

# *The Military-Climate Change System: A Case Study Using the Agent Based Approach (ABA)*

James Bond<sup>a,b,c,@</sup>

<sup>a</sup> Cornell University

<sup>b</sup> Jeb E. Brooks School of Public Policy

<sup>c</sup> Cornell Institute for Public Affairs

@ email: jmb747@cornell.edu

**ABSTRACT:** The relationship between the United States military and climate change is a complex adaptive system that is, at first, difficult to understand. By utilizing systems thinking and Plectica software to visualize the salient distinctions, systems, relationships, and perspectives (DSRP), one can achieve a deeper and broader understanding of the agents and simple rules that result in the emerging complex system. Implementing the Agent Based Approach (ABA), this paper will present a mental model map of the military/climate change system that has been analyzed using DSRP/ST-Loop Analysis to reflect reality. Understanding this visual map will allow for greater analysis of the system in order to accomplish three goals - understand the system, identify the prioritization within the system, and provide policy recommendations to military decision-makers.

**Keywords:** Systems Thinking | DSRP | Agent-Based Approach | Climate Change | Military

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## *Introduction*

IN 2007, THE CNA CORPORATION published the first comprehensive analysis of the threats of climate change to the national security of the United States <sup>1</sup>.

After their report, the military has undergone multiple iterations of attempting to integrate climate change considerations into both defense policy and strategy. However, due to political administration changes and prior commitments in the Middle East, the plans continued to fall short of the desired impact. Shortly after President Biden was inaugurated in 2021, he signed Executive Order 14008 - Tackling the Climate Crisis at Home and Abroad that required a national response to climate change <sup>2</sup>. His prioritization was further clarified when the White House published the Interim National Security Strategic Guidance posing climate change as one of the greatest threats to national security. As a result, the Department of Defense (DoD) began publishing their plans to meet the Commander-in-Chief's mandate. In October 2021, DoD issued the Climate Adaptation Plan claiming the military would factor climate change into all future strategic documents, policies, plans and wargames.

The U.S. military has received much criticism related to their response to climate change <sup>3</sup>. Though the military focuses efforts

<sup>1</sup> CNA Corporation, National Security and the Threat of Climate Change, , 2007

<sup>2</sup> 2

<sup>3</sup> 3; 4; and 5



on the impacts caused by climate change - flooding, hurricanes, war over scarce resources, etc - they are often criticized for their lack of mitigation or preventative measures <sup>4</sup>. This relationship between the military and climate change results in what Gerald Midgely calls a “wicked problem” - cross-cutting, interlinked issues with multiple perspectives on the problem and/or solutions steeped in conflict and uncertainty <sup>5</sup>. Though this may pose what seems to be an impossible problem, the way to approach wicked problems is by changing our thinking <sup>6</sup>.

According to Drs. Derek and Laura Cabrera, “Wicked problems result from the mismatch between how real-world systems work and how we think they work. Systems thinking attempts to resolve this mismatch” <sup>7</sup>. The way we think something works is called a mental model - “the way you think about the real situation or environment in which you are working” <sup>8</sup>. Systems thinking seeks to align that mental model with reality, because once we understand reality, we can begin to offer improvements <sup>9</sup>. Therefore, utilizing systems thinking, the aim of this paper is to understand the complex adaptive system (CAS) resulting from the action-reaction relationship between the military and climate change. Understanding the military’s-response-to-climate-change-system will allow us to conduct an intricate analysis of the elements within the system that cause it to behave the way it does. Through the Agent Based Approach, we will analyze this system and provide recommendations on how to incrementally better the system through simple changes to everyday actions by actors within the system.

## *Methods*

THE RELATIONSHIP BETWEEN THE MILITARY and climate change can be characterized as a complex adaptive system (CAS) where agents in the system follow simple rules that lead to emergent behavior <sup>10</sup>. The Agent Based Approach (ABA) is the preferred method to understand the military’s-response-to-climate change system and make recommendations to improve it.

## *Why an Agent Based Approach (ABA)?*

The Agent Based Approach - developed at Cornell University by Drs. Derek and Laura Cabrera - is a method of “thinking about complex adaptive systems (CAS) with the end goal of coming to some recommendations that will help to change the system from its current undesirable state to some future [more desirable] state” <sup>11</sup>. It

was developed as an alternative to Agent Based Modeling (ABM), a “hard” methodology of modeling a complex adaptive system often through computer-based programming<sup>12</sup>. While ABM is a very powerful tool, in the realm of policy or systems analysis it often encounters issues - such as a lack of data, vague variables, limited coding competency, and shoehorning complexity - that render it infeasible<sup>13</sup>. As mentioned above, the U.S. military response to climate change is a CAS. To begin to think about this relationship, it is readily apparent that this CAS cannot neatly fit into ABM methodology as it falls prey to the numerous limitations mentioned above, namely lack of variable specificity or attempting to “shoehorn real-world complexities into tightly-defined, discrete variables”<sup>14</sup>. Therefore, ABA provides the “soft” modelling alternative to tackle the complexity of this relationship<sup>15</sup>.

