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Institutionalisation of the Analytical Support Function to Ensure Credibility of Defence Management - Canada, Norway, Sweden and NATO Case Study

Institucionalizace funkce analytické podpory pro potřeby důvěryhodného řízení obrany – případová studie Kanada, Norsko, Švédsko a NATO

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Abstract: The paper outlines several recommendations for strengthening the institutional framework of the analytical support function for credible defence management. Recommendations are drawn based on the outcome of the institutional research project named *Strategic Alternatives* conducted by the Centre for Security and Military Strategic Studies of University of Defence (CSMSS). The multi-objective research focuses on organisational arrangement of the analytical support function within the overall ministry of defence organisational architecture of several countries (Canada, Norway, Sweden) as well as the NATO structure and management (in this case, the main focus embraces the analytical support to defence planning).

Abstrakt: Článek doporučuje některé přístupy pro posílení institucionálního rámce analytické podpory za účelem zvýšení důvěryhodnosti řízení obrany. Doporučení jsou výsledkem výzkumu, který byl proveden Centrem bezpečnostních a vojenskostrategických studií Univerzity obrany (CBVSS) v rámci dlouhodobého záměru rozvoje organizace s názvem *Strategické alternativy* (STRATAL). Výzkum byl zaměřen na organizační uspořádání funkce analytické podpory v rámci celkového organizačního uspořádání ministerstev obrany několika vybraných zemí (Kanada, Norsko a Švédsko) a v rámci organizační struktury NATO (v tomto případě byla pozornost zaměřena především na analytickou podporu obranného plánování).

Keywords: Analytical Support; Defence Management; Military Decision Making Process; Credible Defence; Institutional Framework.

Klíčová slova: Analytická podpora; řízení obrany; vojenský rozhodovací proces; důvěryhodná obrana; institucionální rámec.

INTRODUCTION

There is an even greater need for sound defence management today than at any time since the dissolution of the Warsaw Pact. The combined effect of resurgent Russia and security pressures from radical extremists coupled with the ongoing national austerity measures present new and growing security challenges for allies and partners. When you couple these new challenges with the emergence of new warfare tools, such as cyber capabilities and greatly enhanced electronic warfare capabilities, enabled by rapid advances in the nation's ability to process information, the security environment becomes more complex than at any time in the past. Two additional elements that add complexity to the capability development are the rise of commercial products and capabilities and the shortening of the technological maturation cycle, both of which change the security environment for most nations. The ability to harness the commercial opportunity in military capabilities is critical for future security. Simply, greater complexity coupled with the rise of a potential near-peer and a challenged resource pool leave all allies and partners in a situation where more, not less, analytical support and research collaboration is needed.[1]

Additionally, the provision of defence is inevitably related to the process of making hard choices in terms of resources allocated to the development of capabilities or people's lives and the potential of material damage in relation to the employment of force in operations. In order to ensure a convincing degree of defence credibility, the decision making process must maintain its objectivity and rational nature. It means, for example, that defence policy objectives should be set right and implemented in the right way. The state's defence 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 very often built upon the background of irrational inputs, permanent lack of information and subjective factors.[2] It means that effective and efficient defence policy formulation and its implementation via sound strategic management framework require the most comprehensive and objective information and inputs into the decision making process. This is understood as an evidence-based decision making.

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1 Science and Technology Organisation Collaborative Programme of Work and Budget for Year 2016. NATO Science and Technology Organisation, Collaborative Support Office, BP 25, F 92201 NEUILLY-SUR-SEINE - FRANCE. 5 February 2016. p. 1.

2 FRANK, Libor; PROCHÁZKA, Josef. Scenarios and Capability Planning: Creation of Scenarios as a Tool for Predicting the Future Operating Environment. *Strategos*, 2017, vol. 1, no. 1, pp. 69-82. ISSN 2459-8771. Available at: http://strategos.morh.hr/wp-content/uploads/2017/03/Libor-Frank-and-Josef-Prochazka.pdf

Therefore, the modern defence sector management benefits from a sound analytical support function (ASF). The point of departure for justification of the ASF is actually the definition of managerial functions.[3] The recognised main managerial functions include planning, organizing, staffing, directing, and controlling. However, there are also supporting managerial functions, which embrace analysing, decision making and communication.[4] It means, in fact, that without proper analysis, decision making and communication the management model of any given organisation would be rather incomplete. This fact could put the functioning of this organisation under a considerable level of risk.[5]

With regard to the role the analysis plays at the Czech MoD, the situation is not very positive. Based on the data acquired in the research entitled "Solving Unstructured Decision-Making Problems in the Czech MoD", it was obvious that the utilization of the strategic analysis methods in this organization is not at a high level. Based on the performed research, there is a lack of utilization of the existing and relevant methods, little knowledge about their proper application and a number of barriers which complicate their effective use.[6]

The author of this article argues that proper institutionalization of the ASF in accordance with the best practices applied by several NATO allies and partner nations will enhance the quality of strategic defence management within the MoD of the Czech Republic and effectiveness of decision making process in the area of defence provision.

The objective of this contribution is to define the ASF and identify its necessary organisational framework, including its mission and areas of interest. The findings presented in this article are outcomes of research spanning several years of analysis encompassing organisations, which might be considered as champions in this area, taking into consideration the wider NATO context (allies and partners).[7]

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3 VODÁČEK, L., VODÁČKOVÁ, O. Modern Management in Theory and Praxice (Moderní management v teorii a praxi). 1. Edition. Prague: Management Press, 2006. 295 p. ISBN 80-7261-143-7.

4 NORMAN, Leyla. What Are the Four Basic Functions That Make Up the Management Process? Available at: http://smallbusiness.chron.com/four-basic-functions-make-up-management-process-23852.html

5 GRASSEOVÁ, M. (ed.) Effective Decision Making: Analysis-Decision Making-Implementation and Evaluation (Efektivní rozhodování: Analyzování – Rozhodování – Implementace a hodnocení). 1. Edition. Brno: Edika, 2013. 393 s. ISBN 978-80-266-0179-1.

