U.S. Department of Energy

Office of Science

BERKELEY LAB

Collaborative Tools and Sociology Tutorial

Deb Agarwal (DAAgarwal@lbl.gov) and

Karlo Berket (KBerket@lbl.gov)

Distributed Systems Department

Ed Ritenour (ERRitenour@lbl.gov)

Information Technologies and Services Division

LBNL

Outline

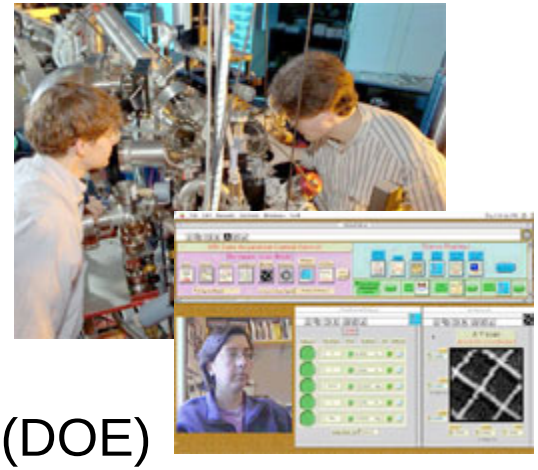
- Introduction
- Asynchronous interaction
  - Wiki/Blog
  - Peer-to-peer filesharing
  - Instant messaging and presence
- Synchronous interaction
  - Video Streaming – seminar broadcasting and archiving
  - Videoconferencing
    - ✓ H.323
    - ✓ VRVS
    - ✓ Access Grid
    - ✓ Conference XP
- Sociology
- Infrastructure services

U.S. Department of Energy

Office of Science

LBNL Collaboratory Experience (10+ years)

BERKELEY LAB



- Support of collaborative science
  - SpectroMicroscopy Collaboratory (DOE)
  - Global Accelerator Network (DOE/NSF)
  - National Center for Hydrology Synthesis (NSF)
  - ESnet collaboration services (DOE)
  - Access Grid (DOE/NSF)
- Research and development of collaborative tools (DOE)
  - Remote camera control
  - Participation in the Science of Collaboratories project (UM/NSF)
  - Access Grid development and deployment
  - Authentication and authorization for collaboratory and Grid tools
  - Asynchronous interaction support
  - Secure peer-to-peer file-sharing
  - Secure and reliable group communication protocols
  - Collaborative workflow definition and tracking

Collaboration Motivation

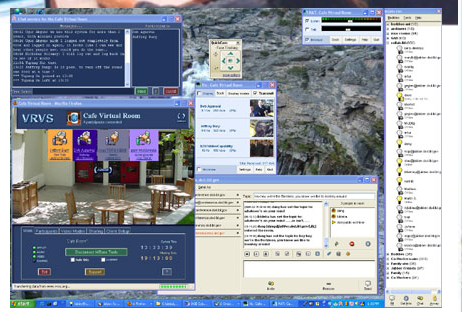
- Distributed science is a reality
  - Large-scale experiments
  - Large-scale simulations
  - Combined experiments
  - Teaming of disciplines to solve problems is becoming common
- Collaborations span the US and the globe and cross site boundaries
- Many collaborators never meet in person
- Collaborating groups range in size from two to hundreds
- A collaboration often begins with two or three members

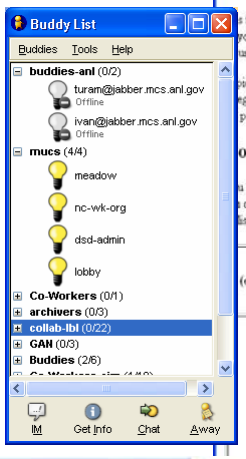
U.S. Department of Energy

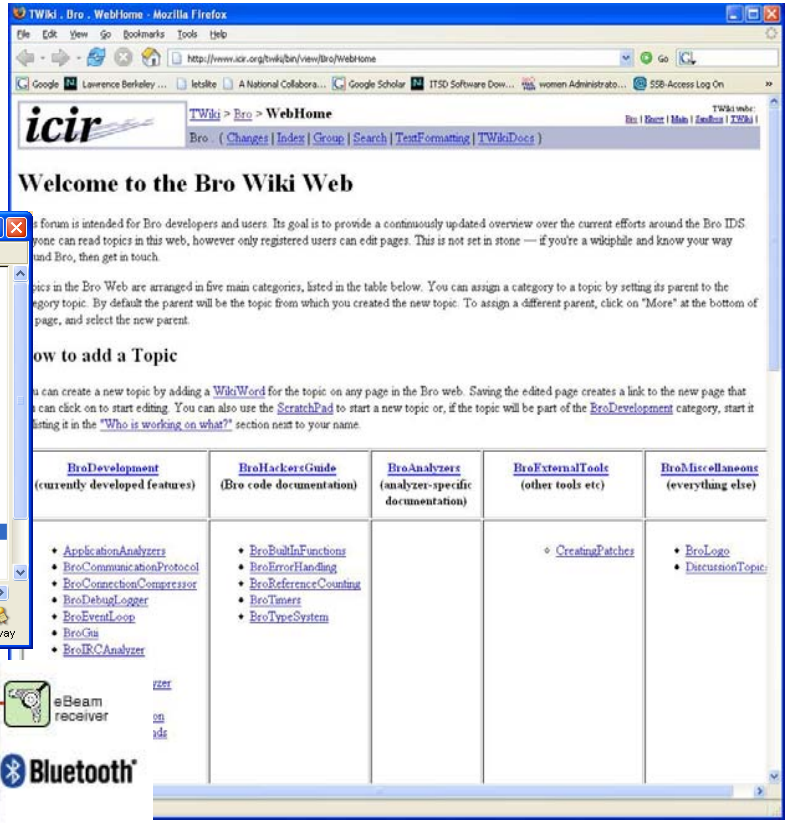
Office of Science

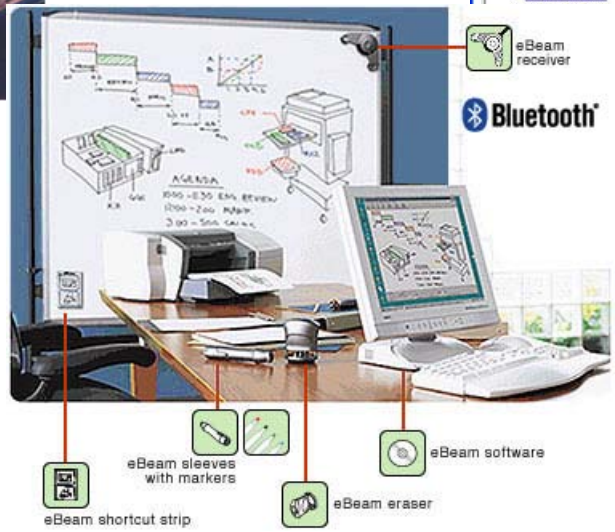
Collaborative Tools Available

BERKELEY LAB









U.S. Department of Energy

Office of Science

Collaboration Environment

BERKELEY LAB

- Collaborative communication options
  - Formal meeting in person
  - Videoconference
  - Teleconference/telephone
  - Informal discussion/meeting
  - File/document sharing
  - E-mail/chat
  - Papers/documents/web

Increasing % of time

Decreasing synchrony

Design Space

- Sharing information, documents, and data
  - Provide shared space, context, and event notification
  - Persistent and pervasive capabilities
  - Supports asynchronous collaboration
- Enabling “semi-synchronous” interaction
  - Provide opportunities for chance encounters/interactions
  - Presence and availability information
  - Archiving and long duration conversations supported
- Supporting meetings and Lectures (fully synchronous)
  - Provide shared applications, powerpoint, and whiteboards
  - Good audio and video
  - Ease of use

Publishing and Distributing Content in a Collaboration

Outline

- Wikis
- Web logs (blogs)
- Web feeds (RSS/Atom)
- Social bookmarking
- Secure peer-to-peer file-sharing (scishare)