### *Steps to an Agent Based Approach (ABA)*

THE AGENT BASED APPROACH CAN be performed in a systematic, step-by-step manner, though it is important to realize that reality is rarely contained within a linear progression<sup>16</sup>. Essential to ABA, however, is defining and understanding DSRP and CAS<sup>17</sup>. DSRP stands for distinctions, systems, relationships, and perspectives, each with its individual elements. These provide the “root theoretical construct of Systems Thinking” as shown in Table 1<sup>18</sup>.

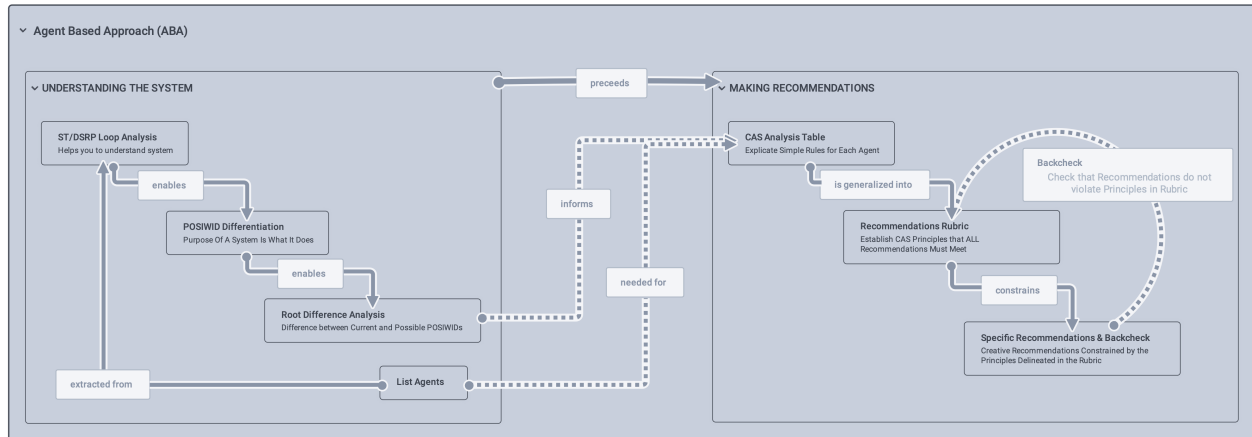
| Patterns                   | Elements                                    |
|----------------------------|---------------------------------------------|
| Distinctions ( <i>D</i> )  | identity ( <i>i</i> ) ↔ other ( <i>o</i> )  |
| Systems ( <i>S</i> )       | part ( <i>p</i> ) ↔ whole ( <i>w</i> )      |
| Relationships ( <i>R</i> ) | action ( <i>a</i> ) ↔ reaction ( <i>r</i> ) |
| Perspectives ( <i>P</i> )  | point ( <i>ρ</i> ) ↔ view ( <i>v</i> )      |

Table 1: DSRP Structures

“DSRP provides the theoretical basis for the analytical and synthetic skills required for understanding and cognitively mapping complex systems”<sup>19</sup>. As mentioned above, the military response to climate change is a CAS. By definition, a complex adaptive system is a “set of agents following local simple rules to lead to collective behavior that yields an emergent property or behavior” (23). Therefore, by utilizing DSRP, we can begin to understand a CAS through mapping to identify the agents and simple rules. A deeper understanding of DSRP and CAS is provided by other resources<sup>20</sup>.

With an understanding of DSRP and CAS, we can break down the steps to ABA. Figure 1 below provides a visual representation of the steps of ABA.

<sup>20</sup> 8; 9; 10; 6; 11; 12; 13; 14; 15; 16; and 17

Figure 1: Agent Based Approach:  
Step-wise Process

### Step 1: DSRP Analysis of the System

#### THE PROCESS

The goal of this step is to begin to understand the system by “analyzing, synthesizing, and interrogating one’s mental models and testing them against reality using DSRP”<sup>21</sup>. This step can be broken down into six sub-steps, though it is not entirely linear. Therefore, in order to complete Step 1, structural predictions and the ST-Loop are the primary tools utilized to capture all six steps and generate the best understanding of a system. By utilizing these processes, the mental model of the system is interrogated, tested against reality, and evolved to achieve the closest approximation to reality.

<sup>21</sup> 7

#### STRUCTURAL PREDICTIONS

DSRP is predictive in nature<sup>22</sup>. By utilizing DSRP rules, any *identity* that is made within a map can be any other element of DSRP - *other, part, whole, action, reaction, point, or view*<sup>23</sup>. This powerfully predictive tool is used to interrogate the system and explore DSRP elements that are not readily apparent during the first mental model generation.

<sup>22</sup> 6

<sup>23</sup> 6

#### ST-Loop

The ST-Loop Feedback is utilized to compare a mental model with reality and change it to reflect reality<sup>24</sup>. Feedback can be gained through reputable publications and literature review, subject matter experts, or experimentation. This step is critical to test the mental model and refine it to best reflect reality. Only when the mental model accurately reflects reality will the intended recommendations

<sup>24</sup> 7

produce the desired outcome.

