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DEVELOPMENT OF BUSINESS INFORMATION SYSTEMS AND CHANGE MANAGEMENT

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Abstract: *Implementation or modification of business information systems (IS) has a strong behavioral and organizational impact. Enterprise business IS transforms the way individuals and groups work and communicate. Changes in the way the information systems are defined, how they are accessed and used in the management of organizational resources, often lead to a new distribution of authority and power. This internal organizational change generates resistance and opposition and may lead to the rejection of otherwise good IS. A very large percentage of the information systems does not provide benefits or solve problems for which it is designed, as the process of organizational changes that accompany the building of IS is not well managed. Therefore, a successful IS building requires a careful change management, which is the main subject of this paper.*

Keywords: *business information systems, organizational changes, electronic commerce, change management*

1. Introduction

In order to effectively manage organizational changes that accompany the implementation of new business IS, the implementation process must be examined. Implementation refers to all organizational activities that are directed towards the adoption, management and full acceptance of innovations such as the new IS. In the implementation process, the systems analyst is an agent of change. The systems analyst does not only develop technical solutions, but it also redefines the configuration, interaction and activities in employees' workplace and changes power of different organizational groups. The analyst is the catalyst of the change process and is responsible for the changes that are generated by a new system to be accepted by all actors involved. Change agent communicates with customers, mediates between competing interest groups and provides organizational adaptation to such changes. (Pugh, 2016)

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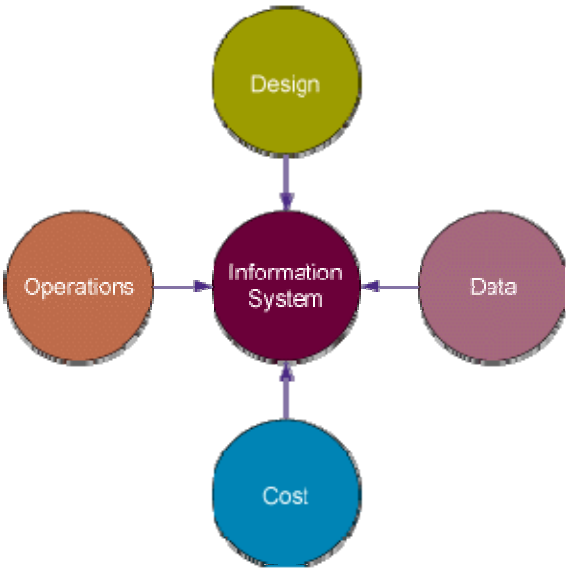
The process of organizational change can be seen through the relationship between the consultant and his client. The consultant is, in fact, the designer of the system, and the client is the user. The success of efforts to change is determined by how well the consultant and the client resolve the key issues at each stage of the process. Other models of IS development and organizational changes describe the relationship between designers, clients and decision-makers who are responsible for managing the development of IS in order to bridge the gap between design and use (Kroenke & Boyle, 2015). New approaches to the development of IS emphasize the need for flexibility and improvisation, with organizational stakeholders for whom roles are not strictly prescribed. The main objective of this paper is to present problems in the development of enterprise business IS and principles to be applied in this development in order to solve the main problems of change management.

2. Problems in the development of enterprise business IS

Problems that cause the failure of IS are classified into several categories, as illustrated in Figure 1. The main problem areas are design, data, costs and operations.

Figure 1. Problem areas of IS



Source: Laudon, K., Laudon, J. & Elragal, A. 2013, p. 482

Design. The current design of IS often fails to meet the essential requirements of the business and to improve organizational performance. Information is often not timely to be in use, may be in a format that is not acceptable and beneficial, or is simply wrong and inaccurate.

The way business users interact with IS can be extremely complicated and daunting. IS can be designed with a bad user interface. The user interface is part of IS with which end users interact. For example, the input form or on-line data entry screen can be so poorly organized that data entry is more difficult. Procedures requiring on-line retrieval of information can be so unintelligible that users are too frustrated and avoid pointing requests for data. Web sites may discourage visitors to explore further, if the web pages are chaotic, poorly arranged, or users cannot easily find the information they need. Numerous studies (Cravero & Sepúlveda 2014), (Demirkan & Delen 2013) have shown that 50% of web buyers give up buying products on-line, because it is too difficult to navigate the web site and they cannot locate the products on the site.

