



Graduate Capstone Design Project

Assessing Transition of Security Operations in Afghanistan

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Executive Summary

Since the Taliban was removed from power in late 2001, U.S. and Coalition forces have been working towards the goal of constructing a liberal democratic government capable of ruling Afghanistan. This requires the transition of security operations within the country to the Afghan people. To measure this transition, however, there must be an objectively derived metric to gauge the progress U.S. and Coalition Forces have made.

The process of deriving the metrics must be two-fold. First, the commanders from the five main military regions across the country need to collect data on the ground to create a comprehensive picture of the status of security in that region. Second, the data is sent to CJ7 in Kabul, where it is stored and analyzed. From the data collected each month, a weighted metric can be determined to grade the progress of the security transition, as well as provide a more detailed look at which areas have improved or need improvement.

The data being collected span across a wide spectrum of issues, including economy, transportation, government, law, general well-being and, most importantly, security. These data points, collected via surveys sent to district commanders, help to construct metrics describing the five Lines of Operation, or LOOs, and how close the Coalition forces are to achieving full transition. These LOOs are:

1. Accelerate growth of the Afghanistan National Security Forces (ANSF)
2. Achieve security for the Afghan people
3. Marginalize malign actors
4. Achieve legitimate, responsive and accountable governance
5. Facilitate community development

Creating metrics to measure these five areas not only allow our forces to produce a single aggregate metric, but to find areas that need improvement, and pinpoint weak areas in the transition process. This will help to reduce the strain on resources and smooth the process of transition to a fully autonomous Afghan state.

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1 Introduction

1.1 Background

On October 7, 2001, a coalition of forces including the United States began combat operations in Afghanistan and eventually removed the Taliban government from power. While combat operations are still being conducted, the coalition is attempting to rebuild the nation to govern itself, care for its people and equip it to defend itself from all internal and external threats. A key aspect of that goal is the transition of security operations from the NATO/US led forces to Afghani units.

The mission of the NATO Training Mission-Afghanistan (NTM-A)/Combined Security Transition Command-Afghanistan (CSTC-A), in partnership with the Government of the Islamic Republic of Afghanistan and the international community, is to plan, program and implement structure, organizational, institutional and management reforms of the Afghanistan National Security Forces (ANSF) in order to develop a stable Afghanistan, strengthen the rule of law, and deter and defeat terrorism within its borders.

NTM-A/CSTC-A provides advisors, mentors and trainers to help both the Ministry of Defense and Ministry of Interior organize, train, equip, employ and support the ANSF in order to defeat the insurgency, provide internal security, extend and enforce the rule of law, set conditions for economic development, and gain the trust and confidence of the citizens of Afghanistan.

Mission success for NTM-A/CSTC-A is defined as fielding an ANSF that is professional, literate, ethnically diverse, tactically competent and capable of providing security throughout Afghanistan. ^[1]

1.2 Problem Statement

President Obama and U.S. Army General McChrystal, the commander of the International Security Assistance Force (ISAF) in Afghanistan, have announced their goal of transferring the lead for security operations to the Afghan government. In order to support this goal, our study sponsor, the Deputy Director of Force Integration and Training (CJ7), Combined Security Transition Command - Afghanistan (CSTC-A), has defined five requirements, or Lines of Operation (LOO), that support the overall goal of transferring the lead for security operations to the Afghan government. CJ7 is focusing on two of the five LOOs, which they see as paramount to the successful transition of security operations in Afghanistan:

- Accelerate growth of the Afghan National Security Forces (ANSF)

- Achieve security for the Afghan population.

The three remaining LOOs, listed below, are viewed by CJ7 staff as supporting the two main LOOs:

- Marginalize malign actors
- Achieve legitimate, responsive and accountable governance
- Facilitate community development

The objective is to develop metrics to measure progress against each of these five goals, or LOOs, and to use these metrics in a model that provides feedback to General McChrystal and other leaders on their progress toward the goal of transferring the lead for security operations to the Afghan government.

1.3 Statement of Need

The CJ7 staff have been tasked with defining a metric to measure the progress of transitioning security operations in Afghanistan. The requirement is to develop the metric based on data collected across the nation, as well as the system to obtain and derive the metric. The purpose of this data is to give a comprehensive picture of security in Afghanistan. After the data have been collected, it is compiled into an objective metric that can grade the transition progress, as well as pinpointing areas that show substantial improvement or decline in most recent time periods.

2 Statement of Work

2.1 Objectives

2.1.1 Overall Objective

The overall objective is to provide senior decision makers with an analysis tool that assesses progress towards the transition of security operations to the Afghanistan government. The analysis tool aims to collect key information from the five main military regions in Afghanistan and process the information in a value model to determine the current status of security operations.

2.1.2 Functional Objectives

- a. Collects input data forms containing key information from the five military regions in Afghanistan.
- b. Extracts and stores information values from the surveys forms for future processing.
- c. Process values and presents a condensed and easily understood assessment for decision makers

2.2 Scope

The Deputy Director of Force Integration and Training (CJ7), Combined Security Transition Command - Afghanistan (CSTC-A), has defined five requirements, or Lines of Operation (LOO), that support the overall goal of transferring the lead for security operations to the Afghan government. This project focuses on the development of a system that will measure metrics pertaining to the five LOOs, stores the metrics in a database, and process them in a value model that assesses monthly progress towards the transition of security operations to the Afghanistan government.

The core of the project is centered on the development of the value model. The value model consists of two major sets of parameters: weights and utility functions. Because of limited interaction with the stakeholder, the parameters in the value model will be developed by the GMU team and will be modifiable by the user to reflect the goals of CJ7.

2.3 Assumptions

In developing the decision analysis system for assessing transition of security operations in Afghanistan, assumptions were made on the computer system and personnel capabilities. Additionally, assumptions on the selection of the metrics used in the survey forms were based on extensive research of U.S. government sponsored open source papers.

- Computers used operate Microsoft Office 2007, including Microsoft Excel and Access 2007.
- Users have basic experience using Microsoft Excel and Access 2007
- Military regions are capable of sending and receiving email with attachments.

3 Operational Concept

3.1 Vision Statement

The project aims to provide senior military leaders with a tool that tracks progress of the transition of security forces to the Afghanistan government in a month to month basis. Currently there is no mechanism to characterize the progress of security operations in Afghanistan. This project aims to provide the U.S. senior leadership with most current information in order for them to make crucial strategic decisions.

3.2 Mission Requirements

The mission requirements of the project is to develop a system that collects forms from the five main military regions in Afghanistan, stores the information

contained in the forms, and process the information to deliver monthly assessments on the progress of security operations. The system shall collect forms developed in Microsoft Excel from the five military regions. The system shall store the information found in the forms in a Microsoft Access Database. The system shall process the information in Microsoft Excel to deliver assessment reports.

3.3 Operational Scenarios

3.3.1 Scenario 1 – Standard Operations

In the standard scenario, the Assessing Transition System provides the Input Worksheet to CJ7 who then sends this form to the five regions. The Region Data Collectors receive the input form and populate the form with the appropriate answers and then send the completed input form to CJ7. CJ7 then compiles the data from the five regions in a main input workbook, populates additional information that is only available at the CJ7 level and sends the information in the Main input workbook to the system. The system then collects, stores and process the data. CJ7 then requests a status report from the data entered, and then the system generates the report for the user.

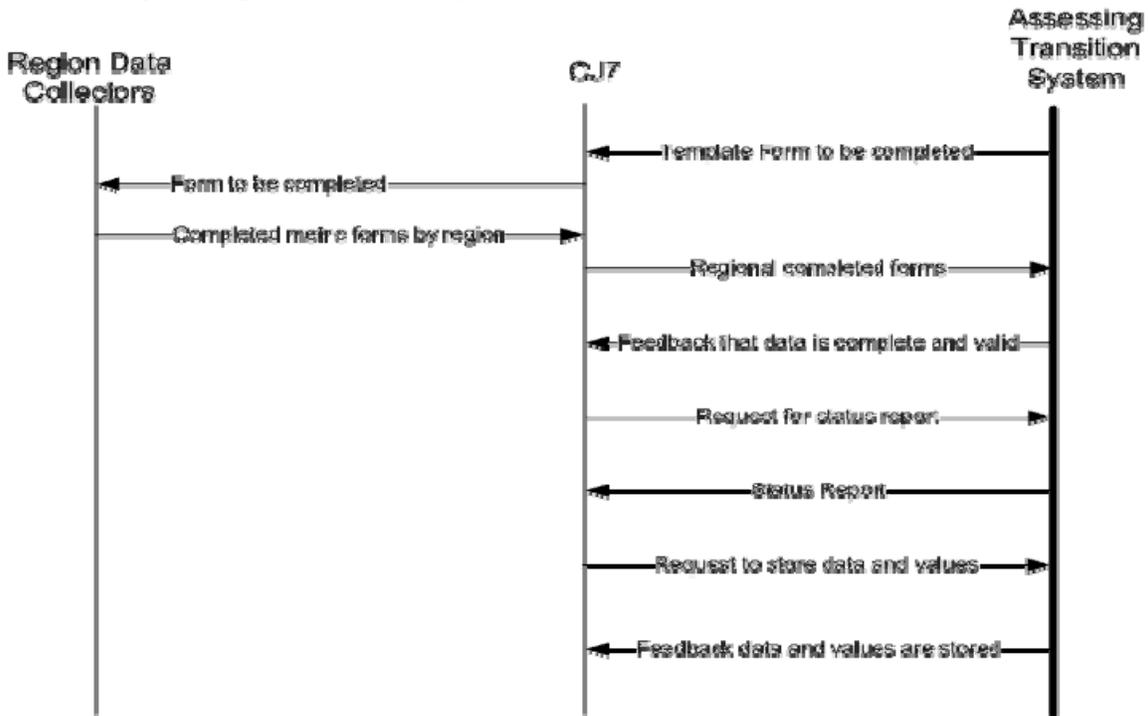


Figure 3.1: Operational Scenario

3.3.2 Scenario 2 – Changing Weights/Utility Functions Operations

This scenario describes the operational scenario when the user wants to change the weights and/or the Utility functions in the tool. The Assessing Transition System provides the Input Worksheet to CJ7, who then sends this form to the

five regions. The Region Data Collectors receive the input form and populate the form with the appropriate answers and then send the completed input form to CJ7. Then, CJ7 requests to change the weights/utility functions of the tool, the system then takes the user to the appropriate worksheet to make the necessary changes and displays the changes to assure the user that the changes have been accepted. CJ7 then compiles the data from the five regions in a main input workbook, populates additional information that is only available at the CJ7 level and sends the information in the Main input workbook to the system. The system then collects, stores and process the data. CJ7 then requests a status report from the data entered, and then the system generates the report for the user.

