R&D Capabilities at the UCIrvine Game Lab

Robert Nideffer, Walt Scacchi, Alex Szeto

www.ucgamelab.net
Our Goal

• Explore and establish foundations for cooperative research and development partnership with DSC, UCI Game Lab, and Creative Kingdoms
• Starting with the DSC Dinosaur Game Exhibit and Online Interaction
Opportunity Areas

• Game R&D at UCI Game Lab
• Science Learning games and game-based exhibits at the Discovery Science Center
UCI Game Culture & Technology Lab

• Established in 2002.
• Laboratory devoted to exploring alternative applications and contexts for computer gaming
• Affiliated with Calit2, UCI’s largest interdisciplinary institute devoted to inventing the next generation of the Internet and its applications
• Focusing on collaborative game play giving rise to persistent online communities of practice
UCI Game Lab People (Faculty)

• Arts: Robert Nideffer, Antoinette LaFarge, Chris Dobrian
• Computer Science: Paul Dourish, Magda El Zarki, Dan Frost, Gloria Mark, Bonnie Nardi, Andre van der Hoek
• Engineering: Tara Hutchinson, Falko Kuester, Joerg Meyer
• ACE: Simon Penny, Bill Tomlinson
• Humanities and Social Science: Tom Boellstorff, Peter Krappe
• ISR: Walt Scacchi, Celia Pearce
Game Lab People

- Sky Frostenson: Art, Computation & Engineering (ACE)
- Adrian Herbez: Art, Computation & Engineering (ACE)
- Eric Kabisch: Art, Computation & Engineering (ACE)
- Eric Cho: Art, Computation & Engineering (ACE)
- Derric Eady: Studio Art

- Nick Urrea: Information and Computer Science
- Kenny Lai: Information and Computer Science
- Mirko Kiric: Information and Computer Science
- Alex Szeto: Information and Computer Science
- Dan Repasky: Studio Art
- Andrew Khoury: Information and Computer Science
- Young Kang: Information and Computer Science
- James Jennings: Information and Computer Science
- Annie Jiu: Information and Computer Science

- UC San Diego Supercomputer Center
  - Steve Cutchin: Visualization Services Manager
  - Natalie Rubin: Game Grid Website Developer
  - Tak (Sunny) Chu: Game Grid Lead Programmer
Game Lab Partners

- California Institute for Telecommunications and Information Technology at UCI—Cal(IT)²
- Center of Graphics, Visualization, and Imaging Technology (Center of GRAVITY at UCI)
- Institute for Software Research at UCI
- Center for Educational Partnerships at UCI
- San Diego Supercomputer Center
- Discovery Science Center
- Digital Industry Promotion, Daegu, Korea
- Sun Microsystems
- Butterfly.net (now Emergent Game Technologies)
- and others
Current Lab Projects

• Heterogeneous game networks (Robert Nideffer)
  – *Unexceptional.net* (multi-platform, location-based (GPS), blog-based game)
  – *Blah-Blah-Blah* (text-speech-text, cell-phone based game)

• Science Learning games (Walt Scacchi)
  – *DSC Dinosaur Game* ((Virtual) exhibit-based, physical interaction life science discovery game with DSC)
  – *Earthquake 2020* (Earthquake Engineering modeling, design, and simulation game)
  – *Game Research Grid* (grid-based, massively multi-player science learning games and community-oriented game venues)
Current Lab Projects

• Autonomous character games (Bill Tomlinson)
  – *Virtual Raft* (interactive wireless tablet PC-based game examining anthropomorphistic migration)
  – *EcoRaft* (interactive wireless tablet PC-based game examining restoration ecology)

• Earth systems games (Falko Kuester, Celia Pearce, Charlie Zender)
  – *Earth Systems Science Game Engine* (high resolution visualization and navigation of very large earth systems data sets)
  – *Spaceship Earth* (global earth systems modeling and simulation game)

• Software engineering games (Andre van der Hoek)
  – *SimSE* (team-based software development role-playing game)
Informal Science Education as a Game Grid Community?