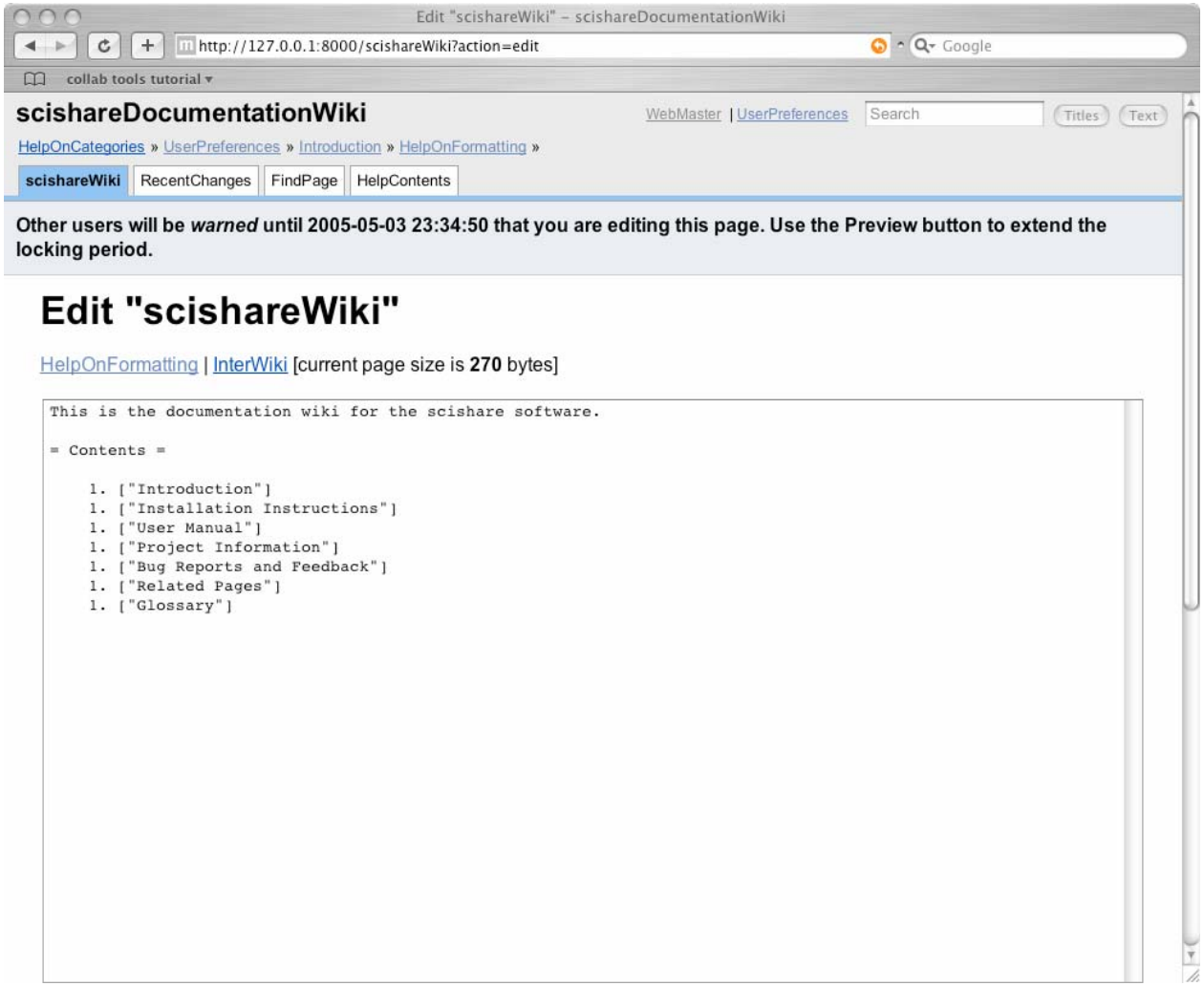
Wiki Examples

- Wikipedia
  - http://en.wikipedia.org/wiki/Main_Page
- CERN wikis
  - https://uimon.cern.ch/twiki/bin/view/Main/WebHome
- Access Grid wiki
  - http://www-unix.mcs.anl.gov/fl/research/accessgrid/wiki/moin.cgi/FrontPage
- Future Techologies Group
  - http://ftg.lbl.gov/

Wiki

- Enables documents to be written collectively through web browser
- Uses a simple markup language
- Version control
- Open philosophy

Wiki Browser Editing



Wiki Formatting Example


```
Example bullets:

 * bullet
 * another bullet
 * '''bold bullet'''
----

[http://dsd.lbl.gov DSD]
```

Example bullets:

- bullet
- another bullet
- **bold bullet**

DSD

Emphasis
"*italics*"; "'**bold**'"; """***bold italics***"""; "*mixed* "'***bold***'" *and italics*"; ---- horizontal rule.

Headings
= Title 1 =; == Title 2 ==; === Title 3 ===; ==== Title 4 ====; ===== Title 5 =====.

Lists
space and one of: * bullets; 1., a., A., i., I. numbered items; 1.#n start numbering at n; space alone indents.

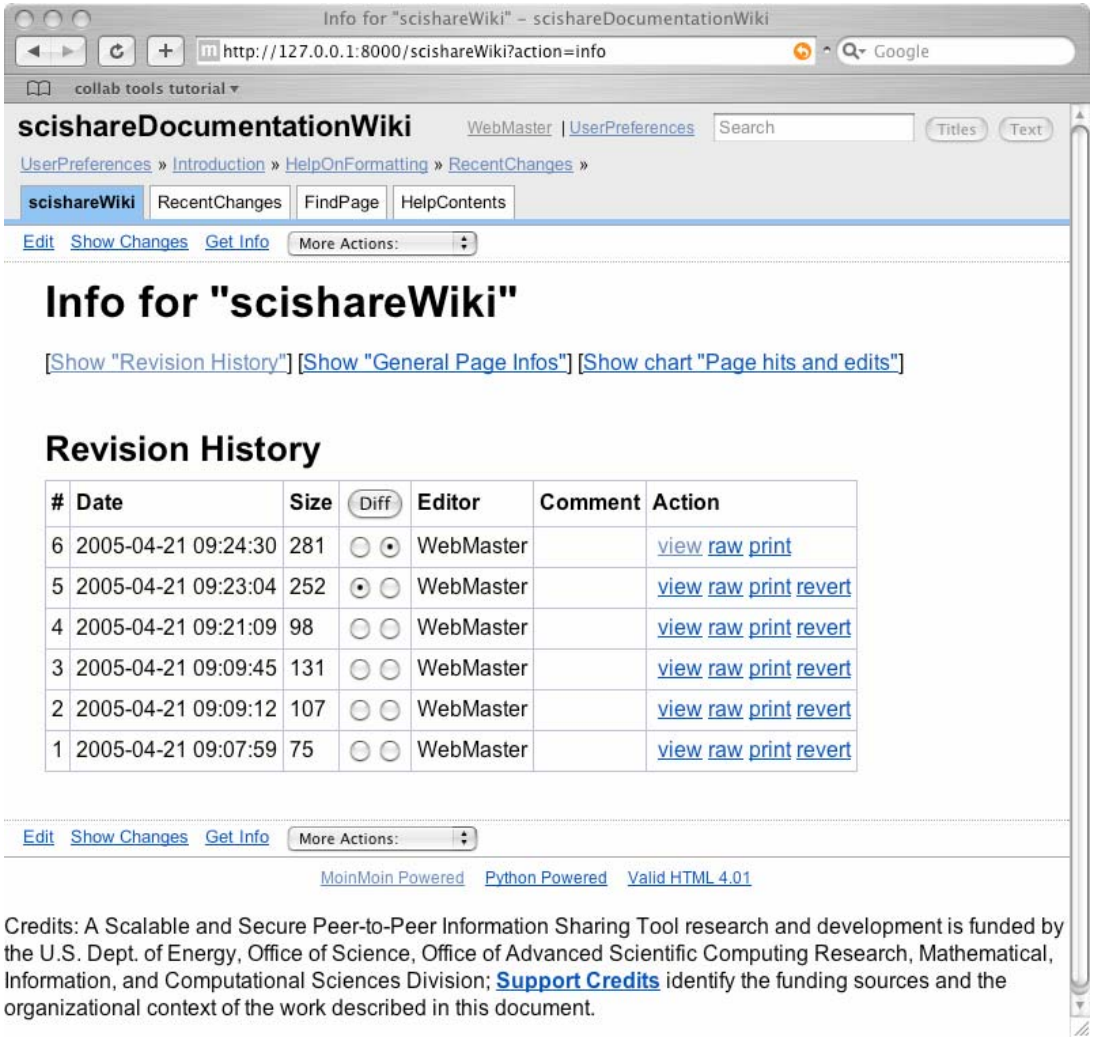
Links
JoinCapitalizedWords; ["brackets and double quotes"]; url; [url]; [url label].

Tables
|| cell text |||| cell text spanning 2 columns ||; no trailing white space allowed after tables or titles.

U.S. Department of Energy

Office of Science

Wiki Version Control



U.S. Department of Energy

Office of Science

Wiki Content Maintenance

BERKELEY LAB

- Philosophy: no review before modifications are accepted
- Maintenance: easy to monitor and remove updates
- Restrict authorship to authorized user

Example Wiki Setup

- MoinMoin
  - Easy setup
    - ✓ Python only requirement
    - ✓ Standalone server option
    - ✓ ACLs in configuration files
      - – Group membership maintained through Wiki page
  - Popular and powerful

Wiki Demo

Summary

- Document publishing by the community for the community
  - Requires community involvement for success
- Collaborative editing of individual documents
- Works well for:
  - Scientific processes
  - Software
  - Community practices

Blog Examples

- Boing Boing
  - http://www.boingboing.net/
- Slashdot
  - http://www.slashdot.org/
- EETD
  - http://bleer.lbl.gov/
- CTWatch
  - http://www.ctwatch.org/blog/

Web Logs (Blogs)

- Periodic time-stamped posts on a common webpage
- Often in reverse chronological order
- Older entries archived
  - Given a static address (permalink)
- Summary of latest entries offered

Web Logs (Blogs)

- Typically accessible to any Internet user
- Many enable visitors to leave public comments

Example Blog Setup

- Blojsom
  - Easy setup
    - ✓ Web application for Tomcat
    - ✓ Administered through configuration files and through the application
  - Articles can be edited as files
  - Categories can be organized as folders

Blog Demo

Summary

- Individual documents have single author
- Community involvement helps but not required for success
- Works well for:
  - Announcements (software updates, reports, publications, stories from the community)
  - PR with a personal touch

Web Feed Examples

- Blogging community
  - Normal
  - Podcasting (audio feeds)
  - Broadcatching (torrent feeds)
- Major news organizations
  - Reuters, AP, New York Times, etc.
- E-mail notification
  - Gmail, java.net forums

Web Feeds

- Short descriptions of web content
  - link to the full version of the content
- Typically information about latest articles/changes on website
- XML file published on the site
- Clients get XML file to learn about updates

RSS and Atom

- Many versions
  - Plain XML
    - ✓ Rich Site Summary (RSS 0.9x)
    - ✓ Really Simple Syndication (RSS 2.x)
    - ✓ Atom Syndication Format
  - RDF-based XML
    - ✓ RDF Site Summary (RSS 0.9 and 1.0)

News Aggregators

- Browsers
  - Firefox, Opera, Avant Browser, Safari (in Mac OS X 10.4), IE (with plug-ins)
- Mail readers
  - Thunderbird (native), Outlook Express (plug-ins)

