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A METHODOLOGY FOR
CAPTURING AND ANALYZING DATA
FROM TECHNOLOGY BASE SEMINAR WARGAMES

by

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A Methodology for Capturing and Analyzing
Data from
Technology Base Seminar Wargames

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ABSTRACT

This thesis provides a structured methodology for obtaining, evaluating, and portraying to a decision maker, the opinions of players of Technology Base Seminar Wargames (TBSW). The thesis then demonstrates the methodology by applying the events of the Fire Support Technology Base Seminar Wargame held in May 1991. Specifically, the evaluation team developed six surveys, each survey capturing opinions using the categorical judgments technique. The subject of each of the surveys comes from characteristics and systems within six major Fire Support areas of interest, target acquisition, weapons and munitions, command and control, support and sustainment, fundamental principles of future combat, and technologies and systems. These areas of interest were provided by the United States Field Artillery School and United States Army Laboratories Command, co-sponsors of the TBSW. These surveys were administered at the Fire Support TBSW in May 1991. The results are calculated using a scaling method and are displayed in a manner that illustrates the strength of preference for each of the characteristics and systems, the interval between each characteristic of system, and the category in which they fall. Using these easily readable, graphical results , the decision maker can now use the findings of TBSWs, a previously unattainable task.

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The reader is cautioned that computer programs utilized/developed in this research may not have been exercised for all cases of interest. While every effort was made, within the time available, to ensure that the programs are free of computational and logic errors, they cannot be considered validated. Any application of these programs without additional verification is at the risk of the user.

Unless otherwise stated, whenever the masculine or feminine gender is used, both men and women are included.

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I. INTRODUCTION

The 100-hour war between the United Nations alliance and Iraq was one of the most overwhelming military operations of all time. The total surprise after movements of thousands of men and pieces of equipment, the great distances covered, the harsh environment on which the scene unfolded, and the accuracy and lethality of the United Nations alliance force all made the operation uniquely spectacular. And what were the causes of this overwhelming victory? There were many, but the superior United States (U.S.) technology has to be one of the top items on the list.

Now look to the future. Assume that the U.S. wants to maintain its technological edge, a fair assumption considering the results in Iraq. With the time interval from conception of a new system to fielding the system being as much as twenty years, some of the new systems used in the Iraq campaign were being conceived in the early 1970's. Therefore, systems needed for the year 2010 and beyond must be conceived today. But how are these systems conceived? One method used by United States Army Laboratories Command (LABCOM), is to gather technologists (those that build the systems) and tacticians (those that use the systems) at one location, focus them on one issue such as fire support or logistics, and have them interact in seminar wargames with possible scenarios which might take place 20-25 years in the future. LABCOM has conducted several of these Technology Base Seminar Wargames in the recent past. Certainly no one can see the future, but one hope is that through an analytic synthesis of evaluations from experts in technology and tactics, proposed systems can be examined and the most meaningful technologies for the future selected and developed. Such wargames bring technologists and tacticians together so that each develop a better understanding of the other's difficulties and problems. One of the problems with seminar wargames, however, has been the collection and assessment of results. During the seminars, participants gain a great knowledge of the technological requirements seen to be successful on future battlefields, but the Army's decision makers may gain maximum benefit from the process because of a limited analysis made in assessing wargame results. Unfortunately, after each of these wargames, the three of four days of thought from upwards of 100 experts, the money spent on bringing them together, and most importantly, the knowledge and understanding generated on the proposed systems and concepts are not captured in an analytically meaningful way. In more recent seminar wargames, there has been an attempt to compile summary findings, but these attempts were the observations of one or two people who tried to capture the opinions of all participants just through listening and watching the proceedings. Needless to say, this method has many drawbacks as the summarizers cannot be in every seminar all the time, they may already have an established bias on many issues, and cannot remember all the relevant ideas that occurred over the course of three or four days. Basically, at the end of the seminar wargame, participants walked away with a increased personal knowledge, the Army got little readily usable output or the perhaps biased opinion of the report compilers, and the taxpayers received a bill for hundreds of thousands of dollars. These observations motivated the need for this research.

The genesis of this thesis was a request from LABCOM to TRADOC Analysis Command (TRAC) Monterey. The request was for a methodology to incorporate the findings and conclusions generated in LABCOM's ongoing series of Technology Base Seminar Wargames that can be readily used in a decision making process. This decision making process is typically for technology investment in many areas, from target acquisition systems to munitions systems to logistics systems. As part of the TRAC - Monterey team, the author used the methodology at the Fire Support Technology Base Seminar Wargame at Fort Sill Oklahoma in May 1991. The scope of this thesis focused on capturing the essence of opinions of wargamers from the Fire Support Technology Base Seminar Wargame to assist decision makers better invest in future technologies and systems. Developing the methodology required accomplishing three tasks: constructing a meaningful opinion measurement instrument, analyzing the results of the measurement instruments, and portraying the results in a manner that assists a decision maker to quickly see the the strength of preference of the systems and characteristics.

Once given the task to develop the methodology, the three agencies involved (USAFAS, LABCOM, and TRAC Monterey) used the following process to complete the task (Figure 1). First, they decided on the conduct of the wargame with its scenarios, systems, and participants. Then the evaluation team designed the survey. Individuals from the RAND Corporation were also instrumental in this phase. They suggested a method of combining characteristics and systems in an hierarchy that provides a systematic approach to data gathering. Next, the team administered the survey at the Fire Support Technology Base Seminar Wargame at Fort Sill, Oklahoma in May 1991. Following survey administration, the responses were recorded and analyzed at TRAC Monterey in June 1991. Finally, the team presented the results in a graphical form to representatives of the Field Artillery School in July 1991.

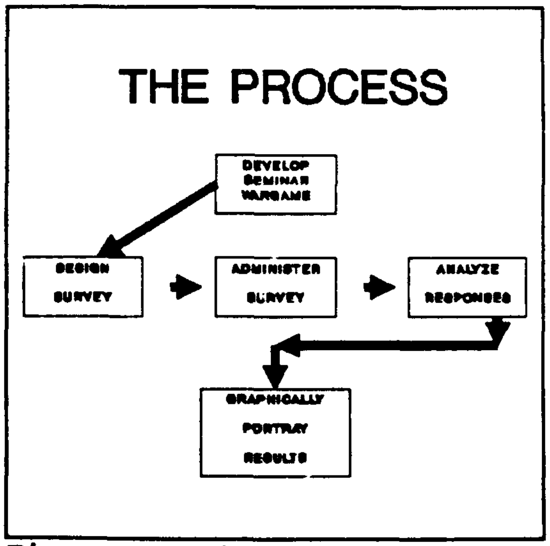

Figure 1 The Process

The thrust of this methodology is not to be a panacea to answer all questions that deal with investing in future technologies and systems. This is, however, more than just another tool! The seminar wargame uses experts in two fields, tactics and technology, places them on actual terrain with realistic future missions, probable future threats, and proposed future systems and lets them simulate battles against each other. The methodology collects and analyzes these expert opinions, and then measures these strengths of preference. This accomplishes much more than a simple and perhaps unintentionally biased summary. There are, however, some disadvantages. By the nature of the wargame structure the results portray nothing about scenarios that are not played, and by the questionnaire structure the results portray nothing about technologies or systems that are created by the players during the seminar wargame.

There have been many attempts to predict the future, but this thesis is unique in that it is the first systematic method for analyzing TBSWs which try to forecast future needs. The following chapters lead the reader through a discussion of exactly what a Technology Base Seminar Wargame is and does (Chapter II), development of the data collection surveys and an explanation of the analysis methodology (Chapter III), a graphical presentation of some of the results of each survey (Chapter IV), and some concluding remarks on individual survey results and the overall methodology (Chapter V). Appendix A is added to walk the reader through one example of the analysis methodology. Apppendix B shows the participants and the breakdown of the actual Fire Support Technology Base Seminar Wargame. Appendix C lists the abbreviations used throughout the thesis and in the surveys. Appendix D provides the computer programs used to conduct the analysis. The last two appendices, Appendix E and F, portray the results and the surveys, respectively.

II. NATURE OF THE PROBLEM

Obtaining and analyzing data from technology base seminar wargames is unlike gathering and analyzing data from most other wargames for several reasons. First, the wargames are <u>not</u> computer assisted. Since all the systems portrayed in the wargame are proposed systems, and many systems are created during the discussions, there are no constant parameters for the systems. Therefore the systems cannot be programmed into a computer to be used during the wargame. Without the computer assistance there is really few ways to keep track of results except by someone acting as a scribe. The purpose of conducting the wargame in a seminar is to have a relatively free flow of ideas and the requirements of a scribe would detract from this process.

Second, while the game is as realistic as possible (the game is played on a map of actual threat areas, one group plays the Red force and the other plays the Blue force, and each force has a mission), there are no game pieces, system parameters, or time periods to constrain the participants so the game is much more free flowing than a traditional wargame which has game turns, defined systems, and game pieces. This seminar process creates much discussion and many new ideas which is what is desired, but it does not provide any mechanism for tracking results or measuring effectiveness.

Third and last, because of the high cost of bringing approximately one hundred experts together from across the country for a one three day period, data gathering in the technology base seminar wargames is a one-shot deal that cannot be conducted again and again like most of our current wargame models. Therefore, the data either are gathered the first time around or are lost forever. Data lost forever is exactly what happened in past Technology Base Seminar Wargames. For the above reasons a new method of gathering, analyzing, and displaying the data had to be developed.

Before explaining the methodology, the following paragraphs detail the purpose, conduct, and participants of a Technology Base Seminar Wargame.

A. PURPOSE

> "The purpose of these games is to bring material developers and users together to assess the value of technologies on the future battlefield. The results of these games are information sources for determining the Technology Base Investment Strategy [Ref. 1: p.1].

The above stated purpose is really a combination of three goals. First, technology base seminar wargaming provides technologists (those that create the systems) from the different Army laboratories and Army tacticians (those that fight the systems) a meeting ground so that technologists can see what is needed and tacticians understand what is feasible. Secondly, the participants assess currently proposed systems. Tacticians change them as needed and technologists change them as feasible. During the wargame better systems are developed, and all players better understand the combat value of each proposed system. Finally, the results are supposed to be "information sources" for technology investment decisions. The first goal has been achieved during each seminar wargame, and this has made participants "feel" good, but has done very little directly for technology investments. The last two goals are probably much more important as far as dollars, or in the lives of American soldiers, and so far the process has been severely deficient in these two areas.

The three goals just listed define what the wargame accomplishes, probably just as important are the limits of each game. These limits include the following. There is no discussion of the monetary cost of each system, of the technological uncertainty of developing the system, or of the monetary cost of developing the system. All three limitations of the competing systems are considered equivalent, and therefore do not weigh in any decision making during the wargame.

B. THE ORGANIZATION

The number of participants varies for each wargame, but the figures here are representative of past and projected wargames. A total of 106 individuals participated in the technology base seminar wargame of which 97 participated in the data collection by answering at least one survey. Figure

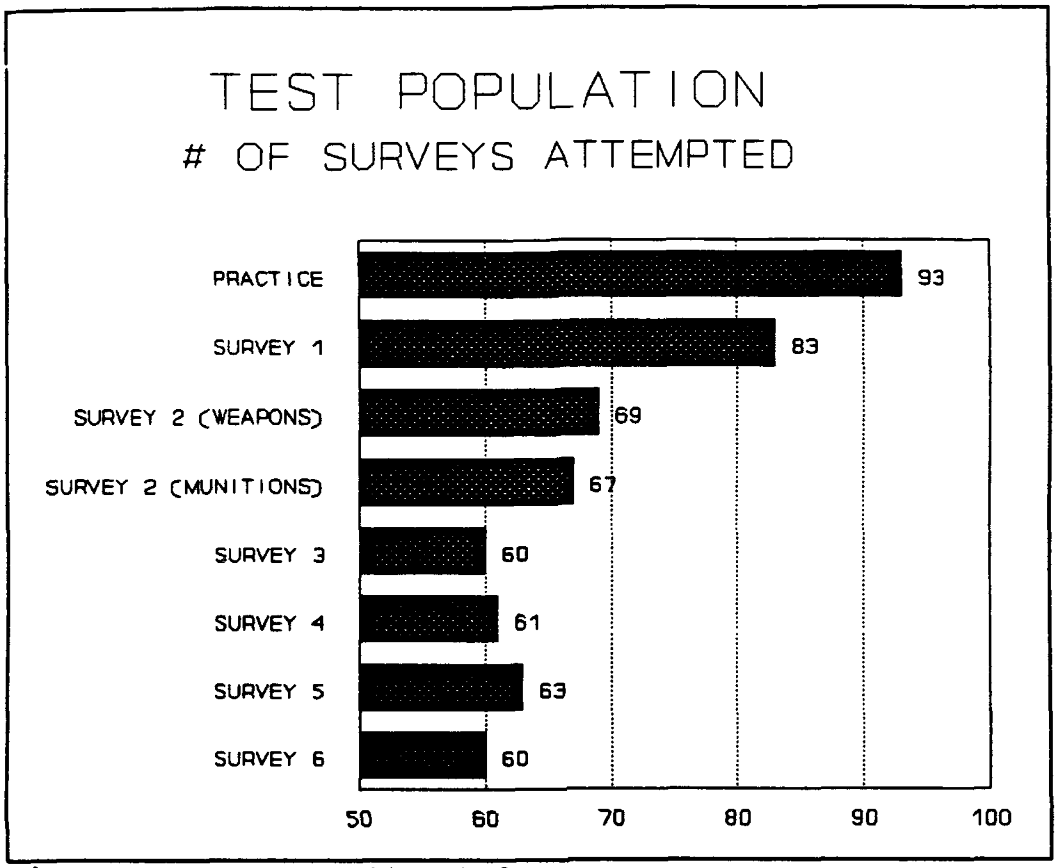

Figure 2   Surveys attempted

2 displays how many surveys participants answered.

The participants represent the six Army laboratories (Ballistics Research, Harry Diamond, Human Engineering, Atmospheric Science, Avionics, and Engineer Topographic), eight Army centers (Chemical Research and Development, Aberdeen Research and Development, Foreign Science and Techology, Logistic Management, Signal, Infantry, Belvoir Research and Development, and Night Vision Electro-optics), eight different Army commands (Training and Doctrine, Material, Natick Research and Development, Missile, Communications and Electronics, Laboratory, Tank Automotive, and Medical Research and Development), and seven Army schools (Field Artillery, Air Defense Artillery, Infantry, Armor, Aviation, Command and General Staff, and the Air University). The Army was also represented by ranks CPT through MAJ General and by many branches to include Infantry and Armor officers from Combat units, and Field Artillery, Aviation, and Engineer officers from Combat Support units. In this particular Technology Base Seminar Wargame the actual wargame players from the technologists and tacticians were divided into three groups of approximately twenty-three each, half technologists and half tacticians. Each of these groups concentrated in one of the following regions; desert, tropical, or northern continental. These three regions were chosen as the most likely representative threat areas by the USAFAS. Each of these regional groups was then divided in half in order to evaluate the two different types of fires, long range or close range. The two different types of fires were chosen because of the USAFAS's long running concern for the different effects and requirements of close and long range fires. Finally, each long or close range fires group was divided into Red and Blue teams to portray opposing sides during the wargame. The creation of opposing sides added an air of competition that theoretically motivated more creative options. Figure 3 shows how the participants were organized. A list of all the participants in their groups is enclosed in Appendix B.

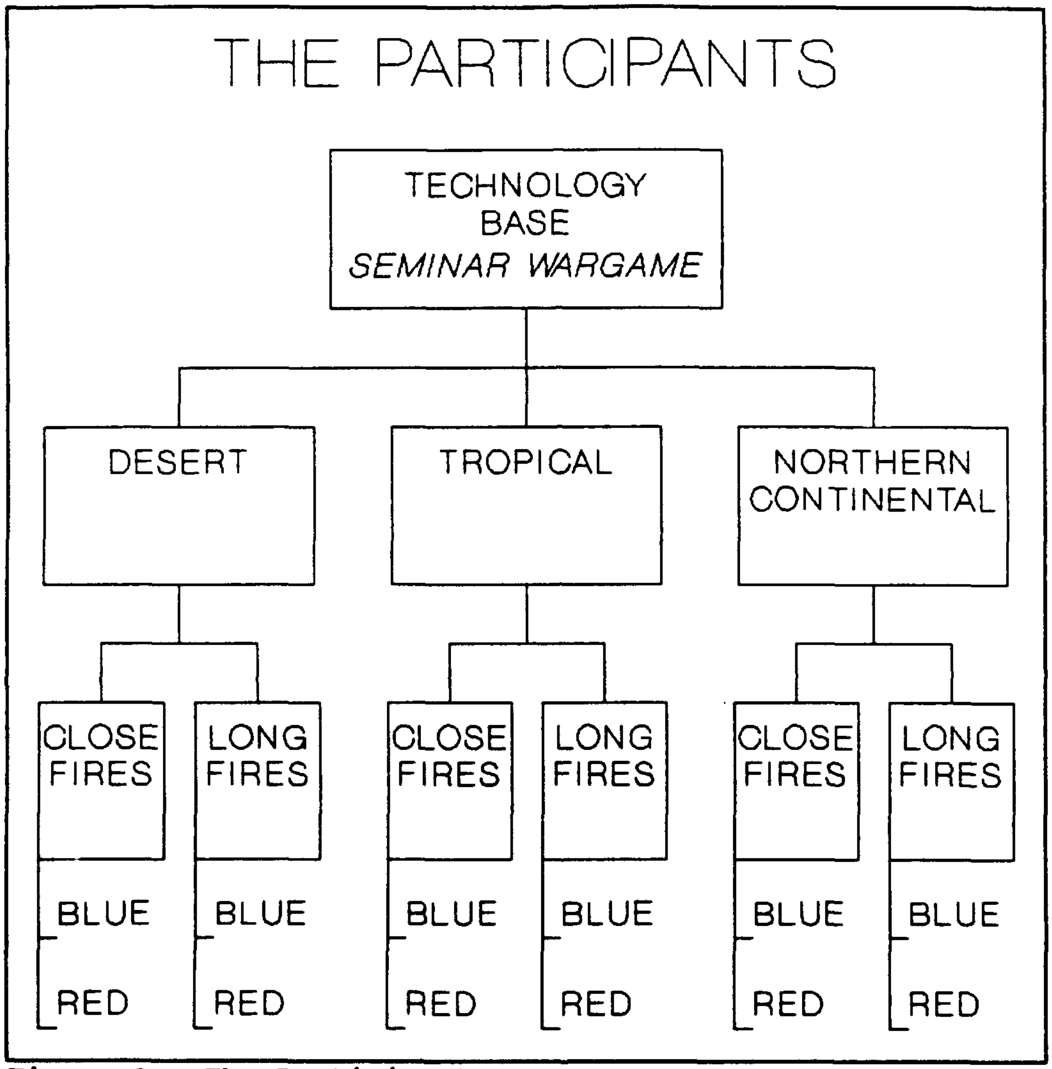

Figure 3 The Participants

To further add realism to the wargaming, each regional group was assigned advisors in weather, logistics, and chemical/smoke effects. Lastly, each regional group was assigned two wargame advisors (one for long range fires and one for close range fires) that acted as facilitators to encourage discussion and ensure events ran in a timely manner.

C. PROCESS

Each Technology Base Seminar Wargame has its own individual quirks, but the basic process is the same in each. This Technology Base Seminar Wargame process began with all participants gathered together in a main lecture hall. They were briefed on the following; the purpose, the groupings, the future scenario, and the data collection method. The purpose and grouping briefings provided the motivation to do a thorough job and the organization with which to do this, respectively. The future scenario briefing described possible future situations the Army considers possible. This ensured all participants had a common starting ground for understanding the United States Army future missions, probable enemies, possible terrain, and troops available (future systems and their effects). The data collection briefing described the surveys and ensured all participants received the same instructions in an effort to reduce any bias caused by differing instructions. The participants also filled out a practice survey to familiarize themselves with the survey completion process and to avoid misinterpretations later in the process.

After the initial briefings, each regional group retired to their own room where two mapboards surrounded by chairs awaited them, one for the close fires group and one for the long fires group. Initially and within each close and long range fires group, the Red and Blue groups independently spent time discussing how to use their systems and technologies. Then each Red and Blue group pairing came together to discuss strengths and weaknesses of their own systems and technologies against the opposing force's systems and technologies. Finally, each close and long range group independently discussed what technologies and systems not present were needed and which technologies and systems present were not needed. These observations were captured by two methods; a briefing prepared by each regional group and presented to all the regional groups, and in a survey. This process was repeated four times over the three days. Each repetition had the following different focus; target acquisition, weapons systems and munitions, command and control, and finally, support, sustainment, and deployability. Because of the four different focuses, each survey was different in that it asked questions of systems that were specific to that repetition. At the conclusion of the four repetitions, all participants gathered for an outbrief and two final surveys. These surveys questioned overall trends that emerged throughout the four repetitions. Table 1 portrays the six different surveys with their corresponding area of focus.

TABLE 1. SURVEY DESCRIPTION

Survey #	Area of Focus
I	Target Acquisition
II	Weapons Systems and Munitions
III	Command and Control
IV	Support, Sustainment, Strategic Deployability, and Tactical Mobility
V	Combat Power and Battlefield Operating Systems
VI	Emerging Systems and Technologies

III. EXPERIMENTAL DESIGN

> "The objectives of technology seminar war gaming are creative stimulation and idea collection, rather than finite measures of effectiveness among competing weapon systems and tactics" [Ref. 1:p. 2].

In previous seminar wargames, participants verbally expressed their views where the strong personalities (not necessarily the majority or the most informed of the group) could express their views the loudest. Ideas were summarized in a report which was one or two individuals' interpretation of the events. With the events often taking place over several days, and despite the best intentions, it was easy for this person or people to forget, misinterpret, express the opinions of only the vocal members of the group, or advance their own conclusions rather than advance the opinions of the whole. It is likely that many usable ideas were never expressed or were expressed only briefly before suppressed or forgotten in order to move on to other points of interest. For this reason, LABCOM contacted TRAC Monterey to develop a methodology supported by a survey to collect, analyze, and portray results of Technology Base Seminar Wargames and specifically the Fire Support Technology Base Seminar Wargame.

A. DATA COLLECTION

1. Purpose of the Survey

The principle data collection tool is the survey of wargame participants. The survey satisfies the objectives of two different proponents, LABCOM and USAFAS. The USAFAS wanted to investigate and evaluate proposed systems within the Fire Support arena with the brain power that was assembled at the seminar wargame. LABCOM wanted to be creative, to conjure new systems and determine important technology characteristics across the broad spectrum of warfighting. USAFAS knew what questions they wanted answered, however, LABCOM did not. LABCOM recognized that there were much data lost at each wargame and did not want this repeated.

2. General Design Development

Satisfying USAFAS's agenda became relatively straight forward after a conversation with Mr. Bruce Goeller and spending considerable time with Dr. Kenneth Solomon, both of the RAND Corporation. The approach suggested by both calls for determining the important characteristics or capabilities needed to conduct the required task, and then evaluating the proposed systems with those important characteristics. For example, the proposed target acquisition systems are evaluated with key target acquisition characteristics. By first assessing the value of the characteristics/capabilities and then assessing the value of each proposed system within each characteristic, the methodology provides excellent results to the USAFAS of the instance (system or characteristic) values, the interval between the instances, and the category bounds.

Determining the survey design for LABCOM was the tougher design problem. Because they wanted to capture the important characteristics and systems developed during the wargame, a fill-in-the-blank design was needed. Since they also wanted to know the importance of different characteristics/capabilities of future combat, the evaluation team generated a methodology that would provide instances, intervals, and bounds as above.

In order to accomplish all tasks (instance values, intervals, and bounds for USAFAS, fill-in-the-blank, instance values, intervals, and category bounds for LABCOM), six different surveys were designed. The first four surveys were administered after each of the four types of wargame, the four types being target acquisition, weapons systems and munitions, command and control, and support and sustainment. Each of these surveys had the same basic design. The first stimulus and response measured the important characteristics of the type wargame. The next group of stimuli and responses measured how well each system did in each of the characteristic areas. The last stimulus and response measured all the systems regardless of characteristic. The final portion was a fill-in-the-blank question to capture new ideas before the participants left the area. Table 2 depicts the four areas of each of the first four surveys.

TABLE 2. SURVEY STIMULI FOCUS

Stimulus #	1	2,...,n-2	n-1	n
Focus of Stimulus	Character-istics	Systems measured against each characteristic	Systems measured against all character-istics	New ideas (fill in the blank)

Each of these surveys gathered the data needed to accomplish the USAFAS task of evaluating the proposed systems and characteristics. These surveys also satisfied the LABCOM task of capturing the creative new ideas that were generated in the seminars. These surveys did not, however, rank characteristics of a broader nature that LABCOM also required. To accomplish this task, the evaluation team designed two final surveys that measured these broad characteristics.

3. USAFAS Requirements

USAFAS identified the proposed systems for the wargame. These systems and their abbreviations are given in Appendix C.

For the TBSW, USAFAS and TRAC Monterey developed characteristics to measure the desirability of these systems since specific characteristics for target acquisition, weapons systems and munitions, command and control, and support, sustainment, and deployment were not available. The original lists of characteristics for both the target acquisition survey and the weapon systems and munitions survey came from the Army's tactical bible [Ref. 2:p. 13], the list for command and control came from a British Field Manual [Ref. 3:p. 69], and the list for support, sustainment, and strategic deployability and tactical mobility came from adjectives on the description of proposed combat service support equipment in an Army draft manual [Ref. 4:p. II-H-7]. To ensure complete and correctly worded lists, the USAFAS reviewed the characteristics. During the review, the characteristics changed dramatically. These changes ensured the proponent agencies the most usable data possible.

4. LABCOM Requirements

LABCOM wanted generic characteristics that spanned a broad spectrum of weapon systems. To accommodate this spectrum, the evaluation team considered the Principles of War [Ref. 2:p 173], the four characteristics of Combat Power [Ref. 2:p. 11], the Battlefield Operating Systems (BOS), and previous TBSW reports. After much consideration, the evaluation team dismissed the Principles of War as too nebulous for the seminar wargames. The evaluation team also reduced the four characteristics of combat power to three as the characteristic of leadership was not an integral part of a "technology base" seminar wargame. They also reduced the seven BOS to only one, the system of Fire Support, as the others were not substantially addressed at this Fire Support wargame. The team also added two other lists taken from previous TBSW results, emerging technologies and emerging systems.

5. Specific Survey Design

After consultations with LABCOM, USAFAS, and TRAC Monterey, two requirements for the analyzed data became apparent. The methodology needed to measure the strength of preference participants had for the instances (characteristics and systems) and the interval between the instances. Several methods of gathering responses were considered for these tasks. A brief description of each follows.

a. Paired Comparisons

The method of paired comparisons requires each instance be compared to another. Therefore, if there are n instances, there are n(n-1)/2 judgements. With the following number of characteristics used in each of the first four surveys, 18, 16, 19, and 17, each participant would need to make 153, 120, 171, and 136 judgements, respectively, on the first question of each survey. When all the questions from all the surveys were included, the number of judgements for each participant was considered too high to be used for this research [Ref. 5:p. 166].

b. Graphic Rating Scale

The graphic rating scale requires participants to indicate their judgements by marking a point on a line [Ref. 6:p. IV-D-p2]. This method allows for fine discrimination but can be hard to score. Because of the large number of responses and the difficulty in scoring, this method was discarded.

c. Categorical Judgements

This technique requires participants to select the category for each instance that best mirrors their opinion. Then the categorical ratings are used to construct an interval scale. The scale shows the location of the instances, the interval between instances, and the category bounds. The evaluation team chose this method because it provided categories that the other methods did not and it was easy to score. [Ref. 7:p. 1].

6. Stimulus Design

For ease of answering and scoring, the evaluation team designed each the same. The stimulus is divided into four parts and an example is provided below for reference.

Given a fixed budget and assuming that maximizing accuracy will win the war, indicate with what probability you would allocate funds to the following systems.

Each of the four parts of the stimulus has a different origin. The first part of the stimulus incorporates the phrase, "Given a fixed budget". The objective of the phrase is to discourage considering "everything" as equally important and encourage discrimination between instances. The phrase "assuming that maximizing accuracy" provided the answering participant a common mental yardstick with which to measure his response. This phrase attempts to preclude participants from mentally choosing different yardsticks and undermining the results. The phrase "will win the war" left no doubt in the participant's mind about the ultimate purpose of the question. The word "probability" was used vice words such as "importance" or "value" because of the ability to quantify probability. The unquantifiable words do not have the same meaning to everyone and destroy the precision in the test.

7. Response Field Design

The response field design can best be discussed in two parts, the category descriptions and the instances.

a. Category Description

The evaluation team designed each stimulus with seven response categories. The literature indicates that between 5 and 9 response categories are best depending on the situation [Ref. 7:p. 57, Ref. 6:p. IV-E-p1]. The number 7 was chosen for several reasons. The odd number provides those participants with a neutral opinion an obvious answer, the middle response category. Five was discarded as not providing enough precision in the answers. The evaluation team discarded nine as too many categories that made the answering process excessively difficult for the participants.

The team also described each category in two different manners, one being numeric and the other being verbal. The verbal descriptions came mainly from the Questionnaire Construction Manual and consisted of the following categories; very small, small, not great, borderline, reasonable, high, and very high [Ref. 6:p. VIII-D-p1]. The numerical range came from the article "How Probable is Probable" in the Journal of Forecasting. The results of this article were that numerical probabilities showed much lower variability than verbal probabilities, however, participants are much more comfortable with words than numbers [Ref. 8:p. 258]. Therefore the suggestion of the article and the method used in this survey was to include both verbiage and numerical probabilities in the category descriptions. The numerical categories from the article were separated as follows; 0-14, 15-28, 29-42, 43-57, 58-71, 72-85, and 86-100 [Ref. 8:p. 262]. The verbiage and the numerical probabilities were incorporated as follows.

Verbal expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range	0-14	15-28	29-42	43-57	58-71	72-85	86-100

b. Instances

All instances (characteristics or systems) for the first four surveys came from the list of systems provided by the USAFAS or the list of characteristics generated by TRAC Monterey and subsequently reviewed and revised by USAFAS. The response descriptors for the final two surveys were also from a list generated by TRAC Monterey, but LABCOM reviewed and revised these. There was a conscious effort to keep this list of instances for each question less than ten, thus allowing the participants to make better judgements between the systems [Ref. 6:p. IV-E-p1]. The evaluation team had fair success with this approach in the systems questions of the first four surveys. The team, however, increased the list of characteristics for each survey considerably, as the needs of the sponsoring agency outweighed the desire to keep the list small. The surveys are included as Appendix E.

8. Survey Administration

The evaluation team administered seven surveys to the wargame participants over the three day period. The first survey was a practice survey administered during the opening session of the first morning. This introduced the participants to the survey structure in a common setting so that all received the same instructions and reduced the possibility of instruction induced differences. The next four surveys, Target Acquisition, Weapon Systems and Munitions, Command and Control, and Support and Sustainment and Strategic Deployability and Tactical Mobility, were administered in the regional group rooms around the map board during the seminar wargame process. The purpose of each of these surveys was to assess the instance values, measure the interval between the instances, and categorize the instances.

The team administered the final two surveys when all participants were gathered at the conclusion of the seminar wargames. The purpose of the final two surveys was to gather data on characteristics influencing future combat and to assess the strength of preference of emerging technologies and systems that were important in previous TBSWs, the interval between the strength of preference, and the category of each preference.

B. ANALYZING THE RESULTS

LABCOM recorded all the results from the fill-in-the-blank questions for further study and will not be dealt with further in this thesis. The evaluation team analyzed the data collected from the categorical judgements with a method used on research projects of this type at the Naval Postgraduate School. This method produces a scale that portrays the instances, the interval between the instances, and the category boundaries [Ref. 9:p. 1]. Because of the need to provide the scaled instances and the interval between the instances, this method ideally suited the analysis. More than just seeing the instance values and intervals, the decision maker also sees the category bounds.

