INTERNET TRENDS 2017 – CODE CONFERENCE

Mary Meeker
May 31, 2017

kpcb.com/InternetTrends
Internet Trends 2017

1) **Global Internet Trends** = Solid…Slowing Smartphone Growth  
   4-9

2) **Online Advertising (+ Commerce)** = Increasingly Measurable + Actionable  
   10-79

3) **Interactive Games** = Motherlode of Tech Product Innovation + Modern Learning  
   80-150

4) **Media** = Distribution Disruption @ Torrid Pace  
   151-177

5) **The Cloud** = Accelerating Change Across Enterprises  
   178-192

6) **China Internet** = Golden Age of Entertainment + Transportation  
   (Provided by Hillhouse Capital)  
   193-231

7) **India Internet** = Competition Continues to Intensify…Consumers Winning  
   232-287

8) **Healthcare** @ Digital Inflection Point  
   288-319

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   320-333

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    334-351

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    352-353
Thanks...

Kleiner Perkins Partners
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Hillhouse Capital
Especially Liang Wu…his / their contribution of the China sector of Internet Trends provides an especially thoughtful overview of the largest market of Internet users in the world…

Participants in Evolution of Internet Connectivity
From creators to consumers who keep us on our toes 24x7...and the people who directly help us prepare this presentation...

Kara & Walt
For continuing to do what you do so well...
GLOBAL INTERNET TRENDS =

SOLID USER GROWTH…
SLOWING SMARTPHONE GROWTH
Global Internet Trends =
Solid User Growth…Slowing Smartphone Growth

1) **Global Internet Users** = 3.4B…Flat Growth +10% vs. 10% Y/Y…
+8% vs. 8% Y/Y (ex. India)

2) **Global Smartphone Shipments** = Slowing +3% vs. +10% Y/Y

3) **Global Smartphone Installed Base** = Slowing +12% vs. +25% Y/Y

4) **USA Internet Usage (Engagement)** = Solid +4% Y/Y
Global Internet Users = 3.4B @ 46% Penetration…
+10% Y/Y vs. +10%...+8% Y/Y vs. +8% (Ex-India)

Source: United Nations / International Telecommunications Union, US Census Bureau. Internet user data is as of mid-year. Internet user data for:
USA from Pew Research, China from CNNIC, Iran from Islamic Republic News Agency / InternetWorldStats / KPCB estimates, India from KPCB
estimates based on IAMAI data, Indonesia from APJII.
Global Smartphone Unit Shipments = Continue to Slow... @ +3% Y/Y vs. +10% (2015) / +28% (2014)

Source: Morgan Stanley Research (5/17)
Global Smartphone Installed Base = 2.8B…
+12% Y/Y vs. +25% (2015) / +37% (2014)

Source: Morgan Stanley Research (5/17)
Note: Owing to use of different source, prior period data may have slight adjustments vs prior reports. Smartphone installed base based on preceding 8 quarters of smartphone shipments.
Internet Usage (Engagement) = Solid Growth…+4% Y/Y… Mobile >3 Hours / Day per User vs. <1 Five Years Ago, USA

![Bar chart showing time spent per adult user per day with digital media, USA, 2008 – 2016](chart.png)

Source: eMarketer 9/14 (2008-2010), eMarketer 4/15 (2011-2013), eMarketer 4/17 (2014-2016). Note: Other connected devices include OTT and game consoles. Mobile includes smartphone and tablet. Usage includes both home and work. Ages 18+; time spent with each medium includes all time spent with that medium, regardless of multitasking.
ONLINE ADVERTISING (+ COMMERCE) =
INCREASINGLY MEASURABLE + ACTIONABLE
Ad Growth = Driven by Mobile
Online Advertising = Growth Accelerating, +22% vs. +20% Y/Y...
Mobile $ > Desktop (2016) on Higher Growth, USA

Advertising $ =
Shift to Usage (Mobile) Continues

% of Time Spent in Media vs. % of Advertising Spending, USA, 2016

Source: Internet and Mobile advertising spend based on IAB and PwC data for full year 2016. Print, Radio, and TV advertising spend based on Magna Global estimates for full year 2016. Print includes newspaper and magazine. Internet (IAB) includes desktop + laptop + other connected devices. ~$16B opportunity calculated assuming Mobile (IAB) ad spend share equal its respective time spent share. Time spent share data based on eMarketer (4/17). Arrows denote Y/Y shift in percent share. Excludes out-of-home, video game, and cinema advertising.
Internet vs. TV Ad Spend ($B), Global, 1995-2017E

Source: Zenith Advertising Expenditure Forecasts (3/17)
Google + Facebook = 85% (& Rising) Share of Internet Advertising Growth, USA

Google + Facebook = 85% (& Rising) Share of Internet Advertising Growth, USA

Source: IAB / PWC Advertising Report (2016), Facebook, Morgan Stanley Research
Note: Facebook revenue includes Canada. Google USA ad revenue per Morgan Stanley estimates as company only discloses total ad revenue and total USA revenue. “Others” includes all other USA internet (mobile + desktop) advertising revenue ex-Google / Facebook.
Ad Measurability = Can Be Triple-Edged…

When Things Are Measured = People Don’t Always Like What They See… Users Don’t Always Like Data Collected
Advertisers = Like Measurable Engagement Metrics But… Some Find Measuring ROI Challenging (as with Offline)

Social Advertisers
Metrics Used to Measure Success, 6/16

- Engagement: 56%
- Conversion & Revenue: 21%
- Amplification & Brand Awareness: 15%

Social Media Marketing
Top Challenges, 6/16

- Measuring ROI: 61%
- Securing Budget & Resources: 38%
- Tying Social Campaigns to Business Goals: 34%

Source: Simply Measured State of Social Marketing Annual Report (6/16)
Note: Based on a survey of social media advertisers, n=350.
Ad Blocking = Growth Continues…Especially in Developing Markets…Users Increasingly Opt Out of Stuff They Don’t Want

Adblocking Users on Web (Mobile + Desktop), Global, 4/09 – 12/16

Adblocking Penetration (Mobile + Desktop), Selected Countries, 12/16

<table>
<thead>
<tr>
<th>Country</th>
<th>Desktop</th>
<th>Mobile</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>1%</td>
<td>13%</td>
</tr>
<tr>
<td>India</td>
<td>1%</td>
<td>28%</td>
</tr>
<tr>
<td>USA</td>
<td>18%</td>
<td>1%</td>
</tr>
<tr>
<td>Brazil</td>
<td>6%</td>
<td>1%</td>
</tr>
<tr>
<td>Japan</td>
<td>3%</td>
<td>--</td>
</tr>
<tr>
<td>Russia</td>
<td>6%</td>
<td>3%</td>
</tr>
<tr>
<td>Germany</td>
<td>28%</td>
<td>1%</td>
</tr>
<tr>
<td>Indonesia</td>
<td>8%</td>
<td>58%</td>
</tr>
<tr>
<td>UK</td>
<td>16%</td>
<td>1%</td>
</tr>
<tr>
<td>France</td>
<td>11%</td>
<td>1%</td>
</tr>
<tr>
<td>Canada</td>
<td>24%</td>
<td>--</td>
</tr>
</tbody>
</table>

Source: PageFair 2015, 2017 reports. These two data sets have not been de-duplicated. The number of desktop adblockers after 1/16 are estimates based on the observed trend in desktop adblocking and provided by PageFair. Note that mobile adblocking refers to web / browser-based adblocking and not in-app adblocking. Desktop adblocking estimates are for global monthly active users of desktop adblocking software between 4/09 – 12/16, as calculated in the PageFair’s 2015 and 2017 reports. Mobile adblocking estimates are for global monthly active users of mobile browsers that block ads by default between 9/14 – 12/16, including the number of Digicel subscribers in the Caribbean (added 10/15), as calculated in the PageFair & Priori Data 2016 and PageFair 2017 Adblocking Report.
Leading Platform Ad Offerings =

Rapidly Improving with
Back-End Data +
Front-End Measurement Tools +
Targeted Delivery of Ads
Users Increasingly Want
Leading Online Ad Platforms = Providing More Ways to Target + Measure Ads

**Facebook (Delivery Insights)**

**Google (AdWords)**

**Snap (Snap Ads)**

Source: Facebook, Google, Snap
Product Listing Ads (Google) = Driving Clicks to Product Pages

Google Product Listing Ads (PLAs)
Share of Retail Paid Clicks on Google, USA, 2014-2016

Google PLA on Mobile Web, 12/16

Source: Merkle Digital Marketing Report (Q1:14-Q1:17), Right image: Search Engine Land
Targeted Pins (Pinterest) = Driving Product Discovery + Purchase

Pinterest
Browsing Turning into Buying, 4/17

Which of these services is a great place to browse for things you might want to buy?

- Browse: 33% (4/15), 44% (4/17)

Which of these services is a great place to buy things online?

- Buy: 12% (4/15), 24% (4/17)

Source: Pinterest
Note: Based on an internal survey of global internet users, n=12K. Other answers to the questions include Facebook, Instagram, Twitter, Snap, YouTube, and Google with each respondent only allowed to choose one option.
Contextual Ads (Facebook) = Driving Direct Purchases

**Facebook Users**
26% that Click Ads Make Purchase, USA, 3/17

*In past 30 days, have you clicked an ad on Facebook?*

*In past 30 days, have you purchased a product you saw on Facebook?*

<table>
<thead>
<tr>
<th>Clicked on an Ad</th>
<th>Didn’t Click on Ad</th>
<th>Not Sure</th>
</tr>
</thead>
<tbody>
<tr>
<td>26%</td>
<td>74%</td>
<td>7%</td>
</tr>
<tr>
<td>93%</td>
<td></td>
<td>90%</td>
</tr>
<tr>
<td>10%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Survata (4/17), Messenger Image: Facebook Blog (9/16)
Note: Based on survey of USA internet users, n=1,500 (3/17).
Goal Based Bidding Ads (Snap) = Driving User Action

Snap / Gatorade Ad Campaign
Users Swipe Through Ad to Web Game, 8/16

Users Spend Average of 196 Seconds Playing Game

Source: Snap Case Study: Gatorade (8/16)
Geo-Targeted Local Ads (Google) = Driving Foot Traffic to Stores

Google Location-Tagged Ads
99% Accuracy Tracking Visits to 200MM Stores Globally, 9/16

5B Cumulative Tracked Store Visits, Up 5x Y/Y*, 5/17

* 5B (5/17) vs. 1B cumulative tracked (5/16).

Source: Google Adwords Blog (5/16, 9/16, 5/17), Image: Google Adwords Blog (9/16)
Incentive-Based + Skippable Video Ads = Driving Positive Interactions

Incentive-Based + Skippable Video Ads
More Likely to be Viewed Positively, 5/16

How would you characterize your attitude towards the following formats of online video advertising?

<table>
<thead>
<tr>
<th>Format</th>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile App Reward</td>
<td>68%</td>
<td>32%</td>
</tr>
<tr>
<td>Social Click-to-Play</td>
<td>52%</td>
<td>48%</td>
</tr>
<tr>
<td>Skippable Pre-Roll</td>
<td>51%</td>
<td>49%</td>
</tr>
<tr>
<td>Skippable Mobile Pop-up</td>
<td>46%</td>
<td>54%</td>
</tr>
<tr>
<td>In-Banner Click-to-Play</td>
<td>45%</td>
<td>55%</td>
</tr>
<tr>
<td>Social Auto-Play</td>
<td>26%</td>
<td>74%</td>
</tr>
<tr>
<td>In-Banner Auto-Play</td>
<td>21%</td>
<td>79%</td>
</tr>
<tr>
<td>Pre-Roll</td>
<td>20%</td>
<td>80%</td>
</tr>
<tr>
<td>Mobile App Pop-Up</td>
<td>19%</td>
<td>81%</td>
</tr>
</tbody>
</table>

Source: MillwardBrown AdReaction Video Creative in a Digital World (5/16)
Note: Survey of people from Argentina, Australia, Brazil, France, Germany, Mexico, UK, and USA who watched 20 ads (at least 100 per ad) and answered positive or negative, n=10.739. The survey included TV, YouTube skippable pre-roll, Facebook auto-play, Facebook click-to-play, and mobile video ad formats.
In-App Ads + Dynamic Creative (Vungle) = Driving Higher In-App Install Performance

Dynamic Tab Ad
Video + Images

Vungle Dynamic Creative Ads
Improving Conversion Rates, 5/17

Source: Vungle (5/17)

Note: “Dynamic creative” is any creative ad that changes automatically based on information about the user (behavior, location, or context). A dynamic tab ad includes multiple interactive promotional modules alongside a video ad.
In-Ride / In-Hand Recommendations (Uber + Foursquare) = Location + Route + Destination + Time of Day (+ an Offer)

Uber / Foursquare Partnership
In-App Recommendations for Nearby Businesses, 4/17

Hog Island Oyster Co.
1155 ratings · $$
Seafood · 1.1mi

"Right near the water! Get the oysters, mussels and fried anchovies. They are all super fresh and tasty"

Blue Bottle Coffee
428 ratings · $$$$  
Coffee Shop · 1.4mi

"Latte and Snickerdoodle - delicious quick snack. Clean facility, good coffee, good service and friendly staff."

Source: Uber (4/17)
Hyperlocal Targeting (Nextdoor…xAd) = From Home (Neighborhood) to Work (Commute)

Nextdoor
Neighbors Drive Word of Mouth

+8% Engagement Lift for Ring

xAD
Tracking Where / When Purchases Likely to be Made

Source: Nextdoor, xAd
Advertising Inefficiency = Increasingly Exposed by Data…

Right ‘Ad’ @ Right Place / Time
User-Typed Input (Words)...

Linked to Relevant Ad = Google AdWords (Launched 2000)

1. User performs a search by entering search terms (keywords)

On the left are the organic search results. AdWords does not affect search results. People cannot pay to get on the search results or better placement.

Source: Historyofinformation.com, Google
…Right Ad @ Right Place / Time…

Based on *User-Typed Input (Words)* = Big Business for Google

Google = $679B Market Capitalization
+30x vs. IPO

Source: Yahoo Finance
Note: Priced as of 5/26/17 market close. Google IPO’ed @ $85 / share on 8/19/04.
Right Ad @ Right Place / Time (Driven by Algorithms)…

*User-Uploaded Input (Real-Time Images)*…

Linked to Relevant Ad = SnapAds (Launched 2014)

Source: Image: Adweek (10/14)
…Right Ad @ Right Place / Time…

Based on *User-Uploaded Input (Images) = Big Business for Snap*

Snap = $25B Market Capitalization

Source: Snap Filings

Note: Priced as of 5/26/17 market close. Snap IPO’ed @ $17 / share on 3/2/17.
A lot of the future of search is going to be about pictures instead of keywords.

- Ben Silbermann, Pinterest Founder / CEO, 4/17
Ads Evolving Rapidly =

Often Organic + Data @ Core
Emerging Retailers + Crafty Big Brands =

Finding Ways to Make Collaborative Ad Creation (Social + UGC) Work for Them…
Brands + Consumers = Re-Distribution Driving Engagement…

Effective UGC can generate 6.9x higher engagement than brand generated content on Facebook, per Mavrck, 2/17

Ben & Jerry’s / UGC on Instagram, 5/17

Source: Mavrck Facebook UGC Benchmark Report (2/17), Image: benandjerrys Instagram featuring mistress_spice (4/17)
Note: Study based on 536,238 micro-influencer brand activations completed via Mavrck Platform from 1/1/16-12/13/16.
Brands + Consumers = Brands Sourcing Content from Fans…

Brands = Leveraging UGC on Instagram

% of Instagram Content Regrammed

- Qatar Airways: 70%
- Red Bull: 60%
- BMW: 60%
- Wayfair: 50%
- Sephora: 40%
- Netflix: 40%
- Starbucks: 30%
- Cathay Pacific: 30%
- Turkish Airlines: 20%
- Emirates: 20%
- Amazon Video: 10%

Source: SimplyMeasured (11/16)
Note: Data collected from each company’s Instagram page from 7/16-10/16. Posts were manually tagged for regrams based on mentions on ‘regram’ in the post or the camera emojis.
Influencers = Can Impact Followers

Source: Stance
…Emerging Retailers + Crafty Big Brands = Finding Ways to Make Images (+ Video) + Data + Algorithms + Voice Work for Them
Image-Based Platform *Front-Ends* = Tap + Augment Can Replace Typing…

‘Front-End’
User-Generated Real-Time Geolocated Images

Source: Left Image: Snap, Right Image: Instagram blog (3/17)
…Image-Based Platform *Front-Ends* = Taking Pictures Can Replace Typing…

‘*Front-End*’
Google Lens Will Provide Greater Context to Images

Source: Google I/O (5/17)
Image-Based Platform *Back-Ends* = Algorithms Infer User Context from *Images*…

‘Back-End’

Algorithms Infer Images / Project AR Objects into Scenes

Source: Images: CB Insights, Seene Patents (acquired by Snap in 6/16) and Looksery Patents (acquired by Snap in 9/15)
Image Recognition **Back-Ends** = Can Provide Contextual Relevance for Advertisers

**Snap Image Recognition**
Potential Ad Targeting Tool

**Google Visual Positioning Service**
Tracking Path to Purchase…In-Store

Source: Left Image : Snap Patent (7/16), Right Image: Google I/O (5/17)
Voice-Based Mobile Platform Front-Ends = Voice Can Replace Typing…

Google Assistant
Nearly 70% of Requests are Natural / Conversational Language, 5/17

20% of Mobile Queries Made via Voice, 5/16

Source: Google I/O (5/16), Image: Macrumors (2/17)
…Voice-Based In-Home Platform Front-Ends = Voice Can Replace Typing…

Amazon Echo Evolution, 11/14 – 5/17

Amazon Echo Device Installed Base, USA

Amazon Echo Skills
Broadening Use Cases

Echo = Shopping + Media
Echo Look = Shopping + Recommendations
Echo Show = Video + Voice Calls

Source: Image: Amazon, Consumer Intelligence Research Partners LLC, Geekwire, Technology Review, Wired, Fast Company
Voice-Based Platform Back-Ends = Voice Recognition Accuracy Continues to Improve

Google Machine Learning
Achieving Higher Word Accuracy, 2013-2017

Google Machine Learning Accuracy Over Time

- Word Accuracy Rate (%)
- 2013 to 2017
- Google: 70% to 95%
- Threshold for Human Accuracy: 95%

Source: Google (5/17)
Note: Data as of 5/17/17 and refers to recognition accuracy for English language. Word error rate is evaluated using real world search data which is extremely diverse and more error prone than typical human dialogue.
Ads = Becoming Targeted Storefronts
Ads / Content / Products / Transactions = Lines Blurring. Fast…

The Content = The Store

Facebook Feed
Browsable Storefronts

Source: Left Image: Facebook, Right Image: Stitch Fix
…Ads / Content / Products / Transactions = Lines Blurring. Fast.

The Ad = The Transaction

*Instagram Feed*
Tap to Book, 4/17

*Snap eCommerce Ad*
Swipe Up to Buy, 5/16

Source: Left Image: Instagram, Right Image: Snap
Product Quality + Customer Support + Transparency
Bars Rising =

Owing to Social Media
If you could choose two things for organizations to improve in customer service, what would they be? (Select two), 8/16

- Easier Access to Online Support Channels: 60%
- Faster Agent Response Times: 53%
- Consistent Customer Experience Across Channels: 29%
- Faster Access to Live Support: 21%

Source: Ovum Get It Right: Deliver the Omni-Channel Support Customers Want (8/16)
Note: Survey of consumers ages 18-80 in Australia, Europe, New Zealand, and USA, n=400.
...Social Media = Can Drive Accountability…

82% of Customers Stopped Doing Business with a Company After Bad Experience vs. 76% in 2014, 8/16

Source: Image: Allbirds, Ovum Get It Right: Deliver the Omni-Channel Support Customers Want (8/16)
Note: Survey based on consumers ages 18-80 in Australia, Europe, New Zealand, and USA; n=400.
…Real-Time Online Customer Conversations = Rising Rapidly…

Intercom Conversations Started, Global, 12/13-12/16

Source: Intercom
Note: Conversations include messages initiated by businesses & consumers.
Customers = Increasingly Expect to Understand How Things Work

SoFi ‘How It Works’
Most Viewed Content, After Home Page

The secret to our low rates? Efficiency.

SoFi takes a unique approach to lending, offering lower interest rates and big savings. Here's how.

We're digital.
Doing business online allows us to keep expenses down. We then pass these savings onto our members.

Source: SoFi

SoFi Member Dashboard
Send Questions Directly to CEO

Send feedback direct to the CEO
Email mikecagney@sofi.com and tell him about your experience, what we're doing well, and what we can improve.

Social Comparison
See how you compare to other SoFi members.

Compare Now
Retailers Emerging With Especially Effective Strategies…
Chewy.com = Pet Treats / Food / Supplies…
Strong User Community + Great Target Market

Engaged Community + High Customer Satisfaction

Dynamic Customer Service

Source: Chewy.com
Glossier = Skincare & Beauty Products...
Content Marketing

User Generated Content = Influencers

‘Into the Gloss’ = Content Marketing

Accelerating Active Customer Growth

Source: Glossier, Top Left Image: Instagram user genius_hotel, Bottom Left Image: Glossier
UNTUCKit = Shirts…
Online-Offline Synergies in Marketing + Merchandising

Digital-Physical Feedback Loop
Deliberate Branding + Clear Messaging @ Core

Offline Engagement
Direct Touchpoints in Physical World

In-Store Interactions
Intimacy + Active Dialogue

Online Storefront
Digital Merchandising Insights

Online Sessions
Up >2.5x Y/Y

Source: UNTUCKit
Note: Online session defined as website visit.
Allbirds = Shoes… Innovative Product + Simple Choice (Less Selection = More)

Two Comfortable, High Quality Styles

Growing eCommerce Sessions

Product Changes Based on Customer Input

- 3x adjustments to U-throat opening
- Tongue lace loop reworked
- Tongue reinforcement layer added
- Alternative insole cover material developed
- New process/material logo tabs developed
- New internal toe reinforcement added
- Tongue base – double row stitch implemented
- New vamp lining wool textile introduced
- Outsole durometer reduced
- Insole geometry modified
- Outsole redesigned

Source: Allbirds
Trendyol = Apparel...
Private Label + Local Sourcing for Local Consumers (Middle East)

Private Label + Local Sourcing
Low Prices + Short Lead Times

~1K Suppliers 50km from Trendyol HQ

Fast Replenishment (7-10 days)

Private Label @ 38% of Revenue

Other Fashion Brands

Source: Trendyol
Note: Average units per active shopper calculated over the course of shopper lifetime.
MM.LaFleur = Women’s Professional Wardrobe… Relationship-Driven Experience (Online & Offline)

### Wardrobe Survey
Algorithmic Optimization

What’s your typical weekday dress code?

