Corporate Information Infrastructure – Management Aspects

Ivo Damyanov

Faculty of Mathematics and Natural Sciences, South-West University, Blagoevgrad, Bulgaria

Abstract – **The development of information and communication technologies enforces an increasing dependence of the business on a successfully built and developed corporate information technologies infrastructure. The role of the IT manager and the IT team of the company constantly evolves. In this paper, we present management aspects of the core components and desired characteristics of IT infrastructure in the corporate organization as well as the human factor behind (or beside) it in the face of the IT manager and the IT team of the company. We develop a conceptual framework of the connections, dependencies, responsibilities and activities of an IT manager and company's IT team.**

Keywords – **Information infrastructure, IT manager, IT team, concept map, management aspects, team priorities, manager roles.**

1. Introduction

Information technology infrastructure is a crucial element in the organizational information system. Corporate Information Infrastructure includes, but is not limited to, core and complementary software systems and services, hardware assets, computer networks and server support, outsourced activities and services. An essential part of corporate IT infrastructure is human resources, including established relationships with outsourcers and service providers as well as with other departments of the company.

With the development of Information and Communication Technologies and the penetration of the ICT in business and its growing dependence on information technology for a large number of companies in their organizational structure, IT and corporate IT infrastructure are defined as structurally crucial and critically important. Environmental and internal changes in the organization require changes in information systems and therefore the ability to change IT infrastructure becomes an important issue.

IT infrastructure decisions cannot be made without a clear understanding of the organizational context in which the infrastructure is developed and used [1]. On the other hand, the management aspect of IT infrastructure is critical, because management practices have been developed in parallel with the organization development and they appear to be unique [2].

Many factors shape the corporate IT infrastructure but some of the most important are: business and IT strategies defined by managing body of the company; IT manager proficiency to weigh up current technologies and trends and ability to see them as a part of the infrastructure's future development; experience and skills of IT team; and last but not least financial resources for further growth and renewal.

In this paper we propose a management concretization of the corporate information infrastructure which focuses on two aspects: the infrastructure with its core components, and the IT team and the IT manager as the human factor behind (or beside) the corporate IT infrastructure.

2. Core Components and Characteristics of Corporate IT Infrastructure

There is no formal definition of IT infrastructure. Some define IT infrastructure as the basis for a shared information technology on which business depends. Others characterize IT infrastructure as a technological basis for computers, communications, data, and core systems.

In [3], Simon Liu defines IT infrastructure as a set of IT resources and organizational capabilities that employees share in the organization. Infrastructure provides the foundation on which to develop

business applications and to support business processes. Therefore, human resources, documentation and planning activities and corporate knowledge can be considered as an integral part of corporate infrastructure and IT management.

Hardware and software assets are the main part of the IT infrastructure since the first moment of its establishment. With the third wave of evolution of the IT infrastructure, i.e. Client/Server Computing [4] connectivity becomes an essential part of it, so the **network** is the next core component nowadays. Increased dependency of the business on the information and optimization of the maintenance and cost leads to the evolution of one more core component i.e. **data center and storage facilities**. Two other connected key trends have appeared – outsourcing and cloud computing. There are many reasons for outsourcing. The decision to use external resources and services should be seen from several perspectives, including in terms of risks, strategic importance and cost-effectiveness. Thus, we get the next core component of the IT infrastructure – namely **virtual and remote assets**. Nowadays IT is service oriented. **Technology services** are another self-existent core component.
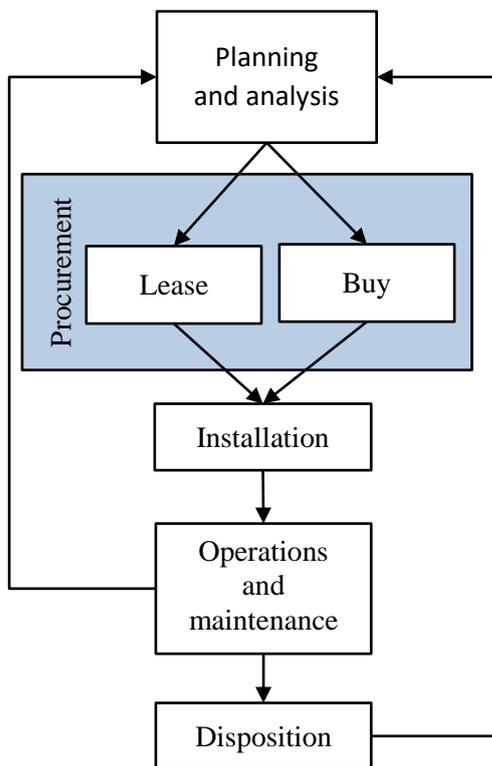

