Appendix D: Draft user Manual

Emerging-State Actor Model (E-SAM)

Iteration 1.0 2/28/2018

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# Introduction

The Emerging-State Actor Model (E-SAM) enables policy makers, researchers and military operational planners to understand conflicts involving non-state actors. This includes insurgencies, terrorism, emerging-state actors as well as non-lethal conflicts such as propaganda. Policy makers can use E-SAM to educate themselves on the unanticipated consequences of policy choices. Researchers can instantiate specific iterations of E-SAM to a time and location to study a specific conflict, or more broadly study these conflicts in general. Military operational planners can instantiate a model for a specific theatre or region of interest and analyze courses of action, testing them against baseline scenarios and assess the merits prior to adopting, as well as using the tool to monitor ongoing conflicts.

E-SAM is a simulation that can run to cover up to a 20-year period of conflict between a state-actor government (“Green”) and a non-state actor (“Red.”) E-SAM can simulate the potential path of progression from initial assumptions, understand the impact of changing conditions or entrance of third party state-sponsors backing either side, or evaluate courses of action for intervention.

E-SAM is a Systems Dynamics simulation designed primarily to support military operational planning and research into violence and instability. E-SAM is constructed to evaluate and understand medium-to-long term effects (several years to decades) of choices made by state and non-state actors. Within one structure E-SAM integrates territorial data of the region of interest, ethnographic demographics and perception to actors including reaction to grievances, the actors themselves (including governance, financial performance, military activities).

The E-SAM has been designed to support operational planning and research around policy design, testing and monitoring in conflict zones. E-SAM can be used individually or in a game context by multiple users each taking the role of an actor (to educate and inform stakeholders) or run by AI players competing against one another. In any of these configurations E-SAM can be used to test national strategies, forecast the impact on current and future operations of new intelligence, validate existing counter-insurgency theories and uncover new insights into how to conduct conflict in these arenas. Exercises in any of these often involve creating a baseline scenario where performance can be modeled absent significant change. Then intervention portfolios, enemy strategies, and changes in the environment can be simulated along-side the baseline. Significant gaps between strategic goals and simulation results indicate potential changes required in allocations as well as possibly adding or removing intervention options.

This appendix proposes a DRAFT user-manual that is focused to a user of E-SAM who is not in the field of system dynamics or a research scientist. It provides clearer descriptions of the use of Operational Orders as they are aligned to military doctrine and contains a glossary.

## Structure of the Appendices and this Document

The four Appendices are the supporting materials to E-SAM.

***Appendix A Model Documentation***

This appendix includes an overview of model-structure by sector, the complete equations for E-SAM, command scripts for the Baseline Historical and Baseline without Intervention scenarios, and all starting model values. It is sufficient to replicate E-SAM in its entirety and recreate the experiments detailed in this paper.

***Appendix B: Discussion of Structure & Parameterization***

This appendix provides more detailed discussion of the structure, formulation and parametrization approach of select portions of E-SAM. Due to length and other considerations it is available only upon request by contacting the author tbclancy@wpi.edu.

***Appendix C: Validation & Confidence Building Tests***

This appendix provides full documentation on validation and confidence building tests performed on E-SAM. Included are boundary adequacy, structure assessment, dimensional consistency, parameter assessment, extreme condition, integration error, behavior reproduction, behavior anomaly, family member test, surprise behavior, sensitivity analysis, and system improvement tests.

***Appendix D: User Manual for E-SAM***

This appendix provides a stand-alone proposed user-manual for use of E-SAM in wargaming and military planning scenarios. It includes an overview of how to set the scenarios, determine Theatre Strategy, and execute Operational Orders. Also includes a glossary of term linked to current US military doctrine sources.

# Emerging State Actor Simulator Overview

The Emerging-State Actor (ESA) Simulator is designed to be used by both human and computer operational planners to evaluate the dynamics and potential progress of unconventional conflict, test different policies, and evaluate courses of action to select paths forward.

## Local Actors

The Simulator models the development of conflict between two actors: Green and Red. Green represents the status-quo government, ostensibly allied with the United States. Red is the local competing actor – be it a guerilla group, insurgency or emerging-state actor. However, Green is simply the designation of the state actor, and Red the non-state actor – in a scenario.

Nearly any form of less-than-full-spectrum conflict can be modeled using the simulator. The Red Actor may represent terrorist networks operating clandestinely with little or no support of the population. To guerilla movements or insurgencies that have conventional military forces but can’t control the territory sovereignly or seek to govern openly. To emerging-state actors who openly seize, and govern as a sovereign, territory. Although these can be influenced by the Theatre Strategy settings (see below) in some cases the Red Actor may endogenously move through these different states. Likewise, the Green actor responses can wildly vary from a counter-terrorism centric approach, population centric, political (address ethnographic grievances) to conventional warfare against the Red Actor.

## Ethnographies

The model can depict any number of different Ethnographies that the Green and Red actor are influencing and being influenced by. These ethnographic populations drive many important dynamics as they select which side, Green or Red, they will support and to what extent. An ethnographic population may be split between three states of support with any Actor, and their support may cross different actors:

* Governed is a state where the population views the Actor as the legitimate government.
* Calculated is a state where the population views the Actor as the “best-choice” government for now but is open to switching.
* Coerced is a state where that population would switch sides or leave the government but is prevented by force of arms from doing so.
* Unaligned is a state where the population supports no Actor currently and evaluates the two Actors on where they appear to be heading in terms of support for the Ethnography.

Additionally, under certain conditions members of an Ethnographic population will rise as local-opposition fighters within the Actor. They may not formally be aligned with Green or Red but represent additional indigenous sources of conflict.

## Foreign Actors

External state-sponsored support to the Green or Red actor is depicted by Blue or Purple actors. Blue actors support through intervention with accompanying training, equipment provision, combat training etc. the Green actor, while Purple supports the Red actor.

# Running the Simulation

Every simulation is played by one or more “planners”, which may be human participant or a machine learning algorithm. These planners then compete against one another, or against the simulation itself. Note that the simulation in this context is ***not*** a learning environment, it creates dynamic conditions upon which a machine learning algorithm can learn.

The progress of simulation activities in each game is the same, regardless of who is portraying a planner.

## Selecting Theater Strategies

First, each planner reviews available Theater Strategies and picks one for their side. A Theater Strategy represents parameter values for numerous starting conditions for either Actor, the Ethnographies, the Territories they are conflicting over or the limitations of external help from Blue or Purple.

Technically, the selection of each Theater Strategy identifies a Scenario file in the database to pull and merge into one unified “scenario” which is then loaded. This unified scenario determines the boundaries of the model, geospatial data of troops, resources, ethnographic population and perceptions and other simulation data. If deterministic strategies are needed, for example what path the Red Actor will seek to conquer cities, this is loaded in as well.

For both actors the Theater Strategies represent decision making by leaders dictating the constraints within which they can create a campaign plan. For the Red Actor this might be fatwa’s, the beliefs or grand strategies of key leaders or tribal realities. For the Blue Actor this represents national security objectives, policy constraints, SOFA agreements etc. Once selected each Theater Strategy is fixed for the length of the game. This means there is a bit of game-theory between each planner when picking a Theater Strategy to determine what the other side is picking. However, picking the ‘wrong’ Theater Strategy versus an opponent selection doesn’t guarantee a loss, it just makes the operational campaign much harder.

## Operational Orders

The bulk of the game is played within the simulation as each planner issues operation orders (OPORDs) at regular intervals within the game. These are issued every six months. Because the perspective is operational, the focus is on orders at the campaign plan level and not the tactical. These are choices of allocations of available resources to various tasks. For example, the Red Actor may allocate 20% of their personnel to Recruiting and 5% to Propaganda, but there is no tactical decision making in how recruiting and propaganda are conducted. Constants can be set to mimic general effectiveness of the known tactics of the Actor, but this is part of Theatre Strategy selection and not something the player will be able to modify.

