State Security Dynamics and the Impact of Intervention to Build Country Capacity

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Abstract

Recent history has shown that the armed forces will encounter significant challenges in its future stability and reconstruction efforts that seek to establish a safe and secure environment in the assisted country. In addition to establishing and maintain security, the military will ensure government stability with democratic practices including fair elections rule of law, and human rights; development of a robust economy; and assist the country in becoming a respected member of the international community. The military has had some success at affecting the social, governance, and economic fabric of a country. However, as recently demonstrated in Afghanistan and Iraq this has come with a significant price tag in terms of human life and investments. Few will deny that the US has struggled to invest our resources during stability and reconstruction operation in an efficient and effective manner. The Department of Defense must learn to better invest its resources before the outbreak of hostilities as well as throughout the spectrum of conflict and post-conflict operations. More importantly, we must better understand when to invest in building host nation capacity. This paper uses systems dynamics to understand how and where these investments affect the long-term legitimacy and capacity of a nation.

Key Words: System dynamics, state security, government capacity, capacity development

Introduction

Since the 1970s, the greatest threats to the national security of the United States (U.S.) have come from both emerging ambitious states and from nations unable or unwilling to meet the basic needs and aspirations of their people. Subsequently, since the end of the Cold War the U.S. and its allies have begun a new stability and reconstruction (S & R) operation every 18 to 24 months. The margin of victory in peace building will be measured in far different terms from the wars of past. Time may be the ultimate arbiter of success: time to bring security to an embattled populace; time to provide for the essential humanitarian needs of the people; time to restore basic public order and a semblance of normalcy to life; and time to rebuild the institutions of government and market economy that provide the foundations for enduring peace and stability. Between forty and sixty nation states, home to nearly 2 billion people, are either sliding backward or have already collapsed and the destructive power at the disposal of these countries and their ability to cause regional and even global instability, more than any time in history the global military and economic leaders need to invest in developing a sustainable global peace. This can only be accomplished one country at a time with huge resource investments.

According to the United Nations (2012):

- 1.5 billion people live in conflict-affected and fragile states,
- About 70% of fragile states have seen conflict since 1989,
- Basic governance transformations may take 20-40 years, and
- 30% of official development assistance is spent in fragile and conflict-affected contexts and these countries are furthest away from achieving the United Nation's Millennium Development Goals (MDGs) of legitimate politics, security, justice economic foundations and revenues and service

In order to address these failed states and make progress towards the MDGs, now is the time to address not so much the "why" but the "what and when" of investing scarce resources. This paper demonstrates the utility in using system dynamics to model government capacity and stability using a hypothetical country in Africa. Tradeoffs in allocating resources to security intervention, partner nation training, infrastructure and capacity development, weapons and technology sales, etc., will be analyzed to understand the effects on security/stability, governance, economic development, and societal issues (e.g. human trafficking, drugs, etc.).

Background

The wars in Iraq and Afghanistan have demonstrated that we must strategically invest in security, development, and governance in a much more deliberate and targeted manner. Simply investing significant resources is not sustainable nor does it works well to address the complex nature of state security. The Department of Defense, in concert with the whole government team, must develop methods, processes, and tools that can look beyond simply investing resources focused on short-term results to address medium- and long-term sustainability results. These methods must address the "what and when" of harmonizing with the national and local context in order to build country capacity.

A new philosophy is emerging in which global powers use their industrial and military capacity to develop strategic partnerships designed for building relationships and host country capacity in lieu of simply selling military equipment. By proactively building capacity of partner countries, we can hope to create and reinforce relationships, supporting mutual goals and interests, improve the quality of life in the partner nation, and perhaps prevent the emergence of non-state actors who should seek to undermine lawful governance. Figure 1 depicts the prototypical resource allocation for a major regional conflict for both a proactive and reactive policy of intervention.

The proactive approach to building capacity involves allocating resources and intervention well before the large-scale crisis or hostilities. Even without early intervention, the military must be able to plan and resource S & R efforts throughout the conflict life cycle shown in Figure 1. Each phase requires a different focus and priority of investment in security, governance, and economic development projects. The complex, dynamic environment our whole government team, partners, and NGOs faces today requires an understanding of the conditions that exist in the partner nation in order to make smart investments in capacity development. The social, governance, and economic implications of these investments within the partner country and the resulting effects can often lead to unforeseen second order effects. Quantitative means are needed for not only prioritizing investments but to understand the short and long-term effects of those investments. Currently, very few quantitative techniques exists in

how to allocate resources in support of building a country's capacity to provide for its populace along with a fundamental understanding of how capacity is affected by economic, security, and governance investment.

