# Serious Games Taxonomy

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Tuesday, February 19, 2008

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# Games for Health 2008

## Registration is now open!

www.gamesforhealth.org

May 8-9, 2008

Baltimore, MD

## Pre-Conference Workshops : May 7

Virtual Worlds & Health

Games Accessibility Day

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# All Games are Serious

*Work in Progress*

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# Overview

- Justification for Developing a Taxonomy

- Background Investigation & Related Taxonomy Work

- Serious Games Taxonomy Details

- Putting the Taxonomy to Work

- Next Steps

# Why Develop a Taxonomy?
# & Background Investigations...

# Why Do We Need A Taxonomy?

- Get All Serious Games Parties on Same Page

- Erase Various Myths About Serious Games

- Provide Snapshot for Current State of Serious Games Industry

- Find Where R & D is Lacking

- Create Foundation for Future Efforts & Organizing

Serious Games = Games for Learning or Training

Serious Games = Games for Learning or Training

Work Progress

Wrong!!!

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# Other Names Being Used

- Educational Games
- Simulation
- Virtual Reality
- Alternative Purpose Games
- Edutainment
- Digital Game-Based Learning

- Immersive Learning Simulations
- Social Impact Games
- Persuasive Games
- Games for Change
- Games for Good
- Synthetic Learning Environments
- Game-Based "X"

# The Mistake...

*"Too Often Serious Games is Defined Only as That Which the Definer Does!"*

*- Sawyer, 2007*

*"Most Labels Define a Specific Output Ignoring The Larger Possibility Space For Serious Games. This Implies The Possibility Space for Serious Games Only Equals That Specific Label."*

*- Smith & Sawyer February 2008*

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# Pre-Cursors

| Pre-cursor | Purpose & Comparative Advantage | Example(s) |
|---|---|---|
| Game-Based Simulation | 1. Improve accessibility to simulation by merging in game approaches to visuals, interface, rules of play, and fidelity of model such that the impact of exposure to the simulation can be multiplied | Virtual U |
| Game-Based Model | 1. Improve accessibility to model by merging in game approaches to visuals, interface, rules of play, and fidelity such that the impact of exposure to the model can be multiplied. 2. Draw upon techniques for modeling systems with little actual data that game developers excel at. | Bridge Build, Sims |
| Game-Based Visualization | 1. Use visual technologies and techniques from games to create new forms of visualization and more accessible versions of visualization  2. Allow for higher levels of interactive visualization where user actions might affect resulting visualization | Holt Forestry |
| Game-Based Interface | 1. Non standard but highly symbiotic interface design produced often for games applied to other applications.  2. Approach of making interaction with application "fun" using concepts from gaming (e.g. discovery, visual rewards, easter eggs, etc.) often associated with games 3. Re-skinning non-game software & software processes to established game interfaces/interface patterns | Doom Linux Seriousity CTVEE/DARPA |
| Game-Based Application | 1. Any application which derives its output through gameplay  2. Applications which take on game-like interface/interaction qualities to accomplish tasks | "Funware" |
| Game-Based Authoring | 1. Use of tools or game/game engines created for videogaming to output some other piece of media  2. The process of creating another tangible output as a result of gameplay or use of a videogame | Electroplankton |
| Game-Based Production | 1. Use of tools or game/game engines created for videogaming to output some other piece of media  2. The process of creating another tangible output as a result of gameplay or use of a videogame | Machinima |
| Game-Based Messaging \| Advertising \| Marketing | 1. Using games to transmit a message, advertise a product/service, market a product  2. Relating to people through association with videogames for purposes of marketing | |
| Game-Based Training | 1. Add gameplay to enhance motivation to train, or effectiveness of content transfer, behavior change, or specific goal of training | Binary Game |
| Game-Based Education \| Learning | 1. Using gameplay to enhance motivation to learn, engage education, or to enhance effectiveness of content transfer or other specific learning outcome | |

# Pre-Cursors

| Pre-Cursors | Alternative Names | Popularity* |
|---|---|---|
| Game-Based Education | Game-Based Learning, Edutainment, Learning Games | 10,943,370 |
| Game-Based Production | Game-Based Authoring, Machinima | 3,190,010 |
| Game-Based Simulation | Game-Based Simulator, Simulation Game | 2,480,860 |
| Game-Based Messaging | Game-Based Advertising, Game-Based Marketing, Advergaming | 470,620 |
| Game-Based Training | Game-Based Trainer | 12,390 |
| Game-Based Application | | 8,630 |
| Game-Based Visualization | Game Visualization | 3,980 |
| Game-Based Interface | Game Like Interface, Game-Based UI | 3,500 |
| Game-Based Model | | 3,380 |

*Popularity Based on Number of Google Hits.   Ben Sawyer = 59,200   Peter Smith = 970,000