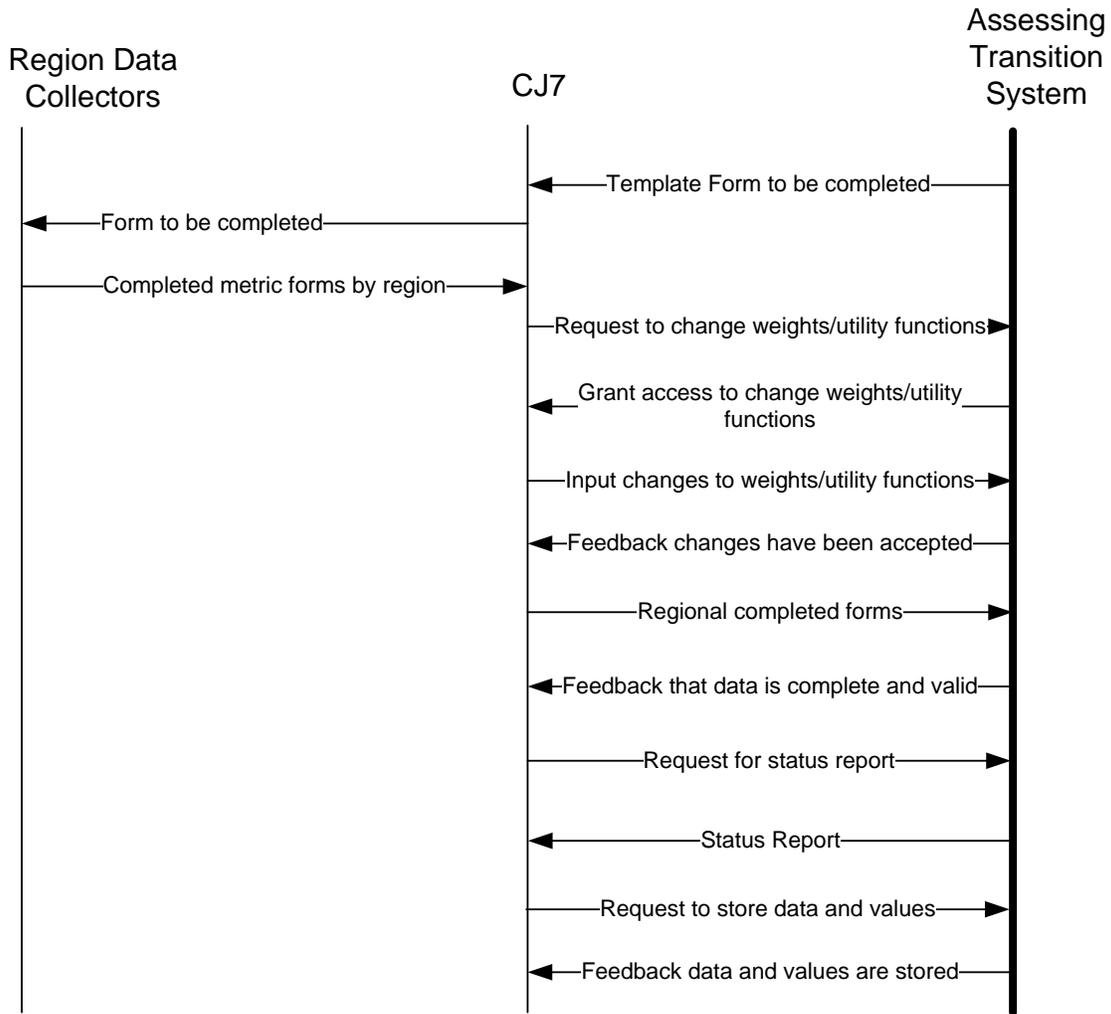


Figure 3.2: -Changing Weights/Utility Functions Operations

4 Value Hierarchy

4.1 Lines of Operation

The five Lines of Operation, or LOOs as defined above, provided the structure upon which the system metrics were built. All of the data is collected to derive the attributes, which provide metrics that these LOOs are based off of. Therefore, the LOOs provide the highest level of the hierarchy in the system model. The five LOOs, in greater detail, are:

1. **Accelerate ANSF Growth:** Represents the growth and sustainment of the Afghanistan National Security Forces, which include the Afghanistan National Army (ANA) and the Police Forces (ANPF). This LOO concentrates not only on the growth in personnel, but the growth in capabilities of the ANSF, represented by adequate training and equipment necessary to undertake a variety of missions.
2. **Achieve Security for Afghanistan:** Represents the general state of safety for the citizens of Afghanistan, as well as the population's perception of their own safety. This can be captured by economic factors influenced by risk, as well as civilian involvement in starting or ending violence.
3. **Marginalize Malign Actors:** Represents progress made on defeating the various actors or groups aiding in the destruction of the Afghan government. This not only includes active insurgents, such as Al Qaeda, but also actors and groups not aligned with the Afghan government, and so detracting from the legitimacy of the government in Kabul.
4. **Achieve Accountable Governance:** Represents the legitimacy and accountability of the government agents, as perceived by the Afghan population. If the population views the government as more legitimate and capable than any other entity, they will be more invested in the success of the government as a whole.
5. **Facilitate Community Development:** Represents the overall welfare of the communities within Afghanistan. If communities are functioning at a high level of complexity and order, with a high proportion of civilians involved in its development and sustainment, citizens will be less inclined to sympathize with malign actors working to dissolve these communities.

4.2 Attributes

4.2.1 Accelerate ANSF Growth (refer to Figure 11, Appendix A)

Force Size captures the growth rates and capacities of the ANSF. This is depicted in three attributes: Maximum Size of Force, ANSF Attrition Rate and Number of ANSF Soldiers Available. Maximum Size of Force is the theoretical maximum of the force, given current recruitment and loss rates. ANSF Attrition Rate is the rate at which the number of ANA and ANP personnel have been attrited over the past month. Number of ANSF Soldiers Available is the absolute number of personnel that can be accounted for.

Availability of Equipment captures the availability of the necessary materiel required for ANSF troops to complete their stated missions, generally separated into four categories: Weapons, Communications Equipment, Vehicles and Unit Facilities. The number of each type of equipment available is collected and compared against the number required for a specific unit type. The ratio of the two is given as a metric of success.

Training and Leadership consist of the performance and capability of the MiTT programs in place in Afghanistan. The Performance is graded on the average rating of the units trained. The capability is determined by the ETT availability across the theater.

Confidence attempts to measure the level of maturity and cohesiveness that is present in the ANSF units. While confidence itself cannot be measured, some of the effects can be, such as the proportion of soldiers that are present for duty throughout the month, as well as the reenlistment rate.

Ministry and HQ Capability consists of a series of subjective ratings, geared to measuring the level of capability and success the senior ANSF leadership has shown in the six fields: Force Management, Acquisition Operations, Training Plan and Goals, Force Sustainment, Force Deployment, and Resource Management.

4.2.2 Achieve Security for Afghanistan (refer to Figure 12, Appendix A)

Sufficient Forces Available strives to ensure that we have the forces on the ground to successfully combat the insurgency. Unlike the previous attributes, this does take into account U.S. and Coalition Forces. The formula for the number of forces required to reduce violence per 1000 population, F, is:

$$F = 1.2 \times (K/L)^{0.45} + 2.8$$

Where K is the number of security forces killed per million population annually, and L is the fraction of security forces local to the conflict area.¹

Afghan-on-Afghan Violence measures the number of deaths are caused and perpetrated against Afghan civilians. When this number remains high, this means a lack of trust in local authorities to deliver justice, or a malicious act against the government. In either case, it works to undermine security in the region.

Price on Select Foods is determined by the difference between the highest and lowest prices available for food across the country. Since not all food is grown locally across all of the country, some foods are transported across the country. If the difference between the price of a certain food in the place it is grown and a place it is not grown is abnormally high, this means that transportation is risky and the food has become scarce in some regions.

Voluntary Reporting is the number of accurate reports made by citizens voluntarily about malign actors. This not only measures the trust that the citizens have in the government and the U.S. forces, but also it shows that they feel more secure with the prospect of eliminating the malign actors than keeping quiet and allowing them to continue, or actively helping them.

Capital Flight measures the amount of money that is leaving a country for other countries and banks worldwide. When a country becomes unstable and unsafe, it is a prudent decision for people with money to place it in a safe institution outside of the country. When capital stays inside the country, this means investors believe the country is a relatively safe environment, or investment.

4.2.3 *Marginalize Malign Actors (refer to Figure 13, Appendix A)*

Number of Shadow Governments counts the number of districts that have shadow governments that are not in cohesion with the nationally recognized government. These could include tribal chieftains, religious leaders or terrorist networks – any worldly organization that citizens hold a greater loyalty to than the local authorities.

Detainee Guilt Ratio measures the proportion of detainees rounded up by the local authorities for terrorist actions are, in fact, proven and committed terrorists. If this ratio is high, this means that the local security forces are looking in the right places and capturing the right people. If this ratio is low, not only are the

¹ Goode, Steven M., “A Historical Basis for Force Requirements in Counterinsurgency”, p. 9, Winter 2009-2010

security forces being inefficient by detaining innocent people, but the process of detaining innocent people may be actively turning a apathetic citizen into an insurgent.

Religious Leaders' Attitudes approximately measures the percentage of religious leaders that are pro-insurgency. The support of religious leaders exacerbates the problem of terrorist cells, since it gives religious vindication for the actions of the insurgents in the minds of the citizens. This also makes it harder for U.S. and ANSF to gain the trust of the population.

Access to Internet is measured by the percentage of the population that has any access to internet, which was prohibited under the Taliban. This allows for citizens to gain a broader prospective of the events occurring across the country and the world. As this occurs, they may be less likely to help the insurgents, being more aware of their lack of worldwide appeal.

4.2.4 *Achieve Accountable Governance (refer to Figure 14, Appendix A)*

Polling Data is a random sampling of the population on their opinions regarding the government performance and capability. The two questions that concern the survey are "What government entity would you prefer?" and "What is your assessment of the Afghan Government?" If a high percentage both prefer the current government and have a high opinion of it, it generally means that they consider the current government capable and accountable.

Number of Civilian Casualties (CIVCAS) counts the number of civilians killed by ANSF over the course of last month. If this is high, then this will naturally lead to the population losing trust in the ANSF's ability to protect them, and therefore will lose trust in the accountability of government.

Number of Active Insurgent Lashkar Formations counts the number of "law enforcement" formations being used currently by local warlords. These formations show a lack of trust, among both the local warlords and the population at large, in the government's ability to defend the communities.

Ratio of Money Spent / Allocated measures the amount of money that went to the development of the projects it was budgeted to fund. If this is a low ratio, this means the money is not helping the country build much needed infrastructure and programs, which does not lend credence to the government's accountability. Usually, this money is lost in backroom deals and bribes.

Number of New Court Cases counts the number of court cases initiated with the local authorities. The greater number of court cases depicts a high amount of

trust in the local authority's ability to deliver justice fairly and quickly. A low amount most likely means that citizens are going to other organizations to deliver justice, such as insurgents, local warlords or religious authorities.

4.2.5 *Facilitate Community Development (refer to Figure 15, Appendix A)*

Number of Projects Started counts the number of projects that have been initiated to fulfill some need of one of the communities within the country. The more projects that are started that improve the well-being and standard of living of everyone, the more invested citizens are to the security of the community.

