High-end Visualization – Why it still makes sense

Bill Sherman, Eric Wernert

April 12, 2010

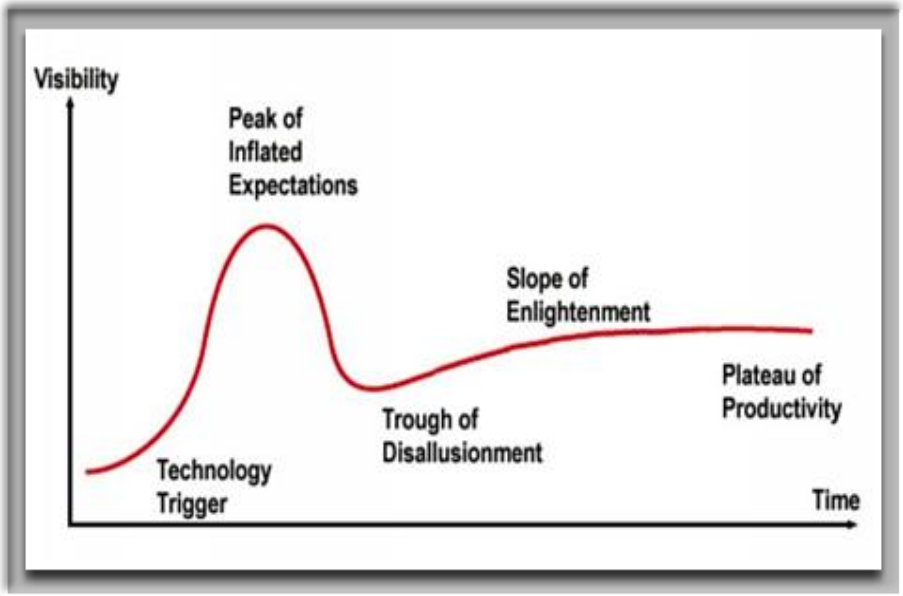
INDIANA UNIVERSITY

Commonly cited challenges / issues for high-end visualization facilities

- Expense
- Complexity
- Space
- Accessibility
- Utilization
- Impact
- Sustainability
- Software continuity

Past promises of High-end vis

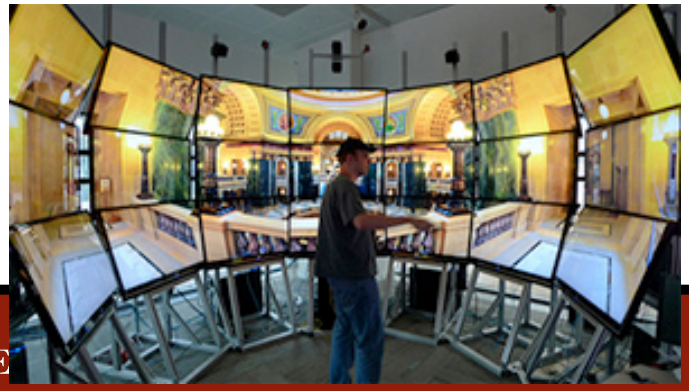
- Unmet expectations
  - Poor communication between research community vs. user community?
- Does not mean there is not now great value and opportunity with high-end displays
- Perhaps now is a good time to re-evaluate

