Security of the Citizen Oriented Informatics Applications Based on Orthogonality

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Citizen oriented applications require a high security as these applications involve interaction with their users and people need protection used data application usage. Orthogonality characteristic is present and how to determine the orthogonality citizen oriented applications. They determined two types of orthogonality: the orthogonality structure of applications which must be at a level as high and orthogonality terms used in user interaction. This orthogonality must be reduced so that applications present the characteristic of continuity in their use among users.
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1 Security informatics

Security informatics is the concept that describes methods and techniques that ensure proper functioning of the transmission and reception of data over a network. It implemented the concept of computer security ensures protection of networks against attacks from both inside the network and outside it.

Attacks from within network are the result of causes related to:

- a weak training the personnel software application and thus accessing data stored and processed;
- lack of access levels to protect the networks / applications;
- a weak data validation are introduced from access terminals;
- unauthorized access from within network because the access terminal is unsafe.

Internal computer security is based on the concept that each terminal is a potential security vulnerability, so that each user is connected to the computer and access to the information transmitted in the network should be treated as an individual entity that needs to be imposed rules clear regarding the provision of access both within the network and especially the data.

Outside network attacks occur because [1]:

- improper configuration of the entire system, resulting in improper operation thereof, and faulty terminal components synchronization;
- communication errors between terminals that allow the interposition of foreign entities and handling content transmitted;
- implementation of security protocols technologically outdated, which allows easy access to network resources;
- implementation of security methods unsuitable for the needs mismatch network;
- lack of updates the security solutions implemented;
- a improper managed computing environment, the lack of adequate training of staff dealing with the administration or because of faulty implementation of the means of administration.

Security informatics is designed to manage network resources such as information transmitted in the network may not be altered or modified internal attacks and external attacks.

Information is subject to effective implementation of security methods, so for optimal results, the environment in which it travels and is processed must provide high security. Any change that occurs between the initial information that is sought and queries within the network and the information that is used by the recipient prejudice, from

simple data storage inaccurate and ending with pecuniary damage resulting from the provision improper solutions.

Accessing computer applications is accomplished using a vocabulary that store user names, passwords their users groups to which they belong. Unauthorized access to computer applications weight increases as the vocabulary size is larger. The vocabulary is larger, the greater the number of tests that are performed to validate user access. If the access is performed on a small number of passwords, they are fully validated, while building vocabulary expanded access leads to non-testing all combinations and thus to allow unauthorized access.

Security informatics uses a number of key concepts such as:

- unauthorized access - access without right to a system or a computer network in violation of security rules;
- privacy - attribute data characterizing their availability restricted to a specific group of users;
- cybercrime - crime committed using a computer or in a paperless environment;
- electronic paper / electronic document - electronic data collection;
- informatics fraud - input, alteration, deletion or imprinting of data or computer programs which cause economic damage or material intention to obtain an unfair economic advantage for himself or for another;
- unauthorized interception - interception without right and the technical means of communication with the destination, origin and within a computer system or network;
- software piracy - reproduction, distribution or public communication, without right of a computer program protected by law;
- sabotage computer - input, alteration, deletion or imprinting of data or computer programs or interference with systems intended to prevent the operation of a computer system or telecommunications system; the development of new applications tend to

incorporate as many open source components or their own programs that have been developed for other applications, there is a danger that some of the libraries imported several functions overlap and thus appear in the application security breaches, breaches they are exploited by attackers;

- electronic signature - electronic data collection incorporated, attached or associated with an electronic document intended to produce legal effects and formal identifying the signatory; there are delays in the use of an electronic signature, which from quite high costs involved and relatively low presentation concept, which results in a relatively low popularity; an advertising campaign in which to present the concept of electronic signature and benefits compared to the costs involved, is indicated to increase the number of users;
- intelligence information - obtain by illegal means or disclosure, transfer or use without right or without any other legal justification of an industrial or commercial secret, the intent to cause economic harm to the person who has the right to confidentiality or obtain for himself or for other illicit economic benefits.

The main issue affecting cyber security is the wide variety of user requirements and trends default producers to thank all buyers. Implement management facilities safe void the various options offered and categories of beneficiaries' users.

