Policy Summary:
Using Systems Engineering Tools to Rethink US Policy on North Korea and the War on Terror

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--Part I: North Korea--

Introduction and thesis

North Korea has long been one of the United States' greatest foreign policy challenges. This paper seeks to provide policymakers a new perspective on potential North Korea policy options using a systems engineering framework for the problem. By using a systems engineering approach, policy-makers will be able to expand the number and quality of the mental models surrounding reasoning about US-North Korean relations and to develop a more robust policy which addresses all facets of US interests in the region.

Systems engineering framework and introduction of "policy architectures"

Systems engineering is a "management technology to assist and support policy making, planning, decision making, and associated resources allocation of action deployment" (Sage and Armstrong, p. 8). A dramatic benefit of using a systems engineering approach to policy analysis is that systems engineers have well-developed and robust tools and processes to merge the best qualitative and quantitative methods. Although systems engineering is most frequently used in the design and development of complex physical systems, the methods are relevant for analyzing non-engineering systems as well (see Sage & Armstrong, Maier & Rechtin, Buede). Here, we use this approach to develop a "policy architecture" for North Korea. A policy architecture is an integrated approach to US policy that involves formulating explicit models of the complex system upon which we intervene, as well as models of the instruments of state power used to enable such interventions. A policy architecture can be used to drive analytic and intelligence requirements and to brainstorm the space of possible policy positions vis-à-vis any given system. While it is beyond the scope of this paper to fully explain the notion of a policy architecture, we would contend that policy architectures are always constructed in the minds of policy makers coping with issues, but that they are often constructed only implicitly. Making our policy architectures explicit is a step towards making our policies more consistent with effects-based planning.

The first step in the systems engineering process is to clearly articulate the problem to be addressed. Based on the failure of the 1994 Agreed Framework, current DPRK actions, and US interests, the problem is to develop comprehensive framework for addressing North Korean nuclear proliferation within the context of long-term US strategic objectives for the Far East (Armitage, Perry, CSIS).

Once the problem is defined, systems engineering consists of an array of heuristic tools that are used within an iterative process to solve the defined problem (Maier and Rechtin). To create a robust policy architecture for the DPRK, we recommend the following steps:

Step 1: Identify Stakeholders
Step 2: Define Stakeholder Objectives (Vital Interests)

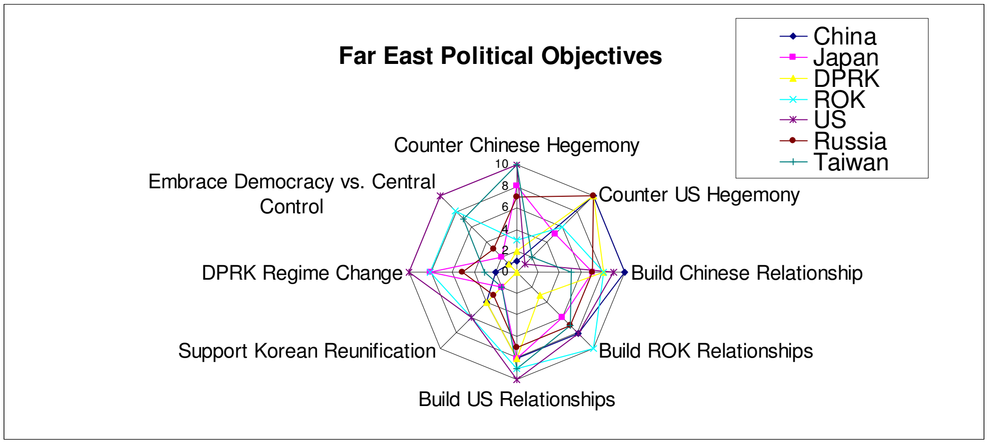
Step 3: Identify Activities to Achieve Objectives
Step 4: Identify Agents Responsible for Activities
Step 5: Define Measures of Performance for Activities
Step 6: Identify System Drivers (endogenous/internal & exogenous/external system variables)

This process provides a rigorous methodology for efficiently identifying the system boundary and the critical system variables. Once the system variables are defined, they can be organized into a system causal matrix structure, which highlights the causal nature between variables (Bartolomei, Management Causal Matrix, 2001.) Next, the mathematical nature of the causal relations can be derived for further quantitative analysis, perhaps by building a high-level system model before "drilling down" using more traditional analytic techniques. Ideally, all six of these steps would be accomplished as a prelude to examining what instruments of state power can be brought to bear on the system so as to achieve US goals. However, given time and space constraints, we limit ourselves here to the identification of the systems stakeholders and analysis of stakeholder objectives.