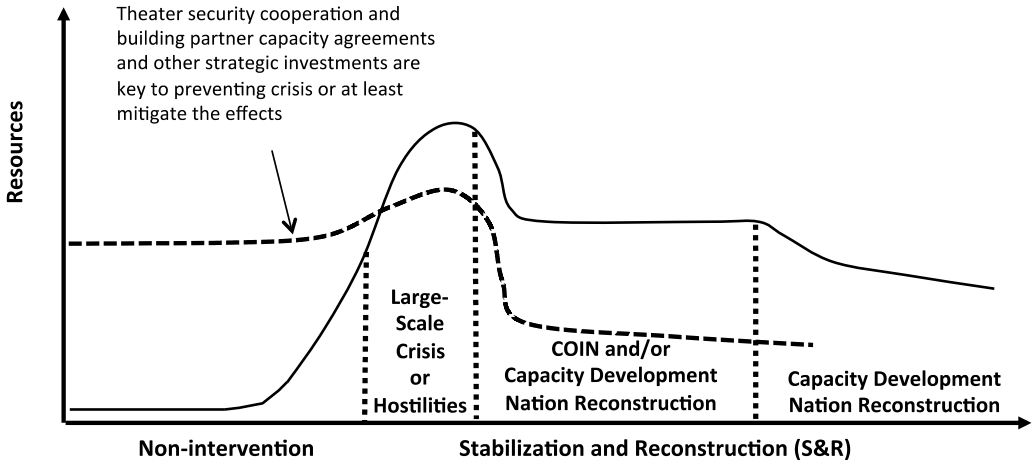

Figure 1: Timeline of a Major Regional Conflict and Resources

Literature Review

One aspect of the literature that is essential to the basis of this paper is the description of S & R and country capacity. Country capacity is the ability of a country and government to perform the functions of providing for the populace, solves problems, and achieves objectives in a sustainable manner. Nelson defines S&R as the process to achieve a locally led and sustainable peace in a dangerous environment (2006). The military role in this process is halting residual violence and ensuring order and security, including those reconstruction efforts required to repair enough damage to enable restoration of the most essential services. Additionally, the Department of Defense (DoD) defines building partner capacity (BPC) as "targeted efforts to improve the collective capabilities and performance of the DoD and its partners" (2006). A major component of BPC is security force assistance (SFA). The DoD defines SFA as department activities that contribute to unified action by the U.S. government to support the development of the capacity and capability of foreign security forces and their supporting institutions (2010). The DoD builds partner capacity by training and equipping the partner nation's military and improving their quality of life through infrastructure improvements, education, and equipping the civilian workforce. Governments train their militaries to fight and win their nation's wars; however, in modern conflicts to include S&R, non-military capacity building actions have become as important as any kinetic weapon system.

System dynamics (SD) provides an excellent tool for analyzing the complex interdependencies and feedback evident in nation reconstruction and capacity development that creates the dynamic behavior of the system. This should lead to more defensible and transparent government policies and investments. SD explains the behavior of systems over time as a direct result of the system structure and aims to adjust individuals' mental models of the system to implement policies to improve system performance. Forrester described the potential for SD as

an approach that should help in the important high-level management problems (1961). He noted that solutions to small problems will only yield small results and that people get mediocre results by setting improvement goals too low. He suggests that the change must be at the enterprise level to achieve major improvement and that the goal should be to determine policies that lead to greater success (Forrester, 1961).

Dynamics are the behavior of a system over time, which are generally complex and non-linear in nature (Forrester, 1961). This complexity comes from feedback within the system, time delays between decisions and effects, and the learning process of the system (Sterman, 2000). Causal loops diagrams (CLD) are a key element of the system dynamics approach which are signed diagrams that represent the reinforcing or balancing feedback within a system. Causal loops are different from discrete, event-oriented perspective of individual causes and effects in that they acknowledge that in a closed system any cause is an effect and any effect is a cause (Richardson, 1991). One is able to describe the behavior of the system by talking through the loop to tell the story of the interactions within the system (Meadows, Jorgen and Meadows, 2004).

As previously discussed, the purpose of this research is to demonstrate the utility of SD as an analytical tool for this class of complex systems problems. Scholars have extensively used SD to address military problems and components of government capacity. Robbins developed an SD model focused mainly on combat operations (2005). Additionally, several authors have used SD to examine at certain components of a government. For example, Sterman presents a SD model of gross domestic product (GDP) (2000). Another paper deals with the role of water in the Manas Basis in Africa (Shanshan, Lanhai, and Honggang, 2009). Crane used mainly a Likert scale ratings for Democratic Republic of the Congo along with some open source data to develop a conceptual SD model (2009). He used a set of what he termed Nation Building Elements that consisted of security, humanitarian relief, economic stabilization, and governance.