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# Usage Models

| Usage Model | Explanation | Example(s) |
|---|---|---|
| Tool Appropriation | Use of Game Production Tool for Production of Non-Game Content | Machinima |
| Hardware Appropriation | Use of Uniquely Game Hardware for Delivery of Other Service or Content Style | Folding@Home |
| Engine Appropriation | Use of Game Engine for Production of Non-Game Application | Holt Forestry Visualization |
| Game For X | Game with Non-Entertainment Goals As Most Desired Outcome | America's Army |
| Embedded Messaging and/or Action | Entertainment Games with Third-Party Embedded Non-Entertainment Messaging/Action Goals | SimCity Societies |
| Technology Appropriation | Derivative Hardware & Software Output Direct from Games | Network 3D Game Engines |
| Technique Appropriation | User Interface or Design Technique Appropriated from Games for Non-Game Purpose | "Fun Ware" : Applications with Game Like User Interface Properties |
| Talent Appropriation | Appropriation of Talent Due to Game Development Expertise for Non-game Application Need | Park Design by Keita Takahashi |
| Cultural Appropriation | Use of game cultural and visual cues as a means of reaching a particular gamer-oriented audience for branding & messaging | Volvo Commercial w/Rallisport Coca-Cola / World of Warcraft |

# Concepts & Forces at Work

# Games: 30+ Years of Evolutionary Design

Tens of Millions of Customers

Tens of Millions of GPUs

30+ Billion Revenues

Games
|
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Alternative Inputs

Global Culture

Major Multicore Platforms

Darwinian Business Environment

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# Market Segments

| Enterprise | Non-Entertainment Users | | | Retail |
|---|---|---|---|---|
| **Instructors & Utilizers** | E-Learning | Modeling & Simulation | Commercial Serious | **Game Developers** |
| | Education Software | Serious Games | Serious COTS | |
| | Game Marketing & Cultural Cues | Serious Stuff Gamers Do | Commercial Gaming | |
| Game Influenced | Entertainment & Gamers | | | Actual Game |

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# Serious Usage Segments

| | | Gamers | Third Party | Developers | Technologies |
|---|---|---|---|---|---|
| | | Serious Stuff Gamers Do | Instructor \| Therapist \| Mentor \| Leader \| Marketer | Commercial \| Indie \| Serious Software & Hardware | Middleware + Tool Vendors (hardware & software) |
| Serious COTS | Reset Purpose | Wii Exergaming | Curriculum Development | Teaching Guides & Support Forums | Machinima |
| | Modify Software or Hardware | CounterStrike | Revolution (Neverwinter Nights) | Non-Entertainment Modes of Play | PS3 Folding@Home |
| | Augment | Guitar Hero Sequencer Maps for WoW | Curriculum Development | PowerGrid SmartBrainGames | Linux on PS3 |
| Serious Games | Virgin Development | XNA Creators Club \| Indie Development | Use of Specialized Serious Games | Serious Game COTS & Specialized Serious Game Development | Microsoft ESP or Breakaway MOSBE |

# Games = Simulation + Media

- Not local card game, board game night, D&D club from 1980's or that "role play" thing you did at office last week

- Games today means: SOFTWARE but with media conventions...

    - often a <u>highly stylized</u>

    - following specific expected conventions of its user-base

- Today's games are about:

    - Computation/Moore's Law & Networking/Metcalfe's Law

    - And Marshall McLuhan

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# Simulation

Packet Tracer

Federal Budget Game

Media Conventions

Virtual U

Bridge Builder

Simulation ←————————————————————→ Game

Governance & Model Conventions

Sim City

Half-Life 2

MS Flight Simulator

Every Day Shooter

Game

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# Important Related Taxonomies

# Misconceptions

- Game Misconceptions
  - Breadth of Game Design Patterns
  - Multiplayer
- Serious Games Misconceptions
  - Broad Outputs vs. Specific Outputs
  - Hardware as well as Software
  - COTs Representation
  - Applicability of More Obscure Design Patterns

# Additional Design & Engineering Patterns

Google Maps Games    Interactive Fiction Systems    MUDs    SimCountry    Sensor Based Games    PBEM Clients
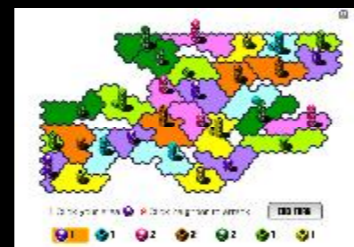
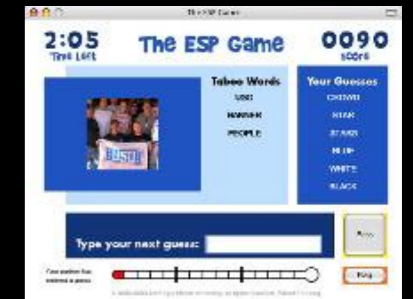ARGs    Simple Augmented Reality    DiceWars    Runescape    Augmented Advanced Card Games    ESP Game/Crowd Sourcing