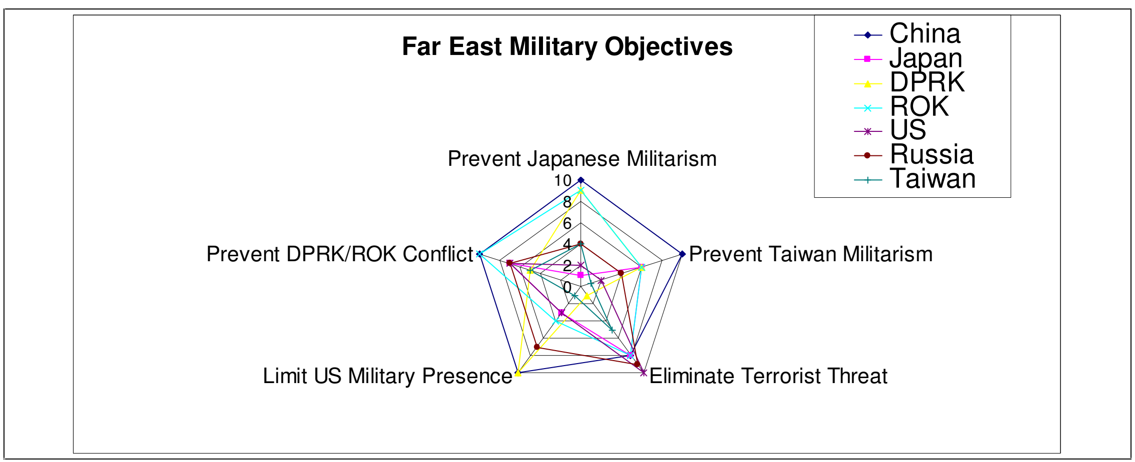
Once the common objectives are identified a vital interest analysis was performed to graphically represent where stakeholders *agreed or disagreed* on particular interests. Spider graphs (also called "radar graphs") were used to highlight these relationships. These graphs provide quick and easy to grasp insights into similarities and differences between stakeholder objectives. The graphs are read by reading outward from the origin on a radial line; the further out the point is, the more salient and important (on a scale of 0 = not important to 10 = supremely important) that objective is to the stakeholder. For example, working our way out from the center along the "Counter Chinese Hegemony" radial line in the "Far East Political Objectives" graph, we can see that China has no interest in countering its own hegemonic objectives (obviously), while the DPRK has only a slight interest. By far the actors most concerned with countering Chinese hegemony are Tiawan and the United States, with Japan closely behind. The measures for each point on the spider graph were derived through expert interviews and a review of the literature. We canvassed the extant literature for indications, both behavioral and verbal, of stakeholder interests. Our initial formulation was then "sanity checked" by showing the results of our literature analysis to several area experts at the US Air Force Academy. The final results of these interactions are shown.

Note that this exercise is useful even independent of the rest of the systems engineering infrastructure. By glancing at the graphs, diplomats and policy makers can quickly tell where the sticking points will be for negotiations; conversely, they might discover areas of agreement they had not realized existed before. And by overlapping all the stakeholder's objectives on a single graph, one can also quickly identify commonalities and differences that are systemic and wide-spread.

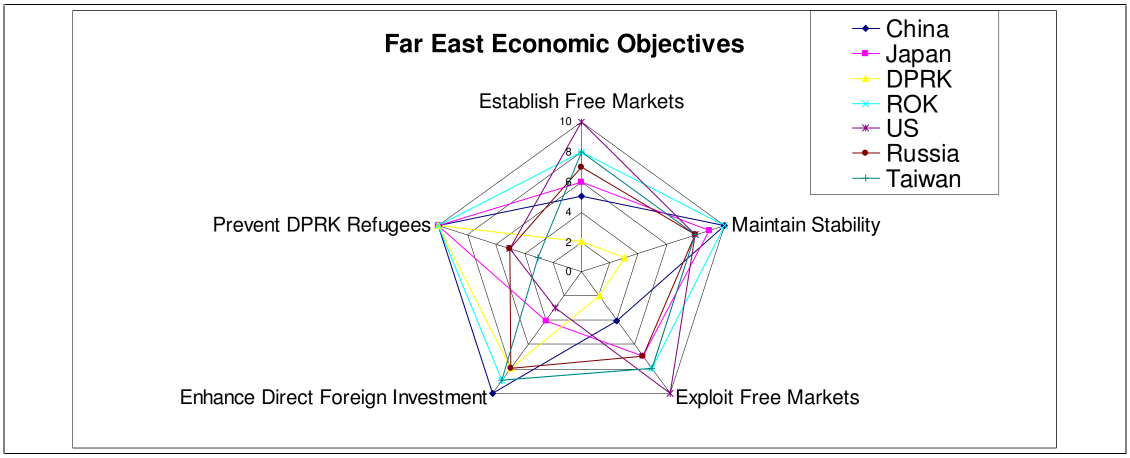
The following graphs from our analysis are followed by a few sentences pointing out some important features of the graph.



Graph One--Far East Political Objectives: Note that all the stakeholders in the system would like some kind of relationship with the US. Incentive and disincentive structures tied to potential relationships with us will likely be very effective at influencing the system. Conversely, there is radical disagreement between system stakeholders regarding whether or not regime change should occur. This will be a sticking point. Reunification does not appear to be the primary concern of any of the stakeholders; care should be taken before reunification issues are allowed to trump other common objectives.



Graph Two--Far East Military Objectives: The security dimensions of the East Asian FOS are especially tense, with the stakeholders varying markedly in their commitment to the resolution of certain security issues. Nonetheless, all the stakeholders are concerned about reducing terrorist threats, so perhaps that issue could be used to shoehorn negotiations on other more contentious issues into place; if any of our actions can be recast in terms of preventing international terrorism, that may allow us to achieve objectives that would otherwise have been difficult to reach.



Graph Three--Far East Economic Objectives: Note the commonality of interest in economic stability. If we can link undesirable North Korean actions to the creation of economic instability, we may be able to unite the other stakeholders in the system so as to bring multiple state's instruments of power against DPRK proliferation. Most of the stakeholders would like direct foreign investment in their economies; such investment offers might serve as efficient carrots to induce movement on other radials.

