V20PCA107 - IT INFRASTRUCTURE MANAGEMENT

UNIT-I_WEEK -1

INTRODUCTION

INFRASTRUCTURE

In information technology and on the internet, infrastructure is the physical hardware used to interconnect computers and users. Infrastructure includes the transmission media, including telephone lines, cable television lines, satellites antennas, Routers (A router is a networking device that forwards data packets between computer networks) and other devices that control transmission paths. Infrastructure also includes the software used to send, receive and manage the signals that are transmitted.

- IT infrastructure management Infrastructure management is the process of keeping an organization's IT infrastructure—hardware, data storage, operating systems, networks and communications, enterprise software, and internet platforms—running smoothly.
- Sounds simple enough, but the list of tasks involved in achieving that outcome is long.

Information Technology (IT) Infrastructure:

IT Infrastructure is the integrated framework upon which digital network operates. The infrastructure includes data centres, computers, computer network, Database management devices and regulatory system.

Components of IT Infrastructure:

1. Switching
2. Routers
3. Firewalls
4. Servers
5. Physical Plant (also known as Physical facilities such as, lands, buildings, furniture's and physical infrastructures)

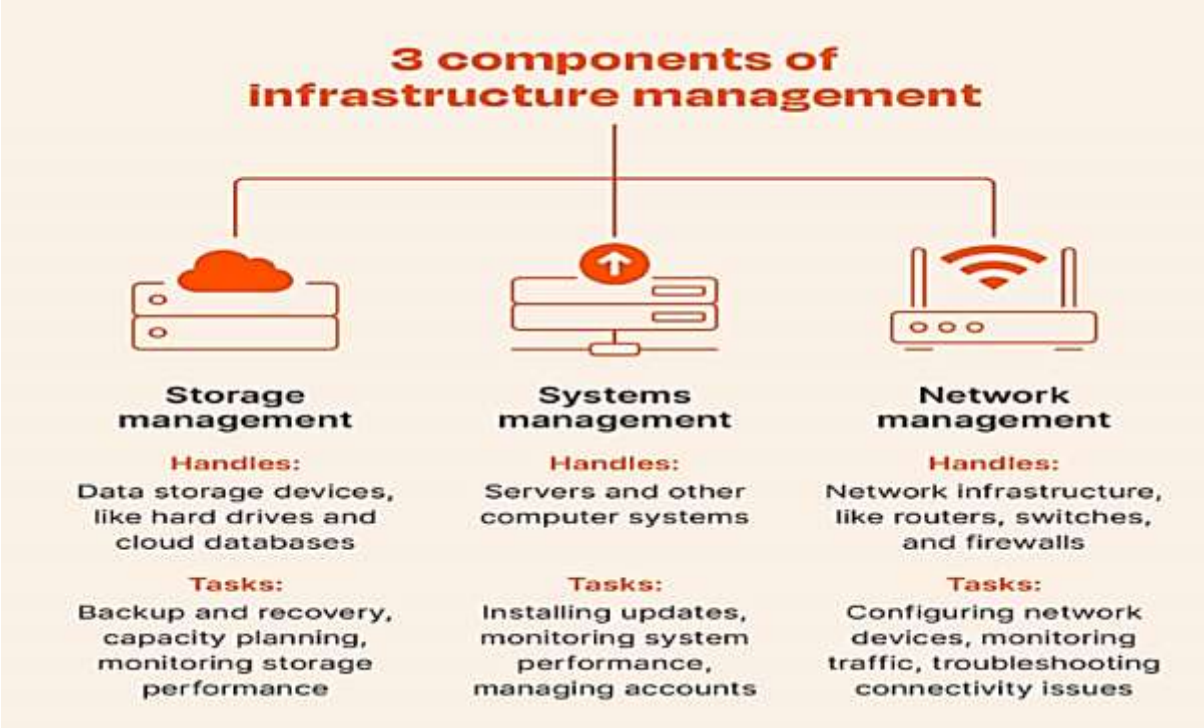
6. People
7. Server Rooms / Data Centre
8. Infrastructure Software

Definition of IT Infrastructure

- The IT infrastructure of an organization consists of various components essential for providing IT services to its customers.
- These components include hardware equipment, software applications, and any other necessary elements to ensure the effective delivery of IT services.
- **"IT infrastructure of an organization includes hardware, software, and other components necessary for delivering IT services".**

