



Collaviz[®]

Collaborative Visualization Current Systems and Future Trends

Christophe Mouton
EDF R&D, CMC
Paris, France

Kristian Sons
DFKI, Supporting.com
Saarbrücken, Germany

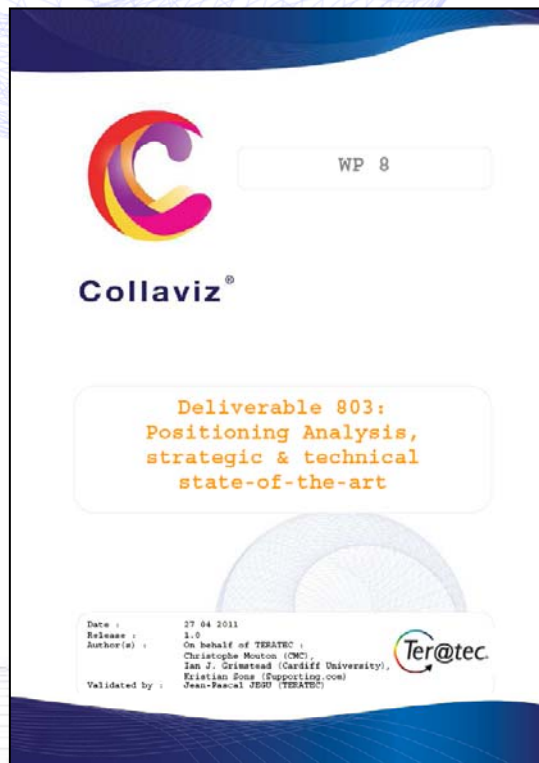
Ian Grimstead
Cardiff University,
Cardiff, UK





A TERATEC report

- An ANR Collaviz Project deliverable
- A scientific paper accepted and presented at the 2011 Web3D ACM conference, June 20-22, Paris





Agenda

- Positionning of the « collaborative visualization »
- Brief state-of-the-art
- Common issues and challenges
- Towards NextGen Collaborative Visualization



The tale of being (virtually) here without being there (really) ...

F2F meeting with foreign collaborators



Domestic constraints





Is a reality ... Almost...

F2F meeting with foreign collaborators



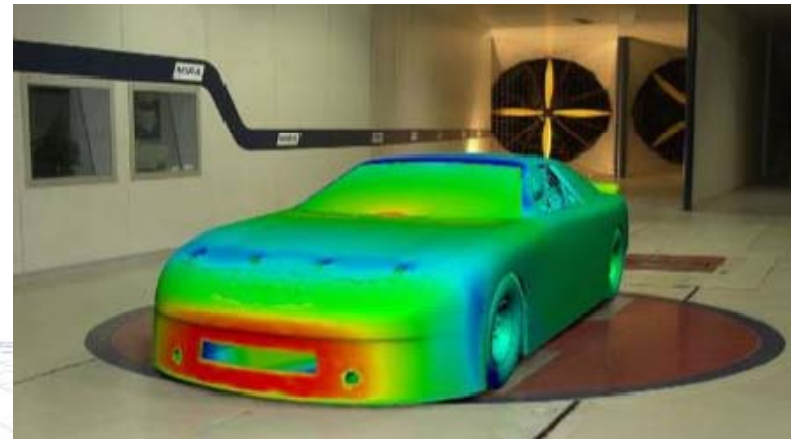
Domestic constraints





Telepresence and Videoconferencing are great!

- But collaborative tools and visualization are still the key for remote collaboration
- A question of usage and needs :
 - Sharing Office tools : Excel, Word, PowerPoint
 - WebConferencing!
 - What is feasible for CAE?
 - Especialy for 3D realtime and interactive software?





Let's get deeper inside collaborative tools

1. Take your favorite CAE software
2. Try to answer the question :
"What do I need to share?"





Let's get deeper inside collaborative tools

1. Take your favorite CAE software
2. Try to answer the question :
"What do I need to share?"

Case 1 :
Sharing a point of view on
a CAD model with an
engineer in the plant?