Significance to policy-makers

While this is only an exploratory analysis, there are several upshots that the work thus far has for policy-makers concerned about Korea. Note that if the system is at least somewhat rationally engineered, there will be tight connections between the goals and objectives of the stakeholders and the activities they accomplish to achieve those goals. If we are to be able to successfully intervene in this federation of systems, we must have a comprehensive understanding of the objectives of the stakeholders, as this is what drives the structure of the remainder of the system. It may very well be that there are relatively low-hanging diplomatic fruit to be harvested by paying attention to spider graphs that compare the various stakeholder's objectives. Initially, we'll discuss how you might go about moving a particular stakeholder along a radial axis, and then see if our analysis has any upshot for US policy. We are not members of the state department, so these suggestions may be naïve, but hopefully they can suggest directions in which policy-makers might move to successfully influence the system. Of course, we are always free to use force to coerce others to take action even when education and persuasion efforts fail. But before resorting to force in any particular instance, we should see if a "radial strategy" is successful. Here are some components of such a radial strategy:

1. **Radial Similarity = Education.** Where interests overlap, education will be an effective strategy. Persuasion is not needed where stakeholders occupy similar positions on radials.
2. **Radial dissimilarity = Persuasion.** Where interest diverge radically, agreement will be difficult to reach; at that point, we can instruments of state power to persuade other stakeholders to change their position on the issue at hand. Or, perhaps more effectively, if we can tie our objectives to other radials where the target stakeholder already is near the outside of the web, persuasion will become much easier.
3. **Persuasion Fails = Tie desired US objectives to other outlying radial points.** Policymakers should focus on proposals that have causal ties to the achievement of our objectives irrespective of which radial they are on, but which can be recast as issues that are of primary importance for achieving a stakeholder's goals that lay on the outer portion of the web. Providing a plausible *"jumping radials" story* is a critical aspect of US strategy.

Note that these general recommendations are congruent with those offered by a recent Council on Foreign Relations Independent Task Force report (titled "Meeting the North Korean Challenge"). Morton Abramowitz and James Laney co-chaired the project; they reached the following conclusions: (1) "…the Task Force argues that the United States needs to restore a healthy alliance and forge a common strategy with South Korea," (2) "…the Task Force believes the United States must form a broader coalition. It urges the administration to establish a policy around which American partners can rally," and (3) "…although a broad settlement of all nuclear and missile concerns would be essential to any long-term agreement, the United States should first propose an interim agreement as an immediate test of North Korean intentions." (p. vi, 2003).

Restoring a healthy alliance and forging a common strategy with regional partners is part and parcel of focusing on commonalities on the spider graphs. If the US is to heed recommendation two from the task force, it must both stress commonalities on the graphs and seek to move other stakeholders towards similar positions on the graphs as the US. The recommendation for an interim agreement is essentially a way to ensure that dramatic standing disagreements on parts of the spider graphs are not allowed to interfere with attempts to reach breakthroughs on positions where all the stakeholders are close together on the radials. A trade-off strategy may be necessary; that is, we may have to move closer to other stakeholder's positions on radials (perhaps along the ones that are least salient to us, ultimately) so as to broker agreement on other radials. This is consistent with the approach advocated by Selig Harrison in his book Korean Endgame: A Strategy for Reunification and U.S. Disengagement (2002).

Suggestions for future research

While we believe our analysis thus far is suggestive, it is by no means complete. We have yet to accomplish the other steps used to analyze systems of interest by systems engineers. Recall that these included:

> *Step 3:* Identify Activities to Achieve Objectives…what activities does each stakeholder need to accomplish in order to achieve their objectives? What activities could we expect, for example, the DPRK to accomplish in order to maintain regime stability?
> *Step 4:* Identify Agents Responsible for Activities…what agents are responsible for accomplishing those activities? For example, who are the major agents responsible for maintaining regime stability? The party leaders and the internal security apparatus?
> *Step 5:* Define Measures of Performance for Activities…how do we measure whether the agents are successfully achieving their objectives? What are the most important indicators of regime stability and instability? How do the North Koreans know when they are meeting their goals?
> *Step 6:* Identify System Drivers (endogenous/internal & exogenous/external system variables)…what variables influence the success of the agents in accomplishing their objectives? For example, is lack of food positively related to regime instability? What is the shape of the curve that defines that relationship (linear, exponential, S-shaped, etc.)?

After accomplishing these steps, the policy analyst has a choice. She can be satisfied with the insight she has gained into the system merely by asking and possibly answering these questions. The qualitative insights gained by framing policy problems in this way can be very helpful. Or, the analyst could decide to move from the answers to these questions to a high-level systems dynamics model of the system; in other words, our technique can be used to translate qualitative theories about the nature of the system into quantitative theories and then to models. *Conclusion*

Systems engineering techniques can be used to move from gut-level feelings about what needs to be done to achieve US objectives to a quantifiable (and model-worthy) description of the system we wish to influence. These techniques can help us frame our thoughts about policy-making in unforeseen ways, and are a necessary part of any effects-based planning process. While our analysis is only in the initial phases of the functional decomposition process, it has cast some light on the types of policies that might be effective in influencing stakeholder objectives—policies that address spider-graph revealed radial differences, and these recommendations are consistent with those offered by other analysts. And in any case, understanding these objectives must be done before almost any analytical process, let alone our methodology, can be applied to the North Korean problem.

--Part II: Terrorism--A Case Study of the Growth Dynamics of Peru's Sendero Luminoso--

This section seeks to provide policymakers a new perspective on potential violent non-state actor policy options using a systems engineering framework for the problem. By using a systems engineering approach, policy-makers will be able to expand the number and quality of the mental models surrounding reasoning about how VNSA develop and to gain deeper insights into the complexity of the system.

Developing the Structure of a VNSA Architecture

Systems engineering consists of an array of heuristic tools that are used within an iterative process to solve a defined problem. To create the "structure" component of the policy architecture for the VNSA, we implemented the following steps:

Step 1: Identify VNSA Stakeholders
Step 2: Define Stakeholder Objectives (Vital Interests)
Step 3: Identify Activities to Achieve Objectives
Step 4: Identify Agents Responsible for Activities
Step 5: Define Measures of Performance for Activities
Step 6: Identify System Drivers (endogenous/internal & exogenous/external system variables)
Step 7: Define the Casual Relationships between System Variables

This process provides a rigorous methodology for efficiently identifying the system boundary and the critical system variables. Once the system variables are defined, they can be organized into a system causal matrix structure, which highlights the causal nature between variables (Bartolomei, Management Causal Matrix, 2001).

