The Future of Command and Control

Topic 7: Other C2 Related Research and Analysis

Time aspects of command and control

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Abstract

The command and control (C2) research community mainly agree upon the overall purpose of C2 – to generate desired effects in an operational environment thereby fulfilling stated goals. This purpose indicates an action oriented approach that focuses on the C2 process and its constituent activities. This paper inquires the persistently elusive question of when the C2 process starts and ends. This question has a strong linkage to whether the C2 process begins by a top-down and beforehand need or if it is commonly initiated as a reaction to a, more or less sudden and unforeseen, situation or event. These two different approaches have significant impact on C2 theory, for instance how much effort should be dedicated to preparation before an operation/mission, and indeed if these approaches are compatible within the same theoretical framework at all. Further, this paper surveys the often mentioned need for speed in regard to the C2 process – to get inside the enemy’s decision cycle. This line of thought is in turn related to the choice between an analytical or intuitive decision making approach in the C2 process. This paper applies a literature review method that compares a national C2 process standard with an international equivalent.

Introduction

The phenomenon of C2 can be observed through a variety of lenses. C2 can for example be viewed as a function, a capability or as a process (or sometimes as a mixture of all three). Even though a majority of perspectives on C2 are characterized by an action oriented approach, core manuals or method descriptions in the military domain are focusing on preparation or planning for the execution of C2 in the context of a mission. They do not focus on how to exercise command and control, or at least a relatively small proportion is dedicated to the execution stage of a mission. This paper explores, within the overall inquiry about time and C2, also the relation between C2 and planning.

The time-factor is so tightly associated with C2 that it may be taken for granted and not specifically investigated when developing more effective C2-methods. However, time has profound effects on C2 in numerous ways. Most significant is perhaps the time-factor in its relation to the very context itself – the actual operational environment including the problematic situation to be dealt with. The operational environment, the current situation and our own resources, or mission respondent system, constantly changes over time as a consequence of our own decisions and actions but also due to the adversaries decisions and actions. The decision-making necessary to cope with these continuously changing circumstances is termed dynamic decision-making (Brehmer, 1992, 2000; Brehmer & Thunholm, 2011). Its core premises are (Brehmer & Thunholm, pp. 3-4):

1. They require a series of decisions
2. The decisions are not independent
3. The state of the problem changes, both autonomously and as a consequence of the decision maker’s actions
4. The decisions have to be made in real time
To illustrate and highlight the time-factor in dynamic decision-making (DDM), the different delays involved in DDM are represented in figure 1.

![Diagram of DDM model](image)

Figure 1. Time-delays in dynamic decision-making (Adapted from Försvarsmakten 2012).

Experiments have investigated participant’s ability to solve dynamic decision tasks and results show repeatedly that this is truly difficult for many people (e.g., Brehmer, 1995). One of the most prominent features of this DDM model is the feedback relation between decisions and the operational environment, and the interdependencies between own (blue) and the adversary (red) system. Several models of C2 resembles the DDM model above (figure 1) and this fact is no surprise since decisions are a key component in a majority of C2 models (e.g., Boyd, 1995/96; Endsley, 1995). Indeed the whole cybernetic C2 paradigm (e.g., Builder, Banks, & Nordin, 1999; Stanton, Barber, & Harris, 2008) is related to this particular perspective on decision-making by its apparent connection to control theory. However, in DDM the decision-maker plays a key role which is not always the case in control theory. It is important to notice that DDM is not a special type of particularly efficient decision-making; no, it is a necessary way to cope with and, make decisions in, a dynamic context.
Dynamic C2

This paper sets out with a view on C2 that has its roots in the tradition of DDM. An operational definition of C2 suitable for the context of this paper, and in line with other often-cited definitions is: C2 is a human activity or system that strives to solve (military) problems in order to achieve goals. The overall purpose of C2, to achieve goals, is attained by the direction and coordination of the resources available in an organization. Hence, direction and coordination are the products produced by the C2 process or C2 system. However, four main and general activities are necessary to produce the direction and coordination: communication, data providing, orientation and planning (see figure 2). These four activities has been relatively stable for over a decade in the theory for C2 as initiated in a series of papers by Brehmer (2005, 2006, 2007, 2013) and developed further by others (e.g., Spak & Carlerby, 2018). In this paper, the activity “Influence” is organized within the activity “Communication” as a sub activity. A set of sub activities are suggested for each main activity.

