Interactive Media and Game Development

Frontiers 2006

Mark Claypool

What Do You Think Goes Into Developing Games?

- Choose a game you're familiar with
- Assume you are inspired (or forced or paid) to re-engineer the game
- Take 1-2 minutes to write a list of the tasks required
  - Chronological or hierarchical, as you wish
- Trade write-ups with another student
- What do we have?

Outline

- Background
- What is a Game?
- Genres
- The Game Industry
- Game Timeline
- Team Sizes

Professor Background (Who am I?)

- Dr. Mark Claypool (professor, "Mark")
  - Computer Science
  - Interactive Media and Game Development
- Research interests
  - Networks
  - Multimedia
  - Network games
  - Performance

Student Background (Who Are You?)

- Year
  - Junior, Senior, …
- Interest:
  - Art or Programming or …
- Computer Programming
  - (what's a program) 1 to 5 (hacker)
- Gamer
  - (casual) 1 to 5 (hard-core)
- Built any games?
- *Favorite game?*
  - What type of game is it? Why is it fun?
- Other …

Course Materials

http://web.cs.wpi.edu/~claypool/courses/frontiers-06/

- Slides
  - On the Web
  - PPT and PDF
- Resources
  - Game creation toolkits, documentation, etc.

Overall Course Structure

- 8:30-10:30
  - Technical aspects of IMGD
- 10:30-12:30
  - Communication Workshops
- 1:30-3:30
  - Artistic aspects of IMGD (storytelling)
- 3:30-4:30
  - Lab

Technical Course Structure

- Topics
  - Game Design
    - What is a game, what makes it fun, how to design
  - Game Art
    - What is an animation, how to make sprites
  - Game Programming
    - No programming required!
- Use game development tool … Game Maker
  - Game development environment

Rough Timeline

- Days 1-5
  - Aspects of game development
- End of day 5
  - Idea for your own game
- Day 6-8
  - Work on game
- Days 8+
  - Game goes live
- Day 10
  - Demo of game ("event")

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What is a Game? (1 of 3)

- Movie? (ask: why not?)
  → no *interaction*, outcome fixed
- Toy? (has interaction … ask: why not?)
  → no *goal*, but still fun (players can develop own goals)
- Puzzle? (has goal + interaction … ask: why not?)
  → strategy and outcome is the *same* each time

"A computer game is a software program in which one or more players make decisions through the control of game objects and resources, in pursuit of a goal."

What is a Game (2 of 3)

- A Computer Game is a *Software Program*
  - Not a board game or sports
  - Consider: chess vs. soccer vs. Warcraft
    - Ask: What do you lose? What do you gain?
  - Lose: 1) *physical pieces*, 2) *social interaction*
  - Gain: 1) *real-time*, 2) *more immersive*, 3) *more complexity*
- A Computer Game involves *Players*
  - "No, Duh". But stress because *think* about audience. The game is not for *you* but for *them.*
  - Don't just think about your story or the graphics or the interface, but consider the *players*.
  - Ex: complicated flight simulator (say, you are a flying geek) but audience is beginner

What is a Game (3 of 3)

- Playing a Game is About Making Decisions
  - Ex: what weapon to use, what resource to build
  - Can be frustrating if decision does not matter
  - Want good *gameplay* (next major topic)
- Playing a Game is About Control
  - Player wants to impact outcome
  - Uncontrolled sequences can still happen, but should be sparing and make logical
  - Ex: *Riven* uses train system between worlds
- A Game Needs a Goal
  - Ex: Defeat Ganandorf in Zelda
  - Long games may have sub-goals
  - Ex: recover Triforce first, then Sword of Power
  - Without game goals, a player develops his/her own (a toy)


What a Game is Not (1 of 2)

- *A bunch of cool features*
  - Necessary, but not sufficient
  - May even detract, if not careful, by concentrating on features not game
- *A lot of fancy graphics*
  - Games need graphics just as hit movie needs special effect … but neither will save weak idea
  - Again, may detract
  - Game must work without fancy graphics
  - Suggestion: should be fun with simple objects

"When a designer is asked how his game is going to make a difference, I hope he … talks about gameplay, fun and creativity – as opposed to an answer that simply focuses on how good it looks" – Sid Meier *(Civilizations, Railroad Tycoon, Pirates)*

What a Game is Not (2 of 2)

- *A series of puzzles*
  - All games have them
  - But not gameplay in themselves
  - Puzzles are specific, game systems spawn more generic problems
- *An intriguing story*
  - Good story encourages immersion
  - But will mean nothing without gameplay
  - Example: Baldur's Gate, linear story. Going wrong way gets you killed. But not interactive. Interaction in world all leads to same end.

