Creating Opportunities for Computer Game R&D Projects

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Motivation

What are we doing?

- Empirical research and technology prototyping of computer games/virtual worlds (CGVWs) that support challenge problems in science, health care, art, technology and defense studies
- Serial research entrepreneurship

Why are we doing this?

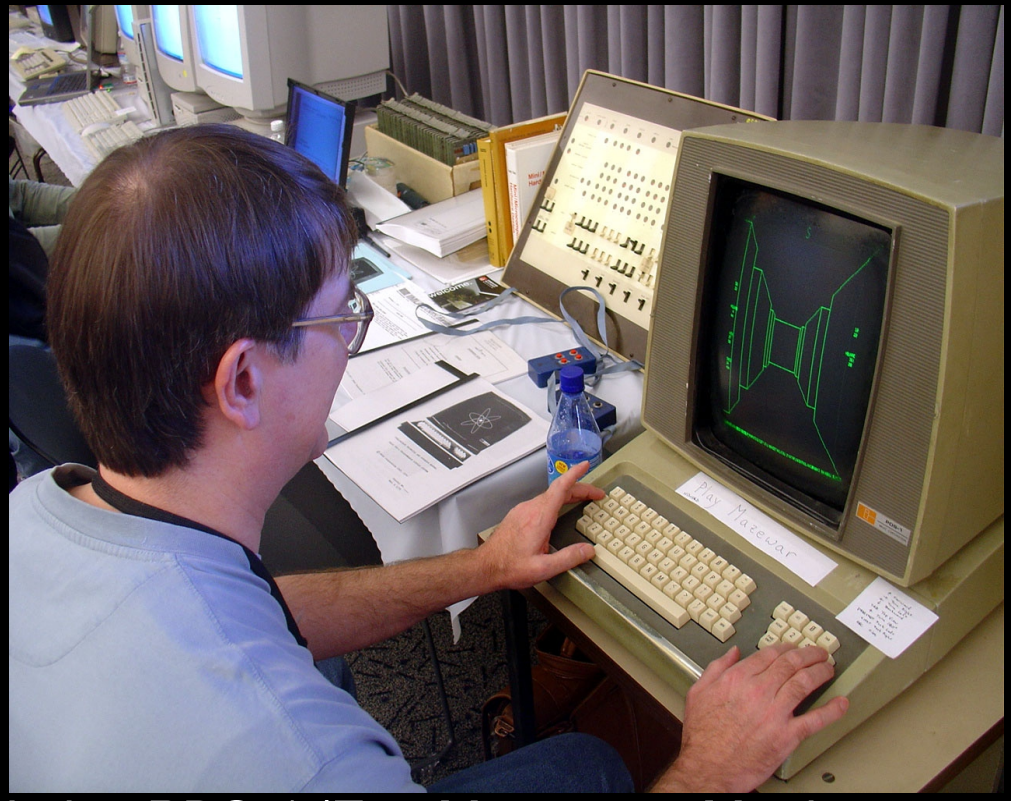
- Computer games are both *technology* and *new media*
  - An opportunity area for research and innovation in playful socio-technical systems
- Enable immersive and transformative experiences that facilitate learning through R&D, play and failure experiences
- Engage new students and emerging scholars

Some game R&D projects of interest

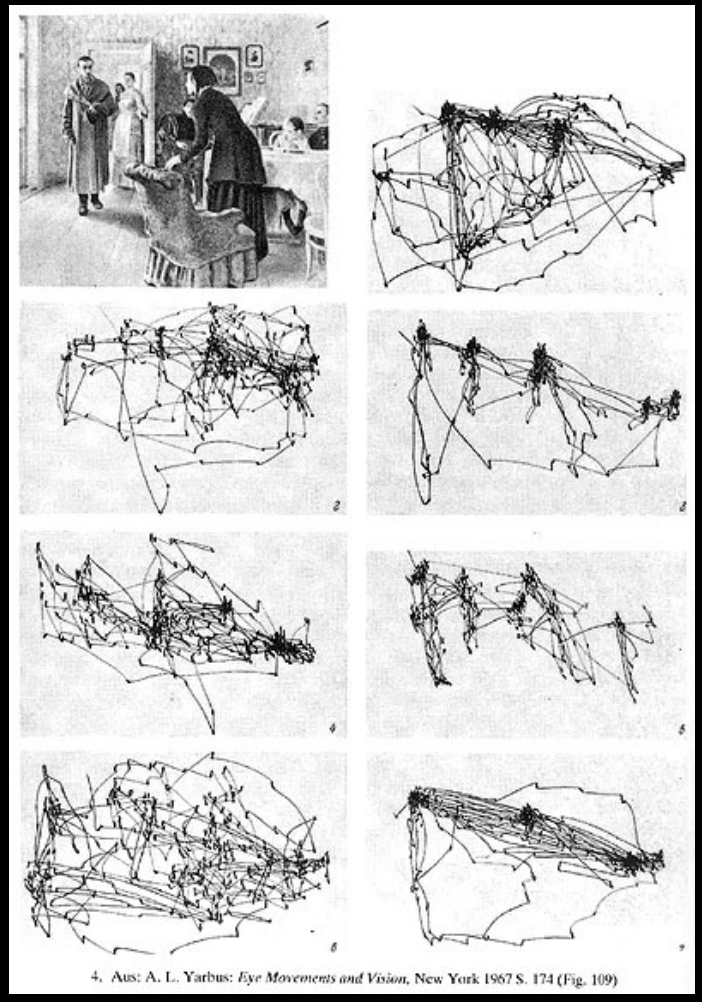
- Vintage projects (1977-2000)
- Science learning games for informal science education at Discovery Science Center
- Game-based semiconductor fabrication operations training simulator
- Virtual worlds for space science on a sphere
- Game-based decentralized command and control training simulator
- Experimental games for business, cultural critique, art and technology
- Facilitating local game development community
- New projects in progress:
    - World of Music, and Science Mission games

Vintage (c. 1977): *The Visualizer*

Research challenge: develop interactive environment for visualizing mental imagery via “semantic” eye movements and verbal (narrative) cueing.



