Dynamics of ISIS: An Emerging-State Actor

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Abstract: This paper seeks to explain the rapid growth of the Islamic State of Iraq & Syria (ISIS) and approach the question of "what is" the Islamic State? The paper offers several contributions. First is the proposal of a dynamic hypothesis that ISIS is an emerging-state actor and differs notably from traditional non-state actors and insurgencies. The theory consists of both a causal loop diagram and key propositions.   A detailed system dynamics simulation (E-SAM) was constructed to test the theory. The propositions of emerging-state actor theory are constructed as synthetic experiments within the simulation and confirm evidence of emerging-state actor behavior. E-SAM's novelty is its combination of combat simulation with endogenous geospatial feedback, ethnographic behavior in choosing sides in conflict, and details internal simulation of key actor mechanisms such as financing, recruiting and governance. E-SAM can be loaded with scenarios to simulate non-state actors in different geospatial domains: ISIS in Libya, Boko Haram in Nigeria, Taliban in Afghanistan and even expatriated ISIS fighters returning to pursue new conflicts such as in Indonesia.

Keywords: ISIS, ISIL, DAESH, insurgency, conflict, security, non-state actor, emerging-state actor, combat simulator, geospatial, national security.

This paper was previously published as a conference paper. The simulation model and findings have been substantially revised with since then.[1]

1. Introduction

The rise and staying power of the Islamic State of Iraq & Syria (ISIS) created enormous regional instability that survives after its territorial collapse. Although ISIS's predecessor Al-Queda in Iraq (AQI) presented a threat as a traditional insurgency, ISIS operates in an entirely different manner. Terming ISIS an insurgency is difficult because they operated openly. Likewise, explanations that ISIS is a messianic religious cult or some form of mafia discounts how ISIS governed and sought to establish civic institutions in territory it controlled. So what was ISIS? What strategies can contain or defeat it? Can the ISIS phenomena be replicated elsewhere?

This paper proposes a hypothesis that ISIS represented a type of non-state actor termed an emerging-state actor. Emerging-state actors operate in fundamentally different modes than other non-state actors like insurgents or terrorists and this difference helps explain the rapid growth of ISIS and why other insurgencies might shift to this mode of conflict in the future. The theory of emerging-state actors as it applies to ISIS is developed within the existing framework of non-state actors. A dynamic hypothesis of an emerging-state actor is then developed through a series of logical statements connected in a causal-loop diagram. Experiments are conducted on the propositions of the dynamic hypothesis using a detailed system dynamics simulation called the Emerging-State Actor Model (E-SAM) (explained fully in Appendices) to build confidence in the theory. The paper finishes with a conclusion that summarizes the insights, discusses limitations, and identifies future opportunities for research with the emerging-state actor theory as well as the simulation model created for this effort.

2. Detailed Problem Description

In 2003 Al-Queda Iraq (AQI) emerged as a potent threat to the stability of Iraq. The strength of AQI peaked in 2006 before declining as the result of three circumstances: a troop surge of US Forces, a Sunni-Shia civil war that AQI helped spark, and the indigenous resistance to AQI growing out of the Anbar Awakening. In 2013 ISIS seized of Ar-Raqqah, a medium sized city in eastern Syria with an estimated 13,200 militants.   By late 2014, ISIS had grown to between 50,000-80,000 militants strong, taken control of nearly thirty per cent of the territory in Syria and Iraq, and threatened regional stability. It took the combined intervention of over five different international forces, of which the US led-coalition was just one, plus the combined militaries and local militias of Syria and Iraq to remove ISIS from the territory it held. The rapid growth of ISIS and staying power represented a problem in the study of insurgencies and how to contain them. How did ISIS grow so quickly between 2013 and 2014? What made ISIS so difficult to confront? What would've happened had the foreign interventions not occurred?

3. Literature Review

Although the literature on insurgencies is extensive, in 2009 Kilcullen argued that Cartesian or reductionist quantitative analysis to model insurgencies may not be the best approach, and instead complexity theory and systems theory approaches may be more practical.   There are only a handful of quantitative system dynamic efforts dealing with insurgencies or irregular warfare in the manner described by Kilcullen. An early multi-polar examination of conditions that give rise to internal violence in developing economies was conducted by Khalid Saeed in 1983. The paper analyzed how social and political factors determined long term growth. Instability in the form of dissidence and subversive activities were modeled, but not explicitly as a violent insurgency or with resources becoming controlled by the dissidents. [4] In 2010 Turnley et. al. specifically modeled an irregular warfare environment to provide a computational representation of the interdependence between kinetic and non-kinetic aspects of a battlefield. The model highlights the interaction of latent structure as it is affected by kinetic activity, but Turnley does not model the organization of the insurgency itself as a key factor in the dynamics of how it operates.[5]

In 2011 Anderson used actual data from the Anglo–Irish War of 1919-1921 to model insurgency and counterinsurgency theories indicating potential gaps in the theory when compared to simulation results. However, the IRA was never able to seize and hold territory with this approach and may not best represent the dynamics of an actor like ISIS which seizes territory to the exclusion of all other actors.[6]

In 2013 Saeed et. al. developed a generic structure to model political conflict which could include insurgencies.[7] The model, like Turnley, focuses on decision-making and choices of the population rather than the explicit structure of how an insurgency like ISIS might operate.

In 2014 Aamir presented a paper on modeling terrorist organizations using existing system dynamic models of business entities. However, except for Attacks & Agency the models Aamir used were from existing system dynamics literature on business models, built generically, rather than aiming to model the performance of any one insurgent group.[8]

This paper seeks to build upon the work of this existing literature by proposing a dynamic hypothesis that ISIS represents a new form of insurgency created by an "emerging-state" actor. In this effort I will adopt Turnley's approach of using U.S. military definition of terms, the aspects of modeling ISIS as a firm or state from Aamir, and pay close attention to the causal mechanisms (financing, recruiting, gaining equipment) that allows ISIS to operate and achieve its goals missing from the theoretical structure of Anderson and the generic structure of Saeed.   The crucial feedback loops between state and non-state actor discussed by Saeed are explicitly modeled.

My contribution to the literature in this paper is the theory of an emerging-state actor, that ISIS is such an actor and the testable propositions of what constitutes such an actor. I test the propositions of the theory in simulation experiments to see whether they are valid within the context of the model boundaries or not, and validate those boundaries. Finally, I have contributed a detailed simulation model in E-SAM that can simulate the performance of a wide variety of unconventional conflicts between state and non-state actors. E-SAM can be used either as a wargame by military planners or a research tool by analysts or academics. The model contains a combat simulator configurable by scenarios to represent different terrain and types of environments as well as starting conditions.[9] The model serves as a platform for conducting a portfolio of policy tests to understand the behavior of an emerging-state actor versus an insurgent non-state actor or clandestine terrorist network – but as well conduct policy tests on interventions against such actors. [1]

4. Hypothesis Development: What is ISIS?

Developing a hypothesis that ISIS was an emerging-state actor first requires identifying the existing perspectives on terrorism, insurgencies and irregular warfare then locating ISIS within this typology of non-state actors. Part of that effort involves making explicit the modeling boundaries and how the problem is being sliced. This section concludes with the proposed hypothesis of ISIS as an emerging state actor.[10]

Existing terms often do not distinguish between tactics used by a non-state actor and threat to the state by a non-state actor. The two figures below, Figure 1 and Figure 2, both represent continuums along axes. Beginning with "tactics," a continuum of the methods of operations employed in furthering an agenda by non-state actors can be notionally established using terms and definitions from the U.S. Military. In Figure 2, at the left of the continuum, are non-state actors who seek to achieve their agenda through unconventional warfare defined as "…operating through or with an underground, auxiliary, and guerrilla force in a denied area."[11, p. 261]

Unconventional Warfare   Irregular Warfare

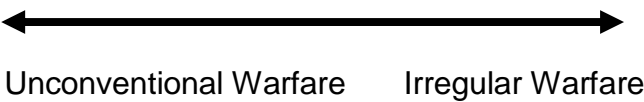



Figure 1. Tactics Continuum

On the right side of the continuum are those non-state actors who further their agenda through a "…violent struggle among state and non-state actors for legitimacy and influence over the relevant population(s),"[11, p. 125] the key distinction being to what extent the non-state actors are operating in a clandestine or more open fashion and seeking legitimacy over the local population. The continuum ends at irregular warfare excluding conventional full-spectrum operations and nuclear war as being beyond the reach of non-state actors.

