

Adaptability of the Information Systems to the changes in the Business Processes

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Abstract. A company doesn't exist if it doesn't have clients and definite well business processes. A company that doesn't have clients doesn't have business processes. Actually is most important the automatization of this processes trough information systems that generates and maintain the control of the activities. This process is obtaining a product that generates value for the company and for the clients. Achieve that the organizations have a high yield; it depends on the strategic decisions and the efficiency in the business processes and of the rapidity with which it is obtained. The present investigation, arises with the interest to analyze the problems that make consider to the "Adaptability" like an attribute of Quality in Information systems, with the objective to turn it a characteristic, that includes all the stages of the development of software oriented to the businesses, that is to say, observing not only the technical problems, but the problematic one, from the point of view of as software adapts to changes in the business.

Key words: Business process, Software Quality, Information Systems, business engineering, management.

1. Introduction

" A business process is a concrete way of arranging a set of activities, not annotated by organizational barriers, with a beginning and an end, coordinated and orientated to the attainment of a product that generates value for a final or intermediate client ". [1] The fundamental element in the previous definition is the search of the satisfaction of the final or intermediate client. If there is no client then there is not any business

process. Both elements are so close that he is the client the one that gives content to concept the business process. In fact the company is defined as the sum of business process and the client sees her when it uses someone of them.

Multiple business studies have shown evidence that organization do often is inconsistent with the environment conditions and generally not the right thing at the right time. Most of the time they follow a given strategy direction. Changes may seem continuous, but occurs in the context of that orientation. Organizations usually "do more of the same", some times improved. Most organizations like periods of stability because they achieve success not by changing strategies, but by practicing the ones they know and have successful proved before. This can be happen because the same types of conditions are cyclic and tend to occur again. In a rapidly changing world, across every industry, businesses environment is becoming more complex, more competitive, fast-paced and unpredictable. To compete and succeed, businesses have to become an adaptive and agile enterprise that can accommodate change and adapt to the change quickly. It is there where this research arises in the search of concepts, definitions, formalizations that lead to turning the attribute Adaptability, in one Characteristic to demand in information systems orientated to the business, across all your life's cycle, guaranteeing Adaptable Information Systems to the changes in the business processes.

For understand because it becomes necessary to propose the creation of a model that allows the evaluation of the Adaptability as characteristic of the Systems of Information the changes of the business processes, the present article is divided of the following form: First there are mentioned brief big paradigms that they precede to the emergence of the need of development of Adaptable Information Systems. Then, it talk the new paradigm Adaptability in Information Systems proposing a model based in patterns [7] that it gives place to the offer of a group of subcharacteristics with the objectives to turn the Adaptability into a characteristic that the enclose. Finally, an example, conclusions and work future relating to the investigation are provided.

2. Problem with the Traditional Information Systems

Generally, the development of the Information Systems takes a lot of time and money and even, on having used them they become fragile, particularly, in situations for which explicitly it wasn't designed. One can speak about paradigms in the development of the information systems:

1. Structured programming. Which arose in the 70s and which was trying to make the system construction feasible on a large scale, having to rely on a specification of the results wished from the beginning of the project and bearing in mind that the specification rare times changed.
2. Programming OO. It was the following great paradigm that appears in the 80s, trying to do "easily" to be reorganized when the specification of the system was changing, dividing from that the functionality is separated in classes that are designed to have a minimal interaction between them. Nevertheless, every change of specification or of the environment of work, there needs the intervention of analysts, designers and programmers, which, carries to expenses in re-designing,

re-helping, reconstructing and passing again for the whole life's cycle of software development.

Today, one presents another type of problem that with the methodologies constructed and orientated to objects, is not so easy to face, to programmer adaptable information systems to the change.

3. Adaptability in Information Systems

For a company being adaptable is to be capable of operating productivity in a competitive environment of continually and unpredictable changes [8].

For an individual being adaptable is to be capable of contributing to the bottom line of a company that is constantly reorganizing its human and technological resources in response to unpredictable market change. With the Internet emergence (Information Systems Web, eBusiness, eCommerce, Services Web) or companies that handle your information across Intranet, it is allowed that there should appear applications that typically they need to adapt to the rapid and constant changes of the way.

