



<http://www.diva-portal.org>

Postprint

This is the accepted version of a paper presented at *21th International Command and Control Research and Technology Symposium (ICCRTS), 6-8 September, London, UK.*

Citation for the original published paper:

Andersson, I. (2016)

Operations assessment: focus on reality rather than the plan.

In: *21st International Command and Control Reserach and Technology Symposium (ICCRTS): C2 in a Complex Connected Battlespace* International Command and Control Institute

N.B. When citing this work, cite the original published paper.

Permanent link to this version:

<http://urn.kb.se/resolve?urn=urn:nbn:se:fhs:diva-6527>

Operations assessment - focus on reality rather than the plan

Isabell Andersson

Swedish Defence University

Abstract

Since no plan survives contact with reality, during the execution of a military operation it might be necessary to re-plan the operation. In order to decide whether, and when, re-planning should be initiated a feedback process is needed that provides the commander with information about the progress of the operation, and an assessment of whether the operation is leading towards the overarching goals or not. The operations assessment process is part of such a feedback process.

The current method (in e.g. NATO) operations assessment is focused on the accomplishment of planned actions and on the effects in the operational environment system. A data collection plan is established during development of the operational plan which specifies which and how data should be collected. Thus the “questions” the operations assessment process poses towards the environment are tightly connected to critical elements of the operational plan.

If the plan, however, starts to become obsolete due to unforeseen changes in the operational environment, there might be a risk that the assessment process, grounded in the plan, neglects information that is critical for decisions about re-planning. This paper suggests an alternative approach to operations assessment that is based on an idea of separating the operations assessment plan from the operational plan. Such a separation would focus the assessment process on the evolving operational environment, thus reducing the risk that unanticipated threats, or opportunities, will be overlooked and re-planning is overdue.

Keywords: operations assessment, execution, feedback

Introduction

Since no plan survives contact with reality, during the execution of a military operation it might be necessary to adjust the plan or even re-plan the whole operation in order to meet operational objectives and to eventually reach the end state. To decide whether, and when, to initiate adjustments or re-planning a feedback process is needed that provides the commander with information about the progress of the operation and an appreciation of whether the operation is leading towards the overarching goals or not. The operations assessment process is part of such a feedback process.

The purpose of the operations assessment process, at least for larger scale operations such as NATO or US campaigns, is twofold however. On the one hand, the products of the assessment process serve to inform policymakers about progress of operations which then may affect the support for the operation. On the other hand, assessment serves to inform commanders, staff and planners about progress in order to improve an ongoing operation. The not always consonant purposes serving different audiences may direct inflict the assessment process differently, resulting in more “optimistic” versus more “realistic” views on the ongoing operation depending on the audience (Downes-Martin, 2011; Mushern & Schroden, 2014; Williams, Bexfield, Bell, & Pennell, 2013). This paper will only concern the second of these purposes however, that is, assessment as a part of the internal feedback process whose function is to inform commanders’ decision making during execution of an operation.

The text is organized as follows: first, I set the stage by portraying execution of a military operation as a case of dynamic decision making. Then, I give an overview over current assessment process as described in NATO documents. Thereafter, I argue that this process leads to “plan-centric” operations assessment and how this in turn may result in reduced flexibility and agility during execution. Lastly, I outline an alternative approach to assessment, *Dynamic Assessment*, which would foster a more “environment-centric” view of the operation which presumably increases flexibility and agility.

Execution of military operations as dynamic decision making

Planning and execution of military operations can be understood as a *dynamic decision making* by which the commander and his or her staff is trying to control aspects of the operational environment and make it change from an undesired state to a desired state. The dynamic decision making problem requires a series of decisions in an environment that changes partly due to own decisions and actions, and partly due to other factors such as an adversary’s decisions and actions. During the planning phase feed forward control is applied by means of the planning process. During the execution phase the decision problem environment becomes dynamic and control becomes feedback based (Brehmer, 2000; Brehmer & Thunholm, 2011).

Feed forward and feedback control are concepts which originates in engineering science and specifically control theory which involves mathematical modelling of control processes. The

principles of control theory may be useful as a metaphor of how to control the state of the operational environment in military operations (Brehmer, 2000).

