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Value based information systems for small and medium enterprises

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1. Introduction

Projects for informational systems frequently fail. Statistics show that the rate of failure for large projects is about 50 – 60% (Dorsey, 2004). Concerning the role of methodology in the success of the projects of informational systems, there are several opinions. Some say that it is not important which methodology is chosen. The important thing is that the requests of the selected methodology are respected throughout the project so that the information technology and communications specialists' work doesn't become disorganized. And yet, from the beginning of informatics methodologies have been continuously perfected, creating up to one thousand different projections and analyzing methodologies (Oprea - Airinei - Fotache, 2002:154). We consider the continuous perfecting of the methodologies to be a good argument in favor of their importance to the success of the projects of informational systems.

In this moment, the methodology experiences a tendency of transition from the hard approach to the soft approach. The soft approach must be regarded as complementary: it has been developed to rectify the omissions of the first method and as a response to the enhancement of the role of social and organizational aspects within informational systems. The actual tendency in the evolution of the soft approaches is the methodology elaborated by Hauser and Clausing, entitled: House of Quality (Flynn, 2000). In the center of this approach lies the determining character of the clients' demands in the projection of informational systems. In this tendency, the approach based on Value Analysis is also subscribed.

The main aims of this paper are:

- to present the opportunity of integration for the value consideration into all of the existing and emerging software engineering principles and practices; It is a particularly approach that intend to link software architecture design decisions with the management goals affected by those decisions. In center of the proposed approach is the value of the final product which is given by the customers and named customer value;
- to identify the roll of value based approach in the success of economic software product;
- to motivate why we choose this approach for Romanian small and medium enterprises field;
- to outline the process of value analysis based software development.

2. What does Value Analysis Bring in Software Development?

This paper proposes a particular approach that intends to link the software architecture design decisions with the small and medium enterprises objectives affected by these decisions. The basic concept of this approach is similar with the one used by Faulk S. R. and Harmon R. in their project called "Value-Based Software Engineering for Small Business" (Faulk – Harmon, 2000). In the center of this approach is the value of the final product, called customer value. The value is given by the beneficiaries of the information systems who can be managers or operational personnel.

Value Analysis, as a technical and economic method of projection, fundamentally differs from the classic methods of the cost reduction through the functional and systemic approach of the projected objects, processes and services. The first step of the projection process is to identify the needs that have to fulfill. Then, the specialists project the physical, tangible form of the object/process that satisfies the identified needs. Because the economic value of a product/service is, in fact, the customer-recognized social value, the Value Analysis can be considered as the method that ensures, on one hand, the needs' fulfillment and, on the other hand, the individual price reduction of the product/service through cost reduction.

In this particular case, value defines the relationship between the perceived benefits of information systems developed for small and medium enterprises and its cost. The functions are the attributes of information systems that give their value. According to Value Analysis approaching, the value of the information system is given by the amount of its functions. The production cost can be cut in a special way by eliminating the useless functions of the software and by relating production costs. This is a way to obtain a product dedicated to small and medium enterprises with a greater value for a good price.

Agreeing upon Value Analysis (as an alternative of classic methodologies) actually means the acceptance of the challenges of integrating value consideration into all of the existing and emerging software engineering principles and practices and of developing a framework in which they reinforce each other. The usage of Value Analysis in software engineering will put together recent results of research in Customer Value Analysis, software architecture and process improvement.

For the software professionals it is very important to understand exactly what the customers want. One of the key factors in the success of a software product is to know what the customer value expectation is. If we talk about the programs designed to link together the users with the objectives of the small and medium enterprises management, we have to concentrate upon the step of writing the specifications. Analysts' job has to be focused on beneficiaries' and users' needs. Another important factor in a software product's success is to understand the differences that appear in the perception of software's value between the user situated on different levels of the enterprises' management (operational level and middle and top management) and the developer organizations.

3. About the Possibility of Introduction Value Analysis Concepts in the Development of the Information Systems

In the methodological evolution two lines of development have been outlined. The first has a multidisciplinary character, as it integrates into software engineering concepts of value analysis, quality management, risk management and human resource management (Biffel – Aurum - Boehm – Erdogmus - Grünbacher, 1993). The second line of development takes a part of the fundamental concepts of Value Analysis and transposes them in software engineering (Faulk - Ruffo - Harmon, 2000).

