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INFORMATION SYSTEMS FUNCTION: ACTIVITIES, RESOURCES, AND INFLUENCING FACTORS

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The Information Systems Function, understood as the set of organizational activities aiming to optimize the organization's information system, is analyzed and characterized in this paper, under three views that together provide a complete perspective of its reality: the actual activities (planning, development, exploitation, and management), resources (human, financial, technological, and informational), and influencing factors (structural, environmental, social, cultural, psychological, and time-related). Recognizing the various elements that compose the Information Systems Function allows a better realization of the multiple aspects that must be taken into account in management of information systems.

Keywords: Information Systems Function, Information Systems Management

FUNÇÃO SISTEMAS DE INFORMAÇÃO: ACTIVIDADES, RECURSOS E FACTORES DE INFLUÊNCIA

A Função de Sistemas de Informação, entendida como o conjunto de actividades que numa organização visa a optimização do seu sistema de informação, é analisada e caracterizada neste artigo através de três perspectivas complementares da sua realidade: actividades (planeamento, desenvolvimento, exploração e gestão), recursos (humanos, financeiros, tecnológicos e informação) e factores de influência (estruturais, ambientais, sociais e culturais, psicológicos e temporais). O reconhecimento dos diversos elementos participantes na Função de Sistemas de Informação, possibilita uma melhor compreensão dos múltiplos aspectos que é necessário considerar na sua gestão.

Palavras-chave: Função Sistemas de Informação, Gestão de Sistemas de Informação

1. INTRODUCTION

In what is essentially a dynamic environment, under constant change, Information Systems (IS) play a role that is absolutely central to organizational activities, by simplifying or determining almost all organizational initiatives. As such, they must be carefully planned, designed, developed, used, and managed, in order to provide the necessary support to information needs of organizations, at their several levels and scopes (VARAJÃO 2005).

This is only possible in the context of an organizational practice that is globally understood, and served by the realization of all aspects composing the IS reality. It's fundamental that a competent Information System Function (ISF) is in place, one able to deal with the various complexities that it faces, able to respond to the multiple challenges that are placed before it (VARAJÃO, 1997).

The ISF must adapt to the size of the organization, but also to its structure, culture and many other features (circumstantial, endogenous e exogenous); the ISF setting and management depend on the several different environments of the organization. In management of IS, it's necessary to equate all matters involved in the ISF and combine them in order to make them fully manageable. Reaching this goal requires a profound realization of the role of the several elements that compose the entire ISF (VARAJÃO, 2002).

Turbulence, constant change in the business envelope, and the specificity of each organization, render unviable the formulation of universal solutions for the ISF. This is mainly due to the circumstances under which the ISF is developed in an organization, at a given moment, for they hold the potential of being different from any other situation (AMARAL, 1994). All the same, it's important to have conceptual descriptions and models that convey a global, integrated vision of the various features that are relevant to the ISF.

In order to establish the adequate principles and approaches for studying and using the ISF, one has to identify the set of its activities, but also to perform a reflection on its global reality. By recognizing it as complex and circumstantial, it's possible to understand its conveyors and capabilities.

Accepting that the ISF is composed by the set of organizational activities aiming to optimize the organization's IS, figure 1 describes its status under three main views, which provide a complete perspective: activities (planning, development, exploitation, and

management), resources (human, financial, technological, and informational), and influencing factors (structural, environmental, social, cultural, psychological, and time-related). This model is the result of several research activities conducted throughout the past few years, particularly surveys of existing literature, case studies, and Grounded Theory studies (VARAJÃO, 1997; VARAJÃO, 2002).

