

Future Streaming Media Services

ITU-T SG21 and ISO/IEC JTC 1 SC 29 Joint Workshop on
“Media Streaming Service – What’s next”

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Korea's National ICT Research Institute

- **Scale:** 2,000+ specialized researchers.
- **Legacy:** 50 years of pioneering ICT innovation.
- **Achievements:** Spearheaded key technologies including CDMA, DMB, WiBro, LTE-A, and 5G/6G.
- **Global Leadership:** Leading international standardization (MPEG, ATSC, ITU-T).
- **IP Strength:** Holder of over 2,000 Standard Essential Patents (SEPs) in the media domain.
- <https://www.etri.re.kr/50th/eng/history-overview.html>





Research areas

1. Foundational technologies for Metaverse services
2. 6DoF immersive video R&D and standardization
3. Video coding and processing technology for machines

<Spatial Media Core Technology>

- Point cloud spatial video generation.
- 2D/3D video-based spatial information prediction.

<Immersive Video Technology>

- 3DoF 360 video generation core technology.
- 3DoF+ / 6DoF video technology and international standardization.

<Video Coding for Machines>

- Video pre/post-processing for machines
- Video coding for machines



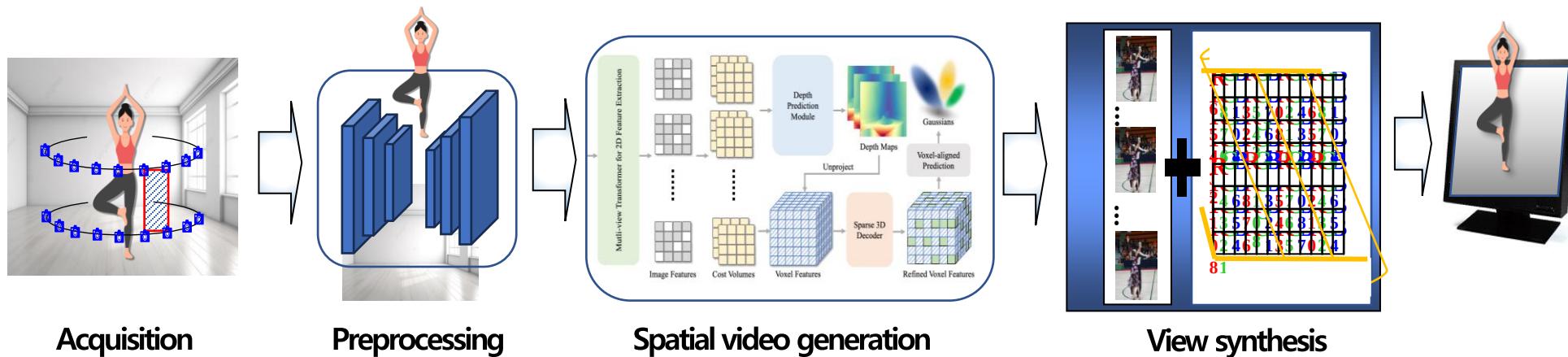
Foundational technologies for Metaverse services

Objective

- Develop core technologies for real-time acquisition, generation, and rendering of dynamic spatial video in small stage environments

