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ABSTRACT

In the new world of asymmetrical and other forms of warfare, adaptability and agility will be key features of military forces in meeting new operational requirements resulting from these forms of warfare. A joint-project arrangement has been established between Sweden, the Netherlands and Canada in order to study the concepts of adaptability and agility in military organizations. Canada's research program addresses institutional leadership and its influence on organizational outcomes such as adaptability. The Dutch program focuses on strengthening both individual and organizational adaptability. The Swedish program is developing empirical research methods to assess adaptability and command and control (C2) agility by assessing the relationship between adaptability and agility on performance in the navy. The trilateral project arrangement enables collaboration in developing increased understanding of human and organizational adaptability and agility across multiple international military organizations. This paper presents a joint framework and initial findings from both the collaboration and the separate national efforts, including the balance between robustness and flexibility, organizational change, training, assessment, innovation, and maintenance of best practices.

Key words; Adaptability, Agility, Command and control, Assessment, Training, Institutional Leadership

1. Introduction

A community once farmed the banks of a turbulent river in an arid valley, where the harsh weather brought unpredictable cold winds and the flood-prone river eroded the soil. So the community surrounded its riparian home with a line of trees chosen to counter the threats it faced. Along the river banks the people planted maples whose deep roots prevented erosion, and they sheltered their homes and fields from the harsh winds with oaks and elms. And the community prospered behind its defensive forest as the maples, oaks, and elms matured, combining the contrary qualities of flexibility and robustness that made the tree line the optimal defence against the elements.

But the community became complacent and failed to renew their protective forest. As the trees reached the ends of their lives, they lost their suppleness and their roots became shallow. Realizing the danger too late, the people took to splinting the branches and trunks of the trees and to fertilizing their roots. These efforts rejuvenated the forest for the time being, but the trees gradually lost their twin qualities of flexibility and robustness to age, disease and the numerous splints. Meanwhile the weather is more turbulent than ever. The inevitable is now undeniable to everyone, and the community faces a dilemma: Do they cut down their forest and replace it with something new, or do they replant it and try to restore its health—try to restore the flexibility and robustness that made the forest the agile defence it had been in earlier times?

Modern militaries (in our case, the militaries of Sweden, the Netherlands, and Canada), find ourselves in a similar position. We also became complacent in the face of the bright and peaceful future foreseen in the 90s, which, needless to say, has given way to a more sinister forecast. Defence forces of democratic countries face asymmetric and hybrid warfare from adversaries who operate in radically different ways than they did during the Cold War. At the same time, the old Cold War tensions are reemerging, with aggression evolving into new conflict arenas, such as cyberattacks and media propaganda. Military and political coalitions that have traditionally been perceived as reliable and sustainable—NATO and the European

Union, for example—are now openly questioned by a large portion of the population and may even be falling apart.

Still, future challenges must be addressed by defence policies and military capabilities to ensure that the free world continues to develop and prosper. Many nations are struggling with the realization that serious reforms are required to handle the volatile and uncertain environment that they operate in. Adaptability and agility will undoubtedly be key features of these reforms, and research should be undertaken for insight into how to organize militaries and operations of the future.

Canada, Sweden, and the Netherlands have initiated a three-year joint-project arrangement (PA) called Human and Organizational Adaptiveness and Agility. The PA is undertaken within a cooperative science and technology memorandum of understanding between Defence Research and Development Canada (DRDC), Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek (TNO), and the Swedish Defence Research Agency (FOI). Each partner has a research program that addresses adaptability and agility from their own perspective. The Canadian program focuses on institutional leadership and how it influences organizational outcomes, such as adaptability, with the objective of developing and validating an integrated leadership framework suited to the international security environment. The Dutch program focuses on individual and organizational adaptability, with the objective of developing a framework of factors that strengthen the adaptability of military personnel and the defence organization. The Swedish program focuses on the assessment of agility and adaptability in naval operations, with the objective of developing a method to evaluate the adaptiveness and agility of command and control (C2) in the naval environment and to identify key mechanisms, constraints, and opportunities for naval C2 assessment.

Trilateral cooperation means scientific effort has been combined to investigate military adaptability, so this paper presents an overview of each national program and proposes a joint framework for strengthening individual and organizational adaptability. The collaboration has given added value and enhanced progress towards project objectives for each national project. However, outlining or listing the contribution from our collaboration to the national programs is not the scope of this paper. Instead, we have tried to take our different perspectives and approaches in order to see if there are any joint lessons to learn. The conclusions drawn in this paper might be unexpected and perhaps challenging, but the motivation is to strengthen our defence organizations so they continue to operate at the highest possible level. This paper also identifies some challenges for future research and policymaking.

2. The research program at TNO in the Netherlands

The Dutch contribution to the PA is a three-year (2015–2017) research program called Human and Organisational Adaptability, which was initiated by the Dutch Armed Forces to investigate ways of increasing their overall adaptability. The study consisted of three phases, two of which have been completed, with the third in progress. Following is an account of the insights gained in the first two phases and the pilot studies underway for the third.

Phase 1: Theoretical research

The first phase was a comprehensive literature review of the theoretical underpinnings of individual and organizational adaptability, supplemented by a narrower search for literature on military adaptability. The

work looked at definitions of adaptability, qualities that predict adaptability, assessments of adaptability, and how to strengthen adaptability. Interviews were also conducted with leaders inside and outside the Dutch military. Twenty generals (ranging between one and three stars) and twenty other officers (from captain to colonel) were interviewed. In addition, representatives from 10 civilian firms were interviewed to learn how they approached adaptability. The theoretical framework and findings can be divided into two broad categories: individual and organizational adaptability.

Organizational adaptability. Both in the scientific literature and in civil and military practice, we found paradoxical views on what constitutes adaptability and which characteristics define an adaptable organization. Yet much evidence supported the adaptiveness of two basic, but very different, orientations:

> The robust orientation. If circumstances are relatively predictable, and the organization wants to prevent its operations being influenced by changes in the environment, then robustness is an adaptive response.
>
> The flexible orientation. If circumstances are highly unpredictable, and achieving objectives is more important to the organization than the means of achieving them, then flexibility is an adaptive response.

