Effects-based...what?

Effects-Based ... what?

EBO (Effects-Based Operations), EBAO (Effects-Based Approach to Operations), EBA (Effects-Based Approach), CA (Comprehensive Approach)... all these acronyms refer to the practice of contemplating solutions that rely on the use of effects to achieve success. Both NATO and non-NATO countries are currently developing their respective versions of the 'effects-based' concept. This work generates a lively debate, and the concept has achieved the status of a benchmark for current and future development not only of the Armed Forces, but also of the strategy of the State. The purpose of this paper is to familiarize the reader with the basic tenets of the concept. It also endeavors the discussion of these tenets and its purpose is to highlight some of the risks and advantages associated with them.

Sylvain Curtenaz[*]

A complex world[1]

War, as understood by Clausewitz, has its own permanent logic. However, in the century of "Unrestricted Warfare"[2], and in a world deeply transformed by technology in general, and information technology in particular, the grammar of war has indubitably changed:

"Even in the so-called post-modern, post-industrial age, warfare will not be totally dismantled. It has only re-invaded human society in a more complex, more extensive, more concealed, and more subtle manner. [...] War which has undergone the changes of modern technology and the market system will be launched even more in atypical forms. In other words, while we are seeing a relative reduction in military violence, at the same time we definitely are seeing an increase in political, economic, and technological violence. However, regardless of the form the violence takes, war is war, and a change in the external appearance does not keep any war from abiding by the principles of war.[3]

[...] there is nothing in the world today that cannot become a weapon, and this requires that our understanding of weapons must have an awareness that breaks through all boundaries."[4]

This change reflects a deeper trend that stresses the need to make a clean break from the mental straightjacket of the Cold War and industrial age warfare when it comes to threat and response. War, as a duel of wills, remains. The context however has been once more transformed, and it can be argued that

we live today in a permanent state of crisis regularly heated up by the use of not only military force[5] but also of other means: for example the cyber-attacks against Estonia in Spring 2007. If anything can be a weapon then military defense takes on a whole new meaning in the new security context.

A quick look at the achievements of the past decade underpins the premise that soldiers benefiting from the finest technology have generally failed to bring enduring strategic success.[6] Superior technology is no match against a superior will engaging in psychological attrition, or a divergent understanding of time and social values as its weapon of choice. Rapid decisive military victories remain of little use to those who forget that, in the words of F. Kagan, "[...] when you start to see war as a technical exercise and you stop seeing it as a fundamentally political activity, you lose sight of the obstacles you're going to face."[7]

The "effects-based way" (EBW) – a term I forged for the purpose of this article and that encompasses the family of definitions for EBO, EBAO, EBA, etc.– is a method of

considering a solution that focuses on a strategic end-state achieved through the linkage of actions, objectives and effects, harmonized among all the instruments of power of a State and across all levels of command and control (grand strategic to tactical), to prevent, contain and solve a crisis. EBW underpins the importance for all instruments involved to share a common understanding of the context, and to be aware of the consequences of their actions. A world of complex adaptive systems requires the ability to generate a variety of responses that use all available means. In such an environment, EBW is a valuable instrument to help us shape our security in the 21st Century.

The purpose of this paper is to familiarize the reader with the concept, mainly as it is understood in NATO. It also endeavors the discussion of its tenets and intends to highlight some of the risks and advantages associated with them. This paper opens with a brief history of the concept and a presentation of NATO's developments. It then discusses the concept's basic tenets, and concludes that the key to a successful EBW is a holistic approach to security that considers the consequences of our actions not only geographically, but in the broader strategic environment of the Information Age.

An American concept[8]

Relating the story of an idea is not without risks. One idea can have many owners, and the thought of combining various instruments of power to achieve an effect, to attack the opponent's psyche, or to strike multiple targets simultaneously, is not new to strategists and military historians.[9] Contemporary thinking on the use of effects

[*] Colonel (GS) Sylvain Curtenaz is the Partner National Liaison Representative for Switzerland to NATO HQ SACT, Norfolk (USA). He was deployed as the National Contingent Commander in Kosovo in 2002–2003 and he is a 2006 graduate of the U.S. National War College (National Defense University). This paper (completed in January 2008) does not reflect the current state of Swiss work on the effects-based concept. The views and opinions expressed in this paper do not represent any endorsement by the Swiss authorities, political and military alike. Address: sylvain.curtenaz@act.nato.int

[1] Complex vs complicated: A complicated system can be understood and mastered when broken into simpler single pieces. Although an airplane is made of 4 million parts, each part can be understood and integrated into the whole. A complex system is made of a number of other complex systems which cannot be fully understood, or even grasped without using experimentation and the simulation of the whole system of systems. – See: Gaëtan Girardin, "Analyse de Systèmes dans le cadre de l'approche des opérations basées sur les effets," Research Paper (v. 1.0), Military Doctrine Division of the Swiss Armed Forces Planning Staff, Sept. 2007.

[2] Qiao Liang and Wang Xiangsui, Unrestricted Warfare (Beijing: PLA Literature and Arts Publishing House, 1999), www.c4i.org/unrestricted.pdf.

[3] ibid., 6.

[4] ibid., 25.

[5] Raymond Sayegh, "Réflexions sur la guerre," Revue Militaire Suisse, no. 3 (2007), 40.

[6] Robert Gates, speech to the Marine Corps Association, August 6 [?], 2007.

[7] F. Kagan, quoted in Anna Mulrine, "Rumsfeld's unfinished plans," U.S. News & World Report, April 16, 2007, 34. Clausewitz wrote: "War is an instrument of policy. It must necessarily bear the character of policy and measure by its standards. The conduct of war [...] is therefore policy itself, which takes up the sword

in place of the pen, but does not on that account cease to think according to its own laws." – Carl von Clausewitz, On War. Edited and Translated by Michael Howard and Peter Paret. (Princeton: Princeton University Press, 1989), 610.