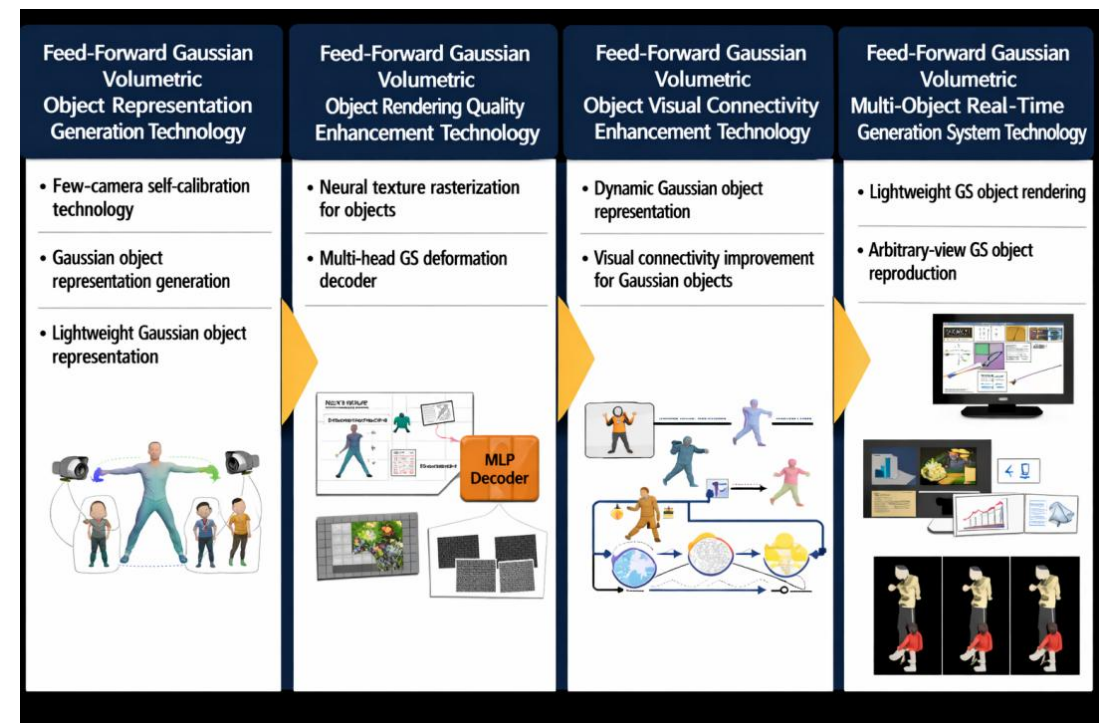
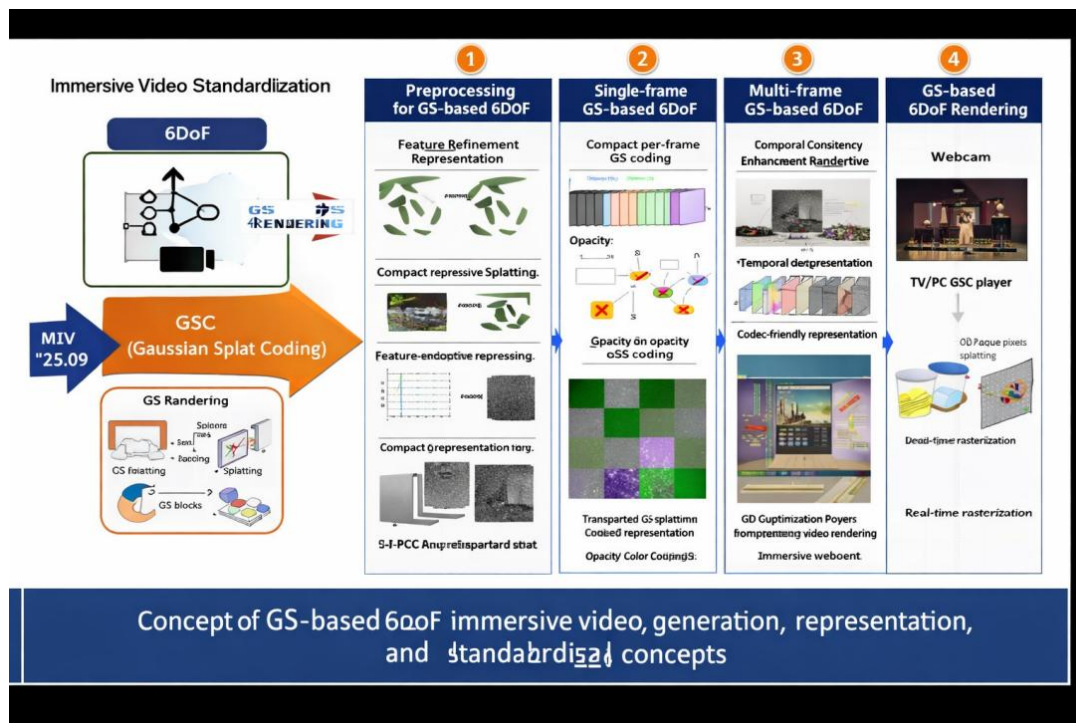
Research contents

