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Lecture 15

Game Analytics

The Rise of Big Data

- Big data is changing game design
  - Can gather data form a huge number of players
  - Can use that data to inform future content
- **What can we do with all that data?**
  - What types of questions can we answer?
  - How does it affect our business model?
- **How do we collect all of this data?**
  - What are the technical challenges?
  - What are the legal/ethical challenges?

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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

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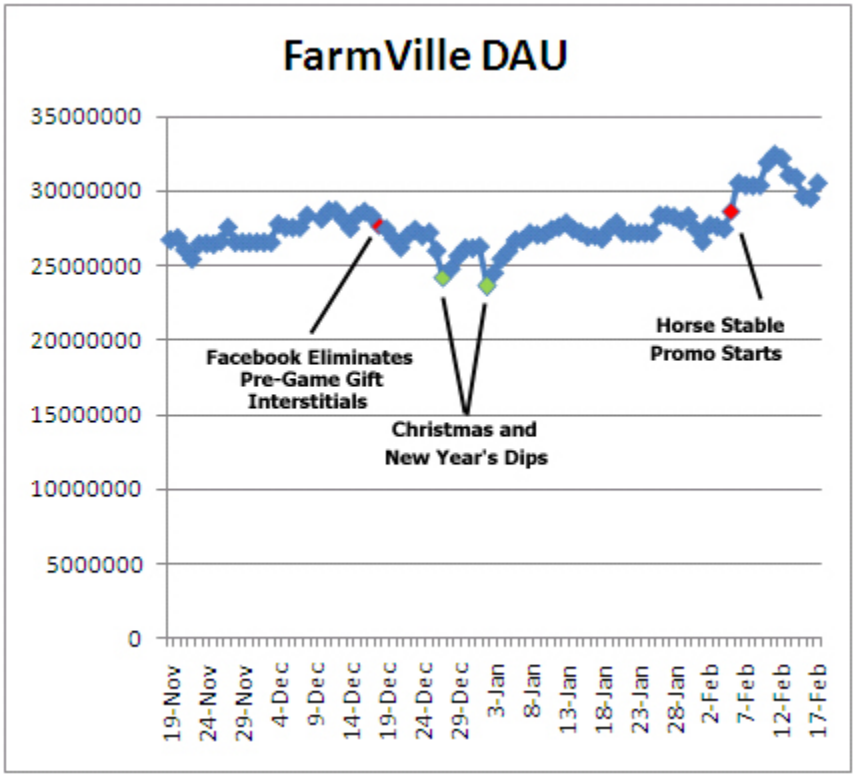
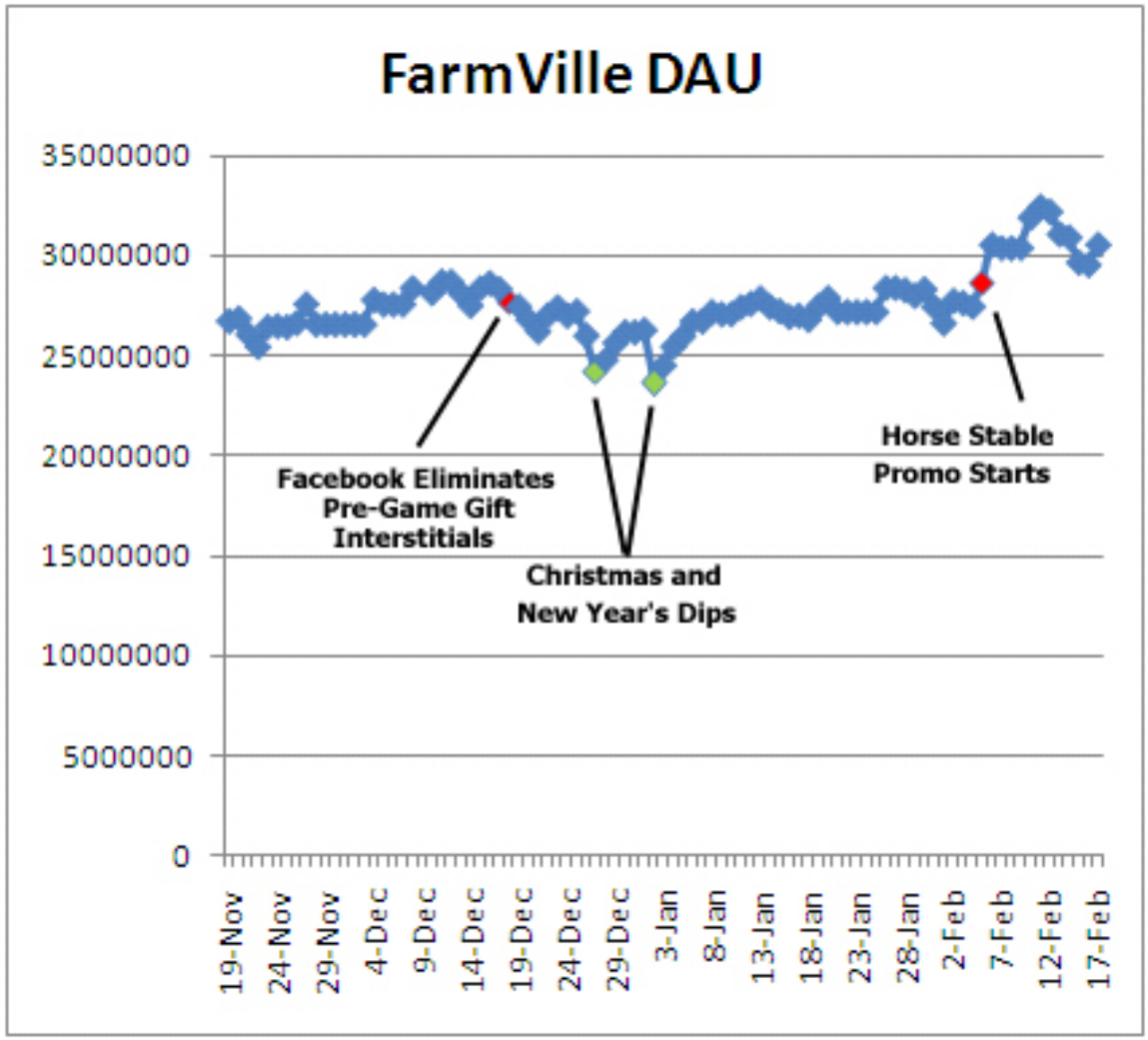
Player Activity Analytics

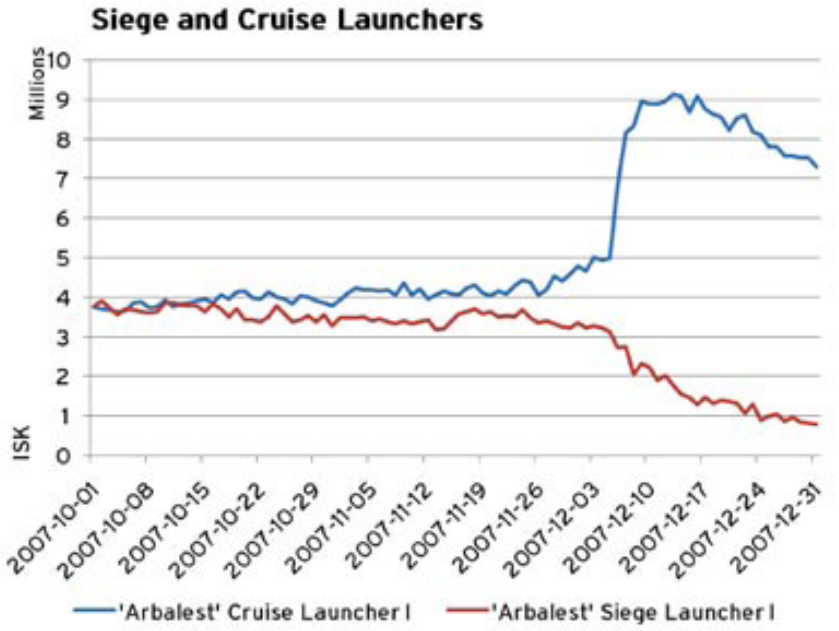


- **Data for a single player**
  - Or for a given player group
- **Examples**:
  - How often do they play?
  - When does the player quit?
  - Can we get the player back?
- Some support from platform
  - Generalities like play time
  - Found in Facebook, Steam
  - Custom solutions for more