Certainly, it is here where there are needed other methodologies that improve the software, which is orientated to the problem of handling the change in the business processes, adaptability in information systems that enclosed are anticipated to the change and almost automatically identify in a program traversing that is what one will affect, bearing in mind what says the definition of adaptable software: "Adaptive software uses available information about changes in its environment to improve its behavior." [2]

Adaptability enables information systems to follow changes that occur along the lifetime of a software system. In this spirit, adaptability is a visionary concept. A vision that assumes that business support is given almost autonomously during build and runtime of the software system. Terminology on adaptability is not consistent. The most essential terms comprise for instance flexibility, adaptation and agility. From a research viewpoint adaptable systems represent the ideal final condition reflecting unlimited problem space. Therefore it is necessary to extract the qualities that are responsible for adaptable behaviour and to transfer these qualities on information systems.

4. Proposal use Patterns to structure model for Adaptability in Information Systems

Patterns [7] provide a way to capture and document expert knowledge to be used by non-experts. The pattern approach provides the foundation for various pattern styles such as design and analysis pattern for instance. The assumption is that changes in the organization can see like patterns, is possible to observe a number of patterns that exist specific to adaptability requirements in enterprise systems. The detected patterns are based on iterative analyses of business process requirements and technical features with regard to adaptability and its attributes such as efficiency and flexibility for instance. The Adaptability patterns are found in the characteristic of quality that is

necessary an information system for that considered like adaptable. First is necessary identifies the structures that exist in the information systems themselves the second recognizes patterns in the process of intervention which bring about changes in the enterprise system (as a consequence of business process changes). The classification is presented like subcharacteristics in the sections 4.1.1, 4.1.2 and 4.1.3. It necessary to heel that the subcharacteristics that moment it identified has the objective in the Information System the managing Structural Analogy, Knowledge, Redundancy and Customizing of business. The use patterns or the business dimension characterize the circumstances of the usage of an information system. They reflect that adaptability-enabling factors are also related to decisions referring to the deployment of the system. In this area patterns are for instance the capabilities of personnel (person-bound) knowledge; existing guidelines to proper deploy a software system.

4.1 Propose of Subcharacteristics

It necessary explain that the model doesn't formally established, that is based into all the stages of a software development cycle and taking as a base the structure proposed in the Mexican standard NMX-I-O55-NYCE [4], which in turn bases on the standard international ISO/IEC 9126 [5], they appear and they propose some Subcharacteristics that will have to be contained inside the characteristic Adaptability and for which will have to establish metric concrete. System patterns describe the immanent qualities of the information system itself. The system is considered a closed system to measure its capacities to manage change. The subcharacteristics and metric offers must include three big stages of the evolution of development of software: correct Analysis of the problem, Design of the problem of correct form and that the Implementation uses as base for another development. Can see that subcharacteristics are identified like patterns. (See Fig. 1)

System-based (to guarantee a correct Analysis of the problem and that an implementation uses as base for another development)		Business Use
Validation	Design (to assure a Design of the problem of correct form)	Structural Analogy
Utility	Monitoring	Knowledge
Usability	Reliability	Redundancy
Adaptability Feasibility	Correctness	Customizing
Extensibility	Faults rate	
Flexibility	self-similarity	
Tuning	Availability	
Fixability of the changes		
Reusability		
Scalability		
Modularity		
Mobility		
Interoperability		
Self-organization		

Fig. 1. Identified Patterns of Adaptability

4.1.1 Subcharacteristic to guarantee a correct Analysis of the problem

Validation. The metric ones elaborated for this subcharacteristic will have to guarantee that the requirements were understood of precise form and besides, bear in mind the time that went to understand the requirements.

Metrics some of them who consider this objective can be: *How much effort took the comprehension and precise understanding of the requirements? What so much will they change the requirements from the moment that they were raised by the client until the system is dedicated? There has been born in mind that the requirements of the business are a mobile objective? Have measurements been taken in order that the requirements are satisfied at all time? Has it achieved that the system is adaptable to the desires of the client?*

The important of the subcharacteristic validation is to assure that the information system is adaptable to any reasonable change and that it will be able to be constructed in the time that the business like that it needs.

