Bulletin of the *Transilvania* University of Braşov • Vol 6(55), No. 2 - 2013
Series III: Mathematics, Informatics, Physics, 73-86

CONTROL AND MANAGEMENT IN COMPLEX INFORMATION SYSTEMS

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Abstract

Management has to decide what to reasonably invest for security and control in IT and how to balance risk and control investment in an often unpredictable IT environment. While information systems security and control help manage risks, they do not eliminate them. In addition, the exact level of risk can never be known since there is always some degree of uncertainty. Ultimately, management must decide on the level of risk it is willing to accept. Judging what level can be tolerated especially when weighted against cost, can be a difficult management decision. Therefore, management clearly needs a framework of generally accepted IT security and control practices to benchmark their existing and planned IT environment. Ever since MIS (Management Information Systems) began to appear and be absorbed more widely into the corporate framework, anecdotal accounts have persisted of user dissatisfaction, especially with the lack of systems responsiveness to user needs.

Computer assistance has traditionally been designed around particular functions, for example transaction processing, messaging, remote task execution and high level planning aids. This support has tended to evolve as a response to the particular needs of relatively isolated functional domains and the technical response has consequently been targeted towards providing limited, local solutions.

2000 *Mathematics Subject Classification:* 68U35, 97R50, 90B50, 68P15.
Key words: management information system, projects, planning, opportunity, scheduling, tracking, flexibility.

1 Introduction

The process of making an I.S. is a long term and complex activity, which implies big material as well as human and time resources. Planning and coordinating the entire activity regarding the process of making the informatics project is the responsibility of the project manager. He must decide which is the best - planned control structure for the project.

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It is a well - known fact that making the decisions without having the target to make them work, is usually without effect. The same can be said about the planning activity, which will bring lesser benefits if it is not controlled and supervised. The control is a continuous evaluation of the progresses made in the making of the project, in relationship with certain criteria divided on targets levels.

This paper contains the description of the flexible evaluation system regarding the administration of the activities involved in the management of complex I.S. projects. Designing this tool allows the project manager to correctly evaluate the opportunities and to take important decisions.

2 The management of risk data and information

MIS offers you total flexibility for quoting customers and will help you in the following ways by:

- Allowing you to use your knowledge of the market, your customers and their budgets, or your competitors to formulate quotes that give you the best chance of winning business.[10]
- Enabling you to turn quotes around in seconds and email them directly to customers, again improving your chance of winning business.[10]
- Allowing addition of narrative to individual line items.[10]
- Presenting you with a history of over/under recovery by customer to aid more profitable quoting.[7]
- Allowing working in reverse from a quotation and advises how much time there is for a range of skills to be applied within the budget.[9]

Technology and technologists have moved through a variety of changes to try to overcome the difficulties but, in effect, have created further problems. The more recent move towards networking and data sharing with personal computers or work-station on every desk have suggested that computer systems can now better be shaped to serve the interest of the user organization, rather than work practices being adversely redesigned to compensate for technological limitations. This parallels the trend towards increasing openness in systems which is lowering the barriers between functional areas. The integration of information and of the functions or processes which use it is an irresistible trend in the era of more open systems. Its benefits are obvious: interoperability can reduce duplication of effort and strengthen the bonding between related systems; interworking can release a synergistic potential in the performance of large groups. And yet even before the onset of open systems the trend toward closer integration in information use was strong. [2, 8]

The management of risk data and information is the key to the success of any risk management effort regardless of an organization's size or industry sector. Risk management information systems are typically computerized systems that assist

the consolidation of property values, claims, policy, and exposure information and provide the tracking and management reporting capabilities to enable you to monitor and control your overall cost of risk. [5, 14]

Software development projects require a lot of "paperwork" in the form of requirements documents, design documents, test plans, schedules, checklists, release notes, etc. It seems that everyone creates the documents from a blank page, from the documents used on their last project, or from one of a handful of high-priced proprietary software engineering template libraries. For those of us who start from a blank page, it can be a lot of work and it is easy to forget important parts. That is not a very reliable basis for professional engineering projects. [9, 11]

What are some key features?