Audio Only Games    Ajax-Based Games    Habbo Hotel    Whyville    Webkinz / Neopets    Flickr Games

Passively Multiplayer    Fantasy Sports    Mass Balance    Dope Wars    Incident Commander    GeoLocation Games

# Additional Design & Engineering Patterns

| Action | Story | Strategy |
|---|---|---|
| Hunting<br>Dance/Rhythm<br>EyeToy<br>Party<br>Exergaming | Dating<br>Anime Adventures<br>Interactive Fiction<br>MUDs<br>ARGs | Puzzle Games<br>"3 in a Row"<br>Brain Games |
| Serious Games | | |
| Augmented Reality | | |
| Ephemeral Games | | |
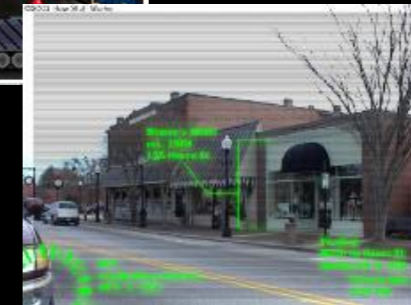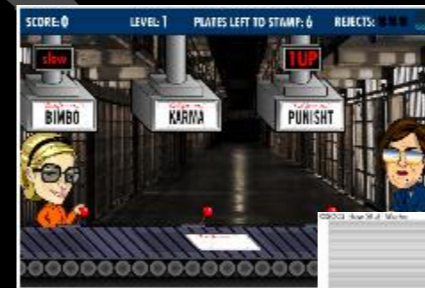
# Lesson:

*You can't have a serious Serious Games Taxonomy without developing a taxonomy of all games*

# Multiplayer Taxonomy

| | Multiplayer Opponents | Multiplayer Tournament | Massive Multiplayer (Shareded) | Massive Multiplayer (Grid) |
|---|---|---|---|---|
| No. of Players | 1-4 | 8-64 | 1000-10,000 | Everyone |
| Server? | Via Provider or P2P | Player Hosted Third Party Hosted | Provider Only | Provider Only |
| Notes | In classroom group games use this approach<br><br>Making History | Most FPS games fit this approach<br><br>America's Army | Most MMPs use this approach<br><br>Lunar Quest | Other MMPs use this approach<br><br>Second Life |

| Name | ARGs | Web MMP | Play By Email | Social Networks Games |
|---|---|---|---|---|
| How Played | Message Boards, Etc. | Turn Based | File Attached to Client | Social Network API Compliant Application |
| Example | World Without Oil | Sim Country | Scrabble | SmartyPants EA | Blueprint |

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# Hardware Re-appropriation

| | Access to hardware | Robust API | Hardware Reuse |
|---|---|---|---|
| **Xbox 360** | Controllers + XNA Creators Club | XNA | Controller |
| **Playstation 3** | Linux Installable Controllers Browser | GCC OpenSource APIs | Controller System |
| **Wii** | Controllers & Web Browser | None | Controller |
| **DS** | Third Party Tools Browser | Unofficial | Homebrew Development + Browser |
| **PSP** | Browser Video Audio | Unofficial | Homebrew Development + Browser + Media Playback + Skype |

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# Taxonomy

# Taxonomy of Serious Games

| | Games for Health | Advergames | Games for Training | Games for Education | Games for Science and Research | Production | Games as Work |
|---|---|---|---|---|---|---|---|
| **Government & NGO** | Public Health Education & Mass Casualty Response | Political Games | Employee Training | Inform Public | Data Collection / Planning | Strategic & Policy Planning | Public Diplomacy, Opinion Research |
| **Defense** | Rehabilitation & Wellness | Recruitment & Propaganda | Soldier/Support Training | School House Education | Wargames / planning | War planning & weapons research | Command & Control |
| **Healthcare** | Cybertherapy / Exergaming | Public Health Policy & Social Awareness Campaigns | Training Games for Health Professionals | Games for Patient Education and Disease Management | Visualization & Epidemiology | Biotech manufacturing & design | Public Health Response Planning & Logistics |
| **Marketing & Communications** | Advertising Treatment | Advertising, marketing with games, product placement | Product Use | Product Information | Opinion Research | Machinima | Opinion Research |
| **Education** | Inform about diseases/risks | Social Issue Games | Train teachers / Train workforce skills | Learning | Computer Science & Recruitment | P2P Learning Constructivism Documentary? | Teaching Distance Learning |
| **Corporate** | Employee Health Information & Wellness | Customer Education & Awareness | Employee Training | Continuing Education & Certification | Advertising / visualization | Strategic Planning | Command & Control |
| **Industry** | Occupational Safety | Sales & Recruitment | Employee Training | Workforce Education | Process Optimization Simulation | Nano/Bio-tech Design | Command & Control |

