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Global ICT Standards Conference 2023

ICT 표준 전문가 워크숍. (세션2) 디지털 플랫폼 기반 기술 표준화 동향

MPEG 비디오 코딩 그룹 표준화 소개

방건 표준전문위원, 한국전자통신연구원

주최



과학기술정보통신부
Ministry of Science and ICT



특허청
Korean Intellectual
Property Office

주관



국립전파연구원
National Radio Research Agency



IITP

KEA

kista

ETRI

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MPEG¹⁴²

01. MPEG(Moving Picture Expert Group) 이란

MPEG의 역할

- 1990년초 MPEG은 ISO/IEC JTC1/S29/WG11에서 지난 30년 이상 멀티미디어를 활용하는 다양한 분야의 여러 기술적 표준을 개발하는 그룹임
- 2020년 8월 SC29 내 조직을 개편하여 **WG11 내의 Sub-Group들이 WG으로 승격됨**



01. MPEG(Moving Picture Expert Group) 이란

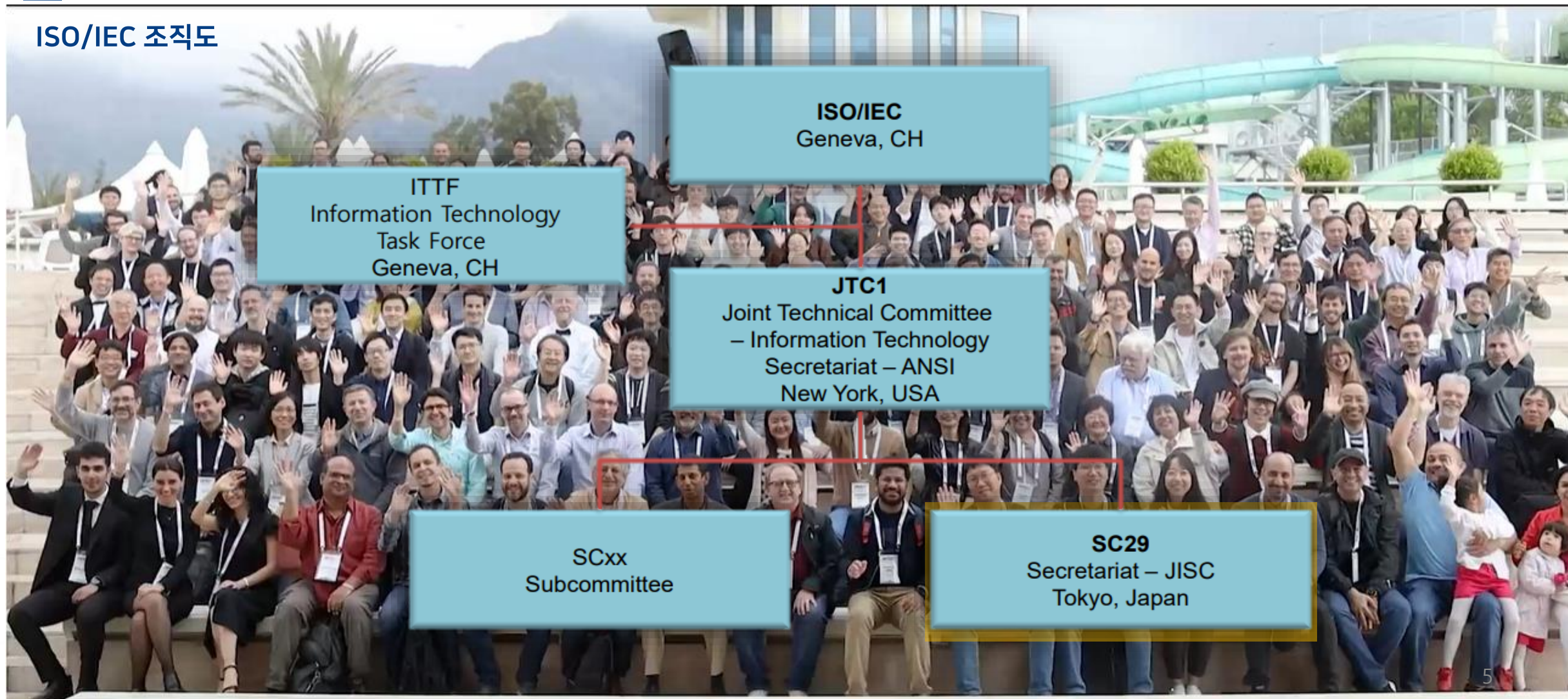
MPEG의 현황

- ISO/IEC JTC1 SC29/WG2 ~ WG8
- Informal: Moving Picture Experts Group (MPEG)
- MPEG은 개인/기관/국가의 지적재산권 가치 제고를 위해 보유기술의 국제표준진입을 위해 세계 유수의 기관(산학연)들이 MPEG의 멤버로서 활동 중
- 매년 4번 회의(1, 4, 7, 10)
- 참석자: 약 400명 (Apple, Sony, Tencent, Samsung, LG, ETRI, Dolby...)



