AI-Enabled Social Cyber Maneuver Detection and Creation Matthew Hicks

Thesis Proposal

Spring 2024

Committee

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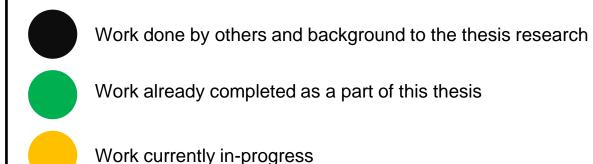
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Thesis Work Completion Key



Work not yet started

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Social-Cyber Security

- BEND provides a framework for describing information space maneuvers
- BEND allows us to frame:
 - (Source) Who
 - (Payload) Maneuver
 - (Target) On Whom
 - (Effect) Impact

Narrative Maneuvers: Impact what is being said and how it is being said		Community Maneuvers: Alter who is connected to whom, the strength of those connections, and so alters who is influential and what groups exist			
Emotional Messaging	Develop Narrative	Counter Narrative	Individual Centric	Make Groups	Unmake Groups
Excite	Explain	Distort	Back	Build	Neutralize
Dismay	Engage	Dismiss	Negate	Bridge	Narrow
Enhance Distract			Boost	Neglect	

Major questions and motivation

- Q1: How does the BEND framework fit into current military doctrine and how can it enhance current information environment analysis?
- Q2: How can we detect the presence of BEND maneuvers through their effects?
 Can we match these maneuvers to narrative campaigns?
- Q3: How can we develop exercise training scenarios for the BEND framework?
 - Can we extract a training scenario from real data without resorting to hand-crafting messages?
 - How can we leverage AI/LLMs to enhance training scenarios and generate multi-modal BEND?

Purpose

The purpose of this thesis is to:

- Move BEND beyond a theoretical discussion framework and into an operationally relevant construct for evaluating socialcybersecurity
- Nest BEND within current US military doctrine
- Identify countermeasures to BEND maneuvers,
- Connect detected maneuver effects with broader BEND campaigns
- □ Leverage AI to develop synthetic training scenarios that closely mirror real word data with minimal human intervention

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Doctrinal BEND



Prior Work

- □ Blaine (CMU-S3D-23-102) looked at and compared BEND to four other information operations frameworks:
 - Ben Nimmo: 4Ds
 - ABCDE Framework
 - ☐ Camille François: ABC Framework
 - ☐ Alexandre Alaphilippe: ABCD Framework
 - ☐ Pamment: ABCDE Framework
 - Blazek: SCOTCH Framework
 - DISARM Foundation: DISARM Framework

Table 1.1: Comparison of informations operations frameworks

Characteristics	4 D's	ABC(D)(E)	SCOTCH	DISARM	BEND
General high-level approach	X	X	X	X	X
Specific systematic methodology					X
Key Actor Analysis		X	X		X
Behavior Analysis	X	X		X	X
Quantitative Analysis					X
Limited to Disinformation Analysis	X	X		X	
Influence campaign analysis/assessment			X		X
Develops recommendations		X		X	X
References	[98]	[3, 57, 101]	[22]	[50]	[17, 38]



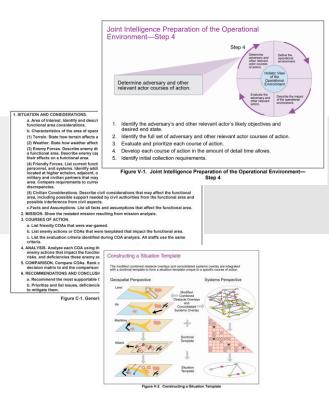
How does the BEND framework fit into current military doctrine?

Current References

- JP 3-04 Information in Joint Operations
- JP 3-13 Information Operations
- NWP 3-13 Navy Information Operations
- FM 3-13 Information Operations
- AFDP 3-13 Information in Air Operations
- CJCSI 3110.01C Joint Information Operations Proponent
- DODI 3600.01 Information Operations
- ADP 5-0 The Operations Process
- MCWP 3040.4 Marine Air-Ground Task Force Information Operations
- JP 2-01.3 Joint Intelligence Preparation of the Operational Environment
- ATP 2-01.3 Intelligence Preparation of the Battlefield
- JP 3-60 Joint Targeting

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Current Products



New References and Products

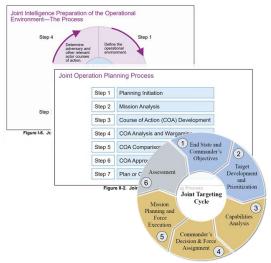


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How do we use BEND with current doctrine?

JIPOE

BEND



- A) SPOTREP of adversarial action on social media
- B) J2/OSINT updates EN SITEMP (JIPOE, JOPP 1, JTC 2)
- C) PAO evaluates CDR's objectives, desired effects, and endstate (JOPP 2, JTC 1)
- D) JFECC develops COAs for CDR (JOPP 3, JTC 4/5)
- E) CDR approves COA (JOPP 6, JTC 5)
- F) COA Execution by PAO (JTC 6)
- G) Impact Assessment by J2/OSINT (JIPOE, JOPP1, JTC 0/1)

Friendly Situation IE Impact **SPOTREP** IE MCOO/ **Enemy Situation COA Development** Assessment **Systems Overlay Template** COA1: US conducts EXCITE by MDCOA: EN conducts BRIDGE between highlighting successful US and allied antianti-US echo-chambers and indigenous piracy efforts in the region IOT engender and environmental rights activists IOT joy and contentment in regional populace connect both groups' goals **BEND Framework** COA2: US conducts BRIDGE between MLCOA: EN conducts DISTRACT using US women's rights initiatives in the Community Maneuvers: supposed US COVID response failures region and indigenous and environmental Information and content of messages Alter the connections within the IOT dilute US solidarity message against rights activists IOT connect US goals with (What/How topics are discussed) social network (i.e., online communities adversary expansion in the region. activist goals COA3: US conducts DISTRACT by highlighting adversary environmental affects IOT to overshadow adversary Neglect claims of the same Narrow Null Enhance Bridge

