



# Object and Scene Description

09 and 16 UTC 7<sup>th</sup> September 2023

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# About MPAI

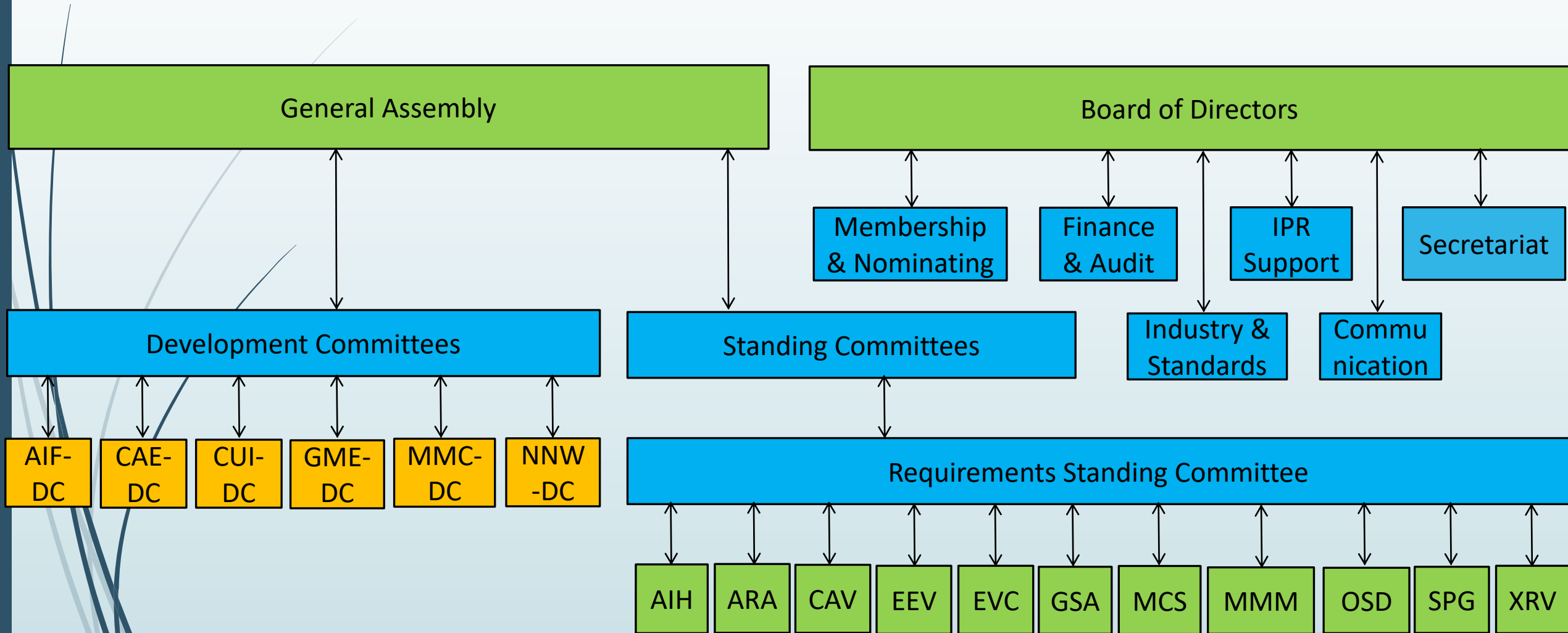
# **MPAI stands for Moving Picture, Audio, and Data Coding by Artificial Intelligence.**

*International, unaffiliated, non-profit SDO.*

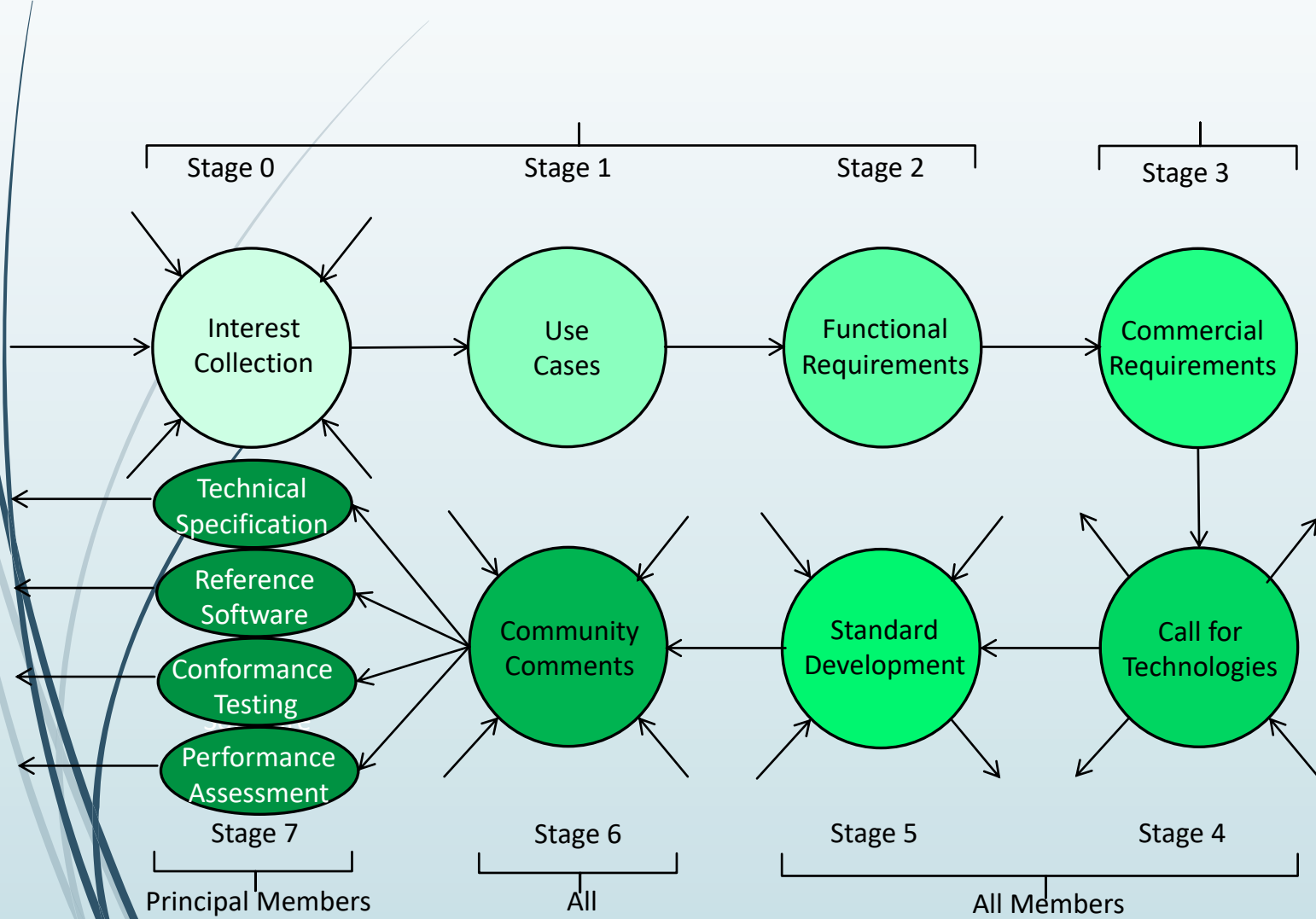
*Developing AI-based data coding standards.*

*With clear Intellectual Property Rights licensing frameworks.*

# The MPAI organisation



# The MPAI standard development process



- Develop Use Cases and Functional Requirements.
- Develop Commercial Requirements (Framework Licence).
- Issue Call for Technologies with attached:
  - Functional Requirements.
  - Commercial Requirements.
- Develop standard (MPAI members only).
- SEP holders select patent pool administrator.



# MPAI standards for a better AI

- MPAI's data coding standards make explicit the computing workflow of AI applications.
- An MPAI standard **breaks up monolithic AI applications** into a set of interacting components of known data semantics (as far as possible).
- **Developers compete** offering “improved” performance “standard” components.
- Humans can **select applications whose internal operation they can somehow understand**.

