Lecture 18

Game Analytics
The Loss of a Course

- **CS/Info 4154: Analytic-Driven Game Design**
  - Course that focused on analyzing gameplay data
  - Games included code to record what players do
  - Students ran statistics to see what worked/failed
  - Student altered gameplay to meet certain targets

- **No longer exists** for two major reasons
  - The faculty member who ran it left Cornell
  - Depended heavily on Flash for larger player base
The Loss of a Course

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Unfortunate since more relevant that ever
Will Break Into Two Lectures

- **Today:** Understanding analytics
  - Why is it so important to modern game design?
  - What are the different kinds of analytics?
  - What types of questions can be answered

- **Next Time:** Implementing analytics
  - How to instrument your code
  - How to record the instrumented features
  - How to visualize the results
The Role of Analytics

- Game development continues after you ship
  - Improvements to expand player base
  - Critical for DLC or in-game items
- Mixture of **business** and **game design**
  - How do you keep players playing the game?
  - What do they like? What makes them frustrated?
  - This is the **new direction** of game design
- Breaks down into **three categories**
  - Categories determined by data complexity
Player Activity Analytics

- Data for a single player
- Or for a given player group

- Examples:
  - How often do they play?
  - When does the player quit?
  - Can we get the player back?

- Some support from platform
  - Generalities like play time
  - Found in Facebook, Steam
  - Custom solutions for more
Player Activity Analytics

FarmVille DAU

Facebook Eliminates Pre-Game Gift Interstitials
Christmas and New Year's Dips
Horse Stable Promo Starts
Game System Analytics

- **Non-spatial game data**
  - Behavior of many players
  - Often the game economy
  - Also issues of game balance
- Needs custom data gathering
  - Data tailored to your game
  - And so are the data queries
- But visualization is easy
  - Queries *format* is standard
  - Can use existing viz tools
**Example**: Weapon economy in *Eve Online*
Spatial Data Analytics
Spatial Data Analytics

- **Spatial game data**
  - Where are things happening
  - Critical for big MMOs
  - Also useful in level design

- Requires custom solutions
  - Custom data collection
  - Custom data visualization

- Complex tools made in-house by the game studios
  - Only worth it for big games
Player Activity: Funnel Charts

1000 People Clicked on the Ad
880 People Downloaded Client
650 People Created an Account
550 Entered Credit Card

What Happened?
200 Created a Character
180 Played 15 Minutes
**Goal**: find “pain points”
- When does player quit X?
- Why doesn’t player do Y?
- Less pain = more accessible

But do not necessarily want to eliminate them all
- Easy game = casual game
- Turns off hardcore players
- Hardcore players are needed for almost any game (?)

Funnel Charts and Design

- Starts Quest Chain
- Completes 1st
- Completes 2nd
- Creates a Character
- Reaches 10th Level
- Reaches 20th
- Joins Guild
Casual and Core are property of players, not the game.
Casual and Core are property of **players**, not the **game**

- Interested
- Casual
- Commited
- Devoted
- Hardcore

- Occasional Free Player
- Bought an Item
- Buys a Lot

**Free-to-Play Games**
Casual and Core are property of *players*, not the *game*

Goal of funnel is to find out how far apart these are
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Goal of funnel is to find out how far apart these are

```
Interested  Casual  Commited  Devoted  Hardcore
```

**Casual-Hardcore Spectrum**
Funnel charts are typically game specific

- **What** distinguishes casual from core?
- Cannot get this from platform specific tools

This requires **custom instrumentation**

- Functions called at specific activity
- Record result of activity … *somewhere*
- Almost exactly the same as profiling
- Except that there are no pre-made tools
Logging Game Data

Query 1

Query 2

Query 3

Game Analytics
Logging Game Data

Will talk about this more next time
Player Logging: Other Benefits

- **Helping players**
  - Restoring lost items
  - Fixing data corruption

- **Finding cheaters**
  - Did they use an exploit?
  - Is their skill plausible?

- **In-game advertising**
  - But beware selling user data
  - Most states have data laws

- Game is run as a **service**
Gameplay Activity

- Very similar to player activity
  - Custom instrumentation code
  - Put in datastore and queried
  - Only difference is what looking for

- Focusing on game mechanics, not individuals
  - But focus on **non-spatial** game systems
  - Want systems that can be visualized numerically
  - Generally means **resources** and **game economies**
EVE Examples: Titanium

- Shuttles can be reprocessed
- Can turn back into minerals
- Can use (for building) or resell these minerals
- Shuttles have a fixed cost
- What if player is bankrupt?
- Gives players a fallback
- Puts price cap on Titanium
- If too much, buy shuttles
- Do we like this design?

![Graph showing Calderi shuttles and titanium over time](attachment:image.png)
EVE Examples: Weapons

- *Trinity* altered gameplay
  - Changed torpedo mechanics
  - Range was made shorter
  - But rate of fire increased
- But players valued range
  - Torpedos volume dropped
  - Cruise Missiles spiked
  - Similar chart for launchers
- But this not mean that the redesign was a bad idea
Spatial Game Data

- Needed for anything that depends on location
  - Identify where players are having difficulty
  - Critical for MMOs, large and persistent worlds
  - **Example**: player death heat maps

- Visualization is much, much harder
  - Spatial representation is particular to your game
  - There are no simple, existing solutions
  - Companies create their own custom tools
Spatial Data: Heatmaps

Zone of Death!
SWTOR Example: Chat Logs

Filter on:
How do I…
SWTOR Example: Chat Logs

Filter on:
Bug, Broken
SWTOR Example: Player Deaths

Legend:
Orange = group
Green = solo
SWTOR Example: Player Deaths

Legend:
Orange = group
Green = solo

Enemy level - player level
SWOTOR Example: Patrol Paths

Encounter “pull” radius
Challenges of Spatial Data

- There are many 3rd party data analysis tools
  - Data analysis is a major part of running a business
  - Business tools work well for player analysis

- But spatial data is very *game specific*
  - Superimposed onto your game visuals
  - Must integrate into your rendering engine
  - Limited to high-end game companies

- What can an **Indie developer** do?
The Simplest Option: Excel

Game Analytics
The Professional Option: **Tableau**

**Hockey Game Session**

**Shot Timing Profile**

**Shots by Player**

Choose Player(s)
- B??
- Bru
- Cla
- Dal
- Eri
- Feh
- Gor
- Gre
- Knu
- Lai
- Lun
- Mod
- Mor
- Nea
- Nis
- Nul

Shot Type
- BACKHAND
- SLAP
- WRIST
Tableau is Better on Large Datasets

Game Play Analysis

Character Types

Assassins & Fighters

Damagers & Tanks

Hybrid Characters

Game Average

Healers

Highlight Tier
- Tier A
- Tier B
- Tier C
- Tier D

Choose Character
- Aldon
- Alekim
- Angok
- Angust
- Arir
- Atrim
- Brybur
- Cereck
- Chyden
- Drasayo
- Eldworu
- Enur
- Faor
- Garler
- Geess
- Ghaia
- Hoet
- Jitin
- Joen
- Kalidel
- Kelech

Summary Statistics

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Summary

- Gameplay analytics are increasingly important
  - Often driven by your business model
  - Crucial for monetized/free-to-play games
  - Skill heavily in demand at most game companies

- Often break data into different types
  - **Player analytics**: activity of a player over time
  - **Gameplay analytics**: game economy and balance
  - **Spatial analytics**: Locality of behavior in game