News Aggregators

- Stand-alone clients
  - RSS Bandit (Win), NewsMac (Mac), NewsFeed (Python/Tk), and many many others
- Online
  - e.g. My Yahoo, Waggr, Bloglines
- Server side
  - e.g. MetaPlanet (PHP), Planet Planet (Python)

Web Feed Demo

Summary

- Less-intrusive than mailing lists
- More anonymous than mailing lists (maybe)
- “Free” with blogs and wikis
- Additional uses:
  - CVS commit notification
  - Experiment status/monitoring

U.S. Department of Energy
Office of Science

Social Bookmarking Examples

BERKELEY LAB

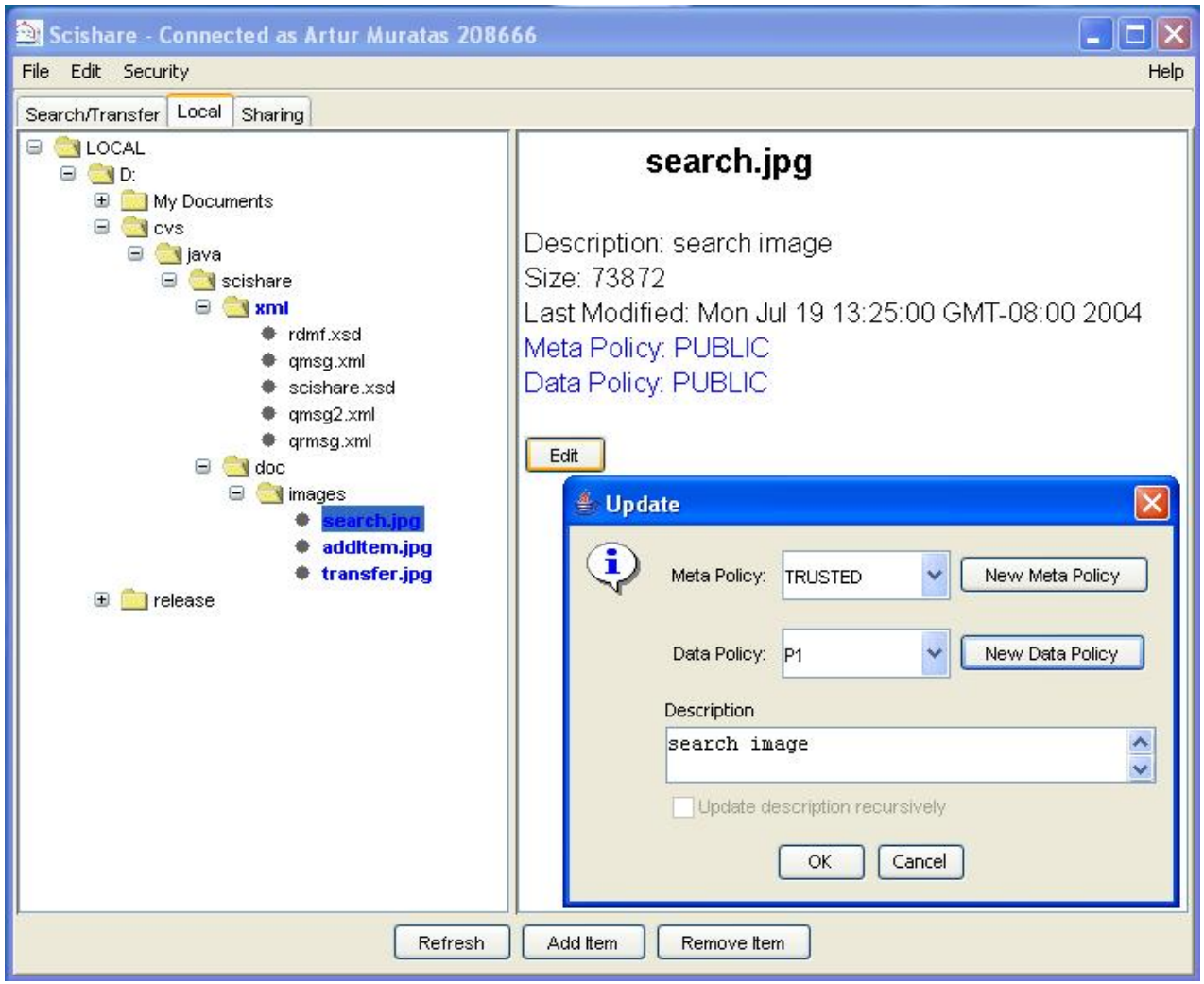
- Most popular
  - http://del.icio.us
- Citations
  - http://www.citeulike.org/
  - extracts them automatically

Social Bookmarking

- Online service
- Users save and categorize personal collection of bookmarks
- Share those bookmarks with community
- RSS feeds typically provided

Social Bookmarking Demo

Scishare Local View

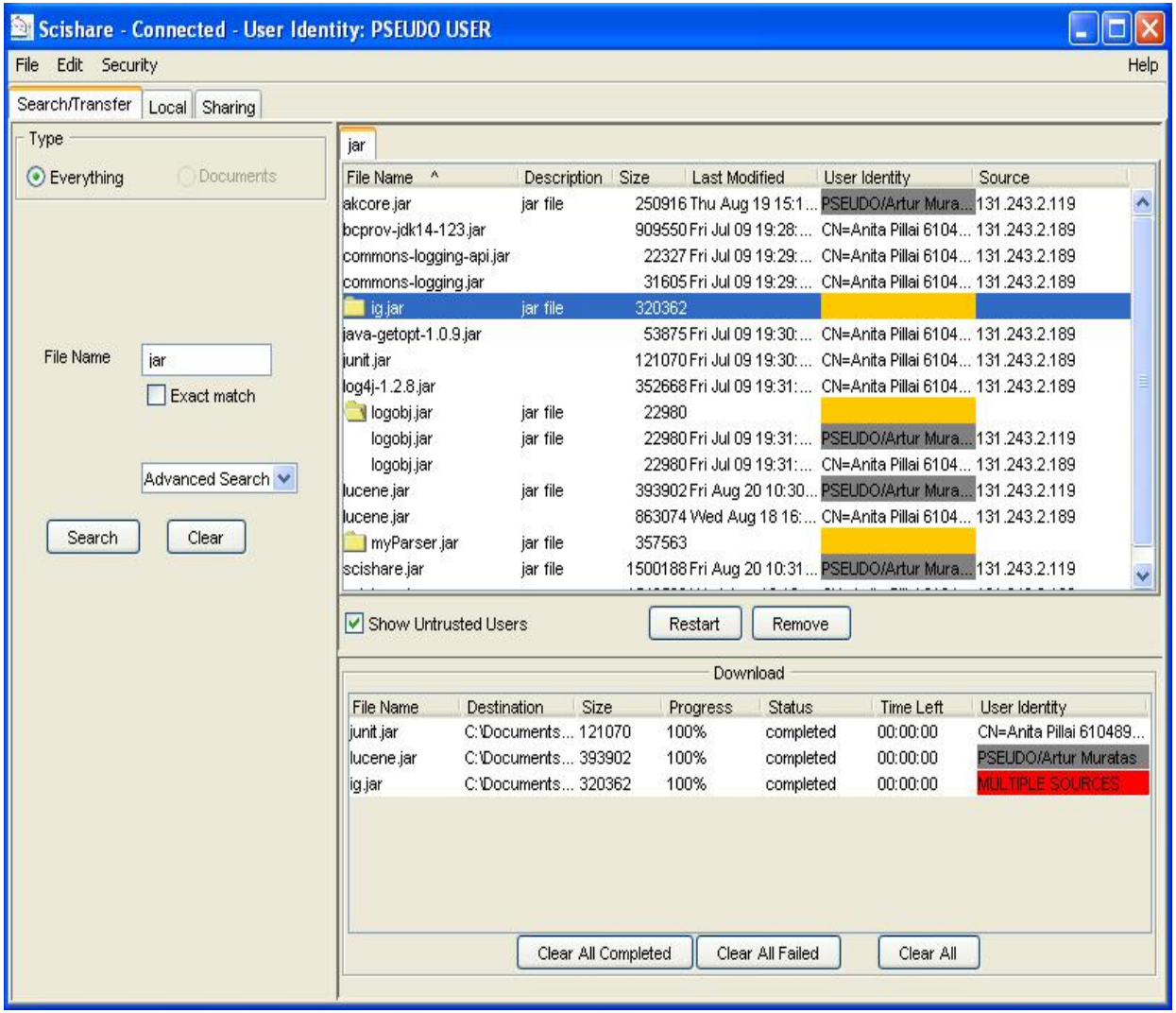


U.S. Department of Energy

Office of Science

Scishare Search View

BERKELEY LAB



Scishare

- Share local data
- Allows for extensible search
- Support ad hoc collaborations
  - Meetings at conferences
- Security
  - Confidentiality and integrity of communication
  - Fine-grained access control to resources
  - Easy-to-use fine-grained access control interface is a must
- Flexible security model
  - Quick and easy startup
  - Trust building
- Run on many OS and architectures

Summary

- Secure sharing between groups of collaborators
- Secure sharing between your computers
- Lightweight, easy to setup
- Low startup cost (time and resources)
- Software @ http://www.dsd.lbl.gov/scishare

