ISO/IEC JTC1 SC37 WG3
Biometric Data Format and Related Standards

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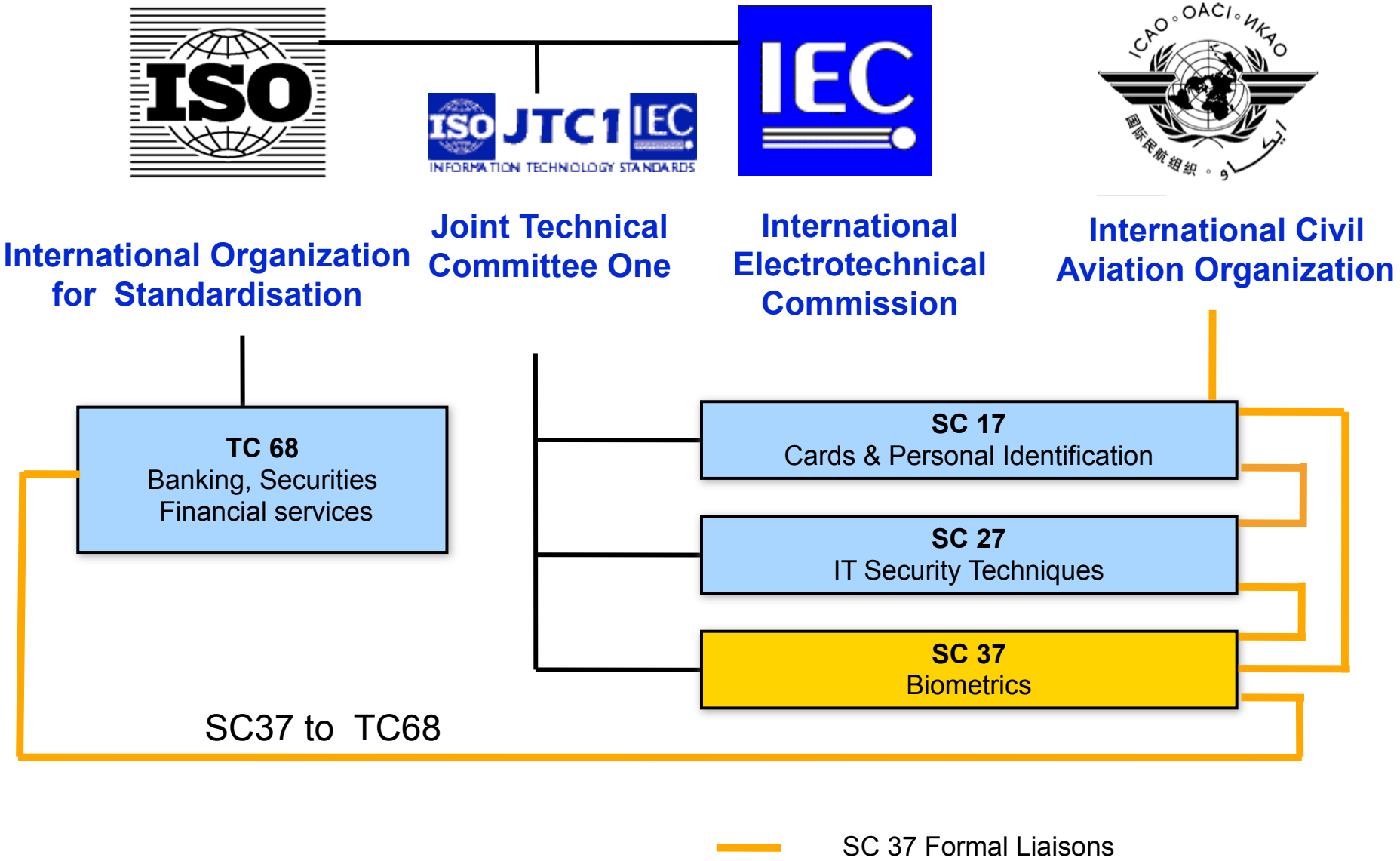
Lysaker
2014-08-12

Biometric Standardisation



ISO/IEC SC37 Biometrics

Established by JTC 1 in June 2002 to ensure

- a high-priority, focused and comprehensive approach worldwide for the rapid development of formal generic biometric standards

Scope of SC37

- *"Standardization of generic biometric technologies pertaining to human beings to support interoperability and data interchange among applications and systems. Generic human biometric standards include: common file frameworks; biometric application programming interfaces; biometric data interchange formats; related biometric profiles; application of evaluation criteria to biometric technologies; methodologies for performance testing and reporting and cross jurisdictional and societal aspects"*
- http://www.jtc1.org

Next meeting: January, 2015

Working Group 3

Title: Biometric Data Interchange

- Convenor: Christoph Busch (Germany)

Terms of Reference:

