Game-Based Virtual Worlds as Decentralized Virtual Activity Systems

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Motivation

What are we doing?

- Empirical research and technology prototyping of CGVWs that support challenge problems in science, health care, energy, environmental, and defense studies

Why are we doing this?

- CGVWs are both *technology* and *new media*
  - this represents a new opportunity area for research and innovation
- Enable immersive and transformative experiences that facilitate learning through R&D and Play
- Engage new students and emerging scholars

Research Collaborators

Faculty

– Thomas Alspaugh, Alfred Kobsa, Crista Lopes, Gloria Mark, Bonni Nardi, Robert Nideffer, David Redmiles, Richard Taylor

Post-Doctoral Scholars

– Hazel Asuncion (UWash), Garnet Hertz, Chris Jensen

Research Staff

– Craig Brown, Yuzo Kanomata, Kari Nies, Alex Szeto

External Partners

– Aerospace Corp., Discovery Science Center, Encitra Inc., EON Reality Inc., Intel Research, Naval Postgraduate School, Northrop-Grumman, Panasonic Shikoku Electronics, San Francisco Symphony, UCI Calit2, UCI Video Game Developers Club.

Decentralized Virtual Activity Systems (DVAS)

Activity System (AS)

– networked computing system for multi-user work or play

Virtual Activity System

– AS with user interaction mediated via avatars or online artifacts

– allows for visual, textual, or other media-based online worlds

Decentralized Activity System

– "non-hierarchical" (P2P) AS with dispersed users

Decentralized Virtual Activity System

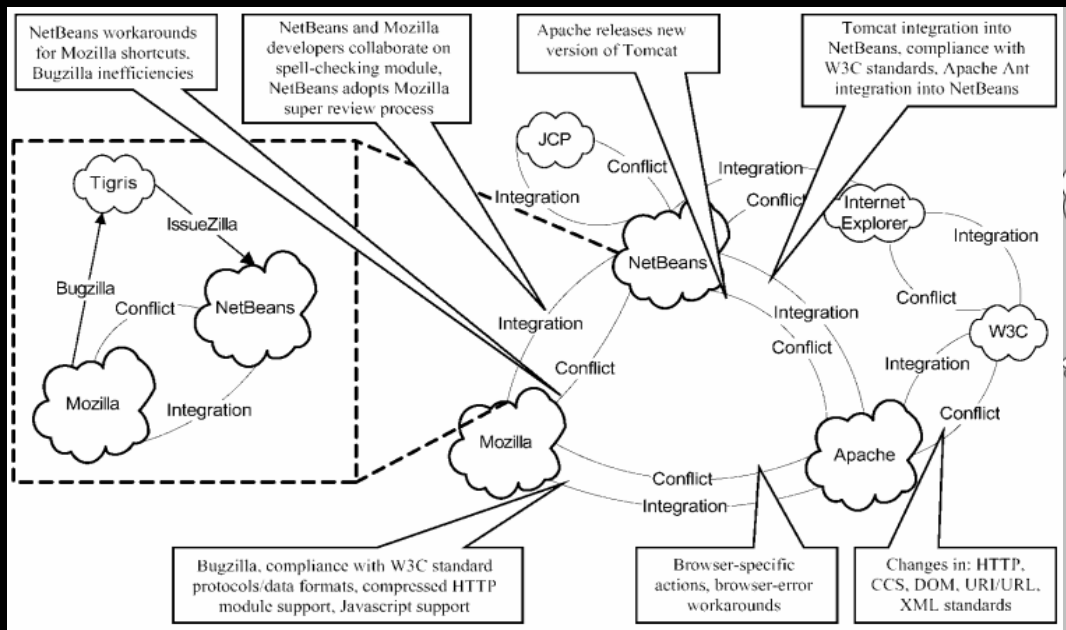
– non-hierarchical AS with dispersed users whose interactions are mediated via avatars or artifacts

