

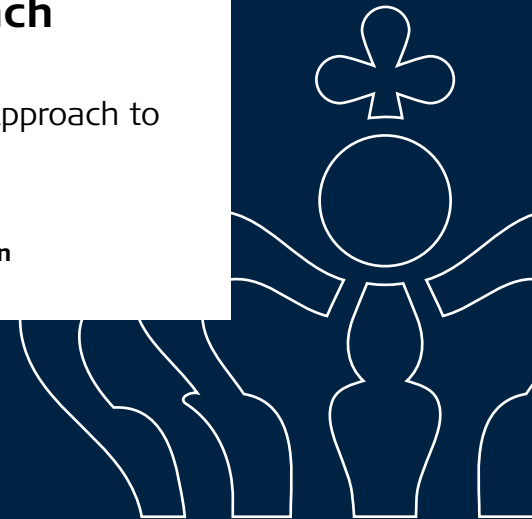
ROYAL DANISH DEFENCE COLLEGE

Comprehensive Approach Capacity Building:

Implementing the Effects Based Approach to
Military Operations

by Dr. William Mitchel
Institute for Leadership and Organisation

Report



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Executive Summary

Ensuring the implementation of a military doctrine that reflects the same principles as CA in their operational planning, is essential to CA capacity building.

The asymmetric nature of modern conflicts requires new approaches to operational planning that incorporates the cognitive domain for strategic reference to deal with complex conflicts.

The new Effects Based Approach to Operations (EBAO) is a military doctrine for operational planning that provides the philosophy, principles, practices, and procedures for managing complex conflicts.

The military will be responsible for exploiting five new dimensions, the political, economic, social, infrastructure, and information domains, along with the traditional military dimension (PMESII) for the purposes of strategic reference in warfare.

Officers must therefore be capable of effectively integrating the non-military domains of PMESII into the operational planning process (OPP.)

To ensure Danish Officers have the skills to manage the implementation of the EBAO doctrine, it is recommended that EBAO specific training programs should be established at VUT I, and VUT II.

To ensure Danish Officers have the capacities to apply theory and method to the exploitation of the non-military dimensions of PMESII, an academic education in the social science method equivalent to the first 2 years of a Bachelors, is recommended. It is no longer only a question of bench-marking - but of effective war fighting.

Military intelligence structures, cycles, and analysis drive the OPP and will have a direct affect on the degree of effective exploitation of PMESII.

Expansion of the military intelligence organization involved in OPP support is recommended to ensure the proper exploitation of the non-military dimensions. Organization & structures must be established to collect, and process a broader range of unclassified information that stem from the non-military dimensions of PMESII.

It is recommended that Denmark should support the establishment of a national Command and Control (C2) research platform, with a standing C2 assessment team, to ensure the implementation of EBAO, support Danish Chief of Staffs in HQ formation, and establish an authoritative platform for Danish input and influence over multi-national endeavors in the field of C2 research.

Resume

Det er afgørende for en styrkelse af CA, at man sikrer implementeringen af en militær doktrin, som afspejler de samme principper som CA i deres operationelle planlægning.

Den asymmetriske karakter af moderne konflikter kræver nye tilgange i den militære, operationelle planlægning. Disse skal omfatte det kognitive domæne strategisk for at kunne forholde sig til komplekse konflikter.

Den effektbaserede tilgang til operationer (Effects Based Approach to Operations - EBAO) er en militær doktrin for operationel planlægning, som stiller filosofi, principper, fremgangsmåder og procedurer til rådighed for håndtering af komplekse konflikter.

Forsvaret skal påtage sig at integrere de fem nye domæner - politik, økonomi, sociale forhold, infrastruktur og information - i det traditionelle militære domæne (samlet kaldes det for PMESII) med henblik på strategisk anvendelse i krig.

Officereren skal derfor være i stand til effektivt at integrere de ikke-militære domæner i PMESII i den operationelle planlægnings proces (OPP).

Det anbefales at lave specifikke EBAO træningsprogrammer på VUT I og VUT II for at sikre, at danske officerer har kompetencerne til at håndtere EBAO doktrinen.

Det anbefales, at der etableres en akademisk uddannelse i metode svarende til de første to år af en bachelorgrad for at sikre, at danske officerer har kapaciteten til at anvende og udforske teori- og metode-dimensionerne af PMESII. Det er ikke længere et spørgsmål om benchmarking men om effektiv krigsførelse.

Den militære efterretningsstruktur, cyklus og analyse er drivekraften bag OPP'en og disse elementer vil have en direkte effekt på effektiviteten af PMESII'en.

Det anbefales, at den militære efterretningsorganisation, som arbejder med OPP, udvides for på den måde at sikre den bedste udnyttelse af de ikke-militære dimensioner. Der bør etableres strukturer til at samle og analysere et bredere udsnit af både klassificeret og ikke-klassificeret information, der stammer fra ikke-militære dimensioner af PMESII. Målet hermed er at sikre, at de integreres med den traditionelle militære dimension.

Det anbefales, at Danmark støtter oprettelsen af en national Command and Control (C2) forskningsplatform med et permanent evalueringshold for dels at sikre implementeringen af EBAO, samt at støtte Dansk COS og opbygning af en HQ stab til forskellige missioner, og dels for at etablere en autoritativ platform for dansk input og indflydelse på multinationale bestræbelse, når det handler om forskning i C2.

List of Acronyms

AFG	Afghanistan	JFCB	Joint Force Command Brunssum
AWG	Assessment Working Group	JOPG	Joint Operations Planning Group
COMISAF	Commander of the International Security and Assistance Force in Afghanistan	JTEG	Joint targeting Effects Group
C2	Command & Control	LEGAD	Legal Advisor (Office of)
CIMIC	Civilian & Military Cooperation	ORBATS	Order of Battle Reports
CJ2	Combined Joint Intelligence	OPP	Operational Planning Process
COS	Chief of Staff	OPLAN	Operational Plan
CA	Comprehensive Approach	MoCE	Measures of C2 Effectiveness
CRM	Campaign Review Management	MoE	Measures of Effectiveness
DCOS	Deputy Chief of Staff	MOP	Measures Performance
DP	Dimensional Parameters	NAC	North Atlantic Council
EBAO	Effects Based Approach to Operations	NATO	North Atlantic Treaty Organization
EBO	Effects Based Operations	NGO	Non-Governmental Organization
ETG	Effects Targeting group	PBA	Predictive Battlespace Awareness
EWG	Effects Working Group	PEL	Prioritized Effects List
GOP	Guidelines for Operational Planning	POC	Point of Contact
HQ	Headquarters	PMESII	Political, Military, Economic, Social, Infrastructure, Information (dimensions)
IGO	International Governmental Organization	POLAD	Political Advisor (Office of)
INFOPS	Information Operations	HQ SACT	Headquarters Supreme Allied Commander Transformation
IOCB	Info Ops Coordinating Board	SHAPE	Supreme Headquarters Allied Powers Europe
IPB	Intelligence Preparation of the Battlespace	TB	Taliban
ISAF	International Security and Assistance Force	TLO	Tribal Liaison Office
JCB	Joint Coordination Board	TNL	Target Nomination List
JEB	Joint Effects Branch		
JEG	Joint Effects group		
JETO	Joint Effects Targeting Operations		

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Introduction

"I am convinced that the nations and people who master the new sciences of complexity will become the economic, cultural, and political superpowers of the next century."

Heinz Pagels

Physicist, author of *Dreams of Reason*

SECTION A: The Comprehensive Approach (CA)

This report is intended as a contribution to a growing array of information concerning the Danish initiative known as the Concerted Planning and Action of Civil and Military Activities in International Operations, commonly referred to as the comprehensive approach, or CA.¹ It was introduced by the Danish Ministry of Defence and The Danish Ministry of Foreign Affairs on the 10 of March, 2004. The goals of the initiative were to improve the coordination and planning of both the civilian and military efforts in a mission area with special focus on the civilian element within 'Theatre,' while pursuing a more coordinated planning effort to optimize national effort.² The central thrust of CA is to create more synergy between the military and non-military resources to maximize the desired effect at all levels of policy and plans, the tactical, the operational, the strategic, and the political-normative.³ In this regard CA represents a desire for a more effective doctrine when dealing with complex conflicts.⁴

Yet the implementation of any doctrine will require a certain degree of capacities to provide Command and Control (C2), whether it is the United States (US) military, the Post Office, or the Catholic Church. A doctrine provides a common frame of reference for standardizing operations, and establishing common ways of accomplishing tasks – and acts as the organization's guide to go from political/normative declarations to physical actions. However, it is the C2 capacities that provide the backbone for managing doctrine implementation, from the interpretation of political/normative declarations in a particular social environment at the strategic level, through the operational planning, and the final physical execution on the tactical level.⁵

(1) The comprehensive approach is known as the "samtækningsinitiativ" in Danish.

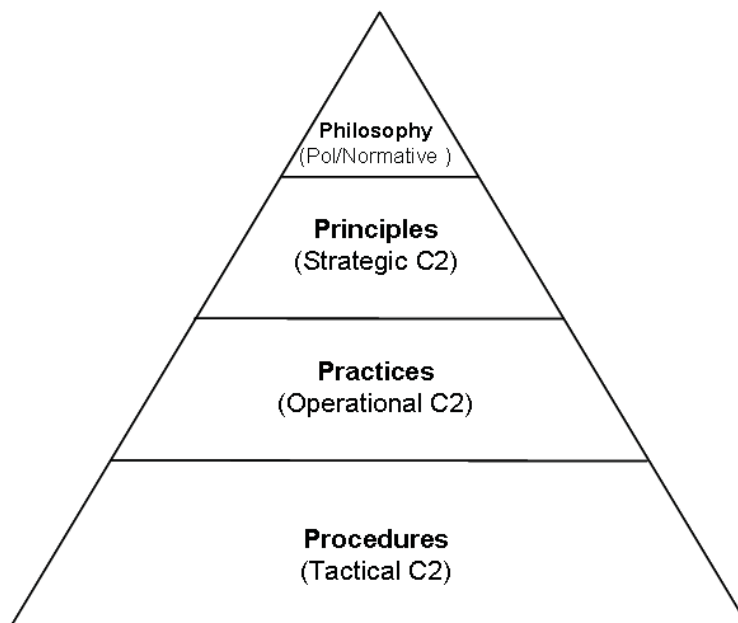
(2) See Danish Gov Doc, Defence Command Denmark Directive FKODIR Pl. 190-1. For some general background material see, FKODIR PL 190-1 Bilag 1 & Bilag 2; Forsvarfolig 2005-2009; Jan Top Christiansen's Chairmans Report from June 20-21 2005 Seminar on CA, hosted by Danish Ministry of Foreign Affairs and Ministry of Defence.; For some wider perspectives see Jakobsen (2005); Harboe (2007); Macrae (2007); Ølgaard (2007); Burlin (2004); Nielsen and Larsen (2007); Holt (2006); Slim (2004); Aaronson (2007).

(3) Fischer & Christensen (2005).

(4) UK MOD Doc. (2005):1-1.

(5) See Mitchell (2004): 10-12. Also see Luttwak, 2001:93-112; and Mitchell (2002):487.

Fig. 1 The Doctrine Hierarchy



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If there are no C2 capacities to support a doctrinal framework at the strategic, operational, or tactical levels, you are left with varying degrees of what best could be described as 'rhetoric' from the political leadership. If we remove the political-normative level of the doctrinal framework (though hard to imagine happening on a grand scale) you would be left with what would appear to be 'mindless' activity relative to the social environment in which they are being carried out. CA aspirations currently being articulated clearly indicate a degree of political/normative and strategic level leadership, where it concerns philosophy and principles, but it will require C2 capacities to execute practices & procedures in order to become more than 'rhetoric.'

SECTION B: The CA Challenge

However, the very nature of the CA requirement for multiple political actor cooperation at the strategic level within a conflict situation inhibits CA's development of C2 capacities to support a 'stand alone' doctrinal framework that reaches the tactical level. The wide range of suggestions and disagreements as to what CA encompasses⁶ at the political/normative level, from different actors, both state and non-state, is representative of the inherent dilemma.⁷

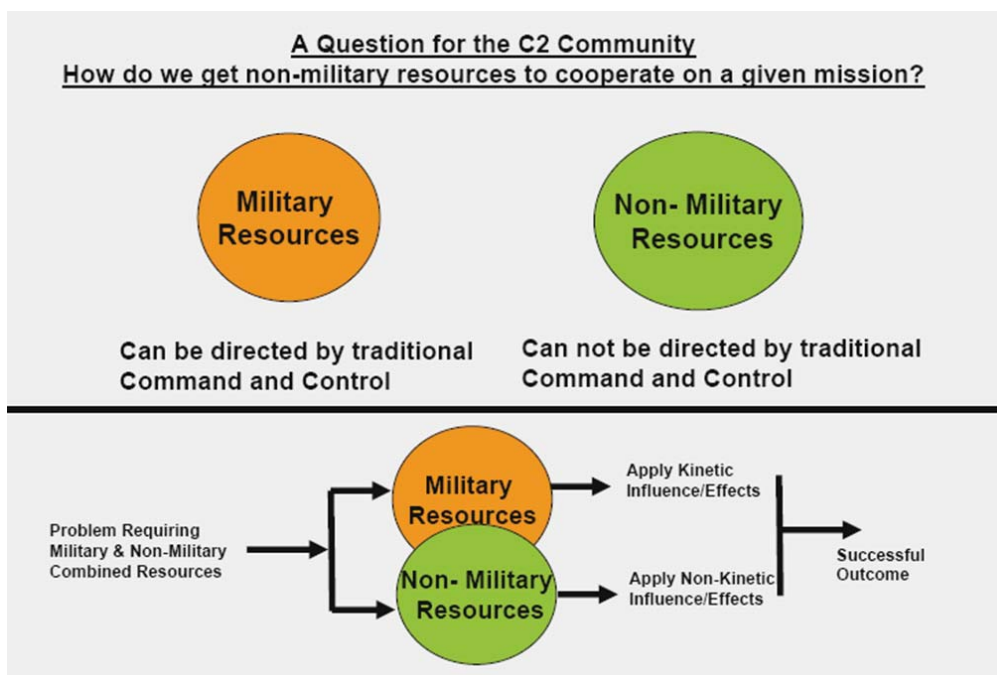
(6) DK MOD Doc. (2206):1-14 | Note the report is in Danish).

(7) UK MOD Doc. (2005): Para. 105-106.

The political aspirations of CA are inherently resistant to a single C2 structure to manage the interdependence of the various levels of policy implementation. Furthermore, the complexities of modern conflicts ensure there are no two conflicts alike. Without viable C2 capacities providing a coherent framework for flexibility, experimentation, creative thinking, and new initiatives, a CA doctrine will risk disintegrating into an array of competing political interests and objectives. What might have worked for one conflict relative to the participating actors and their respective interests, might not necessarily work for the next conflict for reasons as uncomplicated as their geographic location. Quite simply, as conflict situations change one would expect that the interests of participating actors to change, threatening the unity of command and - more importantly as far as the CA philosophy is concerned - the unity of effort.

Without CA C2 capacities lead by a single political master, CA will find it difficult to develop as a complete doctrine - and therefore the desired synergetic effect will be very difficult to achieve.

Fig. 2 The CA - C2 Disjoint



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SECTION C: The Military

There is one key dimension to CA that Denmark could focus on first to ensure there is a good foundation for the future development of CA capacities: The military dimension. Currently, the military dimension is in the midst of a transitional period where a new doc-

trinal framework is being developed and applied within the North Atlantic Treaty Organization (NATO); it is called the Effects Based Approach to Operations (EBAO).⁸

As the focus of this report will rest entirely on the military dimension of CA, the contribution of the report should be seen as presenting a 'brick or two' – and not the final construction of a CA capacity. However, the importance of this first step should not be underestimated; CA cannot exist without the military dimension. The military are the only ones capable of providing access to the complex conflict environments that CA is intended to resolve more effectively. Furthermore, with regards to preparation for, and participation in, conflicts, a standing doctrine is the 'central idea of the army'.⁹ Therefore it will be difficult to ensure the future development of CA capacities if the core doctrine of the military C2 involved in the complex conflict environment does not reflect the philosophy and principles of CA. In such a context, the military and non-military cooperation at all levels will be difficult to implement coherently, and CA will remain an academic exercise in wishful thinking.¹⁰ Therefore, ensuring that the philosophy and principals of CA are entrenched in military doctrine is a logical first step for Denmark.

It is also an achievable first step because the Danish state controls military doctrinal development within the best traditions of objective civilian control of the military, and, secondly the military has existing C2 capacities to implement practices and procedures. With regards to the international environment, the majority of C2 capacities in the Danish military, as well as the doctrinal framework, is already shared by many allied nations through NATO and therefore provides a stable venue for doctrinal change, innovation, and Danish influence internationally within the NATO alliance. Finally, timing could not be better as the NATO regime is presently developing and implementing a new doctrine that has been 'in the pipe' for many years - EBAO - and it certainly is no stranger to the philosophy and principles of CA.

In the context of supporting the development of CA capacities, this report will examine existing military C2 capacities for implementing the new EBAO doctrine as it relates to strategic and operational planning both within Denmark and the NATO regime. It will evaluate two key elements of these capacities where Denmark can realistically take action to ensure the Danish military is well prepared for EBAO and eventual CA capacity building. The first is the training of the leadership responsible for executing an operational planning process (OPP) based on EBAO. The second is to ensure that the driving force behind the OPP – military intelligence – supports the requirements of the EBAO.

