the gamedesigninitiative at cornell university

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

- **CS/Info 4154:** Analytic-Driven Game Design
  - Course that focused on analyzing gameplay data
  - Games included code to record what players do
  - Stude[illegible]failed
  - Stude[illegible]argets
- **No longer exists** for two major reasons
  - The faculty member who ran it left Cornell
  - Depended heavily on Flash for larger player base

Unfortunate since more relevant that ever

Will Break Into Two Lectures

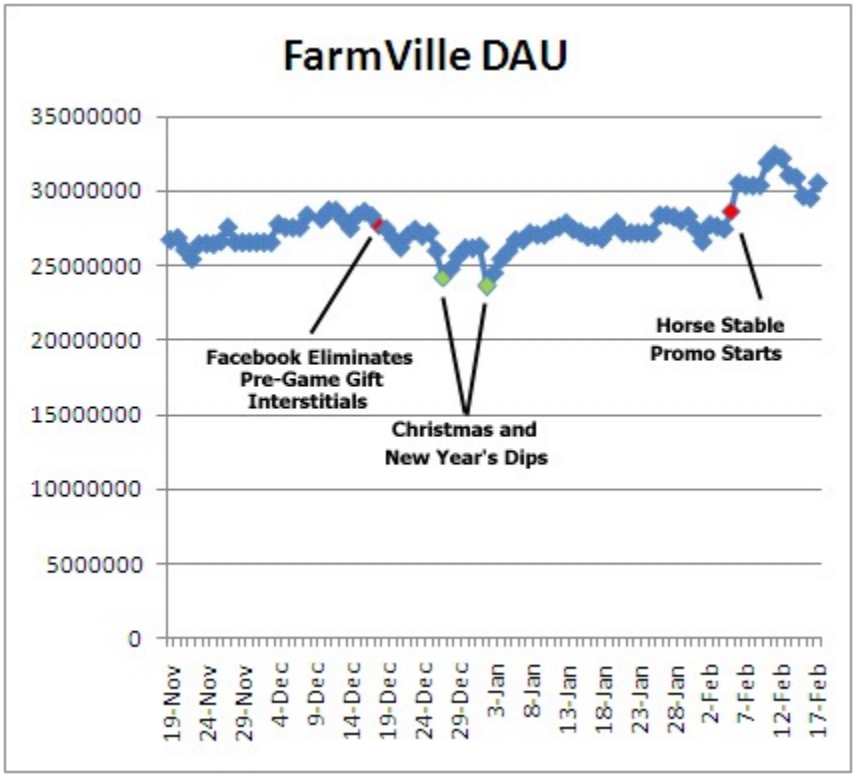
- **Today:** Understanding analytics
  - Why is it so important to modern game design?
  - What are the different kinds of analytics?
  - What types of questions can be answered
- **Next Time:** Implementing analytics
  - How to instrument your code
  - How to record the instrumented features
  - How 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

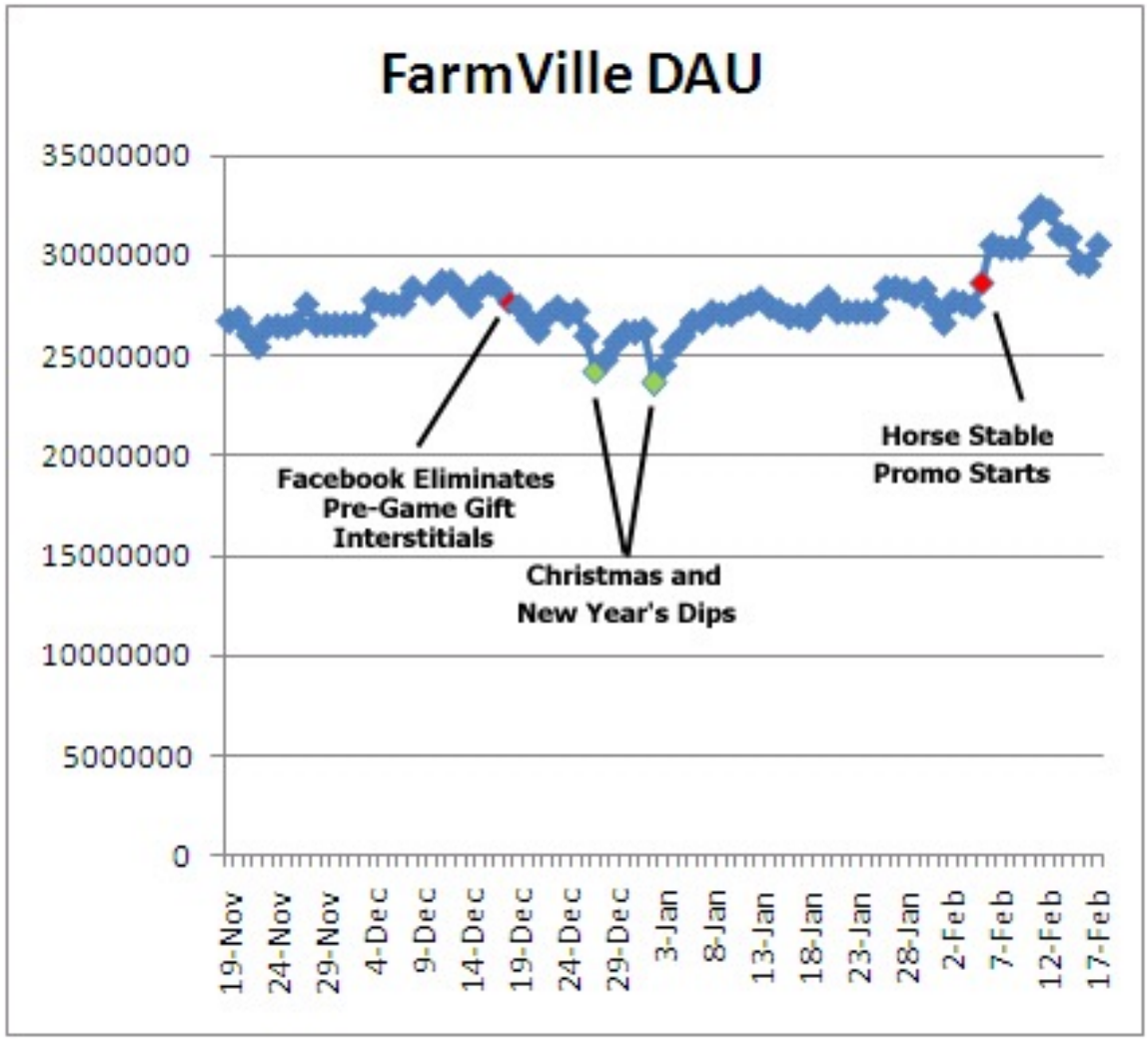
- Mixture of **business** and **game design**
  - How do you keep players playing the game?
  - What do they like? What makes them frustrated?
  - This is the new direction of game design
- Breaks down into **three categories**
  - Categories determined by data complexity

Player Activity Analytics

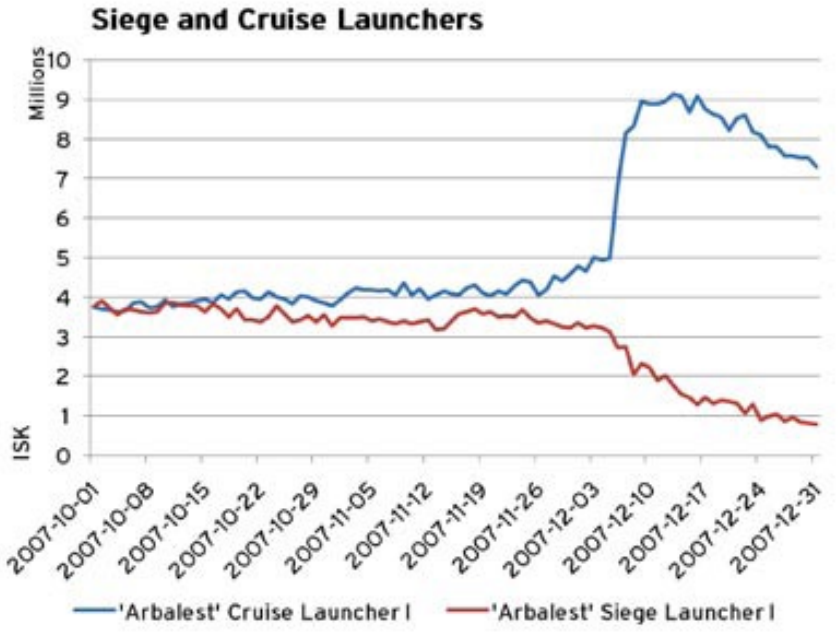


- **Data for a single player**
  - Or for a given player group
- **Examples**:
  - How often do they play?
  - When does the player quit?
  - Can we get the player back?
- Some support from platform
  - Generalities like play time
  - Found in Facebook, Steam
  - Custom solutions for more

