FHIR Testing and Touchstone

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Goal of Session Two

- Present the FHIR Testing framework
- Introduce Touchstone:
  - User registration
  - Account setup
  - Test system setup
  - Test execution (demo)

FHIR Testing Framework

- To ensure interoperability between applications claiming conformance to the specification, a testing framework has been established within the FHIR specification.
- This framework defines the TestScript resource as a natural language, computable format of a test case.
- It provides a defined test methodology for the FHIR specification which can be used to validate interoperability across FHIR server and client implementations.

FHIR Testing Framework

7.2 Testing FHIR

FHIR Infrastructure Work Group	Maturity Level: 2	Ballot Status: Draft

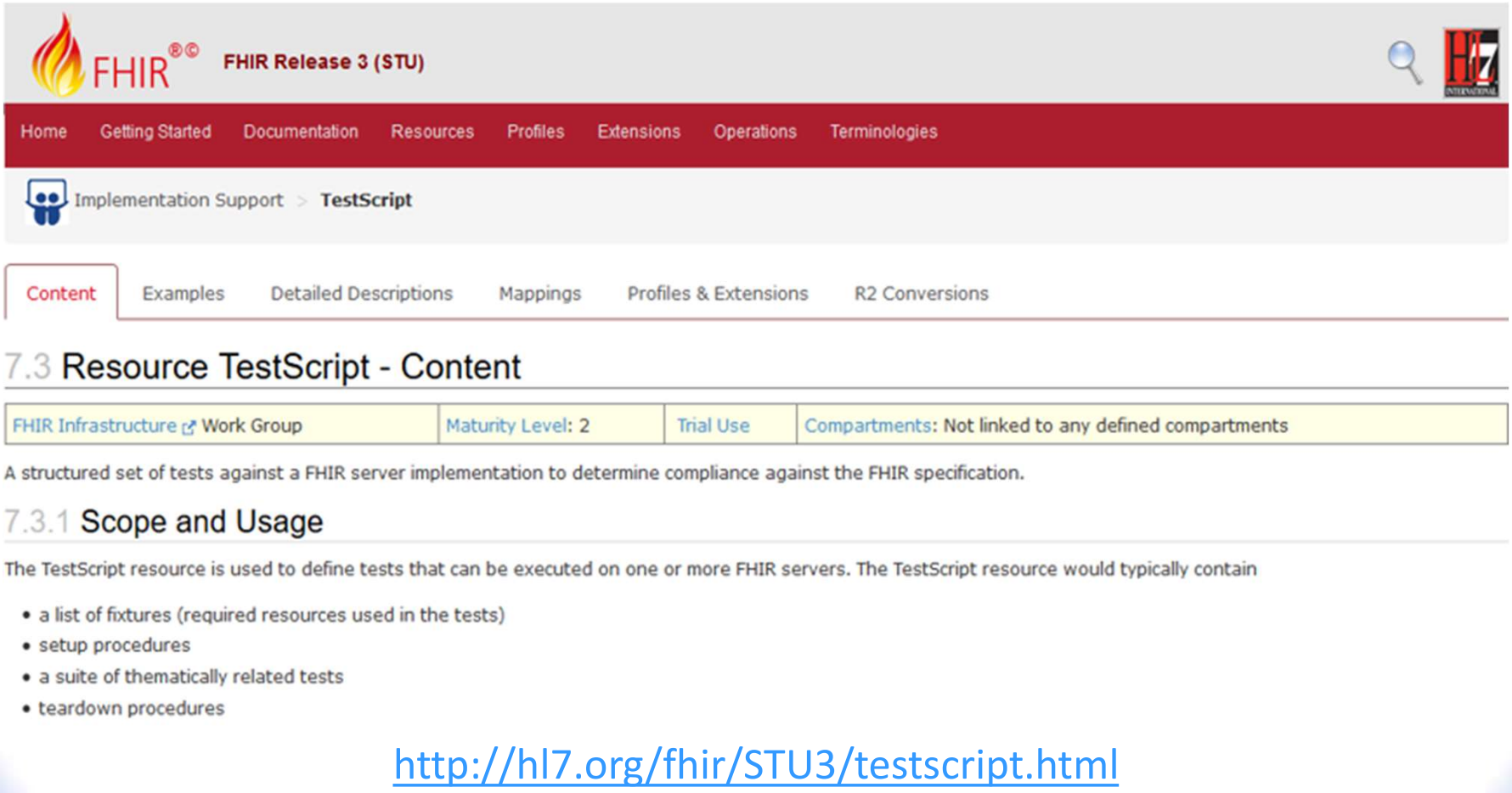
The FHIR specification describes a set of resources, and several different frameworks for exchanging resources between different systems. Because of its general nature and wide applicability, the rules made in this specification are generally fairly loose. As a consequence and in order to insure interoperability between applications claiming conformance to this specification, a testing framework has been established within the FHIR specification. To this end, the TestScript resource provides an implementation-agnostic description of tests that allows test execution engines to evaluate if a FHIR implementation conforms with the FHIR specification. Providing a clear and concise test methodology for the FHIR specification through the TestScript resource helps to enable interoperability among various FHIR server and client implementations.