6 GRASEOVÁ-MOTYČKOVÁ, Monika and Jiří RICHTER, Methods of Strategic Analysis Used by Strategic Documents Processing in the Ministry of Defence - The Present and Possible Changes. *Vojenské rozhledy - Czech Military Review.* 2016, 25 (special issue), pp. 62-82. DOI: 10.3849/2336-2995.25.2016.05.061-081. ISSN 1210-3292 (print), 2336-2995 (on-line). Available at: www.vojenskerozhledy.cz

7 PROCHÁZKA, Josef. *Report on Defence Research and Development Support Function, Analytical support to decision making in the area of defence and security, Case Study Canada and the Czech Republic.* A study. Brno: Centrum bezpečnostních a vojensko strategických studií UO, 2016, 38 p.

1. Definition of the Analytical Support Function

In general, the ASF might be defined as an operations research or operational research. It is a discipline that deals with the application of advanced analytical methods to help make better decisions. Employing techniques from other mathematical sciences, such as mathematical modelling, statistical analysis, and mathematical optimization, operations research arrives at optimal or near-optimal solutions to complex decision-making problems. Operations research is often concerned with determining the maximum (of profit, performance, or yield) or minimum (of loss, risk, or cost) of some real-world objective. Originating in military efforts before World War II, its techniques have grown to concern problems in a variety of industries.[8]

For the successful implementation of the ASF, it is critical to establish the right relation between practitioners and researchers. Both sides must make every effort to develop relationships that will enable practitioners to keep in touch with research developments and that will expose academics to the rapidly changing real world. Academics and practitioners should develop and support links that keep both parties up to date with important issues and enable them to develop jointly new knowledge and theory. Research is important, but there can never be any guarantee that any particular idea or project will be successful. Practice is important and the complicated world of deadlines and budgets will always make things difficult.[9] Therefore, modern defence organizations maintain appropriate institutional framework for providing the academic level of expertise to assist practitioners in their effort to ensure effective and efficient defence.

The ASF in modern defence organisations is usually defined by: (1) stable institutional framework (organisation); (2) knowledgeable and experienced strategic and operational analysts and researchers (human resources); (3) institutional knowledge in the form of analytical tools and procedures (know-how); (5) processes allowing effective control and utilisation of this function including tasking, financing and evaluation (processes); and (6) appropriate support, such as IT, simulation, laboratories and others (material).[10]

The modern institutional framework for relevant ASF arrangement should address the following elements:

- Ownership including proper tasking and reporting arrangement;
- Appropriate business model, e.g. project management functional structure and processes;
- Motivated personal with required skills;

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8 KATSALIAKI, K.; MUSTAFEE, N.; DWIVEDI, Y. K.; WILIAMS, T.; WILSON, J. M. (2010). A profile of OR research and practice published in the Journal of the Operational Research Society. *Journal of the Operational Research Society*. 61: 82. *doi*:*10.1057/jors.2009.137*

9 Williams, T., Wilson, J. & Pidd, M. J Oper Res Soc (2005) 56: 479. doi: 10.1057/palgrave.jors.2601977

10 PROCHÁZKA, Josef. *Report on Defence Research and Development Support Function, Analytical support to decision making in the area of defence and security, Case Study Canada and the Czech Republic.* A study. Brno: Centrum bezpečnostních a vojensko strategických studií UO, 2016, 38 p.

- Adequate financial resources while combining the institutional and customer ways of funding.

In a broader view, for the purpose of this study the ASF is understood as a complex activity portfolio embracing research and development (R&D) on defence related phenomena and development of new processes, methods, tools, and equipment used for military purposes. The aim of these activities related to R&D is to deliver timely results and advice that advance the defence capability of the respective nation and its armed forces and strengthen the defence management.

In a much narrower context, the ASF comprises operational research and analysis (ORA), which focuses generally on conducting studies, analysis and information exchange activities that explore how operational capability can be provided and enhanced through the exploitation of new technologies, new forms of organization, or new concepts of operation. Such studies provide, where appropriate, explicit consideration of financial and other resource issues. In particular, the ORA focuses on the methods, techniques and procedures required to address the new issues brought up by the evolving strategic environment.[11]

2. Research Methodology

The research covers three defence research institutions providing a complex ASF to strategic defence management in Canada, Norway and Sweden and one agency responsible for providing the analytical support function for NATO.

The research concerns the following organisations:

- Defence Research and Development Canada (DRDC)[12]
- Forvarets Forskningsinstitutt (FFI), Norway. English name: Norwegian Defence Research Establishment[13]
- Totalförsvarets Forskningsinstitut (FOI), Sweden. English name: Swedish Defence Research Agency (FOI)[14]
- NATO Communication and Information Agency (NCIA), NATO[15]

The reason why these nations and institutions became the subject of this research was influenced by several factors. First of all, these institutions are recognised leaders of collaborative research of the System Analysis and Studies Panel (SAS Panel) of NATO Science and Technology Organisation (NATO STO). Secondly, they exercise stable defence policies accompanied with solid institutional frameworks including an in-house analytical function. Thirdly, these nations maintain high-quality armed forces whose size is comparable to the Czech Armed Forces (CZAF).

11 The System Analysis and Studies Panel Handbook Version 3.0, December 2014. p. 12.

12 Official DRDC website: http://www.drdc-rddc.gc.ca/en/index.page

13 Official FFI website: http://www.ffi.no/en/Sider/default.aspx

14 Official FOI website: https://www.foi.se/en.html

15 Official NCIA website: https://www.ncia.nato.int/Pages/homepage.aspx

The research aims at answering the following questions:

a) Does the MoD have a formal institutional framework for research and development (R&D) and operational research analysis (ORA)?
b) With whom does the highest authority for the R&D management rest?
c) What is the legal statute, ownership and financing of the R&D organisation(s)?
d) What is the mission of the R&D organisation(s)?
e) What are the main research areas and what is the level of effort devoted to them?
f) What is the personnel strength of the R&D organisation(s)?
g) What is the business model (modus operandi, tasking) of the R&D organisation(s)?

