



# Market Disruptions and Innovation

Erik Troan

## Erik Troan

- Graduated NCSU in 1995 w/ computer science degree
- First job at Red Hat (during Internet bubble)
  - Raised money, went public
- Got a master's degree in economics
- Founded rPath (during 2008 recession)
  - Raised money
- Cofounded Pendo (during current... *expansion*)
  - Raised money



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TECH INDUSTRY

# Red Hat shares triple in IPO

The initial public offering for the Linux software maker explodes a

 **Raleigh software startup Pendo lands \$50M, plans major expansion, more hiring**

 **\$50M, plans major expansion, more hiring**

 **hiring**



PENDO

TODD OLSON



## Makes me really interested in

- Why does this happen?
- How can it happen again?
- Why do these “crazy” valuations start to make sense years later?

# Creating Market Value

This valuation is nuts, right?

# Total Available Market (TAM)

- Toyota
  - Everyone in the world who needs a car
- Capital Ford
  - Everyone in Raleigh who needs a car
- Diamond's Direct
  - Everyone getting married
- Bailey's Jewelers
  - Everyone in Raleigh, who is in the top XX% of income, who is getting married

Major metric for venture capital and private equity investors.

**\$1B**



## What Limits a TAM?

- Number of people experiencing the problem
- Price point
- Geography
- Product complexity
- Product requirements
  - Computer?
  - Latest smartphone?
  - Broadband?

## Companies grow by increasing TAM

- In November, 2017 GM sold 70% more cars in China than in the US
- Netflix's TAM is largely defined by US broadband penetration
  - Which grew exponentially
- Salesforce's TAM was limited by sales team spend
  - So they expanded into customer support and marketing
- Microsoft defined a large TAM
  - "A Computer on Every Desk"

# Where Do Companies Invest to Grow?

- Infrastructure
  - Furniture
  - Computers
  - Desks
- People
  - Salaries
  - Training
- Customer Acquisition
  - Marketing
  - Sales
  - Support

$$\text{Value} = \frac{\text{TAM}}{\text{Cost}}$$

# 40 Year Technology Boom

- Technical achievements have driven down costs
  - Infrastructure
  - Customer Acquisition
- New products have driven up TAM a single company can reach
- Result is massive value creation

# Personal Computer Market


Where it all got started (1981 - 1995)

# 1981

- IBM PC Launched into a crowded market
  - That only sold to enthusiasts
- Cost \$2500 (or so)
- Price performance was 10x minicomputers of the time
- Smash hit
  - Selling 750,000 annually two years later



## TAM Was Even Bigger

The logo for Compaq, featuring the word "COMPAQ" in a bold, italicized, red sans-serif font.The classic IBM logo, consisting of the letters "IBM" in a blue, horizontally-striped, sans-serif font.The logo for Control Data, featuring a stylized black "CD" monogram above the words "CONTROL" and "DATA" in a black, sans-serif font.The logo for Dell, featuring the word "DELL" in a blue, sans-serif font with a distinctive cutout in the letter "E".The logo for Cordata ATP, featuring the word "cordata" in a bold, black, lowercase sans-serif font, with "ATP" in a smaller, black, uppercase sans-serif font below it.

By 1992 IBM was selling 10% of PCs



## How did the software market change?



TAM



Cost to  
Enter



**Borland**

And the winner is...

MICROSOFT'S LOGO (1985)



MICROSOFT

## Microsoft Dominated the new Market

- MS-DOS made a PC a PC. Everyone had to have it
- Microsoft Word
  - Released in 1983
  - Quickly became #2 player in the market
- Windows 3.0
  - Release in 1990
  - Became more important than any other PC software program
  - Pushed Excel and Word to market leadership, later Office
- By 1996 Microsoft was worth more than IBM

**Microsoft was instrumental in building a huge TAM,  
and captured most of it.**

# The Network is the Computer

Building a mass market for... everything (1995 - 2006)

# Networks were everywhere already

- Local Area Networks (LAN) were dominant in commercial settings
  - Novell
  - LANtastic
  - Microsoft (a little)
  - IBM
- Building network products meant
  - Picking one (fractured market)
  - Supporting many (high cost)
- Network applications fractured
- TCP/IP was the open networking standard
  - Embraced by academia and government
  - Ignored by everyone
  - You needed a workstation to use it

# Web Browsers made the Internet

- Built on open HTTP and HTML standards
- Publishers could publish once for multiple platforms
- A single application for users to install to access everything
- TCP/IP was an afterthought for Windows. It didn't matter.
- Microsoft embraced it all with Internet Explorer
  - All of a sudden the Internet was everywhere.