Imlac PDS-1 (Eye Movement Monitor not shown)



4. Aus: A. L. Yarbus: *Eye Movements and Vision*, New York 1967 S. 174 (Fig. 109)

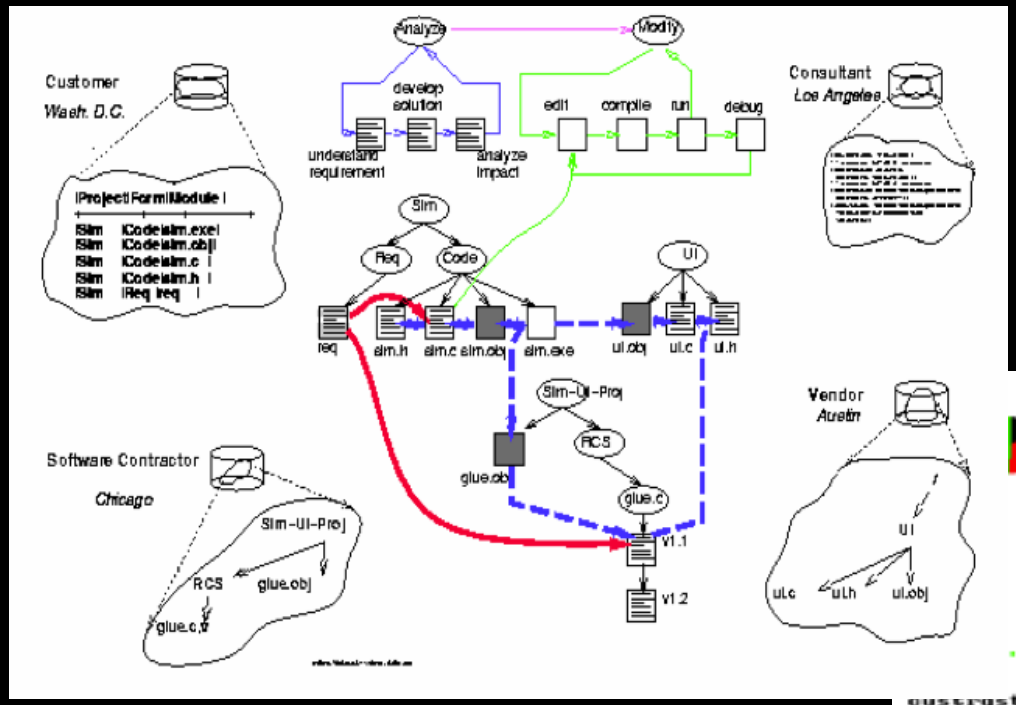
Vintage (c. 1977): *The Visualizer*

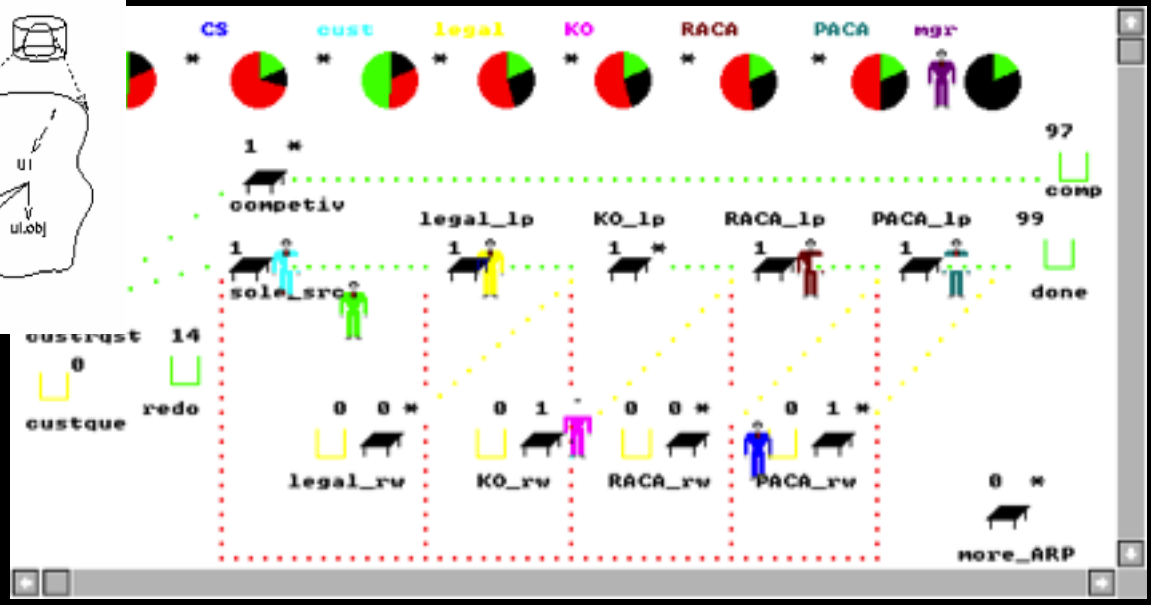
Oversimplified version: Scacchi, W. (1979). Visual Motion Perception by Intelligent Systems, *Proc. 1979 Pattern Recognition and Image Processing Conference*, Chicago, IL, IEEE Press, 646-652.

