Invisible Design Part 1: Data Analytics

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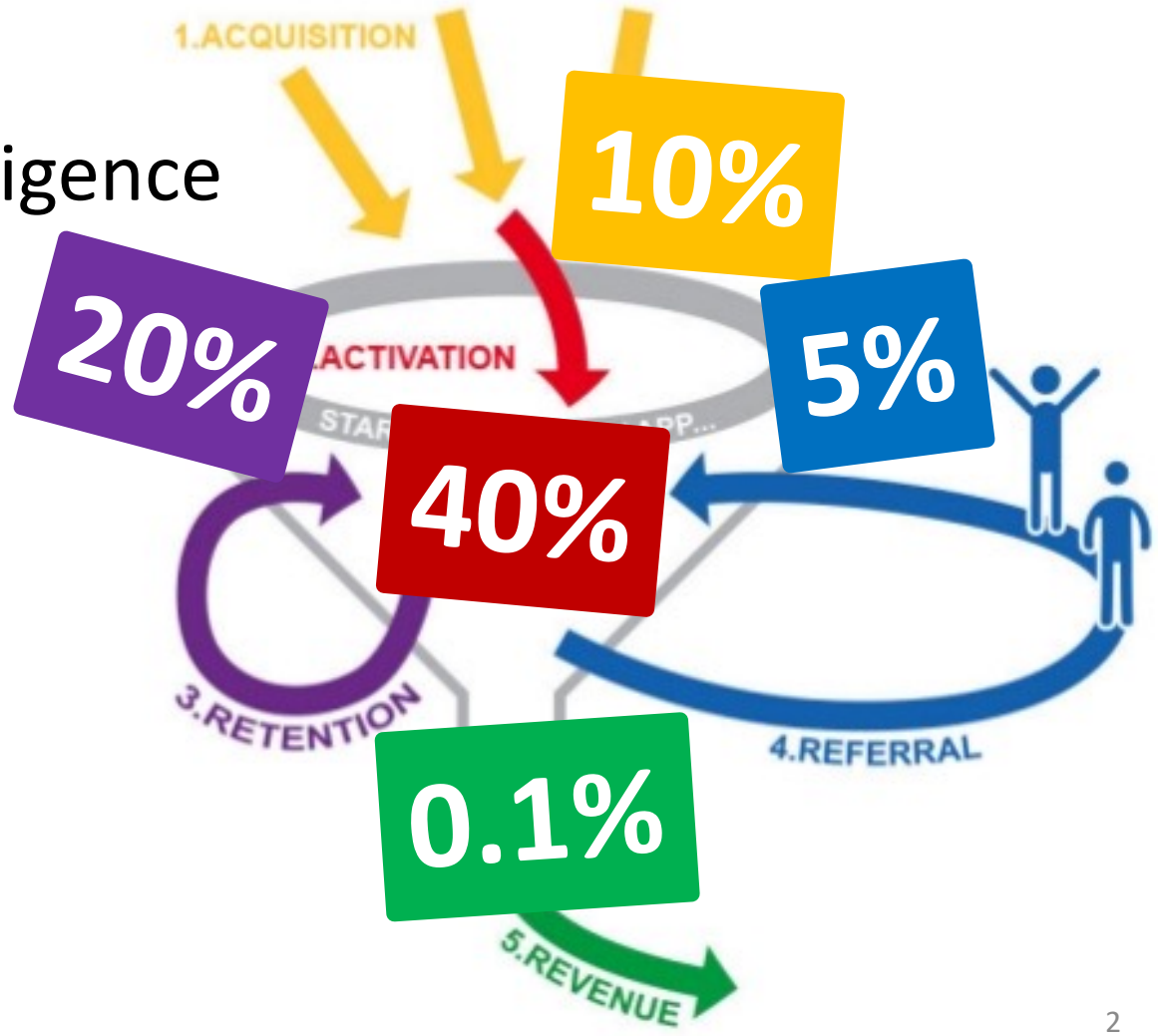
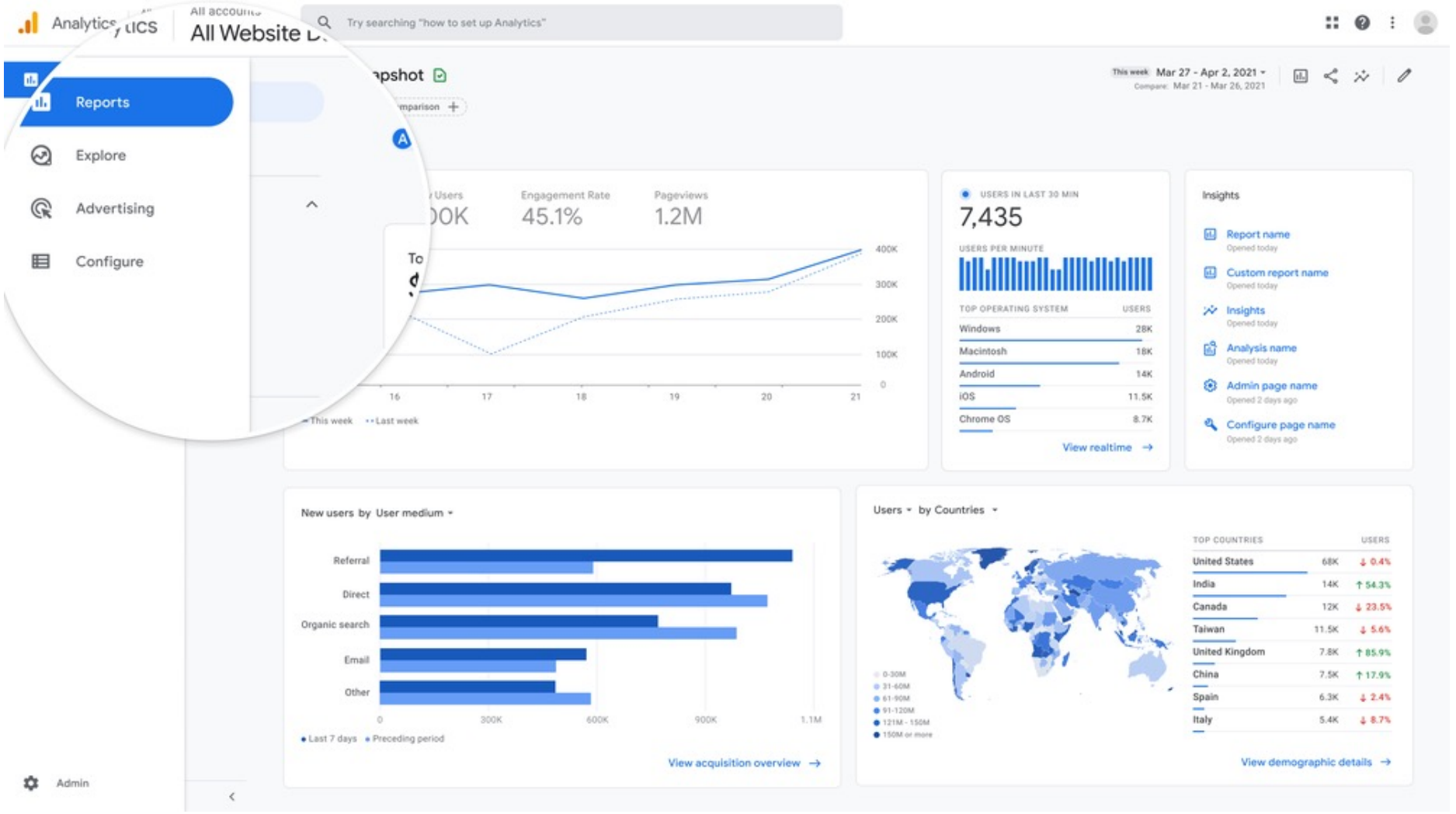
Invisible Design

