

Introduction to ISO/IEC JTC 1/SC 29

Coding of audio, picture, multimedia and hypermedia information:

The world of JPEG and MPEG

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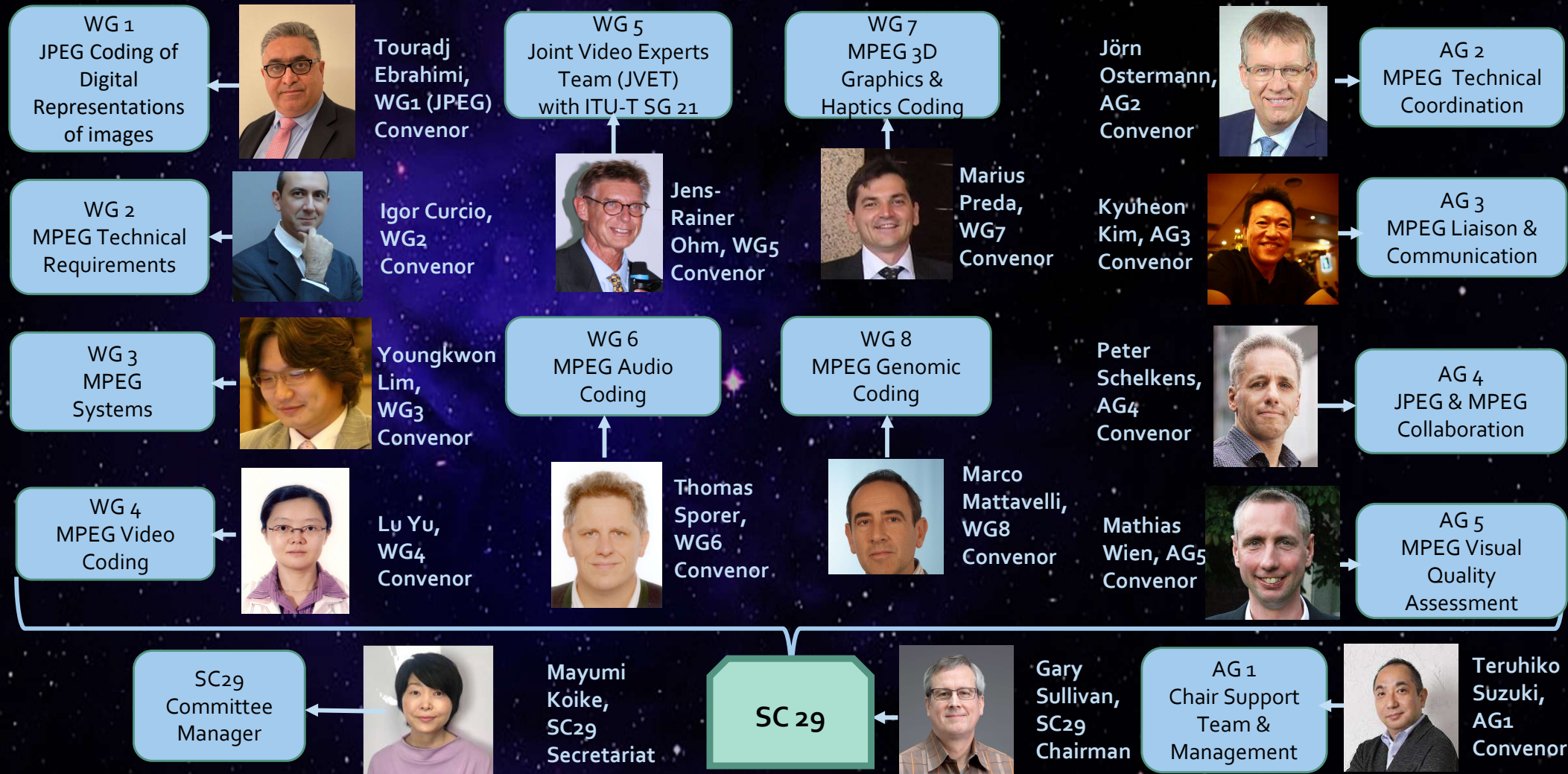


