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Security zones

Summary

In the literature on security of social organization¹ there are many definitions of the concept of security. In most cases, they refer to certain aspects of security rather than to define it as an abstract scientific concept and suffer from some conceptual incompleteness. In order to solve the problem with the definition of security there is a requirement for its content to which we adhere in this study. The purpose of the report is to continue the study of the content of the concept of security in greater depth. To achieve this goal, concepts have been introduced defining the framework of different security areas and a conceptual description of the basic characteristics of the security areas thus defined and their limit parameters.

¹ Under *security*, we will further understand the security of the social organization. The social organization is regarded as a complex social system..

Keywords: security, security levels, organization

Анотация

В литературата за сигурността на социалната организация¹ се срещат множество определения за понятието сигурност. В повечето случаи те се отнасят към определени аспекти на сигурността отколкото да я определят като абстрактно научно понятие и страдат от известна концептуална непълнота. За решаване на проблема с определението на понятието сигурност е изведено изискване за неговото съдържание към което се придържахме в настоящото изследване. Целта на доклада е да продължи изследването на съдържанието на понятието сигурност в по-голяма дълбочина. За постигане на тази цел са въведени понятия, чрез които са дефинирани рамките на различните зони за сигурност и е направено концептуално описание на основни характеристики на така дефинираните зони за сигурност и на техните гранични параметри.

¹ Под *сигурност* по-нататък ще разбираме сигурност на социалната организация. Социалната организация се разглежда като сложна социална система.

Ключевые слова: сигурност, нива на сигурност, организация

According to the requirements for the content of definition of security [1], it should include three basic elements: the first one is that security is a dynamic state; the second one is that it is at the required level when the organization operates in a scheduled (normal) mode; the third element of the requirement is what should happen in the organization when it enters a non-planned mode of work. These requirements are based on the application of the scientific approach and the organization theories known in science.

The task of this report is to broaden the field of reasoning and on this basis to create new knowledge of security as a concept in order to better understand this phenomenon. On the basis of the definition of security defined in the aforementioned requirement, three distinct areas of the security state of the organization can be outlined. This is justified by the fact that each area has a certain range and that the transition of the security state of the system from one area to another occurs when the security level reaches the limit of one area that is the initial limit of the next area. Security areas should be considered in descending order from the point of view of system security in each of them, i.e. from the area with the highest level of security to areas with lower security levels. For this purpose, a conceptual theoretical approach has been applied, with arguments for the principles for defining the limits of security areas. The application of this knowledge enables a scientifically grounded, conceptual, methodological approach to be taken in defining the specific limits of security areas when examining different aspects of it. The goal is the knowledge of security to approach as much as possible at the present stage of development of science the quantitative methods of its measurement. The rationale behind this is that qualitative research methods are largely ideologized to a degree that distinguishes them from scientific theories. The increase of the share of quantitative security measurements in security leads to more competent management.

Security is a dynamic state that must be understood as a sequence of changes on its level over a given time interval. It is understandable that the level of security is a momentary state in a dynamic process that is perceived and shared in the organization as a *normal* state that satisfies the organizational understanding of security, meets the organization's expectations, coincides with the accepted and shared value systems in it, has time interval of action and ultimately serves to ensure the achievement of organizational goals. In this reasoning there are the following key elements: 1) normal state; 2) security levels; 3) security areas in which the security level varies within a certain range for each of them; 4) time intervals in which security levels are within a certain security area.

Here are outlined the following tasks to be solved: 1) How to determine security areas? 2) How to determine the range of security levels within the range of each area?

The *normal state* of the organization is understood to be its ability to function according to the design organization-architectural-functional model and to produce the planned quantity with the planned quality of products or services. The attribute *normal* is derived from the noun *norm*. The latter means accepted and shared parameter values within which a state, activity, or phenomenon should fit. In the specific case of the organization, these are the values of the parameters in which its functionality must fit - these are the design parameters.