- High-quality outlines, sample text, and checklists.
- Uses simple web technologies: Pure XHTML and CSS.
- Templates for many common software engineering documents.

How can users get started?

1. Briefly browse all templates
2. Download the templates and unarchive
3. Edit the templates to fit the needs of your project
4. Place the templates on a web server where all your project stakeholders can view them
5. Edit the templates to fill in detailed information
6. Use the checklists to catch common errors and improve the quality of your documents
7. Use the words-of-wisdom pages to help improve the document or deepen your understanding of relevant issues

What are some current approaches to this problem?

Users can tell each other about clan websites, but that is not scalable because it depends on manual steps by people who may not be motivated or honest in their evaluations. There are already some clan directory web sites, but they are not automated so they are always out of date and do not rate the quality of the websites. [3]

What are the main risks of one project?

1. There is a potential conflict between the goals of a high-quality appearance and one that is completely customizable. We can only succeed if players find the web site appealing, and game vendors can customize it with no more effort than would be needed to build a static website. We already have a design in mind that will address this risk and we will review it with a web site designer who worked for a game vendor site. [13]

2. There are significant technical difficulties in building a web site and web application. This will be a risk because one person on our team has much experience with the relevant tools and technologies. Although the others will learn, we will certainly make some mistakes and suboptimal choices. We will address this risk by scoping the project such that we have enough time to train and to review the design and implementation. [15]

3. The schedule for the project is very short. We will manage this by planning a conservatively scoped functional core and series of functional enhancements that can be individually slipped to later releases if needed.

3 What are the main rewards if this project succeeds?

If we accomplish the elements of our plan, our clan directory website engine will replace existing clan directory websites and generate traffic which will result in advertising revenue and/or hosting fees paid by game vendors. Our ability to overcome the challenges above will determine time to market, the speed of adoption, the amount of web traffic, and thus the generated revenue over time.[2]

COBIT provides a detailed set of controls and control techniques for the information systems management environment. Under the Monitoring domain, Cobit has a high level control objective - Assess Internal Control Adequacy- that has a number of detailed control objectives, such as Internal Control Monitoring, Timely Operation of Internal Controls and Internal Control Reporting, underlying it. (Figure 1)

The achievement of each of these detailed control objectives could be assisted by the use of control risk self-assessment techniques.

Control risk self-assessment techniques can be used both to assess the extent to which an area or function is meeting these detailed control objectives and also to help the area or function to improve its performance in meeting the objectives.

Under the Planning & Organisation domain, COBIT has a high-level control objective - Assess Risks - that has a number of detailed control objectives, such as

- Risk Identification
- Risk Measurement
- Risk Action Plan

underlying it.

Also, the achievement of each of these detailed control objectives could be assisted by the use of control risk self-assessment techniques. Control risk self-assessment techniques can be used to identify and assess inherent and residual risks in an area or function and to help develop an action plan for the effective management of these risks. (Figure 2)

