

---

---

**Information technology — Object  
oriented BioAPI —**

**Part 4:  
C++ implementation**

*Technologies de l'information — Objet orienté BioAPI —*

*Partie 4: Implémentation C++*

*ITeH Standards*  
**(<https://standards.iteh.ai>)**  
**Document Preview**

[ISO/IEC 30106-4:2019](https://standards.iteh.ai/catalog/standards/iso/8cfc154e-4828-4cb5-bca0-1362c8659125/iso-iec-30106-4-2019)

<https://standards.iteh.ai/catalog/standards/iso/8cfc154e-4828-4cb5-bca0-1362c8659125/iso-iec-30106-4-2019>



iTeh Standards  
(<https://standards.iteh.ai>)  
Document Preview

[ISO/IEC 30106-4:2019](https://standards.iteh.ai/catalog/standards/iso/8cfc154e-4828-4cb5-bca0-1362c8659125/iso-iec-30106-4-2019)

<https://standards.iteh.ai/catalog/standards/iso/8cfc154e-4828-4cb5-bca0-1362c8659125/iso-iec-30106-4-2019>



**COPYRIGHT PROTECTED DOCUMENT**

© ISO/IEC 2019

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Fax: +41 22 749 09 47  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland

# Contents

	Page
Foreword .....	v
Introduction .....	vi
<b>1 Scope .....</b>	<b>1</b>
<b>2 Normative references .....</b>	<b>1</b>
<b>3 Terms and definitions .....</b>	<b>1</b>
<b>4 BioAPI C++ general requirements .....</b>	<b>1</b>
<b>5 Data types and constants .....</b>	<b>2</b>
5.1 Basic data types .....	2
5.1.1 Enumerations .....	2
5.1.2 BioAPIData .....	10
5.1.3 RegistryID .....	10
5.1.4 UUID .....	10
5.1.5 Date and Time .....	10
5.2 Class ACBioParameters .....	11
5.2.1 Description .....	11
5.2.2 Properties summary .....	11
5.3 Class BFPListElement .....	11
5.3.1 Description .....	11
5.3.2 Properties summary .....	11
5.4 Class BFPSchema .....	11
5.4.1 Description .....	11
5.4.2 Properties summary .....	11
5.5 Class BIR .....	12
5.5.1 Description .....	12
5.5.2 Properties summary .....	12
5.5.3 Method summary .....	13
5.6 Class BSPSchema .....	14
5.6.1 Description .....	14
5.6.2 Properties summary .....	14
5.7 Class candidate .....	15
5.7.1 Description .....	15
5.7.2 Properties summary .....	15
5.8 Class FrameworkSchema .....	15
5.8.1 Description .....	15
5.8.2 Properties summary .....	15
5.9 Class GUIBitmap .....	16
5.9.1 Description .....	16
5.9.2 Properties .....	16
5.10 Class Identifypopulation .....	16
5.10.1 Description .....	16
5.10.2 Properties summary .....	16
5.10.3 Method summary .....	16
5.11 Class PopulationMember .....	17
5.11.1 Description .....	17
5.11.2 Properties summary .....	17
5.12 Class SecurityProfileType .....	17
5.12.1 Description .....	17
5.12.2 Properties summary .....	17
5.13 Class UnitList .....	18
5.13.1 Description .....	18
5.13.2 Properties summary .....	18
5.13.3 Methods summary .....	18