[8] See: Philipp S. Meilinger, "A History of Effects-Based Air Operations," The Journal of Military History 71, January 2007: 139-68, and Leonard D. Rickermann, Effects-Based Operations: A New Way of Thinking and Fighting (Fort Leavenworth: United States Army Command and General Staff College, 2002–03).

[9] See for example J.F.C. Fuller: "The grand-tactical object is the destruction of the enemy's plan [...]. The strength of this plan is, however, divided between the hostile army, government, and people, all of which should, if possible, be attacked directly, or indirectly by force of arms and by political action." – J.F.C. Fuller, The Foundations of the Science of War (London: Hutchinson & Co., 1926), 108 and: "Politically, the decisive point is the will of the hostile nation, and grand tactically it is the will of the enemy's commander. To paralyze this will we must attack his plan, which expresses his will – his reasoned decisions. Frequently, to do so, we must attack his troops, but not always; for he can be attacked in rear by the will of his own people and his own politicians, also he can be out-maneuvered and surprised." ibid., 110.

has evolved mainly from an Air Force oriented operational concept to the status of a strategic instrument in the hands of the state or of an alliance. Both NATO and non-NATO countries are working on their respective versions of such an effects-

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EBAO is closely associated to the development of air warfare.

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based concept.[10] It is fairly safe, however, to assert that the Effects-Based Approach to Operations (EBAO) was born in the USA as an offspring of the Effects Based Operations (EBO). While both names tend to be used indiscriminately in the early literature, EBAO generally now represents a widening of EBO, in scope as well as in the implementation.

EBAO is closely associated to the development of air warfare, more particularly to bombing operations. With the goal to improve the effectiveness of their operations, airmen looked for those essential capabilities nested in the adversary's economic organization which, when destroyed, should bring the war machine to a halt, and bring the adversary to his knees. During the Second World War, Allied analysts identified many of such capabilities in the German economy[11] but, missing the proper analytical tools, they failed to agree on which ones were pivotal to the Nazi war effort. In the years following the Second World War the U.S. military further researched ways to enhance and measure the effectiveness of military operations. The trend switched to counting "things" and to mistaking this count for effectiveness. On the ground, the "body count" was "the epitome of a measure of effectiveness gone wrong".[12] In the air, the U.S. Air Force (USAF) focused on tracking sorties, bomb tonnage, destroyed bridges, etc.[13]

The theoretical constructs of J. Boyd and J. Warden who focused on affecting the adversary's behavior by depriving the leadership of its ability to make decisions, issue and implement orders finally broke the deadlock.[14] In addition, with technology providing command and control, and also precision, stealth and speed to replace numbers and to increase mass, the air campaign of the 1991 Gulf War capitalized on the simultaneity of attacks in time, space and levels of war, thus operationalizing "parallel warfare". Building on the lessons of the air campaign, D. Deptula further developed the idea, replacing the traditional concept of annihilation by the one of control. Within this concept the neutralization of selected targets, by the law of causes and effect, aims at affecting essential system components, thus allowing gaining control over

the entire system of systems of the adversary with fewer and better used resources.[15]

As the U.S. Armed Forces entered the realm of Information Age Warfare, stressing the importance of the cognitive domain – the behavior – EBAO opened to the wider world of transformation.[16] JFCOM, the Headquarters in charge of Transformation, Doctrine, and Training, started working on the concept in the late nineties. It published various pre-doctrinal documents, including its Commander's Handbook for an Effects-Based Approach to Joint Operations. Although the Commander's Handbook has not been endorsed by any of the Services, the concept – albeit limited to the discussions of effects – has nevertheless been embedded in the latest versions of the major U.S. Joint Publications.[17]

To this date the Services of the U.S. Armed Forces, apart from sharing the view that this "body of thought is about a command 'approach' to national and military strategy,"[18] rather to operations only, or even targeting per se, have not yet come up with a common and shared level of understanding and integration of EBAO. The USAF is the most advanced in the implementation of an Effects-Based Approach (EBA) which now represents the core element of its doctrine.[19]

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[10] For her part, Switzerland has identified EBAO as the fundamental intellectual framework for the work done in the context of its future concept of Network Enabled Operations (NEO).

[11] Such as ball bearing factories, rail lines, oil production facilities, etc.

[12] Meilinger, 160–61.

[13] ibid.

[14] Warden's five rings are, from the core to the outer ring: leadership, organic essentials, infrastructure, population, fielded forces.

[15] David A. Deptula, "Firing for Effects," Air Force Magazine, April 2001, 46–53, and Effects-Based Operations: Change in the Nature of Warfare (Arlington: Aerospace Education Foundation, 2001).

[16] On EBAO and Transformation, see E.A. Smith: Complexity, Networking, and Effects-Based Approaches (Washington, D.C.: CCRP, 2006), and Effects-Based Operations: Applying Network Centric Warfare in Peace, Crisis and War (Washington, D.C.: CCRP, 2002?).

In the USA, transformation is generally understood as "the act of creating and harnessing a revolution in military affairs" [Hans Binnendijk, ed., Transforming America's Military (Washington: National Defense University Press, 2002), xvii.] that aims at shaping "the changing nature of military competition of cooperation through new combinations of concepts, capabilities, people and organizations" ([Donald H. Rumsfeld], Transformation Planning Guidance (April 2003), 3.) in order to maintain a technological and operational advantage.

As of para 4 c, The NATO Military Command Structure (MC 324/1), 7 May 2004, "transformation in the context of the Alliance is defined as a continuous and pro-active process of developing and integrating innovative concepts, doctrines and capabilities in order to improve the effectiveness and interoperability of NATO and Partner forces, as appropriate."

