



Cees de Laat 

On behalf of the CineGrid Amsterdam Collaboration

**Many slides from partners &
Laurin Herr, Pacific Interface Inc.
CineGrid.org**



What is CineGrid?

- ❑ Formed 2004 – non-profit international membership organization
- ❑ Members – media arts schools, research universities, scientific labs, post-production facilities & hardware and software developers around the world
- ❑ Connected – via 1 G - 100 G Photonic - Ethernet networks
- ❑ For – research & education, experimentation, prototyping



CineGrid Mission

To build an interdisciplinary **community** that is focused on the **research, development, and demonstration** of **networked** collaborative tools to enable the production, **use** and **exchange** of very-high-quality digital media over **photonic networks**.

<http://www.cinegrid.org/>

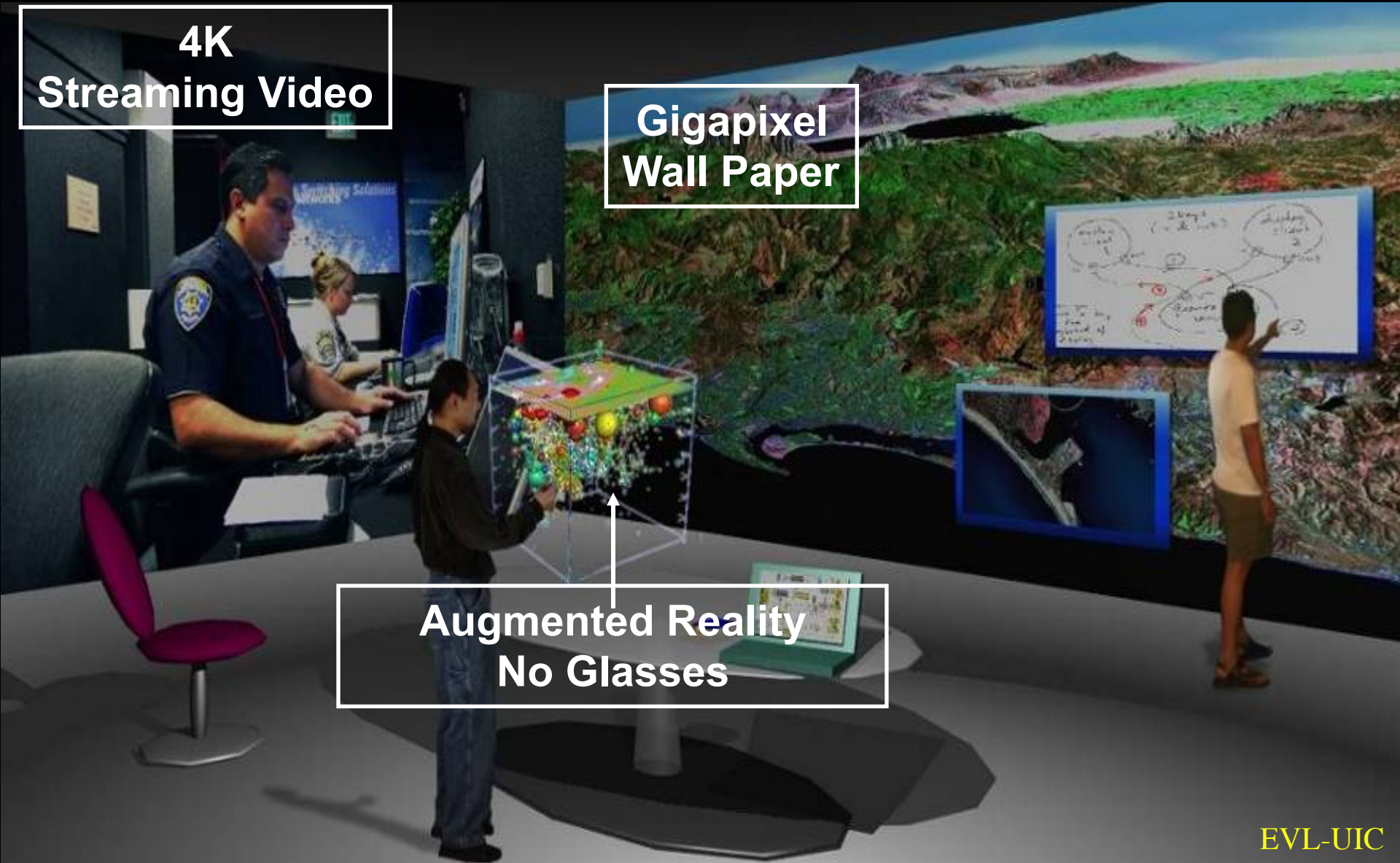


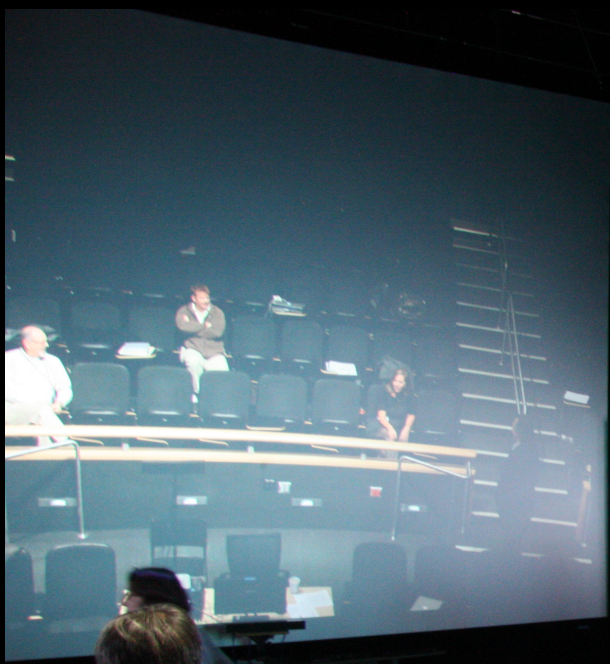
Vision for the Next Decade Gigapixels @ Terabits/sec

4K
Streaming Video

Gigapixel
Wall Paper

Augmented Reality
No Glasses





Connected with the
Electronic Visualization Laboratory
in Chicago





Connected with the
Electronic Visualization L
in Chicago





Drop windows to:

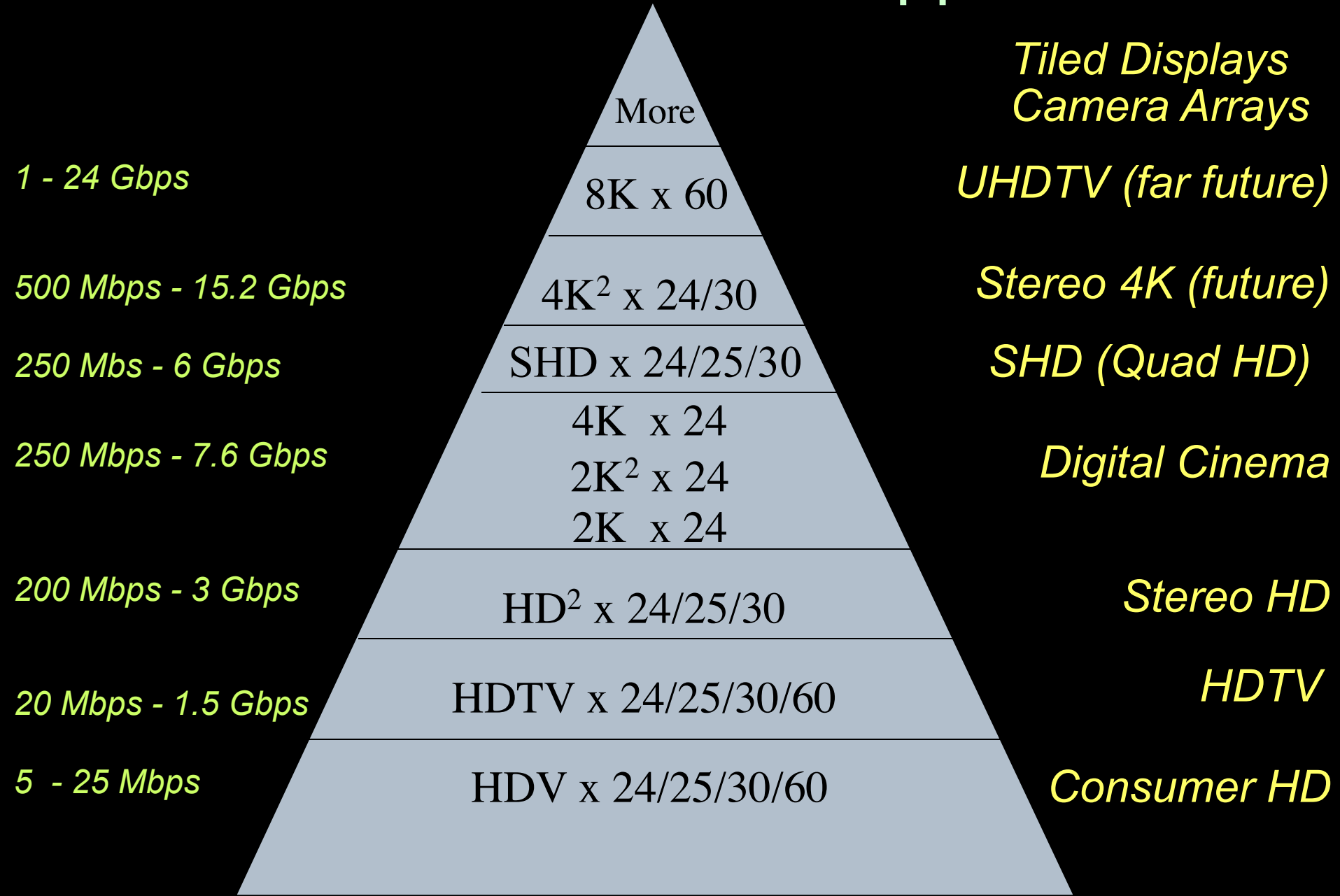
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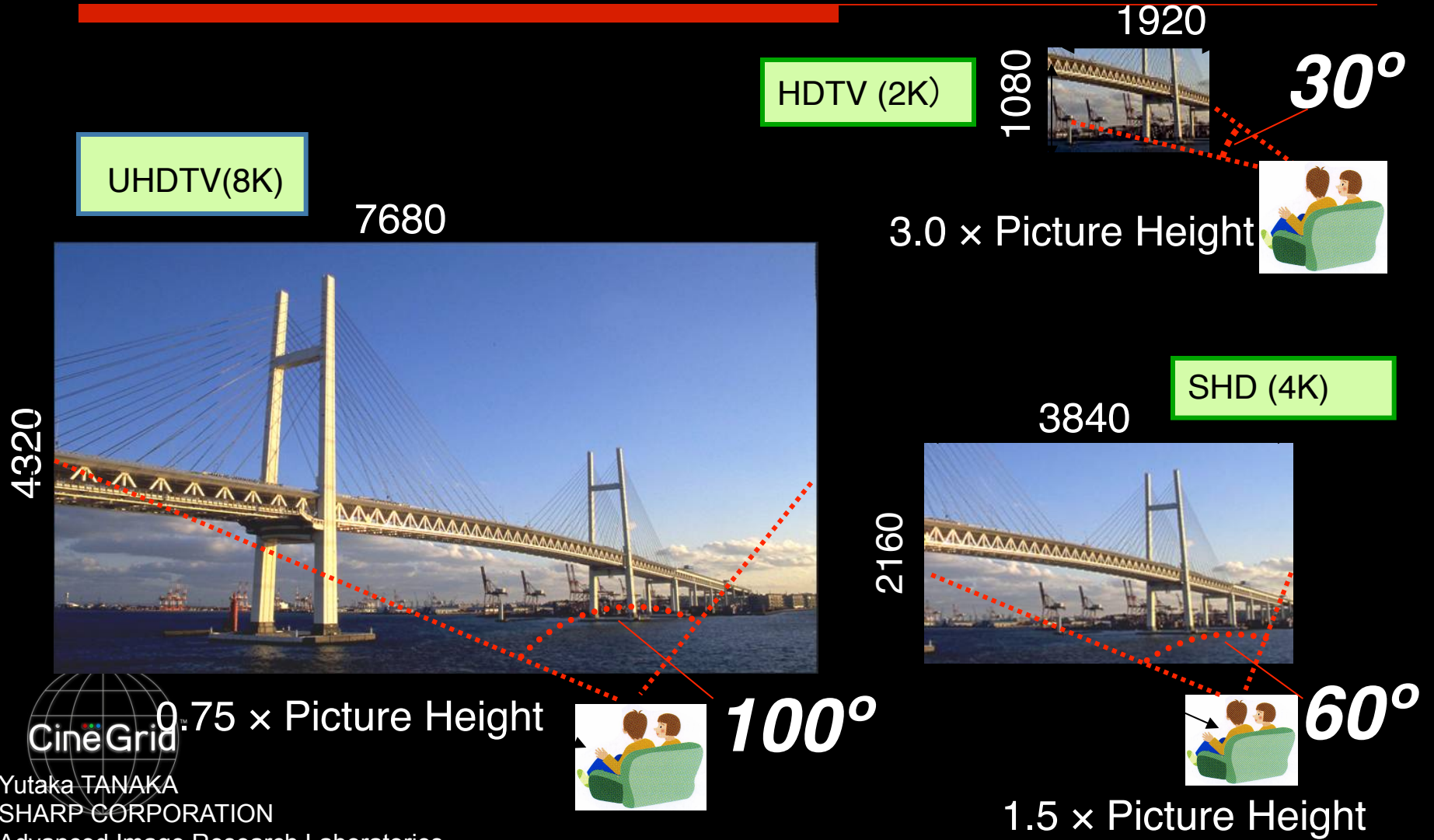


