

TxDLA Conference, Ft Worth, March 2005

Examples of Integrating 3D Online Learning Environments into Blended Course Offerings



Greg Jones, PhD

<http://courseweb.unt.edu/gjones>

3D Online Learning Environments

- Combines
 - Context
 - Unified Communications
 - Collaborative Tools
 - Scales across the Digital Divide



Why 3D ?



- Are you worried about student satisfaction for online courses ?
- Are you worried about bandwidth ?
 - Student connection ?
 - Campus connection ?
- Are you wanting to build community ?
- Are you wanting to distribute access ?
- Do you want to continue using similar access paradigm as web-based delivery ?
- Do you want to increase feedback and interaction ?

Why is 3D more possible now?

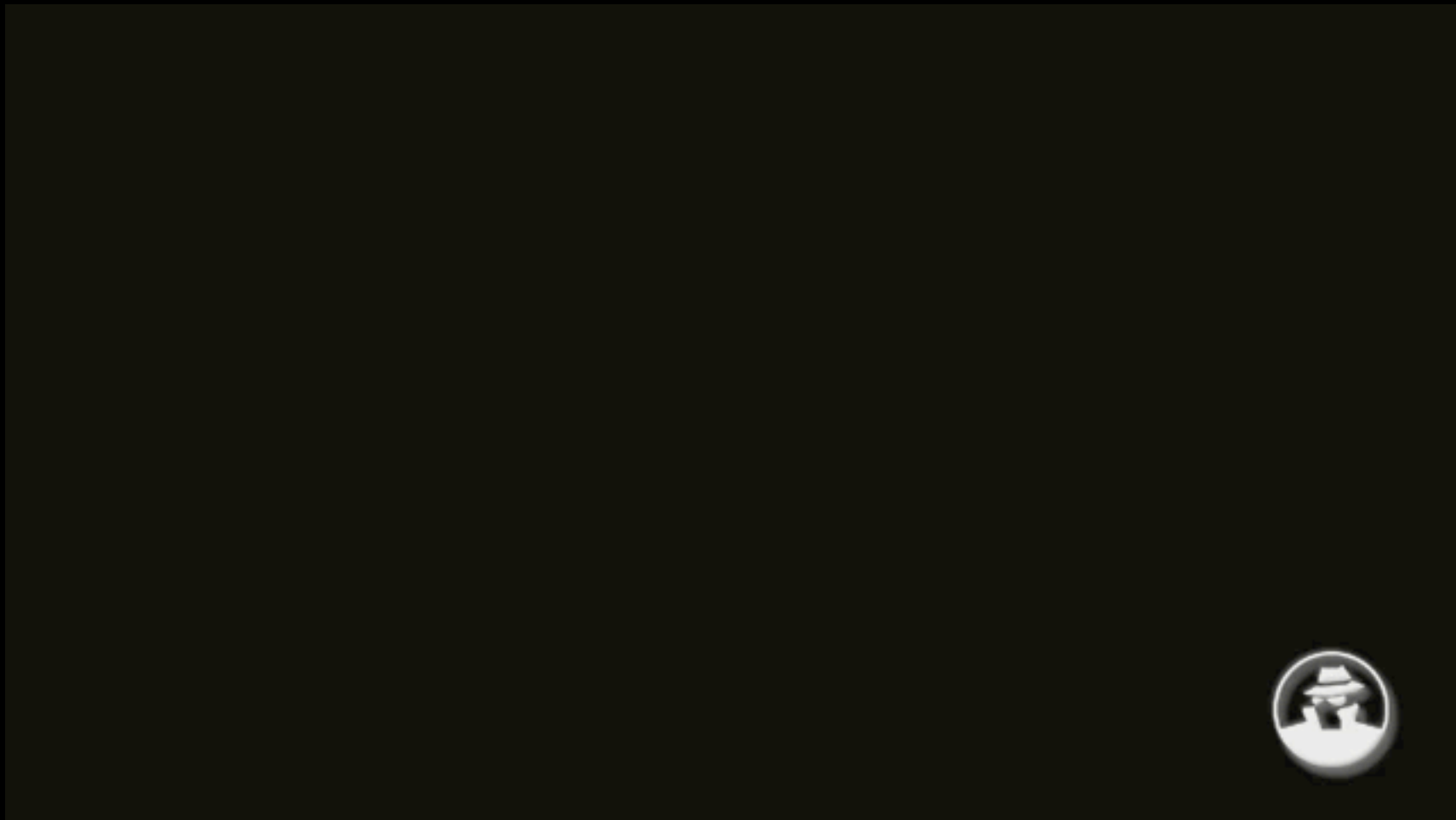
- 1999 and 2000
 - Consumer Computer Technology Plateau
- Barriers to Access begin to decline
 - Internet common and affordable
 - Personal Computer Performance
 - 3D GPU in 80% of shipped units
- We have gone from 20,000 polygon displays in 1999 to 3D scenes derived from 200million in 2004.
- Games and 3D graphics are the “new literacy” created by the availability of technology.

