Project Summaries:

Novel data capture and presentation technologies used in museum and art gallery exhibitions.

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July 2011

iVEC @UWA

Introduction

Topics

- Data capture
  - Stereoscopy (photography and video).
  - Panoramas, stereoscopic panoramas.
  - Fisheye.
  - Ultra high resolution photography.
  - Surround video.
  - Volumetric data.
- Presentation
  - Stereoscopic projection.
  - Immersive cylindrical environments.
  - Immersive dome environments.
  - High resolution displays.

Demonstration
- Stereoscopic display.
- iDome.
- High resolution tiled display.

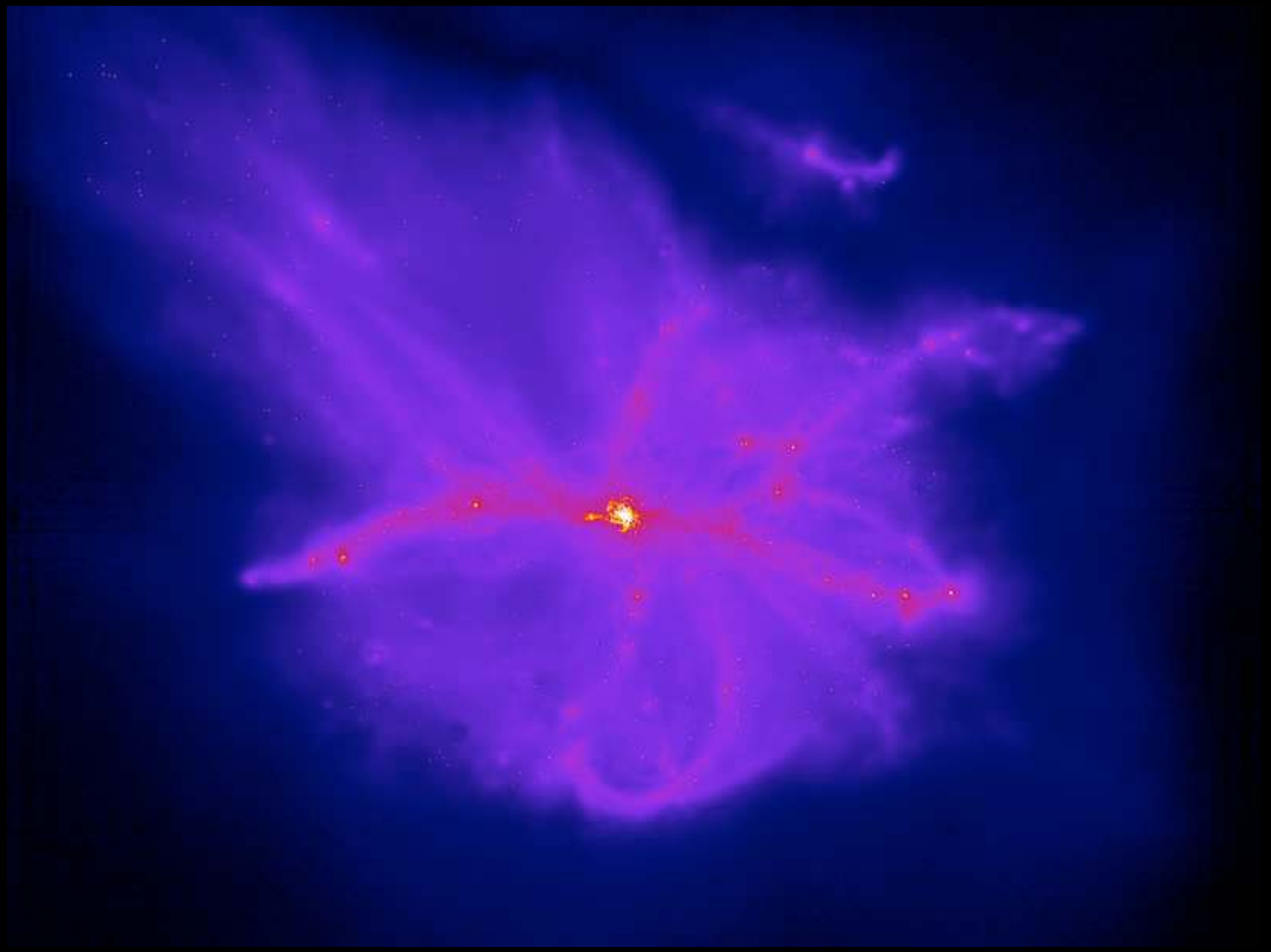
Exhibitions

- Virtual Room.
  Museum Victoria.
- Home of the Blizzard.
  Tasmania Museum and Art Gallery.
- Place Hampi.
  Immigration Museum Melbourne.
- Frozen.
  Horizon Planetarium.
- Eye of Nagaur.
- Place Turkiye.
- Pausiris.
  MONA, Hobart.
- Jordan.

iVEC@UWA and Science Visualisation

- iVEC: A partnership between the 4 public Universities in WA and CSIRO.
- iVEC@UWA: A facility of iVEC on the UWA campus.
- Provide high performance computing, visualisation, eResearch, collaborative tools, data storage ... to the University research community.
- My job is to support visualisation
  - "Turning data into images and animations" (informal)
  - Providing insight into data and the underlying physical processes by applying computer graphics techniques.
- Outcomes
  - Revealing something new within datasets.
  - Finding errors within datasets.
  - Communicating research to peers.
  - Communicating science to the general public.
- Opportunity to engage in a wide range of activities using the same techniques employed in the science visualisation process. For example: computer graphics, visual representations of data, display technology, immersion, ...