Player Activity Analytics



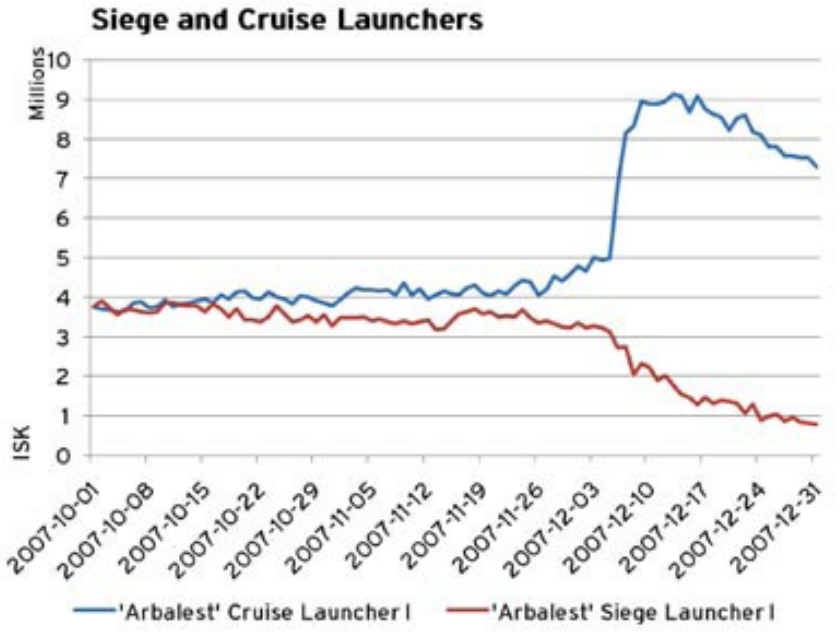
Game System Analytics

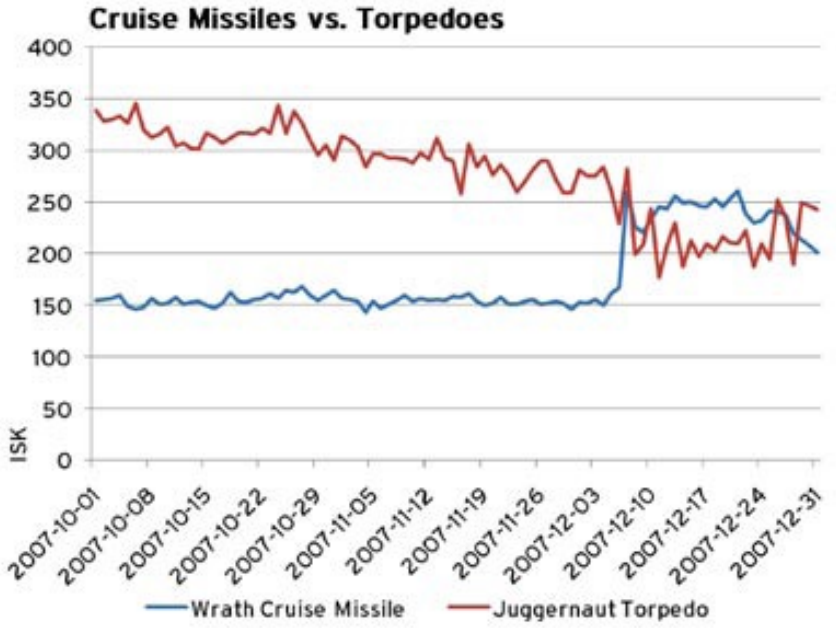


- **Non-spatial game data**
  - Behavior of many players
  - Often the game economy
  - Also issues of game balance
- Needs custom data gathering
  - Data tailored to your game
  - And so are the data queries
- But visualization is easy
  - Queries *format* is standard
  - Can use existing viz tools

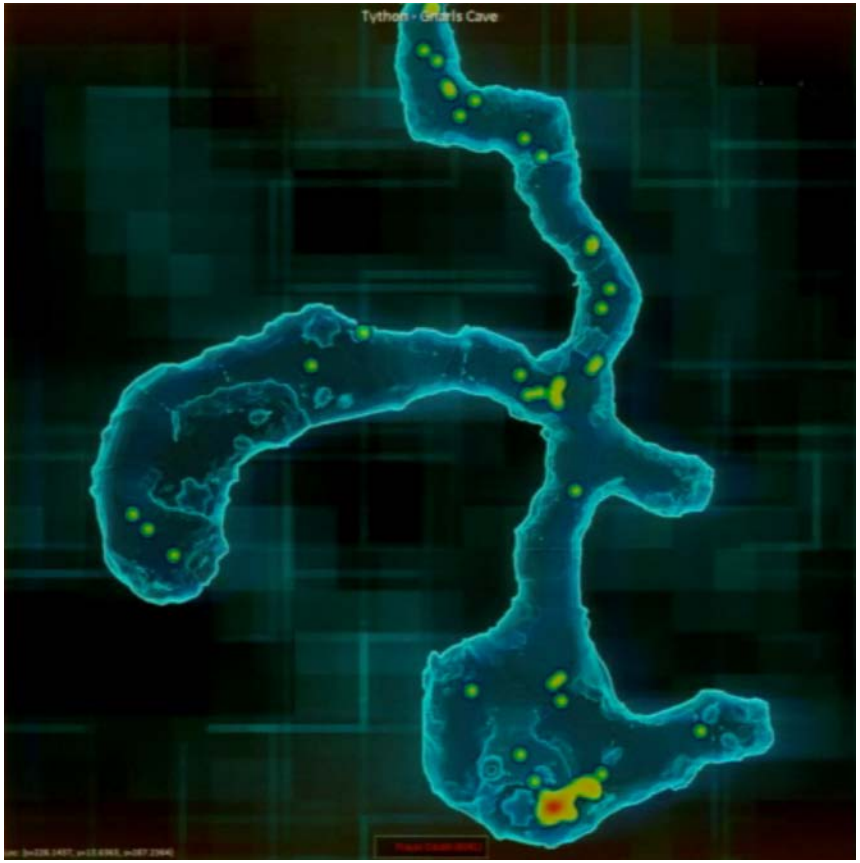
Game System Analytics

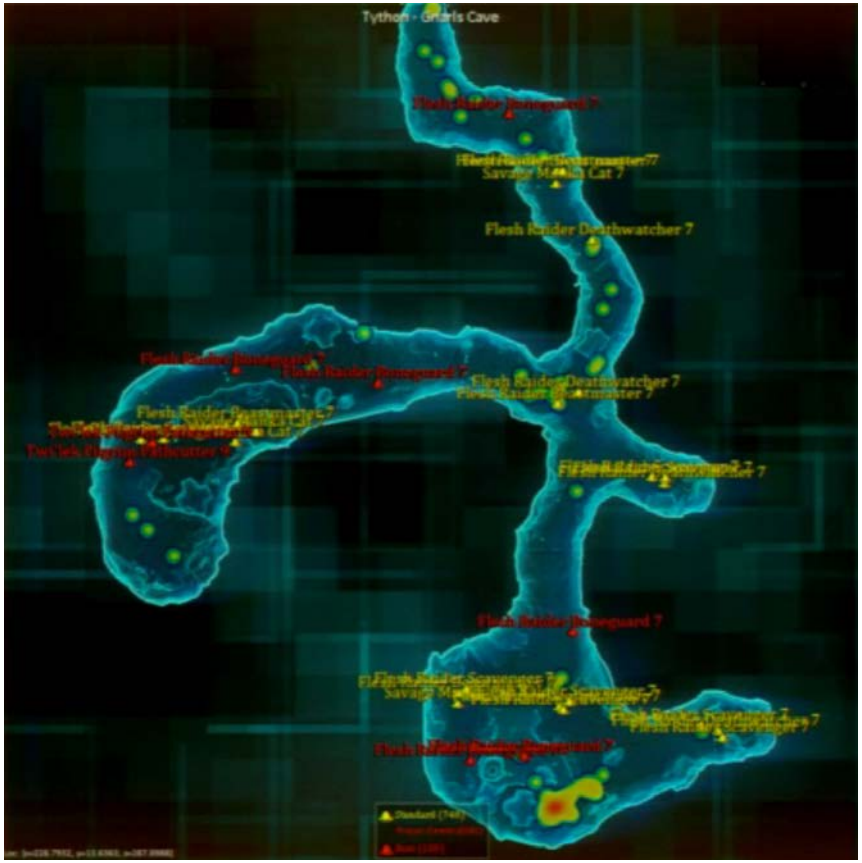
- **Example**: Weapon economy in *Eve Online*



