A System Dynamics Perspective on Insurgency as a Business Enterprise

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Abstract

A system dynamics model is developed to describe how insurgency groups pursue funding for their operations and the choices they make in how they allocate these funds to maintain their operations and advance their causes. The model illustrates that the insurgent groups, under survival pressure, will seek necessary resources to continue their operations by any means necessary regardless of ideology or higher goals. This self-preservation hypothesis is predicated on evidence-based counter-insurgency research. The model focuses on four primary activities of the insurgency: force maintenance, public relations, commission of violent acts, and community outreach. The model shows how decisions to re-allocate resources among these four activities, affects the overall financial well-being of the insurgency. Indeed, the model can be used to determine the pressure points of an insurgency which may provide insight in how to financially damage such an organization.

Introduction

The idea of using a system dynamics approach to modeling insurgency and conflict situations has been around for some time. The early work of Ruloff (1975) provided some of the basis of using computer simulation for the dynamics of conflict between nations. The work of Coyle (1985) represents some of the earliest work using an SD approach though only at the causal loop level. More recent work contains full SD models such as Anderson (2006) who presents an SD model for the Anglo-Irish War of 1916-1921 as a case study of insurgency management. The paper represents an important effort in verification and validation of an SD model for an actual case study of an insurgency. The paper by Grynkewich (2006) develops an SD model for the financial operations and organizational behavior of the Salafist Group for Preaching and Combat. The paper by Choucri et al (2007) uses SD to model and nation-state stability. They represent the nature and dynamics of the 'loads' generated by insurgency activities, on the one hand, and the core features of state resilience and its 'capacity' to withstand these 'loads', on the other. The model by Richmond (2009) also takes an SD approach to the counter-terrorism problem. Other approaches besides SD include agent-based modeling, game theory, and finite state

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machines. Two examples of agent-based modeling in the social science realm include the Senturion model (NDU, 2006), and the seminal paper by Epstein (2002). The former is a commercial product for political prediction. The latter describes the procedure for using agent-based computation in modeling civil violence.

As previously stated, an important early paper on counter-insurgency modeling using system dynamics is Coyle (1985). The importance of this paper is that it is one of the first works that shows how to take a systems approach to the problem of counter-insurgency strategies. The importance of Counter Insurgency Warfare is briefly reviewed, and the rigorous approach is applied to produce a diagrammatic model of the influences at work between Government and Insurgents. The paper describes a causal loop diagram identifying the basic feedback loops involved in an insurgency situation. Coyle's contribution is the formal identification of the feedback loops (causes and effects) that dynamically influence the way in which insurgencies and host nation governments interact. Further, Coyle shows how the host nation government can use security to improve its ability to contain the insurgency.

Another important paper is that of Fearon and Laitin (2002). They argue that the factors that explain which countries have been at risk for civil war are not their ethnic or religious affiliations but rather the conditions that favor insurgency which include poverty, which marks financially and bureaucratically weak states and also favors rebel recruitment, political instability, rough terrain, and large populations. The thesis by Cornwell (2005) builds on Fearon and Laitin's work by using statistical tools to show which variables hold predictive power with regards to conditions favoring an insurgency. They show that democratization achieves this predictive power when conditions of GDP per capita and population are held to a certain low level.

The paper by Merari (1993) specifically examines terrorism as a strategy for insurgency. The author concludes that terrorism is adopted by insurgents as a matter of circumstances, not by choice. Terrorism is in fact the easiest form of insurgency, and thus it is almost always employed by insurgents. This paper provides some of the fuel for the Insurgency model developed here since it suggests that an insurgency is an organization motivated by survival and self-perpetuation, and thus terrorist acts are a means of self-preservation.

