

AN ALTERNATIVE OF THE SYSTEM APPROACH TO FUNCTIONAL ASPECTS ANALYSIS OF THE MARITIME CRISIS MANAGEMENT SYSTEM

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Abstract: When answering the question “What kind of Maritime Crisis Management System (MCMS) do we need?” a useful tool is provided by the system approach. The traditional system approach, presented by the sequence “system goal (goals) definition – goal supporting strategy development – system technology and structure elaboration,” is not applicable to the process of MCMS analysis due to many reasons. The paper proposes an alternative method to study the MCMS functional aspects. The proposed approach describes the functioning of MCMS on the background of the Maritime Security Negative Factors (MSNF) evolution. The MSNF evolution is represented as a life cycle that follows the sequence: “emergence of maritime security challenges – evolution to risks – formation of threats.” The MCMS functioning is described by “Observation – Orientation – Decision – Action” (OODA) loops performed by the system in reaction to the negative factors and their evolution.

Keywords: Maritime Crisis Management System analysis and design; Maritime Security Negative Factors evolution; maritime security challenges, risks, and threats; system approach to security systems’ functional aspects analysis.

Introduction

The Black Sea region underwent considerable changes during the last decade. Concisely, the nature of the process is emergence of a dynamic maritime security environment. Many directions of the changes can be defined. But the most significant trend of the new security environment is the shift of the military efforts focus from high scale military conflicts to the area of crisis prevention.

As a result, the centralized maritime security systems in the Black Sea region, which were dominated by the Navies, have been replaced by multi-component models. An inevitable aftermath of this process is a capability gap in the network-organized Maritime Crisis Management System (MCMS).

Logically, the process of transformation has commenced in order to adapt MCMS to the widening content of the term “security.”

When answering the question “What MCMS do we need?” a useful tool is provided by the system approach.

The application of the system approach to MCMS should take into account the following considerations:

1. MCMS is an artificial system in its nature. The main consequences, which follow from this consideration, are the following:
 - MCMS’s structure is dominated by its functioning;
 - The traditional sequence for system’s architecture development is as follows: “system goal (goals) definition – goal supporting strategy development – system technology and structure elaboration.”
2. MCMS has been developed and it is maintained in order to protect the society from a certain set of challenges, risks, and threats.¹ The practical dimensions of this consideration are:
 - MCMS is subordinate to a suprasystem,² which means that MCMS performs predominantly adaptive functions in relation to society;
 - MCMS’s functioning is closely related to the security challenges, risks and threats manifestations and sometimes the reactions of MCMS are predetermined by the behavior of the negative factors.

Logical result of the derived considerations is the necessity to apply the following sequence of system analysis when studying MCMS:

- Functional analysis;
- Structural analysis;
- Analysis of MCMS’ system characteristics.

This article is limited to some aspects of the functional analysis. It proposes an approach for this analysis, which describes the MCMS’s functioning against the background of Maritime Security Negative Factors (MSNF) evolution.

Possible Approaches for Functional Analysis

The major task of functional analysis is the description of its contents. Two approaches are possible.

The *traditional approach*³ proposes the following sequence:

- Definition and analysis of the MCMS’s functioning goals;

- Decomposition of the goals into a system of objectives for their achievement. This decomposition should be performed for any of the goals defined;
- Elaboration of strategy as a set of objectives arranged in time perspective, whose fulfillment ensures the achievement of a separate goal. In practice, this process is a synthesis of an operational structure;
- Elaboration of technology as a relation between the strategy and the existing system structure. In terms of system architecture development, this stage provides a logical connection between the functional and structural aspects of the system.⁴

Due to many factors, the traditional approach sequence is not applicable to the process of MCMS's design.

The first factor that should be taken into consideration is the variety of situationally-oriented goals of MCMS's functioning. The possible goals of MCMS vary in a wide range of functional directions, starting from legislative initiatives, through education and training of the system's personnel, to reaction to a high scale threats. Even in the area of reaction to threats, there is a variety of potential goals because of the possible states of the environment in its political and physical aspects.

Such an approach is unable to provide viable results because of the existence of MSNF, which behave as a system. Typical representatives of this type of MSNF are piracy, terrorism, and organized crime. One of the trends, which these three factors have in common, is that their behavior pursues goals, which are antagonistic in relation to the goals of MCMS.

The situationally-based variety of goals could be systematized by the way of scenario development. Obviously, such an approach will help the application of the traditional approach for functional analysis and something more – it will contribute to the process of elaboration of a detailed system's model. But the question is "Is it necessary to achieve this detailed level in the process of system's architecture development?" There are arguments for and against.

Main advantage of the detailed description is the fact that it brings about a high level of practical orientation of the results.

On the contrary, such an approach may result in elaboration of a system, which is situationally-oriented, and which is designed for the achievement of optimal results but in a particular set of environmental conditions described by the scenario. It is well known that too often the ideas for optimization and for adaptability are not compatible.⁵ The possible consequences of such an approach are hyperbolized by the subjective nature of the scenario development process.

This contradiction could be overcome by correct understanding of the designation of the scenario development process.

