



*March 2011
Game Developer Convention:*

5 Cheats for Game Metrics



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Changes to Presentation After GDC Session:

1. **Added results** of interactive demonstration
2. **Added definitions** at the end of slideshow which were requested by audience members who were very new to game metrics
3. **Added “more resources”**
4. **Added discussion sections** to add some of the content discussed in the talk that wasn't in slides

Cheat #5 How to Mine for Valuable users



It's exhilarating to build a game with your team then watch people interact with it.

Interestingly the metrics that come out of people interacting with your game are a game in itself that is fascinating for the game creators to play.

Like any good game, basic metrics are easy but mastery is difficult because of the complexity and synergistic effects that occur.

The rewards are worth it! If you play the metrics game well, you can evolve your actual game much more effectively.

In a one hour session you can't possibly cover all game metrics so I tried to focus on 'cheats' – tips and tricks with examples that I wish someone had given me.

Top teen avatar-based social network

WeeWorld™

WeeWorld™

- 42M WeeMees created on WeeWorld.com and other sites
- Top 10 Teen Site in US
- 30 minutes session times
- 1 year return tenure
- Visual self expression through avatar, room, games and interactions helps evolve identity



FROM THE DIRECTOR OF TWILIGHT
BELIEVE THE LEGEND.
BEWARE THE WOLF.

RED RIDING HOOD
EATERS MARCH



Add as friend

Messages

<< First < Prev 1 - 10 of 3474 Next > Last >>



GivingGoldd Noo Pasz Neededd If You Wantt Sendd Me Ur Cell Number!!!!
★ [View profile](#) ★

Posted 9 hours ago

- ★ Red Riding Hood is HERE!
- ★ Watch NEW VIDEOS = GOLD 4 U
- ★ Ashton Kutcher vid - FREE GOLD
- ⚡ Survey: Tell us what you think!
- 💎 Get points

More updates...

Look HOT, get the latest styles

Revenue: Virtual Goods

WeeWorld™

- 15M assets/mo
- Decorative, functional, branded and behavioral virtual goods
- Many payment methods



Revenue: Advertising

Over ½ billion
impressions/mo

Integrated Brands

- Users choose brands
- Viral spread
- Users ask for brands to come back



1. DEVELOPMENT

2. OPERATIONS

3. MARKETING

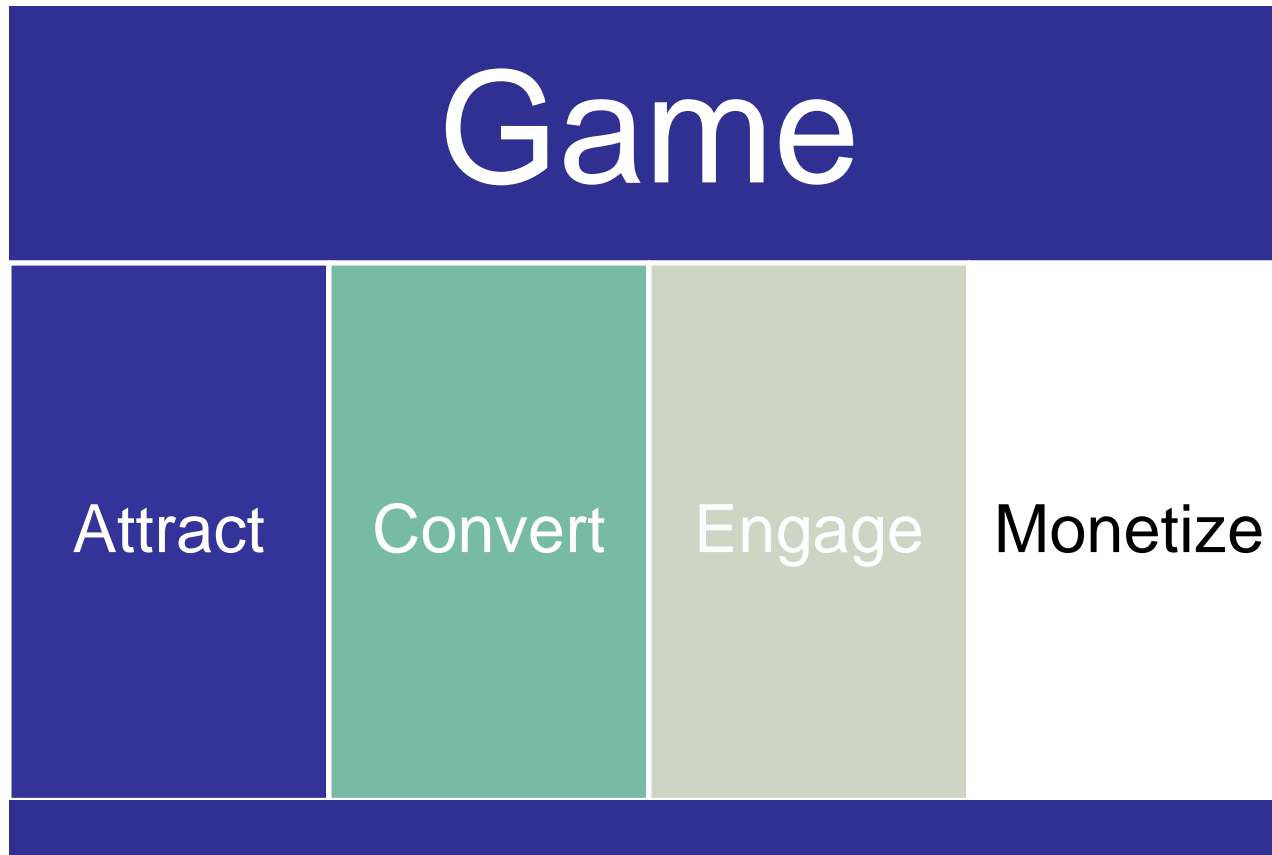
4. BUSINESS

5. OTHER

1. NEW TO METRICS

2. HAVE THE BASICS

3. ITS CORE TO MY JOB



Discussion: One way to cut up metrics is by whether you are trying to attract, convert, retain or monetize users. Each has its own set of metrics, and each metric is often looked at several ways including but not limited to time period, country, demographic, acquisition channel, time period.

The next few slides just give example metrics in each area.