Five APL (*A Programming Language*) functions (Appendix C) were used to manipulate the numbers, four of these were developed by Professor Glenn F. Lindsay, an Operations Research Professor at the Naval Postgraduate School. The fifth function combined the results of the first four to provide the bounds, the instance value, and the interval between instances on the same scale.

The method used requires four assumptions and they are listed below [Ref. 9:p. 6].

1. A participant's "opinion" about the scale value of an instance (characteristic or system) i is a normally distributed random variable with mean μ_i and variance σ_i^2.

2. Participants view the continuum of values for instances as being broken into successive intervals called categories.

3. A participant's opinion about a category upper bound is a normally distributed random variable so that for category j, the upper bound would be normally distributed with mean μ_j and standard deviation σ_i^2.

4. All category bounds have the same variance, so that for all j, $\sigma_j^2 = c$.

1. Step By Step Procedure For Obtaining Scale Values

The following are the steps from Professor Lindsay's paper for obtaining scale values and category bounds.

a. Arrange the raw frequency data in a table where the rows are the instances and the columns are the categories. The columns should be in rank order, with column 1 representing the least favorable category.

b. Compute relative cumulative frequencies for each row, and record these in a new table. The last column of this new table will consist of unit values, and is omitted.

c. Treating these values as leftward areas under a Normal (0,1) curve, go to a table of the normal distribution and find the z values for these areas. Record these in a new n by (m-1) table. This is the z_{ij} array for the following computations.

d. For each row i in the z_{ij} array, compute the row average, $\bar{z}_i$.

e. For each column j in the z_{ij} array, compute the column average. Call these column averages b_j, and note that b_j is the value of the upper bound of category j on the scale.

f. Compute a grand average of all the values in the z_{ij} array. This is readily done by simply averaging the column averages. Call the grand average $\bar{b}$.

g. Compute

$$B=\sum_{j=1}^{m-1}(b_j-\bar{b})^2$$

h. Compute for each row

$$A_i=\sum_{j=1}^{m-1}(z_{ij}-\overline{z_i})^2$$

i. For each row, compute $\sqrt{\frac{B}{A_i}}$. This is an estimate of $\sqrt{\sigma^2{}_i+c}$.

j. Finally, for each row (instance) compute

$$S_i=\bar{b}-\overline{z_i}\sqrt{\frac{B}{A_i}}$$

These are the scale values of the instances, and they are on the same interval scale as the category bounds b_j. Now use any linear transformation, $y=\alpha+\beta x$, $\beta>0$, to move the scale where it is needed. The APL function "RAW" in Appendix C uses this linear transformation.

2. Incomplete z_{ij} Arrays

The one problem with this method occurs when there is an incomplete array. An incomplete array is one that has values < .02 of the row sum. This may happen for many reasons such as low variance between the participant's opinions, high or low opinion held by all or most judges, or even a bimodal distribution. There are three techniques that fix the problem. The evaluation team used the following procedure in this project.

Separate any incomplete array into several smaller complete ones. Make the smaller arrays complete by collapsing columns as needed. Then scale these arrays on the corresponding values of the largest array to ensure the scaling is consistent. This technique insures that no instances or boundaries are unscaled.

3. Example Problem

An example problem is provided in Appendix A to show the reader how the evaluation team used Professor Lindsay's technique.

C. MAKING THE RESULTS "FRIENDLY" TO A DECISION MAKER

This step required plotting the instances and the categories on a simple line graph depicted in Figure 4.

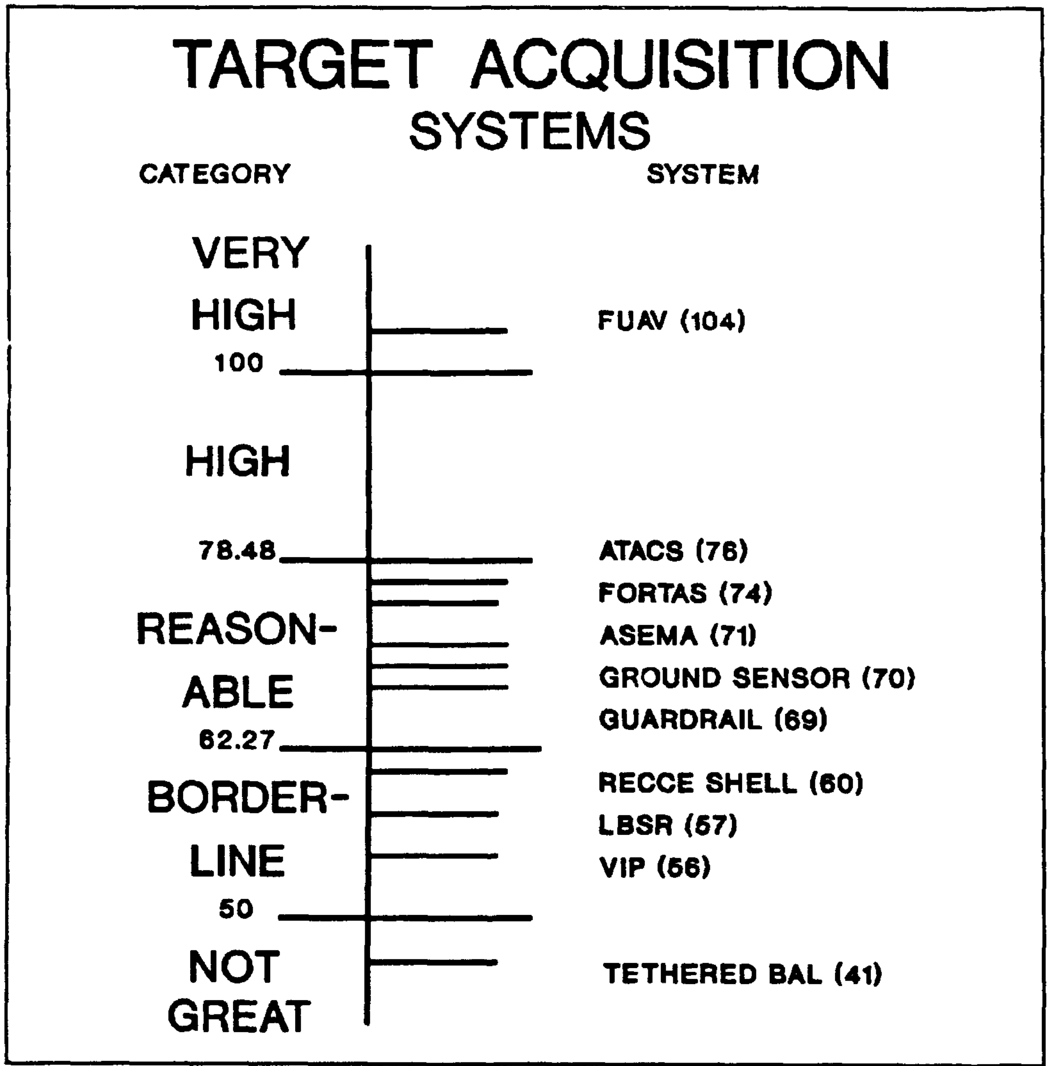

Figure 4 Example Results

IV RESULTS

The goal of this methodology was to portray the instances, the intervals between them, and the categories on the same scale. This methodology accomplishes this goal. The results of every question display all three items mentioned above. Since there is one figure for every question, there is the potential for 116 figures. When the different categories such as Long and Close Fires and Desert, Tropical, and Northern Continental scenarios are considered, there are many more possible figures. Displayed here are only the most interesting figures of each survey, along with one figure showing the difference in preferences in weapons systems in the Close and Long Fires scenarios, and one figure showing the difference in preferences in munitions between the Desert, Tropical, and Northern Continental scenarios. All other results are in Appendix E.

A. SURVEY 1 (TARGET ACQUISITION)

The following figure (Figure 5) depicts results from the stimulus requiring participants to assess target acquisition systems.

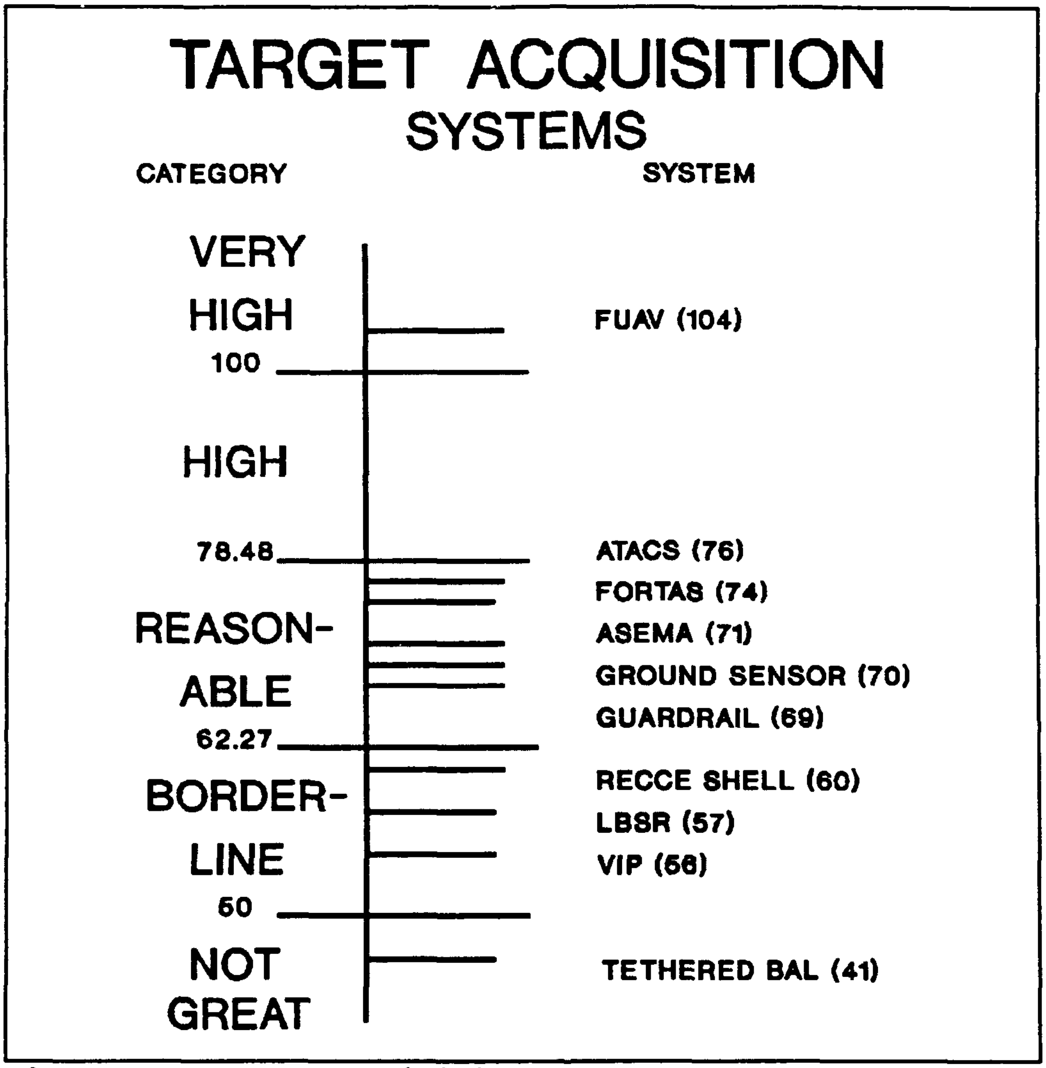

Figure 5 Target Acquisition Systems

These results quickly show that the FUAV is not only considered the best system, but it is one entire category removed from other systems.

B. SURVEY 2 (WEAPONS)

Figure 6 shows the results of response 18, the stimulus requiring participants to assess the proposed weapon systems.

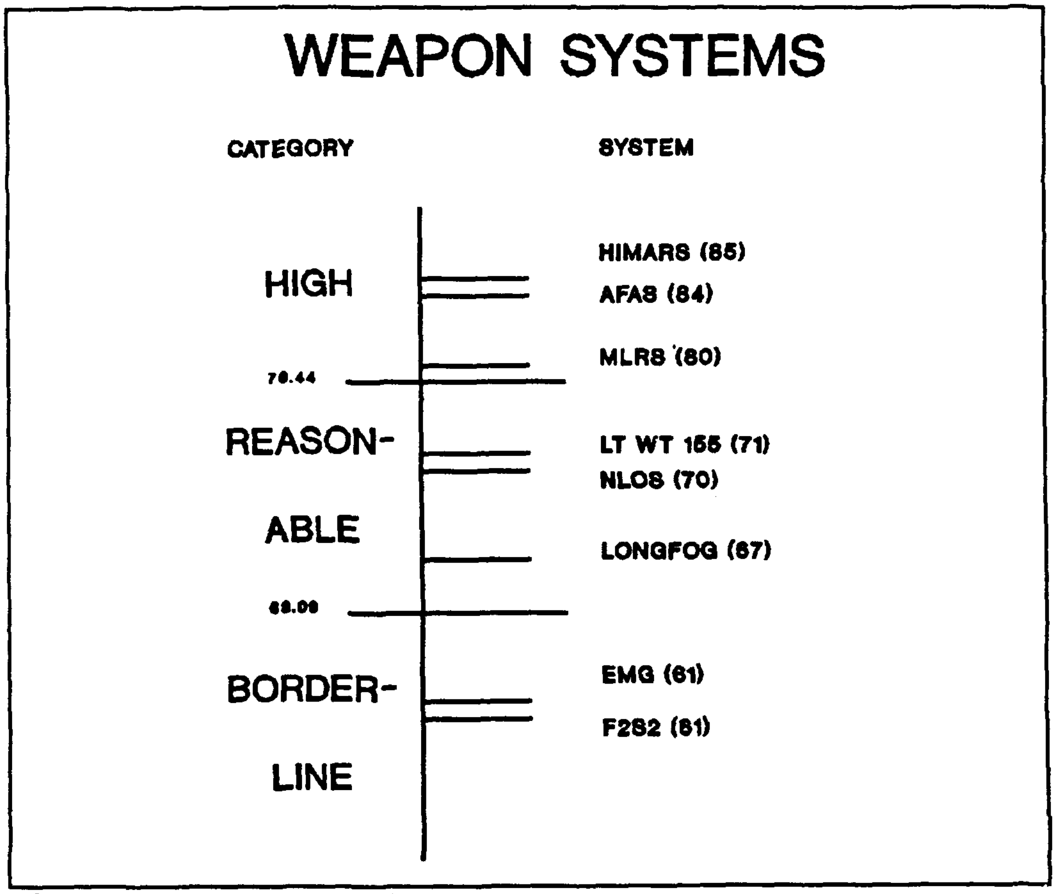

Figure 6 Weapon Systems

There appear to be five winners, with three in the "high" category and two others very close. The EMG result, however, was the interesting result. With all the talk about the EMG recently, it was a surprise to see it ranked so low.

C. SURVEY 2 (MUNITIONS)

The following figure (Figure 7) shows the results of the munitions assessments.

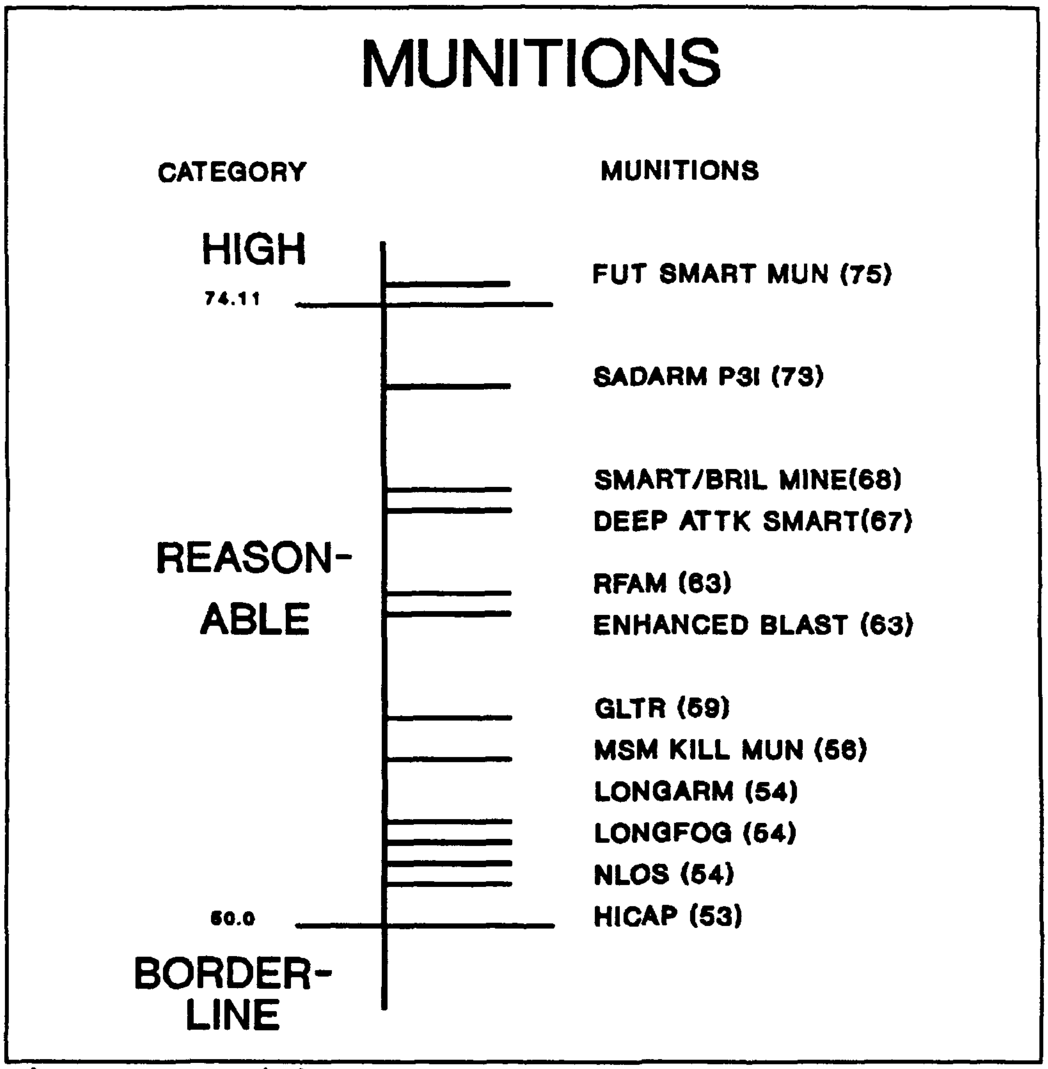

Figure 7 Munitions

The Future Smart Munition is the best here, but it is just barely in the "high" category. All other systems are in the "reasonable category", which seems to imply that there are many differing views on which system will be needed in the future. The scenarios comparison sheds light on this observation.

D. SURVEY 3 (COMMAND AND CONTROL)

Figure 8 displays how the participants assessed the systems on the last stimulus of the survey. This stimulus required participants to indicate their strength of preference for proposed command and control systems discussed in the wargame.

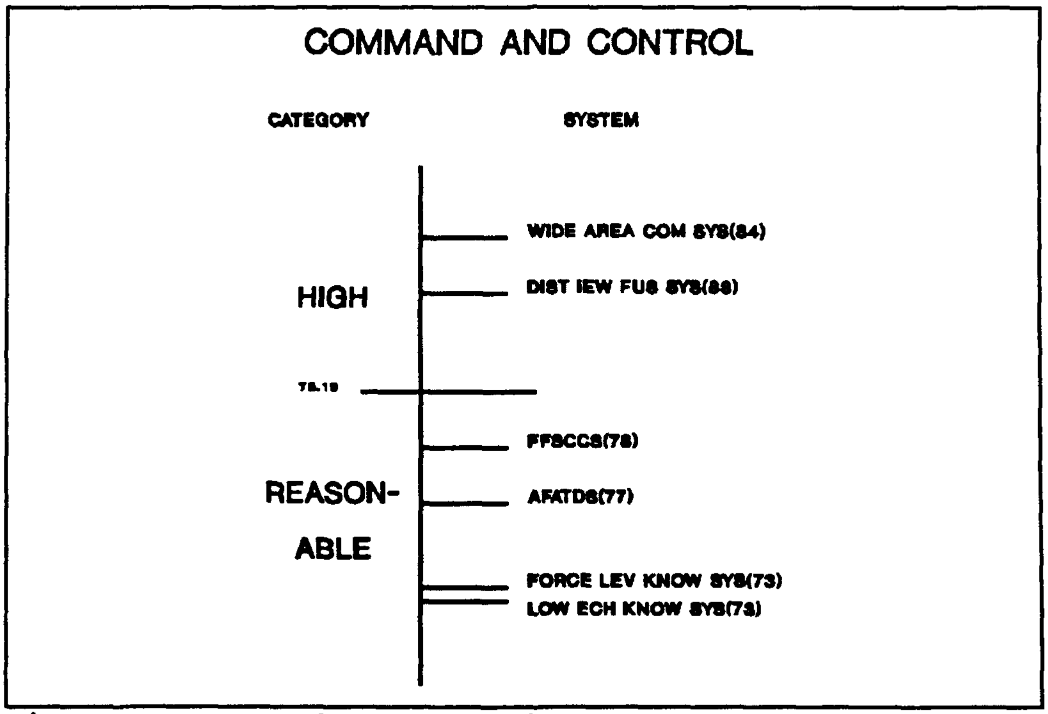

Figure 8 Command and Control Systems

Aside from the displayed winners and losers, the figure shows that continued investment in the two Knowledge Systems appears pointless (both anchor the bottom of the scale).

E. SURVEY 4 (SUPPORT, SUSTAINMENT, STRATEGIC DEPLOYMENT AND TACTICAL MOBILITY)

This figure (Figure 9) depicts results from response 19, the stimulus asking participants to assess support systems. Certainly, proponents of the TRAC will not like this, but when a decision maker sees this, he has no problem seeing which system is deficient.

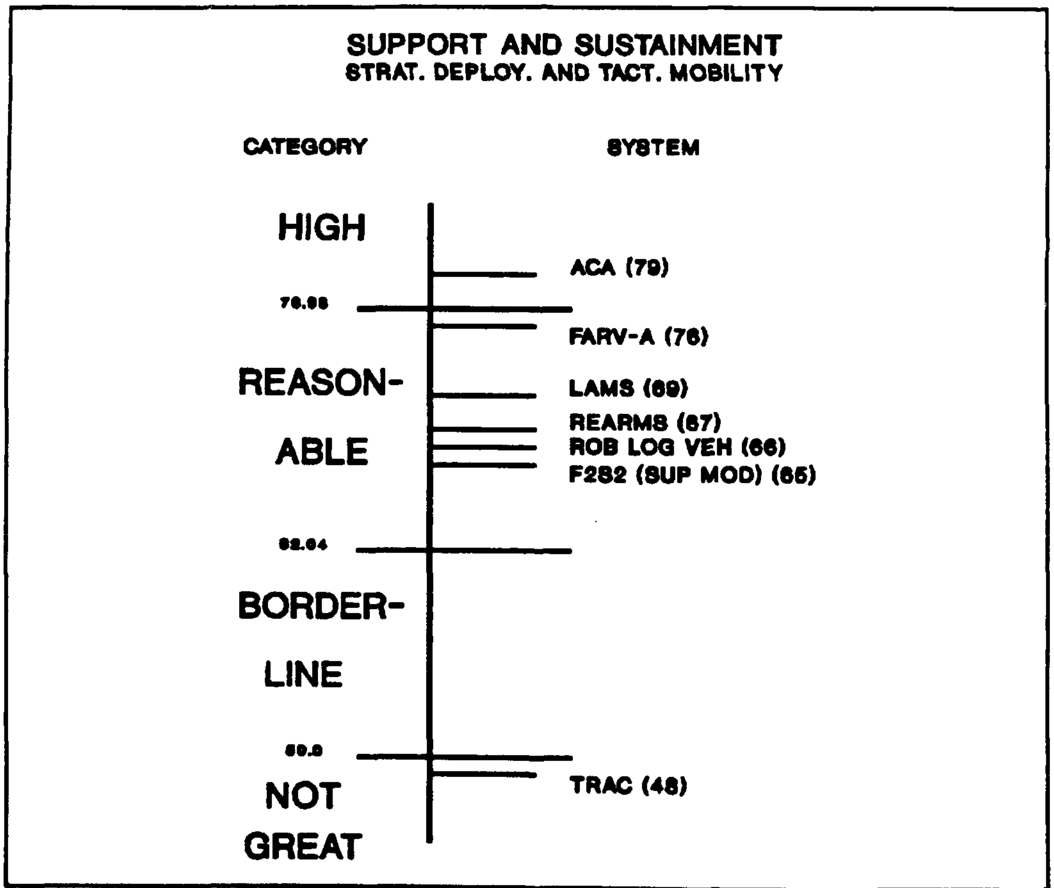

Figure 9 Support and Sustainment Systems

F. SURVEY 5 (FUTURE COMBAT CHARACTERISTICS)

Figure 10 shows results from the stimulus concerning fire support systems.

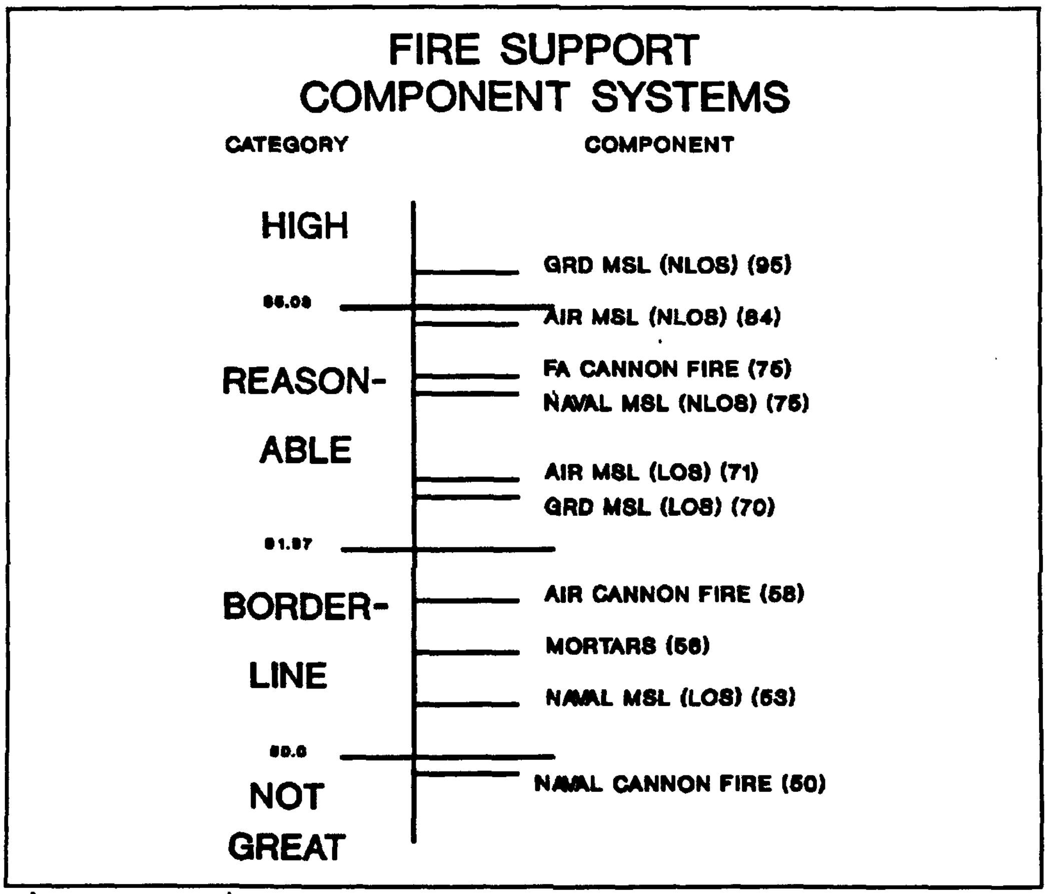

Figure 10 Fire Support Component Systems

NLOS systems are obviously the best, making up three of the top four systems. Interestingly Naval systems fared very poorly (except for the NLOS system), possibly adding rationale to the decision to retire battleships.

G. SURVEY 6 (PAST WARGAME TRENDS)

The following results (Figure 11) are from the stimulus concerning the importance of the Top Ten Systems.

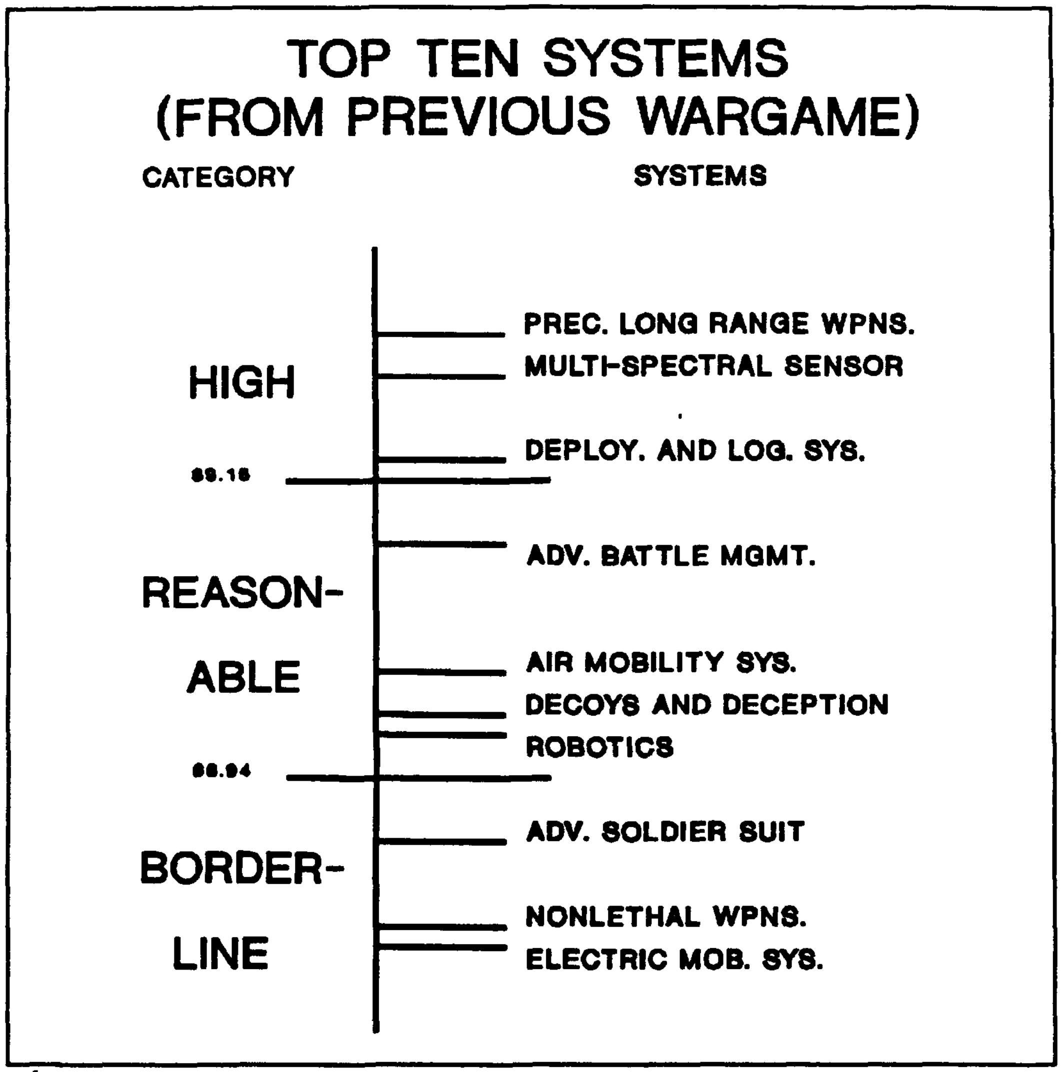

Figure 11 Top Ten Systems

The organizers of the next TBSW may want to change the Top Ten Systems to the Top Seven Systems after considering these results.