# Browser Made Huge TAMs Everywhere

- Market for goods and services became a single set of buyers
- Large market TAM for
  - Finance
  - Information
  - Books
  - Music
  - Pet food
  - Just... **everything**



YAHOO!

mp3.com

EXTRADE®



## Serving Internet Traffic was Expensive

- Server class hardware meant Unix workstations
- Entry price in high tens of thousands of dollars
  - Servers cost more than the IBM PC did!
  - Data centers had to be built and used
  - Huge VC expenditures to hardware and networking equipment



Logos/Logos.com



## Linux Grows through late 1990s

- Cooperatively developed
- Runs on Intel class machines
- Price performance is 10x proprietary workstations
- Slower sure, but just buy more of them!
  - Horizontal scaling
- Red Hat was built by replacing Solaris on connected servers



+



# Open Source Goes Everywhere



THE  
**APACHE**®  
SOFTWARE FOUNDATION

## Brought together by...

The Google logo is displayed in its characteristic multi-colored font, with the letters 'G', 'o', 'o', 'g', 'l', and 'e' in blue, red, yellow, blue, green, and red respectively.

- Leveraged open source
- Accessible to everyone on the internet. Simple and trusted.
- Provided a single market to everyone
- Ads connected consumers to providers in the market
- A tiny percentage of this global market is huge revenue

## What just happened?



TAM



Cost to  
Enter

# Who Needs Wires?

Mobile takes over 2007 -

# Remember these?



# iPhone

June 29, 2007

"Apple reinvents the phone."



Thickness  
11.6 mm

Weight  
135 g (4.8 oz)

Display  
3.5"

Storage  
4, 8, 16 GB

Camera  
2.0 MP

Memory  
128 MB



Multitouch



Proximity sensor



Ambient light sensor



Accelerometer

~300,000 sold in first weekend



## In many ways it was worse than the rest

- Used the older, slow 2G network
- Only on AT&T
- No 3rd party applications
- Poor email integrations

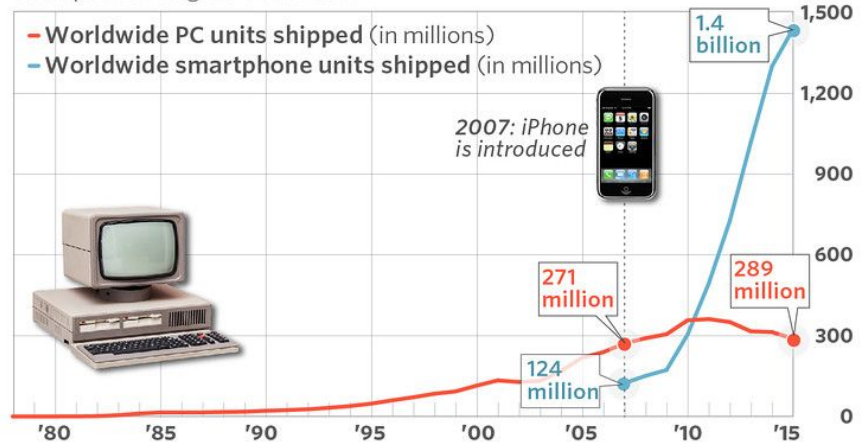
***And it changed everything***

# Multiplied the TAM of the Internet

- Mobile Internet increased market reach of the Internet
- Within 10 years the TAM addressable by smartphone was 7x larger than that addressable by computers

