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Report on Issues for Harmonizing Conformity Assessment to Biometric Standards

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Report on Issues for Harmonizing Conformity Assessment to Biometric Standards

1 Introduction

M1 formed an Ad Hoc Group on Issues for Harmonizing Conformity Assessment to Biometric Standards. As part of its assignment, the Ad Hoc Group has drafted this report, which:

- Identifies and defines the possible types of activities that may occur under Conformity Assessment schemes (e.g., supplier's declaration, laboratory accreditation, conformance testing and reporting, test tool(s) development and maintenance, conformance test results and certification/validation),
- Identifies the various kinds biometric standards which M1 could develop for use in biometric standards based conformance testing programs,
- Provides guidance on a generalized taxonomy for conformance testing methodology standards,
- Provides recommendations to M1 on best practices for supporting conformance testing to biometric standards, and
- Provides some suggestions for harmonizing biometric standards based conformance testing programs.

While this report refers to INCITS M1 standards, it is also applicable to the international standards projects within ISO/IEC JTC 1/SC 37.

Early identification of issues for harmonizing conformity assessment to biometric standards will hopefully lead to broader acceptance of standards based conformance test reports (i.e., one standard, one test report, accepted everywhere).

The scope of this report is conformity assessment, which is based upon conformance testing. This report does not cover other testing, such as acceptance, interoperability, performance, or robustness testing.

Annex G, Glossary, provides a listing of the acronyms and abbreviations mentioned in this report.

2 References

ECMA International Technical Report TR/18: The Meaning of Conformance to Standards

ISO/IEC Guide 2: Vocabulary, 1996

ISO/IEC Directives, Procedures for the technical work of ISO/IEC JTC 1 on Information Technology (5th Edition)

NIST Special Publication 939: Kemmerer, Sharon(ed), STEP: The Grand Experience, (1999)

NISTIR 6025: Metrology for Information Technology, May 1997

SC 37 Standing Document 7 (SD7): Report on 2003-12(15-16) Conformity Assessment Rapporteur Group Meeting (SC 37 N 395)

3 Definitions

The following definitions may be useful for development of conformance testing methodology standards or new project proposals. Some of the terms may have more than one definition, in which case the one that is most suitable for a particular conformance testing standard should be selected and used by the standard's developer. A general guidance to use of the terms and definitions provided in this report is that they should be used if possible, but the developers of conformance testing standards are not prevented from using other definitions as long as the definitions can be referenced to a definitive source.

acceptance testing: The process of determining whether an implementation satisfies acceptance criteria and enables the user to determine whether or not to accept the implementation. This includes the planning and execution of several kinds of tests (e.g., functionality, quality, and speed performance testing) that demonstrate that the implementation satisfies the user requirements. *[ISO/IEC 15444-4]*

accreditation: Procedure by which an authoritative body gives formal recognition that a body or person is competent to carry out specific tasks. *[ISO/IEC - Guide 2]*

assertion:

a) The specification (description) for testing a conformance requirement. These are specific class of conditions that can be tested. *[NIST]*

b) The specification for testing a conformance requirement in an Implementation Under Test (IUT) in the form defined in [this] standard. *[ISO/IEC 9646-1]*

certification: Procedure by which a third party gives written assurance that a product, process, or service conforms to specified requirements. *[ISO/IEC - Guide 2]*

conformance testing (or conformity testing):

a) Captures the technical description of a specification and measures whether an implementation faithfully implements the specification. *[NIST]*

b) Conformity evaluation by means of testing. *[ISO/IEC - Guide 2]*

conformity: Fulfilment by a product, process or service of specified requirements. *[ISO/IEC - Guide 2]*

conformity evaluation: Systematic examination of the extent to which a product, process or service fulfills specified requirements. *[ISO/IEC - Guide 2]*

interoperability testing: The testing of one implementation (product, system) with another to establish that they can work together properly. *[NISTIR 6025]*