Business IS will be considered a failure if its design is not compatible with the structure, culture and goals of the organization as a whole. Historically, the design of IS was preoccupied with technical issues at the expense of organizational problems without adjusting to the organization - IS provoked tensions, instability and conflicts.

Data. The data in the IS can have a high level of inaccuracies or inconsistencies. The information in certain fields can be misleading or ambiguous or may not correspond to the business purpose. Information required for specific business functions may be incomplete, and therefore useless. (Sharda, Delen & Turban, 2013).

Costs. Some ISs operate quite well, but the costs of their implementation and functioning are well above budget. Other IS projects may be too expensive, so it is not at all profitable for the company to complete it. In both cases, the extremely high costs of IS cannot justify the business value of information that it provides. (Evans, 2017).

Operations. When the IS is completed, it often happens that it does not function properly. The information is not provided in a timely and efficient manner, because the failure of computer operations for information management. Jobs that are interrupted, quite often lead to high repetition and delay, or unfulfilled plan for the delivery of information. On-line system may be operationally inefficient because the response time to user requests is too long. Some of these problems can be attributed to the technical characteristics of the IS, but many occur due to organizational factors. The staff for the development of the IS should realize these organizational issues and learn how to manage the changes related to the new system. (Rainer, Prince & Cegielski, 2014)

3. Consequences of poor IS project management

Conflicts and uncertainties related to each project of IS development will be much higher when the project is poorly managed and organized. As illustrated in Figure 2, a project of IS development without proper management will likely have the following negative consequences: costs that significantly exceed the project's budget, high time consumprion, technical deficiencies that result in performance significantly below the required level, the failure to provide the anticipated benefits. (Laudon, K. Laudon, J. & Elragal, A., 2013)

Figure 2. Consequences of poor IS project management

Source: Laudon, K., Laudon, J. & Elragal, A., 2013, p. 483

Practice has shown that, on average, IS projects are underestimated by one half, considering budget and time required to complete the IS according schedule and plan. A very large number of projects is supplied with incomplete functionality. Between 30-40% of all IS projects prevail those out of control that over exceed the original planning and budget projections, and which do not function as initially specified. It should be briefly analyzed why IS projects are so poorly managed and what can be done about it. (Dwivedi et al. 2015)

The reasons for poor IS project management can be found in two phenomena which are quite often present in the practice of many companies, and they are ignoring and optimism. Namely, techniques for the assessment of the time needed to analyze and design the IS are poorly developed. Most applications are first implemented, and there is no previous experience in the field of the application. The greater the IS, the greater the ignorance and optimism. The final result of these factors is that the estimates are unrealistically optimistic and wrong. It is assumed that everything will go well, but in reality it does not really happen.

The traditional unit of measurement used by the designers for the IS project costs is *man-month*. Projects are evaluated in terms of how many man-months will be required. However, the addition of more members of the project team does not reduce the time required to complete the IS project. Unlike some other jobs, when tasks can be strictly divided, when communication between participants is not required and training is not necessary, systems analysis and design include many tasks that are sequentially connected, which cannot be executed in isolation and therefore require intensive communication and training. Adding a staff to software projects development team can often slow down the development of the IS; communication, coordination and learning costs can escalate and reduce the results of the members of project team. For example, imagine what would happen if five amateurs joined a professional basketball team. A team composed of only 5 professional basketball players would probably achieve better results than team with five professionals and five amateurs. (Laudon, K., Laudon, J. & Elragal, A., 2013, p. 487)

Considering IS projects, timeout, failure and doubt are often reported to top management when it is too late. CONFIRM project (Pearlson, Saunders & Galletta, 2016, p. 237), a very large system project for the integration of hotel, plane and rent-a-car service reservations is a classic example. It was sponsored by the Hilton Hotels, Budget Rent-a-Car and Marriott Corporation, and developed by AMR Information Services, Inc. This project was very ambitious and technically complex, employing a staff of 500 people. Members of the project management team did not send the correct information when the project had problems in coordinating the various activities of processing transactions. Clients continued to invest in the dubious project because they were not informed about the problems with the database, decision support and IT for integration.