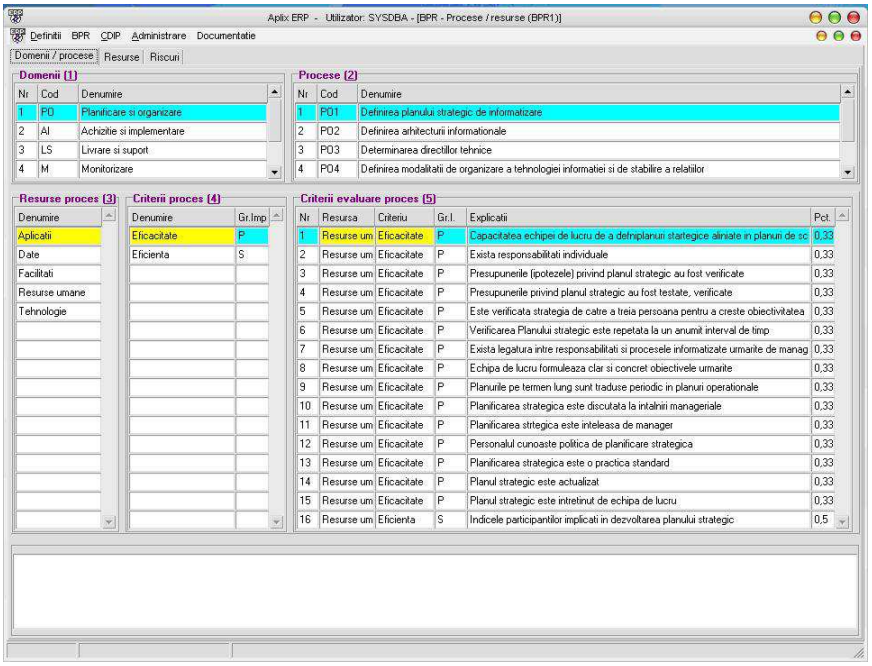

Figure 1: Control Keys

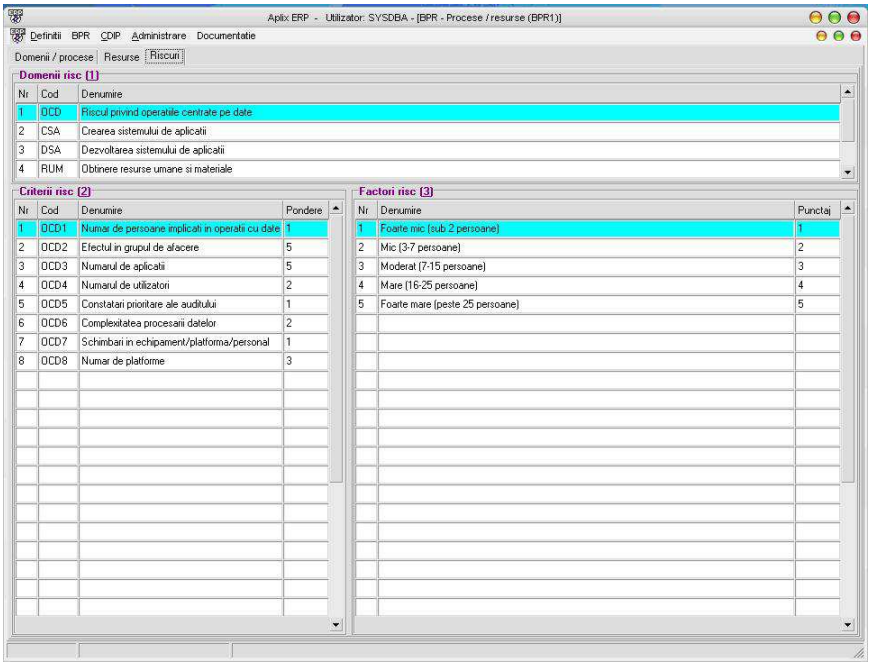

Figure 2: Risk Factors

4 Interdependent factors in the success of a project

Frequently, auditors have taken the lead in such international standardization efforts because they are continuously confronted with the need to substantiate the opinion on internal control to management.

Without a framework, this is an exceedingly difficult task. This has been illustrated by several recent studies on how auditors judge complex security and control situations in IT studies that come about almost simultaneously in different corners of the world. Furthermore, auditors are increasingly being called on by management to proactively consult and advice on IT security and control-related matters. [2]

In an era that demands increased accountability and transparency of business practices, much of a company's potential exposure and risk hinges on the integrity and reliability of its information systems. IT organizations must juggle the growing scope of change needed to support a variety of business initiatives information security, application integration, the development and deployment of web serviceswhile at the same time supporting vital everyday business needs ranging from compliance with regulatory changes to mergers and acquisitions to changes in supply chains. In the quest to increase efficiency and gain competitive business advantage, IT organizations have embraced numerous methodologies and technologies over the past two decades. While these efforts were based on the best technologies and thinking of the day, and while they delivered adequate value for the time, they can no longer support today's more complex technology-dependent business. Although technologies designed to improve automation and increase business intelligence have yielded some measurable benefits, the prolific use of technologies applied to individual business problems has frequently resulted in nonintegrated, complex, expensive and inflexible IT silos that are slow to adapt to changes in business processes and strategy. [2]