Instant Messaging

Instant Messaging and Presence

- Internet Relay Chat
- iChat
- AOL Instant Message
- MSN
- Jabber

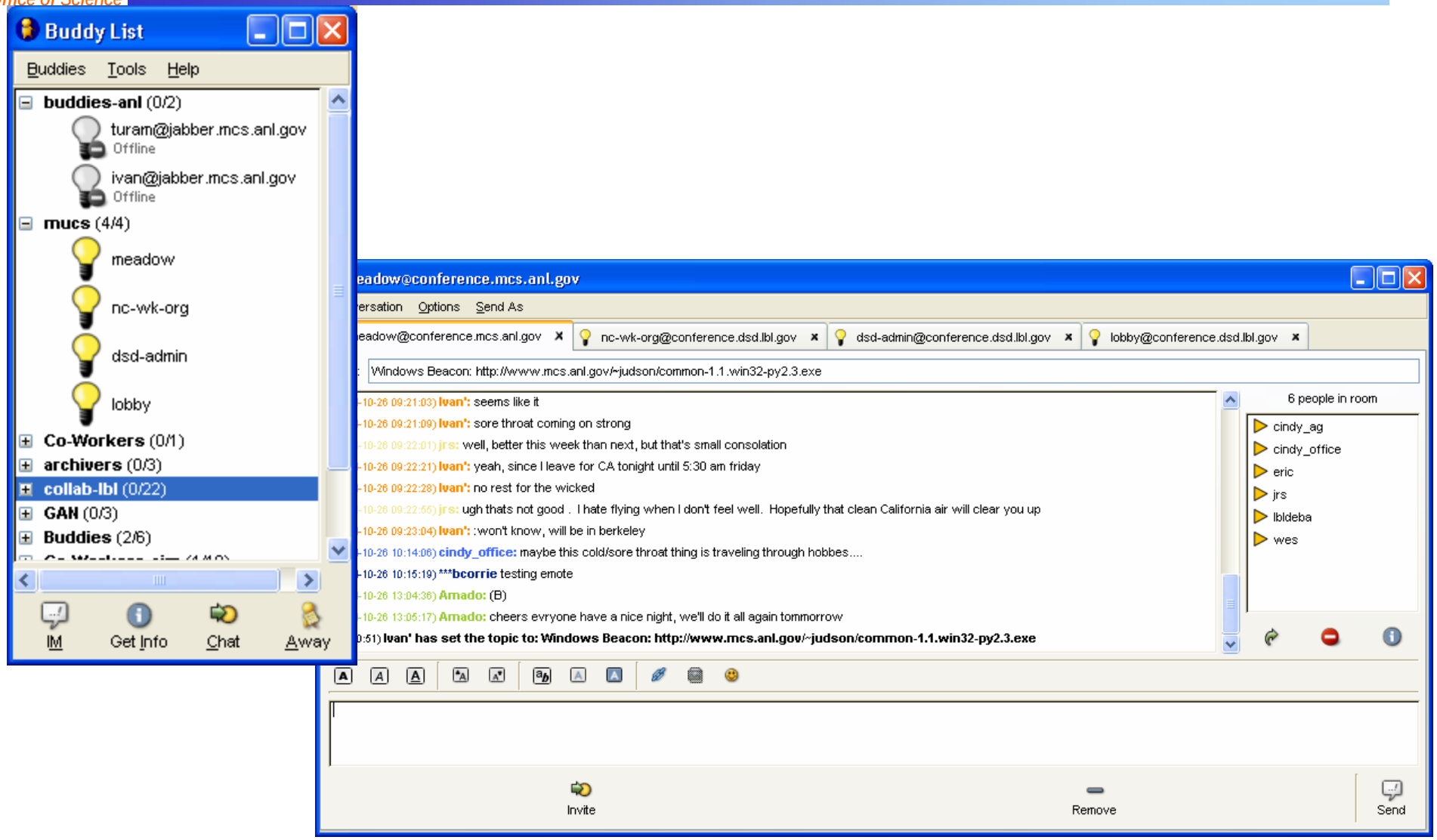
Jabber - Presence and Messaging

- "Jabber" - set of standard protocols for streaming XML elements
- Provides near-real-time messaging and supports long-running conversations
- Provides presence, messaging, events, and multi-user chats
- Open and extensible protocols
- Stable and widely used (likely millions of users)
- Large and active developer community,

U.S. Department of Energy

Office of Science

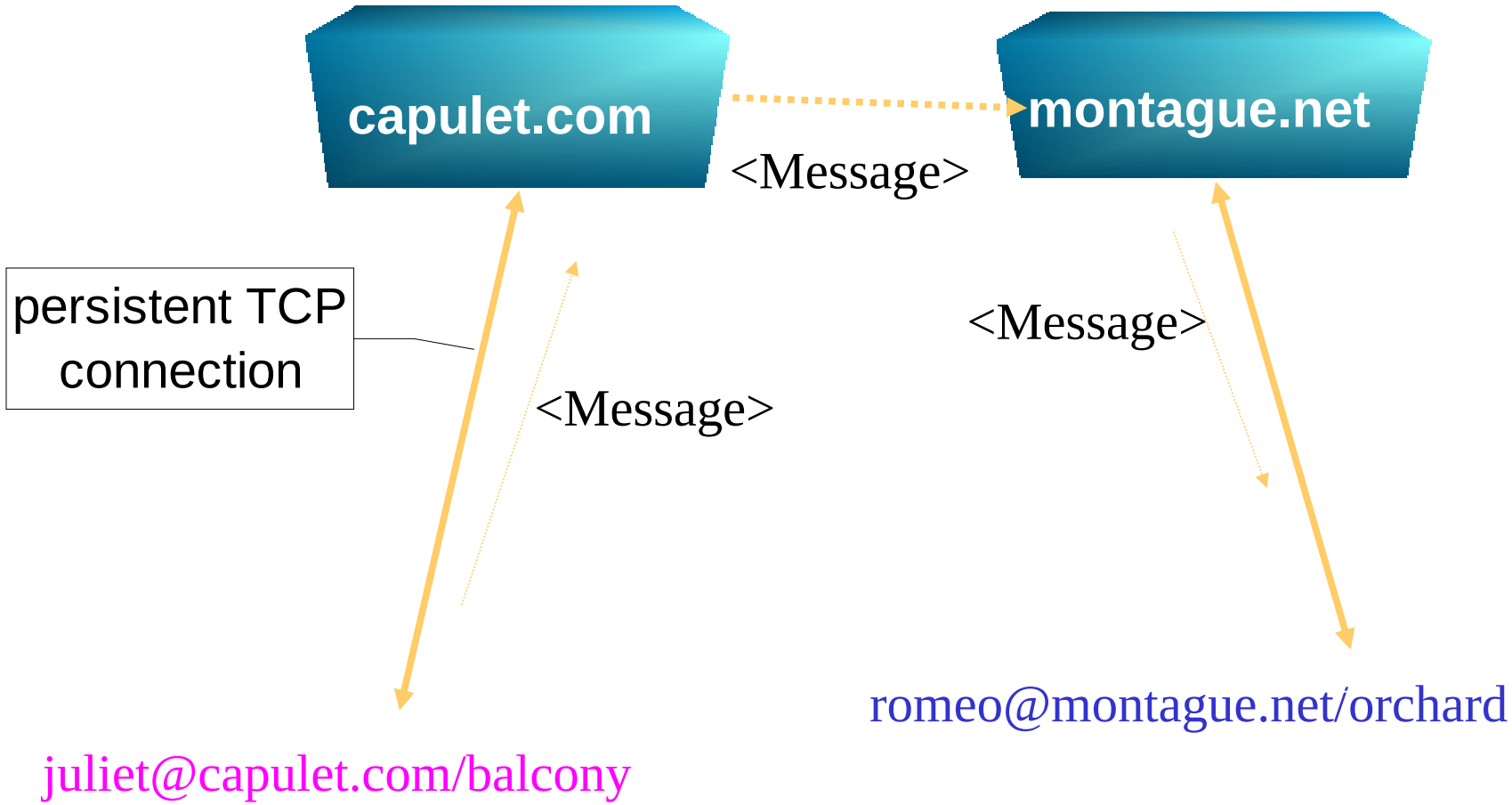
Jabber Messaging



Jabber Protocol Architecture

- "Streaming" XML messages over a (duplex) TCP connection
- Messages are addressed to a "Jabber ID" (JID), which is ***user@server/resource***
- ***Network of servers handle messages, and route messages not intended for them***
- ***Clients live at the "edges" and talk to servers***

Jabber Message Delivery



U.S. Department of Energy
Office of Science

Jabber Existing Software

BERKELEY LAB

- Servers
  - "jabberd" from jabber.com
    - ✓ GPL
    - ✓ Stable version is 1.4; beta 2.0 supports IETF protocol extensions (security)
  - Other open-source: ejabberd, WPJabber
  - Commercial: Rhombus, Accept
- Clients
  - Gaim (popular universal IM client, works on Windows and Linux using Qt library, Mac/X11)
  - PSI (Jabber-only client, Win/Lin/Mac)
  - Many more: Exodus, RhymBox, Gabber, ...
  - Web client interfaces also available

U.S. Department of Energy
Office of Science

Jabber Clients & Devices

BERKELEY LAB


Palm


SMS

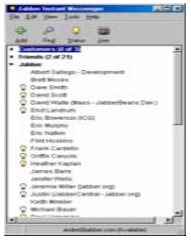

RIM


Pocket PC


J2ME


Symbian


WAP


Windows


Linux


Web

Source: http://downloads.weblogger.com/gems/andredurand/JabberNetworkInterop.ppt

U.S. Department of Energy

Office of Science

LBNL Jabber Enhancements

BERKELEY LAB

- Personal Archiver
  - Built a Python agent that archives chats and web page to search archives
  - Runs with its own credentials
  - Visible entity in the space
  - Invite archiver to chatroom to archive a conversation
  - Archive controlled by individual running archive
  - Archives to searchable database or web page

AOL, iChat, and MSN

- All support presence and instant messaging
- Some support chat rooms
- Each uses a different protocol – they don't interoperate and most are non-standard protocols
- Servers run by a commercial company
- User population unlimited
- Adding video and audio capability or already have it

