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Afghanistan National Development Assessment System (ANDAS)

OPERATIONS RESEARCH CENTER OF EXCELLENCE
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Abstract

In this report, we discuss an assessment methodology developed to assist in determining whether we are winning or losing the global war of terror in Operation Enduring Freedom. The assessment system developed is based on metrics and was developed with the support of the Operational level staff in Afghanistan.

From the start of the operation, the Combined Joint Task Force – 180 in Afghanistan needed a methodology to assess their current situation. The system had to provide them with a means to convey their status to higher levels of command and support decisions on future necessary effects required by subordinates. In late 2002, the command asked a group from the Information Technology Operations Center (ITOC) from the US Military Academy to develop a system to assist in this process.

At that time, the command wanted a system that allowed a great deal of subjective assessments and only loosely based on quantitative analysis. To support this, the ITOC developed a system called the Dynamic Planning and Assessment System, or DPASS. This web-based system decomposed the effects the command was asked to attain by the CENTCOM CONOP. The system was very useful for the command at the time.

In spring of 2003, Mr. Donald Rumsfeld announced that Afghanistan had entered Phase IV, or Stability Operations. This new mission set coincided with the arrival of a new command group in CJTF-180. They immediately sought a system based directly on metrics. The command staff could not adjust DPASS to directly account for these and they decided to ask the Operations Research Center of Excellence (ORCEN) also at the US Military Academy to look at the problem for them.

The ORCEN analysts, in consultation with the previous ITOC analysts and the CJTF-180 Assessment Staff, determined that a major obstacle in the development of a quantitative means to assess the implementation of the effects-based orders was the “task-based” approach to decomposition. Our functional decomposition, the identification of direct metrics and the application of value focused thinking to the assessment process are discussed in this presentation

and paper. Additionally, the model developed and now being implemented in CJTF-180 will be discussed in detail. The model, the Afghanistan National Development Assessment System, or ANDAS, achieves Secretary Rumsfeld's goal of being able to use metrics to assess our level of success as well as provides the CJTF-180 staff with a means to identify on which effects they should focus their efforts in future operations.

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Chapter 1: Introduction

Today, we lack metrics to know if we are winning or losing the global war on terror. Are we capturing, killing or deterring and dissuading more terrorists every day than the madrassas and the radical clerics are recruiting, training and deploying against us?

-- The Honorable Donald Rumsfeld
(“Rumsfeld's war-on-terror memo”, USA Today, Oct 22, 2003)

Timely and accurate assessment is a significant part of any military operation. Proper assessments provide commanders, at all levels, with necessary information to rapidly adjust resources and missions to meet ever-changing battlefield requirements. Unfortunately, for many reasons, developing assessments in a battlefield environment is a difficult and complex task. One complicating factor is the inherent inaccuracies and time delays in battlefield reporting. Another, albeit associated, factor that makes assessment such a complex task is the inherent difficulty that staff have in determining exactly what information is required to provide “actionable” assessments. Actionable assessments allow commanders to adjust their resources and missions in a manner which best supports the achievement of current objectives and results in the desired effects.

The above quotation from the Secretary of Defense underscores the current push in the US Military to develop quantitative measures to support proper assessments. Despite this growing awareness of the importance of quantitative assessments of battlefield operations, there is some reluctance to move away from qualitative assessments in current operations. This reluctance is borne, at least in part, of the reliance of the US Government and the media on what are now known to be exaggerated body counts during the Vietnam conflict to assess the success

of the conflict there. Based on this measure and others which were historically used to assess previous conflicts, the United States clearly “won” that war. It is clear however that these measures did not provide an accurate portrayal of this conflict.

The key, therefore, in providing useful and actionable quantitative assessments to commanders leading forces involved in Operations Enduring Freedom in Afghanistan and Iraqi Freedom in Iraq is determining the correct measures to accurately assess progress in those regions. In this paper, we discuss two ongoing efforts that were directed by the commanders and the staffs of the headquarters operating in Afghanistan to develop an assessment system designed to direct future operations and to report their level of success to their higher headquarters, the US Central Command (CENTCOM).