The main motive in the scenario development process is to reveal the possible future conditions, in which the system will function. These environmental conditions provide, on one hand, a basis for definition of potential functional directions of MCMS's objectives, and on the other hand they serve as an environment for testing the fitness of the alternative realizations of MCMS's organization.

The notion is that scenarios should be used rather as criteria for testing the viability of the system than as requirements for system design.

The requirement for full compliance between, on one hand, system's strategy and structure, and, on the other hand, conditions of functioning, could be satisfied by delegation of authority to the system to select goals of functioning and related strategy in concrete situations. Obviously, such an approach necessitates the delegation of an authority to perform structural adjustment in support of the selected strategy. In other words, this approach means that the MCMS should be delegated with authority to decide on:

- *Strategic task*,⁶ related to the selection of a goal of functioning;
- *Tactical task*, related to the elaboration of a strategy and a supporting system structure aimed at achievement of a desired end-state.⁷

The idea of delegating authority to decide on the so called *strategic task* suggests that the traditional approach for functional analysis described by the sequence "definition of the goals of functioning – elaboration of a strategy – elaboration of a technology" should rather be set as a model in the decision-making process of MCMS than to be used as an approach for functional analysis when developing a model for MCMS.

Obviously, MCMS will possess a high degree of autonomy, which suggests the necessity to provide and maintain an adequate command and control authority to the suprasystem. This necessity, on one hand, poses requirements to the legal status of MCMS, and, on the other hand, insists on the application of the mission approach to the functional analysis of MCMS.

The *mission approach* for functional analysis needs a functional trend, which all possible strategies have in common. A good suggestion is provided by the idea to use the "life-cycle" of the MCMS's reactions.⁸

In order to apply the mission approach, we need a clear definition of the MCMS's missions.

For the purpose of this study we adopt the following definition of the MCMS's mission: "*To oppose any negative factor in the possible conditions of the maritime security environment.*"⁹

Taking into account the artificial nature of MCMS and its mission, the mission approach for functional analysis presented here aims to reveal the functional orientation of the objectives performed by MCMS against the background of the "life-cycle" of the negative factors presented by their evolution in the logical sequence: *challenges – risks – threats*.

The Negative Factors' "Life-cycle"

Answering the question "What has happened in the maritime security environment?" is a necessary prerequisite for the process of studying the evolution of negative factors.

The most significant trend of recent society is the process of globalization. The systematic aspect of this process is of high importance for understanding the evolution of negative factors.

Classically, the process of globalization is associated with the high connectivity, on one hand, between the components of the maritime security system, and, on the other hand, between the factors that this system is to counter. Regarding the negative factors, the direct consequences of this connectivity can be classified into two functional directions: an increased sensitivity of the system and a possibility for spontaneous self-organization of the components. Taking into account the fact that both directions are based on the possibility for rapid and practically only slightly controlled exchange of information, it is expedient to treat them simultaneously.

Increased sensitivity, as a consequence of globalization, is traditionally associated with the reverberation in society caused by the incidents related to maritime security. There is a high degree of correspondence between the public reaction and media coverage of such incidents. Even though this reaction reflects public sentiments, by no means is it directly proportionate to the scale of the events.¹⁰ Something more – the information related to the disadvantages of the security system is an object of significant interest for society and we have to recognize that there is a tendency to hyperbolize the disadvantages of MCMS. As a logical result, there is evidence that the reactions of MCMS suffer from the so called "CNN Effect."¹¹ The aftermath of this effect is that MCMS reacts with a priority to the occurrences, which irritates the "sense of social security," in comparison to the roots of the problems. The potential aftermaths could be hyperbolized by the opportunity that similar behavior can provoke an emergence of social bodies, whose members share discontent of reactions of MCMS in a particular situation.¹² There is a real danger that problems in the MCMS's functioning

can cause emergence of new challenges to security. To a great extent of certainty, we can state that the right to show dissatisfaction provides a tool for society to control MCMS's functioning, but the positive idea in this process can be distorted by the spontaneous self-organization of the negative factors. It should be noted that representatives of the so called "non-traditional threats" like piracy and organized crime will try to penetrate non-governmental organizations and movements in order to explore the opportunities to acquire information, manifest ideas, and even – escalate tension.

The idea of self-organization should be developed in one more direction – the opportunities for information exchange between the negative factors. The information exchange does not imply only a classical case of exchanging data. It explores the idea that the existence of only one subject, which counters the negative factors (the MCMS in our case), makes it possible any of the factors to acquire information concerning the disadvantages of the opposing system, using the "experience" of the other factors. It is not necessary to provoke an accident in order to reveal the defects in the MCMS's functioning – it is enough to look for a similar case in the media and to select a tactic, which has worked!

We have to recognize that examples for information exchange are fact. In the Black Sea region, there is a high level of coherence between the poaching and the contraband carried out by small ships, but the most dangerous aftermath remains the fact that piracy and terrorism are almost indistinguishable in definition and tactics!

The short description of the process of globalization in the area of maritime security provides a basis for the following requirement: MCMS should possess a high degree of autonomy and it should be able to perform rapid functional adaptation.