JIPOE - Joint Intelligence Preparation of the Operational Environment (JIPOE) JOPP - Joint Operation Planning Process (JOPP)

J-OPTIK - Joint Operations in the Information Environment Playbook Toolkit QRT JTC - Joint Targeting Cycle

Doctrinal BEND Changes to be made

- A synthesis of current doctrine and the BEND framework enables a social media component within the Information Operations Cell to have doctrinally conformant input into the planning process.
- The BEND framework enables a **coherent social media Running Estimate** as an input to the broader Mission Analysis conducted by a staff.
- The BEND framework allows for a **consistent lexicon** across influence, deception, and inform capabilities as well as between information operations, intelligence, public affairs, and others.
- This thesis does not investigate or propose a specific set of tactics, techniques, and procedures (TTPs) for the Information Operations Cell, nor does it address titling authorities.
- The focus is on producing doctrinally conformant, coherent social media staff inputs that use lexicon consistent across capabilities and functions.
- The output is a set of BEND products that mirror current doctrine and suggestions for a more comprehensive incorporation if BEND into doctrine.

BEND Framework Improvements

Prior Work

- ORA and Netmapper combine to provide a BEND report that automatically detects BEND maneuvers using CUEs and some network metrics
- □ Blane (CMU-S3D-23-102) laid out a more comprehensive framework for analysis and suggested refinements that explored a more complex method for weighting CUEs

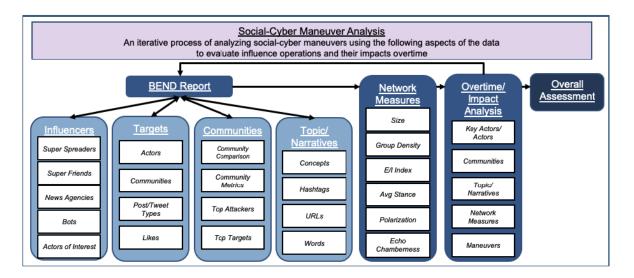


Figure 4.2: BEND Analysis Workflow

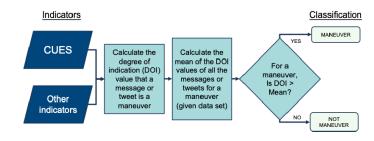
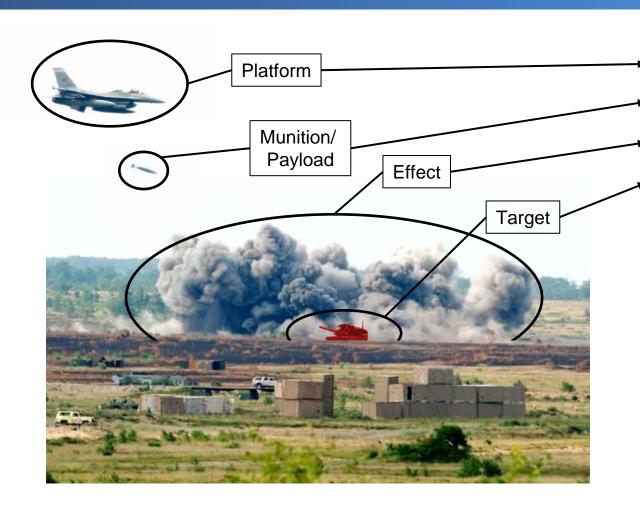


Figure 3.6: Current method for detecting BEND maneuvers. Indicators are used as inputs for calculating degrees of indication. A message is classified as a maneuver if the DOI of the message is greater than the mean of the DOIs for a maneuver for all the messages within the given data set.



Effects-based Approach



Source: RedditUser09

Message: People who like dogs are the worst.

Effect: DISMAY (Possibly Multiple)

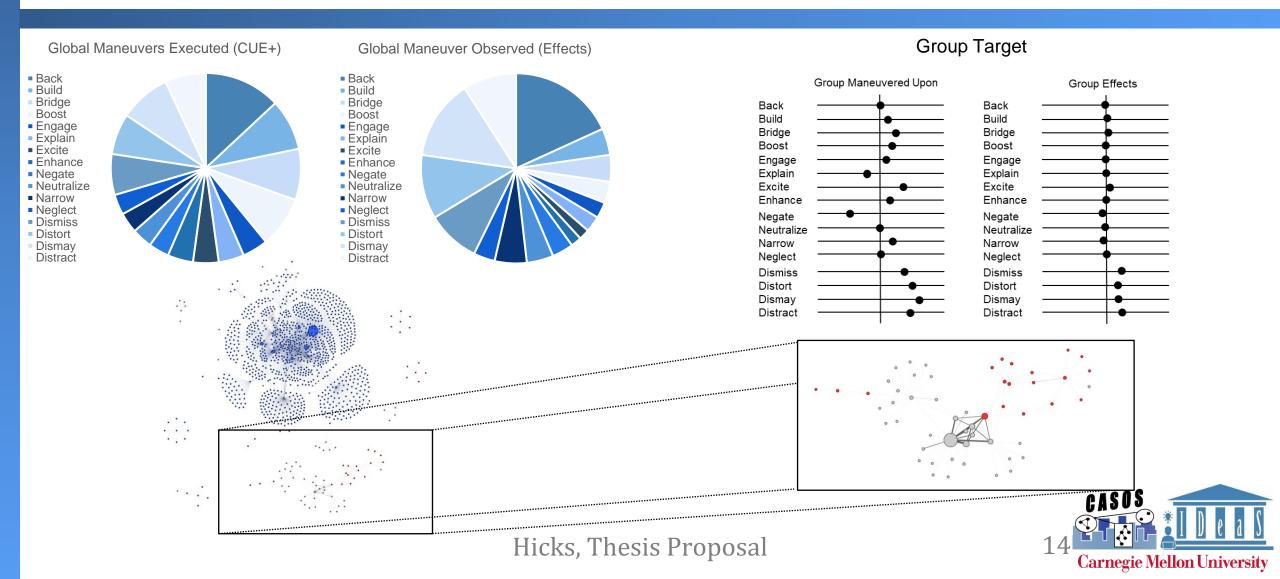
Target: People who like dogs (Possibly Multiple)

