CDL Advanced

Scaling and Defensibility

1 | The Six Ways to Scale

2 | If you scale successfully, how do keep your profits from being competed away?

AFTER CLASS NOTES IN RED

A quick recap:

Block 1: Experimentation – startups have few resources, lots of uncertainty, and skewed outcomes: picking "experiments" with option value is most important early task

Block 2: Analysis – How do I price? Who do I sell to? Direct or with a channel? One-time or as a service? Plus AI…

Block 3: *Scaling and defensibility*

Your start-up will need to prove:

1) Who will pay for the product

VALUE CREATION; PRODUCT MARKET FIT

2) That you can sell a lot, *profitably*

VALUE CAPTURE; SCALABILITY

3) When you do so, incumbents don't kill you

DEFENSIBILITY

CDL mentors often say “this feels like a good consulting business…”

They do not mean this positively. What is their concern?

Great product market fit...but not clear how lifetime value of customer can be increased, or costs (including CAC) decreased, if company grows, largely because existing sales method requires such hands-on customization or contact from aspects of the venture (like a famous co-founder) which are going to be difficult to replicate. You need not only validated product-market fit but also *a scaling and defensiblity hypothesis!*

Scaling Strategy

How can you acquire customers and scale your business in such a way that you become profitable (or more profitable)?

What must be true?

(Just as with product-market fit, there is always a lot of uncertainty about how a company will be able to scale profitably: explicit hypotheses plus experimentation that generates option value by letting you avoid wasting time and capital and unprofitable scaling strategies is super important)

Your venture almost certainly not profitable, esp. if they are paying founders a market wage! So you need to scale beyond early adopters, either get price up or cost down, and keep this gap even when competitors enter

Scaling profitably requires that:

1. **You "cross the chasm"**

Move from early adopters to broad market appeal (that is, show WTP > costs even for non-early adopters)

2. **You reduce CAC**
3. **You reduce AC**
4. **You increase WTP**

The economics of your business improve with scale.
At least one of these must be true

5. **Competition doesn't drive prices to costs**

You are sufficiently differentiated or have built a 'moat'

"Crossing the chasm" means that PMF with early adopters not necessarily a sign of demand or ability to sell to broader market. Pool of early adopters who will use new, untested, "cool tech" products is generally fairly small - so you need to be sure you have PMF in general, not just with that early group – see "Crossing the Chasm" book chapter on Quercus

Scaling profitably requires that:

1. **You "cross the chasm"**

Move from early adopters to broad market appeal (that is, show WTP > costs even for non-early adopters)

2. **You reduce CAC**
3. **You reduce AC**
4. **You increase WTP**

The economics of your business improve with scale.
At least one of these must be true

5. **Competition doesn't drive prices to costs**

You are sufficiently differentiated or have built a 'moat'

If need to reduce CAC (customer acquisition cost) is important risk, experiment with targeted ads or ways to generate organic inbound or alternative enterprise sales channels, etc., to see if they can drive enough customers to you cheaply

Scaling profitably requires that:

1. **You "cross the chasm"** — *Move from early adopters to broad market appeal (that is, show WTP > costs even for non-early adopters)*
2. **You reduce CAC**
3. **You reduce AC**
4. **You increase WTP** — *The economics of your business improve with scale.* ***At least one of these must be true***
5. **Competition doesn't drive prices to costs** — *You are sufficiently differentiated or have built a 'moat'*

If AC (average costs of production) reductions necessary and most important unknown, technical experiments to learn scale economies or learning curve benefits may be more important

Scaling profitably requires that:

1. **You "cross the chasm"**

Move from early adopters to broad market appeal (that is, show WTP > costs even for non-early adopters)

2. **You reduce CAC**
3. **You reduce AC**
4. **You increase WTP**

The economics of your business improve with scale.
At least one of these must be true

5. **Competition doesn't drive prices to costs**

You are sufficiently differentiated or have built a 'moat'

If WTP is too low, why? Perhaps customer churn is high. Understanding factors that reduce churn, allowing you to earn more revenue per acquired customer, might be important.

As always in entrepreneurship, your scaling plan is subject to unknowns! Therefore…

You need **hypotheses** about how start-up will scale

You need to run **experiments** to test these hypotheses

Remember why: hypotheses to choose what info to gather (startups are resource-constrained!). Experiments to generate option value (largely by avoiding wasting time and resources on things that won't pay off)

Entrepreneurs don't *plan* (they don't know enough to do so credibly!) but they also don't just wait for useful info to arrive naturally before they make decisions: they figure out what info they need and go get it

There are six, and only six, broad ways to scale

As you company becomes more advanced, the following things change:

1. Current volume produced
2. Cumulative volume produced
3. Product line scope

Your scaling strategy better involve either costs falling or WTP increasing as 1, 2 or 3 increase

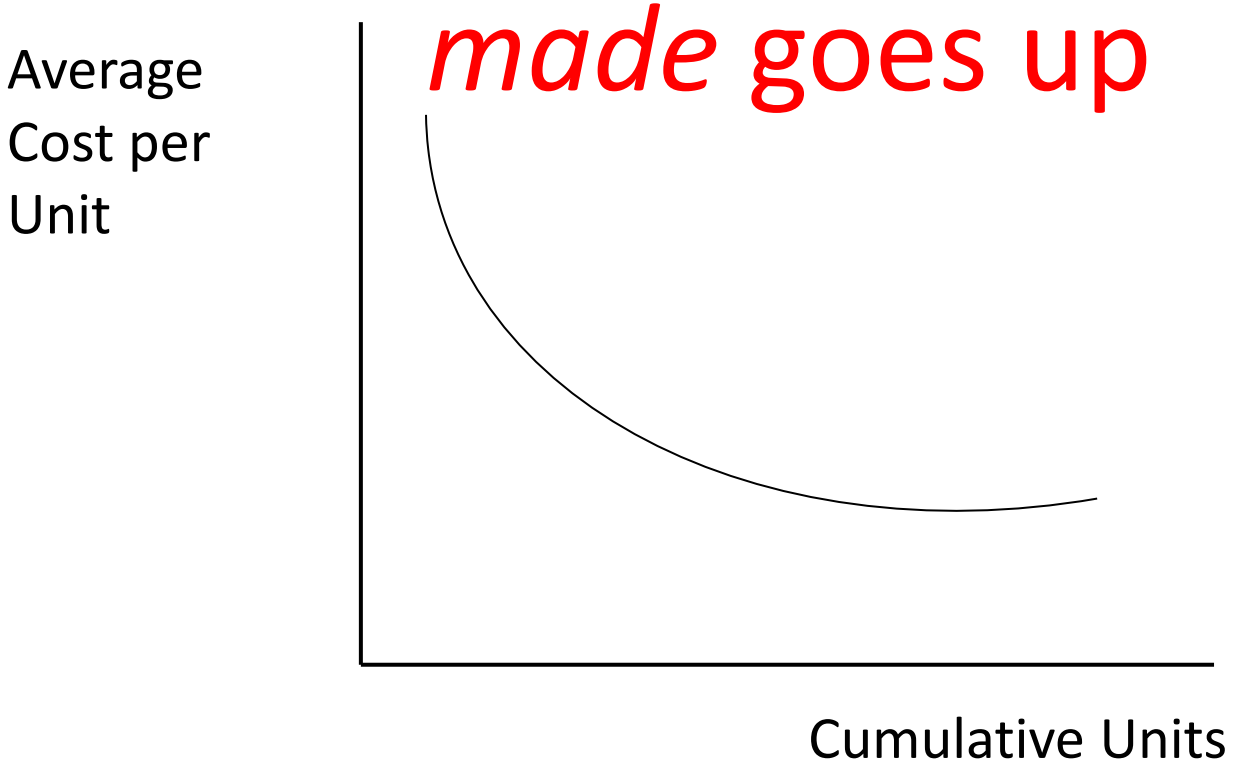
How Can Scale Affect Value Creation (WTP-Cost)

(Note: since profit is literally price minus costs and almost every startup is not profitable early on, then for firm to be profitable as it expands, at least 1 of these must be true):

	Current volume	Cumulative Volume	Product Line Scope
Costs Down	Scale Economies	**Learning Curves**	Scope Economies
WTP Up	Network effects	Data/AI Economies	Complementarities in Demand

What is a **learning curve**?

