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The Estimate Process

Observations

*M. Bélanger
DRDC Valcartier*

Defence R&D Canada – Valcartier

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Author

Micheline Bélanger

Approved by

É. Bossé
Section Head

Approved for release by

G. Bérubé
Chief Scientist

13dm22

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Abstract

The Canadian Forces Operational Planning Process (CF OPP) is a systematic approach to analyzing a situation, bringing staff expertise to bear on the relevant factors, narrowing courses of action, obtaining the commander's approval, and developing the detailed annexes necessary to produce an executable plan. In order to support the commander and his/her team in the achievement of the CF OPP, Defence Research and Development Canada (DRDC) is investigating computer-based critiquing systems as decision support facilities for the Estimate Process. During the first phase of this project, defence scientists have dedicated time and efforts to improve their understanding of the Estimate Process. The aim of this memorandum is to document this effort. It presents the Estimate Process as described in the CF manual as well as information on how this process is performed at the operational level. Furthermore, it introduces some decision-support system concepts that could be provided to the Estimate Process.

Résumé

Le processus de planification opérationnelle des forces canadiennes (PPOFC) est une approche systématique pour analyser une situation, faire converger l'expertise du personnel sur les facteurs pertinents, restreindre les suites d'actions possibles, obtenir l'approbation du commandant et préparer les annexes nécessaires à la production d'un plan exécutable. Afin d'apporter une aide au commandant et à son équipe pour la réalisation du PPOFC, les centres de Recherche et développement pour la défense Canada (RDDC) étudient l'utilisation des systèmes automatisés de critique pouvant faciliter l'aide à la décision dans le processus d'estimation. Lors de la première phase de ce projet, les scientifiques de la défense ont consacré temps et effort afin d'améliorer leur compréhension du processus d'estimation ainsi que de la réalisation de ce processus. Le but de ce mémorandum est de documenter cet effort. Il présente le processus d'estimation tel que décrit dans le manuel des Forces canadiennes ainsi que des informations sur la réalisation de ce processus. De plus, il introduit des concepts de systèmes d'aide à la décision qui pourraient être fournis au processus d'estimation.

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Executive summary

The Canadian Forces Operational Planning Process (CF OPP) is a systematic approach to analyzing a situation, bringing staff expertise to bear on the relevant factors, narrowing courses of action (COAs), obtaining the commander's approval, and developing the detailed annexes necessary to produce an executable plan. Since military operations are evolving into a dynamic, complex and uncertain environment, the CF OPP is often performed under high time pressure and stressful conditions. Different approaches can be proposed to help military officers compensate the influence of these factors, which are known to have a negative effect on human capacity of reasoning and judgment.

In order to support the commander and his/her team in the accomplishment of the CF OPP, Defence Research and Development Canada (DRDC) is conducting research and development activities to investigate the different types of computer-based systems that decision-support facilities can be provided with. One of these activities is a Technology Investment Fund (TIF) project called "COA Critiquing System for the Improvement of the Military Estimate Process". It proposes to investigate computer-based critiquing facilities to assist the commander and his/her team during the first part of the CF OPP, called the Estimate Process. The Estimate Process involves the elaboration of different COAs following situation analysis and the selection of the most appropriate one for its subsequent planning.

During the first phase of this project, defence scientists have dedicated time and efforts to improve their understanding of the Estimate Process and its achievement. The aim of this memorandum is to document this effort. It presents the Estimate Process as described in the CF manual as well as information on how this process is performed at the operational level. Furthermore, it introduces some decision-support system concepts that could be provided to the Estimate Process.

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Sommaire

Le processus de planification opérationnelle des Forces canadiennes (PPOFC) est une approche systématique pour analyser une situation, faire converger l'expertise du personnel sur les facteurs pertinents, restreindre les suites d'actions possibles, obtenir l'approbation du commandant et préparer les annexes nécessaires à la production d'un plan exécutable. Comme les opérations militaires ont habituellement lieu dans un environnement dynamique, complexe et incertain, le processus d'estimation est souvent exécuté avec des contraintes temporelles et dans des conditions de stress. Différentes approches peuvent être proposées afin d'aider les officiers militaires à compenser l'influence de ces facteurs qui sont reconnus pour avoir un effet négatif sur les capacités humaines de raisonnement et de jugement.

Afin d'apporter une aide au commandant et à son équipe dans la réalisation du PPOFC, les centres de Recherche et développement pour la défense Canada (RDDC) poursuivent différentes activités de R&D afin d'étudier les différents systèmes d'information pouvant fournir des fonctionnalités d'aide à la décision. Une de ces activités est un projet du Fonds d'investissement en technologie (FIT) appelé « Système de critique de suites d'actions pour l'amélioration du processus militaire d'estimation ». Ce projet propose d'étudier les systèmes automatisés de critique pour aider le commandant et son équipe dans la réalisation de la première partie du PPOFC, appelée le processus d'estimation. Le processus d'estimation implique l'analyse de la situation, l'élaboration des différentes suites d'actions ainsi que la sélection de la suite d'actions la plus appropriée à cette situation.

Lors de la première phase de ce projet, les scientifiques de la défense ont consacré temps et effort afin d'améliorer leur compréhension du processus d'estimation ainsi que de la réalisation de ce processus. Le but de ce mémorandum est de documenter cet effort. Il présente le processus d'estimation tel que décrit dans le manuel de Forces canadiennes ainsi que des informations sur la réalisation de ce processus. De plus, il introduit des concepts de systèmes d'aide à la décision qui pourraient être fournis au processus d'estimation.

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1. Introduction

The Canadian Forces operational planning process (CF OPP) is a systematic approach to analyzing a situation, bringing staff expertise to bear on the relevant factors, narrowing courses of action, obtaining the commander's approval, and developing the detailed annexes necessary to produce an executable plan. Adapted to the needs of the operations, it can be used at different levels of planning: strategic as well as operational and tactical. It can also be used with different time constraints. When there is no immediate time pressure for prevailing threats, deliberate planning (presented in Annex A) consists in initiating and developing plans in anticipation of a known or expected future event or circumstance that Canada will or might face. On the other hand, crisis action planning consists of time sensitive planning and will be conducted in response to an unforeseen development. In this case, CF OPP process will be tailored either by combining steps or compressing time available for staffing. Annex B presents this condensed version of the OPP.

The CF OPP, described in the CF Operational planning process manual [1], intends to guide operational planning in the Canadian Forces. As a doctrine, this manual is authoritative but the process requires judgement in its application. Representing the idealized process, it wants to optimize logical, analytical steps of decision making in conditions of uncertainty and ambiguity, while maximizing the commander's and staff's creative thinking and associated thought processes. CF OPP is composed of five main stages:

- Initiation;
- Orientation;
- Course of action (COA) development;
- Plan development; and
- Plan review.

The *initiation* stage results in the activation of Planning Staff, and commander's guidelines about the kind of planning process to achieve.

In the *orientation* stage, the commander orients his/her staff in the determination of the nature of the problem and the confirmation of the results to be achieved. This stage results in the development of the Commander's Planning Guidance.