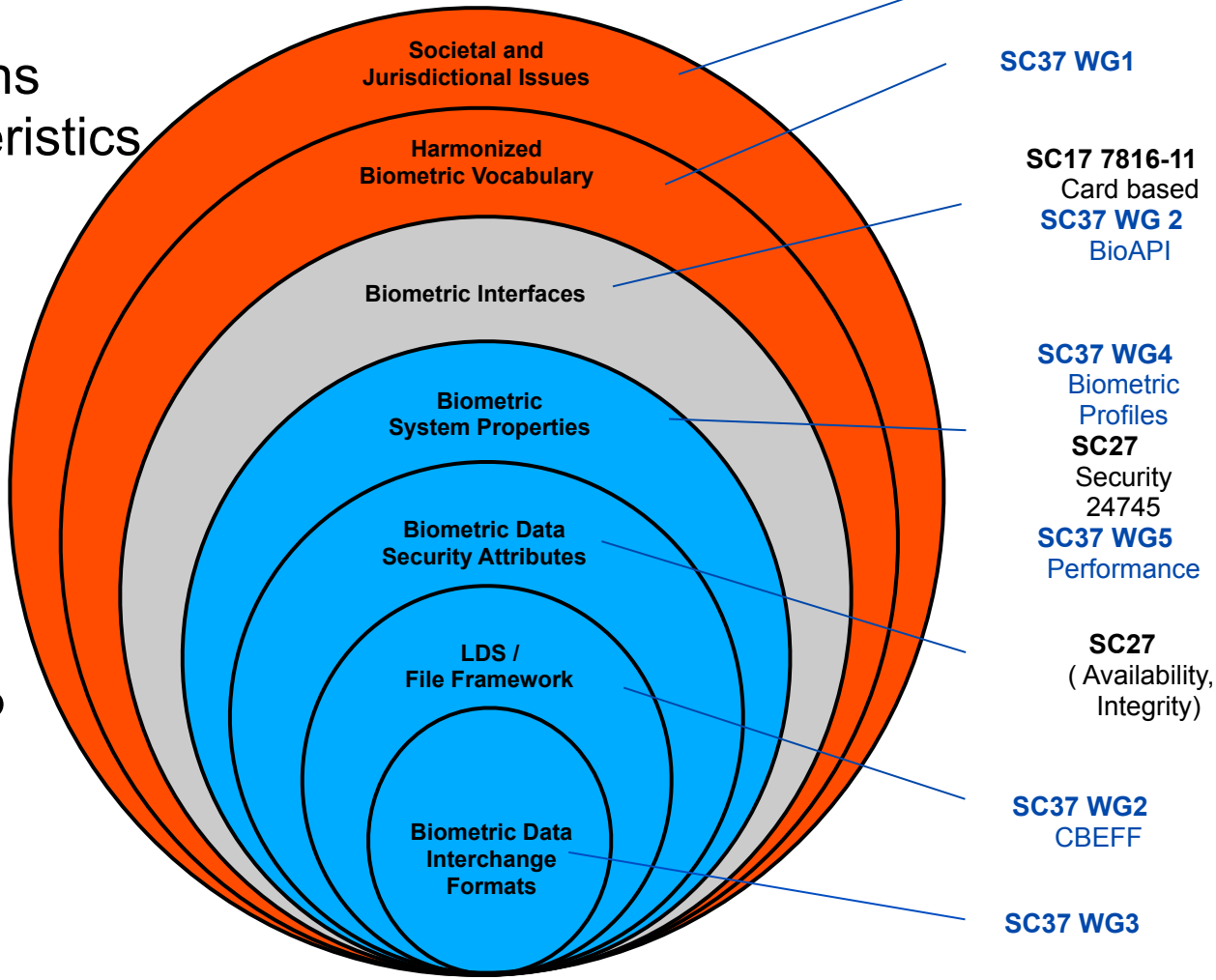
- To consider the standardisation of the content, meaning, and representation of biometric data formats which are specific to a particular biometric technology. To ensure a common look and feel for Biometric Data Structure standards, with notation and transfer formats that provide platform independence and separation of transfer syntax from content definition

“Getting equipment to understand each other”

Biometric Standardisation

Onion Layers

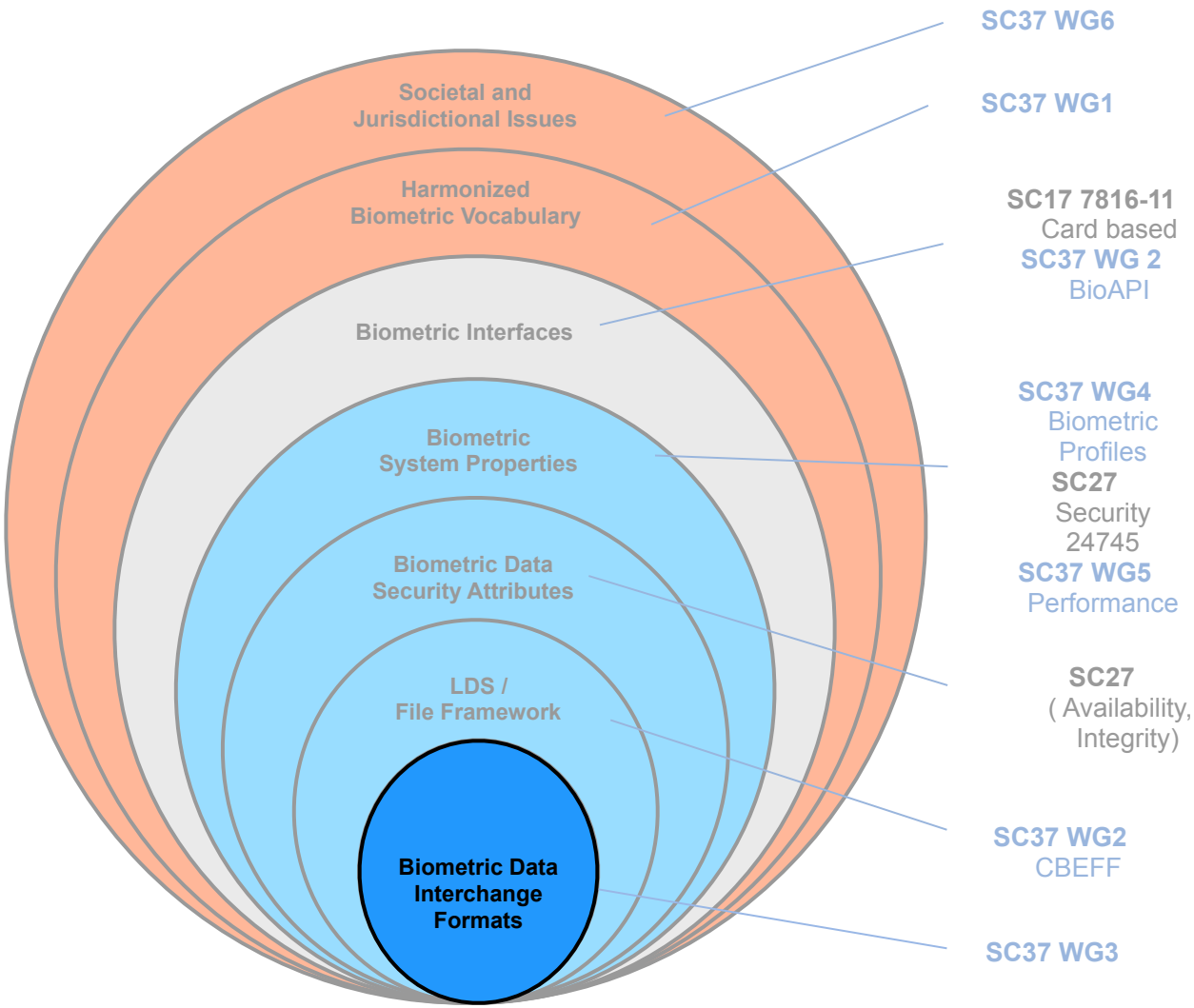
- Layer 1: BDIR
  - Digital representations of biometric characteristics
- Layer 2: LDS
  - CBEFF Meta-data
- Layer 3+4: System properties
  - Security
  - Performance
- Layer 5: BioAPI, BIP
  - System Integration