http://hl7.org/fhir/STU3/testing.html

FHIR TestScript Resource

- The TestScript resource represents an executable test definition for examining the results of FHIR RESTful API interactions.
- A TestScript example would be a set of tests that exercise a certain function, such as Patient Search, and validating the responses. For this example we require:
  - Patient resource(s) required to complete this test
  - A setup procedure to create those Patient resource(s)
  - The tests which execute the functions being exercised & evaluate the results
  - A setup or tear-down procedure to initialize or clean up the test data

TestScript Resource



http://hl7.org/fhir/STU3/testscript.html

Test Engine Workflow

- Pre-Processing
  - Determine whether or not the TestScript interactions match the capabilities of the system under test. If supported, the test engine proceeds.
- Setup Execution
  - Optional operations that prepare the system under test for subsequent test execution.
- Test Execution
  - Execute and record each test's operations and assertions.
- Teardown Execution
  - Optional operations that revert the system under test to its pre-test state.
- Post-Processing
  - Cleanup of test execution data and collection of test results.

http://hl7.org/fhir/STU3/testing.html#execution

Pre-Processing

Capability Based Testing

- The test engine will use the CapabilityStatement of the system under test to determine how to process a TestScript.
- If the TestScript defines the testing of capabilities that the system under test does support, the test engine will continue the workflow process.
- If the TestScript defines the testing of capabilities that the system under test does not support, the test engine should allow the TestScript to be skipped.

Test Execution

Executing Operations

- Test execution consists of two action types:
  - operation: The FHIR RESTful API interaction to be executed.
  - assert: The rule that is evaluated against the results of the operation. If true, the assert passes.

Key concept: The operation is always executed regardless of whether or not an assert follows.

TestScript Operations

FHIR Interactions

Instance Level Interactions

- Read (GET)
- Vread (GET)
- Update (PUT)
- Patch (PATCH)
- Delete (DELETE)
- History (GET)

Type Level Interactions

- Create (POST)
- Create via Update (PUT)
- Search (GET)
- History (GET)

Whole System Interactions

- Capabilities (GET/OPTIONS)
- Batch/Transaction (POST)
- History (GET)
- Search (GET)

Extended Operations

http://hl7.org/fhir/STU3/operationslist.html

- Base Operations (All Resources)
- Operations Defined by Resource Type

Asserts

Conditions, Rules or Expressions

- An assert acts on the immediately preceding operation.
- It states a condition, rule or expression that will be evaluated against the executed operation context.

Asserts provide support for:

- Evaluation of both the inbound request or outbound response
- Complex and simple evaluation of HTTP headers and response codes
- Operators for equality, relational comparison, containment, etc.
- Expression language support for XPath, JSONPath and FHIRPath
- Payload comparison to defined fixtures (static or dynamic)
- Payload validation against defined FHIR profile(s)
- *Plus a whole lot more…*

Recap: FHIR Testing and TestScripts

- FHIR defines a Testing Framework as part of the specification
- Test Engines should follow a prescribed Workflow
- TestScript Resource Type provides a complete, executable test definition
- Support for the entire FHIR RESTful API (Operations)
- Support for Evaluation of Extensive Conditions, Rules and Expressions (Asserts)

Discussion (Q & A)