EBAO, the NATO version of EBW

NATO's version of EBW, the EBAO, derives from the Alliance's broader approach to security (i.e. not only military, but the need for coherence of all instruments of power in action), as defined in its 1999 Alliance Strategic Concept.[20] Considering that forces can be engaged in a broad array of operations and in a context where the delineation of peace and war is blurred, EBAO is the instrument used to guide the development of capabilities and operational concepts through the process of transformation, while framing the decision making at both the operational and strategic levels.[21] In NATO the "effects-based approach to operations is the coherent and comprehensive application of the various instruments of the Alliance, combined with practical cooperation with non-NATO actors (NNA) involved, to create effects necessary to achieve planned objectives and ultimately the NATO end-state."[22]

The development of information technologies and of technology as a whole is perceived as the key enabler for such a concept. Whereas interoperability remains of significant importance as an instrument, the ultimate goal is to achieve coherence of the Alliance's actions and end-states, from the political-military level down to the tactical level. This consequently requires that NATO forces achieve their own coherence – and the yet to be identified steps beyond it – while ensuring successful coordination with all the NNAs involved.

The efforts focus on improving "the three COs": COherence, COmprehensive and COordination:

a. Improving the coherence from end-state to action (end-state, objectives, effects, actions) across the entire board of NATO capabilities, and vertically from the political-military level down to the tactical levels.

b. Comprehensive application of NATO's own crisis management tools, drawing military and non-military tools together within NATO.

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[17] 3-0, Joint Operations and 5-0, Joint Operations Planning, 3-60, Joint Targeting.

[18] R. Thompson, Securboration Inc., e-mail message to the author, November 9, 2007.

[19] Air Force Doctrine Document 2: Operations and Organizations, 3 April 2007.

[20] NAC-S(99)65, The Alliance's Strategic Concept, 24 April 1999.

[21] The key military document that merged these ideas was the Bi-SC Concepts for Alliance Future Joint Operations, or CAFJO, from February 20, 2006. Although CAFJO has not been formally endorsed by the members of NATO, its key ideas, and more particularly EBAO, have been integrated in important documents like the 2006 MC Position on an Effects Based Approach to Operations (MCM-0052-2006), and the Comprehensive Political Guidance published at the NATO Summit in Riga, 29 November 2006.

[22] MCM-0052-2006, MC Position on an Effects Based Approach to Operations, 6 June 2006.

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c. Coordination with NNAs: understanding the different linkages between end state, strategic objectives, effects and actions as they are meant by all the actors, and coordinating them within NATO and with the NNAs.[23]

The work on the military component of EBAO is moving forward steadily. It reflects the shared views of Allied Command Operations (ACO) and Allied Command Transformation (ACT), the two Strategic Commands, and has the tacit support of the Alliance. The process of revising the Guidelines for Operational Planning (GOP) will also probably begin in the course of this year. At this stage however, EBAO is not approved NATO doctrine.

It is at the grand strategic level that the Alliance encounters the most difficulties in dealing with an effects-based concept. To support the execution of an EBAO, NATO discusses the implementation of an overarching concept, the Comprehensive Approach (CA). A CA is not only necessary to coordinate the Military and Political instruments of power within the Alliance, but also with the Military, Political, Economic and Civil (MPEC) elements of its individual members and of the NNAs. The use of the military instrument of power is not the sole guarantee of success, therefore stabilization and reconstruction, both during and post conflict, must be taken into consideration from the very onset of planning, thus requiring a strong role to be played by the North Atlantic Council (NAC). Such issues are sensitive among NATO nations, and despite their commitment to an enhanced civil-military cooperation the CA debate may last for a while as it touches on the very core of the understanding of the Alliance's role and mission, and would ultimately call for a review of the Alliance's internal organization and processes.[24] The

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NATO's EBAO Handbook

The latest NATO product on EBAO is the Effects-Based Approach to Operations Handbook. Published in December 2007,[25] this edition of the Handbook is considerably leaner than its original draft, and has been cleared of almost all references to the political-strategic level. This supports a previous assumption that, in NATO, EBAO refers strictly to the use of the military instrument, including the topic of "military/non-military harmonization."

Other documents and tools are in preparation under the auspices of the Bi-SC EBAO Working Group.

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road to making the Alliance's broad approach to security a comprehensive one remains a rocky path.

How does EBW work?

The idea

John Boyd's idea of the "OODA loop"[26] was to help understand and explain the dynamics of the decision cycle. This would allow not only faster decision-making, but action aimed at the disruption of the opponent's OODA loop, therefore affecting his capability to make decisions and act. The focus on both physical and cognitive capabilities, with kinetic and non-kinetic actions within an EBW follows a similar path. In addition, by widening the usual military planning scope up to a MPEC[27]-integrated strategic level, EBW provides more options within the strategic and the operational environments for selecting physical and non-physical areas where to fix and 'effect' an elusive adversary, as operational capability is no longer limited to military outputs but extended to the entire MPEC spectrum.

A successful EBW represents the harmonization of military and civilian activities across the band of the instruments of power in order to influence the behavior of all the actors, friends, foes, and neutrals. Planning, execution and assessment aim at generating the necessary effects at all levels. Using EBW requires thinking comprehensively about the situation while planning and acting with regard to the consequences.

EBW is output focused. It focuses on the ends and not on the means, or inputs. EBW relies on the principle that actions cause effects and that these effects influence the way one thinks and acts. Therefore, while EBW requires planners to deliberately plan actions in order to produce specific effects to alter the behavior and the capabilities of different actors,[28] it also requires that they be aware of the possible effects of their intended actions outside of their particular fields of interest. Any Effects-Based concept, whatever the label, begins with the understanding that undertakings have intended and unintended (as well as unforeseen) consequences and that all these consequences, especially in the complex and transparent environment of the Information Age, need to be taken into account during planning and execution. The end-state results from the achievement of various objectives. These objectives are the result of one or more effects. Actions generate effects aimed at the achievement of the objectives. A continuous assessment cycle, in the spirit of a results-based management,[29] constantly measures the progress towards the end-state, objectives and effects.