The Community Simulation Model (CSM) by Cleland (2000) was an important system dynamics economic model based on Forrester's Urban Dynamics model in the early 1970s. This work captures basic economic dynamics with the security issue. More generic work on terrorism was examined in the work of Sageman (2008) which describes the leaderless Jihad and gives some of the social characteristics of would-be terrorists. Complementary work by Abrahms (2008) points out that many people turn to terrorism for social solidarity (e.g. "band of brothers") and are very similar in characteristics to urban street gangs in the U.S. This underpins some of the theory behind the Insurgency model in this paper. Finally the issue of poverty in insurgency is explored in the report by Azariadis (2004) which is a neoclassical representation of the cycle of poverty. It gives support for the economic representation of grey choices near the poverty line. A recent Rand report (Rand Corporation 2008) evaluates the end game scenarios of many recent terrorist organizations and concludes that military action alone rarely brings about their demise. They conclude that policing and intelligence gathering are likely to be more effective. Saeed (2008)

looks at resource allocation at the political and economic level which serves as a more generic structure for the modeling of insurgency organizations.

There are other techniques in use for modeling of social systems (e.g. rational choice theory, game theory, agent-based modeling, optimization, etc.), but these models are often of limited use in decision support or else they lack the identification of crucial feedback loops in the systems. System Dynamics was chosen to be the initial and primary modeling paradigm because it identifies the stocks and flows that are involved in the main feedback loops of social systems. It is the interaction of these loops with their associated stocks and flows that determine the dynamic behavior of the system. An advantage of this approach is that the models tend to be simple and easy to interpret. They are usually not computationally complex and can run quickly on standard laptops. Further, they allow analysis and design strategies to be applied with nominal effort such as optimization, control, parametric uncertainty, and verification & validation (see Sterman (2000)).

Our basic approach to modeling and decision support using System Dynamics is to develop hypotheses from literature, existing models, talking to the sponsor, experts, and brainstorming. We seek supporting and contradicting theory and data (usually by analogy) to allow us to narrow the hypotheses. For each hypothesis chosen, we draft causal loops and encode the System Dynamics model. We then conduct parametric sensitivity testing and identify the data needs and availability and populate the model with data.

The critical fuel for terrorist and insurgent groups appears to be insufficient acceptance of the host nation government. Defeat of the current groups may be possible with sufficient information superiority and effective measures to separate critical resource suppliers from terrorist and insurgent groups. Without political change, other groups would likely arise.

The above leads to a natural separation of short and long term strategies and their associated effects. Figure 1 illustrates how the key short term desired effect (reduction in violence) and the key long term desired effect (acceptance of the host nation government) play off of each other. It should be noted that acceptance of the host nation government has more to do with the lack of behaviors that undermine the government as opposed to complete acceptance and loyalty to the government (which may be unlikely).

Reduction in violence is a key short-term effect and also critical to government validity as governments need a monopoly on violence

Violence

Government Validity

The key long-term effect is acceptance of the government, or more precisely <u>the lack of behaviors that undermine the government</u>
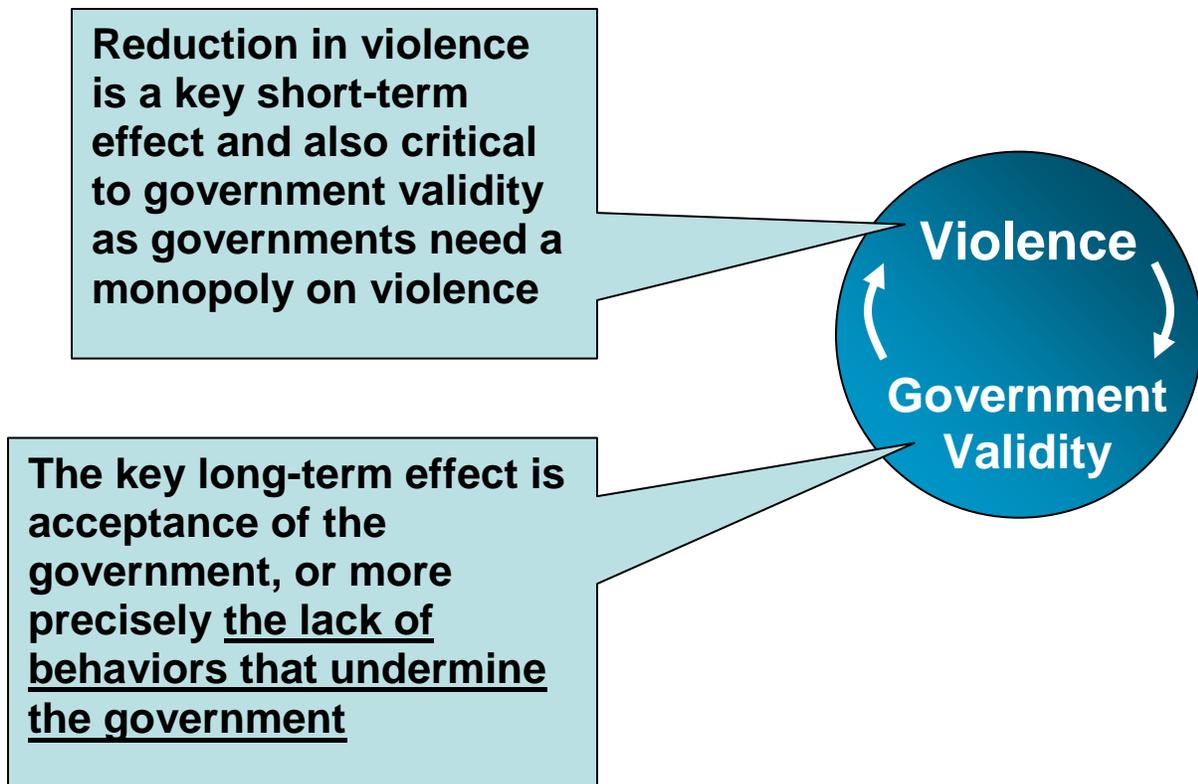
Figure 1. Critical Success Factors – MOEs – Measures of Effectiveness.