System Dynamics Model

The military typically focuses on those activities that are consistent with its mission – mainly security cooperation. However, the problems today's military faces are much more complex in nature and require a broader way of thinking about the problem. Kilcullen describes an insurgency as a complex system that needs energy, in the form of acts of violence and grievances against the government, to sustain itself through several feedback structures (2004). The SD model presented represents those activities needed for a country to meet the needs of its populace and the feedback observed in this complex system. The model accounts for and simulates the energy required to ignite and fuel an insurgency as mentioned by Kilcullen. In some situations, such as the presence of significant counterinsurgency operations, the military would be heavily involved in restoring stability to a country. However, in general, the whole government team and members of the international community are essential for accomplishing non-security related activities that aim to build a country's capacity before it falls into an insurgency. Although the model does not specify which agency is responsible for building capacity in the various areas, it demonstrates the benefits associated with improving a country's capacity in the security and non-security related areas.

The overall objective of BPC efforts is to increase the capacity of a country to a point in which it can sustain itself. This prevents the security situation and government legitimacy from

degrading to a point where the country spirals downward into a state of chaos. Figure 2 presents a CLD of government capacity that includes the country's education level, medical capacity, security situation, infrastructure, and economic capabilities. The CLD represents the feedback between these individual elements and the population of the nation, which creates the dynamic behavior observed. Additionally, each of these individual system views of a government's capacity contains their own internal feedback structures that generate specific behaviors. By combining the behavior at the individual system level, the SD model is able to capture the behavior of the complex system over time.

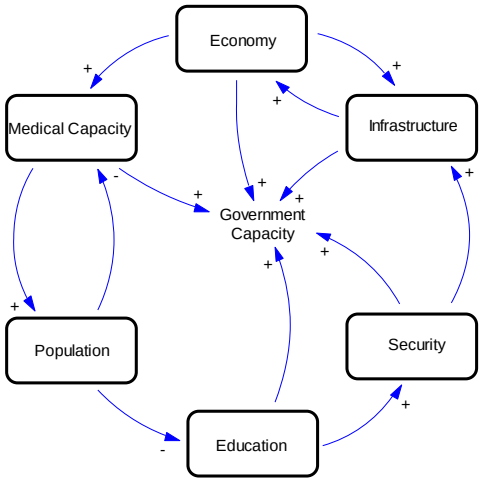

Figure 2: Macro Causal Loop Diagram of Government Capacity

The model includes structure for each of these sub-systems; however, this paper will present only an examination of one of the system level models demonstrates the structure seen in several of the systems. Figure 3 presents the system view of the medical capacity portion of the SD model. This view shows how the population system interacts with the medical capacity as the total population of the country has a positive relationship to the desired medical capacity.