Figure 2. The C2 process with its necessary, sufficient and general activities produce direction and coordination.

The relation between the activities within the C2 process are not strictly sequential. A continuous exchange is going on between the activities. This is the reason to why the four main activities are grouped “inside” each other in the model of a generic C2 process depicted in figure 1. However, an important exception is the sequence between orientation (what should be achieved and done) and planning (how it should be done). The main reason for the what to proceed the how, is the possible exploration of new solutions to a problem. This is a central principle within the design perspective, which accordingly has the ability to enhance creativity and surprise (see also Andersson, Josefsson, & Svanborg, 2020).

The purpose of data providing is to fulfill the information requirements from orientation (not to be mixed up with the collection of as much data as possible). The input to data providing is data from the operational environment. This data is collected with different sensors (including humans). To fulfill the data providing activity, a number of sub activities are needed: a) sensor direction, b) data collection, c) data processing and d) dissemination. The abstract output from data providing is required information and is for example expressed in the form of various common operational pictures.

The purpose of orientation is to answer the question: What should we achieve and do to manage the situation and solve the mission? Four sub activities are needed in order to fulfill the purpose: a) information requirements (for the direction of data providing), b) monitoring to detect relevant changes in the operational environment (in relation to the plan but also to find new opportunities and potential new crisis or problem situations), c) assessment to evaluate these changes in relation to own mission and the situation and d) estimation to decide
on a course of action. The output from orientation is an action oriented understanding or expressed in a more concrete form, as a course of action and a commander’s intent.

The purpose of *planning* is to “dress” the concept of operations with resources in time and space (who does what, where and when), in other words; how activities should be done. The abstract product from planning is a coordination of resources in time and space and is expressed as the actual operational plan. To complete the planning activity, two sub activities are needed: a) synchronization and b) wargaming to evaluate the plan.

The purpose of *communication* is to transfer messages of many different kinds. One important type of input to communication is various reports from the units in the field. Two sub activities are needed: a) influence concerns leadership to motivate and uses the mandate to conduct C2 – a necessity to “get the mission done”, b) cooperation is needed within own organization, but perhaps foremost in relation to other organizations and may result in an agreement. One main output from communication (although many interactions are carried out with the other activities as well) is the actual transmission of the mission to the next level of command or to the execution system with its units (see figure 3).

![Diagram of C2 process](image)

*Figure 3.* The figure shows the C2 process and its activities in a structure or organization with three levels of command. To the right, the C2 system together with the execution system constitute the mission respondent system. “Missions” and “reports” are highlighted in order to display the relation within and between the systems and the need for feedback. Note also the horizontal dimension in the report symbol. It is representing the cooperation within and between organizations. Time delays are presented to the left (compare with figure 1) to show both delays in reporting and delays when transmitting the mission. The execution system is represented by units from defense, police and emergency response that execute actions and creating effects to solve the problem situations.

*Views on planning*

In contrast to DDM and the cybernetic approach to C2, there is a tradition of literature on *planning* (see Mumford & Frese, 2015). The most common meaning of the concept of
planning is a preparing process taking place before actions are carried out. Since this preparing-process continues without substantial interaction with the operational environment (perhaps with the exception of intelligence activities), it is no surprise that planning has evolved in a linear and rather mechanistic manor. If planning would be considered as an unambiguous preparation-process, its linear character would be understandable. However, the planning process is sometimes considered as equivalent with the C2 process and sometimes as an activity within the C2 process. These two additional perspectives are undoubtedly rather confusing in relation to the former meaning of the concept. The ambiguous use of the planning concept contribute to make the question of when the C2 process starts hard to answer. Thus, there may exist a real capability problem in defense organizations that unilaterally focus on C2 as a planning or preparation process. In doing so, the well-established problems related to DDM risk not to be noticed and therefore not addressed and managed.

When does the C2 process start and why does it matter?