For the assessment of main research focus of the R&D organisation(s), two levels of granularity were established: (1) Generic Focus Area (GFS), and (2) Specific Focus Area (SFA).

Generic Focus Areas embrace: (1) Strategic Level Decision Making, (2) Procurement, (3) Operational Effectiveness, (4) Technology Development.

For each GFA, the following several SFAs were identified:

- Strategic Level Decision Making: (1) Defence Policy Development and Review, (2) Military Strategy Formulation, (3) Political Guidance Development, (4) Management of Force Structure Realignment and Readiness, (5) Strategic Resource Management, (6) Investment Portfolio Management, (7) Performance Measurement, (8) Property Management, (9) Human Resource Management, (10) Capability Planning.
- Procurement: (1) Bidding Process Preparation, (2) Bid Evaluation, (3) Life-Cycle Cost Analysis, (4) Cost-Benefit Analysis of Procurement Options.
- Operational Effectiveness: (1) Operations Assessment, (2) Lessons Learned from Operations, (3) Optimisation of Logistic Support, (4) Through Life-Cycle Maintenance, (5) Training, (6) Exercise Design and Evaluation, (7) Platform Availability, (8) Multiple Objective Optimization, (9) Fleet Replacement, (10) Different Platforms Trade-Offs.
- Technology Development: (1) Assessment of Technology Trends and Maturity for Military Exploitation, (2) General Engineering and Design.
- Additionally, Level of Effort (LoE) for each SFA was assessed against the following criteria: the number of analysts involved per year and the quality of decision influenced by the outcomes of the ASF. In both instances, this assessment was based on the professional judgement of employees (researchers) of the respective organisations. Also, in this case, the questions were included in the research survey.
- Levels of Effort:
- **LoE 1 Very limited or almost no LoE** - there is no significant LoE allocated to the SFA from the analytical support function (organisation).
- **LoE 2 Low** - there is a low LoE allocated to the SFA in terms of labour and time from the analytical support function (organisations). This LoE consists of variety of analytical inputs (expert discussions, analytical material as studies, reports and other analytical products). *In quantitative terms, it is less than 1 analyst full time job per year equivalent.*
- **LoE 3 Moderate** - there is a moderate LoE allocated to the SFA in terms of labour and time from the analytical support function (organisations). *In quantitative*

terms, it is 1 analyst full time job per year equivalent. Additionally, this LoE is reflected in some way in the quality of the respective final outcome or the process of its development benefits from analytical inputs (analysis, studies, reports, other analytical products).

- **LoE 4 Substantial** - there is a substantial LoE allocated to the SFA in terms of labour and time from the analytical support function (organisations) and this effort is significantly reflected in the quality of the respective final outcome. *In quantitative terms, it is more than 1 analyst full time job per year equivalent.*

The answers to the research questions and the research focus and level of effort dedicated to the SFAs were sought using several methods. For Canada and Norway, staff talks were conducted in July 2016 and February 2017. Furthermore, the questionnaire for nations and organisations was developed and the research survey among the SAS Panel members conducted between October 2016 and May 2017. Responses were provided by Norway, Sweden, Turkey, and NCIA. Additionally, information for clarification and in some scope also for validation of data was searched at the Internet.

3. Findings and Discussion

The point of departure both for the Czech Republic and the analysed nations (Canada, Norway and Sweden) or organization (NATO) in the area of defence management is completely different. The Czech MoD has undergone fundamental structural changes after 1989 during a long transition process in order to establish a sound defence management system and modern armed forces according to the western standards.[16]

Nevertheless, even today this effort cannot be seen as a "mission accomplished". After several waves of sometimes questionable reforms, there is still the need for further optimization of the MoD's internal business process, enhancement of its overall performance and strengthening of the armed forces' posture and readiness. The critical functions in this regard include: (1) defence planning, (2) capability delivery with expected parameters, on-time and on-budget (armaments), and (3) sound human resource management.

The author of this article argues that one of the areas which could considerably reinforce the Czech MoD's overall performance and effectiveness in terms of forward looking planning, smarter resource management, providing better value for money in capability delivery, and last but not least contributing to successful operational deployments is the proper institutionalisation of the ASF. Relevant inspiration for this effort considers also the findings outlined in this article, which represent the best practices adopted by the analysed nations and their R&D organisations. Moreover, the overall R&D arrangement might be seen as a strategic enabler for the institutional adaptation and capa-

16 PROCHÁZKA, Josef. Adaptation of the Czech Republic Defence Policy - Lessons Learned. *Security and Defence*, 2015, vol. 6, no. 1, p. 15-28. ISSN 2300-8741.

bility development. It is also an opportunity for knowledge transfer and multinational research and capability development.[17]

In the past, several attempts have already been made within the Czech MoD to institutionalize the ASF. Nevertheless, it has never succeeded to create a necessary institutional framework for its sustainable development in the long-term perspective.[18]

One of the preconditions for the successful ASF institutionalisation is the change of mindset and organisational culture at the Czech MoD, which will be supportive to more rigorous and evidence-based decision making. This kind of mindset and organisational culture would naturally create demand for rigorous analytical inputs into the decision making process, because unless there is a smart customer, there is no chance to establish a sound ASF according to the standards (best practices) implemented by the analysed countries.