The Operational Orders available to Green and Red Actor are:

Table : Local Actor Operational Order Overview

|  |  |
| --- | --- |
| Local Actor Operational Orders | Description |
| AFV/IFV Purchases | Per Period Purchase Rate of Armored or Improvised Fighting Vehicles |
| Artillery Purchases | Per Period Purchase Rate of Artillery Pieces |
| OpOrder Armed Civil Affairs | Pct of Military Actions allocated to Armed Civil Affairs. This creates government capacity via military force. |
| OpOrder Combatting Terrorism | Pct of Military Actions allocated to Combatting Terrorism (AT & CT) activities. CT effectiveness is useful for exposing and thwarting Terrorism and Prison Breaks (though Prison Breaks also require Prison Duty.) |
| OpOrder Conventional Warfare | Pct of Military Actions allocated to Conventional Warfare - either capturing or reclaiming Territory. |
| OpOrder Indirect IED VBIED or SVIED | Pct of Military Actions allocated to Indirect attacks using IED - these attacks influence conventional combat and are not targeting the civilian population (see Terrorism.) |
| OpOrder Prison Breaks | Pct of Military Actions allocated to attempting to break Actor Detainees out of Prison. |
| OpOrder Prison Duty | Pct of Military Actions allocated to attempting to prevent Prison Breaks. |
| OpOrder Propaganda | Pct of Military Actions allocated to Propaganda efforts. |
| OpOrder Recruiting | Pct of Military Actions allocated to Recruiting, by Ethnography. |
| OpOrder Terrorism | Pct of Military Actions allocated to conducting terrorism, of all forms, against a civilian population by Ethnography. |
| OpOrder War Crimes | Pct of Military Actions allocated to War Crimes, by Ethnography. War Crimes are ethnic cleansing, massacres, forced eviction etc. |

Table : Foreign Actor Operational Orders Overview

|  |  |
| --- | --- |
| Foreign Actor Operational Orders | Description |
| Blue or Purple Airpower Targeting Combatants | Pct of state-sponsor airpower sorties per day that are used in close-combat supports to attack conventional fighters of the opponent. |
| Blue or Purple Airpower Targeting Government Capacity | Pct of state-sponsor airpower sorties per day that target the opponents governing capacity. |
| Blue or Purple Airpower Targeting Resources | Pct of state-sponsor airpower sorties per day that target resources and resource production. |
| Blue or Purple OpOrder Advanced Equipment Provision | Pct of state-sponsor military actions allocated to the provision and training of advanced equipment use by front-line conventional troops. |
| Blue or Purple OpOrder Airpower | Pct of state-sponsor military actions allocated to sustaining airpower operations. The number of troops sustaining airpower determine the number of sorties per day available. |
| Blue or Purple OpOrder Armed Civil Affairs | Pct of state-sponsor military actions allocated to increasing government capacity through military units. |
| Blue or Purple OpOrder Embedded Combat Advisers | Pct of state-sponsor military actions allocated to embedding troops into local actor units as combat advisers. This will risk these troops to death or detention. |
| Blue or Purple OpOrder Information Operations | Pct of state-sponsor military actions engaging in Information Operations, which functions similarly to Propaganda. |
| Blue or Purple OpOrder Training Local Actor | Pct of state-sponsor military actions allocated to training local actor in security issues, this improves CT effectiveness. |
| Intervention Size | The number of people that Blue/Purple desire to have in Theatre supporting the Green or Red Actors respectively. |

## Scoring & Victory Conditions

Scoring for both sides is based on the allocation of ethnographic populations within the three possible perceptions to an Actor:

1. That the population supports them only when coercively forced to do so.
2. That a population supports them from the standpoint of calculated-legitimacy.
3. Or the population supports them as fully legitimate.

Each “person” in one of these perceptions is a weighted score for the Actor. And the total score determines victory based on the victory conditions of the Theater Strategy. This allows complex victory conditions such as a “victory” for the Red Actor, even if they are defeated militarily, if their Theater Strategy was to create a Failed State in the operational area.

## Primary Measures of Effectiveness

In addition to scoring and victory conditions the following primary measures of effectiveness can be tracked.

Table : Sample Primary Measures of Effect

|  |  |
| --- | --- |
| Sample Primary Measures of Effect | Description |
| Actor Combatants that are Local | The percentage of combatants within an actor who are locally recruited vs. the total which includes foreign fighters and Blue/Purple support. |
| Actual Garrison | The actual number of allocated military personnel assigned to garrison and/or policing duty from the Actor. |
| Civilian Deaths | All civilian deaths in total, can be segmented by Ethnography. |
| Finances | The cash reserves, by Actor. A high surplus indicates available funds to send abroad to sponsor foreign actions by the Actor. |
| Foreign Combatants | The number of foreign fighters who have traveled to the theatre and joined Green or Red side. |
| Local Opposition Fighters to Actor | The unaligned or loosely organized local combatants who oppose the Actor, but are not formally part of Green or Red. |
| Territory Controlled by Actor | The percentage of the overall territory that an Emerging-State Actor has seized control of. |
| Total Combatants | The total number of combatants or combatants within an Actor. |
| Total Conflict Deaths | The aggregate number of Green, Red, Blue, Purple combatant deaths, deaths of the local opposition and civilian deaths. |
| Total Ethno by Actor | The total number of ethnographic civilian population who are in the Green or Red Control. |
| Total Garrison Needed | The number of combatants who are required to adequately garrison & police the population. Garrisoning at less than this amount will result in the rise of Local Opposition Actors. |
| Total Population by Actor | The total number of civilian population, across all ethnographies, who are in the Green or Red control. |
| Total Refugees all Ethnicities | The total number of refugees, either IDP or having exited the country, that have been produced across all ethnographies over the course of the conflict. |
| Total Terrorist Attacks | The total number of Terrorist attacks by an Actor, regardless of Ethnography targeted or success of an attack. |
| View Actor as Best Choice for Now | The population wide view of an Actor, across all ethnographies. Represents the percentage of the population who at least view the Actor from a standpoint of calculated legitimacy. When combined with *View Actor as Legitimate Government this* primary measure is referred to as the “conflict narrative.” |
| View Actor as Legitimate Government | The population wide view of an Actor, across all ethnographies. Represents the percentage of the population who view the Actor as the legitimate government. When combined with *View Actor as Best Choice for Now* this primary measure is referred to as the “conflict narrative.” |

## Secondary Measures of Effectiveness

Depending on the Theatre Strategy selected virtually any parameter in the model might become a secondary measure of effectiveness. For example if a counter-terrorism strategy is envisioned, then the number of terrorist attacks attempted, completed, thwarted and the deaths/refugees specifically from terrorism may be important as a secondary measure of effectiveness.

# Green/Red Operation Orders

### Operation orders allocate Green/Red personnel who are not otherwise assigned to garrison/policy duty to undertake a variety of different types of military actions.

## AFV/IFV Purchases

This is manually set to represent how many Armored or Improvised Fighting vehicles an Actor acquires every Period.

## Artillery Purchases

This is manually set to represent how many Artillery Pieces an Actor acquires every Period.

## Armed Civil Affairs

Armed Civil Affairs is the use of military units to support or bolster governing capacity. Each military action of Armed Civil Affairs will add to the credible governing capacity across all Ethnographies. This can either bolster a weak governing system, or help jump-start governing capacity for Red Actor with no previous experience in governing.