- Real-time dynamic spatial video generation using few-view networks (10fps)
- High-speed spatial video quality enhancement
- GS-based fast virtual view synthesis (<50 views @ 4K)
- RL-based dynamic spatial video generation





Immersive media R&D	
Objective	Gaussian-splatting based 6DoF immersive media R&D and standardization
Research contents	- GS-based 6DoF immersive video preprocessing - Feed-forward GS multi-object generation





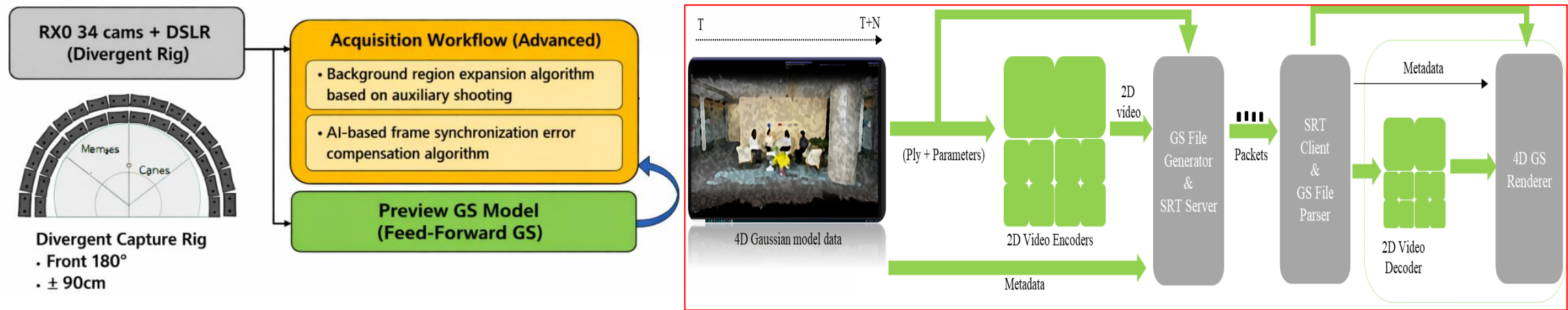
Ultra-Realistic Metaverse Spatial Computing

Objective

- Develop spatial computing technologies for ultra-realistic metaverse environments.

Research contents

- 180° LF capture workflow
- Transient object modeling using 4DGS
- 4DGS-based spatial reconstruction and streaming
- Multi-view LF rendering for immersive displays
- Integrated platform for ultra-realistic spatial computing services





