

Future of Video Evolution

Technology Strategy Dept., Sony Visual Products

Toshi Ogura

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- **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

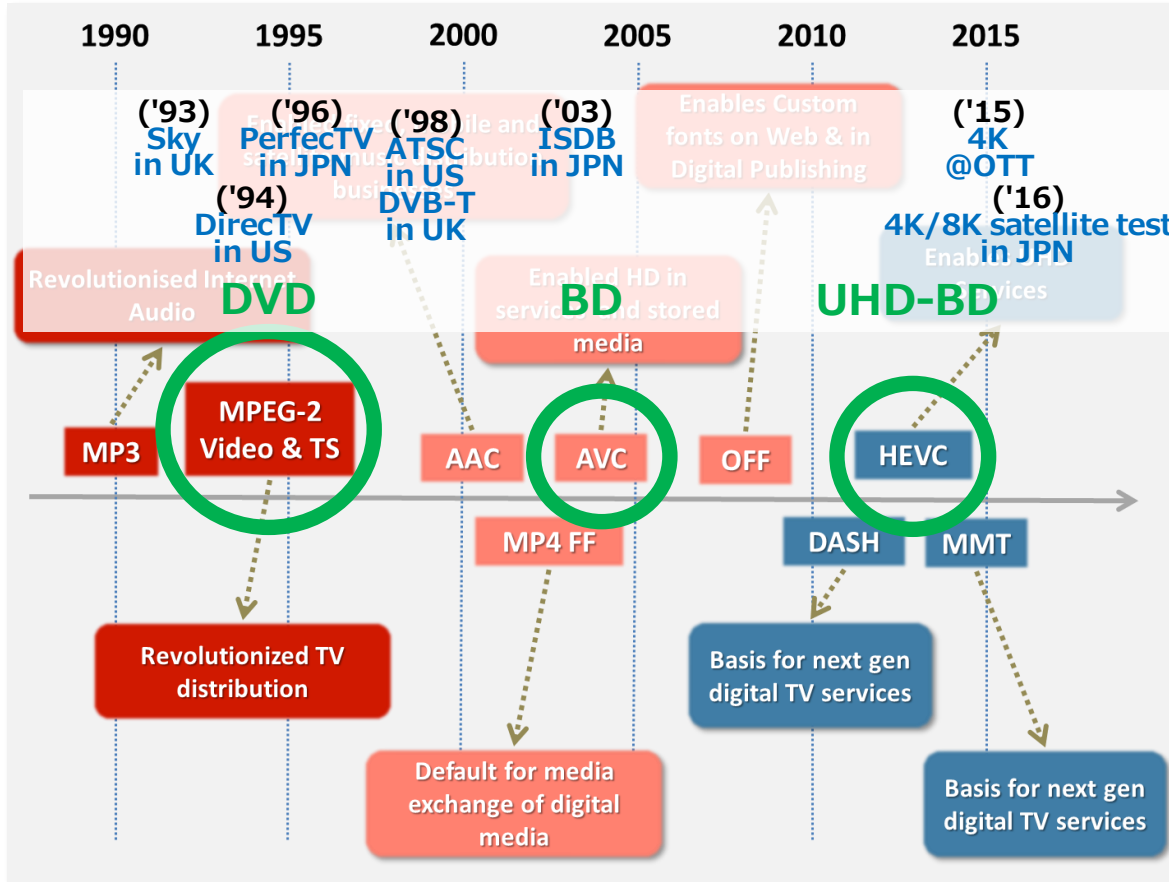
- **now: evangelist**

 - 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!



