Project Wonderland in the Age of Immersive Education

Sun Microsystems, Inc.
Immersive Education Initiative, Media Grid
November 2009

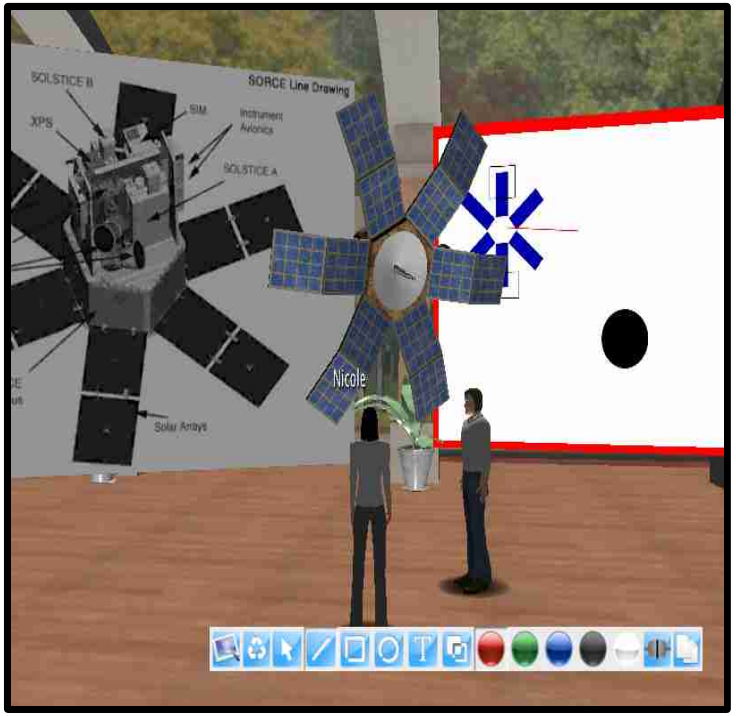
Agenda

- Introduction
- Project Wonderland Overview
  - Nicole Yankelovich, Principle Investigator, Collaborative Technologies, SunLabs
- Wonderland v0.5 Technical Overview
  - Jonathan Kaplan, Architect, Project Wonderland, SunLabs
- Wonderland and the Immersive Education Initiative – Aaron Walsh, Director, Grid Institute, Media Grid and Immersive Education Initiative
- Close

Introduction to Project Wonderland

Nicole Yankelovich
Principle Investigator
SunLabs

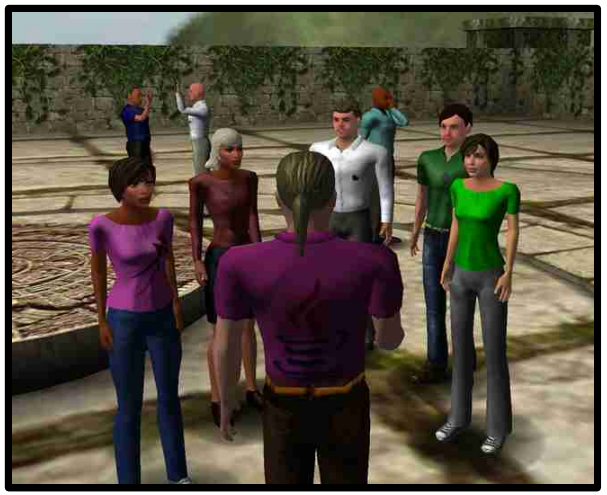
Motivation



- Highly distributed workforce
  - ~11% home-based employees
  - On any given day over 50% work remotely
- Immersion enhances business and edu collaboration
  - Multiple simultaneous conversations crucial for informal interaction
  - High emotional / social bandwidth increases sense of presence
  - 3D space provides context and helps define culture
  - Collaboration is the norm

Reasons to do a Virtual World Project

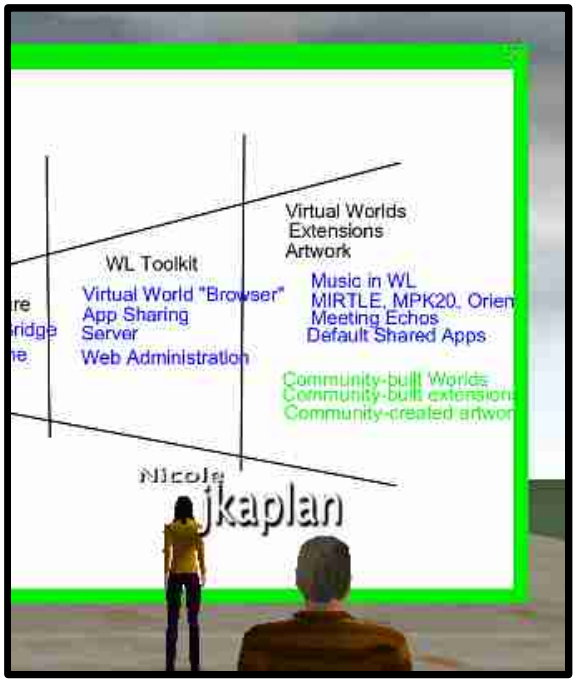
- Involves collaboration
  - Students / teachers are distributed
  - Requires remote communication
    - Family, students in other cultures, experts



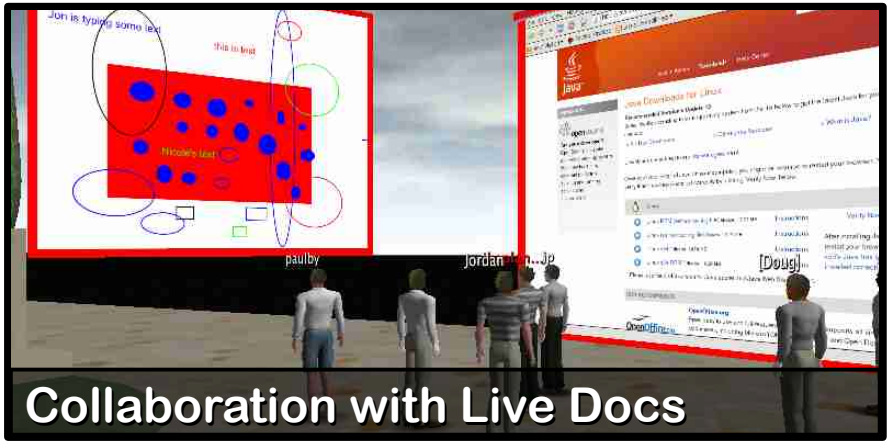
- Compelling need for 3D
  - Multi-dimensional data to visualize
  - Learning topic involves 3D
    - E.g., imagining future cities, inventing new devices
    - E.g, simulations of real-life objects (satellites, lab equipment,...)
- Want to rehearse skills in realistic context
  - Language learning, public speaking, negotiation, ...