## How smartphones killed the PC

Smartphones outgrew PCs in 2011



Source: Gartner, IDC, Apple

# Apple Is a Mobile Company

- Mobile transitioned Apple from irrelevant to dominant
- First company to maintain \$1 Trillion market cap
- 56% of sales are iPhones
  - Not iPads
  - Not watches
- 15-20% of sales are services
  - AppStore
  - AppleCare

# Facebook Won Mobile Software Market

- Founded in 2004
- Added instagram
- 1.5 billion users. A day.
- 90% of revenue is mobile
  - Up from 30% in 2013
  - Mostly advertising for third parties
- \$450B market cap



## Plenty of Others Winning On Mobile



ROVIO



The New York Times



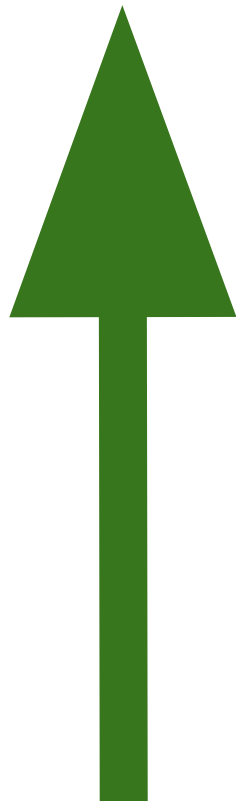
snapchat

NETFLIX

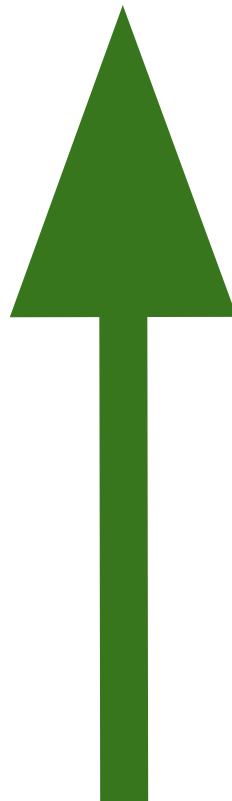


Spotify®

# Reach the Planet



TAM



# What's Next?

Moving on from 2018

# Cloud Computing

- Why build it if you can rent it?
  - Computers
  - Networking
  - Storage
  - Database
  - Machine Learning
- Powers Amazon
  - AWS provided 100% of Amazon's 2017 operating income
- Virtually all startups are built on cloud infrastructure
  - And so are companies like Netflix



Cost to  
Enter



## What about this one Erik?

- rPath founded in 2003
- Tried to catch the wave of virtualization and cloud computing
- It didn't work. Execution and timing matter
- Years later Docker is strong in the market segment rPath was trying to create



r p a t h



docker

# Pendo

- Began operations in January, 2014
- Cloud tech stack enabled a fast growing, capital efficient business
- Now serve 700 customers
- Collecting 2.5 billion web events a day
- We don't have
  - A data center
  - A server
  - A database administrator
  - A network engineer
  - A build farm
  - (Red Hat had all of these, less than 20 years earlier)
- Using Google Cloud Platform lets us focus on innovating, not building commodity infrastructure



# Internet of Things?

- Computers are
  - Tiny
  - Low power
  - Always connected
- Will everyone want one? Or ten?
- Cheap to get started
  - Arduino
  - Raspberry Pi
  - Particle



## High Speed Mobile?

- Mobile speeds will increase by 10x in the next 5 years
- Entertainment?
- Gaming?
- Social networking?

# So What?

What should I remember?

# What do disruptions look like?

- Increase total market any one company can reach
  - Size of audience
  - Ability to pay
  - Value of Product
- Decrease cost to build and provide products
  - Infrastructure
  - Development
  - Sales
- The biggest disruptors do both

$$\text{Value} = \frac{\text{TAM}}{\text{Cost}}$$

$$\text{Value} = \frac{\text{TAM} \uparrow}{\text{Cost} \downarrow}$$



$$\text{Value} = \frac{\text{TAM} \uparrow}{\text{Cost} \downarrow}$$

**Technology and Engineering Drive Both**