IT630 – Computer Simulation & Modeling

SERIOUS GAMES, SIMULATIONS, BUSINESS PROCESS MANAGEMENT SIMULATORS, & VIRTUAL WORLDS

DR. ROBERT H. SEIDMAN – AUGUST 31, 2009
Preparing for this class – do prior to class

  - Watch the trailer.
  - Try Smarter Customer Service Scenario to get a feel for it. You do not have to complete it.
- Point your browser to [http://cnettv.cnet.com/](http://cnettv.cnet.com/). In the search field type: *second life w hotel*. In the results, click on “New Edge 2.0: Virtual hotel.”
  - View the video.
- Do an internet search for a current articles on “serious games.”
  - Choose one interesting article. Read it and prepare a 2 paragraph summary that you can share in class.
- OPTIONAL: Get a Second Life account and explore. [http://secondlife.com](http://secondlife.com)
Serious Games & Simulation Modeling

- Part of this class period is devoted to exploring of the current and future role of computer simulation & modeling in the field of serious games and to brainstorming advanced aspects of DES.
- Class time is divided into:
  - Forming 5 groups of 4 students each.
  - Share your serious games articles and choose the most interesting one to present to the entire class.
  - Each group comes up with their definition of ‘serious game.’ Ok to do internet research.
  - Lecture on serious games, virtual worlds & the place of simulation and modeling.
  - In-class group work.
  - Groups report out to entire class.
  - Wrap-up by instructor: serious games, simulation & virtual worlds.
  - Continue our study of simulation modeling using Arena.
Approximate time line for the 195 minute class.

- Minutes 1-20: Group work on articles, definitions and sharing with entire class. (20 minutes)
- Minutes 21-56: Professor’s lecture/demo on serious games, virtual worlds and simulations. (35 minutes)
- Minutes 56-96: Group work on in-class assignment (40 minutes)
- Minutes 97-112: 15-minute Break
- Minutes 117-137: Groups report out on assignment (20 minutes)
- Minutes 138-148: Professor wrap-up on serious games, virtual worlds and simulations (10 minutes)
- Minutes 149-195: Continue coursework on simulation & modeling using Arena software - Rossetti textbook (46 minutes)
Form 5 groups of 4 students each.

You have already individually researched some the literature on serious games. Share your article summaries with your group members & then collectively, decide on the most interesting one to tell to the class. Choose a spokesperson for this article summary.

As a group, create a two-sentence definition of ‘serious game’ and choose a spokesperson to convey this to the class.

Groups post their chosen article summary and definition to the Serious Games discussion forum in Bb.
Groups present their most interesting serious games article summary and their best definition.

Other students can see what the groups have posted to Bb discussion forum.

Class now discusses the definitions and comes up with one definition that we all can agree upon.

SERIOUS GAMES DEFINITION POSTED HERE:

xxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
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Walking through a 3D digital virtual world can hardly be called a game, much less a serious game.

But, how about Innov8 2.0? More about this later.
Serious Game Working Definition:

“Any contest (play) among adversaries (players) operating under constraints (rules) for an objective (winning, victory, or pay-off).” (Abt, 1970)

Educational games (or serious games) are designed to reach people about a certain subject, expand concepts, reinforce development, or help them drill or learn a skill or change their attitudes as they play.
Serious Games Working Definition (continued)

For our purpose, we also include simulations in this category. Simulations resemble games in that both have some underlying model, allowable actions that the learner can take, and constraints under which those actions should occur. Additionally, learners observe their actions’ consequences.”

(von Wangenhein and Shull, 2009).
### Table I. Identifying Simulation Games and Simulators