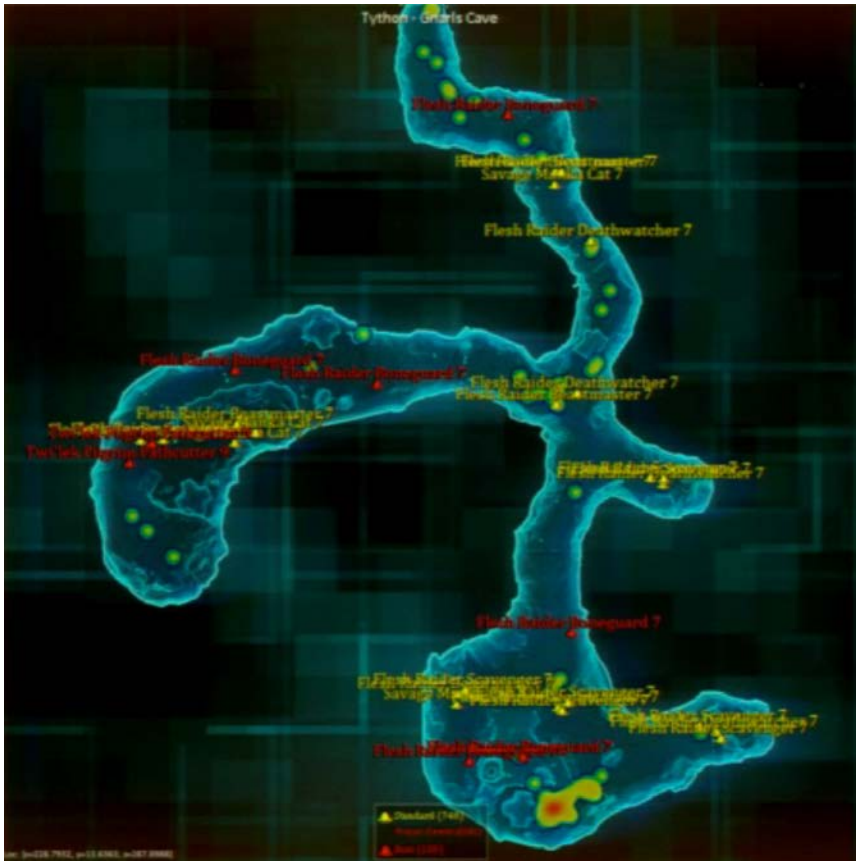


Spatial Data Analytics





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

200 Created a Character

180 Played 15 Minutes

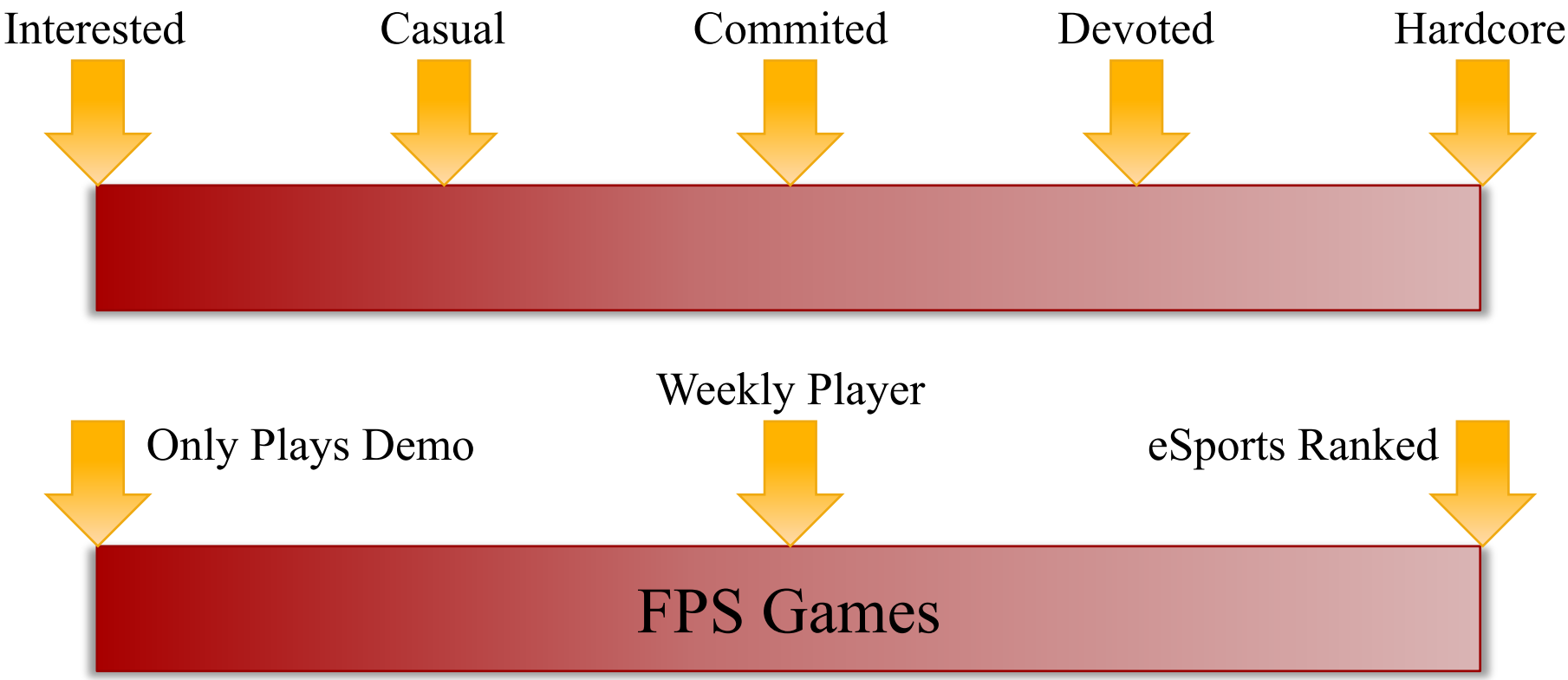
What Happened?

Funnel Charts and Design

- **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 (???)

