Shaping the Future of Collaboration in Global Science Projects

A Conference Sponsored by

Workshop on Advanced Collaborative Environments

and

CERN Large Hadron Collider Users

Executive Summary

A workshop was held in Geneva, on December 11-13, 2006, to examine the status and future of collaborative tool technology and its usage for large global scientific collaborations, such as those of the CERN LHC (Large Hadron Collider). This document highlights the main topics presented at the conference and summarizes the conclusions, recommendations, and proposals for follow up action that emerged during the course of the conference and the final panel discussion.

It has been authored by members of the organizing committee and is designed to help interested parties assess how the experience gained from investment to date can lead to significant improvements, and therefore greatly enhanced collaboration effectiveness, by building on the work and ideas presented at the conference.

Conference Goals

Shaping Collaboration 2006 focused on exploring how collaborative tools could meet the urgent needs of global science projects, in particular those of the CERN LHC, to provide essential means of communication between each member of their large and geographically diverse communities.

It brought together representatives of the LHC user community with experts in collaborative tool technologies to inform the latter individuals of LHC needs, and to teach the LHC community of the state of the art in collaborative tools and of innovations currently under development.

Conference Overview

Organizing Committee

The program was established by an Organizing Committee, who consulted widely with experts concerning the topics of the conference. Members of the Organizing Committee included:

- R. Eisberg (DESY IT)
- P. Galvez (California Institute of Technology)
- S. Goldfarb (University of Michigan)
- J. Herr (University of Michigan)
- E. Hofer (University of Michigan, School of Information)
- T. Kawamoto (ICEPP, University of Tokyo)
- H. Neal (University of Michigan, Chair)
- H. Newman (California Institute of Technology)
- M. Storr (CERN DSU/ED)

Attendees and speakers

There were approximately 100 conference participants, including registered attendees, as well as those opting to attend remotely through audio or video conferencing. The list of speakers included individuals from Germany, Italy, U.K., Japan, Korea, CERN and the US. They came from universities, research institutes, laboratories and private industry. A partial listing of speakers includes:

- Jos Engelen - CERN Deputy Director General for Science
- Doug van Houweling - Director Internet 2
- Tim Smith - CERN IT/UDS Group Leader
- Markus Nordberg - ATLAS Resources Coordinator
- Steinar Stapnes - ATLAS Deputy Project Leader
- Dan Atkins - US NSF Director Office of Cyberinfrastructure
- Harvey Newman – CMS, US CMS Collaboration Board Chair, VRVS/EVO, US LHCNet, ICFA SCIC, UltraLight, ……
- Homer A. Neal - ATLAS, WLAP, ATLAS Collaboratory Project,…
- and more…

Session Topics

Conference sessions covered the following subjects:

- The Human Component of Collaboration
- Views from the LHC
- The Impact of Geography
- Collaborative Tools and Developing Countries
- Collaborative Tools, Education and Training
- A Vision for the Future
- Funding Models and Strategies for Collaborative Tool Support in Scientific Projects
- Frontiers in Collaborative Tool Research (**WACE** 2006)

Program Agenda

Introduction/Keynote (Homer A. Neal – University of Michigan)
- Welcome (Jos Engelen - CERN)
- Keynote Presentation (Douglas van Houweling - Internet2)

Reflections on the Development of the Web (Mick Storr - CERN)
- Reflections on the Development of the Web: The Goal of Scientific Collaboration (Robert Cailliau - CERN) [presented by Mick Storr]

The Human Component of Collaboration (Reinhard Eisberg - DESY)
- Intergroup Protocols and Human Collaboration (Deb Agarwal - LBNL)
- Theory of Remote Scientific Collaboration (Erik Hofer – University of Michigan)
- Collaboration in Context - capturing and utilizing context to support collaborative knowledge building (Martin Wessner - Fraunhofer Institute)

Deployment Experiences / Remote Control Room (Steven Goldfarb – University of Michigan)
- Beyond HEP - Experiences from UK eScience (Andy Parker - Cambridge eScience Centre)
- CMS Plans for Centres (Lucas Taylor – Northeastern University)
- Plans for the USCMS Remote Operations Center (Erik Gottschalk - FNAL)

Views from the LHC (Mick Storr - CERN)
- An Overview of the ATLAS Experiment and the Role of Collaborative Tools in Scientific Discovery (Steinar Stapnes - CERN)

- Collaborative Tools in a Grid Environment (Rick Cavanaugh – University of Florida)
- RTAG 12: An Assessment of the Collaborative Tool Needs of the LHC (Steven Goldfarb – University of Michigan)
- Collaborative Tool Plans at CERN (Tim Smith - CERN)

Geography Matters (Tatsuo Kawamoto - ICEPP, Tokyo)
- The Impact of Distance and Time in Large Scientific Collaborations (Hiroshi Sakamoto - ICEPP, Tokyo)
- The Importance of Collaborative Tools in Developing Countries (Airong Luo – University of Michigan)

Maximizing Returns on National Investments (Homer Neal – University of Michigan)
- Maximizing Returns on National Investments (Dan Atkins - U.S. NSF Office of CyberInfrastructure)

Collaborative Tools, Education & Training (Mick Storr - CERN)
- Collaborative Tools, Education and Training (Joseph Hardin - Sakai Project)

State of the Art (Philippe Galvez – California Institute of Technology)
- Enabling Virtual Organizations (EVO) (Philippe Galvez – California Institute of Technology)
- Web Lecture Archiving, Robotic Tracking Systems, and the Lecture Object (Jeremy Herr - University of Michigan)
- MVL, a Tool to Support Maintaining, Optimizing, and Trouble Shooting Accelerator Components from Off-Site (Roberto Pugliese - Elettra, Trieste)
- ConferenceXP: Shaping the Future of Collaboration (Todd Needham - Microsoft Research)

A Vision for the Future (Harvey Newman – California Institute of Technology)
- A Vision of Collaboration at the High Energy Frontier in the LHC Era (Harvey Newman - California Institute of Technology)
- Using OpenGL and 3D to Manage Large Numbers of Video Conferencing Streams (Pavel Farkas - California Institute of Technology)
- Collaborative Tools and the Management of Large Experiments (Markus Nordberg - CERN)
- Grid Enabled Collaborative Tools for Scientific Research (Charles Severance – University of Michigan)

Wrap-Up (Homer Alfred Neal – University of Michigan)
- Panel Discussion

Issues and Outcomes

During the formal presentations, group discussions, and the final panel discussion, the following issues were identified as important conference outcomes, representing conclusions, recommendations and follow up action.

In terms of collaborative tool usage:

What Should the LHC Users and Their Universities Do To Prepare Themselves for LHC Data Taking and Analysis?
- Propagate the culture of collaboration within groups
- Train group members to utilize collaborative tools
- Become familiar with the collaborative tool systems CERN has deployed and plans to deploy
- Review and determine how to configure rooms for effective collaboration
- Initiate desktop conferencing, and pervasive use of collaborative tools as needed
- Seek cost proposals; assemble costing options
- Consult with national project offices about best-practices

- Engage university administration in discussions about the importance of cost sharing for collaborative tools

What should LHC Project Managers Do?
- Collect information about best practices within national environment
- Assign special responsibilities within national LHC structure (e.g., Tier-2 sites)
- Attach collaborative tool training sessions to Grid (and other) meetings
- Share widely the experiences of challenges faced by remote colleagues

What are the Spokesperson's Responsibilities?
- Make sure that remote collaboration is possible and supported

What Should National Funding Agencies Do?
- Recognize the importance of supporting collaborative tools for its research groups; recognize the critical nature of collaborative tools for success of the LHC program
- Eliminate policies that restrict funding for collaborative tools
- Support interdisciplinary efforts to develop a coordinated approach to generate collaborative environment for HEP research

What Should the Host Laboratory Do?
- Provide necessary local facilities to support laboratory meetings, and interconnectivity
- Modernize network connections
- Show users best-practices and equipment information
- Establish "standards" for use
- Support laboratory structures that seek user input and advice

What Funding Models Should be Used for Collaborative Tools Hardware and Staff Support?
- Given that experiments have become proactive in supporting collaborative tools, an approach for cost sharing with the Lab should be pursued; all entities are short of funds and a shared effort should be pursued
- Team account charges for specific services should be implemented
- Experiments must be prepared to provide funds for critical short term needs, until such time as long term plans may be put in place. This is particularly important now in the first year of LHC running.

What Are Some Notable Takeaways?
- Many interesting r/d projects were reported (e.g., EVO developments, GECSR'…)
- Should pursue collaboration with other communities (Fusion Energy Community ILC,…)

What Areas Should Be Given The Highest Priorities For Future R/D?
- Integration
- Robustness & Ease of Use
- Security
- Pervasiveness

How Would One Form A Multi-disciplinary Effort To Pursue The Collaborative Tool Needs Of LHC Experiments?
- Agency sponsored workshop; Goal to develop vision
- Focus on CyberInfrastructure proposal development

How can industry and the HEP community become better connected in terms of meeting the HEP collaborative tool needs?

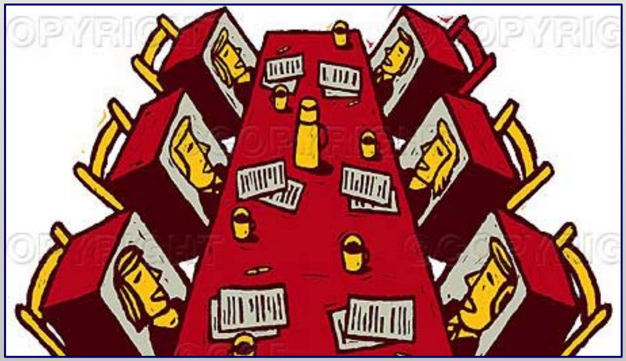
- Motivate industry to partner in developments that serve large distributed organizations such as those in HEP.
- Define pilot projects with industry with service level agreements
- Involve industry experts in the planned agency workshops

More information

Selected PowerPoint slides from conference presentations are attached as an appendix to this document.

A complete record of the conference, including slides and slide synchronized video recordings, is accessible from the conference web site: **http://cern.ch/ShapingCollab2006**.

Shaping Collaboration 2006:
Shaping the Future of Collaboration in Global Science Projects



Summary Report

Conference Organizing Committee

17 Feb 2007

The Conference

In Brief

- *Information, Agenda, Presentation Material*
  - http://cern.ch/ShapingCollab2006
  - Web Archives to be published starting this week.
- *Date, Venue*
  - December 11-13, 2006, CICG (Geneva)
  - Not at CERN!
- *Merging of Two Events*
  - Workshop on Advanced Collaborative Environments http://www.mcs.anl.gov/wace
  - Workshop on Collaborative Tools for the LHC

Goal

"…bring together members of the user community of the CERN Large Hadron Collider with researchers and practitioners in the area of advanced collaborative tools [to] focus on ways these communities can work together to advance research in collaboration while meeting the needs of global science projects."