Game

Attract

Virality of existing users:

Virality coefficient or K factor; buzz coefficient

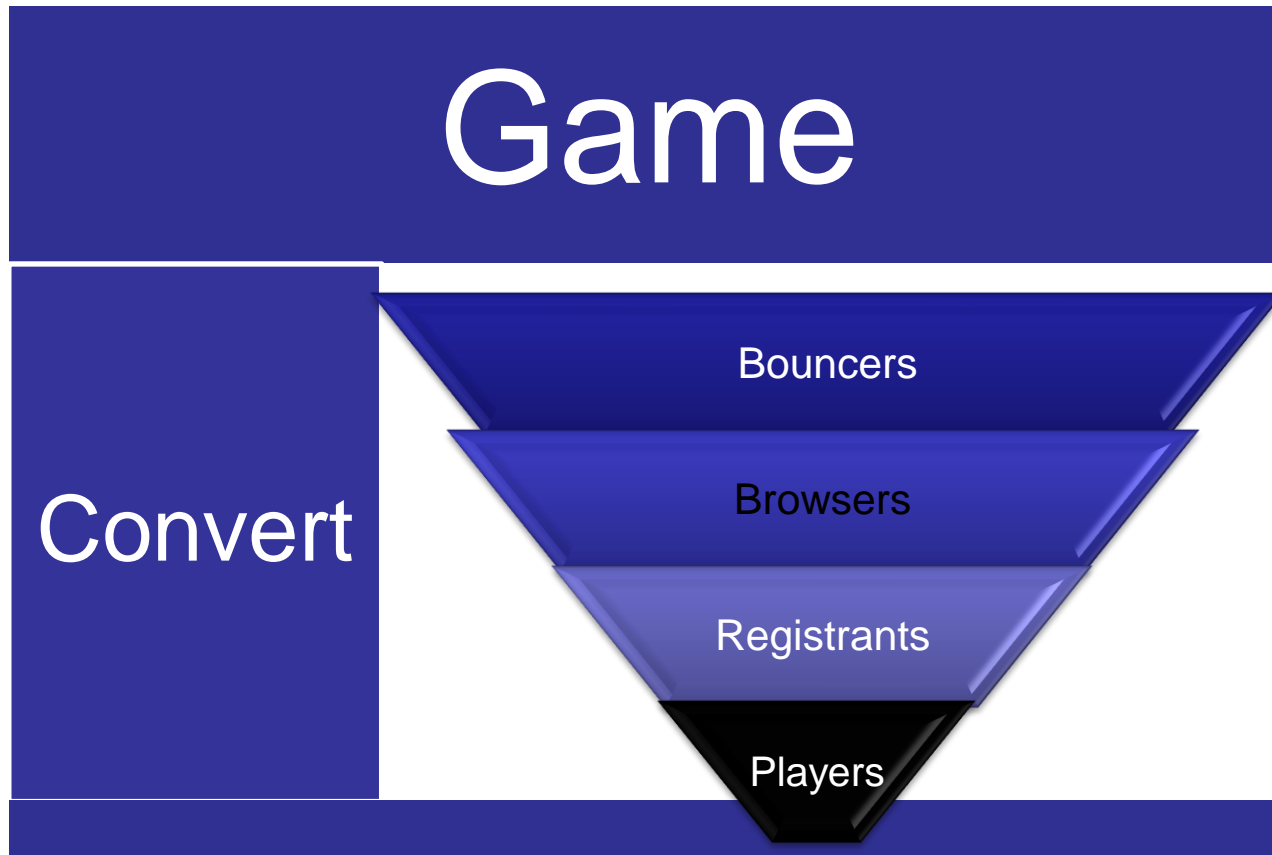
LTV; Channel; Demographics; Psychographics;
ROI

BD: Rev share, conversion, barter

Banner: Cpm, cpc, cpa

TV: Days, Time

Email: Open rate, CTR



- Conversion Funnel
- Bounce Rate
- Registration Rate,
- Tutorial and first few minutes retention rate
- 1 and 7 day retention rates (***and monthly***)

Game

Engage

User Feedback + Surveys

Session time

Visits per visitor

Page views

MAU/DAU

Messages sent, levels achieved, friending behavior, visits to parts of game, number of trophies earned, level earned, other events

Game

Monetize

Virtual Goods

ARPU, ARPPU, average transaction value, # of transactions, Revenue by asset type, new vs. return purchaser, type of virtual good, experience, payment method, % purchasing

Advertising

CPM, CPC, CPA, CTR, Impressions, video completions, likes, interactions, influence, intimacy

Interactive Exercise...

Demonstration: 9 people visited site multiple times

1 person bought \$3 worth of virtual goods on Tuesday

1 person bought \$7 worth of virtual goods on Friday



**10 volunteers
needed**

Unique Visitors		ARPU
Monday	5	0
Tuesday	7	$\$3/7 = 0.42$
Wednesday	5	0
Thursday	6	0
Friday	3	$\$7/3 \text{ uniques} = 2.33$
Saturday	4	0
Sunday	4	0
Wrong Answer!	34 (wrong)	\$2.75 (wrong)
Correct Weekly	9 uniques (1 out of 10 didn't visit site at all)	$\$10/9 \text{ unique visitors} =$ \$1.11

Cheat #1 Uniques do not add up

Discussion: There may be many sources of unique visitor numbers often don't match
e.g. DoubleClick, Comscore, Google, Quantcast, etc)

Look at them all to cross check – choose one source and user that to compare over time



Web Analytics Association Definition of unique visitors:

The number of individual people within a time period with activity consisting of one or more visits to a site.

Each individual is counted only once in the unique visitor measure for the reporting period.

Cheat #1 Uniques do not add up

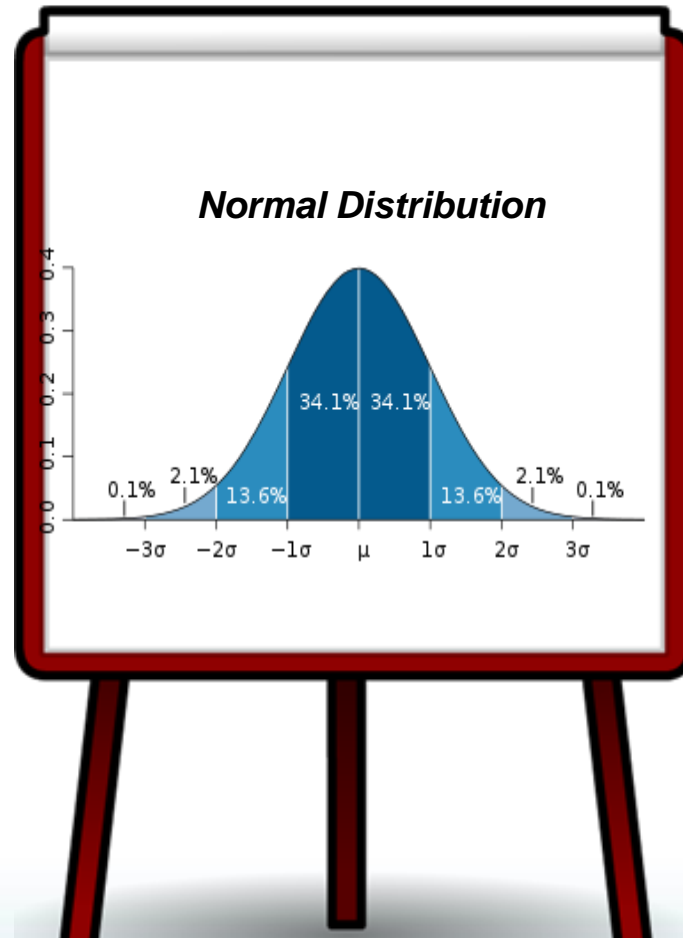


→ Do not add up any metrics based on unique visitors i.e. do not use daily per user metrics to calculate weekly or monthly numbers