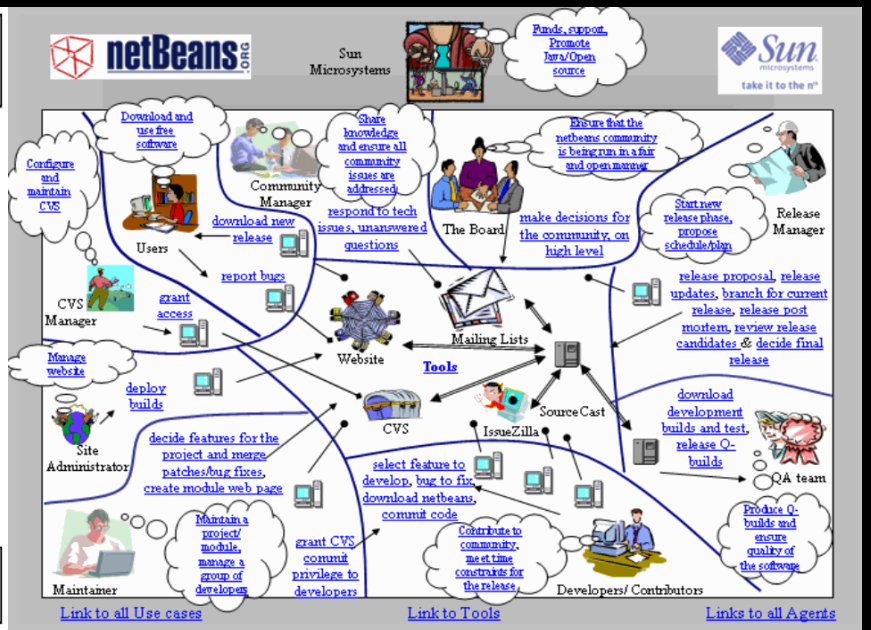
DVAS Empirical Research Problems

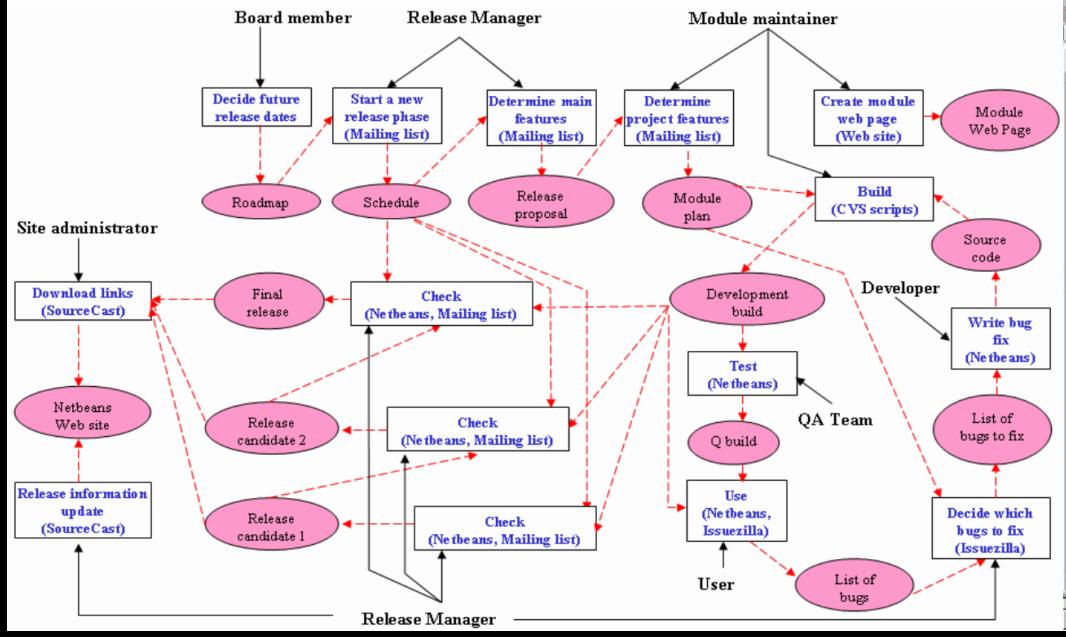
-- Cooperation, coordination, and collaboration
-- Privacy, security (Intellectual Property), trust
-- Development, evolution, innovation
-- Learning and organizational transformation
-- Permeability of physical-virtual system boundaries