(8) EBAO should not be confused with the independent US military Effects Based Operations (EBO) that is much more targeting driven. See Mattis (2008).

(9) Gary Sheffield, (2005):165.

(10) For related research see Viggo Lemche & Svend Bergstein (2006)

SECTION D: C2 Method and Approach

C2 - "The Organization, Process, Procedures and Systems necessary to allow timely political and military decision-making and to enable military commanders to direct and control military forces."

Defined by NATO Military Function 01 (1996)

When dealing with issues relative to leadership and organization within the military, you are dealing with military command structures and control systems. Academic studies in C2 have a slightly broader interpretation than NATO's formal definition above and they see C2 more as an umbrella term that encompasses the concepts, issues, organizations, activities, processes, and systems associated with the NATO definition but also focus on general collaborative and consultative processes that are an inherent part of other sorts of coalition operations.¹¹

Existing C2 structures within the military reflect the complete process of political objectives being translated from normative declarations into kinetic and non-kinetic activity on the ground. This process is not open for negotiation with actors outside of the state and its military. Moreover, NGOs & IGOs have their own political masters and an operational independence guarded by their own C2.

They will therefore be an unlikely permanent integrated element in the military operational planning process (OPP) any time soon. As illustrated in Fig. 2, they will independently choose when and where to cooperate as well as the degree of that cooperation. However, that should not stop the military from preparing to engage IGOs, and NGOs on an ad-hoc basis at the strategic, operational, and tactical levels. Therefore, expectations on improving strategic level coordination should focus on what we can control and strive to optimize with regards to the CA philosophy – our military C2 organization and its implementation of the new EBAO doctrine.

NATO and its member states are still in the midst of a revolution in military affairs, still characterized by a geopolitical, technical, and conceptual dimension.¹² As the geopolitical and technical dimensions continue to change, researchers and analysts will be needed to work more and more in the conceptual dimension in terms of organizing and operating. This report uses the current NATO C2 analysis framework for examining issues related to the OPP and intelligence processes of the military decision-making system. The C2 approach is itself continuously being developed and will by no means be exhausted on the case study data in this report.

Furthermore, it is paramount to remember the degree to which the C2 approach will be

(11) Czerwinski (1996):121-132.

(12) Marc Rodgers (1996):22-23.

applied within this report; it will be confined to a framework based on the following main assumption and research questions:

An effective implementation of EBAO within the military will increase CA capacities.

- 1) *How can Denmark ensure effective implementation of the EBAO in the military OPP?*
- 2) *How can Denmark ensure effective implementation of the EBAO in the military intelligence regime?*

The data collection relative to both case studies relies primarily on direct, participant observations,¹³ as well indirect observation and primary sources from two different command staff environments. The first is a Danish Staff Officer exercise using the EBAO for the first time at the Institution for Military Operations, at the Royal Danish Defence College in Copenhagen. The second environment is ISAF X Kabul, from August to December in 2007.¹⁴ These observations are further backed by secondary sources when possible or 'reach back' resources from both operational environments.

There are some weaknesses with this method in terms of selectivity and interpretation. However, in regards to this report, problems with selectivity are mitigated by the fact that general observations were made where it concerns both the OPP and the intelligence organisation, without specific guidance from sub-variables. With regards to mitigating possible problems with interpretation, a process of cross-verification and de-confliction with secondary sources from the respective environments has been completed. Due to the sensitivities surrounding the OPP processes and the persons still actively involved, and the desire to keep this report as accessible as possible (unclassified), observations are 'generically' described within the context of the C2 approach. This will also assist in limiting the number of acronyms, making the reading less alien to readers unfamiliar with NATO 'acronym-mania' (for example J2 and CJ2 respectively refer to the military intelligence structures in the AL-NUR, and ISAF X case studies. However, in the case studies they will be referred to simply as the intelligence structures.)

The first chapter presents the theoretical background to the EBAO doctrine, as well as the analytical method based on the NATO C2 approach to be applied. Chapter II uses the NATO C2 approach to analyse the observations from the OPPs of the AL-NUR exercise, and ISAF X. Chapter III applies the same approach to the observations from the intelligence regimes of both the AL-NUR exercise and the ISAF X. Finally, chapter IV closes the report with conclusions, and recommendations.

(13) Participant observation as a technique for field studies requires that the researcher must be a participant within the group or environment from which the observations will be taken. This acceptance is necessary if the investigator is to benefit from the natural environment of the observed. It is often referred to as the ethnographic approach and has been used in sociology for decades. One of the main advantages is that it offers a more accurate or complete picture of behaviours than recall data or documentation.

(14) I served as senior intell analyst in ISAF HQ.

Chapter I - Complexity and modern Warfare

SECTION A: Asymmetric Warfare & Managing Complexity

The emergence of the CA discourse and EBAO around the same time is no accident; they are the result of technological, geopolitical, ideological, economical, and social changes within the international environment since the end of the Cold War. This upheaval in the international system combined with rapid technological advancement has affected the nature of warfare. What used to be based on simple symmetrical measures for strategic reference within the logic¹⁵ of strategic choice for parties to a conflict is no longer valid. The last 15 years has seen the development of war fighting environments that depict two separate domains for strategic reference, one physical and the other cognitive.¹⁶

'The first, the supreme, the most far-reaching act of judgment that the statesman and commander have to make is to establish by that test the kind of war on which they are embarking; neither mistaking it for, nor trying to turn it into, something that is alien to its nature. This is the first of all strategic questions and the most comprehensive.'

Carl von Clausewitz, On War

At its root the difference between asymmetric warfare and symmetric warfare lies in the fact that non-linear conditions develop when there is a difference in the domains (physical or cognitive) being used for strategic reference by combatants. One party, the United States of America (USA) for example, calculates its strategy based on the number or quality of men or material 'means' it has compared to those of the enemy. Their opponent, Al Qaeda for example, develops strategies based on symbolic actions that have cognitive implications as they are expressions of 'will' rather than means. The objective is to utilize such tactics as exploiting weaknesses in the US identity/culture, and with very little material effort, so that they appear to challenge the overwhelming material dominance of the US military.¹⁷

The result is a conflict with two distinct variables representing the domains for strategic reference, and a non-linear relationship that produces complex interactions in the battlespace. It is complex because one cannot simply sum the net results of two distinct variables as one can with a single variable.¹⁸ Apples and oranges are apples and oranges. Furthermore, one cannot obtain symmetrical dominance by adding more 'means' or more 'will' to the equation as they are two distinct variables interacting under the same aggregate - in this case 'warfare.' It is this aggregate of the two interacting domains that make asymmetric warfare more complex than symmetrical warfare. Examples of symmetrical

(15) Edward N. Luttwak (2001):3-50. Luttwak explains the logic of strategic thinking within a the context of war, the paradoxical logic affecting the combatants was linear in terms of material/efficiency calculations, both sides referred to the same physical domain. However the same logic applies to the onset of asymmetric warfare, the physically weaker side can circumvent the overwhelming physical advantage by changing the terms of strategic reference to the cognitive domain - this choice is also a product of the logic of strategy and human innovation.

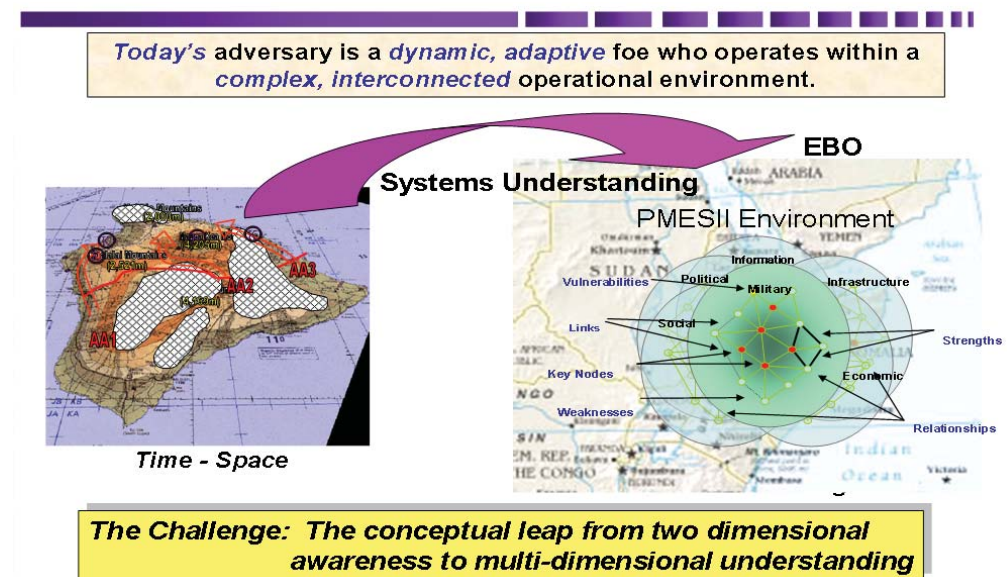
(16) Nicholson (2006):133-136

(17) For a visual representation see Edward A. Smith, (2005):30.

(18) Tom Czerwinski (1998):7-26.

strategic reference can clearly be seen in the arms race leading to World War I, or the Cold War Arms race, especially where it concerned the comparative method of counting soldiers, battleships, bombers, or Intercontinental Ballistic Missiles (ICBMs) in order to determine strategy.¹⁹ Though we are still learning about the complexities generated by asymmetric environments, requiring us to expand our perception of the battle field, lessons learned since the end of the Cold War can be traced to Iraq I, Somalia, the Balkans Conflict, Kosovo, Afghanistan, and Iraq II.²⁰

FIG. 3 Expanding Our Perception



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From an academic perspective, though depicted as two separate domains for strategic reference, it does not mean that they are mutually exclusive; far from it, they are so ontologically intertwined that despite 10 years of theoretical development in social science, from anthropology to international politics, we are still far from completely managing the full scope of their 'intersubjective' relationship.²¹ Furthermore, we suffer from a lack of cohesion around the empirical management of relevant data from the cognitive domain. In some ways the military have gone further than many respective academic communities by

(19) For example see Daniel Yergin (1977):123; David Holloway (1983).

(20) For an operational C2 focused example see Allard, Kenneth (2005): 19-67 (Somalia conflict).

(21) For a basic background see Emanuel Adler (1997):318-363; Also Finnemore, Martha (2001):391-416.

attempting to apply their somewhat accidental encounter with social constructivism²² in concrete strategic planning processes first called 'shaping.'²³ However, the military has found out that establishing test variables²⁴ to measure progress with regards to constitutive concepts is not easy.²⁵ For example, how does one measure democracy or liberty? Compare this to the simplicity of establishing 'measures of effectiveness' for the symmetry of the physical domain - best illustrated by a body count of the enemy vs. their estimated muster.

Consequently, there is no point in expecting decisive victories when formulating strategies based on overwhelming means/efficiency calculations - if the very opponent you are trying to 'outthink' materially does not use the physical domain as the main terms of reference for their own strategic decision-making. It is the equivalent to sitting at the same game board with your opponent, strategizing to beat him/her in a game of checkers, while your opponent strategizes how to beat you in chess.

This realization that the linear relationship between us and our enemies in terms of strategic reference is no longer a given has forced us to re-examine the way we think and plan strategically, operationally, and tactically. Yet asymmetric warfare has even made this traditional endeavor more complex as the interaction of the physical and cognitive domains in terms of strategic reference produces results that have blurred the lines between the characterization of the traditional strategic, operational, and tactical levels. A physical event on the tactical level that would normally be insignificant in a symmetrical context may have strategic or operational consequences in the form of a cognitive effect 'en masse.' A good example would be the resulting strategic impact of the Abu Ghraib prison scandal in Iraq.

In accordance with Luttwak's paradoxical logic of strategic interaction, we, as humans, have not sat idly by and ignored the developing problem of complexity associated with asymmetric warfare. Consequently, one of the most important developments in Western military thinking ever is about to come to fruition in the form of EBAO. What first started as a doctrinal framework for 'input based targeting' by the US Air Force in the early 1990s²⁶ is soon to be a complete doctrinal framework for national, joint, and combined

(22) What became known as "Shaping" was one of the three main pillars the 1997 NSC Report. It was therefore 'accidental' because arguably the first ontological foundation for "shaping" appeared in International Security, Ted Hopf (1998):171-200. Here Hopf argued that conventions could be established limiting the intersubjective dynamic to a commonly understood subjective context. In this way one could legitimise the analytical/strategic use of constitutive concepts such as norms, identity, democracy, and liberty. 'Shaping' was an instrumental attempt to establish principals for strategically instigating intersubjective interactions in directions as to produce the desired effect on the environment - arguably before there was a concrete ontological argument as to if it was possible. See Czerwinski (1996):121-132 for necessity description.

(23) National Security Council Report (1997): Ch. II "Shaping the International Environment".

(24) Canadian Department of National Defence Document B-GG-005-004/Af-023. (1999); Canadian Government Doc (1999); McCafferty (1997);Waltz, (1999):7-14.

(25) Nicholson (2006):139-141.

(26) Owens (1995):35-39; Phister et al. (2004):2.

HQs planning environments.²⁷ At present, it has developed into a 'flagship' project of NATO's Headquarters Allied Supreme Commander Transition (HQ SACT).

SECTION B: The Effects Based Approach to Operations

"An effects based approach involves the comprehensive, integrated application of all instruments of Alliance power, both military and non-military, to desired outcomes"

NATO Bi-SC Strategic Vision

In terms of military science, EBAO represents the meeting place between the social sciences and the long domination by the natural/physical sciences of time and space within the OPP.²⁸ It is not a chance encounter; the development of EBAO is an attempt to reduce the complexity produced by the non-linear strategic interaction in modern conflicts.

To illustrate the point, I will use Tom Czerwinski's 'billiard' metaphor.²⁹ Imagine using a q-ball to break a full set of q-balls, in order to plan for the next shot, you must manage an extremely complex situation as the balls themselves are indistinguishable from each other. Your only option would be to keep track of distances and trajectories of every ball relative to a fixed point on the table. However, if you were able to give some balls a red stripe, others a blue stripe, and yet others a yellow, and the rest green stripes, you would significantly reduce the complexity of the situation for planning your next shot. This technique to help manage complex situations is called tagging.³⁰

EBAO attempts to do just that with the complexities of an asymmetric battlespace by dividing it up into different dimensions for strategic reference when decision-making or planning. Instead of there being just a military dimension, they must now consider the political, economic, social, infrastructure, information dimensions of their battlespace. By doing so it hopes to make the predictions of the non-linear interactions more manageable. The logic is simply to deny the enemy the strategic initiative in both the cognitive and physical domains. However, by opening up non-military dimensions for the OPP, the military will also be establishing the foundation for building future CA capacities.

The Comprehensive Approach and effects-based philosophy together offer more sophisticated ways of analyzing complex situations and planning operations, as well as the means of incorporating and coordinating the efforts of all instruments and agencies required to counter irregular activity."

Joint Doctrine Note (JDN2/07), March 2007, MOD, UK

(27) SAS 050 (2006):115-116. Also see Ch.1.

(28) Phister et al. (2004):1-2;Czerwinski (1996):121-132;Owens (1995):35-39.

(29) Czerwinski (2003):114-115.

(30) Ibid., 114.

What the implementation of EBAO in the military brings with it to the building of CA capacities is a doctrinal framework with a concrete C2 structure that is better equipped to engage the principles of CA. Using EBAO properly will increase CA synergy at all levels of plans and policy, from the strategic to the tactical level. The doctrinal entrenchment of the political, military, economic, social, infrastructure and information domains (PMESII) within the sphere of every officer's battle planning training will ensure that the principals of CA have a very concrete C2 structure to support their further development. It does not solve the C2 problem with non-military actors – but it does provide a more consistent foundation upon which to build future models of military-civilian cooperation at the national and international levels. Table 1 illustrates the PMESII guidelines for the engagement of the non-military domains, and it does not take much imagination to visualize grounds for cooperation between military and non-military actors where it comes to information sharing in the non-military domains or to the development of joint plans for action with willing partners.

Table 1 PMESII³¹

Category	Review of Background	Review of Current Crisis
Political	History of political system. Political processes and culture. Central / Local government. Political interest groups. Regional / Int'l conditions. Influential individuals. Political security. International Organisations.	What aspects of the political system affect the current crisis? What aspects of governance are contributing to or mitigating the current crisis? Who are the key nodes in the political system and what are their goals? What are the key relationships of political system elements?
Military	History of military system. Leadership. Armed forces/ORBATS. Internal security. Military industrial complex. Logistics and Sustainment. Opposing forces.	What are the objectives of friendly and opposing forces in the current crisis? What are the key military nodes? What are probable courses of action of friendly and opposing forces?
Economic	Natural assets. Production capabilities. Distribution systems. Consumption.	What aspects of the economic system affect the current crisis? What are the critical system elements of the economic system? Who wants to use the economic system and for what goal?

(31) Bi-Strategic Command Pre-Doctrinal Handbook (2007):5-3.

Social	Ethno-linguistic groups / Religion. IO/NGOs/DP/Refugee groups. Terrorist / Criminal Organizations. Business associations. Health care / Education.	What aspects of the social system affect the current crisis? How are social groups involved in the current crisis? Relationships between social system elements?
Infra-structure	Utilities. Transportation. Industry. Public facilities.	What aspects of the infrastructure system affect the current crisis? What are the critical infrastructure system elements and their associated relationships?
Information	Global information. National information. Defence information. Military C2.	What aspects of the information system affect the current crisis? Who is trying to use the information systems and for what goals? What are the critical system elements of military C2?