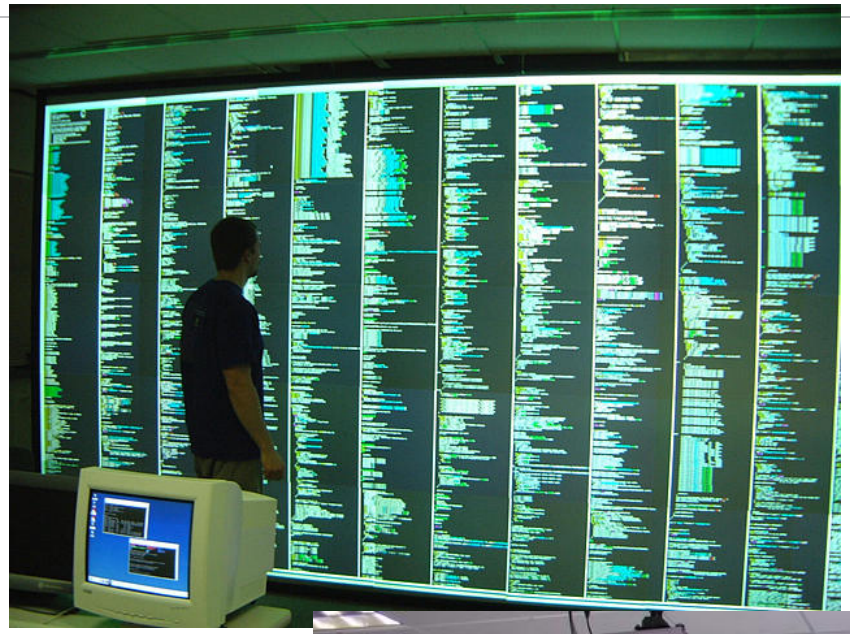


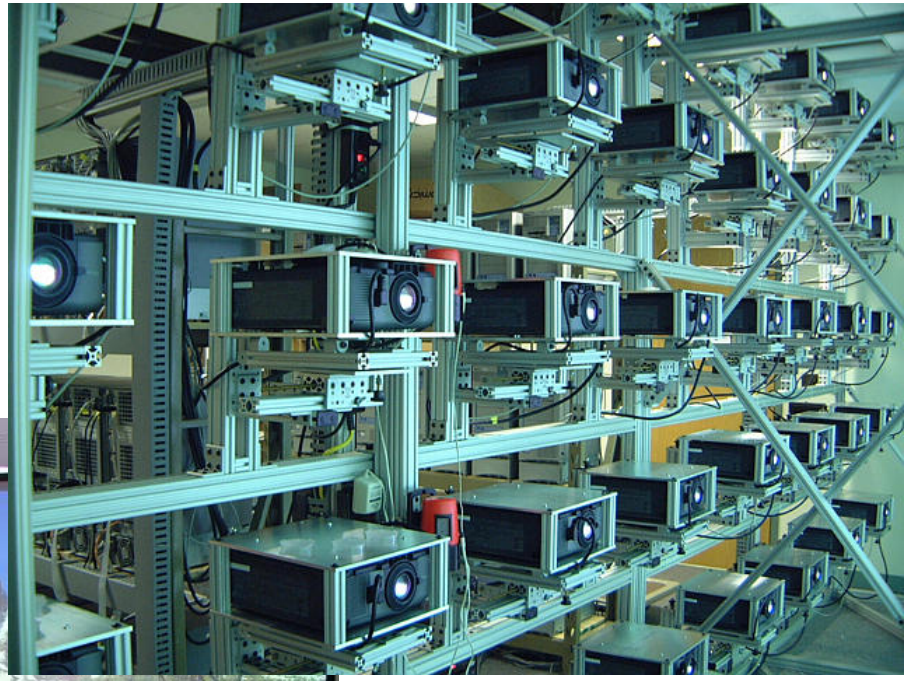
What are people doing now?

(and why are they still doing it?)

- 6-sided CAVE
- 4-sided CAVE/FLEX
- NexCave
- Ultra-res tiled walls
- Sam's project(s) at Brown







Research CS vs. Applied CS

- Is there a conservation of CAVEs?
  - Many places ramping down usage
  - Other places ramping up
  - Perhaps: research-down – application-up
- Is this a reflection of what the visualization community as a whole has experienced?

Solutions – an effort in bridge building

- Software – advance VR to work with existing visualization tools
- Hardware – provide the intermediate steps (e.g., IQ stations)
- Disciplines – reach across from both sides
- Motivation to cross

Something electrifying on the other side

Solutions – an effort in bridge building

- Software – advance VR to work with existing visualization tools
- Hardware – provide the intermediate steps (e.g., IQ stations)
- Disciplines – reach across from both sides
- Motivation to cross
  - Prospect of something beneficial on the other side
  - Quantification of benefits

Building bridges (continued)

- Maintaining the bridge
- Shepherd users toward self-reliance
- Lower the barrier to entry
  - Cost
  - Usability
  - Etc.