The *nominal values* of the parameters of the functional indicators of the system are the values of given parameters, which give the best practical results of its functioning. There may be a difference between the theoretical and practically normal and optimal values of the operating parameters of an organization. The reasons may be that it is impossible at a historical stage to reach the theoretical requirements of technological and managerial abilities. For research purposes, it is assumed that the difference between them is negligible, especially in the sphere of managerial abilities. Consequently, the *nominal values* of given organizational parameters are the values for which the system operates in *optimal terms* from the point of view of the quantity and quality of products and services produced that meet the requirements of the customer and meet the needs for which he agrees to pay.

The *nominal operating mode* of the organization is the mode in which the parameters of the indicators are within the range of the nominal values. The *optimal mode* of functioning of the organization is understood as the operating mode of the organization where the parameters of the indicators are within the range of the nominal values

It follows from the abovementioned definitions that, for the purpose of this study, the *nominal mode of operation of the system coincides with the optimal mode*.

A *security level* is the instantaneous magnitude of the probability of occurrence of an event that is undesirable for the organization, which may lead to a decrease in its nominal (optimal) performance. It is appropriate to measure it in percentage, assuming that it is theoretically impossible to achieve a 100% probability of security for the organization. This means that in the process of organizational design the nominal values of its functional parameters are set and realized in the organizational and architectural project of the organization. The security level is a complex indicator consisting of two sets of indicators of a probable nature – risks and threats. Risk events are more closely related to the organization, while threats are mainly associated with external factors. In this context, risk events cannot be avoided, but the likelihood of their occurrence, which corresponds to security, can be reduced. Threats can be avoided, but they also correspond to security.

The interval within which the current security level changes may be in certain normal (desired, planned) values of the parameters by which to measure security level or leave them. It is important to set these *limit values*. It is logical that the maximum and minimum security value, which determines the multitude

of its instantaneous possible values that it can accept, can be defined as a *security area*. Acceptance of these different security values takes place in the continuum of time and its crossing of the limit values is the passage of the security state into another security area. Therefore, each security area has important characteristics and defining features that distinguish it from one another. If this is the case, an important question arises: *How to define these characteristic features for the areas?* This is another task that needs to be solved. In addition, changes in security level (dimension) are not instantaneous. It is the result of multiple changes – at least in two main groups of parameters: internal and external to the organization. The larger an organization, the slower the processes of changing the level of security in it in comparison with a smaller organization, and vice versa – with smaller organizations, these changes are getting faster than in larger organizations. The logic of this statement is based on the laws of the systems applied to the organization's research [2, pp. 31–53]. The larger organization is a more complex system, consisting of multiple recursive systems, and in it the processes are quantitatively more multilevel than the smaller organization. Naturally, multiple stage processes require more time to change as compared to those with a lesser degree of system element interactions.

A *security area* is the interval in which the security level meets certain design requirements. Within the security area, the security level does not fall below the minimum area requirement for that area and does not exceed its maximum magnitude level for the same area. Passing the minimum level and lowering the level of security to the lower level than the limit for the area is seen as a new state of system security. It switches to another security area, which also has certain limits in which the security level varies within certain limits. This process is moving the system to a lower security area. Thus, the logic of the arrangement of the security areas is from the highest security area – the nominal area, the lower security areas – the emergency areas located on both sides of the nominal area, and the areas with an unsatisfactory level of security located away from emergency areas (Figure 1)