H. CLOSE VERSUS LONG FIRES

Figure 12 is a comparison of weapon systems as judged in Close and Long fires scenarios.

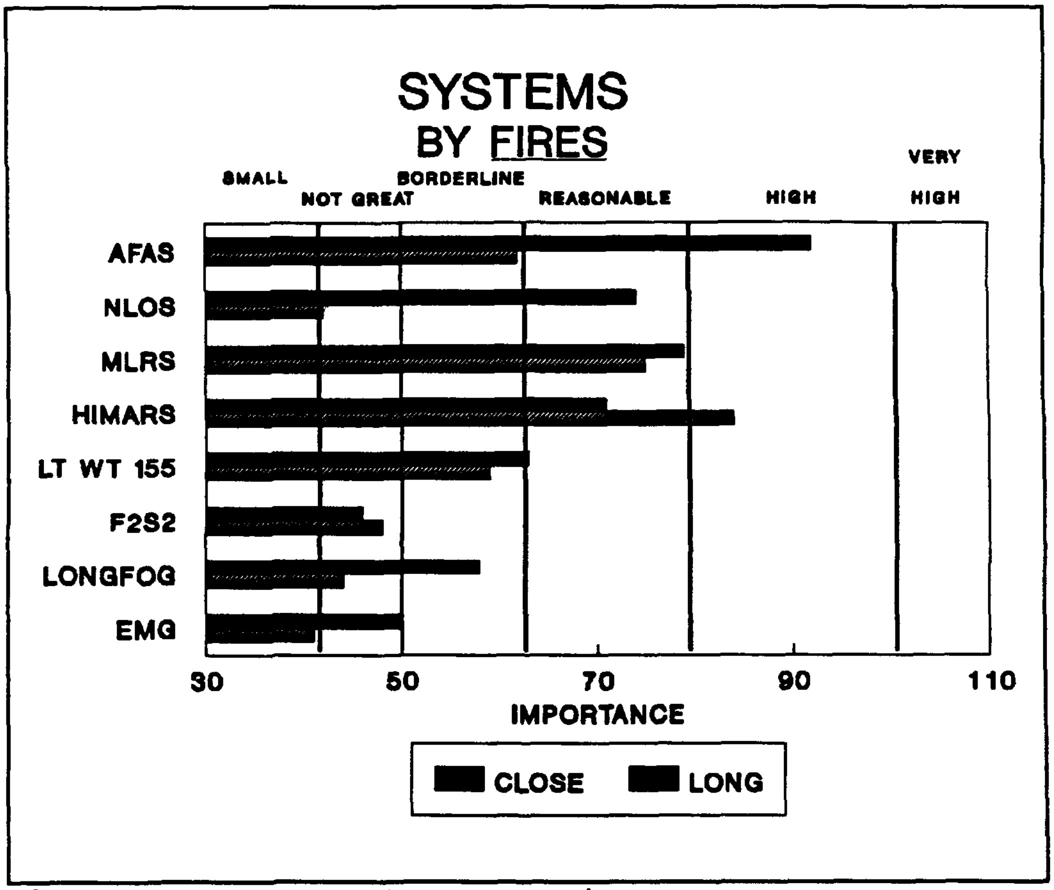

Figure 12 Weapon Systems Comparison

This figure displays the need for several systems since one system will not meet all the needs in all the cases. For example, NLOS is the third best system and in the "high" category when in a Close fire scenario, but drops to next to last and the "borderline" category when in the Long fire scenario.

I. DESERT VERSUS JUNGLE VERSUS NORTHERN CONTINENTAL SCENARIOS

The following two figures (Figures 13 and 14) show the comparison of 12 munitions (6 per figure) in different scenarios.

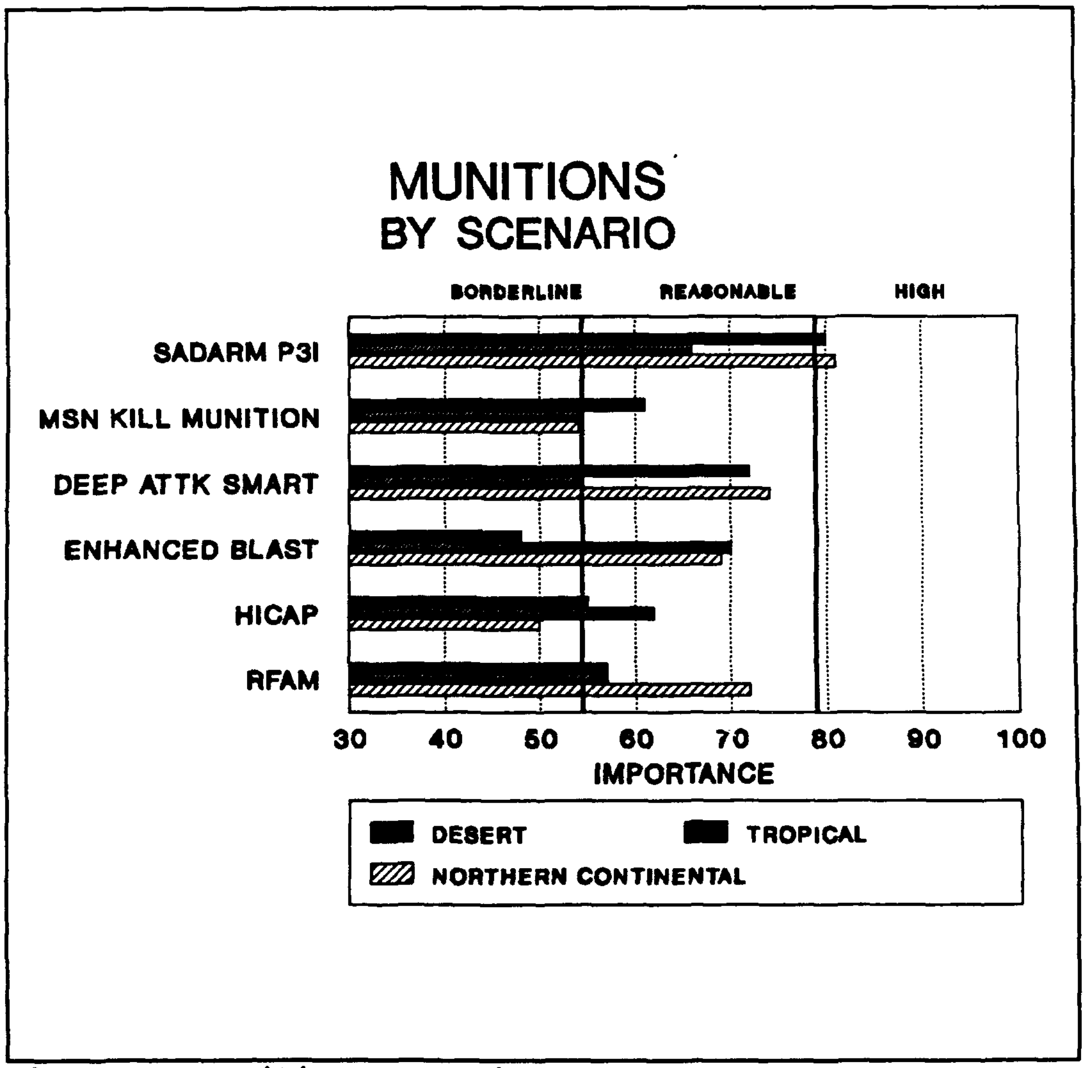

Figure 13 Munitions Comparison 1

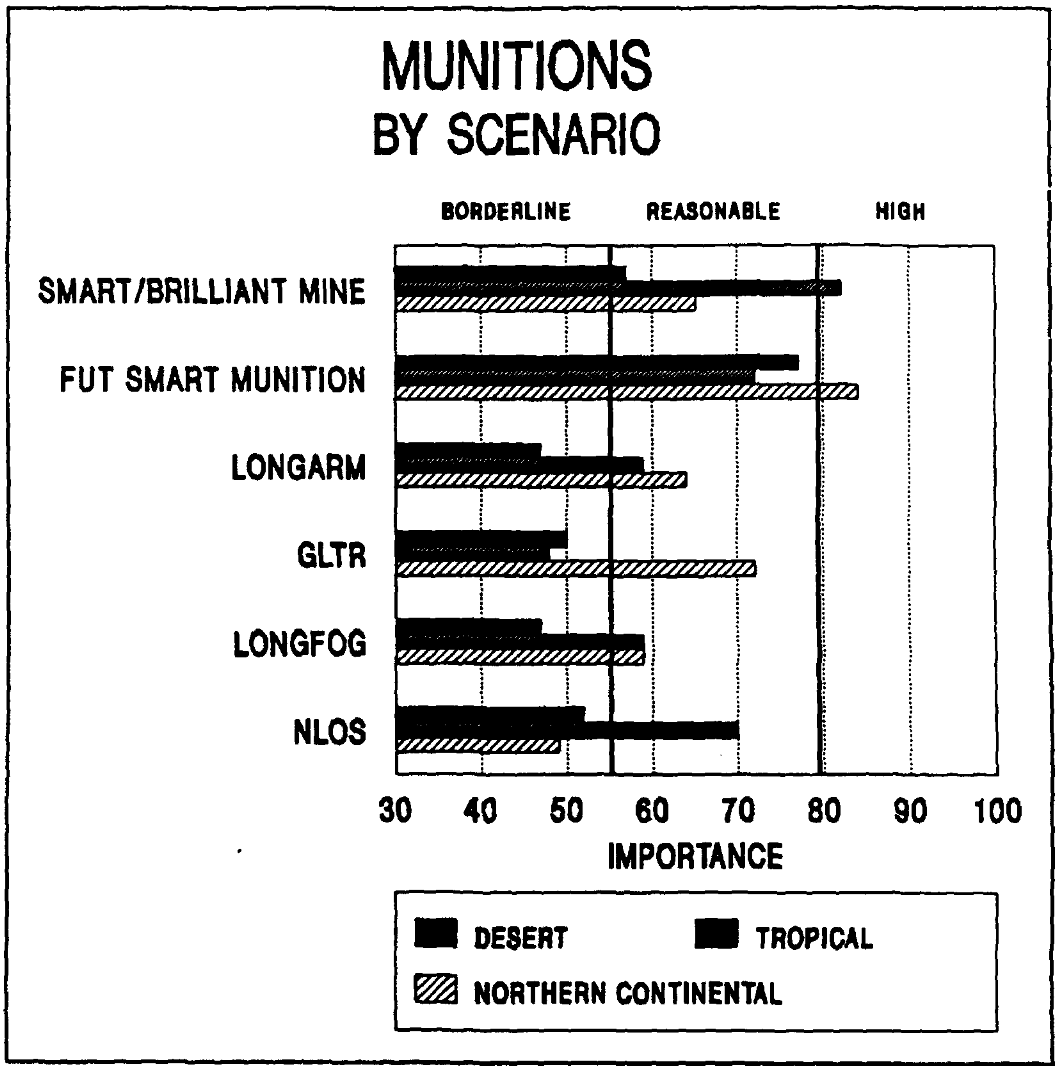

Figure 14 Munitions Comparison 2

The key point from these figures is that one munition will not be great in all scenarios. For instance, the Smart/Brilliant Mine is the number one system and is in the "high" category in the Tropical scenario, but it drops to sixth in the Desert scenario and is barely in the "reasonable" category.

V. CONCLUSIONS AND RECOMMENDATIONS

Analysis of each survey and the different groups that participated in the surveys using this methodology provided much insight into future technologies and systems. The methodology also provided graphical results that are friendly to even the most mathematically inhibited decision maker. The individual survey conclusions are as follows.

The Target Acquisition survey participants considered the FUAV the best system in which to invest. Participants expressed this view in every response except one, and in that response the FUAV was judged number two. The final response result, Figure 5, makes a very strong point, showing the FUAV in the "very high" category by itself.

The results from the Weapons Systems and Munitions survey showed that several systems and munitions are highly valued. Five of the 8 weapon systems and 6 of the 10 munitions held the top position at least once in the survey. Combined with the figures of Long versus Close Fire comparisons of weapons systems, Figure 12, and of Scenario comparisons of munitions, Figures 13 and 14, the notion that one system, whether it be a weapons system firing platform or munition, meets all the current requirements in all the possible scenarios is discarded.

Participants in the Command and Control survey considered two systems (Wide Area Communication System and the Distributed IEW Fusion System) the prime movers in this field. Probably just as important, in each of the twenty responses except one, the two Knowledge Systems were judged as least useful.

The results of the final Support, Sustainment, Strategic Deployability and Tactical Mobility survey response, Figure 9, is very representative of all the responses. The highest judged system changes with the characteristics, but in every response the TRAC is judged worst.

From the LABCOM perspective, the results are not as clear cut. Survey 5 (Combat Power) shows future trends in many areas, as follows:

1. Passive target detection is very important and active target detection is not. This is very interesting considering most Army systems use active detectors.

2. Strategic deployability is more important than either operational deployability or taactical mobility, which implies that getting there is more important than what happens once on the ground.

3. NLOS systems are the firepower systems of the future; mortars are not.

Survey 6 (Emerging Technologies and Systems) results focus on two areas. These results show that Advanced Signal Processing/Computing and Protection/Lethality technologies along with Precision Long Range Weapons and Multi-Spectral Sensor/Fusion systems are judged the technologies of the future. At the other end of the spectrum, the number of emerging technologies could shrink from 13 to 11 and the number of emerging systems from 10 to 7. The next wargame sponsor could drop Biotechnology and Neuroscience technologies and Advanced Soldier Suit, Nonlethal Weapons, and Electric Ground Mobility systems from the lists of those considered.

The survey design of the first four surveys is very similar with the only real difference being their area of focus and the resulting change in characteristics and systems. Since many of the characteristics evaluated were the same in all four of the surveys it would have been easy to generalize across the characteristics. The evaluation team was careful not to do this however. For example, in the support and sustainment scenarios tactical mobility was more important than strategic deployability, but in weapons systems scenarios the trend was reversed. In target acquition scenarios range under 60 kilometers was most important, but in the weapons systems scenarios range out to 100 kilometers was just as important.

Apart from the individual surveys, the methodology provides a tremendous improvement of obtaining and portraying results over previous TBSWs. USAFAS was pleased with the results and wants a follow up briefing to their new Commanding General. TRAC-Monterey will use the methodology during the next LABCOM TBSW in the fall of 1991. There are, however, some improvements that can be made.

These improvements include closer working relationships with the proponent agencies during the survey development. USAFAS played an integral part in the survey design and consequently received much from the results. Unintentionally but unfortunately, the same cannot be said of the results for LABCOM. Reduction in the number of characteristics per each type of survey to seven would reduce the number of questions per survey and increase the precision of the results. Another improvement would be automation of the data transfer from the surveys to a computer program. An optical scanner would reduce this workload significantly.

This methodology in its current form is a significant improvement over past analysis efforts of TBSWs. Decision makers receive instance values, intervals between values, and category bounds which are all helpful in making decisions. As long as the decision maker recalls that the TBSW participants consider costs of each system, the technological risk of developing each system, and the cost of the technology for each system the same, he has a very useful tool with which to make decisions on the combat effectiveness of each system. With the above listed improvements, the methodology will not only provide useful results, but the results will be timely and have more precision.

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5. Torgerson, W.S., "Theory and Methods of Scaling", John Wiley & Sons,Inc., 1958.

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8. Beyth-Marom, Beth, "How Probable is Probable? A Numerical Translation of Verbal Probability Expressions", Journal of Forecasting, Vol. 1, John Wiley and Sons, Ltd., 1982.

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APPENDIX A EXAMPLE PROBLEM

The following is an example of how the evaluation team used Professor Lindsay's technique. The data comes from the Target Acquisition Survey, Stimulus 21. This stimulus required participants to indicate their strength of preference for proposed target acquisition systems that were discussed during the wargame.

The first step is to count the frequency of responses in each category for each instance and build the frequency array as shown in Table 1.

TABLE 1. INITIAL FREQUENCY OF RESPONSES

SYSTEM	VERY SMALL	SMALL	NOT GREAT	BORDER-LINE	REASON-ABLE	HIGH	VERY HIGH
ATACS	2	4	3	12	22	13	15
FORTAS	1	8	4	14	19	18	7
VIP	8	7	16	15	11	10	2
RECCE SHELL	10	5	8	17	16	10	5
TETHERED BALLOON	23	9	14	15	8	2	0
ASEMA	4	2	7	10	17	25	6
FUAV	1	0	0	1	13	18	41
GUARD-RAIL	3	3	9	8	23	21	5
GRD SENSOR	3	1	5	15	29	16	3
LBSR	5	9	14	15	18	10	0

Next find the relative frequencies by dividing each cell by the row total, this result is shown in Table 2.

TABLE 2. RELATIVE FREQUENCIES

SYSTEM	VERY SMALL	SMALL	NOT GREAT	BORDER-LINE	REASON-ABLE	HIGH	VERY HIGH
ATACS	.0280	.056	.042	.169	.310	.183	.211
FORTAS	.014	.113	.056	.197	.268	.254	.099
VIP	.116	.101	.232	.217	.159	.145	.029
RECCE SHELL	.141	.070	.113	.239	.225	.141	.070
TETHERED BALLOON	.324	.127	.197	.211	.113	.028	0.00
ASEMA	.056	.028	.099	.141	.239	.352	.085
FUAV	.014	0.000	0.000	.014	.176	.243	.554
GUARD-RAIL	.042	.042	.125	.111	.319	.292	.069
GRD SENSOR	.042	.014	.069	.208	.403	.222	.042
LBSR	.070	.127	.197	.211	.254	.141	0.00

Once the frequency chart is complete, construct the cumulative frequency chart by summing across the rows and placing the current total in each cell as it is added. This number is called p_{ij}. Table 3 shows the cumulative frequencies.

TABLE 3. CUMULATIVE FREQUENCIES

SYSTEM	VERY SMALL	SMALL	NOT GREAT	BORDER-LINE	REASON-ABLE	HIGH	VERY HIGH
ATACS	.0280	.084	.126	.295	.605	.788	1.00
FORTAS	.014	.127	.183	.380	.648	.902	1.00
VIP	.116	.217	.449	.666	.825	.970	1.00
RECCE SHELL	.141	.211	.324	.563	.788	.929	1.00
TETHERED BALLOON	.324	.451	.648	.859	.972	1.00	1.00
ASEMA	.056	.084	.183	.324	.563	.915	1.00
FUAV	.014	.0140	.0140	.028	.204	.447	1.00
GUARD-RAIL	.042	.084	.209	.320	.639	.931	1.00
GRD SENSOR	.042	.056	.125	.333	.736	.958	1.00
LBSR	.070	.197	.394	.605	.859	1.00	1.00

Now remove all values of p_{ij} > .98 and < .02. Drop the last column because all its values exceed .98. Combine all cells

that are too small with cells to their right until a value greater than .02 is achieved. Drop any cells and all cells to the right that still have a value greater than .98. Because some rows now have fewer columns than other rows, the array is incomplete. Now split the original array into the following four arrays (referred to as Set 1 through 4 in Tables 4 through 7), each array with the same number of columns and the same categories.

TABLE 4. REMOVE P_{ij} < .02 OR > .98, SET 1

SYSTEM	VERY SMALL	SMALL	NOT GREAT	BORDER-LINE	REASON-ABLE	HIGH
ATACS	.0280	.084	.126	.295	.605	.788
VIP	.116	.217	.449	.666	.825	.970
RECCE SHELL	.141	.211	.324	.563	.788	.929
ASEMA	.056	.084	.183	.324	.563	.915
GUARD-RAIL	.042	.084	.209	.320	.639	.931

TABLE 5. REMOVE P_{ij} < .02 OR > .98, SET 2

SYSTEM	SMALL	NOT GREAT	BORDER-LINE	REASON-ABLE	HIGH
FORTAS	.141	.183	.380	.648	.902
GRD SENSOR	.098	.125	.333	.736	.958

TABLE 6. REMOVE P_{ij} < .02 OR .98, SET 3

SYSTEM	VERY SMALL	SMALL	NOT GREAT	BORDER-LINE	REASON-ABLE
TETHERED BALLOON	.324	.451	.648	.859	.972
LBSR	.070	.197	.394	.605	.859

TABLE 7. P_{ij} < .02 OR > .98, SET 4

SYSTEM	BORDER-LINE	REASON-ABLE	HIGH
FUAV	.028	.204	.447

Notice there are no values of p_{ij} > .98 or < .02 in any table.

Use the p values to find the corresponding z value from the Normal Distribution tables. Tables 8 through 11 display the z values.

TABLE 8. NORMALIZED SET 1

SYSTEM	VERY SMALL	SMALL	NOT GREAT	BORDER-LINE	REASON-ABLE	HIGH
ATACS	-1.91	-1.39	-1.13	-.54	.27	.80
VIP	-1.20	-.78	-.13	.43	.94	1.88
RECCE SHELL	-1.18	-.80	-.46	.14	.80	1.47
ASEMA	-2.54	-2.39	-.90	-.46	.16	1.37
GUARD-RAIL	-2.64	-2.39	-.81	-.47	.36	1.48

TABLE 9. NORMALIZED SET 2

SYSTEM	SMALL	NOT GREAT	BORDER-LINE	REASON-ABLE	HIGH
FORTAS	-1.08	-.90	-.31	.38	1.29
GRD SENSOR	-1.29	-1.15	-.43	.63	1.73

TABLE 10. NORMALIZED SET 3

SYSTEM	VERY SMALL	SMALL	NOT GREAT	BORDER-LINE	REASON-ABLE
TETHERED BALLOON	-.46	-.12	.38	1.08	1.91
LBSR	-1.48	-.85	-.27	.27	1.08

TABLE 11. NORMALIZED SET 4

SYSTEM	BORDER-LINE	REASON-ABLE	HIGH
FUAV	-1.91	-.83	-.13

Compute the column averages, b_j and the grand average, $\bar{b}$. Tables 12 through 15 show these results.

TABLE 12. CATEGORY BOUNDS, SET 1

SYSTEM	VERY SMALL	SMALL	NOT GREAT	BORDER -LINE	REASON -ABLE	HIGH	ROW TOTAL	ROW AVERAGE ($\bar{z}_i$)
ATACS	-1.91	-1.39	-1.13	-.54	.27	.80	-3.9	-.65
VIP	-1.20	-.78	-.13	.43	.94	1.88	1.14	.19
RECCE SHELL	-1.18	-.80	-.46	.14	.80	1.47	-.03	-.005
ASEMA	-2.54	-2.39	-.90	-.46	.16	1.37	-4.76	-.79
GUARD-RAIL	-2.64	-2.39	-.81	-.47	.36	1.48	-4.47	-.745
COLUMN TOTALS	-9.47	-7.75	-3.43	-.90	2.53	7.00	GRAND AVERAGE: $\bar{b}$ = -.401	
COLUMN AVERAGES: b_j	-1.89	-1.55	-.69	-.18	.506	1.40		

TABLE 13. CATEGORY BOUNDS, SET 2

SYSTEM	SMALL	NOT GREAT	BORDER -LINE	REASON -ABLE	HIGH	ROW TOTAL	ROW AVERAGE ($\bar{z}_i$)
FORTAS	-1.08	-.90	-.31	.38	1.29	-.62	-.124
GRD SENSOR	-1.29	-1.15	-.43	.63	1.73	-.51	-.102
COLUMN TOTALS	-2.39	-2.05	-.74	1.01	3.02	GRAND AVERAGE: $\bar{b}$ = -.115	
COLUMN AVERAGES: b_j	-1.195	-1.025	-.370	.505	1.51		

TABLE 14. CATEGORY BOUNDS, SET 3

SYSTEM	VERY SMALL	SMALL	NOT GREAT	BORDER-LINE	REASONABLE	ROW TOTAL	ROW AVERAGE ($\bar{z}_i$)
TETHERED BALLOON	-.46	-.12	.38	1.08	1.91	2.79	.558
LBSR	-1.48	-.85	-.27	.27	1.08	-1.25	-.25
COLUMN TOTALS	-1.94	-.97	.11	1.35	2.99	GRAND AVERAGE: $\bar{b}$ = .147	
COLUMN AVERAGES: b_j	-.97	-.485	.055	.675	1.459		

some improvements that can be made.

TABLE 15. CATEGORY BOUNDS, SET 4

SYSTEM	BORDER -LINE	REASON -ABLE	HIGH	ROW TOTAL	ROW AVERAGE ($\bar{z}_i$)
FUAV	-1.91	-.83	-.13	-2.87	-.957
COLUMN AVERAGE: b_j	-1.91	-.83	-.13	GRAND AVERAGE: $\bar{b} = -.957$	

The category boundaries from each set are summarized in Table 16.

TABLE 16. UPPER BOUNDS

SET	VERY SMALL	SMALL	NOT GREAT	BORDER-LINE	REASON -ABLE	HIGH
1	-1.89	-1.55	-.69	-.18	.506	1.40
2	NA	-1.195	-1.025	-.370	.505	1.51
3	-.97	-.485	.055	.675	1.459	NA
4	NA	NA	NA	-1.91	-.83	-.13

To get the scaled instance value, solve the following equation.

$$S_i = \overline{b} - \overline{Z_i}\sqrt{\frac{B}{A_i}}$$

To solve this equation, the variables A_i and B need to be calculated. Obtain A_i from the following equation,

$$A_i = \sum_{j=1}^{m-k} (Z_{ij} - \overline{Z_i})^2 \quad .$$

The results of this calculation are displayed in Tables 17 through 20.

TABLE 17. ROW SUM OF SQUARES DIFFERENCE, SET 1

$$A_i=\sum_{j=1}^{m-k}(Z_{ij}-\overline{Z_i})^2$$

SYSTEM	VERY SMALL	SMALL	NOT GREAT	BORDER -LINE	REASON -ABLE	HIGH	$\overline{Z_j}$	A_i
ATACS	-1.91	-1.39	-1.13	-.54	.27	.80	-.65	5.326
VIP	-1.20	-.78	-.13	.43	.94	1.88	.19	6.453
RECCE SHELL	-1.18	-.80	-.46	.14	.80	1.47	.01	5.064
ASEMA	-2.54	-2.39	-.90	-.46	.16	1.37	-.79	11.316
GUARD-RAIL	-2.64	-2.39	-.81	-.47	.36	1.48	-.75	12.549

TABLE 18. ROW SUM OF SQUARES DIFFERENCE, SET 2

$$A_i=\sum_{j=1}^{m-k} (Z_{ij}-\overline{Z_i})^2$$

SYSTEM	SMALL	NOT GREAT	BORDER -LINE	REASON -ABLE	HIGH	$\overline{Z_j}$	A_i
FORTAS	-1.08	-.90	-.31	.38	1.29	-.124	3.804
GRD SENSOR	-1.29	-1.15	-.43	.63	1.73	-1.02	10.723

TABLE 19. ROW SUM OF SQUARES DIFFERENCE, SET 3

$$A_i=\sum_{j=1}^{m-k}(Z_{ij}-\overline{Z_i})^2$$

SYSTEM	VERY SMALL	SMALL	NOT GREAT	BORDER-LINE	REASON-ABLE	$\overline{Z_j}$	A_i
TETHERED BALLOON	-.46	-.12	.38	1.08	1.91	.558	3.628
LBSR	-1.48	-.85	-.27	.27	1.08	-.250	3.913

TABLE 20. ROW SUM OF SQUARES DIFFERENCE, SET 4

$$A_i=\sum_{j=1}^{m-k}(Z_{ij}-\overline{Z_i})^2$$

SYSTEM	BORDER -LINE	REASON -ABLE	HIGH	$\overline{Z_j}$	A_i
FUAV	-1.91	-.83	-.13	-.957	1.608

Now calculate B. The equation is listed below.

$$B=\sum_{j=1}^{m-k}(b_j-\overline{b})^2$$

Table 21 shows the resulting B for each set.

TABLE 21. RESULTING B FOR EACH SET.

SET	1	2	3	4
B VALUE	7.58	5.21	3.66	1.61

Now compute the s_i. The results are displayed in Tables 21 through 24.

TABLE 22. INSTANCE VALUE, SET 1

SYSTEM	ATACS	VIP	RECCE SHELL	ASEMA	GUARD -RAIL
S_i	.416	-.450	-.284	.191	.124

TABLE 23. INSTANCE VALUES, SET 2

SYSTEM	FORTAS	GROUND SENSOR
S_i	.012	-.009

TABLE 24. INSTANCE VALUES, SET 3

SYSTEM	TETHERED BALLOON	LBSR
S_i	.412	.398

TABLE 25. INSTANCE VALUES, SET 4

SYSTEM	FUAV
S_i	.01

Now transform the data and the bounds so that all systems and bounds are on the same scale. The evaluation team arbitrarily chose the category bound between "high" and "very high" as 100 and the bound between "borderline" and "not great" as 50. Using the following simultaneous equations yields the results for Set 1 shown in Table 26.

$$100 = \alpha + \beta\ (\ 1.405\ )$$

$$50 = \alpha + \beta\ (\ -.688\ )$$

TABLE 26. TRANSFORMED DATA, SET 1

SYSTEM	s_i	TRANSFORMED s_i
ATACS	.416	76.36
VIP	-.450	55.69
RECCE SHELL	-.284	59.65
ASEMA	.191	71.00
GUARD-RAIL	.124	69.40

Using the following simultaneous equations yields the results for Set 2 shown in Table 27.

$$100 = \alpha + \beta\ (\ 1.511\ )$$

$$50 = \alpha + \beta\ (\ -1.027\ )$$

TABLE 27. TRANSFORMED DATA, SET 2

SYSTEM	s_i	TRANSFORMED s_i
FORTAS	.012	70.46
GRD SENSOR	-.009	70.06

Using the following simultaneous equations yields the results for Set 3 shown in Table 28.

$$39.13 = \alpha + \beta (-.488)$$

$$50 = \alpha + \beta (.056)$$

TABLE 28. TRANSFORMED DATA, SET 3

SYSTEM	s_i	TRANSFORMED s_i
TETHERED BALLOON	-.412	40.65
LBSR	.398	56.83

Using the following simultaneous equations yields the results for Set 4 shown in Table 29.

$$100 = \alpha + \beta (-.136)$$

$$78.48 = \alpha + \beta (-.832)$$

TABLE 29. TRANSFORMED DATA, SET 4

SYSTEM	s_i	TRANSFORMED s_i
FUAV	0.00	104.21

The transformed data for all systems appears below.