02. MPEG 그룹 소개

ISO/IEC 조직도



02. MPEG 그룹 소개

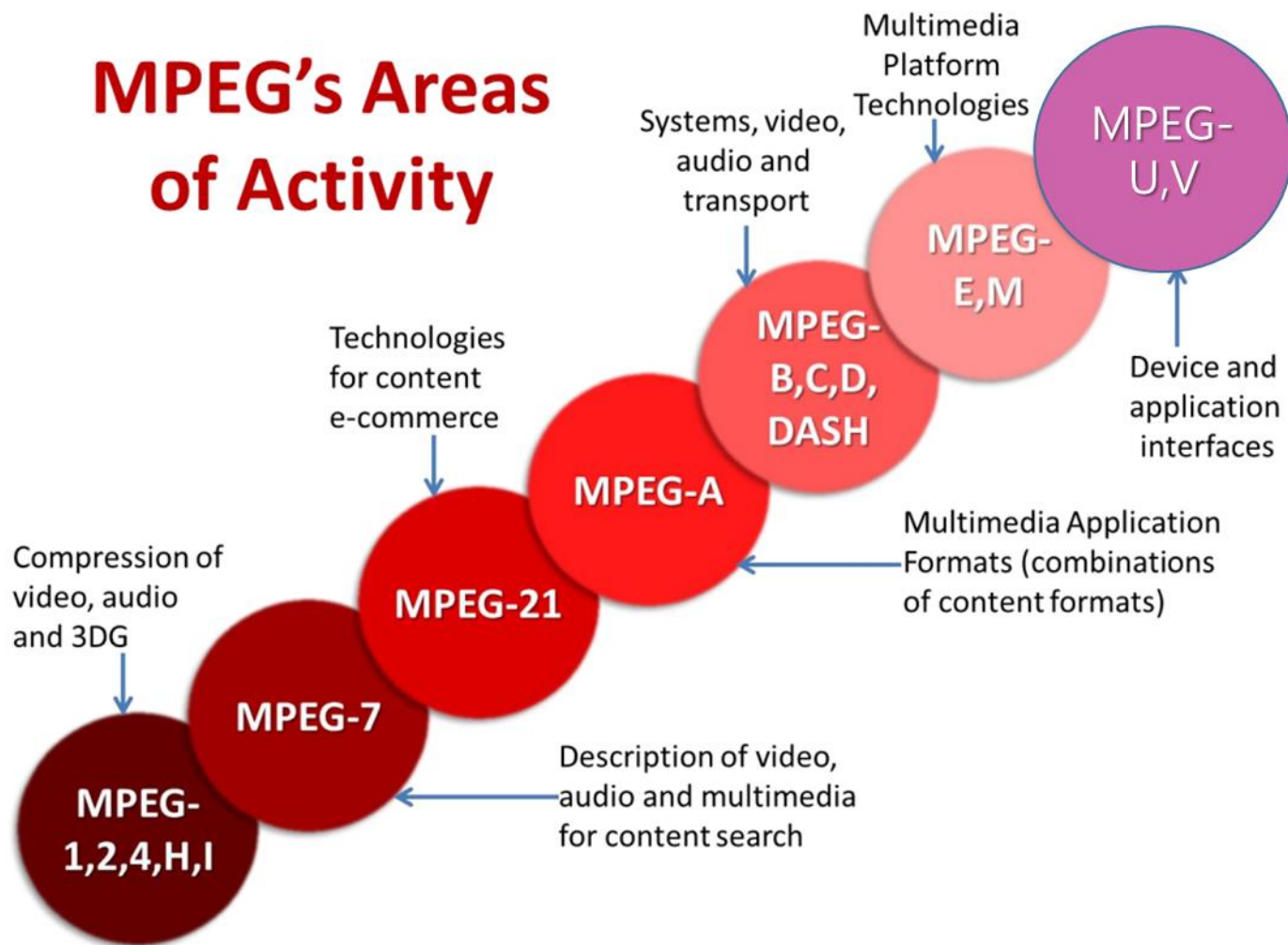
MPEG 그룹의 구성

2023.08



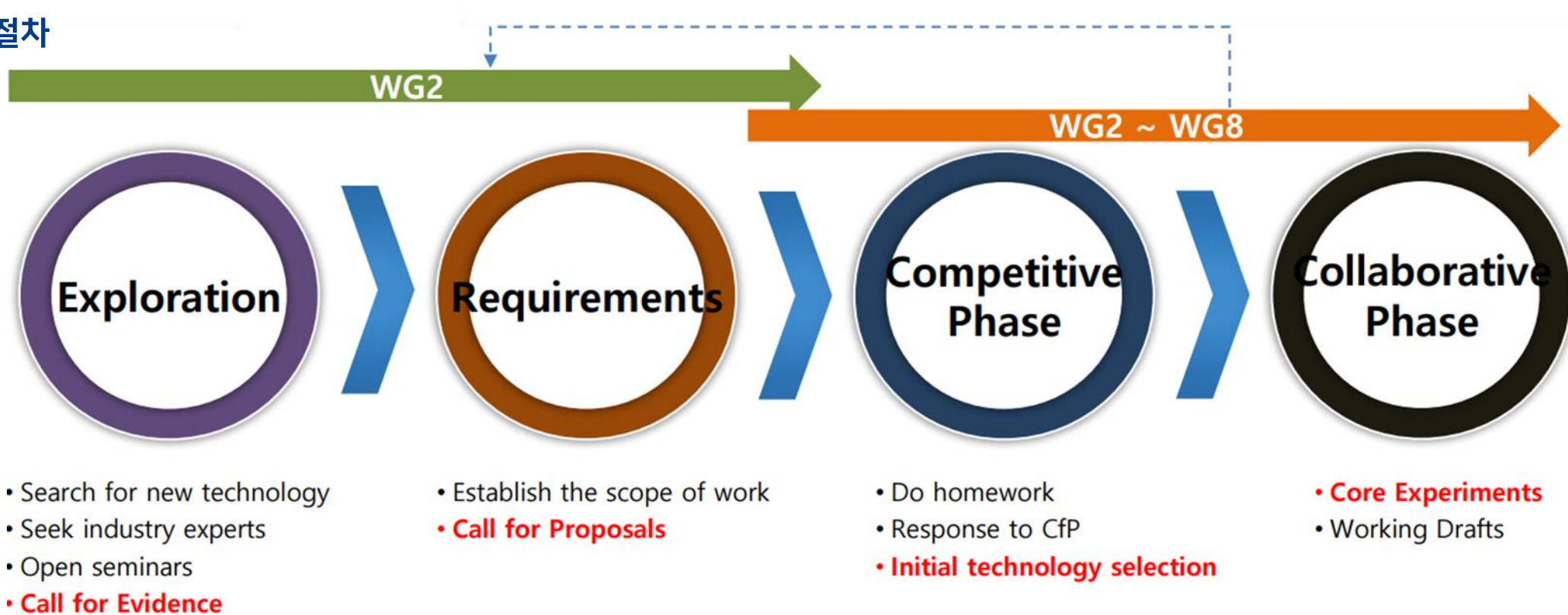
02. MPEG 그룹 소개

표준 영역



03. MPEG 국제 표준 개발 절차

표준화 절차



- Standardization (표준화)
 - **Exploration Phase**: Search for new technology
 - **Requirements Phase**: Establish the scope
 - **Competitive Phase & Collaborative Phase**: Develop standard