- Business Formal
- Business Casual
- Casual
- Fashion-forward

### Bento Box
Curated Impressions

### Online Shopping
Ongoing Customer Engagement

### In-Store Stylist Appointments
Human Touch + Active Dialogue

### High Growth + Retention

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenue ($MM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>$5</td>
</tr>
<tr>
<td>2016</td>
<td>$30</td>
</tr>
</tbody>
</table>

- Returning Customers
- New Customers

Source: MM.LaFleur
eCommerce A-Ha’s
If It Seems Like Package / Parcel Growth is Accelerating…
It’s Because It Is, +9% Y/Y…

Parcel Volume*, USA, 2010-2016

Source: USPS, Fedex, UPS Filings
*Combines USPS’s Domestic Shipping and Package Services volumes, Fedex’s calendar year Domestic Package volumes, and UPS’s Domestic Package volumes.
…Apartment Building Lobbies Becoming Warehouses…
Doormen Becoming Foremen…

**Landlords**

Expanding Package Rooms to Accommodate Rising Online Order Delivery

Source: Image: NYTimes Photographer Tony Cenicola
Unboxing YouTube Top 5 Channels =
33MM+ Subscribers, 5/17

Source: YouTube: Ryan’s Toy Review, Fun Toys Collector Disney Toys Review, Disney Car Toys, Toys AndMe, Blu Toys Club Surprise, Images: CKN Toys
…Eating Out is…
Increasingly Eating In…

Top 10 DoorDash San Francisco Bay Area Restaurants

Delivery as % of Revenue = 7% vs. 2% (2015)
Revenue Growth = +45% Y/Y vs. 10% (2015)

Eating Out

Eating In

Source: DoorDash, Left image: Pexels, Right image: DoorDash
Instacart = Personalized Grocery Recommendations

8x More Likely to Buy
When Prompted with ‘Buy It Again’ Option

85% of In-Store Replacements...
Chosen Based on Algorithmic Recommendations

Source: Instacart
...Lowe’s Doing Augmented Reality…
Helping Consumers Find Products In-Store…

Lowe’s / Google Partnership
Guides Customers to In-Store Items via Augmented Reality on Mobiles, 3/17

Source: Google, Lowe’s
…Stitch Fix Launching Another Private-Label Clothing Brand &…
It’s Computer-Generated (1% of Products for Now)…

Product Attributes + Customer Feedback + Data Science / Testing
New Style, 5/17

Cassie Crochet Detail Top

Source: Stitch Fix, Left Image: Stitch Fix Algorithms Tour, Right Image: Stitch Fix
…Retail Store Closings May Break 20 Year Record While... Amazon Opens Retail Stores…

Retail Unit Closings, USA, 1995-2017 YTD

Amazon Looks to Expand its Physical Footprint

Source: Credit Suisse, Amazon
Note: 2017 is YTD as of 4/6/17. 2017 estimate per Credit Suisse.
I don't think retail is dead. Mediocre retail experiences are dead.

- Neil Blumenthal, Co-CEO @ Warby Parker, 1/17

Warby Parker
Schedule Eye Exams…Buy Glasses

Bonobos Guide Shops
Try On In-Store…Ship to Home

World’s Largest Offline Retailer (Wal-Mart)… Getting Aggressive Online…

**90% of Americans Live Within 10 Miles of a Wal-Mart**

Wal-Mart eCommerce Revenue Y/Y Growth, Global

Organic + Inorganic Growth

- **FQ1:18 eCommerce Revenue Growth:** @ 63% Y/Y vs. 29% FQ4:17, USA

Recent Acquisitions & Investments

- Modcloth.com, 3/17
- Moosejaw, 2/17
- JD.com (Increased to 12%), 2/17
- Shoebuy, 1/17

Acquired Jet.com, 8/16

Source: Wal-Mart

Note: Fiscal year ends January. Wal-Mart stopped disclosing global eCommerce revenue growth after FQ4:17 and began disclosing USA eCommerce revenue growth.
Amazon Becoming a Leading Private-Label Supplier of… Baby Wipes + Batteries, USA…

Amazon Basics Market Share, 8/16 USA

Source: Images: Amazon, 1010 Data
Note: Data collected from 9/15-8/16
...eCommerce Growth = +15% Y/Y… Accelerating, Again, USA…

Online Retail Sales vs. Y/Y Growth, USA 2010-2016

Source: St. Louis Federal Reserve FRED Database
…And Now We Have a New Kind of Store = A Subscription Store

Amazon Subscription Store = Central Hub for Monthly Services, 4/17

Source: Amazon
More / Faster Than Ever =

Great Products Find Customers…
Customers Find Great Products…

Process + Data Collection + Intermediaries = Changing @ Torrid Pace…
1) **Ad Growth** = Driven by Mobile

2) **Ad Measurability** = Can Be Triple-Edged

3) **Ads Evolving Rapidly** = Often Organic + Data @ Core

4) **Ads** = Becoming Targeted Storefronts

5) **eCommerce Growth** = Accelerating, Again

6) **eCommerce A-Ha’s**…
INTERACTIVE GAMES =

MOTHERLODE OF...

TECH PRODUCT INNOVATION / EVOLUTION + MODERN LEARNING

WITH THANKS TO BING GORDON FOR INSIGHT + INSPIRATION
Global Interactive Gaming = Mainstream / Evolving Rapidly / Still Early Days…

2.6B Gamers* vs. 100MM in 1995


*Unity estimates reflect the total number of users seen playing mobile games (at least once every three months) powered by both proprietary and leading 3rd party game engines. This number assumes all PC or Console gamers also play at least 1 mobile game.
Gaming Evolution = 
Individual Play → Global Collaborative Play (1967-2017)…

Moore’s Law (Processing) →

1 Player = Arcade

2 Players = Consoles

2+ Players = Consoles + LAN

Millions of Players = Online Network

Millions of Players + Spectators = eSports

Solo – Living Room…

…Many – Arena (Thousands)…

Online (Millions)

45 Years

Source: Images: National Museum of American History (Brown Box), Wikipedia Creative Commons (Pac-Man, Atari 2600, SG-1000, SNES, N64, PS1, Xbox, PS2), Flickr user Sham Hardy (World of Warcraft), Flickr user coneybeare (Words with Friends), ESL (ESL Logo), Twitch (Twitch Logo), Major League Gaming (MLG Logo), Wikimedia Creative Commons (Pong), Flickr user BagoGames (eSports Stadium)

Note: In 1967 TV Game Unit #7, also known as the “Brown Box” was launched as a prototype and is considered the father of video game consoles per the National Museum of American History.

*Zuckerberg’s Law describes the exponential growth of online social networks as per Saul Hansell in NY Times, 11/6/08.
...Gen X + Millennials = Gamified Since Birth

Source: Images: Wikimedia Creative Commons (Pong, Asteroids, Space Invaders, Pac-Man), Flickr user BagoGames (Mario Bros), Mobygames (John Madden Football), Electronic Arts (FIFA), Pokémon (Pokémon Red and Blue versions), World of Warcraft (Warcraft), Supercell (Clash of Clans), Minecraft (Minecraft Logo), Riot Games (League of Legends), King (Candy Crush Saga), Activision Blizzard (Overwatch), Pokémon Go (Pokémon Go)
Gaming = Large + Broad + Growing Business…Revenue @ $100B, +9% Y/Y

Interactive Gaming Revenue Estimates per Newzoo, Global, 2016

<table>
<thead>
<tr>
<th>Region</th>
<th>Revenue ($B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia Pacific</td>
<td>$47</td>
</tr>
<tr>
<td>North America</td>
<td>$25</td>
</tr>
<tr>
<td>Western Europe</td>
<td>$17</td>
</tr>
<tr>
<td>Latin America</td>
<td>$4</td>
</tr>
<tr>
<td>Eastern Europe</td>
<td>$3</td>
</tr>
<tr>
<td>Middle East &amp; Africa</td>
<td>$3</td>
</tr>
</tbody>
</table>

Note: Excludes console / gaming PC hardware revenue.
Gamers = All Ages…
35 Year-Old Average, USA

Gamer Demographics vs. Average Age, USA, 2003-2016

Source: Entertainment Software Association (ESA) Essential Facts About the Computer and Video Game Industry 2003-2016
Note: Based on a survey of 4,000 U.S. households.
Female Gamers = Players Since Early Days But Genres Vary…

2000 (Year) Marked Rise of Casual Female Gamer

% of Female Players by Game Genre, Global, 1/17

- **Match 3**: 69%
- **Family / Farm Sim**: 69%
- **Casual Puzzle**: 42%
- **MMOs (Fantasy)**: 36%
- **Action Adventure**: 18%
- **MMOs (Sci-Fi)**: 16%
- **First-Person Shooter**: 7%
- **Racing**: 6%
- **Sports**: 2%

Source: Quantic Foundry, Top Right Image: Popcap, Bottom Left Image: MoMA

Note: Each genre analyzed contained between 3-5 game titles. The median sample size for each game title was 1,184. And the median sample size for each genre was 4,657.
Gaming Tools = Pervasive Online…

Can Optimize Learning +
Engagement…

Foundational for Internet Services
Gaming Tools =
Can Optimize Learning + Engagement…
Foundational for Internet Services

- Repetition
- Dynamic Difficulty Adjustment
- Solving Puzzles
- Planning Workflows
- Completing Projects
- Leveling Up
- Competing
- Exploring / Discovering
- Following Rules
- Collaborating – Social Connection / Leadership
- Observing
- Interacting With / Analyzing Data
- Self Optimizing
- Creative Story Telling
Repetition = Learn from Losing…

Trial & Error
Gaming Lifecycle

Play

Respawn

Try again, with experience

Fail

Test Tactics

Source: Center quote from Len Schlesinger: “Failure doesn’t mean the game is over, it means try again with experience,” Global Leadership Summit (8/11/11). Images: Playpacmanonline.net
Dynamic Difficulty Adjustment = Ultimate Trial & Error Experience…

Engaging Learning Process
Machine-Learning Fine-Tunes Gaming Mechanics

Source: Image: Games for Learning Institute
…Solving Puzzles = Pattern Recognition + Critical Thinking…

Defined Rules + Strategy (Short-Form)
Minesweeper

Unstructured Puzzles (Long-Form)
L.A. Noire Detective Cases

Source: Left image: Game Set Watch, Right image: L.A. Noire (Rockstar Games)
…Planning Workflows = Manage Time + Resource Efficiency…

**Time Management**
Legend of Zelda: Majora’s Mask Quest
Progress Resets Periodically

**Resource Management**
Starcraft II ‘Require More Minerals’

Source: Left image: Zelda Informer, Right image: Activision Blizzard Battle.net
…Completing Projects = Track Finish Line from Start…

**Focus on End Goal**
Pokémon ‘Gotta catch ‘em all!’

**Track Experience**
Skyrim

Source: Left Images: Logos Wikia, Bulbapedia, Right Images: Skyrim, YouTube user HighlandMarker, Portforward.com, metagamebook, Stack Exchange
…Leveling Up = On-Going Progress Measurement…

Leveling Up
Candy Crush Saga

Quantified Mastery
Max Level in World of Warcraft

Gain Experience Completing Puzzles

Source: Left Images: Apptipper, King, Right Image: Blizzardwatch
Competing Against Yourself
Time Trials in Mario Kart 64

Competing Against Others
Scoring Goals Online in Rocket League

Source: Left Image: YouTube user Drew Weatherton, Right Image: GameSpot
…Exploring / Discovering = Open Closed Doors…Hack to Improvement…

Discovering Glitches
Secret Level in Super Mario Bros

Discovering Easter Eggs
Silent Hill 2 + Tony Hawk’s Pro Skater 2

Source: Left Images: Nintendo, Right Images: Digital Trends, Games Radar
A game is a system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome.

- Salen & Zimmerman, Rules of Play: Game Design Fundamentals, 9/03

Players = Free to Break Rules…

…But = Consequences

Source: Salen & Zimmerman, Rules of Play: Game Design Fundamentals, Left image: YouTube user Ross Campbell, Right image: YouTube user x Pepper
Blizzard = Millions Playing Together Online, Global
Key Multiplayer Franchises = World of Warcraft + Diablo + Starcraft + Overwatch

Source: Activision, Morgan Stanley
Note: Graph emphasizes Blizzard over Activision and King users due to the multiplayer nature of most Blizzard franchises.
…Observing = Learn From Watching Others Perform…

**Twitch Streaming**
10MM DAU, 2/17

- Live Streamed Gameplay
- Subscribe to Streamer
- Live Streamed Player Reactions
- Live Chat Interaction with Player

**Twitch Hours Streamed vs. Unique Monthly Streamers**

Source: Left image: Twitch Streamer: cherrysamora, Twitch Annual Reports 2013-2016
Interacting With / Analyzing Data = Many Games Have Strong Math Underpinnings…

**Live Stats**
Feed Into Video Games + Fantasy Sports

**Fantasy Sports**
Fans Engaged in Analytics, USA, 1988-2016

Source: FSTA, Left image: Flickr user We Are Social, U.S. Census Bureau
*Fantasy Sports Players are defined as U.S. individuals aged 18+ having played fantasy sports in the past year. Based on survey of USA individuals aged 18+, n=1,000.*
…Self-Optimizing = Driven by Math (Statistics / Metrics / Rankings)…

In-Game Player Analytics / Dashboards
Increasingly Found in Enterprise / Consumer Products / Services

Madden 2017 Player Stats

Looker Business Intelligence Dashboard

Source: Top left image: YouTube user Brian Mazique, Bottom left image: Uproxx, Right Image: Looker
…Creative Story Telling = Can Be Master of a Universe

Choosing Gameplay Experience
Mass Effect 3

Laying Building Blocks of a Virtual World
Minecraft

Choose Your Experience
Select the type of experience you would like to have. You can change these settings at any time in the Options menu.

Action
Role Playing
Story

The traditional Mass Effect experience.
Customize your character and choose dialog responses. Combat difficulty is adjustable.

Source: Left image: Gamepedia blog, Right image: Kotaku Minecraft
Gaming Tools =

Can Optimize Learning + Engagement…

Foundational for Internet Services

Reputation / Rankings
Digital Recognition
Interactive Storytelling
Interactive Learning
Upgrades + Downloadable Content
Secondary Markets
Messaging
Live Camera Angles
Graphics Computation
Reputation / Rankings = Deep Roots in Gaming…

**Early Gaming (1978)**

Space Invaders
First Arcade Game to Record High Scores

**Mainstream Internet (Now)**

Airbnb
Superhost Program Recognizes Top Performing Hosts

Source: Left image: Codexdex, Right image: Airbnb, Probnb
…Digital Recognition = Deep Roots in Gaming…

**Early Gaming (1980)**

*Activision 2600 Games*
Physical Badges for In-Game Achievements

**Mainstream Internet (Now)**

*Facebook*
Give Digital Badges to Others

Source: Left image: Atari Age, Right image: Facebook
Interactive Storytelling = Deep Roots in Gaming…

Early Gaming (1980)

Atari
First Role Playing Game

Mainstream Internet (Now)

Netflix + Amazon / Twitch
Experimenting with Interactive Shows

Source: Left image: mprd.se, Right images: Netflix, Amazon
Interactive Learning = Deep Roots in Gaming…

Early Gaming (1979)

Lemonade Stand
Teaching Economics 101

ON DAY 1, THE COST OF LEMONADE IS $.02
LEMONADE STAND 1 ASSETS $2.00
HOW MANY GLASSES OF LEMONADE DO YOU WISH TO MAKE?

LEMONSVILLE WEATHER REPORT
THUNDERSTORMS!

Mainstream Internet (Now)

Duolingo
Leveling Up in Languages

Lesson Complete! +10 XP
Heart Bonus! +3 XP

NEXT LEVEL
250 / 500 XP

TODAY
20 XP

Source: Left Image: Archive.org, Right Image: Duolingo,
Upgrades + Downloadable Content = Deep Roots in Gaming...

**Early Gaming (1993)**
- Sega
  - Downloadable Content via Cable

**Mainstream Internet (Now)**
- Tesla
  - Over-the-Air Software Updates

Source: Left image: Gamecrate, Right image: Tesla
Secondary Markets = Deep Roots in Gaming…

**Early Gaming (2001)**

**Runescape**
Secondary Markets for Items / Currency

- **Air Rune (RS3) x 50 000**
  - 5-30 minutes
  - Price: $1.75

- **Fire Rune (RS3) x 50 000**
  - 5-30 minutes
  - Price: $3.45

- **Water Rune (RS3) x 50 000**
  - 5-30 minutes
  - Price: $1.75

**Mainstream Internet (Now)**

**Apple iMessage**
3rd Parties Offer Sticker Packs

Source: Left image: RPGStash, Right image: Macstories
…Messaging = Deep Roots in Gaming…

Early Gaming

1999
OICQ

2009
Tiny Speck

2013
Hammer Chisel

Mainstream Internet (Now)

768MM DAU
12/16

5MM DAU
1/17

9MM DAU
5/17

Source: WeChat 2016 Year End Report (12/16), Ali Rayl Interview (Head of Global Customer Experience at Slack) (1/17), Venture Beat (5/17), Top left image: Pingwest, Top right images: Tencent, Middle images: SiteProNews, Bottom left image: ifeng, Bottom right image: Corsair
Live Camera Angles = Deep Roots in Gaming…

Early Gaming (1996)

Madden Football
Unique Game Perspectives

Mainstream Media (Now)

Cable TV Cameras
Unique Angles of Live Games

Source: Left image: Electronic Arts, Right image: Giants NFL
Graphics Computation = Deep Roots in Gaming

Early Gaming (1999)

NVIDIA Launches GeForce 256 GPU

Mainstream Internet (Now)

Many Companies
GPUs Used for Artificial Intelligence

Source: Left Images: NVIDIA, VGA Museum, Right images: Google DeepMind, Amazon, IBM
In Era of Perceived Disengagement = ‘Engagement’ Rising…
Video Gaming = Most Engaging Form of Social Media

Daily Minutes Spent per User Across Select Digital Media Platforms

Source: Global Web Index (9/16), Facebook Q1:16 Earnings Call (4/16) & Q3:14 Earnings Call (10/14), Activision Q1:17 Earnings Call (5/17), Snapchat Q1:17 Earnings Call (5/17)

Note: Video Gaming (Consoles): Global survey, n=17,990, of console users aged 16-64 asking "Roughly how many hours do you spend playing on game consoles during a typical day."
Includes Xbox One, Nintendo Wii U, PS4, Xbox 360, PS3, Nintendo Wii.

King: Average time spent per DAU. King used to illustrate mobile gaming time spent given the global nature of the platform and large base of daily active users (peaked at 158MM as of Q1:15, 128MM in Q4:15 was last disclosure).

Snapchat: Average of the 25-30 minutes of daily usage found in the S-1 filing.
Mobile Daily Gaming Session Duration = +33% (3/17 vs. 7/15), Global, per Unity Games

Source: Unity
When I play a video game, it’s the only time I put away the phone and forget it exists.

Video games command your attention in a way that nothing else can or will.

- Gary Whitta, Screenwriter, Rogue One: A Star Wars Story, 5/17

Source: GamesBeat Summit 2017: How games, sci-fi, and tech create real-world magic (5/12/17)
Perhaps Interactive Gaming Evolution / Growth / Usage…

Has Been Helping Prepare Society for Ongoing Rise of Human-Computer Interaction?
Gaming Tools =

Improving Human Performance...

Virtual + Augmented Reality / Simulations / Real-Time Analytics
Immersive Gaming Tools = Improving Athlete Performance
Video + Virtual Reality = Mental Reps Can Improve Performance

STRIVR Labs + Stanford Football
Utilize Video + Virtual Reality to Repeatedly Run Plays / Scenarios

Source: STRIVR Labs, Inc.
Video + Machine Learning = Visuals + Deep Analytics Can Improve Performance

**Second Spectrum**
150K+ Tracked Events per Game,* 5/17

**Video Analytics of Key Plays**

**Teams vs. Video Sessions per Team**

Source: Second Spectrum

*Events are data surrounding key in-game actions such as pick-and-roll defenses, off-ball screens, shot probability or rebound probability. This allows players to query specific tactical actions during a game to gain better insight into how individuals / the team played.
Audio + Guided Meditation = Mental Focus Can Improve Performance

Headspace
Run Streak Reinforce Habits

CJ McCollum, NBA Shooting Guard
Uses Headspace to Maintain Focus, 6/16

There’s a lot of stress in my job…and a 10 minute Headspace meditation helps you take care of all of those things and more.

- CJ McCollum, 4/17

Source: Headspace
Physically Interactive Media (PIM) = Real-Time Activity / Analytics Can Boost Intensity / Focus for Athletes

Peloton

2 Workouts per Week per Subscriber

100K+ Bike Subscribers (95% Retention After 1 Year)...400K+ Home Riders

1MM+ Home Workouts Streamed in 3/17

Source: Peloton
I could go ten hours at a stretch [playing soccer video games] and I’d often spot solutions in the games that I parlayed into real life.


