Future of Video Evolution

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Who is Toshi Ogura?

- **Toshiyuki (Toshi) Ogura**
  Chief Distinguished Engineer
  Technology Strategy Section, Sony Visual Products Inc.

- **career:**
  1983 join Sony, TV deflection engineer
  1997 transfer to USA, TV model leader
  2004 back to Tokyo, TV common chassis manager
  2007 Digital Imaging, Technology Strategy
  2011 HQ, Technology Strategy, R&D Planning
  2012 Home Entertainment Technology Strategy → now

- **specialty:** **value architect**
  creating a new value of technology by the bird view architecture

- **now:** **evangelist**
  As **HDR evangelist**, building entire HDR ecosystem which includes all of related industries, and propagating to each market.
  As **Product evangelist**, propagating Bravia technologies to the market
Up to now, video format evolution means data rate growing, SD, HD, and 4K.

It is still on going, but next generation is really 8k?

Many people say 4K is enough for regular customers.

Does this mean 4K is the real final goal for TV, and only price erosion is the future of TV?

What's happening now, and what will be happened in the future? Let's investigate about that!
Presentation of MPEG Strategic Standardisation Roadmap (Draft)

- ('93) Sky in UK
- ('94) DirecTV in US
- ('96) PerfectTV in JPN
- ('98) ATSC in US
- DVB-T in UK
- ('03) ISDB in JPN

- Revolutionised TV distribution
- MPEG-2 Video & TS
- MP3

- Default for media exchange of digital media
- Default for media
- Exchange of digital media

- ('05) Enables Custom fonts on Web & in Digital Publishing
- ('10) Enables HD in services and stored media
- ('15) 4K @OTT

- ('16) 4K/8K satellite test in JPN

- 4K/8K satellite test
- in JPN

- DVD

- UHD-BD

- HEVC
- OFF
- MP4 FF

- Basis for next generation digital TV services
- Basis for next generation digital TV services

- DASH
- MMT
Five elements for video quality towards 'REAL'

- **Resolution**
  - 8K
  - 4K
  - 2K
  - HD
  - SD

- **Color Depth**
  - 12bit
  - 10bit
  - 8bit
  - 6bit

- **Frame Rate**
  - 120p
  - 60p
  - 24p
  - 60i

- **Color Space**
  - sRGB
  - DCI P3
  - BT.2020
  - HDR
  - SDR

- **Dynamic Range of Data**
  - Luminance

Sony Visual Products
HEVC @4K-TV

Resolution
- 8K
- 4K
- 2K
- 4K
- 2K
- 8K
- 4K
- 2K

Color Depth
- 12bit
- 10bit
- 8bit
- 6bit

Frame Rate
- 60p
- 120p

Temporal Resolution
- Horizontal
- Vertical

Color Space
- sRGB
- DCI P3
- BT.2020
- HDR
- SDR

Brightness Range
- Luminance

Sony Visual Products
Sony New 4K HDR TV Z9D series

Backlight Master Drive™

TRILUMINOS DISPLAY

4K HDR Processor X1 Extreme

4K HDR
- Previous evolution = increasing **only resolution**
- Recent evolution = improving **all items**
- **Different requirement** by different content
- Final target = 'REAL'
- Different paths to 'REAL'

- More compression, and flexibility
- VR, AR, MR = toward real
- Internet Streaming = band limitation
- Mobile First = multi device
- Content Ecosystem = more complex

- more compression and complexity
future in the movie

- **Space Odyssey ('68)**
  - flat panel display, tablet

- **Star wars ('77)**
  - hologram

- **Matrix ('99)**
  - direct brain access

- **Surrogates ('09)**
  - real time avatar communication
near future seems complexed
  • but, just the beginning

final future goal = **Light Field**
  • great visual experience with picture reality, real three dimensional viewing, real visual field
  • real, virtual fusion
  • much more data for more dimensions
  • great technologies evolution of capture, transmission, display

completely new transmission technology
  • current: A/D, data compression, D/A ← not the case for future
  • future: **new method**, e.g. polygon, object base
  • **new ecosystem**: production ~ distribution ~ client
Thank you for your attention