What is Project Wonderland?

100% Java, free, open-source toolkit for creating 3D immersive virtual worlds

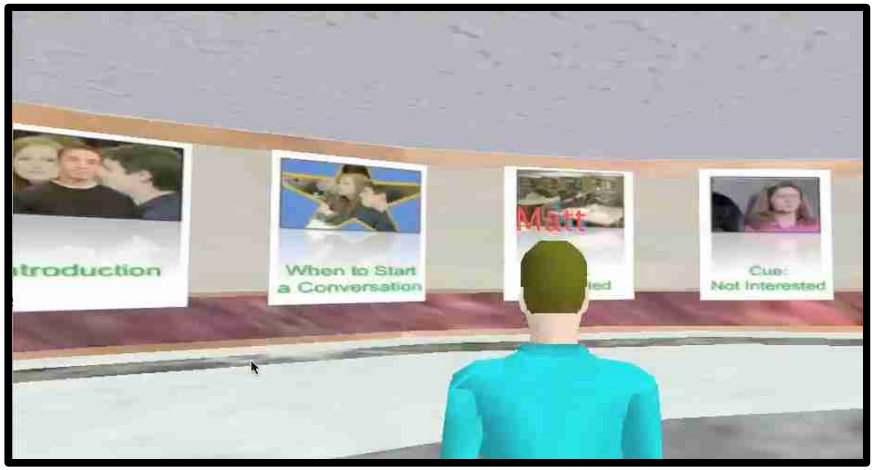


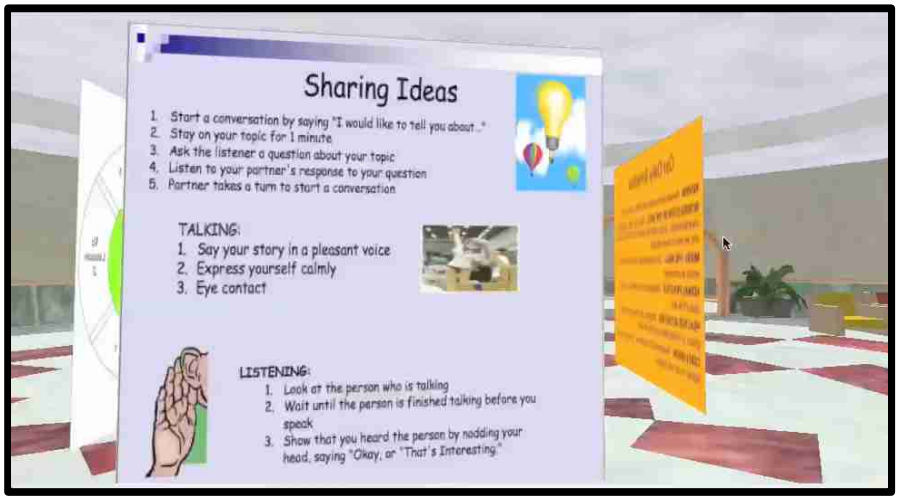
Use the Toolkit to Build Worlds for...