The *course of action (COA) development* stage results in the production of the concept of operations (also called the CONOPS) that identifies the commander's line of action in order to accomplish his/her mission. It presents the COA that will be implemented. In a previous version of the OPP there was a decision stage, that is now integrated into the COA development one.

The *plan development* stage results in a set of orders based on the commander's decision to provide to subordinates and supporting units with the necessary information to initiate planning or execution of operations.

The *plan review* stage results in the regular revision of the plan to evaluate its viability. The period used to review the plan depends on the evolution of the situation, the type of operation and the environment.

In order to support the commander and his/her team in the accomplishment of the CF OPP, Defence Research and Development Canada (DRDC) is conducting research and development activities to investigate decision-support facilities. One of these activities is the investigation of computer-based critiquing facilities to assist the commander and his/her team during the first part of the CF OPP, called the Estimate Process. The Estimate Process, which consists of the three first stages of the CF OPP, involves the elaboration of different courses of action (COAs) following situation analysis and the selection of the most appropriate one for its subsequent planning.

During the first phase of this project, defence scientists have dedicated time and efforts to improve their understanding of the Estimate Process and its achievement. Even if the CF OPP can be used to all levels of planning (strategic, operational, strategic), it was decided to concentrate our efforts on the operational level. The operational level of conflict, as defined in the doctrine [1], is concerned with the joint employment of land, maritime and aerospace forces employed in sequential and simultaneous engagements that are linked by design in a campaign plan.

The Estimate Process events that have been observed for this work are:

- A planning exercise of Final Lance scenario played by students at Canadian Forces College (CFC) Toronto (2000);
- The exercise Vigilance 2000;
- A CFOPP Familiarization Course given by two teachers of CFMWC (2002);
- The Maritime Warfare Standard Course at CFMWC (2003);
- An observation exercise that was organized at DRDC Valcartier. Four military officers from CFMWC staff participated in the Estimate Process for two different scenarios (Osprey and Winged Thunder) (2003).

Furthermore, the observations of Human Systems Incorporated made during the functional analysis of the Canadian Naval Task Group Operational Planning Process [2] have also been used as reference.

This memorandum presents the Estimate Process as described in the CF manual and gives some details on how this process is achieved at the operational level. Furthermore, it introduces some decision-support system concepts that the Estimate Process could be provided with.

2. The Estimate Process

This chapter presents the Estimate Process, as described in the CF Operational Planning Process manual [1]. As presented in Figure 1, the Estimate Process is composed of the three first stages of the CF OPP.

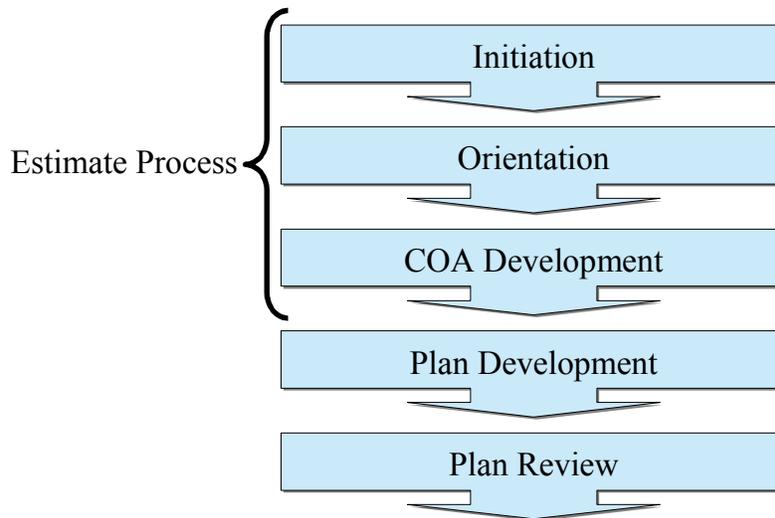


Figure 1. Estimate Process

2.1 Initiation stage

The *Initiation* stage can commence when initiating directive is received (Annex C). This stage consists of the activation of planning staff, gathering of planning tools (e.g. maps of the area of operations, own and higher headquarters' standing operating procedures (SOPs), appropriate documents, estimates), production of guidelines to staff related to how to apply the planning process as well as the time available to it. The commander must specify to his/her team how he thinks the process should be.

2.2 Orientation stage

In the *Orientation* stage, the commander must “orient the staff towards the requirements of the new operation”. To orient the planning, a mission analysis will be conducted (see Annex D). It is an exercise between the commander and key staff to designate the centre of gravity, the end state and criteria for success for the staff. This is a key activity in the CF OPP, which has two objectives: determine the nature of the problem and confirm the results to be achieved. This work is based on a review of the situation as well as a review of the higher command level intents.

From this information, the staff will develop a good understanding of the situation by covering the following aspects:

- Critical facts and Assumptions;
- Constraints/Restrains;
- Key Strengths and Weaknesses (own and enemy);
- Centre of Gravity (Own and Enemy);
- Tasks (Assigned/Implied);
- Objectives;
- End State;
- Criteria for Success;
- Force Capabilities and Groupings Required;
- Command and Control Structures;
- Assess Risk;
- Propose Timelines;
- Battlespace Effects;
- Etc.

and will draft a mission statement that answers the following questions:

- a. Who (what types of forces) will execute the action?
- b. What type of action (for example attack, defend) is contemplated?
- c. When will the action begin?
- d. Where will the action occur (area of operations and objectives)? And
- e. Why (for what purpose) will each force conduct its part of the operation?

The output of the orientation stage is called the Commander's Planning Guidance.

2.3 Course of action development stage

The *COA Development* stage starts with a review of Commander's Planning Guidance to ensure that all staff develops a common understanding of the commander's intent. Then a staff analysis is executed to identify the factors and the derived deductions that are relevant to the operation being planned as well as to determine whether the mission is achievable based on limitations imposed by higher authorities. These factors will cover, but are not limited to:

- Area of Operations (AOO);
- Opposing Forces Capabilities;
- Political Considerations;
- Own Forces Capabilities;
- Time and Space;
- Command and Control;
- Logistics and Movement;
- Rules of Engagement;
- Conflict of Termination;
- Risk;
- Assigned/Implied Tasks;
- Etc.

Then, all enemy COAs (ECOAs) should be developed and analyzed according to factors such as:

- Enemy's objectives in the AOO;
- Enemy's capabilities;
- Enemy Centre of Gravity;
- Enemy's method of operations (doctrine and experience);
- Etc.

This analysis will lead to the identification of the most likely ECOA and the most dangerous one.

When the ECOAs are identified, realistic friendly COAs are developed based on all deductions that have been made so far. A good COA positions the force for the future operations and provides flexibility to meet unforeseen events during its execution. Then, the staff will analyze the COAs to determine their viability by considering the following aspects:

- Suitability: does it achieve the mission, satisfy the commander's intent and accomplish the tasks? Does it counter enemy COAs?;
- Feasibility: do force structure and resources exist to mount and sustain?;
- Acceptability: does it account for limitations placed on the operation, is it worth the risk?;
- Compliance: does it conform to approved CF doctrine and applicable policy, regulations, legislation and/or guidelines?