Players + Coaches View Digital Stats as Important Performance Measure

Video Game Player Stats
Real-Time Feedback Offline, 9/16

Hoffenheim Scout Discovers Roberto Firmino...
Using Football Manager Video Game, 11/16

Source: Left Image: Twitter user Michy Batshuay, Right Image: Hardware Zone
### Madden Football Super Bowl Predictions vs. Actual Results, 2004-2017

<table>
<thead>
<tr>
<th>Game</th>
<th>Year</th>
<th>Teams</th>
<th>Madden Winner</th>
<th>Madden Score</th>
<th>Actual Winner</th>
<th>Actual Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Super Bowl LI</td>
<td>2017</td>
<td>Patriots vs. Falcons</td>
<td>Patriots</td>
<td>27-24</td>
<td>Patriots</td>
<td>34-28</td>
</tr>
<tr>
<td>Super Bowl L</td>
<td>2016</td>
<td>Broncos vs. Panthers</td>
<td>Panthers</td>
<td>24-20</td>
<td>Broncos</td>
<td>24-10</td>
</tr>
<tr>
<td>Super Bowl XLVIII</td>
<td>2014</td>
<td>Broncos vs. Seahawks</td>
<td>Broncos</td>
<td>31-28</td>
<td>Seahawks</td>
<td>43-8</td>
</tr>
<tr>
<td>Super Bowl XLVII</td>
<td>2013</td>
<td>49ers vs. Ravens</td>
<td>Ravens</td>
<td>27-24</td>
<td>Ravens</td>
<td>34-31</td>
</tr>
<tr>
<td>Super Bowl XLV</td>
<td>2011</td>
<td>Steelers vs. Packers</td>
<td>Steelers</td>
<td>24-20</td>
<td>Packers</td>
<td>31-17</td>
</tr>
<tr>
<td>Super Bowl XLIV</td>
<td>2010</td>
<td>Saints vs. Colts</td>
<td>Saints</td>
<td>35-31</td>
<td>Saints</td>
<td>31-17</td>
</tr>
<tr>
<td>Super Bowl XLIII</td>
<td>2009</td>
<td>Steelers vs. Cardinals</td>
<td>Steelers</td>
<td>28-24</td>
<td>Steelers</td>
<td>27-23</td>
</tr>
<tr>
<td>Super Bowl XLII</td>
<td>2008</td>
<td>Patriots vs. Giants</td>
<td>Patriots</td>
<td>38-30</td>
<td>Giants</td>
<td>17-14</td>
</tr>
<tr>
<td>Super Bowl XLI</td>
<td>2007</td>
<td>Colts vs. Bears</td>
<td>Colts</td>
<td>38-27</td>
<td>Colts</td>
<td>29-17</td>
</tr>
<tr>
<td>Super Bowl XL</td>
<td>2006</td>
<td>Steelers vs. Seahawks</td>
<td>Steelers</td>
<td>24-19</td>
<td>Steelers</td>
<td>21-10</td>
</tr>
<tr>
<td>Super Bowl XXIX</td>
<td>2005</td>
<td>Patriots vs. Eagles</td>
<td>Patriots</td>
<td>47-31</td>
<td>Patriots</td>
<td>24-21</td>
</tr>
<tr>
<td>Super Bowl XXXVIII</td>
<td>2004</td>
<td>Patriots vs. Panthers</td>
<td>Patriots</td>
<td>23-20</td>
<td>Patriots</td>
<td>32-29</td>
</tr>
</tbody>
</table>

Source: Electronic Arts, ESPN, USA Today, Forbes
…Immersive Gaming Tools =

Improving Performance Across Disciplines
Gamification = Influencing Multiple Consumer Services…

**Education**  
Duolingo

**Personal Health**  
Mango Health

**Personal Finance**  
Acorns

**Energy Conservation**  
Nest

**Food**  
Starbucks

**Exercise**  
myfitnesspal

**Dating**  
Bumble

**Advertising**  
Snapchat

Source: Top Row Images: Duolingo, Mango, Acorns, Nest, Bottom Row: iPhone in Canada (Starbucks), Consumer fitness news (myfitnesspal), 5why.com (Bumble), Snapchat
Gamification = Influencing Multiple Businesses...

**Healthcare Research**
- Foldit

**Military Training**
- Boeing

**Work Productivity**
- Betterworks

**Pilot Training**
- Simulated Surgery

**Healthcare Training**
- PTSD Therapy

Gamification = Influencing Complex Virtual Worlds + Real-World Simulations

Improbable in Gaming
Simulate Vast Virtual Worlds

Improbable in Real World
Simulate Cities + Power / Web Networks

Source: Worlds Adrift: Bossa Studios, Improbable
As Rapid Data Growth Continues =

Gaming Tools / Interfaces / Processors Will Continue to Organize + Drive Usefulness
Data Volume Growth Continues @ Rapid Clip…
% Structured / Tagged (~10%) Rising Fast…

Information Created Worldwide =
Expected to Continue Accelerating

Source: IDC DataAge 2025 Study, sponsored by Seagate (3/17)
Note: 1 petabyte = 1MM gigabytes, 1 zeta byte = 1MM petabytes
GPU Processing Power Ramp Continues

NVIDIA Transistors, 1998-2016

- 2002 = 5 GFLOPS
  Battlefield 1942
- 2007 = 350 GFLOPS
  Unreal Tournament 3
- 2016 = 10K GFLOPS
  Paragon

Source: NVIDIA
Note: 1 GFLOP = 1B FLOPS, or “floating point operations per second.”
Gaming Platforms =

Evolving @ High Speed
New Gaming Development Tools / Platforms = Evolving to Continue to Build Virtual Worlds…

<table>
<thead>
<tr>
<th>Developers</th>
<th>Development Platforms</th>
<th>Players</th>
</tr>
</thead>
<tbody>
<tr>
<td>Build Virtual Worlds / Share Ideas</td>
<td>unity, Unreal Engine</td>
<td>Explore Virtual Worlds</td>
</tr>
<tr>
<td>Construct Virtual Worlds with New Dimensions</td>
<td>VR / AR Platforms</td>
<td>Have Virtual Experiences</td>
</tr>
<tr>
<td>Build / Share Creations</td>
<td>In-Game Sandboxes</td>
<td>Build / Share / Explore Creations</td>
</tr>
<tr>
<td>Distribute Content</td>
<td>Gaming Marketplaces</td>
<td>Discover / Buy / Share Content</td>
</tr>
</tbody>
</table>

Source: Unreal, Unity, HTC Vive, Oculus (Facebook) Microsoft, Minecraft, Roblox, Tencent, Steam (Valve), Sony
New Gaming Development Tools / Platforms = Supporting Rapid Growth

Unity = Registered Developers

Roblox = Monthly Active Users

Steam = Peak Concurrent Users*

Source: Unity, Roblox, Steam (Valve), Forbes, Venturebeat, Bloomberg

*Taken on the last available day of each month using waybackmachine.org.
eSports =

Expanding Gaming Ecosystem via Fans / Spectators
eSports = 45 Year Evolution to Global Stage

1972
Stanford University AI Lab = First Ever Gaming Tournament (Spacewars)

1980
Atari Space Invader Competition = Early National Gaming Tournament

1997
Red Annihilation Quake Tournament = Early eSports Competition

2000
Electronic Sports League + Korea eSports Assn. = Emerge as First eSports Leagues

2006
Justin.tv Founded = Precursor to Twitch.tv

2009
League of Legends Released = Becomes One of Most Played Strategy Games (100MM MAU, 9/16)

2012
OnGameNet Begins Broadcasting League of Legends = First Major Korean Tournament on TV

2016
League of Legends 2016 World Championship = 43MM viewers

eSports = People Watch What They Play…

League of Legends Expands from Home to Staples Center, LA
(Worlds 2016 Finals = ~20K in Stadium + 43MM Online)

Source: Top left image: Mel Melcon Los Angeles Times, Bottom left image: Dexerto, Top right image: Red Bull, Bottom right image: YouTube
...eSports Trending vs. Traditional Sports = Very Strong with Younger Generations

**Millennials** = 27% ‘Significant Preference’ for eSports vs. 27% for Traditional Sports

**Non-Millennials** = 45% for Traditional Sports vs. 13% for eSports

Which do you prefer, your favorite traditional sport or favorite eSport?

eSports Monthly Viewers @ 161MM…
+40% Y/Y & Accelerating

**eSports Monthly Viewers, Global, 2012-2016**

- **2012**: 58MM +28%
- **2013**: 74MM +22%
- **2014**: 90MM +28%
- **2015**: 115MM +40%
- **2016**: 161MM

Y/Y Growth (%)

*Source: Newzoo Global eSports Market Report (2/17), Newzoo press release (1/16), Newzoo Casual Connect Europe Presentation (2/15)*

*eSports Enthusiasts watch eSports once a month and/or participate in tournaments.*
eSports League of Legends Championship Viewers @ 43MM…
+19% Y/Y

League of Legends World Championship Global Viewership
Largest eSports Viewer Base

Total Unique Viewers vs. Peak Concurrent Viewers

Source: Engadget, Polygon, The Verge, eSports Marketing, LoLeSports
eSports Monthly Viewers = 79% <35 Years Old...29% Female

eSports (Like Sports) = Money Follows Viewers + Winners… Fan In-Game Purchases Boost Prize Pools

Prize Pool for The International (DOTA 2), 2011-2017

<table>
<thead>
<tr>
<th>Year</th>
<th>Prize Pool ($MM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>$1.6</td>
</tr>
<tr>
<td>2012</td>
<td>$1.6</td>
</tr>
<tr>
<td>2013</td>
<td>$2.9</td>
</tr>
<tr>
<td>2014</td>
<td>$10.9</td>
</tr>
<tr>
<td>2015</td>
<td>$18.4</td>
</tr>
<tr>
<td>2016</td>
<td>$20.8</td>
</tr>
<tr>
<td>2017 YTD</td>
<td>$10.7</td>
</tr>
</tbody>
</table>

Source: ESPN, eSports Earnings, DOTA 2 (5/24/17)

Note: * The International Compendium represents 25% of in-game purchases during a promotional period leading up to the event. Players can buy virtual items, levels, and other in-game content. As the total prize pool reaches different milestones all players who participated gain access to more exclusive content. 2017 YTD as of 5/25/17.
Partnerships + Investments = Helping Bring eSports into Mainstream

German Soccer Club, FC Schalke 04 = Acquires eSports Team, Elements, 5/16

Philadelphia 76ers = Acquire eSports Teams, Dignitas & Apex, 9/16

Riot Games + BAMTech = $300MM 6yr LoL Streaming Rights, 12/16

Miami Heat = Invests in eSports Team, Misfits, 1/17

Expanding Connections with Sports / Media Platforms

Italian Soccer Club AS Roma = Partners with eSports Team, Fnatic, 2/17

NBA + Up with Take Two = 2K eSports League, 2/17

Facebook = Expands eSports Relationships with ESL Streaming Deal, 5/17

Source: ESPN, Engadget, Yahoo Sports, Live Production, Dot eSports, Forbes
Gaming Experience =>

Technology
Leadership + Innovation?
If you want to see what business leadership may look like in three to five years, look at what’s happening in online games.

- Byron Reeves, Professor of Communication, Stanford University, 6/07
…~Ten Years Later =
Entrepreneurs Often Fans of Gaming Experience

I like video games. In fact, that’s what got me into software engineering when I was a kid. I wanted to make money so I could buy a better computer so I could play better video games.

- Elon Musk, CEO Tesla & SpaceX, 10/16

As a child I played a lot of Avalon Hill board games. And each board game is actually a complex set of rules and circumstances… So it was actually in fact my childhood gaming — for being able to build a model of what a game was — that was essentially the fundamental thing that informs my strategic sense.

- Reid Hoffman, Co-Founder of LinkedIn, 8/15

I do think this dynamic around kids growing up, building games, and playing games, is an important one because I think this is how a lot of kids get into programming. I definitely wouldn't have gotten into programming if I hadn't played games.

- Mark Zuckerberg, CEO Facebook, 5/15

Source: Elon Musk: Forbes Interview (10/1/16), Reid Hoffman: Interview on the Tim Ferris Show (8/31/15), Mark Zuckerberg: Facebook Q&A Session (5/14/15)
Perhaps Interactive Gaming Evolution / Growth / Usage With Related Data Collection / Analytics / Real-Time Simulations + Engagement…

Has Been Helping Prepare Society for On-Going Rise of Human-Computer Interaction?
Interactive Games = Motherlode of…
Tech Product Innovation + Modern Learning

1) **Global Gaming** = Mainstream / Evolving Rapidly / Still Early Days

2) **Gaming Tools** = Pervasive Online

3) **Gaming Tools** = Improving Human Performance

4) **Gaming Platforms** = Evolving @ High Speed

5) **eSports** = Expanding Gaming Ecosystem via Fans / Spectators

6) **Gaming Experience** => Technology Leadership + Innovation?
MEDIA = DISTRIBUTION DISRUPTION @ TORRID PACE
Digital Leaders =

Transforming Media With
Better User Experiences +
Lower Prices...Data + Scale
Music = Why Streaming?  
Access / Choice / Discovery / Personalization / Mobile / Fewer Ads

**Reasons for Paying for Music Streaming, 12/15**

- Free Trial Convert: 42%
- Get Rid of Ads: 29%
- Mobile Access: 27%
- Listening Choice: 24%
- Recs from Friends / Family: 22%
- Bundled: 21%
- Offline Listening: 19%
- Viewed Ad: 9%

**Importance of Streaming Product Features, 12/15**

- Size of Catalog
- New Music Discovery
- Multi-Device Listening
- Support Artists
- Keep Up with Hits
- Curation / Recs
- Simultaneous Music Videos
- Build Playlists
- Share Playlists

Source: Goldman Sachs Research, BPI
Note: BPI Survey as of 12/15, n=1,000 (UK only). Questions: “Why did you decide to pay for a music streaming subscription?” and “Thinking about music streaming, to you, how important are the following?”
Video = Why Cord-Cutting?
Lower Price + Convenience

Reasons for Cutting Pay-TV Service, Q4:16

- Too Expensive: 80%
- Use an Internet Streaming Service: 48%
- Use Antenna to Get Basic Channels: 27%
- Like to Binge Entire Seasons via Streaming: 19%
- Dropped Cable Upon Moving / Relocating: 13%
- Bulk of Viewing is Streaming Service Original Content: 11%

Source: TiVo Q4 2016 Video Trends Report
Note: Survey includes 18+ year olds in USA and Canada, n=3,079. Other categories omitted include "Not My Choice," "Share SVOD Login," "Moved In With New Roommate," "Other."
Digital Evolution of Music + Video =

Ramping Rapidly…
Recorded Music Revenues by Format ($B), USA, 1973-2016

Source: Recording Industry Association of America
Note: “Subscription and Streaming” includes paid subscriptions (full and limited tier), SoundExchange, ad-supported streaming and other digital.
“Download & Synchronization” includes download single / album, kiosk, download music video, ringtone / ringback, and synchronization.
“Physical” includes LP / EP, vinyl single, 8-track, cassette (full / single), CD / CD single, music video, DVD audio and SACD.
Spotify = Catalyst for Internet-Driven Evolution of Music Industry…
0 → 50MM Paid Subscribers / 126MM MAUs in <9 Years…

Spotify Subscribers (MM) & Revenue (€MM), 2008 – 2016*, Global
Q4:16 Monthly ARPU = €5.80 ($6.10)

Source: Spotify
* Subscribers as of 3/2017, when Spotify announced they had reached the 50 million subscriber mark.
Spotify = 20% of Global Music Industry Revenue vs. 0% in 2008

Spotify Subscribers (MM), 2008 – 2016*, Global
Q4:16 Monthly ARPU = €5.80 ($6.10)

Spotify Paid Subscribers (MM)

Share of Global Music Revenue (%)

Source: Spotify, IFPI 2017 Global Music Report
* Subscribers as of 3/2017, when Spotify announced they had reached the 50 million subscriber mark.
Spotify = Users Listen to 41 Artists per Week, +40% (vs. 1/14) Owing to… Recommendation Engine (Data + Algorithms)
Network TV* Minutes Delivered = 2011 Top 5 Networks -10% Average… Netflix +669% Over 5 Years, USA…

<table>
<thead>
<tr>
<th>Network Group</th>
<th>2010-2011 (through Feb)</th>
<th>2015-2016 (through Feb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NBC Universal</td>
<td>300</td>
<td>269</td>
</tr>
<tr>
<td>Disney</td>
<td>230</td>
<td>210</td>
</tr>
<tr>
<td>21st Century Fox</td>
<td>180</td>
<td>200</td>
</tr>
<tr>
<td>Netflix</td>
<td>669%</td>
<td>669%</td>
</tr>
<tr>
<td>CBS</td>
<td>21%</td>
<td>21%</td>
</tr>
<tr>
<td>Time Warner</td>
<td>35%</td>
<td>33%</td>
</tr>
<tr>
<td>Viacom</td>
<td>16%</td>
<td>30%</td>
</tr>
<tr>
<td>Discovery</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>A&amp;E</td>
<td>4%</td>
<td>2%</td>
</tr>
<tr>
<td>ESPN</td>
<td>1%</td>
<td>1%</td>
</tr>
</tbody>
</table>

Note: Inclusive of Broadcast + Basic Cable + Premium Cable, C7 Live + VOD + DVR. Does not account for multiple viewers (i.e. unique minutes delivered) or TV everywhere (though note that even if every TV Everywhere stream started in 12/15 was completed and 1 hour long, consumption would have increased national TV time by only 1.9%).
Netflix = Catalyst for Internet-Driven Evolution of Video Industry…
95MM Streaming Subscribers in 10 Years…

Netflix Subscribers (MM) & Quarterly Revenue ($MM), 2/99 – 3/17, Global
Q1:17 Streaming ARPU per Month = $9.14

Source: Netflix
Note: Netflix subscription DVD service launched 9/1998. Data before Q3 2001 represents all subscribers because paid subscribers not broken out. Netflix split streaming subs from DVD subs in Q3 2011; graph shows only streaming subs thereafter. ARPU shown ex-DVD.
…Netflix Streaming = From 0% to >30% of Home Entertainment Revenue in 10 Years, USA

Netflix Subscribers, 2009 – 2017*, Global
Q1:17 Streaming ARPU per Month = $9.14

Source: Netflix
Note: Share represented by Netflix domestic streaming revenue over total home entertainment revenue in USA. Domestic streaming not broken out as individual segment until 2012. Netflix split streaming subs from DVD subs in Q3 2011; graph shows only streaming subs thereafter.
* Q1:17 represents Netflix annualized domestic streaming revenue figure. ARPU shown ex-DVD
Google Pioneered Search / Find / Obtain (SFO) for Content + Products...

Netflix + Spotify Pioneered Search / Find / Serve Up (SFS) for Media


From Give to Get...With Data + Algorithms

98MM Different Netflixes...

$1B cost savings / year from recommendations (12/15)

126MM Different Spotifys...

~5B Discover Weekly streams in <1 year post-launch (5/16)


Note: Netflix estimated cost savings due to improved engagement and reduction of monthly churn, driving lower need for subscriber acquisition cost in the future.
Digital Evolution of Music + Video = Multiple Approaches…
Facebook / Instagram / Snap = Mobile Video Traffic Share Gainers Over 4 Years…

Share of Downstream Video Traffic (%), North America, 2H 2016

Source: Sandvine Global Internet Phenomena Report (2H 2012 and 2016)
Netflix / YouTube = Fixed-Access Video Traffic Share Leaders

Share of Downstream Video Traffic (%), North America, 2H 2016

Source: Sandvine Global Internet Phenomena Report (2H 2012 and 2016)
Facebook (Facebook / WhatsApp / Messenger / Instagram) = Video Ramping Across Platform

Facebook Platform MAUs, Global, Months Since Launch

- Instagram
- Facebook
- WhatsApp
- Facebook Messenger

Source: Facebook, Instagram, Whatsapp, Financial Times, TechCrunch
Snap = Ramping Original Short-Form Content

Snap ‘Original Shows’

Phone Swap
10MM+ Views for 1st Episode, 5/17

Source: Snap

Second Chance
8MM+ Views for 1st Episode, 5/17

Source: Snap
Generational Media Usage =

Chasm Increasing...

Shifts to Internet-Enabled Media Continue
Mobile Device Time per Day = +2x Over 2 Years…

Daily Time Spent by Media (Not De-Duped), USA, Q4:14-Q4:16

- **Q4:14**
  - Analog: 7:06
  - Digital: 2:17

- **Q4:15**
  - Analog: 7:12
  - Digital: 2:44

- **Q4:16**
  - Analog: 7:16
  - Digital: 4:14

Source: Nielsen Total Audience Report Q4:16
Note: “Analog” includes Live / DVR / Time-shifted TV, AM / FM radio, DVD / Blu-ray, and game consoles. “Digital” includes Multimedia devices (viewing on Apple TV, Roku, Chromecast, smartphone, computer etc. connected to TV), internet on PC, video on PC, app / web on smartphone / tablet, and video on smartphone.
…Mobile Device Time per Day =
18-24 Year-Olds @ 49% Digital…65+ Year-Olds @ 13%, USA

Daily Time Spent by Media & Age Bracket (Not De-Duped), USA, Q4:16

- **18-24**: 4:35 Analog, 4:27 Digital
- **25-34**: 5:42 Analog, 4:42 Digital
- **35-49**: 7:17 Analog, 5:19 Digital
- **50-64**: 9:09 Analog, 4:41 Digital
- **65+**: 9:49 Analog, 1:30 Digital

Source: Nielsen Total Audience Report Q4:16
Note: “Analog” includes Live / DVR / Time-shifted TV, AM / FM radio, DVD / Blu-ray, and game consoles. “Digital” includes Multimedia devices (viewing on Apple TV, Roku, Chromecast, smartphone, computer etc. connected to TV), internet on PC, video on PC, app / web on smartphone, and video on smartphone.
Traditional Cable Conundrum =

Channels + Consumer Prices + Programming Costs Rising...