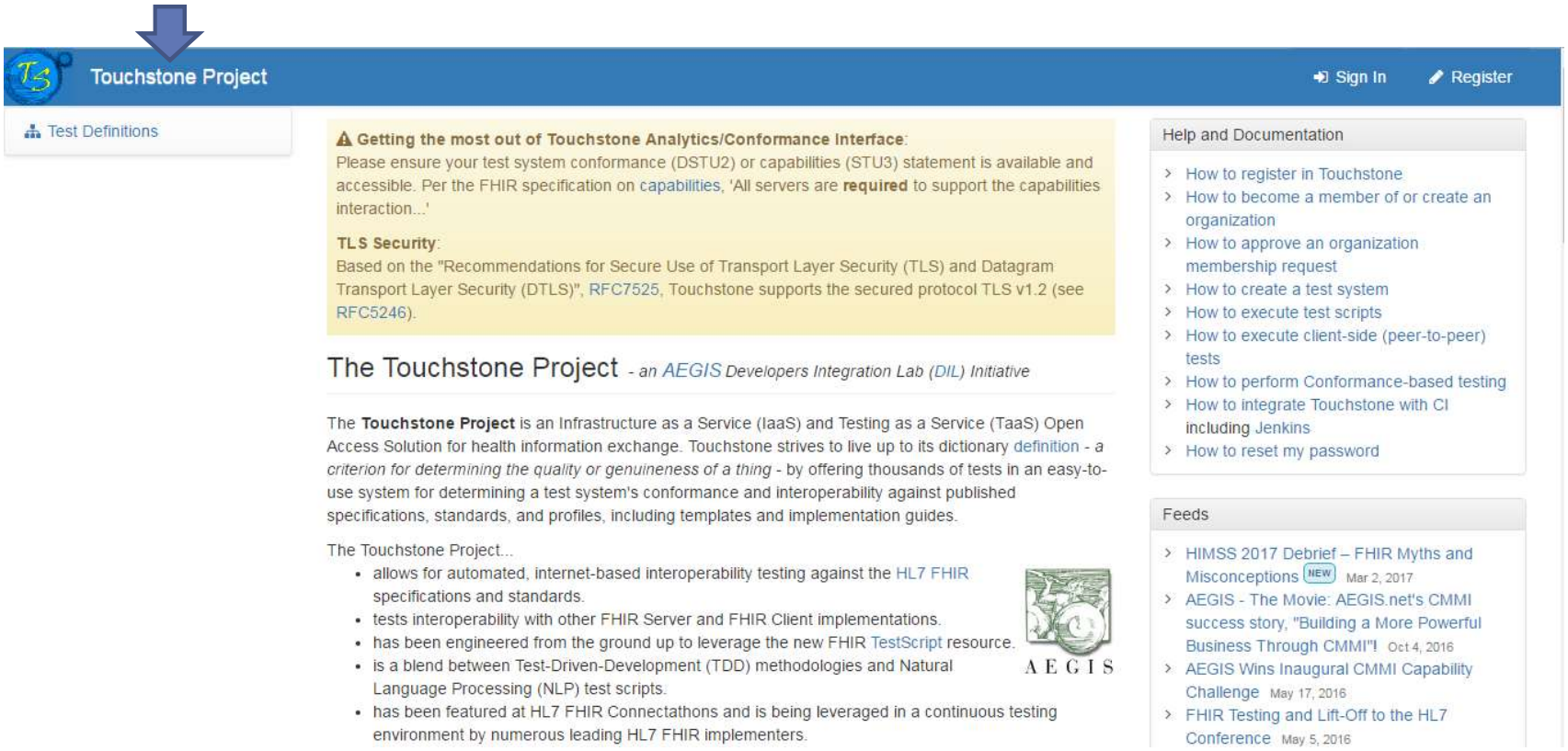
Introducing Touchstone

Touchstone is an easy-to-use testing platform for health information exchange that implements the FHIR Testing Framework architecture.