Each component has its own level of privacy applications. Based on each security level of all components that make up an application, to reach a level equal to the minimum level of individual privacy of each component. Because of this level, the integration of components is intended that each component has a maximum level of privacy, so overall security level to be a satisfactory.

Differences in levels of security applications from the technology components of functionality, the user group for which

applications are built and how applications are structured component modules.

So, the most important cause of low overall level of security comes from the heterogeneity of component applications.

2 Orthogonality, Software Quality Characteristic

Orthogonality studying the degree of similarity between two or more concepts implemented by the characteristics that define. Through this quality characteristics determined the extent to which concepts differ from each other.

Orthogonality concept comes from mathematics, which takes into account the following aspects [2], [3], [4], [5]:

- if two planes are orthogonal if their intersection angle cosine is equal to zero; a finite set of plane is orthogonal if two planes are perpendicular to two;
- two lines are orthogonal if they form congruent adjacent angles; a finite set of lines is orthogonal if two lines are perpendicular to two;
- two vectors are orthogonal if their dot product is zero; a finite set of vectors is orthogonal if the dot product of any two different vectors is null.

Orthogonality is studied on the basis of orthogonality. With these criteria are highlighted features that have the same value for the concepts studied and are determined levels of similarity.

Let be the E1 concept defined by the features of C1, C2, ..., Cn. To be studied orthogonality of two or more concepts, as a first condition to be met, they must have the

same structure, that is to be defined by the same characteristics.

Based on the characteristics of concepts, indicators are defined. Based on these indicators is constructed an indicator that takes into account the values of component indicators.

One area where orthogonality is important is programming. Programming languages are designed so that their orthogonality is maximal in the sense that the concepts implemented terms and keywords used are unique to avoid confusion among both users and especially for not to compilers when not knowledge implies a code line, due to several possible options.

Comparison of the two concepts is reduced to report a concept at the other concept, namely to identify the common parts and the parts that differ. Are thus comparable corresponding characteristics of the two concepts [6], [7], [8], [9].

To study the orthogonality is defined a standardized indicator in the range [0, 1], which takes the following values:

- 1, if the elements are orthogonal, that have nothing in common;
- 0, elements are identical, that is not different values for any feature.

If the indicator tends to 1 means that the data sets contained two concepts tend to orthogonality, and if the indicator is close to 0 means that the data sets have many identical elements.

Thus categories of the orthogonality are made and shown in Table 1

Table 1. Groups of orthogonality

Non- orthogonal	0
Very weak orthogonal	0 - 0,32
Wak orthogonal	0,32 - 0,52
Orthogonal to the average	0,52 - 0,72
Strong orthogonal	0,72 - 0,92
Very strong orthogonal	0,92 - 0,99
Perfect orthogonal	1

If orthogonality is very important to study and meaning of the data used. If concepts are used to define an industry and the concepts are certain restrictions on the information available, the frequency of use will have similar values, the content will be similar, the only aspect that distinguishes the meaning of the concepts used data.

It traced how the two concepts differ or are similar, so that the frequency of occurrence of words, content, and meaning of the data contained.

To study the orthogonality concepts have created a number of criteria so that it is checked and ensure the comparability of concepts. Because belonging to the same domain, the test of orthogonality be customized to take into account that not all words or data that has the same value for both concepts are essential.

The study of the orthogonality of the two programs in a specific programming language, will take into account that users will use the same basic words, so it is important to study their frequency and context of occurrence, the function the proceedings in the main program. To streamline procedures, the frequency of keywords used must be studied closely with issues related to the definition of the user data, such as variable names, type variables, defining their frequency [10], [11].

For software practical way to increase the orthogonality is the parameterization of the software. Type parameter must be implemented to allow a declaration of variables from different fields of interest: Integer, Float, Char, String, Boolean.

Using the parameterization, the code is doubled for each declared variable, function parameter is created as general, that call is customized for the desired type.

This creates the premise of a detailed study focused on user actions regarding the use of facilities provided by the programming language.

3 The Procedure for Checking the Orthogonality

Consider the set of programs P. Let be the Pi and Pj programs to set P. It is said that Pi and Pj are strongly orthogonal or orthogonal perfect if the indicators used to determine the degree of similarity have values ranging [0.92;1].