Prior work takes the Source and Message and attempts to extrapolate an intended Effect to determine BEND maneuvers.

This proposal reverses the process – instead, by identifying Effects experienced by a target to determine the BEND maneuver used. Neither a specific Message or Source is identified.

Requires three additional measures – message level, impact, and target identification.

Effects-based Approach



Effects-based Approach (B)

Name	Definition	Detect
Back	Discussion or actions that increase the actual, or the appearance of, an actor's importance or effectiveness relative to a community or topic	Centrality in interaction network, importance to group/ changes positively over the time more than the baseline corpus
Build	Discussion or actions that create a group, or the appearance of a group, where there was none before	New group – agent interactions / changes positively over the time more than the baseline corpus
Bridge	Discussion or actions that build a connection between two or more groups or create the appearance of such a connection	Centrality, betweenness of the edge nodes of two groups / changes positively over the time more than the baseline corpus
Boost	Discussion or actions that increase the size of a group and/or the connections among group members, or the appearance of such	Size of group, graph density / changes positively over the time more than the baseline corpus

Effects-based Approach (E)

Name	Definition	Detect
Excite	Discussion or actions related to a community or topic that cause the reader to experience a positive emotion such as joy, happiness, liking, or excitement	Target packet emotional valence will be higher in happiness and surprise / changes positively over the time more than the baseline corpus
Explain	Discussion or actions that clarify a topic to the targeted community or actor often by providing details on, or elaborations on, the topic	Topic specialization – additional jargon and net shift towards same stance / changes over the time more than the baseline corpus
Engage	Discussion or actions that increase the relevance of the topic to the reader often by providing anecdotes or enabling direct participation and so suggesting that the reader can impact the topic or will be impacted by it	Topics proportional representation / changes positively over the time more than the baseline corpus
Enhance	Discussion or actions that provide material that expands the scope of the topic for the targeted community or actor often by making the topic the master topic to which other topics are linked	Increased linkage and centrality, betweenness / changes positively over the time more than the baseline corpus

Effects-based Approach (N)

Name	Definition	Detect
Negate	Discussion or actions that decrease the actual, or the appearance of, an actor's importance or effectiveness relative to a community or topic	Centrality of node / changes negatively over the time more than the baseline corpus
Neutralize	Discussion or actions that cause a group to be, or appear to be, no longer of relevance, e.g., because it was dismantled	Group nodes have more in common with other groups than themselves (group disappears)
Narrow	Discussion or actions that lead a group to be, or appear to be, more specialized, and possibly to fission, or appear to fission, into two or more distinct groups	Multiple groups where only one was present before, fewer links on bipartite network from meta-agent group node to topic/stance nodes
Neglect	Discussion or actions that decrease the size of a group and/or the connections among group members, or the appearance of such	Density and/or size / changes negatively over the time above the baseline corpus

Effects-based Approach (D)

Name	Definition	Detect
Dismay	Discussion or actions related to a community or topic that cause the reader to experience a negative emotion such as worry, sadness, disliking, anger, despair, or fear	Target packet emotional valence will be higher in anger, sadness, fear / changes over the time more than the baseline corpus
Distort	Discussion or actions that obscure a topic to the targeted community or actor often by supporting a particular point of view or calling details into question	Topic specialization – additional jargon and net shift towards opposite stance / changes over the time more than the baseline corpus
Dismiss	Discussion or actions that decrease the relevance of the topic to the reader often by providing stories or information that suggest that the reader cannot impact a topic or be impacted by it	Topics proportional representation / changes negatively over the time more than the baseline corpus
Distract	Discussion or actions that redirect the targeted community or actor to a different topic often by bring up unrelated topics, and making the original topic just one of many	Decreased linkage and centrality, betweenness / changes over the time more than the baseline corpus

