to support thousands of online remote terminals
  - 1965 less expensive minicomputers introduced, allowing decentralised computing
- Personal computer era: 1981 to present
  - 1981 Introduction of IBM PC
  - Proliferation in 80s, 90s resulted in growth of personal software
- Client/server era: 1983 to present
  - Desktop clients networked to servers, with processing work split between clients and servers
  - Various types of servers (network, application, Web)
- Different business users wanted different systems
  - This expanded the IT department to meet the demand and often failed to deliver

The enterprise ICT era

- 1990s – 2010s - The enterprise ICT era
  - Applications were split into separate components
  - Integration was born to allow these independent applications to connect
  - But if something changed in one system we needed to ensure it didn't break any integrations (tightly coupled)
  - To manage this challenge the enterprise service bus (ESB) was created
  - But the ICT department struggled to meet the demand
- Enterprise Internet computing era: 1992 to present
  - Move toward integrating disparate networks, applications using Internet standards and enterprise applications
- Era of Cloud Computing & Services: 2000 to present
  - ICT became a broker of services, not a manager of them
  - Cloud services and the Internet of things (IoT) significantly increased the number of organisations able to build ICT for business
  - ICT Infrastructures become even more complex & difficult to manage

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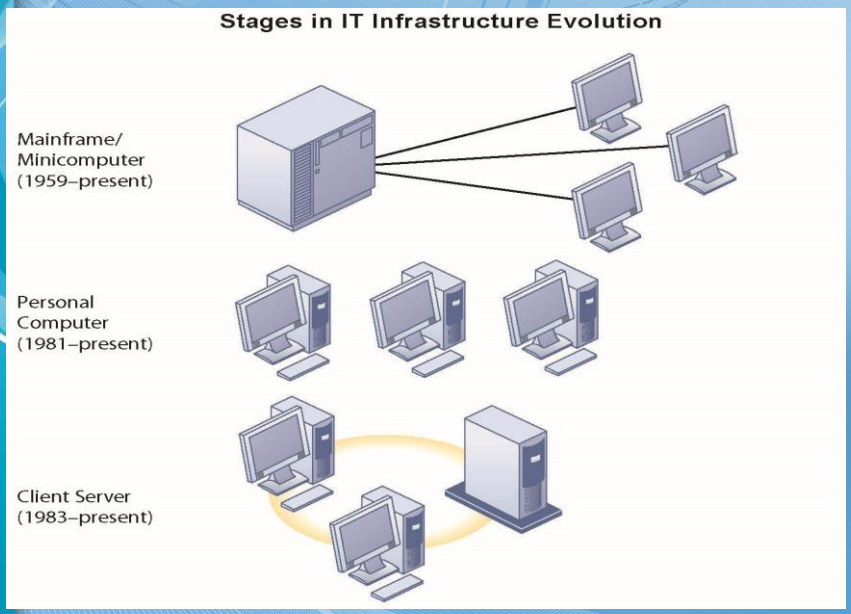
Evolution of IT cont



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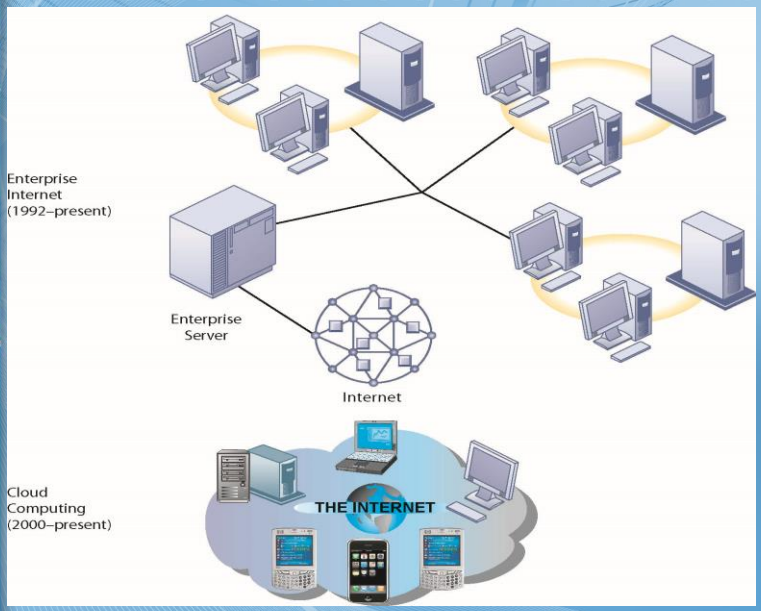
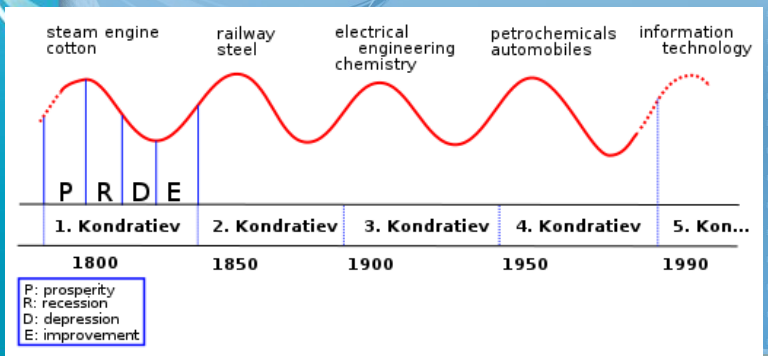
Evolution of IT cont