My real job: Example from earlier this week



Visualisation of Galaxy Formation Simulations

Virtual Room

- Developed by myself while at Swinburne University, Melbourne.
- Inside-out CAVE.
- Installed at Museum Victoria, 2003-2009.
- 6 sided "room", see the same virtual environment from different viewpoints.
- Stereoscopic rendering created to provide correct sense of depth and scale so objects appear to be inside the room.
- Productions included:
  - Sacred Ankor, Cambodia.
  - Australian polar dinosaurs.
  - The Thylacine.

Current installation

ALIVE Laboratory, City University Hong Kong

UNMAKEABLELOVE

Adapted from Samuel Beckett's narrative 'The Lost Ones', UNMAKEABLELOVE is a virtual reality installation that focuses and makes interactively tangible a state of confrontation and interpolation between our selves and a society of computer generated people who are living in a severe state of physical and psychological entropy. UNMAKEABLOVE presents this community of real time animated figures by means of 3D projections on six screens that are arranged as a 6-meter wide hexagonal room (Re-Actor) that the viewers walk around and peer into. Using physical torches as interfaces, the viewers project virtual light beams into this room to illuminate the elusive order of a confined existence that evokes in post-modern abstraction a space resonating with Dante's Purgatory.

Home of the Blizzard

- Research project by Peter Morse.
- Restoring stereoscopic photographs from early expeditions to Antarctica.
  Sir Douglas Mawsons 1912-1914.
- Initially exhibited at TMAG (Tasmania Museum and Art Gallery), 2006.
- Supplementary material from current times formed part of an exhibition at the John Curtin Gallery, Curtin University.

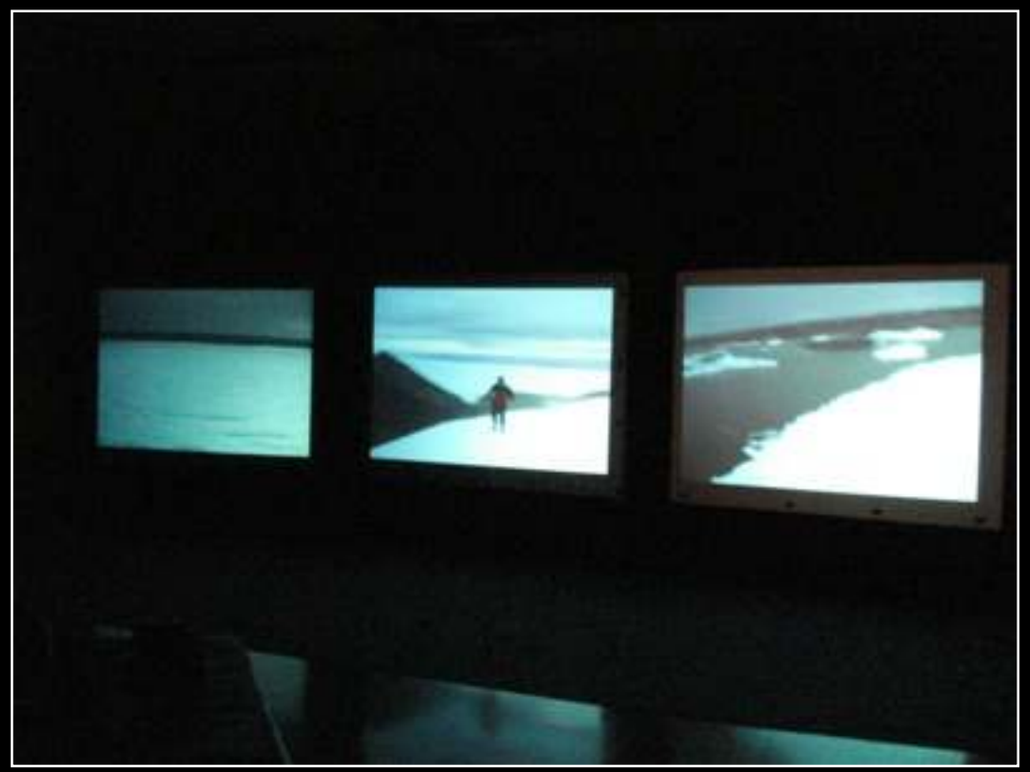
Now possible to bring these to life in a way never previously imagined.