## Garrison

Garrison is a special type of operational order that occurs by default. The model automatically calculates how many troops are needed to garrison the population under control based on their disposition between Coerced, Calculated and Governed. The *Total Garrison* is then compared to a maximum garrison amount as a percentage of all forces based on the size of any current Uprising. The model will use the lesser of the two values (*Total Garrison* and  *Max Garrison Allocation)* to determine the *Actual Garrison.*  This prevents newly established insurgencies from allocating 100% of their troops to garrison the population, even if there isn’t any uprising against their actions yet. In many situations *Total Garrison* and *Max Garrison Allocation* will be the same number. Often when this occurs it represents a natural limit to growth. The Actor has as much population as it can handle and 100% of Combatants are being allocated to garrison and police duty. The Actor must either shift more population to Governed, recruit more troops, or reduce through combat the opposition number before they can territorially expand again.

This Garrison calculation is carried out prior to allocating combatants between squads for other military actions. Thus if 100% of the combatants are in a Garrison mode, then none will be available for any other OpOrder.

## Conventional Warfare

This action seeks to use the military force represented by the squads in this OpOrder to attack the other combatant and seize territory, or take it back. Conventional Warfare leverages the Situational Force Scoring (SFS) combat simulator to determine who wins in conflict, and how much territory exchanges hands.

## Indirect Attacks

Description: Indirect Attack OpOrders are how Actors can use IED, VBIED, and SVIED for military purposes. This can shape the battlefield by denying access or maneuver, or directly harming the enemy. The mechanical effect of this in the simulation is that squads assigned to Indirect Attacks add to the Indirect Attack pool in the combat simulator as if they were a poor-man’s artillery. The actual suicide bombers who might die in such attacks are not accounted for – assuming to be recruited, trained and deployed as part of the squads actions.

***Intended Use***: Traditional artillery is inaccessible to the Red Actor through most simulations. Using Indirect Attacks via IED is a way to access at least part of the military benefits of this kind of equipment, which are quiet effective in urban areas, that they might not otherwise have.

## Local Recruiting

***Description:*** Local Recruiting Actions are the basic building block of Actor forces. Squads assigned to this OpOrder will seek to recruit more combatants from the fighting-age men of each ethnographic group. Recruiting only can be accomplished from populations within Calculated Legitimacy or Governed. Each Actor has a target recruiting number per action, by ethnographic group, for the two types of population. Total recruiting is limited by the adequacy of fighting age men, which is set demographically as a percentage of the whole by ethnographic group in the scenario. Higher levels of militant experience will increase the pool of fighting-age men from which to draw from, thereby increasing recruiting even under difficult conditions and could represent recruiting child-soldiers, women, those who might not normally fight etc.

***Intended Use:*** Recruiting Actions are the only way to grow the size of a militant force or replace losses. Since all Op Orders require combatants who can be formed into squads, recruiting is an essential function of both actors to manage.

## Terrorist Attacks

***Description:*** Suicide bombings, VBIED, IED’s, vehicular ramming – all attacks conducted with an aim of inflicting mass causalities at a target ethnographic group residing under the control of an opposing Actor.

***Intended Use:*** Terrorism produces civilian deaths and refugees within the population controlled by an opposing Actor. This hurts the ethnographic perception of the controlling actor as being unable to protect the population. In this way for example the Red Actor could target Terrorist attacks on the Green Actor’s Sunni population, driving them into the arms of the Red Actor. Also because Terrorism adds to the overall rate of violence, they will have an effect of increasing the need for garrisoning troops, leading to destabilization if garrison needs cannot be met. Terrorism also serves as the most powerful propaganda tool for Red to recruit foreign fighters. It will cause negative perceptions to form within the Ethnographic group to the Red Actor. If a Theater Strategy is to destabilize a country with a large flow of IDP’s, or a neighboring countries capacity to manage that many, then increasing the number of Terrorist acts is one way to accomplish that. At the operational level Terrorist acts are assumed to “succeed” unless opposed by Counter-terrorism OpOrders carried out by the other actor.

## Combatting Terrorism

***Description:*** An order covering the full spectrum of operations necessary to disrupt terrorist and other clandestine activities. This includes antiterrorism defensive protection of high value targets, ethnographic populations and facilities; as well as counterterrorism efforts to gather intelligence, identify and attack the network of terrorists and their supporters.

***Intended Use:*** This OpOrder assigns Actor Squads to CT duties. Their effectiveness depends on their experience, and any benefit derived from Blue/Purple Training operations. The higher effectiveness, the greater percentage of acts that will be stopped from commission and “thwarted.” CT Effectiveness is a multiplier that determines how many Terrorist Attempts are Thwarted, and how many Prison Duty Squads are successful in stopping Prison Breaks. However it is impossible to stop all acts, as some small percent will always get through. Effectiveness degrades over time, at a rate that declines the more experienced the Actor is. This means an Actor with career professionals will experience far less, even zero, degradation of effectiveness than one that relies mainly on untrained conscripts.

## Propaganda

***Description:*** An Actor can manipulate Ethnographic support for themselves and an opposing actor by assigning OpOrders for Propaganda. The effect impacts negatively the short term Ethnographic Perception of opposing Actors, and positively impacts the perception of the Actor conducting the act.

***Intended Use:*** Propaganda allows an Actor to reduce ethnographic support without necessarily killing the targets, such as in Terrorist or War Crime OpOrders. For example, the Red Actor might use Armed Propaganda on Sunni Arabs within the Green Actor’s control, lowering the perception to encourage more Sunni’s to defect to Red Actor’s control.

## Armed Civil Affairs

Description: These OpOrders assign Squads to conduct civil affairs, building credible institutional procedures within the target Ethnography.

***Intended Use:*** An Actor’s Institutional Procedures requires population to begin being built, and is limited by finances. Assigning militant squads to Armed Civil Affairs allows the creation of governmental structure without having to have a controlled population first. This will benefit the Actor when they do gain control of population by already having an infrastructure in place.

## Prison Breaks

***Description:*** Prison Breaks are OpOrders for squads to seek out opposing actor detention facilities and free militant detainees. Based on the scenario, a certain percentage of the militant detainees will return to the Actor which freed them.

The number of Squads assigned to this OpOrder is compared with the number of prisons holding detainees. The ratio between the two determines how many detainees will be freed from detention. This means that all Prison Break actions are assumed to be successful unless the opposing Actor assigns squads to Prison Duty. (Its assumed militant squads will overcome local or municipal jail guards.)

***Intended Use:***  The Green Actor captures Red Actor and detainees them. This represents a reserve pool of combatants to ‘reobtain’ without having to recruit. Also militant detainees have the highest starting value of experience, at 10 years, reflecting how many prisons serve as insurgent graduate school providing training and networking with other captured insurgents. Under most scenarios the Red Actor does not hold Green combatants as detainees, killing them on the battlefield. This can be changed by scenario and then the Blue Actor Prison Breaks represent efforts to free these captured combatants and return them to Blue Actor control.

## Prison Duty

***Description:*** This allocates Squads of the Actor to protect its prison camps, prisons and municipal jails. Prison Duty Squads reduce the effective number of Prison Break actions, reducing the ratio at which detainees will be freed, possibly to zero. These actions are wasted if the Opposing Actor is not allocating squads to prison breaks.

