

Evaluating an Immersive Virtual World for Accelerating T&E

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Evaluation National
Conference

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Development Scale Problem

- In large, distributed, complex programs, T&E can be a discovery process rather than a confirmation
 - Many MSLOC, several supplier tiers, many regional facilities
 - Communication, coordinating/synchronizing supplier actions, deploying & clarifying information are problematic
 - Iterations of test-analyze-fix from conflicting interpretations of requirements, designs, interfaces
- Collocation optimizes development but is unlikely; using conventional media as a substitute fails
- Medium that simulates collocation might mitigate problems
- Internal evaluation focused on 25 regional facilities

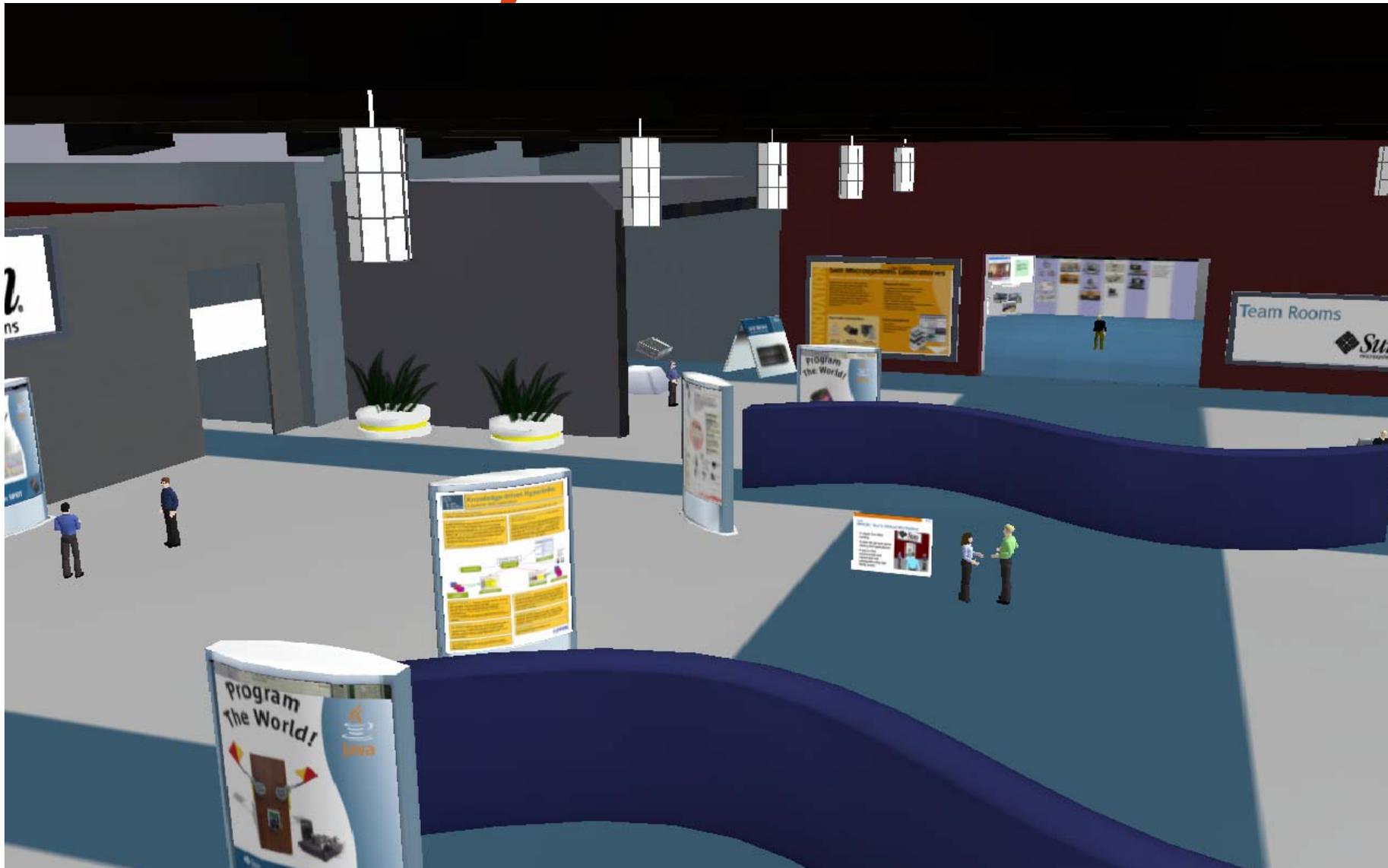
Immersive Virtual Collaboration

- Immersive virtual world simulates collocation
 - Includes integrated audio & visual animation, data & object persistence, common view, integrated development tools
- Could provide enough fidelity to collocation for effective collaboration & synchronizing suppliers
 - Strangers meet in online games & social worlds, form teams, strategize, execute plans, coordinate actions
- Could reduce number of errors that escape implementation phase into T&E
- Integrated modeling & simulation tools could provide environment for initial T&E