Player Activity Analytics



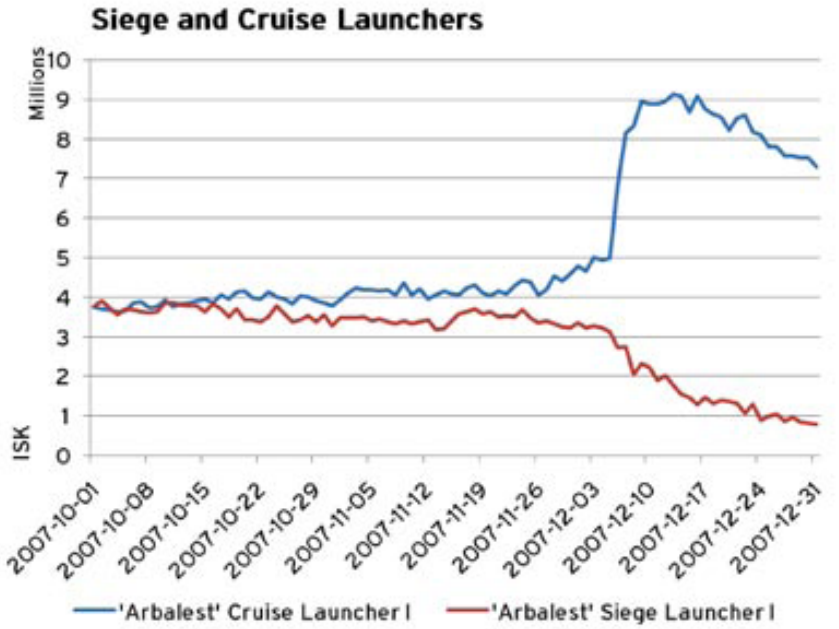
Game System Analytics

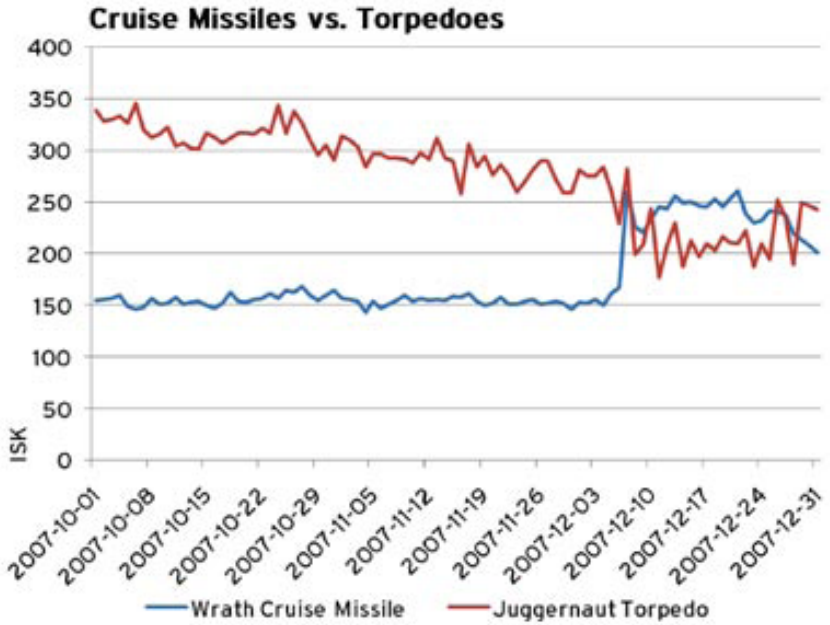


- **Non-spatial game data**
  - Behavior of many players
  - Often the game economy
  - Also issues of game balance
- Needs custom data gathering
  - Data tailored to your game
  - And so are the data queries
- But visualization is easy
  - Queries *format* is standard
  - Can use existing viz tools

Game System Analytics

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





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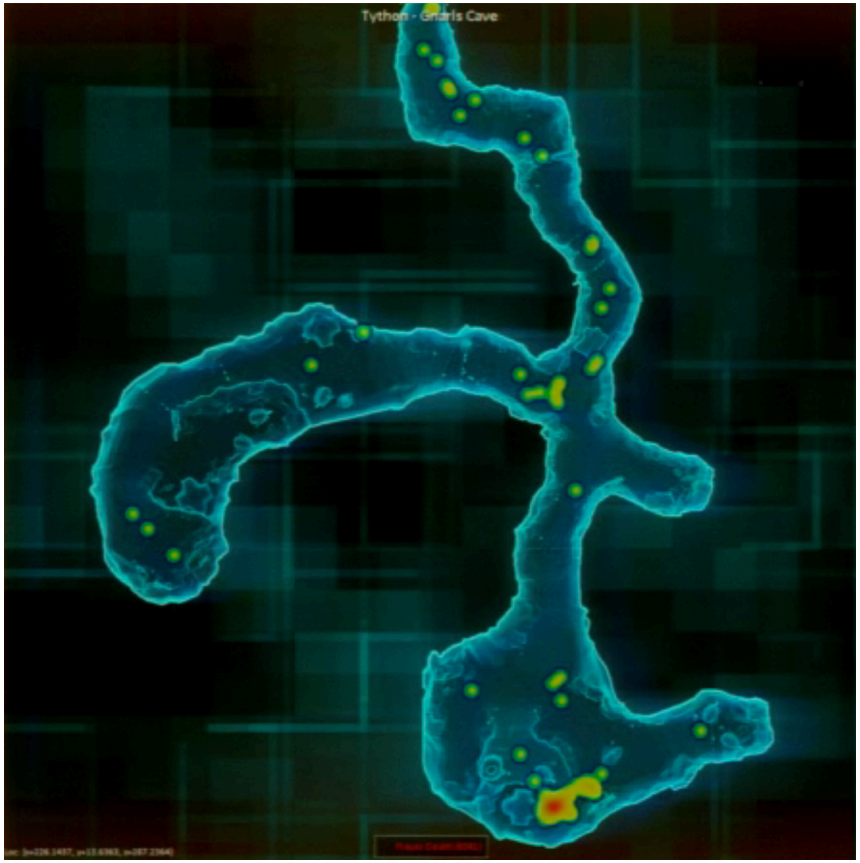
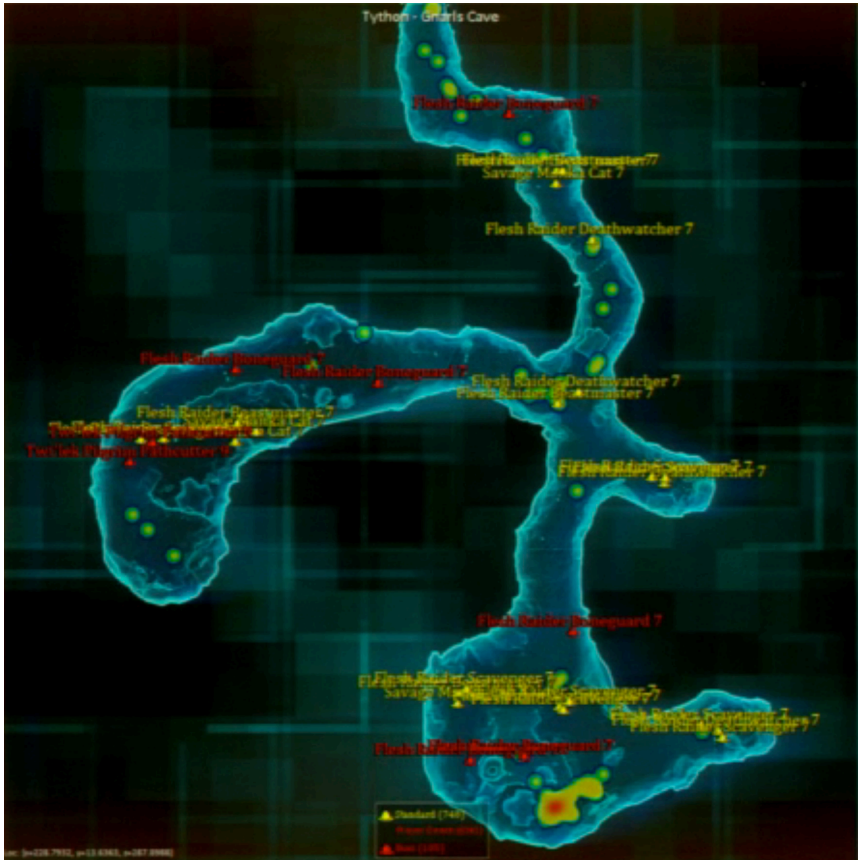
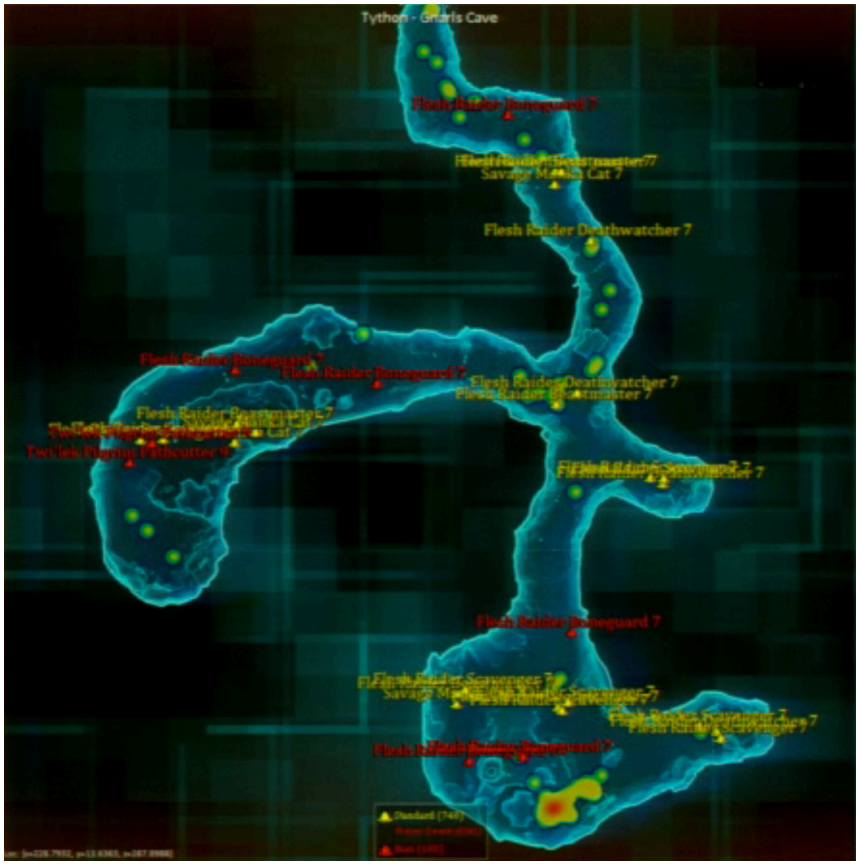
Spatial Data Analytics



