International Standardization in JTC 1

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1. Introduction

This paper presents an overview of international standardization activities relating to biometrics technology at ISO/IEC JTC 1 — Joint Technical Committee 1 of the ISO (International Organization for Standardization) and the International Electrotechnical Commission (IEC).

JTC 1 creates international standards relating to information technology, and currently consists of subcommittees (SCs) in 20 different fields. JTC 1 includes three SCs that work with technology related to biometrics: SC 37 (Biometrics), SC 27 (IT Security techniques), and SC 17 (Cards and personal identification). This paper introduces the organizational structure and activities of SC 37, which is concerned with biometrics itself, and also introduces the work related to biometrics technology that is being carried out by SC 17 and SC 27.

But first, here is an overview of the international standard development process in JTC 1. The development of an international standard starts with a New Work Item Proposal (NWIP). NWIPs are made by SCs or by the National Bodies (NBs) that participate in SCs. The NBs participating in JTC 1 then vote to decide whether or not to turn the NWIP into a project. When a project is established, an editor is appointed and a series of draft documents are produced: WD (Working Draft), CD (Committee Draft), DIS (Draft International Standard), and FDIS (Final Draft International Standard). At the WD stage, comments on the WD are collected from the experts participating in the WG (Working Group) subordinate to the SC, and these comments are compiled by the editor and examined at an international conference. No voting takes place at the WD stage. From the CD stage onwards, the actual deliberations are carried out by the WG, but votes are cast at the SC level in the CD stage, and at the JTC 1 level in the DIS and FDIS stages.

The Japanese organization participating in JTC 1 is the Japanese Industrial Standards Committee, which delegates its technical deliberations to the technical committee of the IPSJ/ITSCJ (Information Processing Society of Japan/Information Technology Standards Commission of Japan). Participation in each SC is the responsibility of the expert committee in ITSCJ corresponding to each SC. However, for SC 17, the expert committee is set in the Japan Business Machine and Information System Industries Association.

2. SC 37

2.1 Overview

As described below, SC 37 consists of 6 working groups WG 1 through WG 6. The host country is the United States, and the American National Standards Institute (ANSI) is appointed as the secretariat. Since the establishment of SC 37 in 2002, this subcommittee has been chaired by Fernando Podio (US) who will remain in office until 2017. In order from WG 1, the WG conveners are appointed from Australia, South Korea, Germany, the US, the UK and Italy.

There are countries represented at SC 37, comprising 28 P members (actively participants) and 13 O members (observers). Of the P members, the main participating countries in the WG (normally held in January and July) and Plenary Meeting (held in January) over the last few years have been Australia, Canada, France, Germany, Italy, Japan, South Korea, Malaysia, New Zealand, South Africa, Spain, the UK, and the US. The countries that have been actively contributing are France, Germany, Japan, the UK and the US. Contributions have also been made by Australia, Canada, South Korea and Spain.

As of October 2016, SC 37 has created and published 122 International Standards (IS), 15 Technical Reports (TR), 23 Amendments (Amd), and 20 Corrigenda. There were eleven standard publications in 2015, with two Japanese editors in two projects and four Japanese co-editors in four projects. There are 25 projects currently under development, of which one has a Japanese editor and three have four Japanese co-editors.

The national expert committee comprises a chairperson (Asahiko Yamada (National Institute of Advanced Industrial Science and Technology)), secretaries (Soichi Hama (Fujitsu Laboratories) and Mitsutoshi Himaga (Hitachi)), WG convenors of Japanese NB, and liaison representatives (with SC 17, SC 31, ISO/TC 68 and ITU-T/SG 17), and meets roughly once per month. Each WG subcommittee also meets about once per month, but as a rule, WG 4 and WG 6 hold joint meetings, while WG 1 holds its discussions by email and does not hold meetings.

In the following, the prefix ISO/IEC is omitted from the representations of standards, and only the numbers are shown.

2.2 WG 1: Harmonized Biometric Vocabulary

WG 1 (WG convenor of Japanese NB: Masanori Mizoguchi (NEC)) is standardizing biometric technical terms with the aim of harmonizing the diverse concepts used in SC 37. Their activities are centered around the creation of SD (Standing Document) 2 Harmonized Biometric Vocabulary.