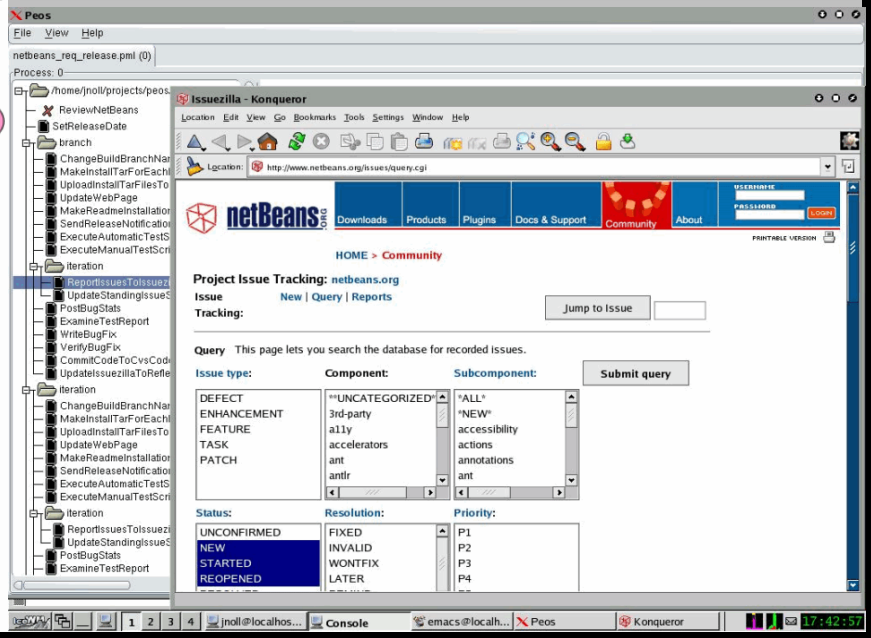
Scacchi, W., Kobsa, A., Lopes, C., Mark, G., Nardi, B., Redmiles, D., & Taylor, R. N. (2008). *Decentralized virtual activities and technologies: A socio-technical perspective* Institute for Software Research Report, UCI-ISR-08-04, December.

Discovering open source software development processes









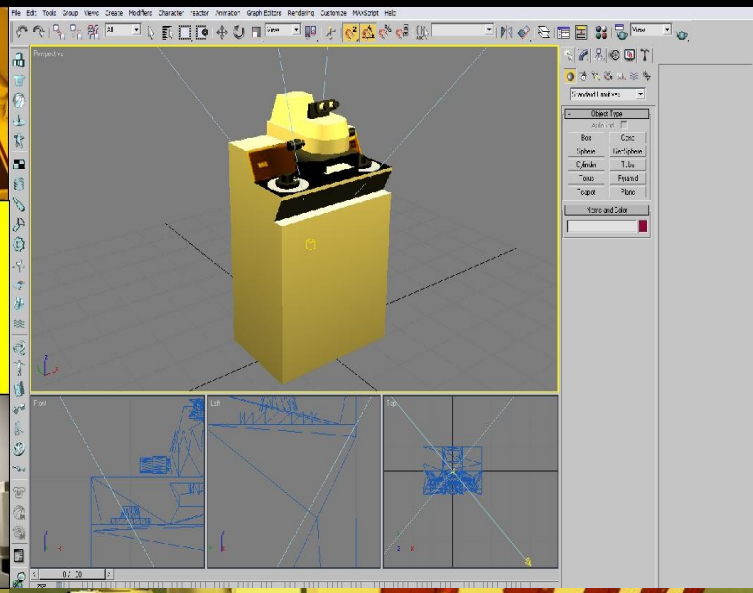
Jensen, C. and Scacchi, W., 2006. Experiences in Discovering, Modeling, and Reenacting Open Source Software Development Processes, in M. Li, B.E Boehm, and L. Osterweil (eds.), *Unifying the Software Process Spectrum*, 442-469, Springer-Verlag.

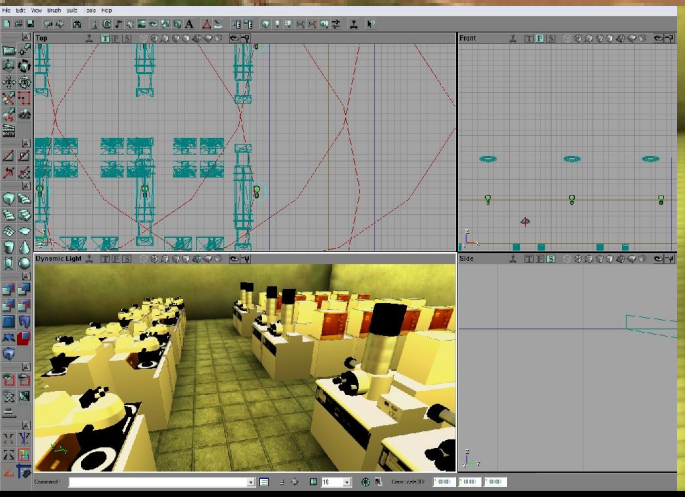
Web-based science learning games for informal science education for K-6 students and families