MiRTLE – University of Essex

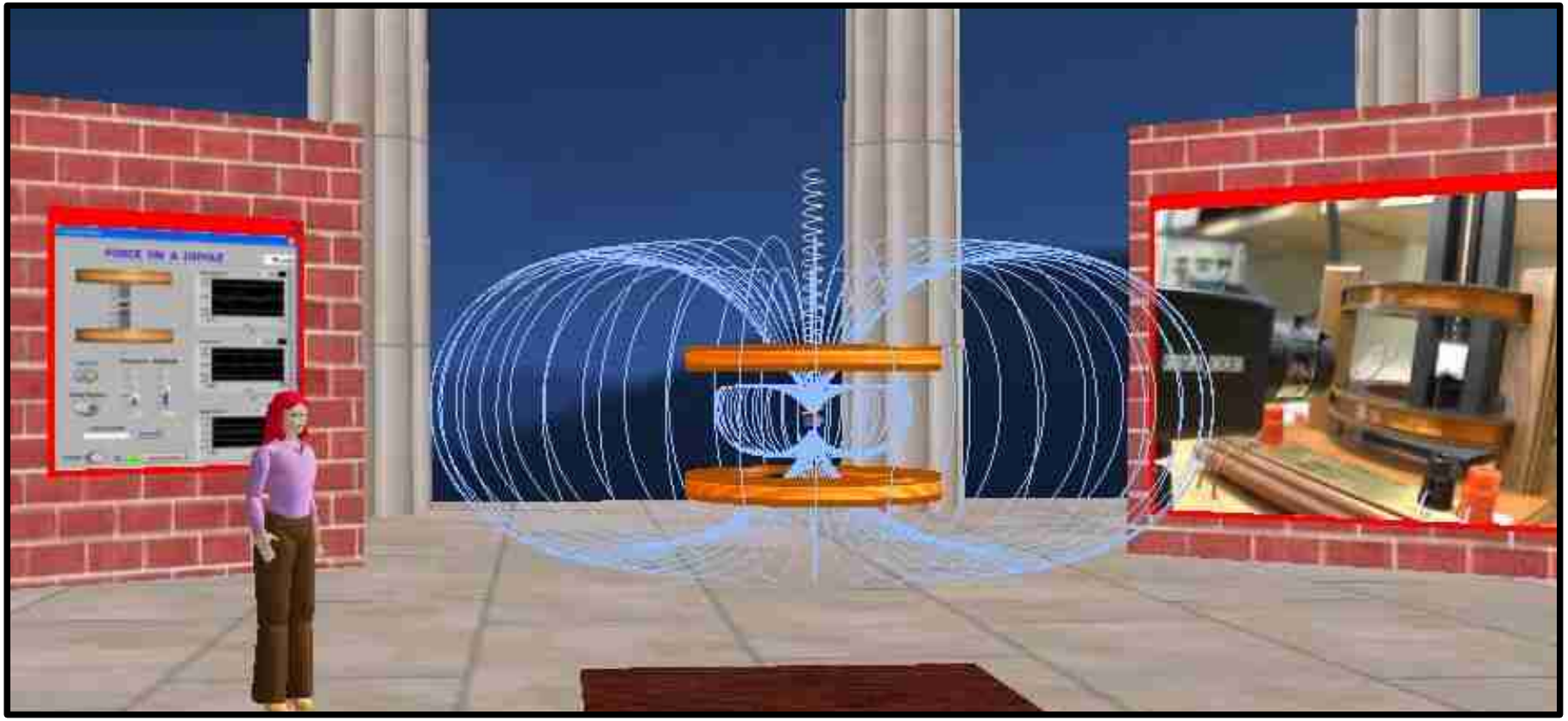
iSocial – University of Missouri





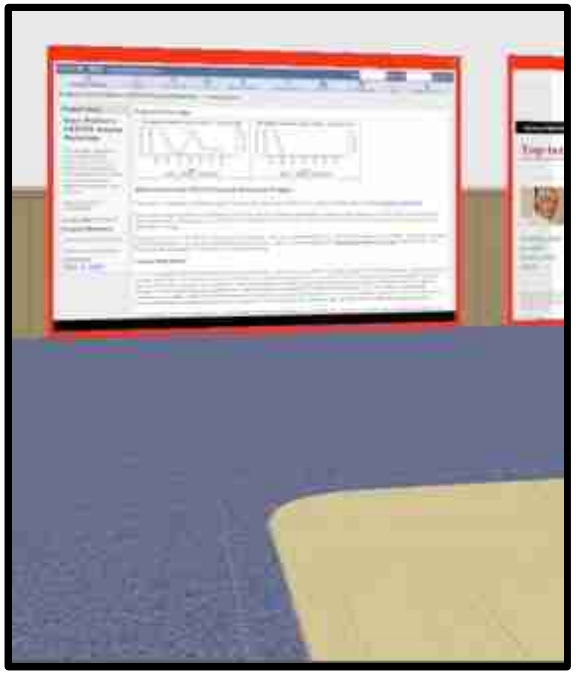
Virtual Academy - VEGA

Force on a Dipole - MIT

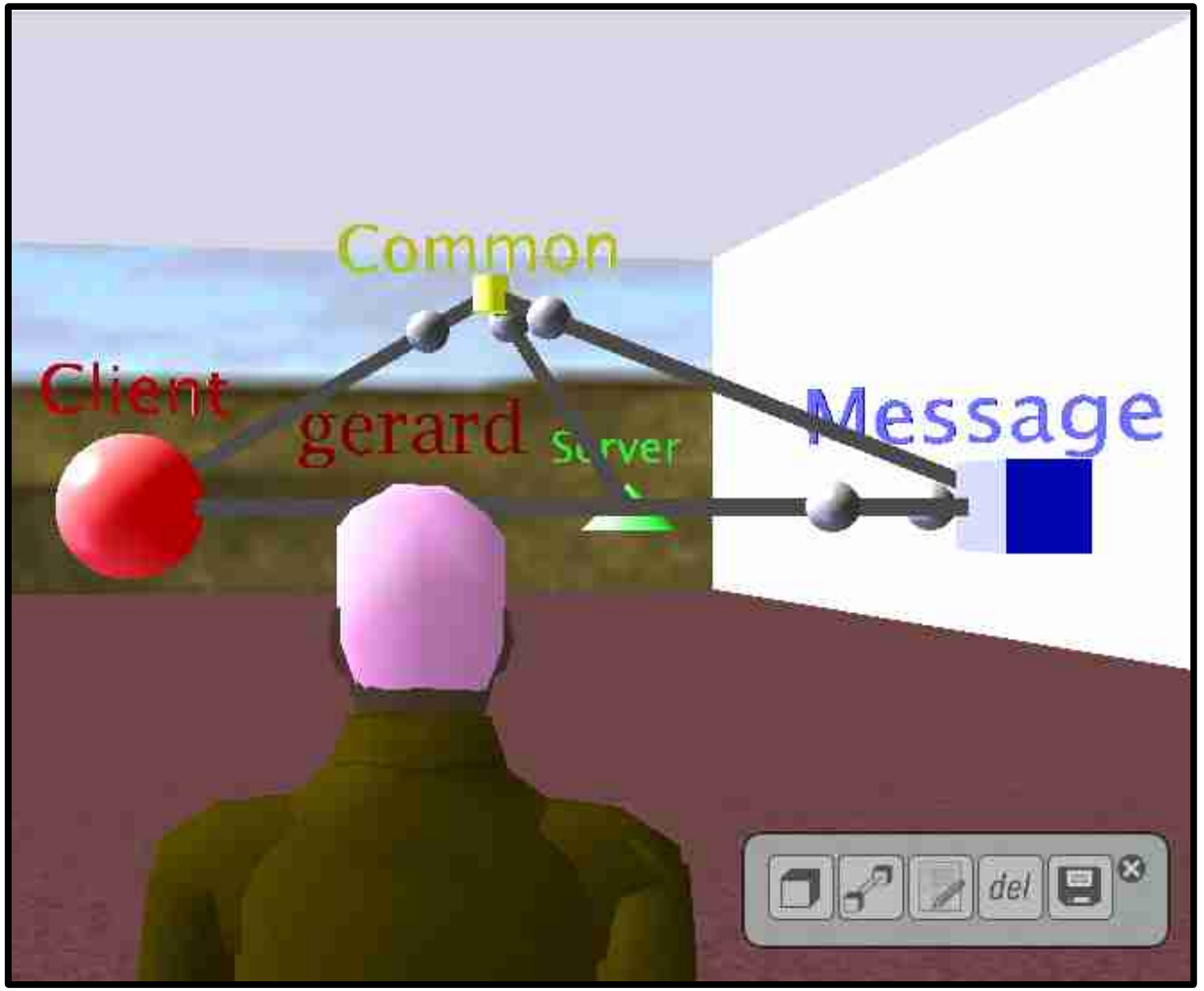


Presentation Space – MIT Media Lab

Engineering Team Room
Worcester Polytechnic Institute (WPI)