INTERNATIONAL ORGANISATION FOR STANDARDISATION
 ORGANISATION INTERNATIONALE DE NORMALISATION
 ISO/IEC JTC 1/SC 29/WG 11
 CODING OF MOVING PICTURES AND AUDIO

ISO/IEC JTC 1/SC 29/WG 11 N16355
 Geneva, CH - June 2016
 See presentation in annex ZIP file

Source: WG11
 Title: Presentation of MPEG Strategic Standardisation Roadmap
 Status: Draft

Presentation of MPEG Strategic Standardisation Roadmap (Draft)

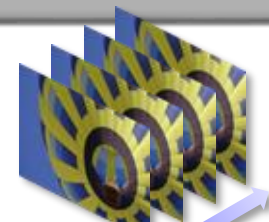
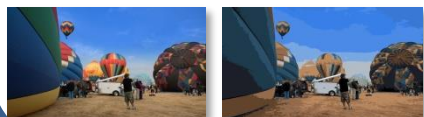
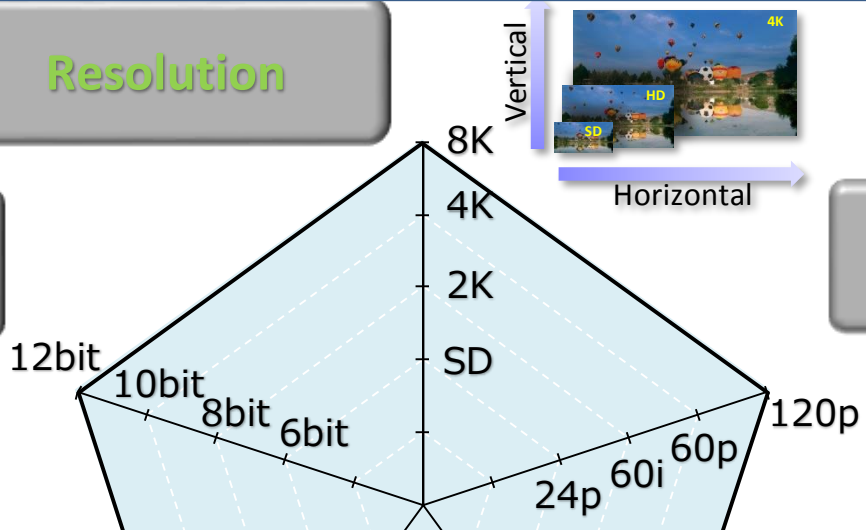
Five elements for video quality towards 'REAL'