- Data analytics
- Business intelligence

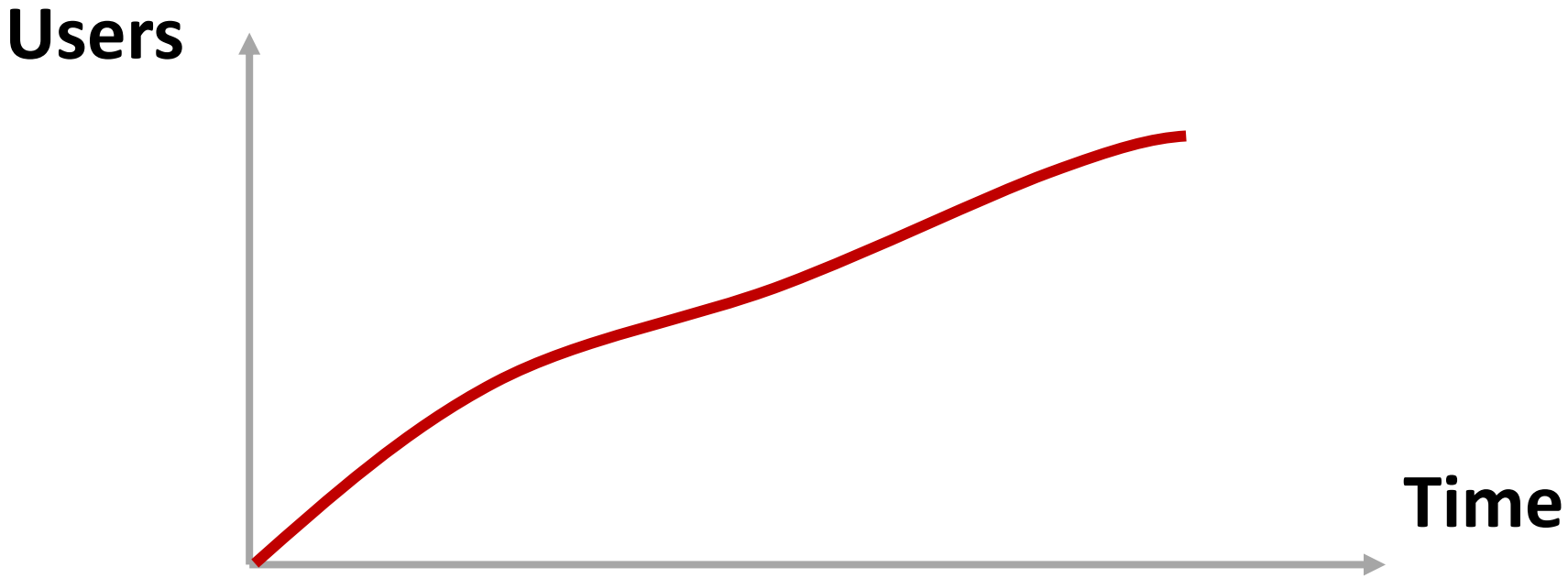


Data Analytics

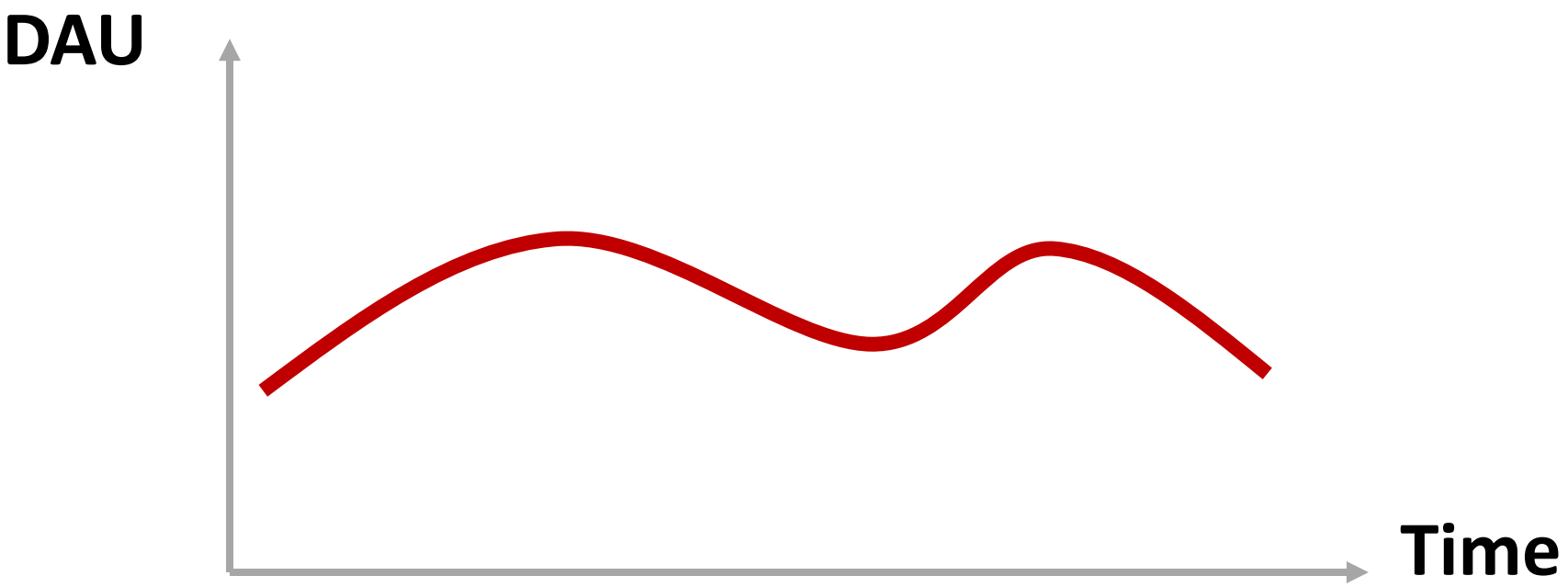


Avoid Vanity Metrics!

- Vanity metrics are those ***you cannot act upon***
  - E.g., #total users



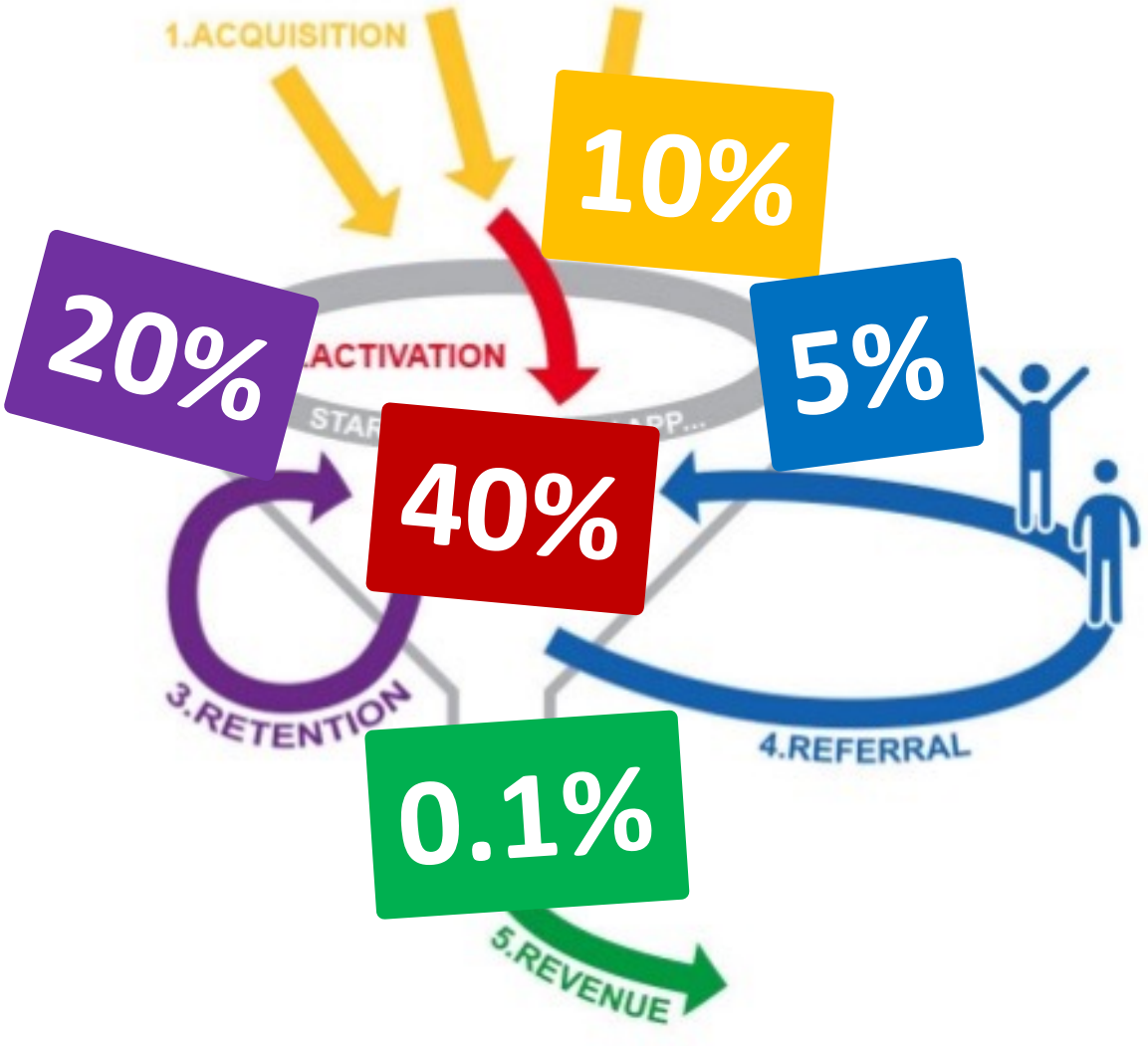
PKIs: DAU, WAU, and MAU



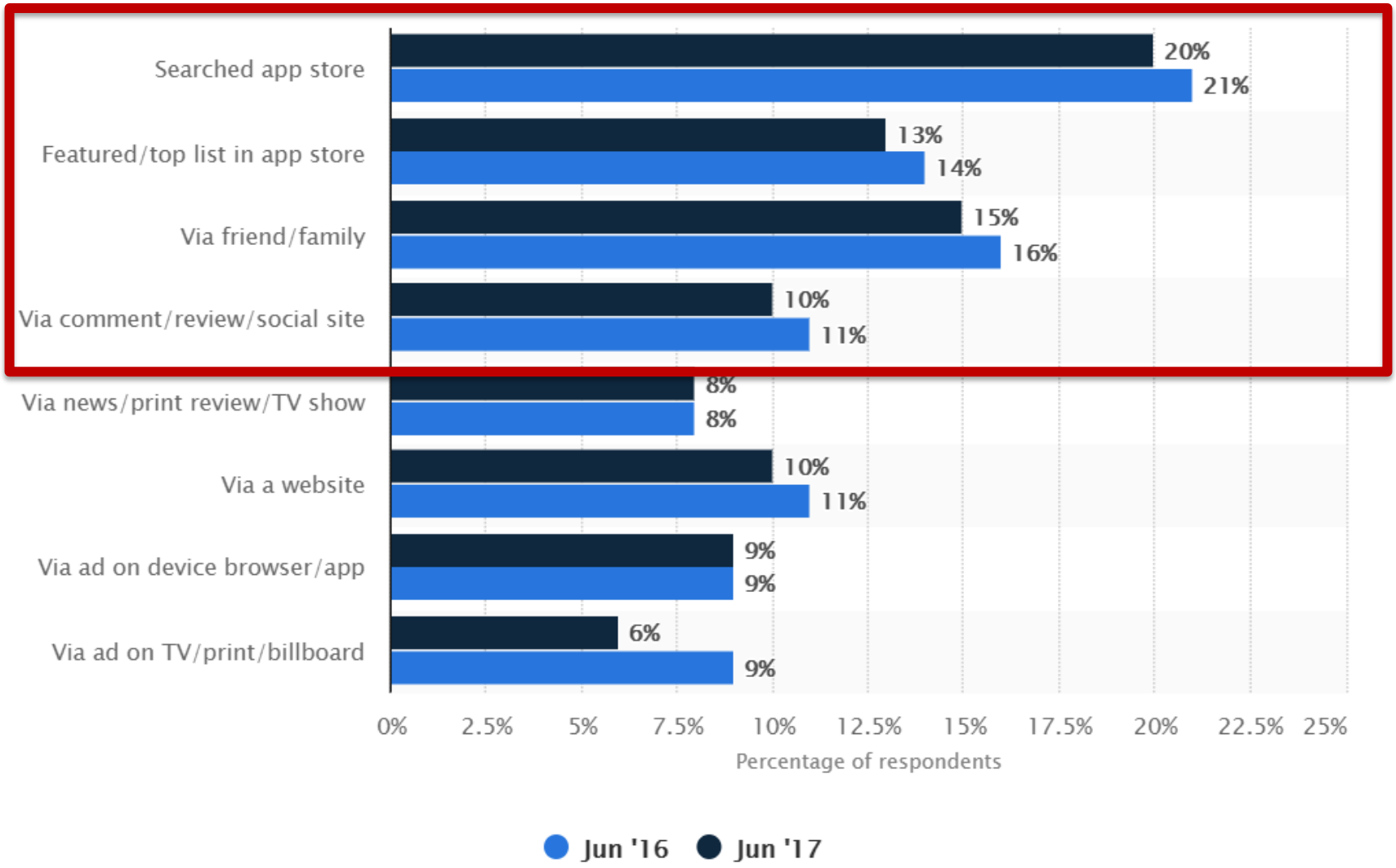
- Daily/weekly/monthly active users
- Better than #users because they ***lead to actions***