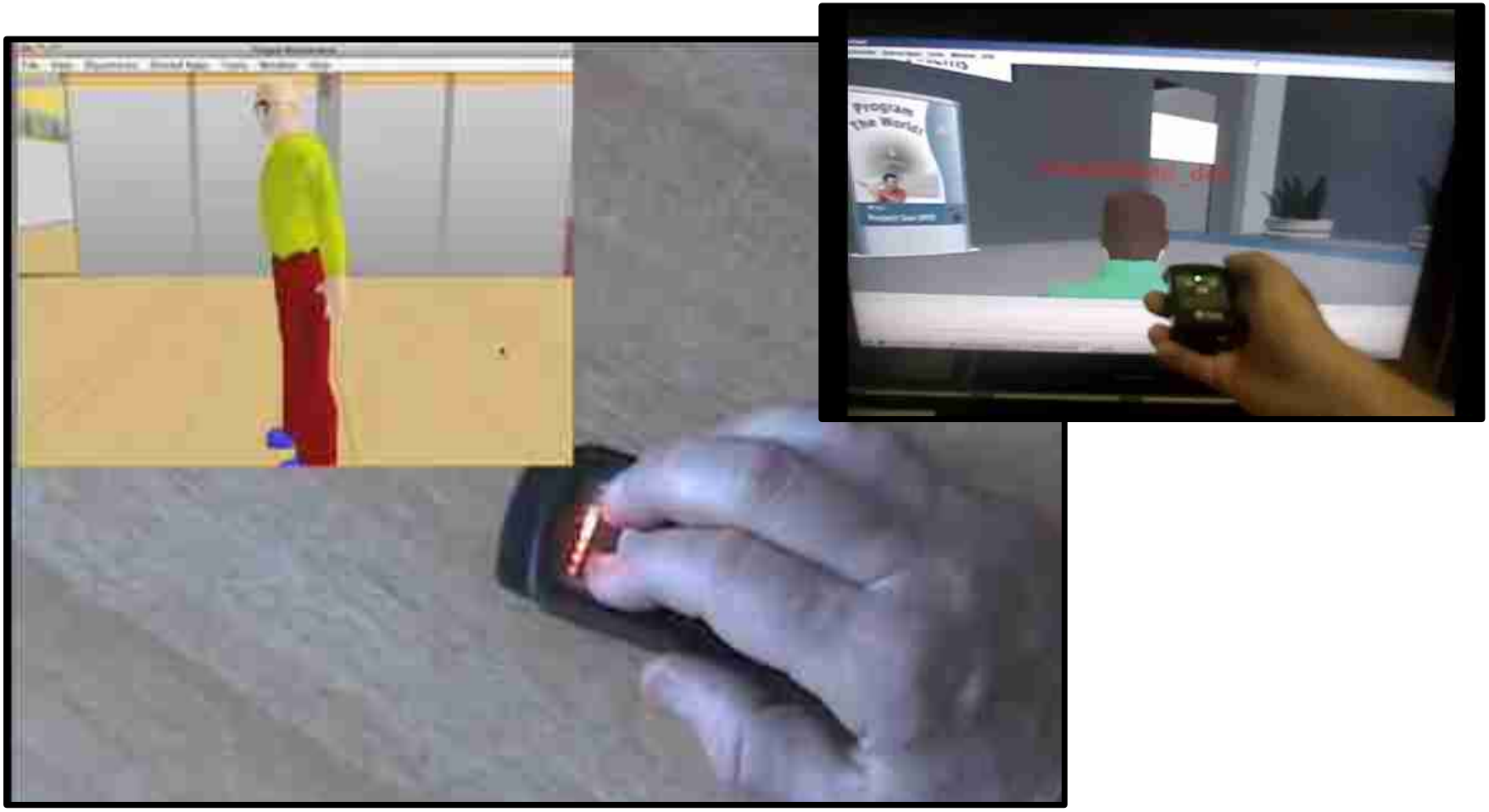


HTML Viewer

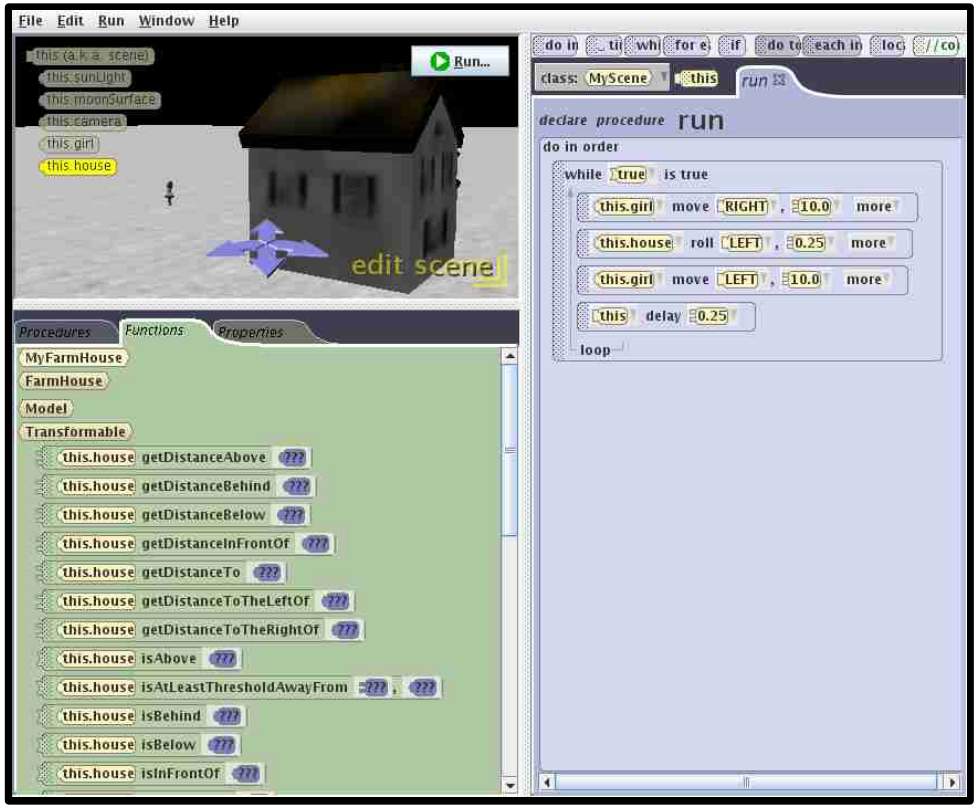


WonderBlocks

Sapienza University / Sun
Controlling Wonderland Worlds with Sun SPOTS



Alice Integration – Stanford / CMU / Sun



Virtual Worlds
Other Educational Uses

- Computer Science education
  - Virtual worlds provide motivating environment to learn computer programming
- Creative Expression
  - Construct or modify virtual worlds
- Enrichment
  - Explore 3D visualizations
  - Interact with students from other schools, other cultures