03. MPEG 국제 표준 절차

표준 개발 기간(3 tracks)

Track 1
Accelerated standards development track
(2 years)

- 6 months to produce first DIS
- 18 months to produce FDIS
- **24 months** to publication

Track 2
Default standards development track
(3 years)

- 12 months to produce first CD
- 18 months to produce first DIS
- 30 months to produce FDIS
- **36 months** to publication

Track 3
Extended standards development track
(4 years)

- 12 months to produce first CD
- 24 months to produce first DIS
- 42 months to produce FDIS
- **48 months** to publication

04. Joint Video Coding Team(WG5)

2D 비디오 압축 부호화 표준

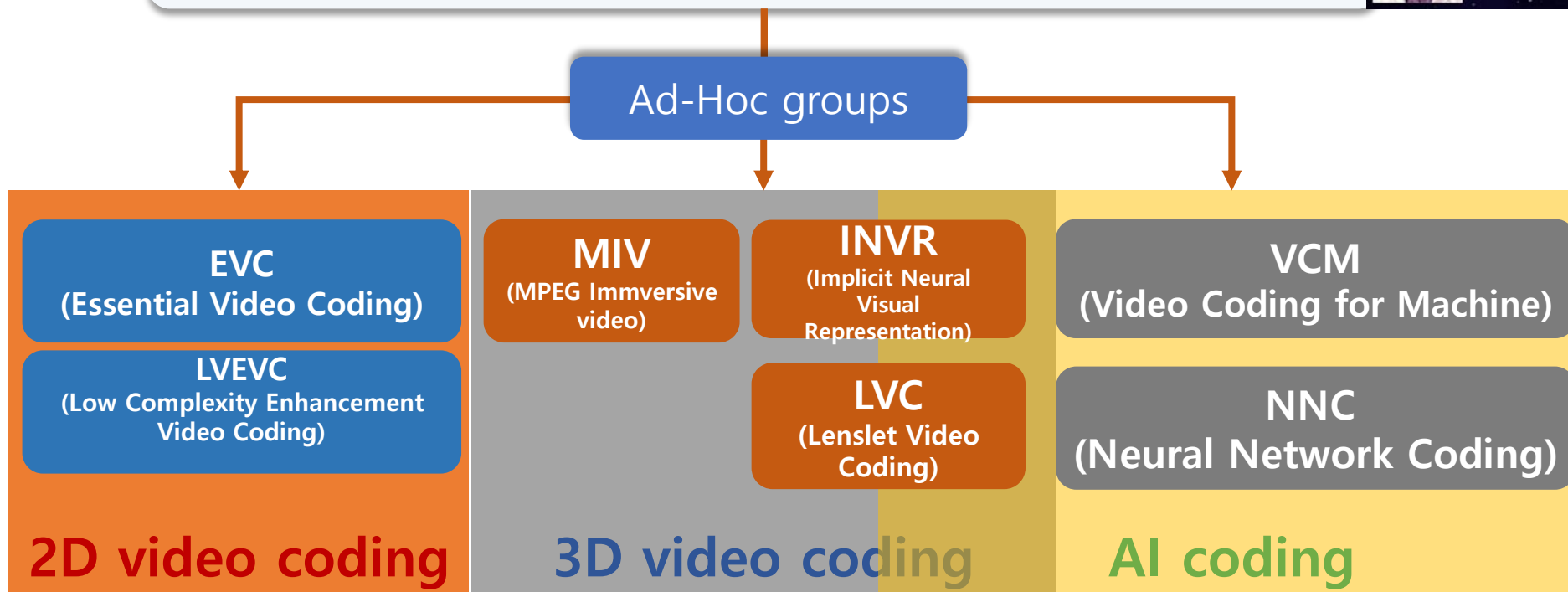


	1세대	2세대	3세대	4세대	5세대
표준 명칭	MPEG-1 Video	MPEG-2 Video	MPEG-4 AVC	MPEG-H HEVC	MPEG-I VVC
정의	저장/재생용 비디오 압축 표준	고화질 비디오 압축 표준	범용 비디오 압축 표준	범용 고효율 비디오 압축 표준	범용 다기능 비디오 압축 표준
지원 비트율	~1.5 Mbps	1.5 Mbps ~ 50 Mbps	64 kbps ~ 240 Mbps	128 kbps ~ 800 Mbps	128 kbps ~ 1.8 Gbps
응용 서비스	[SD 시대]	[HD 시대]	[FHD 시대]	[4K 시대]	[8K & 360 VR 시대]
	Video CD	DTV/HDTV DVD	3G HDTV DMB IPTV Internet Blu-Ray	4G UHDTV IPTV OTT Mobile UHD Blu-ray	5G 8K UHDTV HDR VR
원본 대비 압축률	25:1	50:1	100:1	200:1	400:1
제정 년도	1993	1995	2003	2013	2020

04. MPEG 비디오 코딩 표준화 그룹(WG4) 구성

구성

MPEG Video Coding(WG4) – Lu Yu, (Convener)



AhG on EVC (Essential Video Coding)

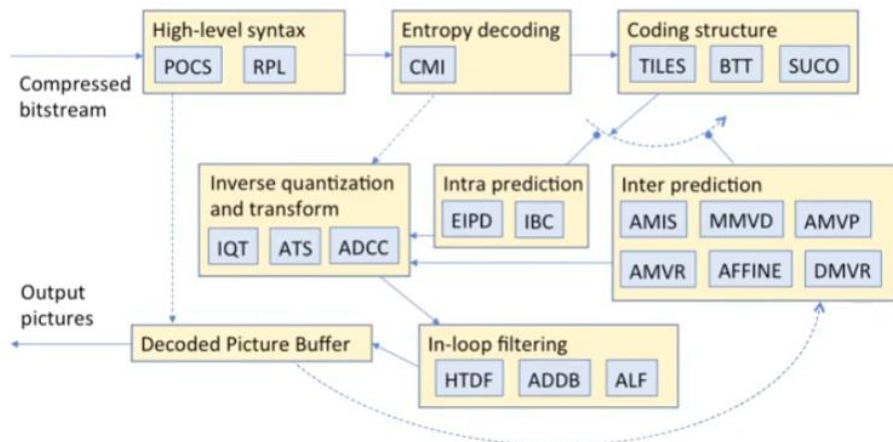
• Motivations:

- To provide an ISO video coding standard to address business and technology needs in some use cases that are not well served by existing ISO standards, such as HEVC

• Objectives:

- To develop a new video coding standard that meets a combination of business and technology requirements

TECHNOLOGY



	Y	U	V	EncT	DecT
Tango2	-27.5%	-28.5%	-29.3%	387%	195%
FoodMarket4	-27.2%	-22.4%	-22.3%	311%	194%
CatRobot1	-33.9%	-36.8%	-33.2%	459%	188%
DaylightRoad2	-33.9%	-32.9%	-32.7%	481%	181%
ParkRunning3	-27.4%	-16.6%	-16.1%	668%	181%
MarketPlace	-22.4%	-18.1%	-19.9%	501%	165%
RitualDance	-21.9%	-20.5%	-21.4%	479%	160%
Cactus	-25.0%	-26.0%	-23.2%	603%	160%
BasketballDrive	-25.3%	-29.4%	-29.5%	572%	172%
BQTerrace	-20.9%	-24.9%	-11.8%	578%	155%
Overall	-26.5%	-25.6%	-23.9%	493%	175%

BD-Rate difference
calculated using PSNR for
4 different QP values.

ETM version 3.0
HM version 16.16

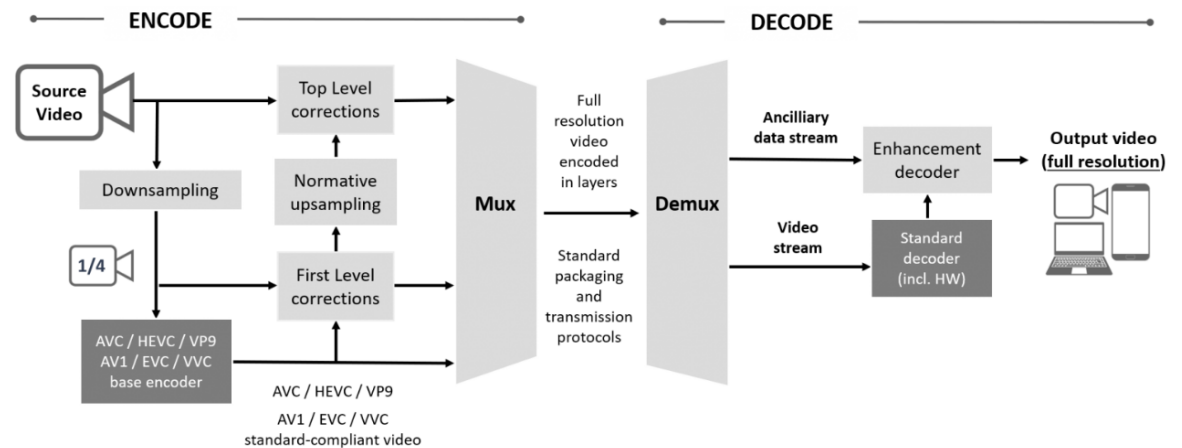
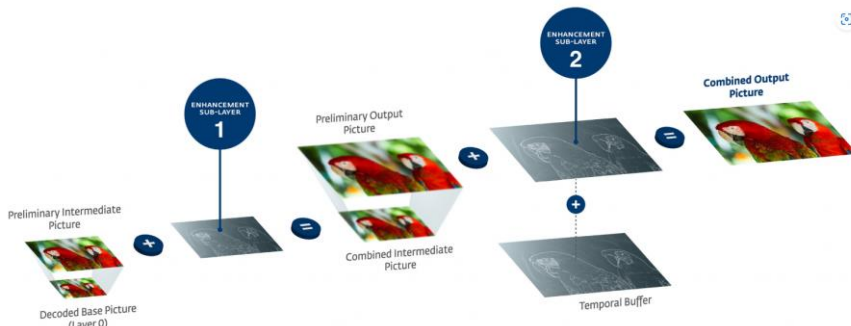
AhG on LCEVC (Low Complexity Enhancement Video Coding)

- **Motivations:**

- There is a commercial need for a lightweight video codec that has better coding performance while also being low complexity

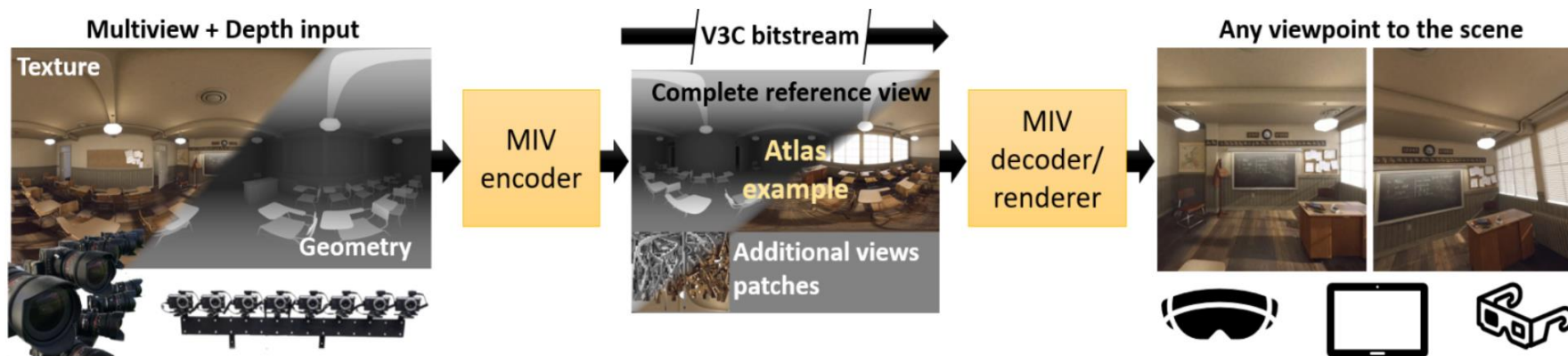
- **Objectives:**

- The objective of this project is to develop a standard that leverages existing deployed MPEG video codecs in a manner that improves video compression efficiency while keeping the incremental technology complexity impact low