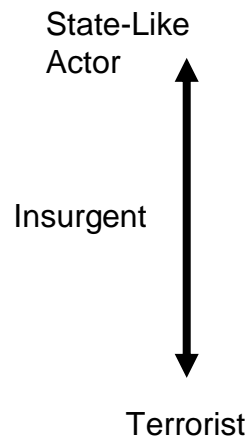



Figure 2. Threat to the State

Figure 2: "Threat to the State" represents the extent to which the agenda of a non-state actor represents an existential threat to the survival and continuance of a state. Agendas which seek change in government policy, release of prisoners, or financial demands are fundamentally different from agendas with goals to remove or replace current leadership or violently overthrow the state itself. Kilcullen distinguishes between "terrorist" and "insurgent" based on the question of how much of a threat to the state the non-state actor poses. He describes how in "Western popular culture the conception of terrorism became that of disembodied cells of radicalized, nihilistic individuals [who]…could not and did not tap into a mass base that drew its legitimacy from popular grievances, as traditional insurgents.[3,Location 3123]" But many insurgencies, Kilcullen continues, especially those of the 21st Century, operate in a conflict where the insurgents "challenge the state by making it impossible for the government to perform its functions, or by usurping those functions—most commonly, local-level political legitimacy; the rule of law; monopoly on the use of force; taxation; control of movement; and regulation of the economy.[3, Location 2529]"   So insurgencies differ from terrorism in their intent of challenging the state, however most insurgencies still operate in a clandestine fashion. This is because an insurgency does not yet have a monopoly on the activities within the territory they occupy, so the non-state actor can neither operate nor govern openly. This territorial control leading to open-governing distinction is vital amongst the non-state actors. Once an insurgency controls territory to the exclusion of any other force establishes enforcement of law, commerce, and social activity, they have evolved to something more than an insurgency. In 2007 the United States military published the Joint Operating Concept on Irregular Warfare to guide future joint force commanders on a wide variety of types of irregular warfare.   The Joint Operating Concept briefly treats this concept of insurgencies acting in sovereign fashion in a footnote "[s]tate-like adversaries refer to non-traditional adversaries that have evolved to the point of attaining state-like power, authority, and influence over a population" and later acknowledging that "these adaptive actors may possess some of the power of states and adopt state-like structures.[5]"   This final definition allows the creation of a vertical continuum of the threat to the state. At the bottom, small groups of individuals pursue policy change but have little chance of disrupting state function. In the middle, an insurgency begins to threaten the governing of a state by disrupting the means to do so. At the top, an insurgency has begun to capture territory and govern openly becoming a state-like actor. Perhaps the only difference at that point remaining from a state-like actor and a state is international recognition.   Using the defined horizontal and vertical axes, non-state actors can now be notionally plotted based on where they fall on both continuums. This is illustrated in Figure 3.

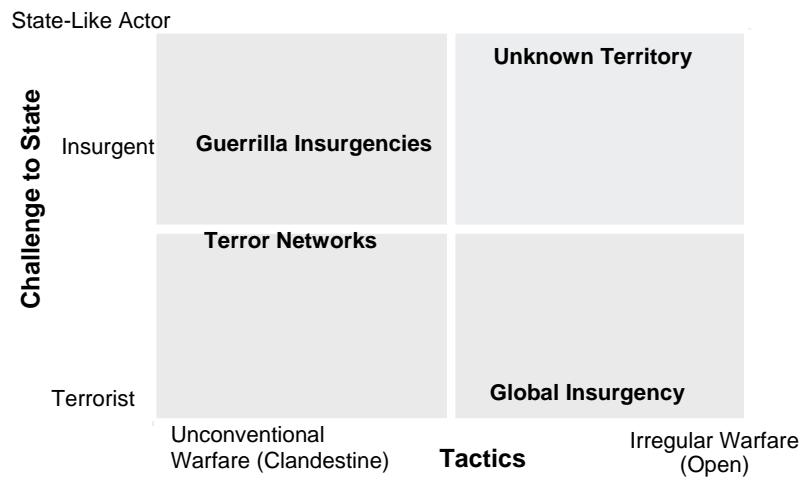



Figure 3. Non-State Actor Segmentation

Further segmentation can be arrived at by illustratively separating the graph into four quadrants representing the four natural distinctions of a two-axis arrangement as: high-challenge to the state with unconventional means, high challenge to the state with irregular warfare means, low challenge to the state with unconventional means, and so on. Three quadrants are easily defined with existing terms.

It's worth noting that "Guerrilla Insurgencies" do not top the "challenge to state" axis.   It follows logically that meeting the definition of a state-like actor would require the guerrilla insurgency to abandon clandestine or underground methods characteristic of unconventional warfare and begin operating in the open. Therefore, as a guerrilla insurgency gains territory and begins governing, it shifts to the right upper quadrant currently named 'Unknown Territory'. The actors who occupy this space are those who conduct irregular warfare and yet present a threat to the state of equal or higher magnitude than guerilla insurgencies. Defining the characteristics of this 'unknown territory' quadrant occurs below.

First, we must trace the path of ISIS's history and shifting modes of operation. Before 2003 what would become AQI operated as at best a terrorist network of cells, the lower left quadrant. From 2003–2013 as AQI operated as an insurgency in the upper left quadrant threatening various governments conducting attacks, gaining criminal revenues all from within clandestine networks hidden within the population. However, AQI never openly governed any population. With the capture of Ar-Rakkah in 2013 this mode shifted from clandestine to open territorial seizure – moving to the highest point on the vertical scale. ISIS no longer sought to just deny governmental functions to the states (Syria and Iraq), but through the seizure of territory and establishment of governance create their own state. From a perspective of means although ISIS continued its clandestine methods, it also began attacking in the open with uniformed troops and marked vehicles. This was more a form of irregular than unconventional war. Because of this shift in approach and end goals, ISIS at this time was better located in the upper-right quadrant and deserving of a term representative of insurgencies that govern openly and no longer execute solely unconventional operations but embrace all aspects of irregular warfare. As ISIS set up courts of law, collected taxes, established government services, and enforced social norms the group clearly began operating as a "state-like" actor, and given its rise might be better termed "emerging-state" or "proto-state" actor. Indeed, the qualities of an "emerging-state" actor well qualify the upper right portion of the previously established quadrant. Locating ISIS in this space along with illustratively placing other non-state actor groups, the graph now appears as in Figure 4.

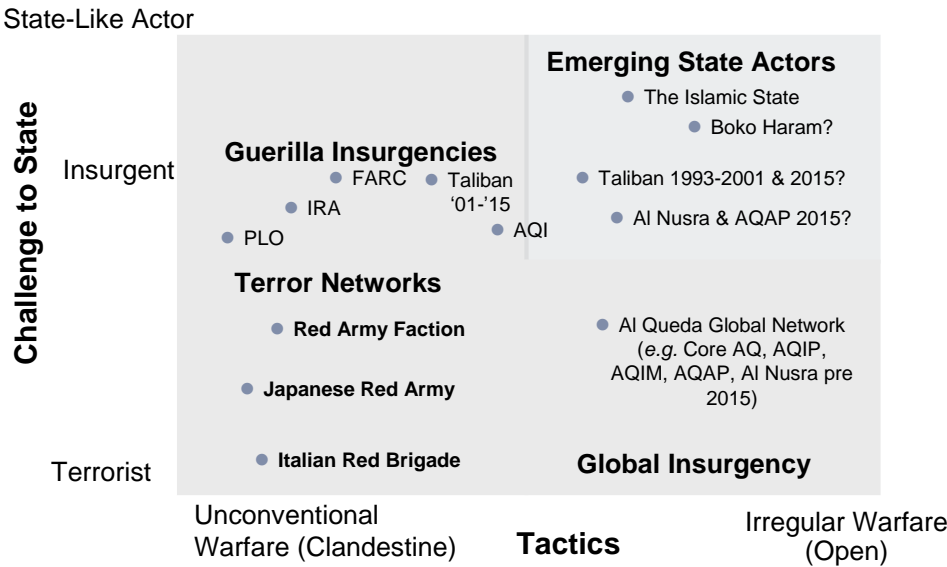



Figure 4. Illustrative Location of Non-State Actors by Segmentation

This structure now provides a shaping context for the discussion of "what is ISIS" and a point of alignment in the modeling effort: the amount of relevant population under some form of control by ISIS. From Turnley, two forms of control over a population are identified: control through coercive power and control through government via legitimacy. Coercive power results from the exercise of "coercion and reward" and is "particularistic as it is support for a specific action or specific person, not for an institution or a system of government." Coercive power is more resource intensive as it "requires the investment… to induce compliance whenever necessary.[6]"   Legitimacy is a form of power that relies on the function of procedures that the governed considers fair established with credibility over time. Unlike coercive power used to ensure compliance, control by others is replaced by self-control, which socially is a much cheaper way to ensure social order."[5, pp. 38–40] Turnley illustrates the transitioning distribution of a population controlled through coercive power and governed through legitimacy with a diagram presented as Figure 5.