Next, I will elaborate on why it is important to be able to answer the question of when the C2 process starts and ends. First, there is the political reason. Democracies demands control of the military instrument of power. Therefore, military operations do not start without a formal mission. Second, there is the quality reason. What is effective and efficient C2? To answer that question one needs knowledge about desired objectives and end state (in order to validate the contribution of the C2 system to the efforts conducted by the mission respondent system). It is difficult to conceive objectives and end state without a mission communicated by the C2 process/system. Third, the ability to respond to an unforeseen and sudden attack. If the preparation phase is included in the C2 process (one of the planning perspectives presented above) it needs the capacity to cope with fast and threatening events (Carlerby, 2020). Fourth, there is the reason regarding sustainable and enduring C2 – the ability to conduct C2 over time. The time span of a mission can vary between some days to several years, which demands for sustainable and enduring C2.

The reasoning above about the C2 process being heavily influenced by the concepts of dynamic decision making and the planning process leads to two overarching hypothesis from an organizational viewpoint:

1.) C2 is an on-off process, which starts with a mission and ends when the end state is achieved.
2.) C2 is a continuous process, which fluctuate in level over time, from no current missions to several simultaneous missions.

Figures 4 and 5 presents the two perspectives on C2.

![Figure 4. C2 as an on-off process.](image)
**Method**

I have selected two influential\(^1\) manuals on planning and C2\(^2\) for comparison reasons and to exemplify the problem with ambiguity concerning the planning concept. The first is the North Atlantic Treaty Organization (NATO) Comprehensive Operational Planning Directive (COPD) from 2013. This piece of work will represent the international perspective on this issue. The second is the *Svensk planerings- och ledningsmetod (SPL)* [Swedish planning- and C2 method] from 2017. This handbook will provide the national\(^3\) perspective. Both COPD and SPL focus on the strategic and operational command levels. The comparative analysis is guided by the two hypothesis presented together with the national and international perspective as showed in figure 6.

\(^{1}\) By influential I refer to the fact that both the COPD and the SPL is used extensively in the education of officers at the Swedish Defense University.

\(^{2}\) The COPD focus is on the operations planning process (OPP). However, the OPP is the military component to the overall NATO Crises Management Process (NCMP). Even though the mentioning of the term C2 is sparse in the COPD, the overall C2 perspective could perhaps be related to the “management” in the NCMP.

\(^{3}\) Obviously, “national” refers to the Swedish view in this paper, not other national views.
Results

The Comprehensive Operational Planning Directive

The structure of the COPD is primarily governed by the strategic and operational command levels, with the exception of the chapters concerning situational awareness and operations assessment as depicted in table 1.

Table 1. The COPD structure.

<table>
<thead>
<tr>
<th>Situational awareness</th>
<th>Introduction</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strategic level (Phase 1 -6)</strong></td>
<td><strong>Operational level (Phase 1 -6)</strong></td>
</tr>
<tr>
<td>1 - Initial situation awareness of a potential/actual crisis</td>
<td>1 - Initial situation awareness of a potential/actual crisis</td>
</tr>
<tr>
<td>2 - Strategic assessment</td>
<td>2 - Operational appreciation of the strategic environment</td>
</tr>
<tr>
<td>3 - Military response options development</td>
<td>3 - Operational estimate</td>
</tr>
<tr>
<td></td>
<td>3A - Mission analysis</td>
</tr>
<tr>
<td></td>
<td>3B - Courses of Action Development</td>
</tr>
<tr>
<td>4 - Strategic plan development</td>
<td>4 - Operational plan development</td>
</tr>
<tr>
<td>4A – Strategic concept of operations development</td>
<td>4A – Operational concept of operations development</td>
</tr>
<tr>
<td>4B – Strategic OPLAN development and force generation</td>
<td>4B – Operational OPLAN development</td>
</tr>
<tr>
<td>5 - Execution</td>
<td>5 - Execution</td>
</tr>
<tr>
<td>6 - Transition</td>
<td>6 - Transition</td>
</tr>
<tr>
<td>Operations assessment</td>
<td>Operations assessment</td>
</tr>
<tr>
<td>Formats and administration</td>
<td>Formats and administration</td>
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</tbody>
</table>

COPD has a perspective on planning, in accordance to suggested classification in the introduction, as equivalent to C2. COPD describes the operational planning process as (p. 1 – 6):

[T]he process begins with a review of the situation based on the strategic analysis of the situation and the mission to develop a clear appreciation of “what” must be accomplished, under what “conditions” and within what “limitations”. Based on this appreciation, it then focuses on determining “how” operations should be arranged within an overall operational design.

