How production evolves to provide new audience experiences

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The need to evolve content production

- Competing entertainment is increasingly interactive, immersive, personalised
  - £1.42 billion was spent on boxed game software in UK in 2011, with a further £520 million spent on online games
  - This is 52% of the BBC's entire annual licence fee income (£3.7bn in 2013/14)

The need to evolve content production

- TV viewing is lower (and dropping faster) in younger age groups that are migrating to other forms of interactive entertainment
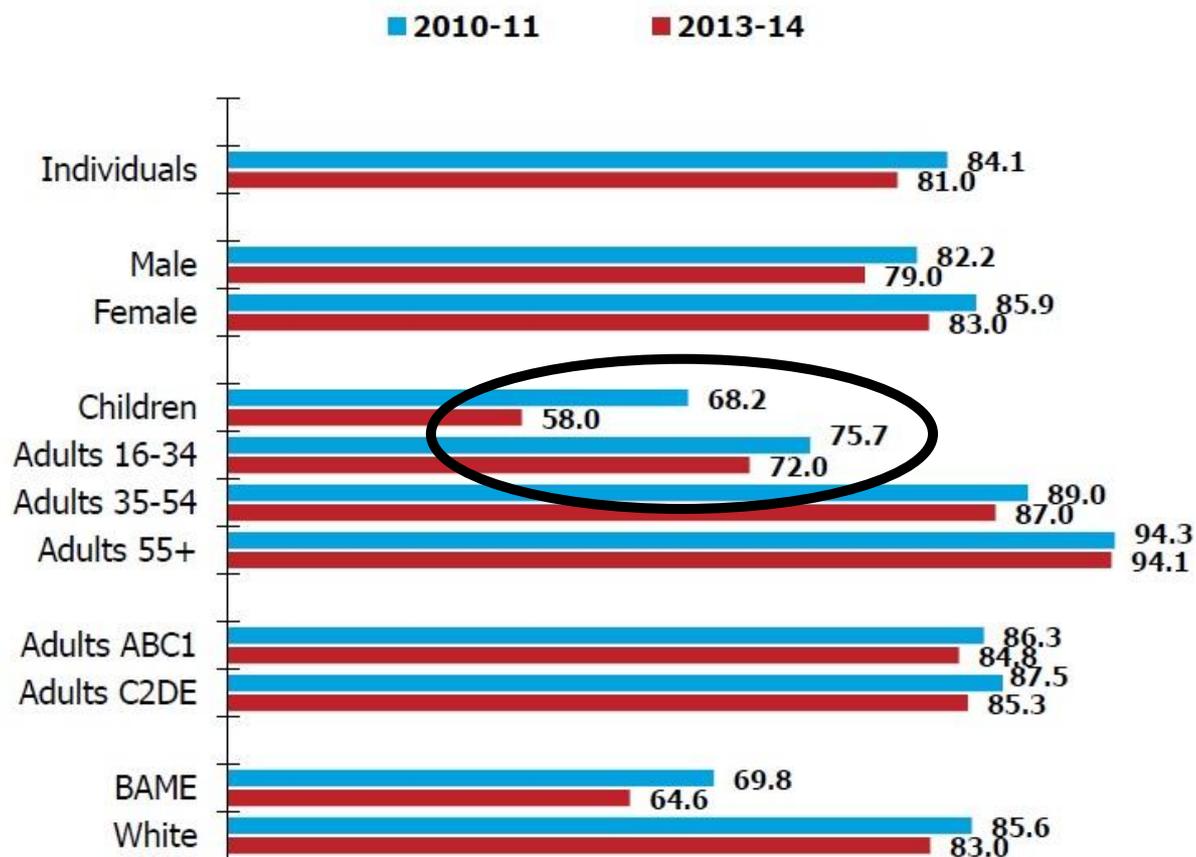
Source: BARB. 15 minute weekly reach

## Existing forms of interactive / immersive content based on traditional film / video

- Computer games based on films / TV
  - Expensive to produce
  - Not a good fit to many traditional TV genres (natural history, live sport, news, …)
- Web sites supporting TV programmes or related material
  - Usually text + stills + video; limited interactivity without specially-commissioned interactive applications

New possibilities include:

- Telepresence / immersion to bring live events or unusual environments to people in new / engaging ways
- Ability for user to explore a scene & study the parts of interest to them (as they do with a web page)
- Customise the way that content is presented to better suit the user's device capabilities or interests

