Moving Picture, Audio and Data Coding
by Artificial Intelligence
www.mpai.community

MPAI Technical Specification

AI Module Profiles
MPAI-PRF

V1.0

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Readers are invited to review Annex 1 - Notices and Disclaimers.

MPAI Technical Specification
AI Module Profiles (MPAI-PRF) V1.0

Contents

Foreword (Informative)

In recent years, Artificial Intelligence (AI) and related technologies have been applied to a broad range of applications, have started affecting the life of millions of people and are expected to do so even more in the future. As digital media standards have positively influenced industry and billions of people, so AI-based data coding standards are expected to have a similar positive impact. Moving Picture, Audio, and Data Coding by Artificial Intelligence (MPAI) has been established to develop standards that promote the efficient use of data especially using Artificial Intelligence technologies.

The accomplishment of the MPAI mission is facilitated by two foundational Technical Specifications:

- *Technical Specification: Artificial Intelligence Framework (MPAI-AIF)* [2] specifying an environment enabling initialisation, dynamic configuration, and control of AIWs in the standard AI Framework environment depicted in Figure 1 where AI applications called AI Workflows (AIW) can be executed. An AIW can include interconnected AI Modules (AIM).
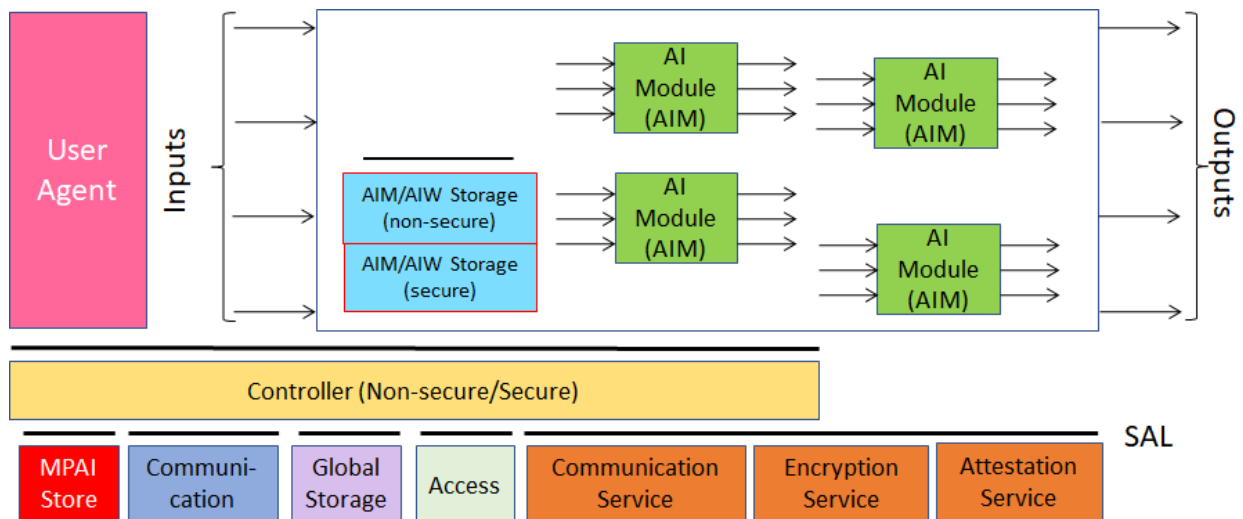
Figure 1 - The AI Framework (MPAI-AIF) V2 Reference Model

MPAI-AIF supports small- and large-scale high-performance components and promotes solution with improved explainability.

- *Technical Specification: Governance of the MPAI Ecosystem* [1] defining the operation of the following elements of the MPAI Ecosystem:
  - Standards, i.e., the ensemble of Technical Specifications, Reference Software, Conformance Testing, and Performance Assessment.
  - Implementers of MPAI Technical Specifications.
  - MPAI Store in charge of making AIMs and AIWs submitted by Implementers available to Integrators and End-Users.
  - Performance Assessors, independent entities assessing the performance of implementations in terms of Reliability, Replicability, Robustness, and Fairness.
  - End Users.

1   Introduction (Informative)

Implementations of a large number of MPAI standards are typically made as AI Workflows (AIW) composed of interconnected AI Modules (AIM). Some AIM receive more or less input and produce more/fewer output data than an AIM with the same name that is used in other AIWs even though they nominally perform the same functions. For instance, the Natural Language Understanding (MMC-NLU) AIM in the Conversation with Emotion AIW (MMC-CWE) receives Recognised Text as input and produces Refined Text and Meaning as output. However, the MMC-NLU AIM used in the Communicating Entities in Context AIW (HMC-CEC) may also use Audio-Visual Scene Descriptors and Audio and/or Visual Object Instance IDs to achieve better understanding of the textual sentence.

Since it is not realistic to mandate that all MMC-NLU AIMs be equipped with the logic required to understand and use Descriptors and Object information in addition to Recognised text to produce Refined Text and Meaning, *Technical Specification: AI Module Profiles (MPAI-PRF)* provides a mechanism that unambiguously signals which characteristics of an AIM – called Attributes in the following – are supported by the AIM. This information is designed to be both machine readable and the signalling easily read and understood by a human.

Table 1 defines the Terms specific of this Technical Specification and Table 5 those used across MPAI Technical Specifications. Chapters, Sections, and Annexes are Normative unless they are explicitly identified as Informative (as in this Introduction).

2   Scope

Technical Specification: AI Module Profiles (MPAI-PRF) specifies a standard way to signal a label – called AI Module Profile – that uniquely identifies the set of AIM Attributes – input data, output data and functionality – that characterises an AI Module instance.

MPAI-PRF has been developed by the Multimodal Conversation (MPAI-MMC) and Portable Avatar Format (MPAI-PAF) Development Committees. MPAI may issue new Versions of this Technical Specification or new Technical Specifications.