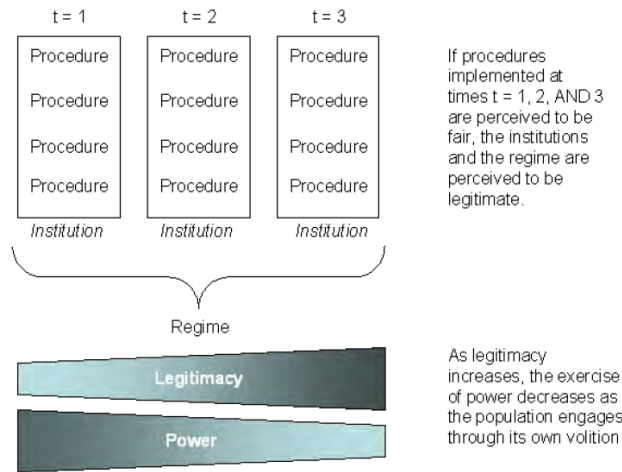



Figure 5: Power & Legitimacy

Institutions are created at times t1, t2 & t3, each deploying a series of procedures to execute their purpose. As each procedure by an institution is considered "fair," the amount of Power (coercive power) decreases as Legitimacy (governed through legitimacy) increases. Additionally, the succession of credible and fair institutions also decreases the amount of Power needed versus Legitimacy. This means Legitimacy is a function of the successful execution of each function as well

as the length of time in which all previous functions have also been successfully executed. Likewise, the length of time it takes to transition a population from control through Coercive Power to Legitimacy determines the overall resources required to govern that population. A middle-stage, lying between Coercion and Legitimacy, is identified from Hurd's research. In this model a third stage, "self-interest" or Calculated Legitimacy lies between Coercion and Legitimacy. The difference between Coercion and Calculated Legitimacy as described by Hurd: "is that an application of coercion leaves the coerced actor worse off than it was beforehand…whereas a self-interest perspective sees the actor as better off than it would be taking any other available path."[13, p. 386]   The in-between state more accurately captures some of the complex patronage relationships where out of purely self-interested ethnographic groups will temporarily align with the local power, but quickly remove that alignment if their interests diverge. In summary, by creating credible institutional procedures replicated over time provisioning both punishments and services any state-actor will affect the distribution of a target ethnographic group among Coerced, Calculated Legitimacy and Governed that indicates along a continuum the extent of external-threat vs. self-restraint that is necessary to achieve compliance of that population to the state.

5. Modeling Boundaries & Approach

Prior to creating a simulation model, the proposed theory to be tested must be developed into a strong logical argument. In system dynamics these logical structures are made visual and explicit with causal loop diagrams (CLD) that distill into to a key feedback loops the hypothesis of what is generating the proposed behavior. From this CLD, the detailed simulation model of hundreds of equations can be constructed. However, since models can never truly represent reality, boundary selection must be made explicitly clear. Reasonable boundaries for proposed hypothesis can be selected through a "slicing approach" to complex systems as advocated by Saeed in 1992.[14] In complex systems modes of behavior can exist in time, geography (both a geography of 'terrain' and a geography of 'things'), and simultaneous modes. In this paper the complex system will be sliced as depicted in Table 1. Additional commentary on these selections is provided in the Appendix B.

Axes	Slice Modeled	Slice Not Modeled
Mode	Exponential growth of Governed Population	Behavioral Limits to Growth
Time	Duration = 2010-2020 Unit = 3 months, dt = .011 (or ~1 day)	Pre-2010 and greater than 10 year feedback loops
Geography	Territory: Iraq & Syria Provinces & Cities Ethno-Social Populations: Kurds, Shia & Sunni Forces: ISIS vs. Syria, Iraq, & Foreign	Cross Regional Flows Tribal Structures Towns & Villages
Policy Responses	Exogenous & Endogenous within the geography boundary.	Global responses outside of geography boundary.

Table 1. Proposed Slicing of Simulation Model

6. Hypothesis Design through Causal Loop Analysis

Existing causal loop structure for insurgencies in the literature is limited as discussed previously. Because the models used by Aamir were already extant, he did not provide an integrated causal loop structure.[8, p. 8] In their 'Farmers, Bandits, and Soldiers' model Saeed et. al. likewise did not depict a causal loop diagram.[7]   Only in Anderson's paper was a causal loop diagram of his theoretical construct created, as depicted in Figure 6.[6, p. 8]

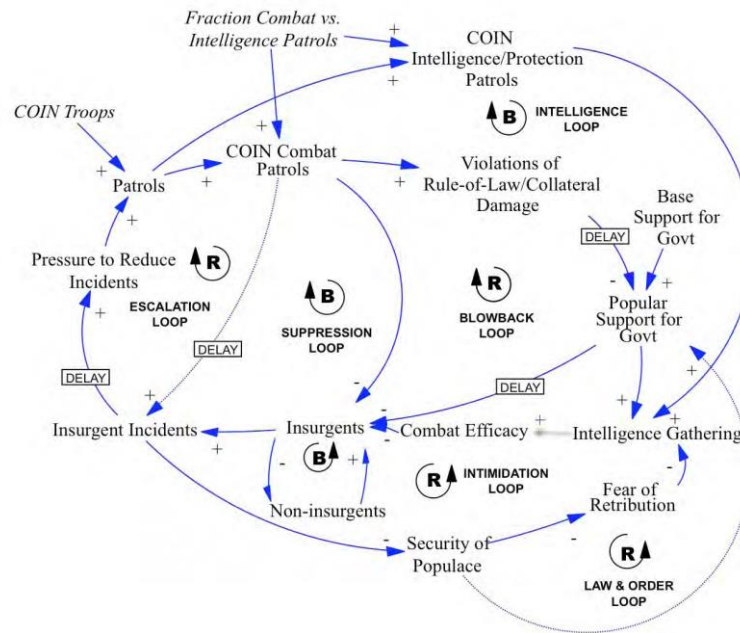



Figure 6. Anderson COIN CLD

Anderson's model is limited in its utility in examining ISIS and other emerging state actors using irregular warfare. This is because Anderson's model is built on the premise that insurgents are fighting a "classic" insurgency following O'Neill's definition that largely confines insurgents to operating in a guerrilla manner, e.g. "raids, ambushes, bombings, etc."[6, p. 3] This is consistent with the Joint Forces definition of unconventional warfare of "operating through or with an underground, auxiliary, and guerrilla force in a denied area."[11, p. 261] This does not comport with behavior that is state-like, or defined above as emerging-state behavior.

Causal loop diagrams can demonstrate the different phases already identified: clandestine terror networks, insurgencies and emerging-state actors.   All three phases operate within the same system, but the differences between them manifest in the theory of emerging-state actor behavior and performance. These differences can then be tested in the simulation model for validation against the hypothesis that ISIS is an emerging state actor.

This paper proposes that this cycle begins with a State Actor and the desire to credibly govern a specific ethnographic group. The higher that desire, the higher the legitimacy of the State Actor within that ethnographic group. This desire also exhibits a tolerance of civil reforms. This means when grievances do arise – they can be resolved through less-than-violent means.   However, if a State Actor has a low desire to credibly govern, this decreases their legitimacy to the ethnographic group, increasing grievance, and the unwillingness to allow civil reforms leads over time to general uprising and resistance. This initial stage is depicted in Figure 7 below.