Skype

- Impressive voice conferencing quality
- Based on the Kazaa P2P infrastructure
- Provides presence and audio conferencing between up to 4 people
- Encrypts traffic
- Transmits all traffic through the P2P network
- Users behind firewalls are connected through nodes which are not behind firewalls
- Cross-platform
- Many sites are banning use due to the traffic volume

Videoconferencing

Videoconferencing Variables

- Format on the network and for display
- Equipment needed
- Ease of use
- Audio and video quality
- Transmission method
- Immersion level
- Interoperability
- Number of participants supported
- Availability at participant locations
- Availability of maintenance contract

Audio Exceedingly Important

- Microphones
  - Need enough to pick up everyone in the room
  - Reject room background noise
- Speakers
  - Need to be able to hear remote participants clearly
- Echo cancellation
  - Subtracts signal coming out the speakers from the signal seen at the mic to break the feedback loop
  - Headset echo canceller is user's head
  - Software echo cancellation is not very good
  - Difficult to recognize because problem site does not hear the echo
- Without good audio, video- and tele-conferences do not work

Video Considerations

- Life-size pictures of remote people make them feel like peers
- Cameras at eye level also help create a feeling of peers
- Video frame rate and quality with enough detail to see non-verbal cues from participants
- Important to be able to see all sites and participants if it is a meeting rather than a lecture

H.323 Videoconferencing

+ Commercial products
+ Standard protocols
+ Installed and maintained by institution
+ Some free clients available e.g. netmeeting
- Requires a MCU
- Not immersive
- Poor multi-site properties

H.323 Protocols

- Standard recommended by the International Telecommunication Union (ITU)
  - Set of standards for real-time multimedia communications:
    - ✓ Voice
    - ✓ Video
    - ✓ Data conferencing
  - For packet switched networks
  - Originally approved in 1996
  - Current version is version 2

H.323 Components

- Terminals – end station equipment
- Gatekeepers – communication central
  - Address translation
  - Admissions control
  - Bandwidth control
  - Zone management
- Gateways – connect different networks
- MCU – connect more than two participants

H.323 Protocols

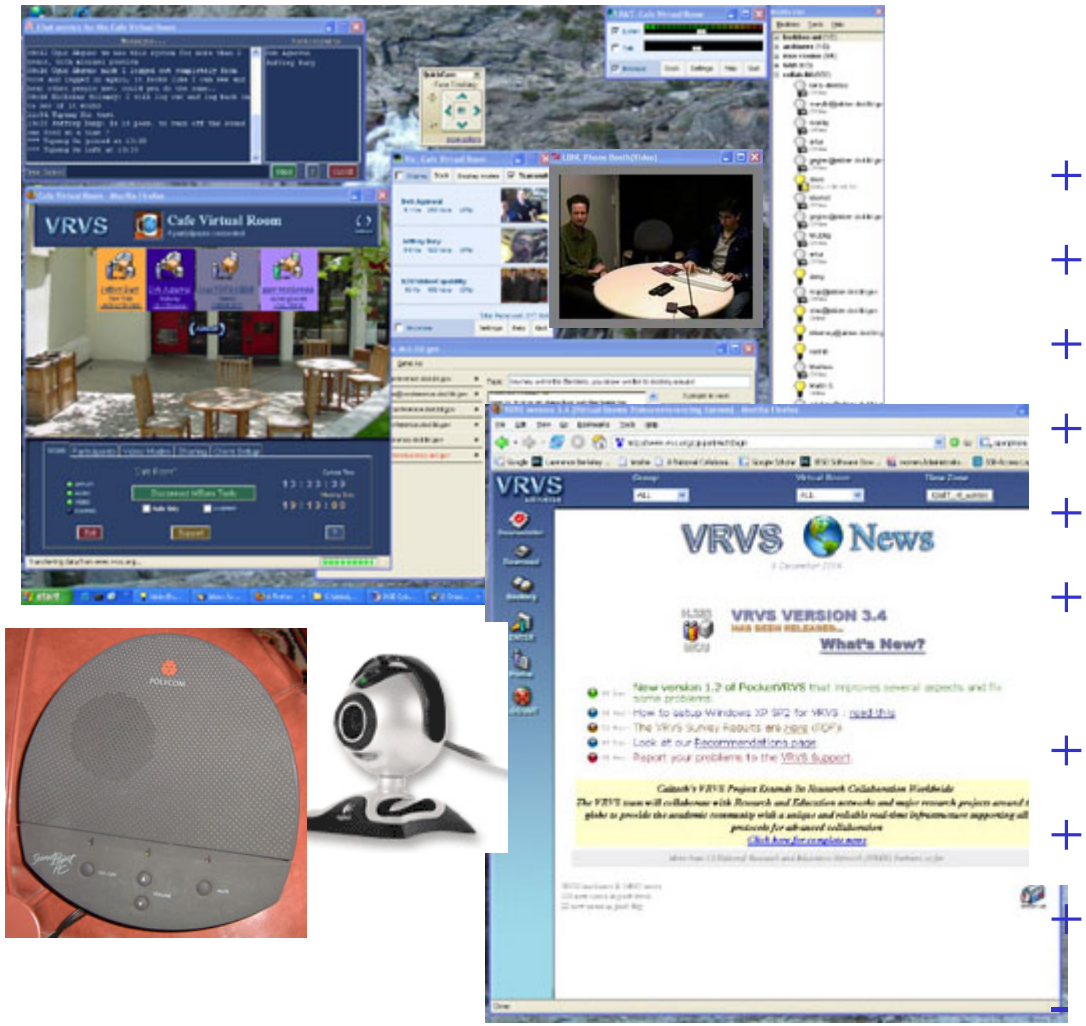
- Audio - G.723 (G.711, G.722, G.728,G.729, MPEG 1)
- Video – H.261 or H.263
- System Control - H.225
- Security – H.235
- Data/application sharing – T.120

Components

U.S. Department of Energy
Office of Science

VRVS Videoconferencing (CalTech)

BERKELEY LAB

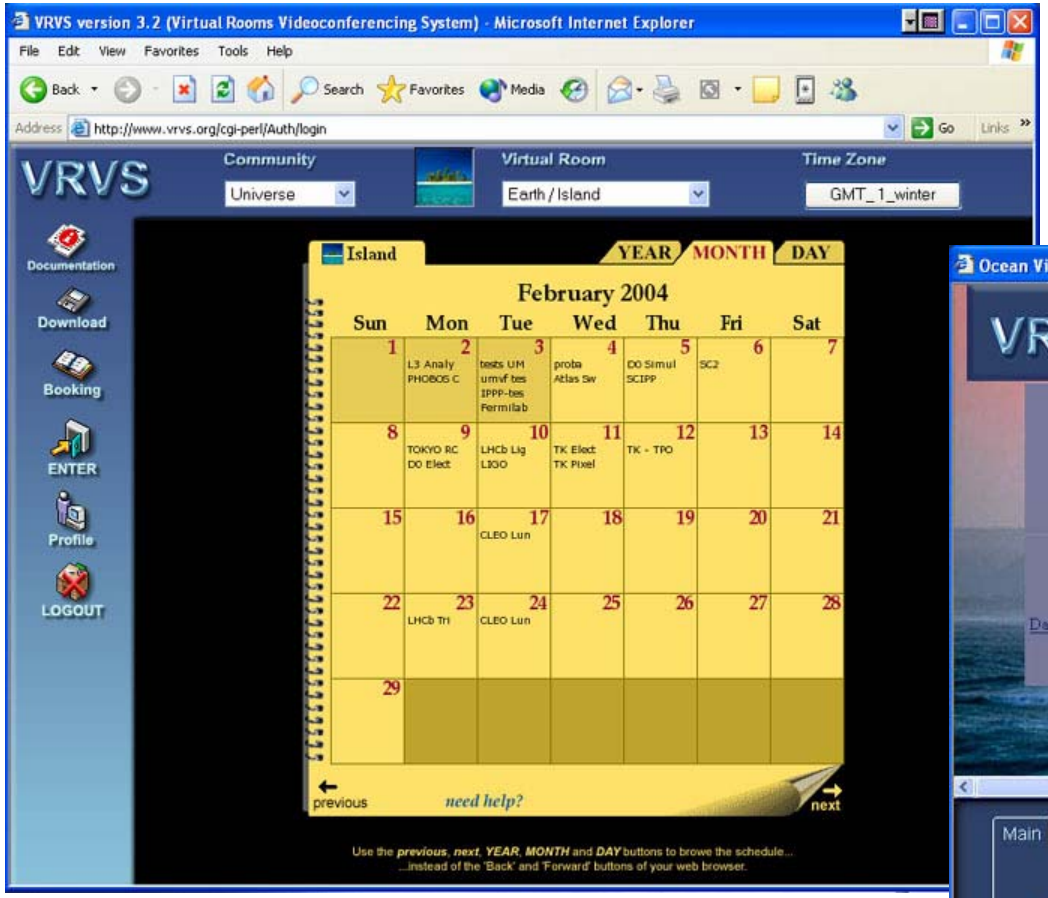


- High-Energy Physics uses to support collaboration
- Interoperates with H.323
- Free software
- No MCU required
- Virtual room paradigm
- Reflector network
- Automated network monitoring and recovery
- Cross-platform
- Web interface to launch
- Supports Multi-party
- Not immersive