Games are Not Everything

- Most important … *is it fun, compelling, engaging?*
  - And these come from a superset of games
- Computers are good at interactivity
  - Allow for interactive fun
  - *Interactive Media* and Game Development ☺
- Examples:
  - *SimCity* - very compelling, but mostly no goals. More of toy than a game, but still fun.
  - *Grim Fandango* - good visuals, story, etc. But need to do puzzles to proceed. Could have skipped to just watch story. Would still have been *fun* without the gameplay.

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Game Types

- What are some types of games?
- Provide examples
- What separates them from others?

Arcade Games

- Reaction speed are the most important aspect of the game
  - Examples: scrolling shooters, maze games like *Pacman*, paddle games like *Breakout*, *Pong*
- Relatively easy to make
- Normally 2-d graphics
- Good starting point for first game

Puzzle Games

- Clever thinking is the most important aspect
- Ex: Many maze games are actually more based on puzzle solving rather than on reaction speed
- Other examples include board games and sliding puzzles
- Normally 2-dimensional
- Relatively easy to create
  - Except when played against a computer opponent
  - Artificial Intelligence can be harder
    - Ex: How to program the computer to play chess?

Role Playing Games

- Steer a character through a difficult world
  - Examples are *Diablo* and *Baldur's Gate*
- Development of character to learn new skills, becoming more powerful, and finding additional and better weapons
- Opponents become more powerful as well
- Can create 2-d or 3-d
- Generally harder to make because must create the mechanism of character development
- Also normally need large world
- Good level design is crucial

Strategy Games

- Real-time (RTS) or turn-based
- Player only indirectly controls the character
  - Tactics less important than Strategy
- Examples include *Age of Empires*, *Warcraft III*…
  - Also, usually "God Games", such as *B&W*
- Generally take a lot of time to create
  - Require many different game objects, each with animated images and specific behavior

Adventure Games

- Game is about adventure and exploration
  - Story line is rather crucial
- Can be 2-d or 3-d
- Actions easy (just move)
- Difficulty is in making exploration/adventure interesting
  - Interesting, funny, and surprising story line
  - Corresponding artwork
- Artists role crucial

First-Person Shooters

- 3-d version of many arcade-style games (move and shoot)
- Emphasis is on fast-paced action and reaction speed, not on cleverness and puzzle solving
- Many examples: *Doom, Quake, …*
- Need to be 3-d
- Relatively difficult to create because of models

Third-Person Action

- Player directly controls a game character (avatar) through a hostile world
  - Ex: *Tomb Raider*
- Not much emphasis on character development
- Fast action and discovering the game world
- Some have story line, other adventure game aspects
- Can be 2-d or 3-d
- Can sometimes be created easily

Sports Games

- Real-life sport, made virtual
- Ideas, rules in place
- Making realistic, challenging, fun like sport can be difficult

Racing Games

- Drive a vehicle, as fast as possible or sometimes for exploration or combat
- Special type of sport game
- Either realistic (ex: *Formula 1*) or focused on fun aspects (*Midtown Madness*)
- Both 2-d or 3-d

Simulators

- Try for realistic representation
  - Ex: flight simulators
- Other simulations include world simulation
  - Ex: *simCity* or *simEarth*
- Relatively difficult to create since getting details right a challenge

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The Game Industry

- 60% of all Americans play video games
  - In 2000, 35% of Americans rated playing computer and video games as ***the most fun entertainment activity*** for the third consecutive year
- Computer/video game industry on par with box office sales of the movie industry
  - $6.35B/year for U.S. Sales in 2001
- Development
  - Costs $3M to $10M to develop average game
  - Takes 12-24 months

What Games are Played?