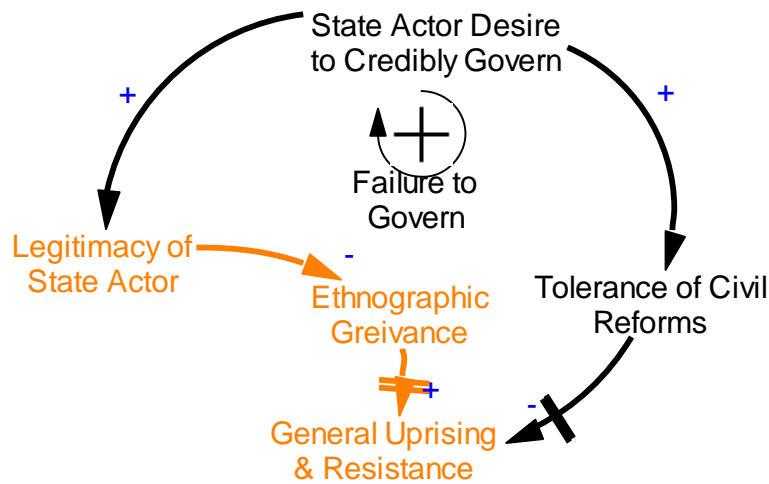



Figure 7. Conditions for Civil Conflict

If the State still refuses participation in civil reforms, the General Uprising & Resistance will likely manifest at the extremes as Military Actions of which Clandestine Terrorism will be the first.   This is the Clandestine Terrorist Network stage where the first two positive feedback loops emerge as shown in Figure 8.

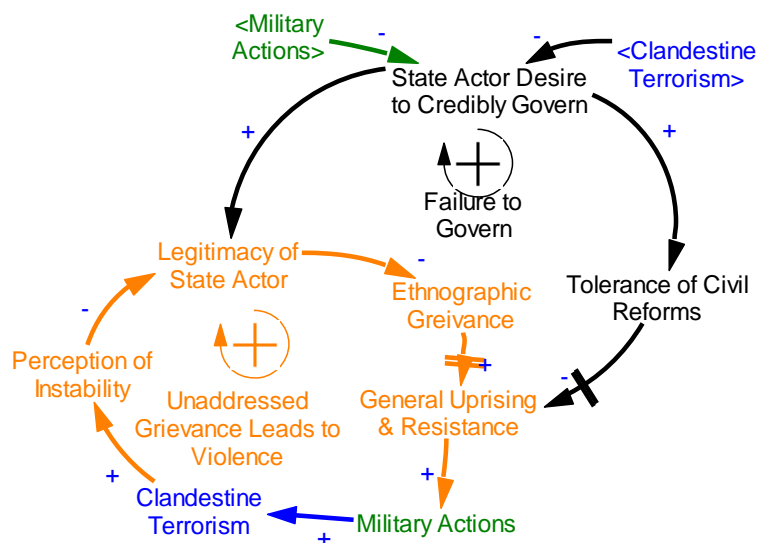



Figure 8. Clandestine Terror Stage of Unconventional Conflict

In this stage the extremists use clandestine terrorism to target the population or the government. This increases a perception of instability within the targeted population that weakens the legitimacy of government who is perceived as being unable to control the violence. Simultaneously, the State Actor desire to credibly govern the targeted ethnographic group often declines in response to the violence of terrorism and other military actions.   This cycle can exist for a great deal of time and never evolve past this stage.   But if it does it is because the Military Actions performed by extremists within the General Uprising & Resistance begin to focus on recruiting into organized formal groups. These groups begin to exert a shadow-influence on the population – gaining support from some and intimidating others. Criminal activities often are employed to gain finances

which fund further military actions. This is when a clandestine terror stage morphs into an insurgency stage of conflict.

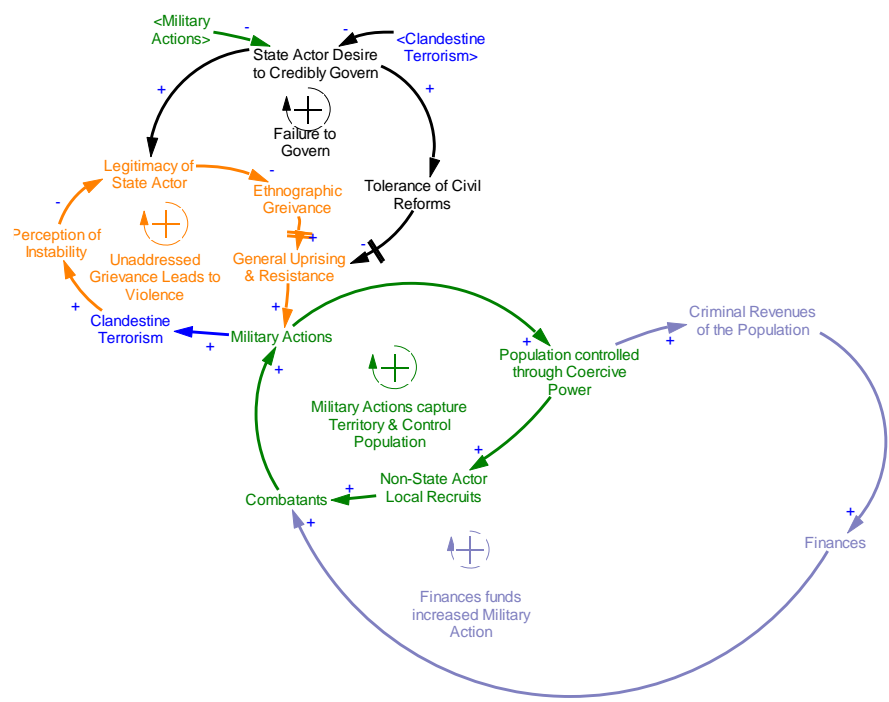



Figure 9. Insurgency Stage of Conflict

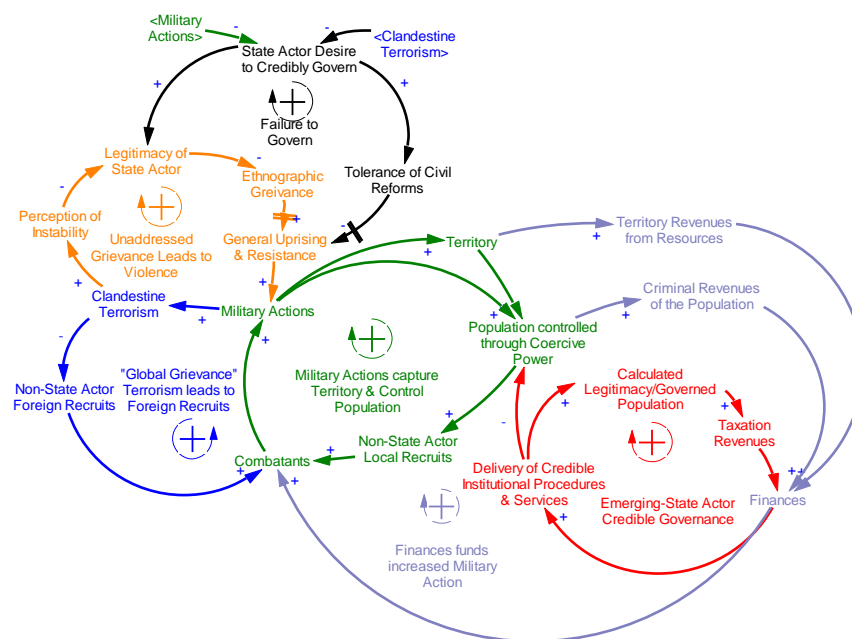
The logic of an insurgent is to leverage the local legitimate grievances of an ethnographic group and leverage that into finances and manpower to conduct violence against the state. This adds two more positive feedback loops to the existing. As local grievances increase, so do militants, and if local grievances were to decrease, militants and their actions would also decrease. This is illustrative of the importance of resolving local grievances, through political reform and changing the desire of the State to credibly govern, as a sustained approach to ending an insurgency over time.[3, pp. 6-7 location 173-199] These could be criminal activities targeting populations that are not aligned with the insurgents such as ransoms, extortion, reselling of stolen property, looting, and selling of blood-antiquities (stolen historical artifacts). Criminal activities also include activities which are illegal globally but may be tolerated locally such as the illegal drug trade.   Finally, criminal revenues include informal taxation schemas that bear more resemblance to extortion than a formal state levied tax. These funds increase non-state actor insurgent's finances, allowing them to support and pay more Combatants. Logically, a sustained reduction in local grievances through reconciliation, ability to gain finances, or reduction of combatants through military action all hold the potential to reduce the reinforcing feedback effect that powers the classic non-state actor insurgent, especially when applied in combination. The means of these reductions are accessible both to the State and to a lesser degree the local ethnography.