U.S. Department of Energy

Office of Science

VRVS Interface

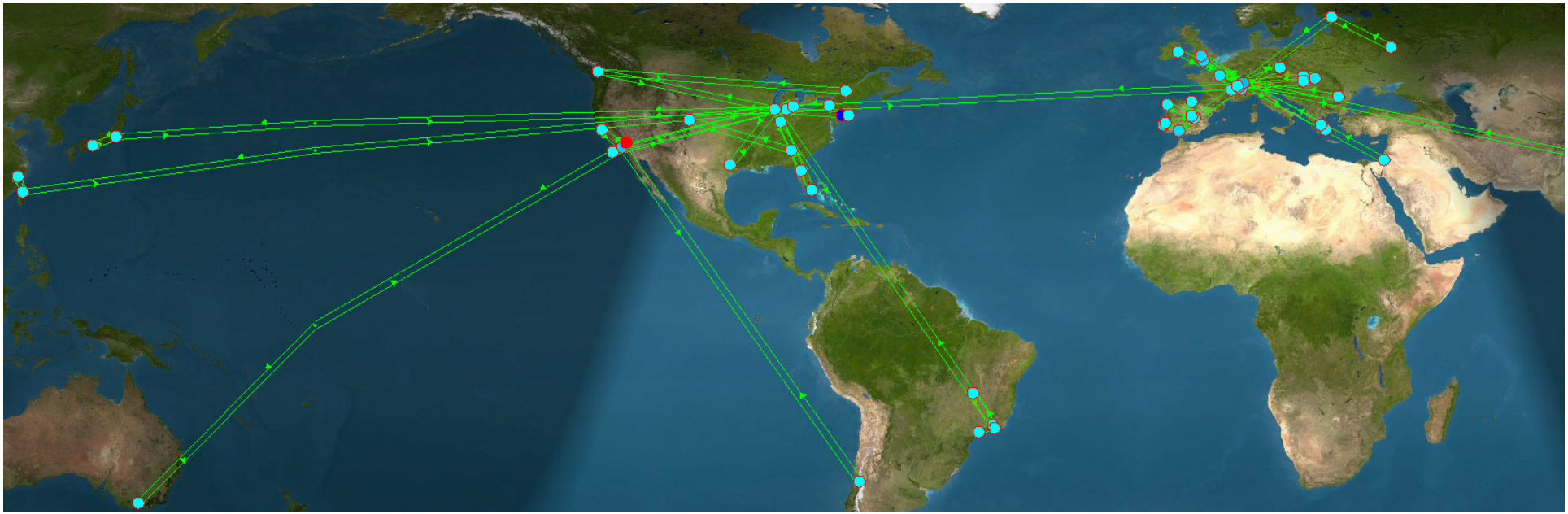


U.S. Department of Energy

Office of Science

VRVS Reflector Network

BERKELEY LAB



U.S. Department of Energy
Office of Science

Access Grid Nodes (ANL)

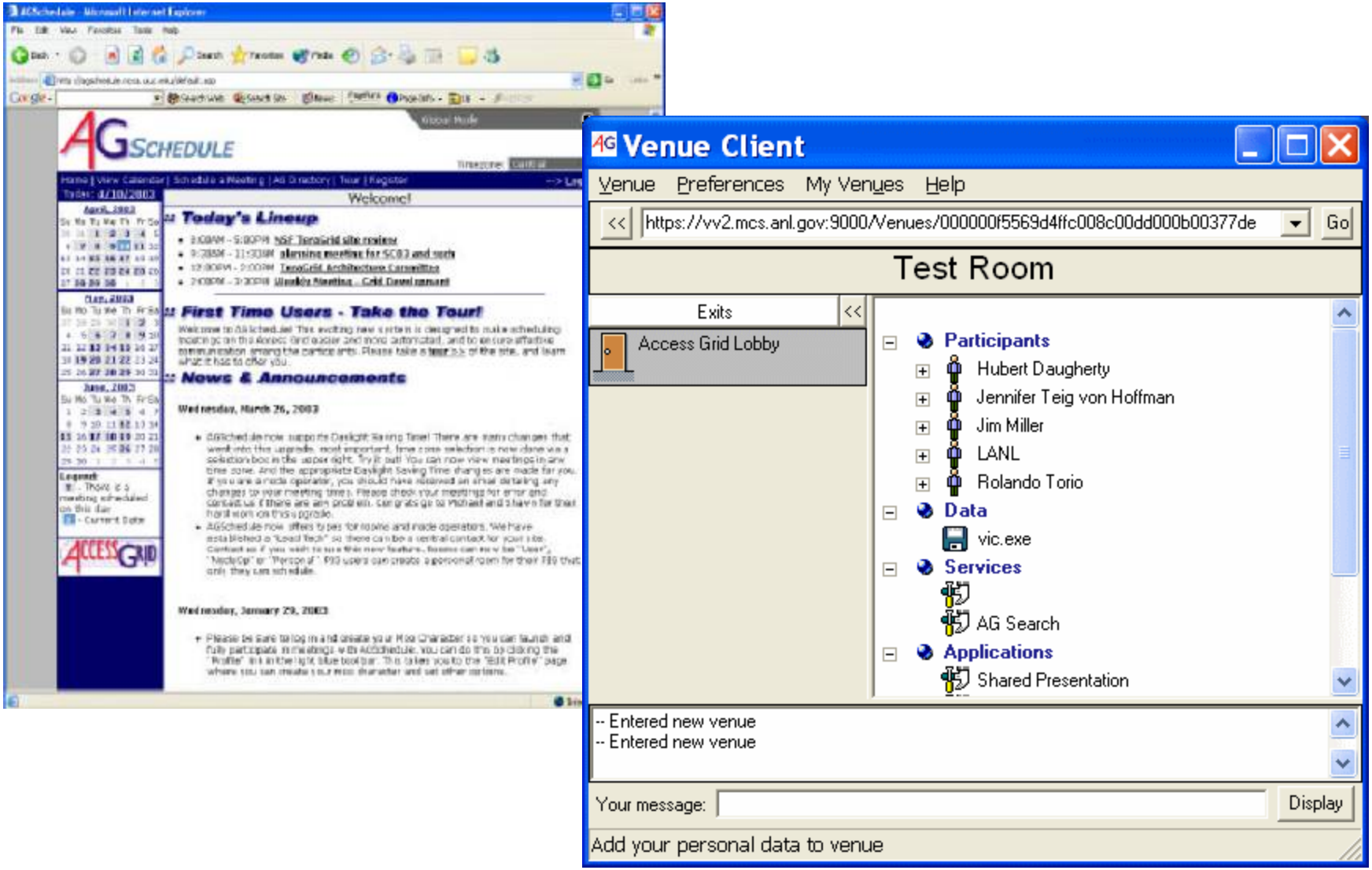
BERKELEY LAB

+ Many communities using
+ Immersive environment
+ Supports group-to-group
- Requires an operator
- Ease of use

U.S. Department of Energy

Office of Science

AG Interface and Scheduling



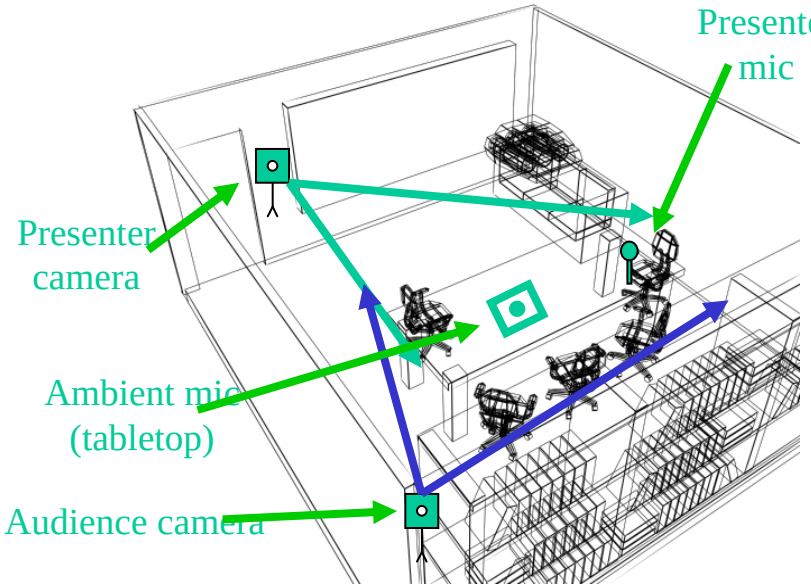
AG Equipment

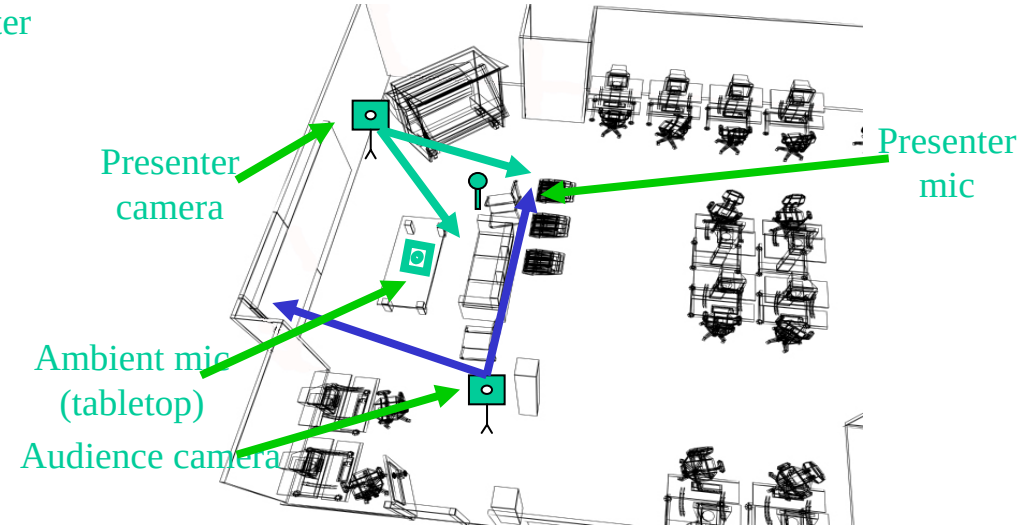
- Room ideal
  - 3 cameras
  - Room microphones and speakers
  - Echo cancellation
  - Computer
  - Multiple displays
  - Good lighting and sound configuration
  - Operator
- Minimum
  - Camera hooked to computer
  - Headset
  - Network connection
  - Computer

