EXPLANATION FOR THE APPLICATION/DEMONSTRATION PLAN FOR THE STANDARDIZED UXO TECHNOLOGY DEMONSTRATION SITE

Note: Application should be filled out in Times New Roman size 12 font. Information provided in this application will be used to fill data required in the final report.

BASIC DEMONSTRATOR INFORMATION

Demonstrator name: Name of company or organization running demonstration
Technology name: Name of technology to be demonstrated
Demonstrator address: Full mailing address of the demonstrator
Demonstrator main phone number: Phone number of the demonstrator
Demonstrator main fax number: Fax number of the demonstrator
Demonstrator main email address: Email address of the demonstrator
POC: Lead POC for the demonstration
POC phone number: Phone number of the lead POC
POC fax number: Fax number of the lead POC
POC email address: Email address of the lead POC

SITE INFORMATION

Site location: (APG/YPG) Which standardized site is this application addressing?

Areas to be utilized:

APG

- □ Calibration lanes (mandatory)
- □ Blind grid (mandatory before use of other areas)
- □ Mine grid
- □ Open field (all sub areas)
  - □ *Legacy sub-area*
  - □ *Direct fire sub-area*
  - □ *Indirect fire sub-area*
  - □ *Challenge sub-area*
- □ Moguls
- □ Woods

YPG

- □ Calibration lanes (mandatory)
- □ Blind grid (mandatory before use of other areas)
- □ Open field
- □ Inverted moguls
- □ Desert extreme

Number of days site is required: How many working days will the demonstrator be on site. This includes mobilization, demobilization, and actual demonstration.

Dates requested: What are the dates that the demonstrator would like to utilize the site.

Prior visits: List previous demonstrations utilizing the technology at any of the standardized sites. Include final report numbers from the demonstration.

AREA OBJECTIVE

Calibration lanes: A 6 x 11 cell matrix of 4m x 4m cells providing the demonstrator the opportunity to train their system on the 14 different ordnance and eight representative clutter used at the site.

Blind grid: A 20 x 20 cell matrix of 2m x 2m cells used to evaluate the demonstrator's system at detecting and discriminating ordnance and clutter (ordnance fragments) without regard to determining location. The cells are populated with the 6 ordnance and the type of clutter found in direct and indirect fire sub-areas of the open field. The center of each cell will contain either single ordnance, a piece of clutter, or will be empty (blank).

Open field - legacy sub-area: A minimally cluttered flat terrain area used to evaluate the demonstrator's system at detecting and discrimination ordnance and clutter along with determining object location. The area is populated with an expanded list of ordnance and clutter that would be typical of a multi-use range. This area is configured as the site was before the January 2008 general reconfiguration of the site.

Open field - direct fire sub-area: A minimally cluttered flat terrain area used to evaluate the demonstrator's system at detecting and discrimination ordnance and clutter along with determining object location. The area is populated with a limited list of ordnance and clutter that would be typical of a direct-fire impact area. Ordnance in this area is only composed of three types of rounds (25mm, 37mm, and 105mm projectiles).

Open field - indirect fire sub-area: A minimally cluttered flat terrain area whose objective is to evaluate the demonstrator's system at detecting and discrimination ordnance and clutter along with determining object location. The area is populated with a limited list of ordnance and clutter that would be typical of an indirect fire impact area. Ordnance in this area is only composed of three types of rounds (60mm, 81mm, and 105mm mortars/artillery).

Open field - challenge sub-area: An empty flat terrain area that can be easily configured to meet the specific needs and requirements of the demonstrator or the program sponsor. Any results from this area will not be reported in the standardized scoring record.

Mogul area: An open terrain area that presents navigation difficulties and whose objective is to evaluate potential demonstrator's system degradation at detecting and discrimination ordnance and clutter compared to the open field area. The area is populated with an expanded list of ordnance and clutter that would be typical of a multi-use range and is similar to the distribution found in the open field legacy sub-area.

Wooded area: An area that presents surface obstacles (trees, brush) and whose objective is to evaluate how the demonstrator's system degrades (if any) at detecting and discrimination ordnance and clutter compared to the open field area. The area is populated with an expanded list of ordnance and clutter that would be typical of a multi-use range and is similar to the distribution found in the open field legacy sub-area.

SYSTEM INFORMATION (submit one per area surveyed)

System description: This description should consist of information on the system including type of sensor, platform, and navigation/positioning instrument used for the survey. Specifics on the system should also include the type of instruments used for the survey, instrument settings (bandwidths, transmit pulses, etc.), survey height, etc. Details on the deployment of the system should include the line spacing of the instrument, sampling rate, and forward speed. Any differences in operation from area to area should be noted.

