2014 Edition Test Scenarios

Revised March 25, 2013

Introduction

Purpose of Scenarios

- Make clinically plausible
- Ensure use of data store in the EHR
- Increase value, efficiency, and consistency of testing

Unit-Based Testing

- Currently implemented (required)
- Individual unit tests and data
- 2011 and 2014 Edition test procedures

Scenario-Based Testing

- Future implementation (optional)
- Linked unit tests and threaded data
- First test scenario – EHR Interoperabiliity: Intake
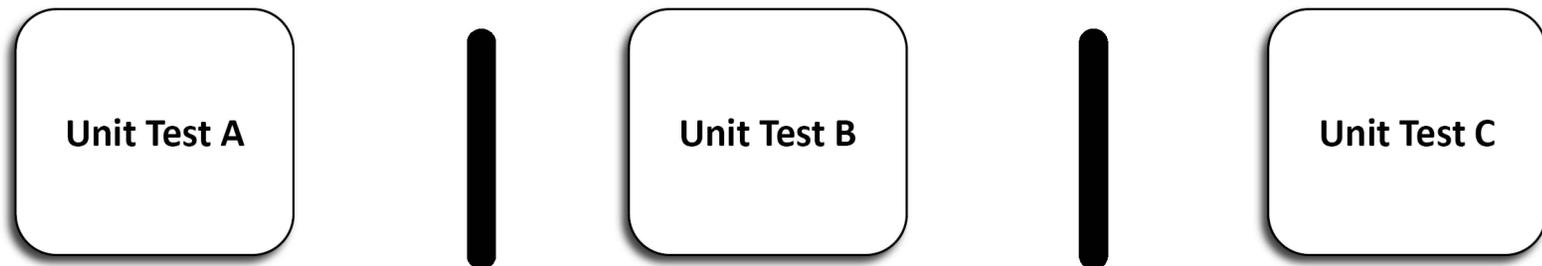- Requesting public input

Contents

Unit-Based Testing

- Minimum requirement
- Independent tests
- Individual test data (input) and result(s) (output)
- Currently employed for 2011 and 2014 Edition test procedures
- Required for 2011 and 2014 Edition testing and certification

Unit Based Testing

Unit Test A	Unit Test B	Unit Test C

One Unit Test

Data

Entered during test

Set Test to Initial State

Unit Test

Post-test state

Data and other state information present at the end of the test. *Includes data that was not verified as part of the test.*

End State

Test Results

Data

Data

Verified during test (on screen or by reviewing interoperable output)
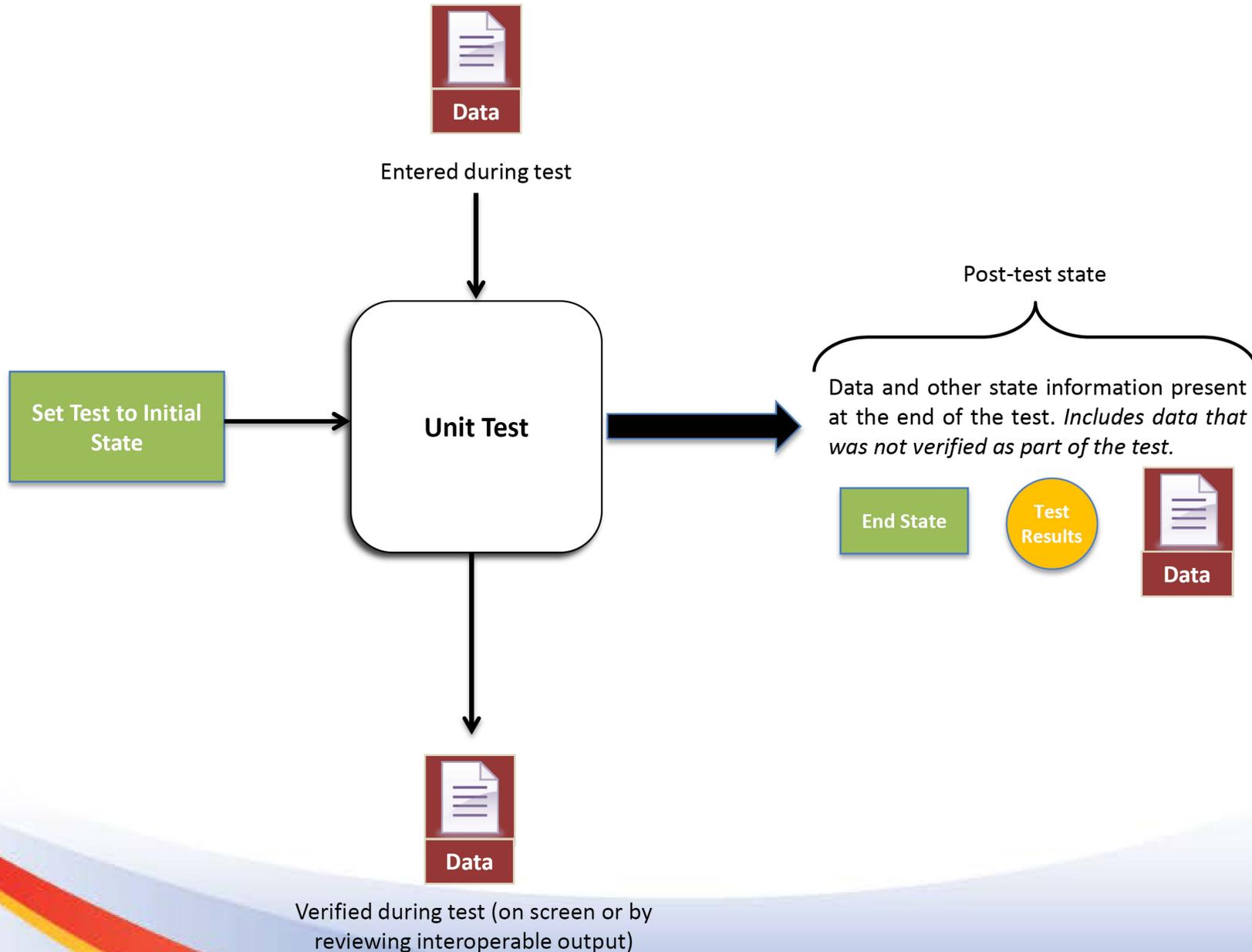
Purpose of Scenario-Based Testing

