18th ICCRTS

Paper 055

Target Network Modeling

Point of Contact
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Agenda

• Intro to SATs & TNM
• Battlespace Agility Framework
• Testing, Evaluation, Results
What are SATs?

Structured Analytical Techniques for Intelligence Analysis
by
Richard J. Heuer Jr.
Randolph H. Pherson

Putting forward a common taxonomy for developing a common understanding of methodology.

We are also talking about developing a common language for the discussion of intelligence analysis.
EXAMPLE: Robert M. Clarks TNM, the target centric view of automaking.
Clark suggests some generic characteristics for target models...

- It is Complex

- It is a System; it has
  - Structure - components and their relationships
  - Function - results produced
  - Process - sequence of activities or events

- It is a Dynamic Network

- Many model types exist...
  - Profiles
  - Process models
  - Simulation models
  - Pattern models
  - Performance models

- ...and many tools for creating them
  - GEOINT tools
  - Analyst Notebook
  - Palantir

The target network:
People
Places
Things
Organizations
Ex. Slavery TNM
Battlespace Agility

The speed at which knowledge is turned into actions for desired effects.

Stems from SAS-050, SAS-065, SAS-85
Agility research

Flexibility
Adaptiveness
Responsiveness
Versatility
Innovativeness
Resilience

NATO DOCTRINE 2.0, 3.0, 3.9, COPD

AGILITY IN A WARFIGHTING CONTEXT

Speed, Precision, Appropriateness
Main Research Question

Does target network modeling increase battlespace agility?

• Project Kitae - Battlespace Helmand
• Project Crows Nest – Naval Exercise Joint Warrior
• Advanced Joint Intelligence Course
Project Kitae Situational Awareness/Situational Understanding (SA/SU)
Linear vs. Network models

<table>
<thead>
<tr>
<th>Helmand 1</th>
<th>Helmand 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area of Responsibility (AoR) Understanding</td>
<td>Order of Battle (ORDBAT) Understanding</td>
</tr>
</tbody>
</table>

**S3**
(Operations)

**S2**
(Intelligence)

**TTS ORBAT**

**SNA ORBAT**

**INTELLIGENCE UNDERSTANDING**

**NARCOTICS**

**HWY EAST**  **HWY WEST**  **RIVER WEST**  **RIVER EAST**

**CITY**

**CORRUPTION**

**ALPHA 1**  **Local Gang**

**ALPHA 2**  **Trafficker**

**ALPHA 3**  **Network Manager**

**ALPHA 4**  **Chemist**

**ALPHA 5**  **IED Supplier**

**ALPHA 6**  **Police Official**

**Project Kitae Situational Awareness/Situational Understanding (SA/SU)**

**Linear vs. Network models**

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**Project Kitae Situational Awareness/Situational Understanding (SA/SU)**

**Linear vs. Network models**

# Example of Indicators of Intelligence Analytical Agility In The Battlespace

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>DEFINITION</th>
<th>More Agile when ...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intelligence Timliness</td>
<td>Extent to which currency of information is suitable to its use.</td>
<td>HIGH</td>
</tr>
<tr>
<td>Intelligence Currency</td>
<td>Difference between the current point in time and the time the intelligence was made available</td>
<td>LOW</td>
</tr>
<tr>
<td>Intelligence Correctness</td>
<td>Extent to which intelligence is consistant with ground truth.</td>
<td>HIGH</td>
</tr>
<tr>
<td>Intelligence Accuracy</td>
<td>Degree to which intelligence quality matches what is needed.</td>
<td>HIGH</td>
</tr>
<tr>
<td>Intelligence Precision</td>
<td>Level of measurement detail in intelligence item.</td>
<td>HIGH</td>
</tr>
<tr>
<td>Intelligence Relevance</td>
<td>Extent to which intelligence quality is relevant to the task at hand</td>
<td>HIGH</td>
</tr>
<tr>
<td>Intelligence Completeness</td>
<td>Extent to which intelligence relevant to ground truth is collected.</td>
<td>HIGH</td>
</tr>
</tbody>
</table>

*(Based NATO SAS-050 Variable Definitions)*
Project Kitae Targeting

Shared SA/SU was faster and more precise
Project Kitae Targeting

Master TNM: 4
State Model

Slave TNM: 4 State Model
Populated Locally for Targeting
Shared SA/SU was faster and more precise
# Project Crows Nest

## Sense-Making Relationship to be Measured

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N2 &amp; Commander DATG</td>
</tr>
<tr>
<td>2</td>
<td>N2 &amp; N3</td>
</tr>
<tr>
<td>3</td>
<td>N2 &amp; Info Ops/</td>
</tr>
<tr>
<td></td>
<td>N2 &amp; N5</td>
</tr>
<tr>
<td>4</td>
<td>N2 &amp; Assets &amp; Sources (ICP – Tasking/RFIs)</td>
</tr>
</tbody>
</table>

## Sense-Making Variable to be Measured

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>X</td>
<td>Shared Information</td>
</tr>
<tr>
<td>Y</td>
<td>Shared Awareness</td>
</tr>
<tr>
<td>Z</td>
<td>Shared Understanding</td>
</tr>
</tbody>
</table>