Entertainment Industry



- Is driving the technology development
- In 2003, video game industry sales topped \$11 billion in the U.S.
- In 2003, more than 239 million computer and video games were sold, or almost two games for every household in America.
- This impacts
 - Tools
 - Available Talent from Industry and Schools
 - Cost
 - Technology

From 1998 to 2004 Graphics



Virtual People in 2004 Graphics



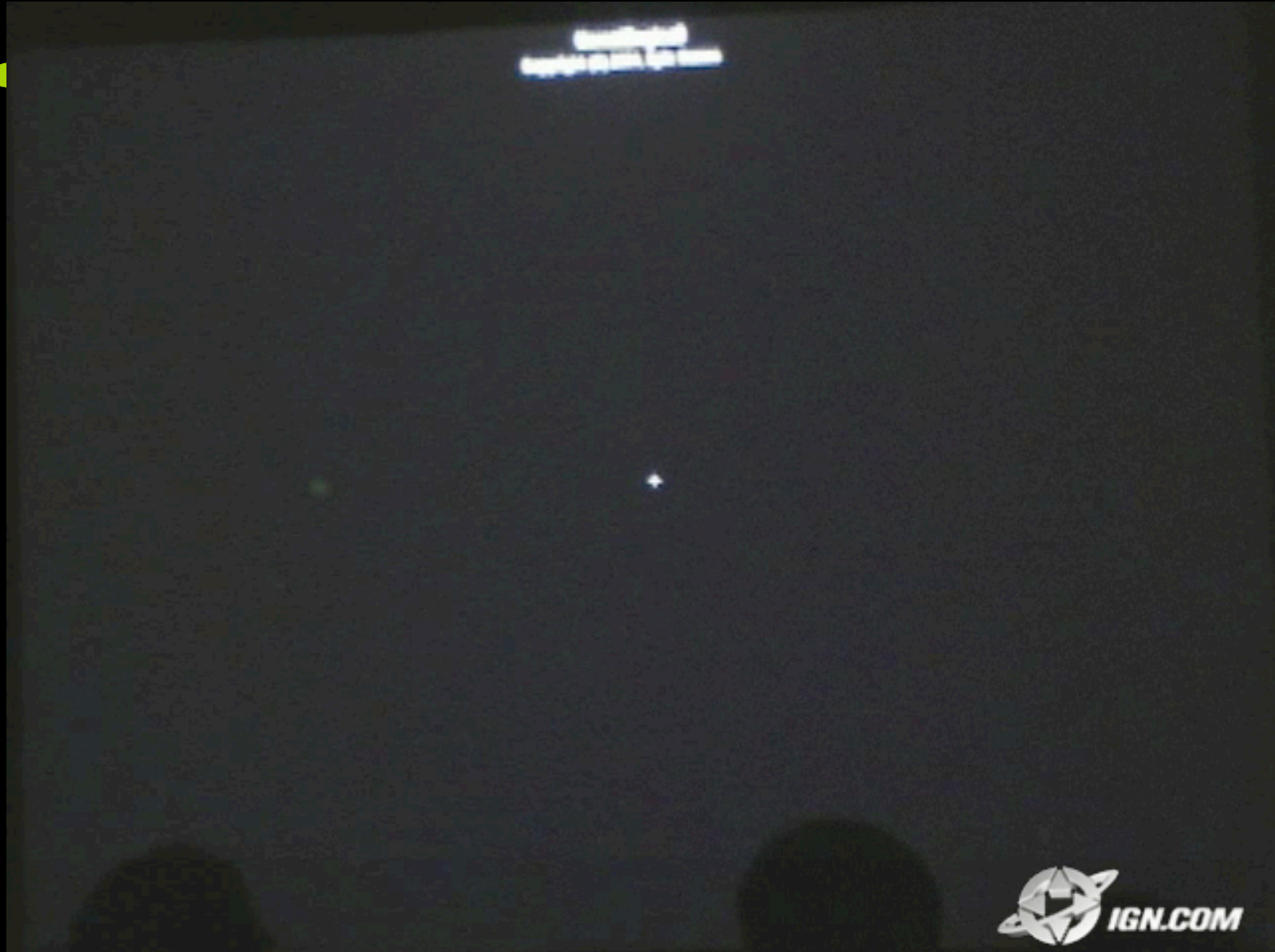
1:14

Excerpt from half-life2 demo.

Photorealistic 3D Environments



Scene and Physic Engine 2004-05



3:06

Excerpts from UnrealEngine3 & Halfife 2.

CRG 3D Visual eXplorer Interactive



- Portal-based 3D environment that was created to support distributed learning.
 - Provides for just-in-time transmission of visual data
 - Unlike a game doesn't depend on all the data to be present at run-time.
 - Controls data by location context
 - Support audio and other interactions
 - Support 1999-2000 graphics
- UNT, Univ of Hawaii, NIME, and others have been pilot testing the software for distributed courses.
- NASA MGS MOLA project incorporated into the system (97% of mars)

Some examples of published uses



- Appalachian State Univ
- University of Houston
- Arcada, Finland
- University of North Texas
- Harvard
- MIT CMS
- More....

Appalachian State University



- **College of Education**
- Appedtec provides a place for students in the Instructional Technology program at Appalachian State University to learn about building worlds and their use in learning settings. Students may build an area for delivering a course or may take a course in Appedtec. In addition, master's and doctoral degree students are afforded an opportunity to study the use of such environments in learning settings.

University of Houston



- Writing Center
- Presented last year at TxDLA
- A pilot course using a MUVE was conducted fall semester, 2003, and continued in spring 2004.
- Course provides instruction in human resource management / business writing and was developed specifically for hospitality industry majors.
- It helps students see and present themselves more clearly as valuable employees.

Arcada Polytechnic, Helsinki, Finland



- Flash based system
- Marketing related classes
- Showed improved student interaction
- System didn't scale well - so
 - They did models
 - They are working towards another system