U.S. Department of Energy
Office of Science

Access Grid Nodes

BERKELEY LAB



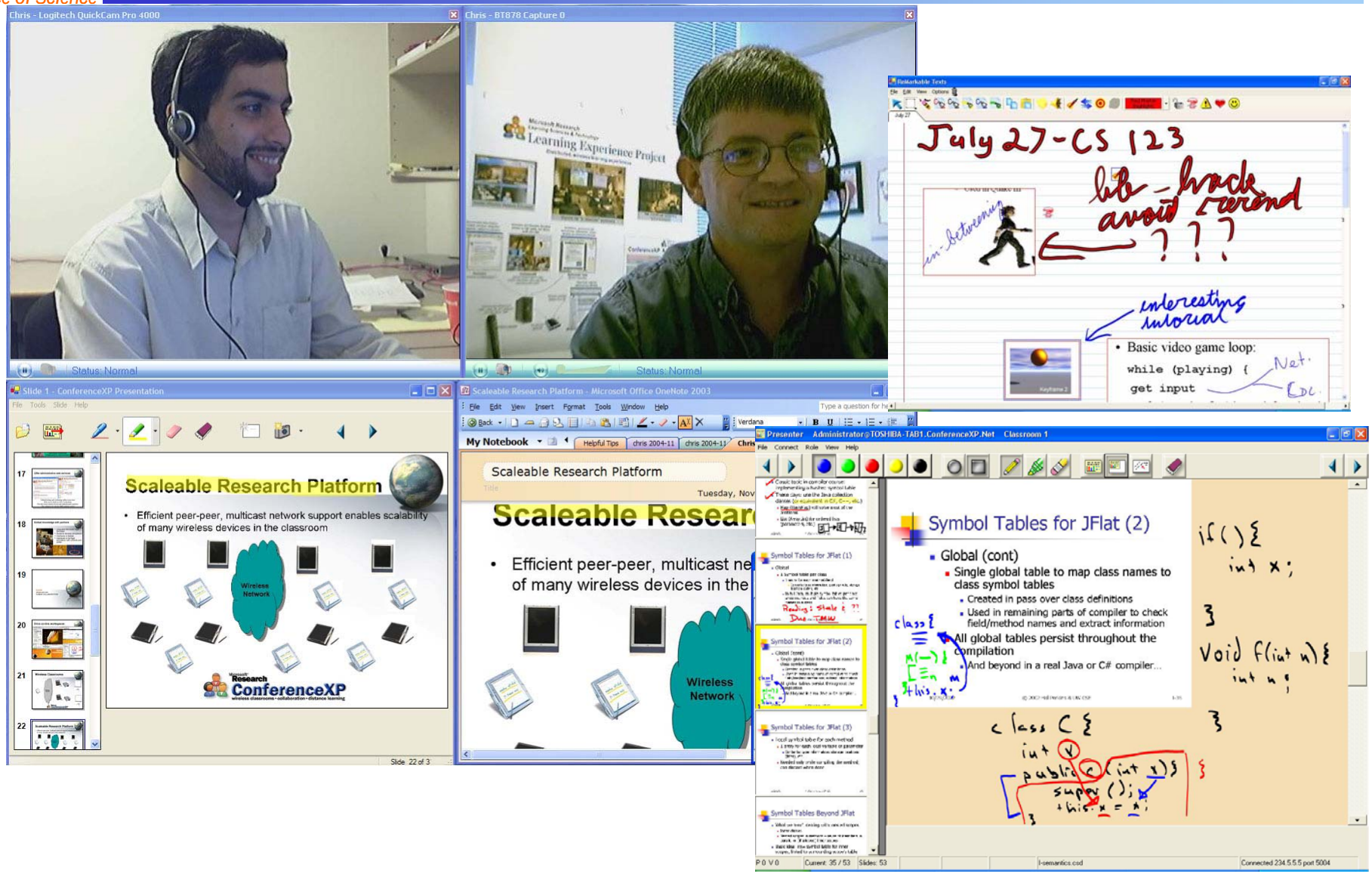


U.S. Department of Energy

Office of Science

Conference XP

BERKELEY LAB



U.S. Department of Energy

Office of Science

URLs for more information

BERKELEY LAB

- www.h323forum.org
- www.packetizer.com/voip/h323/
- www.vrvs.org
- www.accessgrid.org
- www.conferencexp.net

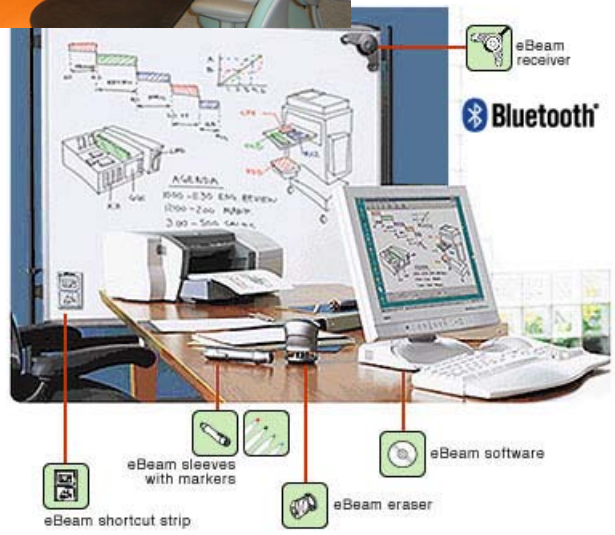
Shared Whiteboards

U.S. Department of Energy

Office of Science

E-Beam Shared White Board

BERKELEY LAB



+ Portable sensor
+ Captures real and screen whiteboards
+ Free software
+ Inexpensive sensors
+ Web interface
- LBNL proximity sensors use the same ultrasound frequency as the eBeam

Whiteboards Cont.

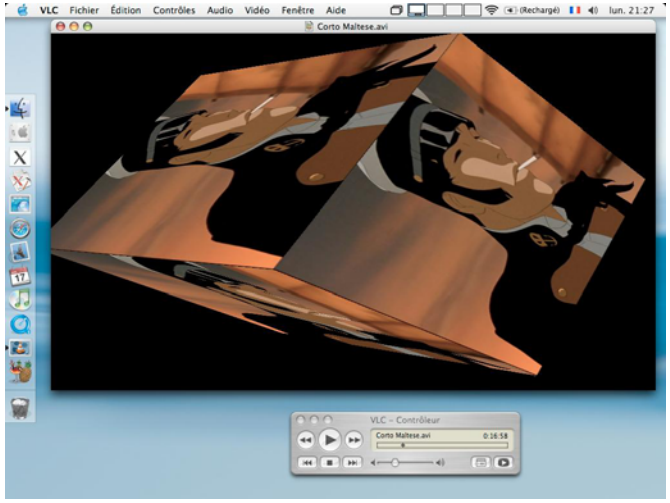
- Other whiteboards
  - Media Lecture Board (MLB)
  - WB
  - Smartboard
- Issues
  - Natural writing interface - pen
  - Equal participation capability
  - Pen input – tablet PCs
  - Ability to import graphics and documents

Video Streaming

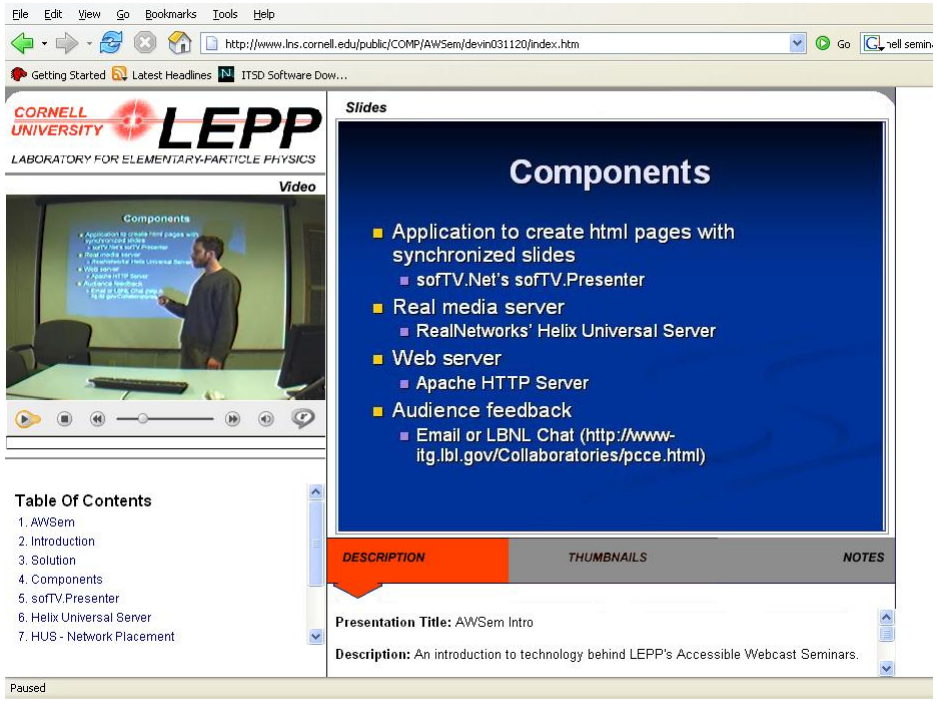
- Laptop capture
- VideoLAN
- Real networks
- Other products
- WebEx

Video Streaming

- VideoLAN – www.videolan.org
- Adopted by Internet 2 community for seminar transmission
- Easy to use and produce streams
- Cross-platform
- High quality video and audio stream
- Uses significant bandwidth
- http://db.arts.usf.edu/dvguide/listings.asp



Lecture Capture and Playback



- Capture equipment needed
  - Computer/laptop
  - Web camera
  - Microphone
  - Realvideo server
  - Capture software
- Playback via browser
- Several commercial products available