## Intervening Activities to be Tested

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Target Network Modelling (AGM: Internal/External)</td>
</tr>
<tr>
<td>2</td>
<td>Narrative Report/Returns Format (AGM: Internal/External)</td>
</tr>
<tr>
<td>3</td>
<td>Battle Rhythm (AGM: Internal)</td>
</tr>
<tr>
<td>4</td>
<td>Indicators List (AGM:Internal)</td>
</tr>
<tr>
<td>5</td>
<td>HVTL Generation, Management, Effectiveness (AGM:Internal/External)</td>
</tr>
<tr>
<td>6</td>
<td>TARGETING PROCESSESS (AGM: Internal/External)</td>
</tr>
</tbody>
</table>
Project Crows Nest

Master TNM: The Battlespace

Slave TNM: Pirating focus for targeting

Smuggling
X Clan

Piracy
Y Clan

Proscribed Groups

LAND1
Multi-National Force
Host support
LAND 2

Sub-Slave TNM: Populating the pirate clans

X Clan Pirates

Y Clan Pirates

Com
2IC
FIN
W.S
POC
Com
2IC
FIN
W.S
POC
## Project Crows Nest

<table>
<thead>
<tr>
<th>Measurement Variables</th>
<th>Definition</th>
<th>Primary Battlespace Agility Component</th>
<th>HELMAND, AFGHANISTAN (2010-2011)</th>
<th>Projected in Degraded Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Shared Information Accuracy</td>
<td>Degree to which shared information quality matches what was is needed</td>
<td>Precision</td>
<td>TNM reduced the collection of frivolous information.</td>
</tr>
<tr>
<td>2</td>
<td>Shared Information Completeness</td>
<td>Extent to which shared information relevant to ground truth is collected.</td>
<td>Precision</td>
<td>TNM ensured contextual flexibility with individual parts of the overall problem. (ex. Role of poppy farming)</td>
</tr>
<tr>
<td>3</td>
<td>Shared Information Consistency</td>
<td>Extent to which shared information is consistent with prior shared information and consistent across sources.</td>
<td>Precision</td>
<td>TNM improved the generic framework for collection that improved consistency especially on handovers.</td>
</tr>
<tr>
<td>4</td>
<td>Shared Information Correctness</td>
<td>Extent to which shared information is consistent with ground truth.</td>
<td>Precision</td>
<td>TNM greatly improved the consistency with ground truth. It essentially stopped the organization from making the situation fit the organizational doctrine, and adjust the doctrine to fit the situation.</td>
</tr>
<tr>
<td>5</td>
<td>Shared Information Currency</td>
<td>Difference between the current point in time and the time the shared information was made available.</td>
<td>Speed</td>
<td>TNM combined with 'flattening' technologies greatly increases currency.</td>
</tr>
<tr>
<td>6</td>
<td>Shared Information Precision</td>
<td>Level of granularity of measurement detail of shared information item.</td>
<td>Precision</td>
<td>TNM provided a framework that restricted the communication of frivolous information. Individual components better managed their own details by 'pulling' only the needed information within the improved context.</td>
</tr>
<tr>
<td>7</td>
<td>Shared Information Relevance</td>
<td>Extent to which shared information quality is relevant to task at hand.</td>
<td>Speed &amp; Precision</td>
<td>TNM greatly improved shared information relevance through providing a more broadly shared context platform reducing time wasted on irrelevant information.</td>
</tr>
<tr>
<td>8</td>
<td>Shared Information Timeliness</td>
<td>Extent to which currency of information is suitable to its use.</td>
<td>Speed</td>
<td>TNM greatly improved timeliness as it promoted a common framework for information, it was easier to share.</td>
</tr>
<tr>
<td>9</td>
<td>Shared Information Uncertainty</td>
<td>Degree of uncertainty about the battlespace. The sum of unknowns.</td>
<td>Precision</td>
<td>TNM reduced uncertainty as to component commands' responsibility in the 'big picture.'</td>
</tr>
<tr>
<td>10</td>
<td>Shared Information Sharability</td>
<td>The extent to which an element of information is in a form or format understandable by all nodes in the Network.</td>
<td>Speed &amp; Precision</td>
<td>TNM greatly increased information 'shareability' as it focuses on shared context between the component commands instead of details.</td>
</tr>
</tbody>
</table>

Shared SA/SU was faster and more precise
For the second year in a row TNM has been a central part of our analyst training.

Feedback on the use of TNMs has been extremely good.

Here is a comparative example depicted by three different groups using the same complex exercise information to create a 1 slide TNM.
CONCLUSION

TNM as a formal structured analytical technique for decomposition and visualisation increases battlespace agility.

- Target network modeling should be taught as a fundamental skill for intelligence analysts for production of baseline SA/S products as well as targeting support models.

- Target network model reading skills should be taught to Commanders and planners at all levels.

- Tests need to be run on how the use of TNMs affects timeliness within the framework of inter-agency cooperation.