Figure 1. IT infrastructure management lifecycle (adapted from [3]*)*

As a foundation of shared IT capabilities that enable the development of IT applications and the support of business processes, IT Infrastructure needs to be developed aiming at the following characteristics:

Centralized managed – with the trend of building infrastructure with distributed and loosely coupled packages or services (using microservices and container technologies) centralized management is not always easily achievable, even though it is something that needs to be aimed at. Technological solutions are based on automation, agents and dashboards.

Sustainable and Reliable – to operate reliable infrastructure we usually utilize two things – redundancy and monitoring. In addition to this it is very important to maintain an up-to-date disaster recovery plan, which is tested at least annually. Development of IT infrastructure should be done in a planned and predictable way.

Efficient – IT infrastructure should have effective utilization and increase productivity. Most of the time the efficiency is a direct result of training end-users.

Heterogeneous – homogeneous infrastructure is limited today. With the rise of cloud services and mobile apps, heterogeneity appears naturally in the IT infrastructure.

Flexible – flexible infrastructure is a must-have so that company becomes more responsive to the change of business demands. Flexibility components are connectivity, modularity, compatibility and IT team flexibility. In [5] authors found that only compatibility gives a positive and significant impact to IT-business strategic alignment.

Evolving - Infrastructure is evolving. The main cycle for its management [3] includes five major phases, namely – planning and analysis, procurement, installation, operations and maintenance, disposition (see Fig. 1.).

Standardized - Standards are in a key role in development of IT infrastructure that is flexible and adapts to future business needs. Each company needs to find its model to follow when building and managing it.

Compliant – There are lots of regulations and licensing options. By providing good inventory audit and appropriate design adjusted to regulations, we could have infrastructure operating in legitimate and effective way.

Cost optimized and Scalable – Maintaining one's own infrastructure always puts on a trial cost optimization and scalability. Today, there is an excellent solution consisting in moving services and data on the cloud.

Secure – IT infrastructure should be defended in depth by utilizing specialized hardware and software, permanent end-user education and proper testing.

Collaborative – to unlock the end user potential, IT infrastructure should provide collaborative experience through fast access to the information and

consistent connectivity. Teamwork is already shifted in the virtual space. By design, IT infrastructure should support it without extra complications.

Some of the features described above are inversely related. That is why achieving their optimal combination is essential. This is important since the IT infrastructure has some bad trends to lock-in. Lock-in means that, when a technology has been adopted, it will be very hard or impossible to develop competing technologies due to investments in the large installed base and resulting technological lock-ins. [6].