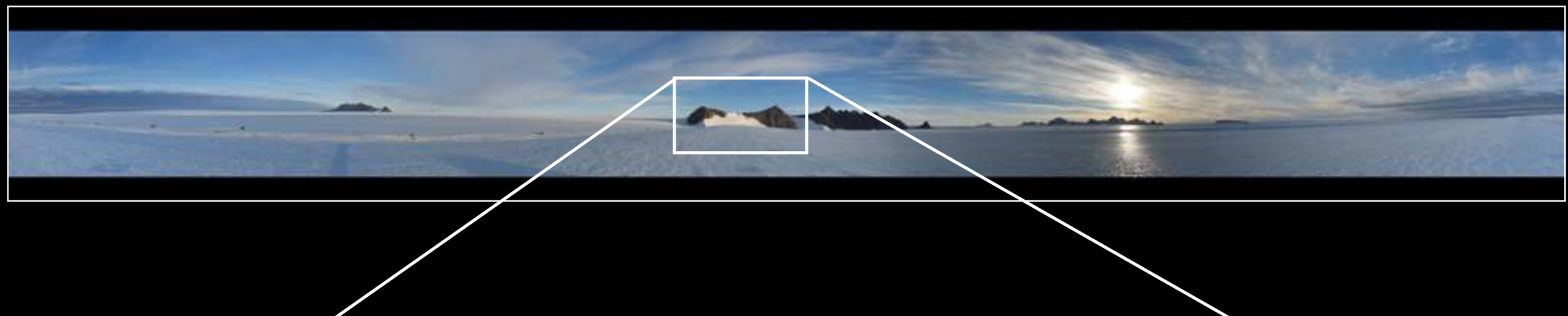
Many think today that stereoscopy is “new”. Brewster stereoscope dates back to 1849. Sir Charles Wheatstone circa 1838.

Mawsons expedition (similar effort as going to the moon) took stereoscopic cameras, Frank Hurley as photographer.

Holmes Stereoscope

John Curtin Gallery





Ultrahigh resolution stereoscopic panoramas. Courtesy Peter Morse.

Captured using two still cameras, manually rotated about their central point.

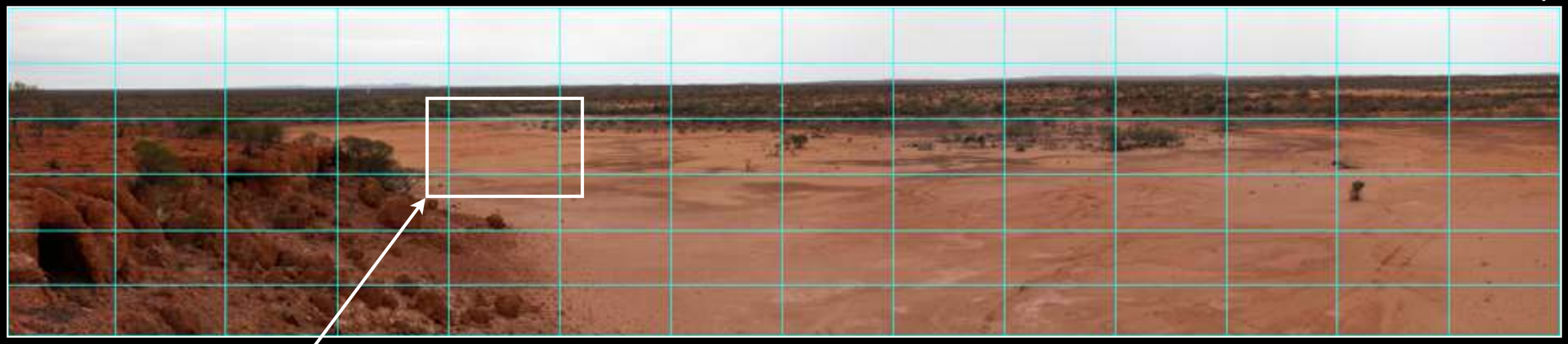
Frozen

- Project by Peter Morse.
- Fulldome projection, Horizon Planetarium. 2009.
- Based upon a number of ultra-high resolution full spherical panoramas.
- iDome interactive prototype.

Tiled photography

- Realise that sensor resolution is not increasing fast enough.
- In order to capture higher resolution images multiple shots are taken and stitched together.
- Stitching and blending technology has improved significantly over the last 10 years.
- Occurring in such diverse fields and scales as astronomy (Hubble deep field), Google Art project, and microscopy.