- Make **clinically plausible** (i.e. align with plausible clinical scenarios)
- Ensure ability to use **data across systems**
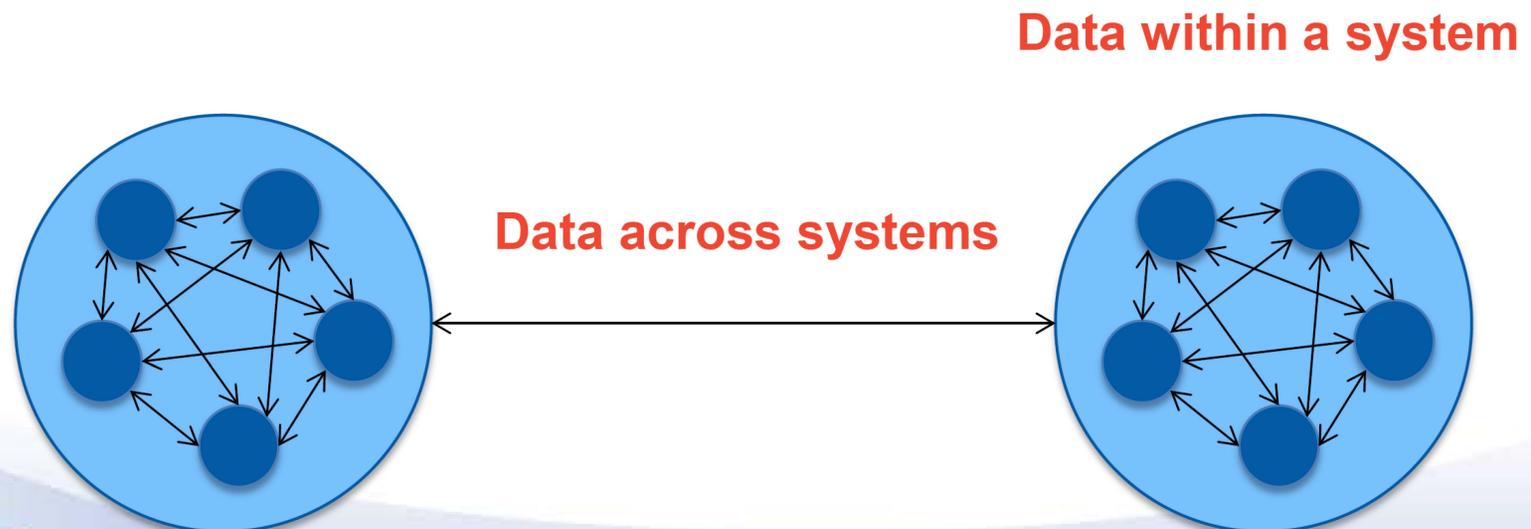- Ensure ability to use **data within a system**
- **Increases value** of testing
- **Improve efficiency** of testing
- **Reduce setup** of testing
- Make testing **consistent** and **replicable**

Data within a system

Data across systems

Scenario-Based Testing

Scenario-based testing will be an **alternative** to unit-based testing

- Scenario-based testing means **dependent** tests

    - Test data links unit tests with dependent inputs and outputs

    - The test data **output** of one test can be the **input** for another

    - Scenario-based testing will be **optional** for the 2014 Edition

Scenario-based test procedures will be **clinically plausible**

- A scenario represents **one** possible clinical workflow that could link unit tests

- It does **not** represent the **only** way unit tests could be linked in a clinical workflow

- Scenarios will test **all** of the capabilities of the criteria in the scenario

    - They allow EHR technology to be **tested** in a clinically plausible way

    - They do **not** imply any requirements about how eligible providers should **use** EHR technology to attest to meaningful use

Two Unit Tests: Sequential and Independent

Current testing practices call for unit tests to be independent.