Scope of ISO/IEC JTC1/SC 29

Standardization in the field of

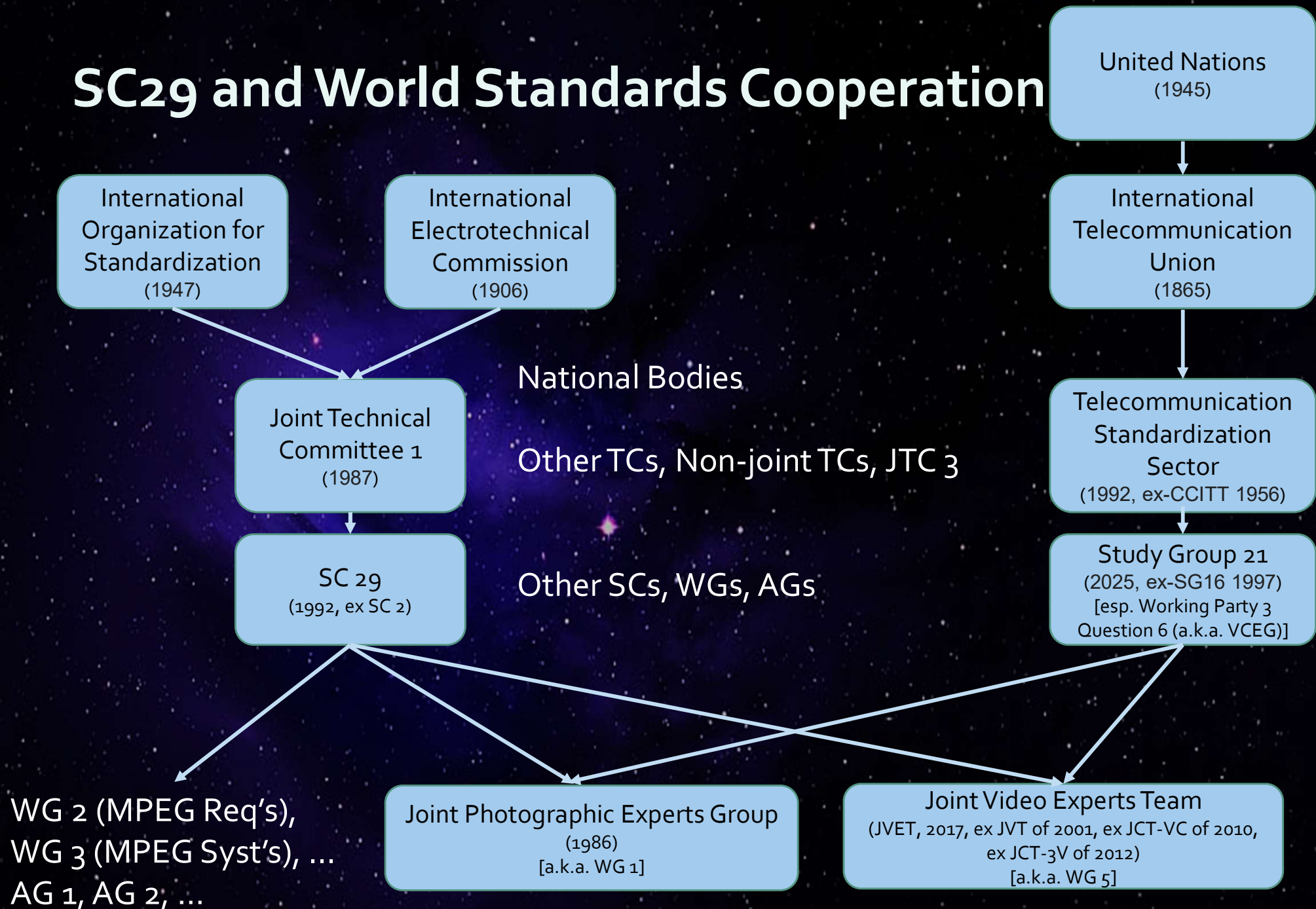
- **Efficient coding of digital representations of images, audio and moving pictures, including**
 - Conventional (natural, computer-generated and immersive) images, moving pictures and audio
 - Invisible light and other sensory (such as medical and satellite) images
 - Static and dynamic graphic objects
- **Efficient coding of other digital information, including**
 - Multimedia, environment and user related metadata
 - Sensor and actuator information related to audiovisual information
 - Other digital data in agreement with the relevant committee, such as genomics
- **Digital information support, including**
 - Synchronization, presentation, storage and transport of single or combinations of media
 - Media security and privacy management
 - Quality of Experience evaluation and system performance metrics