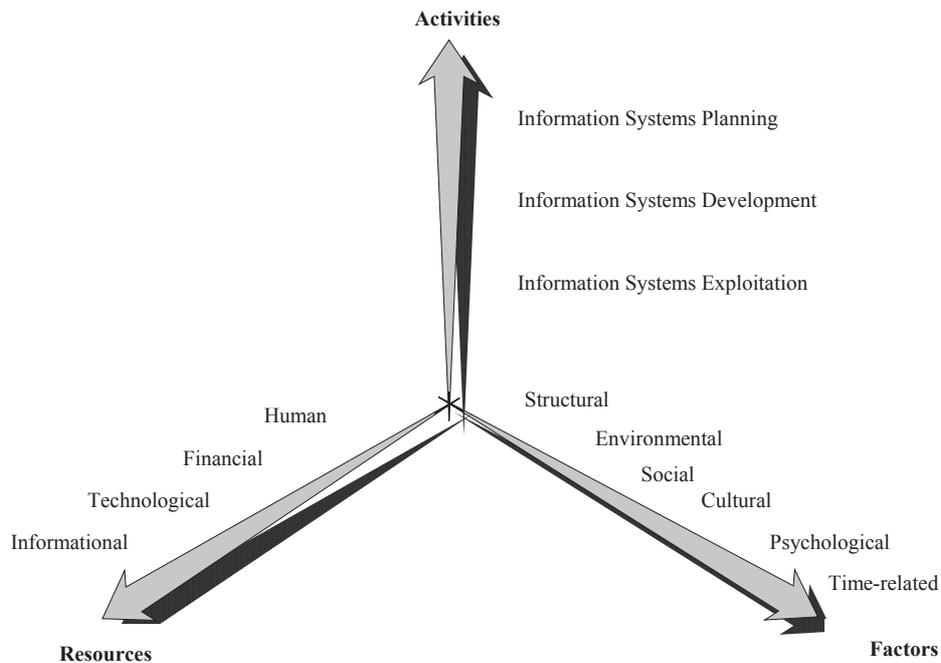


Figure 1: Three views of the Information Systems Function

Source: (VARAJÃO, 2002)

This model identifies – generically – the ISF activities, and the necessary resources, but it also points out the affecting factors (conversely, these factors are also affected by the ISF). Although this model presents an high level of abstraction, it is useful in the realization of the scope of the ISF, for it allows the identification of the various elements in its universe, and the need of their conjugation in order to ensure that the IS provides an effective response to the organization’s needs.

We shall now look at the ISF under its various features, with the purpose of creating a global integrated vision, allowing the broad realization of its capabilities and role in the organization, for only in such fashion can it be properly managed. The coming sections describe the activities, resources, and influencing factors.

2. ISF ACTIVITIES

It's useful to conceptualize the ISF by the means of four main activities: Information Systems Planning (ISP), Information Systems Development (ISD), Information Systems Exploitation (ISE), and Information Systems Management (ISM).

ISP is responsible for identifying the systems that are needed in an organization, thus preceding ISD, in charge of developing the systems identified during ISP. Afterwards, ISE is responsible for ensuring the proper usage of the IS, in the best interests of the organization. The ISM is required to provide structure and control to all these activities. ISP is a necessary precursor to ISD, since it provides a long-term vision, by identifying the potential systems and defining a full set of management policies and approaches. It is assumed that ISP is integrated and aligned with the business planning, being therefore a planning strength for organizational change, provided by ISD, since a new system frequently implies a new form of organization.

In order to support the needs of the organization as time elapses, IS must adapt to the naturally-occurring changes. In this sense, it is possible to consider a cyclical and continuous sequence of ISF activities: the several activities feed each other in each system generation, and possess strong interlinks.

It is possible to consider a logical sequence of activities, under which an IS is thought-over (in the scope of ISP), produced (in the scope of ISD), and then used (in the scope of ISE). However, in practice these activities take place concurrently, with significant inter-relationships and interdependences; and these relationships are strongly interactive. The several activities cannot be approached in isolation, they must be taken in account and integrated together.

There are multiple propositions for ISP, ISD, ISE, and ISM, each involving several activities (KENDALL and KENDALL, 1992) and denominations (MARTIN et al., 1994). It is somewhat hard to come across two authors agreeing in detail over the same proposition (SAGER, 1990). Some authors stand for a larger number of activities, while others propose that they should be aggregated. However, in spite of all variations, their nature is mostly similar, irrespective of the actual proposition. Table 1 presents those activities that met major dissemination and are most commonly accepted for the ISF.