The fall of a tree

A couple of years ago, a tree falling on a power line crossing the Swiss Alps shut down Italy's power grid generating a national state of emergency. In an EBW understanding of this event, the tree is the "action". The state of emergency is the "effect:" the system of systems "Italy" reacts to the action by altering its shape. It is unknown however, prior to the crisis, which configuration, which shape, the system of systems will chose, how well this new configuration will perform, and what the resulting consequences will be. The analysis and the simulation of the system of systems "Italy" reacting to the action "tree falling" would bring some answers, as well as highlight unforeseen other possible effects.

Of course, the action "tree falling" not being the result of intent, this example involves neither objectives nor end-state.

The NATO concept[30]
a. Actors and the engagement space

EBAO develops in a wide operational environment referred to as the engagement space. The engagement space is part of the strategic context in which NATO will engage, but also where the interaction of the various actors may impact on the end-state.[31] This space consists of systems divided along the lines of what both the U.S. and NATO describe as PMESII, the acronym that stands for Political, Military, Economic, Social, Infrastructure and Informational.

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[23] ibid, para 16–19.
[24] Decision by the higher NATO authorities on The Future Comprehensive Civil-Military Interaction Concept (FCCMI), an important enabler of an improved vertical (inside of NATO), and horizontal (with the NNAs) civil-military cooperation has been expected for almost half a year already!
[25] Effects-Based Approach to Operations (EBAO) – Bi-SC pre-doctrinal handbook, Dec. 4, 2007. Further referred to in the text and the footnotes as the NATO's EBAO Handbook.
[26] Observe, Orient, Decide, Act.
[27] The U.S. uses the acronym DIME (Diplomatic, Information, Military, Economic) which may be replaced by DIMEFIL (DIME + Finance, Intelligence, Law Enforcement).
[28] Development of NATO's Effects-Based Approach to Operations (EBAO) – Bi-Strategic Command Discussion Paper, July 2, 2007, 2.
[29] [NATO], Engagement Space Assessment Handbook, v. 1.0, 10 August 2007, 4.
[30] This part is based on the NATO's EBAO Handbook. The reader interested in more details is advised to consult the Handbook.
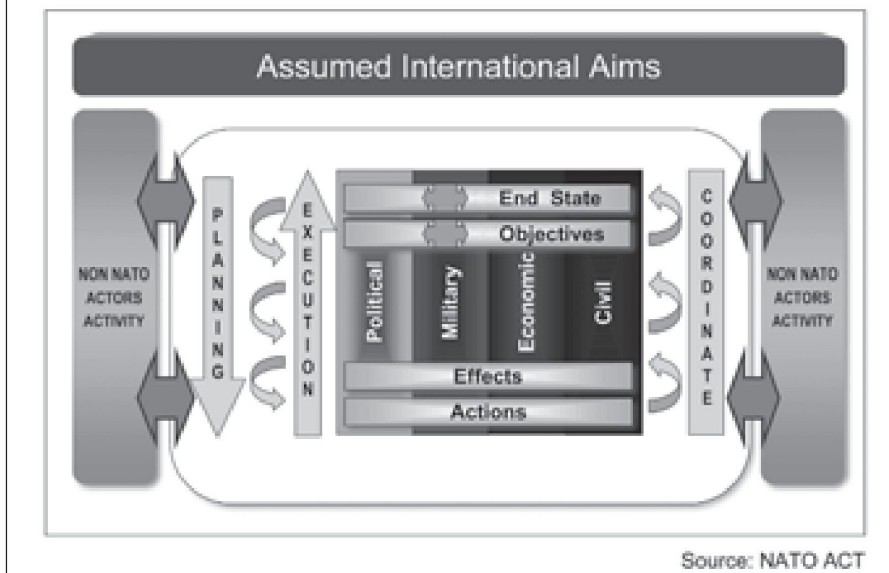[31] Bi-Strategic Command Discussion Paper, 3–4.

The illustration shows the relationship between the end state to be achieved, and the actions to be taken in order to generate the effects aimed at different objectives across the MPEC spectrum.

It is therefore accepted that a crisis can be described as a friction or clash of two or more systems of systems, and that other systems gravitate close to those. Neutral parties to the conflict and non-governmental organizations (NGO) all represent systems of systems whose interaction also needs to be taken into account. All these other systems are referred to as Non-NATO Actors (NNA).

b. End-state

End-state: "A single, agreed unambiguous concluding situation attained by the achievement of one or more strategic objectives determined by the [North Atlantic Council] NAC."[32]

The nature of the end-state is political, and the NATO end-state must be written in such a way that a range of acceptable engagement space behavior is described.[33] The instruments of power (MPEC) contribute to the end-state by achieving objectives in a supported/supporting role. In NATO, an objective is a "clearly defined and attainable goal in the engagement space, essential to military commanders' plans. Objectives are achieved by the outcome of an aggregation of intended effects and are derived from the end-state. Their completion should lead to the achievement of the end-state."[34]

c. Effects and actions

Effect: "The cumulative consequence of one or more actions across the engagement space that leads to a change in the situation in one or more domains. Aggregation of intended effects leads to the achievement of objectives."[35]

Effects play the central role in EBAO. They link objectives to actions. Actions are the dynamic elements that produce effects. In the NATO jargon, an action is "the process of engaging any Alliance instrument at each level in the engagement space in order to create (a) specific effect(s) in support of an objective."[36]

Effects are directed either at the capabilities or at the behavior of actors in order to induce or prevent change, or to thwart the use of capabilities. Effects can be primary or subsequent as they cascade from other effects, physical, as well as non-physical ones. Although the intent is to produce effects that are desired, actions may also generate undesired ones. Effects, desired and undesired, are achieved directly or indirectly (i.e. through other effects). The attainment of the objectives is the final measure of the success of the effects.