System picture: Paste a picture of the technology to be tested.

Support equipment required: List all equipment, vehicles, and expendables to be brought onto the site by the demonstrator. Storage needs for these items should also be identified. List any and all logistics, support equipment, or special needs that the demonstrator may require from the site manager.

Frequency and radio utilization: In this section, provide a listing of frequencies and power of EM/FM and radio (including differential GPS) equipment to be utilized at the site. This information is used to coordinate and determine RF interference to or from the host installation.

Demonstrator's field personnel: The site personnel list containing the names of people the demonstrator is planning to bring onsite. Each individual role and responsibility during the demonstration must be described.

Note: Each individual needing access to the site will be required to provide information such as social security and driver licenses numbers to gain access to the military installation. Foreign nationals will need to submit a site visit request through their respective embassies. Access to the Standardized Site will be coordinated with the individual site manager.

DATA PROCESSING AND ANALYSIS (submit one per area surveyed)

The section should be submitted for each area surveyed by the vendor. Discussion should include how target selection, parameter estimation, and classification vary by site area and objective. The following information should be submitted to ATC within 30 days before each area is surveyed:

Target selection criteria: This section will detail the target selection criteria and the data required to implement the criteria by answering the following questions:

a. What kind of pre-processing (if any) is applied to the raw data (e.g. filtering, etc)?

b. What is the format of the data both pre and post processing of the raw data (e.g. ASCII, binary, etc)?

c. What algorithm is used for detection (e.g. peaks of signal surpassing threshold, etc)?

d. Why is this algorithm used and not others?

e. On what principles is the algorithm based (e.g. statistical models, heuristic rules, etc)?

f. What tunable parameters (if any) are used in the detection process (e.g. threshold on signal amplitude, window length, filter coefficients, etc)?

g. What are the final values of all tunable parameters for the detection algorithm?

Parameter estimation: This section should include the details of which parameters will be extracted from the sensor data for each detected item for characterization. Please answer the following questions:

a. Which characteristics will be extracted from each detected item and input to the discrimination algorithm (e.g. depth, size, polarizability coefficients, fit quality, etc)?

b. Why have these characteristics been chosen and not others (e.g. empirical evidence of their ability to help discriminate, inclusion in a theoretical tradition, etc)?

c. How are these characteristics estimated (e.g. least-mean-squares fit to a dipole model, etc), include the equations that are used for parameter estimation?

d. What tunable parameters (if any) are used in the characterization process? (e.g. thresholds on background noise, etc)?

Classification: This section should include the details describing the algorithm and associated data and parameters used for discrimination by answering the following questions:

a. What algorithm is used for discrimination (e.g. multi-layer perception, support vector machine, etc)?

b. Why is this algorithm used and not others?

c. Which parameters are considered as possible inputs to the algorithm?

d. What are the outputs of the algorithm (probabilities, confidence levels)?

e. How is the threshold set to decide where the munitions/non-munitions line lies in the discrimination process?

Training: This section should include the details of how training data is used to make a decision on the likelihood of the anomaly correspondence to munitions. Please answer the following questions:

a. Which tunable parameters have final values that are optimized over a training set of data and which have values that are set according to geophysical knowledge (i.e. intuition, experience, common sense)?

(1) For those tunable parameters with final values set according to geophysical knowledge:

(a) What is the reasoning behind choosing these particular values?

(b) Why were the final values not optimized over a training set of data?

(2) For those tunable parameters with final values optimized over the training set data:

(a) What training data is used (e.g. all data, a randomly chosen portion of data, ect)?

(b) What error metric is minimized during training (e.g. mean squared error, ect)?

(c) What learning rule is used during training (e.g. gradient descent, ect)?

(d) What criterion is used to stop training (e.g. number of iterations exceeds threshold, good generalization over validation set of data, ect)?

(e) Are all tunable parameters optimized at once or in sequence ("in sequence" = parameters 1 is held constant at some common sense values while parameter 2 is optimized, and then parameter 2 is held constant at its optimized value while parameter 1 is optimized)?

b. What are the final values of all tunable parameters for the characterization process?

Overview of Quality Control (QC): This section is an overview of the complete QC portion of the QA/QC plan. The QC portion is the description of how systems checks are done by the demonstrator to check on items such as tracking, accuracy, drift, and system performance.

Overview of Quality Assurance (QA): This section is an overview of the complete QA portion of the QA/QC plan. The QA portion is the description of the procedures to be employed during the demonstration to include items such as lane spacing, sampling rates, and estimated accuracy of navigation and tracking systems.