Currently, technical defence research and development in the Czech Republic is ensured through state owned and to some extent also controlled defence R&D enterprises (Military Technical Institute and Military Research Institute), state owned production enterprises (LOM Praha and VOP) providing maintenance and modernisation of most of the equipment operated by the CZAF. Furthermore, there are several organizations founded and sponsored by the MoD ensuring variety of services related to the medical support, including research, e.g. Military Hospital Prague, Institute of Aviation Medicine in Prague and Sport Research Institute of the CZAF (CASRI).

Additionally, there are several specialised institutions within the Czech MoD's organisational structure providing in-house defence research in the area of geography, hydrometeorology, medicine and military history.[19]

The research and development in the area of military science, military leadership, military technology, and military medicine is chiefly exercised by the University of Defence. The University of Defence is also part of the MoD's organisational structure and it might be considered - to some extent - as the "in-house ASF provider".

The responsibility for strategic analysis rests implicitly with the Centre for Security and Military Strategic Studies (CSMSS) of the University of Defence, unfortunately, with most of its capacity (almost 80%) devoted to career education of high ranking officers (General Staff Course and Senior Officers Staff Course).[20]

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17 KOLÍN V. Česká republika a „nová" Společná bezpečností a obranná politika EU: Čas zásadních rozhodnutí. *Czech Military Review (Vojenské rozhledy).* 2016. ISSN 1210-3292 (print), 2336-2995 (on-line). Available at: http://www.vojenskerozhledy.cz/kategorie/cr-a-nova-sbop-eu

18 Comprehensive analysis of the R&D transformation between 1989-2009 is provided by JANOŠEC in his article Defence R&D between 1989-2009 (Obranný výzkum a vývoj v letech 1989-2009). *Military Review (Vojenské rozhledy) 2009/4. pp.71-82.* ISSN 1210-3292 (print), 2336-2995 (online). Available at: http://www.vojenskerozhledy.cz/kategorie/obranny-vyzkum-a-vyvoj-v-letech-1989-2009

19 Concept on Defence Applicable Research, Development and Innovation 2016-2022 (Koncepce obranného aplikovaného výzkumu, vývoje a inovací na období 2016 až 2012). Ministry of Defence of the Czech Republic. Prague 2016. p. 9. Available at: https://vyzkum.army.cz/sites/vyzkum.army.cz/files/dokumenty/zakladni-stranka/iii_koncepce.pdf

20 The calculations of CSMSS available capacities are conducted on regular basis as part of the routine management process and results are available at the executive management level of this organisation.

The long-term tradition in the area of defence R&D including the existence of expertise rested with the above mentioned R&D organisations are seen as the strength of the Czech MoD. On the contrary, the non-existence of institutional cooperation among the military and civil research institutions, limited centralisation of national capabilities in the defence R&D and insufficient research activities in the area of military strategy and operational art represent the weaknesses of the current institutional arrangement.[21]

In terms of focus of the defence R&D, the priority focus areas of the Czech MoD follow the material rather than non-material research. Nevertheless, the general analytical support is also listed in that priority list. But it is reduced almost exclusively to conflict analysis and capability development for the purpose of security environment prediction. However, most of the focus areas of the ASF as it is understood and defined in this article are missing.[22]

Based on this assessment, it is possible to conclude that the ASF embracing operational research and analysis within the broader R&D context is not formally institutionalized by the Czech MoD. Furthermore, there is no ambition to reinforce the existing "in-house" institutional arrangement in the mid-term time span. The objective is to utilize the existing capabilities of the Czech MoD's R&D organisations and enhance the cooperation with civil research institutions rather than to develop a robust centralised R&D organisation as an "in-house" ASF provider.

In the following paragraphs, the answer to the defined research questions and relevant findings will be communicated.

- **Does the MoD have a formal institutional framework for research and development (R&D) and operational research analysis (ORA)?**

In comparison to the Czech Republic, nations such as Canada, Sweden and Norway have a long-term tradition of employing science in support of sound defence management. Despite limited resources, the political and military leaderships have always seen value added in the outcomes provided by an "in-house" maintained ASF.

An "in-house" ASF has been established during the World War II or shortly after. In case of Canada, for example, the main reason at that time was to optimize the protection of maritime convoys supporting the Canadian forces deployed on WWII battlefields. Since that time the variety of tasks fulfilled by the ASF has been significantly growing, embracing support to strategic planning, force development, force sustainment, and force deployment.

21 Concept on Defence Applicable Research, Development and Innovation 2016-2022 (Koncepce obranného aplikovaného výzkumu, vývoje a inovací na období 2016 až 2012). Ministry of Defence of the Czech Republic. Prague 2016. pp. 5-6. Available at: https://vyzkum.army.cz/sites/vyzkum.army.cz/files/dokumenty/zakladni-stranka/iii_koncepce.pdf

22 Concept on Defence Applicable Research, Development and Innovation 2016-2022 (Koncepce obranného aplikovaného výzkumu, vývoje a inovací na období 2016 až 2012). Ministry of Defence of the Czech Republic. Prague 2016. pp. 7-8. Available at: https://vyzkum.army.cz/sites/vyzkum.army.cz/files/dokumenty/zakladni-stranka/iii_koncepce.pdf

Currently, the ASF is institutionalised by all three analysed nations and also NCIA. The ASF is provided by "in-house" R&D organisations, in which organisational elements responsible for the provision of the ASF services are embedded. In the case of DRDC Canada, for example, the ASF is ensured by Centre for Operational Research and Analysis (CORA) with the strength of more than 100 analysts. In Norway, the ASF rests with the FFI's Defence Analysis Department. In terms of NCIA, the ASF is ensured by the Analytical Support Department responsible for the delivery of operational and planning support services. It comprises 26 analysts.