## War Crimes

***Description:*** War crimes include the intentional targeting of civilians, ethnic cleansing, crimes against humanity and other mass casualty attack by conventional or unconventional forces against a target ethnographic group. These are distinguished from terrorism however within the model. War Crimes can be either an act of deliberate policy, or reflect the inexperience of troops or provocation by opposing Actors. Ethnic Cleansings cause fatalities in the targeted ethnographic population controlled by Actor who commits the War Crime. This means Green Actor atrocities will impact Green Actor populations. Unlike Terrorism the ethnographic perception penalty applies to the Actor committing the War Crime. Actors take a significant ethnographic penalty for committing War Atrocities, and because they add to the overall rate of violence, they will have an effect of increasing the need for garrisoning troops, leading to destabilization. War Atrocities also create refugees fleeing the violence. These refugees begin as IDP and then leave the country – potentially depopulating it.

***Intended Use:*** War Atrocities are a way for an actor to “cleanse” its controlled population of undesired ethnographic groups. Because War Atrocities are only targeted against a population the Actor physically controls – the deaths and refugees have the effect of ‘clearing out’ the target population. The simulation effect of this is that an Actor can reduce its Garrison requirements over time by committing War Atrocities against an Ethnographic group that already views it poorly, thus reducing the number of Coerced Population that need to be Garrison. Even though this will cause an Ethnographic hit, if there are less people of that ethnography within the Actor’s control it won’t matter as much. Also if a Theater Strategy is to destabilize a country with a large flow of IDP’s, or a neighboring countries capacity to manage that many, then increasing the number of War Atrocities is one way to accomplish that, though at a cost of increasing the difficulty of governing the targeted population at anything other than Coercive levels.

# Foreign Actor Operation Orders

Foreign intervention is possible in E-SAM on behalf of either the Green or Red Actor. These can be by state or non-state actors. Foreign intervention on behalf of Green is designated as the Blue Actor, while foreign intervention on behalf of Red is designated as the Purple Actor.

## Blue/Purple Armed Civil Affairs

Same as Green/Red Armed Civil Affairs, but executed by Blue/Purple personnel.

## Blue/Purple Information Operations

Same as Green/Red Propaganda, but executed by Blue/Purple personnel.

## Blue/Purple Training Actor Security Forces

Description: Conduct activities like those described under “Framework of Development: Train” to include developing training standards, training HNF soldiers, officers, civilians and friendly networks.[[1]](#footnote-1) Assumes the Required Assessment & Organize activities are complete.[[2]](#footnote-2) In the *Ideal Case* these shaping activities take negligible time. In the *Operationally Constrained Case* these activities represent the ramp-up time before Training formulations take effect.

Includes all efforts – from personnel training, physical infrastructure and technology improvements and direct support in CT operations to improve the Actor Security Forces ability to thwart terrorism and other clandestine acts such as prison breaks.

Intended Use: This training is provided by Blue/Purple personnel to Green/Red personnel conducting Combatting Terrorism OpOrders. The number of Green/Red personnel assigned to CT is compared to Blue/Purple. Unlike Combat Training or Advanced Equipment Provision, there is no multiplier training effect. This is based on the assumption that the ongoing mentorship of Counter Terrorism is more intensive than one-off training for a new piece of equipment or tactic. The percentage of Blue/Purple training forces to Green/Red CT forces is the additional % that will be added every Period to the Current Security Effectiveness. This makes CT training either very personnel intensive or time intensive, or both, to make a difference.

## Blue/Purple Airpower

Description: Fixed wing, rotary, drones and all forms of aviation are covered under this OpOrder. Airpower is designated by an overall rate, which determines the number of aircraft and sorties per day available, and then a secondary allocation is made to determine the targeting priorities of those aircraft: ground support, attacking an Actor’s resource production or attacking an Actor’s governing capabilities.

Intended Use: Assigned personnel represent the maintenance, sustainment and piloting requirements to field a certain amount of aircraft. In other words the number of aircraft, or sorties per day, are not determined arbitrarily, but as a function of how many personnel are assigned. It currently is set at 27 Squads necessary to support a Squadron of Aircraft, each of which consists of 12 planes, each of which can on average support 2 Sorties per day.

### Airpower Target Combatants

All close ground-support and stand-off attacks are covered under this. A percentage benefit is provided within the SFS Combat Simulator to represent proper air-support. This increases the exchange ratio which helps cause losses to the other side. However airpower targeting combatants does not eliminate Actor forces outside of battle itself.

### Airpower Target Resource Production

Drone strikes, cruise missiles and traditional airpower strikes are covered under this OpOrder. These strikes target the Resource Production of the Actor, and each strike eliminates a certain number of producing units, thus degrading the ability of the Actor to obtain resources. Note that in the ESA Simulator, Resource Production refers to a specific valuable resource that it takes control of the land to access and exploit: e.g. oil, opium, cocaine etc. Airpower strikes target this particular resource, and are not targeting more general or broad economic activity.

### Airpower Target Government Capability

Includes attacked against fixed or mobile infrastructure, command and control, communication or other instruments of state power. Airpower strikes against government capability reduce by block-amounts the ‘credible institutional procedures’ an Actor is able to provide, across all ethnographies. This has a second-order effect of reducing Ethnographic support for that actor. These strikes will either have a limited effect, or must be continued for a long duration, to degrade an largely legitimate government. However a failed-state or emerging-state actor governance, strikes such as this can make the difference between Coercion and Calculated Legitimacy perceptions of the government, or make it more difficult for the Actor to function as a state.

## Blue/Purple Providing Advanced Equipment

Description: The provision of advanced weaponry, communications or other materiel equipment including the necessary training to be able to use the equipment effectively.

Intended Use: Advanced Equipment provides a % increase in overall combat effectiveness in the SFS Simulator. The amount of that benefit actually obtained is based on the ratio between Blue/Purple squads assigned to provisioning and the conventional forces of the Actor. There is a multiplier effect, one Squad of trainers can train 10 Squads of Trainees per military action. Like CT Effectiveness, the ability to use advanced weapons degrades over time – mitigated by the Actors overall experience level. (e.g. a highly experienced military will not lose the training benefit, while a less experienced on will lose it rapidly.)

## Blue/Purple Combat Advising

Description: Covers all the aspects of military training including embedding in combat troops, establishing training regimes, academies etc.

Intended Use: These Blue/Purple squads assigned to embed as combat advisors join the Actor’s conventional forces, providing benefits to Morale and a faster increase in Experience. They also count to the Actor’s Infantry, adding additional direct combat capability. However, as they are directly engaged in combat, they suffer losses at a percentage rate equal to their overall percentage within the force they are advising.

## Intervention Size

This OpOrder sets the in-country level of military personnel a Blue or Purple actor is willing to commit. It takes time for troops to deploy and reach effective operating status – so if an Intervention Size is increased dramatically in one period, not all of those troops will be available that, or even the next period. Additionally, the Tooth-to-Tail ratio for Blue and/or Purple determines what % of the intervention size is available for actual military actions. The remainder are considered to be allocated to logistics, administration and other functions that don’t add capability directly – but are necessary for the ongoing maintenance of the force.

## War Crimes

This is a special action that doesn’t represent an intentional operational order for Blue/Purple military actions. Instead a set percentage of all Blue/Purple airpower sorties and Embedded Combat Advising will instead be diverted and result in War Crimes, similar to a war crime by a Green/Red Actor. This percentage is usually very low, 1/10th of 1%. But represents inadvertent missile strikes, fog-of-war and actual intentional war crimes by rogue troops.

# Starting Conditions

E-SAM has over 100 customizable starting parameters that can be adjusted to fit a regional or historical context. However, not all of these need to be set for each scenario as many represent core dynamics that will be common across conflicts. The current values in E-SAM are set to a scenario of Iraq & Syria corresponding with the rise of ISIS in 2010 but they can be modified.

## Ethnography Starting Conditions

Ethnography starting conditions represent the starting attributes, size and distribution of ethnographic groups. Note the Territory Conditions Table for Distribution of Population are designed to be cut and paste directly into Vensim Lookup Functions if required.

