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CEN/TC 224/WG 18 European requirements for biometric products Part 3

Document type	Related content	Document date	Expected action
Project / Other		2023-09-28	**INFO**

Description

Personal identification — European requirements for biometric products — Part 3: Functionality evaluation methodology

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Document type	Related content	Document date	Expected action
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Personal identification — European requirements for biometric products — Part 3: Functionality evaluation methodology

Einführendes Element — Haupt-Element — Ergänzendes Element

Élément introductif — Élément central — Élément complémentaire

ICS:

CCMC will prepare and attach the official title page.

Contents

European foreword

This document (prEN XXXX:XXXX) has been prepared by Technical Committee CEN/TC XXX "Title", the secretariat of which is held by XXX.

This document is currently submitted to the CEN Enquiry.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

[NOTE to the drafter: Add information about related documents or other parts in a series as necessary. A list of all parts in a series can be found on the CEN website.]

Introduction

The use of remote services has increased significantly. This was boosted during 2020-2021, when many service providers and Administrations migrated most of their processes to online handling. We can find nowadays many online services, such as opening of a bank account, claiming expenses, paying taxes, starting legal actions, etc.

For all these services there is the need of identifying the persons claiming for that service, and doing it in a comfortable, universal, reliable and auditable way. Even though some of those services, in some countries, were deployed using PKIs (Public Key Infrastructures), as recommended by eIDAS, this approach was far away from being used by a significant part of the population.

This situation led to creating identification services using videoconferencing tools, such as using any device camera to scan a document, and capture your face for biometric recognition. This is deployed in many countries and sectors, but using ad-hoc solutions, limiting interoperability and increasing costs and risks.

In this context, service providers and Administrations have to define their own requirements, select the products and deploy the solution. On the other hand, manufacturers had to implement different solutions to different customers, in order to fulfil each of those requirement sets. Both sides would benefit from standards and regulations, on which to rely for the product definition.

Everybody will benefit from having a common way of defining those requirements, and a detailed evaluation methodology. These two items can be used by conformity assessment bodies or by business owners, to create their own certification schemes for this kind of technology/products, by following the international ISO/IEC 17000 series of standards.

This project is addressing this need for the case of Biometric Products, analysing and merging all current works, and defining a detailed set of requirements, a biometric-modality-specific evaluation methodology, and the passing criteria for different application profiles. This work will be developed in accordance with GDPR principles.

DISCLAIMER: As we're in initial WDs some terminology will have to be revisited to be compliant.

This will be written as a multipart project with the following structure:

— Parts 1-3: Defining the generic principles and methodologies, not requiring a biometric modality specific approach. In particular these parts will be:

  — Part 1: General requirements and application profile definition

  — Part 2: Interoperability tests

  — Part 3: Functionality evaluation methodology

— Parts 4-n: Defining the particularities of each biometric modality (e.g., specific tests, specific requirements), and containing, each of the parts, a set of application profiles, that will establish the test and requirements applicable for a specific application and context. Those application profiles will be written as individual annexes, following the structure provided in Part 1. The numbering of these parts, has been done trying to keep conformance with the numbering used by ISO/IEC 19794 series of standards. Therefore:

  — Part 4: Fingerprint biometrics

  — Part 5: Face biometrics

  — Etc.

Identification of patent holders, if any.

NOTE FOR THE EDITOR: Figures shall fit the specifications from CEN. Apply that in the next cycle.

1   Scope

This TS series provide a generic framework for the establishment of requirements and their evaluation methodology for biometric products. The requirements will be established depending on the biometric modality considered, and they will be adapted to each scenario, through the definition of a variety of application profiles.

This series of standards are expected to provide the evaluation methodology, the individual tests, and the application profiles (with their particular requirements).

This document specifies:

— The different kind of evaluations to be performed

— The terms used during the description of the tests to be applied

— The parameters used, whose values will be defined by each application profile, for each of the individual tests

— Test data used, and considerations dealing with personal data protection

— How to perform technological evaluations

— Execution flow for functionality scenario evaluations

— Execution flow for attack resistance evaluations

NOTE   Additional parts are provided covering the specifics of each biometric modality. For each of these modalities, application-independent tests are defined, as well as a set of application profiles, that detail the applicable tests, the evaluation parameters, and the passing criteria.

The Technical Specifications within this series can be taken by any certification body, government and/or sector, to define and evaluate the requirements for their biometric products within their selected applications. This may be used in coordination with other current National initiatives. Governments may decide to give a higher preference to other National specifications.

2   Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

[NOTE to the drafter: The Normative references clause is compulsory. If there are no normative references, add the following text below the clause title: "There are no normative references in this document."]

EN XXXX, *Title of document*

EN XXXX-1:20YY, *General title of series — Part X: Title of part*

EN XXXXX (all parts), *General title of series*

[NOTE to the drafter: If a dated reference is impacted by a standalone amendment or corrigendum, list the main standard and include a footnote as follows:

EN XXXX:20YY[1], *General title*]

EDITOR'S NOTE: These are the documents to be used as a base for this work:

- ISO/IEC 19795-x
- NIST FRVT evaluations
- FVC on-going evaluations
- ISO/IEC 21472 on User Interaction
- ISO/IEC 29197 on Environmental Influence
- ISO/IEC 30107-x
- CEN TS on Data Injection attacks
- ISO/IEC 19989-x
- Common Criteria (ISO 15408) Biometrics Security Community – Collaborative Protection Profile PP-Module for Biometric and Verification
- France: ANSSI "Remote Identity Verification Service Providers"
- Spain: ETD/465/2021 + LINCE + STIC 140 F11 + IT-14
- Portugal: Decree-Law No. 126/2021
- Germany: BSI TR-03121, BSI TR-03122, BSI TR-03166

3   Terms and definitions

EDITOR'S NOTE: To be defined during project drafting

For the purposes of this document, the terms and definitions given in ISO/IEC 19795 series, ISO/IEC 30107 series, ISO/IEC 2382-37 and the following 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/

[NOTE to the drafter: The Terms and definitions clause is compulsory. If there are no terms and definitions, add the following text: "No terms and definitions are listed in this document."]

NOTE   Certain terms, being common-use words, are used in capitals throughout the text to make it clear for the reader that they are evaluation parameters, not regular terms.

EDITOR'S NOTE: the terms written in capital letters throughout this document shall be placed here.

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[1] As impacted by EN XXXX:20YY/A1:20YY.

3.1

ARTIFACT

Artificial object or representation, that present a copy of the biometric characteristics of a SUBJECT

3.2

ATTACKER

Person that attacks the system. It can be an imposter of use an ARTIFACT for attempting a presentation attack

3.3

ATTEMPT

Each of the individual interactions between the SUBJECT and the TOE within a TRIAL

3.4

ERROR

Situation in which the TOE is not able to operate correctly, and therefore, is not able to accomplish a result of the biometric comparison

Example 1 to entry: The TOE is not able to acquire a biometric sample from a bona-fide SUBJECT due to low quality samples captured.