ASKAP site, Boolardy



21 MPixels
Canon EOS 5D Mk11

Total: 1.5 GPixels

Gigapixel photography

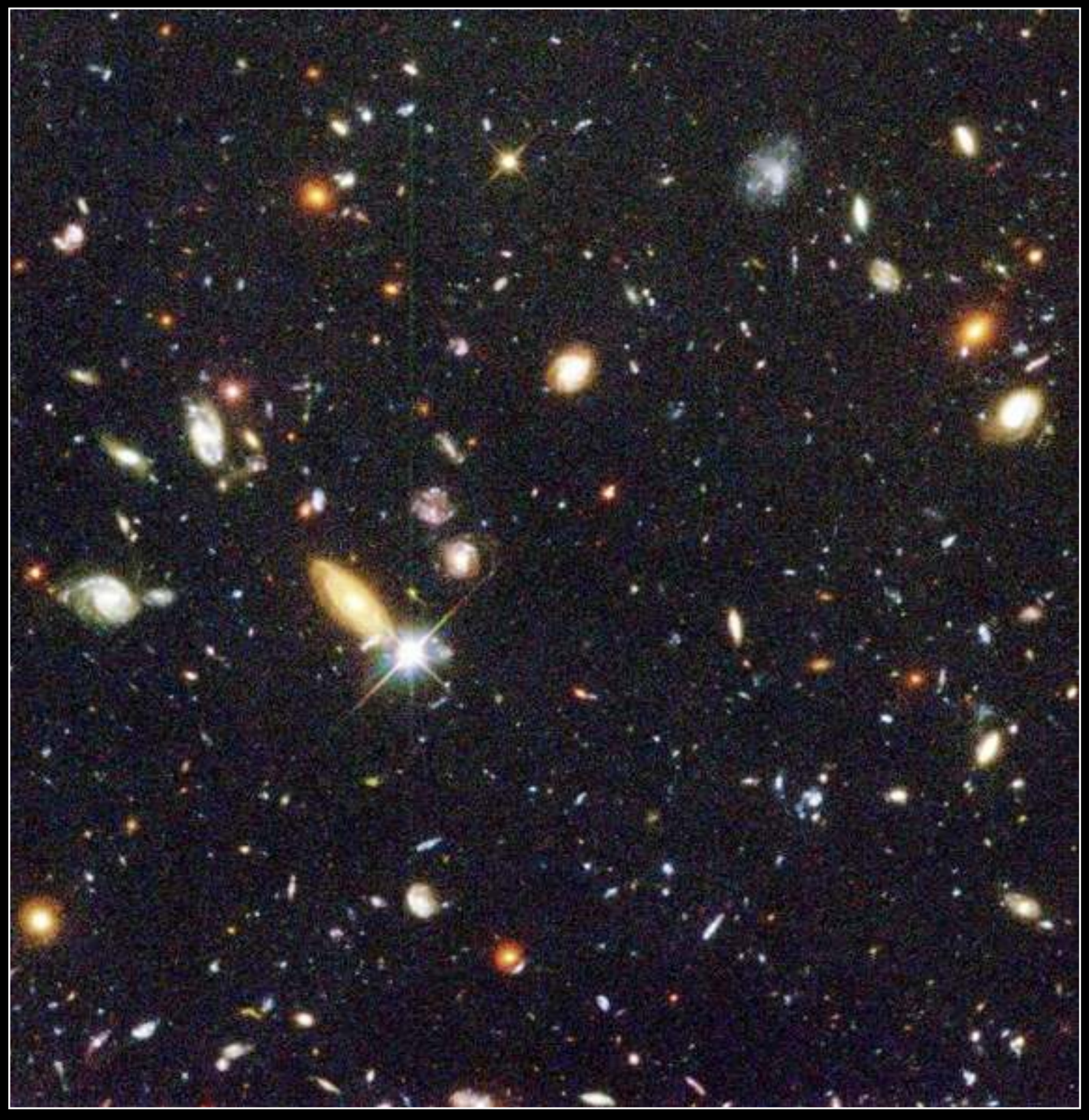
First ASKAP dish

Canon EOS 5D MkII camera
and gigapan mount

Total: 1.5 GPixels

ASKAP site, Boolardy

Astronomy



Hubble deep field, 340 images.

Microscopy

Image courtesy CMCA, UWA

11,000 x 8,000 pixels

Google Art Project.

100,000 x 80,000 pixels

6400 x 5120 pixels

Stitched spherical panorama example

Left eye image

40,000 by 20,000 pixels

Hurleys darkroom, Mawsons hut (Antarctica), courtesy Peter Morse.

iDome interactive prototype

- Interactive iDome version.
- Virtual hut with photographic bubbles.