These two orientations place very different demands on the organization and the individual. What choices should the organization make to increase the adaptability of individual service members and the organization as a whole? Our findings show that the choice is not one approach or the other, but a dynamic balance between the two approaches. Thus, we defined organizational and individual adaptability in this study as follows:

> *Adaptability is the ability of a system to anticipate, identify, and interpret (un)foreseeable change and to respond to it swiftly and in a manner that maintains optimal performance.*

The definition broadly corresponds to the NATO STO SAS-085 (2014) definition, and it includes the important concepts of anticipation, identification, interpretation, and response. Adaptability is a proactive capability that entails preparation for change and the ability to monitor and interpret the environment. Ultimately, moreover, it is the component concepts and the relations between them that, if strengthened, influence the degree of adaptability. Our research thus looked at developing a new defence-specific model of adaptability (Figure 1) that integrated the different views in the fields examined in the study (academic, civilian and military culture) and incorporates bivalent thinking ('t Hart, Dekkers, Kamphuis, Sassen, & de Vries, 2016).

In Figure 1, the green boxes denote how a system adapts to its environment, where the *system* can be an individual, a group of individuals in a team, a department, a division, or an organization as a whole. The green and grey boxes illustrate the system continually creating an optimal fit between itself and the environment. The blue boxes describe the organizational determinants that influence the overall adaptability process.

The organizational determinants serve as criteria for assessing a system's capacity for adaptability by comparing the fit between present adaptability to each determinant and current circumstances. We have included both the robustness and the flexibility orientations as organizational determinants of adaptability (the left blue box), and the yin and yang symbol denotes the ability to hold both at the same time. In the blue box to its right, the two orientations are categorized into seven factors that describe an organization and can be used as starting points to change an organization. These seven factors, leadership, structure,

processes, vision, culture, materiel, and personnel are based on the McKinsey 7S framework (Waterman, Peters, & Phillips, 1980).

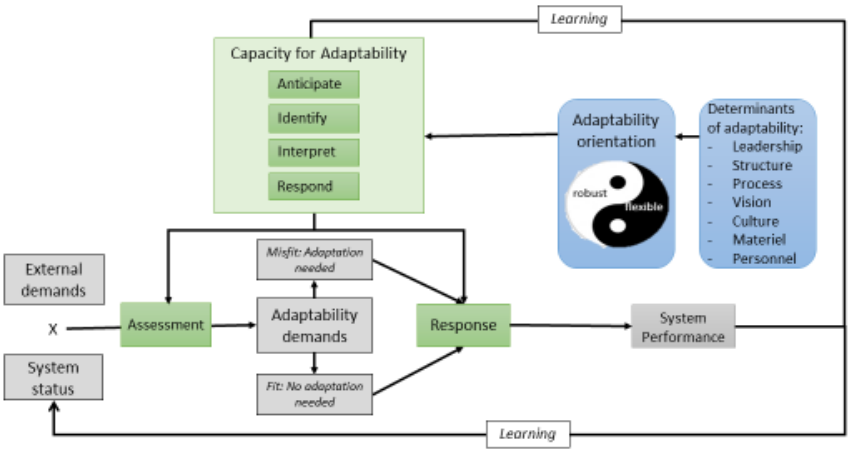

Figure 1: A systems model of the adaptability of a military organisation

Individual adaptability. The model in Figure 1 also describes individual adaptability, though the determinants in the blue box are different for an individual. The determinants of individual adaptability include personality traits, cognitive abilities, and environmental influences. We have categorized these determinants of adaptability in terms of distal predictors (personality traits that are mostly ingrained from birth) and proximal predictors (skills that can be developed).

The study also investigated whether military operations require varying components of adaptability. Given the diversity of functions within the military organization and the variety of environments the military have to work in, it is very likely that the different tasks in military operations call upon different dimensions of adaptability. What might these dimensions be, and can they be measured? Can performance be predicted based on one's capabilities? Is there evidence of a differentiation in adaptability components across civil and military functions or among soldiers from different military functions?

In order to address all of these questions, we developed an instrument (D-ADAPT) for measuring the adaptability requirements of a particular military function, and for measuring self-assessed adaptability in different work situations. The instrument D-ADAPT consists of two questionnaires: work-ADAPT, which measures the required adaptability demands for different job types, and self-ADAPT, which is a self-assessment on adaptive behaviours of individuals. D-ADAPT has been validated in a study with 151 military and 186 civilian participants (N = 337; Oprins, Bosch & Venrooij, Manuscript submitted for publication).

The work-ADAPT can differentiate between jobs in general (military versus civilian as well as civilian job types), but the instrument should be refined for differentiating between military job types. The first step is to revise the classification into military job types, based on a more extensive job analysis. The main conclusion of this study is that military jobs generally have higher adaptability demands than civilian jobs; as a consequence, military job performers are generally more adaptable than civilian job performers. The ultimate goal of these studies is to better understand adaptability demands of military jobs, and to be able to select and prepare the right people for an unpredictable future.

Phase 2: Military relevance

The second phase of the study focused on applying the theoretical insights from the first, namely, to identify important aspects of adaptability that should be subject to more in-depth empirical research, and then to set up pilot studies in domains considered most relevant to the military. Over 50 military experts and scientists gathered for a two-day Adaptive Concepts event. The challenge was to develop good ideas for practical pilot studies based on the theoretical ideas from Phase 1. The results of these two days of intensive workshops and creative sessions were presented to a selected group of 15 key institutional leaders of the Dutch military in the hope of finding institutional support, facilitation, and sponsorship for the pilot studies. Five pilot studies were eventually selected for the last phase of the program.

Phase 3: Pilot studies

The third phase is five empirical studies, all of which pilot a way to increase adaptability based on the factors identified in the first and second phases. The five studies have been initiated in close collaboration with units from the Dutch Armed Forces, and each involves interventions to strengthen the adaptability of the units. An adaptive framework is also being developed as we learn from the pilot studies. What follows below are the concepts that were studied in each of the pilots.

Individual adaptability. Can an individual's ability to adapt to complex and unanticipated situations be improved by training in "pure perception" (self-aware attention) and by training in "cognitive flexibility" (metacognitive reflective thinking)? The question is how such training should be designed, and whether such training improves abilities predictive of adaptability. The work includes two experiments. One study examines the effects of ki-Aikido, Yoga, mind-fitness, and Zen to test training in pure perception. The second study explores game-based training in dealing with rule-changes and whether this improves cognitive flexibility. The results may be used to guide current or design new military training programs to improve adaptability.