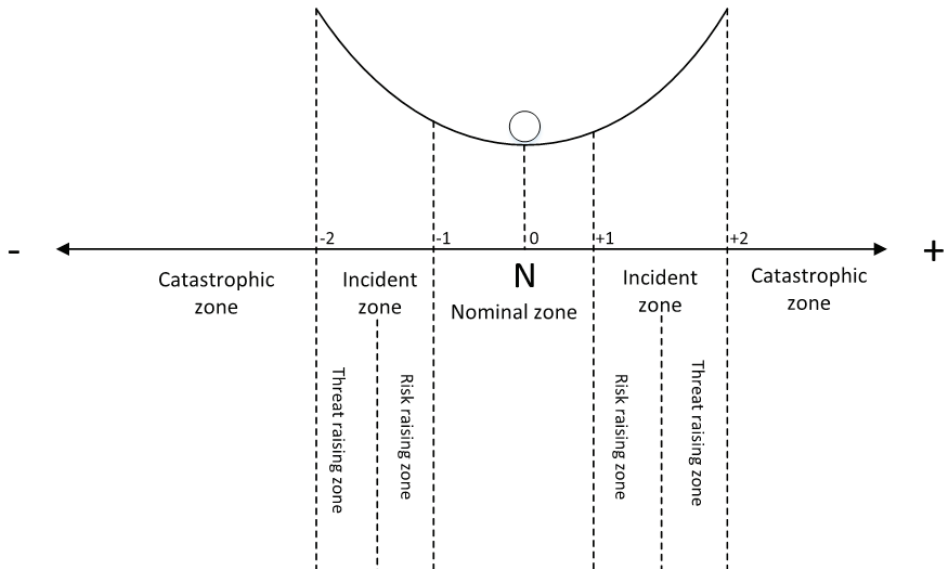


Fig. 1. Security zones

Therefore, three security zones – a maximum security area, two zones with intermediate security levels and two areas with the minimum security level are outlined. Each of the security areas has specific characteristics that distinguish it from the others. These characteristics determine the state of the system in terms of its security.

The area with the highest level of security is determined by a number of factors, the main one being to achieve the maximum possible and at the same time economically appropriate level of security for the organization. This is the area with the highest level of security of the organization. It is planned in the process of organizational design and depends on many factors. More important and limiting are the following:

- The main purpose for which the organization was created. In order for the organization to function as effectively as possible, four important conditions must be fulfilled at the same time: first, ensuring that the continuous supply of the necessary quantity and with the necessary quality of external resource at the entrance of the organization. This resource must provide the operating processes in the organization.
- The resources entered in the organization must be reworked in accordance with the defined and planned design and organization technological processes and algorithms to produce the desired result of the production process.
- The result of processing the input resources should be in the form of a product that has the specified qualities to satisfy the user's needs. The organization

must produce a certain amount of product for a certain time, with the required quality and quantity.

- In order to make the three processes mentioned above a reality, there must be a management system that controls the three groups of activities - acquiring and submitting in the organization of the input resources, running the planned technological and algorithmic internal organizational processes and producing the planned quantity and quality of production. This activity is carried out by the management system of the organization, which integrates the individual groups of activities into a unified system, monitors the observance of the algorithms and technological processes, the internal and external conditions of the organization and, if necessary, intervenes in order to prevent production of a product with parameters, different from the planned ones.

What determines the limits within which the system functions normally. This range is conceptually determined by the required quantity and quality of the product that the system should produce for a given time. This product is called a planned product. The parameters of the planned product are set by the user who agrees to pay for exactly that product. These user requirements become mandatory for designing of the operating parameters of the system. These parameters are called planned parameters or design parameters for the system's operating mode.

Each of these four groups of activities, shown above, is linked to the complex organization of multiple elements of subsystems. No mode of operation can be provided for any of the most elemental technological elements at strict optimal value of its projected design parameters. The reasons for this are many, but the most important one is that it is not possible to provide the necessary resources with parameters having a constant optimal value. These parameters vary within certain limits. Each system has certain limits of the temperature of the operating mode of operation, within which it is guaranteed with the necessary degree of certainty that it will produce a product with the set design parameters. Over time, all elements of the system are worn out and aged, and therefore change their design features. Their time and operational suitability is within certain limits. For this purpose, the principle of tolerances for the values of each parameter for each element of the system is introduced. The margin is the range within which the variation in the value of a parameter ensures the normal operation of the system and guarantees the planned quantities and qualities of the product produced. The most advantageous planned value of a given parameter is called a nominal value, or in short nominal. The acceptable magnitude of a value deviation of a given parameter from its nominal value is called tolerance. It is measured as a percentage of the nominal value with the same unit of measure as that of the nominal.