→ Do not compare daily, weekly and monthly per user metrics

→ Know the source

Cheat #2 Dangers of Averages

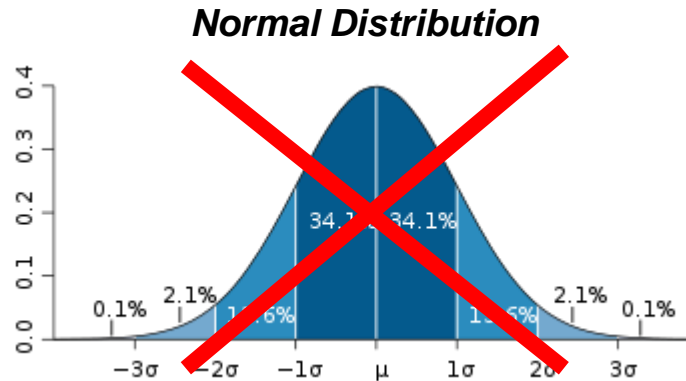


40K	40K	45K	50K	50K	50K	50K	50K	55K	60K	60K
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$(40+40+45+50+50+50+50+50+55+60+60)/10$

Mean (avg value) = **\$50,000**

Cheat #2 Dangers of Averages



40K	40K	45K	50K	50K	50K	50K	50K	55K	60K	1,000K
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$$(40+40+45+50+50+50+50+50+55+60+60)/10$$

Mean (avg value) = **\$144,000**



Median (middle value) = **\$50,000**

Mode (most common value) = **\$50,000**

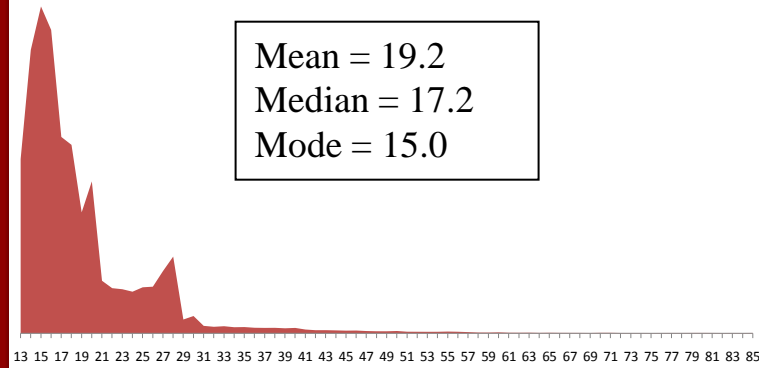
Cheat #2 Dangers of Averages

Discussion:

The long tail skews the average



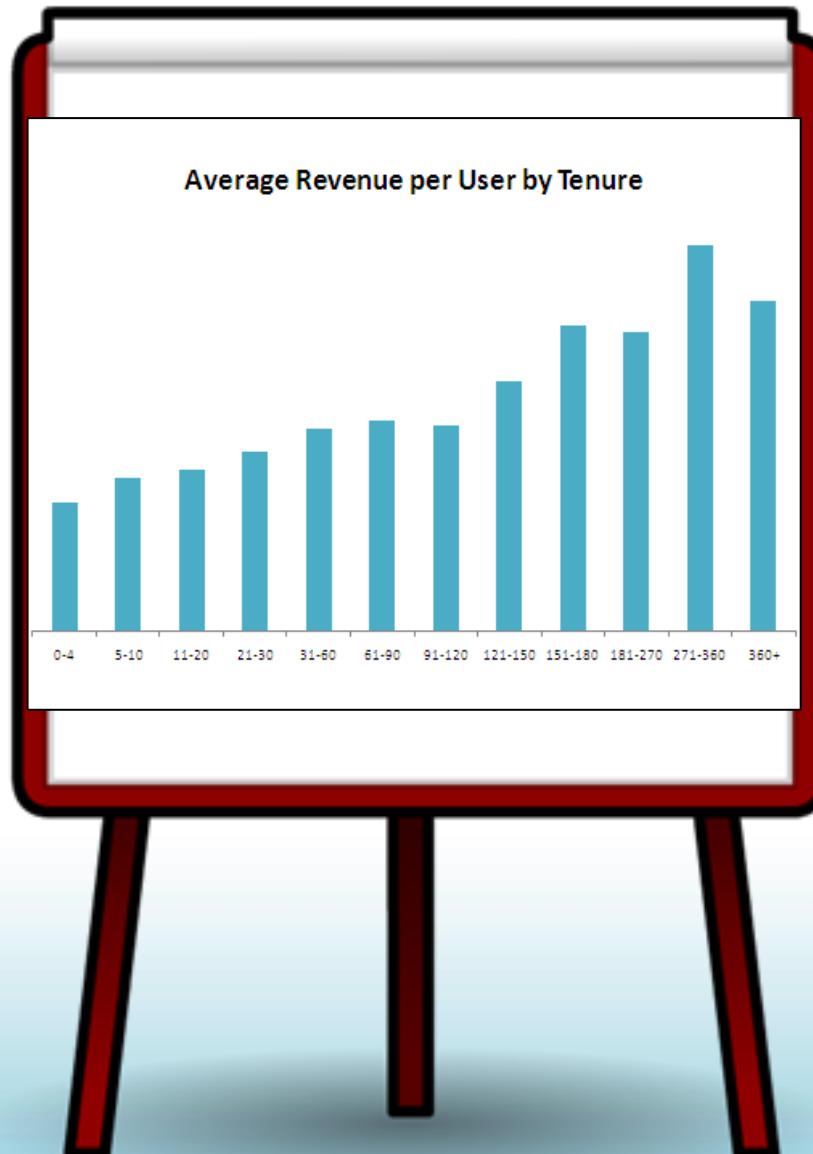
**Age Distribution of Registered User
Weeworld**



Cheat #2 Dangers of Averages

Discussion:

Mean average is misleading...
It's the users who stay on the site
longer that are worth more