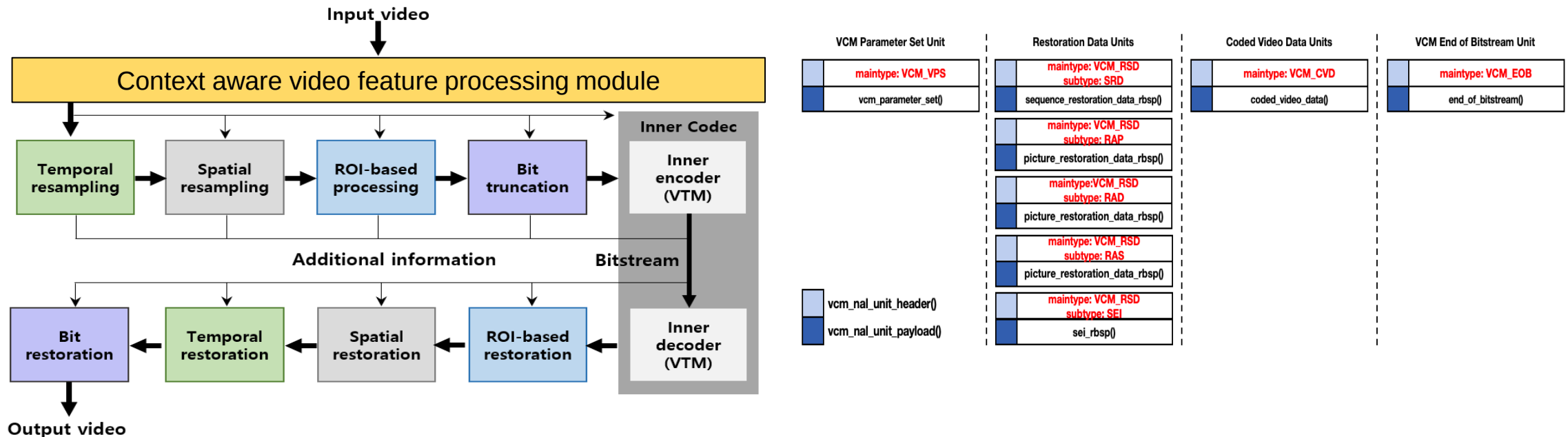
Video coding for machines

Objective

- Video and feature coding for machines R&D and standardization

Research contents

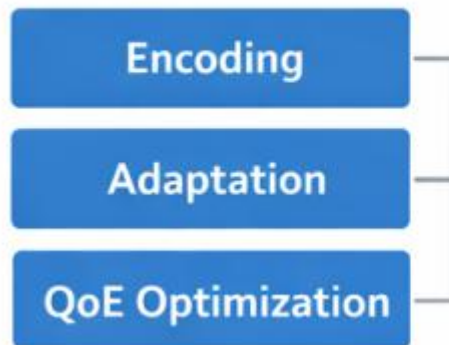
- Foreground/background coding optimization
- Adaptive deep feature preprocessing
- VCM performance evaluation SW
- MPEG VCM / FCM standardization



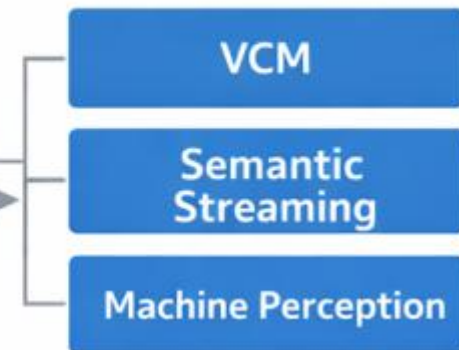


- **AI-Driven and AI-Targeted Media Processing in Future Streaming Systems**
 - AI is transforming both **media creation** and **media consumption**.
 - MPEG systems must evolve to support **AI-native content formats** and **AI-assisted delivery pipelines**.
 - Two perspectives:
 - **AI for Media Processing** – using AI to enhance encoding, adaptation, and QoE.
 - **Media for AI Processing** – designing media streams optimized for machine perception (e.g., VCM).
 - Goal: enable **intelligent, adaptive, and interoperable streaming ecosystems**.