There are four general conditions that are required for controlling a system:

- There must be a goal
- It must be possible to change the state of the system that is to be controlled
- It must be possible to observe the state of the system that is to be controlled
- There must be a model of the system that is to be controlled. The model should describe how the system reacts to input.

The observed state of the system is fed back to the controller (feedback signal), which compares the observed state to the goal state (reference signal). If the observed state and the goal state differ, the model is consulted about what should be done to reduce the difference. Thereafter the controller takes the actions needed to influence the system towards the goal state (e.g. Conant & Ashby, 1970).

In military terms, the goal is given as part of the mission, formulated for instance as objectives and an end state. To change the system own forces and other assets are engaged. The state of the system, the operational environment, is notoriously hard to fully observe in part due to the adversary's concealing of information; nevertheless an approximation is done by the intelligence function and *Knowledge Development*. The fourth condition, the requirement of a model, is more interesting for the purpose of this paper however. As stated above, the model should describe how the system, in this case the operational environment, reacts to input. The model thus must encompass the cause-and-effect relationships that prevail in the operational environment. The model is built before and during planning based on observations of the operational environment but it can, in principle, not be perfect due to the limitations in observability of the system (Brehmer, 2000). Therefore it must be supplemented by assumptions made about the workings of the operational environment.

In a paper by Brehmer and Thunholm (2011) presented at 16th ICCRTS that portrays execution of military operations as a case of dynamic decision making, the authors claim that the model is embodied by the operational plan. "In execution, the model is the plan. It is the plan that tells the commander what to do and *what to expect*." (p. 7, italics added) They point out that the quality of the model is essential for the commanders' decision making during execution.

NATO operations assessment

The requirement of a model as a description of the workings of the operational environment, as mentioned above, fits well with for instance NATO principles of operations planning and associated assessment process. Current NATO principles for assessment¹, which focus on the measurement of performed actions and effects in the operational environment, are derived from the effects-based approach to operations (EBAO). EBAO is based on a system analysis

¹ This and following discussion mainly concern the operational and component levels.

of the operational environment and a description of the desired changes in the state of the system. Thus NATO operations planning and also assessment during execution are basically theory-driven (Williams & Morris, 2009). The use of systems thinking, promoting a holistic approach, is a result from the increasing complexity of recent operations which involves a multitude of actors and both kinetic and non-kinetic activities.

During planning of any operation, “complex” or not, it is necessary that the planners have some kind of notion about the causal relations in the operational environment, that is, a notion of which actions would lead to which outcomes during execution of the operation.² In NATO planning as described in for instance by Comprehensive Operations Planning Directive (COPD, 2013) outcomes or results are of different kinds; *End State* and *Objectives* describe the overarching goals of the operation, whereas results based *Decisive Conditions* and *Effects* are more specific outcomes. Effects are defined as “a change in the state of the system (or system element), that results from one or more actions, or other causes” (COPD, 2013, p. 1-11). *Desired Effects* are leading towards the achievement of objectives, whereas *Undesired Effects* disrupt or jeopardize the achievement of objectives. These outcomes are supposed to result from certain activities labelled *Actions* or *Tasks*. These supposed cause-effect linkages are part of the planners’ notions about the operational environment, and would thus be a part of the model mentioned above.

NATO assessment process as described in NATO Operations Assessment Handbook (NOAH, 2011) mainly concerns measuring of actions taken (via Measures of Performance, MOP) and measuring of the effects or changes in the system (via Measures of Effectiveness, MOE), and subsequent analysis of the measures. By repeated measurement of the performed actions and the effects the workings of the system can be estimated and the assumed causal linkages can be confirmed. For example, if an *Action* is accomplished but still the associated *Effect* is not achieved, this indicates that the assumed linkage may not be valid. The result on the *Effect* may instead be caused by another influence such as the adversary’s actions, or faults in measuring etc., which makes interpretation less than straightforward. The opposite case, when an *Effect* is reached without the *Action* is accomplished, could also indicate that the assumed linkage is invalid, but may also be caused by other factors. Quite obviously this means that also the case that both *Actions* and associated *Effects* are achieved does not necessarily indicate a true causal linkage, but at least it does not invalidate the assumed linkages.