VNSA Stakeholders

The process for moving from a qualitative understanding to a quantitative model began by identifying the stakeholders of the system. The stakeholders are defined as the individuals and organizations which drive the requirements of the system. Performing a stakeholder analysis is similar to the customer/market analysis required in traditional systems engineering and product development. For typical VNSA, these might include Sympathetic State leaders, Religious leaders, VNSA leaders, identity entrepreneurs, and the state population which the VNSA is trying to influence. The success of the VNSA hinges on the VNSA's ability to meet the stake holder requirements.

Defining the Stakeholder Objectives through Functional Analysis

The behavior of any system is based on the structure of the system and the casual relationships between the variables within the system. For VNSA the stakeholders drive the causal relationships between many of the system variables. Therefore, an understanding of the stakeholder's objectives (their vital interests) is necessary to gain insight into the causal structure driving the system behaviors.

In many cases, the stakeholder objectives are easily determined. For instance, the SL leaders are quite vocal about their desires to overthrow the government. Other times, stakeholder interests are less obvious, example SL was less vocal concerning their desire for wealth and their desires to strengthen their stake in the drug trade. We can work backwards from the actions of the stakeholder to reasonably infer what objectives they are pursuing so as to maximize our chances of correctly identifying vital interests. Engineers often struggle with similar issues when reengineering products designed by other companies ("What were they thinking when they put the power switch on the computer here rather than there? What did they hope to achieve?"). A common methodology employed by engineers to tackle this problem is to perform a functional analysis of existing products. The goal of the functional analysis is to clearly identify the functions of the parts of a physical system. Once the functions for each part are identified, the engineer can *re*engineer the system so as to (hopefully) improve it. Generally, the functions can be arranged hierarchically. Based on the hierarchy, the objectives of the system can be inferred even in the absence of specific knowledge about the intention of the designers.

VNSA Activities Defined and Classified

Based on the overall objective of IMPOSING WILL, a mature VNSA will have to develop multiple subfunctions, including firing on all cylinders may be very developed in its organizational structure with many layers of systems and subsystems that are performing multitudes of activities. Although the methodology enables us to fully decompose the entire system, we will only develop the ATTRACT PEOPLE function.

Identify VNSA Agents

For each of the activities identified, an agent or multiple agents of the organization must be responsible for the execution of the activities. Paul Davis presents the different types of agents found within a VNSA. These includes the following: top leaders, lieutenants, foot soldiers, recruiters, supportive population segments, sources of moral and religious support, external suppliers and facilitators, and heads of supportive states.

The SL had multiple agents responsible for recruitment activities to include: top leaders, lieutenants, foot soldiers, and recruiters. For example, Guzman, a university philosophy professor, recruited heavily at San Marcos University in the early stages of SL's development. As the organization grew, SL foot soldiers comprised of Peruvian peasants were able to attract people by leveraging peasant dissatisfaction with the state of their environment and the Peruvian government's response to it.

VNSA Activity Measures of Performance

Once the activities and the agents are identified, the next questions asked is how do we measure whether the agents are successfully achieving their objectives? What are the most important external indicators of the VNSA's organization health and effectiveness? How might the VNSA know when they are meeting their goals?

For the ATTRACT PEOPLE function and supporting activities, we determined that two indicators seemed most logical: total number of VNSA members and total number of VNSA sympathizers. In most cases, the general population of a country does not fill out registration cards for their local VNSA, nor do they volunteer information about their level of sympathy for the VNSA. In the real world, this would require significant human intelligence to determine these measures. For the SL, we looked to historical data presented by David Scott Palmer for SL from 1970-1992.

In addition, other measures of performance for the other critical functions and supporting might include: VNSA Dollars and Arms for the ACQUIRE MATERIAL function and number of acts of terror for the COMMITT TERROR functions. For SL, the identification of these variables is important when modeling recruitment since these variables directly affect the "identity entrepreneur's" ability to influence the population (the identity entrepreneur is the person or persons, like Guzman, who exploits existing identity cleavages in order to mobilize a disaffected population).

Identifying the VNSA's measures of performance serves two major functions. First, clearly articulating the measures of performance can be helpful in driving the intelligence requirements in the surveillance of a particular VNSA. In addition, it is important to understand the effectiveness of the VNSA in the execution of activities because these activities directly affect other variables of the system. For example, the larger the VNSA membership the greater the greater the identity entrepreneur's influence on the population…other examples. The measure of the identity entrepreneur's influence on the population is a good example of an endogenous variable that is affected and affects other variables within the system. The next step of the process requires a through analysis of the system to identify both the endogenous and exogenous variables with the system.

VNSA System Drivers

We call these endogenous/internal & exogenous/external variables the VNSA system drivers. These are the variables which directly affect the VNSA's ability to execute activities and conversely can be affected by the VNSA's reinforcing actions. For example, population disaffection is a system driver positively influences the VNSA's ability to attract people. Using the open-systems assumptions presented in previous chapters, we believe VNSA grow and develop at the intersection of environmental conditions and group psychology. For a VNSA, the system drivers will be the environmental and psychological variables that are influencing the system.