Outline

- Acquisition
- Activation
- Retention
- Growth
- Revenue

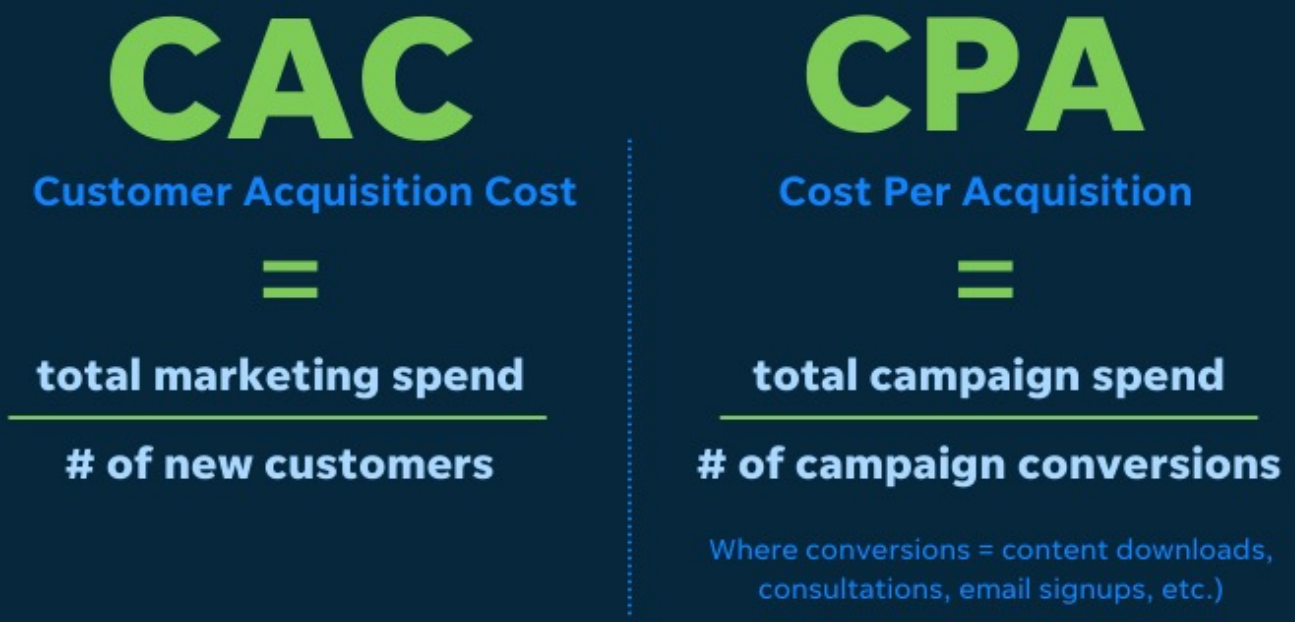


The Path of App Discovery



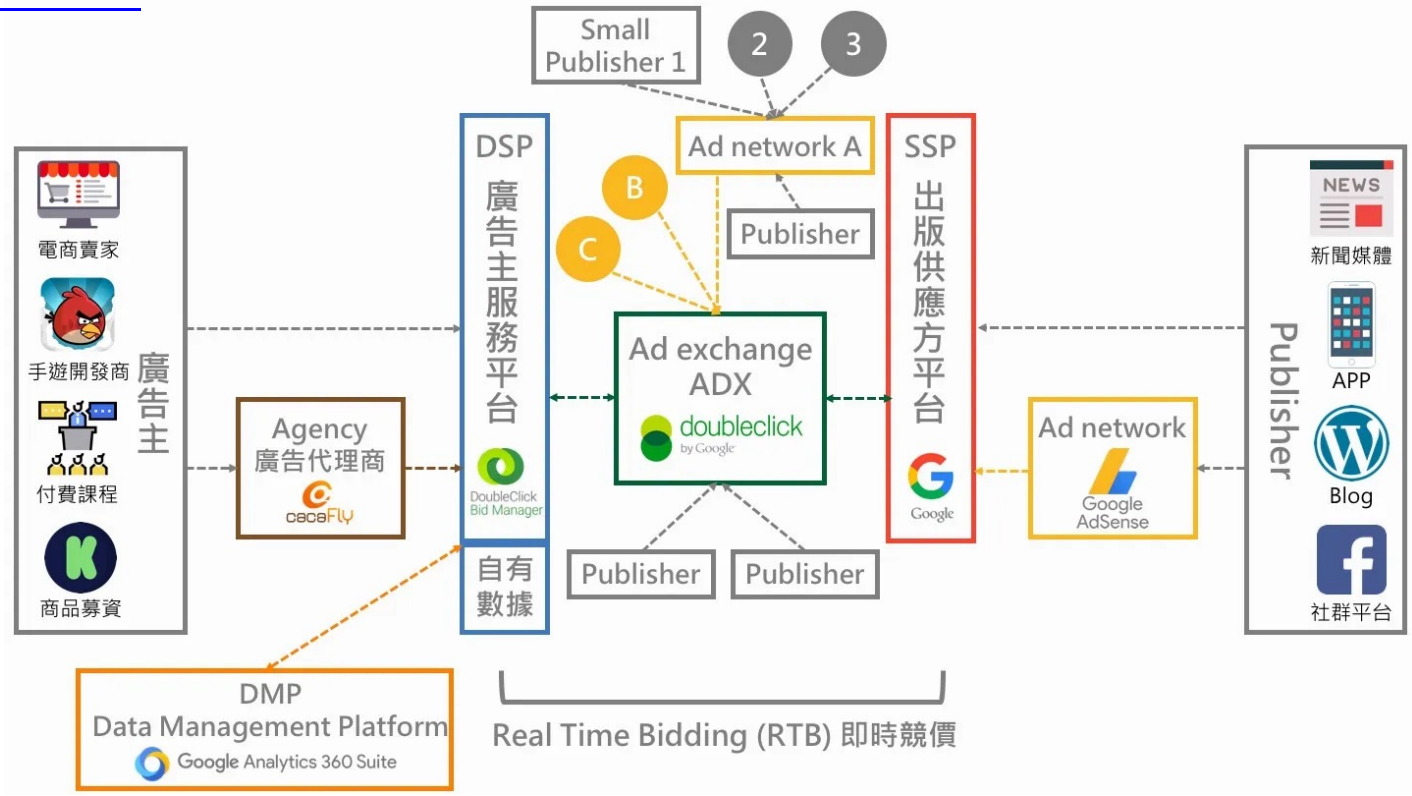
KPIs

- For each major channel, track
  - Conversion rates
  - Costs



Paid Channels

- E.g., Google or Facebook ads
- Real-time bidding based on generalized second price auction



Your Ad Campaigns

- Settings
  - Total budge ($)
  - Goal (branding or conversions)
- Costs:
  - CPM (cost per mille/thousand impressions)
  - CPC (cost per click)
  - CPA (cost per acquisition/action)

How Much to Bid for an Impression, Click or Action?

- In the beginning
  - Just follow the suggested price
- Later
  - Based on ***unit economics*** (to be explained later)

Outline

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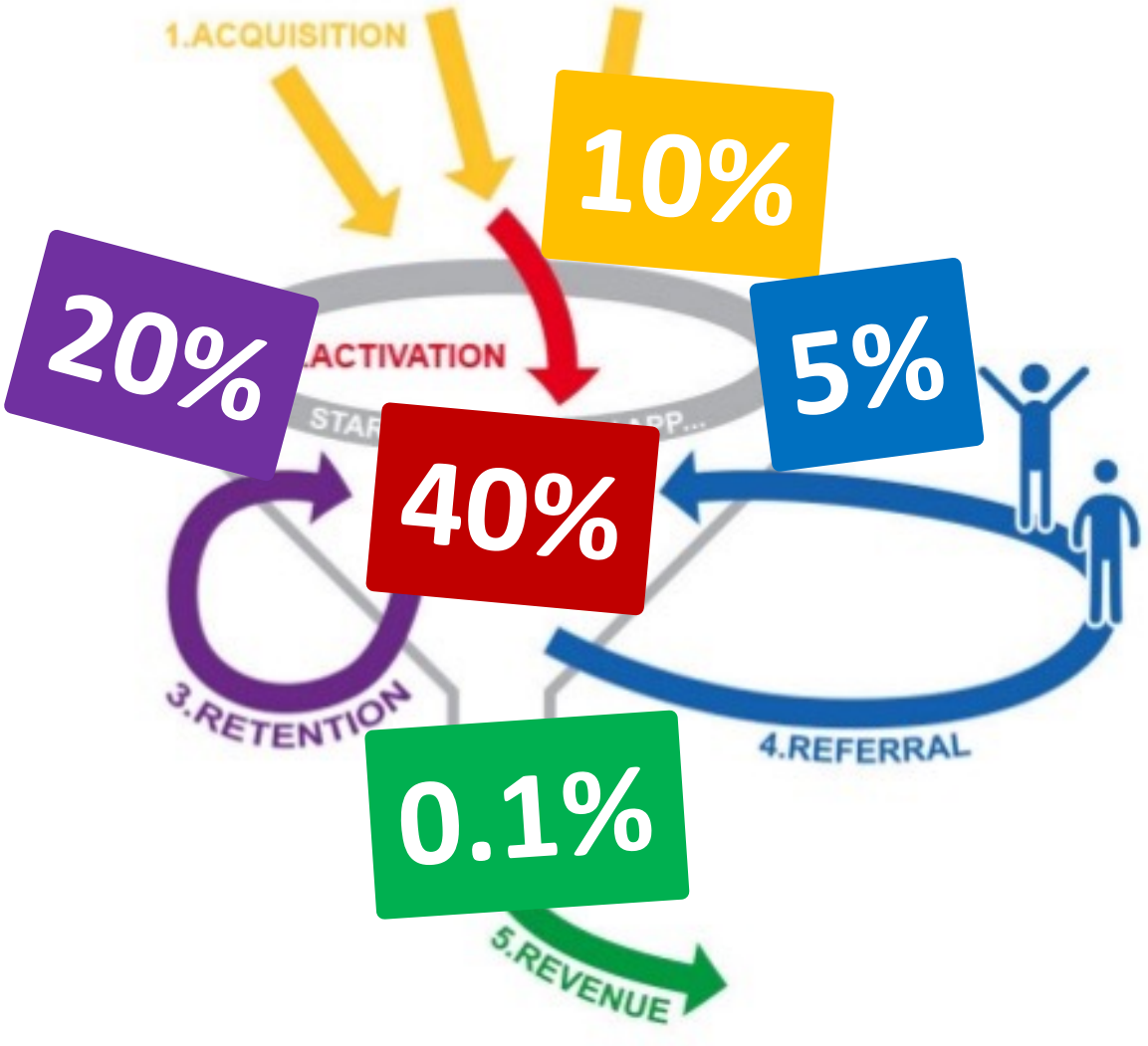
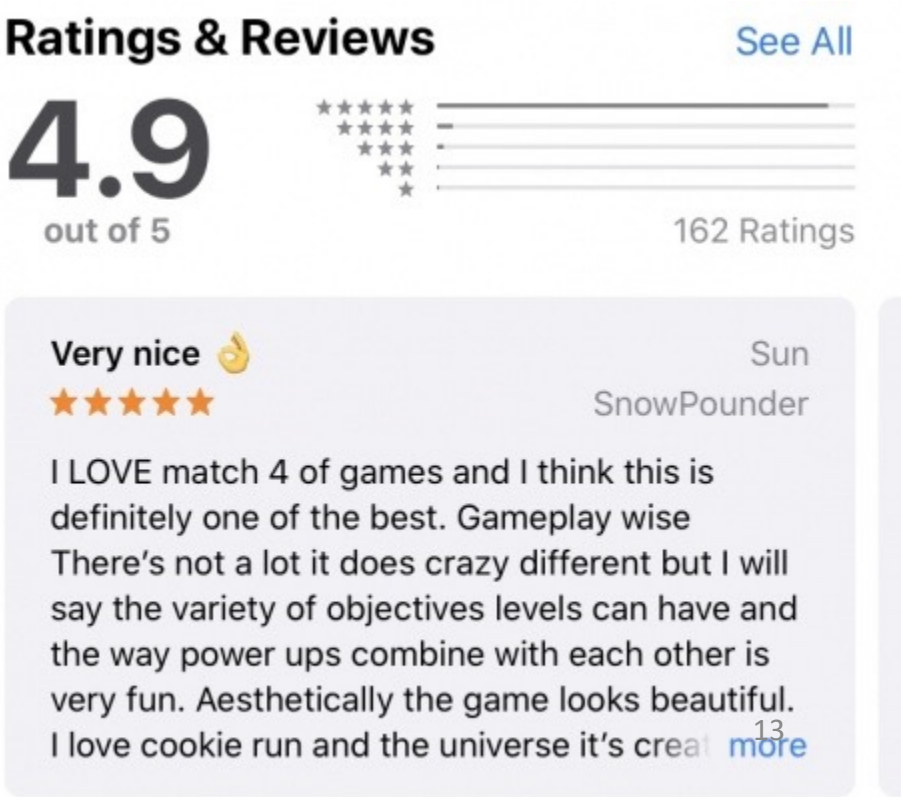