3   Definitions

A dash "-" preceding a Term in Table 1 indicates the following readings according to the font:
1. Normal font: the Term in the table without a dash and preceding the one with a dash should be read <u>before</u> that Term. For example, "Data" and "- Type" means "Avatar Model."
2. *Italic* font: the Term in the table without a dash and preceding the one with a dash should be read <u>after</u> that Term. For example, "AI Module" and "- *Basic*" means "Basic AI Module."

The definition of all MPAI Terms is available online.

Table 1 - Terms used in this Technical Specification

Term	Definition
AI Module (AIM)	A data processing component performing a Function by processing AIM-specific Input Data and producing AIM-specific Output Data.
- Attribute	An input Data or an output Data or a functionality, such as the ability to translate.

- *Basic*	An AIM that does not aggregate other AIMs.
- *Composite*	An AIM aggregating more than one AIM.
- Profile	The label that uniquely identifies a set of Attributes.
Avatar	An Object rendered to represent a Human of a Machine in a virtual space.
- Model	An inanimate Avatar exposing animation interfaces.
- *Portable*	A Data Type including Avatar ID, Time, Visual Environment, Spatial Attitude, Avatar Model, Body Descriptors, Face Descriptors, Language Preference, Speech Coding, Speech Data, Text, and Personal Status.
Body	A digital representation of a human body.
- Descriptors	A Data Type representing the features of an Entity's Body.
- Object	A Data Type representing the body of an Entity, head included, face excluded.
Context	Information surrounding an Entity and providing additional insight into the information the Entity communicates.
Data	Information in digital form.
- Format	A standard representation of Data.
- Type	An instance of Data with a specific Data Format
Entity	A human digitally represented as a Digitised Human in a Virtual Environment or a Virtual Human in a Virtual Environment.
Face	A digital representation of a human face.
- Descriptors	A Data Type representing the motion and conveying information on the Personal Status of the face of a human or an avatar.
- Object	A Data Type representing the face of an Entity.
Factor	One of Cognitive State, Emotion, and Social Attitude
Modality	One of Text, Speech, Face, or Gesture.
Object	Data that can be rendered to cause an Experience.
- *Audio*	A Data Type representing an object or a computer-generated Object that can be rendered to and perceived by a human ear.
- *Audio-Visual*	An Object composed of Audio and Visual Objects sharing the same Spatial Attitude.
- Instance	The instance of an Audio Object.
- *Visual*	The digital representation of an object captured by an electromagnetic or high-frequency audio signal or computer-generated that can be rendered to and perceived by a human eye.
Personal Status	A Data Type representing the ensemble of information internal to a person expressed by 3 Factors (Cognitive State, Emotion, Social Attitude) conveyed by one or more Modalities (Text, Speech, Face, and Gesture).
Point of View	The Spatial Attitude of an Entity user looking at an Environment.
Scene Descriptors	The digital representation of the features of a scene.
Audio	A Data Type representing the Audio Objects and their spatial arrangement in an Audio Scene.
Audio-Visual	A Data Type representing the Audio-Visual Objects and their spatial arrangement in an Audio-Visual Scene.
Visual	A Data Type representing the Visual Objects and their spatial arrangement in a Visual Scene.
Scene Descriptors	The digital representation of the arrangement of a Scene's Objects.

-	*Audio*	A Data Type representing the spatial arrangement of a Scene's Audio Objects.
-	*Audio-Visual*	A Data Type representing the spatial arrangement of a Scene's Audio, Visual, and Audio-Visual Objects.
-	*Visual*	A Data Type representing the spatial arrangement of a Scene's Visual Objects.
Speech		Digital representation of analogue speech sampled at a frequency between 8 kHz and 96 kHz with a number of bits/sample of 8, 16 or 24, and non-linear and linear quantisation or compressed. Data with characteristics of Speech may be synthetically produced.
-	Descriptors	A Data Type representing information elements incorporated in a Speech Segment, e.g., personal identity, Personal Status, additional factors such as vocal tension, creakiness, whispery quality, etc.
-	Model	A Neural Network trained to generate utterances with specific Speech Descriptors.
-	Object	An Object described by Speech Descriptors.
Text		A series of characters drawn from a finite alphabet of a Character Set.
-	Descriptors	A Data Type including the digital representation of the features of Text.
-	Object	A string of Text.
-	*Recognised*	The Text produced by the Automatic Speech Recognition AIM.

4 References

4.1 Normative References

1 MPAI; Technical Specification; MPAI Ecosystem Governance (MPAI-GME) V1.1; https://mpai.community/standards/mpai-gme/.
2 MPAI; Technical Specification: AI Framework (MPAI-AIF) V2.0; https://mpai.community/standards/mpai-aif/.
3 MPAI; Technical Specification: Human and Machine Communication (MPAI-HMC) V1.0; https://mpai.community/standards/mpai-hmc/.
   3.1 Entity and Context Understanding: https://mpai.community/standards/aiws-and-aims/entity-context-understanding-hmc-ecu/.
4 MPAI; Technical Specification: Multimodal Conversation (MPAI-MMC) V2.1; https://mpai.community/standards/mpai-mmc/.
   4.1 Entity Dialogue Processing: https://mpai.community/standards/aiws-and-aims/entity-dialogue-processing-hmc-edp/.
   4.2 Natural Language Understanding: https://mpai.community/standards/aiws-and-aims/natural-language-understanding-hmc-nlu/.
   4.3 Personal Stats Extraction: https://mpai.community/standards/aiws-and-aims/personal-status-extraction-mmc-pse/.
   4.4 Text and Speech Translation: https://mpai.community/standards/aiws-and-aims/text-and-speech-translation-mmc-tst/.
   4.5 Text To Speech: MMC-TTS is specified at https://mpai.community/standards/aiws-and-aims/text-to-speech-mmc-tts/.
5 MPAI; Technical Specification: Portable Avatar Format (MPAI-PAF) V1.1; https://mpai.community/standards/mpai-paf/.
   5.1 Audio-Visual Rendering: https://mpai.community/standards/aiws-and-aims/audio-visual-scene-rendering-hmc-avr/.

