Hybrid Scenario Development Methodology and Tool

An Arctic-Oriented Scenario Example

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Defence R&D Canada
Centre for Operational Research & Analysis

Strategic Analysis Section

National Defence Défense nationale

Canada

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Abstract

Scenarios are the foundation of effective planning and training efforts. They serve as a common context for multiple stakeholders in evaluating current capabilities to meet realistic potential future security challenges. This contractor report outlines a new systematic approach to Arctic Defence and Security-related scenario development (i.e. context-setting) for DRDC's Centre for Operational Research and Analysis (CORA). The prescribed outcome is a methodology that delivers a scenario development tool capable of capturing sufficient information to aid the end-user (DRDC CORA defence scientists and researchers) in their drive to improve and support overall planning efforts. This methodology is supportive of Chief of Force Development's (CFD) Capability-Based Planning (CBP) process. This improved process will in turn aid DRDC/CORA sponsored strategic/operational level planning, training, and analysis across the Government of Canada (GoC). The related Capability Inventory Tool (CIT) will provide useful reference material to this methodology.

Résumé

Les scénarios constituent le fondement des efforts de planification et de formation efficaces. Ils servent de contexte commun à nombre d'intervenants pour l'évaluation des capacités actuelles à confronter d'éventuels enjeux réalistes de sécurité. Le présent rapport de l'entrepreneur met en lumière une nouvelle démarche systématique à l'égard de l'élaboration de scénarios liés à la défense et à la sécurité de l'Arctique (c.-à-d. l'établissement du contexte) pour le Centre d'analyse et de recherche opérationnelle (CARO) de RDDC. Le résultat attendu est une méthodologie qui procure un outil d'élaboration de scénarios capable de rassembler suffisamment de renseignements pour aider les utilisateurs finaux (les chercheurs et scientifiques en matière de défense du CARO RDDC) dans leur volonté d'améliorer et d'appuyer les efforts de planification en général. Cette méthodologie appuie le processus de planification fondée sur les capacités (PFC) du Chef - Développement des forces (CDF). Ce processus amélioré aidera, à son tour, la planification, la formation et l'analyse de niveau stratégique/opérationnel de RDDC/CARO à l'échelle du gouvernement du Canada (GC). L'outil connexe servant à l'inventaire des capacités fournira des documents de référence utiles pour cette méthodologie.

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Executive Summary

Hybrid Scenario Development Methodology and Tool: An Arctic-Oriented Scenario Example

Peter Avis; David Mugridge; Peter Race; Shaye Friesen; Peter Archambault;
DRDC CORA CR 2011-097; Defence R&D Canada – CORA; July 2011

Introduction: Scenarios are the foundation of effective planning and training efforts. They serve as the common context for multiple stakeholders in evaluating current capabilities to meet realistic potential future security challenges. This contractor report outlines a new systematic approach to Arctic Defence and Security-related scenario development (i.e. context-setting) for DRDC's Centre for Operational Research and Analysis (CORA).

Results: The prescribed outcome is a methodology that delivers a scenario development tool capable of capturing sufficient information to aid the end-user (DRDC CORA defence scientists and researchers) in their drive to improve and support overall planning efforts. This methodology is supportive of Chief of Force Development's (CFD) Capability-Based Planning (CBP) process. This improved process will in turn aid DRDC/CORA sponsored strategic/operational level planning, training, and analysis across the Government of Canada (GoC).

Significance: This hybrid scenario development tool methodology will aid the formulation of complex, multi-agency scenarios by establishing coherence with the Morphological and Global Business Network (GBN) approaches currently employed by DRDC CORA and DND/CF's military estimate and appraisal process. The above approach seeks to document scenario authors' considerations for inclusion in their statements of alternative futures when seeking to develop a scenario. If fully employed, it is believed this method will provide relevant and skill-testing scenarios for the current Canadian approach to Arctic defence and security.

Future plans: The project team is currently in the process of examining the broader applicability of this methodology to support scenario development, and has met with representatives from CFD to explore the possibility of exploiting this work as part of the existing CBP process.

Sommaire

Hybrid Scenario Development Methodology and Tool: An Arctic-Oriented Scenario Example

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Introduction : Les scénarios constituent le fondement des efforts de planification et de formation efficaces. Ils servent de contexte commun à nombre d'intervenants pour l'évaluation des capacités actuelles à confronter d'éventuels enjeux réalistes de sécurité. Le présent rapport de l'entrepreneur met en lumière une nouvelle démarche systématique à l'égard de l'élaboration de scénarios liés à la défense et à la sécurité de l'Arctique (c.-à-d. l'établissement du contexte) pour le Centre d'analyse et de recherche opérationnelle (CARO) de RDDC.

Résultats : Le résultat attendu est une méthodologie qui procure un outil d'élaboration de scénarios capable de rassembler suffisamment de renseignements pour aider les utilisateurs finaux (les chercheurs et scientifiques en matière de défense de RDDC CARO) dans leur volonté d'améliorer et d'appuyer les efforts de planification en général. Cette méthodologie appuie le processus de planification fondée sur les capacités (PFC) du Chef - Développement des forces (CDF). Ce processus amélioré aidera, à son tour, la planification, la formation et l'analyse de niveau stratégique/opérationnel de RDDC/CARO à l'échelle du gouvernement du Canada (GC).