Note: this is AC falling as *cumulative units ever made* goes up



Learning Curves: unit cost falls as production experience increases

Based on *cumulative quantity ever produced*

Where do learning economies come from?

Workers' dexterity

Workers use/learning of IT and capital

Accumulated knowledge of market & customers

Learn to work as a team

Management experience

My favorite example of a learning curve? The "July Effect": your probability of dying on a hospital visit in the US is quite a bit higher: it's when new residents start their rotations. So that ignorance is bliss, we won't mention the equivalent month for Canada! (And of course, there is some debate in the literature about how big the July Effect is, but a great story nonetheless)

What are key sources of learning economies in startups?

Learning about demand and customers

Learning how to describe the product

Learning who the right person in the customer organization is

Learning how to sell

Learning what marketing channels have highest ROI

Learning who's best at what job and how to divide tasks (when small number of people all doing many things, etc… learning how to operate a business!

For companies producing a physical product, learning about production process (learning lowest cost outsources)

Surely there are many others!

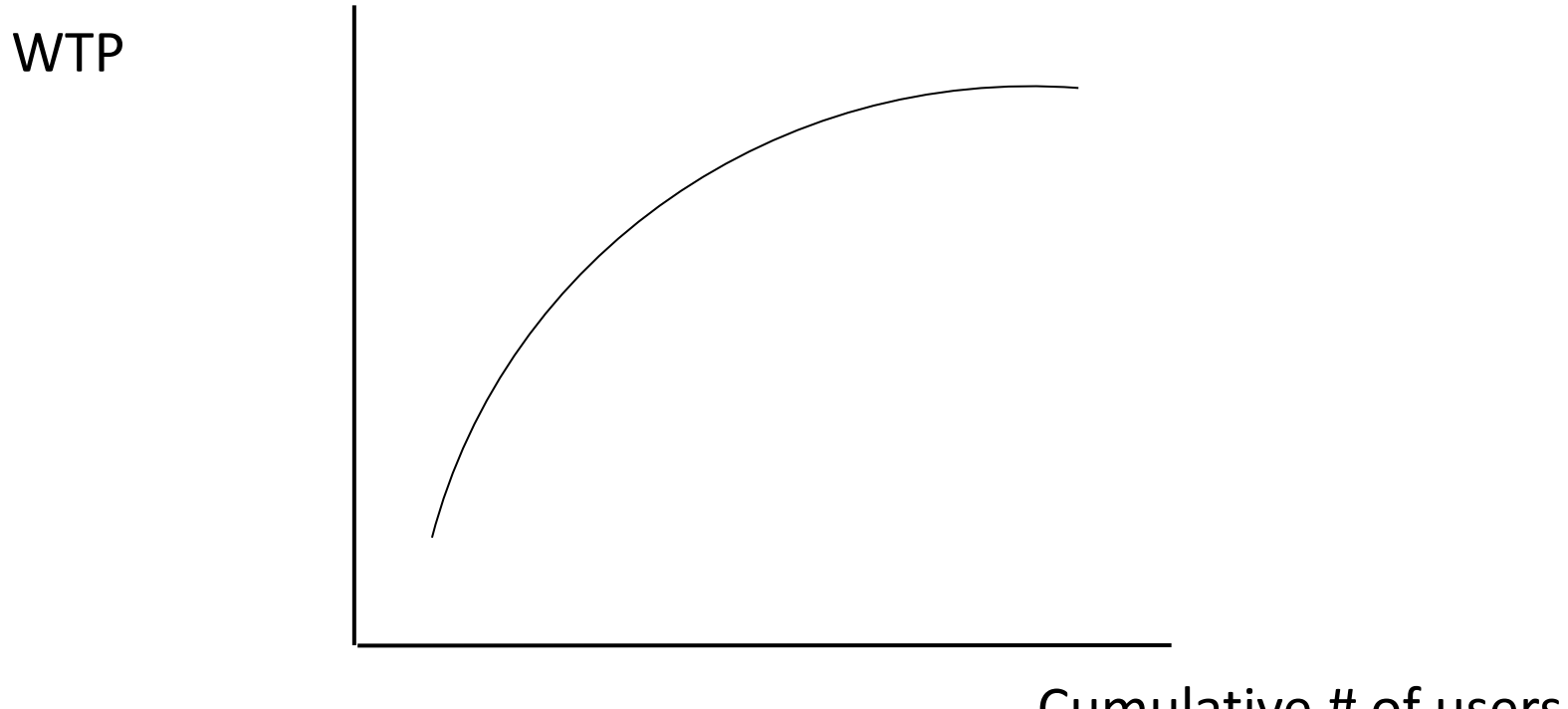
What are key sources of learning economies in technology start-ups?

How Can Scale Affect Value Creation (WTP-Cost)

	Current volume	Cumulative Volume	Product Line Scope
Costs Down	Scale Economies	Learning Economies	Scope Economies
WTP Up	Network effects	**Data/AI Economies**	Complementarities in Demand

What are **data/AI economies**?

A user's WTP for your product increases with the *cumulative number of past users*



Why do data/AI economies arise?

Predictions get more accurate with more data and more training

Products that incorporate prediction will therefore get better with more past users

Key challenge this creates: how to attract the early users?

