

Will UHDTV change the world?

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Chair CM-UHDTV

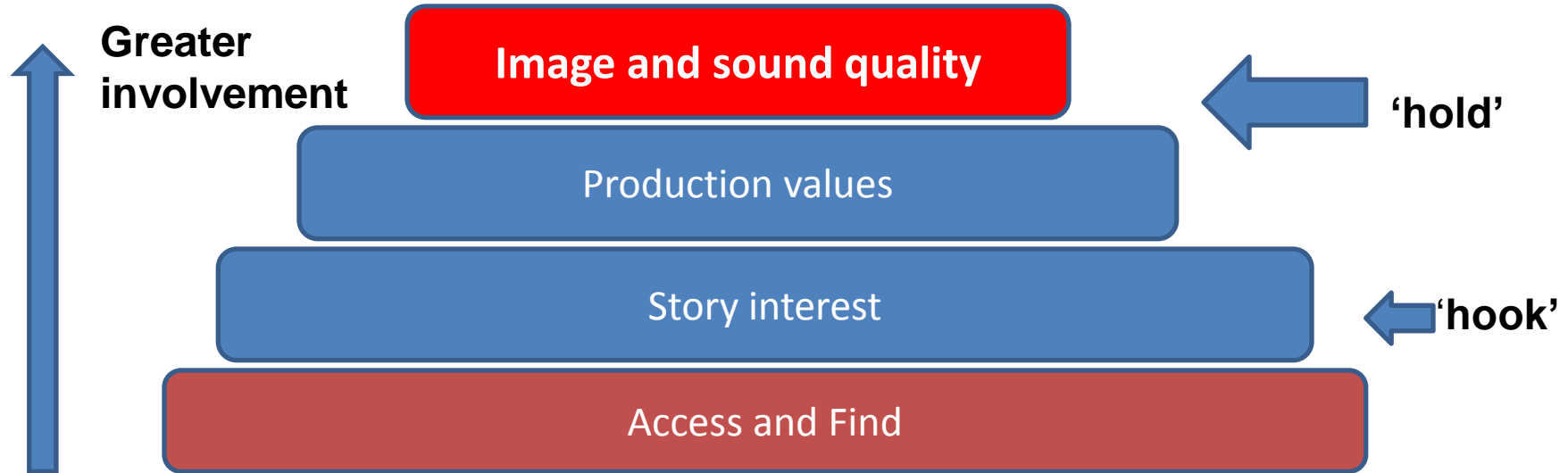


What could UHDTV change?

- Our notion of 'good quality'.
- Our emotional involvement with TV.
- What we remember about what we see.
- The time we spend watching TV.
- Our spending on media equipment.
- The kind of programmes we watch.
- Our sense of who we are.
- The European content industry base
- The world wide TV display industry

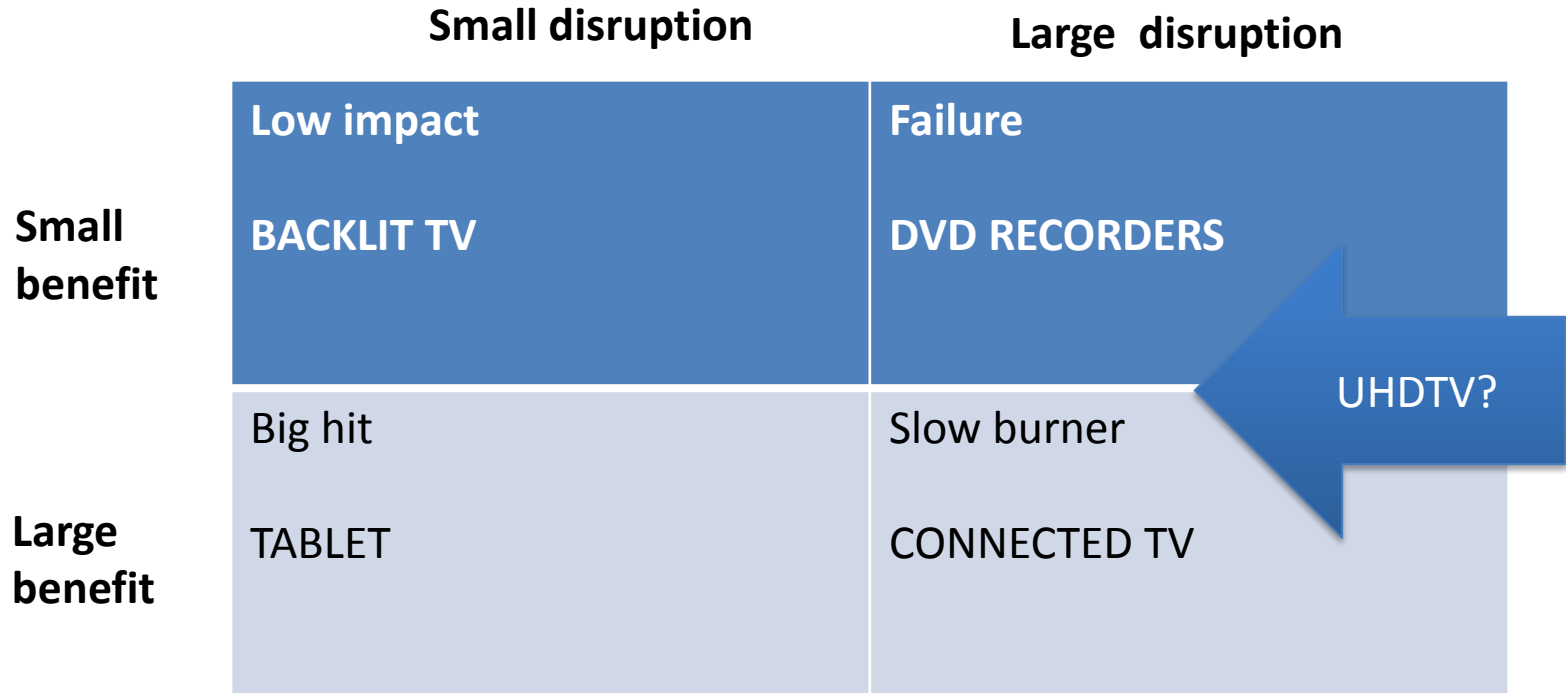
Remember the media is not just
about technology itself!

