Review of Advanced Coding

- JPEG2000
- H.264
- MPEG-21

What is JPEG 2000?

- JPEG 2000 is a wavelet-based image-compression standard, developed by the same ISO committee that previously developed JPEG, although with a different group of participants and contributors.
- JPEG 2000 was conceived as a next generation image compression standard that would improve on the performance of JPEG while, more significantly, adding features and capabilities not available with Baseline JPEG compression.

Why use JPEG 2000?

- Open Standard
  - Royalty free
- One master supports multiple derivatives
  - One file for both lossless and lossy data
  - Progressive display and scalable rendering
  - One algorithm for both lossless and lossy compression
- Region-of-Interest (ROI) on coding and access
- Easily handles large images
  - Multiple components and high bit-depth images
- Generous metadata support

JPEG 2000 Standard - Parts 1-6

Part 1: Core Coding System

Part 3: Motion JPEG2000

Part 4: Conformance Testing

Part 6: Compound Image File Format

Part 2: Extensions

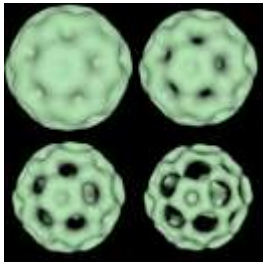
Part 5: Reference Software

JPEG 2000 Standard - Parts 8-13

Part 8: JPSEC
Secure JPEG2000

Part 9: JPIP
Interactivity Tools

Part 10: JP3D
3D & Floating Pt



Part 11: JPWL
Wireless

Part 12: ISO
Media File Format

ISO

Part 13: Entry-Level
JPEG2000 Encoder

Encode

Key

Under Development

Published

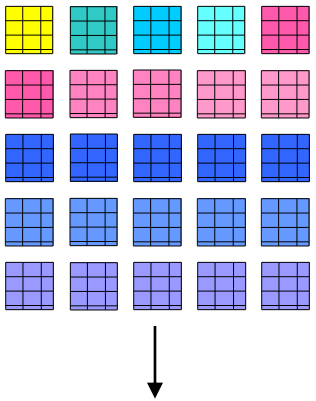
One Master → Multiple Derivatives

- A single JPEG2000 master can serve multiple uses
  - Scale by resolution
    - Thumbnail image
    - Screen resolution image
    - Print quality image
  - Scale by quality
    - Lossless → Lossy
    - Preset file size
- Key enabling technologies
  - Wavelet transform
  - Embedded block coding