Very long review in: H.-H. Nagel (1980). Analysis of Image Sequences: What Can We Learn from Applications?, in: *Image Sequence Analysis*, T.S. Huang (ed.), Springer Verlag, Berlin-Heidelberg-New York.

Vintage (c. 1990): *Articulator*

Research challenge: develop and deploy knowledge-based environment for modeling, simulating, and redesigning distributed multi-agent organizations.





Vintage (c. 1990): *Articulator*

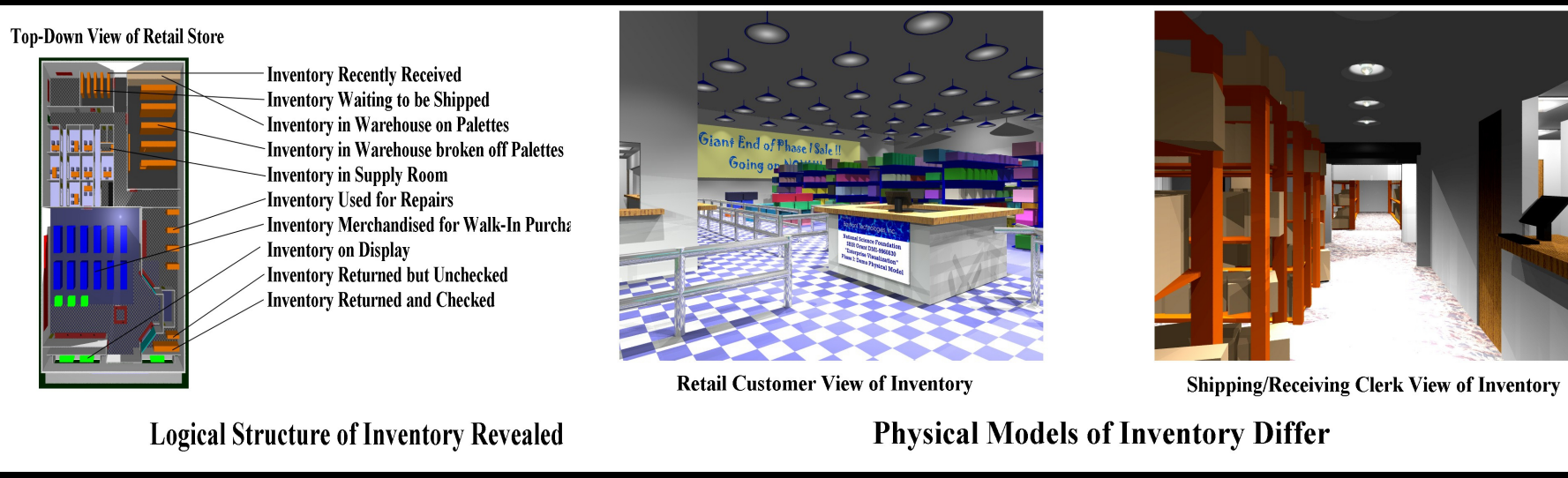
Mi, P. and Scacchi, W. (1990). A Knowledge-Based Environment for Modeling and Simulating Software Engineering Processes, *IEEE Trans. Data and Knowledge Engineering*, 2(3):283-294, September. Reprinted in *Nikkei Artificial Intelligence*, 20(1):176-191, January 1991, (in Japanese). Reprinted in *Process-Centered Software Engineering Environments*, P.K. Garg and M. Jazayeri (eds.), IEEE Computer Society, 119-130, 1996.

Mi, P. and Scacchi, W. (1996). A Meta-Model for Formulating Knowledge-Based Models of Software Development, *Decision Support Systems*, 17(4):313-330.

Scacchi, W. and Mi. P. (1997). Process Life Cycle Engineering: A Knowledge-Based Approach and Environment, *Inter. J. Intelligent Systems in Accounting, Finance, and Management*, 6(1):83-107.

Vintage (c. 2000): *Enterprise Visualizer*

Research challenge: design and develop a VW for visual modeling, simulation, and redesign of enterprise processes using knowledge-based CG technology (startup venture)