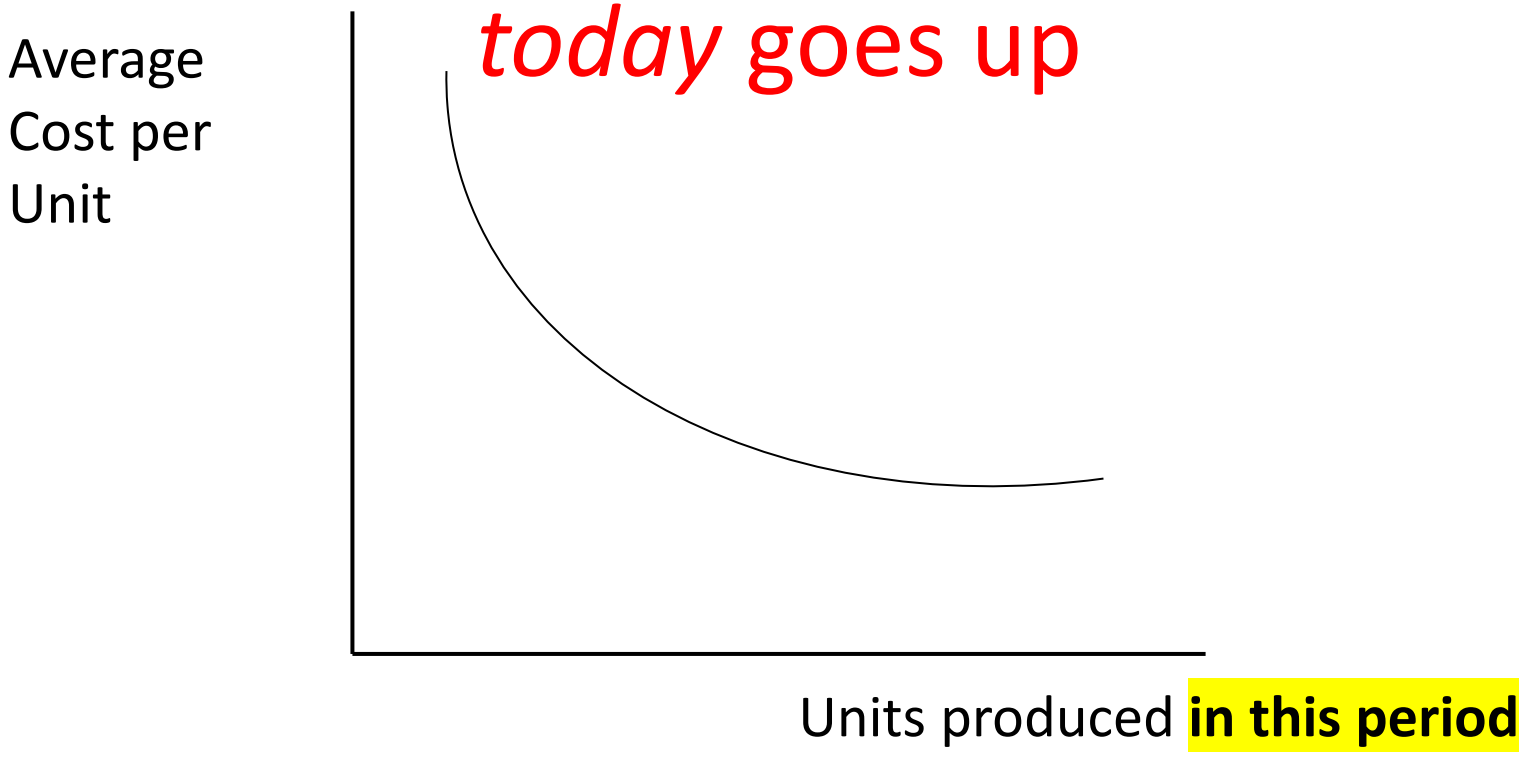
Be careful: “we will eventually monetize the data” is not a growth hypothesis! Be precise about the contribution of each additional user to the value of the product. Doubling some technical milestone does NOT mean you have doubled WTP, despite what many founders implicitly think!

How Can Scale Affect Value Creation (WTP-Cost)

	Current volume	Cumulative Volume	Product Line Scope
Costs Down	**Scale Economies**	Learning Economies	Scope Economies
WTP Up	Network effects	Data/AI Economies	Complementarities in Demand

What are **economies of scale** (and how do they differ from the learning curve)?

Economies of scale are AC falling as units produced *today* goes up



What are key sources of scale economies in start-ups?

Obvious one - high fixed costs/low variable costs businesses like software

R&D is a big fixed cost for many start-ups

Manufactured product - economies of scale in production

Organic acquisition/word of mouth - reductions in CAC

Specialization - people wear fewer hats. Hire experts in particular areas

Most firms, as they grow, both get bigger (scale economies) and get more experienced (learning curves). BUT

The two concepts have different strategic implications for your start-up

Imagine that changes in the economy mean that worker turnover goes up.

Does this matter if your strategic advantage is based on learning economies vs. economies of scale?

Imagine that demand in your industry is highly variable: 20,000 units some years, 40,000 units in others

Does this matter if your strategic advantage is based on learning curves? Economies of scale?

Suppose learning economies arise in a start-up as its founders learn how to sell to large enterprise clients

(eg: who to meet, how to describe the value prop, how to demo the product, how to structure the terms of the deal,etc…)

Will this cause CAC to fall as startup scales?

It depends!

- Is this knowledge tied to the founders who actually ‘had the experience’?
- Or can they transfer it to new hires? How easily?
- As firm scales and hires new employees, where are they on the sales learning curve?

Startups need to transfer individual-level experience into firm-level experience

Startups often face a trade-off between customizing their product to make an early sale and keeping their early product as general as possible. Why?

Hard to “cross the chasm” (early adopters not “normal” customers) and scaling profitably means you won’t be able to provide the same level of customization and deep customer support that you provided for your pilot customers - better not rely on that as basis of sales, then! That is, whatever you are doing to find product-market fit better not be something that destroys ability to scale…

BY CHARLIZE ALCARAZ / CANADIAN STARTUP NEWS / DECEMBER 7, 2022

GOBOLT CLOSES $75 MILLION SERIES C ROUND TO DOUBLE DOWN ON EVS, NORTH AMERICAN EXPANSION

GoBolt was founded by a Rotman grad as “Second Closet”. Initially profitable providing “shared storage units with pickup” for, e.g., college students on break. Now much more around local logistics, such as doing delivery for Ikea. Latter had good economies of scale, while former much less so, hence major pivot. Take a look at some press articles about this company and see if you can think of a less costly or quicker way they could have figured out this scaling issue.

betakit

CANADIAN STARTUP NEWS & TECH INNOVATION

BY JESSICA GALANG / CANADIAN STARTUP NEWS / SEPTEMBER 6, 2018

SECOND CLOSET RAISES $2.04 MILLION, PLANS VANCOUVER EXPANSION

betakit

CANADIAN STARTUP NEWS & TECH INNOVATION

BY MEAGAN SIMPSON / CANADIAN STARTUP NEWS / DECEMBER 13, 2019

SECOND CLOSET RAISES $13.2 MILLION TO DISRUPT BILLION DOLLAR SELF-STORAGE MARKET

CANADIAN STARTUP NEWS & TECH INNOVATION

BY MEAGAN SIMPSON / CANADIAN STARTUP NEWS / MARCH 30, 2021

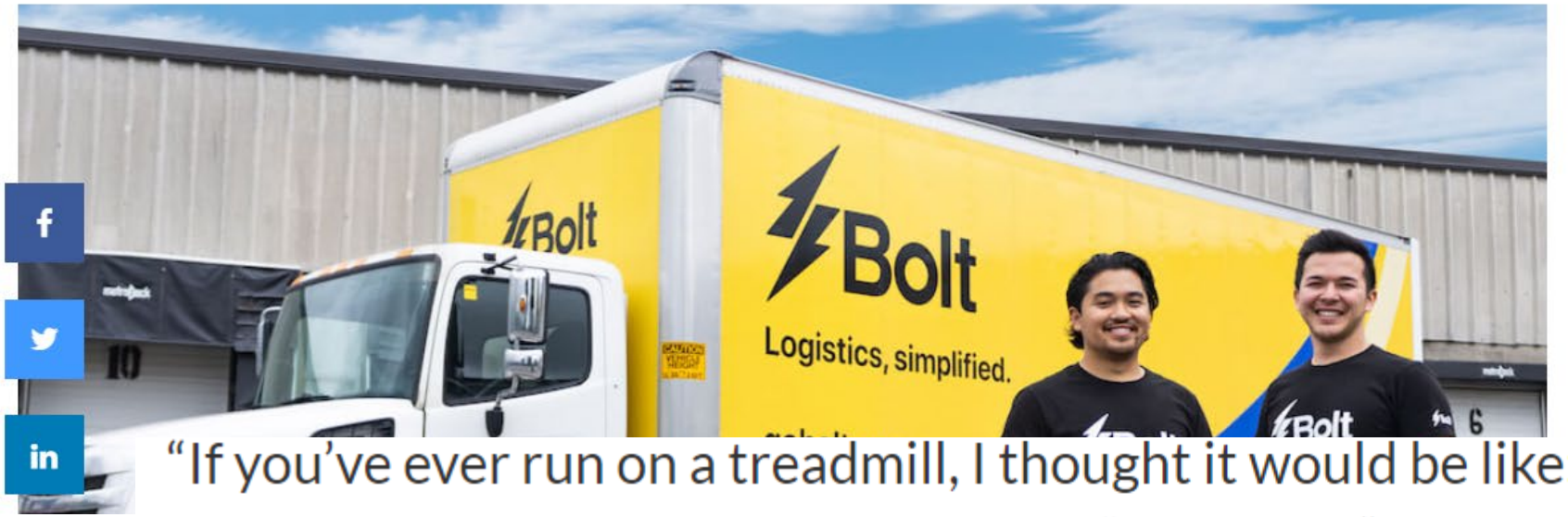
SECOND CLOSET SECURES $20 MILLION AS IT SHIFTS FOCUS AWAY FROM SELF-STORAGE TOWARDS B2B THIRD-PARTY LOGISTICS