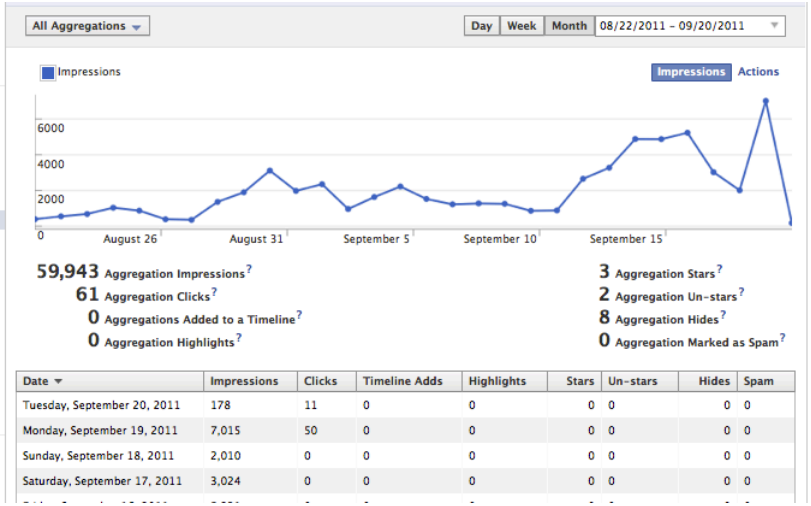


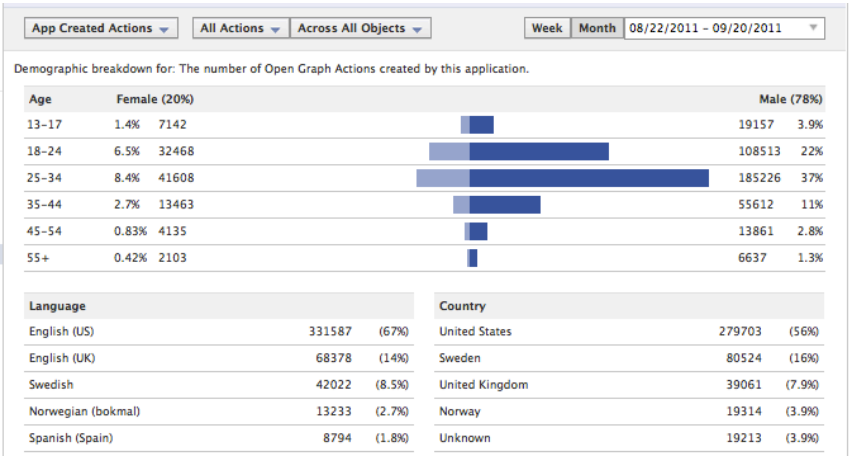
Spatial Data Analytics



- **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

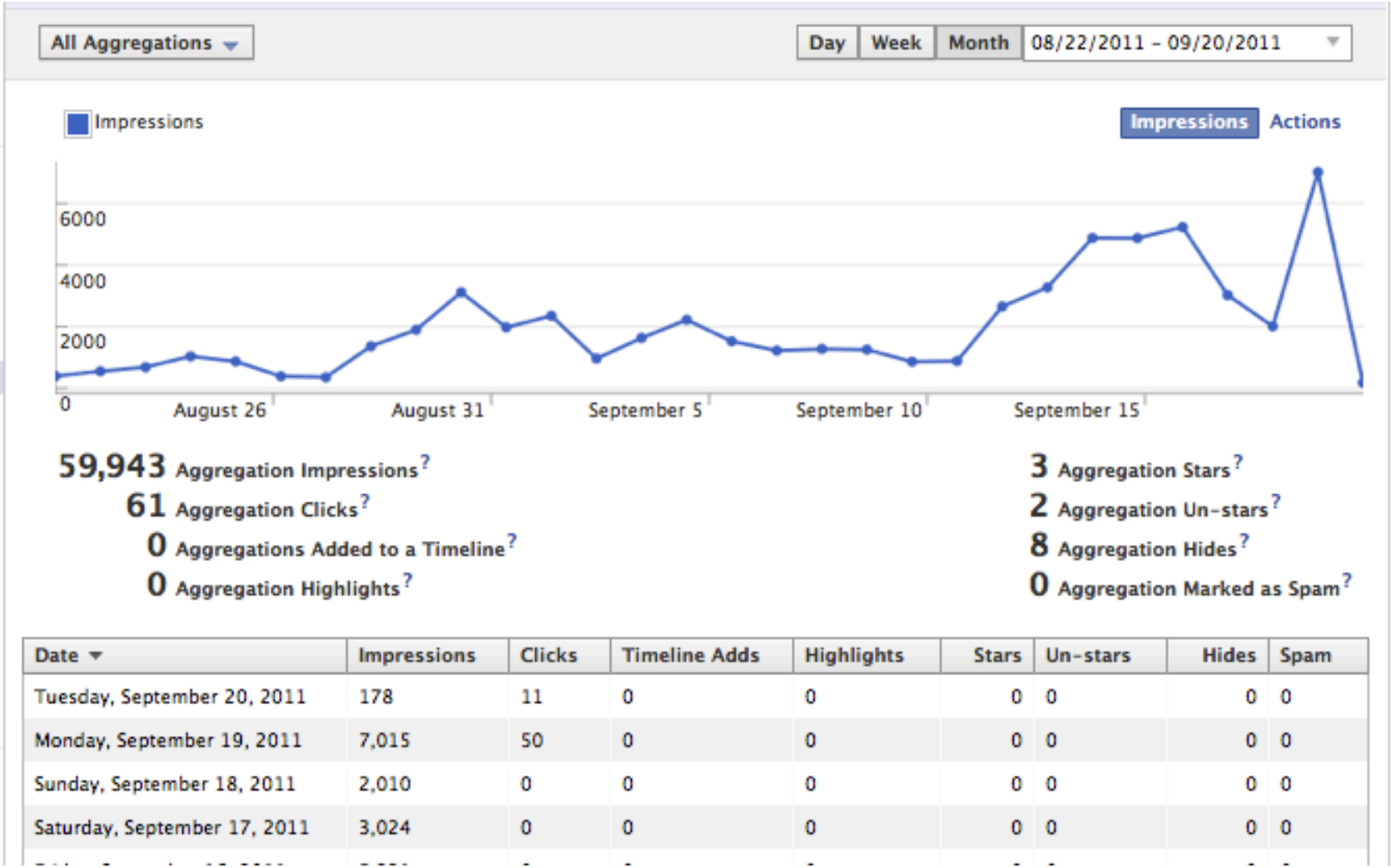
Player Activity: Facebook





- Tracks Facebook API usage
  - Game accesses user profile
  - Player launches game
  - Player sends a gift in game
  - Player receives gift in game
- Measures game activity
  - How popular is the game?
  - Does popularity change?
- Measures social elements
  - How much engagement?

Player Activity: Facebook



Date	Impressions	Clicks	Timeline Adds	Highlights	Stars	Un-stars	Hides	Spam
Tuesday, September 20, 2011	178	11	0	0	0	0	0	0
Monday, September 19, 2011	7,015	50	0	0	0	0	0	0
Sunday, September 18, 2011	2,010	0	0	0	0	0	0	0
Saturday, September 17, 2011	3,024	0	0	0	0	0	0	0

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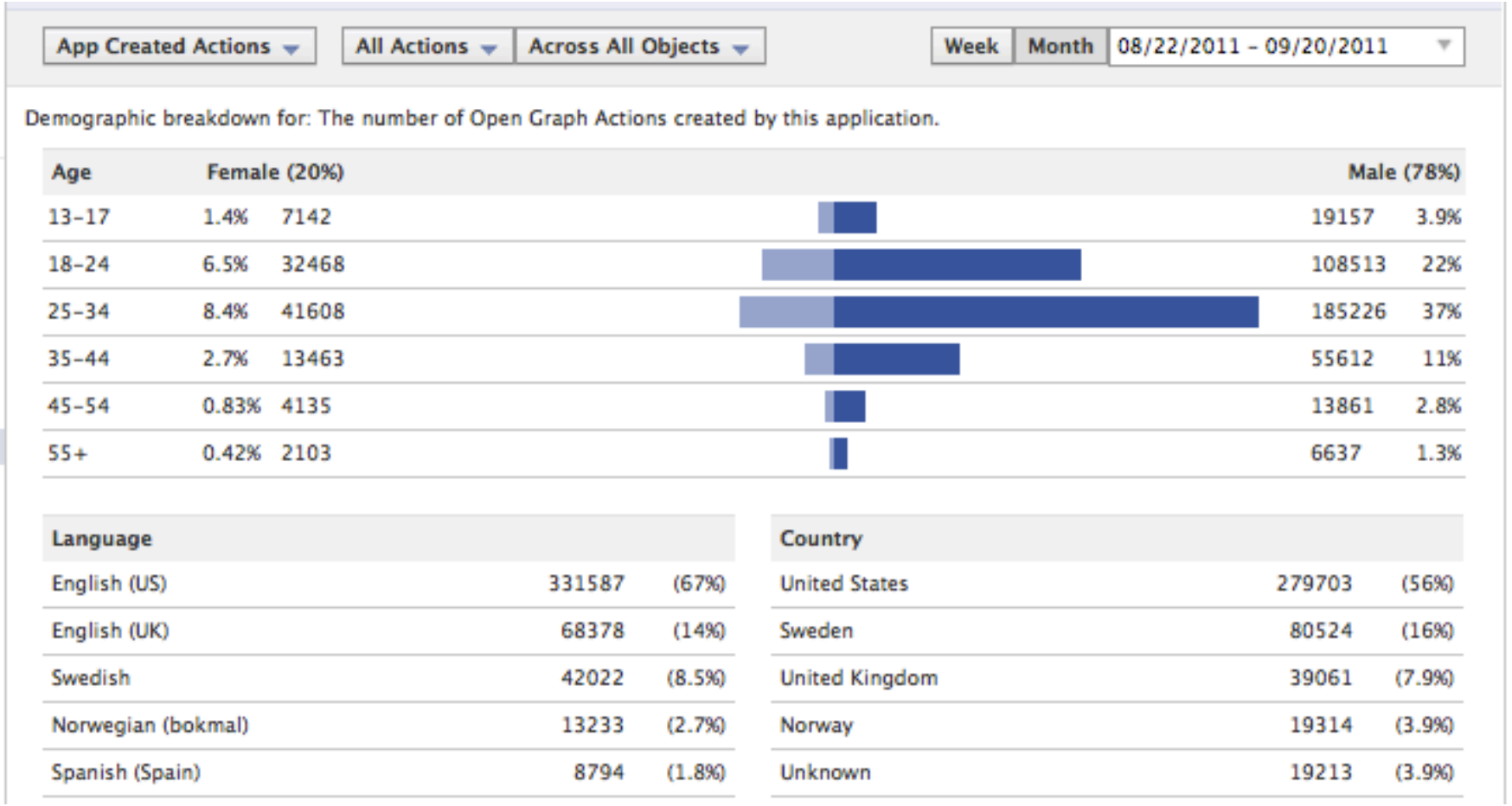
Player Activity: Facebook