For recruitment, many of the important environmental variables influence the disaffection of the VNSA's target population. To fully decompose the variable which contribute to population disaffection we reviewed the literature and relied on expert opinion. We classified the variables into four distinct categories as follows: Maslow variables, Camus variables, Smith variables, and Dewey variables. The Maslow classification represents variables that relate to a population's fundamental needs being met. Maslow variables include food and water availability, infant mortality rate, level of medical care, etc. Camus variables, named after the existential philosopher Albert Camus, include variables which deal with the spiritual and moral fabric of a population. Dewey variables, after the philosopher John Dewey, consist of social factors like freedom of movement, freedom of speech, etc. Smith variables represent the system economic variables. All of the variables listed above are external to the VNSA and are considered inputs into the system. The exogenous factors are generally independent of the VNSA activities, in other words it is difficult for the VNSA to influence these variables with reinforcing actions.

Examples of endogenous system drivers for the recruitment activities of the VNSA are the variables associated with the role of the identity entrepreneur. For example, in order for the identity entrepreneur's ability to convert a VNSA sympathizer into a full-fledged member of the VNSA he must be able to influence society. The measure of this ability is an endogenous variable which lies within the VNSA system and positively affects the VNSA's ability to accomplish the functions. In addition, endogenous variables are factors that the VNSA can affect with reinforcing actions.

Step #7: Highlight the Causality within the System

The next step of the process is to highlight the causal relations that exist between variables. A common systems thinking methodology for capturing these casual relations is through the use of causal-loop diagrams (Sterman, Senge). Systems engineers and the product development community when developing complex engineering systems have used an alternative method of capturing these relationships through the use of matrices (Otto and Wood, Hill and Warefield, Bartolomei). Matrices have many advantages, firstly they are generally are very orderly and efficiently determined, they organize the variables in a structured format, and they enable analysts to quickly determine the boundaries of the system (a taxing effort for most analysts).

To capture VNSA, we employed a tailored version of common systems engineering/design matrices designed explicitly for tackling a non-engineering system. We call this tool a System Causal Matrix.

VNSA System Causal Matrix

A System Causal Matrix is a matrix which captures the entirety of variables uncovered through the analysis of the Step #'s 1-6 of the process presented above. These variables are organized into the format listed in Figure 1. The matrix in the top left-hand corner captures the Stakeholders and the Stakeholder Objectives into an inter-relational matrix. This is an important matrix because each stakeholder has objectives supported by the VNSA, and all activities performed by the VNSA flow from these objectives.

The next matrix organizes the hierarchal relationships between the objectives of the system. The highest order objectives and the supporting objectives from the functional analysis described above are placed into the intra-relational matrix. The next matrix is the matrix which correlates the activities and the objectives which those activities support. As we move to the right, the next matrix highlights agent/activity relationship by showing which agents are responsible the VNSA activities. Next, the VNSA activities and the system drivers are captured in the inter-relational matrix. This is the first causal matrix, where the reinforcing or balancing nature between variables is defined. For example, Level of Population is a system driver which positively influences the VNSA's ability to cultivate sympathizers. The next matrix connects the VNSA activities with the Measures of Performance for each activity. Each activity should have at least one Measure of Performance.

As we move clockwise around the right-hand side of the diagram, the lower-right hand matrix highlights the causal relationship between Measures of Performance and the System Drivers. This matrix captures the reinforcing actions the VNSA has on the system drivers. The intrarelational matrix on the left represents the causal relationships between the systems drivers.

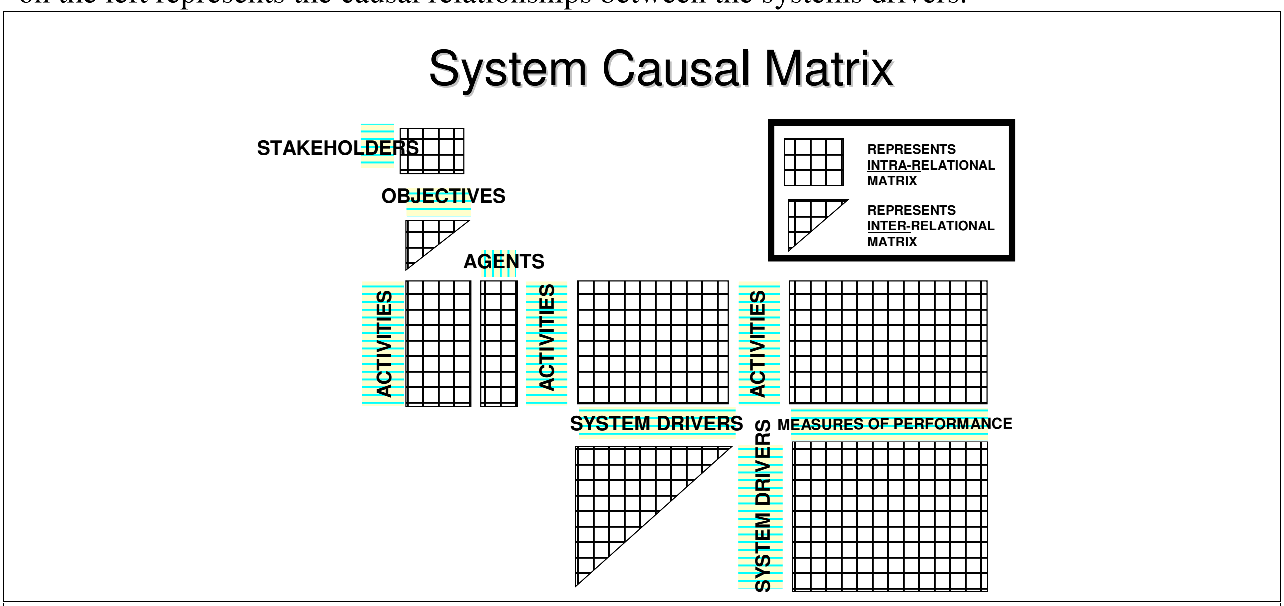


Figure 1 Example of a System Causal Matrix

The unique arrangement of the system causal matrix not only organizes the variables, but also captures the feedback within the system. The structural component of the VNSA Policy Architecture is complete. Below is a (merely illustrative) diagram (figure 2) of the VNSA System Causal Matrix which captures the ATTRACT PEOPLE functional activities for the Sendero Luminoso. You will notice that although there are many variables within the system. Only a few variables are interdependently related, thus only a few of the matrix cells are highlighted with a positive "+" or a negative "-" designator.

