Playing the Wild Cards:
A Structured Method for Intelligence Analysts
to Identify and Exploit Possible Surprises

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1. Introduction

You thought victory was certain…but you still lost everything. It was a three-player poker game. Each player had five cards, two were secret and three were visible to everyone. Your first opponent's visible cards were three '8's'. Your second opponent's visible cards were an '8,' a 'K,' and a 'Q'. Your visible cards were two 'A's' and a '6'. In addition, your two secret cards were also an 'A' and a '6'. This meant that you had a "full house" consisting of three 'A's' and two '6's'. The only things that can beat this are four-of-a-kind or a straight flush (five consecutive cards of the same suit). Given your opponent's visible cards, neither could have a straight flush. And, while your first opponent showed three '8's', the second opponent had the fourth '8'. Thus, no one could have four-of-a-kind either. You bet it all. The cards were revealed and…you lost. For, your first opponent's secret cards were a '5' and….a joker. They played a wild card giving them four-of-a-kind and costing you a certain victory.

Intelligence analysts continually grapple with the possibility of a surprising event that will change the overall environment for international relations or national security. Whether it is the assassination of Archduke Ferdinand, Pearl Harbor, the Iranian Revolution, the collapse of the Soviet Union, the attacks of September 11, 2001, or the Arab Spring of 2011, unexpected events can have dramatic effects that analysts have to try to anticipate *somehow*. And, the idea of a "wild card" that enters play and completely changes the course of a game is a powerful metaphor for this kind of surprise. Unfortunately, though, while the concept of a wild card is often thrown around amongst discussions of analytical methods, it has never been developed to its full potential of undergirding a unique structured approach to identifying and exploiting possible surprises.

The purpose of this paper is to explore the metaphor of a wild card in a new way, and to develop a comprehensive method for identifying and exploiting these possible surprises through a unique combination of two approaches that have previously never been combined: counterfactual reasoning and systems dynamics. First, it establishes what is distinct about the idea of a wild card and the method that will be developed for exploring them (especially in contrast to similar concepts). Second, it explains the core of counterfactual reasoning and systems dynamics and how they can be combined to form a unique approach to wild card analysis. Third, it illustrates the first stage of this method, the "rules of the game," in much more detail with an extended example. Fourth, it continues the exploration of the example with the second stage of the method, "strategies of the game." Fifth, it completes the examination of the example with the third stage of the method, "winning the game." And sixth, the paper concludes

with further thoughts on where intelligence analysts can best employ this method to help their consumer better prepare for these possible surprising events.

2. Establishing a Unique Metaphor: The Wild Card

Intelligence analysts have long wrestled with how to anticipate events that would otherwise be surprising. And, a number of metaphors have emerged with corresponding methods to explore them. First, there is the concept of the "best case" or "worst case" scenario, along with the alternative futures analysis used to generate the scenarios.[i] Second, there is "high impact/low probability analysis" in which one attempts to identify the consequences of an event that would be surprising if it occurred, but dramatic in its consequences if it did. A related method is "what if" analysis which explores how surprising events could come-to-be.[ii] And third, there is the recently popular concept of a "black swan" event that defies all predictions and disrupts future forecasts.[iii] Now it is important to note that "wild card" also has been discussed at some length previously. But, thus far, the concept *has typically been defined as simply identical to one of these other metaphors.*[iv] In other words, to most, a "wild card" is simply a surprising event with dramatic consequences. However, there is much more to the idea of a wild card that has yet to be explored.

The wild card metaphor has had only limited utility for analysts because little attention has been paid to heart of the metaphor: literal wild cards. Take the opening example for instance. In it, the wild card appears at first glance simply to enter play and suddenly determine who wins and who loses. In that way, wild cards seem like "black swans", "high impact low probability" events, or "worst case" scenarios…they just happen, have their effects, and are gone. However, upon further inspection, wild cards are not so simple. Even in the opening example, the players would not have been dealt all their cards at once, but instead over a series of rounds. Thus, player one would not have known they had four-of-a-kind at the start. Instead, they would have (let us say) had their two secret cards and one visible card: a '5,' a 'joker,' and an '8'. At this point, they only have (at best) a pair of '8's'. When their next visible card comes, they add an '8' and now have (at best) three '8's'. Neither of these hands is itself especially powerful in a poker game. Both are easily beaten. Especially since your visible cards were two 'A's' and the other player had the third '8'. The first player would have to decide to stay in the game hoping that the last card was the fourth and final '8' to have (a virtually unbeatable) four-of-a-kind. Thus, the wild card did not simply enter play and ensure anyone's victory. Rather, it made certain courses of action possible that otherwise would not be. Player one chose to pursue some of those courses of action, and thereby won the game.

Herein lies the uniqueness of the wild card metaphor: the power is not in you (or your opponent) being dealt a wild card, but in how you (or your opponent) play the wild card and everyone else responds. History's most dramatic surprises were not so because they merely happened, but because of how people responded to them. The assassination of Archduke Ferdinand, Pearl Harbor, and 9/11 were somewhat dramatic in themselves, but the *response of*

the other players to them was what made them ultimately significant. The Iranian Revolution, the collapse of the Soviet Union, and the Arab Spring of 2011 were even more about the responses since each of these consisted in series of events in which different sides responded to each other making the ultimate outcome as dramatic as it was. The real challenge for analysts is not the surprising event that simply happens and has its effect, but instead it is the event that happens and makes certain courses of action possible for different actors some of which could have dramatic effects. What makes a wild card so dramatic is not the event itself, what the analyst's consumers (or their competitors) do about it.

But how can an analyst possibly anticipate this kind of surprise? Ultimately, the real power of the wild card metaphor is showing how and why they do not have to. One need not predict the wild card event for the consumer to benefit from it. But, to see why, it is useful to have a better example of a literal wild card. For, our common assumptions about wild cards tend to be overly simplistic and exaggerate the power of the wild card event itself as well as underemphasize the active roles the players have responding to it. Imagine a game in which players are attempting to complete sets of cards of the same color and play them to available spaces on a board, where the greater the number of cards in the set the more points they score. Say a set of 1 scores 1 point, 2 scores 2 points, but 3 scores 4 points, 4 scores 7 points, 5 scores 10 points, and 6 scores 15 points. Players can have as many cards as they like in their hand, but there are only a certain number of available places to play them. Thus, there can be a rush to be the first to play to a certain space. Players draw cards either from a secret draw pile, or from one of four visible cards (which are replaced by another visible card when a player draws one). Suppose that player one has a hand of 5 red cards and 1 green one, and player two has a hand of three blue cards, and three green ones. The draw pile features one yellow, one blue, one green, and one wild card. Players can draw two cards per turn *unless they want to draw a wild card in which they can only draw the wild card.*[v] It is player two's turn.

What does the wild card mean in this game? It does not mean either player will automatically win or lose if they are (or are not) the one to draw it. Instead, it represents a range of possibilities for each player. Does player two take the green card and the blue card to have two sets of four cards (worth 14 points total) but then let their opponent take the wild card and end up with a possibly larger set (in this case a set of six instead of five worth +5 points)? Or do they take the wild card to have one set of four cards (worth 7 points) and prevent their opponent from a larger set (in this case a set of five instead of a set of six forth -5 points)? Or perhaps, do they do something else? In this game, wild cards bring the potential to have bigger sets (and score more points), so each player can try for that. Or, each player has the chance to prevent the other from using the wild card to score points, and also to hold on to the card to score points later. No one is guaranteed a win or loss by the introduction of the wild card, but they can use it to score more points (or to prevent their opponent from scoring more points). If this is done at a especially critical time in a game, such as at the end of a close game, or when one player is trying to close (or establish a larger) point game, *then wild cards have dramatic consequences.* But, played less effectively (or if countered effectively by an opponent), wild cards can also have

rather mundane consequences. It is not the introduction of the wild card itself that matters, nor is it predicting when they will enter play, but how the players respond to the wild card. *That* is the potential "game changer".

To develop this account of the wild card metaphor fully, this paper will construct an analytical method to both identify and exploit possible wild card events in intelligence analysis. This method will ultimately employ a unique combination of counterfactual reasoning and systems dynamics, each of which will be explored in the next section. But before doing that, it is critical to provide more groundwork on the purposes of the method as well as to contrast it from three other (seemingly similar) enterprises: critical thinking, game theory, and wargaming.

This method, like all analytic methods, attempts to increase the rigorousness of one's thinking over a certain range of problems. And, broadly speaking, there are two types of strategies to increase rigor in thinking. The first may be termed strategies of "symbolic representation". These strategies include logic, mathematics, and statistics. Their approach is to represent the problem in terms of its constituent elements and then apply formal rules to those representations. The result is (typically or at least ideally) a single determinate outcome. Normally these approaches are applied to increase knowledge or technical capabilities over the long-term. And it often takes months, years, or longer to apply these approaches effectively to real-life problems (as well as to learn to use the approaches correctly). There is also a fairly high epistemological expectation with these approaches that (given the underlying data), there is a low probability of error when they are correctly applied. By contrast, the second type of strategy may be termed strategies of "self reflection". These strategies include what goes under the name of "critical thinking." Their approach is to reflect on the way one is solving a problem to draw attention to particular aspects of it and focus one's thinking on them. The result is (rarely) a single determinate outcome, but instead an outcome that was the result of a process guided by self-conscious reasoning and application of a set of general rules. This approach can be applied to any type of problem over the short or long-term, and it takes much less time to be able to begin using these approaches. Epistemologically, the expectation is never that the proper application of this approach will guarantee a correct outcome, but only that a correct outcome will be more likely than it would have been otherwise. In other words, the goal is simply to think better.[vi]

This paper will propose a method that falls into the category of strategies of self-reflection. While it certainly has rules and principles that have to be employed correctly, it is not a formalized method where elements are represented, abstracted, and subjected to underlying axioms to generate a definitive outcome. Rather, these rules direct the analyst to ask particular questions, form a general account of the problem, and then evaluate a series of possible outcomes according to general guiding principles. This method will guide and constrain the analyst's thinking, but not so much as to remove all individual variation or all potential for error (even when done properly). The advantage of this is that it also means the method can be learned and applied in a relatively short period of time, which is vital given the time constraints analysts typically face. Therefore, this method is similar to critical thinking in being a strategy to increase

rigor through increased self reflection. However, it covers a range of problems and methods beyond what is usually included in standard critical thinking, which generally has confined itself to developing informal versions of basic logic, mathematics, and statistics. In particular, the method will use an informal (and qualitative) version of systems dynamics combined with counterfactual reasoning (which are described in the next section).

Game theory is the formal examination of strategic situations as if they were structurally like games. That is, the decision situations have players pursuing specific goals through a range of possible actions governed by particular rules. And, as such, there are ways to anticipate what it is reasonable (or not) for each player to do.[vii] And, in principle, this anticipation could (in itself) help players to resolve the situation. Now, game theory falls under strategies of symbolic representation to increase thinking rigor. This paper's method also examines strategic situations as if they were structurally like games, however it will do so informally in keeping with the spirit of other strategies of self reflection to increase rigor. As a result, this approach can avoid the complexity of game theory, but also its abstractness. While a powerful idea, many of the "games" of game theory have proven to be rather limited in their application to real-life situations evaluated by intelligence analysts (apart from the famous applications to the Cold War dilemmas of nuclear proliferation and deterrence). The method aspires to be a small piece of what would be the self reflection equivalent of game theory. That is, just as critical thinking is to logic and mathematics, this approach is to game theory. Perhaps this approach (broadened out beyond the wild card issue) could be thought of as an attempt to encourage "critical playing".

Wargaming also treats certain strategic situations as if they were structurally like games. However, it also do so through a more formal representation. However, in wargaming, the representation is not through formal mathematical formulas, but actors who take on the role of the participants in the real-life situation being examined. (Sometimes this is also combined with computer simulation elements, which are done ultimately through formal mathematical formulas). Unlike game theory, wargaming has the analysts taking on the role of the participants in the game and acting things out according to that person's interests and desires (which may or may not correspond to what is rational for them). This method does not purport to offer a simulation or to involve any role-playing. Thus, it is also quite different from wargaming.

The wild card is a powerful potential metaphor for intelligence analysts. For it emphasizes that the consequences of surprising events are dramatic not merely (or even primarily) due to the events themselves, but rather because of how everyone responds to them. When the situations are conceived of as structurally like a game, a wild card presents an opportunity for players to respond in new ways, and in so doing further advance their progress to the ultimate goal. They do not automatically ensure winning or losing, but are another tool in their play. And, a method that is build around them can offer guiding principles to analysts to help their consumers to capitalize on these possible surprising events and thereby *play critically*.