Cost of New Projects is a metric that is similar to the last, but it aggregates the cost of all the new projects initiated that month. The general trend is that the more projects cost, the greater the improvement that project makes to the community and the people living in it.

Hours of Electricity Availability measures the average number of hours electricity is available per day. The more hours electricity is available, the more functions each household or community can perform that requires electricity, which would improve the efficiency of the people in that community.

Number of Doctors counts the average number of trained professional doctors there are present per 1000 people (for comparison, the U.S. has 2.3 as of October 2009). The greater number of doctors available, the higher availability there is to medical care for all civilians, thus improving the health of the community members.

Polling Data is a random sampling of the population on their opinions regarding the well-being and direction of the community they live in. The two questions that concern the survey are "Do you believe Afghanistan is moving in the right direction?" and "Are you better off now than five/ten years ago?" If they answer in the affirmative to both questions, this means that they have a positive view of the direction and progress their community has made.

5 Parameter Elicitation

The quantitative component of the value model consists of two major sets of parameters: weights and utility functions. Together, these parameters measure progress towards the achievement of the Decision Maker's (DM's) objective. It is important that both the weights and utility functions reflect the goals of the DM; therefore, both sets of parameters need to be determined via some interface with the DM. In our case, a direct dialogue with the DM, or even the DM's staff, was not feasible; therefore, we made the elicitation process intuitive and

straightforward so that it can be completed and modified in theater. Instead of constructing lotteries by setting up a complex series of questions, administered by an Operations Research Analyst (who may or may not be present), we developed spreadsheets that can be used in theater by the DM himself/herself to elicit the weights and utility functions. These spreadsheets will be described below in Section 5.1 and Section 5.2 (weights and utility respectively).

5.1 Weight Elicitation

The weights in a value model articulate the relative importance, to the goals of the Decision Maker (DM), of each attribute in relation to the other attributes. As mentioned above, the system includes a relatively simple weighting interface to be used in theater with existing software. The interface utilizes a weighting spreadsheet in Microsoft Excel for each logical section of the value model that can use either the swing weight or the rank sum elicitation methods (the DM can use both and see which provides a better reflection of his or her goals).

The figure below shows the weighting spreadsheet for the highest level of attributes in the value model. The DM can decide on the rank of importance for each attribute under the Lines of Operation (LOO), and then assign each rank under the "Order of Importance" column and the system will calculate the normalized weights in the "Rank Sum Weights" column. The DM can also use the swing weight method by entering 100% for the DM's most important attribute in the "Importance Comparison" column. The swing weight method allows the DM to judge the importance of each of the remaining attributes, relative to the most important attribute, and to input these values into the "Importance Comparison" column. The system calculates the normalized weights and displays them in the "Swing Weights" column. The DM can compare the two methods side by side and decide which weighting scheme best reflects his or her goals. The DM can select the appropriate button (in gray at the bottom of the spreadsheet) to transfer the desired weights to the "Approved Weights" column. This procedure is repeated at the various sections of the overall value hierarchy.

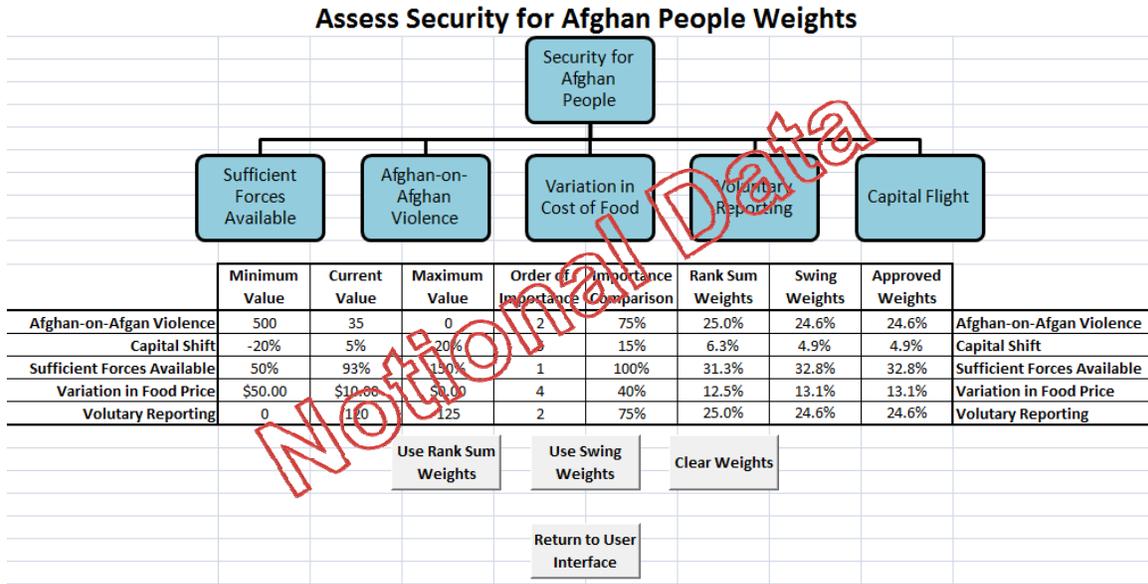


Figure 5.1: Weight Elicitation Example

5.2 Utility Elicitation

The system uses a method of utility elicitation that was flexible enough to adapt to each attribute, yet intuitive enough to be used by the DM (or DM's staff) in Afghanistan. The utility function of each attribute is defined as belonging to one of three categories. The three general utility function categories are: 1) when the function is continuous and maximum attribute value has greater utility than minimum attribute value; 2) when the function is continuous and the minimum attribute value has greater utility than maximum attribute value; and 3) when the function is discrete and utility is being determined for specific values (such as the Capability Milestone (CM) levels).

The utility function for each attribute is then elicited using templates described below. For continuous functions (items 1 and 2 above), the system implements a template with a piecewise linear function due to the flexibility to approximate any risk attitude (Risk-Seeking, Risk-Averse, or Risk Neutral). For discrete functions (item 3 above), it uses a template with a step function.

For utility elicitation form reference, please see Figure 5.2 below. The utility elicitation process begins with the elicitation of the actual range of variation (ROV) obtained from either a subject matter expert or the historical database. The current value of the attribute is imported from the database into the orange cell. The DM is asked to enter (in the green cells) his or her satisfaction level, as a percentage, for three different points within the ROV (at one quarter, one half, and three quarters of the scale between the minimum and maximum ROV values). The results of the DM's selections are displayed in the graph on the

spreadsheet. Finally, the utility of the current value is calculated on a piecewise linear curve, using the DM's input, in the blue cell and is ingested by the value model as part of the overall value equation.

For discrete functions, the DM is asked for his or her level of satisfaction (as a percentage) for each discrete level of the step function. This method is implemented primarily with parameters that use the Capability Milestone (CM) levels as a measure of utility.

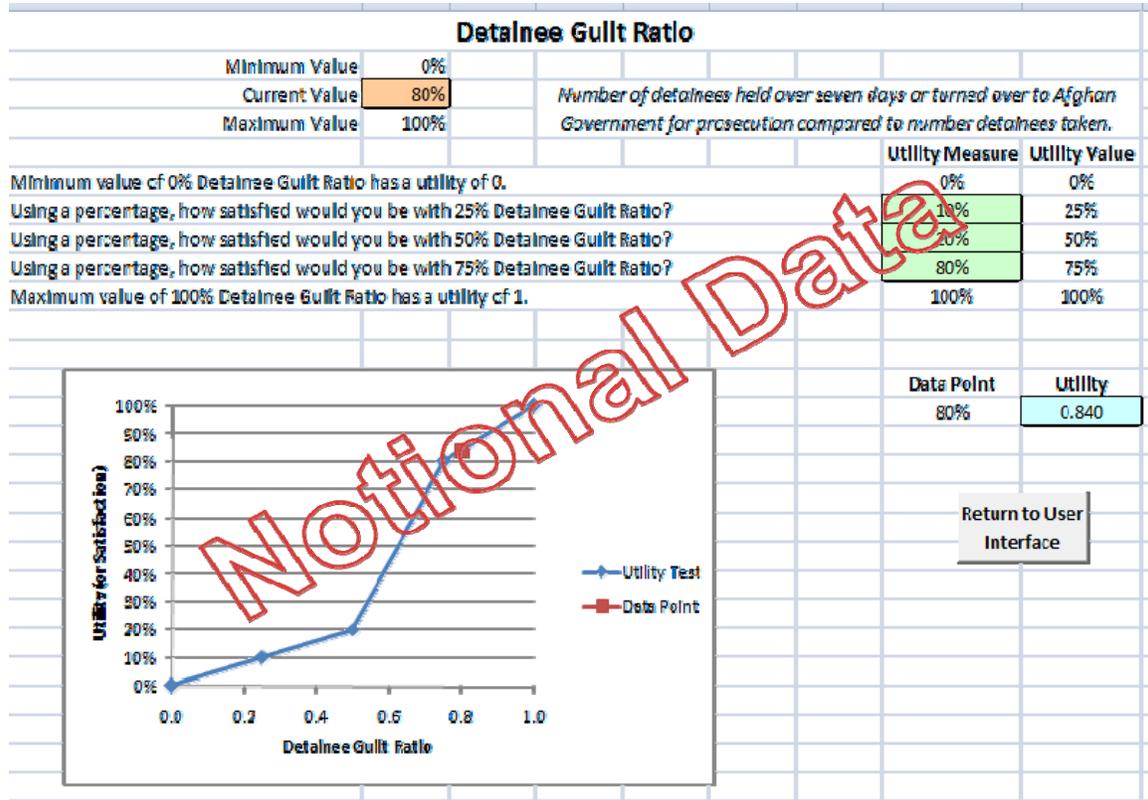


Figure 5.2: Utility Curve Elicitation Example

6 Requirements

6.1 General

- 6.1.1 The System shall be comprised of a Data Processing Station, Input Stations, and a Value Model.
- 6.1.2 *Data Processing Station*
 - 6.1.2.1 The Data Processing Station shall consist of a screen, keyboard, mouse, CPU, and data storage.
 - 6.1.2.2 The Data Processing Station shall contain Microsoft Excel 2007 software.
 - 6.1.2.3 The Data Processing Station shall contain Microsoft Access 2007 software.
 - 6.1.2.4 The Data Processing Station shall contain email software.
 - 6.1.2.5 The Data Processing Station shall connect to the military Network
 - 6.1.2.6 The Data Processing Station shall provide no less than 2 Gigabytes of data storage.
- 6.1.3 *Input Stations*
 - 6.1.3.1 The Input Station shall consist of a screen, keyboard, mouse, and CPU.
 - 6.1.3.2 The Input Station shall contain Microsoft Excel 2007 software.
 - 6.1.3.3 The Input Station shall contain email software
 - 6.1.3.4 The Input Station shall connect to the military Network
 - 6.1.3.5 The Input Station shall provide no less than 20 Kilobytes of data storage.
- 6.1.4 *Value Model*
 - 6.1.4.1 The Value Model shall consist of a User Interface, Weight, and Utility spreadsheets in Microsoft Excel 2007 and database in Microsoft Access 2007.

