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Scenarios and Capability Planning: Creation of Scenarios as a Tool for Predicting the Future Operating Environment

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Abstract

The goal of the present paper is to introduce the audience to selected methods (especially future scenario-based method) and their usability in predicting future developments of a security and operating environment. Furthermore, this paper highlights the place of these methods in the process of capability planning and creation of a security and defence policy of the state. This paper explores the possibilities, practical applications, risks and limitations of using the selected methods in predicting the future development of a security and operating environment.

Key words:

Security environment, method, scenario, capability planning

Sažetak

Cilj ovoga članka je upoznati čitatelje s odabranim metodama (posebno budućih metoda, baziranih na scenarijima), njihovom uporabljivošću u prognoziranju budućeg razvoja sigurnosnog i operativnog okružja, kao i ukazivanjem na njihovo mjesto u procesu planiranja sposobnosti i stvaranju sigurnosne i obrambene politike države. Članak razmatra mogućnosti, praktične primjene, rizike i ograničenja korištenja odabranih metoda u predviđanju budućeg razvoja sigurnosnog i operativnog okružja.

Ključne riječi:

Sigurnosno okružje, metode, scenarij, planiranje sposobnosti

Introduction

Security policy is the most general and all-embracing programme of the state in the field of security and defence as well as protecting national interests. In order for the state's security policy to be successful, i.e., maintaining or strengthening the position of the state, it must maintain its objectivity and rational nature. The state's security policy should be the most rational (the most reasonable) policy of the state, because, in case of its failure, the existence of the state is threatened. It is a paradox, however, that in everyday practice, this perfectly reasonable policy of the state is built upon the background of irrational inputs, permanent lack of information and subjective factors. When designing and implementing the security policy, the need for the most comprehensive and objective information and inputs into the decision-making process leads to the analysis not only of the present situation, but also the future development of a security environment.

The Role of Methods of Analysis and Prediction of the Security Environment in the Process of Creating a Security and Defence Policy

Analysis and prediction of a security and operating environment and the resulting security threats and risks are an essential source of information for decision making in the field of security and defence policy. Basic outputs of such analysis and prediction include:

- identification of the threat;
- evaluation of risk (as in the scale of the threat) in relation to the protected value (reference object) or in relation to the risks of other threats;
- risk assessment, or deciding whether the risk is acceptable.

High quality analysis and prediction of development of security and operating environment and the resulting security threats and risks is, in an optimal case, a prerequisite for selecting and deciding on the creation of appropriate security (counter-) measures, continuous improvement and raising the level of safety including improvement in capability development. It also aids in reducing potential losses and damages resulting from the effects of realised threats (see, e.g., Parsons, 2001: p.105). However, when making conclusions about the predictions, one should always take into account the limiting factors:

- probability of fulfilling the prediction decreases depending on the availability of information (the more distant the prediction is in terms of the future, the less probable it is);
- it is impossible to rule out unexpected and unpredictable events that can make the prediction worthless ('black swans');
- conclusions of even the best analysis and prediction have no chance of being used when implementing a security policy, if this is significantly influenced by other partial factors and interests.

Basic Characteristics of Plausible Qualitative Methods

Because there are many ways and methods that can be applied when analysing the development of a security and operating environment, selection of appropriate methods is very important. The approach must be appropriate for the situation, objectives and context in which the analysis is conducted. Each approach and each method of risk assessment has its advantages and its shortcomings. Selecting the appropriate approach and appropriate method are dependent on the purpose of the performed evaluation, nature of the available data, availability of funds, and often also socio-political context.

Although the major obstacle in analysing and predicting the evolution of a security and operating environment and the resulting security threats, risks and missions of military is generally the lack of data and information, or lack of ability to select relevant and valid information, it is also important to select appropriate methods and analytic procedures. According to Grasseová-Motyčková (2016: p.33), in principle, two general types of methods are

used in analysing and predicting security threats – qualitative methods and quantitative methods.