5.2   Personal Status Display: PAF-PSD is specified at https://mpai.community/stand-ards/aiws-and-aims/personal-status-display-paf-psd/.

6   ISO 639:2023 - Code for individual languages and language groups; https://www.iso.org/standard/74575.html

7   Khronos; Neural Network Exchange Format (NNEF)

8   ONNX; Open Neural Network Exchange

4.2   Informative References

9   MPAI; The MPAI Statutes.

10   MPAI; The MPAI Patent Policy.

5   AIMs requiring profiles

The first column of Table 2 provides the current list of names of AIMs requiring Profiles, the second column their acronyms, and the third column the JSON Metadata [2].

Table 2 - AIMs requiring Profiles

AIM Name	Acronym
Audio-Visual Scene Rendering	PAF-AVR
Entity Context Understanding	HMC-ECU
Entity Dialogue Processing	MMC-EDP
Natural Language Understanding	MMC-NLU
Personal Status Display	PAF-PSD
Personal Status Extraction	MMC-PSE
Text and Speech Translation	MMC-TST
Text-to-Speech	MMC-TTS

This list will be This list will be revised if:
1. Some AIMs currently without, subsequently require Profiles.
2. The functionality of existing AIMs is extended in a way that requires Profiles.
3. New AIMs requiring Profiles are specified.

Note that this document treats uniformly Composite and Basic AIMs.

6   Profile signalling

Table 3 lists the 24 Attributes and their 3-character codes that have been found necessary to iden-tify the AI Modules of Table 2.

Table 3 - Coding of AIM Attributes

Attributes	Code
Audio Object	AUO
Audio-Visual Scene Descriptors	AVD
Avatar Model	AVM
Body Object	BDO
Body Descriptors	BDD

Entity Personal Status	EPS
Face ID	FCI
Face Object	FCO
Face Descriptors	FCD
Language Preferences	LGP
Memory	MEM
Speech Model	SPM
Object Instance ID	OII
Point of View	POV
Portable Avatar	PAV
Speech Descriptors	SPD
Speaker ID	SPI
Speech Model	SPM
Speech Object	SPO
Text Descriptors	TXD
Text Object	TXO
Recognised Text	TXR
Translation	TRN
Visual Object	VIO

An AIM Profile is identified by:
1. Three characters identifying the Technical Specification that specifies the AIM.
2. Three characters identifying the AIM of that Technical Specification.
3. The Version and Subversion of the Technical Specification.
4. The AIM Profile-specific sequence of coded Attributes drawn from Table 3.

An AIM Profile can be validly signaled in two ways: as a list of Attributes that an AIM does or does not support by prefixing ALL and NUL to the list of Attributes to indicate whether the list refers to supported or not supported Attributes. This choice allows for a more compact signalling depending on the actual number of Attributes supported by the AIM. For instance, the Profile of a Natural Language Understanding (HMC-NLU) AIM that does not handle spatial information (see Section 8.3) can be labelled by, respectively:

MMC-NLU-V2.1(ALL-AVS-OII)   List of supported Attributes
MMC-NLU-V2.1(NUL+TXO+TXR)   List of unsupported Attributes

An Attribute can be characterised by Sub-Attributes. For instance, the Sub-Attributes of the Personal Status (EPS) Attribute are Text (PST), Speech (PSS), Face (PSF), and Gesture (PSG). To signal Sub-Attributes used by an AIM, the character @ is prefixed to the Attribute (EPS in the example above) followed by a list of supported Sub-Attributes each prefixed by the character #.

In the first example below, an implementation supports all Attributes of the Personal Status Display (PAF-PSD) specification, but Personal Status only supports the Speech and Face Sub-Attributes. In the second example, an implementation supports the Text, Avatar Model and Personal Status Sub-Attributes but limited to Face and Gesture (e.g., in case of a sign-language capable AIM).

PAF-PSD-V1.1(ALL@EPS#PSS#PSF)   List of supported Attributes
PAF-PSD-V1.1(NUL+TXO+AVM@EPS#PSF#PSG)   List of unsupported Attributes

MPAI-PRF also supports Translation-related Sub-Attributes. The Test and Speech Translation AIM's Sub-Attributes signal which languages are supported in which direction as exemplified below:

MMC-TST-V2.1(NUL+TXO@TRN#eng->ita)   Signals unsupported Attributes
MMC-TST-V2.1(ALL-ISD@TRN#kor<->fra#ger->swa) Signals supported Attributes

The first case refers to an AIM than only supports text translation from English to Italian and the second to an AIM that does not support Speech Descriptors (see Section 8.5) but supports text and speech translation from both Korean to and from French, and from German to Swahili (Table 4).

The capabilities of an AIM can thus be represented along two dimensions: the first relates to its Attributes and is called Profile and the second relates to its Sub-Attributes and is called Level. Table 4 lists the Sub-Attributes of the Personal Status and Translation Attributes:

Table 4 - Attributes and Sub-Attributes

Attribute	Coded Attributes	Sub-Attributes	Coded Sub-Attributes
Personal Status	EPS	Text	PST
		Speech	PSS
		Face	PSF
		Gesture	PSG
Translation	TRN	Language	3-letter codes of [6], Part 3

Important note: An AIM implementing AIM Profile signalling need not expose the interfaces of missing Attributes. If all Attributes are supported, all interfaces shall be exposed.