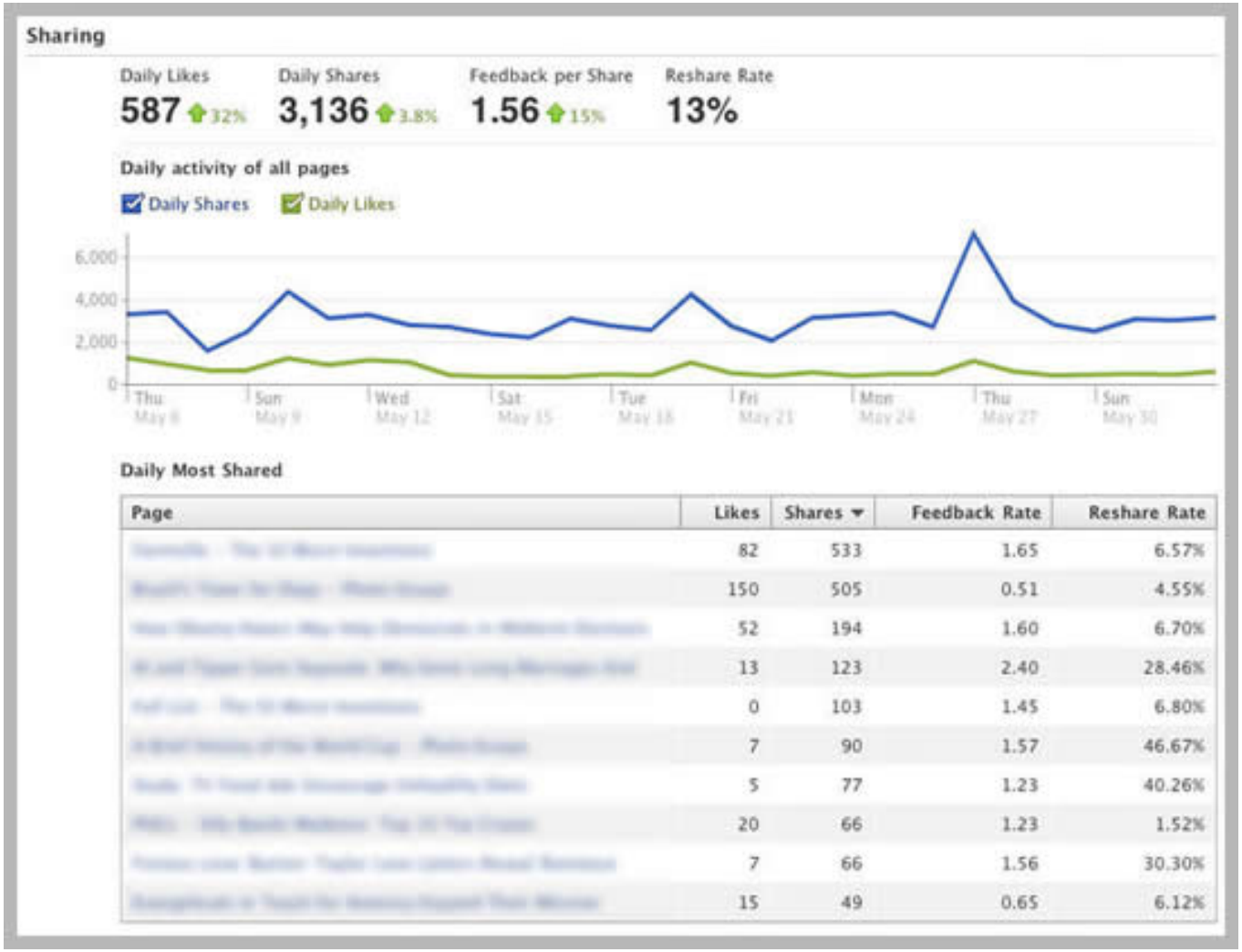
Demographic breakdown for: The number of Open Graph Actions created by this application.

Age	Female (20%)		Male (78%)	
13-17	1.4%	7142	19157	3.9%
18-24	6.5%	32468	108513	22%
25-34	8.4%	41608	185226	37%
35-44	2.7%	13463	55612	11%
45-54	0.83%	4135	13861	2.8%
55+	0.42%	2103	6637	1.3%

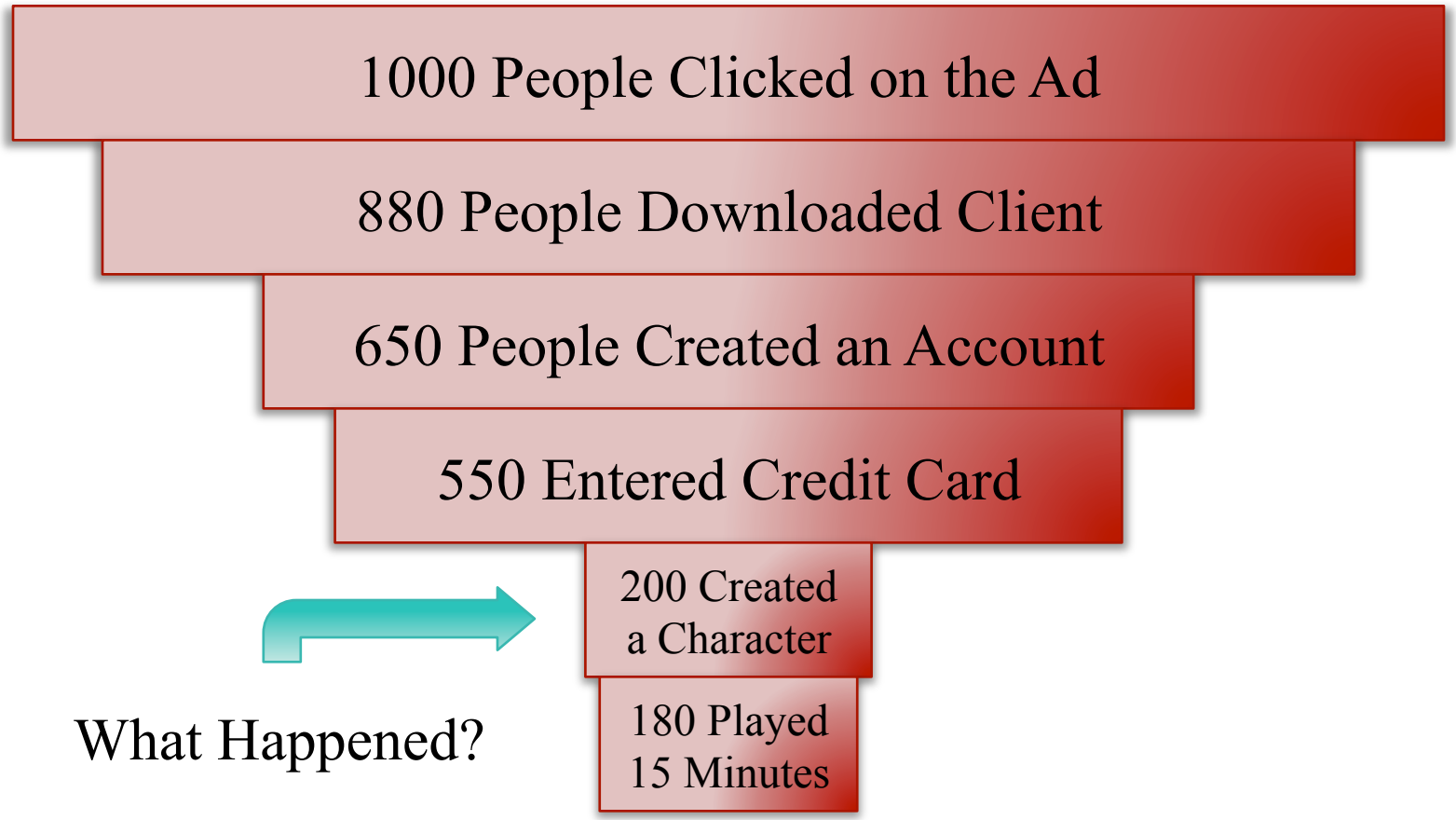
Language		
English (US)	331587	(67%)
English (UK)	68378	(14%)
Swedish	42022	(8.5%)
Norwegian (bokmal)	13233	(2.7%)
Spanish (Spain)	8794	(1.8%)