Note 1 to entry: In the case of a PAD TEST, an ERROR (once the maximum number of allowed ATTEMPTS has been reached) can be considered as a NON-MATCH, as the ARTIFACT was not able to be properly captured.

3.5

FAIL

For those TESTs within Phase 1 and Phase 2, it is the final result for such TEST, which tells that the TOE behaviour is not appropriate. On the other hand, during Phase 3, a result of FAIL, tells that the attack has not been successful and, therefore, the TOE behaviour is not inadequate

3.6

MATCH

Positive result of a biometric comparison during a TRIAL

Example 1 to entry: A bona-fide SUBJECT acceptance in a functional TEST.

Note 1 to entry: In the case of a PAD TEST, a MATCH is the non-desired result, as it will show that the ARTIFACT used was able to achieve a successful comparison.

3.7

NON-MATCH

Negative result of a biometric comparison during a TRIAL

Example 1 to entry: A bona-fide SUBJECT rejection in a functional TEST.

Note 1 to entry: In the case of a PAD TEST, a NON-MATCH is the desirable result, as it will show that the comparison with the ARTIFACT used was not successful.

8

3.8

OPERATOR

Human being that, based on the TOE acquired data and result, take the decision on whether the transaction is valid or not

3.9

PASS

For those TESTs within Phase 1 and Phase 2, it is the final result for such TEST which tells that the TOE is presenting an appropriate behaviour. On the other hand, during Phase 3, a result of PASS, tells that the attack has been successful and, therefore, the TOE is vulnerable

3.10

SERVER

Computer-based equipment in which the TOE stores the acquired data during the biometric recognition process. Such data can be analysed later by an OPERATOR

3.11

SETTING

Execution context for a TRIAL within a TEST. The SETTING can be the description of equipment to use, the way the SUBJECT has to interact with the TOE, ambient conditions, ARTIFACTs to be used, etc. For each TEST, one or several SETTINGs have to be specified

3.12

SUBJECT

Individual whose biometric data is intended to be enrolled or compared as part of the evaluation. Traditionally, a SUBJECT will be a USER, but in certain evaluations the SUBJECT is a combination of a USER and some additional property or element

Example 1 to entry: In the case of a videoconference system, where the TOE is being used with a USER a potentially a variety of documents, the SUBJECT will be the combination of USER plus document.

Example 2 to entry: In the case Phase 3 test, a SUBJECT is the combination of USER, ARTIFACT, and any other relevant property.

3.13

TEST

Action to evaluate the behaviour of the TOE for certain features. One TEST is composed of several TRIALS, which involve several SUBJECTS and, probably, several SETTINGs

3.14

TEST_ERROR

Situation in which, within a TEST, the TRIALs corresponding to a certain SUBJECT get over the limit MAX_SUBJECT_ERRORS

3.15

TRIAL

Each of the interactions between the SUBJECT and the TOE, during the TEST. Depending on the TOE, each TRIAL may allow several ATTEMPTS

Example 1 to entry: The TOE may ask the SUBJECT to repeat the biometric presentation due to acquisition errors. In such a case, the new presentation will be considered as a new ATTEMPT within the same TRIAL.

3.16

USER

Human being that takes part in a TRIAL. Depending on the TEST, the USER could be a bona-fide SUBJECT or an ATTACKER, or it can behave in one TRIAL as a bonafide SUBJECT, and in another TRIAL as an ATTACKER

3.17

term

text of the definition

3.2

term
admitted term

text of the definition

Note 1 to entry:

[SOURCE: EN XXXX:20YY, definition XX]

[NOTE to the drafter: If applicable, a list of 'Symbols and abbreviated terms' can be included as a subclause under Clause 3 or added as a separate Clause 4.]

4   Symbols and abbreviations

— **MAX_ATTEMPTS:** Maximum number of ATTEMPTS allowed for a TRIAL, before resulting in an ERROR for that TRIAL.

— **MAX_SETTING_MATCHES:** Maximum number of TRIALS, among all required for a SETTING during a TEST, that provide a MATCH result. When this number is reached, the TEST is considered as a PASS for that SETTING. This is only applicable to Phase 3.

   NOTE   In a Phase 3 TEST, a PASS result means that the TOE is vulnerable for that attack.

— **MAX_SETTING_NON_MATCHES:** Maximum number of TRIALS, among all required for a SETTING during a TEST, that provide a NON-MATCH result. When this number is reached, the TEST is considered as FAIL for that SETTING. This is only applicable to Phases 1 and 2.

— **MAX_SUBJECT_ERRORS:** Maximum number of ERRORs allowed for the sum of all TRIALS for a single SUBJECT, within a particular SETTING and TEST. This is only applicable to Phases 1 and 2.

— **MAX_SUBJECTS_FAIL:** Maximum number of SUBJECTs, for which TRIALS within a SETTING and TEST have reached the limit of MAX_SUBJECT_NON_MATCHES. This is only applicable to Phases 1 and 2.

— **MAX_SUBJECT_MATCHES:** Maximum number of TRIALS with a MATCH result, allowed for a single SUBJECT within one SETTING. This is only applicable to Phase 3.

   NOTE   In a Phase 3 TEST, a PASS result means that the TOE is vulnerable for that attack.

— **MAX_SUBJECT_NON_MATCHES:** Maximum number of TRIALS with a NON-MATCH result, allowed for a single SUBJECT within one SETTING. This is only applicable to Phases 1 and 2.

— **MAX_SUBJECTS_PASS:** Maximum number of SUBJECTs, for which TRIALS within a SETTING and TEST have reached the limit of MAX_SUBJECT_MATCHES. This is only applicable to Phase 3.

— **MAX_TEST_ERRORS:** Maximum number of SUBJECTS, within a TEST, for which its TRIALS have reached the limit given by MAX_SUBJECT_ERRORS. This is only applicable to Phases 1 and 2.

— **MAX_TEST_MATCHES:** Maximum number of TRIALS, among all included in a TEST, with a MATCH result. If such number is reached, the TEST is considered as a PASS. This is only applicable to Phase 3.

  NOTE   In a Phase 3 TEST, a PASS result means that the TOE is vulnerable for that attack.

— **MAX_TEST_NON_MATCHES:** Maximum number of TRIALS, among all included in a TEST, with a NON-MATCH result. If such number is reached, the TEST is considered as FAIL. This is only applicable to Phases 1 and 2.

— **MIN_SETTINGS:** Minimum number of SETTINGS defined.

— **MIN_SUBJECTS:** Minimum number of SUBJECTS defined.

— **MIN_TRIALS:** Minimum number of TRIALS defined.