KPI

- User ratings & reviews
  - Focus on negative comments
- Engagement funnel
  - Conversions
  - Events



Engagement Funnel

- Aware (App store or web) → downloaded → launched → active → engaged (tier 1) → engaged (tier 2) → …

- Track the conversion rate for each step
- There's no general definition for activeness
  - Log ***custom events*** to Google Analytics

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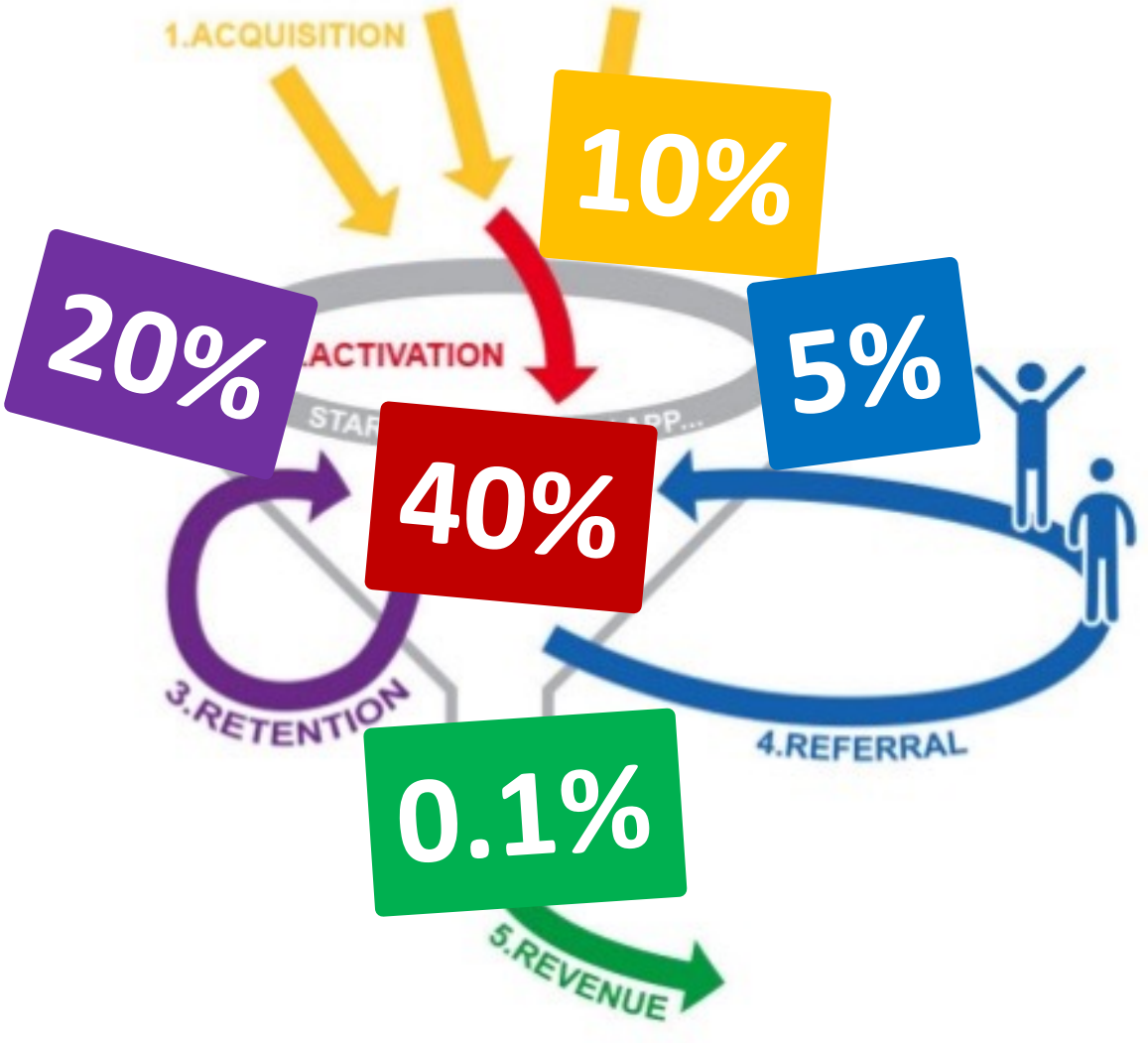
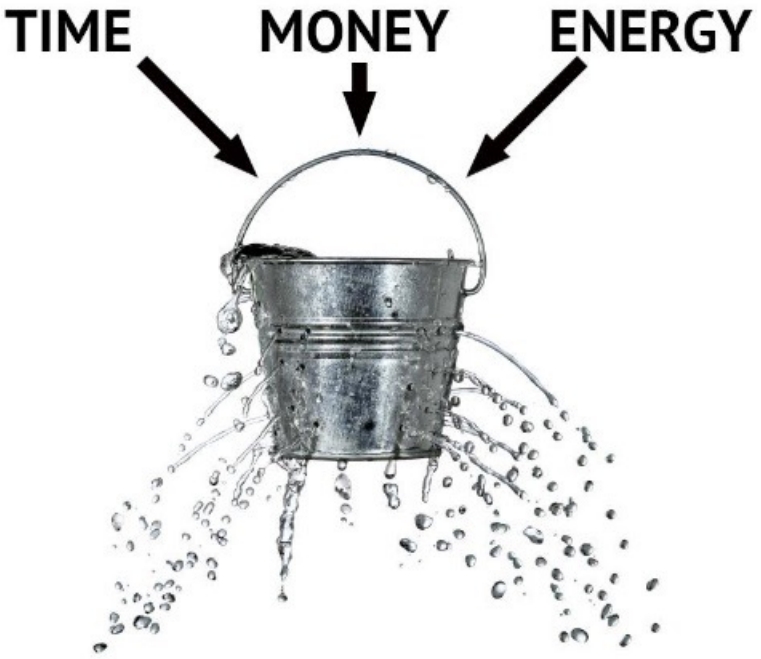


KPIs: Retention Rates

- % of returning users after ? Days
  - DAU, WAU, MAU

- Low DAU (1 day): False advertising?
- Low WAU (7 days): No activation?
- Low MAU (30 days): Not the first-choice solution?

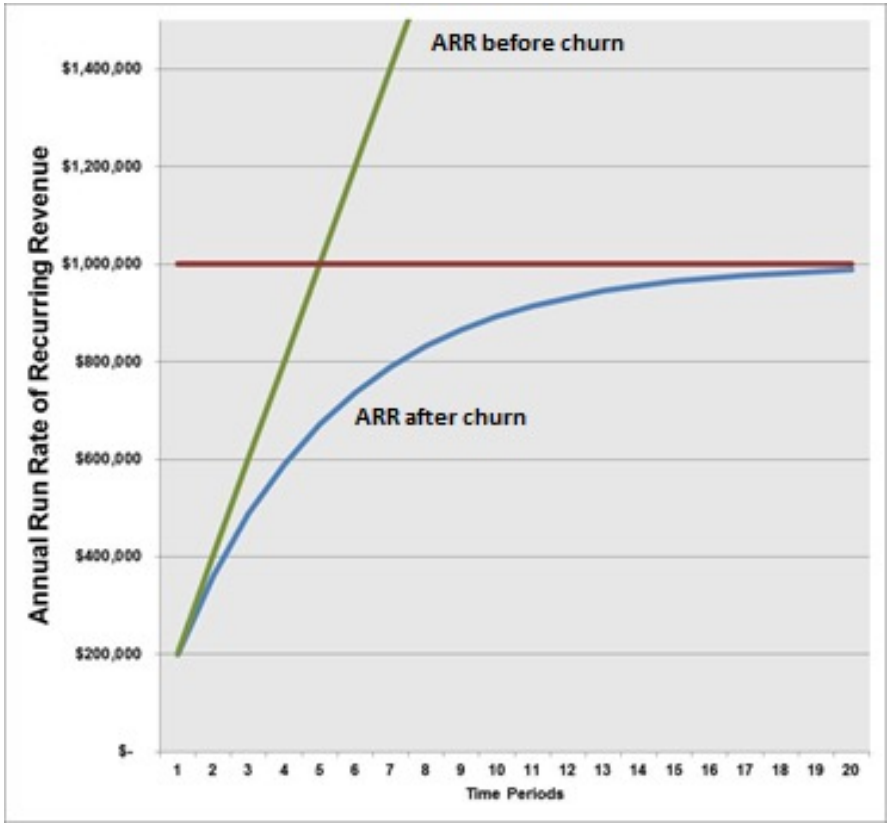
Stop the Leaky Bucket*!*



- ***Reducing churn rate is usually your first focus*** after launch
  - Saves time & money
- User churn rate ≠ customer churn rate
  - Track both

Why Is Churn Rate So Important?

- May define an upper bound of your business
  - E.g., customer churn rate over ARR
- Usually, ***re-engagement*** is more cost-effective than acquisition
  - E.g., via tailored emails



Cohort Analysis

- Your product is changing
  - The lifecycles of users coming at different time may be different
- A ***cohort*** is a group of users coming at a particular period of time
- ***Cohort analysis*** compares the lifecycles of different cohorts

Exercise: How's the Product Going?

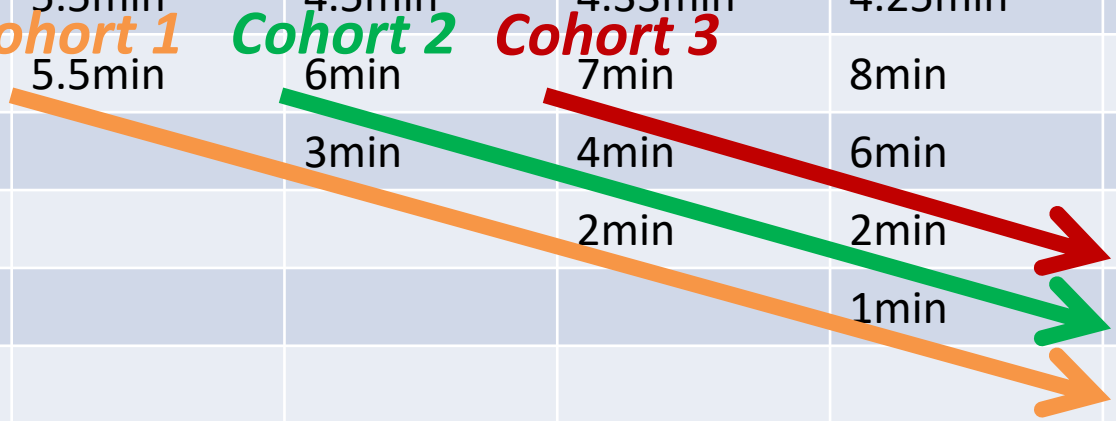
	Jan	Feb	Mar	Apr	May
#Customers	1,000	2,000	3,000	4,000	5,000
Avg sess time	5.5min	4.5min	4.33min	4.25min	4.5min

- Static growth in #customers
- Stable average session time

- Growing idled?