Also is necessary considered the subcharacteristics that repeat like patterns: *Scalability, Modularity, Mobility, Interoperability and Self-organization.*

4.1.2 Subcharacteristics to assure a Design of the problem of correct form

Monitoring. That the requirements have been translated from faithful form into the requirements of the solution.

Reliability. That doesn't exist distrust any respect that the resultant design will give an application of agreement to the requirements of the business. There must be born in mind that the companies not always are ready to pay money extra to guarantee reliability.

Correctness. That the design allows any adequacy changes, without of an effect wave. There must be born in mind all the requirements of the business that with the time can change.

Faults Rate. The faults and mistakes must be corrected from the first stages, since no company expects to invert money extra (though the tariffs are low) to correct faults. If some it is not possible to avoid them, there must exist a plan of contingency that allows remedying immediately the problems that arise. When changes arise in the business processes, there must be guaranteed that they must not introduce new faults. The business have changed your attitude with regard to the Information Systems that nowadays not only are instruments of finance, but rather functions control essentials of the business, which if it is definitive is that the clients demand simple interfaces and reliable results. The standards at present, they are those who dictate the rules of the game relating to the quality of the information systems, which they allow to make competitive to the business and to achieve that the clients of the same one go away with the business that thanks to the support of the information systems seem to them to be more reliable.

Self-similarity. Also has an important consequence for the design of computer networks, as typical network traffic has self-similar properties for drive business process.

Availability. The availability of a repairable system as "the probability that the system is operating at a specified time t".

4.1.3 Subcharacteristics to guarantee that an implementation uses as base for another development

There exist ways of guaranteeing that the developments of information system at present, they could provide a good base for the construction of the systems of tomorrow, for it one of the important characteristics in this stage is the Reusability.

Reusability. The construction of reusable parts likes a great game of LEGO where an assembly can be disarmed in pieces to build something different. For the case of the software, there is born in mind the reusability of analysis, designs and certainly the software itself (class libraries) that include from processes up to interfaces graphs and frames of work for data bases. Nevertheless, it is important bear in mind that the Reusability stretches to be less successful in the highest levels of applications of the business; motives exist for this, but the most common is the general tension in the company between the Reutilization and the Utility.

Utility. It hopes that between more Reutilization it is, this does not influence that the resultant product is "less easy" to use.

Facility of Use (Usability). On the other hand, doing that the system is "easy to use" there diminishes your aptitude to be re-used in a different authority or objectives (tools with specific intention are in general "easy to use" compared with multipurpose tools). Because of this and other factors, the components of high level in a product, generally they are not reusable to construct the different one and the manufacture of reusable components of high level across authorities of the problem, typically they increase the cost of your utilization.

Adaptability Feasibility. This subcharacteristic that will have to be born in mind in this phase, already is own of the model who is in structure, besides it is the one that guarantees the feasibility of adapting the existing system to the needs of the tomorrow of the business. This approach is lightly different from that of reusable parts, which are those that in group they constitute to the system and which depend on the experience of the programmers to construct the information systems of the tomorrow with the parts of the current one; with the approach of obtaining of a Adaptable Information System it hopes that the system could be personalized by the final users or for a person who did not have to see with the development. Four factors exist in the Information Systems, which need to be adaptable and which bear the consideration of 4 more subcharacteristics in this stage; 2 imply changes to very high level (subcharacteristics Extensibility and Flexibility) and two changes to low level (subcharacteristics Tuning and Fixability of the changes).

Extensibility. This subcharacteristic capture in counts the facility with which the system is capable of growing with the needed changes. For example, it is said that a Information System is extensible if it is relatively "easy" to add the managing of graphical devices or other formats or any another managing of statistical graphs that the current system does not possess.

Flexibility. It bears in mind that so easy is to change the capacities of the system into styles, categories, certain processes, etc. Without one affects your integrity.

