ISYS90048 Managing ICT Infrastructure

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Teaching Session 02

1. Explain current trends in ICT infrastructures and their impacts on ICT infrastructure management
2. Explain service models
3. ICT and business
4. ICT Infrastructure management: Challenges and Trends

Terms

- Web Service:
- A web service is any software that can be accessed by other applications over the Internet and uses standardised XML
- The output is usually HTML (eg: a web browser)
- All the standard web services work using the following components:
  - SOAP (Simple Object Access Protocol)
  - UDDI (Universal Description, Discovery and Integration)
  - WSDL (Web Services Description Language)
  - Can be a Java-based web service or a C# web service (.Net)
- In summary, Web services are a request/ response mechanism that allows a client to remotely access/ modify data
- Example: New email in Gmail, Web service sends response to the browser or pop-up window "New mail"

Roles of ICT in Business

- ICT is indispensible for core business
- ICT provides the essential infrastructure for daily business operations ICT significantly improves business efficiency and effectiveness, and hence productivity and profitability
- ICT enhances competitive advantages and facilitates the adoption of strategic opportunities
- ICT facilitates agility
- ICT is increasingly important in providing business intelligence
- ICT is ubiquitous – it's everywhere
- Therefore, organisations need to invest appropriate effort in their design, planning, and management, in order to get the best value from ICT

ICT Infrastructure

- The management of complex ICT infrastructures have become the current focus of many organisations
- Today's organisations understand the link from the availability and performance of the ICT infrastructure to the availability and performance of business processes as a whole
- The management of the ICT infrastructure has a significant impact on the success or failure of the business, directly affects the quality of service of business applications, and contributes to the satisfaction of internal and external users
- The fields of ICT management and ICT service management rely on ICT infrastructure, and the ITIL framework was developed as a set of best practices with regard to ICT infrastructure

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ICT Infrastructure

- **What is ICT Infrastructure?**
  1. **Hardware**: Servers, computers, data centres, switches, hubs, routers, etc
  2. **Software**: Enterprise resource planning (ERP), customer relationship management (CRM), productivity applications and more
  3. **Networks**: Network enablement, Internet connectivity, firewall, security
  4. **Human users**: network administrators, developers, designers and users with access to ICT devices or service are also part of an ICT infrastructure, specifically with the advent of user-centric ICT service development

  – **Infrastructure is the assets - people, hardware, systems, networks, deployed to support a business**
  – **Architecture is concerned with the design of how these assets work together**

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ICT Infrastructure & Business model

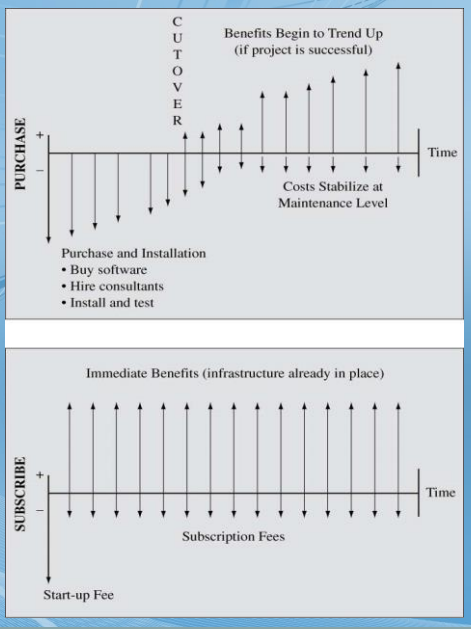
- Old Business Model:
  - Each company develops own infrastructure for communication with customers and partners
    - Duplication
    - Lack of interoperability
    - Required separate software simply to convert between incompatible systems
    - Proprietary systems locked in relationships over a long term, removing bargaining power
    - Most companies today spend roughly 80% of their ICT budget on operations and maintenance

ICT Infrastructure & Business model cont

- New Business Model:
  - Open standards of communication
  - Leverage work done by others
  - Shared infrastructure with partners
  - Software leasing that is simple, cheap
  - Less locking of partnerships
  - Services can come from separate providers instead of ICT departments
  - Incremental services instead of large commitments – operating vs capital costs
  - Virtual integration of partners
  - Service Level Agreements

Purchase vs subscribe cashflow

- Capital costs vs operating costs



Rob Austen, 2005

Service Models

- Client-server computing
- High capacity networks
- Develop new capabilities quickly, reducing time to market
- Better cash-flow
  - Rethinking ICT purchasing – capital costs vs operating costs
- Cost reduction
  - Centralisation of updates
  - Eliminated need for specialised support
  - Less vulnerable points of security breach
  - Economies of scale
- Global accessibility

