

Physics of eCommerce

It is rocket science

Let's Boldly Go... On a Journey

- Bio
- Physics of space shuttle take off
- Physics of scaling e-commerce brands
- Intense speculation
- Galaxy of Revelation

I'm Mitch Lowe....



I'm Matthew Luhn....



I'm Doug Crowe



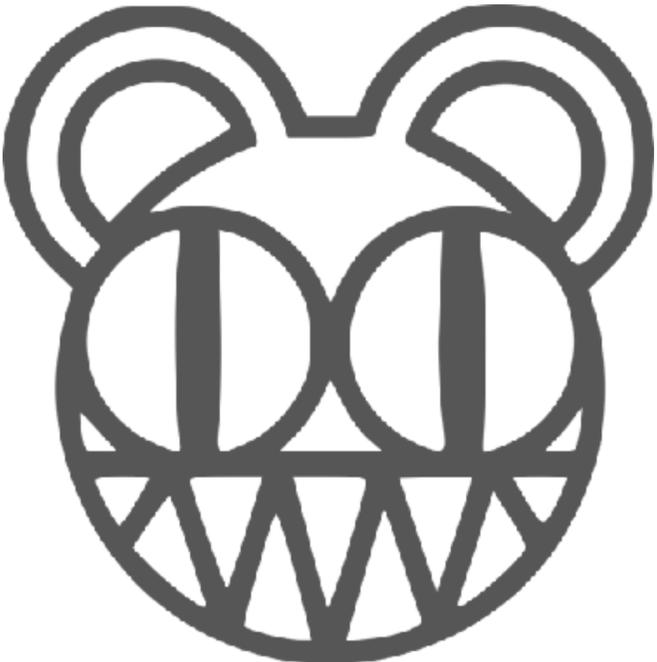
I'm Doug Crowe



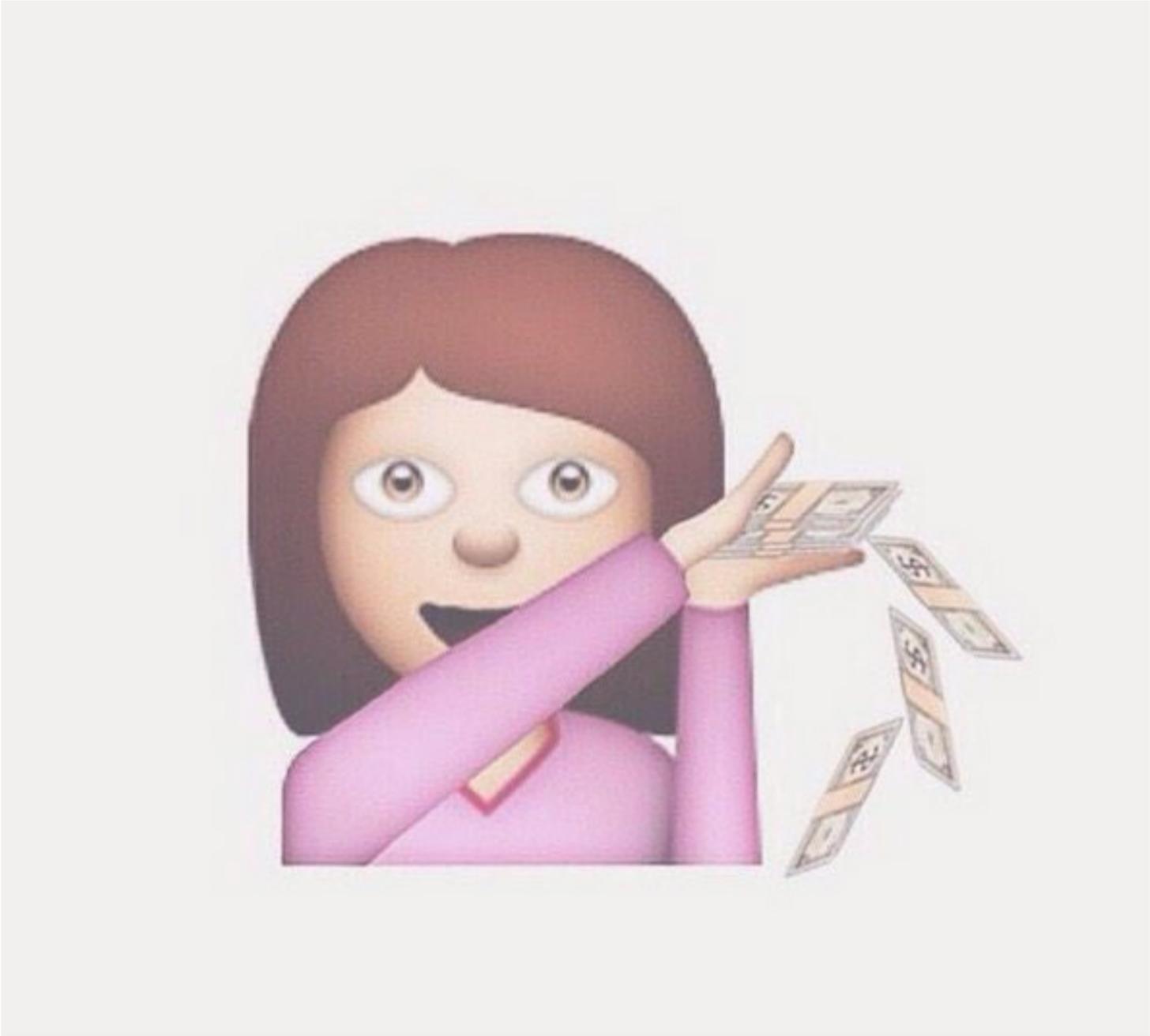


My Background

Shopify Plus



Clients generated over \$1 billion ecommerce revenue

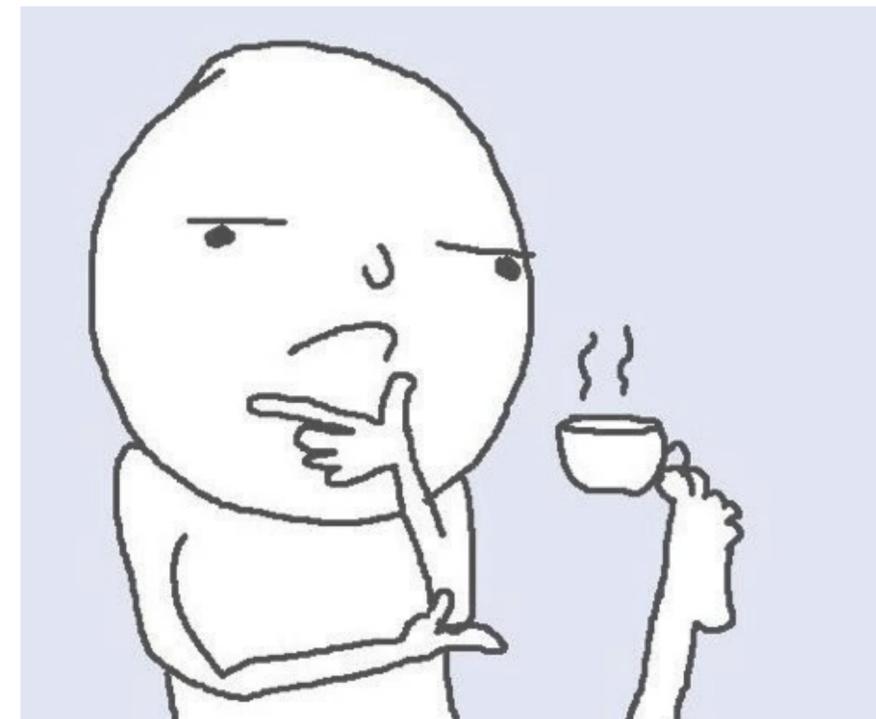


Clients generated over \$1 billion ecommerce revenue



Merchant Acceleration

- What are top e-commerce performers doing differently?
- How can we leverage what we see, and teach these principles to a broader audience?
- Research & structured educational content.



A grayscale photograph of a well-organized closet. On the right, a long metal rack holds numerous hanging garments, including jackets, sweaters, and trousers. Above the rack, a shelf is filled with several large, dark-colored bags or backpacks. On the left, a wooden cart with two large wheels is positioned, topped with several neatly folded stacks of clothing. Behind the cart, a wooden shelving unit with a triangular top section holds various items, including hats and folded clothes. The overall scene is clean and orderly, showcasing a variety of clothing items.

Our Latest Discovery

There are a set of laws that apply to all businesses. These laws explain a businesses success or failure.

Newton's 3 Laws



Newton's Laws of Motion



"Every object persists in its state of rest or uniform motion in a straight line unless it is compelled to change that state by forces impressed on it."

"Force is equal to the change in momentum (mV) per change in time. For a constant mass, force equals mass times acceleration."
 $F = m a$

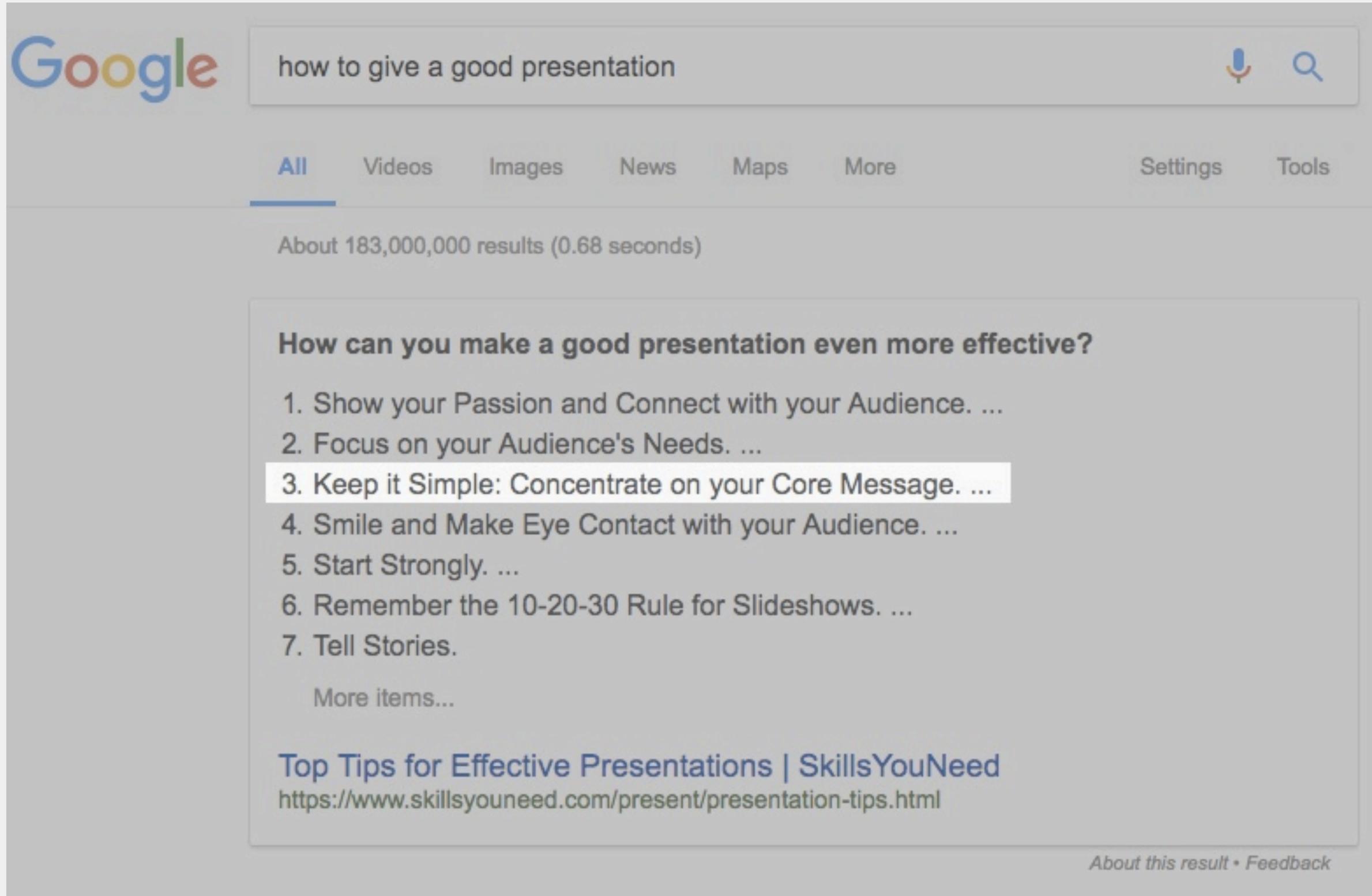
"For every action, there is an equal and opposite re-action."

Discovering These Principles



My desire for taking things too far...