Subscribers Falling
Pay TV Household Growth = -1.3% Average for Last 12 Quarters…
While Programming Costs >2x+ since 2006…

Source: Nielsen Total Audience / Cross Platform Reports, US Census Bureau, St. Louis Federal Reserve FRED Database
Note: Pay TV households represented by Nielsen “Cable Plus” metric, which includes households who receive television via Wired Cable (No Telco), Telco, or Satellite. “Programming Costs” includes total program and production costs for Cable and Other Subscription Programming firms, 2006-2015, as per US Census Services Annual Survey for Employer Firms ($25B in 2015, up from $12B in 2006).
…# TV Channels Watched <10% of Channels Received…
Pay TV ARPU 10-15x > Netflix…

Source: Nielsen, Matthew Ball & Tal Shachar; REDEF Original 3/9/16, DirecTV, AT&T, Charter, Dish Network, Comcast
Note: TV channel data as of mid-year. DirecTV ARPU calculated by dividing the 2016 Video Entertainment revenue by the average number of Linear Video Connections during 2016. Charter ARPU calculated by dividing 2016 Video revenue by average Video Residential Primary Service Units during 2016. Dish Network ARPU calculated by multiplying the 2016 Pay-TV Average Monthly Revenue per Subscriber by 12. Comcast ARPU calculated by dividing the 2016 Residential Video revenue by the average Video Customers in 2016. Netflix ARPU is based off the Global Streaming revenue and average subscribers in 2016. All estimates are global.
Digital Subscriptions =

Rising Owing to Massive User Experience Improvements…

On-Demand / A La Carte Selection + Choice / Personalization / Payment Systems / 2-Way UGC / Mobile…

**Network Era**
1950s-1980s
Cater to All / High Viewership / No Personalization

**Cable Era**
1980s-2010s
Broad Genres / Focus on Programming / Limited Bundle Choices

**Digital Era**
Current
Cater to Sub-Genres / Power Users / A La Carte + Subscription

---

Digital Distributors
- Crunchyroll
- Shudder
- Fandor
- Seeso
- Cheddar
- Fullscreen

Digital Studios
- YouTube Red
- Cheddar
- Fullscreen

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1) **Digital Leaders** = Transforming Media With Better User Experiences + Lower Prices...Data + Scale

2) **Generational Media Usage** = Chasm Increasing as Shifts to Internet-Enabled Media Continue

3) **Traditional Cable Conundrum** = Channels + Consumer Prices + Programming Cost Rising...Subscribers Falling

4) **Digital Subscriptions** = Rising Owing to Massive User Experience Improvements (On-Demand / Selection + Choice / Personalization / Payment Systems / 2-Way UGC / Mobile...)
THE CLOUD =

ACCELERATING CHANGE ACROSS ENTERPRISES

ALEX KURLAND @ KLEINER PERKINS
1) **Cloud Adoption** = Reaching New Heights + Creating New Opportunities

2) **Enterprise Software** = Customer Expectations → Mirroring Those of Consumer Apps

3) **Security** = More Applications → More Vulnerabilities
Cloud Adoption =

Reaching New Heights +

Creating New Opportunities
Public + Private Clouds = Approaching Traditional Data Center Spend…
+37% to $36B vs. 2014

IT Infrastructure Spend, Global, 2014-2016

% of Total IT Infrastructure Spend

- Traditional Data Center
- Public Cloud
- Private Cloud

Source: IDC Worldwide Quarterly Cloud IT Infrastructure Tracker; Gartner; CloudHealth estimates
Public Cloud Adoption Trends = AWS Maintains Lead…Azure + Google Rising

Public Cloud Adoption, 2016 vs. 2017
% of Respondents Running Applications

<table>
<thead>
<tr>
<th></th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWS</td>
<td>57%</td>
<td>57%</td>
</tr>
<tr>
<td>Azure</td>
<td>20%</td>
<td>34%</td>
</tr>
<tr>
<td>Google Cloud</td>
<td>10%</td>
<td>15%</td>
</tr>
<tr>
<td>IBM</td>
<td>7%</td>
<td>8%</td>
</tr>
</tbody>
</table>

Source: Rightscale 2017 State of the Cloud Report
Note: Based on survey of IT Professionals, n=1,002.

Public Cloud Adoption, 2017
% of Respondents Running, Experimenting, or Planning to Use Applications

<table>
<thead>
<tr>
<th></th>
<th>Running Apps</th>
<th>Experimenting</th>
<th>Planning to Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWS</td>
<td>34%</td>
<td></td>
<td>17%</td>
</tr>
<tr>
<td>Azure</td>
<td></td>
<td>21%</td>
<td>10%</td>
</tr>
<tr>
<td>Google Cloud</td>
<td></td>
<td>12%</td>
<td>15%</td>
</tr>
<tr>
<td>IBM</td>
<td></td>
<td></td>
<td>8%</td>
</tr>
</tbody>
</table>

Source: Rightscale 2017 State of the Cloud Report
Note: Based on survey of IT Professionals, n=1,002.
Cloud Concerns = Shifting from Data Security + Cost Uncertainty → Vendor Lock-In + Compliance / Governance

Share of Respondents Citing Criteria as Top-Three Concern, USA, 2012-2015

Data Security: 42% (2012), 35% (2015)
Uncertainty of Costs and Savings: 38% (2012), 21% (2015)
Compliance / Governance: 27% (2012), 21% (2015)
Reliability (SLA Requirements): 21% (2012), 14% (2015)
Data Portability and Ownership: 20% (2015), 18% (2015)
Software Compatibility: 18% (2012), 14% (2015)
Lock-In (ability to change vendors): 7% (2015), 22% (2015)

Source: Bain Cloud Computing Survey, 2015 (n=347); Morgan Stanley AlphaWise Survey of IT Managers (n=304)
Cloud Evolution / Tools = Paving Way for… Innovation Across Infrastructure Landscape…

New Methods of Software Delivery =
APIs / Browser Extensions…creating new wave of capabilities (+ companies) for both companies and end users

Containers / Microservices =
Simplify software development process / improve consistency between testing & production environments / reduce complexity of managing & updating apps due to modular approach

Elastic Analytical Databases =
Likes of Google BigQuery / Snowflake / AWS Redshift Spectrum nearly infinitely scalable / usage based + have minimal maintenance requirements

Edge Computing =
Pushing compute away from centralized nodes & closer to sources of data… addresses many IT challenges when running data-centric workloads in cloud – reduces latency / can have security + compliance benefits…

Source: Lloyd Tabb, Looker Founder & CTO; Happiest Minds; Azuqua; TheServerSide; Forbes
…New Cloud Companies Emerging… Providing Elegant + Intuitive Experiences for End Users

**Rubrik**
Managing data across cloud & on-prem infrastructure, approaching $100MM in annualized bookings

**Stripe**
Processing billions of transactions a year across 100K+ businesses in 100+ countries

**Looker**
Empowering data analysis for 40K users across every department, each averaging 2 new queries every day

**CloudHealth**
Actively managing more than 1.3MM policies globally for hybrid & multi-cloud environments

Source: Company-provided & publicly available data; Snipcart
Enterprise Software =

Customer Expectations ➔
Mirroring Those of Consumer Apps
Enterprise Software (2000 → 2017) = Users Expect Products to be as Well Designed / Easy-to-Use / Reliable as Consumer Apps

**Perpetual, On-Premise Software → Cloud-Based SaaS Apps → Mobile-First Smart Apps**

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Delivery Method</strong></td>
<td>On-Prem</td>
<td>Cloud-based</td>
</tr>
<tr>
<td><strong>Pricing</strong></td>
<td>Perpetual License</td>
<td>Subscription</td>
</tr>
<tr>
<td><strong>UX</strong></td>
<td>Generic</td>
<td>Personalized</td>
</tr>
<tr>
<td><strong>Intelligence</strong></td>
<td>Constrained</td>
<td>Unlimited (AI / ML)</td>
</tr>
<tr>
<td><strong>Growth Engine</strong></td>
<td>Sales</td>
<td>Product</td>
</tr>
<tr>
<td><strong>Purchase Decision</strong></td>
<td>Top-Down</td>
<td>Bottoms-Up</td>
</tr>
<tr>
<td><strong>Measure of Engagement &amp; Customer Satisfaction</strong></td>
<td>N/A</td>
<td>DAUs / MAUs / NPS</td>
</tr>
</tbody>
</table>
Design = Increasingly Core to Enterprise R&D…  
End-Users Demanding Consumer-Quality Product Experiences

### Change in Designer : Developer Ratio, Selected Enterprises, 2010-2017

<table>
<thead>
<tr>
<th>Company</th>
<th>2010 - 2012</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atlassian</td>
<td>1 designer : 25 developers</td>
<td>1 designer : 9 developers</td>
</tr>
<tr>
<td>Dropbox</td>
<td>N/A</td>
<td>1 designer : 6 developers</td>
</tr>
<tr>
<td>IBM</td>
<td>1 designer : 72 developers</td>
<td>1 designer : 8 developers</td>
</tr>
<tr>
<td>INTERCOM</td>
<td>N/A</td>
<td>1 designer : 5 developers</td>
</tr>
<tr>
<td>LinkedIn</td>
<td>1 designer: 11 developers</td>
<td>1 designer : 8 developers</td>
</tr>
</tbody>
</table>

Source: Company data, Figma  
Note: Ratios for entire orgs, unless noted otherwise. Atlassian historical ratio from 2012; Dropbox data for product org only; IBM historical ratio from 2012, data for product org only; Intercom data for product org only; LinkedIn historical ratio from 2010.
Security =

More Applications → More Vulnerabilities
Cloud-Enabled App Use in Enterprises = Rising Rapidly…
Cheaper to Build / Easier to Adopt / Harder to Secure…

This has serious security & compliance implications…
94% of all cloud apps used are not “enterprise-ready,” per Netskope

### Avg. # of Cloud Apps Used by Vertical, Global, April 2017

<table>
<thead>
<tr>
<th>Vertical</th>
<th>Avg. Cloud Apps Used per Enterprise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retail, Restaurants, &amp; Hospitality</td>
<td>1,206</td>
</tr>
<tr>
<td>Financial Services, Banking, &amp; Insurance</td>
<td>1,170</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>1,092</td>
</tr>
<tr>
<td>Healthcare &amp; Life Sciences</td>
<td>907</td>
</tr>
<tr>
<td>Technology &amp; IT services</td>
<td>893</td>
</tr>
</tbody>
</table>

### Avg. # of Cloud Services used by Category, Global, April 2017

<table>
<thead>
<tr>
<th>Category</th>
<th># Per Enterprise</th>
<th>% Not Enterprise Ready</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marketing</td>
<td>91</td>
<td>97%</td>
</tr>
<tr>
<td>HR</td>
<td>90</td>
<td>96%</td>
</tr>
<tr>
<td>Collaboration</td>
<td>70</td>
<td>87%</td>
</tr>
<tr>
<td>Finance / Accounting</td>
<td>60</td>
<td>95%</td>
</tr>
<tr>
<td>CRM / Sales</td>
<td>43</td>
<td>94%</td>
</tr>
<tr>
<td>Software Development</td>
<td>41</td>
<td>96%</td>
</tr>
<tr>
<td>Productivity</td>
<td>37</td>
<td>95%</td>
</tr>
<tr>
<td>Social</td>
<td>30</td>
<td>91%</td>
</tr>
<tr>
<td>Cloud Storage</td>
<td>27</td>
<td>72%</td>
</tr>
<tr>
<td>IT Service / Application Management</td>
<td>25</td>
<td>98%</td>
</tr>
</tbody>
</table>

Source: Netskope April 2017
Note: 461 cloud apps in April 2017, one year ago = average of 917 from Feb-16 report & 935 from Jun-16 report; “Not enterprise ready” = received a rating of “medium” or below in the Netskope Cloud Confidence Index.
Network Breaches = Increasingly Caused by Email Spam / Phishing… Spam +350% vs. Q1:15 Monthly Average…

Change in Amount & Type of Spam, Global, 2015-2016
Indexed to Q1:15 Monthly Average

% Change in Spam (Indexed to Q1:15 Monthly Average)

- Spam Without Malicious Attachments
- Spam With Malicious Attachments

Source: AntiPhishing Working Group Phishing Activity Trends Report - Q4 2016; IBM X-Force Threat Intelligence Index 2017
...Cyber Threats Severity Rising = 10MM+ Identities Exposed in... 15 Breaches in 2016...vs. 11 in 2014

% of Internet Traffic by Source, Global, 2012-2016

Breaches with 10MM+ Identities Exposed, Global, 2014-2016

Source: Incapsula 2016 Bot Traffic Report (100k Randomly Selected Domains); 2017 Verizon Data Breach Investigations Report
CHINA INTERNET =

GOLDEN AGE OF ENTERTAINMENT + TRANSPORTATION

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China Macro =

Positive Trends
China Macro = Confidence Improving Since CH2:16

China Macro =
Confidence Improving Since CH2:16

Consumer Confidence Index & Manufacturing PMI Index, China, 1/14 – 3/17

Source: China National Bureau of Statistics, Bernstein Research
Service Sector Output as % of Nominal GDP, China, 1961 – 2016

Source: China National Bureau of Statistics, Morgan Stanley Research
Note: Service sector defined as all industries outside of agriculture, forestry, animal husbandry and fishery industries (except support services to agriculture, forestry, animal husbandry and fishery industries), mining (except auxiliary activities of mining), manufacturing (except repairs for metal products, machinery and equipment), production and supply of electricity, steam, gas and water, and construction.
China Macro = Private (Non-SOE) Enterprises… Increasingly Driving Wealth Creation + Economic Growth + Jobs

Private Enterprise (Non-SOE*) % Share of MSCI China Weighted Market Cap

Source: Morgan Stanley Research, MSCI
*SOE = State Owned Enterprise.
China Macro =
Technology Companies Lead Public Market Wealth Creation

Private Enterprise (% of MSCI China Market Cap by Sector, 2005 vs. 2016)

- Information Technology
- Health Care
- Consumer Discretionary
- Financials
- Overall MSCI China
- Materials
- Consumer Staples
- Industrials
- Utilities
- Energy
- Telecommunication Services

Source: Morgan Stanley Research, MSCI
*SOE = State Owned Enterprise.
China Internet Users + Usage =

Healthy User Growth…
Usage Outpacing Users
China Mobile Internet Users = @ ~700MM, +12% Y/Y vs. 11% in 2015

Mobile Internet Users & Y/Y Growth, China, 2008 – 2016

- China Mobile Internet Users = @ ~700MM, +12% Y/Y vs. 11% in 2015
- Source: CNNIC
- Note: Internet user data is as of year-end.
China Mobile Internet Usage Outpacing User Growth = +30% Y/Y for Usage…+12% for Users

Estimated Mobile Internet Daily Time Spent, China, 2012 - 2016

Source: Hillhouse estimates based on daily media time spent data from ZenithOptimedia and mobile data from QuestMobile
China Entertainment =

Online Innovation Driving
Robust User + Usage +
Monetization Growth
China Media = Internet @ 55% of Time Spent…Mobile > TV (2016)

Average Daily Media Consumption Minutes by Medium, China, 2012 - 2016

Source: Zenith Optimedia
China Entertainment = Key Driver of Mobile Time Spent…

eCommerce + Games = Monetize Best Per Time Spent…

China Mobile Internet Daily Hours By App, 11/14 – 4/17

Source: QuestMobile
Note: Only top 100 apps by time spent are categorized by company affiliation. Tencent, Alibaba and Baidu affiliates include strategically invested companies.
China Online Entertainment = Consumers Increasingly Willing to Pay…
Led by Games + Livestreaming + Video

Online Entertainment User-Pay Revenue By Vertical, China, 2011-2016

- Online Game
- Online Literature
- Digital Music

Online Entertainment User-Pay Revenue By Vertical, USA, 2011-2016

- Online / Console Game
- Online Video
- eBook
- Digital Music

Source: Game industry data per Newzoo and Hillhouse estimates, excludes console or PC hardware related revenue. Online video data per iResearch (China) and Hillhouse estimates (USA), excludes advertising related revenue. Digital music data (excl. advertising) per iResearch (China) and RIAA (USA). Livestreaming (China) data per Hillhouse estimates. eBook data per Hillhouse estimates (China) and AAP and Hillhouse estimate (USA)
Global Interactive Game Revenue = China #1 Market in World* > USA (2016)

Interactive Game Software Revenue by Region, Global, 2012 – 2017E

Source: Newzoo

* Excluding console / gaming PC hardware revenue.
China Online Gaming = Tencent + NetEase…Mobile MOBA + MMORPG Game Leaders…

**Tencent – Honor of Kings**
Mobile Multiplayer Online Battle Arena (MOBA) Leader…
50MM+ DAU, $3B+ Annualized Bookings
Driven by Social + Simple UI + Constant Product Improvement

**NetEase**
Portfolio of Leading Mobile Massively Multiplayer Online Role Playing Games (MMORPGs)…
Driven by Mobile First Mover Advantage + IP + Social Design + Quality Production

Source: Tencent, NetEase
China Online Gaming = Tencent + NetEase Driving Mobile Innovation + Revenue

Source: Tencent, NetEase, Goldman Sachs Investment Research
Note: Assuming 1USD = 6.9RMB.
China Livestreaming = High Consumer Engagement + Willingness to Pay…

Diverse Live Content Type
Singing / Dancing / Talk Show / Game Play…

Interactive / Social / Gamified
Like / Chat with Hosts & Audience / Buy Virtual Gifts to Support Performers

Local / Social
Nearby Livestreams / Chat & Add Friends

20+ Virtual Gift Categories
priced from Rmb0.01

Source: Hillhouse research
Estimate Revenue per Hour, China, 2016

Livestreaming
Online Games
TV
Online Video
Radio
Online Music

Source: Hillhouse estimates based on Newzoo, iResearch, Questmobile, and select company disclosures.
Note: Revenue data includes subscription, advertising and paid download revenue streams.
China On-Demand Transportation =

#1 Global Market…
Cars + Bikes
China On-Demand Transportation (Cars + Bikes) = Global Leader @...~67% Global Share (10B+ Annualized Trips, + >2x Y/Y)

Source: Hillhouse Capital estimates, include on-demand taxi, private for-hire vehicles, as well as on-demand for-hire motorbike and bike trips booked through smartphone apps

On-Demand Transportation Trip Volume by Region, Global, Q1:13 – Q1:17

Quarterly Completed Trips (MM)

- ROW
- SE Asia
- India
- EMEA
- N. America
- China Bike
- China Car
China On-Demand Bike Sharing = Mobile Innovation Driving Significant Usage Ramp

In-Bike GPS + Smartphone
Bike Sharing Without Stations...Location-Based Virtual Red Envelope Drives Utilization

QR Code + Mobile Payment
Easy Unlock & Low Friction Payment

Ubiquity + Low Cost
($1/$0.15 per 30 min) + Convenience
Mass Adoption & Bike Utilization

Source: Mobike
China On-Demand Bike Sharing =…
@ 20MM+ MAU…100%+ M/M Accelerating Growth

Source: TrustData
Note: Dip in M/M growth rate in 1/17 was driven by Chinese New Year.
China On-Demand Bike Sharing = High Frequency… 2/3 Users Ride 3+ Times Per Week

Highlight from Shenzhen Municipality On-Demand Bike Sharing Study, 5/17

On-Demand Bike Trips per Week

- <1x: 9%
- 1-2x: 25%
- 3-5x: 32%
- 6-10x: 18%
- 10+: 16%

Purpose of On-Demand Bike Trips

- Commute: 50%
- Leisure / Exercise: 29%
- Shopping: 12%
- Business: 3%
- School: 1%
- Other: 5%

Source: Transport Commission of Shenzhen Municipality study on bike sharing, based on operating data from four participating companies and survey data between 10/16 and 3/17, n=16,546
On-Demand Bike Sharing = Positive Environmental Impact + High Customer Satisfaction

Highlights from Shenzhen Municipality On-Demand Bike Sharing Study, 5/17

11MM
Registered Users in
Shenzhen, China

530K
Available Bikes

2.6MM
Daily Trips

5
Trips per Available Bike per
Day

50%
On-Demand Bike Trips Serving as Last-Mile Connection to Public Transit Trips

10%
Bike Trips Replacing Private Car Driving Trips

100K+ Tons
Reduction in Annual CO2 Emission*

95%
Respondents Support Continued Development of Bike Sharing

Source: Transport Commission of Shenzhen Municipality study on bike sharing, based on operating data from four participating companies and survey data between 10/16 and 3/17, n=16,546

* Based on following assumptions – 250k reduction in daily private car trips, avg. trip length of 10km, avg. fuel consumption of 6.9 L/100km, avg. CO2 emission of 2kg/L of fuel.
<table>
<thead>
<tr>
<th></th>
<th>On-Demand Car Share (Didi)</th>
<th>On-Demand Bike Share (Mobike / Ofo)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average Trip Distance</strong></td>
<td>8 KM (~5 Miles)</td>
<td>2 KM (1.2 Miles)</td>
</tr>
<tr>
<td><strong>Average Trip Cost</strong></td>
<td>20 RMB (~3 USD)</td>
<td>~1 RMB (~0.15 USD)</td>
</tr>
<tr>
<td><strong>Cost per Km</strong></td>
<td>~2.50 RMB</td>
<td>~0.50 RMB</td>
</tr>
<tr>
<td><strong>Cost per Mile</strong></td>
<td>~0.60 USD</td>
<td>~0.12 USD</td>
</tr>
</tbody>
</table>

Source: On-demand car share data per Hillhouse estimate. On-demand bike share data per Transport Commission of Shenzhen Municipality study on bike sharing, based on operating data from four participating companies and survey data between 10/16 and 3/17, n=16,5466.92
China Mobile Payment Infrastructure =

Enabling Rapid Growth + Monetization of Internet Usage
China Mobile Payment Volume = +2x Y/Y to $5T+ Led by AliPay + WeChat Pay

China Mobile Payment Volume, 2012 - 2016

China Mobile Payment Market Share*, Q1:17

Source: Analysys

*Excludes certain P2P and transfer payments. Assume constant FX rate of 1USD = 6.9RMB.
China Mobile Payments = Convenience vs. Cash & Bank Cards… Small Transactions Growing Especially Fast (<100RMB / $15)

Size of Mobile Payment Transactions, 2012 - 2016

Reasons for Using Mobile Payments, 2012 - 2016

Source: PCAC, Bernstein Analysis
AliPay + WeChat Pay on Mobiles = Digitizing Micro Payments On + Offline

~$0.15 for On-Demand Bike

~$0.15 for On-Demand Mobile Recharge

$0.50+ for Street Food

$0.01+ for Article / Author Tipping

$0.01+ for Livestreaming Tipping

Source: Hillhouse estimates
China Mobile Payments = Low Relative Cost… Helped by Regulated Interchange Rates…

Average Merchant Discount Rate, Basis Points (100bps = 1%)

Source: Hillhouse estimates based on published rate schedule, JPMorgan Research estimates and transaction take rate for PayPal in 2016.