Web Services Model

- Online, automated negotiation for service
- On-demand computing and economy
  - The On-Demand Economy is defined as the economic activity created by technology companies that fulfil consumer demand via the immediate provisioning of goods and services
    - Anywhere, anytime
    - Information processes
    - Middleware
      - Automated middleware that 'manages itself' (Adapters, smart APIs)
    - Supply is driven via an efficient, intuitive digital mesh layered on top of existing infrastructure networks

Web Services Model cont

The On-Demand Economy:

- Consumer behaviour is changing
- Immediate access to messaging, e-mail, media, and other online functionality through smartphones has generated a sense of entitlement to fast, simple, and efficient experiences
- The On-Demand Economy is here to stay
  - It will represent the fastest and most significant shift in spending since the advent of Internet ecommerce
  - This new industry, and its ability to satisfy consumers increasing demand for simplicity, efficiency, and convenience is novel today
    - Becoming an expectation
    - And it's still early days

Web Services Model cont

- Rise of "As a service" model
- No longer do businesses have to purchase specific hardware or software
  - The hardware or software can be used on an as-needs basis, usually paid for monthly by subscription
- With technology constantly evolving, keeping up with the latest technology trends can be difficult
- However, with the service model, organisations can upgrade without having an additional cash outlay and without having to research and stay ahead of tech developments
  - The service provider does all the work

Connection Between the company, ICT Infrastructure & Business Capabilities

- The services a company is capable of providing to its customers, suppliers, and employees are a direct function of its ICT infrastructure
- This infrastructure should support the company's business and information systems strategy
- New information technologies have a powerful impact on business and ICT strategies, as well as the services that can be provided to customers
- The centrality of ICT infrastructure and services is vital to the achievement of organisation success
- Ultimately, what the company delivers to customers, its quality, is a direct function of the power of its infrastructure

Connection Between the company, ICT Infrastructure & Business Capabilities

- For instance, Amazon is routinely sited as the most popular online shopping site and receives high praise from customers for the quality of its service and speed of execution
  - There is a reason for this: Amazon has one of the world's largest computing infrastructures numbering several hundred thousand processors to provide these services

Technology drivers of ICT infrastructure evolution

- Microprocessing power – computing power, nanotechnology, falling costs
- Mass Digital Storage – capacity increases, falling costs
- Networks – increased usage, falling costs
- Standards and economies of scale

Trends

Hardware:

- While cost of computing is lower, infrastructure costs have expanded
- The mobile digital platform consist of mobile devices, netbooks, Cloud computing, Autonomic computing
  - Self-managed, self-monitoring, self-configuration, self optimisation, self-protection

Software:

- Open-source software
- Web Services
- Standardisation, eg: XML
- Service-oriented architectures (SOA)
  - Set of self-contained services that communicate with each other to create a working software application
  - Software developers reuse these services in other combinations to assemble other applications as needed
- Software as a service (SaaS): software delivered over the Internet (Cloud)

Strategic challenges of organisations

- Scale & complexities – physical expansion, capacity planning
- Diversity – hardware, software, networks
- Support – access, solutions
- High availability/resiliency
- Configuration management – network configuration, storage issues
- Governance & quality
- Change & Risk management – prioritising, planning, scheduling, testing
- Data/data centres – scale, safety, reliability, site selection, redundancies, risk, security, strategies

Operational challenges of organisations

- Emerging technologies such as virtualisation and high-availability configurations
- Adopting a cloud model
- Use mature tools and processes that deliver right service and support your SLAs
- Provide dynamic reporting capability and create a portal to store reports for easy access
- Reduce carbon footprint
- Standardisation and customise processes to enable enterprise ICT to be interoperable (interoperability)
- ICT is like an Ecosystem
- What we are trying to do is manage this complex ecosystem
  - ICT Infrastructure Management is one aspect of this

ICT Infrastructure Management

- ICT Infrastructure Management aims to manage all the ICT components for effective utilisation in order to provide better services to customers by using automation, virtualisation and autonomic computing & self managed capabilities
- Four main processes:
  - ICT Design and Planning: which technology, capacity planning
  - ICT Deployment Management: hardware and software changes
  - ICT Operations Management: Eg, job scheduling, data management (including backup and recovery), and database administration
  - ICT Technical Support: ICT technical support primarily serves as a support to other ICT processes
- In addition to the four core components, medium to long-term budgets and policies (eg, strategic, security) are also required for managing an effective ICT Infrastructure

ICT Infrastructure Management cont

- ICT infrastructure management attempts to:
  - Cut costs while improving service & increasing business agility
  - Efficiency: Decrease the duplication of effort (standardised infrastructure & operations)
  - Resiliency: Decrease business risk
  - Ensure the use of standards
  - Scalability: Ensure minimum down time (high availability)
  - Agility: Improve adaptability necessary for a changing environment
  - Improve the information flows
  - Data Retention: Ensure interoperability among organisational departments/ areas and external entities