Qualitative methods are applicable in cases where there are no "hard data" available or the analysed problems are too complex, interrelated and difficult to describe using the quantified data. Basic procedures used in qualitative methods are based on experience, reasoning and expert opinions. This is a typical feature of a qualitative approach to research, which is not based on reliable, objective and complete data, and permanently applicable laws, but rather on experience and subjective intuition of experts. Qualitative procedures are either exploratory or normative. Exploratory methods are based on information about the past and the present, and apply heuristic approaches towards the future (often by studying possible scenarios or alternatives futures), so that the resulting forecast answers the questions: what could the next development be and what events or phenomena may occur in the future? On the contrary, normative forecast starts with future targets (e.g., ensuring a certain degree of protection for specific values), and returns back from this future starting point to the present, identifying what resources and technologies are necessary to attain these targets and what constraints must be eliminated. This approach, however, is a minority approach not only in the Czech Republic but also in general (see, e.g., Frank, 2015: p.282).

According to Ritz (2001), typical qualitative methods of analysis and prediction of security threats and risks and impact of future evolutions in the operating environment or technological trends include the so-called naive extrapolation (naive extrapolation starts from the simplified assumption that the future development and status of the risk is actually a simple extension of the results of the present situation), consensus forecasts, the Delphi panel (or the Delphi method), analogy or historical analogy (prediction uses historical knowledge and based on the findings of identical elements and features between the already known and the researched phenomenon, it assumes a similar mechanism of development in the future by comparison of the two).

Major advantages of qualitative methods include mainly the possibility of selection and aggregation of large amounts of information and its

transformation into attractive and understandable scenarios or alternative futures. Their disadvantage lies in the lack of a system of measurements and evaluation of analyses and predictions, and especially high influence of subjective evaluations by experts. Qualitative methods are particularly suitable for long-term predictions of a security and operating environment, or identification of threat or capability requirements.

Classification and Characteristics of Plausible Quantitative Methods

Unlike qualitative methods, quantitative methods of analysis and prediction of security threats and risks have the advantage of minimising subjective influences by using objective "hard data", often involving statistical and mathematical methods, modelling, etc. Quantitative methods can be divided into two groups:

- methods based on monitoring time series, and
- econometric or causal methods.

Prediction models based on time series studies analyse the chronological sequences of observations of each variable (e.g., demographic or economic data), and are based on the assumption that the study of past values and their development over time can predict future values of the analysed variables. Causal models or econometric forecasts derive values of the predicted (dependent) variables from the behaviour of other (independent) variables. The aim of causal models is to express the relationships between independent variables through a mathematical formula in order to determine the predicted values of the dependent variable (e.g., estimate of consumption of strategic raw materials based on analysis and prediction of economic growth, technological innovation, estimated amount of resources, etc.).

A frequently used quantitative method in the field of analysis and prediction of the security environment and the resulting security threats and risks (especially for demographic and economic development) is the method of extrapolation, which is based on extending the observed development series. The initial presumption is that the process will evolve in the same

direction or with the same intensity in the future. The relatively high value of extrapolation can be expected if we manage to formulate laws of development of the forecasted phenomenon or process, for example, through the development curve (line for linear development, such as growth, cyclical curve for recurring phenomena, exponential curve, etc.) and collect a sufficient amount of quantifiable data.

Quantitative methods and approaches are advantageous in their relative objectivity of outputs from the analysis and prediction, as the subjective element of the evaluators is eliminated. However, the demand of these methods lies particularly in the need for long-term, accurate and extensive data collection. Their use is suitable for short- or medium-term predictions, but increasing the time horizon of prediction decreases their accuracy and information value (for details see, e.g., Stojar, 2011: pp.257-258).

Potential Use of Qualitative Methods

There are two critical areas were qualitative methods may provide considerable contribution. First is the assessment of policy options and second is the identification of capability requirements. The most suitable methods for these two tasks are: (1) alternative futures assessment and (2) scenarios development.

Alternative futures assessment

Alternative futures methodological framework (AFMF) as a tool for assessment of strategic environment evolution is one of the outcomes of the institutional research project Strategic Alternatives for Armed Forces Development (STRATAL) which has been conducted by the Centre for Security and Military Strategic Studies in 2016. The AFMF provides an effective analytical method for assessing the potential development of a strategic environment in support of future policy formulation and strategic level decision making in the face of growing complexity and uncertainty. Its relevance has already been proven in several instances, e.g., Future Policy Survey in Netherlands or Future Army Capability Assessment in Canada.