Model

The hypotheses behind the Insurgency model developed here is the following: Under survival pressure a group will secure necessary resources in any way possible regardless of ideology or higher goals. The purpose of the model is to help in reducing support for these groups. This is not about reducing their popularity, but rather interrupting the flow of resources. This model is predicated on evidence-based terrorism research. This research focuses on determining the incentive structure of violent extremist organizations and concludes that terrorist organizations resemble "street gangs" more than politically motivated insurgents (though there is an element of both).   See, for instance, Sageman, "Leaderless Jihad: Radicalization in the West", and Abrahms, "What Terrorists Really Want". Groups that extricate wealth from a society or economy without adding economic value are described by an economic theory called "rent-seeking," e.g., Krueger (1974). Figure 2 illustrates the idea. Figure 3 shows a screen shot of the Insurgency as business enterprise model.
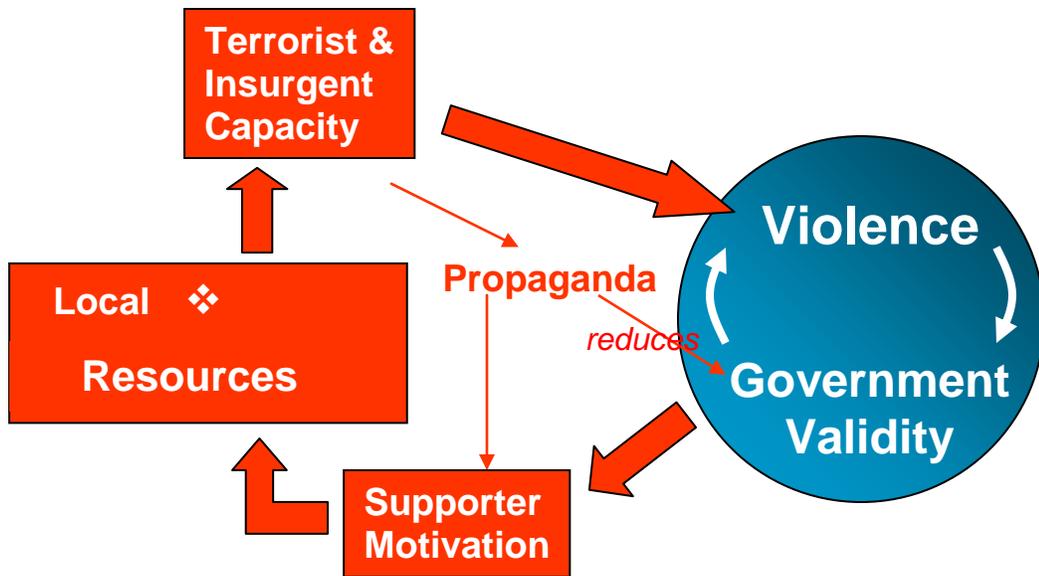
Figure 2. Under survival pressure a group will secure necessary resources in any way possible regardless of ideology or higher goals.
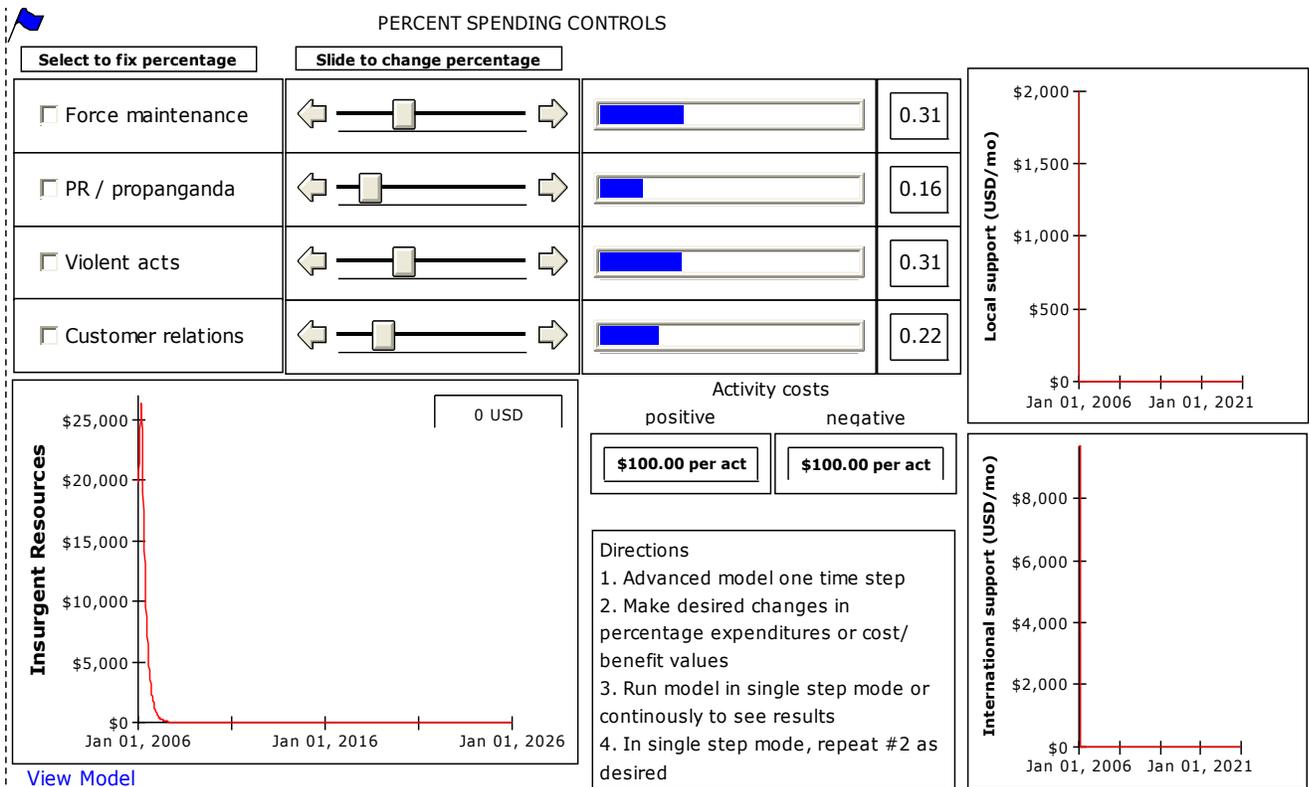
Figure 3. Interface Screen Shot shows how an insurgency can go bankrupt if too reliant on violent acts
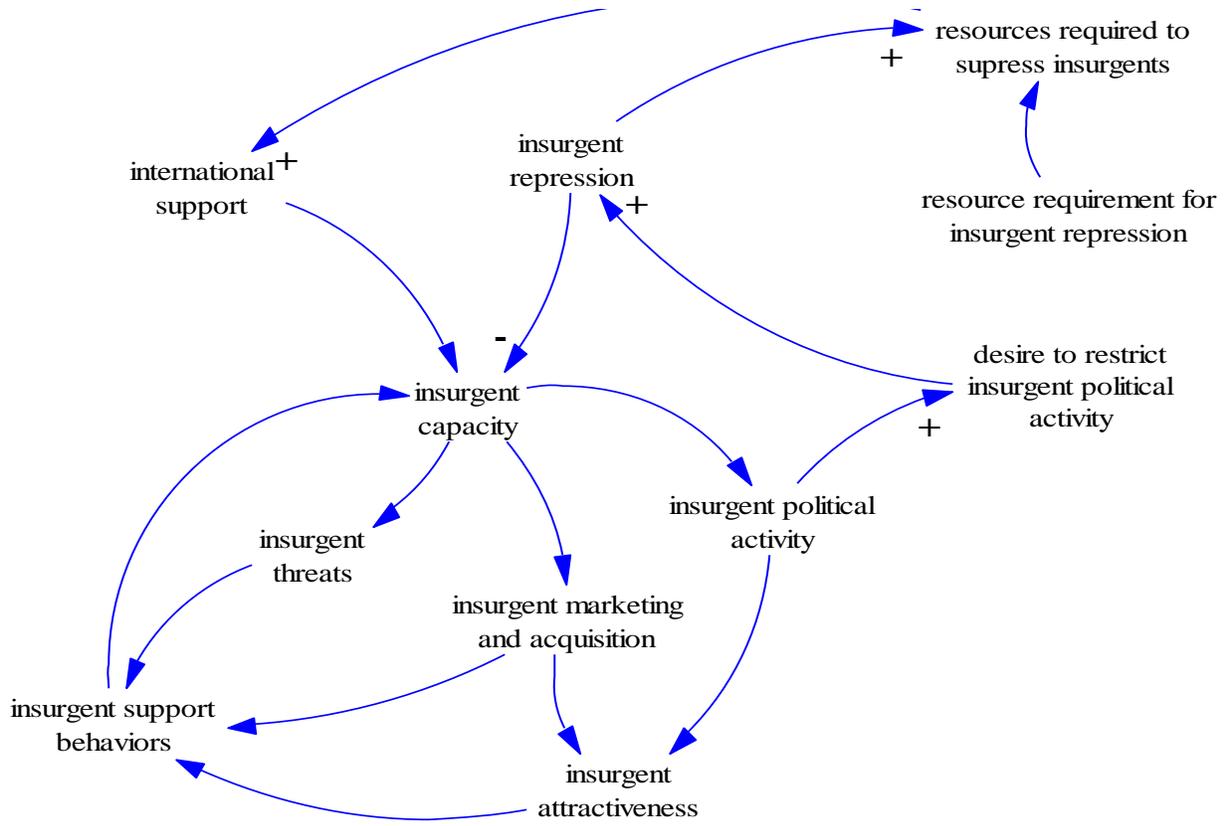
Figure 4. Causal loop diagram of Insurgency model.
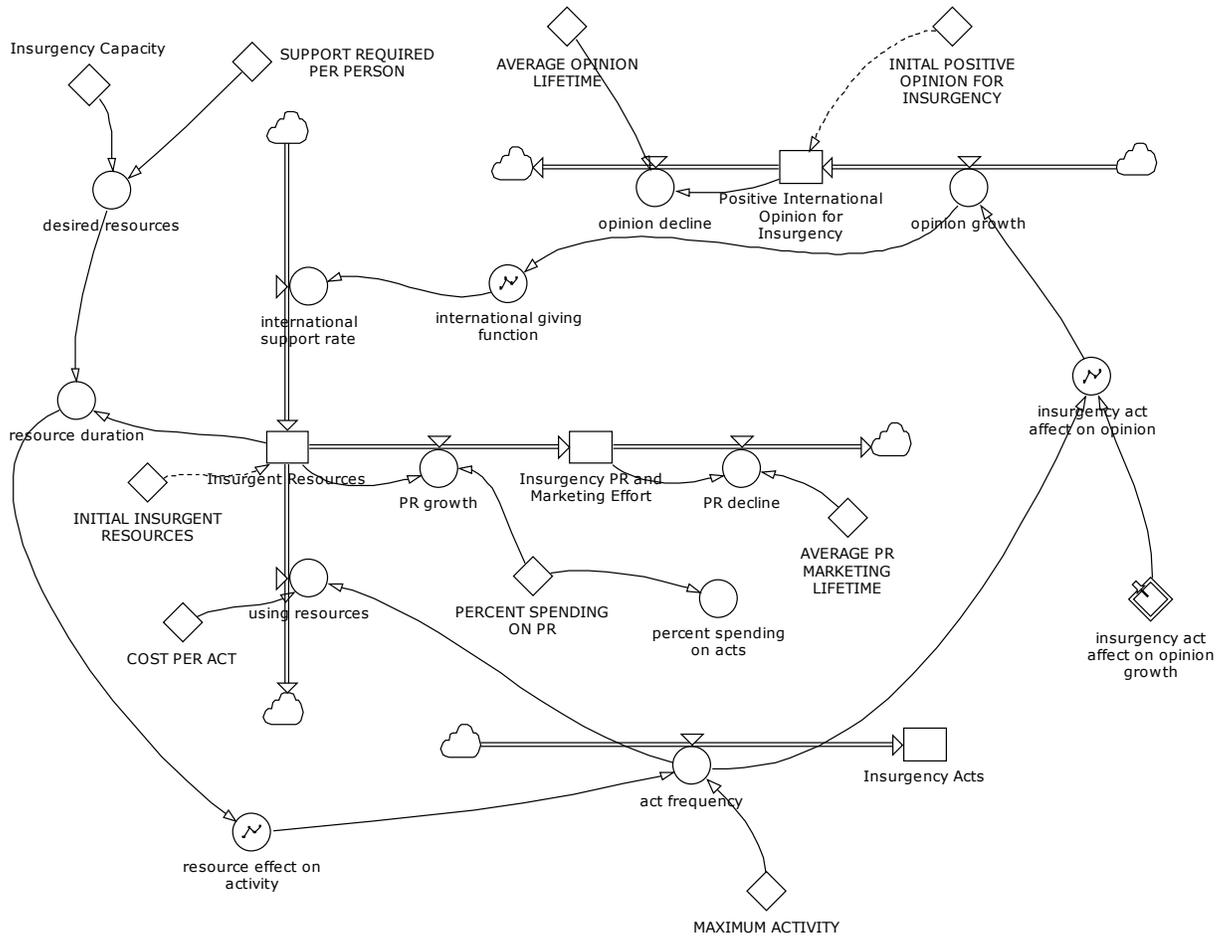
Figure 5. Stock and Flow diagram of Insurgency model.