5.14	Class UnitListElement.....	18
5.14.1	Description.....	18
5.14.2	Properties summary.....	18
5.15	Class UnitSchema.....	19
5.15.1	Description.....	19
5.15.2	Properties summary.....	19
<b>6</b>	<b>Object oriented interfaces for supporting BioAPI_Units .....</b>	<b>19</b>
6.1	General.....	19
6.2	Interface IArchive.....	20
6.2.1	Description.....	20
6.2.2	Method summary.....	20
6.3	Interface IComparison.....	23
6.3.1	Description.....	23
6.3.2	Method summary.....	24
6.4	Interface IProcessing.....	27
6.4.1	Description.....	27
6.4.2	Method summary.....	27
6.5	Interface ISensor.....	28
6.5.1	Description.....	28
6.5.2	Method summary.....	28
<b>7</b>	<b>BFP level.....</b>	<b>29</b>
7.1	Interface IBFP.....	29
7.1.1	Description.....	29
7.1.2	Imported interfaces.....	30
7.1.3	Properties summary.....	30
7.1.4	Events summary.....	30
7.1.5	Method summary.....	30
<b>8</b>	<b>BSP level.....</b>	<b>33</b>
8.1	Interface IBSP.....	33
8.1.1	Description.....	33
8.1.2	Imported interfaces.....	34
8.1.3	Properties summary.....	34
8.1.4	Events summary.....	34
8.1.5	Method summary.....	34
<b>9</b>	<b>Framework level.....</b>	<b>41</b>
9.1	Interface IComponentRegistry.....	41
9.1.1	Description.....	41
9.1.2	Method summary.....	41
9.2	Interface IFramework.....	43
9.2.1	Description.....	43
9.2.2	Inherited interfaces.....	43
9.2.3	Properties summary.....	43
9.2.4	Method summary.....	43
<b>10</b>	<b>Application interaction.....</b>	<b>47</b>
10.1	class BioAPIException : Exception.....	47
10.1.1	Description.....	47
10.1.2	Constructor summary.....	48
10.1.3	Properties summary.....	48
10.1.4	Method Summary.....	49
10.2	Callback functions.....	49
10.2.1	Description.....	49
10.2.2	Callback functions specification.....	49
<b>Annex A (informative) Calling sequence examples and sample code.....</b>		<b>56</b>
<b>Bibliography.....</b>		<b>57</b>

## 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](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)) or the IEC list of patent declarations received (see <http://patents.iec.ch>).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 37, *Biometrics*.

A list of all parts in the ISO/IEC 30106 series can be found on the ISO website.

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](http://www.iso.org/members.html).

## Introduction

In this document an application programming interface expressed in C++ language is specified. C++ is a basic, general-purpose, object-oriented programming language that is used in most computer-based platforms and operating systems.

One of the advantages of using C++ is that, as it is supported by most computer platforms, the development, in source code, may be fully (or at least to a great part) supported from one platform to another.

C++ is a programming language standardized by ISO/IEC 14882, and most development platforms allow its use in conjunction to other programming languages and frameworks.

This document is drafted to make a clear and usable interpretation of ISO/IEC 30106-1, when using C++ programming language.

# iTeh Standards (<https://standards.iteh.ai>) Document Preview

[ISO/IEC 30106-4:2019](https://standards.iteh.ai/catalog/standards/iso/8cfc154e-4828-4cb5-bca0-1362c8659125/iso-iec-30106-4-2019)

<https://standards.iteh.ai/catalog/standards/iso/8cfc154e-4828-4cb5-bca0-1362c8659125/iso-iec-30106-4-2019>

# Information technology — Object oriented BioAPI —

## Part 4: C++ implementation

### 1 Scope

This document specifies an interface of a BioAPI C++ framework and BioAPI C++ BSP which will mirror the corresponding components specified in ISO/IEC 30106-1. The semantic equivalence of this document will be maintained with ISO/IEC 30106-2 (Java implementation) and ISO/IEC 30106-3 (C# implementation). In spite of the differences in actual parameters passed between functions, the names and interface structure are the same.

### 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.

ISO/IEC 30106-1, *Information technology — Object oriented BioAPI — Architecture*

ISO/IEC 30106-2, *Information technology — Object oriented BioAPI — Part 2: Java implementation*

ISO/IEC 30106-3, *Information technology — Object oriented BioAPI — Part 3: C# implementation*

ISO/IEC 14882, *Programming languages — C++*

### 3 Terms and definitions

No terms and definitions are listed in this document.

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

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

### 4 BioAPI C++ general requirements

All classes defined in the scope of this document shall have a constructor with all its properties as parameters, as well as a destructor that will free all allocated memory. In addition, the definition of each of the classes may contain further requirements for the constructor.