- **With whom does the highest authority for the R&D management rest?**

In all three nations, there are high ranking MoD officials **responsible** for the defence R&D management. In Canada, this responsibility rests with the Assistant Deputy Minister who reports both to the Deputy Minister of Defence and the Chief of the Defence Staff (CDS) of the Canadian Armed Forces (CAF). This arrangement makes the unique expertise resting with the R&D function equally available to all customers both within MoD and CAF. In Sweden and Norway, this responsibility is assumed by the Division Directors. Within the NATO framework, the authority for the R&D provision is exercised by the NATO Chief Scientist, who reports directly to the North Atlantic Council.

- **What is the mission of the R&D organisation(s)?**

The top political and military leaderships of all analysed nations face a similar or even identical set of challenges in the pursuit of ensuring the country's defence as does the top-level management of the Czech MoD.

In general, the mission of the analysed R&D organisations is to provide MoD, Armed Forces (AF) and other government departments as well as the public safety and national security communities with the knowledge and technologies needed to defend and protect national interests at home and abroad. These organisations should support the following processes: (1) formulation of relevant defence policy in the dynamic security environment, including the right set of strategic objectives, (2) establishment of equilibrium between those objectives and resources required for their successful implementation while taking on board acceptable levels of risks, (3) design of relevant, sustainable and still affordable force structure with appropriate levels of readiness to fulfil all assumed tasks, (4) identification of military requirements in short and long timeframe within the defence planning processes, (5) formulation and execution of the most suitable strategic portfolio - investment programs - with the highest value possible while considering broader political, operational, social, and economic interdependencies, (6) identification of the most effective human resource policy while competing on a constrained labour market, (7) last but not least, making decisions on operational deployments once it comes to the use of force for safeguarding the security interests of the country.

- **What is the legal statute, ownership and financing of the R&D organisation(s)?**

All three nations run defence R&D organisations as **agencies**. There is a transparent ownership mechanism in place to exercise the appropriate level of control through steering boards. The composition of these bodies ensures appropriate control mechanisms

(transparency, effectiveness and efficiency). In the case of NCIA, it is the Advisory and Steering Board (ASB), in which all NATO member states are represented.

There is variety of mechanisms to task these organisations based on different arrangements with customers. Basically, the **tasking** process with the principle customer (MoD and AF) reflects the discussion between agencies and their customers taking into consideration the customers' needs and financial possibilities and available capability and capacity of the respective agency. In case of Norway, the FFI offers also topics of potential interest to its customer. The agreed topics and costs are usually outlined in the program of work (PoW) and finally agreed by the steering board. Regarding DRDC, the tasking is reflected in research programs. Formulation of these programs and portfolio execution rest with several director generals dealing exclusively with the customers.

In terms of financing, the DRDC, FFI and FOI operating budgets are covered by the respective MoD's budget. The PoW is always customer funded. In case of FFI and FOI, the operating budget covers about 20% of the overall agency's needs. Interestingly, in all cases the funds from the MoD or NATO principal customers are re-allocated directly to the ASF provider without any formal competition (bidding) process. The agreed PoW serves as reference.

The NCIA's legal statute is defined in its charter. NCIA is a customer-funded organisation established by NATO. It is NATO's principal command, control and communication (C3) capability deliverer and communication and information service provider for the NATO HQ, the NATO Command Structure, NATO Agencies (including itself), nations and multinational organizations.[23] Tasking of NCIA is the outcome of the customers' requirements identification against the catalogue comprising also approved rates (the decision making authority rests with the ASB).

- **What are the main research areas and what is the level of effort devoted to them?**

Despite the technological development and material research exercised by all analysed national institutions (all invest substantial LoE in this area - see figure 2), there are basically two relatively broad areas of non-material research, in which the ASF services are delivered: (1) Analytical Support to Strategic Decision Making, and (2) Analytical Support to Defence Planning.

Analytical Support to Strategic Decision Making

DRDC and FFI allocate substantial LoE and FOI moderate LoE to the support of defence policy development and review. Furthermore, DRDC and FFI invest also substantial LoE to the support of military strategy formulation (see figure 2).

Defence policy development and review. Strategic analysts provide assessment of future security environment, including technology evolution, demography and economy. They assess impacts on the defence policy and strategy, role of the military power, mission of the military and capability development.

Close to real time strategic situational awareness - the management of force structure realignment and readiness. Analysts contribute to the development of management

23 Charter C-M 2012(0049) - 14 June, 2012.

tools.[24] They are objective, complex, administratively light and simple tools to be used for monitoring the strategic task implementation (performance management) and assessing force posture and readiness of all armed force elements in the horizon of up to 5 years.

Operational Effectiveness. Operational researchers support the optimal use of capabilities and resources for mission accomplishment of all services. These tasks embrace optimisation of logistic support, through life cycle maintenance, basic training, exercise design and evaluation, capabilities and capacity issues. Examples: optimization of platforms and their availability, pilot training and crew optimisation, surveillance and patrolling, multiple objective optimization, impact assessment of new operational deployments, fleet replacement and effect delivery of different platforms - trade-offs.

Contribution to SMART procurement. Operational researchers provide advice to help make sure that the given defence strategy is fulfilled in the most effective and efficient way - do the right thing right. In the area of procurement, they contribute to the life-cycle cost analysis and costing methods development, cost-benefit analysis of procurement options, bid formulation and evaluation.

Strategic Resource Management is a critical area for political and senior military leadership. Analysts address rapid change of political priorities in a constrained resource environment. The main tasks embrace the development of modern tools for investment (strategic) portfolio performance measurement, advanced visualization techniques for communicating value, risks and performance assessment for senior political and military leadership, corporate risk management, alignment of programs and individual projects with strategy and policy, and harmonisation of force generation process (Force Posture & Readiness (FP&R).

Analytical Support to Defence Planning

All analysed organisations allocate substantial LoE to the support of defence planning process, including trade-off analysis of different platforms (see figure 2).

Analysts assist in the development of sound and well-structured defence planning process while implementing the best practices from allies and partners.