Cheat #2 Dangers of Averages

Use Cohorts for insight

Examples

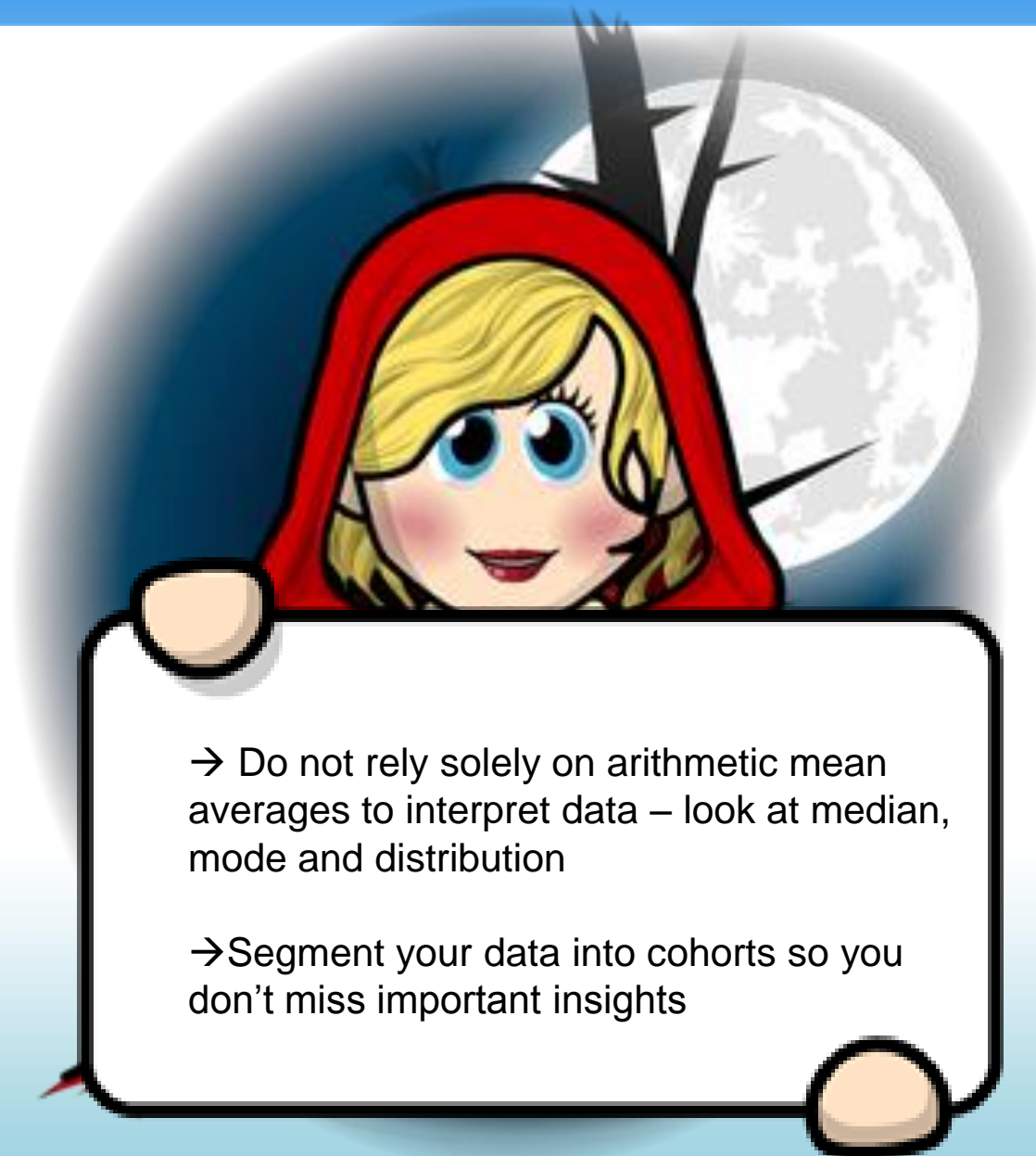
Users who joined within a month

Users who joined through a channel

Users who bought a particular kind of virtual good



Cheat #2 Dangers of Averages



→ Do not rely solely on arithmetic mean averages to interpret data – look at median, mode and distribution

→ Segment your data into cohorts so you don't miss important insights

Cheat #3 Avoid Drowning in Engagement Metrics

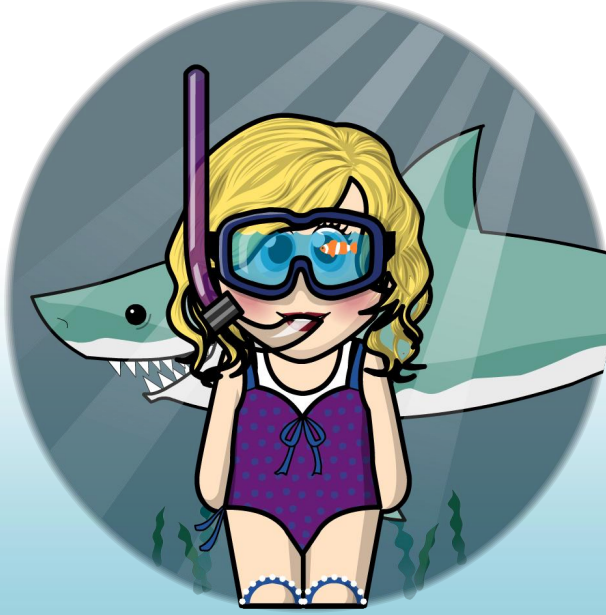


****Most important engagement metrics****

1. New and return unique users
2. Sessions/user
3. Session Time

Engagement can also be analyzed through many others including

1. Concurrent Users
2. Tenure
3. DAU/MAU
4. Bounce rate
5. Impressions+time in each game area
6. Analyzing actions/events (friending, achievements, feature interactions, etc)



Monitor new visitor conversion through

- K factor (or virality coefficient)
- Campaign referrals and conversion rates
- Retention rates (particularly 1 + 7 day)

Also monitor revenue/economy

1. Revenue and conversion rate by each payment method
2. ARPU/ARPPU
3. Asset performance by week including top sellers, top revenue producers, asset diversity by asset type
4. Impressions + CPM
5. Ratio of earned vs. purchased currency as well as balances

(not strictly metrics, but worth mentioning...)

User feedback

- Write in User feedback
- Usertesting.com to test new features
- 4Q survey (4qsurvey.com)
- User surveys (surveymonkey.com)
- Qualitative focus groups, etc.