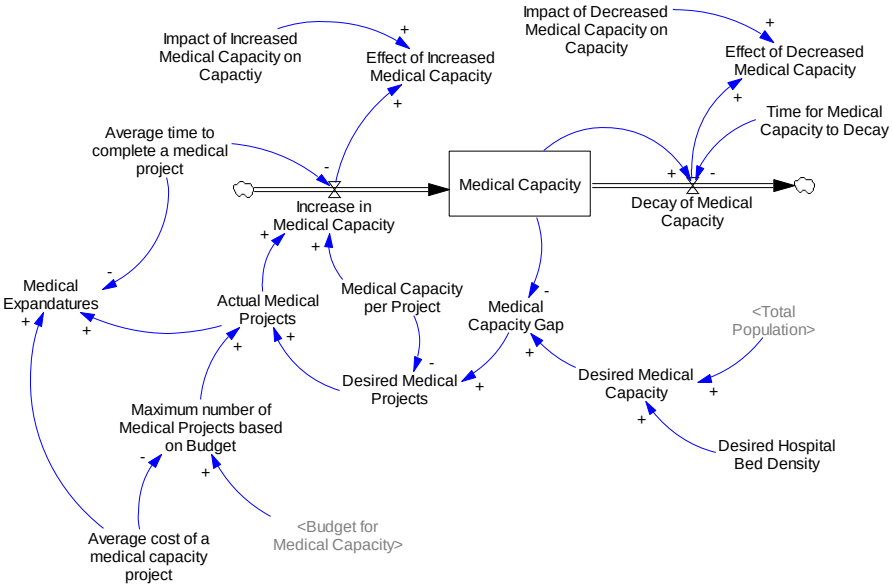

Figure 3: Medical Capacity Sub-System Structure

The model utilizes an average medical bed density of ten developed countries as the "Desired Hospital Bed Density" for the goal of the system to achieve (Central Intelligence Agency, 2012). Based on this desired medical capacity, the model calculates a gap and determines the number of projects to complete to fill this gap. However, the reconstruction budget allocated for medical capacity constrains the total number of medical projects, thus limiting the increase in medical capacity. Additionally, the model accounts for the delay in construction time with a simple first order material delay before the government realizes an increase in capacity from increased medical capacity. Through the use of auxiliary variables, any increase or decrease in the medical capacity has a similar effect on the overall capacity of the government.

This paper does not present the education or infrastructure model; however, the model utilizes a similar structure for these systems with a desired capacity for each based on an average value from several developed countries. For the education sub-model, the model measures the impact a country's literacy rate has on government capacity. For the infrastructure contribution to capacity, if further decomposed this factor into electrical grid, improved water, and improved sanitation.

Figure 4 presents the economic system structure that includes the nation's expenditures on infrastructure, medical, security, and education. Sterman provides a basic model of gross domestic product (GDP), the proxy measurement for the nation's economy, which demonstrates how a nation's GDP will adjust to the aggregate demand for its goods and services (2000). For this application, the model expands on his base model by endoginizing, or making internal, the variable of government expenditures by linking other system level model into the economy model. These government expenditures come from money spent on increasing the medical, security, education, and infrastructure capacity of the system. As a government spends resources on increasing the capacity of one of these sub-systems, it creates jobs, purchases goods, and increases production, thereby increasing the GDP and improving their overall stability.

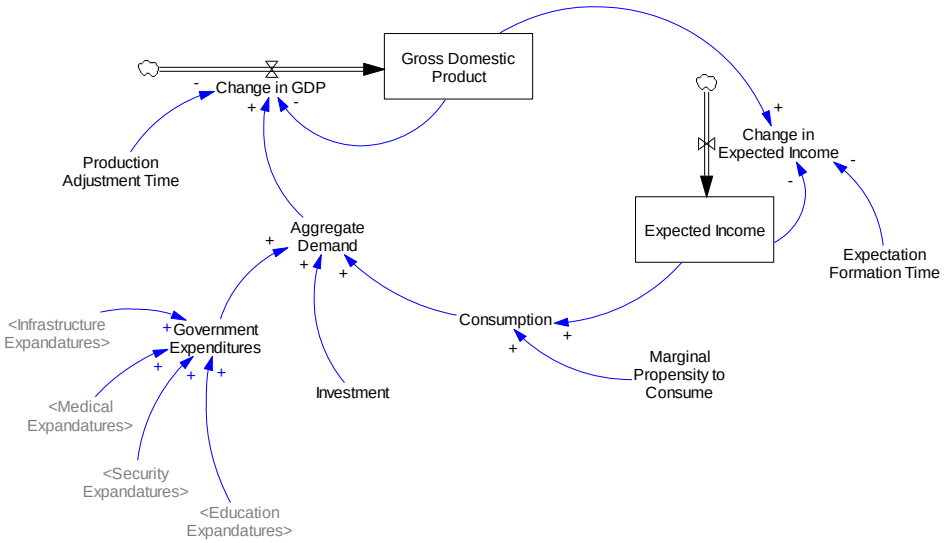

Figure 4: Economic Sub-System Structure (Sterman, 2000)

A major component of government capacity is the security component and the ability for security forces to maintain the peace within a country. Choucri, et al built a model of state

security that included the movement from the pro-government population to dissidents to insurgents that had the potential to be removed by security force (2006). Their model provided the basis for the structure of the security view of this system of system model of a nation's capacity.

Figure 5 presents the stock and flow diagram of the security system that shows how the military aged population can become dissident based upon opposition recruitment. Additionally, some fraction of the dissident population will become insurgents. The model accounts for both the host nation security forces and external security forces. As the number of insurgents increases in the model, the acts of violence subsequently increase to a point that it triggers intervention from an external nation to help with security and reconstruction. Additionally, the model incorporates the decision to deploy additional forces as the acts of violence continue to rise. This decision rule is consistent with deployments to Iraq and Afghanistan, where an initial number of soldiers deployed and then the U.S. increased the number of soldiers deployed as the violence in these nations increased. The model also incorporates the blowback from insurgent removal activities as it increases the effect of the opposition's recruitment message and builds increased support for the opposition. This portion of the model links to government capacity and the budget for security forces and uses portions of the population model as well.