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

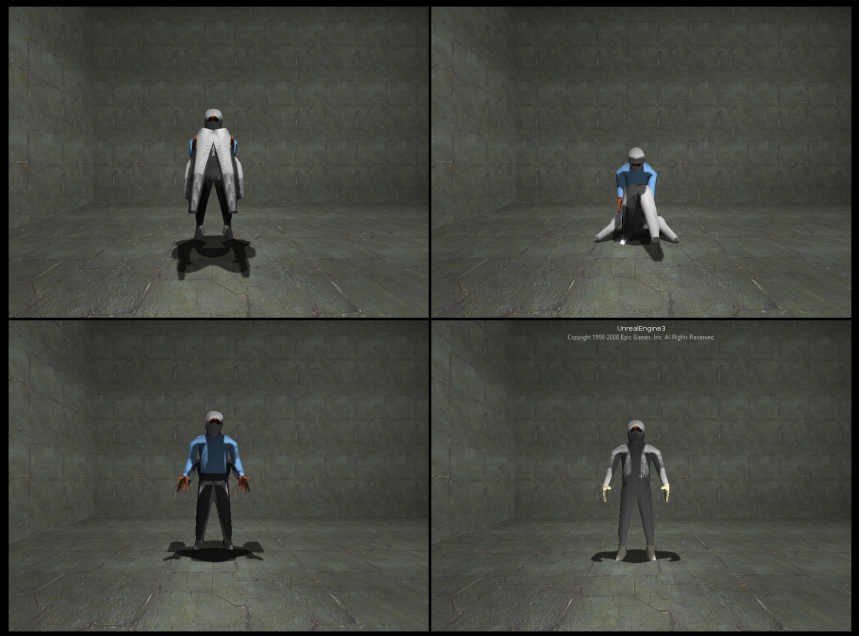




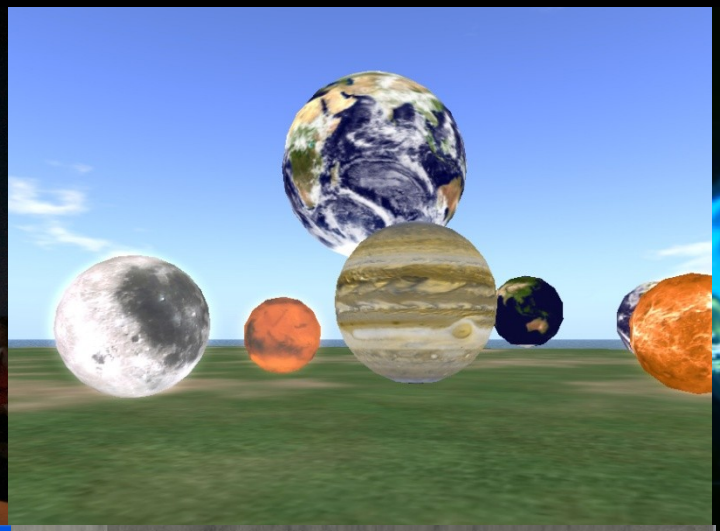
FabLab Demo Reel

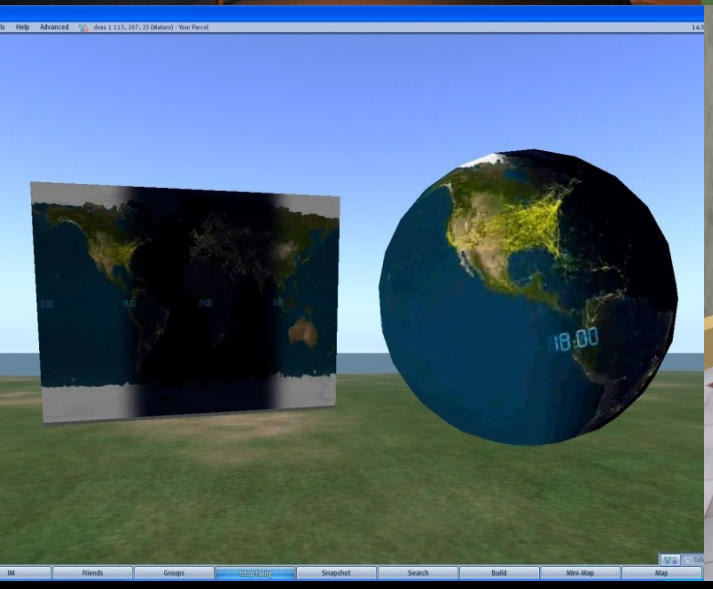
Scacchi, W. (2010). Game-Based Virtual Worlds as Decentralized Virtual Activity Systems , in W.S. Bainbridge (Ed.), *Online Worlds: Convergence of the Real and the Virtual*, Springer, New York, 225-236.

