

GISC 2025

Global ICT Standards Conference 2025

(세션2) 후세대 전문가를 위한 국제표준 노하우 가이드

인공지능 기술의 국제표준화 동향

최미란 전문위원
한국전자통신연구원

ICT Standards and Intellectual Property:
AI for All

Index

01 인공지능 표준화 소개

02 ITU-T SG21 인공지능 표준화

03 MPAI 인공지능 표준화

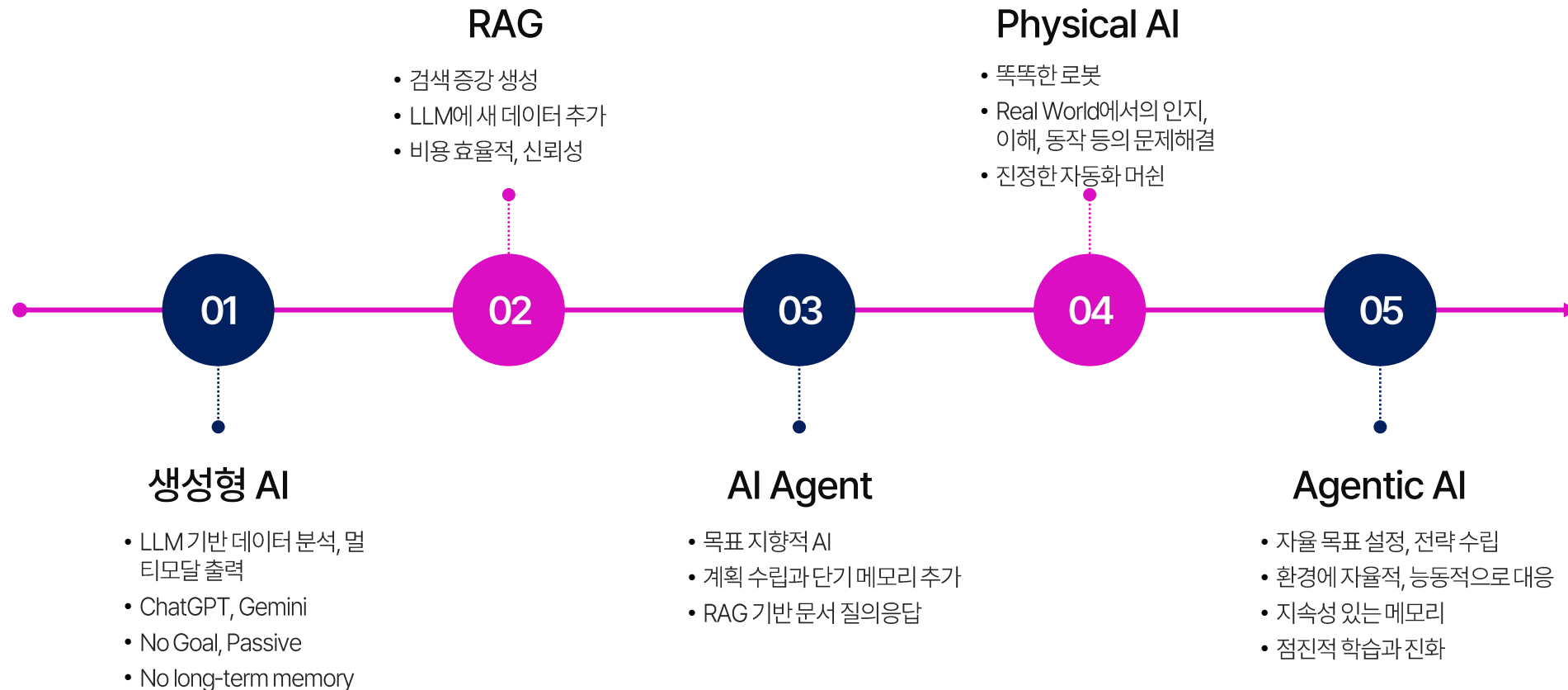
Abstract

I ITU-T SG21 에서 개발되고 있는 다양한 인공지능 표준에 대하여 소개하며,
특히 언어지능과 휴먼팩터와 관련된 국제표준 개발 내용과
인공지능 표준 그룹인 MPAI에서 다루어지고 있는
인공지능 주제별 표준개발 현황을 소개하며 미래의 표준화 활동 방향을 제시한다

ICT Standards

01. 인공지능기술의 변화

| 정확성, 설명성, 자동화, 적극성, 속도



02. ITU-T SG21 인공지능 표준화 현황

| SG21: Technologies for multimedia, content delivery and cable television

01

Question 4 (작업반)

- Human Factors for Intelligent user interfaces and services
- 언어지능, 인적요소, 사용자 인터페이스 관련 표준화
- 한국 주도

03

Question 7

- Intelligent visual systems and services
- 인공지능 기술 응용 감시 시스템 등
- 중국

02

Question 5

- AI-enabled multimedia applications
- AI 시스템의 기본 프레임워크와 요구사항
- AI 응용 시스템의 참조 표준화
- 중국 주도

04

Question 10

- Vehicular multimedia communication, systems, networks and applications
- 차량 관련 멀티미디어 기술 표준화
- 한국, 중국, 일본 등 참여

02. ITU-T SG21 인공지능 표준화 현황

I Q5 인공지능 표준화 :AI-enabled multimedia applications

표준항목

- **scope and definition of AI** as it relates to multimedia applications;
- identify specific **use cases** where AI can be applied to multimedia applications;
- identify **AI techniques** facilitating intelligent and automated multimedia-based tasks;
- identify use cases, framework and requirements of multimedia applications using **AI generated content** (AIGC), including those utilizing large foundational models, techniques enabling AIGC are to be studied, works related to content itself, such as creation, inspection, regulation, etc., are out of the scope of this Question;
- **data preparation** for use with AI-enabled **multimedia applications**;
- specific **system characteristics** for AI-enabled multimedia applications;
- **assessment and evaluation** techniques for AI-enabled multimedia services;
- identification of how **AI may impact** existing multimedia applications;

Q5 인공지능 표준화 : 신규 표준항목 (2025.10월 회의)