The Conference

Organizing Committee

- *Reinhard Eisberg, DESY IT*
- *Philippe Galvez, California Institute of Technology*
- *Steven Goldfarb, University of Michigan*
- *Jeremy Herr, University of Michigan*
- *Erik Hofer, University of Michigan, School of Information*
- *Tatsuo Kawamoto, ICEPP, University of Tokyo*
- *Homer A. Neal, University of Michigan (Chair)*
- *Harvey Newman, California Institute of Technology*
- *Mick Storr, CERN DSU/ED*

General Meeting Structure

- *1.5 Days on LHC Collaborative Tool Issues*
  - Concluding with a panel discussion on the future
- *1.5 Days on WACE*
  - Featuring novel projects, tools and ideas for the future

Participation

- *Approximately 100 local & remote participants over 3 days*
- *Speakers from Germany, Italy, U.K., Japan, Korea, CERN and the US, representing universities, research institutes, laboratories and private industry*

The Conference

Some Key Participants Concerning the LHC / CERN

- *Jos Engelen - CERN Deputy Director General for Science*
- *Doug van Houweling - Director Internet 2*
- *Tim Smith - CERN IT*
- *Markus Nordberg - ATLAS Resources Coordinator*
- *Steinar Stapnes - ATLAS Deputy Project Leader*
- *Dan Atkins - US NSF Director Office of Cyberinfrastructure*
- *Harvey Newman - CMS, VRVS, LHCNet, PPDG, UltraLite,…*
- *Homer A. Neal - ATLAS, WLAP, ATLAS Collaboratory Project,…*
- *and more…*

Some Images

LHC Sessions I

Introduction/Keynote (Homer A. Neal - Michigan)

- *Welcome (Jos Engelen - CERN)*
- *Keynote Presentation (Douglas van Houweling - Internet2)*

Reflections on the Development of the Web (Mick Storr - CERN)

- *Reflections on the Development of the Web: The Goal of Scientific Collaboration (Robert Cailliau - CERN) [presented by Mick Storr]*

The Human Component of Collaboration (Reinhard Eisberg - DESY)

- *Intergroup Protocols and Human Collaboration (Deb Agarwal - LBNL)*
- *Theory of Remote Scientific Collaboration (Erik Hofer - Michigan)*
- *Collaboration in Context - capturing and utilizing context to support collaborative knowledge building (Martin Wessner - Fraunhofer Institute)*

Deployment Experiences / Remote Control Room (Steven Goldfarb - Michigan)

- *Beyond HEP - Experiences from UK eScience (Andy Parker - Cambridge eScience Centre)*
- *CMS Plans for Centres (Lucas Taylor - Northeastern)*
- *Plans for the USCMS Remote Operations Center (Erik Gottschalk - FNAL)*

LHC Sessions II

Views from the LHC (Mick Storr - CERN)

- *An Overview of the ATLAS Experiment and the Role of Collaborative Tools in Scientific Discovery (Steinar Stapnes - Fysisk institutt)*
- *Collaborative Tools in a Grid Environment (Rick Cavanaugh - Florida)*
- *RTAG 12: An Assessment of the Collaborative Tool Needs of the LHC (Steven Goldfarb - Michigan)*
- *Collaborative Tool Plans at CERN (Tim Smith - CERN)*

Geography Matters (Tatsuo Kawamoto - ICEPP, Tokyo)

- *The Impact of Distance and Time in Large Scientific Collaborations (Hiroshi Sakamoto - ICEPP, Tokyo)*
- *The Importance of Collaborative Tools in Developing Countries (Airong Luo - Michigan)*

Maximizing Returns on National Investments (Homer Neal - Michigan)

- *Maximizing Returns on National Investments (Dan Atkins - U.S. NSF Office of CyberInfrastructure)*

Collaborative Tools, Education & Training (Mick Storr - CERN)

- *Collaborative Tools, Education and Training (Joseph Hardin - Sakai Project)*

LHC Sessions III

State of the Art (Philippe Galvez - Caltech)

- *Enabling Virtual Organizations (EVO) (Philippe Galvez - Caltech)*
- *Web Lecture Archiving, Robotic Tracking Systems, and the Lecture Object (Jeremy Herr - University of Michigan)*
- *MVL, a Tool to Support Maintaining, Optimizing, and Trouble Shooting Accelerator Components from Off-Site (Roberto Pugliese - ELETTRA, Trieste)*
- *ConferenceXP: Shaping the Future of Collaboration (Todd Needham - Microsoft Research)*

A Vision for the Future (Harvey Newman - Caltech)

- *A Vision of Collaboration at the High Energy Frontier in the LHC Era (Harvey Newman - Caltech)*
- *Using OpenGL and 3D to Manage Large Numbers of Video Conferencing Streams (Pavel Farkas - Caltech)*
- *Collaborative Tools and the Management of Large Experiments (Markus Nordberg CERN)*
- *Grid Enabled Collaborative Tools for Scientific Research (Charles Severance - Michigan)*

Wrap-Up (Homer Alfred Neal - Michigan)

- *Panel Discussion*

WACE Sessions I

WACE 2006 Welcome and Conference Overview

Putting Advanced Collaborative Environments to Work

- *Integrated Student Activities: An International Course Offering using Tutored Video Instruction (Fred Videon - University of Washington)*
- *Networked Creative Collaboration (Nora Barry - Druid Media)*
- *SIDGrid - The Social Informatics Data Grid (Mark Hereld - Chicago)*

Frontiers in Interactive High Definition Video

- *Multipoint Uncompressed HD Conferencing using Ultragrid (Petr Holub - Masaryk University)*
- *The Research Channel iHDTV1500 System (Jim DeRoest - Washington)*
- *Experiences Using Uncompressed HD Conferencing to Support Distributed Work (Erik Hofer - University of Michigan)*

Keynote

- *Keynote (Charles Severance - Michigan)*

Management Issues in Collaborative Technologies

- *Integrating Group Collaboration Tools (Erik Dobbelsteijn - SURFnet)*
- *Awareness in Collaboratories (Airong Luo - Michigan)*
- *Controlling and Coordinating Large, Complex and Distributed Scientific Research Collaboration (Sandra Slaughter - Carnegie Mellon University)*

WACE Sessions II

Collaboration Platform Updates

- *The ConferenceXP Research Platform (Todd Needham - Microsoft Research)*
- *From VRVS to EVO (Philippe Galvez - Caltech)*
- *Access Grid Update (Michael Papka - Argonne National Laboratory)*

Where Visualization and Collaboration Meet

- *Using OpenGL and 3D to Manage Large Numbers of Video Conferencing Streams (Pavel Farkas - Caltech)*
- *Using Motion Tracking to Provide Dynamic Shared Visual Spaces in Collaboration Environments (Jeremy Birnholtz - University of Toronto)*
- *Petascale Visualization and Collaboration (Michael Papka - ANL)*

Town Hall Discussion

Selected Extracts

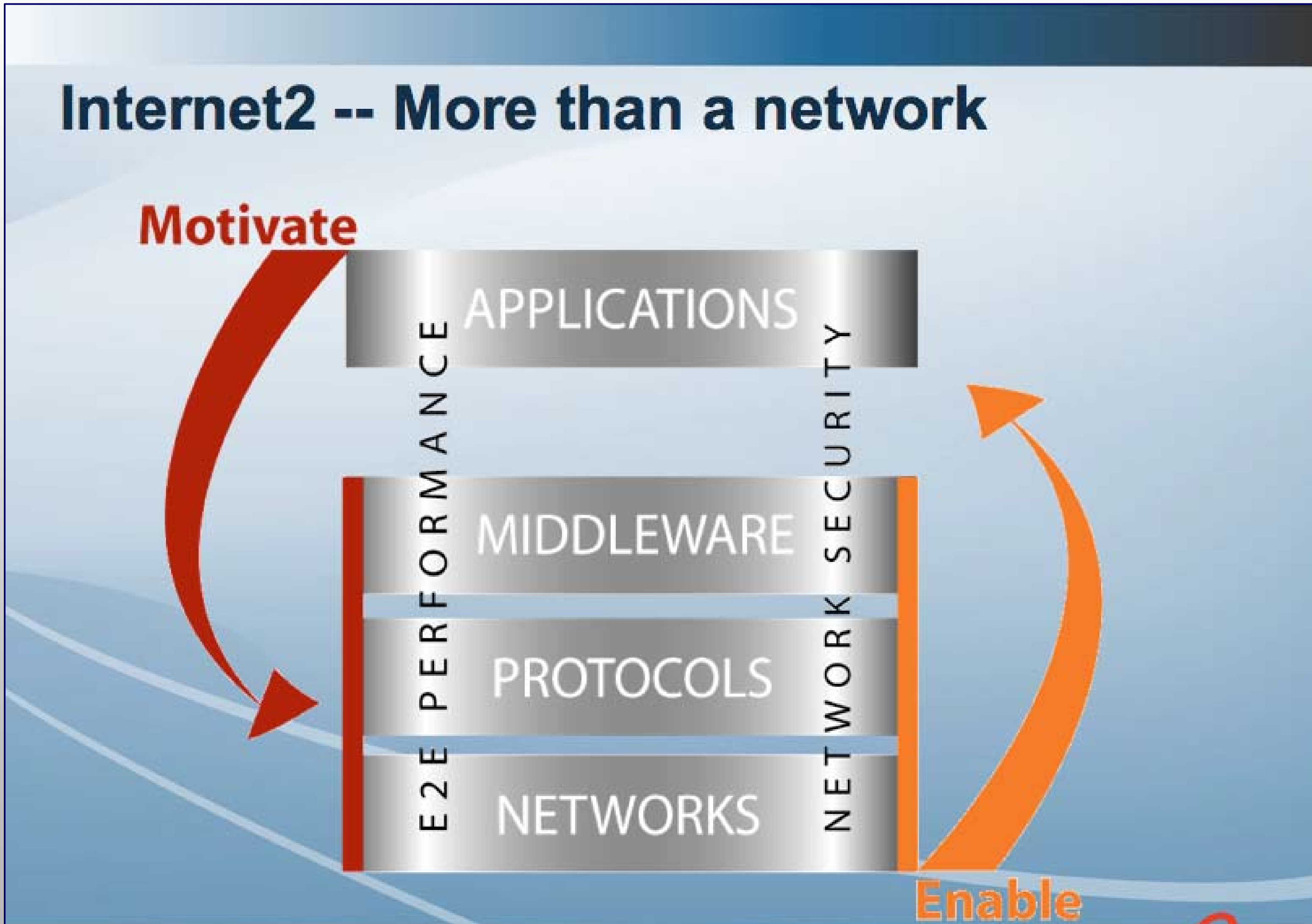
Extract Slides Follow

- *The following selection of slides presents only a very brief extract of the outstanding work displayed and discussed during the conference. A complete collection of all slides can be found on the conference web site:*
  - http://cern.ch/ShapingCollab2006
- *Click on "Timetable"*

Web Lectures

- *In addition to slides, web lectures for the first half of the conference are now available. Here is an example:*
  - Keynote Presentation (D. van Houweling)
- *Other web lectures are available via the agenda or directly at*
  - http://esmane.physics.lsa.umich.edu/wlap-cwis/SPT--BrowseResources.php?ParentId=241

Keynote Presentation (D. van Houweling)



