



Federal Office  
for Information Security

BSI Technical Guideline TR-03121-1

# Biometrics for Public Sector Applications

Part 1: Framework

Version 5.2



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# 1. Changelog

The following tables present the changes introduced to this Technical Guideline since version 5.1. The changelog lists the changes grouped per part of this Technical Guideline, per building block (Application Profile (AP), Partial Application Process (PAP), Task, Function Module (FM)) or element (section, table, figure).

## 1.1. Changelog Version 5.2-draft1

This chapter includes all changes between Version 5.1 and Version 5.2-draft1.

### 1.1.1. Changelog BSI TR-03121, Part 3

TR Volume	Block / Section / Type	Name	Type of Change	Change Description
IMA	-	-	Added	Initial release of volume BSI TR-03121-3.6 (Immigration Authorities)

**Table 1.1** Changelog BSI TR-03121, Part 3

## 1.2. Changelog Version 5.2-draft2

This chapter includes all changes between Version 5.2-draft1 and Version 5.2-draft2.

### 1.2.1. Changelog BSI TR-03121, Part 1

Element Name	Type of Change	Change Description
-	-	<i>No Changes</i>

**Table 1.2** Changelog BSI TR-03121, Part 1

### 1.2.2. Changelog BSI TR-03121, Part 2, Volume HLBS

Element Name	Type of Change	Change Description
Service Definition "Facial Image Acquisition System"	Changed	Added User Command "RotateManually" and feedback "QACroppedFacialImageRotation". Added information for feedback "QAEntireFacialImage" that the ImageRegion SHALL be used for marking the area of the cropped facial image.
Service Definition "Basic Facial Image Acquisition System"	Added	Service Definition Basic Facial Image Acquisition System added.
Service Definition "Facial Image Acquisition System"	Changed	Changed possible value annotation for feedback images from "Image in a common data format (jpeg, bmp or png) expected" to "Image in a common data format (e.g. jpeg or bmp) expected".
Service Definition "Fingerprint Acquisition"	Changed	Changed possible value annotation for feedback images from "Image in a common data format (jpeg, bmp or png) expected" to "Image in a common data format (e.g. jpeg or bmp) expected".

Element Name	Type of Change	Change Description
Service Definition for "Self Service System"	Changed	Changed possible value annotation for feedback images from "Image in a common data format (jpeg, bmp or png) expected" to "Image in a common data format (e.g. jpeg or bmp) expected".
Data Types "Application-Profile"	Added	Format Restriction added: "IMA_MultiModalProcessingImmigrationAuthoritiesEES "
Data Types "Application-Profile"	Added	Format Restriction added: "IMA_MultiModalProcessingImmigrationAuthoritiesSIS "

Table 1.3 Changelog BSI TR-03121, Part 2

### 1.2.3. Changelog BSI TR-03121, Part 3

TR Volume	Block / Section / Type	Name	Type of Change	Change Description
BCL	FM	UI-FI-BSJ	Fixed	Requirements for the UI of the feedback screen take only effect, if another FM requires the system to have such a feedback screen.
BCL, GID, ARE, IMA	FM	QA-FI-SB	Changed, Renamed	Removed volume specific information (threshold requirements) and renamed FM to QA-FI-GENERIC.
BCL	FM	QA-FI-BCL	Added	Volume specific threshold requirements added to this FM.
GID	FM	QA-FI-GID	Added	Volume specific threshold requirements added to this FM.
ARE	FM	QA-FI-ARE	Added	Volume specific threshold requirements added to this FM.
IMA	FM	QA-FI-IMA	Added	Volume specific threshold requirements added to this FM.
BCL, IMA	FM	COM-FI-EES	Removed	Removed FM from volumes BCL and IMA.
BCL	FM	COM-FI-BCL	Added	Added compression requirements for entire volume.
IMA	FM	COM-FI-IMA	Added	Added compression requirements for entire volume.
BCL, IMA	FM	COM-FP-EES	Removed	Removed FM from volumes BCL and IMA.
BCL	FM	COM-FP-BCL	Added	Added compression requirements for entire volume.
IMA	FM	COM-FP-IMA	Added	Added compression requirements for entire volume.
IMA	FM	REF-FI-AAD	Removed	Removed FM from volume IMA.
IMA	FM	REF-FP-AAD	Removed	Removed FM from volume IMA.
IMA	FM	O-ALL-USV	Removed	Removed FM from volume IMA.
IMA	FM	COM-FP-WSQ	Removed	Removed FM from volume IMA.