The above-mentioned most important principle positions for project parameters indicate that none of them can have a constant value in the continuum

of time. All system parameters are designed to have a nominal value and within the limits of the planned tolerances.

The nominal value is the value at which the system works best. Determining the nominal value of the parameters depends on many factors and conditions. Not always for nominal values can be accepted the theoretically derived values. In such cases, the principle is that the nominal design value of the parameter to be as close as possible to the optimum. Therefore, for the purpose of conceptual reasoning it can be assumed that the optimal and the nominal value of the design system parameters coincide. The tolerance is a deviation interval of the parameter values in which the manufacturing system produces a product that meets the prescribed design requirements. These requirements also deviate from the nominal within certain limits. Therefore, the nominal value and tolerances for each system parameter are important in terms of its design operation and can be used as reference points for the reliability (security) of its operation. How should they be defined from a conceptual theoretical point of view of security?

To answer to the last question, we use the knowledge of system theory. It is known that each system has the property of striving to maintain its state of equilibrium. It is logical when designing this equilibrium point to be set and set as the nominal value of each of the system elements. Therefore, the equilibrium point is a state of optimal functioning of the system. It can be assumed with practical enough accuracy that in real systems the point of their equilibrium operation coincides with the nominal value of the parameters, i.e. the nominal mode of operation matches the equilibrium mode of the system.

At the equilibrium (nominal) operating point of operation of the system, the highest reliability is obtained for its faultless operation, which means that we have the highest degree of security of system operation. At this point the quality of the manufactured product is highest and it can be assumed that its value is also at nominal level. For system security purposes, it can be summarized that when the system operates at the nominal values of the parameters of its elements, the operating mode can be called nominal. The nominal operating mode of the system is logical to be set in the project and implemented in the construction of the respective system. In this mode of operation, the system is at its equilibrium point. Summarized, the nominal mode of operation of the system is a mode of its equilibrium from the point of view of system theory. Therefore, this point, characterized by the nominal value of the individual parameter, also determines the system equilibrium point and should be chosen as a basic point to be considered for the security levels of the systems. This equilibrium point determines the highest theoretical and sufficient for the practice accuracy, systemic level of security. Any deviation of the parameter values of the system elements from the nominal will result in a decrease in the system's overall security level.

Once the nominal point has been determined, we should also define the limit points at which the values of the individual parameters and the aggregate nominal system parameter can deviate. Any deviation of the values of the parameters of the indicators of the system from the nominal value will take it into a mode of operation different from the steady state of equilibrium, where it has the highest level of security. This means we will have less quantity and quality of the products produced by the system. The deviation from the nominal values can be provisionally applied to the axis with a start "Nominal value" in which the system is in equilibrium (Figure 1). The deviation of the parameter values to the right of the nominal value is positive (with the "+" sign, and to the left for a negative value with the "-" sign.) The task is to determine to what deviations of the system parameters to the nominal (equilibrium point) mode of operation of the system will still provide a satisfactory quantity and quality output. Therefore, the maximum absolute value of a deviation of the parameter values from the nominal will be different for each subsystem unit, will be different for the whole system as a whole. Two important questions arise: What is the conceptual indicative limit absolute value of this permissible deviation from the nominal value? The second question is: How to determine it?