Let's get deeper inside collaborative tools

1. Take your favorite CAE software
2. Try to answer the question :
"What do I need to share?"

Case 2 :
Working together with
another team member on
the same software?





Let's get deeper inside collaborative tools

1. Take your favorite C
2. Try to answer the question "What do I need to

Case 1 :
Sharing a point of view on a 3D model with an engineer?



Whether
the software?





2000 : peer to peer collaboration

- NetMeeting – T120 standards
 - Based on local resources and performance
 - OK for Office apps
 - Poor network
 - Not enough bandwidth -> not enough frames per second
 - Forget for Collaborative CAE and videos □

BUT

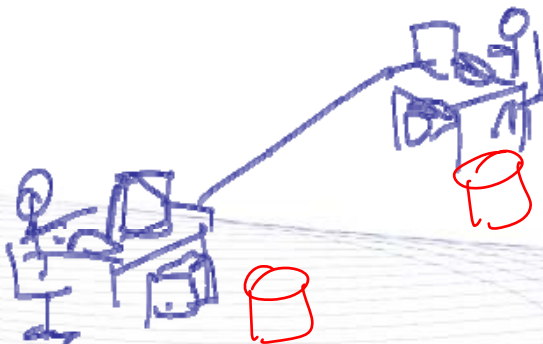
- Have led to recently successful Webconferencing systems : Webex...
 - Around 1-2 images per second for desktop sharing
 - Fit perfectly for remote presentation
 - Not P2P ;-)



The collaborative viz challenges

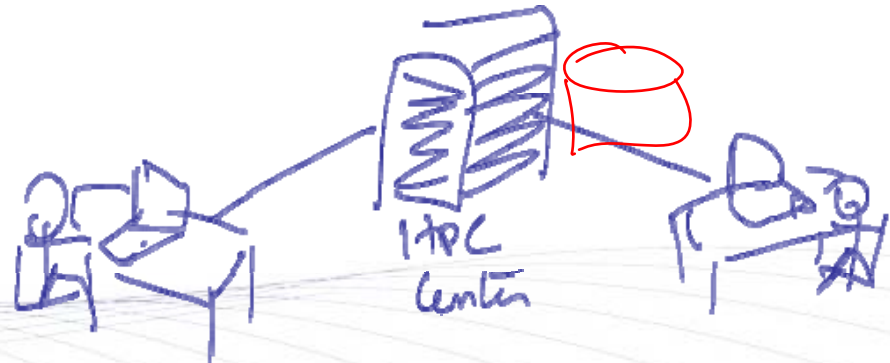
- Remote shared and realtime interactions for CAE software
 - How to achieve 17 fps for Realtime 3D interaction?
- First steps towards collaborative Viz :

