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Challenges in Interactive Distance Education

University of Washington Center for Collaborative Technologies

- Established by Microsoft Research External Research and Programs in July 2007
- Goals:
 - Investigate educational and other collaborative scenarios
 - Extend and maintain the ConferenceXP platform
 - Build the community of users and developers
- <http://cct.cs.washington.edu>

Core Technology: ConferenceXP

- Platform for real-time collaboration
- Project began at MSR in 2001
- Codebase ownership transferred to CCT in July 2007
 - Licensed with MSR academic use license
- Numerous successful deployments for synchronous distance learning

ConferenceXP Releases

- ConferenceXP 4.1, December 2007
 - Localization with human verified Chinese version
 - x64 and Vista support
- ConferenceXP 5.0, August 2008
 - Conference diagnostics, security, high-quality audio, improved unicast support
- ConferenceXP 5.1, Beta released March 30, 2009
 - Diagnostic logging, audio codec, further unicast improvements, DV Audio, move codebase to VS 2008

Effective use of technology in education

- Deploy our technologies in innovative educational scenarios
- Internal Deployments
 - Working with our own classes
 - Opportunity to innovate
 - Pressure to make things work
- External Deployments
 - Broad range of ideas
 - User suggestions
 - Feedback on ideas



Lessons Learned using the Classroom Experience Project

Jay Beavers, Microsoft Research
Richard Anderson, Univ of Washington

How to fail at video conferenced teaching

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Faculty
Summit
2002

What we hoped to achieve

- Increased interaction between sites
- Ability of remote students to interact with the instructor
- Ability of instructor to engage remote students
- Student interaction across sites
- No degradation of experience of local students
- No System Administrator

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2002

What happened

- Week 1
 - Used old system (for comparison)
- Weeks 2-4
 - Bad patch cable caused 30% packet loss, maiming Conferencing app
- Weeks 5-9
 - Router incompatibilities caused intermittent multicast failure (~15 minutes between failure)
- Weeks 10-12
 - Worked as expected

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2002

How to fail at a distance course

- Transmission failures
- Production quality
 - Lighting, room noise, camera management
- Structured presentations limit activity
- Classroom issues
 - Table layout, overhead positioning
- Attitudes

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Faculty Summit
2002

Student Reactions

- Repeated failures reduced students attempt to interact across sites
- Even intermittent failures had significant psychological impact
- Students recognized that we were *attempting* to do a good job (we were present in the remote classroom, and shared their pain)
- With our workarounds (high latency video, conference phone) students did not participate.
- In spite of technical difficulties many students chose to attend the remote site (commuting 15 miles in traffic being an alternative)
- Local students complained of intrusiveness of interruptions. Had little sympathy for remote students.

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ConferenceXP Project



- Full reset after Spring 2002 train wreck
- Applied lessons learned
 - Reliability of software
 - Production issues
- Re-engaged with UW PMP, Spring 2003
- Expanded to 4-way courses
 - UW, UCB, UCSD, Microsoft
- Spring 2008, UW, Microsoft, LUMS Pakistan





Distance Classes in UW CSE Master's Program

- Initial phase
 - Winter 1997 – Winter 2002
 - Polycom + Netmeeting for PPT and SmartBoard
- MSR DISC Project
 - Target: UW, CMU, UCB, Brown graduate class
 - Spring 2002
- ConferenceXP
 - Since Spring 2003
 - Four way courses, Autumn 2004, Autumn 2005, Autumn 2006
 - UW, MSR, UCB, UCSD

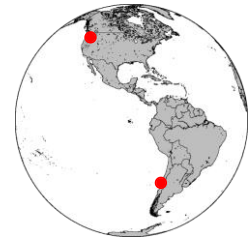


ConferenceXP

- High quality, low latency video to support interactive classes
- High bandwidth internet video conferencing
 - Internet2
 - Multicast
- Single machine deployment
 - High end PC
 - Performance limit: handling multiple high resolutions video streams
- Innovative presentation tools

Going International

- March 29, 2008, LACCIR Meeting
 - Latin American and Caribbean Collaboration for ICT Research
- Seattle and University of Chile, Santiago, Chile
 - Seminar, October 15, 2008
 - Richard Ladner /Jaime Sanchez
- CXP Unicast reflector