3. IT Manager and IT Team of the Company

The conceptual framework in which complex connections, responsibilities and tasks of the IT manager and IT team of the company as well as the various aspects, activities, systems related to the corporate IT infrastructure are presented on the next map (see Fig. 2.). It is not complete and can vary depending on the position of the IT Manager in the company.
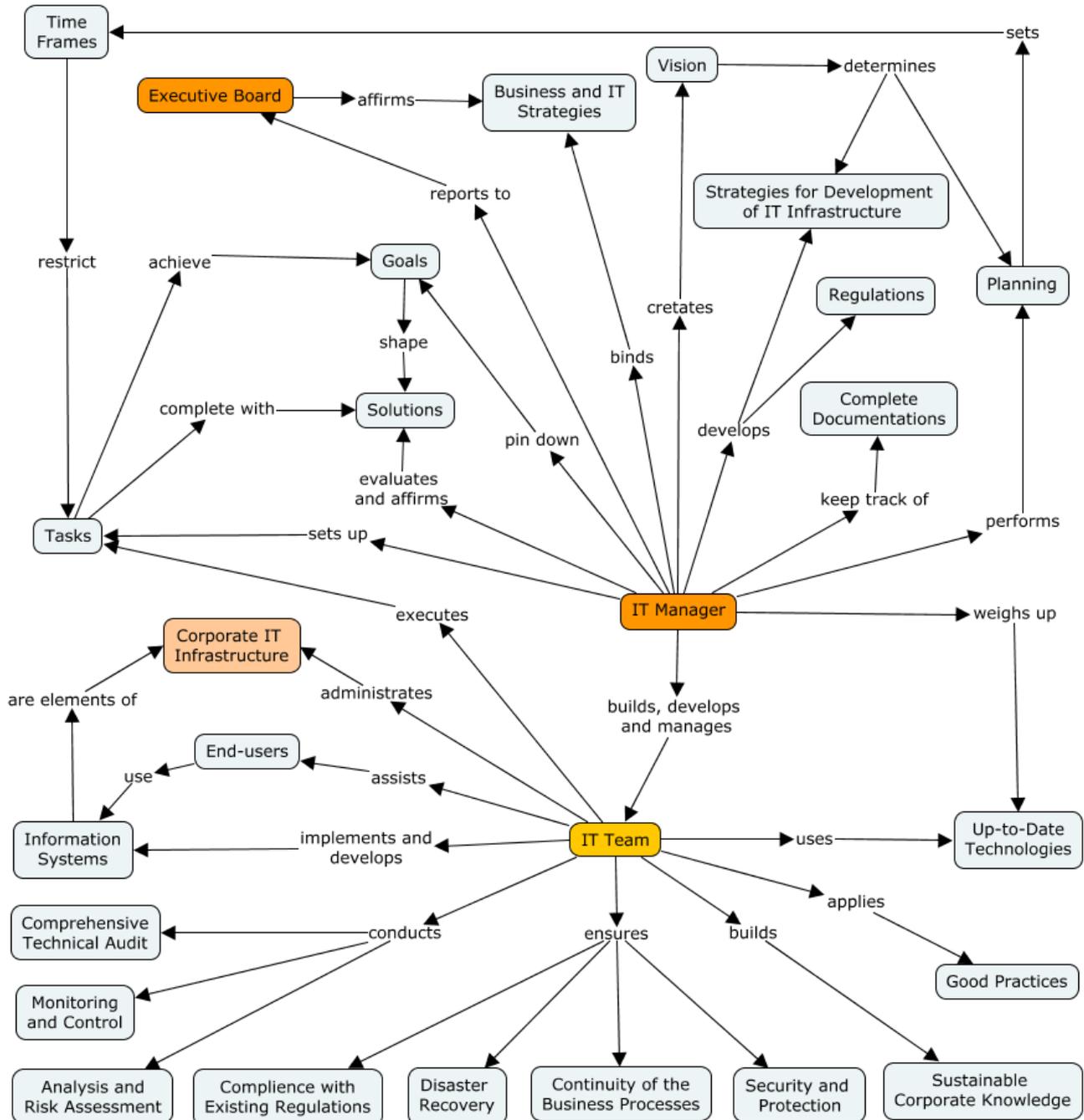

Figure 2. A conceptual map for the role of the information technology manager and the IT team in the company structure

The day-to-day task of the IT manager and IT team is to identify the priority actions that will:

- Create the necessary stability, completeness and competitiveness in the provisioning of IT resources to the company business;
- Provide a development perspective;
- Improve processes and new software development;
- Improve communications with contractors;
- Ensure compliance with cyber-security requirements, license coverage and up-to-date software and hardware;
- Improve the operational efficiency of employees;
- Improve customer service and communication.