CineGrid: A Scalable Approach



Why is more resolution is better?

1. More Resolution Allows Closer Viewing of Larger Image
2. Closer Viewing of Larger Image Increases Viewing Angle
3. Increased Viewing Angle Produces Stronger Emotional Response



Moving Big Data Objects Globally

□ Digital Motion Picture for Audio Post-Production

- 1 TV Episode Dubbing Reference ~ 1 GB
- 1 Theatrical 5.1 Final Mix ~ 8 GB
- 1 Theatrical Feature Dubbing reference ~ 30 GB

□ Digital Motion Picture Acquisition

- 4K RGB x 24 FPS x 10bit/color: ~ 48MB/Frame uncompressed (*ideal*)
- 6:1 ~ 20:1 shooting ratios => 48TB ~ 160TB digital camera originals

□ Digital Dailies

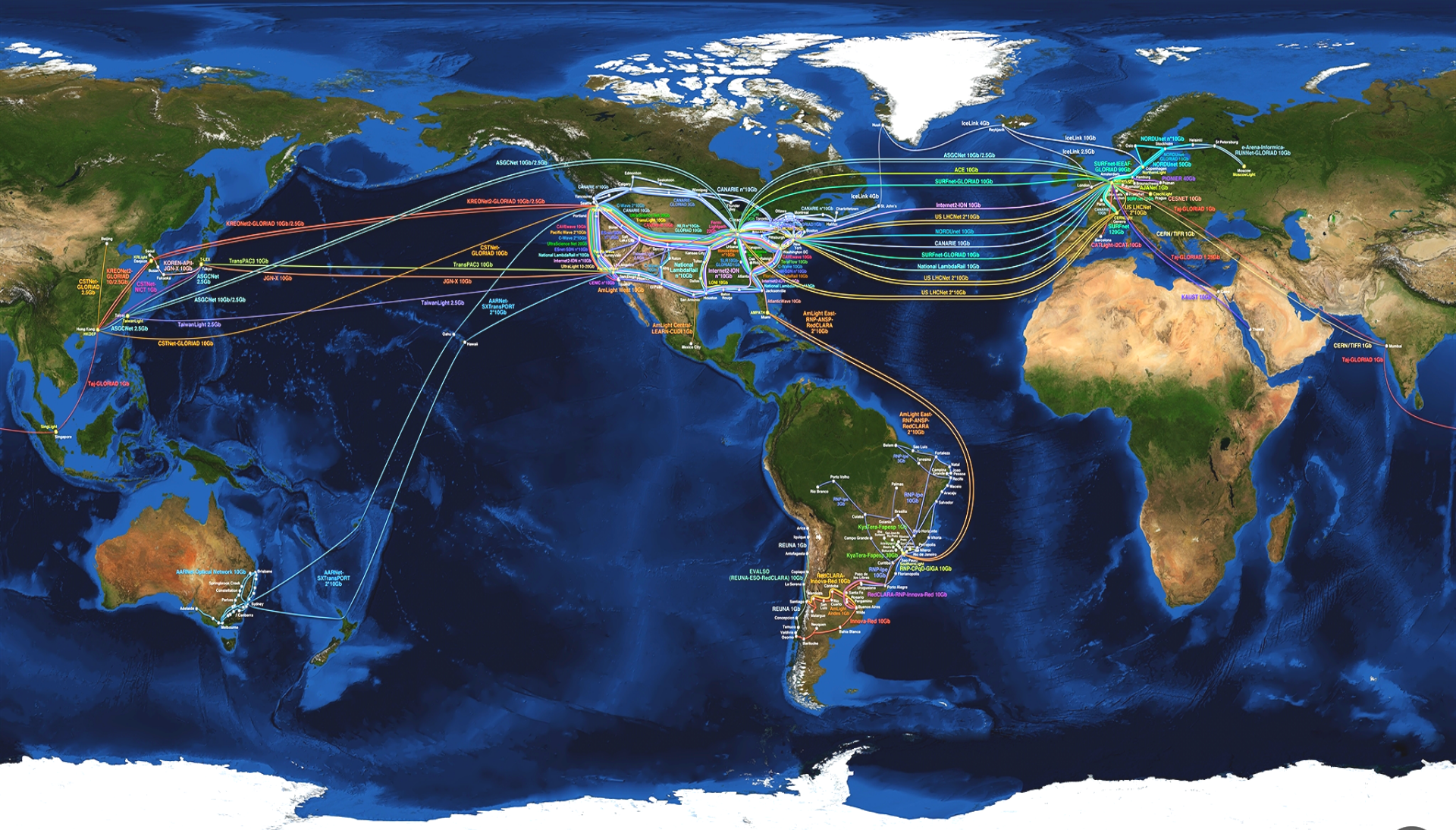
- HD compressed MPEG-2 @ 25 ~ 50 Mb/s

□ Digital Post-production and Visual Effects

- Gigabytes - Terabytes to Select Sites Depending on Project

□ Digital Motion Picture Distribution

- Film Printing in Regions
 - Features ~ 8TB
 - Trailers ~ 200GB
- Digital Cinema Package to Theatres
 - Features ~ 100 - 300GB per DCP
 - Trailers ~ 2 - 4GB per DCP