#	Acronym	Title
1.	F.GAI-Nocode	Framework and Requirements for of no-code generative artificial intelligence systems in software defined domains for multimedia AI applications
1. 2	F.AAI	Technical Requirements for AI Agent Interoperability
1. 3	F.PEM-LLM	Performance evaluation methods for large language model inference service
1.	F.TR-ED	Technical requirements for embodied artificial intelligence teleoperation data collection systems in real-world scenarios
1.	F.RF-MDC	Requirements and framework of model distillation capabilities
1.	F.MFMP	Requirements and framework for the meteorological foundation models platform based on multimedia data
1.	F.AI-SCVC	Requirements and framework of AI-based semantic communication for video calls
1.	F.AII	Technical Requirements of AI Accelerators Interconnection Framework for Multimedia Application
1.	TR.WM	Technical report on technical framework and essential capabilities of World Models
1.	F.IMSS-AI	Framework and Requirements of Intelligent Marketing Service System based on AI
1.	F.TAKEA	Framework and technical requirements for knowledge engineering applications based on foundation models
1.	TR.FRES	Power Efficiency metrics and Evaluation Requirements for Foundation Model Training and Inference Systems
1.	F.CETD	Requirements for the Construction and Evaluation of Fine-Tuning Datasets for the Training of Domain-specific Models
1.	F.op-reqts	Framework and general requirements of observability platform for foundation model training and inference clusters
1.	F.AI-RFTSFMP	Requirements and framework for the time series foundation models platform
1.	F.FFM	Requirements and Framework for Federated Foundation Model
1.	F.RF-CSAIA	Requirements and framework for Customer Service AI Agents
1.	F.MRMS	Requirement and framework for Distributed machine learning-based remote monitoring services for multimedia applications
1.	F.FUCL	Requirements and Framework of Cross-Platform Unified Communication Libraries for Distributed Multimedia AI Systems
1.	F.AICP- MoE	F.AICP-MoE: "General technical requirements and framework for artificial intelligence cloud platform: Mixture of Experts (MoE) capability"
1.	F.AICP-DP	F.AICP-DP "General technical requirements and Framework of for artificial intelligence cloud platform: data processing requirements"
1.	F.EML	Evaluation Methods for Adaptability of AI Systems to Foundation Models
1.	F.CFM	Requirements and framework for cloud-edge-end collaborative interaction between foundation models and lightweight models
1.	F.SPAIAS	Requirements and evaluation methods of Smart phone artificial intelligence agents
1.	F.RF-AIA	Requirements and framework for artificial intelligence appliance
1.	F.BA-EAI	Framework for benchmarking and assessment of embodied artificial intelligence systems

02. ITU-T SG21 인공지능 표준화 현황

| Q4 Human Factors 진행표준

하이브리드 워크
환경에서의 효율적인
대화 시스템 요구사항

인터랙티브 가상 공연
예술서비스 프레임워크

고령자를 위한 지능형
사용자 인터페이스
요구사항

수면 관리 서비스를
위한 상호 운용성
프레임워크

재난정보에 대한 메
타데이터

디지털 휴먼
커스터마이제이션
프레임워크

인공감성지능 기반
상담서비스
기능 요구사항

지능형 안전진단
시스템 UI 요구사항

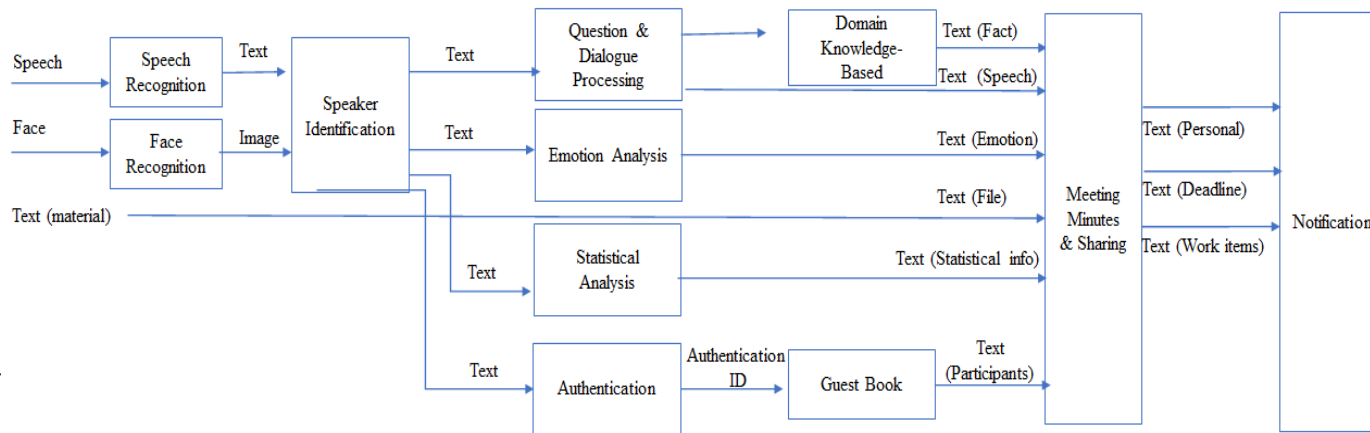
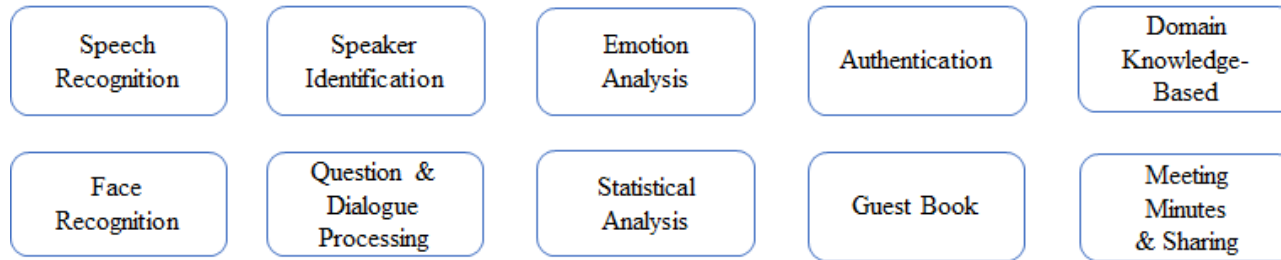
설명 가능한
의사결정지원
서비스

VR/AR 환경에서의
제스처 인터랙션
(중국)

지능형 차량의 HUD
인터페이스
요구사항 (중국)

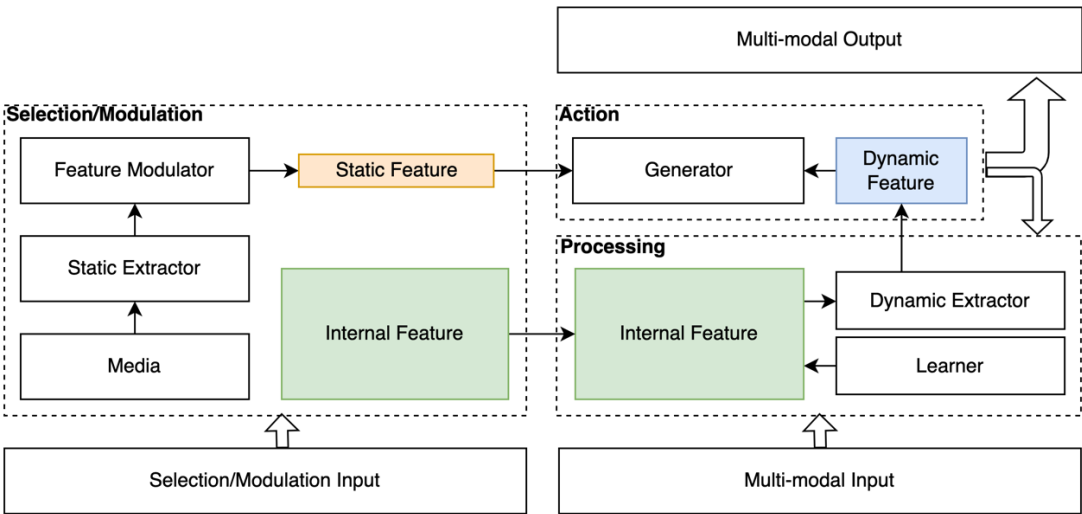
하이브리드 워크 환경에서의 효율적인 대화 시스템 요구사항

- F. ECHO: Requirements for conversation system in a hybrid work environment
- 제안: 한글과 컴퓨터 -> F.746.19로 승인