Finally, a last check can be done to verify how the COAs counter the expected ECOAs against the deductions and conclusions drawn earlier in the process and against the principles of war or tenets of joint warfare applicable for the operation. The ten Canadian Principles of War provide general guidance for the conduct of war. Their application will not guarantee success. The commander has to decide which principles will receive emphasis at any given moment. The adherence to one principle can be done at the expense of another principle.

When analyzed, the friendly COAs are validated with the commander during an information briefing and adjusted according to his/her comments/preoccupations. Then validated COAs are compared among them and the result of the comparison is presented to the commander, so he can select the COA that is the most appropriate to the situation according to his point of view.

The output of the COA development stage, which is also the output of the Estimate Process, is the CONOPS.

2.4 Risk management

Even if the risk is considered anywhere in the Estimate Process as a factor to be analyzed (it is an element/factor to be considered during mission analysis, staff analysis, analysis of COAs or comparison of COAs), there is a particular emphasis on the whole aspect of risk management in the CF Operational Planning Process manual.

Risk management is composed of two stages: risk assessment and risk mitigation. Risk assessment is conducted during the planning and consists of threat identification and threat assessment. In threat identification, individuals identify the threats or factors that could generate threats that may be encountered in executing a mission. In threat assessment, they determine the direct impact of each threat on the operation. Risk assessment provides enhanced awareness and understanding of the situation.

The risk assessment matrix is the tool proposed to guide the risk assessment of each threat. It can be used to evaluate the acceptability of a risk, and the level at which the decision on acceptability will be made. The matrix may also be used to prioritize resources, to resolve risks, or to standardize threat notification or response actions.

Risk Assessment Matrix						
		Probability				
Severity		Frequent A	Likely B	Occasional C	Seldom D	Unlikely E
Catastrophic	I	E	E	H	H	M
Critical	II	E	H	H	M	L
Marginal	III	H	M	M	L	L
Negligible	IV	M	L	L	L	L

Figure 2. Risk assessment matrix

3. Observations

The CF OPP is the process used to prepare plans and orders for CF operations. It can be seen as a coordinated process to determine the best method of accomplishing assigned operational tasks and to plan possible future tasks. The CF OPP focuses on establishing the areas of focus, the kinds of issues to be resolved, and the outputs that must be produced [2]. As a result, it intends to maintain a minimum of quality in planning results. This process is generic enough to be used at the strategic as well as the operational and tactical level.

The Estimate Process, which is the subject of this document, is achieved by a team of people having different areas of expertise. Based on their experience and on their capacity to retrieve relevant knowledge stored in their memory, they will use the Estimate Process as a guide to provide a recommendation to their commander. Even if the different functions to be executed at the different stages are well identified, no formal procedures are defined in the CF manual [2]. The planning staff has to determine by itself how it will execute these functions. Intuitive strategies are usually employed [2].

3.1 Initiation stage

The first stage, the initiation, is the key part for setting parameters for the dynamic of the team. In all cases, the Chief of Staff (COS) decided the type of decision-making process to be used during the process. The decision-making strategies that have been selected, most of the time, were the vote or the consensus. When consensus was selected, no formal consensus process was used.

The team dynamic between the members was always different from one team to another. Most of the time, there was one member (sometimes more than one) that has a less cooperative behaviour in the group. Different reasons can be considered for such attitude, including hurry to finish the process, absence of will to consider other opinions, contestation of leadership. Such attitude was disruptive for the team dynamic since communication and collaboration between all team members were not completely achieved. The teams using the consensus seemed to be the most affected by this aspect. Nevertheless, the Estimate Process has always been completed. It is clear, however, that the COS was the key player to set the team dynamic parameters and make them respected by all members.

The initiation stage is also the phase to set the physical environment that will be used for executing the planning. Paper maps with coloured stickers, binders of papers, whiteboards, flip charts and a computer with Word, Powerpoint and Internet are usually the tools used by the planning teams. Most of the people seemed to find assets such as whiteboards useful. However, since there were a lot of people who did not like writing on them, it was noticed that they were really used efficiently only when the COS designated someone to do it.

3.2 Orientation stage

The orientation stage is crucial in order to clarify the commander's guidance for the rest of the process and to transmit to the team a common understanding of the commander's expectations. In the exercises observed, each members of the team read all the documentation of the scenario that was given at the beginning of the exercises. By these individual efforts, each person was trying to collect all information that would be needed for the mission analysis and started to make his mind related to what was going on.

When everyone had completed their reading, then they started the mission analysis. At this point, the team was trying to focus on the understanding of the problem. Except for the end state and criteria for success, which were given in the description of the scenario, brainstorming sessions were used to identify the different elements of the mission analysis. When working on the mission analysis, the teams addressed the factors in a sequential way, and used the order specified in the manual to avoid forgetting one of them. What happened then is that information related to other factors were coming up all the time, even if the teams were always trying to focus on one particular factor at a time. Most of the time, it was decided to delay discussions on these upcoming aspects to later on (when the appropriate factor would be analyzed). However, sometimes, these aspects did not come up when the appropriate factor was analyzed.

3.3 COA development stage

The different functions of the COA development stage can be presented as in Figure 3. One of the first tasks of the COA development stage is to ensure a common understanding of the commander's intent by all team members. This was usually done by a review of Commander's Planning Guidance, and clarification of some aspects through discussions. Discussions were used as a tool to ensure that all staff developed a common understanding of the commander's intent, and that this understanding was consistent with the intent of the commander. When the team doing the COA development was the one doing the orientation (which was the case in many of the exercises observed), this step was implicitly executed. However in the case where not all the people involved in the COA development stage had been involved in the orientation stage, it was really done.

Next, the staff factor analysis allows a refinement of the understanding of the situation. The staff further developed the factors having an impact on the operations and the gist of this impact (describe this impact). The question "So what?" had to be answered. According to some military officers, one of the most frequent problems of novices as well as some more experimented planners is the fact that there is a natural tendency to develop solutions before completing a good understanding of the situation.