Place Hampi

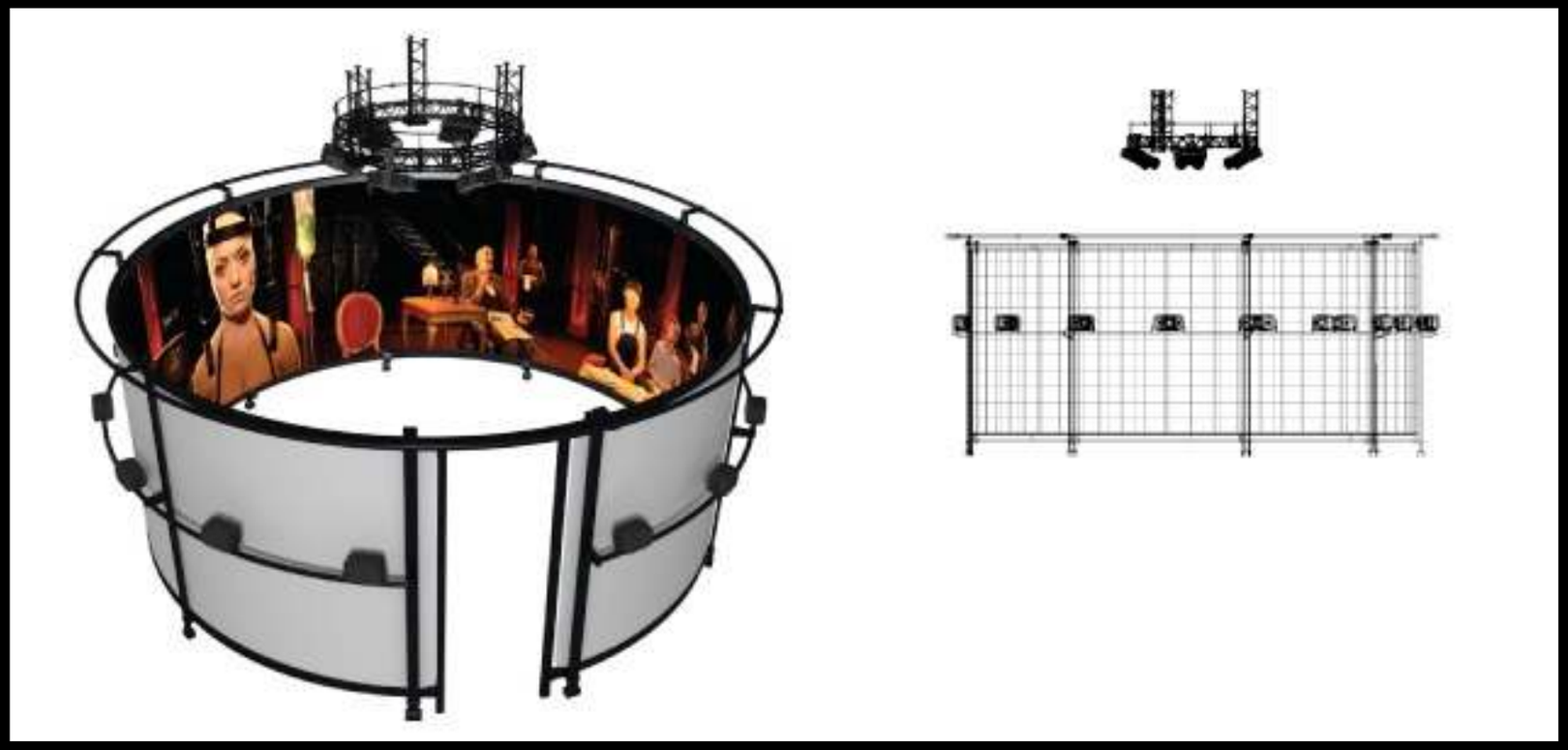
- Project by Sarah Kenderdine and Jeffrey Shaw.
- Featured stereoscopic 3D panoramas.
- Exhibited at the Melbourne Immigration Museum, 2008.
- http://www.place-hampi.museum/

Left eye

Right eye

Stereoscopic cylindrical panoramas display

- Stereoscopic panoramas are unique in that, unlike other stereoscopic 3D immersive environments they can be used by multiple people at one time.
- Almost all other immersive (engages peripheral vision) stereoscopic displays are only suitable as a single person experience.
- ALL stereoscopic 3D displays are only strictly correct for a single viewer position.



AVIE: Advanced Visualisation and Interactive Environment.

Roundshot camera

Left eye

Right eye

Stereoscopic panning platform

EON: Eye of Nagaur

- Project by Sarah Kenderdine and Jeffrey Shaw, made possible through the vision of His Highness Maharaja Gajsingh II of Marwar - Jodhpur and The Mehrangarh Museum Trust.
- An alternative interface to high resolution spherical photography.
- "Visualizing the inner life of Ahhichatragarh Fort and Palace complex at Nagaur, Rajasthan (India). Visitors make an exceptional journey of discovery of Ahhichatragarh's magnificent architectural spaces and the artistic decorations found throughout. Looking through the 'eye' of its imposing three-metre diameter circular screen, viewers explore a constellation make an exceptional journey of discovery. Eye of Nagaur a prosthetic eye that reveals the beauty of this fort and palace complex, exploring in fine detail the painted ceilings, floors and wall decorations, hydraulic infrastructure and the unique fusion of Mughal-Rajput architectural features. With almost infinite 'zoom' reflecting back the rich life of the former inhabitants."

Demonstration

On the outside of the pearl.

Inside the pearl.

Place Turkiye

- Project with Sarah Kenderdine and Jeffrey Shaw.
- Exhibition in Istanbul, 2010. Currently touring.
- Captured “hundreds” of high resolution stereoscopic cylindrical panoramas from Turkey.
- Recorded dozens of cultural events as 360 degree video captured with the LadyBug-3 camera.