*Cash payment there is no merchant discount rate, ~40bps of marginal cost of processing cash payment is an estimate per European Commission study in 2014. USA debit and credit card merchant discount rate is an estimated offline average, online (card-not-present) merchant discount rate is higher.
### Mobile Payments = Gateway for China Internet Leaders to Become Diversified Financial Services Platforms

<table>
<thead>
<tr>
<th></th>
<th>Payment</th>
<th>Wealth Management</th>
<th>Financing</th>
<th>Insurance</th>
<th>Credit Rating / History</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ant Financial</strong></td>
<td>![Ant Financial Logo]</td>
<td>![Alipay Logo]</td>
<td>![Yuebao Logo]</td>
<td>![Ant Credit Pay Logo]</td>
<td>![ZhiMa Credit Logo]</td>
</tr>
<tr>
<td></td>
<td>451MM Annual Active Users¹</td>
<td>&gt;300MM Cumulative Users²</td>
<td>&gt;100MM Cumulative Consumer Finance Users³, &gt;5MM Cumulative SME Borrowers⁴</td>
<td>380MM Cumulative Users⁵</td>
<td>130MM Cumulative Users⁶</td>
</tr>
<tr>
<td><strong>Tencent</strong></td>
<td>![WeChat Pay Logo]</td>
<td>![Tencent Wealth Logo]</td>
<td>![WeChat Credit Logo]</td>
<td>![Tencent Insurance Logo]</td>
<td>![Tencent Credit Logo]</td>
</tr>
<tr>
<td></td>
<td>&gt;600MM MAU⁷</td>
<td>&gt;80MM Cumulative Users⁸</td>
<td>&gt;30MM Cumulative Users⁹</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>JD Finance</strong></td>
<td>![JD Pay Logo]</td>
<td>![JD Golden Wallet Logo]</td>
<td>![JD Credit Logo]</td>
<td>![JD Insurance Logo]</td>
<td>![JD Credit Logo]</td>
</tr>
<tr>
<td></td>
<td>119MM Annual Active Users¹⁰</td>
<td>&gt;20MM Cumulative Users¹¹</td>
<td>&gt;30MM Cumulative Users¹¹</td>
<td>168MM Cumulative Users¹¹</td>
<td>&gt;35MM Cumulative Users¹¹</td>
</tr>
</tbody>
</table>

Source: Alibaba / Ant Financial, Tencent, JD Finance

¹Number of users of Alipay with one or more successful transactions in 2015; ²As of 3/16; ³As of 4/17; ⁴As of 1/17; ⁵As of 2015; ⁶As of 3/16; ⁷For 12/16; ⁸As of 11/16; ⁹As of 5/17; ¹⁰As of 12/16; ¹¹Number of users of JD Pay with one or more successful transactions in 2016; ¹²As of 5/17
China eCommerce + Advertising = Innovation + Growth
China eCommerce = Strong Growth
+24% Y/Y @ $681B GMV...71% Mobile

China B2C eCommerce Gross Merchandise Value ($B),
Desktop vs. Mobile, 2012 - 2016

Source: iResearch
Note: Assuming constant FX 1USD = 6.9RMB
China B2C eCommerce @ 15% of Retail Sales… Penetration Ramping Faster Than Peers

B2C eCommerce as % of Retail Sales by Country, 2002 - 2016

Source: Euromonitor

Korea  |  UK  |  China  |  USA  |  Germany  |  Japan  |  France  |  Brazil


0%  |  5%  |  10%  |  15%  |  20%
Alibaba = Massive Scale + Engagement + Innovation…

507MM Mobile MAUs, +24% Y/Y…41% DAU/MAU Ratio…
24+ Minutes Daily Time Spent per User

Taobao App with Livestreaming / Microblog / Personalization

Cainiao Logistics Smart Label / Routing

GMV Generated from Recommendations, 2015-2016

Source: Alibaba
Note: MAU data as of 3/17, DAU/MAU ratio data refers to mobile Taobao app, as of 5/16. Daily time spent per DAU limited to Taobao app, per QuestMobile data in 4/17. GMV generated from recommendations data are indexed, 4/15 vs. 4/16.
JD.com = World Class Fulfillment + Delivery…91% / 58% Orders* Delivered Within 2 Days / 1 Day, Up from 68% / 47% Four Years Ago

JD.com % of First-Party Orders Delivered by Speed, 2013 – 2017 YTD

Source: JD.com

*Orders exclude third party sellers. **Defined as JD’s 211 program – any orders received by 11am will be delivered on the same day, and any orders received by 11pm will be delivered by 3pm on the following day. Bulk of orders are delivered within 3-18 hours. Customers also can request that orders placed by 3pm be delivered in the evening on the same day in selected cities. There is no extra charge for delivery under the 211 program for orders that satisfy the minimum size requirement. The program does not cover delivery to addresses through third-party couriers or products shipped directly from third-party sellers. Bulky items such as refrigerators are also eligible for same-day or next-day delivery in selected areas. Customers can also request expedited delivery within two hours by paying an extra charge in select cities. JD’s 211 service covered 1,410 counties and districts across China as of 2016. 2017 YTD data as of Q1.
China Online Advertising Revenue = +30% Y/Y @ $40B

Source: iResearch
Note: Assuming constant FX 1USD = 6.9RMB.
Algorithmic Mobile Newsfeeds = Driving Usage + Advertising Growth (Toutiao / Baidu / Weibo / Tencent…)

**Toutiao / Baidu / Weibo / Tencent**
*Mobile Newsfeeds with Personalization*

**China Mobile Newsfeed Advertising Revenue & Y/Y Growth, 2014 – 2017E**

- **$0** to **$8,000** Mobile Newsfeed Advertising ($MM)
- **0%** to **200%** Y/Y Growth

- **Mobile Newsfeed Advertising**
- **Y/Y Growth**

<table>
<thead>
<tr>
<th>Year</th>
<th>Mobile Newsfeed Advertising ($MM)</th>
<th>Y/Y Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>$0</td>
<td>0%</td>
</tr>
<tr>
<td>2015</td>
<td>$2,000</td>
<td>50%</td>
</tr>
<tr>
<td>2016</td>
<td>$4,000</td>
<td>100%</td>
</tr>
<tr>
<td>2017E</td>
<td>$8,000</td>
<td>150%</td>
</tr>
</tbody>
</table>

Source: iResearch
Note: Assuming constant FX 1USD = 6.9RMB.
China Internet = Golden Age of Entertainment + Transportation

1) **Macro** = Positive Trends

2) **Internet** = Healthy User Growth…Usage Outpacing Users

3) **Entertainment** = Online Innovation Driving Robust User + Usage + Monetization Growth…

4) **On-Demand Transportation** = China #1 Global Market…Cars + Bikes

5) **Mobile Payment Infrastructure** = Enabling Rapid Growth + Monetization of Internet Usage…

6) **eCommerce + Advertising** = Innovation + Growth
INDIA INTERNET =

COMPETITION CONTINUES TO INTENSIFY… CONSUMERS WINNING
India Economy (GDP) = Fastest Large Grower…
+7% Y/Y @ #7 Global GDP Rank

2016 GDP ($B) and GDP Growth Rates (%), Selected Countries >$1T of GDP

<table>
<thead>
<tr>
<th>Country</th>
<th>2016 GDP ($B)</th>
<th>Y/Y Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>$18,569</td>
<td>1.6%</td>
</tr>
<tr>
<td>China</td>
<td>$11,218</td>
<td>6.7%</td>
</tr>
<tr>
<td>Japan</td>
<td>$4,939</td>
<td>1.0%</td>
</tr>
<tr>
<td>Germany</td>
<td>$3,467</td>
<td>1.8%</td>
</tr>
<tr>
<td>UK</td>
<td>$2,629</td>
<td>1.8%</td>
</tr>
<tr>
<td>France</td>
<td>$2,463</td>
<td>1.2%</td>
</tr>
<tr>
<td>India</td>
<td>$2,256</td>
<td>6.8%</td>
</tr>
<tr>
<td>Italy</td>
<td>$1,851</td>
<td>0.9%</td>
</tr>
<tr>
<td>Brazil</td>
<td>$1,799</td>
<td>-3.6%</td>
</tr>
<tr>
<td>Korea</td>
<td>$1,411</td>
<td>2.8%</td>
</tr>
<tr>
<td>Russia</td>
<td>$1,281</td>
<td>-0.2%</td>
</tr>
<tr>
<td>Spain</td>
<td>$1,233</td>
<td>3.2%</td>
</tr>
</tbody>
</table>

Source: IMF, 4/2017
Note: Y/Y growth based on constant prices.
India Internet Users = +28% (2016-June) vs. 40% Y/Y Growth... @ 27% Penetration...355MM Users...#2 Behind China

India Internet Users (MM) & Penetration (%), Monthly Active*, Mid-Year (June) 2009 – 2016E

Source: IAMAI. UN Population Division, Worldometer, KPCB estimates based on IAMAI data. Uses mid-year figures.

*Note that “Monthly Active Users” are distinct from “Ever” users, which IAMAI defines as anyone who has ever accessed the internet. Owing to increasing activity levels, the number of “Monthly Active Users” may grow faster than “Ever” users.
India = #1 Global Market (ex-China) Android Phone Time Spent…

Google Play Downloads > USA (2016), per App Annie

**Source:** App Annie 2016 Retrospective

Note: USA @ ~59% vs India 78% Android share of total mobile Internet traffic (Statcounter, 5/17)

* Data excludes China
India Smartphone Shipments = +15% Y/Y (Q1:17)…+5% (2016)…+29% (2015)

Source: Morgan Stanley, IDC
Smartphone + Feature Phone Shipments =
+6% Y/Y (Q1:17)…-3% (2016)…-2% (2015)

India Mobile Phones Unit Shipments,
Q1:10 – Q1:17

Source: Morgan Stanley, IDC
India Smartphone + Data Costs =

Declining But Still High for Majority of India’s 1.3B Citizens
India Smartphone Cost (excluding Data) = Unaffordable for Many… @ 8% of Annual Average GDP per Capita…

Source: Morgan Stanley, IDC. GDP per Capita data based on IMF, 4/17.
India Wireless Data Cost* = Declining to More Affordable Levels @ 1.3% of Annual Average GDP per Capita (3/17) vs. 3% (3/15)

*Industry average calculated using average cost of 1 GB of data from Bharti Airtel and Idea Cellular and exclude the impact of Reliance Jio.
Chart is illustrative and assumes an average consumption of 1GB / month. Alliance for Affordable Internet data suggests that 2% of monthly income for 1GB of data is within affordable range.
India Internet =

Fierce Global Battleground
(Hardware / Carriers / Software / Commerce)…
India Mobile Hardware (2012-Q1:17) = Intense Competition → Massive Share Shifts

Rise of India OEMs (2012-H1:14)
Likes of Micromax / Lava / Karbonn Fight for Feature Phone Market Share via Price…ASPs Fall ~40%…Shares Rise

Rise of China OEMs + Reliance (H2:14-Q1:17)
Likes of Lenovo / Xiaomi / Oppo / Vivo Fight for Smartphone Market Share via Quality / Features / Online Distribution…ASPs Stable…Shares Rise…Reliance Gains Share in 2016 on Launch of Jio 4G Service + LYF-Branded Smartphones...

Competition Intensifies (H1:17…)
Xiaomi / Oppo / Vivo Share Gains Continue… Smartphones Get Cheaper / Better… Lava / Micromax / Jio Fight for Low-Cost 4G Feature Phone Share...

Source: IDC, Morgan Stanley, Lava, Micromax, Jio.
India Wireless Carriers = Incumbents + New Entrants… Fighting Aggressively for Share Over Past 4 Quarters…

2015 – 1H:16
Top 3 India wireless carriers Bharti Airtel / Vodafone / Idea collectively maintain ~60% share of broadband subscribers + ~$2.80 – $3.00 monthly ARPU (Voice + Data + Value-Added Services).

Q2:16
Wireless incumbents begin to cut data rates in anticipation of Reliance Jio launch in 9/16. Data costs per GB decline from $3.50 to ~$3.15 (-10%) Q/Q. Voice costs decline 4% Q/Q.

9/16
Reliance Jio – after investing $25B over 7 years – rolls out 4G Pan-India Jio network + $0 Monthly ARPU (post 3/17 when ARPU rose to $4.70)

Q4:16 – Q1:17
Wireless incumbents begin to lose data subscribers. In response, they cut data prices further over next 2 quarters. As of 3/17, average cost of 1GB of data @ ~$2 among incumbents, -48% Y/Y...ARPU -20%. Including Jio, average cost of 1GB of data @ $0.33 (3/17).

3/17
Reliance Jio free-data period ends with ~67% paid migration (72MM convert to paid Jio Prime subscribers out of 108MM sign-ups)

Source: JP Morgan, Public Filings, TRAI, Reliance Jio. Jio sign-ups are total number of Jio SIMs registered, while paying subscribers are a subset of sign-ups who have later converted to Jio Prime paid subscription. Data for incumbents based on average of Idea and Bharti Airtel.
India Wireless Consumer Data Prices = -48%+ in Last Year* as Incumbent Carriers Responded to Jio’s Low Pricing…

Data Prices per GB, Industry*, CQ1:14 – CQ1:17

*Industry incumbent average calculated using weighted average cost of 1 GB of data realization from Bharti Airtel / Idea Cellular. Reliance Jio data assumed at 10 INR / GB based on March realization.
India Broadband Subscribers* = +85% Y/Y (Q1:17)…Accelerating… Reliance Jio Rose to 39% Share vs. 0% (Q3:16) Owing to Low Price Launch

India Broadband (>512 Kbps) Subscribers* by Service Provider, CQ1:15 – CQ1:17

Source: TRAI reports.
Subscribers are defined as all unique SIMs within a carrier’s database, less test/service cards, employees, stock in hand, SIMs where the subscriber retention period has expired, and service suspended pending disconnection.
Note that as of 3/17, Jio’s subscribers mentioned here were on free data plans. Subsequent to this free trial period, 72MM so far have converted to paying subscribers.
India Software – Mobile Browser Usage Market Share = China (UC/Alibaba) @ 50%...USA (Google Chrome) @ 32%...

Source: Statcounter 2017
Note: Data reflects usage share across calendar year quarters. As Q2 is in progress, data for Q2 2017 reflects current share as of 5/30/17
...India Software – Top Downloaded Android Apps =
USA @ 4 of 10…China @ 2 of 10…India @ 2 of 10

<table>
<thead>
<tr>
<th>Rank on 5/29/17</th>
<th>App</th>
<th>Origin</th>
<th>Category</th>
<th>Rank on 5/30/16 (1 Year Ago)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>WhatsApp (Facebook)</td>
<td>USA</td>
<td>Messaging</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Facebook Messenger</td>
<td>USA</td>
<td>Messaging</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>ShareIt</td>
<td>China</td>
<td>Utility – file transfer</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>Truecaller</td>
<td>Sweden</td>
<td>Utility – dialer</td>
<td>11</td>
</tr>
<tr>
<td>5</td>
<td>Facebook</td>
<td>USA</td>
<td>Social</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>UC Browser (Alibaba)</td>
<td>China</td>
<td>Browser</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>MX Player</td>
<td>Korea</td>
<td>Utility – video player</td>
<td>13</td>
</tr>
<tr>
<td>8</td>
<td>Hotstar</td>
<td>India</td>
<td>Entertainment</td>
<td>6</td>
</tr>
<tr>
<td>9</td>
<td>JioTV</td>
<td>India</td>
<td>Entertainment</td>
<td>301</td>
</tr>
<tr>
<td>10</td>
<td>Facebook Lite</td>
<td>USA</td>
<td>Social</td>
<td>9</td>
</tr>
</tbody>
</table>

Source: "Top 10 Non Gaming Apps, Google Play Store, India, 5/29/17
Note: Google Play Store ranks reflect rankings based on daily download volumes
Blue indicates a Facebook app. Green indicates an app owned by Alibaba."
India eCommerce = Many Players Fighting for Share...
Amazon India = Inventory (SKUs) & Sellers +3x Y/Y...Fulfillment Centers +30% Y/Y...Aggressive / Investing Heavily

Source: Barclays Research, Amazon.com, MWPVL International
Per public statements, Amazon has pledged to invest $5B into India
India Internet Usage =

Rising Owing to...

Cheaper / Faster Access
India Wireless Internet Data Usage = Rising Dramatically as Access Costs Have Fallen…

Total Monthly Wireless Data Consumed (MM GB)*, 3/14 - 3/17

Millions of GB per Month

Source: Reliance Jio, Bharti Airtel, Idea, Reliance Communications, Vodafone India.
*Note total data consumed based on publicly available data from Reliance Jio, Bharti Airtel, Idea, Reliance Communications, Vodafone and may not be collectively exhaustive.
India Wireless Internet Data Usage = Bandwidth Intensive App Usage Growing Dramatically

**Gaana Streams, 6/16 – 3/17**  
(Music Streaming App)

Streams per Month (MM)

<table>
<thead>
<tr>
<th>Month</th>
<th>6/16</th>
<th>9/16</th>
<th>12/16</th>
<th>3/17</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+3x Growth</td>
</tr>
</tbody>
</table>

**Hotstar DAUs, 6/16 – 4/17**  
(Video Streaming App)

Daily Active Users as % of Total Users

<table>
<thead>
<tr>
<th>Month</th>
<th>6/16</th>
<th>9/16</th>
<th>12/16</th>
<th>4/17</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4x+ Growth</td>
</tr>
</tbody>
</table>

Source: Gaana, SimilarWeb estimates for HotStar, 5/17
Note: DAU estimates are intended to reflect relative growth within reasonable confidence intervals using SimilarWeb's methodology.
India Leadership =

Focused Pro-Digital Policies
India Leadership = Digital-Focused Government Policies Rolled Out with Speed + Scope

Narendra Modi Elected India Prime Minister = 5/14

Key Policies

‘Banking for All’ ‘Jan Dhan Yojana’ = 8/14
~280MM+ new bank accounts opened to deliver financial services directly to underbanked in effort to bypass corruption

‘Power for All’ Rural Electrification = 7/15
Program to electrify 100% of villages by 2019, with 133MM rural households electrified to date…~45MM remaining

Demonetization = 11/16
~85% of paper currency in circulation replaced overnight to clean ‘black’ money (estimated at 22%+ of total GDP) & boost digital payment adoption

Nationwide Tax (GST) Reform = 3/17
Single indirect tax replacing 17 different state & central taxes, turning India into single national market & eliminating double taxation for consumers

Digital India = 7/15
National rollout of high speed broadband access & digital delivery of land records, income tax filings & other government services

Skills & Entrepreneurship = 6/15
Dedicated ministry to upgrade youth skills…goal to train 10MM new workforce entrants per year

Startup India = 1/16
High level support of Indian startups via funding & fast tracking of regulatory support for new companies

Infrastructure Enhancements = 2/17
$59B targeted to upgrade railways / airports / roads

Other Notable Policies

India Internet Usage Growth Strong Owing In Part to Broader Availability of Low Cost Data Access...

India Internet User Base @ +355MM is Large...

Ongoing Smartphone + Access Price Declines Key to Onboarding Next 200MM Users…

Driving Free Cash Flow for Many Internet Businesses Challenging Owing to Fierce Competition…

Consumers Benefitting from Competition & Government Policies
India Internet Innovation =
Leapfrogging + Re-Imagining

Leapfrogging
  Mobile
  Identity
  Bandwidth
  Payments

Re-Imagining
  Entertainment
  Education
  Healthcare
  Marketplaces
India Mobile Usage = A Global Leader vs. Desktop Usage…

~80% of Internet Usage on Mobiles…

Mobile Share of Web Traffic, 1/17

Source: Hootsuite, Statcounter, 1/17.
India Identity = Aadhaar + eKYC – Digital Authentication for 1B+ People… Use Growing Rapidly @ 16MM Authentications per Day (3/17) vs 3MM Y/Y…

**Aadhaar Authentication**

Are You Who You Claim To Be?
- Binary Yes / No Answer Only
- Uses Biometrics (Fingerprint + Iris)
  + Unique 12-Digit Number to Verify

If Yes

**eKYC Authentication**

Proof of Address / Birth / Photos…
- Secure Dropbox for Basic Paper Records
- Can Only be Accessed if Aadhaar ID is Authenticated + User Gives Consent

---

**Aadhaar Authentications / Day, 9/12 - 3/17**

**eKYC Verifications / Day, 5/16 – 10/16**

Source: UIDAI (Indian Government), iSpirit / IndiaStack.
Note: Aadhaar authentication per day estimates provided by Prime Venture Partners, based on monthly authentication figures released by UIDAI
India Identity = India Aadhaar Digital IDs Have Broad Coverage...@ 82% of Population (1.1B People) vs. Zero 6 Years Ago...#1 in World...
India Identity = Aadhaar IDs + eKYC Improving Foundational Access to Broad Services

**Sim Card Activation**

Before Digital ID = 1-3 Days
Proof of Address / original photo IDs / attested photocopies + potential fraud...