—

5   General concepts

5.1 General

EDITOR'S NOTE: Content to be added here:

— Context of the evaluation

— Relationship with the application profiles

— Relationships with the Phases

— Relationship with 19795 and 30107

— Mentioning the differences between technological, scenario and operational evaluation (even though operational is not expected to be covered by this document)

5.2 Evaluation phases

Within this conformity assessment scheme, the evaluation of the TOE, shall be done following three phases, executed in a sequential manner:

— Phase 1: TOE performance tests

  — The main target of these TESTs is to verify the TOE behaviour regarding what it has been declared by the product supplier. This is to be checked using the relevant SETTINGs for the application profile selected.

— Phase 2: Bona-fide robustness tests

  — The main target of these TESTs is to learn about the TOE, as to be able to locate the operating boundaries in using the TOE with bona-fide SUBJECTs.

  — This knowledge may help evaluators to discover strategies to attack the TOE during Phase 3 tests.

  — Results obtained will be checked with the TOE documentation, as to check is the FAILed tests are clearly excluded from the TOE usage.

— Phase 3: Presentation attack detection tests

  — The main target of these tests is to determine if the TOE is vulnerable to presentation attacks, either Type 1 or Type 2 attacks (as defined in ISO/IEC 30107-1 and CEN TS Digital Injection).

  — According to the application profile, the evaluated attacks may be impostor attacks, concealer attacks or both.

  — The EU Cybersecurity Act (EUCSA) defines 3 levels of assurance, named as Basic, Substantial and High.

  — Under a high-level security (as defined by the EU Cybersecurity Act – EUCSA), as a general rule, any ATTEMPT resulting in a PASS, will declare a FAIL in the Phase 3 evaluation of the TOE. This will be determined by analysing that the attack is not exceeding the maximum attack potential for the TOE evaluation.

5.3 Terms and parameters used during the evaluation

Most of biometric TESTs follow a very similar execution sequence, which is described in clauses 8 and 9. Such clauses are written in a generic way, so as to allow an easier description of each of the TESTs. Other parts of this Technical Specification will define each of the specific TESTs, based on that sequence.

For a better understanding of this methodology, the following terms are needed (defined in clause 3):

— ARTIFACT

— ATTACKER

— ATTEMPT

— ERROR

— FAIL

— MATCH

— NON-MATCH

— OPERATOR

— PASS

— SERVER

— SETTING

— SUBJECT

— TEST

— TEST_ERROR

— TRIAL

— USER

It is also important to consider the following parameters that will be used throughout this evaluation methodology (defined in clause 4):

— MAX_ATTEMPTS

— MAX_SETTING_MATCHES

— MAX_SETTING_NON_MATCHES

— MAX_SUBJECT_ERRORS

— MAX_SUBJECTS_FAIL

— MAX_SUBJECT_MATCHES

— MAX_SUBJECT_NON_MATCHES

— MAX_SUBJECTS_PASS

— MAX_TEST_ERRORS

— MAX_TEST_MATCHES

— MAX_TEST_NON_MATCHES

— MIN_SETTINGS

— MIN_SUBJECTS

— MIN_TRIALS

MIN_TRIALS, MIN_SETTINGS and MIN_SUBJECTS define the minimum number specified for each TEST. These are the numbers to be used by the TL. If during an evaluation the TL detects too many ERRORs

during the TRIALS, the TL may increase those numbers, until it can obtain a number of conclusive (i.e., NON-ERROR) results, equal to:

$$Minimum\ conclusive\ results = \ MIN\_TRIALS * MIN\_SETTINGS * MIN\_SUBJECTS \qquad (1)$$

This deviation shall be fully justified and included in the ETR.

6 Test data

6.1 General considerations

Data is needed for performing biometric evaluations.

In the case of technological evaluations, when the biometric capture subsystem can be detached from the TOE, previously recorded databases can be used to speed up the evaluation, increasing also the significance of the results obtained.

In those cases where the biometric capture subsystem cannot be detached from the rest of the TOE, test data can only be obtained by calling test crews.

GDPR has always to be preserved

6.2 Stored databases

6.2.1 Recorded databases

EDITOR'S NOTE: This subclause shall be populated, covering the following items:

— Reference to publicly available databases

— The possibility of using the lab own database

— Anonymization of the biometric samples.

— Parameters to determine the "universality" of the database, such as race, gender, age group, etc

Most of the tests to be defined under this evaluation methodology are going to be scenario-based tests, which means using real users as input to the TOE. But there are some tests that can be considered as technological evaluations and, therefore, use databases.

For those kind of tests, ISO/IEC 19795 parts 1 and 2 shall be followed. As it is stated in those two standards, the databases shall be representative of the target population where the TOE is going to be applied, and be varied enough as to be able to cover most of the diversity of such population.

Databases can be previously recorded and used in several TOEs, as long as GDPR regulation is followed, and the representativeness of the database is guaranteed.

NOTE   As a minimum requirement for GDPR, the records within a database shall be anonymized whenever possible.

The above mentioned technological tests are typical from either interoperability testing (see part 2), or for some of the tests in Phase 1 and Phase 2 (see clause 8).

6.2.2 Use of synthetic databases

EDITOR'S NOTE: CALL FOR CONTRIBUTIONS FOR THIS SUBCLAUSE considering the following:

When using any database, it has to be proven that the database is representative of the target population where the TOE is going to be used.

In the case of synthetic databases, the realism of the samples has to be proven. Also, the significance shall be detailed, in accordance to the target population of the TOE.

Adding SFINGE as an example for fingerprint may be a good idea.

6.3 Test crews in scenario and operational evaluations

EDITOR'S NOTE: This subclause shall be populated, covering the following items:

— Process to grab and register users for the evaluation

— Relationship with the TOE

— Need to state the diversity of the test crew

— Calling method

— Enrolment

— Handling of real users

— GDPR

— Compensations

— Way of acting

7 Technological evaluations

EDITOR'S NOTE: CALL FOR CONTRIBUTIONS, considering:

This will be based either on ISO/IEC 19795-1 & -2, or on public evaluations such as NIST FRVT. An important point to discuss is if this methodology shall be designed only for limited time & cost evaluations, or generic and the Application Profiles will determine the approach chosen. Other issues to be documented in this clause are:

— Determination of technological evaluation needs and associated parameters.

— Parameters to be determined by the application profile.

— Selection of input data.

8   Evaluation process for Phase 1 and 2

8.1 Overall view of the scenario evaluation

At Phases 1 and 2, several scenario evaluations are executed. For this methodology, each of these evaluations is called a TEST. Each TEST will consider a number of SETTINGS and a set of SUBJECTS (i.e., a test crew).

For each combination of SETTINGS and SUBJECTS, a number of TRIALS will be performed, being possible that each TRIAL allows a maximum number of ATTEMPTS.