Exercise: How's the Product Going?

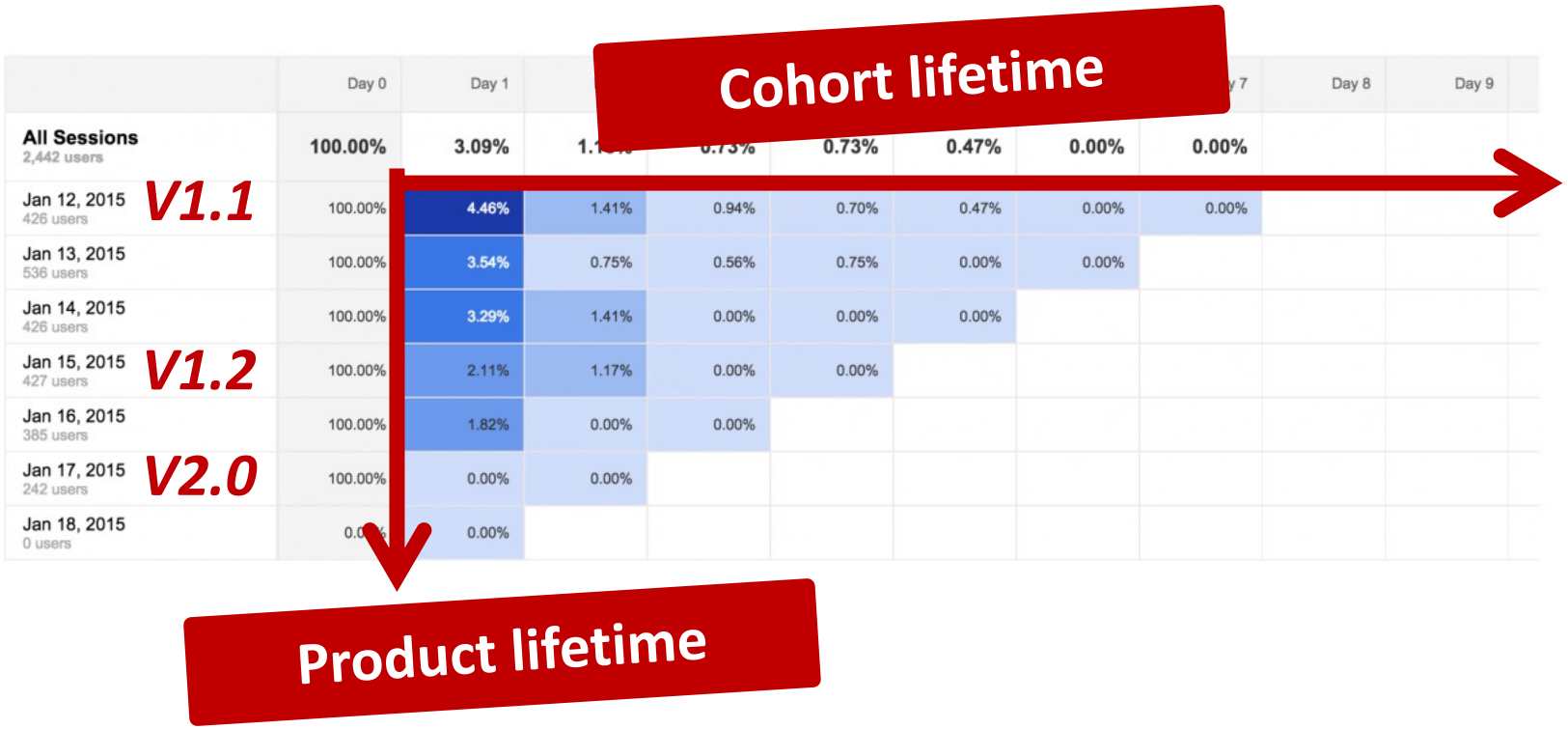
	Jan	Feb	Mar	Apr	May
#Customers	1,000	2,000	3,000	4,000	5,000
#New	1,000	1,000	1,000	1,000	1,000
Avg Sess time	5.5min	4.5min	4.33min	4.25min	4.5min
Month 1	5.5min	6min	7min	8min	9min
Month 2		3min	4min	6min	7min
Month 3			2min	2min	5min
Month 4				1min	1min
Month 5					0.5min



- The product is in fact flourishing!

Cohort Retention Rates

- Available in most analytic tools
  - E.g., Google Analytics



	Day 0	Day 1					Day 8	Day 9
All Sessions 2,442 users	**100.00%**	**3.09%**	**1.1…%**	**0.73%**	**0.73%**	**0.47%**	**0.00%**	**0.00%**
Jan 12, 2015 426 users	100.00%	4.46%	1.41%	0.94%	0.70%	0.47%	0.00%	0.00%
Jan 13, 2015 536 users	100.00%	3.54%	0.75%	0.56%	0.75%	0.00%	0.00%	
Jan 14, 2015 426 users	100.00%	3.29%	1.41%	0.00%	0.00%	0.00%		
Jan 15, 2015 427 users	100.00%	2.11%	1.17%	0.00%	0.00%			
Jan 16, 2015 385 users	100.00%	1.82%	0.00%	0.00%				
Jan 17, 2015 242 users	100.00%	0.00%	0.00%					
Jan 18, 2015 0 users	0.0…%	0.00%						

Extensions

- Compare results of ***the same cohort***

- Segmentation
  - Split a cohort into segments based on attributes (e.g., age, gender, country, device, etc.)
- A/B testing
  - Randomly split a cohort into 2 segments
  - Deliver A and B to different segments

We have 15% retention rate after 30 days. Is it good enough?

Know Your Industry

- "80% of app users churn in 90 days"

Performance Metrics on Day 1 vs. Day 30 for iOS App Installs Worldwide, by App Category, Q1 2016

1 Retention rate
2 Sessions per user
3 Time spent per session (seconds)

	Day 1			Day 30		
	1	2	3	1	2	3
Books & magazines	26.1%	1.75	487.0	4.4%	1.55	265.0
Education	26.5%	1.77	513.5	6.0%	1.57	334.0
Entertainment	26.4%	1.86	509.0	5.1%	1.62	361.0
Finance & business	26.3%	1.74	411.5	6.9%	1.65	287.0
Food & drink	26.0%	1.81	555.0	5.1%	1.55	318.0
Games	27.1%	1.84	566.0	4.5%	1.57	348.0
Hobbies	29.7%	1.93	646.0	5.5%	1.63	403.0
Lifestyle	26.7%	1.94	637.0	5.2%	1.58	373.0
Social & communication	24.6%	1.82	531.0	5.8%	1.67	299.0
Travel & transport	25.9%	1.80	501.0	5.9%	1.70	310.5
Utilities	25.8%	1.84	551.0	5.2%	1.65	372.5

Note: represents activity on adjust's platform, broader industry metrics may vary; all values represent median; app classification based on categories used by Apple App Store
Source: adjust, "Mobile Benchmarks Q1 2016," May 17, 2016

211330 www.eMarketer.com

Outline

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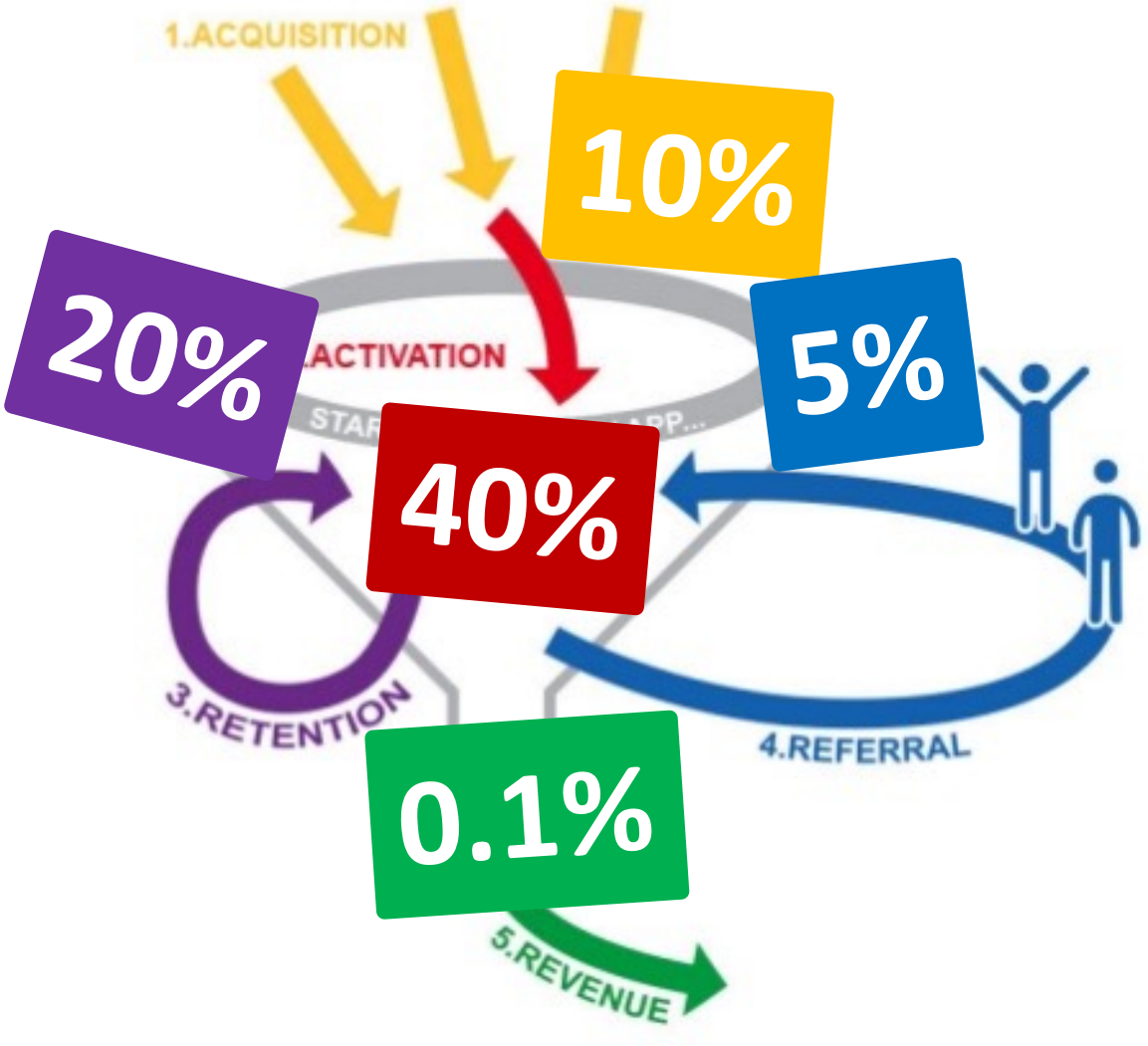


Vanity Metrics

- #shares
- #likes
- #reviews

Virality

- ***Inherent virality***: a function of use, e.g., Messenger
- ***Artificial virality***: forced, often built into a reward system
- ***Word-of-mouth virality***: conversation of satisfied users, product-independent

KPIs

- Viral coefficient
- Viral cycle time

Viral Coefficient

- The number of new users/customers that each existing user/customer successfully converts