SC29 organization under ISO/IEC JTC1



Updates: As of Feb 2026, Mathias Wien, AG5 Convenor, is also ISO/IEC co-chair-elect of JVET Incoming Chair and Convenors for 2027 to be considered in July 2026 (key AG 3, AG 5, WG 2, WG 3)

SC29 and World Standards Cooperation



Highlights

- About 75 standards under development, more than 600 standards published, 31 P-members, 17 O-members, >1000 experts, ~500 attending WGs quarterly
- Reorganized in 2020: MPEG (WG 11) became MPEG WGs 2-8 and AGs 2, 3, 5
- Most convenor terms and chair term renewed for 2024-2026, one advisory group retirement replacement appointed for 2025
- Highly-prominent standards recognized by ~~nine~~¹⁰ Emmy awards (three ~~4~~ within the last 5 years, ISO Base Media File Format, DASH, and Open Font Format) **+ CMAF**
- Recent standards for Versatile Video Coding, JPEG XL Image Coding, JPEG XS Low-Latency Image Coding, JPEG AI Image Coding, JPEG Trust Authentication & Provenance, 3D Audio, Point Cloud Coding, Neural Network Coding for Media, Immersive Video, Smart Contracts for Media, Common Media Application Format, Genomic Coding, etc.

New areas

- **New areas & explorations:** Media trust authentication & provenance, Video coding beyond VVC capability, Plenoptic & holographic light fields, Lenslet image & video coding for dense light fields, Point cloud coding, Dynamic mesh coding, Avatars for visual communication, Generative face video coding, Advanced genomics features & technologies, image storage as DNA, Visual event coding, Haptics, Non-fungible tokens, Incremental neural network compression, Neural network-based image, video and graphics coding (JPEG AI / NNVC), Audio and video coding for machine analysis, Immersive audio, Media for immersive applications and immersive rendering-based displays, Implicit neural video representation, Neural radiance fields, Gaussian splatting
- **Artificial intelligence / machine learning / neural networks** in media coding and applications is a pervasive recent theme

Rules & procedures

- Basic rules
 - [Directives Part 1 JTC 1 Consolidated Supplement](#) (2024, to change in 2026): Procedures
 - [Directives Part 2](#): Drafting
 - Resources
 - [Drafting Standards](#) & [ISO House Style](#)
 - New: [Online Standards Development](#)
 - [ITU-T/ITU-R/ISO/IEC Common Patent Policy](#)
- WGs are established by SCs to develop work items (Therefore, a WG cannot exist without at least one work item)
- Each WG and AG has a *Terms of Reference* description
- SCs consist of NB *delegations*, operating by P-member *voting*
- WGs consist of P-NB-qualified *experts*, operating by *consensus*
- SCs have (term-limited, Secretariat-selected) *chairs*; WGs have (non-term-limited, NB-nominated, SC-selected) *convenors*

Approval: Committee, Enquiry, Publication

- **International Standards (ISs):** NP/NWIP (12)/Request → [WD] → [CD/CDAM] → DIS/DAM → WG Completion [FDIS/FDAM] → Publication
- **Technical Reports (TRs):** Request (0-4) → [WD] → [CDTR] → DTR → Publication
- The NP/NWIP/Request phase can be somewhat merged with others
- Square bracket stages can sometimes be skipped