Sociology

Typical Decision Variables

- Capabilities provided
- Ease of use
- Available to collaborators
- Interoperability with other tools
- Required hardware, software, and operating system
- Availability of support and servers
- Security
- Availability of ‘killer’ content or capability
- Robustness and reliability
- Flexibility to add features or customizations
- Performance, bandwidth, cybersecurity issues

Collaboration Realities

- Collaboration takes effort and thus must
  - Provide a perceptible benefit to all participants
  - Fit with current work practices
  - Be accessible to the users
- Collaboration tools need to be used regularly (not on the shelf)
- Group must already have a strong need to collaborate

U.S. Department of Energy

Office of Science

Collaborative Design Process

BERKELEY LAB

- Identify key activities to share
- Inventory available technologies and hardware
- Make sure all participants have an incentive
- Develop realistic use cases/interactions
- Role play the interactions
- Identify critical technologies to enable collaboration
- Keep it as simple as possible

Continuous Re-evaluation

- People typically do not always use the tools the way you intended
- New modes of interaction will develop over time using the tools
- Needs of the collaboration are not static
- New people who join after the collaboration has started may need help understanding the paradigm and terminology
- Introduce tools incrementally into the environment

U.S. Department of Energy

Office of Science

Technology Adoption Stages

BERKELEY LAB

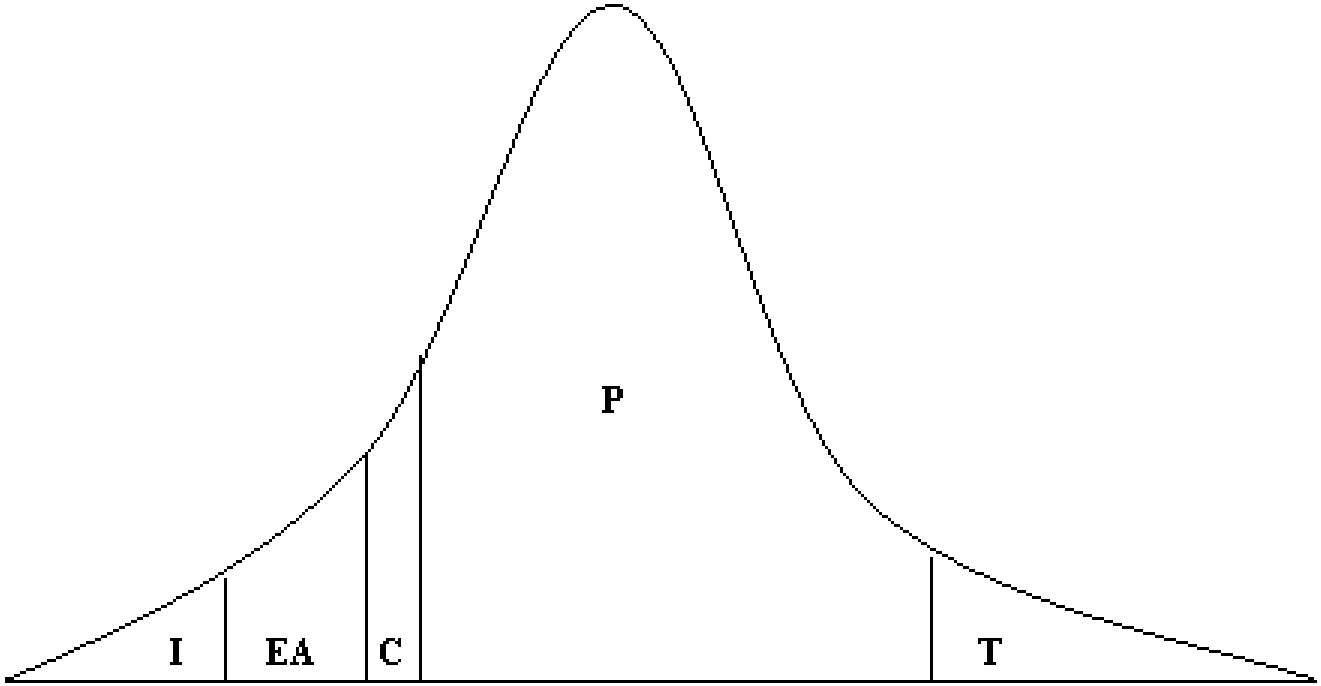
Innovators (I) The enthusiasts who like technology for its own sake.
Early Adopters (EA) Those who have the vision to adopt an emerging technology to an opportunity that is important to them.
The Chasm (C) Time gap in technology adoption, which is between the early adoptors and the pragmatists.
Pragmatists (P) Early Majority Early majority pragmatists are the solid citizens who do not like to take the risks of pioneering, but are ready to see the advantages of tested technologies. They are the begining of a mass market.
Pragmatists (P) Late Majority Late majority pragmatists, who represent about one-third of available customers, disklike discontinuous innovations and believe in tradition rather than progress. They buy high-technology products reluctantly and do not expect to like them.
Traditionalists (T) Traditionalists (laggards) do not engage with high technology products - except to block them. They perform the valuable service of pointing out regularly the discrepancies between the day-to-day reality of the product and the claims made for it.

From Crossing the Chasm (1991) - Moore

U.S. Department of Energy

Office of Science

Technology Adoption Curve



From Crossing the Chasm (1991) - Moore

Some URLs

- Collaborative environments
  - Groove – www.groove.net
  - Sakai/Chef - collab.sakaiproject.org
- Videoconferencing
  - H.323 - www.ecs.es.net
  - Access Grid – www.accessgrid.org
  - VRVS – www.vrvs.org
  - Conference XP – www.conferencexp.net
  - VideoLAN - http://www.videolan.org/
- Components
  - Wiki – www.twiki.org
  - MLB - http://www.informatik.uni-mannheim.de/pi4/lib/projects/mlb/
  - XMPP/Jabber – www.jabber.org
  - E-beam shared white board - www.e-beam.com
  - SciShare file sharing system - www.dsd.lbl.gov/P2P/file-share/
  - Plone content management system – www.plone.org

ITSD

INFORMATION TECHNOLOGIES & SERVICES DIVISION

Ed Ritenour

Networking and Telecommunications Department

LBNL Supported Conferencing

BERKELEY LAB

Methods of Communications

- **First and foremost preferred method of conferencing is:**

  Face to Face communications

- **But what if you can't physically be there ?**

Methods of Communications (Cont)

- **Audio Conferencing**
  - **Desktop phone**
  - **Cell Phone**
  - **Room speaker phone**
  - **Audio Bridging, for multiple participants**
    - **Internal to PBX**
    - **Audio bridge**

Methods of Communications (Cont)

- **Video Conferencing**
  - **Provides needs that lie somewhere between physically being there and communicating by phone.**

Methods of Communications (Cont)

- **Video Conferencing (Systems Supported)**
  - **Room systems**
    - Four public rooms at the Lab configured for lectures, presentations, and of course standard meetings
    - Three ISDN / IP rooms
    - One Access Grid room
  - **Portable unit**
    - Auditoriums or Large conference rooms
    - Large group of local people with one or more remote participants

Methods of Communications (Cont)

- **Video Conferencing Systems**
  - **Personal systems (One Person)**
    - Desktop H323
    - AG PIG
  - **Bridges for multiple sites**
    - Provided free by ESnet

Methods of Communications (Cont)

- **Video Conferencing**
  - — **Technologies**
    - **ISDN**
    - **IP Unicast**
    - **IP Multicast**

Video Conference Capabilities

- **Video Conferencing**
  - **Conferencing Capabilities**
    - **Point to point**
    - **Multipoint (Multiple sites)**
      - **(Requires a bridge)**
    - **Support Multicast IP**
    - **Access Grid room**
    - **Audio participants**
      - **(Room systems and bridges all have audio ports)**

Video Conference Capabilities

- **Video Conferencing**
  - **AG Node (Access Grid)**
    - **Allows multiple video streams to be simultaneously received or sent**
    - **Synchronized PowerPoint slides**
    - **Non standard**
    - **Uses Multicast IP**
    - **Generally requires a operator**
    - **Can be expensive to build and operate depending on your facility**
    - **Still has a few bugs**

Other Conferencing Capabilities

- **Video Streaming**

  (Not to be confused with Videoconferencing)

  - **RealPlayer**
  - **Live and Video on Demand**
    - **Can stream live from both Auditoriums or Pers Hall**
  - **We usually work with the Creative Services group when professional filming or editing is required for video on demand files.**

Other Conferencing Capabilities

- **Data Sharing**
  - **White boards**
    - **PC Applications**
    - **Electronic**
      - **Standard Electronic white board**
      - **E beam**
  - **Data Sharing bridges**
  - **Documents**
    - **Eroom**

Energy Sciences Network

- **ESnet Conference Services**
  - **Audio conference bridging service**
  - **Videoconference bridging service**
  - **Data sharing conferencing service**

AV Services

- **Support both Auditoriums and Pers Hall**

  — **Supported equipment**
  - **Ceiling mounted Projectors**
  - **Hand held microphones**
  - **Lapel microphones**
  - **Pointers**
  - **Overhead projectors**
  - **Portable Videoconference unit**

COMPUTING SCIENCES ITSD

LBNL Conferencing Requests

BERKELEY LAB

- We do charge a fee for all our services
- Where to Find: http://tscweb.lbl.gov/home/home.html
  - For LBNL Audio conference requests:
    - Via phone Ext 7997
    - Reach us via Email at: tsc@lbl.gov
  - For LBNL Videoconference and Streaming and A/V requests:
    - Phone Ext 6767
    - Email at: videoconf@lbl.gov
    - Email at: ag@lbl.gov
    - Email at: av@lbl.gov
  - For ESnet Services: http://www.ecs.es.net