CovisE 2000



09/08/2011

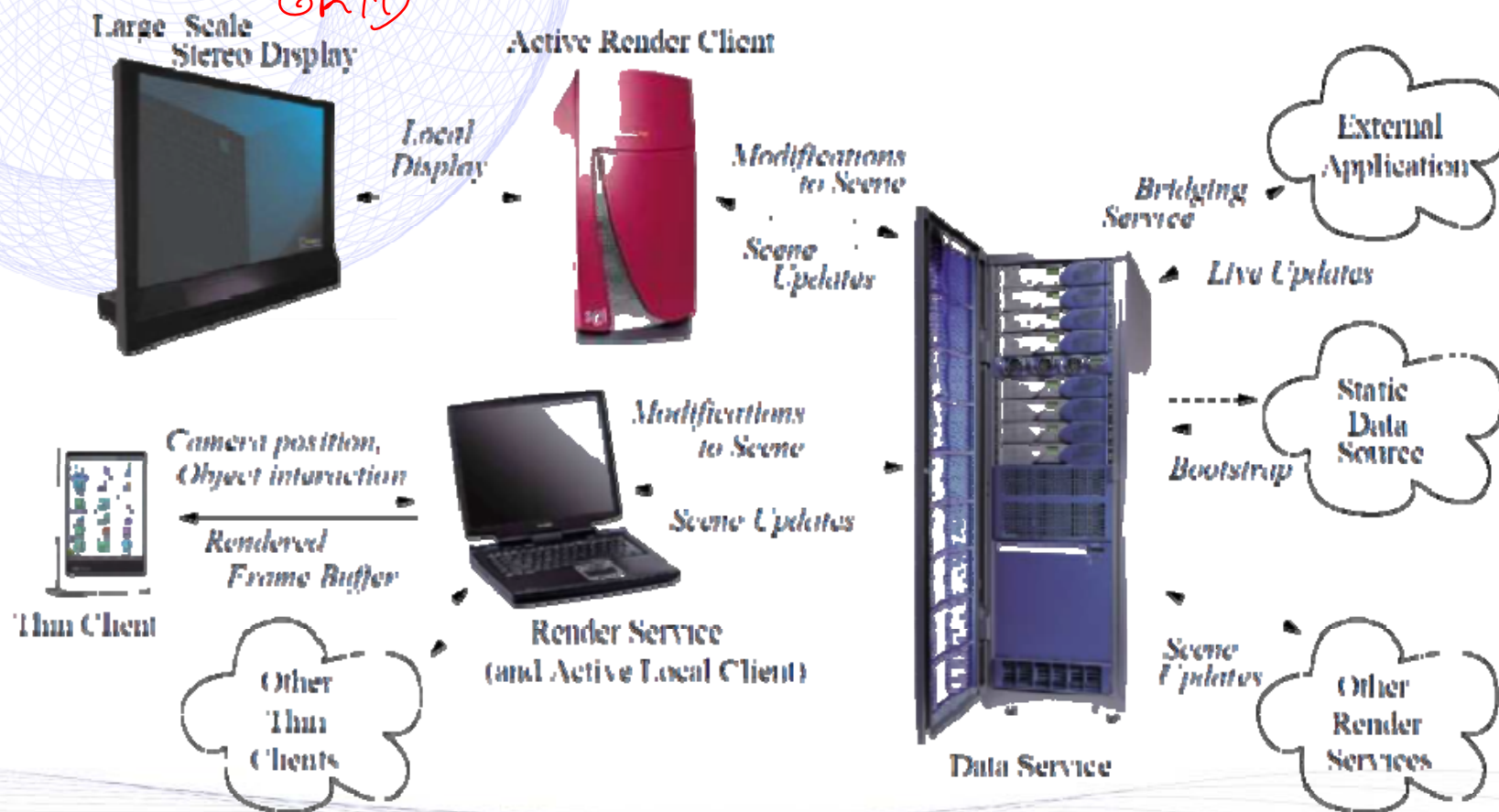
OPENGL VISBRIDGE 2001





Resource Aware Visualization Environment (“RAVE”) : e-Science and HPC

- A 2005 ~~Cloud~~ ^{GRID} Computing Project: Test Web Services for collaborative viz.





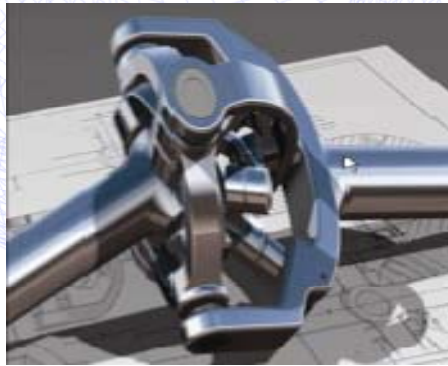
RAVE: Issues / Lessons Learnt

- Incompatibility with existing applications
 - RAVE “imported” many “standard” data formats
 - But there are many standards...
- People wish to use their existing application
 - Familiarity of use
 - Domain specific controls
- Ideally:

People want remote resource access /
collaboration all through existing
application