Orthogonality programs identify differences between programs based on their content and on how to arrange the content. Statements are considered in programs keywords used repetitive structures underlying the implementation of the programs and the results obtained from the same set of input data.

The programs are identical if they have a high degree of similarity, the same structure, the same keywords, the order of their use is the same, the results provided are identical and the number of steps taken to provide results correspond.

Programs differ orthogonal horizontal structure, Figure 1, differences in vertical structure, Figure 2, differences in achievement and purposeful.
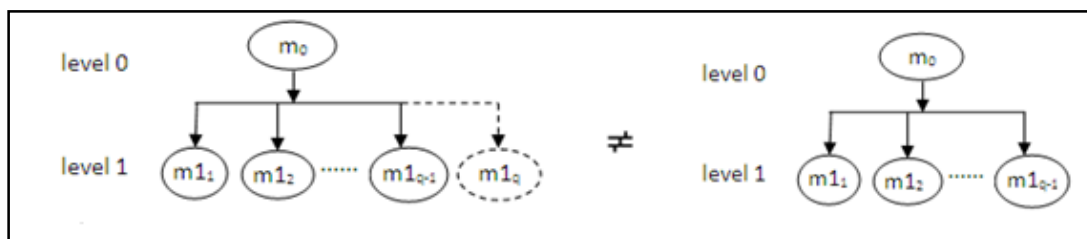

Fig. 1. Orthogonality of horizontal structure

Orthogonality of horizontal structure is achieved by adding new modules on the same level. Orthogonality of vertical structure is achieved by adding a new level in the application.
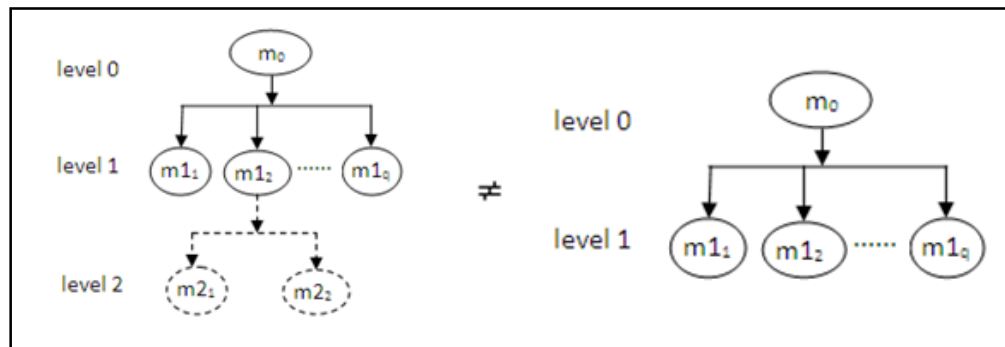
Fig. 2. Orthogonality of vertical structure

Programs are programs undergo changes that are going on developing new programs source. The differences between these programs are not large, the new program retaining structure issues found in the original program.

Programs suffering interchange orders suffer variations in the layout of the source code controls, declaring variables work without undergoing major changes regarding the terms used and implemented structures.

To optimum management programs to introduce the concept versions of standard software. Through standard means the optimal version of the product program referred to when the product software suffers due to unauthorized access.

By comparing the standard version with the version in question is identified changes that alter the product program, it is rewritten and brought back to the standard version.

To optimize application and save the current data stored by the application at regular intervals after validation prior standard version is updated to the latest version of the product program that works, so if database standard version store data saved version.

4 Conservation Processes Citizen Oriented Applications

Citizen oriented applications:
- containing processed without operator; input data are entered only by citizens of society and performers from organizations without requiring knowledge of computer;
- select options to people in management and decision making, resulted in the selection of variants and variant signature decided;
- information from databases generated activities in organizations, creating customized products and services offered to those who have requested;
- any application is open to citizens, store information, and using robotic systems to produce exactly what is desired in the required amount; unique elements became the same characteristics as mass production.

Citizens are simple applications use information in that data dictates operators or identifiers and variable fields to trigger purchases, payment or performance of services, testing, documentation, architectural projects.

In the new context created, citizens:
- enter data;
- triggers actions selected;
- trigger processes;
- provides management.

Therefore citizen oriented applications have:
- to be easy to understand interface must allow direct access mode;
- minimum flows are very few selections to achieve what he has done;
- maximize the reuse of data in principle enter the code numbers and all data obtained.