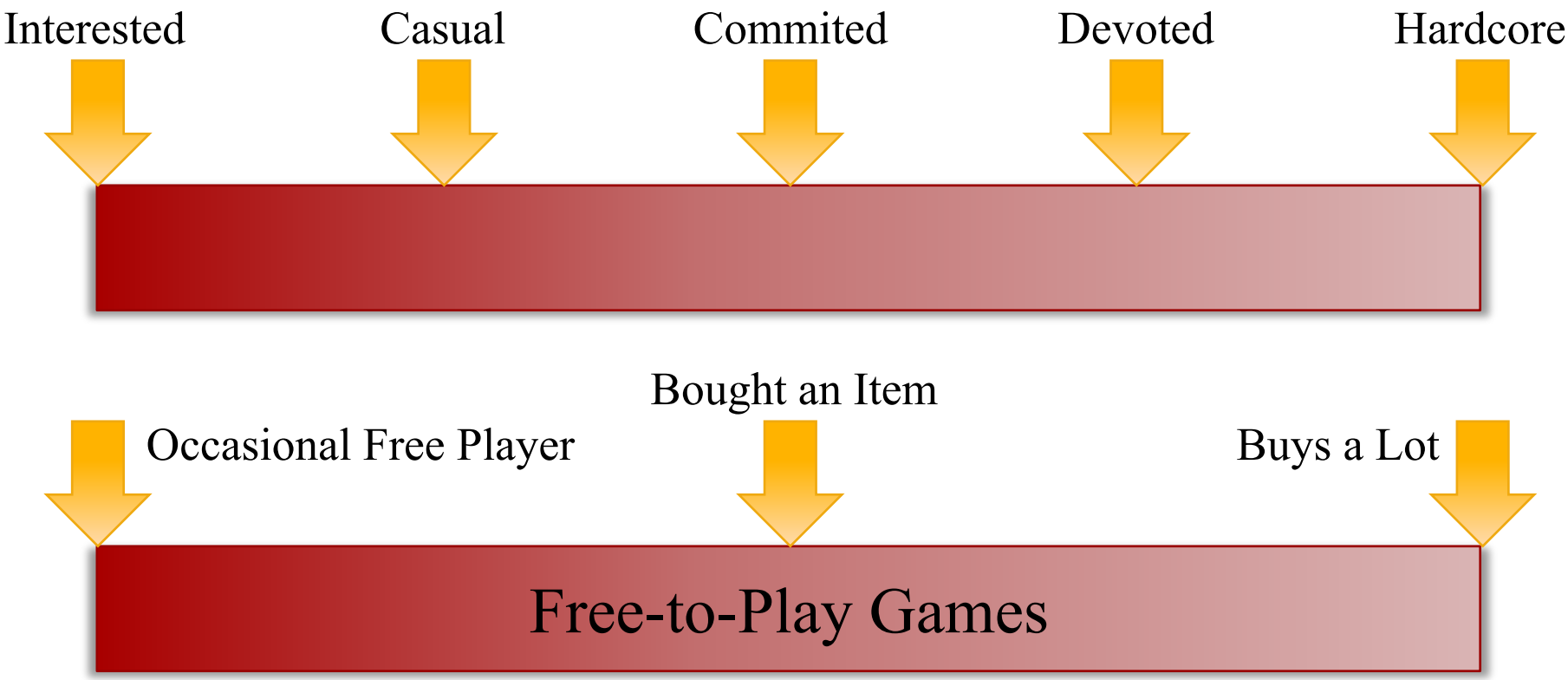
Casual-Hardcore Spectrum

Casual and Core are property of **players**, not the **game**



Casual-Hardcore Spectrum

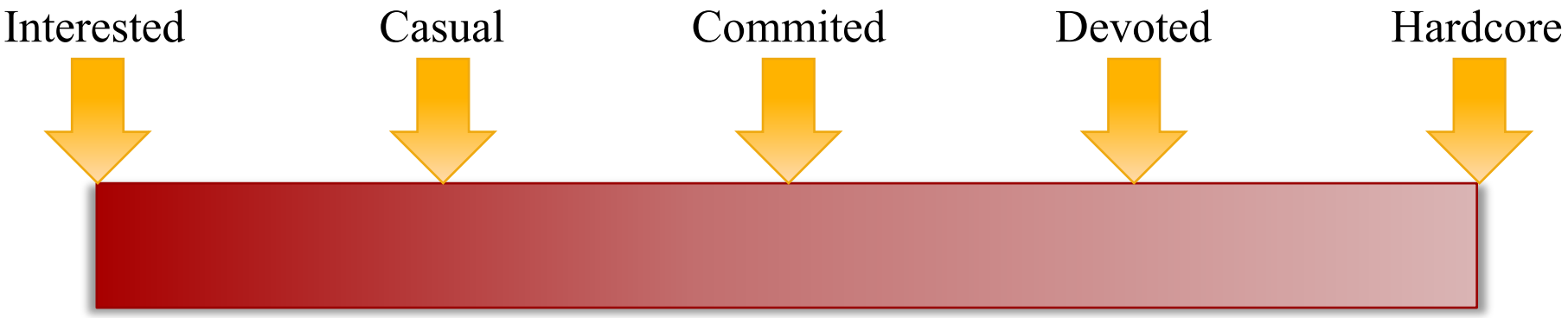
Casual and Core are property of **players**, not the **game**



Casual-Hardcore Spectrum

Casual and Core are property of **players**, not the **game**

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



Casual-Hardcore Spectrum

Casual and Core are property of **players**, not the **game**

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

Game Specific Data

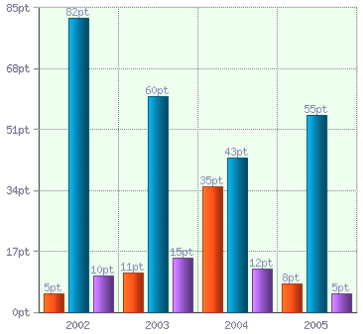
- Funnel charts are typically game specific
  - **What** distinguishes casual from core?
  - Cannot get this from platform specific tools
- This requires **custom instrumentation**
  - Functions called at specific activity
  - Record result of activity … *somewhere*
  - Almost exactly the same as profiling
  - Except that there are no pre-made tools

Logging Game Data

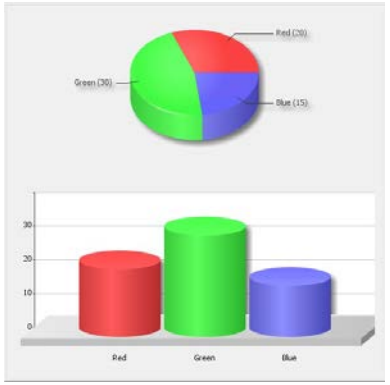
Log

Data Store

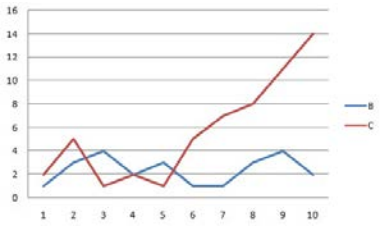
Query 1



Query 2



Query 3

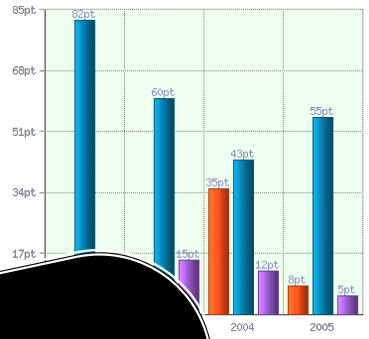


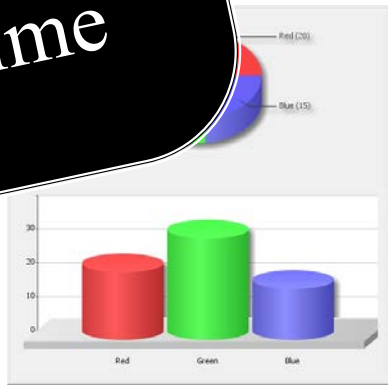
Logging Game Data

Will talk about this more next time

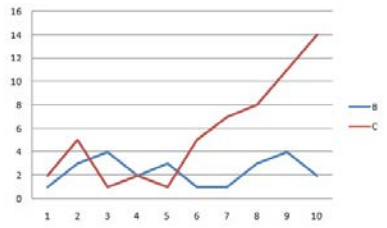
Data Store

Query 1





Query 3



Player Logging: Other Benefits

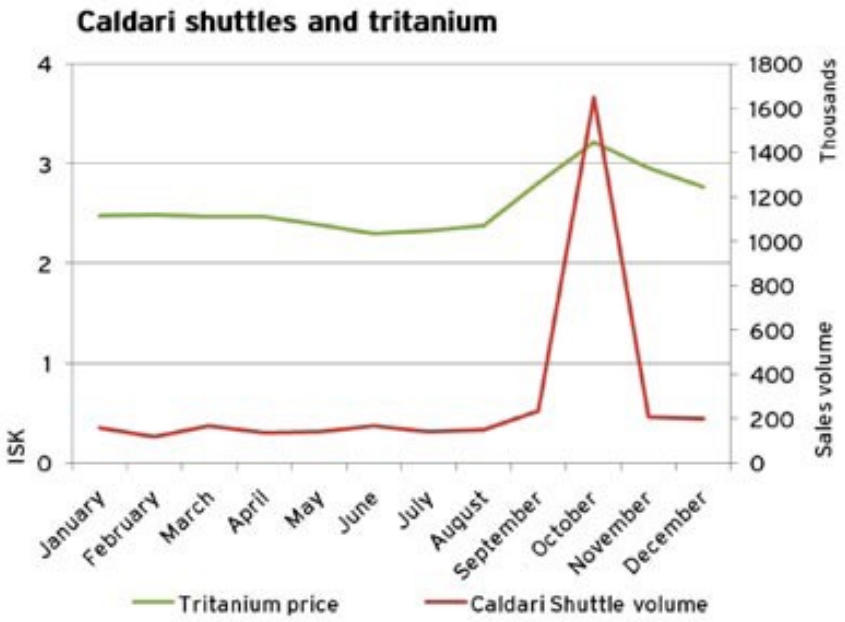
- **Helping players**
  - Restoring lost items
  - Fixing data corruption
- **Finding cheaters**
  - Did they use an exploit?
  - Is their skill plausible?
- **In-game advertising**
  - But beware selling user data
  - Most states have data laws
- Game is run as a **service**

Gameplay Activity

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

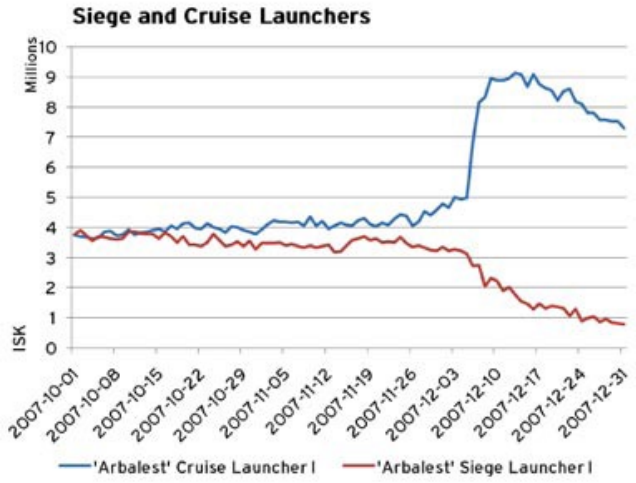
- Focusing on game mechanics, not individuals
  - But focus on **non-spatial** game systems
  - Want systems that can be visualized numerically
  - Generally means **resources** and **game economies**

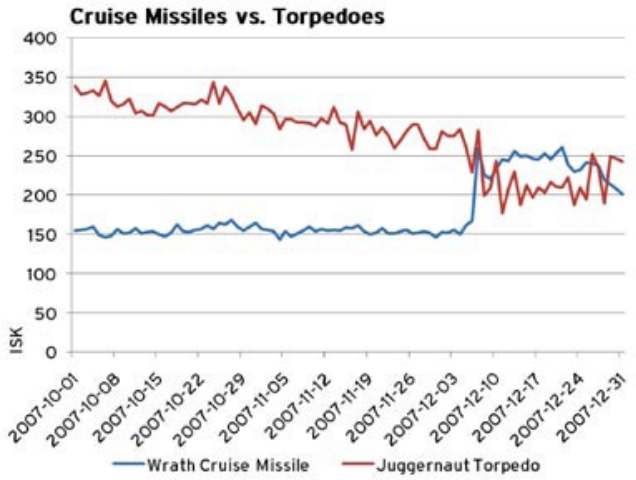
EVE Examples: Titanium



- 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?