Every business decision triggers a series of IT events. In that sense, and especially in this business climate, an adaptive IT can actually enable agility. However, many IT infrastructures cannot keep up with the pace of change, much less turn these changes into an advantage. To understand how to best adapt your current architecture so it can better adapt, it's important to examine how IT has evolved over the past two decades.

The management of the complex IS offering the economic unit trough this the possibility to receive the full advantages in regard of its information and achieving in this way full benefits, taking advantage of the opportunities and earning competitive advantages . The managers usually come upon situations in which they have to take into consideration a business depending on resources and expenses in order to maintain control upon informational infrastructure. The majority of the questions are about: how far should we go and is the price justified by the profits?

Taking into consideration the increase of interconnections and the dependence of IT in the global economy which is more and more automat zed, the management of risk and safety is more and more dependent on the specific practices of management.

In the complex economic medium, the manager is in a continuous search for compressed information and in real time, considering that difficult decisions must be taken in conditions of risk and even incertitude quickly and with chances of

success. [4]

5 Controlling management information systems

The design of a flexible evaluation system offered the advantage that each company will understand its own performance and will be able to measure its own progress offering at the same time the manager of project the possibility to correctly evaluate and in due time the degree of accomplishment of the tasks of each team work:

- Which is the correct level of control for its own informatics systems in order for this to support the aims of the economic unit
- How much do we automate
- What do we automate
- Do we have enough resources
- How far should one economic unit go with the IS implementation and is the price justified
- What international recognized standards exist and what relation do we have with them
- What is regarded as best practice in economy and what is the position of the society in regard of this best practice
- Based upon external comparison can we say that we have taken reasonable cautions in order to keep the information safe?

It is difficult to answer and to argument because the instruments necessary in such evaluation are not always available. The management of complex IS in a continuous need for instruments for self evaluation and control on levels as an answer to the need of knowing what the manager of project should do in a more efficient manner.[4]

Based upon the help of the design product the project manager can evaluate the degree of the accomplishment of the targets. This means

- a relative evaluation of the position of the company
- a manner to efficiently decide where the company is going to
- a tool in the measurement of the progress of the projects in comparison with the target

With the help of a flexible evaluation system, we can establish how well achieved a process is from an IT point of view. Such a generic model could help the manager of project to explain with argument to the economical unit manager the deficiencies in the development of the IS and also could help him establish targets regarding the level he wants to reach comparing his own results to those from the best practice.

An essential point for the manager of project in order to improve the control and safety could be analyzing the international standards as they appear in the best in class practices. The nowadays practices can become the tomorrow level and this is the reason why they are useful in establishing the status of the organization in time. The evaluation is built on levels of analysis as it follows:

- Understanding, evaluation and controlling the results;
- Training and communication applied on the results;
- Processes and practices which are implemented;
- Atomization techniques in order to make the processes more efficacious and effective;
- Satisfying the internal policy of laws and rules;
- Type and number of expert employees.

Generally all methods, techniques and tools used in the planning and control activities and projects imply the achievement in advance of the following activities: making a list of all the actives involved in the project, establishing the logical succession of the activities, estimating the length of each activity and realizing which of the activities involved can be done simultaneously.

The I.S. is the result of I.T. The activities of accomplishment and maintenance of an I.S. must be efficient, that is the effort involved in the making process must be smaller than that involved in the obtained effort. We must always take into consideration the informatics context in which an I.S. is realized and developed, that is on the hardware and software support used by the existent I.T. The introduction of an I.S. involves important expenses, which must be recovered in time. [1]

All projects have the same characteristic designing the ideas and activities and their transformation in new projects. The presence of risk and uncertainty shows that the events and the necessary tasks for the achievement of the project can never be absolutely predicted.