Country		
United States	279703	(56%)
Sweden	80524	(16%)
United Kingdom	39061	(7.9%)
Norway	19314	(3.9%)
Unknown	19213	(3.9%)

Player Activity: Facebook

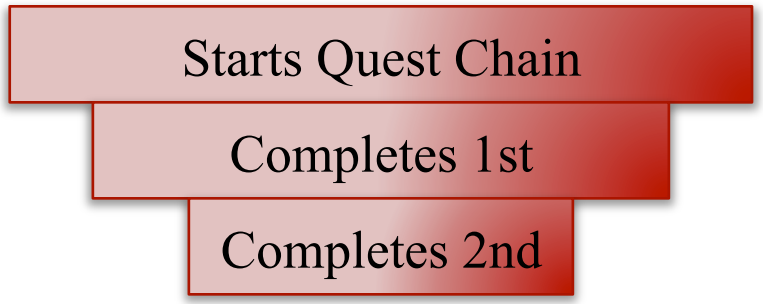


Drilling Down: Funnel Charts



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 (???)



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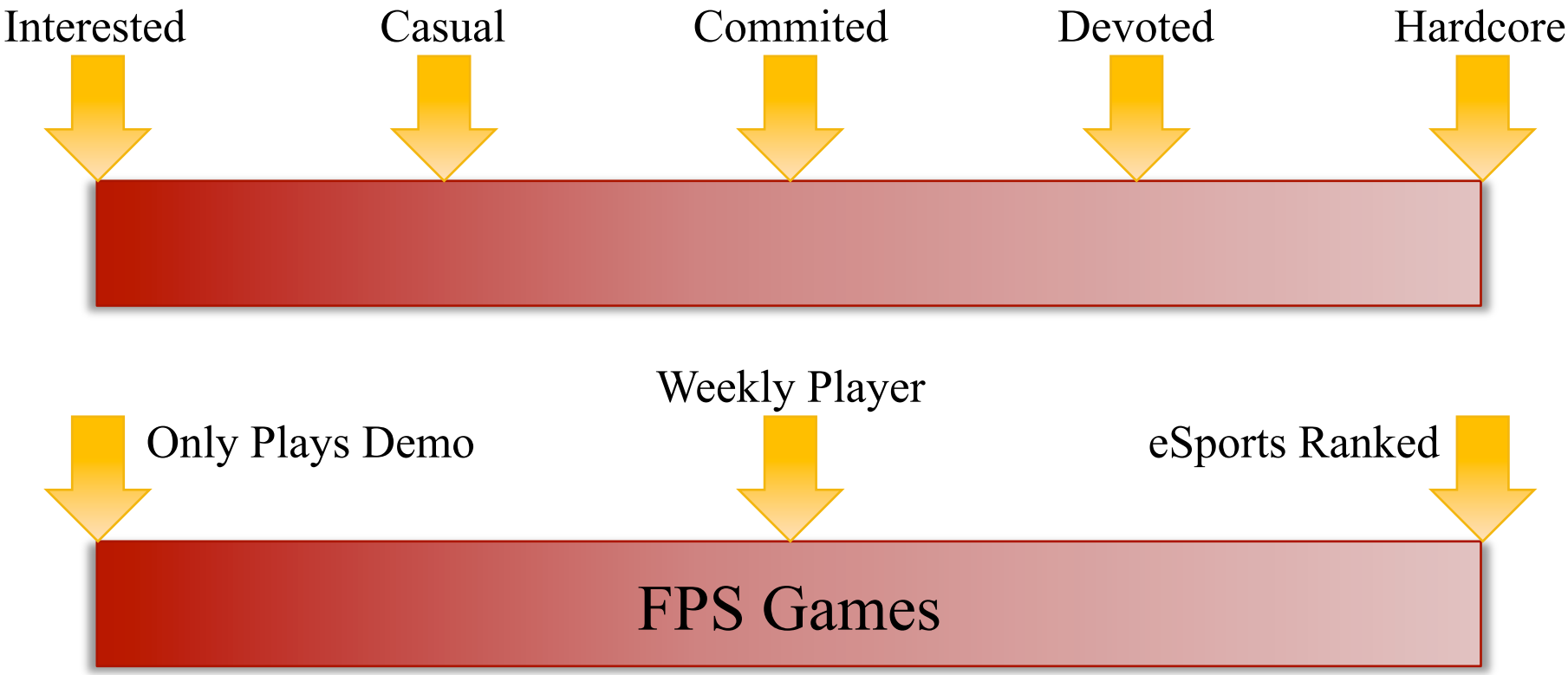
Casual-Hardcore Spectrum

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



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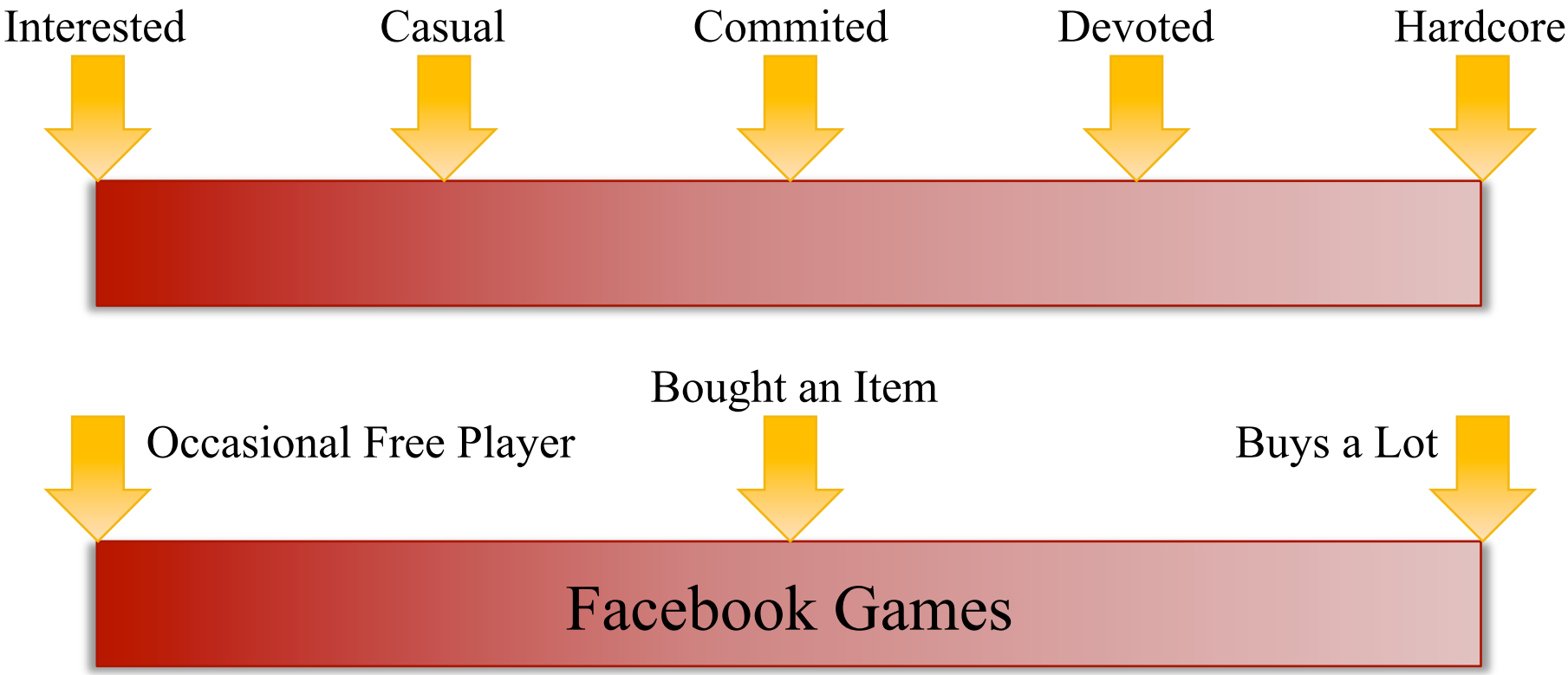
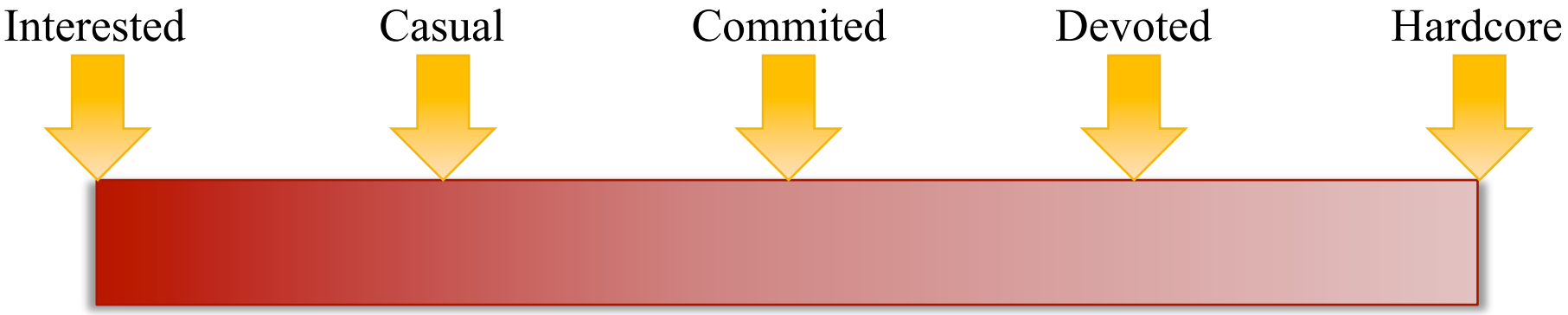