- Testing frameworks often randomize the sequence of unit tests to detect any accidental carry-forward of data or Test state information from one test to the next.

- In the example below, the post-test state of Unit Test 1 would **not** be used for setting the initial state of Unit Test 2.

Test 1

Data

Entered during test 1

Set Test to Initial State

Unit Test 1

Unit Test 1 Results

Data

Verified during test 1

Post-test state

End State

Data

Test 2

Data 2

Entered during test 2

Set Test to Initial State

Unit Test 2

Unit Test 2 Results

Post-test state

Data

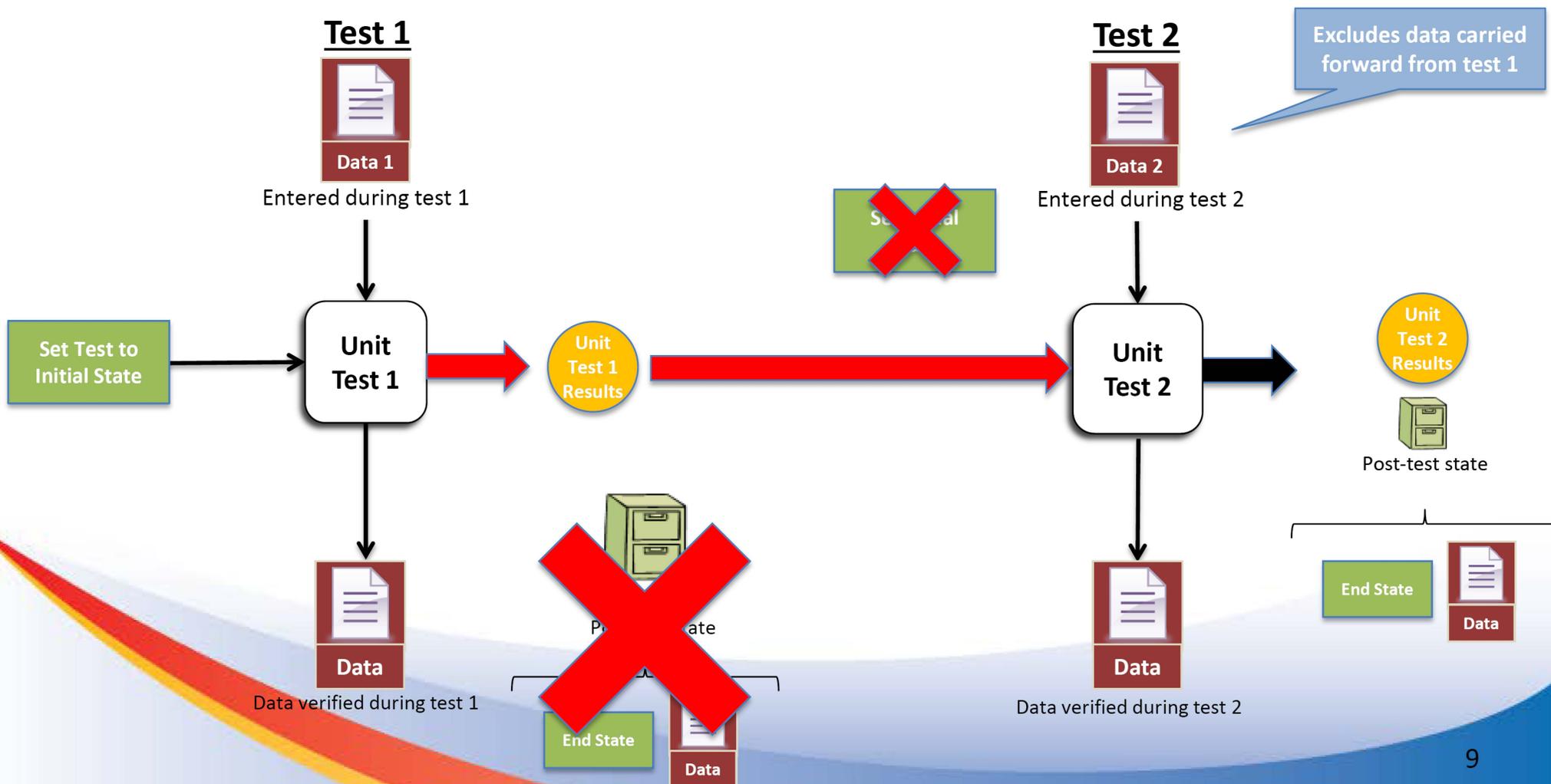Verified during test 2

End State
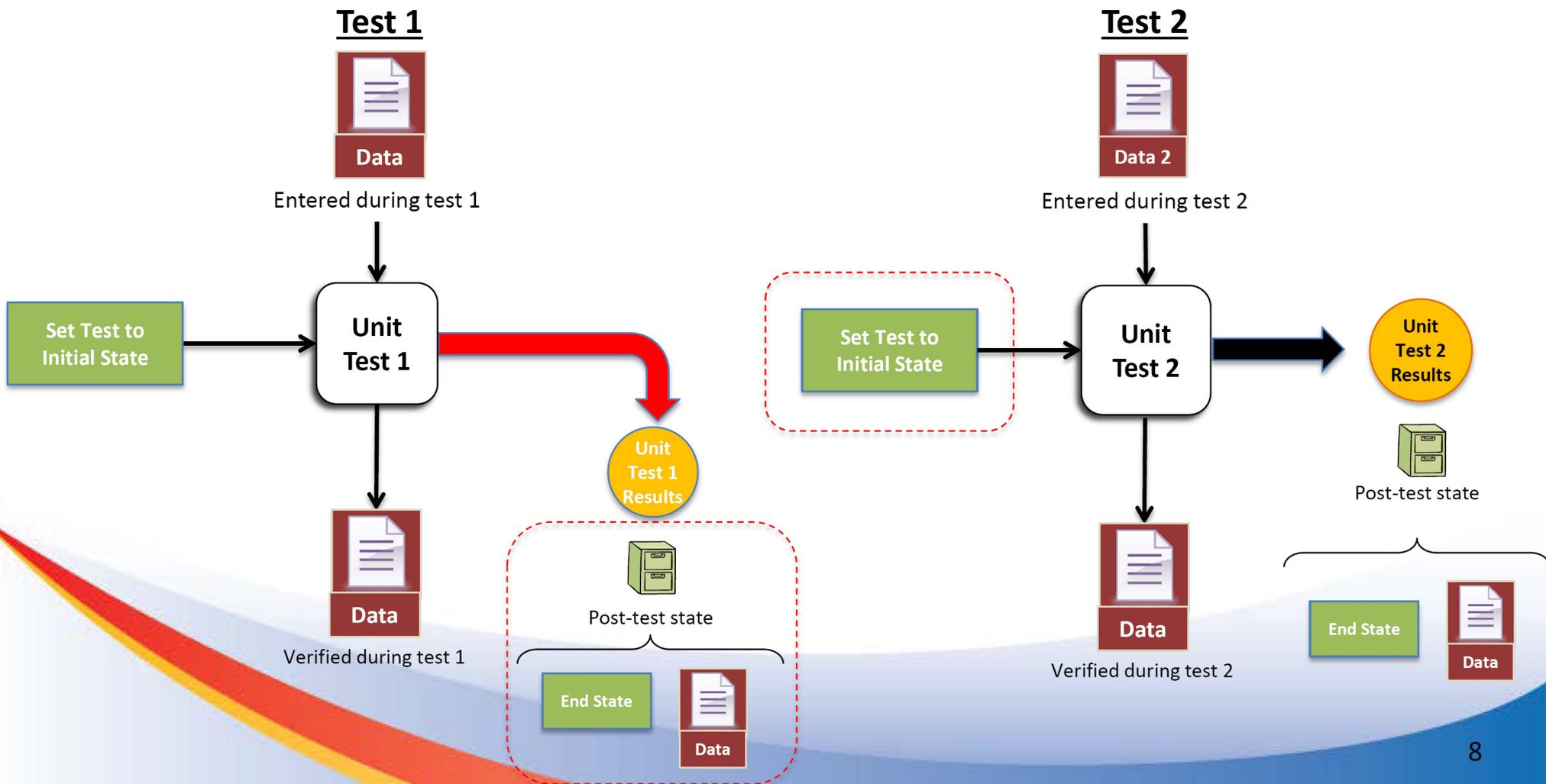
Data

Scenario-Based Test Sequence

In order to avoid redundant data entry this test sequence assumes a sequence of unit tests.

- This is acceptable because the purpose of certification is different than that of quality testing. For certification, we verify that the expected outcome can occur, not that the code is bug free.
- In the example below, the post-test state of Unit Test 1 **would** be used for setting the initial state of Unit Test 2.