Touchstone

- Is available as a publicly accessible cloud-based testing platform
- Provides automated, internet-based interoperability testing of the HL7® FHIR® specification
- Tests the capabilities of and interoperability between both FHIR Server and Client implementations
- Is a blend between Test-Driven-Development (TDD) methodologies and Natural Language Processing (NLP) TestScripts

Touchstone Landing Page



www.touchstone.com

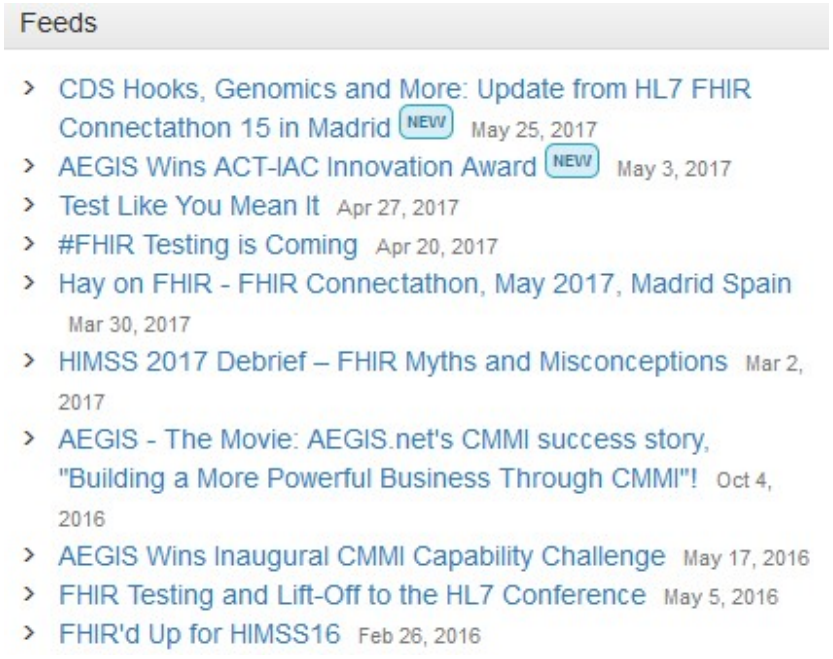
Touchstone Landing Page

Alerts: Important usage information

Touchstone Updates: Describes significant released version updates

Help and Documentation: Links to User Guide

Touchstone Landing Page



Feeds: News links related to FHIR, Testing and Touchstone

Touchstone Totals: Tracks participation since Touchstone v1.0 release

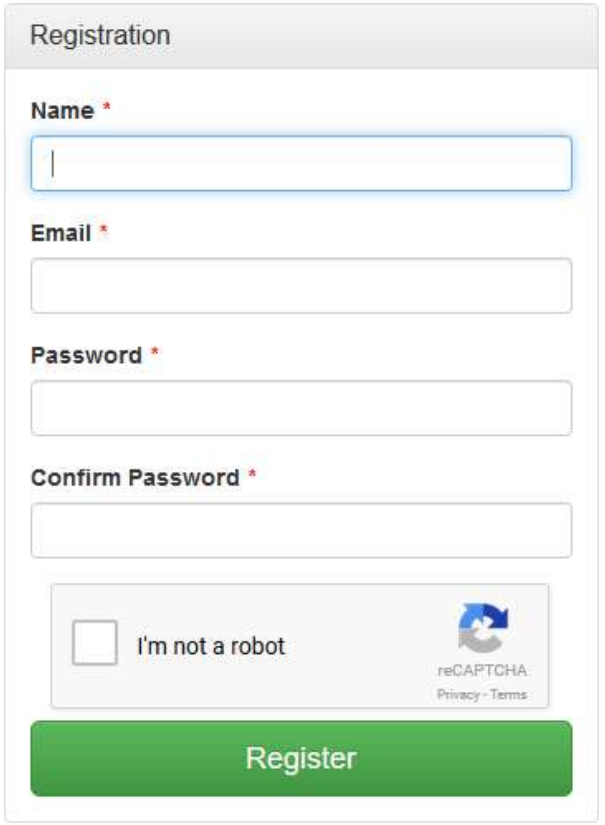
Discussion (Q & A)

Getting Started with Touchstone

- All testing participants need to first Register with Touchstone
- Organizations may have 1 or more registered users on Touchstone (based on the organization's subscription level)
- Registration and acceptance of registration must be completed before any testing can begin
- An organization will typically have at least 1 test system and may choose to run tests against other publicly available test systems

