Test Driven Development or TDD

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An Introduction

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Supporting and Promoting FHIR since 2013
Inventor – Developers Integration Lab (DIL)
Research – FHIR Testing (JMIR)
Awards – Gartner Top Strategic Technology, Cool Vendor
  Federal Health IT Top Innovation Award (new award created specifically for the
  DIL & Touchstone
  2022 Federal Health IT Top 100 (Executives)
An Introduction to FHIR Testing

Agenda

• What is Test-Driven-Development (TDD)
  • Validation ensures interoperability with other systems

• Why do we Test our FHIR Implementation
  • How Test Early-Test Often can accelerate your FHIR Implementation efforts

• When should we start thinking about Testing our FHIR Implementation
  • Before we ever start developing! Really? let us explain further ...
What is Test-Driven-Development (TDD)

• Both Test Driven and Behavioral Driven Development & Testing techniques follow a similar premise - software requirements should be converted to testable artifacts before software is developed

• Whether you are using a traditional Waterfall methodology, or more modern techniques like Agile (Sprints & Scrums) or Dev-Ops (... Dev-Sec-Ops) – clearly defining success criteria (or Exit Criteria) prior to beginning the development phase.

• Help’s to build a better requirement, when you have to think about operational outcomes
Why do we test our FHIR Implementations?
Why do we test our FHIR Implementations

• Healthcare and Healthcare IT has long been in search of Interoperability
  • An ability to seamlessly access and reuse data, information and knowledge
  • Care Coordination aspirations state the Patient should be at the center of care continuum

• Compliance and Conformance (Validation and Verification) Regulations
  • 21st Century Cures Act (ONC and CMS FINAL RULE) on the role of Interoperability

• Data Quality, better Decision Support Systems and Outcome Analytics
  Supporting a Connected-world (Artificial Intelligence)
When should we start …

• When we begin developing requirements we should consider testability

• When we bring Healthcare Communities together for consensus based standards

• When we consider which FHIR Implementation Guides (IG’s) or Workgroup we will support

• A stalwart follower of TDD might argue that we violate TDD if the actual developer writing the code does NOT write the Test Script.
Client vs Server vs Workflow Testing

• In the FHIR spectrum of implementations, there are several differing lenses of testing
  • Testing a FHIR Server
  • Testing a FHIR Client
  • Testing a complex Workflow (multi-actor, multi-step)

• Complex Enterprise Solutions
  • What does a Patient Record look like through the lenses of Interoperability
Continuous Interoperability

- An integrated FHIR Ecosystem will see a homogeny of FHIR Standards
  - FHIR STU3, R4, R5 or in the future R6
  - FHIR IG’s and Profiles (with extensions)
- FHIR Versioning will play a significant role
- FHIR Static vs Dynamic Resources (Store-and-Forward vs Real-time)
- Provenance and the history of information
At the Connectathon

Look for the Break-Out Room for Testing Support

• Provide a review of track tests
• Help with testing setup for individual or peer-to-peer
• Insights about test results
• Direct users to other available tests

Contact Touchstone_Support@AEGIS.net
Resources

• [https://www.hl7.org/fhir/us/core/](https://www.hl7.org/fhir/us/core/)
  Profile Only Support: Systems may support *only* the US Core Profiles to represent clinical information.
  Profile Support + Interaction Support: Systems may support *both* the US Core Profile content structure *and* the RESTful interactions defined for a resource.

• JMIR Research on FHIR Testing -

• [https://www.hl7.org/fhir/r3maps.html](https://www.hl7.org/fhir/r3maps.html)

• [https://www.hl7.org/fhir/versioning.html#mt-version](https://www.hl7.org/fhir/versioning.html#mt-version)

• [https://www.hl7.org/fhir/capabilitystatement-operation-versions.html](https://www.hl7.org/fhir/capabilitystatement-operation-versions.html)