INTERNET TRENDS 2016 – CODE CONFERENCE

Mary Meeker
June 1, 2016

kpcb.com/InternetTrends
Outline

1) Global Internet Trends
2) Global Macro Trends
3) Advertising / Commerce + Brand Trends
4) Re-Imagining Communication – Video / Image / Messaging
5) Re-Imagining Human-Computer Interfaces – Voice / Transportation
6) China = Internet Leader on Many Metrics (Provided by Hillhouse Capital)
7) Public / Private Company Data
8) Data as a Platform / Data Privacy
Thanks...

KPCB Partners
Especially Alex Tran / Dino Becirovic / Alexander Krey / Cindy Cheng who helped develop the ideas / presentation we hope you find useful...

Hillhouse Capital
Especially Liang Wu...his / their contribution of the China section 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
Global Internet Users @ 3B

Growth Flat =
+9% vs. +9% Y/Y...
+7% Y/Y (Excluding India)
Global Internet Users = 3B @ 42% Penetration...
+9% vs. +9% Y/Y...+7% (Excluding India)

Global Internet Users, 2008 – 2015

Source: United Nations / International Telecommunications Union, US Census Bureau. Internet user data is as of mid-year. Internet user data for: China from CNNIC, Iran from Islamic Republic News Agency, citing data released by the National Internet Development Center, India from IAMAI, Indonesia from APJII / eMarketer.
India Internet User
Growth Accelerating = +40% vs. +33% Y/Y...

@ 277MM Users...
India Passed USA to Become #2 Global User Market
Behind China

Source: United Nations / International Telecommunications Union, US Census Bureau. Internet user data is as of mid-year. Internet user data for: China from CNNIC, India from IAMAI. India users as of 10/2015 was 317MM per IAMAI; USA total population at 12/2015 (inclusive of all ages) was 323MM per US Census.
India Internet Users = 277MM @ 22% Penetration...
+40% vs. +33% Y/Y

Source: IAMAI. Uses mid-year figures.
Global Smartphone Users Slowing = +21% vs. +31% Y/Y

Global Smartphone Unit Shipments Slowing Dramatically = +10% vs. +28% Y/Y
Global Smartphone User Growth Slowing...
Largest Market (Asia-Pacific) = +23% vs. +35% Y/Y

Smartphone Users, Global, 2005 – 2015

Source: Nakono Research (2/16).
* "Smartphone Users" represented by installed base.
Global Smartphone Units Slowing Dramatically...
After 5 Years of High Growth @ +10% vs. +28% Y/Y

Source: Morgan Stanley Research, 5/16.
Android Smartphone Share Gains Continue vs. iOS... 
Android ASP Declines Continue...Delta to iOS @ ~3x

Smartphone Unit Shipments, iOS vs. Android, Global, 2007 – 2016E

2009 Share:
- iOS = 14%
- Android = 4%

2015 Share:
- iOS = 16%
- Android = 81%

iOS ASP ($) $594 $621 $623 $703 $712 $686 $669 $680 $717 $651
Y/Y Growth – 4% 0% 13% 1% -4% -2% 2% 5% -9%

Android ASP – $403 $435 $441 $380 $318 $272 $237 $216 $208
Y/Y Growth – – 8% 1% -14% -16% -15% -13% -8% -4%
New Internet Users =

Continue to be Harder to Garner Owing to High Penetration in Developed Markets
Countries fall into one of 5 groups based on barriers they face to Internet adoption

**Performance on Internet Barriers Index**
- Average score
- Minimum = 0
- Maximum = -100

**Incentives**
- Group 1
- Group 2
- Group 3
- Group 4
- Group 5

**Infrastructure**

**Low incomes and affordability**

**User capability**

**Group 1: High barriers across the board; offline populations that are young, rural, and have low literacy**
- **Countries:** Bangladesh, Ethiopia, Nigeria, Pakistan, Tanzania
- **Offline population, 2014:** 548 million
- **Internet penetration, 2014:** 18%

**Group 2: Medium to high barriers with larger challenges in incentives and infrastructure; mixed demographics**
- **Countries:** Egypt, India, Indonesia, Philippines, Thailand
- **Offline population, 2014:** 1,438 million
- **Internet penetration, 2014:** 20%

**Group 3: Medium barriers with greatest challenge in incentives; rural and literate offline populations**
- **Countries:** China, Sri Lanka, Vietnam
- **Offline population, 2014:** 753 million
- **Internet penetration, 2014:** 49%

**Group 4: Medium barriers with greatest challenge in low incomes and affordability; offline populations predominantly urban / literate / low income**
- **Countries:** Brazil, Colombia, Mexico, South Africa, Turkey
- **Offline population, 2014:** 244 million
- **Internet penetration, 2014:** 52%

**Group 5: Low barriers across the board; offline populations that are highly literate and disproportionately low income and female**
- **Countries:** Germany, Italy, Japan, Korea, Russia, USA
- **Offline population, 2014:** 147 million
- **Internet penetration, 2014:** 82%

**Source:** World Bank; McKinsey analysis from Internet Barriers Index

**With Already High Mobile Penetration in More Developed / Affluent Countries... New Users in Less Developed / Affluent Countries Harder to Garner, per McKinsey**
## Smartphone Cost in Many Developing Markets = Material % of Per Capita Income...

15% (Vietnam) / 10% (Nigeria) / 10% (India) / 6% (Indonesia), per McKinsey

### Average retail price of a smart phone, $USD, 2014

<table>
<thead>
<tr>
<th>Country</th>
<th>Average Price</th>
<th>Cost of Smartphone as a % of GNI per capita, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethiopia</td>
<td>$262</td>
<td>47.6%</td>
</tr>
<tr>
<td>Tanzania</td>
<td>$198</td>
<td>21.5%</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>$123</td>
<td>11.4%</td>
</tr>
<tr>
<td>Vietnam</td>
<td>$279</td>
<td>14.8%</td>
</tr>
<tr>
<td>India</td>
<td>$307</td>
<td>10.1%</td>
</tr>
<tr>
<td>Nigeria</td>
<td>$212</td>
<td>10.3%</td>
</tr>
<tr>
<td>Egypt</td>
<td>$195</td>
<td>6.1%</td>
</tr>
<tr>
<td>Indonesia</td>
<td>$212</td>
<td>5.8%</td>
</tr>
<tr>
<td>Philippines</td>
<td>$163</td>
<td>4.7%</td>
</tr>
<tr>
<td>Thailand</td>
<td>$273</td>
<td>4.7%</td>
</tr>
<tr>
<td>Colombia</td>
<td>$291</td>
<td>3.7%</td>
</tr>
<tr>
<td>South Africa</td>
<td>$256</td>
<td>3.8%</td>
</tr>
<tr>
<td>China</td>
<td>$243</td>
<td>3.3%</td>
</tr>
<tr>
<td>Turkey</td>
<td>$522</td>
<td>4.8%</td>
</tr>
<tr>
<td>Brazil</td>
<td>$319</td>
<td>2.7%</td>
</tr>
<tr>
<td>Russia</td>
<td>$232</td>
<td>1.8%</td>
</tr>
<tr>
<td>Mexico</td>
<td>$244</td>
<td>2.5%</td>
</tr>
<tr>
<td>Germany</td>
<td>$486</td>
<td>1.0%</td>
</tr>
<tr>
<td>Italy</td>
<td>$327</td>
<td>0.9%</td>
</tr>
<tr>
<td>Spain</td>
<td>$269</td>
<td>0.9%</td>
</tr>
<tr>
<td>South Korea</td>
<td>$216</td>
<td>0.8%</td>
</tr>
<tr>
<td>Japan</td>
<td>$232</td>
<td>0.6%</td>
</tr>
</tbody>
</table>

**Source:** McKinsey, Euromonitor (smartphone prices); World Bank, estimates (GNI p.c., Atlas method)

**Note:** Reflects true prices as paid by the consumer at point-of-sale; includes taxes and subsidies. Excludes data plan costs.
GLOBAL MACRO TRENDS
Global Economic Growth = Slowing
Global GDP Growth Slowing = Growth in 6 of Last 8 Years @ Below 20-Year Average

Global Real GDP Growth (%), 1980 – 2015


Note: GDP growth based on constant prices (real GDP growth).
Commodity Price Trends =

In Part, Tell Tale of Slowing Global Growth
Commodity Prices Down = -39% Since 5/14 vs. -8% Annual Average (5/11-4/14) & +6% (1/00-4/11)

Global Commodity Prices, Bloomberg Commodity Index (Indexed to 0 @ 1/00), 2000 – 2016 YTD

Source: Morgan Stanley, Bloomberg as of 5/25/16
Note: Bloomberg Commodity Index represents 22 globally traded commodities, weighted as: 31% Energy, 23% Grains, 17% Industrial Metals, 16% Precious Metals, 7% Softs (Sugar, Coffee, Cotton), and 6% Livestock.
Global Growth Engines = Evolve Over Time
Global Growth Engines @ ~2/3 of Global GDP Growth...
1985 = N. America + Europe + Japan
2015 = China + Emerging Asia

Real GDP Growth Contribution by Region, 1985 / 2015
(Based on Purchasing Power Parity)

1985
$19T = World GDP
+4% Y/Y

N. America + Europe + Japan = 63% of Total
China + Emerging Asia = 18% of Total

2015
$114T = World GDP
+3% Y/Y

N. America + Europe + Japan = 29% of Total
China + Emerging Asia = 37% of Total

China’s Gross Capital Formation (Capital Equipment / Roads / Buildings...)

Past 6 Years > Previous 30 Years
China Gross Capital Formation = Slowing… Sum of Past 6 Years > Previous 30 Years

China Gross Capital Formation, 1980 – 2015
(In 2010 Dollars)

Source: China National Bureau of Statistics, 5/16. Assumes constant FX rate RMB/USD @ 6.5.
Amounts are inflation adjusted to 2010 dollars based on IMF data on inflation rates (yearly average).
Gross capital formation = gross fixed capital formation (majority) + changes in inventory. Gross fixed capital formation includes land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. It also includes the value of draught animals, breeding stock and animals for milk, for wool and for recreational purposes, and newly increased forest with economic value.
Shanghai Area Over Past 2+ Decades = Illustrates Magnitude of China (& Emerging Asia) Growth

Shanghai, China, Pudong District

1987

2016

Source: Reuters/Stringer, Carlos Barria, Yichen Guo.
Re-Imagination of China
Over Past 3+ Decades –
World’s Population Leader +
#3 in Land Mass –

Helped Drive Incremental
Global Growth of Likes Which is
Difficult to Repeat
Interest Rates Have Fallen to Historically Low Levels =

Interest Rate Trends =
Can be Indicative of Perception for Growth Outlook
USA 10-Year Treasury Yields, Nominal and Real, 1962 – 2016YTD

Source: Morgan Stanley, Bloomberg, 5/16
Note: Real rates based on USGGT10Y Index on Bloomberg, which measures yield to maturity (pre-tax) on Generic 10-Year USA government inflation-index bonds.
Global 10-Year Bond Yields = Have Trended Down

10-Year Real Sovereign Bond Yields (%), Various Countries, 2001 – 2016YTD

Source: Morgan Stanley, Bloomberg, 5/16.
Note: Real rates based on yield to maturity on 10-year inflation-indexed treasury security for each country.
Total Global Debt Loads
Over 2 Decades =

High & Rising Faster Than GDP
Global Debt By Type ($T, Constant 2014 FX), Q4:00 – Q2:15

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Household</td>
<td>8.5</td>
<td>3.0</td>
</tr>
<tr>
<td>Corporate</td>
<td>5.7</td>
<td>6.4</td>
</tr>
<tr>
<td>Government</td>
<td>5.9</td>
<td>8.7</td>
</tr>
<tr>
<td>Financial</td>
<td>9.6</td>
<td>3.7</td>
</tr>
</tbody>
</table>

Source: McKinsey Global Institute (3/16), IMF.
Total Debt-to-GDP Ratios = High & Up in Most Major Countries... @ 202% Average vs. 147% (2000)*

Change in Real Economy Debt / GDP (%), 2007 – Q2:15

Source: McKinsey Global Institute (3/16). Debt includes that owed by households, non-financial corporates, and governments (i.e. excludes financial sector debt).

*Country inclusion per McKinsey; includes top developed countries by GDP and representative geographic selection of emerging countries.
Demographic Trends = Slowing Population Growth... Slowing Birthrates + Rising Lifespans
World Population Growth Rate Slowing = +1.2% vs. +2.0% (1975)

Source: U.N. Population Division
Note: Growth Rates based on CAGRs over 5 Year Periods.
Global Birth Rates =
Down 39% Since 1960 (1% Annual Average Decline)

Birth Rates per 1,000 People per Year, By Region, 1960 – 2014

Source: World Bank World Development Indicators
Note: Represents birth rates per 1,000 people per year.
Global Life Expectancy @ 72 Years = Up 36% Since 1960 (0.6% Annual Average Increase)

Life Expectancy (Years, Both Genders), By Region, 1960 – 2014

Source: World Bank World Development Indicators
Net, Net, Economic Growth Slowing + Margins for Error Declining = Easy Growth Behind Us
5 Epic Growth Drivers Over Past 2 Decades = Losing Mojo

1) Connectivity Growth Slowing –
   Internet Users rose to 3B from 35MM (1995)

2) Emerging Country Growth Slowing –
   Underdeveloped regions developed – including China / Emerging Asia / Middle East which rose to 69% of global GDP growth from 43%...