Cheat #3 Avoid Drowning in Engagement Metrics



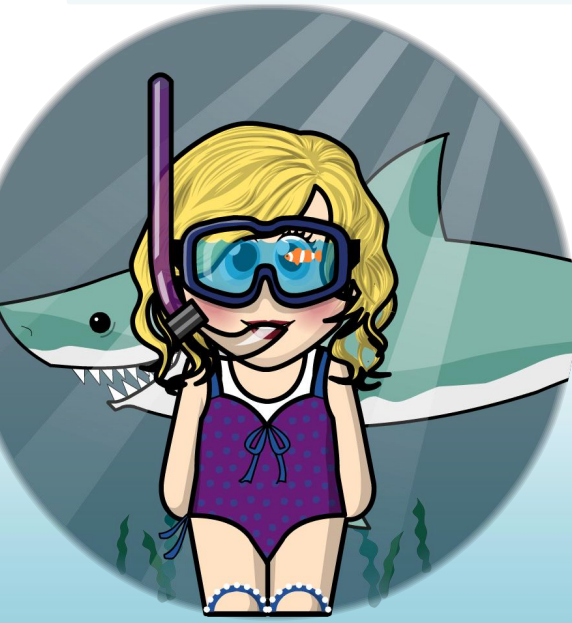
Examples of metrics changing and the reasons we were able to identify for the changes

Positive

- **Impressions Up**
 - Site speed improvement
- **Registration increased 7%**
 - Redesign registration page
- **Visitors and Session times up 15% on typical slow day**
 - Snowstorm on eastern seaboard – the 4th and 5th time this happened we had confidence in the reason.
- **Virtual good a huge hit**
 - But overall no rise in revenue – be careful to keep track of asset diversity

Negative

- **Retention rate dropped**
 - Drop due to significantly increased % of items for sale (we fixed retention by adjusting economy – gave away 1000 earned currency)
- **Impressions drop**
 - Feature change – ease of responding to your friend means you don't need to visit their page – good user experience that decreased revenue
- **Registration rate dropped**
 - Seasonal effects are powerful and predictable – September is lower when users go back to school. In summer visits and session times peak, purchases are highest on holidays.



Discussion

If you notice a change in a key metric you can't easily identify, you may need to dig deep into metrics to answer why. Before you do that make sure the change has statistical significance rather than just a simple fluctuation.

To find answer you may need to sort metrics by user tenure, demographics, feature changes to site, looking at seasonality, etc. Sometimes the exact answer is not clear because of the constantly changing state of users and the game and the vast number of synergistic effects.

Metrics can also be monitored when you test e.g. new features, new acquisition channels, pricing of assets, etc. A/B or multivariate testing helps you draw more definitive conclusions but sometimes may not be practical depending on complexity of test.

Cheat #3 Avoid Drowning in Engagement Metrics



→Uniques, sessions, session times, tenure, virality 'vital stat signs'

→Compare over time using same method/source for trends

→“Why” questions often involves digging deeper into event based engagement

Cheat #4: Know the Pitfalls of LTV



Discussion: Every method is imperfect because you are taking a snapshot in time e.g. some people don't pay and some do and that mix changes over time, some people are no longer active while others are just getting started.



Method #1: Unadjusted LTV

Total Value of Sales/Total # of Customers

Method #2: Adjusted LTV

(Total Value of Sales/Total # of Customers)
minus users < avg tenure

Method #3: LTV based on tenure

Average Tenure X Average monthly ARPU

Method #4: Churn

$LTV = ARPU \times 1/\%Churn$

Method #5: Cohort Method

ARPU month 1 +(retention rate month2 X
ARPU month2) ...
repeat for all months of tenure = LTV

Cheat #4: Know the Pitfalls of LTV



Cohort example of LTV

Tenure	Retention	# of Users	ARPU	\$	Cum Value
<1	100%	1000	\$0.30	\$300	\$300
1 < 2	90%	900	\$0.45	\$405	\$705
2 < 3	80%	800	\$0.60	\$480	\$1185
3 < 4	70%	700	\$0.75	\$525	\$ 1,710
4 < 5	60%	600	\$0.60	\$360	\$2,070
5 < 6	50%	500	\$0.54	\$270	\$2,340

$$\text{LTV} = \$\text{cumulative revenue}/\text{number of users} = \\ \$2340/1000 = \mathbf{\$2.34}$$



Cheat #4: Know the Pitfalls of LTV



→ Use the cohort method of calculating LTV if the purchasing behavior and lifetime is changing rapidly

→ Use the unadjusted LTV for quick comparisons (e.g. marketing channels)

Cheat #5 How to Mine for Valuable users



Method #1 ***LTV***

By marketing channel or tenure

If calculated by marketing channel
also evaluate in context of cost to
acquire and volume available to
find ROI

Also consider

1. Recency of login
2. Latency of login
3. % single visits

Cheat #5 How to Mine for Valuable users



Method #2 ***Game Level***

Combined with revenue this is a quick and easy way to find highly engaged, profitable users or to identify 'sweet spots'

Example: we found if we can keep users until levels 8-12 they start to spend significant money