- Console game players:
  - Action (30%), sports (20%), racing (15%), RPG (10%), fighting (5%), family entertainment (5%), and shooters (5%)
- Computer gamer players:
  - Strategy (30%), children's entertainment (15%), shooters (15%), family entertainment titles (10%), RPG (10%), sports (5%), racing (5%), adventure (5%), and simulation (5%)

What about Online Games?

- Grew from 38 million (1999) to 68 million (2003)
- Not just for PC gamers anymore
- 24% of revenues will come from online by 2010 (Forrester Research)
- Video gamers
  - 78% have access to the Internet
  - 44% play games online
  - Spend 12.8 hours online per week
  - Spend 6.5 hours playing games online

Game Studios – Vertical Structure

- Developers
- Publishers
- Distributors
- Retailers

- Much like a mini-Hollywood

Developers

- *Design and implement games*
  - Including: programming, art, sound effects, and music
  - Historically, small groups
  - Analogous to book authors
- Structure varies
  - May exist as part of a Publisher
  - May be "full-service" developers or may outsource some
    - Motion Capture (to replicate realistic movement)
    - Art and Animation (can be done by art house/studio)
- Many started on PC games (console development harder to break into)
- Typically work for royalties & funded by advances
  - Do not have the capital, distribution channels, or marketing resources to publish their games
  - Often seen that developers don't get equitable share of profits
  - Can be unstable

Publishers

- *Fund development of games*
  - Including: manufacturing, marketing/PR, distribution, and customer support
- Publishers assume most of the risk, but they also take most of the profits
- Relationship to developers
  - Star Developers can often bully Publishers, because publishers are desperate for content
  - Most Developers are at the mercy of the almighty Publisher (details on relationship in Chapter 7.3, done later)
- Originally grew out of developers
- Massive consolidation in recent years
- Most also develop games in-house

Retailers

- *Sell software*
- Started with mail-order and computer specialty stores
- Shift in 80's to game specialty stores, especially chains (Today 25%)
  - *EB Games*, *GameStop*
- Shift in 90's to mass market retailers (Today 70%) (ask)
  - *Target*, *WalMart*, *Best Buy*
- Retailers generally earn 30% margin on a $50 game
- Electronic download of games via Internet still in infancy
  - Big but not huge (Today 5%)

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Game Development Timeline (1 of 5)

- Inspiration
  - getting the global idea of the game
  - duration: 1 month (for a professional game)
  - people: lead designer
  - result: treatment document, decision to continue
- Conceptualization
  - preparing the "complete" design of the game
  - duration: 3 months
  - people: lead designer
  - result: complete design document
  - (continued next slide)

Concept

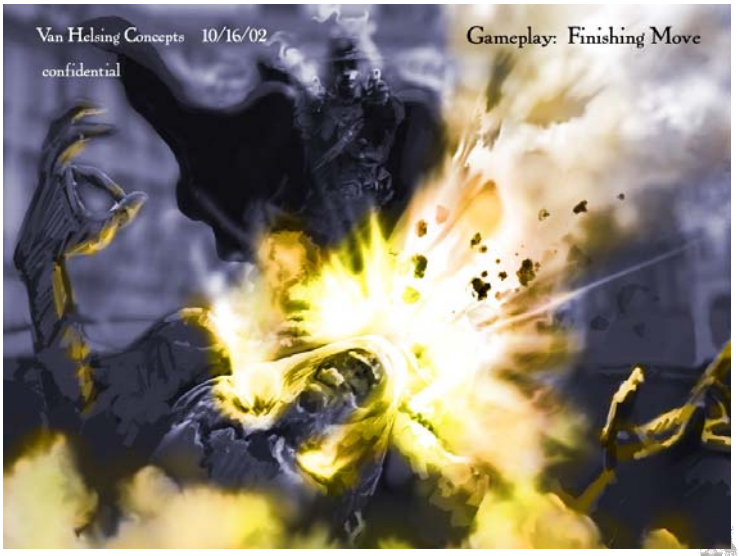
- Define Game Concept
- Define Core Game Features
- Find/Assign Developer
- Estimate Budget & Due Date