In this regard, the AFMF might also be understood as a process for systematic and rigorous assessment of the ever evolving strategic landscape including military technology in which political masters formulate their vision and defence policy objectives and top military leadership designs the most relevant military strategy in order to fulfil these political expectations. It offers a sound methodological framework for strategists, defence planners and other stakeholders involved in strategic level decision making and planning in the area of national defence provision. Its main objective is to assist decision makers and strategic planners in addressing uncertainty and complexity when predicting the strategic environment and assessing its implications. It also could help in understanding the impact of technology on developing credible military capabilities in a long-term time span. This long-term time span deals with the configuration of Future Armed Forces 15 to 30 years in the future. This time span allows for prudent reengineering of existing and planned defence posture, command and force structure and capabilities while taking into consideration both opportunities and challenges stemming from the external environment including military technology advancements.

Based on alternative futures, decision makers and planners can formulate more flexible policies that ensure their organisations have the required agility to compete in whichever future, even one that is different from the futures envisaged. It will also help them to anticipate changes and prepare the organisation for dealing with future challenges as well as taking advantage of emerging opportunities. (Canadian Army Land Warfare Centre, 2014:pp.9-12).

The AFMF is built on a process embracing the following 10 steps: (1) identification of key focus areas and potential drivers of their change, trends and shocks; (2) environmental scanning; (3) determination of uncertainties and their polarities; (4) ranking uncertainties; (5) development of alternate future framework; (6) writing alternative futures; (7) communicating and validating outcomes; (8) identifying and assessing military implications; (9) identifying signs – indicators; and (10) monitoring results – assessing implementation and updating if required. (Canadian Army Land Warfare Centre, 2015:pp.23-24). Key focus areas are critical for investigating plausible

defence policy and military strategy options. They may embrace politics, economics, social dimensions, science and technology, environment, legal domain, security, human domain and military (NATO, 2015:pp.70-75). Key change drivers are variables that have the potential to change the future in a significant way but are not very predictable as they are themselves dependent on several factors, e.g., oil price.

Environment scanning must ensure undirected viewing (peripheral vision – to see and think outside the box), conditioned viewing (trends and early warnings about emerging issues), identification of the organisation's main features and assessment of its impact (identification and presentation of secondary and tertiary consequences of trends and events).

Ranking uncertainties and their polarities indicate opportunities and threats stemming from the external environment. The following is a set of examples for consideration: (1) impact of age and demographics on military force composition (ageing population and population growth and younger societies); (2) energy security (surpluses vs. deficiencies); (3) exponential technology growth (development and innovation accepted vs. opposed). We can apply the impact and uncertainty matrix. This entails assessment of the future importance of key change drivers to the decision arena and the degree of uncertainty that exists about future outcomes and an impact each force will have in shaping the future of the key decision factors and how important it will be in determining the differences among the alternative futures that are developed.

Alternate futures framework is created by selecting two trends, such as those with critical uncertainties, in the form of a simple 2x2 matrix with these trends as the axes. An illustrative example (see Figure 1) demonstrates that the alternative futures are defined by whether trend one moves to high transparency or low transparency, and whether at the same time trend two moves to uncontrolled access to technology or regulated access to technology.

As a result, we have a simple cross of alternative futures. Each of the four quadrants represents a distinct alternative, as the outcome of combining either/or options of the selected trends. The alternative futures (policies) will be named, further elaborated and their impact will be assessed. The following

process entails more detailed and structured planning, implementation, monitoring of outcomes and if needed the process might be updated.

