

# Phase I Project Summary

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**Firm:** Intelligent Automation Inc

**Contract Number:** NNX10CC36P

**Project Title:** A Sensor Management Tool for Use with NASA World Wind

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**Identification and Significance of Innovation:** *(Limit 200 words or 2,000 characters whichever is less)*

Increasing numbers of sensors are deployed. NASA and NOAA data sets provide a large volume of sensor data. US intelligence and commercial endeavors are also generating vast amounts of sensor data, gathered from sources ranging from satellites to vehicles. Software to support discovery, access and utilization of the volume data produced by the sensor is crucially needed.

The Sensor Management Tool (SMT) is a solution to this problem. The Phase I effort investigated SMT design that was focused on the individual Scientist/Researcher as the user. The Phase II effort will include support for the Emergency Incident Commanders.

Sensor Management Tool innovations in Phase I include: (1) conceptualization of the tool, (2) data model design based on the open Sensor Web Enablement standards suite from Open Geospatial Consortium, (3) component –based architecture design that separates views, model and logical control, (4) open sourcing of the SMT, (5) integration of NASA World Wind into the SMT, (6) prototyping functionality for requesting, acquiring data, (7) prototyping manipulation/visualization of retrieve data supported by inline wizards, (8) publishing data based on a standards-derived meta-model. The Phase II effort will greatly extend the SMT's functionality done in Phase I to include workflow support, configurable views, etc.

**Technical Objectives and Work Plan:** *(Limit 200 words or 2,000 characters whichever is less)*

Phase I Technical Objectives:

- 1: Develop the Meta-Model that Harmonizes the Disparate Formulations for Sensor and Sensor Observations
- 2: SMT Design and Development: Develop Wizards to Support the User in Utilizing the Sensor Management Tool
- 3: SMT Design and Development: Develop the Sensor Management Tool Infrastructure Utilities.
- 4: SMT Design and Development: Integration with Java World Wind.

Phase I tasks are:

- Task 1: Kick-off Meeting
- Task 2: Knowledge Engineering to Identify Current Sensor Models and Researcher Priorities
- Task 3: Sensor Model Harmonization: Development of a Meta-Model for Sensors / Sensor Observations and Utilization
- Task 4: SMT Tool Architecture
- Task 5: Create Wizard Support for the Researcher
- Task 6: Java Implementation of the Sensor Management Tool

**Technical Accomplishments:** *(Limit 200 words or 2,000 characters whichever is less)*

Technical Accomplishments in the Phase I effort include:

- 1) Development of the Sensor Harmonization Meta-model to serve as the theoretical component behind the Sensor Management Tool 'publish' functionality,
- 2) Phase I level design of the Sensor Management Tool using a Model-View-Controller architecture pattern,
- 3) Phase I level design of the Sensor Management Tool's data architecture design that reflects the relevant Sensor Web enablement standards from the Open Geospatial Consortium,
- 4) Integration of NASA World Wind into the SMT functionality to support visualization of sensor data sites with drill down to inspect meta-data on observations,

- 5) Initial design and prototyping of the Request & Acquire functionality in the SMT, placed onto two view 'tabs',
- 6) Initial design and prototyping of the 'Search (local data), Visualize and Manipulate/Calculate' functionality in the SMT, placed onto three view 'tabs',
- 7) Inclusion of in-line 'Wizard' support for the Manipulate/Calculate Tab, for the Search Tab and for the Visualize Tab,
- 8) Initial design and prototyping of the 'Publish' functionality that utilizes the Sensor Harmonization Meta-model as its theoretical underpinning,
- 9) Integration of the OOSTethys server that provides the server via which the data is published.
- 8) Lessons learned that will greatly improve the design and functionality of the Sensor Management Tool in the Phase II effort, along with extensions to additional categories of user (beyond scientists) with the support of configurable views.

**NASA Application(s):** (Limit 100 words or 1,000 characters whichever is less)

Our proposed Sensor Management Tool is relevant to and can be utilize in a wide range of Earth or planetary science related endeavors. These include:

1. Sensor Management Tool use in accessing and managing data for ocean studies (including Gulf of Mexico efforts),
2. Sensor Management Tool use for managing data relevant to hurricane studies,
3. Sensor Management Tool use for managing data relevant to climate and ecology studies,
4. Sensor Management Tool use for managing data from UAVs in NASA – led technology development for western region firefighting mission efforts,
5. Sensor Management Tool for use in managing data from planetary missions (NASA World Wind earth globe would be replaced by the appropriate map).

**Non-NASA Commercial Application(s):** (Limit 200 words or 2,000 characters whichever is less)

Promising Non- NASA commercial applications are:

1. Use of Sensor Management Tool with Emergency Incident Commander Views for FEMA applications,
2. Use of Sensor Management Tool for accessing, retrieving and managing data for DoD Surveillance applications,
3. Use of Sensor Management Tool regarding data related to agriculture monitoring or ecology monitoring (dept. Agriculture, various state agencies)
4. Use of Sensor Management Tool with respect to data related to infrastructure monitoring (Homeland security),
5. Use of Sensor Management Tool with respect to data related to commercial facilities monitoring,
6. Use of Sensor Management Tool with respect to data in vehicle and fleet maintenance management.

**Name and Address of Principal Investigator:** (Name, Organization, Street, City, State, Zip)

Margaret Lyell, Ph.D.  
Intelligent Automation Inc  
15400 Calhoun Drive **Suite 400**  
Rockville MD 20855

**Name and Address of Offeror:** (Firm, Street, City, State, Zip)

Intelligent Automation Inc  
15400 Calhoun Drive **Suite 400**  
Rockville MD 20855