The Wood Triangle – the staircase to media success

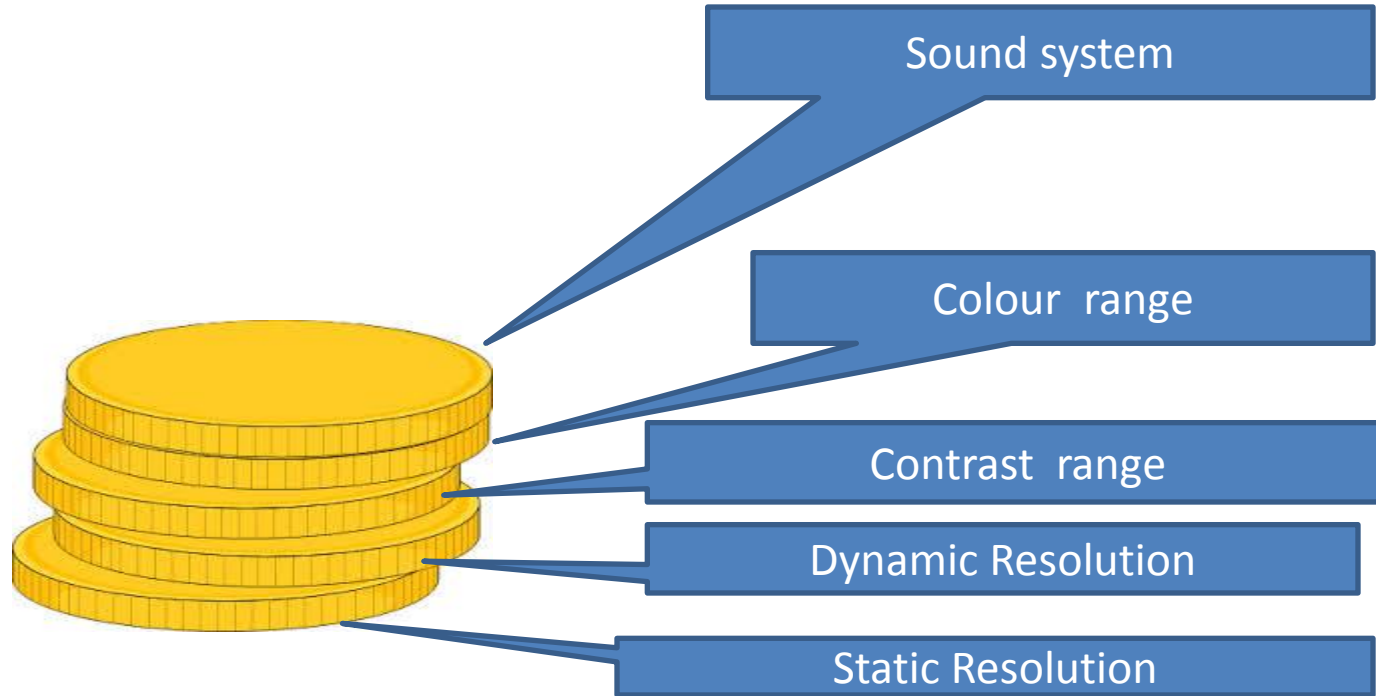


The more layers you include, the greater the viewer's involvement

Where will UHDTV broadcasting lie?