Tuning. This subcharacteristic also can be thought as an activity of change. To tune to the development with the possible changes in the business processes. A system that it is considered to be "easily tuning" can be changed of forms that affect your performance for good. An example of tuning agreement to [6] would be: For example, CORBA objects are location-independent, which allows objects to be physically

moved around on the network (e.g., to reduce network traffic) without impacting very much, if any, code. Java is even more extreme in this aspect, since the objects can be moved to any machine on the network on the fly. Naturally none of this negates the need to do up-front performance engineering work.

Fixability of the changes. This subcharacteristic is defined as the skill of fixing a change without affecting the rest of the system; this can be difficult in big systems, since it is needed bear in mind many aspects, to separate the interfaces of the implementation and to approach the specification of the behavior of every component. The first attempt of this subcharacteristic can think in the Design Patterns [7] that they provide the solution of a definite well, adaptable problem to new needs.

4.1.4 Evaluation of the Adaptability of Information Systems

Table 1 shows the propose of the evaluation subcharacteristics.

Subcharacteristic: "x"			
Attribute	Weight	Effect	Points
.....			
Subcharacteristic index		⇒	

Table 1. Determination of the Subcharacteristic Index for evaluation characteristic Adaptability in Information Systems

The business dimension characterizes the circumstances of usage for an information system. It is outlined that the degree of adaptability, which can be reached by a specific information system, is influenced by decisions referring to the deployment of the system within a business organization. The calculation of the index is not detailed in this paper.

5. Business Strategy Generation: Intuitive Example

Let us consider an insurance broker agency formed by ten employees. As a broker, the agency sells policies for different companies. The main products are life and automobile policies. For selling and advertising the insurance company obtains detailed information from potential customers (C), and from private and governmental agencies (A). This information is distributed between the company's agents (AG) that contact potential clients via phone and try to set up a conference call; however, they also have their own sources of information. At the interview, the agent examines the client's current insurance coverage and tries to find an opportunity for a policy that will best fit the customer's needs. Before obtaining an insurance policy, the new client suffers an identity investigation. In the case of a life insurance, the client has, in addition, to approve a physical examination test in an accredited hospital (H). In the case that the investigation is positive both parts sign a policy and keep a copy of the contract. If during the investigation irregularities are found, the agent is informed who meets with the client in order to find new options. The insurance policy is in effect when the client makes the first insurance premium payment. Every policy carries with a schedule of premiums, which varies with the type and coverage. Each policy provides a commission for the agency. The commission varies with the insurance company, policy type and coverage. The insurance company management (M) defines

the commissions politic, which varies from agency to agency. The agency splits the commission received for each policy with the agent who sold it; the rate depends on the seniority of the agent. Once a policy has been sold, the agency submits premium bills to the client, collects payment and sends the payment, minus its commission, to the insurance company. If a client fails to pay premiums, the agent who sold the policy is informed, so that he can contact the client. Claims can be made on insurance policies as specified in the policy itself. Clients or beneficiaries (B) contact the agent to file such claims. For an automobile insurance policy, claims are made when the car is involved in an accident, damaged or stolen. The beneficiaries may make life insurance claims on the death of the insured. In both cases, the insurance company sends an adjuster (AD) to legitimate the claim and arrange the final insurance details. Life insurance company's objectives, goals, strategies and Critical Success Factors (CSFs) are defined and the cross-reference identifies the relationship established between the elements. For instance, an external organizational entity identified in the life insurance company context diagram is Management (M). The management has the objective to achieve market leadership position (O1). To accomplish that objective, management's establish to reduce operation cost 5% (G1), achieve 30% of market participation (G2) and improve stockholders gains 15% (G3). The organizational strategies involve penetration into new markets (S2). CSFs like growth through acquisition (C7) will be taken out to each objective and goals proposed.

Facts and beliefs from the confidential knowledge base:

↑) Leadership. - It is the second seller of life assurance reaching \$50 millions this year, with selling projected in \$75 millions next year. In car assurance hold the sixth national place.

↑) Acknowledgement. - Recognized prestige in products and services quality, supported by ISO-9000 certification and the norms of the American Institute of Banking.

↑) Growing. - Growing potential is attractive in the life assurance segment by virtue of its dominant position in the market.

↑) Supporting. - The Company is part of one of the most important financial groups of the country, having a significant financial, technology and holding support.

