Game-Based Virtual Worlds for Health:
Self-managed chronic care games

Walt Scacchi, Jill Berg, Yunan Chen, Alfred Kobsa, Jung-Ah Lee

Institute for Software Research
and
Center for Computer Games and Virtual Worlds
http://cgvw.ics.uci.edu

9 July 2011
UCI faculty investigating Games for Self-Managed Chronic Care for Asthma, Diabetes, Obesity, etc.

- **Walt Scacchi**, Research Director, ISR and Center for Computer Games and Virtual Worlds – *interested in games for health*
- **Jill Berg**, Associate Professor of Nursing Science – *interested in self-managed chronic care for asthma, diabetes, etc.*
- **Yunan Chen**, Assistant Professor of Information – *interested in personal medical health records, and personalized systems*
- **Alfred Kobsa**, Professor of Informatics – *interested in personalization technologies and privacy*
- **Jung Ah Lee**, Assistant Professor of Nursing Science -- *interested in self-managed chronic care for asthma, diabetes, etc., and US-Korean self-managed care practices*
Quest for the Code: Game for learning about asthma

Learning objectives:
- Early warning signs and symptoms
- Identifying and avoiding asthma triggers
- Myths about asthma
- How asthma affects the lungs
- Proper use of asthma medication devices
- Long-term control medicine and quick-relief medicine
- Measuring and monitoring peak flow
- How to answer questions from peers about asthma
Game-based virtual worlds can be used to support various kinds of tele-medicine, robotic surgery training, and other medical device applications.

Self-managed health care support can include:
- Remote observation, tele-consultation, role-playing and identity switching through avatars, medical device data collection, device software updates, collaborative product/prototype development, and more.
Some findings on Games for Health/Therapeutic Applications

- The design and utility of a game to realize therapeutic value or improve health is not obvious.

### Table 1. Gaming design criteria for stroke rehabilitation programs serving elderly users

<table>
<thead>
<tr>
<th>Criteria for Stroke Rehabilitation</th>
<th>Criteria for Elderly Entertainment</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Adaptability to motor skill level</td>
<td>• Appropriate cognitive challenge</td>
</tr>
<tr>
<td>• Meaningful tasks</td>
<td>• Simple objective/interface</td>
</tr>
<tr>
<td>• Appropriate feedback</td>
<td>• Motivational Feedback</td>
</tr>
<tr>
<td>• Therapy-Appropriate ROM</td>
<td>• Element of social activity</td>
</tr>
<tr>
<td>• Focus diverted from exercise</td>
<td>• Appropriateness of genre</td>
</tr>
<tr>
<td></td>
<td>• Creation of new learning</td>
</tr>
<tr>
<td></td>
<td>• Sensitivity to decreased sensory acuity and slower responses</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pong</th>
<th>Driver's SEAT</th>
<th>Whack-a-mouse</th>
<th>Tetris</th>
<th>Computer Chess</th>
<th>Trivial Pursuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

### Table 2. Gaming design criteria for stroke rehabilitation programs serving elderly users

- Adaptability to motor skill level
- Meaningful tasks
- Appropriate feedback
- Therapy-appropriate ROM
- Focus diverted from exercise
- Appropriate cognitive challenge
- Simple objective/interface
- Motivational Feedback
- Element of social activity
- Appropriateness of genre
- Creation of new learning
- Sensitivity to decreased sensory acuity
- Sensitivity to slower responses
Selected research findings and results in Games for Health

-- 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)