The following figure represents the hierarchical relationship among these elements.
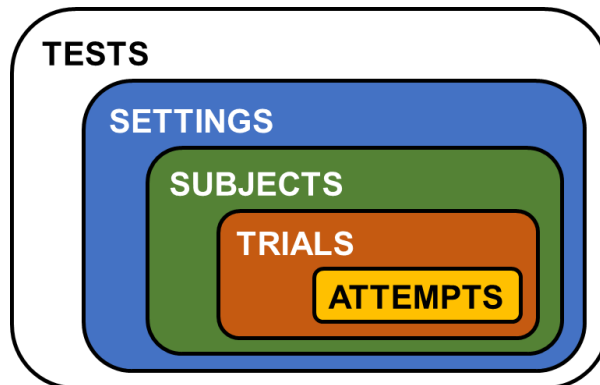
Figure 1 – Hierarchical relationship among evaluation elements

This will be the hierarchical relationship that will be used during the whole description of this evaluation methodology.

But, depending on the evaluation, it could be interesting to exchange the order among TESTS, SETTINGS and SUBJECTS. For example, the TL might consider more practical to execute all TESTs relevant to the same SETTING to all SUBJECTS, before changing the SETTING. Or it could be more practical to execute all TEST with all SETTINGS for each of the SUBJECTS. This decision is up to the TL. If the relationship given in Figure 1 is modified in any manner, this shall be justified and detailed in the ETR. The following figure show some alternatives.
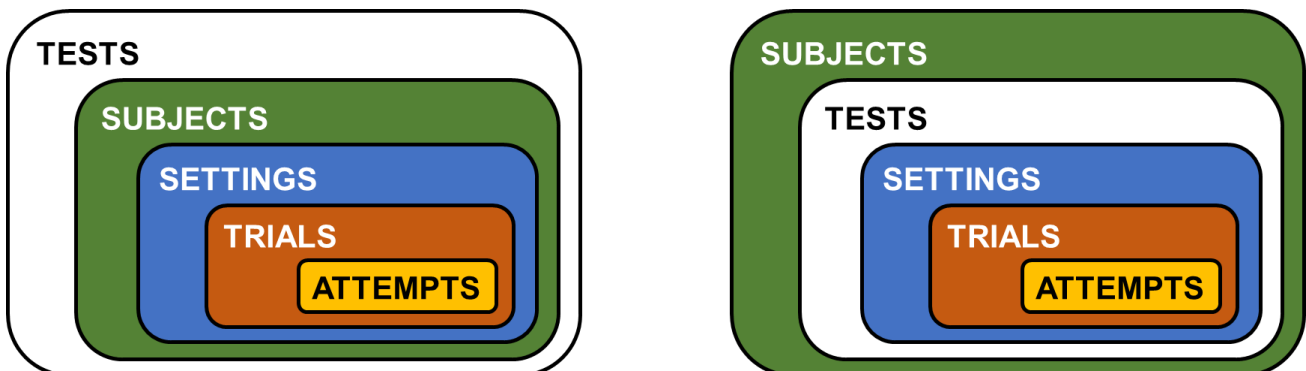
Figure 2 – Alternatives to the relationship among evaluation elements

8.2 TEST-level process

Each TEST is composed by the execution of a series of SETTINGS, up to reaching the limit given by MIN_SETTINGS. The TL may increment this number if the amount of conclusive results is below the one demanded by equation (1).

Once the execution of all SETTINGS, for all SUBJECTS and TRIALS is finished, the final results are analysed to determine if the TEST is a PASS or FAIL, according to the criteria provided by the relevant application profile.

The flowchart for the TEST-level process is given in the following figure, which includes how to handle the SETTINGS.
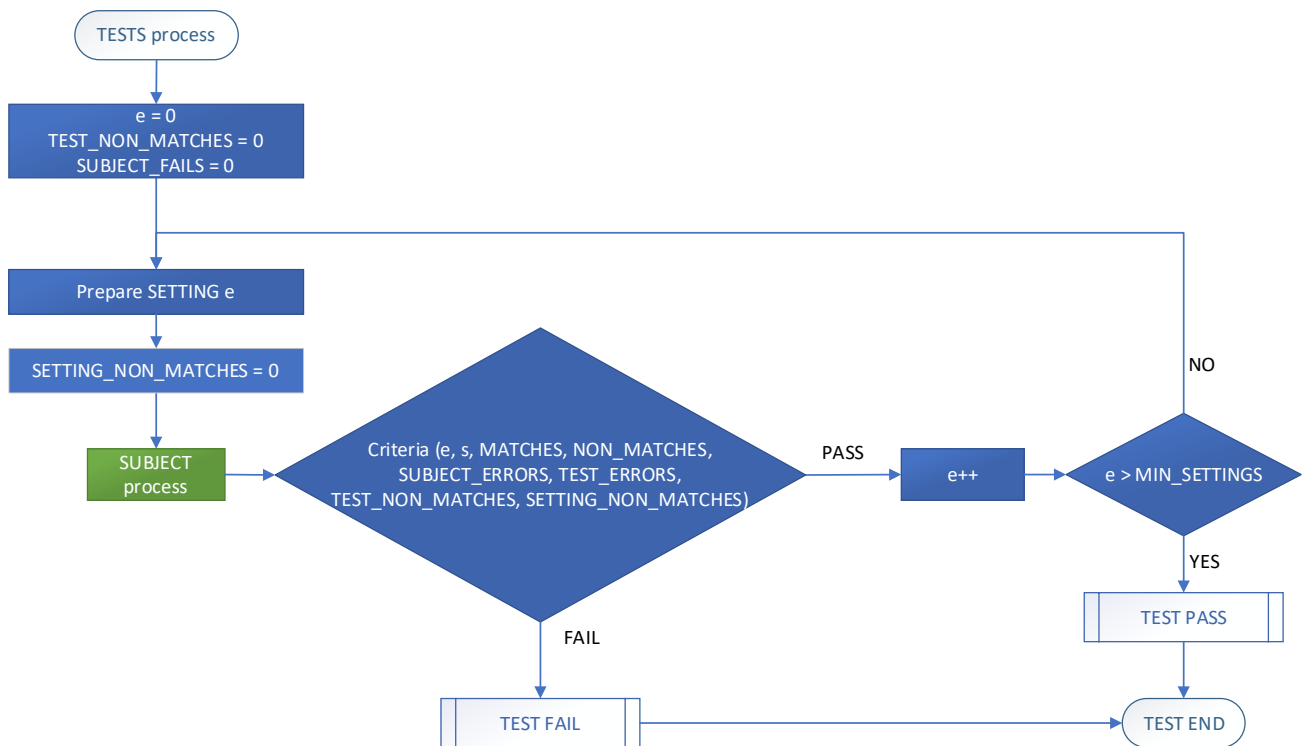

Figure 3 – Flowchart for the TEST-level process (Phases 1 and 2)

8.3 SUBJECT-level process

During the execution of each SETTING, several SUBJECTS take part until, at least, a number of MIN_SUBJECTS is reached. The TL may increment this number if the amount of conclusive results is below the one demanded by equation (1).