High-end – higher initial costs

- Spending more up front can improve:
  - Usability
  - Reliability & maintainability
  - Perception of quality
  - Lifecycle (upgradability)

What it ultimately comes down to

- Users must have a positive experience
- Good software/applications are the key

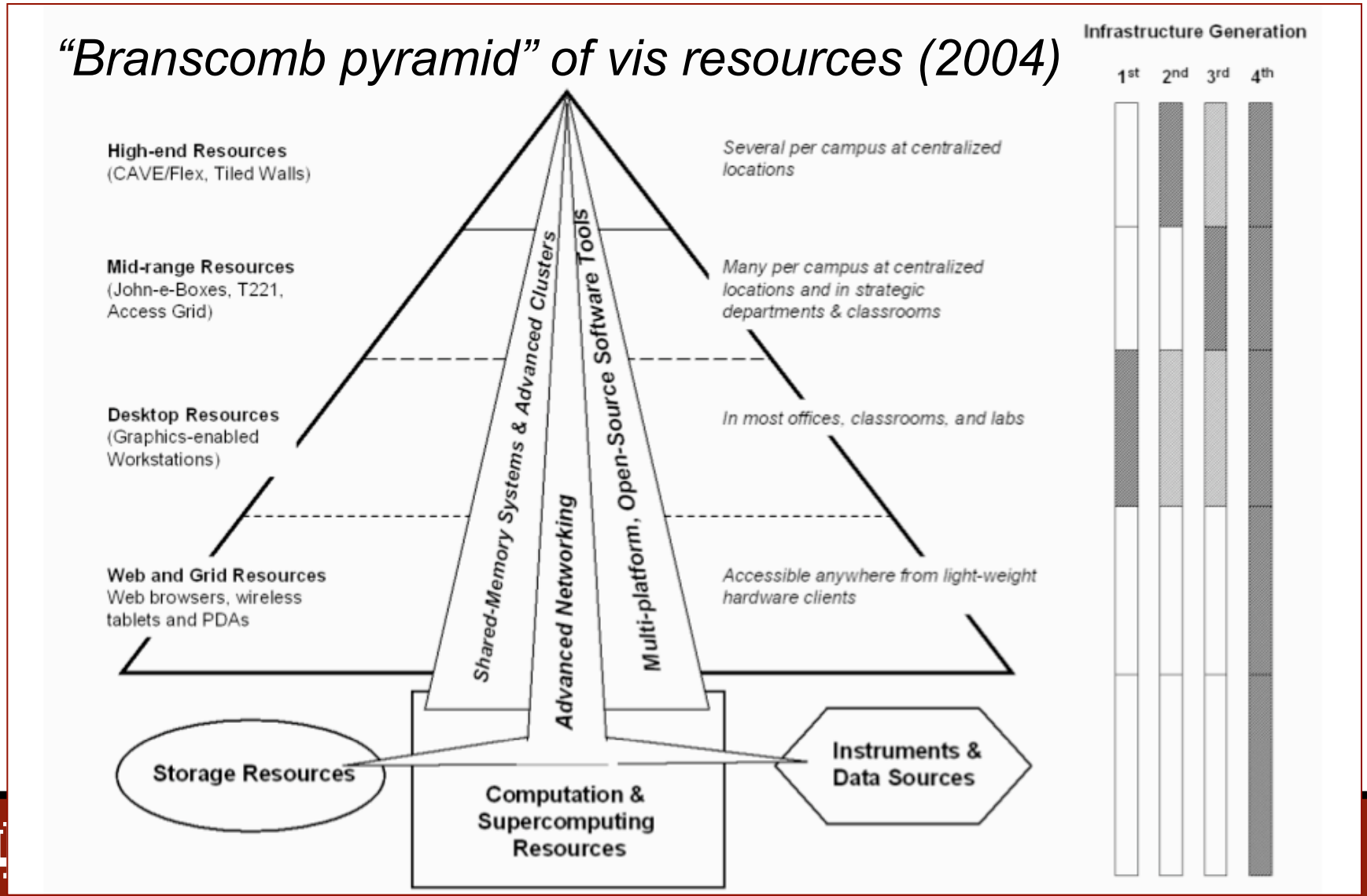
Our strategy for vis systems at IU

1. Develop a broad base of users and application areas
2. Use widely-deployed mid-range systems to supplement/complement high-end systems
3. Focus on usability, user experience, and support
4. New models of facility design, use, and governance