TABLE 30. FINAL RANKED DATA

SYSTEM	TRANSFORMED DATA	RANK
ATACS	76.36	2
FORTAS	70.46	4
VIP	55.69	9
RECCE SHELL	59.65	7
TETHERED BALLOON	40.65	10
ASEMA	71.00	3
FUAV	104.21	1
GUARD-RAIL	69.40	6
GRD SENSOR	70.06	5
LBSR	56.83	8

APPENDIX B. PARTICIPANTS

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APPENDIX C. ABBREVIATIONS

ABBREVIATION	DEFINITION
ACL	Acceleration
ACT	Active
ADV	Advanced
ACA	Advanced Cargo Aircraft
AFAS	Advance Field Artillery System
AFATDS	Advanced Field Artillery Tactical Data System
ASEMA	Advanced Special Electronic Mission Aircraft
ATACS	Advanced Target Acquisition Counterfire System
ADA	Air Defense Artillery
AI	Artificial Intelligence
AMC	Army Material Command
AMSAA	Army Material System Analysis Activity
ARDEC	Aberdeen Research and Development Center
ARI	Army Research Institute for Behavorial and Social Sciences
ARO	Army Research Office
ASL	Atmospheric Science Laboratory
ATTK	Attack
BAT	Battle
BRDEC	Belvoir Research and Development Center
BRL	Ballistics Research Laboratory
CAMO	Camouflage
CECOM	Communications and Electronics Command
CGSC	Command and General Staff School
CNVEO	Center for Night Vision Electrooptics
COM	Commonality
COMMO	Communication
CONT	Containerization
CRDEC	Chemical Research and Development Center
DEPL	Deployability
ELEC	Electric
EMG	Electro Magnetic Gun
ENV	Environmental
ETL	Engineer Topographic Laboratory
EW	Early Warning
FA	Field Artillery
FARV-A	Future Armored Resupply Module

FFSCCS	Future Fire Support Command and Control System
F2S2	Future Fire Support
FORTAS	Forward Observation Remote Target Acquisition
FSTC	Foreign Science and Technology Center
FUAV	Future Unmanned Aerial Vehicle
GRD	Ground
GLTR	Ground Launched Tacit Rainbow
HDL	Harry Diamond Laboratory
HEL	Human Engineering Laboratory
HICAP	High Capacity Munition
HIMARS	High Mobility Artillery Rocket System
IFF	Identification Friend or Foe
LABCOM	Laboratory Command
LAUN	Launch
LOS	Line Of Sight
LOG	Logistics
LAMS	Logistics Air Mobility System
LBSR	Lightweight Battlefield Surveillance Radar
LONGFOG	Long Fiber-optic Guided Missile
M-SPEC	Multi-spectral
MAT	Material
MHE	Material Handling Equipment
MAX	Maximum
MICOM	Missile Command
MIN	Minimum
MISMA	Model Improvement and Study Management Agency
MSL	Missile
MOB	Mobility
MLRS	Multiple Launch Rocket System
MRDEC	Medical Research and Development Center
NLOS	Non-line Of Sight
NBC	Nuclear, Chemical, and Biological
NRDEC	Natick Research and Development Command
OPN	Operational
PAS	Passive
POL	Petroleum and other lubricants
PRE	Precision
PROC	Processing
PROT	Protection
REARMS	Rapidly Deployed Artillery Resupply Module
RFAM	Radio Frequency Attack Missile
ROB	Robotics
RES	Resupply
SADARM P3I	Search and Destroy Armor, Pre-planned

	Product Improvement
SHIP	Shipping
STRAT	Strategic
SUP	Supply
SUPT	Support
SURV	Survivability
SYS	System
RECCE	Reconnaissance
TAC	Tactical
TACOM	Tank Automotive Command
TRNG	Training
TRAC	Trajectory Realtime Analysis Closed Loop
TRADOC	Training and Doctrine Command
UNCOM	Uncommitted
USAADAS	U.S. Army Air Defense Artillery School
USAARMS	U.S. Army Armor School
USAAVNS	U.S. Army Aviation School
USAFAS	U.S. Army Field Artillery School
USAIS	U.S. Army Infantry School
USALMC	U.S. Army Logistic Management Center
USASIGC	U.S. Army Signal Center
VAL	Avionics Laboratory
VEH	Vehicle
VIP	Video Imaging Projectile
WPN	Weapon
WT	Weight

APPENDIX D. APL FUNCTIONS

The following functions transformed the raw data into the scaled values for this thesis . The functions were developed by Professor Glenn F. Lindsay of the Naval Postgraduate School.

The following variables are user inputs.

N = number of instances

M = number of categories

R = a vector of consecutive rows of the raw frequency array.

A. PMATRICE R

This function changes the raw data to the cumulative relative frequency array.

```
∇ PMATRICE [⎕] ∇
∇ PMATRICE R
[1] F←(N,M)⍴R
[2] L←⍴F
[3] N←L[1]
[4] M←L[2]
[5] F1←+\F
[6] P←⍉(M,N)⍴(F1[;M])
[7] P←F1÷P
[8] P←P[;⍳(M-1)]
[9] 'THE P MATRIX IS;'
[10] P
[11] ' '
[12] ' '
∇
```

B. NQUAN

NQUAN takes the cumulative frequency matrix and converts it to the corresponding z values.

```
∇ NQUAN[⎕] ∇
∇ Q←NQUAN P
[1] →L1×⍳(0<+/P=0)∨(0<-/P=1)
[2] C0←2.515517
[3] C1←0.802853
[4] C2←0.010328
[5] D1←1.432788
[6] D2←0.189269
[7] D3←0.001308
[8] PP←(P×1-V)+(1-P)×V←P≥0.5
[9] Q←T-(C0+T×(C1+T×C2))+1+T(D1+T×(D2+D3×T←-2×⍟PP)*0.5))
[10] Q←Q×V)-Q×1-V
[12] →0
[13] L1:'SOME PROBABILITIES ARE ZERO OR ONE'
∇
```

C. CATEGORICAL

CATEGORICAL computes the bounds and scaled values.

```
∇ CATEGORICAL[⎕] ∇

∇ CATEGORICAL Z

[1] L←⍴Z

[2] N←L[1]

[3] M←L[2]+1

[4] BOUNDS←(+⌿)÷N

[5] 'CATEGORICAL BOUNDS'

[6] BOUNDS

[7] '  '

[8] BARZ←(+/Z)÷(M-1)

[9] BBAR←(+/BOUNDS)÷(M-1)

[10] NUM←+/((BOUNDS-BBAR)*2)

[11] DEN⍉((M-1),N)⍴BARZ)

[12] DEN←+/((Z-DEN)*2)

[13] SD←(NUM×(÷DEN))*0.5

[14] 'STANDARD DEVIATIONS ARE:'

[15] SD

[16] '  '

[17] S←BBAR-(SD×BARZ)

[18] '  '

[19] 'INSTANCE SCALE VALUES ARE:'

[20] '  '

[21] S

∇
```

D. SCALE

SCALE combines the previous functions to show the output.

```
∇ SCALE[⎕] ∇

∇ SCALE P

[1] M←M-1

[2] Z←NQUAN(,P)

[3] Z←(N,M)ρZ

[4] CATEGORICAL Z

∇
```

E. RAW

RAW takes the scale values and boundaries from the previous functions and puts the values from the same z array on the same linear scale.

```
∇ RAW [⎕]
∇ RAW
[1] SLOPE←50+((-1↑BOUNDS)-(1↑(-3↑BOUNDS)
[2] INT←100-SLOPE×(-1↑BOUNDS)
[3] TBOUNDS←INT+SLOPE×BOUNDS
[4] TS←INT+SLOPE×BOUNDS
[5] 'STANDARD DEVIATIONS ARE:'
[6] SD
[7] ' '
[8] 'BOUNDS'
[9] BOUNDS
[10] ' '
[11] 'TRANSPOSED BOUNDS'
[12] TBOUNDS
[13] ' '
[14] 'INSTANCE SCALE VALUES ARE:'
[15] S
[16] ' '
[17] 'TRANSPOSED S'
[18] TS
∇
```

APPENDIX E. RESULTS

A. SURVEY 1, TARGET ACQUISITION.

TABLE 1. QUESTION 1. ASSESS THE CHARACTERISTICS.

CHARACTERISTIC	TRANSFORMED DATA	RANK
RANGE (0-60KM)	82.50	5
RANGE (60-100KM)	73.81	7
RANGE (100-160KM)	73.28	8
RANGE (160-490KM)	65.57	11
ACT TGT DETECTION	63.38	12
PAS TGT DETECTION	86.63	2
TGT ID	82.80	4
NON-COOP IFF	74.54	6
TGT LOC ERROR	68.74	10
TGT PROCESSING TIME	83.65	3
TGT DAMAGE ASSESSMENT	69.55	9
REAL TIME DATA FUSION	92.17	1

TABLE 2. QUESTION 2. ASSESS THE CHARACTERISTICS.

CHARACTERISTIC	TRANSFORMED DATA	RANK
LASER RANGEFINDER	58.44	6
THERMAL	70.95	4
VISUAL	67.62	5
MILLIMETER WAVE	76.13	2
ACOUSTIC	73.23	3
SIMULTANEOUS TGT	90.81	1

TABLE 3. QUESTION 3. ASSESS THE SYSTEMS AGAINST RANGE, 0-60KM.

SYSTEM	TRANSFORMED DATA	RANK
ATACS	77.52	2
FORTAS	73.77	3
VIP	64.32	8
RECCE SHELL	63.39	7
TETHERED BALLOON	49.03	10
ASEMA	64.23	9
FUAV	96.07	1
GUARDRAIL	70.91	4
GROUND SENSOR	67.92	5
LBSR	63.62	6

TABLE 4. QUESTION 4. ASSESS THE CHARACTERISTICS AGAINST RANGE, 60-100KM.

SYSTEM	TRANSFORMED DATA	RANK
ATACS	66.48	4
FORTAS	52.36	6
VIP	45.31	9
RECCE SHELL	46.89	8
TETHERED BALLOON	38.82	10
ASEMA	74.66	2
FUAV	97.12	1
GUARDRAIL	73.75	3
GROUND SENSOR	61.54	5
LBSR	49.70	7

TABLE 5. QUESTION 5. ASSESS THE SYSTEMS AGAINST RANGE, 100-160KM.

SYSTEM	TRANSFORMED DATA	RANK
ATACS	50.15	5
FORTAS	37.26	6
VIP	28.08	8
RECCE SHELL	25.33	10
TETHERED BALLOON	26.94	9
ASEMA	78.67	2
FUAV	96.12	1
GUARDRAIL	72.88	3
GROUND SENSOR	55.52	4
LBSR	36.02	7

TABLE 6. QUESTION 6. ASSESS THE SYSTEMS AGAINST RANGE 160-400KM.

SYSTEM	TRANSFORMED DATA	RANK
ATACS	41.17	5
FORTAS	31.13	6
VIP	19.09	9
RECCE SHELL	19.79	8
TETHERED BALLOON	16.78	10
ASEMA	83.49	2
FUAV	95.27	1
GUARDRAIL	68.18	3
GROUND SENSOR	46.24	4
LBSR	28.20	7

TABLE 7. QUESTION 7. ASSESS THE SYSTEMS AGAINST ACTIVE TARGET DETECTION.

SYSTEM	TRANSFORMED DATA	RANK
ATACS	75.00	2
FORTAS	65.49	6
VIP	55.13	9
RECCE SHELL	57.90	8
TETHERED BALLOON	44.69	10
ASEMA	71.10	4
FUAV	93.64	1
GUARDRAIL	74.53	3
GROUND SENSOR	67.68	5
LBSR	62.90	7

TABLE 8. QUESTION 8. ASSESS THE SYSTEMS AGAINST PASSIVE TARGET DETECTION.

SYSTEM	TRANSFORMED DATA	RANK
ATACS	56.67	8
FORTAS	67.91	4
VIP	57.24	7
RECCE SHELL	60.39	6
TETHERED BALLOON	54.16	9
ASEMA	63.08	5
FUAV	84.21	1
GUARDRAIL	72.68	2
GROUND SENSOR	68.12	3
LBSR	43.94	10

TABLE 9. QUESTION 9. ASSESS THE SYSTEMS AGAINST TARGET IDENTIFICATION.

SYSTEM	TRANSFORMED DATA	RANK
ATACS	66.67	5
FORTAS	73.65	3
VIP	64.75	6
RECCE SHELL	64.61	7
TETHERED BALLOON	51.30	10
ASEMA	72.26	4
FUAV	97.21	1
GUARDRAIL	74.14	2
GROUND SENSOR	61.92	8
LBSR	57.58	9

TABLE 10. QUESTION 10. ASSESS THE SYSTEMS AGAINST NON-COOPERATIVE IFF.

SYSTEM	TRANSFORMED DATA	RANK
ATACS	56.99	7
FORTAS	66.35	4
VIP	54.80	9
RECCE SHELL	56.64	8
TETHERED BALLOON	46.66	10
ASEMA	72.47	2
FUAV	93.49	1
GUARDRAIL	71.40	3
GROUND SENSOR	64.93	5
LBSR	57.08	6

TABLE 11. QUESTION 11. ASSESS THE SYSTEMS AGAINST TARGET LOCATION ERROR.

SYSTEM	TRANSFORMED DATA	RANK
ATACS	84.06	2
FORTAS	76.71	3
VIP	59.46	9
RECCE SHELL	62.88	6
TETHERED BALLOON	45.37	10
ASEMA	67.36	4
FUAV	85.88	1
GUARDRAIL	66.61	5
GROUND SENSOR	64.77	7
LBSR	62.14	8

TABLE 12. QUESTION 12. ASSESS THE SYSTEMS AGAINST TARGET PROCESSING TIME.

SYSTEM	TRANSFORMED DATA	RANK
ATACS	76.51	2
FORTAS	75.00	3
VIP	57.21	9
RECCE SHELL	59.90	8
TETHERED BALLOON	42.43	10
ASEMA	68.85	5
FUAV	82.27	1
GUARDRAIL	69.57	4
GROUND SENSOR	67.42	6
LBSR	62.98	7

TABLE 13. QUESTION 13. ASSESS THE SYSTEMS AGAINST TARGET DAMAGE ASSESSMENT.

SYSTEM	TRANSFORMED DATA	RANK
ATACS	47.80	10
FORTAS	66.89	5
VIP	69.83	4
RECCE SHELL	71.47	2
TETHERED BALLOON	47.98	80
ASEMA	70.80	3
FUAV	95.72	1
GUARDRAIL	55.83	6
GROUND SENSOR	50.73	7
LBSR	47.95	9

TABLE 14. QUESTION 14. ASSESS THE SYSTEMS AGAINST REAL TIME DATA FUSION.

SYSTEM	TRANSFORMED DATA	RANK
ATACS	33.97	7
FORTAS	61.24	2
VIP	29.03	10
RECCE SHELL	45.10	6
TETHERED BALLOON	33.93	8
ASEMA	47.28	5
FUAV	71.23	1
GUARDRAIL	48.33	4
GROUND SENSOR	48.43	3
LBSR	31.18	9

TABLE 15. QUESTION 15. ASSESS THE SYSTEMS AGAINST LASER RANGE FINDER CAPABILITY.

SYSTEM	TRANSFORMED DATA	RANK
ATACS	37.03	9
FORTAS	67.17	2
VIP	45.28	5
RECCE SHELL	48.91	4
TETHERED BALLOON	40.50	8
ASEMA	66.43	3
FUAV	89.35	1
GUARDRAIL	42.39	6
GROUND SENSOR	41.98	7
LBSR	36.47	10

TABLE 16. QUESTION 16. ASSESS THE SYSTEMS AGAINST THERMAL CAPABILITY.

SYSTEM	TRANSFORMED DATA	RANK
ATACS	43.24	8
FORTAS	75.63	2
VIP	75.73	3
RECCE SHELL	72.00	4
TETHERED BALLOON	57.91	6
ASEMA	64.45	5
FUAV	97.33	1
GUARDRAIL	43.64	7
GROUND SENSOR	42.56	9
LBSR	39.63	10

TABLE 17. QUESTION 17. ASSESS THE SYSTEMS AGAINST VISUAL CAPABILITY.

SYSTEM	TRANSFORMED DATA	RANK
ATACS	48.57	7
FORTAS	57.39	3
VIP	39.40	10
RECCE SHELL	45.40	8
TETHERED BALLOON	40.04	90
ASEMA	66.49	2
FUAV	79.77	1
GUARDRAIL	55.11	4
GROUND SENSOR	49.58	5
LBSR	49.15	6

TABLE 18. QUESTION 18. ASSESS THE SYSTEMS AGAINST MILLIMETER WAVE CAPABILITY.

SYSTEM	TRANSFORMED DATA	RANK
ATACS	39.07	7
FORTAS	61.84	1
VIP	28.59	10
RECCE SHELL	34.40	9
TETHERED BALLOON	48.06	30
ASEMA	44.59	5
FUAV	57.12	2
GUARDRAIL	41.16	6
GROUND SENSOR	45.37	4
LBSR	36.95	8

TABLE 19. QUESTION 19. ASSESS THE SYSTEMS AGAINST ACOUSTIC CAPABILITY.

SYSTEM	TRANSFORMED DATA	RANK
ATACS	78.10	2
FORTAS	66.65	6
VIP	47.92	9
RECCE SHELL	45.93	10
TETHERED BALLOON	48.64	8
ASEMA	77.10	3
FUAV	88.53	1
GUARDRAIL	72.64	4
GROUND SENSOR	71.33	5
LBSR	61.52	7

TABLE 20. QUESTION 20. ASSESS THE SYSTEMS AGAINST SIMULTANEOUS TARGET PROCESSING.

SYSTEM	TRANSFORMED DATA	RANK
ATACS	74.12	6
FORTAS	76.18	3
VIP	53.86	9
RECCE SHELL	55.95	8
TETHERED BALLOON	42.89	10
ASEMA	74.91	4
FUAV	89.31	1
GUARDRAIL	74.86	5
GROUND SENSOR	76.46	2
LBSR	61.54	7

TABLE 21. QUESTION 21. ASSESS THE SYSTEMS

SYSTEM	TRANSFORMED DATA	RANK
ATACS	76.36	2
FORTAS	70.46	4
VIP	55.69	9
RECCE SHELL	59.65	7
TETHERED BALLOON	40.65	10
ASEMA	71.00	3
FUAV	104.21	1
GUARDRAIL	69.40	6
GROUND SENSOR	70.06	5
LBSR	56.83	8

SURVEY 2, WEAPONS SYSTEMS.
TABLE 1. QUESTION 1. ASSESS THE CHARACTERISTICS.

CHARACTERISTIC	TRANSFORMED DATA	RANK
RATE OF FIRE	69.47	13
STR DEPLOYABILITY	85.68	3
OPN DEPLOYABILITY	76.48	10
TACTICAL MOBILITY	84.53	4
SUSTAINABILITY	77.74	9
ENVIRONMENT SURV	66.15	16
MAT HANDLING SURV	67.93	14
BAT DAMAGE SURV	76.09	11
ACCURACY	88.65	1
RANGE 0-60KM	81.60	6
RANGE 60-100KM	81.92	5
RANGE 100-160KM	74.46	12
RANGE 160-490KM	66.97	15
RELIABILITY	85.74	2
AVAILABILITY	79.37	7
MAINTAINABILITY	78.74	8

TABLE 2. QUESTION 2. ASSESS THE SYSTEMS AGAINST RATE OF FIRE.

SYSTEM	TRANSFORMED DATA	RANK
AFAS	79.49	1
NLOS	60.51	7
MLRS	77.14	2
HIMARS	74.42	3
LT WEIGHT 155	66.33	4
F2S2	56.68	8
LONGFOG	61.80	6
EMG	65.22	5

TABLE 3. QUESTION 3. ASSESS THE SYSTEMS AGAINST QUESTION STRATEGIC DEPLOYABILITY.

SYSTEM	TRANSFORMED DATA	RANK
AFAS	61.94	7
NLOS	69.25	4
MLRS	69.45	3
HIMARS	88.32	1
LT WEIGHT 155	85.34	2
F2S2	63.10	6
LONGFOG	64.94	5
EMG	57.56	8

TABLE 4. QUESTION 4. ASSESS THE SYSTEMS AGAINST OPERATIONAL DEPLOYABILITY.

SYSTEM	TRANSFORMED DATA	RANK
AFAS	74.84	3
NLOS	69.99	4
MLRS	64.83	7
HIMARS	81.65	2
LT WEIGHT 155	82.87	1
F2S2	67.44	5
LONGFOG	65.47	6
EMG	59.26	8

TABLE 5. QUESTION 5. ASSESS THE SYSTEMS AGAINST TACTICAL MOBILITY.

SYSTEM	TRANSFORMED DATA	RANK
AFAS	79.94	1
NLOS	67.86	5
MLRS	73.82	3
HIMARS	75.72	2
LT WEIGHT 155	71.65	4
F2S2	63.66	7
LONGFOG	66.20	6
EMG	62.00	8

TABLE 6. QUESTION 6. ASSESS THE SYSTEMS AGAINST SUSTAINABILITY.

SYSTEM	TRANSFORMED DATA	RANK
AFAS	76.49	2
NLOS	67.80	6
MLRS	76.56	1
HIMARS	71.31	3
LT WEIGHT 155	68.76	5
F2S2	66.39	7
LONGFOG	69.99	4
EMG	63.90	8

TABLE 7. QUESTION 7. ASSESS THE SYSTEMS AGAINST ENVIRONMENTAL SURVIVABILITY.

SYSTEM	TRANSFORMED DATA	RANK
AFAS	80.57	1
NLOS	64.28	8
MLRS	74.96	2
HIMARS	71.74	3
LT WEIGHT 155	67.50	4
F2S2	64.62	7
LONGFOG	66.79	5
EMG	65.58	6

TABLE 8. QUESTION 8. ASSESS THE SYSTEMS AGAINST MATERIAL HANDLING SURVIVABILITY.

SYSTEM	TRANSFORMED DATA	RANK
AFAS	88.73	1
NLOS	65.00	6
MLRS	75.24	2
HIMARS	67.49	4
LT WEIGHT 155	61.73	8
F2S2	69.86	3
LONGFOG	66.02	5
EMG	62.38	7

TABLE 9. QUESTION 9. ASSESS THE SYSTEMS AGAINST BATTLE DAMAGE SURVIVABILITY.

SYSTEM	TRANSFORMED DATA	RANK
AFAS	89.27	1
NLOS	69.81	6
MLRS	76.60	3
HIMARS	83.31	2
LT WEIGHT 155	76.22	4
F2S2	72.05	5
LONGFOG	64.09	7
EMG	58.89	8

TABLE 10. QUESTION 10. ASSESS THE SYSTEMS AGAINST ACCURACY.

SYSTEM	TRANSFORMED DATA	RANK
AFAS	80.03	2
NLOS	76.22	3
MLRS	69.05	6
HIMARS	68.77	7
LT WEIGHT 155	71.33	5
F2S2	74.29	4
LONGFOG	80.40	1
EMG	64.38	8

TABLE 11. QUESTION 11. ASSESS THE SYSTEMS AGAINST RANGE, 0-60KM.

SYSTEM	TRANSFORMED DATA	RANK
AFAS	93.62	1
NLOS	73.24	4
MLRS	69.91	5
HIMARS	65.23	6
LT WEIGHT 155	77.42	2
F2S2	56.97	8
LONGFOG	61.63	7
EMG	75.54	3

TABLE 12. QUESTION 12. ASSESS THE SYSTEMS AGAINST RANGE, 60-100KM.

SYSTEM	TRANSFORMED DATA	RANK
AFAS	54.52	5
NLOS	38.99	8
MLRS	76.80	2
HIMARS	80.10	1
LT WEIGHT 155	39.21	7
F2S2	70.61	4
LONGFOG	74.34	3
EMG	51.63	6

TABLE 13. QUESTION 13. ASSESS THE SYSTEMS AGAINST RANGE, 100-160KM.

SYSTEM	TRANSFORMED DATA	RANK
AFAS	32.50	5
NLOS	29.45	7
MLRS	83.75	1
HIMARS	82.72	2
LT WEIGHT 155	29.09	8
F2S2	71.57	3
LONGFOG	66.66	4
EMG	31.55	6

TABLE 14. QUESTION 14. ASSESS THE SYSTEMS AGAINST RANGE, 160-400KM.

SYSTEM	TRANSFORMED DATA	RANK
AFAS	22.27	5
NLOS	20.15	7
MLRS	94.78	1
HIMARS	93.24	2
LT WEIGHT 155	19.43	8
F2S2	85.33	3
LONGFOG	45.64	4
EMG	22.16	6

TABLE 15. QUESTION 15. ASSESS THE SYSTEMS AGAINST RELIABILITY.

SYSTEM	TRANSFORMED DATA	RANK
AFAS	80.99	1
NLOS	72.97	5
MLRS	73.93	4
HIMARS	74.36	3
LT WEIGHT 155	75.24	2
F2S2	65.43	7
LONGFOG	67.06	6
EMG	60.76	8

TABLE 16. QUESTION 16. ASSESS THE SYSTEMS AGAINST AVAILABILITY.

SYSTEM	TRANSFORMED DATA	RANK
AFAS	80.33	1
NLOS	69.72	5
MLRS	75.64	3
HIMARS	74.56	4
LT WEIGHT 155	78.82	2
F2S2	65.35	7
LONGFOG	67.77	6
EMG	60.31	8

TABLE 17. QUESTION 17. ASSESS THE SYSTEMS AGAINST MAINTAINABILITY.

SYSTEM	TRANSFORMED DATA	RANK
AFAS	66.35	5
NLOS	66.04	6
MLRS	73.82	2
HIMARS	72.18	3
LT WEIGHT 155	73.83	1
F2S2	60.59	7
LONGFOG	66.64	4
EMG	57.89	8

TABLE 18. QUESTION 18. ASSESS THE SYSTEMS.

SYSTEM	TRANSFORMED DATA	RANK
AFAS	84.12	2
NLOS	70.12	5
MLRS	79.78	3
HIMARS	84.54	1
LT WEIGHT 155	71.20	4
F2S2	61.09	8
LONGFOG	67.09	6
EMG	61.17	7

SURVEY 2, MUNITIONS.
TABLE 1. QUESTION 1. ASSESS THE CHARACTERISTICS.

CHARACTERISTIC	TRANSFORMED DATA	RANK
EASE OF HANDLING	78.83	8
ACCURACY	92.23	1
RANGE, 0-60KM	82.14	5
RANGE, 60-100KM	79.23	7
RANGE, 100-160KM	74.16	9
RANGE, 160-490KM	66.35	12
LOITER ABILITY	72.54	10
COLLATERAL DAMAGE	66.63	11
FLEXIBILITY	84.87	4
LETHALITY ON SOFT TGTS	79.41	6
LETHALITY ON HARD TGTS	85.56	3
LETHALITY ON EMITTERS	85.99	2

TABLE 2. QUESTION 2. ASSESS THE SYSTEMS AGAINST EASE OF HANDLING.

SYSTEM	TRANSFORMED DATA	RANK
SADARM P3I	79.23	1
MSN KILL MUNITION	68.10	6
DEEP ATTACK SMART	78.41	2
ENHANCED BLAST	72.63	5
HICAP	65.97	10
RFAM	67.38	8
SMART/BRILLIANT MINE	74.46	4
FUTURE SMART MUNITION	75.80	3
LONGARM	63.33	11
GLTR	67.65	7
LONGFOG	62.41	12
NLOS	66.47	9

TABLE 3. QUESTION 3. ASSESS THE SYSTEMS AGAINST ACCURACY.

SYSTEM	TRANSFORMED DATA	RANK
SADARM P3I	84.31	1
MSN KILL MUNITION	64.31	10
DEEP ATTACK SMART	80.72	3
ENHANCED BLAST	62.86	11
HICAP	60.56	12
RFAM	66.82	9
SMART/BRILLIANT MINE	73.08	5
FUTURE SMART MUNITION	83.62	2
LONGARM	71.19	7
GLTR	68.84	8
LONGFOG	71.55	6
NLOS	73.29	4

TABLE 4. QUESTION 4. ASSESS THE SYSTEMS AGAINST RANGE, 0-60KM.

SYSTEM	TRANSFORMED DATA	RANK
SADARM P3I	82.72	1
MSN KILL MUNITION	68.37	6
DEEP ATTACK SMART	55.08	11
ENHANCED BLAST	69.29	5
HICAP	66.56	7
RFAM	65.96	8
SMART/BRILLIANT MINE	77.00	2
FUTURE SMART MUNITION	73.07	3
LONGARM	51.50	12
GLTR	59.91	9
LONGFOG	55.57	10
NLOS	72.10	4

TABLE 5. QUESTION 5. ASSESS THE SYSTEMS AGAINST RANGE, 60-100KM.

SYSTEM	TRANSFORMED DATA	RANK
SADARM P3I	55.98	7
MSN KILL MUNITION	57.44	4
DEEP ATTACK SMART	50.53	9
ENHANCED BLAST	50.43	10
HICAP	41.91	11
RFAM	52.63	8
SMART/BRILLIANT MINE	56.62	5
FUTURE SMART MUNITION	67.45	1
LONGARM	58.15	3
GLTR	56.14	6
LONGFOG	60.68	2
NLOS	37.62	12

TABLE 6. QUESTION 6. ASSESS THE SYSTEMS AGAINST RANGE, 100-160KM.

SYSTEM	TRANSFORMED DATA	RANK
SADARM P3I	51.58	7
MSN KILL MUNITION	49.88	8
DEEP ATTACK SMART	66.61	1
ENHANCED BLAST	44.04	9
HICAP	30.77	11
RFAM	53.11	6
SMART/BRILLIANT MINE	41.95	10
FUTURE SMART MUNITION	55.02	4
LONGARM	64.65	2
GLTR	62.50	3
LONGFOG	54.18	5
NLOS	29.77	12

TABLE 7. QUESTION 7. ASSESS THE SYSTEMS AGAINST RANGE, 160-400KM.

SYSTEM	TRANSFORMED DATA	RANK
SADARM P3I	39.26	9
MSN KILL MUNITION	48.51	5
DEEP ATTACK SMART	69.18	1
ENHANCED BLAST	43.01	7
HICAP	24.90	11
RFAM	51.21	3
SMART/BRILLIANT MINE	34.72	10
FUTURE SMART MUNITION	45.27	6
LONGARM	68.25	2
GLTR	49.64	4
LONGFOG	42.40	8
NLOS	24.36	12

TABLE 8. QUESTION 8. ASSESS THE SYSTEMS AGAINST LOITER ABILITY.

SYSTEM	TRANSFORMED DATA	RANK
SADARM P3I	50.21	5
MSN KILL MUNITION	42.59	9
DEEP ATTACK SMART	52.29	4
ENHANCED BLAST	30.20	11
HICAP	28.59	12
RFAM	39.31	10
SMART/BRILLIANT MINE	54.88	3
FUTURE SMART MUNITION	56.01	2
LONGARM	49.11	7
GLTR	67.09	1
LONGFOG	49.33	6
NLOS	44.42	8

TABLE 9. QUESTION 9. ASSESS THE SYSTEMS AGAINST MINIMIZING COLLATERAL DAMAGE.

SYSTEM	TRANSFORMED DATA	RANK
SADARM P3I	66.18	3
MSN KILL MUNITION	59.07	7
DEEP ATTACK SMART	71.30	2
ENHANCED BLAST	58.31	8
HICAP	52.06	11
RFAM	47.53	12
SMART/BRILLIANT MINE	64.03	4
FUTURE SMART MUNITION	73.65	1
LONGARM	55.95	9
GLTR	52.94	10
LONGFOG	59.35	6
NLOS	60.99	5

TABLE 10. QUESTION 10. ASSESS THE SYSTEMS AGAINST FLEXIBILITY.

SYSTEM	TRANSFORMED DATA	RANK
SADARM P3I	83.05	1
MSN KILL MUNITION	61.57	7
DEEP ATTACK SMART	69.11	4
ENHANCED BLAST	46.08	9
HICAP	42.10	10
RFAM	34.47	12
SMART/BRILLIANT MINE	71.57	3
FUTURE SMART MUNITION	77.30	2
LONGARM	62.61	6
GLTR	40.43	11
LONGFOG	57.60	8
NLOS	68.03	5

TABLE 11. QUESTION 11. ASSESS THE SYSTEMS AGAINST LETHALITY ON SOFT TARGETS.

SYSTEM	TRANSFORMED DATA	RANK
SADARM P3I	67.22	2
MSN KILL MUNITION	66.79	3.5
DEEP ATTACK SMART	61.29	6
ENHANCED BLAST	72.23	1
HICAP	56.22	8
RFAM	42.58	11
SMART/BRILLIANT MINE	63.22	5
FUTURE SMART MUNITION	66.79	3.5
LONGARM	52.98	10
GLTR	42.33	12
LONGFOG	53.44	9
NLOS	58.37	7

TABLE 12. QUESTION 12. ASSESS THE SYSTEMS AGAINST LETHALITY ON HARD TARGETS.

SYSTEM	TRANSFORMED DATA	RANK
SADARM P3I	37.42	11
MSN KILL MUNITION	41.25	10
DEEP ATTACK SMART	52.55	5
ENHANCED BLAST	57.00	3.5
HICAP	43.49	7
RFAM	78.99	1
SMART/BRILLIANT MINE	32.35	12
FUTURE SMART MUNITION	57.00	3.5
LONGARM	43.32	9
GLTR	78.34	2
LONGFOG	43.37	8
NLOS	44.21	6

TABLE 13. QUESTION 13. ASSESS THE SYSTEMS AGAINST LETHALITY ON EMITTERS.