Planning encompasses the definition of the desired effects to be achieved, as well as the identification of undesired effects to be avoided, and that of the effects generated by other instruments that could support or impact the objectives. Further analysis of the effects supports the designing of courses of action. The goals for assessment are produced while the effects are defined.

d. The four activities of EBAO

To put this construct in motion, EBAO requires four activities, known in NATO as 'functions': Knowledge Development (KD), Planning, Execution and Assessment.[37] The implementation of these functions in the decision making process, as well as the development of adequate procedures and tools, for example the socio-cultural and behavioral analytical and simulation softwares SEAS VIS and NRT,[38] currently represent the main challenge generally encountered in the realization of EBAO.

1) Knowledge Development (KD)

Knowledge Development provides a comprehensive understanding of the engagement space which is accessible to all from a common pool of knowledge.[39] Knowledge is not only directed at the opposing party's capabilities, but also towards its behavior (i.e the motives for/behind its actions). The own party (Blue), as well as the neutrals (Green), are also considered in the KD process. This, according to the theory, can be achieved through the systemic analysis of the different systems constituting the engagement space, or PMESII. Systemic analysis is a permanent process supported by special cells, the Red, Green and Blue Teams. They focus on the key actors and contribute to the simulations, the mission analysis and the wargaming by elaborating their own effects and their own reactions to the effects applied to the systems they represent.

2) Planning

NATO considers EBAO as an enhancement of its Operational Planning Process (OPP); an add-on that will improve the ability to plan. Planning and execution strive to achieve the coordinated and synchronized application of actions, in the form of missions and tasks, to generate the desired effects and attain the objectives. A continuous cycle of assessment ensures that actions, creation of effects, and achievement of objectives all progress towards the accomplishment of the end-state.

3) Execution

NATO states that "execution in an EBAO requires the command and control of military forces and interaction with other non-military means to conduct integrated, coordinated or synchronized actions to create desired effects."[40] Generating effects is the responsibility of the military-strategic and of the operational levels. To be successful, execution requires the feedback provided by the fourth function of EBAO, the assessment. Through this process, ongoing operations can be adapt-

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[32] NATO's EBAO Handbook, 2-1.
[33] From the draft version of NATO's EBAO Handbook, June 19, 2007, 24.
[34] NATO's EBAO Handbook, 2-1.
[35] ibid.
[36] ibid.
[37] Also referred to as Effects-based planning (EBP), -execution (EBE), and -assessment (EBA).
[38] www.simulexinc.com
[39] Bi-Strategic Command Discussion Paper, 6. / NATO's EBAO Handbook, 2-7.
[40] NATO's EBAO Handbook, 2-8.

ed, and the plan amended. In addition, execution also focuses on the synchronization of actions and actors across MPEC.

4) Assessment

EBAO depends upon developing the most appropriate measures of effectiveness (MoE)[41] as well as of performance (MoP). Assessment is crucial to the success of execution, and more generally to the concept of EBAO itself. Assessment ensures the necessary adaptations of plans at all levels as the adversary systems react to the effects applied to it, in order to capitalize on gains and mitigate the consequences of undesired effects. It is recommended to share MoE and MoP across all levels of commands and the MPEC in order to enhance awareness and facilitate synchronization. On the military side, assessment does not replace, but rather complements, and is enriched by, what the U.S. call combat assessment.[42]

Measures of Effectiveness (MoE)	"Was the intended new system state – the desired effect – created?" Focus is on how system behavior or capabilities have been affected by actions. Apart from describing the system element it applies to and how it is expected to change, an MOE must be observable and quantifiable, and must include a threshold value to describe the effect status.
Measures of Performance (MoP)	Focus is on the evaluation of the actions to determine if they are accomplished or not.

The assessment criteria are developed during the planning and implemented concurrently with the plan. Assessment aims at providing an evaluation of progress towards the achievement of the objectives and of the end-state. Therefore, assessment focuses on the effects and on the actions.

The tenets of EBW

The fundamental, and original, tenets of EBW are threefold: the systemic approach, causality, and reliance on technology.[43] Technology aims principally at achieving information dominance. It supports EBW by providing knowledge development, knowledge sharing and planning tools designed at facilitating the analysis and sharing of data. Technology works as a powerful enabler from which EBW reaps the benefits as the tools continue to evolve.[44]

The systemic analysis of the engagement space, a process known as System of Systems Analysis, or SoSA, is central to KD. SoSA is an analytical methodology aimed at providing the user with a view of the interconnections between the actors and the issues. It mostly answers the "how" systems work. The U.S. and, so far, NATO have focused on structuring the environment according to six elements,

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The U.S. and, so far, NATO have focused on structuring the environment according to six elements, Political, Military, Economic, Social, Information and Infrastructure, or PMSEII.

Political, Military, Economic, Social, Information and Infrastructure, or PMSEII. PMSEII is built on the assumption that all systems and their components are linked together, and therefore are not fields without common elements.[45] The product is a set of models which represent the environment and support decision making. The same way field commanders use sketches and maps to better understand the terrain, decision makers of the 21st Century can use models to better grasp the systems' complexity.

A system can be defined as "a functionally, physically, or behaviorally related group of interdependent elements, which forms a unified whole."[46] Each system is therefore coherent, and so is the system of systems. This coherence becomes a focus for effects in any attempt to affect control over the opponent. The role of analysis is to highlight those links and actors that stand out, while supporting the understanding of the dynamic behavior of systems. Using a collaborative and permanent process, SoSA aims at identifying and understanding key system elements, nodes, leverage points, relationships, dependencies and vulnerabilities by which capabilities, perceptions, decision making and behavior could be influenced. Systemic analysis therefore brings along the need to rethink the concept of the Center of Gravity (CoG). Is the CoG still needed in such a construct when it can be argued that it can either be a node, a link, a system, a system element, or the fabric that keep elements together thus leading to a endless multiplication of CoGs, or its melting into one single entity?[47]

In a systemic approach the link between the action and the objective is a causal link. A basic underpinning of EBW is that all causal links between intended effects and planned actions are deduced using some logical construct or analysis. All causal links should be sensibly viewed as planning assumptions and not as planning facts in order to avoid planning the unknown, for a crisis is neither linear nor predictable in nature. The view that it is possible (indeed a necessary requirement for EBW) for all causal links to be identified with high 'assurity' appears to be misguided, as is the assumption of linearity in effect-chain modeling.[48] In addition, effects may not yield results immediately and it is difficult to appreciate this lapse of time, especially when applying cognitive effects. Delay, continuance of validity, 'assurity',[49] and the mainte-

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A crisis is neither linear nor predictable in nature.