EVE Examples: Weapons



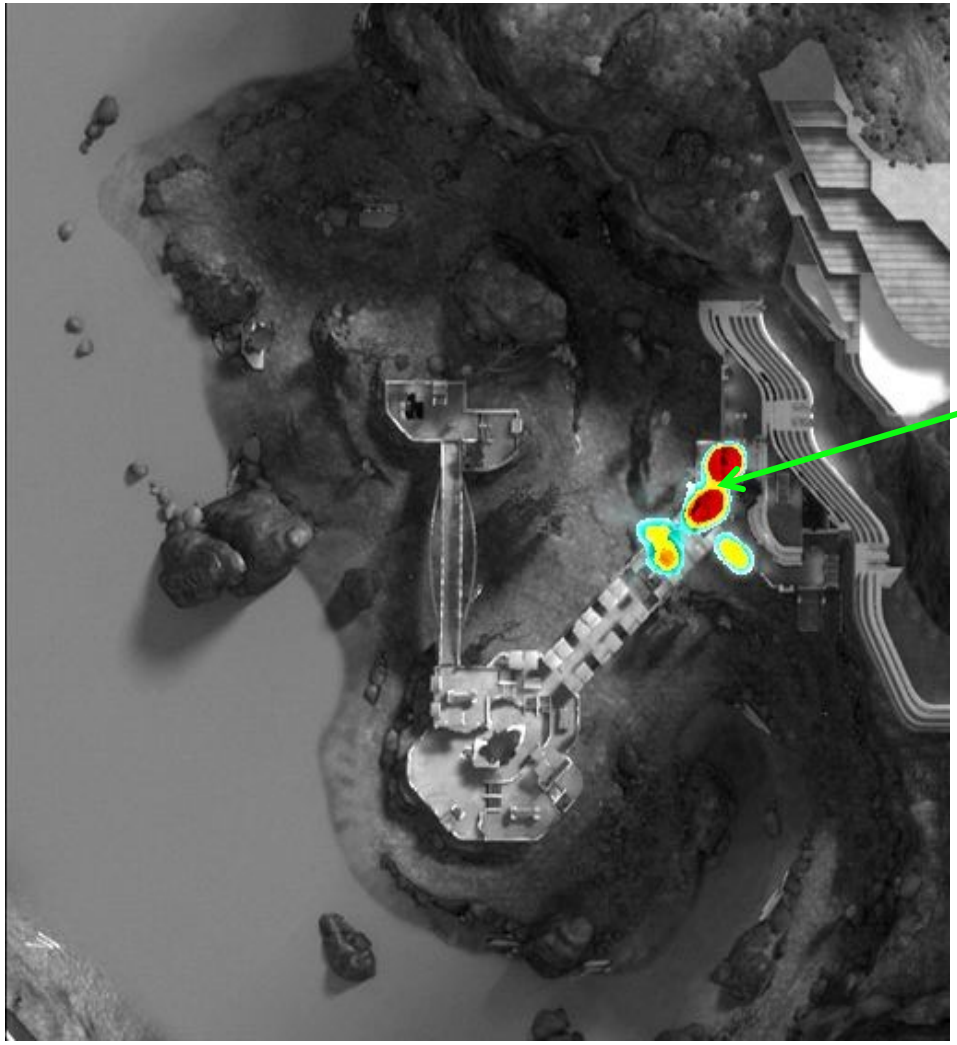


- *Trinity* altered gameplay
  - Changed torpedo mechanics
  - Range was made shorter
  - But rate of fire increased
- But players valued range
  - Torpedos volume dropped
  - Cruise Missiles spiked
  - Similar chart for launchers
- But this not mean that the redesign was a bad idea

Spatial Game Data

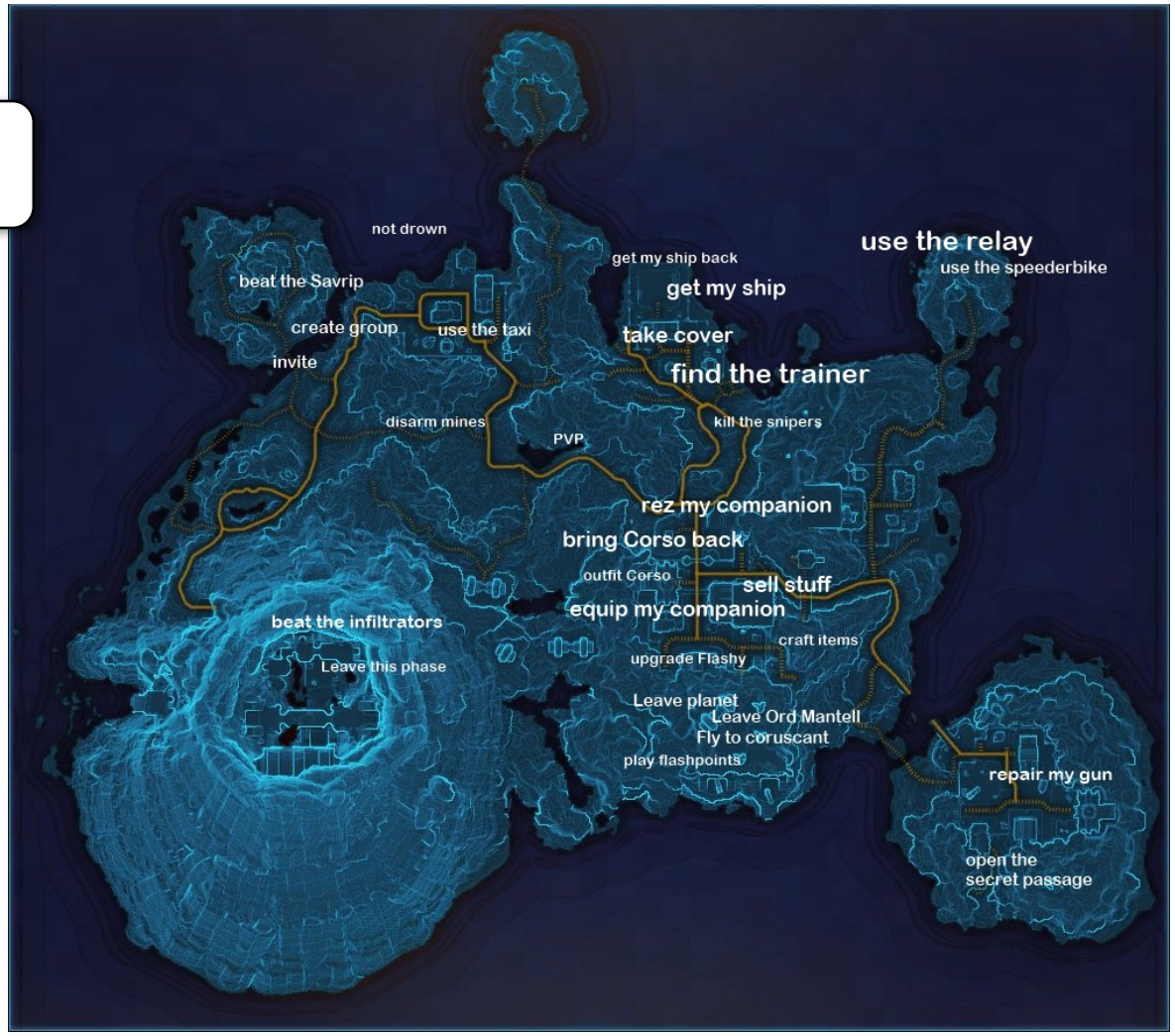
- Needed for anything that depends on **location**
  - Identify where players are having difficulty
  - Critical for MMOs, large and persistent worlds
  - **Example**: player death heat maps
- Visualization is much, much harder
  - Spatial representation is particular to your game
  - There are no simple, existing solutions
  - Companies create their own custom tools