### *Step 2: POSIWID and CAS Analysis*

#### POSIWID ANALYSIS

Once the model has reached its closest approximation to reality, the next step is to determine the POSIWID of the system as it currently exists. Stafford Beer developed the acronym POSIWID which stands for “The purpose of a system is what it does” <sup>25</sup>. This means that the results of a system are based on the design of the system <sup>26</sup>. Therefore, “when assessing a system, we need to focus on what the system actually does rather than its ostensible, original, or ideal purpose (since these often do not match)” <sup>27</sup>. One must first determine the current POSIWID based on the developed understanding of the system, which is called the “Current-Is-POSIWID” - “System X is exceptionally well designed and good at its purpose of Result 1, 2, 3, etc.” <sup>28</sup>. Next, determine what the POSIWID should be in the future, or the “Should-be-POSIWID” <sup>29</sup>. By comparing and contrasting these two POSIWID statements, we conduct Root Difference Analysis which highlights the structural differences between the current and desired states of the system <sup>30</sup>. This provides the foundation for the future steps in ABA.

#### CAS ANALYSIS

Whereas POSIWID analysis looks at the complex emergent properties of the system, CAS Analysis focuses on the agents and simple rules within the system <sup>31</sup>. Remember that a complex adaptive system is agents following simple rules leading to collective behavior and emergence <sup>32</sup>. Therefore, the product of this analysis is the CAS Table of the salient agents and the simple rules they follow within the system <sup>33</sup>. Identification of the agents and simple rules is critical within ABA because the recommendations are founded on “the idea that the greatest leverage points in a CAS are the agents and simple rules” <sup>34</sup>.

### *Step 3: Rubric and Recommendations*

BEFORE DEVELOPING RECOMMENDATIONS based on what has been found in the preceding steps of ABA, it is critical to create a recommendations rubric. This is a list of “design principles... that all future recommendations must meet” <sup>35</sup>. In order to determine these principles, you must identify the patterns underlying all possible recommendations <sup>36</sup>. Therefore, this rubric serves as boundaries for

creativity within recommendation development. Once the recommendation rubric is developed, we identify creative recommendations that are screened through the principles outlined within the rubric<sup>37</sup>. This ensures greater feasibility for the recommendations.

<sup>37</sup> 7

## Results

THE FOLLOWING SECTION outlines the results of the ABA applied to the military's response to climate change. It will provide a deeper understanding of the capability of systems thinking and the process and outcomes of the Agent Based Approach. The explanation of these results will be covered later in the discussion section.

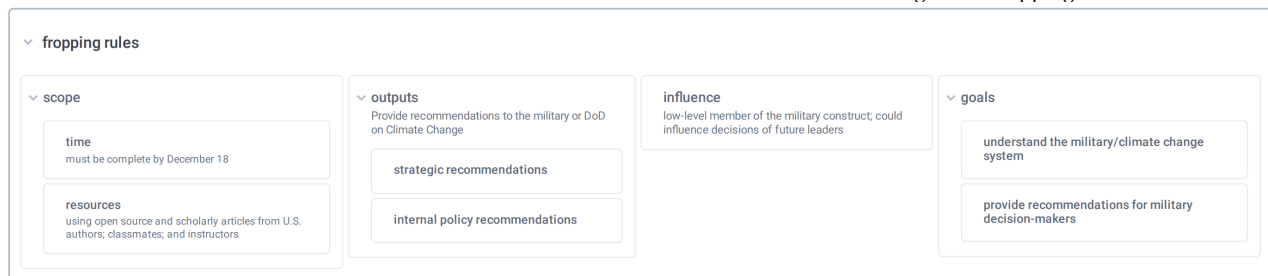
### DSRP Analysis of the System

BEFORE MAPPING the military's-response-to-climate-change-system, I developed a list of "fropping rules" (Figure 2) which framed and provided boundaries for the analysis<sup>38</sup>. These rules develop "a perspective on the goal of analysis that answers questions of what is relevant, when to stop, what/where to explore"<sup>39</sup>.