Existing users	2,000		
Total invitations	5,000	Invitation rate	2.5
Downloads	1,000	Acceptance rate	0.2
		Viral coefficient	**0.5**

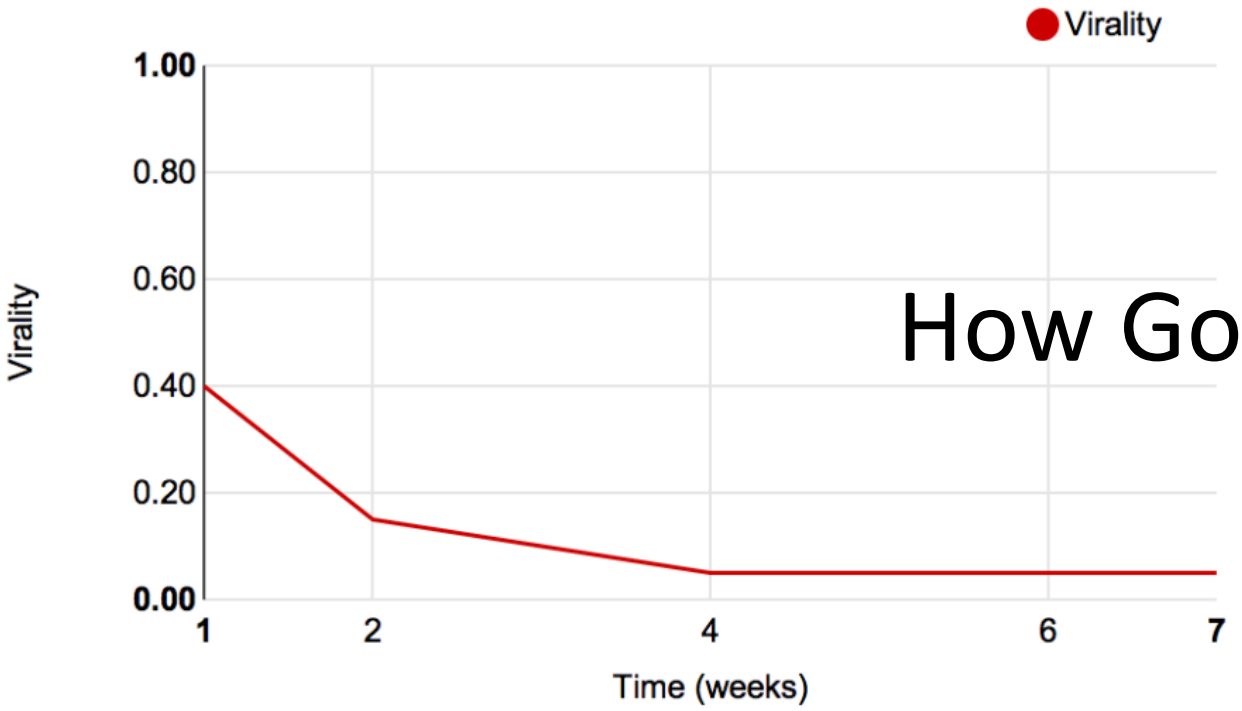
- VC = IR * AR
  - How to increase Invitation Rate?
  - How to increase Acceptance Rate?

Viral Cycle Time

- Avg. time required for each conversion
  - Time to invite + time to accept
- Assume 2k initial users and VC = 0.5, after 20 days:
  - 115K users if cycle time = 2 days
  - ***6.6M*** users if cycle time = 1 day
- How to reduce time to invite?
- How to reduce time to accept?

More Metrics

- Track events/objects that drive shares
- Watch the word-of-mouth (qualitative)
  - Inject hashtags into shared text
  - Monitor hashtags using tools like TweetDeck

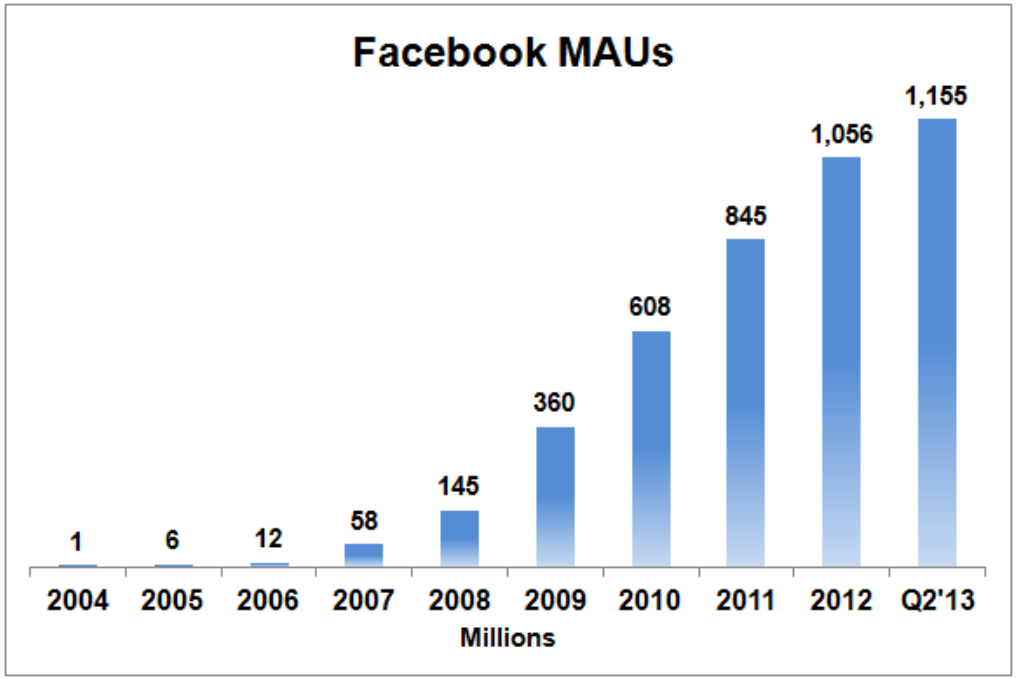


How Good Is Good?

- You viral coefficient will saturate
  - Depending on how “tight” between users
- Generally, VC > 1 means you are “viral”
  - Grow without much marketing/PR budget

Growth Curve

- If you are viral, your growth will looks like a Bass diffusion curve:



  - Usually, the initial flat period is much longer
- Y-Combinator teams: ***5% per week***

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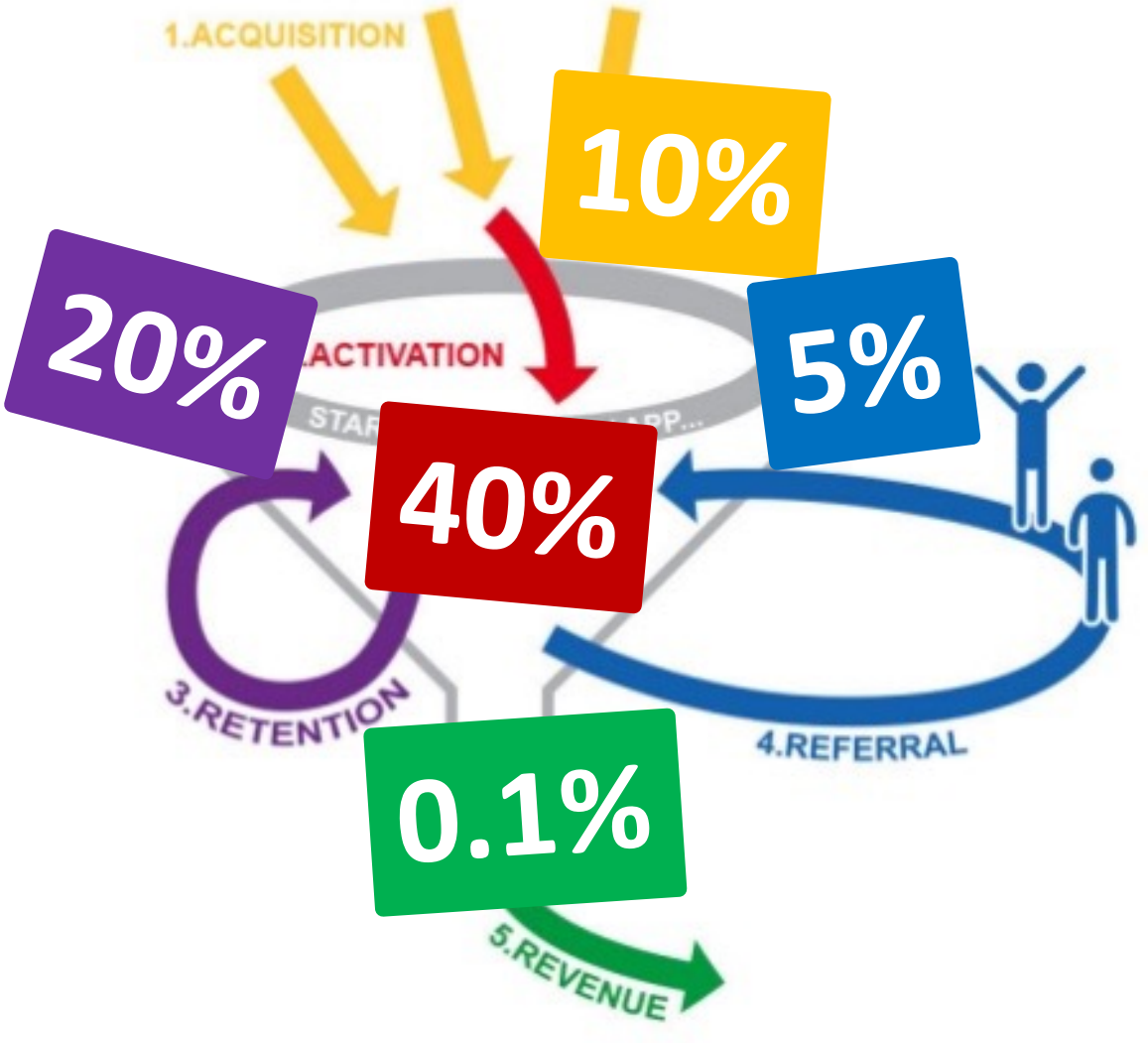
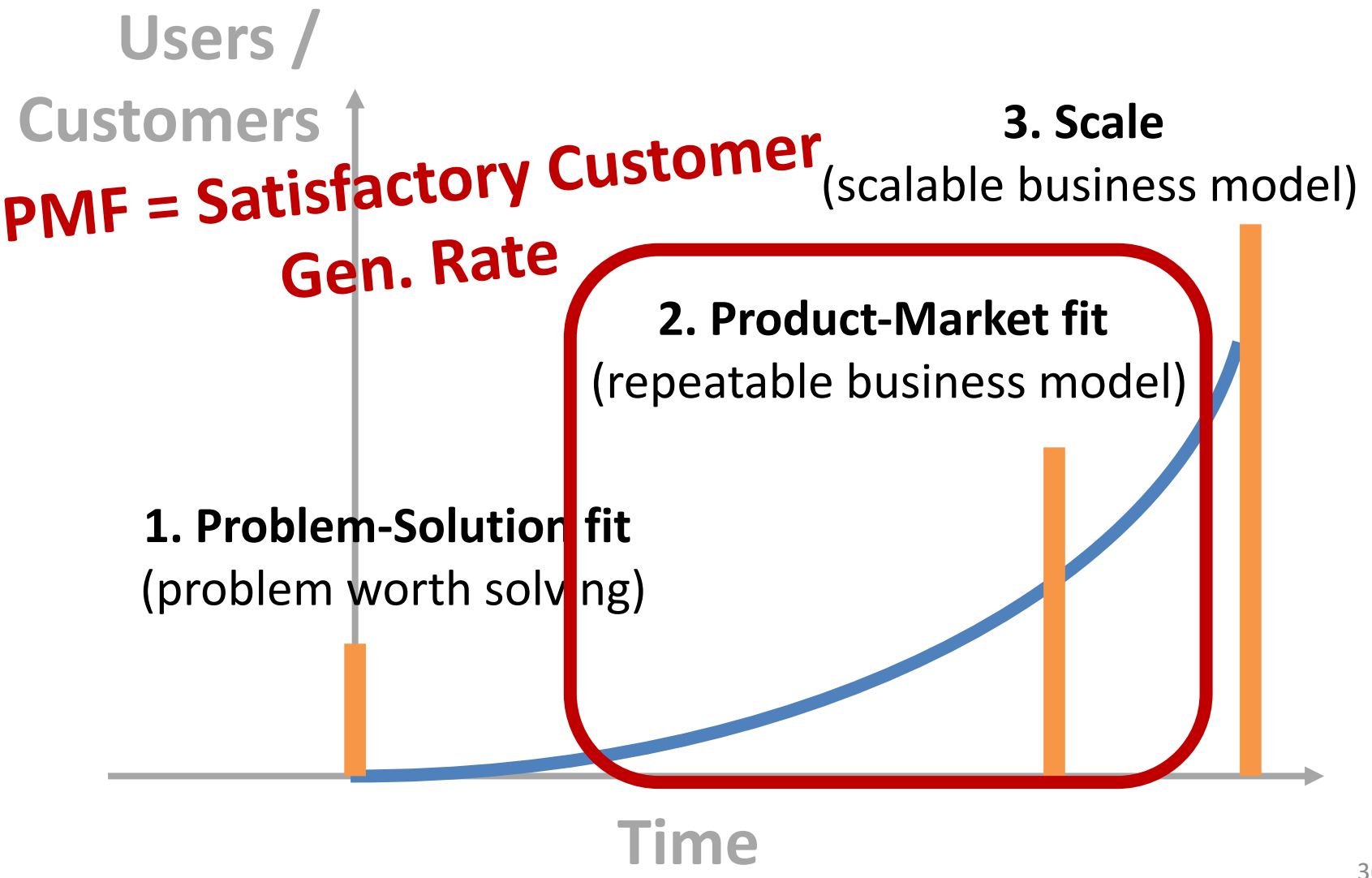