Portée : Cet outil d'élaboration de scénarios hybrides facilitera la formulation de scénarios complexes, multi-agences, en établissant une cohérence avec les approches du *Morphological and Global Business Network* (GBN) présentement utilisées dans le processus d'évaluation militaire du MDN/des FC et du CARO RDDC. Les approches mentionnées ci-dessus ont pour but de documenter les considérations des auteurs de scénarios afin qu'ils les intègrent dans leurs déclarations de possibilités futures lorsqu'ils veulent élaborer un scénario. Si elle est bien utilisée, cette méthode devrait fournir des scénarios d'évaluation des compétences et pertinents en ce qui concerne l'approche actuelle du Canada à l'égard de la défense et de la sécurité de l'Arctique.

Recherches futures : L'équipe de projet examine présentement l'applicabilité générale de cette méthodologie pour appuyer l'élaboration de scénarios et a rencontré des représentants du CDF afin d'explorer la possibilité d'exploiter ce réseau dans le cadre du processus actuel de PFC.

Table of Contents

List of Figures

Acknowledgements

The project team would like to acknowledge CORA Defence Scientists Shaye Friesen and Peter Archambault for their guidance and contribution to this report. Their advice and effort elevated the final result to what is presented here.

1 Aim

Scenarios are the foundation of effective planning and training efforts. They serve as the common context for multiple stakeholders in evaluating current capabilities to meet realistic potential future security challenges. This report aims to outline a new systematic approach to Arctic-orientated Defence and Security-related scenario development[1] (i.e. context-setting) for DRDC's Centre for Operational Research and Analysis (CORA). The growing importance of Arctic / Northern Security has led to the region being identified as a prime area for Department of National Defence / Canadian Forces (DND / CF) research and conceptual development.[2]

The prescribed outcome is a methodology that delivers a scenario development tool capable of capturing sufficient information to aid the end-user (DRDC CORA defence scientists and researchers) in their drive to improve and support overall planning efforts. This methodology is supportive of Chief of Force Development's (CFD) Capability-Based Planning (CBP) process. This improved process will in turn aid DRDC CORA sponsored strategic/operational level planning, training, and analysis across the Government of Canada (GoC). The related Capability Inventory Tool (CIT) will provide useful reference material to this methodology.

For the purposes of this brief, the following definitions have been applied:

- Scenario development - story creation process within scenario planning; and
- Scenario planning – complete foresight study incorporating all process related aspects of this form of training.

In order to deliver a working scenario development tool it is essential that this hybrid approach both builds off of the results of the CIT and remains coherent with established DND/CFD practices.

The two core processes of this methodology are:

- The scenario development grid as published at Annex A; and
- The phased SLEEPS scenario developmental grids for scenarios 1 and 2 are published at Annexes C and D.

[1] The current state of scenario development: an overview of techniques (Peter Bishop, Andy Hines and Terry Collins) p1 states: "Perhaps the most common confusion when discussing scenarios is equating scenario development with scenario planning. We suggest that ''scenario planning'' has more to do with a complete foresight study, where scenario development is concerned more specifically with creating actual stories about the future. Scenario planning is a far more comprehensive activity, of which scenario development is one aspect." P. Bishop, A. Hines, and T. Collins, "The current state of scenario development: an overview of techniques", *Foresight*, Vol. 9 No. 1; 2007, pp. 5-25.

[2] Conference Board of Canada, *Security in Canada's North: Looking Beyond Arctic Sovereignty*, 2010. http://www.conferenceboard.ca/documents.aspx?did=3887. Last accessed 7 January, 2011.

For the requirements of this study, the project team will have investigated fully the scenario development concept as outlined the annexes. A copy of the statement of work (SOW) that initiated this study is provided in Annex E.

2 Objectives

This report outlines the following four key 'scenario development' objectives that were used by the contractors:

1. **PROMOTE** a clear understanding of the central political-military issues that should be considered as essential in the development of a potential DND/CF response to any future Arctic security scenarios. This is based upon the premise these scenarios will be used to explore aspects of Canada's Northern and Canada First Defence Strategies;

2. **ENSURE** that due consideration is given to the research, analysis, synthesis and application of information available to DND/CF strategic level researchers and planners (relevant books, monographs, journal articles, concepts, allied documents etc);

3. **EXPLORE** the freedoms and constraints imposed by time and the operational time-line, so that practitioners understand the capability/operational requirements required to perform all necessary missions from prevention, surveillance, and monitoring standing and extended deployments through to long-term recovery within comprehensive and expeditionary operations; and

4. **FOSTER** a working climate that improves situational awareness and multi-agency cooperation within the Arctic theatre of operations.

3 Scenario Development Process

After populating the CIT with the various categories for strategy, policy and capabilities, the team established an objective insight into the types of scenarios it was possible to build so as to explore the concepts of DND/CF being both the supported and supporting commander.

The following three phase scenario development process was followed:

- Phase 1 – An examination of GoC strategy and policy using functionality of CIT and the method as outlined in Annex A. This approach was based upon the premise the use of both the CIT and methodology grid would provide a high level of intellectual rigour to operational analysis and allow future authors to focus upon highly specific areas of military activity;
- Phase 2 – Brainstorm and develop scenario within approved area of activity. This activity was known to be judgement-based and does reflect some 'subjectivity' of the consulting team. The results of this brainstorming exercise are found in Annex B, and;
- Phase 3 – Write scenario using both scenario development methodology and the time-based event grid.