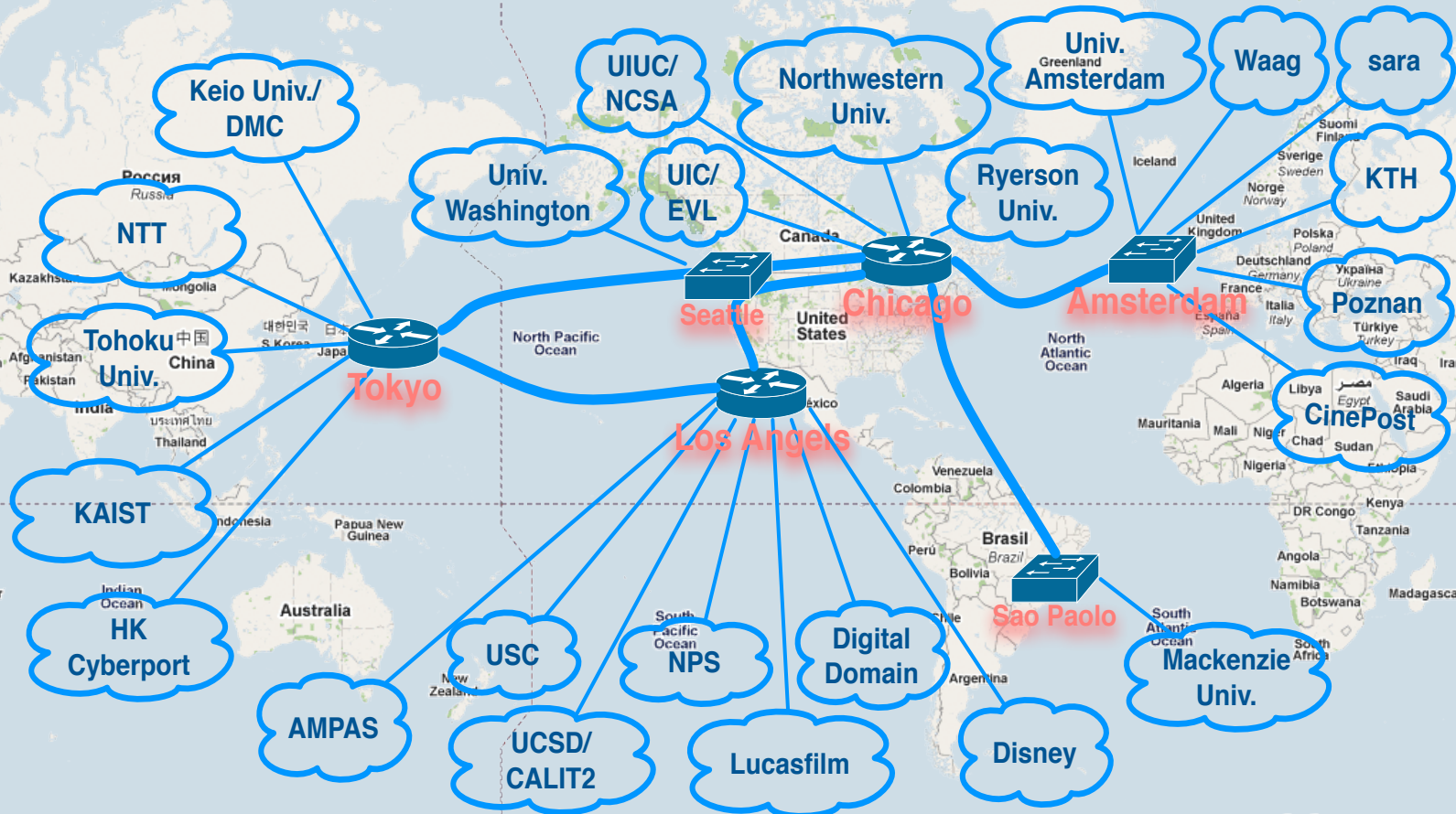
We investigate:
 complex networks!



