## Sensor Control System structure

In this first example/exercise, we will execute process 1 of the workflow to define the basic structure of a Sensor Control System (SCS) within a Situational Awareness Control System (SACS) of an air platform.[[1]](#footnote-1) SCS components are derived directly from the system description that follows and that is modeled using the ReqSpec requirements language.[[2]](#footnote-2) Within one component, we will define tasks that carry out the basic functions of the SCS – communication with sensors and processing of commands. The example will present a basic set of requirements and illustrate how OSATE can be used as a modeling tool for these requirements. It will provide a basic understanding of AADL – how to model a system’s architecture, describe properties and requirements of each part of the system. The example will also illustrate a basic workflow for the development process.

### SCS level 1 requirements

The SCS is used to obtain and process sensor data from the aircraft environment and to issue actuator commands in response to that sensor data. Sensors of many types may be part of a larger flight operations system. Sensor inputs may include: ground signals, radar inputs, obstacles, external temperature, and imaging. In addition, the SCS may process on board information required for health maintenance of sensors. The SCS interacts with a display system to report status of sensors and with user commands to effect actuator commands.

The SCS requirements provide a simplified view for controlling and processing sensors and sensor data for monitoring aircraft environment. The requirements highlight the incoming sensor data, processing that data, and using that data to create actuator commands to maintain inputs to the SA capability. (In the current description, the pilot receives feedback in the form of sensor readings, but cannot issue adjustment commands to sensors via the SCS.) Actuator commands are issued in response to incoming sensor signals if the SCS determines that sensor adjustments are needed.

External

Environment

Operator Interface

Sensor Control System

Pilot

**SA Control Sys.**

Operator

Settings

Operator

Feedback

Sensor

Sensor

Data

Actuator

Command

Actuator

State

Internal Environment

State Change

The system engineer defines the basic requirements as follows:

A pilot monitors SA state via the Operator Interface. The interface receives state and sensor data via Operator Feedback. The SCS interacts directly with two other system elements shown in the figure:

* Sensors obtain data about the external environment of the aircraft platform to formulate the SA state.
* Actuators can change sensitivity or other sensor element setting.

Internal SCS operations are as follows:

* The SCS takes current sensor input and filters that data for operator display.
* The SCS takes filtered sensor data and determines any sensor adjustments that are needed.
* Sensor adjustments are sent in the form of actuator commands to effect internal environment.
* Sensor data may also lead to mode changes if bad data is received or if a sensor fails.

1. See ACVIP Model Repository & Configuration Management Capability Scenarios (Scenario 1) [↑](#footnote-ref-1)
2. Feiler, P.; Delange, J.; Wrage, L. “A requirement specification language for AADL”. CMU/SEI-2016-

   TR-008. [↑](#footnote-ref-2)