Categories in Infrastructure

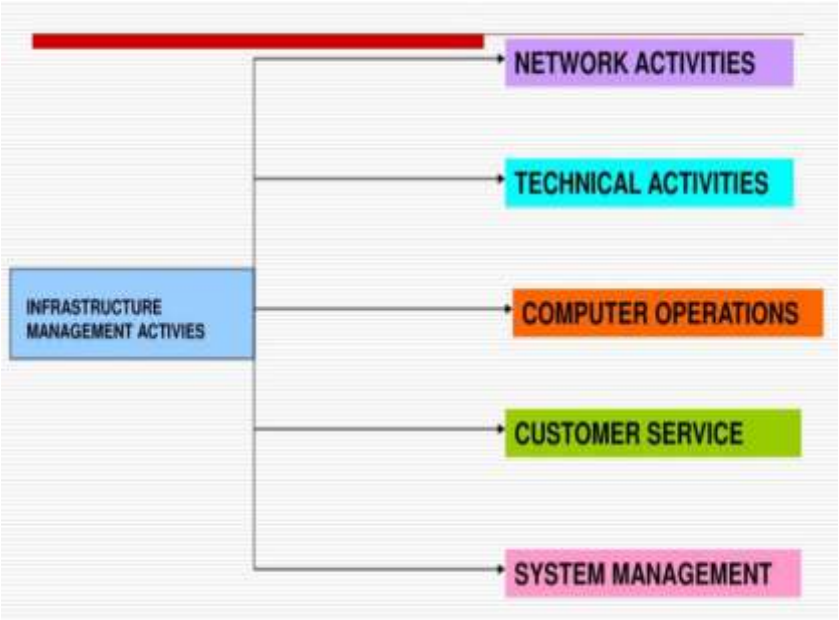
- Think of infrastructure management is in three broad categories:
- **Storage management** - capacity planning and storage performance monitoring.
- **System management** - installing updates, monitoring system performance.
- **Network management** - configuring network devices, installing firewalls, monitoring traffic, and troubleshooting connectivity issues.



Activities in IT Infrastructure

An organization's infrastructure management should address the availability, fault and performance management of its IT infrastructure. Infrastructure Management covers: Optimization of the IT infrastructure to meet business needs for high availability, reliability and scalability. IT 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.



Need - Well Planned IT Infrastructure Management

Today's business environment relies heavily on the constant availability of platforms, applications, and data.

- Almost all business activities of an organization highly depend on the infrastructure.
- A good and reliable IT infrastructure is the key to successful operations and is the foundation of any viable IT organization.
- Every organization must scale its information technology (IT) infrastructure to support business growth, managing global networks, databases and applications becomes an important task.

- IT infrastructure needs to be developed and managed in an effective manner to support the requirements of the organization.

Major Aspects in IT Infrastructure Management

1. Purchased software (e.g., ERP packages, RDBMS, operating systems, e-mail tools, office tools, financial applications, etc.)
2. IT infrastructure hardware (e.g., machines, desktops, servers, switches, communication devices, etc.
3. Software's developed
4. Software maintenance (corrective, perfective, adaptive, preventive)
5. IT services (e.g., software setup, help desk, computer administration, etc.)
6. Human resource (working staff)

Aim of IT Infrastructure Management

IT infrastructure management aims to manage these components for effective utilization to provide better services to customers

Who will perform IT infrastructure Management - This is usually done by IT department of an organization in consultation with “top management”

How to perform IT infrastructure Management - IT infrastructure management creates an infrastructure management environment that reduces IT complicacies. It automates and supports required performance and service availability levels and resolves problems to ensure business continuity.

Major Activities Involved in IT Infrastructure Management

Among many other objectives, IT infrastructure management tries to:

1. Decrease the duplication of effort and increase organizational production
2. Decrease business risk
3. Ensure the use of standards
4. Ensure minimum downtime

5. Improve adaptability necessary for a changeable environment
6. Improve the information flow in information system
7. Ensure interoperability among organizational and external entities
8. Increase service quality
9. Reduce operational costs
10. Increase business planning

The following is the list of activities happening in the broad aspect of IT infrastructure management.

IT infrastructure management focuses on efficiently managing and utilizing IT components to deliver superior services to customers. A robust and dependable IT infrastructure is essential for successful operations and forms the foundation of any viable IT organization. Effective IT infrastructure management minimizes complexities and enhances overall performance.