Test 1

Data 1

Entered during test 1

Test 2

Data 2

Entered during test 2

Excludes data carried forward from test 1

Set Test to Initial State

Unit Test 1

Unit Test 1 Results

Unit Test 2

Unit Test 2 Results

Post-test state

Data

Data verified during test 1

End State

Data

Data

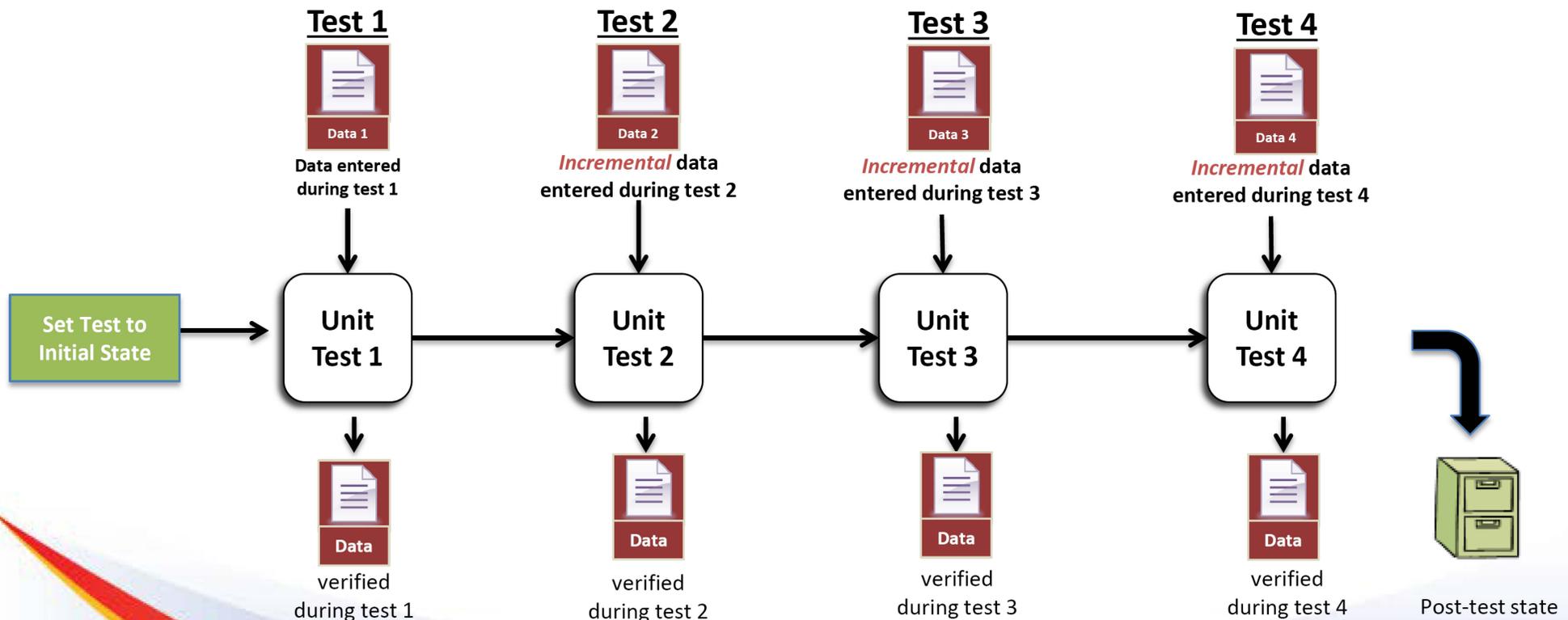Data verified during test 2

End State

Data

Multi-Test Scenario

For each test after 1, a testing analyst must determine what data flows through from previous tests and what incremental data must be entered during the test.

- The volume of flow-through data is compounded with each test in the scenario.
- The flow-through data includes not only information that would otherwise be re-entered during subsequent tests. It also includes other data that might influence the quality of the unit test.

Test 1	Test 2	Test 3	Test 4
Data 1	Data 2	Data 3	Data 4
Data entered during test 1	*Incremental* data entered during test 2	*Incremental* data entered during test 3	*Incremental* data entered during test 4

Set Test to Initial State → Unit Test 1 → Unit Test 2 → Unit Test 3 → Unit Test 4 → Post-test state

Data	Data	Data	Data
verified during test 1	verified during test 2	verified during test 3	verified during test 4

There can be two testing scripts each for tests 2, 3 and 4
- One instructs the tester to enter all of the data
- One instructs the tester only to enter the incremental data