Based on notes from Neal Robison, ATI

Concept: Van Helsing (1 of 4)

Based on notes from Neal Robison, ATI

Concept: Van Helsing (2 of 4)



Based on notes from Neal Robison, ATI

Concept: Van Helsing (3 of 4)

(Van Helsing
Pre-Production)

Based on notes from Neal Robison, ATI

Concept: Van Helsing (4 of 4)

(Van Helsing
Finished
Concept)

Based on notes from Neal Robison, ATI

Game Development Timeline (2 of 5)

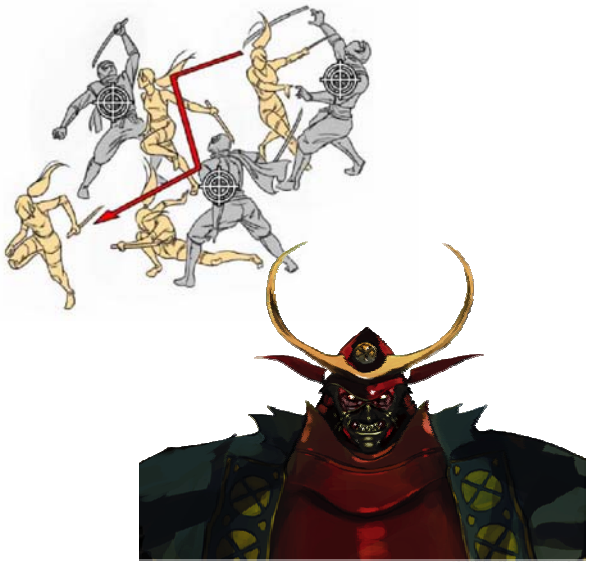
- Prototypes
  - Build prototypes as proof of concept
    - Can take 2-3 months (or more)
    - Typically done a few months in
  - In particular to test game play
  - Throw them away afterwards
  - Pitch to Publisher
- (Continued next slide)

Prototype or 1st Playable

- GDD & TDD = "The Bibles"
- Production Budget & Detailed Schedule
- Submit Concept to Sony, etc.
- Working Prototype, with Game Mechanics
- Focus Test

Based on notes from Neal Robison, ATI

Prototype: Red Ninja (1 of 3)



Based on notes from Neal Robison, ATI

Prototype: Red Ninja (2 of 3)

(Red Ninja
Pre-
Production)

Based on notes from Neal Robison, ATI

Prototype: Red Ninja (3 of 3)

(Red Ninja
Final
Production)

Based on notes from Neal Robison, ATI

Game Development Timeline (3 of 5)

- Blueprint
  - separate the project into different tiers
  - duration: 2 months
  - people: lead designer, software planner
  - result: several mini-specification
- Architecture
  - creating a technical design that specifies tools and technology used
  - duration: 2 months
  - people: project leader, software planner, lead architect
  - result: full technical specification

Game Development Timeline (4 of 5)

- Tool building
  - create a number of (preferably reusable) tools, like 3D graphics engine, level builder, or unit builder
  - duration: 4 months
  - people: project leader and 4 (tool) programmers
  - result: set of functionally tools (maybe not yet feature complete)
- Assembly
  - create the game based on the design document using the tools; update design document and tools as required (consulting the lead designer)
  - duration: 12 months
  - people: project leader, 4 programmers, 4 artists
  - result: the complete game software and toolset

Other Development Milestones: Alpha Definition

- At Alpha stage, a game should:
  - Have all of the required features of the design implemented, but not necessarily working correctly
  - Be tested thoroughly by QA to eliminate any critical gameplay flaws
  - Still likely contain a certain amount of placeholder assets
  - (Continued next slide)

Alpha Definition

- Feature Complete
- "Localization" Begins
- Focus Test
- Play Testing
- Marketing Continues

Based on notes from Neal Robison, ATI

Alpha: Crash Bandicoot (1 of 2)

Based on notes from Neal Robison, ATI

Alpha: Crash Bandicoot (2 of 2)