1. Broad base of users and app areas

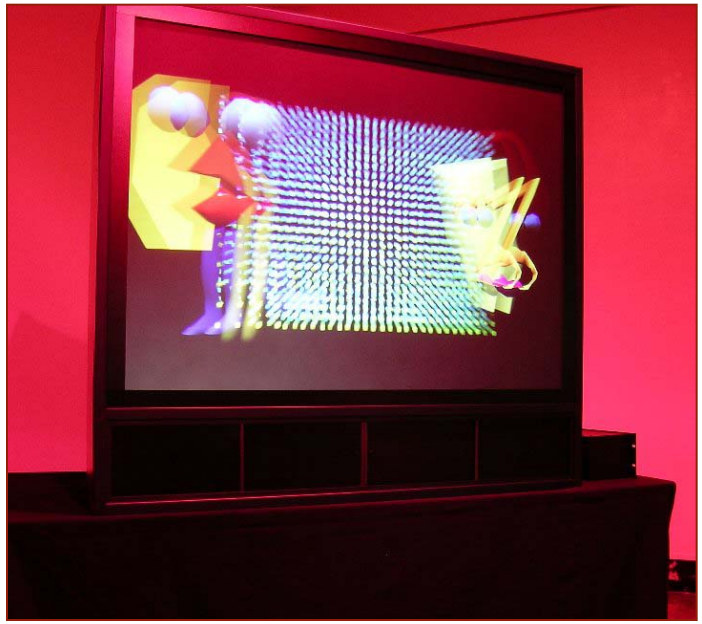
- embrace all aspects of University mission: research, education, creative activity, engagement
  - *Everyone* has an education mission in addition to research - users, decision-makers, funders, etc.
- Amortize cost of systems and staff across as many activities as possible
  - takes the pressure off finding the killer app
- Embrace the tour
  - Many groups don't get any spotlight at all

2. Integrated range of systems

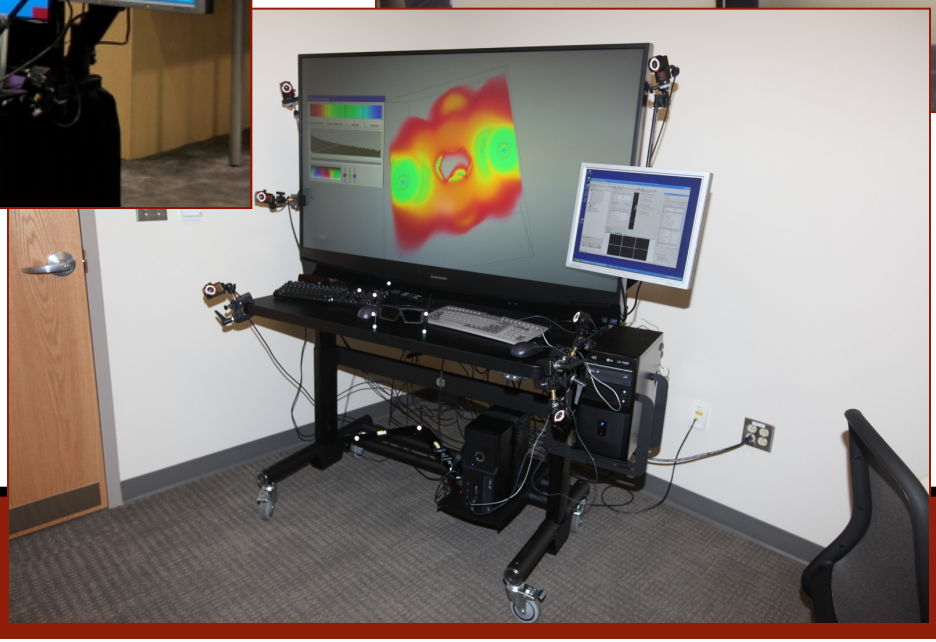


John-e-Box (2002-03)

- IU-developed passive stereo display
- Licensed to Indy company; 10 deployed at IU (8 via NSF/MRI grant), 4 beyond.