This quote strongly indicates that the COPD planning process has the very same objectives as most definitions of C2 processes (see introduction). The “what” is an expression for direction and the “how” for coordination.

The stated purpose of COPD is (p. 1 – 4):

Set within the context of a NATO contribution to a comprehensive approach, the purpose of this Allied Command Operations (ACO) Comprehensive Operations Planning Directive (COPD) is to outline the military procedures and
responsibilities governing the preparation, approval, implementation and review of operation plans to enable a common approach to operations planning.

This quote, together with the very structure of the document (table 1), demonstrates COPD approach towards the time factor. It is supposed to be applicable for preparation and approval (phase 1 – 4), implementation and review (phase 5) and transition (phase 6).

COPD view on how and when the planning process (C2 process?) starts at the strategic level is that the Comprehensive Crisis and Operations Management Center (CCOMC) manage activities at phase 1 (table 1). These activities usually begin when “their horizon scanning activities identify an emerging potential/actual crisis that may have implications to NATO’s security interests.” Via a multistep and partly iterative procedure, the CCOMC can build an understanding of the emerging crisis that may result in a recommendation to the Crisis and Operations Panel (COP) that in turn can advise NATO Head Quarter (HQ) to prepare for further activities. Finally, based on indications and warnings provided, the North Atlantic Alliance (NAC), which is the highest political authority within the alliance, can decide to move on to phase 2 (table 1). For a graphical overview, see (COPD, figure 3.2, p. 3 – 9).

COPD presents a detailed description of the multiple steps in the planning process through phases 1 to 4. One might believe that the manual would actually end after phase 4, if the perspective on planning as preparation was expected. However, this is not the case. The stepwise description of the execution phase is far less exhaustive then previous phases and it is closely related to the separate chapter covering operations assessment (p. 3 – 106): “includes all strategic level activities to ‘execute’ the strategic OPLAN”. These activities include supporting the initiation and conduct of the operation, including periodic review of strategic progress (e.g., strategic Operations Assessment) and, as required, conducting a plan review.” Further, the functions of the strategic level during phase 5 are: “the provision of situational awareness and understanding and military advice to the NAC, and strategic C2 of the operation within ACO.” Since there is a clear relation between execution and assessment, the main content of assessment will be briefly touched upon, but first a look into the corresponding parts (start of planning/[C2?] process and relation to execution) on the operational level of command.

At the operational level phase 1 starts as a result of own horizon scanning or as a task/request from the strategic level (p. 4 – 5). The process continues and resembles the phase 1-process at the strategic level. This means an iterative process between the intelligence/knowledge staff and the Commander/Director of Operations. Further development depends on (p. 4 – 9): “The source of initial indications of the emerging crisis, the urgency of the situation and the magnitude of the possible impact to NATO are to be considered when deciding what operational Phase 1 activities are appropriate.” If the OPP is decided to continue, an integrated understanding is developed through the Comprehensive Preparation of the Operational Environment (CPOE) process, which includes Political, Military, Economic, Social, Infrastructure, and Information (PMESII) domains across relevant actors in the operational environment (land, air/space, maritime). Understanding of the emerging crisis is further developed by the identification of information requirements to fill gaps, and monitoring of the crisis, by the intelligence/knowledge staff, for threat evaluation. The resulting operational considerations are shared with the strategic level (pp. 4 - 10-12). The transition to phase 2 is initiated by a warning order from the strategic level. COPD makes an
in-depth description of the following planning process steps in phases 2 – 4 and is then followed by the execution phase (5). For an overview, see (figure 4.1, p. 4 – 4).