Resolution

density of data

Color Depth

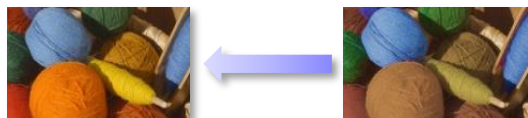
Frame Rate
Temporal resolution



dynamic range of data

Color Space

Brightness Range
Luminance



BT.2020

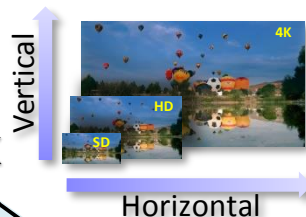
HDR

sRGB

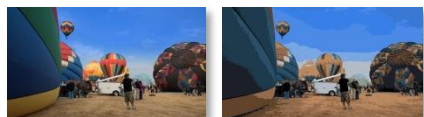
SDR

DCI/P3

Resolution



Color Depth



Fine ← Depth → Course

12bit

10bit

8bit

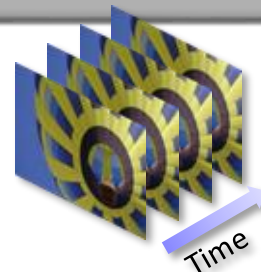
5bit

SD

60p

120p

Frame Rate
Temporal resolution