After-Digital ID = 15 Minutes
Aadhaar number + fingerprint / biometric eSign

**Bank Account & Digital Wallet Opening**

Before Digital ID =
Physical visit to bank, paper-based KYC, lack of ability to scale, improper documentation

After-Digital ID =
Open account on mobile phone... in secure / scalable way

**Pensions & Social Services**

Before Digital ID =
Cash-based / leakage of payments to government officials / corruption / fraud

After-Digital ID =
12-15% increase in final payouts to workers owing to reduced leakage

Source: UIDAI (Indian Government), iSpirit / IndiaStack, Skoch Group
Note: Image credits – Hindu Business Line, NDTV, Reliance Jio, DBS India, Livemint (2017)
India Bandwidth = Reliance Jio High-Speed Bandwidth Ramp…
@ 108MM Sign-Ups* in 7 Months…72MM Converted to Paying Subscribers

Reliance Jio Sign-Ups and Subscribers (MM),
9/16 – 4/17

Source: Cellular Operators Association of India (COAI), Reliance Jio, various press releases
*Sign ups represent all those who have signed up for a Jio SIM card. Subscribers are those who remained with Jio after their free trial period ended on 3/31/2017 and became Jio Prime subscribers.
# India Payments = Evolution of Building Blocks for Digital Payment / Data Infrastructure for 1B+ Indians (2009 ➔ 2017)

<table>
<thead>
<tr>
<th>Phase</th>
<th>Project</th>
<th>Functionality</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Identity</td>
<td>Aadhaar (1/09) + eKYC (5/13)</td>
<td>Single digital ID + authentication database</td>
<td>• 1B+ Aadhaar cards issued since 2010&lt;br&gt;• ~16MM authentications/day (4/17)</td>
</tr>
<tr>
<td>2) Banking</td>
<td>Jan Dhan Yojana (8/14) ‘Banking for All’</td>
<td>Bank accounts tied to Aadhaar for previously non-banked citizens</td>
<td>• 280MM+ accounts opened in 3 years...&lt;br&gt;50% of existing bank accounts&lt;br&gt;• Direct subsidies to citizen bank accounts have saved $775M owing largely to reduced corruption leakage (12/16)</td>
</tr>
<tr>
<td>3) Mobile Services</td>
<td>Universal Payments Interface (UPI) (7/16)</td>
<td>Instant money transfer between bank accounts via phone numbers</td>
<td>• ~$380MM monthly transaction volume (4/16)&lt;br&gt;• Use accelerated after demonetization (11/16)</td>
</tr>
<tr>
<td></td>
<td>Bharat Interface for Money (BHIM) (12/16)</td>
<td>Government App for UPI based payments</td>
<td>• 17MM+ downloads within 2 months of launch (2/17)</td>
</tr>
</tbody>
</table>

Source: Kalaari Capital, Prime Venture Partners, Indiastack.org, Department of Financial Services, Government of India (2016)
Paytm Registered Users (MM), 11/14 - 3/17

- India Payments = Online Leader
- Paytm Ramping Users Rapidly...
- Bolstered by Uptake of Online + Offline Commerce...

Source: Paytm.
India Payments = UPI (Universal Payments Interface)…Rapidly Enabling Bank-to-Bank Mobile Money Transfers

Monthly Digital Payments Volume in India via UPI ($MM), 8/16 – 3/17

Source: Reserve Bank of India, Monthly Bulletin (Payments and Settlement Systems)
India Internet Innovation = Leapfrogging + Re-Imagining

Leapfrogging
Mobile
Identity
Bandwidth
Payments

Re-Imagining
Entertainment
Education
Healthcare
Marketplaces
India Entertainment = Weekly Mobile Time Spent @ 7x TV…
45% Mobile Time = Entertainment…

**Time Spent with Media per Week (Hours), 2016**
- Mobile: 28 hours
- Television: 4 hours
- Print: 2 hours

**Percent of Time Spent on Mobile by Category, 2016**
- Entertainment: 45%
- Search, Social and Messaging: 34%
- Others: 13%
- Shopping: 4%
- Finance: 2%
- News & Media: 2%

Source: MMA Kantar India Mobile Usage Report, 2016
…India Entertainment Re-Imagined = Internet-First Shows Optimized for Mobile…
Replacing Longer / Linear Programming Optimized for TV

**THEN**

**TV Soap Operas + Reality Shows**
- Scripted, family-focused dramas targeted @ older viewers + families with ‘rinse & repeat’ plots
- Produced for linear programming without user data / feedback
- Little to no user data, often based on small TV rating sample sizes / surveys

**NOW**

**On-Demand Web-Video Shows**
- Millennial focused / short-form content such as ‘Hinglish’ standup comedy
- Made for mobile / shared via messaging channels (Whatsapp, FB, etc)
- Instant user data + feedback (Views, Geos, Replays etc.)
- Dramatic growth assisted by 4G rollout of Jio…AIB Channel @ 100MM+ views

Source: Google Play, Reliance Jio Annual Report
India Education = Largest K-12 School System (250MM+ Students) in World With…
High Demand for After-School Education…

Total K-12 Student Enrollments by Country (MM), 2015

India: 300MM
China: 250MM
US: 150MM
UK: 100MM

Indian Private Coaching Industry, 2014

- Primary: 22%
- Upper Primary: 26%
- Secondary: 37%

Reasons for Private Coaching

- Augmenting Basic Education: 89%
- Prep for Job Exams: 8%
- Entrance Exam Prep: 2%
- Others: 2%

Indi...n Accessible (via Mobiles) + Self-Paced + Personalized

**THEN**

Offline Private ‘Tuition’ Centers

- Offline lectures + in-person testing
- Directly based on income & geography
- 1:35+ student-teacher ratio
- One-size-fits-all approach
- Extreme focus on test taking

**NOW**

Mobile Self-Paced Learning
ex. Byju’s

- Math + science with games + videos
- Anyone / anywhere with smartphone
- 40+ minutes average daily usage
- Personalized
- Learning outcomes* improved 15%+

Source: Byju’s, *data refers to improvements among students who took a test, watched the video and then took another test*

Image: DailyMail
India Healthcare = High (& Rising) Out-of-Pocket Spend… <20% Insurance Penetration…

**India Out-of-Pocket Spend**
(% of Private Expenditure on Health), 2014

- Mexico: 90%
- India: 80%
- Indonesia: 70%
- China: 60%
- UK: 50%
- Germany: 40%
- Brazil: 30%
- France: 20%
- USA: 10%
- South Africa: 0%

**Health Expenditure per Capita in India ($), 2004 - 2014**

**Percent of Indian Population Not Covered by Insurance, 2014**

- Rural: 86%
- Urban: 82%

Offline Labs & Pharmacies

- Long wait times for standard lab tests
- Limited drug inventory
- Geography dependent
- Up to 60-80% price variance for identical drugs owing to lack of price transparency

Online Health Hubs

- In-home tests ordered online
- Access to aggregated inventories of multiple pharmacies in metro
- 40-50% lower prices for lab tests
- Instant drug price comparisons offer transparency, saving users 20 - 30% per prescription

Source: 1Mg, Portea, CDSCO Report 2016
Indian Marketplaces = Organizing the Un-Organizable…
Replacing Middlemen with Smartphones + Direct to Consumer Marketplaces

**THEN**

Hyperlocal Offline Markets
ex. Fish Mandis

- Multiple middlemen
- High price variance
- No consumer visibility into quality

**NOW**

Mobile / Direct-to-Consumer
Ex. Freshtohome.com

- High quality produce sourced directly from fishermen
- Online distribution allows 20-25% lower prices for consumers

Source: FreshtoHome
Image: TheIndianIris
India Internet Challenges =

Fundraising Environment + Language
India = Especially High Venture Capital Funding in H2:14 – 2015…
Helped Drive Aggressive Start Up Valuations + Spending + Competition

Indian VC Funding by Quarter, Q1:13 – Q1:17

- 2013: $1.4B
- 2014: $5.1B
- 2015: $7.6B
- 2016: $4.7B

Source: Tracxn, Inc42
India = 29 Languages Spoken by >1MM People…6 >50MM (ex-English)…46% of Internet Users Primarily Consume Local Language Content

Indian Internet Users & Primary Language for Content Consumption, 2012 – 2015

India Macro…

Demographics = Bad & Good

Other Challenges =

1) Job Creation
2) Business Basics
3) Education
4) Logistics
5) Gender Disparity
India = Low Relative GDP per Capita…Poverty Levels…While Improving…Remain High

GDP per Capita ($) Among Countries >50MM in Population, Current Prices, 2016

GDP per Capita data based on current prices. Selected for countries with population >50MM.
India = Lots of Young People…
64% of Population...72% of Internet Users <35 Years Old…

**India Population by Age Group, 2015**

- **Population by Age Group (MM)**
- **% of Total Population**

**Distribution of India Internet Users by Age Group, 2017**

- **Distribution of Internet Users by Age Group (%)**

Source: UN Population Division, ComScore, 3/17. ComScore data based on panel and census and only includes Android.
India = Working Age Population Growth + Millennial Per Capita Income… Compare Favorably with Other Countries

Percent (% of Population 15 – 64 Years Old, India vs. China vs. More Developed Regions, 1950 – 2050E

Per Capita Income Distribution, India / USA / China by Age, 2015

(Index to the Highest Income Age Category for Corresponding Country)

India = ‘Consumption Class’ Growing Rapidly…
@ 27% of Households (66MM) vs. 7% Ten Years Ago

**India Households by Income Bracket, 2005 vs. 2015**
*(in constant 2015 dollars)*

Source: Kalaari Capital, 3/17, NCAER, McKinsey.

*Consumption Class = income levels at which consumers start to spend beyond basic necessities*
India Consumption = Mostly Focused on Basics…“Roti, Kapda Aur Makaan”…@ 54% of Personal Consumption Expenditure

Source: Euromonitor, Goldman Sachs Investment Research.
India Job Creation = Employment Levels @ 55% of Working Age Population...
Employment Trending Slower than Population Growth

India Working Age (15-64 Years Old) Population vs. Employment,
1995 – 2050E

Working age population defined as ages 15-64.
India Business Basics = Ease-of-Doing Business Lags Behind Many Countries

<table>
<thead>
<tr>
<th>Topics</th>
<th>India</th>
<th>China</th>
<th>USA</th>
<th>OECD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Ease of Doing Business (Rank out of 190)</td>
<td>130</td>
<td>78</td>
<td>8</td>
<td>--</td>
</tr>
<tr>
<td>Ease of Starting a Business (Rank out of 190)</td>
<td>155</td>
<td>127</td>
<td>51</td>
<td>--</td>
</tr>
<tr>
<td># Procedures to Register Business (Number)</td>
<td>14</td>
<td>9</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Time to Register Business (Days)</td>
<td>26</td>
<td>28</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Cost to Register Business (% of Income Per Capita)</td>
<td>16.5%</td>
<td>0.6%</td>
<td>1.3%</td>
<td>3.1%</td>
</tr>
</tbody>
</table>

Source: The World Bank, 2017 (http://www.doingbusiness.org/rankings). Rankings apply to 190 countries. Number of procedures, time to register, and cost as % of income per capita reported here based on statistics that apply to men.
India Education = Average Years of Schooling Lags Peers

Average Years of Schooling Among Selected Medium Human Development Countries, 2015

Mean years of schooling defined as average number of years of education received by people ages 25 and older, converted from education attainment levels using official durations of each level.
India Logistics = Low Infrastructure Competitiveness

### Infrastructure Rankings Across Asia, 2016

<table>
<thead>
<tr>
<th>City</th>
<th>Country</th>
<th>Traffic Index</th>
<th>2015 Population (MM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kolkata</td>
<td>India</td>
<td>337</td>
<td>12MM</td>
</tr>
<tr>
<td>Dhaka</td>
<td>Bangladesh</td>
<td>317</td>
<td>18MM</td>
</tr>
<tr>
<td>Mumbai</td>
<td>India</td>
<td>308</td>
<td>21MM</td>
</tr>
<tr>
<td>Sharjah</td>
<td>UAE</td>
<td>298</td>
<td>1MM</td>
</tr>
<tr>
<td>Nairobi</td>
<td>Kenya</td>
<td>295</td>
<td>4MM</td>
</tr>
<tr>
<td>Manila</td>
<td>Philippines</td>
<td>283</td>
<td>13MM</td>
</tr>
<tr>
<td>Jakarta</td>
<td>Indonesia</td>
<td>280</td>
<td>10MM</td>
</tr>
<tr>
<td>Tehran</td>
<td>Iran</td>
<td>272</td>
<td>8MM</td>
</tr>
<tr>
<td>Mexico City</td>
<td>Mexico</td>
<td>272</td>
<td>21MM</td>
</tr>
<tr>
<td>Istanbul</td>
<td>Turkey</td>
<td>263</td>
<td>14MM</td>
</tr>
</tbody>
</table>


India Gender Disparity = Female Labor Participation Rate @ 27%...Below World Average

Female Labor Force Participation Rate, 2008 - 2016

![Female Labor Force Participation Rate Graph]

Source: International Labor Organization, 2016
Note: ILO defines female labor force participation rate as the proportion of the female population of age 15 and older that is economically active: all people who supply labor for the production of goods and services during a specified period.
India Internet = Competition Continues to Intensify…Consumers Winning

1) **Economy** = Strong Growth
2) **Internet Users** = Solid Growth
3) **Mobiles** = Choppy Growth…Recent Acceleration
4) **Internet** = Fierce Global Battleground (Hardware / Carriers / Software / Commerce)
5) **Internet Usage** = Rising Owing to Cheaper / Faster Access
6) **Leadership** = Focused Pro-Digital Policies
7) **Internet Innovation** =
   - **Leapfrogging** = Mobile…Identity…Bandwidth…Payments
   - **Re-Imagining** = Entertainment…Education…Healthcare…Marketplaces
8) **Internet Challenges** = Financing Environment…Language Diversity
9) **India Macro** = Demographics = Bad & Good…Challenges = Job Creation…Business Basics…Education…Logistics…Gender Disparity
HEALTHCARE @ DIGITAL INFLECTION POINT

NOAH KNAUF @ KLEINER PERKINS
Healthcare @ Digital Inflection Point

100 Years Ago
Human Touch

25 Years Ago
Machine Assisted / Analog

Today
Technology Enabled / Digital

Source: History of Nephrology, Welch Allyn, Medisave, Kinsa
Digitization of Healthcare = Virtuous Cycle of Innovation

1) **Digital Inputs** = Rapid Growth in Sources of Digital Health Data

2) **Data Accumulation** = Proliferation of Digitally-Native Data Sets

3) **Data Insight** = Generated Following Accumulation & Integration of Data

4) **Translation** = Impact on Therapeutics & Healthcare Delivery

5) **Outcomes** = Measure Outcomes & Iterate… Innovation Cycle Times Compressing
Digital Inputs =

Rapid Growth in Sources of Digital Health Data
Measurement = Most Widely Used Medical Technology Now Digital / Connected…

<table>
<thead>
<tr>
<th></th>
<th>2000’s</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-Ray</td>
<td>2D / Analog</td>
<td>3D / Digital</td>
</tr>
<tr>
<td>ECG</td>
<td>Paper-Based / Analog</td>
<td>Wearable / Digital</td>
</tr>
<tr>
<td>Blood Pressure</td>
<td>Manual / Analog</td>
<td>Automatic / Digital</td>
</tr>
<tr>
<td>Hospital Monitoring</td>
<td>In-Room / Analog</td>
<td>Remote / Digital</td>
</tr>
</tbody>
</table>

Source: Medisave, GE Healthcare, iRhythm Technologies, Welch Allyn
…Diagnostic Technology =
Measured / Monitored Data Attributes Rising Rapidly…

**Commercially Available Lab Tests, 1993-2017**

<table>
<thead>
<tr>
<th>Year</th>
<th>Lab Tests with Waived Status Under CLIA*K</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>13</td>
</tr>
<tr>
<td>1994</td>
<td>13</td>
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<tr>
<td>1995</td>
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<td>2015</td>
<td>13</td>
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<tr>
<td>2016</td>
<td>13</td>
</tr>
<tr>
<td>2017</td>
<td>59</td>
</tr>
</tbody>
</table>

* Lab Tests are considered to be CLIA waived if the test is simple and accurate enough that it is impossible to produce incorrect results conducting them and does not do any harm to the human body. Tests become CLIA waived automatically if the FDA approves it for at-home use.

**Source:** CLIA/FDA Database of Waived Tests and Database of Analytes (5/17)

**2017 as of 5/17.**
Wearables = Gaining Adoption
~25% of Americans own a Wearable, +12% Y/Y, 2016

Global Wearable Shipments

<table>
<thead>
<tr>
<th>Year</th>
<th>Shipments (MM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>26</td>
</tr>
<tr>
<td>2015</td>
<td>82</td>
</tr>
<tr>
<td>2016</td>
<td>102</td>
</tr>
</tbody>
</table>

Sensors in Wrist Wearables, 9/16

- Accelerometer: 86%
- Heart Rate: 33%
- GPS: 28%
- Gyroscope: 26%
- Compass: 19%
- Microphone: 18%
- Ambient Light: 12%
- Barometer: 7%
- Altimeter: 6%
- Camera: 6%
- Thermometer: 5%
- Others: 13%

Source: Rock Health 2016 Consumer Survey (12/16), IDC, Collection and Processing of Data from Wrist Wearable Devices in Heterogeneous and Multiple-User Scenarios (9/16)
* Based on analysis of 140 different wrist wearable devices
% of Consumers Willing to Share Health Data

Google 60%
Microsoft 56%
Samsung 54%
Apple 50%
Amazon 39%
Facebook 39%
IBM 37%

Source: Rock Health 2016 Consumer Survey
Note: Based on consumer survey with 4,015 participants; as % of respondents willing to share their health data with tech company at all.
Data Accumulation =

Proliferation of Digitally-Native Health-Related Data Sets
Proliferation of Health Apps = Rapid Rise of Empowering Data in Consumer Hands…

Health & Fitness App Downloads*, Per App Annie
+5% Y/Y in US, +15% Y/Y in ROW

Health Apps by Category, Global, 2015

- 36% Fitness
- 24% Diet & Nutrition
- 17% Disease & Treatment
- 12% Lifestyle & Stress
- 11% Other

Source: App Annie, IMS Health (6/15)
Note: Due to focus on iOS App Store and Google Play, Rest of World in the App Annie chart does not capture China’s downloads on other app stores. The IMS chart includes iOS App Store and Google Play as of 6/15.
* App downloads captures iOS App Store and Google Play
Electronic Health Record (EHR) Adoption = Broad + Centralized Accumulation of Data...

EHR Adoption Among Office-Based Physicians, USA 2004-2015

Average Amount of Clinical Data Elements per Patient per Year*, 8/16

- Clinical Results: 26.3
- Scanned Images: 10.5
- Vital Signs: 4.1
- Problems (historical, current): 3.2
- Other (e.g. medications, allergens, etc.): 5.5

Source: Office of the National Coordinator for Health Information Technology (12/16), Galen Healthcare (8/16)*

*Estimated per year clinical data element collection based on data elements collected over 6 years for 165,399 patients, average 49yrs old
...Hospitals Providing Digital Access to Healthcare Information = +7x Since 2013...

Hospitals that Enable Patient Digital Data Access, 2012 - 2015

Source: ONC/AHA Annual Survey Information Technology Supplement: 2012-2015 (9/16)
Note: Percentage of non-federal acute care hospitals that provide patients with the capability to electronically view, download, and transmit their health information
Increasing Digitization of Inputs = Healthcare Data Growing at 48% Y/Y

Growth in Healthcare Data

153 Exabytes

Worldwide Healthcare Data (2013)

Data Drivers

Typical 500 Bed Hospital

• 500 Beds
• 8,000 Employees
• 400 Applications
• 500 Databases
• 1,000 Interfaces
• 10,000 Desktops
• 500 Owned/Controlled Tablets
• 2,000 Owned/Controlled Mobile Devices

50 Petabytes of Data per Hospital

Source: IDC & EMC (12/13)
Note: 1 Exabyte = 1B Gigabytes, 1 Petabyte = 1M Gigabytes
Data Insight + Translation =

Early Innings of Impact on Therapeutics
Rise in Inputs + Data = Medical Research / Knowledge Doubling Every 3.5 Years…

Cumulative PubMed Scientific Article Citations*

<table>
<thead>
<tr>
<th>Years</th>
<th>Citations (MM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1907</td>
<td>0.06</td>
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<tr>
<td>1917</td>
<td>2</td>
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<tr>
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<td>2007</td>
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<tr>
<td>2017</td>
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</tr>
</tbody>
</table>


*Based on cumulative number of published medical citations on PubMed, **Based on peer-reviewed article on challenges in medical education

Years to Double Medical Knowledge**

- 1950: 50 years
- 1980: 7 years
- 2010: 3.5 years
Clinical Trials = Follow Expansion of Research Insight But Clinical Impact Lags Owing to Length of Trials...

Growth in Clinical Trials

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Number of Registered Clinical Trials (K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>20</td>
</tr>
<tr>
<td>2007</td>
<td>40</td>
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<tr>
<td>2008</td>
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<td>2010</td>
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<tr>
<td>2011</td>
<td>120</td>
</tr>
<tr>
<td>2012</td>
<td>140</td>
</tr>
<tr>
<td>2013</td>
<td>160</td>
</tr>
<tr>
<td>2014</td>
<td>180</td>
</tr>
<tr>
<td>2015</td>
<td>200</td>
</tr>
<tr>
<td>2016</td>
<td>220</td>
</tr>
</tbody>
</table>

Average Clinical Trial Duration

- **Phase 0**: ~3.5 Years
- **Phase 1**: 1.8 Years
- **Phase 2**: 2.1 Years
- **Phase 3**: 2.5 Years

Average Time to Market (New Drug): ~12 Years

Source: ClinicalTrials.gov database (5/17), FDAReview.org (2016)
Number of Registered Clinical Trials posted on ClinicalTrials.gov.
New Data Streams = Enhancing & Perhaps Accelerating Clinical Trials…

Selection Biomarkers (Enabled by DNA Sequencing) for Enrolling Patients in Clinical Trials Improves Probability of Success

Source: Biotechnology Innovation Group, Biomedtracker, Amplion (5/16)
Note: Based on 9,985 phase transitions of trials between 2006 – 2015. 512 phase transitions incorporated selection biomarkers for patient stratification; phase transitions identified by mapping NCT numbers from ClinicalTrials.gov with Amplion's BiomarkerBase and Biomedtracker’s transition database.
Data Silos = Breaking Down Owing to Broad Efforts to Share Data Among Scientific Community...