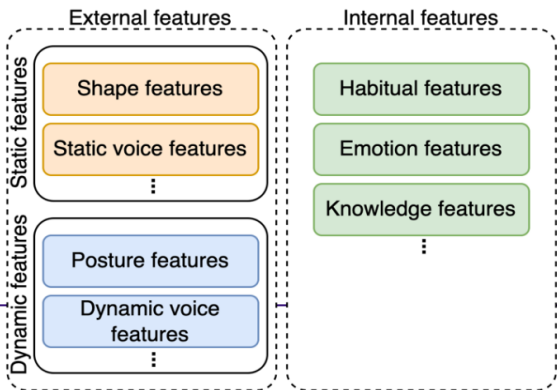


디지털 휴먼 커스터마이제이션 프레임워크

- F. FDHC: Factors and framework for digital human customization
- 제안: 클레온



Digital human customization and interaction framework



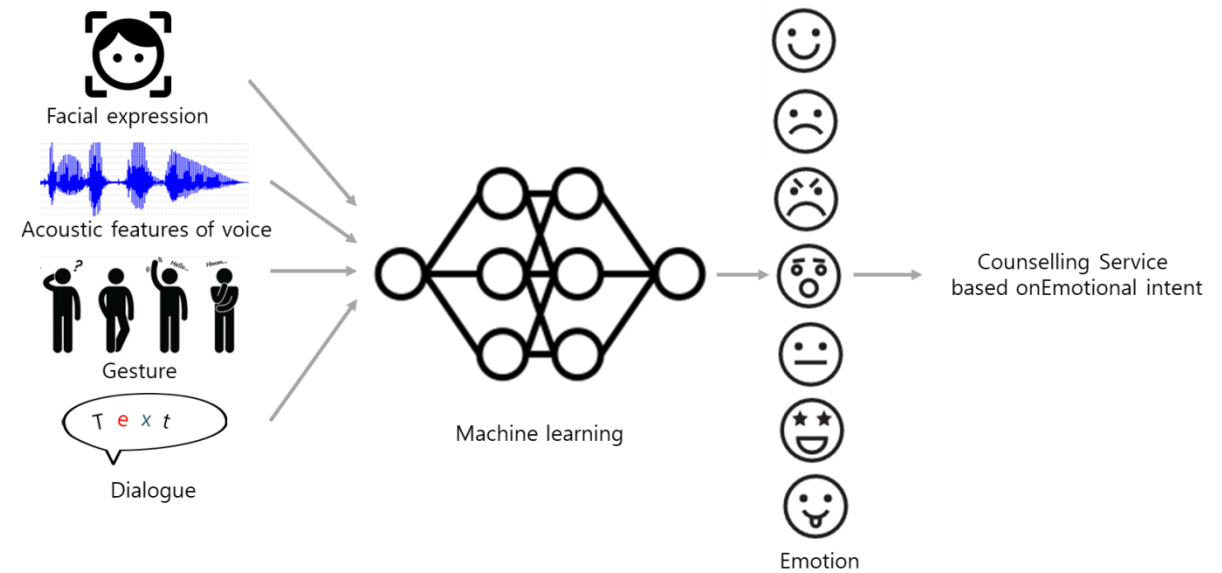
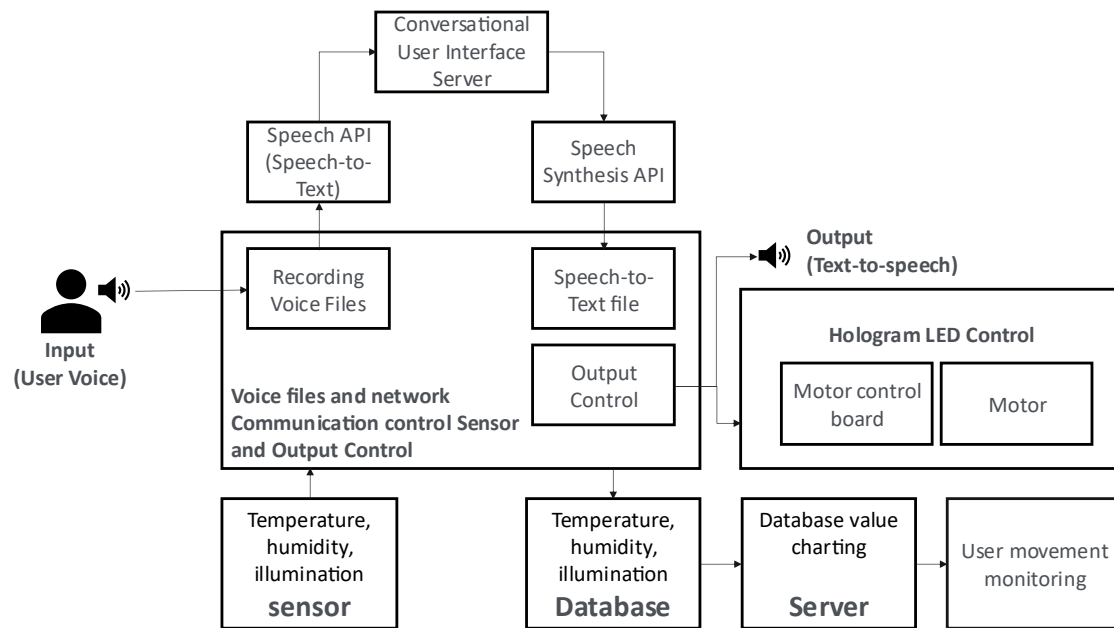
Classification of digital human features

Table 3 – Shape features

Feature	Format / Unit	Description
Facial shape parameters	List of values	A set of parameters determining shape of a face
Hairstyle	Map of parameter values	Map of hair shape parameters along the head area
Body skeleton on tree	(Tree structure)	A directed graph without cycles, consists of joints as nodes and body segments as edges, which defines topology of body.
Length of body segments	cm	Length of body segments
Bendable range of joints	degrees (minimum), degrees (maximum)	Allowed angle between two connected parts along bending axis
Swayable range of joints	degrees (minimum), degrees (maximum)	Allowed angle between two connected parts perpendicular to bending axis
Twistable range of body segments	degrees (minimum), degrees (maximum)	Relative angle of two bending axes of two joints incident with a given body segment, when projected into the perpendicular plane of the segment
Thickness of body segments	cm	Square root of largest cross-section area of a given body segment, multiplied by $2/\sqrt{\pi}$