3. Explaining a Unique Approach: Wild Card Analysis Through Counterfactual Reasoning and Systems Dynamics

The proposed approach of wild card analysis features a unique fusion of counterfactual reasoning and systems dynamics. And, while a full understanding of these methods is certainly not necessary for using wild card analysis, it is important to have a general sense of these approaches. While neither method is used as it normally is, but instead is employed in unique way, some understanding of how the methods work will help to explain how wild card analysis works. Thus, this section introduces the broad concepts of both methods, as well as how they are fused to create the wild card analysis approach.

3.1. Counterfactual Reasoning: A Brief Overview

Strictly speaking, a 'counterfactual' is a conditional or subjunctive (if…then) statement whose antecedent (first part) is false (i.e. "counter-to-the-facts"). Generally, these statements refer to past possible events that could have happened, but did not such as "If Chamberlain had not appeased Hitler at Munich, then WW2 would have been avoided." Philosophers and logicians have long discussed the logic of these kinds of statements as well as what must be true of the nature of the reality that they can be true or false, and historians have debated the merits of particular counterfactual statements (including the one just mentioned). More recently psychologists have developed a strong interest how and why humans actually think about counterfactuals, and social scientists have begun using them more to help explain major causal claims in their fields. However, until very recently, while there were vague general rules, there were no full scale approaches to determining which counterfactual claims were rational justified or how to approach counterfactual reasoning systematically. There was no real normative theory of counterfactual reasoning. However, recent work specifically in the intelligence analysis and critical thinking fields by Noel Hendrickson has developed an approach to counterfactual reasoning.[viii] More importantly, this work shows that (epistemologically) reasoning about past (nonactual) possibilities is structurally the same as reasoning about future (uncertain) possibilities. In other words, counterfactual reasoning can be extended to reasoning about any possibility that is "counter-to-the-known-facts-at-the-present-time". So, an analyst can use it not simply to explore how past events might have played out differently (such as if the US had not invaded Iraq in 2003), but more importantly what are the most plausible consequences of possible future possibilities (such as what if Iran secures nuclear weapons, Russia invades Ukraine, or Mexico collapses into a narco-state, etc.)

More generally, counterfactual reasoning represents a complex approach to scenario development in which a particular possibility is explored in three successive ways. First, it is explored in terms of its plausible backstory. That is, how does the possibility come-to-be? This is the "antecedent scenario". Second, it is explored in terms of its relations to other currently

projected causal forces. That is, to what extent is the possibility compatible with the other causal forces currently identified (and trends projected for the future)? These other forces with which it is compatible are the "intermediate states". And third, it is explored in terms of what would or might follow from it. What might follow are the "consequent scenarios". Thus, ultimately, counterfactual reasoning analyzes possibilities as "complex scenarios," or scenarios that consist in a relationship between other scenarios. In particular, an antecedent scenario and then a set of consequent scenarios, mediated through various intermediate states. This approach can be used instead of either "high impact/low probability" analysis or "what if" analysis. In fact, it subsumes both forms of analysis under a single rubric. As well, it can be combined with more conventional scenario/quadrant analysis as a way to explore each scenario in much greater detail.

There are three stages to counterfactual reasoning, along with a required prior and preparatory (fourth) stage. This preparatory stage (or "stage zero") is not so much a stage of counterfactual reasoning as much as a prerequisite to it. Before full scale counterfactual reasoning is possible, one must begin with a full account of the major causal forces influencing the topic of interest to the analyst. So, if the analyst wishes to consider the possibility of Russia invading the Ukraine, they would have first to develop an account of the major causal forces involved in current Russian-Ukrainian relations (as well as related issues). Now the analyst may choose to use an appropriate type of causal analysis to do this, which is why it is not (strictly speaking) a stage of counterfactual reasoning, but a prerequisite to it. One of these approaches that could be employed (and is on this paper's approach) is systems dynamics. However, in principle, any type of causal analysis could be combined with counterfactual reasoning.

The first stage of counterfactual reasoning is to select antecedent scenarios. In this stage, the analyst determines the most plausible way that the possible event could come-to-be. For each possible event, there is not simply way one that it could occur. For instance, there are many sequences of events that could lead to Russia invading Ukraine. And, the way this comes about could make a significant difference to the outcome. Thus, analysts should generate several different possible paths from the present, identifying a range of "triggering events" that deviate from currently projected trends, but combine (in the longer term) to bring about the possible event. These possible scenarios are assessed in terms of their length, as well as the number and probability of the triggering events. Generally, a shorter scenario with more probable triggering events is preferred.

The second stage of counterfactual reasoning is to select intermediate states. In the first stage, analysts will select a specific path to the possible event (a "backstory"). In so doing, they will have to postulate alternations to currently projected trends (since the possible events themselves are surprising, one or more unexpected event has to contribute to their occurrence). However, analysts will not likely postulate a change to all these trends. But, that does not mean they are not still affected by the changes that are postulated. Suppose an analyst has identified twelve critical causal forces influencing Russian-Ukrainian relations that they project into the near future. They then have to alter three of them, let us say, to create enough of a conflict over the Black Sea Fleet for Russia to invade. The analyst has to determine what the

"ripple effect" of this will be for the remaining nine causal forces or trends. Given the events of the antecedent scenario, what are the chances that these trends will continue? Do they increase, stay the same, or decrease? If they increase or stay the same, then they may continue to be projected and become part of the set of intermediate states (or independent givens) for the reasoning. If they decrease, then unless the decrease is incredibly slight, the trends can no longer be projected with enough confidence to include them, thus they must be rejected. As well, analysts should consider the possibility of new trends that will emerge immediately upon the occurrence of their antecedent scenario and that will be important for determining its longer term effects.

The third stage of counterfactual reasoning is to select consequent scenarios. In this third stage, analysts consider the possible outcomes of the underlying causal forces (from their underlying causal analysis), the antecedent scenario, and all the intermediate stages they have identified. Their goal is to both identify what might happen as well as what would happen. For what might happen, they develop several complete scenarios for the future of their subject ruling out everything that is incompatibility (or highly improbable) given the prior stages. Each scenario represents one way that things might go. Then, they do a cross scenario analysis to determine what (if anything) is common to many of these scenarios. This represents what would happen (or at least, what would very likely happen).

3.2. System Dynamics: A Brief Overview

System Dynamics is a simulation-based methodology for addressing problems that emerge from complex feedback systems. The goal in system dynamics is to gain insights about how the ***structure*** of the system (causal links, feedback dynamics, etc) has shaped the past and how it might be exploited to influence the future. The field is over 60 years old and was pioneered by Dr. Jay Forrester, who was a professor at M.I.T.

One of the distinctive features of system dynamics is that it provides an accessible language and iconic representation of systems that is accessible to non-modelers. As a result, the methodology has found its way into a variety of problem contexts, including environmental management, national energy policy, public health, education, business management, and national security. In its fullest implementation, a system dynamics study involves the development of a running simulation model that can be used by decision makers to gain insight about the sometimes counterintuitive nature of their problem. However, many studies stop short of developing a fully functional simulation model and instead focus on developing a ***qualitative description*** of the systemic causal structure behind the problem and then gleaning insights from that description. This qualitative description is often referred to as a ***dynamic hypothesis***,[ix] since it provides an informed but provisional explanation for system behavior. Since this description is a hypothesis, it is subject to various forms of testing or validation, including (but not restricted to) quantitative validation through simulation. While a qualitative analysis is provisional (subject to validation), it can be used as part of broader counterfactual analysis to explore

possible futures that might plausibly emerge from the hypothesized structure. Hence, even though a qualitative dynamic hypothesis cannot reliably predict the future, the skilled analyst can use the system description to identify important dynamics in that will likely have a significant influence on how the future might unfold.

3.2.1. An Example: Simple Qualitative Analysis of U.S. Fire Suppression Policy

To illustrate the approach, Figure 1 presents the evolving level of forest fire losses in Arizona and New Mexico from the early 1900's into the 21st century. Of particular interest in this graph is the fact that the fire losses remained at reasonably stable and low levels from the early 1900's (when the Forest Service adopted an increasingly aggressive fire suppression policy) up through the 1960's. However, in the later part of the century, these losses began to accelerate, reaching historic proportions by the end of the 1900's. Why did this happen, especially I light of the apparent successes of the fire suppression policy in the first 50-60 years of the 20th century? What can be done to reverse this trend?

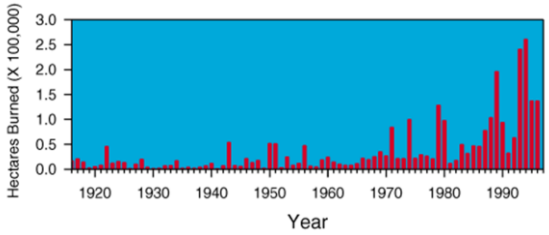


Figure 1: Annual area burned by wildfires in Arizona and New Mexico (all lands), 1916-1996. Source: Swetman, T. W.; Betancourt, J. L (2003). ***Mesoscale Ecological Responses to Climatic Variability in the American Southwest***, U.S. Dept of Interior and U.S. Geological Survey. Retreived from http://geochange.er.usgs.gov/sw/impacts/biology/fires_SOI/ on 5/15/12

All system-based studies (whether they involve only a qualitative analysis or develop a fully-functional simulation model) think of problems in terms of such "evolving behavior over time." The goal is to articulate and evaluate the underlying systemic structure that gives rise to this behavior, with the hope that, having done so, one could then exploit that structure to influence the future in desirable ways. The qualitative dynamic hypothesis is such an articulation of system structure and will be the way in which system dynamics analysis is employed in the methodology we propose here. In this paper, a multi-player game metaphor is applied to national security futures analysis and the systems dynamics perspective is used by focusing on how the prospects of each player might evolve over time.

3.2.2. The Causal Loop Diagram: A Visual Tool for Communicating and Evaluating Causal Structure

One commonly used tool for articulating system structure is the causal loop diagram (CLD). The CLD provides a visual representation of what the analytical team believes is the relevant system structure behind

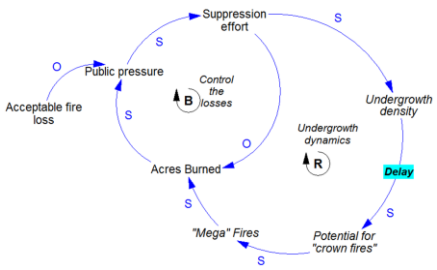


Figure 2: Simple Causal Loop Diagram describing some of the dynamics behind the fire loss trends in Figure 1

the time-based behavior of interest. By "relevant system structure" we mean those system actors, system states, causal links, feedbacks, and delays that explain the evolving behavior that we wish to understand and manage. Figure 2 is a highly simplified CLD that explains at least part of the puzzling behavior of fire losses in Figure 1.

In order to make sense of such a diagram, some explanation of the notation is in order. The CLD includes ***variables*** which are linked by arrows showing the direction of causal influence. These variables represent named quantities or characteristics in the system and that can increase or decrease over time and that are thought to be relevant to the problem. This diagram shows seven variables (Acceptable fire loss, Public pressure, etc).

The arrows connecting the variables are called ***causal links***. These represent the direction of causal influence (pointing from the causing variable to the affected variable). Each link is labeled with a ***polarity*** ("S" or "O") which indicates the type of influence that is realized through the causal link. "S" polarity indicates a relationship in which the affected variable tends to move in the *same* direction as the causal variable. For example, the S polarity on the causal link between the *Acres Burned* and *Public Pressure* indicates that, as the *Acres Burned* changes from one year to the next, the *Public Pressure* tends to move in the same direction (more acres burned leading to more public pressure, and fewer acres burned leading to lower public pressure). That is, the *Public Pressure* for reducing forest fire losses moves in the same direction as the *Acres Burned*. "O" polarity indicates that the affected variable as an inverse relationship with the cause, so that, as the causal variable changes, the affected variable moves in the *opposite* direction. The relationship between the *Suppression Effort* and *Acres Burned* has O polarity; the greater the effort to suppress fires, the lower the fire losses.

Another important feature of a CLD is the identification of ***feedback loops***. A feedback loop is a closed circle of cause effect relationships. That is, you can begin anywhere on the feedback loop and trace the causal links in the direction of causality to eventually end back where you started. Feedback is one of the most important characteristics of complex systems and has significant impact on the behavior of the system over time. In fact, rather than seeking to explain system behavior by concentrating on individual variables, systems analysts think of the feedback loops as the "engines" behind system behavior. When multiple feedback loops are present, the system can exhibit surprising, even counterintuitive behavior. Hence, it is very important to identify and evaluate the role of feedback during the analysis.