The brief description of the process of globalization in the area of maritime security provides also a basis for understanding the negative factors' "life cycle."

Classically, the evolution of any negative factor threatening the state's maritime sovereignty follows the logical sequence "a challenge – a risk – a threat." Obviously, it is necessary to provide definitions of these terms.

For the purpose of this study we have adopted the following definitions.

Challenge is a state of the environment that is directly or indirectly oriented against the presence of the governmental institutions, the non-governmental organizations, and/or the legal and physical entities in the National Maritime Spaces (NMS), whereas the adverse effect on their interests is hard to be identified and is characterized by a high degree of indefiniteness.

Risk is a state of the environment oriented against the presence of the governmental institutions, the non-governmental organizations, and/or the legal and physical entities in NMS, whereas it is possible for adverse effects on their interests to occur for an indefinite period of time.

Threat is a state of the environment oriented against the presence of the governmental institutions, the non-governmental organizations, and/or legal and physical entities in NMS, whereas it is highly possible for adverse effects on their interests to occur.

It is appropriate to illustrate the process of the so called evolution.

Any negative factor begins its existence as a challenge to social security. During this stage, we can say that social bodies arise in the form of groups of individuals united on the basis of mutual interests. In order to name such a community “a negative factor,” it is necessary for the motivation, which justifies the emergence of the organization, to be in a way contradictory to existing societal beliefs, traditions, and/or laws. Traditional reasons for similar unification are related to the presence of discrepancies in the existing *status quo*. In conditions of insufficient control over the information exchange, the Internet offers a suitable environment for such processes. The emergence of a challenge on the base of unification of individuals sharing common interests usually is motivated by the opportunity to exchange opinion.

With a high degree of certainty, we can state that the organization exists on the principle of voluntary participation and it possesses a very low level of structural identity. In this type of organizations, we cannot identify command and control bodies or standard organizational rules and functional procedures. The things we have for sure are the community of individuals sharing common opinion and showing interest in unification.

In similar situations it is possible to witness a process of self-organization. Suitable conditions for self-organization could be provided by:

- Leaving problems that provoke emergence of discrepancies unresolved;
- Existence of an environment for free communication (for example – an Internet site);
- Lack of sanctions for illegal information exchange;
- Presence of individuals and/or organizations interested in escalation of the existing discrepancies. Typical representatives are, on one hand, individuals and/or organizations deeply interested in the solution of the problems, but, on the other hand, individuals and/or organizations exploring the opportunity to cause riots in the society.¹³

If we have the conditions just described, we can witness the process of initial formation of an organization. Typical indications of this process are:

- Performance of activities, which are arranged in advance and represent the interests of the community;
- Development and maintenance of a specialized environment for communication among interested individuals (for example, an internet site with a forum, which needs registration and is maintained by administrator);
- Origination of a “managing body,” which performs rather coordinating activities than “command authority.”

At this stage, the organizational structure is more network-organized than centralized. The principle of voluntary participation remains valid, but the so called “would be members” should meet some requirements in order to be given access to the community. In terms of Internet-based communication, these requirements are usually presented by the requirement to fill an application form for registration in a forum. This act aims to estimate the readiness of the potential members to share personal information in a closed community and to follow the “rules” of the organization. In short – *the community selects its ranks and starts to bring them up.*¹⁴

To a certain extent we can state that the organization becomes “visible” for the society during this stage of its development. It is possible to overcome the challenge by undertaking adequate measures aimed at solving the problems that have provoked the emergence of the challenge.

The next stage of negative factors’ development is usually related to the process of hierarchy-creation of the organization. Classically, this process starts on a regional basis. In terms of organizational identification in Internet environment, we can say that the organization “steps out of the shadow of virtual anonymity.” Usually, the manifestations of this process are:

- Establishment of clubs for regular meetings;
- Delegation of a higher level of authority to the managing bodies;
- Establishment of more strict rules for membership;
- Establishment of sources for funding. The most common ways are donations and membership dues.

Significant reduction of the number of members is witnessed during this stage. Usually, there are two reasons for decreasing in number of the organization:

- The interests of the organization are in inconformity with these of a particular individual;

- Some of the individuals do not want to identify themselves with an organization.

We can say that the negative factor evolves from “challenge” to “risk.” The necessary conditions for this transformation are, on one hand, the processes described, and, on the other hand, the existence of interests and goals contradictory to those, existing in the society.

During the stage named “risk,” we can witness typical processes of organizational differentiation. Although the organization continues to perform activities standing up for and propagandizing the ideas which provoke its establishment, the dominant part of the activities is aimed at structural improvement. The typical activities are:

- Establishment of a legal basis for existence of the organization;
- Looking for sources for permanent funding;
- Establishment of privileges for members in contrast to the rest of society. Simultaneously with this process, the organizational discipline is strengthened;
- Transformation of the “managing bodies” to “command and control authorities.”