The defence planning process is owned by the military, responsive to political expectations, addresses short and long-term timeframes, and mitigates uncertainty in the strategic environment, evolution in operating environment and resource constraints. The analysts' role is to provide assistance to the military, which encompasses planning process enhancement, environment assessment, scenario development, mission and capability assessment, requirement setting and validation, risk assessment and prioritisation of requirements.

24 The Strategic Managed Readiness Tool (SMaRT) has been used by the Canadian Armed Forces since April 2015. It provides the Chief of Defense Staff (CDS) with an efficient and effective means of articulating force generation tasks for the CAF and identifying risk of not being able to fulfil these tasks. It supports the Strategic Joint Staff in its effort to elaborate and implement the CDS Annual Directive on Force Posture and Readiness.

NCIA uses a robust analytical instrument for defence planning (Joint Defence Planning Analysis and Requirements Toolset - JDARTS). It is an integrated federation of software applications developed to provide analytical support to the execution of the enhanced NATO Defence Planning Process (NDPP). JDARTS provides the Alliance with a unique and powerful analytical toolset, based on the consolidated military analysis of NATO staffs, in which coalition capability requirements can be systematically identified, stress tested and subsequently compared against the spectrum of military capabilities available to NATO in Steps 2 and 3 of the NDPP.[25]

FFI (NOR) adopted and customised JDARTS for their national needs via its membership in the Multinational Alliance Defence Analysis and Planning for Transformation (MN ADAPT) Smart Defence project. This project offers a cost effective means of training and supporting their national JDARTS evaluations and usage.

Support to Top-Down Planning. Meaningful and overarching political guidance and clear senior military direction is a critical component for the successful conduct of defence planning. The analytical support consists mainly of providing decision support to informing the development of strategic level documents and their elaboration subject to the defence planning guidance. Analysts help enhance the understanding of security environment trends and challenges, their implications for the future operating framework and roles of armed forces. They also support the identification of potential options in the endeavour to connect the means and the ways to the ends (objectives) of defence strategy.

Support to Force Generation Process (Force Posture and Readiness). The planning should address short term challenges in generating the right set of force elements and at the same time allow for long term thinking about the future requirements and create adequate time for force realignment if required. Analysts provide assistance in the process adaptation, guidance and directive formulation and force posture and readiness objective evaluation and associated risks assessment.

Support to Capability Based Planning. CBP is still a relevant tool for dealing with uncertainty and dynamics in the security environment. The use of scenarios supports the rigorous mission and capability analysis. The employment of analysts leads to the establishment of a sound methodological framework for CBP. Nevertheless, the military judgement is a critical component in capability assessment and requirement identification. It means that the CPB process is to be owned by the military!

Balancing Requirement and Resources. Analysts facilitate objective based prioritisation and risk assessment in a resource constrained environment. They assess (qualitatively) the relative value of each capability requirement for the mission accomplishment and operational risks associated with the non-existence of the capability for the mission accomplishment.

[25] Staff talks between NCIA and CSMSS conducted in Brno and Hague in 2015. NCIA explained the JDART functionality and offered membership in the MN ADAPT Smart Defence project. Consequently, the outcomes of this discussion were presented to the leadership of Defence Policy and Strategy Department Division of the Czech MoD.

Support to Bottom-Up Planning. Analysts support the enhancement of the existing strategic level lessons learned process and improvement of its conduct during exercises and deployments (preparation, collection and evaluation), including information and knowledge management (database, information sharing and access to lessons learned).

Support to Services. Analysts also assist services (Army, Navy, Air Force and Special Forces) in conducting their own planning activities spanning short, mid-term and long--term timeframes. In Canada, for instance, three levels of considerations are employed: Forces of Today (up to 5 years) -Tomorrow's Forces (from 5 to 15 years) - Future Forces (more than 15 years). The analytical support embraces the potential evolution of the future security environment and implications for the services' employment and capability development. The analytical tools are designed to serve this purpose, including the methodological and conceptual framework at services level. However, the approaches of various services differ. In Canada, services are fully independent and they use different processes and develop different outputs (documents). This effort helps the military leadership and officers understand the implications of alternative futures for their services in the complex manner along all the lines of capability development. In Norway and Sweden, the strategic level planning rests with the MoD and General Staff level. Services have only limited freedom to exercise their own capability development.

The ASF focus concern areas both generic and specific and the levels of effort devoted to each of them are assessed in matrix, which allows for a comprehensive comparison of all analysed organisations (see figure 2).

- **What is the personnel strength of the R&D organisation(s)?**

FOI in Sweden employs 950 persons, 780 out of them are researchers and analysts.

The Norwegian FFI personnel strength is more than 700 people; more than 500 of them are researchers and analysts (50 of them dealing with the strategic analysis and operations research).

Canada exercises the most robust R&D organisation. DRDC employs 1500 people, 800 of them researchers. The Centre for Operational Research and Analysis (CORA), part of DRDC, keeps more than 100 strategic analysts and operational researchers.[26]

- **What is the business model (modus operandi, tasking) of the R&D organisation(s)?**

The importance of the ASF is reflected in the organisational structure of MoD. In all three nations, the ASF is an inherited part of the defence R&D organisation within MoD. It is an in-house, centralised, robust, and high-quality capability able to satisfy the customer's needs with relevant multi-disciplinary expertise in a timely manner. Its valuable output outweighs the associated costs.

26 CORA consists of 5 sections (Strategic Analysis, Joint System Analysis, Maritime and Air, Land and Operational Command, Scientific and Technical Intelligence). Strategic analysts and operational researchers (mostly civilians) provide deep insight into problem solving. They develop unique expertise which is impossible to maintain within a system of rotating military personnel. In addition, they contribute to the institutional knowledge development (enhanced institutional memory).