Growth in Publically-Available Clinical Trial Results

In 2014, Nature launched a peer reviewed open-access scientific journal focused on publishing datasets in machine-readable format for sharing across the natural sciences. Nature encourages authors to submit to Scientific Data in parallel but requires authors to enter the following data in community-endorsed, public repository prior to publishing in Nature:

Mandatory deposition
- Protein sequences
- DNA and RNA sequences
- DNA and RNA sequencing data
- Genetic polymorphisms
- Linked genotype and phenotype data
- Macromolecular structure
- Microarray data
- Crystallographic data for small molecules

 Suitable repositories
- Uniprot
- Genbank
- DNA DataBank of Japan
- EMBL Nucleotide Sequence Database
- NCBI Trace Archive
- NCBI Sequence Read Archive
- dbSNP
- dbVar
- European Variation Archive
- dbGAP
- The European Genome-phenome Archive
- Worldwide Protein Data Bank
- Biological Magnetic Resonance Data Bank
- Electron Microscopy Data Bank
- Gene Expression Omnibus
- ArrayExpress
- Cambridge Structural Database

Source: ClinicalTrials.gov database (5/17), Nature (7/14)
Number of Registered Studies with Public Results posted on ClinicalTrials.gov. ClinicalTrials.gov launched results database in September 2008 so earliest available full year is 2009.
...As Data Accumulates & Silos Breakdown…
Research Insights Could Accelerate…

Growing Evidence That Data = Cheaper + Faster Clinical Trials

<table>
<thead>
<tr>
<th></th>
<th>Traditional UK Department of Health Study</th>
<th>Archimedes Data Simulation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of Patients</strong></td>
<td>2,838</td>
<td>50,000</td>
</tr>
<tr>
<td><strong>Years of Data</strong></td>
<td>7 Years</td>
<td>30 Years</td>
</tr>
<tr>
<td><strong>Length of Study</strong></td>
<td>7 Years</td>
<td>2 Months</td>
</tr>
<tr>
<td><strong>Conclusion</strong></td>
<td>Out of 4 principal findings Archimedes predicted 2 exactly right, 1 within the margin of error, and 1 slightly below.</td>
<td></td>
</tr>
</tbody>
</table>

Archimedes Simulation = a mathematical model to simulate (1) human physiology and disease, (2) care process models, and (3) healthcare system resources. Ran virtual trials of large, simulated populations in a fraction of the time and cost of a traditional study.

Note: The UK Department of Health launched a trial study, Collaborative Atorvastatin Diabetes Study (Cards), and the American Diabetes Association asked David Eddy to conduct a simulation addressing the same issues before the UK results were released.
Data Insight + Translation =

Healthcare Delivery Could Change Faster With Consumer Engagement & Faster Innovation Cycles
Consumers = Increasingly Expect Digital Health Services… Especially Millennials…

Digital Health Adoption Across Generations

- Own a Wearable: Millennials 40%, Gen X 26%, Baby Boomers 10%
- Go Online to Find Physician: Millennials 38%, Gen X 23%, Baby Boomers 10%
- Select Provider Based on Online Reviews: Millennials 34%, Gen X 21%, Baby Boomers 8%
- Have Sought Remote Medical Care / Advice*: Millennials 56%, Gen X 31%, Baby Boomers 31%

*Represents % of Millennials that have sought medical care/advice over live video, % of Gen X that have over text message, and % of Baby Boomers who have over phone.

Source: Rock Health Digital Health Consumer Adoption (12/16)

Millennials include 18-34 year olds; Gen X include 35-54 year olds; Baby Boomers include 55+ year olds.
Consumers = Increasingly Use Digital Health Tools

Consumers Using Digital Health Tools (Telemedicine, Wearables, etc.)
88% Using at Least One Tool, 1 in 10 are Super Adopters

Source: Rock Health Digital Health Consumer Adoption (12/16)
Based on consumer survey of n=4,015; number of digital health categories used by respondent
Healthcare Practices = Being Re-Imagined… Leveraging Data to Optimize Outcomes

**Patient Empowerment & Health Management**

- Propeller Health + Bluetooth Inhaler Sensor = Improved Medication Adherence + Insights
- Livongo + Connected Glucose Meter = Personalized Coaching + $100/Month Savings for Payers

**Improvements to Clinical Pathways / Protocol**

- Ayasdi AI + Mercy Health System Patient Data = Clinical Anomaly Detection + Improved Clinical Pathway Development
- Flatiron + Foundation Med (FMI) = 20,000 Liked Cancer Patients Records + Personalized Medicine

**Preventative Health**

- Kinsa + Crowdsourced Temperature Data = Local Flu Predictions + Proactive Treatments for Populations
- Omada + Preventative Program = 4-5% Body Weight Reduction + Reduced Risk for Stroke and Heart Disease

Source: PBS, Propeller Health, TechCrunch, Livongo, Ayasdi, Flatiron, Xconomy, Kinsa, Omada
Digital Health = Could It Follow Tech-Like Rapid Adoption Curves?

Acceleration of Technological Adoption Curves 1867-2017

- Electricity (46)
- Telephone (35)
- Radio (31)
- Television (26)
- PC (16)
- Cellphone (13)
- Internet (7)
- Social Media (5)

Source: The Economist (12/15), Pew Research Center (1/17)
*Social Media Adoption based on founding date of MySpace (2003) and Social Media Penetration calculated by Pew Research Center
Evolution of Genomics =

Case Study in Virtuous Cycle of Innovation…

Input…Data Accumulation…Insight…Translation…
Genomics Digitizes = Gets Faster / Better / Cheaper…

Introduction of Digital Technology Accelerates Cost Reduction Faster Than Moore’s Law

2007: Digital Technology Leads To Cost Reduction
Illumina (Solexa) Launches the Genome Analyzer
Time to sequence a genome: 10 Months

2015: Step Function Reduction In Cost
Illumina Launches the X10
Time to sequence a genome: 27 hours

Cost to Sequence (per Genome)

Source: National Institute of Health, National Human Genome Research Institute (7/17), Biology Reference, Illumina
…Accumulation of Genomic Data Leads to…
19x Increase in Genomic Knowledge…

Source: PloS Biology (7/15), SNPedia (5/17)
SNPs (Single Nucleotide Polymorphisms) represent nucleotides where the DNA of different people vary; variants can be predictive of disease risk, drug efficacy, and phenotypic differences.
...Genomics Research & Insights Lead to Rapid Increase in Available Genetic Tests...

Genetic Disorders with Diagnostic Tests Available, 5/29/2017

Number of Disorders


Source: Genetests (5/17)
Number of Personalized* Medicines Up From Almost None in 2008, 2008-2016

- 2008: 5
- 2010: 36
- 2012: 81
- 2014: 106
- 2016: 132

Source: Personalized Medicine Coalition (2017)
*Number of personalized medicines calculated based on PMC's Case for Personalized Medicine and the FDA's Table of Pharmacogenomic Biomarkers in Drug Labeling
Evolution of Genomics Technologies Enable Deeper Research… Consumer Genomics Evolving Similarly…

- **SNP Arrays and Genotyping (v1.0)**
  - Identifies variations in specific, pre-defined single letters within a gene

- **Next Generation Sequencing (v2.0)**
  - Looks for variations throughout the entire gene

---

**Research**

- **SNP Arrays and Genotyping**
  - Articles in PubMed:
    - 1000 articles in 2016

- **Next Generation Sequencing**
  - Articles in PubMed:
    - 8,904 articles in 2016

---

**Consumer**

- **23andMe**
- **ancestry.com**
- **color**

Source: PubMed, Helix

Based on PubMed queries for peer-reviewed articles on genotyping and sequencing
Digitization = Enabling New Business Models in Genomics

DNA Sequenced Once

Query Often: Ecosystem of Products from Partner Organizations

More Empowered + Informed Consumers

Source: Helix (5/17)
Healthcare @ Digital Inflection Point

100 Years Ago
Human Touch

25 Years Ago
Machine Assisted / Analog

Today
Technology Enabled / Digital

Source: History of Nephrology, Welch Allyn, Medisave, Kinsa
GLOBAL PUBLIC / PRIVATE INTERNET COMPANIES =

IT’S BEEN A GOOD TIME TO BE A LEADER / INNOVATOR
Global Internet Companies =

An Epic Half-Decade for Public + Private Internet Companies
<table>
<thead>
<tr>
<th>Rank</th>
<th>Company</th>
<th>Region</th>
<th>Current Market Value ($B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Apple</td>
<td>USA</td>
<td>$801</td>
</tr>
<tr>
<td>2</td>
<td>Google - Alphabet</td>
<td>USA</td>
<td>680</td>
</tr>
<tr>
<td>3</td>
<td>Amazon</td>
<td>USA</td>
<td>476</td>
</tr>
<tr>
<td>4</td>
<td>Facebook</td>
<td>USA</td>
<td>441</td>
</tr>
<tr>
<td>5</td>
<td>Tencent</td>
<td>China</td>
<td>335</td>
</tr>
<tr>
<td>6</td>
<td>Alibaba</td>
<td>China</td>
<td>314</td>
</tr>
<tr>
<td>7</td>
<td>Priceline</td>
<td>USA</td>
<td>92</td>
</tr>
<tr>
<td>8</td>
<td>Uber</td>
<td>USA</td>
<td>70</td>
</tr>
<tr>
<td>9</td>
<td>Netflix</td>
<td>USA</td>
<td>70</td>
</tr>
<tr>
<td>10</td>
<td>Baidu</td>
<td>China</td>
<td>66</td>
</tr>
<tr>
<td>11</td>
<td>Salesforce</td>
<td>USA</td>
<td>65</td>
</tr>
<tr>
<td>12</td>
<td>Paypal</td>
<td>USA</td>
<td>61</td>
</tr>
<tr>
<td>13</td>
<td>Ant Financial</td>
<td>China</td>
<td>60</td>
</tr>
<tr>
<td>14</td>
<td>JD.com</td>
<td>China</td>
<td>58</td>
</tr>
<tr>
<td>15</td>
<td>Didi Kuaidi</td>
<td>China</td>
<td>50</td>
</tr>
<tr>
<td>16</td>
<td>Yahoo!</td>
<td>USA</td>
<td>49</td>
</tr>
<tr>
<td>17</td>
<td>Xiaomi</td>
<td>China</td>
<td>46</td>
</tr>
<tr>
<td>18</td>
<td>eBay</td>
<td>USA</td>
<td>38</td>
</tr>
<tr>
<td>19</td>
<td>Airbnb</td>
<td>USA</td>
<td>31</td>
</tr>
<tr>
<td>20</td>
<td>Yahoo! Japan</td>
<td>Japan</td>
<td>26</td>
</tr>
</tbody>
</table>

Total: $3,827


Note: For public companies, colors denote current market value relative to Y/Y market value. Green = higher. Red = lower. Yellow = private companies, where market value represents latest publicly announced valuation. Ant Financial and Didi Kuaidi valuation per latest media reports as of 6/16 and 4/17 respectively. Xiaomi valuation per latest media reports as of 4/17. Ant Financial treated separately from Alibaba as Alibaba retains no control of Ant and will receive a capped lump sum payment in the event of an Ant liquidity event. Cash includes cash and equivalents and short-term marketable securities plus long-term marketable securities where deemed liquid.
Global Public Companies =

An Epic Half-Decade for Internet Companies
2017 Global Market Capitalization Leaderboard = Tech = 40% of Top 20 Companies…100% of Top 5…

<table>
<thead>
<tr>
<th>Rank</th>
<th>Company</th>
<th>Region</th>
<th>Industry Segment</th>
<th>Current Market Value ($B)</th>
<th>2016 Revenue ($B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Apple</td>
<td>USA</td>
<td>Tech – Hardware</td>
<td>$801</td>
<td>$218</td>
</tr>
<tr>
<td>2</td>
<td>Google / Alphabet</td>
<td>USA</td>
<td>Tech – Internet</td>
<td>680</td>
<td>90</td>
</tr>
<tr>
<td>3</td>
<td>Microsoft</td>
<td>USA</td>
<td>Tech – Software</td>
<td>540</td>
<td>86</td>
</tr>
<tr>
<td>4</td>
<td>Amazon</td>
<td>USA</td>
<td>Tech – Internet</td>
<td>476</td>
<td>136</td>
</tr>
<tr>
<td>5</td>
<td>Facebook</td>
<td>USA</td>
<td>Tech – Internet</td>
<td>441</td>
<td>28</td>
</tr>
<tr>
<td>6</td>
<td>Berkshire Hathaway</td>
<td>USA</td>
<td>Financial Services</td>
<td>409</td>
<td>215</td>
</tr>
<tr>
<td>7</td>
<td>Exxon Mobil</td>
<td>USA</td>
<td>Energy</td>
<td>346</td>
<td>198</td>
</tr>
<tr>
<td>8</td>
<td>Johnson &amp; Johnson</td>
<td>USA</td>
<td>Healthcare</td>
<td>342</td>
<td>72</td>
</tr>
<tr>
<td>9</td>
<td>Tencent</td>
<td>China</td>
<td>Tech – Internet</td>
<td>335</td>
<td>22</td>
</tr>
<tr>
<td>10</td>
<td>Alibaba</td>
<td>China</td>
<td>Tech – Internet</td>
<td>314</td>
<td>21</td>
</tr>
<tr>
<td>11</td>
<td>JP Morgan Chase</td>
<td>USA</td>
<td>Financial Services</td>
<td>303</td>
<td>90</td>
</tr>
<tr>
<td>12</td>
<td>ICBC</td>
<td>China</td>
<td>Financial Services</td>
<td>264</td>
<td>85</td>
</tr>
<tr>
<td>13</td>
<td>Nestlé</td>
<td>Switzerland</td>
<td>Food / Beverages</td>
<td>263</td>
<td>88</td>
</tr>
<tr>
<td>14</td>
<td>Wells Fargo</td>
<td>USA</td>
<td>Financial Services</td>
<td>262</td>
<td>85</td>
</tr>
<tr>
<td>15</td>
<td>Samsung Electronics</td>
<td>Korea</td>
<td>Tech – Hardware</td>
<td>259</td>
<td>168</td>
</tr>
<tr>
<td>16</td>
<td>General Electric</td>
<td>USA</td>
<td>Industrial</td>
<td>238</td>
<td>120</td>
</tr>
<tr>
<td>17</td>
<td>Wal-Mart</td>
<td>USA</td>
<td>Retail</td>
<td>237</td>
<td>486</td>
</tr>
<tr>
<td>18</td>
<td>AT&amp;T</td>
<td>USA</td>
<td>Telecom</td>
<td>234</td>
<td>164</td>
</tr>
<tr>
<td>19</td>
<td>Roche</td>
<td>Switzerland</td>
<td>Healthcare</td>
<td>233</td>
<td>51</td>
</tr>
<tr>
<td>20</td>
<td>Bank of America</td>
<td>USA</td>
<td>Financial Services</td>
<td>231</td>
<td>80</td>
</tr>
</tbody>
</table>

Total $7,207 $2,497

Source: CapIQ. Market value data as of 5/26/17
Note: For public companies, colors denote current market value relative to Y/Y market value. Green = higher, red = lower.
2012 Global Market Capitalization Leaderboard = Tech = 20% of Top 20 Companies...40% of Top 5

<table>
<thead>
<tr>
<th>Rank</th>
<th>Company</th>
<th>Region</th>
<th>Industry Segment</th>
<th>5/31/2012 Value ($B)</th>
<th>2011 Revenue ($B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Apple</td>
<td>USA</td>
<td>Tech – Hardware</td>
<td>$540</td>
<td>$128</td>
</tr>
<tr>
<td>2</td>
<td>Exxon Mobil</td>
<td>USA</td>
<td>Financial Services</td>
<td>368</td>
<td>434</td>
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<tr>
<td>3</td>
<td>PetroChina</td>
<td>China</td>
<td>Energy</td>
<td>267</td>
<td>318</td>
</tr>
<tr>
<td>4</td>
<td>Microsoft</td>
<td>USA</td>
<td>Tech – Software</td>
<td>245</td>
<td>72</td>
</tr>
<tr>
<td>5</td>
<td>ICBC</td>
<td>China</td>
<td>Financial Services</td>
<td>227</td>
<td>70</td>
</tr>
<tr>
<td>6</td>
<td>Wal-Mart</td>
<td>USA</td>
<td>Retail</td>
<td>224</td>
<td>447</td>
</tr>
<tr>
<td>7</td>
<td>IBM</td>
<td>USA</td>
<td>Tech – Hardware</td>
<td>223</td>
<td>107</td>
</tr>
<tr>
<td>8</td>
<td>China Mobile</td>
<td>China</td>
<td>Telecom</td>
<td>203</td>
<td>84</td>
</tr>
<tr>
<td>9</td>
<td>General Electric</td>
<td>USA</td>
<td>Industrial</td>
<td>202</td>
<td>143</td>
</tr>
<tr>
<td>10</td>
<td>AT&amp;T</td>
<td>USA</td>
<td>Telecom</td>
<td>200</td>
<td>127</td>
</tr>
<tr>
<td>11</td>
<td>Royal Dutch Shell</td>
<td>Netherlands</td>
<td>Energy</td>
<td>197</td>
<td>470</td>
</tr>
<tr>
<td>12</td>
<td>Berkshire Hathaway</td>
<td>USA</td>
<td>Financial Services</td>
<td>196</td>
<td>141</td>
</tr>
<tr>
<td>13</td>
<td>Chevron</td>
<td>USA</td>
<td>Energy</td>
<td>194</td>
<td>236</td>
</tr>
<tr>
<td>14</td>
<td>Google / Alphabet</td>
<td>USA</td>
<td>Tech – Internet</td>
<td>189</td>
<td>38</td>
</tr>
<tr>
<td>15</td>
<td>Nestlé</td>
<td>Switzerland</td>
<td>Food / Beverages</td>
<td>180</td>
<td>90</td>
</tr>
<tr>
<td>16</td>
<td>China Construction Bank</td>
<td>China</td>
<td>Financial Services</td>
<td>173</td>
<td>58</td>
</tr>
<tr>
<td>17</td>
<td>Johnson &amp; Johnson</td>
<td>USA</td>
<td>Healthcare</td>
<td>171</td>
<td>65</td>
</tr>
<tr>
<td>18</td>
<td>Procter &amp; Gamble</td>
<td>USA</td>
<td>Consumer Goods</td>
<td>171</td>
<td>84</td>
</tr>
<tr>
<td>19</td>
<td>Wells Fargo</td>
<td>USA</td>
<td>Financial Services</td>
<td>170</td>
<td>73</td>
</tr>
<tr>
<td>20</td>
<td>BHP Billiton</td>
<td>Australia</td>
<td>Metals / Mining</td>
<td>170</td>
<td>75</td>
</tr>
</tbody>
</table>

Total: $4,512 $3,257

Source: CapIQ. Market value data as of 5/31/12.
Note: For public companies, colors denote current market value relative to Y/Y market value. Green = higher, red = lower.
Big Get Bigger = & Go After Other Bigs…

Often Led by Founder-Driven Innovation / Seeing Around Corners
## Internet Bigs Expansion / Growth = A Long Way from Where They Started

<table>
<thead>
<tr>
<th>Company</th>
<th>Founding Year</th>
<th>Original Business</th>
<th>Current Businesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>1976</td>
<td>Personal Computer Maker</td>
<td>Smartphone / Computer / Tablet Maker…Content / Media Marketplace…Cloud Services</td>
</tr>
<tr>
<td>Facebook</td>
<td>2004</td>
<td>Social Network (USA)</td>
<td>Global Social Network…Instant Messaging Platform…Image Sharing Platform…AR / VR Software / Hardware…Ad Ecosystem</td>
</tr>
<tr>
<td>Tencent</td>
<td>1998</td>
<td>Instant Messaging Platform (China)</td>
<td>Instant Messaging Platform…Gaming…Content Ecosystem…Social Network…Ad Ecosystem…Payments…Digital Video / Music Platform…Cloud Services</td>
</tr>
</tbody>
</table>

Source: Company filings
Global Technology Financings =

Strong Relative to History…
Slowing @ Margin
Global Technology Financings = Strong Relative to History…Slowing @ Margin

Global USA-Listed Technology IPO Issuance & Global Technology Venture Capital Financing, 1990 – 2017YTD

VC Funding per Company ($MM)

Source: Morgan Stanley Equity Capital Markets, 2017YTD as of 5/12/17, Thomson ONE 2017YTD as of 5/12/17. All global U.S.-listed technology IPOs over $30MM, data per Dealogic, Bloomberg, & Capital IQ. VC Funding per Company ($MM) calculated as total venture financing per year divided by number of companies receiving venture financing.

*Facebook ($16B IPO) = 75% of 2012 IPO $ value. **Alibaba ($25B IPO) = 69% of 2014 IPO $ value. ***Snap ($4B IPO) = 74% of 2017 YTD $ value.
Global Technology Mergers & Acquisitions = Robust Relative to History
Global Technology Merger & Acquisition Volume = Robust Relative to History

Global Technology M&A Deals, 2010-2016

- 2010: $100
- 2011: $138
- 2012: $72
- 2013: $145
- 2014: $179
- 2015: $365
- 2016: $336

Source: Morgan Stanley, Thomson Research
There are pockets of Internet company overvaluation but there are also pockets of undervaluation...

Very few companies will win – those that do – can win big...