2005-2011 : Lets get the power to meet real business models



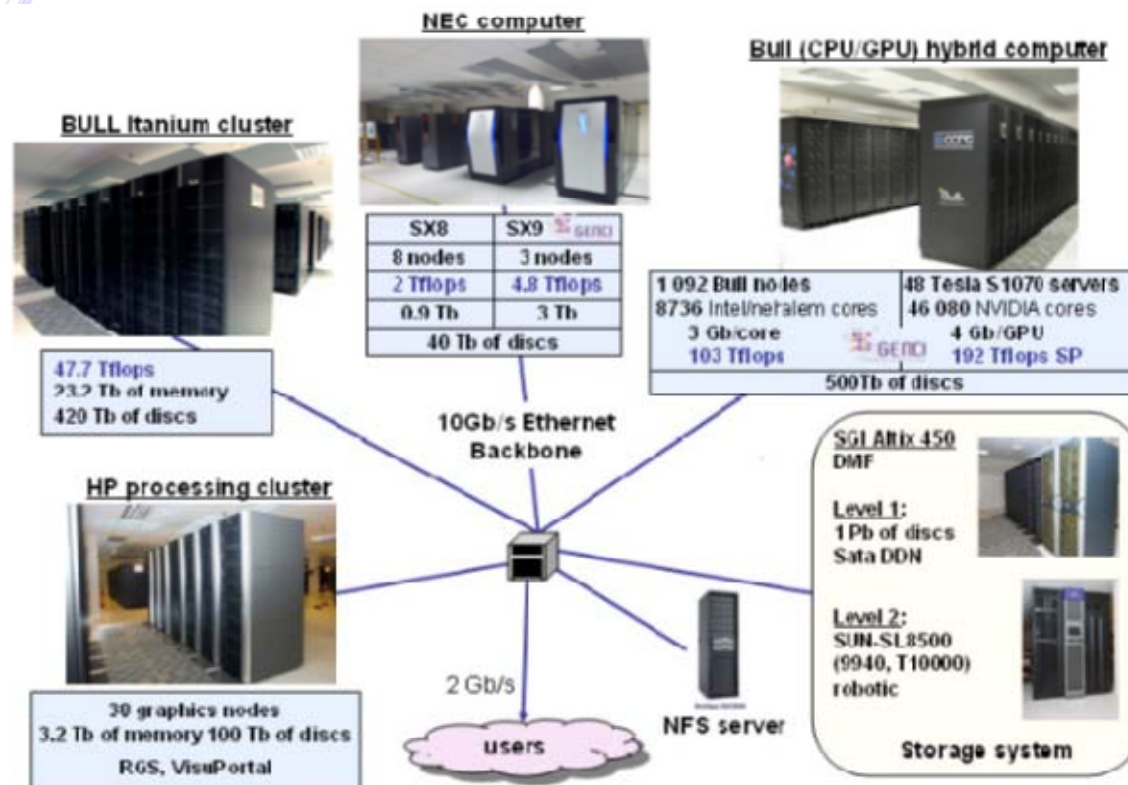
2D + 3D
✓
1-2 FPS
OR
17 FPS !