3.1 Scenario Development Methodology Grid

The grid establishes two over-arching concepts which require the author(s) to address:

- Determine strategic relationship between scenario and policy through examination of GoC strategy, policy and desired capabilities as outlined and analysed within the CIT; and
- Time and operational timeline (freedoms versus constraints) imposed by factors such as:
    - Speed, time and distance; and
    - Climatic considerations.

The grid then establishes a chronological and coherent organization (as illustrated by Annex A) which allows authors to write a plausible scenario which articulates the scenario through an events-based transition across the following phases:

1. Underlying environment;
2. Proximal causes; and
3. Triggering events.

Under these guidelines, the author(s) – direct and develop the Scenario. This stratified methodology is consistent with the standard North Atlantic Treaty Organization (NATO) planning cycle, DND/CF battle rhythms and staff divisions.

3.1.1 Section 1 – Direct Scenario

Section 1 is focused upon background factors, such as underlying causes and triggers which establish the scenario's context and asks the question - why is this 'alternative future' a viable scenario? It will also explore the necessary linkage to extant Government of Canada strategy, diplomacy, and policy. In its development of this alternative future (scenario's current situation), it will be essential to capture those factors which will shape the participants' options to follow a comprehensive approach.

This section should consider:

- Here the use of the CIT and worldwide web (www) are essential in creating the veritable foundation of the scenario. The ability to extract information from these sources is fundamental to the development process. The CIT offers a wide spectrum of predominantly Canadian sourced information and is complimented by use of the www to give a breadth of perspective and evidence to build a scenario upon.
- Proximal Causes; here there is a requirement for the scenario authors to apply the information imparted from the underlying environment and commence shaping the scenario along the specific lines required.
- Triggering Events. These events must be seen as a series of catalysts which drive the scenario from a situation which is the summation of both the preceding stages. Here with the emphasis placed upon the SLEEPS model it is possible to shape the scenario into providing catalysts across the specified lines of operation.

3.1.1.1 Employment of SLEEPS Model

The scenario authors used the SLEEPS model as the basis for designing multi-dimensional scenarios. This model was designed to coordinate complex Whole of Government operations which require input from a number of departments and levels. Force orchestration and the results of situational analysis provide the information required to populate six lines of operation under the confines of the Model. In scenario development, these lines of operation serve as a means to characterize the various dimensions of the operational environment.

Under the umbrella of Information and Media Management this model would be used to co-ordinate lines of operation across a wide spectrum of activity:

- Security (including Military);
- Legal (including separate Judiciary and Law Enforcement);
- Economics;
- Environment (including Energy, Infrastructure & Means of Production);
- Politics (including Inter- and Intrastate Governance); and
- Sociological (including Education, Health Care, Religion and Social Affairs).

By using the SLEEPS model, the scenario author(s) can better enable planners to adopt a Whole of Government /Comprehensive Approach. Each of the SLEEPS lines of operation can thus be synchronised into the operational phases of a campaign with key activities combining to achieve an end-state which aligns with identified strategies and policies.

The SLEEPS model can be applied to the spectrum of potential missions which the DND/CF is likely to undertake:

- Search & Rescue (including Combat Search and Rescue);
- Surveillance & Monitoring;
- Aid to Law Enforcement Authorities (ALEA);
- Environmental Response;
- Non-combatant Evacuation Operations (NEO) & Disaster Relief;
- Sea Lines of Communication (SLOC) & Sovereignty; and
- Military Engagement (including Combat).