In there functional decomposition of the OPP, Human Systems Incorporated [2] have identified a set of factors that have been considered during the execution of the COA development stage. This list, which includes the factors described in CF manual [1], is composed of:

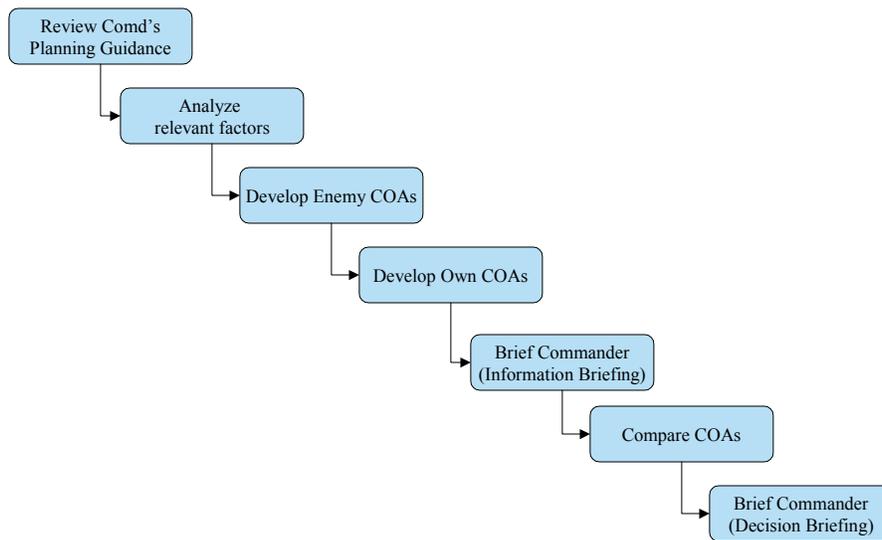


Figure 3. COA development

- Political/Economical Factors;
- Social/Psychological Factors;
- Climatography Factors;
- Oceanography Factors;
- Own Force Strengths and Weaknesses;
- Enemy Force Strengths and Weaknesses;
- Force Dispositions;
- Harbours and Airports;
- Logistic Support Factors;
- Centres of Gravity, Critical Vulnerabilities and Decisive Points
- Critical Dates and Timings
- Time and Space, and Distance Factors;

- Morale Factors;
- Command, Control, Coordination, Communications, Computer Systems, Intelligence, Surveillance, (C5IS) Factors;
- Costs and Risks Factors;
- Security Factors;
- Legal and ROE Factors;
- Public Relations Factors.

Next, the staff focused on the development of comprehensive and flexible plans within the time available. This type of plans, called COA is a high level plan that wants to identify use of generic resources instead of specific ones. To better demonstrate these nuances, some military officers used the terms “Hand planning versus finger planning”. It might be composed of a sequence of phases, and be represented by sketches. In brief, the COAs should answer the fundamental questions of:

- a. When: When does the action begin or when must it be completed?
- b. Who: Who will conduct the operation?
- c. What: What military operations are being considered?
- d. Where: Where will they be performed?
- e. Why: Why are the operations being conducted?
- f. How: How will the operations be conducted?

The team always started with brainstorming sessions to develop ECOAs. This seemed to be quite easy to do. Following the identification of the ECOAs, the most likely and the most dangerous ones were identified. Sometimes, the most likely was also the most dangerous. According to the time available, the list of ECOAs was sometimes limited to the worst one and the most likely one.

Friendly COAs were also identified during brainstorming sessions. From their observations, Human Systems Incorporated [2] had identified a basic list of COAs strategies that were considered when developing COAs (enemy and friendly). They are:

- Defend;
- Reinforce;
- Attack;
- Withdraw;

- Delay;
- Weapons of Mass Destruction.

When there were enough people in the staff to do it, a part of the staff concentrated on ECOAs, while the other worked on friendly COAs.

Once developed, the team analyzed the friendly COAs. Each had to be viable, which means suitable, feasible, acceptable, exclusive and complete.

The viable COAs were then presented to the commander during an information briefing, so he/she could provide further direction to his staff to polish the COAs. As a result of this briefing, the commander determined if any of the COA should not be considered, should be modified, or if an entirely new one had to be developed. Moreover, he sometimes identified a list of evaluation criteria representing the factors to measure the relative effectiveness and efficiency of each COA according to his preferences.

Once the possible COAs have been identified, the next step was their analysis. During a discussion, the staff took a COA and determined its strengths and weaknesses by pitting it against potential ECOAs (war gaming). To analyze the COAs, the team often needed to develop the COA into further details: even some tactical issues were sometimes considered at this time. Furthermore, contingency plans were also developed for each COA analyzed, in order to be able to present this info to the commander, if requested.

Then, the next step was the comparison of the COAs in order to highlight the respective advantages and disadvantages of each COA. All potential ECOAs were compared with each friendly COAs. However, in time-sensitive situations the opposing forces' most likely and most dangerous COAs were the only ones considered. When comparing the COAs among them, different factors were considered. They were sometimes the ones already considered previously, or sometimes completely new aspects. For example, the factors presented in Table 1 had been identified for a situation of counter-drug [3, 4]. The team members had to determine which aspects were more important to consider than others, and based on the result of the comparison of the COAs, determined which one was the most appropriate to the situation.

The technique used to compare the COAs and to present the result of the comparison to the commander was the decision matrix, which uses evaluation criteria to assess the evaluation of each COA. In a previous draft of the CF OPP, it was mentioned that the staff could use three different types of decision-matrixes:

- Subjective analysis (Figure 4);
- Numerical analysis (Figure 5);
- Broad-categorized analysis (Figure 6).

Table 1. Evaluation criteria

Factor	Criterion	Concerned with
Flexibility		
	C1: Covering Operational Tasks	the ability of a COA to adapt to possible changes in operational task which may occur during its implementation
	C2: Covering Mission's Possible Locations	the ability of a COA to adapt to possible changes in the predicted mission's locations which may occur during the implementation of a COA
	C3: Covering Enemy's COA	the ability of a COA to adapt in time to possible changes in the enemy's COA that may occur during the implementation
Complexity		
	C4: Operations Complexity	the COA implementation difficulties caused by its operational requirements
	C5: Logistics Complexity	the COA implementation difficulties caused by its logistics requirements
	C6: Command and Control Complexity	the COA implementation difficulties caused by Command and Control relationships and co-ordination requirements in operation
Sustainability		
	C7: Sustainability	the ability to continue (stay in) the operation as a function of the on-station time associated with the COA
Optimum use of resources		
	C8: Cost of Resources	the cost of the resources being used
Risk		
	C9: Impact of the Sensors Coverage Gap	the possibility of mission failure caused by the existence of radar and/or radio gaps
	C10: Military Personnel Loss	the likelihood of military personnel loss during the mission
	C11: Collateral Damage	the possibility of collateral damage (anything but the target) during the mission
	C12: Confrontation Risk	the possibility of mission failure due to confrontation
	C13: CoA Equipment Reliability	the equipment reliability and the robustness of the COA
	C14: CoA Personnel Effectiveness	the effectiveness of the personnel which may be jeopardized by fatigue, stress, etc. at any moment during the mission

These three kinds of grid have been used during the different exercises. In all cases, an add hoc aggregation process lead to one or more recommendations. Building the matrix never seemed to be a problem for the teams. It was always done based on the experience of the team members and, most of the time, no scientific approach was used to evaluate any of the aspects. However, reinterpreting it afterwards did not seem to be so trivial to do.

Next, COA approval consists of the choice of the best COA according to the commander's beliefs and estimates. The final decision related to the COA to be executed was always under the responsibility of the commander, who usually had a more global view of the situation than his/her team due to his/her extended level of expertise. By deciding on a COA, the commander assessed what residual risk was acceptable, and based on his/her decision and final guidance, the staff refined the COA, completed the planning process and issued orders.