The first effort, conducted very early in the conflict, was led by the Information Technology and Operations Center or Excellence (ITOC) from the United States Military Academy at West Point. The Combined Joint Task Force – 180 (CJTF-180) has been the on-the-ground command since early in the conflict in Afghanistan. Very early on, the command group recognized the need for a comprehensive assessment system for this operation. Analysts from the ITOC were asked by the command to travel to Afghanistan to develop a distributed, web-based system to perform this critical function. The system they developed was dubbed the Dynamic Planning and Assessment Support System, or D-PASS. At the request of the group then in command, this system relied on a more qualitative means to assess the operation. D-PASS served the command extremely well for the early phases of the operation.

The assumption of the command by a different unit and the progress of the operation into a different phase of the operation resulted in a desire to make significant changes to the assessment process. The most significant change requested by the new command group was a

greater reliance on quantitative assessments. This change of focus resulted in the command requesting the participation of the Operations Research Center of Excellence (ORCEN). The ORCEN, like the ITOC, is one of many Centers of Excellence (COE) at the United States Military Academy, each of which has different focuses and competencies.

This follow-on effort combined the competencies of the ORCEN and the ITOC to develop an assessment system which combined the quantitative assessment desired by the new command with the distributed, web-based features of the initial D-PASS system. This new system was dubbed the Afghanistan National Development Assessment System, or ANDAS.

In this paper, we begin in the next section with a description of the first effort by the ITOC in its development of D-PASS and its application in theater. In the following section, we describe the process followed by the ORCEN, with support of a senior analyst from the Air Force Institute of Technology (AFIT), in the development of the quantitative assessment of the operation and the subsequent collaboration with the ITOC in the eventual development of ANDAS. The following section describes in detail the prototype system developed for the operational command. We conclude with a summary of the current status of the system and discuss potential applications of the process and/or the product.

Chapter 2: The Dynamic Planning and Assessment Support System (D-PASS)

In early June 2002, the Director of the Staff of the Combined and Joint Task Force-180, stationed in Bagram, Afghanistan made a request to the US Military Academy (USMA) for five officers to fill critical positions on the CJTF Planning staff, CJ-5. The Academy responded quickly to this request and within a week an officer from each of five different academic

departments was identified and had begun the deployment process. The specific mission given to these officers was not specified until the group arrived in Afghanistan in mid June. That mission, the development of a comprehensive and distributed process for performing operational assessments, became the focus not only for these five officers but for ten faculty members from the USMA Department of Electrical Engineering and Computer Science. This squad of additional faculty members, both military and civilian, made significant contributions to the design and implementation of the fully distributed web-based application that came to be known as D-PASS.

The CJTF staff, and in particular, Lieutenant Colonel James Dickens, the Deputy Director of Plans, CJTF-180, specified a number of important requirements for the system to the D-PASS development team. These were requirements that they did not feel were met by their existing non-automated process. In addition, they did not feel that their requirements were met by other existing software systems, including the CENTCOM-developed Campaign Analysis / Decision Support System (CA/DSS) (Carlock, 2002). For the record, it should be noted that while the CA/DSS did not meet the needs of the CJTF-180 staff many of the underlying ideas in D-PASS, particularly the employment of a hierarchical arrangement of effects, objectives, and tasks, were inspired by the CA/DSS application.

The stated requirement for D-PASS was that it “provide an automated means to develop and refine effects-based strategic, operational, and tactical assessments to support the planning process.” (Dickens, 2003)” In more detail, the CJTF-180 staff requested that the D-PASS team design and implement an application that supported an assessment process for the CJTF staff that was rigorous, consistent, and well-coordinated. Significant effort was expended on the part of

D-PASS developers in Afghanistan and at West Point to ensure that the resulting application met these requirements.