*MPAI's AI  
standardisation is  
“component-based”.*

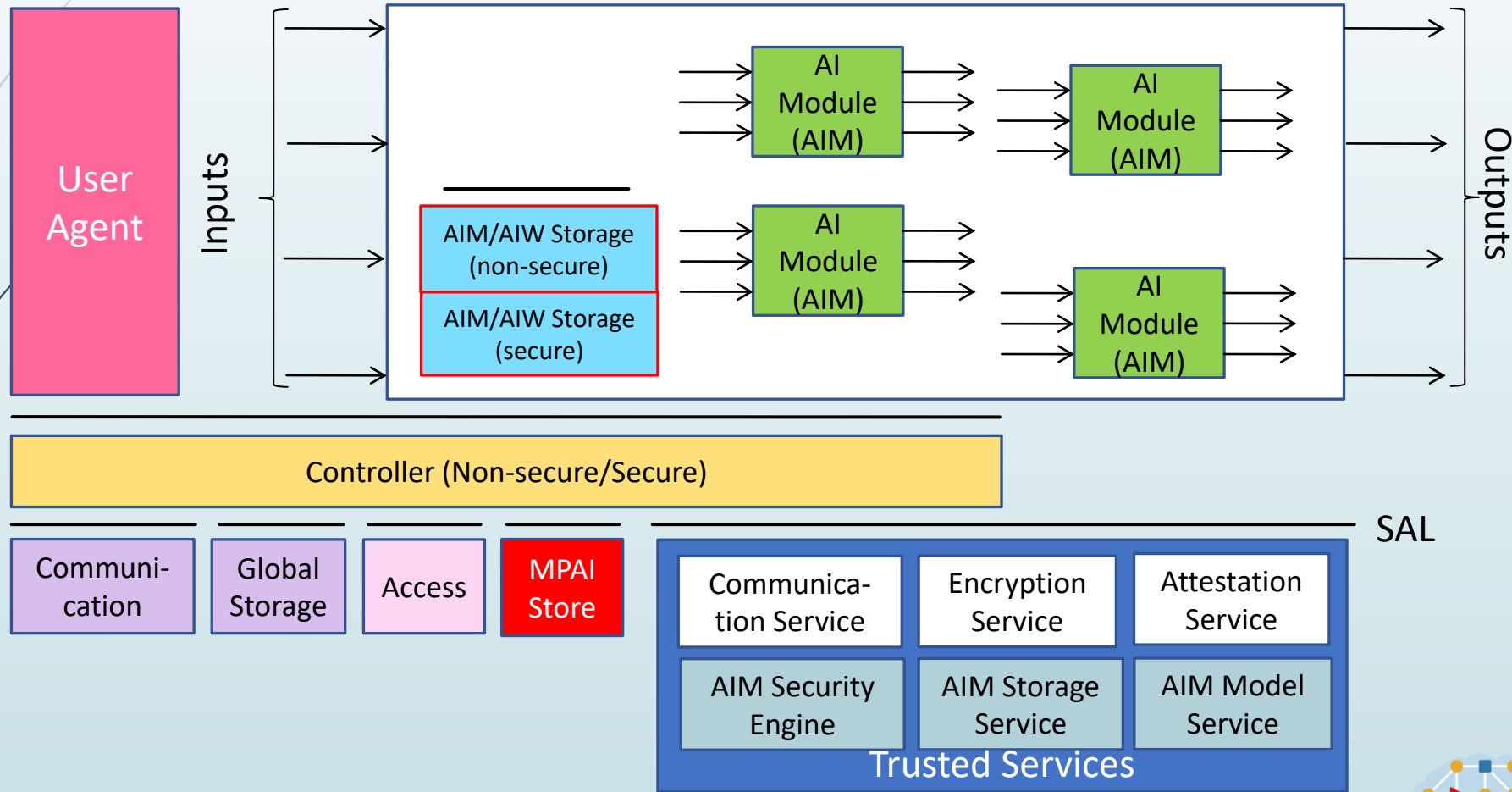
*An AI application is:*

- *Subdivided in smaller components: AI modules (AIM).*
- *Aggregated in one or more AI workflows (AIW).*
- *Executed in a standard environment (AIF).*

*1 foundational Technical Specification  
AI Framework (MPAI-AIF)*



# The MPAI AI Framework



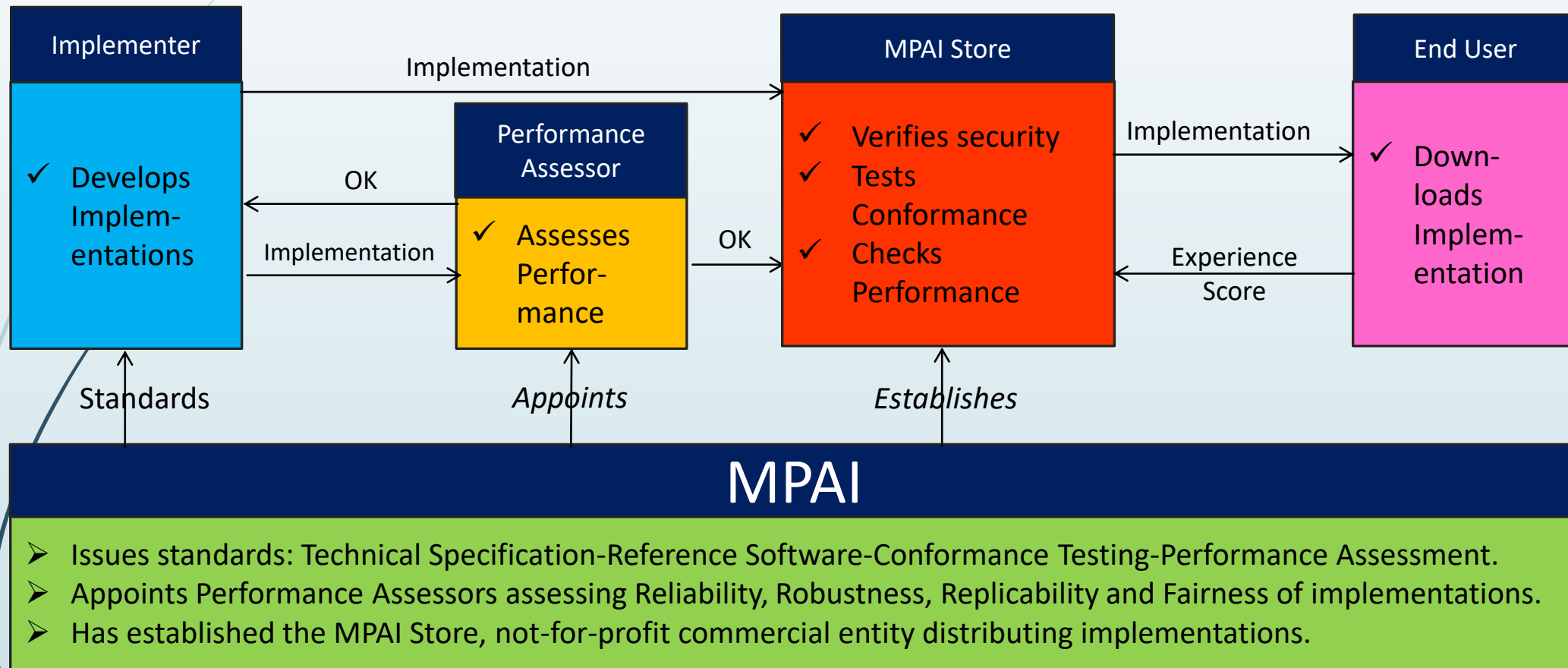


# A sustainable MPAI Ecosystem

- **MPAI standards** create an ecosystem composed of:
  - **Developers:** develop components  
→ require interoperability to bring their components to the market.
  - **Integrators:** assemble components  
→ require ability to assemble third party components.
  - **Consumers:** use assembled components  
→ require that the assembled components be trusted.
- The MPAI Store guarantees that AIMs/AIWAs are:
  - Interoperable.
  - Trusted.
  - Available.