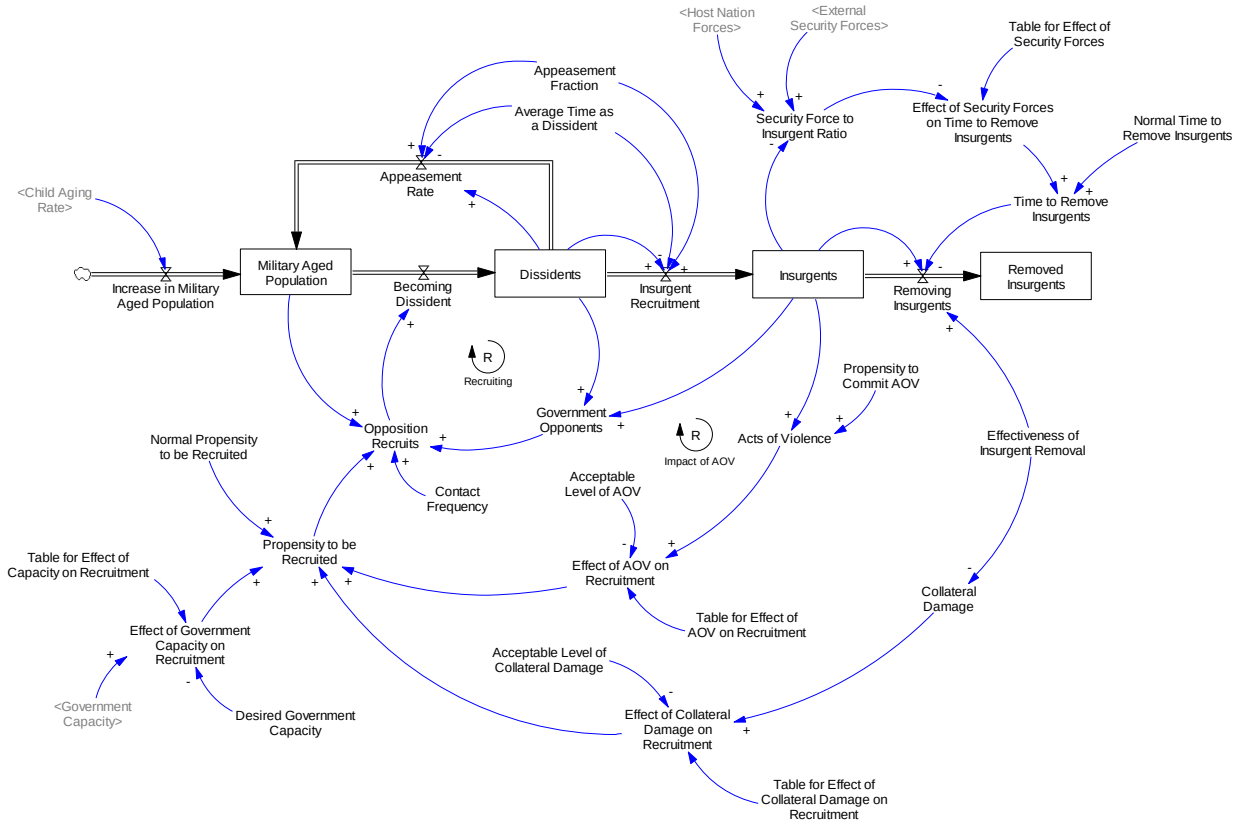

Figure 5: Security Sub-System Structure (adapted from Chourci et al, 2006)

Figure 6 presents the final system view for the model and includes the population of the country divided into three stocks of individuals: children, adult population (15 years), and elderly (65 years). The structure is a simple aging chain between the different stocks with additional outflows for migration and deaths. The Central Intelligence Agency (CIA) World Factbook

provides data for each of these populations, fractional birth rates, infant motility rates, life expectancy, death rates, and migration rates, so the model can match any country's initial conditions (2011). Again, to endogenizes these variables, the country's medical capacity will have a direct impact on several of these variables and can be quantified in the mathematical relations within the model.