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]*

performance testing: Measures the performance characteristics of an Implementation Under Test (IUT) such as its throughput, responsiveness, etc., under various conditions. *[ISO/IEC 15444-4]*

reference data: In information technology, reference data is any data used as a standard of evaluation for various attributes of performance. *[NISTIR 6025]*

reference implementation: Implementation whose attributes and behavior are sufficiently defined by standard(s), tested by certifiable test method(s), and traceable to standard(s) that the implementation may be used for the assessment of a measurement method or the assignment of test method values. *[NISTIR 6025]*

robustness testing: The process of determining how well an implementation processes data, which contains errors. *[ISO/IEC 15444-4]*

test: Technical operation that consists of the determination of one or more characteristics of a given product, process or service according to a specified procedure. *[ISO/IEC - Guide 2]*

test assertion: A specification for testing a conformance requirement in an 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. *[this M1 Ad Hoc Group]*

test case:

a) 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. *[NIST]*

b) A specification of the actions required to achieve a specific test purpose or combination of test purposes. [ISO/IEC 9646-1]

test method: Specified technical procedure for performing a test. [ISO/IEC Guide 2]

test procedure: [definition to be determined in the future]

test purpose: A prose description of a narrowly defined objective of testing, focusing on a single conformance requirement. [ISO/IEC 9646-1]

test scenario: [definition to be determined in the future]

testing: Action of carrying out one or more tests. [ISO/IEC - Guide 2]

4 Conformity Assessment Activities

Annex A contains an illustration of the high-level functions that occur in the typical implementation of a Conformity Assessment scheme. Annex B illustrates the possible spectrum and relationships of conformity assessment activities. Annex C shows the relationships and roles of technical standards developers (e.g., INCITS M1), the conformity assessment management systems standards developer (i.e., ISO CASCO, Committee on conformity assessment), and organizations overseeing conformance testing programs. Annex D shows some of the ways conformance testing of products, systems, and services are used in the marketplace. Annex E lists some of the key guides and standards developed by ISO CASCO for conformity assessment. Annex F provides recommendations on Conformity Assessment activities that were approved by the JTC1/SC 37 Plenary meeting in June 2004.

5 Guidance on a Possible Taxonomy for Conformance Testing Methodology Standards

Annex C, JTC1 Policy on Conformity Assessment, of the JTC 1 Directives, encourages the development of technically sound information technology standards that are testable. To this end, it is suggested that, where appropriate, conformance testing methodology standards be developed. Annex C notes that a conformance testing methodology may include the specification of some or all of the following: terminology, basic concepts, requirements and guidance concerning test methods, test specification and means of testing, and requirements and guidance concerning the operation of conformity assessment services and the presentation of results.

Considering the fact that a number of conformance testing methodology standards are now being developed within M1 (and SC 37), and several more projects may be initiated in the near future, it is useful to provide some guidance

on a generalized taxonomy for such standards. The suggested taxonomy below represents a general structure for a conformance testing methodology standard. It could be modified, as necessary, for the specific needs of a particular M1 project.

- Foreword
- Introduction
- Scope
- Conformance
- Normative References
- Terms and Definitions

These initial clauses of the conformance testing methodology standards are expected to be present. The "Scope" clause should explicitly state what is covered by the standard – whether the entire specification under test is the subject of testing or only a critical subset of its requirements. The "Conformance" clause should describe what it means for test method implementations (test suites) to be conformant to this standard.

Testing Methodology

This clause should describe requirements for test method, specific requirements to the IUT as pertained to the conformance testing process, provide test flow and/or algorithms, describe test model(s), and other procedures specific to the particular testing methodology described in the standard. One of the important sub-clauses may be a set of requirements for test data sets (e.g., reference data).

Assertion Language (optional)

This clause may describe an Assertion Definition Language (ADL) being used for assertion definitions. It can be a complete language specification (e.g., WD 24709-1) or a reference to an existing ADL (e.g., ITU-T Z.140).

