




EBU TECHNICAL

3D-TV if, when, and how?

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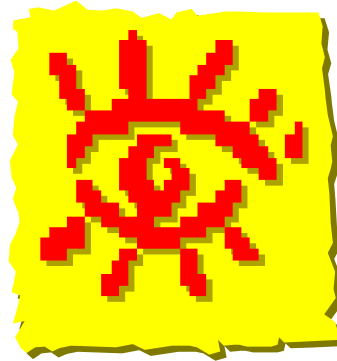
Why has 3D come and gone in cycles?

- There have been cycles of 3D activity about every 25 years in movies.
- There have been 'knock on' cycles in TV too. 1950s (Baird), 1980s (ARD, FT), today (C4, BSkyB, NBC, Televisa).
- The 'technology' today is similar to the past, despite the hype.
- What happens each time?
- Will it happen again?
- What can we learn from history?



Is there a risk of eyestrain?

- Eyestrain is caused when the eyes are asked to do things they do not normally do.
- There can be many contributory factors; vertical registration, retinal rivalry, and infinity divergence. It can be minimized.
- But one of them – the need to separate focus and pointing - is fundamental to the stereoscopic process.
- The author knows of no complete scientific studies to evaluate the risk of eyestrain, and particularly important to understand risks (if any) to young people.



What are the limitations of stereoscopic 3D?

- The best 3D comes with new production grammar
- Key objects within depth distance.
- Maintain 'geometrical congruency', avoid playing card effects. This depends on many factors and can be difficult. It is influenced by the lenses used, on screen disparity, and viewing distance.
- Avoid large changes of key object depth of at scene cut.
- There can be great 3D, but 2D will always have a place too.



Next stage: Fill in the boxes

Matrix of signal formats for 3DTV

Compatibility level ↓

Conventional HD Service Compatible (CSC) Level 4	2D HD + MVC³ (i.e. MVC) (L, R formed by matrixing)	2D HD + MVC ⁴ (i.e. MVC) (Depth, occlusion, transparency data)	
HD Frame-Compatible (FCC) Level 3	Frame compatible plus MPEG resolution extension, for example SVC ⁵		
Conventional HD Frame Compatible (CFC) Level 2	Frame compatible (L, R in same HD frame)		
Conventional HD Display Compatible (CDC) Level 1	Optimized colour anaglyph		
	Plano-stereoscopic profile 1st generation 3DTV	Multiview profile 2nd generation 3DTV	Object wave profile 3rd generation 3DTV

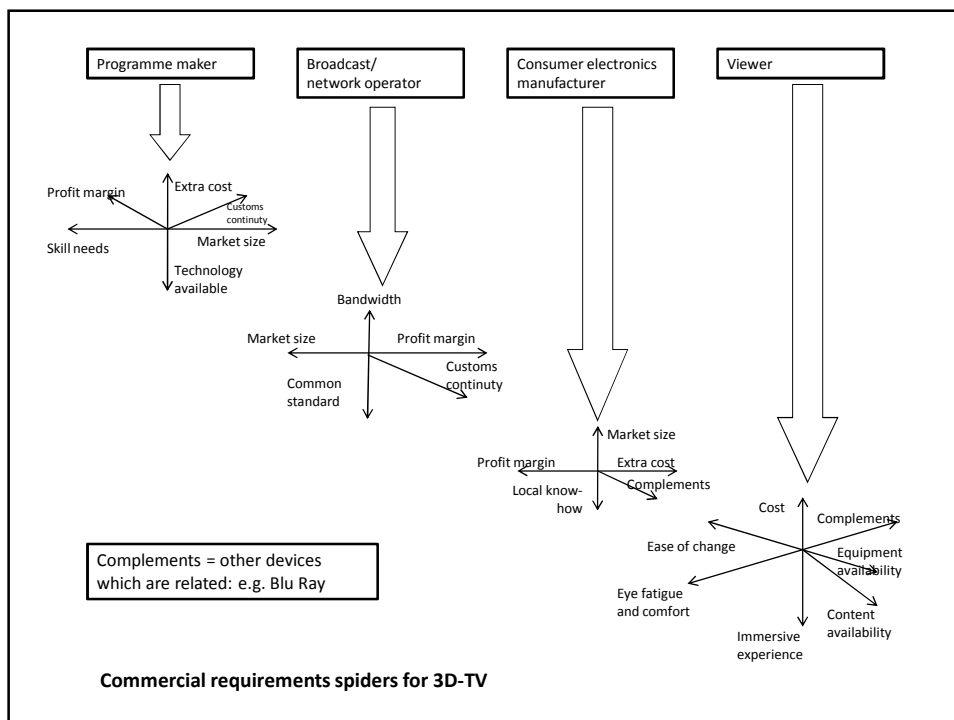
Generation profile →

The ColorCode Level 1 system



What do the ITU-R administrations want?

- much interest in 3D-TV across the world.
- some national tests
- but few plans for broadcast services (BSkyB UK)
- most want a common worldwide, regional, and national system.
- all willing to discuss
- most want a 2D-compatible system
- half want a standard in two years
- most want broadcast and blu-ray to be the same
- most want broadcast and Internet system to be the same
- half want same system for broadcast and cinema
- most want ITU-R to work with IEC on receivers.



What kind of content is suited to 3D?

- Computer animation, where picture elements can be well controlled to minimize eyestrain.
- In general, content where the audience wants to 'be there'
- Content that can work with a short lens, such as certain kinds of sport.
- Long lenses with greater inter-lens spacing (PePax) ok, but....



So where is 3D, in the line between 'important media form' and 'fairground sideshow'?

Think about it...

- too many axes thrown at the audience, too much jumping about in the scene, too many gimmicks, and this is just a circus.
- too much action in the plane of the screen, and there is no eyestrain - but we don't need the 3D for that.
- What do you think?



3D programme production – reality check

Make your own 3D programmes?

- teach new production and editing grammar.
- new cameras/camera rig, local monitor.
- create HD frame compatible for distribution or use 2 HD-SDI
- new alignment post processing system
- find new distribution platform or colour anaglyph.

3D-TV Standards

- **ITU-R SG6.** Work over the past year, largely assembling information. Meets in April 2010 next.
- **DVB.** DVB Commercial Module DVB.CM-3D. First meeting and seminar in January 2010.
- **SMPTE.** Report on scenarios and requirements.
- **ISO/IEC JTC.** 2D+something approach standardized.
- **Blu Ray.** In discussion.
- **Internet systems.**
- **EBU?**

Things to remember....

- The **higher the quality** of the L and R pictures, the better the quality of the 3D-TV.
- All 3D-TV systems have the potential to cause **eyestrain**. It can be minimized by careful attention to shooting, processing, and display, but (probably) not eliminated. More research needed
- **You cannot achieve miracles**. Do not expect the viewer to watch 3D-TV for very long periods. Think in terms of an hour or two only.
- **An announcement should probably be given before 3D TV broadcasts** – if you feel discomfort, take the glasses off.

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Thank you
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