Method #3 ***RFM ANALYSIS***

1. Recency
2. Frequency of Purchase
3. Monetary Value

RFM 555 = top 5 quintile for all three areas = most valuable purchasers

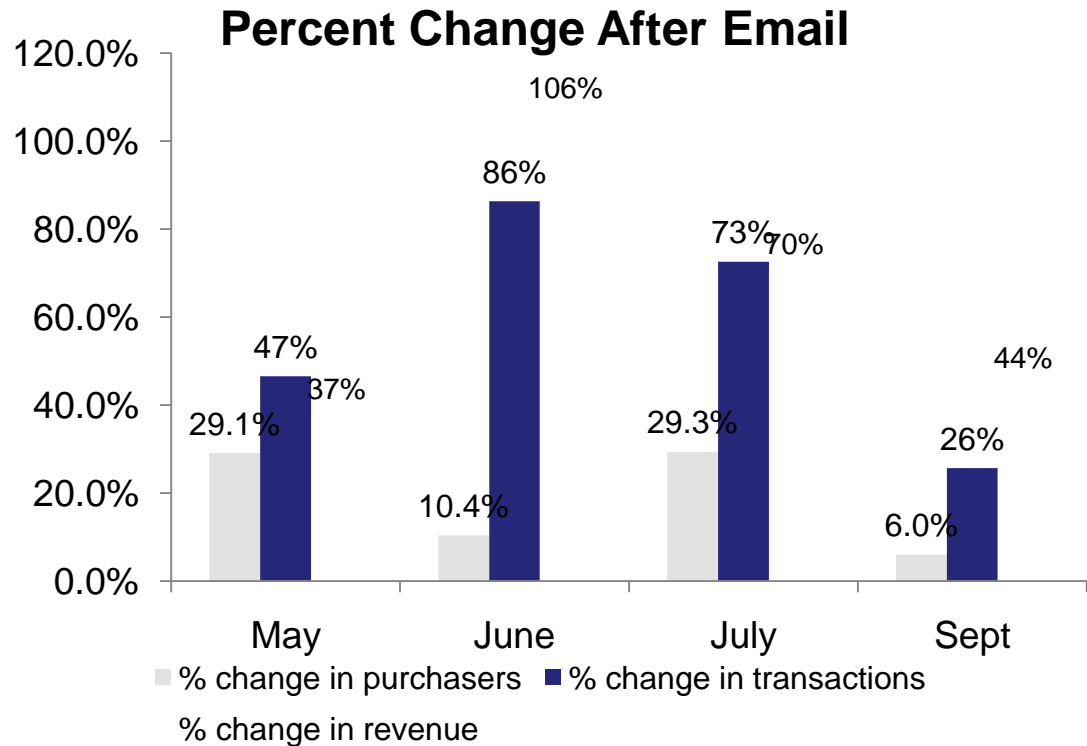
Cheat #5 How to Mine for Valuable users



RFM ANALYSIS

Discussion: Set tripwires ..
Example: If a 555 user hasn't purchased in the frequency we expect, we send them an email to reengage

They spend more \$



Cheat #5 How to Mine for Valuable users

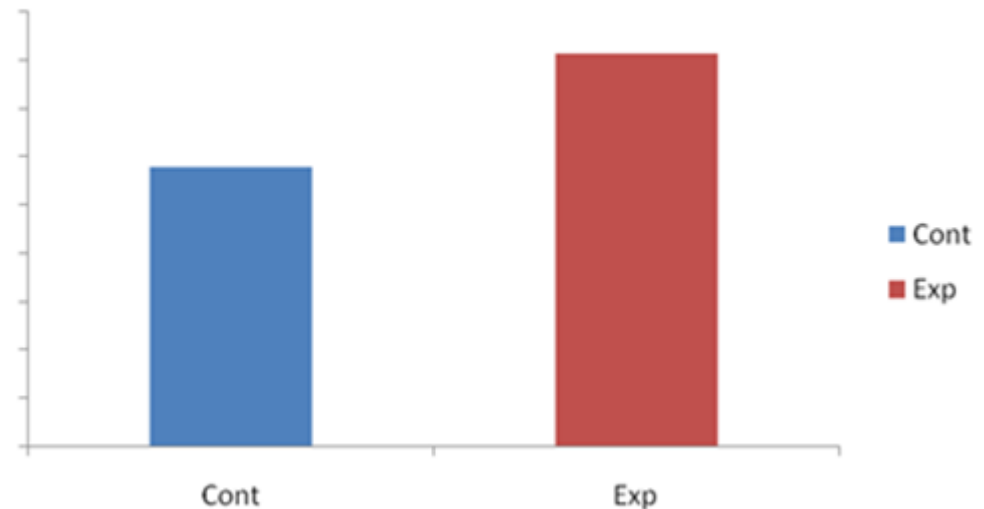
RFM ANALYSIS

Discussion: How do we know the people would have bought without the email?

We set up a control group that did not get the email – they did not spend as much



Average Spend Increased by 41%



Cheat #5 How to Mine for Valuable users



Method #4

RFF ANALYSIS

Find the most engaged users

1. Recency of messaging
2. Frequency of Messaging
3. Number of Friends

RFF 555 = top 5 quintile for all three areas = highly engaged

Cheat #5 How to Mine for Valuable users



Method #5 Identifying Influencers

Users that invite the most #
of friends that join

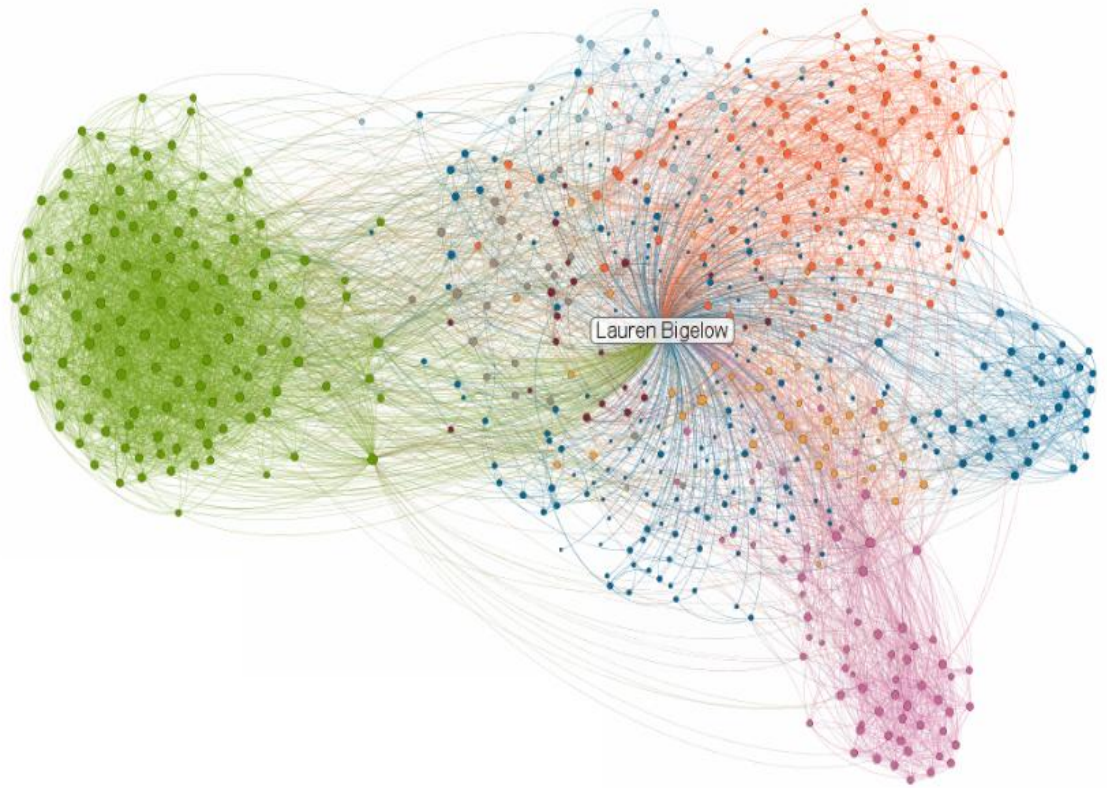


Method #6 Social Graph

Social structure made of individuals called "nodes," which are tied by one or more specific types of interdependency, such as friendship