Test Assertions

This clause should consist of actual tests to be executed in order to perform the conformance testing. While grouping and naming of the tests may be different for each conformance testing standard, each test should have a reasonably unified structure, for example:

Requirement Under Test <reference to the element of the specification under test>

Test Case <Test_Case_Name> <Test_Case_ID>

Test Purpose: <text of the test purpose>

Test Description: <text of the test case description and test conditions>

Expected Result: <description of the expected results>

Test Assertion: <text of the test assertion in ADL>

Test Case <Test_Case_Name> <Test_Case_ID>

... etc.

Test Report

This clause should describe specific requirements for test report and corresponding processes of its production.

Conformance Test Suite (optional)

This clause should describe requirements of the CTS that would implement the testing methodology described in this standard. While CTS implementers should have enough freedom implementing the CTS, there may be specific requirements that have to be fulfilled.

Annexes

The above structure is a general recommendation. Every conformance testing methodology standard should use a specific structure of documenting its tests suitable for purposes of that standard. For example, in M1/04-0437, the "Initial Contribution for Review and Consideration at the August 2004 Meeting of M1.2" (BioAPI Conformance Testing Methodology) the following structure for Assertions and Test Cases is used (it is based on the format used by the NIST Smart Card Conformity Assessment documents):

Feature N

- BioAPI Documentation Extracts (Temporary entry)
- BioAPI Specification References
- Starting State For Each Assertion

Assertion N.1

- Purpose
- Scenario
- Expected Results

Test [Case] for Assertion N.1

- Instantiation Scenario
- Verification Goal
- Verification and Reporting Scenario
- XML

Assertion N.2

- Purpose
- Scenario
- Expected Results

Test [Case] for Assertion N.2

- Instantiation Scenario
- Verification Goal
- Verification and Reporting Scenario
- XML

.....

Assertion N.M

- Purpose
- Scenario
- Expected Results

Test [Case] for Assertion N.M

- Instantiation Scenario

6 Recommendations to INCITS M1 on Best Practices for Supporting Conformance Testing to Biometric Standards

- **Recommendation 1 - Conformance clauses should typically be included in all INCITS M1 standards (e.g., an exception might be a vocabulary standard).**

The purpose of this clause should be to ensure an unambiguous understanding of conformity requirements within the standard. There is no specific guidance provided in the ISO/IEC style guidance for conformance clauses. ECMA TR/18 provides guidance and rationale on the necessity of conformance clauses in information technology standards. Over the last two years, INCITS M1 has developed conformance clauses for its ongoing standards development that can serve as guidance for future projects.

- **Recommendation 2 - Biometric Data Interchange Format (BDIF) standards, biometric API standards (e.g., BioAPI), and formats framework (e.g., CBEFF) should have companion conformance testing methodology standards.**

INCITS M1 has already started standards projects for conformance testing methodologies. The first such projects were for the BioAPI and now some of the BDIF standards have companion projects. Such conformance testing methodology standards should specify, if deemed appropriate: test assertions, test cases, use of reference data, test reporting formats, and means of testing requirements.

Development of test tools (e.g., executable test code, reference data) and reference implementations are probably best left to organizations, such as test tool developers and entities operating conformance testing programs.

The INCITS M1 biometric profile standards are intended to ensure interoperability of the biometric information across the functions of a particular application. As such, interoperability testing, for example via a reference implementation, is probably more relevant than conformance testing. And, interoperability testing is better left to other organizations (e.g., users and vendors), not INCITS M1.

7 Keys to Harmonizing Conformance Testing

The opportune time to establish an environment for harmonized conformance testing is now, before testing programs are already underway. Of course, if only one testing program is ever established and it is widely (globally) recognized, then harmonizing becomes moot. However, the ultimate goal of INCITS M1 participants is internationally approved biometric standards being used by global markets. Therefore, it is only prudent to assume that there will likely be more than one region or nation or agency interested in conformity assessment to biometric standards.