***1 system Technical Specification:  
Governance of the MPAI Ecosystem (MPAI-GME).***

# The MPAI ecosystem



# More published MPAI standards

## *4 Technical Specifications*

- 1 - Context-based Audio Enhancement (MPAI-CAE)*
- 2 - Compression and Understanding of Financial Data (MPAI-CUI)*
- 3 - Multimodal Conversation (MPAI-MMC)*
- 4 - Neural Network Watermarking (MPAI-NNW)*

## *2 Technical Reports*

- 1 - MPAI Metaverse Model (MPAI-MMM) – Functionalities*
- 2 - MPAI Metaverse Model (MPAI-MMM) – Functionality Profiles*

# Five standards published for Community Comments to become standards on 29 September

## *Existing MPAI standards extended*

- 1 - AI Framework V2 (MPAI-AIF)**
- 2 - Multimodal Conversation V2 (MPAI-MMC)**

## *New MPAI standards being approved*

- 3 - Avatar Representation and Animation V1 (MPAI-ARA)**
- 4 - Connected Autonomous Vehicles V1 (MPAI-CAV) – Architecture**
- 5 - MPAI Metaverse Model V1 (MPAI-MMM) – Architecture**



# Brewing in the pot

## *Calls for Technologies issued*

- 1 – Artificial Intelligence for Health (MPAI-AIH)*
- 2 – Object and Scene Description (MPAI-OSD)*
- 3 – Extended Reality Venues (MPAI-XRV) - Live Theatrical Stage Performance*

## *New opportunities being explored*

- 1 - AI-based End-to-End Video Coding (MPAI-EEV)*
- 2 - AI-Enhanced Video Coding (MPAI-EVC)*
- 3 - Server-based Predictive Multiplayer Gaming (MPAI-SPG)*

# MPAI and IEEE

## *MPAI Technical Specifications adopted as IEEE standards*

1. ***MPAI-AIF – 3301-2022***
2. ***MPAI-CAE – 3302-2022***
3. ***MPAI-MMC – 3300-2022***
4. ***MPAI-CUI – 3303-2023***
5. ***MPAI-NNW (on its way)***

**All this achieved in less than 3 years!**



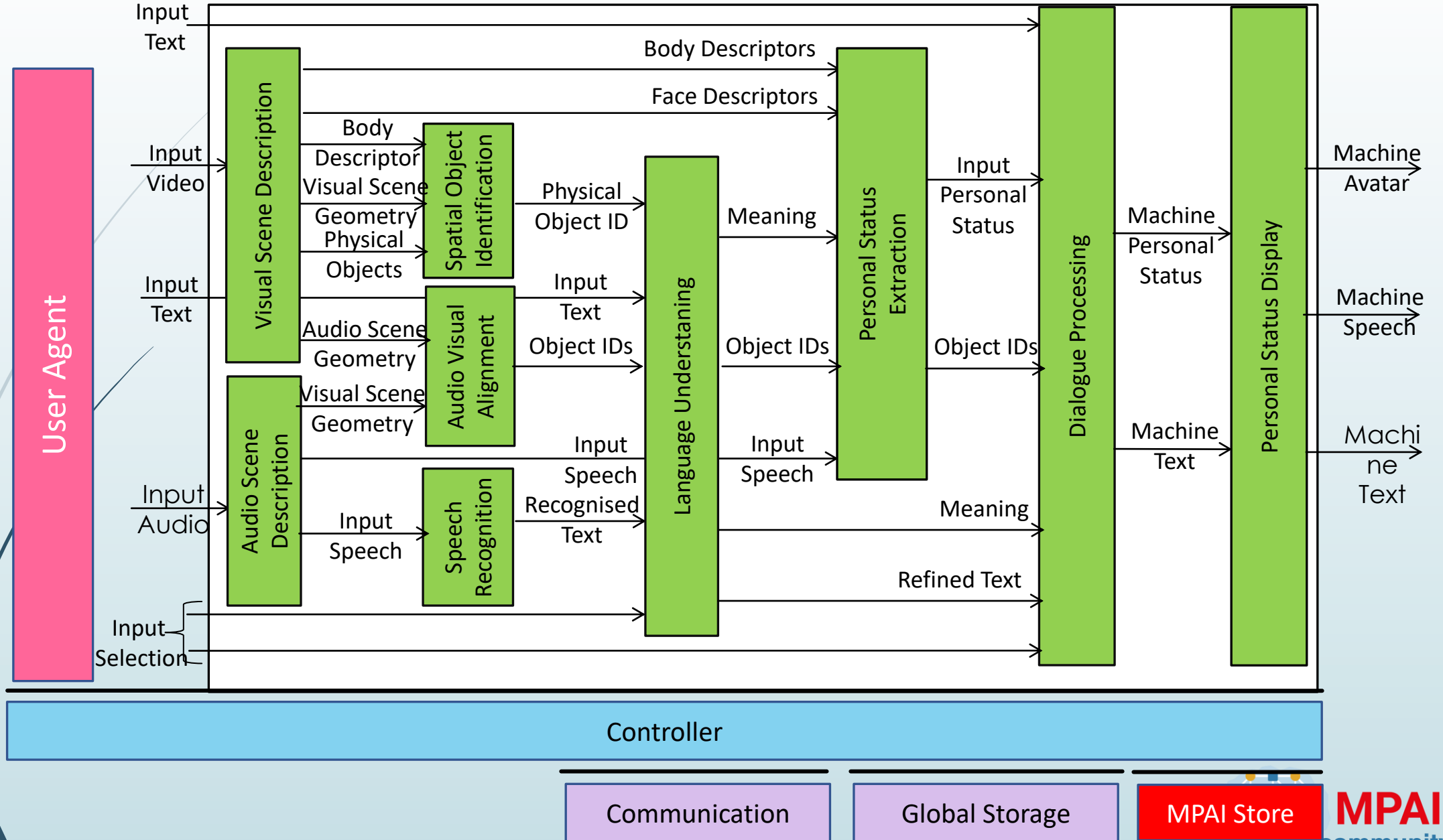
# About MPAI-OSD

# The MPAI-OSD Call for Technologies

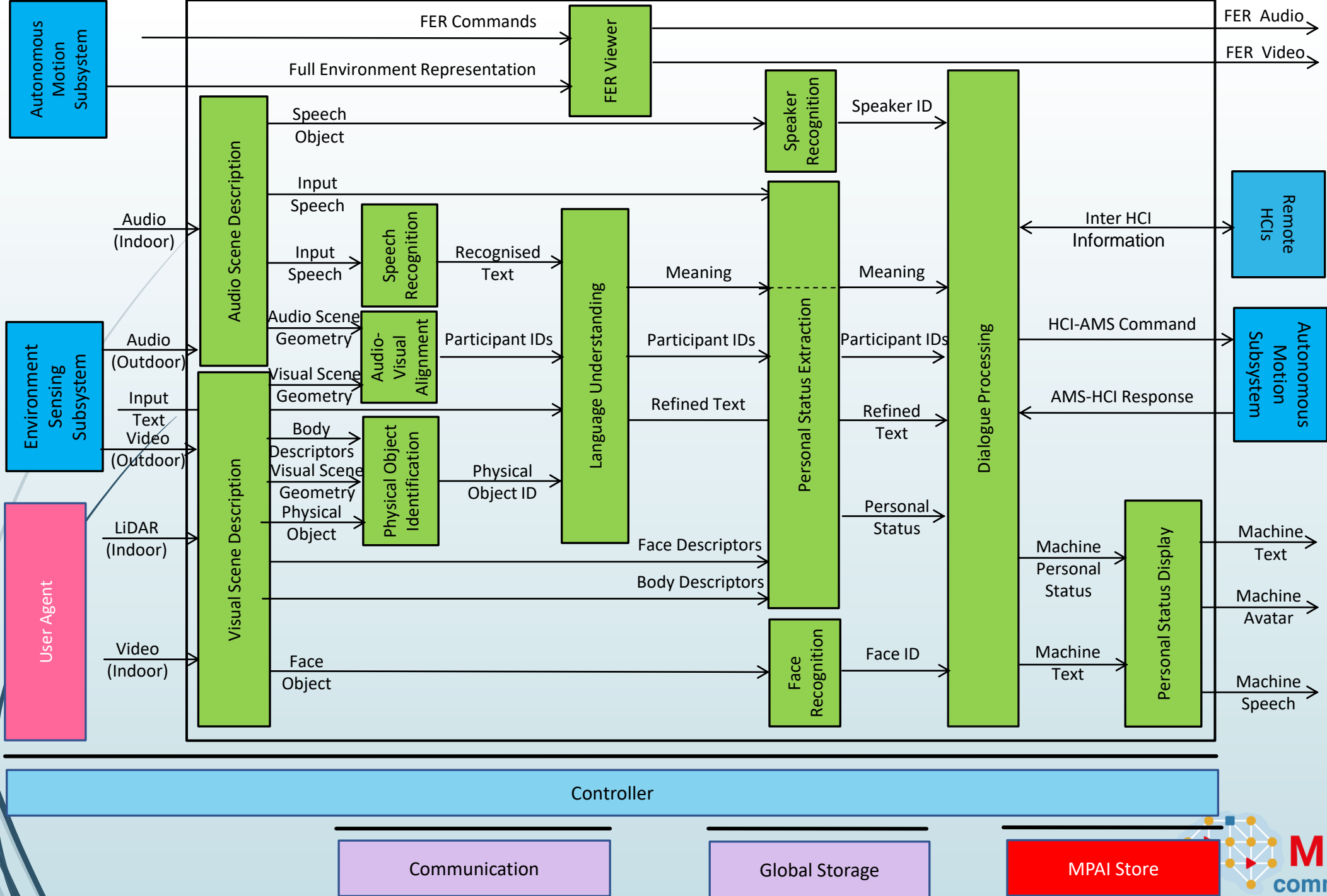
- The Call for Technologies seeks **technologies supporting some or all Functional Requirements** of Use Case and Functional Requirements.
- **Use Case and Functional Requirements: Object and Scenes Description** **collects** Use Cases and identifies Functional Requirements for uni- and multimodal objects and scenes.
- The **purpose** of the planned MPAI-OSD Technical Specification is to **specify object description and their localisation in a space**.
- Proposed technologies used to **develop the planned Technical Specification**.
- Proposers requested to state availability to license their technologies, if adopted by MPAI, in conformity with the **Framework Licence**.