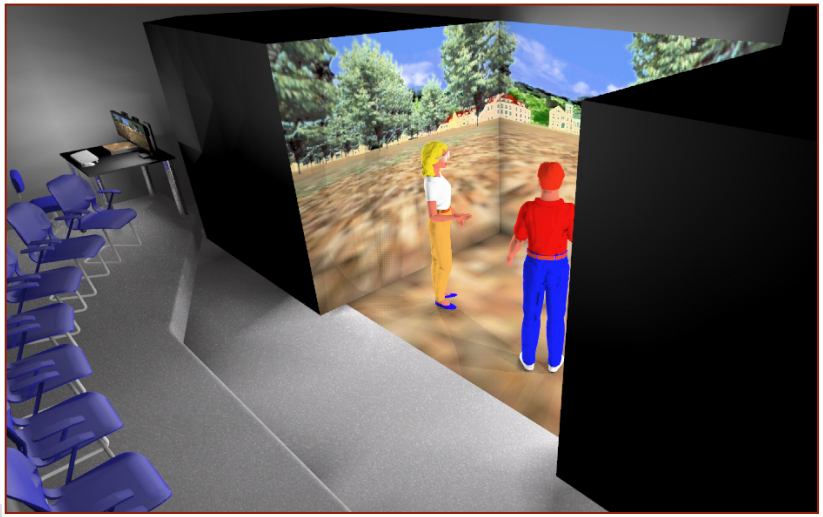


IQ-Station (2009-10)



3. Focus on usability

- Ergonomics, flexibility, etc.



Usability considerations

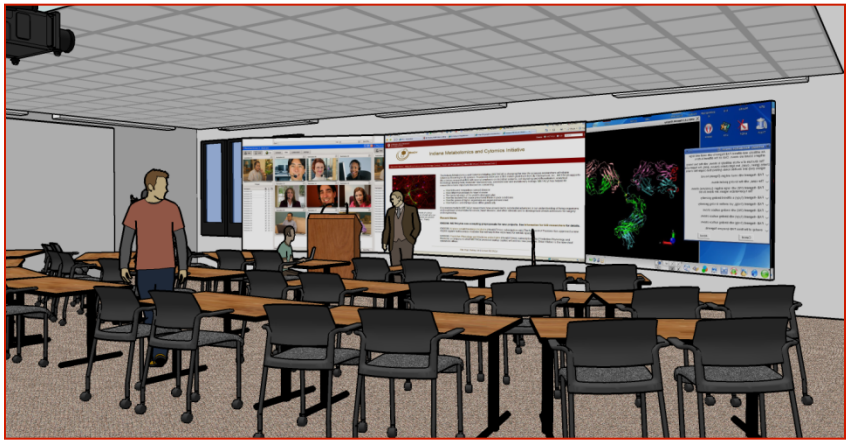
- Ease-of-use may be more important than…
  - cost
  - ultimate performance
  - usage/platform restrictions
- Tiled display examples:
  - 2004: Display cubes over projectors
  - 2004: Jupiter Fusion (WinXP) *plus* 8-way cluster
  - 2010: Samsung UD displays (HiPERwall software)
- Others
  - Commercial videoconferencing over AccessGrid

