Visual Collaboration and Learning Patterns in 3D Virtual Worlds

Emergence, Elements, Examples, Evaluation

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Agenda Island

1. History
2. Forms
3. Benefits
4. Study
5. Risks
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Virtual Worlds – Background & History

- Virtual = “approaching the actual without arriving there” (Boellstorff)
  - (e.g. ‘she is virtually my sister’)
  - There is a gap between the virtual and the actual

- World = large scale social context
  - in the sense of environment or space, but not only

⇒ Virtual World:
  - Places, Sceneries
  - People & Events
  - Technologies/Artefacts
Virtual Worlds – Background & History

- MUDs (Multi-User Dungeons)
  - Text-based virtual worlds
  - *Adventure*, 1975, ARPANET

- MMOGs (Massively Multi-Player Online Games)
  - including MMORPGs (Role-Playing)
  - *Ultima Online*, 1997, [......], *World of Warcraft*, 2004

- Web 2.0
  - Content creation / User-generated content
  - *Producer + Consumer* = „*Prosumer*“
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Varieties of Virtual Worlds

- Second Life
  - Content creation
  - Media integration
  - Stability Problems
  → All-round solution

  → OpenSim
  - Open-source project, based on Second Life code
  - „Controllable“, extensible, progressing fast
Varieties of Virtual Worlds

- Active Worlds
  - Content creation
  - Video integration
  - "Controllable"

→ Corporate use
→ Rapid Development
Varieties of Virtual Worlds

- OLIVE (Forterra)
  - Accurate physics
  - Whiteboarding, App Sharing, SameTime Integration
  - „~controllable“

  ➔ Simulations
  ➔ Collaborative Work
Varieties of Virtual Worlds

- Qwaq Forums
  - Collaborative Document Editing
  - App Sharing in Development

⇒ Document Collaboration
Varieties of Virtual Worlds

- Sun's Wonderland
  - Content creation, AppSharing
  - Video/PDF viewers, Whitebrd.
  - "Controllable", extensible
  - Flexible (API)
  - Very promising project
Still More Virtual Worlds

- There.com
- Entropia
- Kaneva
- Twinity
- Protosphere
- web.alive
- Multiverse
- Club Penguin
- 3DXplorer
- Vastpark
- MTV’s worlds
- Playstation Home
- Habbo
- HiPiHi
- Gaia
- ......and many more...
Overview of Virtual Worlds

Virtual Worlds
Registered Accounts
Q3 2008
Overview of Virtual Worlds

Virtual worlds by sector

Content creation

Socialising/chat

TV/film/books

Casual gaming

Sports

Misc

Education/development

Mirror world

Fashion/lifestyle

Roleplay/fantasyquests

Music

Toys/real world games

Live or open beta

In development/private beta

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Virtual Worlds – Key Elements

- Immersion
  a) Sensory immersion: Virtual Reality (VR)
  b) Mentally/emotionally involved: Virtual Worlds (VW)

- Presence
  - Feeling of ‘being there’
  - Measured mainly in VR so far
Virtual Worlds – Key Elements

- **Avatars**
  - „I think of avatars as I think of musicians - why do we need them beyond their musical creations? (...and I do think we need them)“
  - Current Research

- **Place / Space**
  - Fully configurable, responsive environment
  - Shared space (socializing, collaboration, ...)
  - Current Research
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Stipulated Benefits of Virtual Worlds for Collaboration & Learning

- **Flexible**: from nearly anywhere, anytime, with anyone
- **Cheap**: low setup costs, no travel costs
- **Memorable**: picture superiority effect (dual coding theory)
- **Engaging**: Immersion & Presence lead to increased attention
- **Rich**: interactive avatars and objects allow for extended communication repertoire.
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Research & Virtual Worlds

- **in** virtual worlds
  - Anthropology (Culture)
  - Economics
  - Education
  - Law and politics
  - Psychology
  - Sociology / Communities
  - ... Collaborative Work

- **on** virtual worlds
  - Computer Graphics
  - Human-Computer-Interaction (HCI)
  - Network Communication
  - ...
Our Research Focus

- **Goals**
  - Support collaborative *work* through 3D Visuals
  - Support collaborative *learning* through 3D Visuals

- **Motivation**
  - It is *unclear how to benefit* from virtual worlds
  - Media richness allows for *memorable experiences*
  - It is *unclear how to design* valuable experiences
Our Research Approach

- Pattern
  “Description of a known solution to a specific type of problem.”

- Collaboration pattern
  “Techniques, behaviors, and activities for people who share a common goal of working together in a group.”
### Our Research: Collaboration Framework

<table>
<thead>
<tr>
<th>Context</th>
<th>Collaborate</th>
<th>Learn</th>
<th>Play</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal</td>
<td>Share</td>
<td>Memorize/Recall</td>
<td>Comprehend</td>
</tr>
<tr>
<td>Dramaturgy</td>
<td>Design/Create</td>
<td>Assess/Evaluate</td>
<td>Decide</td>
</tr>
<tr>
<td>Infra-structure</td>
<td>Communicative Actions</td>
<td>Navigation</td>
<td>Object-Related Actions</td>
</tr>
<tr>
<td></td>
<td>Verbal</td>
<td>Non-verbal</td>
<td>Walk</td>
</tr>
<tr>
<td>Static Objects</td>
<td>Automated Objects</td>
<td>Interactive Objects</td>
<td></td>
</tr>
<tr>
<td>fixed</td>
<td>portable</td>
<td>Update State</td>
<td>Execute Animation</td>
</tr>
</tbody>
</table>