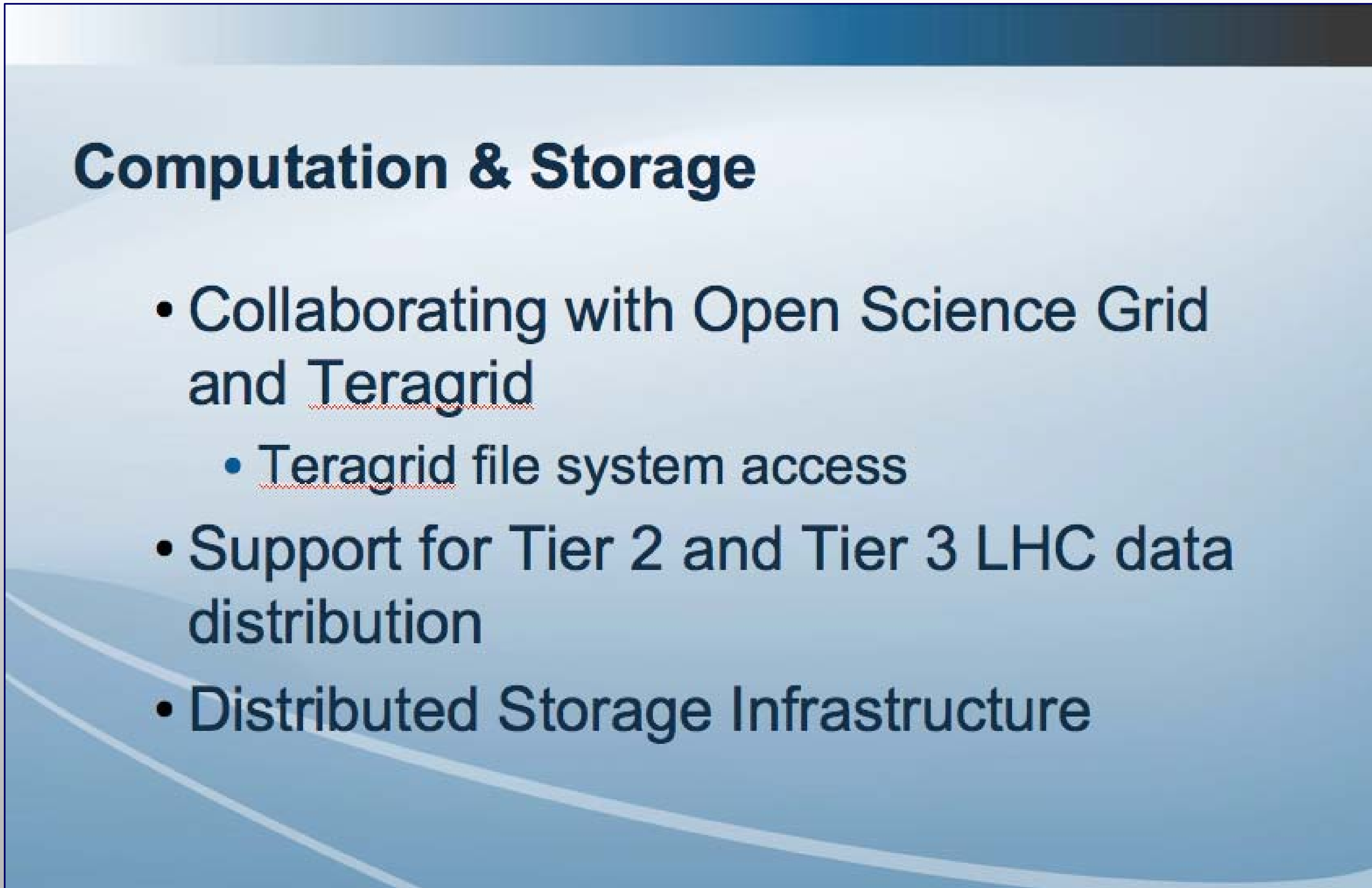
Keynote Presentation (D. van Houweling)

Internet2 Partnerships

Internet2 fosters the partnerships and collaboration that spurred the development of the Internet.

- Academia
- Industry
- Government
- International

Keynote Presentation (D. van Houweling)



Keynote Presentation (D. van Houweling)

New Internet2 Network Capacities

- Initial capacity 10x today's network
  - 10 wavelengths at 10 Gbps
- Future capacity nearly unlimited
  - 40 Gbps and 100 Gbps wavelength capabilities
  - Unlimited additional wavelengths available
- Rapid provisioning of dedicated circuits
- Flexibly-sized circuit capacity

Finding and Supporting Collaboration Needs and Opportunities (Deb Agarwal)

U.S. Department of Energy
Office of Science

Primary Drivers

BERKELEY LAB

- Collaboration takes effort and thus must
  - Provide a perceptible benefit to all participants
  - Fit with work needs
  - Be easily accessible to the users (particularly new users)
  - Have a very low failure rate
  - Be institutionally supported
  - Be a separately funded effort if it is to have strong support
- Group must have a strong need to collaborate and the collaboration tools must provide a significant improvement compared to current practice
- Support for asynchronous interaction important
- Difficult to predict how a technology will or will not be used by a particular group
- Collaboration technology also creates new paradigms of interaction
- Sociology is a dominant factor

Finding and Supporting Collaboration Needs and Opportunities (Deb Agarwal)

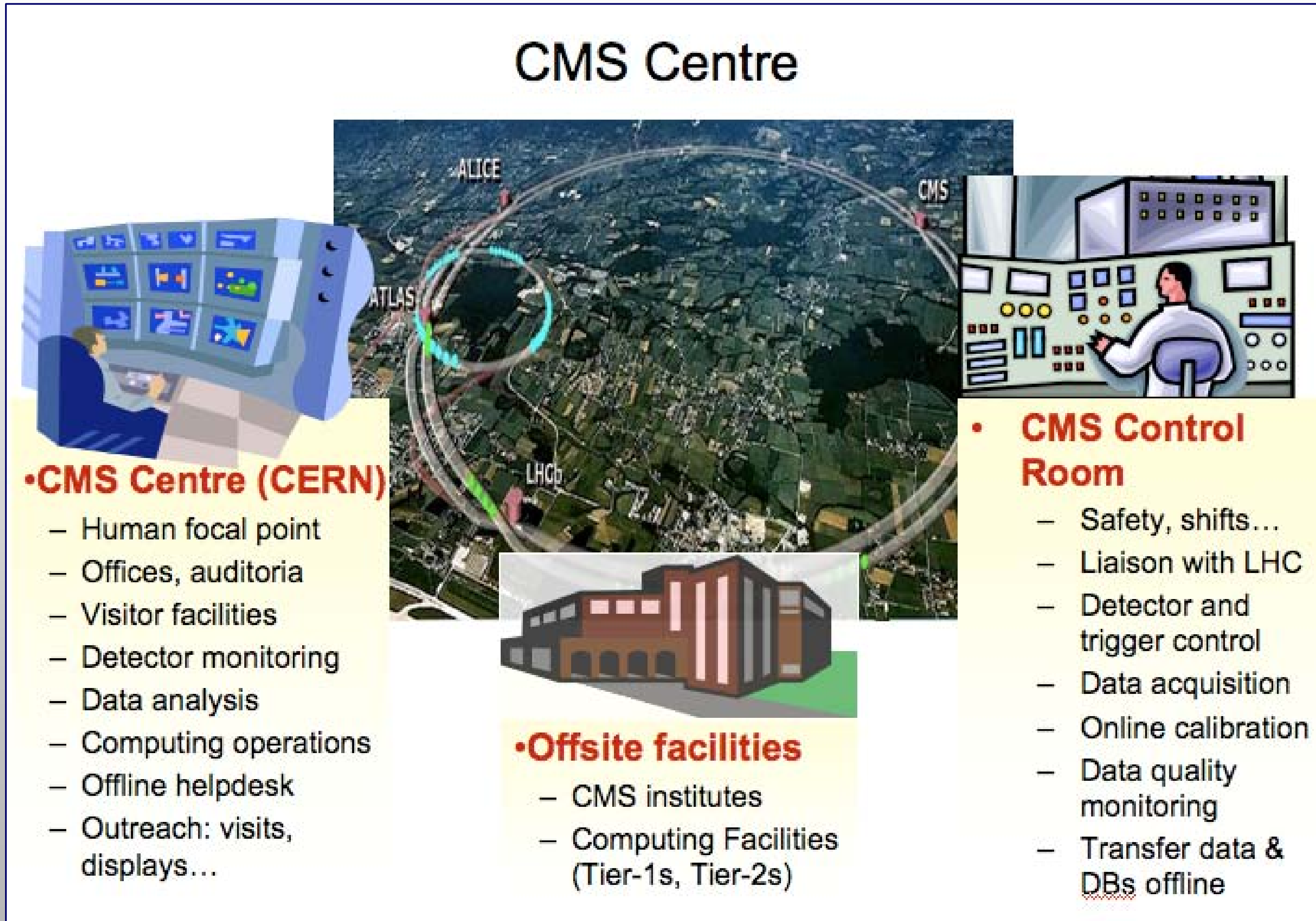
U.S. Department of Energy
Office of Science

Key Points

Berkeley Lab

- Provide killer content
- Support asynchronous interaction
- Make it easy to use and particularly begin to use
- Trust in the system as a primary interaction mode is important
- Cybersecurity will be important to protect content integrity and control access
- Finding the right point of the technology curve is difficult
- Sociology will dominate adoption and should be a serious consideration of design

CMS Centres for Offline Operations, Monitoring & Communication (Lucas Taylor)