for



CineGrid Network 2011

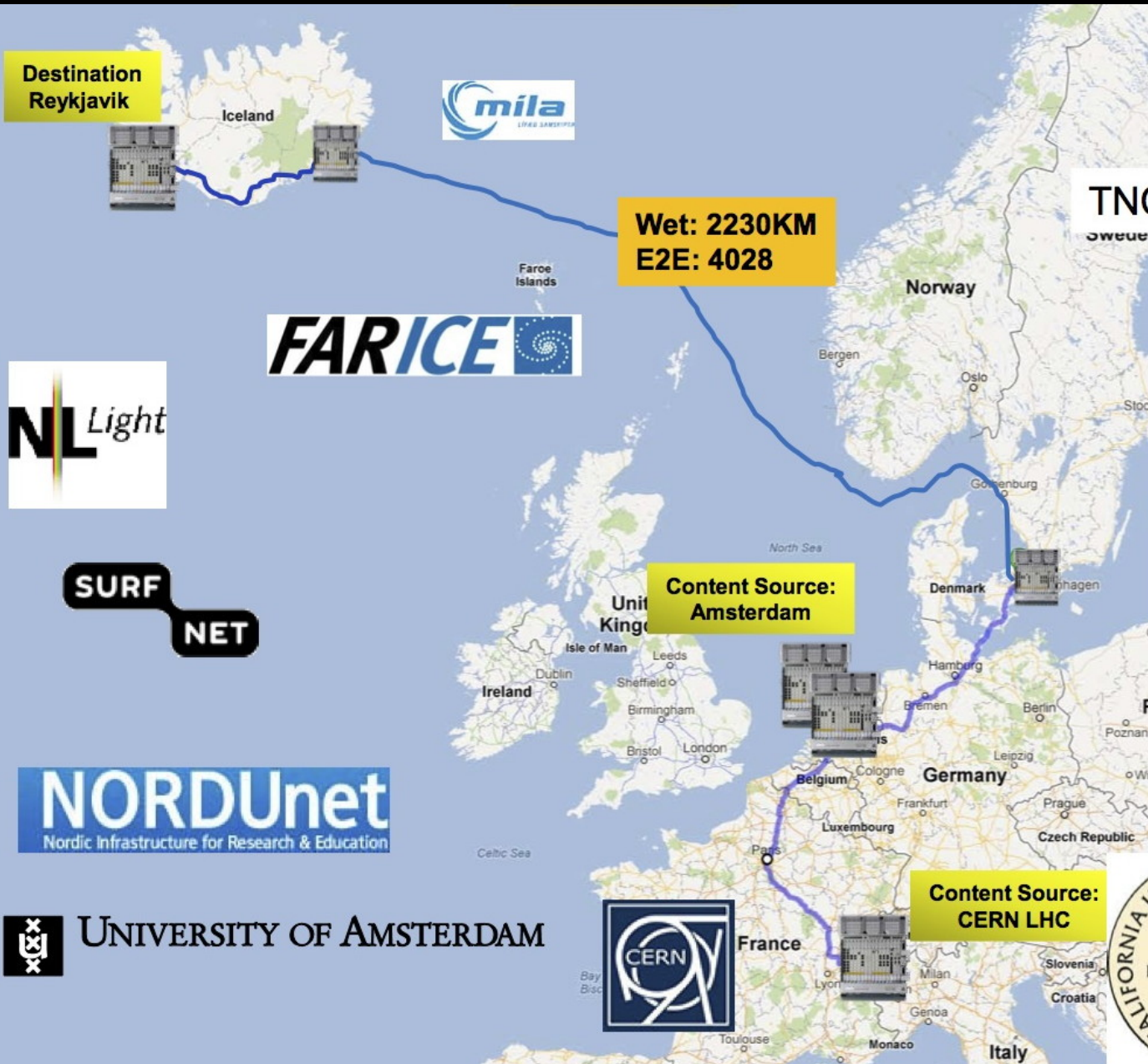


Network Resources are kindly provided by:

AMPATH, C-Wave, CANARIE, CaveWave, CENIC, CESNET, CzechLight, GEMNET, Internet2, JANET, JGN2plus, NetherLight, NLR, NORDUnet, PacificWave, PNWGP, RNP, StarLight, SOL, SURFnet, TransLight/StarLight, T-LEX, WIDE

kaneko@dmc.keio.ac.jp, as of 2011/02/14

100 Gb Network for CineGrid @ TNC12



“Learning by Doing” Early CineGrid Projects



CineGrid @ iGrid 2005



CineGrid @ AES 2006



CineGrid @ Holland Festival 2007

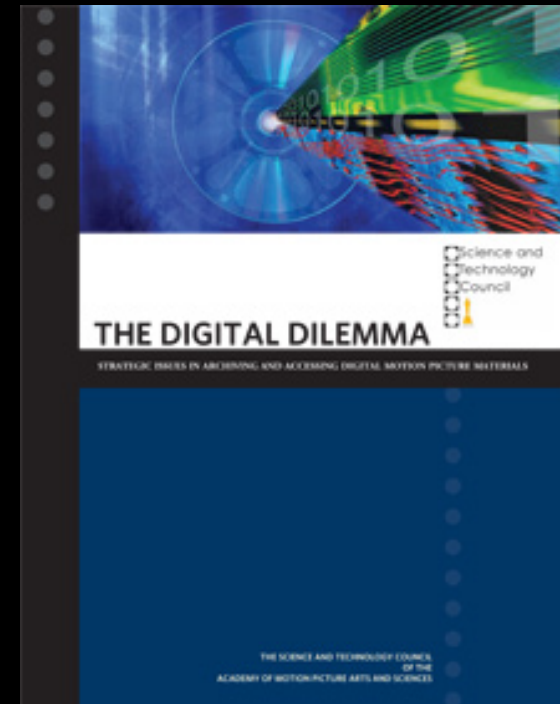


CineGrid @ GLIF 2007



CineGrid Exchange

- ❑ TERABYTES PILING UP. To store & distribute its own collection of digital media assets. Members access materials for experiments and demonstrations.
- ❑ Create global-scale testbed = high quality media assets + distributed storage + fast networks.
- ❑ Enable exploration of strategic issues in digital media storage, access, distribution and preservation – for cinema, scientific visualization, medical imaging, etc.
- ❑ THE DIGITAL DILEMMA. Report published by Academy of Motion Picture Arts and Sciences 2007





4K/2K multipoint interactive telepresence

live 4K JPEG 2000 streaming over IP

Keio@Tokyo ◀.....▶ EVL@Chicago ◀.....▶ Calit2@San Diego



8K x 2K x 60p live remote sensing
dual 4K/60p cameras & dual 4K JPEG 2000 codecs
synchronized 4K JPEG 2000 streaming over IP

Monterey Bay Aquarium→ NPS@Monterey→ Calit2@San Diego



4K interactive digital cinema color grading
realtime 4K uncompressed streaming over IP

CinePOST@Prague



Calit2@San Diego



Tele-collaboration for audio post-production
realtime picture and sound editing synchronized over IP

Skywalker Sound@Marin



Calit2@San Diego

CINEGRID AMSTERDAM

Research-, development- and outreach facility
for production, transport and projection of
digital cinema:

- Digital projection and sound in very high quality
- Editing and capture facilities
- Rendering & disk space
- Extremely high quality networks

In the center of Amsterdam

International context

- Focus on spin-offs & lasting value



PARTNERS

CONSORTIUM PARTNERS

SURFnet, UvA, SARA, Dutch Film- and Television Academy, DELL, TNO, Holland Festival, Blender Institute, Sandberg Institute, MediaGuild, Waag Society

COLLABORATORS

Poznan Supercomputing Center, Amsterdam Innovatie Motor, UCSD, University of Illinois, NHK, KTH, KEIO University, Pathé Benelux, Filmmuseum, Salto, Nationale Computer Faciliteiten, IDFA, BeamSystems, ISOC, IDFA, DutchView, PICNIC, GridForum and many more

CINEGRID AMSTERDAM GOALS

Assemble technology, science, art and education to create new concepts, pilots & business models that result in:

- New forms of storytelling
- New domains for scientific exploration
- Transformation of workflows in creative media production
- Better education
- Enhanced economic growth



RESOURCES

CineGrid Studio for 4K postproduction

- 100 TB of Highly Connected Storage Space
- High Performance Render Cluster
- 3 * 4K Screens and
- 1 – 100 Gb/s light path connections

Expertise in

- Production
- Encoding
- Transmission
- Screening



- CineGrid 2011 & 2012
- One minutes
- Mediapark Jaarcongres '08 '09 '10
- Holland Animation Film Festival
- Holland Festival '07 & '10
- Content, content content..
- Educational contest
- 4K How to Cookbook
- PICNIC '08 & '09
- SURFnet GigaPort
- Workshops 4K
- ICT Delta '09
- BeamLab

