Project Wonderland in Immersive Education

PA-SIG
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Motivation

- Sun's workforce has reached a tipping point
  - On any given day, over 50% of employees are remote (even more on Fridays)
  - Everyone works remote, even in the office!
  - Up until now, remote work has been a choice

- Problems
  - Social Interaction
  - Remote Management
  - Brainstorming

- Current technologies lacking
Why a Virtual World?

- Truly informal conversations
  - Multiple, simultaneous
  - Divide and converge
  - Spontaneous = social
- Space provides context
- Capturing “back-channel” cues
- High emotional and social bandwidth
- 3-D natural for sharing
- Allows employees to confide in managers, people to establish trusting relationship, a place for extroverts to thrive
Second Life Experiment

• Compelling experience
  > Serendipitous encounters
  > Received help from strangers
  > Sense of presence was strong, but not complete

• Drawbacks
  > Lack of audio
  > SL names plus fanciful avatars made it impossible to tell who was who
  > Social experiences possible, but no way to do real work
  > Scripting allowed for only limited extensibility
  > Security
Demo Video
MPK20 - Sun's Virtual Workplace
What is Project Wonderland?

Project Wonderland is a toolkit for creating collaborative 3-D virtual worlds. Within those worlds, users can communicate with high-fidelity, immersive audio, and can share live applications such as web browsers, open office documents, social applications and games.
Wonderland Features

• High-fidelity, immersive stereo audio
• Application sharing in 3D world
• Enterprise Integration & Security
• Intellectual Property Rights
• Open source, Java-based, highly extensible
Sun Virtual Worlds Software Stack

**World**

- **MPK20: Sun's Virtual Workplace (Sample World)**
  - World customized to support Sun's distributed workforce
  - Includes applications for sharing and collaboration

**Client**

- **Project Wonderland**
  - Open source Java 3D-based graphics engine
  - Manages world, animation, and avatars
  - Supports app sharing (initially Java and X apps)
  - Extensible and customizable worlds

**Server**

- **Project Darkstar**
  - Open source communication and app framework
  - Targeted at games
  - Highly scalable
  - Handles persistence
  - Allows extensible set of core services

**SunSPOT**

**Java Voice Bridge**
How the World Works?

- The world is divided into discreet volumes called “cells”
  - Cells are nested into a tree structure
  - Very similar to a scene graph (but not quite)
  - Cell tree divides scene graph into network sized chunks
Darkstar Architecture

• Tier 1: Communications Layer
  > Publish/subscribe channels and direct client/server packets
  > Analogous to the “edge tier”

• Tier 2: Execution Kernel
  > Executes “tasks” in response to “events”
  > Analogous to a J2EE application server

• Tier 3: Object Store
  > Lightening fast, highly scalable access to persistent objects
  > Analogous to the DB tier
Open Source

• Source Code
  > CVS Repository
  > Parallel Development Model

• Multi-Platform Binaries
  > Windows, Mac OSX, Linux, Solaris

• GPL v2 license

• Java 6

• IDE Toolsets
  > Netbeans, Eclipse
  > BlueJ, Greenfoot, Alice
Open Content

- Open Art Path
- Use existing tools:
  - Commercial:
    - Maya, Photoshop, 3D Studio, Poseur, etc.
  - Free:
    - Blender, Gimp, Sketchup
- Open standard file formats
  - X3D
  - Collada
- Art served from standard web server
- Digital repository integration
Technical Requirements

• “Modern game hardware”
• 3D accelerated graphics
  > 128MB video memory
  > ATI or nVIDIA
• ~1GB RAM
• Linux, Windows, Mac, Solaris
• Dual-core/Quad-core AMD servers for hosting
• Java 6
• Scales up or down
Wonderland Status

- Active open source community
- “Small Workgroup Release” > 15-20 Simultaneous Avatars
- Scaling to 200 avatars by 1.0 release (Spring/09)
- Pilots and Proof-of-Concepts Underway
- Getting started: [http://wonderland.dev.java.net/](http://wonderland.dev.java.net/)
What's Next?