TR Volume	Block / Section / Type	Name	Type of Change	Change Description
IMA	AP	Multi-modal Processing in Immigration Authorities	Changed	"elongation of resident permits" changed to "renewal of resident permits".
IMA	PAP	ACQ-FI-SV-4	Changed	Reference in Fig. fixed.
IMA	PAP Task	ACQ-FPS-SV-1	Changed	"Increment i" added in Fig.
GID	FM	EVA-FI-GENERIC	Changed	Detailed description in Tab.
GID	FM	EVA-FP-GENERIC	Changed	Detailed description in Tab.
BCL	FM	AS-FP-MF	Removed	PNG as return format.
BCL	FM	AS-FI-ICS	Removed	PNG as return format.
BCL	FM	AS-FP-SLP	Changed	Classification threshold only for more than two classes.
BCL, GID, ARE, IMA	FM	LOG-ALL-GENERIC	Changed	Added Application Profile element.
BCL, GID, ARE, IMA	FM	LOG-FI-GENERIC	Changed	Added Application Profile and time out, element. For each capture added the operation mode, vertical position, illumination level and focus distance attribute.
BCL, GID, ARE, IMA	FM	LOG-FP-GENERIC	Changed	Added Application Profile and time out element.
IMA	PAP	ACQ-FI-SV-4	Changed	Adapted Capture Process to new HLBS Service Definition Basic Facial Image Acquisition System
BCL, IMA	PAP Task	ACQ-FI-1	Changed	Removed annotation with used FMs on "Retrieve image from hardware", due to ambiguous mapping of FMs in Volumes where FM is not used.
BCL, GID, ARE, IMA	PAP	Introduction	Changed	Removed example FM categories that may apply for Application Profiles, as not all of them are existing in each Volume.
IMA	FM	COD-ALL-IMA	Added	Added new log schema for immigration authorities.
IMA	AP	Multi-modal Processing in Immigration Authorities	Changed	Removed rolled finger acquisition and facial image acquisition from overall process.
IMA	FM	AH-FI-ICS	Removed	Not relevant for IMA Volume.
IMA	FM	AS-FI-ICS	Removed	Not relevant for IMA Volume.
IMA	FM	AS-FP-ROLL	Removed	Not relevant for IMA Volume.
IMA	PAP	ACQ-FI-M-1	Removed	Not relevant for IMA Volume.

TR Volume	Block / Section / Type	Name	Type of Change	Change Description
IMA	PAP	ACQ-FP10R-SV-1	Removed	Not relevant for IMA Volume.
IMA	PAP	ACQ-FP4141-SV-1	Changed	HLBS Service Definition to implement referenced.
IMA	PAP	ACQ-FP442-SV-1	Changed	HLBS Service Definition to implement referenced.
IMA	AP	Application Profile Multimodal Processing in Immigration Authorities	Changed	Split into two APs: "Application Profile Multimodal Processing in Immigration Authorities for EES" and "Application Profile Multimodal Processing in Immigration Authorities for SIS"
IMA	Introduction	Introduction	Changed	Introduction taken from "Application Profile Multimodal Processing in Immigration Authorities"
BCL, IMA	FM	BIP-FI-BCL	Renamed	Renamed FM BIP-FI-BCL to BIP-FI-APP.
BCL, IMA	FM	BIP-FI-APP	Changed	Generalised wording (e.g. passenger to biometric subject) to better suit for more volumes.
BCL	FM	LOG-ALL-BCL	Changed	Added recommendation to log record image also separately.
IMA	FM	LOG-ALL-IMA	Added	Added new FM to IMA Volume.
BCL, IMA	FM	COD-ALL-EES	Added	Added new FM to BCL and IMA Volume.
IMA	FM	COD-ALL-GSAT3	Added	Added new FM to IMA Volume.
BCL, IMA	PAP	ACQ-FPS-SV-1	Changed	Shortened to technical aspects and renamed to "Supervised Acquisition Single Slap".
BCL, IMA	PAP	ACQ-FPS-SV-1	Changed	HLBS Service Definition to implement referenced.
-	Bibliography	EES_ICD_FP	Removed	-
-	Bibliography	EES_ICD_FI	Removed	-
-	Bibliography	EES_ICD	Added	Version 06_00_00, 2021
BCL, GID, VIS, GIS, IMA	FM	AS-FP-SLP	Changed	This FM only applies, when the scanner runs in slap acquisition mode.



TR Volume	Block / Section / Type	Name	Type of Change	Change Description
IMA	AP	Application Profile Multimodal Processing in Immigration Authorities for SIS	Changed	FI acquisition removed.
BCL, IMA	PAP Task	ACQ-FPP-SV-2	Changed	Added the operator decision to accept or recapture a fingerprint of the process diagram in the text.

