BRIEF

Battlespace Agility 101:
The Use of Target Network Modelling to Increase Shared Situational Awareness and Understanding

By William Mitchell, Ph.D.
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Battlespace agility is a warfighting concept defined as “the speed at which the warfighting organisation is able to transform knowledge into actions for desired effects in a battlespace”. For most familiar with operational planning, situational awareness and understanding refers to the knowledge base for description, explanation, and prediction relative to the battlespace to be used for determining the actions for the desired effects. A more technical definition would be the perceptions of the elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the near future. The importance of having shared situational awareness and understanding between operational elements of a unit cannot be understated. If the Commander, the intelligence shop, and the operations people cannot draw a common picture of their battlespace, it is unlikely they will agree on the scope, type, and tempo, of the actions necessary to achieve the desired effects. Moreover, there will likely be disagreement on the measurements of effectiveness (MoEs) and measurements of performance (MoPs). In short, without shared situational awareness and understanding, the unit will likely start off in the wrong direction, and the likely result will be military actions that do not produce the desired effects effectively enough, not at all, or make things worse.

(1) See Mitchell (2012d).
Ideally, the Commander, the intelligence silo, and the operations planning silo should have a common picture of the battlespace in which they are fighting. Finding methods to simplify the communication of that common picture, will also contribute to more agility in the battlespace. The objective of this brief is to highlight one technique that has proven effective in facilitating shared situational awareness and understanding; the technique is called target network modelling [TNM]. The brief will introduce readers to TNM as a methodology for making the military organization more agile in the battlespace by improving its ability to share situational awareness and understanding. It aspires to convince a unit’s Commander, intelligence officers, and operational planners to strive for a simplified common model of the battlespace, before engaging the battlespace.

Battlespace Agility
Without a doubt the introduction of PMESII\(^5\) as a “systems of systems analysis” [SoSA] tool over the last eight years has been successful at communicating the transformational changes in the post-Cold War battlespace understanding at all planning levels. For intelligence analysts, the challenges resolved by PMESII reflect Tom Czerwinski’s “billiard” metaphor and the solution of tagging\(^6\) to simplify and communicate complex situations. NATO’s PMESII guideline attempts to do just that both vertically and horizontally within the organization 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

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(3) See Mitchell (2012b).
(4) TNM was tested in Helmand, Afghanistan by the Danish Battlegroup Team 10 in conjunction with target generation processes related to both SOF and conventional forces. Under 16th Air Assault Brigade target networks models were used to generate, track, and prioritise target sets between different units. The technique is an operationalization of Robert M. Clark’s
(5) PMESII – Political, Military, Economic, Social, Information, Infrastructure domains of a battlespace and represents a system of systems approach. It can also be portrayed accurately as interacting social networks.
dimension, they must now consider PMESII dimensions of their battlespace. By doing so it hopes to make the predictions of the non-linear interactions and their effects more manageable. This effect based thinking [EBT] calls for an expansion and exploitation of our knowledge base to support the planning, execution, and assessment of actions in a complex battlespace defined by the PMESII domains.

Fig. 2 PMESII: A ‘System of Systems’ Understanding

THE BATTLESPACE

In line with EBT, battlespace agility refers to “the speed at which knowledge is turned into actions for desired effects”. It is based on experiments in Afghanistan, to reveal the role of timeliness and precision, in the relationship between knowledge, actions, and effects. The onus is on building an organisation that can learn and adapt fast through situational understanding and the generation of desired effects in that situation. The organisation must adapt to the situation in order to understand and generate the desired effect; not adapt the situation to the organisation and hope for the best. This requires specific tools and approaches to ensure a common framework for communicating situational awareness and understanding between elements of the warfighting organisation. The greater the shared understanding within the organization, the more likely the timeliness and correctness of actions will produce desired effects, producing greater battlespace agility.

(7) NATO Bi-Strategic Command Pre-Doctrinal Handbook, 2007, 5-3.
(8) NATO SAS-085 contribution (Forthcoming); Mitchell 2008; 2012 a, 2012b.
(9) Dostal, 2007. Situational understanding differs from awareness in that it is the result of assessing situational awareness, or an easy way to frame it is situational awareness deals with identifying the “who, what, where, and how” while understanding focuses on the “why”.
The Sharing of Situational Awareness and Understanding

Most intelligence cycles\textsuperscript{10} in the military are iterative processes that reflect four stages: \textit{direction}; \textit{collection}; \textit{processing}; and \textit{dissemination} in some way or form (see Fig. 4). 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.