…as well as the evolution of HD to UHD

Emerging themes & enabling technology

- Flexible IP-based capture systems
  - Standardised ways of passing audio/video & other broadcast-relevant data over IP
  - More flexible than standard broadcast interfaces for supporting additional streams & mixed formats
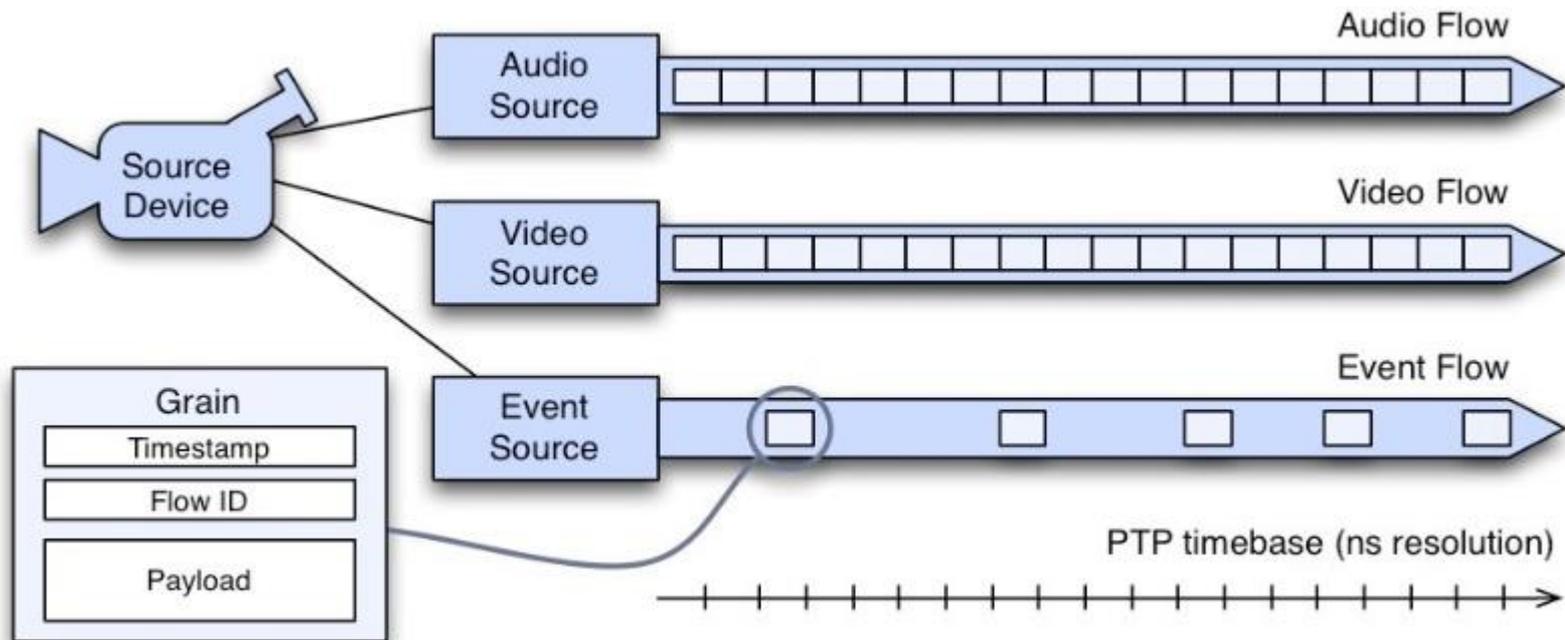
Brightwell et al. The IP Studio. BBC R&D White paper 268