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The responsibility for the implementation of EBAO operationally lies squarely with a Theatre commands' OPP, in whatever structure or form that may take. To deal with the wide variety of command constructions emerging in the age of complex conflicts, military science has also been busy developing a C2 approach for evaluating military doctrinal and structural issues emerging from the necessity to better manage complexity.³² It is an effort to establish a common language for evaluation, adaptation, and innovation as it concerns evaluating the OPP and it will be discussed in much greater detail in Chapter II. The importance of the OPP to the effective implementation of EBAO cannot be understated – in many ways it will “make or break” EBAO.

SECTION C: The Operational Planning Process (OPP)

War plans cover every aspect of a war, and weave them all into a single operation that must have a single, ultimate objective in which all particular aims are reconciled. No one starts a war or rather; no one ought to do so without first being clear in his mind what he intends to achieve by that war and how he intends to conduct it.”

Carl von Clausewitz
On War, 1832

(32)David S. Alberts & Thomas J. Czerwinski (1997): 2 -62; Also see Stuart E. Johnson & Alexander H. Levis (eds.) (1989) (1988); Nicholson (2006):139-146.

The OPP is the overarching process that guides force commanders in developing plans for the employment of military power. It can take many forms depending on the conflict environment. Therefore the OPP has to be an adaptive, collaborative process that can be iterative to provide actionable direction to commanders and their staffs across multiple echelons of command. The OPP provides the pivotal bridge between the strategic and the operational levels – and the operational and tactical levels, between the principals and practices – and the practices and procedures. In short – it is the process that turns words into actions.

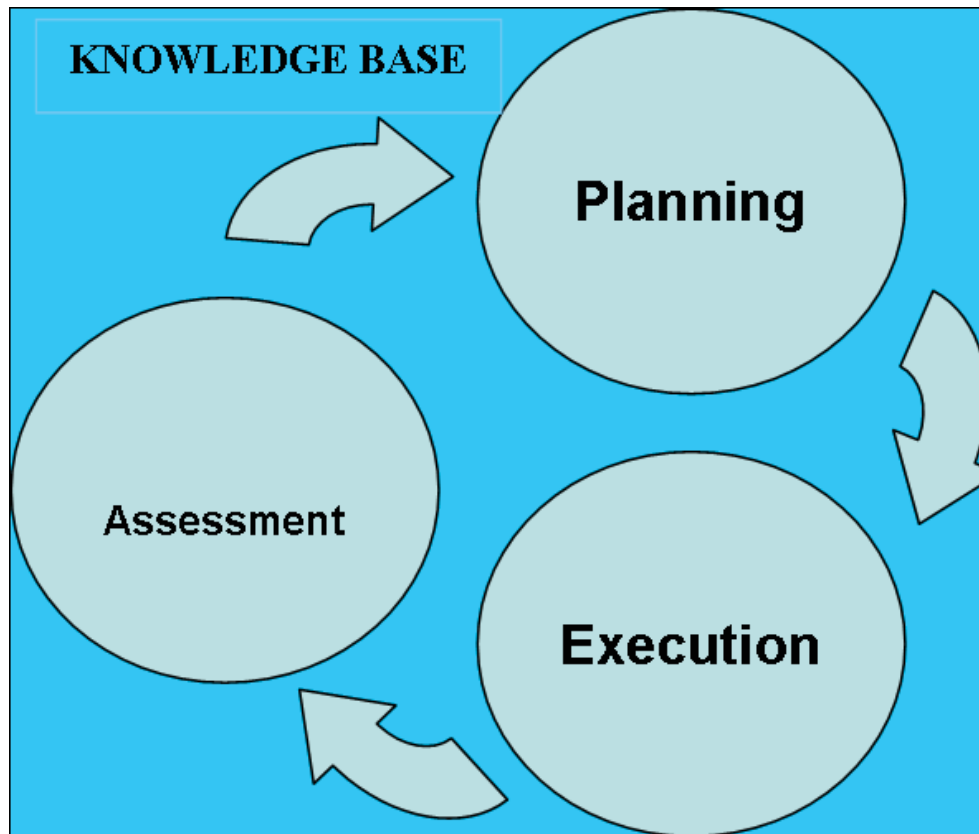
To do that properly requires a great deal of knowledge about the reality in which the actions will take place. To provide that knowledge, the military has its own supporting military intelligence organisation. Historically, military intelligence has been geared primarily to the military dimension and symmetrical conflicts; however, the requirements being set by EBAO in an effort to meet the challenges of asymmetric warfare will necessitate fundamental changes in military intelligence organisation. This will be discussed in more detail shortly; however, the most important aspect for the application of knowledge in relation to the implementation of EBAO is to ensure a “logical” relationship between end-state, objectives, effects, and actions.³³

When assessing the EBAO process and the use of PMESII in the OPP, there are five key aspects that frame the evaluation: The end state, effects, actions, knowledge base, and the EBAO process itself whereby the assessment driven by a knowledge base results in plans and ‘executed’ actions. To drive the EBAO process, there must be a desired end state for denoting the end of both military and non-military operations determined by the political leadership. In order to move towards that end-state, a series of desired effects and sub-effects have to be determined. Effects themselves are the physical and/or behavioural state of a PMESII system within the conflict environment that results from military or non-military actions or sets of actions within the PMESII defined battlespace. Doctrinally, they constitute the move from principles to practices. To move from practices to procedures, actions are required. Actions resulting from the EBAO process and then executed within the battlespace represent both military and non-military activity directed towards the achievement of a specific effect or effects.

The EBAO process itself therefore has to be managed as a doctrine in order to ensure the proper implementation at all doctrinal levels interacting within the OPP as well as providing a frame for iterative evaluation of both actions and effects. Finally, the importance of the knowledge base cannot be understated. In order to support the analysis of the multi-dimensional battlespace depicted by PMESII, the knowledge base has to be substantially expanded from the traditional focus on the military dimension to focus on a variety of non-military dimensions as well.

(33) Bi-Strategic Command Pre-Doctrinal Handbook (2007): 5-8 to 5-9.

Fig. 4 The EBAO Process



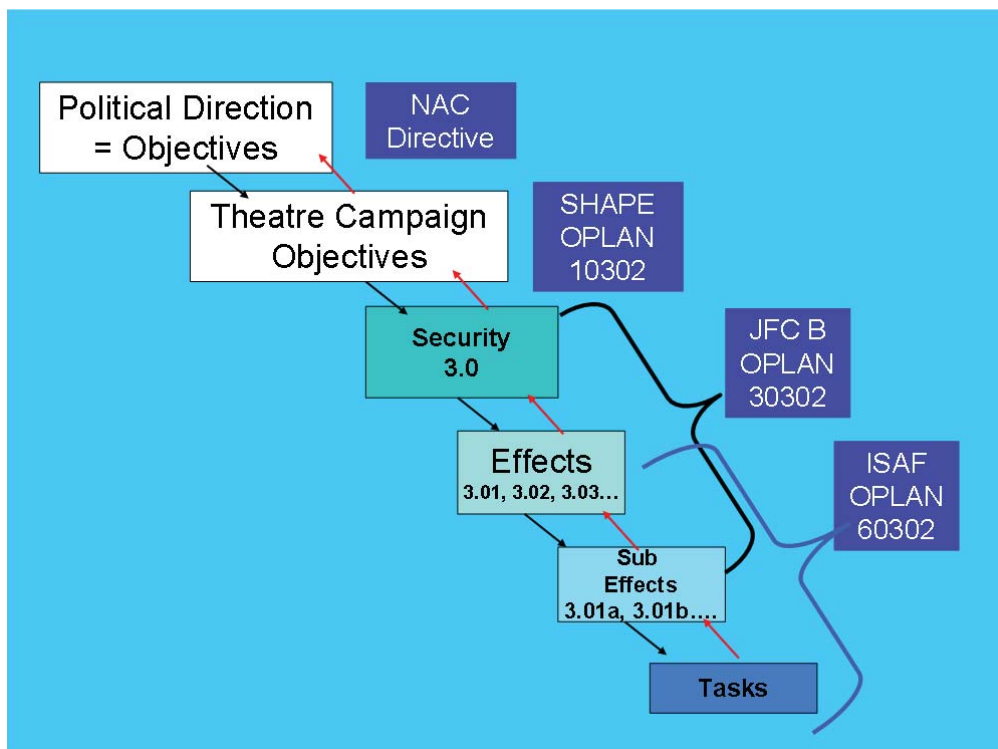
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Though the above process looks relatively simple, carrying it out challenges our ability to manage complexity in three areas; first is orchestrating the right actions to create the behavioural effects we desire in the battlespace; second is determining which direct and indirect effects (desirable and undesirable) are likely to stem from our actions; and third is determining the effects we actually created (defining the measures of effectiveness).³⁴

The key to managing this process is to establish concrete practices and procedures within the OPP to ensure what started at the strategic level in terms of desired effects, arrives in the field as desired sub-effects and action guidance. The journey of the desired effects down through the different doctrinal levels characterized by prediction, planning, and actions is called the effects cascade (see Fig. 5.) Just as important is the evaluative reverse cascade characterized by evaluation and lessons learned. When one talks of managing the EBAO process it is essentially about ensuring that the effects cascade is coherent from top to bottom.

³⁴ Edward A. Smith (2005) Ch.6

Fig. 5 Effects Cascade Example (ISAF)



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In the case of the illustrated ISAF effects cascade, the OPP is in the position as the strategic effects developer in terms of practices related to effects analysis as well as procedures through tasking actions for the tactical level. To support these complex endeavours, one can be certain that our military intelligence community will have to make some dramatic adjustments – particularly where it concerns the expansion of our knowledge base and how we exploit it.

SECTION D: The Role of Intelligence

As changes in the nature of warfare influence military doctrine, there should be no surprise that the traditional role of military intelligence within the OPP will be affected in much the same way their civilian counterparts have been.³⁵ Intelligence cycles³⁶ and supporting collection platforms are extremely important to the OPP process; they drive it and in turn are also driven by it (see fig. 6.) Failure to prepare the intelligence organization to

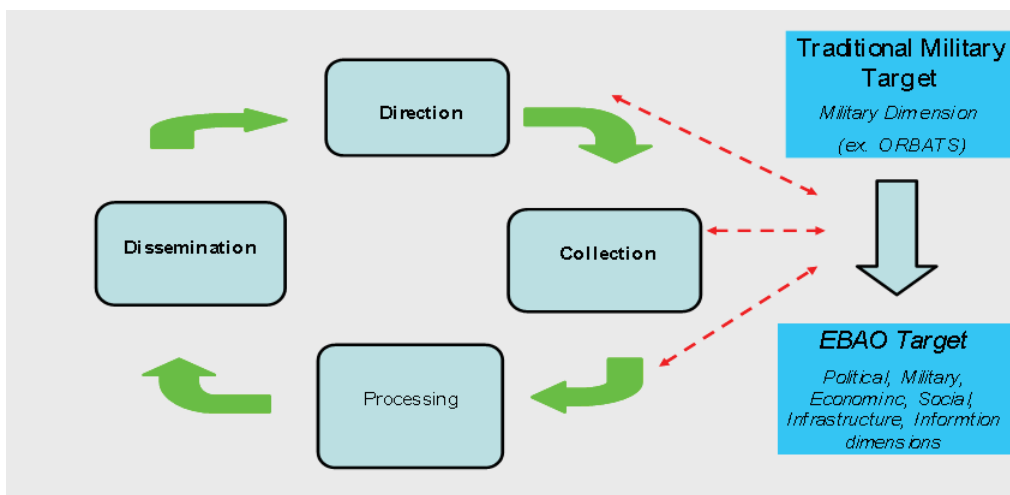
(35) See Alan E. Goodman (2003):3-12 for a good discussion on the affects of the Post-Cold war period on civilian intelligence. Also Herman (2004): 125-126.

(36) Clark (2004):Ch.1; Herman, (2004): 293-296; Mitchell (2002):486.

exploit the principles of EBAO will mean that those principles will not come to drive the OPP; for example, if 'taskings' are not generated by the OPP to support the development of non-military dimensional intelligence, the OPP will not be able to properly integrate the non-military dimensions into the OPP. Known as Intelligence Preparation of the Battlespace (IPB),³⁷ its purpose is to keep the commander aware of recent, current, and near term events in the battlespace. However, EBAO requires a great deal more predictive awareness of the battlespace (PBA)³⁸ for the commander and it is here the challenges lie in terms of fully exploiting military intelligence organization and method. In short, this requires a shift from a focus on descriptive analysis to predictive analysis.³⁹ This has direct methodological implications for the production of estimates and analysis to be discussed later.

And though the traditional cycles for both the civilian and the military are very similar to each other, the military intelligence structure has to operate within an established doctrine that has to manage a variety of time vs. space challenges not normally faced by civilian intelligence. The challenge with regards to fully implementing the principles of EBAO within the military intelligence cycle in terms of the non-military dimensions of the battlespace will be the key to ensuring equal dimensional representation in the OPP (it is important to note here that equal representation in the assessment process does not necessarily mean there must be an equal representation in the final plans).

FIG. 6 PMESII Intelligence Cycle



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(37) Phsiter (2004):2.

(38) SAB-TR-02-01 (2002).

(39) Mitchell (2002):481-485.

The current military intelligence organization has to begin 'gearing up' to provide social intelligence to support the non-military dimensional analysis in the OPP. Specifically, there has to be more focus on something other than Order of Battle Reports⁴⁰ (ORBATS). ORBATS are one of the traditional products of military intelligence output in terms of basic intelligence – it constitutes the intelligence that is used for baseline referencing to support planning as well as grounds for initiating new taskings (direction). It covers tracking such aspects of the opponent's equipment, capabilities, performance⁴¹, as well as some relatively light socio-political matters relative to leadership or logistical support.⁴² It goes without saying that for the implementation of EBAO to be effective, it must be supported by relevant intelligence collection and processing. This means the collection, processing, and dissemination of non-military intelligence will come to play a pivotal role in the development of the knowledge base necessary to ensure that the non-military dimensions of PMESII can be properly exploited in the OPP. Therefore theoretically, the basic intelligence output of the military must expand (see fig.6). The next chapter presents the NATO C2 approach to evaluating the OPP organization and structures, and it applies it on two cases studies of varying complexity and parameters.

(40) UK MOD Doc (1999):1A-2.

(41) Libicki & Johnson (1995): 48-49 (Good example of the comparative tech focus)

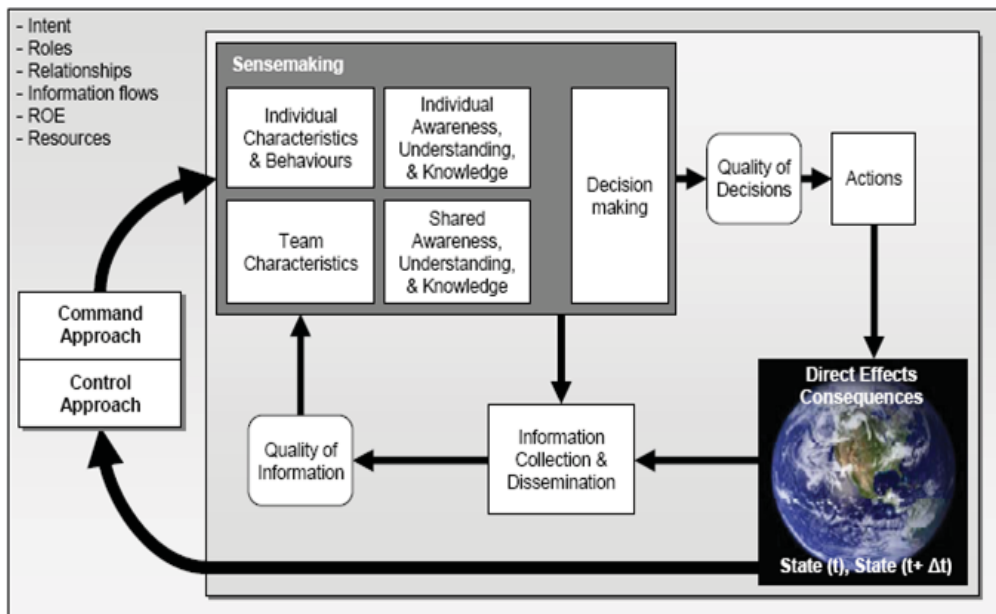
(42) Military intelligence output is divided generically into basic and current intelligence – current intelligence is situational and not referential in character.

Chapter II - Evaluating the OPP

SECTION A: C2 Method Applied

Before starting the analysis it must be stressed that EBAO is a doctrine in development and in both the AL-NUR exercise and ISAF X it was implemented within the existing Guidance for Operational Planning (GOP) framework. NATO's objective with doing so is to see how EBAO thinking could be applied within existing practices and procedures. Therefore serious difficulties in both environments are expected at this point, and such evaluations as the ones presented here serve to inform the EBAO development process. Fig.7 represents the NATO C2 approach reference model developed by NATO sponsored research in 2006. It allows for a wide spectrum of both cognitive and physical variables to be evaluated in relation to each other.