By introducing in software engineering the concept of: usage value given by the consumer it is intended that the perception of the value of the product is measured more directly and more accurately through the characteristics (qualities) for which the consumer is willing to pay (Niemela - Lago - Kalaoja - Tikkala - Kallio - Taulavuori, 2003). The study focuses mainly on the methodology to be used for determining the demands for information systems. In the work environment developed by the authors, the difference between the internal perception of software companies of the value attributed to their product by consumers and the perception of the consumer itself is highlighted for the first time. Also, the existence of different perceptions of the value has been highlighted within the identified group (the producing company), which produces a base for the alignment of the visions from within the producing companies with the market realities. This way of thinking can also be applied to the beneficiary companies.

The theoretical concepts developed have been concretized and put into practice for the lines of products in the project Value-Based Software Engineering for Small Business, developed by the University of Oregon along with Timberline Software Corporation (***, 2001). If we couldn't present at international level, a section regarding theoretical development, in our country doesn't exist applicative implementing in Informational Technology and Soft Enginery domain. Although, Value Analysis was used in Romania to realize practical applications regarding investment and technologic

process, was elaborated specific methodology for application, which represents a novelty at the international level (Ionita, 2000).

The first Standard of the Value Analysis elaborated by Romanian specialists does not nominate the informational systems as possible issues for the studies of the value analysis and does not limit either the using of the method on specific enumerated objects (products, activities, technologies, objectives or investments). The European Standard to which Romania adhered too, includes some of the basic elements of the informational systems – hardware, software or a combination of them, although does not nominate the informational systems as a possible object of study.

In Romania, the special potential of using the value analysis in the development of the quality of the decisional process by the computer data processing of the informational system was noticed by two categories of researcher: specialists in value analysis and info specialists. The researches made so far denotes the expertise of each of the categories mentioned above. So far there is no centralization or standardization of the knowledge and the expertise obtained under the form of a singular methodology for designing the informational systems only by using the value analysis as it exists for the products.

The possibility of including the informational systems in the value analysis objects of study category is mentioned as a potential solution (Ionita, 2000). Applying the value analysis when designing/redesigning the informational systems is presented as the most certain techniques for creating its functions, as per the requests and with minimum costs. The recommended methodology is the one used with products that must be individualized as per the specific elements of the informational systems. A step forward is thus made in applying the value analysis methodology when designing informational systems, by **determining the social need that must be satisfied** by it that is to ensure the management with the necessary information that present the quantity, quality and is given in useful time for taking decisions. In what concerns the determination of functions a turn toward the functions of the management system is made to which creation is a part of, because of the informational subsystem that belongs to the management system.

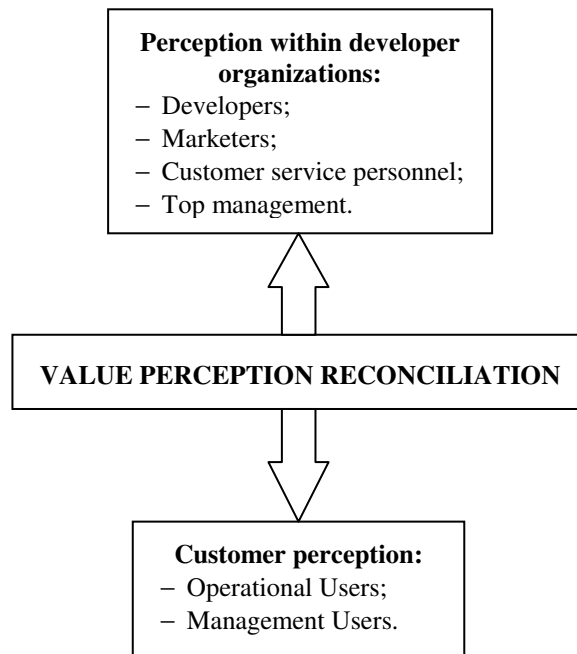
The starting point in the study of the value engineering for the informational systems is given by speeding up the intensive – qualitative development of the informatics activities in the companies in order to superiorly valorize humane resources, technical, material or financial resources that it consumes, modernizing the accomplishment technologies, increasing quality and reducing costs in all the stages of informational systems life cycle. We can notice the identifying of the technical progress as a generating factor for the increase of being used characteristics that is of the informational system particularities that makes it satisfactory of the companies need for information, companies that grow continuously, in parallel with the reducing of the implementation costs and exploitation expenses. The functions of the informational systems are tackled only from the last user point of view, without paying any necessary attention to the other factors involved in the process of developing informational systems. Dealing with the last users is also made within identifying categories, as per the operational and informational needs. The designer is not involved in the process of determining functions, but only in the process of determining technical solutions and production costs. We will take into consideration the limitative approach besides the last world tendencies on the market in determining the informational systems functions, contoured by the researches from the Oregon University. First, we propose to take into consideration in the function determination process the point of view of the Information technology and Communications Professionals.