Two early design decisions proved to be critical to the success of the project. These decisions included using an uncomplicated web interface and incorporating the use of a relational database. Because the application uses a relational database, the many important relationships between various areas of assessment could be readily represented and captured. This database “back-end” also allowed staff officers to provide greater justification for their assessments for other users of the system; particularly the Commander. The distributed nature of the application was fully facilitated through the use of a simple web-interface. This allowed CJTF staff officers who were responsible for assessment to directly collaborate with their counterparts in other staff sections on the CJTF staff as they performed their respective assessment. It should be noted that prior to the development of D-PASS, operation assessments performed by CJTF staff officers were done using ad-hoc methods that provided only limited justification for assessment to the CJTF-180 Commander and higher headquarters.

Another benefit of D-PASS was that, in addition to serving as an analysis tool, its uncomplicated, graphical web interface allowed it to serve as an excellent presentation tool. For nearly eighteen months the CJTF Commander received weekly or bi-weekly briefings in which D-PASS was the primary presentation medium. This meant that very little time was devoted by staff officers translating information from D-PASS to a presentation graphics application (i.e., Microsoft PowerPoint).

The D-PASS team was able to successfully address many challenges during the development process including: the need to develop and test an unclassified application that processes primarily classified data, and the 12-hour time difference between Afghanistan and

New York. One challenge that proved intractable to the team was the inability of the team to incorporate quantitative analysis into the assessment process. There are clearly areas where such analysis would contribute to a better overall assessment but, unfortunately, the D-PASS team was unable to develop consensus among the users of the system concerning the manner in which this analysis should be done. Consequently, the final prototype for D-PASS, while considered an unqualified success by all of its initial users, provided almost no support for quantitative analysis.

Chapter 3: The Afghanistan National Development Assessment System (ANDAS)

By mid-July 2003 it had become clear to the newly arrived command group for CJTF-180 that D-PASS was not providing them with the assessment means they desired. They began to press their assessment team, part of the CJ5 staff section, to provide them with quantitative metrics to support their assessments of the operation. Mounting frustrations by the command group, as well as the assessment group, prompted the Chief, Fires and Effects staff section to offer the services of an organization with which he had worked in his previous assignment to assist in the development of a more quantitative assessment tool for that command.

The Chief, Fires and Effects section at the time was Colonel Creighton, the Commander of the Division Artillery for the 10th Mountain Division. Prior to this command assignment, Colonel Creighton was the Chief of G8, the analytical support section of the United States Army Staff. While in this assignment, he worked on a project to determine the best alternative to field the Army's newest weapon system, the Future Combat System (FCS) which was still under development. Recognizing the need to provide a quantitative underpinning for his recommendation to the Army Chief of Staff, he contacted the ORCEN at the United States

Military Academy. Being very impressed with their support of that analysis, he quickly recommended their participation on developing a quantitative assessment system to the CJTF-180 command group. By early August, a small two-man team from the ORCEN, augmented by a senior analyst from AFIT, departed to Afghanistan to develop the quantitative assessment system desired by the command.

3.1 Interim Assessment Process

In the summer of 2003, the responsibility for developing assessment reports for CJTF-180 fell squarely on the shoulders of the CJTF-180 Assessment Team Chief, Major Gus Kostas. Major Kostas, a Marine Reserve officer, had been working assessments for CJTF-180 since his arrival in country the previous November. His presentations to the command had become increasingly difficult. The combination of the pressure from his superiors for quantitative evidence for the assessments and the lack of support from the other staff sections in developing the weekly assessments had clearly begun to wear on him.

To help develop the assessment report for the command, Major Kostas had organized an assessment team. The team consisted of representatives from the Civil-Military Operations Staff Section (CJCMOTF), the Intelligence Section (CJ2), the Fires/Effects Section (CJTF Fires), and the Information Operations Section (CJTPIO). The assessment process consisted of convening the group and discussing in detail one sub-task from D-PASS. There was a great deal of discussion and subjective assessment included in the overall assessment. This part of the process normally took two hours and required meetings two or three times a week.

These assessment meetings would be the first step in the overall assessment process. After updating the task/objective, Major Kostas would take the partial assessment and roll it into the overall assessment that he had completed for the remaining tasks. His requests for

information from the other sections usually were not answered. This put great pressure on Major Kostas to develop a reasonable, and defensible, assessment of the Afghanistan operation. Once prepared, the assessment would then be presented to the Command Group by Major Kostas.