Making This Presentation



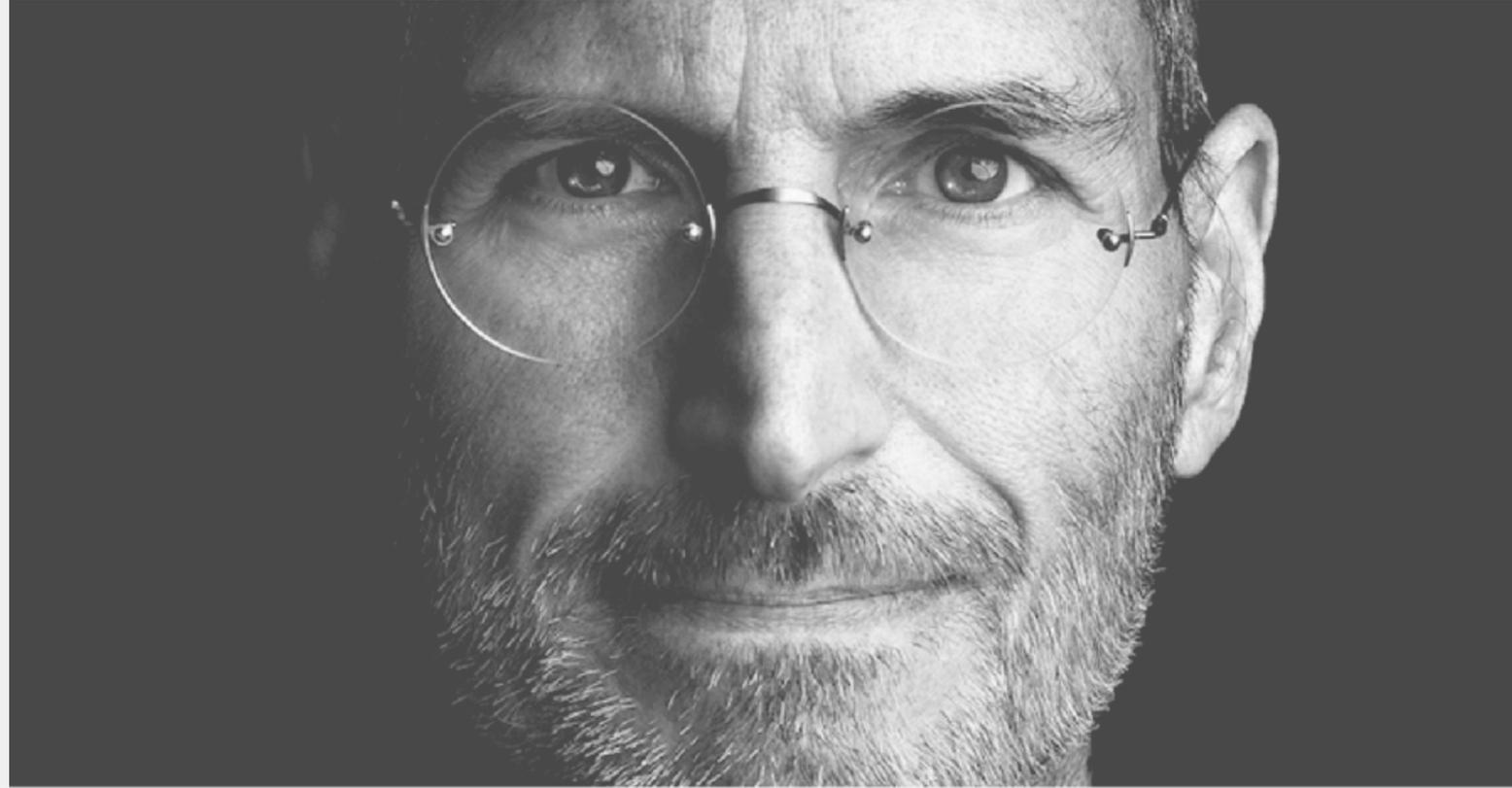
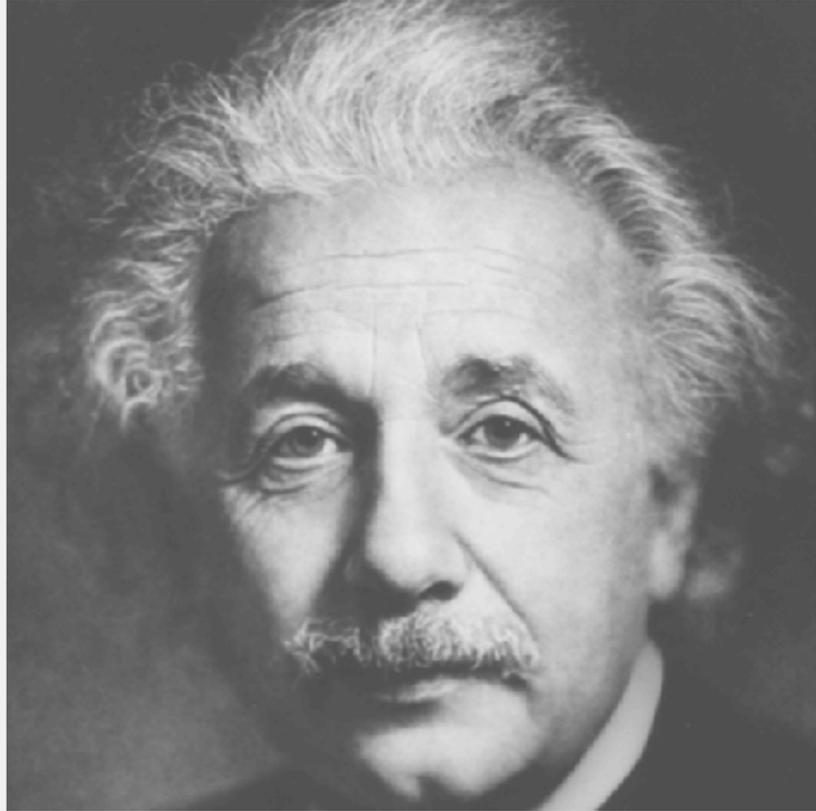
The image shows a screenshot of a Google search page. The search bar contains the text "how to give a good presentation". Below the search bar, there are navigation tabs for "All", "Videos", "Images", "News", "Maps", "More", "Settings", and "Tools". The "All" tab is selected. Below the tabs, it says "About 183,000,000 results (0.68 seconds)". The main content area displays a search result with the title "How can you make a good presentation even more effective?". Below the title is a list of seven tips:

1. Show your Passion and Connect with your Audience. ...
2. Focus on your Audience's Needs. ...
3. Keep it Simple: Concentrate on your Core Message. ...
4. Smile and Make Eye Contact with your Audience. ...
5. Start Strongly. ...
6. Remember the 10-20-30 Rule for Slideshows. ...
7. Tell Stories.

Below the list is a link "More items...". At the bottom of the result is the title "Top Tips for Effective Presentations | SkillsYouNeed" and the URL "https://www.skillsyouneed.com/present/presentation-tips.html". In the bottom right corner of the search result area, there is a link "About this result • Feedback".

First Principle Thinking

Everyone's Doing It...

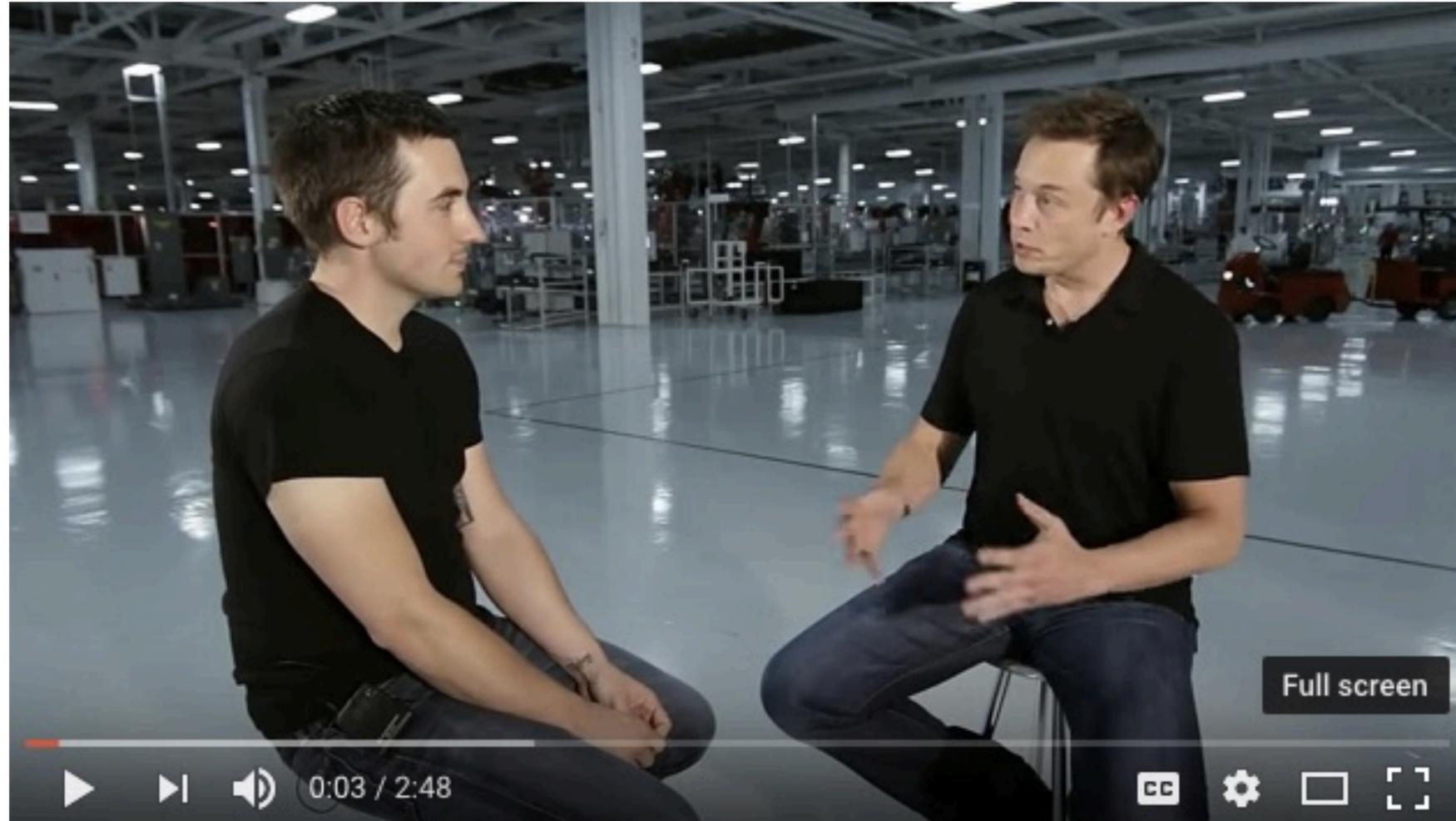


First Principles Thinking

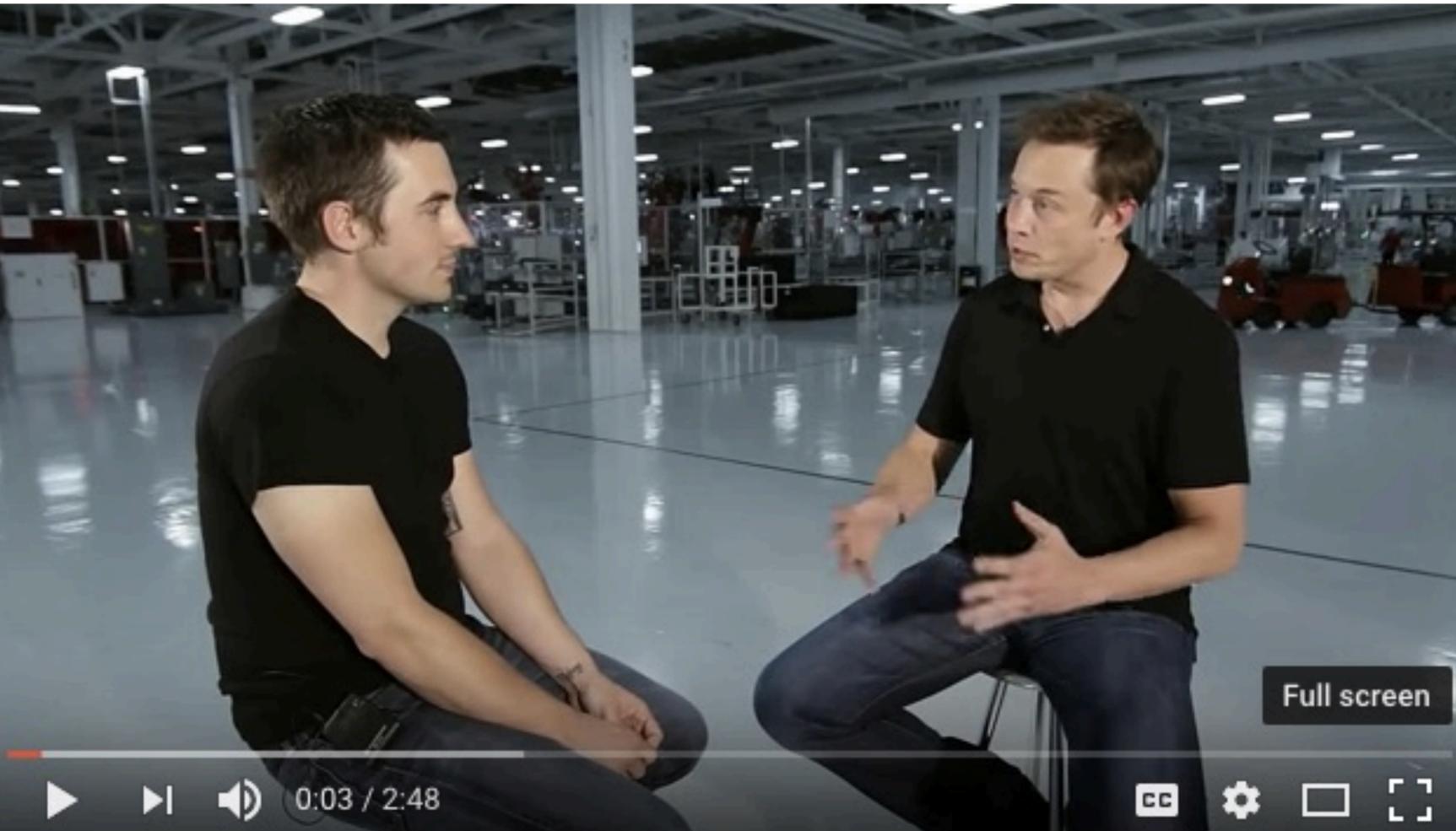
“First principles is kind of a physics way of looking at the world.

You boil things down to the most fundamental truths and say,

“What are we sure is true?”
... and then reason up from there.”



First Principles Thinking



“Somebody could say,
“Battery packs are really
expensive and that’s just the
way they will always be...”

Historically, it has cost \$600
per kilowatt hour.