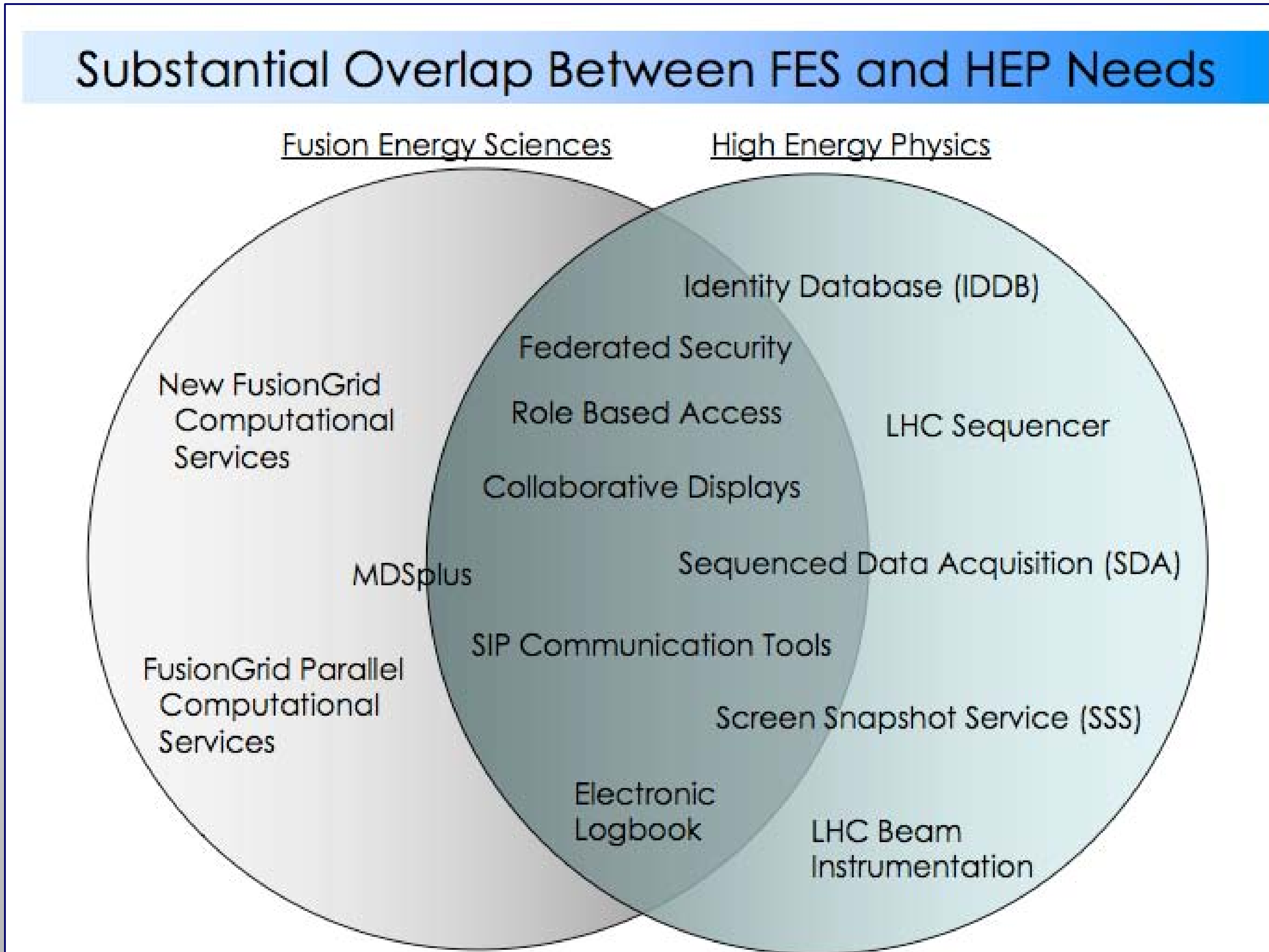


LHC@FNAL (Erik Gottschalk)

What is LHC@FNAL?

- A Place
  - That provides access to information in a manner that is similar to what is available in control rooms at CERN
  - Where members of the LHC community can participate remotely in LHC and CMS activities
- A Communications Conduit
  - Between CERN and members of the LHC community located in North America
- An Outreach tool
  - Visitors will be able to see current LHC activities
  - Visitors will be able to see how future international projects in particle physics (such as the ILC) can benefit from active participation in projects at remote locations.

LHC@FNAL (Erik Gottschalk)



The ATLAS Detector System and Collaboration (Steinar Stapnes)

ATLAS collaboration

(As of the October 2006)

35 Countries
164 Institutions
1800 Scientific Authors total
(1470 with a PhD, for M&O share)

Albany, Alberta, NIKHEF Amsterdam, Ankara, LAPP Annecy, Argonne NL, Arizona, UT Arlington, Athens, NTU Athens, Baku, IFAE Barcelona, Belgrade, Bergen, Berkeley LBL and UC, HU Berlin, Bern, Birmingham, Bologna, Bonn, Boston, Brandeis, Bratislava/SAS Kosice, Brookhaven NL, Buenos Aires, Bucharest, Cambridge, Carleton, Casablanca/Rabat, CERN, Chinese Cluster, Chicago, Clermont-Ferrand, Columbia, NBI Copenhagen, Cosenza, AGH UST Cracow, IFJ PAN Cracow, DESY, Dortmund, TU Dresden, JINR Dubna, Duke, Frascati, Freiburg, Geneva, Genoa, Giessen, Glasgow, LPSC Grenoble, Technion Haifa, Hampton, Harvard, Heidelberg, Hiroshima, Hiroshima IT, Indiana, Innsbruck, Iowa SU, Irvine UC, Istanbul Bogazici, KEK, Kobe, Kyoto, Kyoto UE, Lancaster, UN La Plata, Lecce, Lisbon LIP, Liverpool, Ljubljana, QMW London, RHBNC London, UC London, Lund, UA Madrid, Mainz, Manchester, Mannheim, CPPM Marseille, Massachusetts, MIT, Melbourne, Michigan, Michigan SU, Milano, Minsk NAS, Minsk NCPHEP, Montreal, McGill Montreal, FIAN Moscow, ITEP Moscow, MEPhI Moscow, MSU Moscow, Munich LMU, MPI Munich, Nagasaki IAS, Nagoya, Naples, New Mexico, New York, Nijmegen, BINP Novosibirsk, Ohio SU, Okayama, Oklahoma, Oklahoma SU, Oregon, LAL Orsay, Osaka, Oslo, Oxford, Paris VI and VII, Pavia, Pennsylvania, Pisa, Pittsburgh, CAS Prague, CU Prague, TU Prague, IHEP Protvino, Regina, Ritsumeikan, UFRJ Rio de Janeiro, Rome I, Rome II, Rome III, Rutherford Appleton Laboratory, DAPNIA Saclay, Santa Cruz UC, Sheffield, Shinshu, Siegen, Simon Fraser Burnaby, SLAC, Southern Methodist Dallas, NPI Petersburg, Stockholm, KTH Stockholm, Stony Brook, Sydney, AS Taipei, Tbilisi, Tel Aviv, Thessaloniki, Tokyo ICEPP, Tokyo MU, Toronto, TRIUMF, Tsukuba, Tufts, Udine, Uppsala, Urbana UI, Valencia, UBC Vancouver, Victoria, Washington, Weizmann Rehovot, FH Wiener Neustadt, Wisconsin, Wuppertal, Yale, Yerevan

The ATLAS Detector System and Collaboration (Steinar Stapnes)

Collaborative tools

- Such tools heavily used:
  - For example: Construction of specific detector subsystem parts with 4-5 groups involved, usually separated by large distances and several timezones
  - Documentation sharing, phone and video meetings, common logbooks, application sharing ….
  - More generally for ATLAS wide meetings: Agenda System,Video and Webcasting
- Since around 20% of the collaboration is typically at CERN the ability to contact and communicate with the 80% outside is essential
- This need will continue and probably increase as we move into operation with our distributed computing and distributed physics analysis

Facilitating Science Collaborations for the LHC: Grid Technologies (Richard Cavanaugh)

Problem Solving at the LHC

Technical Challenges

- One of the most complex instruments ever built by humankind
  - The LHC Accelerator
  - The four LHC Experiments
- Network intensive:
  - From ~200 Gbps (2008)
  - To ~1 Tbps (2013)
  - Across & among world regions
- Data and computationally intensive
  - From Petabyts (2008) to Exabytes of Shared Data
  - 10^5 processors evolving with technology; 10^5 jobs

Social Challenges

- Teams organized around common goals
  - Communities: "Virtual organizations"
- Diverse membership & capabilities
  - Heterogeneity is a strength not a weakness
- Geographic and political distribution
  - No location/organization possesses all required skills and resources
- Must adapt as a function of the situation
  - Adjust membership, reallocate responsibilities, renegotiate resources

Facilitating Science Collaborations for the LHC: Grid Technologies (Richard Cavanaugh)

RTAG 12 - Follow-Up (Steven Goldfarb)

Endorsement by LHC Collaborations

- *All Four Spokespersons Expressed Written Support*
  - General agreement with findings, recommendations

Noise by RTAG Chair

- *Final Report Presented at Conferences*
  - HEPix 2005, ESnet 2005, CHEP 2006, ViDeNet 2006, ACCU 2006, ATLAS 2006, Shaping Collaboration 2006

Changes to CERN Organization

- *All Activities Brought Under IT*
  - Coordinated by IT-UDS-AVC Division
- *Creation of RCTF (Remote Collaboration Task Force)*
  - Chaired by Thomas Baron (IT/UDS)
  - Attended by IT Coordination, Developers, LHC Representatives
  - Bi-Monthly Meetings
    - *Focus on Prototypes, Priorities (no budget, yet)*
    - *Current discussions on MoU's and/or service agreements*
  - Documentation
    - *https://cern.ch/twiki/bin/view/RCTF/WebHome*

RTAG 12 - Follow-Up (Steven Goldfarb)

CERN & LHC Activities

- *Prototype Video Conferencing Facilities*
  - 40-4-C01 (funded by ATLAS), 40-R-B10 (funded by CMS)
  - Tutorials to Users
  - Next Auditorium in 40 under investigation
  - Central Room Management System
- *HERMES Collaboration*
  - MCU Operated in Partnership: IN2P3, CNRS, INSERM and CERN
    - *http://cern.ch/it-multimedia/HERMES.htm*
- *Audio Conferencing System (24/7 - No Operator)*
  - Under Beta Test
- *Lecture Archiving System*
  - ATLAS Recording all Plenary Sessions, Tutorials in 2006
    - *http://esmane.physics.lsa.umich.edu/wlap-cwis/index.php*
  - New Infrastructure in Main Auditorium, Software & Database Development
    - *SMAC System, Similar to Michigan's WLAP (Ongoing)*
- *InDiCo*
  - Integration of booking system for VRVS, Phone, CRBS (Ongoing)

In my opinion, about as much as can be done without a serious dedicated budget!

RTAG 12 - What Remains (Steven Goldfarb)

Completion of Conference Facility Implementation

- *Service-Level Agreement Between LHC & CERN IT*
  - Specification of Requirements & Resources
  - Agreement from Both Parties
- *Similar Agreements with Individual Entities*
  - Universities, External Labs, etc.
- *Adequate Funding in CERN/LHC Budgets*

Support for Conference Services

- *LHC/CERN-Wide Support for EVO, ECS, Other Facilities Currently In Use*
  - Maintenance + R&D

Steve's Opinion

We are very close to a satisfactory solution:

- *An excellent staff has taken over at CERN IT (see Tim's talk next).*
- *They have a clear, workable plan to implement.*
- *The experiments recognize the urgency & are ready to dedicate resources.*
- *We are only waiting for CERN to do the same.*

Status of Collaborative Tools at CERN (Tim Smith)

Service: Event Management

- Indico deployed at CERN 2004
  - CDS Agenda migration completed (almost)
- Integration of VC features ongoing
  - VRVS done (released mid-Aug)
  - HERMES and eDial booking soon
  - CRBS: Physical room booking under develop
- World-wide installations
  - FNAL, IN2P3, ILC
  - Collaborative developments
    - e.g. Time-zone awareness

Collaborative Tools @ CERN: Tim Smith 6/12

Status of Collaborative Tools at CERN (Tim Smith)

Select/Recommend: VC rooms

- Goal: to refresh and standardise
  - Same equipment for audio and video confs
- Refining requirements
  - RCTF monthly meetings with experiments
- Supplier contacts
  - Tandberg, Polycom, Aethra
    - Balance budget and quality of service
  - Physical infrastructure (carpets, walls, lighting)
- Test and supervise installation
  - Pilot projects:
    - 40-4-C01 for ATLAS (since May)
    - 40-R-B10 for CMS
- Study the possibility of recording the VC sessions and play them back on demand