Sun's MPK20 – Project Wonderland

- Operation can be confined within firewall to resolve third party storage, data/access control, identity masking, etc.
- Animation of configurable avatars, stereo VOIP, IM
 - Keyboard steers avatar through prefabricated concourse, conference room, offices, lab
 - Users logged onto same server see, hear each other
 - 3-D objects can be assembled and animated
- Provides collaboration via 3rd party applications launched into in-world 2-D windows
 - Participants jointly develop artifacts by explicitly sharing control of launched applications

MPK20 – Project Wonderland



Code Window, 3rd person view

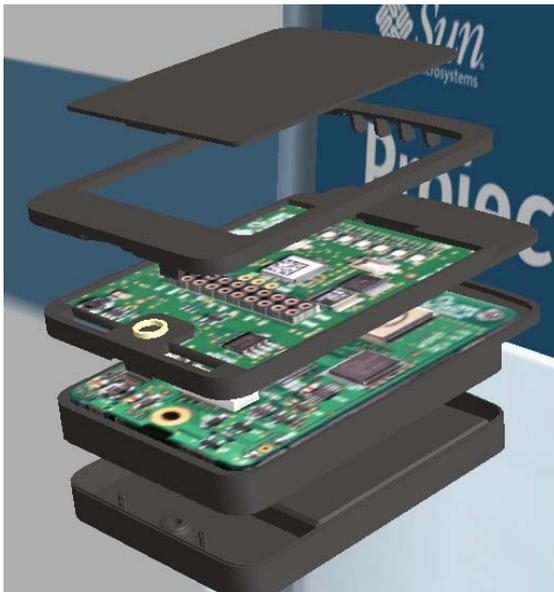
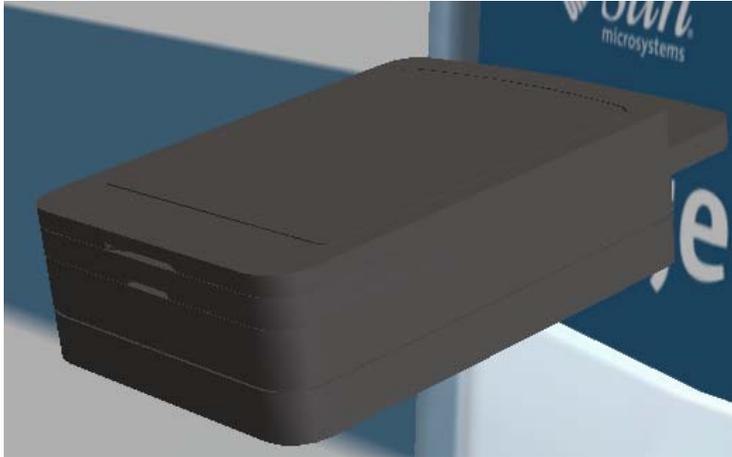


First Person View

```
String stateClassName = in.readUTF();  
  
try {  
    Class c1 = Class.forName( stateClassName, true, classLoader );  
    // System.out.println("Got class "+c1 );  
    Constructor construct = c1.getConstructor(  
        new Class[] {  
            com.sun.j3d.utils.sceneobject.io.retained.SymbolTableData.class,  
            com.sun.j3d.utils.sceneobject.io.retained.Controller.class } );  
    // System.out.println("Got constructor "+construct );  
    state = (SceneGraphObjectState)construct.newInstance(  
        new Object[] { null, this } );  
  
    System.out.println("Got state instance "+state);  
} catch (ClassNotFoundException e) {  
    throw new java.io.IOException( "Error Loading State Class "+stateClassName+  
        e.getMessage() );  
} catch (NoSuchMethodException ex) {  
    throw new java.io.IOException( "1 Broken State class for "+  
        stateClassName+" "+ex.getMessage() );  
}
```