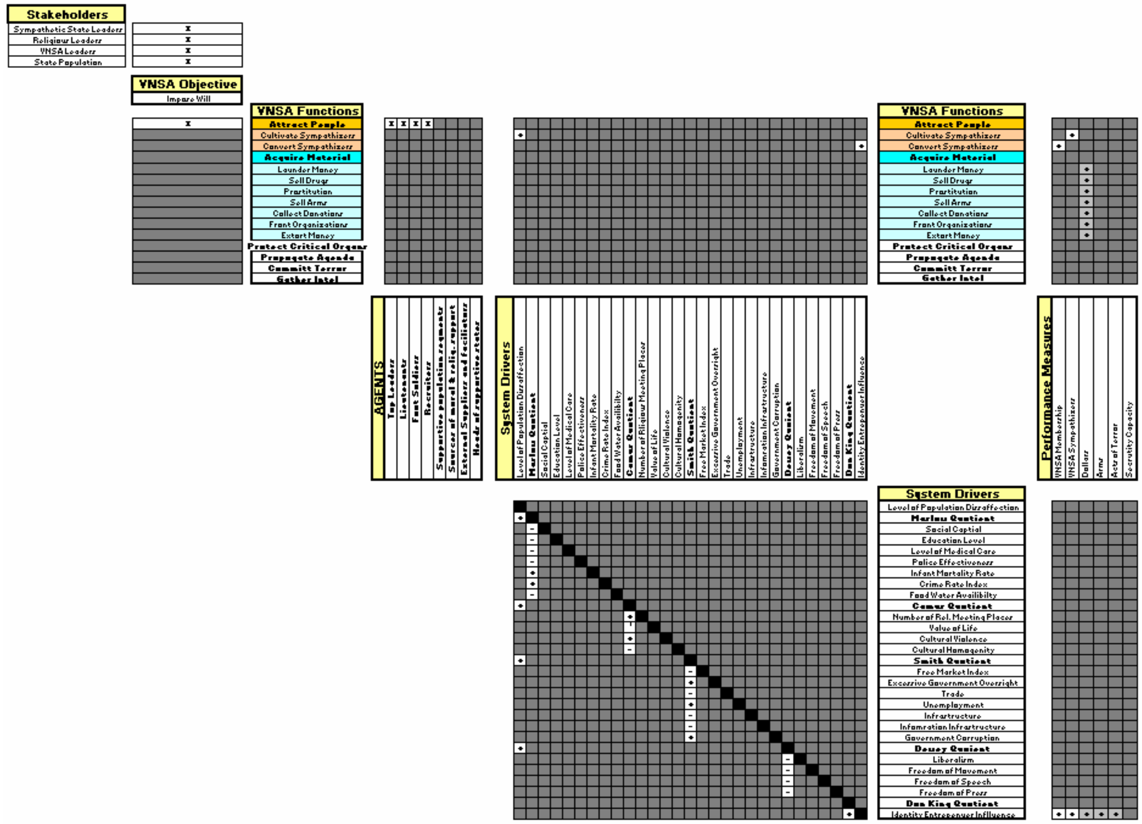


Figure 2 Partial VNSA Management Causal Matrix

The Analysis Component of the VNSA Policy Architecture: Moving from the Matrix to a Systems Level Model

After accomplishing these steps, the policy analyst has a choice. She can be satisfied with the insight she has gained into the system merely by asking and possibly answering these questions. The qualitative insights gained by framing policy problems in this way can be very helpful. Or, the analyst could decide to move from the answers to these questions to a high-level systems dynamics model of the system; in other words, our technique can be used to translate qualitative theories about the nature of the system into quantitative theories and then to models. These models can be quickly built using inexpensive commercially available software such as Stella VIII (Bartolomei and Casebeer, 2003).

If she decides to model the system mathematically and develop a systems-level simulation of the system she must perform the following steps, which we will discuss only briefly:

Step 8: Determine the Nature of the Causal Relations Mathematically
Step 9: Develop Systems-level Model for the System
Step 10: Perform Validation/Verification of the Model

Systems Level Model Using Stella 7

Because VNSA development occurs over time, we decided to utilize a system dynamics approach to create a systems-level model. The first step in this process is to translate the variables defined in the matrix into a stock and flow structure based on the causal relationships highlighted in the matrix and the nature of the variables. Our specific focus on the growth of a VNSA and the recruitment activities, we first started by trying to understand the conversion of the general population into sympathizers, and the ability of the VNSA to convert sympathizers into VNSA members.

Based on our qualitative understanding, population disaffection is a major factor affecting growth and recruitment rates. So we first determined the mathematical mature between these relationships and captures them in the model. Figure XX is presents the model interface for these variables.