With each deviation of the mode of operation of the system, it has the intrinsic property to seek to return to its equilibrium point of functioning. This process of deviation from the nominal value is not unlimited. When the deviations increase, the operating conditions of the system deteriorate to the design ones, and therefore, at a certain deviation value, the system will not be able to return to a self-regulating mode, i.e. will not be under the influence of the law of striving for equilibrium. It is precisely this maximum absolute value of a deviation from the nominal value to be appropriate to be considered as a limit absolute value of deviation from the nominal. This is one reason. There is another consideration - in terms of the quantity and quality of the product produced by the system. It has been said above that by increasing the magnitude of a deviation from the nominal value, the operating conditions of the system elements deteriorate relative to the optimal, i. e. quality deteriorates and the amount of product produced is reduced. This deterioration of these two indicators may be acceptable to certain limits beyond which the product will not meet customer requirements. The minimum values of the indicators of quantity and quality of the product, where the minimum requirements of the customer for the product are not met, are called limit values. These limit values can be obtained before reaching the maximum values of the deviations from the nominal ones, where the system will not be able to attempt to return to the equilibrium (nominal) operating state itself. *Therefore, the maximum absolute limit deviation value of the parameters of the system elements and the system as a whole is that where the quality and quantity of a product does not meet the minimum requirements of the customer.* This means that during the

design of the system and its elements, the nominal values of their parameters and their maximum permissible absolute values of the deviations must be determined (calculated) i.e. their tolerances. For greater convenience in practice, the tolerance value is not stated in absolute value, but is given in permissible percentages of the nominal value of the respective parameter. This deviation is considered in both directions – positive, i.e. permissible value of increase above the nominal, and negative – the reduction value below the nominal value. These two limit values, in relation to the nominal value, determine the area, the set of values that the given parameter can receive, in which the system will operate in modes close to the equilibrium and the produced product will satisfy the requirements of the customer. Thus we answered the question of how to define the limits of the area of operation of the system with the highest security. This area simultaneously covers the range of changes in the values of the parameter indicators in the positive and negative directions relative to their nominal value taken into account from the equilibrium operating point of the system. This area shall be called the *nominal area*. Its most important features are: the system functions at its equilibrium point or near it; the quality and quantity of the product produced satisfies the customer; in the case of deviations of the parameter values within the tolerances the system tends itself, without any external intervention, to return to its equilibrium mode of operation.

We have to answer the question: How to define the limits of the next security area of the system? For this purpose, let us assume that the values of the deviations of the parameters of the indicators go through the absolute values of the end limits of the nominal zone, with the positive deviations leading to an even higher increase of the absolute values of the parameters of the indicators in relation to the maximum value of the nominal zone, and deviations in the negative direction decrease the absolute values of the parameters that become smaller than the minimum value of the nominal area. With these deviations, the system can still function, but already with deteriorating quality and decreasing the quantity of products. The greater the deviations are than the end values of the nominal area, the more the results get worse and the system's ability to return to its equilibrium point of operation becomes smaller. This can be considered the final, outer limit of these areas - located to the left and right of the nominal area (Figure 1). When parameter deviations increase, the time comes when the system reaches a limit mode of operation in which it is unable to function independently. At this point there are three possibilities for the system: 1) to reorganize; 2) to fall apart; 3) to return to the emergency area and then to the nominal mode of operation, but only by obtaining external resources for the system. According to the theory of crisis management [3, pp. 42-49], we can name these two areas, where the system operates in emergency mode *emergency areas* of security. Emergency areas are located to the left and right of the *nominal area of security*. In them, the system

operates under conditions of reduced level of security against its operation in the nominal area of security.

The system cannot operate outside the emergency area due to conditions of a high degree of uncertainty. The risks, threats and dangers of its existence are unbearable, that is why the system collapses. To overcome these risks, threats and dangers, external resources are needed to help the system return to more favorable modes of operation and prevent its collapse.

There are also specific areas within limit values of the areas, in which the risk rises and threats are constantly increasing by approaching the next lower security zones. This is also the subject of more in depth research.

References:

- Manev E., Definition of Security – Organizational Cultural Approach, Conference with International Participation, Bourgas Free University, 2016 (in Bulgarian: Определение за сигурност – организационнокултурен подход).
- Manev E., Global, Regional and National Security, Softrade, 2012, pp. 31–53 (in Bulgarian: Глобална, регионална и национална сигурност).
- Penev P., Fundamentals of the Crisis and Conflict Theory, Sofia, 2009, pp. 42–49. (in Bulgarian: Основи на теорията на кризите и конфликтите).