From P.S. to P.M. Fit



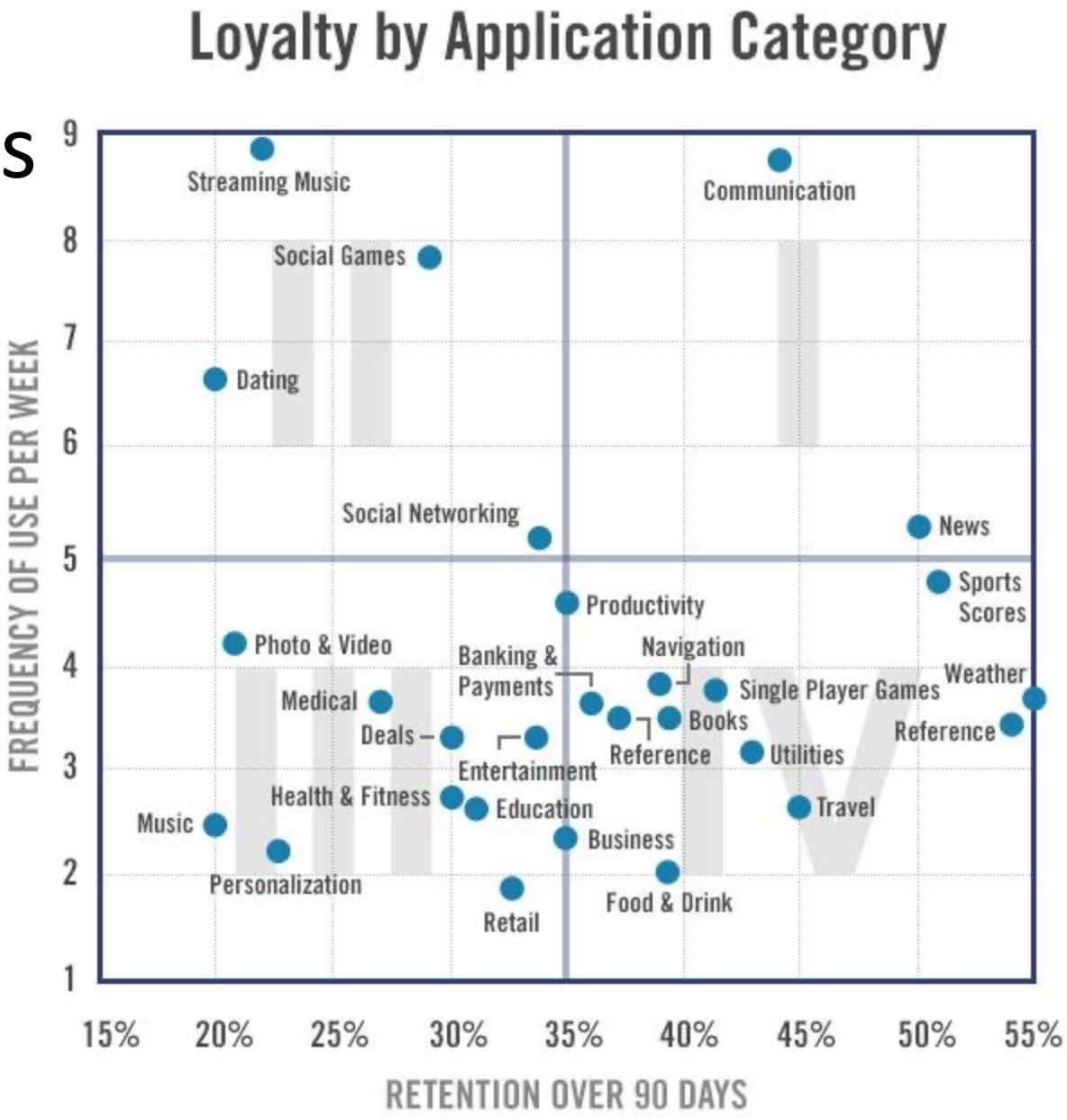
Common Business Models

- Types:
  - Direct B2C (e.g., Amazon) or B2B (e.g., AWS)
  - Multi-sided (e.g., Google, Facebook)
  - Marketplace (e.g., App Store, Airbnb)

- If possible, start from a direct model
  - Other models require a ***critical mass***
  - High burn rate: ROI = (R – C – **OE**) / **I**

Common Pricing Methods

- I:
  - Ads
  - Recurring fees
- II:
  - Per-tx fee
  - Discounts for recurrence
- III:
  - Paid app or one-time fee
- IV:
  - Upselling
  - Discounts for referral



App Engagement: The Matrix Reloaded, by Flurry, Oct 2012

How to Know If My Idea Works?

- ***Don't*** write a 100 pages BP doc
- Challenges:
  - You don't have users
  - You don't even have a product yet

- Hacks:
  - Use Fermi's Notebook method for sanity check
  - Use landing page to validate your business ideas
    - E.g., "Buy It Now," "Contact Sales"

Fermi's Notebook Method

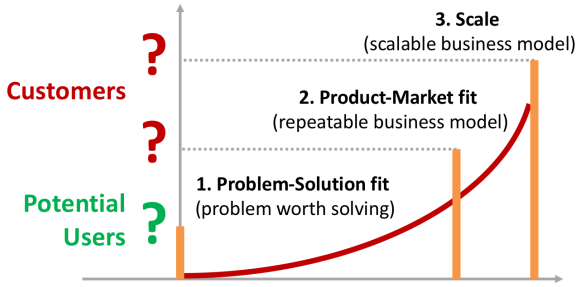
- Input: very few data
- Output: estimate ***in order of magnitude***

Enrico Fermi

Exercise: How Many Piano Tuners in Chicago?

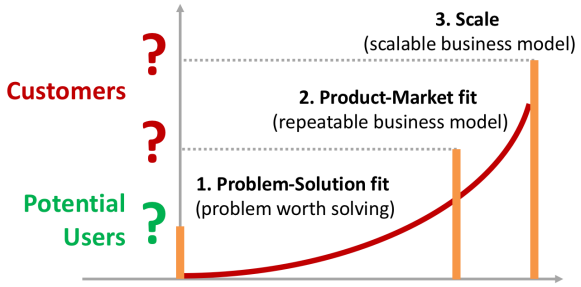
- #people? 100K, 1M, 10M
  - 1M people
- Piano rate? 1/10, 1/100, 1/1000
  - 1M * 1/100 = 10K pianos
- #pianos tuned by a tuner / year? 100, 1000
  - 10K / 100 = ***100*** tuners
- Correct answer: 81 in 2016

How Many Users to Acquire?



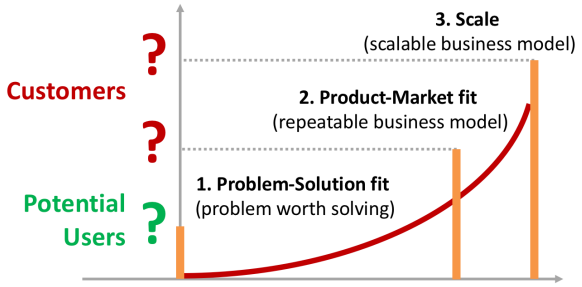
- User lifetime? 1w, 1mo, 1yr
  - 1mo (most app users churn in 3Ms)
- Satisfactory revenue/mo? $1K, $10K, $100K
  - $10K (2 founders: $4K, servers: $0.5K, ads: $5.5K)
- User lifetime value (LTV)? $1, $10, $100
  - $1
- #customers@scale: $10K / $1 = ***10K***
- #customers@pmf: 10K / 10 = ***1K***

How Many Users to Acquire?



- User/customer conversion rate? 0.1, 0.01, 0.001
  - 0.01
- #customers@psf: 1
- #potential users@psf: ***100***

How to Set Price?



- Customer LTV: $1
- PMF goal: 1K customers/mo
- User/customer conversion rate: 0.01
- PMF goal: 100K users/mo (possible?)

- ***What if LTV = $10?***
- PMF goal: 10K users/mo

- Should take into account competitors' pricing

Vanity Metrics

- #customers
- Total revenue

- Useless; all go up as time passes by

KPIs

- ***Customer*** conversion and churn rate
- ***MR***/AR (monthly/annual revenue)
  - ***ARPPU*** (average revenue per paying user)
  - ***ARPU*** (average revenue per user)
    - Do more users create more value (and sells)?

- ***Recurrent*** revenue is more important than one-time revenue
  - ***MRR***/ARR (monthly/annual recurrent revenue)

Detailed Revenue Metrics

- Don’t just track MRs/MRRs over time
- Group revenue readings by
  - ***Cohorts*** (v2 better than v1?)
  - ***Segments*** (Girls pay more than boys?)
  - ***Pricing tiers*** (Item A sells better than B?)