Adaptive leadership. This pilot study investigates the implications of a bivalent orientation for military leadership. Leaders are more adaptable when they learn to balance paradoxes (robustness and flexibility) effectively. The work is expected to provide guidelines for enhancing the adaptive behaviour of military leaders in order to make them more effective at bivalent thinking. Insight into bivalent thinking for military leaders will also enhance the adaptive behaviour of subordinates.

Dynamic deployment. This pilot study focuses on adaptive and flexible mission preparation and execution. For this study, military planning was divided into two roles to simulate the "ideal" mission flexibility envisioned in our model of adaptability: The traditional planning role—called the creator role in our study—is paired with an attuning role that pursues a dynamic fit between the plan and the changing environment. The two roles will be evaluated in a workshop experiment with subject matter experts, and the attuning role will be studied during a live exercise. This is expected to provide knowledge on how "license to act" can be operationalized by a creator and how the set of capabilities can be dynamically revised without losing coherence in the field.

Smart innovation. This pilot study will focus on how the Ministry of Defence can make better use of external innovations, solutions, and capacities. A Defence Open Innovation Model (DOIM) has been developed along with a questionnaire to test whether all the relevant building blocks for innovation are in place. Interviews and workshops will be used to assess the innovation's performance, process, and management.

Informal workarounds. This pilot study will focus on how synergy between formal rules and procedures and informal workarounds contribute to a more adaptive culture in which people are able to make decisions that fit with the situation while considering different perspectives. A gaming approach will be used to validate the results from our analysis: Under which circumstances will people choose to follow formal procedures and when will they look for informal workarounds? This knowledge will help stimulate adaptive decision making on formal and informal paths in specific situations.

3. The research project at FOI in Sweden

The Swedish contribution to the trilateral PA, MONiTOR, is a three-year research project on Command and Control (C2) agility funded by the Swedish Armed Forces and led by FOI. The focus has been the Swedish Navy's organizational C2 agility and its human component, though the project aims to develop empirical methods to evaluate all future naval C2 capability. In practical terms, the project seeks to identify which specific data collection methods are appropriate in which situations and contexts so an assessment tool and a C2 agility training program can be developed for navy officers.

The project has reviewed existing methods for C2 performance assessment and developed an approach for assessing agile C2 capability in close collaboration with the Navy and, specifically, the Swedish Naval Warfare Centre, which is responsible for the development of naval tactics. The feasibility of different data collection approaches are being tested by collecting data during exercises.

Theoretical framework

C2 in military organizations has been studied from an agility perspective, defining agility as "the capability to successfully effect, cope with and/or exploit changes in circumstances" (NATO STO SAS-085, 2014). Agility can be viewed as the ability of a system to change - which is also sometimes referred to as adaptability (Hoffman and Hancock, 2017; Alberts and Hayes, 2003). C2 agility then refers to the ability to adapt to changes, primarily by adjusting information flows and the allocation of decision rights (NATO STO, 2013; Huber, Moffat, & Alberts, 2012).

A central conceptual model used in C2 agility theory is the C2 approach space. This is a three-dimensional space describing how a C2 system can position itself along the dimensions of distribution of information, allocation of decision rights, and patterns of interaction (NATO STO SAS 065, 2010). *Distribution of information* refers to the policy and technical capability for sharing information among entities (who gets to know what?). *Allocation of decision rights* refers to how authority and responsibility is allocated among the entities (who has the mandate to take action?). *Patterns of interaction* refers to who actually interacts with whom. This is largely determined by policy, procedure, method, and physical systems like information communication technology.

The location of an entity in the space defined by the three dimensions is referred to as a *C2 approach*. A central theory in the NATO STO SAS 085 report (2013) is that there is no single C2 approach that is appropriate for coping with all situations. The appropriateness of a C2 approach can be evaluated in light of the situation in which it is applied—*the C2 problem space* (Albert & Hayes, 2006). Sometimes each involved entity might act separately, with required coordination handled at the top command level (referred to as *de-conflicted C2*). More complex and unpredictable situations may require entities to collaborate on multiple levels concurrently (referred to as *collaborative* or *edge C2*). The ability to recognize the need to change C2

approach and to perform that change is what constitutes C2 agility (NATO SAS-08, 2014). Consequently, agile C2 systems are expected to be projected onto different locations in the C2 approach space as the situation changes (see Figure 2).

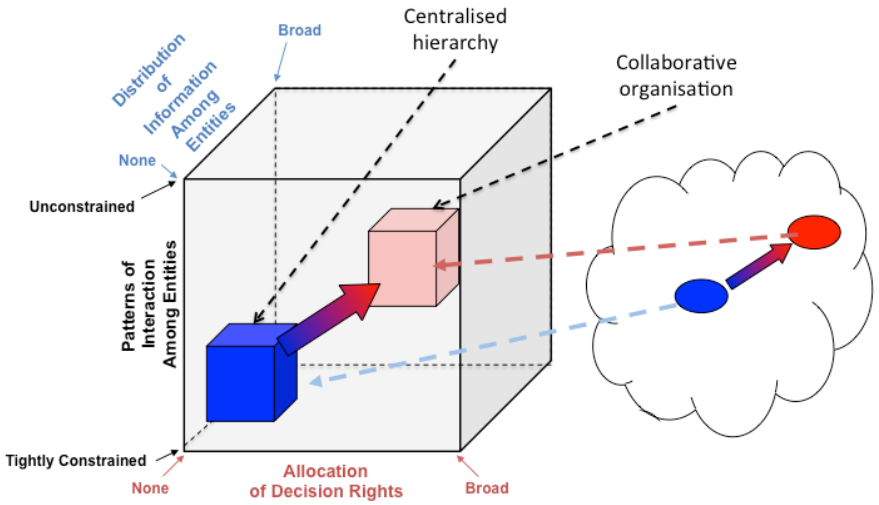

Figure 2. The C2 Approach Space and the C2 Problem Space.