3.2 Initial Meetings and Directions

When the team first met with Major Kostas, he was unconvinced that the team could develop a system the command group would like and the staff could use. Of primary concern for Major Kostas was that the command group did not clearly express their priorities between the often conflicting directions of the assessment systems. This created an atmosphere of everything being important and therefore limited the ability of the assessment team to provide useful information for the Effects team in the CJTF-180 planning cell.

There was also a significant initial discussion on exactly what the Director of the Staff of CJTF-180 wanted the team to accomplish. There were some on the staff who wanted the team to concentrate on developing assessment for Information Operations. There were others who wanted the team to work on assessments for only the combat portions of the conflict in Afghanistan. The team quickly decided that they needed to start at the top to quickly focus on the "right" problem.

They met with BG Byron Bagby, the Director of the Staff for CJTF-180 within two days of their arrival. BG Bagby provided the team with the focus they needed to begin the process of developing an assessment tool. He said that the command needed to be able to explain how they were doing and base it on quantitative evidence. They also needed to be able to determine on what they should focus their efforts in the future of the conflict.

The team explained they intended to conduct stakeholder interviews with all command section chiefs, unit commanders and with individuals involved in the military-political efforts in

Kabul. They would also develop a system for meeting the Directors requirements, would depart in three weeks and then return to Afghanistan with the finished product. The Director supported the process going forward and the timeline.

3.3 Stakeholder Analysis

The first step the team undertook after meeting with the Director was to interview each significant stakeholder in the assessment process for the command to ensure they captured all the concerns in the system they developed. This also provided a direct way to ensure each stakeholder that the system was not being developed to make their jobs more difficult, or of more concern to the staff section chiefs, provide a means for the Director to directly determine how their sections were performing.

The initial intent was to interview each staff section chief, each commander including the commanders in the field, and the military-political assets in Kabul. Major Kostas, who responsibility it was to make arrangements for all the interviews, was reluctant to leave Bagram Airbase for outside interviews. His rationale was that others could do the interfacing with the stakeholders outside the base and that there was not enough time for the interviews. The team reluctantly agreed. This turned out to be a poor decision.

The list below summarizes the concerns of the stakeholders interviewed. Essentially, the system should be able to:

- provide a means to measure success along three lines of operations over time.
- be measurable.
- be simple to provide inputs.
- address both national and regional impacts.
- provide a means to differentiate between CJTF, ISAF and GOA/UNAMA/

NGOs/IOs/USG and others' efforts.

- allow subjective assessments (not just management by statistics).
- provide traceability from existing orders and other documents and be tractable to inputs

from organizations within the Afghan AOR

- reflect items that are critical to Afghan culture and not just to Western ideals.
- consider coalition access and input.

3.4 Value Approach to Effects Based Operations Analysis

When the second assessment team arrived in early August, the Phase IV order had been already published by the US Army Central Command (CENTCOM). Phase IV is generally referred to as "Stability Operations". This phase is normally considered to begin only after all combat operations have ended. In a non-traditional operational environment like Afghanistan, combat operations had not ended when the US Army Secretary of Defense announced the operation had transitioned to Phase IV. In spite of this announcement, the new order included both a combat Line of Operation as well as Lines of Operations focused on the stability of the new Afghani government and gaining the support of the populace.

Corps-level operations, which the CJTF was considered, are widely termed, "the Operational Level" of combat operations.¹ At this level, higher headquarters orders directed the subordinate headquarters to "achieve effects" vice specific objectives like terrain features. These "Effects-Based Operations" were the cause of most of the assessment problems. Assessing success in controlling terrain features was simple compared to achieving stability in a region. Since the D-PASS structure was based on a task-oriented breakdown structure, it was not well-