Usually, the commander was periodically kept informed by the COS on the results of the team's progresses. In all cases, the information briefings as well as the decision briefings were privileged moment for the commanders to have a direct contact with all the planning teams, and to ask to specific persons direct questions when needed.

Subjective Decision Grid	COA1		COA2		COA3	
	Strengths	Weaknesses	Strengths	Weaknesses	Strengths	Weaknesses
Aspect1						
Aspect2						
Aspect3						

Figure 4. Subjective decision grid

Numerical Decision Grid	COA1	COA2	COA3
Aspect1 (weight1)	rate11	rate12	rate13
Aspect2 (weight2)	rate21	rate22	rate23
Aspect3 (weight3)	rate31	rate32	rate33
Global rank	COA 1rank	COA 2rank	COA 3rank

Figure 5. Numerical decision grid

Broad-Categorized Decision Grid	COA1	COA2	COA3
Aspect1	+	+	-
Aspect2	-	-	-
Aspect3	+	+	-
Aspect4	-	+	+

Figure 6. Broad-categorized decision grid

3.4 General observations

Planning in combined/joint environments may be affected by the diverse backgrounds of planners from different services. This could make it harder for planners to understand each other and to share a common perspective on the problem [2]. For example, using different semantics for a same terminology is something that happens for the different environments. The fact that the team members did not necessary share exactly the same ontology might affect the common understanding of the situation as well as the common understanding of COA impacts.

Since the approach to integrate risk management into the process was a new aspect into the CF OPP document, it cannot be said that a real integration of the risk management into the Estimate Process has been observed.

Even if intelligence and other external information is suitable to develop a better understanding of the situation and to develop COAs, the process can be executed without them, however the quality will be accordingly. In all stages, frequent requests for information were asked and the process was going on even without their answers. Since the Estimate Process is executed in a highly iterative way [2], the team can always go back to revise some earlier aspect of the estimate, when new information are available. The fact that team has a complete liberty of how to executed the process make it easy to go back and correct any problem anytime during the process.

During the exercises observed, there was always an individual mandated to do the typing. This person had the role to keep up with the discussions, summarize them and put them in a format compatible with the format requested (ex. Estimate Process format showed in Annex E). Since this person had his/her own domain of expertise, he/she also had to contribute to the discussions when appropriate. Maintaining this double role seemed to be very difficult to perform. Since discussions were sometimes concurrent and not always disciplined, it was very difficult for this individual to catch everything that was said. Therefore, the information in the documents produced did not always contain all aspects that were discussed. Justifications for some aspects as well as entire aspects that have been discussed have sometimes been omitted. The teams always reviewed the documents from time to time to verify that everything was there, but even with that, some information was not part of the documents. Sometimes it was intentionally, sometimes not. Could it be said that the missing aspects were not important, this is still a question ?

In the same line of thought, the person who wrote the reports and presentations always gave his/her own flavour to the documents, by focussing more or less on certain aspects, or by the way the information was presented.

It is interesting to notice the Novice/Expert issues that were identified during the observation of Task Group Force Integration Training [2]:

- Dealing with limited time;
- Appreciating the situation;

- Knowledge what to ask for;
- Knowledge and understanding of strategy, tactics, and operations;
- Communicating two levels up and two levels down;
- Avoiding detail.

These issues generally pertain to the knowledge base that members of the planning team bring to the process and their ability to utilize that knowledge effectively, especially under stress [2].

4. Discussion

Most of the time, military operations are evolving into a dynamic, complex and uncertain environment. In this type of context, the Estimate Process is often performed under time pressure and stressful conditions. Under the influence of these factors, the human capacity of reasoning and judgment can be significantly reduced. Since time pressure and stress may negatively affect the human judgment and capacity of reasoning, it can be said that factors such as the time pressure and stress may negatively affect the commander and team's assessment of the situation as well as their assessment of the COAs. Then, the use of computer-based decision-aid systems supporting the commander and his team appears to be an interesting avenue for the improvement of the Estimate Process. However, to be efficient, these systems must be adapted to the process to be executed as well as to the team that has to execute the process.

4.1 The process

The sequence of functions proposed in the Estimate Process wants to make sure that the situation is well understood before developing COAs, and that the COAs are well assessed before selecting the most appropriate one. For example, during staff factor analysis, the team identifies and understands pertinent factors, trying to focus on the critical factors to the mission and avoiding spending too much time on details that are not so important. It is only when this is done that an acceptable set of options will be defined, and evaluated to be able to make a decision. If new information is received or hypothesis modified, the team can always go back in the process to review/modify previous deductions, COAs.

This sequence of functions can corresponds to the behaviour of experience planners: "Instead of dropping pattern recognition in novel situations, experienced decision makers learn to pause and think critically about the results of recognition." [5]. It is interesting to notice that, experienced army planners do not necessary spend less time planning than novice planners [6]. Indeed, "experienced planners did not generate an initial plan more rapidly (e.g., based on similarities with prior situations), tended to see the situation as more complex, and felt the need for more time to think about their plan than novices"[5].

Therefore, computer-based systems providing workflow facilities such as workflow manager or workflow monitoring and critiquing seem to be appropriate to the Estimate Process.

When working on the mission analysis as well as on factor analysis, the team has to identify and assess the factors that may have an impact on the operation. Even if the team was trying to focus on only one factor at a time, elements important to the assessment of other factors were coming up all the time. Most of the time, it was decided to delay the discussion on these upcoming aspects to later on (when the appropriate factor would be analyzed). However, sometimes, these aspects did not come up when the appropriate factor was analyzed. It could be said that if they did not come up later, it

was because they were not so important. But can we be sure of that? Accordingly, it is thought that if all these ideas were automatically recorded, and brought to them when the appropriate factor is analyzed, then the team had less chance to forget discussing certain aspects.

Having a computer-based system able to hear and understand the discussion and the body language exchanges of the team members and put everything that is discussed into context would be ideal. However, these days, we do not have such facilities. Another approach to this aspect would be to have a computer-based infrastructure to exchange information among the team: each team member uses a computer to communicate with the rest of the group. Existing tools such as collaborative tools, computer-based discussion forums or brain storming tools could be used as such infrastructure. Then, facilities to interpret the discussion, put the information into context, and keep track of all information discussed accordingly is more achievable.

Finally, this process is composed of a set of intermediate outputs that the team has to produce. Factors important to the situations, assessment of these factors, enemy COA, enemy COA assessment, friendly COA, friendly COA assessment and friendly COA comparison are some of them. Here again, computer-based system could provide facilities to automatically provide part of these outputs or help the end users producing them. Advanced techniques such as genetic algorithms, artificial intelligence, multi-criteria analysis, etc. could certainly demonstrate some utility.

4.2 The team

The use of a team for the execution of the Estimate Process is necessary for different reasons. Firstly, the expertise is distributed among the team members. Secondly, the quality of the result is improved by the contribution of more than one individual. Indeed, “An advantage of the use of teams is that in many situations they produce better problem-solving and decision-making outcomes than do individuals working alone. ...The improved outcomes are partially due to team interaction gains that result from pooled individual information” [7].