The destructor shall fulfill at least, the same requirements that the corresponding `Dispose()` method defined in ISO/IEC 30106-2 and ISO/IEC 30106-3.

In addition, most implementations shall declare the classes as exportable. Therefore, in this document a constant called `BIOAPI` is defined, allowing exportation of the classes.

EXAMPLE In Windows the definition of `BIOAPI` is: `#define BIOAPI __declspec(dllexport)`

To illustrate the use of the specification given in this document, refer to [Annex A](#).

## 5 Data types and constants

### 5.1 Basic data types

#### 5.1.1 Enumerations

<b>5.1.1.1 BiometricSubtype</b>	
<u>Description:</u>	Subtype of the biometric data used (e.g. which finger used in finger modalities). When transferring this information into/from a binary format, the Biometric Subtype constants defined in ISO/IEC 30106-1 shall be used.
<u>Enum Constant Summary:</u>	<ul style="list-style-type: none"> <li>— <i>NoValueAvailable</i></li> <li>— <i>Left</i></li> <li>— <i>Right</i></li> <li>— <i>LeftThumb</i></li> <li>— <i>LeftIndexFinger</i></li> <li>— <i>LeftMiddleFinger</i></li> <li>— <i>LeftRingFinger</i></li> <li>— <i>LeftLittleFinger</i></li> <li>— <i>RightThumb</i></li> <li>— <i>RightIndexFinger</i></li> <li>— <i>RightMiddleFinger</i></li> <li>— <i>RightRingFinger</i></li> <li>— <i>RightLittleFinger</i></li> <li>— <i>LeftPalm</i></li> <li>— <i>LeftBackOfHand</i></li> <li>— <i>LeftWrist</i></li> <li>— <i>RightPalm</i></li> <li>— <i>RightBackOfHand</i></li> <li>— <i>RightWrist</i></li> </ul>



<b>5.1.1.2 BiometricType</b>	
<u>Description:</u>	Type of the biometric data used (e.g. modality). When transferring this information into/from a binary format, the Biometric Type constants defined in ISO/IEC 30106-1 shall be used.
<u>Enum Constant Summary:</u>	<ul style="list-style-type: none"> <li>— <i>NoValueAvailable</i></li> <li>— <i>MultipleBiometricTypes</i></li> <li>— <i>Face</i></li> <li>— <i>Voice</i></li> <li>— <i>Finger</i></li> <li>— <i>Iris</i></li> <li>— <i>Retina</i></li> <li>— <i>HandGeometry</i></li> <li>— <i>SignatureOrSign</i></li> <li>— <i>Keystroke</i></li> <li>— <i>LipMovement</i></li> <li>— <i>Gait</i></li> <li>— <i>Vein</i></li> <li>— <i>DNA</i></li> <li>— <i>Ear</i></li> <li>— <i>Foot</i></li> <li>— <i>Scent</i></li> </ul>

<b>5.1.1.3 BIRDatabaseAccess</b>	
<u>Description:</u>	Defines the access mode to the database
<u>Enum Constant Summary:</u>	<ul style="list-style-type: none"> <li>— <i>Read</i> – access mode which allows only retrieval of records.</li> <li>— <i>ReadWrite</i> – access mode which allows addition, deletion and retrieval of records.</li> <li>— <i>Write</i> – access mode which allows addition and deletion of records, but retrieval is not allowed</li> </ul>