3) Government Debt Rising (& High) –
   Spending rose to help support growth...Government debt-to-GDP rose to 66% from 51% (2000) for 50 major economies

4) Interest Rates Have Declined –
   Helped fuel borrowing – USA 10-Year Nominal Treasury Yield fell to 1.9% (2016) from 6.6% (1995)

5) Population Growth Rate Slowing & Population Aging –
   Higher birth rates helped drive labor force growth – population growth rate continued to fall – to 1.2% from 1.6% (1995)

Several Up / Down Cycles in Past 2 Decades = Internet 1.0 (2000)...Property / Credit (2008)...

Stock / Commodity Markets Performance (% Change From 1/93), 1/93 – 5/16

Source: Capital IQ. Note: All values are indexed to 1 (100%) on Jan 1, 1993. Data as of 5/27/16.
Adjusting to Slower Growth + Higher Debt + Aging Population Creates Rising Risks...

Creates Opportunities for Businesses that Innovate / Increase Efficiency / Lower Prices / Create Jobs – Internet Can Be @ Core of This...
ADVERTISING /
COMMERCE + BRAND TRENDS
Online Advertising =

Mobile + Majors + Newcomers
Continue to Crank Away
USA Internet Advertising Growth = Accelerating, +20% vs. +16% Y/Y...
Owing to Mobile (+66%) vs. Desktop (+5%)

Google + Facebook = 76% (& Rising) Share of Internet Advertising Growth, USA

Source: IAB / PWC 2015 Advertising Report, Facebook, Morgan Stanley Research
Note: Facebook revenue include 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.
Advertisers Remain Over-Indexed to Legacy Media

% of Time Spent in Media vs. % of Advertising Spending, USA, 2015

Source: Advertising spend based on IAB data for full year 2015. Print includes newspaper and magazine. Internet includes desktop + laptop + other connected devices. ~$22B opportunity calculated assuming Mobile ad spend share equal its respective time spent share. Time spent share data based on eMarketer 4/16. Arrows denote Y/Y shift in percent share. Excludes out-of-home, video game, and cinema advertising.

~$22B Opportunity in USA
Google Has Proven Effective Online Advertising Works...
Google = $75B Revenue (2015), +14% Y/Y / $510B Market Value (5/31/16)

...But Many Online (Video) Ads are Ineffective, per Unruly...
81% = Mute Video Ads
62% = Annoyed with / Put Off by Brand Forcing Pre-Roll Viewing
93% = Consider Using Ad Blocking Software

...But There are Ways Video Ads Can Work, per Unruly
1) Authentic
2) Entertaining
3) Evoke Emotion
4) Personal / Relatable
5) Useful
6) Viewer Control
7) Work with Sound Off
8) Non-Interruptive Ad Format
Global Adblocking Users on Web (Mobile + Desktop), 4/09 – 3/16

Source: PageFair, 5/16. Dotted line represents estimated data. These two data sets have not been de-duplicated. The number of desktop adblockers after 6/15 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 – 6/15, as calculated in the PageFair & Adobe 2015 Adblocking Report. Mobile adblocking estimates are for global monthly active users of mobile browsers that block ads by default between 9/14 – 3/16, including the number of Digicel subscribers in the Caribbean (added 10/15), as calculated in the PageFair & Priori Data 2016 Adblocking Report.

Adblocking @ ~220MM Desktop Users (+16% Y/Y)...~420MM+ Mobile (+94%)...
Majority in China / India / Indonesia = Call-to-Arms to Create Better Ads, per PageFair
Video Ads that Work = Authentic / Entertaining / In-Context / Often Brief

Snapchat’s 3V Advertising

**Vertical** (Made for Mobiles) / **Video** (Great Way to Tell Story) / **Viewing** (Always Full Screen)

<table>
<thead>
<tr>
<th>Spotify (10-Second Ad) in...</th>
<th>Furious 7 (10-Second Ad) in...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snapchat Live Stories + Discover</td>
<td>Ultra Music Festival Miami Live Story</td>
</tr>
</tbody>
</table>

26MM+ Views, 12/15

14MM+ Views, 3/15

+30% Lift in Subscription Intent, 2x More Effective Than Typical Mobile Channels

+3x Attendance Among Target Demo for Snapchatters vs. Non-Snapchatters = Opening Weekend Box Office
Commerce + Brands = Evolving Rapidly By / For This Generation
Each Generation Has Slightly Different Core Values + Expectations...

Shaped by Events that Occur in Their Lifetimes
**Consumer Preference / Value Evolution by Generation, USA...**

**Millennials = More Global / Optimistic / Tolerant..., per Acosta**

<table>
<thead>
<tr>
<th>Silent</th>
<th>Baby Boomers</th>
<th>Gen X</th>
<th>Millennials</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year Most of Generation 18-33 Years Old</strong></td>
<td>1963</td>
<td>1980</td>
<td>1998</td>
</tr>
<tr>
<td><strong>Summary</strong></td>
<td>Grew up during Great Depression</td>
<td>Grew up during time of idealism with TV + car for every suburban home</td>
<td>Grew up during time of change politically, socially + economically</td>
</tr>
<tr>
<td></td>
<td>Fought 2nd “war to end all wars”</td>
<td>Apollo, Civil Rights, Women’s Liberation</td>
<td>Experienced end of the Cold War, Reaganomics, shift from manufacturing to services economy, + AIDS epidemic</td>
</tr>
<tr>
<td></td>
<td>Went to college on G.I. Bill</td>
<td>Disillusionment set in with assassination of JFK, Vietnam War, Watergate + increase in divorce rates</td>
<td>Rise of cable TV + PCs</td>
</tr>
<tr>
<td><strong>Core Values</strong></td>
<td>Discipline</td>
<td>Anything is possible</td>
<td>Independent</td>
</tr>
<tr>
<td></td>
<td>Dedication</td>
<td>Equal opportunity</td>
<td>Pragmatic</td>
</tr>
<tr>
<td></td>
<td>Family focus</td>
<td>Question authority</td>
<td>Entrepreneurial</td>
</tr>
<tr>
<td></td>
<td>Patriotism</td>
<td>Personal gratification</td>
<td>Self reliance</td>
</tr>
<tr>
<td><strong>Work / Life Balance</strong></td>
<td>Work hard for job security</td>
<td>Climb corporate ladder</td>
<td>Work / life balance important</td>
</tr>
<tr>
<td></td>
<td>Family time not first on list</td>
<td>Don’t want to repeat Boomer parents’ workaholic lifestyles</td>
<td></td>
</tr>
<tr>
<td><strong>Technology</strong></td>
<td>Have assimilated in order to keep in touch and stay informed</td>
<td>Use technology as needed for work + increasingly to stay in touch through social media such as Facebook</td>
<td>Technology assimilated seamlessly into day-to-day life</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Financial Approach</strong></td>
<td>Save, save, save</td>
<td>Buy now, pay later</td>
<td>Cautious, conservative</td>
</tr>
</tbody>
</table>

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Source: Acosta Inc., Pew Research
Image: Doomsteaddiner.net, Billboard.com, Metro.co.uk
### Characteristic Evolution by Generation @ Peak Adult Years (18-33), USA...

#### Millennials = More Urban / Diverse / Single...

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Year Most of Generation 18-33 Years Old</td>
<td>1963</td>
<td>1980</td>
<td>1998</td>
<td>2014</td>
</tr>
<tr>
<td>Location When Ages 18-33 Metropolitan as % Total</td>
<td>64%</td>
<td>68%</td>
<td>83%</td>
<td>86%</td>
</tr>
<tr>
<td>Diversity When Ages 18-33 White as % Total</td>
<td>84%</td>
<td>77%</td>
<td>66%</td>
<td>57%</td>
</tr>
<tr>
<td>Marital Status When Ages 18-33 Married as % Total</td>
<td>64%</td>
<td>49%</td>
<td>38%</td>
<td>28%</td>
</tr>
<tr>
<td>Education by Gender When Ages 18-33 % with Bachelor’s Degree</td>
<td>12% Male / 7% Female</td>
<td>17% Male / 14% Female</td>
<td>18% Male / 20% Female</td>
<td>21% Male / 27% Female</td>
</tr>
<tr>
<td>Employment Status by Gender When Ages 18-33 Employed as % Total*</td>
<td>78% Male / 38% Female</td>
<td>78% Male / 60% Female</td>
<td>78% Male / 69% Female</td>
<td>68% Male / 63% Female</td>
</tr>
<tr>
<td>Median Household Income ** When Ages 18-33</td>
<td>N/A</td>
<td>$61,115</td>
<td>$64,469</td>
<td>$62,066</td>
</tr>
<tr>
<td>Population of Generation When Ages 18-33</td>
<td>35MM</td>
<td>61MM</td>
<td>60MM</td>
<td>68MM</td>
</tr>
</tbody>
</table>


Note: *Only shows those that were civilian employed (i.e., excludes armed forces, unemployed civilians, and those not in labor force). **Median household income shown in 2015 dollars.
Marketing Channels Evolve With Time…

Shaped by Evolution of Technology + Media
Each New Marketing Channel = Grew Faster...
Internet > TV > Radio

Advertising Expenditure Ramp by Channel, First 20 Years, USA, 1926 – 2015
(In 2015 Dollars)

Source: McCann Erickson (1926-1979); Morgan Stanley Research, Magna, RAB, OAAA, IAB, NAA, PIB (1980-2015)
Note: Data adjusted for inflation and shown in 2015 U.S. dollars. Television consists of cable and broadcast television advertising. Radio consists of network, national spot, local spot, and streaming audio advertising. Internet consists of mobile and desktop advertising.
Retailing Channels Evolve With Time...

Shaped by Evolution of Technology + Distribution
Evolution of Commerce Over Past ~2 Centuries, USA = Stores → More Stores → Malls → E-Commerce

- **Corner / General Stores**
  - 1800s

- **Supermarkets**
  - 1930s

- **Discount Chains**
  - 1950-60s

- **Wholesale Clubs**
  - 1970-80s

Illustrative Generational Overlap

- **Silent Generation**
  - Department Stores: Mid-1800s

- **Baby Boomers**
  - Shopping Malls: 1950s

- **Generation X**
  - Superstores: 1960-80s

- **Millennials**
  - E-Commerce: 1990s

Source: McKinsey
Note: Millennials defined as those born between 1980 and 2000. In 2015, they are ages 15-35. Gen X defined as those born between 1965 and 1979. In 2015, they are ages 36-50. Boomers defined as those born between 1946-1964. In 1950, they are ages 61-70. Silents defined as those born between 1925 – 1945. In 1950, they are ages 71 – 90. Note there are varying opinions on what years each generation begin and end.
New / Emerging Retailers Optimize for Generational Change = J.C. Penney → Meijer → Walmart → Costco → Amazon → Casper

Retail Companies Founded by Decade (Illustrative Example), USA, 1900 – 2015

<table>
<thead>
<tr>
<th>Decade</th>
<th>1900s</th>
<th>1910s</th>
<th>1920s</th>
<th>1930s</th>
<th>1940s</th>
<th>1950s</th>
<th>1960s</th>
<th>1970s</th>
<th>1980s</th>
<th>1990s</th>
<th>2000s</th>
<th>2010s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product</td>
<td>ALCO</td>
<td>SAFEWAY</td>
<td>West Disney</td>
<td>meijer</td>
<td>Walgreens</td>
<td>Safeway</td>
<td>Best Buy</td>
<td>Walmart</td>
<td>Costco</td>
<td>Amazon</td>
<td>GoPro</td>
<td>Warby Parker</td>
</tr>
<tr>
<td>Product</td>
<td>NORDSTROM</td>
<td>Wegmans</td>
<td>Hallmark</td>
<td>Dillard's</td>
<td>Fred's</td>
<td>Lowe's</td>
<td>T.J. Maxx</td>
<td>Kohl's</td>
<td>Bed Bath &amp; Beyond</td>
<td>CB2</td>
<td>BIRCHBOX+</td>
<td>PETSMART</td>
</tr>
<tr>
<td>Product</td>
<td>JCPenney</td>
<td>Dominick's</td>
<td>NAPA</td>
<td>Albertsons</td>
<td>Dick's Sporting Goods</td>
<td>Ross</td>
<td>Best Buy</td>
<td>WILLIAMS-SONOMA</td>
<td>Borders</td>
<td>BONOBOS</td>
<td>EVERLANE</td>
<td>DSW</td>
</tr>
<tr>
<td>Product</td>
<td>Neiman Marcus</td>
<td>Jitney Jungle</td>
<td>Winn Dixie</td>
<td>DOLLAR GENERAL</td>
<td>BETS B&amp;Y</td>
<td>Toys &quot;R&quot; Us</td>
<td>GAP</td>
<td>THE GAP</td>
<td>GameStop</td>
<td>LUCKY BRAND</td>
<td>Blue Apron</td>
<td>Casper</td>
</tr>
</tbody>
</table>

Note: Companies shown above in chronological order by founding year by decade. Companies from 2000s onwards selected as diverse set of fast-growing companies based on web sales data from the Internet Retailer “2016 Top 500 Guide.” Gen Z defined as those born after 2000. In 2015, they are ages 0-15. Millennials defined as those born between 1980 and 2000. In 2015, they are ages 15-35. Gen X defined as those born between 1965 and 1979. In 2015, they are ages 36-50. Boomers defined as those born between 1946-1964. In 2015, they are ages 51-70. Silents defined as those born between 1925 – 1945. In 2015, they are ages 71 – 90. GI Generation defined as those born between 1900 – 1924. In 2015, they are age 91 – 115. Note there are varying opinions on what years each generation begin and end.
Millennials = Impacting + Evolving Retail...
Millennials @ 27% of Population = Largest Generation, USA... Spending Power Should Rise Significantly in Next 10-20 Years

Population by Age Range, USA, 2014

Household Expenditure, Annual Average, by Age of Reference Person, USA, 2014


Note: Millennials defined as persons born between 1980 – 2000. There are varying opinions on what years each generation begin and end.
Internet Continues to Ramp as Retail Distribution Channel = 10% of Retail Sales vs. <2% in 2000

E-Commerce as % of Total Retail Sales, USA, 2000 – 2015

$340B+ of E-Commerce Spend

Source: U.S. Census Bureau, Federal Reserve Bank of St. Louis (5/16)
Note: E-commerce and retail sales data are seasonally adjusted. Retail sales exclude food services, retail trade from gasoline stations, and retail trade from automobiles and other motor vehicles.
Retail = Technology + Media + Distribution
Increasingly Intertwined
Retail – The New Normal = Drive Transaction Volume → Collect / Use Data → Launch New Products / Private Labels...