6.2 Functional Requirements

- 6.2.1 *Primary System Functions*

- 6.2.1.1 The System shall allow the user to receive and send email with 20 Kilobytes attachments.
- 6.2.1.2 The System shall allow the user to input data into Microsoft Excel 2007 spreadsheets.
- 6.2.1.3 The System shall allow the user to import Microsoft Excel 2007 spreadsheets into Microsoft Access 2007 database.
- 6.2.1.4 The System shall allow the user to save data in Microsoft Access 2007.
- 6.2.1.5 The System shall allow the user to request status reports.
- 6.2.1.6 The System shall process data with Value Model and display status reports.
- 6.2.2 *Input Station*
 - 6.2.2.1 The Input Station shall allow the user to receive and send email with 20 Kilobytes attachments.
 - 6.2.2.2 The Input Station shall allow the user to input data into Microsoft Excel 2007 spreadsheets.
 - 6.2.2.3 The Input Station shall allow the user to save Microsoft Excel 2007 spreadsheets.
- 6.2.3 *Data Processing Station*
 - 6.2.3.1 The Data Processing Station shall allow the user to modify Microsoft Excel 2007 spreadsheets.
 - 6.2.3.2 The Data Processing Station shall allow the user to receive and send email with 20 Kilobytes attachments.
 - 6.2.3.3 The Data Processing Station shall allow the user to import Microsoft Excel 2007 spreadsheets into Microsoft Access 2007 database.
 - 6.2.3.4 The Data Processing Station shall allow the user to save data in Microsoft Access 2007.
 - 6.2.3.5 The Data Processing Station shall allow the user to request status reports.
 - 6.2.3.6 The Data Processing Station shall process data stored in Microsoft Access 2007.

6.2.3.7 The Data Processing Station shall display status reports.

6.2.4 *Value Model*

6.2.4.1 The Value Model shall process data in the User Interface, Weight, and Utility Microsoft Excel 2007 spreadsheets and Microsoft Access 2007 database.

6.2.4.1.1 *User Interface*

6.2.4.1.1.1 The User Interface shall allow the user to update transition value data.

6.2.4.1.1.2 The User Interface shall allow the user to lock and unlock workbooks.

6.2.4.1.1.3 The User Interfaces shall allow the user to show and hide all system spreadsheets.

6.2.4.1.1.4 The User Interfaces shall allow the user to edit the utility form for the five lines of operation.

6.2.4.1.1.5 The User Interface shall allow the user to select the past and current months.

6.2.4.1.1.6 The User Interface shall calculate if input form data is old.

6.2.4.1.1.7 The User Interface shall calculate if the input form data contains errors.

6.2.4.1.1.8 The User Interface shall calculate if the input form data contains blank space.

6.2.4.1.1.9 The User Interface shall illustrate the past and current month values for every line of operation.

6.2.4.1.2 *Weight Form*

6.2.4.1.2.1 The Weight Form shall allow the user to edit minimum, current, and maximum attribute values.

6.2.4.1.2.2 The Weight Form shall allow the user to edit the attribute order of importance.

6.2.4.1.2.3 The Weight Form shall allow the user to select rank sum and swing weights.

6.2.4.1.2.4 The Weight Form shall allow the user to return to user interface.

6.2.4.1.2.5 The Weight Form shall allow the user to clear weights.

6.2.4.1.3 *Utility Form*

6.2.4.1.3.1 The Utility form shall allow the user to edit the minimum, current, and maximum value of attribute.

6.2.4.1.3.2 The Utility Form shall illustrate the utility curve.

6.2.4.1.3.3 The Utility Form shall calculate the utility value.

6.2.5 *Data*

6.2.5.1 The system shall allow the user to import data from a separate data storage device.

6.2.5.2 The system shall allow the user to export data to a separate data storage device.

6.2.5.3 The system shall allow the user to save all data into its database.

6.2.5.4 The system shall allow the user to retrieve all data from its database.

6.2.5.5 The system shall allow only authorized users to enter, import, export, send, receive, save, and retrieve data.

6.2.5.6 The system shall notify the user if they do not have access to perform data related actions.

6.2.6 *Software*

6.2.6.1 The system shall operate using Microsoft Excel 2007 and Microsoft Access 2007.

6.3 Non-Functional Requirements

6.3.1 Input Form

- 6.3.1.1 The Input Form shall use a Microsoft Excel 2007 spreadsheet.
- 6.3.1.2 The Input Form shall permit users with authorization to edit the spreadsheet.
- 6.3.1.3 The Input Form shall contain metrics for the five lines of operations.

6.3.2 Weight Form

- 6.3.2.1 The Weight Form shall use a Microsoft Excel 2007 spreadsheet.
- 6.3.2.2 The Weight Form shall permit users with authorization to edit the spreadsheet.
- 6.3.2.3 The Weight Form shall contain weights for the five lines of operation.
- 6.3.2.4 The Weight Form shall contain weights for the five main metrics of the Accelerate Growth of ANSF.
- 6.3.2.5 The Weight Form shall contain weights for the rest of the values.

6.3.3 Utility Form

- 6.3.3.1 The Utility Form shall use a Microsoft Excel 2007 spreadsheet.
- 6.3.3.2 The Utility Form shall permit users with authorization to edit the spreadsheet.
- 6.3.3.3 The Utility Form shall contain the minimum, current, and maximum value for each attribute.
- 6.3.3.4 The Utility Form shall contain a graphical representation of the utility curve.

6.3.4 User Manual

6.3.4.1 The User Manual shall provide step by step instructions.

6.3.4.2 The User Manual shall provide screen shots of every step.

6.3.5 Other

6.3.5.1 The system shall be usable by a user with basic knowledge on Microsoft Excel 2007.

6.3.5.2 The system shall provide the user with an instructional manual.

6.3.5.3 The system shall be able to operate on PC and Macintosh platforms.

6.3.5.4 The system shall not be affected by system updates.

6.3.5.5 The system shall allow maintenance on a regular basis.

6.3.5.6 The system shall allow expansions.

7 Design Diagrams

7.1 External System Diagram

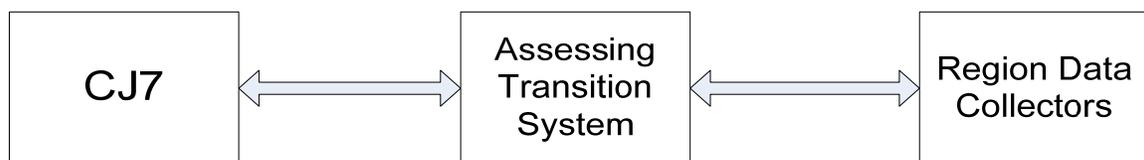


Figure 7.1: External System Interactions

This Assessing progress toward the transition objective of security operations in Afghanistan system interacts with two main external systems. Figure 7.1 shows the interactions between the system and the major external systems CJ7 and Region Data Collectors. The following describes the major external systems: **CJ7** – the sponsor of this project and the main stakeholder, since they are responsible for sending the Input Worksheet to the five regions, collecting the input worksheets, compiling the data into one main input spreadsheet and requesting the system to store and process the data and to generate the status report.

Region Data Collectors – receive the input worksheet, update it and send it back to CJ7 on a monthly basis.

7.2 Assessing Transition System Analysis Diagram

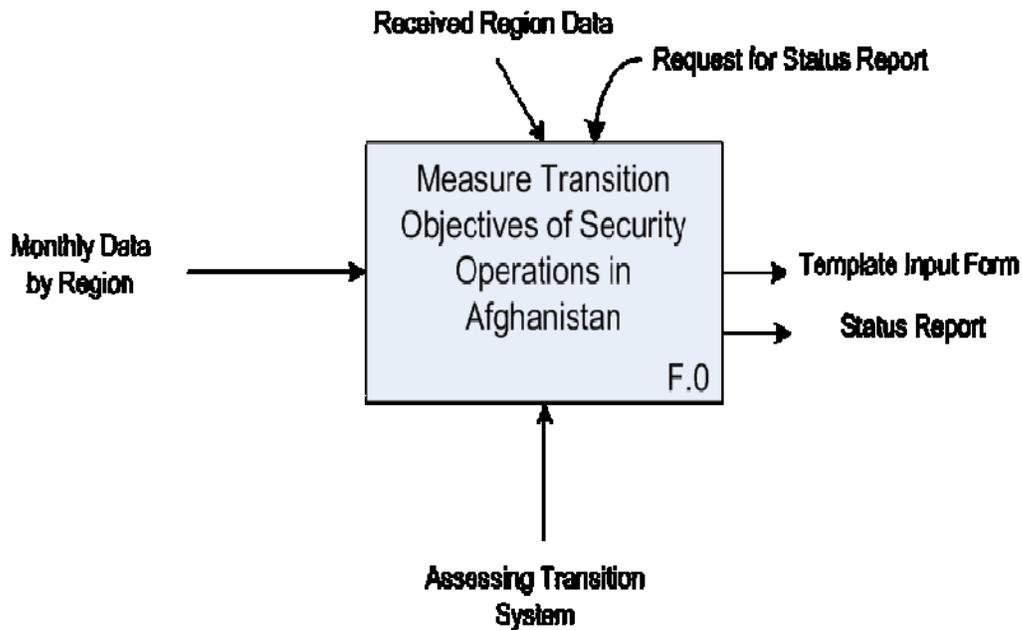


Figure 7.2: Assessing Transition System Analysis Function

The main function of the Assessing transition system is to Measure the Transition Objectives of Security Operations in Afghanistan using the information provided in the input form. This system interacts with two main stakeholders - CJ7 and the Region Data Collectors - through the inputs and outputs required to run the system. The main input to the system is the monthly compiled data which is used to run the sub-functions of the system that collects, stores and process the data and then provides the status report to the stakeholder. The system also provides the input form to the stakeholder so that they can populate the necessary data and send it back to the system.