Note that feedback loops are designated by the letter B or R, with an accompanying circular loop arrow and a descriptive name. There are two such loops in Figure 1. The "B" designation indicates that the loop is *balancing*, in that the causal relationships in the loop collectively work to restore "balance" to the variables in the loop. That is, a balancing feedback loop seeks to drive the variables in the loop toward steady-state or level behavior over time. This is why balancing feedback loops are often referred to as "goal seeking" loops. The "R" designation indicates that the feedback is *reinforcing*. Such loops represent a "snowball effect," driving the variables in the loop further and further away from equilibrium. In this way,

reinforcing feedback represents vicious or virtuous cycles (depending on your point of view about the problem).

The *control the losses* feedback loop in Figure 1 is a balancing feedback loop that seeks to manage fire losses to a steady-state level that is acceptable to the public. Equivalently, this loop seeks to manage *Public Pressure* about fire losses to a manageable, steady state level by using fire suppression to keep those losses to a minimum. The *undergrowth dynamics* feedback loop is a reinforcing feedback loop that represents a vicious cycle whereby aggressive fire suppression leads to (over time) higher undergrowth density in the forest, which in turn sets the scene for even more destructive "mega fires." As these mega-fires happen, public pressure mounts, leading to even more fire suppression efforts, thereby reinforcing the very problem that we wish to overcome!

Finally, the CLD in figure 1 has a ***delay marker*** on the causal link between *Undergrowth Density* and *Potential for Crown Fires*. This marker indicates that undergrowth density can increase for some period of time without measurably impacting the potential for devastating crown fires. That's because, once an aggressive fire suppression policy is in place, it can take decades for the undergrowth density to accumulate to the point that there is sufficient undergrowth to enable fires to reach such intensity levels that the fire can burn up into the canopy of the forest and destroy whole forests.[x]

3.2.3. The CLD as a dynamic hypothesis

Now we can see how the causal loop diagram in Figure 2 provides a plausible explanation (dynamic hypothesis) of the behavior in Figure 1. This explanation is a ***dynamic*** hypothesis because it explains the behavior in Figure 1 in terms of the feedback dynamics in the underlying system. In particular, the hypothesis represented in the CLD is this:

> *The relatively low fire losses in the decades following adoption of a national fire suppression policy is a direct result of the short-term success of the policy. As intended, fire suppression created a balancing feedback dynamic that worked to keep fire losses to a minimum up through the 1960's. However, since this policy extinguished even naturally-occurring fires that normally kept the forest floor clear of overly dense undergrowth, the policy of fire suppression also enabled the growth of increasingly dense undergrowth. After several decades, the undergrowth was so dense as to create a "powder keg" that could turn low-grade, ground-level fires into devastating crown fires. These in turn raised public concerns and further increased pressure in favor of more aggressive fire suppression efforts. This created a self-reinforcing dynamic of more fire suppression, greater undergrowth density, greater fire losses and more public pressure for fire suppression.*

3.2.4. Using Qualitative System Dynamics and High-Leverage Points to Develop Wild Card Scenarios

Once a dynamic hypothesis has been developed and represented in a CLD, we can explore the hypothesized causal structure to find potential high-leverage points that could have an undue influence on future behavior. There are many different approaches to finding system leverage points[xi], but we propose a simple method here that focuses on finding those system variables that participate in, or are, in some sense, "close" to the feedback dynamics that drive the system. Note that the goal here is not to predict the future, but rather to identify potential points in the hypothesized system structure where *"…a small shift in one thing could produce big changes in everything."*[xii] If such points could be found, they could help inform a futures analysis aimed at identifying potential "wild card" or "game changer" circumstances worthy of further exploration. In the sections that follow we will demonstrate this approach by using a metric that we refer to as the ***causal distance from feedback***…a measure of "how far" each variable in the CLD is from the feedback dynamics in the system.

It is at this point that we depart from the conventional use of system dynamics. Rather than use the CLD and a subsequent computer simulator as a predictive tool to gain insights about potential system outcomes, we are instead using the CLD as a means of generating scenarios for future exploration via counterfactual reasoning. In this way, the causal loop diagram serves as an analytical "story board" that represent the analytical team's best understanding of the main dynamic forces (i.e. feedback dynamics) driving those system outcomes of most interest.[xiii] Given this storyboard, the analytical team can search for places where "game changers" or "wildcards" could have disproportionate impact on the future, simply because those events or circumstances have a cascading impact on the feedback dynamics in the system.

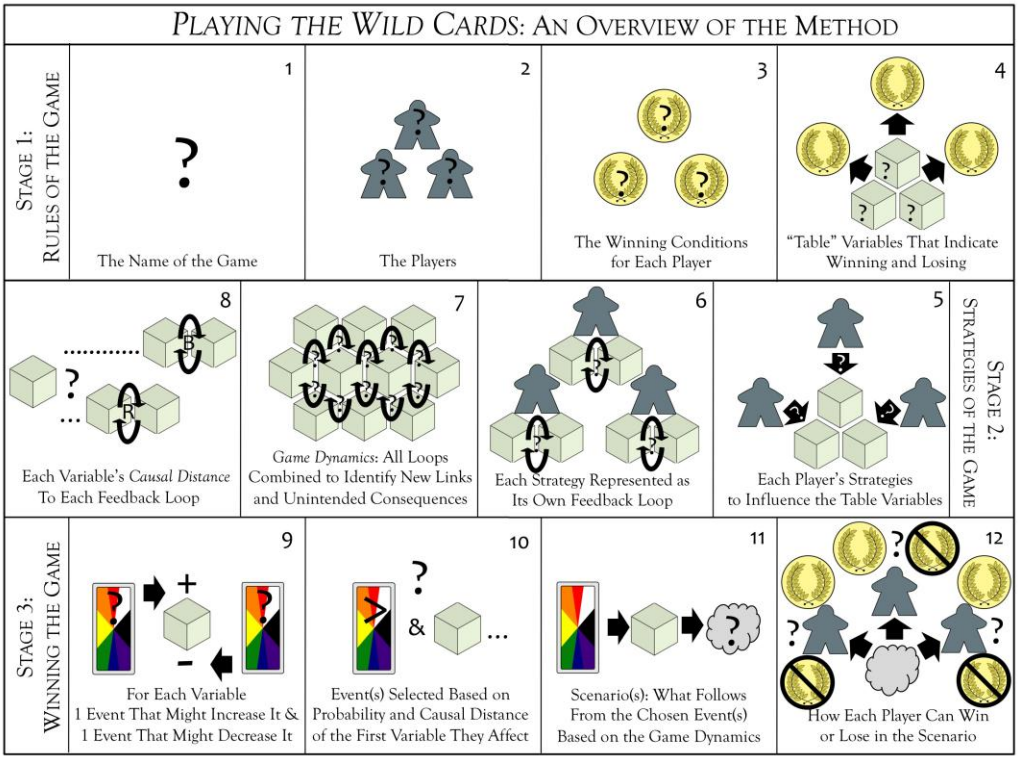
3.3. The Methods Fused to Create Wild Card Analysis: A Brief Overview

Counterfactual reasoning and systems dynamics have slightly different purposes. Counterfactual reasoning is used to identify the characteristics and consequences of possible events to locate the most plausible conditional (if…then) claims that may be made about them. Systems dynamics is used to form an account of the causal forces that underlie a particular situation, and thereby help explain how that situation might evolve over time. Even though these purposes differ, they are complimentary as counterfactual reasoning begins (but does not include itself) with an analysis of the causal forces at work in the environment in which the possible event occurs. One way to do that would be with systems dynamics. As well, systems dynamics seeks to explain the behavior of those forces over time, and one situation in which they might evolve would be the possible event. Thus, the framework of counterfactual reasoning could be used to examine (and rework) the system as it is (imagined to) evolve over time. Wild card analysis does both of these with the analysis framed from the outset in the context of treating the

situation as structurally like a game and the possible event(s) being the wild cards in it. The result is one unique way to combine the two methods.

The method consists of three stages, each of which have four steps. In the first stage, "rules of the game," analysts identify the overall boundary of the subject they wish to assess and its structure as like a game including the name, players, their winning conditions, and how they monitor progress towards those conditions. In the second stage, "strategies of the game," analysts explore the courses of action each player is pursuing and the resulting dynamics in terms of each player's strategy in principle and as a feedback loop, a combination of feedback loops, and the distance the between each variable and each feedback loop. In the third stage, "winning the game," analysts develop wild card scenario(s) and evaluate how each player could best respond to the wild card to move closer towards winning the game in terms of possible wild cards, their plausibility, resulting scenarios, and how each player can win or lose in the scenario(s). While counterfactual reasoning, systems dynamics, and the game representation are presented throughout the method, counterfactual reasoning is most present in the later steps, systems dynamics is most present in the middle steps, and the game representation is most present in the starting steps and final steps.

The overall approach may be represented as follows:



Structurally, this chart is meant to resemble a game board featuring varying playing pieces that represent the steps in the process. Generally, the anthropomorphic figures represent the players, the medals with laurel wreaths in them represent victory, the cubes represent variables, the cards

of different colors represent the wild card event(s), and the clouds represent scenarios. The core steps run as follows:

Step 1: Determine **the name of the game:** What is the ultimate subject of the analysis and situation one hopes to assess?

Step 2: Identify **the players:** Who are the primary actors involved?

Step 3: Describe **the winning conditions for each player:** What is the ultimate goal or objective of each of the actors?

Step 4: Locate **the "table" variables that indicate winning or losing:** What would determine whether each player has (or has not) achieved their objective? What factor(s) should each player monitor to track their progress towards winning or losing?

Step 5: Describe each player's strategy for achieving their goals. These strategies are designed to move each player's table variables in the direction they most desire.

Step 6: Represent each strategy as a series of feedback loops involving each player's table variables.

Step 7: Describe and evaluate the overall game dynamics. Examine the combined player feedback loops in an overall CLD to identify how the strategies interact to create both intended and unintended consequences

Step 8: Use the causal distance from feedback to look for leverage points in the game dynamics

Step 9: For each variable in the game dynamics CLD, **identify two possible wild card events**: one that dramatically increases the value of that variable and one that dramatically decreases the value of that variable.

Step 10: From the events defined in step 9, select those that have the highest probability of occurrence and that involve variables with low causal distance to feedback.

Step 11: For each event you select in step 10, adapt the original CLD to account for the impact on the game dynamics and evaluate the implications for how the future might unfold.

Step 12: Identify conditions under which each player could win and under which each player could lose under each wild card event, given the implications for the game dynamics.

The following sections explore each of these steps in terms of the three stages of this approach in terms of a more detailed example.

4. Exploring an Extended Example: Wild Card Analysis In Action, Stage 1: Rules of the Game

To illustrate wild card analysis, this paper will explore an extended example. However, since the purpose of the paper is to advocate the method, rather that specific conclusions with it for any particular example of it, the example will be a generic one. That is, it will feature a situation inspired by real-world events, but abstracted away from any particular instance. The example will be a long-serving dictator in a third-world country that is of strategic interest to the US because of its natural resources and potential support for forces hostile the US. The US has supported this dictator to help secure its access to the region's natural resources as well as to help curb the risk associated with the forces hostile to the US. Naturally, there are many real-world countries that qualify as an instances of this, and which helped to inspire the example, but the example is not meant to be any specific one of these. Using this generic case, the wild card analysis method can be explored at length without creating the distracting potential of controversy over details of a specific instance.

Wild card analysis consists of three stages, each of which have four steps. The first stage, "rules of the game," defines the analytical boundary of the problem and the situation for which one is seeking to anticipate and to exploit possible surprises. It consists of the following steps:

Step 1: Determine **the name of the game:** What is the ultimate subject of the analysis and situation one hopes to assess?

Step 2: Identify **the players:** Who are the primary actors involved?

Step 3: Describe **the winning conditions for each player:** What is the ultimate goal or objective of each of the actors?

Step 4: Locate **the "table" variables that indicate winning or losing:** What would determine whether each player has (or has not) achieved their objective? What factor(s) should each player monitor to track their progress towards winning or losing?