These processes are intensified by gaps in the laws and/or by crisis in the security system.¹⁵

Such a situation provides the opportunity for representatives of existing illegal organizations to penetrate the “new-born” organization. This fact implies that there are prerequisites, on one hand, for unification of the negative factors, and, on the other hand, for rapid information exchange among the negative factors, which contributes to rapid development of the factors and sudden escalation of tensions.

In practice, in the situation described, the necessary conditions for evolution of “a risk” to the stage of “threat” could be found.

The stage of “threat” is characterized by undisguised antagonism of the negative factor’s functioning towards the goals of the security system and the society as a whole.

It is possible to state that the negative factor is “mature enough” to oppose overtly to the security system and the conflict is unavoidable.

An Application of the Mission Approach for Functional Analysis of the Bulgarian Maritime Crisis Management System

The negative factors’ “life-cycle” provides the necessary background application of the mission approach for functional analysis of MCMS.

The congruence between negative factors' "life-cycle" and the main functional directions in MCMS's functioning is given in Figure 1. It is necessary to provide some arguments.

Regardless of the variety of possible approaches for decomposition of system's goals of functioning, there are two groups of goals.

The first group includes these functional directions, which are related to the reason for establishment of the system. In this group we have to include these functional directions, which have a direct relation to the achievement of the global goal of the system. Typical examples are acquisition and analysis of information concerning the negative factors and the environment, planning, and training.

The second group of goals is related to the self-reproduction and self-maintenance of the system. Classically, this set of functional directions includes educational, administrative, and legal activities.

It is appropriate to consider both directions.

As we have already mentioned, MCMS performs predominantly adaptive functions in relation to the suprasystem. The practical dimensions of the reason for MCMS's establishment could be summarized as a counteraction, in the sense of reaction, to the negative factors' manifestations. In this context, it is possible to group the different reactions as function of adaptation. When applying such an approach, it should be considered that there are three different levels of adaptation (adaptability): short-term, long-term, and evolutionary adaptability.

Short-term adaptability is a process of adaptation to the current situation. As such, it is a process of direct and situationally-oriented adaptation. It is performed predominantly by the way of functional adjustment.

Long-term adaptability is a process of adaptation to relatively predictable future conditions of the environment. It is performed by elaboration of structural requirements for functional adjustment to possible future situations.

Evolutionary adaptability is observed in unpredictable situations. Thus, it is performed by elaboration of structural requirements for the necessary system's properties for adaptation in cases of emergency.

Typically, the system reactions are based on preliminary preparation for action and acquisition of the necessary information. In this context, the first functional direction of MCMS's goals of functioning includes:

- Preparation for reaction in response to manifestation of a negative factor or combination of negative factors;