Once the execution of all TRIALS for each SUBJECT is finished, the number of SUBJECT_ERRORS, MATCHES and NON_MATCHES obtained are analysed.

When all SUBJECTS have been evaluated, the final results for all SUBJECTS are analysed, to determine if the SETTING is a PASS or a FAIL. This will be done if a FAIL has not been declared before finishing with all SUBJECTS.

The flowchart for the SUBJECT-level process is given in the following figure, calling the TRIALS-level process:
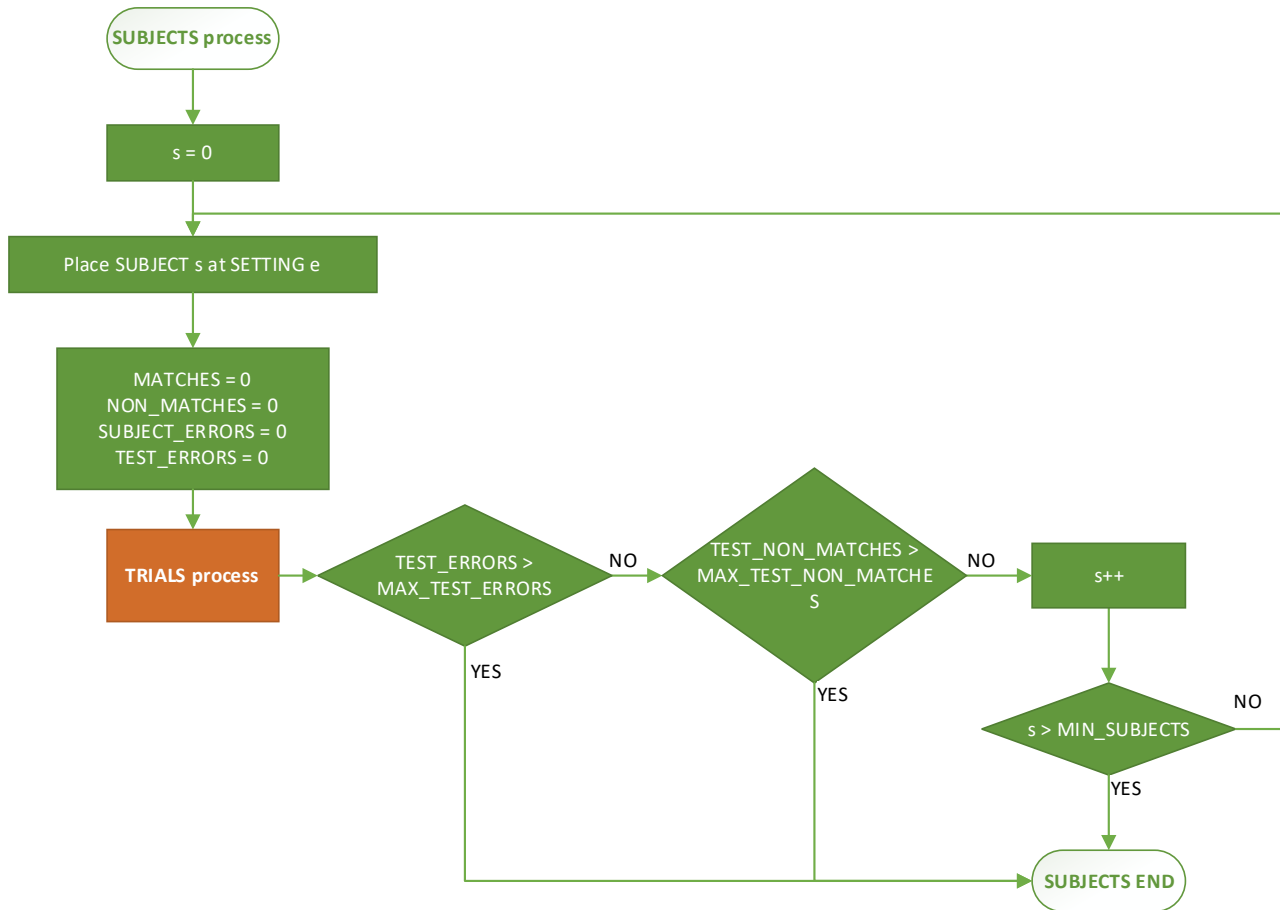

Figure 4 – Flowchart for the SUBJECT-level process (Phases 1 and 2)

8.4 TRIAL-level process

For each SUBJECT, a set of TRIALS are executed, until, at least, a number of MIN_TRIALS is reached. The TL may increment this number if the amount of conclusive results is below the one demanded by equation (1). During the execution of each of the TRIALS, several ATTEMPTS may be allowed (up to the maximum limit given by MAX_ATTEMTPS), until either a MATCH, NON-MATCH or ERROR is obtained.

If when executing an ATTEMPT the TOE does not offer a result, but fails in its execution, a new ATTEMPT will be started. This will be done until the limit of MAX_ATTEMPTS is found. If such limit is reached, the TRIAL will result in an ERROR, and the TEST_ERRORS counter will be incremented.

If the number of TRIALS resulting in ERROR reaches the limit given by MAX_SUBJECT_ERRORS, TRIALS will be finished for that SUBJECT.

If during the whole TEST, the number of TEST_ERRORS reaches the limit given by MAX_TEST_ERRORS, this will be reported at the ETR. Then, the TL will add a new SUBJECT, and all TRIALS are executed for

that new SUBJECT, decreasing TEST_ERRORS in one unit. If this situation is repeated, the TEST will be finished with a FAIL result.

In each ATTEMPT, if the result is a MATCH, the counters MATCHES and TEST_MATCHES are be incremented, and a new TRIAL is started. In case the result is a NON-MATCH, the counters NON_MATCHES,TEST_NON_MATCHES and SETTING_NON_MATCHES are incremented in one unit, and a new TRIAL is started.

If the number of NON_MATCHES is higher than MAX_SUBJECT_NON_MATCHES, the TEST will be finished for that SUBJECT, indicating a TEST FAIL for that SUBJECT. In such a case, the TEST continues with the following SUBJECT.

If the number of TEST_NON_MATCHES reaches the limit given by MAX_TEST_NON_MATCHES, the TEST will be finished, applying the defined criteria for that situation in the relevant application profile.

It is very important to consider that, in each ATTEMPT, the SUBJECT has to interact with the TOE, in the way it is indicated in the operational guide given by the product supplier. In other words, between ATTEMPTS, the SUBJECT shall withdraw from the interaction with the TOE in a significant manner.

EXAMPLE   In the case of a videoconference system, the SUBJECT shall move temporally away from the focus line of the TOE, before returning for the new ATTEMPT.