Casual-Hardcore Spectrum

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

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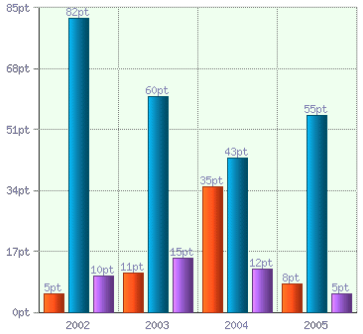
Logging Game Data

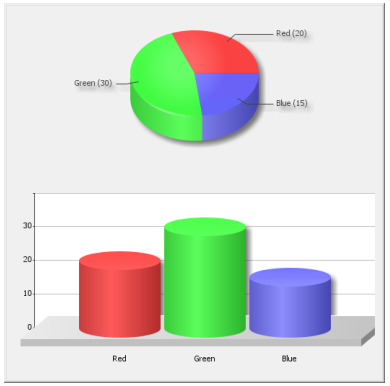
Log

Data Store

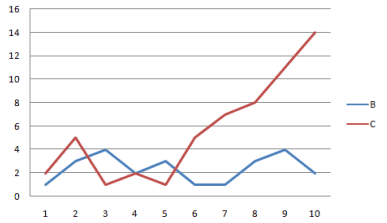
Query 1



Query 2



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**

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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**

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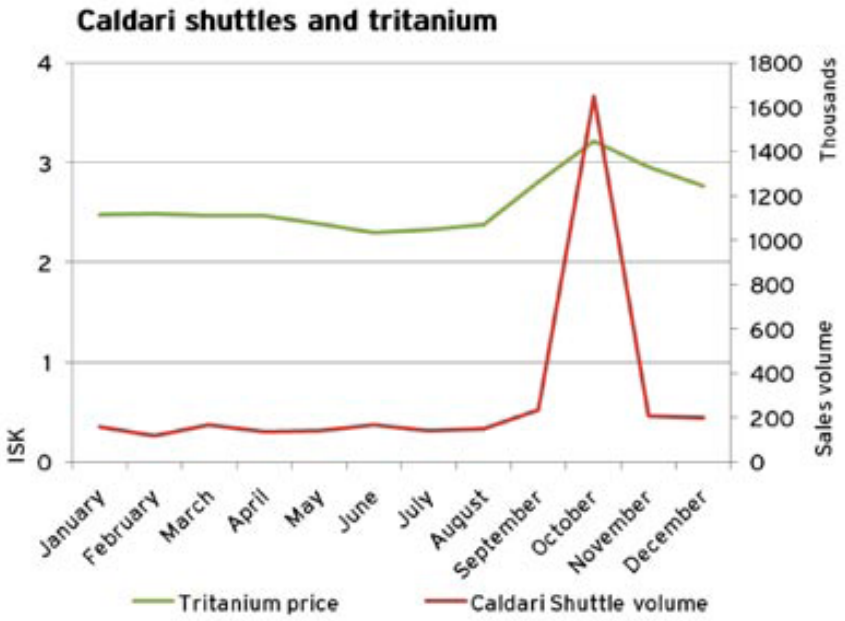
EVE Examples: Titanium



- 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?

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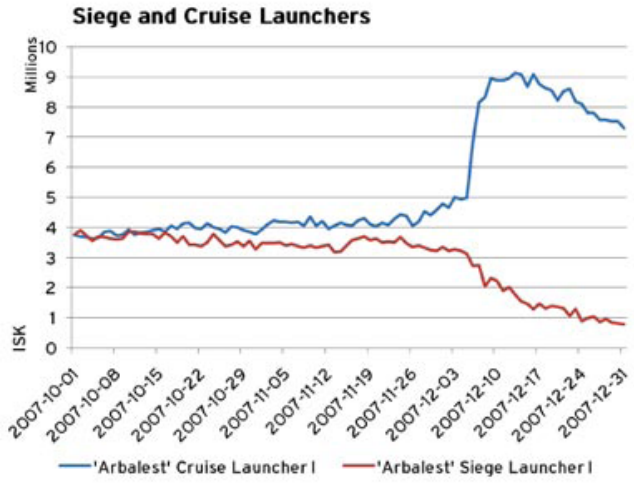
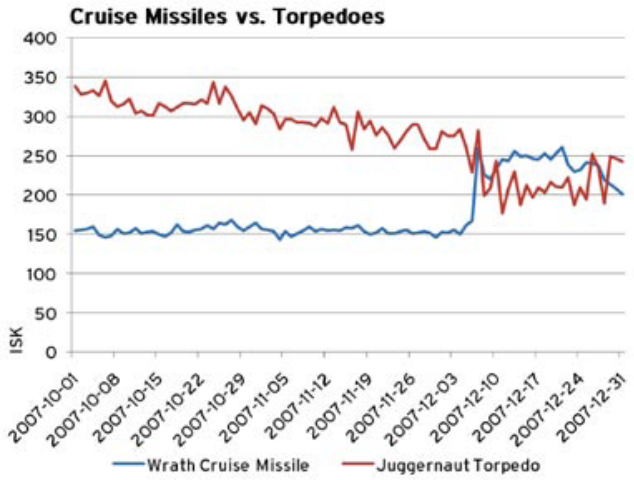
EVE Examples: Weapons





- *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

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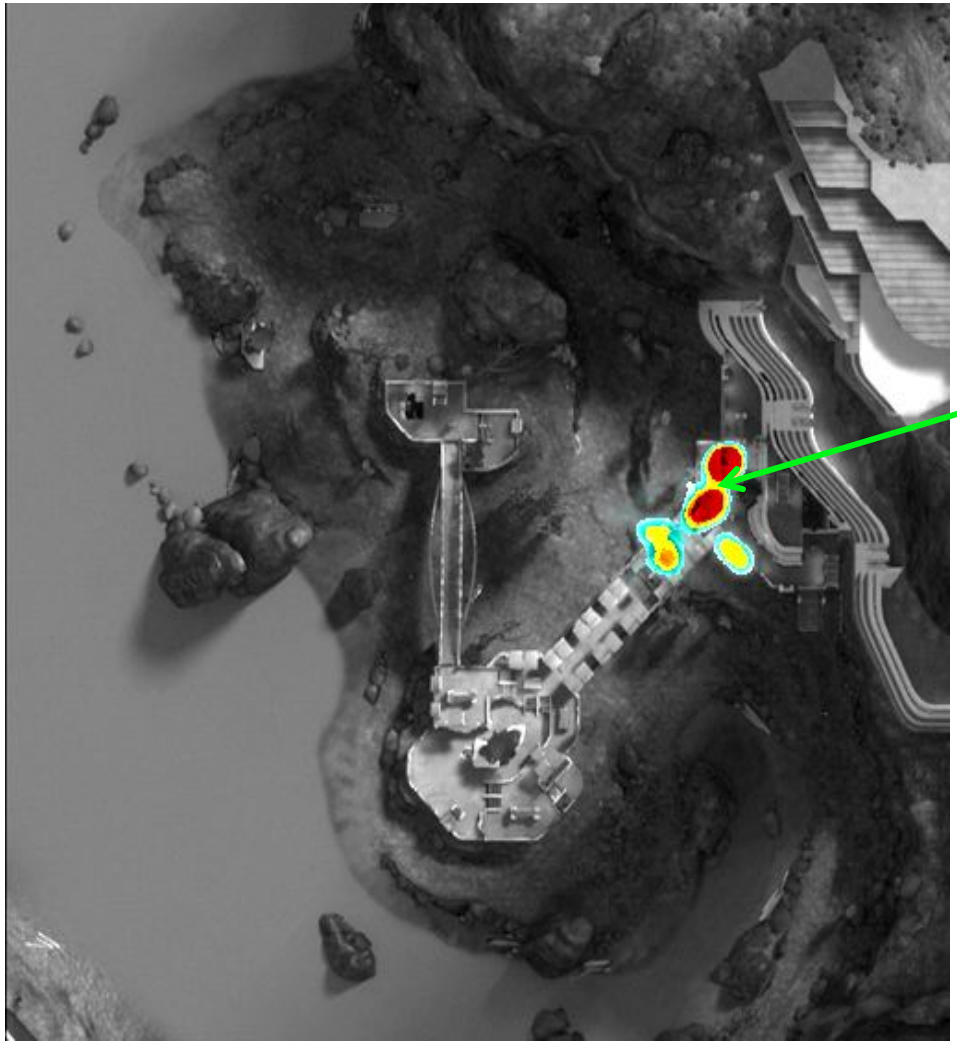
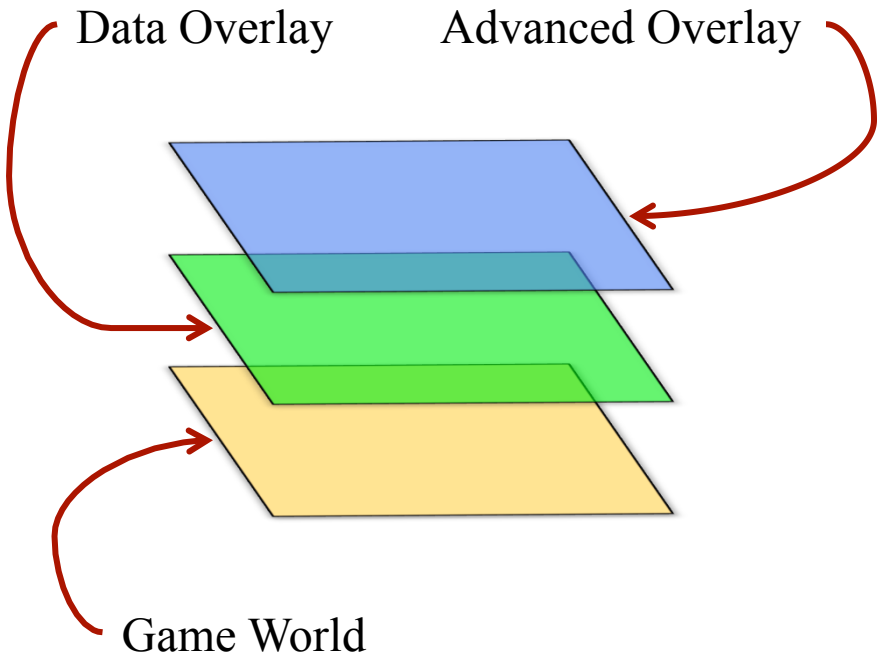
Spatial Data: Heatmaps