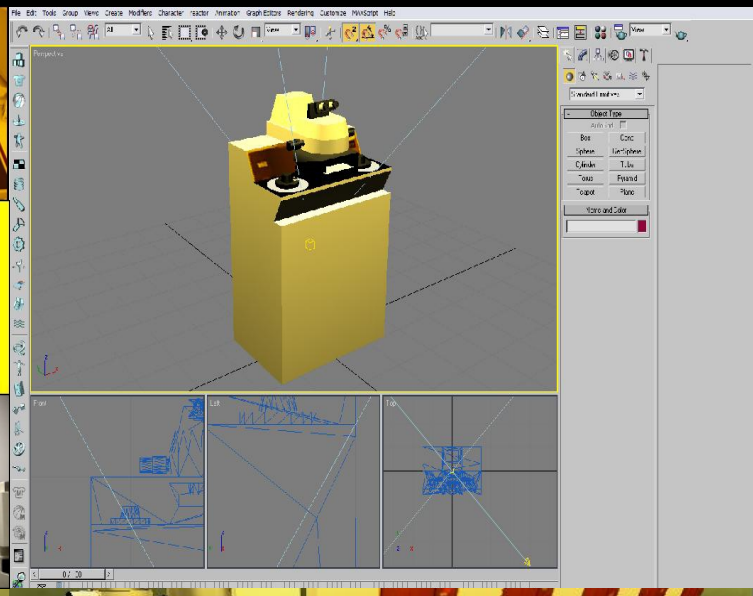


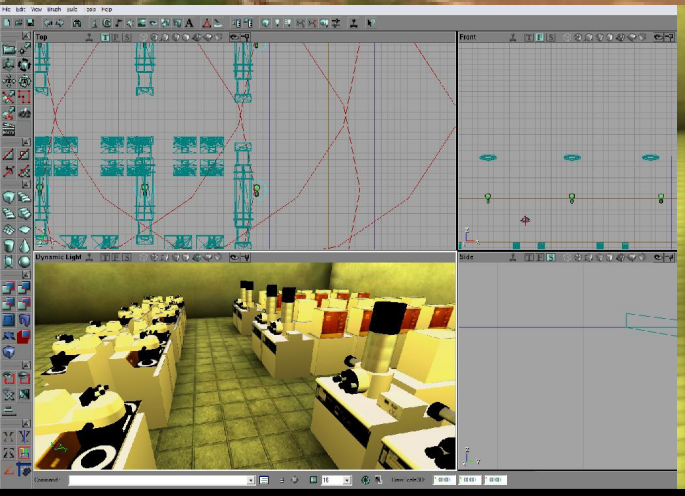
Web-based science learning games for informal science education for K-6th grade students and families

http://www.DQOnline.org/

Scacchi, W., Nideffer, R. and Adams, J. (2008), *A Collaborative Science Learning Game Environment for Informal Science Education*, in *New Frontiers for Entertainment Computing*; P. Ciancarini, R. Nakatsu, M. Rauterberg, M. Roccetti (Eds.); Boston: Springer, 71–82.