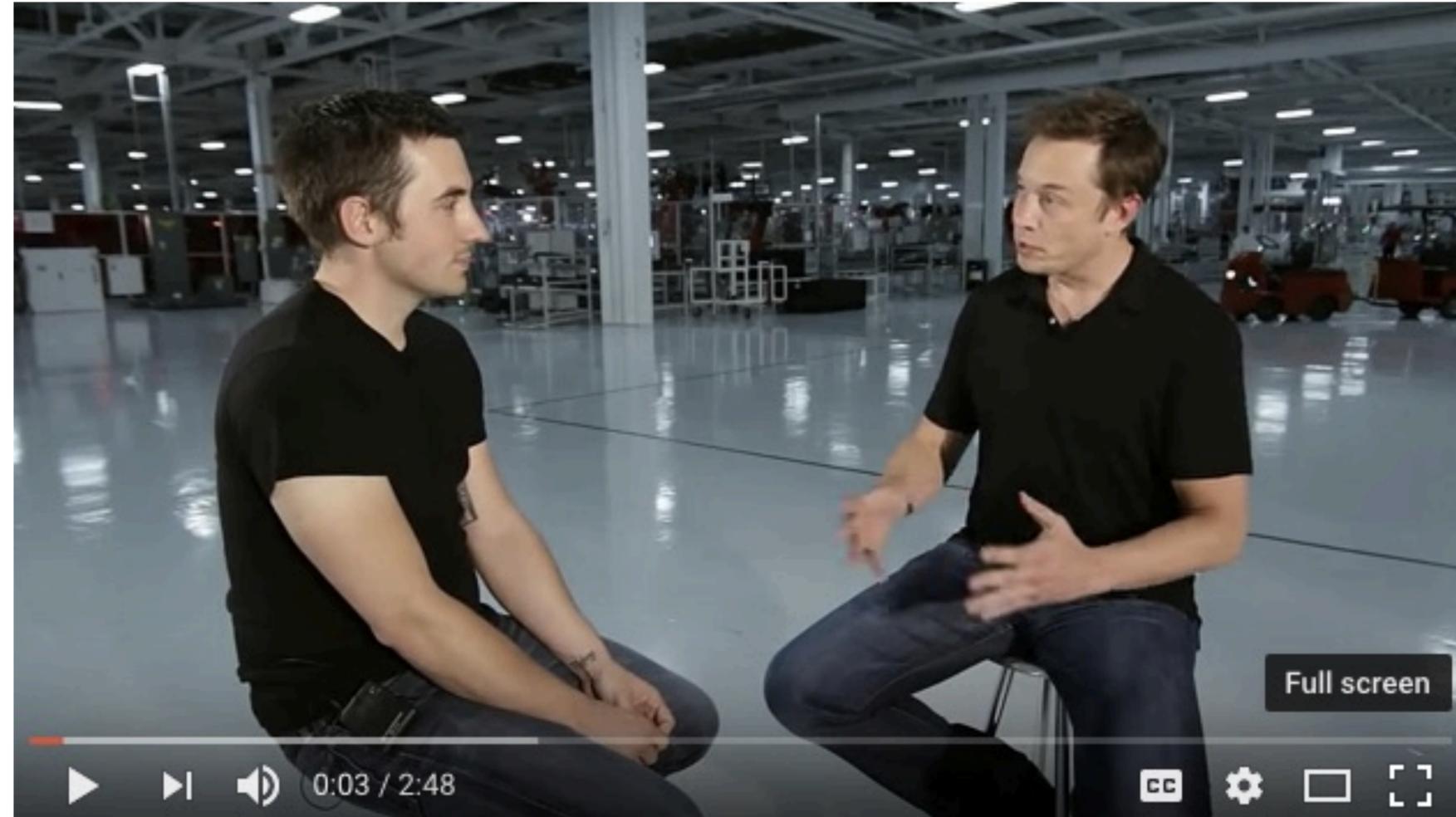
It’s not going to be much
better than that in the future.”

First Principles Thinking

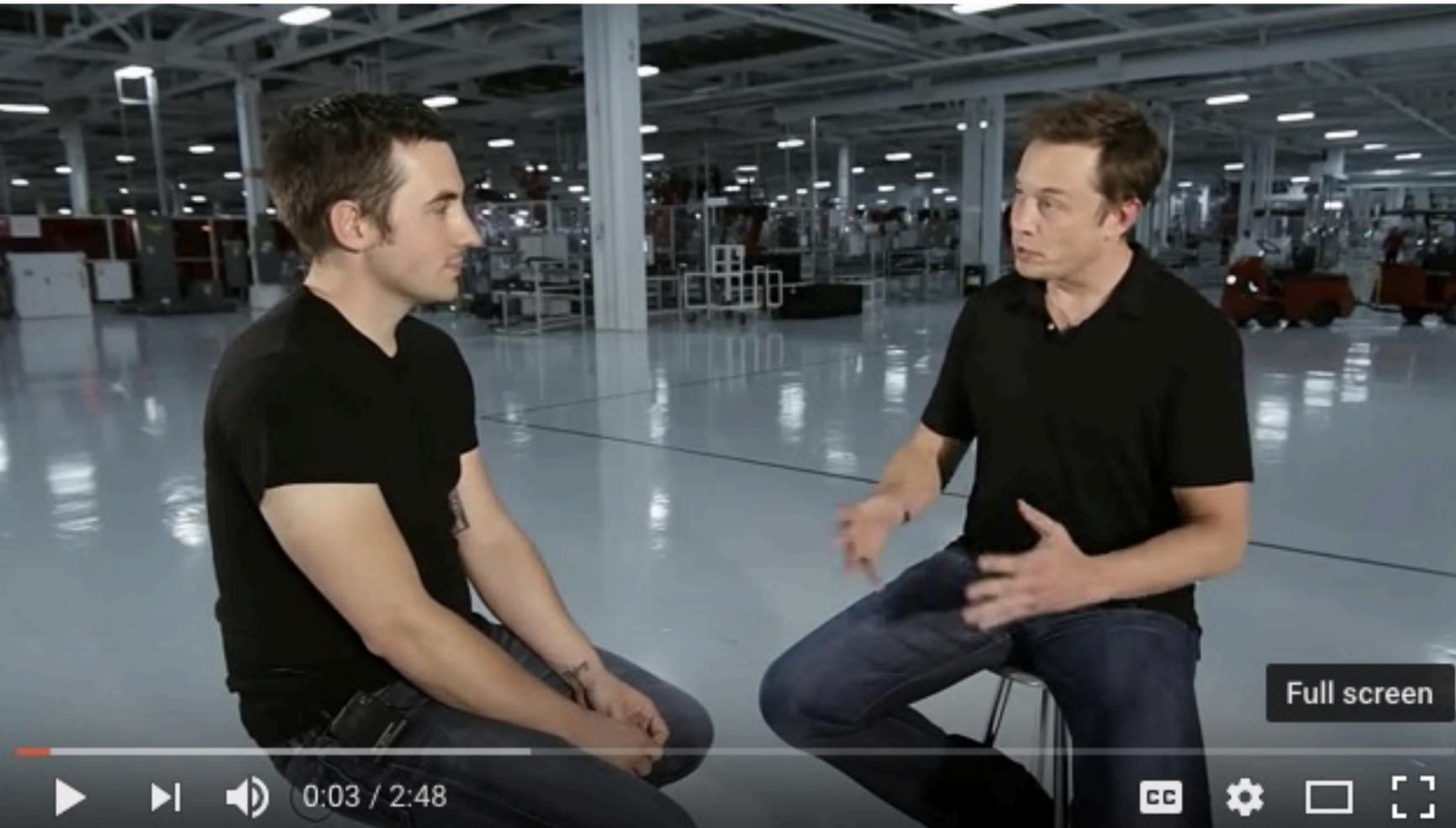
With first principles, you say,

“What are the material constituents of the batteries? How much do they cost on the London Materials Exchange?”

...Turns out its \$80 per kilowatt-hour.”

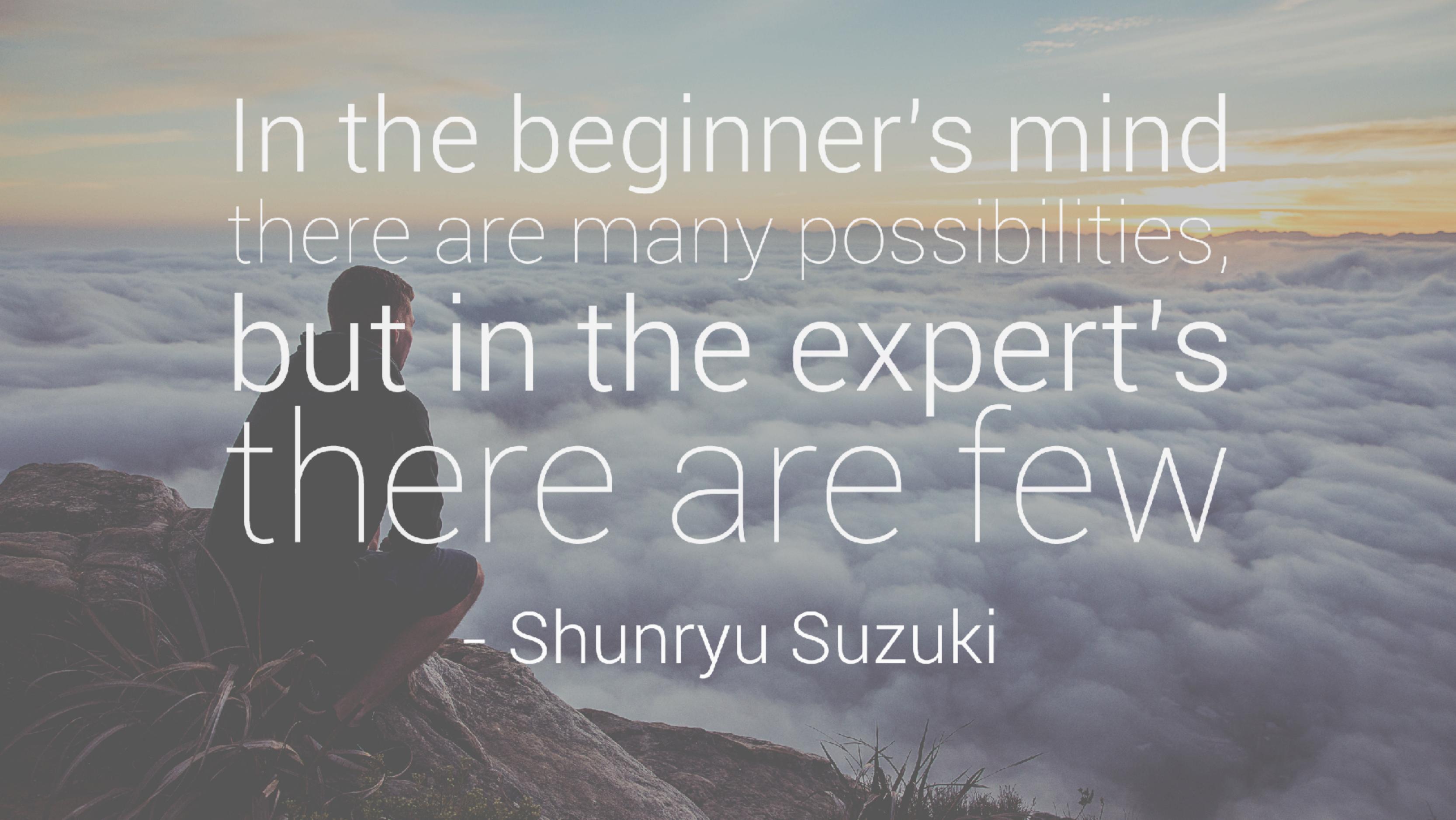


First Principles Thinking



“It’s like \$80 per kilowatt hour.

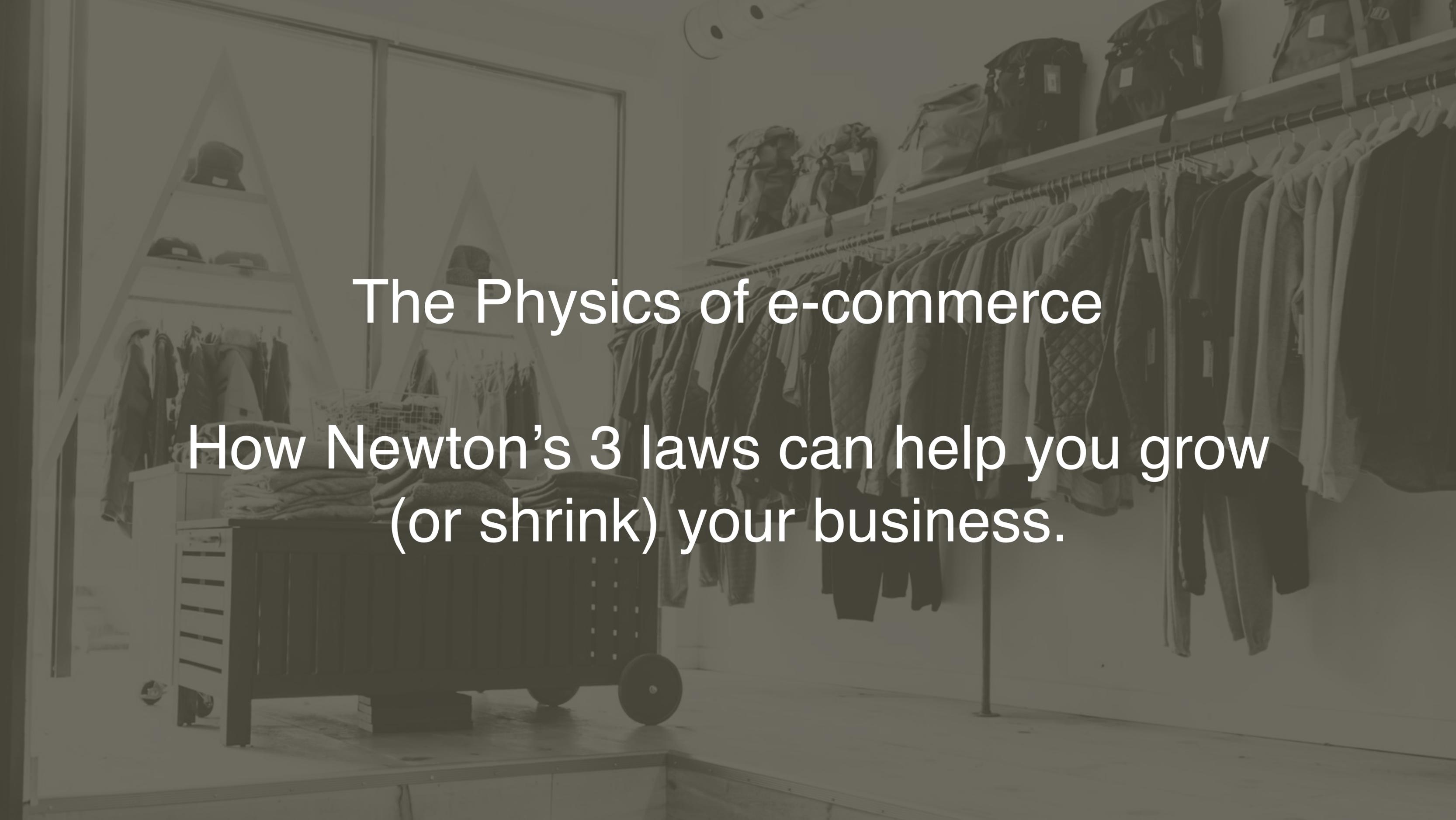
So clearly you just need to think of clever ways to take those materials and combine them into the shape of a battery cell and you can have batteries that are much, much cheaper than anyone realizes.”