<table>
<thead>
<tr>
<th>Identifying Characteristics</th>
<th>Games</th>
<th>Simulation Games</th>
<th>Training Simulators</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Involves simulation</td>
<td>1. A virtual environment is present. 2. The application interactively engages the user in a form of simulation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Imaginative experience</td>
<td>1. May provide an imaginative or fictitious simulated environment.</td>
<td></td>
<td>1. Only provides recreations of real-world environments.</td>
</tr>
<tr>
<td>3. Entertaining, fun, and engaging</td>
<td>1. Provides entertainment. 2. Provides interesting &amp; engaging challenges. 3. Provides a fun experience.</td>
<td></td>
<td>1. Not intended to be entertaining, fun, or engaging. 2. Operator may possibly find the application entertaining, fun, and engaging.</td>
</tr>
<tr>
<td>4. Skills development</td>
<td>1. Does not provide an application-specific skill development. 2. Possible, although not as a primary feature.</td>
<td></td>
<td>1. Operator skills-development is the primary purpose of a simulator.</td>
</tr>
<tr>
<td>5. Type of challenge</td>
<td>1. Ideally, a continuous and intelligent challenge.</td>
<td></td>
<td>1. Challenges depicted accurately with respect to an equivalent real-world scenario.</td>
</tr>
</tbody>
</table>
Table IV. Identifying Simulation Games and Serious Games

<table>
<thead>
<tr>
<th>Identifying Characteristics</th>
<th>Simulation Games</th>
<th>Serious Games</th>
</tr>
</thead>
</table>
| 1. Involves simulation     | 1. A virtual environment is present.  
2. The application interactively engages the user in a form of simulation. | | |
| 2. Imaginative experience  | 1. May provide an imaginative or fictitious simulated environment. | | |
2. Provides interesting and engaging challenges.  
3. Provides a fun experience. | 1. Built for non-entertainment  
2. Can provide interesting and engaging challenges.  
3. Can provide a fun experience. | |
| 4. Skills development      | 1. Does not provide an application-specific skill development.  
2. Possible, although not as a primary feature. | 1. Usually designed to provide some form of skill development, especially in training applications. | |
| 5. Type of challenge       | 1. Ideally, a continuous and intelligent challenge. | 1. The challenges vary with the type of simulation. | |
2. Game-play patterns may vary.  
3. Possible development of a game-play gestalt. | 1. Presence of game-play patterns and gestalt vary, depending on the application. | |
2. No obvious end-state. | 2. May or may not have an obvious end-state, depending on application. | |
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Serious Game Design Disciplines

The Heart of Serious Game Design

- Theory
  - Learning
  - Cognition
  - Pedagogy
  - Perception
  - Gender
  - Affect
  - Flow-Presence
  - Psychology
  - Persuasion
  - Consumer Behavior
- Content
  - Cognitive Tutors
  - Corporate Training
  - Museums
  - Health
  - Social Issues
  - Science
  - Ecology
  - K-12, Higher Ed
  - Military Training
  - Everything Else
- Game Design
  - HCI
  - Fun
  - Simulation
  - World Building
  - Advergames
  - Technical Writing
  - Storytelling
  - Level Design
  - Design
  - Art
  - Comics Programming
  - Artificial Intelligence
  - 3D, 2D
  - NPCs
  - Avatars

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Hospital Emergency Room

- Create: Patient Arrivals
- Assign: Record Arrival Time
- Process: Release
- Process: Triage
- Decide: Difficult
- Assign: Mark Critical
- Release: Nurse
- Seize: Wait for Doctor
- Delay: Move to Exam Room
- Delay: Treatment by Nurse
- Seal: Wait in Room
- Delay: Treatment by Doctor

- Record: Patient Dismiss Time
- Record: Patient Departures
- Dispose: Leave Facility

- Hold: Hold Until Triage
- Alter: Call Doctor

- Dispatch: Alter

Doctors: 0
Nurses: 0
Patient Departures: 0

DES model in Arena
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DES model animation view in Arena

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Client Nodes

- Client 1
  - Assign Service Requested_1
- Client 2
  - Assign Service Requested_2
- Client 3
  - Assign Service Requested_3
- Client 4
  - Assign Service Requested_4

Network

- Com_Network
  - Dispatch Requests and Replies in Network

Server Node

- Transaction Monitor
  - Dispatch Requests from Network
- Change Type

DES model in Arena

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MODSIM World is a unique multi-disciplinary International Conference & Exposition for the exchange of modeling & simulation knowledge, research, and technology across industry, government, and academia.