Semiconductor/nanotechology fabrication training game

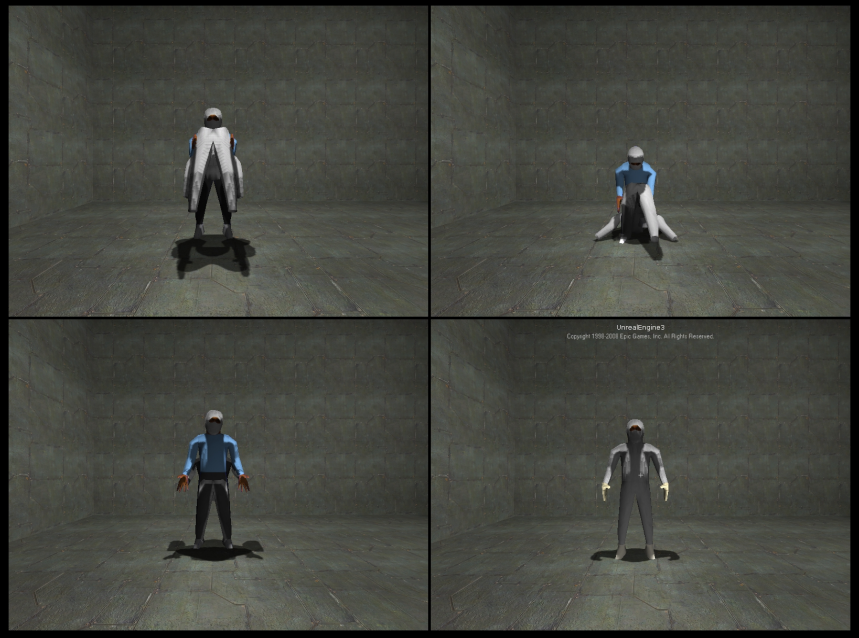




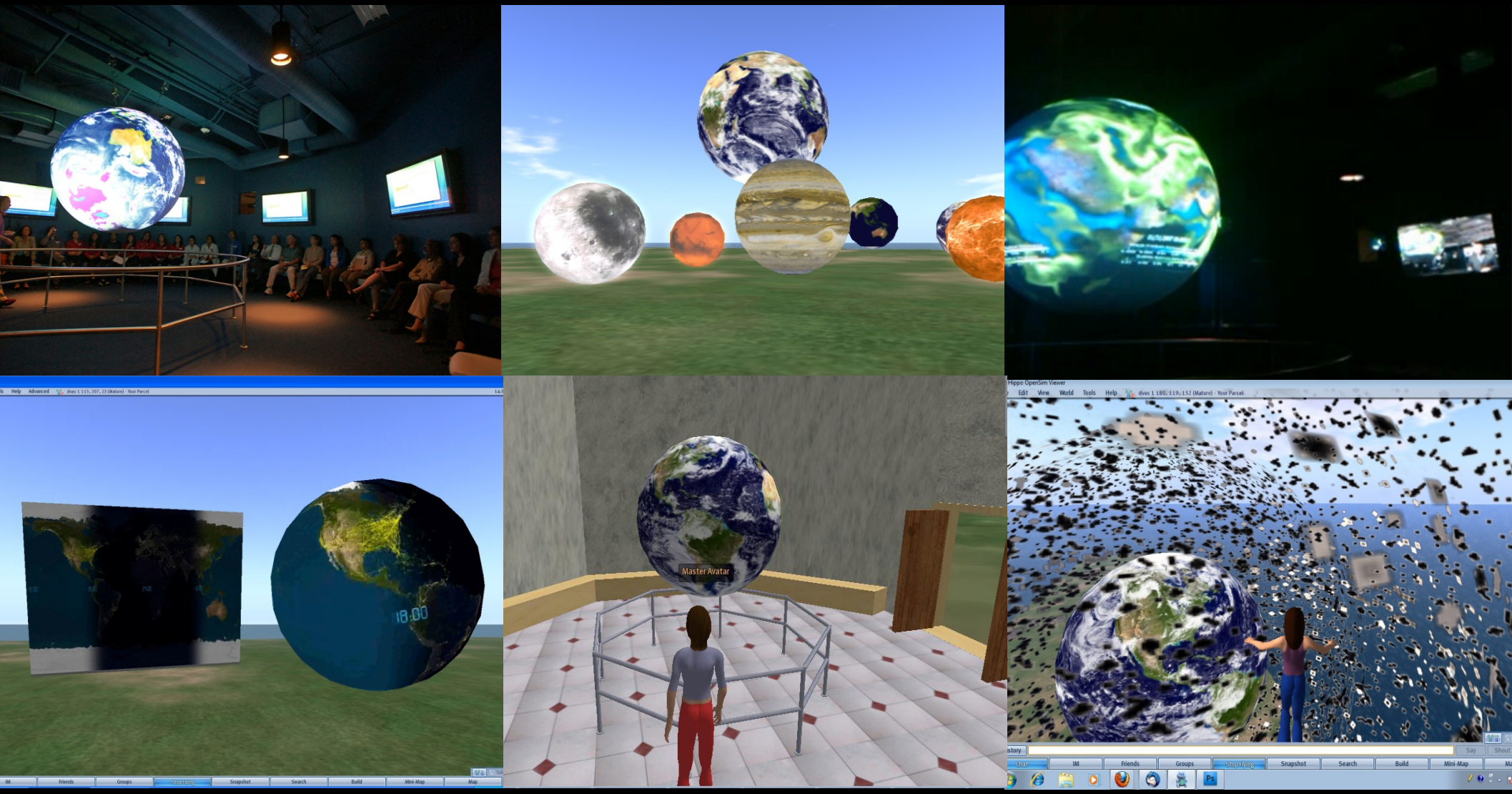
FabLab Demo Reel

Scacchi, W. (2010). Game-Based Virtual Worlds as Decenralized Virtual Activity Systems, in W.S. Bainbridge (Ed.), *Online Worlds: Convergence of the Real and the Virtual*, Springer, New York, 225-236.

Semiconductor/nanotechology fabrication training game: “gowning processes”

