

***Development of a  
Conformance Testing Methodology  
for  
ANSI/NIST-ITL 1-2011***

Second Workshop for the Development of  
ANSI/NIST-ITL 1-2011 Standard

March 1-3, 2011

*Mike Hogan & Elham Tabassi*

*ANSI/NIST-ITL Conformance Working Group*

# ***ANSI/NIST-ITL – Conformance Working Group Charter***

- Consensus was reached to establish a working group to develop a modified conformance clause (2.3 of the standard).
- ***The working group shall also discuss development of a separate conformity assessment document/standard and longer-term development of conformance assessment tools and associated data, presenting findings at the next workshop.***

# ***ANSI/NIST-ITL – Conformance Working Group Membership***

- Dave Benini, AWARE
- Gerry Coleman, DOJ NIEM
- Michael Evanoff, FBI
- Brian Finegold, Noblis
- Will Graves, DHS/US-VISIT
- Patrick Grother, NIST
- Austin Hicklin, Noblis
- Scott Hills, AWARE
- CJ Lee, TSC
- John Mayer-Splain, Noblis
- Mike McCabe, FBI
- Rob Mungovan, AWARE
- Fernando Podio, NIST
- Adam Rosefsky, Maxvision
- Justin Smith, FBI
- Bonny Scheier, Saber
- Jennifer Stathakis, FBI
- Scott Swann, FBI
- Elham Tabassi, NIST
- Sudhi Umarji, DOJ
- Kimberly Woods, DoD BIMA
- Matt Young, DoD BIMA

# ***ANSI/NIST-ITL – Conformance Working Group Meetings***

- *October 27, 2010*
- *November 22, 2010*
- *January 31, 2011*

# ***ANSI/NIST-ITL 1-2011***

## ***Draft Conformance Clause***

### **2.3 Morphological and Lexical conformance**

Also known as Level 1 conformance

Satisfy morphological and lexical requirements for each implemented record type as stated in

- Clause 7 – Data common to several record types, and
- Clause 8 – Record Type Specifications

Satisfy morphological and lexical requirements of either:

- Annex B – Traditional encoding
- Annex C – NIEM-conformant encoding rules

Checks for:

- form and structure of the internal content of each field, sub-field and information item in transaction and verifies data structures exist and have correct values

# *Examples of Morphological and Lexical (Non)Conformance*

- Field 4.004 – Friction Ridge Generalized Position / FGP
  - Valid values: 0-17, 19, 40-50, 255
  - Level 1 Conformant: 10
  - Level 1 Non-conformant: 250

# ***ANSI/NIST-ITL 1-2011***

## ***Draft Conformance Clause***

### **2.4 Syntactic conformance**

Also known as Level 2 conformance

Satisfy syntactic requirements for each implemented record type as stated in

- Clause 7 – Data common to several record types, and
- Clause 8 – Record Type Specifications

Satisfy syntactic requirements of either:

- Annex B – Traditional encoding
- Annex C – NIEM-conformant encoding rules

Checks for:

- relationships between fields, subfields, or information items within a transaction to other values within the same transaction

# *Examples of Syntactic (Non) Conformance*

- Field 17.026 Iris diameter / IRD
  - Valid values  $10 < \text{IRD} < 9999$  integer value
  - Level 1 Conformant: 200
  - If SAP = 40 then  $\text{IRD} \geq 210$
  - Level 2 Non-conformant (if SAP=40): 200
  - Level 2 Conformant (if SAP=40): 220



# ***ANSI/NIST-ITL 1-2011***

## ***Draft Conformance Clause***

### **2.5 Semantic conformance**

Also known as Level 3 conformance

Satisfy semantic requirements for each implemented record type as stated in

- Clause 7 – Data common to several record types, and
- Clause 8 – Record Type Specifications

Checks:

- Relationship between a transaction's data values and the input biometric data from which the transaction was generated
- Content of a record is a faithful representation of the data captured
- Individual fields meet explicit semantic requirements in addition to syntactic requirements

# *Examples of Semantic Conformance*

- Field 9.137 Finger Minutiae Data / FMD
  - Minutiae corresponding to each set of coordinates (x, y, t) of the location encoded in the record
- Field 10.013 Subject Acquisition Profile / SAP
  - SAP Level-50 image has semantic requirements including the position and size of the face within the image, angle of view, and lighting

# ***Purpose of a Conformance Testing Methodology (CTM)***

- Ensure that all necessary and sufficient tests are unambiguously documented for test tool developers.