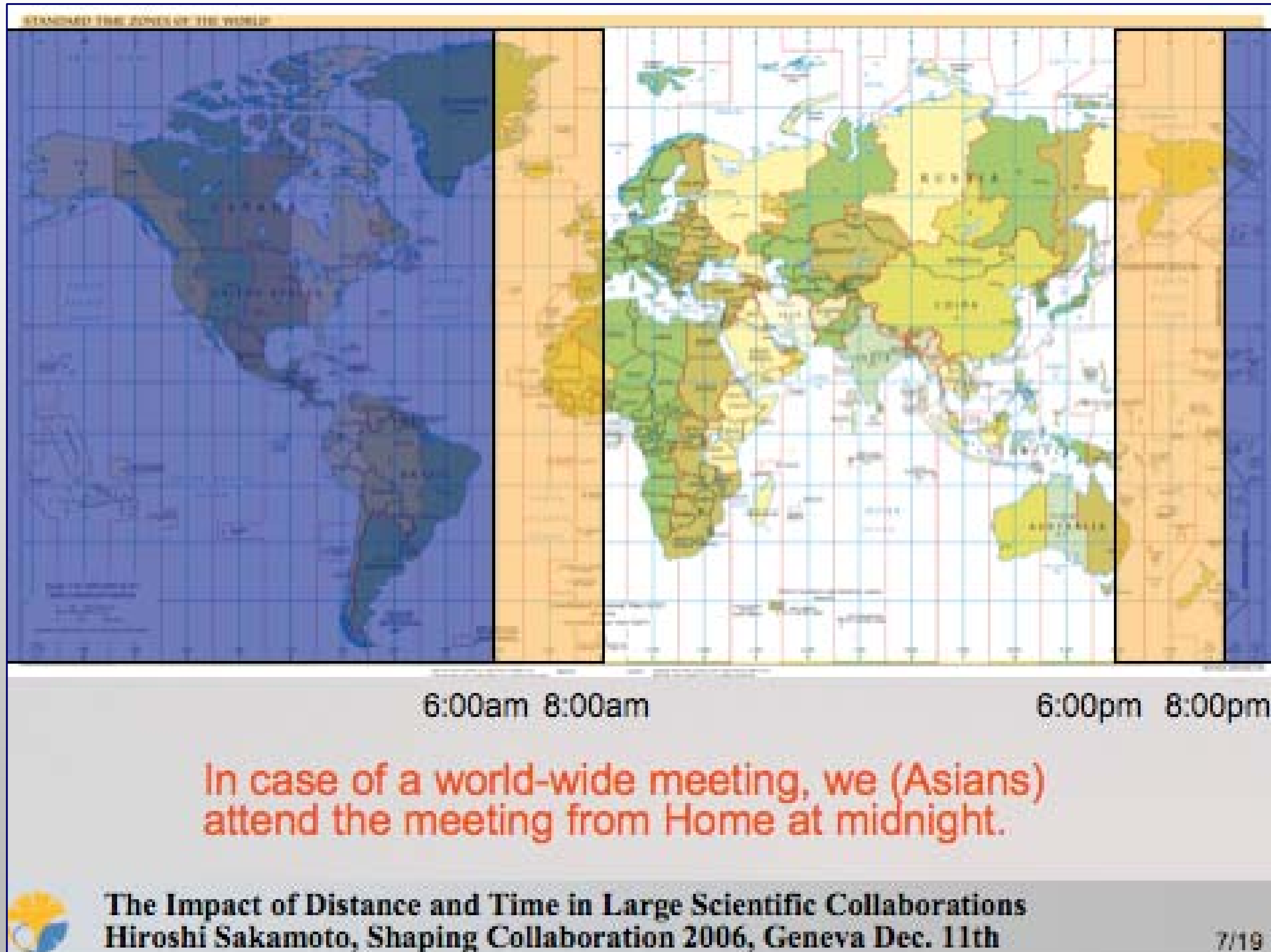
Status of Collaborative Tools at CERN (Tim Smith)

Conferencing Resources

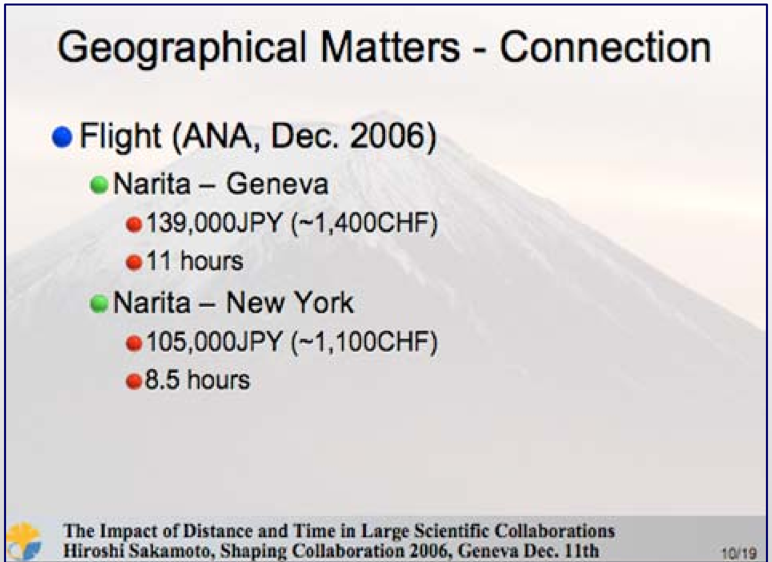
- Personnel
  - Videoconference service:
    - Operator/technicians: 1 staff, 1 service contractor
    - VRVS support and integration: 1 project associate
    - VC equipment engineer: 1 consultant until Dec ★
    - Documentation and training: 1 fellow
  - Retransmission and Webcast:
    - TechEng: 1 staff
  - Indico and SMAC:
    - Support & SW development: 1 fellow, 1 technical student ★
- Materials
  - Started with room owners (ATLAS and CMS)
  - Need O(500kCHF) for the 11 B.40 rooms
    - (and matching increase in operator coverage)

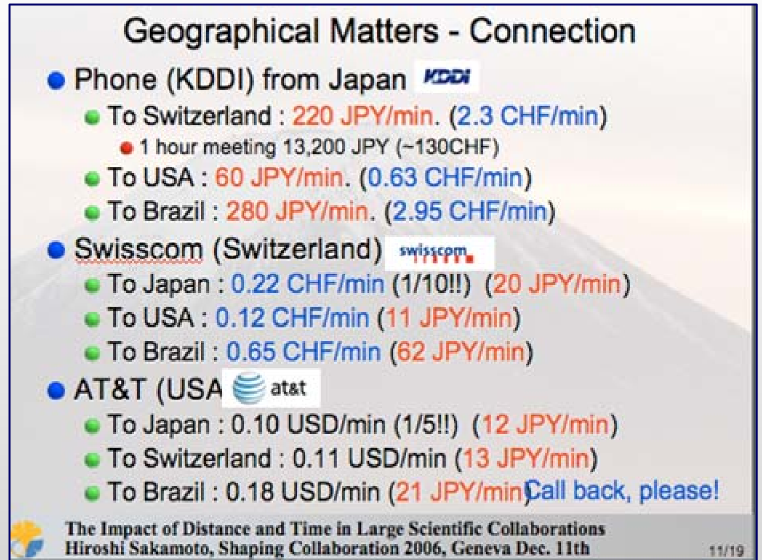
Collaborative Tools @ CERN: Tim Smith 12/12

The Impact of Distance and Time in Large Scientific Collaborations (Hiroshi Sakamoto)



The Impact of Distance and Time in Large Scientific Collaborations (Hiroshi Sakamoto)

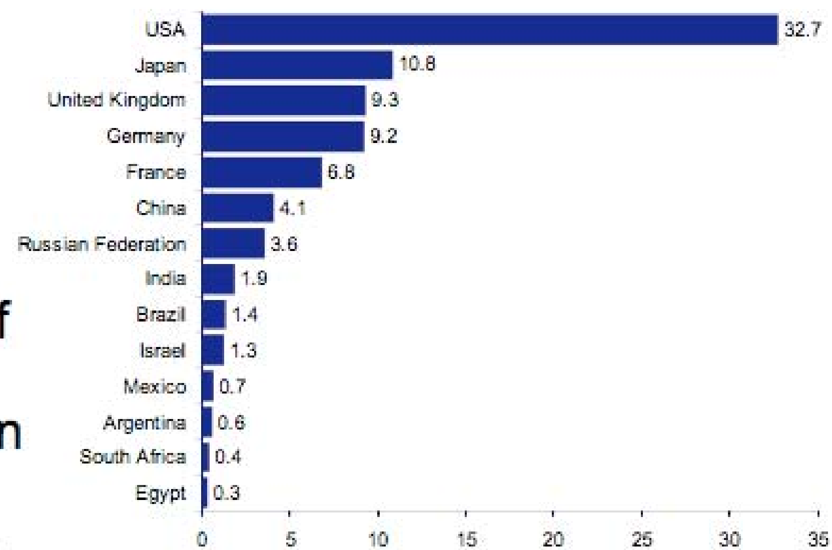




Supporting Participation in Collaboratories by Scientists from Developing Countries (Airong Luo)

The Problem

- There is a gap in scientific output between developing and developed countries.
- Ninety-five percent of the new science in the world is created in the countries comprising only one-fifth of the world's population



World Shares of Scientific Publications, 2001
Source: UNESCO Science Report 2005

scienceofcollaboratories
An alliance to advance understanding of collaborative research

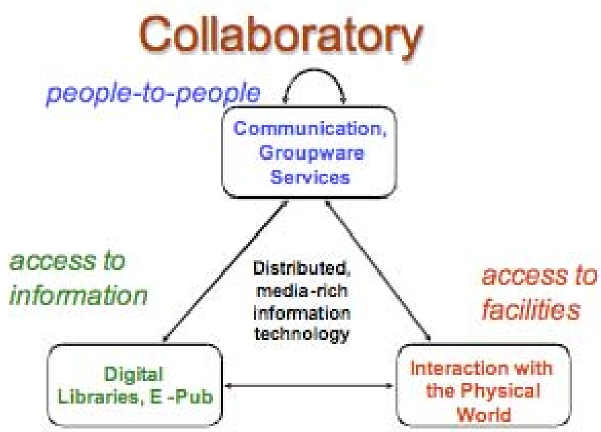
2

SCHOOL OF INFORMATION
UNIVERSITY OF MICHIGAN

Supporting Participation in Collaboratories by Scientists from Developing Countries (Airong Luo)

