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# MANAGING CONTEMPORARY SECURITY THREATS IN THE LIGHT OF THE SYSTEMS THEORY
## - Case Study: COVID-19 -

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**Abstract:** The crisis that emerged from the COVID-19 epidemic represents a complex problem situation, characterized by an enormous number of various subjective and objective factors, as a result of multiple co-determination, mutual causality and variable interactions between them. Furthermore, there is a significantly high level of uncertainty, primarily based on the fact that it is about relatively new and unknown risk factors, and its initial changes led to dramatic consequences in every aspect of life on national, regional and global levels, in an extremely short time. The effect of the time "compression" and the ultimate destructive potential of the epidemic have been added to already limited possibilities in the aspect of planning and decision-making, in order to manage the crisis situation as adequately as possible.
Starting with an interdisciplinary approach to resolving complex problems, by exceeding the "artificial" dichotomy between natural and social sciences, the system approach emerges as the most adequate approach for managing existing crises. Finally, the co-authors reviewed different ways of managing crisis situation, or different strategies for exceeding crises (specifically the pragmatist approach), the potential of the short-term prognoses and predictions (with an accent on the famous scenario-planning method), including the implications of the strategic "surprises" (black swans, black elephants, or dragon kings).

**Keywords:** COVID-19, risk management, crisis management, systems theory, uncertainty.

### 1. Introduction – epidemic as a complex problem

The key challenge of today for every decision maker is complexity. Complexity, as a characteristic inherent to all complex systems, and especially those that include human activity, is a fundamental determinant of risk management. Complex systems, like society, imply the existence of a large number of autonomous agents (elements of the system) that interact with each other in various ways towards achieving a common goal (as real, open, dynamic social systems). The very nature of this mutual connection is complex, since each of the actors can have very different (often conflicting) interests and goals. The environment is not a static entity either, but has a dynamic and varied effect on each of the actors. In

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complex systems, therefore, there is no determinism, but uncertainty is present. In order to understand complex systems, in addition to understanding agents individually, it is necessary to understand all types and variations of interactions between them, including interactions arising from/with the environment. Therefore, the framework for solving complexity depends on new properties obtained from the synergy of the interaction of interdependent parts (Petrović 2006, 39).

Crisis management, like the recent COVID-19 pandemic, is a "book" example of a complex problem or, more precisely, a problem situation. The initial dilemma was the fact that it was an insufficiently structured problem, accompanied by various uncertainties. It became difficult to recognize all the elements (on the strategic, tactical and operational level), their mutual interactions (both among themselves and in relation to the "crisis"), and thus the potential numerous outcomes (on different levels). As these outcomes essentially represent the result of the action of numerous and different factors (in relation to agents and the environment), objective and subjective, and which, even when recognized, cannot always be properly quantified, one of the biggest obstacles to the management of such crises is the fact that the problem can only be defined fragmentarily (if at all), that is, its solution can be only partially formalized.

Speaking specifically about the management of the COVID-19 epidemic, it started with the presence of a large number of actors (political leadership, crisis headquarters, epidemiologists, including the health and economic sectors, even the citizens themselves, as well as the media), with a wide range of different goals, interests and perspective. Although in principle one primary goal (suppression of the epidemic) is spoken of, its optimization necessarily implies that the realization of other, individual goals is partially or completely thwarted. In other words, the mutual dependence of the actions of different agents (from the fields of politics, health, economy, etc.) means that the action of one of them inevitably affects the others. In this sense, we are speaking about the existence of many different solutions to the problem situation, i.e. different ways to achieve the final goal, and which can have different purposes (according to individual prioritization).

As the crisis went beyond the framework of the health crisis, leading to dramatic consequences in almost all spheres of social life (economic, social, etc.), its management was not conducive to a reductionist approach. Even a simple division into isolated problems (according to fields) cannot provide a solution that, through subsequent synthesis, could be applied to a broader national, regional, and especially not global level. Instead, we are speaking about a complex problem situation that represents a kind of a scheme of joint interaction and multiple causality (Petrović 2006, 40) and, we would add, co-determination. At the same time, one must take into account the fact that the nature of this scheme often seems unclear (2006, 40).