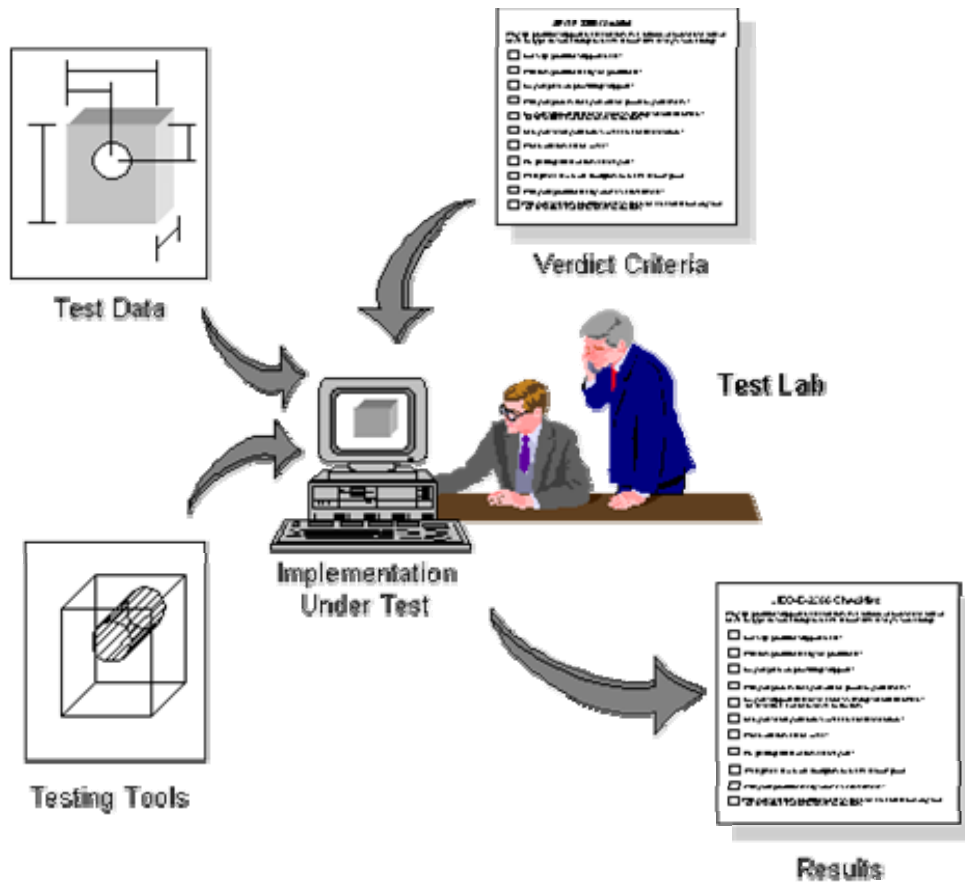
In order to harmonize between separate conformity assessment programs, organizations operating such programs will have to agree on the equivalence of their programs with respect to issues such as: biometric base standards, conformance testing methodology standards, test tools, testing laboratories, laboratory accreditation bodies, and certification bodies. Agreement on these issues constitutes the basis for formally harmonizing through a formal memorandum of understanding.

INCITS M1 plays a key harmonization role by developing timely, technically sound, biometric base standards and conformance testing methodology standards. These standards permit the development of quality means of testing (e.g., test tools) whose equivalence can be determined.

Participants in INCITS M1 should encourage organizations planning to operate conformity assessment programs to use the relevant INCITS M1 standards; M1 standards based quality means of testing, and the appropriate ISO CASCO standards and guides in developing their programs. This is the key to obtaining the elusive goal: “one standard, one test report, accepted everywhere.”

