Agile testing for Autosar Product

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Revision Sheet

Version	Date	Author	Description of Change
1.0	05/28/2024	Krishna	Initial Draft: Sprint Planning
1.1	05/28/2024	Asha	Revised Draft: Test-Driven Development (TDD)
1.2	05/28/2024	Tahir	Revised Draft: Continuous Integration (CI)
1.3	05/28/2024	HarshVardhan	Revised Draft: Daily Stand-Ups
1.4	05/28/2024	Anupam	Revised Draft: Incremental Testing
1.5	05/28/2024	Manish	Revised Draft: System Testing
1.6	05/28/2024	Hrushi	Revised Draft: Review and Retrospective
1.7	05/28/2024	Group 1	Final Draft: Example User Story Testing Flow and Tools and Frameworks

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Introduction

Agile testing for an AUTOSAR (Automotive Open System Architecture) product involves integrating testing activities into the agile development lifecycle, focusing on iterative and incremental delivery.

Here's a demonstration of how agile testing can be applied to an AUTOSAR product:

1. Sprint Planning

- Requirement Analysis: Review AUTOSAR requirements, functional safety requirements, and other system constraints.

- Test Planning: Define testing goals for the sprint. Identify which AUTOSAR modules (e.g., BSW, RTE, SW-C) will be developed and tested.

- User Stories and Test Cases: Break down requirements into user stories. Create corresponding test cases for each user story, focusing on both unit tests and integration tests.

2. Test-Driven Development (TDD)

- Writing Tests First: For each user story, write test cases before developing the code. For AUTOSAR, this could include:

  - Unit Tests: For individual SW-C (software components).

  - Integration Tests: For interactions between different AUTOSAR layers, such as communication between SW-Cs and BSW modules.

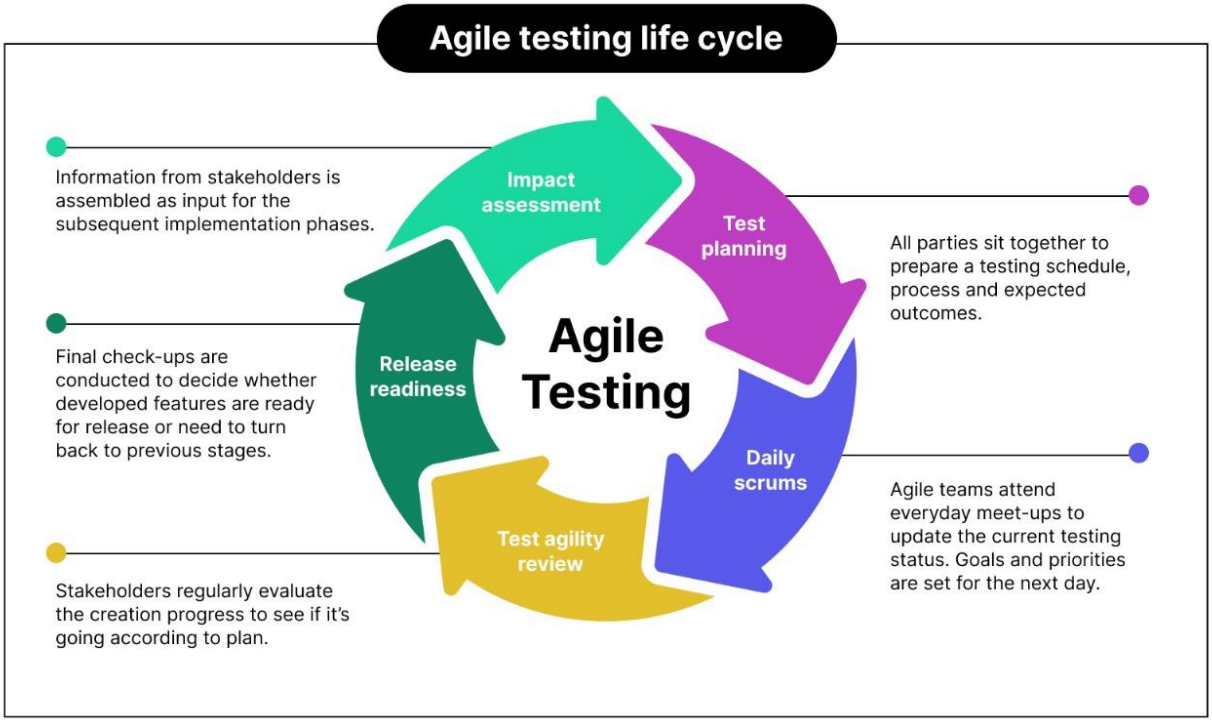
- Example: If a user story involves creating a CAN communication module, write tests to verify message transmission, reception, and error handling.

3. Continuous Integration (CI)

- Automated Builds and Tests: Set up a CI pipeline to automatically build the AUTOSAR software and run tests on every code commit.

- Tool Integration: Use tools like Jenkins, GitLab CI, or Azure DevOps to automate the process. Integrate with AUTOSAR tools like Vector CANoe for simulation and testing.

- Static Analysis: Integrate tools for static code analysis (e.g., Polyspace, QAC) to ensure compliance with coding standards and detect potential issues early.



4. Daily Stand-Ups

- Progress Tracking: Discuss testing progress, any issues encountered, and adjust the plan as necessary.

- Defect Reporting: Report and prioritize defects found during testing. Use a defect tracking tool (e.g., JIRA) to manage them.

5. Incremental Testing

- Unit Testing: Developers write unit tests for their components. Use frameworks like Google Test or VectorCAST.

- Integration Testing: As modules are integrated, perform integration tests to verify communication and interaction. Use tools like dSPACE or ETAS for hardware-in-the-loop (HIL) testing.

- Example: If integrating a new sensor input module, test how it interacts with existing control modules in both simulated and real environments.

6. System Testing

- End-to-End Testing: Perform system-level tests to validate the entire AUTOSAR stack. This includes testing in a simulated vehicle environment and on actual hardware.

- Functional Safety Testing: Conduct tests to ensure the system meets safety requirements as per ISO 26262.

7. Review and Retrospective

- Test Coverage Analysis: Review test coverage reports to ensure all parts of the code are adequately tested.

- Sprint Retrospective: Discuss what went well in the testing process and what can be improved. Adjust the testing strategy accordingly.

Example User Story Testing Flow

User Story: Implement Diagnostic Communication

1.Requirement:

The system must support diagnostic communication over CAN.

2. Test Cases:

- Verify that diagnostic messages can be received and decoded.

- Verify that the system can respond with appropriate diagnostic data.

- Test handling of erroneous diagnostic messages.

3. TDD:

- Write unit tests for the diagnostic module functions.

- Develop the diagnostic module.

- Run unit tests to validate functionality.

4. Integration Tests:

- Integrate the diagnostic module with the CAN communication stack.
- Test diagnostic communication in a simulated environment using Vector CANoe.

5. System Tests:

- Test the complete diagnostic communication process on HIL setup.
- Validate against real vehicle scenarios.

Conclusion

By incorporating agile testing practices, AUTOSAR product development can achieve higher quality, quicker feedback cycles, and better alignment with evolving requirements.

THANK YOU