Circulation type	Preparation	Translation	Commenting	Total
CD/CDAM/CDTR			8 weeks	8 weeks
(first) DIS/DAM	2 weeks	8 weeks	12 weeks	22 weeks
Subsequent DIS/DAM	2 weeks	(none)	8 weeks	10 weeks
(first) DTR	6 weeks	2 weeks	8 weeks	16 weeks
Subsequent DTR	2 weeks	(none)	8 weeks	10 weeks
DCOR			12 weeks	12 weeks
FDIS/FDAM	6-12 weeks+		8 weeks	~16 weeks

Tools & operations

- **ISO Documents**
 - JPEG extensively uses the Member Area
 - Other groups document working methods there
- **ISO Meetings**
 - All groups should have a 2+ year planning horizon
 - Most meetings use 2 registrations in practice (ISO & Host)
 - WGs & AGs typically have 4 meetings/year (and SC 29 has 2)
 - Most meetings are (best-effort) hybrid
 - ~1 meeting per year has been virtual; this is no longer required
- **ISO Projects**
 - Mostly used by the official editors
- **Online standards development (OSD) new drafting system**
- **jpeg.org & session calendar**
- **mpeg.org & mpeg.expert session calendar and DMS**

Drafting guidance (part 1 of 3)

- Drafting Standards page and Resources on ISO website
- Templates and Rice example (Foreword, Introduction, 1. Scope, 2. Normative references, 3. Terms and definitions)
- House Style guidance
- Verbs
 - “shall” or “is required” is a *command*; don’t use it in a TR or a NOTE
 - “shall not” is similar
 - “should” or “is recommended” is not, but don’t use in a TR or NOTE
 - “may” or “is permitted” is *permission*, not possibility
 - “can” or “is possible” is *possibility*
 - Don’t use “may not”
 - Avoid other words (“must”, “could”, “might”, “needs to”, “has to”)
- When in doubt, avoid using figures
 - If you use them, check and follow the rules
 - Small errors in figures can become problems and cause delays

Drafting guidance (part 2 of 3)

- Lowercase titles, clause/subclause headings, and defined terms
- Use Oxford spelling (also used by the UN and thus the ITU)
 - *organization, signalling, colour, neighbour, but analyse*
- There are special rules for formulae (not “equations”) and pseudocode
- Automatic numbering and cross-references are problematic
- No hanging paragraphs
- No clauses and subclauses called “Introduction” (use “General”)
- Clearly refer to every annex, using “shall” if normative
- Turn off automatic language detection
- Use Canadian (or British) English language identification
- Use Cambria font (Courier New for pseudocode)
- Set field code shading to “always”
- Learn how to edit field codes (use print preview, search “not found”)
- Provide a zipped copy of the software if there is software
- Use the MXM software license; make the license(s) easy to find

Drafting guidance (part 3 of 3)

- Turn on viewing of white space characters
- Turn off automatic capitalization of table cells and sentences
- References go in two different places:
 - Normative references (Clause 2) for documents used as definitions and in “shall” statements
 - Bibliography (at the end of the document) for informatively referenced documents
 - All referenced documents need to be referred to (clearly)
- If the text refers to a specific location in a referenced document, the reference needs to be a *dated* reference
- To refer to the current document, use “this document”
- All defined terms need to be used in the document
- Definitions should not start with “a” or “the”
- Don’t discuss development process or WG or plans in a standard
- Some (not all) standards & TRs can be published for free by request
- There are slightly different rules for joint standards (e.g. with ITU-T)

Some neural network-related projects

- Neural Network Coding published 2022
 - ISO/IEC 15938-17, to compress representation of a neural network
 - 2nd edition 2024 with incremental compression
- JPEG AI learning-based image coding
 - To compress pictures using neural network technology
 - ITU-T T.840.1 | ISO/IEC 6048-1, finished (v1) in 2025
- JPEG Pleno learning-based point cloud coding
 - ISO/IEC 21794-6, finished 2025
- Optimization for machine analysis of coded video content
 - ITU-T H.Supp-MACVC | ISO/IEC CDTR 23888-3
 - Draft Technical Report in progress, to finish mid 2026
- Video Coding for Machines
 - ISO/IEC CD 23888-2, completion 2026
- Feature coding for machines
 - Call for Proposals April 2025
- Neural Network Video Coding exploration in Joint Video Experts Team