Increase business planning.IT skills and managerial practices also play an important role in IT infrastructure management. The diagram below presents an overview of IT infrastructure highlighting the importance of human element in it. The last three bottom layers depicts physical shared components such as computers and common technologies. The second bottom layer contains the commonly shared services such as database services and connections to internet. The components of these two layers are changed into IT infrastructure services by human element using its skills, experience and knowledge. The human element binds IT components into a reliable set of IT infrastructure services which are shared in business processes across the organisation. Good IT infrastructure management avoids the occurrence of IT infrastructure problems and resolve them before they impact business availability.

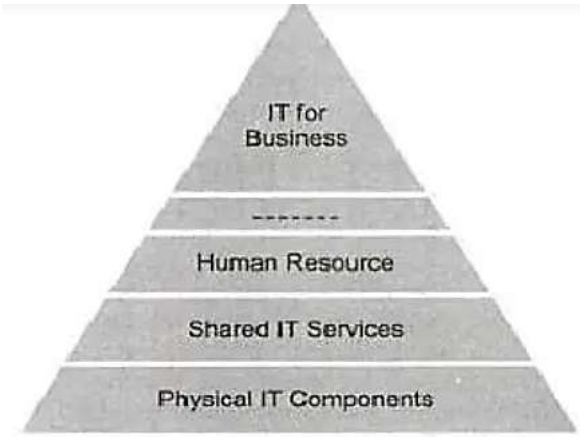


Fig. 2.1 *Relationship among various IT infrastructure elements*

Challenges in IT Infrastructure Management

IT infrastructure consists of resources and capabilities which are built through the interaction between technology and people in the organisation. It consists of elements shared by different levels of users and processes and provides platform to the people to share knowledge. IT infrastructure and its management are very essential for smooth running of an organisation.

Why it is challenging to manage IT infrastructure

- IT infrastructure consists of different technology and people in the organization.
- It consists of elements shared by different levels of users and processes and provides platform to the people to share knowledge.

Some challenges are faced in management and development of ManagingIT infrastructure those are below.

Suitability to the Organisation: IT infrastructure management needs to develop and deploy (organise or send out) management activities in such a way that they support operational and strategic goals of the organisation. The management activities consists of two parts :

i. Maintenance of Existing Systems and
ii. Development of New Infrastructure.

Information system development relies on existing hardware and software resources. Vision is required in both business and IT order to achieve what technology can do and how to make its best possible use.

Low Cost and High Quality: Management activities should achieve low cost with high quality. Sometimes, interactions and partnership with outside IT service providers may provide solutions to this challenge.

Adaptability in changeable Environment: IT infrastructure should not only be reliable in operations today, but it should also be open for changes in the future, to incorporate future business requirements. All choices that are made in developing the infrastructure are important because the infrastructure is an organisational asset and meant to be used for an extended period.

Decrease Business Risk: Infrastructure provides the foundation upon which business applications are built. Therefore, it is required to be managed in such a way that it does not fail under any circumstances. Since these challenges are related to IT management problems, IT managers should develop management procedures to match the current and future requirements.

Important - Role of IT Manager

- ❑ The above challenges - IT managers should develop management procedures to match the current and future requirements.
- ❑ IT managers can ensure that their infrastructure remains robust, scalable, and capable of supporting the organization's evolving goals and technological advancements.

DESIGN ISSUES OF IT ORGANISATION AND IT INFRASTRUCTURE

Success of any IT organisation depends on:

- ✓ The suitability of its design with the business needs and the availability of effective and efficient IT infrastructure support.
- ✓ To support an operating environment, it is necessary to have organisational design which matches the business requirements, necessary infrastructure,

good strategy for the deployment and technology and well-defined accountability plan for the use and application of technology.

Design of IT Organization

1. IT leaders should seek the answer to four questions: what works, what does not work, when will it work and why?
2. No single proven optimal design strategy.
3. There are many best practices available for learning and benchmarking purposes.
4. Keeping this challenge in mind, IT leaders always try to find out a perfect IT organizational model that addresses all problems in their own scenario.
5. Solutions to these four questions form the core of a "best practice" for a specific organizational setting. They assist IT leaders in deciding whether a particular "best practice" is suitable for their organization.

Success Depends on Infrastructure Design

The success of any IT organization depends on its infrastructure design:

- ✓ Aligning with business needs and providing effective and efficient IT infrastructure support.
- ✓ Enabling the business to function smoothly.
- ✓ Organizational design involves dividing the workforce into different tasks and coordinating these tasks.