The flowchart for the TRIAL-level process is given in the following figure, including the ATTEMPTS:
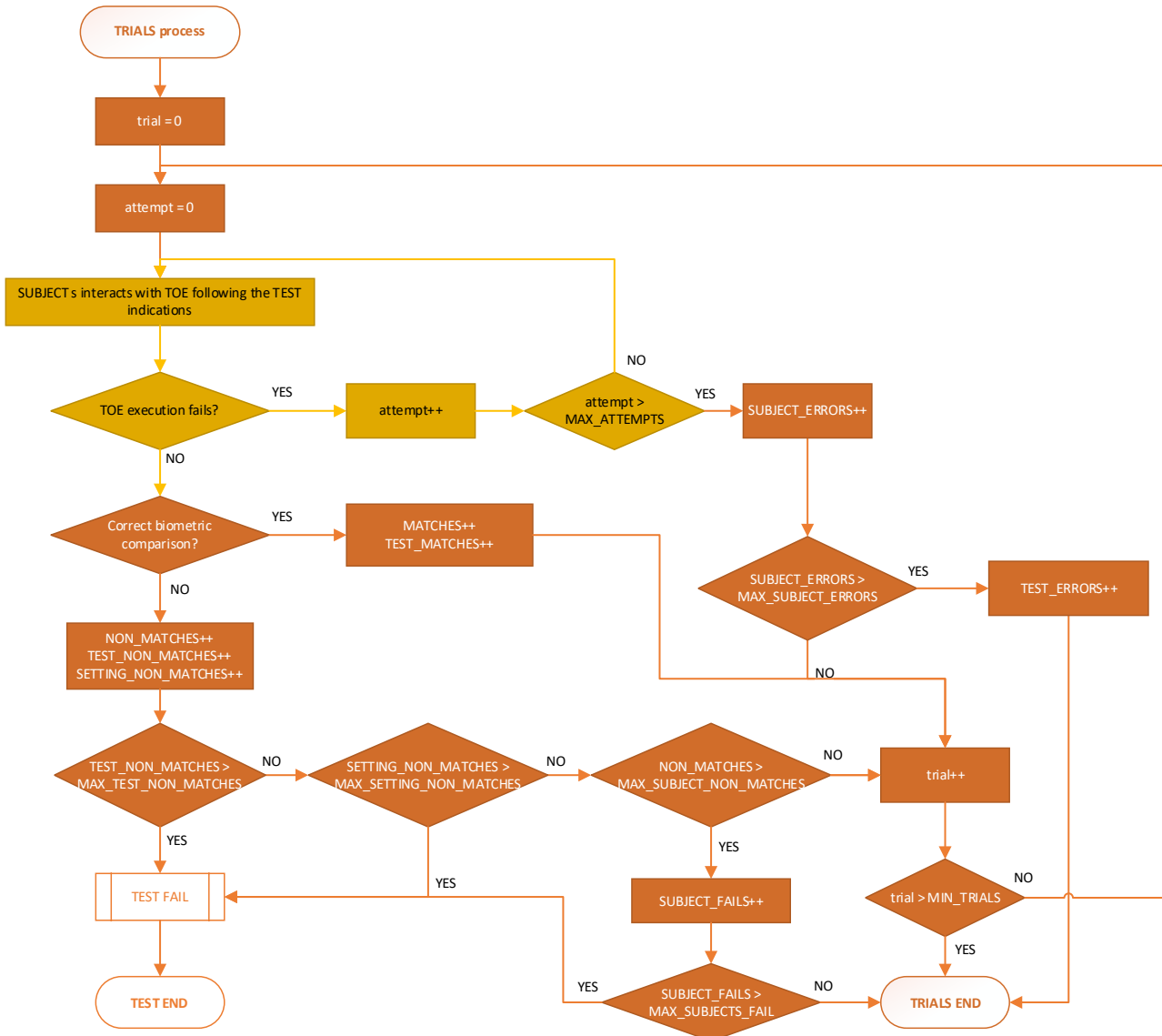
Figure 5 – Flowchart for the TRIAL-level process (Phases 1 and 2)

8.5 Families of tests in Phase 1

Many different tests can be defined for Phase 1, and this will be detailed in parts 4, or beyond, for each biometric modality.

As a general rule, tests in Phase 1 can be grouped in the following set of families:

— Technological evaluation of the TOE, as to analyse the base-line performance under bona-fide and regular conditions.

— Operation in the recognition considering regular variations of the conditions of the SUBJECT (e.g., facial expression, finger humidity, etc.)

— Operation in the recognition considering regular variations of the scenario, i.e., the SETTING (e.g., environment illumination, background scenery, etc.)

8.6 Families of tests in Phase 2

Many different tests can be defined for Phase 2, and this will be detailed in parts 4, or beyond, for each biometric modality.

As a general rule, tests in Phase 2 can be grouped in the following set of families:

— Limits in the recognition considering sensible variations of the conditions of the SUBJECT (e.g., facial expression, finger humidity, etc.)

— Limits in the recognition considering sensible variations of the scenario, i.e., the SETTING (e.g., environment illumination, background scenery, etc.)

9 Evaluation process for Phase 3

9.1 Overall view of the scenario evaluation

The description of the scenario evaluation for Phase2 1 and 2 (i.e., clause 8.1) is also applicable to Phase 3. But the most important difference, is that in Phase 3, a TEST resulting in a PASS, means that the TOE is vulnerable for that TEST, and therefore, the desired result for Phase 3 TESTS is FAIL.