Emerging themes & enabling technology

- Object-based production & broadcasting: perform final composition (and even editing) at the consumer end, based on:
  - device characteristics (e.g. speaker configuration, screen size)
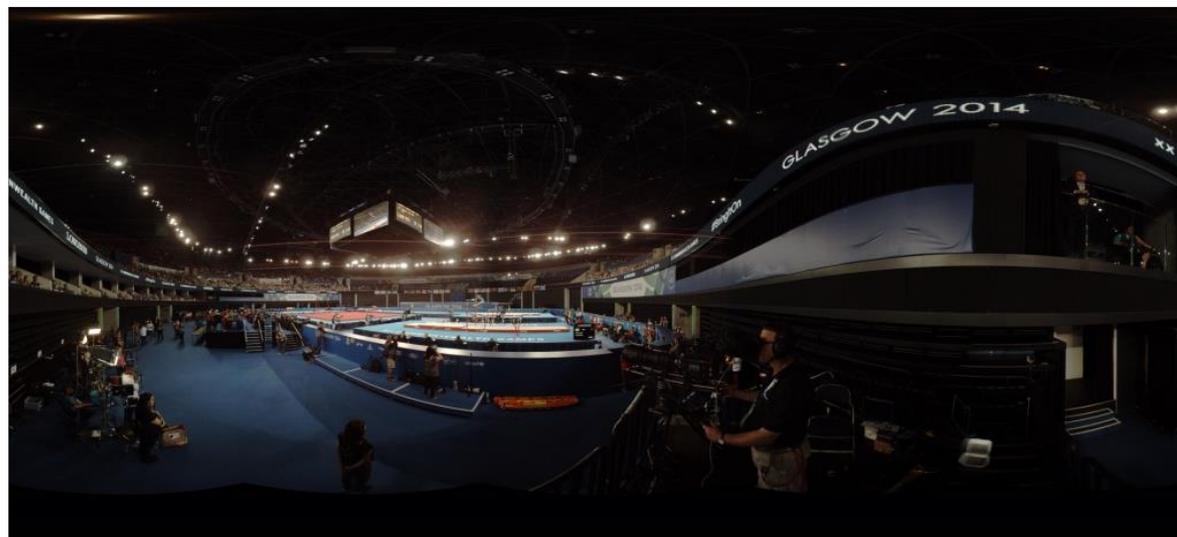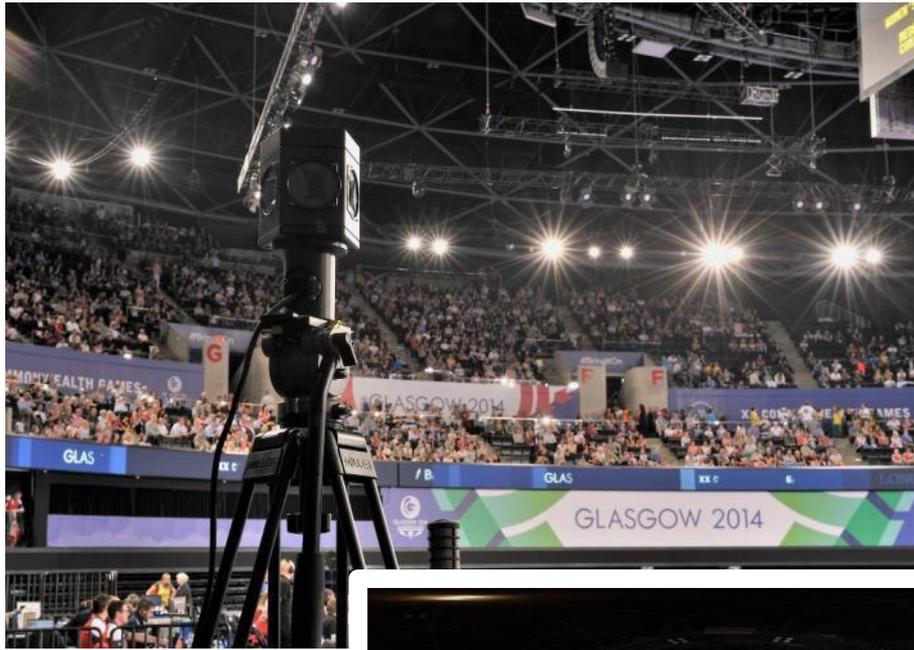 - user preferences (e.g. viewpoint, audio mix, programme length)

Melchior et al. Object-based broadcasting. IBC 2014

Capturing immersive content for broadcast – 360° video & audio

Video of user

# Capturing immersive content for broadcast – 360˚ video & audio

Current practical limitations on 360° video

- Human eye can perceive detail up to around 1 minute of arc
  - so a 120-degree field-of-view needs 120 x 60 = 7,200 x 7,200 pixels
  - and a 360-degree view needs around 22,000 pixels horizontally
- Capture
  - E.g. Ladybug camera gives around 2,000 x 1,250 pixels live at 30Hz, up to around 4,000 x 2,000 with off-line stitching
    - about 5-10x below ideal resolution
- Display
  - Latest Oculus Rift is 1,920 x 1,080 @ 75Hz (960x1,080 per eye) with around 120 degrees field-of-view
    - about 7.5x below ideal resolution