<sup>38</sup> 18

<sup>39</sup> 18

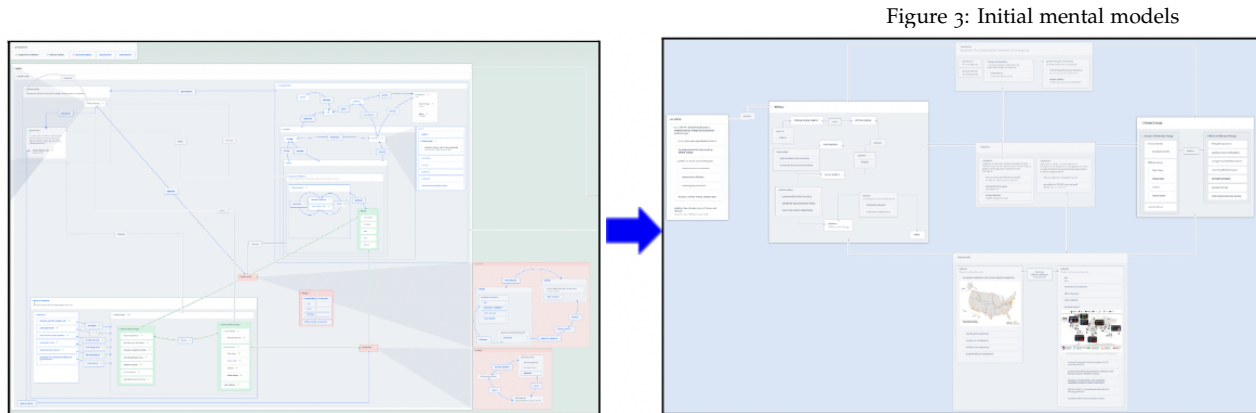
Figure 2: Fropping Rules



The initial mental model (Figure 3) of the complex adaptive system was created utilizing Step 1.1 of the Agent Based Approach, ST/DSRP Loop Analysis<sup>40</sup>. I developed the foundational understanding of the system through Executive Order 14008, the Interim National Security Strategic Guidance, the Climate Adaptation Plan Framework and IPCC's Sixth Annual Report. The map evolved through multiple iterations of the ST/DSRP Loop until it developed into the map in Figure 4.

<sup>40</sup> 7

The image below presents the most basic form of the system that captures the key distinctions, systems, relationships, and perspectives. In Systems Thinking, this structure is considered a *P-circle* where



each of the identities are outside the system having a *view* of different *points* within the system.

Utilizing structural predictions, I was able to expand the understanding of the system by increasing each of the structural elements of DSRP. Table 2 provides a summary of the impact structural predictions had on the content of the map.

| DSRP Element | Original | New | Total Structures |
|--------------|----------|-----|------------------|
| <i>i</i>     | 90       | 149 | 239              |
| <i>o</i>     | 52       | 42  | 94               |
| <i>Dio</i>   | 52       | 42  | 94               |
| <i>p</i>     | 58       | 66  | 124              |
| <i>w</i>     | 15       | 25  | 40               |
| <i>Spw</i>   | 12       | 19  | 31               |
| <i>a</i>     | 19       | 35  | 54               |
| <i>r</i>     | 5        | 14  | 19               |
| <i>Rar</i>   | 2        | 3   | 5                |
| <i>ρ</i>     | 11       | 41  | 52               |
| <i>v</i>     | 2        | 1   | 3                |
| <i>Ppv</i>   | 3        | 10  | 13               |

Table 2: Results of Structural Predictions

Below is a summary of some highlighted changes due to structural predictions.

- *Distinctions.* For any *identity* that I deemed important, I would seek to determine the other that existed within the system. Some of the key *Dios* I identified were “climate change” and “other drivers of instability”, “defense strategy” and “defense policy”, and “security” and “risks”.
- *Systems.* To understand “military” and “climate change”, it was important to understand the part they played in their whole systems. Additionally, I began to systematize all important distinguished relationships, specifically the RDSs between military and climate change.

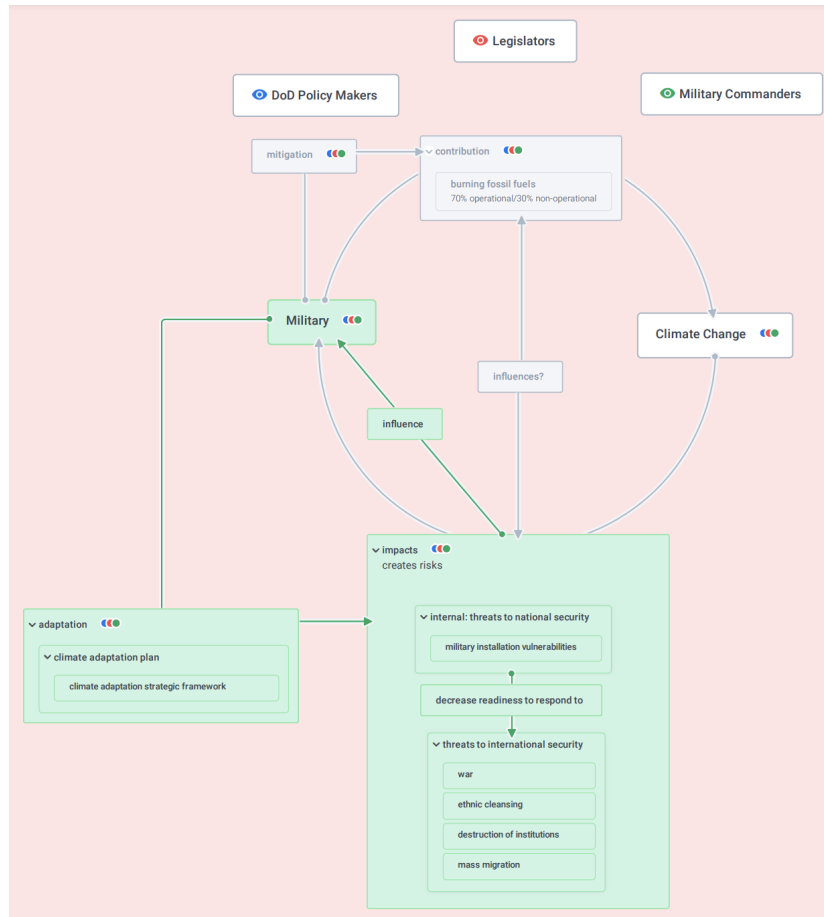


Figure 4: Military's Response to Climate Change System (P-circle)