Most military organizations will be somewhere between the two extremes of deconflicted C2' and 'edge C2', thus positioning themselves toward the middle of the C2 approach space. Ideally, a modern military is organized as a hierarchy, using modern IT for information dissemination and allocation of decision rights as dynamically as possible. Also, allocation of decision rights may change dynamically during operations, such as in the case of applying mission command during certain phases. C2 agility can be seen as a bridge between organizational and individual adaptability. C2 is the process performed by one or more organizations to orchestrate the activities of their units and personnel. C2 agility is the ability to apply various approaches for this process. However, the ability to do so is rooted in individual adaptability, as the human component of the organization is the one that, in the end, has to adapt. The concept of individual adaptability has been outlined in Section 2.

Development of an assessment approach with corresponding data collection tools

A central part of the MONiTOR project has been to outline and test a C2 agility assessment tool based on the theoretical concepts presented above. In addition, earlier work in resilience engineering (Johansson & Lindgren, 2008; Lundberg & Johansson, 2015) and cognitive systems engineering (Hollnagel & Woods, 1983; 2005) have informed the development of our assessment approach. A central concept is a deviating event, which refers to changes in the situation that challenge the outlook of a successful mission. Agile organizations are better equipped to predict, detect, and quickly respond to deviating events and turn them into favourable conditions.

As a part of the research project, a variety of assessment approaches and methods for C2 have been identified. The project has worked in two parallel tracks, aiming at developing methods and tools for (in the context of the Swedish navy): assessment of potential C2 agility and continuous and repeated measurement during live exercises and operations.

Assessment tool of potential C2 agility. The assessment tool is based on four components, each comprising a set of items: System[1] goal and context, ability to detect deviating events, ability to cope with deviating events, and agile C2 capability.

The first component, system goal and context, is descriptive and aims to build an understanding of the nature of the system. What is the purpose of the system? What does it do? What are the major constraints on the system? What is the context of the system in terms of geography, climate, and temporal factors?

The second component, ability to detect deviating events, consists of a set of scale rating questions concerning the ability to predict, monitor, and understand changes in the environment in which the system exists.

The third component, ability to cope with deviating events, also uses scale rating questions to explore the ability to cope with deviations when they occur. The ability to withstand damage and to use resources in a flexible manner is also probed.

The last component, agile C2 capability, specifically looks at the ability to adapt different approaches to C2; i.e., the potential to occupy different parts of the C2 approach space. An attempt to describe the mission space should also be made.

Continuous and repeated measurement during live exercises and operations. A prerequisite for assessing dynamic variations in adaptability and agility is the ability to collect data that describes variation over time. This calls for continuous or repeated measurement that allows for within-subject designs. An approach to capturing repeated measurement data on C2 agility has been evaluated during two live naval exercises, each of which spanned more than a week.

The two studies evaluated different approaches to collecting repeated measurements on ability to detect deviating events, ability to cope with deviating events, agile C2 capability (i.e., three of the components of the assessment tool described above), and individual adaptability (as a part of the trilateral cooperation). Items from t'Hart and Oprins' (2015) instruments for measuring the adaptive behaviours and preferences of individuals formed a complementary view to the components of the C2 agility assessment tool developed by MONiTOR.

The first study (Wikberg, Johansson, & Andersson, 2016) was an exploratory case study using observations, document analysis, and interviews in the operational setting of a naval exercise. In general, the conditions were found to be suitable for collecting repeated measurements, although with a few limiting factors. The most important was the limitation on deploying observers to platforms due to limited space. The results pointed to principles for further developing approaches for assessing adaptability; for instance, only a few key individuals in each entity can respond accurately to probes on perceived organizational adaptability. Individual adaptability, on the other hand, can be probed among a larger set of individuals. A realistic approach is to have participants provide data a few times a day to make sure that the data collection does not become a burden for operators with an already heavy workload.

The second study (Wikberg, Andersson, & Johansson, 2017) was also an exploratory case study undertaken during a naval exercise in which lessons from the previous study were implemented to gain more knowledge on how to assess C2 agility and adaptability. The study focused on the challenge of obtaining repeated measures from key personnel in command teams during distributed operations. The exercise scenario was

[1] By *system* we refer to socio-technical systems, such as organizations or other collectives of people and technology that work in a goal-oriented fashion in a context signified by change.

designed to become progressively more challenging, which was expected to decrease performance and adaptability over time.

The results indicate acceptable survey response rates among those respondents who were not hindered from answering due to operational circumstances, leading to the conclusion that the repetition of 21 scalar questions is not overly obtrusive for the officers to complete repeatedly after their daily shifts. The collected data showed trends in response profiles, with a noticeable decrease in organizational adaptability and C2 agility as time progressed and mission complexity increased, while the reported individual adaptability increased (see Table 1). We have not been able to identify other studies reporting results on this topic and we therefore believe this calls for further investigation. A possible explanation for the difference between individual and organizational trends might be the scenario design used in the exercise. Although the situation got more complex and challenging from the point of view of higher organizational levels, the expectations on the different roles taken by individuals may have become clearer. The initial unclear, but less threatening situation, called for individuals to prepare for a wider set of options. As the situation became more threatening and, hence, more complex from an organizational C2 point of view, individual responsibilities may actually have become clearer as the individuals could focus on their main tasks.

Table 1. *Final distribution of items to trait per response profile type.*

	Response profile			
Trait	**Decreasing**	**Increasing**	**Flat**	**Indeterminate**
Organizational adaptability	7 items	-	-	1 item
Individual adaptability	1 item	5 item	-	1 item
C2 approach agility	2 item	-	1 item	1 item
Performance	1 item	-	1 item	-

In addition, a principal component analysis (PCA) was performed where five latent variables were identified explaining more than 75% of the total variance in the dataset. The strongest latent variable, labelled C2 structure and performance, explains more than 37% of the variation and is characterized by C2 interaction, situation assessment, role importance, and performance. This component is also negatively loaded by collaboration and creativity on the individual level, which is in line with the opposite trends identified between individual and organizational factors. The relative importance of the identified components should be further investigated.

Future directions for the project

The MONiTOR project will end in 2017. A final data collection is also planned for this year in order to investigate to what degree practitioners recognize the need for adaptability as a means for coping with situational changes.

4. The research projects at DRDC in Canada

The Canadian contribution to the trilateral PA is aligned with two research projects. Both aim to impact the development of Canadian Armed Forces (CAF) leadership doctrine. The first project, Integrated Institutional Leadership Model: A Behavioural Perspective, developed an institutionally focused leadership framework in order to identify strengths, gaps, and priorities for military leadership development, especially for adaptability. The second project, Conceptual Development for the Your Say Survey, measures CAF leadership adaptability at the individual and organizational level. Both of these projects extend beyond the scope of adaptability. As such, only the aspects of the projects related to this PA will be discussed here.