7.3 Functional Decomposition

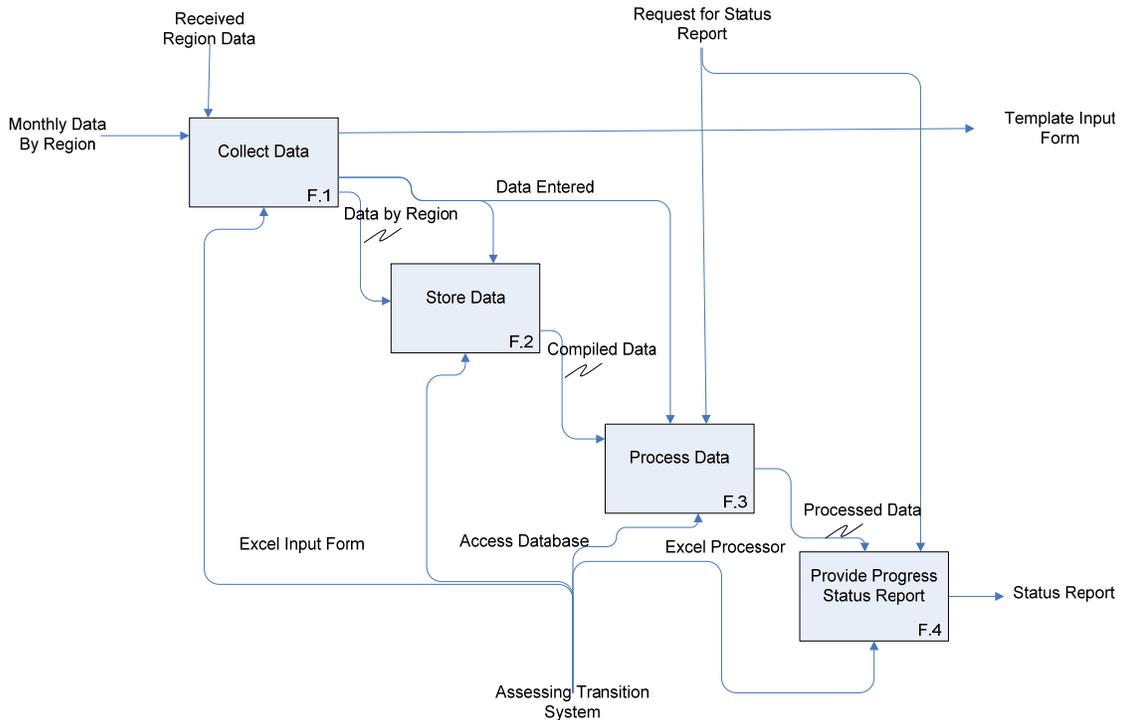


Figure 7.3: Functional Decomposition of the Assessing Transition System Analysis

The Assessing Transition System is built from four sub-functions as displayed in figure 7.3.

Collect Data: A main input worksheet is used to compile the information received from the five regions and additional information only available to CJ7.

Store Data: The compiled data is then stored in the access database repository.

Process Data: The compiled information is then processed to provide measures on the progress of transitioning security operations in Afghanistan.

Provide Progress Status Report: Once the data has been processed, the system is capable of generating a status report at the user’s request.

7.4 Functional Architecture

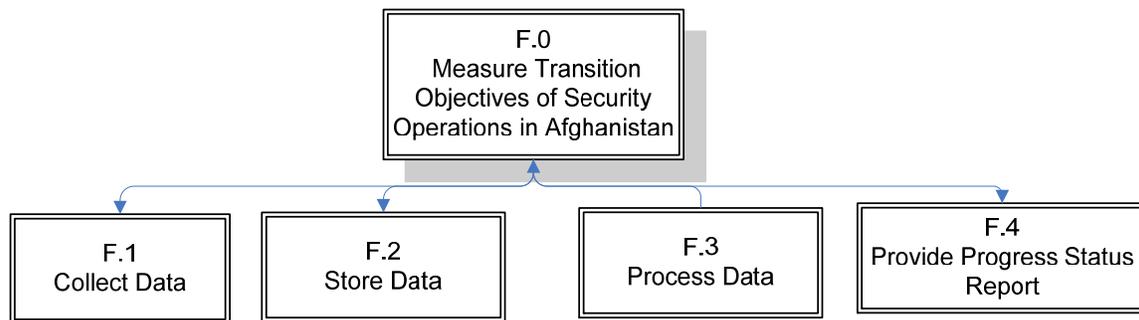


Figure 7.4: Functional Architecture for Assessing Transition System

The Functional Architecture shows the breakdown of the Assessing Transition System. This shows a hierarchy of the functions in the system. The main function is broken down into four sub-functions: Collect Data, Store Data, Process Data and Provide Progress Status Report. The interactions between these functions are described in detail in the previous section, 7.3.

7.5 Physical Architecture

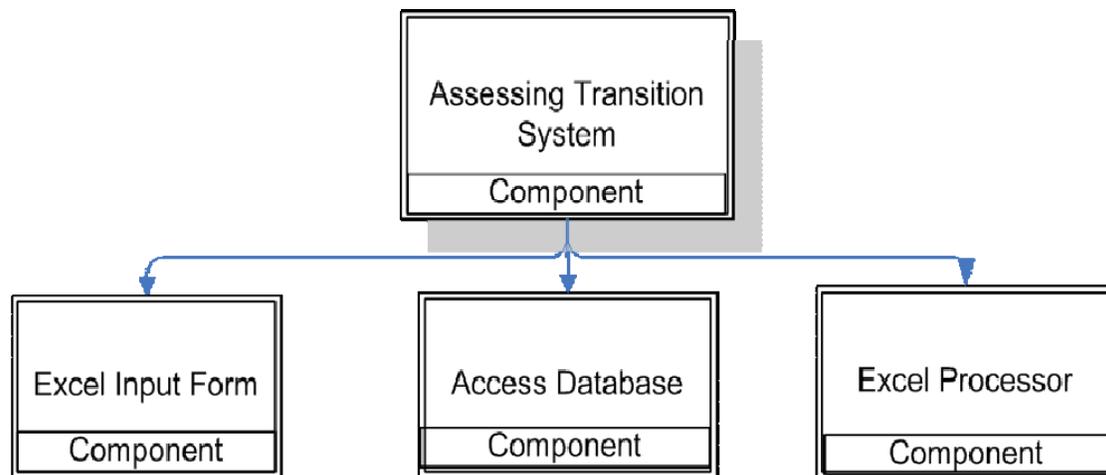


Figure 7.5: Physical Architecture for Assessing Transition System

Figure 7.5 shows a diagram of the physical components of the Assessing Transition System. The physical components of the system perform each of the functions described in the functional architecture.

The Assessing Transition System provides the user a status report that provides measurements on the progress toward transitioning security operations in Afghanistan. The system is broken into its components: The input form collects the data from the regions and CJ7; The access database stores the information

collected; and the Excel processor performs necessary calculations and provides the results to the user.

8 System Details

8.1 System Input

The system input consists of five Microsoft Excel input forms, the Microsoft Excel processor, and the Microsoft Access database. The five Excel input forms are identical workbooks that have been developed to elicit metrics information from each of the five regions. The Excel processor contains an input form for CJ7, since they have access to additional metrics that the five regions do not. The five Excel input forms and the Excel processor are linked in order to allow the processor to compile all input data from CJ7 and the input data that is emailed in monthly from each of the five regions.

The Access database has a built-in user interface switchboard that allows the user to hit a button and import the consolidated input data from the Excel processor into the database. There are two data tables in the Access database; the Data Table that stores all input metric data and the Values Table that stores values for the metrics that are calculated by the Excel processor. The import button on the Access database user interface imports the information to both data tables simultaneously.

In order for the import button to work, the Access database must be connected to the Excel processor via a macro. The ability of the Access database to import Excel information has been successfully tested but the macro link between Access and Excel will be broken when the system is delivered to Afghanistan. Therefore, CJ7 will have to reestablish the link between Access and Excel once they receive the system. One of the deliverables of this project is a detailed Users and Maintenance Manual. The steps required to reestablish this macro link between Access and Excel will be explained in the set up procedures part of the manual.

8.2 System Storage

The main purpose of the Microsoft Access database is to store the collected data. This database will be updated monthly and will eventually require a large amount of storage space, which is the reason Microsoft Access was chosen to facilitate this operation. This database also provides any user, who has knowledge of Access, the ability to easily sort, filter, and query data. The database is a flat file database, which resembles a large spreadsheet. Although there are two data tables, the tables are not related. Flat file databases are easier to use and maintain than relational databases, and it is desirable to put the least

amount of burden on the user as possible when using this system. There are some built-in generic queries and the user will be able to build their own and use the Database as they wish.

Over time, the Data Table and the Value Table will accumulate several months' worth of information. The Data Table will be able to show both consolidated Afghanistan metric data as well as metric data by Region (and CJ7). In other words, there will be six rows of data per month that appear in this table; five rows of data with metric data from each of the five regions on a separate line, and one row with all consolidated data points from CJ7 and the five regions. The Value Table will only have one row of metric value data per month. As time progresses, this stored information will be important, because an analyst will be able to look at a few months worth of historical data and use various analytical tools to develop descriptive, or predictive, models. The information that will accumulate in the Data Table over time will be the raw metric information. The information that will accumulate in the Value Table over time will be the values of the metrics from month to month that can be used to see whether or not progress is being made.

8.3 System Processing

All data processing and calculations will be done by the Microsoft Excel processor. This system will calculate the value metrics once the user hits the "Update Transition Value Data" on the user interface screen that has been built into the Excel processor. The processor consists of several linked worksheets that calculate weights and utility values of the input metrics. Although most of the linked worksheets that do the processing are hidden, the user will be able to change weights and utility functions when they want to by using buttons on the user interface screen. The user interface is designed to calculate data as well as hide and unhide certain worksheets, and steer the user to the worksheets they need to go to when they want to revise weights or utility functions. This design is in place to prevent the user from accidentally changing some information they do not intend to change.

8.4 System Output

The system output consists of the user interface worksheet in the Microsoft Excel processor. This user interface screen will tell the user whether the last round of input data is out of date or not, and will let the user know if there are any errors in how the data has been input. Once the "Update Transition Value Data" button has been hit on the user interface screen, the screen will automatically update itself using Visual Basic code to display the current month's calculated value results in comparison to the previous month's value results. Any differences in the data from the previous month to the current month will be easily distinguishable both by color and by an arrow symbol. Colors will go

from various shades of red to yellow to green if the data is improving from month to month and vice versa. An arrow pointing upward means there has been improvement from the previous month to the current month, whereas an arrow pointing downward means things have gotten worse over the last month, and an arrow pointing to the right means there has been no change. This user interface screen will show previous month and current month values for each of the five LOOs as well as for the total assessment for Afghanistan.

An additional piece of analysis the model executes is to identify which values have the greatest short term potential for growth. The model changes the non-step values (those values measured with CM4-CM1) by 10% in the beneficial direction and re-evaluates the utility function and identifies the greatest change in value.

For instance, ANSF Attrition's greatest utility is at 0%; therefore, the current attrition is reduced by 10% and the utility is re-evaluated. Total Force Size's utility increases as the size increases; therefore, 10% is added to the current value and it is re-evaluated.

The system then identifies the five values that cause the greatest positive change to the overall value function and displays them for the user. The user can then focus limited resources towards the values that will provide the largest movement towards the optimal situation.

APR 2010 Data		MAY 2010 Data
0.42	Transition Assessment	↑ 0.64
0.52	Accelerate Growth of ANSF	→ 0.52
0.42	Security for Afghan People	↑ 0.69
0.23	Marginalize Malign Actors	↑ 0.85
0.54	Accountable Governance	↓ 0.50
0.64	Community Development	↑ 0.78

Update Transition Value Data

Notional Data

Top 5 Value Gains with a Favorable 10% Change to Data
Sufficient Forces Available, increase of 0.014
Budget Execution, increase of 0.008
Detainee Guilt Ratio, increase of 0.005
Present for Duty, increase of 0.005
Voluntary Reporting, increase of 0.004

Update Top 5 Gains Information

Figure 8.1: Sample Output Example

9 Project Management Plan

9.1 Work Breakdown Structure

The work breakdown structure (WBS) for the Assessing Transition System is displayed in the following figure. The WBS was created to divide the tasks and make them manageable in order to design and develop the system more efficiently.