- *Relationships.* Understanding that everything can be related allowed me to not only create new relationships, but also identify what the “other” was in the relationship. Relationships that developed from structural predictions were the actions that “defense strategy” and “defense policy” have on the RDSs between climate change and military.
- *Perspectives.* Multiple perspectives are taken on this system. However, two anthropomorphic perspectives that developed as a result of structural predictions were the “security” and “international” perspectives. Each of these view the system and have the potential to impact it in different ways.

The ST-Loop Feedback was utilized to compare this mental model with reality and change it to reflect reality<sup>41</sup>. This was conducted by both formal and informal means. There were a total of eight formal ST-Loop Feedback iterations where I intentionally tested the mental model against reality through literature review, systems thinking

<sup>41</sup> 7

peers, and systems thinking experts. The sources used for literature review are listed here <sup>42</sup>. The informal feedback was gained through passive collection, such as a news article or conversation, that would later provide additional perspective or insight that would refine the map.

<sup>42</sup> 19; 20; 21; 22; 23; 24; 25; 26; 27; and 28

### *POSIWID Analysis*

DETERMINING THE POSIWID of the system begins by looking at the system structure. Rooted in an understanding of CAS and Systems Thinking, we know that “system structure determines the behavior of the system” <sup>43</sup>. Therefore, when looking at the whole system of the military’s response to climate change, the behaviors that emerge are (1) increasing security risks, (2) increasing contributions to climate change, and (3) creating policy failures.

<sup>43</sup> 29

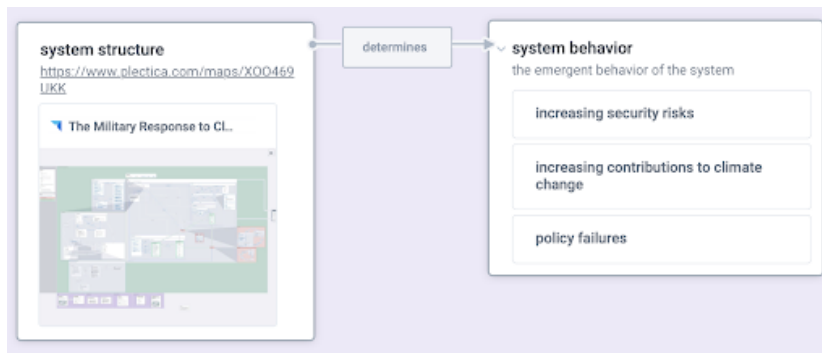


Figure 5: System determines Behavior (SdB)

This is then translated into the current POSIWID. To determine the future POSIWID, I determined the desired end-state of the military’s response to climate change. Both of these are seen in Table 3.

The root difference in Table 3 becomes apparent as we look at the barriers in the system which prevent the desired end state or Future POSIWID. In its current state, the system prioritizes funding to address the risks of climate change, prioritizes global competition over the impact of climate change, complies with policy instead of committing to it, and is predisposed to focus on the effects instead of the root causes of climate change.

### *CAS Analysis*

THE MILITARY’S RESPONSE to climate change is a complex adaptive system that contains various agents that follow simple rules and

| Problem Statement                                                                                                                                                                                | Current POSIWID                                                                                                                                                                                             | Future POSIWID                                                                                                                                                                                                            | Root Difference                                                                                                                                                                                                                                                                         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The current U.S. military response to climate change is inadequate, and if it remains unaddressed, will continue to decrease the readiness of the military and increase national security risks. | The “military’s response to climate change” system is exceptionally well designed and good at its purpose of increasing risks to security, increasing contributions to climate change, and policy failures. | The “military’s response to climate change” system is exceptionally well designed and good at its purpose of managing risks to security, decreasing contributions to climate change, and implementing effective policies. | At its core, POSIWID difference is:<br><ol style="list-style-type: none"> <li>1. Funding prioritizes risks vs. contribution</li> <li>2. Global competition vs global impact</li> <li>3. Compliance policy vs commitment policy</li> <li>4. Effects focus vs root cause focus</li> </ol> |

Table 3: POSIWID Analysis

produce the emergent behavior indicated above. A list of these agents and their rules are listed in Table 4.

### *Rubric and Recommendations*

The Recommendation Rubric provides the criteria for all proposed recommendations. The proposed recommendations are assessed against the rubric and it is considered a viable recommendation so long as it does not violate the criteria.

