**Software Verification**

**and**

**Validation Plan**

**AAU Gold Team**

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# 1. Purpose

This document describes the verification and validation (V&V) procedures that will be followed for the development of our University Website Portal project, titled “Above Average University.” These are the processes by which we will ensure that our software meets our specifications and maintains a level of quality throughout development.

# 2. Referenced Documents

IEEE Std 1012-2004, *IEEE Standard for Software Verification and Validation,* IEEE 2004

Project Documents:

C. Boatman & P. Parker, *Software Project Management Plan*

R. Peters, *Software Requirement Specification* (to be written)

J. Andras & J. Potrawski, *Software Quality Assurance Plan*

J. Hertl, A. Tonkovich, *Software Configuration Management Plan*

# 3. Definitions and Acronyms

PM Project Manager

RE Requirement Engineer

SA Software Architect

IE Integration Engineer

TE Testing Engineer

CD Code Developer

SCMP Software Configuration Management Plan

SPMP Software Project Management Plan

SQAP Software Quality Assurance Plan

SRS Software Requirement Specification

STP Software Test Plan

AAU Above Average University

# 4. V&V Overview

## 4.1 Organization

Our project is organized in several roles that complement each other throughout each V&V process. This is described further in the SPMP.

## 4.2 Master Schedule

Each iteration of our project, as described in the SPMP, will end with verification and validation processes confirming our progress thus far. In the event that we are falling behind on verification, further iterations may be toned down to compensate for the additional workload.

## 4.3 Software Integrity Level Scheme

The AAU website application has a moderate integrity level due to it handling personal and potentially private information for students and faculty. The software will also handle credit card numbers and social security numbers, and thus the confidentiality of this information must be maintained throughout the project.

## 4.4 Resource Summary

Development of the AAU website requires a team of eight (PM, RE, two IE’s, two SA’s, and two TE’s) as defined in the SPMP with a shared knowledge of the software engineering life cycle and the verification and validation plan. Each team member will also contribute to the project by sharing the responsibilities of a CD.

## 4.5 Responsibilities

Project Manager (PM)

Requirement Engineer (RE)

Software Architect (SA)

Integration Engineer (IE)

Testing Engineer (TE)

Code Developer (CD)

## 4.6 Tools, Techniques, and Methodologies

Tools:

GitHub and Trello are the two external software tools that will be used to process the handling of all defects.

GitHub is a source code management and version control tool. All resources are stored on GitHub and they are updated when a code developer pushes the updated file to the GitHub repository. GitHub also highlights the changes that have been made to each document when a new version is pushed to the repository. This allows the team to have access to the most recent versions of each resource at all times.

Trello is a collaboration tool which is used to assign tasks to different members. Each individual task is represented as what is labeled a card in Trello. The card contains information pertaining to the defect itself such as severity level, description, and the team member or members who are responsible for resolving the defect. Trello also allows us to track our progress with different lists. Cards can be moved from one list to another to show which phase a task is in. For example, when a defect is first documented, it may fall under the list of “To Be Resolved” and when the defect has been resolved, it can simply be moved into the “Resolved” list. This tool allows us to keep our defect resolution process organized.

Techniques and Methodologies:

Exploratory, functional, and user-acceptance testing procedures as well as methodologies for testing are all explained in the STP document.

# 5. V&V Processes

## 5.1 Management of V&V

V&V for the AAU website will involve every team member to ensure quality code, but this V&V plan will be managed by the RE.

## 5.2 Acquisition V&V

Software used will be determined by group consensus, with the final say being left up to either of the SAs. In each iteration, new features will be analyzed and third-party software that can help realize those goals will be proposed and voted upon before tasks are assigned.

# 5.3 Development V&V

### 5.3.1 Concept V&V

Our initial concept for the AAU website portal will be verified by answering the following questions:

* Do the ideas discussed for the project relate to the concept of a university website portal?
* Are we in proper communication with our project customers to ensure that we have all of the information necessary to begin the specification and design of our project?

Validation of these concept ideas will come from answering the following questions:

* Are any concepts being discussed “getting ahead of ourselves” by asking questions and presenting ideas that assume a prior consensus, such as discussing the project language before the scope is considered?
* Is the concept discussed reasonably sized in scope such that estimated completion time for development is within our expected delivery schedule?

### 5.3.2 Requirements V&V

Our AAU website SRS will be verified by answering the following questions:

* Are all of the requirements laid out in the initial concept phase specified and detailed?
* Is the history of every requirement laid out plainly to communicate the order in which requirements were determined?
* Do the requirements meet some minimum standard for a functional university website?
* Are there any requirements that are not easily explained or otherwise too complex to develop? If so, should these be reevaluated?