The design of complex I.S. is initiated by different sources for different reasons. Some of the suggested projects will be able to survive different studies of evaluation, some will not. Businessmen suggest such systems from two reasons:

- Because they experiment problems that lead them to informatical solutions and
- Because they come to recognize the opportunities to improve the performances through systems upgrade, transformation and putting into service.

A complex system is among other things composed by heterogenic elements, bounded by strong but fluctuant interaction. Emergent qualities appear from the organization of all the activities and can react upon parts from within. This is true in case of complex I.S. projects which support many risks, and whose **difficult development must be carefully predicted**. A complex system is a system which can be irreducible to a finite type, as complicated, stochastic, and sophisticated, no matter the type or size, the number of components and the intensity of their interaction. A project has two main complexity causes. The first refers to time, the problem dealt with in the 3rd chapter, and the second being represented by **participants from within the project**, which is, beyond all, a human accomplishment, if we take into consideration the fact that a model is never quite the same with the work itself.

The project manager will have to decide which the best project is and he will have to choose the control structure for the project. His success will be determined by the shortest delivery period of the completed product, with a minimum budget of good quality and functionality.

Good managers realize that the recognition of the symptoms of the problems, the diagnosis of these problems and then the confrontation are imperative solutions for the business if we want the business to work in the most proper way.

Problems come out in different ways. The Feedback can offer information regarding the gap between actual performance and the desired one. We could say that feedback highlights the problems. Also the external feedback is extremely important and must not be ignored.

The three most relevant and key elements in order for the project to be fulfilled are:

- Technical feasibility: added to the present system, available technology for the users requests
- Economic feasibility: the period of time in witch a project is designed, the cost for its planning, the cost for the employee's time of study, the estimative cost of the hardware and software equipments and their development.
- Operational feasibility: The well functioning of the system after it has been installed and the usage of the designed project.

For the approval of each project needs must be identified first... This identification is not easy because generally we can only specify a scientific need by an approximation of the desired result. Next you have to compare the identified needs with the estimative costs, the aim being the justification of the investment... It is also necessary that the project is possible from the technical point of view. The question is if the present technology allows its accomplishment, and if these technologies exist, are they accessible taking into consideration the knowledge, the abilities, the budgets and the human and material resources. [4]

6 The project manager is responsible for the correct investment of the resources

The demand for the management teams is to think in terms of process and not in divisions and functional units. If the companies want to successfully compete among themselves, they must frequently modify the processes, to adapt them to the market requests and to add new tools which have to adapt to these changes. [3]

Taking the decisions without a proper subversion of their well functioning has usually no effect whatsoever. It is the same in the planning activity which will bring lesser benefits if the planned activities are not supervised and controlled .The control implies a continuous evaluation of the progresses made in the process of achievement of the project, as compared with certain criteria. Generally, these criteria are time, quality and budget. The degree of complexity of the project is a factor, which determines the report and control method. Taking into consideration the size and complexity of the hole project it is possible that its manager will not be able to make the control of the project from a quality point of view, situation in which he must appeal to the designation of a person in charge with the quality control of the project. A complex project necessarily requires intermediate levels of leadership and report. [3]

The complex I.S. project planning includes all the required activities for:

- The selection of the working team;
- The designation of the job requests for each member of the team;
- The evaluation of the time necessary for the accomplishment of the tasks;
- The planning of the project so that the tasks should be fulfilled in due time.

The beginning of a complex I.S. system means the design of the project on four major activities:

- analysis,
- design,
- implementation,
- maintenance.

These activities are then separated in other detailed activities associated with the working period. Sometimes the most difficult part of a project planning is **evaluating the period of time** necessary for the realization of each task involved in the project. There is no other substitute but the experience for the evaluation of the period of time. The use of the computer in planning the projects has become more practical and direct. **Microsoft Project** is a good example for a perform ant program in this direction.