Spatial Data: Heatmaps



SWTOR Example: Chat Logs

Filter on:
How do I…

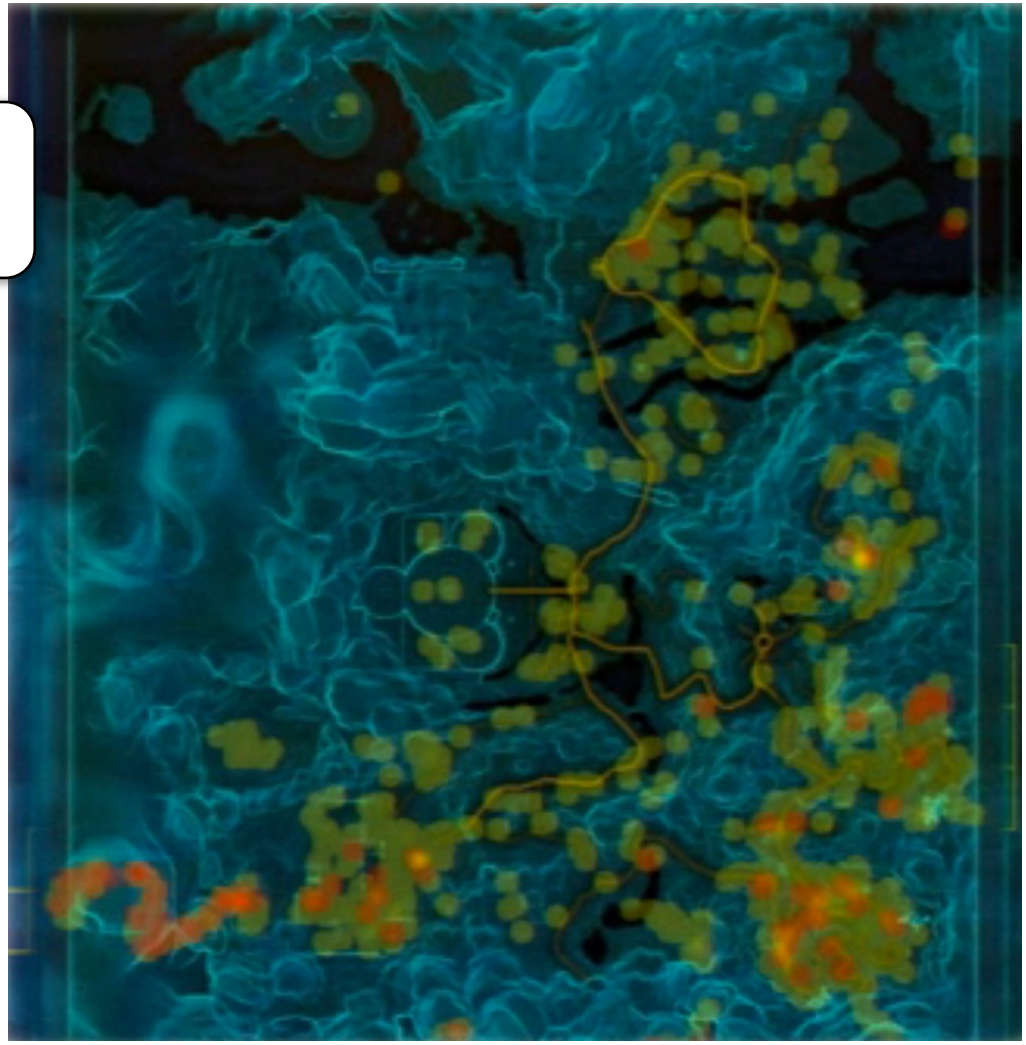


SWTOR Example: Chat Logs

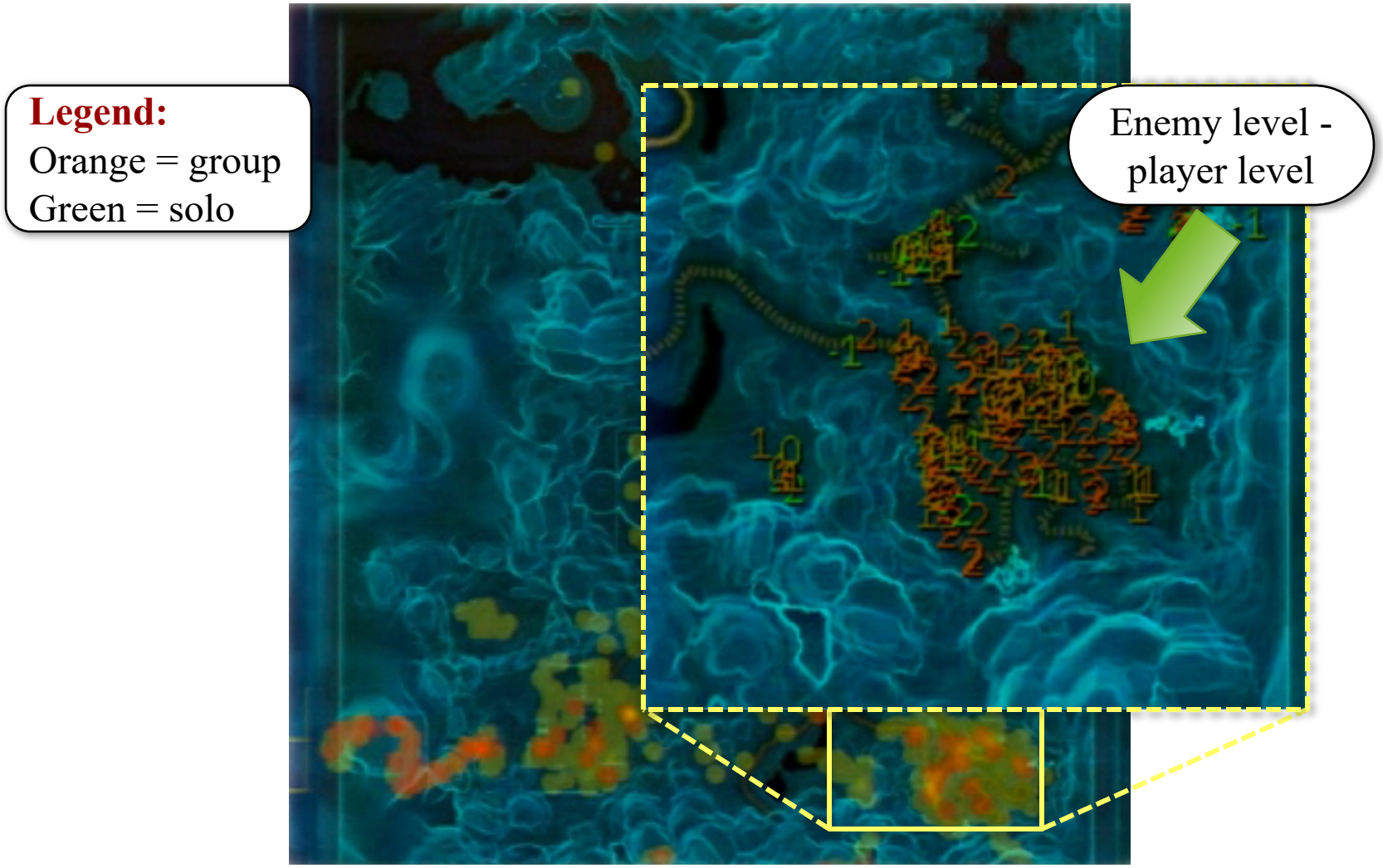
Filter on:
Bug, Broken

SWTOR Example: Player Deaths

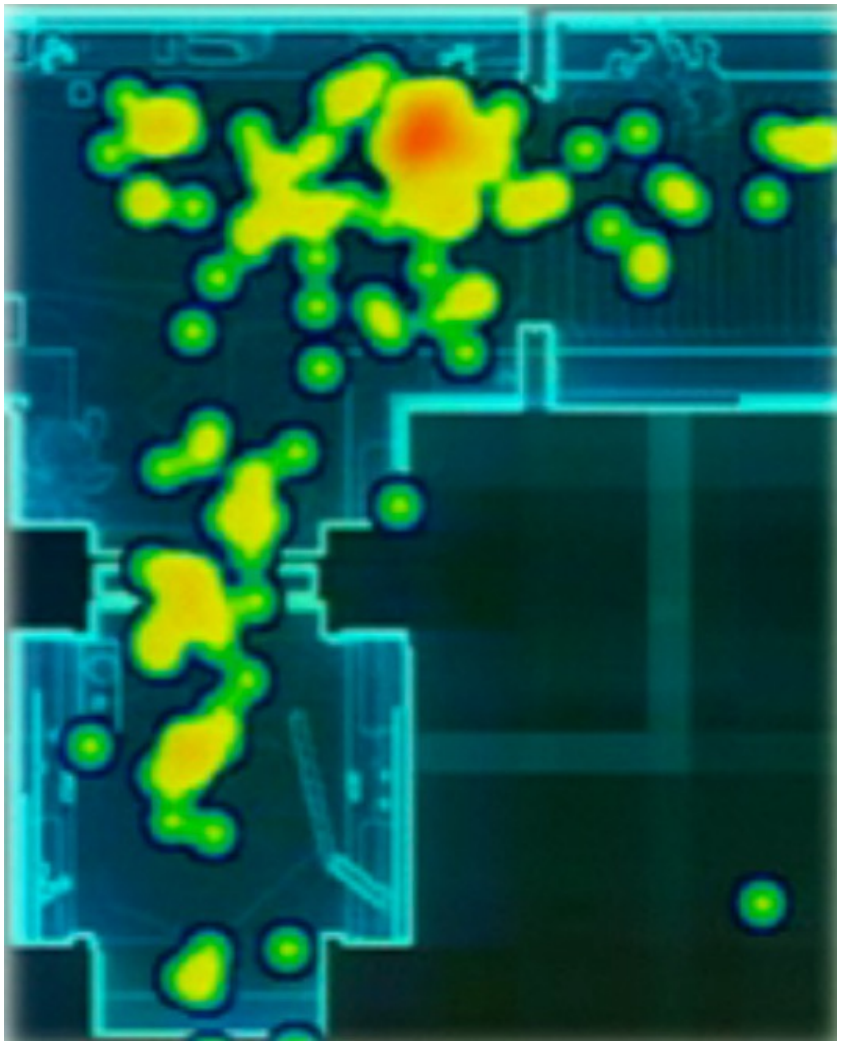
Legend:
Orange = group
Green = solo

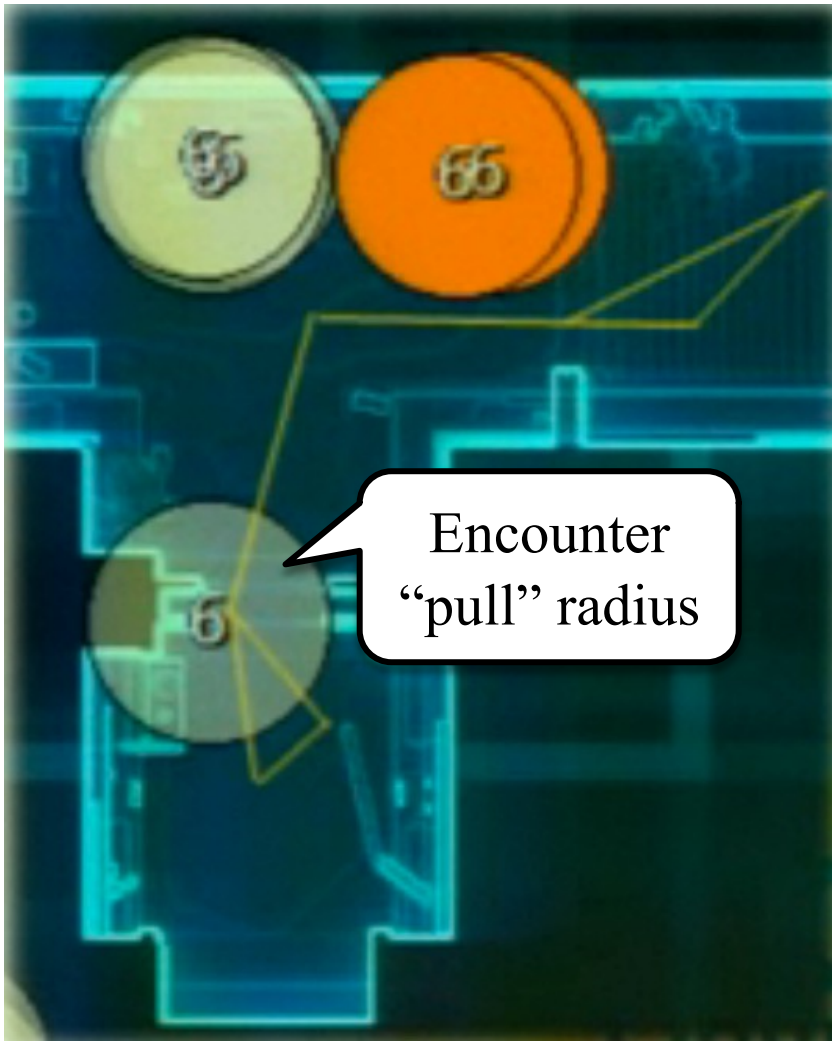


SWTOR Example: Player Deaths



SWOTOR Example: Patrol Paths

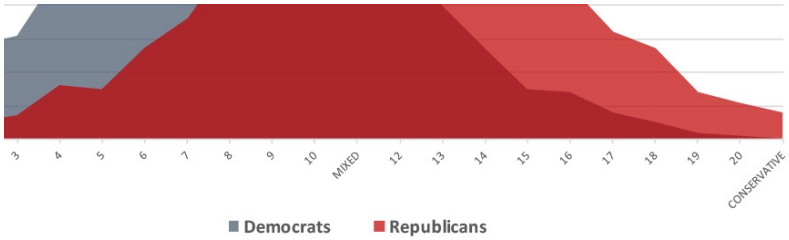


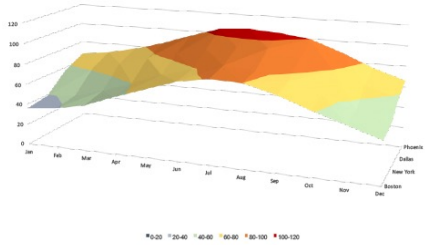