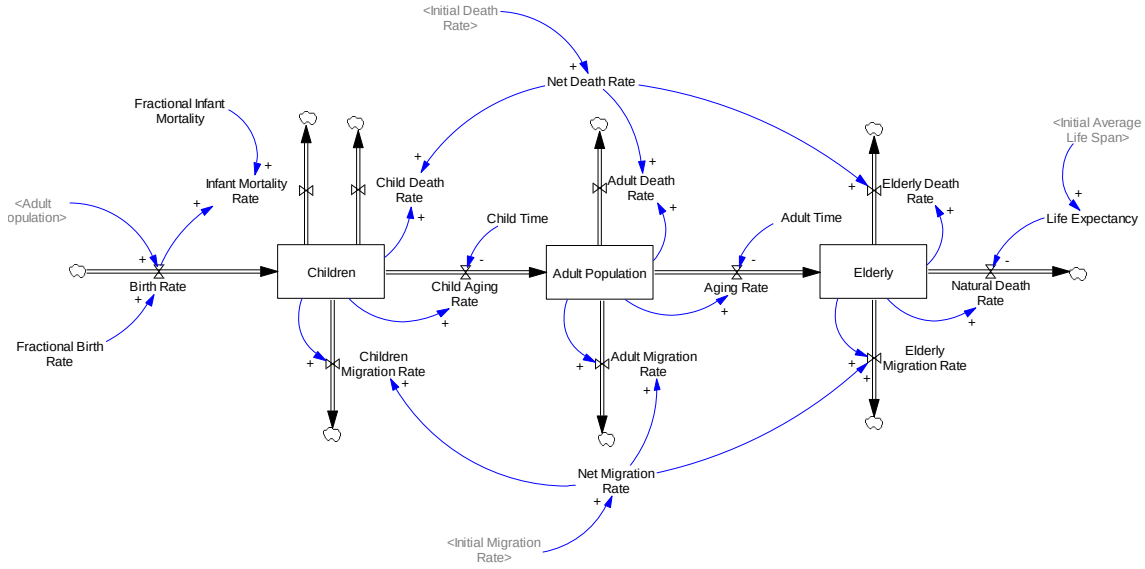

Figure 6: Population Sub-System Structure

Potential Policy Recommendations

The power of SD models comes in their ability to model system's behavior over time and the ability to compare different policy recommendations. This model utilizes data from the Central Intelligence Agency World Factbook for a typical sub Sahara country as a base case to determine if the model will generate observed historic behavior as government capacity decreases and sends the country into a state of chaos. As a country's security level decreases to a certain point, the model triggers intervention on the part of a security force nation in the form of soldiers and money, which is the traditional method of intervention. The model will output the amount of capital invested by the country over time and determines a total amount of capital invested by the security force nation. Additionally, the model can also simulate the behavior over time for a nation's capacity and security if a developed nation adopts a preemptive intervention strategy in the form of building partner capacity. A comparison of these two policies shows the advantages, both economic and social, of adopting a preemptive partner building policy.

Figure 7 presents the structure of the external security forces sub-system of the model. In this sub-system, acts of violence and the insurgency drive the need for external security forces. Initially, events trigger the deployment of an external security force to the host nation. As the security situation deteriorates, the model triggers the deployment of additional soldiers to address the security concerns in the host nation. As the security situation improves, forces re-deploy based on an average deployment length without replacements. This structure enables the simulation of both the reactive policy, described above, and the proactive policy. In the proactive policy, a small security and capacity building force deploy to the host nation to assist

with security and capacity development. In the model, a switch for a partnership force activates this policy to evaluate the behavior over time of the proactive policy.

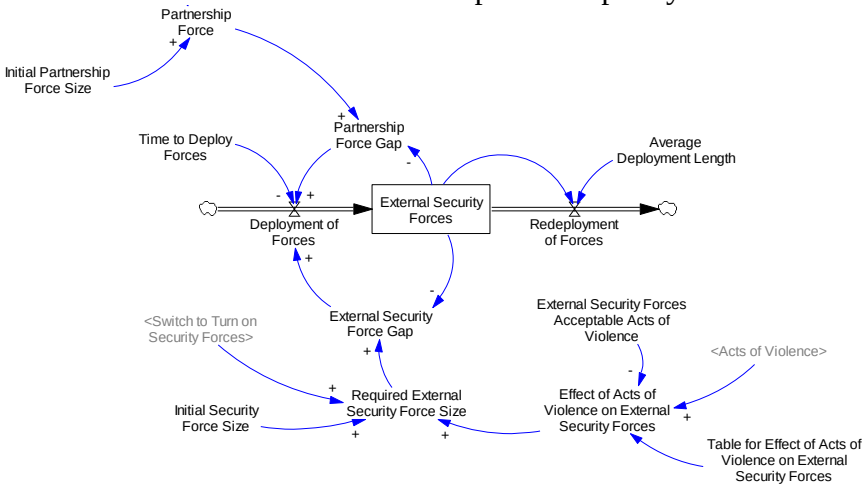

Figure 7: Structure of Security Force Sub-System

The major output of the model is the variable of government capacity, which is a weighted measure of the country's ability to provide for its people. It is a combination of the medical, education, infrastructure, security, and economic capacities of a country. Figure 8 presents the output of the model for the variable government capacity in both the reactive policy and the proactive policy. As shown, the proactive policy initially underperforms the reactive policy; however, eventually it overtakes the reactive policy, as the nation is able to sustain itself. Additionally, the external security forces are able to accomplish this with significantly fewer resources, both troops and financially.