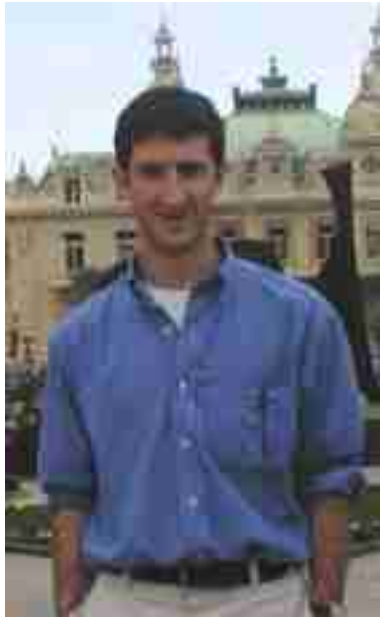
Hello Amigo – US / Chile

Vision

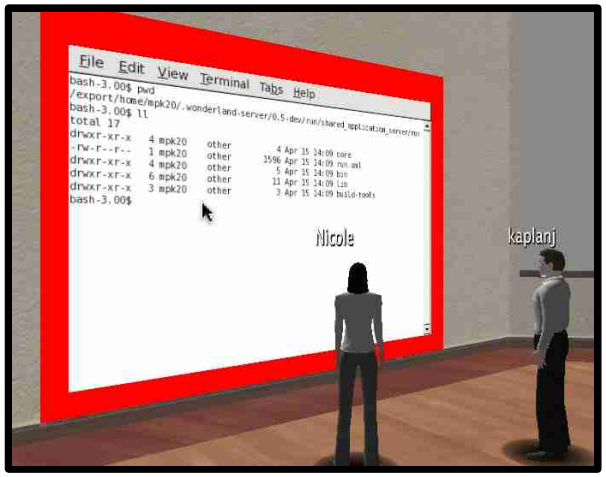
- 3D Web
  - > Federated, specialized virtual worlds
  - > Common way to express behavior across platforms (Java mobile code)

Project Wonderland Technical Overview, v0.5

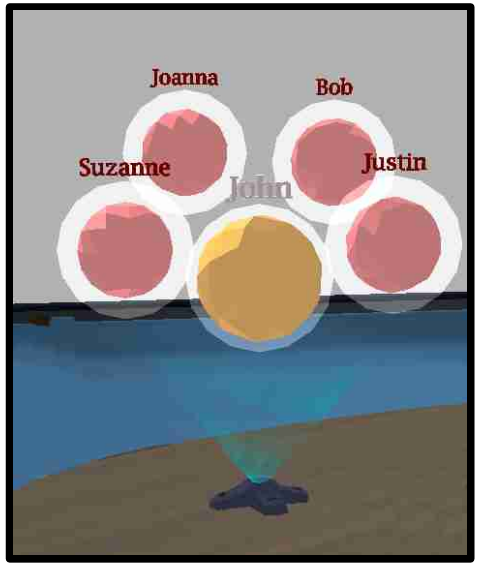
Jonathan Kaplan
Software Engineer
Project Wonderland
SunLabs



Wonderland Core Features



- Application Sharing
  - > Unmodified X11 application and collaboration-aware Java applications
- Immersive Audio
  - > Includes mix of recorded and live audio, range of audio fidelities, individual volume control, audio recording, and audio applications such as the virtual microphone and cone-of-silence
- Telephone Integration
  - > Includes dial-in, dial out, and connecting avatars with telephone audio



Wonderland Architecture, v0.5

Client

- Designed as browser for Wonderland worlds
- Each world has different content and behavior
- Client downloads content and code when connecting to a server

Server

- Set of independent applications managed by a web server
  - External Processes
  - World Assets
  - Module-based Extensibility
  - Security
- Federated - "Web-server model"

Darkstar Server

Voice Bridge

Shared App Server

Chat Server

External Services

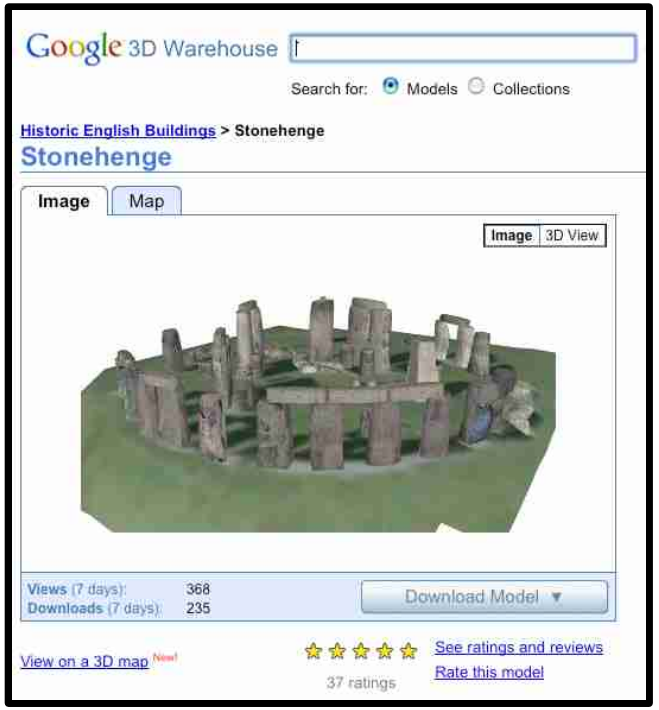
- Identity services
- Asset repositories
- Real-time telemetry
- Hosting / world management

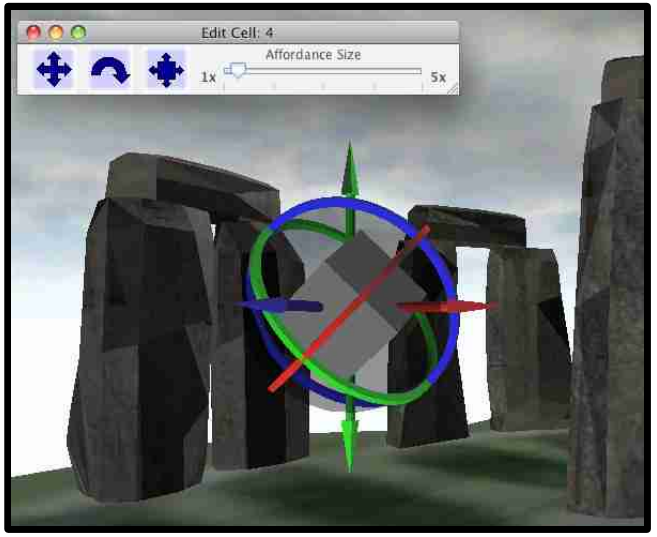
Advanced Graphics and Avatars

- MTGame Graphics System
  - > Based on jME (jMonkeyEngine)
  - > Adds threading and process model
- Avatar System
  - > Bone models
  - > Skinning
  - > Customizable animations (requires Maya)
  - > Limited posing

3D World Assembly

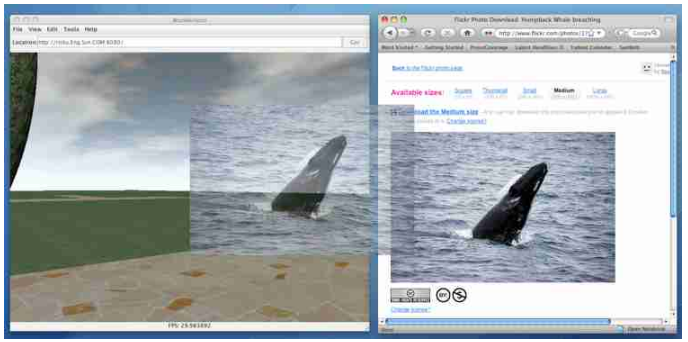
- Open art path for 3D
  - > Import Collada 3D models
  - > Uses industry-standard tools
    - Photoshop, GIMP
    - SketchUp, Maya, Blender
  - > Direct import of .kmz models created with Google SketchUp
- Move, resize, and scale objects using in-world tools