Just as at the strategic level, the execution phase (which starts with an activation order issued by the commander) is not at all as expansive as previous phases. However, in comparison to the strategic level, the execution phase is more developed at the operational level (pp. 4 – 111-118). For example, it includes both implementation (with synchronization and coordination of activities) and assessment (with reviewing and adapting to events and situations that may arise). The execution phase is to a substantial part feedback driven with several examples of process steps (review and measure progress, adjustment, rapid conduct of operational estimate) specific meetings and products/tools (battle rhythm with Situational Awareness Briefing (SAB), Assessment Board (AB), and Joint Coordination Board (JCB)) with the aim of establishing adaptation capabilities. Adaption can be carried out by the use of fragmentary orders (FRAGO), Joint Coordination Orders (JCO), plan revision, branches and sequels. On an overall level, the COPD displays a high awareness regarding that (p. 4 – 112) “execution occurs in a dynamic, ever-changing environment”.

The operations assessment chapter strengthen the relation between the phases before execution, execution itself, and to the decision-making process. COPD (p. 5 – 11) states: “Operations assessment is done to monitor and validate the plan during execution and can be a significant part of the decision-making process. Without operations assessment, decision makers will find it more difficult to get the appropriate feedback (plan-execute-monitor-assess).” Further, operations assessment (at the operational level) is divided in: a) assessment concerning the planned actions which is termed “measures of performance” (MOP) and b) assessment regarding the planned objectives which is referred to as “measures of effectiveness” (MOE). Even though operations assessment as a process focuses on the execution phase, the COPD highlights the necessity of also considering the operations assessment already in the planning phases before execution.

The results from the analysis of the COPD can be summarized as:

a) COPD views planning as equivalent to C2,

b) COPD displays mainly an on-off perspective on how the planning/C2 process starts and ends (one important point is when the NAC decides to move on to phase 2 [strategic assessment], and another important point is when the commander issues the activation order thereby entering phase 5 [execution]),

c) COPD has a rather developed view on operations assessment that may aid to distinguish effective and efficient C2,

d) COPD has primarily an approach that is characterized by a top-down and beforehand perspective with sufficient time to go through all process steps (a brief description of how to conduct a “rapid operational estimate” during execution is however presented in the operations assessment chapter (pp. 4 – 115-116),

e) COPD does not comment about the ability to conduct C2 over time.
**Svensk planerings- och ledningsmetod (SPL) [Swedish planning- and C2 method]**

The basic structure of the SPL resembles the COPD in many ways. The most obvious sign of similarity is the overall structure of the document, building on the strategic and operational command levels with its sequential process phases (see table 2).

Table 2. The structure of SPL (translations within brackets).

<table>
<thead>
<tr>
<th>Inledning [Introduction]</th>
<th>Inledning [Introduction]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grunder [Foundation]</td>
<td>Grunder [Foundation]</td>
</tr>
<tr>
<td><strong>Militästrategisk ledningsnivå (fas 1-6)</strong> [Military strategic command level (Phase 1-6)]</td>
<td><strong>Operativ ledningsnivå (fas 1-6)</strong> [Operational command level (Phase 1-6)]</td>
</tr>
<tr>
<td>1 – Fördjupad kunskapsuppbyggnad [Immersed knowledge development]</td>
<td>1 – Fördjupad kunskapsuppbyggnad [Immersed knowledge development]</td>
</tr>
<tr>
<td>2 – Uppdragsanalys [Mission analysis]</td>
<td>2 – Operativ innebörd [Operational appreciation]</td>
</tr>
<tr>
<td>4A – Utveckling av planeringsdirektiv [Planning directive development]</td>
<td>4A – Utveckling av operativt koncept [Operational concept development]</td>
</tr>
<tr>
<td>4B – Utveckling av ÖB OPLAN [Commander-in-chief OPLAN development]</td>
<td>4B – Utveckla operativ operationsplan [Operational OPLAN development]</td>
</tr>
<tr>
<td>5 – Genomförande av operationen [Operational execution]</td>
<td>5 – Genomförande av operationsorder [Activation order development]</td>
</tr>
<tr>
<td>5A – Utveckling av Försvarsmaktsorder [Armed forces order development]</td>
<td>5A – Utveckling av operationsorder [Activation order development]</td>
</tr>
<tr>
<td>5B – Genomförande av operation [Operational execution]</td>
<td>5B – Genomförande av operation [Operational execution]</td>
</tr>
<tr>
<td>6 – Avsluta operationen [Operational termination]</td>
<td>6 – Avsluta operationen [Operational termination]</td>
</tr>
</tbody>
</table>