**RECOMMENDATION RUBRIC** No specific recommendation should violate these rules:

1. The recommendation must balance adaptation and mitigation, not just respond to adaptation.
2. The recommendation must consider global impact as more important than global competition.
3. The recommendation must ensure commitment to policy change instead of merely compliance.
4. The recommendation must address the root cause as well as the symptoms of climate change.

### **SPECIFIC INTERVENTIONS/RECOMMENDATIONS**

**Intervention/Recommendation 1: Decision-making rubric.**  
Develop a procedural step/process that forces decision makers to check their bias before signing a decision or policy.

**Intervention/Recommendation 2: Non-defense input.** Create defense policy utilizing the advice and feedback from the non-



| List of Salient Agents                       | Current Simple Rules                                                                                                                                                                                                                                                                  | Current System Level Behavior                                                                                                                                                                                              |
|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Military Commanders<br>(Corps and JCS-level) | <ol style="list-style-type: none"> <li>1. Implement strategic guidance through understandable tasks/purpose.</li> <li>2. Enforce policy compliance.</li> <li>3. Report on measures of success.</li> <li>4. Advise policy makers.</li> <li>5. Report operational readiness.</li> </ol> | Advise according to current structure and capabilities to meet current risks; provide reactionary capability; comply with administration in office; focuses on global competition instead of organizational global impact. |
| Defense Policy Makers                        | <ol style="list-style-type: none"> <li>1. Produce policy based on strategic guidance.</li> <li>2. Balance military capabilities with political tide.</li> </ol>                                                                                                                       | Produce policy that responds to risks of climate change; compliant to current administration.                                                                                                                              |
| Legislators                                  | <ol style="list-style-type: none"> <li>1. Get re-elected.</li> <li>2. Vote according to constituents.</li> <li>3. Show immediate return vs. long-term investment.</li> </ol>                                                                                                          | Funding that supports response to risks of climate change; mitigate effects instead of addressing root for quick political win.                                                                                            |

Table 4: CAS Analysis

defense community. Include additional autonomous agents from within the larger system.

Intervention/Recommendation 3: **Change directions.** Policy is usually established top-down. Instead of implementing strategic guidance, create the policy that will impact the guidance and set the example for other departments (bottom-up).

## Discussion

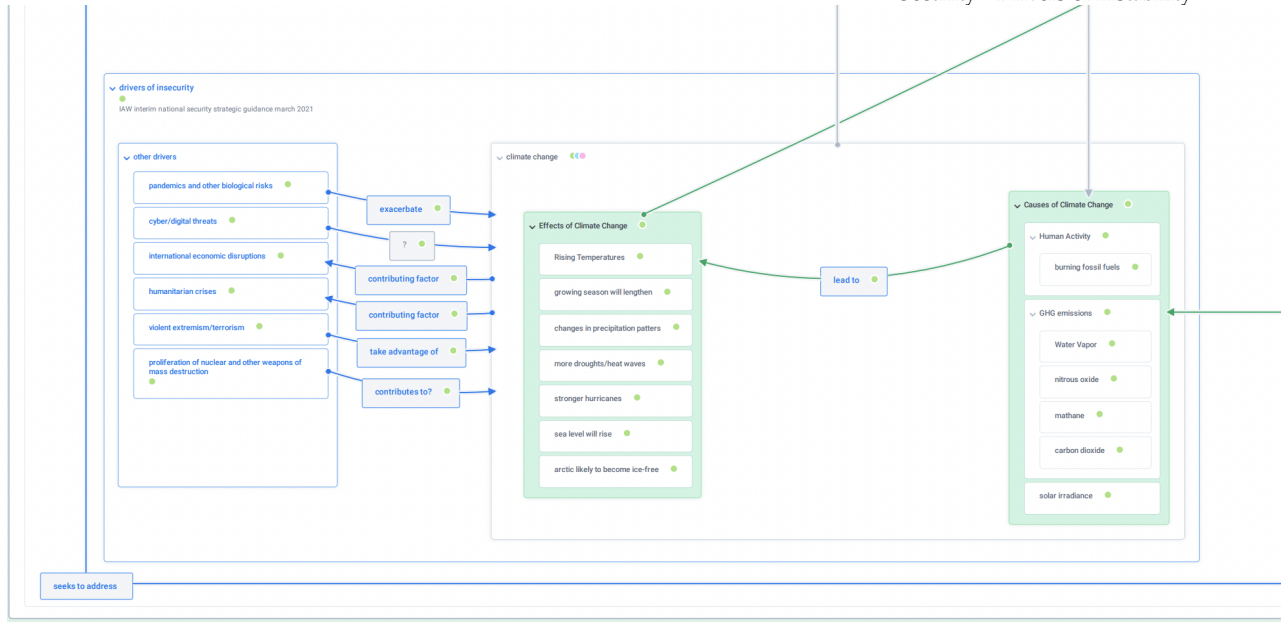
### DSRP Analysis of the System

THROUGHOUT STEP 1 of the ABA process, the goal was to reach an understanding of the military's response to climate change in both breadth and depth. Utilizing structural predictions and ST-Loop feedback, I constructed a detailed mental model of the system (Figure 3). However, this system was steeped with *identities* or *Spws* (System-part-wholes) that, while important, could be minimized in order to capture the salient parts that resulted in the emergent behavior. For example, a key identity within the system is "national security" which includes two parts - defense policy and defense strategy. The U.S. government, (the *whole* that contains the military)



is responsible for (*relationship*) national security, which addresses the military's *action-reaction relationship* to drivers of insecurity (the *whole* which contains "climate change"). These are all vital components of the CAS that provided context for the system, yet the focus of the Agent Based Approach was the relationship between the military and climate change.