Table 1.4 Changelog BSI TR-03121, Part 3

### 1.3. Changelog Version 5.2-draft3

This chapter includes all changes between Version 5.2-draft2 and Version 5.2-draft3.

#### 1.3.1. Changelog BSI TR-03121, General

Element Name	Type of Change	Change Description
-	-	<i>No Changes</i>

Table 1.5 Changelog BSI TR-03121, Part 1

#### 1.3.2. Changelog BSI TR-03121, Part 1

Element Name	Type of Change	Change Description
-	-	<i>No Changes</i>

Table 1.6 Changelog BSI TR-03121, Part 1

#### 1.3.3. Changelog BSI TR-03121, Part 2, Volume HLBS

Element Name	Type of Change	Change Description
Service Definition Self-Service System	Changed	Removed ReferenceImage configuration parameter for SSS Service Definition (Automated Acquisition of Facial Images).
Client-Server Connection Scenarios	Added	Figure for logical HLBS Architecture.

Table 1.7 Changelog BSI TR-03121, Part 2

#### 1.3.4. Changelog BSI TR-03121, Part 3

TR Volume	Block / Section / Type	Name	Type of Change	Change Description
BCL	FM	AH-ALL-SSS	Changed	Clarified that the identification of multiple persons is required during the capture of fingerprints.

TR Volume	Block / Section / Type	Name	Type of Change	Change Description
BCL, IMA	PAP Task	ACQ-FPS-SV-1	Fixed	Uniformed information of text and process diagram (added more information about counter handling in the text).
ARE	PAP Task	ACQ-FPS-SV-2	Fixed	Uniformed information of text and process diagram (added more information about counter handling in the text).
BCL, GID	PAP Task	ACQ-FPP-SV-2	Fixed	Uniformed information of text and process diagram (added more information about counter handling in the text).
ARE	PAP Task	ACQ-FPS-SV-2	Changed	Slap classifier added.
ARE	AP	Application Profile Arrival Attestation Document	Changed	FM AS-FP-SLP added to List of Mandatory Function Modules.
BCL	AP	Application Profile Automated Border Control (Face-Verification Only)	Changed	FM COD-FI-GENERIC added to List of Mandatory Function Modules.
BCL, VIS, IMA	FM	COD-ALL-GENERIC	Removed	
BCL	FM	AH-FI-BCL	Changed	Background blurring removed.
BCL, GID, VIS, ARE, GIS, IMA	FM	QA-FI-SB	Removed	All references to FM QA-FI-SB changed to FM QA-FI-GENERIC and FM QA-FI-<VL>
BCL	PAP	ACQ-FI-M-1	Renamed	The process was renamed from PAP ACQ-FI-M-1 "Manual Facial Image Acquisition System" to PAP ACQ-FI-SV-5 "Supervised Facial Image Acquisition System".
BCL	PAP	ACQ-FI-SV-5	Changed	Specified process to perform cropping and de-rotation to face automatically with the option for the operator to optimise the cropping and the de-rotation manually.
BCL	PAP	ACQ-FI-AUTO-1	Changed	Specified process to perform cropping and de-rotation to face automatically.
BCL	PAP	ACQ-FI-USV-1	Changed	Specified process to perform cropping and de-rotation to face automatically.
BCL	PAP Task	Slap Acquisition Request EES	Removed	
BCL	PAP	ACQ-FPS-USV-1	Changed	Process simplified. Title changed to: "Unsupervised Acquisition Slap" and process description added.
ARE	FM	COD-ALL-AAD	Renamed	Renamed FM COD-ALL-AAD to FM COD-ALL-ARE.

TR Volume	Block / Section / Type	Name	Type of Change	Change Description
ARE	FM	COD-ALL-ARE	Changed	The name of corresponding schema file for logging changed from aadXvX.xsd to areXvX.xsd and the root element changed from aad-app to are-log.
ARE	FM	EVA-ALL-AAD	Renamed	Renamed FM EVA-ALL-AAD to FM EVA-ALL-ARE.
ARE	FM	EVA-FI-AAD	Renamed	Renamed FM EVA-FI-AAD to FM EVA-FI-ARE.
ARE	FM	EVA-FP-AAD	Renamed	Renamed FM EVA-FP-AAD to FM EVA-FP-ARE.
ARE	FM	LOG-ALL-AAD	Renamed	Renamed FM LOG-ALL-AAD to FM LOG-ALL-ARE.
ARE	FM	REF-FI-AAD	Renamed	Renamed FM REF-FI-AAD to FM REF-FI-ARE.
ARE	FM	REF-FP-AAD	Renamed	Renamed FM REF-FP-AAD to FM REF-FP-ARE.
GID, ARE, GIS, IMA	FM	AS-FI-DC	Changed	Camera resolution SHALL be chosen to acquire a facial image of at least 1200 x 1600 pixels with an inter eye distance of at least 120 pixels.
GID, VIS	PAP Task	ACQ-FPP-USV-1	Added	Display warning message to user, if sequence check fails.
BCL	FM	AS-FI-ICS	Removed	Export requirements for uncompressed images removed.
GID	FM	COD-FI-GID2	Added	
GID	AP	Facial Images Cloud	Added	Initial Release.
GID	AP	Biometric Data Selection Procedure	Added	Initial Release.
GID	FM	PAD-FI-APP1	Added	
BCL	AP	Application Profile Semi-Mobile Manual Border Control	Added	Initial Release.
BCL	AP	Application Profile Update Process	Removed	Removed empty application profile.
BCL	AP	Application Profile Second Line	Removed	Removed unused application profile. See application profile MBC or Semi-Mobile MBC as replacements.

