Lessons Learned from the Computer Game Industry

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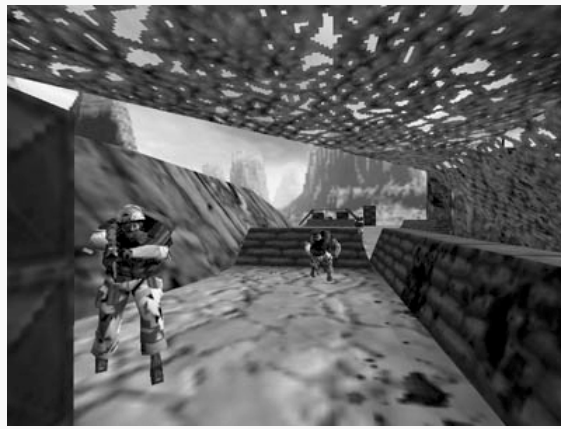


Soar Workshop XX

My Pilgrimage

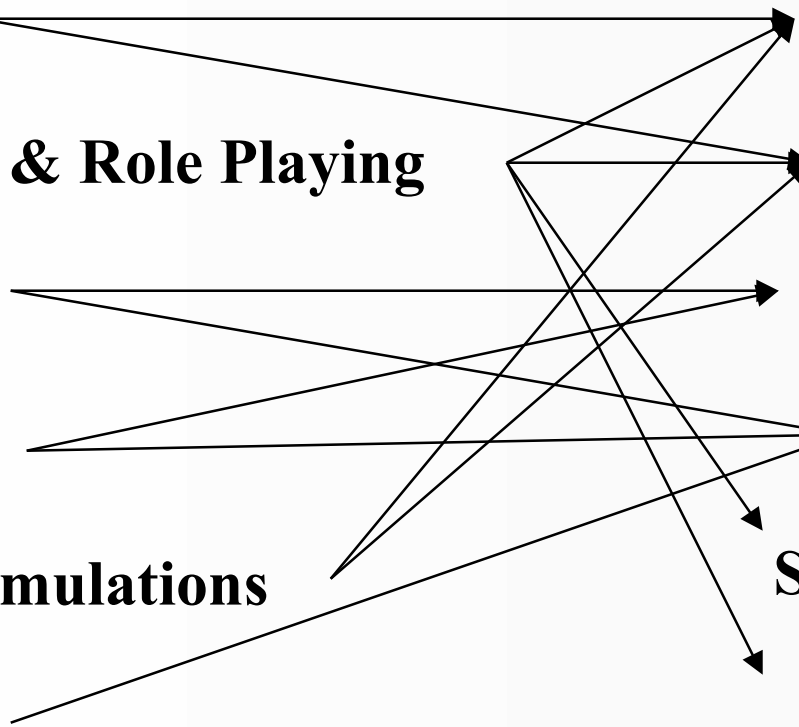
- Attended Game Developers Conference: 1997-2000
- Visited thirteen computer game companies
- Four of the largest companies
  - Activision, Electronic Arts, Microsoft, Sony
- Nine small and medium-sized companies
  - 3DO, Bungie, High Voltage, nSpace, Outrage Entertainment, Presto Studios, Raven Software, Tiburon, Zombie

Computer Games

- **Action**
  - Quake, Unreal, Half-Life, Spec Ops, Rainbow Six
- **Adventure & Role Playing**
  - Blade Runner, Baldur's Gate, Asheron's Call, Everquest
- **Sports**
  - Madden Football, FIFA Soccer, Need for Speed
- **Strategy**
  - Starcraft, Command & Conquer, TacOps, Age of Empires
- **Military Simulations**
  - Flight Simulator, Jane's USAF
- **Misc.**
  - SimCity, Sims, Roller coaster Tycoon

Computer Games & Synthetic Characters

- **Action**
- **Adventure & Role Playing**
- **Sports**
- **Strategy**
- **Military Simulations**
- **Misc**.



Tactical Enemies

Tactical Partners

Strategic Enemies

Individual Units

Support Characters

Story Directors

Computer Game AI

- Goals
  - Entertain, better gameplay,interesting competition
  - Not too predictable, smart, dumb - put up a good fight
- Environment — Very Controlled
- Numbers — Tens
- Development Effort — One man/year
- Development Tools — C & scripting language
- Final Specialization — Level Designer
- Runtime Resources — 5-10% of 1 CPU

The Illusion of Intelligence: When in Doubt, Cheat!

- Unrealistic sensors
  - No fog of war, see through walls
- Unrealistic actions
  - Inhuman aim, better armor, more production capability
- Scripted/captured behavior
  - Based on expert – very specialized
- Emphasize the way it “looks”
  - Motion capture, physics-based motion, …

AI Game Technology

- C or derivatives
  - When in doubt, hack!
- Simple scripting languages
  - Not very reactive
- Finite state machines
  - Good for football players
- Little use of AI techniques (except A*)
  - Decision trees, rule-based systems, neural nets, …

Future of Computer Game AI

- More CPU available for AI; Graphics off CPU
  - Playstation 2, X-Box, G-Force 2
- Good AI is a selling point
  - “Its thinking”
  - People want to “train” against human-level opponents
- More AI-savvy Gamers
  - Already 5 AI Ph.Ds in game industry

Our Challenge

"There are many reasons why online gaming is substantially different from the console experience that has come before, in both obvious and subtle ways. The most important of which is that playing against a real person over the 'net is inherently more interesting than grappling with preprogrammed AI. Ask any PC gamer who spends time searching for deathmatches and he'll tell you that battling against bots, no matter how well designed they may be, just can't hold a candle to fighting human opponents."

Jeff Lundrigan, Sega‘s New Deal, *Next Generation Magazine*, 2:2(5), May 2000, p. 31

Computer Games as a Research Environment

- Detailed, realistic, immersive environments
- Demanding in real-time response
- Cheap ($49.95)
- Robust, bug free, easy to install
- Small memory & processing requirements
- Free level editors
- Some come with bot interfaces
- Great demos!

Possible Research Areas in Computer Games

- Individual Combatants & Command Level Entities
  - Action and Strategy games
- Human-like Behavior
  - Reaction Time, Sensing, Emotions, Personalities, …
- Advanced Capabilities
  - Teamwork, Anticipation/Planning, Language, Learning
- Scenario Control
  - Dynamic changes in scenarios and character goals

Nuggets and Coal

- Nuggets
  - Great environments
  - A real need for better AI
  - They liked my talk!
- Coal
  - No research funding from game companies

Play List for AI & Games

- The Sims, Unreal Tournament