Biometric Standardisation

Onion Layers

- Layer 1: BDIR
  - Biometric Data Interchange Record

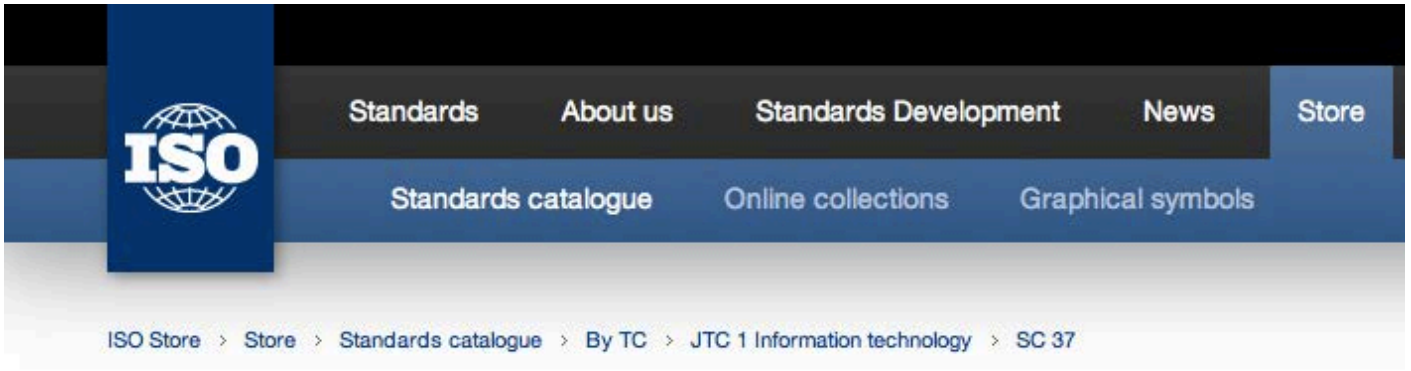


Harmonized Biometric Vocabulary

ISO/IEC 2382-37:2012

Information technology - Vocabulary -Part 37: Biometrics:

http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=55194



Harmonized Biometric Vocabulary

ISO/IEC-Vocabulary:

http://www.christoph-busch.de/standards.html

Harmonized Biometric Vocabulary

The following terms and definition are based on the ISO SC37 Harmonized Biometric Vocabulary (Standing Document 2 Version 12 – dated 2009-09-16) as defined in SC37 Working Group 1. The German and French translations are provided by the national delegate in Working Group 1 and are still subject to national body approval.

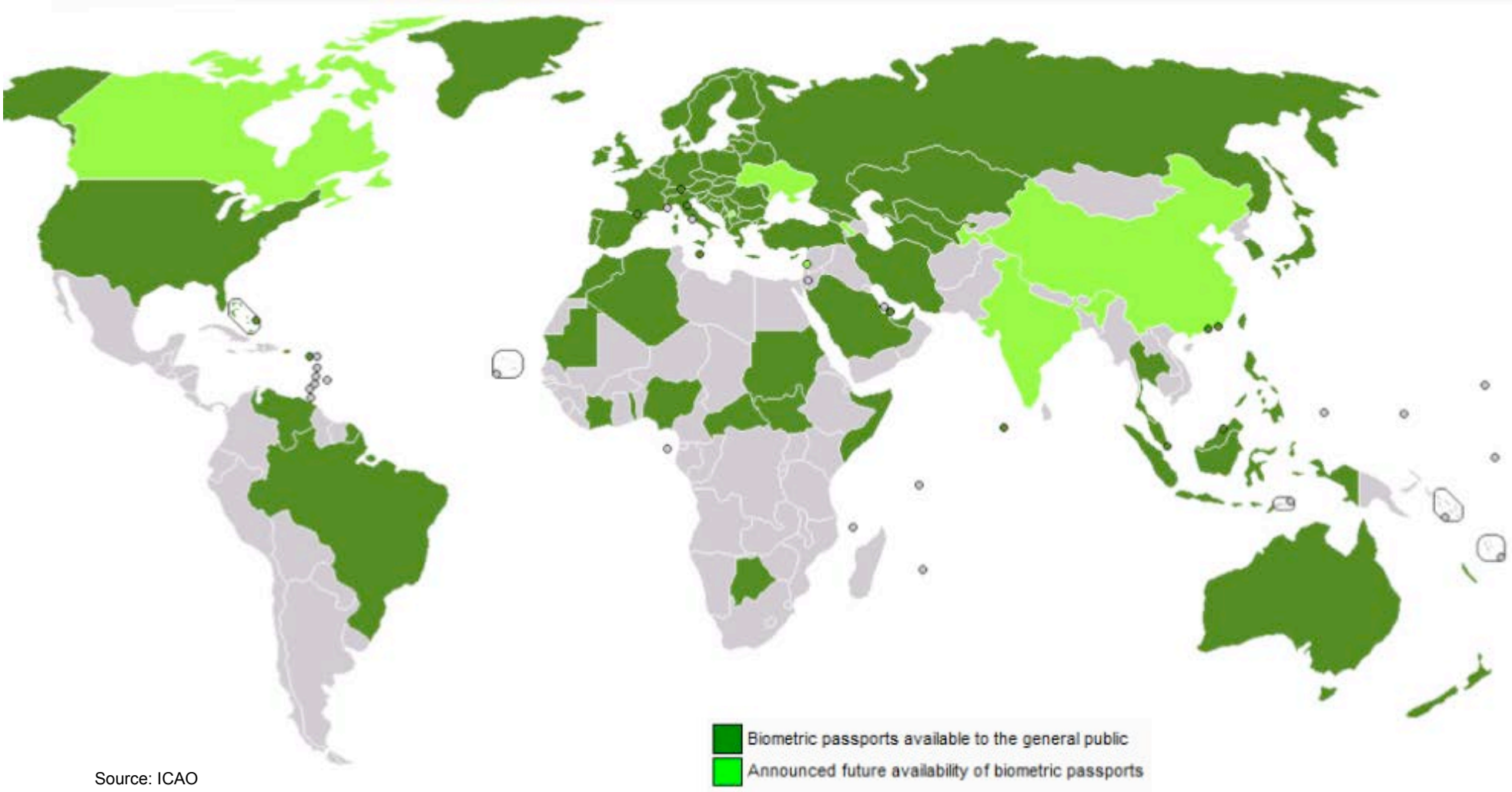
No.	English	German	French
3.1	**General concept terms**	**allgemeine Begriffe**	
3.1.1	**biometric**	**biometrisch**	**biométrique** (adj.)
	of or having to do with biometrics	in Beziehung zur Biometrie stehend	en relation avec la biométrie
	NOTE The use of biometric as a noun, to mean for example, biometric characteristic, is deprecated.		
	EXAMPLE Incorrect usage #1: ICAO resolved that face is the biometric most suited to the practicalities of travel documents.	BEISPIEL für falsche Verwendung #1: Die ICAO entschied, dass das Gesicht die für Reisedokumente praktikabelste Biometrie ist.	
	EXAMPLE Correct usage #1: ICAO resolved that face recognition is the biometric modality most suited to the practicalities of travel documents.	BEISPIEL für korrekte Verwendung #1: Die ICAO entschied, dass die Gesichtserkennung die für Reisedokumente am praktikabelste biometrische Modalität ist.	
	EXAMPLE Incorrect usage #2: The biometric recorded in my passport is a facial image.	BEISPIEL für falsche Verwendung #2: Die in meinem Pass gespeicherte Biometrie ist ein Gesichtsbild.	
	EXAMPLE Correct usage #2: The biometric characteristics recorded in my passport is a facial image.	BEISPIEL für korrekte Verwendung #2: Das für meinen Pass aufgenommene biometrische Charakteristikum ist ein Gesichtsbild.	