Register an Account in Touchstone

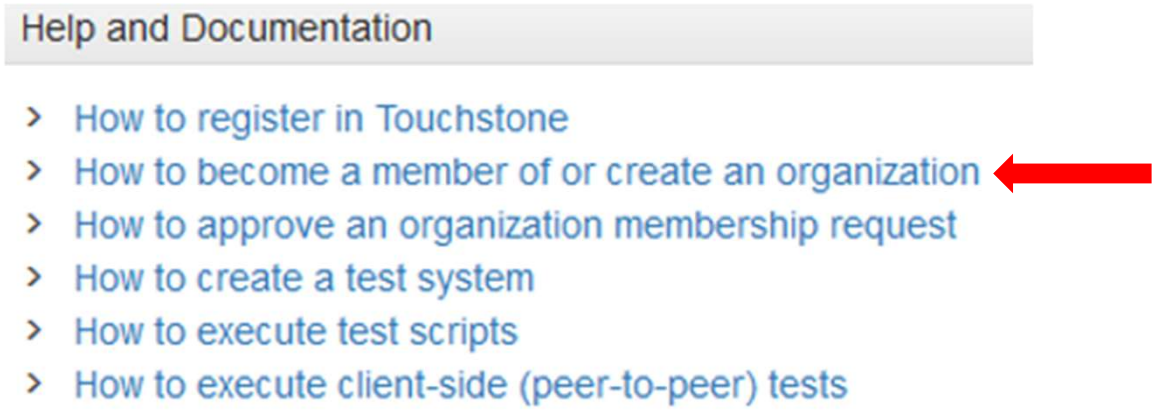
- Click Register
  - Enter your user name, email, password twice, and select "I'm not a robot"
  - Click the Register button



Create or Join an Organization

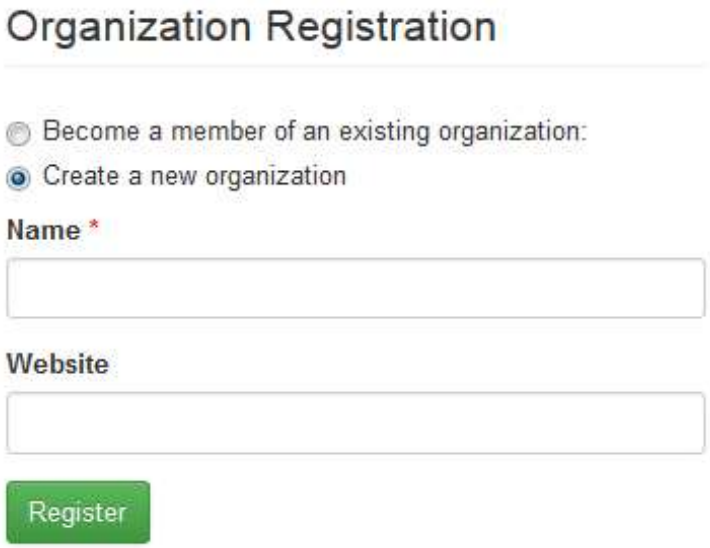
Your user account must belong to an organization. You can:

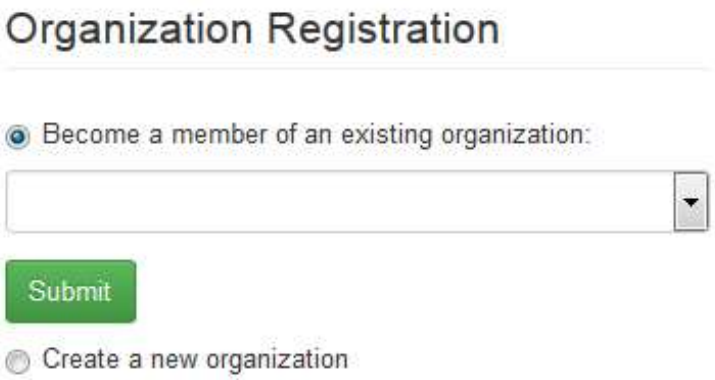
a. Create an organization with your team
b. Join an existing organization
c. Use the Help and Documentation links if guidance is needed