Cappadoccia

Bosphorus river

Sample stereoscopic panorama

42,000 pixels x 12,000 pixels

Left eye

Right eye

Ephesus. Courtesy Sarah Kenderdine, Jeffrey Shaw

Example 360 video shoots

Borusan Philharmonic Orchestra

Yeni (New) Mosque

Hashbecktashi Dancers

Whirling dervishes: Orient Express Train Station

Borusan Philharmonic Orchestra

5400 x 2700 pixels per frame

Raw camera footage

Fisheye

Interactive spherical in iDome

Cylindrical

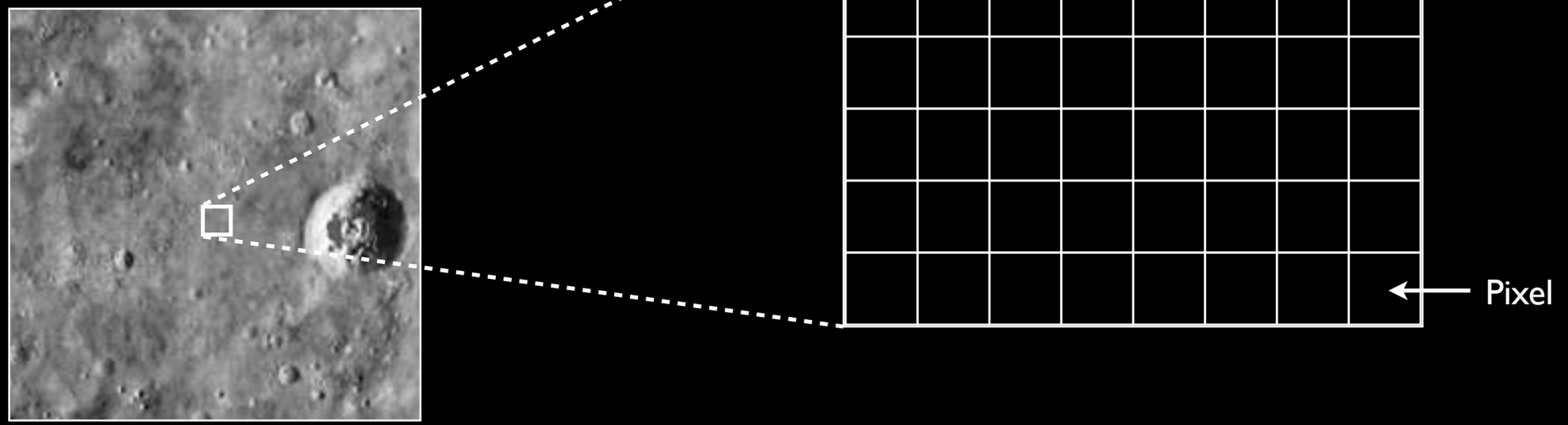
Pausiris

- In collaboration with Peter Morse and MONA.
- MONA: Museum of New and Old Art, Hobart. January 2011 - current.
- Visualisation of high resolution volumetric dataset, in this case a CT scan from the Hobart hospital.

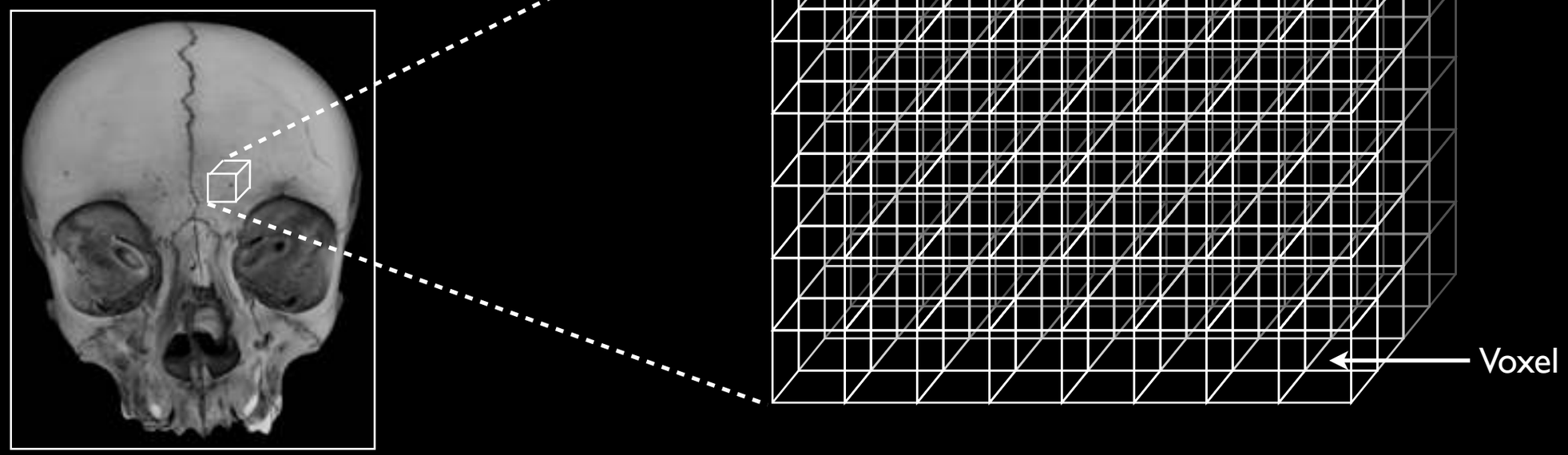
TePausiris (Egypt, Ptolemaic to Roman Period, 100 BCE–CE 100; Human remains encased in stucco plaster with glass eyes, incised and painted decoration)