Terms for which stable definitions had been obtained from SD 2 were published in 2382-37 Biometric Vocabulary in 2012. An early revised version is currently in production.

They are also making revisions to TR 24741 Biometric tutorial, which provides an overview of biometric technology.

2.3 WG 2: Biometric Technical Interfaces

WG 2 (WG convenor of Japanese NB: Takeshi Kikuchi (Hitachi Solutions)) is a group that is drawing up specifications for interfaces that share biometric information. Their activities are centered around the development of two series of common interface specifications: one is 19784 BioAPI (Biometric API) which specifies a standard application programming interface (API) for biometrics, and the other is 19785 CBEFF (Common Biometric Exchange Formats Framework) which specifies metadata formats for biometrics.

a) 19784 BioAPI series and related projects

The BioAPI series includes specifications on a hierarchical software structure comprising the following three layers:

BioAPI framework
BSP (Biometric Service Provider)
BFP (Biometric Function Provider)

The BioAPI framework is called from the application, BSP is called from the BioAPI framework, and BFP is called from BSP.

19784-1 defines the BioAPI API (the programming interface to the BioAPI framework) and the BioAPI SPI (the service provider interface to BSP). 19784-2 and subsequent standards define interfaces for BFPs such as sensors. Biometric data received by the API and SPI conform to the CBEFF data structure specified by 19785.

After the publication of 19784-1 in 2006, three amendments were published relating to GUIs and security. Japanese experts worked as editors for two of these amendments. 19784-1 and its amendments are referred to as BioAPI version 2, and the ANSI specifications upon which 19784-1 is based are referred to as BioAPI version 1. In 2010, it was agreed that the consolidation of version 2 and version 3 would be developed. Version 3 was proposed by Germany and reached the CD stage in 2015, but the editor resigned and development was put on hold. Although the consolidation of version 2 was halted, it was resumed in 2016. The development of version 3 may be resumed when the consolidation of version 2 has been completed.

The 19784 series provide specifications in the C language, but after it was argued that the specifications also need to be in object-oriented languages, progress was made in developing the 30106 series that standardize object-oriented BioAPI specifications. Part 1: Architecture, Part 2: Java implementations and Part 3: C# implementations were entered and published in 2016. A C++ version has been proposed as a NWIP for Part 4.

Standards for testing conformance to the specifications of 19784-1 have been developed in the 24709 series. Part 1 specifies test methods and test scenario description methods for BioAPI products, Part 2 specifies conformance test specifications for SPIs for BSPs, and Part 3 specifies conformance test specifications for APIs in BioAPI frameworks. Part 3 came out later than Parts 1 and 2. It was worked on by a Japanese editor, and became an international standard in 2011. Part 3 introduced an efficient new description format to the test specification of 24709. As a result, a revision was made to reflect the new description format in Part 1.

b) 19785 CBEFF series

Part 1: Data Element Specifications defines abstract data elements, and for each field of use, Part 3: Patron Format Specifications defines concrete data structures (binary format and XML format). The CBEFF data structure consists of three blocks.

SBH (Standard Biometric Header): Consists of attribute information such as data formats of biometric data put into a BDB (described below).
BDB (Biometric Data Block): The main body of the biometric data. Uses the data format of 19794, described below.
SB (Security Block): includes information for the integrity and confidentiality of SBH and BDB.

Part 1 became an international standard in 2006, followed by the other parts which are now also international standards. A Japanese editor was appointed for the SB specifications, which became an international standard as Part 4 in 2010. The ISO secretariat pointed out that the content of Part 2 — which specifies patron format registration procedures — departs from the ISO's legal policy, and for this reason Part 2 was abandoned.