Amazon – Private Label Brand Launches, 2004 – 2015

<table>
<thead>
<tr>
<th>Outdoor Furniture</th>
<th>Home Goods</th>
<th>Electronic Accessories</th>
<th>Fashion Brands</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strathwood</strong></td>
<td><strong>Pinzon</strong></td>
<td><strong>AmazonBasics</strong></td>
<td><strong>Franklin &amp; Freeman, Franklin</strong></td>
</tr>
</tbody>
</table>

% Total Amazon Purchasers Which Purchased Home & Garden Products: 11%
% Total Amazon Purchasers Which Purchased Household Products: 10%
% Total Amazon Purchasers Which Purchased Electronics (<$50) Products: 21%
% Total Amazon Purchasers Which Purchased:
- Men’s Apparel – 12%
- Women’s Clothing – 9%

Source: Internet Retailer, Bizjournals.com, Cowen & Company Internet Retail Tracker Image: Amazon.com, Milled.com

Note: Purchaser data based on Cowen & Company consumer tracking survey (n= ~2,500), as of 3/16. Data shown is percentage of Amazon purchasers who purchased items from a specific category.
Less differentiation between products / brands / retailers as single products evolve into brands + consumers shop directly from brands + retailers leverage insights to develop own vertically-integrated brands...New distribution models emerging enabling direct-to-consumer commerce in the home...

**Products → Brands**
(Casper)

**Brands → Retailers**
(Warby Parker)

**Retailers → Products / Brands**
(Thrive Market)

**New DTC Distribution Models**
(Stitch Fix)

Image: Myjane.ru, CNBC.com, Vanityfair.com, Insidebusinessnyc.com, Funandfit.org, Thrivemarket.com, Thedustynosestyle.com, Stitchfix.tumblr.com
...Physical Retailers Become Digital Retailers... Digital Retailers Become Data-Optimized Physical Retailers...

Physical Retailers Evolving & Increasing E-Commerce Presence...New Products / Brands / Retailers Launching Physical Stores / Showrooms / Retail Channels...Omni-Channel is Key...Warby Parker @ $3K Annual Sales per Square Foot = One of Top Grossing Physical Retailers per Square Foot in USA

**Offline → Online**
(Neiman Marcus)

26% of F2015 Sales on Internet, +24% Y/Y

**Online → Offline**
(Warby Parker)

31 locations (5/16), up from 10 locations (12/14)

**Top 5 Physical Retailers by Sales / Sq. Ft., USA, 2015***

- Apple: $5,546
- Warby Parker: $3,000
- Tiffany & Co.: $2,951
- Lululemon: $1,560
- Athletica: $1,466

Source: Company filings, Fast Company, Time, eMarketer
Image: Pursuitist.com, Digiday.com, Warbyparker.com
Note: *Excludes gas stations. Based on sales figures from trailing 12 months. Warby Parker figures as of February 2015.*
...Connected Product Users Easily Notified When to Buy / Upgrade...
Can Benefit from Viral Sharing

Ring Connected Devices with Sharable Content

Sharing of Events Captured on Ring on Neighborhood Level – Nextdoor, TV...

Proliferation of Ring Connected Devices Serving Broader Communities

Source: Ring, Nextdoor, WLKY News
Image: Ring.com, Whas11.com
Internet-Enabled Retailers / Products / Brands On Rise =

Bolstered by Always-On Connectivity + Hyper-Targeted Marketing + Images + Personalization
Hyper-Targeted Marketing = Driving Growth for Retailers / Products / Brands

Internet = Driving Force for New Product Introductions with Hypertargeting / Intent-Based Marketing via Facebook / Twitter / Instagram / Google...

Combatant Gentlemen

"Our customer acquisition strategy was Facebook. Our [target customer] typically spends a lot of time on Facebook...Every $100 we spent on Facebook was worth $1,000 in sales. For us, it was a simple math equation."

"We target based on [Facebook] likes...For example, we have a lot of guys in real estate who are climbing up the ladder. What we do is we put these guys into cohorts and we say, ‘These are our real estate guys.’"

- Vishaal Melwani
CEO and Founder, Combatant Gentlemen

Stance

After noticing that its Instagram placements were outperforming all other placement types in its Star Wars collection launch campaign, Stance decided to create a dedicated ad set to maximize its ad spend against this placement & build upon Instagram’s unique visual nature and strong targeting capabilities.

Stance targeted the ads to adults whose interests include the Star Wars movies, but excluded those interested only in specific Star Wars characters. The ‘Sock Wars’ campaign generated an impressive 36% boost to return on ad spend.

Source: One Million by One Million Blog, Instagram Business
Image: Pinterest.com, Instagram Business
Stitch Fix User Experience = Micro Data-Driven Engagement & Satisfaction...
Data Collection + Personalization / Curation + Feedback...

**Stitch Fix = Applying Netflix / Spotify-Like Content Discovery to Fashion...**
Each Customer = Differentiated Experience...
99.99% of Fixes Shipped = Unique

Data-Driven Onboarding Process = Mix of Art + Science
Collect data points on customer preferences / style / activities. 46% of active clients provide Pinterest profiles. Stylists use Pinterest boards + access to algorithms to help improve product selection.

Ship ‘Fixes’ with Curated Items Based on Preferences / Style
Allows clients to try products selected by stylists in comfort of home / return items they don’t like.

Customer Preferences & Feedback
Collect information on customer experience to drive future product selection.

Source: Stitch Fix
Image: Forbes.com
Stitch Fix Back-End Experience = 39% of Clients Purchase Majority of Clothing from Stitch Fix vs. ~30% of Clients Y/Y

**Stitch Fix = Data On Users + Data on Items + Constantly Improving Algorithms = Drive High Customer Satisfaction...100% of Purchases from Recommendations**

Data Collection on Item-by-Item Basis Coupled with User Insights

Stitch Fix captures 50-150 attributes on each item, uses algorithms + feedback to determine probability of success (i.e. item will be purchased) for specific demographics, allows stylists to better select items for clients

Data Networking Effect... Helps Stylist Predict Success of Items with Specific Client

The more information collected, the better the probability of success. Stitch Fix showing 1:1 correlation between probability of purchase per item and observed purchase rate over time

Strong Consumer Engagement / Anticipation...Increased Wallet Share...

39% of Stitch Fix clients get majority of clothing from Stitch Fix, up from ~30% of clients a year ago

*Example of Product Success Probability by Age*

*Example of Product Success Probability by Sizing*
Many Internet Retailers / Brands @ $100MM in Annual Sales* in <5 Years...
Took Nike = 14 Years / Lululemon = 9 / Under Armour = 8**

Source: Internet Retailer "2016 Top 500 Guide", company filings
Note: *Data only for e-commerce sales and shown in 2015 dollars. **Years to reach $100MM in annual revenue in 2015 dollars. Chart includes pure-play e-commerce retailers and evolved pure-play retailers. Companies shown include Birchbox, Blue Apron, Boozoo, Boxed, Casper, Dollar Shave Club, Everlane, FitBit, GoPro, Harry’s, Honest Company, Ipsy, Nasty Gal, Rent the Runway, TheRealReal, Touch of Modern, and Warby Parker. The Top 500 Guide uses a combination of internal research staff and well-known e-commerce market measurement firms such as Comper, Compuware APM, comScore, ForeSee, Experian Marketing Services, StellaService and ROI Revolution to collect and verify information.

Viral Marketing / Sharing Mechanisms (Facebook / Instagram / Snapchat / Twitter...)
+ On-Demand Purchasing Options via Mobile / Web + Access to Growth Capital
+ Millennial Appeal = Enabling Rapid Growth for New Products / Brands / Retailers

Sales Growth For Select Internet Retailers*, USA, First 5 Years Since Inception

Source: Internet Retailer "2016 Top 500 Guide", company filings
Note: *Data only for e-commerce sales and shown in 2015 dollars. **Years to reach $100MM in annual revenue in 2015 dollars. Chart includes pure-play e-commerce retailers and evolved pure-play retailers. Companies shown include Birchbox, Blue Apron, Boozoo, Boxed, Casper, Dollar Shave Club, Everlane, FitBit, GoPro, Harry’s, Honest Company, Ipsy, Nasty Gal, Rent the Runway, TheRealReal, Touch of Modern, and Warby Parker. The Top 500 Guide uses a combination of internal research staff and well-known e-commerce market measurement firms such as Comper, Compuware APM, comScore, ForeSee, Experian Marketing Services, StellaService and ROI Revolution to collect and verify information.
RE-IMAGINING COMMUNICATION VIA SOCIAL PLATFORMS –
– VIDEO
– IMAGE
– MESSAGING
Visual
(Video + Image)
Usage Continues to Rise
Millennial Social Network Engagement Leaders = Visual... Facebook / Snapchat / Instagram...

Age 18-34 Digital Audience Penetration vs. Engagement of Leading Social Networks, USA, 12/15

Average Monthly Minutes per Visitor

% Reach Among Age 18-34

Source: ComScore Media Metrix Multi-Platform, 12/15.
Generation Z (Ages 1-20) =
Communicates with Images

Attributes – Millennials vs. Gen Z

**Millennials**
- Tech Savvy: 2 screens at once
- Communicate with text
- Curators and Sharers
- Now-focused
- Optimists
- Want to be discovered

**Gen Z**
- Tech Innate: 5 screens at once
- Communicate with images
- Creators and Collaborators
- Future-focused
- Realists
- Want to work for success

Note: Gen Z defined in this report as those born after 1995. In 2016 they are ages 1-20. Note that there may be different opinions on which years each generation begins and ends.
Video Viewing Evolution
Over Past Century =

Live → On-Demand → Semi-Live → Real-Live
**Video Evolution = Accelerating**

**Live (Linear) → On-Demand → Semi-Live → Real-Live**

<table>
<thead>
<tr>
<th>Live (Linear)</th>
<th>On-Demand</th>
<th>Semi-Live</th>
<th>Real-Live</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Traditional TV</em> 1926</td>
<td><em>DVR / Streaming</em> 1999</td>
<td><em>Snapchat Stories</em> 2013</td>
<td><em>Periscope + Facebook Live</em> 2015 / 2016</td>
</tr>
<tr>
<td>Tune-In or Miss Out</td>
<td>Watch on Own Terms</td>
<td>Tune-In Within 24 Hours or Miss Out</td>
<td>Tune-In / Watch on Own Terms</td>
</tr>
<tr>
<td>Mass Concurrent Audience</td>
<td>Mass Disparate Audience</td>
<td>Mostly Personal Audience</td>
<td>Mass Audience, yet Personal</td>
</tr>
<tr>
<td>Real-Time Buzz</td>
<td>Anytime Buzz</td>
<td>Anytime Buzz</td>
<td>Real Time + Anytime Buzz</td>
</tr>
</tbody>
</table>

Images: Facebook, Twitter, Snapchat, Netflix, TVopedia, BT.com

1926 - First television introduced by John Baird to members of the Royal Institution. 1999 - First DVR released by Tivo. 2013 – Snapchat Stories launched.
Video

Usage / Sophistication / Relevance Continues to Grow Rapidly
User-Shared Video Views on Snapchat & Facebook = Growing Fast

Facebook Daily Video Views, Global, Q3:14 – Q3:15

Snapchat Daily Video Views, Global, Q4:14 – Q1:16

Source: Facebook, Snapchat. Q2:15 Facebook video views data based on KPCB estimate. Facebook video views represent any video shown onscreen for >3 seconds (including autoplay). Snapchat video views counted instantaneously on load.
Smartphone Usage Increasingly = Camera + Storytelling + Creativity + Messaging / Sharing
Snapchat Trifecta = Communications + Video + Platform...
Stories (Personal) → Live (Personal + Pro Curation) → Discover (Pro)

**Stories (Personal)**
- 10/13 Launch

**Live (Personal + Pro Curation)**
- 6/14

**Discover (Professional)**
- 1/15

---

10–20MM Snapchatters View Live Stories Each Day

More Users Watched College Football and MTV Music Awards on Snapchat than Watched the Events on TV

70MM+ Snapchatters View Discover Each Month

Top Performing Channels Average 6 – 7 minutes per Snapchatter per Day

Source: Snapchat
Advertisers / Brands = Finding Ways Into...