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[41] Meilinger, 164.

[42] Combat assessment is composed of 3 related elements: battle damage assessment, munitions effectiveness assessment, and future targeting or re-attack recommendations. (Commander's Handbook for an Effects-Based Approach to Joint Operations, IV-9).

[43] Marc Humbert, "Effects Based Approach to Operations; Faire de l'EBAO ou ne pas en faire?," Paper, [2007].

[44] The U.S. tested ONA and the simulator SEAS in Afghanistan. The German KD concept and tools have been tested in Kosovo.

[45] Knowledge Development. Draft Concept, Spring 2007, 7.

[46] NATO's EBAO Handbook, B-3. This definition draws directly from the U.S. definition (JP 3-0, Rev.2): "A functionally, physically, or behaviorally related group of regularly interacting or interdependent elements; that group of elements forming a unified whole. Systems associated with national security include political, military, economic, social, informational, infrastructure, and others."

[47] J. Neureuther, Bundeswehr, e-mail message to the author, Nov. 22, 2007; R. Thompson, Securboration Inc., e-mail message to the author, November 9, 2007. See also Robert Umstead and David R. Denhard, "Viewing the Center of Gravity through the Prism of Effects-Based Operations," Military Review, Sept.–Oct. 2006: 90–95.

[48] R. Thompson, Securboration Inc., e-mail message to the author, November 9, 2007. It is also worth noting that, in the earlier stages of EBAO development, Paul K. Davis proposed that "different degrees of probability" be part of the definition. Paul K. Davis, Effects-Based Operations: A Grand Challenge for the Analytical Community. (RAND: 2001), 7.

[49] Redvers Thompson. Effects-Based Approach to Operational Design: Toward a new paradigm for campaign design & tactical planning. Briefing. 8 May 2007.

By realizing the synthesis of the context, of the knowledge of the own capabilities, and of the capabilities of the opponent with the effects models, Operational Net Assessment (ONA) provides the planners with options for action by identifying actions that could be taken against the various PMSEII nodes. These options are expressed in terms of effect-node-action-resource links (ENAR). ONA can thus help to plan not only faster, but to produce more comprehensive and better synchronized plans.

ONA is a "knowledge-centered process for leveraging information and expert analysis for the operational needs commanders and decision makers, yielding a product that enables more effective planning."[50] ONA integrates people, processes and tools using "multiple information sources and collaborative analysis to build shared knowledge of the adversary, the environment, and ourselves."[51] It does not replace the work of intelligence, but supplements it by "filling in the knowledge gaps on non-military systems and nodes […]."[52] A synchronization of intelligence, more precisely of Joint Intelligence, Surveillance and Reconnaissance (JISR) with ONA is necessary, "ONA and JISR [being] intended to be mutually supporting processes that develop complementary products."[53]

To support ONA, and ensure collaborative and integrated planning, the U.S. have developed the Collaborative Information Environment (CIE), "A virtual aggregation of individuals, organizations, systems infrastructure, and processes to create and share the data, information, and knowledge needed to plan, execute, and assess joint force operations and to enable a commander to make decisions better and faster than the adversary."[54]

nance of effects have therefore to be taken into consideration. KD and assessment are tools to overcome linearity; the one by the constant systemic evaluation of all the relevant factors within the engagement space, by considering change over time, and by highlighting subsequent effects; the second, by tracking the effects, and both, ultimately, by feeding the planning process.

Nothing can however completely lift the "fog of war" or reduce Clausewitzian friction to a mere disturbance: "Human limitations, informational uncertainties, and non-linearity are not pesky difficulties better

technology and engineering can eliminate, but built-in or structural features of the violent interaction between opposing groups we call war."[55] The human element remains in the loop, even if the decision maker can rely on a variety of tools and instruments to support him. Both the users and the developers of KD and assessment have to solve this challenge to ensure a successful implementation of the EBW. In addition, they will have to clearly define the roles of KD and of intelligence and establish how they share their processes and outputs.

Constituents of a Nation or Society

Source: DCDC, U.K.
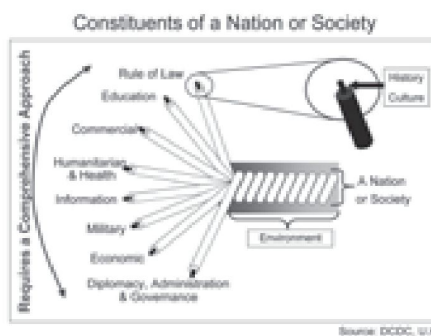
History plays an important role in the way cultures and societies develop. Such a complexity is not only the focus of EBW, it also represents the major hurdle it has to deal with: The main risk inherent to SoSA is mirror-imaging the other systems with the one to whom the planners belong (e.g. the belief that all societies strive at democracy). This can easily be made worse if planners, fed by machines, mistake this virtual reality for the truth! In addition, socio-cultural elements cannot, or only with ex-

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The human element remains in the loop.

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treme difficulty, be measured in a way to support assessment. Finally, stating the endstate is setting the "public standard for success or failure,"[56] and our socio-cultural understanding of victory and defeat may well obstruct the setting of proper standards especially when engaged in a struggle not fought on a common moral and ethical ground by all actors.

