# **Community Sensor Model (CSM)**
# Technical Requirements Document (TRD)
# Appendix E
# Example Statement of Objectives

15 November 2010
Version: 3.0

# EXAMPLE STATEMENT OF OBJECTIVES

# For
# Community Sensor Model (CSM) Developers

# Table of Contents

# 1.0 Scope

This Statement of Objectives (SOO) outlines a plan for Community Sensor Model (CSM) Developers to deliver sensor models for integration into the Sensor Exploitation Tools (SETs). The goal of this appendix is to ensure that Developers design, develop, verify, and deliver sensor models in accordance with the CSM Technical Requirements Document (TRD) and appropriate appendices. In this appendix, "Government" refers to the Government office requesting or contracting for the sensor model, or the Government office validating or evaluating the sensor model. "Developer" refers to the Government office or Contractor who is actually creating or delivering the sensor model. If the Developer is delivering the sensor model under a contract with the Government and there is a conflict between the CSM TRD and the contract, the provisions in the contract shall supersede.

# 2.0 Requirements

The primary objective of the Community Sensor Model program is to provide the Government and Industry with the capability to create and maintain sensor models for current and future sensors. The sensor models support SETs and other application tools that require a precise understanding of the image (data) and ground coordinate relationships. The model shall support the calculation of precise coordinate transformations within the constraints of the host system/platform. The specific objectives are as follows:

2.1 The Developer shall design the sensor model to meet all requirements in the Technical Requirement Document (TRD), including appendices.

2.2 The Developer shall comply with the appropriate security guides. (Director Central Intelligence Directive (DCID) 6/3 and Joint DODIIS / Cryptologic SCI Information Systems Security Standards (JDCSISS) in the safeguarding of all classified elements both internally and/or externally accessed. The Developer will design the CSM such that it does not impede the ability of a SET to meet the appropriate security requirements. The Developer shall provide the Government a summary of any potential issues with the CSM software for DCID 6/3 or JDCSISS compliance.

2.3 The Developer shall submit a list for Government approval of all Free and Open Source Software used in the sensor model.

2.4 The Developer shall design and develop the Community sensor model as a dynamically linked (or loaded) library and shared object that does not require re-compilation of the SET. The Developer shall design and develop the sensor model to support all operating systems and compilers documented in the TRD Appendix B or as specified by the Government.

2.5 The Developer shall develop and provide a technical report detailing the software design information.

2.6 The Developer shall develop and deliver an installation report for the sensor model. At a minimum, the report shall cover installation, setup, performance verification, and any special considerations for installation and use of the software.

2.7 The Developer shall develop and deliver a technical report/documentation providing detailed information on the baseline performance, sensor model design, and error propagation for the sensor model. This will include descriptions of the rigorous projection model, the implementation of adjustability, and the implementation of error propagation, including underlying equations and algorithms.

2.8 The Developer shall develop, implement and deliver the sensor model (equation and algorithms) in MATLAB, Mathcad or similar environment. (This requirement can be tailored if the underlying sensor model implementation is proprietary.)

2.9 The Developer shall deliver engineering releases of the sensor model with functionality specified by the Government to support NGA validation and SET integration.

2.10 The Developer shall provide a minimum of 100 total test points of varying topography to compare sensor model results to ground truth, survey points, or points dropped on reference imagery. A minimum of 10 images with varying geometry will be used to provide the test points. These test points should demonstrate image to ground, ground to image, and image loci transformations used in the sensor model verification and validation process. (If a Mathcad or MATLAB model is delivered, these test points should be calculated using both the math model as well as the software sensor model implementation.)

2.11 The Developer shall provide a Government-approved test plan for Factory Acceptance Testing (FAT). At a minimum, FAT will included passing the following evaluations: software thread safety, Verification Test System (VTS) and Generic Sensor Exploitation Tool (GSET). VTS provides proof of sensor model compliance with the TRD and the API in Appendix C. GSET performs two functions: Direct Geopositioning Analysis (DGA) and Precision Modeling Analysis (PMA). DGA verifies reliability and consistency of coordinate generation and error prediction. PMA demonstrates adjustable parameter effectiveness and minimization of systematic errors. The Government program office or designated representative will witness the FAT.

2.12 The Developer shall provide a test report with the sensor model.

2.13 The Developer shall deliver the sensor model source and object code on compact disc or DVD in the format specified in the CSM TRD appendix C. An object code only delivery is acceptable if the sensor model implementation is proprietary.

2.14 The Developer shall deliver the sensor model with Government Unlimited Rights in order to distribute the sensor model to users with the applicable SETs and to distribute the sensor model to SET developers. If the sensor model is delivered with less than Government Unlimited Rights, the Developer shall clearly state the rights granted with this delivery.

2.15 The Developer shall deliver a completed CSM Plugin Summary form.

2.16 The Government may require a DD250 after successful completion of FAT.

2.17 The Developer shall provide the Government with program management information as required. This may include conducting requirements reviews, design reviews, test readiness reviews, pre-ship reviews, and providing cost information, schedules, technical performance information, and periodic progress reports to the Government.

2.18 The Developer shall collaborate and support technical working groups and technical exchange meetings with Government and contractor support personnel associated with the SET programs, the CSM Working Group, and other CSM stakeholders as required.

2.19 The Government will perform formal validation testing with the sensor model using GSET and other validation tools after successful completion of Developer testing and delivery of the sensor model. This is to determine if NGA is able to validate that SETs used with the sensor model will output mensurated positions in latitude, longitude, height, and error propagation estimates within the stated performance parameters. The Developer shall provide technical support for this testing.

2.20 The Developer shall provide telephone support for 45 calendar days after Government acceptance of the sensor model.

## 3.0 Meetings

3.1 Sensor model development kickoff meeting: Developer's facility.

3.2 Program readiness meetings and reviews as specified by the Government: Developer's facility.

3.3 Technical Interchange Meeting: Government or contractor facilities.

## 4.0 Government Furnished Information

4.1 CSM Technical Requirement Document

4.2 Thread safety test driver software

4.3 VTS Software

4.4 GSET Software

4.5 Sensor Imagery if required

4.6 CSM Plugin Summary Form

## 5.0 Contract Data Requirements List

5.1 Program Management Information (Reference Appendix E, paragraph 2.17)

5.2 Sensor Model Design Documentation (Reference Appendix E, paragraph 2.5)

5.3 Sensor Model Installation Document (Reference Appendix E, paragraph 2.6)

5.4 Test Plan (Reference Appendix E, paragraph 2.11)

5.5 Test Report (Reference Appendix E, paragraph 2.12)

5.6 CSM Source Code (Reference Appendix E, paragraph 2.13)

5.7 Filled-out CSM Plugin Summary (Reference Appendix E, paragraph 2.15)

5.8 Other items as required.