In principle, the purpose of assessment is to monitor and validate the plan, and implicitly the model that underlies the plan (c.f. Williams & Morris, 2009). As expressed in COPD: “Operations assessment aims to provide confirmation of the plan design, by demonstrating that the planned actions are indeed creating the desired results, and to improve understanding of the workings of the engagement space.” (COPD, 2013, p. 5-8) When this confirmation fails, it might be necessary to change or refine the plan, and thus the underlying model.

As noted above, planning and assessment are closely related in that planning elements are the basis for assessment. During the development of the operational plan, also an assessment data

² This does not imply that it is indeed *possible* to correctly model the causal relations in the operational environment, only approximations or assumptions are achievable (c.f. NOAH, 2011, p. 3-9).

collection plan is developed which specifies what and how data should be collected, stated as MOE and MOP (NOAH, 2011, 4-1). Thus the “questions” the operations assessment process poses towards the environment are tightly connected to critical elements in the operational plan.

Also information beyond what is specified in the assessment plan is considered when formulating the assessment recommendations to the commander. Additional sources of information could be Intelligence reports or daily reports from subordinate levels. This part of the assessment process is more bottom up driven and is not considered in the assessment process described in NOAH (2011).

The “plan-centricity” of current assessment process

The assessment process described in NOAH and COPD would result in an appreciation of how well the model, embodied by the operational plan, fit the workings of the environment during execution of the operation. Emerging discrepancies between the operational plan (i.e., the underlying model) and the evolving environmental system would presumably be discovered and any need for adjustments or re-planning (resulting from modifications of the model) would be identified (c.f. Williams & Morris, 2009).

There are two principal problems pertaining to the model underlying the operations plan and associated assessment plan: The first problem, already mentioned, is that the model is inherently uncertain due to difficulties in collecting the information needed and in identifying relevant linkages during systems analysis. The second problem pertains to the dynamic character of the operational environment. The evolving situation may cause the model to become less fitting during execution of the operation. That is, even in cases in which the systems analysis would reveal the more or less true workings of the system at the time when the plan is developed, these mechanisms or linkages may change in character later on in the operation. In addition, system elements that are deemed relevant during planning may lose relevancy and new elements (e.g. new actors) may enter and change the dynamics of the system. It is the second of problem that is of interest for the following discussion.

When the assessment process is based on the model that is established during planning, novel effects (changes in system state) will not be captured. The “questions” specified in the assessment plan will direct data collection towards anticipated or desired effects, but unanticipated changes in the operational environment will be ignored by the process. The “questions” can be altered by revisions of the assessment plan, but this revision should be done together with revisions of the operational plan. Thus the assessment process will inform about the progress of the plan relative specific anticipated effects, but would still lack a broader perspective on the evolving situation. The narrow focus on anticipated effects in the assessment process could therefore lead to inflexibility in execution of the operation.

Also Williams and Morris (2009) touch upon this issue: “Current military thinking requires that several courses-of-action are analyzed in planning, from which the commander selects one. A decision made by a senior staff officer is usually binding to some extent. There is a

danger that Assessment results will be constrained to inform only within the framework of the existing or chosen course-of-action, rather than allow the creation of a whole new one.” (p.75)

Dynamic Assessment - an alternative approach

In order to avoid the plan-centricity of current assessment process, I suggest an alternative approach, *Dynamic Assessment*, which is based on an idea of creating an assessment data collection plan that is hold separate from the operational plan.³ Such a separation would yield a more dynamic yet structured assessment process that would provide a broader picture of the unfolding operational environment than the current process. In particular, it would reduce the risk that new unforeseen impending threats or opportunities will be overlooked when providing recommendations to the commander.

Dynamic Assessment consists of the following three steps:

- *Creation of a Situation Model.* During planning a *Situation Model* is built that represents relevant parts of the operational environment, as it is apprehended at the moment. The Situation Model could be based on systems analysis, with input from Knowledge Development/intelligence staff (in the form of CPOE for instance), and supplemented by the assumptions needed to fill in information gaps. The Situation Model is thus to be seen as a collection of more or less probable hypotheses about the nature of the operational environment. The model forms the basis for development of the operational plan. This step is in principle similar to current process (as part of Mission Analysis).
- *Updating of the Situation Model.* During execution of the operation, the Situation Model is continuously updated to mirror the operational environment. That is, the Situation Model is continuously refined or revised to capture the dynamically unfolding situation, for instance changes in relations between elements (actors), and the actual existence of elements, that are believed to be relevant for the goals of the operation. Since the Situation Model comprises hypotheses about the operational environment principles of falsification could be applied (i.e., to look for data that contradicts parts of the model). The Situation Model would thus direct the “questions” that assessment poses to the environment, and the “answers” would be used for updating the model. Also other types of information, not asked for by the Situation Model and delivered by a bottom-up process, should be considered when updating the model (similar to the current use of for instance daily reports).