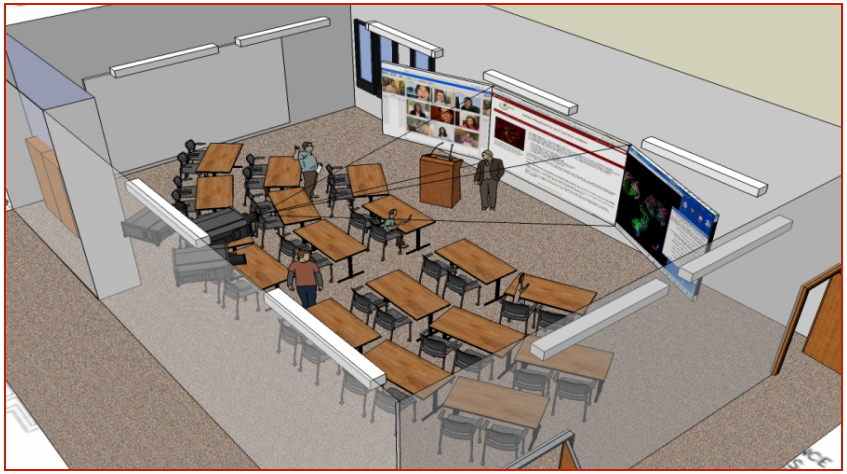
4. New models for larger facilities

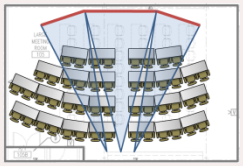
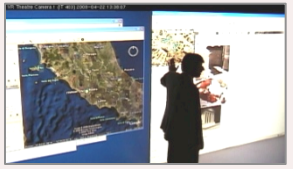
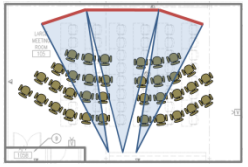
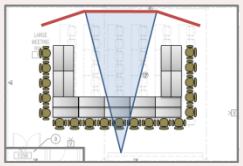
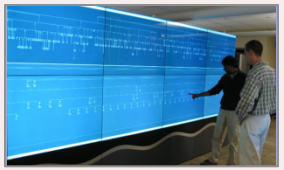
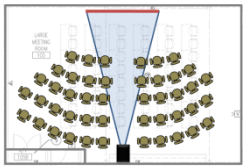
Mixed use and control - requires give and take

- Innovation Center
  - shared room with tech-transfer org
  - 50% grant funded, 100% of space
- University Cinema
  - 4K and stereo 2K capabilities
  - External donors; technology partnerships
- CIB display
  - Public and presentation space