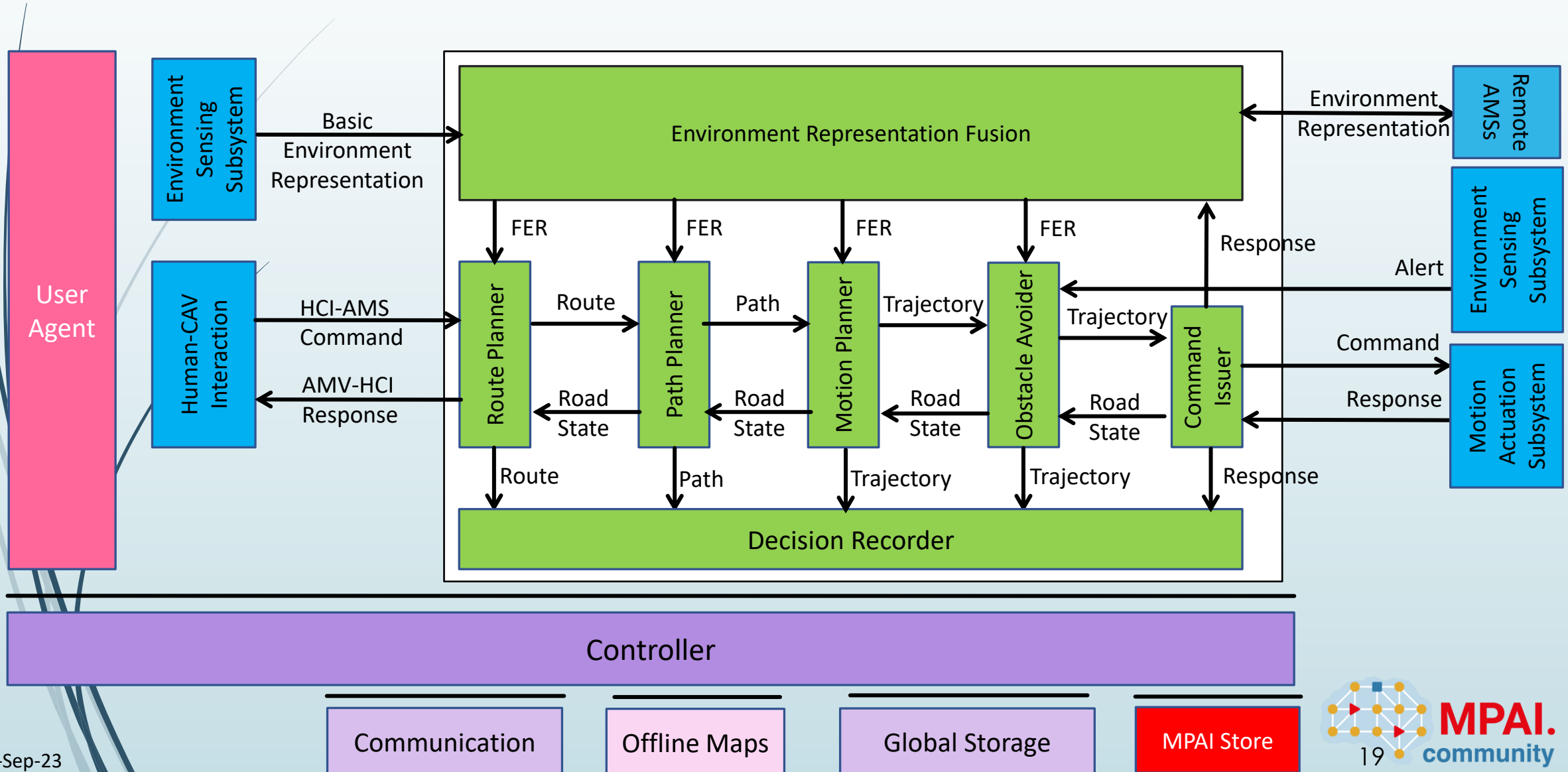
# Conversation About a Scene

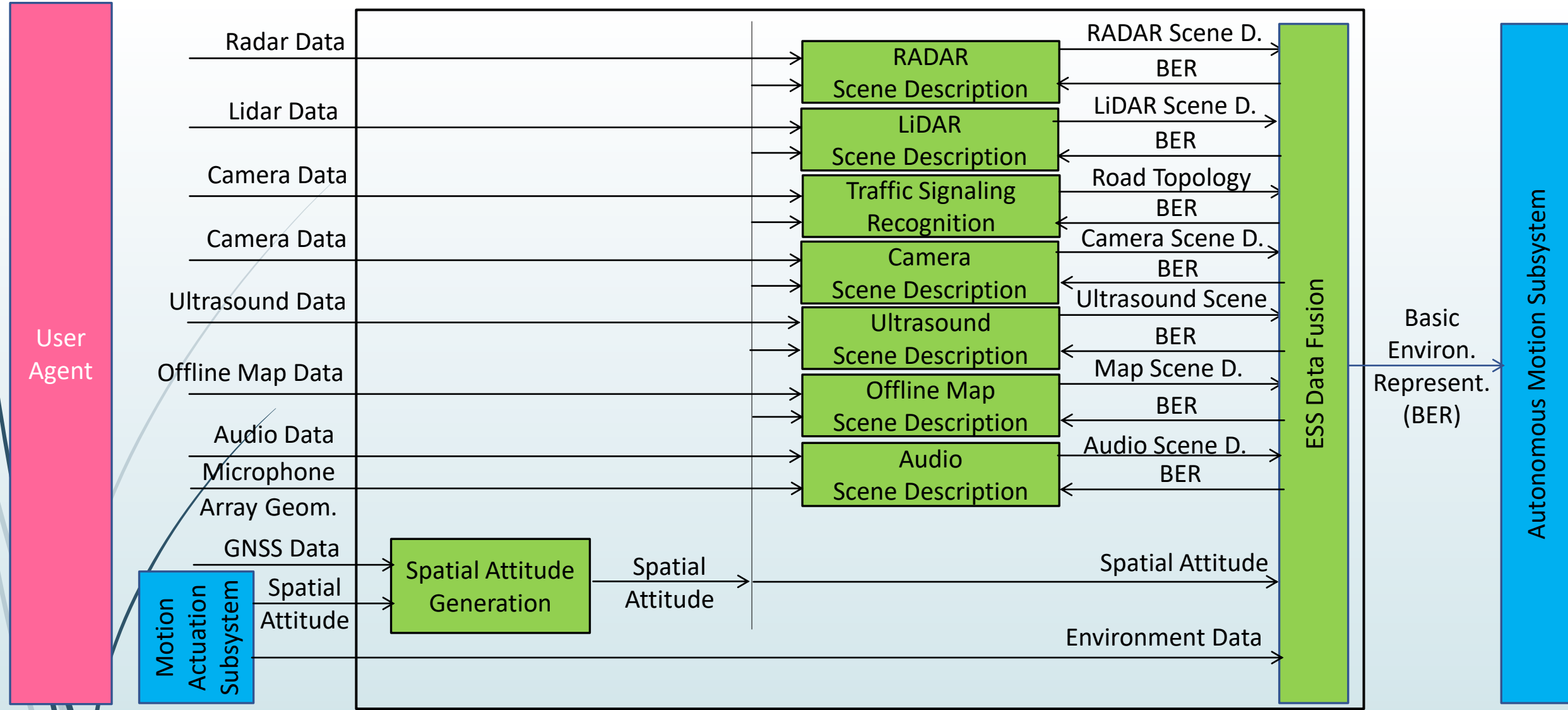


# Human-CAV Interaction



# Autonomous Motion Subsystem





Communication

Offline Maps

Global Storage