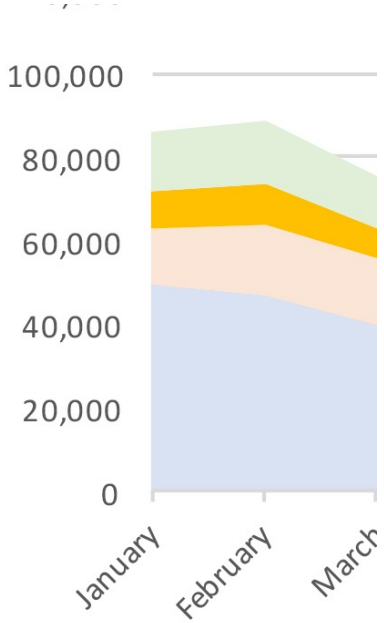
Challenges of Spatial Data

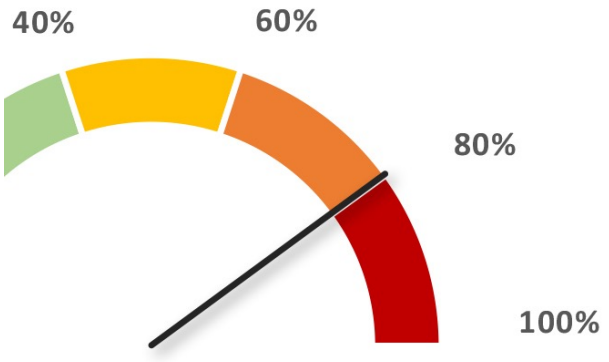
- There are many 3rd party data analysis tools
  - Data analysis is a major part of running a business
  - Business tools work well for player analysis
- But spatial data is very *game specific*
  - Superimposed onto your game visuals
  - Must integrate into your rendering engine
  - Limited to high-end game companies
- What can an **Indie developer** do?