Fig. 7 The NATO C2 Approach



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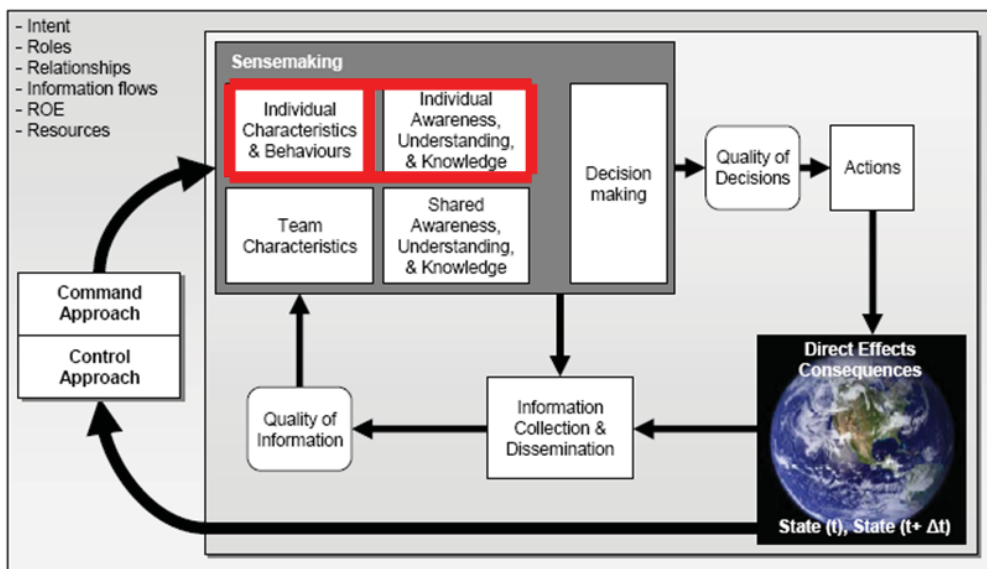
The NATO Code of Best Practice for C2 Assessment provides the general framework for the assessment of C2 organization within the context of implementing EBAO. It is an approach largely based on the SAS-050 Final Report in 2006. As the traditional focus of military research has been the physical domain in terms of material/efficiency concerns, this C2 approach strives to provide a flexible framework for managing both cognitive and the physical factors with relation to the OPP. It begins with a generic identification of the standard elements to be examined determining the classification of 'measures.' The analyst's "Summary Guide Handbook of NATO's Code of Best Practices for C2 Assessment"⁴³ calls for the selection of the relevant Measures of Merit (MoM,) a generic term referring to the different classes of measures found in the C2 approach. The classes of measures

(43) See NATO (2002):89-126 for initial development of variable categories.

that suit the focus on EBAO implementation in this report include Measures of C2 Effectiveness (MoCE,) that refer to the spectrum of variables for measuring the impact of C2 systems within the operational context (ex. measuring the assessment quality vis-à-vis the information dimension of PMESII); the Measures of Performance (MoP,) that refers to the spectrum of variables for measuring internal system structure characteristics and behavior (ex. correctness of situational perception in the political dimension); and finally, the Dimensional Parameters (DPs,) that refer to a spectrum of variables that measure the properties or characteristics inherent in the C2 system in focus (ex. attributes of personnel involved in the OPP).⁴⁴

The evaluation of the OPP will focus on the variables and relationships that describe human characteristics and behaviors that may affect the quality of decision-making in C2 processes. The quality of information and the information collection & dissemination will be dealt with separately in the next chapter on intelligence. In this chapter, the OPP of both the AL-NUR and the ISAF case studies will be evaluated; only observations relevant to the 'Individual Characteristics & Behaviors' as well as 'Individual Awareness, Understanding, and Knowledge' will be considered.⁴⁵ The focus of the C2 approach is highlighted in fig.8.

Fig. 8 C2 Approach -OPP Focus



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The key cognitive issues to be controlled for in both case studies will be mental model development, awareness and understanding, quality of planning, and task performance.

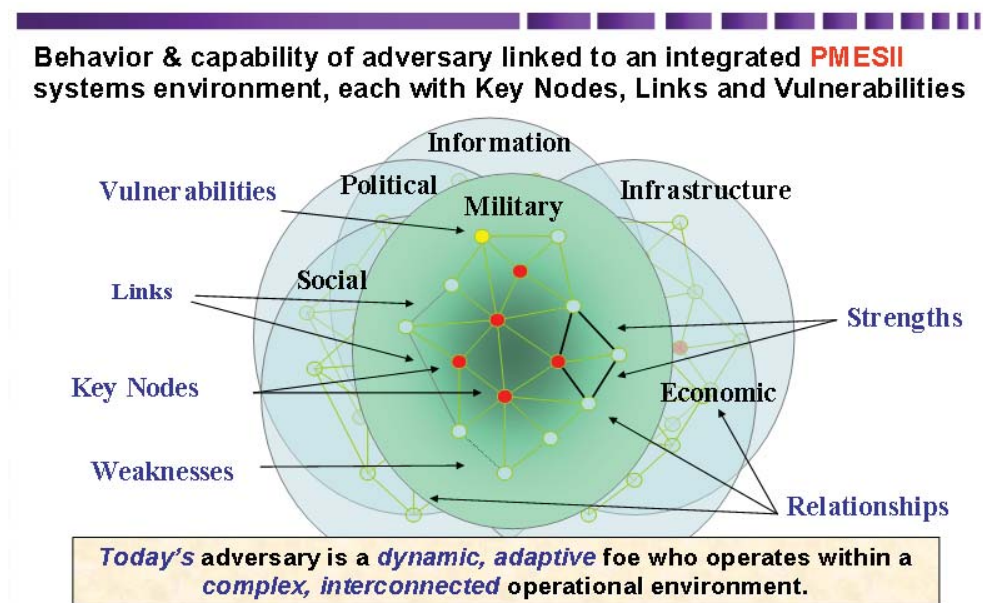
(44) See NATO (2002):15-16 for further examples of each group.

(45) SAS 050 (2007): 37-38.

A key element in the evaluation - and of great importance to the effective implementation of EBAO - will be the ability to develop mental models to manage the integration of the non-military dimensions of EBAO. The better the integration - the better aggregate product (warfare) - the more effective we are in an asymmetric environment.

Of great importance to the success of EBAO (and ultimately the future of CA capacity building) is the ability of the individual planners and analysts to systematically manage a greater number of variables and relationships. It is therefore the ability to model is extremely important - it no longer just in the physical domain with regards to traditional military science;⁴⁶ as officers become responsible for all six dimensions they will have to use more conceptual, predictive, and normative modeling.⁴⁷ Therefore, in evaluating the current state of EBAO implementation, special focus has to be placed on the ability of the staff to generate models that help manage all the interacting dimensions of PMESII in terms of effects and actions relative to the desired end state. One of the fundamental aspects to the art of modeling is the ability to formulate hypotheses. Doing so presents the logic so all can see and evaluate, and doing so also ensures that there will be detection if something is going wrong in terms of that logic, forcing a re-evaluation that might not have taken place before it was too late. It is this combination of modeling and hypothesizing that will be needed to manage the complexities of the PMESII and to assess the interaction of all six dimensions that produce desired or undesired effects.

Fig. 9 Understanding the Operational Environment



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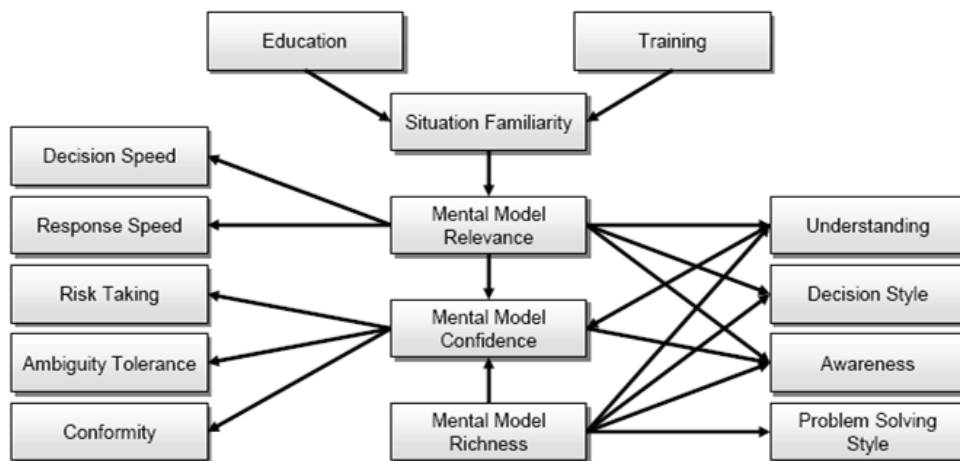
(46) For an example of the distinctive origin of military science see Gat (1992).

(47) SAB-TR-02-01 (2002) See IPB vs. PBA Table.

SECTION B: Mental Models⁴⁸

The ability to develop mental models is essential to sense making and also provides a framework for the evaluation of an individual's cognitive framework for understanding the relative battlespace.⁴⁹ A model can be a replication or representation of an idea, an object, or actual system. More importantly, it often describes how a system behaves.⁵⁰ Models can be used to describe, explain, and predict. They can be used to create baseline references and for building up databases of knowledge that can be manipulated to advantage. When applying EBAO, prediction⁵¹ is the primary analysis objective as compared to description or explanation, and this is why iterative modeling based on hypotheses becomes extremely important to both the production of useful products as well as to the management of the effects cascade in terms of applying or evaluating results.⁵² The NATO C2 reference model shown below illustrates the array of variables and resulting relationships that will be used in the OPP assessment.

Fig. 10 Mental Models



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SECTION C: Operation AL-NUR Analysis

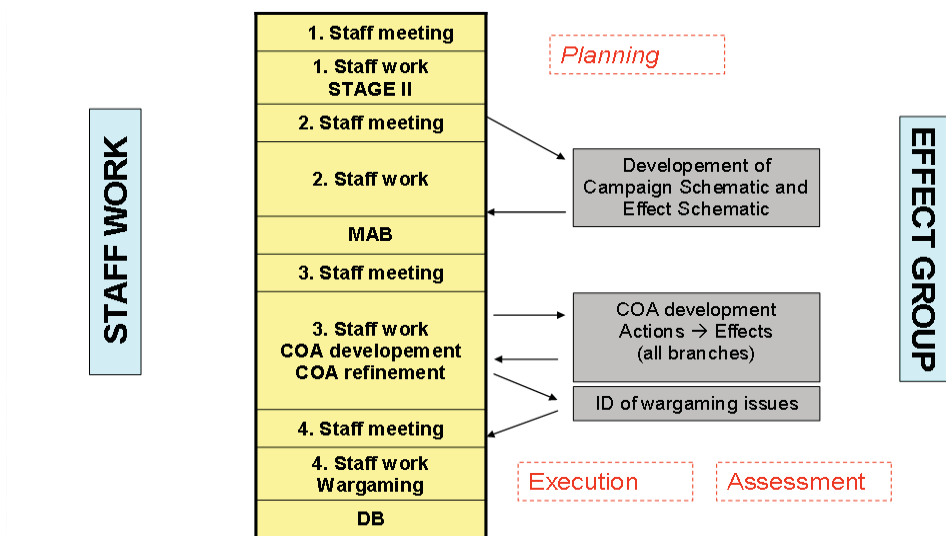
To evaluate the implementation of EBAO (the planning, execution, assessment), the key component to a HQ is the effects working group (EWG). It is here the experts from the different dimensions relevant to PMESII should discuss desired and undesired effects relative to the effects cascade and produce statements of effects. In both cases, there is an EWG and a synchronization process (see fig. 11, fig.13); however, there are major differences in the analytical parameters of both cases, and both have their respective advantages and disadvantages with regards to providing observations. Participation in the AL-

(48) SAS O50(2007): 23.
 (49) Heuer (2006):vii-ix;15-31.
 (50) Clark (2004):29.
 (51) Mitchell (2002):480-485.
 (52) Heuer (2006):47-105.

NUR exercise permits a high level of accessibility to the components and individuals within the OPP. The synchronization process is not complicated and the ability to focus on the thinking within the EWG is very high. Furthermore, as the AL-NUR exercise is fictional, there are no accessibility problems for the observations produced and no operational security issues to attend to.

The disadvantages are that a complete EBAO cycle cannot be completed in order to put the chosen measures of effectiveness (MoEs) to work, thereby assessing the produced effects. Furthermore, cycle time is not an issue in the exercise – and therefore no battle rhythm can be established without completing an EBAO cycle. This does take away from the reality surrounding an operational HQ. So although the EBAO stages of planning, executing, and assessing all are reflected in the synchronization process developed by AL-NUR Command Staff, the parameters of the exercise do not allow for a cycle to be completed in order to make a full assessment of produced effects (see fig.11).

FIG. 11 AL-NUR Synchronisation Process



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Table 2 EWG Participation

JFC (in principal)
COS
DCOS
POLAD/LEGAD So1x2
J2 SO1
J4 SO1
J5 SO1
J9 SO1
INFOOPS SO1
PA SO1

OPERATION AI-NUR (1)

Mental Modelling⁵³

It was clear from the observations that analysis to support the OPP in terms of managing the complete spectrum of EBAO dimensions is limited (as expected considering 'beginner' parameters of this exercises use of EBAO). In terms of the 'richness' of the applied mental models, operational impact hypotheses generation and iterative modeling in the non-military dimensions were very superficial compared to, for example, the naming of the 'what' and 'why' of specific combat forces required for the mission.

According to our reference model in fig. 10, 'richness' and 'relevance' is directly impacted by individual characteristics such as understanding, problem solving style, awareness, correctness, and accuracy and therefore reflect the fundamental levels of education and training as a basis for mental modeling and, in this case, better EBAO exploitation.

Observations placed in the fig. 10 reference model reinforced the models' functionality, as the fact that the participants had little to no training in EBAO management was quickly detected by the spectrum of sub-variable controls provided by the reference model.

Of greater interest was the notable absence of basic social science method in general to integrate the non-military dimensions of PMESII into the OPP. Specifically, there was no use of hypotheses driven iterative models to manage the effects-actions relationships and therefore it was very difficult to identify the lines of logic within the OPP for immediate evaluation and use, or archiving them as knowledge for eventual baseline referencing.

There were some attempts at integrating social facts into kinetic considerations, but they were restricted to the impact assessments vis-à-vis post military objective 'achieved,' – not as pre-determinants of the actions themselves. The kinetic operations (military dimension) were not systematically subjected to multi-dimensional effect models in the form of action impact assessment to control for desired or undesired effects.

The most visible example from the exercise was in the first OPLAN, where a military presence in Somaliland was missing while all kinetic activity was concentrated on Southern Somalia. This was an activity that was not fully evaluated with any political dimension effects control – if done it would have warned of a serious risk that Somaliland might use the opportunity to declare independence from Somalia (the provided intelligence indicated this) – a much undesired effect with regards to the strategic objectives. If the PMESII was applied in structured manner, that is, committing all kinetic planning to multi-dimensional analysis, this important fact would likely have been considered (see fig.12).

(53) SAS 050 (2007):23-25

Fig. 12 The Proposed OPLAN

- Establish presence in Mogadishu and expand with main effort in Southern Somalia.
- Target extremist and encourage negotiation with all other parties.
- Humanitarian relief and CIMIC coordinated with targeting.
- When SASE is established in Southern Somalia - expand success and SASE northwards.
- Deliberate approach to DDR-process.



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To 'put my money where my mouth is' with regards to the use of hypotheses and iterative modeling, now consider the following: ideally, a standing model based on PMESII and illustrating the dimensional relationships of the Somaliland independence would have allowed not only for the identification of undesired effects from actions in all the dimensions, it would also have helped to develop strategies to mitigate undesired effects vis-à-vis preferred courses of action; for example, the use of model testing for a smaller military presence (military dimension) in Somaliland with focused economic assistance (economic & infrastructure dimensions) to the identified clans that want independence. Particularly those along their provincial border (political & social dimensions) and backed up by information operations (INFOPs) promoting the benefits of unity (information domain). These multi-dimensional efforts might mitigate the risk of a unilateral Somaliland declaration of independence, allowing the majority of military forces in the south to conduct combat operations after the OPLAN.

The AI-NUR exercise provided an excellent opportunity to establish an initial baseline for reference in terms of developing and evaluating EBAO relevant training & education. It would also be very beneficial to maintain and refine such a testing platform for EBAO implementation training, as well as part of a standing C2 assessment capacity to support Danish HQ formation and a synchronization process.

In relation to effectively implementing EBAO, the goals of providing relevant training and education (see fig. 10) to officers would specifically be to increase the individual's mental modeling skills to better exploit PEMSII in the OPP.

The training should focus on EBAO management aspects where it concerns the establishment of more concrete practices and procedures on the lower quarter of the effects cascade. For example, pre-mission command structure evaluation based on the NATO C2 approach in order to support a Danish COS, effect cascade mapping (systematization of effects production and analysis), and managing the resulting synchronization processes in the OPP in terms of C2. In short, training should be designed to support EBAO being applied as a more 'concrete' doctrine.

Particularly for the non-military dimensions, it is important that method is applied in a systematic manner, not only to maintain clear lines of logic with regards to effect evaluation, but also for building a database of information that could be exploited at a later date (baseline referencing) that would over time build more confidence in the chosen MoEs for the OPP. Knowledge of basic scientific method to formally manage iterative modeling and hypothesis generation is essential for PMESII based analysis. This would suggest that officers should receive the equivalent to the minimum 'method' course requirement for a Bachelors Degree (BA) in social sciences to resolve this issue. Ensuring that the type method learned matched the civilian social science requirements and not existing military operational requirements framed by the GOP.

In terms of applying their modeling capabilities to PMESII, it would be beneficial that officers involved in an OPP had a BA in any of the social sciences relative to the non-military dimensions of PMESII (for example, politics, sociology, or economics).

The AL-NUR Staff exercise provides a very personal and direct opportunity for observations of the interpretation and implementation of EBAO. It allows for an observer to see and hear the thinking processes of the OPP. It is therefore an excellent platform for evaluating the effect of eventual EBAO specific training, or changes to officer educational requirements. It is a very manageable and effective physical laboratory for the C2 approach.