4. Specifics of the electronic commerce project management

At the beginning of any project of electronic commerce (e-commerce), the project idea must be defined and accepted by the management. When this is complete, the project manager is responsible to clearly define the objectives and scope of the project and to identify activities and resources to achieve these goals. The project of e-commerce should employ the following resources:

- *Financial resources*. It is necessary to define the budget to the successfully implemented e-commerce project.
- *Human Resources*. Manager of the project should determine the necessary competence of staff, required skills and if it is necessary to find consultants.
- *Equipment*. The project manager shall assess the available infrastructure, hardware, software, networking and more. The assessment is required as soon as possible in order to identify the necessary equipment and tools for the project.
- *Possible changes*. No matter how perfect the planning is, unexpected things will happen in the course of the project, which requires the project manager to make changes. Planning the changes in advance is the responsibility of the project manager.

IS project managers must be aware that e-commerce projects often require innovative, and sometimes unconventional technologies and solutions, They need to define certain characteristics when selecting technologies:

Scalability. The platform for electronic commerce should be scalable and able to support the exponential growth in demand for e-commerce services. The size of e-commerce project is difficult to determine before implementation, therefore, project managers should ensure that the technology is in line with needs.

Security. Security is a critical element that needs to be carefully addressed in the implementation of e-commerce projects. The selected technology must support all levels of security.

Centralized management. The chosen technology should provide the option for centralized management, in order to reduce the cost of management and operations, thereby increasing the efficiency of e-business.

Another important responsibility of the project manager is the risk assessment in the early stages, in order to reduce the risk if there are any changes. The aim is to set expectations before the beginning of the project and thus minimize unpleasant surprises. Also, the project manager should look for the technology that is suitable for the project, not necessarily to use the latest technology.

Naturally, process of e-commerce project management depends on technological constraints and experience of the project manager. The project manager has to make a lot of projects to gain knowledge in many areas. Here are some methods of financial analysis to check the profitability of the project, such as Net Present Value analysis, Return on Investment (ROI) and Payback analysis. (Kroenke & Boyle, 2015)

5. Agile approach to IS development and change management

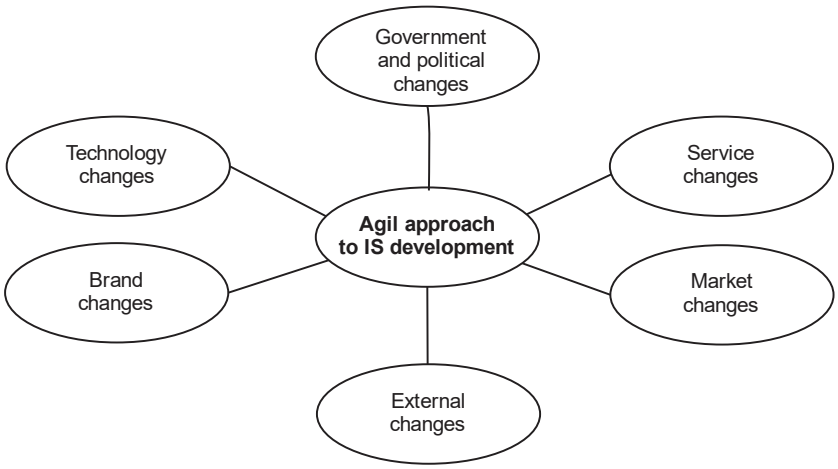
As already noted, most of the time and money in IS development are usually spent on change management. General control of changes involves identifying, evaluating and managing change throughout the life cycle of the IS project. The three main objectives of control changes are: to influence the factors that create changes, to determine whether there has been a change and to manage the actual changes when they occur. (Hayes, 2018)

The changes are related to the human factor and different interest groups (stakeholders) act on the project. It is useful to have an analysis of these groups in form of Document Management Scope. It is often used to be accompanied by an analysis of interest groups that contain sensitive information, such as the names of the stakeholders and their organizations, their roles in the project, the unique facts about the stakeholders, the level of influence and interest in the project, suggestions and a summary of each participant in the project.