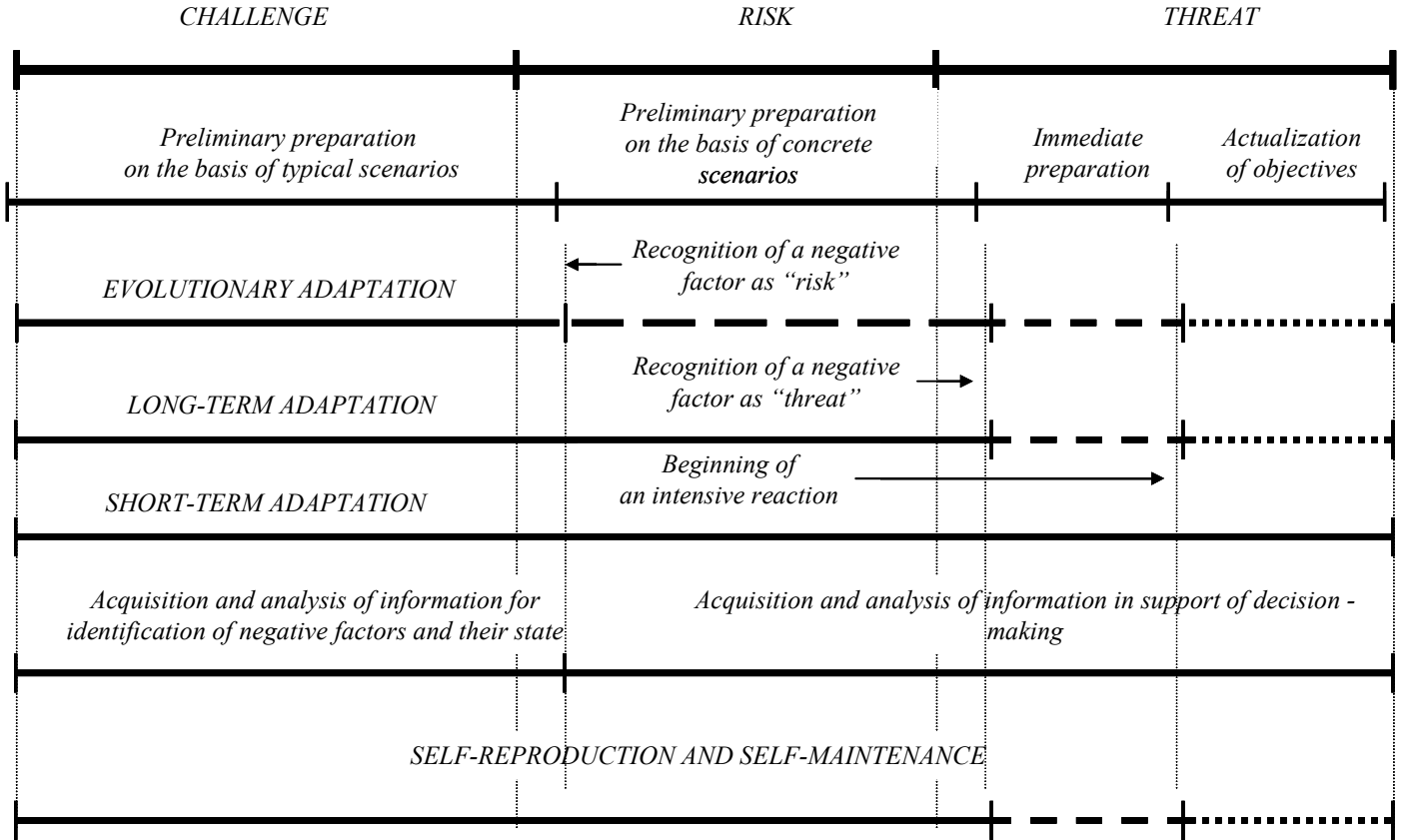


Figure 1: General Correspondence between Negative Factors' "Life-cycle" and the Functional Directions MCMS's Functioning.

- Reactions in terms of short-term adaptability, long-term adaptability, and evolutionary adaptability;
- Acquisition and analysis of information concerning the environment and the negative factors.

The reaction of any system is predetermined by the *system's memory*. In this context, it is appropriate to start the analysis looking for correspondence between the negative factors' "life-cycle" and the accents of the process of preparation of the MCMS's reactions. There are four directions in the process of preparation:

- Preliminary preparation on the basis of typical scenarios;
- Preliminary preparation on the basis of concrete scenarios;
- Immediate preparation;
- Actualization of objectives.

Preliminary preparation on the basis of typical scenarios is performed in circumstances posed by *an unidentified risk*.¹⁶ In terms of the process of preparation, MCMS performs the following activities:

- Development of typical scenarios;
- Development of typical reactions in the context of the typical scenarios;
- Examination of the system's functioning in the environment described by the typical scenarios.

These activities are usually performed through research, planning, and training.

Typically, the recognition of a negative factor as "risk" finalizes the preliminary preparation on the basis of typical scenarios. The focus of preparation shifts to *preliminary preparation on the basis of concrete scenarios*. The question is "*Who initiates this change of accents in the process of preparation?*" The Bulgarian practice shows that it is done by the suprasystem. The negative conclusions are:

- In fact, MCMS is being formed at this moment, which means that we have a complex of interacting components rather than a system.
- MCMS will react with delay to the negative factors' evolution.
- The "command level" becomes higher, which is not always necessary.

Preliminary preparation on the basis of concrete scenarios normally follows the sequence:

- Selection of a scenario (set of scenarios);
- Actualization of the selected scenario and elaboration of its detailed description;

- Planning of the reactions of the system in the concrete situation and in short-term perspective;
- Training of MCMS in the context of the elaborated scenario.

If the negative factor evolves to the state of “threat,” the next change of accents in the process of preparation could be witnessed – the process of *immediate preparation* begins.¹⁷

During this stage, the preparation activities are focused on the elaboration of a concrete plan for action. Thus, the immediate preparation is object-oriented and dominated by the situation.

The process of immediate preparation typically ends after the plan has been put into effect. The process of preparation focuses on *actualization of objectives* and maintenance of the plan. In fact, *the process of preparation is dominated and predetermined by the requirements to MCMS’s functioning posed by the short-term adaptation process.*

Against this background, we can start studying the development of the accents of the system’s reactions in response to negative factors’ evolution.

It is appropriate to start with the *short-term adaptation process* as a necessary prerequisite for long-term adaptability and evolutionary adaptability performance.

There are three distinctive stages in the short-term adaptation process:

- Before recognition of a negative factor as “risk;”
- After recognition of a negative factor as “risk,” but before its recognition as “threat;”
- After recognition of a negative factor as “threat.”

The short-term adaptation during the first stage is focused on the maintenance of a definite regime in the sea territories. A clear division of responsibilities among the MCMS’s components could be witnessed.

After the recognition of a negative factor as “risk,” usually a developed in advance plan is put into effect. Normally, the short-term adaptation process is focused on the recognized risk; the bulk of the activities remain maintenance of a regime, but usually the regime is stricter. The principle of division of responsibilities among the MCMS’s components remains valid.

The most significant change of the short-term adaptation’s accent takes place after a negative factor has been recognized as threat. During the previous stages, the MCMS’s reactions are preventive in nature. After recognition of a threat, the reactions are object-centered and they are pronouncedly active in nature.

It should be noted that after the recognition of a negative factor as threat, the *short-term adaptation process becomes dominant in relation to any other functional direction*. The evolutionary and long-term adaptation processes, in practice, stop and “melt” into the background of the short-term adaptation.