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# Taxonomy of Serious Games

| | Games for Health | Advergames | Games for Training | Games for Education | Games for Science and Research | Production | Games as Work |
|---|---|---|---|---|---|---|---|
| **Government & NGO** | Public Health Education & Mass Casualty Response | Political Games | Employee Training | Inform Public | Data Collection / Planning / Visualization | Strategic & Policy Planning | Public Diplomacy Opinion Research |
| **Defense** | Combat Medicine, Rehabilitation & Wellness | Recruitment & Messaging | Soldier/Support Training | School House Education | Wargames / planning | War planning & weapons research | Command & Control |
| **Healthcare** | Cybertherapy / Exergaming | Public Health Policy & Social Awareness Campaigns | Training Games for Health Professionals | Games for Patient Education and Disease Management | Visualization & Epidemiology | Biotech manufacturing & design (Folding@Home) | Public Health Response Planning & Logistics |
| **Marketing & Communications** | Advertising Treatment | Advertising, marketing with games, product placement | Product Use | Product Information | Opinion Research | Machinima | Opinion Research |
| **Education** | Inform about diseases/risks | Social Issue Games | Train teachers / Train workforce skills | Learning | Computer Science & Recruitment | P2P Learning Constructivism Documentary? | Teaching Distance Learning |
| **Corporate** | Wellness Information & Wellness | Customer Education & Awareness | Employee Training | Continuing Education & Certification | Advertising / visualization | Strategic Planning | Command & Control |
| **Industry** | Occupational Safety | Sales & Recruitment | Employee Training | Workforce Education | Process Optimization Simulation | Nano/Bio-tech Design | Command & Control |

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# Games for Health Taxonomy

| | Personal | Professional Practice | Research / Academia | Public Health |
|---|---|---|---|---|
| **Preventative** | Exergaming Stress | Patient Communication | Data Collection | Public Health Messaging |
| **Therapeutic** | Rehabitainment Disease Management | Pain Distraction CyberPsychology Disease Management | Virtual Humans | First Responders |
| **Assessment** | Self-Ranking | Measurement | Inducement | Interface/Visualization |
| **Educational** | First Aide Medical Information | Skills / Training | Recruitment | Management Sims |
| **Informatics** | PHR | EMR | Visualization | Epidemiology |

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# Advergaming

| | | Using Games | | | | Game Association | | |
|---|---|---|---|---|---|---|---|---|
| | | In Game Placement | | Out of Game Placement | | | Marketing with Games | |
| | Standalone Advergame | Billboards | Integrated Gameplay | Outside Field of View | Interstitial | Games in Ads | Event Marketing | Product Tie-In |
| **Branding** | Coke Studios | FIFA Soccer | Playboy the Mansion | Game Portals ie. Kongregate | Xbox Live | Coca Cola w/ Warcraft | EA Sports 500 at Talladega | Slusho Cloverfield Game |
| **Product** | Yaris Racing On Xbox Live | Massive In Game Product Placement | Axe Body Spray | Doritos Unlock the Xbox Design Contest | Old Spice Achievement on Xbox Live | Volvo w/ Rallisport | MTV Gamers Ball | Movie Licensed Games |
| **Issue** | Darfur Is Dying | | Second Life Relay for Life | Free Rice | | | | |
| **Political** | Take Back Illinois | | Candidate Second Life Islands | | | Ping Time Labor Party Ad | | |
| **PSA** | Catch The Sperm | Massive in Game Stay in School Ads | | | | Teenage Mom Ad | Penny Arcade ESRB | |
| **Recruitment** | America's Army | British Intelligence Agency in Quake Wars | | Military Recruitment Ads on Game Portals | | US Army Gamer Targeted TV Ad | Army Game Experience | PS2 America's Army |

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# Games for Training

| | Elementary Skills | Occupational Safety | Employee Health & Wellness | Orientation | Awareness | Communications | Skills |
|---|---|---|---|---|---|---|---|
| Informal | Single Task | Single Task | Single Task | Single Task | Single Task | Single Task | Single Task |
| | Comprehensive | Comprehensive | Comprehensive | Comprehensive | Comprehensive | Comprehensive | Comprehensive |
| Formal | Single Task | Single Task | Single Task | Single Task | Single Task | Single Task | Single Task |
| | Comprehensive | Comprehensive | Comprehensive | Comprehensive | Comprehensive | Comprehensive | Comprehensive |

Adapted from Bureau of Labor Statistics : http://www.bls.gov/ept/home.htm#training