(Crash Bandicoot)

Game Development Timeline (5 of 5)

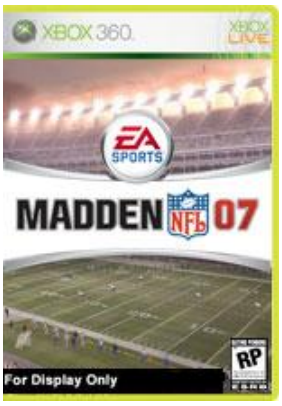
- Level design
  - create the levels for the game
  - duration: 4 months
  - people: project leader, 3 level designers
  - result: finished game with all levels, in-game tutorials, manuals
- Review
  - testing the code, the gameplay, and the levels
  - duration: 3 months (partially overlapping level design)
  - people: 4 testers
  - result: the gold master

Other Development Milestones: Beta Definition

- At Beta stage, a game should:
  - Have all content complete
  - Be tested thoroughly for bugs and gameplay tweaks
  - Be shown to press for preview features
  - (Continued next slide)

Stages of Development: Beta

- Polish, Polish, Polish
- Game Balancing
- Localization Continues
- Demo Versions



Based on notes from Neal Robison, ATI

Other Development Milestones: Gold Master Definition

- At Gold Master stage, a game should:
  - Be sent to the platform holder/s (where applicable) for TRC testing
  - Be sent to press for review
  - Be sent to duplication for production
  - Be backed up and stored
  - (Continued next slide)

Final/GMC/Gold

- The Game is "Done"
- Testing, Testing, Testing
- Intense Pressure
- Submit to Console developers
- Manufacturing Timing

Based on notes from Neal Robison, ATI

Post-Mortem

- Analysis of PR, Marketing
- Analysis of Production, Source Code
- Archive All Assets
- What went right, what went wrong
- Kick-off the Sequel!

Based on notes from Neal Robison, ATI

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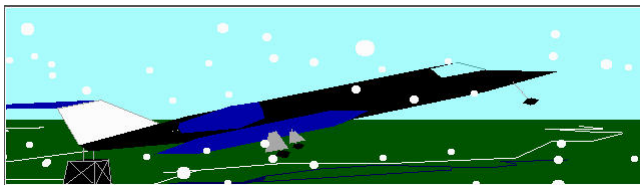
Development Team Size

- As late as the mid-80's teams as small as one person.
- Today, teams today ranging from 10-60 people.
- Programming now a proportionally smaller part of any project
- Artistic content creation proportionally larger
- See Gamasutra, (www.gamasutra.com)
  - Search for "post mortem"
  - Game data at bottom includes team size and composition

Development Team 1988

- Sublogic's *JET* (early flight sim)
  - Sublogic later made scenery files for Microsoft flight simulator
- 3 Programmers
- 1 Part-Time Artist
- 1 Tester

Total: 5



Development Team 1995

- Interplay's *Descent*
  - Used 3d polygon engine, not 2d sprites
- 6 Programmers
- 1 Artist
- 2 Level Designers
- 1 Sound Designer
- Off-site Musicians

Total: 11

Development Team 2002

- THQ's *AlterEcho*
- 1 Executive Producer
- 1 Producer
- 4 Programmers
- 2 Game Designers
- 1 Writer
- 3 Level Designers

Total: 19+

- 3 Character Modelers and Animators
- 1 2d and Texture Artist
- 1 Audio Designer
- 1 Cinematic Animator
- 1 QA Lead and Testers

Development Teams for Online Games

- Star Wars online (2003?)
- Development team: 44 people
  - 50% Artists
  - 25% Designers
  - 25% Programmers
- 3 Producers
- "Live" Team (starting at Beta, 6 months before done)
  - 8 Developers
  - 50-60 Customer support (for 200K users)
  - 1000 Volunteer staff (for 200K users)

A (Larger) Developer Company Today

- Designing and creating computer games is serious business
  - Large budgets ($1 million+)
  - Large number of people involved
  - Large risk
- Wisdom
  - Use modern software development techniques
  - Keep creativity were it belongs
    - In the design
    - Not during the programming