Collab Vis for (Optimising) Business As Usual 1/3

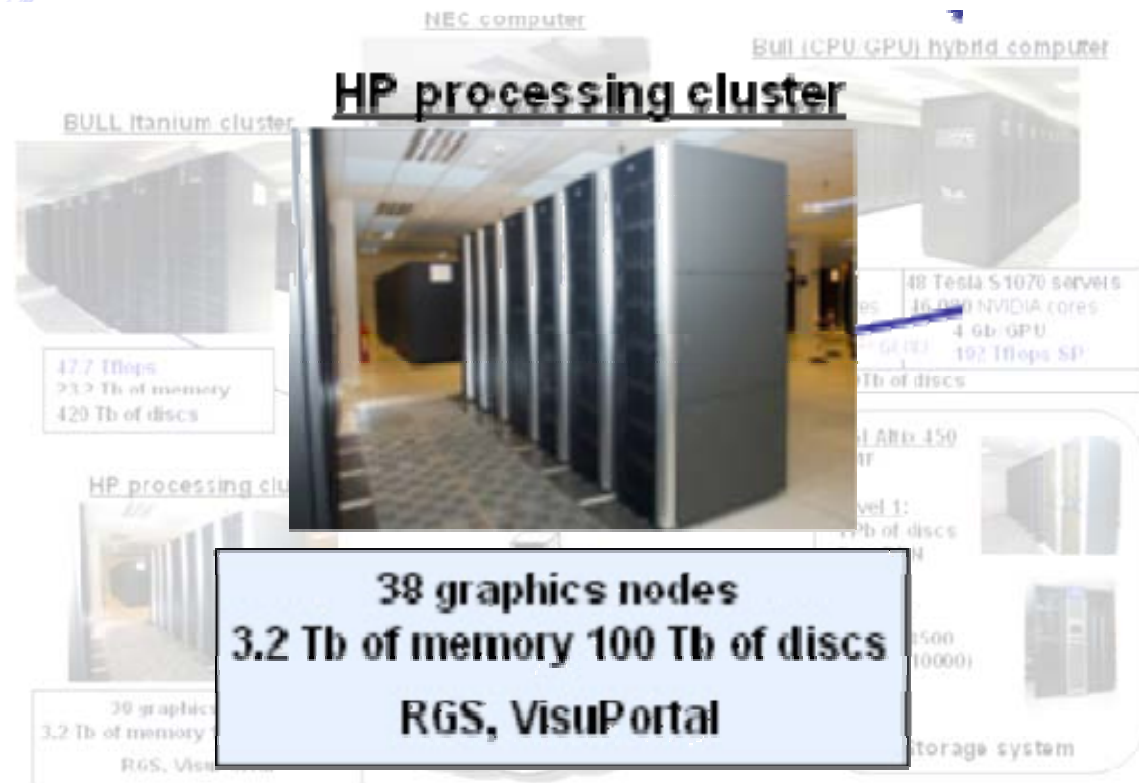
- HPC : Visualizing simulations
 - From 100 000 to x Millions users





Collab Vis for (Optimising) Business As Usual 1/3

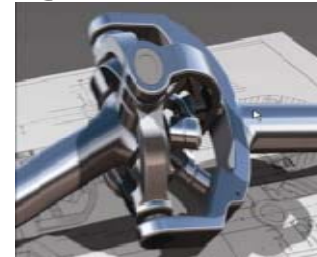
- HPC : Visualizing simulations
 - From 100 000 to x Millions users