ICT Infrastructure Management cont

- An organisation's infrastructure management should address the availability, fault and performance management of its ICT infrastructure
- ICT Infrastructure Management covers:
  - Optimisation of the ICT infrastructure to meet business needs for high availability, reliability and scalability
  - ICT infrastructure monitoring and testing technologies that deliver service assurance
  - Technologies needed to build business service views
  - Capacity-planning processes and best practices
  - Enterprise Customer Relationship Management
  - Managed services including Business Processes Management and Hosted Services

ICT Infrastructure Management cont

- The rate at which new demands are being placed on the ICT infrastructure is outpacing the capacity of ICT organisations to effectively manage and support them
- The complexity of what to manage and how to manage is compounded by the sheer number of new managed objects, as well as the legacy objects that must be maintained
- Business units, however, see the ICT infrastructure as a utility managed in such a way that it is available when needed and priced as a commodity
- Information and Communications Technology Infrastructure Management (ICTIM), (including the processes, organisation and tools) aims to provide a stable ICT and communication infrastructure

ICT Infrastructure Management cont

- Attempts to:
  - Use standards
  - Ensure interoperability
  - Improve adaptability and agility
  - Improve efficiency
  - Autonomy
  - Loose coupling
  - Reusability
  - Composability
  - Increase scalability
  - Increase reliability
  - Improve resilience
  - Improve service

Trends in ICT Infrastructure Management

- Hosted services
  - To reduce the cost, time and burden of supporting ICT infrastructures, new generations of services are being sourced, including:
    - Networked infrastructure management services
    - Remote server management
    - Security services provisioning
    - Business continuity services
    - Web hosting solutions
    - Storage management and storage service providers
    - Monitoring and management services
    - Service management/services automation tools
    - Enterprise application delivery systems and application service providers (ASPs)

Trends in ICT Infrastructure Management cont

- Application management services
  - Today, all manner of applications are available as hosted or managed solutions
  - These offerings range from horizontal systems applicable to all classes and sizes of organisations, to niche systems limited to very narrow vertical market segments
  - These services include:
    - Software as a service
    - ERP and back-office applications options
    - Hosted desktops and front-office systems
    - Hosting options for wireless services
    - Technical evaluation and selection
    - Managed applications & e-services including, email, data warehousing, procurement, supply chain, virtual office solutions

Trends in ICT Infrastructure Management cont

- Customer service management
  - Customers are looking for information access at a time of their choosing, 24/7
  - Increased customer expectations are putting new pressures on organisations to deliver services
- Governance of ICT Infrastructure Management
  - Many organisations do not consider the management side of ICT Infrastructure
  - For many organisations, the governance process is *ad hoc* and informal
- Compliance
  - Organisations are becoming aware of the importance of compliance, especially relating to security and data loss
- Business process management services
  - Increasing move towards ICT Services and Infrastructure outsourcing:
    - From local ICT teams to Infrastructure Management Services (IMS)
    - From onsite to mostly offsite

Key Challenges of Infrastructure Management

- Cost & pricing: cost of ICT is expensive
- Service Level Agreements: must ensure high level of service
- Customer Satisfaction: adapting to changing customer demands
- Operating models: organisations need to choose their operating models carefully
- Reporting: IT infrastructure management decisions depend heavily on accurate reporting
- Right tools: organisations must balance human aspects, level of integration between the tools chosen and security aspects
- Reliability: organisations must ensure that ICT infrastructure is up and running all the time
- Efficiency: organisation must match ICT resources to their business needs

Summary

- The best, most effective and sustainable ICT infrastructure isn't really about the technology
  - It's about how well that infrastructure serves your operations & strategic objectives
- In order to maintain a dynamic and resilient ICT environment businesses need to effectively manage their ICT infrastructure
- Organisations that focus on industry-wide service challenges can improve their business capabilities
- Organisations need to align their ICT infrastructure with business goals
- ICT Infrastructure Management provides the foundation for Service Delivery and Service Support
- ICT infrastructures have become increasingly complex

References

- Katz, R. N. (2002). The ICT Infrastructure A Driver of change. *In* EDUCAUSE Magazine July/August 2001, 51-61.
- Softyf Technologies Information Technology and Services (2017). ICT Infrastructure Management, 6 pp.
- Verma, A. (2016). The overwhelming challenges of IT infrastructure management, 8 pp.

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Videos

- IT Infrastructure (6.06 min)

https://www.youtube.com/watch?v=RhSfQqmp-9Q&t=194s