Scenario-Based Sequence: Optional Tests

Scenarios represent a suggested sequence for testing criteria

- In a scenario, unit tests can be added, removed, or rearranged for various reasons, depending on the scenario
- For instance, a scenario can be made clinical location-specific by adding or removing unit tests
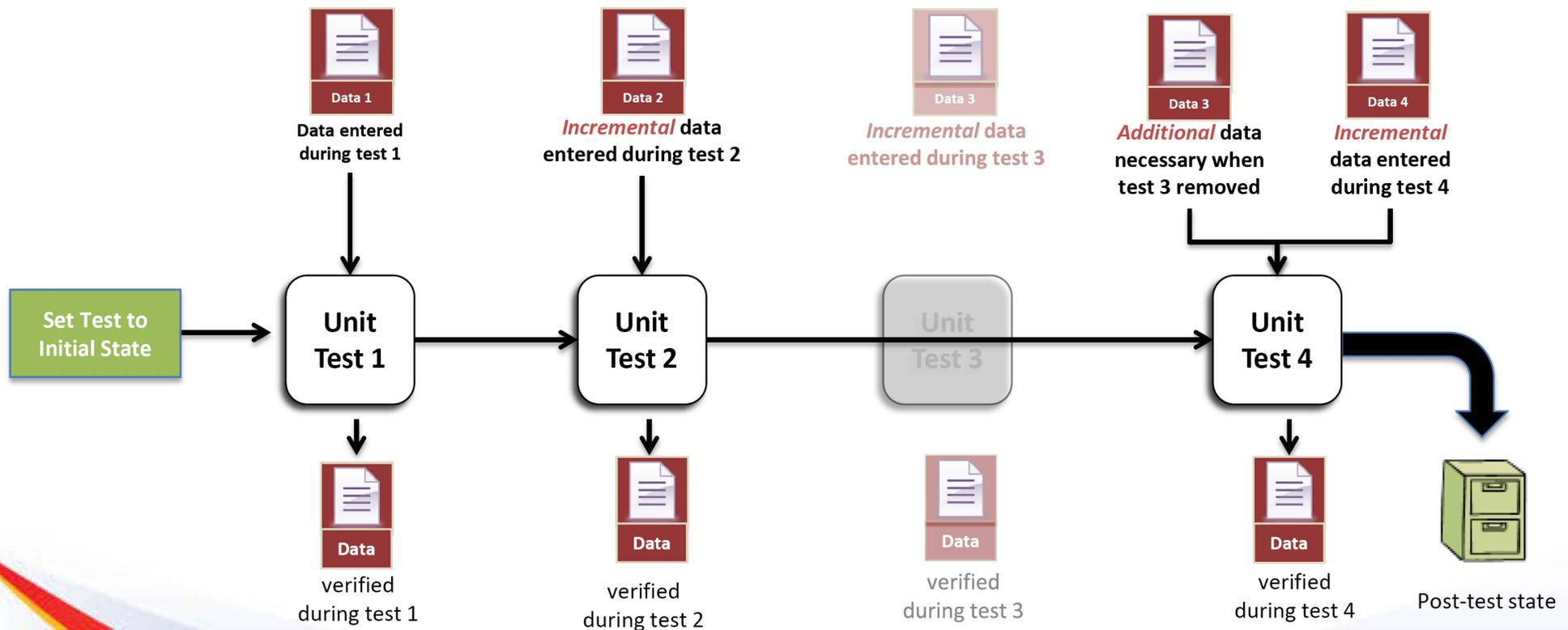
The flow through data includes not only information that would otherwise be re-entered during subsequent tests, but also other data that would have been created by the skipped unit test.

2014 Edition Test Scenarios – In Review

Components
- 2014 Edition Test Method
- Consistent and threaded data

Scope
- Focused
- Clinically plausible workflow

Specificity
- Not clinical location or test data specific
- Unit tests determine clinical location (add/remove tests depending on location)
- Scenario details determined by patient test data (e.g. pediatric vs. geriatric)

Documentation
- Test scenario diagram
- Test scenario procedure (contains the test scenario narrative)
- Test scenario data

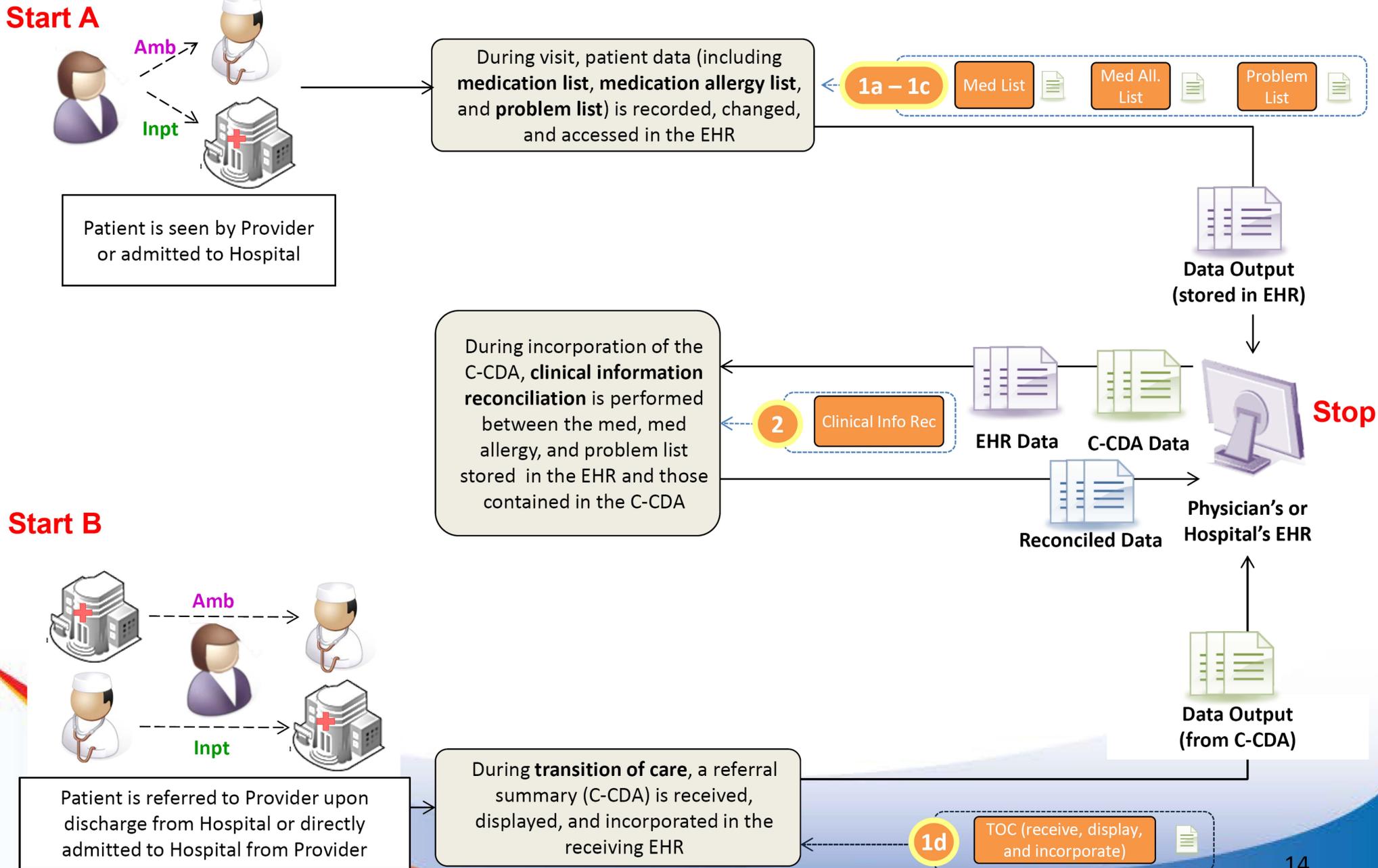# Test Scenario Introduction: EHR Interoperability: Intake