Collab Vis for (Optimising) Business As Usual 2/3

- CAE : sharing and optimising hardware
 - 100000 - xx Millions users

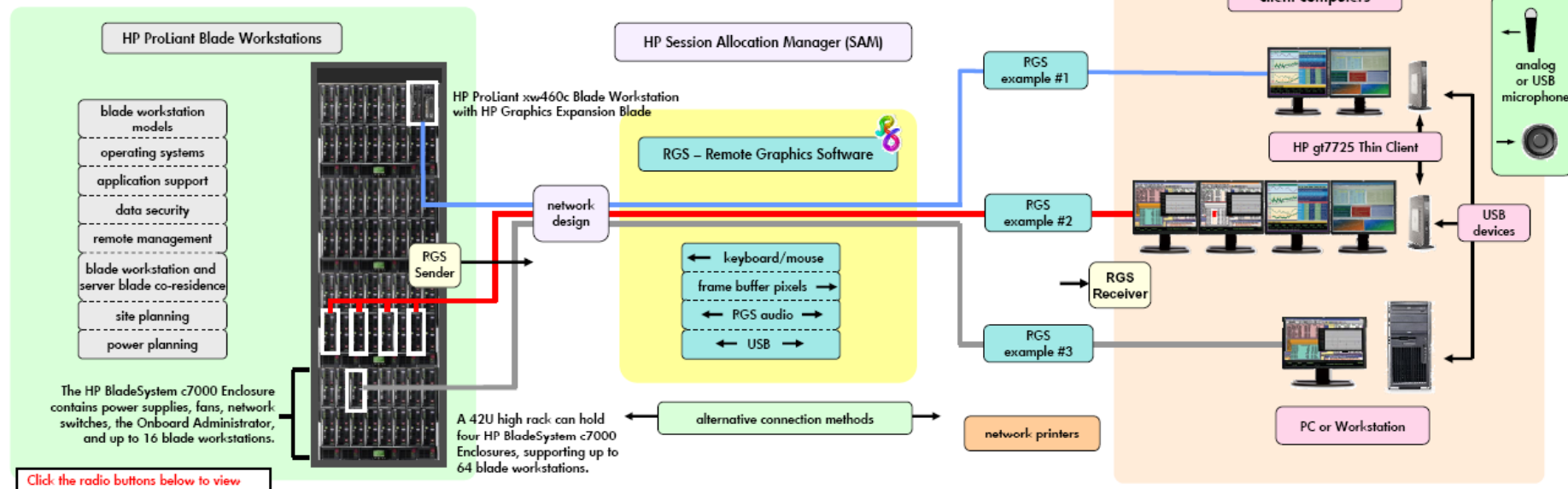


To view additional information, place your mouse over any rounded rectangle button.

Start Here

HP Blade Workstation Solution Architecture

Figure 3-2





Collab Vis for (Optimising) Business As Usual 3/3

- Gaming : your remote gaming console(s)
 - 100 Millions - x Billions users



← → <http://www.vizworld.com/vizworld-video/> ☆ ↻ Google 🏠 Réagir ▾



Where the graphics & visualization community goes for news and insight

Up to 80% Off
Bestselling Magazines



🏠 Infographics Graphics Hardware Science Calendar Podcast Store 🔍

VizWorld Video

📅 June 27th, 2011 [Goto comments](#) [Leave a comment](#)



VizWorld Podcast
Special Edition: OnLive

⏸ 0:14 🔊 🖥 VizWorld

Get More VizWorld!







VIZWORLD
Join our Mailing List! 



ONCE YOU KNOW, YOU NEWEGG.®

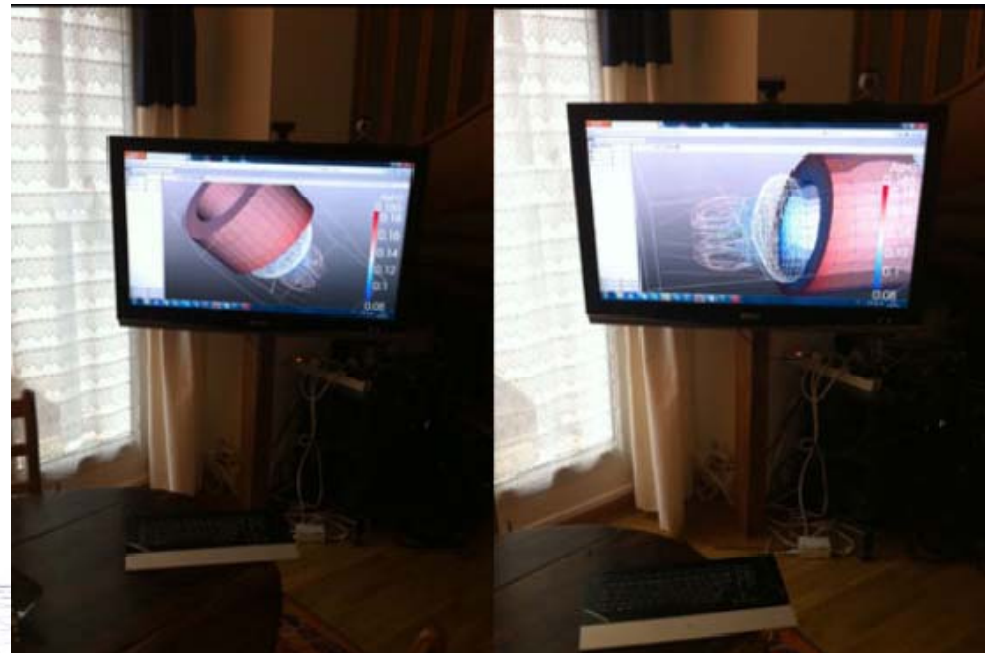
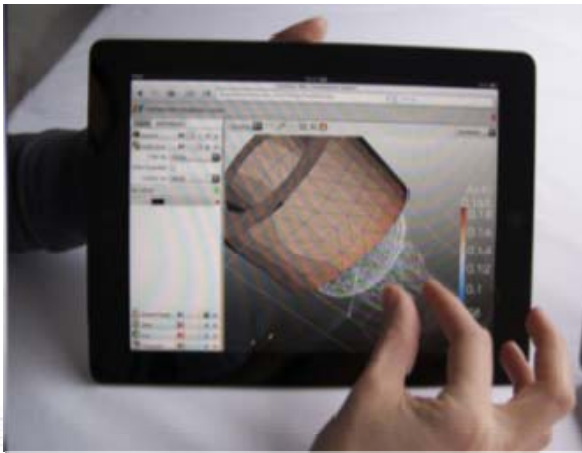
VizWorld Store

