vDome:
Create interactive dome work
Charles Veasey
presenting...
in 3 parts
(1) Who we are, what we do
(2) Make your dome interactive
(3) vDome, a flexible software solution
the world’s only articulating dome which can move 90 degrees and can be positioned from ground to ceiling
Dome Manager:
Mats Reiniusson

Mission:
To empower creativity and leadership in Native Arts and cultures through higher education, life-long learning and outreach.

Charles Lindsey in Wired Magazine
University of New Mexico
ARTS Lab

Mission:
The ARTS Lab is an interdisciplinary center for developing creative relationships connecting Art, Science, Business and Technology in New Mexico's unique environment.
Director: Tim B. Castillo

Associate Director: David Beining
(2) Make your dome interactive
interactive dome?
real-time editing on the dome.
fulldome gaming.
share domemasters on YouTube, Vimeo, etc..
telepresence.
science simulations.
custom controllers.
now easier than ever
free/low cost software & off-the-shelf hardware
single-machine vs cluster renderers
many 3-year old cluster renderers can be replaced by a single machine
good-bye, slicing
cluster distribution
$100K+ computer racks
energy consumption
hello, 4K video standard
24+ display computers
plug ‘n’ play i/o technologies
clusters move to > 4K
let’s talk hardware...
vDome runs on almost anything... so how do you want to use it?
Mac or PC?
Mac: the good
Built for video, QuickTime
Common in audio/video production.
New Mac Pros designed for 4K video.
Good virtual routing options (Syphon, Jack).
Mac: the bad
Lack of customization.
Less native display outputs.
Cost.
Windows: the good

Excellent GPU support.
Easy to set up multiple displays over GPUs.
Unified desktop support.
Windows: the bad

It’s Windows :\ (use v8.1).
Video formats less common than QuickTime.
Surround sound video = AC3 sound.
Linux: the good
Highly customizable.
Excellent GPU support.
Unified desktop support.
Potentially better performance.
Free and open source.
Linux: the bad
Multiple GPUs are more difficult.
More difficult to configure.
Less apps to choose from.
We run vDome on Mac, Windows & Linux using both AMD/ATI & Nvidia graphic cards.
... pick your favorite OS!
One more hardware thing... GPUs?
Multiple GPUs can complicate things and most applications only process (compute) on one GPU.
Hardware and operating systems will determine exactly and how effectively this happens.

E.g. newer Nvidia cards on Windows will ping each card to determine which to use as the processor.
Potentially save money and make life easier with a single GPU combined with display controllers to split 4K video signals.
Careful putting different resolutions on the same GPU. This will *disable* Nvidia Mosaic desktop mode, and may cause syncing issues between displays.

This includes the control monitor.
(3) vDome: a flexible software solution designed for interactivity
History

DomeGL (2010)
  Dr. Joe Kniss, Jeff Bowles, others

vDome Max (2012)
  Charles Veasey

vDome C++ (2013)
  Charles Veasey
DomeGL
C++ /QT / OpenGL library
Click registration point calibration
Single Mac Pro
Games and simulations
vDome Max

Let’s prototype an app!
Manual controls and GUI window
Retain virtual dome concept
Focus on input streams (syphon, tcp...)
No longer active, but on GitHub
vDome (C++)

Between DomeGL and vDome Max
Standalone renderer or media player
Removed GUI window
Moved manual calibration to Dome
Auto-calibration (in-development)
Auto, semi-auto, manual calibration?

Auto - faster but less control
Semi - between auto and manual
Manual - slower but most control
Control monitor?

A monitor used external to dome as a controller

Optional in vDome:
- Can act as a standalone i/o box or media player
- Features on-dome controls
Hardware or software masks?

Hardware masks avoid grey overlap at black levels

Hardware = perfect blending at black
Software = perfect blending at white

DO BOTH
Modular renderer

Hardware input: capture, camera

Virtual inputs:
Syphon (Mac), Spout (Win), Video4Linux
Media Player

QuickTime / AV Foundation (Mac)
DirectShow / Windows Media Foundation (Win)
GStreamer (Linux)
vDome @ IAIA

Video Renderer (Mac / PC) -> (DVI)
(Capture card) -> vDome decoding (Windows)

3D Audio Renderer (Mac / PC) -> (Firewire)
Ambisonic / VBAP 13.2 surround sound
vDome @ UNM

Single Mac Pro

Built-in media player and Syphon
vDome Future

Remote Media player controller
Computer vision auto-calibration
Nvidia warp and blend API
Let’s see vDome