The first difference with the emerging state actor CLD is the input of non-local grievances that bring foreign recruits to an area. These militants may be aligned to the local grievances at first, but a reduction in local grievances will not result in a reduction of foreign intervention since those grievances are non-local. The second difference is that military actions in this model are designed not only to terrify or intimidate populations, but also to seize territory. This territory then enables an additional feedback loop of "territorial revenues" from land-intensive resources to be activated. Control of territory allows a non-state actor to control the resource extractions that occur in that territory. These territorial revenues require coordination of workers and leveraging infrastructure, and they are difficult to secure when an insurgency operates in a classical clandestine manner. In

Afghanistan the Taliban took advantage of opium farming, while in Nigeria Boko Haram helps fund itself through oil while in Columbia the Revolutionary Armed Forces of Columbia (FARC) exploited the production of cocaine. For ISIS, the territorial revenue is oil located in the territories they seize. These additional financial inputs produced from lucrative, fungible, globalized trade charge the reinforcing feedback loop that runs through finances to obtain more militants, conduct more military actions and thus gain more territory.

Seizing territory opens another powerful feedback loop of enabling non-state actors to begin governing the population. This creates the processes by which coercive power shift to calculated legitimacy and legitimate governing power. Populations controlled through legitimacy are less resource intensive to control, since the population "self-controls" and also allows taxation of normal commerce and individuals. The shift to Legitimacy also feeds back on itself. The more people governed through Legitimacy, the easier finances are collected through taxation, which fund local governance mechanisms. These local governance mechanisms can provide the services that only a sovereign state actor can provide: law enforcement, judicial proceedings, building infrastructure, social services, and other government services that may have been lacking in the area.

When we add these aspect to our existing CLD structure, three loops emerge: seizure of territory, control of population through legitimacy, and foreign recruiting by playing on global grievances. The larger CLD is depicted in Figure 10.

Figure 10. CLD of an Emerging-State Actor

The emerging state actor theory to this point can be summarized as:

1.   A failure of governance by the state-actor and inability to tolerate civil reforms decreases legitimacy, increases grievance and leads to general uprising and resistance.

2.   This resistance manifests first in the form of clandestine terrorism which increases the perception of instability, further decreasing the legitimacy of the state. Likewise, violent acts reduce incentives of the State Actor to credibly govern the ethnographic group from within which these actions emerge.

3.   Local grievances bring militants and a non-state actor either emerges or is drawn into conflict.

4.   The non-state actor uses militants and finances to conduct military actions.

5.   As the non-state actor gains controlled population begins extracting coercive revenues through criminal activities and recruiting locally from within the controlled population.

6.   Within its territory, the non-state actor attempts to monopolize the use of force, taxation, control of movement, and regulation of the economy. By operating in a sovereign manner, the non-state actor shifts to an emerging state actor.

7.   Coercive revenues & territorial revenues are used to finance governing mechanisms which can begin building legitimacy to shift the controlled population into a governed population.

8.   As the emerging-state actor gains a governed population, it also gains taxation revenue and increases its draw of non-local foreign recruits by propagandizing its non-local grievances, which may or may not align to local grievances.

9.   The loops complete into a positive feedback loop of exponential growth. More militants mean more military actions, which means more territory and access to controlled populations, which can begin to be governed, fueling finances, which fund more militants and military actions.

The shift from a classic non-state actor insurgency to an emerging-state actor, in this sequence, begins at step 6 and completes in step 7. This can be described in another way. For a non-state actor to become an emerging-state actor it must at some point:

A.   Control territory to the exclusion of all other state actors.

B.   Seek to govern that territory in an open manner to build legitimacy.

In the case of ISIS's predecessor AQI, the group was able to reach step 5 and partially step 6. Even though AQI certainly influenced a population and extracted criminal revenues from them, AQI was never able to meet the two criteria above to complete the transition from insurgency to emerging-state actor. In this formulation, an emerging-state actor is self perpetuating, a foregone conclusion once militants enter the system. To complete the CLD in Figure 11, balancing loops are added representative of various limits to growth.

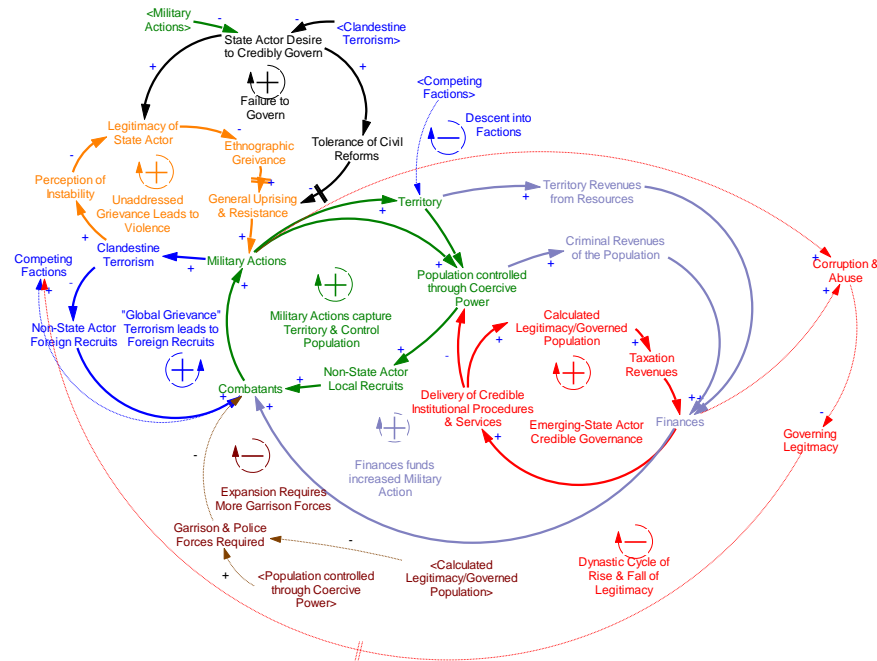



Figure 11. Emerging-State Actor with Balancing Loops

These are endogenous limits on the emerging-state actor which even absent external pressure, can and will engage to slow down or reverse the growth over time. The "Expansion Requires More Garrison Forces" loop activates as an emerging-state actor controls more population – requiring more forces to garrison than population to prevent uprisings against their rule. This reduces the number of combatants available to gain more territory. Furthermore, the force ratios for garrisoning a population controlled through coercive power are higher, ranging from 8:1 to as high as 55:1 than the ratios necessary to police a population, ~2.8:1, governed through legitimacy. This loop can also act in the same way the "Failure to Govern" loop does for the State Actor, starting a general uprising against the emerging-state actor. Another negative feedback loop in the emerging-state actor theory is "Descent into Factions." ISIS owes its existence to the activation of this loop within Al-Queda as a previous incarnation split from the global terrorist network in 2013. A third negative feedback loop, the "Dynastic Cycle" loop begins with the corruption and abuse of arbitrary power available to a state, similar to Katouzian's theory of arbitrary state and society.[15, p. 7] These abuses erode governing by legitimacy, feeding both the Uprising & Resistance loop and the Descent into Factions loop.   However, Descent into Factions and the Dynastic Cycle loops have significant delay functions and therefore may develop well after an emerging-state actor has established itself. As modeled by Langarudi, the Katouzian dynastic cycle can take decades to manifest.[15, pp. 10–16] The Afghanistan Taliban, as an emerging-state actor, maintained its governing legitimacy despite widespread abuses until the post-9/11 U.S. invasion in 2001. The attached E-SAM has all these balancing loops modeled numerically so the conditions for their activation can be examined.

The emerging-state actor theory can help explain not only the rise of ISIS in 2013, but the collapse of AQI forces in 2006–2007. The inability of AQI to establish institutions and processes with which to govern legitimately meant it relied only on coercive and often abusive power. This activated the "Expansion Requires More Garrison Forces" negative feedback loop from local fighters. Beginning in the Anbar Awakening of 2006 that was followed soon thereafter with an U.S. troop surge AQI faced local-opposition fighters. AQI as a classical insurgent could not sustain itself in that environment, perhaps a lesson learned by its members and carried forward into the new incarnation of ISIS.