2.4 WG 3: Biometric Data Interchange Formats

WG 3 (WG convenor of Japanese NB: Takashi Shinzaki (Fujitsu Laboratories)) is a group that is drawing up formats for the exchange of biometric data in order to facilitate interoperability between biometric systems. Specifically, it is involved in deliberations of the multipart 19794 (Biometric Data Interchange Formats) series of standards for each modality (i.e., biometric characteristic: fingerprint, vein, etc.), the 29794 series of related standards on biometric sample quality, and the 30107 standard on presentation attack detection (PAD).

a) Data exchange formats and related projects

1) 19794 series

The 19794 series is a multipart standard consisting of

Part 1 (which specifies a framework common to all modalities) and separate parts for each of the 13 modalities listed below:

Part 1: Framework
Part 2: Finger minutiae data
Part 3: Finger pattern spectral data
Part 4: Finger image data
Part 5: Face image data
Part 6: Iris image data
Part 7: Signature time series data
Part 8: Finger pattern skeletal data
Part 9: Vascular image data
Part 10: Hand geometry silhouette data
Part 11: Signature feature data
Part 12: (missing number)
Part 13: Voice data
Part 14: NDA data
Part 15: Palm crease image data

The first generation of formats became international standards between 2005 and 2007, and the standardization of the second generation is currently under way. Japanese experts were appointed as the editor for Part 8 and as the editor and co-editor for Part 9.

The first-generation face image format standard ISO/IEC 19794-5:2005 was adopted in ICAO e-passports, which are used by 108 countries. However, following the issue of two amendments and four corrigenda, it has continued to be difficult to refer to this standard. To improve this situation, since the plenary meeting of 2014, SC 37 has continually asserted the importance of a consolidated publication to JTC 1, and having gained the consent of SC 17/WG 3 and the ICAO relating to this standard, the decision to publish a consolidated standard was made by the ISO Technical Management Board in February 2016.

Third generation development was also started, and the specifications are being studied based on the precondition of maintaining backward compatibility with the first generation used in e-passports.

2) XML format

The conversion of each part of 19794 to XML format was developed as Amendment 2. Amendments for Part 1: Framework, Part 5: Face image data and Part 9: Vascular image data have already been published. Progress is also being made with Part 2: Finger minutiae data, Part 4: Finger image data, Part 6: Iris image data and Part 7: Signature time series data. Japanese experts have been appointed as the editor and co-editor of Part 9.

3) Conformance test methods

The conformance test standards for each part of 19794 are standardized in the 29109 series for the first generation of 19794, and in Amendment 1 of each part of 19794 for the second generation. In each case, Japanese experts have been appointed as the editor of Part 8 and as the editor and co-editor of Part 9.

b) Projects related to the quality of biometric samples

The standards in the 29794 series deal with the quality of biometric samples corresponding to each part of 19794. Four parts have been published — Part 1: Framework, Part 4: Finger image data, Part 5: Face image data and Part 6: Iris image data.

c) Presentation attack detection (PAD) project

30107 is a project for PAD technology that includes the detection of fake biometric sources. SC 37 started this project from a recognition of the need for international standards relating to PAD so that biometrics can be more widely accepted. This standard consists of three parts: Part 1 covers detection models and the classification of presentation attacks, Part 2 covers data structures for the transmission of detection results, and Part 3 covers the testing and reporting of PAD technology. Part 3 is being developed in collaboration with WG 5. Part 1 was published in January 2016, and as of October 2016, Parts 2 and 3 are at the DIS stage. Japanese experts have been appointed as the co-editor for each of these parts.

2.5 WG 4: Technical Implementation of Biometric Systems

WG 4 (WG convenor of Japanese NB: Asahiko Yamada (National Institute of Advanced Industrial Science and Technology)) is drawing up standards relating to biometric application systems.

The central standard is Part 1: Overview of 24713 series for biometric system profiles. This is applied to physical access control for employees at airports in Part 2, and to biometrics-based verification and identification of seafarers in Part 3. SC 37 has also published TR29195: Traveller processes for biometric recognition in automated border control systems, TR29196: Guidance for biometric enrolment, and TR30125: Biometrics used with mobile devices.

Projects that are currently under development include 30124 (Code of practice for the implementation of a biometric system) and 30137 (Use of biometrics in video surveillance systems) Part 1: Design and specification. Note that Part 2: Performance testing and reporting is being discussed by WG 5. Since the deliberations of this project require expertise in surveillance cameras, it is being carried out with the cooperation of an expert committee on video surveillance systems at Japan Electronics and Information Technology Industries Association (JEITA).