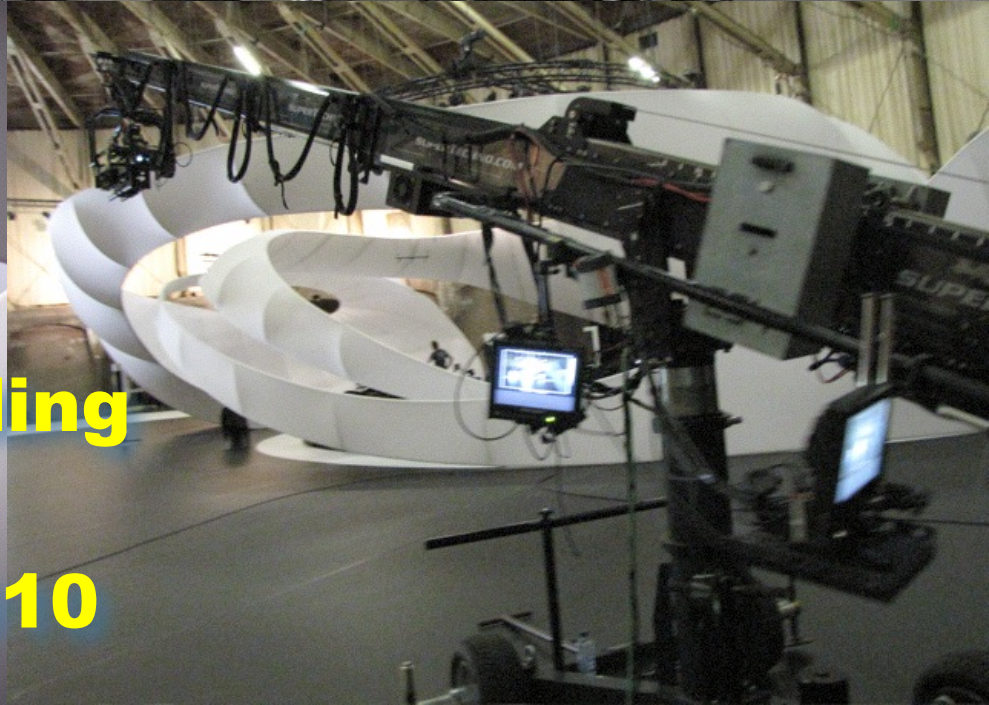


A large crowd of people is shown in a dimly lit setting, likely a theater or concert hall. Many individuals are holding binoculars to their eyes, and some are using cameras. The scene is filled with a sense of anticipation and focus. The lighting is primarily blue and dark, creating a dramatic atmosphere. The text "SEEING IS BELIEVING" is overlaid in a bright yellow, serif font across the middle of the image.

SEEING IS BELIEVING



Handelingen Maarten de Heer



STEREO 4K Recording
Viktorija Mullova
Holland Festival 2010



Hey, sit still.



We're almost done. Sshh...





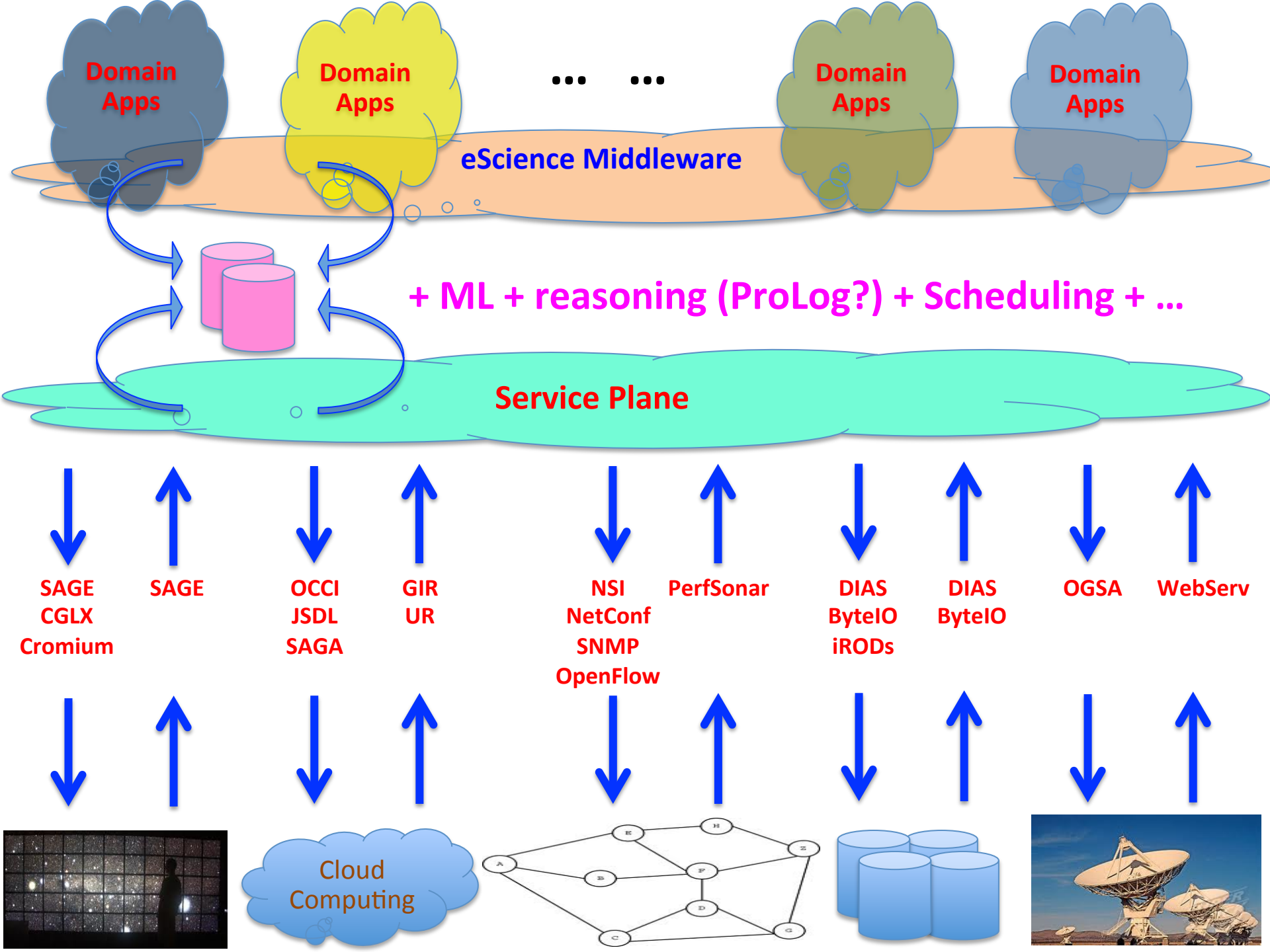
Why?