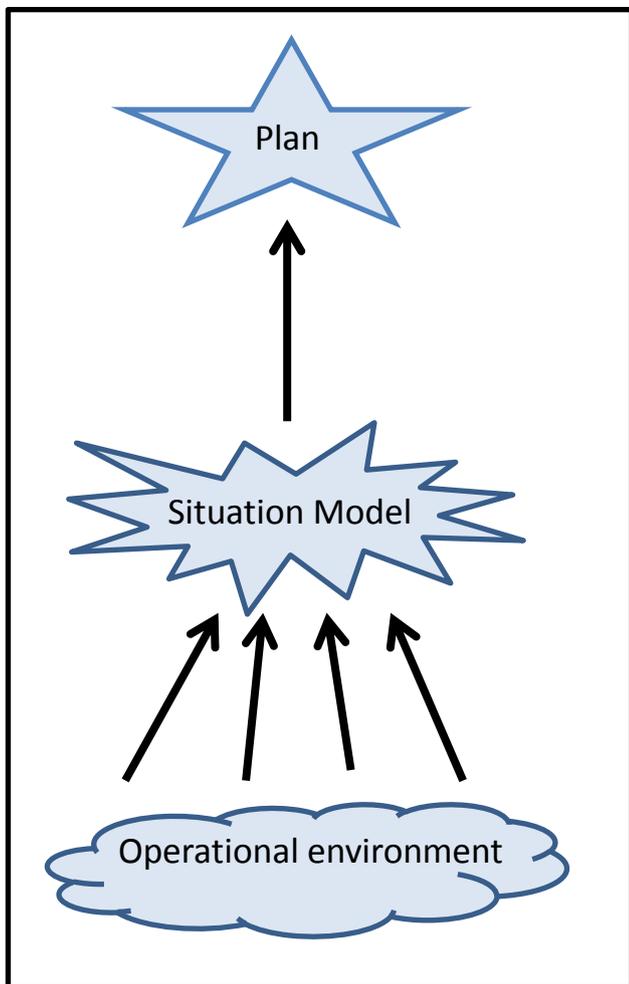
³ The suggested separation between a Situation Model and the plan (i.e., the model underlying the plan) is similar to the principles described in the CECA-model of military decision making (Bryant, 2003, 2009). In the CECA-model the model underlying the plan, labelled *conceptual model*, is the commander’s mental model of how to accomplish the operation. Bryant does not link the CECA-model to practical command and control issues, but it fits well with the suggested Dynamic Assessment process.

- *Comparing the updated Situation Model to the operational plan.* During execution the updated Situation Model is recurrently compared to the initial model that underlies the plan (which is manifest in the plan itself). If the comparison shows that the updated Situation Model differs in relevant parts from the plan, it would provide a feedback signal to the commander that adjustments of the plan, or re-planning, should be considered. The actual “art of assessment” would lie in the comparison of the two models.