A person is sitting on a rocky cliff, looking out over a vast sea of clouds. The sky is a mix of blue and orange, suggesting a sunset or sunrise. The clouds are thick and white, filling the lower two-thirds of the frame. The person is in the foreground, on the left side, wearing a dark jacket and shorts. The overall mood is contemplative and serene.

In the beginner's mind
there are many possibilities,
but in the expert's
there are few

- Shunryu Suzuki

A journey of first principles.



The Physics of e-commerce

How Newton's 3 laws can help you grow
(or shrink) your business.

Exhibit A: Escape Earth's Atmosphere.



Exhibit B: Escape the Struggle of Growing

Walmart's \$3.3 billion acquisition of Jet.com is now official. Next comes ...

<https://www.recode.net/2016/9/19/12979008/walmart-jet-acquisition-closed> ▼

Sep 19, 2016 - Walmart announced on Monday that its monster \$3.3 billion acquisition of e-commerce startup **Jet.com** is official. Walmart CEO Doug McMillon ...

Walmart Agrees to Acquire Jet.com, One of the Fastest Growing e ...

<news.walmart.com/.../walmart-agrees-to-acquire-jetcom-one-of-the-fastest-growing-e-...> ▼

Aug 8, 2016 - Wal-Mart Stores, Inc. and **Jet.com**, Inc. today announced they have entered into a definitive agreement for Walmart to **acquire Jet** for ...

Wal-Mart to Acquire Jet.com for \$3.3 Billion in Cash, Stock - WSJ

<www.wsj.com/.../wal-mart-to-acquire-jet-com-for-3-3-billion-in-cash-stock-147065976...>

Aug 8, 2016 - Wal-Mart will buy online retailer **Jet.com** in a \$3.3 billion cash and stock deal, the largest-ever purchase of a U.S. e-commerce startup.

The Unfortunate Truth



The Unfortunate Truth

[Shoes.com, ShoeMe to Shut Down Operations Immediately – Techvibes](https://techvibes.com/2017/.../shoes-com-shoeme-to-shut-down-operations-immediate...)

<https://techvibes.com/2017/.../shoes-com-shoeme-to-shut-down-operations-immediate...> ▼

Jan 27, 2017 - The Canadian company says will take all three of its e-commerce properties—SHOES.com, OnlineShoes.com and **ShoeME.ca**—offline, along ...

[Online shoe titan SHOEME.CA closes doors and shuts down online ...](https://www.reddit.com/r/.../online_shoe_titan_shoemeca_closes_doors_and_shuts/)

https://www.reddit.com/r/.../online_shoe_titan_shoemeca_closes_doors_and_shuts/ ▼

Jan 27, 2017 - I am one of The local artists who were showcased at the Toronto location. Firstly it took over 3 months to be paid for products sold at their ...

Newton's 1st Law



Newton's First Law Applied to Rocket Liftoff



"Every object persists in its state of rest or uniform motion in a straight line unless it is compelled to change that state by forces impressed on it."

Before firing:

Object in state of rest, airspeed zero.

Engine fired:

Thrust increases from zero.

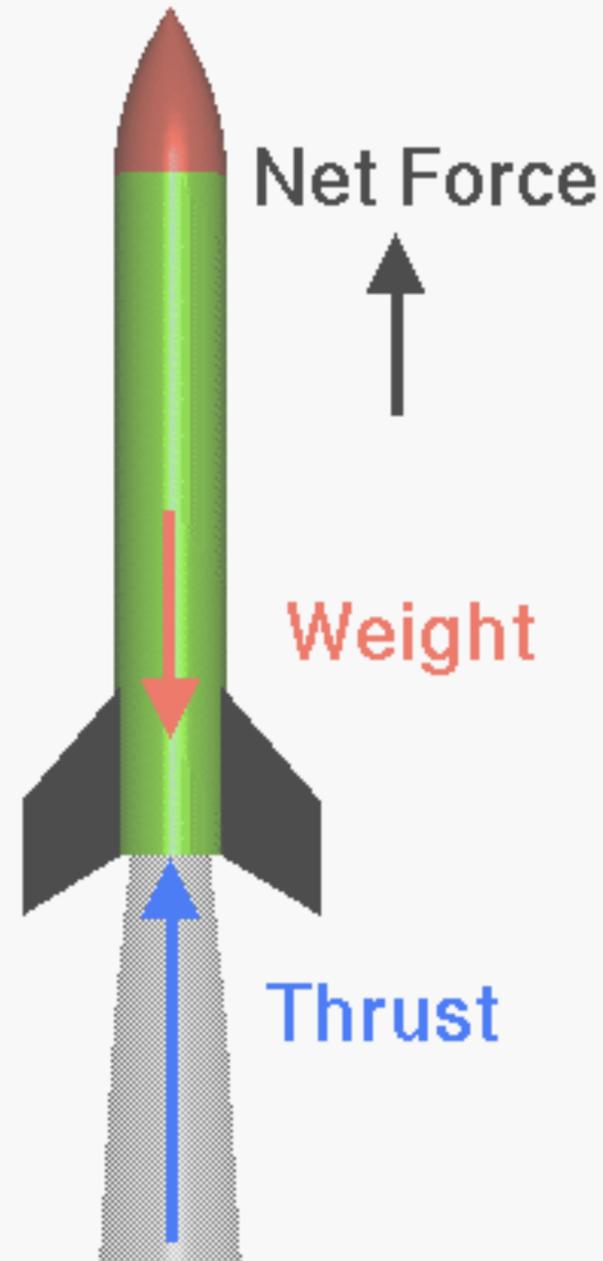
Weight decreases slightly as fuel burns.

When Thrust is greater than Weight:

Net force (Thrust - Weight) is positive upward.

Rocket accelerates upward

Velocity increases



Objects at rest will stay at rest and objects in motion will stay in motion, unless acted upon by an unbalanced force.

Exhibit A

Objects at rest will stay at rest and objects in motion will stay in motion, unless acted upon by an unbalanced force.



Exhibit B

Reports / Dashboards

Last 90 days ▾

Total Sales

Last 90 days

	Total sales	Order count
Last 90 days	\$0.00	0
Today	\$0.00	0
Yesterday	\$0.00	0
Last 7 days	\$0.00	0

There were no sales in the last 90 days.



Visitors

Last 90 days

Total
87

Unique
75



Conversions

Last 90 days

Added to Cart
1.15%
1 customers

Reached Checkout
0.00%
0 customers

Purchased
0.00%
0 customers

Top products

Last 90 days

There were no sales in the last 90 days.

Objects In Motion Will Stay In Motion



Objects In Motion Will Stay In Motion

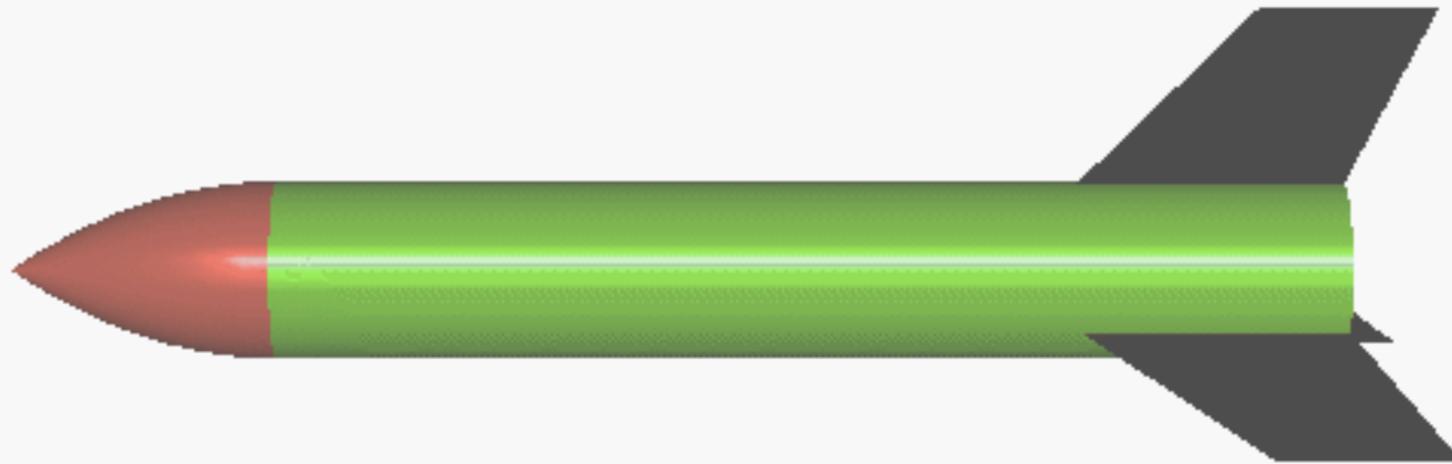
October 2016	1,754	\$769,922.09	-\$173.34	-\$179.97	\$769,568.78	\$226.53	\$92.87	\$769,888.18
November 2016	1,689	\$751,053.23	-\$98.25	-\$1,059.03	\$749,895.95	\$10.00	\$171.73	\$750,077.68
December 2016	1,684	\$715,895.25	-\$114.74	-\$1,695.99	\$714,084.52	\$90.00	\$215.81	\$714,390.33
January 2017	1,791	\$759,405.78	-\$331.10	-\$2,160.43	\$756,914.25	\$50.65	\$344.22	\$757,309.12
February 2017	1,661	\$884,250.55	-\$670.75	-\$157,452.04	\$726,127.76	\$44.00	\$533.48	\$726,705.24

Newton's 2nd Law



Newton's Second Law

Definitions



Force = Mass x
Acceleration

or

Acceleration = Force
/ Mass

Differential Form: Force = change of momentum
with change of time

$$F = \frac{d(mv)}{dt}$$

or:

Force = change in mass X velocity with time

$$F = \frac{(m_1 V_1 - m_0 V_0)}{(t_1 - t_0)}$$

With mass constant: Force = mass X acceleration

$$F = m a$$

Force, acceleration, momentum and velocity are all vector quantities.

Each has both a magnitude and a direction.