Capturing content for interactive experiences – 'Venue Explorer'
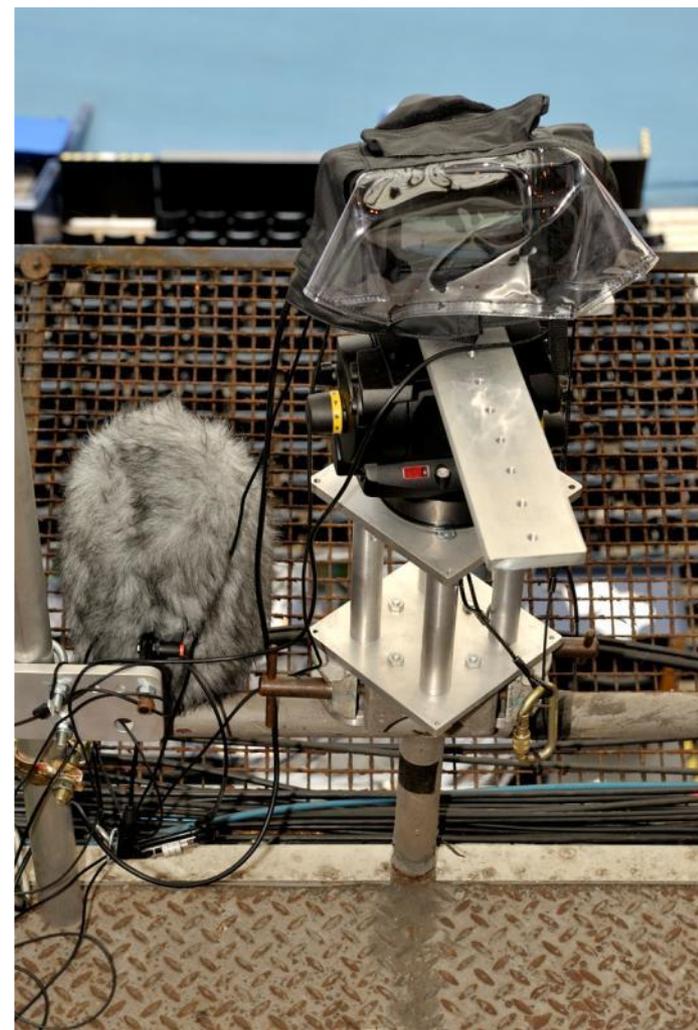
Capturing content for interactive experiences – 'Venue Explorer'
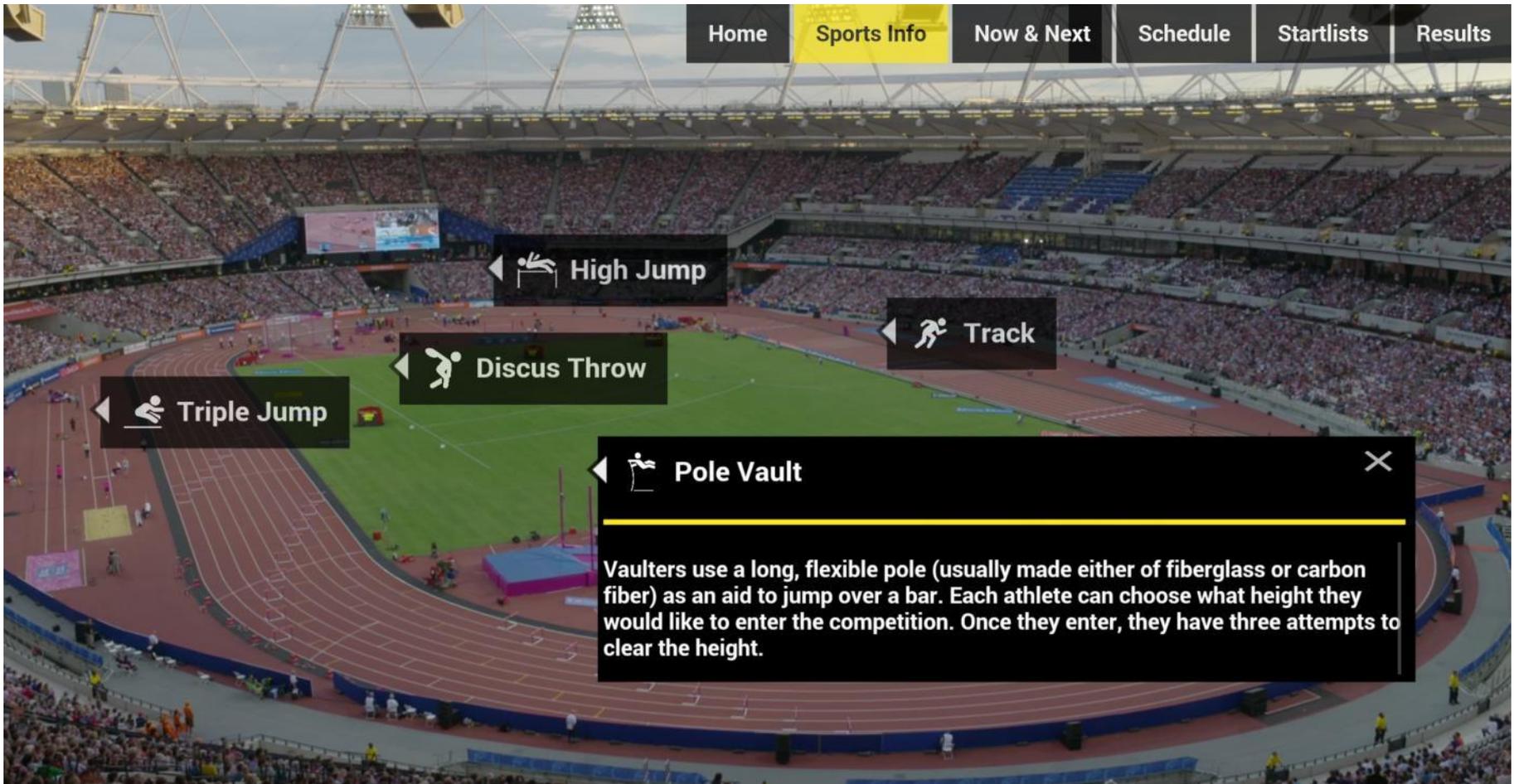
[Demo at Commonwealth Games 2014](#)

