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What evolution of content forms should cable networks anticipate?

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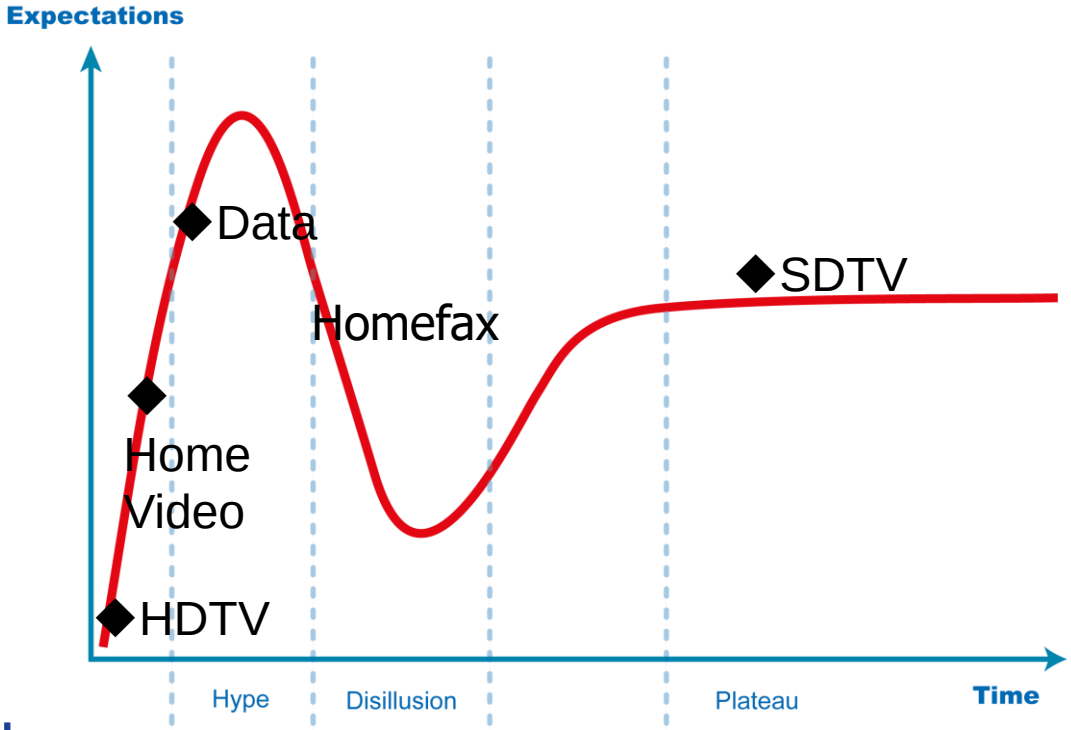
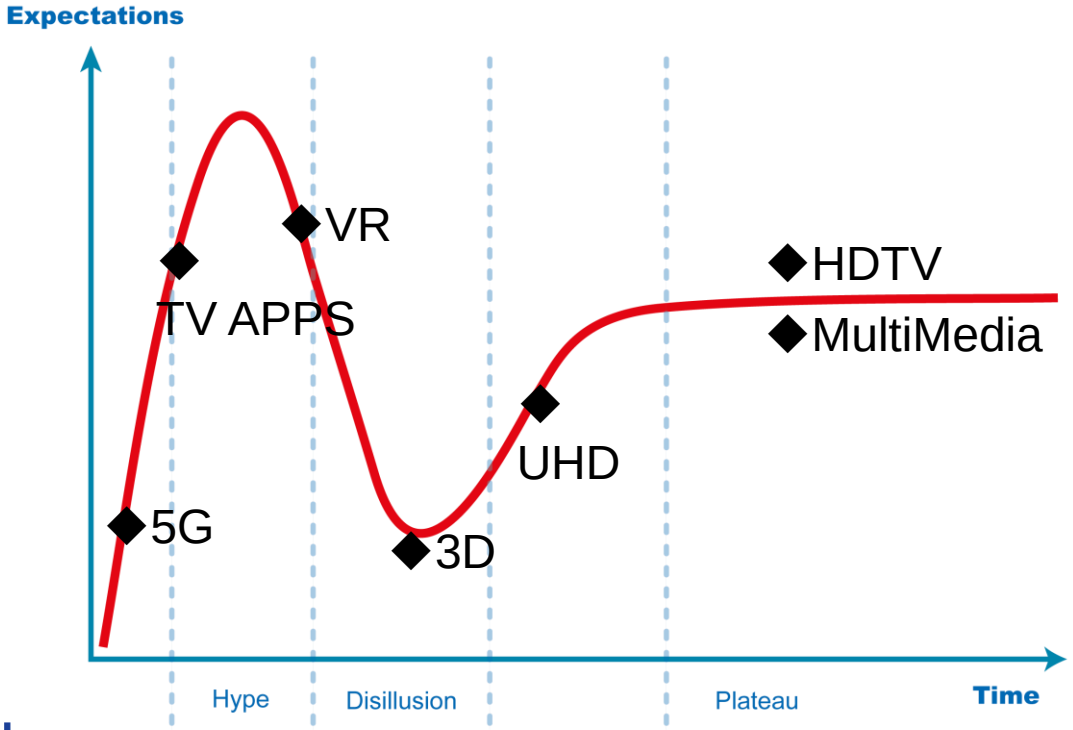
WHERE WAS BROADCAST TECHNOLOGY IN/ABOUT 1967?