**Who**
- (Participants, Roles, Relations)

**Where**
- (Location, Setting, Atmosphere)

**When**
- (Timing)

**What**
- (Steps/Macro-Actions, Rules)

Our Research: Collaboration Patterns

<table>
<thead>
<tr>
<th>Name</th>
<th>Virtual Team Meeting</th>
<th>Virtual Design Studio</th>
<th>Spatial Group Configuration</th>
<th>Virtual Knowledge Fair</th>
</tr>
</thead>
<tbody>
<tr>
<td>Context</td>
<td>Collaborate – project meeting, team meeting, management meeting, etc.</td>
<td>Collaborate – product development, design session, architectural review, etc.</td>
<td>Collaborate – voting by position, division into groups, revealing similarities, etc.</td>
<td>Collaborate – internal knowledge sharing, dissemination, find partners, etc</td>
</tr>
<tr>
<td>Goal</td>
<td>Share – knowledge transfer</td>
<td>Design – design of a physical or virtual object or building</td>
<td>Decide – vote</td>
<td>Share – exchange experiences and project information, present work or new products, advertise, network</td>
</tr>
<tr>
<td></td>
<td>Decide – decision making</td>
<td>Assess – assess, annotate, modify drafts</td>
<td>Share – show preferences and opinions</td>
<td>Decide – vote</td>
</tr>
<tr>
<td>dramaturgy</td>
<td>Who: &lt; 15 team members</td>
<td>Who: &lt; 6 designers, product engineers, architects</td>
<td>Who: &gt; 10 or &gt; 30 individuals, depending on utilization</td>
<td>Who: &gt; 30 specialists</td>
</tr>
<tr>
<td></td>
<td>Where: virtual team or meeting room</td>
<td>Where: functional design room</td>
<td>Where: vast field, either subdivided into areas or framed by symbols</td>
<td>Where: convention center, pavilions, show rooms, or other stands</td>
</tr>
<tr>
<td></td>
<td>When: &lt; approx. 1 hour (duration)</td>
<td>When: &lt; approx. 4 hours (duration)</td>
<td>When: &lt; 5 minutes (duration)</td>
<td>When: duration of up to an entire day (synchronous) or week (asynchronous)</td>
</tr>
<tr>
<td></td>
<td>What: define the agenda, discuss its items, screen options, reach decisions, document decisions and next steps, as well as responsibilities</td>
<td>What: prepare design room, agree on design scope, import drafts, edit and modify designs, try out design alternatives, export approved versions</td>
<td>What: define the alternatives for voting/assessing, subdivide area and/or place symbols, let users position their avatars on the field, analyze result</td>
<td>What: prepare stands and hallways/paths showing information and demos, run/execute scheduled lectures and presentations, look after visitors</td>
</tr>
<tr>
<td>infrastructure</td>
<td>Actions: Verbal – talk, chat, Non-Verbal – show, affirm, decline, vote, Create/Insert – upload documents Modify – co-edit documents</td>
<td>Actions: Modify – model, sketch, annotate Create/Insert – upload documents Select – select objects or parts Non-Verbal – point, show perspective</td>
<td>Actions: Walk – position avatar on a field subdivision or close to a symbol, to communicate vote, decision or assessment answer</td>
<td>Actions: Verbal – chat, talk, present Non-Verbal – point, draw attention, demonstrate Walk – roam the fair, meet others</td>
</tr>
</tbody>
</table>

![Screenshots](image-url)
Our Research: Classification of Patterns

It is still unclear...
  ▪ ...what value virtual worlds might add
  ▪ ...what enhancements are needed for/in virtual worlds

⇒ Isolate features of Virtual Worlds
⇒ Evaluate / compare to other collaboration technologies (chat/messenger)
Our Research: Collaboration Experiments

- **Project goal:** Development of a website that illustrates the financial crisis, tailored to non-experts
- **Project roles:** PM, Content, Development, Marketing

Experiment: Task 1: Information Sharing
Experiment: Task 1: Information Sharing
Experiment: Task 2: Grounding

- Easy to understand
- Crisis effects for communication
- Discuss briefly about the project. Get to a common understanding. Write the main goals on the board.

Anne 1: the 3rd can be written plus visual?
Jennifer 1: yes for me
Experiment: Task 2: Grounding
Experiment: Task 3: Decision-Making
Experiment: Task 3: Decision-Making
Recall of team members' characteristics and of decisions is better in Virtual World Setting

n = 70

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Risks to Consider or Avoid

- Distracting from task when Virtual World is novel.
- Losing time in building & optimizing environment.
- Oversubstitution for physical encounters.
- Underestimating potential for latent misunderstandings.
- Digital Divide problem emphasized.
“WELL, YES, WE COULD READ YOUR BLOG.... OR YOU COULD JUST TELL US ABOUT YOUR SCHOOL DAY.”
Further Information and Links to our work

- www.visual-literacy.org
- realvirtualx.wordpress.com
- www.knowledge-communication.org
- www.youtube.com/KnowViz
- www.risk-visualization.org
- www.youtube.com/Viz4Mgmt