OPERATION AL-NUR (2)

Levels of Awareness and Understanding⁵⁴

Both awareness and understanding were characterized by variables representing their accuracy, completeness, consistency, correctness, currency, precision, relevance, timeliness, and uncertainty (see Appendix A for definitions) and are mitigated by the intervening variable of mental models. As illustrated in fig. 10, variables such as understanding have an impact on the behavioral variables named above. The picture painted by observations reinforces that of the mental model variable control; without specific training in managing EBAO, and greater method skills, it will make synchronization difficult within the OPP.

For example, the accuracy, completeness, and consistency (see Appendix A for definiti-

(54) SAS 050 (2007):24.

ons) of the OPLAN generated were reduced by the dominance of military considerations, particularly where it concerned dealing with the issue of pirates. At one point it called for the destruction of pirate home bases; however, the basic understanding of the pirate issue suggested that pirating itself was an economic supplement for local urban centres along the coast. Therefore, issues within the political, economic, social, and military became much more significant in terms of operational impact. For example, do those towns support the Islamic insurgents? What will the economic impact be on those towns? Does destroying the 'home-bases' require occupation and military forces? Will such an action create more support for insurgents behind our lines of communication? What will be the effect on info operations in Southern Somalia? How can we mitigate (multi-dimensionally) the risks associated with the desired action?

EBAO management training will improve awareness and understanding and thus contribute to the overall richness of the modeling within the OPP. Same point goes for education as the inherent weaknesses in the analytical method and in the non-military dimensions reduce the ability to systematically perform multi-dimensionally assessments, thus reducing the effectiveness of the PMESII exploitation.

OPERATION AL-NUR (3)

Quality of Planning⁵⁵

Quality of plan is characterized by the variables representing their accuracy, completeness, consistency, correctness, currency, feasibility, precision, relevance, timeliness, and uncertainty (see Appendix A for definitions). As far as the OPP is concerned, when using EBAO, the battlespace has six different dimensional variables for strategic reference to manage complexity - but still only one aggregate result (effect) on the battlespace. Therefore, if you mismanage one dimension, you lower the quality of the final OPLAN. In theory and in practice (asymmetric warfare), you will have to be very lucky if a single dimensional based OPLAN produces a high quality aggregate result in the battlespace. The exercise bears this out as the final OPLAN presented to COS lacked currency in assessments - or logic according to PMESII. In a process where the military dimension overshadows all other dimensions, products will always be open for challenges based on logic generated from applying the full scope of PMESII.

The goals of any EBAO specific training should concentrate on the application of PMESII; military officers involved in the OPP must be trained to think multi-dimensionally in planning warfare in order to produce high quality operations that would best serve the principles of EBAO and CA capacity building. Theoretically, they must be able to handle more complex social phenomena; in asymmetric warfare it is very important for the development of high quality kinetic planning and for becoming more effective at pursuing/producing the desired end-state.

(55) SAS 050 (2007): 24.

OPERATION AL-NUR (4)

Individual Characteristics and Behaviors⁵⁶

There was very little method used in the implementation of EBAO and the application of the multi-dimensional PMESII was largely superficial and not analytically concrete. For example, there was no iterative modeling to manage the logical development of undesired effects. Therefore, indications are that the C2 approach and the cognitive abilities evaluation should assist in identifying weakness in cognitive capacity, cognitive flexibility, and cognitive complexity (see Appendix A for definitions) and consequently would assist in supporting the argument for academic education for officers in more detail. But it should be carried out by assessment specialists in the field of psychology who are familiar with the framework of Danish norms for such personal evaluations.

As far as this report is concerned, the most interesting aspect is that it appears to contribute something new to the current debate on the 'akademisering' – or the establishment of academic standards for the Danish officer corps. Based on the NATO C2 approach and the implementation of EBAO, it appears there might be a good 'war fighting' argument as to why Danish officers should have an academic education.

OPERATION AL-NUR (5)

Conclusion

Implementing EBAO in existing GOP doctrine has two challenges. The first concerns the existing GOP structures and their ability to manage the effects cascade. The second concerns the EBAO skills of the personnel involved in the OPP. The existing structures are not designed to manage the effects cascade, and this case clearly illustrated that as participants in the EWG struggled with applying PMESII systematically. Furthermore, without EBAO management training, it is not surprising the participants 'fell back' on what they know best - the traditional GOP based OPP that in turn perpetuated the clear dominance of the military dimension in their analysis. The conclusion is that implementing EBAO with existing structures does not lend itself to the exploitation of PMESII. If EBAO is to become more concrete, it will need its own structures and practices as well as EBAO specific training on how to run them.

The traditional time and space based military dimension reflected in the existing GOP, has never needed a great deal of hypothesis based iterative modeling. Therefore, the effective implementation of EBAO will require a review of how we deliver these particular skills to military personnel.

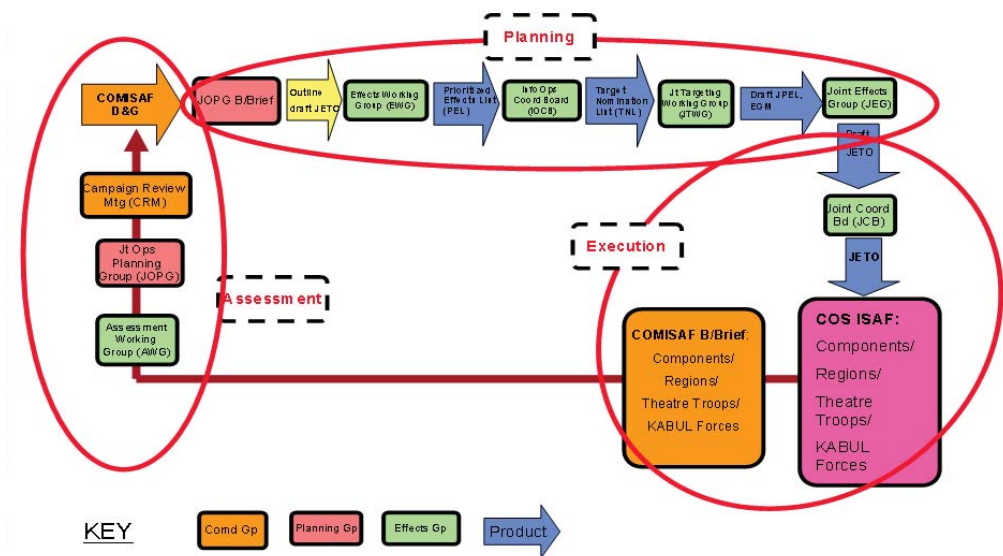
SECTION D: ISAF X OPP Analysis

The evaluation of the implementation of EBAO in ISAF relies on observations generated

(56) SAS 050 (2007):26-32

from the synchronization process in the period August, 2007 to January, 2008. The synchronization process used by the HQ reflects the three stages of the EBAO approach in terms of planning, execution, and assessment. The ISAF synchronization process is far more complicated than that used in Operation AL-NUR. Fig.13 is in fact a simplified depiction of a four week OPP cycle in ISAF. The advantages with the ISAF case study is that several operational cycles were completed in the time period producing a large variety of plans and actions. Also one gets a feeling for the battle rhythms' impact on practices and procedures including establishing and applying MoEs. However, the biggest disadvantage for this report is that the plans produced cannot be discussed in any detail depicting specific components or persons due to both political considerations and security restrictions.

Fig. 13 ISAF Synchronisation Process



Copyright HQ ARRC

As in Operation AL-NUR - the key group for the implementation of EBAO is the EWG. It is here the combined expertise of the various HQ components meet to track and generate analysis relate to desired/undesired effects and where current effects are measured. In principle, expertise in the various dimensions of PMESII should be present, keeping in mind that EBAO is not a fully developed doctrine and had to be implemented within a GOP framework conducting war. So again, the purpose was to inform the EBAO development process as it concerns interactions with the current GOP doctrine. The participants in the EWG for ISAF are listed in table 3; however, in order to safeguard the generic nature of this report, in the actual analysis there will be no references to particular components participating in the EWG.

Table 3 EWG Participation

Ch TIO (Chairman)	SO1 Tgts and Jt Fires Plans
Chairman ETG (Ch FCOORD)	SO1 Tgts and Jt Fires Ops
Chairman AMC/CALWG (Chief JEB Air)	SO1 TH
Chairman IOCB and COS JEC (Chief Info Ops)	SO1 AH
Chairman CMG (ACOS G9 CIMIC)	SO1 Info Ops
Ch AOCC(L)	SO1 CIMIC Plans
Ch OAB	SO1 G4 Plans (or rep)
Ch SF	SO1 Engineer Ops/Plans
POLAD	SO2 G2 Assessments
Ch PInfo	SO2 Tgts and Jt Fires Plans
SO1 ASFAO AOCC(L)	SO2 G3 Ops Coord
SO1 AOAD	SO2 G6 SPECMAN
SO1 Legal	RAC N, W, S and E LNO
DACOS G5 Plans	ACC LNO
SO1 FCOORD Tgts	

ISAF X OPP(1)
Mental Modeling⁵⁷

Extra challenges to mental modeling in a combined joint environment stem from the conglomerate of different nationalities with different levels of education, training, and language skills. Further challenges were generated by the sporadic turn over of personnel in key positions such as analysts that provide advisory inputs to the OPP.⁵⁸

Within the framework of EBAO and the application of PMESII, the ISAF X OPP did not display any considerable degree of richness where it concerned the analysis of the non-military dimensions. There was little to no integration of PMESII into the OPP process that reflected the methodological application of the EBAO or was indicated by a systematic engagement of the supporting intelligence cycle. Participating parties to the EWG did not work with iterative modeling but rather focused on developing MoEs for the campaign. Participation was sporadic due to a competing GOP battle rhythm, and the management of the integration process was not yet concrete. The analysis used in the OPP process reflected the emphasis on the military dimension, and indicators for undesired effects were not developed or disseminated for analytical review. It was in this manner that the rele-

(57) SAS 050 (2007):23-25.

(58) In some case senior analysts that were stationed in Afghanistan were in a position of high influence over the OPP. To add to the challenges, different command components would often be in a state of competition that reduced information sharing.

vance of the EBAO was reduced to general discussions on MoEs. Some improvements were made near the end of ISAF X that mainly focused on the improving integration of INFOPS into the OPP. In terms of modeling, military historical models dealing with insurgencies were popular.⁵⁹

Though the implementation process was making progress where it concerned mental modeling, the military dimension clearly had a tendency to dominate and perpetuate the military dimension within the OPP. The exploitation of the non-military dimensions will become better as method, hypotheses generation, and iterative modeling skills begin to generate tasks for more non-military intelligence.

ISAF X OPP(2)

Awareness and Understanding⁶⁰

The level of awareness and understanding was negatively affected by inaccuracies produced by inconsistencies in applying EBAO (not surprising considering the restrictions of the GOP). These inconsistencies increased in tact with the increasing dominance of the military domain within the planning group. Planned kinetic activity within the non-military dimensions of PMESII was not conceptualized, including managing undesired effects. The effects cascade in the OPP needed more concrete analytical practices or mapping out of the tactical level activity attached to the effects.

Completeness was negatively affected by the over-emphasis on the military dimension and ORBAT related priorities; there was also a lack of completeness in the environment used for effects assessment. The high turn over of analysts involved in the OPP produced problems with consistency – the degree to which PMESII would be exploited depended on specific leadership personalities. Correctness was reduced by the desire to force things into the military dimension. Precision was negatively affected by the inability to assess systematically, and this was further hindered by sometimes competing components sporadically feeding into the process. Much of the awareness obtained was relevant; however, it was not utilized to its full potential due to the lack of method and modeling experience in the non-military dimensions. And on timeliness, as far as it concerned EBAO/PMESII, it was too disjointed in process to evaluate. Uncertainty was produced by little to no subjective assessment of non-military dimensions, and most problems were reduced to ad hoc comparative studies in military history.

(59) In my experience, the driving characteristics of these models tend to fit better with symmetrical warfare environments, many of them do discuss unconventional tactics/operations, but they are generally employed with the purpose of gradually increasing their symmetrically measured 'means' strategically – and therefore it is still just the physical domain that informs the aggregate result on the strategic level. Therefore these models are not receptive to EBAO dictating desired end-states to an OPP - but rather dictate to PMESII how it can support symmetrically defined end-states. (Ex. Mao's 3 phases of guerilla warfare.)

(60) SAS 050 (2007):24

ISAF X OPP (3)

Quality of Plan⁶¹

The overall quality of planning within the framework of the EBAO was not as effective as it could have been in terms of PMESII exploitation, particularly where it concerned involving the non-military dimensions in prediction, targeting, and pattern of life analysis for the Taliban (TB).

One example that stands out was an assumption that many TB stopped operations and migrated via 'rat lines' (mountain trails) in platoon size units on foot over the border for the winter after they had reaped the benefits of the poppy harvest. Social and economic information was being received that suggested there would be no migration; furthermore, it was suggested that the locals themselves were conducting the harvest (social dimension). Information pointed to the fact that TB who were not conducting operations were not packing (collecting resources locally) for a long trip through the cold mountains on "ratlines" – but rather that they were going to drive over the border using cars, trucks, and buses on the main road (infrastructure dimension). Finally, at the same time the TB was also putting out feelers for possible political negotiations with the AFG government (political dimension) - a new aspect not seen in the previous years. It was a perfect chance to exploit iterative models reflecting the post-harvest/migration hypothesis from previous years – by adding the new information (tacit TB-AFG bargaining) and conducting a predictive analysis. Yet the question was never asked what effect the non-military dimensional information or the on-going tacit negotiations would have on TB military operations and the annual migration assumption. A more structured application of PMSEII might have resulted in the question being asked.

ISAF X OPP (4)

Individual Cognitive Attributes⁶²

Where it concerns such attributes as general intelligence, cognitive capacity, and flexibility, the complex environment of a combined joint OPP environment would make it very difficult to ensure any standards. However, some general comments calling for higher education and training are properly placed here, as observations illustrated the obvious need for more abstract thinking involving non-military dimensions, more method behind effect-action evaluations, a much greater use of iterative modeling in a structured manner to manage the all the PMESII dimensions, and finally the establishment of a knowledge base to support iterative modeling.

An example of how PEMSII iterative modeling could be exploited in AFG was the assessment management of the impact that key command changes in the security forces of AFG neighbors would have on operations in Theatre. The baseline hypothesis establishing the

(61) Ibid., 24

(62) SAS 050 (2007):26-32

key dynamics of the model was reactive to whether new personnel being placed in the key positions were known as being secularist or not. If they were not secularists, the hypothesis was that security operations against TB in the neighboring country would decrease - and TB operations would increase in Theatre. If the new personnel were recognized as being secularists, then we could expect the operations tempo to remain high across the border - tying up TB resources and benefiting our operations. As new changes were made within the bordering countries' security forces, the new information would be run through the baseline analytical model to come with an estimate of effect (from the political dimension) on AFG operations (the military dimension.) This model actually worked quite well during turbulent times within the region; however, the model was the exception and not the rule.

ISAF X OPP (5)

Conclusion

The complications of the international environment aside, the ISAF case reflected the conclusions of the AL-NUR in that the effects cascade does not naturally fall into place or peaceful co-existence within the existing GOP. Nor does PMESII based analysis fall naturally into the existing structures coherently. Therefore, if EBAO is to become a more concrete doctrine, new structures to enforce the effects cascade are required, and with it more EBAO and PMESII specific training.

Chapter III - Military Intelligence

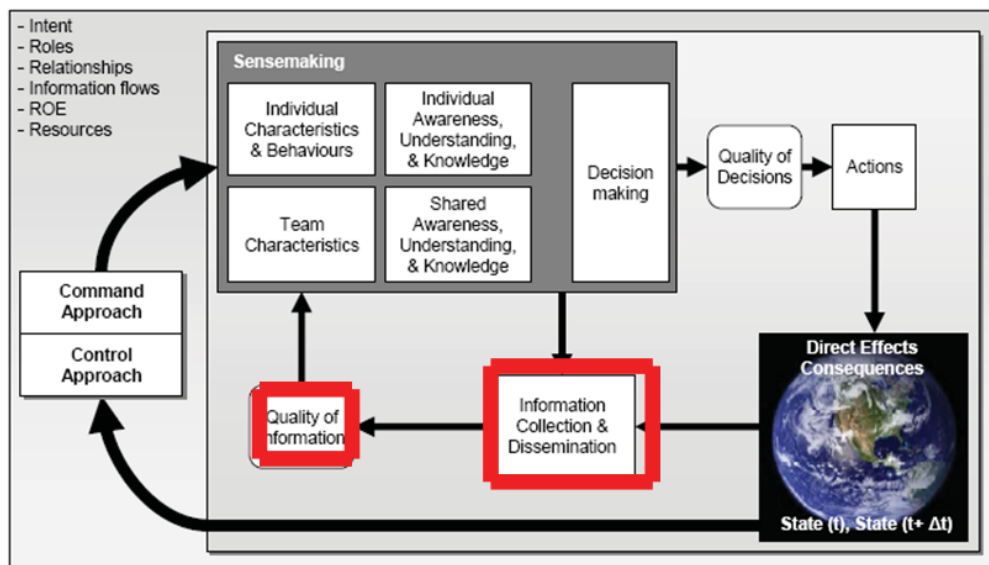
SECTION A: C2 Approach to Intelligence

The role of operational intelligence (OPINTEL) is to provide commanders and their staffs with the fullest possible understanding of the adversary and of the operational environment within a specific operational context, in order that they can plan and conduct operations successfully.