Collaboratory as a Possible Solution

- Click to add text



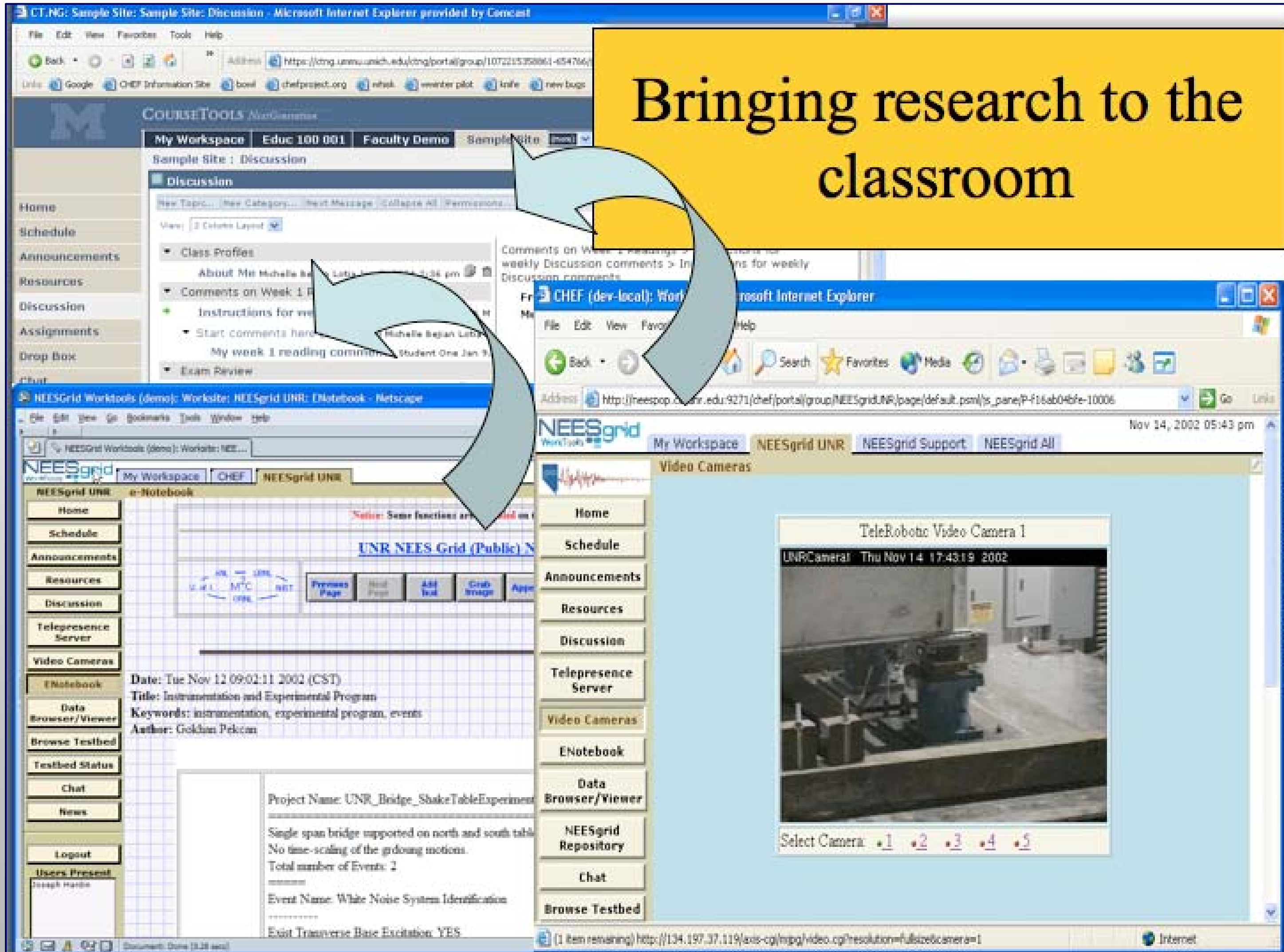
- an organizational entity
- spans distance
- provides access to data sources, artifacts and tools required to accomplish research tasks
- supports rich and recurring human interaction oriented to a common research area. (Olson *et al*., 2004)

scienceofcollaboratories
An alliance to advance understanding of collaborative research

3

SCHOOL OF INFORMATION
UNIVERSITY OF MICHIGAN

Sakai - An Open Source Collaboration and Learning Environment (Joseph Hardin)



Sakai - An Open Source Collaboration and Learning Environment (Joseph Hardin)

Teaching and Research in Sakai

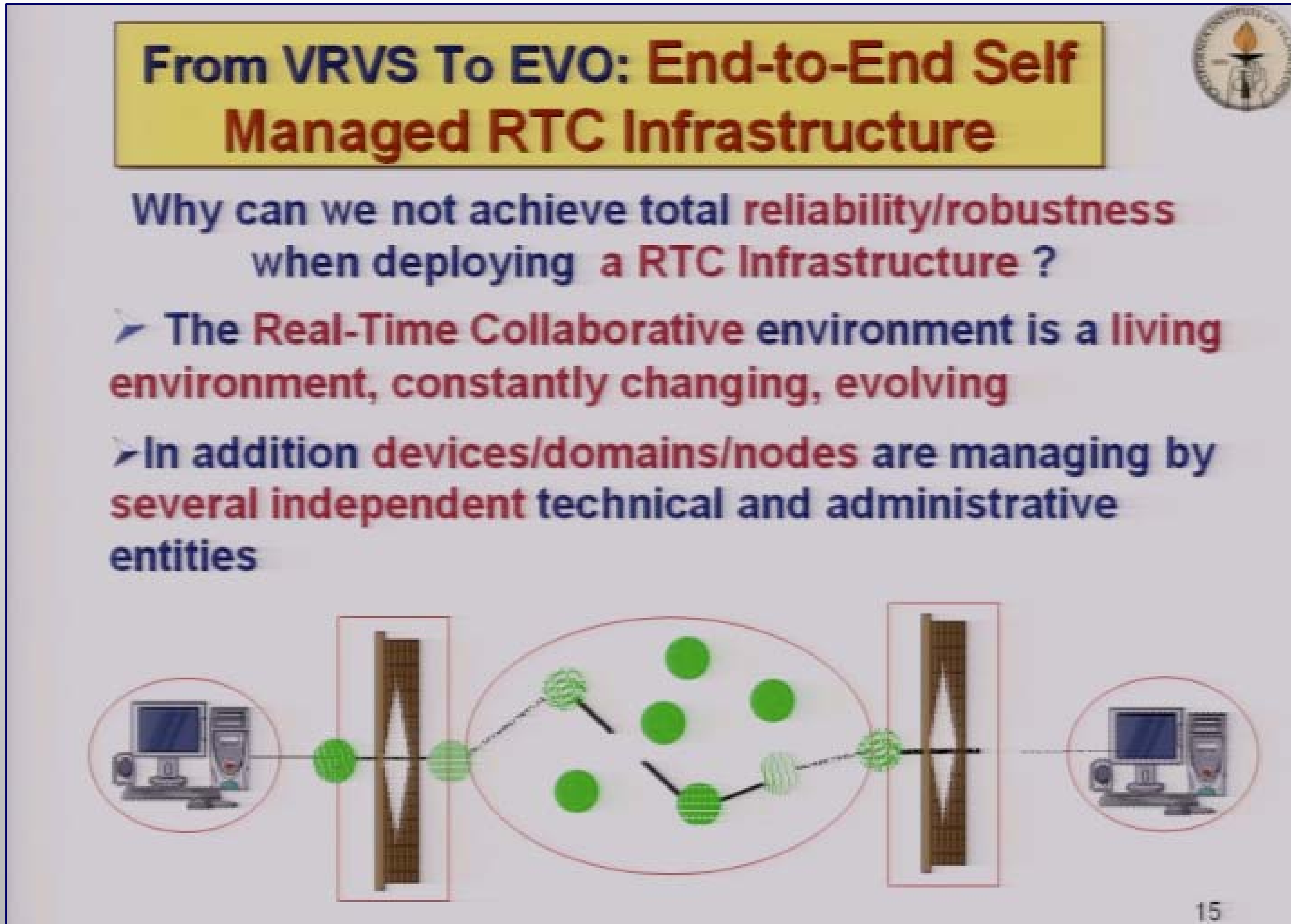
- Sakai does all the mundane work of supporting traditional classes online, and supporting forms of distance education
- Also supports Projects – 'classes' are just a form of collaboration; Sakai lets anyone set up a project and use all the tools (which here include GRID tools);
- Faculty, scientific researchers can set up collaborations using the same system, and do (at UM this semester – 3,100 classes, 2,400 projects)
- Such a distributed system allows for rapid experiments in 'virtual organizations' or 'participation environments'
- Later talks today will talk more about support of research collaborations

Sakai - An Open Source Collaboration and Learning Environment (Joseph Hardin)

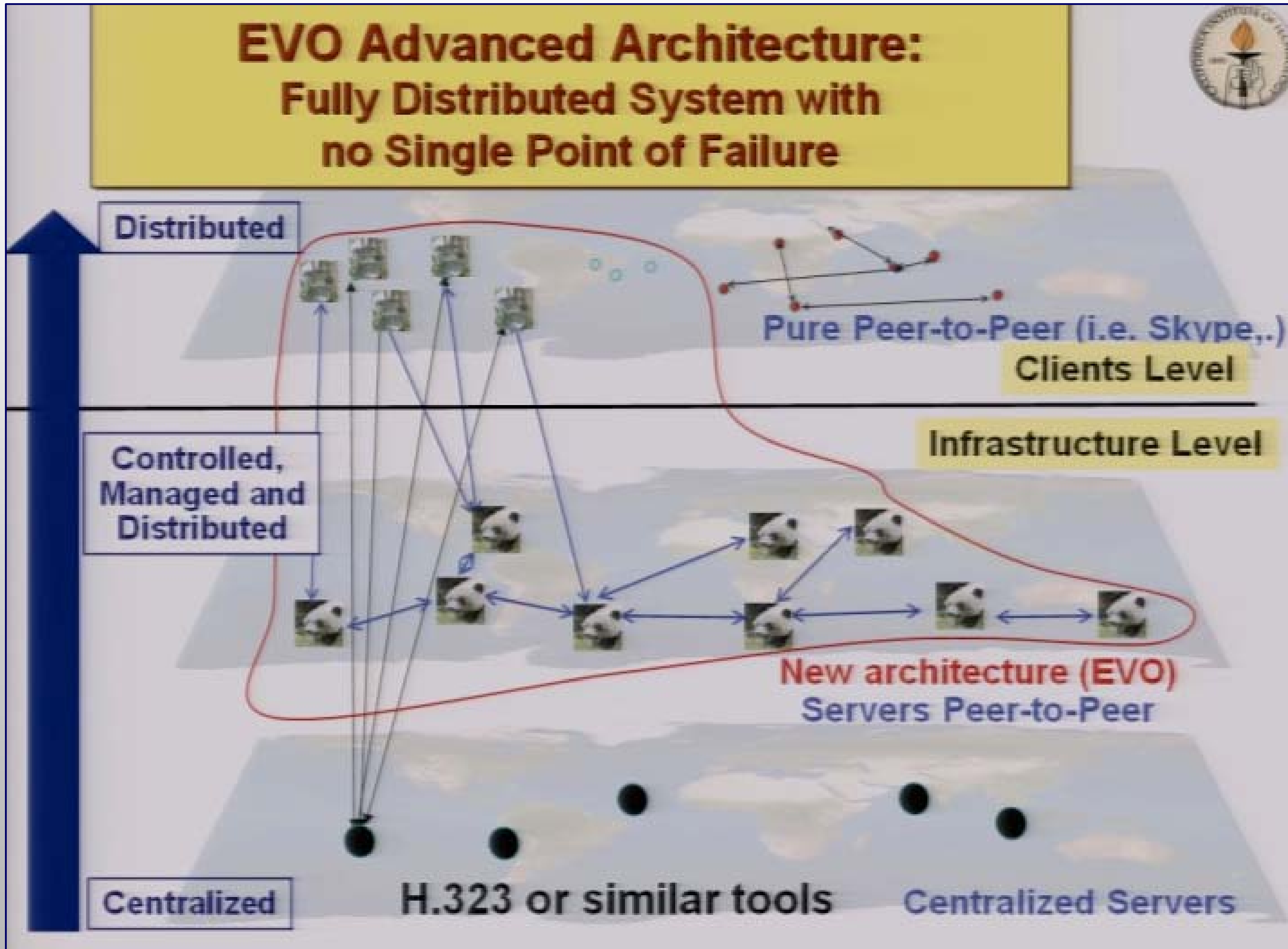
Challenges for LHC – Bringing Teaching to Research