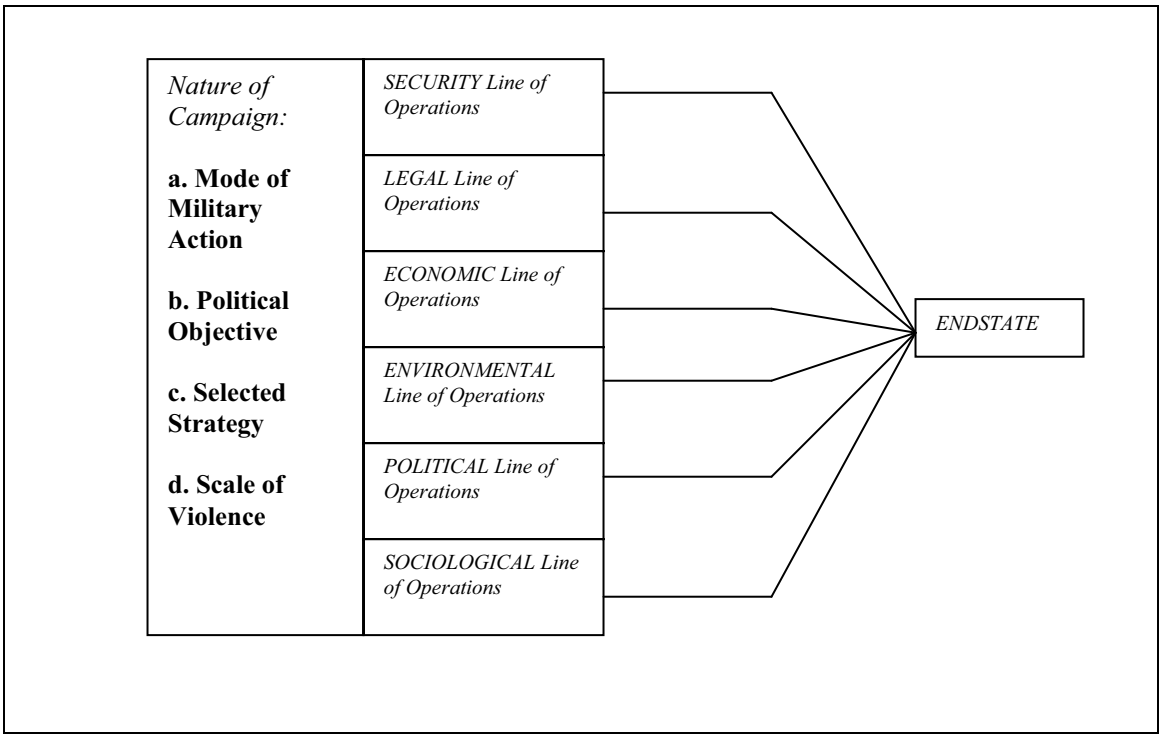

Figure 1: 'SLEEPS' Model Illustrating Multiple Lines-of Operation

In order to establish GoC's Political Intent it will be essential for scenario authors to explore the political links to those pieces of policy and legislation which underpin the current Canadian approach to Arctic Region:

- Canada's Northern Strategy;
- Canada First Defence Strategy;
- National Defence Act; and
- National Security Policy and Foreign Policy.

Through the exploration of the strategic objectives of any adversary, the authors should create a plausible rationale as to why the conflict/crisis has developed. Here again it is worth the authors compiling a comprehensive appraisal of those foreign activities which are or likely to contribute to the scenario. Within this area it is imperative for authors to consider the constraints and limitations imposed by amongst others:

- NATO Treaty;
- United Nations (UN) Treaty;
- North American Aerospace Defence Command (NORAD Treaty;
- Membership of Arctic Council; and
- Security & Prosperity Partnership.

Based upon their knowledge of both the domestic and international affairs situation, authors should articulate or suggest strategic centres of gravity for all nation-states included.

Scenario authors should encourage an exploration of relationships and roles for Other Government Departments (OGDs) and DND/CF's relationship with them through an examination of domestic legislation contained within the CIT. Not only will this encourage participants to use the CIT, but it will also raise awareness of the benefits of a Whole of Government approach. This intra-government / multi-agency approach will be essential given the horizontal and interlocking nature of planning and policy documents such as:

- Federal Emergency Response Plan (FERP);
- National Defence Act (NDA); and
- National Security Policy (NSP). (For the purposes of this brief and the envisaged timeline there are no significant changes to current legislation as outlined by the CIT).

3.1.2 Section 2 – Develop Scenario

Within this section authors should seek to establish sufficient information to allow the formulation of mission statements and the corresponding political intent by providing sufficient evidence/information to answer the five W's (who, what, when, where and why?).

The clear and unequivocal articulation of DND/CF's Mission is essential and should always include the Strategic Level Main Effort & Commander's Intent. This statement / direction should invariably indicate:

- Range of operations;
- Duration; and
- Readiness.

Early and clear indication should be provided to participants of those factors that are fundamental to shaping the nature of the government's response, such as:

- Expansion of Rules of Engagement (ROE);
- Intra & Inter government Information Sharing; and
- Intelligence Provision.

Regardless of whether the operation is within domestic or international boundaries, due consideration should be given that all Arctic operations are by default expeditionary regardless of current infrastructure and should take account of the following factors:

- Readiness;
- Force Generation;
- Deployable command, control, communications, computers, intelligence, surveillance, target acquisition, and reconnaissance (C4ISTAR);
- Sustainability;
- Strategic mobility; and
- Interoperability.

Scenario authors should provide sufficient detail to determine range of operations, duration, readiness, specified tasks as well as suggestion of any implied tasking. The information provided should include at a minimum:

- Factors involving interoperability continuum;
- Length of operation;
- High level force generation timeline;
- Concept of operations;
- Government direction with regard to decisive and decision points;
- Desired strategic as opposed to operational end-state
- Consideration of existing contingency plans and production of valid DND/CF options which are coherent with current doctrine; and
- Synchronisation of effects.

4 Conclusion

This hybrid scenario development tool will aid the formulation of complex, multi-agency scenarios by establishing coherence with the Morphological and Global Business Network (GBN) approaches currently employed by DRDC CORA and DND/CF's military estimate and appraisal process. The above approach seeks to document scenario authors' considerations for inclusion in their statements of alternative futures when seeking to develop a scenario. If fully employed, it is believed this method will provide relevant and skill-testing scenarios for the current Canadian approach to Arctic defence and security.