Table : Ethnographic Starting Conditions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Arab Sunni | Arab Shia | Kurdish Sunni | Notes |
| Normal Pct of Fighting Age Men in Population | 0.23 | 0.23 | 0.23 | The % of fighting age men (16-44yrs) in a population who can be drawn to recruits, become local opposition etc. As this depletes recruiting and joining opposition becomes more difficult. |
| Starting Level of Ethnographic Population | 10000000 | 30000000 | 10000000 | Raw number of people in total at the start of the scenario for each ethnographic population. |
| Territory Conditions Table for Distribution of Population by Ethnography on Territorial Map | [(0,0)-(1,1)],(0,0.00496),(0.00317,0.00496),(0.00367,0.01231),(0.05867,0.03494),(0.09117,0.04777),(0.09167,0.05865),(0.09217,0.09468),(0.32217,0.10144),(0.38243,0.11139),(0.4224,0.12594),(0.4229,0.13179),(0.42912,0.13204),(0.46912,0.13363),(0.46962,0.13369),(0.49962,0.15349),(0.50012,0.1711),(0.51574,0.17245),(0.51624,0.17445),(0.53124,0.18805),(0.53174,0.19409),(0.60174,0.20311),(0.63174,0.20576),(0.63224,0.21479),(0.63274,0.21693),(0.64257,0.24055),(0.64915,0.25532),(0.64965,0.26032),(0.66965,0.2695),(0.67992,0.27326),(0.68042,0.28826),(0.71116,0.29326),(0.74116,0.29417),(0.74166,0.29736),(0.77166,0.29736),(0.82166,0.29736),(0.82216,0.29736),(0.84716,0.29824),(0.84766,0.30039),(0.87356,0.30039),(0.95856,0.30039),(0.99356,0.30039),(0.99406,0.30039) | [(0,0)-(1,1)],(0.00317,0.00028),(0.00367,0.00068),(0.05867,0.00194),(0.09117,0.00265),(0.09167,0.00326),(0.09217,0.01001),(0.32217,0.01039),(0.38243,0.01094),(0.4224,0.01175),(0.4229,0.01208),(0.42912,0.01641),(0.46912,0.04512),(0.46962,0.04625),(0.49962,0.06605),(0.50012,0.08365),(0.51574,0.09514),(0.51624,0.11214),(0.53124,0.12534),(0.53174,0.13121),(0.60174,0.13996),(0.63174,0.14128),(0.63224,0.15031),(0.63274,0.15245),(0.64257,0.15245),(0.64915,0.15245),(0.64965,0.15245),(0.66965,0.15857),(0.67992,0.15857),(0.68042,0.15857),(0.71116,0.17357),(0.74116,0.17878),(0.74166,0.19686),(0.77166,0.19686),(0.82166,0.19686),(0.82216,0.19686),(0.84716,0.19686),(0.84766,0.19686),(0.87356,0.19686),(0.95856,0.19686),(0.99356,0.19686),(0.99406,0.19686) | [(0,0)-(1,1)],(0.00317,0.00028),(0.00367,0.00068),(0.05867,0.00194),(0.09117,0.00265),(0.09167,0.00326),(0.09217,0.00551),(0.32217,0.00589),(0.38243,0.00644),(0.4224,0.00725),(0.4229,0.00757),(0.42912,0.00781),(0.46912,0.00941),(0.46962,0.00947),(0.49962,0.02927),(0.50012,0.04688),(0.51574,0.04755),(0.51624,0.04855),(0.53124,0.06175),(0.53174,0.06762),(0.60174,0.07637),(0.63174,0.09891),(0.63224,0.26141),(0.63274,0.29994),(0.64257,0.30781),(0.64915,0.32258),(0.64965,0.32758),(0.66965,0.34289),(0.67992,0.34664),(0.68042,0.36164),(0.71116,0.36164),(0.74116,0.36164),(0.74166,0.36164),(0.77166,0.38125),(0.82166,0.382),(0.82216,0.402),(0.84716,0.40988),(0.84766,0.42924),(0.87356,0.44519),(0.95856,0.45609),(0.99356,0.46109),(0.99406,0.50109) | Lookup function that determines a % of the overall population, by ethnography, that occupies each section of the map. As these sections are conquered (or lost) the population is removed from the other Actor via Conquest functions. |
| Normal Procedures Required for Credibility per Pop | 1 | 1 | 1 | The number of credible institutional procedures needed for every person to reach "Governed" consensus. |
| Normal Time for Population to Transition | 0.25 | 0.25 | 0.25 | The amount of time for population to complete the transition between Coerced, Calculated Legitimacy and Governed at each stage. Population only shifts when there is sufficient credible institutional procedures in place. Nominally set at .25 or ~3weeks. |
| Time for Unaligned to Choose a Side | 10 | 10 | 10 | Currently set at 2.5 years for all of Unaligned to pick a side. |
| Time to be Conquered | 1 | 1 | 1 | This is the period of time it takes a "conquered" population to shift out of the previous and into the new Actors Coerced population. (All conquests enter Coerced). .035 represents a week, though various ethnographies may have longer or slower times. |
| Time to form Long Term Perception | 10 | 10 | 10 | The perception formation time of the Ethnographies "Deep Anchor." nominally set at 10 period, 2.5 years, or 5 times the short term value in order to see all dynamics without an extended duration model. |
| Time to form Perception | 0.5 | 0.5 | 0.5 | The perception formation time of an Ethnographies Perception of an Actor, this is nominally set at .5, or 1.5 months, which means that if there are sufficient governing credibility conquered people will move from Coerced to Calculated in 1.5months, and from Calculated to Governed in 1.5months. |

## Actor Starting Conditions

Actor starting conditions represent initial values of key resources, capabilities, and skill sets.

Table : Actor Starting Conditions

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Green # | Red # | Notes |
| Blue or Purple Intervention Time | 0.00E+00 | 0 | The number of periods after which Blue or Purple will intervene at the set Desired Intervention Size. |
| Minimum Force Size to Engage | 0.00E+00 | 20,000 | The number of combatants Red Actor must have before it begins waging conventional military attacks |
| Normal Combatting Terrorism | 8% | 0% |  |
| Normal Desire to Credibly Govern | 1,1,1 | 1,1,1 | The "level of concern" an actor has with credibly governing an Ethnographic Group. When value is 1, then full procedures will be developed. At .25, then only 25% of needed procedures will be developed, limiting the ability to influence an Ethnographic group into moving to Calculated or Governed status. |
| Scenario Morale Effect | 0 | 0.13 | Exogenous addition to morale established by scenario. |
| Starting Actor Advanced Weapon Effectiveness | 0 | 0 | The Pct of Equipment Modifier benefit they will get from weapons provided by Blue or Purple. |
| Starting Actor Conditions Expatriate Fighters | 0.00E+00 | 0 |  |
| Starting Actor Security Effectiveness | 0.50 | 0.5 | Starting security effectiveness. |
| Starting AFV/IFV | 2137 | 0 | The starting armored or improvised vehicles by actor. |
| Starting Artillery | 594 | 0 | The starting artillery pieces by actor. |
| Starting Blue or Purple Personnel | 0 | 0 | The number of state-sponsored foreign troops supporting Green or Red respectively. |
| Starting Cash | 5.00E+09 | 10,000,000 | The starting value of Finances |
| Starting Combatants | 87200,261600, 87200 | 1500,0,0 | The number of combatants by ethnography that each actor begins with. |
| Starting Detainees by Actor | 0.00E+00 | 1,500 | The number of Combatants held by the other side at start. |
| Starting Ethno Distribution Unaligned | 0,0,0 | 0,0,0 | % of all Ethnographies that start in the Unaligned position |
| Starting Ethno Distribution Calculated by Actor | 0,0,0 | 0,0,0 | % of all Ethnographies controlled by Actor that start in Calculated Legitimacy Stage |
| Starting Ethno Distribution Coerced by Actor | 0,0,0 | 0,0,0 | % of Ethnographies controlled by Actor that are in Coerced Stage |
| Starting Ethno Distribution Governed | 1,1,1 | 0,0,0 | % of all Ethnographies controlled by Actor that start in Governed Stage |
| Starting Ethno Distribution Unaligned by Actor | 0,0 | 0,0 | % of Ethnographies that are in Unaligned. |
| Starting Ethnographic Deep Anchor Perception | Computed | 3500000, 1300000, 825000 | The perception of the ethnography to the actor at start. |
| Starting Ethnographic Perception | Same as Starting Generational | Same as Starting Generational | The short term perception of the ethnography to the actor at start. |
| Starting Experience | 0.00E+00 | 3 |  |
| Starting Foreign Combatants | 0.00E+00 | 0 | Number of foreign fighters fighting within Green or Red. |
| STARTING WORLDWIDE POPULATION OF FOREIGN RECRUITS | 0.00E+00 | 100,000 | The number of potential foreign fighters who might join Green or Red. |
| Territory Conditions Pct Territory Controlled by Actor Start | 1 | - | Total territory controlled at simulation start. Note Green Actor is assumed to control anything not controlled by Red Actor |