Figure 6: U.S. government - National Security - Drivers of Instability



Through ST/DSRP Loop analysis, the salient distinctions, systems, relationships, and perspectives emerged. There are two major portions of this system (Figure 7) that stand out as a result of mapping. First is the circular relationship between the military and climate change. They are inextricably linked, and the military attempts to change these relationships through two actions - mitigating their contribution and adapting to the impacts/risks. These two actions are influenced by the second point drawn from this map - the perspectives of the policy influencers and decision makers.

As mentioned above, this system is a cognitive jig called a P-circle<sup>44</sup>. The perspectives of the decision makers - DoD policy makers, military commanders, and legislators - influence their decisions regarding climate change. Through ST/DSRP Feedback, it became apparent that the decision makers regularly make decisions based on their limited perspective on one portion of the system - a system of relationships (highlighted in green). The decision makers view the threats caused by climate change, and create policy regarding military "adaptation" to the threats. As a result, there is a significant

<sup>44</sup> 6

lack of attention to the mitigation of the “adaptation” relationship between the military and climate change. This is largely due to the concern for the immediate threat versus the long-term reality.

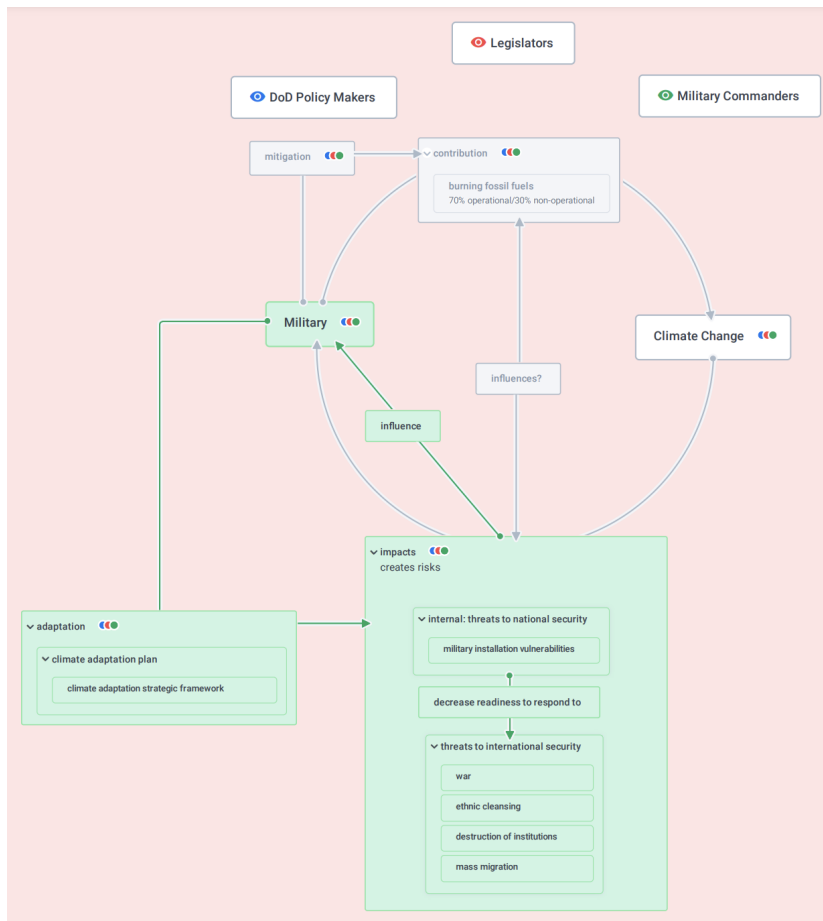


Figure 7: Military's Response to Climate Change System - P-circle

### POSIWID Analysis

THE EMERGENT PROPERTIES within the system were outcomes of the structure of the system. A cyclical process (a *System of Relationships*) was created within the system where policy would dictate the military's response to threats/risks caused by climate change. This response would therefore cause an increased expenditure of fuel, thereby contributing to climate change. These are ultimately due to policy failures as the policy dictates how the military will respond.