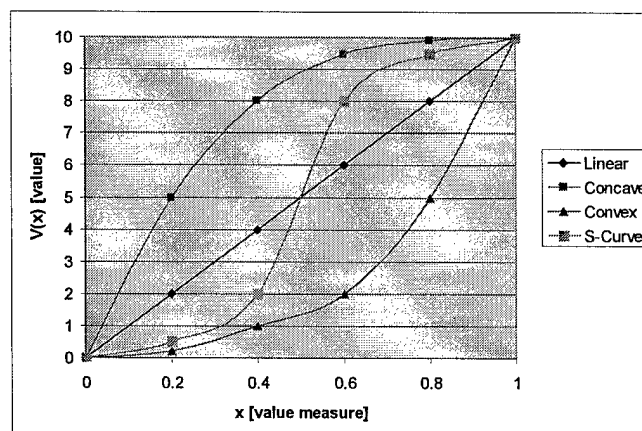
¹Below Corps-level is considered the "Tactical level" and above the Corps level is considered the "Strategic level".

suited to assess the achievement of these effects quantitatively because the structure did not accommodate summation from lower levels of the hierarchy.

To counter this, the team began developing a functional decomposition. This effort would attempt to functionally decompose a desired effect completely. Then each function would be decomposed into sub-functions. This would continue until the sub-functions could be directly measured using attainable Measures of Effectiveness (MOEs). Because the objective of the assessment system was to assess the attainment of the overall effect, the measures had to be summarized. This created a problem in that the units of the individual measures were different which prevented direct summing of the sub-measures. To address this, the team turned to “value modeling” (Keeney, 1992).

Value modeling is generally used to analyze between competing alternatives and is a favorite approach in decision analysis. In this approach, the analyst develops, in conjunction with a client, a “value curve”. This curve is intended to be the functional transformation of the measure of effectiveness to a value between 0 and 10. The shape of these curves is important and must be decided on based on the relative level of importance of increasing the level of the measure. The four basic examples of the shapes of the curves are shown in figure 1 below:

Figure 1. Four types of value functions (Parnell, 2003)



After the development of the hierarchy including the measures and establishment of the value functions, the decision maker identifies weights for each function, sub-function and eventually each value. These values, which sum to one for each level, is then multiplied by the value which leads to a “score” at each level. In the application of this approach to assessment systems, the weights represent the commander’s priorities for the desired effects from the CENTCOM order. The first step and most difficult step would be to develop the hierarchy. This was done as a group effort.

3.5 Mission Deconstruction and Assessment System

Development

The assessment development team and Major Kostas gathered a group of experts from the entire staff to help develop the functional decomposition hierarchy of the effects. There were representatives from the Intelligence section, the Information Operations section, the Fires/Effects section, the Plans section, the Development and Reconstruction Interagency Council (DARIC) section, the Civil-Military Operations section and others.

The process they followed was simple. For each effect the operations order directed (called Lines of Operation), the group would identify functions that must be achieved in order to successfully attain the overall effect. The functions that the group established were then grouped together. These groups become the next lower level of the hierarchy. This process continues until the sub-function can be directly measured by one or a few measures of effectiveness. This is a time-consuming and painstaking process. The benefit is that as a group, the functions are more comprehensive and there is more “buy-in” as the process continues. The ability of the facilitator is critical to keep the group on task.

After two weeks of work, the hierarchy was about 80% complete. At this point, the team returned to West Point for completion of the hierarchy and the development of the overall assessment system. Unfortunately, the analysts departed the area without interviewing any members from the embassy in Kabul or any members of the Office of Military Cooperation – Afghanistan (OMC-A) which is responsible to support the burgeoning Afghani government.

3.6 Interim Model Development

Upon the assessment team's return to West Point in early September, the Information Operations and Technology Center (ITOC) and the Operations Research Center (ORCEN) begin working directly together on the model for the first time. The plan to complete the task was a two-phase operation. In the first phase, the model hierarchy would be completed and integrated into an Excel-based model. This interim product would be then returned to Afghanistan for evaluation. In the second phase, the evaluated model would be developed into a web-based system which would be fully distributed with the functionality of DPASS.

The intent of the system was to sum the weighted values derived from the transformation of the measures of effectiveness for each level. The weighted values would then be calculated for each level of the value hierarchy. The scores themselves for a given month would be of little value in assessing the progress of the campaign. What would be of interest would be the comparison of a monthly value to the values of proceeding months. In this way, trend analysis would provide insight into the direction of the effects. It would also highlight those areas which would provide the most benefit in subsequent months. These would be the effects on which the command should focus their efforts in future operations.