7. Hypothesis that ISIS is an Emerging State Actor

Based on the previous theoretical development, I propose the following dynamic hypothesis: the Islamic State (ISIS) is an emerging-state actor, which uses methods of irregular warfare to capture territory to influence populations ("coercive power"), which it then attempts to govern in furtherance of its objective to become a functioning state ("legitimate power"). I recognize that although the term for this category might be new in this application, the behavior and model is not, as other actors, such as the Taliban in Afghanistan and Hezbollah in Lebanon have taken this route as indicated by the segmentation.

To test the hypothesis, I created a simulation model of sufficient detail to test the propositions of the emerging-state actor theory and the hypothesis that ISIS is an emerging-state actor. The model is created in two sections: a strategic architecture of both the state government named the "Green Actor" and ISIS, named the "Red Actor." The strategic architecture identifies the resources and capabilities that determine performance at any point in time. The second section is a World Model within which these two Actors compete against one another over control of a variety of ethnographic groups and with varying degrees of foreign intervention. This strategy-dynamics approach to modeling recognizes that these resources accumulate or deplete driven by flow-rates and the changes in the resource.[16] Sub-systems representing the constants, parameters, information flow, and leadership decisions, behaviors and side-choosing of ethnographic groups, as well as the influence of other resource levels, all combine to affect the rates of change. Reinforcing and balancing feedback interactions between these resources can be used to explain the dynamics of strategic performance. This aggregate strategic architecture is depicted in Figure 12.

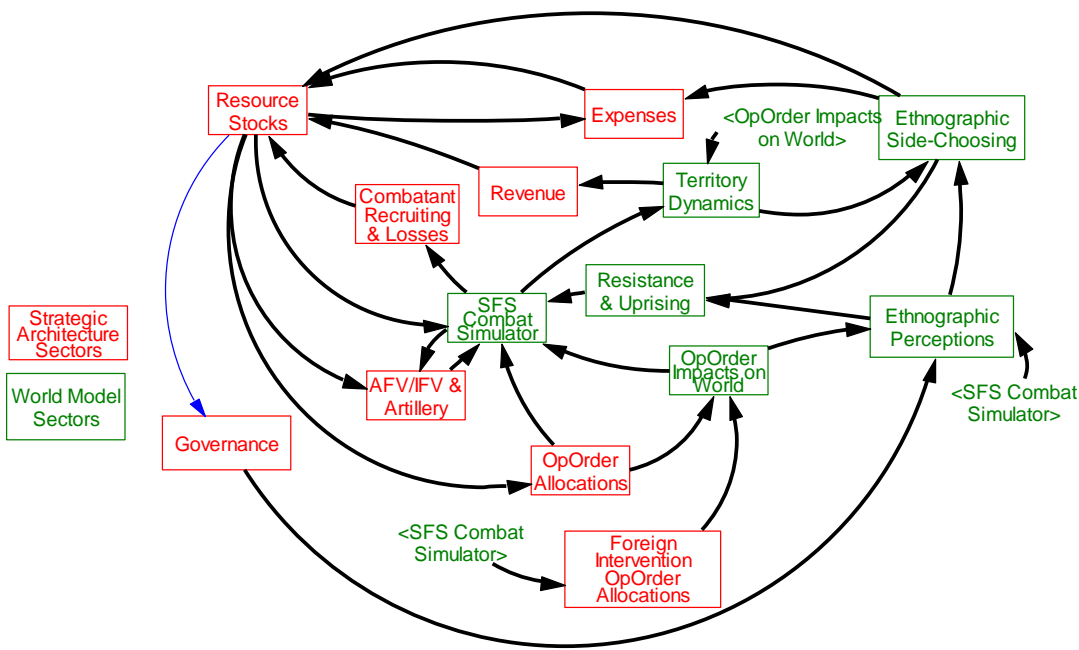



Figure 12. ISIS Strategic Architecture

The strategic architecture represents the resources, capabilities, and skills of each the Green and Red Actor.   The world model defines the "environment" within which subsystems interact with local conditions (where recruits and resources are located relative to what is controlled), competitors (who will resist expansion and what means are used), and even internal dynamics (how effectively revenue and expenses are managed) interact with the subsystems.

Two baseline scenarios were run in the simulation. Both seek to replicate the conditions in Syria and Iraq beginning in 2010, the grievances of the Arab Suuni's that led to the rise and expansion of ISIS. The Baseline Historical scenario then includes the significant foreign interventions that

occurred beginning in 2014. The Baseline without Intervention takes a counter-factual that this intervention never occurred and projects what might have occurred with ISIS absent foreign involvement. When simulated in this fashion the Baseline Historical replicates sufficiently, though not exactly, the rise of ISIS through stages of clandestine terrorism, insurgency and emerging-state actor. It also charts the decline and collapse of ISIS under pressure of multiple foreign intervention and increasing coordinated activities against it on multiple fronts.   This is behavior is charted in three primary measures-of-effectiveness of the Red Actor: Territory Controlled, Total Combatants, and Population in Figure 13.

(a)   (b)   (c)

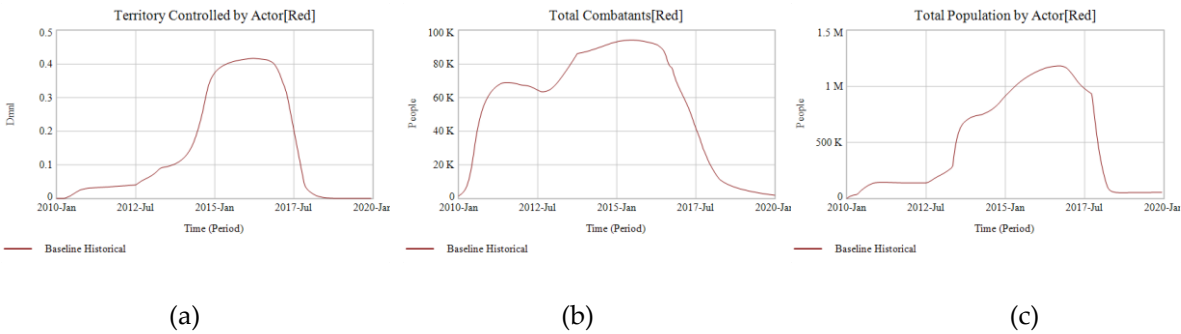



Figure 13. Primary Measures of Effectiveness

(a)   (b)   (c)

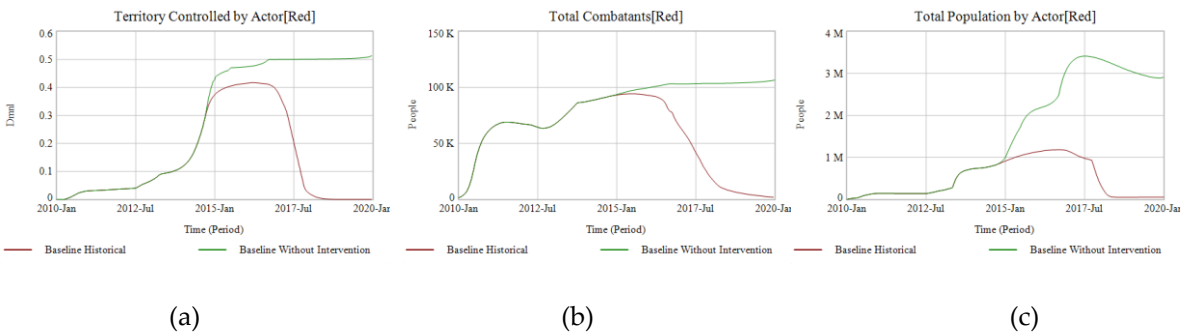



Figure 14. Comparison of Baseline Historical & Baseline without Intervention

The Baseline Historical simulation successfully replicates the behavior mode on which the dynamic hypothesis is based as well as the early growth and resilience of ISIS.   The Baseline without Intervention demonstrates that the model can produce substantially different behaviors. In Figure 15 below a "Dashboard of Performance" is created comparing results from both scenarios across a wide variety of measures.