<b>5.1.1.4 BSPSchemaOperations</b>	
<u>Description:</u>	Enumerates the different operations that a BSP can offer to the biometric application (see 5.6)
<u>Enum Constant Summary:</u>	<ul style="list-style-type: none"> <li>— <i>CalibrateSensor (0x00020000)</i></li> <li>— <i>Capture (0x00000004)</i></li> <li>— <i>CheckQuality (0x00080000)</i></li> <li>— <i>ControlUnit (0x00400000)</i></li> <li>— <i>CreateTemplate (0x00000008)</i></li> <li>— <i>CreateTemplateWithAuxBIR (0x00000020)</i></li> <li>— <i>EnableEvents (0x00000001)</i></li> <li>— <i>Enrol (0x00000100)</i></li> <li>— <i>GetIndicatorStatus (0x00010000)</i></li> <li>— <i>Identify (0x00000080)</i></li> <li>— <i>IdentifyAggregate (0x00000400)</i></li> <li>— <i>PresetIdentifyPopulation (0x00001000)</i></li> <li>— <i>Process (0x00000010)</i></li> <li>— <i>ProcessWithAuxBIR (0x01000000)</i></li> <li>— <i>QueryBFPs (0x00200000)</i></li> <li>— <i>QueryUnits (0x00100000)</i></li> <li>— <i>Security (0x10000000)</i></li> <li>— <i>SetIndicatorStatus (0x00008000)</i></li> <li>— <i>SetPowerMode (0x00004000)</i></li> <li>— <i>Verify (0x00000040)</i></li> <li>— <i>VerifyAggregated (0x00000200)</i></li> <li>— <i>VerifyWithAuxBIR (0x02000000)</i></li> </ul>

**5.1.1.5 BSPSchemaOptions**

<u>Description:</u>	Enumerates the different options that can handle a BSP (see <a href="#">5.6</a> )
<u>Enum Constant Summary:</u>	<ul style="list-style-type: none"> <li>— <i>Adaptation (0x00000800)</i></li> <li>— <i>AppGUI (0x00000010)</i></li> <li>— <i>ArchiveBFP (0x00020000)</i></li> <li>— <i>Binning (0x00001000)</i></li> <li>— <i>BirEncrypt (0x00000200)</i></li> <li>— <i>BirSign (0x00000100)</i></li> <li>— <i>CaptureMultiple (0x00400000)</i></li> <li>— <i>CoarseScores (0x00100000)</i></li> <li>— <i>ComparisonBFP (0x00040000)</i></li> <li>— <i>GUIProgressEvents (0x00000020)</i></li> <li>— <i>IdentifyIndicator (0x00200000)</i></li> <li>— <i>OCC (0x00004000) (on-card comparison, formerly known as MOC)</i></li> <li>— <i>AdditionalData (0x00000080)</i></li> <li>— <i>ProcessingBFP (0x00080000)</i></li> <li>— <i>ProcessMultiple (0x00800000)</i></li> <li>— <i>QualityIntermediate (0x00000004)</i></li> <li>— <i>QualityProcessed (0x00000008)</i></li> <li>— <i>QualityRaw (0x00000002)</i></li> <li>— <i>Raw (0x00000001)</i></li> <li>— <i>SelfContainedDevice (0x00002000)</i></li> <li>— <i>SensorBFP (0x00010000)</i></li> <li>— <i>SourcePresent (0x00000040)</i></li> <li>— <i>SubtypeToCapture (0x00008000)</i></li> <li>— <i>TemplateUpdate (0x00000400)</i></li> <li>— <i>Disabilities</i></li> <li>— <i>PADFeature</i></li> </ul>

5.1.1.6 EventKind	
<u>Description:</u>	Defines the kind of sources that can originate an event
<u>Enum Constant Summary:</u>	<ul style="list-style-type: none"> <li>— <i>Insert (0x00000001)</i></li> <li>— <i>Remove (0x00000002)</i></li> <li>— <i>Fault (0x00000004)</i></li> <li>— <i>SourcePresent (0x00000008)</i></li> <li>— <i>SourceRemoved (0x00000010)</i></li> </ul>

5.1.1.7 Facility	
<u>Description:</u>	Defines originator of the error in an exception (see <a href="#">10.1</a> )
<u>Enum Constant Summary:</u>	<ul style="list-style-type: none"> <li>— <i>Framework – The error was reported by the framework component.</i></li> <li>— <i>BSP – The error was reported by the biometric service provider.</i></li> <li>— <i>Unit – The error was reported by the biometric unit</i></li> </ul>

iTeh Standards

5.1.1.8 GUIEnrolType	
<u>Description:</u>	Indicates the enrol type of a BSP (see <a href="#">10.2</a> )
<u>Enum Constant Summary:</u>	<ul style="list-style-type: none"> <li>— <i>TestVerify</i></li> <li>— <i>MultipleCapture</i></li> </ul>