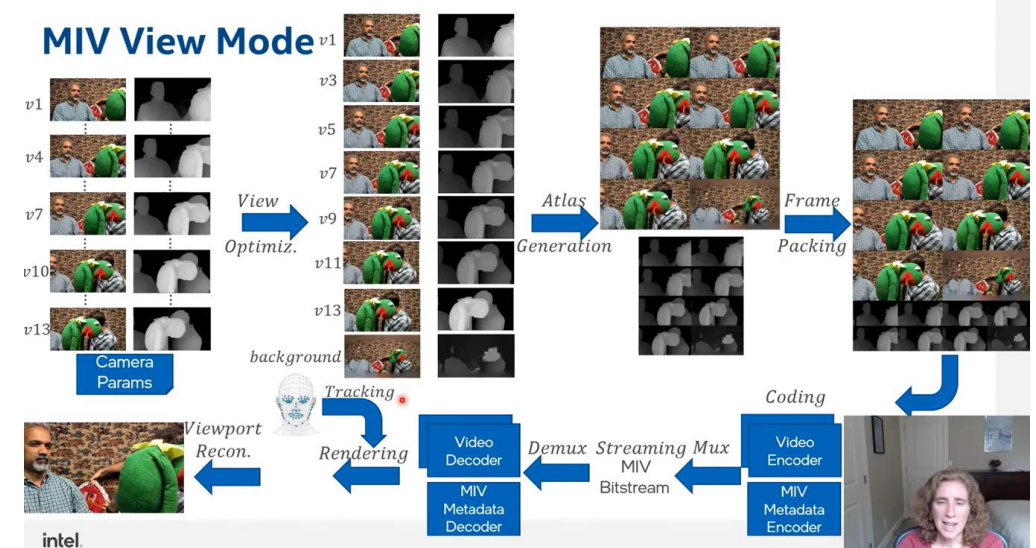
AhG on MIV (MPEG Immersive Video)

- **Motivations:**
 - Enable immersive video viewing experience of real-world and virtual 3D scenes
- **Objectives:**
 - Develop coding technology of multiple texture and depth views representing immersive video, enabling user viewing with 6 Degree of Freedom (6DoF) at any position and orientation within a constrained range, utilizing legacy 2D video coding standards



AhG on MIV

- MPEG Immersive Video (MIV) – 3DoF+ video compression
 - Evaluation of CfP response, Mar. 2019
 - CD , July 2020
 - DIS, Oct. 2020
 - FDIS, Jan. 2021
 - Now under 2nd Edition development phase



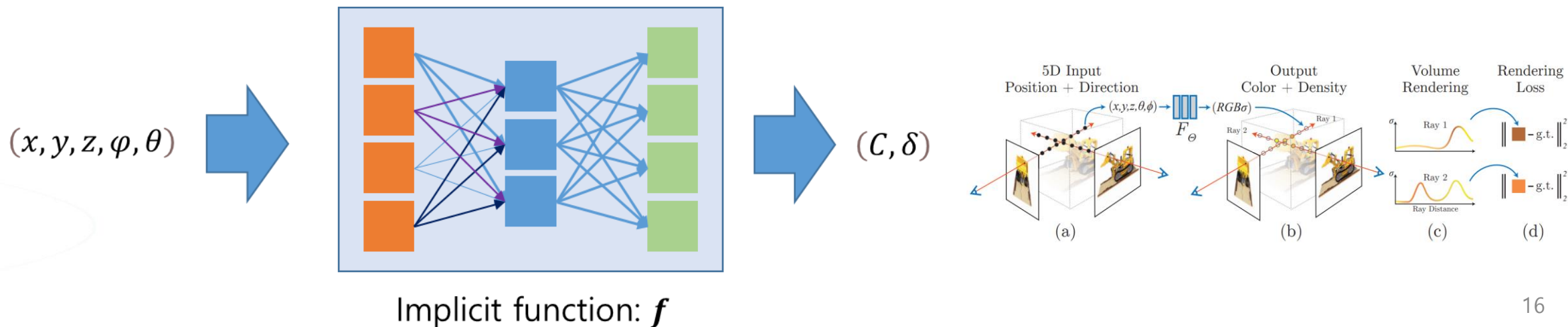
[Freeport Player Demo \(Intel\) - YouTube](#)

AhG on INVR (Implicit Neural Visual Representation)

- **Motivations:**

- Established MPEG INVR AhG at the 139th MPEG meeting in July 2022
- Recognizes implicit neural representation **as a potential format** for image and video data, including 3D videos
- Opens **new possibilities for visual data compression** with this novel, universal visual data representation

- **Objectives:** Transforms data compression domain into **network or feature compression**, provided representation conversion maintains high fidelity