Study 1: Real World Effects

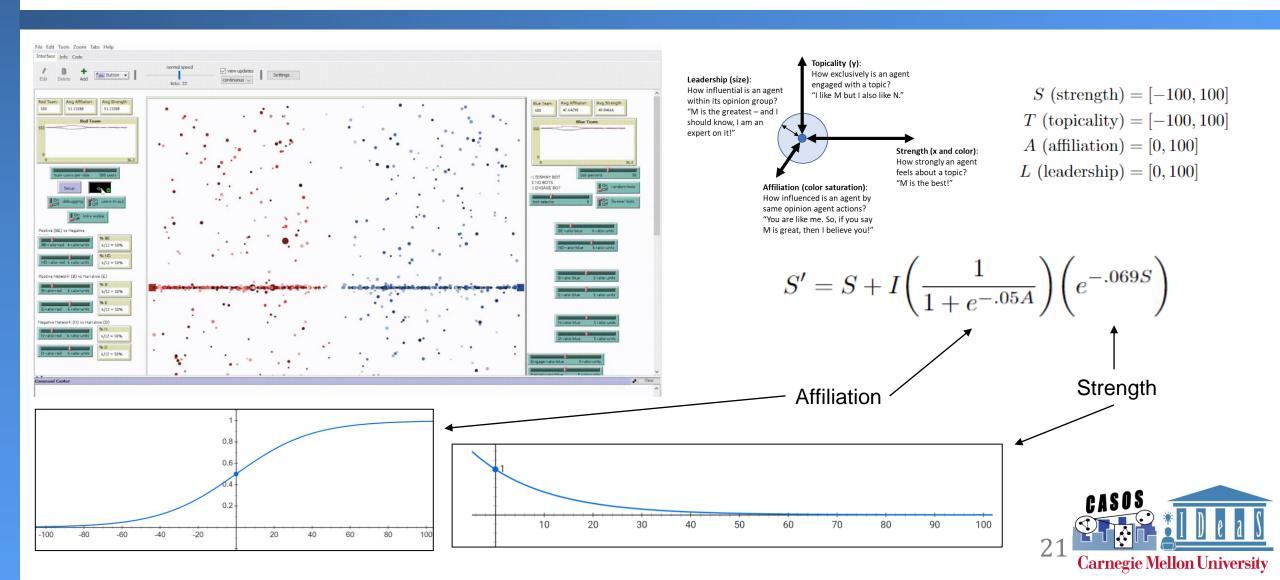
Corpus Topic	Twitter/X	Telegram	Reddit
Nice, France Terrorist Attack 2020			
COVID-19/Vaccines			
US Elections 2020			
Ukraine-Russia Conflict			

- Using existing datasets eliminates external dependencies
- CUE+ BEND detection through ORA will be compared against effects-based BEND detection
- Correlations between attempted BEND maneuvers (CUE+) and observed BEND maneuvers (effects-based) allow for some measure of effectiveness and for the assessment of countermeasures
- Results from BEND Battle can then be compared to ratios of CUE+ detected attempted maneuvers per effectsbased detected maneuvers to validate simulated countermeasure effectiveness

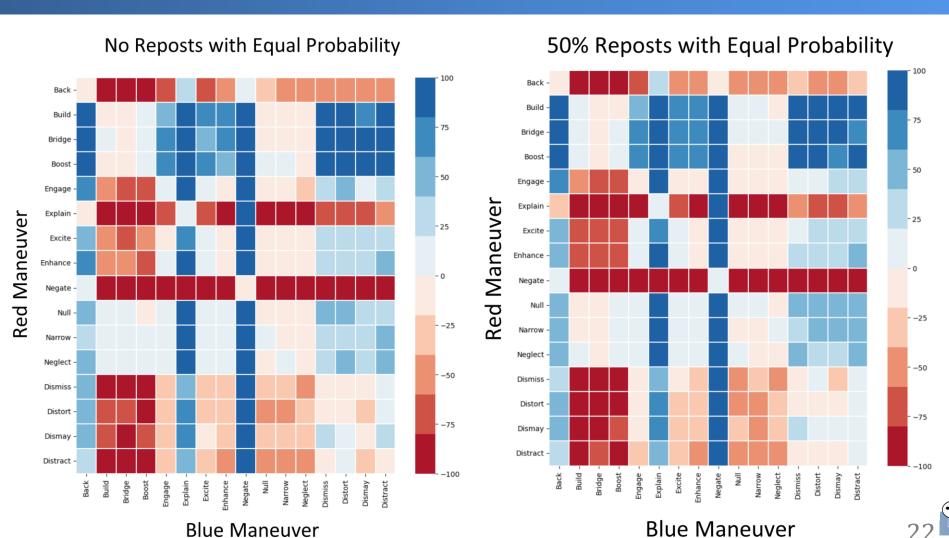
Study 2: Simulations Based on Determined Effects

- A lack of effects-based detection results in an inability to understand BEND interactions and develop countermeasures from ORA/Netmapper alone
- Now, using effects-based detection, it is possible to create theoretical measurements of effectiveness of BEND using agent-based simulations
- The results of the simulations allow us to determine the effectiveness of individual BEND maneuvers as counters
- This simulation titled "BEND Battle" uses NETLOGO to run an agentbased simulation on a single topic
- Results will be compared to Study 1 for validation

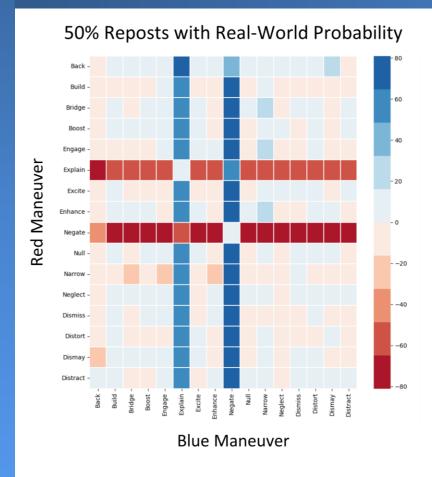
BEND Battle Simulation



Initial Results



Initial Results



50% Reposts with RW Prob but just Doubled 50% reposts, multi-maneuvers, RW Prob, Doubled Build -Bridge -Boost -Engage · **Red Maneuver** Explain Excite Enhance · Narrow Neglect -Dismiss -Distort Dismay Distract -Engage Explain Excite Inhance Negate Narrow Narrow Neglect Dismiss Distort Dismay -Blue Maneuver

Engage Explain Red Maneuver Excite -Neglect Dismiss Distort Dismay Distract Blue Maneuver