Acceleration = Force / Mass



Acceleration = Force / Mass

Online Store Dashboard

Total Sales

Custom

Custom	Total sales	Order count
	\$270.4k	4.4k

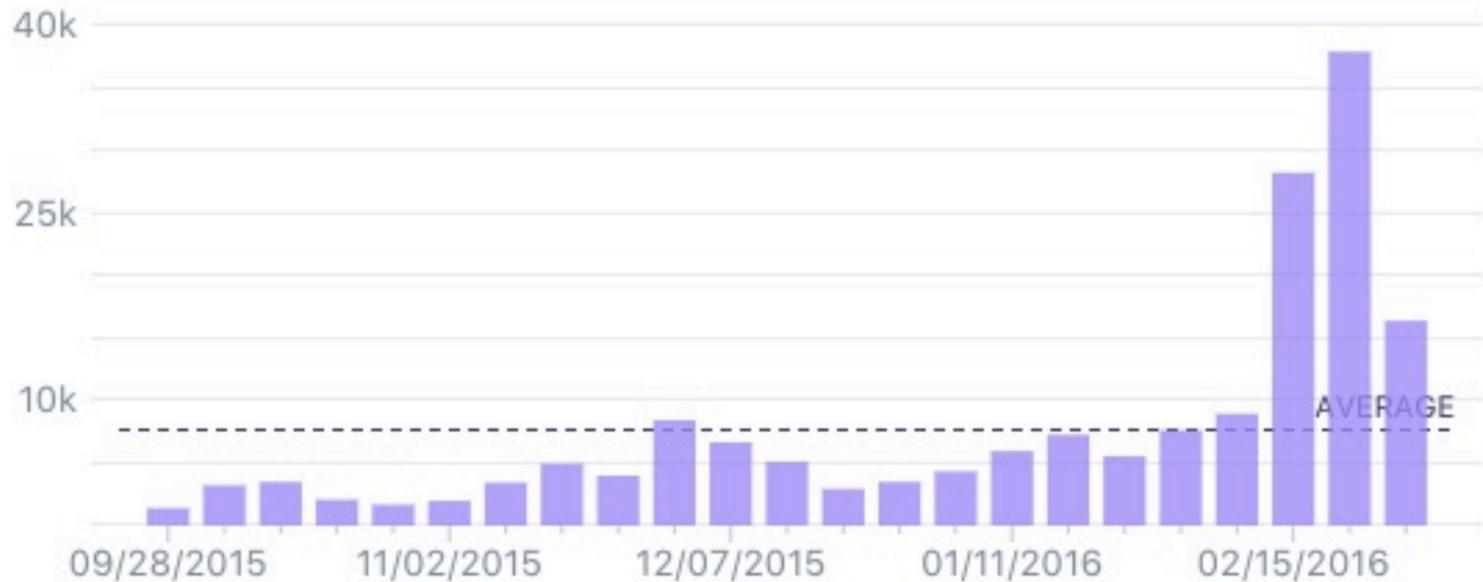


Visitors

Custom

Total
193,344

Unique
175,318



Acceleration

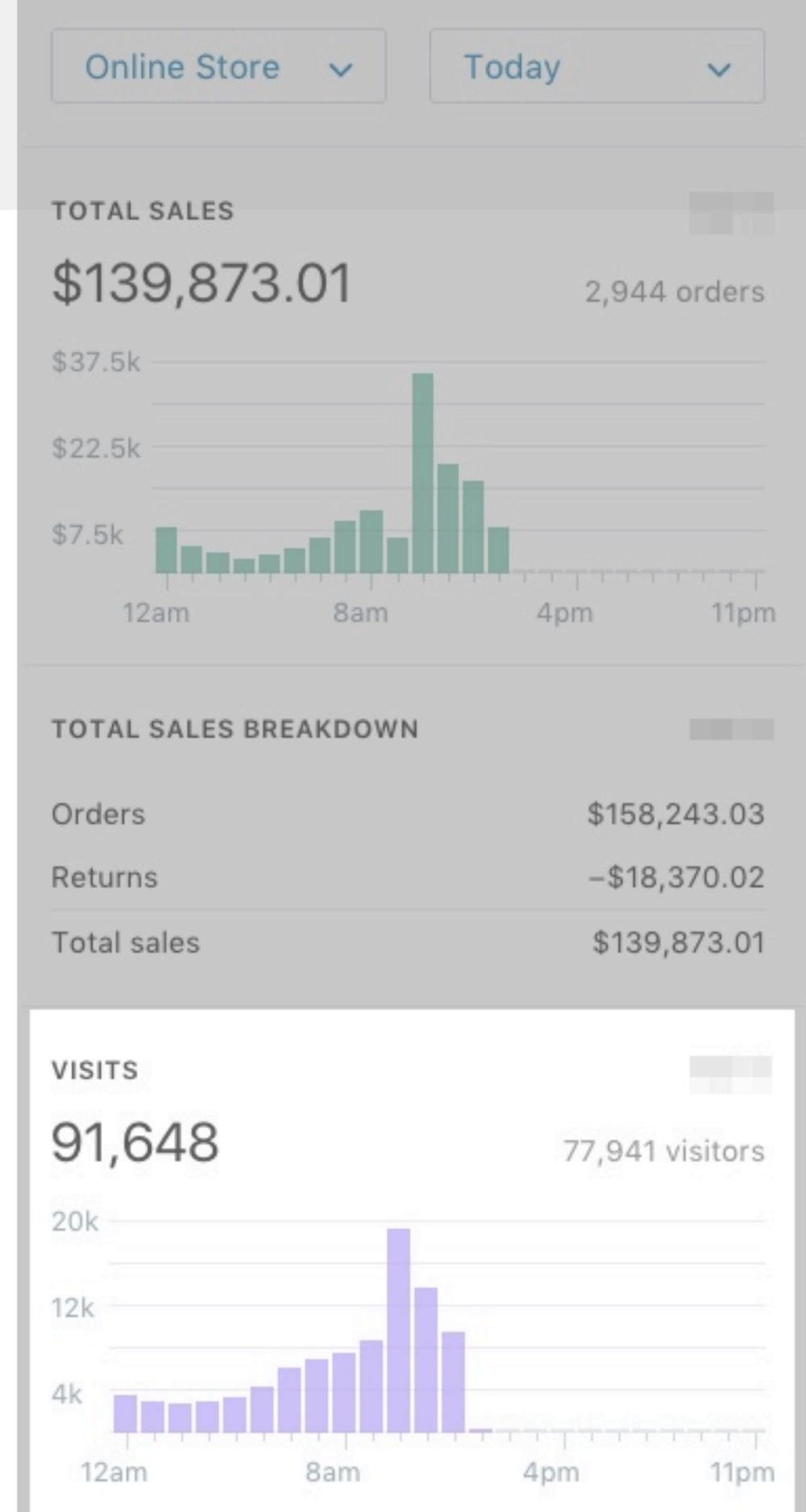
The change in speed over time.

In e-commerce, the change in revenue over time.

Positive or Negative.

E-commerce Force

- Force is visibility.
- How many people are seeing your offer?
- Visitors



E-commerce Mass

Conversions

Last 7 days

Added to Cart

17.52%

297438 customers

Reached Checkout

7.32%

124192 customers

Purchased

6.51%

110574 customers

- Mass is effort.
- How hard is it to buy your product?
- The harder it is, the more force is required.
- High price, undesirable product, lack of trust...
- Opposite of mass is Desire.

Desire, The Opposite of Mass

Conversions

Last 7 days

Added to Cart

17.52%

297438 customers

Reached Checkout

7.32%

124192 customers

Purchased

6.51%

110574 customers

- Conversion rate
- Lifetime Value

Measured by:

Revenue Per User

Acceleration = Force / Mass

Acceleration =

Visitors/Users

*

Revenue Per User



Note on Revenue Per User

A number that is the sum of your conversion rate (% of people who make a purchase) and your average order value (\$ spent per order) or your customer lifetime value.

The single most important number for predicting high performing e-commerce businesses.

Revenue Per User Example 1

Visitors: 100,000

Conversion rate: 1%

Average order value: \$500

Purchase frequency: 1 per year

Revenue Per User: \$5

Revenue Per User Example 2

Visitors: 100,000

Conversion rate: 1%

Average order value: \$100

Purchase frequency: 5 per year

Revenue Per User: \$5

Acceleration = Force / Mass

Revenue Visitors Non Desire

The diagram illustrates the relationship between Acceleration, Force, and Mass. The equation $Acceleration = Force / Mass$ is centered. Above the word 'Acceleration' is an upward-pointing arrow. Above the word 'Force' is an upward-pointing arrow. Above the word 'Mass' is a downward-pointing arrow. Below the equation, the words 'Revenue', 'Visitors', and 'Non Desire' are positioned under 'Acceleration', 'Force', and 'Mass' respectively.

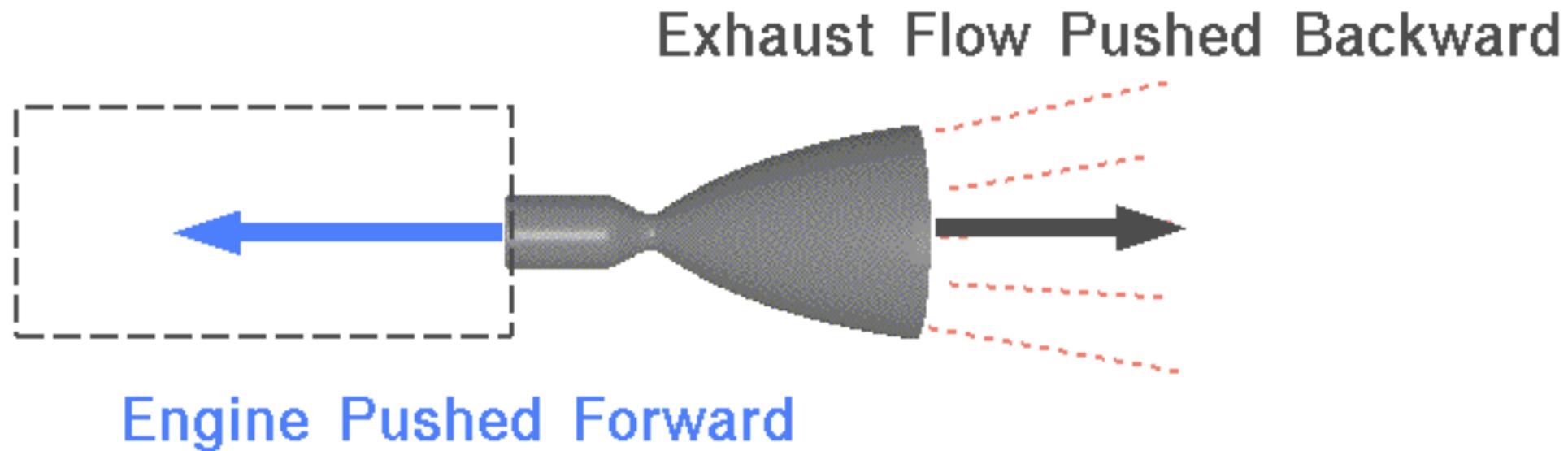
Newton's 3rd Law



Newton's Third Law



Rocket Engine Thrust

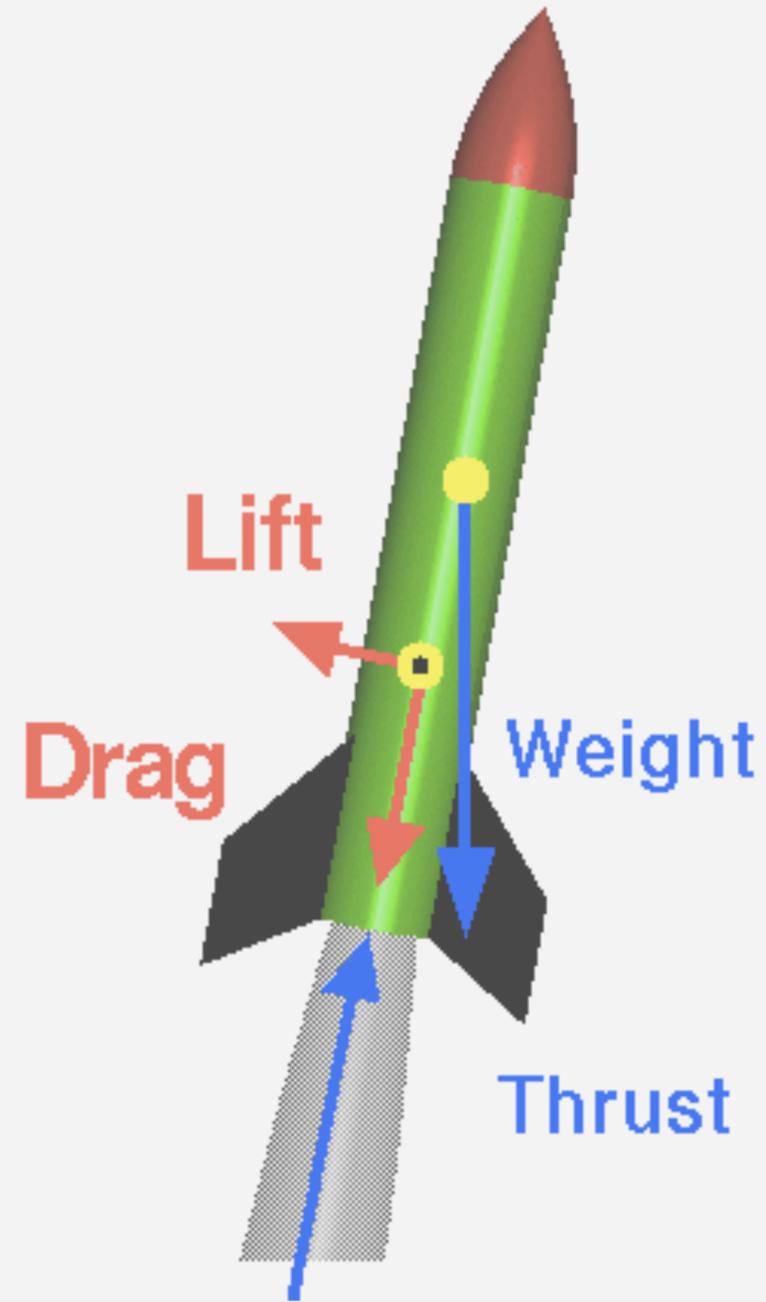


For every action, there is an equal and opposite re-action.