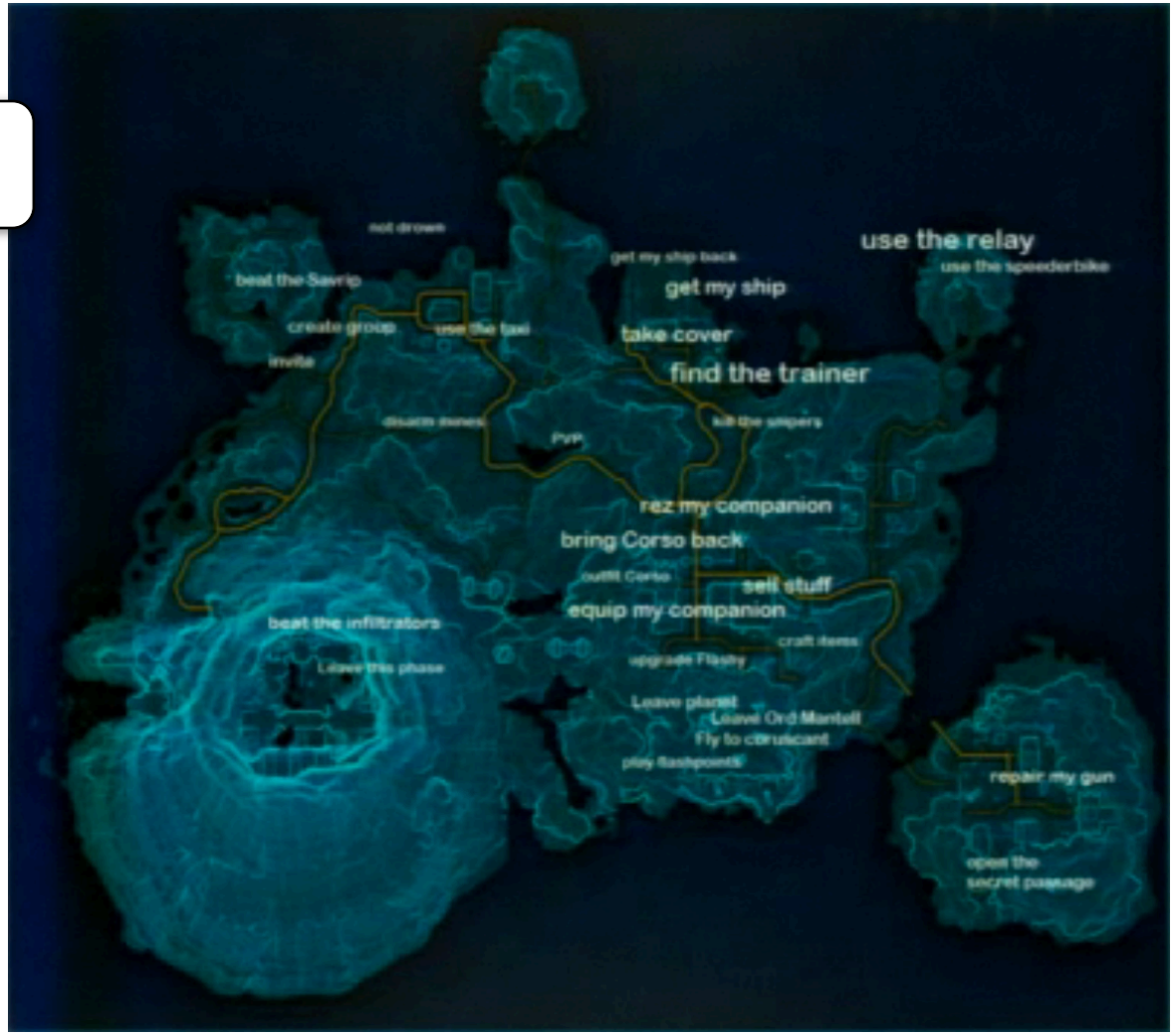
Simple Solution: Overlays

- Use game drawing code
  - Render world normally
  - Or in a compressed view
  - Integrate in level editor?
- Draw data in layer on top
  - Heat maps for histograms
  - Labels for filtered data
  - Other standard techniques (word clouds?)
- Google tools and HTML5
  - Especially if a web game