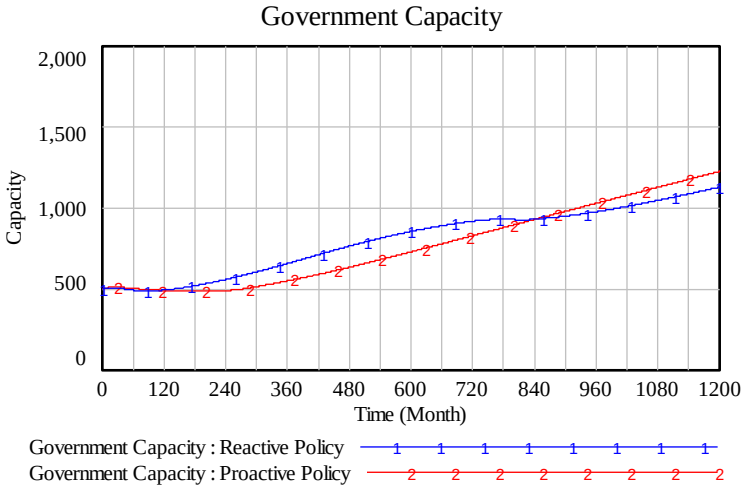

Figure 8: Government Capacity

From the security view of the model, the number of insurgents and the number of external security forces provide valuable insights into the overall capacity of the government. The number of insurgents indicates the nation's ability to conduct counterinsurgency operations and maintain a stable environment to grow their country. Figure 9 presents the output of the

model and includes both the proactive policy of becoming partners with the host nation and a reactive policy of deploying security forces after a crisis arises in the country. As shown, the level of insurgents in a proactive policy is drastically lower than the reactive policy. This is due to the improved training of host nation security forces when partner forces deploy to a country to assist in building capacity. Figure 10 shows the level of security forces that a partner country deploys in both policies. In a reactive policy, the security forces deploy as the result of a crisis in the country and deploy additional forces to combat the high level of insurgents in the nation. This is similar to the "surge" observed in Operation Iraqi Freedom. However, in the proactive policy, a constant force of 5,000 soldiers from the partner nation is able to training host nation security forces with a much smaller number of soldiers.

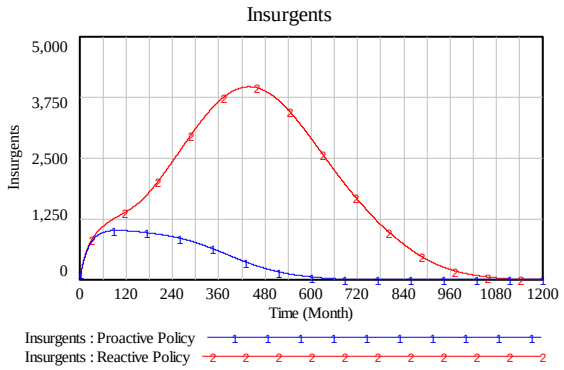

Figure 9: Model Output – Insurgents

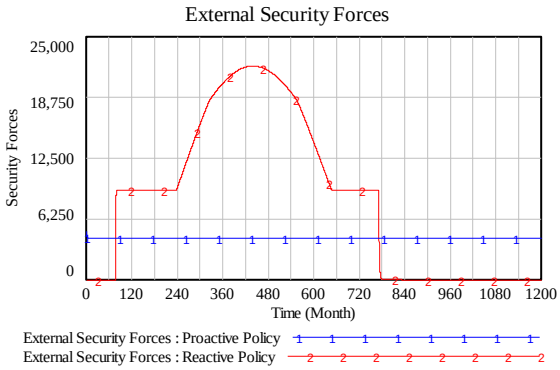

Figure 10: Model Output - External Security Forces

The output of the budget portion of the model presents the monthly investment by security forces in the host nation and determines the total of all investments. Figure 11 presents the monthly investment by security forces in the host nation. Although the output of the model does not exactly match the theoretical resources over time presented earlier, the behavior is generally the same.

