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Information security, cybersecurity and privacy protection — General principles, requirements and guidance for security evaluation of biometric systems

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives or www.iec.ch/members_experts/refdocs).

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This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 27, *Information security, cybersecurity and privacy protection*.

This second edition cancels and replaces the first edition (ISO/IEC 19792:2009), which has been technically revised.

The main changes are as follows:

— the structure has been harmonized with general security evaluation methodology;

— the title has been changed from “Security evaluation of biometrics” to “General principles, requirements and guidance for security evaluation of biometric systems”, to align with the ISO/IEC 19989 series, the ISO/IEC 15408 series and the ISO/IEC 18045.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

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Introduction

This document does not aim to define any concrete methodology for the security evaluation of biometric systems but instead focuses on the principal requirements. As such, the requirements in this document are independent of any evaluation or certification scheme. If the requirements of this document are intended to be used in such a scheme, it will be necessary to adapt and incorporate them into the scheme before use.

This document defines various areas that are important to consider during a security evaluation of a biometric system. These areas are represented by the following clauses:

— Clause 5 explains the outline of security evaluation of biometric systems;

— Clause 6 overviews the threats and vulnerabilities to biometric systems that should be considered for the evaluation;

— Clause 7 describes the evaluation of biometric specific vulnerabilities related to recognition performance;

— Clause 8 deals with the evaluation of biometric specific vulnerabilities related to presentation attack detection;

— Clause 9 overviews the evaluation of privacy.

This document is relevant to both evaluator and developer communities. It shows how a security evaluation of a biometric system is performed. It serves to inform developers of the requirements for biometric security evaluations to help them prepare for security evaluations.

Although this document is independent of any specific evaluation scheme, it serves as a framework for developing concrete evaluation and testing methodologies that integrate the requirements for biometric evaluations into existing evaluation and certification schemes.

This document refers to and utilizes other biometric standards, notably those for biometric performance testing and reporting from ISO/IEC 19795-1, and the evaluation of presentation attack detection from the ISO/IEC 30107 series. These standards have been applied as necessary for the specific requirements of biometric security evaluation.

This document can also be used by organizations such as developers and procurers of biometric systems or devices to set proper security requirements for biometric systems or devices.

This document focuses mostly on the cases of complete biometric systems for verification or identification scenarios. However, the evaluation principles can be used entirely or partly for other cases such as: subsystems (e.g. presentation attack detection component, comparison component), other biometric scenarios (e.g. enrolment, duplicate enrolment check, white listing, black listing, quality assessment) or other biometrics-related processing aspects (e.g. emotional estimation, age estimation).

This document can be seen as an introduction to the ISO/IEC 19989 series, which covers the security evaluation of biometric products based on the ISO/IEC 15048 series. In addition, this document provides general guidance to design and execute security evaluation methodologies of biometric systems that are not aimed for evaluation conformant to ISO/IEC 15408 series.

This document does not address the vulnerabilities that are common to IT systems in general. For example, unprotected biometric data, biometric references, or comparison decisions, with which an attacker can tamper in order to impersonate someone else, are such vulnerabilities and are subject to evaluation under a general methodology, not specific to biometrics, such as the one specified in ISO/IEC 15408-1. However, general vulnerabilities associated with the information handled by the biometric system can employ system specific countermeasures which are addressed in Clauses 6 and 8.

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Information security, cybersecurity and privacy protection — General principles, requirements and guidance for security evaluation of biometric systems

1 Scope

This document specifies general principles, requirements and guidance for a security evaluation of a biometric system.

This document provides an overview of the main biometric-specific aspects, i.e. recognition performance, presentation attack detection and privacy, and specifies principles to consider for the security evaluation of a biometric system.

This document does not address the non-biometric aspects which can form part of the overall security evaluation of a system using biometric technology (e.g. requirements on databases or communication channels).

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1 General biometric terms

3.1.1
assurance
grounds for confidence that a target of evaluation meets the security functional requirements

[SOURCE: ISO/IEC 15408-1:2022, 3.6]

3.1.2
attacker
person seeking to exploit potential vulnerabilities of a biometric system

3.1.3
authentication
provision of assurance that a claimed characteristic of an entity is correct

[SOURCE: ISO/IEC 27000:2018, 3.5]

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3.1.4
biometric
of or having to do with biometrics

Note 1 to entry: The use of biometric as a noun, to mean for example, *biometric characteristic* (3.2.1), is deprecated.

EXAMPLE 1 Incorrect usage #1: ICAO resolved that face is the biometric most suited to the practicalities of travel documents.

EXAMPLE 2 Correct usage #1: ICAO resolved that face recognition is the biometric mode most suited to the practicalities of travel documents.

EXAMPLE 3 Incorrect usage #2: The biometric recorded in my passport is a facial image.

EXAMPLE 4 Correct usage #2: The biometric characteristic recorded in my passport is a facial image.

Note 2 to entry: Since the late 19th century the terms biometrics and biometry have been used with the general meaning of counting, measuring and statistical analysis of any kind of data in the biological sciences including the relevant medical sciences.

[SOURCE: ISO/IEC 2382-37:2022, 37.01.01]

3.1.5
biometric recognition
biometrics
automated recognition of individuals based on their biological and behavioural characteristics

Note 1 to entry: In the field of biometrics (as defined in this document), “Individual” is restricted in scope to refer only to humans.

Note 2 to entry: The general meaning of biometrics encompasses counting, measuring and statistical analysis of any kind of data in the biological sciences including the relevant medical sciences.

Note 3 to entry: Biometric recognition encompasses biometric verification and biometric identification.

Note 4 to entry: Automated recognition implies that a machine-based system is used for the recognition either for the full process or assisted by a human being.

Note 5 to entry: Behavioural and biological characteristics cannot be completely separated which is why the definition uses "and" instead of "and/or". For example, a fingerprint image results from the biological characteristics of the finger ridge patterns and the behavioural act of presenting the finger.

Note 6 to entry: Use of "authentication" as a synonym for “biometric verification or biometric identification” is deprecated; the term biometric recognition is preferred.

[SOURCE: ISO/IEC 2382-37:2022, 37.01.03]

3.1.6
developer
organization responsible for the development of the target of evaluation

Note 1 to entry: According to ISO/IEC 15408-1:2022, 3.90, a target of evaluation is defined as a set of software, firmware and/or hardware possibly accompanied by guidance, which is the subject of an evaluation.

[SOURCE: ISO/IEC 15408-1:2022, 3.33, modified — Note 1 to entry has been added.]

3.1.7
evaluation
assessment of a target of evaluation against defined criteria

[SOURCE: ISO/IEC 15408-1:2022, 3.37, modified — “PP-Configuration, protection profile (PP), a security target (ST), or” has been removed.]

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