Need for Standardization

Deployment of Biometric Passports

489 million ePassports

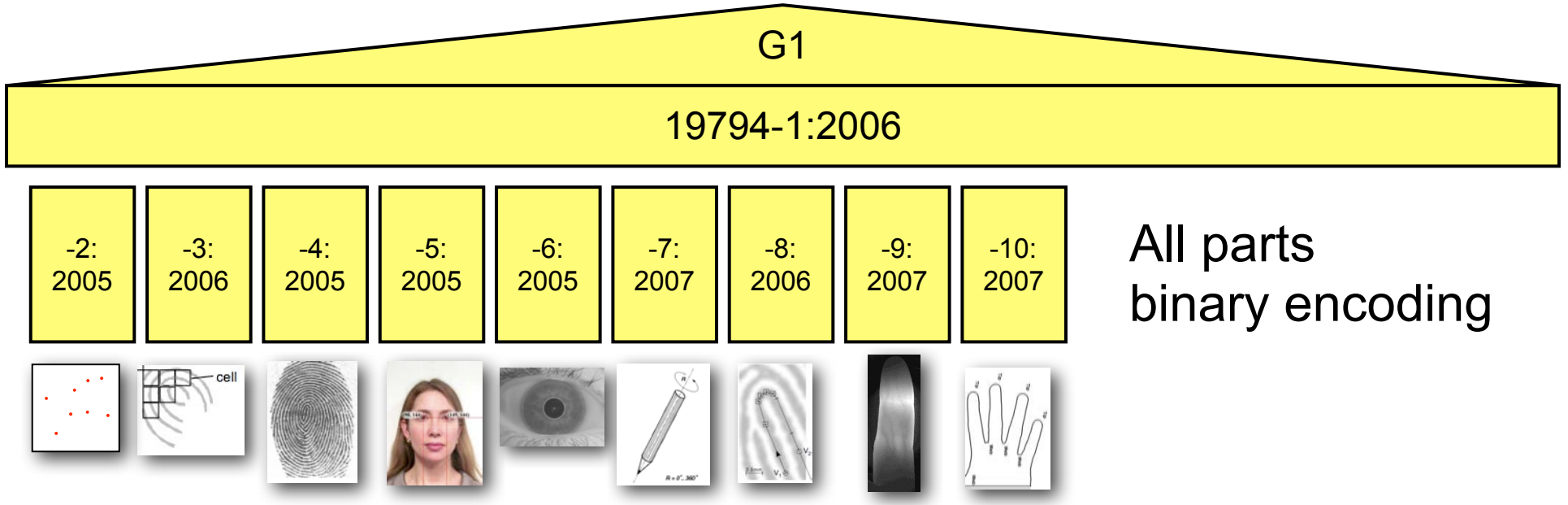
- issued by 101 states (ICAO estimate as of February 2013)