The hierarchy was completed and the Excel-based model was completed by the end of September and sent to Afghanistan so the assessment section could begin collecting data. The

assessment team from West Point would follow in early October to determine required changes and to present the model formally to the Director of the Staff.

Upon their arrival, they were made aware of changes which occurred in the command while they were away. First, another level of command was established in Afghanistan. CJTF-180 now fell under the control of the Combined Forces Command – Afghanistan (CFC-A), eventually commanded by MG(P) Barno. CJTF-180 was now commanded by BG(P) Austin, while BG Bagby remained as the Director of the CJTF -180 staff. In addition, Major Kostas would soon be replaced by Major McCullough, another Reserve Marine.

The impact of the new command structure would soon be felt. When the Assessment team from West Point briefed the new system to BG Bagby and BG(P) Austin it was well received as a comprehensive means of assessing the progress of the command using quantitative means – exactly the stated mission of the team. The presentation to the new commander however did not go quite as well.

MG(P) Barno did not like the process nor the product presented to him by the team. His primary point of contention with the process was that the team only interviewed military personnel and did not interact with any political personnel from the Embassy. This was a valid point and a significant weakness of the study (identified earlier) especially since one of the primary effects the command hoped to achieve was purely political in nature.

Other issues that MG(P) Barno disagreed with were the basics of the system development. He did not feel that summing the values for each effect provided the correct view of the actual situation. Also, he did not want to become so tied to quantitative measures but rather wanted to use qualitative, subjective assessments from subordinate commanders to a greater extent.

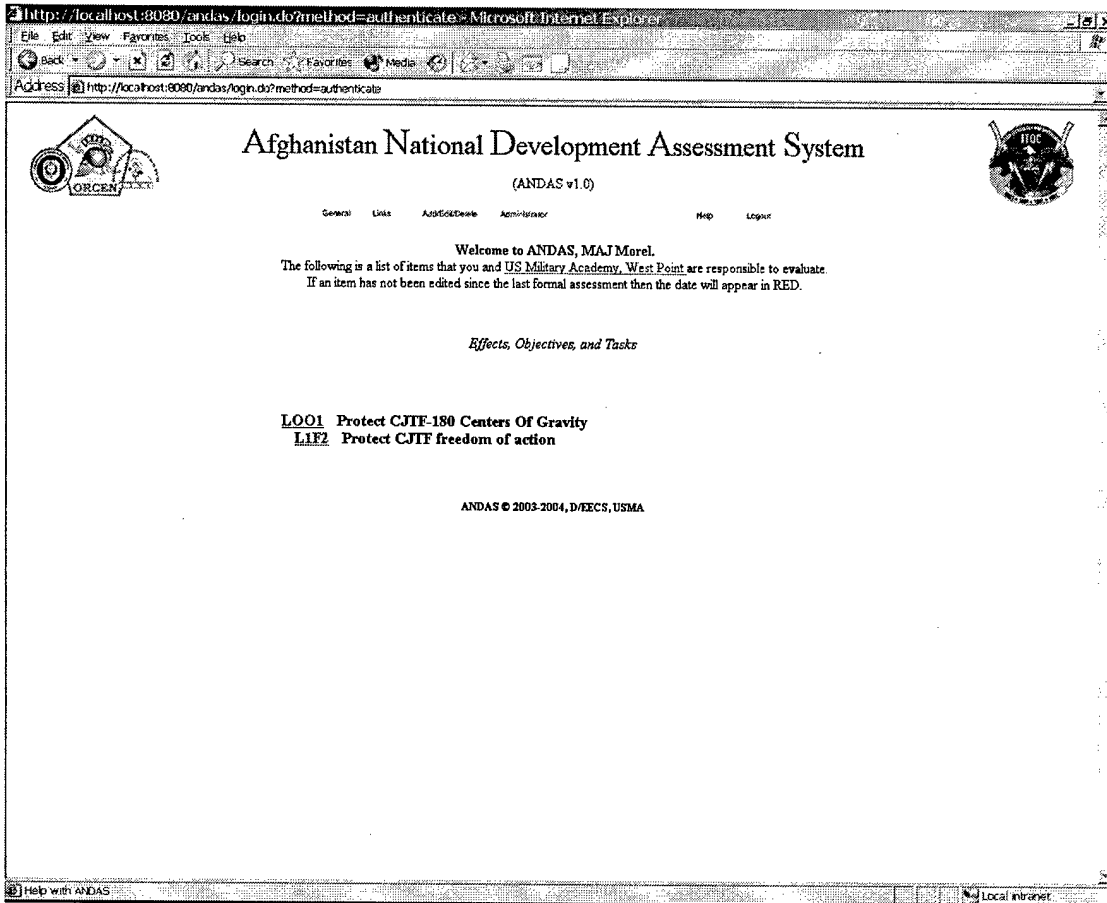
The team returned to BG Bagby to report on their less-than-successful reception by MG(P) Barno. BG Bagby, who was the client for the team's work, wanted the team to continue to the final development of the model into a distributed, web-based assessment system. He felt that though the system in its current formulation was not deemed useful at the CFC-A level, it was still of use at the CJTF-180 level. With this, the team returned to West Point to complete the final version of the system.