9.2 TEST-level process

For the TEST-level process, the following figure represent its flow chart, which calls the SUBJECT-level process:
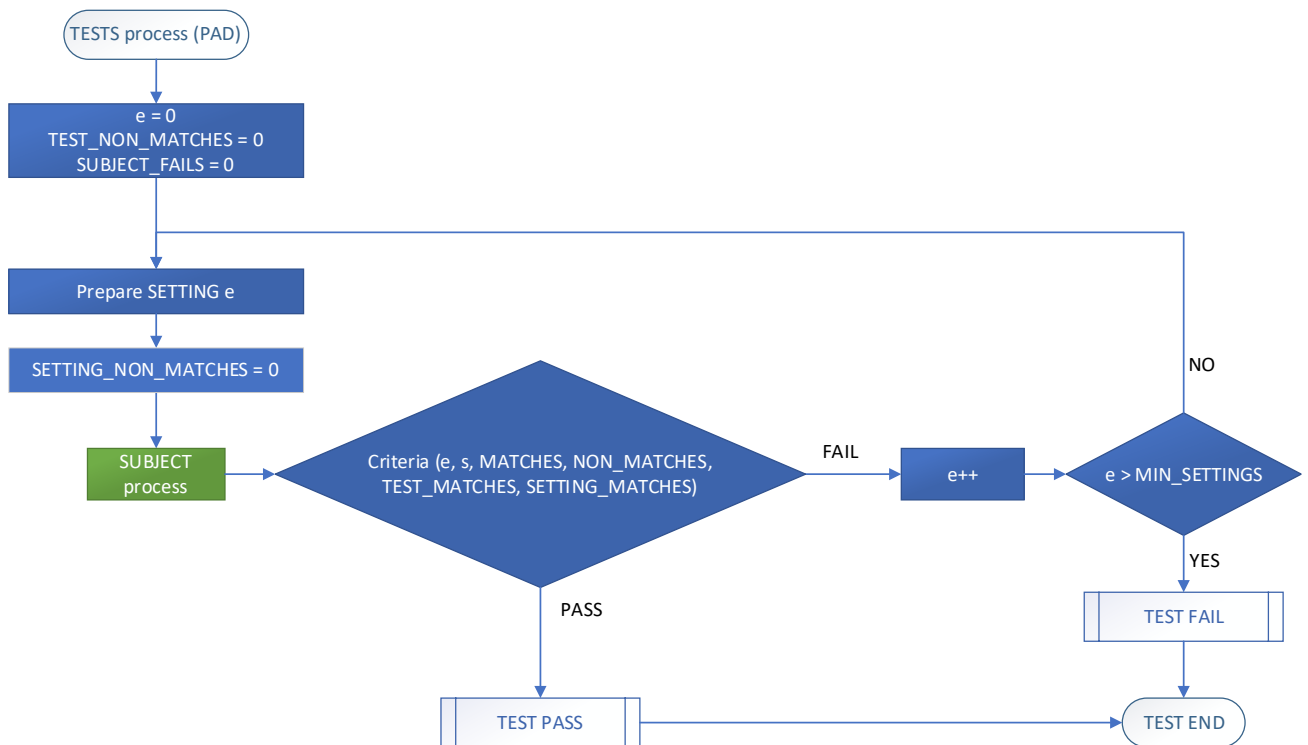

Figure 6 – Flowchart for the TEST-level process (Phase 3)

9.3 SUBJECT-level process

In Phase 3, during the execution of the SETTING process, several BONA-FIDE USERS will take part, until the minimum of MIN_SUBJECTS is reached. The TL may increment this number if the amount of conclusive results is below the one demanded by equation (1).

Once the execution of all TRIALS for each SUBJECT is finished, the number of MATCHES and NON_MATCHES obtained are analysed for that SUBJECT. Once all SUBJECTS have gone through the TEST, the results will be analysed as to decide if the TEST results in a PASS or a FAIL

The following figure shows the flowchart for the SUBJECT-level process, which calls the TRIAL-level process:
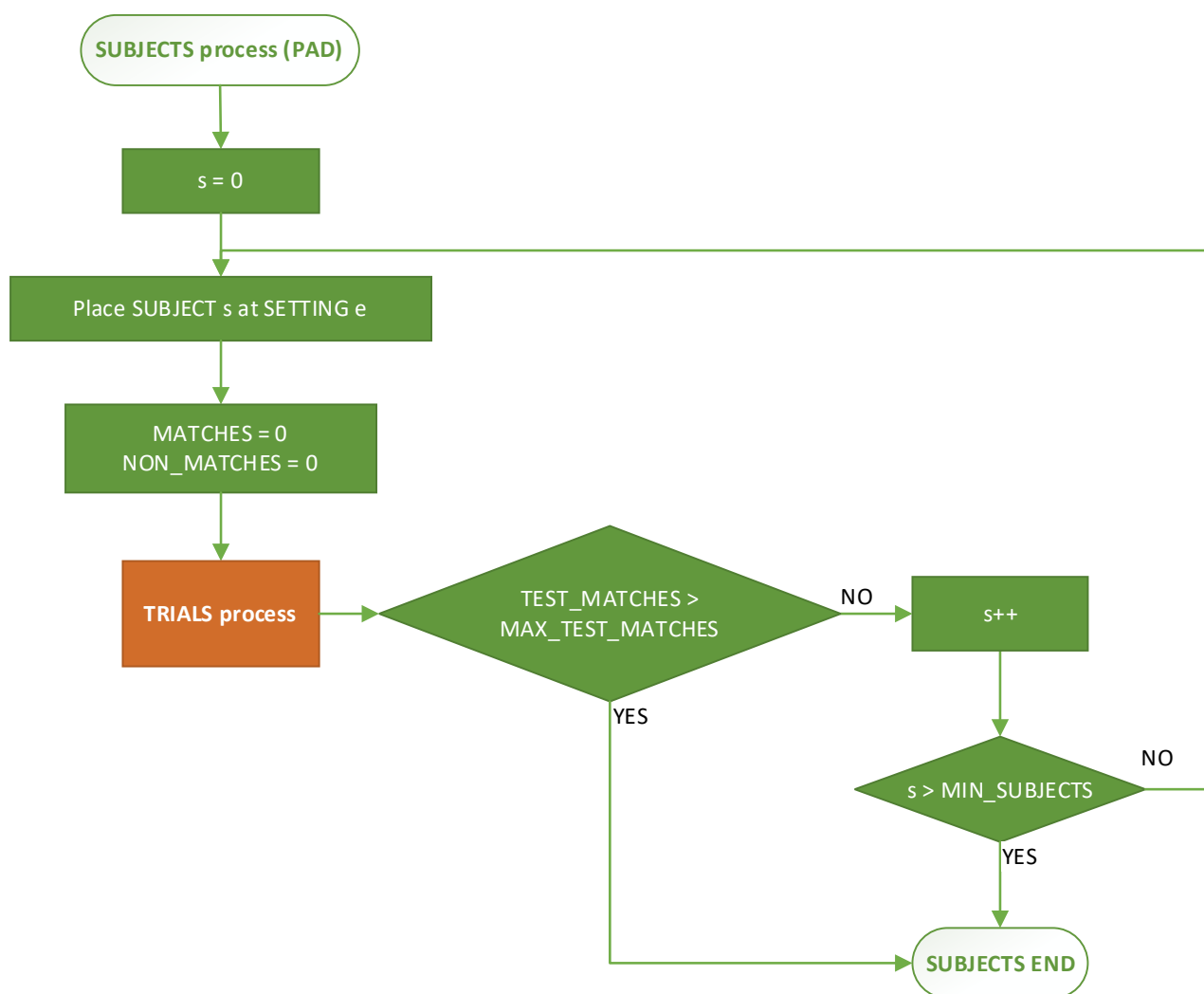

Figure 7 – Flowchart for the SUBJECT-level process (Phase 3)

9.4 TRIAL-level process

In Phase 3, a series of TRIALS are executed with each SUBJECT, until the minimum of MIN_TRIALS is reached. The TL may increment this number if the amount of conclusive results is below the one demanded by equation (1). During the execution of each TRIAL, several ATTEMPTS may be allowed (until the limit of MAX_ATTEMPTS is reached). For each TRIAL, a result of MATCH, NON_MATCH or ERROR, shall be obtained.