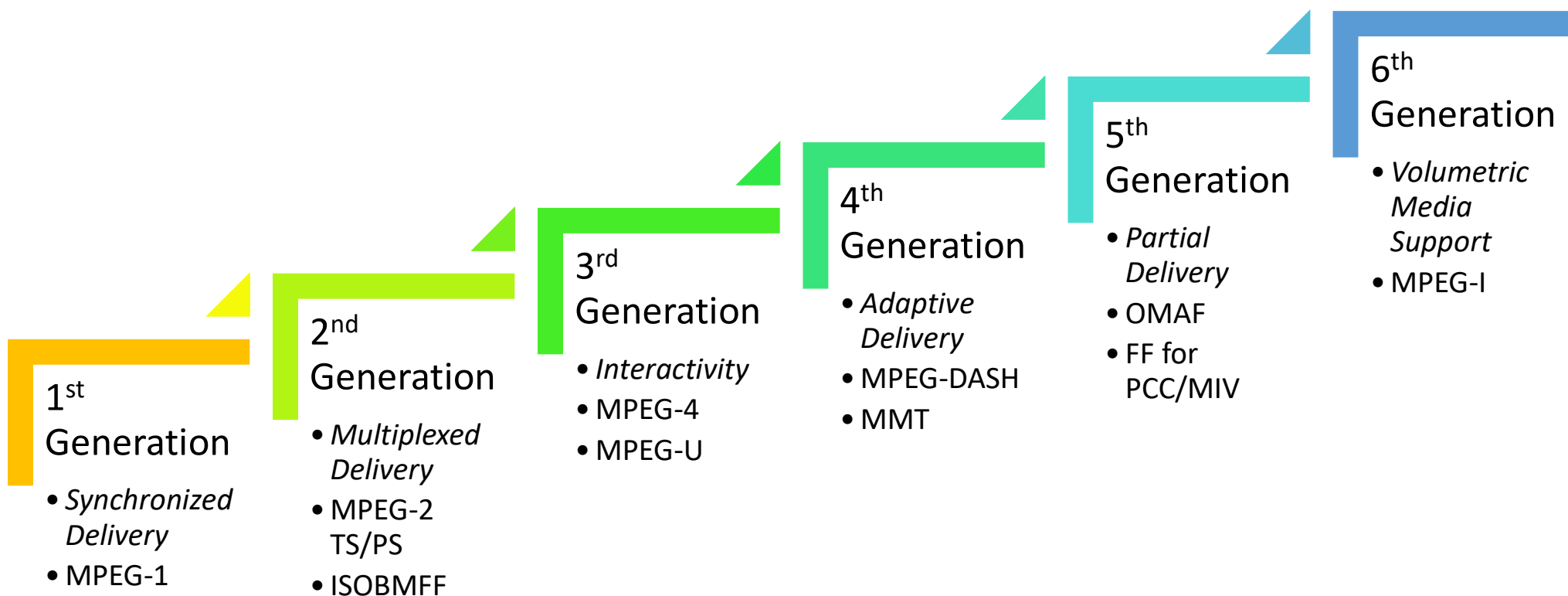
Developments in JPEG AI

- JPEG AI (ITU-T T.840 | ISO/IEC 6048)
 - Version 1
 - Part 1 IS / Recommendation published in 2025
 - Part 2 Profiling IS is issued by WG 1 in July 2025
 - Part 3 Reference Software IS is issued by WG 1 in July 2025
 - Part 4 Conformance DIS under ballot
 - Part 5 File format IS is issued by WG 1 in July 2025
 - Compression efficiency gains between 12.5% to 27.9% over the VVC Intra coding anchor, with a wide range of complexity tradeoffs (7 to 216 kMAC/px) at the decoder side
 - JPEG AI Version 2 is under discussion
 - JPEG AI requirements not yet addressed in version 1, e.g. related to processing and computer vision tasks
 - Significantly improved solutions for JPEG AI requirements already addressed in version 1, e.g. compression efficiency