Annex A Scenario Development Grid

<table>
<tr><td colspan="8">SCENARIO PLANNING INFORMATION REQUIREMENTS (Version 8.1)</td></tr>
<tr><td colspan="8">Determine Strategic Relationship between Scenario and Policy through examination of GoC strategy, policy and desired capabilities. (CIT)</td></tr>
<tr><td colspan="8">TIME & Op Timeline (Event Horizon based [D-3 to Zero to D+3) as well as Freedoms Vs Constraints (Speed, Time, Distance & Climatic Considerations)</td></tr>
<tr><td colspan="4">DIRECT & DEVELOP PHASE 1 (SCENARIO DEVELOPMENT)</td><td colspan="2">ANALYSE & ASSESS PHASE 2</td><td>RECORD & RECOVER PHASE 3</td></tr>
<tr><td colspan="2">Section 1 – Outline Scenario (40% LOE)</td><td colspan="2">Section 2 (20% LOE)</td><td colspan="2">(20% LOE)</td><td>(20% LOE)</td></tr>
<tr><td colspan="2">Establish context (policy prisms etc) within 5-10 year time frame</td><td colspan="2">Facilitate Mission Appraisal & Initial Direction</td><td colspan="2">Allow Plan Development (D-3 to D+3)</td><td>Record Lessons Process Vs Stated Aims and Objectives</td></tr>
<tr><td>1A. Background Factors to include underlying causes and triggers</td><td rowspan="2">SLEEPS FACTORS (Security, Legal, Economic, Environmental, Political, Social)</td><td>Consider provision of Mission Statement</td><td rowspan="2">Executive Summary of Who, What, Where, When & Why?</td><td rowspan="13">Considerations for Development & Validation Process</td><td>CONOPS</td><td>Record those Strategic & Policy factors which were appropriate to Success Criteria –</td></tr>
<tr><td>Appreciation of domestic legislation & International Treaties so for 5-10 year window assume CFDS,NSP,NDA & NS are all extant</td><td>(Does it contain Range of Ops, Duration, Readiness, Specified Tasks & Implied Tasks?</td><td>Scenario Schematic (Effects Based)</td><td>Where were areas of friction?</td></tr>
<tr><td></td><td></td><td></td><td>5 IC Factors</td><td>How did strategic considerations impact upon operational level planning?</td></tr>
<tr><td>1B. Current Situation (include ROE, Info sharing, Media LTT & Intel Provision, CCIRS, & Command Planning Direction</td><td>Link to Northern Strategy, CFDS, NDA, NSP, Wider Strategy and Diplomatic Policies.</td><td colspan="2">Consideration given to outlining Political Intent – GOC</td><td>Sync-Matrix (LoO, Event Horizon & Assets)</td><td>What were the capabilities and limitations that proved to be mission critical at the strategic and policy level?</td></tr>
<tr><td rowspan="2">1C. OGD Lines of Operation (Interagency)</td><td rowspan="2">Consider likely Strategic Objectives of Poss. Adversary</td><td colspan="2">Mission & Command Intent Main Effort Stated 2Up</td><td rowspan="2">Validate Options & Decision Points</td><td>Financial</td></tr>
<tr><td rowspan="3">Consider establishing mission/scenario specific success criteria</td><td>Legislation & Treaty Implications</td></tr>
<tr><td>Consider Comprehensive Approach Doctrine & impact on type of expeditionary Military Mission:</td><td>Consider potential Centres of Gravity</td><td>Consider existing Contingency Plans</td><td>How well was expeditionary nature of operation understood?</td></tr>
<tr><td>Surveillance & Monitoring</td><td>Limit formulation of Options</td><td>Coherence with Doctrine</td><td>Capability Assessment (METS)</td></tr>
<tr><td>ALEA</td><td rowspan="2">Define OGD Relationships & Roles wrt FERP/NDA/NSP</td><td rowspan="2">Consideration this is an Expeditionary Operation regardless of Infra-structure: (Ref current GOC Doctrine)</td><td>Length of Operation</td><td>What were the gaps and vulnerabilities exposed by scenario?</td></tr>
<tr><td>Environmental Incident Response</td><td>Clarify Decisive Points</td><td>Record Lessons iaw NATO Doctrine (C2, Doctrine, Training, IT/IM, Interoperability, Planning & Specialists)</td></tr>
<tr><td>SAR (inc CSAR)</td><td rowspan="4">Consider Inter-Govt Relations wrt NATO/NORAD/UN</td><td></td><td rowspan="4">Consider Force Generation Timeline</td><td rowspan="4">Establish emergent priorities</td></tr>
<tr><td>NEO & Disaster Relief</td><td>Readiness, Force Generation</td></tr>
<tr><td>SLOC & Sovereignty</td><td>Deployable C4ISTAR, Sustainability</td></tr>
<tr><td>Military Engagement (inc Combat)</td><td>Strategic Mobility & Interoperability</td></tr>
</table>

Annex B Results of Brainstorming

SCENARIO SELECTION LEGEND		
First Choice	Second Choice	Third Choice

* Note: Scenario taxonomy from AHRA Risk Taxonomy, DRDC CSS, 2008.