Annex A

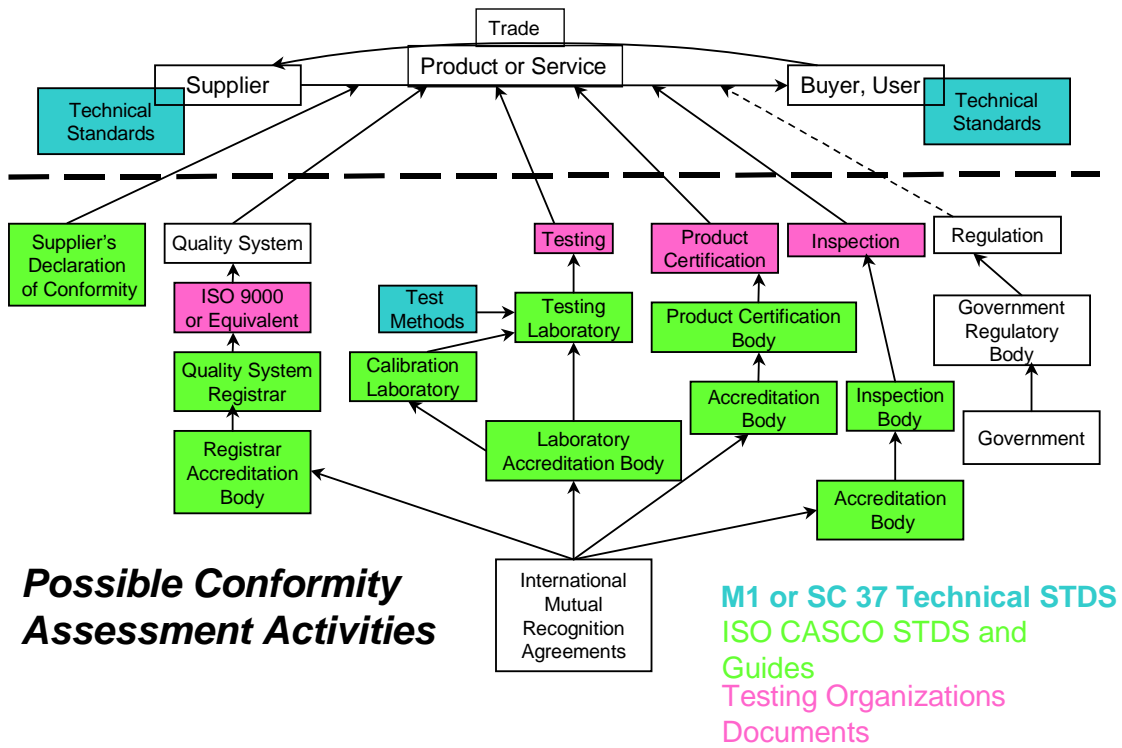
Aspects of Conformance Testing



Annex B

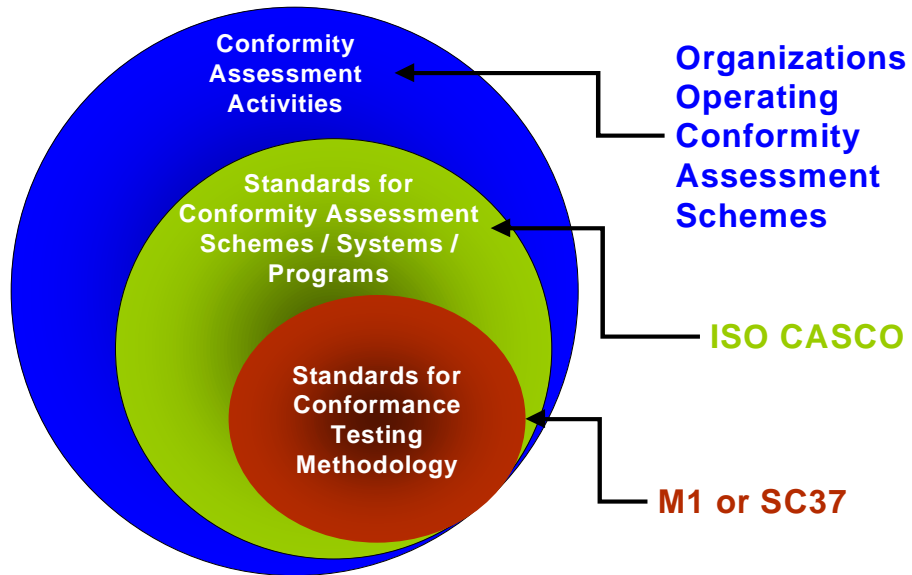
Conformity Assessment Activities

Standards, CA, Trade, & Mutual Recognition



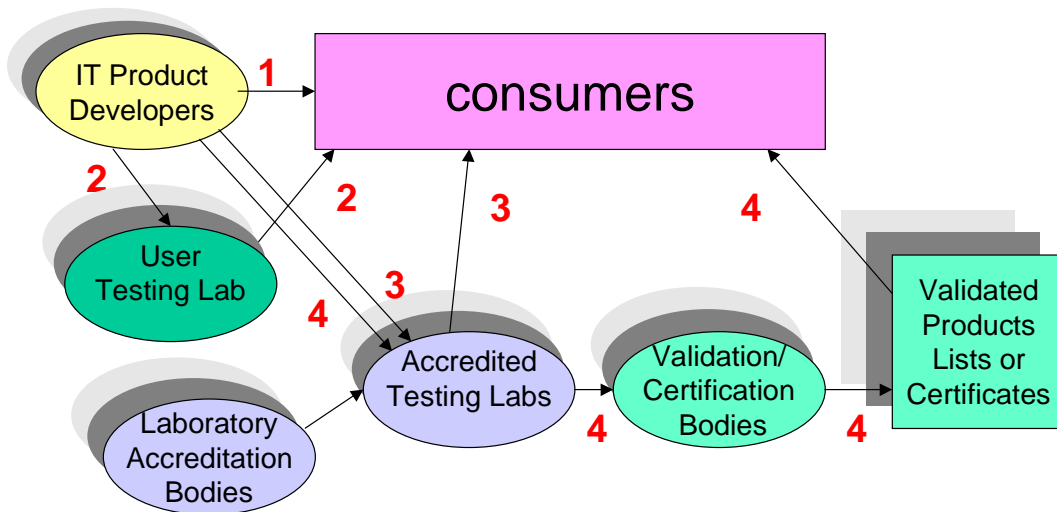
Annex C

Responsibilities of Bodies Involved in Conformity Assessment



Annex D

Paths to Consumer



Path 1: IT Product Developer self declaration of conformity

Path 2: Second Party Testing

Path 3: Conformance demonstrated by evaluation in accredited laboratory

Path 4: Conformance demonstrated by evaluation and validation/certification

Annex E

ISO CASCO Conformity Assessment Guides and Standards

Vocabulary	ISO/IEC Guide 2:1996 Clauses 12 - 17
Standards and conformity assessment	ISO/IEC Guide 7:1994
Code of good practice for conformity assessment	ISO/IEC Guide 60:1994
Mutual recognition arrangement	ISO/IEC Guide 68:2002
Supplier's declaration of conformity	ISO/IEC Guide 22:1996
Accreditation	ISO/IEC Guide 58:1993
	ISO/IEC Guide 61:1996
	ISO/IEC TR 17010:1998
Testing/ calibration	ISO/IEC 17025:1999
	ISO/IEC Guide 43-1:1997 R 2002
	ISO/IEC Guide 43-2:1997 R 2002
Inspection	ISO/IEC 17020:1998
Product certification	ISO/IEC Guide 23:1982
	ISO Guide 27:1983 under systematic review
	ISO/IEC Guide 28:1982
	ISO/IEC Guide 53:1988
	ISO/IEC Guide 65:1996 R 2000
System certification	ISO/IEC Guide 62:1996
	ISO/IEC Guide 66:1999
Certification of persons	ISO/IEC 17024:2003

This table was extracted from:

<http://www.iso.ch/iso/en/comms-markets/conformity/listguides.html>

Annex F

From SC 37 N395 - List of Rapporteur Group Recommendations to SC 37:

Recommendation 1 – Conformity, Conformance and Compliance

Recommendation 1.1

The terms conformity and conformance should be considered synonymous in accordance with ISO/IEC 17000, Clause 2.2.2. This clause notes that the term conformance should be deprecated, thus making conformity the preferred term to use. However, due to the common usage of the phrase “conformance testing” in the IT world (e.g., JPEG 2000 Conformance Testing), we recommend that the term conformance should continue to be used by SC37.