However, there are also some noticeable differences. The SPL has two introductory and theoretic chapters that are not present in the COPD. In chapter 2 “Grunder” [“Foundation”], the SPL elaborates on explaining basic terms and concepts divided in “Operationslogik” [“Logic of operations”] and “Ledningslogik” [“Logic of C2”]. The latter part provides an overall framework of C2 to which the handbook content can be attached. This part is not present in the COPD. The corresponding overall reference to C2 in COPD is limited to (COPD, P. 1 – 6): “support the commander’s decision making process”. COPD has a separate chapter on “Situational awareness” and the corresponding matter in SPL is assimilated into both the section “Grunder” [Foundation] that includes a section about the “Kunskapsdomänen” [“Knowledge domain”] and in chapter 3 “Processen” [“The Process”]. Chapter 3 in SPL has consolidated matter about the processes in each phase from both the
strategic and operational level. The process is specifically referred to as the C2 process (SPL, p. 57). SPL chapter 3 also covers some aspects of COPD chapter 2 on situational awareness, namely the “omvärldsbevakning” [“horizon scanning”], “fördjupad kunskapsuppbyggnad” [“immersed knowledge development”] and the development of the product “analys av operationsmiljön” [“CPOE”]. Further, chapter 3 contains a description of the assessment process, which in COPD is a chapter of its own. SPL also contains a section in chapter 2 that elaborates on the fact that there are different kinds of problems, which in turn affects for example the balance and needs between intuitive and analytic decision-making. COPD has no equivalent part about problem types.

Operations assessment does not have a chapter of its own in the SPL. Operations assessment is instead placed in chapter 3 regarding the overall process under the section execution. The content is however similar to the presentation in the COPD.

SPL shares a similar view as COPD on the issue of how and when an operation starts and how the transition to the execution phase is managed.

The results from the analysis of the SPL can be summarized as:

a) SPL views planning as preparation before execution but also as an activity within the C2 process.

b) SPL displays mainly an on-off perspective on how the planning/C2 process starts and ends (one important point is when the government office makes a request or the supreme commander decides to move on to phase 2 “uppdragsanalys” [mission analysis], and another important point is when the commander determines the operations order thereby entering phase 5b “genomförande av operation” [execution]).

c) SPL has a rather developed view on assessment that may aid to distinguish effective and efficient C2.

d) SPL has primarily an approach that is characterized by a top-down and beforehand perspective with sufficient time to go through all process steps (although suggestions for speeding up the planning process by for instance an integrated approach between command levels, approval of initiatives from the level of units, and an awareness concerning that unexpected events will happen during execution are presented in chapter 2).

e) SPL does not comment about the ability to conduct C2 over time.

**Discussion**

*View on planning*

If one accepts the theoretic standpoint on C2 given in the introduction, it is a bit troublesome to recognize the views on C2 presented in the analyzed material. The COPD has a very limited connection to the ideas of DDM. To some extent, this is understandable if the manual would solely focus on the preparation phases – before action. However, even though the execution phase of the main process described is only a small part of the full manual, it is there. The COPD uses an approach that is rather sequential, a stepwise procedure, smoothly moving on until the end state is reached. The interaction with the operational environment only plays a limited role.
As expressed by Albert and Hayes, 2006, p. 61: “Traditional treatments of C2 make the distinction between planning and execution. This has been a particularly poor way of thinking about accomplishing missions because it has led to a separation of these two functions conceptually, organizationally, and temporally.” This quote is spot on, since core activities in both the COPD and SPL, such as making estimations and adaptations via assessment, is part of traditional C2 models and DDM as well. With this standpoint, planning is an integral part of C2. The SPL has adopted this viewpoint in part. According to the section “Ledningslogik” [“Logic of C2”] in SPL chapter 2, the planning activity is indeed one of the four main activities together with monitor, assess and estimate in the C2 process during execution (see Spak, 2017, p. 9). On the other hand, SPL still labels the activities preceding execution as planning as well. If it would be desirable to preserve a separate process before execution, the specific use of the term planning could perhaps be altered to preparations or possible preparatory planning for clarity reasons.