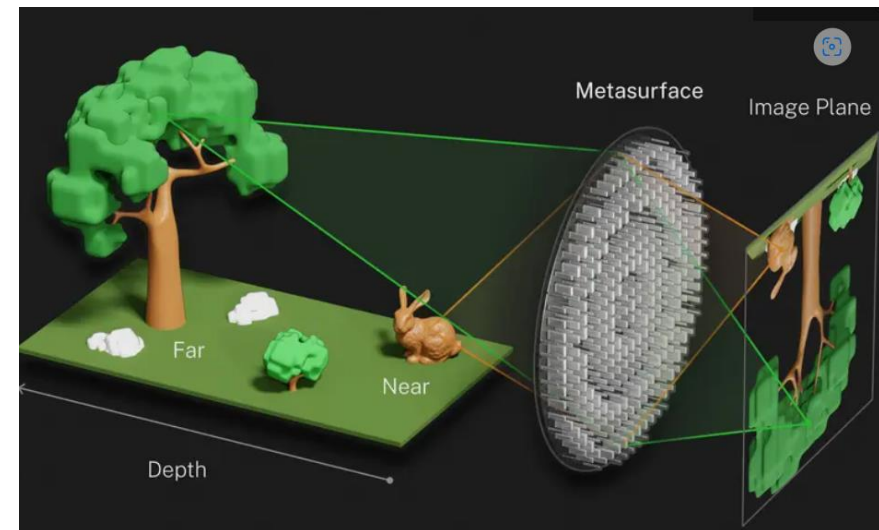
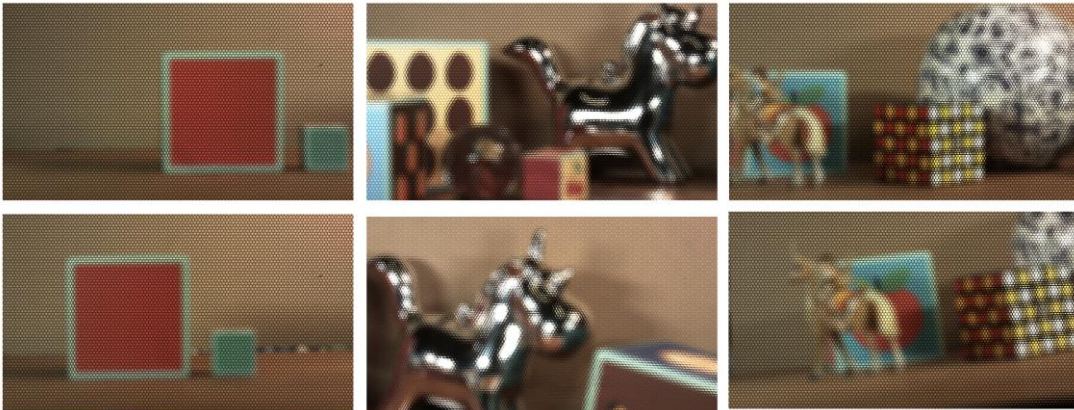
AhG on LVC (Lenslet Video Coding)

- **Motivations:**

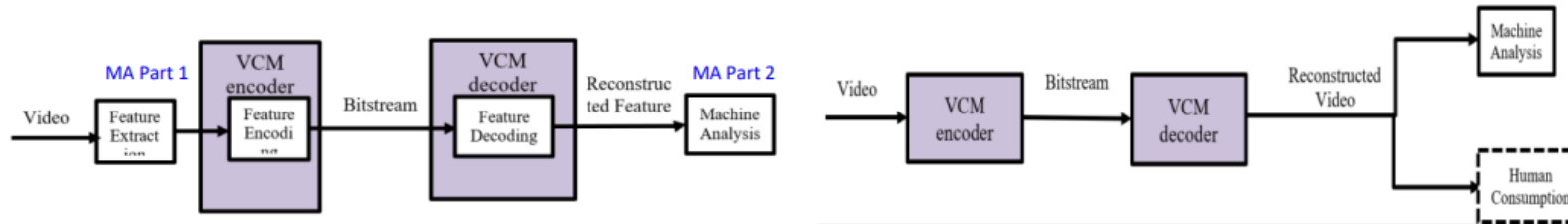
- Recently, camera technology has evolved and new capturing devices are emerging. Such capturing devices can simultaneously acquire dense spatial and angular light information
- Such cameras are expected to be replaced with current cameras to acquire 3-D real-world visual data

- **Objectives:**

- Therefore, a new and compatible compression for such formats would be essential so that new services can be provided

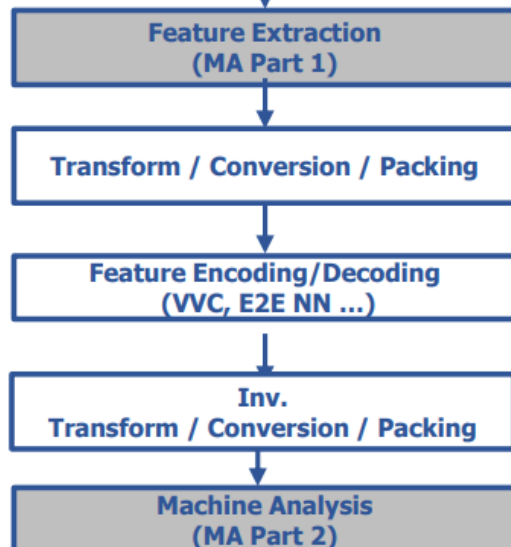


AhG on VCM (Video Coding for Machine)



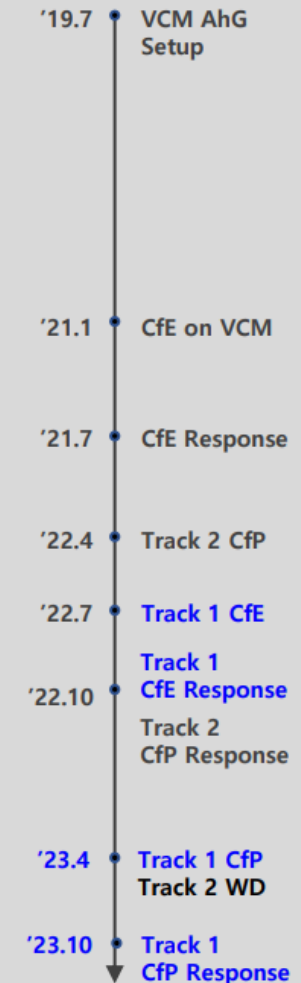
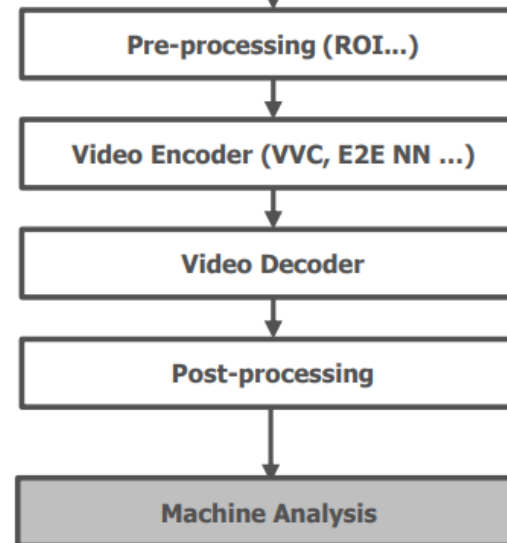
Track 1: Feature Coding (WG2 FCVCM)