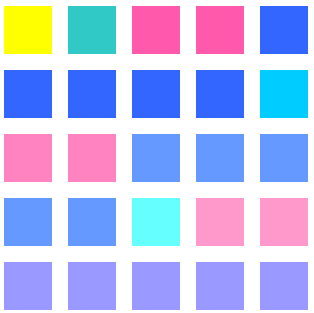
One Master → Multiple Derivatives

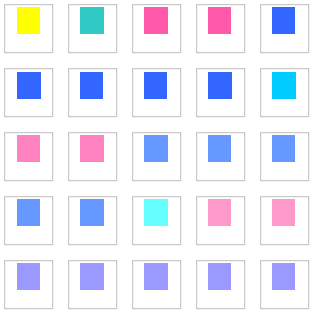
Master Image

Derived Image



Packets reordered by layer





Region of Interest Selected

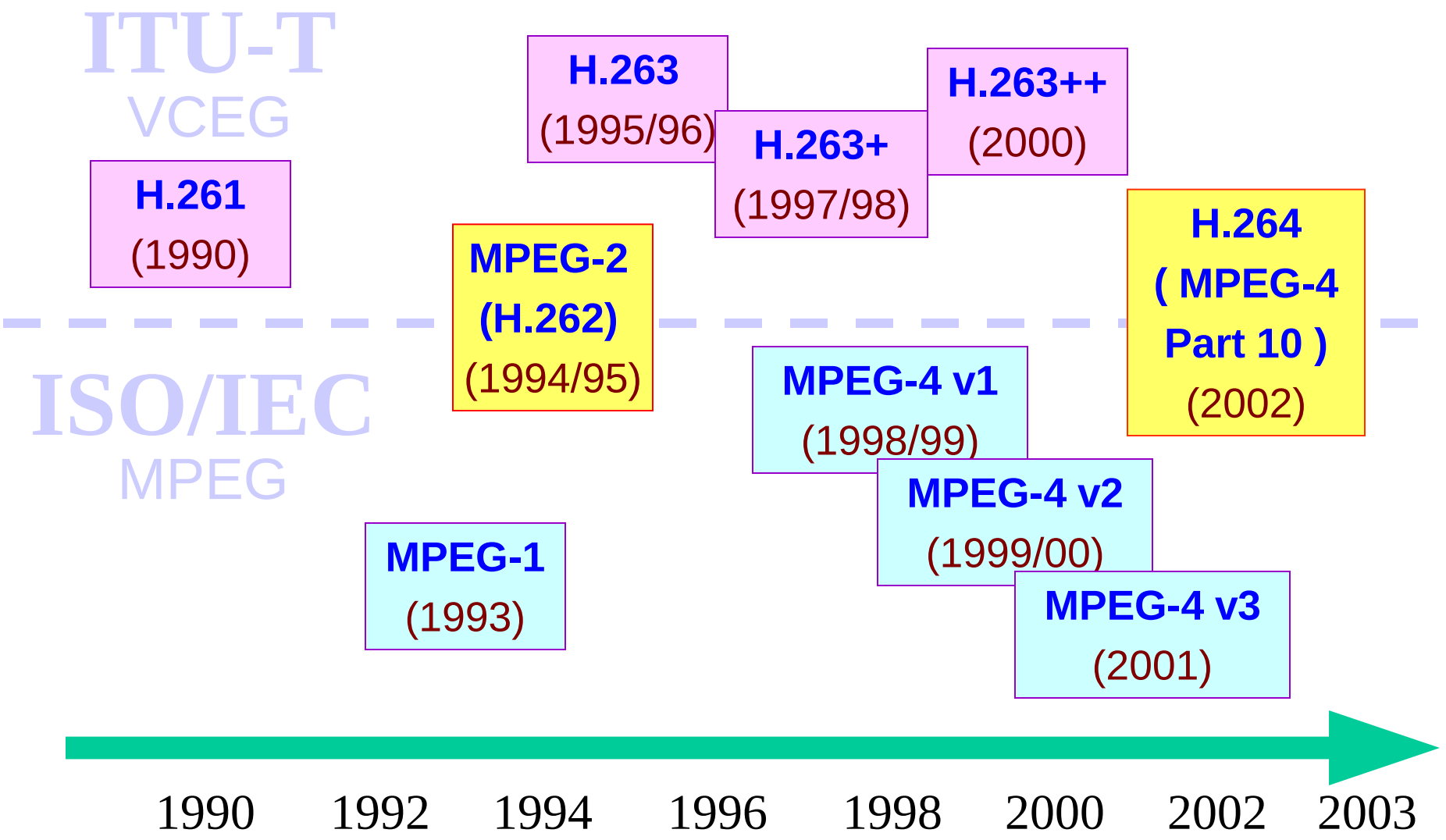
JPEG 2000 File Format Family

- JP2 (JPEG 2000 Core, Part 1)
  - Single image, continuous codestream
- JPX (JPEG 2000 Extensions, Part 2)
  - Multiple codestreams, possibly fragmented