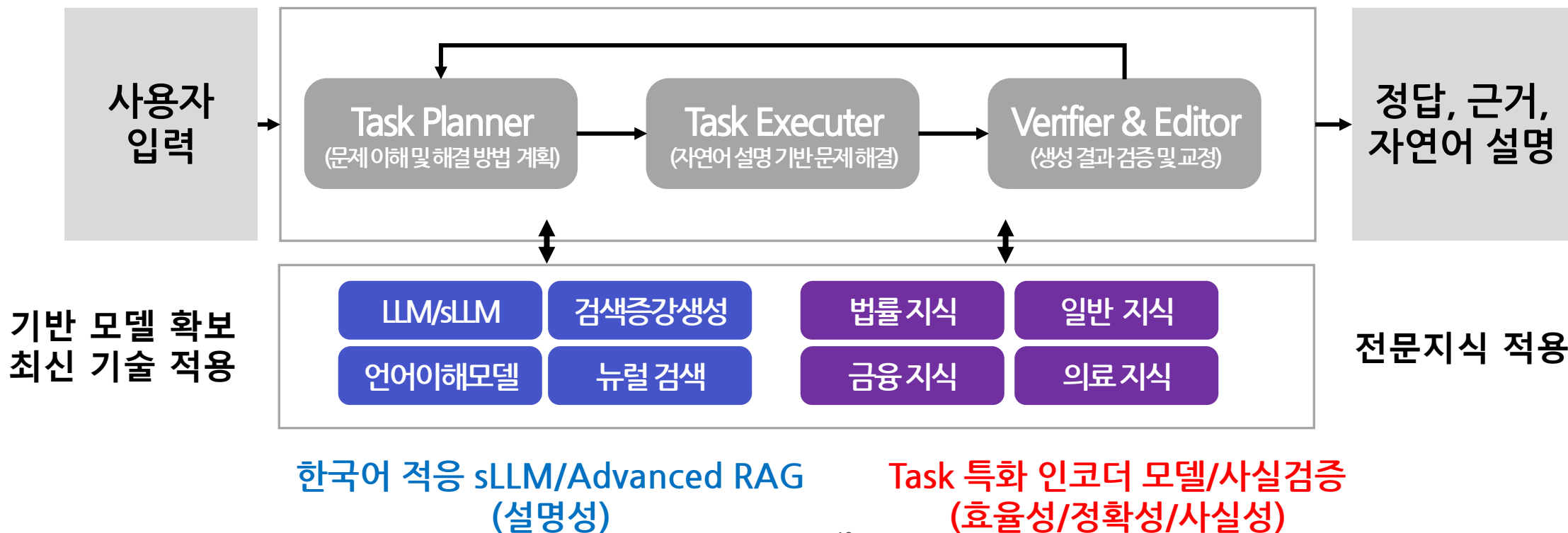
고령자를 위한 지능형 사용자 인터페이스 요구사항

- F. UIES-req: Requirements for Intelligent User Interface services for the elderly
- 제안: MeDiF (한국스마트의료기기산업진흥재단), ETRI -> **F.746.21**로 승인됨



F.UIES-req 상담서비스요구사항

설명가능한 전문가 지원 서비스 프레임워크: F.EDMS -> F.748.59로 승인
(실세계 전문지식을 학습(연구목표#1)할 수 있고, 복잡한 문제를 이해(연구목표#4)하며, 지식/사례를 기반으로 추론(연구목표#2) 하여 검증(목표 추가)된 정답/근거/자연어 설명(이해가 쉬운)(연구목표#2, 3)을 제공)