When executing an ATTEMPT, if the TOE does not provide neither a MATCH, nor a NON_MATCH, a new ATTEMPT will be executed. This will be done until the limit of MAX_ATTEMPTS is reached. If that limit is reached, the TRIAL results in an ERROR. In Phase 3, an ERROR is a desirable result, as it tells that the TRIAL was not successful and, therefore, a PASS has not achieved.

If the TOE results in a MATCH, the counters MATCHES, TEST_MATCHES and SETTING_MATCHES are incremented. In case the result is a NON_MATCH, the counters to increment are NON_MATCHES and TEST_NON_MATCHES.

If the number of MATCHES reaches the limit given by MAX_SUBJECT_MATCHES, the TEST for that SUBJECT is finished, and a PASS will be assigned to such TEST for that SUBJECT. The next SUBJECT starts the TRIAL

If during the TEST execution, the number of TEST_MATCHES reaches the limit of MAX_TEST_MATCHES, the TEST will be finished, indicating a PASS for that TEST. Also, if during the TEST, the number of SETTING_MATCHES reaches the limit given by MAX_SETTING_MATCHES, the TEST is finished with a PASS as a result.

It is very important to consider that, in each ATTEMPT, the SUBJECT has to interact with the TOE, in the way it is indicated in the operational guide given by the product supplier. In other words, between ATTEMPTS, the SUBJECT shall withdraw from the interaction with the TOE in a significant manner.

EXAMPLE   In the case of a videoconference system, the SUBJECT shall move temporally away from the focus line of the TOE, before returning for the new ATTEMPT.

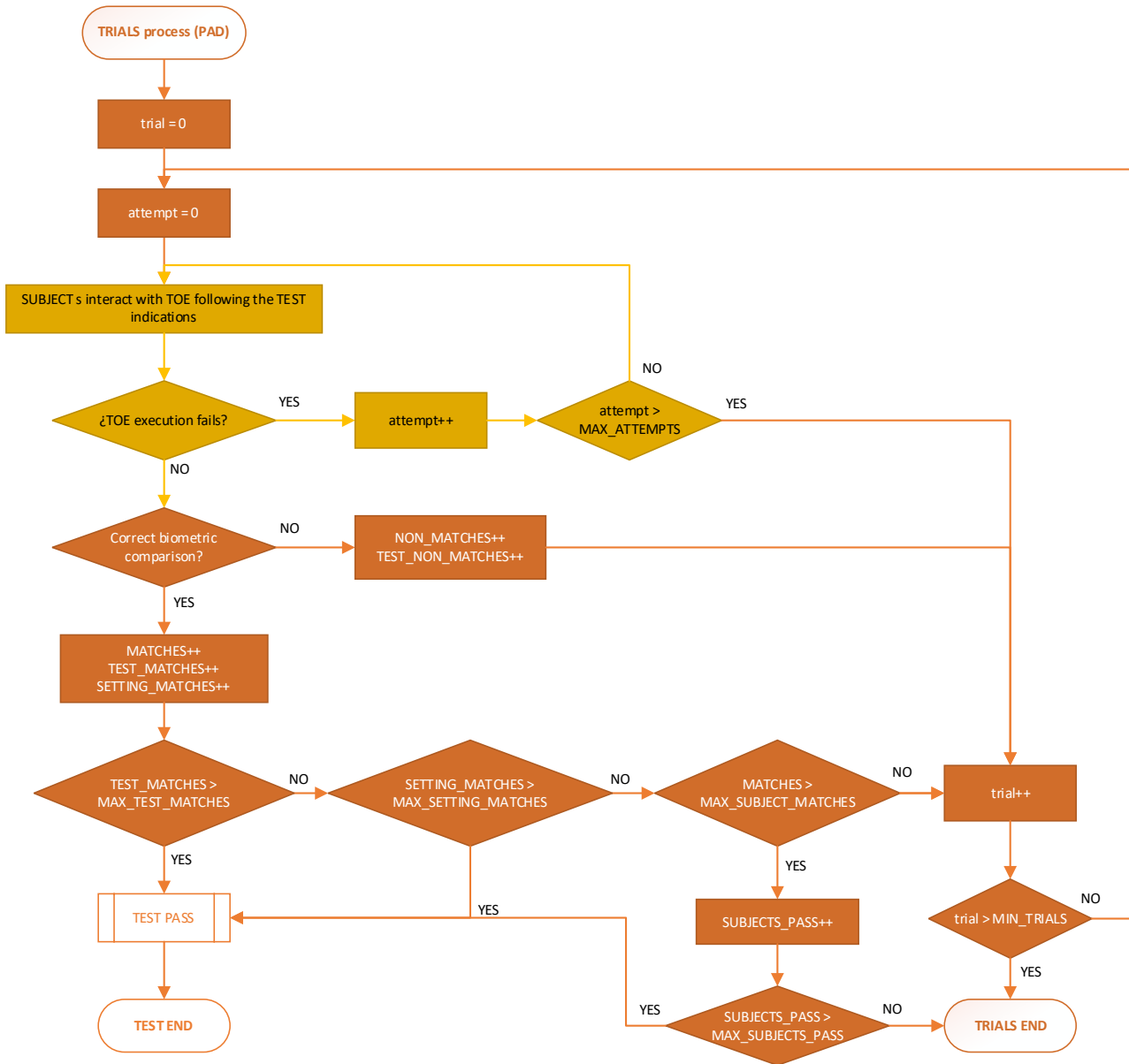The flowchart for the TRIAL-level process is given in the following figure, including the ATTEMPTS:

Figure 8 – Flowchart for the TRIAL-level process (Phase 3)

9.5 Families of tests in Phase 3

Many different tests can be defined for Phase 3, and this will be detailed in parts 4 or beyond, for each biometric modality.

As a general rule, tests in Phase 3 can be grouped in the following set of families:

— Zero-Effort attacks: regular use of the TOE with the intention to perform an attack.

— Enrolment-based attacks: attacking the enrolment phase, with the intent to generate a biometric reference that could be used for an easy attack in a later recognition process (e.g., enrolling the biometric features of a different person, morphing the biometric features of two persons to allow a correct recognition for both persons, etc.)

— Attacks during recognition process: attacking the TOE once the user has been correctly enrolled in the system, as to be able to impersonate such user.

10 Special considerations when using AI methods

EDITOR'S NOTE: CALL FOR CONTRIBUTIONS for this subclause, considering:

It is considered essential to contact experts from JTC21 to align this clause with the works in the EU Artificial Intelligence Act.

Make a reference to ISO/IEC 9868

The editor will read ISO/IEC 9868 and check its applicability to the topic of evaluating biometric products.

If some questions are risen, editor will contact Pierre to forward this to his contacts that have participated in the development of ISO/IEC 9868, to seek advice.

So far, continuous learning is either forbidden, or requiring a continuous checking of ground-truth (to avoid substantial changes of behaviour).

Bibliography

[1]   EN XXXX, *Title of reference*