The COVID-19 epidemic, therefore, as a complex problem, was characterized by a large number of interactions between a large number of subjective and objective factors of different types, but also according to priority, a large number of different actors with different goals and (often contradictory) interests, which were networked in order to come to a choice among potential alternative outcomes, which would suit everyone, as a compromise.

As a starting point for the management of such complexity, the "creation" of an organized framework is imposed, which would include agents, interests, goals, activities and measures, resources, and, finally, alternative outcomes. Complex risk management implies

the inclusion of subjective observations and interpretations as well as objective assessment of reality (2006, 41). „Our finite, part-emotional, part-logical mind, which is our window through which we see the world, has its own complexities. These internal complexities must be understood on their own, because our construction of reality is relative to our physical and behavioral environment. What we want is to close or at least reduce the gap between the current and the desired, progressing through a series of alternating decisions and evaluations, in time and in parallel, comparing staged results until the goal is achieved. What we need are sensitive ways to deal with our problems, that is, approaches that facilitate the use of creativity and experience in structuring complex problems and implementing their solutions in a systematic and accessible framework" (2006, 37-8).

The impossibility of a precise description of the crisis caused by the epidemic, as a problem situation, lead to the urgent need to use a sufficiently flexible methodological instrument in its management, that is, adapted appropriately to the degree of this complexity. Finally, there are grounds for asserting that this crisis could be found as a subject of mathematical-operational research, while recognizing the advantages of applying fuzzy logic.

## 2. Risk and Crisis Management

In the context of the crisis caused by the COVID-19 epidemic, risk management, by analogy with the legal definition (of the Republic of Serbia), would imply a set of measures and activities that are carried out with the aim of implementing the policy of reducing the risk of "destructive scenarios" or "disasters", as well as administrative, operational and organizational skills and capacities for their management. It is a policy that is established and conducted with the aim of preventing new and reducing existing risks through the implementation of integrated and inclusive health, social, economic, normative, political, educational and other measures, which strengthen the resilience and preparedness of the community to respond and mitigate the consequences (Law on Disaster Risk Reduction and Emergency Management, Republic of Serbia). On the other hand, if the response to the risk exceeds the institutional capacity of the system to the extent that the resulting circumstances can lead to irreversible damage in its vital sectors, then we are talking about a crisis. The crisis is therefore also defined as "a serious threat to the basic structures or fundamental values and norms of the social system which, in conditions of time pressure and very uncertain circumstances, requires making of critical decisions" (Đukić 2017, 337), and, we would add, additional investment efforts.

It is clear, therefore, that the crisis initiated by the epidemic is a complex problem that affects all spheres of the state and society. In none of these areas of action, however, can an isolated and independent problem be identified, but the final outcome of the crisis situation depends solely on the combination of interactions between them. In this way, even the mentioned measures cannot be planned, defined and implemented independently of each other (according to the principle of specialization), but only in a wider context, as mutually dependent elements of the system, while always keeping in mind the potential of variations of their interactions for changes in the final score. Moreover, it seems that the aforementioned, when adopting measures and procedures in the "fight" against the recent epidemic in the Republic of Serbia, but also in some places in the region, was not given adequate importance.

In this regard, it is important to point out that the management of an emergency situation requires coordination and management of all relevant actors with the aim of an organized response to disasters and rapid recovery, i.e. that risk reduction, among other things, implies intensive mutual cooperation of all competent institutions at all levels of government, as well as partnerships with private and public companies, other legal entities, entrepreneurs, civil society organizations and all interested citizens who can provide their own contribution to risk reduction in any way (Đukić 2017). All of the above only speaks in favor of the need for a general social, coordinated, comprehensive response to the emerging crisis, taking into account the advantages, but also the necessity of the participation of all relevant actors, and taking into account the requirement for the coordination of the actions of each actor with all others. In this sense, it is necessary to discuss the lack of adequate participation of local self-government units (due to limitations imposed by the action of the strategic level) in responding to the recent crisis situation.