Drag increases with speed



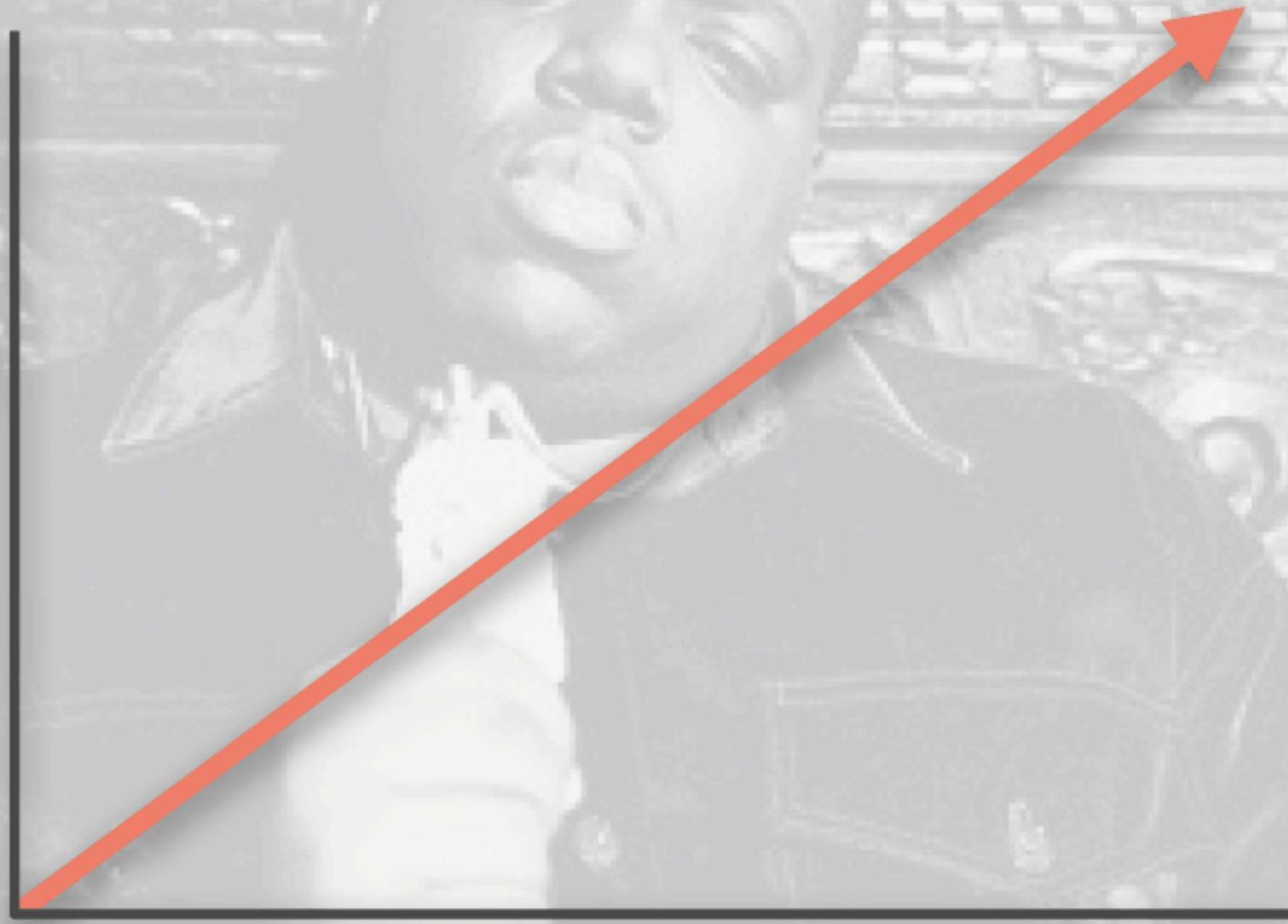
Rocket Aerodynamics



Drag (friction) in ecommerce

Mo' Money, Mo' Problems

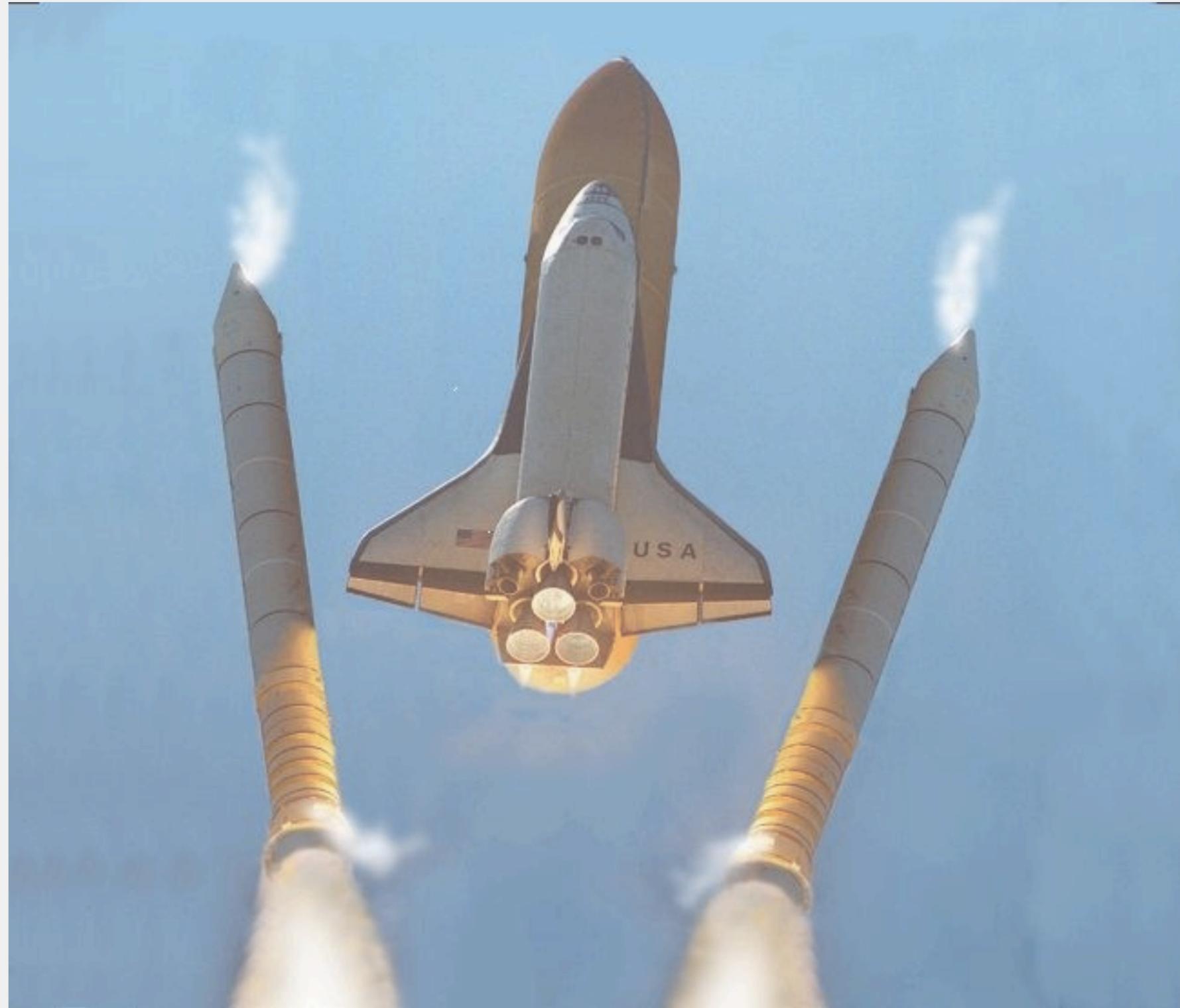
Problems



Money

- Supply Chain / Demand Management
- Fulfillment / warehouse issues
- Product recalls
- Employee turnover
- Competition

Mass decreases over time



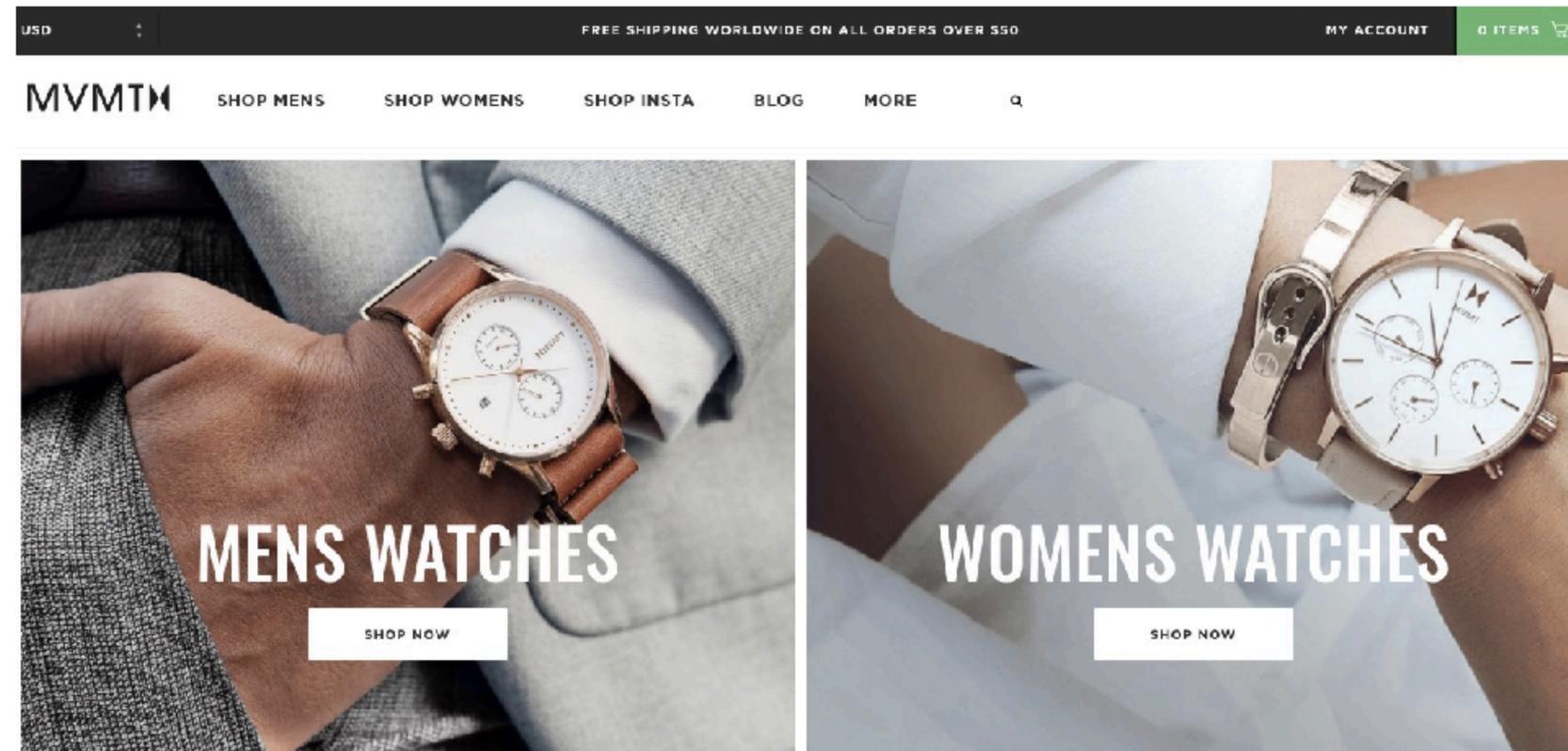
Mass decrease in e-commerce



- Data/Optimization/
Feedback
- Brand recognition
- Loyal customers
- Word of mouth
- Organic press
- Brand assets (followers,
subscribers etc)

Reducing E-commerce Mass

- Reduce your price.
- Increase desirability with better photos, product copy, reviews...
- Make the experience easier/cleaner.
- Scarcity / Urgency.