7 JSON Syntax and Semantics

The following syntax can be used to define a file that may contain many Attributes and Sub-Attributes.

```
{
  "$schema": "http://json-schema.org/draft/2020-12/schema",
  "$id": "https://schemas.mpai.community/MMC/V2.2/data/SocialAttitude.json",
  "title": "AIMProfile",
  "type": "object",
  "properties": {
    "Header": {
      "type": "string",
      "pattern": "^PRF-V[0-9]{1,2}[.][0-9]{1,2}$"
    },
    "Profile": {
      "type": "string",
      "pattern": "^(ALL|NUL)([+-](AUO|AVG|AVM|BDO|BDD|FCI|FCO|FCD|EPS|ISD|
LGP|MEM|SPM|OII|POV|PAV|SPD|SPI|SPO|TXD|TXO|TXR|TRN|VIO)|@EPS(#(SPT|PSS|PSF|PSG))+|@TRN(#([a-
z]{3})(<->|->)([a-z]{3}))+)+$"
    }
  }
}
```

8 AIM Profiles

This Chapter specified the eight AI Modules for which Profiles can be signalled.

8.1 Entity Context Understanding (HMC-ECU)

8.1.1 Function

Receives	Audio-Visual Scene Descriptors.
Processes	Descriptors to enable the AIM to achieve understanding of the information conveyed by an Entity and its Context.
Produces	1 Personal Status 2 Refined and Translated Text 3 Meaning 4 Audio Instance ID 5 Visual Instance ID 6 The Audio-Visual Scene Descriptors.
Enables	An Entity Dialogue Processing AIM to produce a pertinent Text and Personal Status

8.1.2 Specification

Reference [3.1] specifies the Entity and Context Understanding Composite AIM.
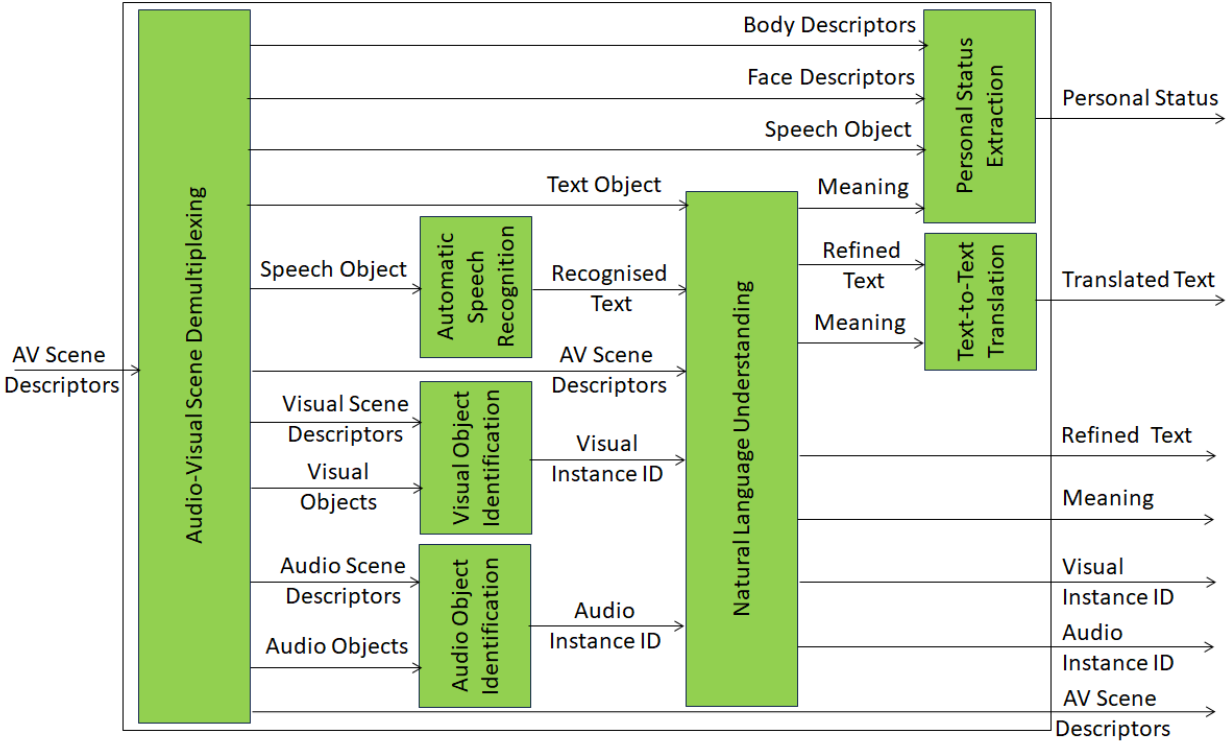
Figure 2 - Entity and Context Understanding

8.1.3 Attributes

HMC-ECU Profiles are determined by the use of one or more of the following attributes by the AIM:

Attribute	Code	Function of HMC-ECU
Body Descriptors	BDD	Receives Body Descriptors
Face Descriptors	FCD	Receives Face Descriptors
Speech Object	SPO	Receives Speech Object
Text Object	TXO	Receives Text Object

Visual Object	VIO	Receives Visual Object
Audio Object	AUO	Receives Audio Object
Audio-Visual Scene Descriptors	AVS	Receives Audio-Visual Scene Descriptors
Translation	TRN	Translates Text Object

8.2 Entity Dialogue Processing (MMC-EDP)

8.2.1 Function

Receives	1 Text Object 2 Object Instance ID 3 Input Personal Status 4 Text Descriptors 5 AV Scene Descriptors 6 Speaker ID 7 Face ID 8 Memory
Processes	Processes the information received: 1 Handling one Speech Object at a time. 2 Taking past Speech Objects into account.
Produces	Elements of the Machine Response to the data issued by the Entity in its Context in the form of: 1 Text. 2 Personal Status