# ***Possible Contents of a Conformance Testing Methodology Document***

- terminology
- requirements and guidance concerning test methods
- test assertions
- test cases
- use of reference data
- means of testing
- test reporting formats
- guidance concerning the operation of conformity assessment services

## *Who develops what?*

- Standards developing organizations usually develop the standards and associated testing methodology documents.
- Various organizations may develop test tools (i.e., executable test code) and reference data.

# *Test Tools*

- Test tool developers that adhere to a recognized testing methodology document permit evaluation on whether each test tool is complete and equivalent.
- A test tool developed in accordance with the requirements of a consensus testing methodology document provides confidence that an implementation under test (IUT) fulfills the requirements in the standard.
- Having a test tool that is maintained (commercial or USG) helps to ensure that transactions are working in real time.

***Are there already some test tools for previous versions of ANSI/NIST-ITL?***

- YES
- NIST Biometric Image Software (NBIS)
  - “chkAN2k”
  - “AN2KConvert” (FBI Funded)
- Test tool for ANSI/NIST-ITL 1-2007 is under development for Types 1, 4, 10, 13, 14, and 17

## ***NIST “chkAN2k”***

- Open-source, C
- The NIST software repository tool is intended for collaborative multiparty software development.
- It is available for worldwide download now.
- It is in a version controlled software repository.
- It is incomplete.
- **It does not implement a formal set of test assertions.**



## ***FBI “AN2KConvert”***

- The tool converts from native to XML format and back, and it checks for semantic conformance to the standard (i.e., if you enter an invalid value or combination of values, it will throw an error or warning).
- It is fully implemented in C++, and there is also a partially completed Java version (in that it only checks specific record types).
- It will be made available.
- **It does not implement a formal set of test assertions.**

## ***Who would develop conformance test tools for ANSI/NIST-ITL 1-2011?***

- Commercial entities (e.g., Aware, NEUROtechnology) plan to develop test tools.
- Sponsored by DHS, NIST plans to develop a test tool.
- The NIST planned release includes open-source, installers, reference data and documentation.

## ***Who would develop conformance test tools for ANSI/NIST-ITL 1-2011?***

- Open-source test tools developed by the USG could encourage commercial test tool development.
- Commercial test tools could build upon free USG test tools for biometric profile testing.

**– OR –**

- The existence of a free USG test tool could adversely impact a market for commercial test tool development.

# ***Do we need Reference Data for ANSI/ NIST-ITL 1-2011 conformance testing?***

- YES
- Both “good” and “bad” reference data are required.

## ***What are the priorities in conformance testing (i.e., Level 1-3 testing)?***

- Syntactic (Level 1 and 2) first for:
  - Type-4, Type-14, Type-13, Type-17, and Type 10
- Semantic (Level 3) later

# ***What is the timeline for development of a CTM and test tools?***

- Development of the CTM would take about 12 months (after the ANSI/NIST-ITL 1-2011 draft is stable).
- Development of a first test tool would take about 12 months for Syntactic (Level 1 and 2) testing.
- The test tool development could be done roughly in parallel with the development of the CTM.

***CWG – 019rev5:  
Conformance testing methodology for ANSI/  
NIST-ITL 1-2011 - 6th Draft***

**Review of document CWG – 019rev5**

# **BACKUP SLIDES**



# *Terminology*

- **test assertion:** A specification for testing a conformance requirement in an Implementation Under Test (IUT) in the form of a software or procedural methods that generate the test results (also named test outcomes or test verdicts) used for assessment of the conformance requirement.
- **test case:** A description of the actions (e.g., condition of the test, expected results) required to achieve a specific test purpose or combination of test purposes.
- **reference data:** In information technology, reference data is any data used as a standard of evaluation for various attributes of performance. *[NISTIR 6025]*