4.1. The Name of the Game

The primary purpose of this entire first stage of wild card analysis is to define the subject of which one hopes to do the analysis. However, develop a strong definition of a question or problem is not an easy task. A hasty description of a situation can bias an entire analysis. Thus, this first stage seeks to break down the process of defining the subject to make it easier for analysts ensure they have well-established boundaries for their analysis. And, in this first step, analysts should offer a high-level, overall description of the situation for which they are doing wild card analysis. The situation is to be conceived of as structurally like a game, and they should try to offer a "name" for their game. What is this game about? What is the game? In this case, the game is "US Support of a Dictator". In coming up with a name, there is no need to try to be creative or clever in titles, instead one should attempt to find something that attempts a description of the situation.

4.2. The Players

Every situation of interest to analysts will consist of multiple actors (including , of course, their consumer). So, the second step of defining the subject is to identify them. Who are the primary persons (or organizations) that are playing the game. Who is attempting to win (or at least stay "in" the game)? It is not practical to identify literally every actor, but it is critical to locate all the major players. For the vast majority of situations, it should be assumed that one is considering a "multiplayer" game (that is, one of three to five players). Obviously some situations might require more, and occasionally less may be adequate. But, generally, one should identify three to five different individuals, groups, or organizations. In some sense, one should approach this step in terms of the next (the winning conditions for each player). In other words, for every set of winning conditions there will be a player. That is, two groups that have the exact same goals would be, in a sense, the same player. To have a different player, one needs to have at least some difference in one's goals. In this example, there are two obvious players including the US and the dictator. However, it is important not to stop there. There is also the local population, as well as the rebels (and/or groups in the country with anti-US sentiment). Each of these groups has slightly different objectives, and thus constitutes a different player.

4.3. The Winning Conditions for Each Player

Each player in the game will have their own winning conditions defined by their goals. What would it mean for them to be the "winner"? What would victory look like for them? Now, some players may have goals in common, but there should be something different about each players winning conditions (at a minimum it could be that they reach them instead of their opponents). These conditions do not have to necessarily be entirely positive for the players. Sometimes a "win" is simply ending up with the lesser of two evils. Or, put differently, sometimes "winning" is just a matter of staying alive or "in" the game. In this example, a US victory means that its national security interests in the region are protected (either by having a

stable access to national resources and/or by preventing forces hostile to the US from threatening US assets). Victory by the dictator means that the dictator remains in power (with at least some measure of security). A local citizens win means that they can live in relative safety with the rights that they value. This means they have access to whatever public services and freedoms that they regard to be essential to their livelihood. Note that these need not necessarily be the same services or freedoms that Westerners regard to be important, rather they are the services and freedoms that the citizens consider to be significant. A win by the rebel groups means that they advance their interests at the expense of US interests (as these are anti-US groups). This could involve getting the US to remove support of the dictator and/or US forces or companies being removed from the region. It is important to note that these victory conditions need not be mutually exclusive (it is not necessarily a "zero sum" game). That is, it is sometimes possible for more than one side to win. In particular, in principle, the US, the dictator, and the local citizens can all win together. So the US and the rebel groups (as well as the dictator and the rebel groups) have winning conditions that conflict even in principle.

4.4. The "Table" Variables That Indicate Winning or Losing

Victories typically do not come about easily, but rather are the result of a lengthy process. As such, there need to be factors that one can monitor to determine a player's progress towards (or away from) victory. Call these "table" variables. In terms of the game metaphor, these are the major ways the players score points. As with the winning conditions, these can be different for each player, and need not preclude another player also scoring from the same thing happening. Like all the factors to be identified in wild card analysis, these variables have to be a property or characteristic of someone or something that can be thought of as increasing or decreasing over time. For the US, it would be threats to US interests, for as this increases or decreases the US moves closer to, or away from, victory. For the dictator, it is simply his power or level of control in the country. As this increases or decreases, so too does his progress towards his objective of staying in power. For the local citizens, there are two variables including the quality of the public services as well as abuses of power by the dictator. As the former goes up and latter goes down, they move towards a win, and as the former goes down and the latter goes up, they move towards a loss. The rebel groups have as their table variable the dictator's power, for as it increases they lose, and as it decreases, they march towards victory.

5. Exploring an Extended Example: Wild Card Analysis In Action, Stage 2: Strategies of the Game

In Stage 1, the analytical team defines the boundaries of the analysis by identifying the players and the overall goals pursued by each player. The goal in Stage 2 is to outline the strategies used by each player to achieve their respective goals, and to show how their strategies interact to create the dynamic complexity of the "game." This will be done by

building a causal loop diagram representing the actions and interactions among the players. The resulting causal structure is then explored to look for potential high-leverage points that could serve as opportunities for wild card scenarios.
The steps in this stage are:

Step 5: Describe each player's strategy for achieving their goals. These strategies are designed to move each player's table variables in the direction they most desire.
Step 6: Represent each strategy as a series of feedback loops involving each player's table variables.
Step 7: Describe and evaluate the overall game dynamics. Examine the combined player feedback loops in an overall CLD to identify how the strategies interact to create both intended and unintended consequences
Step 8: Use the causal distance from feedback to look for leverage points in the game dynamics

5.1. Defining Player Strategies

Define the overall approach taken by each player to accomplish their goals. Avoid defining strategies so specifically as to represent actions that might change from one year to the next. Instead describe in broad terms the approach used by each player to pursue their goals. Seek to describe those aspects of each player's activities that are reasonably constant from year to year. Also provide a brief explanation of why the player believes their strategy will give the desired results. See Table 1 for the player strategies for the example.

Table 1: Player strategies

Player	Table variable	Strategy for impacting table variable
U.S. government	• Threat to U.S. regional interests	Provide support to the dictator in order to secure his help with U.S. interests
Dictator	• Dictator's power	Secure power by providing public services and by aggressively oppressing opposition
Local citizens	• Abuses of power by dictator • Quality of public services	Apply pressure to the dictator's government to provide adequate public services.
Rebel groups	• Dictator's power • Influence of rebel groups	Openly oppose the dictator through propaganda campaigns provoke his abuse and turn public opinion in their favor

5.2. Representing Player Strategies as Feedback Loops

Each player's strategy corresponds to one or more feedback loops. This is because the strategy is designed to control that player's table variables either to a desired steady state (i.e. balancing feedback) or toward accelerating growth or erosion (i.e. reinforcing feedback). That is, each player employs a strategy that effectively chooses action based on the current status of their table variables. Then, based on the outcome of those actions, each player adapts his/her actions, closing the feedback loop. All of this is done in a way that is consistent with their strategy. For example, if the U.S. senses that its interests in the region are in peril, more extensive engagement with the dictator will be pursued in order to mount offensive measures, gather intelligence, etc. In this way, the U.S. "watches" its table variable and chooses action, thereby hoping to impact that variable's status, effectively "closing" the feedback loop.

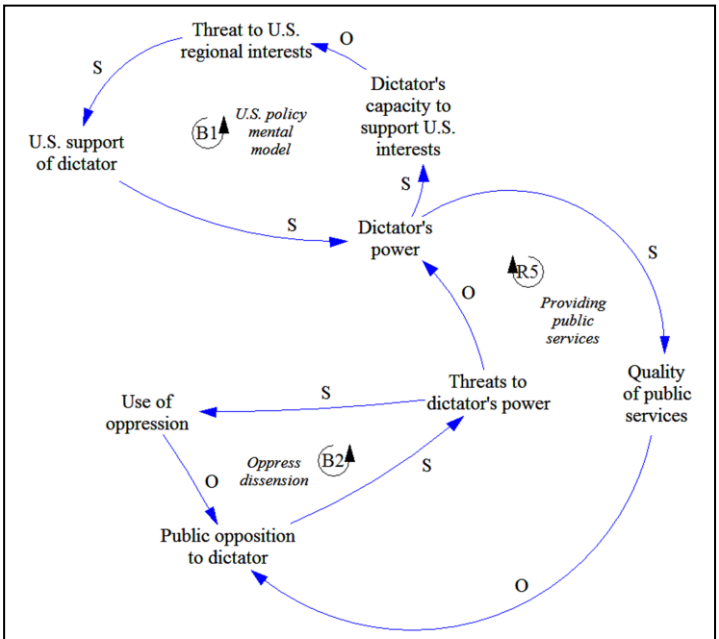


Figure 3: U.S. and Dictator strategies for influencing their respective table variables (Loops B1, R5, and B2)

Figure 3 shows both the U.S. and the dictator's respective strategies for achieving their goals. The U.S. strategy is represented as a balancing feedback loop (***B1: U.S. policy mental model***). The greater the threat to U.S. interests, the more the U.S. offers support to the dictator in order to place resources where needed. The goal is to reduce the threat to U.S. regional interests, thereby moving toward an acceptable (and relatively steady) threat level.

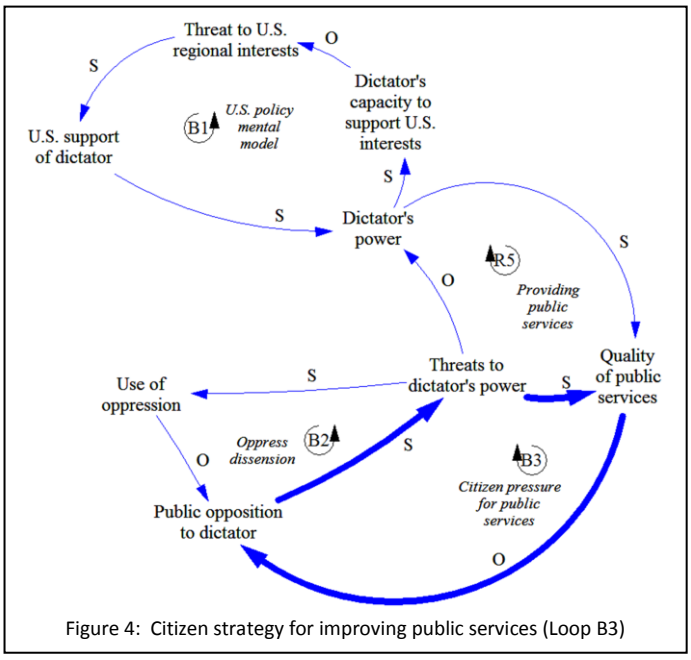


Figure 4: Citizen strategy for improving public services (Loop B3)

The dictator employs two different strategies for securing power. One strategy is to use oppressive methods of intimidation to keep opposition to a small and manageable level (***B2: Oppress dissension***). The

other strategy is to continually grow his power base by providing increasingly better public services for the local population (***R5: Providing public services***), thereby winning public support.

Figure 4 adds the strategy of the citizens to the previous diagram. The citizen strategy is highlighted with bolder causal links in order to make it more visible. The citizen strategy is shown as a balancing feedback loop in which the citizens judiciously apply pressure to the dictator in response to inadequate public services. This is done in hope of motivating the dictator to address their concerns by improving those services (***B3: Citizen pressure for public services***). Notice from this more complete diagram that the dictator responds two ways to public opposition: one way is by improving public services (loop B3), and the other is through aggressive oppression (loop B2). Which of these two feedback loops dominates the dictator's behavior can vary over time and with changing circumstances.

The strategy pursued by the local rebel groups involves two feedback loops, shown as loops R3 and R6 in Figure 5. The core of the rebel strategy is to use propaganda about the dictator's abuses to build credibility for their cause and to provoke the dictator to even more abuses (thereby further enhancing the rebel cause). The propaganda provokes the dictator to more abuses by threatening his power in two ways: it marshals public opposition (***R6: Propaganda and public opposition***), and it enhances the influence of the rebel groups (***R3: Rebel group influence dynamics***).