Source: ICAO

Biometric Data Interchange Formats

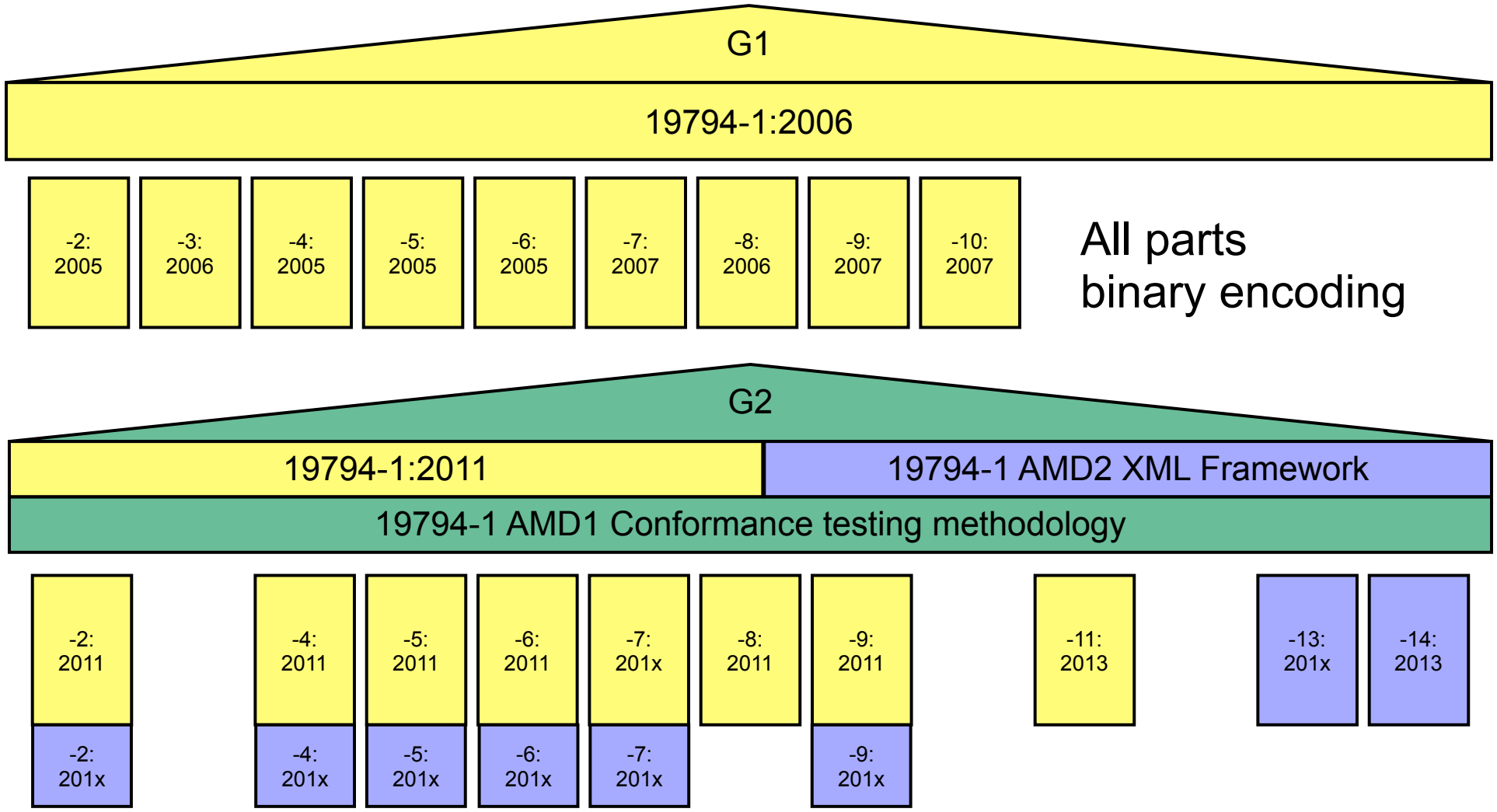
First Generation Format Standards



All parts
binary encoding

The 19794-Family: Biometric data interchange formats

Generation 2 of ISO/IEC 19794

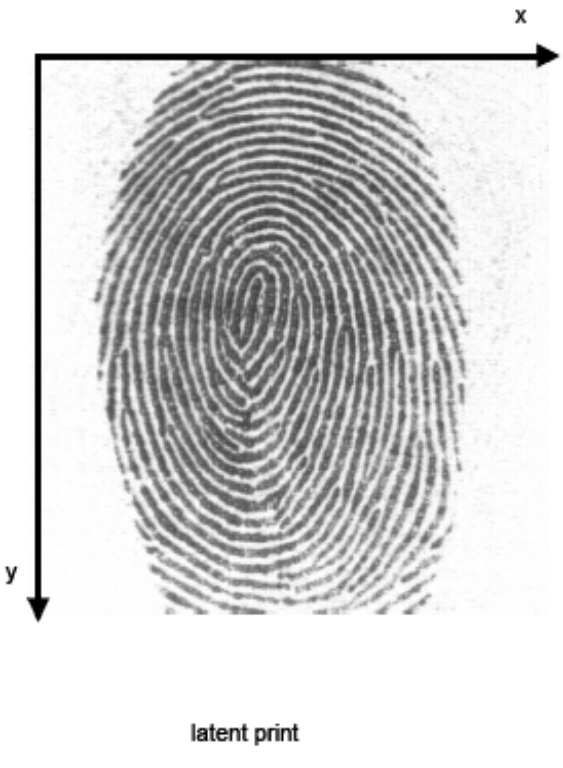


the semantic (i.e. general header / structure of representation header) equivalent for binary encoded and XML encoded parts in G2

Part 2: Finger minutiae data

ISO/IEC 19794-2:2011

- Ridges and valleys, core and delta
- Ridge bifurcation and ridge endings
  - finger minutiae
- Encoded information
  - Minutia point (coordinates x,y)
  - Minutia direction (angle θ)
- How many finger minutiae, and how many ridges between each pair of them?
- A very mature technology



Source: ISO/IEC 19794-4

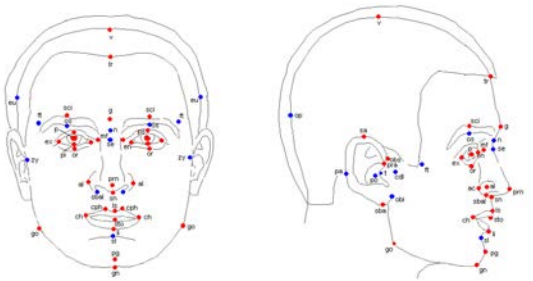
Part 4: Finger image data

ISO/IEC 19794-4

- This part specifies image based encoding of one or more finger images or palm image areas
- Maximum retention of information from the biometric source
- Highest level of interoperability
  - No dependability on the comparison algorithm
- The information consists of a variety of mandatory and optional items, including scanning parameters, compressed or uncompressed images and vendor-specific information
- Encoded information
  - Images (JPEG, JPEG2000, WSQ)
- This format is in use in EU-passports