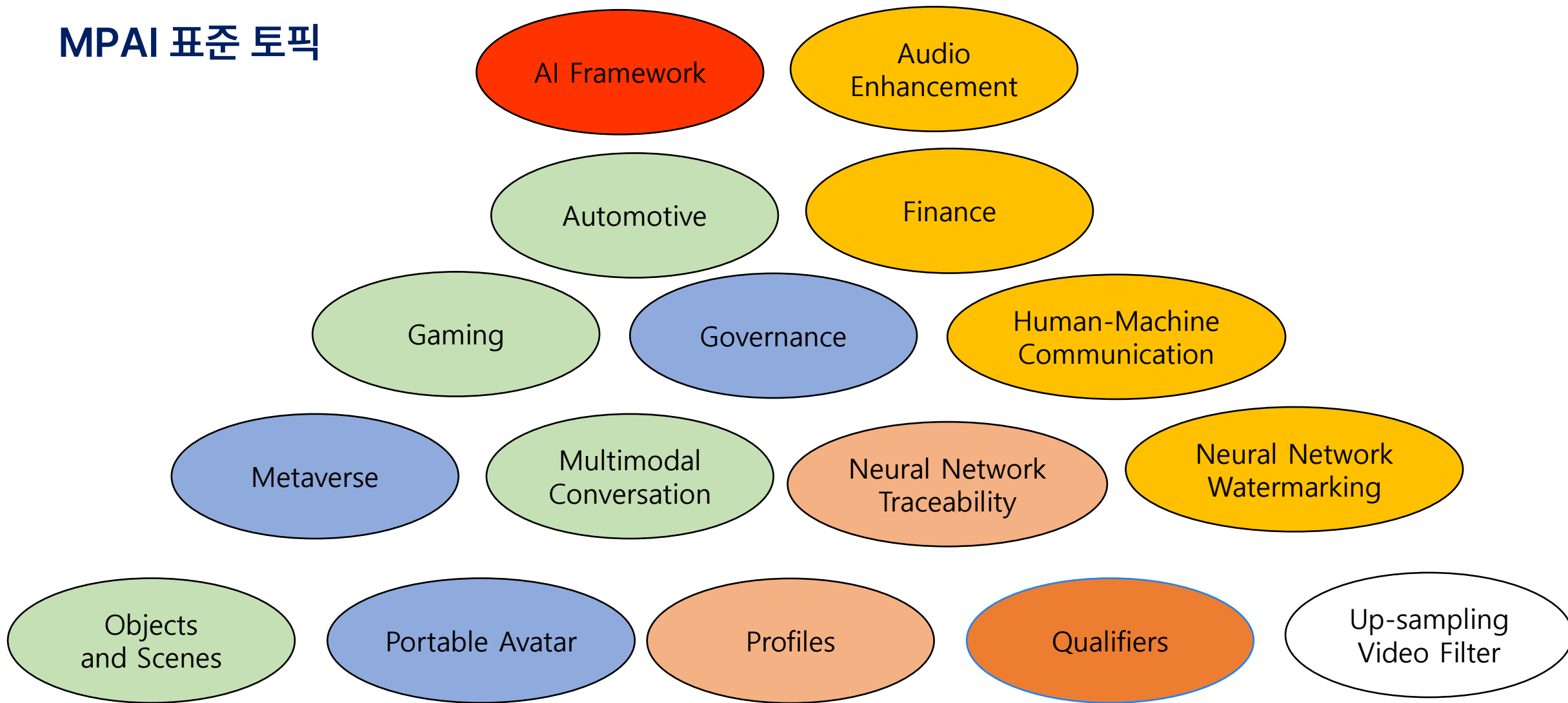
03. MPAI 인공지능 기술 표준화

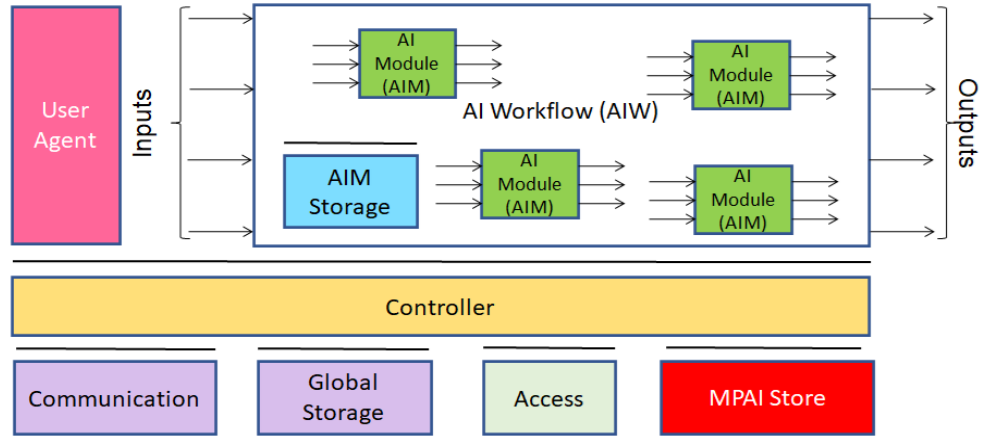
| MPAI: Moving Picture, Audio and Data Coding by Artificial intelligence

- MPEG 창시자 Leonardo Chiariglione 가 설립한 비영리 국제표준단체
- AI 에 기반한 데이터 코딩 표준 개발 목표
- 2020년 9월 30일에 설립된 사실표준화 그룹, 20여개의 AI표준 발간
- IEEE 표준으로 연계하여 9개 표준 발간
- 현재 15개 국가, 40 개의 단체회원 <https://mpai.community>

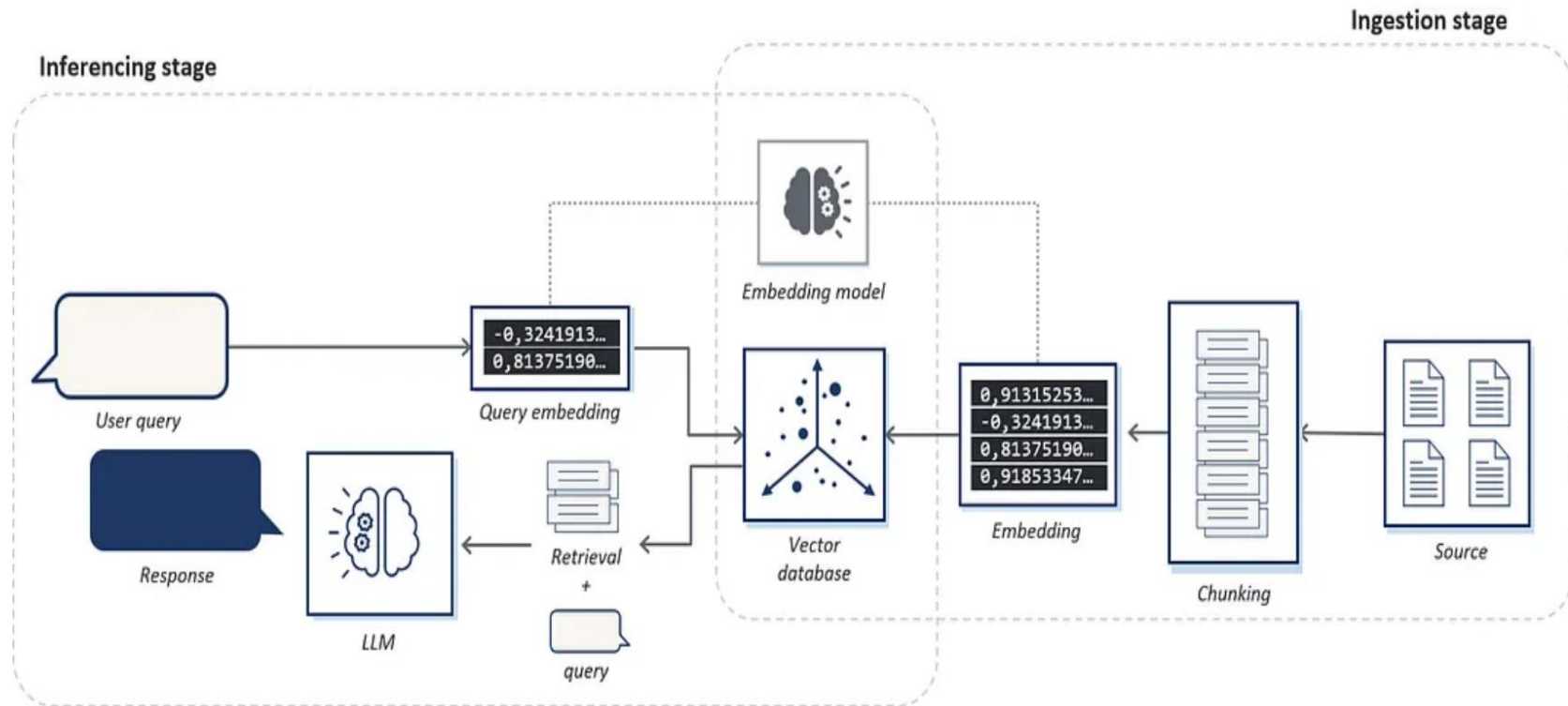
*Data coding: the **transformation of data from a format** into another format more suitable to an application.