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Control variables for the information domain primarily concern the 'quality of information' and the collection and dissemination (see fig.14); key variables will include situational characteristics, distribution of information, information assurance, collaboration, collaboration and interoperability, information quality, and shared information quality (see Appendix A for definitions.) All of these have sub-variables that will be oriented in the case analysis

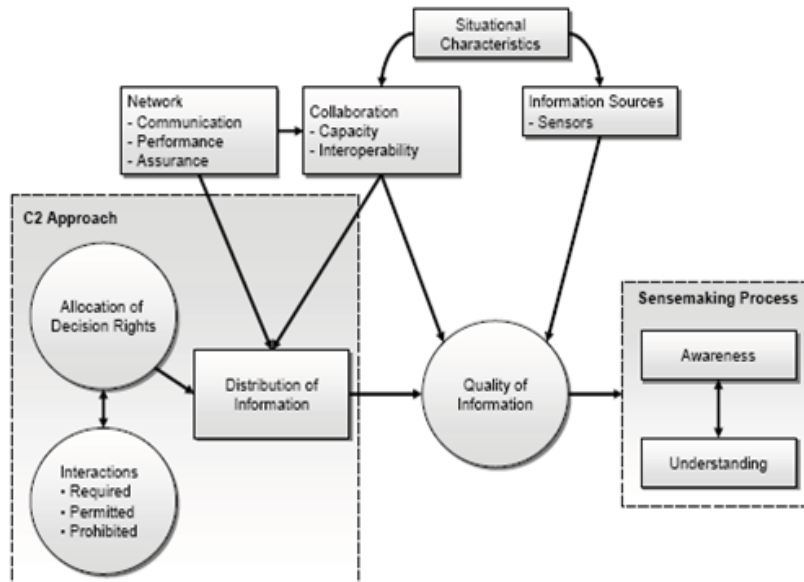
Fig. 14 C2 & Intelligence



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Fig. 15 acts as a reference model for the variable relationships in order to manage the evaluation of the intelligence cycle. Essentially, the 'quality of information' being put into the intelligence cycle relative to PMESII will be indicative of the level of EBAO related awareness and understanding (sensemaking process).

Fig. 15 Variable relationships that contribute to the quality of information

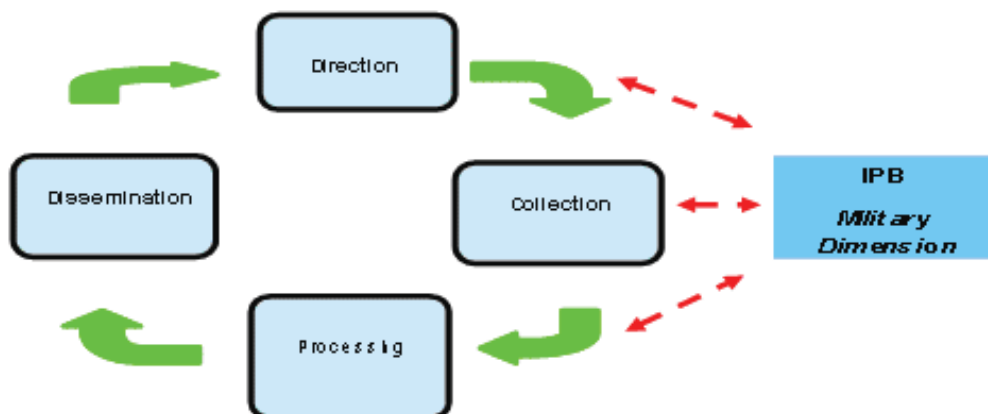


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SECTION B: Intelligence Cycles

Most intelligence cycles in the military reflect four stages or steps, direction, collection, processing, and dissemination, in some way or form. The purpose of the intelligence cycle is to deal with all the available information, decide relevance, search for the missing information, process it into something even more relevant, and make it ready for distribution (See fig.16). The analytical focus is on Intelligence Preparation of the Battlespace (IPB).

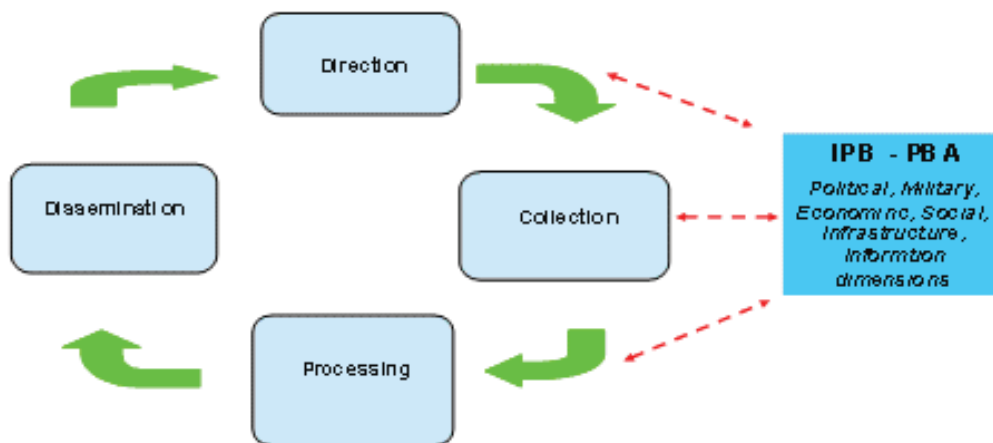
Fig. 16 Traditional Intelligence Cycle



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In order to meet the challenges of complexity in asymmetric warfare EBAO has expanded the 'target' for the vast majority of information collection from one dimension to six dimensions in line with PMESII. However, it is not enough just to increase the amount of information taken into the cycle if the level of analysis of that information cannot turn out useful products for distribution in good time. Therefore, all four stages are important for an evaluation of how PMESII has been integrated into the OPP with regards to supporting intelligence structures (see fig.17). Furthermore PMESII will require a more predictive focus and therefore there will have to be an increased effort to incorporate Predictive Battlespace Awareness (PBA).⁶³

Fig. 17 PMESII Intelligence Cycle



Copyright RDDC

Finally, the intelligence cycle is 'cyclic' because it requires constant renewal and evaluation. This particular point will come to play a very important part in the implementation of PMESII. If the direction is weak on PMESII it will perpetuate weakness with regards to non-military dimensional analysis through the whole intelligence cycle and the OPP.

SECTION C: Operation AL-NUR Intelligence

A most difficult aspect of evaluating the EBAO supporting intelligence cycle in this simulated environment is the fact that a cycle could not be completed. Instead details of the initial processing of intelligence for use in the first OPP could be accessed; details included the collection and interpretation phases of the processing stage with regards to PMESII and the final product in the form of the first OPLAN.

(63) SAB - TR- 02-01: PBA is defined as "the state of the mind that is achieved by the commander through active participation in the predictive process."

OPERATION AL-NUR (1)

Situational Characteristics⁶⁴

Information provided was open to a great deal of interpretation – especially when non-military dimensional factors were being sporadically and unsystematically fed into the intelligence cycle (or without EBAO guidance in terms of practices/procedures) – resulting also in a great deal of situational ambiguity (see Appendix A for definitions). The result was that interpretation within the intelligence cycle was essentially driven by analysis within the military dimension, perpetuating the overall inability to manage the complexity of the situation. Furthermore, due to the absence of cross dimensional analysis, certain aspects could be interpreted in different ways; ex. destroying the pirate’s home bases – does that require the occupation of areas along the coast? There was some analysis from the social dimensions that helped reduce the equivocation of the situation. However, the analysis was not worked systematically via the intelligence cycle into the OPP (for example arguing for, or against, certain kinetic activity because it would produce an undesired affect that had some processed intelligence/knowledge to back up the hypothesis).

The restricted parameters of this exercise does not allow for a deep evaluation of the intelligence cycle’s situational grasp; however, approaches to analyzing the given scenario parameters once again reinforced the military dimension’s dominance in interpretation. Though the EBAO clearly provided directional support with relation to populating models with PMESII information in all dimensions – it was not exploited systematically in terms of processing or direction stages of the intelligence cycle (for example, there was little to no related tasking from other components of the EWG).

This highlights two very important points; firstly, if the direction stage of the intelligence cycle does not apply the full spectrum of PMESII, nothing from the non-military dimensions will be processed and disseminated. The end result is a process that does not perpetuate PMESII within the OPP. Secondly, and just as important, if the intelligence structure does not have the expertise to manage the non-military dimensions in the processing stage of the intelligence cycle, they will develop and exploit what they know best – information from the military dimension framed by the GOP. This of course will eventually lead to the situation described above, a self-perpetuating OPP focused on the military dimension.

OPERATION AL-NUR (2)

Information Assurance⁶⁵

The amount of exploitation of the non-military elements of PMESII within the OPP will have a direct effect on all the sub-processes involved in collecting, processing, and disseminating intelligence. It will set a new range of requirements on the type of information

(64) SAS 050 (2007):17-18.

(65) *Ibid.*, 18-19.

gathered and how it is to be analyzed. Information assurance is a very important element of any military intelligence cycle, for both operational security (OPSEC) and the building up of medium to long-term knowledge and baseline measurements necessary to support verification and de-confliction activities (for example human intelligence (HUMINT) report evaluation). When applying PMESII, the greater effort within the OPP to integrate the non-military dimensions, the more tasking in the non-military dimensions the intelligence structures will be asked to produce. Over time issues related to unclassified social intelligence will also be subject to processes of authentication, integrity, and confidentiality. For example, building up 'pattern of life' databases (life in the village) could end up playing a role in targeting - finding where an insurgent meeting might be held for example. Protecting those analytical techniques, at least while in progress, might eventually become an important issue for counter intelligence.⁶⁶ However, if there is no methodological continuity, there will be no possibility for a medium to long term build up of knowledge, and the necessity for engaging information assurance on what will likely be OSINT based processes becomes a mute point.

OPERATION AL-NUR(3)

Collaboration Among Individuals⁶⁷

Seen from PMESII eyes, collaboration capacity (see Appendix A for definitions) was generally weak within the synchronization of the EBAO in the OPP. Here the primary negative indicator was the lack of multi-dimensional tasking (direction) that perpetuated a lack of support for PMESII in the intelligence cycle. There was collaboration completeness in terms of the military dimension only and therefore the collaboration (collection & processing) within the framework of PMESII was left undermined. The main collaboration mechanism, the EWG and other synchronization processes also failed to manage the effects cascade to the degree where it would begin generating non-military dimensional taskings for the intelligence structures. Without the comprehensive PMESII spectrum of OPP production, the intelligence cycle would be unable to integrate the non-military dimensions (for example, CIMIC as a member of the EWG with some expertise in some in the non-military dimensions, should be able to generate their own tasks for the intelligence process in support of effects analysis – as should POLAD or LEGAD).

Where it concerns the collaboration of participants, there was some agreement reached in the social dimension with regards to the setting 'key leader' engagement as a high priority in the OPLAN. However, with the unstructured effect cascade management, the continuity of interactions as well the frequency of interactions between the intelligence cycle and the EWG was sporadic and the interaction quality low. More concrete practices need to be established to ensure the direction stage of the intelligence cycle is working from the PMESII template.

⁽⁶⁶⁾ Herman (2004): 165-182; Mitchell (2002):483.

⁽⁶⁷⁾ SAS 050 (2007):19-20.

OPERATION AL-NUR (4)

Information Quality⁶⁸

Information accuracy (see Appendix A for definitions) within the military dimension on the UNIMIL side was as well as could be expected in light of the exercise parameters, characterized by limited information concerning opposition forces. However, the lack of depth in management and exploitation of the PMESII dimensions automatically reduced the completeness, consistency, correctness, currency, precision, and relevance of information. Timeliness was restricted to the parameters of the exercise for the OPP only and there were no examples where timeliness could be evaluated. Other characteristics such as information uncertainty, service characteristics, precision, sharability, and source characteristics could not be evaluated because the intelligence cycle could not be completed (a cycle is completed when new direction is given based on disseminated information related to a specific tasking).

OPERATION AL-NUR (5)

Shared Information Quality⁶⁹

The level of shared information accuracy in the intelligence cycle developed over the three days in the OPP exercise with greater CIMIC participation via effects discussions. However, the non-military input mainly focused on follow up activities to the actually planning of military operations. Otherwise the completeness, consistency, precision, relevance, and correctness were strong in the military dimension and weak in the non-military dimensions (it would have been interesting to have had some Somalia cultural experts to sit in on the processing stage of the cycle to comment on possible effects).

OPERATION AL-NUR (6)

Conclusion

This case only allowed for the direction and processing stages of the intelligence cycle to be assessed, and with regards to the implementing of PMESII, there appeared to be two disjoints. The first was between the EWG and the intelligence structures that did not display a capability in the non-military dimensions for structured interaction. The second disjoint was in terms of clarifying responsibilities in terms of direction between the intelligence analysts and possible customers. If the analysts in the intelligence structure do not lead/help plans and policy or CIMIC, for example in establishing relevant tasks to the effects assessments in the non-military dimensions, it is unlikely they will come from those compartments alone as they are quite comfortable with what they know best – the military dimension inside a GOP framework. In short, it demonstrated that the implementation of EBAO into GOP framed intelligence process does not work, and it further undermines the OPP chances for effective PMESII exploitation.

(68) Ibid., 20-21.

(69) SAS 050 (2007):21.

In terms of effectively implementing EBAO, the intelligence structure has to systematically integrate PMESII into the intelligence cycle so that the products of the EWG continue - at a minimum - as basic intelligence output, preferably managed within the common effects tracking system (provided by the effects cascade) and building up a knowledge base for later PBA exploitation.

Finally, one of the key challenges of asymmetric warfare is the ability of tactical events in the physical domain to have strategic impact in the cognitive domain. The case study tendency displayed in the interpretation of intelligence was clearly focused on the operational level. This could eventually be an Achilles heel of EBAO implementation if not checked. As EBAO opens up the cognitive domain for strategic reference, the intersubjective dynamics of traditional doctrinal level interactions are blurred by cognitive event impacts. What might have physically been assessed as tactical and thus operationally insignificant, might end up ruining your coming week's operations all across Theatre - courtesy of CNN (et al.). A more comprehensive matrix of indicators and warnings reflecting cognitive battlespace characteristics might offer some assistance here in impact assessments.

SECTION D: ISAF X Intelligence

Observations from ISAF X provide good insight to the implementation of the intelligence cycle into the OPP within an EBAO/GOP framework because there were hundreds of intelligence cycles (not OPP cycles) completed in the fall of 2007. This provided opportunities to see the principles of EBAO interpreted by the OPP and converted to a number of practices for the HQ, and what effect it had on the established intelligence cycle framed by the GOP. That said, the HQ was, and still is, in a period of transition and therefore had the difficult job of essentially juggling the 'old with the new' in terms of implementing EBAO with the established GOP based OPP - while fighting a war in a period where there were often more than 50 tactical level engagements throughout Theatre per day.

Compared to the AL-NUR exercise where observations represented the interaction of personnel in the direction and processing stages of an intelligence cycle, the generic observations categorized below represent hundreds of completed intelligence cycles and hours of interactions on a wide variety of issues ranging from the tactical level (ex. What type of IEDs are the TB using?), to the operational level (ex. Which districts are the most threatened by the TB?), to the strategic (ex. What is the effect on Theatre of the Benezir Bhutto assassination?). Therefore, though equal in length, the following categorisation of ISAF X observations should be considered as carrying much more weight than observations from the same categories from the AL NUR exercise as they represent a much higher number of completed intelligence cycles relative to a wider range of topics.

ISAF X Intelligence (1)

Situational Characteristics⁷⁰

The amount of ambiguity of situation (see Appendix A for definitions) on most occasions was reliant on the traditional military cycle focusing on ORBATS as the main basis for understanding the situation and therefore clearly dominated the direction provided to the collection stage of the intelligence cycle.

The missing non-military dimensions increased the ambiguity of the situation. It was hard with the existing basic intelligence output (including the existing databases)⁷¹ to determine the effects on operations of a particular events with non-military dimensional implications (for example, a TB assassination of an AFG politician certainly affected the political dimension but our knowledge base was not sufficient to really understand the dynamics). Events often ended up in the lap of the INFOPS who had little direct participation in directing the intelligence cycles. Concrete efforts to better integrate the INFOPS circumvented the EWG and eventually established ad hoc meetings directly with the intelligence structures.

However, the weakest dimension with respect to EBAO and the conflict in AFG was the social dimension. For example, if the intelligence structures would have had a map illustrating territories belonging to different sub-tribes, it could be cross-referenced with reported TB activities, and the intelligence structures could have built up our knowledge base and understanding of the TB areas of operations, their freedom of movement, and the physical range of their local support. It would have been useful for the OPP. However, the map normally used would be one depicting the arbitrary political/administrative lines representing provinces and districts that the TB certainly did not recognize - or likely utilized to determine their movements (for example, predicting which district centers might be attacked would have been easier if we knew on which tribes' territory the district center was - and cross-referenced that with their disposition towards the TB. However, the necessary knowledge base had not yet been developed).

The fact that there were no tribal experts involved in the direction, collection, or processing stages of the intelligence cycle negatively impacted the quality of effect analysis in the social dimension. It weakened the ability to exploit the tribal dynamics in reducing local support for local TB organization in the Pashtun south for example.

This also had a direct affect on the ability to perform 'pattern of life' analysis relative to key TB and tribal leaders. Exploiting local customs of the Pashtunwali⁷² for different sub-tribes of the Pashtun to plan collection activities related to the TB movements was not possible - the knowledge base seen with PMESII eyes was not sufficient. The TB, operating in certain tribal areas, was also required to follow the customs as much as possible, especially when they did their own 'key leader' engagement. In terms of EBAO, it is a

(70) SAS 050 (2007):17-18.