Part 5: Face image data

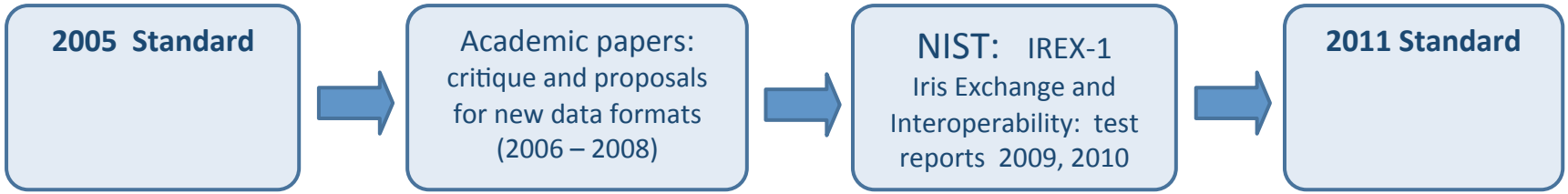
ISO/IEC 19794-5:2011



- Tec Corr 1 and 2
  as well as AMD 1 and 2 integrated
  - 3D Face Image Data Interchange Format
  - Conditions for taking photographs for face image data
- New in G2
  - for records from video sequences
  - for biometric records at higher spatial sampling rate levels
  - for specification of post acquisition steps
    - cropping, down-sampling, in-plan rotation, adjusting white balance not requiring new image types vs.
    - interpolation, pose correction, age processing etc. requiring a new “post-processed” image type
    - Support for lossless compression (PNG, JPEG 2000 lossless)

Part 6: Iris image data

ISO/IEC 19794-6:2011

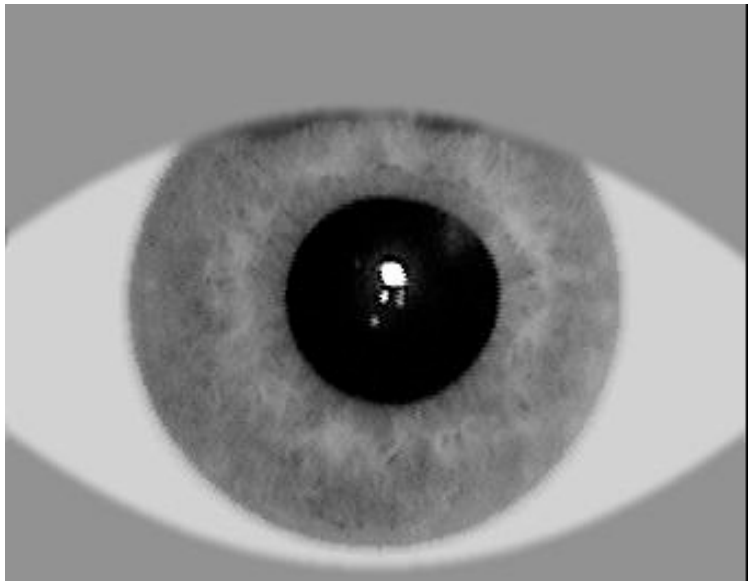


- 4 new iris image formats, compressible to as little as 2,000 bytes
- Iris formats are now highly empirically based, thanks to NIST IREX testing results
- Recommended target record sizes for different applications
- Recommended compression for different applications
- Formats differ in their required amount of image pre-processing
- Original 19794-6:2005 raw image format retained as one case
- Iris sample quality (29794-6) will become normative Annex

Part 6: Iris image data

One new data format in 19794-6:2011

- highly compact iris image, compressed to 2,000 bytes



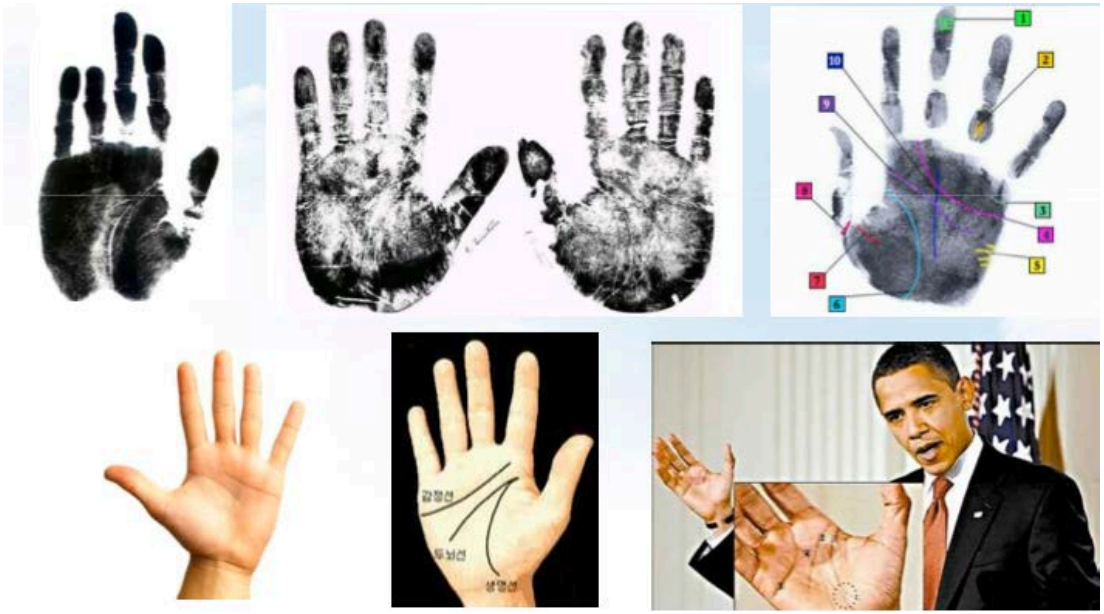
Source: ISO/IEC 19794-6

- Cropping, and masking non-iris regions, preserves the coding budget
- Pixels outside the ROI fixed to constant values, for normal segmentation
- Softening the mask boundaries also preserves the coding budget
- Interoperability of this vendor-neutral format confirmed by IREX results
- At only 2,000 bytes, iris images are now much more compact than fingerprints

Part 15: Palm crease image data

ISO/IEC 19794-15

- A standard image interchange format for biometric systems that utilize human palm crease pattern images (alias palm lines)
- The format will contain detailed pixel information, units of measurement, description of imaging area of body, and imaging methods such as transparency or reflectance image



XML Encoding

Darmstadt Decisions

- ISO/IEC 19794-1:2011 AMD2 - 2nd DAM
- ISO/IEC 19794-2:2011 AMD2 - progress: DAM
- ISO/IEC 19794-4:2011 AMD2 - progress: DAM
- ISO/IEC 19794-5:2011 AMD2 - progress: PDAM
- ISO/IEC 19794-6:2011 AMD2 - progress: 2nd PDAM
- ISO/IEC 19794-7:2011 AMD2 - progress: DAM
- ISO/IEC 19794-9:2011 AMD2 - progress: DAM