Camera-Based Storytelling + Creativity + Messaging / Sharing
Brand Filters Integrated into Snapchat Snaps by Users... Often Geo-Fenced, in Venue

‘Love at First Bite’
by KFC
9MM+ Views

Geofilter offered @ 900+ KFCs in UK and applied 200K+ times, 12/15 – 2/16

+23% Visitation Lift Within 7 Days of Seeing Friend’s Geofilter

‘World AIDS Day – Join the Fight’
by (RED)
76MM+ Views

Each time a geofilter was sent, Bill & Melinda Gates Foundation donated $3 to (RED)'s fight against AIDS 12/15

+90% Higher Likelihood of Donating to (RED) Among Those Who Saw Geofilter

Source: Snapchat
Branded Snapchat Lenses & Facebook Filters... Increasingly Applied by Users

- **Taco Bell Cinco de Mayo Lens**
  - 224MM Views on Snapchat
  - 5/5/16

- **Gatorade Super Bowl Lens**
  - 165MM Views on Snapchat
  - 2/7/16

- **Iron Man Filter from MSQRD**
  - 8MM+ Views on Facebook
  - 3/9/16

---

Average Snapchatter Plays With Sponsored Lens for 20 Seconds
Real-Live = Facebook Live...

New Paradigm for Live Broadcasting
UGC (User Generated Content) @ New Orders of Viewing Magnitude...
Facebook Live = Raw / Authentic / Accessible for Creators & Consumers

Candace Payne in Chewbacca Mask on Facebook Live

Most Viewed Live Video @ 153MM+ Views, 5/16
Kohl’s = Mentioned 2 Times in Video
Kohl’s = Became Leading App in USA iOS App Store
Chewbacca Mask Demand Rose Dramatically

Source: Facebook
Live Sports Viewing =

Has Always Been Social But....
It’s Just Getting Started
How Often are You Able to Watch a Game (on Sidelines or TV) with All Your Friends Who Share Your Team Love?

**Live Streaming** – Wrapped with Social Media Tools – Helps Make that More of a Reality...
2016E = Milestone Year for ‘Traditional’ Live Streaming on Social Networks...

NFL Live Broadcast TV of Thursday Night Football on Twitter (Fall 2016)

Hypothetical Mock-Up
Complete Sports Viewing Platform =
Live Broadcast + Analysis + Scores + Replays + Notifications + Social Media Tools

Tune-In Notifications, Game Reminders, Breaking Actions
Scoreboard Allows Fans to Follow Play-by-Play
Vertical View = Live Broadcast + Tweets Dashboard for Social Media Engagement
Horizontal View = Unencumbered, Full-Screen, TV-like Viewing Experience

Tweets Engage Fans in Real-Time Conversation
Professional Commentary and Analysis
Toggle Between Tweets from Stadium / Nearby / All

Source: KPCB Hypothetical Mock-Up. Design provided by Brian Tian (KPCB Edge)
Image

Usage / Sophistication / Relevance Continues to Grow Rapidly
Image Growth Remains Strong

Daily Number of Photos Shared on Select Platforms, Global, 2005 – 2015

Source: Snapchat, Company disclosed information, KPCB estimates
Note: Snapchat data includes images and video. Snapchat stories are a compilation of images and video. WhatsApp data estimated based on average of photos shared disclosed in Q1:15 and Q1:16. Instagram data per Instagram press release. Messenger data per Facebook (~8.5B photos per month). Facebook shares ~2B photos per day across Facebook, Instagram, Messenger, and WhatsApp (2015).
Images =
Monetization Options Rising
Image-Based Platforms Like Pinterest = Often Used for Finding Products / Shopping...

% of Users on Each Platform Who Utilize to Find / Shop for Products, USA, 4/16

- Pinterest: 55%
- Facebook: 12%
- Instagram: 12%
- Twitter: 9%
- LinkedIn: 5%
- Snapchat: 3%

‘What Do You Use Pinterest For?’ (% of Respondents), USA, 4/16

- Viewing photos: 60%
- Finding / shopping for products: 55%
- Sharing photos / videos / personal messages: 24%
- Watching videos: 15%
- News: 10%
- Networking / promotion: 10%

Source: Cowen & Company "ShopTalk Conference Takeaways: A Glimpse Into The Future of Retail & eCommerce" (05/16)
Note: Based on Cowen & Company proprietary Consumer Internet Survey from April / May 2016 of 2,500 US consumers, 30% of which where Pinterest MAUs as of 4/16.
Average Daily Time Spent per User, USA, 11/14 & 6/15

- Facebook: 42 minutes/day (11/14), 41 minutes/day (6/15)
- Instagram: 25 minutes/day (11/14), 21 minutes/day (6/15)
- OfferUp: 13 minutes/day (11/14), 25 minutes/day (6/15)
- Snapchat: 25 minutes/day (11/14), 21 minutes/day (6/15)
- Pinterest: 21 minutes/day (11/14), 21 minutes/day (6/15)
- Twitter: 21 minutes/day (11/14), 21 minutes/day (6/15)

Source: OfferUp, Cowen & Company “Twitter/Social User Survey 2.0: What’s changed?”
Note: Based on SurveyMonkey survey conducted in June 2015 on 2,000 US persons aged 18+

...Image-Based Platforms Like OfferUp = High (& Rising) Engagement Levels & Used for Commerce...
...Image-Based Peer-to-Peer (P2P) Marketplace OfferUp = Ramping Faster than eBay @ Same Stage...

OfferUp vs. eBay GMV Growth, First 8 Years Since Inception

Source: OfferUp, company filings, and KPCB estimates.
Note: Shown on a calendar year basis and in nominal dollars. eBay was launched in 1995 and OfferUp in 2011.
5.5MM products are available on Houzz for purchase directly within the app and on Houzz.com (Houzz Marketplace). There are 13MM total products available on Houzz Marketplace + linked to merchant sites.

Houzz – Content (Photos) / Community (Professionals + Consumers) / Commerce (Products), 4/12 – 4/16

- **Consumers**: 40MM
- **Content (Photos)**: 13MM
- **Active Professionals**: 1.2MM
- **Commerce (All Products)**: 10MM
- **5.5M Products Available for Purchase on Houzz**: 70K

Houzz Marketplace Launched 10/14

Source: Houzz
5.5MM products are available on Houzz for purchase directly within the app and on Houzz.com (Houzz Marketplace). There are 13MM total products available on Houzz Marketplace + linked to merchant sites.
View In My Room (2/16 Launch)

*Pick a Product & Preview What It Looks Like In Any Room Through Camera*

50% of Users Who Made a Purchase in Latest Version of Houzz App (Since 2/17/16) Used View In My Room

Users = 97% More Likely to Use Houzz Next Time They Shop...5.5x More Likely to Purchase...Spend 3x More Time in App

Sketch (12/15)

*Add Products from Houzz Marketplace to Any Photo on Houzz or Your Own Sketch*

Over 500K Sketches Saved Since Launch

Sketch Users = 5x More Likely to Purchase...Spend 4x More Time in App
Messaging = Evolving Rapidly
Messaging Leaders = Strong User (+ Use) Growth
Messaging Continues to Grow Rapidly...
Leaders = WhatsApp / Facebook Messenger / WeChat

Monthly Active Users on Select Social Networks and Messengers, Global, 2011 – 2015

Source: Facebook, WhatsApp, Tencent, Instagram, Twitter, LinkedIn, Morgan Stanley Research
Note: 2013 data for Instagram and Facebook Messenger are approximated from statements made in early 2014. Twitter users excludes SMS fast followers.
Messaging =

Evolving from
Simple Social Conversations to
More Expressive Communication...
### Global Electronic Messaging Platforms – Evolution of Simple Self-Expression

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td><strong>Japanese Cell Phones – Type-Based Emoji</strong></td>
</tr>
<tr>
<td><em>1990s</em></td>
</tr>
<tr>
<td><img src="image" alt="emoji" /></td>
</tr>
<tr>
<td><strong>AOL Instant Messenger – Convert Text Emoticon to Graphical Smiley</strong></td>
</tr>
<tr>
<td><em>1997</em></td>
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<td><img src="image" alt="emoji" /></td>
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<td><strong>NTT DoCoMo-Emoji</strong></td>
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<tr>
<td><em>1999</em></td>
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<td><img src="image" alt="emoji" /></td>
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<tr>
<td><strong>Apple iOS 5 – Native Emoji</strong></td>
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<tr>
<td><em>2011</em></td>
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<td><img src="image" alt="emoji" /></td>
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<td><strong>Line – Stickers</strong></td>
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<tr>
<td><em>2011</em></td>
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<tr>
<td><img src="image" alt="emoji" /></td>
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<tr>
<td><strong>Bitstrips – Bitmoji Personalized Emoji</strong></td>
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<tr>
<td><em>2014</em></td>
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<td><img src="image" alt="emoji" /></td>
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<td><strong>Facebook Messenger – GIF Keyboard</strong></td>
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<tr>
<td><em>2015</em></td>
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<td><img src="image" alt="emoji" /></td>
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<td><strong>Snapchat – Lenses</strong></td>
</tr>
<tr>
<td><em>2015</em></td>
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<td><img src="image" alt="emoji" /></td>
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</tbody>
</table>
...Messaging =

Evolving from
Simple Social Conversations to
Business-Related Conversations
Asia-Based Messaging Leaders = Continue to Expand Uses / Services Beyond Social Messaging

<table>
<thead>
<tr>
<th>Name</th>
<th>KakaoTalk</th>
<th>WeChat</th>
<th>LINE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Launch</td>
<td>March 2010</td>
<td>January 2011</td>
<td>June 2011</td>
</tr>
<tr>
<td>Primary Country</td>
<td>Korea</td>
<td>China</td>
<td>Japan</td>
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</tbody>
</table>

|-----------------------------|---------------------|---------------|-------------------|

<table>
<thead>
<tr>
<th>Enterprise</th>
<th>×</th>
<th>Enterprise WeChat (3/16)</th>
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</table>

<table>
<thead>
<tr>
<th>Online-To-Offline (O2O)</th>
<th>Kakao Hairshop (1H:16E)</th>
<th>×</th>
<th>Grocery Delivery (2015)</th>
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<table>
<thead>
<tr>
<th>Video Calls / Chat</th>
<th>(6/15)</th>
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<thead>
<tr>
<th>Taxi Services</th>
<th>Kakao Taxi (3/15)</th>
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<table>
<thead>
<tr>
<th>Messaging</th>
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<table>
<thead>
<tr>
<th>Group Messaging</th>
<th>×</th>
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<table>
<thead>
<tr>
<th>Voice Calls</th>
<th>Free VoIP calls (2012)</th>
<th>×</th>
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<thead>
<tr>
<th>Media</th>
<th>Kakao Topic (2014)</th>
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</table>

<table>
<thead>
<tr>
<th>QR Codes</th>
<th>×</th>
<th>QR code identify (2012)</th>
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</tr>
</thead>
</table>

|------------------------|---------------------|---------------|------------------|

<table>
<thead>
<tr>
<th>Developer Platform</th>
<th>KakaoDevelopers</th>
<th>WeChat API</th>
<th>Line Partner (2012)</th>
</tr>
</thead>
</table>

Source: Company websites, press releases, Morgan Stanley Research.

*Blue shading denotes that at least one of the platforms listed has added new features since 2015. Some features for other platforms may have been added in prior years.

Note: Enterprise denotes product made specifically for messaging or social networking within the enterprise, which is distinct from B2C messaging where businesses engage with current or potential customers.
Messaging Secret Sauce = Magic of the Thread = Conversational...
Remembers Identity / Time / Specifics / Preferences / Context

Hyatt
Check Availability / Reservations / Order Room Service

Rogers Communications
Ask Questions / Update Account / Set Up New Plan

--

Started Offering Customer Service on Facebook Messenger in 11/15

+20x Increase in Messages Received by Hyatt Within ~1 Month

Started Offering Customer Service on Facebook Messenger in 12/15

65% Increase in Customer Satisfaction
65% Decrease in Customer Complaints

The Commissioner for Complaints for Telecommunications Services (CCTS) reported a 65 per cent decrease in customer complaints between 8/15 and 1/16 compared to the previous six months.
### Messaging Platforms = Millions of Business Accounts Helping Facilitate Customer Service & Commerce...