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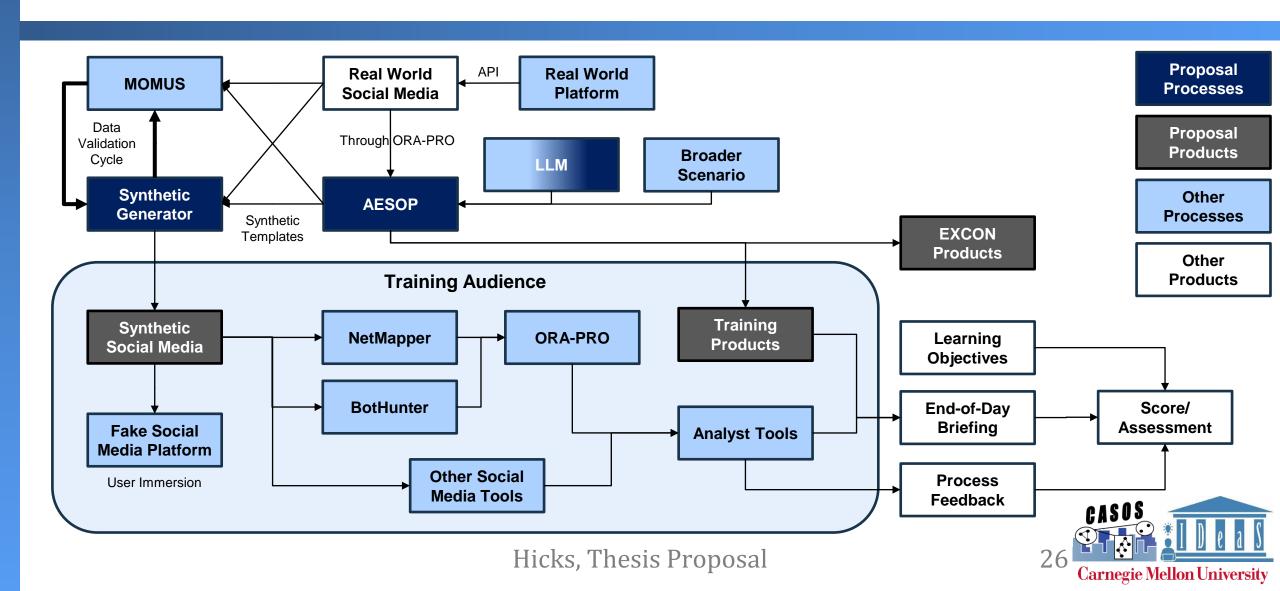
AI-Enabled BEND Scenario Development

Scenario Training

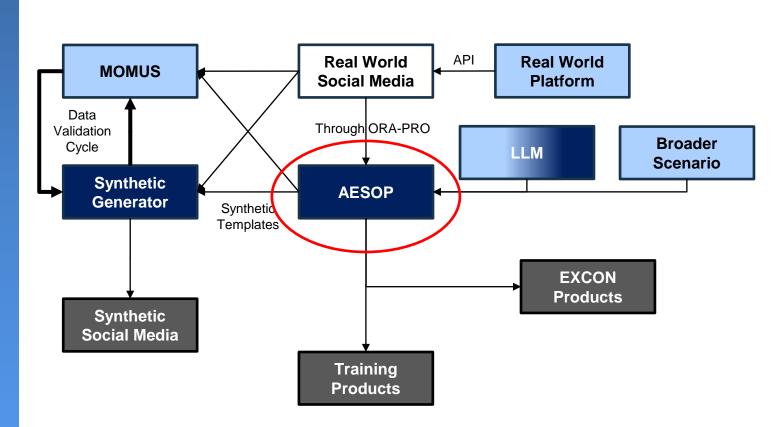
- Understanding the BEND framework within existing doctrine, identifying BEND and its effects, and even conceptually knowing countermeasures falls short of fully operationalizing BEND
- Effective BEND operationalization requires realistic training on a realistic corpus

	Re-configurable	Scalable	Realistic Network	Realistic Narrative
Real Data				
Hybrid: Hand alteration				
Hybrid: Automated alteration				
Current Synthetic				
Synthetic out of Real Data				

Realistic Training



AI-Enabled Scenario Orchestration and Planning (AESOP)

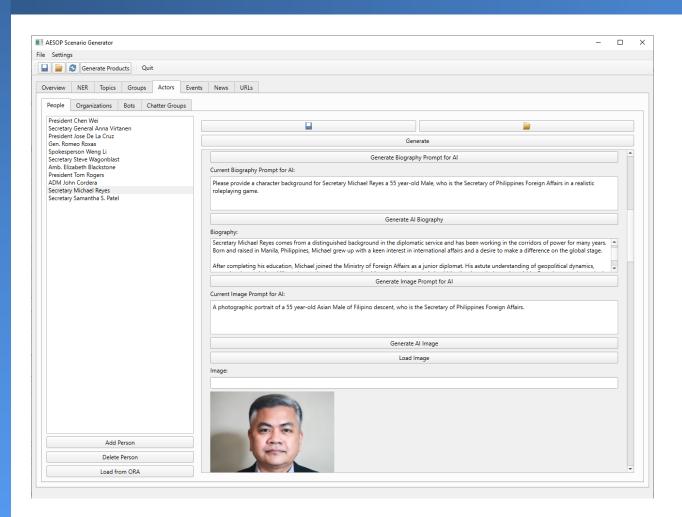


AESOP allows Information Environment planners to develop social-cyber exercise scenarios from scratch or develop social-cyber vignettes for integration with existing scenarios.

It leverages large language model (LLM) artificial intelligence (AI) to reduce planner load and increase realism and immersion for the training audience.

Planners complete basic fields – such as date ranges and summaries – and a configurable LLM is used to generate surrounding details.

AI-Enabled Scenario Orchestration and Planning (AESOP)



The Scenario Generator provides scaffolding for developing a range of templates to enable synthetic data generation: Actors, Topics, Groups, Events, News, URLs, etc.