(<https://standards.iteh.ai>)  
Document Preview

ISO/IEC 30106-4:2019

<https://standards.iteh.ai/catalog/standards/iso/8cfc154e-4828-4cb5-bca0-1362c8659125/iso-iec-30106-4-2019>

5.1.1.9 GUIMoment	
<u>Description:</u>	Determines the moment when the processing of an operation is at the time of calling a GUI callback function (see <a href="#">10.2</a> )
<u>Enum Constant Summary:</u>	<ul style="list-style-type: none"> <li>— <i>BeforeStart</i></li> <li>— <i>AfterEnd</i></li> </ul>

<b>5.1.1.10 GUIOperation</b>	
<u>Description:</u>	Determines the operation being performed when using GUI callback functions (see <a href="#">10.2</a> )
<u>Enum Constant Summary:</u>	<ul style="list-style-type: none"> <li>— <i>Capture</i></li> <li>— <i>Enrol</i></li> <li>— <i>Identify</i></li> <li>— <i>Verify</i></li> </ul>

<b>5.1.1.11 GUIResponse</b>	
<u>Description:</u>	Enumeration of the possible actions to be performed by a BSP after a GUI event notification callback made by the BSP has returned control to the BSP (see <a href="#">10.2</a> )
<u>Enum Constant Summary:</u>	<ul style="list-style-type: none"> <li>— <i>CycleStart</i></li> <li>— <i>CycleRestart</i></li> <li>— <i>Default</i></li> <li>— <i>OpComplete</i></li> <li>— <i>OpCancel</i></li> <li>— <i>ProgressContinue</i></li> <li>— <i>ProgressAbort</i></li> <li>— <i>Recapture</i></li> <li>— <i>SubOpStart</i></li> <li>— <i>SubOpNext</i></li> </ul>

<b>5.1.1.12 GUISuboperation</b>	
<u>Description:</u>	An enumeration of the possible types of suboperations performed by a BSP during an operation, to be reported to the application in GUI event notifications (see <a href="#">10.2</a> )
<u>Enum Constant Summary:</u>	<ul style="list-style-type: none"> <li>— <i>Capture</i></li> <li>— <i>CreateTemplate</i></li> <li>— <i>Identify</i></li> <li>— <i>Process</i></li> <li>— <i>Verify</i></li> </ul>

<b>5.1.1.13 ProcessedLevel</b>	
<u>Description:</u>	Determines the level of processing of the BIR
<u>Enum Constant Summary:</u>	<ul style="list-style-type: none"> <li>— <i>Intermediate</i></li> <li>— <i>Processed</i></li> <li>— <i>Raw</i></li> </ul>

<b>5.1.1.14 Purpose</b>	
<u>Description:</u>	Defines the purpose for which the BIR or process is intended
<u>Enum Constant Summary:</u>	<ul style="list-style-type: none"> <li>— <i>Verify</i></li> <li>— <i>Identify</i></li> <li>— <i>Enrol</i></li> <li>— <i>EnrolForVerificationOnly</i></li> <li>— <i>EnrolForIdentificacionOnly</i></li> <li>— <i>Audit</i></li> <li>— <i>Decide</i></li> <li>— <i>NoPurposeAvailable</i></li> </ul>

<b>5.1.1.15 ResultOptions</b>	
<u>Description:</u>	Defines the request to some BioAPI methods, to provide additional results to the originally defined (e.g. see <a href="#">6.3.2</a> ).
<u>Enum Constant Summary:</u>	<ul style="list-style-type: none"> <li>— <i>RequestAdaptedBIR</i> – Request that a BIR be constructed by adapting the reference template using the processed BIR that is the input to the biometric verification.</li> <li>— <i>RequestAdditionalData</i> – Request that the additionalData should be returned upon successful verification</li> <li>— <i>RequestAdditionalData</i> – Request additional data to be used, for example, in an auditing process.</li> </ul>