4. The Process of Value Analysis Based Software Development

The determination of software value requirements as it is described in the Value Analysis literature (Faulk - Harmon, 2000), is a three steps process as we can see in Figure 1.

First of all, software developers must have direct contact with the customers or potential customers which fit the target market. In order to identify its specific needs can use personal interviews or questionnaires. The focus groups are composed by users from operational and management levels. The questions are about requirements, competitive options and price.

Figure 1: The Process of Value Analysis Based Software Development



Then, they will identify the value perception held by different categories of employees within developer organization. These perceptions that in traditional software practice and theory have major influence in software design and architectural decision, in our proposal are just a component of this process. The final stage is the reconciliation of internal value perceptions with those customers in order to establish the functions of final product. It is a hard work because of significant divergences between what developers think about their product and the customers' value representation. Once a set of software function has been identified, a decision is made regarding which function will be included in the product. Importance to the customer is weighed against IT professional point of view. This can be considered the most important stage for the Process of Value Analysis based Software Development.

5. Why Value Analysis software for Romanian Small and Medium Enterprises?

The analysis of the Romanian software market shows that the Romanian managers understood that the rapid adaptation of high quality informational solutions could make the difference on a market based more and more on the information power. The fact that the market segment of small and medium enterprises of integrated software for business is uncovered, plus the great corporation market segment is already allocated to the foreign providers, makes it attractive for the Romanian software providers. That is why the Romanian business software developers who are active on the Romanian market are focused on the segment of the local small and medium enterprises. The local software developers included in the small or medium enterprise category gradually become the providers for information

and communication technology solutions for the enterprises with a turnover situated under 5 millions of euros. A great part of them has a turnover situated more under 1 million of euros and a reduced numbers of employees which has as the primary consequence an organization chart with a reduced number of levels.

The main factor which stands in front of the software implementation for making the information systems of the small and medium enterprises more efficient is the high price towards the allocated resources through the investments plans. The acquisition of an Enterprise Resource Planning although is felt like a necessity, due the high investment effort, it becomes most of the times impossible for the small and medium enterprises. That is why they have to provide cheaper solutions which satisfy small and medium enterprises' management needs.

There are more other reasons for that we choose for this proposal the small and medium enterprises field:

- it is easier to develop, control and finish a small project than a bigger one;
- the requirements of the information system for small and medium enterprises are different in comparison with the information system of big corporations and organizations;
- on the Romanian information systems market there are not products dedicated to small and medium enterprises needs;
- small and medium enterprises field is very dynamic and it is open to charges;
- the roll of small and medium enterprises sector in Romanian economy is in a continuous growth.

6. FAST Diagram for Information Systems of Small and Medium Enterprises

The next step is to establish a connection between the function. Then, the function will be classified according their importance. The method used to describe the product through his functions is a specific method for Value Analysis. It is called Task oriented FAST (Function Analysis Systems Technique) Diagram. Task FAST diagrams are excellent tools for understanding, controlling or managing systems and products as a whole. Task FAST Diagram is a structured method of function analysis that results in defining the product or process function and establishes the connections between them. The Task in Task FAST is defined as the need of the customer.

There are four parts of this diagram:

- Scope line:
- Task;
- Basic functions:
- Supporting functions.

In order to develop a FAST diagram for information system of small and medium enterprises, it will be used Thomas Snodgrass' method (1986). There are some specific steps in developing a Task Fast Diagram. First of all, we have to identify the functions of the system. It also should be added that each requirement determines a certain function. The second step is to separate the identified functions into basic and supporting functions. Basic functions are those which are essential for the performance of the Task. Without the basic function the system will not work. Supporting functions, though not essential, are extremely important in building customer acceptance and in selling the product or service.