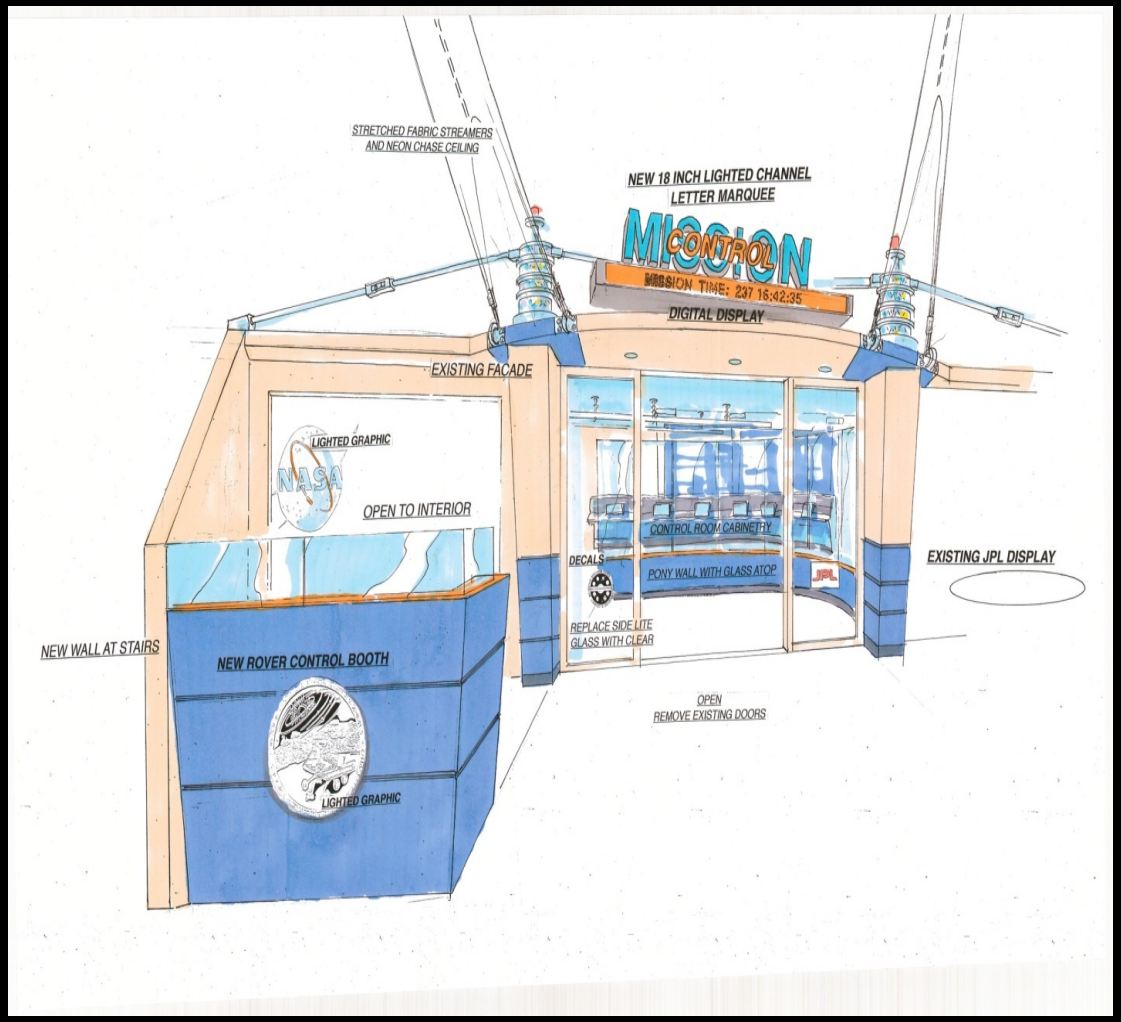


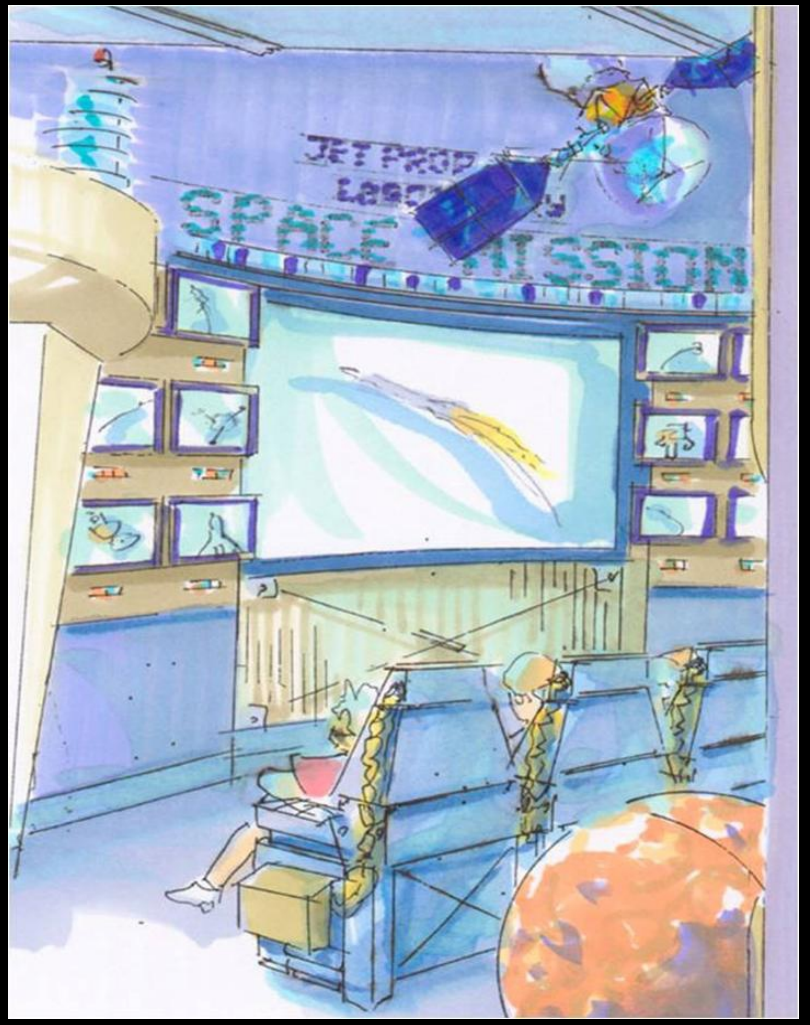
Planetary science data visualization and “spherecasting” support: *NOAA Science on a Sphere* installation in *Opensim* VW platform



Supporting virtual exploration of planetary and near-earth objects (space debris, small satellites, near-earth asteroids)

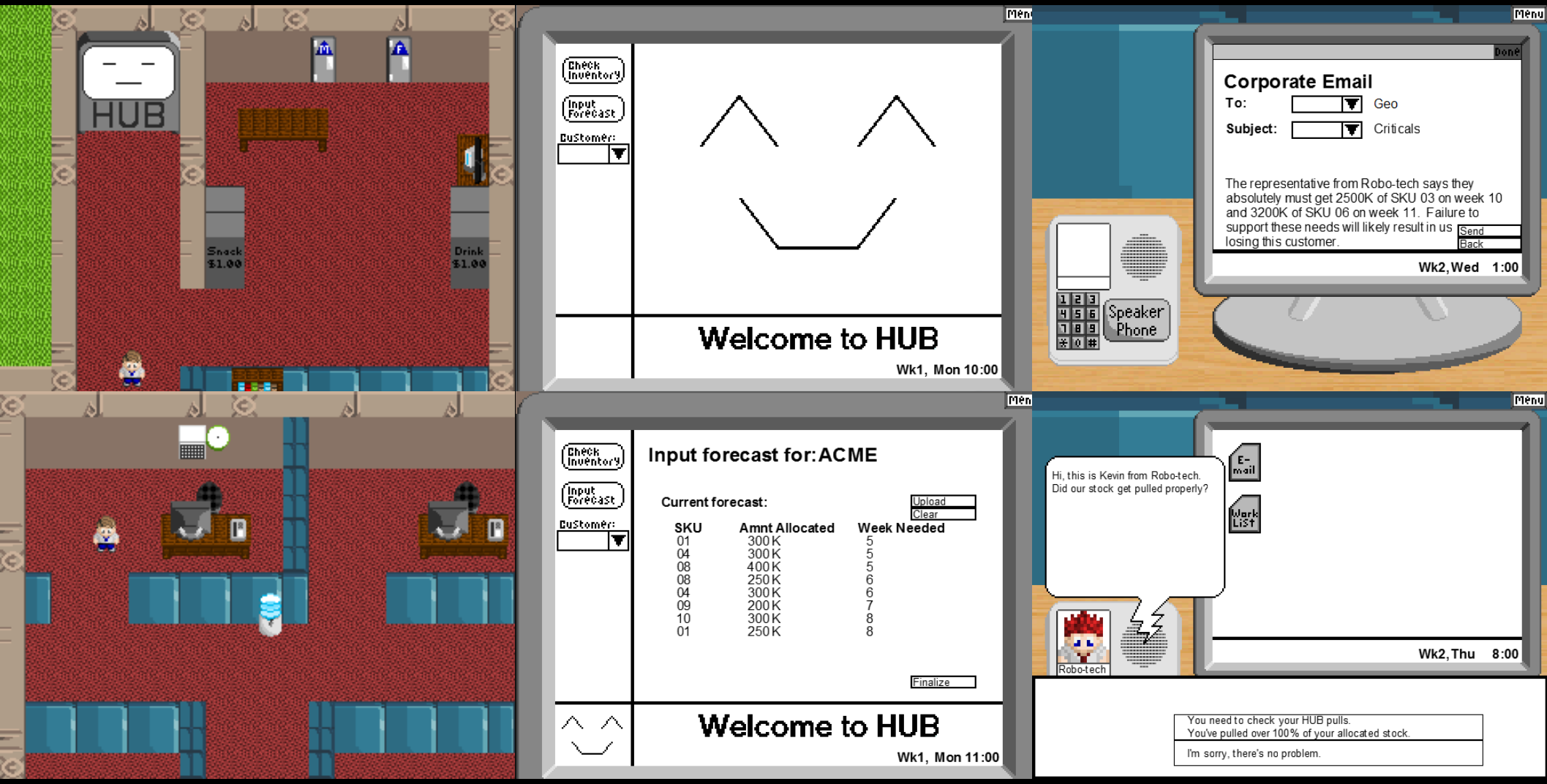
Mission Control Room: Vision for *Discovery Science Center*