The Integrated Institutional Leadership Model: A Behavioural Perspective

The project focuses on high-level command (i.e., generals and above who work with external groups, such as the Government of Canada and other nations). The project assumes that CAF leaders must influence key organizational outcomes, such as external adaptability, member well-being, and military ethos development. In addition, CAF leaders must also continuously manage a system of interrelated components (i.e., people, processes, and structures) that impact the organization's performance and outcomes.

A key leadership concept in CAF is leading the institution (Canadian Forces Leadership Institute, 2005). For the CAF, institutional leadership (IL) refers to the activity of simultaneously exercising guidance inward, within a formal institution, and outward, by representing the institution in the wider world.

However, there is very little research examining the relationship between institutional leadership components (i.e., mission success, internal integration, external adaptability, member well-being, and military ethos) within the Canadian military. The Canadian Defence Academy (CDA) suggests that the current leadership development framework (LDF; see Figure 3) does not address all of the capacities required of effective institutional leaders (Jeffery, 2008). Jeffery (2008) highlighted competency gaps in the LDF at the institutional leadership level in his analysis of organizational change in the CAF. He suggested that senior leaders do not have a strong understanding of the political context. Specifically, their perspective is too narrow, which reduces effectiveness at the strategic level; they lack effective listening skills; they have difficulty recognizing and valuing different organizational cultures; and they do not recognize personal strengths and weaknesses and adjust accordingly. Consequently, empirical research is required to examine these observations and make recommendations for effective change to LDF and IL leader development.

Rank\Meta-competencies	Expertise	Cognitive capacities	Social capacities	Change capacities	Professional ideology
Senior	Strategic	Creative Abstract	Inter-institutional	Paradigm shifting	Stewardship
Advanced					
Intermediate					
Junior	Tactical	Analytical	Inter-personal	Open	Internalize

Figure 3. Leadership Development Framework (Reproduced from Jeffery, 2008)

This project aims to address the gaps identified by Jeffery (2008) in the CAF context, focusing on skillsets, personal attributes, and characteristics of institutional leaders. The project is also intended to identify measurable behaviours and associated outcomes that demonstrate the effectiveness of institutional leaders. Consequently, the work includes the development of research methodologies and measurement tools to assess the performance and effectiveness of CAF institutional leadership.

An initial literature review was undertaken (Lee, Eren, & Budgell, 2016), which resulted in the development of a new integrated institutional leadership framework (see Figure 4). The framework uses a behavioural perspective and reflects existing CAF leadership doctrine.

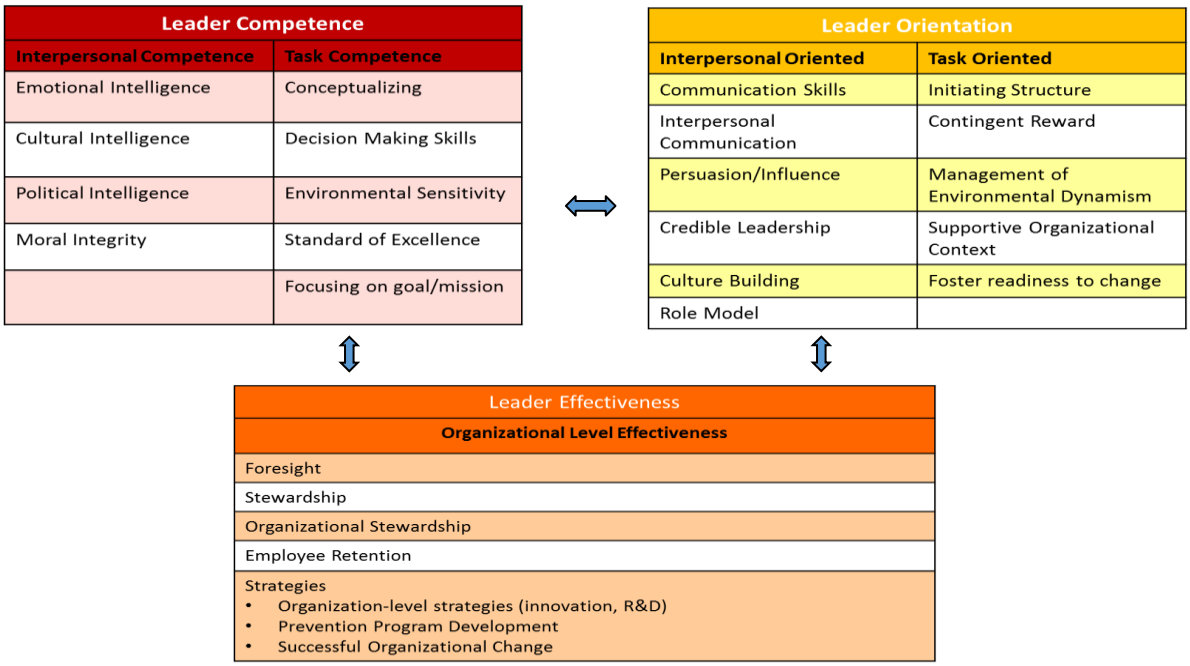

Figure 4. The Integrated Institutional Leadership Model.

The model stresses that competencies, orientations, and the resultant effectiveness are interactive. Hence, the model suggests that improvement in one of the conceptual pieces will lead to improvements in the other competencies in the model, although one might not expect that improvement increments will be equal across factors.

Leading the institution requires that institutional leaders develop and manage external relationships with the government and its departments, as well as with other militaries and private and public organizations. This requires that they develop a high level of competency on multiple facets that may not be essential in demonstrating effectiveness at lower levels of leadership.

Addressing the conceptual gaps identified by Jeffery (2008) in the model will include, for example, development of a Political Intelligence competency (found in the Leader Competence box). Political intelligence means that the leader has the ability to "effectively understand others at work" and can "use such knowledge to influence others to act in ways that enhance [his or her] personal and/or organizational objectives" (Ahearn et al., 2004; p. 311). It is proposed that strength or improvement in this competency will contribute to the positive development of appropriate orientations and will enhance the effectiveness of an institutional leader. Management of Environmental Dynamism (found in the Leader Orientation box)

is another example. Environmental dynamism refers to the degree of change and the unpredictability of change that occurs in an organization's external environment (Dess & Beard, 1984). In terms of adaptability, we predict it will be a key factor in the effectiveness of leading the organization and also that adaptable organizational leaders will turn out to be more effective.

