SE 3501

SOFTWARE VALIDATION AND VERIFICATION

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SOFTWARE VALIDATION AND VERIFICATION

Welcome!

This course is design to provide a comprehensive check of a software system against its specification and to ensure you understand the process in verifying and validating a software produced.

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I. Basics introduction to Software V&V

❖ Class Objectives

✓ To introduce software verification and validation and to discuss the distinction between them.

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❖ Verification Vs Validation

- **Verification**

  "Are we building the product right"

✓ The software should conform to its specification.

- **Validation**

  "Are we building the right product"

✓ The software should do what the user really requires.

I. Basics introduction to Software V&V

❖ Software Verification and Validation

- These are activities that checks the software against its specification.

- Every project must verify and validate the software it produces.

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❖ Software Verification and Validation

➢ ***Who is responsible to organize it?***

- The project management is responsible for organizing software verification and validation activities, the definition of software verification and validation roles, and the allocation of staff to those roles.

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❖ Software Verification and Validation

➢ *How is V & V done (1)*

- By checking that each software item meets specified requirements;

- By checking that each software item before it is used as an input to another activity;

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❖ Software Verification and Validation

➢ *How is V & V done (1)*

- By ensuring that checks on each software items are done, as for as possible , by someone other than the author;

- By ensuring that the amount of verification and validation effort is adequate to shoe each software item is suitable for operational use.

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❖ Verification Vs Validation

- **Verification**

✓ Should check the program meets its specification as written in the requirements document.

Example:

○ This may involve checking that it meets it functional and non-functional requirements.

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❖ Verification Vs Validation

- **Verification(1) – it means the**

✓ Act of reviewing, inspecting , testing, checking, auditing, or otherwise establishing and documenting whether items, processes , services or documents conform to specified requirements.

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❖ Verification Vs Validation

- **Verification(2) – it means the**

✓ Process of evaluating a system or component to determine whether the products of a given development phase satisfy the conditions imposed at the start of the phase.

✓ Formal prof of program correctness

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❖ Verification Vs Validation

- **Verification** activities - include

✓ Technical reviews, walkthroughs and software inspections

✓ Checking that software requirements are traceable to user requirements;

✓ Checking that design components are traceable to software requirements;

✓ Unit, integration, system and acceptance testing

✓ Audit.

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❖ Verification Vs Validation

- **Validation**

✓ Should ensure that the product meets the customers expectations.

Example:

○ This goes beyond checking its meets its specification; as system specifications may not always accurately reflect the real needs of users.

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❖ Verification Vs Validation

- **Validation (according to ANSI/IEEE)**

✓ It’s the process of evaluating a system or component during or at the end of the development process to determine whether it satisfies specific requirements.

➢ Validation is , therefore , ‘end-to-end’ verification.

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❖ Verification and Validation Process

- **A whole life-cycle process**

✓ Must be applied at each stage in the software process.

- **Has two principal objectives**

➢ The discovery of defects in a system

➢ The assessment of whether or not the system is usable in an operational situation.

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❖ Verification and Validation Goals

- V&V should establish confidence that the software is fit for its purpose.

- This does not mean completely free of defects rather, it must be good enough for its intended use and the type of use will determine the degree of confidence that is needed.

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❖ Verification and Validation Confidence

- ***To what extern should a verification and validation be done?***

It depends on :

- ✓ The Software function
- ✓ The User expectation
- ✓ The Marketing environment

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❖ Verification and Validation Confidence

- ***The extern of V & V confidence (1)***

It depends on :

✓ **The Software function**

- The level of confidence depends on how critical the software is to an organization.

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❖ Verification and Validation Confidence

- ***The extern of V & V confidence (2)***

It depends on :

✓ **The user Expectations**

- Users may have low expectations of certain kinds of software.

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❖ Verification and Validation Confidence

- ***The extern of V & V confidence (3)***

It depends on :

✓ **The Marketing environment**

- Getting a product to market early may be more important than finding defects in the program.

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❖ Types of software verification

- ***Software inspection (Static verification)***
- ***Software testing (dynamic verification)***

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❖ Types of software verification(1)

- ***Software inspection (Static verification)***

✓ Its concerns with analysis of the static system representation to discover problems.

- May be supplement by tool-based document and code analysis.

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❖ Types of software verification(2)

- ***Software testing (Dynamic verification)***

✓ Its concerns with exercising and observing product behavior.

- The system is executed with test data and its operational behavior is observed.
- It reveals the presence of errors Not their absence.

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QUESTIONS