2.6 WG 5: Biometric Testing and Reporting

WG 5 (WG convenor of Japanese NB: Masanori Mizoguchi (NEC)) is working to standardize the testing of biometric systems

and components. Centered on the 19795 series of standards, this WG is developing standard test procedures for various types of tests at each level from technology evaluation, scenario evaluation and operational evaluation, and for each modality such as fingerprints, for certain applications such as access control applications. A Japanese expert has been appointed as the editor of TR 19795-3, which relates to testing specialized for each modality. Also, the electronics format of test reports is covered by 29120-1, for which a Japanese expert was appointed as the editor.

Japan has also been appointed as the co-editor of project 30136, which relates to performance testing of template protection schemes.

For document 30137-2 discussed in section 2.5, as in Part 1, discussions in Japanese NB are being performed with the cooperation of the JEITA expert committee.

2.7 WG 6: Cross-Jurisdictional and Societal Aspects of Biometrics

WG 6 (WG convenor of Japanese NB: Asahiko Yamada (National Institute of Advanced Industrial Science and Technology)) is performing standardization in the area of social aspects of the application of biometric technology. To improve the usability of biometrics, the 24779 series that standardizes pictograms, icons and symbols is being developed as a multi-part standard.

a) 24779 series

Part 1 sets forth policies common to all modalities, and each modality is allocated a number corresponding to the part number of 19794. Ahead of the other parts, with a Japanese editor, Part 9: Vascular applications became an international standard in 2015. Part 1: General principles, Part 4: Fingerprints and Part 5: Face images are under development.

The symbols used in each SC have to be standardized by ISO/TC 145 or IEC/TC 3, but SC 37 had not taken this action. Liaison relationship in Japan having extended the international liaison relationship with IEC/TC 3/SC 3C, the development of the 24779 series improved very much.

b) Others

TR 30110 summarizes the considerations affecting the use of biometrics by children, and was published in 2015. Following on from this, considerations affecting the use of biometrics by the elderly are currently being developed as TR20322.

3. SC 27

In SC 27, international standardization relating to biometrics technology is being performed by WG 3 (security evaluation criteria) and WG 5 (identity management and privacy technologies).

In WG 3, biometrics security evaluation became an international standard as 19792 in 2009, with a Japanese expert working as co-editor. 19792 summarizes the considerations regarding the application of security evaluation according to ISO/IEC 15408 to biometrics, and the need for more detailed security evaluations relating to false acceptance/rejection rate, vulnerability assessment and privacy issues. 19989, which is currently under development, is advancing the progress of 19792 and of the creation of an evaluation methodology to facilitate security evaluations of biometrics products based on ISO/IEC 15408. The project was established in 2014, starting with the security evaluation of PAD, but at the meeting in April 2016, the scope was extended to include performance evaluation and the project name was changed to "Criteria and methodology for security evaluation of biometric systems". Furthermore, at the meeting in October, it was split into Part 1: Framework, Part 2: Biometric recognition performance, and Part 3: PAD. A Japanese expert was appointed as the editor of Parts 1 and 3, and as the co-editor of Part 2.

In WG 5, with a Japan expert appointed as editor, 24761 (Authentication context for biometrics) became an international standard in 2009. This standard defines data structures that make it possible to judge the reliability of biometric authentication results in remote environments. At present, revisions are being made to simplify the data structures to facilitate the data validation. 24745 (Biometric information protection), which was published in 2011, summarizes the management measures and techniques for the protection of biometric information. The summarized techniques include not only encryption but also cancellable biometrics models. A project that is currently under development jointly with ITU-T is X.1085 | 17922 (Telebiometric authentication framework using BHSM (biometric hardware security module)). This defines user registration and authentication mechanisms for PKI (public key infrastructure) authentication in which the signing key is activated by biometric authentication, and is at the FDIS stage as of October 2016.

4. SC 17

7816-11 defines a PBO (Perform Biometric Operation) command for biometric processing on IC cards. A Japanese expert has been appointed as editor, and is also working to apply 24761 specified in SC 27 to PBO commands. 7816-11 is at the DIS stage as of October 2016.