3.7 Final Model Development

The team initially felt that there was sufficient functionality incorporated in the original DPASS programming to integrate the weighted sum and trend analysis of the new system. As development progressed however, it soon became clear that changing the original code would be as problematic as a complete construction of a new system.

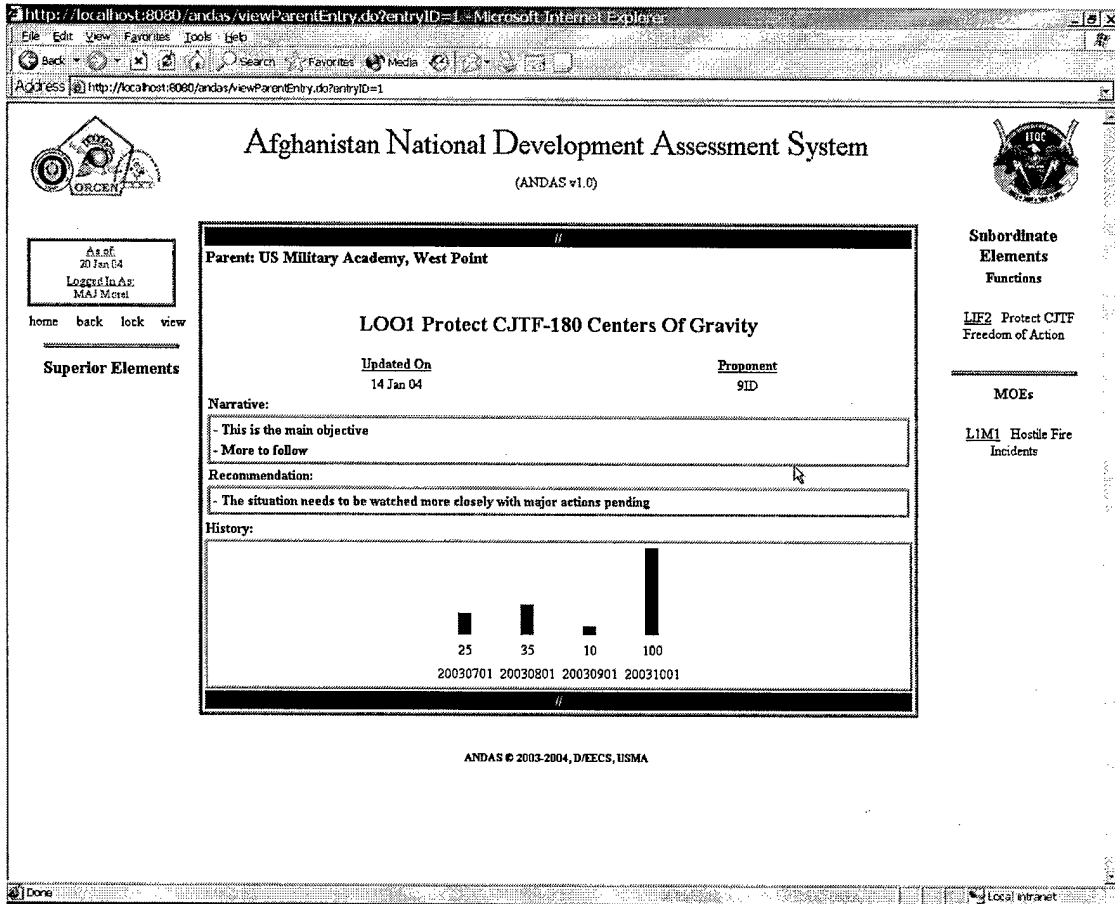
This new system is a fully distributed, web-based replication of the functionality of the Excel-based system. It offers trend analysis, the capability to provide subjective assessments by subordinate sections and commanders at all levels and a means to change the functions, sub-functions and measures without reprogramming the entire system. At figure 2 below is a screen shot of the developmental opening page of the system.