TR Volume	Block / Section / Type	Name	Type of Change	Change Description
IMA	AP	Application Profile Multimodal Processing in Immigration Authorities for EES	Changed	FM QA-FI-PG is no requirement anymore within this application profile.
BCL, GID, ARE	PAP	General Process Requirements	Removed	
BCL, GID, ARE	FM	Category Biometric Comparison	Changed	FM is now recommended.
BCL	PAP	VER-FP-1	Removed	

**Table 1.8** Changelog BSI TR-03121, Part 3

## 1.4. Changelog Version 5.2

This chapter includes all changes between Version 5.2-draft3 and Version 5.2.

### 1.4.1. Changelog BSI TR-03121, General

Element Name	Type of Change	Change Description
-	-	<i>No Changes</i>

**Table 1.9** Changelog BSI TR-03121, Part 1

### 1.4.2. Changelog BSI TR-03121, Part 1

Element Name	Type of Change	Change Description
Function Module Classes	Add	Primary Information Item added to table.

**Table 1.10** Changelog BSI TR-03121, Part 1

### 1.4.3. Changelog BSI TR-03121, Part 2, Volume HLBS

Element Name	Type of Change	Change Description
API DataType "ApplicationProfile"	Changed	Added elements "BCL_SemiMobileManualBorderControl" and "BCL_SelfServiceSystem". Removed "VIS_ManualCounter" and "GIS_MultimodalIndentificationWithWatchlistChecks".

**Table 1.11** Changelog BSI TR-03121, Part 2

### 1.4.4. Changelog BSI TR-03121, Part 3

TR Volume	Block / Section / Type	Name	Type of Change	Change Description
GID	FM	QA-FI-PT	Clarified	The way template gets on the image is variable (e.g. manually done by supervisor or automatically done by software) and the medium of the template is not fixed (it can be physically or digitally).
GID	FM	COD-ALL-GID	Changed	Relevant schema version is 4v6 for this release.
ARE	FM	COD-ALL-ARE	Changed	Relevant schema version is 4v6 for this release.
BCL, GID, ARE, IMA	FM	COD-FI-GENERIC	Changed	Relevant schema version for volumes BCL and IMA is 4v7. Relevant schema version for volumes GID and ARE is 4v6.
BCL	FM	LOG-ALL-BCL	Changed	Added mapping of BCL Application Profiles to ApplicationProfile-element for logging.
IMA	FM	LOG-ALL-IMA	Changed	Added mapping of IMA Application Profiles to ApplicationProfile-element for logging. Removed requirement to not log purpose in case purpose is ambiguous (purpose "other" may be used now).
BCL, GID, ARE, IMA	FM	QA-FI-GENERIC	Changed	Clarified that the image type to process depends on the requirements of the application profile to implement.
BCL, GID, ARE, IMA	FM	LOG	Changed	Clarified that the logging modules and schema-requirements apply both.
BCL, GID, ARE, IMA	FM	LOG-FP-GENERIC	Changed	Reference to probe SHALL be logged.
BCL	FM	COD-ALL-BCL	Changed	Optional schema elements/attributes SHALL be considered as far as possible.
GID	FM	COD-ALL-GID	Changed	Optional schema elements/attributes SHALL be considered as far as possible.
ARE	FM	COD-ALL-ARE	Changed	Optional schema elements/attributes SHALL be considered as far as possible.
IMA	FM	COD-ALL-IMA	Changed	Optional schema elements/attributes SHALL be considered as far as possible.
BCL, GID	PAP Task	ACQ-FPS-USV-1	Changed	Harmonized BPMN-process with process description (sequence check only required for acquisitions of multiple slaps).