In similar situations, a clear situational orientation of the MCMS’s behavior could be witnessed. There is a real danger for MCMS to *lose the main goal of functioning*. Something more – focusing the efforts on the concrete threat could lead to inadequate reactions to the rest of the negative factors. In order to overcome this tendency, security systems usually undertake the incorrect but reasonable approach of treating different negative factors as equal to the most dangerous one.¹⁸ The reason for similar behavior is not only that MCMS does not possess resources, but, also, MCMS does not have a will to react in a different way to different threats. It should be pointed out that *a specific trend of security systems is the fact that they perform full-value functioning in emergency situations* when a great deal of restrictions over them are no longer valid and they can mobilize their full resources.

The following conclusions could be drawn:

- Once activated, MCMS will tend to overstate the real situation;
- Some problems should be expected when trying to “deactivate” a security system after the desired “end-state” of its activation has been achieved.¹⁹

The long-term adaptation process has two distinctive stages:

- Before recognition of a negative factor as “*risk*,”
- After recognition of a negative factor as “*risk*,” but before its recognition as “*threat*.”

During the first stage, the long-term adaptation is focused on both maintenance of a definite regime in sea territories and its actualization in the context of changes in the security environment. There is a direct correspondence between the short-term and the long-term adaptation processes. The main difference is the following – while the short-term adaptation is focused on imposing a regime and its maintenance, the leading motive in long-term adaptation is the process of elaboration of a regime, which is adequate to the situation and adaptive to foreseeable changes in the environment.

Analogous correspondence between the short-term and the long-term adaptation could be witnessed after recognition of a negative factor as “*risk*.” During this period, the focus of the long-term adaptation is on the following directions:

1. Actualization of the regime in the sea territories in conformity with the situation and its foreseeable changes;

2. Elaboration and putting into effect of concrete structural and functional schemes in the context of the elaborated scenarios.

Logically, both directions go closer with the necessities of the short-term reactions.

The *evolutionary adaptation process* is even more limited in time perspective on the background of the negative factors' "life cycle." In practice, the MCMS's ability to perform such activities is restricted. In this context, the evolutionary adaptation is performed by means of elaboration of the necessary prerequisites for emergence and realization of desired system properties. The activities are:

- Elaboration and putting into effect of structural adjustments, which are adequate to possible future MCMS's functions (goals);
- Elaboration of administrative and legal bases, which are necessary for adaptive (flexible) management of MCMS in unforeseen situations;
- Training and management of the MCMS's personnel in order to provide the personnel with the ability to maintain the MCMS's functioning in unexpected and extreme situations.

There is a direct correspondence between long-term and evolutionary adaptation. The main difference between these processes is the following – while the evolutionary adaptation is focused on the elaboration of the system's properties necessary to maintain the goal-oriented functioning in unforeseeable situations, the impetus of the long-term adaptation is on the elaboration of structural requirements and/or system's properties necessary to maintain the goal-oriented functioning in relatively foreseeable conditions of functioning.

All the functional directions discussed above are supported by the process of *acquisition and analysis of information concerning the environment and the negative factors*.²⁰

Considering that this functional direction is closely related to the MCMS's reactions in a particular situation, it is reasonable to discuss its accents in the following periods:

- Before recognition of a negative factor as "risk;"
- After recognition of a negative factor as "risk."

During the first period, the process of acquisition and analysis of information is aimed at identification of negative factors and their status. This includes acquisition of information about:

- The status of known threats;
- Adequacy of the regime in sea territories with respect to the current security environment;

- Tendencies in the security situation, which pose requirements to the process of actualization of MCMS's training;
- Emergence of new challenges.

After recognition of a negative factor as "risk," the process of acquisition and analysis of information focuses on tasks, which support elaboration of object-oriented MCMS's reactions. Because of the variety of possible objectives, it is advisable to summarize that after recognition of a negative factor as "risk," the process of acquisition and analysis of information is integrated to the full possible extent with the command and control functions.

The division of surveillance efforts between different departments is organized on a functional basis and the intradepartmental division is generally territory-based, although some cases of functionally-based scope of responsibility are also possible.

At this point, the following subjects, which have control over the national maritime spaces and have their own surveillance systems, respectively, are set up and are operational: Naval Forces at the Ministry of Defense, Chief Directorate "Border Police" at the Ministry of Interior, Executive Agency "Maritime Administration" and Executive Agency "Port Administration" at the Ministry of Transport, and the Customs Agency at the Ministry of Finance.

The Navy is in the best position to conduct surveillance operations. Its surveillance system comprises subsystems for underwater, surface, and air surveillance. In addition, the Navy obtains information from the Military Command and Control Information System (MCCIS), functioning within the framework of NATO.

The Chief Directorate "Border Police" at the Ministry of Interior has a system for surveillance of the national water of the Republic of Bulgaria and maintains a system for sharing of information related to the border security of the country.

The Executive Agency "Maritime Administration" is also capable of conducting surveillance operations. Within the framework of the Agency, a Vessel Traffic Management Informational System (VTMIS) is set up, which operates on a particular level of the system. The system ensures the constant surveillance and the control of shipping in the sea territories. VTMIS combines the sensor information from the surveillance in the national maritime spaces with the data gathered from the Global Maritime Distress and Safety System (GMDSS) and the Automatic Identification System (AIS).