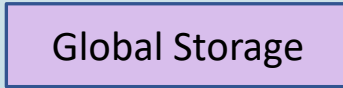
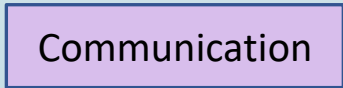
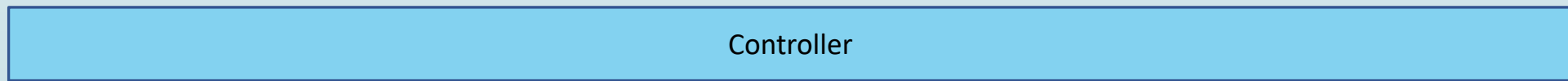
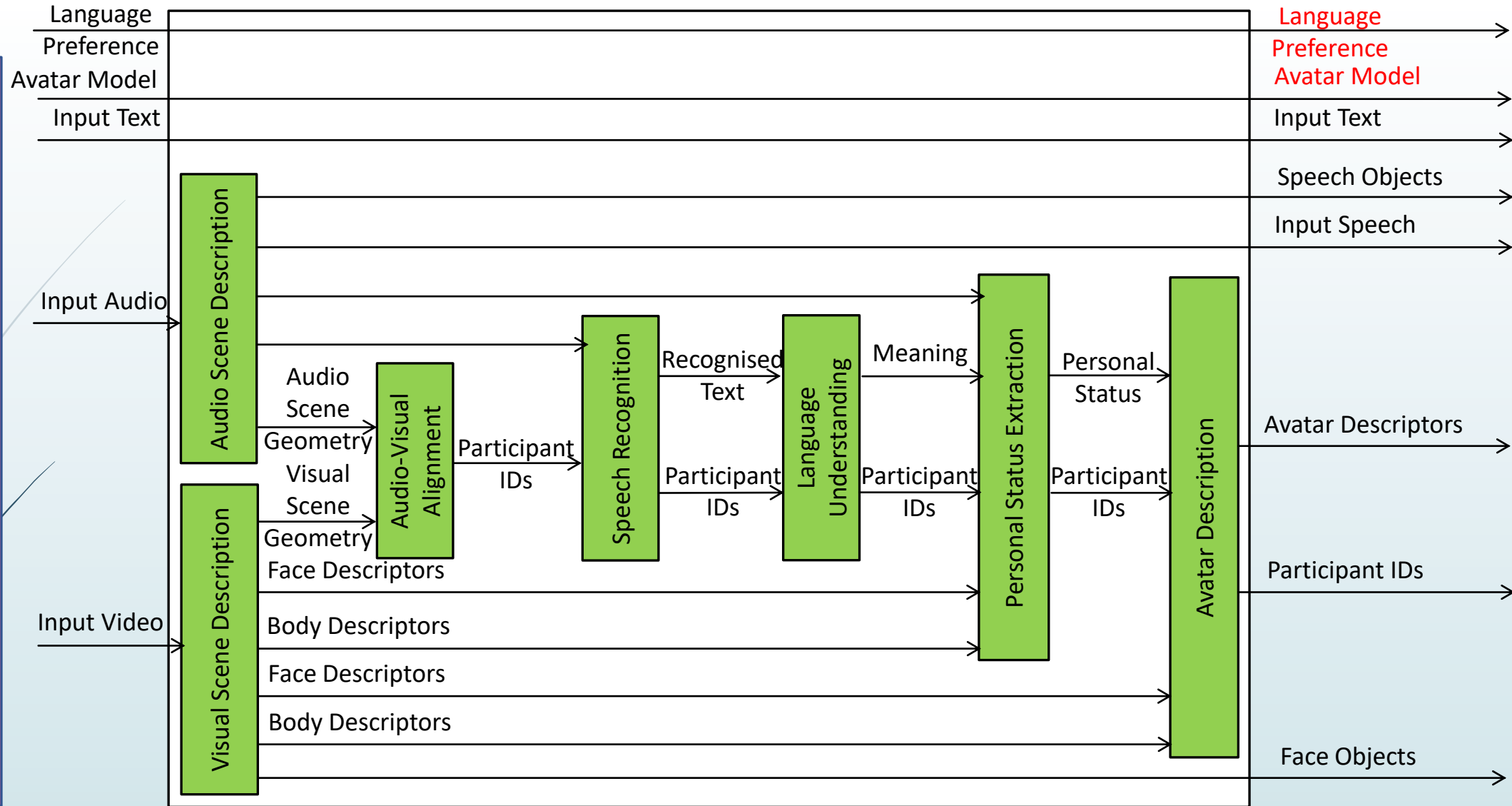
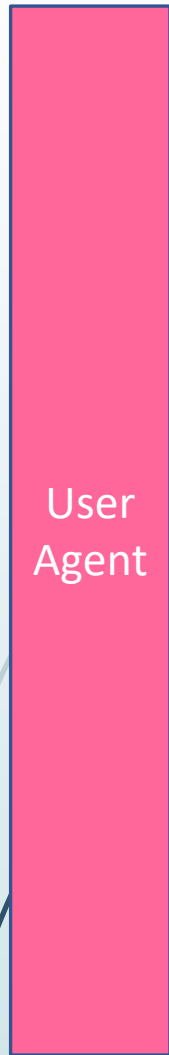
MPAI Store