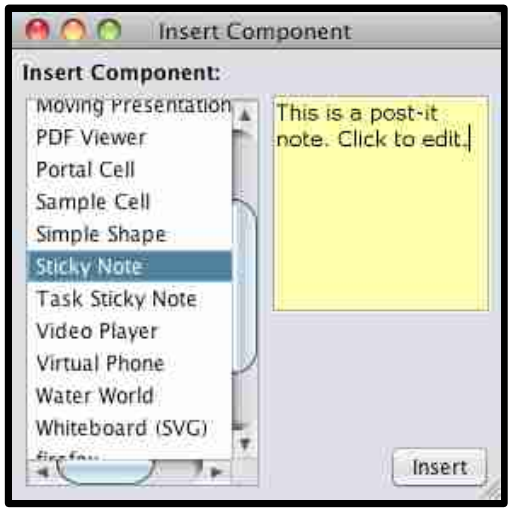




Content Creation

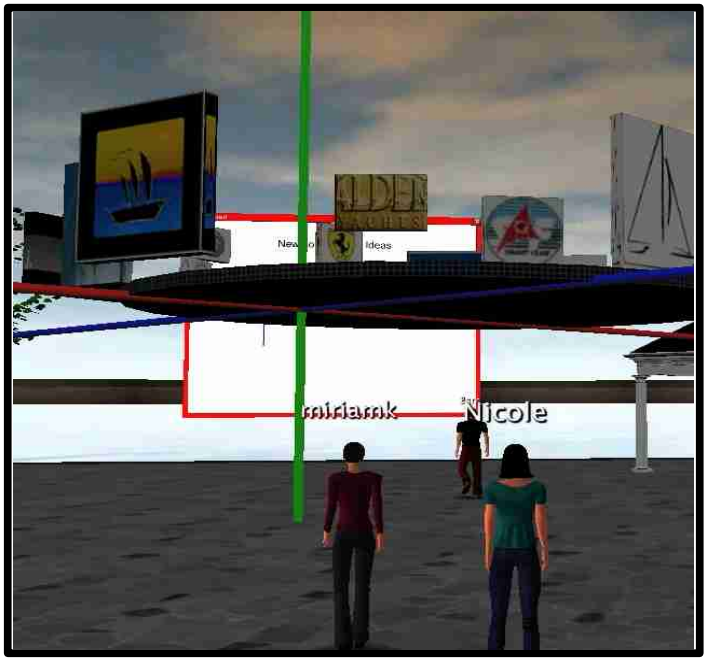
- Drag-and-Drop
  - > Mime-type scheme
  - > Application launches on drop
- Dynamically add interactive content using insert dialog





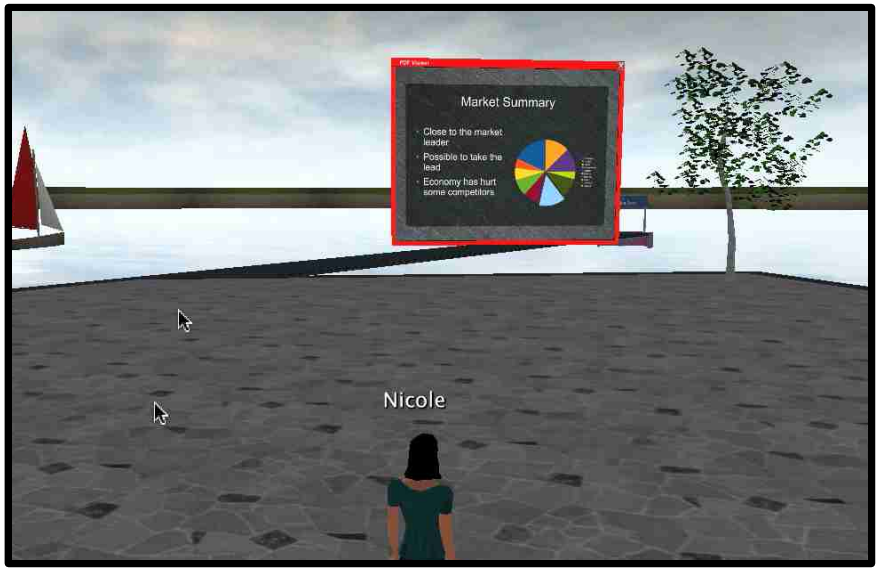
Capabilities

- General functionality that can be applied to multiple types of objects
- Examples
  - > Audio, Cone of Silence, Portal, Security, Container

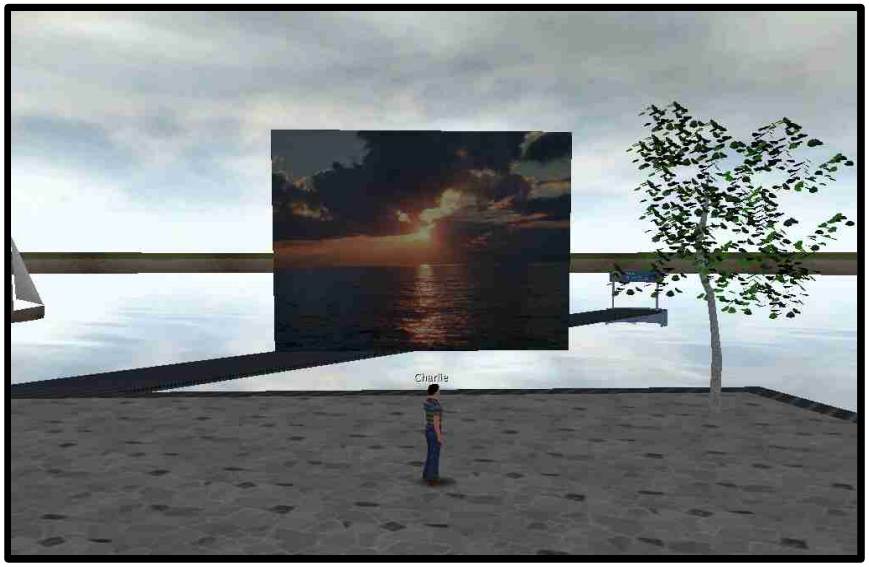


Security

- Authentication
  - > Database, LDAP, *SSO*
- Object-level security
- Cone of Silence