↑) Strategic alliance with other life assurance companies. - This produced lower operative costs, complement of products and better distribution infrastructure.

↓) Competence. - In the life assurance segment the company has a dominant role. However, in the car segment the competence has been growing and the company fall from the third to the sixth place.

↓) Financing. - Nevertheless the company has 1,200,000 clients in the car segment only the 5% of the population pay in advance. In the life assurance segment the 30% of the clients pay in advance.

↓) Needing of distribution channels. - This had affected the selling and the collecting of car insurance.

↓) Investment. - The company has to assign a very important part of the investment in new information systems and building restoring.

↓) Demanding. - Depressing on car demand will affect the selling volume of car assurances.

Facts and beliefs from the popular knowledge base:

- ↑) Improving. - Recovering of the internal life assurance the last two years.
- ↑) Earning. - Width range of suppliers and clients that allow to increase operation profit.
- ↑) Capital outlay. - The lowering of interest rates allows offering high price articles with credit from six to twelve month with out interest.
- ↑) Innovation. - Constantly innovation of new programs and business schemes.
- ↑) Projecting. - The government agency estimates that only ten percent of the population has a life insurance.
- ↑) Demographic growing. - The regular demographic growing guarantees a constant increasing of the sector.
- ↓) Investment. - The sector needs high investment to sustain its increasing.
- ↓) Competence. - There will be a competence increment in the market.
- ↓) Promotion. - There are indispensable intense promotion campaigns for market developing.
- ↓) Price changes. - This area of services is sensible to the price alteration and signified changes are difficult to implement.
- ↓) Earning level. - Company performance is closely related to the earning level of the population.
- ↓) Taxes regulation. - Government controls on selling life and car insurance.

First is necessary establishing Business Strategy but that changes in the organization are limited by the core competencies, i.e. an enterprise that sells computational equipment can be transformed in to an enterprise that sells telecommunication equipment, but would be very difficult to transform it into a financial institution. Then analyze that subcharacteristic will be demanded and establishing weight in agreement to the effects that they cause to the moment to develop the information system. To show the feasibility of the pattern approach, open-source system has been tested on the basis of weighted patterns. The system-based and the business use dimension has analyzed separately, showing that both dimensions are minor developed for analyzed system.

6. Conclusions and Future Works

The main line of this paper contributes to the debate on the adaptability of information systems within a changing organizational environment. To overcome the lack of methodical support, patterns embedded in procedure models to assess and evaluate the adaptability of information systems were outlined. For this has treated to the identified of certain subcharacteristics, thanks pattern in the business ambient for establishing a model who allows to turn the attribute Adaptability into a characteristic to demand into all the stages of the life's cycle Information System development, guaranteeing that will be possible to modify it agree also they change the business processes, bearing in mind that increasingly the systems are in use not for taking only the finance in a company, but for competing and field for being opened in bought increasingly competitive. One of the identified subcharacteristics that it are considered to be they must form a part of the model it is the verification, which, it happens after guaranteeing that the requirements of the information system orientated

to the business went due validation. Of the subcharacteristics that are suggested for a future model of evaluation of the Adaptability in Information Systems to the changes in business processes, the Flexibility is often more difficult to achieve than the Extensibility specially when during the development they change and new needs and requirements are specified. The complexity of the current systems does more improbable than some offers of Software Engineering for the development of information system be perfect, if for no other reason, more that for the fact that the system has changed, has to modify the developed work though it has been elaborated well, this bears to that the subcharacteristic Tuning should be demanded nowadays in the software. Only if the Information Systems are adaptable, it will be reasonable to introduce changes and/or to arrange faults, with a low probability that the new changes introduce new faults. Adaptability in Information Systems to the changes in the business processes, do that the company in question manages to identify like reliability for your clients and eligible instead of other options.

Our proposed future direction would be to continue to working with model, formalizer, but to deepen the analysis from the accumulation of comparative observation and from application of theoretical perspectives. In addition it propose for other authors it concerned with the development of design of the agent-based information system for administrative documentation management in this type the project. We would hope eventually to move in the direction of active models, but would need to add a political analysis before we took that step.

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