As a group of applications intended for broad citizen oriented applications:
- have a large target group (used in collecting taxes for the state budget in simplifying procedures for obtaining passports, flight tickets);
- works non-stop;
- are characterized by ease of use;

- must provide a high level of security.

Given the fact that the citizen oriented applications involving high degree of functionality, it requires the application of a concept of quality that preservation of the application. Conservation involves implementing software application to secure access to application resources, in particular by limiting the opportunities for change. It allows access to data and information consulting managed application, but altering their limited.

Conservation is achieved by the application consistent with the definition of that application is the. For example under consideration the number of fields in a database, the number of lines of program code, the number of users with access rights to resources. Based on these characteristics as part of the application is monitored constantly so that when their identifying unauthorized changes, it automatically launches the application and thus rewrite the data managed by the.

The concept of variation application is implemented based on the orthogonality of the two versions of the same applications, application users and application available on the process to implement conservation.

Unauthorized access to the application leads to damage it, something that is identified at the time of validation orthogonality. If the alteration exceeds permissible margins automatically launches the application process rewrite preserved version.

5 Orthogonality Vocabulary Citizen Oriented Applications

If the citizen oriented applications, orthogonality be measured and the vocabulary used in the application. This orthogonality must present low as citizen oriented applications have to use common elements in interaction with users.

Users do not tend to read the related documentation application they use to learn how to interact with it and how to use, relying on intuition to use the applications. This creates several users types, Figure 3. According to Figure 3 only a small fraction of users read documentation related application. Another small part intuitive in use and most applications are regular users using application based experiences of using other application.
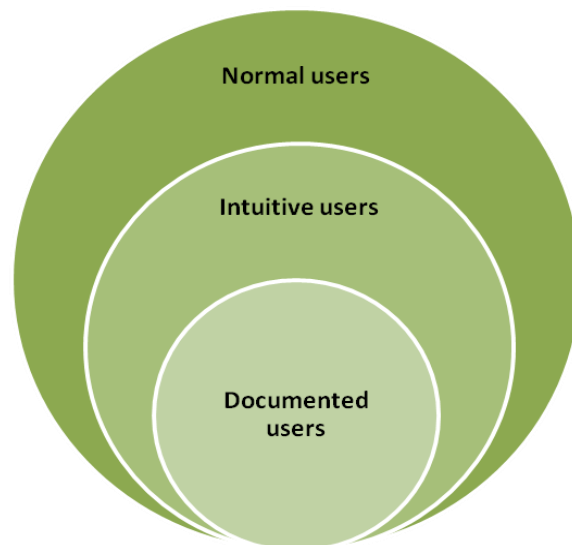

Fig. 3. Types of users

Based on empirical analysis of applications used by users is built a vocabulary of common terminal of these applications and new applications are developed using the the vocabulary of common terms.

Let VTC set common terms established by empirical analysis and VTA set the terms of the application examined. If the two sets are orthogonal means that application vocabulary and common terms such application is easy to use by users undocumented.

Orthogonality sets terms must be as lower and structure orthogonality applications must be larger, Figure 4.
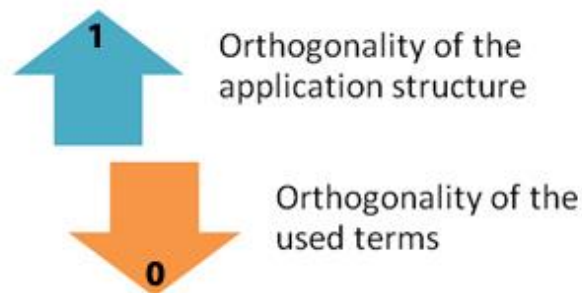
Fig. 4. Structure orthogonality and orthogonality of used terms

Thus the citizen oriented applications are two totally different types of orthogonality between them.

6 Conclusions

By studying and deepening the concept of orthogonality of quality improvement programs are created prerequisites programs, implementation of problem-oriented software and defined working environment for implementing the concept of software reuse. Implementing a software quality approach new areas of interest, increasing the orthogonality are factors that lead to better software quality, to increasing their applicability and, not least, to make better use of the product software.

Acknowledgement

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