Innovation Center – Vis & Collab. Theater



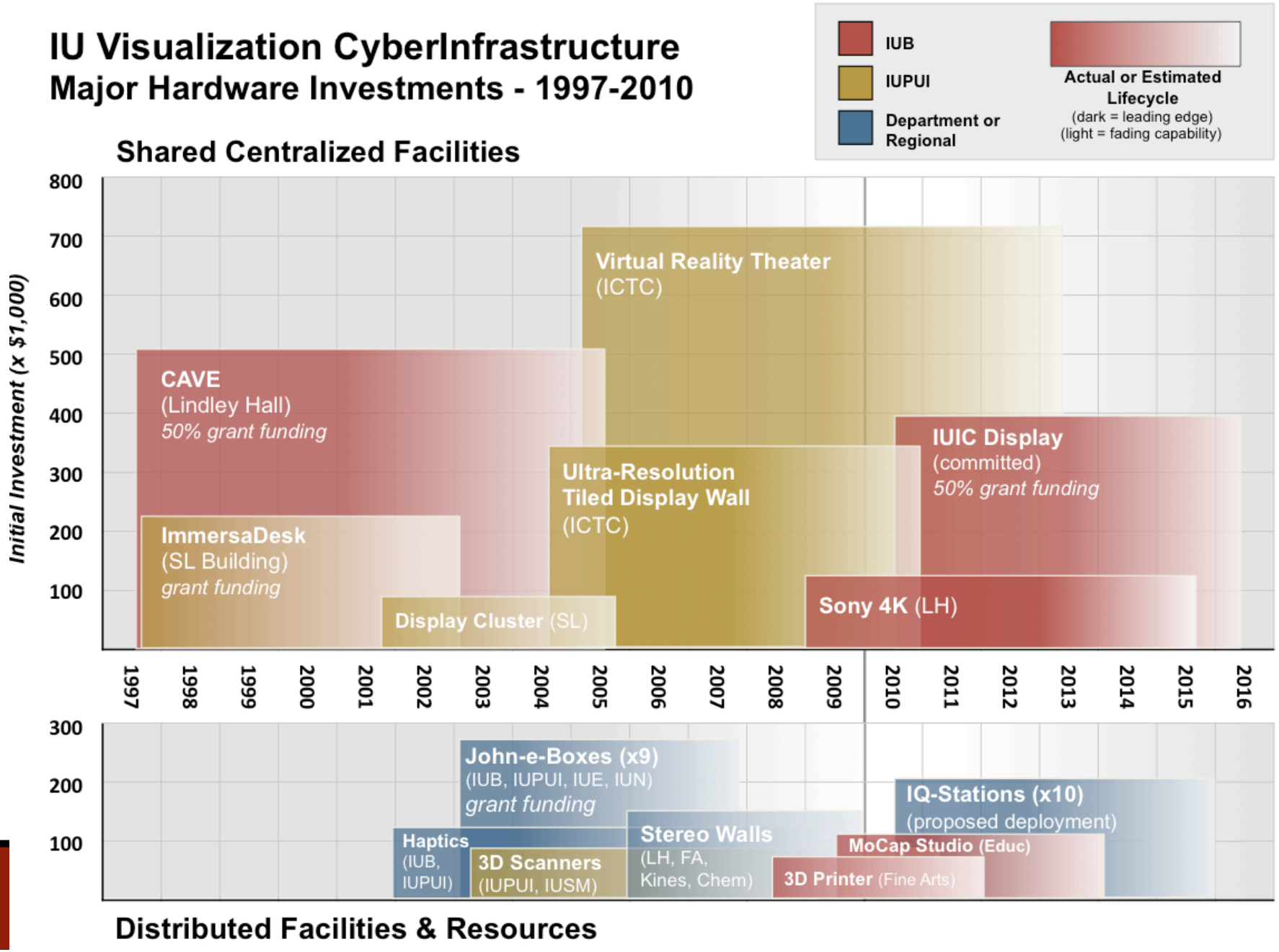


Configurations		
	Presentation or Large Group Teleconference	
	Immersive Environment for Education, Training, and Fine Arts	
	Large or Small Group Collaboration	
	Movie or Live Streaming Presentation	

University Cinema
(includes 4K, 3D 2K, and advanced networking)

New IT Building

- large-group presentations
- small-group collaboration
- Information “kiosk”
- Informal visualization


IU Visualization CyberInfrastructure
Major Hardware Investments - 1997-2010
IUB
IUPUI
Department or Regional
Actual or Estimated Lifecycle
(dark = leading edge)
(light = fading capability)
Shared Centralized Facilities
Initial Investment (x $1,000)
800
700
600
500
400
300
200
100
Virtual Reality Theater (ICTC)
CAVE (Lindley Hall) 50% grant funding
IUIC Display (committed) 50% grant funding
Ultra-Resolution Tiled Display Wall (ICTC)
ImmersaDesk (SL Building) grant funding
Display Cluster (SL)
Sony 4K (LH)
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
300
200
100
John-e-Boxes (x9) (IUB, IUPUI, IUE, IUN) grant funding
IQ-Stations (x10) (proposed deployment)
Haptics (IUB, IUPUI)
3D Scanners (IUPUI, IUSM)
Stereo Walls (LH, FA, Kines, Chem)
MoCap Studio (Educ)
3D Printer (Fine Arts)
Distributed Facilities & Resources

Commonly cited challenges / issues for high-end visualization facilities

- Expense
- Complexity
- Space
- Accessibility
- Utilization
- Impact
- Sustainability
- Software continuity

One more thing …

- ISVC 2010 symposium special track:

Low Cost Virtual Reality: Expanding Horizons

- Call for Papers (due July 12, 2010)
- Las Vegas Nevada
- November 29 – December 1, 2010
- www.isvc.net