(71) For the most part - JOISS.

(72) Pashtun tribal code that varies on custom between the sub-tribes and affects all aspects of life.

good example of how social intelligence eventually could be exploited for targeting based on 'pattern of life' analysis.

The challenges with the application of PMESII reduced the intelligence cycles ability to handle complexity and therefore perpetuated the domination of the military dimension in the collection and processing stages. Uncertainty of the situation increased as the ability to collate, analyze, and interpret (processing) information from the non-military domains remained low. Agreements on PMESII interpretation were often personality driven and not based on method. Situational familiarity in the non-military dimensions related to AFG was – as depicted by the lack of tribal experts – low. Not surprising if one considers that the EBAO was brought into the existing GOP framework where there was no need for deeper cultural expertise than what the military dimension had traditionally called for in terms of light social intelligence. The lack of method also resulted in the temporal focus being ineffective for iterative modeling, and it undermined opportunities to predict based on PMESII driven hypotheses based analysis.

ISAF X Intelligence (2)

Collaboration Among Individuals⁷³

In terms of capacity, the intelligence cycles and their supporting structures in place provided ample arenas for PMESII to be exploited. However, the lack of expertise in dealing with the non-military issues hampered the development of effective collaboration. Varying levels of inevitable compartmental competition aside, EBAO collaboration mechanisms were not taken too seriously, because the GOP they were familiar with provided the ability to fight the war. The competitive analysis amongst some components sometimes led to the evitable hoarding of information and experience in the non-military dimensions. However, genuine efforts to collaborate were common – the draw back seen from EBAO eyes was that they collaborated in the same military dimension. Also the continuity of PMESII related interactions between participants was frustrated by a high level of sporadic personnel turnovers within the analysis community. It is a point worth mentioning that if the eventual implementation of EBAO is to be effective, a substantial knowledge base and expertise will have to be built for Theatre. Short periods of 30 days or less in Theatre for analysts just won't cut it.

ISAF X Intelligence (3)

Information Quality⁷⁴

In terms of applying PMESII, Information accuracy with regards to the non-military dimensions was next to non-existent, there were no tribal information, no infrastructure information, and no cultural expertise seriously exploited within the intelligence cycle. Without

(73) SAS 050 (2007):19-20

(74) Ibid., 20.

direction from the clients, it would be unlikely there would ever be collection in those dimensions. Effect analysis support never made it into the intelligence cycle through tasking – furthermore it would have been hard to argue for the inclusion of the non-military dimensions without doctrinal guidance from the OPP process. Therefore the information was often incomplete with respect to the non-military dimensions.

Furthermore, some attempts to integrate social information without any basic method in terms of managing the process also reduced the correctness and currency of the products produced. Further undermining support for the non-military dimensional analysis. Precision of the military analysis was also undermined by the lack of integration of the non-military dimensions, contributing to the evaporation of relevance. Again the intelligence cycle was never asked to evaluate desired or undesired effects, nor was it asked to evaluate prospective actions with regards to effects. That meant that in relation to the EBAO process – without the support of the intelligence cycle – the only OPP platform for generating knowledge to support the integration of the non-military dimensions was effectively left out of the effects management loop.

Alternatively, exploitation of basic social science method such as making use of iterative modelling for example to track sub-tribal pro or anti-insurgent tendencies could have helped give us indications as to where we could maybe use reconstruction to spark desired rivalries amongst unified insurgent tribal support. Some light social science statistics work could help us determine what is the most effective thing to build in order to undermine local support for the insurgents... a clinic... a school... a mosque? So by implementing EBAO, there are plenty of eventual opportunities to develop PMESII based analysis to support the OPP – but it will require an intelligence regime that is resourced accordingly.

ISAF X Intelligence (4)

Shared Information Quality⁷⁵

There was no unity in the doctrinal application of EBAO in terms of intelligence analysis and therefore very little accuracy, completeness, consistency, correctness, and currency with regards to the application of PMESII and supporting the effects cascade. The shared information quality was sporadic and the implementation of EBAO into the intelligence cycle could further be frustrated by compartmental competition.

There was no systemic exploitation of PMESII within the intelligence cycle and the OPP – the intelligence cycle by direction found it self concentrating on tactical level incidents with the military dimension as the single most important data source for working analysis. The military dimension and ORBAT related tasking dominated the intelligence cycle, and this in turn would hinder the implementation and integration of EBAO in general.

(75) SAS 050 (2007):21.

ISAF X Intelligence (5)

Conclusion

EBAO intelligence requirements are significantly different from GOP based OPP requirements. Implementing EBAO effectively will require an expansion of existing military intelligence resources that looks at all stages of the intelligence cycle in relation to PMESII.

Chapter IV - Conclusions and recommendations

For the military, implementing EBAO correctly is about being more effective at war-fighting. As far as CA is concerned, implementing EBAO correctly is about being more effective at making peace.

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SECTION A: The OPP

How can Denmark ensure an effective implementation of the EBAO in the OPP?

The objective of this report was to present an overview of how the Danish Military may doctrinally contribute to CA capacity building, specifically by focusing on how to support the implementation of EBAO in response to the asymmetric understanding of modern conflict environments. The assumption being that an effective implementation of EBAO within the military C2 will increase CA capacity by ensuring the 'hardcore' of CA operations – the military dimension – reflects the CA philosophy and principles.

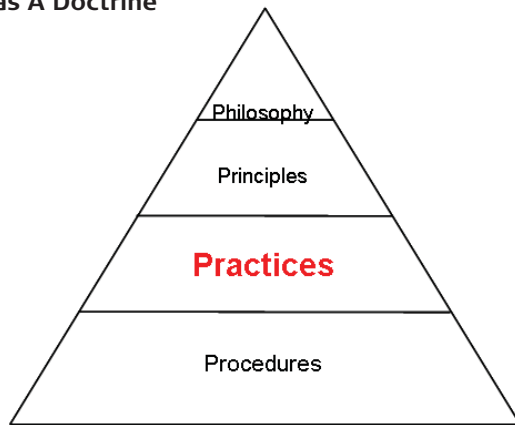
The effective implementation of EBAO within the OPP will improve the war fighting capability to better manage the challenges of asymmetric environments without undermining the ability to fight effectively in symmetric environments. PMESII provides this flexibility. However the opposite is not true, the existing GOP does not adapt well to the asymmetric environments.

The effective implementation of EBAO within the OPP will increase CA capacity by providing practices and procedures within the non-military dimensions of PMESII that can act as the foundation for future military- non-military cooperation.

The present state of the implementation of EBAO reflects doctrinal problems at the lower echelons of implementation. On the political/normative level the EBAO philosophy is fine in terms of acknowledging the realities of modern warfare and the complexity of non-military/military dimensional interaction. Furthermore the principals of EBAO on the strategic level provided ample clarity in terms of initiating the process as well as providing concrete guidance in applying those principals through PMESII. Problems start in the OPP on the operational level with practices in implementing EBAO – and the full exploitation of PMESII. The case studies indicate that simply integrating EBAO into current GOP based OPPs will be difficult.⁷⁶

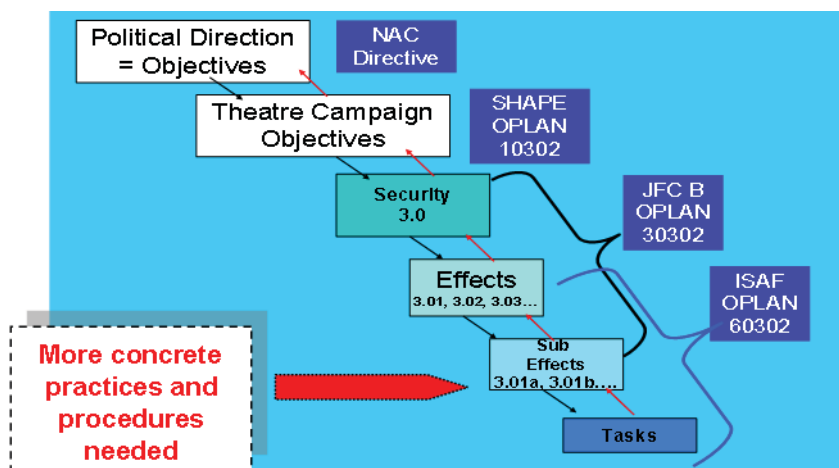
(76) For a direct critic of the more mechanical aspects of the American approach to EBO see Mattis (2008).

Fig. 18 EBAO as A Doctrine



If the practices on the operational level are not effective, it will be difficult to develop procedures on the tactical level that would support the principals of EBAO, and pushing EBAO more towards rhetoric than policy, and undermining our attempt to manage complexities of asymmetric warfare. Therefore focusing on managing the implementation of the EBAO doctrine at the operational level should be the first step. Quite simply EBAO needs to become a more 'concrete' doctrinally at the operational level and this will require EBAO specific training in terms of managing the EBAO from the strategic to the tactical levels. This could mean developing new organizational components to deal with EBAO implementation that reduce the complexity of the synchronization process between EBAO and the traditional GOP OPP practices. Better yet would be if a synchronization process between EBAO and the GOP was not necessary because the EBAO was doctrinally concrete enough in terms of practices and procedures to run the whole OPP 'show.' The argument being that PMESII makes room for the military dimension – the traditional GOP is largely reliant on the military dimension and does not make room for PMESII.

Fig. 19 ISAF Cascade Revisited



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When it comes to the question of ensuring the proper implementation of EBAO in the OPP there are two aspects upon which one can focus. The first is the actual management of the effects cascade within the OPP. As stated earlier the OPP is responsible for turning words into action, in the case of the effect cascade, the OPP is responsible for the planning and execution of actions that would bring about the desired effects. Understood, that the assessment of undesired effects, as well as post execution evaluation of produced effects would also be the responsibility of the OPP. The current problem is that the EBAO doctrine is not concrete enough; doctrinally speaking, the practices and procedures are not concrete enough to accomplish these tasks effectively.

The obvious establishment of more detailed practices and procedures will not in itself ensure improvement, if the personnel do not receive specific effect management training. If personnel are not trained in managing the effects cascade, they will likely resort to what they know best from the military dimension. And denying personnel this escape route is not as simple a task as it may sound; EBAO represents an overhaul of traditional military thinking of magnanimous proportions. Therefore diminishing the possible negative side-effects of the 'old school' thinking will be paramount to ensuring that the full application of EBAO practices and procedures does not become 'watered down.' Preferably the leadership of the OPP process must themselves be experts in the management of the effects cascade for war-fighting.

The second aspect related to practices and procedures that the analysis highlighted with regards to the implementation of the EBAO, was the importance of mental modeling. This has to do with the assessment stage of the EBAO process. The assessment itself unfortunately cannot be administered procedurally to produce better results, but is far more dependent on the cognitive abilities of the analysts. As far as integrating and exploiting the non-military dimensions of PMESII, the cognitive skills developed in applied social science method are paramount. Specifically, the ability to systematically produce relevant mental models to increase the overall effectiveness of the OPP output is paramount. EBAO inherently places the weight of modeling application on prediction in terms of calculating desired and undesired effects. The most common type of modeling for dealing with prediction, and one of the easiest to work with is iterative modeling based on hypotheses defined relationships. Essentially establishing a baseline hypotheses based on the existing situations, then adding new information to assess how the baseline hypothesis is affected to produce predictions. It is the essential methodological minimum to integrating the non-military dimensions into the OPP.

At a minimum Officers involved in the assessment stage of the EBAO should have an academic level education in method, however if all Officers involved in the EBAO process had the same skills in method, the overall process would benefit exponentially in terms of communicating better situational awareness and understanding. (See fig.10)

Finally, one should also point out that once the EBAO philosophical foundation of the

doctrine has been fully accepted (and all indications are that it has) there is no going back to the strict physical parameters that defined strategic reference for symmetrical warfare. One cannot simply turn off the non-military dimensions or, the cognitive domain for strategic reference once its existence is acknowledged. Conflicts that are more symmetrical than others may return, but that will only decrease the relevant input of the non-military dimensions, not make them disappear.

Therefore the eventual proper implementation and exploitation of EBAO in the OPP is paramount to the future of the Danish military's ability to fight war, and arguably specific EBAO management training and an academic education are the essential ingredients to guarantee the most effective implementation possible.

SECTION B: MILITARY INTELLIGENCE

How can Denmark ensure effective implementation of the EBAO in the military intelligence regime?

The intelligence cycles drive and support the OPP by providing the knowledge and analysis to the decision-maker. The intelligence cycle is directed by the principles of the war fighting doctrine, and will drive the collection activity both in terms of what information is required and how it is going to be acquired. Once acquired, it must be analysed and the products disseminated - driving the OPP.

The effective implementation of EBAO in the military intelligence regime will increase the capability of the OPP to fight more effectively within asymmetric environments without undermining the symmetrical capabilities.

The effective implementation of EBAO support in the military intelligence regime will increase CA capacity through the building up of a knowledge base to support the non-military dimensions.

The use of EBAO to manage the complexities of asymmetric warfare automatically sets new requirements for the military intelligence process. For the first, the expansion of the battlespace dimensions from one to six (PMESII) will greatly increase the scope of the direction needed in the intelligence cycle, immediately varying the range and type of collection assets required to produce the best results (unclassified sources-knowledge- will become more important.)

In terms of processing, if the analysts, military or civilian, do not have the necessary theoretical and methodological skills to effectively orient information gathered from non-military dimensions – products will be worthless in terms of exploiting the principals of EBAO. This would have an extremely negative impact on the overall OPP. It will perpetuate

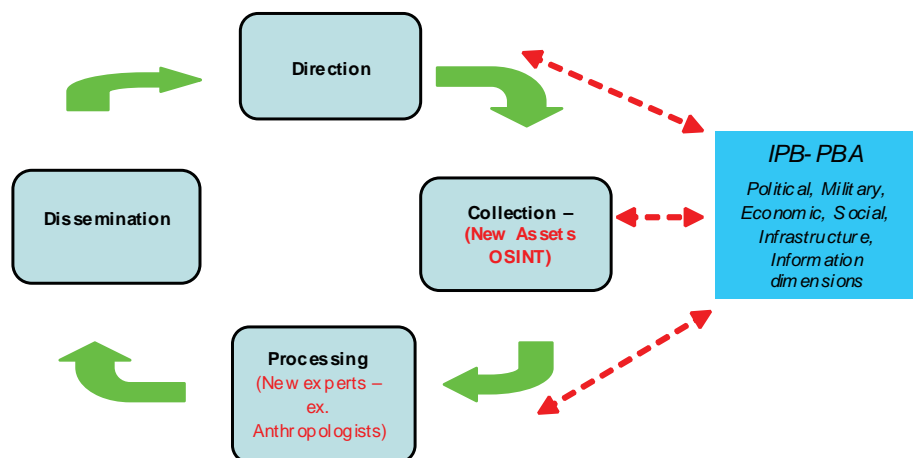
further lack of confidence in the EBAO approach by the actual planners and perpetuate an over reliance on the military dimension, that will in turn perpetuate further directional focus on the military dimension and a further neglecting of the non-military dimensions. When all is said and done, it becomes a self-perpetuating intelligence cycle condemned to undermining the principles of EBAO in the OPP.

As depicted by the OPP evaluation in the report, if the analysts are educated in the use of social science theory and method, in such basics as formulating hypotheses and iterative modelling, a self-perpetuating intelligence cycle promoting the principles of EBAO will be set in motion. They will produce EBAO relevant products in the OPP, and the planners will begin tasking (directing) for more information from the non-military dimensions. The result will be an intelligence cycle that promotes the self-perpetuation of the principles of EBAO in the OPP.

Ideally, for all officers participating in the intelligence cycles - and the OPP in general - would be a education in the basics of social science method as a minimum. That they have a BA in a variety of different subjects relative to PMESII- would be optimal.

Structurally the intelligence regimes should broaden their horizons and move away from the classic - if not often over sensational - reliance on classified intelligence. The asymmetric environment as understood by EBAO is far more complicated than what a few classified sources can deliver. Instead - focus should lie squarely on the building of the largest relevant knowledge base possible while remaining within the realm of manageability (timeliness must be maintained) to support the OPP.

Fig. 20 PM ESII Intelligence Cycle



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This would call for a more balanced review of collection resources in terms of classified assets versus unclassified assess. It is nice to know you have a satellite circling about to support upcoming operations with some current photos of the terrain. However, resources might better be spent by hiring 5 anthropologists to help with establishing databases of 'pattern of life' related analysis for different villages or regions, that can be used to find insurgent eventual meetings or targeting enemy leadership.

Existing analytical techniques within the processing stage also have to be expanded to support PMESII, and a formal process to catalogue various techniques and experience could be very beneficial to eventual training. (For example, cross-referencing i2⁷⁷ tree models of known insurgents in a certain territory, with an i2 tree model of tribal elders in the same territory could help us to determine who supports the insurgents and who doesn't.)

Apart from repeating the benefits of EBAO specific training and academic education, there should be targeted efforts to structure the intelligence community to better meet the challenges of implementing EBAO. For example, where it concerns broadening the knowledge base for supporting PMESII, national level efforts in managing data based information, and providing expert reach-back analysis of academic quality to an OPP would be very beneficial.