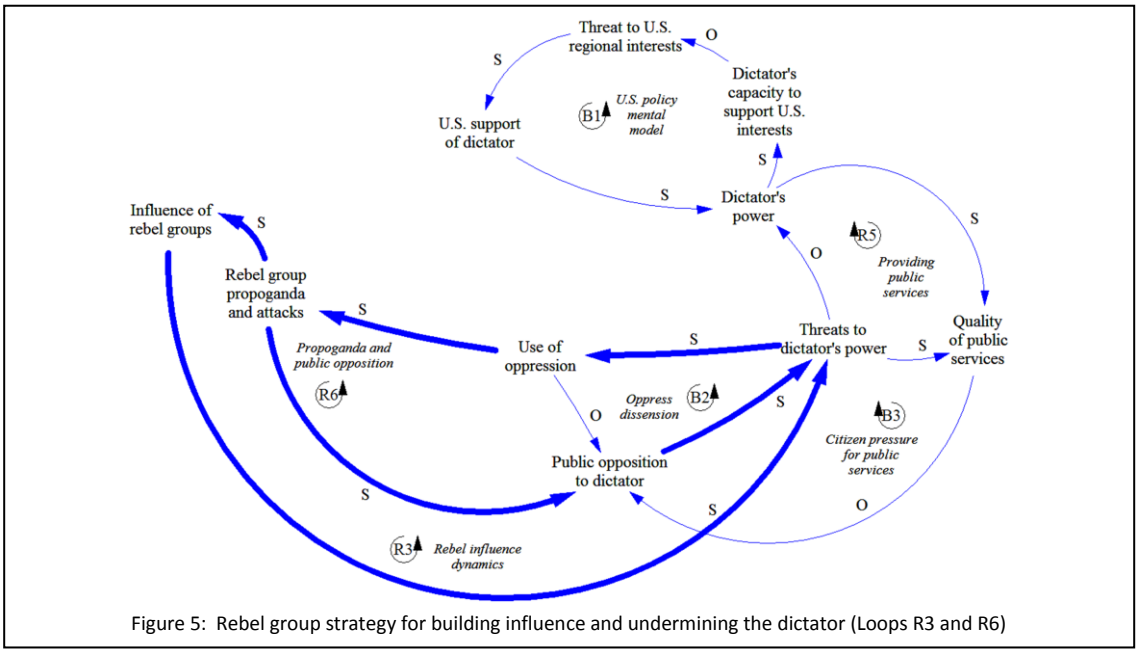


Figure 5: Rebel group strategy for building influence and undermining the dictator (Loops R3 and R6)

5.3. Accounting for Unintended Consequences of Player Interactions

Figure 5 shows the strategies by which each player hopes to move their table variables in the desired direction. Clearly the goals of some players are incompatible with those of other players. In addition, since each player is focused on their own table variables, the game

can take unexpected turns as a result of the collective actions of all the players. Hence, at this point in the analysis, the analytical team should reflect on the CLD developed so far in order to identify ways in which unexpected or unintended consequences might arise.

Figure 6 highlights one unintended consequence of the dictator's actions by highlighting an additional feedback loop (***R7: Powder keg***). This represents the reality that (over a possibly long period of time), the dictator's abuses can load a "powder keg" of resentment in the local populace. This powder keg can erupt into more public opposition, fueling a self-reinforcing cycle of abuse, opposition, and more abuse. The delay on this feedback loop indicates that this reinforcing dynamic may not exert much influence for some period of time, but that it could eventually gain enough momentum to dominate the behavior of the system.

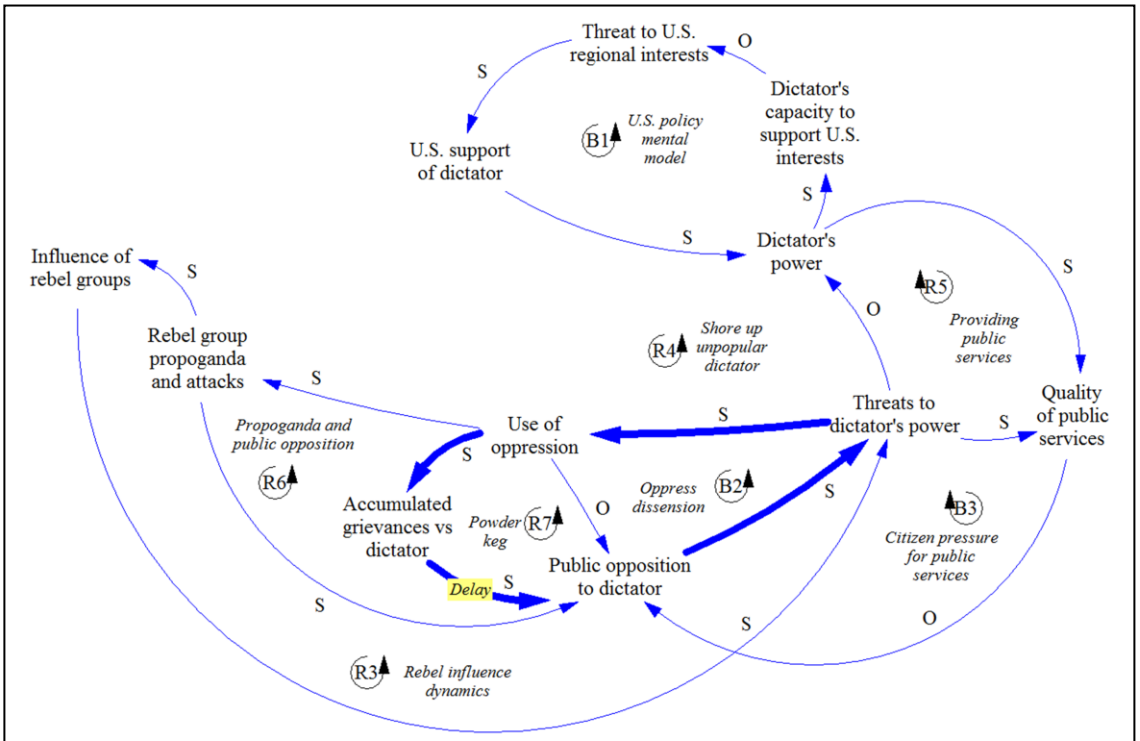


Figure 6: The "powder keg of resentment – An unintended consequence of the dictator's strategy (Loop R7)

Figure 7 highlights three unintended feedback dynamics that emerge from the U.S. support of the dictator. All of these of these dynamics are present because the U.S. policy of support to the dictator creates a situation in which we turn a blind eye to the dictator's abuses (as represented by the variable *U.S. tolerance of human rights abuses*). This tolerance enables the dictator to pursue with impunity oppressive measures against his opposition. This all works to create a set of reinforcing dynamics in which U.S. interests are increasingly threatened as long as

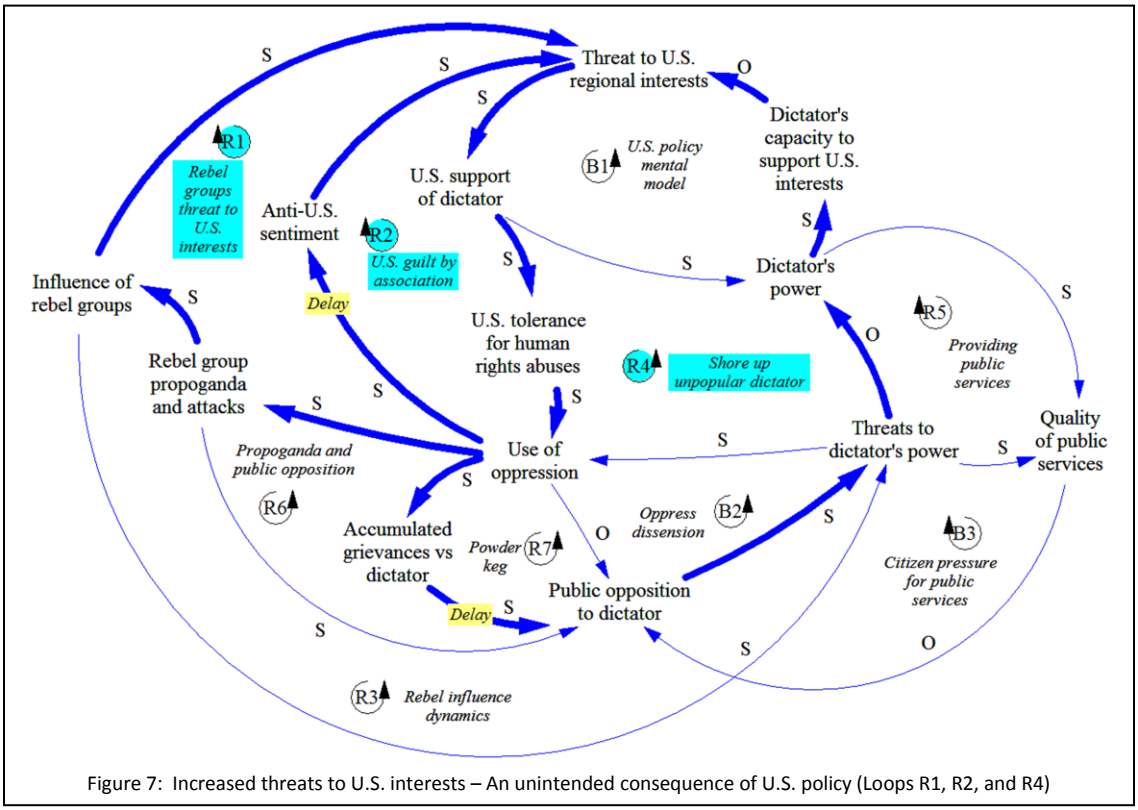


Figure 7: Increased threats to U.S. interests – An unintended consequence of U.S. policy (Loops R1, R2, and R4)

we support the dictator. First, our tolerance of the dictator's abuses and his continued oppression of his people fuels a "powder keg" of local opposition that can erupt to undermine the dictator's power and necessitate increased support from the U.S. in order to shore up the dictators eroding power base (***R4: Shore up unpopular dictator***). Second, the U.S. government is increasingly associated with the dictator's abuses, leading to growing opposition from the local populace and rebel groups inside the country, further threatening our interests in the region (***R1: Rebel groups threat to U.S. interests*** and ***R2: U.S. guilt by association***).

Figure 8 represents the complete picture of the game dynamics for this example. As such, it serves as a hypothesis describing the most important feedback dynamics that determine how the prospects of the various players might evolve during the game. For example, we can see that if the unintended consequences of the dictator's strategy (loop ***R7***) begin to dominate the game, then the U.S. might find that its own interests face an increasing threat level. As a result (if the U.S. keeps its current strategy), this may lead to ever-increasing support of the dictator in order to restore stability. On the other hand, if the rebel groups and public opposition

to the dictator fail to gain momentum through loops ***R3***, ***R6***, and ***R7***, then the dictator may successfully maintain control of his country and continue as a productive U.S. ally.

The goal at this stage is not to predict which of these outcomes is most likely, but rather to explore the causal structure in Figure 8 in order to identify possible wild card scenarios that could significantly impact the future of the game. By so doing, the analytical team can develop alternative courses of action in the presence of those wild cards and might be able to anticipate possible actions that would be taken by the other players in the game.

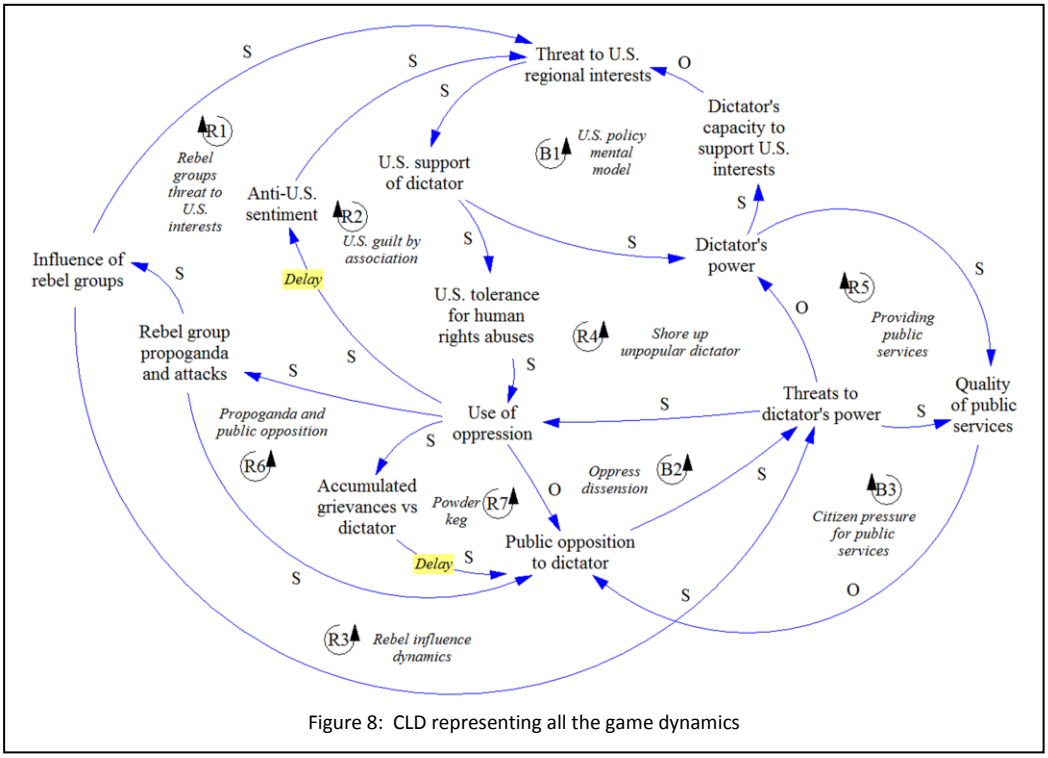


Figure 8: CLD representing all the game dynamics

5.4. Using Causal Distance from Feedback to Identify Potential High-Leverage Points in the System

By definition, and wildcard scenario is any event or combination of circumstances that so impacts the game dynamics as to create game-changing opportunities for one or more players in the game. We will use the dynamic hypothesis represented in the game dynamics CLD (Figure 8) to look for high-leverage elements in the system structure that might present opportunities for such scenarios. Given that the "engine" of the system is found in the feedback dynamics, we will look for elements of the system that have potential to impact a large number of those dynamics.

