EMERGING SKIES

A ROYAL CANADIAN AIR FORCE INITIATIVE, BRINGING TOGETHER THE RCAF, INDUSTRY AND ACADEMIA, TO JOINTLY EXPLORE INNOVATIVE SOLUTIONS FOR CANADA'S FUTURE AIR-POWER NEEDS.

CONCEPT OF OPERATIONS

17 February 2014

National Defence Défense nationale

Canada

EMERGING SKIES INITIATIVE CONCEPT OF OPERATIONS

References:
A. *Royal Canadian Air Force Future Concepts Directive*, version 1.0, 4 April 2013
B. *Guide to Air Force Concept Development and Experimentation*, version 2.1 (Draft), 9 May 2013
C. *Air Force Vectors*, version 1.0, 1 March 2012
D. *The Future Security Environment 2013–2040*, 9 August 2013

1. INTRODUCTION

1.1 General

This concept of operations (CONOPS) describes the general functioning and process of the Emerging Skies Initiative (ESI). Its purpose is to delineate the roles and responsibilities of the various stakeholders and to set the expectations regarding the outcome of this process. It lays out the general structure of the framework and the approach taken to achieve the initiative's objectives.

1.2 Overview

Emerging Skies is a Royal Canadian Air Force (RCAF) initiative that brings together the RCAF as well as Canadian industry and academia to jointly explore innovative solutions for Canada's future air-power needs. It is a voluntary, collaborative approach that leverages existing associations and programmes to access Canadian expertise across sectors. The success of the initiative relies on both the engagement of industry and academia as well as relationships built on mutual trust that will promote a win-win environment and foster a durable partnership.

The objective of ESI is for the RCAF to collaborate and "dream" with industry and academia for concept-development purposes. These concepts will focus on the Horizon 3 timeframe (10–30 years from now)[1] and are intended to assist in capability development to better respond to future requirements. It must be stressed that the initiative is not about seeking to procure or to commercialize the resulting conceptual work in the short term or to produce enhanced research, operational analyses or prototypes. The conceptual review undertaken through ESI aims at fulfilling the Conceive phase of the RCAF capability-development model (Conceive-Design-Build-Manage). Accordingly, it focuses on the research phase of the RCAF concept-development process.[2] In simple terms, concepts developed through ESI are ideas for solving a given problem.

---

1. As defined in the *Defence Terminology Bank*, record 45753, horizon is "[a] planning timeframe used in capability and force development. There are three timeframes: Horizon 1 is short term (1–5 years), Horizon 2 is medium term (5–10 years) and Horizon 3 is long term (10–30 years)."

2. The RCAF concept-development process has four phases: discovery, research, proof of concept and implementation.

© Her Majesty the Queen as represented by the Minister of National Defence, 2014

1.3 Aim

The RCAF, in collaboration with Canadian industry and academia, will, as part of the Conceive phase, explore innovative solutions to address RCAF Horizon 3 future requirements.

1.4 Scope

The scope of the initiative is to identify foundational concepts to enable the subsequent Design-Build-Manage phases of the RCAF capability-development model to address the RCAF Horizon 3 capability requirements. It also includes the creation of a collaborative environment between the RCAF, industry and academia.

2. GOVERNANCE

2.1 Roles and Responsibilities

This initiative is led by the RCAF, through the Canadian Forces Aerospace Warfare Centre (CFAWC). As such, CFAWC is responsible for the overall stewardship of the initiative and is the lead agency for the RCAF.

2.2 Assumptions and Constraints

As one of the main goals of the initiative is to establish a strong partnership with industry and academia, full advantage will be taken of established industry and academia associations such as the Canadian Association of Defence and Security Industries (CADSI). ESI is a voluntary partnership; therefore, participation and interest are driven by the mutual benefits derived from this collaborative effort. Industry and academia will benefit from early engagement in capability development by better understanding the RCAF's future needs and by having access to a significant networking opportunity with the prospect of a better alignment of research and development (R&D) efforts. Participants will fund their attendance at ESI activities. In order to minimize expenses, a dedicated effort will be made to leverage existing industry and academia forums as well as web-based collaborative tools.

3. OPERATIONS AND MANAGEMENT

The ESI process includes four generic steps. Figure 1 illustrates these steps and identifies the key players associated with each activity. Each step is further detailed below.

3.1 Step 1: Identify the Need

The first step of the process consists of identifying the need. There are many sources that feed concept-development work in the RCAF: Commander's direction, capstone documents, emerging technologies, doctrinal gaps, lessons learned, capability gaps and Science and Technology (S&T) proposals represent a few examples. Notwithstanding these traditional sources, the true benefit of the initiative is that it will also receive input from and collaborate with subject matter experts in both industry and academia.