For 2009, the conference focus is on 21st Century Decision-Making: The Art of Modeling & Simulation. Speakers, educational tracks, presentations, and product demonstrations will center on using modeling and simulation tools and practices in emerging & innovative operating environments. Attendees will learn about new applications and practices and have an opportunity to network with other industry professionals.

Here is the description of the MODSIM 2009 serious games track:

Even before computers, people performed complex modeling and simulate activities – directing state-of-the-art technologies – to explore and understand complex phenomena. Over the years, computer hardware and software developments have made increasingly advanced computation covering a broader range of issues possible. Recently, the application of game concepts, design and technologies has brought new perspectives to modeling and simulation. This track focuses on the area of “serious games” – the discipline that leverages game concepts, design and technology for modeling and simulation, training, advertisement, education and social change.

Here is the description of the MODSIM 2009 serious games track: (continued)

Presentations in this track will focus on exploring all dimensions of serious games including those relating to the broader MODSIM World 2009 tracks: Defense & Homeland Security, Education & Training, Engineering & Science, Health & Medicine, Transportation & Logistics, and the Human Dimension. By exploring the tools, technologies, design and implementations of serious games this track intends to challenge traditional perspectives to induce new ideas for how these capabilities can be applied to modern day challenges. (MODSIM, 2009)
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The HIVE continuum

Highly Interactive Virtual Environments Continuum

Infrastructure

Virtual Classrooms

Highly Interactive Virtual Environments

Virtual Worlds

Class Games

Frame Games

Games

Group Challenges

Serious Games

Educational Simulations

(for example, Flight Simulators, War Games)

Media

Sims
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Highly Interactive Virtual Environments Continuum

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DES as a serious game situated inside an interactive virtual world
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Demo of 3D Innov8 2.0 – the avatar

MIKE: Let's focus on productivity. How can we make this more efficient? Our call listers spend lots of time on simple problems, like warranty questions. That's an expensive waste of skills.

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20 Minute Group Activity—Using the Innov8 2.0 Online Simulator

- Group members pair up (2 pairs/each group).
- Point your browser to:
- Choose the Smarter Customer Service Scenario and work through it to the end. Make notes of the choices you make and why. Be sure to take screen shots (you can use [http://www.icyte.com/](http://www.icyte.com/) software to keep track).
- This is a business process management simulator.
- You goal is to relate this simulator to the business process reengineering article you read and to imagine what it would be like to embed Arena (or some such DES) into this simulator or others like it.
- Pairs report to each other. Each group create one response and post to Bb Discussion Forum. Then, groups report to the class.
Class discussion about Innov8 2.0 and Arena embedded in the context of business process reengineering.
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Innov8 2.0 and Arena embedded in the context of business process reengineering.
DES Call Center in Arena: Tech Support part

Tech Support Calls
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DES Call Center in Arena: Graphical output

Model 5-3
Call Center, Version 3

Initial Recording Delay

Tech Call Recording Delay

Order-Status Delay

WIP

Tech 1 Online 0
Tech 2 Online 0
Tech 3 Online 0

Offline Backoffice Research 0
Sales 0

Tech Support
Product 1

Product 2

Product 3

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Proposal to situate a DES serious game inside an interactive virtual world

Figure 24. Full DES language capability embedded into a virtual world simulator such as Innov8 2.0 running in a cloud computing environment with user avatars immersed in a serious game.
Proposal to situate a DES serious game inside an interactive virtual world

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Figure 24. Full DES language capability embedded into a virtual world simulator such as Innov8 2.0 running in a cloud computing environment with user avatars immersed in a serious game.
Homework Assignment – 10 Page (max) paper – library and internet

1. In 3 double-spaced pages, summarize the relationship between discrete-event simulation and serious games.

2. In 3 double-spaced pages explain and describe how business process reengineering (aka, BPM) concepts are taught and tested in IBM’s Innov8 2.0 simulator.

3. In 4 double-spaced pages speculate how DES can be embedded in a serious game simulation/simulator and run in a cloud research environment. Go beyond the instructor’s ideas.

4. Post the completed paper to Bb Assignments page prior to our next class. You will be expected to discuss your paper and your ideas in class.

Paper graded on correctness, clarity, feasibility and creativity of your ideas.