Future directions

In order to explore the concepts discussed above, a research plan was developed by Yelle (2016) with the objective of obtaining a better understanding of institutional leadership in the CAF using feedback from senior executives across the federal government who have had recent and significant experience working with CAF leaders. The study will focus on skillsets, personal attributes, and characteristics of institutional leaders. Data collection started in February 2017 and should be completed by the end of May 2017, with the report to follow by the end of 2017.

In addition, two projects are running concurrently and independently to this project; namely the CAF Competency Dictionary (CD) and the Leader Profile (LP) projects. The CAF CD, which operationalizes the meta-competencies of the Leadership Development Model (LDM), is comprised of 19 competencies that are defined as "global, broad, and comprehensive characteristics that include knowledge, skills, ability, and other Attributes (KSAOs), such as values and personality traits, that are linked to strategic organizational goals" and cumulatively represent the complex, multi-faceted construct of leadership as depicted in the LDF (Rankin, Ruscito, Jalbert, Gauger, Williams, & Burgess, 2014, p. 1; Rankin & Williams, 2016). Launching off the development of the CAF CD and competency model (Rankin & Noonan, 2015), the LP project sought to create occupational profiles for executive leaders in the CAF that include not only competencies, but also the experiences, areas of knowledge, and education/training courses necessary to be successful leaders (e.g., Williams, Rankin, & Rounding, 2016). Although similar, the competencies defined by the CAF CD and subsequently are used in the LPs, are different than those identified herein for institutional leadership. Effort will be required in order to align and integrate each of these projects, the purpose of which would be to define an integrated leadership development plan and assessment tools to measure CAF leader effectiveness.

Conceptual Development for the Your Say Survey

This project focuses on external adaptability at the organizational level**.** External adaptability is viewed as "a concern for the external operating environment and the capability of a military unit, system, or the CAF to anticipate and adapt to changing conditions" (CAF, 2005, p. 4), making it an aspect of effectiveness (Wenek, 2003). The goal of the project is to develop and measure organizational effectiveness using an annual cross-sectional survey. This goal extends beyond the scope of adaptability but the theoretical framework for the project is a valuable contribution to the collaboration.

Theoretical framework. The competing values framework (CVF) suggests that effective organizations must balance competing demands in order to be effective (Quinn & Rohrbaugh, 1983). This includes a flexible organizational structure that can easily adapt to new situations (flexibility in Figure 5) versus a stable organizational structure with clear rules and regulations (control). It also includes the need to focus outside of the organization (external) with the need to focus within the organization (internal).

These two demands can be intersected to form four quadrants. This four-field model forms the basis for the Canadian Forces Organizational Effectiveness Model (CFEF; Wenek, 2003). The four quadrants represent different combinations of demands: member well-being and commitment, external adaptability, mission success, and internal integration. Balancing these competing demands in an adequate way forms the basis of leadership conduct. Mission success is the primary objective of the CAF and thus the most

important quadrant (Peach & Howell, 2013). Still, the CAF must address the other three quadrants, which are secondary outcomes in this model (see Figure 5).

Figure 5. The Canadian Armed Forces Effectiveness Framework. Adapted from CAF (2005).

The quadrants should be viewed as competing roles that leaders play. Effective leaders must know when and where to enact each role (referred to as behavioural complexity; Lawrence, Lenk, & Quinn, 2009). Although all four quadrants can be measured at all levels of the organization, the role of direct leaders (especially those at lower ranks) likely places less emphasis on external adaptability than does the role of institutional leaders. That is, direct leaders must work within the confines of their chain of command, and their freedom to be agile and adaptable may be limited to their delegated responsibility, rather than in leading organizational change.

Given this reduced external adaptability role for direct leaders, the assessment of direct leaders' external adaptability in the CAF[2] is also limited. It contains a short measure of external adaptability in terms of "initiating significant change" adopted from Lawrence, Lenk, and Quinn (2009). In order to address this lack of information, the project has, through a series of psychometric analyses, created a brief direct leadership measure of behavioural repertoire based on the competing values framework (Squires, Peach, & Lemieux, under review). The most recent version of the survey also contains a measure of ethical leadership (Brown, Trevino, & Harrison, 2005), which has been validated in the external literature and is currently being validated with data from CAF members and civilian employees of the Department of National Defence. Future analyses will examine whether it can be a proxy measure for leader ethos.

Future directions from Canada

Although the CAF has a theory of effectiveness at the organizational level, no attempt has been made to measure effectiveness at the organizational level using a scale based on the Canadian Armed Forces Effectiveness Framework. Another ambition is to develop a measure of individual effectiveness (including individual adaptability). In order to incorporate this measure into the survey, it would be important to first theorize how individual adaptability would link to organizational effectiveness.

[2] Assessed in an annual survey to Regular Force and Primary Reserve members called the Your Say Survey.

5. A joint framework

The objective of the trilateral project arrangement is to develop a framework of factors that can be used to strengthen adaptability among individual military personnel and in the military organization. A joint framework was created to illustrate how the outcomes from the different programs can be merged into a combined approach. The framework took the Netherlands model (Figure 1) as a starting point because it was the most comprehensive and already included individual and organizational factors. This model was then enriched by the perspectives from the two other research groups.

In contrast to the Dutch program, the Swedish project focused on the assessment of C2 agility. An assumption in the Swedish assessment approach is that C2 connects and orchestrates individual and organizational entities and capabilities during adverse events. C2 agility can therefore be seen as a bridge between organizational adaptability and individual adaptability. The initial results from the project suggest that individual adaptability does not correlate positively with organizational adaptability at all times (Wikberg, Andersson, & Johansson, 2017). This may be especially accentuated when a mission command approach (U.S. Army, 2012) is used, which is a common approach in the Swedish Armed Forces. The coordinating mechanism, C2, must address this insight as different situations put different demands on different adaptability traits.