On the other hand, according to the legal definition (of the Republic of Serbia), risk assessment, as a "combination of the probability that a disaster will occur in a certain period of time and with certain negative consequences", is "determining the nature and degree of risk from potential danger, state of vulnerability and consequences that can threaten people's life and health, the environment and material and cultural goods" (Đukić 2017, 337). The ultimate goal of this assessment is to prevent possible or mitigate already occurring consequences based on the fullest possible understanding of their risks. In order to achieve the conditions for valid risk treatment, i.e. for adequate treatment of identified risk, in terms of determining activities for taking preventive measures to reduce risk, and preparing for the readiness and training of forces and subjects for response, it is necessary, first of all, to correctly understand the risks and thus define them appropriately.

Finally, it is clear that the decisive influence on all stages of risk management, starting from prevention as a set of measures and activities for mitigating existing risks and reducing the risk of new consequences, through readiness in terms of knowledge and capacities that are developed for effective response and renewal, itself response and recovery, but also to strengthen the resilience of the community, as the ability to respond to the dangers to which it is exposed, recover from negative consequences and regain its basic functions if they are impaired, has exactly the right understanding and the most precise possible identification of risks, as well as " prediction" of all possible significant potential scenarios (Stanković 2021, 2022a, 2022b; Stanković, Lipovac 2022). In this regard, with the passage of time, the consequences of the apparent misunderstanding of the various aspects of this risk will be more visible and clearer, and, consequently, "deficient" prediction of the further sequence of events. Based on the above, the decision-making process is of crucial importance, which is usually divided into the following stages: identifying the problem, determining possible alternatives for solving the problem, choosing the most favorable alternative, implementing the chosen alternative and collecting feedback (Certo 2000, 150).

Strategies for overcoming the crisis

The literature knows different ways of managing crisis situations, i.e. different strategies for overcoming the crisis, with the fact that in practice the principled approach, based on the precautionary principle and the principle of minimizing damage ("better safe

than sorry", "better more than less") is most often encountered (Boin, 2020). The choice of this management model seems to be the most attractive for the decision-makers themselves, since it somehow justifies all decisions made and measures implemented with the aim of protecting critical values. In the concrete example of the Republic of Serbia in the recent situation, the application of this very strategy in the moments of implementation of the most rigorous measures to minimize damage to the life and health of its citizens (health aspect) was more than obvious. And yet, the success of the applied management model is significantly limited, in this case, and the degree of respect for political authorities based on citizens' trust in the validity and justification of the decisions made, which is why, in relation to the public, the emphasis was continuously on strengthening civic solidarity. However, we cannot resist asking the question, isn't the latter rather radical "relaxation" of measures an example of the application of this strategy, with the aim of minimizing damage in the domain of economics and politics? All of the above is supported by the use of the metaphor of "war against an invisible enemy" in which a strong intervention in social, economic and other spheres of social life is necessary for victory.

The most fruitful would certainly be the application of a pragmatic approach (Boin, 2020) based on a carefully selected and scientifically based action that would make it possible to continuously adapt to any relevant change in circumstances. In other words, based on the continuous monitoring of feedback, decisions adapted to the recent situation would be made almost simultaneously. However, we are speaking about a challenge that only those extremely organized systems capable of acting immediately upon receiving a response, that is, adequately prepared and ready for action in an extremely short period of time, are able to implement it. We should also add that there seem to be grounds for the claim that in the Republic of Serbia, immediately before the declaration of the epidemic, an approach characteristic of "paralyzed" decision-makers was applied, embodied in the maxim "Sit tight, do nothing" (Boin, 2020), assuming it's "worth the wait". This action, whether consciously or not, has led to significant unintended side effects.

## 3. General Systems Theory

Starting from the importance of an interdisciplinary approach to solving complex problems, by overcoming the "imposed" division into the methodology of natural and social sciences, a systemic approach to the management of the resulting crisis appears as the most optimal. It seems that the grounding in the general theory of the systems, with its numerous "tools" (primarily referring to those created by the growth of technological achievements), would represent a good starting point for a comprehensive, systemic overview, i.e. defining such a complex problem situation.

An indispensable companion of complexity, as already mentioned, is uncertainty. Considering the number and variety of actors, their interactions and all other subjective and objective factors inherent in the resulting crisis, it is clear that this is a process that is necessarily characterized by a high degree of uncertainty. It follows from the above that decision-makers can only use short-term forecasts and predictions. Any long-term implications of the resulting situation, viewed from any angle, would be ultimately unreliable.