Recommendation 1.2

There is widespread use of a variety of definitions for compliance. As such, we recommend that any use of the term compliance by SC37 should include a specific definition. Examples of acceptable definitions include:

- a. To make something conform or to fulfil a regulatory requirement (ISO/IEC 17000, Clause 2.2.2, Note 2);
- b. Refers only to the particular sample of the product that was tested. (Derived from ISO/IEC Directives Part 2:2001, Clause 6.3.5.1).

Recommendation 2 - Conformity Assessment

When referring to Conformity Assessment, SC37 should utilize the latest ISO definition. This is currently ISO/IEC DIS 17000 Conformity Assessment – General Vocabulary, Clause 2.1.1:

conformity assessment - activity that provides demonstration that specified requirements (2.2.1) relating to a product (2.2.4), process, system, person or body are fulfilled

NOTE 1 Conformity assessment covers such activities as, testing (2.3.2), inspection (2.3.3) and certification (2.4.5), as well as the accreditation (2.4.6) of conformity assessment bodies (2.1.5).

NOTE 2 The expression “object of conformity assessment” or “object” is used in this standard to encompass the particular material, product, installation, process, system, person or body to which specified requirements apply in any instance. A service is covered by the definition of a product (see note to 2.2.4).

Recommendation 3 – Conformance Testing Methodology

Accept the definition in Footnote 5 of ISO/IEC JTC1 - Annex C JTC1 Policy on Conformity Assessment, but with terminology that is more readily understood, i.e., Conformance Testing Methodology.

A conformance testing methodology may include the specification of some or all of the following: terminology, basic concepts, requirements and guidance concerning test methods, test specification and means of testing, and requirements and guidance concerning the operation of conformity assessment services and the presentation of results.

Note: Should this recommendation be accepted, this will be directly applicable to the current SC37 Project 24709.

Recommendation 4 – Conformance Clauses

In keeping with the spirit of Annex C JTC1 Policy on Conformity Assessment, C2.2, conformance clauses should typically be included in all SC37 standards projects (e.g., an exception might be a vocabulary standard). The purpose of this clause should be to ensure an unambiguous understanding of conformity requirements within the standard.

Recommendation 5 – NWIP Question D.1 Conformity Assessment

The explanation to accompany a “yes” response to Question D.1 should be included for informational purposes only (e.g., it does not require prior development of a justification report). The purpose of this information could be to:

- a. Inform SC37 of potentially relevant conformity assessment activities (ongoing, planned, etc.) that might find these standards activities useful; and/or
- b. Serve as notification to the SC37 Secretariat that CASCO should be apprised of the approved standards activities (as per Clause 6.7 of ISO/IEC Directives Part 2).

Annex G

Glossary

ADL - Assertion Definition Language
API - Application Programming Interface
BDIF - Biometric Data Interchange Format
BioAPI - Biometric Application Programming Interface
CASCO - Committee on Conformity Assessment (ISO)
CBEFF - Common Biometric Exchange Formats Framework
CTS - Conformance Test Suite
ECMA - formerly, an abbreviation for the European Computer Manufacturers Association; now, ECMA is the formal name for this organization
INCITS - InterNational Committee for Information Technology Standards
IEC - International Electrotechnical Commission
ISO - International Organization for Standardization
IT - Information Technology
IUT - Implementation Under Test
JPEG - Joint Photographic Experts Group
JTC 1 - ISO/IEC Joint Technical Committee 1, Information Technology
M1 - INCITS Technical Committee M1, Biometrics
NIST - National Institute of Standards and Technology
NISTIR - NIST Internal (or Interagency) Report
NWIP - New Work Item Proposal
SC 37 - JTC 1 Subcommittee 37, Biometrics
TR - Technical Report
XML - Extensible Markup Language