Over time, best rule of thumb for valuing companies = value is present value of future cash flows.
Global Public / Private Internet Companies =
It’s Been a Good Time to be a Leader / Innovator

1) **Global Internet Companies** = An Epic Half-Decade for Public + Private Internet Companies

2) **Global Public Companies** = An Epic Half-Decade for Internet Companies

3) **Big Get Bigger** = & Go After Other Bigs…Often Led by Founder-Driven Innovation / Seeing Around Corners

4) **Global Technology Financings** = Strong Relative to History…Slowing @ Margin

5) **Global Technology Mergers & Acquisitions** = Robust Relative to History

6) **Value of a Business**…
SOME MACRO THOUGHTS
USA, Inc.* =

Understanding Where Your Tax Dollars Go


<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue ($B)</td>
<td>$769</td>
<td>$1,055</td>
<td>$1,453</td>
<td>$1,991</td>
<td>$2,407</td>
<td>$2,303</td>
<td>$3,267</td>
<td>+5% Y/Y average over 25 years</td>
</tr>
<tr>
<td>Y/Y Growth</td>
<td>5%</td>
<td>2%</td>
<td>7%</td>
<td>-2%</td>
<td>12%</td>
<td>7%</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>Individual Income Taxes*</td>
<td>$349</td>
<td>$468</td>
<td>$656</td>
<td>$994</td>
<td>$1,044</td>
<td>$1,091</td>
<td>$1,546</td>
<td>Largest driver of revenue</td>
</tr>
<tr>
<td>% of Revenue</td>
<td>45%</td>
<td>44%</td>
<td>45%</td>
<td>50%</td>
<td>43%</td>
<td>47%</td>
<td>47%</td>
<td></td>
</tr>
<tr>
<td>Social Insurance Taxes</td>
<td>$284</td>
<td>$396</td>
<td>$509</td>
<td>$694</td>
<td>$838</td>
<td>$819</td>
<td>$1,115</td>
<td>Social Security &amp; Medicare payroll tax</td>
</tr>
<tr>
<td>% of Revenue</td>
<td>37%</td>
<td>38%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>36%</td>
<td>34%</td>
<td></td>
</tr>
<tr>
<td>Corporate Income Taxes*</td>
<td>$63</td>
<td>$98</td>
<td>$172</td>
<td>$151</td>
<td>$354</td>
<td>$181</td>
<td>$300</td>
<td>Fluctuates with economic conditions</td>
</tr>
<tr>
<td>% of Revenue</td>
<td>8%</td>
<td>9%</td>
<td>12%</td>
<td>8%</td>
<td>15%</td>
<td>8%</td>
<td>9%</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>$73</td>
<td>$93</td>
<td>$115</td>
<td>$152</td>
<td>$171</td>
<td>$212</td>
<td>$316</td>
<td>Estate &amp; gift taxes, duties / fees…</td>
</tr>
<tr>
<td>% of Revenue</td>
<td>10%</td>
<td>9%</td>
<td>8%</td>
<td>8%</td>
<td>7%</td>
<td>9%</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Expense ($B)</td>
<td>$990</td>
<td>$1,324</td>
<td>$1,560</td>
<td>$1,863</td>
<td>$2,655</td>
<td>$3,603</td>
<td>$3,854</td>
<td>+4% Y/Y average over 15 years</td>
</tr>
<tr>
<td>Y/Y Growth</td>
<td>5%</td>
<td>6%</td>
<td>3%</td>
<td>4%</td>
<td>7%</td>
<td>4%</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Entitlement / Mandatory</td>
<td>$416</td>
<td>$597</td>
<td>$787</td>
<td>$1,008</td>
<td>$1,412</td>
<td>$2,026</td>
<td>$2,429</td>
<td>Risen owing to rising healthcare costs + aging population</td>
</tr>
<tr>
<td>% of Expense</td>
<td>42%</td>
<td>45%</td>
<td>50%</td>
<td>54%</td>
<td>53%</td>
<td>56%</td>
<td>63%</td>
<td></td>
</tr>
<tr>
<td>Non-Defense Discretionary</td>
<td>$165</td>
<td>$214</td>
<td>$267</td>
<td>$343</td>
<td>$497</td>
<td>$648</td>
<td>$600</td>
<td>Education / law enforcement / transportation / general government…</td>
</tr>
<tr>
<td>% of Expense</td>
<td>17%</td>
<td>16%</td>
<td>17%</td>
<td>18%</td>
<td>19%</td>
<td>18%</td>
<td>16%</td>
<td></td>
</tr>
<tr>
<td>Defense</td>
<td>$274</td>
<td>$320</td>
<td>$266</td>
<td>$306</td>
<td>$520</td>
<td>$699</td>
<td>$584</td>
<td>2006 increase driven by War on Terror</td>
</tr>
<tr>
<td>% of Expense</td>
<td>28%</td>
<td>24%</td>
<td>17%</td>
<td>16%</td>
<td>20%</td>
<td>19%</td>
<td>15%</td>
<td></td>
</tr>
<tr>
<td>Net Interest on Public Debt</td>
<td>$136</td>
<td>$194</td>
<td>$241</td>
<td>$206</td>
<td>$227</td>
<td>$230</td>
<td>$241</td>
<td>Recent benefit of historic low interest rates</td>
</tr>
<tr>
<td>% of Expense</td>
<td>14%</td>
<td>15%</td>
<td>15%</td>
<td>11%</td>
<td>9%</td>
<td>6%</td>
<td>6%</td>
<td></td>
</tr>
<tr>
<td>Surplus / Deficit ($B)</td>
<td>(221)</td>
<td>(269)</td>
<td>(107)</td>
<td>$128</td>
<td>($248)</td>
<td>($1,300)</td>
<td>($587)</td>
<td>-19% average net margin, 1991-2016</td>
</tr>
<tr>
<td>Net Margin (%)</td>
<td>-29%</td>
<td>-26%</td>
<td>-7%</td>
<td>6%</td>
<td>-10%</td>
<td>-56%</td>
<td>-18%</td>
<td></td>
</tr>
</tbody>
</table>

Source: Congressional Budget Office, White House Office of Management and Budget
Note: USA federal fiscal year ends in September. Non-defense discretionary includes federal spending on education, infrastructure, law enforcement, judiciary functions.
* Individual & corporate income taxes include capital gains taxes.
USA Income Statement = What Net Losses in 45 of 50 Years Look Like...


Source: Congressional Budget Office, White House Office of Management and Budget
Note: USA federal fiscal year ends in September.
* Individual & corporate income taxes include capital gains taxes. Non-defense discretionary includes federal spending on education, infrastructure, law enforcement, judiciary functions.
When Spending > Income → Debt Rises = Net Debt / GDP @ 77%...Higher than 97% of USA's History...

USA Net Debt / GDP Ratio, 1790 – 2016

World War II = ~105%
World War I = ~30%
Civil War = ~30%
2016 = 77%

Source: Congressional Budget Office Long-Term Outlook (3/17), Wall Street Journal
…@ Current Course / Speed (& If Government Projections are Correct)…
USA Net Debt / GDP Ratio Will Break WWII Record by 2035…

**USA Net Debt / GDP Ratio, 1790 – 2047E**

- **1946 = ~105%**
- **2034E = ~105%**

Source: Congressional Budget Office Long-Term Outlook (3/17), Wall Street Journal
### USA = 9th Highest Public Debt / GDP Level… Relative to Other Major Economies

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>% of GDP</th>
<th>2015 Public Government Debt ($B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Japan</td>
<td>248%</td>
<td>$10,083</td>
</tr>
<tr>
<td>2</td>
<td>Greece</td>
<td>177</td>
<td>347</td>
</tr>
<tr>
<td>3</td>
<td>Lebanon</td>
<td>138</td>
<td>68</td>
</tr>
<tr>
<td>4</td>
<td>Italy</td>
<td>133</td>
<td>2,342</td>
</tr>
<tr>
<td>5</td>
<td>Portugal</td>
<td>129</td>
<td>257</td>
</tr>
<tr>
<td>6</td>
<td>Jamaica</td>
<td>120</td>
<td>20</td>
</tr>
<tr>
<td>7</td>
<td>Cyprus</td>
<td>109</td>
<td>20</td>
</tr>
<tr>
<td>8</td>
<td>Belgium</td>
<td>106</td>
<td>478</td>
</tr>
<tr>
<td>9</td>
<td>United States</td>
<td>105</td>
<td>$18,870</td>
</tr>
<tr>
<td>10</td>
<td>Singapore</td>
<td>105</td>
<td>302</td>
</tr>
<tr>
<td>11</td>
<td>Spain</td>
<td>99</td>
<td>1,124</td>
</tr>
<tr>
<td>12</td>
<td>France</td>
<td>96</td>
<td>2,236</td>
</tr>
<tr>
<td>13</td>
<td>Jordan</td>
<td>93</td>
<td>33</td>
</tr>
<tr>
<td>14</td>
<td>Canada</td>
<td>91</td>
<td>1,335</td>
</tr>
<tr>
<td>15</td>
<td>United Kingdom</td>
<td>89</td>
<td>2,458</td>
</tr>
<tr>
<td>16</td>
<td>Egypt</td>
<td>89</td>
<td>280</td>
</tr>
<tr>
<td>17</td>
<td>Croatia</td>
<td>87</td>
<td>40</td>
</tr>
<tr>
<td>18</td>
<td>Austria</td>
<td>86</td>
<td>302</td>
</tr>
<tr>
<td>19</td>
<td>Slovenia</td>
<td>83</td>
<td>30</td>
</tr>
<tr>
<td>20</td>
<td>Ukraine</td>
<td>80</td>
<td>37</td>
</tr>
</tbody>
</table>

Source: IMF

Note: Ranking excludes countries with public debt less than $10B in 2015. Public debt includes federal, state and local government debt but exclude unfunded pension liabilities from government defined-benefit pension plans and debt from public enterprises and central banks.
USA Entitlements = 63% of Spending vs. 45% 25 Years Ago…
Interest Expense Down as % Owing to Interest Rate Declines…

USA Expenses by Category, 1991-2016

- **Entitlements / Mandatory**: 15% in 1991, 6% in 2016
- **Defense**: 24% in 1991, 16% in 2016
- **Non-Defense Discretionary**: 45% in 1991, 63% in 2016

**Change by Category, 1991-2016**
- **Debt**: +$11T / +427%
- **Entitlements**: +$1.8T / +307%
- **Non-Defense Discretionary**: +$387B / +181%
- **Defense**: +$264B / +83%
- **Net Interest Cost**: +$46B / +24%

Source: Congressional Budget Office, White House Office of Management and Budget, US Treasury
Note: Yellow line represents yield on 10-year US Treasury bill from 12/31/91 to 12/31/16.
USA Entitlements = +$1.8 Trillion Over 25 Years…
Paced by Medicare + Medicaid Growth…

![USA Mandatory Outlays by Category ($B), 1991-2016](chart)

- **Social Security**
  - 1991: $163B (27%)
  - 2016: $910B (37%)

- **Medicare**
  - 1991: $114B (9%)
  - 2016: $692B (28%)

- **Medicaid**
  - 1991: $267B (45%)
  - 2016: $53B (9%)

- **Income Security**
  - 1991: $53B (9%)
  - 2016: $459B (19%)

Source: Congressional Budget Office, White House Office of Management and Budget
Note: Numbers may not sum due to rounding.
USA Entitlements = Equivalent to…
32% of Average Annual Income per Household vs. 20% 25 Years Ago…

Median Household Income vs. Effective Entitlement $ Paid per Household, USA, 1990-2016

Entitlements = 20% of median household income

1990

$6K

Remaining Household Median Income = $23K

Entitlements = 32% of median household income

2016

$18K

Effective entitlement dollars per household represents total entitlements over total US households (current $ as of year specified).

Source: Congressional Budget Office, US Census Bureau
Note: Based on median income math. Median income in current $ as of year specified.
Household Debt = Back @ Peak (Q3:08) Level & Rising…
Now vs. Q3:08 = Mortgage Debt (-7%) / Student Loans (+120%) / Auto Loans (+44%)

Source: Federal Reserve Bank of New York Consumer Credit Panel / Equifax, Quarterly Household Debt and Credit Report, Q1:17; St. Louis Federal Reserve FRED Database

* U6 Unemployment Rate defined as total unemployed persons plus all marginally attached workers plus persons employed part time for economic reasons.
USA Rising
Debt Commitments =

Non-Trivial Challenges that Need to Be Addressed
Immigration =

Important for USA
Technology Job Creation

USA = 60% of Most Highly Valued Tech Companies Founded By 1st Or 2nd Generation Americans...1.5MM Employees, 2016

Immigrant Founders / Co-Founders of Top 25 USA Valued Public Tech Companies, Ranked by Market Capitalization

<table>
<thead>
<tr>
<th>Rank</th>
<th>Company</th>
<th>Mkt Cap ($MM)</th>
<th>LTM Rev ($MM)</th>
<th>Employees</th>
<th>1st or 2nd Gen Immigrant Founder / Co-Founder</th>
<th>Generation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Apple</td>
<td>$800,898</td>
<td>$220,457</td>
<td>116,000</td>
<td>Steve Jobs 2nd-Gen, Syria</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Alphabet / Google</td>
<td>$679,533</td>
<td>$94,765</td>
<td>73,992</td>
<td>Sergey Brin 1st-Gen, Russia</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Microsoft</td>
<td>$540,127</td>
<td>$87,247</td>
<td>114,000</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Amazon.com</td>
<td>$475,958</td>
<td>$142,573</td>
<td>341,400</td>
<td>Jeff Bezos 2nd-Gen, Cuba</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Facebook</td>
<td>$440,900</td>
<td>$30,288</td>
<td>18,770</td>
<td>Eduardo Saverin 1st-Gen, Brazil</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Oracle</td>
<td>$186,230</td>
<td>$37,429</td>
<td>136,000</td>
<td>Larry Ellison / Bob Miner 2nd-Gen, Russia / 2nd-Gen, Iran</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Intel</td>
<td>$170,748</td>
<td>$60,481</td>
<td>106,000</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Cisco</td>
<td>$157,502</td>
<td>$48,510</td>
<td>73,390</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>IBM</td>
<td>$143,264</td>
<td>$79,390</td>
<td>380,300</td>
<td>Herman Hollerith 2nd-Gen, Germany</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Priceline</td>
<td>$91,597</td>
<td>$11,014</td>
<td>20,500</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Qualcomm</td>
<td>$84,982</td>
<td>$23,243</td>
<td>30,500</td>
<td>Andrew Viterbi 1st-Gen, Italy</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>NVIDIA</td>
<td>$84,395</td>
<td>$7,542</td>
<td>10,299</td>
<td>Jensen Huang 1st-Gen, Taiwan</td>
<td></td>
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<tr>
<td>13</td>
<td>Texas Instruments</td>
<td>$80,822</td>
<td>$13,764</td>
<td>29,865</td>
<td>Cecil Green / J. Erik Jonsson 1st-Gen, UK / 2nd-Gen, Sweden</td>
<td></td>
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<tr>
<td>14</td>
<td>Adobe Systems</td>
<td>$70,193</td>
<td>$6,153</td>
<td>15,706</td>
<td>--</td>
<td></td>
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<tr>
<td>15</td>
<td>Netflix</td>
<td>$70,007</td>
<td>$9,510</td>
<td>3,300</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Salesforce.com</td>
<td>$64,611</td>
<td>$8,863</td>
<td>25,000</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>PayPal</td>
<td>$61,492</td>
<td>$11,273</td>
<td>18,100</td>
<td>Max Levchin / Luke Nosek / Peter Thiel / Elon Musk*** 1st-Gen, Ukraine / 1st-Gen, Poland / 1st-Gen, Germany / 1st-Gen, South Africa</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Applied Materials</td>
<td>$48,896</td>
<td>$12,942</td>
<td>15,600</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Yahoo!</td>
<td>$48,570</td>
<td>$5,409</td>
<td>8,500</td>
<td>Jerry Yang 1st-Gen, Taiwan</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Automatic Data Processing</td>
<td>$45,345</td>
<td>$12,213</td>
<td>57,000</td>
<td>Henry Taub 2nd-Gen, Poland</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Activision Blizzard</td>
<td>$43,923</td>
<td>$6,879</td>
<td>9,400</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>VMware</td>
<td>$39,538</td>
<td>$7,093</td>
<td>15,905</td>
<td>Edouard Bugnion 1st-Gen, Switzerland</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Cognizant Technology</td>
<td>$39,339</td>
<td>$13,831</td>
<td>261,200</td>
<td>Francisco D'souza / Kumar Mahadeva 1st-Gen, India / 1st-Gen, Sri Lanka</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>eBay</td>
<td>$37,774</td>
<td>$9,059</td>
<td>12,600</td>
<td>Pierre Omidyar 1st-Gen, France</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Intuit</td>
<td>$35,501</td>
<td>$5,089</td>
<td>7,900</td>
<td>--</td>
<td></td>
</tr>
</tbody>
</table>


*While Andy Grove (from Hungary) is not a co-founder of Intel, he joined as COO on the day it was incorporated.
**Francisco D’souza is a person of Indian origin born in Kenya.
USA = ~50% of Most Highly Valued Private Tech Companies Founded By 1st Generation Immigrants... >48K Jobs, 5/17

<table>
<thead>
<tr>
<th>Company</th>
<th>Immigrant Founder</th>
<th>Country of Origin</th>
<th>Market Value ($B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uber</td>
<td>Garrett Camp</td>
<td>Canada</td>
<td>$68</td>
</tr>
<tr>
<td>Palantir</td>
<td>Peter Thiel</td>
<td>Germany</td>
<td>20</td>
</tr>
<tr>
<td>WeWork</td>
<td>Adam Neumann</td>
<td>Israel</td>
<td>17</td>
</tr>
<tr>
<td>SpaceX</td>
<td>Elon Musk</td>
<td>South Africa</td>
<td>12</td>
</tr>
<tr>
<td>Stripe</td>
<td>John Collison, Patrick Collison</td>
<td>Ireland</td>
<td>9</td>
</tr>
<tr>
<td>Slack</td>
<td>Stewart Butterfield, Serguei Mourachov, Cal Henderson</td>
<td>Canada / Russia / UK</td>
<td>4</td>
</tr>
<tr>
<td>Credit Karma</td>
<td>Kenneth Lin</td>
<td>China</td>
<td>4</td>
</tr>
<tr>
<td>Tanium</td>
<td>David Hindawi</td>
<td>Iraq</td>
<td>4</td>
</tr>
<tr>
<td>Instacart</td>
<td>Apoorva Mehta</td>
<td>India</td>
<td>3</td>
</tr>
<tr>
<td>Wish (ContextLogic)</td>
<td>Peter Szulczewski, Danny Zhang</td>
<td>Canada</td>
<td>3</td>
</tr>
<tr>
<td>Moderna Therapeutics</td>
<td>Noubar Afeayan, Derrick Rossi</td>
<td>Armenia / Canada</td>
<td>3</td>
</tr>
<tr>
<td>Bloom Energy</td>
<td>KR Sridhar</td>
<td>India</td>
<td>3</td>
</tr>
<tr>
<td>Oscar Health</td>
<td>Mario Schlosser</td>
<td>Germany</td>
<td>3</td>
</tr>
<tr>
<td>Houzz</td>
<td>Adi Tatarko, Alon Cohen</td>
<td>Israel</td>
<td>2</td>
</tr>
<tr>
<td>Avant</td>
<td>Al Goldstein, John Sun, Paul Zhang</td>
<td>Uzbekistan / China / China</td>
<td>2</td>
</tr>
<tr>
<td>Zenefits</td>
<td>Laks Srin</td>
<td>India</td>
<td>2</td>
</tr>
<tr>
<td>ZocDoc</td>
<td>Oliver Kharraz</td>
<td>Germany</td>
<td>2</td>
</tr>
<tr>
<td>AppNexus</td>
<td>Mike Nolet</td>
<td>Holland</td>
<td>2</td>
</tr>
<tr>
<td>Sprinklr</td>
<td>Ragy Thomas</td>
<td>India</td>
<td>2</td>
</tr>
<tr>
<td>The Honest Company</td>
<td>Brian Lee</td>
<td>South Korea</td>
<td>2</td>
</tr>
<tr>
<td>Zoox</td>
<td>Tim Kentley-Klay</td>
<td>Australia</td>
<td>2</td>
</tr>
<tr>
<td>Jawbone</td>
<td>Alexander Asseily</td>
<td>UK</td>
<td>2</td>
</tr>
<tr>
<td>JetSmarter</td>
<td>Sergey Petrosov</td>
<td>Russia</td>
<td>2</td>
</tr>
<tr>
<td>Quanergy</td>
<td>Louay Eldada, Tianyue Yu</td>
<td>Lebanon / China</td>
<td>2</td>
</tr>
<tr>
<td>Mu Sigma</td>
<td>Dhiraj Rajaram</td>
<td>India</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Company</th>
<th>Immigrant Founder</th>
<th>Country of Origin</th>
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</tr>
</thead>
<tbody>
<tr>
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Note: Due to varying definitions of unicorns, may not align with various unicorn lists. As of 5/17 there are 100 US-based, venture-backed unicorns (including rumored valuations), 50 of which have at least one first-generation immigrant founder.
High Level,
For All the Angst,
Consider This…
World = Getting Better in Many Ways…
Down = Poverty + Child Mortality…Up = Democracy + Literacy

% of People in Extreme Poverty, Global, 1820-2015
- Extreme Poverty
- Not in Extreme Poverty

% of People Living in Democracy, Global, 1816-2015
- No Democracy
- Democracy

Child Mortality Rates, Global, 1800-2015
- Mortality Rate by Age 5
- Survival Rate by Age 5

Literacy Rate, Global, 1800-2014
- Illiterate Population
- Literate Population

Source: Max Roser, Our World in Data; World Bank; Bourguignon and Morrison, “Inequality Among World Citizens”, American Economic Review 92.4, 2002; Gapminder; Polity IV; UN Population Division; Wimmer and Min, “From empire to nation-state: Explaining war in the modern world, 1816-2001,” American Sociological Review 71.6, 2006; OECD; UNESCO

Note: Extreme poverty defined as income level below $1.90 (int'l dollars) / day. Child mortality rates measured before and after 5 years old. Democracy based on Polity IV database. Literacy rate based on ages 15+ globally.
Some Macro Thoughts

1) USA, Inc.* =
   Understanding Where Your Tax Dollars Go

2) Immigration =
   Important for USA Technology Job Creation

3) High Level =
   For All the Angst, Consider This…

CLOSING THOUGHTS…
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<td>Cultivation &amp; Extraction</td>
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