So what?

If EBW is burdened with the fragility of its own basic tenets, why keep it? Initially, EBW was designed with expeditionary operations in mind where, as during the two Gulf Wars, a rapid decisive military victory was the goal. The concept stood the test, and demonstrated its validity. Effectiveness of the military instruments is no substitute to insufficient planning however, and we

Targeting is essential to EBW. It defines the selection of 'targets', physical and non physical, to which apply kinetic or non-kinetic actions in order to achieve the desired effects. The process also encompasses the gathering and analysis of the actions' results.

Targets are to be found in the entire PMESII of all actors, and the ways and means to engage them depend of who engages what (diplomatic effort, information campaign, distribution of humanitarian aid, destruction of selected infrastructure, etc.). A target can be engaged by many instruments of power in a synchronized manner, or with one in the lead and one or more in a supporting role. Targeting also highlights the important role that non-kinetic instruments like Information Operations can play in an EBW.

The major issue with targeting lays in the word itself, which is generally associated with the use of kinetic means in order to achieve destruction. In EBW, the meaning of targeting is as wide as the range of options created by the instruments of powers and by all other associated actors. Therefore, in order not to hurt non-military sensitivities there is a need of a new term to divorce the "targets" from the "fires"… even if the world of economy and media, for example, freely uses the "T" word (e.g.: target audience) without raising any complaints![57]

must not forget that our values, and with them our understanding of war and peace, have evolved since the end of the Second World War. In a world where the U.N.

[50] Pieter W. Wielhouwer, "Towards Information Superiority; The Contribution of Operational Net Assessment," Air & Space Power Journal, Fall 2005, 85.

[51] Doctrinal Implications of Operational Net Assessment (ONA) (2004), 1.

[52] Wielhouwer, 89.

[53] ONA, 17.

[54] Operational Implications of the Collaborative Information Environment (CIE) (2004), 3.

[55] Barry D. Watts, Clausewitzian Friction and Future War, McNair Paper 52 (Washington, D.C.: Oct. 1996), 122, quoted in Colin S. Gray, Modern Strategy (Oxford: Oxford University Press, 1999), 246.

[56] Ralph Peters, "Speed the Kill: Updating the American Way of War," in Rethinking the Principles of War, ed. Anthony Mc Ivor (Annapolis: Naval Institute Press, 2005), 99.

[57] The Swiss Military Doctrine Directorate uses the term "Ziel- und Wirkungsanalyse" (ZAWiA) to describe the process as it better highlights the importance of the process that leads to the selection of not only targets, but also of the means to 'effect' them.

stands as the symbol of a shared interest in stability, the measure of success is no longer the military "victory" only but the success-

The measure of success is no longer the military "victory" only.

ful achievement of the stabilization and the reconstruction efforts that follow the mastering of the crisis considered in its geo-strategic, socio-cultural and economical complexity. This might be particularly be true in war, but also in emergency response situations such as a tsunami or an earthquake. States are no longer the sole actors. Intergovernmental organizations, international organizations, non-governmental organizations (NGO), the private sector, etc., are all involved and act under the watchful eye of the public opinion and its spontaneous, or instrumented, actions and reactions.

EBW has naturally evolved to embrace the challenge of achieving more lasting and durable outcomes in the long term approach to prevent, mitigate and/or resolve crises. Unfortunately, EBW means different things to different people, and the reader should always consider the context when dealing with effects-based concepts. EBW is the method, the way, of solving an issue with military means: The responsive, yet discriminating use of force, or threat to use force, in a situation where results must be achieved at the cost of fewer casualties and limited collateral damage in order to avoid negating post-conflict stabilization and reconstruction efforts. At the operational level, this is the path currently followed by the development of a Multinational EBAO where Sweden plays an important and active role. The intent is to come up with an improved conceptual framework that would build on the broader strategic perspectives that have emerged from EBAO, and contribute to a multinational agreed concept where the military version of EBW would benefit from the greater involvement of the other instruments of power, as well as from independent actors like the NGOs.[58]

EBW is also a method to analyze complex situations and develop proper responses. Acting in an effects-based way is not, and should not, be limited to the military! Both as an instrument, and as a conceptual framework, EBW therefore benefits from being imbedded in a wider framework to guarantee the strategic significance of its effects. The CA is this framework. As for EBW there exist various definitions of the CA, but at least one understanding, namely the sharing of a common goal and strategy by all the instruments of power. In such a

whole of government, the CA contributes to addressing the complex and global issues of the 21st Century with a global and synchronized response.

The CA, like EBW, rests on at least three enablers: a common understanding of the situation, a synchronized response and a clear C2 structure. The CA necessitates

The Effects-Based way is not limited to the military.

sharing all the instruments of power's understanding of the context, of the end-state, and of the way to achieve outcomes that is output-based. The CA is not only a tool to produce a response, but an instrument to prepare for the crisis. It clearly raises the

MNE 5

The major international venue for the developing of EBW and the CA is the US-led series of experiments known as the Multinational Experiment series (MNE). MNE 5 began in Spring 2007 and will last until Spring 2009. The climax of the experiment is a capstone integrating event which will benefit from the lessons learned during various minor and major integrating events, all lead by the participant in charge of the focus area tested at this occasion. The central theme in MNE 5 is a comprehensive approach applied in a crisis scenario based on Africa. The purpose of the experiment is to develop and broaden the understanding of both a crisis and the tools to solve it, as well as to develop the necessary capabilities.

MNE 5 key players and their focus areas are:
France: Multinational Interagency Strategic Planning
Finland: Shared Information Framework and Technology (SHIFT)
Germany: Knowledge Development, and Coalition Information Strategy/Information Operations
Sweden: Information Exchange Architecture Technology
U.K.: Cooperative Implementation Planning
USA: Cooperative Implementation Management and Evaluation, and Multinational Logistics
NATO ACT: Effects Based Approach to Multinational Operations, and Multinational Effects Based Assessment.