<table>
<thead>
<tr>
<th>Business / Official Accounts</th>
<th>Engagement</th>
<th>Payments</th>
<th>B2C Chat for SMEs</th>
<th>Advertising (Within Messengers)</th>
<th>Partnerships / Other Services</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WeChat</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Facebook</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>LINE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

...Messaging Platforms = Conversational Commerce Ramping

**Shopper in Thailand on Instagram**

Browsing Begins on Instagram...Conversation / Payment / Confirmation Ends on Line

Visit Instagram Shop

Browse Products

Inquire About Product via Line

Get Payment Details

Confirm Payment

Ship & Track Order

Best Ways for Businesses to Contact Millennials = Social Media & Chat...  
Worst Way = Telephone

### Popularity of Business Contact Channels, by Age

*Which channels are most popular with your age-profiled customers? (% of contact centers)*

<table>
<thead>
<tr>
<th>Generation</th>
<th>Internet / Web Chat</th>
<th>Social Media</th>
<th>Electronic Messaging (e.g. email, SMS)</th>
<th>Smartphone Application</th>
<th>Telephone</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Generation Y</strong></td>
<td>24% (1st choice)</td>
<td>24% (1st choice)</td>
<td>21% (3rd choice)</td>
<td>19% (4th choice)</td>
<td>12% (5th choice)</td>
</tr>
<tr>
<td>(born 1981-1999)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Generation X</strong></td>
<td>21% (3rd choice)</td>
<td>12% (4th choice)</td>
<td>28% (2nd choice)</td>
<td>11% (5th choice)</td>
<td>29% (1st choice)</td>
</tr>
<tr>
<td>(born 1961-1980)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Baby Boomers</strong></td>
<td>7% (3rd choice)</td>
<td>2% (5th choice)</td>
<td>24% (2nd choice)</td>
<td>3% (4th choice)</td>
<td>64% (1st choice)</td>
</tr>
<tr>
<td>(born 1945-1960)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Silent Generation</strong></td>
<td>2% (3rd choice)</td>
<td>1% (4th choice)</td>
<td>6% (2nd choice)</td>
<td>1% (5th choice)</td>
<td>90% (1st choice)</td>
</tr>
<tr>
<td>(born before 1944)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N = 717 Contact Centers, Global. Results are shown based on contact centers that actually tracked channel popularity. Percentage may not add up to 100 owing to rounding.

Generation Y is typically referred to as “Millennials.”
Android / iOS Home Screens (Like Portals in Internet 1.0) = Mobile Power Alleys (~2008-2016)...

Messaging Leaders = Want to Change That
Average Global Mobile User = ~33 Apps...12 Apps Used Daily... 80% of Time Spent in 3 Apps

**Day in Life of a Mobile User, 2016**

<table>
<thead>
<tr>
<th></th>
<th>Average # Apps Installed on Device*</th>
<th>Average Number of Apps Used Daily</th>
<th>Average Number of Apps Accounting for 80%+ of App Usage</th>
<th>Time Spent on Phone (per Day)</th>
<th>Most Commonly Used Apps</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>USA</strong></td>
<td>37</td>
<td>12</td>
<td>3</td>
<td>5 Hours</td>
<td>Facebook, Chrome, YouTube</td>
</tr>
<tr>
<td><strong>Worldwide</strong></td>
<td>33</td>
<td>12</td>
<td>3</td>
<td>4 Hours</td>
<td>Facebook, WhatsApp, Chrome</td>
</tr>
</tbody>
</table>

*Source: SimilarWeb, 5/16.*

*Apps installed does not include pre-installed apps. Most commonly used apps includes preloads.*
Messaging Apps = Increasingly Becoming Second Home Screen...

iOS Home Screen

Facebook Messenger Inbox
RE-IMAGINING HUMAN / COMPUTER INTERFACES –
– VOICE
– TRANSPORTATION
Re-Imagining Voice = A New Paradigm in Human-Computer Interaction
Evolution of Basic Human-Computer Interaction Over ~2 Centuries =

Innovations Every Decade Over Past 75 Years
Human-Computer Interaction (1830s – 2015), USA = Touch 1.0 → Touch 2.0 → Touch 3.0 → Voice

Punch Cards for Informatics
1832

QWERTY Keyboard
1872

Electromechanical Computer (Z3)
1941

Electronic Computer (ENIAC)
1943

Paper Tape Reader (Harvard Mark I)
1944

Mainframe Computers (IBM SSEC)
1948

Trackball
1952

Joystick
1967

Microcomputers (IBM Mark-8)
1974

Portable Computer (IBM 5100)
1975

Commercial Use of Window-Based GUI (Xerox Star)
1981

Commercial Use of Mouse (Apple Lisa)
1983

Commercial Use of Mobile Computing (PalmPilot)
1996

Touch + Camera-based Mobile Computing (iPhone 2G)
2007

Voice on Mobile (Siri)
2011

Voice on Connected / Ambient Devices (Amazon Echo)
2014

Source: University of Calgary, “History of Computer Interfaces” (Saul Greenberg)
Voice as Computing Interface =

Why Now?
## Voice Interfaces – Consumer Benefits

1) **Fast**
   - Humans can speak 150 vs. type 40 words per minute, on average...

2) **Easy**
   - Convenient, hands-free, instant...

3) **Personalized + Context-Driven / Keyboard Free**
   - Ability to understand wide context of questions based on prior questions / interactions / location / other semantics

## Voice Interfaces – Unique Qualities

1) **Random Access vs. Hierarchical GUI**
   - Think Google Search vs. Yahoo! Directory...

2) **Low Cost + Small Footprint**
   - Requires microphone / speaker / processor / connectivity – great for Internet of Things...

3) **Requires Natural Language Recognition & Processing**

---

Source: Learn2Type.com, National Center for Voice and Speech, Steve Cheng, Global Product Lead for Voice Search, Google
As speech recognition accuracy goes from say 95% to 99%, all of us in the room will go from barely using it today to using it all the time. Most people underestimate the difference between 95% and 99% accuracy – 99% is a game changer...

No one wants to wait 10 seconds for a response. Accuracy, followed by latency, are the two key metrics for a production speech system...

- ANDREW NG, CHIEF SCIENTIST AT Baidu
Machine Speech Recognition @ Human Level Recognition for...
Voice Search in Low Noise Environment, per Google

**Next Frontier** = Recognition in heavy background noise in far-field & across diverse speaker characteristics (accents, pitch...)

Words Recognized by Machine (per Google), 1970 – 2016

- @ ~70% accuracy
- @ ~90% accuracy

Source: Johan Schalkwyk, Voice Technology and Research Lead, Google
Note: For the English language.
Voice Word Accuracy Rates Improving Rapidly...
+90% Accuracy for Major Platforms

Word Accuracy Rates by Platform*, 2012 – 2016

*Word accuracy rate definitions are unique to each company...see footnotes for more details

Source: Baidu, Google, VentureBeat, SoundHound

Note: *Word Error Rate (WER) definitions are specific to each company. Word accuracy rate = 1 - WER. (1) Data shown is word accuracy rate on Mandarin speech recognition on one of Baidu’s speech tasks. Real world mobile phone speech data is very noisy and hard for humans to transcribe. A 3.5% WER is better than what most native speakers can accomplish on this task. WER across different datasets and languages are generally not comparable. (2) Data as of 5/15 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. (3) Data as of 1/16 and refers to recognition accuracy for English language. Word accuracy rate based on data collected from thousands of speakers and real world queries with noise and accents.
Computing Interface…

Evolving from Keyboards to Microphones & Keyboards =

Still Early Innings
Mobile Voice Assistant Usage = Rising Quickly...
Primarily Driven By Technology Improvements

% of Smartphone Owners Using Voice Assistants Annually, USA, 2013 – 2015

<table>
<thead>
<tr>
<th>Year</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>30%</td>
<td>56%</td>
<td>65%</td>
</tr>
</tbody>
</table>

Voice Assistant Usage – Primary Reason for Change, % of Respondents, USA, 2014 – 2015

- **Software / technology has improved**
  - 2015: 32%
  - 2014: 35%

- **More aware of products via advertising / friends / family / other ways**
  - 2015: 32%
  - 2014: 30%

- **Need to use more because of lifestyle / schedule**
  - 2015: 23%
  - 2014: 20%

- **More relevant services to meet needs**
  - 2015: 9%
  - 2014: 9%

- **Don't know why**
  - 2015: 3%
  - 2014: 4%

- **Other (Please Specify)**
  - 2015: 1%
  - 2014: 2%

Note: Results highlighted in these charts are from the 2013, 2014, and/or 2015 Local Search surveys. These surveys were conducted via an online panel with representative sample sizes for the national population in the US. There were 1,102, 2,058, and 2,125 US smartphone owners that completed the surveys in 2013, 2014 and 2015 respectively.
Google Voice Search Queries =
Up >35x Since 2008 & >7x Since 2010, per Google Trends

Google Trends imply queries associated with voice-related commands have risen >35x since 2008 after launch of iPhone & Google Voice Search


- Navigate Home
- Call Mom
- Call Dad

Source: Google Trends
Note: Assume command-based queries are voice searches given lack of relevance for keyword-based search. Aggregate growth values determined using growth in Google Trends for three queries listed above.
Baidu Voice = Input Growth >4x...Output >26x, Since Q2:14

Usage across all Baidu products growing rapidly...typing Chinese on small cellphone keyboard even more difficult than typing English...Text-to-Speech supplements speech recognition & key component of man-machine communications using voice

Source: Baidu

Note: (1) Data shown is growth of speech recognition at Baidu, as measured by the number of API calls to Baidu’s speech recognition system across time, from multiple products. Most of these API calls were for Mandarin speech recognition. (2) Data shown is growth of TTS (text to speech) at Baidu, in terms of the total number of API calls to Baidu’s TTS system across time, from multiple products. Most of these API calls were for Mandarin TTS.
Hound Voice Search & Assistant App = 6-8 Queries Across 4 Categories per User per Day

Seeing 6-8 queries per active user per day among 100+ domains across 4 categories...
Users most care about speed / accuracy / ability to follow up / ability to understand complex queries...


- Local Information: 22%
- Fun & Entertainment: 21%
- Personal Assistant: 27%
- General Information: 30%

Source: SoundHound
Note: Based on most recent 30-days of user activity. Local information refers to queries about weather, restaurants, hotels, maps and navigation. Fun & entertainment refers to queries about music, movies, games, etc. General information refers to queries about facts, dictionary, sports, stocks, mortgages, nutrition, etc. Personal assistant refers to queries and commands about phone / communications, Uber and transportation, flight status, calendars, timers, alarms, etc.
Voice = Gaining Search Share...
USA Android @ 20%...Baidu @ 10%...Bing Taskbar @ 25%

September 2014
Baidu – 1 in 10 queries come through speech.

May 2016
Bing – 25% of searches performed on Windows 10 taskbar are voice searches per Microsoft reps.

2020
In five years time at least 50% of all searches are going to be either through images or speech.
Andrew Ng
Chief Scientist, Baidu (9/14)

June 2015
Siri – handles more than 1 billion requests per week through speech.

2015
Amazon Echo – fastest-selling speaker in 2015, @ for ~25% of USA speaker market, per 1010data.

May 2016
Android – 1 in 5 searches on mobile app in USA are voice searches & share is growing.

Source: Baidu World 2014, Gigaom, Gadgets 360, 1010data, MediaPost, SearchEngineLand, Google I/O 2016, ComScore, Recode, Fast Company
Voice as Computing Interface...

Hands & Vision-Free = Expands Concept of ‘Always On’
Hands & Vision-Free Interaction =
Top Reason to Use Voice...@ Home / In Car / On Go

Primary Reasons for Using Voice,
USA, 2016¹

- Useful when hands / vision occupied: 61%
- Faster results: 30%
- Difficulty typing on certain devices: 24%
- They're fun / cool: 22%
- To avoid confusing menus: 12%
- Other: 1%

Primary Setting for Voice Usage,
USA, 2016²

- Home: 43%
- Car: 36%
- On the go: 19%
- Work: 3%

Note: Based on survey of n = 1,800 respondents who were smartphone users over the age of 18, half female half male, geographically distributed across the United States. (1) In response to the survey question stating “Why do you use voice/search commands? Check all that apply.” (2) In response to the survey question stating “Where do you use voice features the most?”
Voice as Computing Interface...

Platforms Being Built… Third Party Developers Moving Quickly
Amazon Alexa Voice Platform Goal = Voice-Enable Devices = Mics for Home / Car / Mobiles...

Alexa Voice Service – OEM / Developer Integrations (10+ integrations...)

Home
(Various OEMs)

Car
(Ford Sync)

On Go
(Lexi app)

Ring
Invoxia
Philips Hue
EcoBee

Scout Security
ToyMail
Luma

Alexa ‘Skills’ Kit Developers = ~950 Skills (5/16) vs. 14 Skills (9/15)

Source: TechCrunch, Amazon Alexa, AFTVnews
Image: Geekwire.com, Heylexi.com
Note: Amazon launched the Alexa Skills Kit for third-party developers in 6/15.
Amazon Alexa Voice Platform Goal = Faster / Easier Shopping on Amazon

Leveraging proliferation of microphones throughout house to reduce friction for making purchases...
3x faster to shop using microphone than to navigate menus in mobile apps*...

Amazon Echo Dot

Amazon Echo Tap

Amazon Echo

Amazon Prime
(~44MM USA Subscribers)

Evolution of Shopping with Echo

1. Shopping Lists (2014)
2. Reorder past purchases by voice (2015)
3. Order new items – assuming you are fine with Amazon selecting exact item (2015)

Source: Cowen & Company Internet Retail Tracker (3/16), Recode, MindMeld
Image: Amazon.com, Gadgets-and-tech.com, Tomaltman.com, Techtimes.com, Venturebeat.com
Note: *Per MindMeld study comparing voice-enabled commerce to mobile commerce for the following task, “show me men’s black Adidas shoes for under $75” – takes ~7 seconds using voice compared to ~3x longer navigating menus in an app.
~5% of Amazon USA Customers Own an Echo vs. 2% Y/Y...