SYSTEM	TRANSFORMED DATA	RANK
SADARM P3I	58.95	4
MSN KILL MUNITION	43.67	10
DEEP ATTACK SMART	64.17	2
ENHANCED BLAST	29.57	12
HICAP	36.80	11
RFAM	53.24	7
SMART/BRILLIANT MINE	52.83	8
FUTURE SMART MUNITION	70.59	1
LONGARM	48.80	9
GLTR	55.08	6
LONGFOG	60.57	3
NLOS	57.96	5

TABLE 14. QUESTION 14. ASSESS THE SYSTEMS.

SYSTEM	TRANSFORMED DATA	RANK
SADARM P3I	73.29	2
MSN KILL MUNITION	56.24	8
DEEP ATTACK SMART	67.11	4
ENHANCED BLAST	63.17	6
HICAP	52.67	12
RFAM	63.22	5
SMART/BRILLIANT MINE	68.21	3
FUTURE SMART MUNITION	75.00	1
LONGARM	54.14	91
GLTR	58.50	7
LONGFOG	53.72	10
NLOS	53.67	11

SURVEY 3, COMMAND AND CONTROL.
TABLE 1. QUESTION 1. ASSESS THE CHARACTERISTICS.

CHARACTERISTIC	TRANSFORMED DATA	RANK
LONG COMMO RANGE	80.26	12
LARGE COMMO CAPACITY	81.96	8
SURV. FROM FA	85.85	3
SURV. FROM SMALL ARMS	69.37	17
SURV. FROM LARGE CALIBER	58.83	19
SURV. FROM DIRECTED ENERGY	59.49	18
RELIABILITY	73.62	16
AVAILABILITY	87.09	2
MAINTAINABILITY	81.12	9
STRATEGIC DEPLOYABILITY	80.75	10
OPERATIONAL DEPLOYABILITY	80.41	11
TACTICAL MOBILITY	77.36	13
SHORT EMPLACE TIME	82.61	4
REDUNDANCY	82.11	6
SUSCEPTIBILITY TO COUNTERMEASURES	82.07	7
FA MSN. AREA COMMONALITY	82.34	5
COMMONALITY WITH LT FORCE	74.13	15
COMMONALITY WITH HVY FORCE	77.26	14
CROSS MSN AREA COMMONALITY	87.66	1

TABLE 2. QUESTION 2. ASSESS THE SYSTEMS AGAINST LONG COMMUNICATION RANGE.

SYSTEM	TRANSFORMED DATA	RANK
AFATDS	69.70	3
FFSCCS	78.83	2
LOW ECHELON KNOWLEDGE SYSTEM	67.61	4
WIDE AREA COMMO	84.72	1
FORCE LEVEL KNOWLEDGE SYSTEM	61.50	6
DISTRIBUTED IEW FUSION SYSTEM	63.80	5

TABLE 3. QUESTION 3. ASSESS THE SYSTEMS AGAINST LARGE COMMUNICATIONS CAPACITY.

SYSTEM	TRANSFORMED DATA	RANK
AFATDS	73.86	3
FFSCCS	79.45	2
LOW ECHELON KNOWLEDGE SYSTEM	63.45	6
WIDE AREA COMMO	81.02	1
FORCE LEVEL KNOWLEDGE SYSTEM	69.72	5
DISTRIBUTED IEW FUSION SYSTEM	73.49	4

TABLE 4. QUESTION 4. ASSESS THE SYSTEMS AGAINST EASE OF OPERATION.

SYSTEM	TRANSFORMED DATA	RANK
AFATDS	84.76	1
FFSCCS	83.13	2
LOW ECHELON KNOWLEDGE SYSTEM	73.95	3
WIDE AREA COMMO	70.63	5
FORCE LEVEL KNOWLEDGE SYSTEM	68.94	6
DISTRIBUTED IEW FUSION SYSTEM	71.34	4

TABLE 5. QUESTION 5. ASSESS THE SYSTEMS AGAINST SURVIVABILITY FROM FIELD ARTILLERY.

SYSTEM	TRANSFORMED DATA	RANK
AFATDS	79.71	1
FFSCCS	78.38	2
LOW ECHELON KNOWLEDGE SYSTEM	76.67	4
WIDE AREA COMMO	77.87	3
FORCE LEVEL KNOWLEDGE SYSTEM	73.53	6
DISTRIBUTED IEW FUSION SYSTEM	74.06	5

TABLE 6. QUESTION 6. ASSESS THE SYSTEMS AGAINST SURVIVABILITY FROM SMALL ARMS.

SYSTEM	TRANSFORMED DATA	RANK
AFATDS	75.76	1
FFSCCS	73.48	2
LOW ECHELON KNOWLEDGE SYSTEM	71.26	3
WIDE AREA COMMO	65.14	4
FORCE LEVEL KNOWLEDGE SYSTEM	63.48	5
DISTRIBUTED IEW FUSION SYSTEM	63.30	6

TABLE 7. QUESTION 7. ASSESS THE SYSTEMS AGAINST SURVIVABILITY FROM LARGE CALIBER DIRECT FIRE.

SYSTEM	TRANSFORMED DATA	RANK
AFATDS	74.08	1
FFSCCS	73.90	2
LOW ECHELON KNOWLEDGE SYSTEM	69.13	3
WIDE AREA COMMO	69.02	4
FORCE LEVEL KNOWLEDGE SYSTEM	66.67	6
DISTRIBUTED IEW FUSION SYSTEM	67.16	5

TABLE 8. QUESTION 8. ASSESS THE SYSTEMS AGAINST SURVIVABILITY FROM DIRECTED ENERGY.

SYSTEM	TRANSFORMED DATA	RANK
AFATDS	76.45	2
FFSCCS	77.97	1
LOW ECHELON KNOWLEDGE SYSTEM	70.43	5
WIDE AREA COMMO	74.75	3
FORCE LEVEL KNOWLEDGE SYSTEM	69.52	6
DISTRIBUTED IEW FUSION SYSTEM	73.04	4

TABLE 9. QUESTION 9. ASSESS THE SYSTEMS AGAINST RELIABILITY.

SYSTEM	TRANSFORMED DATA	RANK
AFATDS	79.50	1
FFSCCS	77.23	2
LOW ECHELON KNOWLEDGE SYSTEM	69.50	6
WIDE AREA COMMO	71.19	4
FORCE LEVEL KNOWLEDGE SYSTEM	70.53	5
DISTRIBUTED IEW FUSION SYSTEM	74.51	3

TABLE 10. QUESTION 10. ASSESS THE SYSTEMS AGAINST AVAILABILITY.

SYSTEM	TRANSFORMED DATA	RANK
AFATDS	80.07	1
FFSCCS	78.38	2
LOW ECHELON KNOWLEDGE SYSTEM	70.26	5
WIDE AREA COMMO	73.92	3
FORCE LEVEL KNOWLEDGE SYSTEM	70.18	6
DISTRIBUTED IEW FUSION SYSTEM	71.68	4

TABLE 11. QUESTION 11. ASSESS THE SYSTEMS AGAINST MAINTAINABILITY.

SYSTEM	TRANSFORMED DATA	RANK
AFATDS	79.28	1
FFSCCS	77.55	3
LOW ECHELON KNOWLEDGE SYSTEM	73.44	5
WIDE AREA COMMO	78.44	2
FORCE LEVEL KNOWLEDGE SYSTEM	71.40	6
DISTRIBUTED IEW FUSION SYSTEM	77.36	4

TABLE 12. QUESTION 12. ASSESS THE SYSTEMS AGAINST STRATEGIC DEPLOYABILITY.

SYSTEM	TRANSFORMED DATA	RANK
AFATDS	85.70	2
FFSCCS	82.76	1
LOW ECHELON KNOWLEDGE SYSTEM	73.67	4
WIDE AREA COMMO	73.43	5
FORCE LEVEL KNOWLEDGE SYSTEM	68.42	6
DISTRIBUTED IEW FUSION SYSTEM	76.91	3

TABLE 13. QUESTION 13. ASSESS THE SYSTEMS AGAINST OPERATIONAL DEPLOYABILITY.

SYSTEM	TRANSFORMED DATA	RANK
AFATDS	81.70	2
FFSCCS	81.99	1
LOW ECHELON KNOWLEDGE SYSTEM	74.30	4
WIDE AREA COMMO	72.46	5
FORCE LEVEL KNOWLEDGE SYSTEM	69.91	6
DISTRIBUTED IEW FUSION SYSTEM	75.79	3

TABLE 14. QUESTION 14. ASSESS THE SYSTEMS AGAINST TACTICAL MOBILITY.

SYSTEM	TRANSFORMED DATA	RANK
AFATDS	81.31	1
FFSCCS	79.62	2
LOW ECHELON KNOWLEDGE SYSTEM	77.76	3
WIDE AREA COMMO	70.85	5
FORCE LEVEL KNOWLEDGE SYSTEM	68.49	6
DISTRIBUTED IEW FUSION SYSTEM	72.75	4

TABLE 15. QUESTION 15. ASSESS THE SYSTEMS AGAINST SHORT EMPLACE/DISPLACE TIME.

SYSTEM	TRANSFORMED DATA	RANK
AFATDS	76.18	4
FFSCCS	77.13	3
LOW ECHELON KNOWLEDGE SYSTEM	72.47	5
WIDE AREA COMMO	78.94	1
FORCE LEVEL KNOWLEDGE SYSTEM	72.15	6
DISTRIBUTED IEW FUSION SYSTEM	78.67	2

TABLE 16. QUESTION 16. ASSESS THE SYSTEMS AGAINST REDUNDANCY.

SYSTEM	TRANSFORMED DATA	RANK
AFATDS	76.92	2
FFSCCS	76.50	4
LOW ECHELON KNOWLEDGE SYSTEM	76.72	3
WIDE AREA COMMO	79.77	1
FORCE LEVEL KNOWLEDGE SYSTEM	70.33	6
DISTRIBUTED IEW FUSION SYSTEM	75.77	5

TABLE 17. QUESTION 17. ASSESS THE SYSTEMS AGAINST SUSCEPTIBILITY TO COUNTERMEASURES.

SYSTEM	TRANSFORMED DATA	RANK
AFATDS	78.51	2
FFSCCS	80.70	1
LOW ECHELON KNOWLEDGE SYSTEM	75.48	4
WIDE AREA COMMO	74.82	5
FORCE LEVEL KNOWLEDGE SYSTEM	66.63	6
DISTRIBUTED IEW FUSION SYSTEM	78.26	3

TABLE 18. QUESTION 18. ASSESS THE SYSTEMS AGAINST FA MISSION AREA COMMONALITY WITHIN THE LIGHT FORCE.

SYSTEM	TRANSFORMED DATA	RANK
AFATDS	86.18	1
FFSCCS	83.43	2
LOW ECHELON KNOWLEDGE SYSTEM	69.14	6
WIDE AREA COMMO	77.67	3
FORCE LEVEL KNOWLEDGE SYSTEM	71.03	5
DISTRIBUTED IEW FUSION SYSTEM	77.42	4

TABLE 19. QUESTION 19. ASSESS THE SYSTEMS AGAINST FA MISSION AREA COMMONALITY WITHIN THE HEAVY FORCE.

SYSTEM	TRANSFORMED DATA	RANK
AFATDS	80.55	3
FFSCCS	82.56	1
LOW ECHELON KNOWLEDGE SYSTEM	73.38	5.5
WIDE AREA COMMO	80.64	2
FORCE LEVEL KNOWLEDGE SYSTEM	73.38	5.5
DISTRIBUTED IEW FUSION SYSTEM	77.38	4

TABLE 20. QUESTION 20. ASSESS THE SYSTEMS AGAINST CROSS MISSION AREA COMMONALITY.

SYSTEM	TRANSFORMED DATA	RANK
AFATDS	75.06	5
FFSCCS	77.07	4
LOW ECHELON KNOWLEDGE SYSTEM	72.22	6
WIDE AREA COMMO	84.43	1
FORCE LEVEL KNOWLEDGE SYSTEM	79.68	2
DISTRIBUTED IEW FUSION SYSTEM	78.31	3

TABLE 21. QUESTION 21. ASSESS THE SYSTEMS.

SYSTEM	TRANSFORMED DATA	RANK
AFATDS	76.61	4
FFSCCS	77.95	3
LOW ECHELON KNOWLEDGE SYSTEM	73.36	6
WIDE AREA COMMO	84.36	1
FORCE LEVEL KNOWLEDGE SYSTEM	73.39	5
DISTRIBUTED IEW FUSION SYSTEM	82.51	2

SURVEY 4, SUPT, SUSTAINMENT, AND STRAT DEPLOY AND TAC MOB.
TABLE 1. QUESTION 1. ASSESS THE CHARACTERISTICS.

CHARACTERISTICS	TRANSFORMED DATA	RANK
MIN SHIP WT	76.61	7
MAX CONT	78.71	6
STRAT DEPLOY	85.34	2
OPN DEPLOY	85.06	3
TACT MOB	86.67	1
ENV SURV	70.86	12
MAT HANDLING SURV	75.00	8
BAT DAMAGE SURV	69.05	15
RELIABILITY	83.19	4
OPERATING RANGE	72.50	10
MSN AREA COM	72.25	11
MIN # OF PARTS	70.01	13
MAX COMMON PARTS	73.95	9
MIN UNIQUE TOOLS	68.52	16
MIN TOOLS	66.49	17
MAX MHE	69.77	14
MAX AUTOMATED MHE	79.77	5

SURVEY 4, SUPT, SUSTAINMENT, AND STRAT DEPLOY AND TAC MOB.
TABLE 1. QUESTION 1. ASSESS THE CHARACTERISTICS.

CHARACTERISTICS	TRANSFORMED DATA	RANK
MIN SHIP WT	76.61	7
MAX CONT	78.71	6
STRAT DEPLOY	85.34	2
OPN DEPLOY	85.06	3
TACT MOB	86.67	1
ENV SURV	70.86	12
MAT HANDLING SURV	75.00	8
BAT DAMAGE SURV	69.05	15
RELIABILITY	83.19	4
OPERATING RANGE	72.50	10
MSN AREA COM	72.25	11
MIN # OF PARTS	70.01	13
MAX COMMON PARTS	73.95	9
MIN UNIQUE TOOLS	68.52	16
MIN TOOLS	66.49	17
MAX MHE	69.77	14
MAX AUTOMATED MHE	79.77	5

TABLE 5. QUESTION 5. ASSESS THE SYSTEMS AGAINST OPERATIONAL DEPLOYABILITY.

SYSTEM	TRANSFORMED DATA	RANK
FARV-A	70.27	3
REARMS	69.28	4
F2S2 (SUPT MODULE)	66.74	5
TRAC	50.07	7
ACA	80.48	1
LAMS	78.01	2
ROB LOG RES VEH	65.06	6

TABLE 6. QUESTION 6. ASSESS THE SYSTEMS AGAINST TACTICAL MOBILITY.

SYSTEM	TRANSFORMED DATA	RANK
FARV-A	75.80	2
REARMS	70.45	5
F2S2 (SUPT MODULE)	68.01	6
TRAC	53.01	7
ACA	76.70	1
LAMS	71.80	4
ROB LOG RES VEH	72.46	3

TABLE 7. QUESTION 7. ASSESS THE SYSTEMS AGAINST ENVIRONMENTAL SURVIVABILITY.

SYSTEM	TRANSFORMED DATA	RANK
FARV-A	76.27	1
REARMS	74.80	2
F2S2 (SUPT MODULE)	70.92	3
TRAC	54.28	7
ACA	65.63	5
LAMS	63.04	6
ROB LOG RES VEH	69.71	4

TABLE 8. QUESTION 8. ASSESS THE SYSTEMS AGAINST MATERIAL HANDLING SURVIVABILITY.

SYSTEM	TRANSFORMED DATA	RANK
FARV-A	75.14	2
REARMS	76.11	1
F2S2 (SUPT MODULE)	70.22	5
TRAC	48.84	7
ACA	71.68	4
LAMS	68.34	6
ROB LOG RES VEH	74.47	3

TABLE 9. QUESTION 9. ASSESS THE SYSTEMS AGAINST BATTLE DAMAGE SURVIVABILITY.

SYSTEM	TRANSFORMED DATA	RANK
FARV-A	80.32	1
REARMS	74.45	3
F2S2 (SUPT MODULE)	68.65	4
TRAC	55.54	7
ACA	66.78	5
LAMS	63.77	6
ROB LOG RES VEH	74.66	2

TABLE 10. QUESTION 10. ASSESS THE SYSTEMS AGAINST RELIABILITY.

SYSTEM	TRANSFORMED DATA	RANK
FARV-A	71.25	1
REARMS	67.87	2
F2S2 (SUPT MODULE)	66.05	5
TRAC	54.92	7
ACA	67.57	4
LAMS	63.45	6
ROB LOG RES VEH	67.60	3

TABLE 11. QUESTION 11. ASSESS THE SYSTEMS AGAINST BATTLEFIELD OPERATING RANGE.

SYSTEM	TRANSFORMED DATA	RANK
FARV-A	69.28	4
REARMS	69.34	3
F2S2 (SUPT MODULE)	68.68	5
TRAC	48.26	7
ACA	81.52	1
LAMS	76.13	2
ROB LOG RES VEH	68.42	6

TABLE 12. QUESTION 12. ASSESS THE SYSTEMS AGAINST MISSION AREA COMMONALITY.

SYSTEM	TRANSFORMED DATA	RANK
FARV-A	72.95	1
REARMS	71.34	2
F2S2 (SUPT MODULE)	66.09	4
TRAC	45.40	7
ACA	64.00	5
LAMS	60.97	6
ROB LOG RES VEH	67.26	3

TAB'E 13. QUESTION 13. ASSESS THE SYSTEMS AGAINST MINIMAL NUMBER OF PARTS.

SYSTEM	TRANSFORMED DATA	RANK
FARV-A	66.19	2
REARMS	67.41	1
F2S2 (SUPT MODULE)	64.01	3
TRAC	51.63	7
ACA	60.58	5
LAMS	58.80	6
ROB LOG RES VEH	62.21	4

TABLE 14. QUESTION 14. ASSESS THE SYSTEMS AGAINST MAXIMIZING COMMON PARTS.

SYSTEM	TRANSFORMED DATA	RANK
FARV-A	71.13	2
REARMS	75.01	1
F2S2 (SUPT MODULE)	66.63	3
TRAC	50.00	7
ACA	60.24	5
LAMS	57.70	6
ROB LOG RES VEH	64.37	4

TABLE 15. QUESTION 15. ASSESS THE SYSTEMS AGAINST MINIMIZING UNIQUE TOOLS.

SYSTEM	TRANSFORMED DATA	RANK
FARV-A	65.47	2
REARMS	66.70	1
F2S2 (SUPT MODULE)	62.93	3
TRAC	41.73	7
ACA	58.55	5
LAMS	55.79	6
ROB LOG RES VEH	62.13	4

TABLE 16. QUESTION 16. ASSESS THE SYSTEMS AGAINST MINIMIZING TOOLS.

SYSTEM	TRANSFORMED DATA	RANK
FARV-A	65.06	2
REARMS	66.19	1
F2S2 (SUPT MODULE)	61.08	3
TRAC	45.68	7
ACA	56.58	5
LAMS	55.49	6
ROB LOG RES VEH	58.26	4

TABLE 17. QUESTION 17. ASSESS THE SYSTEMS AGAINST MAXIMIZING MATERIAL HANDLING EQUIPMENT.

SYSTEM	TRANSFORMED DATA	RANK
FARV-A	74.12	2
REARMS	75.14	1
F2S2 (SUPT MODULE)	70.75	5
TRAC	42.52	7
ACA	71.62	4
LAMS	64.86	6
ROB LOG RES VEH	73.43	3

TABLE 18. QUESTION 18. ASSESS THE SYSTEMS AGAINST MAXIMIZING AUTOMATED MATERIAL HANDLING DEVICES.

SYSTEM	TRANSFORMED DATA	RANK
FARV-A	74.41	2
REARMS	73.68	3
F2S2 (SUPT MODULE)	68.53	6
TRAC	43.93	7
ACA	68.57	5
LAMS	70.59	4
ROB LOG RES VEH	82.89	1

TABLE 19. QUESTION 19. ASSESS THE SYSTEMS.

SYSTEM	TRANSFORMED DATA	RANK
FARV-A	75.88	2
REARMS	66.72	4
F2S2 (SUPT MODULE)	64.61	6
TRAC	48.31	7
ACA	79.47	1
LAMS	69.06	3
ROB LOG RES VEH	65.62	5

SURVEY 5.

TABLE 1. QUESTION 1. ASSESS THE COMPONENTS OF COMBAT POWER.

COMPONENTS	TRANSFORMED DATA	RANK
FIREPOWER	96.51	1
MANEUVER	82.89	2
PROTECTION	71.59	3

TABLE 2. QUESTION 2. ASSESS THE CAPABILITIES OF FIREPOWER.

CAPABILITIES	TRANSFORMED DATA	RANK
ACT TGT DETECTION	68.86	
PAS TGT DETECTION	89.19	8
TGT IDENTIFICATION	78.47	1
NON-COOPERATIVE IFF	76.01	6
TGT ACQUISITION	89.08	7
TGT ENGAGEMENT	78.95	2
ACCURACY	79.85	5
LETHALITY	79.01	3

TABLE 3. QUESTION 3. ASSESS THE COMPONENTS OF MANEUVER.

COMPONENTS	TRANSFORMED DATA	RANK
GREATER ACL	62.67	9
GREATER AGILITY	81.20	3
LESS WEIGHT	83.94	2
OBSTACLE CROSSING	69.91	8
TACTICAL SPEED	76.83	6
OPERATIONAL SPEED	75.73	7
STRATEGIC SPEED	77.62	5
OPERATING RANGE	79.14	4
MAINTAINABILITY	86.01	1

TABLE 4. QUESTION 4. ASSESS THE COMPONENTS OF PROTECTION.

COMPONENTS	TRANSFORMED DATA	RANK
SIZE	69.02	10
ARMOR QUALITY	76.85	5
SIGNATURE	85.64	1
DEFILADE FIRING	65.94	12
OVER HORIZON FIRING	78.56	4
EM/VISUAL CAMO	78.71	3
EW SENSORS	82.01	2
DECOYS	72.47	8
LOW OBSERVABLES	75.54	6
EMPLACE TIME	74.66	7
NBC DETECTION	67.74	11
NBC PROTECTION	70.97	9

TABLE 5. QUESTION 5. ASSESS THE COMPONENTS OF FORCE PROJECTION.

COMPONENTS	TRANSFORMED DATA	RANK
STRATEGIC DEPLOY	91.71	1
OPERATIONAL DEPLOY	69.42	3
TACTICAL MOB	73.71	2

TABLE 6. QUESTION 6. ASSESS THE COMPONENTS OF UNIT SUPPORT.

COMPONENT	TRANSFORMED DATA	RANK
MAINTAINABILITY	85.17	2
SUPPLY DISTRIBUTION	81.92	3
RELIABILITY	91.89	1
TAC SUP TRANSPORT	77.91	5
TAC POL TRANSPORT	78.66	4

TABLE 7. QUESTION 7. ASSESS THE COMPONENTS OF SUSTAINMENT.

COMPONENT	TRANSFORMED DATA	RANK
MEDICAL EVACUATION	71.13	5
UNIT RECONSTRUCTION	74.31	4
MEDICAL CAPACITY	69.43	6
LOGISTICAL MOBILITY	86.69	1
INDUSTRIAL BASE	74.61	3
SOLDIER TRNG BASE	79.55	2
MANPOWER MANAGEMENT	66.43	7

TABLE 8. QUESTION 8. ASSESS THE SYSTEMS OF FIRE SUPPORT.

SYSTEMS	TRANSFORMED DATA	RANK
MORTARS	56.01	8
FA CANNON FIRE	75.30	3
GRD LAUN MSL (LOS)	70.45	6
GRD LAUN MSL (NLOS)	95.10	1
NAVAL CANNON FIRE	49.60	10
NAVAL MSL (LOS)	52.86	9
NAVAL MSL (NLOS)	75.25	4
AIR CANNON FIRE	57.94	7
AIR LAUN MSL (LOS)	71.08	5
AIR LAUN MSL (NLOS)	84.31	2

TABLE 9. QUESTION 9. ASSESS THE CAPABILITIES OF THE FIELD ARTILLERY BATTLEFIELD FUNCTIONAL MISSION AREA.

CAPABILITIES	TRANSFORMED DATA	RANK
COUNTERFIRE	76.69	5
ATTK OF UNCOM FORCE	83.89	1
SUPPRESSION OF ADA	82.33	3
ATTK OF EMITTERS	80.18	4
NBC DETERRENCE	65.55	8
ATTK CLOSE IN FORCE	82.74	2
MSL DEFENSE	76.34	6
COUNTERMOBILITY	69.88	7

SURVEY 6.
TABLE 1. QUESTION 1. ASSESS THE PROBABILITY THAT THESE TECHNOLOGIES WILL HAVE A BIG IMPACT BY THE YEAR 2015.

TECHNOLOGIES	TRANSFORMED DATA	RANK
ADV MATERIALS	81.09	6
ADV PROPULSION	82.38	4
ADV SIGNAL PROC	90.99	1
AI	83.43	3
BIOTECHNOLOGY	58.50	12
DIRECTED ENERGY	68.02	11
LOW OBSERVABLES	72.44	10
MICRO-ELECTRONICS/ PHOTONICS/ACOUSTICS	82.34	5
NEUROSCIENCE	58.38	13
POWER GENERATION/ STORAGE/CONDITIONING	79.48	7
PROT/LETHALITY	85.94	2
ROBOTICS	77.59	8
SPACE TECHNOLOGY	73.39	9

TABLE 2. QUESTION 2. ASSESS THE PROBABILITY THAT THESE TECHNOLOGIES WILL BE SUCCESSFULLY INCORPORATED INTO FIRE SUPPORT SYSTEMS BY THE YEAR 2015.

TECHNOLOGIES	TRANSFORMED DATA	RANK
ADV MATERIALS	81.95	5
ADV PROPULSION	86.96	3
ADV SIGNAL PROC	94.46	1
AI	82.94	4
BIOTECHNOLOGY	55.55	13
DIRECTED ENERGY	62.29	11
LOW OBSERVABLES	73.21	90
MICRO-ELECTRONICS/ PHOTONICS/ACOUSTICS	80.46	6
NEUROSCIENCE	58.17	12
POWER GENERATION/ STORAGE/CONDITIONING	79.34	7
PROT/LETHALITY	90.59	2
ROBOTICS	73.71	8
SPACE TECHNOLOGY	72.32	10

TABLE 3. QUESTION 3. ASSESS WITH WHAT PROBABILITY THE ARMY SHOULD INVEST IN THESE TECHNOLOGIES.

TECHNOLOGIES	TRANSFORMED DATA	RANK
ADV MATERIALS	76.35	7
ADV PROPULSION	80.61	5
ADV SIGNAL PROC	89.07	1
AI	75.57	8
BIOTECHNOLOGY	53.54	12
DIRECTED ENERGY	61.91	11
LOW OBSERVABLES	73.12	9
MICRO-ELECTRONICS/ PHOTONICS/ACOUSTICS	86.25	3
NEUROSCIENCE	53.25	13
POWER GENERATION/ STORAGE/CONDITIONING	79.75	6
PROT/LETHALITY	88.58	2
ROBOTICS	82.21	4
SPACE TECHNOLOGY	67.39	10

TABLE 4. QUESTION 4. ASSESS THE IMPACT THAT THESE SYSTEMS WILL HAVE BY THE YEAR 2015.

SYSTEM	TRANSFORMED DATA	RANK
ADV SOLDIER SUIT	64.23	8
PRE LONG RANGE WPNS	98.61	1
M-SPEC SENSOR	96.26	2
DEPLOY & LOG SYS	91.13	3
NONLETHAL WPNS	61.26	9
ELEC GRD MOB SYS	60.58	10
ROBOTICS	70.85	7
ADV BAT MANAGEMENT	84.36	4
DECOYS & DECEPTION	71.13	6
AIR MOB SYSTEMS	71.42	5

TABLE 5. QUESTION 5. ASSESS THE PROBABILITY THAT THESE SYSTEMS WILL BE INCORPORATED INTO THE FIELD ARTILLERY BY THE YEAR 2015.

SYSTEM	TRANSFORMED DATA	RANK
ADV SOLDIER SUIT	64.05	8
PRE LONG RANGE WPNS	99.46	1
M-SPEC SENSOR	91.18	2
DEPLOY & LOG SYS	87.52	3
NONLETHAL WPNS	61.23	9
ELEC GRD MOB SYS	59.57	10
ROBOTICS	74.26	6
ADV BAT MANAGEMENT	84.34	4
DECOYS & DECEPTION	73.51	7
AIR MOB SYSTEMS	74.54	5

TABLE 6. QUESTION 6. ASSESS WITH WHAT PROBABILITY THE ARMY SHOULD INVEST IN THE FOLLOWING SYSTEMS.

SYSTEM	TRANSFORMED DATA	RANK
ADV SOLDIER SUIT	67.52	8
PRE LONG RANGE WPNS	98.94	1
M-SPEC SENSOR	92.12	2
DEPLOY & LOG SYS	79.47	4
NONLETHAL WPNS	59.50	10
ELEC GRD MOB SYS	60.76	9
ROBOTICS	69.95	7
ADV BAT MANAGEMENT	84.47	3
DECOYS & DECEPTION	76.98	5
AIR MOB SYSTEMS	71.65	6

APPENDIX F. SURVEYS

The surveys on the following pages are provided in their original form. This form includes the original page numbering as the reader will better understand the organization of each survey with the orignal numbers on them.

TECHNOLOGY BASE/FIELD ARTILLERY
SEMINAR WARGAME

DATA COLLECTION

We hope your experiences during this technology wargame will provide useful insight towards defining and clarifying issues about the uses of new technologies and the future of warfighting. To assist decisionmakers in understanding your insights, a questionnaire survey will be given at the conclusion of each phase of the wargame.

Privacy Act Information

The data collected with these questionnaires will be used for research purposes only. The questionnaires were developed by TRADOC Analysis Command-Monterey for the Army Material Command Technology Planning and Management branch. Names are to be used for administrative and statistical control purposes only. Full confidentiality of your responses will be maintained in the processing of these data. Disclosure of information is voluntary. Not providing information, however, will mean your views will not be included in the analysis of survey results.

Administrative Information (Please Print)

NAME ____

IN WHAT SCENARIO DID YOU PARTICIPATE? (Circle One)

Dessert

Northern Continental

Tropical

IN WHAT VIGNETTE DID YOU PARTICIPATE? (Circle One)

Long-range Fires

Close Fires

IF YOU ARE RETIRED MILITARY, WHAT IS YOUR:

Branch of Service ____________ Specialty ____________

SURVEY I

INSTRUCTIONS

The following survey will give Army decision makers insight on your view of how technology may provide improved warfighting capability to a future force in the year 2015. The questions are general in nature, relating to characteristics and systems applicable to **Fire Support Target Acquisition.** For your responses, consider your **general impression** gained through a look at the scenarios you examined. As always, **your first impression is usually best.** Your answers to these questions will be analyzed to help determine the direction of United States Army technology investments.

INSTRUCTIONS: **PLACE AN "X" IN THE COLUMN THAT *MOST CLOSELY* CORRESPONDS TO YOUR OPINION.**

THE TERM "FIXED BUDGET" IN THE QUESTIONS BELOW IS A CONSTRAINT THAT ALLOWS YOU TO FUND SOME OF THE CHARACTERISTICS OR SYSTEMS YOU DESIRE, BUT NOT ALL.

THE ROW LABELED "VERBAL EXPRESSION OF PROBABILITY" IS A VERBAL DESCRIPTION OF THE PROBABILITY. THE ROW LABELED "NUMERICAL RANGE OF PROBABILITY" IS A NUMERICAL DESCRIPTION OF THE RANGE OF THE PROBABILITY. BOTH ARE PROVIDED TO ASSIST YOU IN YOUR ASSESSMENT.

EXAMPLE: The following is an example question with responses marked in the correct manner.