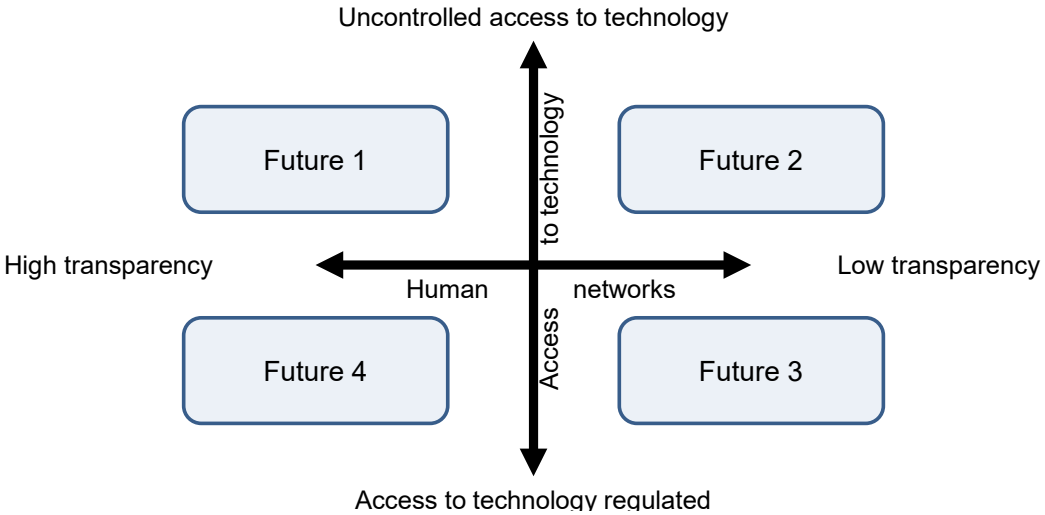

Figure 1 – Alternative Future Cross

Development of alternative futures is a growing international discipline designed to critically examine the difficulties associated with making decisions with long-term future consequences in conditions of uncertainty (Chermack, 2011:pp.136-142). It provides a methodological framework through which these challenges can be handled and their negative impact on decision making reasonably mitigated (Plausible Futures Newsletter, 2007).

Scenarios development

Scenarios mentioned above are used for identification and verification of capability requirements, in particular. Scenarios depict the main features of the environment in which the armed forces will be employed to execute military missions.

Table 1. Best Practices Scenarios Design Methodology for Capability Planning

Strategic Analysis ↓	Security Environment – Security Challenges and Risks Operational Environment and Application of Military Power Technology Politics, Economics, Demography and Environment
Political Guidance ↓	Strategic Assumptions Strategic and Security Interests (State, International Organisation) Political Ambitions Multinational Obligations Resources
Mission Type ↓	Collective Defence (Article 5 Ops) Air Defence, Cyber Defence Crisis Response Operations (multinational effort) Operation under National Command Crisis Response Operations (national effort)
Generic Scenario ↓	Infrastructure Enemy Political and Military End State Strategic Objectives and Effects Operational Objectives and Effects Key Tasks = Capability Requirements
Specific Scenario I	Geography Specific operational conditions including enemy
Specific Scenario II	Geography Specific operational conditions including enemy

Resource: Outcome of Research Project STRATAL. Centre for Security and Military Strategic Studies of Defence University in Brno (The Czech Republic).

Scenarios also reflect operational concepts in the sense of doctrinal use of armed forces. Furthermore, they offer a possibility to identify and quantify required capabilities in a volatile, difficult to predict, complex, permanently

and dynamically changing operating environment, and reduce the level of uncertainty and associated risks. In this regard, scenarios are significant analytical and supporting tools of defence planning with high added value. Correct application of scenarios allows for defining a set of required capabilities necessary for success in potential future conflicts. Also, Davis (2002) has written that scenarios enable long-term planning of capabilities development and optimisation as a platform for qualified and well-informed decisions at the strategic level for the armed forces' character, structure and size with regard to the ambitions and international commitments of the country.

Centre for Security and Military Strategic Studies of Defence University in Brno (Czech Republic) conducted research examining the methodology for scenarios design in order to facilitate identification of capability requirements and rigorous validation of existing and planned capabilities. Depicted in the Table 1 is the best practice methodology derived from the assessment of several models (e.g. NATO, EU, Germany, UK, NL and US; see also, Kříž, 2015: p.117; Ministry of Defence Netherlands, 2010).