Purdue Decision

- ISO/IEC 19794-1:2011 AMD2 - progress: FDAM -

Conformance Testing Methodology

G1 - 29109-x

- Part 1, 2, 4, 5, 6, 7, 8. 9 and 10 published
- 5th WD 29109-2 AMD1 Level 3 Conformance Testing
  - seeking for empirical studiess
- 2nd rev29109-5 to cover defect reports
  - this revision will NOT cover the 3D-Face amendment

G2 - 19794-x:2011 AMD1

- Part 1, 2 4 and 9 are published
- Part 5 and 11 are FDAM
- Part 6 is DAM
- Part 14 is PDAM

- tables addressed testing of Binary Encoded Records only
- adaptation for XML- will be done in AMD2

Related Standards and Trends

Biometric Sample Quality

Revision running for

- ISO/IEC 29794 Part 1: framework
- ISO/IEC 29794 Part 4: finger image data
  - upgrade from TR to IS to incorporate NFIQ2.0 findings
    see: http://www.nist.gov/itl/iad/ig/development_nfiq_2.cfm
- 2nd DIS ISO/IEC 29794 Part 6: iris image data

Biometric Sample Quality

Previous edition ISO/IEC IS 29794-1:2009
"Information technology -
Biometrics sample quality Part 1: Framework"

Definitions

- quality: "the degree to which a biometric sample fulfils specified requirements for a targeted application"
- quality score: "a quantitative expression of quality"
- utility: "the observed performance of a biometric sample or set of samples in one or more biometric systems"
- Quality score from 0 to 100

description		size	valid values	notes
Number of Quality Blocks		1 byte	[0,255]	This field is followed by the number of 5-byte Quality Blocks reflected by its value (see **Fehler! Verweisquelle konnte nicht gefunden werden.**). A value of zero (0) means that no attempt was made to assign a quality score. In this case, no Quality Blocks are present.
Quality Block	Quality Score	1 byte	[0,100] 255	0: lowest 100: highest 255: failed attempt to assign a quality score
	Quality Algorithm Vendor ID	2 bytes	[1,65535]	Quality Algorithm Vendor ID shall be registered with IBIA as a CBEFF biometric organization. Refer to CBEFF vendor ID registry procedures in ISO/IEC 19785-2.
	Quality Algorithm ID	2 bytes	[1,65535]	Quality Algorithm ID may be optionally registered with IBIA as a CBEFF Product Code. Refer to CBEFF product registry

Source: ISO/IEC 29794-1

Presentation Attack Detection

ISO/IEC 30107 - Scope

- terms and definitions that are useful in the specification, characterization and evaluation of presentation attack detection methods;
- a common data format for conveying the type of approach used and the assessment of presentation attack in data formats;
- principles and methods for performance assessment of presentation attack detection algorithms or mechanisms; and
- a classification of known attacks types (in an informative annex).

Outside the scope are

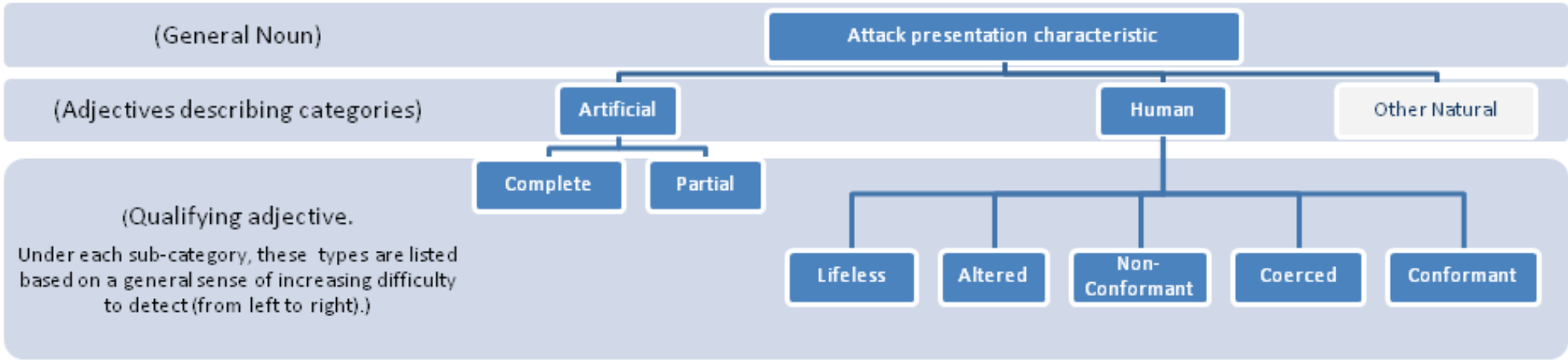
- standardization of specific PAD detection methods;
- detailed information about countermeasures (i.e. anti-spoofing techniques), algorithms, or sensors;
- overall system-level security or vulnerability assessment.

Presentation Attack Detection

ISO/IEC 30107 - Definitions

- artefact: *„artificial object or representation presenting a copy of biometric characteristics or synthetic biometric patterns“*
- spoof: *„to subvert a system by presentation of an artefact.“*
- change of term: Suspicios presentation detection became biometric Presentation Attack Detection (bPAD)

Types of presentation attacks



Source: ISO/IEC 30107

Presentation Attack Detection

30107 parts

- Part 1 (IS) - Framework
  - Elaine Newton
  - status: 2nd CD
- Part 2 (IS) - Data formats
  - Olaf Henniger
  - status: WD
- Part 3 (IS) Testing and Reporting
  - Michael Thieme
  - status: WD

New project Video Surveillance

Discussion in Purdue

- Standard should focus on individuals and not on left on left bagguege
- Primarily focus on face recogntion - not gait
  - standard should not rule out soft biometrics (height)
- Performance of multiple-camera system considered as systems are using multiple cameras
- Offline and online evaluations
- Framework should allow for cooperative and for non-cooperative subjects (i.e. that try to hide)

Use cases for data format

- deploy new entries on watch list to airport
- post event analysis
- avoid vendor-lock-in