Figures 4-5 illustrates the SD model with a causal loop diagram and stock & flow diagram, respectively. The model (developed in PowerSim Studio 7) shows basic feedback loops. The first feedback loop shows that positive international opinion for the insurgency leads to increased international financial support for the insurgency which in turns provides funds to carry out violent insurgent activities. This increased activity has an effect on opinion (both positive and negative) which can then lead to further financial support or an erosion thereof. The second feedback loop shows that spending on resources needed to maintain a force is necessary to carry out violent acts which can then influence opinion. Spending on public relations also leads to changes in opinion which can lead to a change in revenue. But spending that does not result in an increase in revenue (if it persists over time), can eventually lead to the organization's financial demise. An example is an over-reliance on violence. In the short run, this may please some of the supporters of the insurgency. But in the long run, it results in a sharp decline in public opinion which will drain the insurgency's resources without replenishment. This behavior has been captured by the model (Figure 3 represents one such case). Currently under development is an inverse model that shows how to induce an insurgency to a desired state. This would consist of an optimization scheme to show how to manipulate the levers of control such that an insurgency is induced to spend its resources on actions (or neglect others) that will ultimately lead to its financial demise. Such an optimization scheme could serve as a decision support tool

in how to undermine an insurgency organization by identifying the means by which they may become bankrupt.

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