Cheat #5 How to Mine for Valuable users

<http://inmaps.linkedinlabs.com/>



Cheat #5 How to Mine for Valuable users

Blue = purchased virtual product A

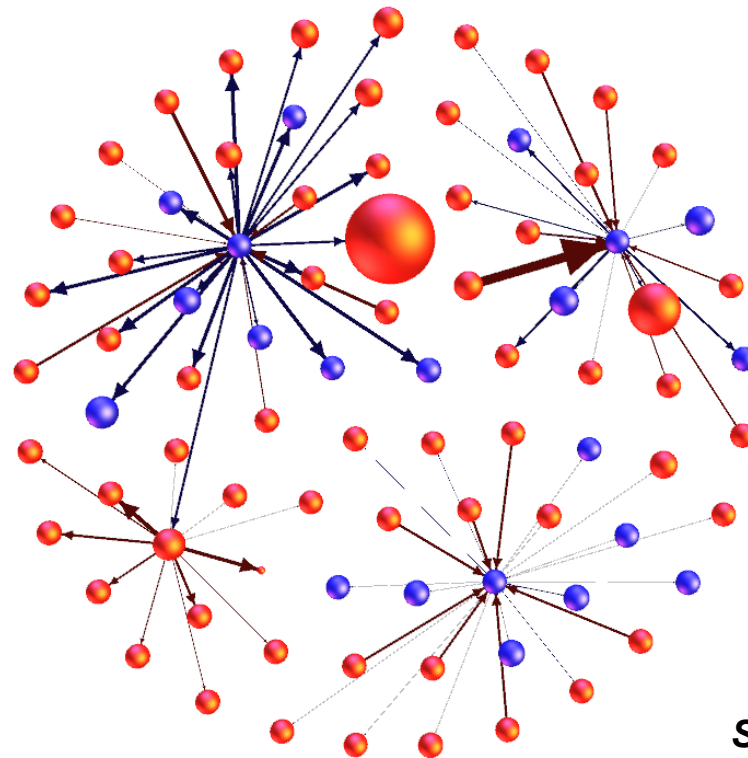
Red = no purchase of virtual product A

Bubble size = number of connections

Purchase behavior spreads from leaders

At least 20% of leader's friends purchase SAME product after leader

Identify 'leaders' by looking at product purchased and social graph



Sonamine LLC



Cheat #5 How to Mine for Valuable users



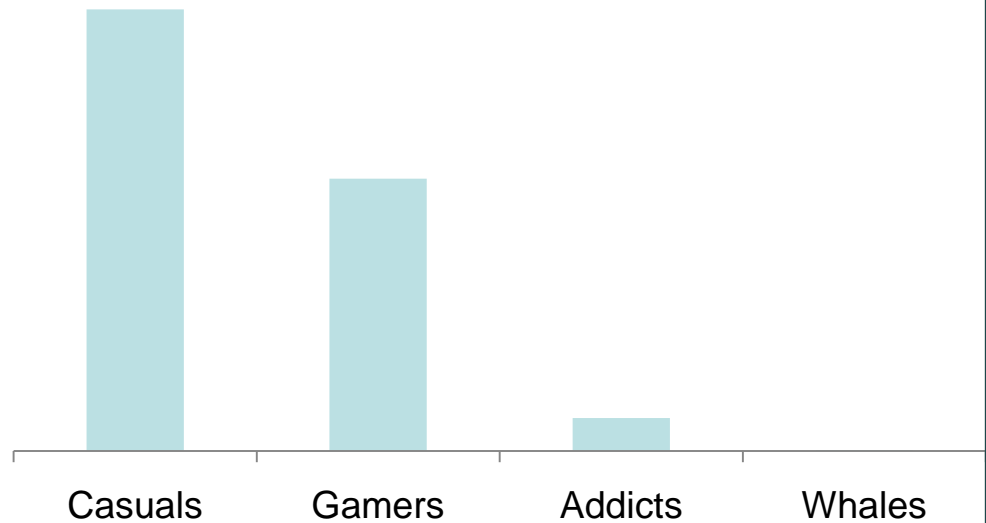
Method #7 Identifying Whales

Monthly spending..
(Arbitrary – set your own)

Casuals	\$0-\$3
Gamers	\$3-\$25
Addicts	\$25-\$100
Whales	\$100+

Cheat #5 How to Mine for Valuable users

Number of Users in Segment



Cheat #5 How to Mine for Valuable users



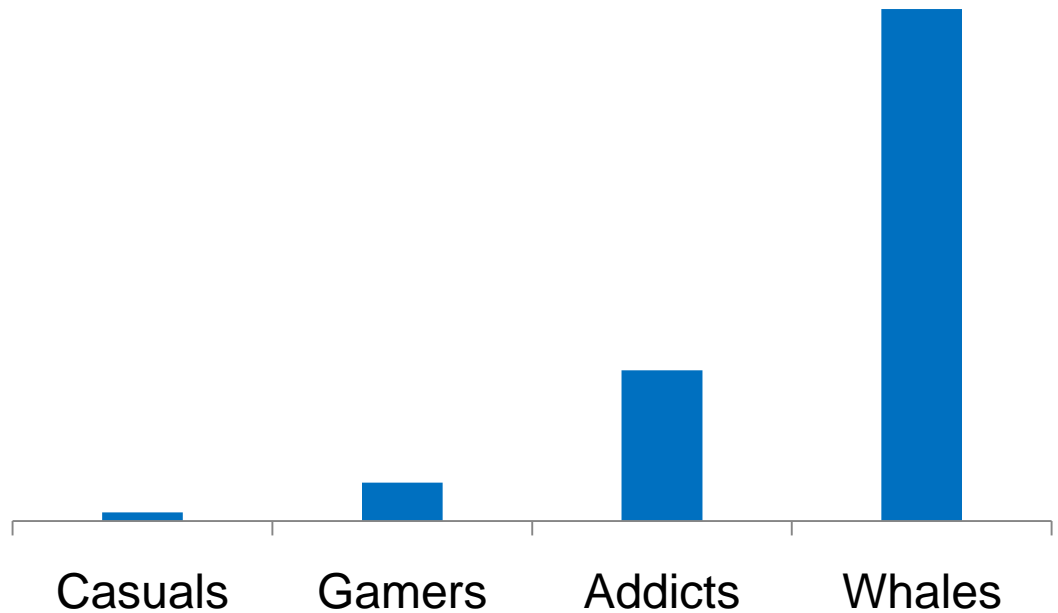
Cheat #5 How to Mine for Valuable users

Whales have:

- 75X** higher number of transactions of an average user
- 20X** revenue of average user

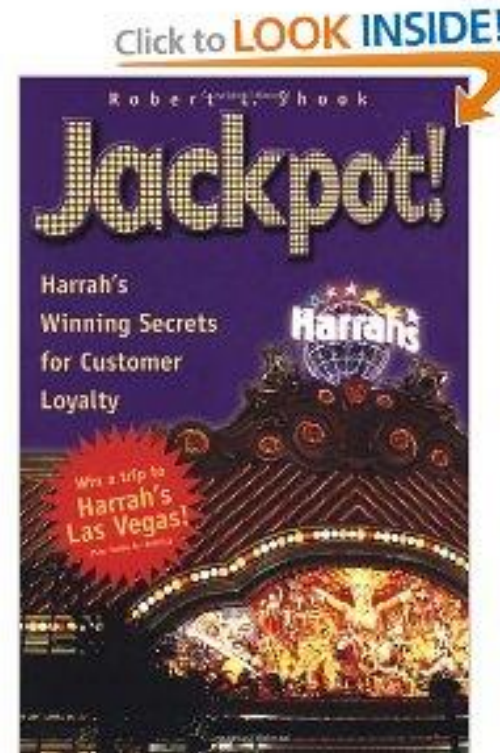


Average Total Transactions



Cheat #5 How to Mine for Valuable users

Here is a book that gives insight into how casinos target whales...