~4MM Units Sold Since Launch (11/14), per CIRP

~4MM Amazon Echo devices have been sold in USA as of 3/16, with ~1MM sold in Q1:16, per CIRP estimates

Amazon Customer Awareness of Amazon Echo, USA, Q1:15 – Q1:16

Amazon Customer Ownership of Amazon Devices, USA, Q1:16

Source: Consumer Intelligence Research Partners (CIRP)
Note: Amazon Echo limited launch occurred in 11/14 and wide-release occurred in 6/15.
Computing Industry
Inflection Points =
Typically Only Obvious
With Hindsight
iPhone Sales May Have Peaked in 2015... While Amazon Echo Device Sales Beginning to Take Off?

iOS Smartphone Unit Shipments, Global, 2007 – 2016E

Estimated Amazon Echo Unit Shipments, USA, Q2:15 – Q1:16

Source: Morgan Stanley Research (5/16), Consumer Intelligence Research Partners (CIRP), KPCB estimates
Note: Apple unit shipments shown on a calendar-year basis. Amazon Echo limited launch occurred in 11/14 and wide-release launch occurred in 6/15.
Re-Imagining Transportation = Another New Paradigm in Human-Computer Interaction... Cars
Is it a Car...Is it a Computer?...
...One Can...
Lock / Monitor / Summon One’s Tesla from One’s Wrist

Source: Tesla, The Verge, Redmond Pie
Car Industry Evolution = Computerization Accelerating
Car Computing Evolution Since Pre-1980s = Mechanical / Electrical → Simple Processors → Computers

**Pre-1980s**

Analog / Mechanical
Used switches / wiring to route feature controls to driver

**1980s (to Present)**

**CAN Bus**
(Integrated Network)
New regulatory standards drove need to monitor emissions in real time, hence central computer

**1990s (to Present)**

**OBD (On-Board Diagnostics) II**
Monitor / report engine performance; Required in all USA cars post-1996

**1990s-2010s**

Feature-Built Computing + Early Connectivity
Automatic cruise control... Infotainment... Telematics... GPS / Mapping...

**Today = Complex Computing**
Up to 100 Electronic Control Units / car...
Multiple bus networks per car (CAN / LIN / FlexRay / MOST)...
Drive by Wire...

**Today = Smart / Connected Cars**
Embedded / tethered connectivity...
Big Tech = New Tier 1 auto supplier
(CarPlay / Android Auto)...

**Tomorrow = Computers**
Go Mobile?...
Central hub / decentralized systems?
LIDAR...
Vehicle-to-Vehicle (V2V) / Vehicle-to-Infrastructure (V2I) / 5G...
Security software...

"The Box" (Brooks & Bone)

# Car Automation Accuracy / Safety Improvements = Accelerating...

**Early Innings of Level 2 / Level 3**


## NHTSA – Automated Driving System Classifications

<table>
<thead>
<tr>
<th>L0</th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
<th>L4</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Automation</td>
<td>No Specific Automation</td>
<td>Combined Function Automation</td>
<td>Limited Self-Driving Automation</td>
<td>Full Self-Driving Automation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
<th>Example</th>
<th>Time Frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>L0</td>
<td>• Driver in complete and sole control of primary vehicle controls (brake, steering, throttle, motive power) at all times. Systems with warning technology (e.g. forward collision warning) do not imply automation</td>
<td>• Since cars invented (1760s)</td>
</tr>
<tr>
<td>L1</td>
<td>• Automation of one or more primary vehicle control functions, but no combination of systems working in unison</td>
<td>• 1990s – Today</td>
</tr>
<tr>
<td>L2</td>
<td>• Automation of at least two primary vehicle control systems working in unison</td>
<td>• 2010s</td>
</tr>
<tr>
<td>L3</td>
<td>• Driver able to cede full control of all safety-critical functions under certain conditions. Driver is expected to be available for occasional control, but with sufficiently comfortable transition time</td>
<td>• 2010s</td>
</tr>
<tr>
<td>L4</td>
<td>• Vehicle can perform all safety-critical driving and monitoring functions during an entire trip</td>
<td>• ?</td>
</tr>
</tbody>
</table>

- **ABS**
- **Cruise Control**
- **Electronic Stability Control**
- **Park Assist**
- **Tesla Autopilot**
- **GM Super Cruise (2017)**
- **Google Car (manned prototype)**
- **Google Car**
Early Autonomous / ADAS Features Continue to Improve = Miles Driven Continue to Rise

Google (Level 3 / 4 Autonomy)

We've self-driven more than 1.5 million miles and are currently out on the streets of Mountain View, CA, Austin, TX, Kirkland, WA and Metro Phoenix, AZ.

Tesla (Level 2 Autonomy)

Tesla customers have driven 100 million miles with Autopilot active

Source: Google, Tesla, Steve Jurvetson, EmTech Conference, The Verge
Primary Approaches to Autonomous Vehicle Rollouts = All New or Assimilation...Traditional OEMs Taking Combined Approach

**All New = Top-Down, Fully Autonomous Vehicles**

- Design & build vehicles from day one with goal of full autonomy
- Craft architectures / systems for end product needs and with full fleet in mind
- Adapt testing environments to needs (individual city testing)
- Solves potentially dangerous middle layer of semi-autonomy
- Need very specific environments and regulation to guide integration with current system
- Potentially difficult to scale
- Key Example: Google

**Assimilation = Gradual Rollout / Mixed-Fleet Environments**

- Roll out / upgrade autonomous features in current automotive context
- Solves issue of integrating autonomy into existing asset base
- Real-time, in-field updates & improvements (Tesla over-the-air software updates)...real-world learnings
- Semi-autonomous stages require potentially dangerous resumption of driver control
- OEM production cycles sometimes long, which could cause innovation to remain slow
- Key Example: Tesla

Source: Google, Tesla, Morgan Stanley Research, Reilly Brennan (Stanford)
Car Industry Evolution = Driven by Innovation… USA Led…USA Fell
Car Industry Evolution, 1760s – Today = Driven by Innovation + Globalization

**Early Innovation (1760s-1900s) = European Inventions**

- **1768** = First Self-Propelled Road Vehicle (Cugnot, France)

- **1876** = First 4-stroke cycle engine (Otto, Germany)

- **1886** = First gas-powered, ‘production’ vehicle (Benz, Germany)

- **1888** = First four-wheeled electric car (Flocken, Germany)

**Streamlining (1910s-1970s) = American Leadership**

- **1910s** = Model T / Assembly Line (Ford)

- **1920s-1930s** = Car as Status Symbol... Roaring ‘20s / First Motels

- **1950s** = Golden Age... Interstate Highway Act (1956)... 8 of Top 10 in Fortune 500 in Cars or Oil (1960)

**Modernization (1970s-2010s) = Going Global / Mass Market**

- **1960s** = Ralph Nader / Auto Safety

- **1970s** = Oil Crisis / Emissions Focus

- **1980s** = Japanese Auto Takeover Begins...

- **1990s – 2000s** = Industry Consolidation; Asia Rising; USA Hybrid Fail (Prius Rise)

- **Late 2000s** = Recession / Bankruptcies / Auto Bailouts

**Re-Imagining Cars (Today) = USA Rising Again?**


- **Today** =

Global Car Production Share = Rise & Decline of USA...
Cars Produced in USA = 13% vs. 76% (1950)...

Source: Wards Automotive, Morgan Stanley Research
Note: Production measure represents all light vehicles manufactured within the given region (regardless of OEM home country). Light vehicles include passenger cars, sport utility vehicles and light trucks (e.g. pickups). Data from 1950-1985 only available every 5 years. Largest “Other” constituents are South Korea, India and Mexico.
Detroit Population Tells Tale of USA Car Production = Down 65% from 1950 Peak @ 1.8MM

Detroit Population, 1900 – 2015

Source: Southeast Michigan Council of Governments
Note: Represents mid-year population.
Car Industry =

Innovation Accelerating in USA
USA Has Many Key Components of Ecosystem

1) **Incumbents** – GM / Ford...Leading (2 of Top 10 Global) Auto Manufacturers

2) **Attackers** – Tesla... #1 Electric Vehicle Manufacturer

3) **Systems / Components** – *Processors / GPUs* (Nvidia...)...*Sensors / LIDAR / Radar* (Velodyne / Quanergy / Google...)...*Connectivity* (AT&T / Telogis / INRIX...)...*Mapping* (Google / Waze / Uber...)...*Operating Systems* (Google / Apple)...*Other* (Drivetrain / Power Electronics / Aerodynamics / Lightweighting / Etc...)

4) **Autonomous Vehicles** – Google / Tesla / Uber...Leadership in Development of Autonomous Vehicle Solutions

5) **Mobility & Fleet Innovation** – Uber / Lyft / Zendrive...Leadership in Ride Sharing Solutions / Infrastructure / Fleet Knowledge (Distribution via Mobile Devices / Recommended Traffic Flows)

USA Could Benefit from Creating Space in the Automotive Regulatory Framework to Foster Innovation

1) Federally Provided Guidance to States to Embrace Autonomy – Multiple legislative frameworks from individual states could impede autonomous innovation...

2) Flexibility of Regulation – Numerous approaches to solving autonomy challenge are likely to evolve simultaneously... regulation should not impede any single innovation approach...

3) Individual Cities / States Championing Autonomy – More testing locations / forward-leaning cities like Mountain View, CA / Austin, TX / Kirkland, WA / Metro Phoenix, AZ...

4) Comprehensive Safety Frameworks – Gov’t should have power to allow autonomous systems that demonstrate quantifiable safety improvements over current driver-vehicle combination...

5) Leaning Forward on Sharing (Car & Ride) – Regulators should work with rather than against sharing companies to craft policy as consumer demand illustrates need / interest in sharing...

6) Auto Cybersecurity – Connected cars face increased risk of cyber attacks...manufacturers & suppliers should keep consumer security / privacy as a key priority...

7) Next-Generation Franchise Laws – Semi-autonomous & autonomous cars are likely to change process of buying / servicing given ‘over the air’ nature of software downloads...USA could consider the EU ‘Block Exemption’ as model & allow consumers to service vehicles at either manufacturer-affiliated or independent locations.
Regulators = Typically Slow to Adapt to New Technologies

Back in the Day When Horseless Carriage (Car) Came Along...

**Locomotive Act of 1865 – Red Flag Act**  
*Law Enacted in UK...*  
*Horseless Carriages (Cars) Had to be Preceded By Someone with Red Flag For Safety Purposes*

**Jitneys (1914)**  
*Ride-Sharing, ~100 Years Ago...*  
*150K Jitney Rides / Day (1915) in LA, yet Regulated Out of Existence by 1919...*  
*157K Uber Rides / Day (2016) in LA...*
N. America – Some home field advantage on tech innovation & early application of shared mobility, but culture of private ownership and litigious USA judicial system may slow progress.

China – Government focus on technology / environment, as well as quality of ride-sharing companies (esp. Didi), have driven strong early sharing adoption. Competing investment in public transit and impact of car ownership on social standing may impede full-scale adoption.

India – Offers all key ingredients (rapid urbanization, limited public infrastructure, large millennial population, internet inflection point) for shared mobility leadership. Current market structure is likely to change as shared mobility gains dominance, so future remains unclear.

Europe – Lack of homegrown tech champions coupled with power of OEMs (particularly Germans) and quality of European public transit may make adoption more difficult. High fuel costs and strong emissions standards may drive movement forward.

Japan – Social implications of an aging population and policy support (given importance of a strong automotive industry) represent key advantages, but OEM buy-in to new paradigm is crucial, and R&D investment in tech arena lags somewhat behind other geographies.

Korea – Strong technological culture, early political support and sharing-focused younger demographic leaves Korea relatively well positioned for move to shared mobility, though adoption remains in its infancy.
Re-Imagining Transportation – Mobility also Being Re-Imagined
Re-Imagining Automotive Industry = From Cars Produced to Miles Driven?

We do believe the traditional ownership model is being disrupted... We’re going to see more change in the next five to ten years than we’ve seen in the last 50.

- MARY BARRA, GM CEO, 10/25/15

You could say there would be less vehicles sold, but we’re changing our business model to look at this as vehicle miles traveled... I could argue that with autonomous vehicles, the actual mileage on those vehicles will accumulate a lot more than a personally owned vehicle.

- MARK FIELDS, FORD CEO, 4/12/16

Source: Mary Barra (General Motors), Mark Fields (Ford), Wall Street Journal
Car Ownership Costs (Money + Time) = High

Car Ownership Costs = High

$8,558 / Year, USA = Depreciation @ 44% / Fuel @ 15% / Finance + Fees @ 14% / Insurance @ 14% / Maintenance + Repair @ 9%

Commuting Time = Significant

4.3 Hours per Week per Worker, Average (13% of Work Week, USA)

Urban Auto Commuting Delays = Rising

42 Hours / Year / Urban Worker, USA (+2x in 30 Years), Equivalent to ~1.2 Extra Work Weeks / Year

Millennials = Driving Differently

Drivers License Usage Declining (Age 16-44) = @ 77% vs. 92% (1982, USA)

Millennial Willingness to Car Share = @ ~50% (Asia-Pacific) / @ ~20% (North America)

46% of Millennials Expect Vehicle Technology to do Everything a Smartphone Can...
Efficiency Gain Potential from Ride & Car Sharing = High

Cars = Underutilized Assets
  USA = 2.2 Cars / Household, ~20% of Households Have 3+ Cars,
  Cars Used ~4% of Time

Vehicle Miles Traveled (VMT) = High Per Capita
  USA VMT Per Capita = 9K / +11x China (~850) / +48x India (~200)

Parking Infrastructure = Lots of It
  ~19MM Parking Spaces in Los Angeles County (2010), +12MM since 1950
  14% of Incorporated Land in Los Angeles County Allocated to Parking
  ~4 Estimated Parking Spots / Person in USA

Energy Consumption by Light Vehicles = Significant
  ~500B Gallons of Fuel, Global (2014)...
Top Reasons Riders Choose Uber

- 93% = Get to Destination Quickly
- 87% = Safety
- 84% = Too Much Alcohol to Drive
- 83% = Save Money
- 77% = Avoid Dealing with a Car
- 65% = Option During Public Transit ‘Off’ Hours
Shared Private Rides Becoming Urban Mainstream = uberPOOL @ 20% of Global Uber Rides in <2 Years

- **36** = Global UberPool Cities, +7x Y/Y
- **100MM** = UberPool Trips Since Launch (8/14)
- **40%** = UberPool as % of Total SF Rides
- **30MM** = China Rides / Month (in <1 Year)
- **>100K** = Riders / Week in 11 Global Cities
- **90MM** = Vehicle Miles Traveled saved vs. UberX*
- **1.8MM** = Gallons of Gas Saved vs. UberX*

* Represents first 3 months of 2016.
Re-Imagining Most Important Seat in Car = Back Seat, Again?