Semiconductor/nanotechology fabrication training game



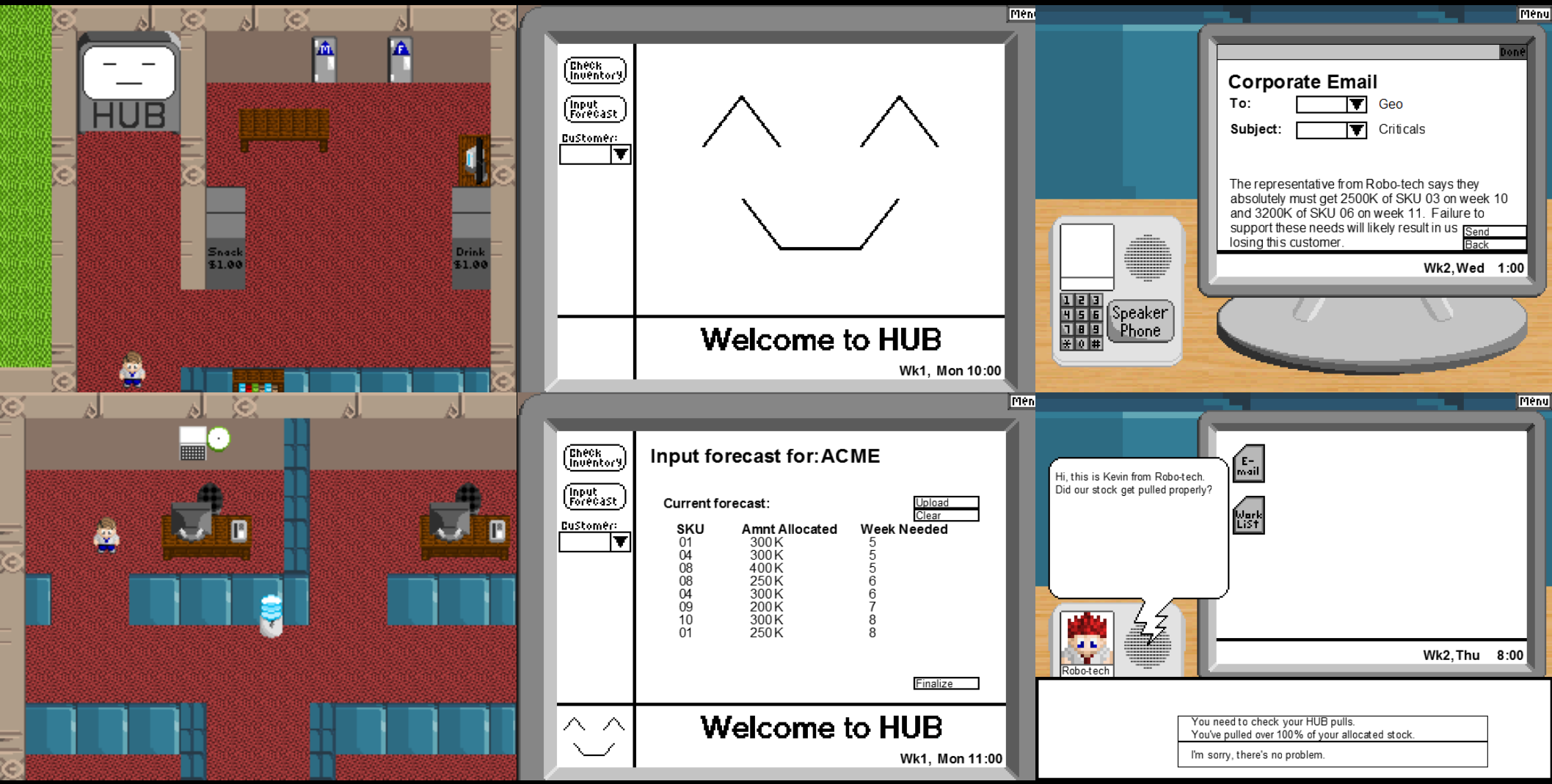
Planetary science data visualization and “spherecasting” support: *NOAA Science on a Sphere* installation in *Opensim* VW platform