Recognizing an opportunity to utilize what Second Closet had originally built as a way to store individual goods, Whitecap pushed the startup to increase its possible scale opportunities, and focus on B2B.

"We sat down with Mark and the rest of the team and said, 'is there a path here to replicate what we've done with one or two early pilot [business] customers, and over the next three years sort of flip the script so that we could get 50-50 business to consumer,'" said Shayn Diamond, partner at Whitecap, in an interview with BetaKit.

BY MEAGAN SIMPSON / CANADIAN STARTUP NEWS / NOVEMBER 8, 2021

IKEA'S INVESTMENT ARM BUYS INTO BOLT LOGISTICS AS PART OF SERIES B ROUND



"If you've ever run on a treadmill, I thought it would be like: we'd be at a pretty brisk pace and then click the button to accelerate," said Ang. "But, really, we actually stepped onto a treadmill that was at full speed and didn't realize how quickly it would be taking off."

Bolt has also anticipated a slower shift from consumer storage to business customers, with a gradual move to a 50-50 split over the next few years. Ang's treadmill metaphor also applies here, as 95 percent of Bolt's customers are now businesses.

BY CHARLIZE ALCARAZ / CANADIAN STARTUP NEWS / DECEMBER 7, 2022

GOBOLT CLOSES $75 MILLION SERIES C ROUND TO DOUBLE DOWN ON EVS, NORTH AMERICAN EXPANSION

Last Time:

- Six ways to scale: you either raise price (with higher WTP) or lower costs as you either become bigger, become more experienced, or sell a wider variety of goods
- At least one must be true! So far we've seen

Economies of Scale (bigger firm -> costs down)

Data/AI Economies (more sold in past -> WTP up)

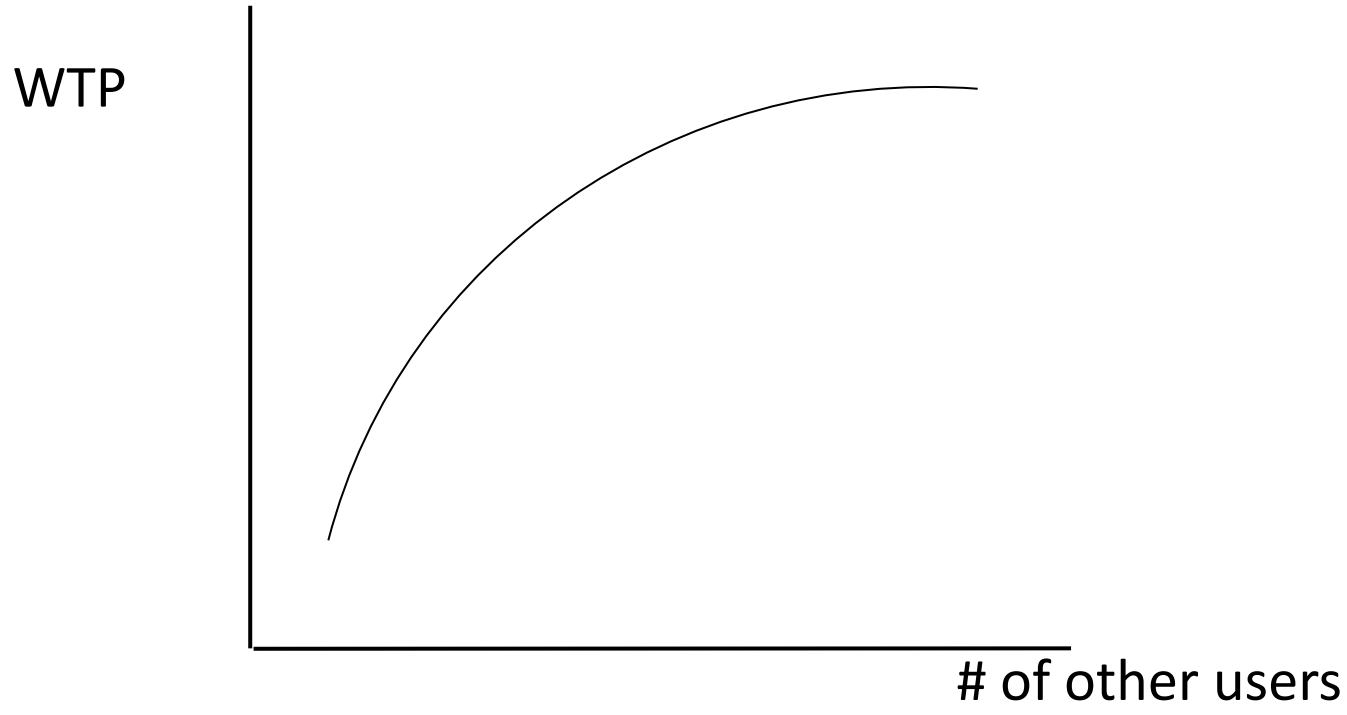
Learning Curves (more sold in past -> costs down)

How Can Scale Affect Value Creation (WTP-Cost)

	Current volume	Cumulative Volume	Product Line Scope
Costs Down	Scale Economies	Learning Economies	Scope Economies
WTP Up	**Network effects**	Data/AI Economies	Complementarities in Demand

What are **network effects**?

WTP for your product increases with the number of other (current) users of the product



Where do network effects come from?