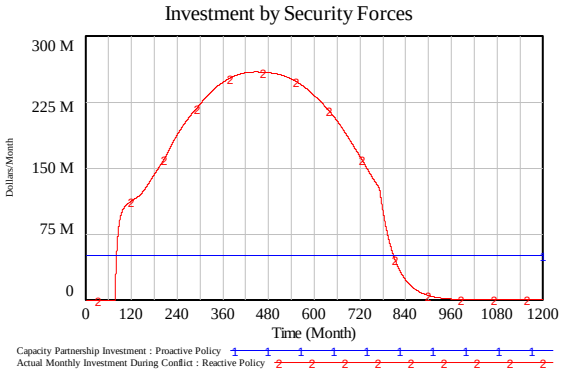

Figure 11: Model Output - Investment by Security Forces

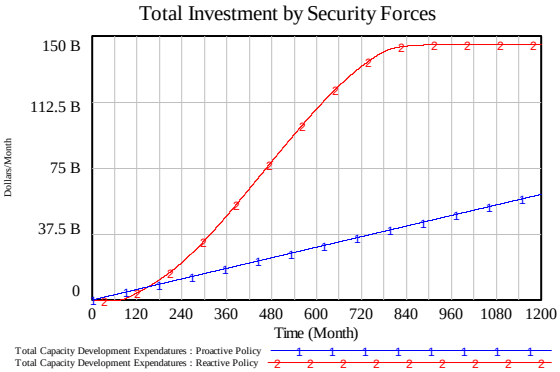

Figure 12: Model Output - Total Investment by Security Forces

In a reactive policy, the partner nation rapidly increases investment in the country in reaction to a crisis and over time is able to slowly decrease its investment as the host nation's capacity is increased. For the proactive policy, a constant investment over the simulation demonstrates the requirements for a partnership to maintain the host nation's capacity. Figure 12

presents the total investment by security forces in the host nation. As shown, the proactive policy demonstrates significant savings over the reactive policy.

Although the model functions without errors and provides an output, it is not calibrated to historical data for use as a predictive model for future policies. The output appears to align with theoretical projections of investment of resources and security force levels; however, more work can be done to refine the model. Additionally, the model contains several assumptions that would need to be validated in order to provide a more accurate prediction of the behavior over time.

Conclusion

The model presented in this paper is a general representation of the behavior of S & R activities for a generic nation state. As designed, the model can adapt to simulate conditions for a specific scenario/country and then be base lined against historical data. System dynamics provides a mythology to understanding resource allocation, secondary effects, priorities for developing government capacity and maintaining security for emerging countries. However, a more detailed model is the only way to validate the interdependencies and complexities of state security. Given that many of these S & R activities involve billions of dollars, a quantitative tool is needed to better understand how strategic investments can best be utilized. This research shows promise in that SD modeling could provide a tool to prioritize and eventually optimize strategic investments alternatives that maximize the ability of a country to care and provide for its people.

The structure of the model facilitates extension of the model to any developing country based on some minor calibration to the model. The model uses inputs mainly from the Central Intelligence Agency, which are readily available for any country in the world (CIA, 2012). With these inputs alone, the model could replicate observed patterns of behavior in any country. Additionally, the use of additional data for other countries may provide an opportunity to better calibrate the model. Ideally, the model this paper presents could simulate the behavior of a government's capacity with minor modification to the initial variables. However, it is unlikely that the exact conditions exist in multiple counties of interest, so the model may not apply to all countries. The true replication opportunity exists in the ability to apply the techniques and methodology this paper presents. Although a model of the country may slightly differ from that of the model presented, the idea of combining several measurable metrics; security, medical capacity, economy, and infrastructure, into a measure of a government's capacity is widely applicable. However, several basic research questions warrant further discussion to include:

1) How would the models differ be for a developed versus non-developed country?
2) Are the elements of country capacity presented the main drivers of behavior?
3) What is the right level of resolution for a nation state model?

Research into the challenges of verification and validation, resolution, data, accurately capturing independences and synergies, second and third order relationships is starting to emerge. Unfortunately, complexity is evolving as fast, or faster than our ability to study and model state security with several states, including several in the Middle East or Northern Africa, falling into conflict during this research. Correct tools and methodologies, applied to these

problems, will provide the only meaningful analysis into the wicked problems of society and state security. As researchers attack these types of problems, gaps in modeling ability and analyze will emerge, thus paving the way for relevant research.

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