If we're lucky... or smart

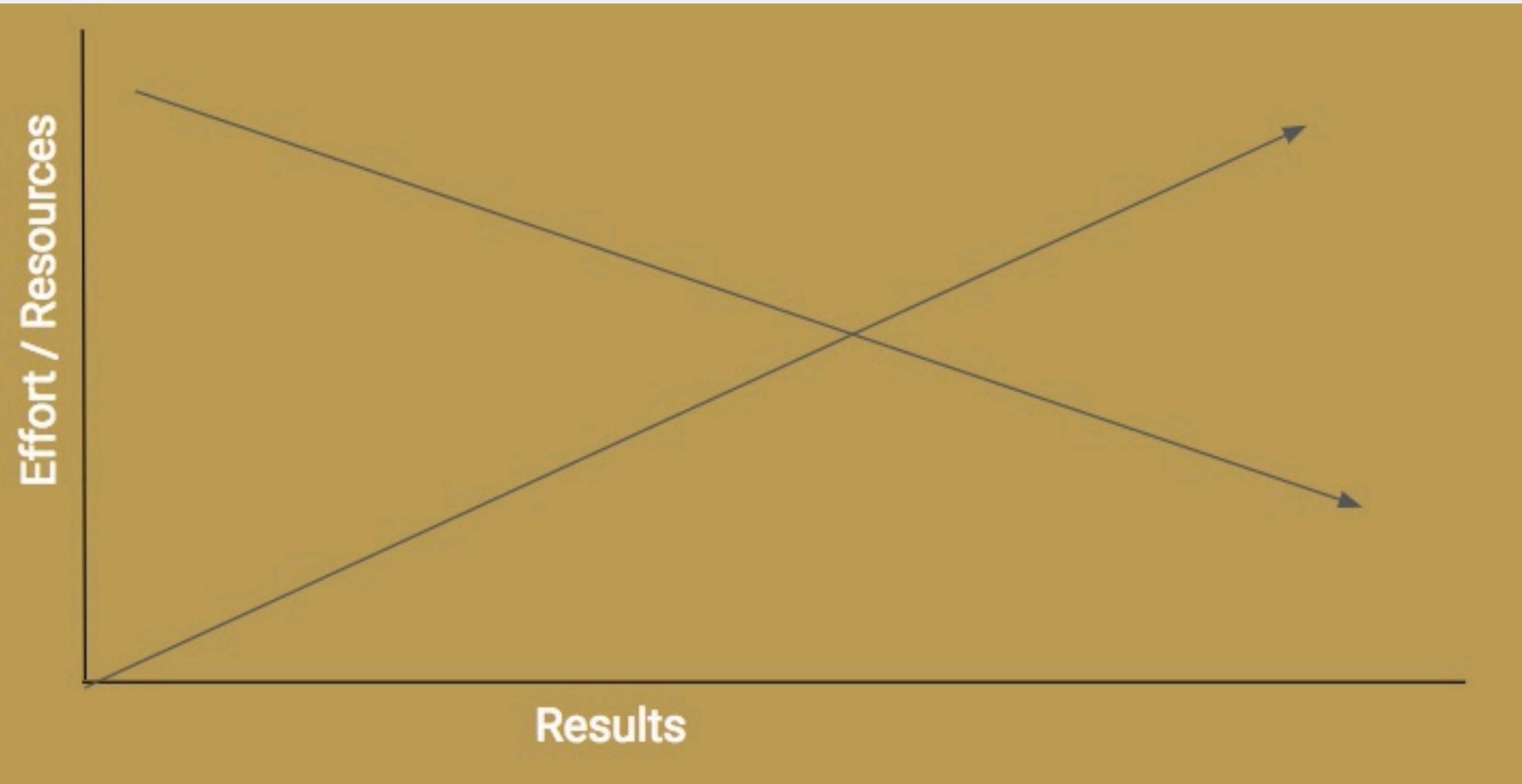


The desired destination is a choice



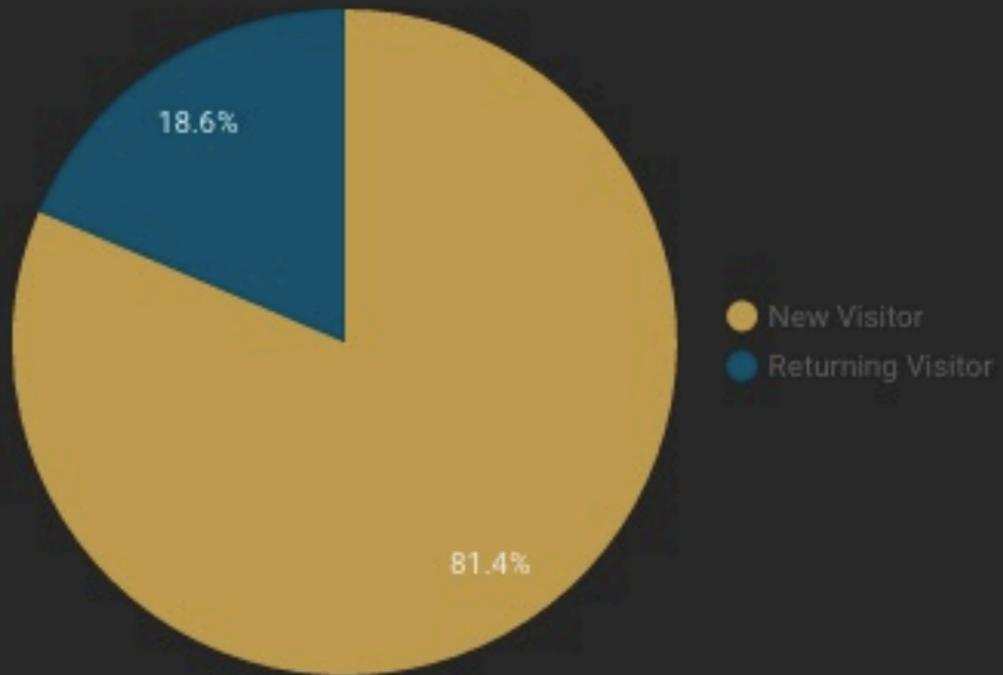
Takeoff Observations

Required effort vs results (Macro + Micro Scale)



Example

User Type	Revenue ▾	Sessions	Revenue per User	Avg. Order Value	Ecommerce Conversion Rate
New Visitor	\$2,299.94	7,399	\$0.31	\$23.71	1.31%
Returning Visit...	\$2,224.54	1,689	\$2.74	\$25.57	5.15%



RPV Speedometer

Profitability
High RPV

Scaling Revenue
Low RPV



RPV

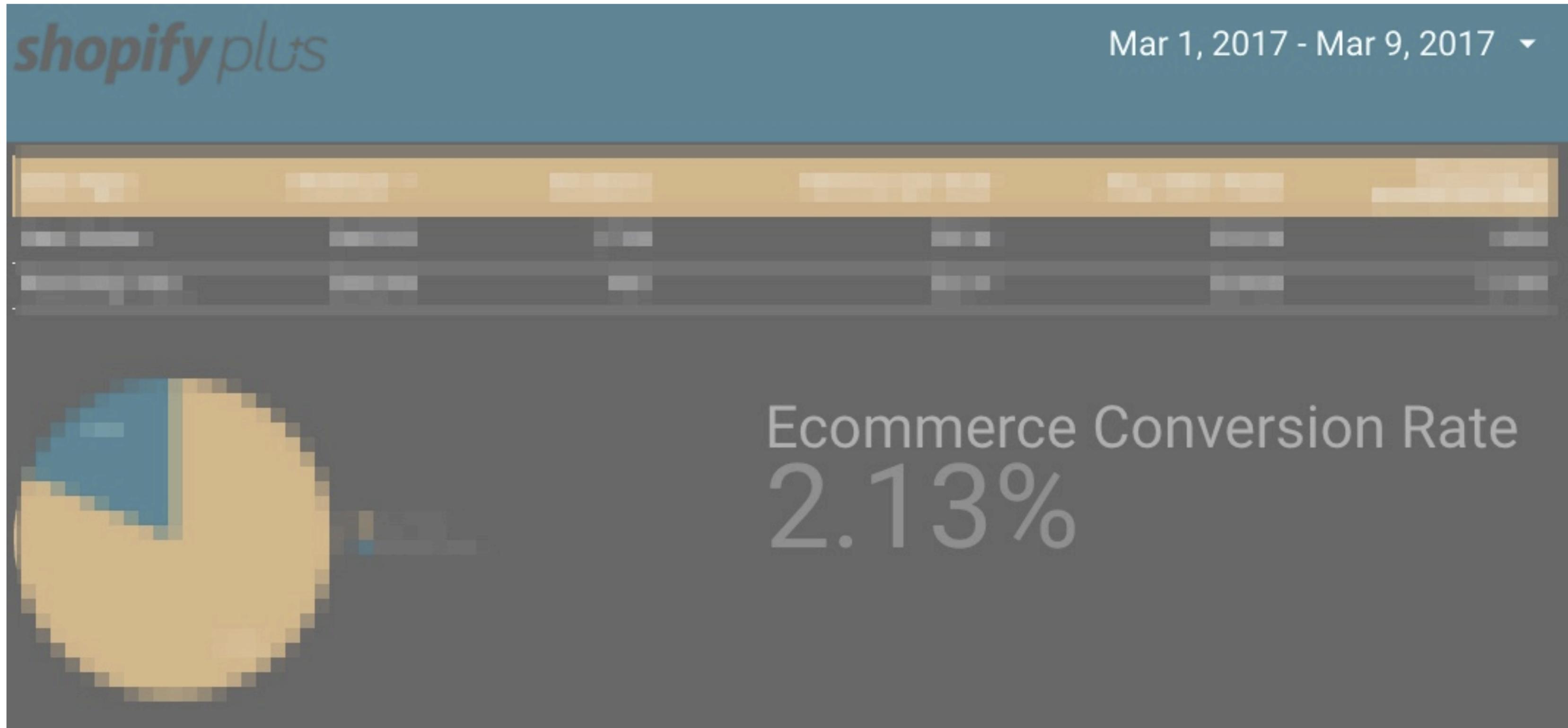
RPV Speedometer

Profitability
High RPV

Scaling Revenue
Low RPV



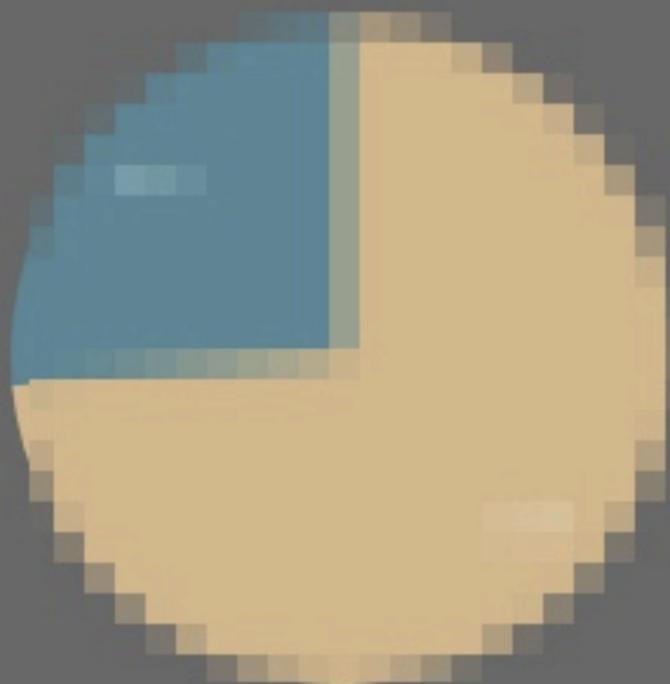
Reducing E-commerce Mass



Reducing E-commerce Mass By 239%

shopify plus

Mar 10, 2017 - Mar 15, 2017 ▾



Ecommerce Conversion Rate
5.09%

Acceleration = Force / Mass

Revenue Visitors Non Desire

The diagram illustrates the relationship between Acceleration, Force, and Mass. The equation $\text{Acceleration} = \text{Force} / \text{Mass}$ is centered. Above the word "Acceleration" is an upward-pointing arrow. Above the word "Force" is an upward-pointing arrow. Above the word "Mass" is a downward-pointing arrow. Below the equation, the words "Revenue", "Visitors", and "Non Desire" are positioned under "Acceleration", "Force", and "Mass" respectively.



Physics in Action A.K.A. Intense Speculation

Intense Speculation

- I don't know these guys.
- I do know they sold their business for \$1 billion dollars after 5 years.
- I can google things.



Rocket Fuel

Funding Rounds (6) - \$163.5M

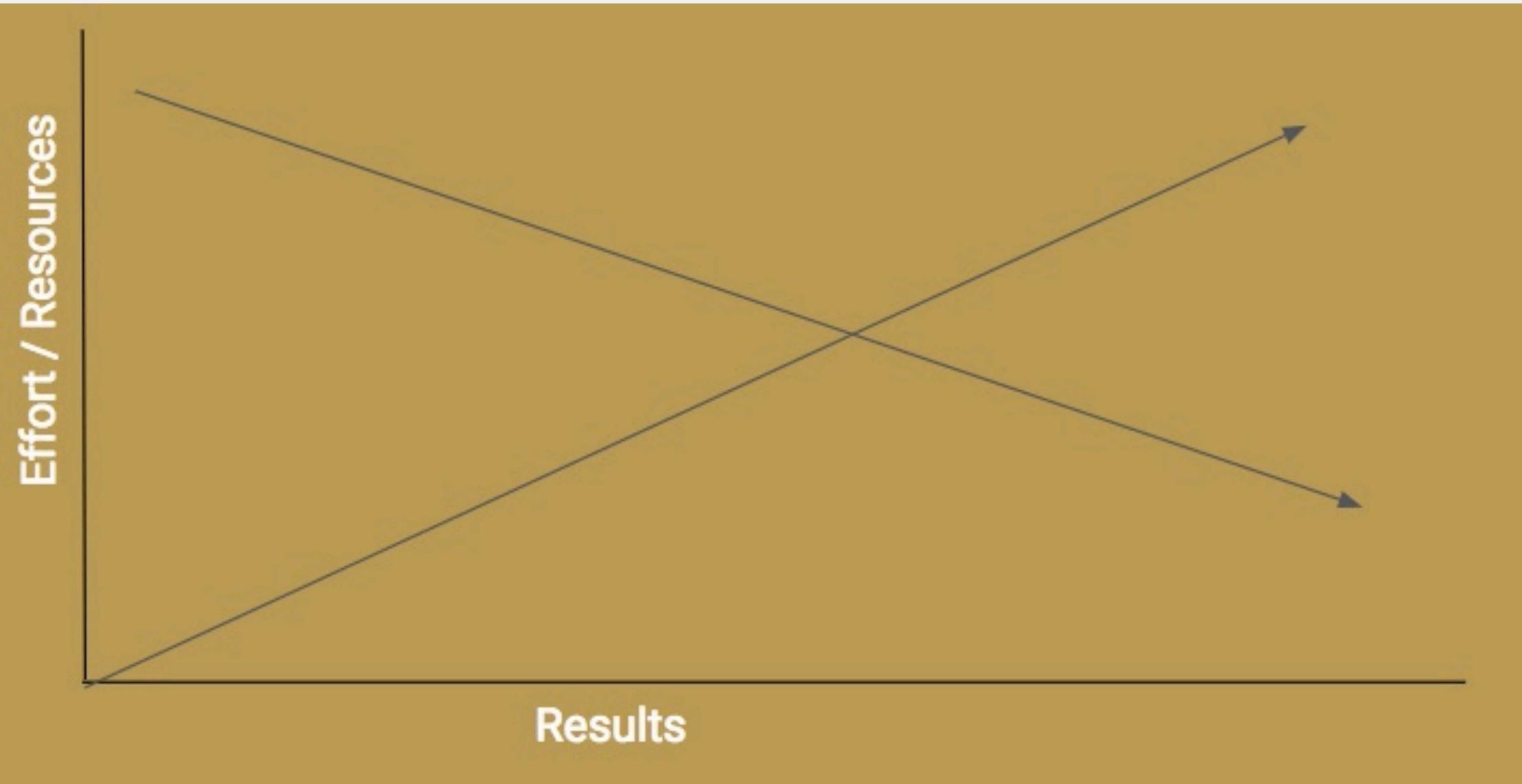
UPDATE

Date	Amount / Round	Valuation	Lead Investor	Investors
Nov, 2015	\$90.7M / Series D	—	TCV	5
Sep, 2014	\$50M / Series C	—	TCV	4
Aug, 2014	undisclosed amount / Secondary Market	—	Founders Circle Capital	1
Oct, 2013	\$12M / Series B	—	Venrock	12
Nov, 2012	\$9.8M / Series A	—	Venrock	5
Mar, 2012	\$1M / Seed	—	Forerunner Ventures	9
			Kleiner Perkins Caufield & Byers	

Makes a lot of money but is not profitable

Of course, Dollar Shave Club's e-commerce bona fides are important to Unilever, which has been promising investors it will get better at selling stuff online. The company will gain access to all the data and analysis the startup has on its customers. **Mulpuru says Unilever paid a "heck of a lot of money for a business that's not profitable,"** but likely did so because it feared other competitors such as Gillette parent Procter & Gamble would make its own offer. "It's worse to have it in P&G's hands," she says, "than for you to not spring an extra hundred million to get it yourself."