**Table 1.12** Changelog BSI TR-03121, Part 3

## 2. Introduction

### 2.1. Motivation and Objectives of Technical Guideline Biometrics

Biometric methods are used in many different areas of applications. The solutions and systems available on the market are able to serve a broad range regarding performance, security, usability and standard conformance. For public sector applications, it is necessary to define precise requirements and general conditions. Furthermore, the systems have to be defined in a way which allows for extension in future developments.

The objective of this Technical Guideline (TR Biometrics) is to offer a basis for a consistent and comparable quality of public sector applications and for building a common architecture.

This guideline has the following objectives:

- *Modularity*: The complete guideline is built from several single guideline modules. For a single application area only the respective modules have to be taken into account. This is done in order to avoid side effects between different kinds of applications which would occur due to changes of special functions.
- *Clarity*: The concept of this guideline follows a well structured framework. With this framework it is easily understandable which kind of guideline modules are valid for the respective application scenario.
- *Expandability*: Modularity is the key component of expandability in the scope of this guideline. This is valid regarding new applications as well as new functional units.
- *Standard conformance*: The Technical Guideline takes national and international standards and guidelines into account and deploys them for governmental applications.
- *Conformance and certification*: The guideline modules are designed in such a way that requirements and conditions for single functional units are clearly separated from each other. Products for single functional units are clearly defined regarding the interfaces and the range of their functionality so that they can be tested for conformance with this guideline and certified.
- *Ability to reference*: The use of functional units allows to specify precise requirements for products that are used in according application scenarios. Therefore, this guideline can be used as a reference e.g. for tenders.
- *Market orientation*: The definition of functional units is related to the products that can be found on the market. Requirements of the guideline can be unambiguously assigned to the respective systems and components.

It should be noted that the content of this guideline is limited to the aspects of biometric characteristics. Interfaces to further technologies (e.g. connection of optical or electronic document readers) are out of scope of this document.

### 2.2. Target Audience and User

Audience for this guideline are institutions that are dealing with projects using biometric characteristics in public sector applications. These include:

- Agencies that are issuing identity documents or visas, e.g. passport agencies of the local authorities or missions abroad of the Federal Foreign Office.
- Public Authorities using biometric applications for identity verification of people, e.g. the German Federal Police (Polizei des Bundes) or the Police of the Federal States (Polizei der Länder), the German Customs Administration (Bundeszollverwaltung) or the Federal Administrative Office (Bundesverwaltungsamt).

Beside these users, this guideline also addresses vendors of biometric systems as well as integrators and application developers.

### 2.3. Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this Technical Guideline are to be interpreted as described in [BIB\_RFC2119].

### 2.4. Business Process Modelling Notation (BPMN)

The processes in this Technical Guideline are modelled using the Business Process Modelling Notation (BPMN). ▶ Figure 2.1 gives an overview over the relevant icons herein.