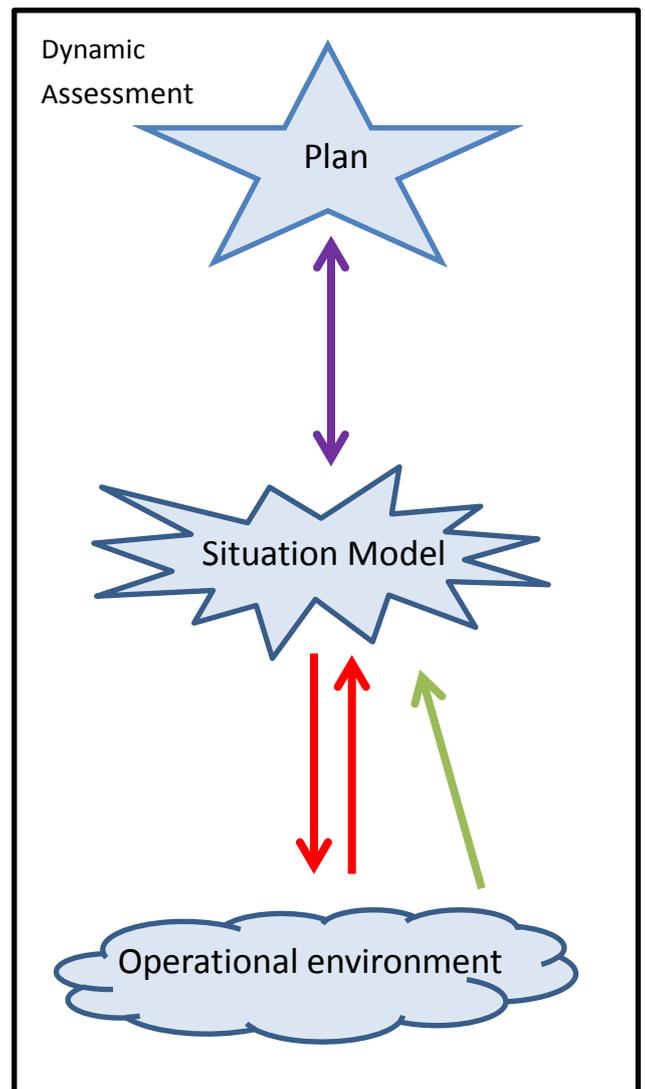
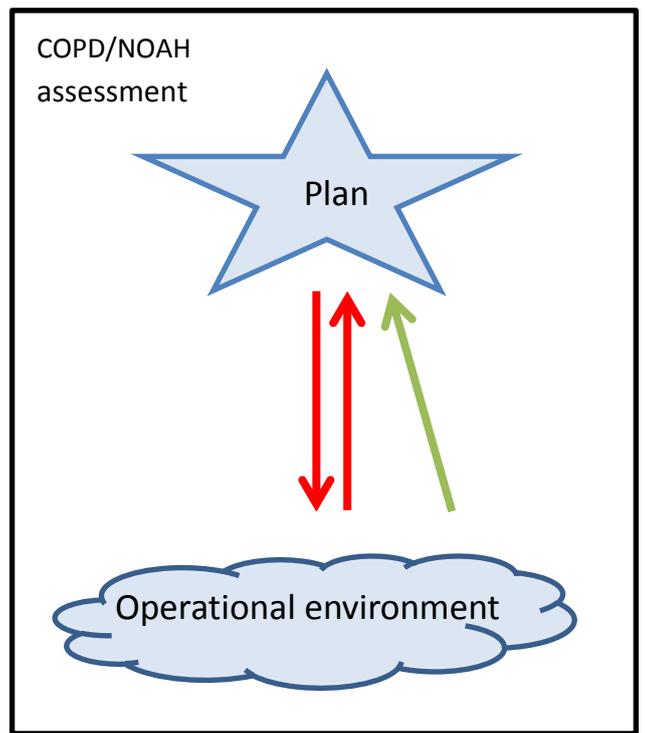
Since the Situation Model would be an approximation of the current situation the model comparison would be fit to answer questions such as “Are the workings of the system significantly altered since the time the plan was made? Does the unfolding situation display threats or opportunities that were unanticipated during planning? Is the plan overridden by reality?” By directly focusing on the ongoing reality rather than through the filter of the operational plan, Dynamic Assessment would possibly lead to a more flexible execution as compared to the current COPD/NOAH assessment process.

Figure 1 shows a comparison between the principles of Dynamic Assessment and the COPD/NOAH assessment process. Note that during planning the processes are identical. A Situation Model is created that subsequently feeds the planning process and becomes manifest in the approved plan. In current COPD/NOAH process the Situation Model is not labelled as such, and consists of the products from systems analysis etc. The difference is that during execution, when assessment “poses questions” towards the operational environment, in the COPD/NOAH process the questions are already formulated within the operational plan and associated assessment data collection plan, whereas in Dynamic Assessment questions are continuously formulated and reformulated by a more swiftly updated Situation Model.