Groups of activities	Activities
Information Systems Planning	Strategy analysis
	Strategy definition
	Strategy implementation
Information Systems Development	System analysis
	System design
	System development
	System deployment
	System maintenance
Information Systems Exploitation	System operation
	Information technologies management
	Human resources management
	Procurement of services and resources
	Other, diversified activities
Information Systems Management	Structure and control

Table 1: Activities of the Information Systems Function

Source: (VARAJÃO, 1997; VARAJÃO, 2002)

Each organization is a particular case. As such, it must always be analyzed under the light of combined models, approaches, methods and techniques, to better suit the actual organization. The key to success of the ISF is certain to be found in the application of the different principles to the needs and circumstances that are particular to each case, depending on the relevance of each feature, on the followed approach, and on the situation itself. If an organization resorts to external services (outsourcing) in order to ensure the development and operation of its IS, the emphasis and management of the several activities of the ISF is bound to be considerably different, regarding a situation where these activities are dealt with mainly by internal services (insourcing) (VARAJÃO, 2001).

3. ISF RESOURCES

The resources are the means employed by the organization to fulfil its mission (RUE and HOLLAND, 1989). In order to perform the various activities in an organization (ISP, ISD,

ISE, and ISM), one needs resources that must be properly planned, procured, paid for, maintained, used, and removed, in order to ensure that the IS provides the best support to the organization. Given their importance, we shall approach individually the main resources involved in the use of the ISF: human resources, financial resources, technological resources, and informational resources.

Human resources are key to the success of the ISF. An organization may possess the most cutting-edge technology, but without people that are able to implement and exploit those systems, able to optimize the use of information, the desired IS support to the organization will fail. The human resources relevant to the ISF are not only IS professionals, but also all system users and external consultants.

Financial resources are also absolutely necessary for the organization's growth and development. With a budget that does not match the needs of the organization, it's unlikely for the ISF to be able to develop initiatives enabling the required services, nor can it be properly scaled to ensure the quality of the IS. The perception by top management of the role and importance of the ISF is an unavoidable matter, regarding release of the amounts required by the ISP, ISD, ISE, and ISM activities.

Just as the ISF success is limited when advanced technologies are available, but not the necessary people, the same happens if people with the adequate skills are available, but they are not provided with technology matching the requirements. Information Technologies are usually grouped under three main categories: software, hardware, and infrastructure.

The global realization of the ISF directly depends on the clear recognition of its individual components, something only achievable resorting to precise information on processes, resources, events, etc. So, are the information resources that allows characterization and management of all other resources.

We can identify two main kinds of information: basic information and architectural information. In the first type, we can find items like strategies for IS, plans for IS, systems specifications, etc. As architectural information, we find information about IS components relationships like network plans, information architecture models, etc.

The existence of models structuring the relationships between IS components is fundamental for adequate management of the various interdependences. The apparent anarchy amongst components strengthens the idea that architectures are needed, for order

and control to be established over investments in the IS, to benefit from synergies resulting from the relationships, and to maximize their collective potential.

Generically, an IS architecture provides a global model integrating the elements that compose the organization IS, focusing the role that each must play and ensure, and defining an acceptable solution (from the operational perspective), both immediately and on the long term (KIM and EVEREST, 1994).

The IS architecture conjoins and articulates representations of the different IS components. The most common form is that proposed by Zachman¹: the set of the various perspectives on data, processes, networks, people, time and motivation, which are involved in the IS of an organization (ZACHMAN, 1987; SPEWAK and HILL, 1993; AMARAL 1994). Therefore, the IS architecture is a set of representations and models that – in articulation – describe at a global level the interesting features of the organization's IS (from the ISM perspective).