Methodology entails analysis of strategic environments, political guidance and type of operation. Based on that, a generic scenario is developed comprising political and military end state allowing for the mission to be subject to task decomposition. Identified tasks define the functional capability requirement needs. According to Procházka et al. (2016: p.46), for validation purposes generic scenarios are placed in a specific geographical location allowing for assessment of capability requirements against specific operational characteristics and concrete enemy.

Conclusion

High quality analysis and prediction of a security and operating environment and its potential implications for policy formulation and capability development is an ongoing and ever more refined process. Its aim is not an accurate description of reality at a future date, but the choice of the most probable development options based on today's information. It draws

attention to important factors, events or constraints that will be important in the future and helps achieve more precise targeting, higher efficiency and lower costs of security and defence policy. Additionally, alternative futures assessment and scenarios development provide a suitable analytical framework for identification of policy options and capability requirements under increasing levels of uncertainty and complexity in the external environment. The described methodological frameworks were developed by the Centre for Security and Military Strategic Studies and customised for a well-informed and evidence-based decision-making process at the strategic level within the Ministry of Defence of the Czech Republic.

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References

Canadian Army Land Warfare Centre. (2014) *No man's land: Tech considerations for Canada's future army*. Kingston, Ontario, Government of Canada, Department of National Defence, Army Publishing Office. Available from: http://publications.gc.ca/collections/collection_2014/mdn-dnd/D2-326-2014-eng.pdf [Accessed: 14th December 2016].

Canadian Army Land Warfare Centre. (2015) *Canada's future army, volume 1: Methodology, perspectives and approaches*. Kingston, Ontario, Government of Canada, Department of National Defence, Army Publishing Office.

Chermack, T. J. (2011) *Scenario planning in organizations: How to create, use and assess scenarios*. Oakland, CA, Berrett – Koehler Publishers.

Davis, P. K. (2002) *Analytic architecture for capabilities-based planning, mission-system analysis, and transformation*. Santa Monica, CA, RAND, National Defense Research Institute.

Frank, L. (2015) *Position of the Czech Republic towards current security threats and measures taken*. In: Anton, S. & Tutuianu, I. S. (eds.) *Proceedings of the International Scientific Conference "Strategies XXI, The Complex and Dynamic Nature of the Security Environment"*. Bucharest, "Carol I" National Defence University. pp. 282-291.

Grasseová-Motyčková, M. (2016) Metody využívané pro řešení problémů v resortu obrany České republiky. *Obrana a Strategie*. 15 (2), 31-50.

Kříž, Z. (2015) *NATO Enlargement: Disaster or success? Evaluation of worst case scenarios*. In: Czulda, R. & Madej, M. (eds.) *Newcomers no more? Contemporary NATO and the Future of the Enlargement from the Perspective of "Post - Cold War" Members*. Warsaw, International Relations Research Institute. pp. 117-130.

Ministry of Defence Netherlands. (2010) *Future Policy Survey: A new foundation for the Netherlands Armed Forces*. Thieme GrafiMedia Groep. Available from: https://www.files.ethz.ch/isn/157125/Netherlands%202008%20Future%20policy%20survey.pdf [Accessed: 14th December 2016].

NATO (2015) *Framework for Future Alliance Operations*. Norfolk, VA, NATO ACT

Plausible Futures Newsletter. (2007) *The use of scenarios in long term defence planning*. Available from: https://plausiblefutures.wordpress.com/2007/04/10/the-use-of-scenarios-in-long-term-defence-planning/ [Accessed: 14th December 2016].

Procházka, J., Mičánek, F., Šmondrk, J., & Melichar, J. (2016) Scenáře v procesu plánování schopností. *Vojenské rozhledy (Czech Military Review)*. 25 (1), 44-60.

Ritz, M. (2001) *Theaters of future conflict: Creating, developing and writing future war scenarios for 21st century strategy and doctrine*. Syllabus of 2001 elective taught by Ritz, M. AFB, AL, USAF Counterproliferation Center.

Stojar, R. (2011) The current military and non-military threats and their impact on the armed forces. *Proceedings of the 17th International Conference "Knowledge Based Organization"*. Sibiu, Romania, Nicolae Balcescu Land Forces Military Academy. 256-260.

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