Cause: Adaptive (Malicious)		Cause: Non-Malicious						
Intentional		Unintentional		Natural Disasters			Health Disasters	
Criminal/Non-State	Foreign State	Social	Technical	Ecological	Weather-Related	Geological	Pandemic **(Disease)**	Contamination
Terrorism - sinking	Part of larger campaign - cyber, etc	Mass refugee arrival - 250-400 pers on a rust bucket	Spill - oil & gas from drilling [Arctic BP]	Global warming as a cause of flood, tidal surge,	Hurricane flooding a small community. Challenge of lack of proper shelter and survivability.	Underwater volcanoes	Refugees with health contamination [relate to ethnic unrest]	Fishing contamination from spill
Native uprising - protests and shutdowns		Weather-driven evac. Relates to weather-related event.	Spill - oil & gas from tanker [Arctic Exxon]	loss of CI (roads etc - list of 10)		Tidal waves or tsunami	Contamination within indigenous population [could relate to ethnic unrest]	Water source contmaination from spill
Org crime - human trafficking			Spill - oil & gas from bunker oil/grounded vessel			Glacial detachment or landslide		Environ contamination from spill/plume
Org crime - smuggling (wpns)			Spill - Chemical contamination [generic dangerous good] - could include fire & plume					

Annex C SLEEPS Scenario Development Grid – Scenario 1

Scenario Development Synchronisation Matrix				SCENARIO DEVELOPMENT ENDSTATE = SCENARIO TRIGGER POINT
CRITICAL PATH FOR SCENARIO 1: RUSSIAN TERRITORIAL DISPUTE OVER ACCESS TO RESOURCES				
CFDS Mission Set & CF Capability Areas				
CONTEXTUAL TIMEFRAME CIRCA 2015				
LINES OPERATION	UNDERLYING ENVIRONMENT	PROXIMAL CAUSES	TRIGGERING EVENTS	
SECURITY (INC DEFENCE)	Include a review of pertinent strategic CIT Canadian Arctic Military Activity Environs (Land, Maritime, Air & SOF) Adversary Strategic Presence	RU Overflight of Op Nanook Militarisation of Russian Research Vessels NORAD Monitors RU Military Activity RU AGI in CA Waters detected by RADARSAT	Bear & CF18 Collide in Arctic Airspace RU & CA both launch CSAR AGI Grounds during Op NN15 NORAD Maintains 2407 AB CAP	
LEGAL	Include a review of pertinent CIT Legislation Role of UNCLOS NDA & Legitimacy of Military Action Historic Basis of Land Claims	CA Complains to UN 4/5 Arctic Powers Appeal for UN Arbitration NATO Endorses CA,US, DE & NO Land Claims CA & DE Settle Land dispute over Hans island	CA Seeks UNSCR RU Claims new 350nm EEZ based on Cont Shelf	
ENVIRONMENTAL	Include a review of pertinent CIT Legislation Relevence to Northern Strategy Highlight impact of Arctic Council Territorial Uncertainty	UN Est's Arctic Territorial Commission First Ice free military passage of NW Passage RU announces oil discovery in "her" waters Greenpeace demonstrate Vs exploitation	RU & NO start commercial exploitation RU deploys rigs to CA EEZ	
ECONOMIC	Include a review of pertinent CIT Legislation Introduce the role of SPP Economic import of Arctic to Canada Global Strategic Import of Arctic reserves	RU Suffers Democratic Collapse China now world's largest economy CH economically assists RU infrastructure Port of Churchill opens as Asia:Arctic hub	Protests in RU over economic issues	
POLITICAL	Include a review of pertinent CIT Legislation Introduce the political role of NATO Highlight impact of Arctic Council Introduce the role of the UN	UNSC Divided by Arctic ? EU is neutral US Pro CH offering to arbitrate a solution CA DIVIDED over Militarisation of Arctic	US & UK Vote for RU & CH Veto FR Abstains CA withdraws Diplomatic Reps from RU	
SOCIAL	Include a review of pertinent CIT Legislation Relevence to Northern Strategy Highlight impact of Arctic Council Introduce the role of the UN	Northern People want share of wealth Native Land claims abound RU adopts infrastructure expansion programme Greenpeace demonstrate Vs exploitation	Arctic Council pro native rights	

Annex D SLEEPS Scenario Development Grid – Scenario 2

Scenario Development Synchronisation Matrix CRITICAL PATH FOR SCENARIO 2: ORGANIZED CRIME IN THE NORTH CFDS Mission Set & CF Capability Areas CONTEXTUAL TIMEFRAME CIRCA 2020				SCENARIO DEVELOPMENT ENDSTATE = SCENARIO TRIGGER POINT
LINES OPERATION	UNDERLYING ENVIRONMENT	PROXIMAL CAUSES	TRIGGERING EVENTS	
SECURITY (INC DEFENCE)	Threat to Canada by terrorism/extremism through northern entry. Maritime Domain Awareness is cause for concern. Organized crime a continued threat.	Opening of lanes to transit creates concerns over Arctic as point of entry. Manageable volumes of people and goods (mostly tourism and energy) but still significant risk residual due to cost/benefit of northern security.	Relation of the vessel to Organized Crime. Known VOI is planned to leave Siberian port. Vessel is tracked. NPOC is beyond Canada.	
LEGAL	Organized crime a continued threat. Conflict over F/P/M Authority	Who is Lead Department Who has jurisdiction What Role PSC	Declaration of refugee status MOUs for SAR MOUs for environmental response	
ENVIRONMENTAL	CCG ER Directorate 75 Staff Conflict in BC between F/P Govts Arctic Environment is sensitive political issue	Arctic tourism increased Open shipping lanes	Cost for SAR; Cost for clean-up; Impact on insurance and tourism up north; Impact on shipping lanes	
ECONOMIC	Impact of port closure/higher security measures Impact on local Fisheries Threat of Terrorism carries with it an implict coss	Open shipping lanes Cost of Operation Activation of Spill Consultants / independent firms	Spill of fuel when ship runs aground Spill of Chemicals post grounding Compensation Claims	
POLITICAL	High level coordination is difficult across issues US:CA Defence & Security Issues	Shared governance, friendly relationships 911 Factor - US still believe perpetrators came from CA	Stranded people up north from a variety of countries; Refugee status claims in the media; Multinational rescue	
SOCIAL	First Nations Issues Impact of Illegal Immigration in remote community	Media Presentation will lead to public fears What to do with immigrants	Damage limitation with local community Impact on traditional livelihoods	