Such an update would also fit the model of C2 presented in the introduction with one exception. The C2 model advocated in this paper, suggests two separate activities representing the what and the how in the C2 process, i.e. orientation and planning. This logic distinction between what and how is present in the COPD as well (as quoted in the result section on p. 8), yet this distinction does not invoke a correspondence in terminology; the what and the how is grouped together under the same umbrella “planning”. One other possible weakness when focusing on planning (as preparation) is the lack of relation to both the communication- and the data-providing activity. This applies especially to the communication between the C2 system and the execution system (see figure 3 about distributing the mission and receiving reports), which will also affect the data-providing activity because of the limited access to the operational environment during planning (as preparation) compared to an approach more focused on the action component of a mission.

**View on C2 as an on-off- or a continuous process**

So far, I have argued that planning should be an integral part of C2 and that planning taking place before execution could be relabeled to preparation or preparatory planning. Now, when discussing the question of when the C2 process starts and ends, one has to decide on the meaning of preparation too. Preparation could refer to the preparation of a specific mission as a response to an actual crisis or problem (see figure 7). It could also refer to the preparation of several different missions as future responses to potential crisis or problems. Defense organizations, whether they are multinational alliances or national, have general and overall missions to manage continuously all the time (see figure 8). Overall missions may include for example: basic homeland defense, border protection, incident readiness and horizon scanning etc. This implies that C2 is in fact conducted continuously, even though on a relatively low level. Thus, the two mainly structural models (figure 7 and 8) need to be complimented with a generic C2 process model that is valid for, and incorporate both the continuous and the on-off perspective on C2. Modelling C2 this way, the unfortunate dividing of planning and execution could possibly come to an end. The model in figure 9 is such an attempt.
Figure 7. A mission respondent system is designed or prepared to meet an actual crisis (situation system). Adapted from (Spak & Carlerby, 2018).

Figure 8. A limited mission respondent system is continuously carrying out the defense systems overall mission. Adapted from (Spak & Carlerby, 2018).
This model of a dynamic C2 process is generalizable to all time-phases: a) before any specific mission has been received, i.e. during the conduct of the defense systems general and overall mission (green situation system x), b) when a specific mission has been received in response to a specific threat (red situation system y). The process during a specific mission could be further classified as: b1) before execution starts (first iteration of the process), and b2) during execution until mission objectives are achieved and mission ends. Naturally, the concrete systems (size, content etc.) will vary depending on time-phase (adapted from Spak & Carlerby, 2018; Spak, 2019).

This approach, which simultaneously deals with C2 as a specific process connected to a specific and actual crisis/situation and as a general and overall process that continuous all the time, is not present in the COPD or the SPL. Both manuals however, has a brief reasoning on a related subject in their respective introduction. Both manuals comment and describe operational planning as either “krisplanering” [“crisis planning”] or “förberedande planering” [“preparatory planning”] (SPL, p. 8) or “crisis response planning” and “advance planning” (COPD, p. 1 - 3), thus relating on the different time aspects, but not regarding C2. As reported in the result section, both the COPD and the SPL have a mainly on-off perspective on the OPP/C2 process. This fact does not facilitate the suggested simultaneous view on C2. On the other hand, it may aid the evaluation of C2 quality.

**Effective and efficient C2**

C2 science, as it has developed at the Swedish Defence University (SEDU), is a normative or design oriented subject. As such, a natural interest is devoted to the question of what constitutes effective and efficient C2 (Spak, 2019). Both the COPD and the SPL presents material on the operations assessment. These parts of the analyzed material constitute a solid foundation for linking objectives and decisive conditions to actions and effects, thereby creating the possibility for a thorough evaluation of the C2 system.
The ability to respond to an unforeseen and sudden attack