- **SDTV Colour TV** (PAL, SECAM, NTSC) already well developed
- **HDTV idea** already there (Dr Takashi Fujio, in1964)
- **Data broadcasting** nearly there - in early 1970s (Teletext, Captain, Antiope)
- **Data services by telephone lines** nearly there – in early 1970s (Viewdata, Videotext)
- **3D slide HMDs**
- **Home video recording** not far away

WHAT IS BROADCAST TECHNOLOGY IN 2017?



- **HDTV** relatively well developed
- **UHDTV** services started
- **Broadcast multimedia** delivery widely available
- **Internet multimedia** delivery widely available
- Early **Virtual Reality services**

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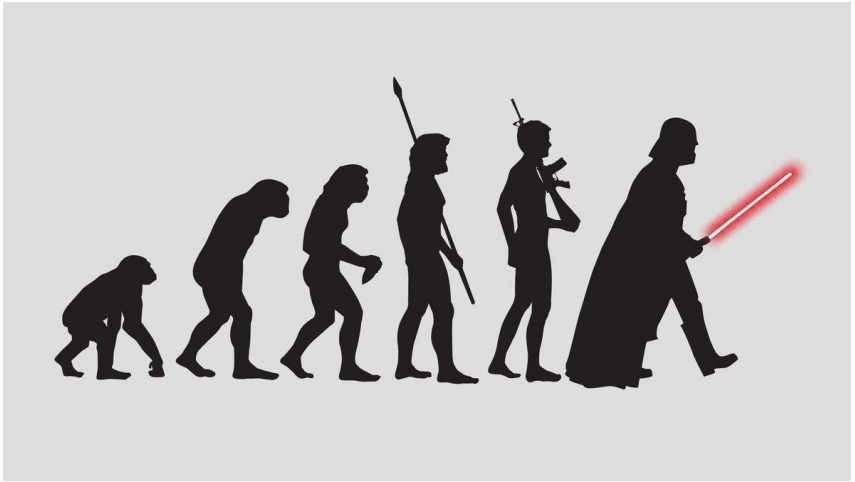
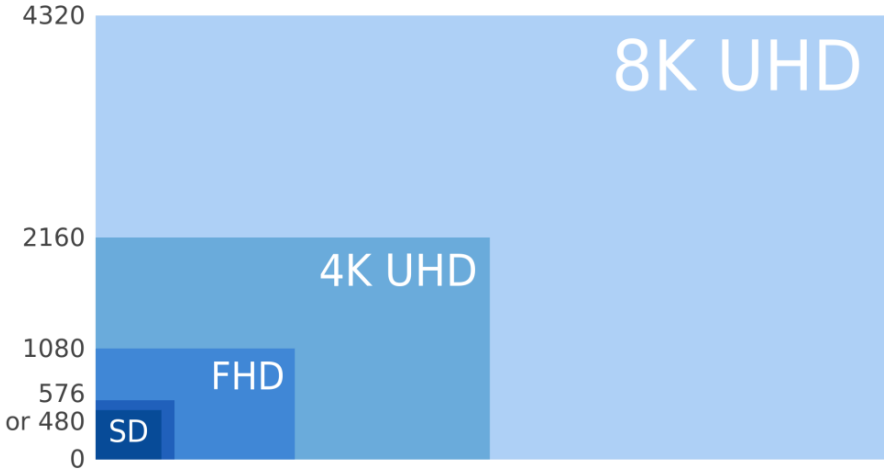
Which forms are evolving?