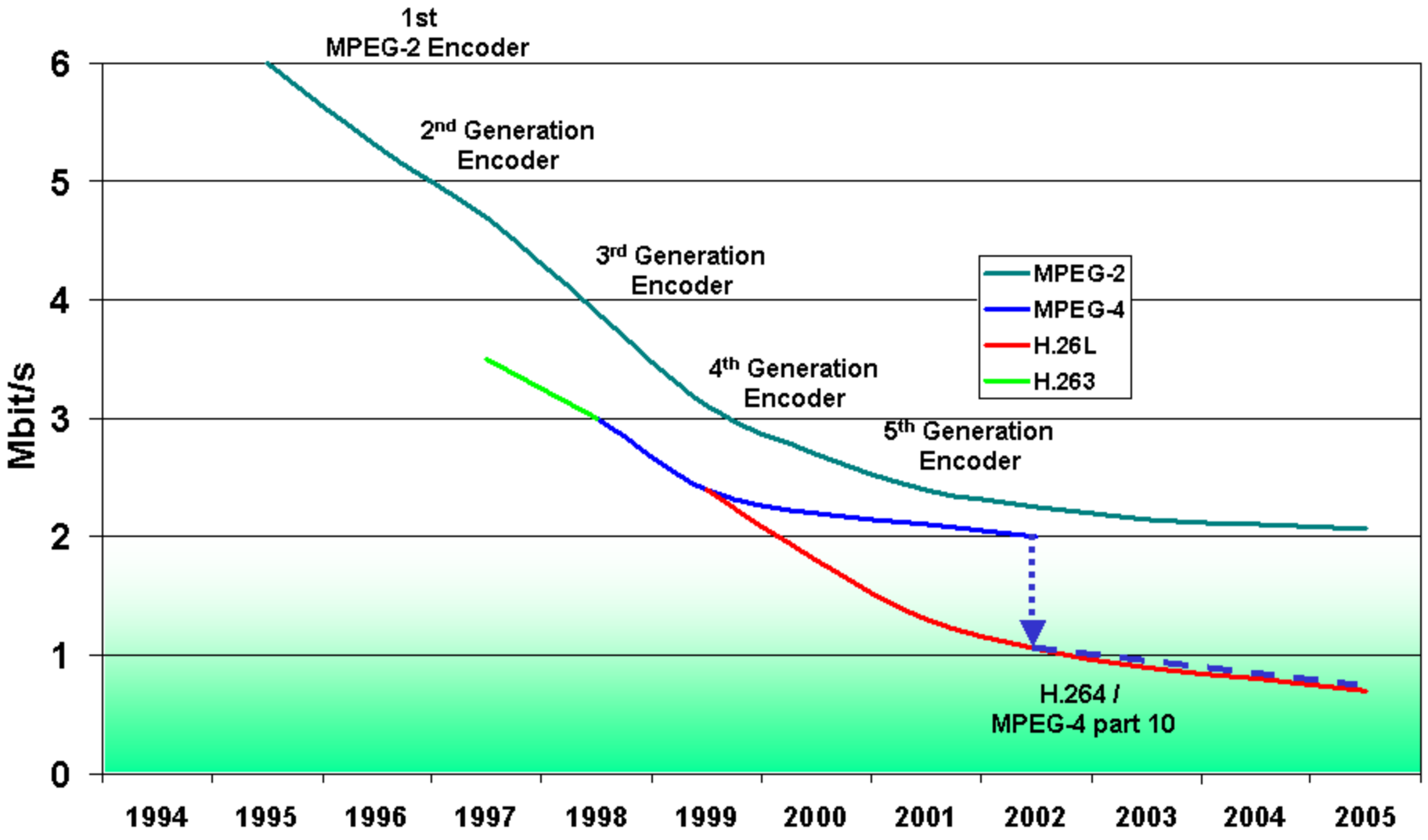
- MJ2 (Motion JPEG 2000, Part 3)
  - Timed sequence of JPEG 2000 images
  - Intra-frame coding only

- JPM (JPEG 2000 Multi-Layer, Part 6)
  - MRC model for compound document images
  - Multiple images (binary and contone) and pages

Chronological Table of Video Coding Standards



Position of H.264



MPEG-21: putting it all together

From the MPEG-21 Proposed Draft Technical Report:

“ Many elements exist to build an infrastructure for the delivery and consumption of multimedia content. There is, however, no 'big picture' to describe how the specification of these elements, either in existence or under development, relate to each other. The aim of MPEG-21 is:

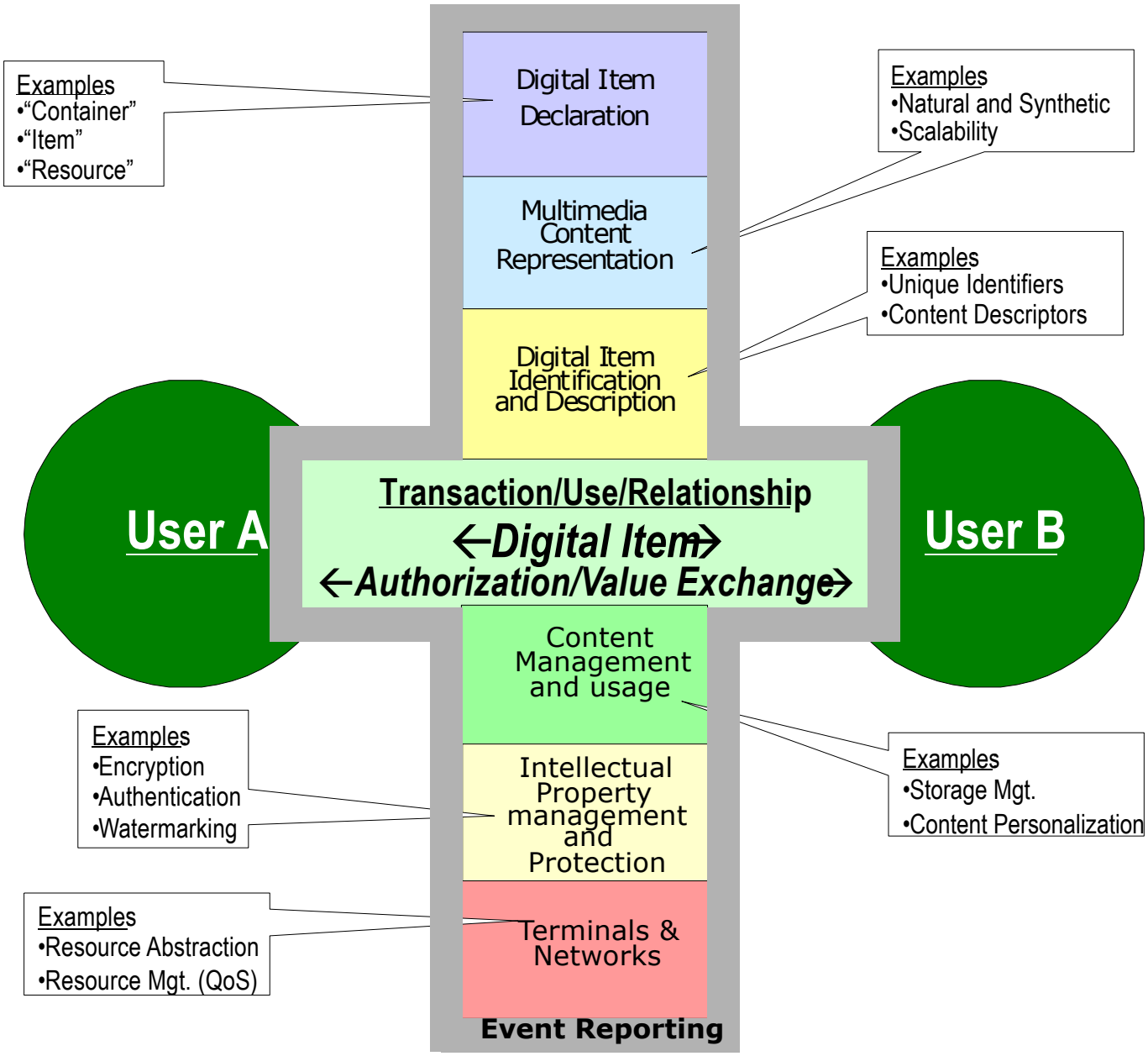
1) to understand if and how these various components fit together and

2) to discuss which new standards may be required, if gaps in the infrastructure exist and, once the above two points have been reached,

3) to actually accomplish the integration of different standards. ”

- In MPEG-21, all Users have Rights and Interests
  - And they all need to be able to express those

Pictorial overview of MPEG-21



Demos of JPEG2000