VW for experimental studies in decentralized command and control centers using open source software (*OpenSim*)

CBA: Customer relations training system implemented using low-cost, rapid micro-development cycle



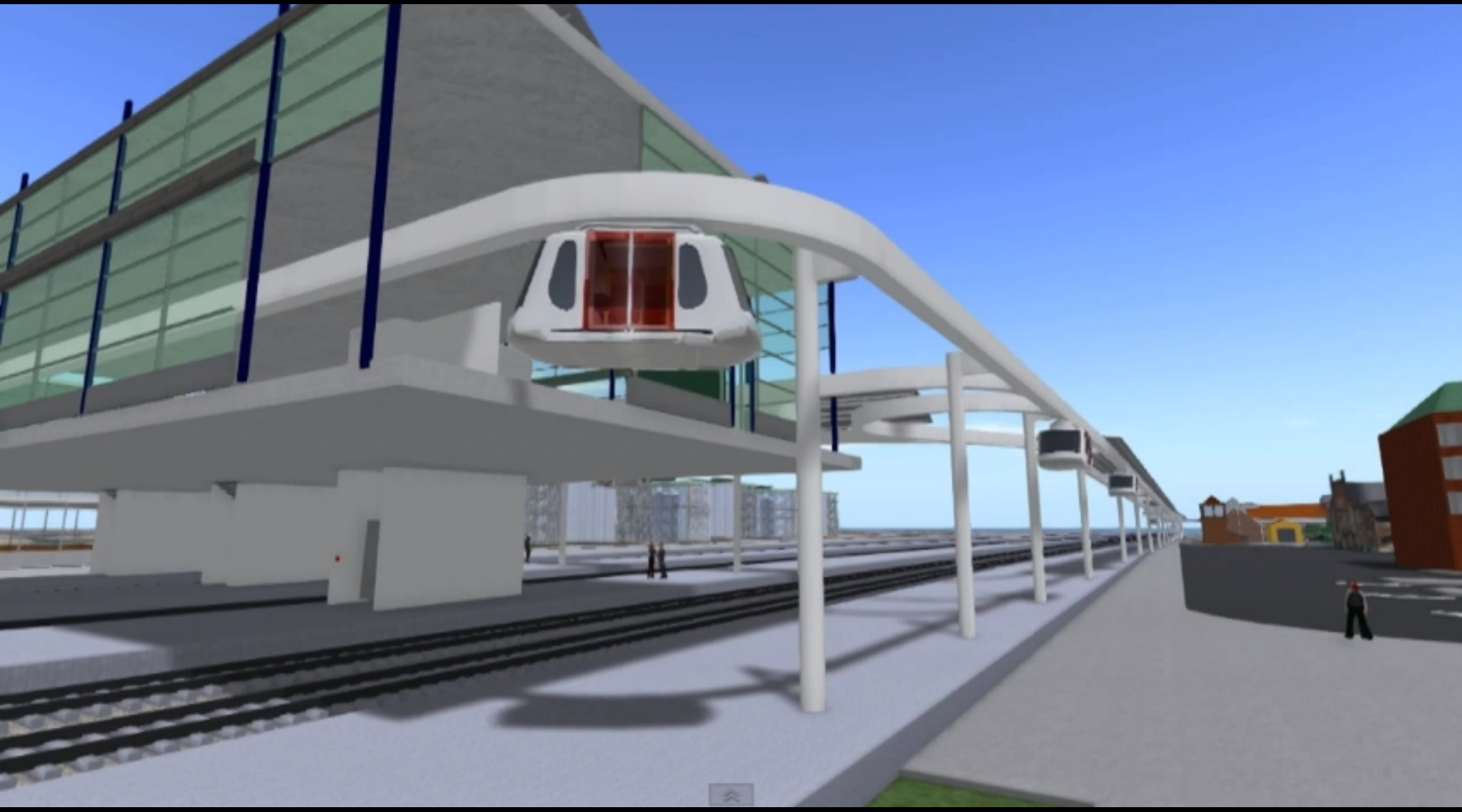
2D, side-scrolling, *World of Warcraft* inspired, role-playing game and CGVW development/modding kit

Aoedipus.net

Envisioning a virtual social computing world

Virtual Life Demo Reel

Modeling and Simulating the design of a Personal Rapid Transit system for Uppsala, Sweden



Game-based VW incorporating real-world news feeds and geopolitically located Twitter feeds

Game-based VW simulator interfaces for immersive motorsports racing experiences

Game-based VW simulator you can actually drive in physical world! -- *OutRun* @ UCI

http://www.conceptlab.com/outrun

Community development concept: Supporting UCI video game developers club projects (sample)

Community development concept: Supporting UCI video game developers club via Computer Game Science Laboratory

Community development concept: *IEEE Intercollegiate Computer Game Development Showcase* (2012-2013)

Informal Classical Music Learning Game Environment

SFSKIDS
FUN & GAMES WITH MUSIC

Discover Music

Under the Sea of Knowledge.