- Video formats and systems
- Audio formats and systems
- New media forms: virtual reality
- New media forms: augmented reality
- Access systems
- Voice activation
- Hybrid systems
- 3DTV



Video formats



- Image quality continues to increase
- A number of parameters that contribute to quality are involved: image resolution, frame rate, dynamic range, colorimetry.
- New formats use 1080p1920 as building block
- 2K, 4K, 8K, 12K, 16K, 32K, HDR, HFR in prospect?
- Basic specs. **ITU BT. 2020, BT 2100.**

IMAGE RESOLUTION

What does “more of the same mean” here?

System	H. res	V. res	Pixels per frame	Compressed Bit rate H264	HEVC	Next Gen. Comp.
1080p	1920	1080	2,073,600	10	?	??
4K	3840	2160	8,294,400	30	?	??
8K	7680	4320	33,177,600	90	?	??
16K	15360	8640	132,710,400			
32K	30720	17280	1,194,393,600			
64K	61440	34560	2,123,366,400			
128K	122880	69120	8,493,465,600			

GREATER IMAGE RESOLUTION – AN INEVITABLE TREND?

- Why more detail?
- “Simple acuity (60c/d)” is not all there is. “Hyper acuity (120c/d)” for feature localisation may also be important.
- Depth perception is improved by better texture gradient.
- There is degradation between the camera and the TV screen and domestic TV sets vary in quality.
- Cinema wide screen aspect ratios can be attractive.
- Bigger numbers always appeal to the public.
- Compression technology continues to improve.

Audio formats

- New concepts in audio – the ‘sound element’ sound plus metadata
- Receiver renderer translates to LS signals
- Channel based coding
- Scene based coding (ambisonics)
- Object based coding
- **ITU-R BT 2051**

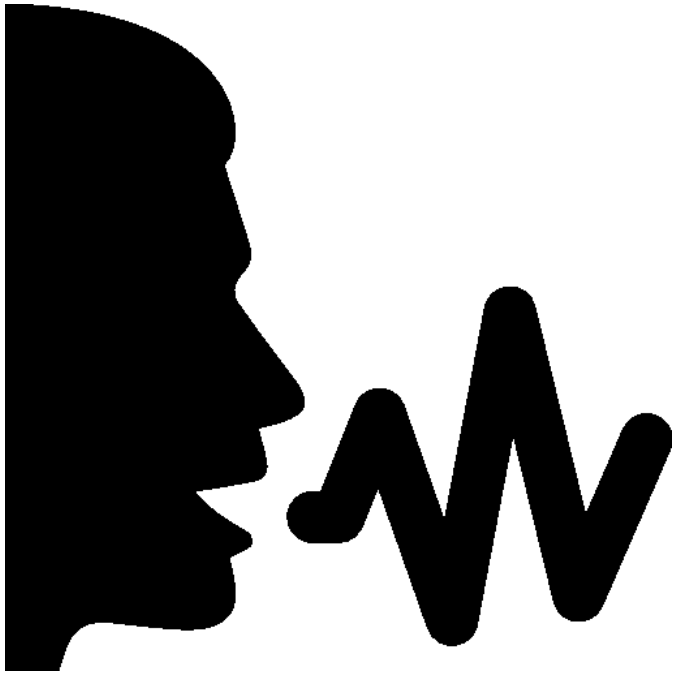
Access Systems

- Subtitle systems - TTML based systems (for UHDTV)
- Audio descriptions (closed).
- Signing (open and closed).
- Clean audio (Rx or transmit).
- Multiple options using NGA for new services
- W3C/IRG AVA

Integrated/Hybrid Systems

- Combination of linear and non linear content
- Companion screens
- Plurality of standards – HbbTV, Hybridcast,...
- Latest systems have arranged time synchronisation
- **ITU-R 2267**