Figure 2. Opening Page of the Web-based ANDAS



The ease of viewing of the status of the trend of the sub-functions is seen at figure 3, below. In this screen shot, one sees a notional Line of Operation and the trend for this LOO. Note the inclusion of the subjective assessments below the LOO description and the decomposition of the LOO on the right side of the screen.

Figure 3. Notional Line of Operation Assessment



The measures under the higher level functions and LOOs are listed on the right hand side of the screen. The user can enter at any level and see the trend of the function, the LOO or the measure over time. This will allow the analyst to determine which effects they should recommend the command focus their efforts in future operations.

The measures will be input by each responsible staff section on their own web page. The sections will sign into the system and can view the status of all the functions, but can only modify the value of the measures associated with their sections. Only the administrator, usually the Assessment Team Chief, will be allowed to modify the weights, the functions or sub-

functions, and the actual measures. This will help prevent sections from modifying the weights to change the trend results.

Chapter 4: Future Direction of Research

The system is ready to be fully deployed in its web-based configuration, though there remains some reluctance on the part of the command in Afghanistan to integrate this into their assessment system. The system is nearly fully verified in its functionality. There must be a time for validation of the system prior to being able to rely on it to provide sufficient insights to direct future effects. We anticipate this taking only one or two months. The reason is that the command has been compiling most of the data required and will be able to generate data for past months allowing good insights into the system.

The system, as it is, is deemed to have too many measures to be useful long term. It may take too long for staff sections to input the data to ensure that the system is fully maintained. The LOOs within the Area of Operation in Afghanistan have already changed and will continue to change. There needs to be a means to allow for quick changes to the system. There will never be a "best" means to assess the situation for two reasons. First, the situation changes and therefore the system must change to provide good insights to direct effects. Second, this system is designed to provide insights to allow the commander to make decisions, therefore as the commander changes and the information needed to make those decisions, the system will have to change.

Chapter 5: Conclusion

Developing one comprehensive assessment system to analyze an entire theater of operations was a challenging proposition for the analysts. In the end, changing the command structure changed the complexion of the problem and resulted in the limited acceptance of the product. This is a strong system based directly on quantitative analysis to provide the commander with the means to make more informed decisions. This is the role of the military analyst in supporting a combat commander.

The military analyst's role is not always easy. As this study shows, there are some who are very wary of quantitative assessments and methods. These are not always trusted because there is a belief they can be manipulated and that they can actually hide reality. The analyst must convince the commander that any system is reliable and at the same time is only there to provide the commander with the means to make more informed decisions.

The reality is that we live in a political time and one where the media has unprecedented access to information within a military command. Any system which provides definitive results – whether they accurately reflect the situation or are just open for interpretation – can possibly be used against the military or used politically. Commanders must be sensitive to this reality. Analysts must also be sensitive to this reality but we must provide the commander with what we believe is the best product possible. The next decision lies with the commander, but the final decision will be made by history.

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