\textsuperscript{10} For a generic understanding see Clark (2004), Ch.1; Herman, (2004), 293-296; Mitchell (2002), 486.
The requirement for military intelligence (MI) to provide the Commander and the operations silo with accurate and timely situational awareness and understanding has not changed, and is definitely not new to warfighting. However the environment in which militaries fight has changed. Complexity in modern warfare requires more than Order of Battle styled reports [ORBATS]. ORBATS are one of the traditional products of basic MI output. It usually covers tracking primarily material/efficiency concerns from the military dimension such aspects of the opponent’s equipment, capabilities, performance, and some relatively light socio-political matters relative to leadership or logistical support. If EBT operations are to be effective they must be supported by relevant intelligence collection from non-military dimensions and an expansion of the knowledge base primarily through non-ORBAT information.

The nature of analysis has traditionally been descriptive in terms of the time and space dimen-

(12) For a good example of the comparative tech focus see Libicki & Johnson (1995), 48-49
(13) Military intelligence output is divided generically into basic and current intelligence – current intelligence is situational and not referential in character.
sions.\textsuperscript{16} However EBT requires a great deal more predictive battlespace awareness [PBA]\textsuperscript{17} for the commander and it is here the challenges lie in terms of adjusting the training of our analysts. In short, applying PMESII to meet the challenges of the complex battlespace within an EBT context will require a shift from a focus on descriptive analysis to predictive analysis in terms of the nature of analysis\textsuperscript{18} (Mitchell 2002, 481-485). It is here the adoption of TNM can contribute greatly to battlespace agility at the point of dissemination and direction, where situational awareness and understanding is shared with the Commander and operations silo (see Fig.5 below).

**Fig. 5 MI and the Sharing of Situational Awareness & Understanding**
of a constructivist\(^{22}\) approach to managing complexity, network thinking acts as method for managing and communicating a representation of the relationships between the physical and cognitive domains in the battlespace. This understanding suggests that “social facts” such as identity or norms, can act as the objects of the intelligence cycle emerging from the interaction between knowledge and the material world – i.e. \textit{intersubjectivity}\(^{23}\) – neither of which are fixed.\(^{24}\) Translated into the language of the war fighter, the principle can be restated as “he who manages ‘intersubjectivity’ best – wins” though definitely not as sexy sounding as some of the others out there, it goes to the heart of modern warfare.

Ontologically speaking, (or in terms of the fundamental categories of reality at play here) it is this intersubjective dynamic that suggests directly that understanding the battlespace does not just depend on understanding the material - but also the ideational;\(^{25}\) that concepts such as culture, identity, and norms that have played a role in understanding the international environment\(^{26}\) in which we have made security policy for over a decade,\(^{27}\) can also play a role in battlespace situational understanding. This opens TNM for unlimited usage in terms of conceptualization and this is reflected in current doctrine. This ontological stance is doctrinally depicted via SoSA systems such as PMESII, that metaphorically slow down the intersubjective dynamic relevant to the task at hand, and enable opportunities for a more comprehensive understanding of actions and effects within an EBT framework.

**Target Network Modelling (TNM)**

Robert Clark was the first to really isolate target network modeling as a tool for intelligence analysis, in his book \textit{Intelligence Analysis: A Target Centric Approach} in 2004. TNM is based on a splicing of two analytical techniques, the first is \textit{modelling}, and the second is \textit{network analysis} via link or systems of systems analysis. A model is a replica, or representation, of an idea, an object, or an actual system. For the purposes of battlespace definition, it should describe how the system behaves. In this regard it should identify the key structures, functions, and processes related to the system in focus.\(^{28}\) Network analysis has its origins in network theory and essentially is intended as a methodology for managing non-linear or asymmetric

\(^{22}\) Social constructivism as it is used here to explain battlespace complexity, is defined as the view that the material world shapes and is shaped by human action and interaction dependent on dynamic normative and epistemic interpretations of the material world. Constructivists consider interpretation as an intrinsic part of social science that stresses contingent generalizations, meaning that they do not freeze our understanding but open up the social world. The issues currently focused upon, originate from the belief that reflexive knowledge (interpretation of the world) when imposed on the material reality of the world becomes knowledge for the world. See Understood in this paper as simply the nature of reality. See Adler 1997, 322; Adler 2002, 104-109. Nicholson 2006, 133-136.

\(^{23}\) See conventional constructivism in Ted Hopf’s “Promise of Constructivism in International Relations Theory” presented in International Security in 1998.

\(^{24}\) Adler 1997, 327-328.