Required effort vs results



Rocket Fuel

crunchbase Look up a specific company, person, investor, or event

Introducing Crunchbase Pro [LEARN MORE](#)

DISCOVER

- Companies
- People
- Investors
- Funding Rounds

Shopify



[ADD TO LIST](#)

Funding Rounds (3) - \$122M

Date	Amount / Round	Valuation	Lead Investor	Investors
Dec, 2013	\$100M / Series C	—	—	6
Oct, 2011	\$15M / Series B	—	—	4
Dec, 2010	\$7M / Series A	—	Bessemer Venture Partners	3

[UPDATE](#)

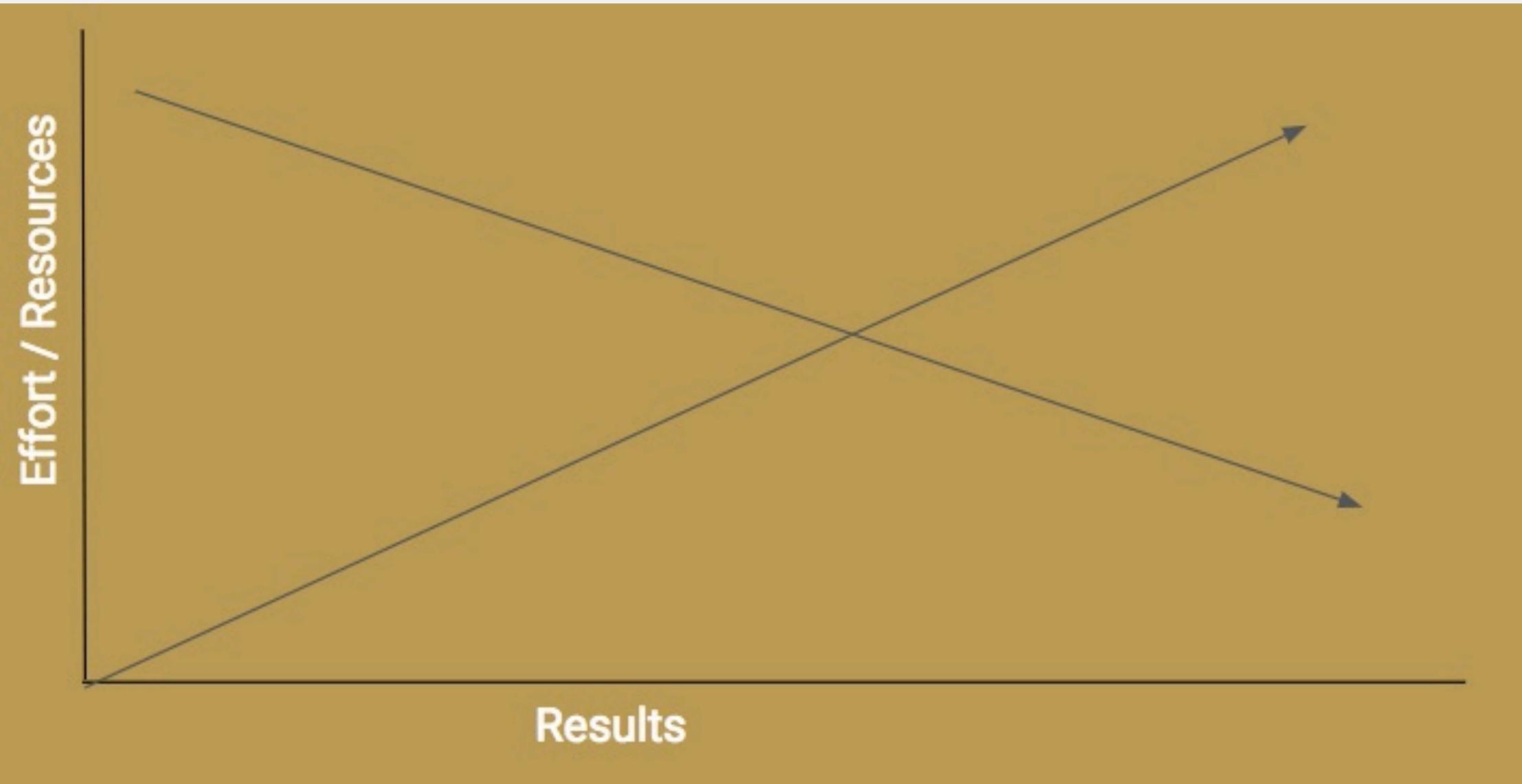
Sacrificing Short Term Profit

Five things to know about Shopify as it goes public - The Globe and Mail

www.theglobeandmail.com › Technology › Tech News ▼

May 20, 2015 - That said, **Shopify is not yet profitable**. It lost \$22.3-million last year, up from a \$4.8-million loss in 2013 and a \$1.2-million loss in 2012.

Required effort vs results



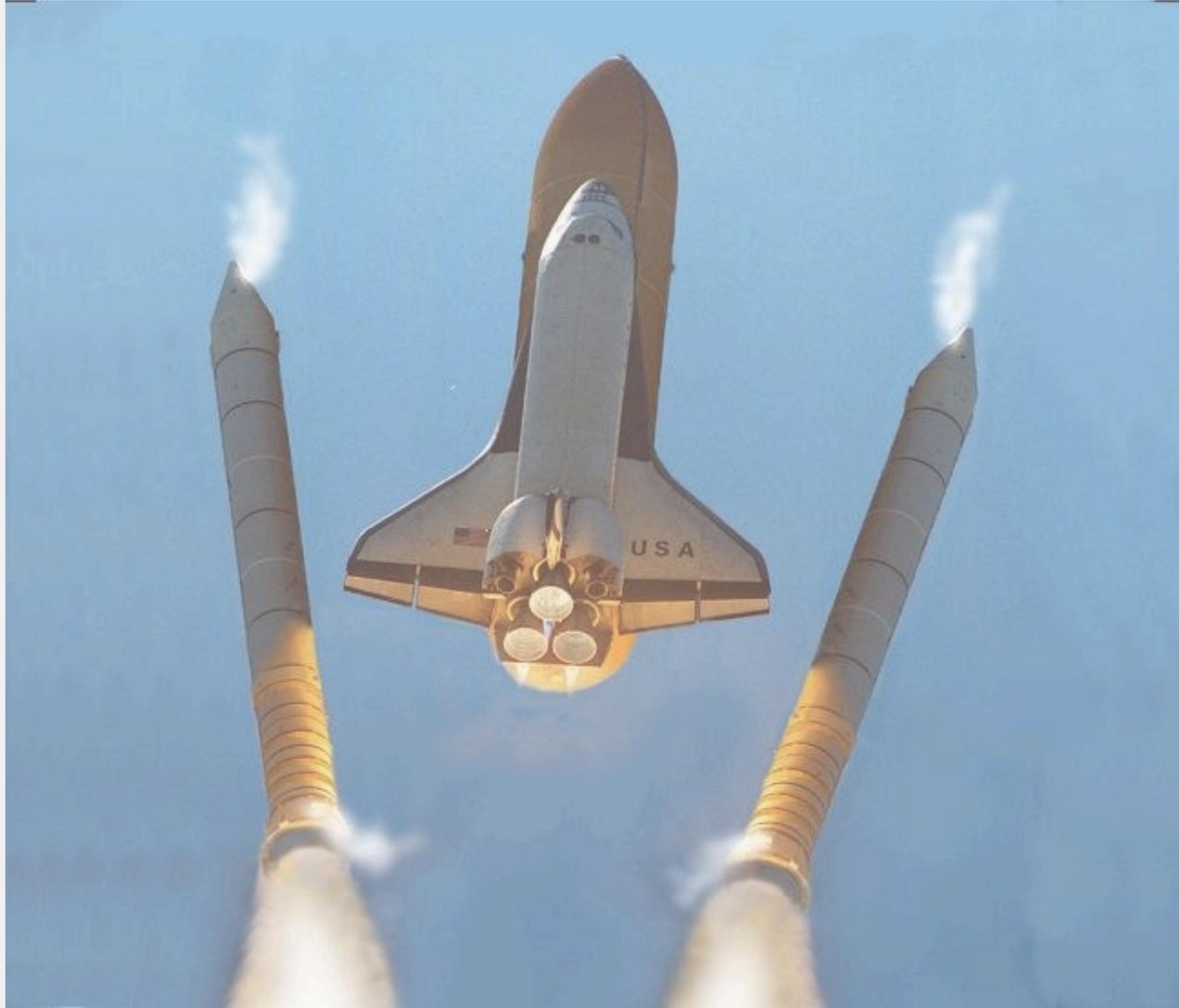
Hyper growth usually means to scale at a loss.

Typical journey is:

Scale at a loss, grow as fast as possible, then transition to profitability, or sell your business.

Decreasing Mass at Scale

Decreasing Mass With First Principles



- Data/Optimization/
Feedback
- Loyal customers (Revenue
Per User)

TBT to 1997



- 30 employees
- \$2.5million seed funding
- Pay Per Rent Online DVDs (e-commerce) business.

1999



- Introduced subscription.
- Decreased 'Mass' by increasing the revenue per user.

2006

NETFLIX

- Embracing feedback.
- New Logo (switched in 2000).
- Introduces online streaming.
- Continually decreasing mass by adapting to customers.
- The rate of mass they reduce is the rate of growth

2012-2015 - Rocket Fuel - World Domination

Netflix non-US losses hit \$100m but subscribers increase | Media ...

<https://www.theguardian.com> › Media › Netflix ▼

Apr 24, 2012 - **Losses at Netflix's operations** outside the US ballooned to more than \$100m (£62m) in the first quarter, as the impact of its launch in the UK and ...

Netflix to complete global expansion by 2016 - Financial Times

<https://www.ft.com/content/5cfdbe52-a0ef-11e4-8ad8-00144feab7de> ▼

Jan 20, 2015 - After a European expansion last year took Netflix to 50 countries, the ... The international business is still **operating at a loss**, which totalled ...

2012-2015 - Rocket Fuel - World Domination

Netflix, Inc.

NASDAQ: NFLX - Apr 7, 4:04 PM EDT

143.11 USD **↓0.63 (0.44%)**

After-hours: 143.11 0.00%

1 day

5 day

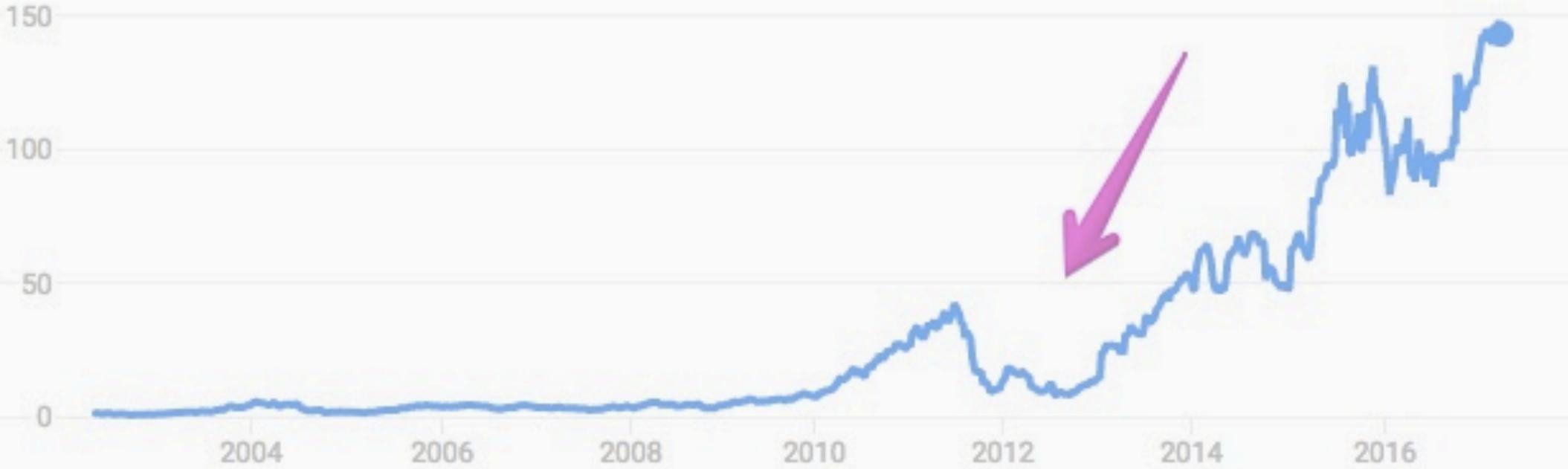
1 month

3 months

1 year

5 years

max



Open 143.79
High 143.89
Low 142.71

Mkt cap 61.65B
P/E ratio 336.44
Div yield -

2012-2015 - Rocket Fuel - World Domination

Netflix profits up 56% as original content splurge pays off | WIRED UK

www.wired.co.uk/article/netflix-2016-earnings-revenue-original-shows ▼

Jan 19, 2017 - A year ago Netflix added more than 130 countries to its service. On Wednesday, it announced a 56 per cent rise on **profits** and a global ...

You May Be Thinking

“Well Doug, this is great and all, but I’m in e-commerce. It’s nothing like Netflix.”



My Response



“Wasn’t Amazon just an e-commerce business too?”

What it means...

Start with first principles.

Challenge things.

Stop Trying to Increase Your Conversion Rates

by **DOUG CROWE** **CONVERSION OPTIMIZATION**

Mar 27, 2017 4 minute read



Decrease mass by finding ways
to increase your revenue per user.

Relentlessly pursue feedback, and act on it accordingly.

Not every space ship makes it out of earths
atmosphere, but every astronaut has to be
bold.



TO BOLDLY GO

Thank you