Given a fixed budget and assuming that maximizing accuracy will win the war, indicate with what probability you would allocate funds to the following system.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
Musket	(X)	( )	( )	( )	( )	( )	( )
M16 Rifle	( )	( )	( )	( )	(X)	( )	( )
M14 Rifle	( )	( )	( )	( )	( )	(X)	( )
9MM Pistol	( )	(X)	( )	( )	( )	( )	( )

PLEASE ANSWER THE QUESTIONS STARTING ON THE NEXT PAGE

The following questions focus on Target Acquisition Assets that are being considered for Fire Support.

The following abbreviations are used throughout the survey.

IFF = Identification Friend or Foe
ATACS = Advanced Target Acquisition Counterfire System
FORTAS = Forward Observation Remote Target Acquisition System
VIP = Video Imaging Projectile
RECCE = Reconnaissance
ASEMA = Advanced Special Electronic Mission Aircraft
FUAV = Future Unmanned Aerial Vehicle
LBSR = Lightweight Battlefield Surveillance Radar

1. Given a fixed budget from which you are to develop some but not all the following capabilities for Fire Support Target Acquisition assets to be fielded in the year 2015, indicate with what probability you would allocate funds to develop the following capabilities.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
Range (0-60 KM)	( )	( )	( )	( )	( )	( )	( )
(60-100 KM)	( )	( )	( )	( )	( )	( )	( )
(100-160 KM)	( )	( )	( )	( )	( )	( )	( )
(160-490 KM)	( )	( )	( )	( )	( )	( )	( )
Active Target Detection	( )	( )	( )	( )	( )	( )	( )
Passive Target Detection	( )	( )	( )	( )	( )	( )	( )
Target Identification	( )	( )	( )	( )	( )	( )	( )
Non-cooperative IFF	( )	( )	( )	( )	( )	( )	( )
Target Location Error	( )	( )	( )	( )	( )	( )	( )
Target Processing Time	( )	( )	( )	( )	( )	( )	( )
Target Damage Assessment	( )	( )	( )	( )	( )	( )	( )
Real Time Data Fusion	( )	( )	( )	( )	( )	( )	( )

2. Given a fixed budget from which you are to develop some but not all the following capabilities for Fire Support Target Acquisition assets to be fielded in the year 2015, indicate with what probability you would allocate funds to develop the following capabilities.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
Laser Rangefinder Capability	( )	( )	( )	( )	( )	( )	( )
Thermal (IR) Capability	( )	( )	( )	( )	( )	( )	( )
Visual Capability	( )	( )	( )	( )	( )	( )	( )
Millimeter Wave Capability	( )	( )	( )	( )	( )	( )	( )
Acoustic Capability	( )	( )	( )	( )	( )	( )	( )
Simultaneous Target Processing	( )	( )	( )	( )	( )	( )	( )

3. Given a fixed budget and assuming that maximizing capabilities in the 0 to 60 KM range will win the war, indicate with what probability you would allocate funds to develop the following system.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
ATACS	( )	( )	( )	( )	( )	( )	( )
FORTAS	( )	( )	( )	( )	( )	( )	( )
VIP	( )	( )	( )	( )	( )	( )	( )
RECCE Shell	( )	( )	( )	( )	( )	( )	( )
Tethered Balloon	( )	( )	( )	( )	( )	( )	( )
ASEMA	( )	( )	( )	( )	( )	( )	( )
FUAV	( )	( )	( )	( )	( )	( )	( )
Guardrail common sensor	( )	( )	( )	( )	( )	( )	( )
Ground based common sensor	( )	( )	( )	( )	( )	( )	( )
LBSR	( )	( )	( )	( )	( )	( )	( )

4. Given a fixed budget and assuming that maximizing capabilities in the 60 to 100 KM range will win the war, indicate with what probability you would allocate funds to develop the following system.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
ATACS	( )	( )	( )	( )	( )	( )	( )
FORTAS	( )	( )	( )	( )	( )	( )	( )
VIP	( )	( )	( )	( )	( )	( )	( )
RECCE Shell	( )	( )	( )	( )	( )	( )	( )
Tethered Balloon	( )	( )	( )	( )	( )	( )	( )
ASEMA	( )	( )	( )	( )	( )	( )	( )
FUAV	( )	( )	( )	( )	( )	( )	( )
Guardrail common sensor	( )	( )	( )	( )	( )	( )	( )
Ground based common sensor	( )	( )	( )	( )	( )	( )	( )
LBSR	( )	( )	( )	( )	( )	( )	( )

5. Given a fixed budget and assuming that maximizing capabilities in the 100 to 160 KM range will win the war, indicate with what probability you would allocate funds to develop the following system.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
ATACS	( )	( )	( )	( )	( )	( )	( )
FORTAS	( )	( )	( )	( )	( )	( )	( )
VIP	( )	( )	( )	( )	( )	( )	( )
RECCE Shell	( )	( )	( )	( )	( )	( )	( )
Tethered Balloon	( )	( )	( )	( )	( )	( )	( )
ASEDA	( )	( )	( )	( )	( )	( )	( )
FUAV	( )	( )	( )	( )	( )	( )	( )
Guardrail common sensor	( )	( )	( )	( )	( )	( )	( )
Ground based common sensor	( )	( )	( )	( )	( )	( )	( )
LBSR	( )	( )	( )	( )	( )	( )	( )

6. Given a fixed budget and assuming that maximizing capabilities in the 160 to 490 KM range will win the war, indicate with what probability you would allocate funds to develop the following system.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
ATACS	( )	( )	( )	( )	( )	( )	( )
FORTAS	( )	( )	( )	( )	( )	( )	( )
VIP	( )	( )	( )	( )	( )	( )	( )
RECCE Shell	( )	( )	( )	( )	( )	( )	( )
Tethered Balloon	( )	( )	( )	( )	( )	( )	( )
ASEDA	( )	( )	( )	( )	( )	( )	( )
FUAV	( )	( )	( )	( )	( )	( )	( )
Guardrail common sensor	( )	( )	( )	( )	( )	( )	( )
Ground based common sensor	( )	( )	( )	( )	( )	( )	( )
LBSR	( )	( )	( )	( )	( )	( )	( )

7. Given a fixed budget and assuming that maximizing the capability to actively detect targets will win the war, indicate with what probability you would allocate funds to develop the following system.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
ATACS	( )	( )	( )	( )	( )	( )	( )
FORTAS	( )	( )	( )	( )	( )	( )	( )
VIP	( )	( )	( )	( )	( )	( )	( )
RECCE Shell	( )	( )	( )	( )	( )	( )	( )
Tethered Balloon	( )	( )	( )	( )	( )	( )	( )
ASEMA	( )	( )	( )	( )	( )	( )	( )
FUAV	( )	( )	( )	( )	( )	( )	( )
Guardrail common sensor	( )	( )	( )	( )	( )	( )	( )
Ground based common sensor	( )	( )	( )	( )	( )	( )	( )
LBSR	( )	( )	( )	( )	( )	( )	( )

8. Given a fixed budget and assuming that maximizing the capability to passively detect targets will win the war, indicate with what probability you would allocate funds to develop the following system.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
ATACS	( )	( )	( )	( )	( )	( )	( )
FORTAS	( )	( )	( )	( )	( )	( )	( )
VIP	( )	( )	( )	( )	( )	( )	( )
RECCE Shell	( )	( )	( )	( )	( )	( )	( )
Tethered Balloon	( )	( )	( )	( )	( )	( )	( )
ASEMA	( )	( )	( )	( )	( )	( )	( )
FUAV	( )	( )	( )	( )	( )	( )	( )
Guardrail common sensor	( )	( )	( )	( )	( )	( )	( )
Ground based common sensor	( )	( )	( )	( )	( )	( )	( )
LBSR	( )	( )	( )	( )	( )	( )	( )

9. Given a fixed budget and assuming that optimizing the target identification capability will win the war, indicate with what probability you would allocate funds to develop the following system.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
ATACS	( )	( )	( )	( )	( )	( )	( )
FORTAS	( )	( )	( )	( )	( )	( )	( )
VIP	( )	( )	( )	( )	( )	( )	( )
RECCE Shell	( )	( )	( )	( )	( )	( )	( )
Tethered Balloon	( )	( )	( )	( )	( )	( )	( )
ASEMA	( )	( )	( )	( )	( )	( )	( )
FUAV	( )	( )	( )	( )	( )	( )	( )
Guardrail common sensor	( )	( )	( )	( )	( )	( )	( )
Ground based common sensor	( )	( )	( )	( )	( )	( )	( )
LBSR	( )	( )	( )	( )	( )	( )	( )

10. Given a fixed budget and assuming that optimizing the non-cooperative IFF capability will win the war, indicate with what probability you would allocate funds to develop the following system.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
ATACS	( )	( )	( )	( )	( )	( )	( )
FORTAS	( )	( )	( )	( )	( )	( )	( )
VIP	( )	( )	( )	( )	( )	( )	( )
RECCE Shell	( )	( )	( )	( )	( )	( )	( )
Tethered Balloon	( )	( )	( )	( )	( )	( )	( )
ASEMA	( )	( )	( )	( )	( )	( )	( )
FUAV	( )	( )	( )	( )	( )	( )	( )
Guardrail common sensor	( )	( )	( )	( )	( )	( )	( )
Ground based common sensor	( )	( )	( )	( )	( )	( )	( )
LBSR	( )	( )	( )	( )	( )	( )	( )

11. Given a fixed budget and assuming that minimizing target location error will win the war, indicate with what probability you would allocate funds to develop the following system.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
ATACS	( )	( )	( )	( )	( )	( )	( )
FORTAS	( )	( )	( )	( )	( )	( )	( )
VIP	( )	( )	( )	( )	( )	( )	( )
RECCE Shell	( )	( )	( )	( )	( )	( )	( )
Tethered Balloon	( )	( )	( )	( )	( )	( )	( )
ASEMA	( )	( )	( )	( )	( )	( )	( )
FUAV	( )	( )	( )	( )	( )	( )	( )
Guardrail common sensor	( )	( )	( )	( )	( )	( )	( )
Ground based common sensor	( )	( )	( )	( )	( )	( )	( )
LBSR	( )	( )	( )	( )	( )	( )	( )

12. Given a fixed budget and assuming that minimizing target processing time will win the war, indicate with what probability you would allocate funds to develop the following system.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
ATACS	( )	( )	( )	( )	( )	( )	( )
FORTAS	( )	( )	( )	( )	( )	( )	( )
VIP	( )	( )	( )	( )	( )	( )	( )
RECCE Shell	( )	( )	( )	( )	( )	( )	( )
Tethered Balloon	( )	( )	( )	( )	( )	( )	( )
ASEMA	( )	( )	( )	( )	( )	( )	( )
FUAV	( )	( )	( )	( )	( )	( )	( )
Guardrail common sensor	( )	( )	( )	( )	( )	( )	( )
Ground based common sensor	( )	( )	( )	( )	( )	( )	( )
LBSR	( )	( )	( )	( )	( )	( )	( )

13. Given a fixed budget and assuming that optimizing the capability to conduct target damage assessment will win the war, indicate with what probability you would allocate funds to develop the following system.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
ATACS	( )	( )	( )	( )	( )	( )	( )
FORTAS	( )	( )	( )	( )	( )	( )	( )
VIP	( )	( )	( )	( )	( )	( )	( )
RECCE Shell	( )	( )	( )	( )	( )	( )	( )
Tethered Balloon	( )	( )	( )	( )	( )	( )	( )
ASEMA	( )	( )	( )	( )	( )	( )	( )
FUAV	( )	( )	( )	( )	( )	( )	( )
Guardrail common sensor	( )	( )	( )	( )	( )	( )	( )
Ground based common sensor	( )	( )	( )	( )	( )	( )	( )
LBSR	( )	( )	( )	( )	( )	( )	( )

14. Given a fixed budget and assuming that maximizing the laser range finding capability will win the war, indicate with what probability you would allocate funds to develop the following system.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
ATACS	( )	( )	( )	( )	( )	( )	( )
FORTAS	( )	( )	( )	( )	( )	( )	( )
VIP	( )	( )	( )	( )	( )	( )	( )
RECCE Shell	( )	( )	( )	( )	( )	( )	( )
Tethered Balloon	( )	( )	( )	( )	( )	( )	( )
ASEMA	( )	( )	( )	( )	( )	( )	( )
FUAV	( )	( )	( )	( )	( )	( )	( )
Guardrail common sensor	( )	( )	( )	( )	( )	( )	( )
Ground based common sensor	( )	( )	( )	( )	( )	( )	( )
LBSR	( )	( )	( )	( )	( )	( )	( )

15. Given a fixed budget and assuming that maximizing the Infra Red capability will win the war, indicate with what probability you would allocate funds to develop the following system.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
ATACS	( )	( )	( )	( )	( )	( )	( )
FORTAS	( )	( )	( )	( )	( )	( )	( )
VIP	( )	( )	( )	( )	( )	( )	( )
RECCE Shell	( )	( )	( )	( )	( )	( )	( )
Tethered Balloon	( )	( )	( )	( )	( )	( )	( )
ASEMA	( )	( )	( )	( )	( )	( )	( )
FUAV	( )	( )	( )	( )	( )	( )	( )
Guardrail common sensor	( )	( )	( )	( )	( )	( )	( )
Ground based common sensor	( )	( )	( )	( )	( )	( )	( )
LBSR	( )	( )	( )	( )	( )	( )	( )

16. Given a fixed budget and assuming that maximizing the visual capability will win the war, indicate with what probability you would allocate funds to develop the following system.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
ATACS	( )	( )	( )	( )	( )	( )	( )
FORTAS	( )	( )	( )	( )	( )	( )	( )
VIP	( )	( )	( )	( )	( )	( )	( )
RECCE Shell	( )	( )	( )	( )	( )	( )	( )
Tethered Balloon	( )	( )	( )	( )	( )	( )	( )
ASEMA	( )	( )	( )	( )	( )	( )	( )
FUAV	( )	( )	( )	( )	( )	( )	( )
Guardrail common sensor	( )	( )	( )	( )	( )	( )	( )
Ground based common sensor	( )	( )	( )	( )	( )	( )	( )
LBSR	( )	( )	( )	( )	( )	( )	( )

17. Given a fixed budget and assuming that maximizing the millimeter wave capability will win the war, indicate with what probability you would allocate funds to develop the following system.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
ATACS	( )	( )	( )	( )	( )	( )	( )
FORTAS	( )	( )	( )	( )	( )	( )	( )
VIP	( )	( )	( )	( )	( )	( )	( )
RECCE Shell	( )	( )	( )	( )	( )	( )	( )
Tethered Balloon	( )	( )	( )	( )	( )	( )	( )
ASEMA	( )	( )	( )	( )	( )	( )	( )
FUAV	( )	( )	( )	( )	( )	( )	( )
Guardrail common sensor	( )	( )	( )	( )	( )	( )	( )
Ground based common sensor	( )	( )	( )	( )	( )	( )	( )
LBSR	( )	( )	( )	( )	( )	( )	( )

18. Given a fixed budget and assuming that maximizing the acoustic capability will win the war, indicate with what probability you would allocate funds to develop the following system.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
ATACS	( )	( )	( )	( )	( )	( )	( )
FORTAS	( )	( )	( )	( )	( )	( )	( )
VIP	( )	( )	( )	( )	( )	( )	( )
RECCE Shell	( )	( )	( )	( )	( )	( )	( )
Tethered Balloon	( )	( )	( )	( )	( )	( )	( )
ASEMA	( )	( )	( )	( )	( )	( )	( )
FUAV	( )	( )	( )	( )	( )	( )	( )
Guardrail common sensor	( )	( )	( )	( )	( )	( )	( )
Ground based common sensor	( )	( )	( )	( )	( )	( )	( )
LBSR	( )	( )	( )	( )	( )	( )	( )

19. Given a fixed budget and assuming that maximizing the simultaneous target processing capability will win the war, indicate with what probability you would allocate funds to develop the following system.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
ATACS	( )	( )	( )	( )	( )	( )	( )
FORTAS	( )	( )	( )	( )	( )	( )	( )
VIP	( )	( )	( )	( )	( )	( )	( )
RECCE Shell	( )	( )	( )	( )	( )	( )	( )
Tethered Balloon	( )	( )	( )	( )	( )	( )	( )
ASEMA	( )	( )	( )	( )	( )	( )	( )
FUAV	( )	( )	( )	( )	( )	( )	( )
Guardrail common sensor	( )	( )	( )	( )	( )	( )	( )
Ground based common sensor	( )	( )	( )	( )	( )	( )	( )
LBSR	( )	( )	( )	( )	( )	( )	( )

20. Given a fixed budget and assuming that minimizing the real time data fusion capability will win the war, indicate with what probability you would allocate funds to develop the following system.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
ATACS	( )	( )	( )	( )	( )	( )	( )
FORTAS	( )	( )	( )	( )	( )	( )	( )
VIP	( )	( )	( )	( )	( )	( )	( )
RECCE Shell	( )	( )	( )	( )	( )	( )	( )
Tethered Balloon	( )	( )	( )	( )	( )	( )	( )
ASEMA	( )	( )	( )	( )	( )	( )	( )
FUAV	( )	( )	( )	( )	( )	( )	( )
Guardrail common sensor	( )	( )	( )	( )	( )	( )	( )
Ground based common sensor	( )	( )	( )	( )	( )	( )	( )
LBSR	( )	( )	( )	( )	( )	( )	( )

21. Given a fixed budget and the knowledge you just gained from playing the last vignette, indicate with what probability you would allocate funds to develop the following system.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
ATACS	( )	( )	( )	( )	( )	( )	( )
FORTAS	( )	( )	( )	( )	( )	( )	( )
VIP	( )	( )	( )	( )	( )	( )	( )
RECCE Shell	( )	( )	( )	( )	( )	( )	( )
Tethered Balloon	( )	( )	( )	( )	( )	( )	( )
ASEGA	( )	( )	( )	( )	( )	( )	( )
FUAV	( )	( )	( )	( )	( )	( )	( )
Guardrail common sensor	( )	( )	( )	( )	( )	( )	( )
Ground based common sensor	( )	( )	( )	( )	( )	( )	( )
LBSR	( )	( )	( )	( )	( )	( )	( )

22. If the Target Acquisition Assets used in the scenario in which you just participated were inadequate, please briefly describe what is needed to fill the void.

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SURVEY II

NAME: Last, First, M.I. (please print)

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The following survey will give Army decision makers insight on your view of how technology may provide improved warfighting capability to a future force in the year 2015. The questions are general in nature, relating to characteristics and systems applicable to **Fire Support Weapon Systems and Munitions.** For your responses, consider your **general impression** gained through a look at the scenarios you examined. As always, **your first impression is usually best.** Your answers to these questions will be analyzed to help determine the direction of United States Army technology investments.

INSTRUCTIONS: **PLACE AN "X" IN THE COLUMN THAT *MOST CLOSELY* CORRESPONDS TO YOUR OPINION.**

THE TERM "FIXED BUDGET" IN THE QUESTIONS BELOW IS A CONSTRAINT THAT ALLOWS YOU TO FUND SOME OF THE CHARACTERISTICS OR SYSTEMS YOU DESIRE, BUT NOT ALL.

THE ROW LABELED "VERBAL EXPRESSION OF PROBABILITY" IS A VERBAL DESCRIPTION OF THE PROBABILITY. THE ROW LABELED "NUMERICAL RANGE OF PROBABILITY" IS A NUMERICAL DESCRIPTION OF THE RANGE OF THE PROBABILITY. BOTH ARE PROVIDED TO ASSIST YOU IN YOUR ASSESSMENT.

EXAMPLE: The following is an example question with responses marked in the correct manner.

Given a fixed budget and assuming that maximizing accuracy will win the war, indicate with what probability you would allocate funds to the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
Musket	(X)	( )	( )	( )	( )	( )	( )
M16 Rifle	( )	( )	( )	( )	(X)	( )	( )
M14 Rifle	( )	( )	( )	( )	( )	(X)	( )
9MM Pistol	( )	(X)	( )	( )	( )	( )	( )

PLEASE ANSWER THE QUESTIONS STARTING ON THE NEXT PAGE

Part I

The following questions focus on Fire Support Weapon Systems that are currently being developed.

Notes.

-The characteristic of Survivability in question 1 refers to emplace and displace time, fire mission execution time, and crew protection.

-The following abbreviations are used throughout the survey.
AFAS = Advanced Field Artillery System
NLOS = Non-line Of Sight
MLRS = Multiple Launch Rocket System
HIMARS = High Mobility Artillery Rocket System
F2S2 = Future Fire Support System
EMG = Electro Magnetic Gun
LONGFOG = Long Fiber-optic Guided Missile

1. Given a fixed budget from which you are to develop some but not all the following capabilities for Fire Support Weapons Systems to be fielded in the year 2015, indicate with what probability you would allocate funds to develop the following capabilities.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
Rate of Fire	( )	( )	( )	( )	( )	( )	( )
Strategic Deployability	( )	( )	( )	( )	( )	( )	( )
Operational Deployability	( )	( )	( )	( )	( )	( )	( )
Tactical Mobility	( )	( )	( )	( )	( )	( )	( )
Sustainability	( )	( )	( )	( )	( )	( )	( )
Survivability							
Environmental	( )	( )	( )	( )	( )	( )	( )
Material Handling	( )	( )	( )	( )	( )	( )	( )
Battle Damage	( )	( )	( )	( )	( )	( )	( )
Accuracy	( )	( )	( )	( )	( )	( )	( )
Range 0-60 KM	( )	( )	( )	( )	( )	( )	( )
60-100 KM	( )	( )	( )	( )	( )	( )	( )
100-160 KM	( )	( )	( )	( )	( )	( )	( )
160-490 KM	( )	( )	( )	( )	( )	( )	( )
Reliability	( )	( )	( )	( )	( )	( )	( )
Availability	( )	( )	( )	( )	( )	( )	( )
Maintainability	( )	( )	( )	( )	( )	( )	( )

2. Given a fixed budget from which you are to develop some but not all the following systems, and assuming that maximizing rates of fire will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFAS	( )	( )	( )	( )	( )	( )	( )
NLOS	( )	( )	( )	( )	( )	( )	( )
MLRS	( )	( )	( )	( )	( )	( )	( )
HIMARS	( )	( )	( )	( )	( )	( )	( )
LT WEIGHT 155	( )	( )	( )	( )	( )	( )	( )
F2S2	( )	( )	( )	( )	( )	( )	( )
LONGFOG	( )	( )	( )	( )	( )	( )	( )
EMG	( )	( )	( )	( )	( )	( )	( )

3. Given a fixed budget and assuming that optimizing strategic deployability will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFAS	( )	( )	( )	( )	( )	( )	( )
NLOS	( )	( )	( )	( )	( )	( )	( )
MLRS	( )	( )	( )	( )	( )	( )	( )
HIMARS	( )	( )	( )	( )	( )	( )	( )
LT WEIGHT 155	( )	( )	( )	( )	( )	( )	( )
F2S2	( )	( )	( )	( )	( )	( )	( )
LONGFOG	( )	( )	( )	( )	( )	( )	( )
EMG	( )	( )	( )	( )	( )	( )	( )

4. Given a fixed budget and assuming that optimizing operational deployability will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFAS	( )	( )	( )	( )	( )	( )	( )
NLOS	( )	( )	( )	( )	( )	( )	( )
MLRS	( )	( )	( )	( )	( )	( )	( )
HIMARS	( )	( )	( )	( )	( )	( )	( )
LT WEIGHT 155	( )	( )	( )	( )	( )	( )	( )
F2S2	( )	( )	( )	( )	( )	( )	( )
LONGFOG	( )	( )	( )	( )	( )	( )	( )
EMG	( )	( )	( )	( )	( )	( )	( )

5. Given a fixed budget and assuming that optimizing sustainability will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFAS	( )	( )	( )	( )	( )	( )	( )
NLOS	( )	( )	( )	( )	( )	( )	( )
MLRS	( )	( )	( )	( )	( )	( )	( )
HIMARS	( )	( )	( )	( )	( )	( )	( )
LT WEIGHT 155	( )	( )	( )	( )	( )	( )	( )
F2S2	( )	( )	( )	( )	( )	( )	( )
LONGFOG	( )	( )	( )	( )	( )	( )	( )
[illegible]	( )	( )	( )	( )	( )	( )	( )

6. Given a fixed budget and assuming that optimizing environmental survivability will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFAS	( )	( )	( )	( )	( )	( )	( )
NLOS	( )	( )	( )	( )	( )	( )	( )
MLRS	( )	( )	( )	( )	( )	( )	( )
HIMARS	( )	( )	( )	( )	( )	( )	( )
LT WEIGHT 155	( )	( )	( )	( )	( )	( )	( )
F2S2	( )	( )	( )	( )	( )	( )	( )
LONGFOG	( )	( )	( )	( )	( )	( )	( )
[illegible]	( )	( )	( )	( )	( )	( )	( )

7. Given a fixed budget and assuming that optimizing material handling survivability will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFAS	( )	( )	( )	( )	( )	( )	( )
NLOS	( )	( )	( )	( )	( )	( )	( )
MLRS	( )	( )	( )	( )	( )	( )	( )
HIMARS	( )	( )	( )	( )	( )	( )	( )
LT WEIGHT 155	( )	( )	( )	( )	( )	( )	( )
F2S2	( )	( )	( )	( )	( )	( )	( )
LONGFOG	( )	( )	( )	( )	( )	( )	( )
[illegible]	( )	( )	( )	( )	( )	( )	( )

8. Given a fixed budget and assuming that optimizing battle damage survivability will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFAS	( )	( )	( )	( )	( )	( )	( )
NLOS	( )	( )	( )	( )	( )	( )	( )
MLRS	( )	( )	( )	( )	( )	( )	( )
HIMARS	( )	( )	( )	( )	( )	( )	( )
LT WEIGHT 155	( )	( )	( )	( )	( )	( )	( )
F2S2	( )	( )	( )	( )	( )	( )	( )
LONGFOG	( )	( )	( )	( )	( )	( )	( )
EMG	( )	( )	( )	( )	( )	( )	( )

9. Given a fixed budget and assuming that optimizing tactical mobility will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFAS	( )	( )	( )	( )	( )	( )	( )
NLOS	( )	( )	( )	( )	( )	( )	( )
MLRS	( )	( )	( )	( )	( )	( )	( )
HIMARS	( )	( )	( )	( )	( )	( )	( )
LT WEIGHT 155	( )	( )	( )	( )	( )	( )	( )
F2S2	( )	( )	( )	( )	( )	( )	( )
LONGFOG	( )	( )	( )	( )	( )	( )	( )
EMG	( )	( )	( )	( )	( )	( )	( )

10. Given a fixed budget and assuming that maximizing accuracy will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFAS	( )	( )	( )	( )	( )	( )	( )
NLOS	( )	( )	( )	( )	( )	( )	( )
MLRS	( )	( )	( )	( )	( )	( )	( )
HIMARS	( )	( )	( )	( )	( )	( )	( )
LT WEIGHT 155	( )	( )	( )	( )	( )	( )	( )
F2S2	( )	( )	( )	( )	( )	( )	( )
LONGFOG	( )	( )	( )	( )	( )	( )	( )
EMG	( )	( )	( )	( )	( )	( )	( )

11. Given a fixed budget and assuming that optimizing each system's capabilities in the 0 to 60 KM range will win the war, indicate with what probability you would allocate funds to develop the following systems. (The range of each system is given in kilometers in the parenthesis after each system's name)

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFAS (60)	( )	( )	( )	( )	( )	( )	( )
NLOS (40)	( )	( )	( )	( )	( )	( )	( )
MLRS (490)	( )	( )	( )	( )	( )	( )	( )
HIMARS (490)	( )	( )	( )	( )	( )	( )	( )
LT WEIGHT 155 (40)	( )	( )	( )	( )	( )	( )	( )
F282 (490)	( )	( )	( )	( )	( )	( )	( )
LONGFOG (100+)	( )	( )	( )	( )	( )	( )	( )
EMG (60)	( )	( )	( )	( )	( )	( )	( )

12. Given a fixed budget and assuming that optimizing each system's capabilities in the 60 to 100 KM range will win the war, indicate with what probability you would allocate funds to develop the following systems. (The range of each system is given in kilometers in the parenthesis after each system's name)

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFAS (60)	( )	( )	( )	( )	( )	( )	( )
NLOS (40)	( )	( )	( )	( )	( )	( )	( )
MLRS (490)	( )	( )	( )	( )	( )	( )	( )
HIMARS (490)	( )	( )	( )	( )	( )	( )	( )
LT WEIGHT 155 (40)	( )	( )	( )	( )	( )	( )	( )
F282 (490)	( )	( )	( )	( )	( )	( )	( )
LONGFOG (100+)	( )	( )	( )	( )	( )	( )	( )
EMG (60)	( )	( )	( )	( )	( )	( )	( )

13. Given a fixed budget and assuming that optimizing each system's capabilities in the 100 to 160 KM range will win the war, indicate with what probability you would allocate funds to develop the following systems. (The range of each system is given in kilometers in the parenthesis after each system's name)

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFAS (60)	( )	( )	( )	( )	( )	( )	( )
NLOS (40)	( )	( )	( )	( )	( )	( )	( )
MLRS (490)	( )	( )	( )	( )	( )	( )	( )
HIMARS (490)	( )	( )	( )	( )	( )	( )	( )
LT WEIGHT 155 (40)	( )	( )	( )	( )	( )	( )	( )
F2S2 (490)	( )	( )	( )	( )	( )	( )	( )
LONGFOG (100+)	( )	( )	( )	( )	( )	( )	( )
EMG (60)	( )	( )	( )	( )	( )	( )	( )

14. Given a fixed budget and assuming that optimizing each system's capabilities in the 160 to 490 KM range will win the war, indicate with what probability you would allocate funds to develop the following systems. (The range of each system is given in kilometers in the parenthesis after each system's name)

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFAS (60)	( )	( )	( )	( )	( )	( )	( )
NLOS (40)	( )	( )	( )	( )	( )	( )	( )
MLRS (490)	( )	( )	( )	( )	( )	( )	( )
HIMARS (490)	( )	( )	( )	( )	( )	( )	( )
LT WEIGHT 155 (40)	( )	( )	( )	( )	( )	( )	( )
F2S2 (490)	( )	( )	( )	( )	( )	( )	( )
LONGFOG (100+)	( )	( )	( )	( )	( )	( )	( )
EMG (60)	( )	( )	( )	( )	( )	( )	( )

15. Given a fixed budget and assuming that maximizing reliability will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border- line	reason- able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFAS	( )	( )	( )	( )	( )	( )	( )
NLOS	( )	( )	( )	( )	( )	( )	( )
MLRS	( )	( )	( )	( )	( )	( )	( )
HIMARS	( )	( )	( )	( )	( )	( )	( )
LT WEIGHT 155	( )	( )	( )	( )	( )	( )	( )
F2S2	( )	( )	( )	( )	( )	( )	( )
LONGFOG	( )	( )	( )	( )	( )	( )	( )
EMG	( )	( )	( )	( )	( )	( )	( )

16. Given a fixed budget and assuming that maximizing availability will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border- line	reason- able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFAS	( )	( )	( )	( )	( )	( )	( )
NLOS	( )	( )	( )	( )	( )	( )	( )
MLRS	( )	( )	( )	( )	( )	( )	( )
HIMARS	( )	( )	( )	( )	( )	( )	( )
LT WEIGHT 155	( )	( )	( )	( )	( )	( )	( )
F2S2	( )	( )	( )	( )	( )	( )	( )
LONGFOG	( )	( )	( )	( )	( )	( )	( )
EMG	( )	( )	( )	( )	( )	( )	( )

17. Given a fixed budget and assuming that maximizing maintainability will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border- line	reason- able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFAS	( )	( )	( )	( )	( )	( )	( )
NLOS	( )	( )	( )	( )	( )	( )	( )
MLRS	( )	( )	( )	( )	( )	( )	( )
HIMARS	( )	( )	( )	( )	( )	( )	( )
LT WEIGHT 155	( )	( )	( )	( )	( )	( )	( )
F2S2	( )	( )	( )	( )	( )	( )	( )
LONGFOG	( )	( )	( )	( )	( )	( )	( )
EMG	( )	( )	( )	( )	( )	( )	( )

18. Given a fixed budget and the knowledge you gained from the last vignette, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	**very small**	**small**	**not great**	**border-line**	**reason-able**	**high**	**very high**
Numerical Range of Probability	**0-14**	**15-28**	**29-42**	**43-57**	**58-71**	**72-85**	**86-100**
AFAS	( )	( )	( )	( )	( )	( )	( )
NLOS	( )	( )	( )	( )	( )	( )	( )
MLRS	( )	( )	( )	( )	( )	( )	( )
HIMARS	( )	( )	( )	( )	( )	( )	( )
LT WEIGHT 155	( )	( )	( )	( )	( )	( )	( )
F2S2	( )	( )	( )	( )	( )	( )	( )
LONGFOG	( )	( )	( )	( )	( )	( )	( )
EMG	( )	( )	( )	( )	( )	( )	( )

19. If the weapon systems used in the scenario you just played were inadequate, can you briefly describe what is needed to fill the void.