## Actor Attributes

These are inherent attributes of an Actor that may be individually modified to reflect more realistic conditions. However – many of these represent somewhat generic values that could be easily used for a variety of irregular conflicts in the early part of the 21st Century.

Table : Actor Attributes

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Green # | Red # | Notes |
| Advanced Equipment Modifier | 0.25 | 0 | The % value of Advanced Weapons that Blue or Purple can provision to Green or Red. Modified by the effectiveness of local troops to use them. |
| AFV/IFV Lost due to Maintenance | 0 | 0 | Per Period Losses due to bad Maintenance |
| Artillery Lost due to Maintenance | 0 | 0 | Per Period Losses due to bad Maintenance |
| Average Blue/Purple War Atrocities Rate | 0.01% | 0 | The rate at which Blue/Purple Military Actions assigned to Airpower (Sorties) or Embedded Combat Advisors will produce a War Atrocity instead of the intended outcome. These War Atrocities feed into the respective Actor's (Green or Red) total. |
| Average Experience of Escaped Detainee | 10 | 10 |  |
| Average Experience of Foreign Recruit | 1 | 1 |  |
| Average Experience of Local Recruit | 3 | 3 |  |
| Average Squadron Sorties per Period | 4320 | 4320 | Number of Sorties over a 6month period. Currently stands at # of planes per squadron (average 12) \* 2/day \* 180 days. |
| Averaging Time Reserves | 4 | 4 | The number of periods on which an Actor will average its financial reserves - relative to making a decision to cease funding new procedures or maintaining them. |
| Blue Deployment Time | 2 | 2 | The number of months for Blue personnel to form into Squads. This represents the time from order to deployment. |
| Blue/Purple Squads to Support a Squadron | 27 | 27 | How many full time (all actions) Squads are necessary to support each flying Squadron. |
| Cost per Military Action | 2700 | 2700 | required financing to conduct a military action prior to activating one |
| Death per Terrorist Attack | 10 | 10 |  |
| Death per War Crime | 25 | 25 |  |
| Desired Cash on Hand | 250,000 | 250,000 | What is the floor above which actors will spend as much as they can to drive military actions. |
| Desired Reserve | 1000000 | 1000000 | The reserve of $$ the Actor desires to have. Continued performance beneath this reserve will lead to the reduction in creating new or replacement procedures. |
| Initial Worldwide Population of Foreign Recruits | 0 | 50,000 | Represents the global recruiting base to draw from. The theoretical ceiling of foreign recruits who can be inspired and arrive. Assumes anything above this doesn't exist, is intercepted, captured etc. |
| Local T3R Ratio | 0.67 | 0.67 | The Ratio of squads in a local actor between logistics and combat. Only combat squads will conduct Military Actions. |
| New Procedure Cost | 10 | 10 | Number of $ per new credible institutional procedure created. |
| Normal # of Detainees per Prison | 100 | 100 | Number of militants held as detainees at each prison (makeshift or permanent.) |
| Normal CT Impact | 1 | 1 | This is the multiplier applied to Squads assigned to Combatting Terrorism. An Actor more effective at CT would have a higher multiplier. Blue Actor advising teams can improve the impact amount. |
| Normal Deaths per Thwarted Terrorist Attack | 11 | 6 | Reflects the likelihood of that actor being killed in a thwarted attack. An 11 indicates that either all terrorists thwarted would fight to the death, or the opposing actor may not take prisoners alive. |
| Normal Defection Rate | 0 | 0 | FIX |
| Normal Degradation Fraction of Effectiveness | 0.12 | 0.12 | The % of Security Effectiveness lost each year until Effectiveness reaches 0. This is offset by the benefit of military experience, which at high levels of experience can take the Effectiveness degradation to zero. |
| Normal Detainees per Thwarted Terrorist Attack | 0 | 5 | Reflects the likelihood of that actor being caught alive and detained for a thwarted attack. A 0 may indicate the opposing actor will kill anyone they catch attempting terrorism. |
| Normal Effect of Kinetic Attack on Governing Capacity | 10000 | 100000 | Number of Institutional Procedures eliminated per kinetic strike (which may be airborne or a ground terrorist attack) made against the actor. |
| Normal Effect of Strike on Resource Production | 400 | 400 | Number of resource units/production/period destroyed on average per airstrike by Blue/Purple state support. |
| Normal Experience Gained per Period | 0 | 0.5 | How much experience per 6month period is gained. A 1:1 gain of experience would be .5, a 0 might be used for Conscripts who receive little to no opportunity for training. |
| Normal Foreign Recruits inspired per Terrorist Attack | 0 | 26 | Critical number that correlates terrorist activity with foreign recruiting, only helps if Foreign Recruiting is activated. Serves as tangible proxy for social media propaganda and effectiveness |
| Normal Military Capability of Squads | 0 | 1 | 1 every 3 months is normal |
| Normal Recruits per Military Action | 10,10,10 | 10,10,10 | How many recruits can a squad obtain in 6 months for 1 action? |
| Normal Size per Squad | 11 | 11 | Squads commit actions so the size of squad divided by the militants determines the number of squads available for military actions |
| Normal Training Reach | 10 | 10 | The number of Squads each Blue/Purple embedded squads can impact. |
| Organic Procedural Development Time | 0.25 | 0.25 | The fraction of time it takes for normal bureaucracy to develop or devolve procedures relative to need. |
| Pct of Losses that are Deaths | 1 | 0 | This and Pct of Losses that are Detainees should equal 1. |
| Pct of Losses that are Detentions | 0 | 57% | Determines how many of "losses" are killed vs. being detained. Detained are transferred to prisoner camps/jails and held until freed. Note because the % is applied to Actor's losses, the % of detention for the \*opposing\* actor should be entered as a value. For example: [Green, Red] entered as [0,57%] means that Red militants will be detained at 57% of the loss rate by the Green Actor, while the Red actor takes no prisoners. |
| Procedure Maintenance Cost | 1 | 1 | Number of $ per procedure an actor needs to spend to maintain the bureaucratic infrastructure of the procedures. |
| Refugees per Terrorist Attack | 25 | 25 |  |
| Refugees per War Crime | 250 | 250 |  |
| Squads Needed per Prison Break Attempt | 5 | 5 | The number of squads that form into a Prison-break team. |
| T3R Ratio | 0.67 | 0.67 | The ratio of Blue personnel between logistics and combat. Only combat personnel will form into Squads and conduct Military Actions. Note that in all cases of "Blue", the Blue is supporting its associated actor. So if Iran and the US are both supporting opposing sides of a conflict, the US would be Blue Personnel [Green] and Iran would be Blue Personnel [Red]. This allows state actor intervention on the opposing side. |
| Table f/ Effect of Procedural Adequacy | [(-2,-2)-(2,10)],(0,2),(1,0.1),(1.25,0.05),(1.5,0),(1.75,0) | [(-2,-2)-(2,10)],(0,2),(1,0.1),(1.25,0.05),(1.5,0),(1.75,0) | Lookup that graphically plots an Actor's concern over procedural inadequacy and acts as a multiplier on Organic Development. |