University of North Texas

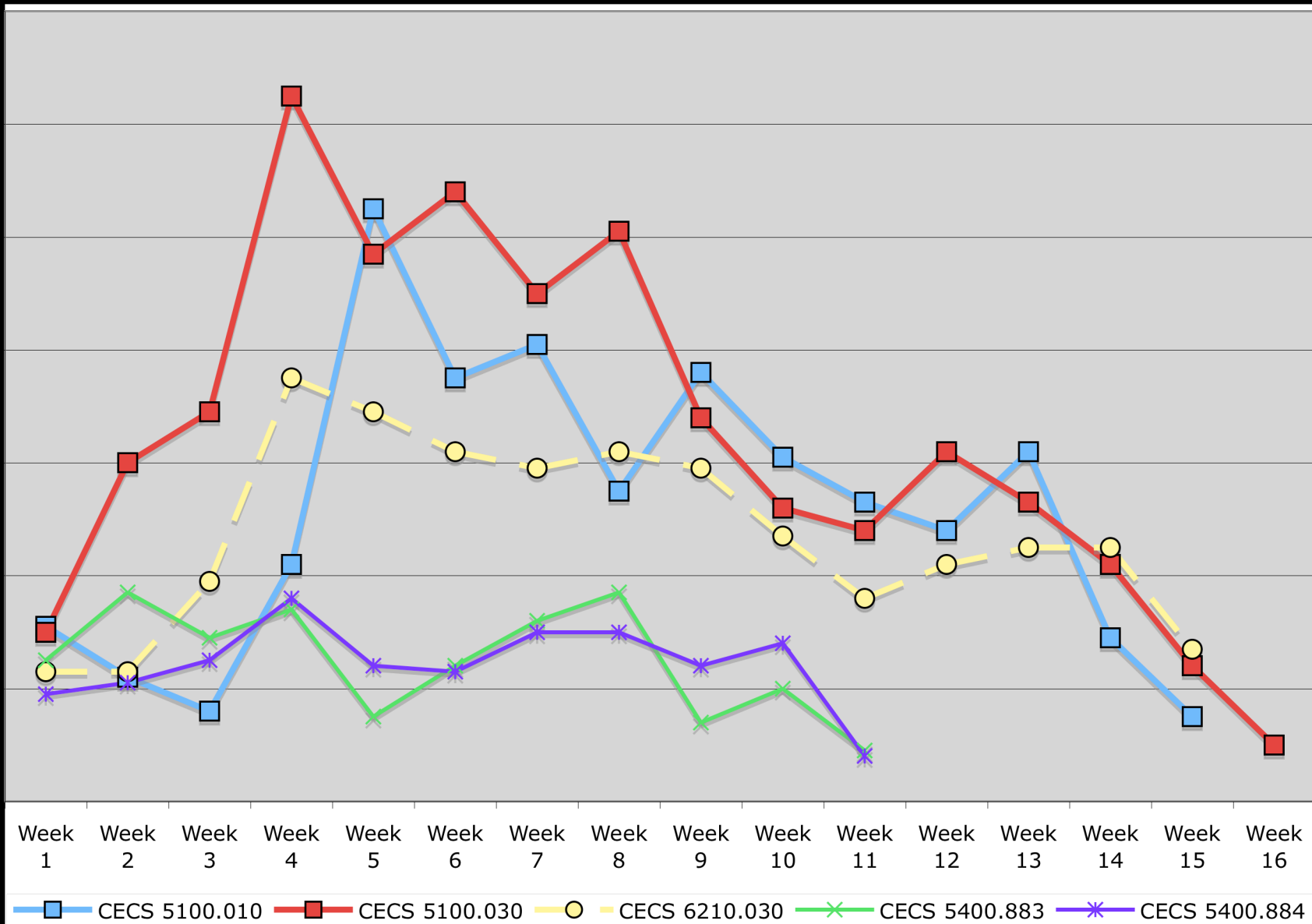


- CRG 3D Distributed Learning
- Masters and Doctoral Courses in Technology and Cognition
- Research across multiple areas
 - Attitude Towards
 - Interactions
 - Discourse Analysis
 - Theory

Examining Attitudes Toward Information Technology between Students in Internet-based 3D and Face-to-Face Classroom Instruction

- Fall 2003
- CECS 4100
- 3 sections 3D (treatment), 9 sections face-to-face (control)
- Pre-Post Test using IITTL Instrument
 - “Instruments for Assessing Attitudes Toward Information Technology”
- Discussion
 - Students in 3D paralleled students in face-to-face
 - Students felt the 3D system was like meeting face-to-face
 - Narrowed this down to interaction and feedback

Discourse Scaffolding - Accelerating Discourse



Consumer Technology Lag

Introduction

Widescale Adoption

- 1999 → 2003-2004
 - 3D Graphics Acceleration
 - $\approx 50,000$ +/- polygons
- 2002 → 2006-2007
 - Pixel and Vertex Shaders
 - $\approx 500,000$ +/- polygon
- 2004 → 2007-2009?
 - Normal Maps
 - 1+million polygons

Interaction and Collaboration 3D



- ✓ Capture, Creation, and other means of creating Environments and Interaction will get cheaper and easier
- ✓ Current Web-browser design is not the solution
- ✓ Game Engines provide a partial solution, but they don't scale well.