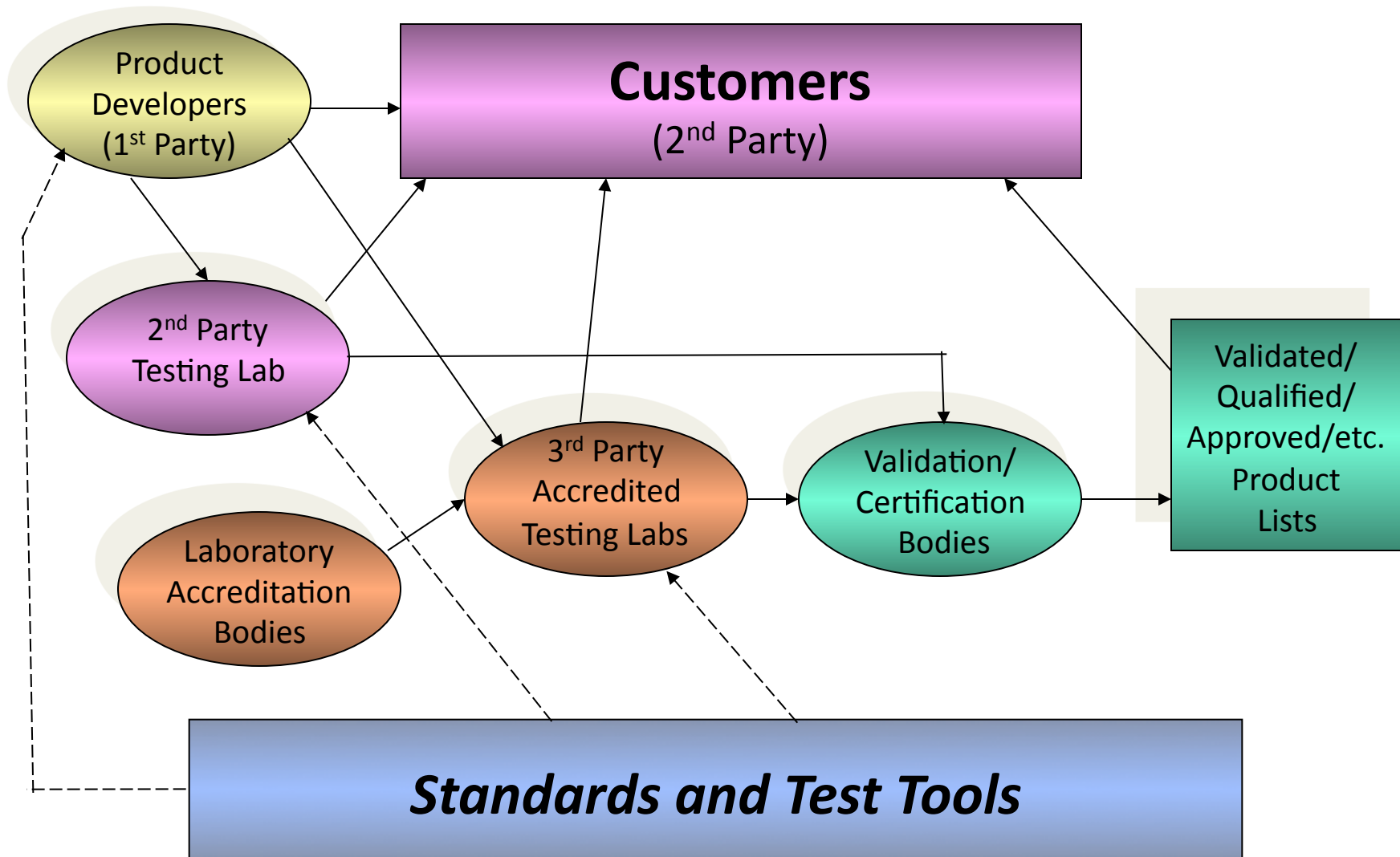
# *Terminology*

- **test method:** Specified technical procedure for performing a test. *[ISO/IEC Guide 2]*
- **means of testing:** Hardware and/or software, and the procedures for its use, including the executable test suite itself, used to carry out the testing required. *[ISO/IEC 9646-1]*
- **Conformity Assessment (CA):** activity that provides demonstration that specified requirements relating to a product, process, system, person or body are fulfilled. *[ISO/IEC 17000:2004]*

## ***Reference Slides on CA***

- Discussing a possible CA program for ANSI/NIST-ITL 1-2011 is not really in the scope of this presentation except that a CTM can cover CA guidance.
- Should there be some discussion of a CA program for ANSI/NIST-ITL 1-2011, two useful “big picture” slides on CA follow.

# ***Standards & CA Infrastructure***



# Conformity Assessment Options

Supplier Declaration of  
Conformity

Listed Products

Certification

Certification Body  
Accredited to  
ISO Guide 65

Qualified Products  
List based on  
ISO Guide 65  
Certification

List of Approved  
Products based on  
contract with  
Manufacturer

Testing by  
Accredited Labs

Qualified Products  
List based on  
ISO Guide 65  
Certification

List of Approved  
Products based on  
contract with  
Manufacturer

Testing by  
Accredited Labs

List of Approved  
Products based on  
contract with  
Manufacturer

Testing by  
Accredited Labs

Supplier Declaration  
of Conformity

Testing by  
Accredited Labs

Supplier Declaration  
of Conformity

Supplier Declaration  
of Conformity

Confidence  
Time, \$\$, Resources