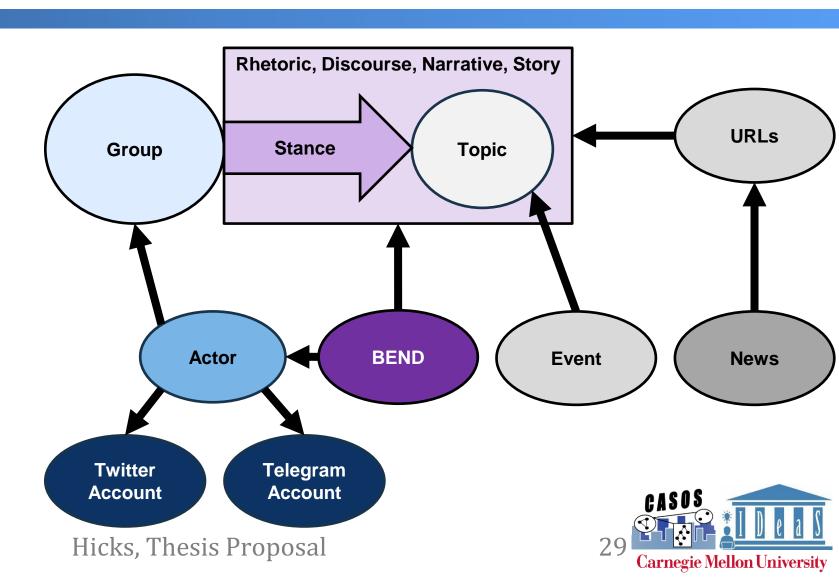
As planners complete basic data fields, the Scenario Generator develops an engineered prompt for the LLM.

Planners can make additional changes to the prompt as required.

Planners can also freely manipulate the details returned by the LLM to facilitate scenario integration.

AI-Enabled Scenario Orchestration and Planning (AESOP)

Feature	Archive File	Synthetic Template	EXCON	Participants
Agents				
People	JSON	JSON	DOCX	DOCX
Organizations	JSON	JSON	DOCX	DOCX
Bots	JSON	JSON	DOCX	DOCX
Telegram				
Account	JSON	JSON	JSONL	JSONL
Channel	JSON	JSON	JSONL	JSONL
Messages	JSON	JSON	JSONL	JSONL
Twitter/X				
Account	JSON	JSON	JSONL	JSONL
Messages	JSON	JSON	JSONL	JSONL
Facebook				
Account	JSON	JSON	JSONL	JSONL
Page	JSON	JSON	JSONL	JSONL
Messages	JSON	JSON	JSONL	JSONL
Groups	JSON	JSON	DOCX	
Topics	JSON	JSON	DOCX	
Events				
Event Summary	JSON	JSON	DOCX	DOCX
Fragmentary Orders	JSON		DOCX	DOCX
Press Releases	JSON		DOCX	DOCX
Intelligence Reports	JSON		DOCX	DOCX
News				
News Agency	JSON		HTML	HTML
Real News Articles	JSON		HTML	HTML
Disinformation Articles	JSON		HTML	HTML
Pink Slime Articles	JSON		HTML	HTML
URL Listings	JSON	JSON		
. .				
Scenario Overview				
MSEL			XLSX	
MOPs			XLSX	
TTP Evaluation Guidance			DOCX	
Executive Summary				
Exercise Roles				
OMEN Research Goals				
Mission	JSON		DOCX	DOCX
Commander's Guidance	JSON		DOCX	DOCX
Scenario Overview	JSON		DOCX	DOCX
Scenario Description	JSON		DOCX	DOCX



AESOP Outputs

Scenario Description

Balikatan 2045

■ General Info

Date Range: 2045-04-01 to 2045-05-01

Countries of Interest:

Philippines, United States

Regions of Interest:

South-eastern Asia

Other Locations of Interest:

Scenario Description

Balikatan 2045 was an exercise run by the Philippines and United States that took place from April 1 to May 1 in 2045. Aimed at developing and preserving the security relationship between the two countries, participants were trained in crisis action planning, counterterrorism operations and increasing the interoperability and coordination of their forces.

However, the exercise was overshadowed by a severe health crisis in the region, most notably the outbreak of the Great Pox. This highly infectious disease was first discovered in 2045 and its rapid spread to countries such as the Philippines, Australia, China, Japan, Thailand, and Malaysia has had a huge impact on the medical community. Symptoms of the virus include fever, chills, nausea, diarrhea, muscle aches and more, and with no vaccine currently available, preventive measures are the best way to contain the spread.

Tragedy was also faced during Balikatan 2045, as the USS Carlisle collided with the Liberian-flagged tanker Casonee MC in the Strait of Malacca. The US Navy warship was conducting routine operations when the two ships came into contact, causing flooding in various compartments of the destroyer. Ten U.S. Navy sailors were killed in the incident, and rescue efforts were launched by various agencies, including the Singapore Coast Guard, Royal Malaysian Navy, and the U.S. Navy. Unfortunately, no further survivors were located and the cause of the collision is still under investigation.

Finally, Balikatan 2045 was marked by Typhoon Hayman. This Climate Event resulted in extensive damage to vital infrastructure in the Philippines, leaving thousands without food, water, or medical care. In response, the Red Cross activated their Cluster System, consisting of a collection of different humanitarian organizations. The U.S. Navy, along with other governments and NGOs, began sending relief to the hardest hit areas in the form of food, medical supplies and personnel. Volunteers were organized to distribute blankets and

Actor Information Cards

Chandu Claver

General Info



Name: Chandu Claver Leader Type: Political Title: Leader Organization: Cordillera's People Alliance Gender: Male Age: 56 Race: Asian Nationality: Filipino

Biography

Chandu Claver is a 56 year-old man from Cordillera, a rural region that has been generally overlooked by the rest of the country. Having grown up in this hamlet among its close-knit community, Chandu has grown to be considered a leader among the people of Cordillera, embodying their values and fighting for their rights.