Play with Music

Above the Musical Skies

Perform Music

In the Instrument Garden

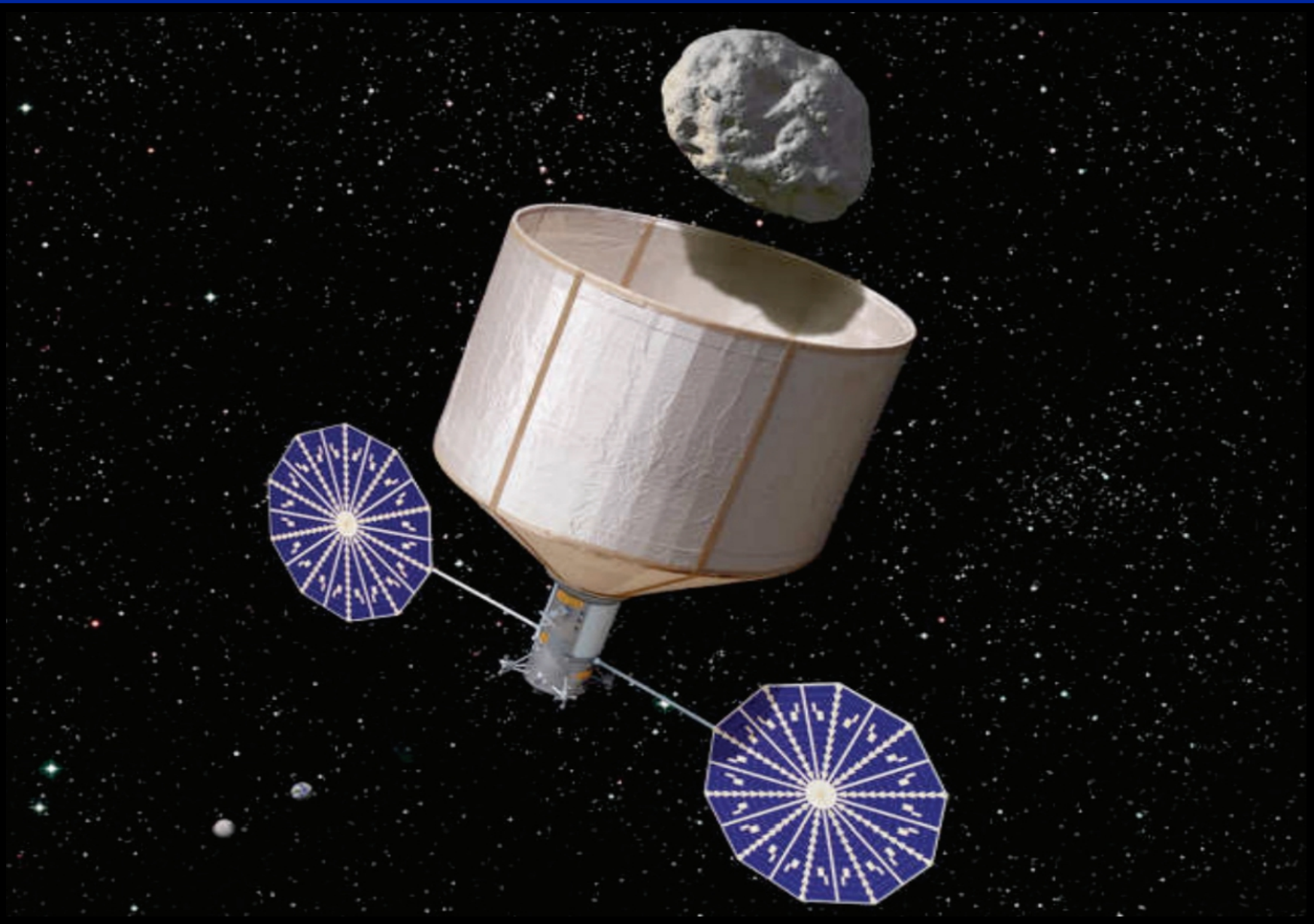
Conduct Music

At the Symphony Hall

Compose Music

Atop the Mountain of Muses

New project: develop reusable framework for developing "science mission games"



Sample project game: *Capture a near-earth asteroid*

Game-Based Worlds for Neuroscience

Adventure/Quest games for learning neuroscience via experiments in simulated brain/anatomical testbeds to study:

- Neurobiological processes

- Disease and drug pathologies

- Brain repair and rehabilitation

- Brain-computer interaction (HMD, EMM, EEG, 5.1 headphones)

Research Collaborators

Faculty

– Robert Nideffer, Thomas Alspaugh, Jill Berg, Yunan Chen, Steve Cramer, Alfred Kobsa, Jung-Ah Lee, Crista Lopes, Gloria Mark, Bonnie Nardi, David Redmiles, Richard Taylor, and others

Post-Doctoral Scholars

– Garnet Hertz (UCI LUCI)

Research Staff

– Craig Brown (SMU), Yuzo Kanomata (VDIO), Kari Nies (HRI/ISR), Alex Szeto (ISR)

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– Digital Industry Promotion (DIP) Agency, Daegu, South Korea
– UCI Video Game Developers Club

- *No review, approval, or endorsement implied*.