8.2.2 Specification

Reference [4.1] specifies the Entity Dialogue Processing AIM.
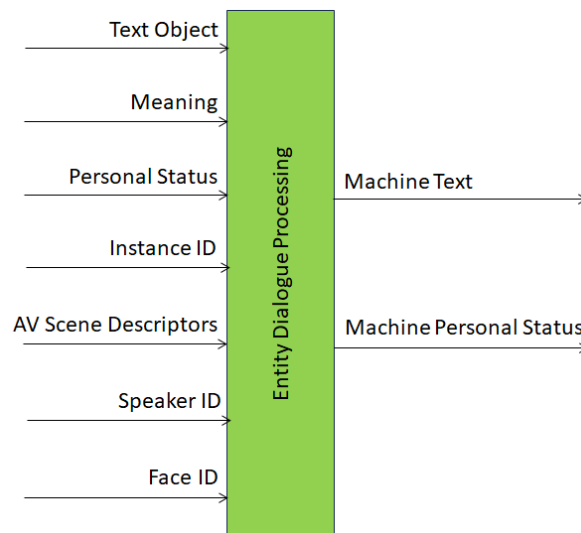
Figure 3 - Entity Dialogue Processing

8.2.3 Attributes

MMC-EDP Profiles are determined by the use of one or more of the following attributes by the AIM:

Attribute	Code	Function of MMC-EDP
Text Object	TXO	Receives Text (directly from human or through NLU).

Object Instance ID	OII	Receives the ID of an A/V/AV Instance referenced in the dialogue.
Input Personal Status	EPS	Receives Personal Status.
Text Descriptors	TXD	Receives Meaning.
AV Scene Descriptors	AVS	Receives AV Scene Descriptors to enable it to locate the Object.
Speaker ID	SPI	Receives Speaker ID.
Face ID	FCI	Receives Face ID.
Memory	MEM	Takes into account prior Input Data of the dialogue session.

8.3 Natural Language Understanding (MMC-NLU)

8.3.1 Function

Receives	1 Text Object directly input by the Entity. 2 Recognised Text from the Automatic Speech Recognition AIM. 3 An ID of an Instance. 4 The Audio-Visual Scene Descriptors containing the Instance ID.
Performs	The following processing: 1 Refines the Input Text if coming from an Automatic Speech Recognition AIM 2 Extracts Meaning (Text Descriptors) from Recognised Text or Entity's Text Object.
Produces	1 Refined Text. 2 Text Descriptors (Meaning).
Enables	Personal Stats Display to produce a Portable Avatar.

8.3.2 Specification
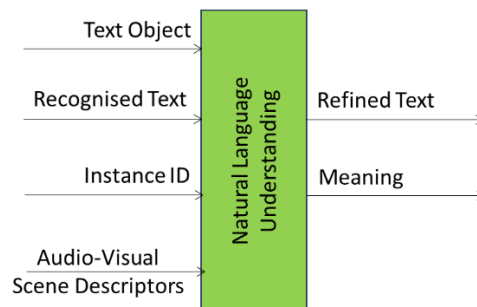
MMC-NLU is specified at [4.2].

Figure 4 - Natural Language Understanding

8.3.3 Attributes

MMC-NLU Profiles are determined by the use of one or more of the following attributes by the AIM:

Attribute	Code	Function of MMC-NLU
Text Object	TXO	Receives Text directly from human.
Recognised Text	TXR	Receives text from ASR.
Object Instance ID	OII	Receives Object Instance ID
Audio-Visual Scene Descriptors	AVS	Receives Audio-Visual Descriptors.

Text Descriptors	TXD	Produces Text Descriptors (Meaning)

8.4 Personal Status Extraction (MMC-PSE)

8.4.1 Function

Receives	1	Text information: 1.1 Text Selector informing about availability of Text Descriptors 1.2 Text Object 1.3 Text Descriptors 2 Speech information: 2.1 Speech Selector informing about availability of Speech Descriptors 2.2 Speech Object 2.3 Speech Descriptors 3 Face information informing about availability of Face Descriptors 3.1 Face Selector 3.2 Face Object 3.3 Face Descriptors 4 Body information regarding availability of Body Descriptors: 4.1 Gesture Selector informing about availability of Gesture Descriptors 4.2 Body Object 4.3 Gesture Descriptors
Processes	received information by: 1 Computing the Modality (Text, Speech, Face, and Gesture) Descriptors for Cognitive State, Emotion and Social Attitude if Selector signals it is not already available. 2 Interpreting the Descriptors to produce the Personal Statuses of the Modalities. 3 Multiplexing the Personal Statuses of the Modalities into the Personal Status.
Produces	Personal Status.
Enables	Entity Dialogue Processing to improve its ability to respond.