How high does the UHDTV coin pile need to be?



Noticeable quality improvement windows






H = Screen Height

| Quality factor | Approx. Distance sensitivity |
|--------------------------|-------------------------------------|
| • Static resolution (+) | • 1.5 to 3H |
| • Dynamic resolution (+) | • 1.5 to 6H |
| • Dynamic Range (++) | • 1.5 to way back |
| • Colour range (+) | • 1.5 to 6H |
| • Sound system (++) | • 1.5 to 8H |

Quality factors and related parameters

Quality factor

Parameter

- Static resolution 
 - Dynamic resolution 
 - Dynamic range 
 - Colour range 
 - Sound system 
- Pixel density
 - Frame rate and aperture angle
 - Bits/sample and transfer curve
 - Colour primaries
 - Discrete channels/scene capture/object based

Broadcast Parameters and costs of providing them



Cost factor

- high ←
- High ←
- Moderate ←
- Moderate ←
- High ←

Parameter

- Pixel density
- Frame rate and aperture angle
- Bits/sample and transfer curve
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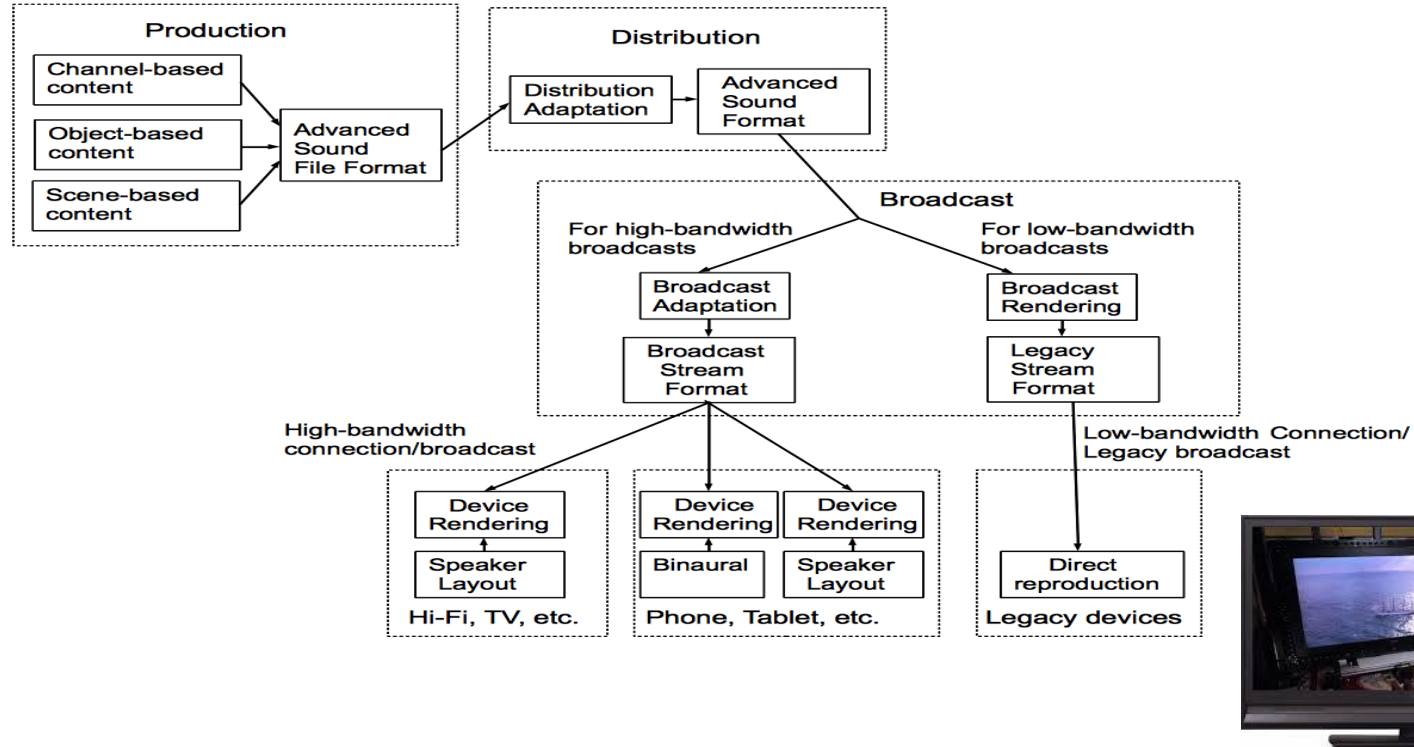