- Change will happen quickly when LHC cranks up
- Ed materials must flow rapidly
- Innovative ideas will come from many places, need to be disseminated quickly
  - A grad class somewhere has valuable material
  - Need to get it to everyone
- New material needs to be published
- Needs the context of the class, and supporting materials – problems as well as lectures
- Needs to be high quality, captured and reproduced well

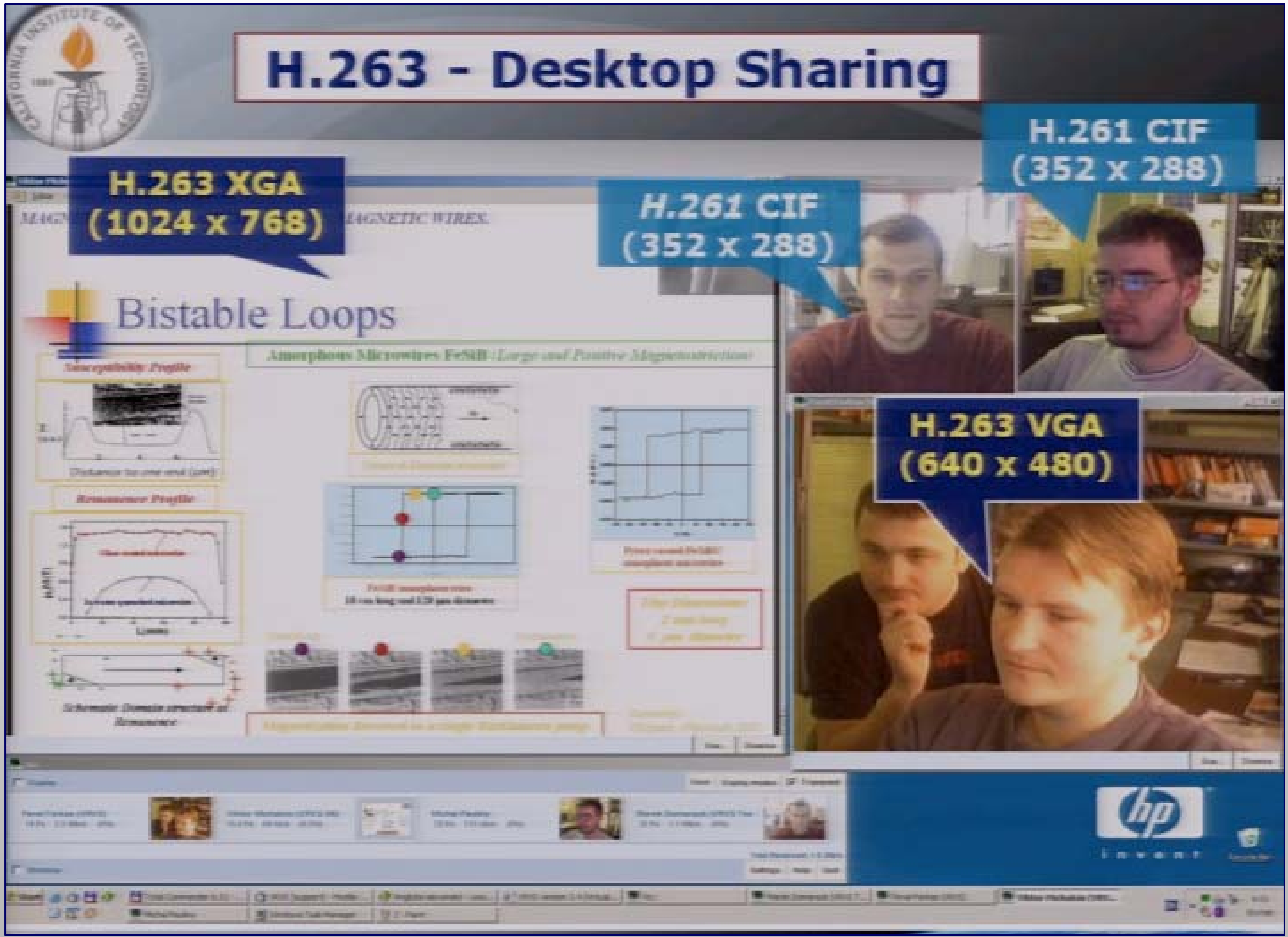
Enabling Virtual Organisations (EVO) (Philippe Galvez)



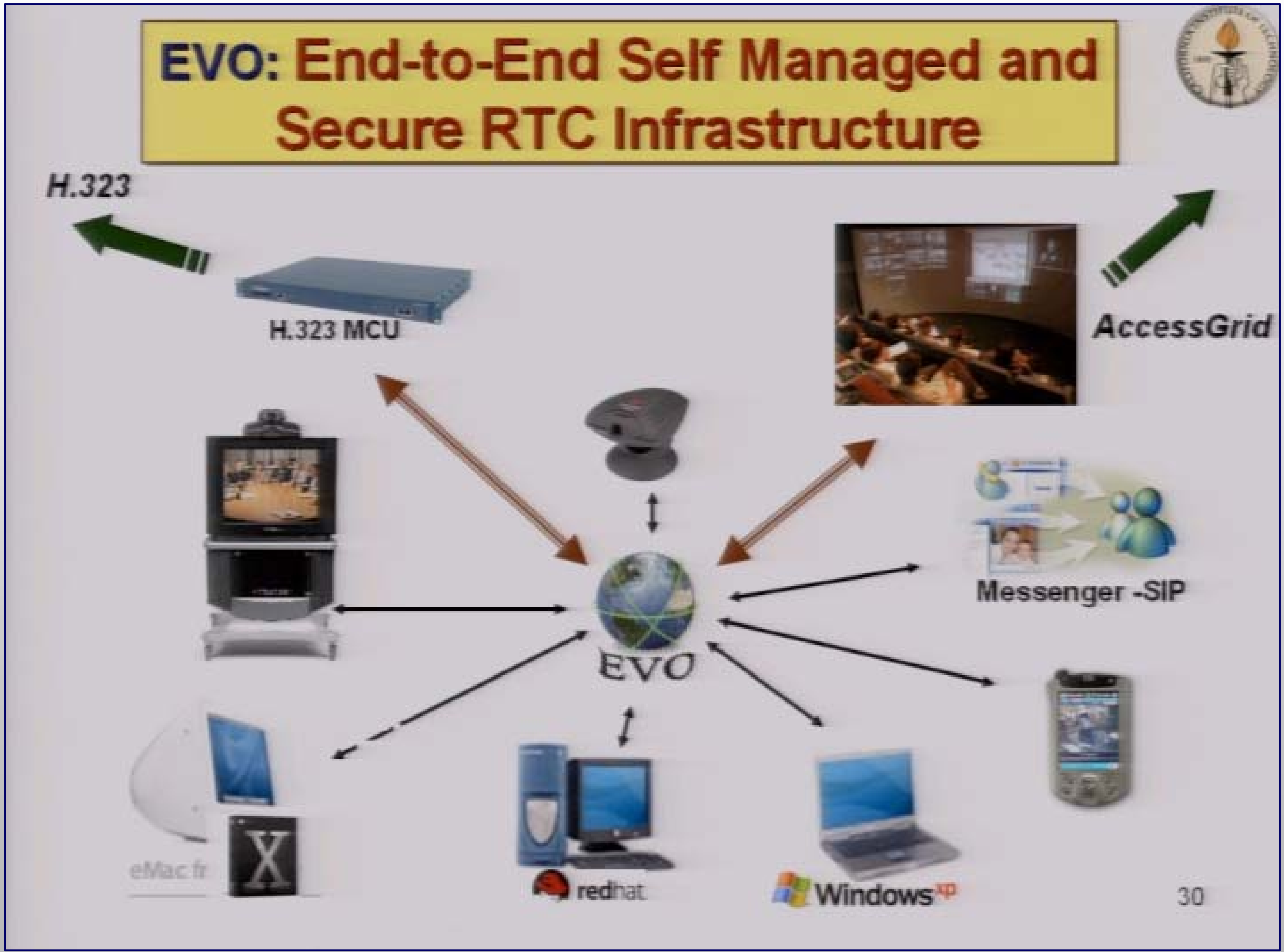
Enabling Virtual Organisations (EVO) (Philippe Galvez)



Enabling Virtual Organisations (EVO) (Philippe Galvez)