Volumetric data

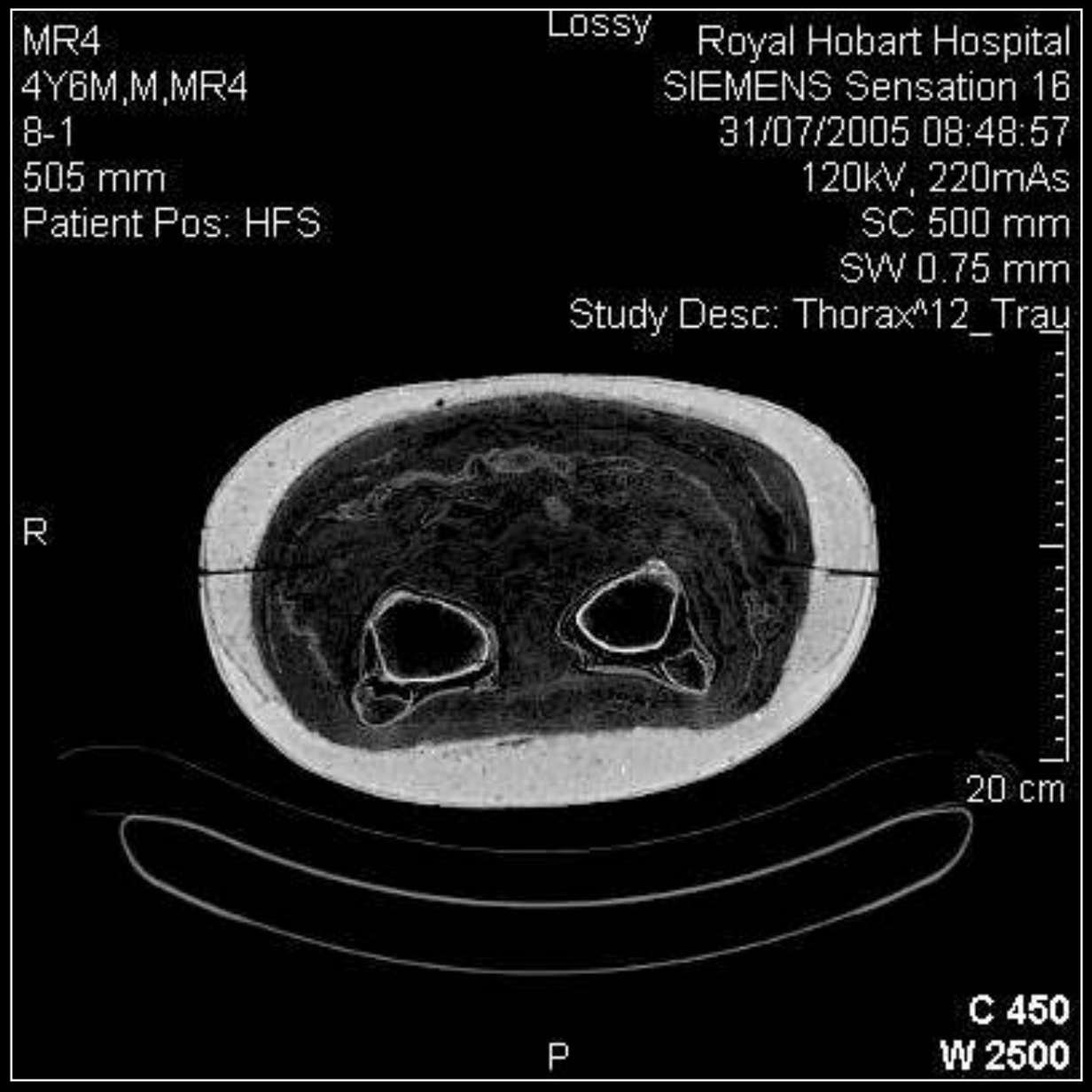
- A digital image contains some quantity sampled on a regular grid on a 2D plane.



- In a volumetric dataset there is some quantity sampled on a regular 3D grid.




Courtesy Ajay Limaye, ANU


MR4
4Y6M,M,MR4
8-1
505 mm
Patient Pos: HFS
Lossy
Royal Hobart Hospital
SIEMENS Sensation 16
31/07/2005 08:48:57
120kV, 220mAs
SC 500 mm
SW 0.75 mm
Study Desc: Thorax^12_Trau
R
20 cm
C 450
W 2500
P

Visualisation

- Visualisation of volumetric data involves a mapping from density to colour and opacity.