The formal process for formulating and prioritizing concept-development efforts is described in the *Royal Canadian Air Force Future Concepts Directive* (*FCD*). The management of this process is governed by the Air Force Concept Development Selection Committee (AFCDSC) which prioritizes concept-development efforts within the RCAF. Essentially, the *FCD* is a command tool for directing concept work in order to keep our finite concept-development capacity focused in those areas that are important to the RCAF. Once approved by the AFCDSC, selected concept-development proposals are then disseminated to various organizations for development. When a concept-development proposal has been approved and assigned to CFAWC for development through ESI, CFAWC will take the lead and coordinate the effort.

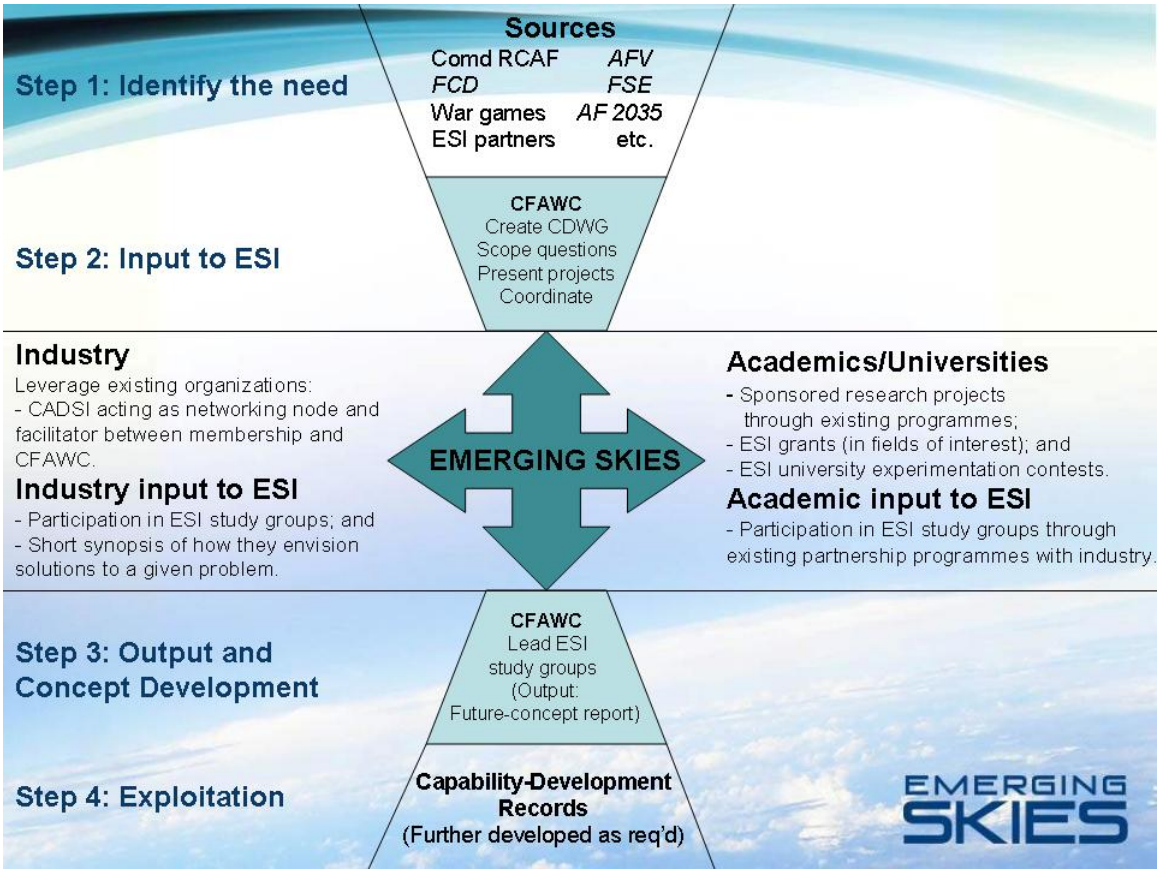

Figure 1. Emerging Skies Initiative Process

3.2 Step 2: Input to the Emerging Skies Initiative

It is at this step that most of the interaction with ESI partners will occur. Step 2 consists of the following tasks:

1. **Identify a concept development working group (CDWG) lead**. When conceptual work is assigned to CFAWC, the Commanding Officer, as concept director, will appoint a CDWG lead, leveraging from the breadth of experience existing within CFAWC to handle a particular concept-development project.

2. **Create the CDWG**. The CDWG will be composed of Department of National Defence (DND) personnel, including subject matter experts from CFAWC, the RCAF at large and the S&T / Operational Research Analysis (ORA) communities. The CDWG will be tailored to each concept-development project under study. The roles and responsibilities of the CDWG will be to assist the CDWG lead to properly scope the concept-development project and to produce the future-concept initiating document and briefings for presentation to potential ESI partners.