## Territory Starting Conditions

Territory starting conditions instantiate the geospatial terrain the conflict will occur over, including identifying terrain type, battle type, location of resources etc. Note lookup functions such as Territory Conditions for Battle Type, Terrain Type, Strategic Surprise etc. are designed to be cut and paste directly into a Vensim Lookup function.

Table : Territory Starting Conditions

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | Notes |
| Territory Conditions Price per Resource Unit | $80,$45 | | The estimated black-market price per unit of resource production Red Actor can obtain once it has seized control of resource production by seizing territory. In Iraq/Syria this was $/bbl. oil, in Afghanistan this might be $/pound of heroin, or $/pound of Cocaine in Columbia. Not all territories have valuable resources that can be exploited by insurgents by seizing land. |
| Territory Conditions Starting Total Territory | 619308 | | The km^2 of the entire bounded territory represented in the model. As Red Actor controls parts of this, it's % of Controlled Territory will be used on lookup functions to determine what they find. |
| Territory Conditions Table for Battle Type Based on Red Actor Location on Map | [(0,0)-(0.7,6)],(0.0032,1),(0.0037,1),(0.0587,3),(0.0912,3),(0.0917,4),(0.0922,2),(0.3222,1),(0.3824,1),(0.4224,1),(0.4229,3),(0.4291,1),(0.4691,6),(0.4696,5),(0.4996,6),(0.5001,5),(0.5157,6),(0.5162,5),(0.5312,1),(0.5317,6),(0.6017,5),(0.6317,4),(0.6322,5),(0.6327,5),(0.6426,4),(0.6492,4),(0.6497,5),(0.6697,3),(0.6799,1),(0.6804,5),(0.7112,4),(0.7412,4),(0.7417,5),(0.7717,4),(0.8217,1),(0.8222,5),(0.8472,1),(0.8477,5),(0.8736,4),(0.9586,1),(0.9936,1),(0.9941,5) | | Provides a Battle Type, 1-6. The exact battle type is determined by the scenario data loaded in and exogenous assumptions of the analyst. |
| Territory Conditions Table for Percentage of Unaligned Population Controlled based on Location of Red Actor on Territorial Map | [(0,0)-(1,1)],(0,0),(1,1) | | This lookup determines how many Unaligned are Conquered, moved into Coerced, based on Red Actor advancement. Currently this is a proportional representation. |
| Territory Conditions Table for Strategic Surprise Based on Location of Red Actor on Territorial Map | [(0,0)-(1,1)],(0,0.05),(0.00317,0.05),(0.00322,0.05),(0.0566,0.25),(0.08828,0.25),(0.08844,0.5),(0.08866,0.5),(0.31224,1),(0.41247,1),(0.41263,1),(0.41885,1),(0.45652,1),(0.45657,1),(0.48642,1),(0.48672,1),(0.50235,1),(0.50251,1),(0.51686,1),(0.51702,1),(0.5852,1),(0.61432,1),(0.61465,1),(0.61482,1),(1,1) | | Determines a strategic surprise variable based on where the Red Actor is located. This is based on Analyst Assumptions. |
| Territory Conditions Table for the Percentage of Resource Production based on Red Actor Location on Territorial Map | [(0,0)-(1,1)],(0,0),(0,0),(0.06,0.04),(0.09,0.04),(0.09,0.04),(0.09,0.05),(0.32,0.05),(0.38,0.05),(0.42,0.06),(0.42,0.06),(0.43,0.06),(0.47,0.14),(0.47,0.14),(0.5,0.14),(0.5,0.14),(0.52,0.39),(0.52,0.39),(0.53,0.39),(0.53,0.39),(0.6,0.39),(0.63,0.39),(0.63,0.4),(0.63,0.4),(0.64,0.4),(0.65,0.4),(0.65,0.4),(0.67,0.4),(0.68,0.4),(0.68,0.4),(0.71,0.4),(0.74,0.41),(0.74,0.41),(0.77,0.41),(0.82,0.41),(0.82,0.41),(0.85,0.41),(0.85,0.41),(0.87,0.42),(0.96,0.42),(0.99,1),(0.99,1) | | Determines the percentage of all resource production Red Actor will gain as they gain territory. Path of conquest is based on analyst assumptions. |
| Territory Conditions Table for the Terrain Type Based on Location of Red Actor on Territorial Map | [(0,0)-(0.7,5)],(0.00317,4),(0.00367,4),(0.05867,1),(0.09117,1),(0.09167,4),(0.09217,4),(0.32217,1),(0.38243,1),(0.4224,1),(0.4229,4),(0.42912,2),(0.46912,5),(0.46962,4),(0.49962,1),(0.50012,4),(0.51574,1),(0.51624,4),(0.53124,1),(0.53174,2),(0.60174,4),(0.63174,2),(0.63224,4),(0.63274,4),(0.64257,5),(0.64915,1),(0.64965,5),(0.66965,2),(0.67992,1),(0.68042,4),(0.71116,1),(0.74116,5),(0.74166,4),(0.77166,2),(0.82166,1),(0.82216,4),(0.84716,1),(0.84766,4),(0.87356,2),(0.95856,1),(0.99356,1),(0.99406,4) | | This lookup "represents" the geographical fixtures of the territory based on the progression of the Red Actor. Requires exogenous analyst assessment of where Red Actor will go and in what order. |
| Territory Conditions Table of Cumulative Green Forces Engaged based on Location of Red Actor on Map | [(0,0)-(1,1)],(0.00317,0.00551),(0.00367,0.01368),(0.05867,0.03882),(0.09117,0.05308),(0.09167,0.06517),(0.09217,0.11021),(0.32217,0.11771),(0.38243,0.12877),(0.4224,0.14494),(0.4229,0.15144),(0.42912,0.15626),(0.46912,0.15816),(0.46962,0.18941),(0.49962,0.21941),(0.50012,0.30323),(0.51574,0.30674),(0.51624,0.33803),(0.53124,0.35876),(0.53174,0.36746),(0.60174,0.42246),(0.63174,0.44998),(0.63224,0.59998),(0.63274,0.69998),(0.64257,0.72998),(0.64915,0.73998),(0.64965,0.75998),(0.66965,0.76498),(0.67992,0.76998),(0.68042,0.79498),(0.71116,0.81998),(0.74116,0.82498),(0.74166,0.85498),(0.77166,0.85648),(0.82166,0.85798),(0.82216,0.90798),(0.84716,0.90998),(0.84766,0.95998),(0.87356,0.96098),(0.95856,0.96198),(0.99356,0.96298),(0.99406,1.01298) | | Lookup of the total % of Green Conventional Forces that will be engaged based on location of Red Actor. |
| Territory Conditions Total Available Resource Production | 5.013E+13 | | The total value of all Available Resource Production in the entire territory. In this case Bbl./Day of oil production. |
| Territory Conditions Table of Local Garrison Green Forces Engaged | [(0,0)-(0.7,0.3)],(0.00317,0.00551),(0.00367,0.00817),(0.05867,0.02514),(0.09117,0.01426),(0.09167,0.01209),(0.09217,0.04504),(0.32217,0.00751),(0.38243,0.01106),(0.4224,0.01616),(0.4229,0.00651),(0.42912,0.00482),(0.46912,0.0019),(0.46962,0.03125),(0.49962,0.03),(0.50012,0.08382),(0.51574,0.00351),(0.51624,0.03129),(0.53124,0.02073),(0.53174,0.0087),(0.60174,0.055),(0.63174,0.02752),(0.63224,0.15),(0.63274,0.1),(0.64257,0.03),(0.64915,0.01),(0.64965,0.02),(0.66965,0.005),(0.67992,0.005),(0.68042,0.025),(0.71116,0.025),(0.74116,0.005),(0.74166,0.03),(0.77166,0.0015),(0.82166,0.0015),(0.82216,0.05),(0.84716,0.002),(0.84766,0.05),(0.87356,0.001),(0.95856,0.001),(0.99356,0.001),(0.99406,0.05) | | This allocates the location of Green Garrison forces across the map. |
| Theatre Plan of Attack | Ar Raqqah City | 0.00317 | This represents the Theatre Plan of attack or sequence to be pursued. The available territory is divided into % and a network map is constructed wherein the % of km^2 advanced in the FLOT by the Red Actor corresponds to the outer limit of its boundary (which can advance as a blob or in discrete unconnected spheres.) So if Baghdad is the first target, it might be at 1% of territory in one scenario but if it's the last conquered it might be 99% in another. It is this sequence that is used to assign terrain type, battle type and population in other settings. |
| Fallujah | 0.00367 |
| Derie e Zor Province | 0.05867 |
| Ar Raqqah province | 0.09117 |
| Ramadi | 0.09167 |
| Mosul City | 0.09217 |
| Anbar Province, Ninawa & Salah ad-Din | 0.32217 |
| Remainder Ninawa Province | 0.38243 |
| Salah ad-Din Province except Tirkrit | 0.42240 |
| Tikrit | 0.42290 |
| Ayn al Arab SubDistrict | 0.42912 |
| Al Hasakah Governate | 0.46912 |
| Kobani | 0.46962 |
| Alleppo Governate but Aleppo | 0.49962 |
| Aleppo | 0.50012 |
| Kirku Province | 0.51574 |
| Kirkuk City | 0.51624 |
| Hama Province | 0.53124 |
| Homs Province but Homs | 0.53174 |
| Take Homs | 0.60174 |
| Rif-Damascus but Damascus | 0.63174 |
| Baghdad | 0.63224 |
| Damascus | 0.63274 |
| Idlib | 0.64257 |
| Latakia & Tartous | 0.64915 |
| Latakia Capital | 0.64965 |
| "As-Suwayda, Quneitra, Daraa |  |
| " | 0.66965 |
| Remainder of Babil | 0.67992 |
| Hillah | 0.68042 |
| Diyala | 0.71116 |
| Erbil | 0.74116 |
| Erbil Capital | 0.74166 |
| Wasit | 0.77166 |
| Remainder of Najaf | 0.82166 |
| Najaf Capital | 0.82216 |
| Remainder Dhi Qar | 0.84716 |
| Nasiriyah Capital | 0.84766 |
| Misan | 0.87356 |
| Muthana | 0.95856 |
| Basra | 0.99356 |