The group was organized into two subgroups

- The Values and Metrics team was in charge of finding feasible requirements, values and metrics that would be required to win a counter-insurgency conflict. They also developed the value model, the input form for values weights and utility.
- The System Design team was in charge of developing the user interface, input form, storage, usable output and integrating values, metrics, and value model.

WBS	Task Name
1	[-] Afghanistan Project
1.1	[-] Project Management
1.1.1	Group Formation
1.1.2	Project Selection
1.2	[-] Documentation
1.2.1	Project Proposal
1.2.2	Develop and complete final report
1.3	[-] Presentation
1.3.1	Status Report #1
1.3.2	Progress Report
1.3.3	Status Report #2
1.3.4	Formal Progress Presentation
1.3.5	Dry Run Presentation
1.3.6	Final Presentation
1.4	Website Development
1.5	[-] System Design
1.5.1	Develop Metrics
1.5.2	Metric Identification
1.5.3	Metric Presentation to Sponsor
1.5.4	Metric Refinement
1.5.5	Elicitation of Weights
1.5.6	Confirm Metrics and Weights with Sponsor
1.6	[-] Model Design
1.6.1	Develop Concept of Operations
1.6.2	Develop Requirements
1.6.3	Analysis and Research
1.6.4	Obtain Approval for Requirements
1.6.5	Document final requirements
1.7	[-] Model Development
1.7.1	Construct User Input Form
1.7.2	Construct Objective Functionality
1.7.3	Construct Output Form
1.7.4	Final Integration of Input, Objective, Output
1.7.5	Obtain Approval for Model
1.7.6	Document Final Model

Figure 9.1: Assessing Transition System Work Breakdown Structure

9.2 Gantt Chart

The Gantt chart that follows is a comprehensive project schedule for the Assessing Transition System project generated by Microsoft project. The chart includes the associated durations for each task and task dependencies, milestones and deadlines.

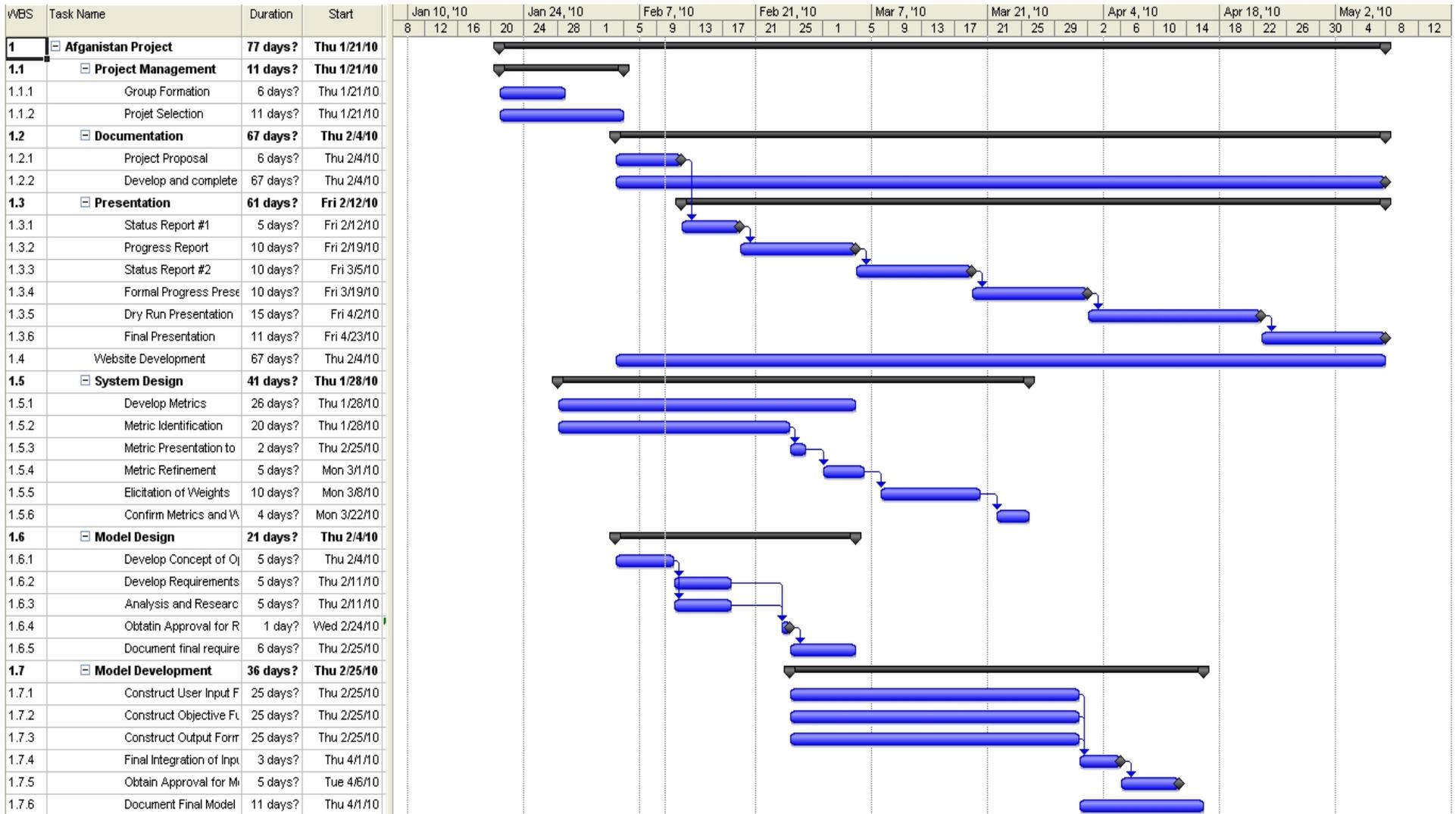


Figure 9.2: Assessing Transition System Gantt Chart

9.3 Earned Value Management

Earned Value Management (EVM) is used to measure and track the cost and time spent in the project. Our Actual Cost Work Performed (ACWP) is a bit lower than expected because the first few weeks were spent on getting the team together and defining our project. The difference between the Budgeted Cost Work Scheduled (BCWS) and the ACWP decreased during the last month of the semester due to the work performed to finalize the final report, presentation, and user manual.