The DRDC programs focus on leadership competencies. Organizational leaders play a key role in establishing and maintaining organizational structures for policy, procurement, training, recruitment, etc. DRDC approaches leadership competence from two frameworks, the competing values framework and the Canadian Forces Effectiveness Framework, and arrive at conclusions similar to those of the original TNO model. The approaches converge over the ability to be robust and flexible, alongside knowing when to change and when not to, both necessary for successful adaptiveness. By applying the DRDC approach to two components of the TNO model, learning and organizational determinants of adaptability orientation, the granularity of the original model is increased. The DRDC approach suggests that institutional leaders are developed through organizational learning processes. Job experiences may play a greater role in developing leaders than formal training. If the organizational learning and selection processes promote individuals who can manage the paradoxes of bivalent thinking, then this capability can increase in the organization over time. Institutional leaders will then have an important influence on organizational determinants, being able to create a vision and shape the culture. As such, we see the CAF integrated institutional leadership model playing a complimentary role to the enhanced model (Figure 6) in explaining how organizational determinants can be shaped by leaders.

Taking these conclusions into consideration, the original model has been developed into a joint framework (Figure 6).

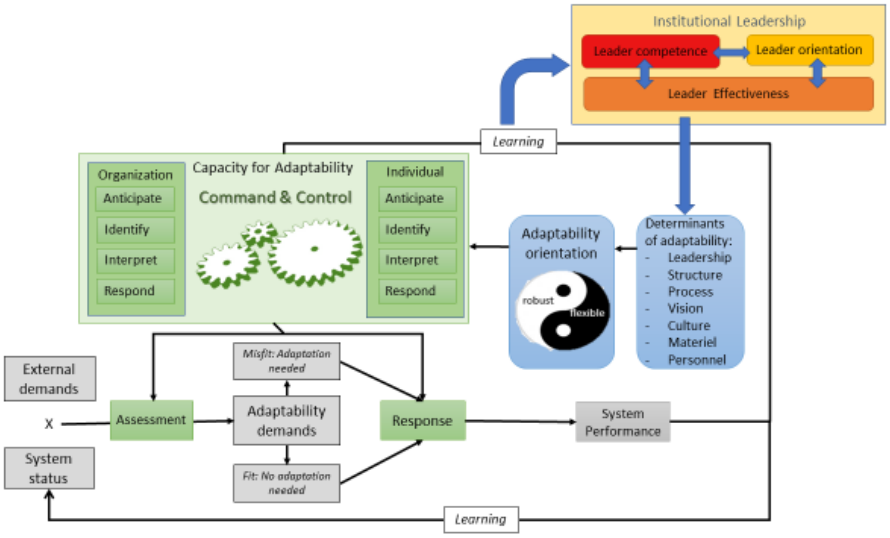

Figure 6. The model in Figure 1 developed with insights from the Swedish and Canadian Research projects.

The joint framework combines development and implementation of adaptability policy from a leadership perspective with C2 agility and organizational and individual adaptability. The enriched model covers both operational demands and practice as well as long-term defence planning from an agility and adaptability perspective. The joint framework describes the role of C2 in the process of coordinating different aspects of adaptability. The joint framework also includes the role of high-level command and the long-term impact it has on the determinants of adaptability.

Moreover, the joint framework elaborates on how the agility in the orchestration functions of C2 is related to organizational and individual adaptability (indicated in the Figure by the box for 'Capacity for Adaptability'). The framework explains how experiences of adaptability from operations and exercises are connected to the long-term development of skills in institutional leadership, which in turn form long-term policies (indicated in the Figure by the box for Institutional leadership). Hence, the joint framework tries to incorporate both a perspective of development as well as a perspective of the different demands on different levels of command.

Several different instruments for measurement have been developed for the different components in the enriched model. Hence, the outcome from the project arrangement might be the embryo for a comprehensive conceptualization and assessment approach to guide how defence forces' ability to adapt should evolve over time.

6. Insights and future challenges

The community discussed in the introduction had to decide how to preserve the defensive forest or come up with something else. The same question must be asked about the agility and adaptability of our defence forces in the face of the threats we now face. This trilateral collaboration has tried to identify some insights and core challenges to rejuvenating our defence forces. These insights are meant to shape our thinking about

military organizations so that we can restore the flexibility and robustness that makes them adaptable. We now propose six insights essential to understanding and strengthening adaptability, and we conclude with five future challenges for research and policy development.

1. Change as a constant in organizational life. The people in the river community must assume that unpredictable weather and flooding will dominate the future, as they have the past.

Change is the rule, not the exception (Lüscher & Lewis, 2008), even though defence forces are organized to be at their best when things stay the same. This does not fit contemporary demands. As a result, many defence forces are now debating how to optimize their organization's adaptability to better meet the threats of tomorrow. Militaries are eager to develop a dynamic capability that allows them to recombine and integrate their resources to adapt to changes in the environment. Adapting means integrating and reconfiguring organizational skills and resources to match the changing environment (Eisenhardt & Martin, 2000; Helfat, 1997; Lavie, 2006; Teece, 2006; Teece et al., 1997; O'Reilly & Tushman, 2008). Thus, leaders and decision makers in military organizations need to maintain an adaptive mindset, to acknowledge that reality is in a constant state of change. Introducing and upholding such a mindset requires alertness to a reality that repeatedly lures unaware minds with false promises of permanency and simple explanations to complex problems. The adaptive mindset alone, however, is not sufficient. An organization needs an adaptive culture that allows it to maneuver and to respond according to the demands of a situation.

2. Developing, training, and managing your leadership based on training and operational experience. The old approach to the forest did not work because the community failed to foster the right kind of caretakers.

Investing in the core capabilities of the military involves developing institutional leaders who build a clear purpose, vision, and identity for the organization. Military leaders must keep the tree flexible. Two skill sets identified in this paper for developing flexible institutional leaders are political skills, which allow leaders to anticipate change, work more effectively with non-military groups, and to understand the consequences of removing rules, and environmental dynamism, which is the ability to anticipate and to adapt to change.

Training organizational and individual adaptability is a challenge that is often approached by the repetition of certain behaviours in pursuit of perfection. A consequence of this type of training is that exercises focus on situations that participants are expected to be able to handle—i.e. the purpose of many exercises, large ones in particular, is to further improve skills in known procedures and methods and to demonstrate that doctrine, training, and equipment function as expected. In order to improve adaptability, however, training must challenge participants in ways that require adaptive behaviour to succeed.