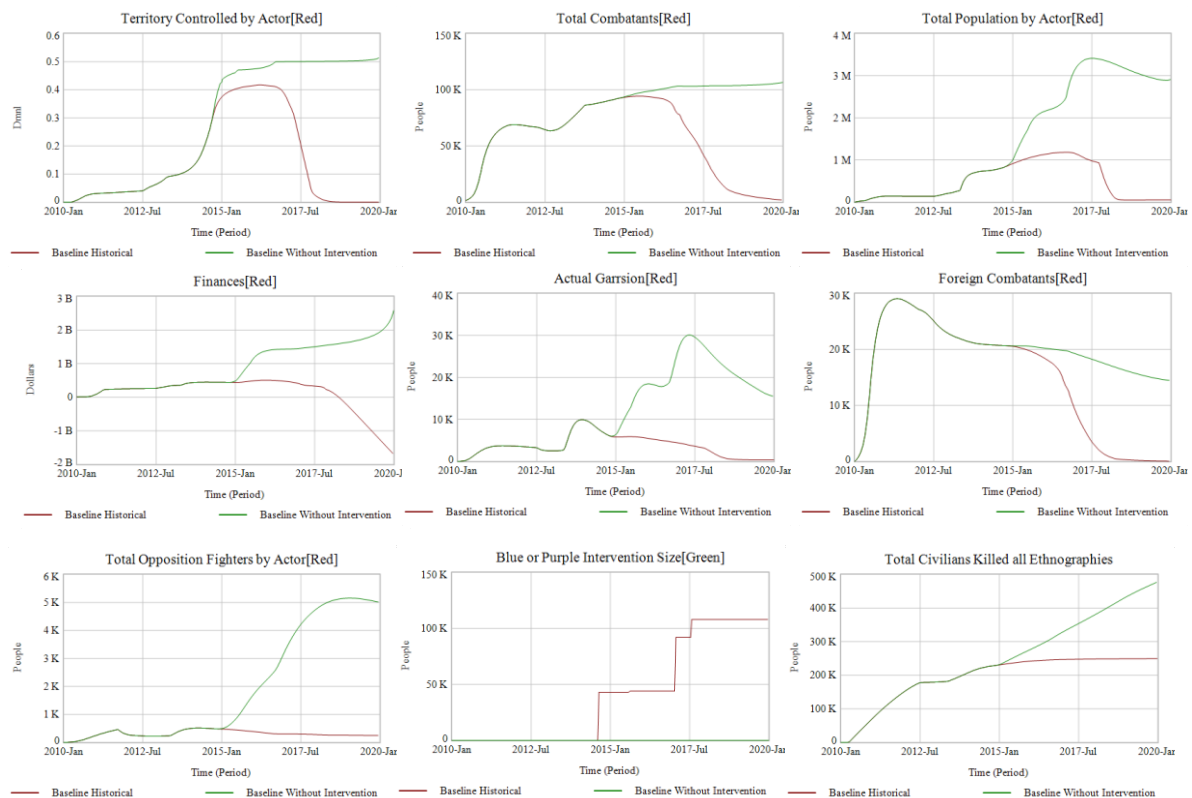



Figure 15. Dashboard of Performance Both Scenarios

In the Baseline Historical ISIS (Red Actor) is defeated from a combination of measures. The growth of its population requires an increasing amount of Garrison troops just as foreign intervention begins increasing and fewer Foreign Combatants are arriving. In the Baseline without Intervention ISIS reaches an "outer envelope" of expansion at about ~60% of available territory. This limit is caused by three key factors. First the Green Actor opposition to ISIS becomes heaviest as they reach the strongly defended cities of Aleppo, Baghdad, Kirkuk etc. Second, the territories on which ISIS must fight to gain that next incremental amount of territory consists of densely packed urban areas that are not as favorable to its style of fighting. Third, the ethnographic makeup of the population in the territory being taken shifts away from ISIS's favor, reducing their ability to recruit local militants. What was once a 9:1 ratio of local to foreign militants drops to almost 1:1. This activates the Resistance & Uprising limit to growth negative loop identified in the CLD. Even though by converting the populations they have controlled to being governed over time, reducing the rate at which opposition fighters accumulate, the aggregate external and internal threats mean "just staying still" for ISIS isn't sufficient. The emerging-state actor must continue recruiting locally and from abroad to hold onto what they have. ISIS has reached its limit to growth – at least for the remainder of the simulation duration.

8. Experimentation to Test the Hypothesis

Having formed a logical construct of the hypothesis and its simulated baseline, it is worth returning to the proposed dynamic hypothesis: the Islamic State (ISIS) is an emerging-state actor which is using methods of irregular warfare to capture territory in order to influence populations ("coercive power") which it then attempts to govern in furtherance of its objective to become a functioning state ("legitimate power"). This hypothesis can be tested against the simulation model. Six propositions emerge from the dynamic hypothesis. Propositions 1-5 are formulated as experiments where a simulation is run ceteris paribus with the only change being the stated formulation change to the subject proposition. Significantly worse experimental performance from baseline indicates potential validity of the proposition within the boundaries of the model, eg. without this element

ISIS would've performed much worse. Proposition 6 is an experiment comparing a classical insurgency performance against the baseline of ISIS. Where appropriate a limited range of contingencies are tested to identify the boundaries of this validity, such as the value of the underlying resource or the time the transition to legitimacy may take. The list of experiments and formulation changes is described in Table 2.

Propositions Tested as Experiments	Change Summary	Command Script Formulation
Experiment 1: ISIS must take and control territory.	Remove ability to gain territory because of combat.	Set "FLOT Movement" in Command Script to 0
Experiment 2a: The territory must have valuable resources. 2b: Black market price of oil is $22/bbl 2c: Black market price of oil drops to $11/bbl.	Sever link to oil production from captured territory or adjust price per bbl.	2a: Set command script "Territory Conditions Price per Resource Unit" from $45/bbl to $0/bbl. 2b: Set command script "Price per Barrel of Oil" from $45/bbl to $22/bbl 2c: Set command script "Price per Barrel of Oil" from $45/bbl to $11/bbl
Experiment 3: The transition from coercively controlled to legitimately governed population cannot be too slow.	Increase Normal Time to Transition by 200%, 300% and 400%.	Desire to Credibly Govern[Red]=1 is changed to: 3a = .75 & Armed Civil Affairs [Red] reduced to 75% 3b = .5 & Armed Civil Affairs[Red] reduced to 50% 3c = .25 & Armed Civil Affairs[Red] reduced to 25% 3d= 0 & Armed Civil Affairs[Red] reduced to 0%
Experiment 4: Local grievances are required for local recruiting.	Disable local recruiting only.	Set "Local Recruiting Actions"[Red] to 0 across all ethnographies.
Experiment 5: Foreign recruits are required.	Disable foreign recruiting in the model.	Set command script "Actual Recruits per Suicide Attack"[Red] to 0.

| Experiment 6: A "classical" insurgency is modeled with no transition to governance or seizing of territory. significant foreign recruiting. | Combine Experiments 1 & 3D. | Set "FLOT Movement" in Command Script to 0 Desire to Credibly Govern[Red]=1 is changed to: 3d= 0 & Armed Civil Affairs[Red] reduced to 0% |

Table 2. Proposition & Experiments

These tests are made both against the Baseline Historical and Baseline without Intervention. The results of these tests and final values against four measures compared to the two baseline scenarios are summarized in Table 3.   The evidence for Experiment 1 & 2a indicates that an emerging-state actor must take both territory and have some valuable resource upon that territory to fund expansion beyond ~20,000 Total Combatants, the upper size of most insurgencies. However, the contingency tests of 2b & 2c indicate that the resource need not be all that valuable relative to the expenses of maintaining the emerging-state actor. ISIS still grows just as strongly when black market oil sells for $22bbl and $11bbl respectively vs. $45bbl. The reason why is the path-dependency of the positive feedback loops identified in emerging-state actor systems above in Figure 11. Once ISIS has reached a tipping point of sufficient population in either Calculated Legitimacy or Governed, the territorial based resource revenues become less important as they can rely on population-based taxation.

Scenario	Experiment	% Territory MAX	Total Pop[Red] MAX	Total Combatants [Red] MAX	% Territory Controlled at End [Red]	Total Population by Actor at End [Red]	Total Combatants at End [Red]
Historical	Baseline Historical	47%	1.993M	177k	0%	55k	24,390
Historical	EXP1	0	35k	23k	0%	25k	30
Historical	EXP2A	5%	220k	23k	3%	33k	4
Historical	EXP2B	41%	1.18M	94k	0%	53k	1,719
Historical	EXP2C	39%	1.10M	91k	0%	52k	3,520
Historical	EXP3A	26%	850K	79k	0%	16k	130

Historical	EXP3B	18%	681k	71k	0%	14k	102
Historical	EXP3C	17%	1.10M	60k	0%	27k	100
Historical	EXP3D	13%	614k	68k	0%	-	75
Historical	EXP4	14%	824k	60k	0%	12k	89
Historical	EXP5	2%	101k	1.6k	0%	3k	-
Historical	EXP6	0%	35k	22k	0%	30k	435

Table 3. Proposition Test Results

Experiments 3a–3d confirms that using government services and credible institutional procedures is important to maximize growth. But as with territorial resources, there are contingencies. When ISIS is willing to credibly govern at 75% or even 50% they perform reasonably well in terms of maximum expansion and combatants. However, at below 50% desire to credibly govern ISIS's performance significantly drops. Part of the reason they still have so many Combatants at max is that their territorial expansion is so limited – they have not provoked a major response from Iraq or Syria. Like an insurgency in a remote region that the government leaves alone for the most part. Experiments 4 & 5 confirm that both local recruiting and foreign recruiting are essential. Although it may not be surprising that local recruiting is essential, the significant difference foreign recruiting makes in comparing Proposition 5 performance to the Baseline is noteworthy.