We will validate these requirements by engaging in mock user sessions with each team member to see if the requirements are well-met or if there are new requirements to consider.

### 5.3.3 Design V&V

Our AAU website SDD will be verified by asking whether or not each requirement is currently being tackled in some design. We will also ask whether or not there are any parts of the design that are extraneous or otherwise taking up too much development time away from meeting our goals.

The SDD will be validated by assessing the fitness of each design in meeting requirement goals in terms of feasibility and potential technical complexity.

### 5.3.4 Implementation V&V

The implementation of the AAU website portal will be verified by ensuring that each intended property of the design is accounted for in the implementation details for each software component.

The implementation will be validated through regular code reviews held each iteration that ensure that the quality of code makes it easy to work with and understand on a conceptual level. This includes proper code formatting, best practices adherence, and extensive documentation.

### 5.3.5 Test V&V

Testing documentation for our University Website will be verified with the following questions:

* Are all potentially user-affecting requirements (i.e. payment) tested at a level to ensure correctness and user safety?
* Does the test style make sense for the requirements being set out?
* Are our test plans and procedures comprehensive? Will we need more coverage?

For validation, the following questions will also be answered:

* Do the measured defect density and severity indicate that the finished product is of acceptable quality? If not, what level of quality is needed?
* Are all metrics specified in the SQAP accounted for?

## 5.4 Operation V&V

The overall verification and validation process will be overseen by the project manager, carried out by the testing engineers and the requirement engineer, and defects will be resolved by the entire team of code developers.

## 5.5 Maintenance V&V

Maintenance will be performed by the code developer that is assigned to a specific defect. As stated earlier, Trello is used to track and manage the details of both resolved and unresolved defects. Once the defect has been resolved, a pull request in GitHub will be created by the code developer which resolved the defect.

# 6. V&V Reporting Requirements

## 6.1 Reporting

Each team member is responsible for reporting inconsistencies with our expected V&V plan for each area. For example, SAs will regularly verify and validate the design against the requirements, so they will report amongst each other.

## 6.2 Administrative

The project team leader ensures that all V&V that is done in each iteration of the project is properly carried out. In the event that the team leader is not able to be present, this responsibility falls upon the RE.

## 6.3 Documentation

V&V reports will be handled by filing reports for requirement, design, and implementation defects using GitHub Issues. This documents all problems encountered during each V&V process and allows us to assign team members to each one.

# 7. V&V Administrative Requirements

## 7.1 Anomaly Reporting and Resolution

We will use GitHub Issues to maintain a running list of open defects as they become known. Each bug report will contain details pertaining to the nature of the issue, its priority level, and the issue type. REs will handle reporting and oversight of all bugs pertaining to meeting high-level requirement specifications in the SRS. SAs will handle reporting and oversight of all bugs pertaining to the general structure of the software and practices defined in the SCMP. TEs will handle reporting and oversight of all other bugs, such as tests that do not pass or unexpected program behavior as defined in the SQAP.

## 7.2 Task Iteration Policy

V&V tasks will be repeated once for each iteration cycle. Each member of the team will inspect for defects according to their own standards using the V&V processes laid out in this document, and as each anomaly is reported, it will be assigned to any willing developer.

## 7.3 Deviation Policy

Any deviations from this plan must be discussed with the person in charge of those responsibilities if it involves any sort of temporary reassignment of duties. Otherwise, the deviation should be discussed with the group at large in order to be approved.

## 7.4 Standards, Practices, and Conventions

Formatting for proper anomaly reported is defined in the GitHub Guides website page on Issues located at <https://guides.github.com/features/issues/>. Each issue will be reported according to the following minimum specifications:

* Issues must have a descriptive title that summarizes the issue in one sentence. An example would be, “Home page drop-down menu does not appear.”
* Each issue must be assigned a label relating to which area of the project the issue is related to. For example, an issue regarding a high-level Model design might be named “Design - Models”. The title and description must build upon this label to provide further context.
* Each issue must be attached to a Milestone. A Milestone is a development target that we are trying to reach. An example of a Milestone in the context of this project might be “Weekly Sprint 3/06/17”, indicating it is intended to be addressed by the end of that sprint milestone.
* After the issue is brought to the attention of the team, one Assignee is listed to resolve the issue. The team member assigned may work with another team member to resolve the issue and must be properly attributed in the issue comments.
* Any developments in the progress of resolving the issue must be succinctly noted and any references to related issues must be written using the proper syntax, as specified on the linked page.

# 8. V&V Documentation Requirements

Documentation of defect resolution takes place in the pull request section in GitHub; there are no official requirements for the documentation of defect resolution other than a summary of the resolution details.