- 영상처리 및 딥러닝 과정 중에 얻어지는 **특징벡터(feature)**를 대상으로 한 압축 부호화



Track 2: Image & Video Coding (WG4 VCM)

- 기존 비디오 부호화 기술(vvc)을 이용하면서 **영상의 전후처리**를 통한 압축 부호화



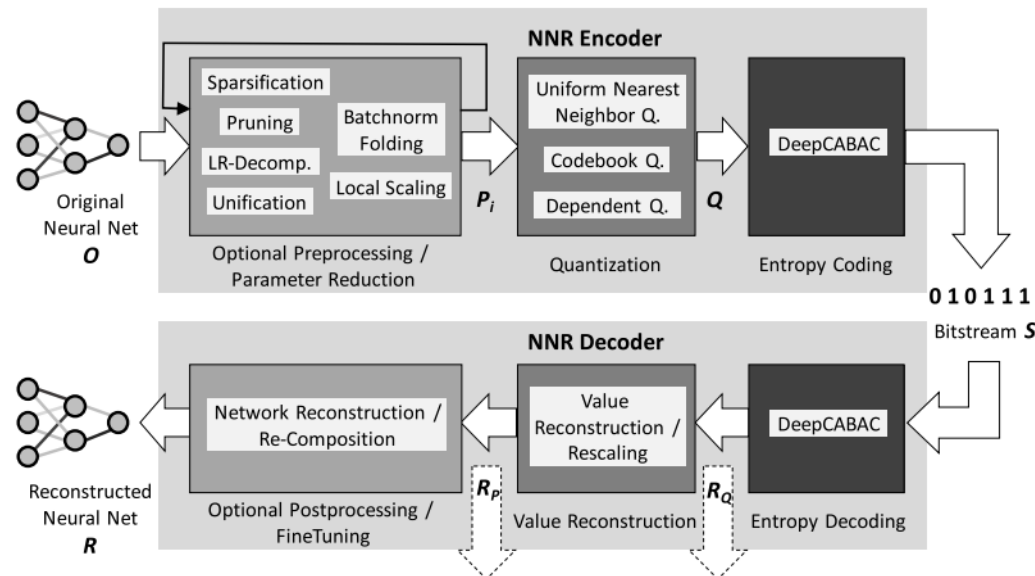
AhG on NNC (Neural Network Compression)

- **Motivations:**

- In many applications the trained NNs (which may contain large amounts of data) need to be transmitted to other systems or terminal devices (with possibly limited computing capabilities), where they are used for inference and/or are updated with local data.
- Thus, efficient representations for exchanging NNs are required