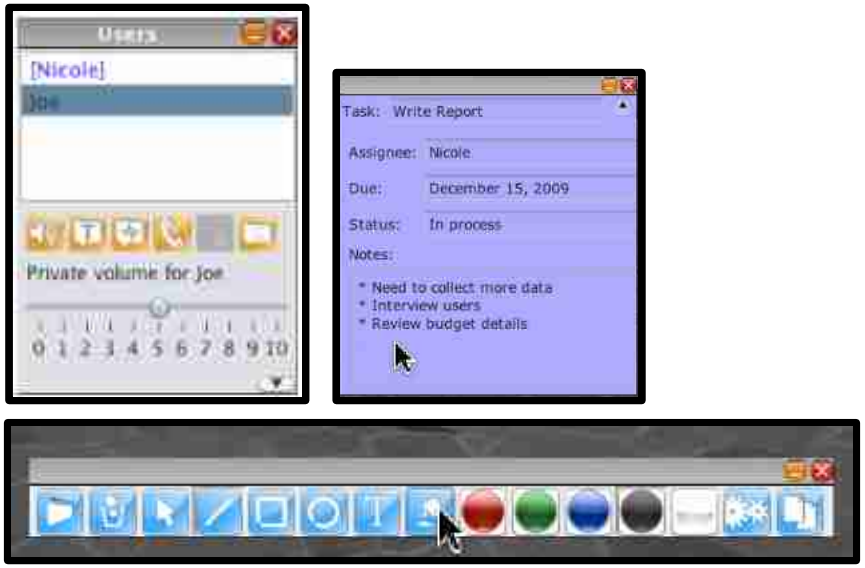
Team member's view



Visitor's view

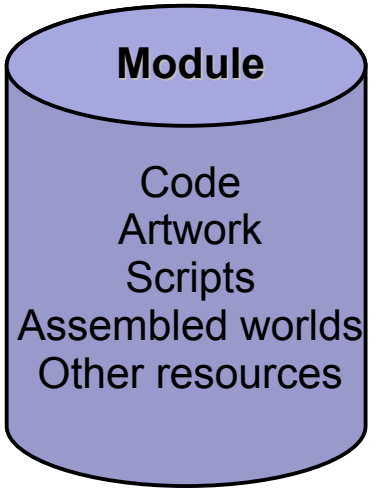
Other Features

- Embedded Swing
  - For in-world applications
  - HUD development



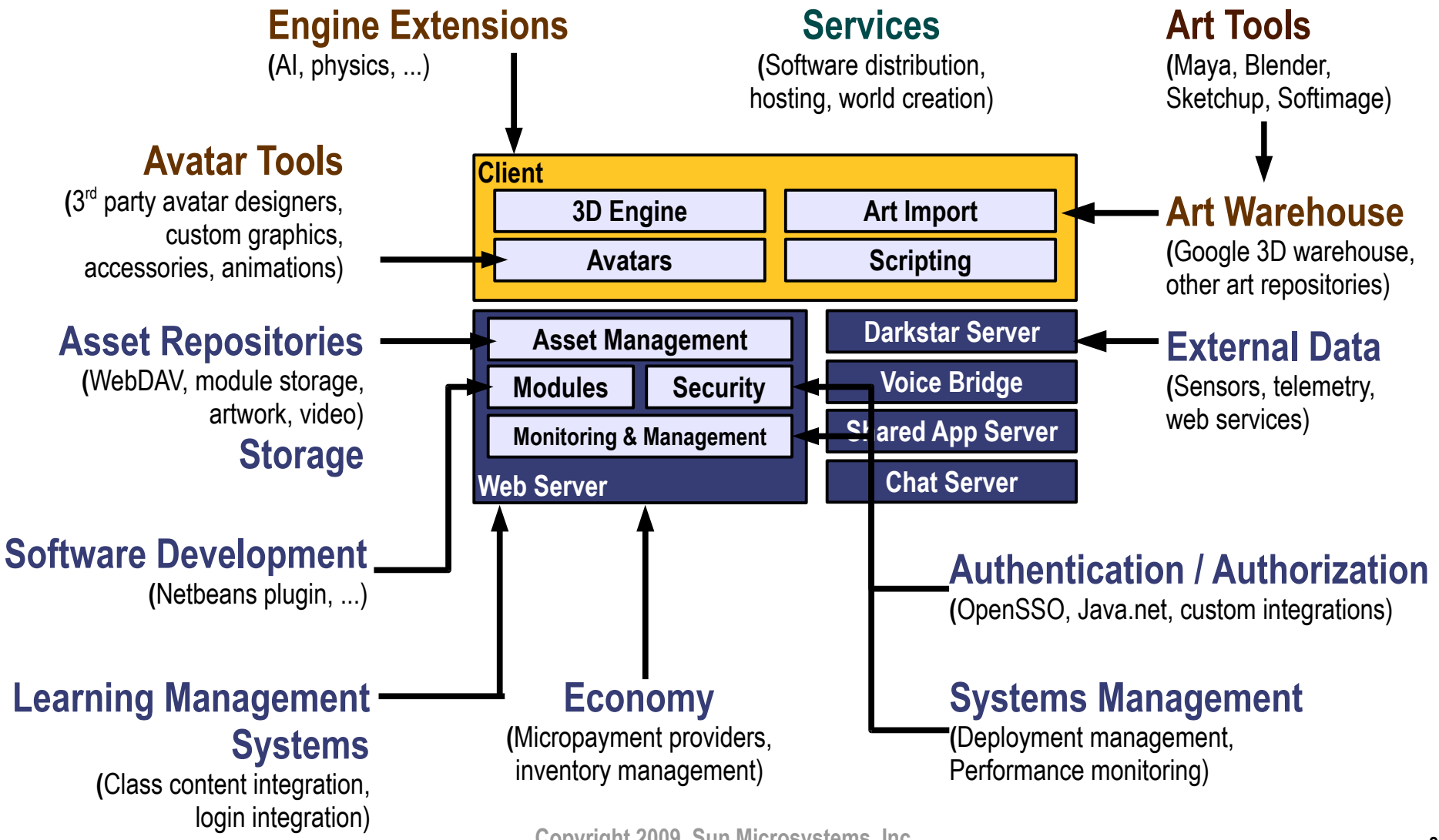
- Web-based management
  - Manage modules
  - Create snapshots
  - Monitor server
  - Access content repository - WebDAV integration
  - Install applications

Modules for Extensibility



- Mechanism for packaging & sharing Wonderland extensions
  - > Can contain code, artwork, audio, scripts, web management and web services
  - > Also world configurations for sharing whole worlds
  - > Deliver art assets via embedded HTTP server
  - > Packaged as archive (jar) files
- Modules can depend on other modules
- Web-based UI for installation and administration