Rolls Royce 10hp (1904) = Designed for Rider

Mercedes-Benz F 015 ‘Luxury in Motion’ Concept (2015) = Déjà Vu?

Commute Time = Significant Engagement / Entertainment Opportunity?

Source: Time Spent data per Cowen & Co. Research + SurveyMonkey (n = 2,059, 6/15, minutes / day spent across all cohorts and extrapolated to hours / month), except for Spotify (per Company).
Commute data per US Census Bureau as of 2013; includes all modes of transportation apart from walking / biking. Assumes 25.9 minute one-way commute, assumed to be 5 days per week in both commute directions and 4.35 average weeks / month. Images per RREC / SWNS.com, Mercedes-Benz, carbodydesign.com
Transportation Industry =
Strap In for Next Few Decades
Automotive Industry Golden Age, Take Two?

What if a Car:

• Is part of a network that provides a commuting service that comes to you?
• Is the most advanced computing device you use?
• In effect, is an on-demand cash generator, boosted by car / ride sharing?
• Gives you safe driving pay-backs from your insurer?
• Is safer, due to automation / reduced human error?
• Drives itself? Parks itself?
• Makes you want to commute?
• Makes you more productive?
CHINA =
INTERNET LEADER ON MANY METRICS

Hillhouse Capital*
Provided China Section of Internet Trends, 2016

*Disclaimer – The information provided in the following slides is for informational and illustrative purposes only. No representation or warranty, express or implied, is given and no responsibility or liability is accepted by any person with respect to the accuracy, reliability, correctness or completeness of this information or its contents or any oral or written communication in connection with it. A business relationship, arrangement, or contract by or among any of the businesses described herein may not exist at all and should not be implied or assumed from the information provided. The information provided herein by Hillhouse Capital does not constitute an offer to sell or a solicitation of an offer to buy, and may not be relied upon in connection with the purchase or sale of, any security or interest offered, sponsored, or managed by Hillhouse Capital or its affiliates.
China Macro =

Robust Service-Driven Job & Income Growth...

Despite Investment Slowdown
China Services Industries = 50%+ (& Rising) of China’s GDP & ~87% of GDP Growth

China’s GDP by Sector, 1995 – 2015

China Services* Industries Job Growth = Accelerating…
Offsetting Job Losses from Construction / Manufacturing / Agriculture

China Annual Employment Change by Sector, 1995 – 2015

- Agriculture
- Construction, Mining & Manufacturing
- Services*
- Net Overall Employment Gain

*Note: Services include wholesale, retail, transportation, storage, communication, accommodation, catering, finance, education, real estate and other services.
China Urban Disposable Income Per Capita = Continues to Grow @ Solid Rates

China Urban Disposable Income per Capita & Y/Y % Growth, 1995 – 2015

Urban Disposable Income per Capita

Y/Y Growth

Source: CEIC, assume constant FX 1USD=6.5RMB.
China Internet @ 668MM Users = +6% vs. +7% Y/Y
China Internet Users = 668MM, +6% vs. 7% Y/Y...@ 49% Penetration
China Mobile Internet Usage Leaders...
Tencent + Alibaba + Baidu = 71% of Mobile Time Spent

Share of Mobile Time Spent, April 2016
Daily Mobile Time Spent = ~200 Minutes per User, Average

Note: Grouping of apps include strategic investments made by Tencent, Alibaba and Baidu. Only apps in top 50 by time spent share are called out. Source: QuestMobile, Trustdata, and Hillhouse estimates.
China Internet Traction = Advertising / Commerce / Travel / Financial Services Trends Often Compare Favorably to USA
China Online Advertising > TV (2015)... Online > 42% Total Ad Spend vs. 39% in USA

Source: GroupM China, April 2016 Forecast. Assume constant FX 1USD = 6.5RMB. USA advertising share data excludes out-of-home, video game, and cinema.
China E-Commerce Companies = Dominate Top Retailer Rankings vs. USA Peers...

China Top 7 Retailers by Revenue*, 2015

- Alibaba
- JD.com
- China Resources
- Suning
- GOME
- Wal-Mart
- Auchan Group

USA Top 7 Retailers by Revenue*, 2015

- Wal-Mart
- CVS
- Kroger
- Walgreens
- Amazon
- Target
- Costco

Source: Euromonitor. Note: *Revenue defined as retail value of goods excluding tax, and excluding certain transaction categories such as consumer-to-consumer, motor vehicles & auto parts, tickets, travel bookings, delivery foodservice, returns, and others, hence may differ from company disclosed total revenue or gross merchandise value figures.
China E-Commerce Companies = Gaining Retail Share Faster than USA Peers...

Source: Euromonitor. Note: *Revenue defined as retail value of goods excluding tax, and excluding certain transaction categories such as consumer-to-consumer, motor vehicles & auto parts, tickets, travel bookings, delivery foodservice, returns, and others, hence may differ from company disclosed total revenue or gross merchandise value figures.
China E-Commerce = Becoming More Social... 31% of WeChat Users Purchase via WeChat, +2x Y/Y

% of WeChat Users Making E-Commerce Purchase Through WeChat

- 2015: 15%
- 2016: 31%

Channels Through Which Users Made E-Commerce Purchase

- JD Mall featured within WeChat: 32%
- Links to Other Apps: 22%
- WeChat Public Accounts: 23%
- Group Chats or Friends Circle: 23%
- Channels Through Which Users Made E-Commerce Purchase

China Travel...Ctrip = Expansive One-Stop-Shop for Travelers...

Priceline App (USA)

- Hotel
- Transport
- Tour
- Attraction
- Restaurant
- Shopping / Currency Conversion

Ctrip App (China)

- B&B, Hostel
- Train / Bus / Ferry Ticket
- Destination Guide
- Portable Wi-Fi for Roaming
- Travel Visa / Insurance
- 24/7 Customer Service

Source: Priceline, Ctrip.
...China Outbound Travel Penetration @ Inflection Point = Already World’s Biggest Outbound Tourism Spender

Outbound Departures as % of Population, 1970 – 2015

- China
- Japan
- S. Korea

Top 10 Outbound Tourism Spending Country, 2014

<table>
<thead>
<tr>
<th>Country</th>
<th>Spending</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>$165B</td>
</tr>
<tr>
<td>USA</td>
<td>$146B</td>
</tr>
<tr>
<td>Germany</td>
<td>$107B</td>
</tr>
<tr>
<td>UK</td>
<td>$80B</td>
</tr>
<tr>
<td>France</td>
<td>$59B</td>
</tr>
<tr>
<td>Russia</td>
<td>$55B</td>
</tr>
<tr>
<td>Canada</td>
<td>$34B</td>
</tr>
<tr>
<td>Australia</td>
<td>$32B</td>
</tr>
<tr>
<td>Brazil</td>
<td>$30B</td>
</tr>
<tr>
<td>Italy</td>
<td>$29B</td>
</tr>
</tbody>
</table>

Source: CLSA, World Bank.
China Smartphone-Based Payment Solutions = High Engagement

Source: US debit and credit card data defined as number of payments (including online and offline) a month per active general-purpose card. Active cards are those used to make at least one purchase or bill payment in a month. Data per 2013 Federal Reserve Payments Study. AliPay / WeChat Pay stats per Hillhouse estimates. WeChat data includes peer-to-peer payments such as virtual Red Envelopes.
WeChat Chinese New Year Payments = 8B Virtual Red Envelopes Sent, + 8x Y/Y...


# of Virtual Red Envelopes Sent (B)

Source: Tencent.
...WeChat Payments = Can Drive Merchant Loyalty & CRM

Source: 86 Research.
Hillhouse Capital
Ant Financial (~$60B Valuation*) = Leveraging Alibaba AliPay Scale... Building China Financial Services One-Stop-Shop

Payment
450MM+ AliPay Users
$1+ Trillion Payment Volume in 2015

Savings / MoneyMarket Funds
260MM+ Users
$150B+ AUM

SMB Lending
$100B+
Cumulative Loans

Consumer Loan / Instant Credit
50MM+
Cumulative Consumer Loan Users

Credit Bureau / Online Insurance / P2P Lending...
China Internet Emerging Momentum = On-Demand
China On-Demand Transportation = Global Leader... 4B+ Annualized Trips (+4x Y/Y...~70% Global Share)

Annualized Global On-Demand Transportation Trip Volume by Region, Q1:13 – Q1:16

- ~25MM Annualized Trip Volume
- ~750MM 30x Y/Y
- ~1.7B 2.3x Y/Y
- ~6.3B 3.7x Y/Y

Source: Hillhouse Capital estimates, include on-demand taxi, private for-hire vehicles, as well as on-demand for-hire motorbike trips booked through smartphone apps.
China On-Demand Transportation...
China Cities = Fastest Global Growers

Monthly Trips Since Inception, Uber China vs. Rest of World

Impact of Internet = Extraordinary & Broad
But, in Many Ways...
It’s Just Beginning
Internet-Related Dislocations = Long-Time in Making...Still Early Stage

Cord-Cutting Impacts Earnings for Traditional Media Companies...
E-Commerce Impacts Revenue Growth for Traditional Retailers

<table>
<thead>
<tr>
<th>Media</th>
<th>Market Cap</th>
<th>2006</th>
<th>2016*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viacom</td>
<td>$33B</td>
<td></td>
<td>$18B</td>
</tr>
<tr>
<td>Netflix</td>
<td>$1.4B</td>
<td></td>
<td>$44B</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Retail</th>
<th>Market Cap</th>
<th>1997</th>
<th>2016*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wal-Mart</td>
<td>$69B</td>
<td></td>
<td>$222B</td>
</tr>
<tr>
<td>Amazon.com</td>
<td>$400MM</td>
<td></td>
<td>$341B</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Media</th>
<th>Revenue</th>
<th>2006</th>
<th>2015*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viacom</td>
<td>$11B</td>
<td>(+19% Y/Y)</td>
<td>$13B</td>
</tr>
<tr>
<td>Netflix</td>
<td>$1B</td>
<td>(+46% Y/Y)</td>
<td>$7B</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Retail</th>
<th>Revenue</th>
<th>1997</th>
<th>2015*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wal-Mart</td>
<td>$118B</td>
<td>(+12% Y/Y)</td>
<td>$482B</td>
</tr>
<tr>
<td>Amazon.com</td>
<td>$148MM</td>
<td>(+9.4x Y/Y)</td>
<td>$107B</td>
</tr>
</tbody>
</table>

Source: CapIQ, Public Filings
Current Generation of Internet Leaders = Growing Faster than Previous Generation

**Marketplaces**
Gross Merchandise Value (GMV), Time Shifted
Alibaba vs. eBay vs. Airbnb vs. Uber

- **Alibaba / Taobao**: $20B
- **eBay**: $15B
- **Airbnb**: $10B
- **Uber**: $5B

Years Since Launch (T+): 1 2 3 4 5 6 7 8

**Commerce**
Gross Merchandise Value (GMV), Time Shifted
Amazon.com vs. JD.com

- **JD.com**: $200B
- **Amazon.com**: $150B

Years Since Launch (T+): 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

**Enterprise**
Est. Quarterly Revenue ($MM), Time Shifted
Salesforce vs. Slack

- **Salesforce**: $20MM
- **Slack**: $15MM

Revenue ($MM): 1 2 3 4 5 6 7 8 9 10 11 12 13

Sources:
- Enterprise: Slack. Graph starting point based on similar est. revenue figures. Salesforce quarterly revenue approximated from publicly disclosed annual GAAP revenues.
Internet Leaders = Getting Bigger...Staying Aggressive
Global Internet Market Leaders = Apple / Google / Amazon / Facebook / Tencent / Alibaba...Flush with Cash...Private Companies Well Represented