Color Space

sRGB

SDR

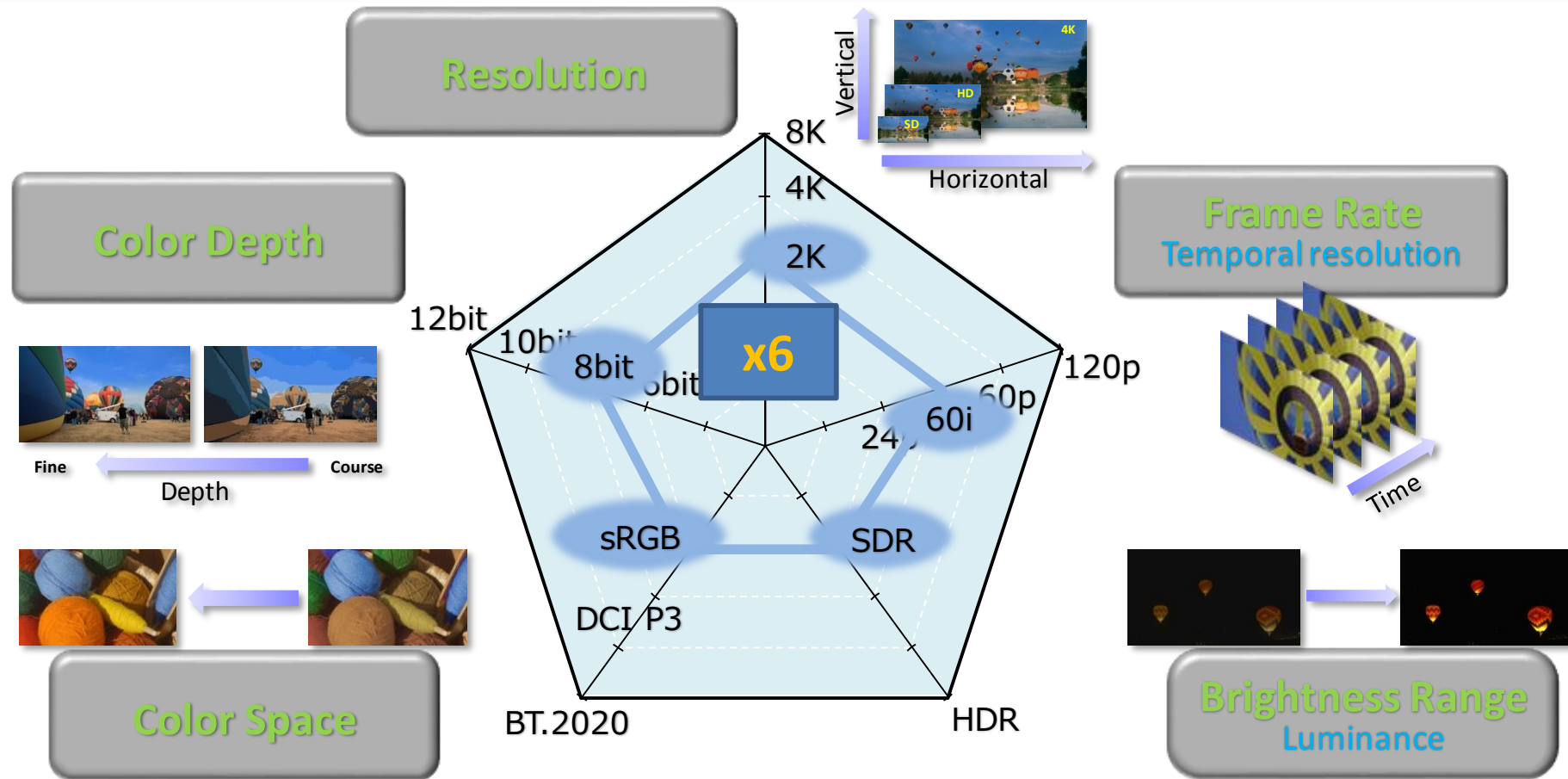
DCI/P3

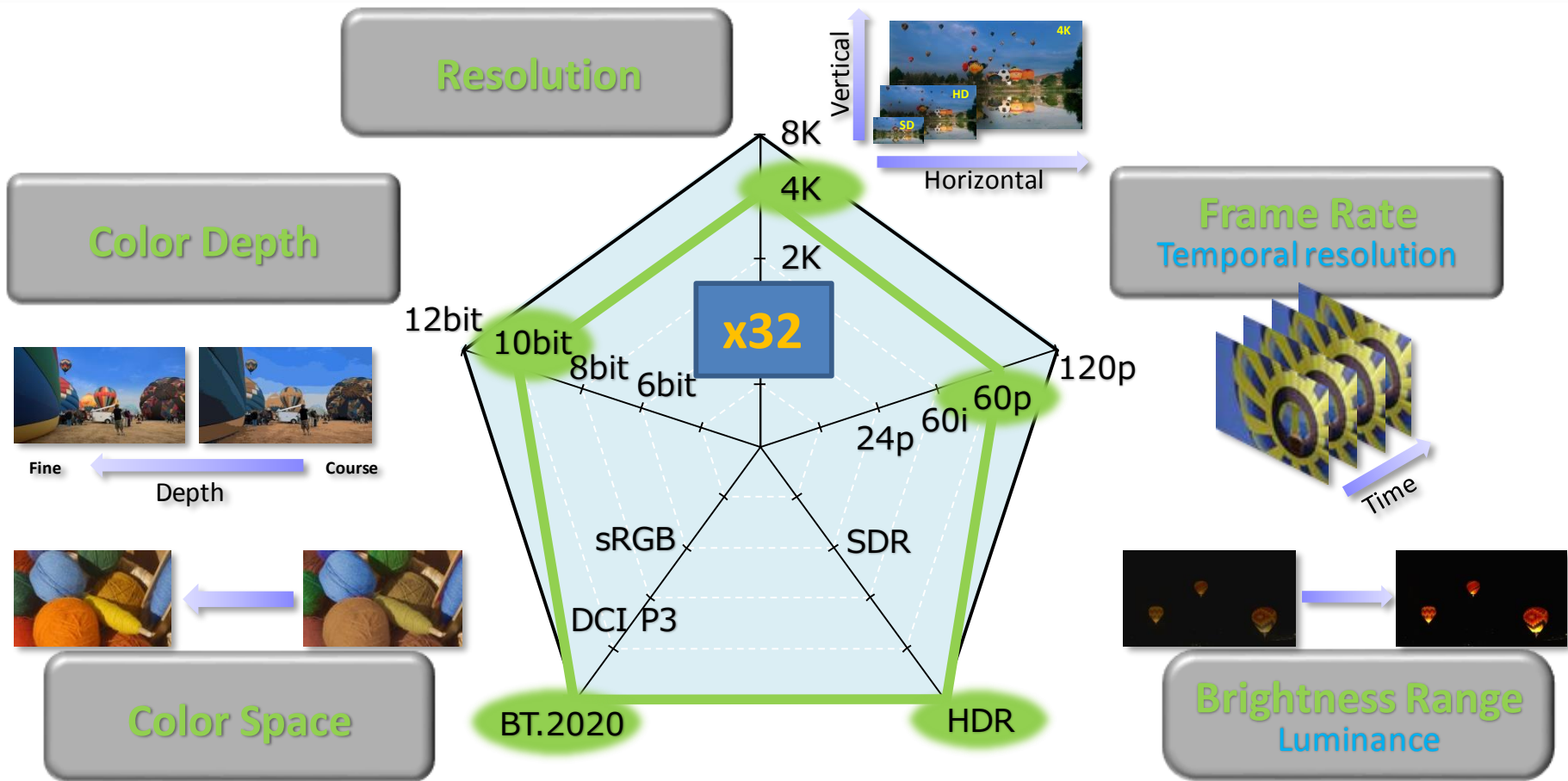
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HDR



Brightness Range
Luminance







Sony New 4K HDR TV Z9D series



Backlight Master Drive™



4K HDR Processor
X1 Extreme



- 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**

- **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

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