In 1981 William R. Synnott [7], introduced the IT manager as a C-level and named it as Chief Information Officer. Over the years, the IT manager's role has changed significantly - from a technical person, to a senior manager. However, the IT Manager's profile today continues to vary depending on degree of business dependence on ICT and degree of implemented innovations.

In a research study conducted by Chun and Mooney [8] four main types of IT manager roles have been identified, namely:

Triage Nurse or Firefighter – managers whose main goal is to fix problems and keep systems running. They are little more than data processing managers, trying to keep IT infrastructure cost effective within company infrastructure technologies.

Landscape cultivator – focused on technical improvement and rationalization by maintaining and integrating existing information systems environments.

Opportunity seeker – managers that are open-minded and forward-thinking, and look for improvement of the business processes within and outside of the company.

Innovator and creator – focused on the implementation of innovative information systems across the company infrastructure.

In a research study by Sobol and Klein [9] it is shown that the objective financial measures of a firm tend to be higher when CIO's position is IT-oriented rather than general management. Perhaps more profitable firms are more likely to hire more professionals or hire trainees for specific jobs. It seems that they are more likely to hire outside the company than to promote "good managers" from other departments. A CIO with more technical guidance to management is associated with a more utilitarian view of IT from the company. This may be due to the shaping of IT infrastructure by a technically oriented CIO or hiring history to achieve organizational goals.

Regardless of how involved are in decision-making, the scope of the IT manager's responsibilities is quite clear and includes:

- Development of information policies;
- Relationships and contracting with external ICT solutions and service providers;
- Promoting innovative IT solutions;
- Strategic planning in the company IT infrastructure;
- Internal staff professional development and certifications;
- Executive IT leadership.

As for the priorities ahead of the IT team, we can split them in two: IT oriented and business oriented. We can state the following major IT priorities directly driven by desired IT infrastructure characteristics and the IT manager role:

- System and Network administration;
- Integration of IT solutions;
- Optimizing IT costs;
- Upgrading or replacing software solutions and computer equipment;
- Ensuring network and data security;
- Implementation of cloud and mobile solutions;
- Providing adequate support and end-user service;
- Implement server and desktop virtualization.

As for the business priorities ahead of the IT team, we can state the following major ones:

- Developing new products and services for the company;
- Implementation of technological innovations;
- Ensuring business continuity;
- Increasing productivity of activities;
- Reducing costs from activities;
- Enhancing cyber security and data security;
- Compliance of IT systems with existing regulations and licensing policies;
- Increasing customer satisfaction;
- Improvement and renewal of the technological base.

Technological changes occur much faster than the development of corporate IT infrastructure. Building sustainable corporate knowledge is a slow process that greatly increases the division between technological development and skills. Despite all the benefits that external resources provide, it is essential to always have available and reliable internal staff who are competent enough to deploy and maintain the

systems. Skills are the most expensive and the least agile resource of the company. It is hard to adequately respond to the rapid business and technological changes. Searching for and attracting IT talents is not less important. It is good to have experienced and versatile employees.

4. Conclusion

The implementation of corporate information infrastructure is a lengthy and difficult process. There is no versatile approach to building and the achieved infrastructure is the result of the lessons the company's IT manager and IT team are learning in the process. The management aspects can be a starting point for setting priorities, milestones, and tasks in the mission of both the IT manager and the IT team. Achieving the balance between the different basic features of the IT infrastructure is determined not only by the distinctive role of the IT manager, but also by the accumulated knowledge of the team and its ability to respond rapidly to changes in both technology and business.

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