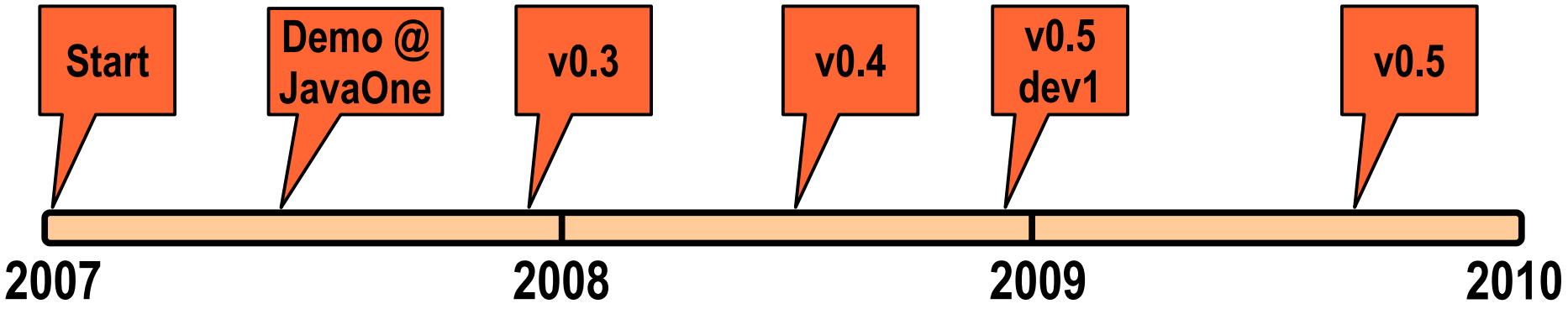
Wonderland Ecosystem



Technical Requirements

- Scales up and down
  - Run entire system on a laptop
- Linux, Windows, Mac, Solaris
- Java 6
- Client: 3D accelerated graphics
  - OpenGL 2.0
  - ATI or nVIDIA
- Server: Unix for application sharing
  - Linux or Solaris, works without apps on other platforms

Wonderland Status



- Started with a challenge from VP of eco responsibility
- Demo of virtual Sun office (MPK20) at JavaOne '07
- Added features to “demo” code base through version 0.4
- Currently working on completely re-architected version 0.5
- Version 0.5 Preview released Sept. 14, 2009

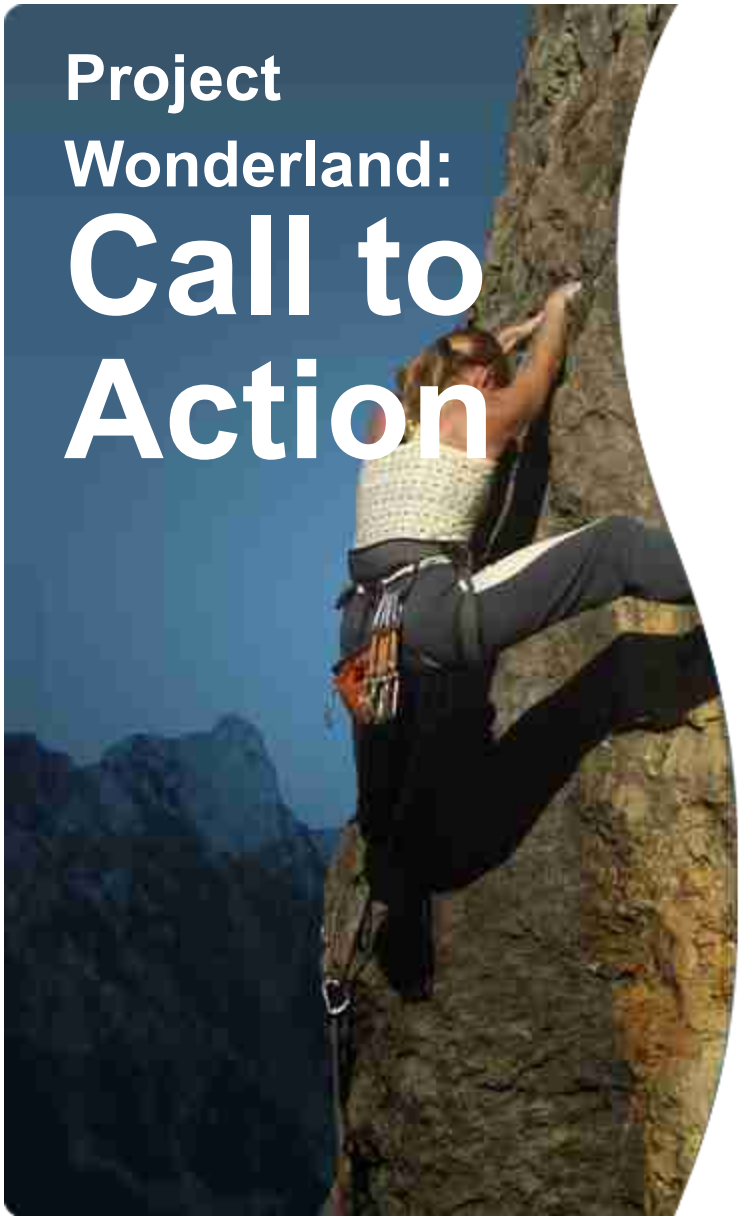
Wonderland and the Immersive Education Initiative

Aaron Walsh
Director, Grid Institute
Immersive Education Initiative
http://www.ImmersiveEducation.org

Wonderland and Immersive Ed

- Immersive Education Overview
- Wonderland and Immersive Ed Standards
- Education Grid Update
- Current Projects
- Upcoming Events
- http://www.ImmersiveEducation.org/

Project Wonderland: Call to Action



- Join the Ecosystem
  - > Offer a Wonderland service
  - > Create & distribute modules
- Become a developer
  - > Plenty of student project ideas
  - > Active open source community
- Create artwork
  - > SketchUp makes 3D content creation accessible to everyone
- Create your own world!

Project Wonderland Resources

- **Open Source Project Site**
  - http://ProjectWonderland.com
  - Download: binary, source code, examples
  - Learning: architecture, roadmap, FAQ
  - Community: latest news/blogs, forums, mailing lists
  - Tutorials, technical articles, troubleshooting
  - Suggestions for student projects
- **WonderBlog - Official Wonderland Blog**
  - http://blogs.sun.com/wonderland
- **Sun Immersion Special Interest Group**
  - http://sun-isig.ning.com
  - Social network for Wonderland interest

Thank you