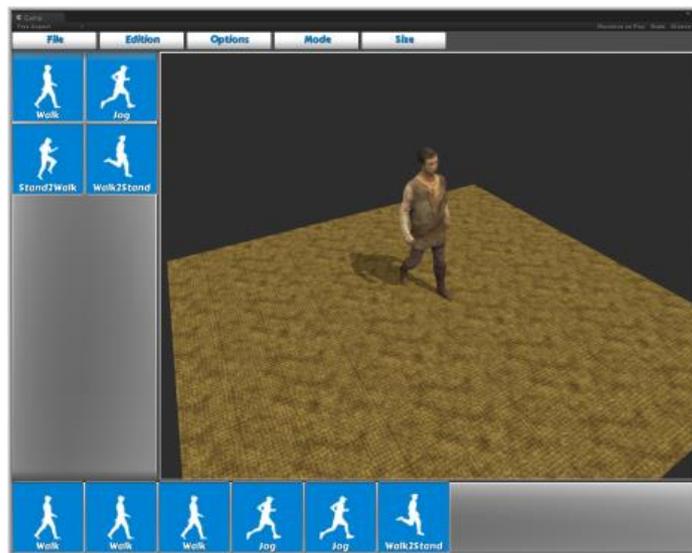(Pictures courtesy of the Commonwealth Games Federation)