 <p>High Dynamic Range Imaging, Second Edition Erik Reinhard, Wol... New \$72.35 Best \$58.99</p>	 <p>CUDA by Example Jason Sanders, Edw... New \$27.26 Best \$27.26</p>
 <p>Physically Based Rendering, Second Edition Matt Pharr, Greg H... New \$44.56 Best \$37.00</p>	 <p>OpenGL SuperBible Richard S. Wright, ... New \$44.56 Best \$37.00</p>



...remote collab viz doesn't mean always « copying » the screen!

- Huge needs of adapting GUI and tasks to support remote collaborative work
 - Dedicated tools depending on the case
 - Various user devices even lightweight ones :





Dedicated tools : Towards Web3D services?

- Since VRML :
 - Lots of projects and... not so much success
- Still a good idea :
 - I just want to publish the right level of data!

But :

- « my data » : engineering, GIS, medical...

- Needs for a publishing lightweight format :

- Proprietary ones... ☹
- Standards to the rescue : X3D (new VRML), U3D, KML...

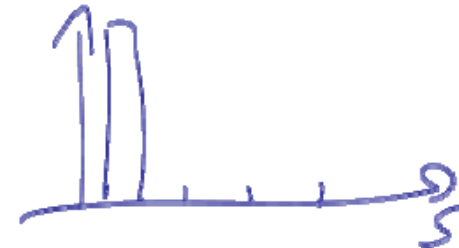
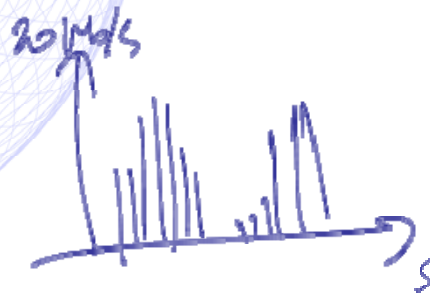
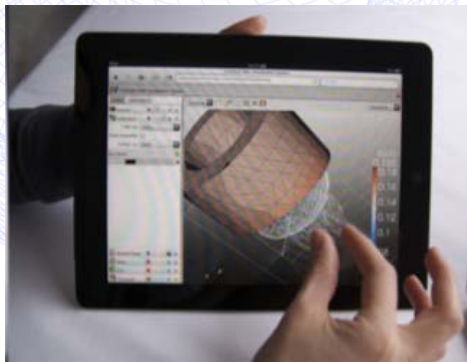
But :

Each vendor or consortium have their own format



Common issues and challenges for Collab Viz

- Image/Video streaming vs 3D data streaming



- Latency vs Computing costs for preparing/reducing data
- Data compression
 - Dedicated compression
 - Standard compression as On-the-Fly GZIP, next EXI ?

Management Case with SFR

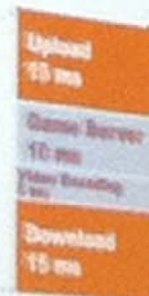
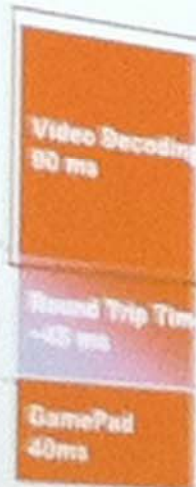
End-to-end latency