Communication/interactions between users (*eg: fax machines, WhatsApp*)

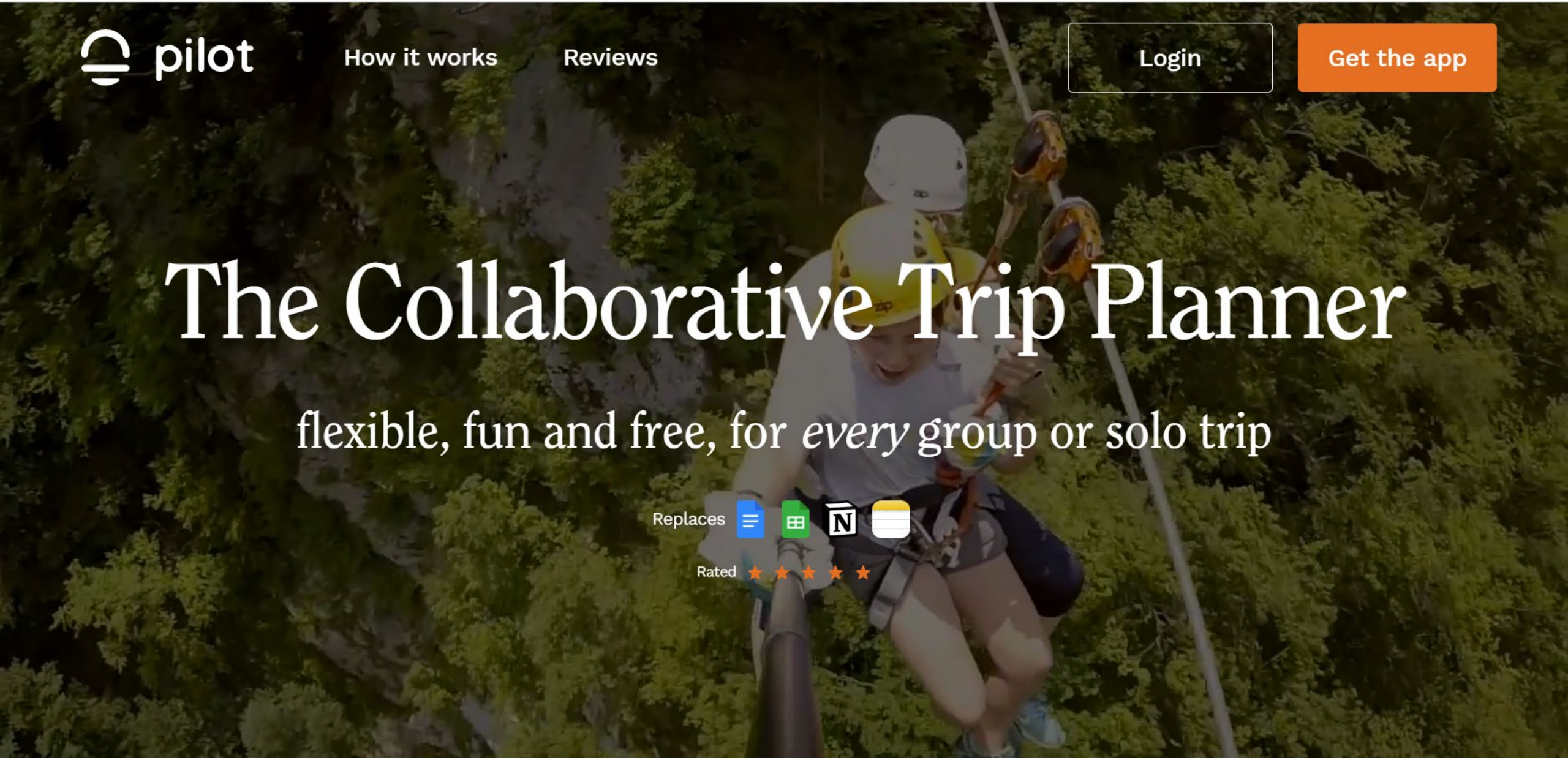
Multi-sided platforms (*eg: Uber*)

Provision of complements (*iOS Apps*)

If network effects important, rules of thumb:

1) It should be very difficult for small rivals to steal your customers with slightly lower price (if they can, the network effect is not actually raising their WTP very much!)
2) Really important to know which customers have high elasticity to other users: e.g., do the video game companies only make games for consoles with many users, or do users refuse to buy consoles without a wide variety of games?

See Pricing class slides for further details


pilot
How it works
Reviews
Login
Get the app
The Collaborative Trip Planner
flexible, fun and free, for *every* group or solo trip
Replaces
Rated

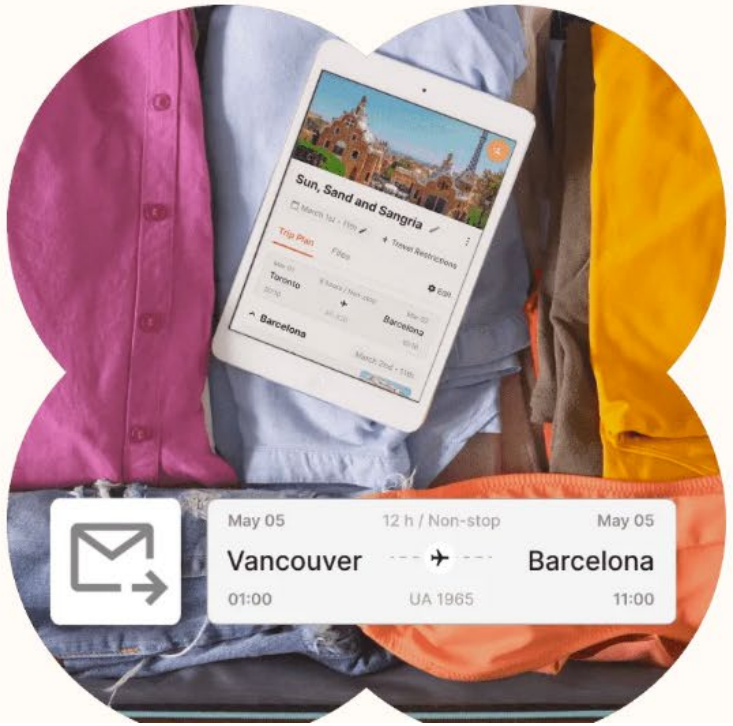
pilot

How it works Reviews

Log in Get the app

Effortlessly plan any trip

Collab with your squad to design your dream trip. Make Pilot your own.



Remember Pilot, the “social trip planner”

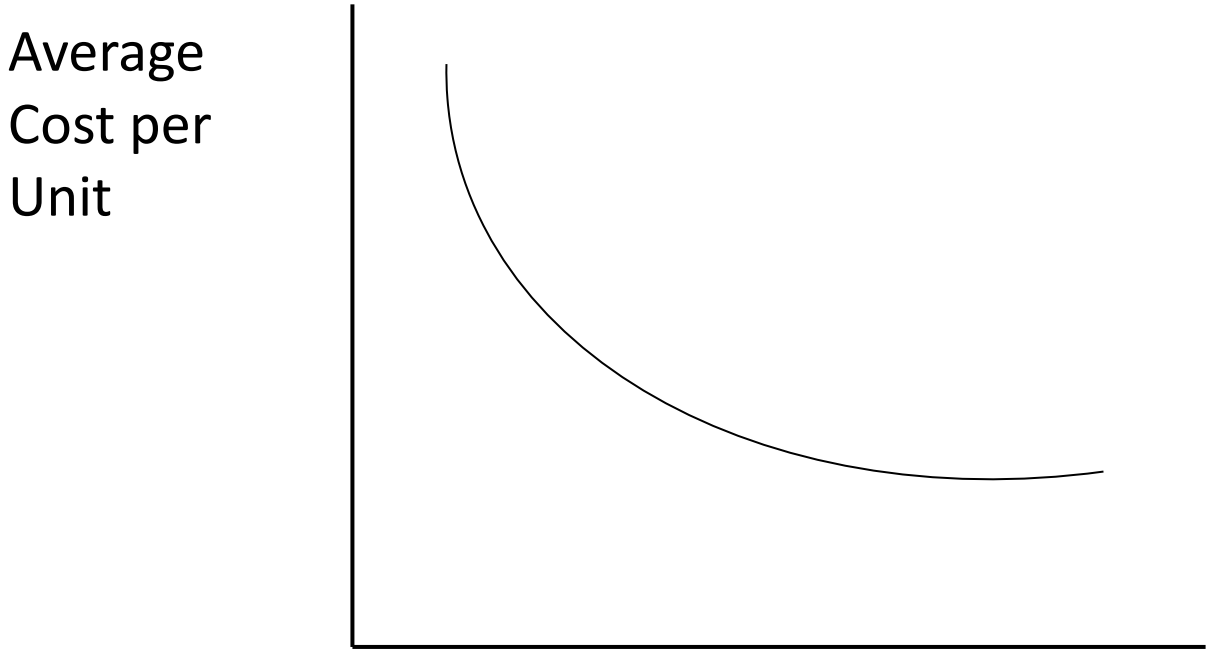
How can network effects be a scaling strategy for them: that is, how can they increase WTP as the number of total customers who have ever used the platform increases?