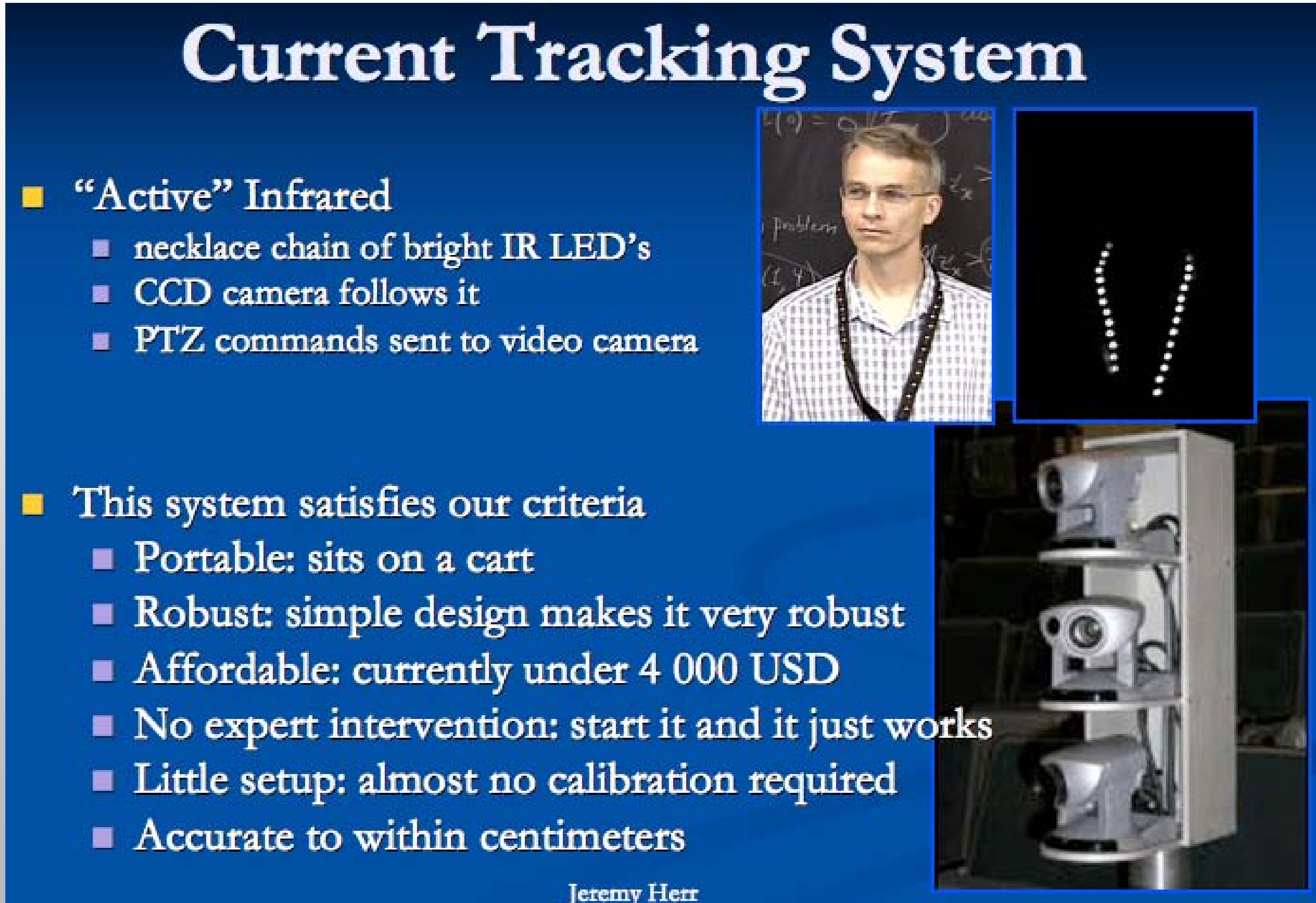
Enabling Virtual Organisations (EVO) (Philippe Galvez)



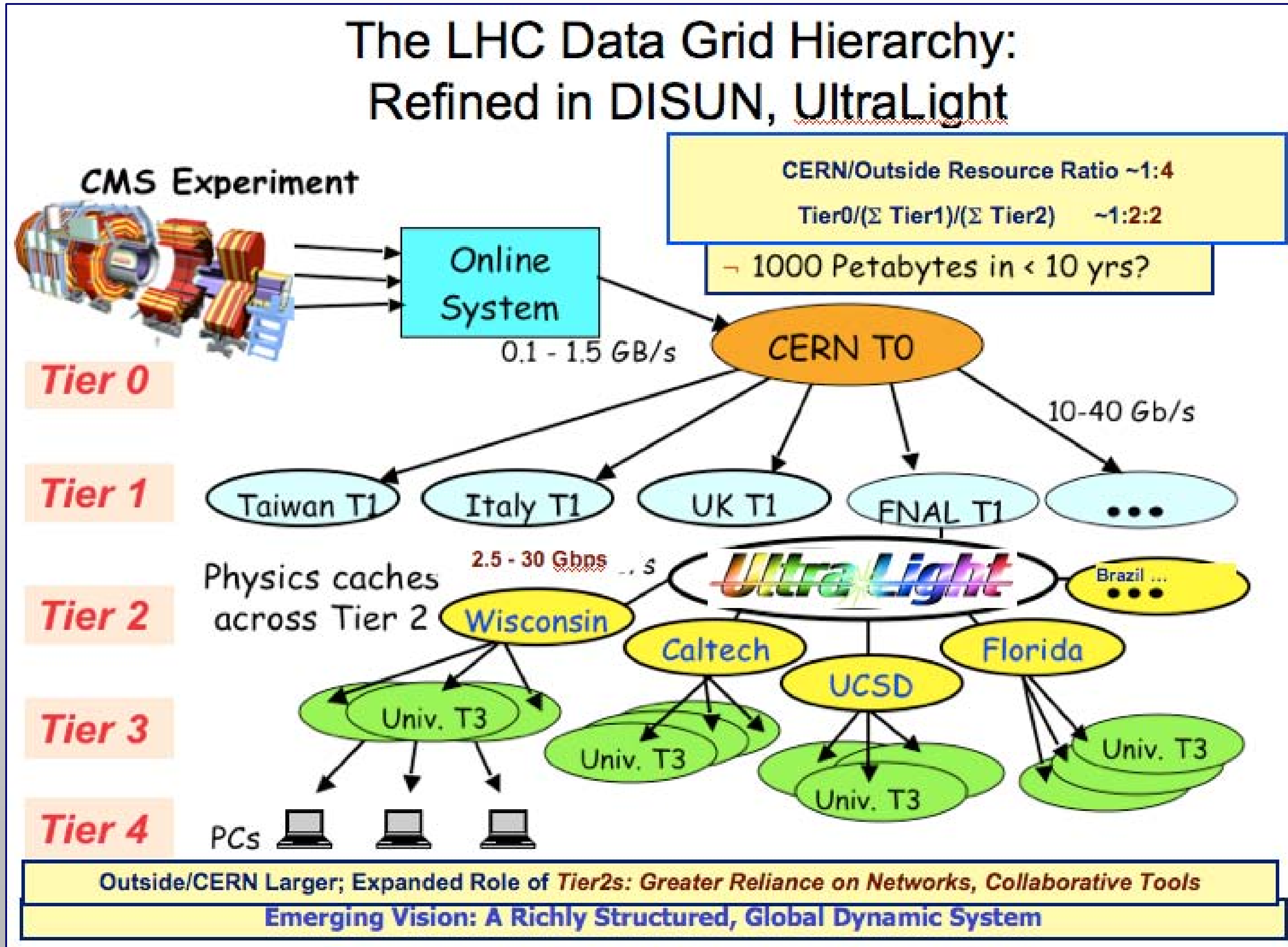
What is a Web Lecture?

- Media-rich presentation viewable by anyone in the world with:
  - any web browser
  - RealPlayer plug-in
- Media streams:
  - lecturer's audio
  - lecturer's video (low bandwidth)
  - high-res slide images
  - high-res chalkboard images
- Features
  - slide index
  - ability to "jump around"
  - platform independence
  - low bandwidth
  - ability to evaluate usage

Web Lecture Archiving, Robotic Tracking Systems, and the Lecture Object (Jeremy Herr)



A Vision of the Future: Collaboration at the High Energy Frontier in the LHC Era (Harvey Newman)



A Vision of the Future: Collaboration at the High Energy Frontier in the LHC Era (Harvey Newman)

Grid-Enabled Analysis for LHC Experiments

- The "Acid Test" for Grids; Crucial for LHC experiments
  - Large, Diverse, Distributed Community of users
  - Support for tens of thousands of analysis and production tasks, shared among ~100 sites
- Operates in a (compute, storage and network) resource-limited and policy-constrained environment
  - Dominated by collaboration policy and strategy
- System efficiency and match to policy depends on agile, intelligent data placement
  - High speed data transport, managed network use are vital

- Requires a global "intelligent" system: to adapt to dynamic operating conditions; to hide and manage complexity
  - Autonomous agents for real-time monitoring, end-to-end tracking
  - A system-wide view for "right" decisions in difficult situations
- *Still Need a Simple User-View: The Clarens Portal*

A Vision of the Future: Collaboration at the High Energy Frontier in the LHC Era (Harvey Newman)

Collaboration at the High Energy Frontier: Requirement for the Next Round of Discoveries

Ubiquitous, Pervasive, Highly Interactive; Global;

- Adapted to every phase of the experiment's lifecycle: desktop, meeting rooms, auditoria, control rooms …
- Presentation Meetings: Boards and Committees; for Planning, Decisions & Decisions; from 10 to 500
- Working Group Meetings: In-depth discussions of data analysis, detectors, computing, software, technical coordination, …, Physics; from 5 to 50
- Remote Operations Centers & Control Rooms: 10-200
  - **Pervasive: Extend to desktops/laptops/handhelds**
- *Desktop & Workroom Collaboration:* One-on-one and Among-a-few
  - ***Intensive, Persistent, …, Ubiquitous***

Collaborative Tools (CT) and the Management of Large Experiments (Markus Nordberg)

Collaborative Tools Today at CERN (1)

- Videoconferencing
  - 18 rooms, 8 new planned for equipping
  - Most rooms for ca. 20 participants, < 10 for 200 persons
  - Occupancy level (hours) ~ 80%
  - A videoconference room typically needs:
    - Large screens (one for video stream out, one for video in)
    - Video projector(s)
    - Central PC unit, console
    - Cameras, microphones (lots of them)
    - Selection of appropriate materials (carpets, curtains, lighting)
  - Technology:
    - Video signal + carrying + mixing
    - Good IP connection, power plug
    - PBX as bridge, SIP as communication protocol (IP)
    - SIP license
    - VRVS -> EVO; 2 servers (Philippe)
  - Cost: ca. 70 kCHF per std room + 30 kCHF for infra (excl. people)
    - Manpower ca 2-3 FTE's for all CERN

Collaborative Tools (CT) and the Management of Large Experiments (Markus Nordberg)

Collaborative Tools Today at CERN (2)

- Video archiving/Web lecturing (Jeremy)
  - Tutorials
  - ATLAS Plenary talks
  - < 10 recorded events per year
- Cost ca 10 kCHF equipment & recording media, 0.5 FTE manpower for ATLAS
- So how much does this all cost??
  - Assume
    - Very basic services
    - Basic (telephony) infrastructure is there
    - Amortization over 3 years
    - Standard room for 20 persons, 80% occupancy
    - 1 FTE ~ 120 kCHF (per 6 rooms)
  - ~ 3 kCHF per participant per year => if more than 3 (video) meetings (of 20 people) per year, more effective than flying?
- Well, why aren't we all then participating to this event by video?
  - Hard do reach to strangers or address unfamiliar/complex issues
  - Still difficult to get different standards to work across different platforms in a reliable and easy manner
  - It's fun to travel (at least now and then)

Collaborative Tools (CT) and the Management of Large Experiments (Markus Nordberg)

Will it ever get any better (cheaper)?

- Yes, it will - already has
  - More vendors
  - Better technology integration
  - More pedagogical approaches
    - One size does not fit all
      - Teaching/lecturing/training (Joseph)
      - Problem solving (e.g. skunk works, brainstorming)
      - Operation (e.g. remote control & maintenance, de-briefing; Roberto)
  - Telecommunication costs/bandwith is no longer the fun spoiler (anybody remember ISDN?)
- But we ain't there yet, folks
  - We have to change/improve our working habits further - beating the distance (Hiroshi, Airong)
  - Fight Aunt Maude's Law - whatever you use today, in 18 months time you'll use it at least twice as rarely (unless it's really really simple to use)

Collaborative Tools (CT) and the Management of Large Experiments (Markus Nordberg)

Conclusions

- A large (global) collaborative effort needs collaborative tools
- The economics of collaborative tools makes sense (in the CERN environment at least)
  - This is not about making huge investments
- Collaborative tools should become part of daily routines in order to be really effective
  - Remember Maude's Law
- We are getting there but need to change the way we work