Non-linearity, as a feature of the system that makes it impossible to analyze it from the point of view of reductionism, additionally emphasizes the need to respect the

systemic approach to the management of the crisis caused by the epidemic. Uncertainty, in that sense, is a direct consequence of non-linearity, because if the course of the epidemic and accompanying phenomena were guided by the principle of linearity, the future would be in a certain sense proportional to the initial state (expected and predictable), which is certainly not the case. When it comes to non-linear systems, such as society, it is primarily necessary to understand the uncertainty and non-linearity itself, which previously imposes as a condition the need to know "well" enough and precisely define all relevant aspects of the current state of society as a system. Since the above is not feasible in practice for many reasons, and primarily considering that it was a new and insufficiently known virus, when managing this crisis, or, more precisely, making decisions with the aim of suppressing the epidemic and mitigating the negative consequences, there should always be a talk about "multiple paths to the future" (Potkonjak-Lukić, Stanislav Stojanović 2016, 103).

As already pointed out, neither the recognition nor, in particular, the quantification of all relevant (subjective and objective) elements of the system (variability of the characteristics and interactions of society, measures, viruses, etc.) determining the entire range of paths into the future, which in theory is called the "range of uncertainty" (Saperstein 1996). It should be emphasized here that with each prediction one must count on a lower or higher degree of uncertainty. Therefore, bearing in mind the pronounced complexity of the entire set of interactions that characterize society as such, and the fact that societies are real dynamic systems that are always open to influences from the environment (at the same time influencing it back), continuous change is always and everywhere a present process. Based on the above, it is clear that the possibility of any more precise prediction of security phenomena (especially global ones) is significantly limited by their complexity and non-linearity.

Considering that the process of strategic planning is extremely complex in itself, it is necessary to apply a sufficiently flexible approach in dealing with such a crisis, whereby the speed of reaction becomes one of the crucial factors of an effective response to current circumstances, and in order to direct society as a system towards the desired state and to set goals. Thus, some of the biggest omissions made in the response to the recent crisis are linked precisely to the absence of a timely reaction. In managing crises like the recent one, decision-makers must be aware that when making decisions, neither in theory nor in practice, can they count on the certainty of the outcome (due to the aforementioned), and that it is necessary to invest additional towards acquiring comprehensive and complete knowledge and understanding of all relevant circumstances, that is, the dynamics of numerous multiple interactions. Only after fulfilling this requirement can one begin to consider the optimal ways of adapting to specific circumstances, that is, the selection of the most suitable adaptive mechanisms.

The time dimension, therefore, had a particular importance for the management of this crisis, since there was not enough time to properly and fully perceive and understand the new situation. Every, even minimal change has the potential to reach enormous proportions very quickly because "the growth of errors takes place exponentially" (Potkonjak-Lukić, Stojanović 2016, 111), with a similar tendency as the growth of the number of infected persons. In this way, depending on the way of "dealing" with complexity and non-linearity, it will result in the society choosing the path of adaptation and development, or, on the other hand, result in unwanted and unnecessary human and material losses, unnecessary consumption of resources, and all accompanying side-effects.

Finally, the systemic approach is simultaneously a "mathematical and intuitive" paradigm (Simonović 2011, XXVVII), applicable to all phases of crisis management - prevention, preparedness, response and recovery. Unfortunately, the methods and techniques that are commonly used do not follow the dynamics of security phenomena and processes, the environment, as well as the current, dizzying technological progress, starting with the fourth industrial revolution. Acknowledging the need for a flexible and innovative methodology appropriate to the achieved technological progress, it seems fruitful to make the most of the potential offered by the application of mathematical-operational models, computer programs, and especially databases.

**4. Prediction in conditions of uncertainty**

When dealing with such a complex crisis, it is necessary to start from the acceptance of the fact that complexity necessarily entails uncertainty, and that forecasting as such is not possible, or at least would not be particularly fruitful. Therefore, the only practically usable possibility remains thinking about future events in a systematic way, with an increase in the range of tools for planning and analysis, primarily in the context of methods and techniques that would help in reducing the degree of uncertainty, i.e. mitigating the frequency and intensity of "surprises". In the literature, similar methods are also referred to as foresight or futures thinking (Ho 2017).