Do you think this is the best scaling strategy? Maybe you are thinking data/AI economies are better? Recall from class that we considered a dozen different ways to scale this business. **These are hypotheses for you to evaluate as quickly as possible.**

How Can Scale Affect Value Creation (WTP-Cost)

	Current volume	Cumulative Volume	Product Line Scope
Costs Down	Scale Economies	Learning Economies	**Scope Economies**
WTP Up	Network effects	Data/AI Economies	Complementarities in Demand

Economies of scope arise when the cost of a single firm producing two goods is lower than the cost of two firms each producing one of those goods



When a start-up's growth hypothesis involves entry into **additional products** sold to the same (or different) customers, key question to ask (and experiment on) is:

Why does the start-up have an advantage in the sale of the new product, relative to a competitor offering it?

"Right now my business is 'X'. But, the 'real business' is Y"
Growth hypothesis better precisely explain: Why does X give you an advantage in Y

- X is an intermediate tech used to make Y, and there are learning curves?
- Faster path to market through existing customers, or learning that can occur without such severe regulatory restrictions. But be precise!

Usually bad reason: I need cash and can't afford to do Y (why does that suggest you should use limited resources on X? If you can't answer that question, it is not a good idea!)

Sources of Economies of Scope

Sharing fixed costs across products:

- Physical assets, advertising/brand building, sales/service operations, market research, knowledge, etc…

Common inputs + some form of efficiency from coordinating the input across products

- E.g., supplier economizes on a single contract and single delivery

Many sources of economies of scope are contractible

You don’t need to produce two products yourself to share costs across them. Two firms could write a contract to share costs or coordinate on common inputs

Key challenge for start-ups - bigger firms they compete with may be able to take advantage of scale and scope advantages that they can’t

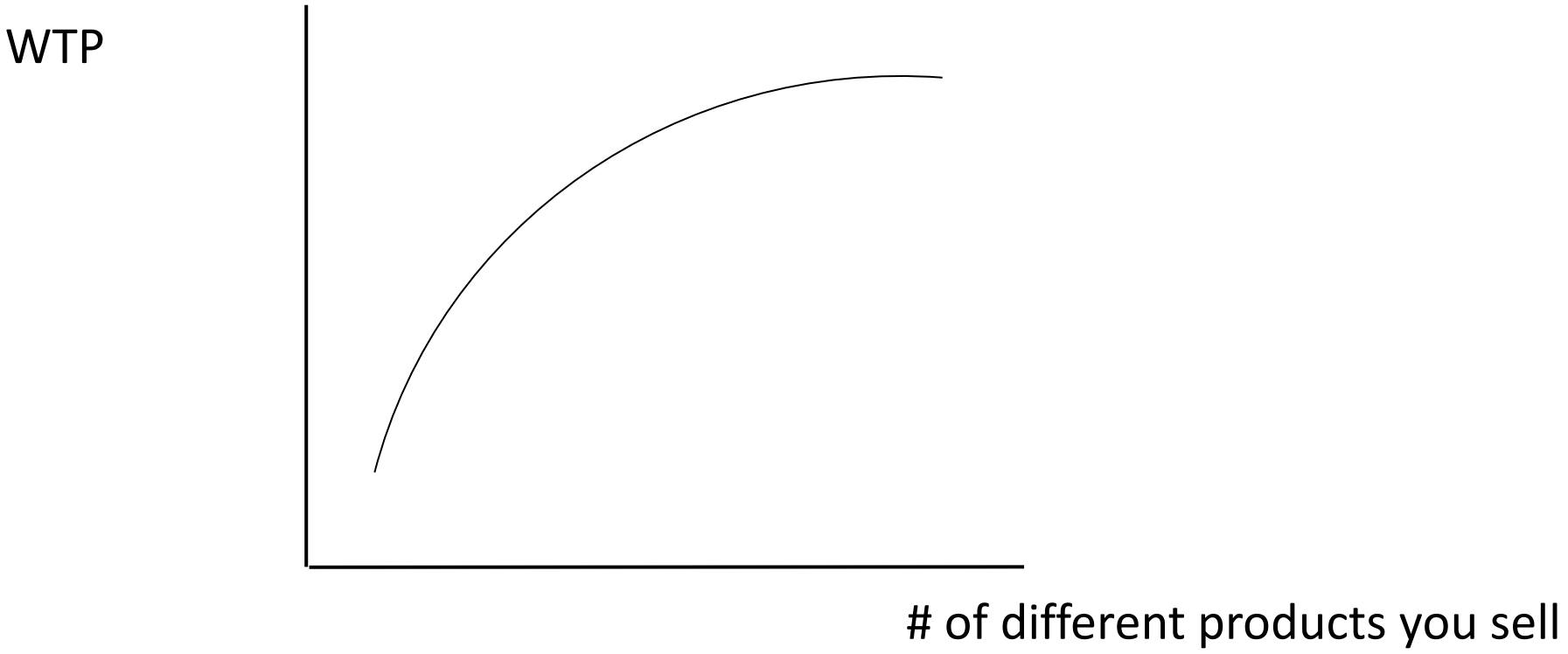
One thing start-ups can do is contract for these things - eg:

- Contract manufacturers to obtain scale economies
- Channel partners to obtain scope economies

How Can Scale Affect Value Creation (WTP-Cost)

	Current volume	Cumulative Volume	Product Line Scope
Costs Down	Scale Economies	Learning Economies	Scope Economies
WTP Up	Network effects	Data/AI Economies	**Complementarities in Demand**

Complementarities arise when value to user of purchasing two products from same firm is higher than value of buying from two different firms



Sources of Complementarities

True product complementarities - ie: products work better together than when ‘mixed-and-matched’ with a product from another firm

User learning costs, switching costs, or search costs

Data-based complementarities - if products share data, predictions will be better quality

- Can Google deliver me better search results because it ‘reads’ my gmail?

Established brand or reputation can reduce quality uncertainty for buyers

“My current business is X but real business is Y”

Common for start-ups to start in one business as a ‘stepping stone’ to the real business. Need to clearly explain why doing X first gives them an advantage in Y

What are good reasons for selling product/service X?