Old Barriers Gone, New Barriers Emerge



- Old Barriers
 - Graphics Card
 - Internet Access
 - Computer Performance
- New Barriers
 - Content
 - Capture, Storage, Presentation
 - Investment
 - Few Standards and changing standards
 - Content Creation Expensive
 - Content Interoperability and Migration Issues

Parthenon - Siggraph 04

- USC film project that combines scans from different locations to create a new integrated model



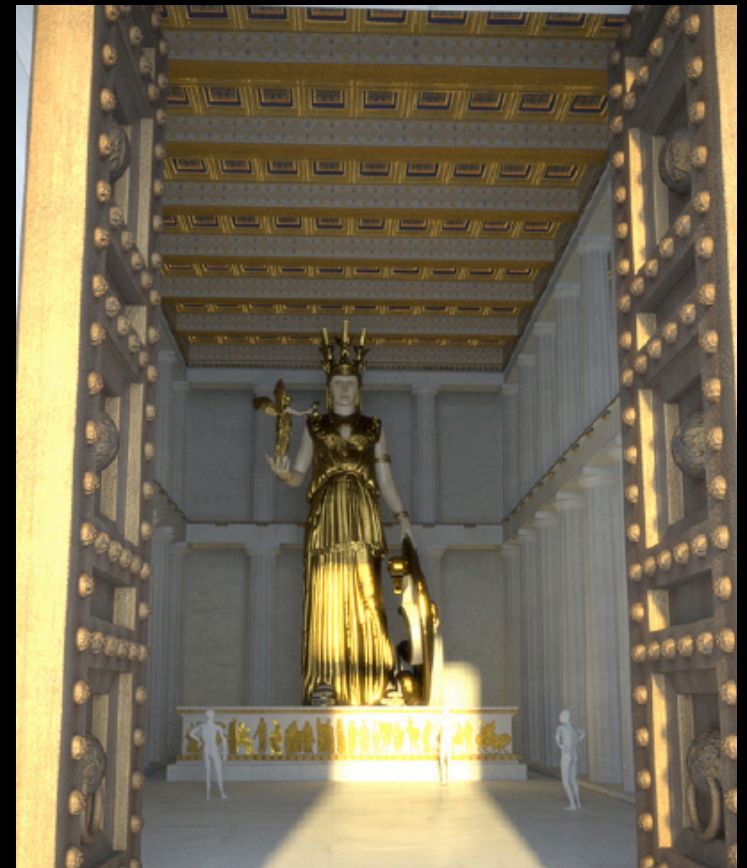
Parthenon

- 3D Model of the British Museum and sculptures from the Parthenon's East Pediment



Parthenon: Rebuilt

- The Frieze of the Ancient Parthenon, and the Cella of the Ancient Parthenon with the Statue of Athena



Parthenon: Scanning Outside



3rd Tech



3rd Tech



So -- where do we find ourselves?

- For wide scale deployment and adoption means using 1999-2000 technology
- Thus:
 - Low-Res environments (<75,000 polys)
 - Limited texture buffer
 - Limited data transfer between CPU and GPU
- However, this does not meet current needs:
 - Scans are creating millions of polys minimum
 - Kids and young adults are expecting current graphic expectations

The Potentials (“Serious Games”)

- I believe the real power of 3D online interfaces is in the creation of virtual spaces for interaction and collaboration.
 - Training and Online Sync / Async Courses
 - Situated Learning, Complex Systems, Community
 - Museums
 - Allows anyone to visit the museum
 - Libraries
 - Visual interface potential, Community
 - Law Enforcement
 - Simulate and Integrate Data
 - Tourism
 - Simulate
 - etc

More Standards Needed



- Objects and Textures
 - VRML (old)
 - X3D
 - COLLADA
 - All XML based, which are good for storage, not good for transmission
- Interactions
 - No real standards
 - This means
 - limited portability for more complex environments
 - Increased hesitance of potential implementers

The Future



- By 2005-2006 we should begin to see most users with pixel and vertex shaders
- More tools and open source scene renderers
- By 2008-2009 we should begin to see user with normal map capability
- Content creation will continue to get cheaper and simpler to use
- Interest in “serious games” will continue to grow and fund pilot-projects to show potential

Contact Information



Dr. Greg Jones

Dept. of Technology and Cognition

University of North Texas

gjones @ unt.edu

[http:// courseweb.unt.edu](http://courseweb.unt.edu)

Created Realities Group

[http:// created-realities.com](http://created-realities.com)