Developments in video coding

- Versatile video coding (ITU-T H.266 | ISO/IEC 23090-3)
 - Finished (v1 publication) in 2020
 - Now approaching v4, coordinated with VSEI
 - Roughly 50% bit rate savings over HEVC (eq. perceptual quality)
- Low-complexity enhancement video coding ISO/IEC 23094-2 in 2021
- MPEG immersive video ISO/IEC 23090-12 in 2023
- Next-generation video coding exploration in Joint Video Experts Team
 - Enhanced Compression Model: Classical-style signal processing
 - Roughly 28% savings over VVC (random access config.)
 - Neural Network Video Coding
 - Hybrid tools approach
 - Intra prediction
 - Super-resolution
 - Post-filter
 - Loop filter (VLOP 10 kMAC/pxl 6%, LOP 22 kMAC/pxl 8%, HOP 14%)
- Joint Call for Evidence issued: Response evaluation Oct 2025
- Draft Call for Proposals new std: Response submission Nov 2026

MPEG Systems technologies



New ITU Partnering: Biomedical Signals

- Signal examples:

- ECG heart signals
- EEG brainwave signals
- EMG muscle signals



- Standard requested by DICOM WG32 Neurophysiology
- Project launch in ITU-T, being joined by MPEG Audio
- ITU Call for Proposals in April 2024, evaluation January 2025
- Focus on near-lossless to lossless coding
- Draft text and software available
 - Target completion July 2026

Developments in graphics coding

- **Point Cloud Compression**

- Video-based PCC (V-PCC): ISO/IEC 23090-5
Finalized v1 (2023), with ongoing improvements in V3C integration and metadata
- Geometry-based PCC (G-PCC): ISO/IEC 23090-9
Finalized v1 (2023), v2 near publication (support for dynamic sequences, improved inter-frame coding)
- AI-based PCC (AI-PCC): in progress
Leverages learned prediction and compression models, Compression gains demonstrated on sparse/dynamic content

- **Dynamic Mesh Compression**

- Video-based Dynamic Mesh Compression (V-DMC): ISO/IEC 23090-29
in progress – Efficient coding of animated meshes using video codecs

- **Gaussian Splat Representation and Coding (GSC)**

- Exploratory activity under MPEG 3DGC (WG 7) and Video (WG 4)
Focus on high-quality, real-time renderable representations
Aligns with neural graphics pipeline
Dataset and benchmark established; call for proposals expected in 2026

- **Haptics: ISO/IEC 23090-31**

- Compression of haptic timelines and spatial signals

Genomic coding ISO/IEC 23092

- Part 1: Transport and storage of genomic information:
 - Data formats for both transport and storage of genomic information, including the conversion processes and the indexing technology
- Part 2: Coding of genomic information
 - Coding technology for references and genomic reads
- Part 3: Metadata & application formats interfaces (APIs)
 - Information metadata, metrics metadata, clinical data linkage metadata, auxiliary fields, SAM interoperability, protection metadata and APIs
- Part 4: Reference software
- Part 5: Conformance
- Part 6: Coding of genomic annotations
 - Compressed representation of genomic annotations of type: variants with genotyping, functional annotations, tracks, expression and contact matrices (from Hi-C experiments)
- Part 7: MPEG-G application formats and profiles
 - Use case oriented structuring of genomic data and associated profiles



Document status abbreviations

Acronym	Meaning
AMD	Amendment
CD	Committee draft
CDAM	Committee draft amendment
CDTR	Committee draft technical report
COR	Corrigendum
DAM	Draft amendment
DIS	Draft international standard
DTR	Draft technical report
DCOR	Draft corrigendum

Acronym	Meaning
FDIS	Final draft international standard
FDAM	Final draft amendment
IS	International standard
NP	New project
NWIP	New work item proposal
TR	Technical report
WD	Working draft