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Part II

The following questions focus on the Fire Support Munitions that are currently being developed.

Notes

-The characteristic of Flexibility in question 1 refers to the munition's ability to attack across a spectrum of target types.

-Soft targets refer to self-propelled Artillery and wheeled vehicles.

-Hard targets refer to Tanks and Infantry Fighting Vehicles.

-The following abbreviations are used throughout the survey.

SADARM P3I = Search and Destroy Armor, Pre-planned Product Improvement
HICAP = High Capacity Munition
RFAM = Radio Frequency Attack Missile
GLTR = Ground Launched Tacit Rainbow
NLOS = Non-line Of Sight

1. Given a fixed budget from which you are to develop the following capabilities for Fire Support Munitions to be fielded in the year 2015, indicate with what probability you would allocate funds to develop the following capabilities.

Verbal Expression of Probability	**very small**	**small**	**not great**	**border-line**	**reason-able**	**high**	**very high**
Numerical Range of Probability	**0-14**	**15-28**	**29-42**	**43-57**	**58-71**	**72-85**	**86-100**
Ease of Handling	( )	( )	( )	( )	( )	( )	( )
Accuracy	( )	( )	( )	( )	( )	( )	( )
Range: 0 to 60 KM	( )	( )	( )	( )	( )	( )	( )
60 to 160 KM	( )	( )	( )	( )	( )	( )	( )
100 to 160 KM	( )	( )	( )	( )	( )	( )	( )
160 to 490 KM	( )	( )	( )	( )	( )	( )	( )
Loiter Ability	( )	( )	( )	( )	( )	( )	( )
Minimizing Collateral Damage	( )	( )	( )	( )	( )	( )	( )
Flexibility	( )	( )	( )	( )	( )	( )	( )
Lethality on soft Targets	( )	( )	( )	( )	( )	( )	( )
Lethality on hard Targets	( )	( )	( )	( )	( )	( )	( )
Lethality on emitters	( )	( )	( )	( )	( )	( )	( )

2. Given a fixed budget and assuming that optimizing ease of handling will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
SADARM P3I	( )	( )	( )	( )	( )	( )	( )
MISSION KILL MUNITION	( )	( )	( )	( )	( )	( )	( )
DEEP ATTACK SMART	( )	( )	( )	( )	( )	( )	( )
ENHANCED BLAST	( )	( )	( )	( )	( )	( )	( )
HICAP	( )	( )	( )	( )	( )	( )	( )
EFAM	( )	( )	( )	( )	( )	( )	( )
SMART/BRILLIANT MINE	( )	( )	( )	( )	( )	( )	( )
FUTURE SMART MUNITION	( )	( )	( )	( )	( )	( )	( )
LONGARM	( )	( )	( )	( )	( )	( )	( )
GLTR	( )	( )	( )	( )	( )	( )	( )
LONGFOG	( )	( )	( )	( )	( )	( )	( )
NLOS	( )	( )	( )	( )	( )	( )	( )

3. Given a fixed budget and assuming that maximizing accuracy will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
SADARM P3I	( )	( )	( )	( )	( )	( )	( )
MISSION KILL MUNITION	( )	( )	( )	( )	( )	( )	( )
DEEP ATTACK SMART	( )	( )	( )	( )	( )	( )	( )
ENHANCED BLAST	( )	( )	( )	( )	( )	( )	( )
HICAP	( )	( )	( )	( )	( )	( )	( )
EFAM	( )	( )	( )	( )	( )	( )	( )
SMART/BRILLIANT MINE	( )	( )	( )	( )	( )	( )	( )
FUTURE SMART MUNITION	( )	( )	( )	( )	( )	( )	( )
LONGARM	( )	( )	( )	( )	( )	( )	( )
GLTR	( )	( )	( )	( )	( )	( )	( )
LONGFOG	( )	( )	( )	( )	( )	( )	( )
NLOS	( )	( )	( )	( )	( )	( )	( )

4. Given a fixed budget and assuming that optimizing each munition's capabilities in the 0 to 60 KM range will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
SADARM P3I	( )	( )	( )	( )	( )	( )	( )
MISSION KILL MUNITION	( )	( )	( )	( )	( )	( )	( )
DEEP ATTACK SMART	( )	( )	( )	( )	( )	( )	( )
ENHANCED BLAST	( )	( )	( )	( )	( )	( )	( )
EICAP	( )	( )	( )	( )	( )	( )	( )
RFAM	( )	( )	( )	( )	( )	( )	( )
SMART/BRILLIANT MINE	( )	( )	( )	( )	( )	( )	( )
FUTURE SMART MUNITION	( )	( )	( )	( )	( )	( )	( )
LONGARM	( )	( )	( )	( )	( )	( )	( )
GLTR	( )	( )	( )	( )	( )	( )	( )
LONGFOG	( )	( )	( )	( )	( )	( )	( )
NLOS	( )	( )	( )	( )	( )	( )	( )

5. Given a fixed budget and assuming that optimizing each munitions capabilities in the 60 to 100 KM range will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
SADARM P3I	( )	( )	( )	( )	( )	( )	( )
MISSION KILL MUNITION	( )	( )	( )	( )	( )	( )	( )
DEEP ATTACK SMART	( )	( )	( )	( )	( )	( )	( )
ENHANCED BLAST	( )	( )	( )	( )	( )	( )	( )
EICAP	( )	( )	( )	( )	( )	( )	( )
RFAM	( )	( )	( )	( )	( )	( )	( )
SMART/BRILLIANT MINE	( )	( )	( )	( )	( )	( )	( )
FUTURE SMART MUNITION	( )	( )	( )	( )	( )	( )	( )
LONGARM	( )	( )	( )	( )	( )	( )	( )
GLTR	( )	( )	( )	( )	( )	( )	( )
LONGFOG	( )	( )	( )	( )	( )	( )	( )
NLOS	( )	( )	( )	( )	( )	( )	( )

6. Given a fixed budget and assuming that optimizing each munitions capabilities in the 100 to 160 KM range will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
SADARM P3I	( )	( )	( )	( )	( )	( )	( )
MISSION KILL MUNITION	( )	( )	( )	( )	( )	( )	( )
DEEP ATTACK SMART	( )	( )	( )	( )	( )	( )	( )
ENHANCED BLAST	( )	( )	( )	( )	( )	( )	( )
EICAP	( )	( )	( )	( )	( )	( )	( )
RFAM	( )	( )	( )	( )	( )	( )	( )
SMART/BRILLIANT MINE	( )	( )	( )	( )	( )	( )	( )
FUTURE SMART MUNITION	( )	( )	( )	( )	( )	( )	( )
LONGARM	( )	( )	( )	( )	( )	( )	( )
GLTR	( )	( )	( )	( )	( )	( )	( )
LONGFOG	( )	( )	( )	( )	( )	( )	( )
NLOS	( )	( )	( )	( )	( )	( )	( )

7. Given a fixed budget and assuming that optimizing each munitions capabilities in the 160 to 490 KM range will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
SADARM P3I	( )	( )	( )	( )	( )	( )	( )
MISSION KILL MUNITION	( )	( )	( )	( )	( )	( )	( )
DEEP ATTACK SMART	( )	( )	( )	( )	( )	( )	( )
ENHANCED BLAST	( )	( )	( )	( )	( )	( )	( )
EICAP	( )	( )	( )	( )	( )	( )	( )
RFAM	( )	( )	( )	( )	( )	( )	( )
SMART/BRILLIANT MINE	( )	( )	( )	( )	( )	( )	( )
FUTURE SMART MUNITION	( )	( )	( )	( )	( )	( )	( )
LONGARM	( )	( )	( )	( )	( )	( )	( )
GLTR	( )	( )	( )	( )	( )	( )	( )
LONGFOG	( )	( )	( )	( )	( )	( )	( )
NLOS	( )	( )	( )	( )	( )	( )	( )

8. Given a fixed budget and assuming that optimizing loiter capability will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
SADARM P3I	( )	( )	( )	( )	( )	( )	( )
MISSION KILL MUNITION	( )	( )	( )	( )	( )	( )	( )
DEEP ATTACK SMART	( )	( )	( )	( )	( )	( )	( )
ENHANCED BLAST	( )	( )	( )	( )	( )	( )	( )
EICAP	( )	( )	( )	( )	( )	( )	( )
RFAM	( )	( )	( )	( )	( )	( )	( )
SMART/BRILLIANT MINE	( )	( )	( )	( )	( )	( )	( )
FUTURE SMART MUNITION	( )	( )	( )	( )	( )	( )	( )
LONGARM	( )	( )	( )	( )	( )	( )	( )
GLTR	( )	( )	( )	( )	( )	( )	( )
LONGFOG	( )	( )	( )	( )	( )	( )	( )
ELOS	( )	( )	( )	( )	( )	( )	( )

9. Given a fixed budget and assuming that optimizing flexibility to attack different targets will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
SADARM P3I	( )	( )	( )	( )	( )	( )	( )
MISSION KILL MUNITION	( )	( )	( )	( )	( )	( )	( )
DEEP ATTACK SMART	( )	( )	( )	( )	( )	( )	( )
ENHANCED BLAST	( )	( )	( )	( )	( )	( )	( )
EICAP	( )	( )	( )	( )	( )	( )	( )
RFAM	( )	( )	( )	( )	( )	( )	( )
SMART/BRILLIANT MINE	( )	( )	( )	( )	( )	( )	( )
FUTURE SMART MUNITION	( )	( )	( )	( )	( )	( )	( )
LONGARM	( )	( )	( )	( )	( )	( )	( )
GLTR	( )	( )	( )	( )	( )	( )	( )
LONGFOG	( )	( )	( )	( )	( )	( )	( )
ELOS	( )	( )	( )	( )	( )	( )	( )

10. Given a fixed budget and assuming that maximizing each munition's lethality against hard targets (Tanks and Infantry Fighting Vehicles) will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	**0-14**	**15-28**	**29-42**	**43-57**	**58-71**	**72-85**	**86-100**
SADARM P3I	( )	( )	( )	( )	( )	( )	( )
MISSION KILL MUNITION	( )	( )	( )	( )	( )	( )	( )
DEEP ATTACK SMART	( )	( )	( )	( )	( )	( )	( )
ENHANCED BLAST	( )	( )	( )	( )	( )	( )	( )
HICAP	( )	( )	( )	( )	( )	( )	( )
RFAM	( )	( )	( )	( )	( )	( )	( )
SMART/BRILLIANT MINE	( )	( )	( )	( )	( )	( )	( )
FUTURE SMART MUNITION	( )	( )	( )	( )	( )	( )	( )
LONGARM	( )	( )	( )	( )	( )	( )	( )
GLTR	( )	( )	( )	( )	( )	( )	( )
LONGFOG	( )	( )	( )	( )	( )	( )	( )
NLOS	( )	( )	( )	( )	( )	( )	( )

11. Given a fixed budget and assuming that maximizing each munition's lethality against soft targets (self-propelled Artillery and wheeled vehicles) will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	**0-14**	**15-28**	**29-42**	**43-57**	**58-71**	**72-85**	**86-100**
SADARM P3I	( )	( )	( )	( )	( )	( )	( )
MISSION KILL MUNITION	( )	( )	( )	( )	( )	( )	( )
DEEP ATTACK SMART	( )	( )	( )	( )	( )	( )	( )
ENHANCED BLAST	( )	( )	( )	( )	( )	( )	( )
HICAP	( )	( )	( )	( )	( )	( )	( )
RFAM	( )	( )	( )	( )	( )	( )	( )
SMART/BRILLIANT MINE	( )	( )	( )	( )	( )	( )	( )
FUTURE SMART MUNITION	( )	( )	( )	( )	( )	( )	( )
LONGARM	( )	( )	( )	( )	( )	( )	( )
GLTR	( )	( )	( )	( )	( )	( )	( )
LONGFOG	( )	( )	( )	( )	( )	( )	( )
NLOS	( )	( )	( )	( )	( )	( )	( )

12. Given a fixed budget and assuming that maximizing each munition 's lethality against emitters will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
SADARM P3I	( )	( )	( )	( )	( )	( )	( )
MISSION KILL MUNITION	( )	( )	( )	( )	( )	( )	( )
DEEP ATTACK SMART	( )	( )	( )	( )	( )	( )	( )
ENHANCED BLAST	( )	( )	( )	( )	( )	( )	( )
EICAP	( )	( )	( )	( )	( )	( )	( )
RFAM	( )	( )	( )	( )	( )	( )	( )
SMART/BRILLIANT MINE	( )	( )	( )	( )	( )	( )	( )
FUTURE SMART MUNITION	( )	( )	( )	( )	( )	( )	( )
LONGARM	( )	( )	( )	( )	( )	( )	( )
GLTR	( )	( )	( )	( )	( )	( )	( )
LONGFOG	( )	( )	( )	( )	( )	( )	( )
NLOS	( )	( )	( )	( )	( )	( )	( )

13. Given a fixed budget and assuming that minimizing collateral damage will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
SADARM P3I	( )	( )	( )	( )	( )	( )	( )
MISSION KILL MUNITION	( )	( )	( )	( )	( )	( )	( )
DEEP ATTACK SMART	( )	( )	( )	( )	( )	( )	( )
ENHANCED BLAST	( )	( )	( )	( )	( )	( )	( )
EICAP	( )	( )	( )	( )	( )	( )	( )
RFAM	( )	( )	( )	( )	( )	( )	( )
SMART/BRILLIANT MINE	( )	( )	( )	( )	( )	( )	( )
FUTURE SMART MUNITION	( )	( )	( )	( )	( )	( )	( )
LONGARM	( )	( )	( )	( )	( )	( )	( )
GLTR	( )	( )	( )	( )	( )	( )	( )
LONGFOG	( )	( )	( )	( )	( )	( )	( )
NLOS	( )	( )	( )	( )	( )	( )	( )

14. Given a fixed budget and the knowledge you gained from the last vignette, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
SADARM P3I	( )	( )	( )	( )	( )	( )	( )
MISSION KILL MUNITION	( )	( )	( )	( )	( )	( )	( )
DEEP ATTACK SMART	( )	( )	( )	( )	( )	( )	( )
ENHANCED BLAST	( )	( )	( )	( )	( )	( )	( )
EICAP	( )	( )	( )	( )	( )	( )	( )
RFAM	( )	( )	( )	( )	( )	( )	( )
SMART/BRILLIANT MINE	( )	( )	( )	( )	( )	( )	( )
FUTURE SMART MUNITION	( )	( )	( )	( )	( )	( )	( )
LONGARM	( )	( )	( )	( )	( )	( )	( )
GLTR	( )	( )	( )	( )	( )	( )	( )
LONGFOG	( )	( )	( )	( )	( )	( )	( )
NLOS	( )	( )	( )	( )	( )	( )	( )

15. If the munitions used in the scenario you just played were inadequate, can you briefly describe what is needed to fill the void.

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SURVEY III

NAME: Last, First, M.I. (please print)

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The following survey will give Army decision makers insight on your view of how technology may provide improved warfighting capability to a future force in the year 2015. The questions are general in nature, relating to characteristics and systems applicable to **Fire Support Command and Control Systems.** For your responses, consider your **general impression** gained through a look at the scenarios you examined. As always, **your first impression is usually best.** Your answers to these questions will be analyzed to help determine the direction of United States Army technology investments.

INSTRUCTIONS: PLACE AN "X" IN THE COLUMN THAT *MOST CLOSELY* CORRESPONDS TO YOUR OPINION.

THE TERM "FIXED BUDGET" IN THE QUESTIONS BELOW IS A CONSTRAINT THAT ALLOWS YOU TO FUND SOME OF THE CHARACTERISTICS OR SYSTEMS YOU DESIRE, BUT NOT ALL.

THE ROW LABELED "VERBAL EXPRESSION OF PROBABILITY" IS A VERBAL DESCRIPTION OF THE PROBABILITY. THE ROW LABELED "NUMERICAL RANGE OF PROBABILITY" IS A NUMERICAL DESCRIPTION OF THE RANGE OF THE PROBABILITY. BOTH ARE PROVIDED TO ASSIST YOU IN YOUR ASSESSMENT.

EXAMPLE: The following is an example question with responses marked in the correct manner.

Given a fixed budget and assuming that maximizing accuracy will win the war, indicate with what probability you would allocate funds to the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
Musket	(X)	( )	( )	( )	( )	( )	( )
M16 Rifle	( )	( )	( )	( )	(X)	( )	( )
M14 Rifle	( )	( )	( )	( )	( )	(X)	( )
9MM Pistol	( )	(X)	( )	( )	( )	( )	( )

PLEASE ANSWER THE QUESTIONS STARTING ON THE NEXT PAGE

The following questions focus on Command and Control Systems that are being considered for the Fire Support.

The following abbreviations are used throughout the survey.
AFATDS = Advanced Field Artillery Tactical Data System
FFSCCS = Future Fire Support Command and Control System

1. Given a fixed budget from which you are to develop some but not all the following capabilities for Fire Support Command and Control Systems to be fielded in the year 2015, indicate with what probability you would allocate funds to develop the following capabilites.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
Long Communications Range	( )	( )	( )	( )	( )	( )	( )
Large Communications Capacity	( )	( )	( )	( )	( )	( )	( )
Ease of Operation	( )	( )	( )	( )	( )	( )	( )
Survivability Against							
Field Artillery	( )	( )	( )	( )	( )	( )	( )
Small Arms	( )	( )	( )	( )	( )	( )	( )
Large Caliber Direct Fire	( )	( )	( )	( )	( )	( )	( )
Directed Energy	( )	( )	( )	( )	( )	( )	( )
Reliability	( )	( )	( )	( )	( )	( )	( )
Availability	( )	( )	( )	( )	( )	( )	( )
Maintainability	( )	( )	( )	( )	( )	( )	( )
Strategic Deployability	( )	( )	( )	( )	( )	( )	( )
Operational Deployability	( )	( )	( )	( )	( )	( )	( )
Tactical Mobility	( )	( )	( )	( )	( )	( )	( )
Short Emplace/Displace Time	( )	( )	( )	( )	( )	( )	( )
Redundancy	( )	( )	( )	( )	( )	( )	( )
Susceptible to Countermeasures	( )	( )	( )	( )	( )	( )	( )
FA Mission Area Commonality							
within the Light Force	( )	( )	( )	( )	( )	( )	( )
within the Heavy Force	( )	( )	( )	( )	( )	( )	( )
Cross Mission Area Commonality	( )	( )	( )	( )	( )	( )	( )

2. Given a fixed budget from which you are to develop some but not all the following systems and assuming that maximizing communications range will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFATDS	( )	( )	( )	( )	( )	( )	( )
FFSCCS	( )	( )	( )	( )	( )	( )	( )
Low Echelon Knowledge System	( )	( )	( )	( )	( )	( )	( )
Wide Area Communications	( )	( )	( )	( )	( )	( )	( )
Force Level Knowledge System	( )	( )	( )	( )	( )	( )	( )
Distributed IEW Fusion System	( )	( )	( )	( )	( )	( )	( )

3. Given a fixed budget and assuming that maximizing communications capacity will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFATDS	( )	( )	( )	( )	( )	( )	( )
FFSCCS	( )	( )	( )	( )	( )	( )	( )
Low Echelon Knowledge System	( )	( )	( )	( )	( )	( )	( )
Wide Area Communications	( )	( )	( )	( )	( )	( )	( )
Force Level Knowledge System	( )	( )	( )	( )	( )	( )	( )
Distributed IEW Fusion System	( )	( )	( )	( )	( )	( )	( )

4. Given a fixed budget and assuming that maximizing ease of operation will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFATDS	( )	( )	( )	( )	( )	( )	( )
FFSCCS	( )	( )	( )	( )	( )	( )	( )
Low Echelon Knowledge System	( )	( )	( )	( )	( )	( )	( )
Wide Area Communications	( )	( )	( )	( )	( )	( )	( )
Force Level Knowledge System	( )	( )	( )	( )	( )	( )	( )
Distributed IEW Fusion System	( )	( )	( )	( )	( )	( )	( )

5. Given a fixed budget and assuming that maximizing survivability against artillery fire will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFATDS	( )	( )	( )	( )	( )	( )	( )
FFSCCS	( )	( )	( )	( )	( )	( )	( )
Low Echelon Knowledge System	( )	( )	( )	( )	( )	( )	( )
Wide Area Communications	( )	( )	( )	( )	( )	( )	( )
Force Level Knowledge System	( )	( )	( )	( )	( )	( )	( )
Distributed IEW Fusion System	( )	( )	( )	( )	( )	( )	( )

6. Given a fixed budget and assuming that maximizing survivability against small arms fire will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFATDS	( )	( )	( )	( )	( )	( )	( )
FFSCCS	( )	( )	( )	( )	( )	( )	( )
Low Echelon Knowledge System	( )	( )	( )	( )	( )	( )	( )
Wide Area Communications	( )	( )	( )	( )	( )	( )	( )
Force Level Knowledge System	( )	( )	( )	( )	( )	( )	( )
Distributed IEW Fusion System	( )	( )	( )	( )	( )	( )	( )

7. Given a fixed budget and assuming that maximizing survivability against large caliber weapons fire will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFATDS	( )	( )	( )	( )	( )	( )	( )
FFSCCS	( )	( )	( )	( )	( )	( )	( )
Low Echelon Knowledge System	( )	( )	( )	( )	( )	( )	( )
Wide Area Communications	( )	( )	( )	( )	( )	( )	( )
Force Level Knowledge System	( )	( )	( )	( )	( )	( )	( )
Distributed IEW Fusion System	( )	( )	( )	( )	( )	( )	( )

8. Given a fixed budget and assuming that maximizing survivability against directed energy weapons will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFATDS	( )	( )	( )	( )	( )	( )	( )
FFSCCS	( )	( )	( )	( )	( )	( )	( )
Low Echelon Knowledge System	( )	( )	( )	( )	( )	( )	( )
Wide Area Communications	( )	( )	( )	( )	( )	( )	( )
Force Level Knowledge System	( )	( )	( )	( )	( )	( )	( )
Distributed IEW Fusion System	( )	( )	( )	( )	( )	( )	( )

9. Given a fixed budget and assuming that maximizing reliability will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFATDS	( )	( )	( )	( )	( )	( )	( )
FFSCCS	( )	( )	( )	( )	( )	( )	( )
Low Echelon Knowledge System	( )	( )	( )	( )	( )	( )	( )
Wide Area Communications	( )	( )	( )	( )	( )	( )	( )
Force Level Knowledge System	( )	( )	( )	( )	( )	( )	( )
Distributed IEW Fusion System	( )	( )	( )	( )	( )	( )	( )

10. Given a fixed budget and assuming that optimizing maintainability will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFATDS	( )	( )	( )	( )	( )	( )	( )
FFSCCS	( )	( )	( )	( )	( )	( )	( )
Low Echelon Knowledge System	( )	( )	( )	( )	( )	( )	( )
Wide Area Communications	( )	( )	( )	( )	( )	( )	( )
Force Level Knowledge System	( )	( )	( )	( )	( )	( )	( )
Distributed IEW Fusion System	( )	( )	( )	( )	( )	( )	( )

11. Given a fixed budget and assuming that optimizing strategic deployability will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFATDS	( )	( )	( )	( )	( )	( )	( )
FFSCCS	( )	( )	( )	( )	( )	( )	( )
Low Echelon Knowledge System	( )	( )	( )	( )	( )	( )	( )
Wide Area Communications	( )	( )	( )	( )	( )	( )	( )
Force Level Knowledge System	( )	( )	( )	( )	( )	( )	( )
Distributed IEW Fusion System	( )	( )	( )	( )	( )	( )	( )

12. Given a fixed budget and assuming that optimizing operational deployability will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFATDS	( )	( )	( )	( )	( )	( )	( )
FFSCCS	( )	( )	( )	( )	( )	( )	( )
Low Echelon Knowledge System	( )	( )	( )	( )	( )	( )	( )
Wide Area Communications	( )	( )	( )	( )	( )	( )	( )
Force Level Knowledge System	( )	( )	( )	( )	( )	( )	( )
Distributed IEW Fusion System	( )	( )	( )	( )	( )	( )	( )

13. Given a fixed budget and assuming that optimizing tactical mobility will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFATDS	( )	( )	( )	( )	( )	( )	( )
FFSCCS	( )	( )	( )	( )	( )	( )	( )
Low Echelon Knowledge System	( )	( )	( )	( )	( )	( )	( )
Wide Area Communications	( )	( )	( )	( )	( )	( )	( )
Force Level Knowledge System	( )	( )	( )	( )	( )	( )	( )
Distributed IEW Fusion System	( )	( )	( )	( )	( )	( )	( )

14. Given a fixed budget and assuming that minimizing emplace/displace time will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFATDS	( )	( )	( )	( )	( )	( )	( )
FFSCCS	( )	( )	( )	( )	( )	( )	( )
Low Echelon Knowledge System	( )	( )	( )	( )	( )	( )	( )
Wide Area Communications	( )	( )	( )	( )	( )	( )	( )
Force Level Knowledge System	( )	( )	( )	( )	( )	( )	( )
Distributed IEW Fusion System	( )	( )	( )	( )	( )	( )	( )

15. Given a fixed budget and assuming that maximizing redundancy will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFATDS	( )	( )	( )	( )	( )	( )	( )
FFSCCS	( )	( )	( )	( )	( )	( )	( )
Low Echelon Knowledge System	( )	( )	( )	( )	( )	( )	( )
Wide Area Communications	( )	( )	( )	( )	( )	( )	( )
Force Level Knowledge System	( )	( )	( )	( )	( )	( )	( )
Distributed IEW Fusion System	( )	( )	( )	( )	( )	( )	( )

16. Given a fixed budget and assuming that minimizing susceptibility to countermeasures will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFATDS	( )	( )	( )	( )	( )	( )	( )
FFSCCS	( )	( )	( )	( )	( )	( )	( )
Low Echelon Knowledge System	( )	( )	( )	( )	( )	( )	( )
Wide Area Communications	( )	( )	( )	( )	( )	( )	( )
Force Level Knowledge System	( )	( )	( )	( )	( )	( )	( )
Distributed IEW Fusion System	( )	( )	( )	( )	( )	( )	( )

17. Given a fixed budget and assuming that maximizing Fire Support Mission Area Commonality within the Light Force will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFATDS	( )	( )	( )	( )	( )	( )	( )
FFSCCS	( )	( )	( )	( )	( )	( )	( )
Low Echelon Knowledge System	( )	( )	( )	( )	( )	( )	( )
Wide Area Communications	( )	( )	( )	( )	( )	( )	( )
Force Level Knowledge System	( )	( )	( )	( )	( )	( )	( )
Distributed IEW Fusion System	( )	( )	( )	( )	( )	( )	( )

18. Given a fixed budget and assuming that maximizing Fire Support Mission Area Commonality within the Heavy Force will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFATDS	( )	( )	( )	( )	( )	( )	( )
FFSCCS	( )	( )	( )	( )	( )	( )	( )
Low Echelon Knowledge System	( )	( )	( )	( )	( )	( )	( )
Wide Area Communications	( )	( )	( )	( )	( )	( )	( )
Force Level Knowledge System	( )	( )	( )	( )	( )	( )	( )
Distributed IEW Fusion System	( )	( )	( )	( )	( )	( )	( )

19. Given a fixed budget and assuming that maximizing availability will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFATDS	( )	( )	( )	( )	( )	( )	( )
FFSCCS	( )	( )	( )	( )	( )	( )	( )
Low Echelon Knowledge System	( )	( )	( )	( )	( )	( )	( )
Wide Area Communications	( )	( )	( )	( )	( )	( )	( )
Force Level Knowledge System	( )	( )	( )	( )	( )	( )	( )
Distributed IEW Fusion System	( )	( )	( )	( )	( )	( )	( )

20. Given a fixed budget and assuming that maximizing cross mission area commonality will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFATDS	( )	( )	( )	( )	( )	( )	( )
FFSCCS	( )	( )	( )	( )	( )	( )	( )
Low Echelon Knowledge System	( )	( )	( )	( )	( )	( )	( )
Wide Area Communications	( )	( )	( )	( )	( )	( )	( )
Force Level Knowledge System	( )	( )	( )	( )	( )	( )	( )
Distributed IEW Fusion System	( )	( )	( )	( )	( )	( )	( )

21. Given a fixed budget and the knowledge you gained from the last vignette, indicate with what probability you would allocate funds to the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
AFATDS	( )	( )	( )	( )	( )	( )	( )
FFSCCS	( )	( )	( )	( )	( )	( )	( )
Low Echelon Knowledge System	( )	( )	( )	( )	( )	( )	( )
Wide Area Communications	( )	( )	( )	( )	( )	( )	( )
Force Level Knowledge System	( )	( )	( )	( )	( )	( )	( )
Distributed IEW Fusion System	( )	( )	( )	( )	( )	( )	( )

22. If the Command and Control assets used in the scenario you just played were inadequate, please briefly describe what is needed to fill the void.

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SURVEY IV

NAME: Last, First, M.I. (please print)

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The following survey will give Army decision makers insight on your view of how technology may provide improved warfighting capability to a future force in the year 2015. The questions are general in nature, relating to characteristics and systems applicable to **Field Artillery Support and Sustainment and Strategic Deployment and Tactical Mobility Systems.** For your responses, consider your **general impression** gained through a look at the scenarios you examined. As always, **your first impression is usually best.** Your answers to these questions will be analyzed to help determine the direction of United States Army technology investments.

INSTRUCTIONS: PLACE AN "X" IN THE COLUMN THAT *MOST CLOSELY* CORRESPONDS TO YOUR OPINION.

THE TERM "FIXED BUDGET" IN THE QUESTIONS BELOW IS A CONSTRAINT THAT ALLOWS YOU TO FUND SOME OF THE CHARACTERISTICS OR SYSTEMS YOU DESIRE, BUT NOT ALL.

THE ROW LABELED "VERBAL EXPRESSION OF PROBABILITY" IS A VERBAL DESCRIPTION OF THE PROBABILITY. THE ROW LABELED "NUMERICAL RANGE OF PROBABILITY" IS A NUMERICAL DESCRIPTION OF THE RANGE OF THE PROBABILITY. BOTH ARE PROVIDED TO ASSIST YOU IN YOUR ASSESSMENT.

EXAMPLE: The following is an example question with responses marked in the correct manner.

Given a fixed budget and assuming that maximizing accuracy will win the war, indicate with what probability you would allocate funds to the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
Musket	(X)	( )	( )	( )	( )	( )	( )
M16 Rifle	( )	( )	( )	( )	(X)	( )	( )
M14 Rifle	( )	( )	( )	( )	( )	(X)	( )
9MM Pistol	( )	(X)	( )	( )	( )	( )	( )

PLEASE ANSWER THE QUESTIONS STARTING ON THE NEXT PAGE

The following questions focus on Field Artillery Support and Sustainment Systems and Strategic Deployment and Tactical Mobility Considerations.

The following abbreviations are used throughout the survey.