The Great Waves of Technological Change

- First Wave: 1800s – Steam engine, cotton/textile industry
- Second Wave: 1850s – Railways, steel industry
- Third Wave: 1900s – Chemicals, electrical engineering
- Fourth Wave: 1950 to 1970 – Petrochemicals, automobile, mass production
- Fifth Wave: 1970 to 2010 – Information Technology & Communications
- Sixth Wave: Resource Efficiency/Sustainability



Kondratiev waves (Super-cycles)

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The Fourth Industrial Revolution (Industry 4.0)

- Industrial Revolution 1: Mechanisation
- Industrial Revolution 2: Mass Production
- Industrial Revolution 3: Computers & Automation
- Industrial Revolution 4:
  - Automation and data exchange in manufacturing technologies
  - Innovative solutions, eg: Internet of Things, Cloud Computing, miniaturisation and 3D printing
  - Interoperability
  - More flexible industrial processes using ICT
  - Autonomous and intelligent applications and manufacturing
    - Intelligent machines, smart factories
  - Digitisation
  - Adoption of standards
  - Decentralisation

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ICT Convergence

Convergence: the integration of different technologies to evolve towards a common platform for the delivery of a similar/closely related set of services

- The converging of IT and communications technology
- Mobile phone or digital television can be used for different services

- Three types: Technological, Internet and Media
- Drivers of Convergence:
  - Digitisation
    - Dramatic rise in volume of digitised information over past 10 years
    - Uptake of broadband telecommunications
    - Technological advances in telecommunication, speed, wireless
- Three levels of Convergence:
  - Produces & Services (Triple Play) - voice, television and Internet
  - Enterprise – different Service Providers offer converged products
  - Platform/Infrastructure – Network technologies (eg: ADSL & Fibre)

Gartner's Top 10 Predictions for IT Organisations & Users in 2018 & Beyond

- Every year, Gartner predicts what will be the next big thing
  - Eg: Voice-based web searches, the rise of cryptocurrencies, the phenomena of fake news & fake content, AI driven chatbots, ICT staff will be versatilists, AI job creation, IoT will be in 95% of electronics, security for IOT
- Underlying tends from Gartner's predictions
  - Need for agile ICT architectural design and deployment
  - Increasing pervasive presence of the Internet of Things
  - Demand for business intelligence from smart analytics, based on AI
  - Need for enhanced Service orientation (requiring a service oriented architecture)
  - Need for greater vigilance in the face of more sophisticated and diverse security threats

Changing Work Practices & Work Places

1. Increasing geographic distribution of organisations
   - Dispersion by use of less concentrated work places
   - Outsourcing functions to service providers
   - Locating manufacturing & back-office functions in lower cost locations
2. Increasing availability of enabling technologies and social networking tools
   - Use of asynchronous communication, eg email, Intranets, LinkedIn & Facebook
   - Use of mobile devices to support decision making on the run; Expecting employees to be available 24/7
3. Impending shortage of knowledge workers
   - An ageing population in western countries and lack of throughput of graduates in ICT

Changing Work Practices & Work Places

4. Demands for more flexibility in work practice
   - Currently trends are towards increased multi-skilling, casualization & contracting of workers
   - Professional workers spend less than 40% of their time in the office, but still require constant access to information sources & networks
5. Pressure for more sustainable enterprises and work styles:
   - Sustainability: environmental, social/cultural & financial
   - Smarter work practices to reduce transport, travel & logistics
   - Greater attention to environmental/social/ethical impact of product development, service delivery and company policies
   - Greater attention to the impact of work on individuals & society
   - Triple-bottom line accounting that addresses all dimensions of sustainability, (social, environmental (or ecological) and financial) not only the financial sustainability of an enterprise

Ref: Ouye, JA "Five Trends that Are Dramatically Changing Work and the Workplace", available at http://www.knoll.com/research/downloads/WP_FiveTrends.pdf

The Growing Need for High Availability

- Almost every aspect of today's business environment has come to rely on the uninterrupted availability of platforms, applications and data
- Real-time business model supported by a Services Oriented Infrastructure
  - Based on Web Services technologies, this approach allows them to integrate their data and applications and adapt them more easily
  - Transactions are processed in real time, instead of waiting for large batch runs at the end of the day
  - Can respond more quickly to new opportunities, changing customer demands, and unexpected supply challenges
- Requires:
  - Standardised Infrastructure and Operations
  - A Focus on Service Delivery
  - A measurement of business value from high availability

Summary

- Aligning ICT with business needs and process remains the CIOs' primary objective
- ICT Infrastructure is directly related to an organisation's high productivity, cost reduction, good quality & performance
- Shift to outsourcing, moving ICT spending from Capital Expenditure to Operation Expenditure

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References

- Gartner Identifies the Top 10 Strategic Technology Trends for 2018. Viewed 11 October 2017, http://www.gartner.com/newsroom/id/3812063
- Huang, *et al*, (2019). The Convergence of Information and Communication Technologies Gains Momentum. Book Chapter *in* The Global Information Technology Report 2012, pages 35 to 45