# Games for Training

| | Elementary Skills | Occupational Safety | Employee Health & Wellness | Orientation | Awareness | Communications | Skills |
|---|---|---|---|---|---|---|---|
| **Informal** | | U. Wisconsin Malaria Safety | DDR in Offices : Generation Fit | Persuasive Games Cold Stone Creamery | | | Cisco Binary Game |
| | | | | America's Army | | | Rosser Surgery Skills w/Games |
| **Formal** | | | | Persuasive Games Dominos Pizza | DOJ Ethics Game | Coast Guard : Shield of Freedom | Cisco Subnetting |
| | | EtcEdutainment Alcoa SafeDock | | Virtual U | | | Virtual Heroes Hilton Hotels |

Adapted from Bureau of Labor Statistics : http://www.bls.gov/ept/home.htm#training

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# Games for Training: Skills

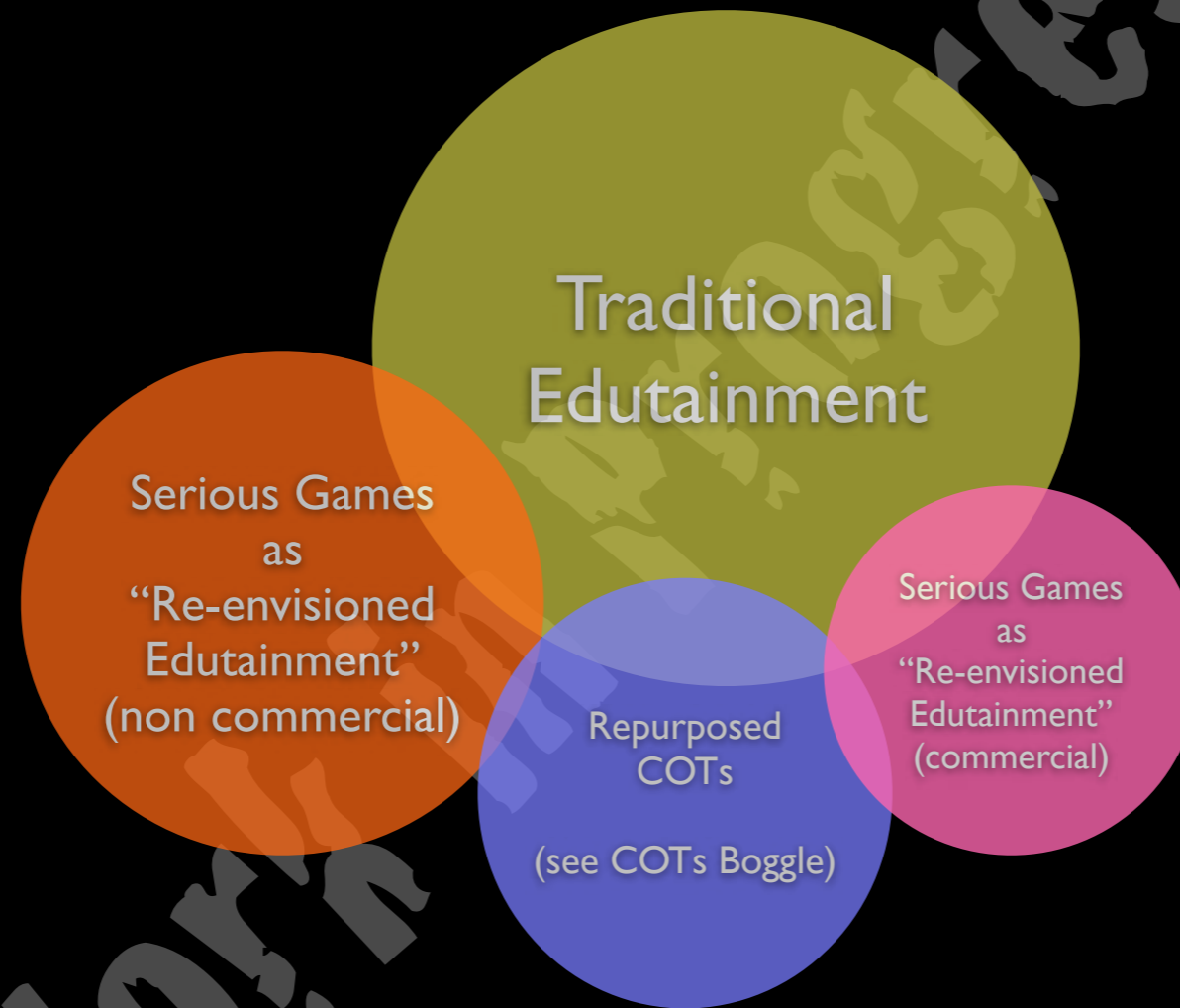| | Management | Professional & Technical Skills | Computer Training | Clerical & Administrative | Sales & Customer Relations | Service Related Training | Production / Manufacturing / Construction |
|---|---|---|---|---|---|---|---|
| **Informal** | Single Task | Single Task | Single Task | Single Task | Single Task | Single Task | Single Task |
| | Comprehensive | Comprehensive | Comprehensive | Comprehensive | Comprehensive | Comprehensive | Comprehensive |
| **Formal** | Single Task | Single Task | Single Task | Single Task | Single Task | Single Task | Single Task |
| | Comprehensive | Comprehensive | Comprehensive | Comprehensive | Comprehensive | Comprehensive | Comprehensive |