VW for experimental studies in decentralized command and control centers

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

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

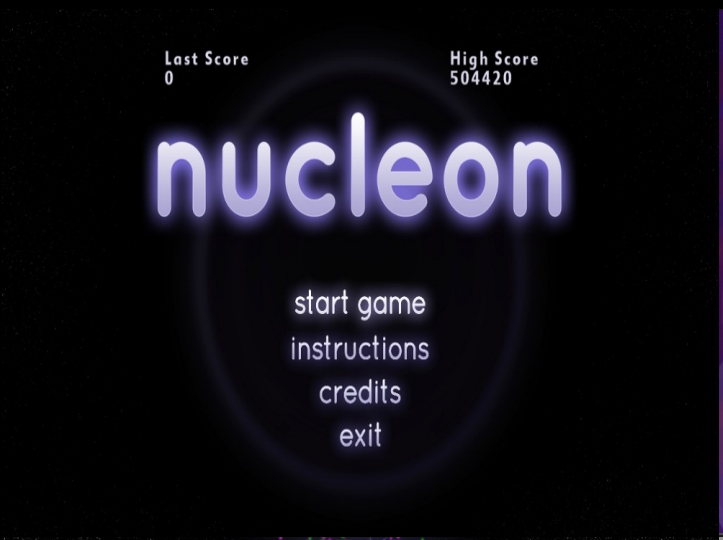
Game-based VW simulator interfaces for immersive motorsports racing experiences

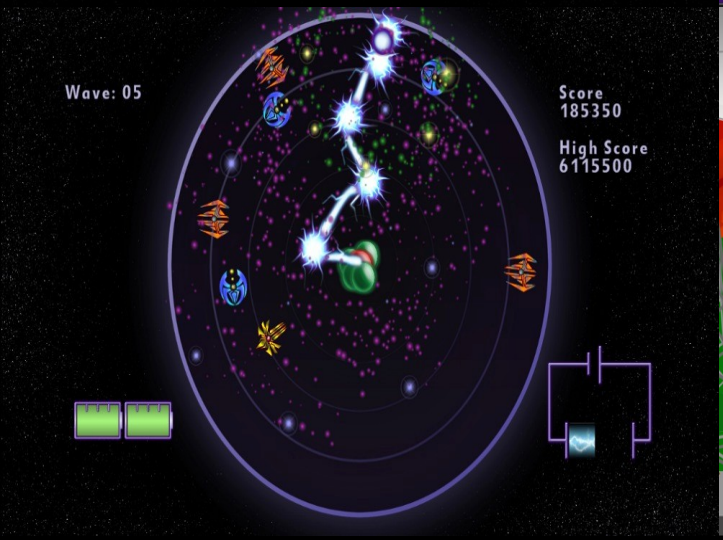
Game-based VW simulator you can actually drive in physical world! -- *OutRun* @ UCI

http://www.conceptlab.com/outrun

CGVW Laboratory and experimental game devices

Computer games developed by UCI video game developers club (undergrad students)





Selected research findings and results

-- Viable group presentation, communication, and social interaction
-- Prototyping and review of virtual objects, composite systems, etc.
-- Training, education, rehearsal, learning
-- New commercial product demonstration
-- Identity role-playing, team building, and other social processes
-- Multi-media storytelling
-- Avatar control and choreography
-- Mirrored worlds and memorialization
-- Game development and modding
-- Semi-automated socio-technical process discovery
-- Modeling, analyzing, and developing complex intellectual property regimes accommodating multiple heterogeneous IP licenses
-- Enabling human behavior transformation (health care)

Future opportunities for games and virtual worlds

- Key challenges to address/overcome -- *scale* and *scope of:*
  - Immersion
  - Verisimilitude
    - Within worlds
    - Spanning physical-virtual worlds
  - (Deleting the) boundaries between collaborative *work* and *play*
  - Relocatability (telepresence)
  - Decentralized virtual organization

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