Capturing content for interactive experiences – RE@CT project

Capturing content for interactive experiences – RE@CT project

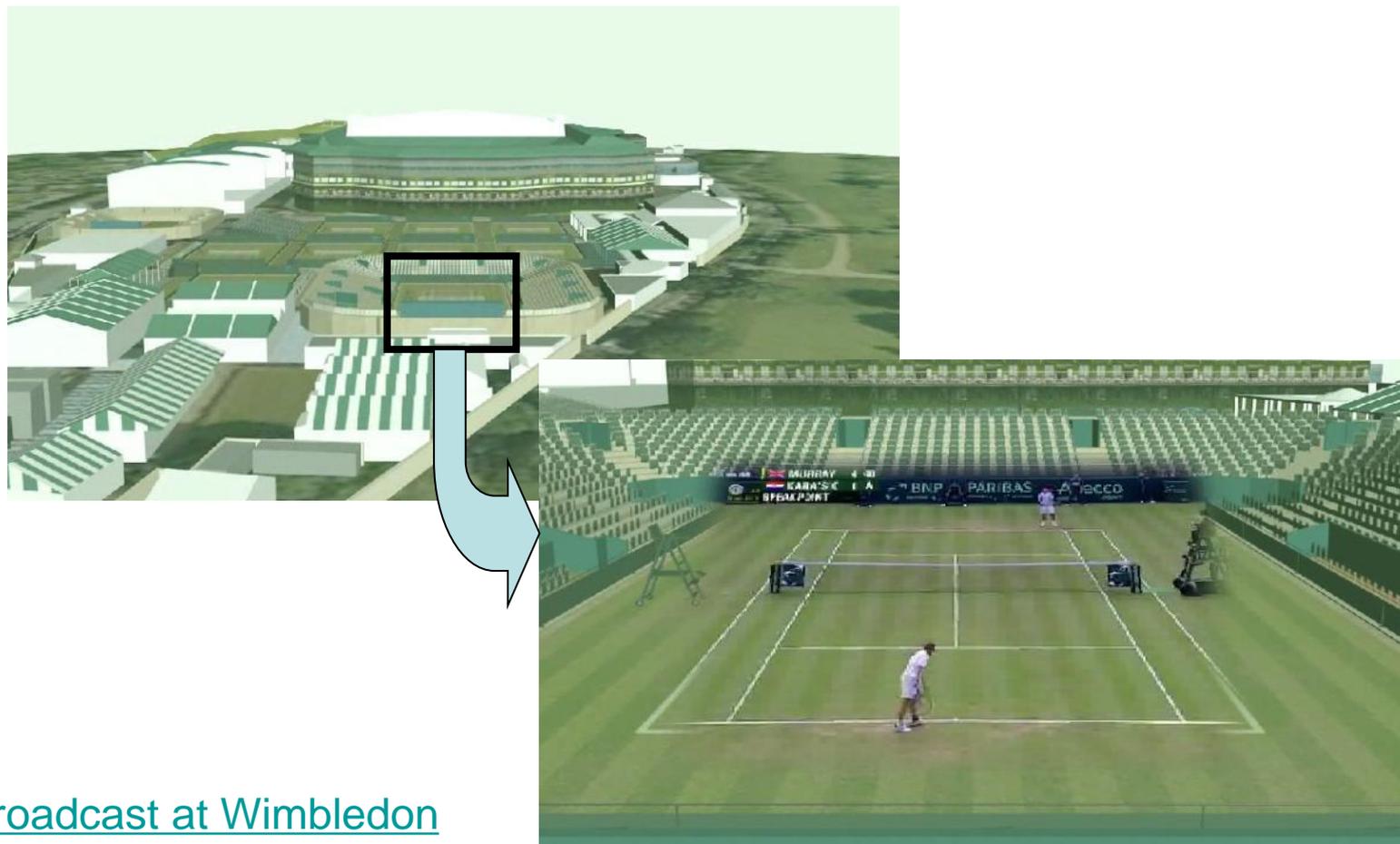# Creating interactive experiences – RE@CT project

Video (courtesy University of Surrey)

WebGL demo at
http://cvssp.org/projects/4d/4DVT/

Enabling free exploration of large environments

- Register one or more cameras in a 3D model
- Allows seamless animations out of one video, through the model, and into another

As broadcast at Wimbledon

Enabling free exploration of large environments

- Image-based rendering techniques applied to natural environments
- Example of work-in-progress – 'fractal zoom'

Video rendered from sequence of 14 images

Conclusion

- Emerging trends in the evolution of production include:
  - Move to IP-based systems to support diverse range of formats on commodity equipment & networks
  - Use of multiple audio / video / data feeds to support interactive, personalised, immersive content with improved accessibility
- 4k UHD currently mainly confined to film production, with some experiments / trials for TV
- The minds of most TV programme makers are still focused on producing HD content for conventional TV on tight budgets!

Thanks for your attention!

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