I want to:

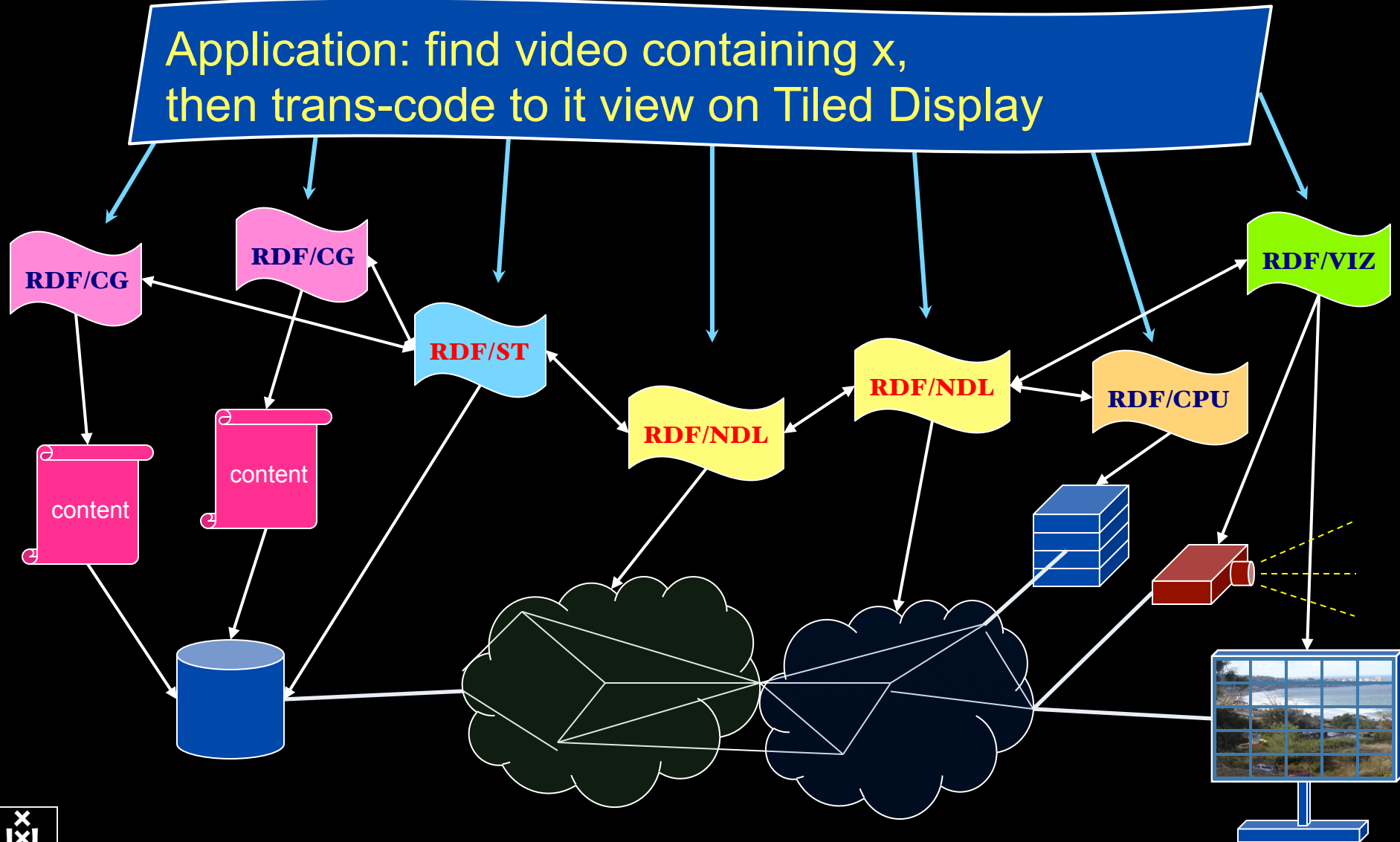
“Show Big Bug Bunny in 4K on my Tiled Display using green Infrastructure”

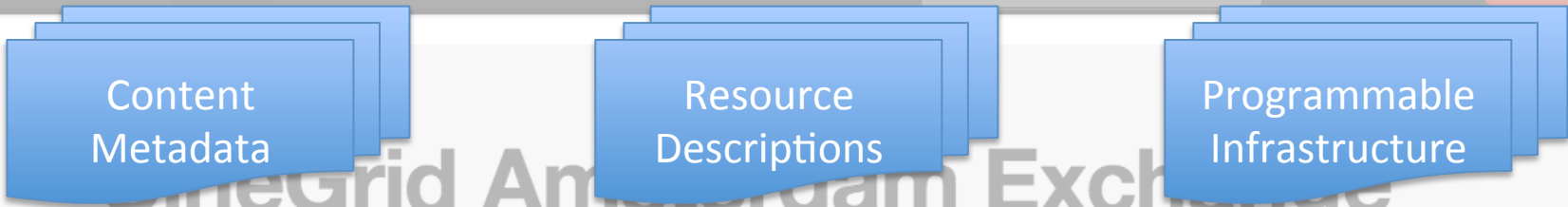
- Big Bugs Bunny can be on multiple servers on the Internet.
- Movie may need processing / recoding to get to 4K for Tiled Display.
- Needs deterministic Green infrastructure for Quality of Experience.
- Consumer / Scientist does not want to know the underlying details.
→ His refrigerator also just works.



RDF describing Infrastructure “I want”

Application: find video containing x,
then trans-code to it view on Tiled Display





Browse content



Portal
The purpose of this portal is to make the public familiar with super-high-quality video and to make the content more accessible for other CineGrid members.

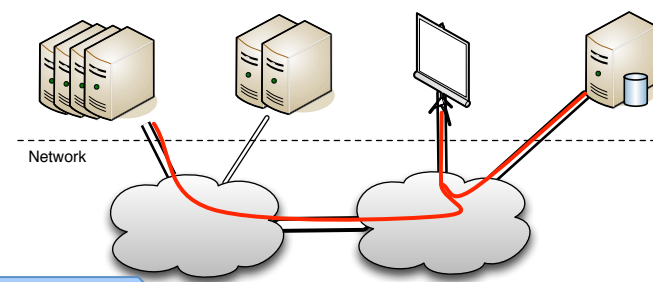
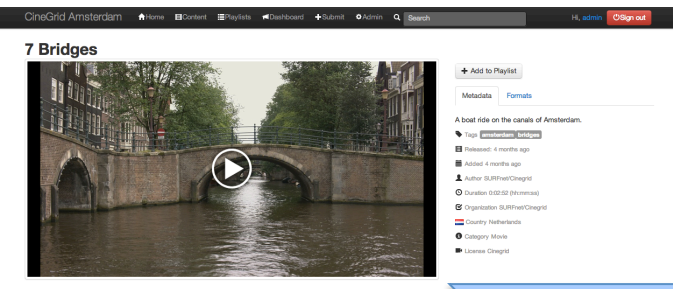
CineGrid
Find out more about Cinegrid Amsterdam.