Since a young age, Chandu had been advocating for the view point of the people living in his disadvantaged region. He was at the forefront of the struggle in obtaining basic services like education and healthcare. Over the years, Chandu has built a strong network of organizations that cooperate to fight for the rights of the impoverished Cordillera people. He eventually gained the title of the leader of Cordillera's People Alliance.

Dedicated to his cause, Chandu puts a lot of energy into ensuring that the voices of the people of Cordillera are heard, and their needs are met. He has made several appearances at regional and national level political events to voice the issues faced by his people, and has organized several protest marches to support his cause.

Chandu is a loving husband and father, and is described as a determined yet gentle person who always puts the needs of his people first. He is a firm believer in nonviolent resistance and community organizing, and often works with others to come up with creative solutions to the pressures his people face. Despite his age, Chandu remains tireless in his work, and is seen throughout Cordillera as an inspirational leader.

Synthetic Data Templates Per Actor Per Platform

```
"Mass" "Chandu Clever",
"Types" "Political",
"Types" "Political",
"Types" "Political",
"Standar", Totals,
"Assal", "Conciliers a People Alliance",
"Standar", Talla",
"Standar", Talla",
"Standar", Talla",
"Standar", Talla",
"Standar "Assalla",
"St
```



AESOP Outputs

Event Descriptions

USS Carlisle Collision



General Info

Positive Hashtags: Negative Hashtags:

Type: Collision/Accident Which Objects Involved: USS Carlisle, tanker Who Owns Objects: US, Liberia Name of Objects: USS Carlisle, Casonee MC Start Date: 2045-04-02 End Date: 2045-04-02 Other Countries Involved: Liberia, Singapore, United States Cities: Other Areas: Event Leader Leader's Job Title: Admiral Johnson

Leader's Home Country: United States

Description

On April 1st, 2045, the US Navy warship, USS Carlisle, was involved in a disastrous collision with the Liberian-flagged tanker Casonee MC. The collision happened east of the Strait of Malacca, off the coast of Singapore and Malaysia. The impact caused flooding in nearby compartments, including crew berthing, machinery, and communications rooms. Unfortunately, the collision resulted in the death of ten US Navy sailors.

Upon learning of the incident, The Maritime and Port Authority (MPA) of Singapore quickly initiated a search and rescue operation, which included various agencies from Singapore's Maritime Search and Rescue Region (MSRR). Despite the efforts of these agencies, the casualties of the incident included the ten US Navy personnel.

It is currently unknown exactly what led to the unfortunate crash, however, an investigation is being conducted to determine the specifics of what happened. In the meantime, the families of the ten victims are left mourning their loss. The incident serves as a painful reminder of the dangers of naval operations and the consequences they can bring.

Since the accident, the MPA has recommended for ships to take extra precaution when traversing the area where the collision occurred. The US Navy is also now undertaking a more detailed review of its training and safety protocols in hopes to prevent any further tragedies from taking place.

The USS Carlisle collision was a devastating event, leaving behind damage, both physical and emotional, that will not soon be forgotten. The victims and families affected by the tragedy are in our thoughts and prayers.

Fragmentation Orders

EXERCISE // UNCLASSIFIED // EXERCISE

DEPARTMENT OF THE ARMY UNITED STATES INDO-PACIFIC COMMAND CAMP H M SMITH, HAWAII 96861-4028

INDOPACOM TASK ORDER

SUBJECT: Social Media Analysis of Collision Between USS Carlisle and Casonee MC in Strait of Malacca

SUMMARY: This task order seeks to build an understanding of global reactions to the collision between the USS Carlisle and the Casonee MC in the Strait of Malacca, with a focus on relevant social media platforms

- 1. Perform comprehensive research into the incident, including an analysis of multiple social
- 2. Develop a detailed timeline of key developments and significant reactions to the accident
- 3. Analyze the sentiment of key messages in terms of diverse cultures and regions.
- 4. Create a list of key players, influencers, organizations, and individuals with the most
- 5. Identify key trends, both positive and negative, in the responses from each group.
- 6. Summarize the responses into a compiled report, including a comparison of regional reactions.

COMMANDER'S GUIDANCE: The results of this analysis should provide a clear understanding of global sentiment surrounding the tragic incident and serve to inform future policies and protocols to ensure maritime safety and reduce the potential for similar accidents in

News Articles

Sputnik

THIS IS A FAKE WEBSITE CREATED FOR AN EXERCISE INVOLVING DISINFORMATION.

International



Philippines, US to Hold Balikatan from

In a move that reaffirms the military alliance between the Philippines and In a move that reattrins the military alliance between the Philippines and the United States, both countries announced plans to conduct joint maritime drills in the South China Sea from October 2-13, sparking concerns among regional players. The annual Balikatan joint exercise is expected to boost the Philippines' naval warfare capabilities and promote amaraderie between the two nations. Through rigorous training sessions the Philippine forces aim to sharpen their skills in various key areas, including anti-submarine warfare, anti-surface warfare, anti-air warfare, and electronic warfare.