In this paper we identify as "high-leverage" those system variables that, in some sense, can have a significant, cascading effect on the feedback dynamics in the game dynamics CLD. We propose a metric called the ***causal distance from feedback*** for measuring how "far"

each variable is from the collective feedback dynamics in the system. This measure should be small for variables that either participate in or are close (in terms of causal linkage) to the feedback loops we've identified. It should be large for variables that participate in few feedback loops or that are far from the feedback loops in the CLD. Scenarios that significantly impact one or more of those variables with the lowest causal distance from feedback are candidate wild card scenarios.

We define causal distance from feedback using the following rules.

Rules for Determining Each Variable's Causal Distance from Feedback

1. A variable's overall causal distance from feedback is determined by calculating its causal distance from each feedback loop in the CLD and adding up across all the feedback loops.
2. A variable's causal distance from a given feedback loop is determined by the smallest number of causal links between it and any variable in the loop, when traveling in the direction of causal influence (i.e. by traveling with the direction of the arrows of the causal links in the CLD).
3. If any variable is part of a given feedback loop, its causal distance from that loop is zero.
4. If it is impossible to follow the causal links from a variable to a given feedback loop, then the variable's distance to that feedback loop is equal to the number of variables in the CLD.

To illustrate this concept, refer feedback loop ***B1*** in Figure 8 (***U.S. policy mental model***). This feedback loop involves the variables *Threat to U.S. interests*, *U.S. support of dictator*, *Dictator's power*, and *Dictator's capacity to support U.S. interests*. The causal distance of each of these variables from loop B1 is zero. The causal distance of the variable *U.S. tolerance for human rights abuses* from loop B1 is 3, since there are at least three causal links between this variable and that loop (assuming we travel ***with*** the direction of causal influence).

Table 2 shows the ***causal distance from feedback*** of all the variables in Figure 8. For each variable, this value is obtained by adding up the distances from each of the individual loops. Notice that some variables (i.e. *Influence of rebel groups, Threats to dictator's power, Use of oppression, Public opposition to dictator*) have a very low causal distance from feedback compared to the others, indicating that events or circumstances that individually or collectively target these variables could have a significant cascading influence on the feedback dynamics in the system. At the other extreme, variables with a high causal distance (i.e. Dictator's capacity to support U.S. interests or Anti-U.S. sentiment) have less potential as targets of game-changing scenarios.

Table 2: Causal Distance Calculations for the Game Dynamics CLD in Figure 8

Variable	Distance From Individual Loops										Causal Distance from feedback
	R1	R2	R3	R4	R5	R6	R7	B1	B2	B3	
Threat to U.S. regional interests	*0*	*0*	*3*	*0*	*2*	*3*	*3*	*0*	*3*	*3*	**17**
U.S. support of dictator	*0*	*0*	*2*	*0*	*1*	*2*	*2*	*0*	*2*	*2*	**11**
Dictator's capacity to support U.S. interests	*1*	*1*	*4*	*0*	*3*	*4*	*4*	*0*	*4*	*4*	**25**
Anti-U.S. sentiment	*1*	*0*	*4*	*1*	*3*	*4*	*4*	*1*	*4*	*4*	**26**
Dictator's power	*2*	*2*	*2*	*0*	*0*	*2*	*2*	*0*	*2*	*1*	**13**
Influence of rebel groups	*0*	*1*	*0*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	**8**
Rebel group propaganda/attacks	*0*	*2*	*0*	*2*	*2*	*0*	*1*	*2*	*1*	*1*	**11**
U.S. tolerance for human rights abuses	*0*	*0*	*1*	*0*	*3*	*1*	*1*	*3*	*1*	*2*	**12**
Threats to dictator's power	*1*	*1*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	**3**
Quality of public services	*3*	*3*	*2*	*1*	*0*	*1*	*1*	*3*	*1*	*0*	**15**
Use of oppression	*0*	*0*	*0*	*0*	*2*	*0*	*0*	*2*	*0*	*1*	**5**
Accumulated grievances vs dictator	*3*	*3*	*2*	*0*	*2*	*1*	*0*	*3*	*1*	*1*	**16**
Public opposition to dictator	*2*	*2*	*1*	*0*	*1*	*0*	*0*	*2*	*0*	*0*	**8**

6. Exploring an Extended Example: Wild Card Analysis In Action, Stage 3: Winning the Game

At this point in the analysis, we exploit the insights gained from the previous steps to define potential wildcard scenarios that might "change the game." These scenarios may provide immediate advantages to one or more players, or they may place the interests (i.e. table variables) of all the players at risk. The goal is to identify one or more potential game changing scenarios and explore how the various players might respond to either maximize their "winnings" or minimize their losses.

In addition, wildcard scenarios might be the result of actions taken by one or more players in the game. They might be the result of actions taken by new players who have chosen to enter the game, or they might come about as a result of such things as natural disasters. The steps in this stage are:

Step 9: For each variable in the game dynamics CLD, **identify two possible wild card events**: one that dramatically increases the value of that variable and one that dramatically decreases the value of that variable.

Step 10: From the events defined in step 9, select those that have the highest probability of occurrence and that involve variables with low causal distance to feedback.

Step 11: For each event you select in step 10, adapt the original CLD to account for the impact on the game dynamics and evaluate the implications for how the future might unfold.

Step 12: Identify conditions under which each player could win and under which each player could lose under each wild card event, given the implications for the game dynamics.

6.1. Identifying Two Potential Wild Card Events for Each Variable in the Game Dynamics CLD AND Selecting Wild Card Events Based on Probability and Impact

Table 3 illustrates these steps for the variables in the game dynamics CLD (Figure 8). Note that the variables have been ordered in this table from lowest to highest causal distance to feedback. Note also that, along with a brief description of each wildcard event, an estimate of the probability of that event (low, medium, or high) is given in parentheses. High or medium probability events near the top rows of the table are good candidates to explore as potential wild card scenarios. Several such events are indicated with bold outlines. The analytical team can choose whether to explore some or all of these events, based partly on their potential to evoke new ideas and options for consideration. For purposes of this illustration, only one such event will be explored…the event of a major earthquake that severely cripples public services in the dictator's country (highlighted in red in the table).

Variable	Causal distance from feedback	Event to make it decrease (probability)	Event to make it increase (probability)
Threats to dictator's power	3	***Dictator finds and kills leadership of rebel groups (high)***	***Revolution "contagion" from neighbors spills over into dictator's country (high)***
Use of oppression	5	*Coalition of EU nations brokers peace talks between rebels and dictator (low)*	***Failed assassination attempt on dictator's life (medium)***
Influence of rebel groups	8	*Rebel groups attack government assets and kill numerous civilians (low)*	*State adversary of U.S. openly endorses rebel group cause (Low)*
Public opposition to dictator	8	*Dictator embraces reforms to allow more representation in government (low)*	*Rebel groups infiltrate dictator's government to acquire and broadcast incriminating information about abuses (low)*

U.S. support of dictator	11	***U.S. resources to dictator are funneled to terrorist groups who attack U.S. assets (medium)***	***Dictator provides critical intel enabling U.S. to dismantle a major terrorist group (medium)***
Rebel group propaganda/attacks	11	***Dictator finds and kills leadership of rebel groups (high)***	*Rebel groups infiltrate dictator's government to acquire and broadcast incriminating information about abuses (low)*
U.S. tolerance for human rights abuses	12	*Rebel groups infiltrate dictator's government to acquire and broadcast incriminating information about abuses (low)*	***Terrorist adversaries of U.S. form alliance with rebel groups in dictator's country (medium)***
Dictator's power	13	***Large oil field discovered in dictator's country (medium)***	***Revolution "contagion" from neighboring countries spills over into dictator's country (high)***
Quality of public services	15	***Major earthquake hits the region, severely crippling public services (high)***	***U.S. adversary woos dictator by providing major support for infrastructure projects (high)***
Accumulated grievances vs dictator	16	*Dictator embraces reforms to allow more representation in government (low)*	*Military crackdown by dictator (medium)*
Threat to U.S. regional interests	17	*Dictator provides critical intel enabling U.S. to dismantle a major terrorist group (medium)*	*A state adversary of the U.S. engineers coup in cooperation with rebel groups (low)*
Dictator's capacity to support U.S. interests	25	*Dictator is assassinated (low)*	*Dictator's neighbors provide safe-haven to terrorist groups threatening U.S. (high)*
Anti-U.S. sentiment	26	*Dictator embraces reforms to allow more representation in government(low)*	*U.S. invades neighboring country to eliminate terrorist groups harbored there (med)*

Table 3: Potential Antecedent Events for Wild-Card Scenarios

6.2. Account for the Wildcard Event's Impact on the Game Dynamics and Describe How the Future Might unfold, Given These Impacts.

Given this "wildcard" antecedent event, its potential impact on the dynamics of this game can be explored by returning to the original game dynamics CLD and modifying it to

account for this event. Figures 9-12 unfold a new set of dynamics that arise as a result of this event. What follows below is a description of these consequent dynamics and their implications for the players in the game.

Figure 9: Initial impact of the earthquake

The initial impact of the earthquake is shown by introducing the variables *Earthquake magnitude*, *Damage to existing service infrastructure*, and *Time to restore public service*. An initial examination suggests a potentially devastating impact on the dictator's ability to rule. The earthquake damages the service infrastructure, which has an immediate impact on the quality of public services. Moreover, the greater the damage, the longer the time required to repair this infrastructure. This repair delay can further feed the *accumulated* grievances against the dictator and ignite of a cycle of protest, oppression, and more protest (***R7: Powder keg***). In addition, the damage to infrastructure provides an immediate opportunity for the rebel groups, who can use the loss in government services as a propaganda windfall, thereby garnering public support for their cause and threatening the dictator (***R6: Propaganda and public support and R3: Rebel influence dynamics***).