6.1 Task determination

The turning point in detection of the task of information system of small and medium enterprises is to answer the following questions:

- What is the information systems' role in small and medium enterprises issues?
- The answer is: to ensure the management with the necessary information that presents the quantity, quality and is given in useful time for taking decisions.

One distinctive function among all functions should be the main reason that the customers buy this product. By definition, "to ensure the management with the necessary information that present the quantity, quality and is given in useful time for taking decisions" is the Task of information systems for small and medium enterprises.

6.2 Basic functions' determination:

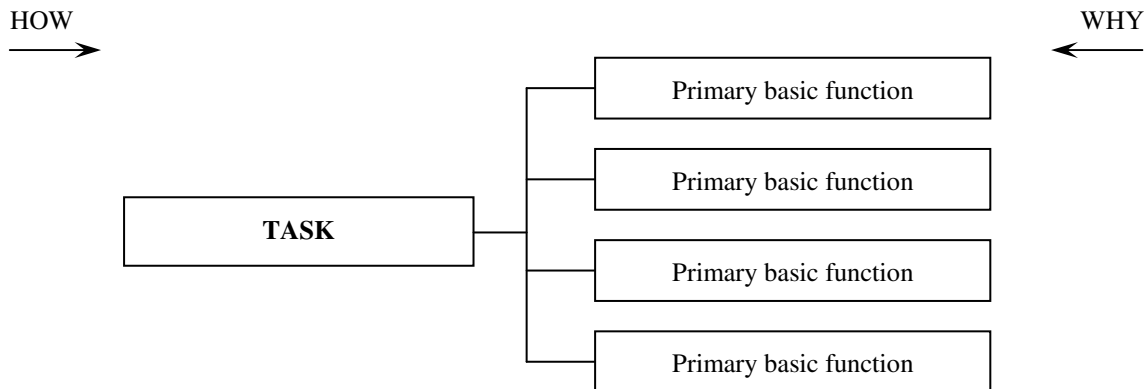
Basic functions' determination can be done by asking the "HOW?" question for the task accomplished by the analyzed information system.

How does an information system for small and medium enterprises to ensure the management with the necessary information that present the quantity, quality and is given in useful time for taking decisions?

The answers are the determined primary basic function.

Asking the "WHY?" question for the prior determined basic functions will lead us to an answer which is the task "to ensure the management with the necessary information that present the quantity, quality and is given in useful time for taking decisions".

Figure 2: Basic functions of the FAST Diagram

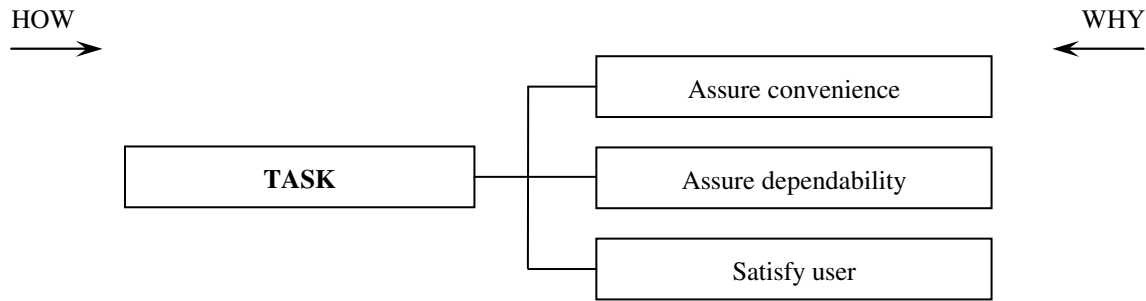


6.3 Supporting Functions – Needs, Wants and Requirements

There are four main categories of supporting functions:

- assure convenience;
- assure dependability;
- satisfy user;

Figure 3: Supporting functions of the FAST Diagram



For each prior determined need there will be a supporting function.

7. Conclusions

The Romanian market of Enterprise Resource Planning is already structured. The well known suppliers which generally are Romanian agencies of international companies develop economic software for government institution or for greatest international and Romanian companies.

On the Romanian market there is not an information systems supply for small and medium enterprises. The greatest software developers are not preoccupied to develop software dedicated for small and medium enterprises needs because of limited amount of information systems budget. More, there is a great demand on the market of government institution and international and Romanian companies.

That's why we consider that the small and medium enterprises which activate on information technology market as economic software developers can product dedicated software for the needs of the same size enterprises. This unsatisfied demand can be an important source of incomes for small size software developers.

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