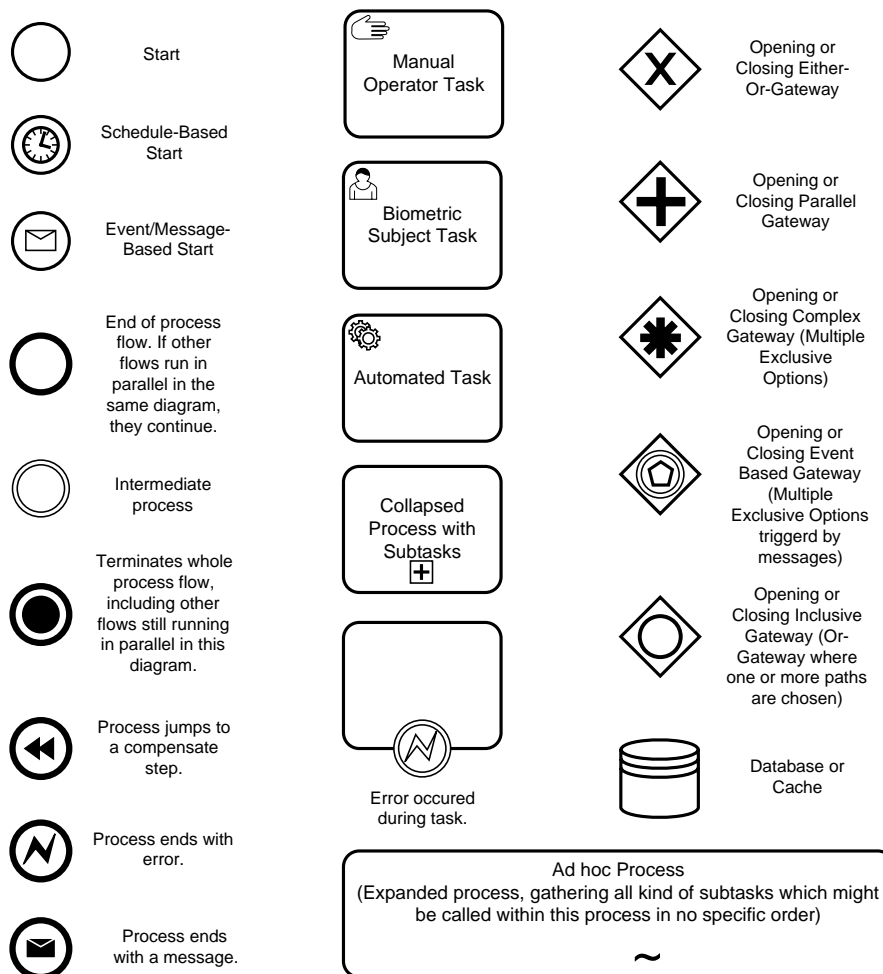


Figure 2.1. BPMN Symbols used for the Process Modelling

## 3. Structure of Technical Guideline Biometrics

This Technical Guideline consists of the following parts:

- Part 1: Framework (TR-03121-1)

TR-03121-1 is the framework document of the guideline. It explains the concept and the relation between the different parts.

- Part 2: Software Architecture (TR-03121-2)

The High Level Biometric Services (HLBS) as well as Service Definitions for specific use cases are specified here.

- Part 3: Application Profiles, Function Modules and Processes (TR-03121-3)

- In the third part, the different Application Profiles with corresponding Partial Application Processes and Function Modules are defined. These contain the detailed technical requirements for each of the components.

- Application Profiles may reference Function Modules, Partial Application Processes and Service Definitions (refer to Part 2).
- Partial Application Processes may refer to Function Module Categories and may be comprised of *Tasks*. Tasks are processes which are part of more than one Partial Application Process.
- For practical purposes, this part is split up in different volumes to serve different user groups.

Please refer to ▶Figure 3.1 for a class diagram of the structure described above.