The COPD has a spirit characterized by the main assumption that NATO will not be surprised. There will be time enough to follow the multi-step procedure in the manual. NATO will detect any potential crisis by horizon scanning and, if necessary, accurately respond when the master plan is developed. This is perhaps an exaggeration or an over-interpretation of the spirit in the COPD, but my concern is that NATO and a small country like Sweden⁴, is in many ways not comparable. Sheer size is one example. NATO is a multinational global actor with super-power military capacity. This fact can be one reason to why the COPD is characterized by a beforehand-top-down-planning-perspective. The likelihood of a surprise attack on a NATO member state is simply relatively low. Nevertheless, both NATO and a small country like Sweden need to cope with and manage the specific problems related to the conduct of a mission. COPD has a very limited amount of descriptions concerning how to speed up the OPP, especially pre execution. The SPL presents some suggestions concerning an integrative approach on planning and approval of initiatives from the level of units. SPL also mentions that unexpected events will happen during execution and stress the need to adapt for such events (pp. 44-45).

Nevertheless, the problems connected to time-delays, which the DDM theory highlights, is not in focus in any of the examined manuals. This is a bit bewildering since the need for speed or “to get inside the enemy’s decision making process” has been part of common military thinking for a long time (see e.g., Scott, 1992, p.3; Thunholm, 2005). However, as pointed out by DDM (see figure 1), it is not just about making faster decisions, all the time-delays must be handled. This fact relates to figures 3, 7 and 8 that displays the systemic approach with a mission respondent system consisting of both a C2 system and an execution system. The conclusion is that the mission respondent system needs to be quicker than the enemy to keep the initiative – not just the C2 system⁵.

Another conclusion concerns the need for different decision-making approaches depending on available time (and type of problem). DDM is always needed in the conduct of C2, but depending on the specific time constraints in an actual situation, two different paths of decision-making are valid. One way of sorting these two paths out is the classification in two thinking modes, system 1 and system 2, as explained by for example Kahneman (2011). System 2 is typically slow, effortful, logical, calculating and conscious whilst system 1 is typically fast, automatic, emotional and unconscious. Both systems obviously have their pros and cons, but in situations characterized by shortage of time, C2 methods relatively more adapted towards system 1 could be preferable (e.g., Thunholm, 2005). The COPD and SPL is relatively more applicable for system 2 decision-making and thinking. The connection between time-constraints and type of decision-making is not present in COPD. SPL (pp. 43-44) does however comment this issue.

In figure 3, the time-delays are displayed at each level of command and between the C2 system and the execution system. I consider C2 theory largely applicable for emergency

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⁴ Sweden is since 1994 a partnership-for-peace (PfP) member of NATO (https://www.nato.int/cps/en/natohq/topics_50349.htm).

⁵ My colleague, Lt. Col. Anders Josefssson, told a striking metaphor to understand this relation: Imagine an agility contest in which one of the participating teams consists of a super-fit and severely skilled dog handler, but also a tired, old and somewhat corpulent Labrador. The team will not be very fast in the track regardless of the skilled dog handler.
response and police activities as well beside the traditional defense domain. Figure 3 displays these various activities at the bottom of the figure. A situation that starts as a limited accident can turn out to be a terror attack or a vast forest fire in a short period of time. These kind of situations demands a different capability of the involved C2 systems with very short time for preparation (see e.g., Uhr & Pettersson, 2018). This is in clear contrast to the views on C2 displayed in the COPD and the SPL.

The ability to conduct C2 over time

Neither the COPD nor the SPL present method support for sustainable C2. Sometimes operations can continue for years and such support could therefore probably be useful. This issue also connects to leadership aspects within the communication activity as presented in the model of dynamic C2 in the introduction. Sustainable C2 will for sure depend on a well-functioning logistic capability (as will the whole mission respondent system), but certainly also on leadership that sustains a will to continue the efforts towards the mission objectives and end state.

Conclusions

- Planning is a key activity within the C2 process, however planning is not the same as C2.

- Within the C2 process, the purpose of planning is to answer the question of how the mission can be executed (the orientation activity handles the question of what to do).

- The C2 process is a continuous process within the defense organization/system, however it is still critical to establish when a specific mission starts and ends.

- Models of C2 should be able to integrate both the continuous and the on-off perspective on C2.

- A parallel approach, instead of a sequential, towards the activities within the C2 process is an advantage concerning for example the ability to cope with unforeseen and sudden attacks.

- Handbooks on C2 should include support for sustainable and enduring C2.

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