Create or Join an Organization

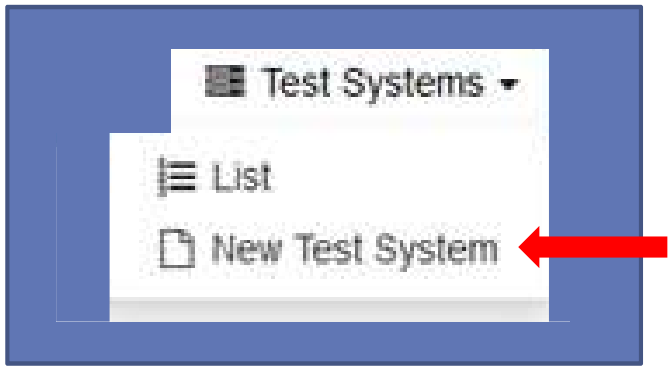
- If you are the first person from your organization to register, select Create a new organization
- If your organization is already registered, select Become a member of an existing organization. Then select your organization from the dropdown list.





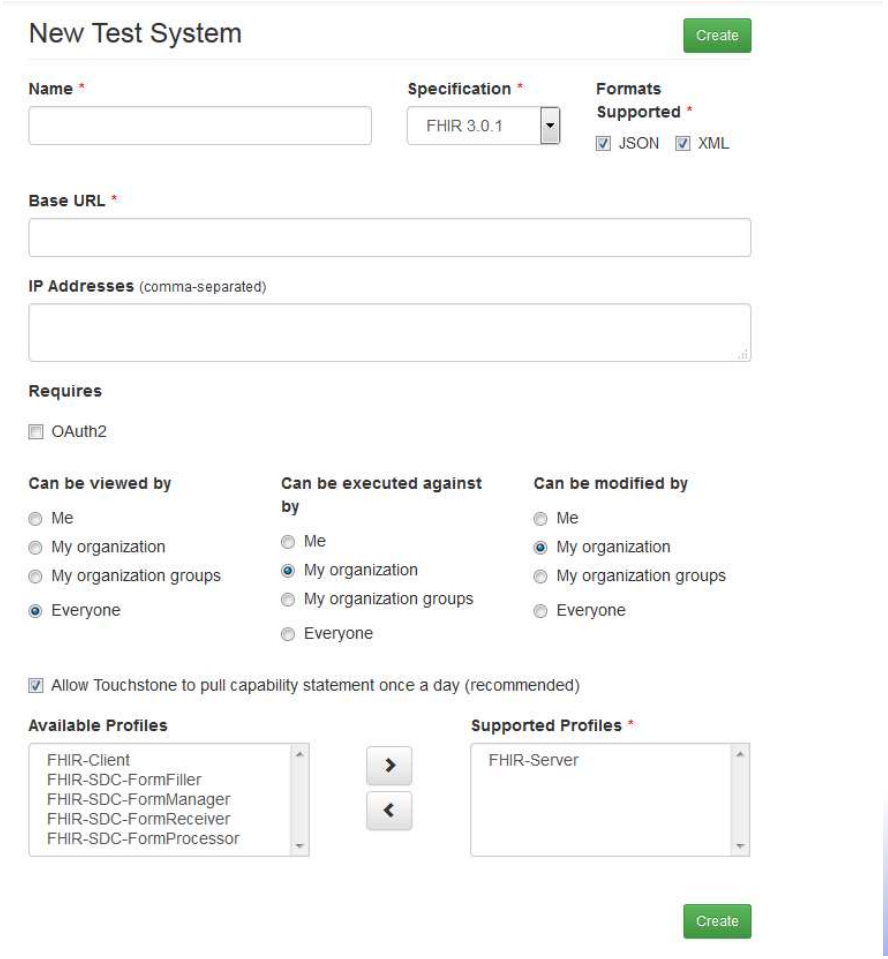
Create a New Test System Definition

- To run tests, a Test System must be defined
- From the top menu
  - Go to Test Systems
  - Select New Test System
- Once selected, a new entry for Test System will display



Create a New Test System Definition

- Enter the test system name
- Select the specification version and supported formats
- Enter the base URL
- The IP addresses are optional
  (Touchstone will determine this if left blank)
- Select OAuth2 if required
- Select privacy settings:
  - who the Test System can be viewed by
  - who can execute against the Test System
  - who can modify the Test System
- Assign the supported actor profiles



Touchstone Demo – Test Execution

Discussion (Q & A)