Overview

The Software Assurance Marketplace (SWAMP) will support five user communities as shown in the diagram below. This document outlines the use case for members of the Software Assurance (SwA) Educators and Students community. The use case covers functionality required by the Department of Homeland Security (DHS) for Initial Operating Capability (IOC) scheduled for early 2014 and additional functionality anticipated in future years based on user community and DHS feedback. The planned functionality to be offered by the SWAMP is described so that potential users can evaluate and comment on the extent to which the planned functionality meets their SwA tool development needs and expectations.
Unique Value Proposition for Educators and Students

- **Efficient environment for both instructor and student.** The SWAMP provides an environment that automates much of the burden of assessing a software package, and viewing the results. This includes building the software package, applying the SwA tool, and viewing the result in a uniform way. Because of this efficiency, more time can be devoted to the core software assurance concepts instead of the mundane operational aspects of performing an assessment. The SWAMP also provides a collaborative environment that supports team-training and class projects. To help students get started, we plan to provide educational videos highlighting secure coding practices that can be followed by hands-on activities in the SWAMP.

- **Access to multiple pre-installed tools, packages and platforms.** Students and instructors have access to a broad set of assessment tools that cover a variety of languages, a corpus of software packages that are known to work with the SwA tools, and a variety of different operating system platforms. SWAMP will also host test suites with known vulnerabilities such as NIST’s Juliet and iARPA’s STONESOUP test cases. Leveraging these resources an instructor can quickly create assignments with little effort.

- **Support for custom tools and packages.** While the SWAMP provides multiple tools and packages preloaded, students and instructors can install their own custom tools and packages to demonstrate specific software assurance principles, or to assess corrected versions of existing software packages.

- **Demonstrating the value of continuous software assurance (CSwA).** Continuous software assurance (CSwA) is the automated, repeated assessment of software by SwA tools. For a software package developer, the SWAMP supports CSwA
by scheduling configured software package assessments on a recurring basis, for example, nightly. Before each assessment begins, the current version of the software package is retrieved by the SWAMP from the developer's repository and assessed using a pre-configured set of tools. Users can view a dashboard page to quickly check the status of their upcoming, ongoing, and completed assessments along with summary results of successfully completed assessments. By comparing results from one assessment to another, the software package developer can easily detect regressions or improvements between versions. The educator can demonstrate the value of CSwA by having the students incorporate CSwA using the SWAMP into software development projects.

- **Simple roster management.** After IOC, the educator will be able to easily manage the class roster to add and remove accounts in bulk, and provide access to tools and software packages on a timely basis without changing the configuration of custom packages or tools between classes.

**Summary of the Use Case**

The education use case encompasses four primary sub-use cases: perform an SwA assessment, be a software package developer, be SwA tool developer, and be a SwA researcher. A primary goal of the SWAMP is to provide a rich, high quality collection of software assurance tools and a large corpus of software packages and test suites against which to run the tools. The SWAMP is designed to make running tools against multiple packages on multiple platforms as easy as possible. This combination provides a rich environment for software assurance educators to introduce the concepts of SwA and CSwA to their students without the overhead and cost of managing such a capable system in their own environment. The SWAMP is of value to educators at diverse instructional environments including 2-year, 4-year and graduate university programs; corporate training; and government training. Educators can create a SWAMP project for each class they wish to teach.
Students are then assigned to the project and can quickly access the pre-installed tools and packages. Additionally, the educator can install custom tools and packages to highlight specific software assurance principles. The SWAMP provides a results browser that lets students compare the assessments from multiple tools and packages.

**SWAMP Software Assurance Educator Use Case Diagram**

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**Educator Manages Course**
- Apply for, receive and manage membership
- Create and manage projects for each course
- Manage student roster
- Manage custom SwA Tools
- Manage custom software packages

**Students Take Course**
- Run SwA Tools
- Act as Software Developers
- Act as SwA Tool Developers
- Act as SwA Researcher

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**Support for Educators and Students at IOC**

We expect educators and students to be able to perform the following common activities:

- Educator manages course:
  - Apply for, receive, and manage membership in the SWAMP.
○ Create a SWAMP project for each course being taught.
○ Manage student roster: add, change and delete students associated with the course.
○ Manage SwA tools: add course specific SwA tools, modify SwA tool access permissions to control SwA tools available for student use.
○ Manage Packages: add course specific software packages, modify package access permissions to control software packages available for assessment by students.

● Students participate in SwA training:

○ Students run SwA tools. Students assess existing software packages with existing SwA tools. Students learn about the types of weaknesses that the selected SwA tools can discover.

○ Students act as Software Developers. Students develop software packages as a course assignment, and can perform one-time or recurring assessments of their software package using the SWAMP. The functionality is detailed in the Software Package Developer Use Case.

○ Students act as SwA Tool Developers. Students develop new SwA tools as a course assignment and can use the SWAMP to test the tool. The functionality is detailed in the SwA Tool Developer Use Case.

○ Students act as SwA Researchers. Students learn about software assurance by researching tools, algorithms and methods. The functionality is detailed in the SwA Researcher Use Case.
Detailed Narrative of Use Case

Educator manages course

An educator first joins the SWAMP and requests a project. When the project has been created in the SWAMP, the educator can then invite students to join the project (course). If the educator plans to only use the SwA tools and packages provided by the SWAMP, the course can commence.

Additionally, the educator can add custom SwA tools and packages. The SWAMP provides services for building, testing and registering SwA tools and registering software packages to be assessed. These tools and packages can be made available only to the educator, students associated with the project (course), or all SWAMP users. Please refer to the SWAMP Software Assurance Tool Developer and Software Developers use cases for additional details on adding and managing tools and packages.

When the course concludes, the educator can remove the students from the project.

Students participate in SwA training

We expect students to learn about software assurance by using services provided by the SWAMP, mainly by performing assessments using SwA tools. The students learn about software assurance and the operation of the SWAMP by assuming the role of a software developer, SwA tool developer or SwA researcher. After completing training, students can transition to using the SWAMP in the role in which they were trained.

Students run SwA tools. This is an elementary assignment to familiarize the student with SwA tools. Students run existing SwA tools against existing SwA software packages and view the results. From this activity students can learn about the types of problems discovered and with the right combination of packages and tools, can learn about the weaknesses themselves.
**Students act as Software Developers.** The students develop a software package as a course assignment with SwA integrated into the software development. Students use the SWAMP to perform one-time or recurring (learning about CSwA) assessments of their software package. The functionality is detailed in the Software Package Developer Use Case.

**Students act as a SwA Tool Developers.** The students develop one more new SwA tools as a course assignment and use the SWAMP to test the tool. The functionality is detailed in the SwA Tool Developer Use Case.

**Students act as SwA Researchers.** Upper-level students perform SwA research including topics related to the operation of SwA tools, the weaknesses reported by SwA tools, or the software packages present in the SWAMP. The functionality is detailed in the SwA Researcher Use Case.

**Future Support for Educators and Students**

The future capabilities described in the Software Package Developer, SwA Tool Developer and SwA Researcher use cases. Besides these, we will add the following capabilities specific to the Education Use Case in years 2-3 of the project:

- **Educator Manages Course:**
  - Provide better bulk roster management. For example, enable uploading the roster of student data to automatically create student accounts in a batch. Provide the capability to delete all students.
  - Allow the scheduled access to tools or software packages.
  - Allow students to form groups.
  - Isolate student work from each other.
  - Allow the instructor and assistant to view the student progress.