There will be has many IS architectures as relationships that can be established between the elements of a system. Truth has it that not all architectures will be useful enough to develop and maintain. The ones most often used in ISM are:

- data architecture (data x data)
- IT architecture (IT x IT)
- information architecture (processes x data classes)
- applications architecture (applications x processes)
- resources architecture (resources x organization areas)
- responsibility architecture (human resources x activities)

4. ISF INFLUENCING FACTORS

Characterizing the ISF does not end after identifying the relevant activities and resources. There is a system of interacting factors, which together compose the conjuncture for acting and decision-making in the ISF. The variables of hierarchy, sociology, and psychology, among many others, take an unavoidable role in the course of all activities of the ISF. Many of these factors don't have a formal representation – or are even impossible to formalize; these are spontaneous elements, such as systems of power and influence,

¹ According to Zachman (Zachman, 1987), there is not one architecture, but rather a ser of architectures, resulting from perspectives at different levels, from the various players involved.

informal rules, value systems, motivations, emotions and desires, affections, empathy, attitude, etc.

In order to achieve a desirable development of the ISF, in consonance with the goals and strategies that materialize the mission of the organization, these aspects must be given due consideration and realized, because they impact and limit the performance of the ISF. Although generally only the formal aspects of the ISF are approached, it is important to have in mind all participating factors, since these may significantly influence the ISF success or failure. We shall now consider the structural, environmental, social, cultural, psychological, and time-related factors.

The organizational structure reflects the way in which tasks and responsibilities are assigned to individuals, and how the individuals are groups under departments and divisions. The structure, reflected through an organization chart, determines the formal relationships, defines the hierarchic levels, and the coordination among activities, aiming to provide results. Regarding the structural factors, from the ISF it is important not only to understand the overall framing and positioning at the organization level, but also understand the internal structure.

Regarding the environmental factors, we can consider essentially two kinds of environment: the internal environment and the external environment. In the internal environment there is a multitude of aspects that have to be considered, such as the vision for the future, groups of informal power structures, user's level of satisfaction with the IS, working environment, age and evolution pattern of the IS and the ISF, critical success factors, existing capabilities and skills, the effectiveness of the ISF, the quality of the information technologies, the quality of areas and locations, leadership approach and style, upper management support, degree of change, business features, ISF difficulties, etc. The external environment is profoundly heterogeneous, and one can consider aspects such as competition, markets' characteristics, IS trends, connections between the organization and external entities, etc.

Social factors in ISF are extremely important. They are connected with aspects such as interpersonal relationships, where the organizational culture plays a major role. At the level of the organization, “culture” basically means the way in which everyone interprets the guidelines that are set towards goals. The culture is related to the nature and history of the organization, the shared values, its practices, traditions, past experiences, etc.

Psychological factors are related with individual goals, with interiorized concepts, with education and ethical behaviour, with character, with experience, with motivation, with degrees of satisfaction, with knowledge, with principles, etc. These are thus determinant not only for the ISF but also for all functions within the organization.

Time-related factors are preponderant in almost all ISF activities. Time constraints are present in definition of planning horizons, development cycles, system delivery deadlines, decision opportunity for acquiring resources, and so on, including even the definition of vacation periods.

5. FINAL REMARKS

IS need to adjust to the size and features of organizations, and their structure depends on the organization’s several environments. It is the ISF responsibility to optimize the IS, in order to ensure that they respond effectively to the information needs of organizations.

A successful ISF requires equating all matters involved in its reality, and articulating them adequately, in order to render its full management possible. To achieve this goal requires a deep realization of the role played by the different elements composing the ISF (VARAJÃO, 2002).

In this paper, we tried to characterize the ISF as an integrated, complex whole, under several views that are fundamental for its realization. Classifying the ISF through a higher abstraction model renders easier the realization of its scope, alerts towards the key aspects of IS management and towards the importance of this function in the operation of any organization, since not only does it points out, generically, the ISF activities and the required resources, but it also identifies its impacting factors (and the factors it impacts). Thus, our contribution is towards a better understanding of the scope of the ISF, since the presented views allow an identification of the several elements in the ISF universe, and how they are conjugated.

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