The final experiment, simulating a "classical insurgency" (EXP6 Historical) removes two key elements of emerging-state theory, the seizure of territory and open governance. It then compares ISIS-as-an-insurgency versus ISIS as emerging-state actor (Baseline Historical) in Figure 16.

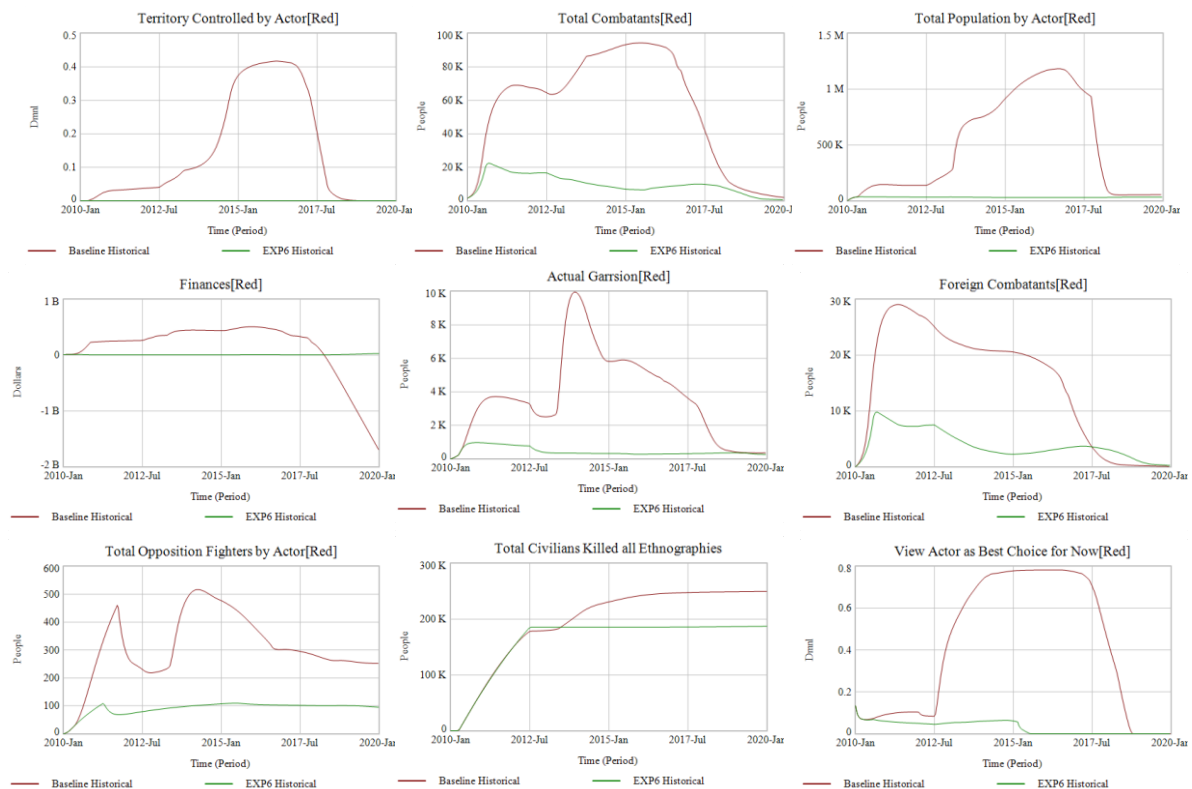



Figure 16. Dashboard Performance of Emerging-State Actor (Baseline) vs. Classical Insurgency (EXP6)

In both simulations ISIS begins gaining combatants quickly but ISIS as an insurgency-quickly stalls out and begins a general decline. As it never seizes territory the "insurgency" does not present an obvious target for military offensives as the emerging-state actor ISIS does.   It still contains a great deal of lethal capacity as seen in the Total Civilians Killed all Ethnographies, but the key chart is in the bottom right – which charts the Calculated Legitimacy an Actor presents to ethnographies. Whereas ISIS acting in the fashion of an emerging-actor can generate this form of strategic side-choosing at least among Sunni Arabs, ISIS as an insurgency never gains even this limited form of legitimacy from the population. The insurgency ISIS dwindles away to end up in similar straits as the emerging-state actor version, but never having obtained the massive success and ability to create a worldwide brand. It is possible that AQI suffered a scenario such as this in 2006 when it rapidly gained coercive control of a population of nearly one million civilians but was unable to openly seize territory in its area of influence nor transition to an open system of governance due to the requirements to remain clandestine due to the presence of US forces. AQI also showed little interest in even a show of providing services. All lessons learned perhaps by its successor ISIS.

Conclusion

In this paper I used the growth and staying power of ISIS in Iraq & Syria even against combined domestic and international militaries to present the theory of an emerging-state actor. Confidence in the theory of an emerging-state actor and its key propositions was gained, though the theory remains unproven, through a limited initial simulation tests conducted in this paper. Calling upon global rather than local grievances the emerging-state actor draws foreign fighters and seizes territory upon which it exercises sovereign control and begins openly governing. The use of governing mechanisms shifts the population from being controlled by coercive power to being governed by legitimacy, freeing up garrison troops to continue expansion and territorial gain. My dynamic hypothesis that prior to its defeat at the hands of a combined multi-national and domestic militaries the Islamic State in Iraq & Syria operated as emerging-state actor using the means of

irregular warfare to usurp existing state-actors to gain control of target populations is shown to be plausible. This dynamic hypothesis is better able to explain ISIS's behavior pattern than traditional insurgency models. This paper also offers a detailed scenario-based simulation model for future use with clandestine terror networks, insurgencies and other emerging-state actors. A full suite of validation and confidence building tests are included in Appendix C on the E-SAM model. These tests revealed that the E-SAM can replicate at least plausible behavior in different regions and contexts (a hypothetical counter-terrorism campaign in Indonesia upon the return of expatriated ISIS fighters home.)   This reduces, but does not eliminate the possibility that the dynamics demonstrated by ISIS are confined to Iraq & Syria.   A larger potential limitation is the significant use of group-behaviors in the simulation by ethnographic groups and leadership of both ISIS and Syria and Iraq. Without substantial data on these qualitative dynamics there may be room for parameter error.

Future work could build upon initial policy analysis for determining intervention and containment policies against ISIS or emerging-state actors.[1] Modeling and simulation of this kind still faces significant methodological challenges of which this model only addresses a few.[9] Future work on emerging-state actor theory could involve significant boundary validation as well as continued confidence building by fully replicating the model under a variety of regional and historical circumstances. This could include additional testing of ISIS as well as other emerging-state actors in different time and regional spaces such as the Taliban in Afghanistan, East India Company in India, the Angles in England etc.

Supplementary Materials: The following are available online at www.mdpi.com/link(tbd) : Appendix A Model Documentation, Appendix B: Discussion of Structure & Parameterization, Appendix C: Validation & Confidence Building Tests, Appendix D: Draft User's Manual for E-SAM.   As well a zip file with the raw model, copies of all scripts, and all results outputs.

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Conflicts of Interest: Timothy Clancy is the founder of a consulting firm that has, and may in the future, receive funds from the Department of Defense or other government agencies on topics related to those covered in this research. However, the DoD had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, and in the decision to publish the results.

Appendix A Model Documentation

This appendix includes an overview of model-structure by sector, the complete equations for the model, command scripts for the <u>Baseline Historical</u>   and <u>Baseline without</u> Intervention scenarios, and all starting model values. It is sufficient to replicate the model 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 the model. 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 the model. 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.

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