After all, there is a good reason for which a project is made; in order to generate and save money... The justification of the project is a price and income analysis, which shows us if the project is to bring profits. The evaluation on categories of the project's costs will be made more correctly if certain basic rules are to be followed:

- Evaluation of the cost of employees must be based upon its medium performances, and their planning must take into consideration the time of realization.
- All the evaluations made by the project manager with the help of the qualified personnel.
- The review of the estimations of the costs is necessary and must be done by authorized persons.
- The planning of the activity is based on the resources of the client in time.

The control of the planning and organization activities for the I.S. systems means the use of the feedback in order to monitor the project, including comparing the planned stage with the actual stage of evolution. In addition, the control means making the right decisions in order to accelerate or to reorganize the activities to be able to finish them in time as well as to motivate the team to do the job right and to be able to remain in the fixed budget. Once the time and financial resources are dealt with, we must take care of the human resources as well.

Mainly this means to communicate with the team members who have been selected for their competence and abilities. The aims for the project productivity must be fixed and the members of the team must be motivated to reach the aims.

To all these we can add a great flexibility and adaptability to changes of the imposed system. The role of the project manager in planning, coordination and control of the complex S.I. project activities is being underlined. The designed system is a necessary tool for the project manager as well as for the economic unit manager in order to obtain and maintain the competition advantage, to plan the necessary of information for the management of the technological changes, which should be one of the main goals of every company.

The need of a flexible evaluation system for the planning and organization of the activities taking place in complex I.S. projects for the acquisition and implementation, assistance and support, monitor the performances of I.S. is being motivated through this. For the control of I.S. projects an evaluation method is being developed in order for each company to be able to self evaluate the own performances regarding the I.T. The principles are applied at informational, strategically, tactical and administrative level

The designed system allows the project manager to monitor the activities and the costs, to evaluate periodically the progress made, to introduce some correction methods in order for the project to be applied to the managerial strategy, to be planned in accordance with the resources, to contribute to the realization of the purpose, to be practical.

Regular monitoring assures a dynamic reaction to the changes that appear, so that the project manager has pertinent information for the politics of the company's implementations.

It is highly important for the manager to establish reachable purposes, activities that are possible to administrate with the given resources.

7 Conclusions

The managers have to understand the technological impact and the informatics applications upon the business they lead, taking into account the fact that I.T. assures them the necessary information and the possibility of being able to select that information in due and real time. Today's businesses are more and more organized, lead and aromatized around the series of processes and the relations established among them. These processes involve developments and the products and services, the interactions with the clients and the support of those processes and of human resources. Thereby, we suggest the identification of the solutions for the successful planning of the specific I.S. activities and their management in accordance with the company's strategy, as well as the evaluation and control of main lines of work in accordance with the following information criteria: efficiency, effectiveness, availability, integrity, confidentiality, accord, safety and the financial and human resources through a flexible system of evaluation. This tool can be an extremely useful informational support for the managers at every level of organization due to the:

- Data analysis,
- Comparisons,
- Measures,
- Establishment of the main goals taking into account the impact they have on the organization and the risks involved.

The information are stored in a database in order to be able to make complex operations. The access to this information being made by taking into account the managers purposes and abilities. The application becomes efficient through the design methods, allowing the interpretation and the manipulation of the data depending on the abilities of each user. One can describe such evaluation criteria able to understand the context, the users medium and to respect the domain of the application.

The system can be adapted to each project manager's way of working, to the company's strategy and to the financial and human resources offered by that company. The main criteria selection of the evaluation and control activities has been made after the following information criteria:

- effectiveness,
- integrity,

- confidentiality,
- availability,
- accordance,
- trust in the information.

It is a system, which allows the project manager to establish the evaluation criteria and to concentrate upon the performances made in the administration of the specific I.S. activities. The control of the activities is essential for the accomplishment of the projects. The role of each of the identified processes in the Cobit standard for the accomplishment of the final project and the current stage of the organization is essential.

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