Figure 1. Left panel shows activities during planning. A model of the situation is created which feeds the creation of the plan. Upper right panel shows COPD/NOAH assessment during execution. Red arrows represent “questions” from the plan (MOE and MOP) and corresponding “answers” from the environment. Green Arrow represents reports from subordinate level. Lower right panel shows Dynamic Assessment. Red arrows represent “questions” from the Situation Model and corresponding “answers” from the environment. Green Arrow represents reports from subordinate level. The Situation Model is updated correspondingly. Purple arrow represents the comparison between model and plan. The Situation Model is updated correspondingly. Purple arrow represents the comparison between model and plan.



Planning phase



Execution phase



Conclusions

In this paper I argue that the plan-centric method applied in current NATO assessment process might lead to a rigid feedback cycle and subsequently to less flexible and agile execution of military operations.

The assessment process is primarily focused on the analysis of metrics obtained through MOPs and MOEs, which in turn are established in the assessment plan. The assessment plan is developed before the execution phase, in parallel with the development of the operational plan. Through the dynamically unfolding situation effects in the environmental system may emerge that are unforeseen during development of the assessment plan, thus the “questions” that the assessment process poses to the environment in the form of MOE and MOP may become obsolete, and insufficient, during the execution phase. The unforeseen effects may be both negative and positive, consisting of new threats or opportunities vis-a-vis the overarching goals of the operation. Such effects might be captured by other means such as bottom-up driven reporting, but in order to form a coherent feedback process it might be valuable to include also these in the formal assessment process.

As a response to this, I suggest that the “questions” asked by the assessment process be initiated by a Situation Model, which is hold separate from the operational plan. Such a separate Situation Model could be updated more swiftly than the currently used assessment plan. This idea is in line with framing military decision making as dynamic decision making. From this perspective the Situation Model fulfils the model condition (which in previous literature was seen as satisfied by the plan itself, see Brehmer & Thunholm, 2011). By basing assessment on a dynamic Situation Model the flexibility and agility of the operation may be increased. However, this kind of assessment process that focus on the evolving situation and on predictions may not meet the purpose of assessment as a means for reporting to policymakers on progress and whether we “are winning” or not (c.f. Mushern & Schrodén, 2014). Instead, it would mainly serve to meet the inward purpose by providing planners and commanders with feedback in the Plan, Execute, Monitor and Assess cycle.

In short, I suggest that in order to provide the commander with relevant feedback, the assessment process should have a broader focus on the evolving environment as compared to the more narrow focus that current process yield. The current process relies heavily on pre-specified measures established in a relatively static assessment plan. No plan survives contact with the enemy, and this might be true for an assessment plan as well.

References

- Brehmer, B. (2000). Dynamic decision making in command and control. In C. McCann & R. Pigeau (Eds.) *The human in command*. New York: Kluwer.
- Brehmer, B. & Thunholm, P. (2011). C2 after contact with the adversary. Execution of military operations as dynamic decision making. 16th ICCRTS.
- Bryant, D. J. (2003). Critique, Explore, Compare, and Adapt (CECA): A new model for command decision making. DRDC Toronto TR 2003-105. Defence R&D Canada - Toronto.
- Bryant, D. J. (2009). Rethinking OODA: Toward a modern cognitive framework of command decision making. *Military psychology*, 18, 183-206.
- Conant, R. C., & Ashby, R. W. (1970). Every good regulator of a system must be a model of that system. *International journal of systems science*, 1(2), 89-97.
- Dawnes-Martin, S. (2011). Operations assessment in Afghanistan is broken. What is to be done? *Naval War College Review*, 64, s. 103- 125.
- Mushern, E. & Schroden, J. (2014). Are we winning? A brief history of military operations assessment. CNA ANALYSIS AND SOLUTIONS ARLINGTON VA.
- Williams, A., Bexfield, J. Bell, A, Pennell, B. (2013). The rationale, challenges and opportunities in operations assessment. In Williams, A., Bexfield, J., Farina, F. F., de Nijs, J. (eds.) *Innovation in Operations Assessment*. Capability Engineering and Innovation Division, Headquarters Supreme Allied Commander Transformation, Norfolk, Virginia.
- NATO (2013). Allied Command Operations Comprehensive Operations Planning Directive COPD-Interim v2.0 Brussels: NATO Supreme HQ Allied Power Europe.
- NATO (2011). Operations Assessment Handbook. Interim version 1.0.
- Williams, A. P. & Morris, J. C. (2009). The development of theory-driven evaluation in the military. *American Journal of Evaluation*, 30, 62-79.