Annex E Statement of Work

E.1 Scope

E.1.1 Purpose

This Statement of Work (SOW) describes the technical services required for supporting the Concept Development Operational Research & Analysis (CDORA) Team and Canada Command Strategic Analysis Team within Defence Research & Development Canada's (DRDC) Centre for Operational Research & Analysis (CORA) in the development of Arctic defence and security scenarios and inventory tool under Project 10aa15.

E.1.2 Background

Recent assessments have shown that the Arctic could destabilize and pose several security-related threats to countries that have interests in this region. Even if there is a significant decrease in the amount of polar sea ice in the Arctic (which many analysts dispute), the time to develop the military forces necessary to perform the future roles and missions envisioned in the Arctic would be subject to physical, human and fiscal resource constraints. In any event, the CF has been directed to increase its presence in the Arctic (i.e., Canada First Defence Strategy) and policy documents have laid out general objectives in the region (Northern Strategy). The general trends identified in existing strategic assessments, concepts and policy analysis of the Arctic region in the context of Canadian security and defence, however, are not to be ignored. Indeed, the heightened importance of the Arctic has implications for the Government of Canada. One necessary consideration for Arctic initiatives is security; this, in turn, implies that plausible, relevant and challenging scenarios be produced so that the CF can set and maintain a coherent force structure for what lies ahead. To provide scenarios from a DND perspective but with a focus on contributions from other government departments within the context of "whole of government" philosophy requires the development of a lasting repository of Government of Canada security and defence capabilities (e.g., policy, legislation, equipment etc) relevant to the Arctic, as it will inform both scenario develop as well as operational implementation. The challenge is to help decision makers and force developers adopt strategies and plans that will work within a range of possible future scenarios. Additional needs analysis capacity to support the development of a range of Arctic scenarios using a structured and systematic approach that supports ongoing military/strategic assessments, policy analysis, force employment strategies, force development activities in the near future.

E.1.3 Requirements

This work aims to support DRDC CORA's Arctic Security Assessment/Force Employment Strategy and Scenario Development activities by developing a set of planning scenarios that will be used for the purposes of supporting the DND/CF Capability Based Planning Process. As part of this work, the contractor will be required to develop a capability inventory in the form of a comprehensive, tailorable and searchable database which can be used by a wide variety of subject matter experts that need information to frame the context required to assess capabilities and gaps (e.g., legislation, policy, equipment etc.) related to Arctic security initiatives. An inventory of

current and developing capabilities is crucial to understand the requirements anticipated in designing scenarios that reflect a comprehensive, interdepartmental and "whole of government" approach to Arctic security.

E.1.4 Tasks

Contractor resources will, during the course of the contract period, lead and/or contribute to the following activities at the direction of the TA:

1. Develop a comprehensive and tailorable "Capability Inventory Tool" that allows end users to easily search, categorize, sort, manipulate and report data/information applicable to Arctic defence and security initiatives, with the objective of using this as a basis for identifying a series of scenarios that fit the context for Arctic-based incidents that require interdepartmental collaboration;

2. Compile, capture and input readily-available (including those to be provided by the PA/TA) data/information related to existing and emerging National Defence/Government of Canada capabilities (e.g., policy, legislation, equipment, jurisdictions, departmental mandates etc) into the "Capability Inventory Tool";

3. Present a draft prototype to the TA for approval prior to proceeding to next task;

4. Building on the "Capability Inventory Tool", and proceeding from consultations with the TA, develop a set of plausible, relevant and challenging Arctic scenarios to accommodate variations in time horizon, driving forces and critical uncertainties (e.g., military, technology, resources, environment); pillars of Maritime Security (i.e., Maritime Domain Awareness, Safeguarding, Responsiveness and Collaboration) and the extent of interdepartmental collaboration;

5. Develop a methodology for developing a set of Arctic scenarios, based on the preliminary work of the CDORA team. The contractor will be required to meet with the TA to ensure a clear understanding of the methodology is developed;

6. Interview/meet with members of the scientific, operational and intelligence community [as required] to ensure a clear understanding of the central military problem(s) that could be considered as essential to the development of a CF response to any future scenarios in the Arctic;

7. Research, analyze and synthesize information in the literature (e.g., relevant books, monographs, journal articles, concepts, allied documents etc) relevant to defence and security in the Arctic in order to develop the Arctic scenarios;

8. Finalize the scenarios by producing a version that would be suitable for publication;

9. Develop a basic tutorial and a briefing deck on the application of the "Capability Inventory Tool" to support the development of a Force Employment Strategy and Capability Based Planning for the DND/CF;

10. Present the final product to DRDC CORA.

E.2 Deliverables

The following deliverables will be provided by the contractor:

1. Prototype of the "Capability Inventory Tool" to be used for the scenarios will be provided;

2. Draft Arctic scenarios will be submitted;

3. Final version of the "Capability Inventory Tool" will be submitted;

4. Final Arctic scenario set will be submitted;

5. Basic tutorial and briefing deck will be submitted;

6. Presentation of final product to DRDC CORA will be completed; and

The table below summarizes the deliverables, format and schedule.