Team decision-making is a subject that has been addressed by many authors in the scientific literature. For example, it has been identified that “Group decisions tend to be better when individuals think about the problem independently before arriving at a group judgment [8, 9]” [5], and that, “groups were more successful in solving problems if they had analyzed problems instead of focusing on solutions” [10]. The factors that are presumed to influence team decision-making are [11, 12, 13, 7]:

- Individual member skills: communication skills, task vs. interpersonal orientation, experience with similar situations, expertise, investment in (commitment to) outcomes, age, tenure, preference to make decisions quickly on limited information, social-interaction skills, knowledge, motivation, role expectations [8];
- Team dynamics: clarity of communication, member roles, member hierarchy, shared mental models (understanding), team composition, established

communication process, e.g., one sentence at a time or developed argument, trust, cooperation, coordination, differential value of individual member input to decisions, groups norms, group size, group composition, interpersonal dynamics, homogeneity of attitudes, values, and preferences [8];

- Organizational specifics: staffing practices, reward systems, organizational climate, intergroup interaction [13];
- Situation specifics: time available, complexity of decision, clarity of purpose/goal [7].

In order to get the maximum of a team decision-making process, those factors should be considered as well as the area of expertise of the individuals, when determining who is going to be on the team. Furthermore, communication and shared mental models are particularly important for team decision making [7]:

- “Effective team coordination in turn is enhanced when team members share mental models [14]. Communication among team members, through validation and elaboration of shared mental models, leads to improved decision making and problem solving” [7];
- “Team decision making depends on shared mental models of the task, the situation, and the communicative processes within the team that create and maintain such shared knowledge” [7].

Accordingly, when team members have difficulty to communicate among them, the quality of the process result will not reach the level of quality that could be achieved otherwise. Computer-based systems providing communication facilities among the team’s members, and providing facilities to support a shared mental model seem to be appropriate to the Estimate Process.

Methods of team decision making can be seen on a continuum with one person having total authority on one end to everyone sharing power and responsibility on the other [15]. The basic ways that teams make decisions can be presented by [16]:

- Command Decision: An individual on the team can make the decision based on his/her own information;
- Consultative Decision: An individual on the team can make the decision based on input from other team members;
- Majority: The team can vote and base the decision on the majority;
- Consensus Decision: The team can work together to decide on an option that everyone can support;
- Unanimous agreement: The team can have everyone agree on one option.

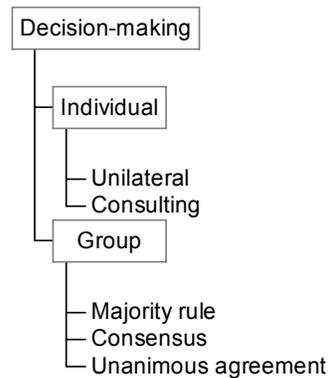


Figure 7. Decision making strategies [16]

As mentioned earlier, the strategies used by the teams during the exercises were majority and consensus. The teams using majority strategy applied it quite easily, while those using consensus strategy seem to have more difficulty to do. It might be because, most of the time, no formal consensus process was executed. Even if it is not necessary to follow a formal consensus process to be able to reach a consensus, the team members should all be aware of what the consensus process involves.

Consensus decision making involved reaching a decision when, after a full discussion to take into account everyone's concerns and resolve them, the team members unify behind the best solution, which seems possible for the team at that time [17]. From different formal consensus processes that have been proposed in the literature [12, 19, 18, 20], it is clear that it requires a commitment to active cooperation, disciplined speaking and listening and respect for the contributions of every member [12]. Generally, the team is taking possession of all proposals/ideas (the proposal is not the property of the presenter anymore). During a discussion, each proposal is challenged by raising any concerns the team members may have. Then, everyone in the team works to improve the proposal to make the best decision for the group.

The fact that everyone works cooperatively does not mean that there will be no divergence of opinion. On the contrary, "Formal Consensus works best in an atmosphere in which conflict is encouraged, supported, and resolved cooperatively with respect, non-violence, and creativity. Conflict is desirable. It is not something to be avoided, dismissed, diminished, or denied" [15]. However, the role of a conciliator or a moderator is the key to the success of the process.

Even if the consensus is time-consuming and difficult [15], it allows reaching the best decision possible since it is a way to tap the collective experience and knowledge of the group [20]. Indeed, "Within every member of any group there is a lifetime of experiences and knowledge. Consensus is a way to tap the collective knowledge of the group to craft the best decision possible" [20].

No matter the strategy selected by the team, it is important that the team understand the process and is comfortable to achieve it. Furthermore, in both cases, discussions should

be considered as an excellent decision-making tool. “Critical discussion is especially appropriate to the team decision-making process because its goal is the mutually acceptable resolution of differences of opinion [21]” [7] . All of this is applicable to the team executing the Estimate Process.

Computer-based systems supporting team decision-making strategies seem to be appropriate to the Estimate Process.

5. Conclusion

The Canadian Forces operational planning process (CF OPP) is based on an Estimate Process that involves the elaboration of different courses of action (COAs) following situation analysis and the selection of the most appropriate one for its subsequent planning. This document has presented the Estimate Process as described in the CF manual as well as information on how this process is achieved at the operational level. These observations are informal, since in all cases, they were based on observations of different exercises and not on observations of real operations. Accordingly, no definitive conclusions can be made regarding real planning operations. However, it can be thought that the difficulties observed during these exercises are a small subset of the real difficulties of executing the process in real-life operations.

The Estimate Process is often performed under time pressure and stressful conditions related to the fact that military operations are evolving into a dynamic, complex and uncertain environment. Under the influence of these factors, the human capacity of reasoning and judgment can be significantly reduced. Since time pressure and stress may negatively affect the human judgment and capacity of reasoning, it can be said that factors such as time pressure and stress may negatively affect the commander and his/her team's assessment of the situation as well as the assessment of the COAs. Then, the use of computer-based decision-aid systems supporting the commander and his/her team appear to be an interesting avenue for the improvement of the Estimate Process.

To be efficient, these systems must be adapted to the process to be executed as well as to the team that has to execute the process. The Estimate Process wants to optimize logical, analytical steps of decision making in conditions of uncertainty and ambiguity while maximizing the commander's and staff's creative thinking and associated thought processes [1]. As a result, it intends to maintain a minimum of quality in planning results. The realisation of the Estimate Process by a team is essential since the expertise is distributed among the team members. Furthermore, the quality of the result is improved by the contribution of more than one individual. Effectively, "An advantage of the use of teams is that in many situations they produce better problem-solving and decision-making outcomes than do individuals working alone [7]". Accordingly, in order to obtain the maximum of a team decision-making process, team dynamic factors should be considered as well as the area of expertise of each individual, when determining who is going to be on the team.