Organisational design refers **to the way in which an IT Organisation divides its work force into different tasks and operates by coordinating these tasks.** To design an IT organisation, major factors influencing organisational design and mechanism should be used to estimate how the design is effective and identify the strengths and weaknesses of the organisation. Designing an effective organisational structure is a real challenge which considers learning and benchmarking processes for it. Keeping this challenge in mind, IT leaders try to design a perfect organisational model that addresses all problems in their current structure. According to people3, Inc report “Structuring for Success: Building Blocks for IT Organisation Design”, while designing an IT organisation, IT

organisation should seek the answers for four questions: what works, what does not work, when will it work and why? The answer for these four questions will provide the essence of a “best practice” for a specific organisational setting and help IT leaders in determining whether a specific “best practice” is appropriate for their organisation or not.

The IT and business leaders should follow the **four basic steps** of the organisational design process to increase the rate of success of their IT re-engineering initiatives.

Business Driver Assessment: This process identifies the business drivers that lead to the development of a re-engineering(re-constructs) strategy.

Organisation Readiness Assessment: It ensures that all the constraints and barriers to organisational re-engineering are evaluated and are taken into consideration during the design and implementation processes.

Structure Model Assessment: This process understands the strengths and weaknesses of each IT structure model (centralised, decentralised or hybrid). It selects the organisational design that is not only aligned with business strategy but also fits to the culture of the organisation.

Business Impact Assessment: This process conducts a series of “what if” business.

Design of IT Infrastructure

The term infrastructure describes the structures required for the operation of a physical facility or business operation. The purpose of IT infrastructure management is to provide structure and control of the functions responsible for diverse technical operations which generally involve hardware, software, and networking in both physical and virtual environments. Here a design document which contains the complete information about the IT Infrastructure is prepared. Generally, the design document contains following information:

- Design of Data Centre and Server Room
- Design of IT network.
- Hardware and software specifications of Servers, Desktops and Laptops.
- Specifications of Server and Client Operating systems.

- Details of access, controls to be implemented to access critical IT assets, etc
- Internet bandwidth, security devices and applications.
- E-mail service to be setup
- Design of backup and disaster recovery mechanism.

An efficient and effective IT infrastructure requires continuous organisation attention.

Definition: IT infrastructure design should be able to take care of various tasks necessary to keep the business of an organization running smoothly.
A good IT infrastructure design needs extensive experience in designing and implementing infrastructure.

Examples of Some Infrastructure Services Include:

Active Directory Design: It explores the organisational structure and geographic spread of an organisation to assess the most effective deployment of active directory. It includes the directory structure, deployment of domain controllers, global catalogue servers, bridgehead servers and single master role servers.
Migration to New Release of Infrastructure: This includes the review of implications to be incurred in migrating from old to new software releases (for example, from NT to Windows 2003, or Exchange 2003, etc). It also prepares plans incorporating an assessment of the risks along with measures to be taken to reduce them.

Some Infrastructure Services

Protecting the Enterprise: The Business managers should understand the information assets, their values and they must draw up a security risk assessment with countermeasures. Typical areas covered include:

- Operating system lockdown,
- Application system development guidance,
- Firewall placement and rule sets,
- Intrusion detection requirements,
- User access controls and

- Written policy documents for management and staff.

Local Area Network (LAN) and Wide Area Network (WAN) Design and Tuning- It includes designing for LANs and WANs, including use of hubs, switches and routers; placement and configuration of DNS (Domain Name Servers) and DHCP (Dynamic Host Configuration Protocol) servers.

Design of IT Infrastructure involves the designing the IT design document

Design Document= complete information about the IT infrastructure.

Design Document = written documentation of the design factors and the choices to satisfy the business and technical requirements. The design documentation also aids in the implementation of the design. The design documents ensure the successful implementation of the design by the implementation engineer.

Contents of the Design Document

1. Architecture design
2. Implementation plan
3. Installation guide
4. Validation test plan
5. Operational procedures

It documents the criteria that must be met to determine the success of the implementation and the test procedures that should be followed when validating the environment

Design documents contain the following major aspects.

- Design of Data Centre and Server Room
- Design of IT network
- Hardware and software specifications (Servers, Desktops and Laptops)
- Specifications of Server and Client Operating systems
- Details of access, controls to be implemented to access critical IT assets
- Internet bandwidth, security devices and applications
- Email service to be setup

- Design of backup and disaster recover mechanism.