## Glossary

*measure of effectiveness* — An indicator used to measure a current system state, with change indicated by comparing multiple observations over time. Also called MOE.

See also combat assessment; mission. (JP 5-0)

*advise* - Advisors are the most prominent group of U.S. personnel that serve with HN units. Advisors live, work, and (when authorized) fight with their HN units. Segregation is kept at an absolute minimum. The relationship between advisors and HN forces is vital. U.S. commanders must remember that advisors are not liaison officers, nor do they command HN units.[[3]](#footnote-3)

*friendly networks* — Friendly networks are networks that are sympathetic to or assisting

directly or indirectly with our mission. They include the military and civil components and non-governmental organizations associated with allied coalition forces and host nation forces. They are characterized as green or blue.[[4]](#footnote-4)

*green networks* — Green networks are military and government civilian host-nation forces.[[5]](#footnote-5)

*operation order* — A directive issued by a commander to subordinate commanders for the purpose of effecting the coordinated execution of an operation. Also called OPORD.

(JP 5-0)[[6]](#footnote-6)

*campaign plan* — A joint operation plan for a series of related major operations aimed at

achieving strategic or operational objectives within a given time and space. See also

campaign. (JP 5-0)[[7]](#footnote-7)

*counterterrorism* — Activities and operations taken to neutralize terrorists and their

organizations and networks in order to render them incapable of using violence to instill

fear and coerce governments or societies to achieve their goals. Also called CT. See

also antiterrorism; combating terrorism; terrorism. (JP 3-26)[[8]](#footnote-8)

*combating terrorism* — Actions, including antiterrorism and counterterrorism, taken to

oppose terrorism throughout the entire threat spectrum. Also called CbT. See also

antiterrorism; counterterrorism. (JP 3-26)[[9]](#footnote-9)

*antiterrorism* — Defensive measures used to reduce the vulnerability of individuals and

property to terrorist acts, to include rapid containment by local military and civilian

forces. Also called AT. See also counterterrorism; terrorism. (JP 3-07.2)[[10]](#footnote-10)

*theater strategy* - An overarching construct outlining a combatant commander’s vision for integrating and synchronizing military activities and operations with the other

instruments of national power in order to achieve national strategic objectives. See also

national military strategy; national security strategy; strategy. (JP 3-0)[[11]](#footnote-11)

*counterinsurgency* — Comprehensive civilian and military efforts designed to

simultaneously defeat and contain insurgency and address its root causes. Also called

COIN. (JP 3-24)[[12]](#footnote-12)

*occupied territory* — Territory under the authority and effective control of a belligerent armed force and not being administered pursuant to peace terms, treaty, or other agreement, express or implied, with the civil authority of the territory. (JP 4-02)[[13]](#footnote-13)

*white network* - Neutral networks are networks that are not hostile to, or in any way

supportive of any one of the forces in a hostile environment. Sometimes characterized as

White networks.[[14]](#footnote-14)

*blue network* — Blue networks are military and government civilian US, allied and coalition forces.[[15]](#footnote-15)

*black network* — Black networks are formal and /or informal grouping of criminals that are not necessarily adversarial to the friendly networks, but thwart attempts to create stability so that they can further the aims of their criminal enterprises.[[16]](#footnote-16)

*red networks* — Red networks are formal and/or informal grouping of adversarial actors that are in opposition to the friendly networks. Red networks are the adversary network(s)

identified in the commander’s intent.[[17]](#footnote-17)

*T3R –* TBD

*Purple Network*  - TBD (see if other but this is a state-actor sponsor of a Red Actor, similar of how Blue supports Green, Purple supports Red)

# Bibliography for Appendix D

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2. Ibid. 6-6 thru 6-12 [↑](#footnote-ref-2)
3. Ibid., 6–17. [↑](#footnote-ref-3)
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13. Ibid., 172. [↑](#footnote-ref-13)
14. *Attack the Network Commanders Guide*, 172. [↑](#footnote-ref-14)
15. Ibid., 159. [↑](#footnote-ref-15)
16. Ibid. [↑](#footnote-ref-16)
17. Ibid., 174. [↑](#footnote-ref-17)