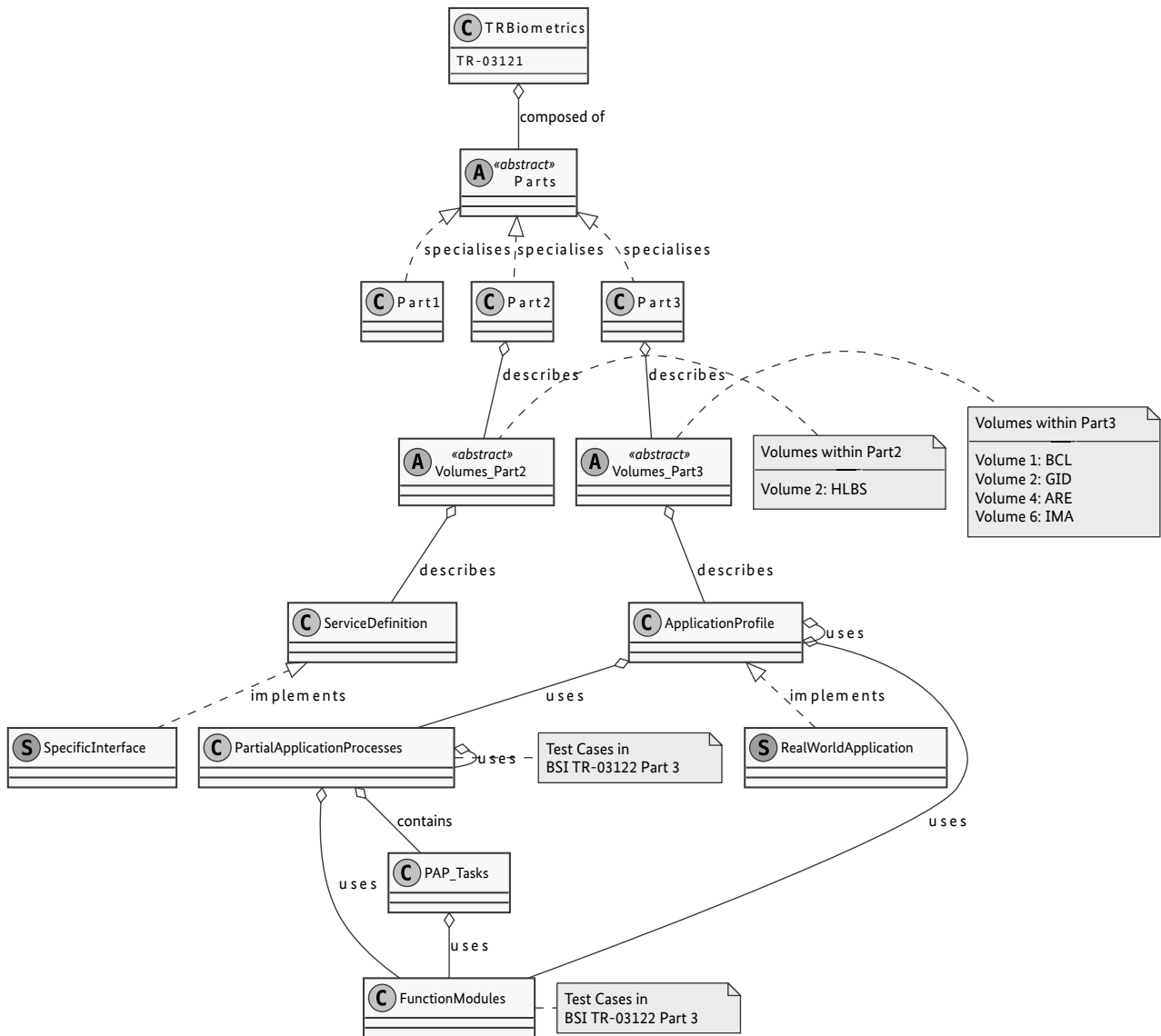


Figure 3.1. Class Diagram of the Technical Guidelines

Additionally, the Technical Guideline BSI-TR 03122 "Conformance Test Specification for Technical Guideline TR-03121 Biometrics for Public Sector Applications" describes the requirements that are essential to declare conformance or to declare the absence of conformance. It consists of the following parts:

- Part 1: Framework (TR-03122-1)
- Part 3: Test Cases for Function Modules and Processes (TR-03122-3)
- Part 4: Additional Test Cases (TR-03122-4)

## 4. How to use this Technical Guideline

This chapter gives a short overview how to read and apply this guideline step by step.

1. The user chooses the desired Application Profile. With the help of the Application Profile the user can get a deeper insight into the application, the required software architecture components and the described functionality. TR-03121-2 offers further information about the software architecture component model.
2. Based on the Application Profile, the mandatory Partial Application Processes and Function Modules are identified. One profile can link to several Partial Application Processes and Function Modules due to different kinds of underlying biometric characteristics or the fact that different technologies (e.g. scanners or digital cameras for the digitisation of a photo) are used.

Function Modules are referenced by an explicit identifier, e.g. AH-FP-GID. The first part identifies the requirement type (e.g. Hardware), the second part represents the biometric characteristic (e.g. fingerprint), and the last part denotes a further descriptor, typically the scope (e.g. German Identity Document).

Function Modules for different biometric characteristics are divided by a comma while a choice between different technologies is denoted by a slash (e.g. AH-FP-FTR, AH-PH-FBS/AH-PH-DC).

If a Function Module is denoted with a placeholder between a less-than and greater-than sign (< >) the actual referenced Function Module is dependant on the context in which the Function Module has been mentioned. For example the Function Module AH-FI-<VL> has been mentioned within a Partial Application Process used in the Border Control (BCL) volume, then the actual referenced Function Module is AH-FI-BCL. The same procedure holds for Application Profiles denoted as <AP> analogously. If no specific Function Module applies, then there are no further requirements defined for this context.

Partial Application Processes are referenced by an explicit identifier, refer to Partial Application Profile section.

3. On the basis of the identifier the according Function Module and Partial Application Processes can be examined. Every Function Module and Partial Application Process provides detailed technical requirements and recommendations. Note, each reference to an Function Module or Partial Application Processes is a link within the document.

## 5. Application Profiles

Different areas in which this guideline can be used are defined in separate Application Profiles. Application Profiles can have mandatory status, e.g. through published regulations and laws or by requirements given in tenders. Besides, such Application Profiles can also be considered as Best Practices.

An Application Profile is described with the following items:

- Introduction (legal requirements)
- Process overview
  - Target audience
  - Users
- Relevant standards and conditions
- List of
  - mandatory Function Modules
  - mandatory Partial Application Processes

## 6. Function Modules

### 6.1. Organisation of the Function Modules

Specific technical requirements are structured in Function Modules. They contain detailed technical requirements for the respective component.

Function Modules are aligned to the products on the market and to the targets of evaluation.

Every Function Module is built of one or more sub-clauses which are assigned to unique identifiers. Within the sub-clauses requirements and recommendations are specified in detail.

Partial Application Processes are referenced by their ID, which can contain up to three information items pointing to its contents.