Gary

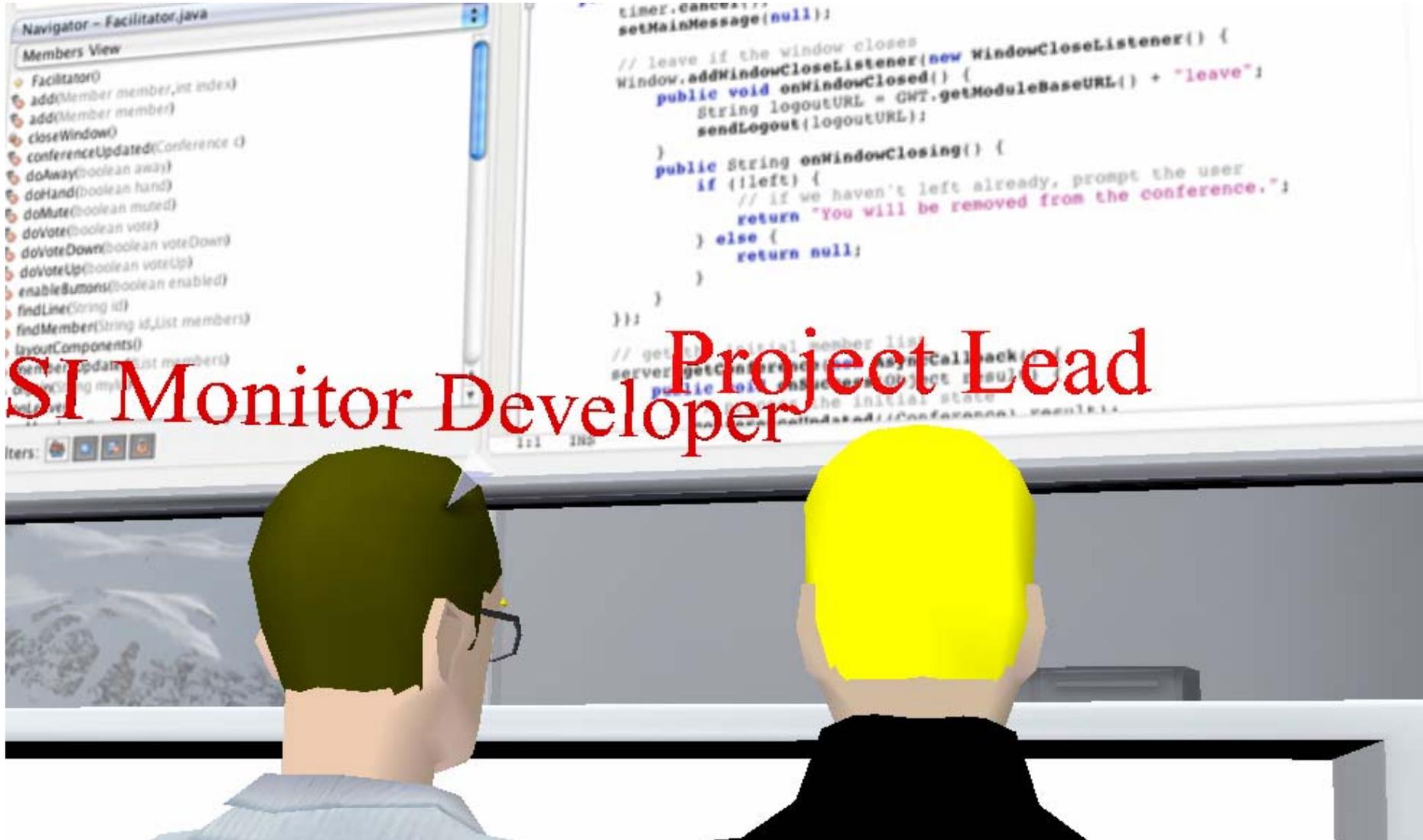
Object animation



Collaborative design



Code inspection



Subjective Assessment ...

- ... based on internal proof-of-concept evaluation and Software Engineering Research Center project
- Promotes informal communication & coordination well beyond IM, tele/video-conferencing ...
 - ... if it is frequently used by nearly everyone
- Integrated tools improve common understanding, increase accuracy of understanding ...
 - ... for requirements, designs, interfaces, status conveyed by modeling/simulation tools, code editors, code coverage tools
- Scalability yet to be evaluated ...
 - ... number of developers, facilities, time zones

Emerging Operational Concept

- Central system assembly & test area with library
- Radial hallways contain offices/labs for analysts, developers, end-users, acquisition team
- Developers analyze, design, code in windows visible to all authorized participants
- Library contains artifacts accessed via integrated tools – e.g., modeling, requirements management
 - Hold artifact reviews in library alcoves
 - Hold program reviews in library auditorium
- Projects spin-off worlds from baseline as need dictates – e.g., unique tools, access restrictions