MPAI 표준 토픽





RAG Architecture for MPAI-AIF extension



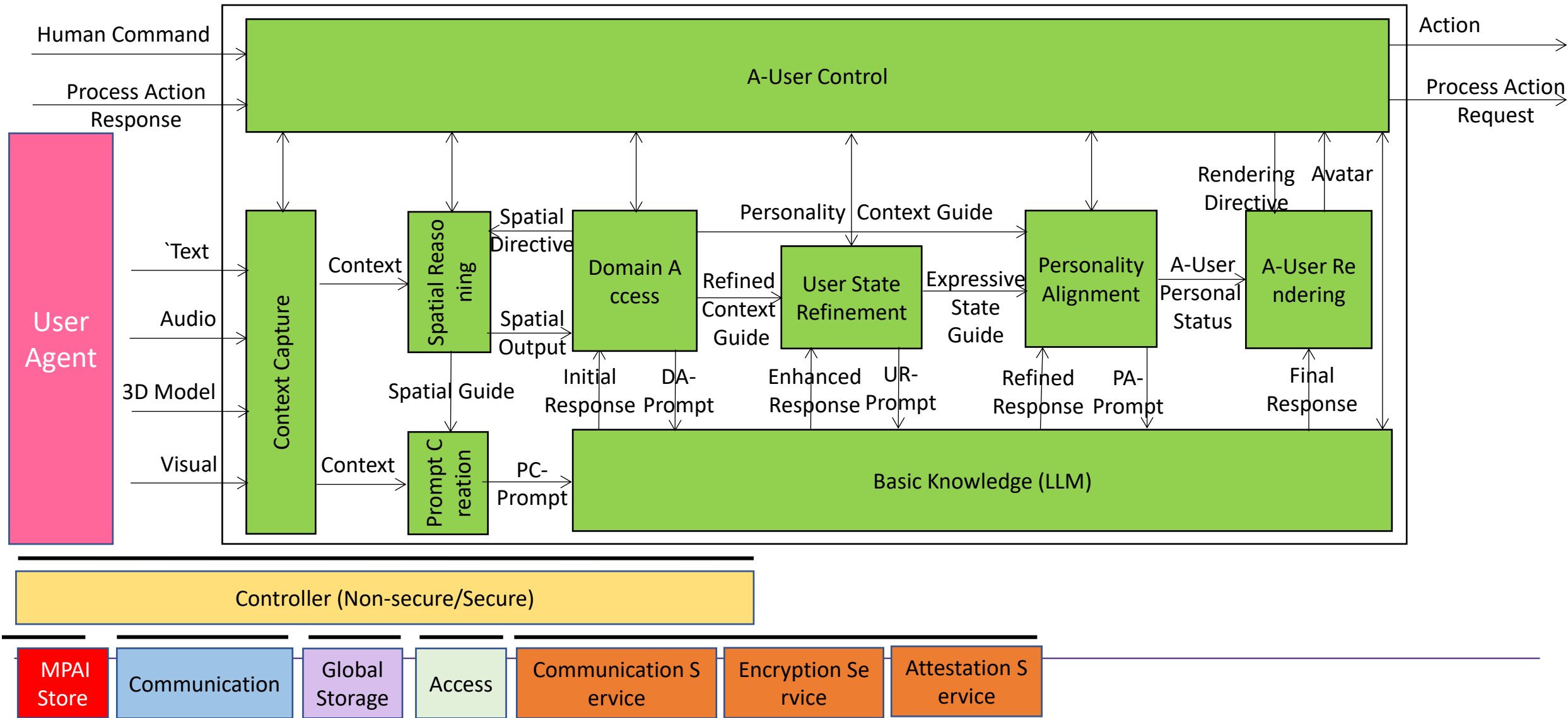
New project – Pursuing Goals in metaverse (MPAI-PGM) – Autonomous User Architecture (PGM-AUA)

Proposal from CAE-DC, MMC-DC, Requirements (M
MM), Requirements (OSD), Requirements (PAF)



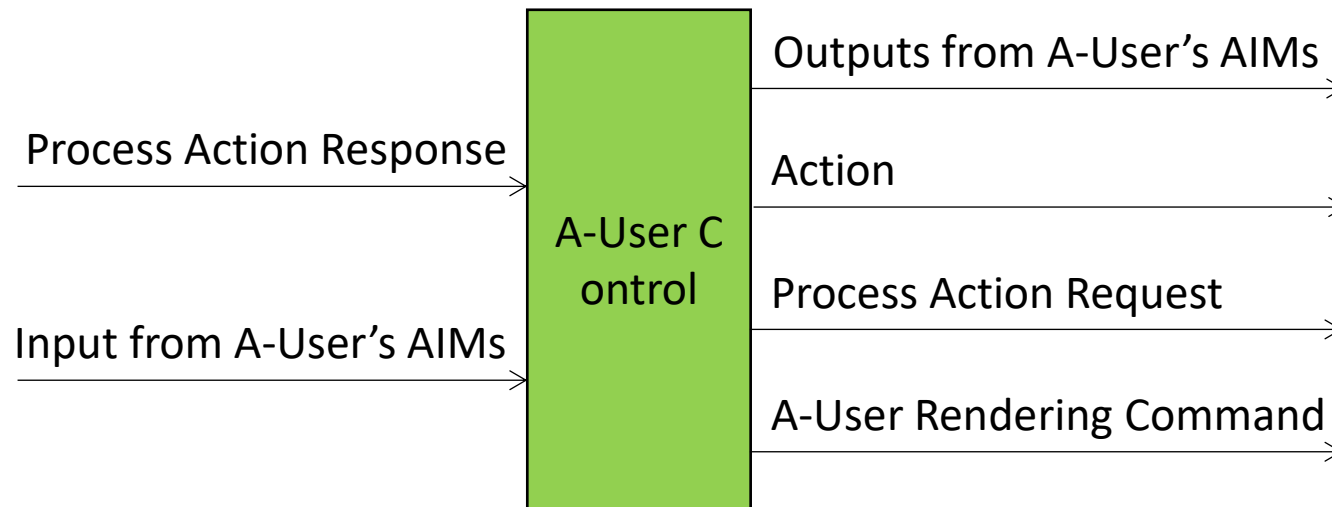
Tentative Scope: It specifies functions and interfaces by which an Autonomous User (A-User) in an M-Instance interacts with another User (Autonomous/Human) who or may be under the direct control of a human, and thus a Human-User (H-User) – a “conversational partner”.

Pursuing Goals in metaverse (MPAI-PGM):Autonomous User (PGM-AUA)



A-User Control

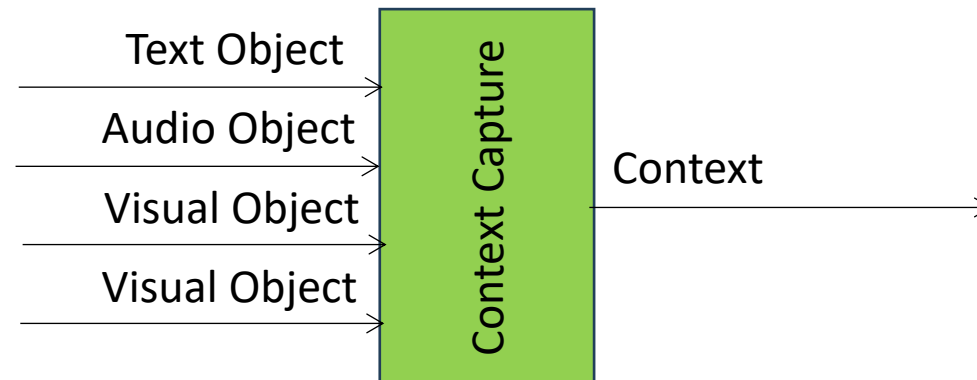
- The **A-User Control** AIM governs the lifecycle of the A-User and orchestrates its interaction with both the M-Instance and the human User:
 - Controls the AIMs and the interaction of the A-User with the M-Instance
 - Performs Actions and Process Actions in the M-Instance based on the Rights it holds and the M-Instance Rules.