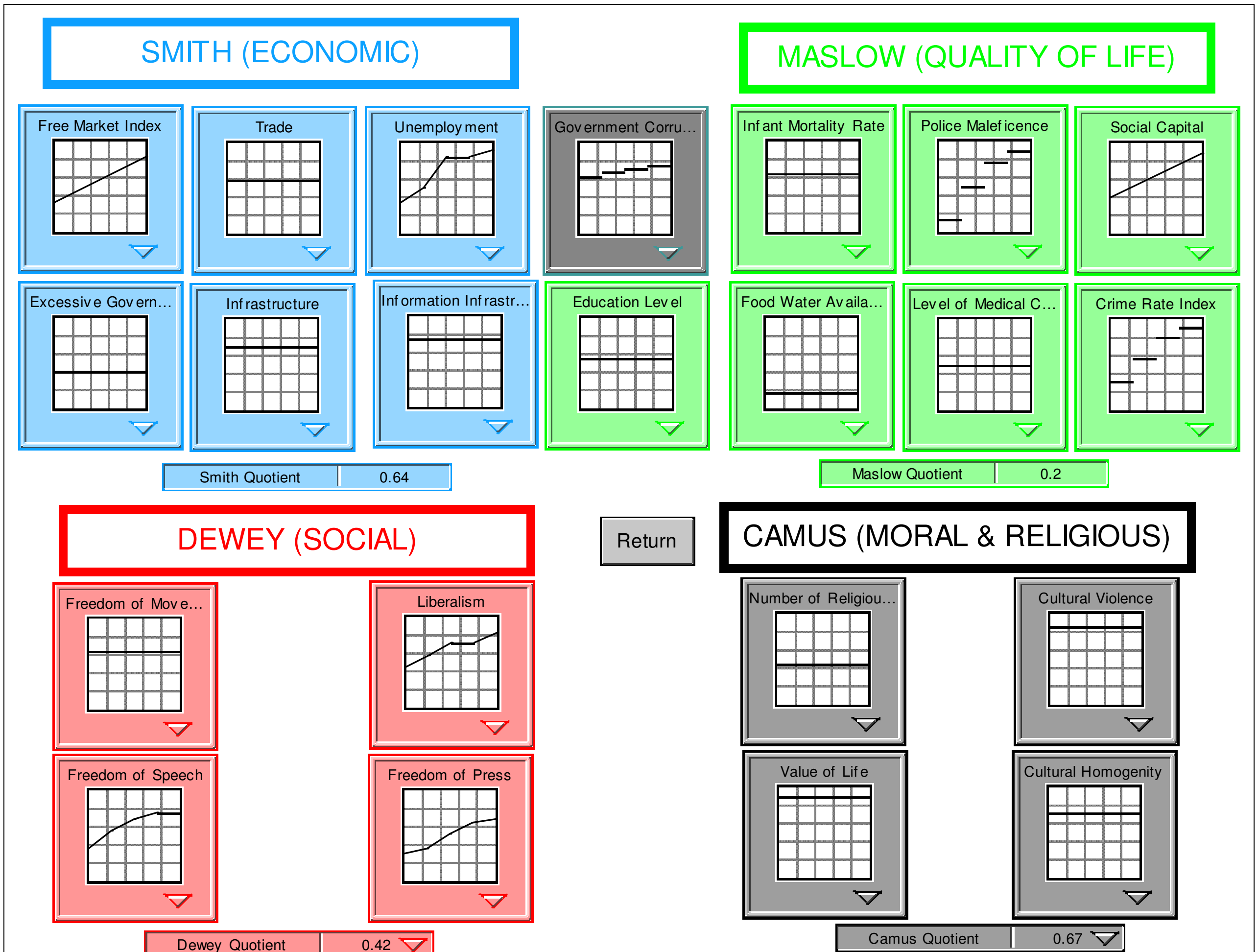


Figure 3 Model Inputs for SIM Sendero Luminoso

Because very little data exists for these variables, we have to rely on expert opinion when capturing them. Therefore, in the knowledge/data elicitation phase of the project we present our experts with x-y axes and ask them to plot the variables over time and seen in the inputs in Figure 5. Else, we ask them to identify the relationship between two variables the independent variable on the x-axis and dependent variable on the y-axis.

On advantage in using a system dynamics approach is the flexibility inherent in the software to easily change assumptions and relationships between variables. In many cases, we had dissenting opinions about certain relationships between variables. It was effortless to change the assumptions and test the hypotheses quickly with the systems-level model.

After determining how the general population is converted into a sympathizer because of the level of disaffection. The next potion of the model to be tackled was the ability of the VNSA to convert the sympathizer into a VNSA member. Based on the relationships uncovered by the matrix, we knew that this was a function of the identity entrepreneur's effectiveness. His effectiveness resulted from his inherent charisma, his finances, and his ability to commit terror, which directly impacts his ability to recruit.

Figure 4 illustrates the stock and flow structure of the system by graphically highlighting the variables which contribute to the chain.