The intelligence culture in general should not go unexamined. There is nothing more disturbing to see a report developed within a PMESII framework, having its usefulness destroyed by over-classification.⁷⁸ When it comes to implementing PMESII within the intelligence cycle there is an unhealthy amount of stigma and sensationalism attached to the traditional intelligence process that if unchecked could undermine the exploitation of PMESII based analysis. We must try to re-launch the image of the intelligence structures and cycles as to minimize damaging internal Cold War stigmatism. If only to stop the insecure intelligence officer stamping it 'secret' – restricting database building-and access and literally 'single-handedly' undermining a complete PMESII based intelligence cycle in terms of evaluation and lessons learned.

Finally, the strongest critique related to EBAO is a critic of the American effects based operations interpretation (EBO) and can be found in a recent memo and guidelines put out by the US Joint Forces Command (USJFCOM) Commander in August, 2008. Here, a heavy critique was levied primarily against the mechanics of the American interpretation of EBO, and the role of targeting in determining operational planning and the limitations on the force Commanders intent. Therefore, where it concerns the mechanics of EBO as applied by the US Army – EBO will be dropped from doctrinal development- primarily to avoid confusion. However even here, Gen. Mattis points out that the comprehensive ap-

(77) Popular brand of analytical software producer for managing personality networks and link analysis.

(78) Shulsky and Schmitt (2002):102-103

proach of NATO – and its EBAO - is different. Furthermore the US Army will retain the PMESII approach to battlespace analysis as it has proven useful. Denmark (and NATO) should heed the warning as to the acceptable limits of EBAO in terms of driving operational planning: EBAO should support the Commanders decision-making process, and provide more flexibility for the Commanders' intent – not less. In any future development of EBAO in Denmark or NATO - this underlying principle should set the deterministic boundaries of an EBAO driven OPP.⁷⁹ The flexibility within the NATO EBAO, in theory, should come from the dimensional expansion and understanding of the battlespace allowing for a greater variety of actions and operational flexibility.

(79) Mattis (2008)

Recomendations

In the interest of building Danish CA capacities, Denmark should support the implementation of the EBAO doctrine within NATO and the Danish Defence Forces.

To support the implementation, Officers should receive EBAO specific training focused on managing the effects cascade and exploiting PMESII. Training should be made available at VUT I, and VUTII.

Based on the NATO C2 analysis framework used in this report, results indicate it would be beneficial to the implementation of EBAO if Danish Officers, at a minimum, receive an academic level education providing the equivalent in scientific method courses to the first two years requirement for a BA. The specific objective would be to improve skills working with hypotheses based modelling in the non-military dimensions, resulting in improved mental modelling skills and 'sense making ability.' With regards to implementation of EBAO and PMESII, it would be optimal if all Officers involved in an EBAO based OPP had a BA in subjects related to the non-military dimensions of PMESII.

Current international operations would likely benefit with a national intelligence analysis platform that provides 'reach back' analysis and knowledge for units sent out. It is not a question of providing more classified assets or analysis – it is a question of providing a broader range of information (knowledge base) properly processed by qualified analysts within the different dimensions of PMESII.

The intelligence community might copy NATOs' lead for moving away from the Cold War stigma attached to 'intelligence' in general by calling it for "knowledge management" within the OPP. Also indicative of the required platform expansion of unclassified collection and processing.

Development of such a platform would also constitute a CA capacity; one which would provide support for eventual CA activities, including supporting non-military actors involved in common conflicts. This particular aspect holds good prospect for Denmark that has a tradition of national cooperation amongst military and non-military Danish actors.

Further EBAO doctrinal research should be developed within Denmark and a NATO C2 framework to examine how the different branches of the Danish military, the Army, Navy, and Air Force can best implement EBAO effectively. Keeping the focus on PMESII driven OPP and not targeting driven OPP.

Finally, Denmark should establish a standing C2 assessment team of experts in the NATO C2 approach capable of providing support to eventual Chiefs of Staff at the Battalion and Brigade levels in constructing the most effective OPP relative to a mission. The C2 teams would also be responsible for keeping abreast of developments within the NATO regime of C2 research, and evaluating standing OPPs at home and in international operations. The C2 team could also be used to assess strategic intelligence structures and processes

supporting the OPP, including providing evaluation based advice on matching them to mission specific requirements. The C2 team can also eventually be used to evaluate ad hoc constructions of military – non-military actor cooperation within an OPP, in support of CA capacity building.

Note: RDDC, ILO is at present reviewing these recommendations and exploring possibilities for eventual supporting actions on various points. (POC: Dr. William Mitchell)

Fig. 21 Previous Recommendations from FOFT 2006

(FOFT RAPPORT NR. M-04/2006/pg.27)

In 2006, the RDDC and the now discontinued "Forsvars Forskningstjeneste" completed a report on EBO, and made the following recommendations:

1. Based on their conclusions they saw no reason for developing an independent EBO-implementation program in the Danish military. (Comment: The first experiments with implementing IBAO as an OPP framework already began in ISAF VIII (2006) after the 2005 Riga NATO Conference moved to continue EBAO development; this included incorporating the support of the JWC at Stavanger. The absence of an independent EBO implementations program in the Danish military reduces our ability to safeguard independent Danish input into the development phase of EBAO in the NATO regime (USA & UK prime influences.) Denmark's active role in both Iraq and Afghanistan conflicts give us some extra -weight in this regard if exploited.
2. Denmark should follow the development of EBAO and participate in relevant forums to secure implementation – when the concept was developed enough. (Comment: The research department was discontinued soon after their 2006 report.)
3. Related IT issues should be followed to ensure interoperability. (Comment: Research department was discontinued soon after their 2006 report; this report has no information about whether it was followed up.)
4. There are grounds for an EBO related evaluation of Officers (and others) education and training. (Comment: This report could not agree more. The conclusions of this report also support this recommendation, and should provide analytical support- based the NATO C2 approach- to make those original 'grounds' more concrete.)

Appendix A

C2 VARIABLE DEFINITIONS (SAS 050:129-149)

Achievement Orientation: Culture	A cultural dimension, characterized by the degree to which values such as assertiveness, the acquisition of money and material goods, and competition prevail in a society [derived from the original concept
Achievement Orientation: Personal Values	An individual attitude, characterized by the degree to which an individual values assertiveness, the acquisition of money and material goods, and competition [derived from the original concept 'Masculinity'].
Action Accuracy	Extent to which actions executed are directed to the intended purpose.
Action Appropriateness	Extent to which actions executed are the appropriate ones to achieve the intended purpose.
Action Completeness	Extent to which actions executed encompass the full scope of the plan or order.
Action Consistency	Extent to which actions executed are consistent with actions in an earlier timeframe.
Action Correctness	Extent to which actions executed without error.
Action Efficiency	Extent to which actions executed are efficient in the use of resources.
Action Precision	Extent to which actions executed are precisely related to the intended purpose.
Action Synchronization	Purposeful arrangement of actions in time, space and purpose. JCS Dictionary of Military and Associated Terms
Action Timeliness	Extent to which actions are executed at the time required by the plan or order (in the case of self-synchronising forces the plan could be an ad hoc arrangement between peers).
Adaptive Behaviour	Any process whereby behaviour or subjective experience alters to fit in with a changed environment or circumstances or in response to social pressure (Colman, A.M. (2003). A Dictionary of Psychology. Oxford, NY: Oxford University Press).
Adaptiveness	The ability to change work processes and the ability to change the organization. (Power to the Edge, 2003)
Agreeableness	Personality trait characterized by being pleasant, characterized by kindness, generosity, warmth, unselfishness and trust (Colman, A.M. (2001). A Dictionary of Psychology. Oxford, NY: Oxford University Press).
Alertness	State characterized by the preparedness to recognize and to react to stimuli. "Continuous Alertness": Selective recognition of and reaction to continuously or frequently occurring stimuli. "Vigilance": Recognition of and reaction to irregularly and infrequently occurring events.

Allocation of Decision Rights	The distribution of choices related to a particular topic under a set of circumstances or conditions disseminated to the international community, a society, an enterprise, or an organization.
Ambiguity of Situation	Extent to which information does not lend itself to interpretation.
Ambiguity Tolerance	The degree to which one is able to tolerate lack of clarity in a situation or in a stimulus.
Anxiety	The affective state characterized by apprehension, dread, distress, uneasiness (Reber, A.S. (1995). The Penguin Dictionary of Psychology. 2nd ed. London: Penguin Books).
Authentication	A security measure designed to protect a communications system against acceptance of a fraudulent transmission or simulation by establishing the validity of a transmission, message, or originator. JCS Dictionary of Military and Associated Terms
Awareness Accuracy	Appropriateness of precision of awareness for a particular use NCO CF
Awareness Completeness	Extent to which awareness necessary for understanding is obtained. NCO CF Awareness completeness includes awareness about capabilities, environment, forces, intentions, and mission.
Awareness Consistency	Extent to which awareness is consistent with relevant awareness at an earlier time period NCO CF
Awareness Correctness	Extent to which awareness is consistent with ground truth NCO CF
Awareness Currency	Time lag of awareness NCO CF
Awareness Precision	Level of granularity of awareness NCO CF
Awareness Relevance	Extent to which awareness obtained is related to task at hand NCO CF
Awareness Timeliness	Extent to which currency of awareness is suitable to its use NCO CF
Awareness Uncertainty	Subjective assessment of awareness uncertainty NCO CF
Cognitive Capacity	The amount of information the human brain can hold and process within a given time (Oxford Dictionary of Economics. Original reference: H. A. Simon, Models of bounded rationality, Volume 2, Cambridge, Massachusetts (MIT Press, 1982).
Cognitive Complexity	The degree to which a person is able to differentiate cognitive elements, and the degree to which these elements can be integrated or related to each other (e.g., Fransella & Bannister, 1977; Schroder et al., 1967; Wyer, 1964; citation (p. 782) from Van Hiel, A. & Mervielde, I. (2003). The Measurement of Cognitive Complexity and Its Relationship With Political Extremism. Political Psychology, 24 (4), 781-801

Cognitive Flexibility	An individual's willingness and ability to change in their understanding of a situation when confronted with new or contradictory information. Cohesion The degree to which team members are attracted to each other and motivated to stay in the team.
Collaboration Capacity	Team members' ability to working together towards a common purpose.
Collaboration Completeness	Includes collaboration about capabilities, environment, forces, intentions, and mission.
Complexity of Situation	The degree to which the relevant information is complicated (involves many factors), and involves intricate linkages; and is therefore difficult to understand.
Cooperability	The ability to engage in co-operative behaviour in a team, e.g. by information sharing and mutual support.
Cooperative Behaviour	The practice of people or greater entities working in common with commonly agreed-upon goals and possibly methods, instead of working separately in competition. URL: http://en.wikipedia.org/wiki/Cooperation [10.03.2005]
Decision Accuracy	Appropriateness of precision of decision (plan, directives) for a particular use. NCO CF
Decision Completeness	Extent to which relevant decisions encompass the necessary: depth: range of actions and contingencies included, breadth: range of force elements included, time: range of time horizons included. NCO CF
Decision Correctness	Extent to which a decision is consistent with ground truth. NCO CF
Decision Currency	Time taken to make a decision (start time - external signal). NCO CF
Decision Relevance	Extent to which a decision is significant to the task at hand. NCO CF
Decision Type	Extent to which a decision is based on rules, algorithms or human judgment.
Decision Uncertainty	Process of generating command intent. NATO COBP for C2 Assessment.
Education	Capacity to learn, A program of instruction of a specified kind or level. The American Heritage Dictionary of the English Language, Fourth Edition. 2004
Equivocality of Situation	Extent to which information can be interpreted in different ways.
Extent of Shared Information	Proportion of understanding in common across force entities, within and across communities of interest (Communities of Interest).
Information Accuracy	Degree to which information quality matches what is needed.

Information Completeness	Extent to which information relevant to ground truth is collected
Information Consistency	Extent to which information is consistent with prior information and consistent across sources
Information Correctness	Extent to which information is consistent with ground truth
Information Currency	Difference between the current point in time and the time the information was made available
Information Pedigree	Extent to which you know where information came from.
Information Precision	Level of measurement detail of information item.
Information Relevance	Extent to which information quality is relevant to the task at hand.
Information Richness	Measures that address the quality of the information content used by actors. (Understanding Information Age Warfare)
Information Service	Describes a range of processing services support than might be Characteristics provided to the force for continuance of operations. Each alternative builds on the previous.
Information Sharability	The extent to which an element of information is in a form or format understandable by all nodes in a network.
Information Source Characteristics	The traits of tools used to develop facts, data, or instructions in any form or medium. All information sources are reporters. They have the following characteristics: False alarm rate; coverage; persistence; spectrum (sensitivity); phenomenology DOD Dictionary of Military and Associated Terms
Information Timeliness	Extent to which currency of information is suitable to its use.
Information Transfer Approach	Movement and distribution of information.
Information Uncertainty	A fundamental attribute of war. Uncertainty pervades the battlefield in the form of unknowns about the enemy, the surroundings, and our own forces. (Power to the Edge)
Mental Models Confidence	The degree of subjective confidence that the mental model in use is appropriate to situation and task.
Mental Models Relevance	The extent to which mental model in use is appropriate to the actual situation and task at hand
Mental Models Richness	The breadth and depth of the range of models that can be brought to bear on the situation.
Mission Effectiveness	Mission Effectiveness is the degree to which a force accomplishes its assigned military mission. Examples of specific components are described in Maxwell, 1998.

Mobility	Extent to which a sensor is able to move from place to place while retaining its ability to fulfill its primary mission.
Plan Accuracy	Degree that the plan matches the Commander's intent.
Plan Completeness	Degree that the plan does not have missing components.
Plan Consistency	Degree of logical coherence of the plan, including elements that cut across functions or echelons.
Plan Correctness	Degree the plan is error free.
Plan Currency	The time lag of issuance of the plan
Plan Feasibility	Degree to which the plan is practicable.
Plan Precision	Level of granularity of elements of the plan.
Plan Relevance	Degree that the plan is pertinent to the Commander's Intent.
Plan Timeliness	Extent to which the plan currency is suitable for use. A suitable length of time used to develop a plan after recognition of the need for a plan.
Plan Uncertainty	Extent to which is it not able to know or predict ground truth based on the plan.
Planning Speed	Time required to develop a plan after recognition of the need for a plan.
Policy Effectiveness	The degree of success in influencing and determining decisions, actions, and other matters as related to societal and policy outcomes.
Problem Solving Style	An individual's problem solving style may be either divergent or convergent. Convergent thinking: bringing together or synthesizing of information and knowledge focused on a solution to a problem; characterized by synthesis of information and analytical, deductive thinking; logical, consciously controlled, reality-oriented. Divergent thinking: diverging of ideas to encompass a variety of relevant aspects, fluent production of a variety of novel ideas relevant to the problem (Reber, A.S. (1995). The Penguin Dictionary of Psychology. 2nd ed. London: Penguin Books).
Shared Awareness Accuracy	Appropriateness of precision of shared awareness for a particular use.
Shared Awareness Completeness	Extent to which awareness necessary forms a complete shared understanding. NCO CF

Shared Awareness Consistency	Extent to which shared awareness is consistent within and across Col.
Shared Awareness Correctness	Extent to which shared awareness is consistent with ground truth.
Shared Awareness Currency	Time lag of shared awareness.
Shared Awareness Precision	Level of granularity of shared awareness.
Shared Awareness Relevance	Proportion of shared awareness that is related to the task at hand.
Shared Awareness Timeliness	Extent to which currency of shared awareness is suitable to its use.
Shared Awareness Uncertainty	Subjective assessment of confidence in shared awareness.
Shared Information Accuracy	Appropriateness of precision of shared information for a particular use
Shared Information Completeness	Extent to which relevant shared information is obtained.
Shared Information Consistency	Extent to which shared information is consistent within and across communities of Interest (Col).
Shared Information Correctness	Extent to which shared information is consistent with ground truth
Shared Information Currency	Time lag of shared information.
Shared Information Precision	Level of granularity of shared information
Shared Information Relevance	Proportion of shared information that is related to task at hand
Shared Information Timeliness	Extent to which currency of shared information is suitable to its use.

Shared Information Uncertainty	Subjective assessment of confidence in shared information.
Shared Understanding Accuracy	Appropriateness of precision of shared understanding for a particular use.
Shared Understanding Completeness	Extent to which relevant shared understanding is obtained.
Shared Understanding Consistency	Extent to which shared understanding is consistent within and across Col.
Shared Understanding Correctness	Extent to which shared understanding is consistent with ground truth.
Shared Understanding Currency	Time lag of shared understanding
Shared Understanding	Level of granularity of shared understanding.
Shared Understanding Relevance	Proportion of shared understanding that is related to the task at hand.
Shared Understanding Timeliness	Extent to which currency of shared understanding is suitable to its use.
Shared Understanding Uncertainty	Subjective assessment of confidence in shared understanding.
Situational Familiarity	The characteristic of having encountered or seen, or having knowledge of a situation.
Understanding Accuracy	Appropriateness of precision of Understanding for a particular use NCO CF
Understanding Completeness	Extent to which Understanding necessary from understanding is obtained NCO CF. A completeness of understanding includes understanding of capabilities, environment, forces, intentions, and mission.
Understanding Consistency	Extent to which Understanding is consistent with relevant awareness at an earlier time period NCO CF
Understanding Correctness	Extent to which understanding is consistent with ground truth NCO CF
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Understanding Precision	Level of granularity of Understanding NCO CF
Understanding Relevance	Extent to which Understanding obtained is related to task at hand NCO CF
Understanding Timeliness	Extent to which currency of Understanding is suitable to its use NCO CF
Understanding Uncertainty	Subjective assessment of Understanding uncertainty NCO CF

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