- Science Games
- Game-based Science Learning LAN/Grid Parties as venue for Higher Education
Kinetic City: Mission To Vearth is produced by the American Association for the Advancement of Science, with major funding from the National Science Foundation. Copyright 2002 AAAS. Click here for Terms and Conditions.
Related Research

• Free/Open Source Software Development for Games
  – *Fifth* most popular area for F/OSSD with >10,000 projects on SourceForge.org

• Tools, techniques, and concepts for
  – Game development (e.g., game modding)
  – F/OSS-based game development
  – Online community development
  – Emerging game grid domains (physical sciences, nanotechnology, visual/performing arts, massively multi-participant worlds for living narratives, GameCons, etc.)

  can be brought together for mutual benefit.
What we are doing:
The DSC Dinosaur Game Project
What we’re doing?

Five phase program for developing and deploying *informal science learning games* at DSC designed to scale to massive, multi-player game worlds and online science learning communities.
How we’re doing it?

• **Phase 1**: Conduct design study for two dinosaur-based, CA science education standards compliant, science learning games

• **Phase 2**: Implement, test, deploy, document, and evaluate age/grade/skill-level targeted games at DSC

• **Phase 3**: Integrate Web-based information infrastructure to enable remote science learning games tied to incremental (skill/learning) evaluation, and continuous content improvement/update

• **Phase 4**: Develop and deploy new science learning games built on this infrastructure operating at DSC (and elsewhere)

• **Phase 5**: Transition game infrastructure to grid-based, enabling large-scale, multi-player science learning games
The Concept
Overview

• **Backstory** -- Dinosaur treasure hunt and quest
• **Physical exhibit** -- Paths to dinosaur exhibit learning task activation interfaces
• **Game play** -- Performing the science learning tasks and receiving intrinsic and extrinsic rewards
• **Reward** -- Activation scoring and game-based reward (animation and audio of dinosaur coming to life; revealing new game play levels)
• **Evaluation** -- Tracking visitor game play progress, activations, skill accomplishments, and rewards
• **Redemption** -- Exchanging accumulated reward or activation points for collectible goods.
Concept

- Linking physical exhibits to online game environment
- Maps as guide to experience and future activities
- Maps locate “mesozoic island worlds” within game
- Uncovering and enacting discovery stories
- Rewards come in the form of activating regions on maps that highlight opportunities for more discoveries in online game
Illustrating Island zones relationship to DSC Dinosaur exhibit space
Game-map concept

- Game map –
  - Denotes correspondence from physical Dinosaur exhibit to online game environment
  - Illustrates activation of island worlds that signal completion of science learning tasks
- Other types of in-game or on-site “learning maps” may be provided
  - Family trees, piece assembly puzzles, etc.
User Experience and Game Play Scenarios
Fossil Dig:
Finding, measuring, identifying, and assembling dinosaur bones
Physical interaction

- Discovering fossil bones (digging)
- Measuring bones
- Identifying bones
- Placing bones into skeletal mold table
  - This triggers a signal that the task has been accomplished, activating the map region for that user
Online interaction

- Player sees virtual representation of fossil dig pit and skeletal silhouette
- Emerging skeleton shows bones that were placed while in physical and online environment
- Player can complete skeletal reconstruction fully activating map region
- Activity events stored in centralized database at DSC on an individual/group level
- Upon activation, creatures animate and progressively “come to life”
Addressing science education standards

- Communicate about investigations
- Understand that learning can come from careful observations and simple experiments
- Recognize how factors such as gravity can affect common objects
- Describe an observed change in terms of starting conditions, ending conditions, using words, simple diagrams, or graphs
- Identify what does and does not change when matter experiences an external influence such as push, pull, tip.
Transition and Discussion

• Robert will discuss integration opportunities, and Alex will present some game play scenarios.

• We welcome your questions and comments.

• We want to explore with you the Opportunity Areas and how we might best pursue them with the Discovery Science Center, UCI Game Lab, and Creative Kingdoms.