8.4.2 Specification
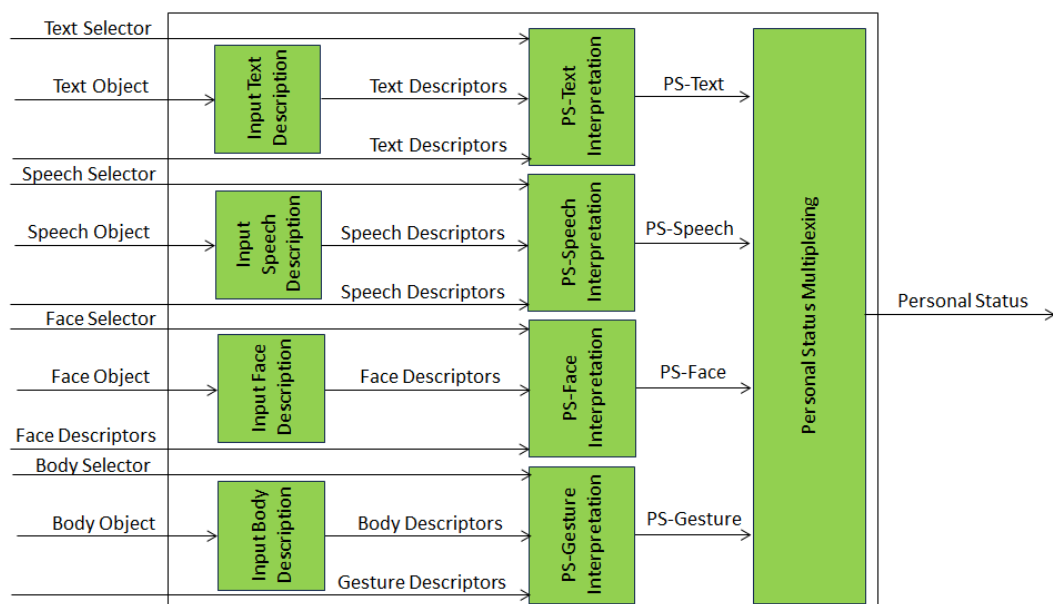
Reference [4.3] specifies MMC-PSE.

Figure 5 - Personal Status Extraction

8.4.3 Attributes

MMC-PSE Profiles are determined by the use of one or more of the following attributes by the AIM:

Attribute	Code	Function of MMC-PSE
Text Object	TXO	Receives Text
Speech Object	SPO	Receives Speech
Face Object	FCO	Receives Face
Body Object	BDO	Receives Gesture

When an MMC-PSE is used as a component AIM in a Composite AIM as in the case of HMC-ECU, the MMC-PSE Attributes become Sub-Attributes of the Composite AIM.

8.5 Text and Speech Translation (MMC-TST)

8.5.1 Function

Receives	1 Selector to inform whether:
	    1.1 The AIM output should be Text or Speech.
	    1.2 The output Speech should retain the input Speech Features.
	2 Language Preferences in the form of requested input and output language.
	3 Personal Status.
	4 Text.
	5 Speech.

Performs	(A subset of) the following: 1 Converts input Speech into Text using Personal Status. 2 Translates the Text to the target language. 3 Extracts the Features from Speech. 4 Converts Text into Speech adding the Speech Features of the input Speech.
Produces	1 Translated Text. 2 Translated Speech.

8.5.2 Specification
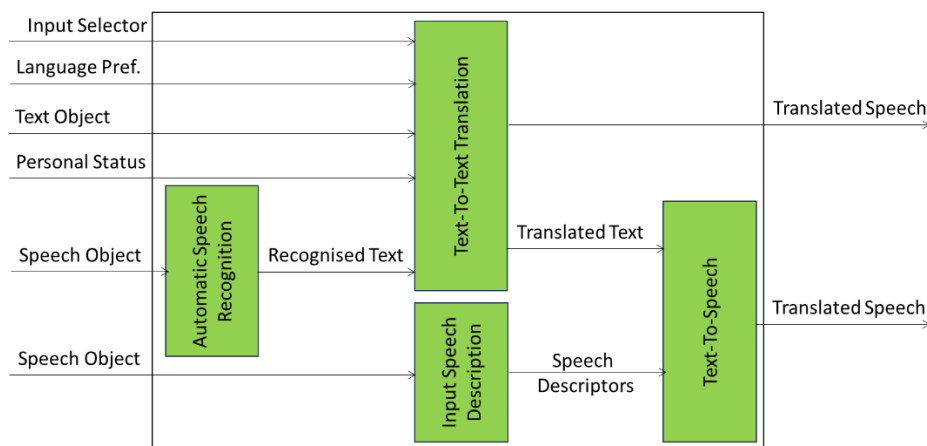
Reference [4.4] specifies MMC-TST.

Figure 6 - Text and Speech Translation

8.5.3 Attributes

MMC-TST Profiles are determined by the use of one or more of the following attributes by the AIM:

Attributes	Code	Functions
Language Prefer-ences	LGP	MMC-TST receives information on input and output lan-guages.
Text Object	TXO	MMC-TST receives Text.
Speech Object	SPO	MMC-TST receives Speech.
Speech Descriptors	SPD	MMC-TST uses Speech Descriptors.
Personal Status	EPS	MMC-TST receives Personal Status.

When an MMC-TST is used as a component AIM in a Composite AIM as in the case of HMC-ECU, the LGP (Language Preferences) Attribute of MMC-TST become Sub-Attributes of the Composite AIM represented as 3-letter codes of [6], Part 3.

8.6 Audio-Visual Scene Rendering (PAF-AVR)

8.6.1 Function

Receives	1 Audio-Visual Scene Descriptors, or 2 Portable Avatar. 3 Point of View.
Transforms	Portable Avatar into Audio-Visual Scene Descriptors if input is Portable Avatar.
Produces	1 Text. 2 Output Audio resulting from rendering of Audio Scene Descriptors from Point of View. 3 Output Visual resulting from rendering of Visual Scene Descriptors from Point of View.

8.6.2 Specification
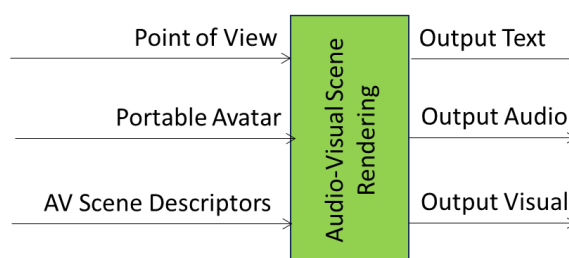
Reference [5.1] specifies PAF-AVR.

Figure 7 - Audio-Visual Scene Rendering

8.6.3 Attributes

PAF-AVR Profiles are determined by the use of one or more of the following attributes by the AIM:

Attribute	Code	Function
Point of View	POV	PAF-AVR is informed to provide Output Audio and/or Output Visual as perceived from a Point of View.