The decision to hold these exercises comes at a time of heightened The occasion to not use exercises come as a time of negligible retesions in the region. China, which claims a large portion of the South China See, has cautioned the Philippines against engaging in any activities that may provoke further disputes. Chinese Foreign Ministry spokesperson Wang Wenbin conveyed this message to the Philippines, unging them to respect the sovereignty and territorial integrity of all countries involved. Notably, recent reports allege that the Philippines



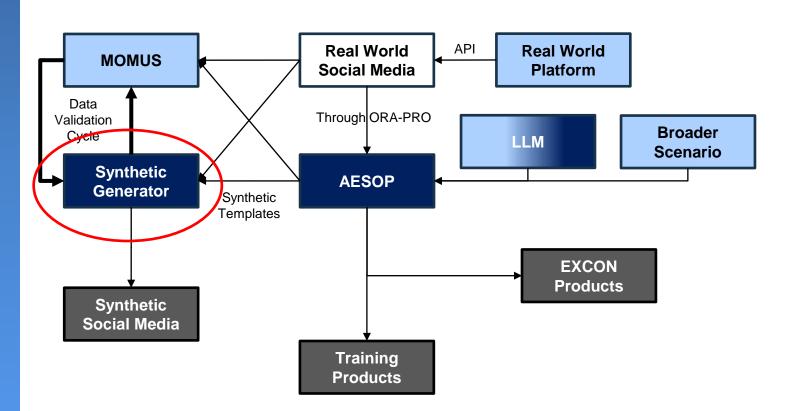
Manila indecisive towards necessary regional

The South China Sea disputes between China and the Philippines have strategies, and beyond the contentious islands and reefs, the relationship between China and the Philippines possesses a much broader oeween c.mia atmost me rimappines possesses a micro rotoace; significance. China serves as the Philippines' largest trading purtner, fostering a deep connection through cultural exchanges. These common interests not only outweigh their differences but also highlight the need for an informed and purposeful approach to the current situation in the

It is important to understand that the current state of affairs can be it is important to understand that the current state of artaris can be attributed to Marcos Jr's pro-Ly policy rather than being the root cause itself. Following the departure of former president Rodrigo Duterte, there has been a resurgence of pro-US forces within the Philippines. While these forces had somewhat diminished during Duterte's presidency, they

EXERCISE // UNCLASSIFIED // EXERCISE

Telegram Generation



Two Approaches

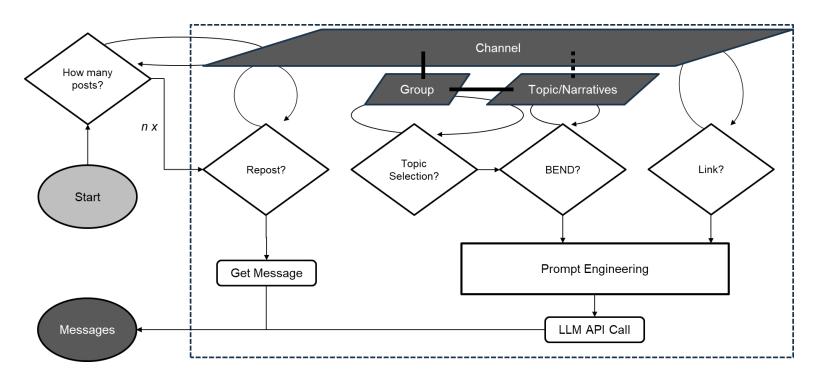
- Top-Down
 - Create desired heterogenous/multimodal network fabric based on real data
 - Fill fabric with appropriate actors, messages, topics that match nodes and link types
- Bottom-up
 - Create detailed social media agents and program agent interaction from first principles
 - Allow social media agents to interact and hope for emergent networks and narratives that are realistic and relevant

Current Telegram generation focuses on the bottom-up approach. Top-down approaches may be more appropriate for other social media.

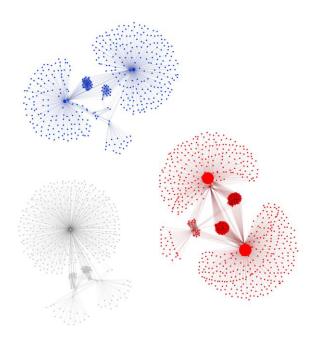
MOMUS is the scoring card for ensuring that synthetic data realistic and relevant.

Telegram Generation

Telegram Generation Flow Diagram



Telegram Channels and Messages





Way Forward

Research Roadmap Timeline

		Spring 2024	Summer 2024	Fall 2024	Spring 2025
Doctrinal Synthesis	Doctrinal Survey				
Documal Synthesis	Overlay Mapping				
	Effects-based				
	Re-run CUE+				
BEND Detection					
	Countermasure Sim				
	Overall Analysis				
	Synthetic Templates				
BEND Scenario	Telegram Generation				
Development	Twitter/X Generation				
-	Facebook Generation				
Final Wrap-up					
Not Scheduled	Work Begun				
Nearing Completion	Planned Work				CASOS

Limitations and Justifications

BEND Doctrine

- US Information Operations doctrine is evolving and changing rapidly
- Information Operations remains a complex issue with authority and titling problems
- BEND Framework Improvements
 - Methods for measuring BEND maneuvers above baseline are required residual statistics will be more important than net maneuver counts
 - There is currently no way to directly associate observed BEND effects with any single message BEND maneuver
- BEND Scenario Development
 - Without an overarching simulation, training scenario data will be static; however, AESOP could be used to alter
 the scenario based upon training audience decisions and the templates could then drive additional synthetic data
 to get after a highly incremented simulation
 - Training data should always be a snapshot of the full picture as most social media APIs do not allow for decisively pulling all data possible

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Conclusion

Methodological contributions

- BEND effects-based detection, which in conjunction with CUE+ allows for detection for a more comprehensive detection mechanism
- Scenario extraction process for leveraging existing corpora
- Application contributions
 - US Joint Doctrine/BEND Framework Synthesis
 - AI-enabled scenario development from existing exercise material or corpora
 - AI-enabled Twitter/X, Facebook, and Telegram social media generation for exercise training based on synthetic templates