Research
Find out more about the Cinegrid Description Language

Infrastructure
The Amsterdam node now has over 64 Terabytes of storage dedicated for CineGrid.

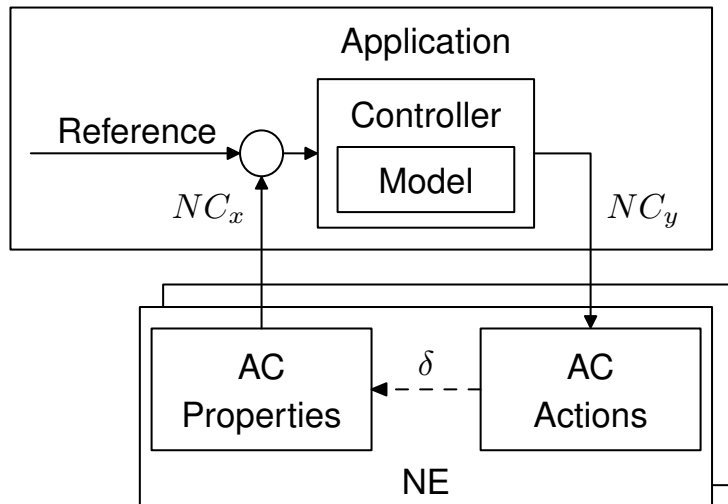
CineGrid Portal

Unified orchestration of distributed CineGrid resources



In the Intercloud virtual servers and networks become software

- Virtual Internets adapt to the environment, grow to demand, iterate to specific designs
- Network support for application specific interconnections are merely optimizations: Openflow, active networks, cisco distributed switch
- But how to control the control loop?



Interactive Networks

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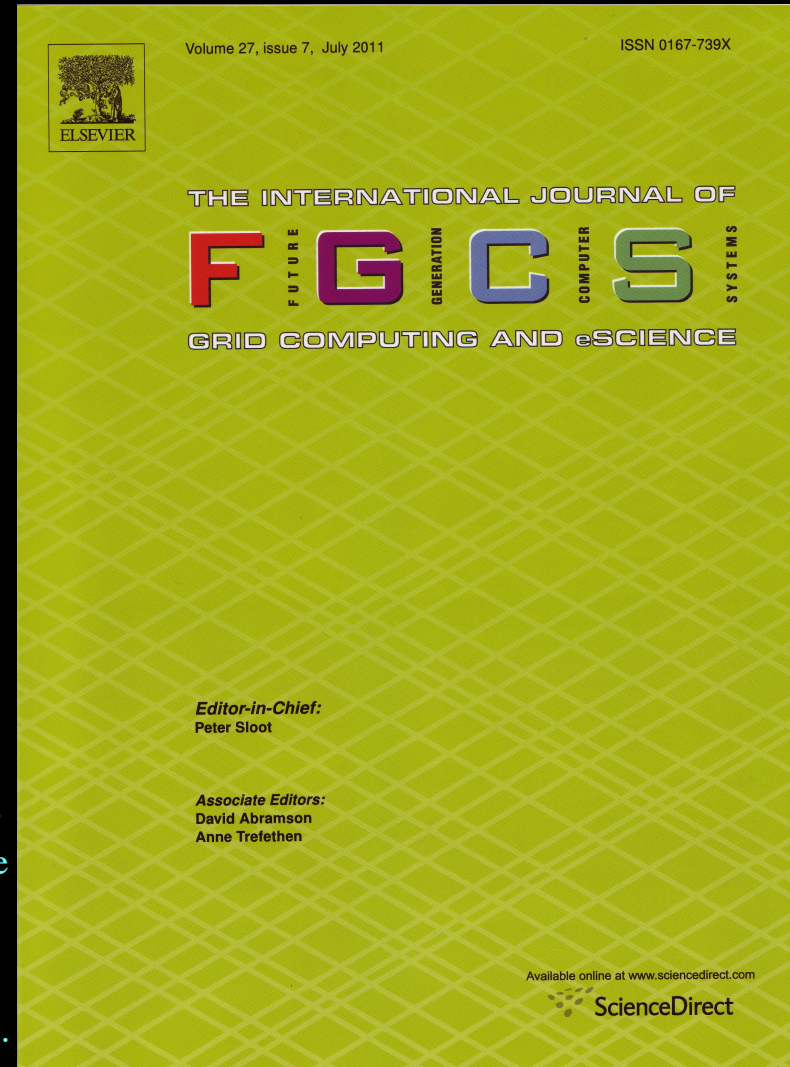
Scientific Publications: FGCS Special Issue on CineGrid!

Volume 27, Issue 7, June 2011

Guest Editors: Naohisa Ohta & Paul Hearty & Cees de Laat

Editorial: CineGrid: Super high definition media over optical networks.

1. Real-time long-distance transfer of uncompressed 4K video for remote collaboration.
2. Media Network (HPDMnet): An advanced international research initiative and global experimental testbed.
3. Producing and streaming high resolution digital movies of microscopic subjects.
4. Enabling multi-user interaction in large high-resolution distributed environments.
5. Tri-continental premiere of 4K feature movie via network streaming at FILE 2009.
6. A collaborative computing model for audio post-production.
7. Design and implementation of live image file feeding to dome theaters.
8. Beyond 4K: 8K 60p live video streaming to multiple sites.
9. Using ontologies for resource description in the CineGrid Exchange.
10. CineGrid Exchange: A workflow-based peta-scale distributed storage platform on a high-speed network.
11. CSTEP: A parallel data transfer protocol using cross-stream coding.
12. Multi-point 4K/2K layered video streaming for remote collaboration.



CineGrid-Amsterdam is supported by

City of Amsterdam, Pieken in de Delta

EFRO / Kansen voor West, Province of Noord-Holland



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X
X Gemeente
Amsterdam



www.cinegrid.nl