One of these methods of thinking about the future is the well-known method of scenario planning (Ho 2017), the result of which - concrete scenarios - represents a reference framework, i.e. a base for strategic planning. While formulating potential future scenarios of the current crisis situation caused by the epidemic, each scenario would have to be viewed through a series of "bifurcations" or fork points, each of which, depending on specific choices/events/circumstances, would lead to two alternatives. In this way, the first bifurcation point would generate two alternatives, the next four, the next eight, etc. It is also important to point out that the bifurcations take place more and more quickly, thereby achieving the effect of "compression" (Potkonjak-Lukić, Stojanović 2016, 110). Also, as already pointed out, in this case it is not about linearity either, but each point of bifurcation implies one of two alternatives, the realization of either of which depends on a large number of different factors.

On the other hand, this epidemic was commonly "labeled" as a black swan, that is, a rare and hard-to-predict event that is not only surprising, but has such an impact that it changes the entire course of the game or the final score (Ho 2017). Or, in other words, as an unexpected cataclysmic event. From the point of view of China and countries close to it, there are grounds for discussion about this phenomenon, but from the point of view of European countries, it seems more probable that it is a black elephant, i.e. a problem that was already visible to everyone, but by underestimating it, political leaders and other relevant decision-makers avoided having to face it, so they acted as if it did not exist. When it emerged in its full manifest form, everyone acted surprised and "shocked" as if it was a black swan.The creator of the black swan himself (Nicolas Taleb) then expressed his regret about the fact that this pandemic, as a phenomenon that could have been predicted to a certain extent, is defined as a black swan, and it was an insufficiently good excuse for the absence of an adequate and timely reactions (Avishai 2020).

There is, however, another potentially extremely fruitful approach to predicting the emergence of phenomena such as a pandemic- unlike the black swan and even the black elephant, this phenomenon can also be defined as the dragon king. Dragon king, whose creator is Didier Sornette, is the name for rare phenomena that produce consequences of enormous proportions (like the black swan), but which can be anticipated with a certain probability. Specifically, we are speaking about phenomena that lead to huge effects (king), but which are also of unique origin (dragon) compared to others that belong to the same category (Sornette, Guy 2012). Given that they have characteristics of non-linear and complex systems, it is suggested to closely monitor their dynamics in order to recognize the indicators of existence of a high degree of probability for the creation of dragon kings. When it comes to predicting an epidemic, undisputed explanatory potential also has the so-called "epidemic phenomena", by analogy with the "herd effect", to explain the way in which any epidemic can reach dramatic pandemic proportions. In such circumstances, it is suggested to break down the factors into endogenous and exogenous, on the basis of which, by applying sufficiently comprehensive statistical models, multivariate techniques and similar methods, the knowledge necessary to strengthen the readiness of the given system and strengthen its ability to predict such phenomena in the future would be acquired. Finally, an appreciation of the importance of extreme differences in the management of risks of any kind is emphasized as a necessary prerequisite for predicting dragon kings in general under conditions of uncertainty.

## 5. Conclusion

The crisis caused by the COVID-19 epidemic represents a complex problem situation characterized by a huge number of relevant subjects at the strategic, operational and tactical level, and thus a huge number of diverse subjective and objective factors resulting from multiple co-determination, mutual causality and extremely variable interactions between them. Added to all of the above is a markedly high degree of uncertainty, primarily based on the fact that this was a relatively new and unknown risk factor whose initial changes in an extremely short time led to unfathomable consequences in all spheres of life at the national, regional and global level.

After all, it is necessary to first understand what is likely to happen, and then, how best to "control" the situation, that is, to manage the crisis so that the probable outcomes can be directed in the desired direction. This is where numerous possibilities of applying various multivariate techniques become important for making as valid decisions as possible at the tactical and operational level. All this, of course, in full consideration of the need for coordinated action by all relevant actors, taking into account all possible future scenarios.

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