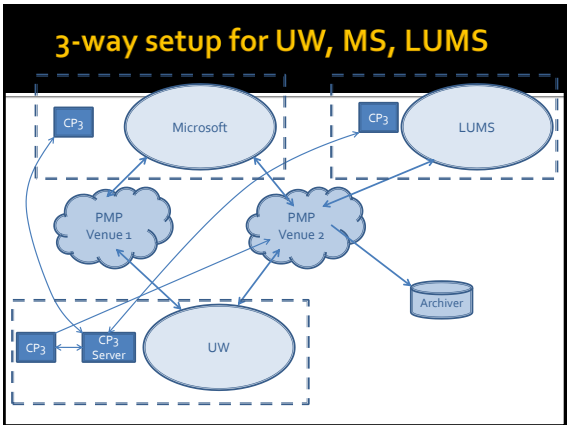
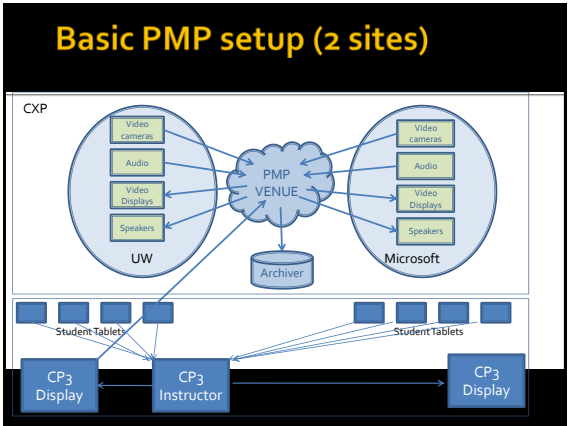
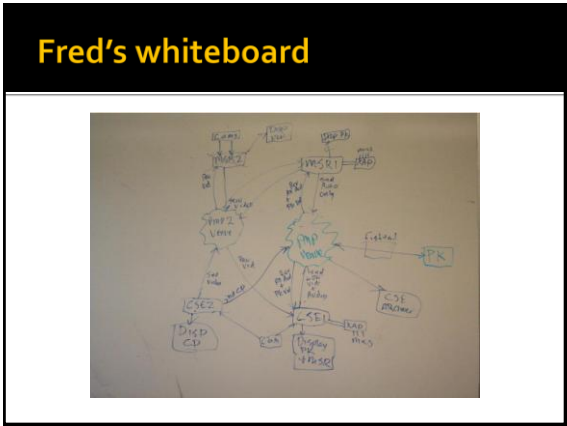
Masters class, UW - Pakistan

- Masters class
 - University of Washington
 - Lahore University of Management Science
 - Microsoft
- Computing for the Developing world



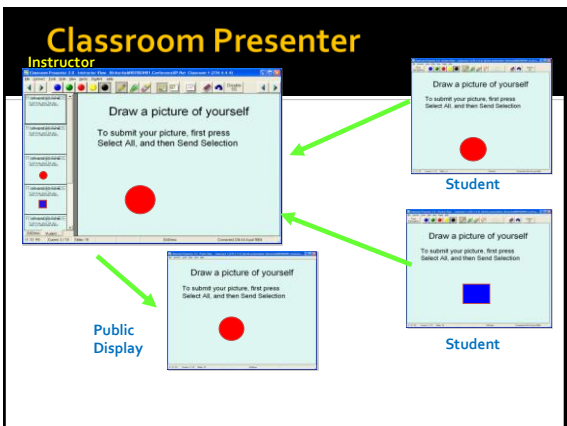
Technical Challenges

- Ensuring adequate bandwidth
 - Limited bandwidth to Pakistan
 - Reliability
 - Multicast
 - Ensuring this did not compromise UW-MS class
 - Limited time to prepare



Use of Classroom Presenter

- Tablet PC based presentation and classroom interaction system
- Ink based presentation
- Classroom Activities



Classroom Activities

SMS Applications (Homework 3)

What could go wrong?

What are the potential difficulties with a large scale PDA based survey?

- Power supply
- Usability - training may be needed
- Stops towards the technology (low technological)
- Crash can cause data loss
- Language - is local language available?
- Stealing of the device
- Maintenance - SW updates and HW repair

How has cell phone usage increased over time?

Identify three potential Kiosk applications

Rate commercial potential and social benefit

Application	Commercial Potential	Social Benefit
hairdressers	high	med
supermarkets	med	high
gas stations	low	med

Status

- Full connectivity for nine of ten weeks
 - One lecture originated from Pakistan
 - Failure occurred on UW/MSR Link
- Improving audio (microphone issues)
- Participation of students from Pakistan
 - Student submissions
 - Questions and discussions
- Multiple rounds of audio communication

Key lessons

- Participants must have incentive for a distance course
- Instructor must make an effort to create multisite interaction
- Active participants at remote site help

What we've learned from all of this

- Value of electronic materials in the process of classroom instruction
- Tools for teaching
 - Teacher and students drive the process
 - Flexible and unpredictable use
- Importance of high reliability
 - And attention to address issues
- Broader context – interplay of technology and other issues

For more information

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Acknowledgements

- Support from Microsoft Research, National Science Foundation, HP, Ford, UW CSE
- Jay Beavers, Jane Prey, Randy Hinrichs, Chris Moffatt, Jaime Puente, Lolan Song, Sailesh Chutanai, Tom Healy Jason Van Eaton, Tony Hey, Harry Shum, Paul Oka, Steve Wolfman, Ken Yasuhara, Ruth Anderson, Craig Prince, Valentin Razmov, Natalie Linnell, Krista Davis, Jonathon Su, Sara Su, Peter Davis, Tammy VanDeGriff, Joe Tront, Alon Halevy, Gaetano Borriello, Ed Lazowska, Hal Perkins, Susan Eggers, David Notkin, Andrew Whitaker, Fred Videon, Rod Prieto, Oliver Chung, Crystal Hoyer, Beth Simon, Joe Tront, Eitan Feinberg, Julia Schwarz, Jim Fridley, Tom Hinkley, Ning Li, Jing Li, Luo Jie, Jiangfeng Chen, Melody Kadenko, Julie Svendsen, Shannon Gilmore, Umar Saif, Mansoor Pervaiz, Jim Vanides

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