3. **Present concept-development projects to ESI partners**. Concept-development projects will be introduced to industry and academia in various ways. Existing associations, such as CADSI, will be critical to support this process. The intent is to leverage the strong networking capabilities of associations, such as CADSI, during this phase, which will be mutually beneficial to everybody involved. As the initiative matures, CFAWC will provide ongoing work updates and introduce new concepts to be developed through CADSI-sponsored forums. The ESI website and collaborative tool will also be key instruments for introducing new concept-development projects in coordination with CADSI. In all cases, the future-concept initiating document will be provided by CFAWC, and potential partners will be given a specific period of time to express their interest in the projects presented.

4. **Create ESI study groups**. In addition to DND personnel, ESI study groups will consist of research and development as well as business development individuals from industry and academia. After interested partners have identified themselves, they will become part of an ESI study group for a particular concept-development project. Depending on their scope, some projects may be subdivided into topics. In this case, ESI substudy groups will be created for each topic, and partners will have the option of participating in one or more substudy groups. By voluntarily joining the initiative, partners agree to the Emerging Skies Partnership Charter, found at Annex A, and the intellectual property (IP) rights[3] associated with the collaborative tool supporting the initiative.

5. **ESI study group kick-off meeting**. While the ESI process is intended to be very flexible, each study group will meet for an initial kick-off coordination meeting. The aim of this gathering is to present the concept-development project, including sufficient background information to provide a common knowledge foundation, to all partners. It is also aimed at developing network connections among partners for the work at hand. All relevant material will be provided to ESI study and substudy groups at the kick-off coordination meeting.

---

3. “Innovation, Collaboration and Exchange Environment, Conditions of Use,” Government of Canada, accessed January 15, 2014, https://strategis.ic.gc.ca/eic/site/013.nsf/eng/h_00007.html#s7.

6. **ESI study group framework**. The work done at the ESI study- and substudy-group levels is intended to be accomplished mainly with web-based tools. This does not mean that the work will be done in isolation. Study-group members will interact with each other and the CDWG lead as required, and the collaborative tool will constitute the central hub with respect to information sharing. This does not preclude partners meeting each other outside the formal ESI framework if they wish to do so, as one of the key features of this initiative is to foster networking connections among all participants. Each concept-development project will have a specific portal through the ESI website to the collaborative tool. Questions/answers and updates will be done through the collaborative tool and shared among the ESI study-group partners. If a particular project requires additional face-to-face meetings for all ESI study-group partners, CFAWC will coordinate with CADSI and study-group participants to explore different options and venues to facilitate this requirement. The contribution expected from the ESI partners is the provision of advice at the conceptual level. Therefore, it is envisioned that industry and academia will provide short synopses on potential solutions for particular concept-development projects. It is not the intent to produce in-depth research or operational analyses or to develop simulation software at this stage of the concept-development process. Rather, it is a quest for ideas that are supported by subject matter experts. The timeline for submission from ESI partners will be discussed during the ESI study-group kick-off meeting to allow sufficient time for all partners to work on the projects. The information and input gathered throughout ESI will be used by the CDWG during Step 3 to produce the future-concept report.

3.3 Step 3: Output and Concept Development

Once the CDWG lead receives the ESI study-group partners' input, the information will be collated and analysed, and a future-concept report will be produced by the CDWG. External RCAF organizations will have the opportunity to review and comment on the report prior to final release.

All the contributing partners will be acknowledged in the report. However, to reflect the team effort sought by the initiative, it will not identify specific contributions. Finally, by participating in ESI, partners agree not only to share their submissions among participants but also that they could become public information and that any one idea could become the cornerstone of a future procurement project without the originator receiving attribution for the original idea. This approach will allow every partner to contribute positively, regardless of the size of and the manpower available within their organization, to the ESI process. In the end, ESI will remain a powerful venue to influence concept development in each partner's sphere of influence and areas of interest. If more restrictive information control measures are deemed necessary, they will be discussed with partners on a case-by-case basis.

3.4 Step 4: Exploitation

The concept documents resulting from this process will eventually populate a Capability-Development Record (CDR) database. Given the nature of the work, it is understood that not all concepts will be implemented, as new technologies, priorities and other factors will affect their viability in the future. The database will be available to various force-development organizations within the RCAF and the Canadian Armed Forces for future reference and exploitation. If the RCAF deems a particular concept to be a viable solution in terms of capability development, the concept could enter the proof-of-concept phase of the RCAF concept-development process and would be further refined through experimentation, exercise, modelling and simulation, further research or war gaming. It is important to realize that ESI does not include the proof-of-concept phase, as it only focuses on the research phase. This does not preclude a partner from being involved in the proof-of-concept phase later on; however, further development will not be done under the ESI umbrella/framework.