G3 roadmap

Data Interchange Format

- Widely adopted and deployed in large number
- Reflecting need for distributed systems with XML encoding
- Reflecting need for actionalbe feedback wtih quality vectors
- Reflecting need for secure system with PAD encoding

Preliminary Discussion with SC17 WG3

- Definition on transition period from G1 to G2 in ICAO 9393
- Suitable revision cycles for definition in ICAO 9303
- Forward and backwards compatibility
- Transcodability from XML to BIN and vice versa

Working on concepts in a Special group

References

Web

- Convenors website with latest news and slides
  http://www.christoph-busch.de/standards-sc37wg3.html
- ISO/IEC JTC SC37
  http://isotc.iso.org/livelink/livelink?
  func=ll&objId=2262372&objAction=browse&sort=name
- Published ISO/IEC Standards
  http://www.iso.org/iso/iso_catalogue/catalogue_tc/
  catalogue_tc_browse.htm?commid=313770&published=on

SC37-conference in Norge in 2015

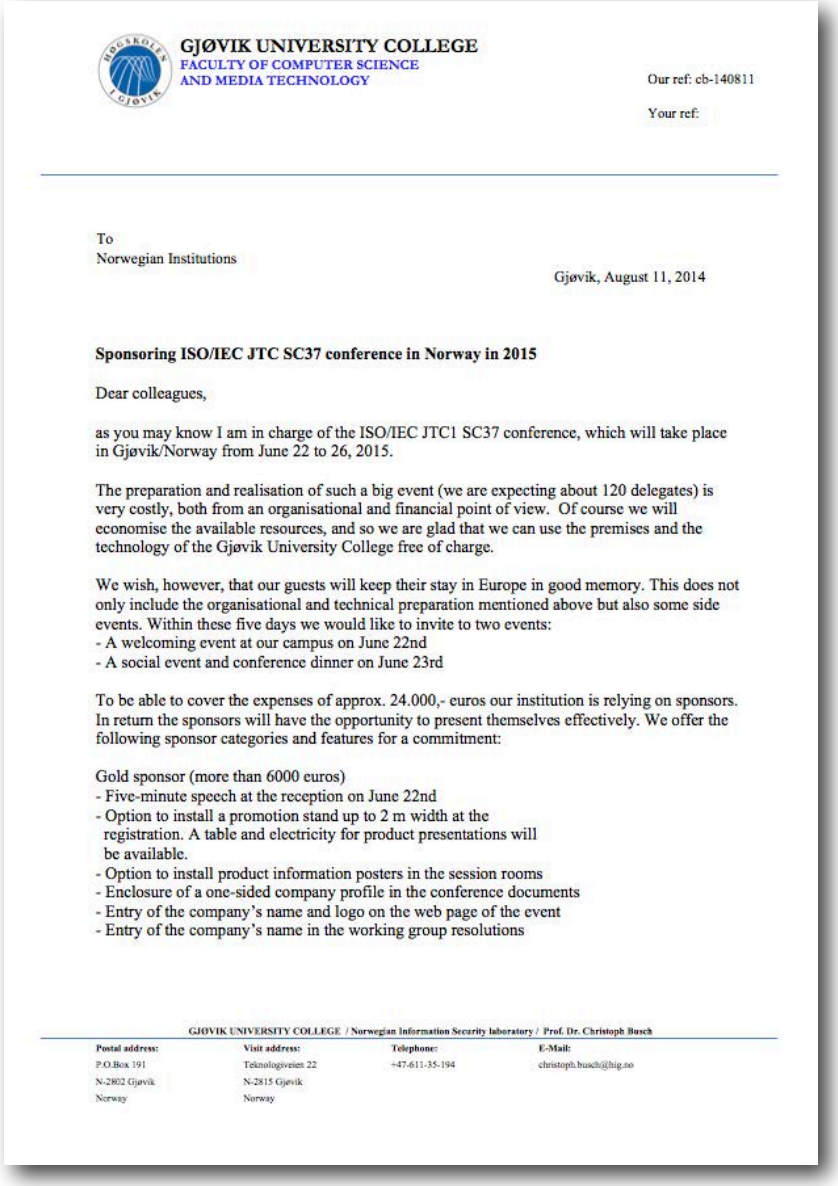
Date

- Mon to Fri
- 2015-06-22 to 2015-06-26
- where: Høgskolen i Gjøvik (HiG)
  - Norwegian Biometric Laboratory
    http://nislab.no/biometrics_lab

SC37-conference in Norge in 2015

Seeking for sponsors

- Gold sponsor
  - more than 6000 euros
- Silver sponsor
  - more than 2000 euros
- Bronze sponsor
  - up to 2000 euros



GJØVIK UNIVERSITY COLLEGE
FACULTY OF COMPUTER SCIENCE
AND MEDIA TECHNOLOGY

Our ref: cb-140811

Your ref:

To
Norwegian Institutions

Gjøvik, August 11, 2014

Sponsoring ISO/IEC JTC SC37 conference in Norway in 2015

Dear colleagues,

as you may know I am in charge of the ISO/IEC JTC1 SC37 conference, which will take place in Gjøvik/Norway from June 22 to 26, 2015.

The preparation and realisation of such a big event (we are expecting about 120 delegates) is very costly, both from an organisational and financial point of view. Of course we will economise the available resources, and so we are glad that we can use the premises and the technology of the Gjøvik University College free of charge.

We wish, however, that our guests will keep their stay in Europe in good memory. This does not only include the organisational and technical preparation mentioned above but also some side events. Within these five days we would like to invite to two events:
- A welcoming event at our campus on June 22nd
- A social event and conference dinner on June 23rd

To be able to cover the expenses of approx. 24.000,- euros our institution is relying on sponsors. In return the sponsors will have the opportunity to present themselves effectively. We offer the following sponsor categories and features for a commitment:

Gold sponsor (more than 6000 euros)
- Five-minute speech at the reception on June 22nd
- Option to install a promotion stand up to 2 m width at the registration. A table and electricity for product presentations will be available.
- Option to install product information posters in the session rooms
- Enclosure of a one-sided company profile in the conference documents
- Entry of the company's name and logo on the web page of the event
- Entry of the company's name in the working group resolutions

GJØVIK UNIVERSITY COLLEGE / Norwegian Information Security laboratory / Prof. Dr. Christoph Busch

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