AI for Media Processing

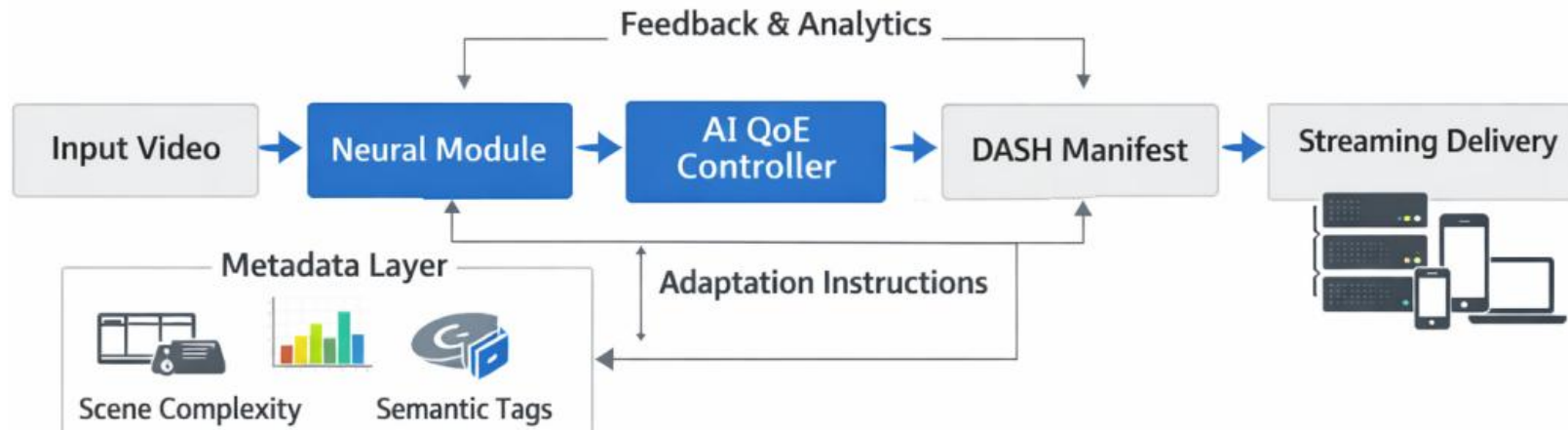


Media for AI Processing

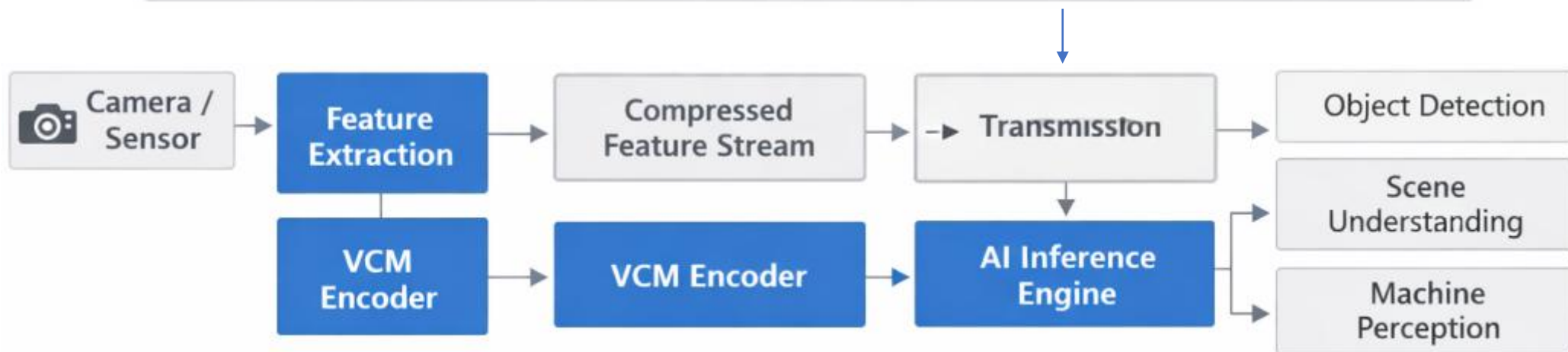




- **Integrating AI into MPEG-Based Streaming Workflows**
 - **AI-assisted encoding and transcoding:**
 - Content-aware bitrate allocation, perceptual quality optimization.
 - Neural compression integrated with existing MPEG codecs (VVC, EVC).
 - **Adaptive streaming intelligence:**
 - Predictive QoE control using reinforcement learning.
 - Dynamic manifest generation (DASH/LL-DASH) guided by AI analytics.
 - **Metadata and signaling:**
 - Need for standardized AI-driven adaptation metadata (e.g., scene complexity, semantic tags).
 - **System architecture:**
 - Hybrid pipeline combining conventional MPEG tools with neural modules.



- ### Metadata Layer (ROI, Semantic Map)





- **System-Level Implications for Future Streaming Media Services**
 - **MPEG system layer evolution:**
 - Support for AI-generated content, immersive formats (6DoF, GS), and multi-modal data.
 - Enhanced signaling for neural network models and inference results.
 - **Edge-AI streaming:**
 - Distributed intelligence between cloud, edge, and client devices.
 - **Standardization priorities:**
 - Integration of AI model descriptors into system layer(e.g. ISO/IEC 23001).
 - Harmonization with MIV, VCM, and GSC initiatives.
 - **Vision:** A future streaming ecosystem where AI and MPEG systems co-evolve to deliver adaptive, intelligent, and interoperable media experiences.



Thank You

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