**MPAI.**  
community



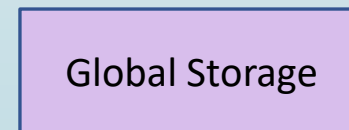
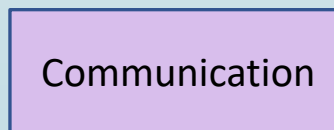
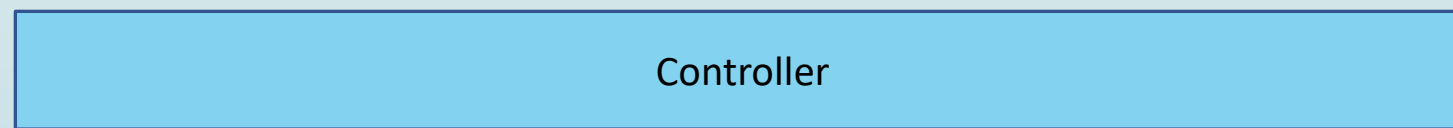
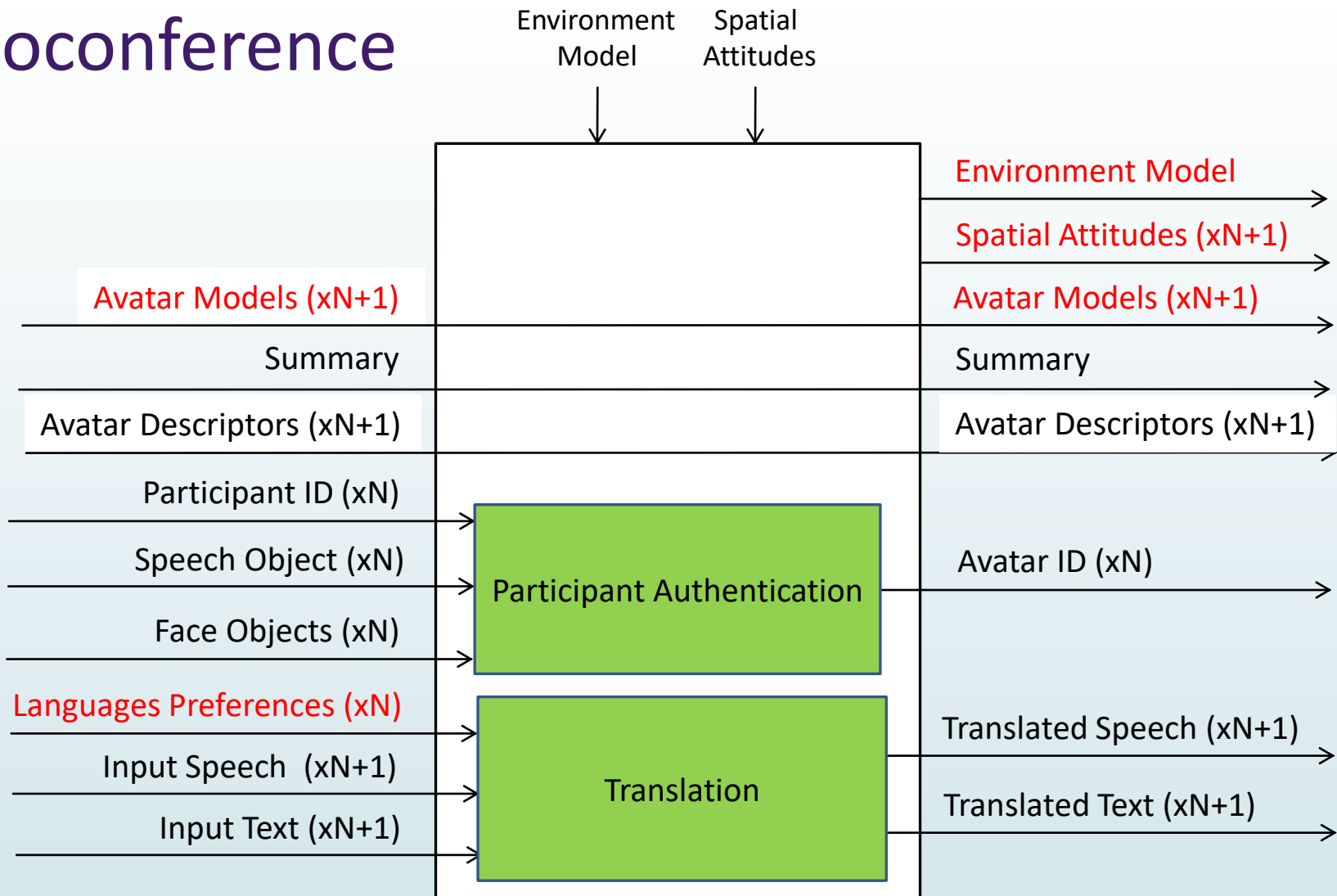
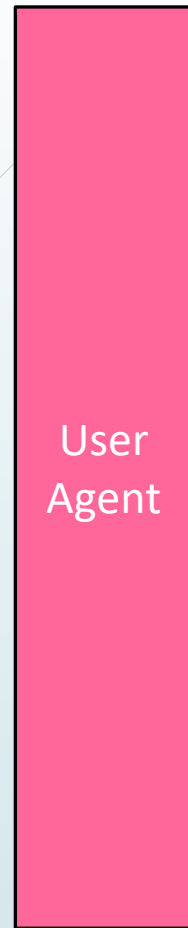
# Avatar Based Videoconference:

## Transmitting Client

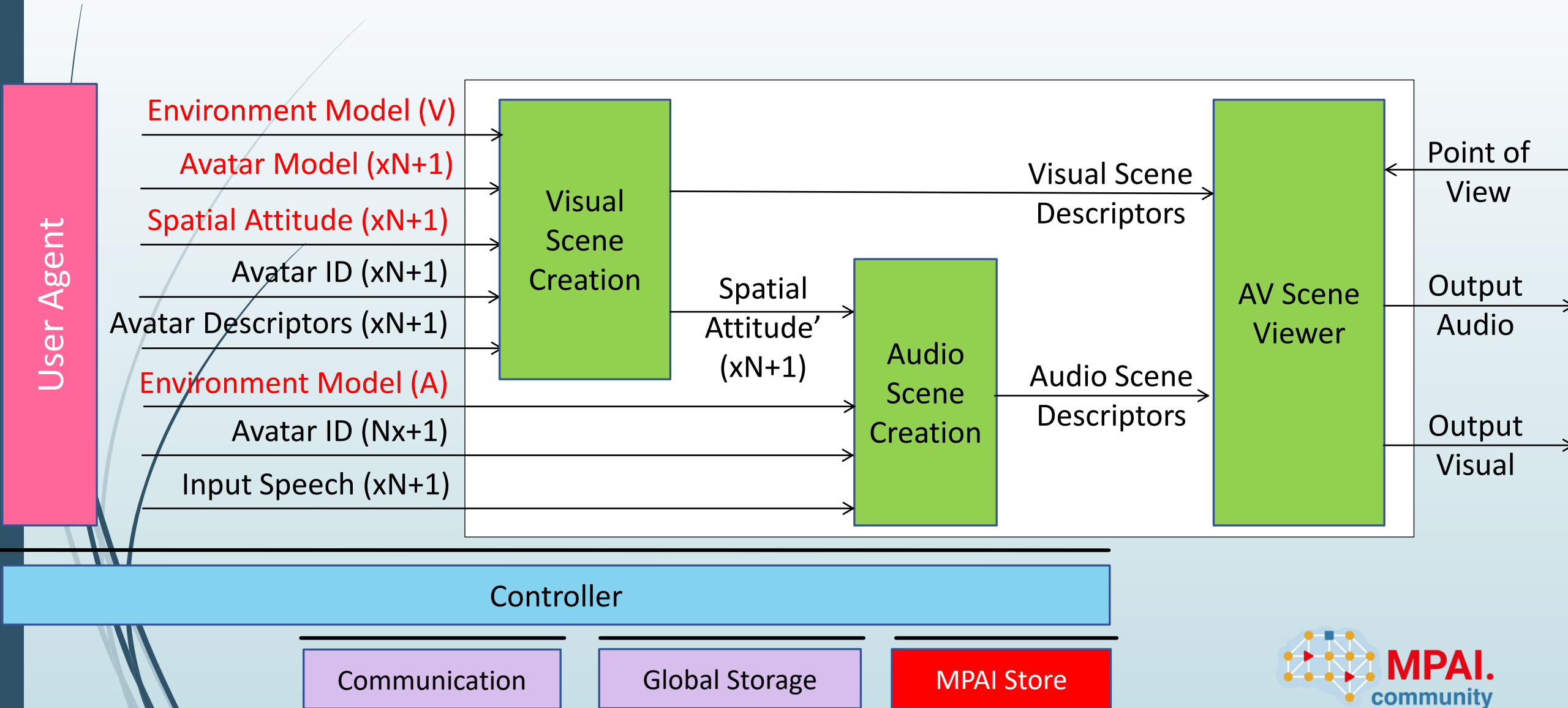


# Avatar-Based Videoconference

## – Server



# ARA-ABV Receiving Client

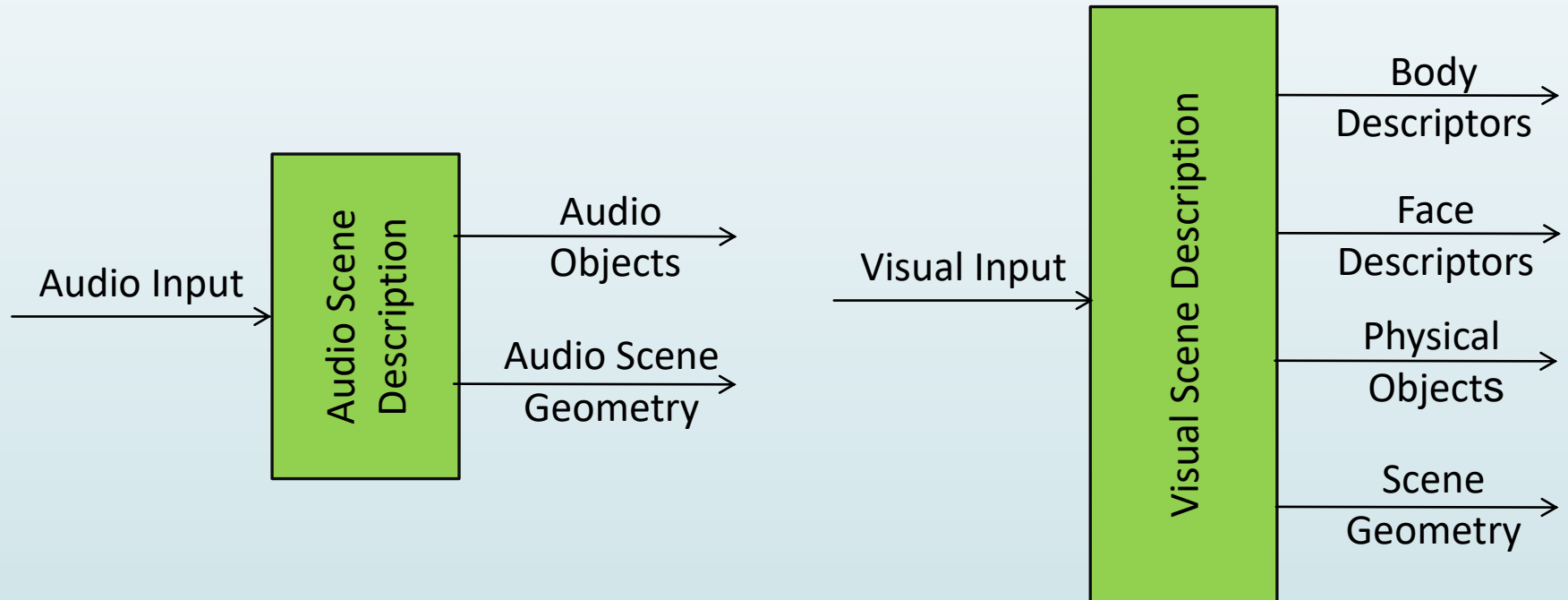




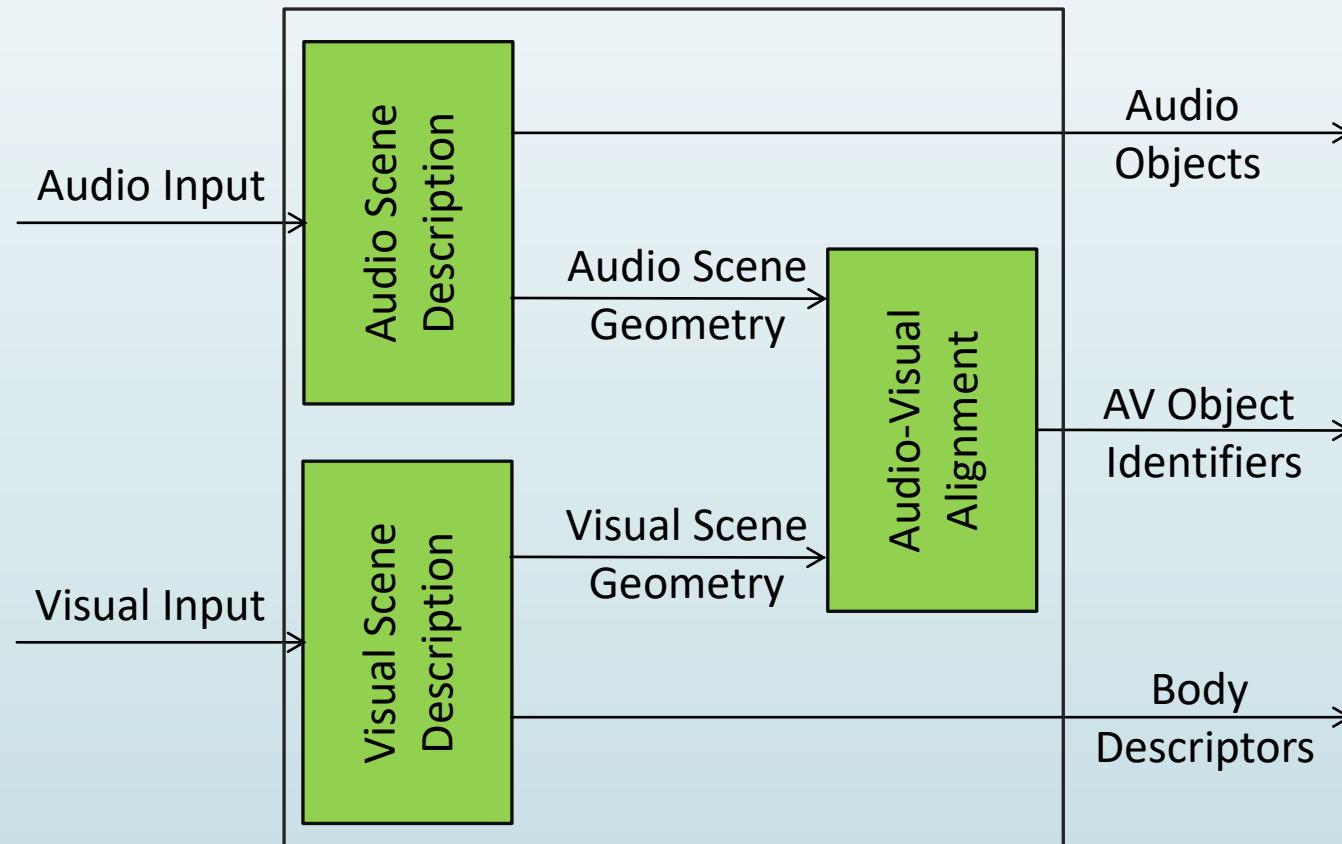
# AI Modules and Data



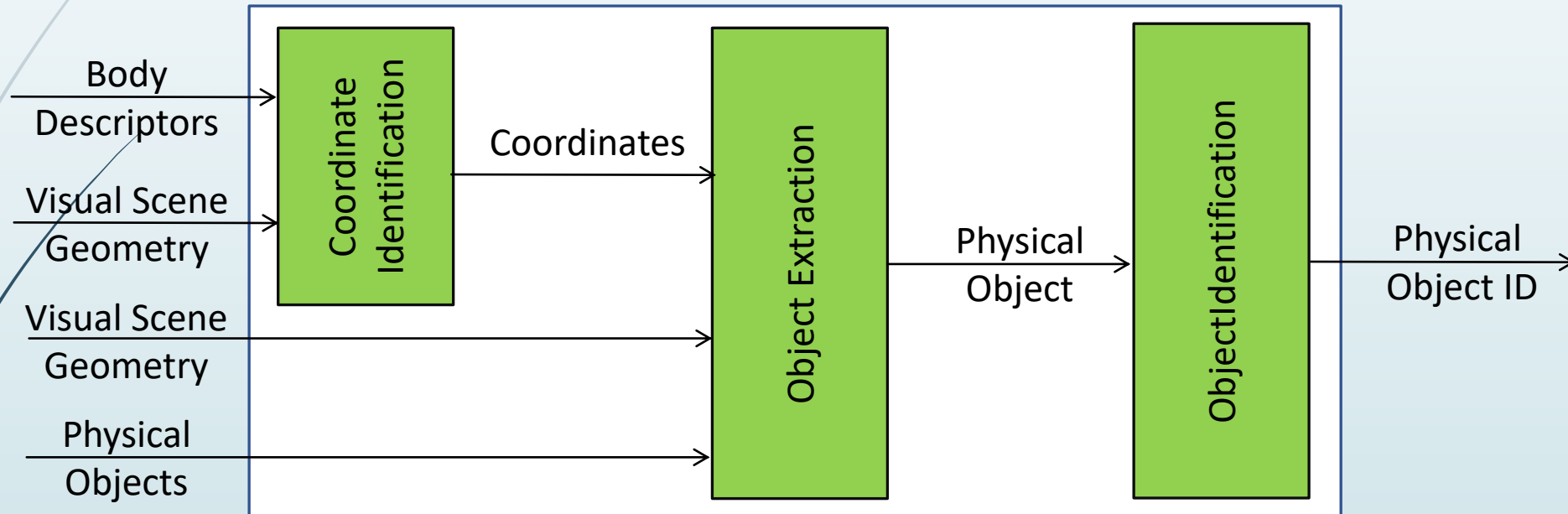
# Audio and Visual Scene Description



# Audio and Visual Object Alignment



# Visual Spatial Object Identification



# Data Formats in MPAI-OSD

Name of Data Format	Defined by
Virtual Environment (A)	CAE
Virtual Environment (V)	OSD
Coordinates, Angles, and Objects	OSD
Spatial Attitude and Point of View	OSD
Audio Scene Descriptors	CAE
Visual Scene Descriptors	OSD
Audio-Visual Scene Descriptors	OSD



# Framework Licence

# Framework Licence: Coverage

- This **Framework Licence** applies to Technical Specification: **Object and Scene Description** – in the following “Standard” – as it will be defined in document N\_\_\_\_ Object and Scene Description planned to be approved by “Moving Picture, Audio and Data Coding by Artificial Intelligence (MPAI)”.
- All contributors to the Standard shall **confirm in writing their intention to make available a Licence** for their Essential IPR based on the Conditions of use of the Licence.



# 3 Conditions of use of the Licence/1

The **Standard Essential IPR holders** commit themselves to issue a Licence with the following conditions:

1. The Licence will be **in compliance** with generally accepted principles of competition law and the MPAI Statutes.
2. The Licence will **cover**:
  1. All claims to **Essential IPR and copyright** of a Licensor that are practised by a Licensee of the Standard.
  2. **Development Rights and Implementation Rights.**
3. The Licence will grant access to **Essential IPRs** of the Standard in a non-discriminatory fashion.
4. The **scope of the Licence may be subject** to legal, bias, ethical and moral limitations.

# Conditions of use of the Licence/2

5. Royalties will apply:
  1. To a **baseline profile** of the Standard **and to other profiles** containing additional technologies.