SWTOR Example: Chat Logs

Filter on:
How do I…

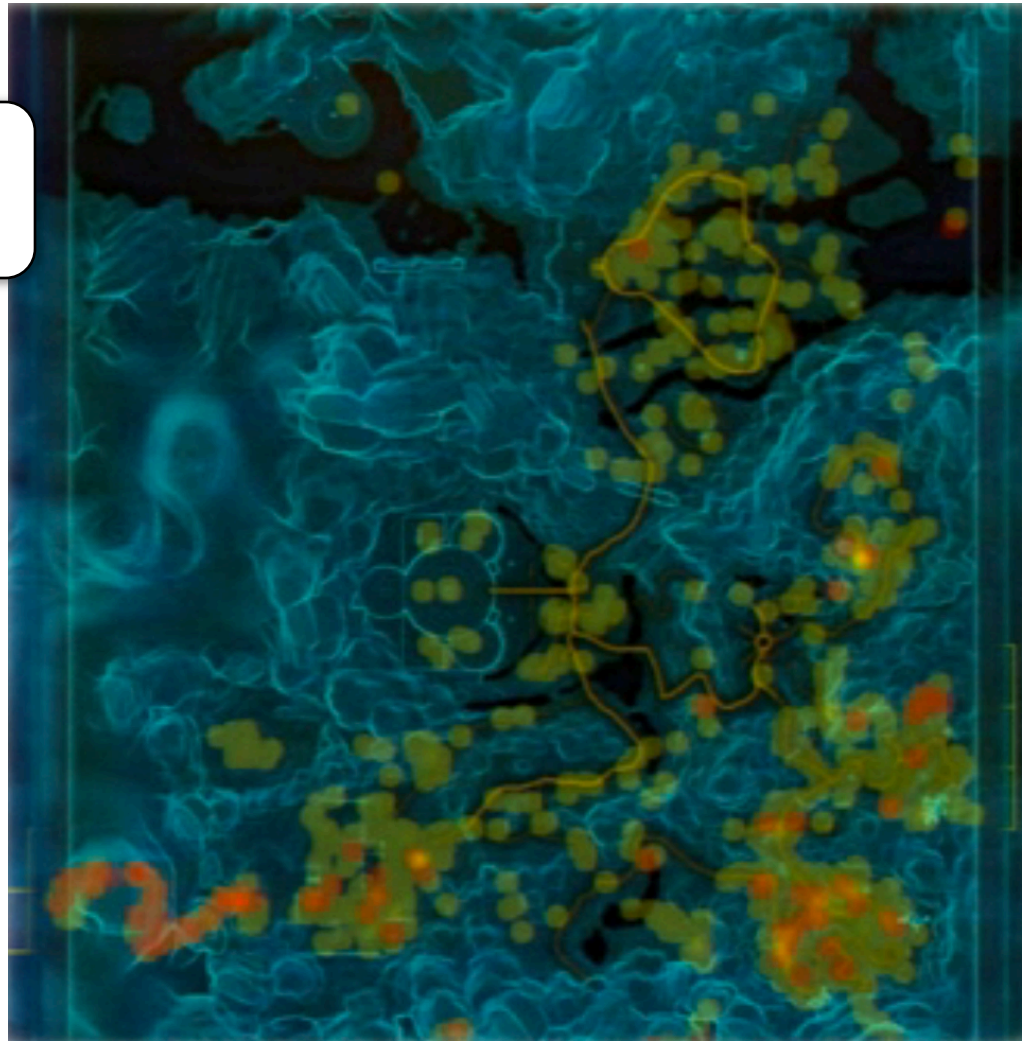


SWTOR Example: Chat Logs

Filter on:
Bug, Broken

SWTOR Example: Player Deaths

Legend:
Orange = group
Green = solo



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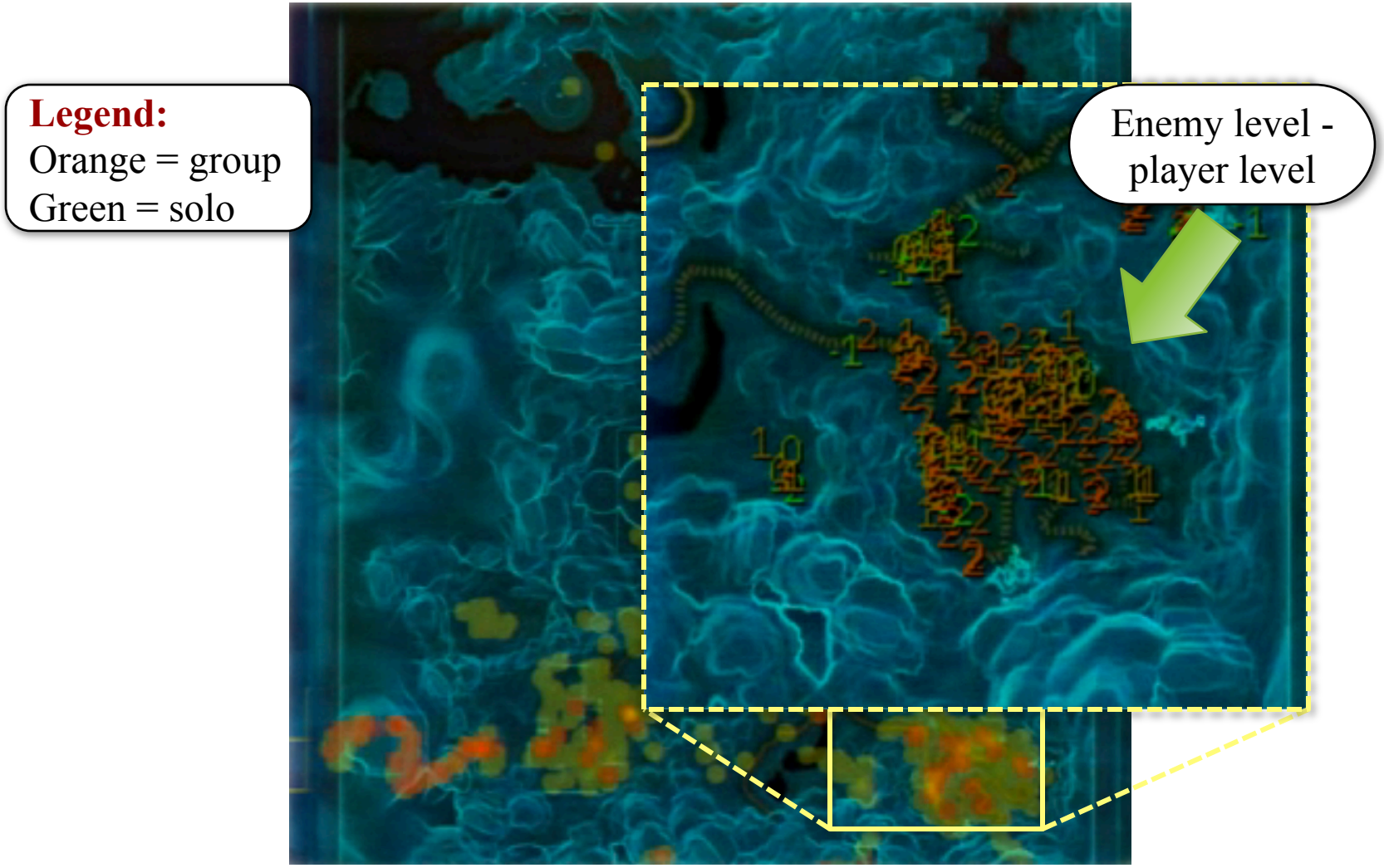
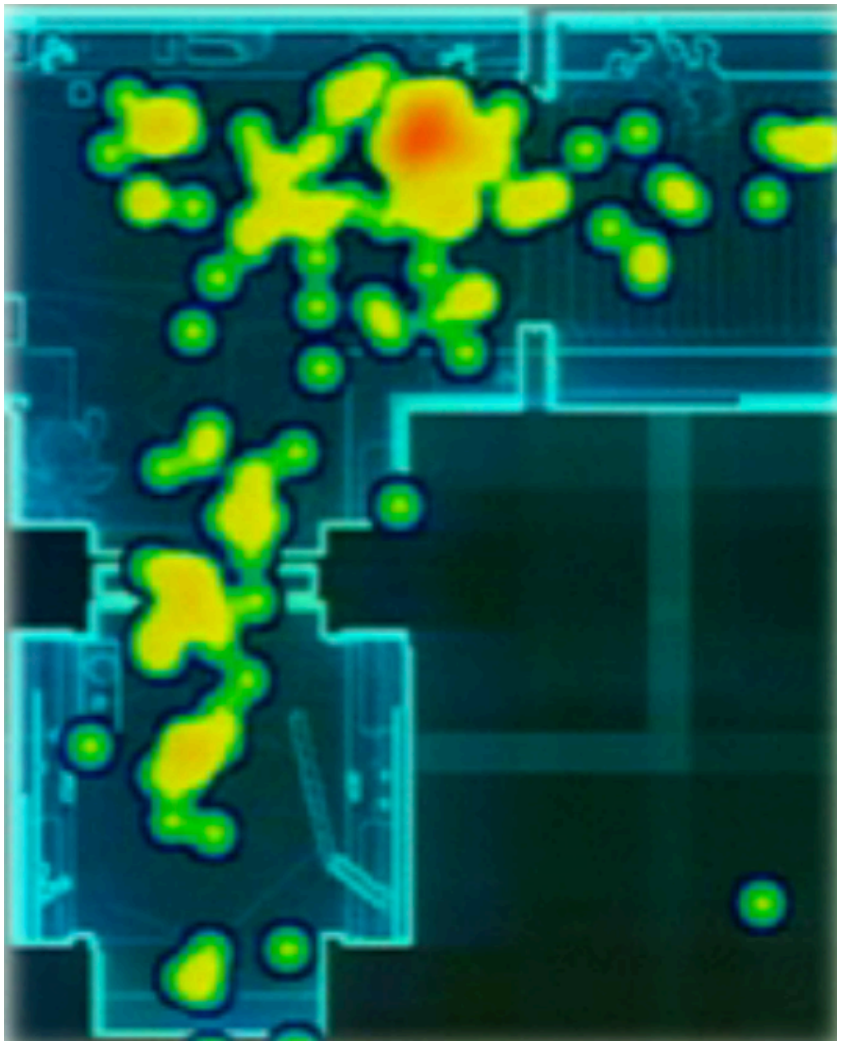
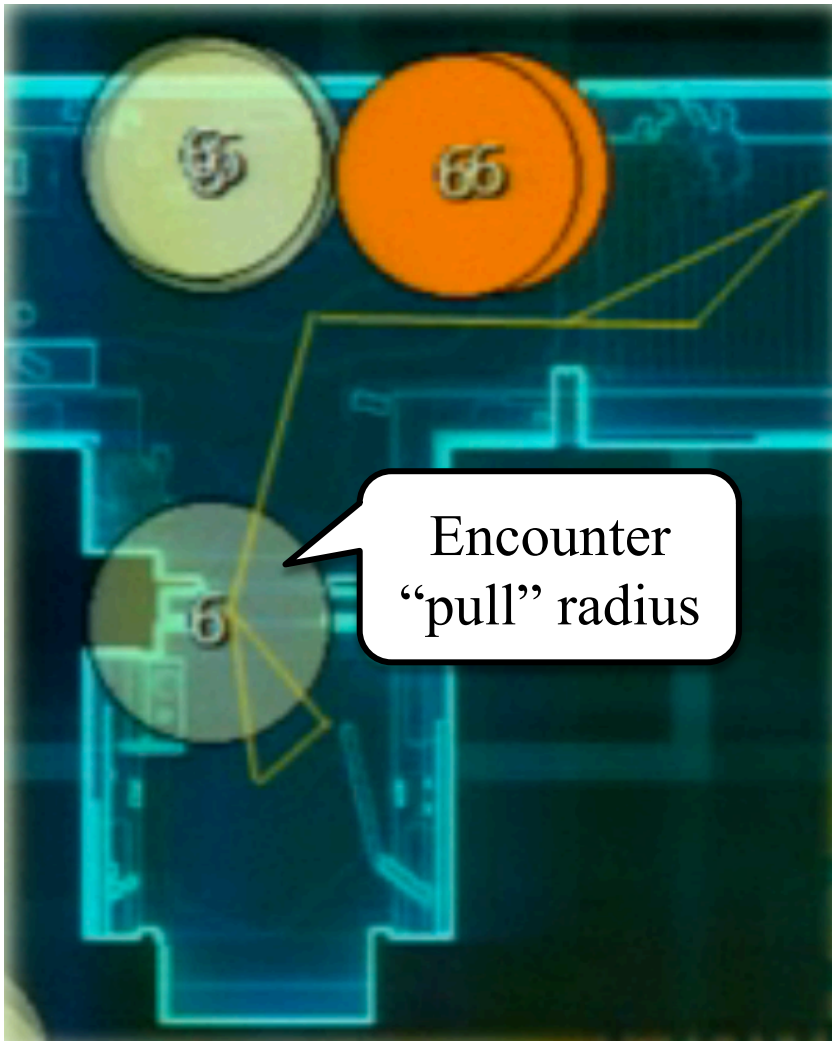


SWOTOR Example: Patrol Paths





Summary

- Gameplay analytics are increasingly important
  - Often driven by your business model
  - Crucial for monetized/free-to-play games
- 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
- **Next time**: How do we get all this data?

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