Portable Avatar	PAV	PAF-AVR receives a Portable Avatar and produces an Audio-Visual Scene from the Point of View.
Audio-Visual Scene Descriptors	AVS	PAF-AVR receives Audio-Visual Scene Descriptors and produces an Audio-Visual Scene from the Point of View.
Output Text	TXO	PAF-AVR produces Text Object.
Output Audio	AUO	PAF-AVR produces Audio Object.
Output Visual	VIO	PAF-AVR produces Visual Object.

8.7 Personal Status Display (PAF-PSD)

8.7.1 FunctionPAF-PSD

Receives	1 Text Object 2 Personal Status 3 Avatar Model 4 Speech Model 5 NN Format
Uses	1 Text and PS-Speech to produce Machine Speech. 2 Machine Speech, Avatar Model, and PS-Face to produce Machine Face Descriptors. 3 Machine Text, Avatar Model, and PS-Gesture to produce Machine Body Descriptors
Produces	Portable Avatar
Enables	PAF-AVR to render the Portable Avatar produced by PAF-PSD.

8.7.2 Specification
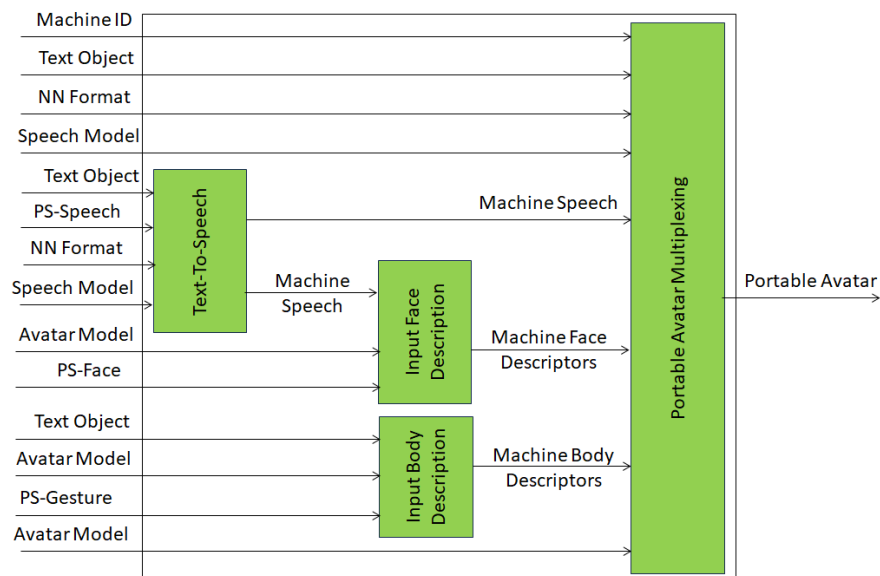
PAF-PSD is specified at [5.2].

Figure 8 - Personal Status Display

8.7.3 Attributes

PAF-PSD Profiles are determined by the use of one or more of the following attributes by the AIM:

Attribute	Code	Function
Text Object	TXO	PAF-PSD receives Text and produces Speech.
Personal Status	EPS	PAF-PSD receives Personal Status.
Speech Model	SPM	PAF-PSD receives Speech Model
Avatar Model	AVM	PAF-PSD receives Avatar Model.

8.8 Text-to-Speech (MMC-TTS)

8.8.1 Definition

Receives	1 Text Object. 2 Personal Status. 3 Speech Model.
Feeds	Text Object and Personal Status to Speech Model.
Produces	Utterance.

8.8.2 Specification

MMC-TTS is specified at [4.5].
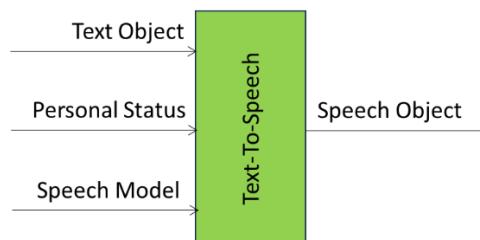
Figure 9 - Text-To-Speech

8.8.3 Attributes

An MMC-TTS AIM Profile is determined by whether the AIM uses one or more of the following Attributes:

Attribute	Code	Function
Text Object	TXO	MMC-TTS receives Text Object
Personal Status	EPS	MMC-TTS receives Personal Status
Speech Model	SPM	MMC-TTS receives NN Speech Model

Annex 1 - Notices and Disclaimers Concerning MPAI Standards (Informative)

The notices and legal disclaimers given below shall be borne in mind when downloading and using approved MPAI Standards.

In the following, "Standard" means the collection of four MPAI-approved and published documents: "Technical Specification", "Reference Software" and "Conformance Testing" and, where applicable, "Performance Testing".

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Annex 2 - General MPAI Terminology

The capitalised Terms used in this standard that are not already included in Table 1are defined in Table 5.

NOTE: A hyphenated entry for e.g., "- Testing" should be read as adding that word to the closest non-hyphenated entry above it – in this case, "Conformance," giving "Conformance Testing" as the complete entry name.

Table 5 – Terms used across several MPAI Technical Specifications

Term	Definition
Access	Static or slowly changing data that are required by an application such as domain knowledge data, data models, etc.
AI Framework (AIF)	The environment where AIWs are executed.
AI Model (AIM)	A data processing element receiving AIM-specific Inputs and producing AIM-specific Outputs according to according to its Function. An AIM may be an aggregation of AIMs.
AI Workflow (AIW)	A structured aggregation of AIMs implementing a Use Case receiving AIW-specific inputs and producing AIW-specific outputs according to the AIW Function.
Application Standard	An MPAI Standard designed to enable a particular application domain.
Assessment Laboratory	A laboratory accredited to Assess the Grade of Performance of Implementations.
Channel	A connection between an output port of an AIM and an input port of an AIM. The term "connection" is also used as synonymous.
Communication	The infrastructure that implements message passing between AIMs.
Component	One of the 7 AIF elements: Access, Communication, Controller, Internal Storage, Global Storage, Store, and User Agent
Composite AIM	An AIM aggregating more than one AIM.
Component	One of the 7 AIF elements: Access, Communication, Controller, Internal Storage, Global Storage, Store, and User Agent
Conformance	The attribute of an Implementation of being a correct technical Implementation of a Technical Specification.
- Testing	The normative document specifying the Means to Test the Conformance of an Implementation.
- Testing Dataset	A dataset used to Test the Conformance of an implementation to a Technical Specification.
- Testing Means	Procedures, tools, data sets and/or data set characteristics to Test the Conformance of an Implementation.