The Executive Agency "Port Administration" makes use of VTMIS for conducting surveillance in the respective regions and even more has at its disposal a system for information sharing on the technical condition of the ships, cargo, and information on the routes.

The Customs Agency does not possess a sensor system for surveillance, but has access to the database, which provides information on the economical aspects of the cargo.

For the time being, the Civil Protection National Service at the Ministry of State Policy for Disasters and Accidents is also accelerating its work. The authorities intend to ensure the information supply in many aspects, including the current problem of preventing oil spills.

The Regional Inspectorate of Environment and Water at the Ministry of Environment and Waters is faced with analogous problems regarding the information supply.

The indicated diversity can be vastly enriched through the inclusion of various economically-oriented (Navigation Maritime Bulgare) and voluntary structures (BULSAR Association).

Due to a number of reasons, the subjects that exercise control in the national sea territories have built their surveillance systems on different technological basis, which leads to serious difficulties in unification of the information streams of the various surveillance systems in one common picture of the national maritime space environment.

The necessity for integration of the information streams results directly from the current concept of control in the national maritime spaces, envisaging sharing of surveillance responsibilities in the sea territories based on a functional principle in conjunction with an opportunity for unification of the efforts in a crisis situation.

A serious argument for integration of the different components' efforts in the area of acquisition and analysis of information is posed by the necessity for timely activation of MCMS in response to an evolving negative factor.

In spite of the fact that the information exchange among the MCMS's components is arranged by an instruction, there are many obstacles for full-value cooperation. Some considerations related to the confidentiality of information, different protocols of the data from sensors, different formats of structured messages lead to the following consequences – *the level of the command authority of MCMS is raised to a governmental level*. As a result, MCMS suffers lack of flexibility and autonomy in dynamic environment.

Once established, any organization elaborates and maintains a set of goals, which are relatively different from the reason for establishment of the system. This functional direction could be named in general *self-reproduction and self-maintenance of the system*.

Normally, this direction includes activities such as education, selection of personnel, legal, administrative, and financial activities. The leading motive of these activities is the will for achievement of an organizational identity. As a result, intra-system rules and traditions are established, which are aimed, on one hand, at enhancing the system's integrity by the way of stimulating the feeling of belonging to an organization, and, on the other hand, at establishing of a clear border between the organization and the environment or other systems.

Since there are a great variety of activities in this functional direction, we are not going to discuss them. It is appropriate to summarize that the accent of these activities is focused on achievement of an organizational identity and establishment of prerequisites for adaptation of the system to the environment, independently of the conditions of functioning. It should be mentioned that the self-reproduction and the self-maintenance of the system are directly related to the long-term and evolutionary adaptation processes performed by MCMS in its own interest. In this context, it should be taken into account that it is possible for the MCMS's interests to be sometimes controversial to these of the suprasystem.

Due to many reasons, the functional direction of self-reproduction and self-maintenance goes closer with the necessities of the short-term reactions after the recognition of a negative factor as "threat." A typical manifestation of self-reproduction and self-maintenance is performance of activities aimed at the physical demolition of anything, which threatens the MCMS's existence.

Conclusion

In conclusion, we intend to summarize the results of the briefly presented mission approach for functional analysis of the Bulgarian MCMS. In a nutshell, this approach helped us not only to reveal the disadvantage of the system's functioning, but also to define concrete recommendations how to overcome them.

It should be considered that we do not propose a new theory or even a concept. What we propose is a different point of view when studying functional aspects of artificial organizations.

In this context, the mission approach for functional analysis is not contradictory to the traditional one. It provides an idea how to improve it.

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Notes:

- ¹ Definitions of the terms “challenges,” “risks,” and “threats” are proposed later in this article. We use here very often the term “negative factors” as a synonym of the terms “challenges,” “risks,” and “threats.”
- ² For the purpose of this study we consider the society as a whole to be the suprasystem.
- ³ Vladimir S. Anfilatov, Aleksandr A. Emelyanov, and Aleksandr A. Kukushkin, *System Analysis in Control* (Moscow: Finance and Statistics, 2003), 62–68.
- ⁴ The correct moment of transition from functional architecture development to structure elaboration is usually unclear because of the iterative nature of the process. It should be noted that there are two typical approaches for technology development. The first approach is observed when the technology is elaborated for a system with a given content. In this case, the strategy is tied down with the existing system’s components on the basis of their capabilities and principles of their usage. When the technology is elaborated for a non-existing system, the system’s components are described by the list of necessary capabilities for the successful fulfillment of the objectives. A typical example is the “Statement of Requirements” in the military operational planning process; see Guidelines for Operational Planning. (GOP Final Revision 1 JUNE 2005. NATO Restricted) – NATO: SHAPE, 2005, p. 4-29.
- ⁵ Yaneer Bar-Yam, *Dynamics of Complex System (Studies in Nonlinearity)* (Westview Press Inc, July 2003), <necsi.org/publications/dcs/> (21 October 2005); Robert J. Lempert, Steven W. Popper, and Steven C. Bankes, *Shaping the Next One Hundred Years: New Methods for Quantitative, Long-Term Policy Analysis* (RAND Corporation, 2003), <www.rand.org/pubs/monograph_reports/MR1626/index.html> (21 October 2007), p. 44.
- ⁶ Anfilatov, Emelyanov, and Kukushkin, *Systems Analysis in Control*, p. 215.
- ⁷ In short, it means that the system will have the right to select both, an end-state and a trajectory to achieve it.
- ⁸ Typically, the term “life-cycle” is used to describe processes in a system starting from its physical establishment to its physical death. In this study, we propose a different meaning for the term “life-cycle:” the functioning of the system in response to emergence of a particular negative factor and its evolution. An inseparable part of the MCMS’s “life-cycle” in this case are “OODA Loops” (*Observation – Orientation – Decision – Action Loops*) performed by MCMS.
- ⁹ The definition proposed is based on our understanding of the term “mission:” a full set of possible goals performed in all possible conditions of functioning.
- ¹⁰ Although unrelated to the sea, an example from 9 February 2007 is illustrative – the protest of the taxi drivers, enraged by the murder of a counterpart of theirs, caused substantially stronger reverberations in the national media than the protests in support of the Bulgarian medics in Libya that had been scheduled for the same date.
- ¹¹ Kevin B. Glenn, “Complex” Targeting: *A Complexity-Based Theory of Targeting and Its Application to Radical Islamic Terrorism*, Master’s thesis (Alabama: Maxwell Air Force Base, Air University, School of Advanced Airpower Studies, June 2002), <www.au.af.mil/au/awc/awcgate/saas/glenn.pdf> (21 October 2007), p. 23.
- ¹² The discontent within the Bulgarian society of the reaction of the Turkish authorities to the sinking of the Bulgarian motor vessel “Hera” led to emergence of movements, which

established a number of committees. The committees succeeded to find out supporters even in the European Parliament!

- ¹³ Classical examples are terrorist organizations, but there are organizations with a different motivation. For example, political parties use any opportunity in order to discredit the governing political formation.
- ¹⁴ An interesting example is the emergence of the association “Present and Future Mothers” in Bulgaria. The initiative started in the middle of May 2006. It started in the forum of the Internet site <bg-mamma.com>. The idea evolved for a couple of months. Two national protests were organized: on the 1st of June and on the 1st of July 2006. The association “Present and Future Mothers” was officially founded on 19th of July 2006. The requests of the association were supported by 17 000 people who signed electronically a petition on the site of the organization in a couple of days. As a result of the initiative, a legislative act was prepared and adopted by the Parliament.
- ¹⁵ In many cases, inadequate intervention of the security system could provide a strong impulse to the evolution of security factors. Unfortunately, Bulgarian security policy provides a suitable example of such behavior. The “attack” against torrent takers performed on the 12th and on the 13th of March 2007 was, not only, a failure, but also resulted in the very unpleasant fact that the torrent takers moved abroad. In practice, the illegal Internet traffic from national scale was raised to an international one. The reason to undertake this “attack” on internet piracy was the annual “Special 301” Report of the global state of intellectual property rights (IPR) protection and enforcement, conducted by the Office of the United States Trade Representative. In fact, “Bulgaria has been removed from the Watch List due to improvements in IPR enforcement efforts and passage of IPR legislation in response to heightened engagement with the United States;” see *Annual “Special 301” Report of the Global State of Intellectual Property Rights (IPR) Protection and Enforcement*, conducted by the Office of the United States Trade Representative, <www.ustr.gov/assets/Document_Library/Reports_Publications/2007/2007_Special_301_Review/asset_upload_file230_11122.pdf>, (22 October 2007).
- ¹⁶ “An unidentified risk” means that the negative factor is in a stage of “challenge” or it has already evolved to a state of “risk” but the security system has not recognized that development of the factor.
- ¹⁷ It is possible to say that this process starts immediately after the evolution of a risk to threat. Taking into account that a negative factor tries to “escape the public attention” in order to improve its structure, we have to say that there will be delay in the MCMS’s reaction with respect to the negative factor evolution.
- ¹⁸ As an inseparable part of any state of emergency, stricter laws are usually put into effect.
- ¹⁹ History shows many examples when the successful end of a war led to a high degree of militarism in the post-war society, even regimes established through *coup d’etat*.
- ²⁰ It should be noted that this function is closely related to the processes of decision-making and command and control. Something more – in the C4ISR systems this function is an integral part of the command and control activities. Notwithstanding this fact, it is recommendable this function to be discussed separately in the article. The arguments are: 1) At the moment, a perfect example of a C4ISR system does not exist and there are some differences among the theoretical descriptions of similar system; 2) It is difficult to name the Bulgarian MCMS a system, still more – a C4ISR system; 3) In terms of philosophy, the Law of prerequisite variety cast a shadow of doubt on the possibility to establish and control a similar artificial organization in the security sector.

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