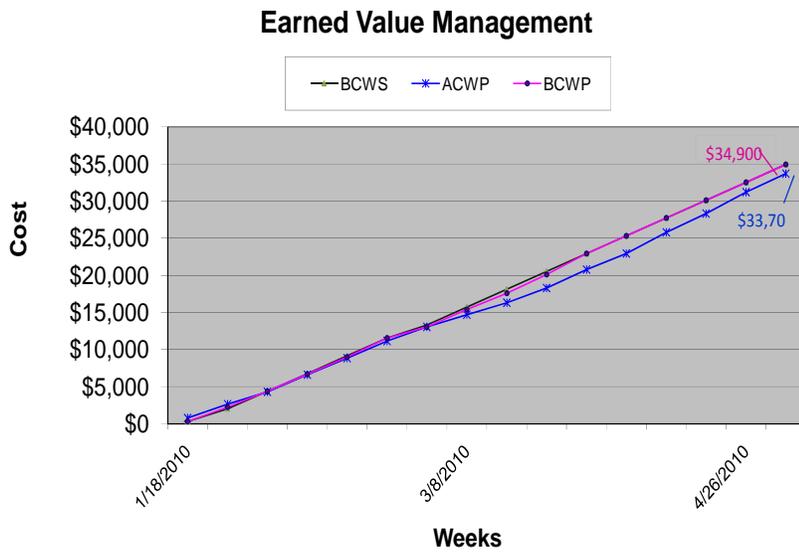


Figure 9.3: EVM Graph

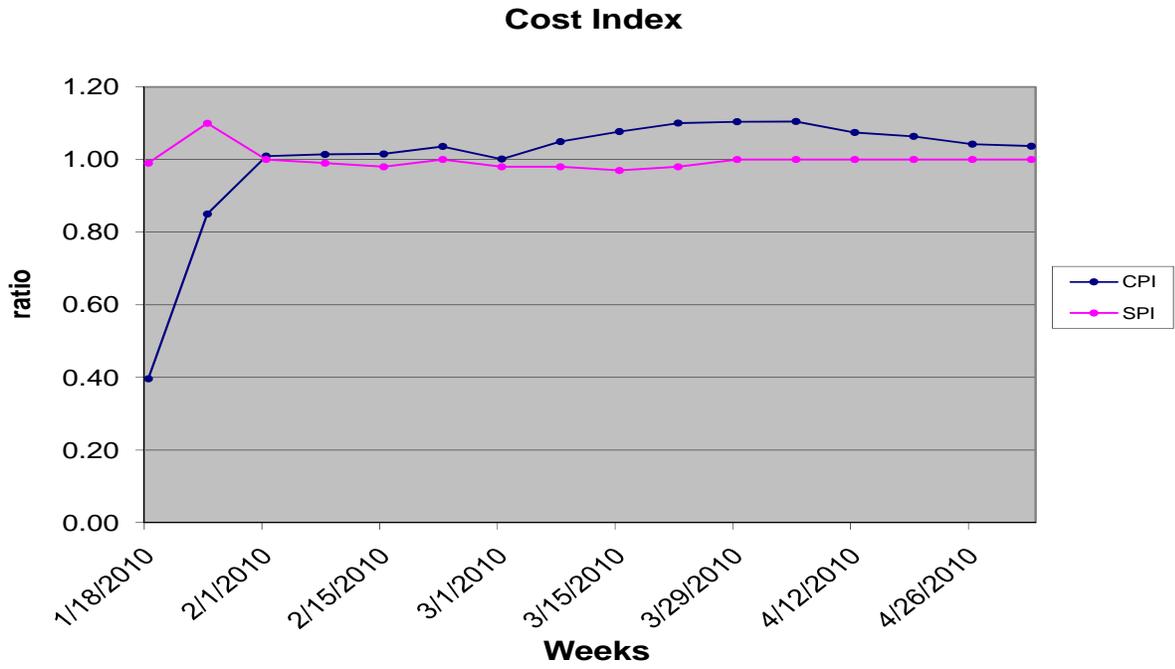


Figure 9.4: CPI vs. SPI Graph

Appendix A: Qualitative Model Hierarchies

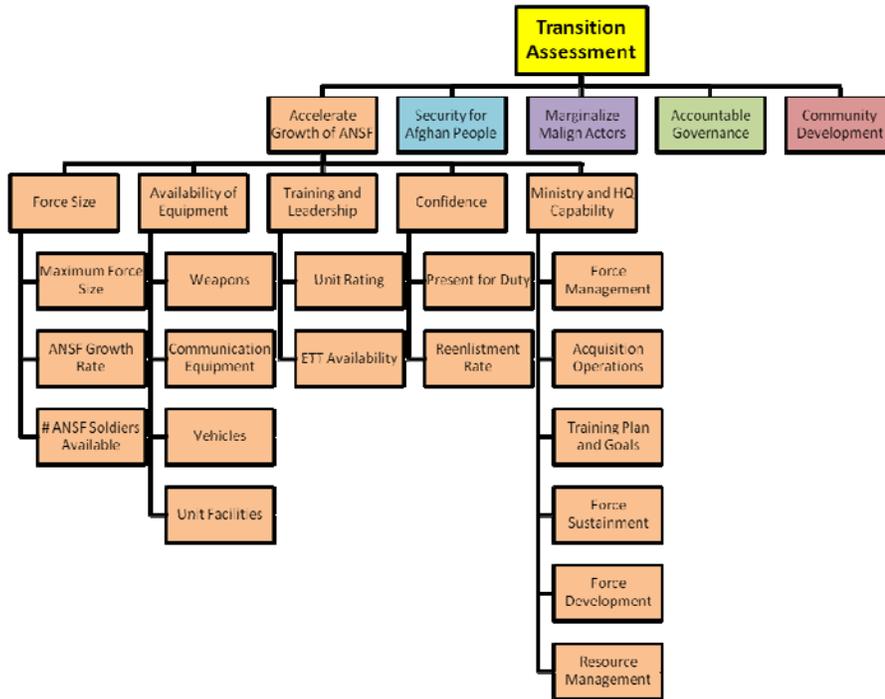


Figure 9.2: Attributes and Metrics for Accelerating Growth of ANSF

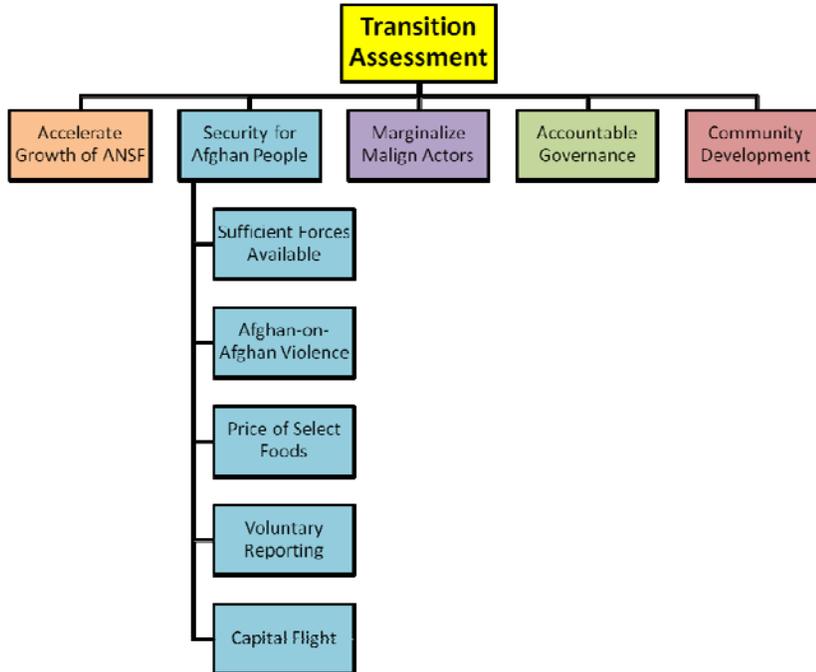


Figure 9.3: Attributes for the Security of the Afghan People

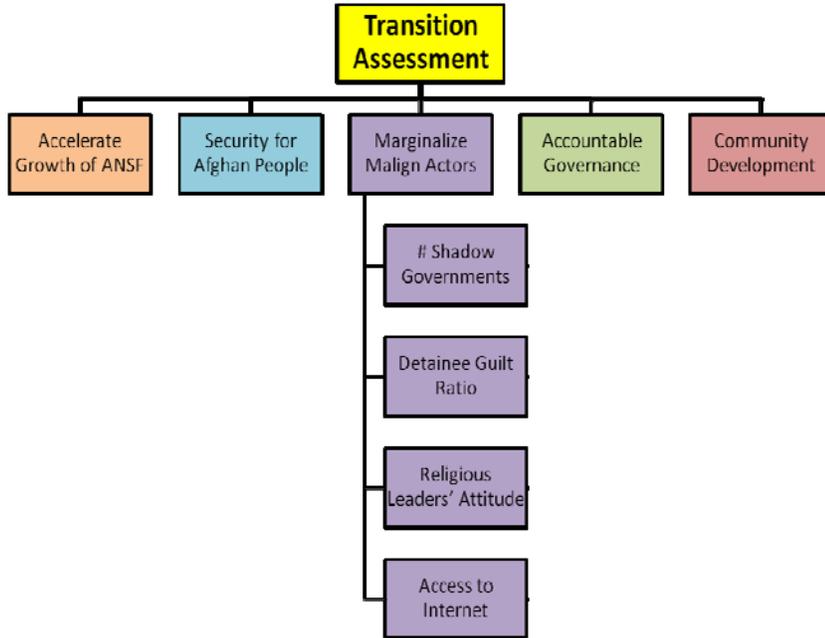


Figure 9.4: Attributes for Marginalizing Malign Actors

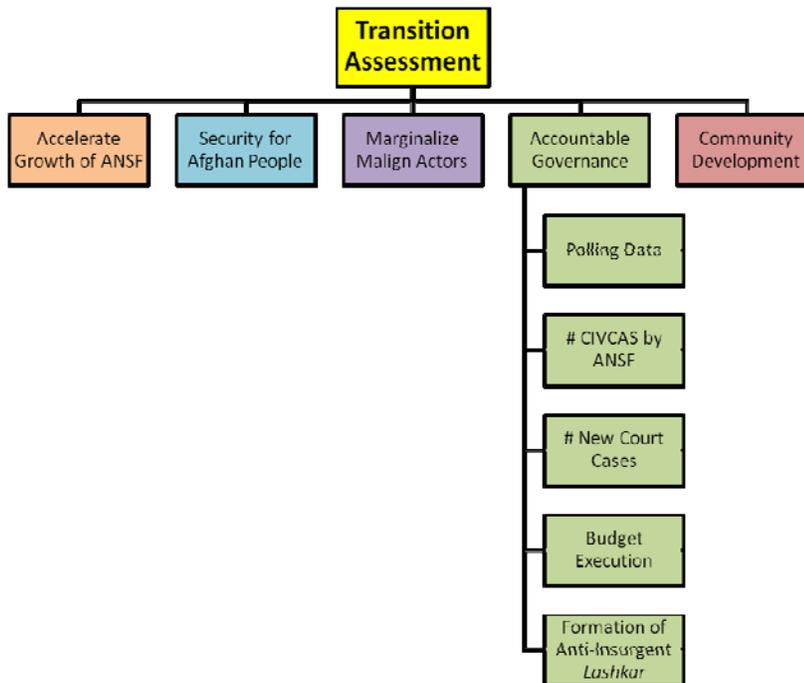


Figure 9.5: Attributes for Accountable Governance

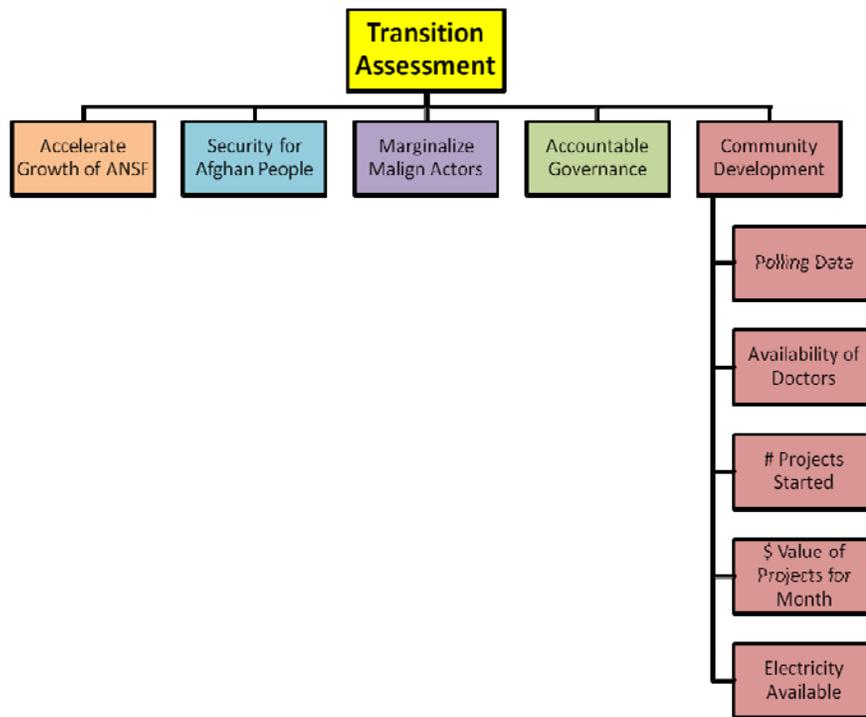


Figure 9.6: Attributes for Community Development

Appendix B: Input Metric Forms

	A	B	C	D
1	SFAP	Number of reported incidents of Afghan on Afghan violence during previous month:	5	
2		Number of intel tips received from Afghan populous during past month:	20	
3		Lowest price observed for FOOD 1:	14	
4		Maximum price observed for FOOD1:	20	
5		Lowest price observed for FOOD 2:	16	
6		Maximum price observed for FOOD2:	18	
7				
8	MMA	Number of detainees taken during past month:	30	
9		Number of detainees held over seven days or turned over for prosecution during past month:	24	
10		Number of religious services monitored during past month:	50	
11		Number of religious services with a pro-insurgency message during past month:	6	
12		Number of districts with known/suspected shadow governments operating within them:	2	
13				
14	AG	Number of active, anti-insurgent Lashkar formations operating within region:	2	
15		Number of civilian casualties caused by ANSF actions during previous month:	3	
16				
17	CD	Number of new community projects started during past month from all sources within region:	10	
18		Value (in \$1000s) of all community development projects during past month within region:	90	
19		Average number of hours electricity was on during previous month within region:	6	
20		Number of practicing doctors within region:	5000	
21				
22			As of Date:	4/26/2010
23			Number of missing fields	0