Considering implementation of IS projects, organizations should apply the agile approach that includes Extreme Programming. Extreme Programming (XP) is an agile software development framework that aims to produce higher quality software, and higher quality of life for the development team. XP is the most specific of the agile frameworks regarding appropriate engineering practices for software development. The general characteristics where XP is appropriate were described by Don Wells (2009): dynamically changing software requirements; risks caused by fixed time projects using new technology; small, co-located, extended development team and the technology you are using allows for automated unit and functional tests.

Agile approach is applied across the entire development cycle of projects, from strategy formulation to implementation of the IS project. In this context, seven key drivers for changes affecting the strategy of development and the implementation of IS are identified, that is shown in Figure 3.

Figure 3. Seven key drivers of change



Source: Dwivedi et al. 2015, p. 150

In order for the agile IS development approach to be successfully implemented, a special attention must be paid to the organization of the project team. The principles of organization of the project team are as follows (Pearlson, Saunders & Galletta, 2016):

1. Focus on the individual knowledge and innovation. The project manager should emphasize the value of each individual's knowledge and skills, and encourage the exchange of skills and knowledge among project team members. For example, e-commerce projects particularly require innovation and creative thinking by all team members.
2. Creation of an efficient communication environment. Project manager should promote effective communications environment in which team members feel free to report the true status of the project, rather than what they assume that it is appropriate at this time. In addition, the project manager should define the standard of communication in order to avoid any misunderstanding and conflict.
3. Development teams. As part of the management process, it is recommended that large IS projects be divided, so that the sub-projects can be run accordingly. Ideally, each team should be composed of analysts, designers, programmers and users, in order to reach quality outcomes. Small development teams of 6 to 10 people, and programming methods, such as extreme programming, promote teamwork and increase communication efficiency and quality, in addition to reducing implementation time.
4. Motivated team members. The main objective of the project manager is to successfully complete the project. Therefore, the project manager must eliminate any negative attitude or unconstructive activity and take measures to re-build the team spirit.

6. Conclusion

Development and implementation of new business IS in the enterprise usually causes internal organizational changes according to which employees involved in the project IS can have resistance. These organizational changes must be managed in order for the IS to provide the adequate benefits and solve problems for which it was developed. This paper briefly introduces the agile development approach to IS development that can successfully solve the problem of change management. In this context, the principles of IS project implementation, specifics of e-commerce project management and principles of the project team organization are presented. The most important principles of IS project implementation are flexibility and the use of iterative development and prototype techniques. Flexibility is probably the most powerful "technique" or principle for situations with uncertainty. Compliance with this principle, for example, gives the ability to adapt to new approaches, enables learning from mistakes and acceptance of changes. This principle develops a level of flexibility that is essential for the success of the project and for adopting innovative techniques, such as extreme programming. Iterative development combined with an iterative prototype is effective in developing applications based on the broad requirements of a high level. Iterative development helps in making high-quality solutions, because errors can be detected and corrected at an early stage. Prototyping minimizes development time, and applications can be improved later.

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RAZVOJ POSLOVNIH INFORMACIONIH SISTEMA I UPRAVLJANJE PROMENAMA

Rezime: *Uvođenje ili modifikacija poslovnih informacionih sistema (IS) ima jak bihevioristički i organizacioni uticaj. Poslovni IS preduzeća transformiše način na koji pojedinci i grupe rade i komuniciraju. Promene u načinu na koji su IS definisani, kako im se pristupa i kako se koriste u upravljanju organizacionim resursima često dovodi do nove distribucije ovlašćenja i moći. Ova interna organizaciona promena izaziva otpor i opoziciju, i može dovesti do odbacivanja, inače dobrog IS. Veoma veliki procenat IS nije od koristi ili ne rešava probleme za koje je dizajniran, jer proces organizacionih promena koje prate izgradnju IS nije dobro vođen. Zato uspešna izgradnja IS zahteva pažljivo upravljanje promenama, što je glavna tema ovog rada.*

Ključne reči: *poslovni informacioni sistemi, organizacione promene, elektronska trgovina, upravljanje promenama*