The basic structure of an ID is: "FM AAA-BBB-CCC", where "AAA" is the so-called primary information item (see: ▶Table 6.1).

### 6.2. Function Module Classes

▶Table 6.1 gives an overview of the different Function Module categories.

Function Module Category	Primary Information Item	Description
Acquisition Hardware	AH	Devices that are used for digitising physical representable biometric characteristics are called Acquisition Hardware. Scanners for capturing photographs, digital cameras to capture facial images, fingerprint sensors, or signature tablets can be named as examples.
Acquisition Software	AS	Acquisition Software encapsulates all functionality regarding image processing except for biometric purposes. Therefore, this module usually contains device driver software for the Acquisition Hardware or in general software that is very close to the physical hardware. Furthermore, colour management and image enhancement mechanisms are often part of this software layer.
Biometric Image Processing	BIP	The module Biometric Image Processing provides the extraction of all relevant biometric information from the data, which is provided by the Acquisition Hardware or the Acquisition Software layer. Thus, a proprietary data block is transformed to a digital image of a biometric characteristic. In general, specific image processing for biometric characteristics is addressed here e.g. provision of full frontal images or segmentation of fingerprints.

Function Module Category	Primary Information Item	Description
Biometric Comparison	CMP	The module Biometric Comparison encloses the mechanisms and algorithms to verify or identify an identity based on a one-to-one or one-to-many biometric comparison between reference data and a current biometric sample (usually a live presented image) no matter where the reference is stored.
Coding	COD	This module contains the procedures to code logging data as well as biometric data in defined formats. Interoperability is provided by means of standard compliant coding.
Compression	COM	The objective of the module Compression is to keep the biometric data below a feasible size without losing too much quality for biometric verification or identification.
Evaluation	EVA	Methods and interfaces which are used in the scope of evaluation are the content of this module.
Logging	LOG	The module Logging contains requirements how and in which modality data has to be logged.
Operation	O	Within the module Operation, the working process is specified for the respective operator.
Presentation Attack Detection	PAD	The Presentation Attack Detection modules give requirements on fake detection. This encloses, among other things, functionality and certification requirements.
Quality Assessment	QA	This module contains all kinds of mechanisms and procedures to check the quality of the biometric data or to select the best quality data out of multiple instances. Quality Assessment is typically used in evaluation of an application's performance over time.
Reference Storage	REF	The objective of this module is to store biometric data in a way that it can be used for reference purposes later on.
User Interface	UI	The User Interface modules give requirements on visualization and user interaction. This encloses, among other things, functionality, quality assurance information, and veto messages.

**Table 6.1** Overview Function Module Categories

## 7. Partial Application Processes

### 7.1. Organisation of the Partial Application Processes

Partial Application Processes are referenced by their ID, which can contain up to three information items pointing to its contents.

The basic structure of an ID is: "PAP (Task) AAA-BBB-CCC-#".

Here, "Task" is optional and is only used if the PAP is a task. *AAA* is the primary information item, pointing to the main contents. *BBB* and *CCC* are optional information items, which can further specify the PAP. These information items may be 1-6 alphanumeric digits. The abbreviations used for the PAP ID are listed in ▶Table 7.1 and ▶Table 7.2. All PAP IDs end with a number #. This number is usually 1, unless multiple IDs with similar preceding information items exist. In this case, they are enumerated increasingly.

Primary Information Item	Description
ACQ	Acquisition
ASS	Assessment
EVA	Evaluation
ID	Identification
LNK	Linking
REQ	Request
UPD	Update
VER	Verification

**Table 7.1** Overview PAP ID Primary Information Items

Optional Information Item	Description
B	Biometrics (fingerprints and facial images)
CL	Candidate List
FI	Facial Image
FP	Fingerprint
FP1P	1 Plain Fingerprint
FP2P	2 Plain Fingerprints
FP4141	Fingerprint 4-1-4-1
FP442	Fingerprint 4-4-2
FPP	Plain Fingerprint
FPR	Rolled Fingerprint
FPS	Single Slap Fingerprint Image
ID	Identification
nCIR	no Connected Identity Register

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Optional Information Item	Description
SV	Supervised
TF	Traveller File
USV	Unsupervised
VER	Verification
wCIR	with Connected Identity Register

**Table 7.2** Overview PAP ID Optional Information Items

## List of Abbreviations

Abbreviation	Description
AP	Application Profile
FM	Function Module
HLBS	High Level Biometric Services
PAP	Partial Application Process



## Bibliography

[BIB\_RFC2119] *RFC 2119: Key words for use in RFCs to Indicate Requirement Levels.*