What High Dynamic Range looks like

UHDTV IMAGE - ITU-R BT 2020

- Two UHDTV levels – **8Mpixels** and **32Mpixels** images – **2160p** and **4320p**
- Assembled multiples of 1080p/1920 – 4 and 16.
- **Parameter values were chosen to be ‘future-proof’, so...**
- Image rates up to 120Hz (yes and no 120/1.001Hz)
- New wider ‘colour primaries’ (beyond OLED).
- Option of ‘constant luminance YUV coding’.
- Bit depth 10 and 12 bits/sample.
- option of additional OETF for HDR.
- (Advanced Sound System)

The Advanced Sound System



The DVB 2160p Plan

- Two 'UHD-1' Phases needed linked to decoder availability.
- **Phase 1** includes 2160p at up to 60Hz and HEVC compression, for use in 2014/15. (Rec. 709, no HDR, simple audio)
- **Phase 1 Spec** agreed – Q2/2014. Subsets of vertical and horizontal resolution useful for streaming. First commercial service from DirecTV in US.
- **Phase 2** will include 2160p at up to 120Hz for use in 2017/18, HDR, etc. Specification under discussion.



Satellite trials by Eutelsat and SES

Terrestrial trials as in table below.

| Country | Transmitter site | Covering | ERP | DTT System | Transmission Mode | Multiplex Capacity | Signal bit rate | Video Encoding Standard | Picture Standard | Frequency used |
|---------|-----------------------|--|---------|------------|--|--------------------|---|-------------------------|---|-----------------------------|
| France | Eiffel Tower | City of Paris | | DVB-T2 | 32k, extended mode, GI = 1/128, 256QAM, FEC2/3, PP7 | 40.2 Mbit/s | 24 Mbit/s | HEVC | 50 frames/s 10 bits per pixel | |
| Spain | ETSI Telecomunicación | Ciudad Universitaria, Madrid | 125W | DVB-T2 | 32k, extended mode, GI = 1/128, 64QAM, FEC5/6, PP7 | 36.72 Mbit/s | 35 Mbit/s (other bit rates also tested) | HEVC | 3840x2160p 50 frames/s 8 bits per pixel | 754 MHz (Ch56 in Region 1) |
| Sweden | Stockholm Nacka | City of Stockholm | 35 kW | DVB-T2 | 32k, extended mode, GI = 19/256, 64QAM, FEC3/5, PP4 | 31.7 Mbit/s | 24 Mbit/s | HEVC | 3840x2160p 29.97 frames/s 8 bits per pixel | 618 MHz (Ch 39 in Region 1) |
| UK | Crystal Palace | Greater London (serving over 4.5 Million households) | 40 kW | DVB-T2 | 32k, extended mode, GI = 1/128, 256QAM, FEC 2/3, PP7 | 40.2 Mb/s | Variable (some trials at 35 Mb/s) | HEVC | Mixture of 3840x2160p 50 frames/s and 3840x2160p 59.94 frames/s | 586 MHz (Ch 35 in Region 1) |
| | Winter Hill | North-west of England, including Manchester and Liverpool (serving 2.7 Million households) | 22.5 kW | | | | | | | 602 MHz (Ch 37 in Region 1) |
| | Black Hill | Central Scotland, including Glasgow and Edinburgh (serving 1 Million households) | 39 kW | | | | | | | 586 MHz (Ch 35 in Region 1) |

Why would UHDTV Phase 2 broadcasting come rapidly?

- **For Viewers**
- greater emotional involvement
- greater retention of contents
- outstanding for sports and natural history
- **For broadcasters**
- longer viewing time before zapping
- greater use of programme products.
- **For consumer electronics industry**
- new products to manufacture and sell
- new USPs



Why UHDTV Phase 2 broadcasting may come slowly?

- **For viewers**
- Benefits of higher static resolution only are viewing distance dependant.
- **For broadcasters**
- Higher costs of UHDTV production and storage ('more care needed')
- Re-equipment needed (plus lenses don't follow Moore's law)
- **For set makers**
- TV sets that exploit all quality factors more complex and more costly



Conclusions

- UHDTV is not an ‘if’ but a ‘when`.
- It will be the most ‘powerful’ medium yet devised with many implications.
- Fast track or slow burner – we cannot be certain.
- The standards are close now.
- P. S. Don’t forget the wood triangle when you make your project proposals – its always a matter of both technology and content.



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