Another challenge is the military career system, which may not encourage adaptive and flexible behaviour. Training is often arranged in the form of competence ladders, where specified behaviours are used as checklists for assessing whether an individual is fit for promotion. This is a paradox from the point of view of adaptability and agility because bold and creative leaders who rapidly adapt to situations often have shown to be successful in wartime, but less appreciated in peacetime. Both George Patton and Bernard Montgomery are well-known examples of such leaders.

Methods for training flexibility and adaptability should be an integrated part of exercise planning as well as developmental work. Without incorporating these concepts into the planning stage, situations that demand flexibility and adaptability are unlikely to emerge during an exercise. The agility and adaptability dimensions of C2 explored and tested in this project might provide guidance on which aspects need to be manipulated

to create such situations. On the individual level, the ability to adapt successfully to complex and unanticipated situations may be improved by training in "pure perception" (self-aware attention) and by training in "cognitive flexibility" (metacognitive reflective thinking). The question is how such training should be designed and whether such training brings about improvements in the capabilities that are predictive for adaptability.

3. Manage development based on assessment of status and future prospects. The river community has to come up with a way to assess the success of their new strategy for preserving the defensive tree line. They need methods to monitor and assess the flexibility and robustness of individual trees and of the forest overall.

A central concept in the theory of C2 agility is self-monitoring (NATO STO SAS-085, 2013), which means that monitoring the environment it is not enough to adapt to changes; it is also necessary to direct attention to the inner workings of the system. By assessing current and future needs and comparing them with current practice, potential mismatches can be detected and compensated for. The first step forward is identifying where the system is. Valid and reliable assessment techniques are required for informed decisions about whether investments in adaptive capability are needed and to what degree these investments are successful.

4. Managing innovation and maintenance of best practices. The trees provided shelter and the community prospered. But procedures to maintain the defensive line did not evolve with the situation, and the community's practices no longer worked.

Adapting to and managing innovations is a core challenge for any defence force. The challenge is threefold: (1) Technological, meaning understanding emerging technologies and opponents' development processes; (2) a wartime problem of adapting to enemy behaviour and adjusting concepts that do not meet expectations; and (3) a strategic issue of long-term peacetime innovation and procurement. As with balancing robustness and flexibility, a balance must be achieved between a sound and conservative skepticism based on combat-proven solutions and exploring and exploiting new ideas and technology. This balance should be integrated into military culture. Allowing and promoting new ideas and technology at an early stage should be rewarded in military organizations, including their promotion systems. At the same time, there should be strong incentives for evidence-based rejection of ideas and inadequate technology at an early stage.

Future research should be geared toward making defence personnel comfortable and adept at working with the tensions between stability and flexibility and to making the kind of organizational structure and culture that supports this type of behaviour. The question is how to gain insight into all the tensions that might arise in such an organization, and which factors (leadership, culture, structure, etc.) play a role in fostering an agile culture.

5. Pursue dualities as competing but jointly desirable objectives. What is more important for the community: Preserving the old forest or growing a new one?

The military organization is traditionally founded on hierarchical structure with clear command and control responsibilities, well-defined rules, robust procedures, and repetitive drills. These remain necessary features of defence organizations. It is the stable and predictable backbone. Control and predictability, however, limit flexibility and the ability to act at the local level or edge because such action requires a high degree of autonomy. But local autonomy introduces uncertainty and limits predictability. The challenge is therefore to evolve toward an adaptive organizational approach that can deal with unpredictability and change without compromising stability and strength. How can one combine these two extremes? "Is it possible to operate

both archetypes under the same organizational roof and develop the ability to switch between them?" (Tushman and O'Reilly question, 1996 in: Bessant et al., 2005).

As we have discussed in this paper, a truly adaptive defence organization has the capacity to be stable and flexible. Both features can "exist simultaneously and persist over time in states of dynamic equilibrium" (Smith & Lewis, 2011). This not only gives us a good conceptual notion of what adaptability is, it helps us to tackle the practical tensions that arise between stability and flexibility.

Defence organizations constantly face choices between operational needs in the theatre, financial limitations, juridical accountability, and safety concerns. One way to promote adaptive responses might be to develop a synergy between formal rules and procedures and informal workarounds so people are able to make decisions that fit with the situation while taking different perspectives and tradeoffs into consideration. Either way, defence organizations must have knowledge about circumstances that lead to specific types of informal workarounds and possible positive or negative consequences. This knowledge will help to stimulate adaptive decisions on formal and informal paths in specific situations.

6. Increasing flexibility by investing in stability. The branches of the trees represent the organization's ability to be flexible while the trunks represent its stability.

Many defence organizations wish to increase their flexibility but often feel restricted by "red tape." But the stability of an organization is not defined by its rules, regulations, and procedures, which are byproducts of organizational structuring and management that define how personnel to act. Rules and procedures should always comply with the raison d'être of the defence organization. The stability of the defence organization comes from a clear vision, a compelling mission statement, and a focus on its core strengths. In the analogy, the roots and trunks of the trees provide its stability. The deeper and stronger the roots, the more leeway the tree can lend to its branches. They can grow further away from the stem and have a wider reach.

Challenges for the future. We can see that defence organizations have been subject to budget cuts, governmental stipulations, social demands, and of course unforeseen operational challenges in theatre. This has led to many quick fixes in the form of rules and directives that have placed the figurative splints on the branches of the trees. Many defence organizations realize that they want to get rid of the splints because they hinder the much-needed movement of the branches. They wish to develop their flexibility yet fear the repercussions of doing away with many of the rules and regulations that they have abided by for all these years. There are presumably tradeoffs and consequences involved with creating a more agile military organization. Whether solutions concern training, procurement, manning, systems, platforms, culture or something else there is always a cost.

Expressed in the terms of the analogy in the introduction, at least five challenges can be formulated. What happens if all the splints are taken away? What do they have left to fall back on? What will the defence organization draw its stability from? Very likely, the defence organization will have to consider the health and strength of its roots. What is the common intent? How do military personnel relate to this intent and how does it reflect in their daily jobs?

Once the organization roots are strong enough, it can surely start to dismantle its splints as it is no longer dependent upon external forces to regulate its operations.

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