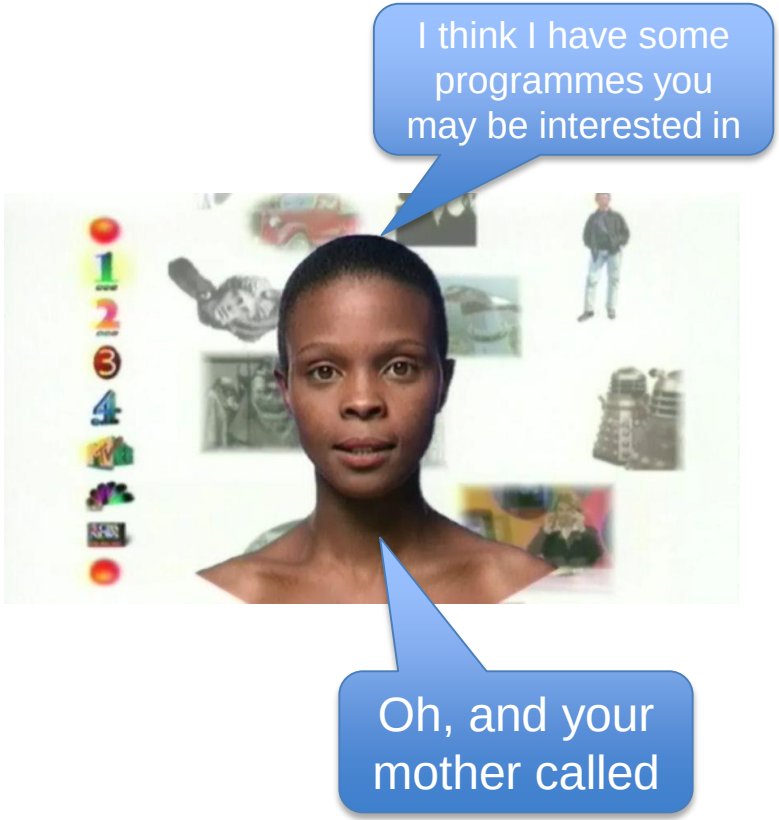
Voice activation



- AI and IoT used
- Control of media system
- Advice and suggestions
- Will take time to develop universally -7000 different spoken languages
- May become a “gatekeeper” for content

PERSONALISATION AND VOICE ACTIVATION

- Voice activation will become more and more important for everything, including television and media.
- But we will need more sophisticated ‘agents’ in the TV set – a friendly face that recognises you, listens to you, and talks to you.



3D TV?

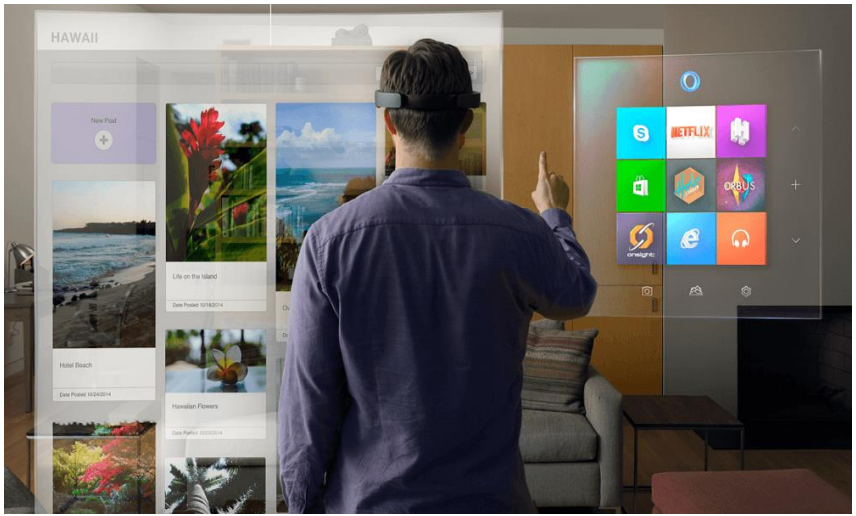
- Simple stereoscopic L and R eye images systems did not prove popular
- Unwieldy glasses, unsuitable for multitasking, and fatigue of the visual cortex. Horizontal disparity only
- Future systems need to provide more object wave information (phase) and both horizontal and vertical disparity
- New tools being developed such as Integral TV
- **DVB standards**

Virtual reality

- 360 video
- 3DoF (Head movement only)
- 6DoF (Head and body movement)
- Mono and stereoscopic video
- **JTC1 MPEG OMAF**
- Limited content duration
- May be a niche

Augmented Reality

- Addition of multimedia to image
- IEEE standards activity
- Mixed Reality – combines two realities
- Uses in both programme production and programme distribution
- Can be used for access services
- May be a niche



Conclusions

- Important for the developers of cable networks to take into account the evolution of content technology.
- Public expectations rise as the public educates itself to its viewing context.
- Most important is to develop systems that can adapt to evolving content forms.
- The most critical evolution is probably image quality and personalisation.

THANK YOU FOR LISTENING!

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