Adapted from Bureau of Labor Statistics : http://www.bls.gov/ept/home.htm#training

# Games for Training: Skills

| | Management | Professional & Technical Skills | Computer Training | Clerical & Administrative | Sales & Customer Releations | Service Related Training | Production / Manufacturing / Construction |
|---|---|---|---|---|---|---|---|
| **Informal** | | Cisco Binary Game | | | Cold Stone Creamery | | |
| | Team Training in Multiplayer Games | | | | | | |
| **Formal** | Adaptive Thinking & Leadership | ACLS Legacy Interactive | | | | | |
| | Virtual Leader | Pulse!! | | | Best Buy Verizon | Hilton Hotels | |

Adapted from Bureau of Labor Statistics : http://www.bls.gov/ept/home.htm#training

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# Games for Education



Traditional
Edutainment

Serious Games
as
"Re-envisioned
Edutainment"
(non commercial)

Serious Games
as
"Re-envisioned
Edutainment"
(commercial)

Repurposed
COTs

(see COTs Boggle)

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# Games for Education

| | General | Adult | University | High School | Middle School | Elementary | Pre-K |
|---|---|---|---|---|---|---|---|
| Informal | Driver Simulators | Flight Simulator | Flight Simulator | Civ4 | Project Connect | Zoo Tycoon | PBS Kids |
| Formal | Cisco Binary Game | | Virtual U | Making History | MIT/PBS Labyrinth | GameStar Mechanic | |

- 🟠 Serious Games as "Re-envisioned Edutainment" (non commercial)
- 🔴 Serious Games as "Re-envisioned Edutainment" (commercial)
- 🔵 Repurposed COTs
- 🟡 Traditional Edutainment

# Games for Science and Research

| | Data Collection | Data Visualization | Data Processing |
|---|---|---|---|
| **Research** | Player Tracking Statistics in Halo 3 | GGNViz Forestry Game | Folding @ Home on PS3 |
| **Development** | Google Image Labeler | Landing Lights Park in Second Life | Warhawk PS3 Dedicated Server Farm |

# Games for Production

| | Game Generation | Media Mash-Ups |
|---|---|---|
| **Audio** | Elektoplankton | Remixed Audio |
| **Graphics** | PGR Camera Mode | Unreal Art |
| **Video** | The Movies | Machinima |

# Games as Work

| | Direct Earnings | Non-Earnings Reward | Opinion | Work to Play | Play to Work |
|---|---|---|---|---|---|
| **Competitive** | Online Casinos/ Skills Gaming | Protest | Predictions Markets | ARGs | Professional Gamers |
| **Personal Reward** | Funds/Donation Reward | Exercise | Self Assessment | User Created Content | Game Escorts |
| **Group Oriented** | ??? | Public Diplomacy | Opinion Research | Guild/Clan Management | Seriousity/ Google Image Labeling |
| **Quasi Occupation** | Gold Farming / Character Leveling | Activism | ??? | ??? | Command & Control |

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# Games as Work II

| | Exercise | Grind, Rewards, & Commerce | Management | Protest & Activism |
|---|---|---|---|---|
| **Casual** | Wii-Games | Level Up | Team Up with Friends | Sponsor or Support Virtual Event |
| **Personally Invested** | DDR | Purchase In-Game Items | Join Guild | Participate in Virtual Event |
| **Actively Engaged** | DDR Exercise Mode | Produce Income | Lead Guild | Organize Virtual Event |

# Serious COTS I

|  | Education | Health | Production | Hardware |
|---|---|---|---|---|
| **Entertainment Repurposed** | Civ4 Revolution (Neverwinter Nights) | DDR PopCap Games EyeToy | The Movies 8-Bit Music | Wiimote Hacks |
| **Non-Entertainment @ Outset** | Making History & General Edutainment | Yourself Fitness BrainAge My Life Coach PowerGrid Fitness Wii Fit | Machinimation | Sony Folding@Home |

# Serious COTS II

| | Straight Up | Changed Orientation of Game | Modded Software | Hardware Augmented |
|---|---|---|---|---|
| Individuals Initiated | Yourself Fitness BrainAge LifeCoach | DDR Nascar 98 | Half-Life Architecture | PowerGrid Fitness |
| Third Party Prescribed | Making History | Civ4 | Revolution (Neverwinter Nights) | SmartBrainGames (Biofeedback) |