Based on the observations described in this document, decision-support facilities have been identified for the Estimate Process. They are:

- workflow facilities such as workflow manager or workflow monitoring and critiquing;
- facilities to interpret the discussions, put the information into context, and keep track of all information discussed;

- automated or semi-automated facilities helping the end users producing intermediate outputs or part of them;
- communication facilities among the team's members;
- facilities supporting a shared mental model;
- facilities supporting team decision-making strategies.

All these aspects are ideas that need to be validated.

Operational Art is defined as “The skilful employment of military forces to attain strategic and/or operational objectives through the design, organization, integration and conduct of theatre strategies, campaigns, major operations and battles”[1]. When developing decision-support systems for the CF OPP, scientists must always keep in mind that they are developing artist supportive tools.

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Annex A – The planning process

This is the planning process presented in B-GJ-005-500/FP-000.

STAGES	KEY ELEMENTS	TASKS	OUTPUT
INITIATION	Receive Planning task	Activate Operations Planning Group Gather Planning tools Get organized	
ORIENTATION	Conduct Mission Analysis Deliver Mission Analysis Briefing Issue commander's Planning Guidance	Review the Situation (Opposing forces, Admin, Logistics, C2, etc) Review Higher commander's Intent, Desired End- States, Restraints and Constraints Identify the Criteria for Success Identify the Assumptions Identify the Centre(s) of Gravity and Decisive Points Assess overall military capabilities of the parties involved Battlespace Effects Identify the Objectives Identify the Tasks (Assigned and Implied) Develop the Mission Prepare and present the Mission Analysis Briefing Develop and issue the commander's Planning Guidance/Wng O	Commander's Planning Guidance Wng O
COA DEVELOPMENT	Analyse Factors Develop COA Information Brief Commander's Decision	Develop and refine COAs Analyse Factors/Make Deductions (Theatre situation, Opposing Forces, military capabilities Time and Space, Assessment of Tasks, C2, Log, Mov and Engr) Develop opposing and own COA Following Info Brief: Compare opposing and own COA Test COA for viability Conduct war gaming Present Decision Brief to the commander	Decision Brief Proceed with plan development, or Develop COA into a CONOPS for approval
PLAN DEVELOPMENT	Develop, Co-ordinate, Seek CONOPS approval Issue plan	Identify and resolve shortfalls Prepare Plan / Op O Develop and synchronize Annexes or SUPs Seek Approval Revise plan as necessary Issue Final Plan / Op O	Approved Plan / Op O
PLAN REVIEW	Plan Review Revised Decision Briefing (if reqd)	Conduct Progress Review Conduct Periodic Review Conduct exercises and/or war games Conduct Revised Decision Briefing as required Update and issue amendments as required Prepare and Issue plans as required	Updated Plan / Op O

Annex B – Time limited option

This is the time limited planning process presented in B-GJ-005-500/FP-000.

STAGES	NORMAL PLANNING TASKS	ADJUSTED OUTPUT
INITIATION	<ul style="list-style-type: none"> Activate Operations Planning Group Gather Planning tools Get organized 	
ORIENTATION	<ul style="list-style-type: none"> Review the Situation (Opposing forces, Admin, Logistics, C2, etc) Review Higher commander's Intent, Desired End- States, Restraints and Constraints Identify the Criteria for Success Identify the Assumptions Identify the Centre(s) of Gravity and Decisive Points Assess overall military capabilities of the parties involved Identify the Objectives Identify the Tasks (Assigned and Implied) Develop the Mission Prepare and present the Mission Analysis Briefing Develop and issue the commander's Planning Guidance/Wng O 	Mission analysis may be abbreviated by limiting the detail in some of these steps.
COA DEVELOPMENT	<ul style="list-style-type: none"> Develop and refine COAs Analyse Factors/Make Deductions (Theatre situation, Opposing Forces, military capabilities Time and Space, Assessment of Tasks, C2, Log, Mov and Engr) Develop opposing and own COA Following Info Brief: <ul style="list-style-type: none"> Compare opposing and own COA Test COA for viability Conduct war gaming Present Decision Brief to the commander 	The commander selects only one COA to be analysed and war gamed. COA confirmed based on balance of risks and constraints.
PLAN DEVELOPMENT	<ul style="list-style-type: none"> Identify and resolve shortfalls Prepare Plan / Op O Develop and synchronize Annexes or SUPs Seek Approval Revise plan as necessary Issue Final Plan / Op O 	Plan/OP O based as much as possible on existing CONPLANS and SOPs
PLAN REVIEW	<ul style="list-style-type: none"> Conduct Progress Review Conduct Periodic Review Conduct exercises and/or war games Conduct Revised Decision Briefing as required Update and issue amendments as required Prepare and Issue plans as required 	Updated Plan / Op O

Annex C – Initiating directive

This is the format for an initiative directive presented in B-GJ-005-500/FP-000.

SECURITY CLASSIFICATION

(Place the required classification at the top and bottom of every page)

Copy No ____ of ____

Issuing Headquarters

Place of Issue (may be in code)

Date-Time Group of Signature

Message Reference No.

INITIATING DIRECTIVE

1. **Situation**
 - a. Strategic Objectives
 - (1) Centre(s) of Gravity (if known)
 - (2) Desired End-state(s), political and military
 - b. Political and Military Restraints and Constraints
 - c. Assumptions
2. **Strategic Mission**
3. **Tasks**
 - a. Other Co-ordination
 - (1) Timing
 - (2) Rules of Engagement (ROE)
4. **Logistics and Key Support Aspects**
5. **Command and Control Arrangements**

ACKNOWLEDGE

NAME (Commander's last name)

RANK

OFFICIAL: (Authentication)

Annex D – Mission analysis format

This is the mission analysis format presented in B-GJ-005-500/FP-000.

1. **Introduction**
 - a. Aim of Brief
 - b. Outline
2. **Review of Situation**
 - a. **General**
 - (1) Political, military and historical background
 - (2) Current Situation
 - b. **Opposing Force Situation**
 - (1) Intent
 - (2) Capabilities
 - (3) Assessment (brief description of likely actions – not COAs)
 - c. **Higher Commander's Direction and Guidance**
 - (1) Mission
 - (2) Intent
 - (3) Objectives
 - (4) End State and Criteria for Success
 - (5) Assumptions
 - (6) Limitations
 - (7) Assigned Tasks to Your Command
 - (8) Implied Tasks to Your Command
3. **Operations Design**
 - a. Key Factors and Deductions (only those with impact on mission analysis).
 - b. Planning Assumptions
 - c. Key Strengths and Weaknesses
 - (1) Opposing Force
 - (2) Own Force
 - (3) Relevant Other Forces, as necessary
 - d. Centres of Gravity

- (1) Strategic
- (2) Operational
- e. Decisive Points (own level)
- f. Objectives
- g. End State and Criteria for Success
- 4. **Proposed Mission**
- 5. **Initial Force Estimate**
 - a. Forces Available for Planning Purposes (if given)
 - b. Estimate of Forces Required
- 6. **Proposed Planning Guidance**
 - a. Proposed Initial Intent
 - b. Direction to Planning Staff (Staff Planning Directive)
 - c. Direction to Subordinate Commands (Wng O)
- 7. **Conclusion**
- 8. **Approvals.** Seek approval of:
 - a. Operations Design
 - b. Mission
 - c. Proposed Planning Guidance
- 9. **Additional Guidance**

Annex E – Estimate format

This is the estimate format presented in B-GJ-005-500/FP-000.