No.	Deliverable	Format	Schedule
1	Prototype of Capability Inventory Tool	Electronic: MS Access, XML, or HTML	1 October 2010
2	Draft Arctic Scenarios	Electronic: MS Word	12 November 2010
3	Final Capability Inventory Tool	Electronic: MS Access, XML, or HTML	26 November 2010
4	Final Arctic Scenarios	Electronic: MS Word	14 January 2011
5	Basic Tutorial and Briefing Deck	Electronic: MS Word, PPT	28 January 2011
5	Presentation of Final Products	Electronic: MS Word, PPT, MS Access, XML or HTML	30 March 2011

Payment will be made in accordance with the NMSO and upon receipt of documentation prepared to the satisfaction of the TA. Reports and other documents should be delivered in electronic format.

E.3 Progress Reporting and Acceptance

Contractor resources will meet with the TA on a regular basis to provide bi-weekly verbal progress reports on work plan activities.

All work done and documents/data delivered in response to this SOW will be evaluated within a reasonable time frame. The evaluation will be on the basis of suitability, quality and adherence to the timelines identified in the deliverables schedule. Acceptance of deliverables will be certified by the TA and this certification will serve as the basis for payment recommendation. The TA

reserves the right to require corrective action before authorizing payment of a holdback and the right to reject the work if it fails to meet specifications.

The language for all deliverables is English and all reports will be in Microsoft Word format. The format of the "Capability Inventory Tool" should be a desktop application using commercial-off-the-shelf software. An abstract and an executive summary will be submitted with the final report. Final deliverables shall be provided on electronic media. Exceptions to these instructions require the approval of the TA. The contractor shall also identify the PWGSC call-up number under which the work was conducted. The TA will provide the contractor with publications standards.

Without restricting the range of the clause « Canada to Own Intellectual Property Rights in Foreground Information », all manuscripts and/or publication in scientific journals or the like, abstracts or oral presentations and any other releases that describe portions of the DRDC contract work or related information, shall be submitted and approved by the Director General of DRDC CORA, for approval of release. In all approved cases, due reference to DND funding shall be specified. All reports and review documentation listed in this SOW are to be delivered in soft copy form.

Particular attention shall be given to the following requirements:

- The writing style and language is clear and understandable;
- The document(s) is relevant and addresses the technical requirements;
- The document(s) is well organised, logically and technically correct; and,
- The interpretations and conclusions are sound and justified by the results.

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List of symbols/abbreviations/acronyms/initialisms

ALEA	Aid to Law Enforcement Authorities
C4ISTAR	Command, Control, Communications, Computers, Intelligence, Surveillance, Target Acquisition, and Reconnaissance
CBP	Capability Based Planning
CF	Canadian Forces
CFD	Chief of Force Development
CIT	Capability Inventory Tool
CORA	Centre for Operational Research & Analysis
DND	Department of National Defence
DRDC	Defence Research & Development Canada
DRDKIM	Director Research and Development Knowledge and Information Management
FERP	Federal Emergency Response Plan
GoC	Government of Canada
NDA	National Defence Act
NEO	Non-combatant Evacuation Operations
NATO	North Atlantic Treaty Organization
NMSO	National Master Standing Offer
NORAD	North American Aerospace Defence Command
NSP	National Security Policy
R&D	Research & Development
ROE	Rules of Engagement
SAR	Search and Rescue
SLEEPS	Security, Economic, Environmental, Legal, Political, Social
SLOC	Sea Lines of Communication
SOW	Statement of Work
TA	Technical Authority
www	Worldwide Web

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Scenarios are the foundation of effective planning and training efforts. They serve as a common context for multiple stakeholders in evaluating current capabilities to meet realistic potential future security challenges. This contractor report outlines a new systematic approach to Arctic Defence and Security-related scenario development (i.e. context-setting) for DRDC's Centre for Operational Research and Analysis (CORA). The prescribed outcome is a methodology that delivers a scenario development tool capable of capturing sufficient information to aid the end-user (DRDC CORA defence scientists and researchers) in their drive to improve and support overall planning efforts. This methodology is supportive of Chief of Force Development's (CFD) Capability-Based Planning (CBP) process. This improved process will in turn aid DRDC/CORA sponsored strategic/operational level planning, training, and analysis across the Government of Canada (GoC). The related Capability Inventory Tool (CIT) will provide useful reference material to this methodology.

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Capability Based Planning; Scenario Development; Methodology; Arctic Defence and Sovereignty Assessment

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