Integrated research and development function. In all three countries, the MoD entities providing R&D services are integrated into one organisation (agency). Canada uses a distributed business model applying embedded personnel (analysts and scientists) throughout the MoD and AF organisational structure. It allows better cooperation with the customer, mutual trust and understanding development between analysts, civilian servants and military staff and an enhanced level of expertise sharing. Indeed, this organisational arrangement significantly contributes to better-quality product delivery as it is aligned with the customer needs.

Business model. The ASF has been adapted to the customer's needs on permanent basis. In Canada, the matrix of the internal organisational structure was introduced, emphasising the need for a close customer engagement while taking on board related coordination challenge with this model. It is basically built on two pillars. (1) Daily routine operations ensured by one overarching umbrella (CORA) and (2) responsibility for the program formulation and portfolio execution resting with several director generals dealing exclusively with the demand side (customers). It allows flexibility for the creation of inter-disciplinary teams designed to solve the respective problems with the required expertise in the most effective manner and at the same time with **high level responsiveness to customer expectations**. However, the matrix structure also requires enhanced coordination, an outcome oriented mind-set and team work cultural awareness.

The R&D agencies in Norway and Sweden keep a traditional hierarchical structure usually dominant in the military environment.

The ASF embraces an in-house wide spectrum of scientific level expertise (from technical to social science, including technical intelligence). The emphasis is put on objectivity, scientific rigour and maintenance of freedom of action and strategic decision making. In addition, there is also an extensive multinational and bilateral cooperation and partnership with other scientific institutions and universities in order to deliver the missing elements of expertise, if needed. The international cooperation is essential for knowledge sharing and success. All three nations promote partnership and multilateral research within the NATO SAS Panel.

A critical aspect is also the protection of defence critical information, which support the in-house provision of the ASF.

Summary of this discussion and comparison of findings is provided in the matrix (see figure 1).

The strategic level findings demonstrate the environment and culture, in which the strategic defence management is conducted by all analysed nations:

- All three nations have been enjoying long-term political, social and economic stability, which is accompanied with solid institutional framework and sound processes. Changes in defence management and its support are subject to evolutionary adaptation rather than revolutionary turmoil. For example, Canada has adopted only six defence policy documents since WWII.[27]

27 The Czech Government adopted more than ten strategic level documents during the last two and half decades.

	FOI Sweden	FFI Norway	DRDC/ CORA Canada	NCIA
Responsibility	MoD Division Director	MoD Division Director	Assistant Deputy Minister of Defence	NATO Chief Scientist
Mission	Technical Research, Defence Analysis and Political Science	Technical Research, Applied Engineering, Defence Analysis	Technical Research, Applied Engineering, Defence Analysis	Technical Research, Applied Engineering, Defence Analysis and Analytical Support to NATO Defence Planning
Ownership	MoD Agency, assignment-based organisation	MoD Agency	MoD Agency	NATO Agency
Financing	20% Operating Budget, 80% Customer Funding, PoW is covered by 19% out of Government Grants	Operating Budget/ Customer Funded PoW	Operating Budget/ Customer Funded Research Portfolio	Customer Funded Mode (PoW)
Employees	950/780	716/514	1500/800	26*
Business Model	Centralised (researchers, analysts and academics concentrated in one organisation)	Centralised (researchers and analysts concentrated in one organisation)	Centralised function in several locations, distributed performance model (embedded researchers)	Centralised, in several locations
Tasking	FOI suggests tasking to customers (Armed Forces, Swedish Defence Materiel Administration, Swedish Civil Contingencies Agency). Decision made by customers after dialogue. The customers provide the financing. There are also customers in the civilian sector, including industry and a range of public and local authorities, primarily in the fields of emergency preparedness and security, as well as from other countries.**	PoW discussed with customers (Armed Forces and MoD). Decision taken by customer and Steering Board. Customers provide financing.	Responsibility for program formulation and portfolio execution rests with several director generals dealing exclusively with customers.	PoW agreed with customers and approved by Steering Board.
Main Focus Areas	C2, Information Technology, Sensors, Materiel, CBRN, Explosives, EW, Security Policy, Defence Analysis, Underwater Research	Electronic, Materiel, CBRN, CD, IED, EW, Defence Analysis	Defence Analysis, Engineering, Economic Intelligence	Electronic, C3, Defence Analysis

Figure 1: Analytical Support Function - Institutional Arrangement

* There are 26 analysts at the Analytical Support Department of NCIA, which might be augmented by contractors based on the current demand.

** Research for a safer and more secure future. FOI. Available at: https://www.foi.se/download/18.38aa824f15a9fd6396e1282/1489138368046/FOI%20i%20fokus_ENG_print.pdf

- All governments put significant level of emphasis on transparency and performance of public institutions, including military, and they seek the best value for money once it comes to public spending.
- There are several rather worrying trends with potentially negative impact on all countries and their armed forces' posture and readiness - aging critical equipment (submarines, fighter jets) and growing cost of military personnel. Recapitalisation of equipment and proper manning of structures is under risk taking into consideration the shrinking or stagnating defence budget.
- All nations' strategic culture calls for long-term forward looking. They allocate significant resources in terms of personnel, time and money to understand properly the evolution of future security and operating environment and its impact on the role of the armed forces and armed forces' development.
- The defence team (civilians and military within MoD and armed forces) sees the value added in the outcomes provided by the ASF; they are applied routinely in variety of areas (business process improvement, optimisation tasks in the area of logistic support, procurement decisions, risks assessment, assessment of operational effectiveness, performance measurement, forward looking planning support and many others).
- The ultimate benefit of the ASF for the decision makers is that it enables them to deconstruct and pinpoint a complex issue, better define risks and threats, work out technical solutions, and aid in the forecasting of the decisions' outcomes and impacts such that the leader is moving forward with a more complete picture. All three nations try to understand the impact of any strategic decision making.
- It is imperative to do the right thing right. While strategic analysis establishes the framework, in which our armed forces will operate in the future (defence policy objectives, ambitions etc.), operational research makes sure that the political and military leadership has the best advice available to conduct military missions in the most effective manner (trade-offs, optimisation of resources).
- As already mentioned, there is variety of findings stemming from this research, which can be considered as building blocks of best practices for the establishment of a solid institutional framework for the ASF and its focus.