# Commercial Serious

| | | |
|---|---|---|
| Teaching & Education | Cognitive Health | Visualization |
| Training & Skills | Exercise | Sports Pre-Viz |
| Production | Psychology | Architecture |

# Serious Stuff Gamers Do

| | Play | Work | Teach & Assist | Culture & Communication | Production |
|---|---|---|---|---|---|
| **Level 1** | Freeplay | Exercise | Themselves | Talk | Media & Art |
| **Level 2** | House Rules | Grind, Rewards, & Commerce | Aide Others | Events, Competitions, Conventions & Cosplay | Communities & Web Sites |
| **Level 3** | Mastery | Management | Instruction | Collecting | Stuff |
| **Level 4** | Competition | Protest & Activism | Materials | Comedy | Mods & Software |

# Putting The Taxonomy to Work

# Projected Taxonomy
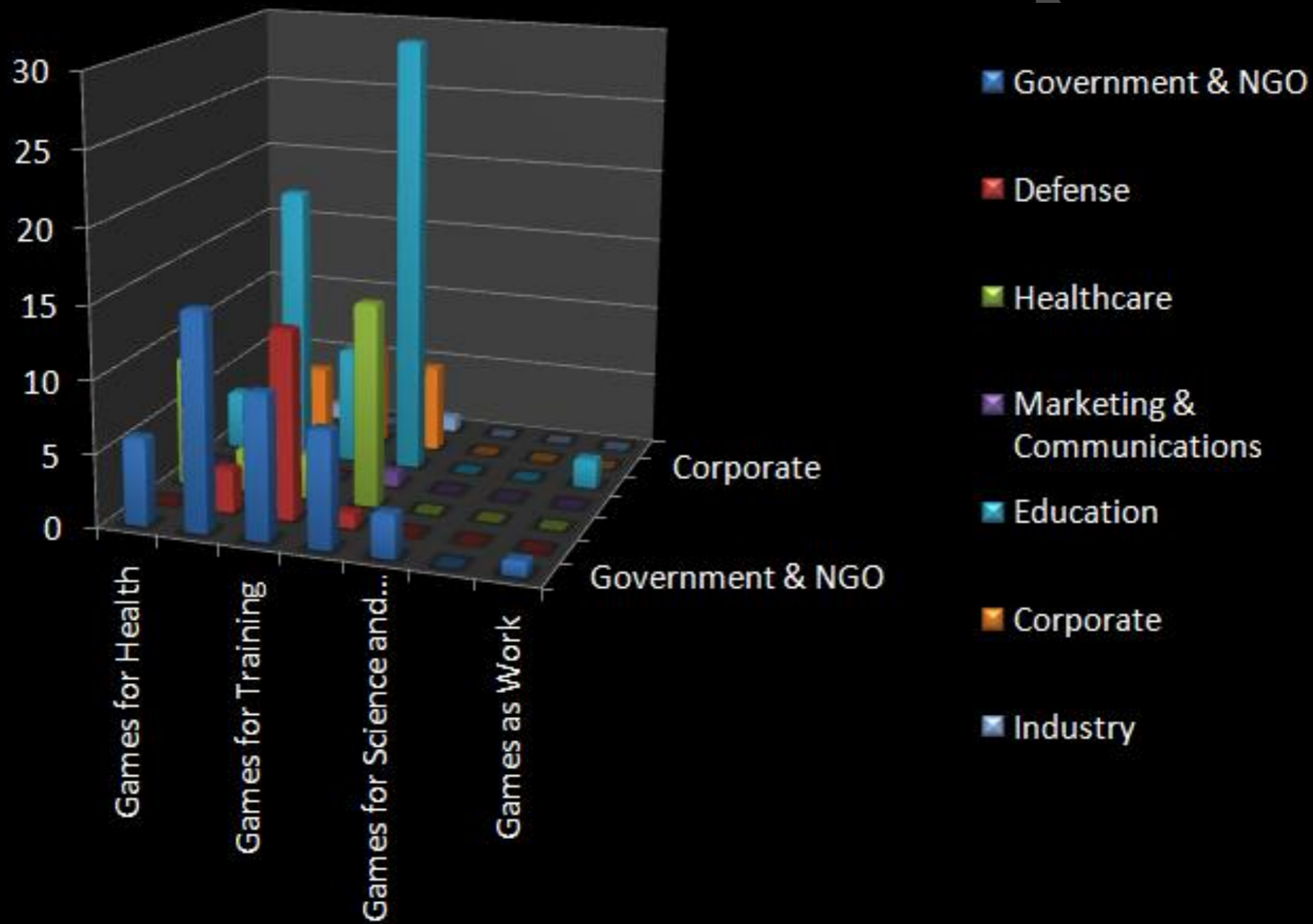
# Number of Games by Industry
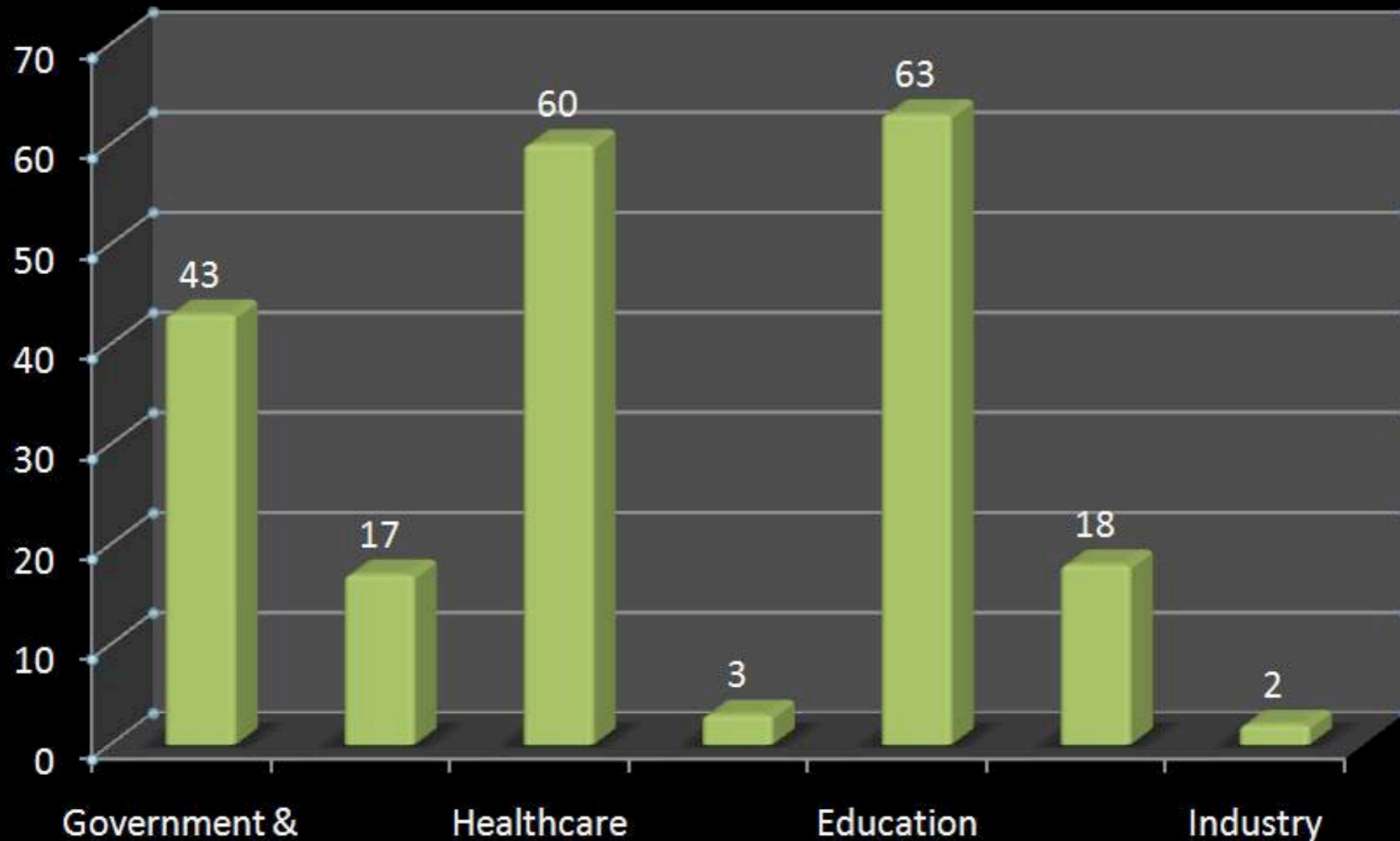
# Last Thoughts...

# A Journey...

- Serious Games = Game Based Simulation

- Serious Games = Games for Government Forsight & Public Policy

- Serious Games = Broader Idea of What Games Can Be

- Serious Games = A Description for a Broader Reapplication of Videogame Resources

- Serious Games = A Broad but Better Defined Reapplication of Videogames

# Next Steps

# Next Steps

- Use This Taxonomy as Starting Point To Define Serious Games Moving Forward

- Continued Discussion and Building Within the Community (Join the Mailing List)

- Taxonomy Will Be Available on a Wiki, Linked to On seriousgames.org

- Community Invited to Contribute to Serious Games Taxonomy 2.0

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# Questions

- Please Fill Out Your Comment Cards

- If You Liked the Presentation Please Give Cards to People At the Door

- If You Did Not We Will Collect Those At the Front

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