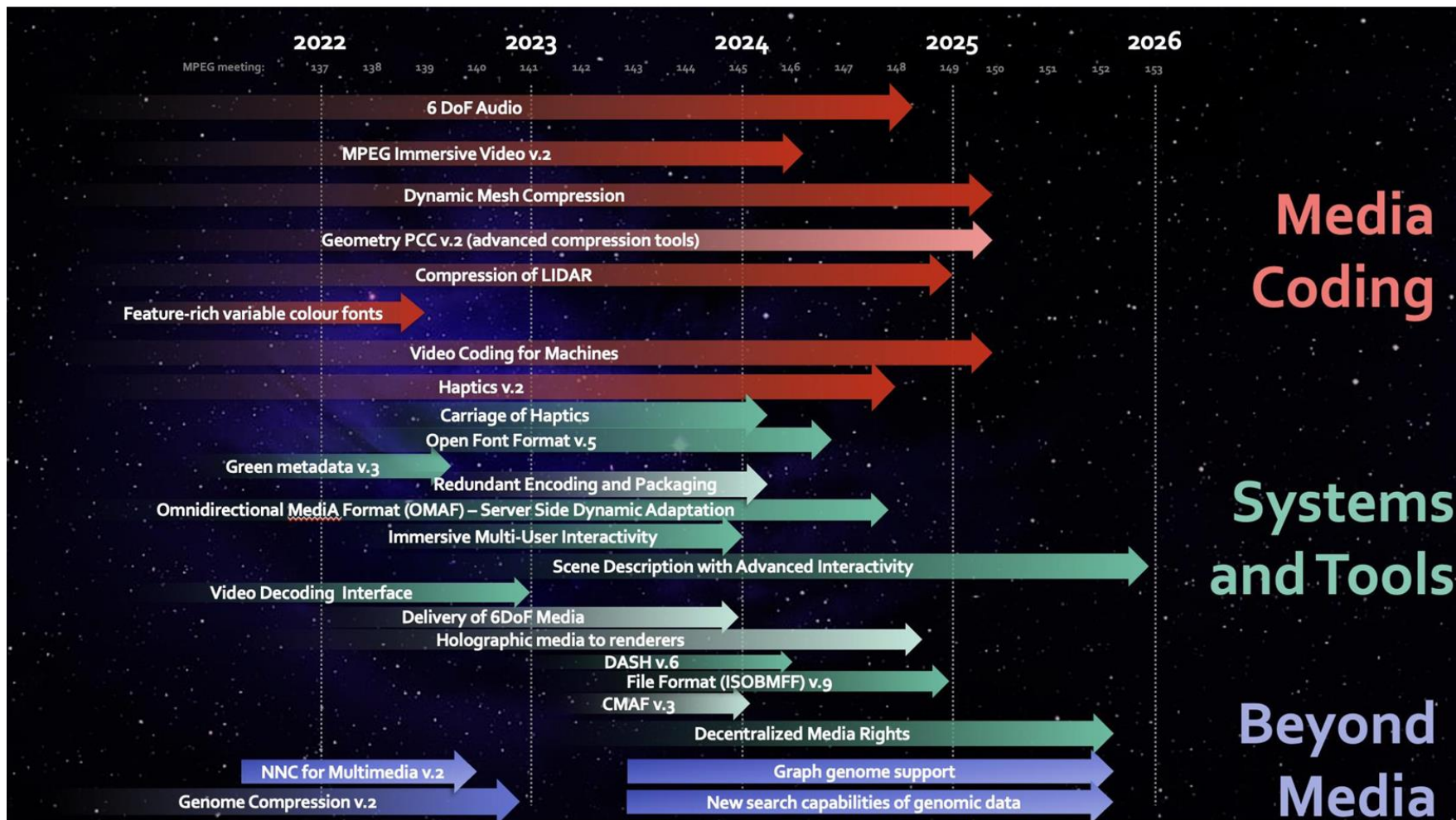
- **Objectives:**

- To identify interfaces where a standard compressed NN representation is needed and the define the requirements for such a representation



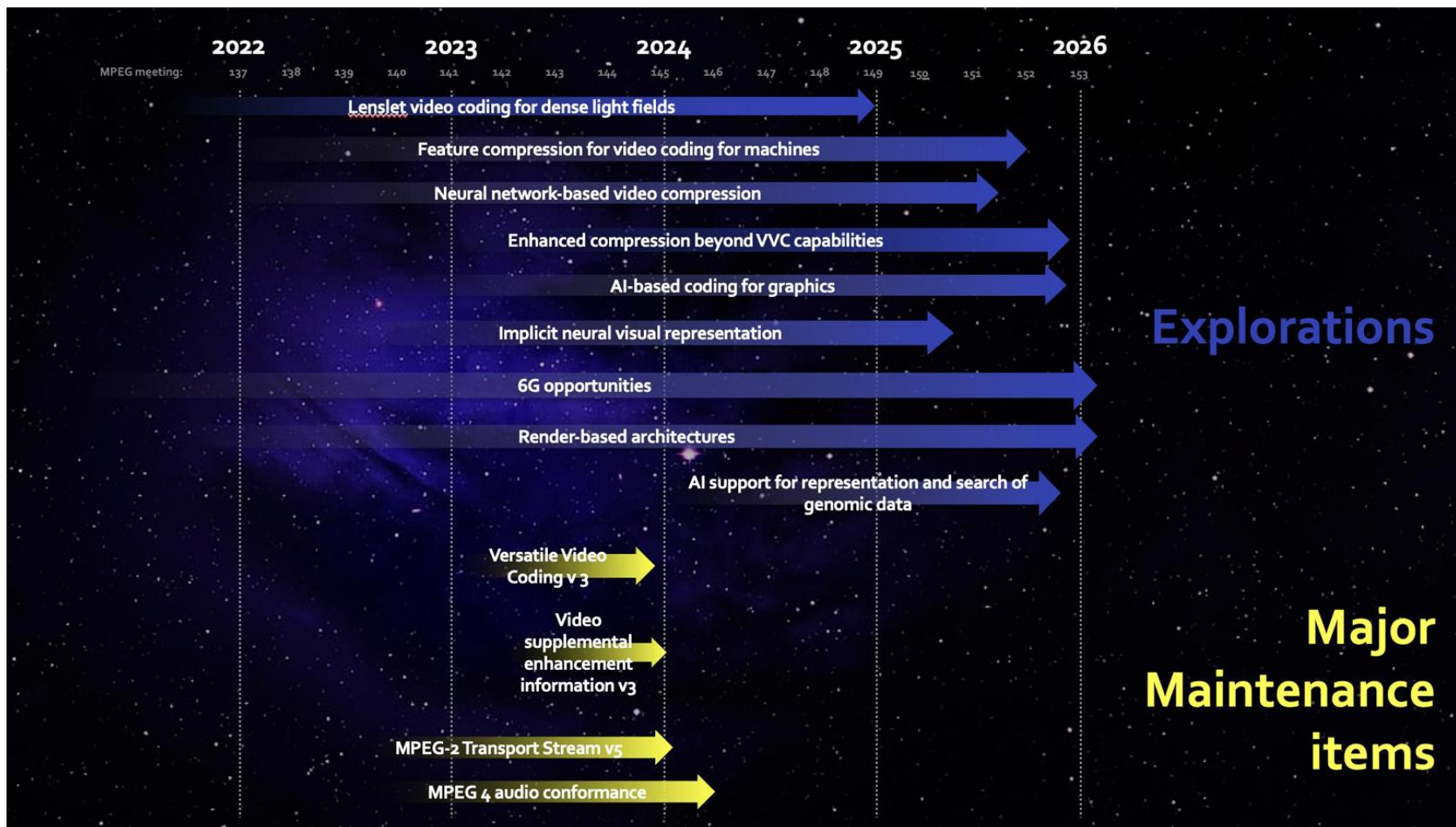
05. 맺음말

MPEG Roadmap



05. 맺음말

MPEG Roadmap



05. 맺음말

MPEG의 과거, 현재 그리고 미래

- 지난 30년간 MPEG-1, MPEG-2, MPEG-4, AVC, HEVC, VVC 최고성능의 비디오/오디오 압축을 위한 표준 제공: 국제 표준 중 가장 성공적인 표준으로 평가됨
- 최근 10년간 가상 현실 비디오 서비스를 위한 다양한 공간 비디오/오디오 압축 위한 표준 개발
- 앞으로 AI 시대 초입에서 AI를 이용한 비디오/오디오 서비스를 위한 압축 기술 표준을 개발 중
- 항상 시대를 선도하는 국제표준을 제공(HD, UHD, VR, AI)



감사합니다.

방건 책임연구원, 한국전자통신연구원
gbangetri@gmail.com