CONCLUSIONS

After 1989, there were numerous serious problems related to the provision of defence in the Czech Republic, e.g. policy and strategy formulation in different phases of defence sector transition from the communist to the current era, realignment of force structure from mass armed forces to a much smaller professional force with expeditionary capabilities, and modernisation of obsolete capabilities, to name just a few of them.

One could argue that a substantial amount of tax payers' money could be saved and potentially even more suitable solution found, if tools such as the ASF were employed appropriately according to the standard code of conduct (best practices) implemented

Analytical Support Function - Focus and Level of Effort		Organisations/Nations			
Generic Focus Areas (GFAs)	Specific Focus Areas (SFAs)	FFI, NOR	FOI, SWE	NCIA	DRDC, CAN
Strategic Level Decision Making					
	Defence Policy Development and Review	4	3	2	4
	Military Strategy Formulation	4	2	3	4
	Political Guidance Development	2	2	2	3
	Management of Force Structure Realignment and Readiness	2	2	4	3
	Strategic Resource Management	4	3	2	3
	Investment Portfolio Management	4	2	1	3
	Performance Measurement	1	3	4	3
	Property Management	1	1	1	2
	Human Resource Management	4	3	1	3
	Capability Planning	4	4	4	4
	Concept Development	3	3	3	3
	Global Development	4	4	3	4
	Information Operations	1	2	1	1
	Civilian Defence	1	4	1	2
Procurement					
	Bidding Process Preparation	4	1	1	3
	Bid Evaluation	4	1	1	3
	Life-Cycle Cost Analysis	3	2	2	3
	Cost-Benefit Analysis of Procurement Options	4	3	2	4
Operational Effectiveness					
	Intelligence Methodology	1	3	1	2
	Operational Planning	1	3	1	3
	Operations Assessment	2	3	4	4
	Lessons Learned from Operations	2	4	2	3
	Optimisation of Logistic Support	3	3	3	3
	Through Life-Cycle Maintenance	1	1	1	2
	Training	4	2	3	4
	Exercise Design and Evaluation	4	2	3	4
	Platform Availability	3	2	1	4
	Multiple Objective Optimization	2	2	2	4
	Fleet Replacement	4	3	1	4
	Different Platforms - Trade-Offs	4	4	4	4
Technology Development	Technology Trends	2	3	4	4
	Engineering	4	4	4	4

Figure 2: Analytical Support Function - Focus and Level of Effort

by countries known for their modern defence sector management. Canada, Norway and Sweden and also NATO might definitely be considered among them.

This assessment is based on a proven list of records of implemented analytical projects, long-standing tradition of the ASF role in decision making and stability of institutions responsible for the ASF provision in these countries.

Since WWII, Canada, Norway and Sweden have developed strategic culture in the way that both political and military leaderships do not hesitate to refer to the analytical support once it comes to decision making in order to develop the broadest possible picture of the issue and understand the impact, consequences and associated risk the particular decision may pose. **Informed and evidence-based decision making has become a critical element of strategic defence management and organisational culture of defence organisation in these three countries. Additionally, tax payers in these countries expect effectiveness, efficiency, accountability, and transparency of their public sectors.**

Based on the assessment of the institutional arrangement of the R&D function within the Czech MoD, it might be concluded that the transformation in this area has actually never finished. One of the reasons for it might be the continuous search for the most efficient institutional framework, balancing in-house capability and capability from the outside of the MoD's authority, both national and multinational.

Moreover, the potential of the ASF (as part of a wider R&D function) has never been considered as significant for effective defence management in the Czech Republic. This approach was reflected also in an inadequate institutional framework, e.g. the authority for managing the R&D function was delegated to the lowest possible level of responsibility within the MoD's organisational structure. Some of the in-house R&D capabilities have been transformed into the form of state owned enterprises, some of them have been reorganised many times. There is a very niche capability in the field of the ORA resting with the University of Defence (CSMSS). One could argue that at the time of permanent institutional transition of the Czech MoD and AF and several periods of austerity there were no suitable conditions for developing a solid institutional framework for the ASF as defined in this article. As the outcome of these unfinished processes, the overall performance of the ASF was shrinking and some of its capabilities inevitably lost.[28]

Most likely, the Czech MoD will never be able to keep such a robust in-house ASF as Canada, Norway or Sweden, for instance. Nevertheless, the demand for an enhanced ASF should be considered again given the changing security environment and the growing importance of credible defence of the country. Based on the research outcome, emphasis should be put on the support to strategic decision making (defence policy and strategy formulation, procurement and resource optimization), long-term planning (long-term requirements setting and validation, performance measurement in terms of force posture and readiness, and strategic portfolio management - investments), and operations. There are areas in which all of the analysed institutions spend significant levels of effort.

The author argues that the Czech MoD should once again reinforce its in-house strategic analysis and operations research capability and establish a sound ASF based on the insti-

28 JANOŠEC, Josef. Defence Research and Development in Years 1989-2009. *Military Review*. 2009, 18(50), pp. 71-86. ISSN 1210-3292 (print), 2336-2995 (on-line). Available at: www.vojenskerozhledy.cz

tutional arrangement in place in Canada, Norway, Sweden, and other countries. It is of utmost importance to draw on the experience and lessons learned of these nations, and where it is found useful, to utilize them to the greatest extent possible also in the Czech Republic. All three nations as well as NATO possess a viable institutional model for providing the ASF, which contributes to establishing best practices in the area of R&D and ORA management among NATO allies and partners. The ambition of this article was to contribute to the future debate in this area, which should be opened soon rather than later.

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