  2. To any **Implementation that is based on the Standard**, with the exclusion of the types of implementations specified in clause 7.1.
  3. On a **worldwide basis**.
6. An Implementation of the Standard **may use other IPR** to extend the Implementation Standard or to provide additional functionalities.
7. Exemptions:
  1. A Licence for Development and Implementation Rights, to the extent it is developed and implemented only for the purpose of **evaluation or demo solutions or technical trials**, will be free of charge.
  2. A Licence may be granted **free of charge for particular uses** if so decided by the licensors.
  3. A free of charge Licence for a **limited time and a limited amount of forfeited royalties** will be granted on request.

# Conditions of use of the Licence/3

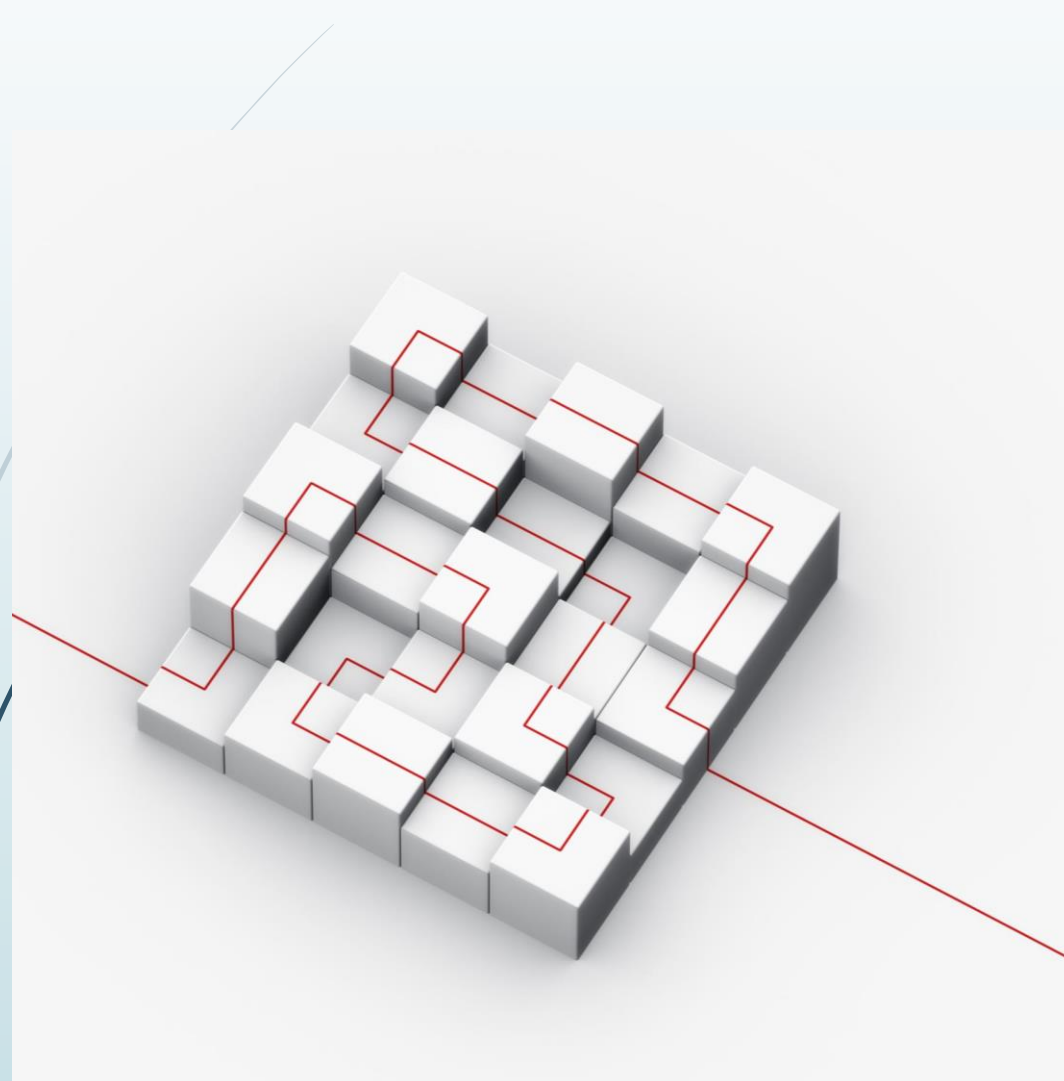
8. A preference will be expressed on the entity that should **administer the pool of holders of Patents Essential** to the Standard.
9. The Licence will be issued **before commercial implementations** of the Standard become available on the market. Commercial implementation implies General Availability to any users and does not include trials.
10. The **total cost of the Licences** issued by IPR holders will be in line with the total cost of the Licences for **similar technologies** standardised in the context of Standard Development Organisations.
11. The **total cost of the Licences** will take into account the **value on the market** of the Standard Essential IPR.



# What's next



# The MPAI-OSD documents



- Anybody is entitled to respond to the Object and Scene Description Call for Technologies.
- Responses should reach [secretariat@mpai.community](mailto:secretariat@mpai.community) by 2023/09/20T23:59 UTC
- Relevant documents:

Call for Technologies	<a href="#">html</a> , <a href="#">pdf</a>
Use Cases and Functional Requirements	<a href="#">html</a> , <a href="#">pdf</a>
Framework Licence	<a href="#">html</a> , <a href="#">pdf</a>
Template for responses	<a href="#">html</a> , <a href="#">docx</a>



We look forward to working  
with you  
on this exciting MPAI project!

Join MPAI  
Share the fun  
Build the future



**MPAI.**  
community