ONC has made the first draft Test Scenario Procedure available on its website:

- The Draft Test Scenario materials include
    - Draft Test Scenario Procedure: EHR Interoperability: Intake
        - Includes the following criteria:
            - (a)(4) Problem list
            - (a)(5) Medication list
            - (a)(6) Medication allergy list
            - (b)(4) Clinical information reconciliation
            - (b)(1) Transitions of care: receive, display, and incorporate
        - The Draft TSP tests **all** of the capabilities outlined by these criteria.
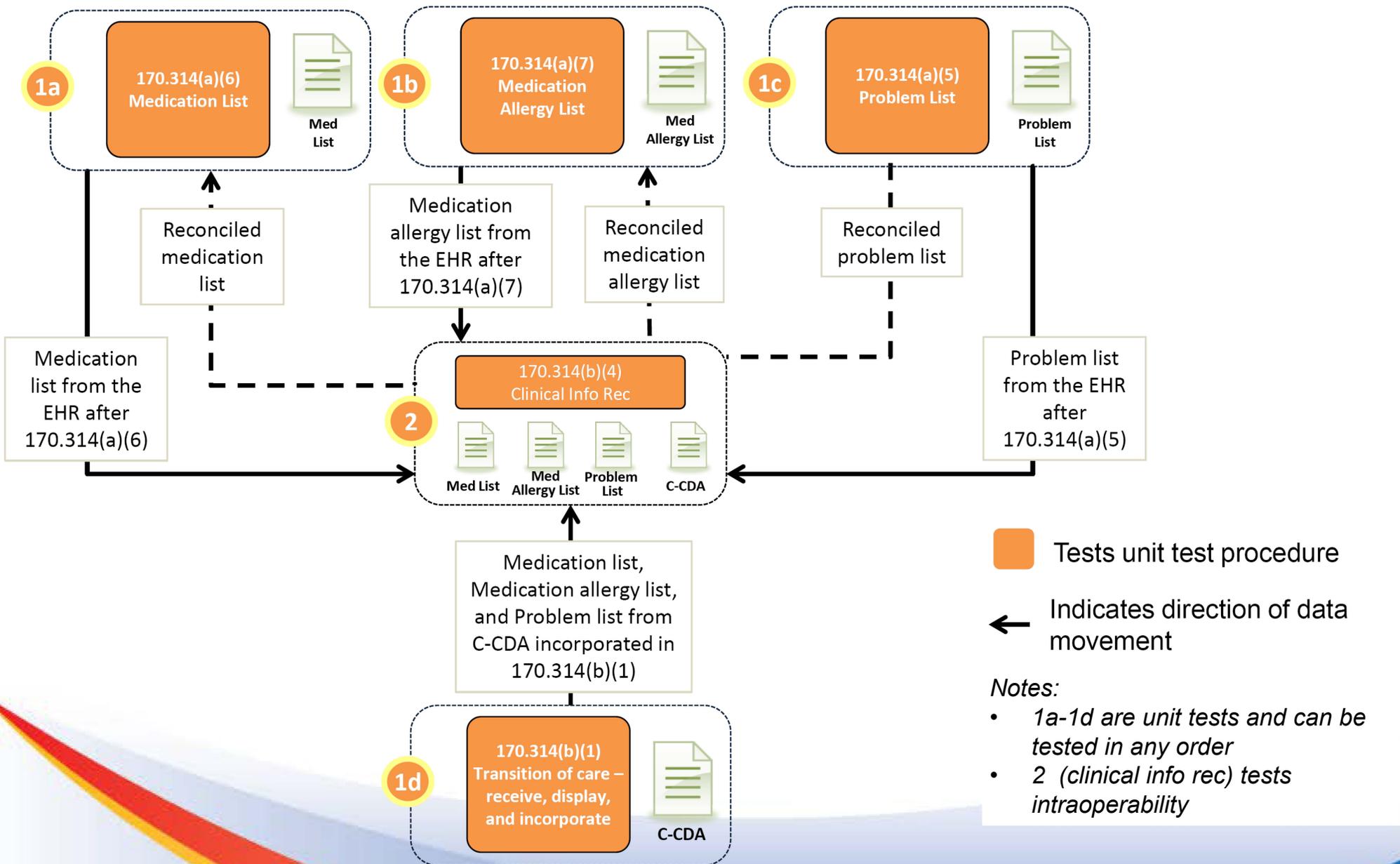   - Draft Test Scenario Data: EHR Interoperability: Intake