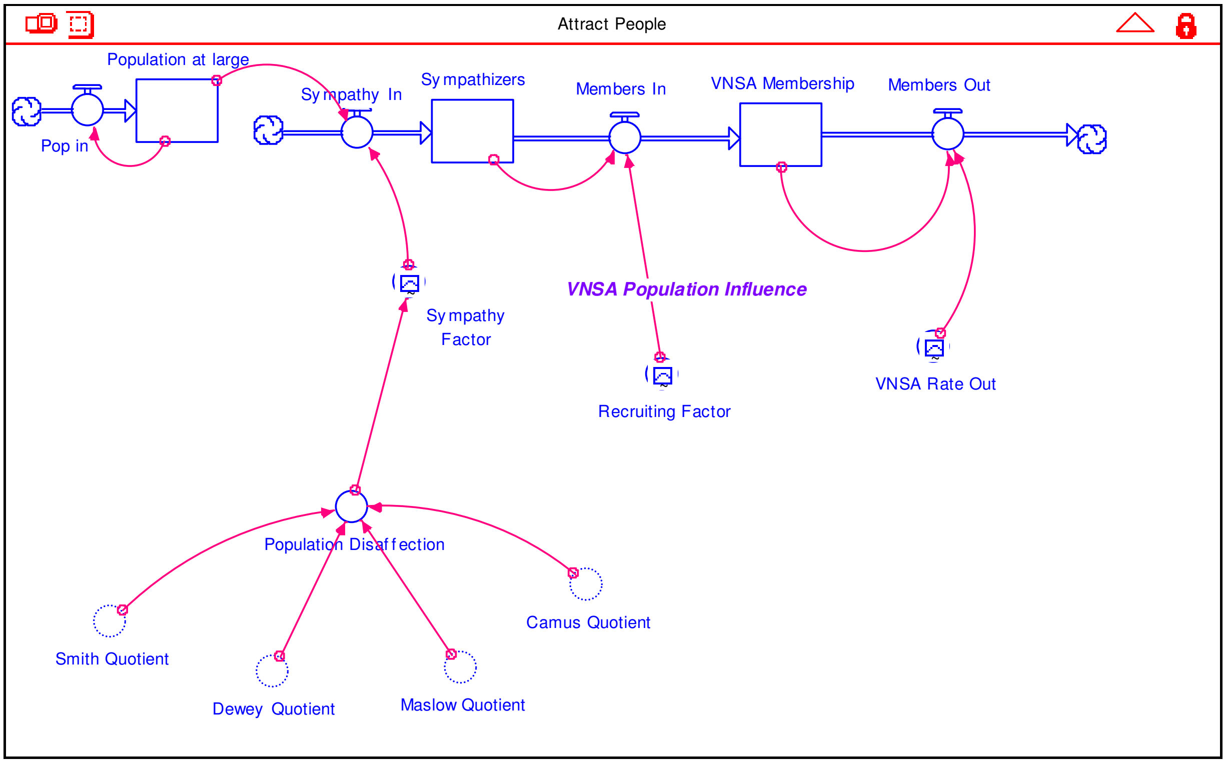


Figure 4 Example of Stella Structure

Once the critical variables are defined with data and/or expert opinion it is time to run the model to test its ability to recreate history.

Validation/Verification of Sendero Luminoso Model

Despite the multiple studies performed on SL, the data available for the important variables uncovered through employing the methodology was quite anemic. In fact, only a few of the variables affecting population disaffection were available, including infant mortality rate, (list). Thus, we were forced to rely on the opinion of experts for many of the inputs.

In addition, David Scott Palmer's historical report on SL had some valuable information including multiple data points on SL membership, acts of terror, and number of deaths. He had only one data point for SL sympathizers and very rough estimates of SL finances. Our goal was to make the best assumptions possible and try to recreate the growth of SL membership from 1970-1992 and recreate the number of SL sympathizers.

Using the best assumptions available, we were able to recreate the curves for VNSA membership growth (see figures below) and hit the number of SL sympathizers in 1992 very closely.

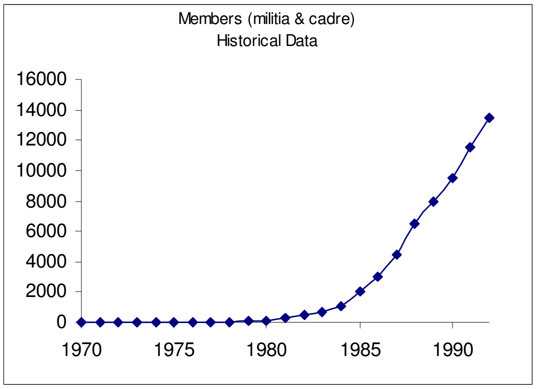


Figure 5 Sendero Luminoso Historical Growth

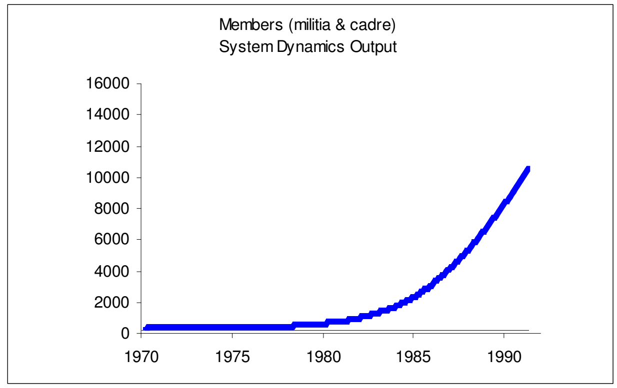


Figure 6 Output from SIM Sendero Luminoso for VNSA Membership

VNSA Policy Architecture Synthesis

Step 11: Use Model to Glean New Insights into the System

We can use our model to brainstorm policy options. For instance, the model predicts that if we had been able to neutralize the influence Guzman had on the population, recruitment rates would have dropped to near zero. On the other hand, if we had addressed environmental variables (such as infant mortality rate or amount of trade), we would have nearly halved the size of SL over the course of its ontogeny.

Step 12: Employ Other Analytical Tools to Gain Deeper Insights as Needed

Once high-level systems modeling has been accomplished, a policy-maker can use more traditional analytical tools, such as agent-based models, to gain higher fidelity insight into the system. Our tool complements the other tools available to the modeler.

Benefits of a Systems Level Model

The easy to use graphic interface on these programs makes it unproblematic for analysts and policymakers to use the quantitative system model to gain insight into the system, and possibly even to predict the consequences of interventions into the system. At the very least, these models can be used for alternate futures analysis, or to drive a stems-and-branches style brainstorming session. They can also help policymakers decide where more time, effort, and other resources should be dedicated (e.g., "we need to conduct a discrete event analysis of the effect that population size and food availability has on regime desperateness…"). The procedures we've argued for in this paper are designed to make such high level systems level exploratory modeling quick and easy for the analyst or policymaker. This can be a very valuable process as it may highlight additional policy options available, and is a necessary part of any good effects-based operation.