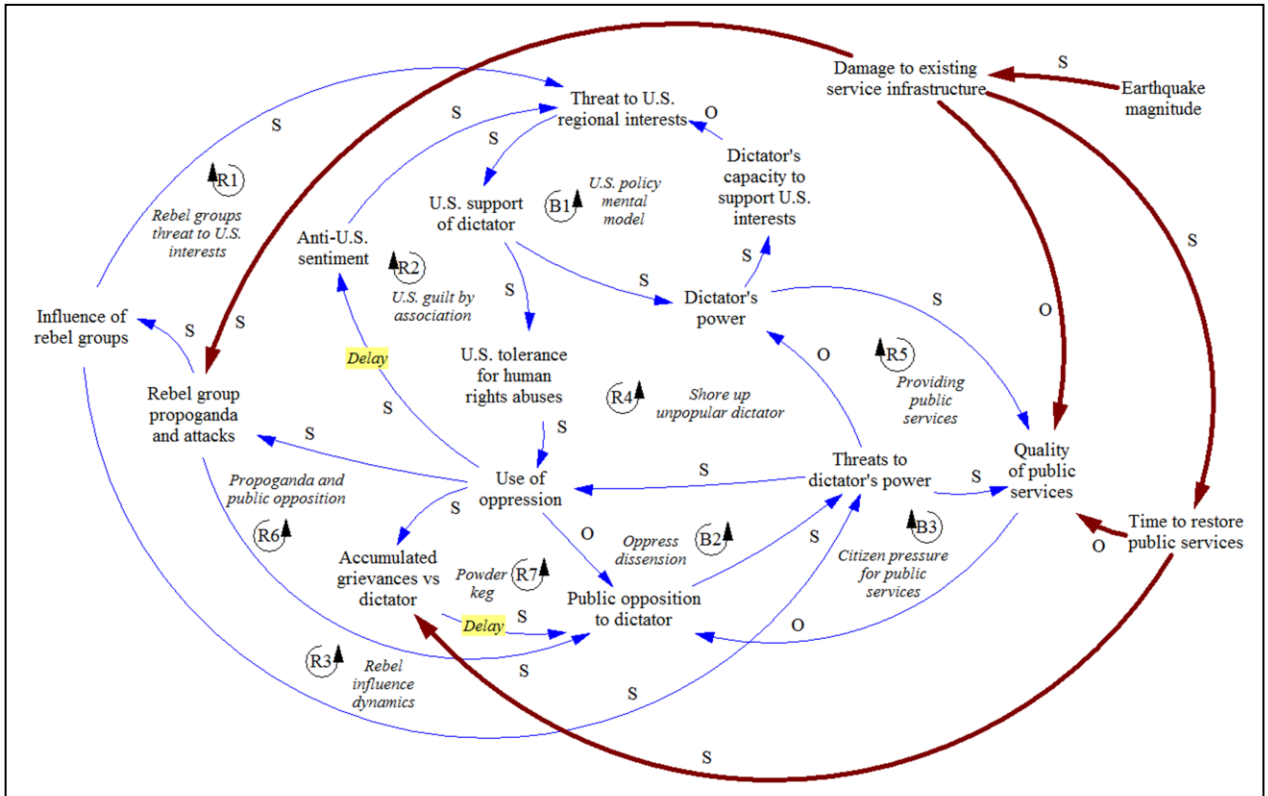


Figure 9: Wildcard game dynamics, part 1: Initial Impact of the earthquake

Figure 10: The Dictator's Options – Exploiting reinforcing feedback dynamics

While the destruction of the service infrastructure provides a threat to the dictator's power, it also

presents an opportunity and an important choice for the dictator. If he aggressively exercises his power in order to restore public services in a timely manner, he can exploit some reinforcing dynamics to secure and increasingly strengthen his position (***R5*: RESTORING public services*** and ***R8: Government timeliness and citizen tolerance***). On the other hand, if the dictator responds with oppression to the rebel group propaganda and public concerns in the earthquake's aftermath (***B2: Oppress dissension***), he can, at best, maintain his position, but will at the same time feed reinforcing dynamic of escalating violence and opposition (***R6: Powder keg***).

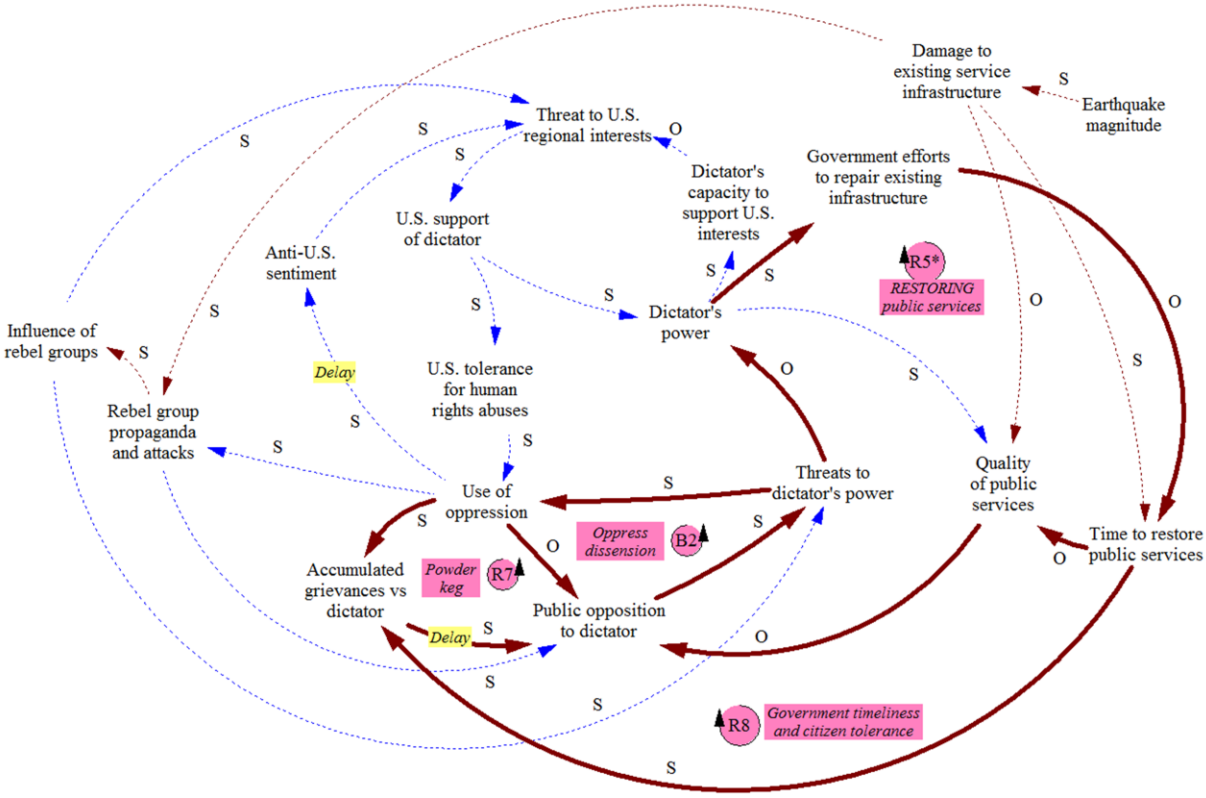


Figure 10: Wildcard game dynamics, part 2: The Dictator's options – Strengthen position by concentrating on public service restoration ***(R5* and R8***) or by relying on oppression to quell the inevitable public outcry (***B2***). The oppression policy can, at best, maintain a "stead-state" level of control, while at the same time fueling a cycle of ever-increasing protest (***R7***). The restoration of public services can build good will and grow his support.

Figure 11: An new opportunity for the rebel groups

The earthquake also presents a new opportunity for the rebel groups to significantly enhance their position and weaken the dictator, assuming they have the resources to act. This opportunity is represented by reinforcing feedback loop ***R3*** (***Rebel groups fill the service gap***). In the aftermath of the disaster, the loss of public services can have a devastating impact on the social fabric of the country and (consequently) on the dictator's ability to provide those services. If the rebel groups act quickly to step into the resulting service gap by providing essential services and supplies in critical regions, they will grow their influence and weaken the dictator's stature and

ability to rule. This can build momentum that can eventually fuel dynamics that can lead to open protests and an erosion of the dictator's rule.

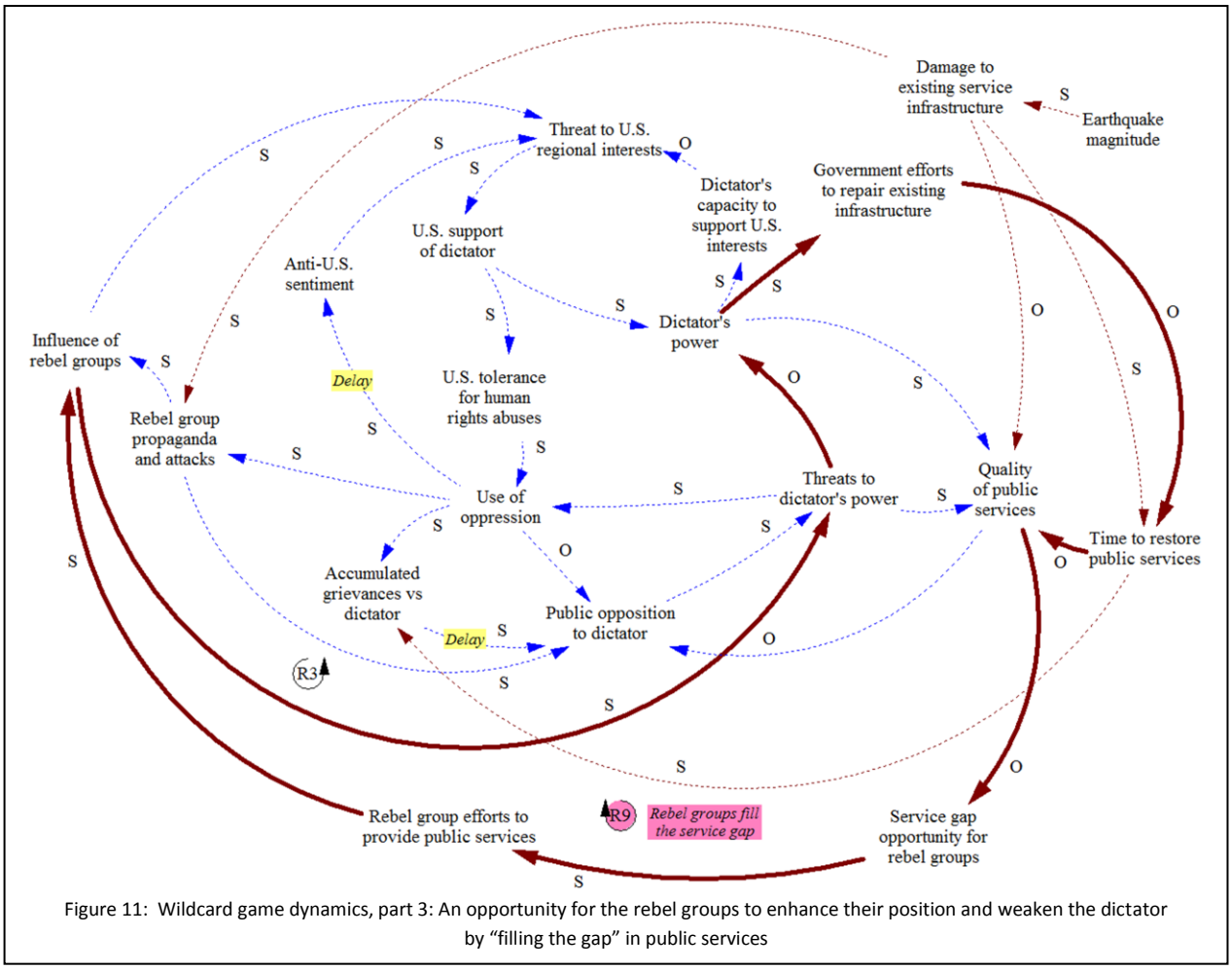


Figure 11: Wildcard game dynamics, part 3: An opportunity for the rebel groups to enhance their position and weaken the dictator by "filling the gap" in public services

Figure 12: Implications for the U.S.

It is in the interests of the U.S. to assure stability in the dictator's government in the aftermath of the disaster. Hence, an obvious action is to supply humanitarian aid to the dictator's government in order to assure that public services are quickly restored (***B10: U.S. disaster relief***). In addition, this could diffuse anti-U.S. sentiment and reduce the potential risks to U.S. interests (not shown in Figure 12). However, if this aid is not used as intended or if it is diverted by the dictator's government to other ends (including possibly for suppression of the internal opposition), then the anti-U.S. sentiment will continue to grow, further threatening U.S. interests (***R2 and R1***).