<table>
<thead>
<tr>
<th>Rank</th>
<th>Company</th>
<th>Region</th>
<th>Current Market Value ($B)</th>
<th>Q1:16 Cash ($B)</th>
<th>2015 Revenue ($B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Apple</td>
<td>USA</td>
<td>$547</td>
<td>$233</td>
<td>$235</td>
</tr>
<tr>
<td>2</td>
<td>Google / Alphabet</td>
<td>USA</td>
<td>510</td>
<td>79</td>
<td>75</td>
</tr>
<tr>
<td>3</td>
<td>Amazon</td>
<td>USA</td>
<td>341</td>
<td>16</td>
<td>107</td>
</tr>
<tr>
<td>4</td>
<td>Facebook</td>
<td>USA</td>
<td>340</td>
<td>21</td>
<td>18</td>
</tr>
<tr>
<td>5</td>
<td>Tencent</td>
<td>China</td>
<td>206</td>
<td>14</td>
<td>16</td>
</tr>
<tr>
<td>6</td>
<td>Alibaba</td>
<td>China</td>
<td>205</td>
<td>18</td>
<td>15</td>
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<td>7</td>
<td>Priceline</td>
<td>USA</td>
<td>63</td>
<td>11</td>
<td>9</td>
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<tr>
<td>8</td>
<td>Uber</td>
<td>USA</td>
<td>63</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>9</td>
<td>Baidu</td>
<td>China</td>
<td>62</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>10</td>
<td>Ant Financial</td>
<td>China</td>
<td>60</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>11</td>
<td>Salesforce.com</td>
<td>USA</td>
<td>57</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>12</td>
<td>Xiaomi</td>
<td>China</td>
<td>46</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>13</td>
<td>Paypal</td>
<td>USA</td>
<td>46</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>14</td>
<td>Netflix</td>
<td>USA</td>
<td>44</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>15</td>
<td>Yahoo!</td>
<td>USA</td>
<td>36</td>
<td>10</td>
<td>5</td>
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<tr>
<td>16</td>
<td>JD.com</td>
<td>China</td>
<td>34</td>
<td>5</td>
<td>28</td>
</tr>
<tr>
<td>17</td>
<td>eBay</td>
<td>USA</td>
<td>28</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>18</td>
<td>Airbnb</td>
<td>USA</td>
<td>26</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>19</td>
<td>Yahoo! Japan</td>
<td>Japan</td>
<td>26</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>20</td>
<td>Didi Kuaidi</td>
<td>China</td>
<td>25</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

Total: $2,752 $447* $554*

Note: For public companies, colors denote current market value relative to Y/Y market value. Green = higher, Red = lower. Purple = newly public within last 12 months (applied here to both eBay and Paypal given Paypal spinoff on 7/20/15). Yellow = private companies, where market value represents latest publicly announced valuation. Ant Financial and Didi Kuaidi valuation per latest media reports as of 5/2016. 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.
Traditional Industry Incumbents = Active in Acquisitions / Investments
Incumbents = Increasingly Betting on Technology Companies to Fuel Growth...
Non-Tech Acquisitions of Tech Companies +2.6x Since 2012

Select Acquisitions by Non-Tech Incumbents

- Auto Consortia / Nokia Here
- Avis / Zipcar
- AxelSpringer / Business Insider
- Disney / Maker Studios, Playdom
- Disney + Fox + NBCUniversal / Hulu
- First Data / Perka, Clover
- Ford / Livio
- General Motors / Cruise Automation
- Hudson Bay / Gilt Groupe
- Liberty Interactive / Zulily
- Monsanto / Climate Corporation
- Neiman Marcus / Mytheresa.com
- Nordstrom / HauteLook
- Northwestern Mutual / Learnvest
- Staples / Runa
- Target / DermStore.com
- Under Armour / MapMyFitness, MyFitnessPal
- Walmart / Kosmix

Select Investments by Non-Tech Incumbents

- American Express / Concur
- Citi / Ayasdi, Betterment
- Coca-Cola / OneWeb
- Ford / Pivotal
- Fox Sports / DraftKings
- General Motors / Lyt
- Goldman Sachs / Dataminr, Kensho, Symphony
- J.P. Morgan / Prosper Marketplace
- Lowes / Porch
- NBCUniversal / BuzzFeed, Vox Media
- Nikkei / Evernote
- Turner Sports / FanDuel
- USAA / TRUECar
- Visa / Square
- Whole Foods / Instacart

Tech Acquisitions by Non-Tech Corporate Buyers

<table>
<thead>
<tr>
<th>Volume ($B)</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$11</td>
<td>$19</td>
<td>$21</td>
<td>$28</td>
</tr>
</tbody>
</table>

Source: Morgan Stanley, CapitalIQ, Thomson Reuters
Note: Includes technology targets >$100MM in value.
Global Technology Financings = Solid Trends in Private Financings...
Only 2 Tech IPOs 2016YTD
Global Technology Public + Private Financing Volume = Solid Relative to History


- **Facebook** ($16B IPO) = 75% of 2012 IPO $ value.
- **Alibaba** ($25B IPO) = 69% of 2014 IPO $ value.

Source: Thomson ONE, 2016YTD as of 5/26/16. VC Funding per Company ($MM) calculated as total venture financing per year divided by number of companies receiving venture financing. Morgan Stanley Equity Capital Markets, 2016YTD as of 5/26/16. All global U.S.-listed technology IPOs over $30MM, data per Dealogic, Bloomberg, & Capital IQ.

- Technology IPO Volume ($B)
- Technology Private Financing Volume ($B)
- NASDAQ

**Technology Market Peak, NASDAQ @ 5,219**

March 10, 2000 = NASDAQ @ 5,049

July 20, 2015 = Technology Market Peak, NASDAQ @ 5,219
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.
DATA AS A PLATFORM / DATA PRIVACY

CREATED BY KPCB PARTNERS TED SCHLEIN / ALEX KURLAND
Data as a Platform
Global Data Growth Rising Fast = +50% CAGR since 2010…
Data Infrastructure Costs Falling Fast = -20% CAGR

Data in Digital Universe vs. Data Storage Costs, 2010 – 2015

Source: IDC, May 2016.
Data Generators = Increasing Rapidly

Source: Apple, DJI, Waze, Tesla, Microsoft, Ring, Fitbit, B & H Foto & Electronics.
### Data = A New Growth Platform...

**Powering New Services / Systems / Apps**

<table>
<thead>
<tr>
<th>The Network</th>
<th>Large investments in fiber optic &amp; last-mile cables created connectivity that facilitated the early Internet growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Software</td>
<td>Optimizing the network with software became far more capital efficient than additional capex buildouts...ultimately resulting in the creation of pervasive networks (siloed data centers $\rightarrow$ AWS)...&amp; then pervasive software (Siebel $\rightarrow$ Salesforce)</td>
</tr>
<tr>
<td>The Infrastructure</td>
<td>Emergence of pervasive software created the need to optimize the performance of the network &amp; store extraordinary amounts of data at extremely low prices</td>
</tr>
<tr>
<td>The Data</td>
<td>Next Big Wave = Leveraging this unlimited connectivity &amp; storage to collect / aggregate / correlate / interpret all of this data to improve people’s lives &amp; enable enterprises to operate more efficiently</td>
</tr>
</tbody>
</table>

Source: Adam Ghetti, Ionic Security; Ted Schlein, KPCB.

**FIRST WAVE**
Constrained Data...
Monolithic Systems, Expensive Storage, Data for Targeted Use Cases

**BUSINESS INTELLIGENCE (BI)**
Business Objects, Cognos, MicroStrategy

**DATA INTEGRATION**
Informatica

**DATA INTEGRITY**
Microsoft, Oracle

**Age of Oracle, Sybase**

**SECOND WAVE**
Data Explosion / Chaos...
Decentralized Systems, Cheap Storage, Big Data Everywhere

**VISUALIZATION**

**CLOUD BI**

**CACHING**

**PREP / WRANGLING**

**ETL**

**INFRASTRCUTURE-CENTRIC SECURITY & MANAGEMENT**
Palo Alto Networks, FireEye

**Age of Big Data**
Hadoop, Teradata, Netezza, NetApp, EMC, Greenplum

**THIRD WAVE**
Mass Data Intelligence...
Pervasive Systems, Big/Fast Storage, Data Instruments the Business

**DEPARTMENTAL APPLICATIONS**
Gainsight, Datadog, InsideSales

**ORGANIZATION-WIDE ANALYTICS PLATFORMS**
Looker, Domo, Anaplan

**DATA-CENTRIC SECURITY & MANAGEMENT**
Ionic Security, Tanium

**Age of Big/Fast**
Redshift, BigQuery, Spark, Presto

Source: Looker, Ionic Security, KPCB.
Data is moving from something you use outside the workstream to becoming a part of the business app itself.

*It’s how the new knowledge worker is actually performing their job.*

FRANK BIEN, CEO OF LOOKER, 2016
Data as a Platform –

A Few Companies Utilizing Analytics to Improve Business Efficiency...
Data Analytics as a Platform = Looker

**THEN**
Complex Tools Operated by Data Analysts, Chaos of Data Silos Across the Company

**NOW**
Looker

Data analytics platform built for both data analysts & non-technical business users that can scale throughout organizations
Customer Data & Relationship Intelligence as a Platform = SalesforceIQ

**THEN**
Difficult to Customize, Lack of Automated Customer Insights

**NOW**
SalesforceIQ

CRM solution that helps businesses build stronger customer relationships by analyzing data & patterns to identify opportunities.

Source: Bomgar Corporation, Salesforce.
Data Mapping as a Platform = Mapbox

**THEN**

Difficult & Expensive to Collect Data...
Limited In-App Digital Map Usage

**NOW**

Mapbox

Worldwide maps crowdsourced by a community of smartphone users whose mobile navigation data facilitates real-time updates to the platform.
Cloud monitoring platform for both System Administrators & Developers that automatically integrates 100+ sources in real-time to represent hundreds of thousands of cloud instances

Source: IBM; Datadog.
Data Security & Management as a Platform = Ionic Security

**THEN**
Securing Infrastructure to Keep Data Safe

**NOW**
Ionic Security

Distributed data protection & management platform that has processed tens of billions of API requests to enable customers to secure & control their data

As Data Explodes...
Data Security Concerns Explode

Edward Snowden (Jun-13)
Former CIA contractor leaked classified information to media about internet & phone surveillance by USA intelligence.

Apple vs. FBI (Feb-16)
FBI claimed it needed Apple to provide access to an iPhone owned by a man who committed a mass shooting in San Bernardino, CA, so that the agency could recover information for its investigation. Request was denied by a federal judge in New York.

WhatsApp’s Default End-to-End Encryption (Apr-16)
WhatsApp implements end-to-end encryption as default setting to protect communications of their 1B monthly active users worldwide.

Burr-Feinstein Anti-Encryption Bill (Apr-16)
Proposed law that would require technology companies & phone manufacturers to decrypt customer data at a court’s request.

Microsoft Lawsuit (Apr 16)
Files lawsuit for right to be able to tell customers when law enforcement officials request their emails & other data.

Apple Hires Data Security Expert (May-16)
Jon Callas, who co-founded several well-respected secure communications companies including PGP Corp, Silent Circle and Blackphone, rejoins Apple (he was also an employee in the 1990s and again between 2009 and 2011, when he designed an encryption system to protect data stored on a Macintosh computer).
Cybercrime = Widespread Borderless Threat…
~4 Billion Data Records Breached Globally Since 2013


Source: Breach Level Index; IBM; Govtech
Note: *Includes 1.2B unique records breached by a Russian CyberGang called CyberVor.
Consumer Data Privacy Concerns Rising Rapidly

How Concerned are You About Data Privacy & How Companies Use Customer Data?

- Very Concerned: 46%
- Somewhat Concerned: 50%
- Not Concerned: 4%

45% Are more worried about their Online privacy than one year ago
74% Have limited their online activity in the last year due to privacy concerns

Consumers’ Top Privacy Concerns = Data Selling / Storage / Access / Being Identified Individually...

Rate Level of Privacy Concerns Across Each of the Following Ways Companies Interact with Personal Data, n = 2,062
(These percentages reflect all respondents who rated their privacy concerns on a 1-5 scale, with 5 = Extremely Concerned, 4 = Very Concerned, etc.)

<table>
<thead>
<tr>
<th>Privacy Concern</th>
<th>Level of Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>If / Where they sell my data</td>
<td>78%</td>
</tr>
<tr>
<td>Where they keep my data</td>
<td>73%</td>
</tr>
<tr>
<td>How they identify me as an individual</td>
<td>68%</td>
</tr>
<tr>
<td>How long they have my data</td>
<td>67%</td>
</tr>
<tr>
<td>Who sees and analyzes the data</td>
<td>67%</td>
</tr>
<tr>
<td>How a company gets my data</td>
<td>66%</td>
</tr>
<tr>
<td>When and how I opted into sharing</td>
<td>61%</td>
</tr>
<tr>
<td>How they use data to personalize marketing</td>
<td>59%</td>
</tr>
<tr>
<td>How they use data to provide customer support</td>
<td>54%</td>
</tr>
<tr>
<td>How they use data to improve or innovate</td>
<td>53%</td>
</tr>
<tr>
<td>How they identify me as a group</td>
<td>52%</td>
</tr>
</tbody>
</table>

...Do People Care About Privacy... Or Do They Care About Who Has Their Data?

**Amazon Echo**
The Echo’s Alexa Voice Service listens to all speech in default mode

**Google Gboard**
Integrated keyboard for iOS devices that had an estimated 500K+ downloads within the first week of launch

Source: Amazon, Google, App Annie. Today, data sent to Google is limited to search queries for processing, anonymous statistics to help diagnose problems when the app crashes and data about the most often used features. Privacy policies can change over time and it is possible Google may decide to track additional data with a user’s consent.
In the tangible world, physical limitations prevent the broad abuse of the law...

Should the same laws automatically apply to the digital world where a few lines of code can unlock someone’s entire life?

- ADAM GHETTI, FOUNDER & CEO OF IONIC SECURITY, 2016
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