SECURITY CLASSIFICATION

(Place the required classification at the top and bottom of every page)

Issuing HQ
Location
Date and Time of Issue

ESTIMATE FOR (TITLE)

References:

- A. Appropriate maps, charts and reports
- B. Supporting estimates
- C. Directives and commander's planning guidance

1. **Situation.** A short summary of the situation, as provided / updated by the Initiating Directive/Wing Orders.
2. **Mission.** State the mission that was determined in the orientation step 2. It may be necessary to include a subparagraph to detail any limitations to the mission. Include centres of gravity if known or determined.
3. **Assumptions.** Include only those assumptions required to complete the estimate. Assumptions made by the commander are to be considered as facts for planning purposes.
4. **Factors Affecting the Achievement of the Mission:**
 - a. Describe the factors, which affect the mission. This can be in either narrative or tabular form. After each factor, list the deductions drawn from the facts. Conclusions should be concise and relevant; ideally, they should be expressed as a building block of information, for example:
 - (1) Offensive air operations cannot commence before day 12; and
 - (2) The maximum size force which can be sustained for the period is one mechanized division or one reinforced air mobile division; and
 - b. Group the deductions by function to assist the development of COAs. It may be necessary to revise deductions, as later aspects of the estimate affect earlier conclusions.
5. **COAs:**
 - a. Describe the COAs open to the opposing force. Ideally, this should be a series of feasible options of varying potential impact on our capacity within the theatre. It is always prudent to identify that COA which has the most serious impact on our capacity, regardless of the likelihood of it occurring. This provides an objective starting point for the array of COAs taken by the opposing force; and
 - b. Describe the COAs, which our forces have the operational and logistic capacity to execute. These COAs should only be limited by the guidance provided in the initiating directive/Wing Order. The description should include:
 - (1) CONOPS;
 - (2) Probable Tasks / Missions;

- (3) Task Organization;
- (4) Critical Support Requirements (Engineering, Movement, Logistics, Sustainment, Financial); and
- (5) Impact of this COA on other CF Ops, Training, procurement, or OGDs.

6. **Comparison and analysis of COAs.** Compare each of our own COAs against the opposing force's potential. This comparison should be as objective as possible using the deductions derived previously from the estimate. It is appropriate to set this comparison out in tabular form to focus on specific elements, particularly the comparison of time, space and mass. For example:

COA 1 - An amphibious assault preceded by naval and air bombardment. (More text as required.)

Comparison Aspect	Opposing Force COA 1	Opposing COA 2, etc.
1. Time effect	a. Most likely that the opposing force will achieve superior rate of build-up.	a. Opposing force will not be able to develop forces in the theatre until after...
2. Space effect	a. The opposing force's advance will open airstrips for offensive operations over...	a. Port facilities will be available to the enemy along the coast from...
3. Mass effect	a. The opposing force can achieve superior concentrations from day 23 onwards...	a. Sustainment of forces will be severely restricted following the opposing force's enforcement of a naval blockade...
4. Etc.		
Assessment	This COA will have the most significant impact on our COA 1. The implications are...	This COA will have little impact on the execution of our COA 1. In fact it will hasten the collapse of...

7. **Summary of our COAs.**

- a. COA X. In separate paragraphs, describe the strengths and weakness of each COA;
- b. Identify which opposing force COA is believed to be the most likely with respect to their capabilities and suspected intentions; and
- c. Identify the criteria chosen for establishing the relative ranking of the COAs with respect to the most likely opposing COA. (for example, relative combat power, Force protection, ease of execution, sustainment, cost, political acceptability, impact on other commitments, etc). Conclude by identifying the COA, which best meets the mission and caters for the opposing force's capability. This may be done in tabular format and may require the staff to weight the criteria to establish a clear ranking.

8. **Selecting Preferred COA.** A statement of the preferred COA, resulting from the above assessment.

9. **Outline Plan.** An outline plan based on the preferred COA(s) is prepared, but only in sufficient detail to enable the staff to undertake the development of the decision brief and CONOPS.

Commander's signature

Annexes/Supporting documents
Distribution list

List of symbols/abbreviations/acronyms/initialisms

1CAD	1 Canadian Air Division
AOO	Area of Operations
C5IS	Command, Control, Coordination, Communications, Computer Systems, Intelligence, Surveillance
CF OPP	Canadian Forces Operational Planning Process
CFC	Canadian Forces College
CFMWC	Canadian Forces Maritime Warfare Centre
CoA	Course of Action
COS	Chief of Staff
DND	Department of National Defence
DRDC	Defence Research and Development Canada
ECOAs	Enemy COAs
FIT	Fonds d'investissement en technologie
PPOFC	Processus de planification opérationnelle des forces canadiennes
RDDC	Recherche et développement pour la défense Canada
SOPs	Standing Operating Procedures
TIF	Technology Investment Fund

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The Canadian Forces Operational Planning Process (CF OPP) is a systematic approach to analyzing a situation, bringing staff expertise to bear on the relevant factors, narrowing courses of action, obtaining the commander's approval, and developing the detailed annexes necessary to produce an executable plan. In order to support the commander and his/her team in the achievement of the CF OPP, Defence Research and Development Canada (DRDC) is investigating computer-based critiquing systems as decision support facilities for the Estimate Process. During the first phase of this project, defence scientists have dedicated time and efforts to improve their understanding of the Estimate Process. The aim of this memorandum is to document this effort. It presents the Estimate Process as described in the CF manual as well as information on how this process is performed at the operational level. Furthermore, it introduces some decision-support system concepts that could be provided to the Estimate Process.

Le processus de planification opérationnelle des forces canadiennes (PPOFC) est une approche systématique pour analyser une situation, faire converger l'expertise du personnel sur les facteurs pertinents, restreindre les suites d'actions possibles, obtenir l'approbation du commandant et préparer les annexes nécessaires à la production d'un plan exécutable. Afin d'apporter une aide au commandant et à son équipe pour la réalisation du PPOFC, les centres de Recherche et développement pour la défense Canada (RDDC) étudient l'utilisation des systèmes automatisés de critique pouvant faciliter l'aide à la décision dans le processus d'estimation. Lors de la première phase de ce projet, les scientifiques de la défense ont consacré temps et effort afin d'améliorer leur compréhension du processus d'estimation ainsi que de la réalisation de ce processus. Le but de ce mémorandum est de documenter cet effort. Il présente le processus d'estimation tel que décrit dans le manuel des Forces canadiennes ainsi que des informations sur la réalisation de ce processus. De plus, il introduit des concepts de systèmes d'aide à la décision qui pourraient être fournis au processus d'estimation.

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