Cheat #5 How to Mine for Valuable users



- Many methods to detect 'valuable' users
- Actionable insights are the key
 - e.g. Reward whales to encourage longer tenure
- Your level 10 today may be your whale next month



→ Unique Users and metrics like ARPU based on them:
Don't just use your calculator !



→ Averages can be misleading



→ Ask yourself.. Are you making an Apples to Apples comparison? Metrics like LTV can be calculated many ways



→ Snapshots are imperfect
Be aware of changing state of your game e.g. LTV



→ Don't drown in metrics:
→ Watch your vital signs,
→ Be ready to plumb the depths when vital signs change



→ Mine your "valuable" users

Acquisition Related Definitions



Life Time Value (LTV)

The measurement of the total worth of a customer – with a freemium game site this is usually all of their purchases plus all of the ad revenue they generate through their actions on the site over the entire time they interact with the game.

CPM cost per thousand impressions of ads

Cost per thousand impressions of ads purchased.

Multiply the CPM rate by the number of CPM units. For example, one million impressions at \$10 CPM equals a \$10,000 total price. $1,000,000 / 1,000 = 1,000$ units; $1,000 \text{ units} \times \$10 \text{ CPM} = \$10,000$ total

The amount paid per impression is calculated by dividing the CPM by 1000. For example, a \$10 CPM equals \$.01 per impression. $\$10 \text{ CPM} / 1000 \text{ impressions} = \$.01 \text{ per impression}$

CPC cost per click on ad

Payment is based on number of clicks on ad (e.g. pay 10 cents per click)

CPA cost per acquisition

Payment is based solely on qualifying actions such as sales or registrations.

K factor = Measure of virality

$\% \text{ users sending invite} \times \text{Avg \# of people invited} \times \% \text{ people accepting invite}$

ROI

ratio of money gained or lost on an investment relative to the amount of money invested

Viral Coefficient

Measure of how many new users are brought in by each existing user.

If the coefficient is 1.0, the site grows linearly and if it's more than that it is growing exponentially.

Viral coefficient = average number of friends that a user invites multiplied by the acceptance rate;

Engagement Related Definitions



Bounce Rate

% visitors who enter the site and "bounce" (leave the site) rather than continue viewing other pages within the same site.

Bounce rate = total number of visits viewing only one page / total number of visits

Visit or Session

A visitor makes a visit when they log into your game and start interacting with it.

Visit or Session Length

The length of time the visitor stays and interacts with your site. A session ends when someone goes to another site, or x minutes elapse (usually 30) between actions on the site, whichever comes first

Tenure

The length of time a user has been active on your site

Page Views per Session

Average number of page views a visitor consumes before ending their session. It is calculated by dividing total number of page views by total number of sessions and is also called Page Views per Session or PV/Session. Many games are no longer based on pages being called from a server (e.g. flash based games) so this metric may not apply.

Frequency / Session per Unique

Frequency measures how often visitors come to a website. It is calculated by dividing the total number of sessions (or visits) by the total number of unique visitors.

DAU/MAU

Daily active users on Facebook game divided by monthly active users is a gross measure of engagement. The higher the %, the more engaging your game is because people are visiting frequently. (caution – if your game user composition is changing [e.g. lots of new users thru mktg that go to the site for one day, prop up DAU and then don't return] this can look like stickiness but it's not.)

Engagement/Revenue Related Definitions



Concurrent Users

Number of users logged into a game at the same time

Number of Friends

Individuals with high numbers of friends combined with high level of messaging demonstrates high level engagement and connectedness

Completed Game Plays or Levels; Number of quests completed, badges or trophies earned

Events

Use your web analytics solution to tag key events in your social game experience, Flash etc such as interaction with video, button clicks, invitations, gifting. The more events, the higher the engagement.

Impression

An impression is each time an advertisement loads on a user's screen. For example anytime you see a banner ad, that is an impression.

% purchasers

The % of the audience by time period that purchased – usually 3-15%/mo often segmented by new and return

Average Revenue per User (ARPU)

Total revenue divided by unique visitors to your game for a specific time period. (Because they are based on uniques they can't be added up)

Average Revenue per Paying User (ARPPU)

Total revenue divided by total number of visitors to your game or site that purchased something for a specific time period. This number is usually much higher than ARPU because it takes out all the users that don't buy anything.

Average Transaction Value

The average value of a purchase.

Some Blogs:

Andrew Chen
<http://andrewchenblog.com/list-of-essays/>
<http://andrewchenblog.com/2011/01/26/retention-metrics-roundup-of-articles-and-links/>

Inside Network
<http://www.insidesocialgames.com>
<http://www.insidemobileapps.com/>
<http://www.appdata.com/>

Kontagent
<http://blog.kontagent.com/>

Web Analytics Forum:
<http://tech.groups.yahoo.com/group/webanalytics>

Avinash Kaushik <http://www.kaushik.net/avinash>

Google Analytics Blog: <http://analytics.blogspot.com>

Web Analytics Demystified
<http://blog.webanalyticsdemystified.com/>

Sterne Measures <http://emetrics.wordpress.com/>

Jim Novo: <http://blog.jimnovo.com/>

Bryan Eisenberg: <http://www.bryaneisenberg.com>

Some Books:

Jackpot! Harrah's Winning Secrets for Customer Loyalty by Robert Shook

Web Analytics 2.0: The Art of Online Accountability and Science of Customer Centricity - Paperback (27 Oct 2009) by Avinash Kaushik

Viral Loop: The Power of Pass-it-on by Adam Penenberg

Drilling Down: Turning Customer Data into Profits with a Spreadsheet - Third Edition by Jim Novo

Competing on Analytics: The New Science of Winning by Thomas H. Davenport and Jeanne G. Harris

Always Be Testing: The Complete Guide to Google Website Optimizer by Bryan Eisenberg (Author), et al

Thank You