“My current business is X but real business is Y”

Common for start-ups to start in one business as a ‘stepping stone’ to the real business. Need to clearly explain why doing X first gives them an advantage in Y

Good answers:

- X allows us to collect the data we need for Y (Y is AI-based)
- X allows us to build and test the tech for Y in a less cumbersome regulatory environment (eg: research vs. clinical)

Bad answer:

- We can’t afford to do Y

Scaling is just like product-market fit, product development, pricing:

- Startups have lots of uncertainty, highly skewed outcomes, limited resources
- So form hypotheses (*not a plan!*), find highest option value tasks, get info quickly & cheaply

My suggestion for you on a “startup roadmap”

1) Do entrepreneurial canvas to get an idea of your major “insight” and to see what the most irreversible things you may need to do are
2) Write down a set of hypotheses for product market fit, pricing, scaling, and defensibility, incl. alternate hypotheses which may be true
3) Find critical hypotheses. Derisk these before spending too much time/money on product development for things that won’t work

Defensibility

Defensibility Hypothesis:

If I have product market fit and I scale, why won't strong incumbents compete me out of business? Why do big incumbents in your field have a major advantage?

If you have success, incumbents will react and entrants will challenge you. Incumbents have existing brand, supplier relationships, knowledge of industry, scale, learning curves…

Defensibility requires either:

1) Incumbents (and strong future entrants) won't want to compete with you even if you succeed, or
2) Incumbents *can't* compete with you when you succeed

Let's start with incumbents. Why would existing strong firms not want to compete with you if you are making money?

Clay Christensen "demand-side disruption" ("The Innovator's Dilemma"): incumbents pay attention to what their customers want right now, hence do not pay attention to technologies which are currently inferior but which are improving in quality rapidly

Rebecca Henderson "supply-side disruption": incumbents have existing architecture (communication channels, decision hierarchies, promotion rules, relational contracts with suppliers and workers, etc.) which works well. New tech which can be exploited without changing architecture is easy to handle (e.g., big pharma firms do just as well pushing new drugs through trials and marketing them as they do with old drugs: the needed firm architecture does not depend on the exact drug). New tech which requires architectural changes is harder (e.g., Blockbuster couldn't become Netflix since C-suite were all retail/real estate folks, promotion and hence effort of workers was based on being promoted to store manager or regional manager, etc.).

If existing strong player's architecture could replicate what you are doing, you better be cooperating/selling to those incumbents, or have a *very* strong defensibility strategy!

Door-to-door salesman of encyclopedia Britannica once common. What happened? Britannica sold CD-ROM versions very soon after the technology was invented, and bought eb.com the year the web browser was invented!

Issue wasn't a lack of awareness a la Christensen or an architectural issue a la Henderson, but rather just a tech change + Wikipedia which made it almost impossible for traditional encyclopedias to survive as a product category. But this is a "boring" type of disruption.

Clayton Christensen's demand-side disruption:

Successful firms get "disrupted" when they ignore competing product because it is initially lower quality and customers don't want it

His book "Innovator's Dilemma" a favorite of everyone from Steve Jobs to Andy Grove. Motivated the iPhone and the Celeron chip. Argues that successful firms pay attention to customer wants today, but by doing so they fail to notice the *rate of change* of new technologies that can take their business. E.g., stagecoach builders think customers want faster horses with a smoother ride, not a car.

But what if you correctly observe new competitors…

Rebecca Henderson's architectural/supply-side disruption says

1) firms have PPDs because of a specific "architecture" of the firm
2) This is hard to change, so…


NETFLIX

As described in the book “Losing the Signal”, Blackberry’s “skunkworks” remote R&D team, deliberately set up to be insulated from day-to-day corporate pressure, invented a chat app that could send images and text cheaply over the internet in an encrypted way – basically, Whatsapp before Whatsapp. When the idea was brought to HQ, people were very positive. However, Blackberry since founding had a dual-CEO structure, one focused on software and one on hardware. The hardware side pushed for BBM to be exclusive to Blackberry hardware.

Whatsapp is worth more than the entire Blackberry company today. This is “architectural disruption” at its finest – the existing “hard to change” aspects of the business, including beliefs among employees and partners, made it hard to adopt profitable innovation or respond to outside threats.


Curve
BlackBerry
Fri, May 19
12:21PM
All
space
sym

If you understand “firm architecture”, you will see how to enter in a way that will not cause a really negative reaction by incumbents

Demand- or supply-disruption explain why incumbents may not want to compete

Alternatively, you can make it so they can’t compete with you – this is useful for preventing competition from future entrants also

Reason others *don't want* to compete:
Competing requires architectural changes
OR
Three ways to make it so others *can't* compete
Entry Barriers
Dynamic Benefits
Customer Stickiness

Three broad types of defensibility:

Entry Barriers

Intellectual Property

Regulatory Barriers

Raising rivals' costs (eg: through regulatory costs)

Though outside of pharma and chemicals, IP/secrecy tends to be relatively useless: too easy to invent around patents/figure out secrets. RRC means pushing artificial fixed costs of regulation so that decent but not great competitors won't find it worth paying fixed cost to enter: e.g., taxi medallions seem to be neutral (all taxis need them in places like NYC) but only most efficient competitors will find it worth entering if you reduce profitability of entering with the need for medallions, hence less competition against incumbents!

Three broad types of defensibility:

Dynamic Benefits

Learning Curves

Economies of Scale

Network effects

Data-based effects

These factors we saw already not only allow you to increase value creation as you scale, but also make it hard for small scale or less experienced rivals to compete against you!

Three broad types of defensibility:

Stickiness

Brand (booking.com $2bn in ads each year!)

Switching Cost (“better” enterprise software won’t sell easily since enterprise decision makers loath to switch all of their users!)

High CAC (customers take a long time to acquire? bad for scalability, great for defensibility!)

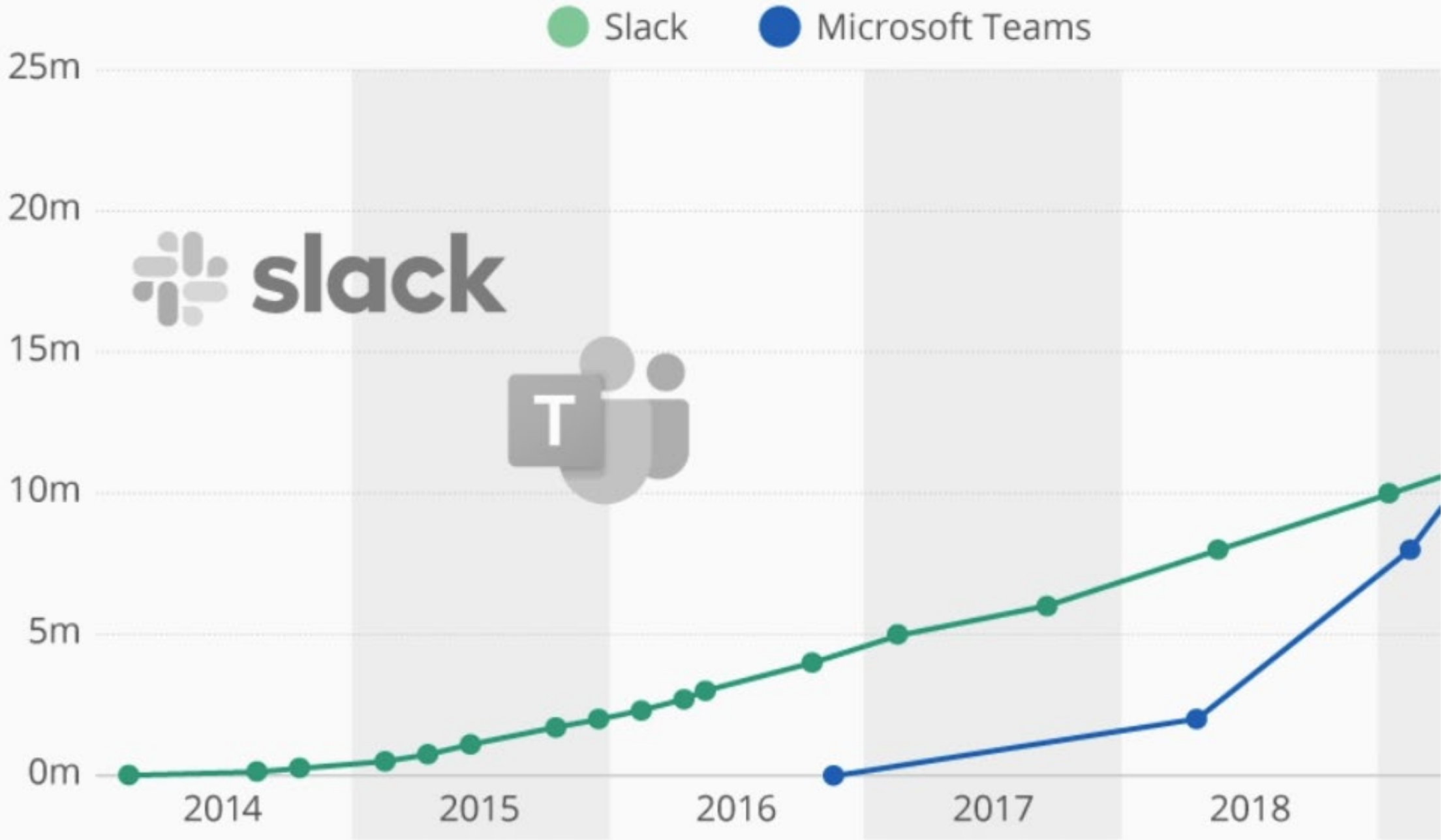
Note about moats:

If a new startup can provide your product at your cost, you don't have a moat: the things that made it difficult for you to scale also help limit competition – this means that things like institutional sales being very hard early on make success here doubly useful, for scaling your business and defensibility later on!

Note 2 about moats:

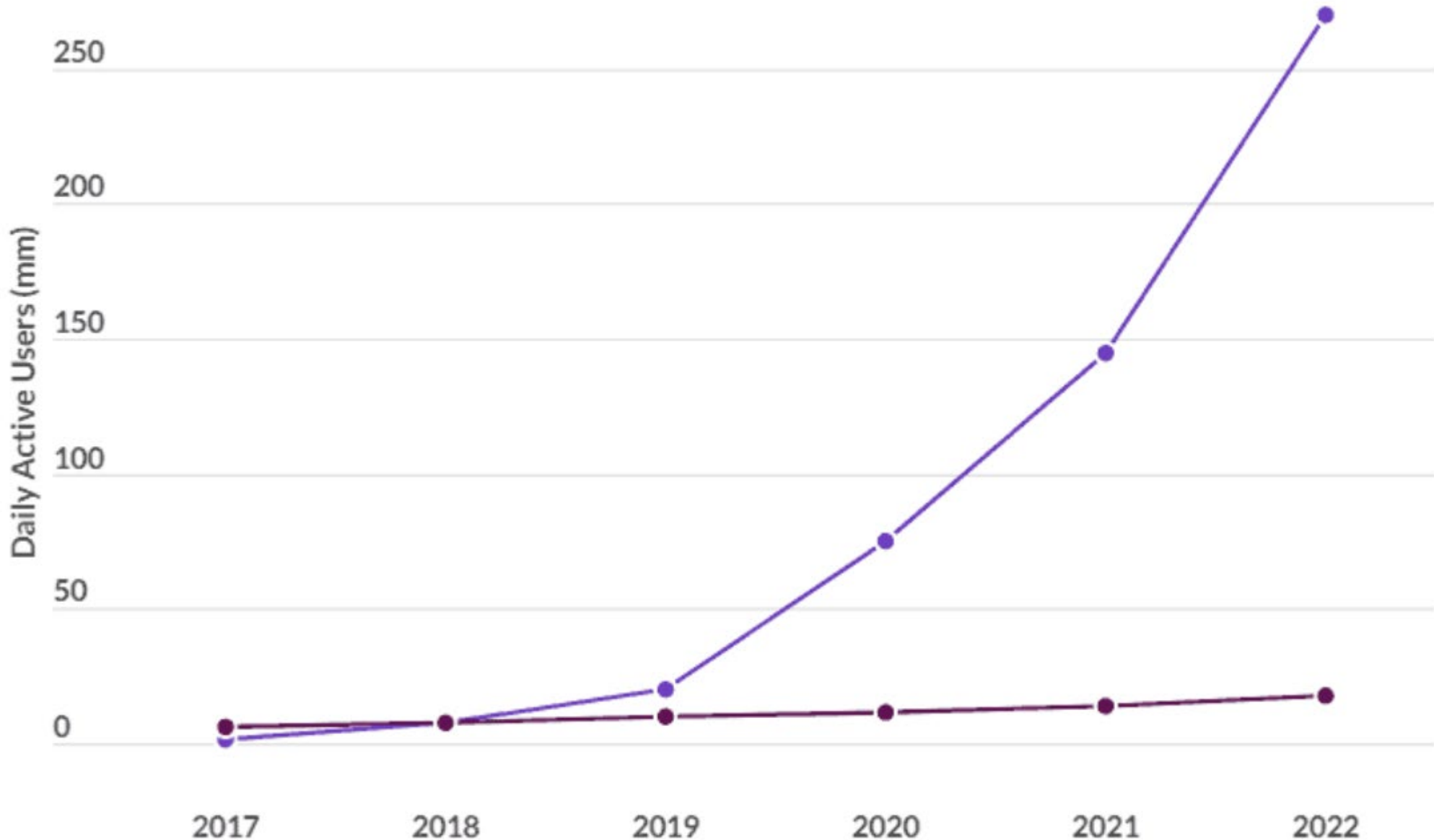
The things that protect you from competition against small firms may not work against large ones. E.g., small firms may have limited reputation, but large firms can parlay their reputation into a new market

Daily active users of Slack and Microsoft Teams worldwide*



Why did Slack have to sell itself despite so much success? The problem was they saw how quickly Microsoft Teams was able to grow in 2020 and 2021. Once Slack-type software became the kind of thing all institutions buy, sales went from being one-offs of individuals to institutional procurement. Microsoft and Salesforce have amazing skill via learning curves and economies of scope at closing these contracts, and Slack was no longer able to defend their business themselves, hence the sale.

Microsoft Teams vs Slack: Daily active users



What is the primary “moat” your venture is planning on? What do they know about whether it will work? How can we learn?

Entry Barriers
Dynamic Benefits
Customer Stickiness

Let’s think about Pilot, the trip planning service once more. What is their source of defensibility? How can you know early on?

Entry Barriers
Dynamic Benefits
Customer Stickiness

Summing Up:

1) You need a scaling strategy since your venture's costs (esp. if you account for market wage of founders) almost certainly above unit revenue, so either former must fall as you grow or latter must rise
2) You need a defensibility strategy since if you manage to scale successfully, incumbents will react and new firms will see what you're doing and enter
3) Creating hypotheses about scaling and defensibility early helps make sure that you *learn critical information* as soon as possible: spending a year and a million dollars on PMF doesn't matter if you won't be able to scale it or if there is no defensible moat!
4) There are exactly six broad ways to scale. Which are possible paths for you?
5) The best way to think about defensibility is that you want to enter such that strong incumbents have "architectural" reasons they won't be able to or won't want to react to your success, and entry barriers, dynamic effects or stickiness to help prevent future entrants from competing with you