Switzerland is not involved in MNE 5.

level of discussion and understanding from platforms to strategy. The human is the major hurdle in the application of a CA: Bureaucracies build cultural and administrative stovepipes, while the horizon of most politicians remains limited to their time in office. In addition, the CA requires thinking about the roles of the instruments of power in new supported/supporting terms. In the past, the military played the key role and was supported. Nowadays modern crises often require a different command and control structure to implement the CA. Having, for example, the Foreign Affairs in charge of all peace-support operations may appear preposterous to some but it makes perfect sense in the current security environment for the military to be the supporting element.

Domestic and external security being increasingly interwoven, interoperability requires that all must be ready to operate in a strategic and operational environment shaped by EBW and the CA, at home and abroad. Success requires understanding the

The CA is not only a tool to produce a response, but an instrument to prepare for the crisis.

context, achieving information dominance, addressing both the physical and cognitive domains, and being aware of the consequences of one's actions. Nothing new, indeed, but a knowledge surely frozen in the misperceptions induced by the force-on-force focus of the Cold War.

Conclusion

When dealing with EBW, there is a risk of confusion. Not only has the concept evolved from an operational concept to a way of thinking (which underpins current doctrinal explorations) but there exist many understandings and many versions of the concept, all generating their own terminology. It also encompasses the strategic level, highlighting the need for the whole of government to adopt the comprehensive approach. Finally, although already partly implemented, the concept is still subject to development and experimentation.

Successful crisis management in a complex transnational environment requires the proper tools. Built on logic of causes and effects, EBW is not about weapons or platforms: it aims at depriving the opponent of its ability to act by affecting its es-

[58] A Multinational Conceptual Framework for EBAO, HQ Swedish Armed Forces, 20 January 2007, draft paper.

And Switzerland?

The doctrinal developments in NATO influence all of Switzerland's neighbors, directly, as members of the Alliance, or indirectly as members of the E.U. and of the Partnership for Peace. EBW, and ultimately the CA, have thus reached the level of benchmarks. These concepts being pervasive in the doctrinal thinking of all major Western countries, Swiss planners have to understand their strengths and weaknesses. EBW-related concepts and ideas were experimented with during the November 2007 command post exercise "STABILO" conducted at the military-strategic level.

Switzerland is accustomed to using the military in a supporting role when dealing with domestic issues like natural catastrophic events. It also kept the institutional knowledge of her "Total Defense" concept alive through various institutions, including its civil defense organization. The country therefore owns a reservoir of best practices that would be most helpful in the definition and implementation of EBW and of the CA.

However, the strategic instruments which were put in place in the nineties and in the wake of the 1999 Report on the Security Policy of Switzerland[59] will not reach their full capability without a cultural change in the hearts and minds of the people, the State's servants and the politicians. In the century of unrestricted warfare, where the delineation between peace and war is blurred, if not erased, deterrence takes on a new meaning: It is not the number of battalions, but the ability of the State to detect, assess and handle risks, and counter threats holistically that counts first.

sential capabilities as well as its behavior by using effects that are either physical or cognitive. The power of EBW lies beyond force-on-force application: The bending of the opponent's will is facilitated by the synchronized action of all instruments of power. EBW offers the opportunity to not only re-discover the lost meaning of strategy[60] but also reconcile the civilian and the military in the conduct of crisis management. The waves of ideological and humanitarian "crusades" of the post–Cold War subsided,[61] EBW can help us further General Sir Rupert Smith's reflections on the use of force in this Century, this post–Nation and post-industrial era that he defines as that of the "war amongst the people":

"[…] it is not merely the militaries that need to be reformed for war amongst the people. We must adapt all our institutional patterns of thought and logic. Our institutions, for example the ministries, armed forces and alliances, have processes that are founded in the experience of industrial war, which structure thinking and tend to lead information to be marshaled and assessed in terms of that model of war. The institutional pattern of thought needs to change to one in which the use of the military force is routinely considered as one of the possible supporting measures for other endeavors and vice versa. In these circumstances force may not be an act of last resort, and it will need to be applied precisely within the greater context of the measures it is intended to support."[62]

With the moral ground as the crucible of success and failure, Lani Kass, Professor of Strategy at the National War College, and a proponent of Clausewitz, always insisted that even before they consider the Ends, Ways and Means, her students should first define the nature of the crisis and their motives to enter and sustain the fight. EBW stresses the value of the holistic and continuous assessment of the context, using a system of systems perspective. It aims at the

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The bending of the opponent's will is facilitated by the synchronized action of all instruments of power.

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planning and delivery of a strategic end-state that will guide all further planning, execution and assessment. It thus forces us to focus first on what is to be achieved instead of on the means to achieve it. It is a way of thinking that encourages a broader and longer term view of the context, and to dealing not only with the symptoms, but with the underlying causes of crises.[63]

The key to EBW, and of course to the CA, is to agree to think differently about security, and to consider the consequences of our actions not only geographically, but in the broader strategic environment of the Information Age. A better grasp of the context and of the environment also entails understanding our own strategic and war fighting cultures, and defining who we are. If we do not, others will, and at our expense: The first line of defense is in our minds and in the fabric of our society. Not at the border.

[59] Report of the Federal Council to the Federal Assembly on the Security Policy of Switzerland, 7 June 1999.

[60] Hew Strachan, "The Lost Meaning of Strategy," Survival, no. 3 (2005): 33–54.

[61] Patrice Buffotot, "Politique d'intervention et pensée stratégique," Revue Militaire Suisse, no 3 (2007), 35.

[62] Rupert Smith, The Utility of Force. The Art of War in the Modern World (New York: A. Knopf, 2007), 397.

[63] A National Perspective to Baseline Effects-Based Matters, DCDC, Briefing, Nov. 19, 2007.