~300 ms



<200 ms

Next step: reducing video encoding latency on the GPU



Before

After back-end optimization

Strictly Confidential



Technology trends

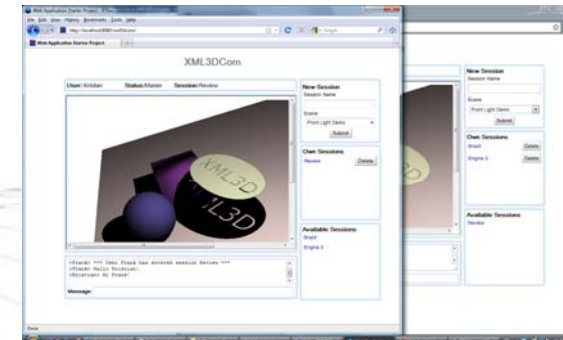
- No more supercomputer at home needed
 - Let's go to the Grid! ~~Grid~~ *CLOUD*
 - On demand and ready!
 - HPC : x86 and GPGPU platforms available
- You have one in your pocket (or your hand...)
 - Your smartphone is as powerfull as an 80's HPC supercomputer
- New user experiences :
 - Difficult to type or write with a stylus with only one hand or two thumbs
 - Touch, multitouch
 - Responsivness for interactions!



Collab Viz in the Web browser

- Web browsers tends to become a « virtual » OS
- No more need for third-party software
- Use web techniques for collaboration (e.g. AJAX)
- WebGL:
 - Exposing GPU instructions to JavaScript
 - But could give malicious code access to hardware
 - « limited » to OpenGL ES 2.0 (2007)
- DOM-based scene description: XML3D & X3DOM
 - Use CSS3, DOM Events etc. to interact with scene

=> Web Browser vs. App?



3D on the Web

- No plugins!!!
- Bandwidth and latency
- The web, not the OS, is your platform
- Combination of: JS speed, chip performance, available bandwidth makes it feasible

15

Web 2.0

THE 16th INTERNATIONAL
ACM CONFERENCE
ON 3D WEB TECHNOLOGIES

June 20-22, 2007
PARIS - FRANCE

WWW.WEB3D2007.FR

SPONSORS

ACM SIGGRAPH

INRIA

UNIVERSITY OF PARIS

UNIVERSITY OF LYON

UNIVERSITY OF BORDEAUX

UNIVERSITY OF NANTES

UNIVERSITY OF CLERMONT

UNIVERSITY OF STRASBOURG

UNIVERSITY OF LILLE

UNIVERSITY OF CAEN

UNIVERSITY OF TOULOUSE

UNIVERSITY OF MONTPELLIER

UNIVERSITY OF NICE

UNIVERSITY OF CRETE

UNIVERSITY OF PATRAS

UNIVERSITY OF TRIESTE

UNIVERSITY OF GENOVA

UNIVERSITY OF PADOVA

UNIVERSITY OF VERONA

UNIVERSITY OF BOLOGNA

UNIVERSITY OF FLORENCE

UNIVERSITY OF ROME

UNIVERSITY OF NAPLES

UNIVERSITY OF CALABRIA

UNIVERSITY OF SARDINIA

UNIVERSITY OF ABRUZZO

UNIVERSITY OF MOLISE

UNIVERSITY OF BASILICATA

UNIVERSITY OF APULIA

UNIVERSITY OF CALABRIA

UNIVERSITY OF SARDINIA

UNIVERSITY OF ABRUZZO

UNIVERSITY OF MOLISE

UNIVERSITY OF BASILICATA

UNIVERSITY OF APULIA





NextGen Collab Viz tools

- Highly specialised Apps with HTML5 and standardized frameworks for Cloud Computing
 - Viz for your needs
 - Same data but different cases if uses
 - Better efficiency!
- Hybrid Rendering :
 - Local resources for Interactivity
 - Remote resources for massive data rendering



Conclusion

- Collaborative Viz is no longer a myth
 - Even Console Gaming is remote now!
- As Webconferencing, collaborative Viz as a service is now feasible in the Cloud.
- Mashups could now be produced from multiple services/sources.



Collaviz[®]

Thank you for your attention

Acknowledgements:

This work has been funded by French National Research Agency (ANR) through COSINUS Program (Collaviz Project ANR-08-COSI-003).