FARV-A = Future Armored Resupply Vehicle
REARMS = Rapidly Deployed Artillery Resupply Module
F2S2 = Future Fire Support System
TRAC = Trajectory Realtime Analysis Closed Loop
ACA = Advanced Cargo Aircraft
LAMS = Logistics Air Mobility System
MHE = Material Handling Equipment

1. Given a fixed budget from which you are to develop some but not all the following capabilities for Field Artillery Support and Sustainment Systems to be fielded in the year 2015 and the requirement for Strategic Deployability and Tactical Mobility, indicate with what probability you would allocate funds to develop the following capabilities.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
Minimize Shipping Weight	( )	( )	( )	( )	( )	( )	( )
Maximize Containerization	( )	( )	( )	( )	( )	( )	( )
Strategic Deployability	( )	( )	( )	( )	( )	( )	( )
Operational Deployability	( )	( )	( )	( )	( )	( )	( )
Tactical Mobility	( )	( )	( )	( )	( )	( )	( )
Survivability							
Environment	( )	( )	( )	( )	( )	( )	( )
Material Handling	( )	( )	( )	( )	( )	( )	( )
Battle Damage	( )	( )	( )	( )	( )	( )	( )
Reliability	( )	( )	( )	( )	( )	( )	( )
Battlefield Operating Range	( )	( )	( )	( )	( )	( )	( )
Mission Area Commonality	( )	( )	( )	( )	( )	( )	( )
Minimize Number of Parts	( )	( )	( )	( )	( )	( )	( )
Maximize Common Parts	( )	( )	( )	( )	( )	( )	( )
Minimize Unique Tools	( )	( )	( )	( )	( )	( )	( )
Minimize Tools	( )	( )	( )	( )	( )	( )	( )
Maximize MHE	( )	( )	( )	( )	( )	( )	( )
Maximize Automated MHE	( )	( )	( )	( )	( )	( )	( )

2. Given a fixed budget from which you are to develop some but not all the following systems and assuming that minimizing shipping weight will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
FARV-A	( )	( )	( )	( )	( )	( )	( )
REARMS	( )	( )	( )	( )	( )	( )	( )
F2S2 (Support Module)	( )	( )	( )	( )	( )	( )	( )
TRAC	( )	( )	( )	( )	( )	( )	( )
ACA	( )	( )	( )	( )	( )	( )	( )
LAMS	( )	( )	( )	( )	( )	( )	( )
Robotic Log. Resupply Vehicle	( )	( )	( )	( )	( )	( )	( )

3. Given a fixed budget and assuming that maximizing containerization will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
FARV-A	( )	( )	( )	( )	( )	( )	( )
REARMS	( )	( )	( )	( )	( )	( )	( )
F2S2 (Support Module)	( )	( )	( )	( )	( )	( )	( )
TRAC	( )	( )	( )	( )	( )	( )	( )
ACA	( )	( )	( )	( )	( )	( )	( )
LAMS	( )	( )	( )	( )	( )	( )	( )
Robotic Log. Resupply Vehicle	( )	( )	( )	( )	( )	( )	( )

4. Given a fixed budget and assuming that optimizing strategic deployability will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
FARV-A	( )	( )	( )	( )	( )	( )	( )
REARMS	( )	( )	( )	( )	( )	( )	( )
F2S2 (Support Module)	( )	( )	( )	( )	( )	( )	( )
TRAC	( )	( )	( )	( )	( )	( )	( )
ACA	( )	( )	( )	( )	( )	( )	( )
LAMS	( )	( )	( )	( )	( )	( )	( )
Robotic Log. Resupply Vehicle	( )	( )	( )	( )	( )	( )	( )

5. Given a fixed budget and assuming that optimizing the operational deployment capability will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
FARV-A	( )	( )	( )	( )	( )	( )	( )
REARMS	( )	( )	( )	( )	( )	( )	( )
F282 (Support Module)	( )	( )	( )	( )	( )	( )	( )
TRAC	( )	( )	( )	( )	( )	( )	( )
ACA	( )	( )	( )	( )	( )	( )	( )
LAMS	( )	( )	( )	( )	( )	( )	( )
Robotic Log. Resupply Vehicle	( )	( )	( )	( )	( )	( )	( )

6. Given a fixed budget and assuming that optimizing the tactical mobility capability will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
FARV-A	( )	( )	( )	( )	( )	( )	( )
REARMS	( )	( )	( )	( )	( )	( )	( )
F282 (Support Module)	( )	( )	( )	( )	( )	( )	( )
TRAC	( )	( )	( )	( )	( )	( )	( )
ACA	( )	( )	( )	( )	( )	( )	( )
LAMS	( )	( )	( )	( )	( )	( )	( )
Robotic Log. Resupply Vehicle	( )	( )	( )	( )	( )	( )	( )

7. Given a fixed budget and assuming that maximizing environmental survivability will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
FARV-A	( )	( )	( )	( )	( )	( )	( )
REARMS	( )	( )	( )	( )	( )	( )	( )
F282 (Support Module)	( )	( )	( )	( )	( )	( )	( )
TRAC	( )	( )	( )	( )	( )	( )	( )
ACA	( )	( )	( )	( )	( )	( )	( )
LAMS	( )	( )	( )	( )	( )	( )	( )
Robotic Log. Resupply Vehicle	( )	( )	( )	( )	( )	( )	( )

8. Given a fixed budget and assuming that maximizing material handling survivability will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
FARV-A	( )	( )	( )	( )	( )	( )	( )
REARMS	( )	( )	( )	( )	( )	( )	( )
F2S2 (Support Module)	( )	( )	( )	( )	( )	( )	( )
TRAC	( )	( )	( )	( )	( )	( )	( )
ACA	( )	( )	( )	( )	( )	( )	( )
LAMS	( )	( )	( )	( )	( )	( )	( )
Robotic Log. Resupply Vehicle	( )	( )	( )	( )	( )	( )	( )

9. Given a fixed budget and assuming that maximizing battle damage survivability will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
FARV-A	( )	( )	( )	( )	( )	( )	( )
REARMS	( )	( )	( )	( )	( )	( )	( )
F2S2 (Support Module)	( )	( )	( )	( )	( )	( )	( )
TRAC	( )	( )	( )	( )	( )	( )	( )
ACA	( )	( )	( )	( )	( )	( )	( )
LAMS	( )	( )	( )	( )	( )	( )	( )
Robotic Log. Resupply Vehicle	( )	( )	( )	( )	( )	( )	( )

10. Given a fixed budget and assuming that maximizing reliability will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
FARV-A	( )	( )	( )	( )	( )	( )	( )
REARMS	( )	( )	( )	( )	( )	( )	( )
F2S2 (Support Module)	( )	( )	( )	( )	( )	( )	( )
TRAC	( )	( )	( )	( )	( )	( )	( )
ACA	( )	( )	( )	( )	( )	( )	( )
LAMS	( )	( )	( )	( )	( )	( )	( )
Robotic Log. Resupply Vehicle	( )	( )	( )	( )	( )	( )	( )

11. Given a fixed budget and assuming that maximizing battlefield operating range will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
FARV-A	( )	( )	( )	( )	( )	( )	( )
REARMS	( )	( )	( )	( )	( )	( )	( )
F2S2 (Support Module)	( )	( )	( )	( )	( )	( )	( )
TRAC	( )	( )	( )	( )	( )	( )	( )
ACA	( )	( )	( )	( )	( )	( )	( )
LAMS	( )	( )	( )	( )	( )	( )	( )
Robotic Log. Resupply Vehicle	( )	( )	( )	( )	( )	( )	( )

12. Given a fixed budget and assuming that maximizing mission area commonality will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
FARV-A	( )	( )	( )	( )	( )	( )	( )
REARMS	( )	( )	( )	( )	( )	( )	( )
F2S2 (Support Module)	( )	( )	( )	( )	( )	( )	( )
TRAC	( )	( )	( )	( )	( )	( )	( )
ACA	( )	( )	( )	( )	( )	( )	( )
LAMS	( )	( )	( )	( )	( )	( )	( )
Robotic Log. Resupply Vehicle	( )	( )	( )	( )	( )	( )	( )

13. Given a fixed budget and assuming that minimizing the number of parts will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
FARV-A	( )	( )	( )	( )	( )	( )	( )
REARMS	( )	( )	( )	( )	( )	( )	( )
F2S2 (Support Module)	( )	( )	( )	( )	( )	( )	( )
TRAC	( )	( )	( )	( )	( )	( )	( )
ACA	( )	( )	( )	( )	( )	( )	( )
LAMS	( )	( )	( )	( )	( )	( )	( )
Robotic Log. Resupply Vehicle	( )	( )	( )	( )	( )	( )	( )

14. Given a fixed budget and assuming that maximizing common parts will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
FARV-A	( )	( )	( )	( )	( )	( )	( )
REARMS	( )	( )	( )	( )	( )	( )	( )
F2S2 (Support Module)	( )	( )	( )	( )	( )	( )	( )
TRAC	( )	( )	( )	( )	( )	( )	( )
ACA	( )	( )	( )	( )	( )	( )	( )
LAMS	( )	( )	( )	( )	( )	( )	( )
Robotic Log. Resupply Vehicle	( )	( )	( )	( )	( )	( )	( )

15. Given a fixed budget and assuming that minimizing the number of unique tools will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
FARV-A	( )	( )	( )	( )	( )	( )	( )
REARMS	( )	( )	( )	( )	( )	( )	( )
F2S2 (Support Module)	( )	( )	( )	( )	( )	( )	( )
TRAC	( )	( )	( )	( )	( )	( )	( )
ACA	( )	( )	( )	( )	( )	( )	( )
LAMS	( )	( )	( )	( )	( )	( )	( )
Robotic Log. Resupply Vehicle	( )	( )	( )	( )	( )	( )	( )

16. Given a fixed budget and assuming that minimizing the number of total tools will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
FARV-A	( )	( )	( )	( )	( )	( )	( )
REARMS	( )	( )	( )	( )	( )	( )	( )
F2S2 (Support Module)	( )	( )	( )	( )	( )	( )	( )
TRAC	( )	( )	( )	( )	( )	( )	( )
ACA	( )	( )	( )	( )	( )	( )	( )
LAMS	( )	( )	( )	( )	( )	( )	( )
Robotic Log. Resupply Vehicle	( )	( )	( )	( )	( )	( )	( )

17. Given a fixed budget and assuming that maximizing the amount of material handling equipment will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border- line	reason- able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
FARV-A	( )	( )	( )	( )	( )	( )	( )
REARMS	( )	( )	( )	( )	( )	( )	( )
F282 (Support Module)	( )	( )	( )	( )	( )	( )	( )
TRAC	( )	( )	( )	( )	( )	( )	( )
ACA	( )	( )	( )	( )	( )	( )	( )
LAMS	( )	( )	( )	( )	( )	( )	( )
Robotic Log. Resupply Vehicle	( )	( )	( )	( )	( )	( )	( )

18. Given a fixed budget and assuming that maximizing the amount of automated material handling equipment will win the war, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border- line	reason- able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
FARV-A	( )	( )	( )	( )	( )	( )	( )
REARMS	( )	( )	( )	( )	( )	( )	( )
F282 (Support Module)	( )	( )	( )	( )	( )	( )	( )
TRAC	( )	( )	( )	( )	( )	( )	( )
ACA	( )	( )	( )	( )	( )	( )	( )
LAMS	( )	( )	( )	( )	( )	( )	( )
Robotic Log. Resupply Vehicle	( )	( )	( )	( )	( )	( )	( )

19. Given a fixed budget and the knowledge you gained from the last vignette, indicate with what probability you would allocate funds to develop the following systems.

Verbal Expression of Probability	very small	small	not great	border- line	reason- able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
FARV-A	( )	( )	( )	( )	( )	( )	( )
REARMS	( )	( )	( )	( )	( )	( )	( )
F282 (Support Module)	( )	( )	( )	( )	( )	( )	( )
TRAC	( )	( )	( )	( )	( )	( )	( )
ACA	( )	( )	( )	( )	( )	( )	( )
LAMS	( )	( )	( )	( )	( )	( )	( )
Robotic Log. Resupply Vehicle	( )	( )	( )	( )	( )	( )	( )

20. What additional requirements need to be addressed in order to support EMG weapons?

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21. If the Support and Sustainment Systems and Strategic Deployment and Tactical Mobility capabilities used in the scenario you just played were inadequate, please briefly describe what is needed to fill the void.

SURVEY V

NAME: Last, First, M.I. (please print)

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The following survey will give Army decision makers insight on your view of how technology may provide improved warfighting capability to a future force in the year 2015. The questions are general in nature, relating to characteristics and systems applicable to **Combat Power and the Battlefield Operating Systems.** For your responses, consider your **general impression** gained through a look at the scenarios you examined. As always, **your first impression is usually best.** Your answers to these questions will be analyzed to help determine the direction of United States Army technology investments.

INSTRUCTIONS: PLACE AN "X" IN THE COLUMN THAT *MOST CLOSELY* CORRESPONDS TO YOUR OPINION.

THE TERM "FIXED BUDGET" IN THE QUESTIONS BELOW IS A CONSTRAINT THAT ALLOWS YOU TO FUND SOME OF THE CHARACTERISTICS OR SYSTEMS YOU DESIRE, BUT NOT ALL.

THE ROW LABELED "VERBAL EXPRESSION OF PROBABILITY" IS A VERBAL DESCRIPTION OF THE PROBABILITY. THE ROW LABELED "NUMERICAL RANGE OF PROBABILITY" IS A NUMERICAL DESCRIPTION OF THE RANGE OF THE PROBABILITY. BOTH ARE PROVIDED TO ASSIST YOU IN YOUR ASSESSMENT.

EXAMPLE: The following is an example question with responses marked in the correct manner.

Given a fixed budget and assuming that maximizing accuracy will win the war, indicate with what probability you would allocate funds to the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
Musket	(X)	( )	( )	( )	( )	( )	( )
M16 Rifle	( )	( )	( )	( )	(X)	( )	( )
M14 Rifle	( )	( )	( )	( )	( )	(X)	( )
9MM Pistol	( )	(X)	( )	( )	( )	( )	( )

PLEASE ANSWER THE QUESTIONS STARTING ON THE NEXT PAGE

This section of the survey considers the physical components of COMBAT POWER, Firepower, Maneuver, and Protection.

1. Many sectors of society develop future technologies that are used by the Army, foreign countries, defense industries, and other services. Many of these do not need major funding from the Army. Understanding this fact, the Army is given a fixed budget from which to develop systems that improve the following components (improvement is not necessarily equal). Assume that maximizing combat power through improved technology in the year 2015 is the best strategy, regardless of the source of development. Indicate with what probability the Army should allocate funds to the following components.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
Firepower	( )	( )	( )	( )	( )	( )	( )
Maneuver	( )	( )	( )	( )	( )	( )	( )
Protection	( )	( )	( )	( )	( )	( )	( )

This question focuses on FIREPOWER.

2. Many sectors of society develop future technologies that are used by the Army, foreign countries, defense industries, and other services. Many of these do not need major funding from the Army. Understanding this fact, the Army is given a fixed budget from which to develop systems that improve the following components (improvement is not necessarily equal). Assume that maximizing firepower through improved technology in the year 2015 is the best strategy, regardless of the source of development. Indicate with what probability the Army should allocate funds to the following capabilities.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
Active Target Detection	( )	( )	( )	( )	( )	( )	( )
Passive Target Detection	( )	( )	( )	( )	( )	( )	( )
Target Identification	( )	( )	( )	( )	( )	( )	( )
Non-cooperative IFF	( )	( )	( )	( )	( )	( )	( )
Target Acquisition	( )	( )	( )	( )	( )	( )	( )
Target Engagement	( )	( )	( )	( )	( )	( )	( )
Accuracy	( )	( )	( )	( )	( )	( )	( )
Lethality	( )	( )	( )	( )	( )	( )	( )

This question focuses on MANEUVER.

3. Many sectors of society develop future technologies that are used by the Army, foreign countries, defense industries, and other services. Many of these do not need major funding from the Army. Understanding this fact, the Army is given a fixed budget from which to develop systems that improve the following components (improvement is **not** necessarily equal). Assume that maximizing through improved technology in the year 2015 is the best strategy, regardless of the source of development. Indicate with what probability the Army should allocate funds to the following components.

Verbal Expression of Probability	**very small**	**small**	**not great**	**border-line**	**reason-able**	**high**	**very high**
Numerical Range of Probability	**0-14**	**15-28**	**29-42**	**43-57**	**58-71**	**72-85**	**86-100**
Greater Acceleration	( )	( )	( )	( )	( )	( )	( )
Greater Agility	( )	( )	( )	( )	( )	( )	( )
Less Weight	( )	( )	( )	( )	( )	( )	( )
Obstacle crossing	( )	( )	( )	( )	( )	( )	( )
Tactical speed	( )	( )	( )	( )	( )	( )	( )
Operational speed	( )	( )	( )	( )	( )	( )	( )
Strategic speed	( )	( )	( )	( )	( )	( )	( )
Operating Range	( )	( )	( )	( )	( )	( )	( )
Maintainability	( )	( )	( )	( )	( )	( )	( )

This question focuses on PROTECTION.

4. Many sectors of society develop future technologies that are used by the Army, foreign countries, defense industries, and other services. Many of these do not need major funding from the Army. Understanding this fact, the Army is given a fixed budget from which to develop systems that improve the following components (improvement is **not** necessarily equal). Assume that maximizing protection through improved technology in the year 2015 is the best strategy, regardless of the source of development. Indicate with what probability the Army should allocate funds to the following components.

Verbal Expression of Probability	**very small**	**small**	**not great**	**border-line**	**reason-able**	**high**	**very high**
Numerical Range of Probability	**0-14**	**15-28**	**29-42**	**43-57**	**58-71**	**72-85**	**86-100**
Size	( )	( )	( )	( )	( )	( )	( )
Armor quality	( )	( )	( )	( )	( )	( )	( )
Signature	( )	( )	( )	( )	( )	( )	( )
Defilade Firing	( )	( )	( )	( )	( )	( )	( )
Over the Horizon Firing	( )	( )	( )	( )	( )	( )	( )
EM/Visual camouflage	( )	( )	( )	( )	( )	( )	( )
Early warning sensors	( )	( )	( )	( )	( )	( )	( )
Decoys	( )	( )	( )	( )	( )	( )	( )
Low Observables	( )	( )	( )	( )	( )	( )	( )
Emplace/displace time	( )	( )	( )	( )	( )	( )	( )
NBC Detection	( )	( )	( )	( )	( )	( )	( )
NBC Protection	( )	( )	( )	( )	( )	( )	( )

The following question focuses on FORCE PROJECTION.

5. Many sectors of society develop future technologies that are used by the Army, foreign countries, defense industries, and other services. Many of these do not need major funding from the Army. Understanding this fact, the Army is given a fixed budget from which to develop systems that improve the following components (improvement is **not** necessarily equal). Assume that maximizing Force Projection through improved technology in the year 2015 is the best strategy, regardless of the source of development. Indicate with what probability the Army should allocate funds to the following components.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
Strategic Deployment	( )	( )	( )	( )	( )	( )	( )
Operational Deployment	( )	( )	( )	( )	( )	( )	( )
Tactical Mobility	( )	( )	( )	( )	( )	( )	( )

The following question focuses on UNIT SUPPORT.

6. Many sectors of society develop future technologies that are used by the Army, foreign countries, defense industries, and other services. Many of these do not need major funding from the Army. Understanding this fact, the Army is given a fixed budget from which to develop systems that improve the following components (improvement is not necessarily equal). Assume that maximizing Unit Support through improved technology in the year 2015 is the best strategy, regardless of the source of development. Indicate with what probability the Army should allocate funds to the following components.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
Maintainability	( )	( )	( )	( )	( )	( )	( )
Supply Distribution	( )	( )	( )	( )	( )	( )	( )
Reliability	( )	( )	( )	( )	( )	( )	( )
Tactical Supply Transport	( )	( )	( )	( )	( )	( )	( )
Tactical POL Transport	( )	( )	( )	( )	( )	( )	( )

The following question focuses on SUSTAINMENT.

7. Many sectors of society develop future technologies that are used by the Army, foreign countries, defense industries, and other services. Many of these do not need major funding from the Army. Understanding this fact, the Army is given a fixed budget from which to develop systems that improve the following components (improvement is not necessarily equal). Assume that maximizing sustainment through improved technology in the year 2015 is the best strategy, regardless of the source of development. Indicate with what probability the Army should allocate funds to the following components.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
Medical Evacuation	( )	( )	( )	( )	( )	( )	( )
Unit Reconstitution	( )	( )	( )	( )	( )	( )	( )
Medical Capacity	( )	( )	( )	( )	( )	( )	( )
Logistical Mobility	( )	( )	( )	( )	( )	( )	( )
Industrial Base	( )	( )	( )	( )	( )	( )	( )
Soldier Training Base	( )	( )	( )	( )	( )	( )	( )
Manpower Management	( )	( )	( )	( )	( )	( )	( )

The following question focuses on the BATTLEFIELD OPERATING SYSTEM of FIRE SUPPORT.

Notes: -The abbreviation LOS stands for Line of Sight.
-The abbreviation NLOS stands for Non-line of Sight.

8. You are given a fixed budget from which you are to develop capabilities that improve the following systems (improvement is not necessarily equal). Assume that maximizing the amount of improvement by the year 2015 is the best strategy. Indicate with what probability you will allocate funds to the following systems?

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
Mortars	( )	( )	( )	( )	( )	( )	( )
Field Artillery Cannon Fire	( )	( )	( )	( )	( )	( )	( )
Ground Launched Missile(LOS)	( )	( )	( )	( )	( )	( )	( )
Ground Launched Missile(NLOS)	( )	( )	( )	( )	( )	( )	( )
Naval Cannon Fire	( )	( )	( )	( )	( )	( )	( )
Naval Missiles (LOS)	( )	( )	( )	( )	( )	( )	( )
Naval Missiles (NLOS)	( )	( )	( )	( )	( )	( )	( )
Air Launched Cannon Fire	( )	( )	( )	( )	( )	( )	( )
Air Launched Missile (LOS)	( )	( )	( )	( )	( )	( )	( )
Air Launched Missile (NLOS)	( )	( )	( )	( )	( )	( )	( )

The following question focuses on operational capabilities of the FIELD ARTILLERY BATTLEFIELD FUNCTIONAL MISSION AREA.

9. You are given a fixed budget from which you are to develop systems that improve the following capabilities (improvement is not necessarily equal). Assume that maximizing the improvement by the year 2015 is the best strategy. Indicate with what probability you will allocate funds to the following capabilities?

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
Counterfire	( )	( )	( )	( )	( )	( )	( )
Attack of Uncommitted Force	( )	( )	( )	( )	( )	( )	( )
Suppression of Air Defense	( )	( )	( )	( )	( )	( )	( )
Attack of Emitters	( )	( )	( )	( )	( )	( )	( )
Chemical/Nuclear Deterrence	( )	( )	( )	( )	( )	( )	( )
Attack of Close in Forces	( )	( )	( )	( )	( )	( )	( )
Missile Defense	( )	( )	( )	( )	( )	( )	( )
Countermobility	( )	( )	( )	( )	( )	( )	( )

SURVEY VI

NAME: Last, First, M.I. (please print)

____

The following survey will give Army decision makers insight on your view of how technology may provide improved warfighting capability to a future force in the year 2015. The questions are general in nature, relating to characteristics and systems applicable to **emerging technologies and systems.** For your responses, consider your **general impression** gained through a look at the scenarios you examined. As always, **your first impression is usually best.** Your answers to these questions will be analyzed to help determine the direction of United States Army technology investments.

INSTRUCTIONS: PLACE AN "X" IN THE COLUMN THAT *MOST CLOSELY* CORRESPONDS TO YOUR OPINION.

THE TERM "FIXED BUDGET" IN THE QUESTIONS BELOW IS A CONSTRAINT THAT ALLOWS YOU TO FUND SOME OF THE CHARACTERISTICS OR SYSTEMS YOU DESIRE, BUT NOT ALL.

THE ROW LABELED "VERBAL EXPRESSION OF PROBABILITY" IS A VERBAL DESCRIPTION OF THE PROBABILITY. THE ROW LABELED "NUMERICAL RANGE OF PROBABILITY" IS A NUMERICAL DESCRIPTION OF THE RANGE OF THE PROBABILITY. BOTH ARE PROVIDED TO ASSIST YOU IN YOUR ASSESSMENT.

EXAMPLE: The following is an example question with responses marked in the correct manner.

Given a fixed budget and assuming that maximizing accuracy will win the war, indicate with what probability you would allocate funds to the following systems.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
Musket	(X)	( )	( )	( )	( )	( )	( )
M16 Rifle	( )	( )	( )	( )	(X)	( )	( )
M14 Rifle	( )	( )	( )	( )	( )	(X)	( )
9MM Pistol	( )	(X)	( )	( )	( )	( )	( )

PLEASE ANSWER THE QUESTIONS STARTING ON THE NEXT PAGE

The following questions concern technologies that dominated the last Technology Based Seminar Wargame. These technologies are the Army's emerging technologies.

1. Assume that all technologies can be successfully developed. You still have a fixed budget. Assume that maximizing the investment in those technologies that will have a major impact on Fire Support Systems by the year 2015 is the best strategy. Indicate with what probability you would allocate funds to develop some but not all the following technologies.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
Adv. Materials	( )	( )	( )	( )	( )	( )	( )
Adv. Propulsion	( )	( )	( )	( )	( )	( )	( )
Adv. Signal Processing/Computing	( )	( )	( )	( )	( )	( )	( )
Artificial Intelligence	( )	( )	( )	( )	( )	( )	( )
Biotechnology	( )	( )	( )	( )	( )	( )	( )
Directed Energy Weapons	( )	( )	( )	( )	( )	( )	( )
Low Observables	( )	( )	( )	( )	( )	( )	( )
Micro-Electronics/ Photonics/Acoustics	( )	( )	( )	( )	( )	( )	( )
Neuroscience	( )	( )	( )	( )	( )	( )	( )
Power Generation/ Storage/Conditioning	( )	( )	( )	( )	( )	( )	( )
Protection/Lethality	( )	( )	( )	( )	( )	( )	( )
Robotics	( )	( )	( )	( )	( )	( )	( )
Space Technology	( )	( )	( )	( )	( )	( )	( )

2. You still have a fixed budget. Assume that maximizing investment in those technologies that can be developed to a level where they can be successfully incorporated into Fire Support Systems by the year 2015 is the best strategy. Indicate with what probability you would allocate funds to develop some but not all the following technologies.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
Adv. Materials	( )	( )	( )	( )	( )	( )	( )
Adv. Propulsion	( )	( )	( )	( )	( )	( )	( )
Adv. Signal Processing/Computing	( )	( )	( )	( )	( )	( )	( )
Artificial Intelligence	( )	( )	( )	( )	( )	( )	( )
Biotechnology	( )	( )	( )	( )	( )	( )	( )
Directed Energy Weapons	( )	( )	( )	( )	( )	( )	( )
Low Observables	( )	( )	( )	( )	( )	( )	( )
Micro-Electronics/ Photonics/Acoustics	( )	( )	( )	( )	( )	( )	( )
Neuroscience	( )	( )	( )	( )	( )	( )	( )
Power Generation/ Storage/Conditioning	( )	( )	( )	( )	( )	( )	( )
Protection/Lethality	( )	( )	( )	( )	( )	( )	( )
Robotics	( )	( )	( )	( )	( )	( )	( )
Space Technology	( )	( )	( )	( )	( )	( )	( )

3. You still have a fixed budget. You understand that the Army's level of advancement in each of the technologies is quite different, and that civilian research is ongoing in many emerging technologies. Assume that maximizing the number of technologies that can be successfully used in Fire Support Systems by the year 2015 regardless of their source of development is the best strategy. Indicate with what probability you would allocate funds to develop the following technologies.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
Adv. Materials	( )	( )	( )	( )	( )	( )	( )
Adv. Propulsion	( )	( )	( )	( )	( )	( )	( )
Adv. Signal Processing/Computing	( )	( )	( )	( )	( )	( )	( )
Artificial Intelligence	( )	( )	( )	( )	( )	( )	( )
Biotechnology	( )	( )	( )	( )	( )	( )	( )
Directed Energy Weapons	( )	( )	( )	( )	( )	( )	( )
Low Observables	( )	( )	( )	( )	( )	( )	( )
Micro-Electronics/ Photonics/Acoustics	( )	( )	( )	( )	( )	( )	( )
Neuroscience	( )	( )	( )	( )	( )	( )	( )
Power Generation/ Storage/Conditioning	( )	( )	( )	( )	( )	( )	( )
Protection/Lethality	( )	( )	( )	( )	( )	( )	( )
Robotics	( )	( )	( )	( )	( )	( )	( )
Space Technology	( )	( )	( )	( )	( )	( )	( )

The following questions focus on the top ten systems/capabilities identified in the last Technology Based Seminar Wargame.

4. Assume that all systems/capabilities can be successfully developed. You still have a fixed budget. Assume that maximizing the investment in those systems/capabilities that will have a major impact on Fire Support Systems by the year 2015 is the best strategy. Indicate with what probability you would allocate funds to develop the following systems/capabilities.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
Advanced Soldier Suit	( )	( )	( )	( )	( )	( )	( )
Precision Long Range Weapons	( )	( )	( )	( )	( )	( )	( )
Multi-Spectral Sensor/Fusion	( )	( )	( )	( )	( )	( )	( )
Deployment and Logistics Systems	( )	( )	( )	( )	( )	( )	( )
Nonlethal Weapons	( )	( )	( )	( )	( )	( )	( )
Electric Ground Mobility Systems	( )	( )	( )	( )	( )	( )	( )
Robotics	( )	( )	( )	( )	( )	( )	( )
Advanced Battle Management	( )	( )	( )	( )	( )	( )	( )
Decoys and Deception	( )	( )	( )	( )	( )	( )	( )
Air Mobility Systems	( )	( )	( )	( )	( )	( )	( )

5. You still have a fixed budget. Assume that maximizing investment in those systems/capabilities that can be developed to a level where they can be successfully incorporated into Fire Support Systems by the year 2015 is the best strategy. Indicate with what probability you would allocate funds to develop the following systems/capabilities.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
Advanced Soldier Suit	( )	( )	( )	( )	( )	( )	( )
Precision Long Range Weapons	( )	( )	( )	( )	( )	( )	( )
Multi-Spectral Sensor/Fusion	( )	( )	( )	( )	( )	( )	( )
Deployment and Logistics Systems	( )	( )	( )	( )	( )	( )	( )
Nonlethal Weapons	( )	( )	( )	( )	( )	( )	( )
Electric Ground Mobility Systems	( )	( )	( )	( )	( )	( )	( )
Robotics	( )	( )	( )	( )	( )	( )	( )
Advanced Battle Management	( )	( )	( )	( )	( )	( )	( )
Decoys and Deception	( )	( )	( )	( )	( )	( )	( )
Air Mobility Systems	( )	( )	( )	( )	( )	( )	( )

6. You still have a fixed budget. You acknowledge that the Army's level of advancement in each of the systems/capabilities is quite different, and that civilian research is ongoing in many of the systems/capabilities. Assume that maximizing the number of systems/capabilities that can be successfully used in Fire Support Systems by the year 2015 regardless of their source of development is the best strategy. Indicate with what probability you would allocate funds to develop the following system/capabilities.

Verbal Expression of Probability	very small	small	not great	border-line	reason-able	high	very high
Numerical Range of Probability	0-14	15-28	29-42	43-57	58-71	72-85	86-100
Advanced Soldier Suit	( )	( )	( )	( )	( )	( )	( )
Precision Long Range Weapons	( )	( )	( )	( )	( )	( )	( )
Multi-Spectral Sensor/Fusion	( )	( )	( )	( )	( )	( )	( )
Deployment and Logistics Systems	( )	( )	( )	( )	( )	( )	( )
Nonlethal Weapons	( )	( )	( )	( )	( )	( )	( )
Electric Ground Mobility Systems	( )	( )	( )	( )	( )	( )	( )
Robotics	( )	( )	( )	( )	( )	( )	( )
Advanced Battle Management	( )	( )	( )	( )	( )	( )	( )
Decoys and Deception	( )	( )	( )	( )	( )	( )	( )
Air Mobility Systems	( )	( )	( )	( )	( )	( )	( )

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