On the flip side (the “Should-be-POSIWID”), if the policy changes, then the cyclical system of relationships can work in the favor of the CAS. If the military decreases its contributions to climate change

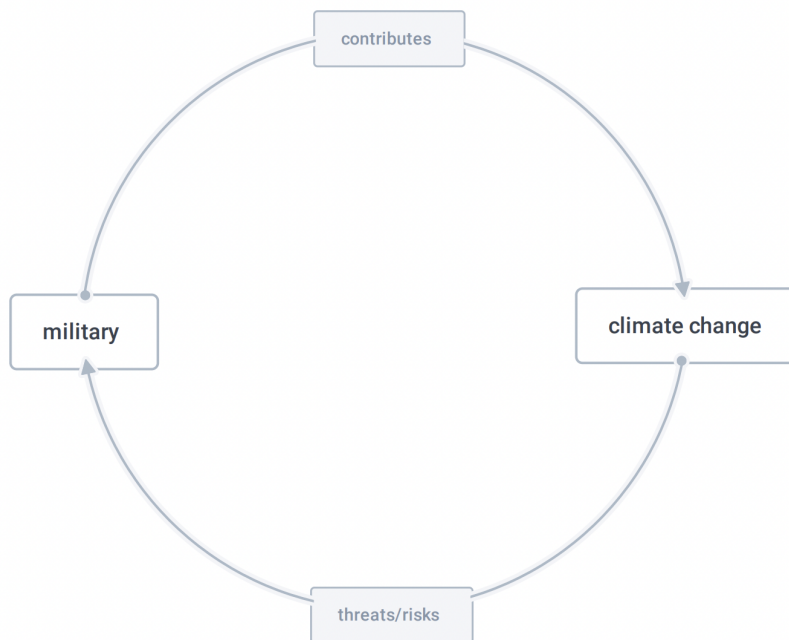


Figure 8: System of Relationships

(less expenditure of fossil fuels), then the threats/risks caused by climate change will also decrease. However, the policy that is created to address these issues is also an emergent property of the system brought on by the autonomous agents following simple rules (covered in CAS Analysis).

The Root Difference Analysis provides us with the fundamental differences between the current and desired state. The policy is built based on perspectives of prioritization. Policy makers prioritize funding to the immediate threat/risks. Advisors prioritize the enemy we can see over the enemy we cannot. All agents comply with the current administration's wishes rather than commit to long-term solutions. Lastly, the policy makers seek to treat the symptoms but not the root cause, settling for the immediate win over the long-term victory.

### *CAS Analysis*

THERE ARE TWO DRIVING FACTORS concerning the agents and simple rules within this system. First, the autonomous agents within this system cast different perspectives on the military's relationship with climate change. This perspective thereby affects the manner the agents execute their simple rules within the CAS. Depending on how

an individual agent views climate change will impact their view and behavior in the system. Second, the longevity of agents within this system is considerably short. Each of the decision makers within this system are only in a position of creating and influencing policy for two to six years. Therefore, time plays a factor in the behavior of the system and its inability to achieve a long term solution.

### *Rubric and Recommendations*

CREATING THE RECOMMENDATIONS rubric provided the “test” for all interventions/ recommendations offered in this paper. This rubric is not limited to this paper, however. As this system is constantly evolving and adapting (hence a complex *adaptive* system), this rubric serves as the test for all future recommendations that may be offered to incrementally improve the military’s response to climate change. As long as the recommendation meets the standards prescribed in the rubric, it may be considered a viable option worth implementing.

The specific recommendations listed in Table 5 follow the objective of the Agent Based Approach - they address either the agents or the simple rules that are within the CAS that results in an emergent behavior. The following explicates each recommendation.

*Recommendation 1: Decision-Making Rubric.* This recommendation addresses the perspective of each of the agents acting in the system. It is an attempt to provide the agents an opportunity to check their bias before making a decision, providing a recommendation, or signing a policy. It is essentially a self-feedback loop expressly focused on climate change related decisions.

*Recommendation 2: Non-defense Input.* The essence of this recommendation is adding agents to the P-circle. Currently, the decision makers for all defense policy are those who are already predisposed to prioritize national security above all else. However, the national security perspective is often short-sighted, seeking to engage a 50 meter smaller target when a more threatening target is 200 meters away. The addition of other agents into the decision making process offers a method of affecting the emergent properties of the system.

*Recommendation 3: Change directions.* The last recommendation seeks to change the simple rules that each of the agents follow. The flow of policy is often top-down. However, instead of merely complying with the current political priorities, the agents could decide to set the standard or provide an example of the most effective climate change policy across government departments. This would be as simple as DoD creating policies that significantly decrease defense contribution to greenhouse gas emissions.

## *Conclusion*

THE AGENT BASED APPROACH provides an effective method of understanding a complex adaptive system such as the military's relationship with climate change. As the system evolves, ABA can continually be applied through DSRP/ST-Loop Feedback which will constantly improve the system relative to reality. POSIWID and CAS analysis provide the emergent properties of the system and the salient agents and rules operating within the system. The recommendations offered then attempt to affect the emergent properties by addressing the agents and simple rules. In the future, ABA can continue to be applied to this system to offer incremental solutions to better address the wicked problem of the military's response to climate change.



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