**GOVERNMENT DISCLOSURE FORM 712B**

**Title:** Developing Irregular Warfare (IW) Human Terrain Data Input for an Agent-based Model

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**Classified/unclassified:**
- [ ] SECRET
- [ ] CONFIDENTIAL
- [x] UNCLASSIFIED

**Distribution statement:**
- [ ] Distribution Statement A
- [ ] Other distribution statement

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## Developing Irregular Warfare Human Terrain Data Input for an Agent-based Model

**Operations Analysis Division (OAD) Marine Corps Combat Development Command (MCCDC)**

Developing Irregular Warfare
Human Terrain Data Input
for an Agent-based Model

LT Robin Marling, USN
Ms. Patricia Rossmaier
Dr. Robert Sheldon

Operations Analysis Division (OAD)
Marine Corps Combat Development
Command (MCCDC)

76th MORSS
WG-32
Agenda

• Irregular Warfare Project: Mission and Goals
• Scenario Background
• Data Acquisition
• How IW Data is used in our Model
• Pythagoras results
Irregular Warfare Project: Mission and Goals

Project Goal: Develop a prototype methodology for analyzing a USMC IW problem in-house
OAD IW Project
The “Khaldun Approach”

Conceptual Model (CM)

Review/Refine CM

Data Development

CM & Data Instantiation

The Khaldun Approach
Colombia Scenario

• Background
• MAGTF Mission:
  • Refugee Camp Security
  • Humanitarian Assistance / Disaster Relief
• 2 Possible Courses of Action (COAs)
  • Sea-Based
  • Shore-Based

Provide:

Joint “Cultural” Prep of the Operational Environment

Plausible Range of Civilian Population Behaviors
Colombia
Population Segments

- Illicit Organizations
- Catholic Church
- Police
- Military
- Displaced Persons
- Urban Poor
- Urban Middle Class
- Old Money

Cultural Behavioral Data
- Orientation (Initial, Tendency)
- Impact Of MAGTF COAs
- Influence Of Population Segment Interactions
Data Required

Step 0: Define population segments

Elicit data for each population segment

1. Natural tendency of the population segment
   • The population segment’s narrative with respect to the insurgency

2. Effect of current events on population segment (impact)
   • How the population segment reacts to a given COA

3. Effect of other population segments on a population segment (influence)
   • How the population segment reacts to the narratives offered by other population segments
SME Interviews

• Selecting SMEs
  – 2 SMEs obtained via MCIA
  – SME credentials

• Analyst & cultural SME communication challenge
  – Analysts need numbers, e.g., probabilities, percentages
  – Cultural SMEs are non-quantitative thinkers
Orientation Data

• Initial orientation
  – “How do the actions of this population segment support the insurgency (FARC) or the Government of Colombia (GoC)?”

<table>
<thead>
<tr>
<th></th>
<th>FARC</th>
<th>Pro-FARC</th>
<th>Neutral</th>
<th>Pro-GoC</th>
<th>GoC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban Poor</td>
<td>5.8%</td>
<td>9.2%</td>
<td>65.7%</td>
<td>15.1%</td>
<td>4.2%</td>
</tr>
</tbody>
</table>

• Natural tendency of orientation
  – “Given no external influences, over time, how would the actions of this population segment change to support the FARC or the GoC?”
  – Captured as data for a Markov transition matrix

Example: Urban Poor

<table>
<thead>
<tr>
<th></th>
<th>FARC</th>
<th>Pro-FARC</th>
<th>Neutral</th>
<th>Pro-GoC</th>
<th>GoC</th>
</tr>
</thead>
<tbody>
<tr>
<td>FARC</td>
<td>99.4%</td>
<td>0.3%</td>
<td>0.2%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Pro-FARC</td>
<td>0.1%</td>
<td>98.0%</td>
<td>1.3%</td>
<td>0.5%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Neutral</td>
<td>0.0%</td>
<td>0.4%</td>
<td>99.1%</td>
<td>0.5%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Pro-GoC</td>
<td>0.0%</td>
<td>0.0%</td>
<td>1.2%</td>
<td>98.5%</td>
<td>0.3%</td>
</tr>
<tr>
<td>GoC</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.1%</td>
<td>0.1%</td>
<td>99.8%</td>
</tr>
</tbody>
</table>
Charles Osgood’s Semantic Differential

- Osgood’s method is a development of the Likert Scale in that Osgood adds in three major factors or dimensions of judgment:
  - EVALUATIVE (good - bad)
  - POTENCY (strong - weak)
  - ACTIVITY (active - passive)

- Semantic Differential is widely used in advertising and marketing research, including questionnaires, interviews and focus groups. The versatility of uses with bipolar adjectives and the simplicity of understanding them have made it ideal for consumer questionnaires and interviews.

- There are several large scale surveys done, providing data on EPA values for over 1000 different actions, emotions and people, led by David Heise, Department of Sociology, Indiana University

Translates SME words to a quantitative measure
Impact of COAs
Elicitation

• “What words would this population segment use to describe MAGTF ‘sea-based’ operations?”
  – ‘Positive words’ averaged to measure leaning more towards GoC (right)
  – ‘Negative words’ averaged to measure leaning more towards FARC (left)

• “What words would this population segment use to describe MAGTF ‘shore-based’ operations?”

<table>
<thead>
<tr>
<th>Word</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>agree with</td>
<td>1.05</td>
</tr>
<tr>
<td>authorize</td>
<td>1.21</td>
</tr>
<tr>
<td>believe</td>
<td>1.62</td>
</tr>
<tr>
<td>please</td>
<td>2.93</td>
</tr>
<tr>
<td>appreciate</td>
<td>3.24</td>
</tr>
</tbody>
</table>
Impact of Shore/Sea Base

- Left means the sea/shore base COA causes the actions of the population segment to lean towards the FARC
- Right means the sea/shore base COA causes the actions of the population segment to lean towards the GoC
Influence Elicitation

• Influence of other population segments
  – “What words would this population segment use to describe another population segment?”

<table>
<thead>
<tr>
<th>Word</th>
<th>Influence</th>
</tr>
</thead>
<tbody>
<tr>
<td>unsuccessful</td>
<td>-2.41</td>
</tr>
<tr>
<td>impotent</td>
<td>-1.53</td>
</tr>
<tr>
<td>cowardly</td>
<td>-2.50</td>
</tr>
<tr>
<td>inexperienced</td>
<td>-2.25</td>
</tr>
<tr>
<td>mediocre</td>
<td>-1.47</td>
</tr>
<tr>
<td>average</td>
<td>-0.14</td>
</tr>
</tbody>
</table>
**Influence of other Segments**

- Catholic Church
- Displaced Persons
- Illicit Organizations
- Urban Poor

Influence of “x-axis” on “legend”
Pythagoras Results
Questions?

TRIM'S FIGHTIN' WORDS, MISTER... UNLESS N. O'COURSE, TRIM'S JUST SEMANTICS.
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Ibn Khaldun

- Ibn Khaldun (1332–1406)
  - Considered the forerunner of several social scientific disciplines: demography, cultural history, historiography, the philosophy of history, sociology, and modern economics

http://en.wikipedia.org/wiki/Khaldun