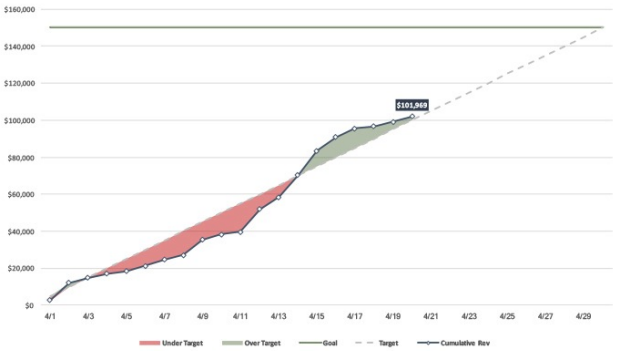
The Simplest Option: *Excel*

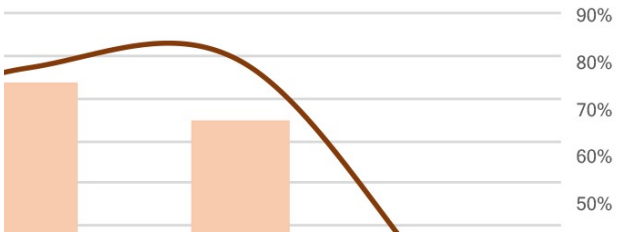


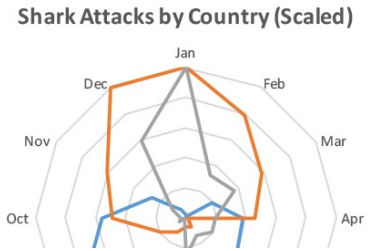


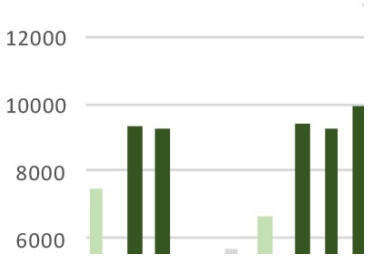












The Professional Option: *Tableau*

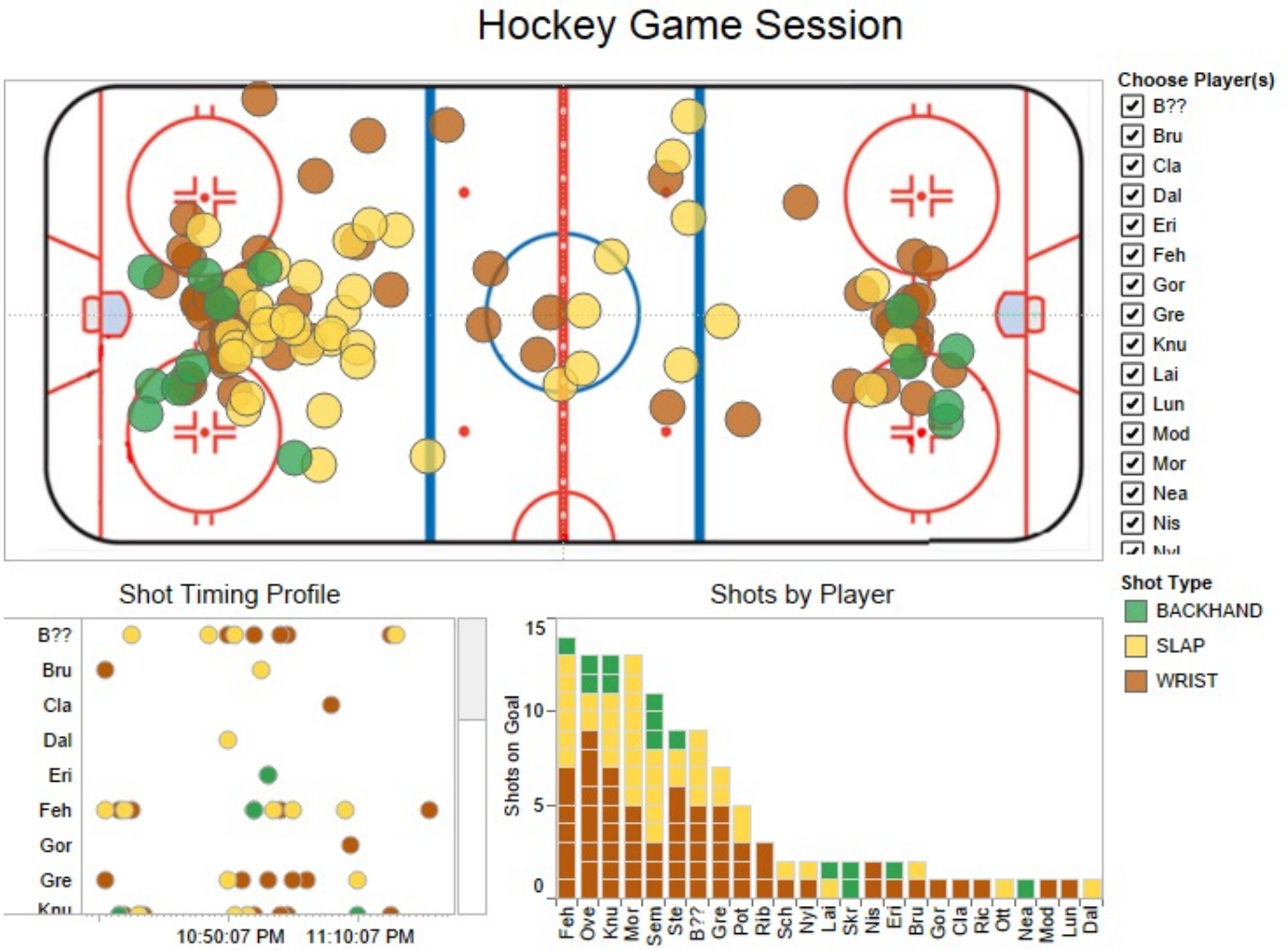
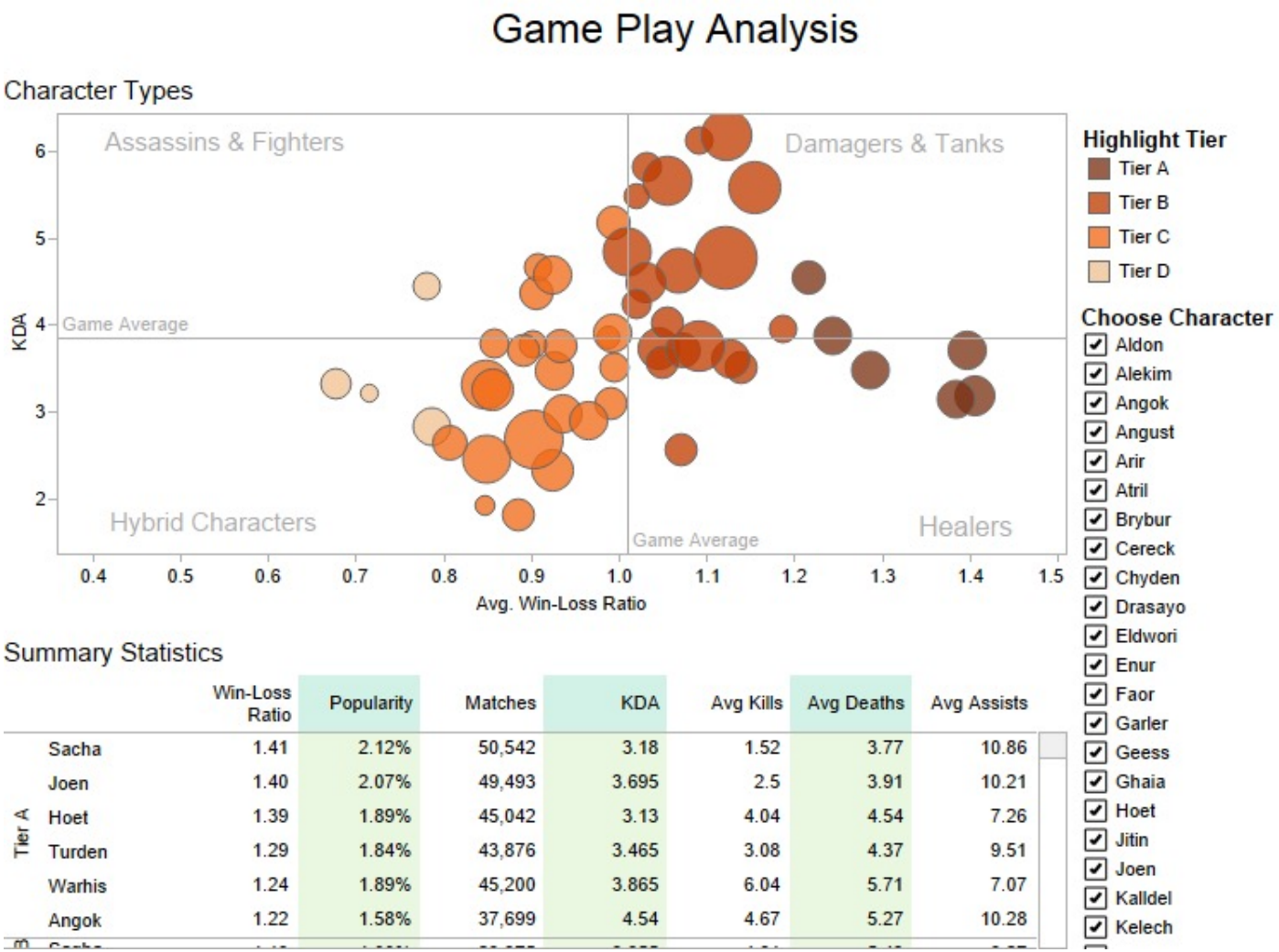


Tableau is Better on *Large* Datasets



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