Figure 9.7: Example of Input Metric Form for Region Command

Appendix C: User Interface

	A	B	C	D	E	F	G	H	I	J	K
1		Recent Data	Number of Blank Data				APR 2010 Data	Value Function Snapshot			MAY 2010 Data
2	Region 1	GOOD	1				0.42	Transition Assessment			↑ 0.64
3	Region 2	GOOD	0								
4	Region 3	GOOD	1				0.52	Accelerate Growth of ANSF			↔ 0.52
5	Region 4	GOOD	0				0.42	Security for Afghan People			↑ 0.69
6	Region 5	GOOD	1				0.23	Marginalize Malign Actors			↑ 0.85
7							0.54	Accountable Governance			↓ 0.50
8	As of month for current data:				MAY		0.64	Community Development			↑ 0.78
9	As of year for current data:				2010						
10											
11	As of date for current Transition Value data:				MAY 2010			Update Transition Value Data			
12	As of date for previous Transition Value data:				APR 2010						
13											
14								Top 5 Value Gains with a Favorable 10% Change to Data			
15								Sufficient Forces Available, increase of 0.017			
16								Afghan-on-Afghan Violence, increase of 0.009			
17								Budget Execution, increase of 0.009			
18								Dollar Value of Projects, increase of 0.009			
19								Present for Duty, increase of 0.006			
20											
21								Update Top 5 Gains Information			
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Figure 9.9: Example of User Interface

Appendix D: System Output

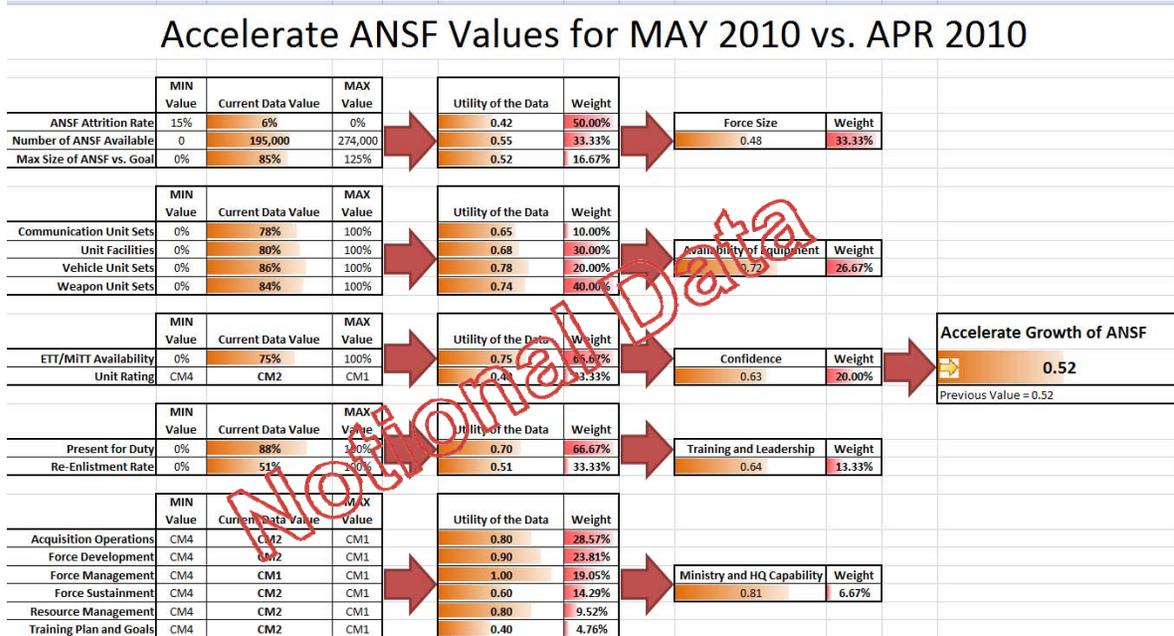


Figure 9.10: Example of Assessment for Line of Operation "Accelerate Growth of ANSF"

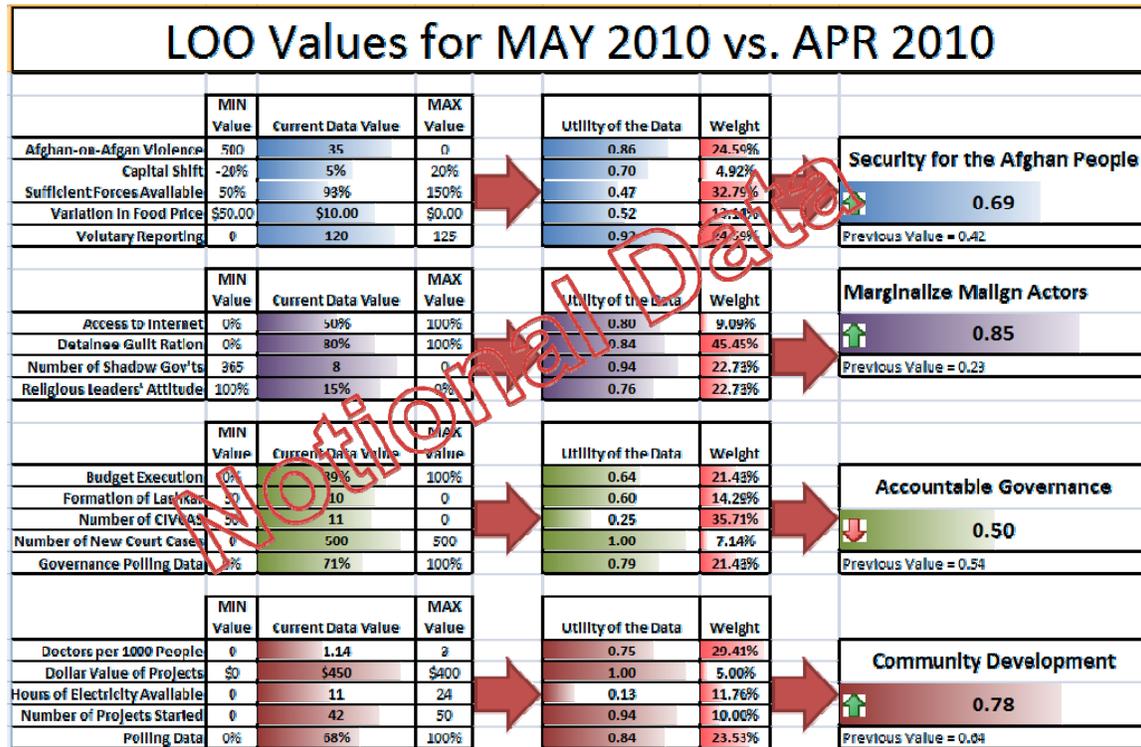


Figure 9.11: Example of Assessments of Lines of Operation "Security for Afghan People", "Marginalize Malign Actors", "Accountable Governance" and "Community Development"

Transition Assessment Values for MAY 2010 vs. APR 2010

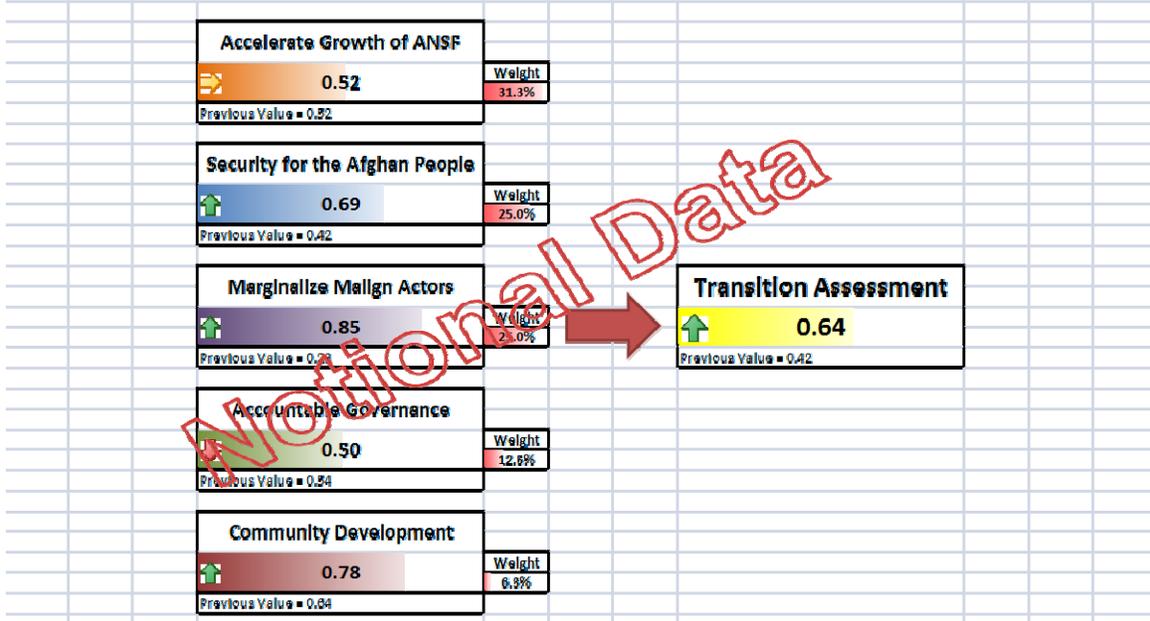


Figure 9.12: Example of Overall Assessment for Transition of Security Operations for Afghanistan

Appendix E: Main Switchboard View

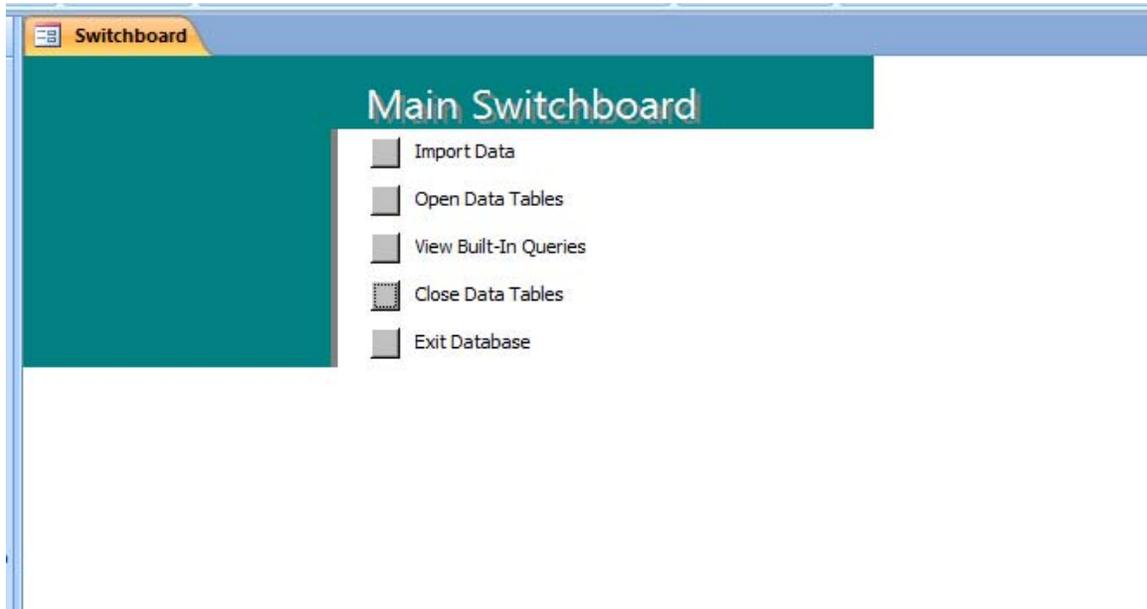


Figure 9.13: View of Main Switchboard

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