As presented

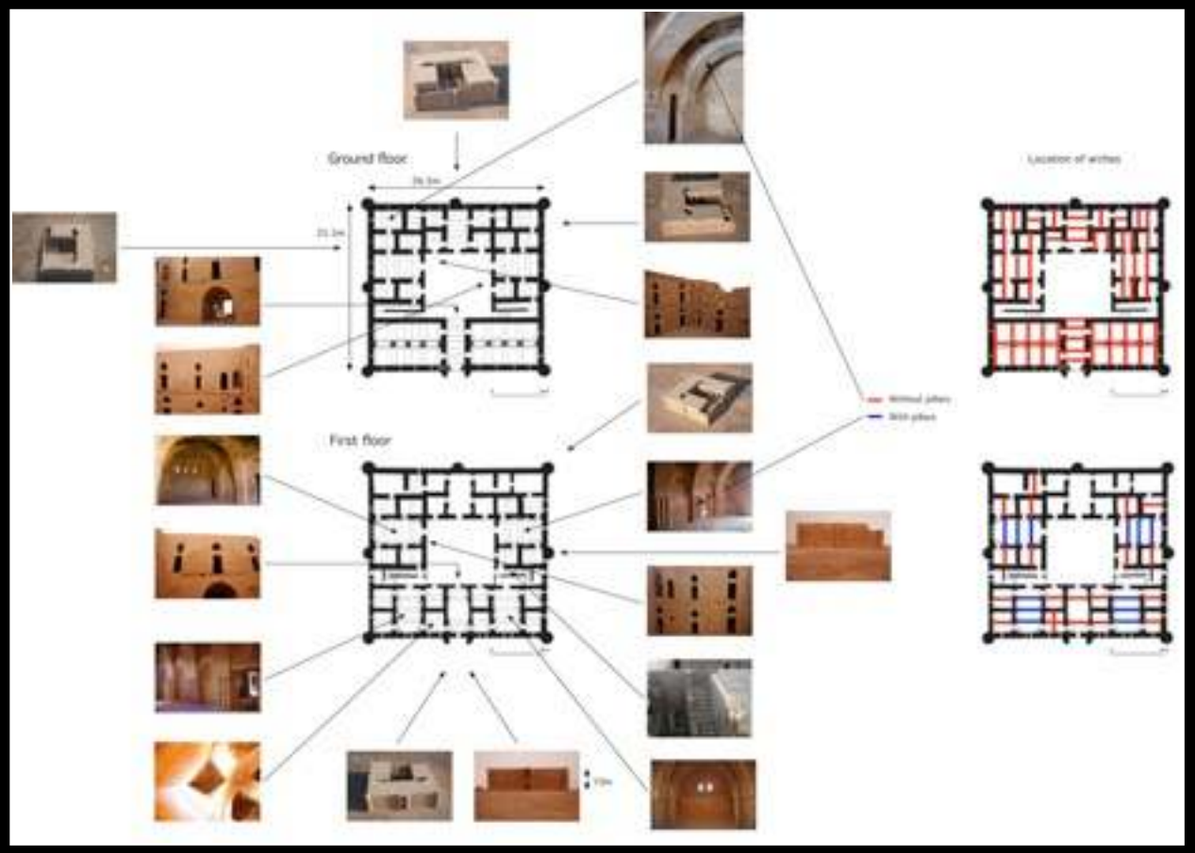
Reconstruction of sites in Jordan

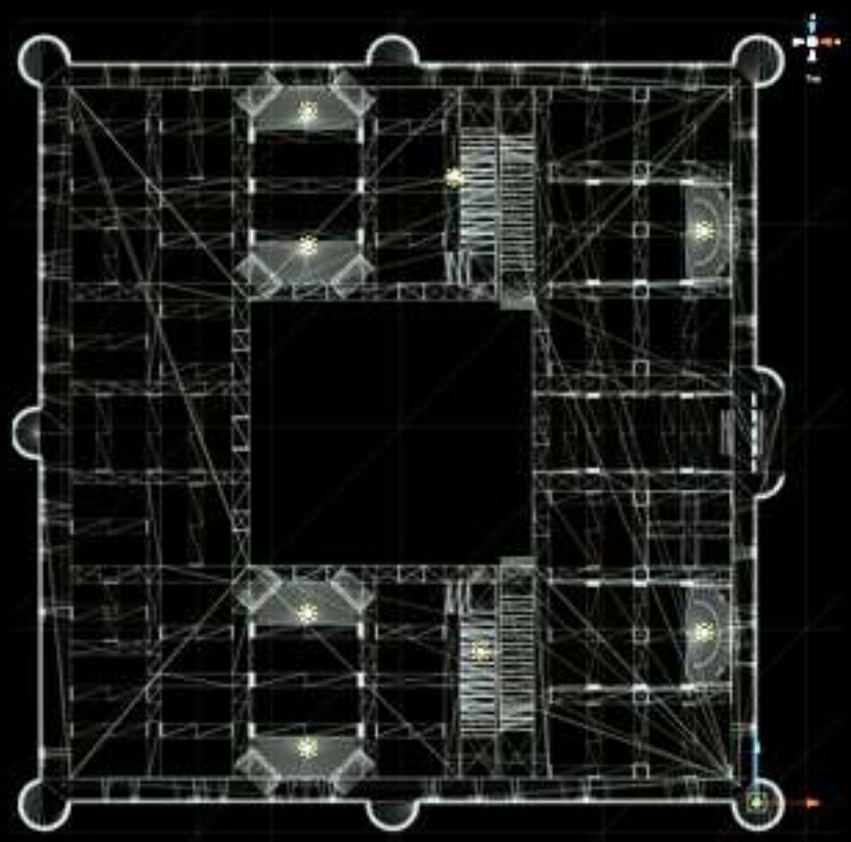
- Project lead by David Kennedy, Classics, UWA.
- Current exploratory project.
- Google Earth Archaeology.

Reconstructed model

Um er Rasas

Google Earth





Interactive Virtual Environment

Demonstrations

- Stereoscopic projection: Stereoscopic examples from VROOM and Place Hampi.
- High resolution display: Google Art Project.
- iDome: Footage from Turkiye.

Place Hampi. Courtesy Sarah Kenderdine

Google Art Project, tiled display.

Whirling Dervishes, iDome.