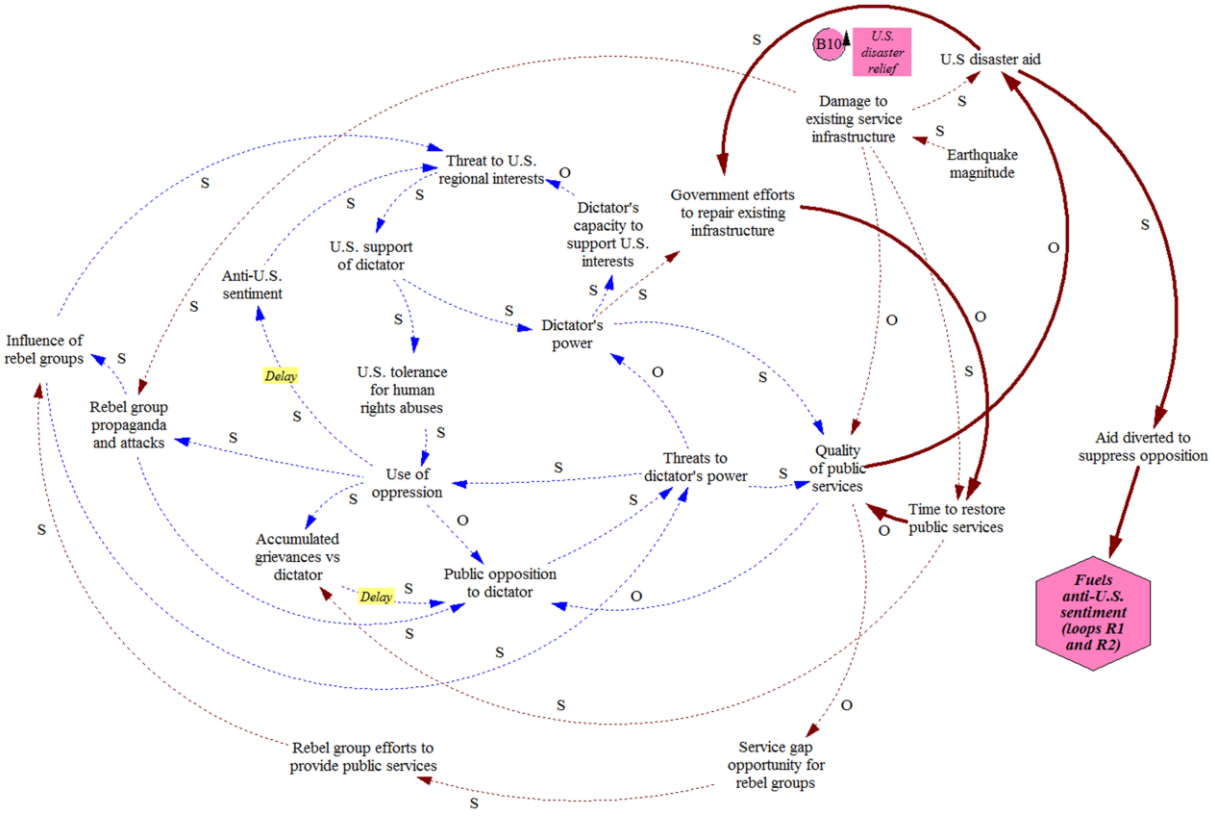


Figure 12: Potential move by the U.S. – Provide disaster relief aid to restore stable public services and help secure the dictator's position; closely monitor to assure aid is used for intended purposes in order to avoid exacerbating anti-U.S. sentiment.

6.3. Identify Conditions Under Which Each Player Could Win and Under Which Each Player Could Lose under Each Wild Card Event, Given the Implications for the Game Dynamics.

The analysis done to this point provides insights about how each player could react to the wildcard event to maximize their chances of driving their table variables in the desired direction. For some players, their original strategy may still be a viable approach to winning. However, for others, the old strategy may need to be modified or altogether abandoned in response to the new game dynamics. The purpose of the analysis at this final step is to summarize the insights to discern potential moves or changes in strategy that each player might need to consider in order to "stay in the game."

Player	Table variable(s)	Original strategy	Implications from the wildcard	Options for staying in the game
U.S. government	• Threat to U.S. regional interests	Provide support to the dictator in order to secure his help with U.S. interests	Restoration of public services is critical to the survival of the dictator's government and to the U.S. strategy. However, if the dictator persists in oppressive measures in the aftermath, things could quickly unravel for the U.S. as rebel groups exploit the loss of services and gain influence through propaganda and by filling the service gap.	• STAYING IN THE GAME o Provide immediate and significant aid to the host government for the purpose of rebuilding the damaged infrastructure o Provide strict oversight and assure transparency of use of aid (to avoid further "guilt by association" with dictator abuses) o Work through diplomatic channels with dictator to emphasize opportunity to strengthen his position by restoring services o Long-term: Use as an opportunity to pressure dictator to a more open government. o LOSING THE GAME o Stand by without providing aid o Fail to assure transparency in the use of aid o Continue tolerance of dictator's abuses
Dictator	• Dictator's power	Secure power by providing public services and by aggressively oppressing opposition	The earthquake creates an immediate crisis for the dictator's position. Rebel groups will quickly exploit the loss of services to fuel their propaganda and build public opposition to the dictator. Restoration of public services is critical to survival of the dictator's government and is his best option for staying in power. In addition, the dictator's policy of aggressive oppression of opposition will at best maintain his power in the short term, but will fail to increase his stature and support among the people. It also runs the risk at this critical time of igniting an outright revolt, given the accumulated grievances from the past.	• STAYING IN THE GAME o Place a top priority on restoring public services, including focusing all resources toward this end o Abandon oppressive methods for addressing opposition. Use military and police only for protection of citizens and to maintain overall order. o Reach out to U.S. and other allies for aid. Submit to requirements for transparent use of that aid • LOSING THE GAME o Respond to the inevitable criticism and protests (due to lack of services) with violence and oppression o Exclude outside aid o Use outside aid for self-gain or to underwrite oppressive policies
Local citizens	• Abuses of power by dictator • Quality of public services	Apply pressure to the dictator's government to provide adequate public services.	The local citizens have the least power and fewest options in the aftermath of this event. Public services will be severely diminished. The rebel groups may seek to foment rebellion, or (at the least) seek to undermine the dictator's government by pointing out failures to restore services. Siding with the rebels poses an uncertain future. Waiting for the government to restore services is the only viable option, even with the attendant risks.	• STAYING IN THE GAME o Give the government time to address the problem. o If no progress is evident, other actions may be necessary, including emigration or appeals to the international community. • LOSING THE GAME o "Take to the streets" in protest against the government (in the short term) and ignite a cycle of violence
Rebel groups	• Dictator's power • Influence of rebel groups	Openly oppose the dictator through propaganda campaigns provoke his abuse and turn public opinion in their favor	The earthquake poses a great opportunity for the rebel groups, particularly if the dictator continues to focus on oppressive measures to maintain power. In the aftermath of the disaster, the loss of public services creates a national crisis that can only be addressed if the dictator directs all resources to the restoration of services. If the dictator successfully does this, then the rebel groups' cause suffer significant setbacks. If the dictator is not successful, or if he continues to rely on oppression, the rebel groups can "step in the gap" and provide services, while also continuing to spread propaganda about the dictator's failings.	• STAYING IN THE GAME o Continue strategy of propaganda, in hopes of fomenting popular resistance in light of the failed public services o If the dictator responds with violence, the rebel groups' cause is greatly enhanced. o Seek opportunities to "fill the service gap" where possible, by providing services to citizens where the government has failed. • LOSING THE GAME o Work to destroy or delay government rebuilding efforts o Fail to provide public services, where needed

7. Conclusion: Where Analysts Can Best Employ This Method

Apart from analysts in specially focused "futures analysis" shops, intelligence professionals will rarely be explicitly asked by their customers to develop a wild card analysis. However, this approach would benefit customers in a wide variety of contexts. Many customers have an ongoing interest in the development of a problem over time whether it is region of the world such as East Asia or the Middle East, or it is a major topic such as counterterrorism, counternarcotics, or counterproliferation. In all cases, the analysts will have to develop (even if implicit) a mental model of the problem and how it is evolving over time. These models are subject to wild card events that could radically disrupt their projections for the future, as well as the courses of actions their consumer is taking. An analyst who understands wild card analysis and how to use it will be more sensitive to these possible events and how to prepare their consumers for them when they occur. For, above all else, they make everyone aware that surprising events do not have dramatic consequences simply because they happen, but rather because of how everyone responds. An analyst that can help their customer respond to have the dramatic effects benefit them will thereby be a better analyst.[xiv]

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[i] Consider, for example, Edward Cornish, *Futuring: The Exploration of the Future* (Bethesda, MD: World Futures Society, 2004); Gill Ringland, *Scenario Planning.* (New York: Wiley & Sons, 1998); Peter Schwartz, *The Art of the Long View: Planning for the Future in an Uncertain World.* (New York: Doubleday, 1991).

[ii] Consider, for example, Richards J. Heuer, and Randolph H. Pherson, *Structured Analytic Techniques for Intelligence Analysis* (Washington, DC: CQ Press, 2011).

[iii] See, for example, Nassim Nicholas Taleb, *The Black Swan* (New York; Random House, 2007).

[iv] See, for example, Martin Barber, Wildcards-Signals from a Future Near You." *Journal of Future Studies*, 11:1.

[v] Just in case the reader is wondering, this example is not made-up, but is the (slightly simplified) way wild cards work in the 2004 international board game of the year (Spiel des Jahres) called "Ticket to Ride" published by Days of Wonder. In the game, the sets of colored cards are turned in to claim train routes on a map in order to (ultimately) both score points for the routes as well as larger tickets that consist in several routes.

[vi] For examples of critical thinking in general consider in intelligence analysis, see Richard Paul and Linda Elder. *Critical Thinking: Learn the Tools the Best Thinkers Use* (New Jersey, Pearson Prentice Hall, 2006); Gregory Bassham, William Irwin, Hendry Nardone, and James M. Wallace, *Critical Thinking: A Student's Introduction* (Boston: McGraw Hill, 2005); Irving I. Copi, Carl Cohen and Daniel E. Flage, *Essentials of Logic* (New Jersey: Pearson Prentice Hall, 2007); William Hughes and Jonathan Lavery. *Critical Thinking: An Introduction to the Basic Skills* (New York: Broadview Press, 2004); Ronald Munson, David Conway, and Andrew Black, *The Elements of Reasoning* (Belmont, CA: Wadsworth, 2004); Joel Rudinow and Vincent E. Barry. *Invitation to Critical Thinking.* (Belmont, CA: Wadsworth, 2004); Lewis Vaughn. *The Power of Critical Thinking.* (New York: Oxford University Press, 2008). For examples of critical thinking in intelligence analysis, consider Noel Hendrickson, "Critical Thinking in Intelligence Analysis,"

International Journal for Intelligence and Counterintelligence, Winter 2008, Vol. 21, No. 4, 679-693; David T. Moore, *Critical Thinking and Intelligence Analysis* (JMIC Press, 2006).

[vii] For examples of game theory, or the related field of decision theory, consider Steven J. Brams, *Game Theory and Politics* (The Free Press, 1975), *Rational Politics*, (CQ Press, 1985); Peter Gärdenfors and Nils-Eric Shalin, *Decision, Probability, and Utility: Selected Readings* (Cambridge, MA: Cambridge University Press, 1988); Richard Jeffrey, *The Logic of Decision.* (Chicago: University of Chicago Press, 1983); Rose McDermott, *Risk-Taking In International Politics* (MI: Michigan University Press, 1998); James D. Morrow. *Game Theory for Political Scientists.* (Princeton, NJ: Princeton University Press, 1994).

[viii] Consider Noel Hendrickson, *Counterfactual Reasoning: A Basic Guide for Analysts, Strategists, and Decision-Makers,* Army War College: Proteus USA, 2008; also of interest may be his "Applied Counterfactual Reasoning," in Shlomo Argamon and Howard Newton-Smith (eds.), *Computational Methods for Counterterrorism*, Springer, 2009, 249-262. "Counterfactual Reasoning, Structured Scenario Fusion, and Futures Analysis," in John Auger and William Wimbish (eds.), *Proteus Futures Digest: Second Edition*, Army War College, 2008, pp. 181-196; and "Counterfactual Reasoning and the Problem of Selecting Antecedent Scenarios," *Synthese*, 2012, Volume 185, Number 3, Pages 365-386.

[ix] Sterman (2000). ***Business Dynamics: Systems Thinking and Modeling for a Complex World*.** Irwin McGraw-Hill, Boston, MA.

[x] In a healthy forest ecosystem, most naturally occurring fires keep the forest healthy by "pruning back" the undergrowth such fires burn close to the ground and do minimal damage to mature trees. If the undergrowth density is high, however, fires can grow in heat and intensity to the point that they climb up the trunks of mature trees and ignite the forest canopy. Such ***crown fires*** are explosive, extremely difficult to control, and can develop into "mega-fires" that destroy millions of acres of forest.

[xi] See Meadows (1999). ***Leverage Points: Places to Intervene in a System***. Sustainability Institute.

[xii] Meadows, ibid.

[xiii] Much could be said about how to validate a CLD against reality so that the system structure it represents is reasonably consistent with reality. We will save the discussion of validation for another paper and proceed under the assumption that the CLD has in fact undergone an appropriate validation and "vetting" process.

[xiv] The research for this paper was sponsored under the IARPA ACE Project, and the DAGGRE Forecasting Team at George Mason University specifically. Thanks to both IARPA and the C4I team at GMU for their support. Earlier versions of this work were also presented at several conferences including DAGGRE Decision and Judgment Analysis Training Workshop, March 18, 2012; Five Eyes Analytic Training Workshop, University of Mississippi, March 8, 2012; Five Eyes Analytic Training Workshop, Bolling AFB, Washington DC, November 2, 2011. Thanks to all the participants for their feedback.