• More focus on Mixed-Reality
• Create adaptable spaces by breaking the laws of physics and fixed geometry
• Graceful adaptation to less capable devices
• Add sensor-based gesture recognition
SunSPOT

- Sun Small Programmable Object Technology
  > Real-time Wireless Sensors
- Data Visualization
- Motion Capture (“Wii”) 
- Wonderland Integration
- Open Source JVM (Project Squawk)
Interest in Virtual Worlds

- Significant interest in “business grade” virtual worlds, social networking and simulation systems
  > Internal collaboration
  > Training
  > On-boarding
  > Shared Simulations
  > Virtual Labs
  > Distance education
  > Data Visualization
  > Motion Capture
Our Vision

• Real work accomplished in the Virtual World
• 3-D Web = Open federation of virtual worlds
• Free and Open Source
• International collaboration of universities, colleges, research institutes, consortia and companies

• Building cross-platform “Education Grid” for virtual reality and game-based learning

• Sun's Project Wonderland and Project Darkstar accepted platforms (Advisory Board)

• Ford Foundation Grant, $1.2M, open curriculum initiative for STEM

• http://www.ImmersiveEducation.org/
• Saint Paul College - Sun's First Center-of-Excellence for Open Virtual Worlds
• Project to build an educational metaverse for Minnesota State Colleges & Universities
• Being done in parallel with efforts underway at other colleges and universities about the world
• Government Funding Recruited to support program
• MiRTLE Trial site
• Developer Support and Documentation
  http://virtualnorthstar.org/
MiRTLE Project

- Mixed Reality Teaching & Learning Environment
- Virtual classroom for a combination of local and remote students in a traditional instructive higher education setting.
- Augments existing teaching practice with the ability to foster a sense of community amongst remote students, and between remote and co-located locations
- Demonstrate at World Exposition, Shanghai, 2010

http://youtube.com/watch?v=Yq7XiW4XTd0
Modesto City Schools

- VirtuED Project
- First K-12 Wonderland Pilot Project
  - PacrimX International language exchange program with Japan
  - Pilot with Stanislaus County School District
  - California budget crisis – Enabling teachers to reach rural school affected by program cuts
  - Second Life not suitable for kids, potential litigation
  - Private Infrastructure
Open Virtual Worlds Project

Sparkling innovative learning & creativity
A collaboration between The Center for Advanced Technology in Education (CATE) at The University of Oregon, Sun Microsystems, and MERLOT to create a virtual commons for teacher tools and best practices for search, authoring and instructional delivery in Wonderland

http://teachingcommons.cdl.edu/clive/index.html
What’s Happening!

- Barriers to social networks, games and computers approaching zero
- Multi-mode communication
- Kids are finding their own voice through games and social networking sites and at ease with technology
- Drivers of new technology adoption are 5-14 years old
- Gamer Generation
Games & Culture

- Games are part of every culture
- Forces lateral thinking
- Engaging mechanics
- Thrill of competition
- Peer Review
- No fear of failure
- Human need to play with others
- Social Learning Pedagogy
Just Ask the Students

- Games make it easier to understand difficult concepts – 51%
- I would be more engaged in the subject – 50%
- I would learn more about the subject – 46%  
  > (56% of students in K-12 chose this as their #1 reason)
- It would be more interesting to practice problems – 44%

Speak Up 2007 for Students, Teachers, Parents & School Leaders
Selected National Findings - April 8, 2008
Or the Teachers

- Increasingly teachers are becoming interested in use of games
  > to increase student engagement (65%)
  > address different learning styles (65%)
  > focus on student-centered learning (47%)
  > develop problem solving and critical thinking skills (40%).
- No differentiation based upon gender, teaching assignment, years of experience or education level
- Only 6% of teachers do not see any value in even exploring gaming within education
- Over 50% of teachers said they would be interested in learning more about integrating gaming technologies into teaching strategies
- 46% would be interested in professional development
- 11% said that they are currently incorporating some gaming into their instruction
Traditional Learning Systems

- Falling behind
- Can’t compete with the onslaught of rich media consumer services
- Not easily adaptable
- Limited to zero room for creativity
- Limited to 2-D page-based metaphor
- Poor entry-point to learning
- Patent battle stifling innovation
Wonderland & The Global Digital Library

- Experiment as collaborative 3-D space for PA-SIG meetings
- Build interface to Shared Digital Collections
- Research on Search, Discovery, Metadata and Preservation of Virtual World Content
- Bridging Access and Digital Collections and Exhibitions
Meeting Global Demand

- Global Education Market - $2.5T
- Private Higher Ed > $400B
- Student Numbers – 115M
  > Rising 15% per annum
- Lifelong Learning
  > 40% undergrads > 25
  > 65% Singapore Private Higher Ed > 25
- e-Learning as National Priority
  > E.g. Open University UK, USA Internet 2, CERNET China
- Every learning option must be explored!
• Educational Applications
• Open Content
• Open Curriculum
• Best Practices
• Industry Partnerships
• Enterprise Integration

http://sun-isig.org/
Thank you