- Testing Procedure	The sequence of steps to be performed to Test the Conformance of an implementation.
- Testing Tools	Devices and/or software used to Test the Conformance of an implementation.
Connection	A channel connecting an output port of an AIM and an input port of an AIM.
Controller	A Component that manages and controls the AIMs in the AIF, so that they execute in the correct order and at the time when they are needed
Data	Information in digital form.
- Format	The standard digital representation of Data.
- Type	An instance of Data with a specific Data Format.
- Semantics	The meaning of Data.
Descriptor	Coded representation of a text, audio, speech, or visual feature.
Digital Representation	Data corresponding to and representing a physical entity.
Ecosystem	The ensemble of actors making it possible for a User to execute an application composed of an AIF, one or more AIWs, each with one or more AIMs potentially sourced from independent implementers.
Explainability	The ability to trace the output of an Implementation back to the inputs that have produced it.
Fairness	The attribute of an Implementation whose extent of applicability can be assessed by making the training set and/or network open to testing for bias and unanticipated results.
Function	The operations effected by an AIW or an AIM on input data.
Global Storage	A Component to store data shared by AIMs.
AIM/AIW Storage	A Component to store data of the individual AIMs.
Identifier	A name that uniquely identifies an Implementation.
Implementation	1. An embodiment of the MPAI-AIF Technical Specification, or 2. An AIW or AIM of a particular Level (1-2-3) conforming with a Use Case of an MPAI Application Standard.
Implementer	A legal entity implementing MPAI Technical Specifications.
ImplementerID (IID)	A unique name assigned by the ImplementerID Registration Authority to an Implementer.
ImplementerID Registration Authority (IIDRA)	The entity appointed by MPAI to assign ImplementerID's to Implementers.
Instance ID	Instance of a class of Objects and the Group of Objects the Instance belongs to.
Interoperability	The ability to functionally replace an AIM with another AIW having the same Interoperability Level
- Level	The attribute of an AIW and its AIMs to be executable in an AIF Implementation and to:

	1. Be proprietary (Level 1) 2. Pass the Conformance Testing (Level 2) of an Application Standard 3. Pass the Performance Testing (Level 3) of an Application Standard.
Knowledge Base	Structured and/or unstructured information made accessible to AIMs via MPAI-specified interfaces
Message	A sequence of Records transported by Communication through Channels.
Norma-tivity	The set of attributes of a technology or a set of technologies specified by the applicable parts of an MPAI standard.
Perfor-mance	The attribute of an Implementation of being Reliable, Robust, Fair and Replicable.
- Assess-ment	The normative document specifying the Means to Assess the Grade of Performance of an Implementation.
- Assess-ment Means	Procedures, tools, data sets and/or data set characteristics to Assess the Performance of an Implementation.
- Asses-sor	An entity Assessing the Performance of an Implementation.
Profile	A particular subset of the technologies used in MPAI-AIF or an AIW of an Application Standard and, where applicable, the classes, other subsets, options and parameters relevant to that subset.
Record	A data structure with a specified structure
Reference Model	The AIMs and theirs Connections in an AIW.
Reference Software	A technically correct software implementation of a Technical Specification containing source code, or source and compiled code.
Reliability	The attribute of an Implementation that performs as specified by the Application Standard, profile, and version the Implementation refers to, e.g., within the application scope, stated limitations, and for the period of time specified by the Implementer.
Replicabil-ity	The attribute of an Implementation whose Performance, as Assessed by a Performance Assessor, can be replicated, within an agreed level, by another Performance Assessor.
Robustness	The attribute of an Implementation that copes with data outside of the stated application scope with an estimated degree of confidence.
Scope	The domain of applicability of an MPAI Application Standard
Service Provider	An entrepreneur who offers an Implementation as a service (e.g., a recommendation service) to Users.
Standard	A set of Technical Specification, Reference Software, Conformance Testing, Performance Assessment, and Technical Report of an MPAI application Standard.
Technical Specifica-tion	(Framework) the normative specification of the AIF. (Application) the normative specification of the set of AIWs belonging to an application domain along with the AIMs required to Implement the AIWs that includes: 1. The formats of the Input/Output data of the AIWs implementing the AIWs. 2. The Connections of the AIMs of the AIW. 3. The formats of the Input/Output data of the AIMs belonging to the AIW.
Time Base	The protocol specifying how Components can access timing information
Topology	The set of AIM Connections of an AIW.
Use Case	A particular instance of the Application domain target of an Application Standard.

User	A user of an Implementation.
User Agent	The Component interfacing the user with an AIF through the Controller
Version	A revision or extension of a Standard or of one of its elements.
Zero Trust	A cybersecurity model primarily focused on data and service protection that assumes no implicit trust.

Annex 3 - Patent Declarations

Technical Specification: AI Module Profiles includes content from the following four MPAI Technical Specifications: MPAI-HMC [3], MPAI-MMC [4], MPAI-OSD [5], and MPAI-PAF and is based on *Technical Specification: AI Framework*. While the AIM Profile identification method has been developed by MPAI and is freely available, the AI Modules and Data Types referenced by the MPAI-PRF Technical Specification may be affected by the Patent Coverage of the relevant Technical Specifications.

Information on known Patent Declaration is published in the relevant Technical Specifications.