\(^{28}\) See Clark 2004.
relationships. Where it concerns intelligence it is primarily link and social network analysis techniques that have become a pillar of intelligence analytical techniques in general. However John Aquila’s Netwars (first printed in 1997) set the stage for an integration of network analysis into military intelligence and operational planning.29 The merging of both techniques within doctrinal circles has recently been reflected in the US Joint Warfighting Centers’ Commanders Handbook for Attack the Network30 that deals in more details with issues raised in this brief. When combined with modelling, we have a methodology for discussing and determining common situational understandings that are easily communicated between interested parties.

As this is a brief, a few examples of some generic target models depicting the situational awareness and understanding for various tasks are presented below. Inherent in all target models are the depiction of process, structure, and function. However the range of conceptualisation is unlimited, and models can be adapted to deal with specific situations, issues, or encompass all levels planning from the tactical to the strategic and everywhere in between. The point here is that TNM is a simple technique that can go a long way in usage for facilitating shared awareness and understanding within the unit or between units and other actors.

(30) Joint Warfighting Centre, 2011.
EX. TNM 1 for “TASK FORCE SLAVERY”

Shared situational understanding between Commander, Intelligence, and Operations

Target Network Model

The above TNM can easily act as a passive situational awareness descriptive tool, an active situational understanding explanatory tool, or an active iterative framework for managing and identifying intelligence gaps, or assist the operational planners with centre of gravity [CoG] analysis and decisive point (DP) identification. Once the TNM is agreed upon by all three parties, the Commander, intelligence, and operations, the usages are indeed many.
**Ex. TNM 2 for “TASK FORCE ROCKETSTAN NON-PROLIFERATION”**

*Shared situational understanding between Commander, Intelligence, and Operations*

**Target Network Model**

TNMs can be developed for strategic level issues that are technical in nature and do not require a great deal of SoSA/PMESII analysis, but rather depict the management of specific issues related to the problem. TNM 2 has a clear iterative usage with regards to tracking the degree of weaponization along a timeline representing past, present, and future. Allowing the intelligence analysts a methodologically sound framework for providing predictive estimates, and act as a tool for resource managers to better determine when and what is necessary to update the model.
Ex. TNM 3 for “TASK FORCE GOVERNANCE IN AFG”

Shared situational understanding between Commander, Intelligence, and Operations

Target Network Model

TNM 3 above reflects a counter-insurgency (COIN) environment. It is simply to illustrate that TNMs can also be characterised by non-military factors affecting operations. It is in such circumstances that the inclusion of a SoSA breakdown via PMESII for example, ensures a richer depiction of the target. This in turn will provide more options for collections as well as more options for the Commander via operations.
Summary

Though I think most would prefer a single TNM power point slide instead of 50 IPB slides, it is not the intention of this brief to suggest that TNM replace an IPB, but rather they supplement each other. It is suggested however that the production of a TNM by the Commander, his intelligence shop, and his operational planning silo, for their battlespace should be made standard practice – understood as 1 lead\textsuperscript{31} TNM per battlespace.

It not only increases the shared situational awareness and understanding amongst the unit, it allows for the development of a common language for inter-unit communication across the board. When it is time for the handover for example, the TNM can act as the start point for the relieving unit to understand the battlespace, it will also track what has been done by previous units, and what understandings have worked or not worked that might require attention. When it comes to communicating with new actors outside of the unit, it provides a simple yet effective way of communicating the complexities of the battlespace as seen by the owners. If a Task Force had to call upon assistance from the FBI\textsuperscript{32}, for example, the FBI would be able to grasp quickly how the Task Force perceives its problem, and compare it to their own understanding.

All in all it is a simple technique that once applied generally can have tremendous usage and effect, as it is also flexible in detail therefore adaptable to various requirements of OPSEC\textsuperscript{33} risk management. On the other hand, if the Commander, the intelligence shop, and operations silo cannot individually draw a TNM of their battlespace that resembles one another in terms of structure, functions, and processes, it does not bode well for the assessment, planning, and execution of operations in that battlespace. TNM is a human skill set that increases the battlespace agility of a unit through a faster conversion of knowledge into actions for desired effects, via improvements to shared situational awareness and understanding. It is easy to teach to all levels of planning, and efforts should be made to ensure TNM becomes a standard process and product of battlespace management.

\textsuperscript{31} Having 1 overall battlespace TNM depiction does not take away the option of developing more specific sub-TNM for targeting purposes.

\textsuperscript{32} US law enforcement agency, the Federal Bureau of Investigation.

\textsuperscript{33} Operational Security
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