Common Ways of Improvement

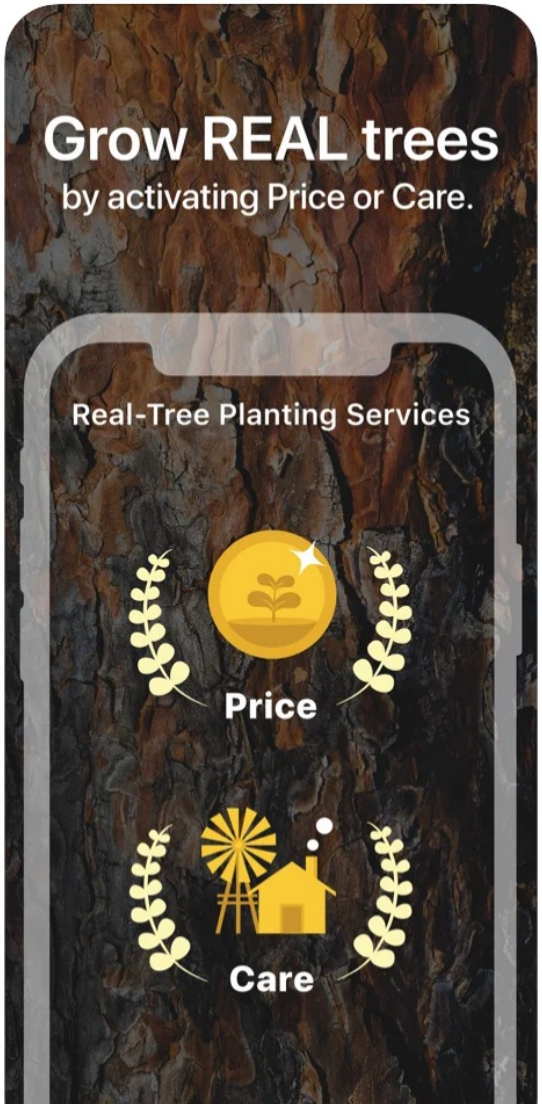
- Increasing customer conversion rate
- Reducing customer churn rate
- Increasing revenue (upselling)
- Reducing cost

Customer Conversion vs. User Churn

- ***Customer*** conversion rate ↑
  - "From now on, we charge…"
- Churn rate of ***users*** ↓
  - Some users may be annoyed by your sales tactics

- Luckily, they are ***not*** necessarily a tradeoff*!*
  - Make it optional (e.g., "pro" features)
  - Creative use of money
  - Psychological shortcuts (in next lecture)

Example: Flora App



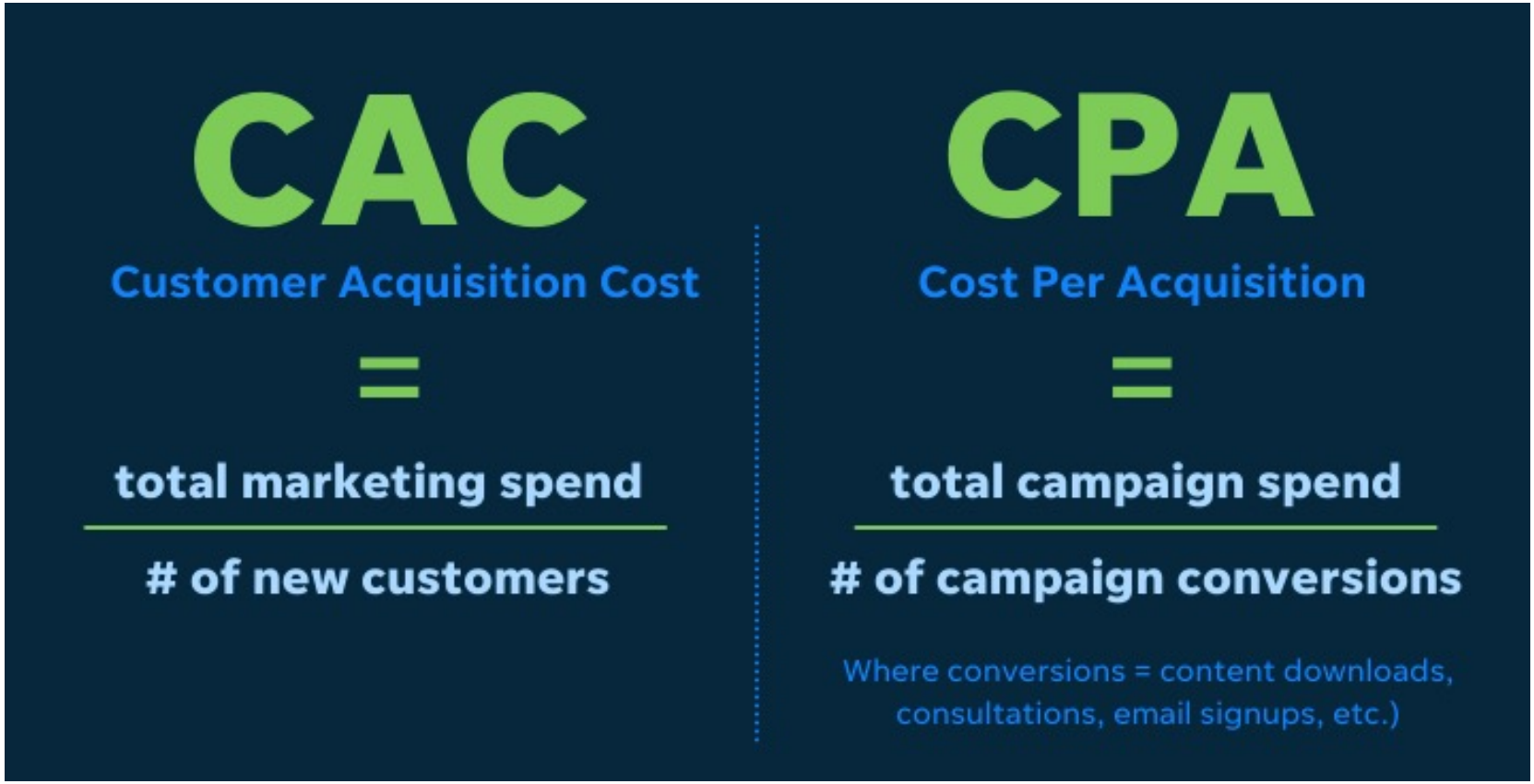
Unit Economics

- A method of analyzing a business model's revenues and costs in relation to an individual users

- Focus on

CLV / CAC

Unit Costs


CAC
Customer Acquisition Cost
=
total marketing spend
# of new customers
CPA
Cost Per Acquisition
=
total campaign spend
# of campaign conversions
Where conversions = content downloads, consultations, email signups, etc.)

CLV (or LTV)

- Customer lifetime ~ 1 / churn rate
  - Assuming fixed #customers
  - $1*C + 2*(1-C)*C + 3*(1-C)^2*C + \ldots$
- CLV (customer):
  (ARPPU – operation cost) / customer churn rate
- LTV (user):
  (ARPU – operation cost) / user churn rate

How Good Is Good?

- Successful SASS companies:

1. CLV / CAC > 3
2. Months to recover CAC < 12 months

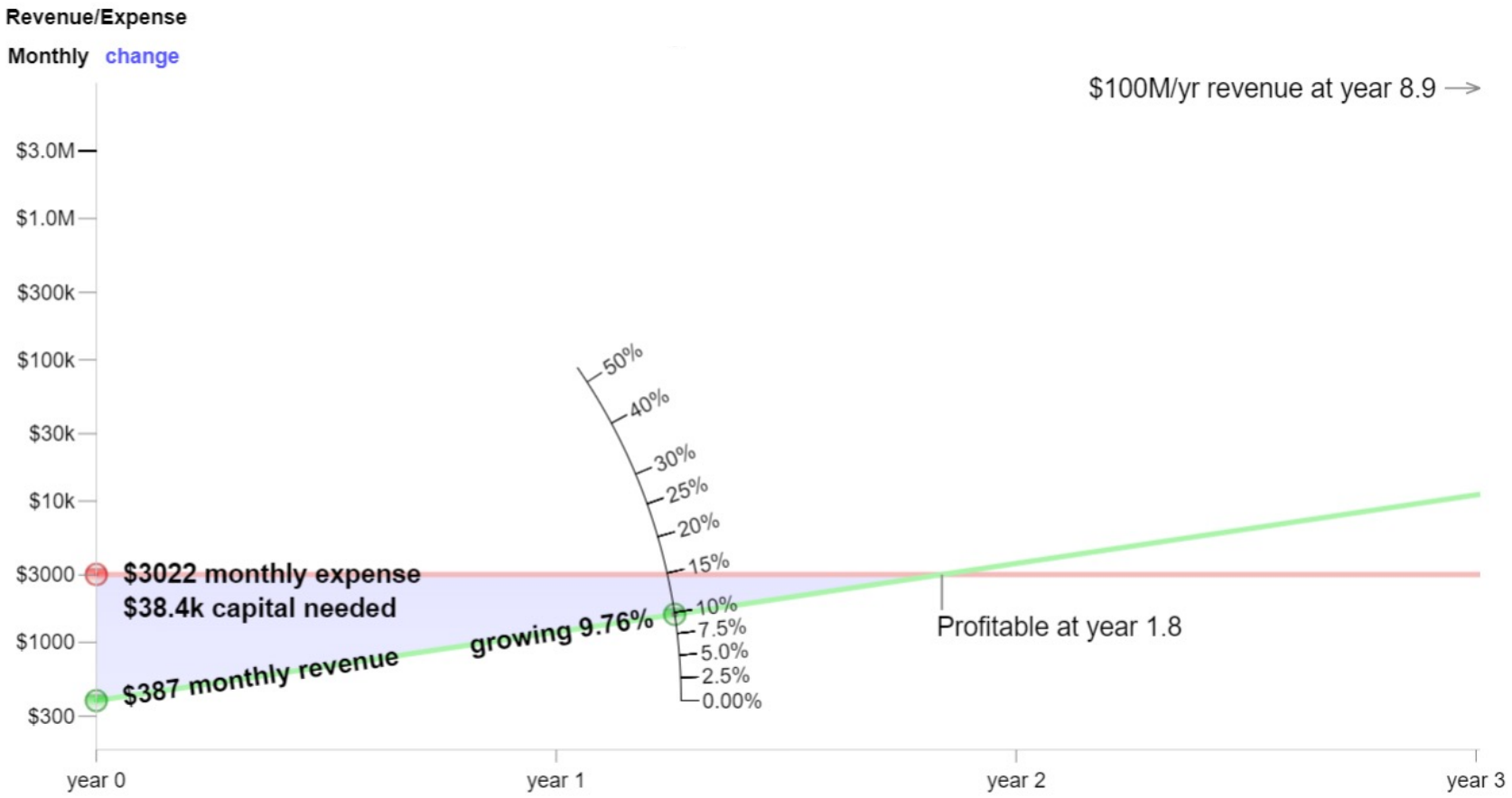
Default ***Alive*** or ***Dead***?

by Paul Graham

- Assuming
  - An initial fund
  - Fixed expenses
  - Linear/predictable revenue growth

- Can you make it to profitability before running out of your money?

Startup Growth Calculator



What's Next?

- Default ***alive***:
  - Ambitious new things
  - Scale phase
  - Raise more fund (O)
- Default ***dead***:
  - Raise more fund (X)
  - Fix your ***growth*** & ***revenue***
  - at no (or little) more expense