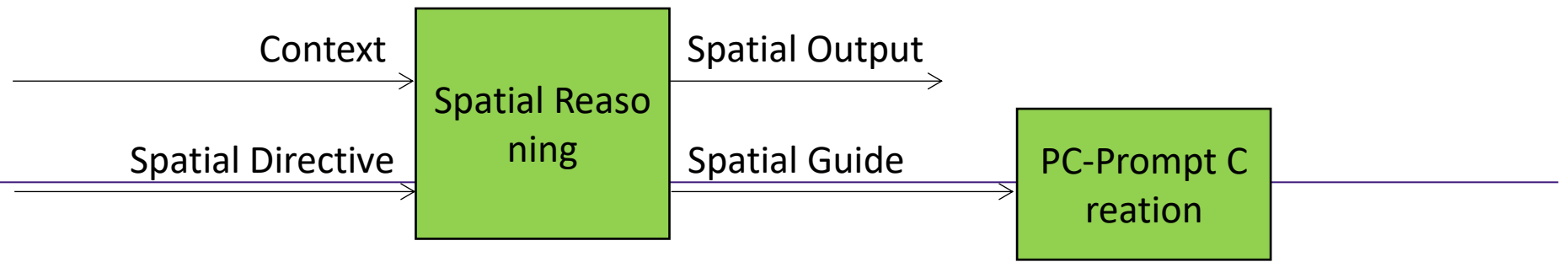
Context Capture

The **Context Capture** AIM enables an A-User to perceive its environment comprised of an Audio-Visual Scene and one A- or H-User and produces **Context**:

- Audio-Visual Scene Descriptors
- User State (includes Personal Status and other User descriptors)
- Text.



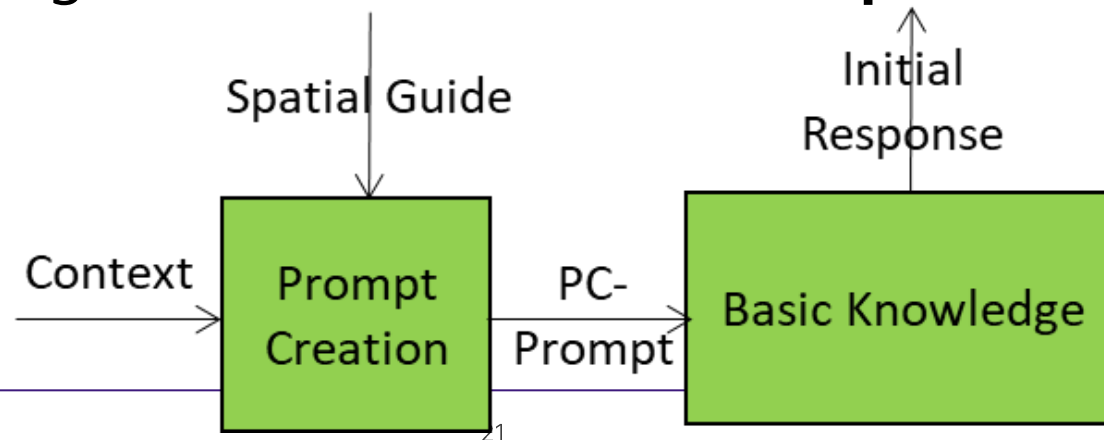
- Interprets the Audio, Speech, and Visual components of an M-Location
- Generates:
 - **Spatial Output** that includes:
 - **Audio Spatial Output** with spatial and temporal interpretations of audio objects.
 - **Visual Spatial Output** with spatial relationships, referent resolutions, and interaction constraints.
 - **Spatial Guide** that includes:
 - **Audio Spatial Guide**, represents the spatial audio context enriching the User's text with audio spatial cues, such as sound source relevance, directionality, and proximity.
 - **Visual Spatial Guide**, represents the visual spatial context enriching the User's text with visual spatial cues, such as object relevance, orientation, proximity, and affordance.
- Sends the Audio and Visual Spatial Guide to the **Prompt Creation** AIM.



Prompt Creation to Basic Knowledge

The **Prompt Creation** AIM

- Augments the User's Text with
 - Audio and Visual Spatial Guide.
 - User description components of Context.
- Produces **PC-Prompt** – a natural language expression structured according to the **PC-Prompt Plan** JSON Schema.
- Sends PC-Prompt to **Basic Knowledge**.
- Basic Knowledge AIM sends its **Initial Response** to the **Domain Access** AIM.

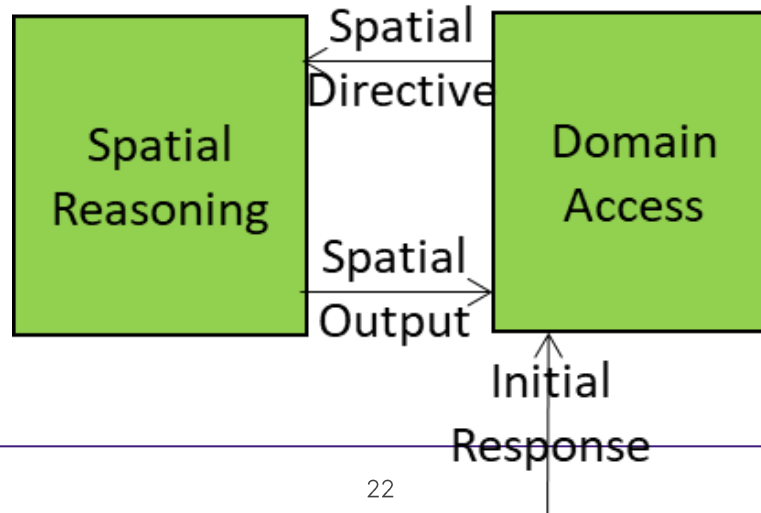


From Spatial Reasoning to Domain Access

Spatial Reasoning sends Audio and Visual Spatial Output to **Domain Access** AIM.