Overview materials for the draft Test Scenario Procedure are also available.

The next three slides explore the structure and narrative of the EHR Interoperability: Intake Draft Test Scenario Procedure in more detail. They include a workflow, a diagram and a narrative outline of the Draft Test Scenario Procedure.

Clinically Plausible Workflow – EHR Interoperability: Intake

Start A

Amb

Inpt

Patient is seen by Provider or admitted to Hospital

During visit, patient data (including **medication list**, **medication allergy list**, and **problem list**) is recorded, changed, and accessed in the EHR

1a – 1c   Med List   Med All. List   Problem List

Data Output (stored in EHR)

During incorporation of the C-CDA, **clinical information reconciliation** is performed between the med, med allergy, and problem list stored in the EHR and those contained in the C-CDA

2   Clinical Info Rec

EHR Data   C-CDA Data

Reconciled Data

Stop

Physician's or Hospital's EHR

Start B

Amb

Inpt

Patient is referred to Provider upon discharge from Hospital or directly admitted to Hospital from Provider

During **transition of care**, a referral summary (C-CDA) is received, displayed, and incorporated in the receiving EHR

1d   TOC (receive, display, and incorporate)

Data Output (from C-CDA)

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Test Scenario Diagram – EHR Interoperability: Intake

Note: This is a diagram of the workflow described by the graphic on the preceding slide (13). A narrative outline will follow on slide 16.

Test Scenario Narrative – EHR Interoperability: Intake

1a – 1c

(a)(6) Medication list, (a)(7) Medication allergy list, (a)(5) Problem list

Ambulatory: Patient is seen by Provider. During this ambulatory visit, a medication, medication allergy, and problem list are recorded, changed, and accessed in the Provider's EHR.

Inpatient: Patient is admitted to Hospital. During this hospitalization, a medication, medication allergy, and problem list are recorded, changed, and accessed in the Hospital's EHR.

med, med allergy, and problem list stored in the EHR are pulled to do clinical information reconciliation

2

(b)(4) Clinical information reconciliation

Ambulatory/Inpatient: During incorporation of the referral summary (C-CDA), clinical information reconciliation is performed between the medication, medication allergy, and problem list stored in the EHR and those contained in the C-CDA. Upon completion of the clinical information reconciliation, the reconciled medication, medication allergy, and problem list are stored in the EHR.

reconciled med, med allergy, and problem list are stored in the EHR

Physician's or Hospital's EHR

1d

(b)(1) Transitions of care – receive, display, and incorporate

Ambulatory: Patient is referred to Provider upon discharge from Hospital. During transition of care, a referral summary (C-CDA) is received, displayed, and incorporated in the Provider's EHR.

Inpatient: Patient is directly admitted to Hospital from an ambulatory visit with Provider. During transition of care, a referral summary (C-CDA) is received, displayed, and incorporated in the Hospital's EHR.

med, med allergy, and problem list stored in the C-CDA are pulled to do clinical information reconciliation

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Note: This is a narrative outline of the workflow described by the graphic on slide 14, diagrammed on the preceding slide (15).

Summary

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Glossary

Unit Test or Unit Test Procedure*   A unit test or unit test procedure evaluates the conformance of EHR technology to a single certification criterion

Unit-Based Testing   The use of independent unit tests to evaluate the conformance of EHR technology to a certification criterion or criteria in the 2011 or 2014 Edition

Scenario-Based Testing   The optional use of test scenarios to test and certify EHR technology to a certification criterion or criteria in the 2014 Edition

Test Scenario   Broad term used to describe the "linking" of unit tests to represent a clinically plausible workflow for a given set of certification criteria

Test Scenario Diagram   Visual representation of a test scenario to illustrate the "linked" unit tests

Test Scenario Procedure (TSP)   Testing instructions for the "linked" unit test procedures specific to a test scenario

Test Scenario Data (TSD)   Data used within the TSP during testing (consistent with all testing, the data is independent of the TSP to allow for multiple test cases)

Test Scenario Narrative   Description of possible sequence of events associated with the clinically plausible workflow represented by the test scenario procedure (this is within the TSP)

*Typically, a "test procedure," without a "unit" or "scenario" modifier, refers to a unit test procedure