4. COLLABORATIVE TOOL AND INTELLECTUAL PROPERTY FRAMEWORK

The Emerging Skies Initiative is supported by the Innovation, Collaboration and Exchange Environment (ICee) tool. The ICee is a database, linked to a wiki, that provides a one-stop resource platform and innovation tool box. It is managed by Defence Research and Development Canada (DRDC), a DND agency, and is meant to accelerate the delivery of novel defence and security capabilities to the Canadian Armed Forces through knowledge sharing and an increased synergy between the government, industry, research organizations and academia on defence and security S&T aspects. **Only releasable content (i.e., non-classified, non-controlled / non-International Traffic in Arms Regulation [ITAR]) can be posted on the ICee.** [4]

By agreeing to participate in ESI, partners agree to the conditions of use associated with the ICee tool. It includes provisions regarding privacy, disclosure and editing of content as well as intellectual property rights, to name a few. **Participation in the Emerging Skies Initiative is not intended to prevent a company from bidding on future projects which may result in whole or in part from this initiative.**

4. “Innovation, Collaboration and Exchange Environment, About ICee,” Government of Canada, accessed January 15, 2014, https://strategis.ic.gc.ca/eic/site/013.nsf/eng/h_00008.html.

5. CONCLUSION

The Emerging Skies Initiative is meant to be a relatively simple and very flexible process aimed at bringing together the RCAF, industry and academia for concept development. It represents an important opportunity for the RCAF to collaborate and leverage a wealth of experience from various partners to develop new ideas to prepare for the Horizon 3 future-security environment. It also constitutes an excellent opportunity for industry and academia to become involved in capability development and to better understand the RCAF requirements and areas of interest within a partnership networking environment. This initiative will consider input from all players and will, therefore, evolve and mature over time. As a result, this CONOPS is a living document that will reflect this reality and will be adjusted when required.

6. ABBREVIATIONS

AF 2035	*Projecting Power: Canada's Air Force 2035*
AFCDSC	Air Force Concept Development Selection Committee
AFV	*Air Force Vectors*
CADSI	Canadian Association of Defence and Security Industries
CDWG	concept development working group
CFAWC	Canadian Forces Aerospace Warfare Centre
comd	commander
CONOPS	concept of operations
DND	Department of National Defence
ESI	Emerging Skies Initiative
FCD	*Royal Canadian Air Force Future Concept Directive*
FSE	*The Future Security Environment 2013–2040*
ICee	Innovation, Collaboration and Exchange Environment
ORA	Operational Research Analysis
RCAF	Royal Canadian Air Force
S&T	Science & Technology

ANNEX A – EMERGING SKIES PARTNERSHIP CHARTER

Vision

A Royal Canadian Air Force initiative, bringing together the RCAF, industry and academia, to jointly explore innovative solutions for Canada's future air-power needs.

Mission

Support the RCAF Horizon 3 concept-development process through collaborative teams, leveraging Canadian expertise across sectors.

Values

In delivering the Emerging Skies Initiative vision and mission, collaborative partners from the RCAF, industry, academia and research organizations acknowledge and embrace the following core values:

- collaboration;
- innovation; and
- integrity.

Given the voluntary nature of the Emerging Skies Initiative, the Partnership Charter does not impose rules on the participants; rather, it is a set of expectations that each has of the others and aspires to satisfy themselves. Accordingly, as partners in the Emerging Skies Initiative, we agree to commit to:

Collaboration

- Work proactively together.
- Create an environment that encourages and maintains trust and engagement.
- Respect and support each other.
- Contribute to the development and maintenance of a positive team spirit.

Innovation

- Encourage innovation and excellence.
- Actively seek innovation in processes, culture, technology and programmes. ESI is about "dreaming together" to find potential solutions in capability development.
- Provide a challenging and welcoming work environment.
- Harness the collective power of the ESI partnership.
- Be open and receptive to the ideas of others.
- Embrace the opportunity to work in multidisciplinary teams.

Integrity

- Communicate openly and honestly.
- Respect and protect the intellectual property rights, as per ICee conditions of use.
- Respect the principles and spirit of Government of Canada policy and regulations.
- Remain lean and agile, focusing on high-value-added activities.
- Ensure all work conforms to best practices and advice is evidence based.
- Avoid potential conflicts of interest and declare them promptly when they cannot be avoided.
- Work towards achieving benefit for all.
- Maintain objectivity and independence in professional dealings, striving to be fair, just and equitable in all activities.
- Strive to make a personal contribution to ESI's success.