Domain Access

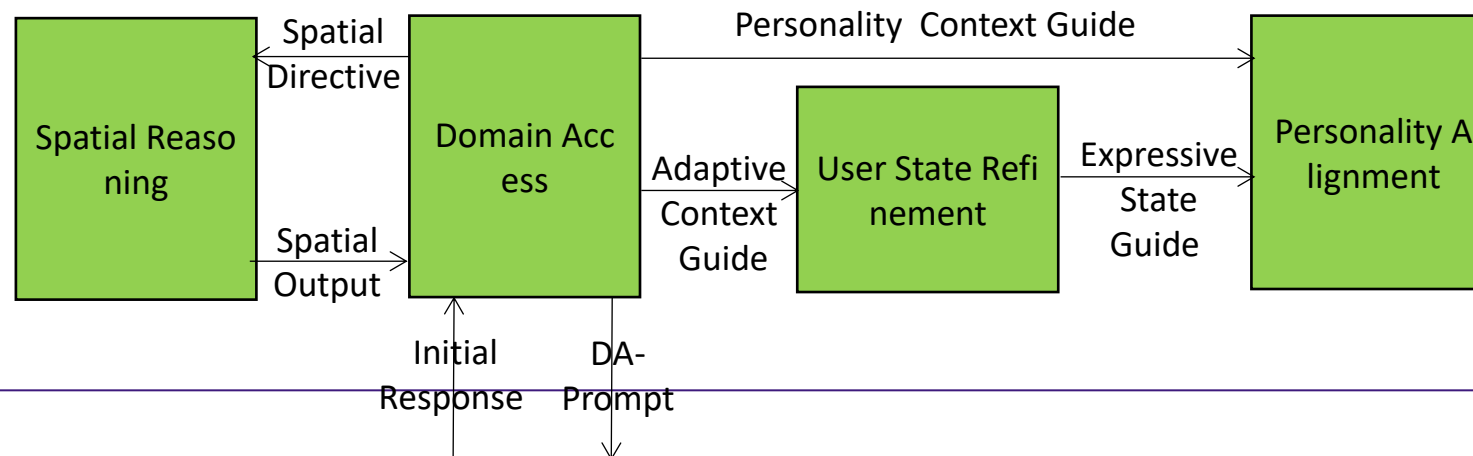
- Accesses domain-specific knowledge.
- Produces and sends **Spatial Directive** back to Spatial Reasoning to improve its understanding of the Audio and Visual Scene.



Domain access to User State Refinement and Personality Alignment

Domain Access

- Integrates the Initial Response with the Audio and Visual Spatial Outputs.
- Produces a JSON object based on **the DA-Prompt Plan** JSON Schema.
- Converts DA-Prompt Plan into a quasi-natural language prompt (**DA-Prompt**)
- Sends DA-Prompt to Basic Knowledge.
- Sends the Domain Access's improved understanding of Context to **User State Refinement** and **Personality Adaptation**.



From User State Refinement to Personality Alignment

Basic Knowledge

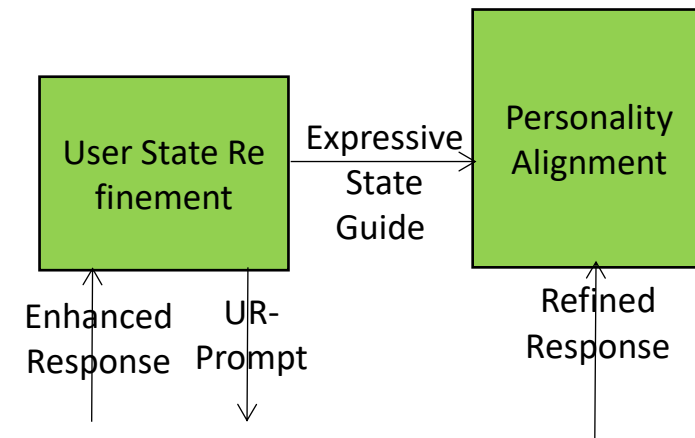
- Produces **Enhanced Response** includes updated information about the User State
- Sends Enhanced Response to the User State Refinements AIM.

User State Refinement

- Converts Enhanced response into a structured format using the **UR-Input** JSON Schema.
- Refines Understanding of User State.
- Generates a JSON object based on the **UR-Prompt Plan** JSON Schema
- Converts UR-Prompt Plan into the quasi-natural language UR-Prompt.
- Sends UR-Prompt to Basic Knowledge
- Sends **Expressive State Guide** to the Personality Alignment AIM.

Basic Knowledge

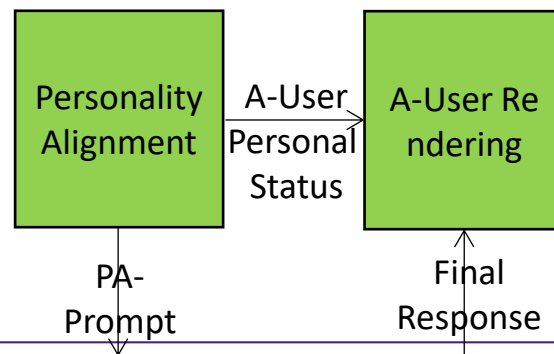
- Produces **Refined Response**,
- Sends Refined Response to Personality Alignment.



From Personality Alignment to A-User Rendering

Personality Alignment

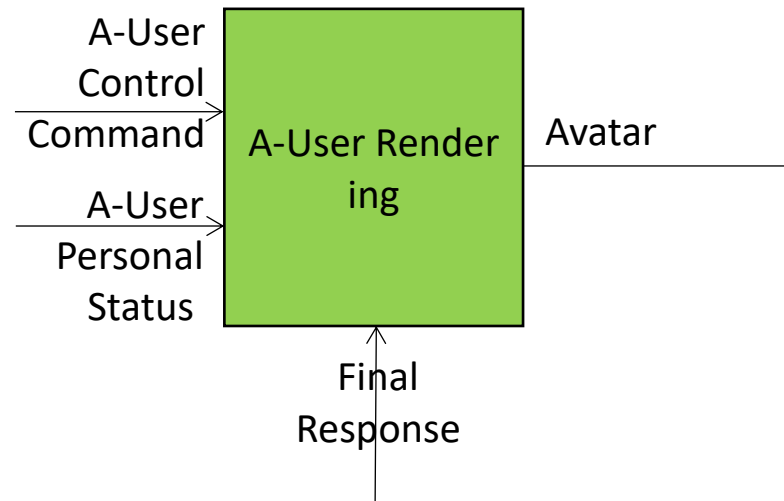
- Converts Adapted Response into a JSON object using **PA-Input** JSON Schema.
- Selects the appropriate **Personality Profile**.
- Generates a JSON object based on the **PA-Prompt Plan** JSON Schema.
- Converts PA Prompt Plan into the quasi-natural language **PA-Prompt**.
- **Sends PA Prompt to Basic Knowledge.**
- Personality Alignment formulates an **A-User Personal Status**.
- Sends A-User Personal Status to **A-User Rendering** AIM.



A-User Rendering

A-User Rendering produces a speaking **Avatar** using

- **Text, Speech, Visual**
- **Command** from A-User Control to shape the speaking Avatar



09. Conclusion

| 빠르게 변하는 AI 기술의 표준화를 위한 대응 필요

ICT Standards

- 미래 환경 변화와 기술 변화 예측
- 기술을 반영한 빠른 표준화 절차



GLISC 2025

Global ICT Standards Conference 2025

- 감사합니다 -

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ICT Standards and Intellectual Property:
AI for All