

Internet Economics and Financial Technology
Computer Science COMSM0019

Lecture 2: Who wants to be a billionaire?

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University of
BRISTOL

Who wants to be a billionaire?



John Cartlidge

MVB 3.39

Thomson Reuters Lecturer in Financial
Informatics and Data Analytics



Dave Cliff

MVB 5.16

Foresight Lead Expert Group,
FCA Academic Advisory Council

Who wants to be a billionaire?

Unfortunately, we're not.

Do you think we'd be here if we were?

Instead...

Who wants to be a billionaire?



**Pierre
Omidyar**

Started 1995

Market Cap
2019: \$32bn

2016: \$29bn
2014: \$65bn

Personal
2019: \$12.5bn
2014: \$8.9bn

<http://www.forbes.com/billionaires/list/>

Who wants to be a billionaire?



Jeff Bezos

Started 1994

MarketCap:
2019: \$852bn
2016: \$231bn
2014: \$150bn

Personal Wealth
2019: \$112bn
2016: \$47bn
2014: \$29bn

Who wants to be a billionaire?

we
are

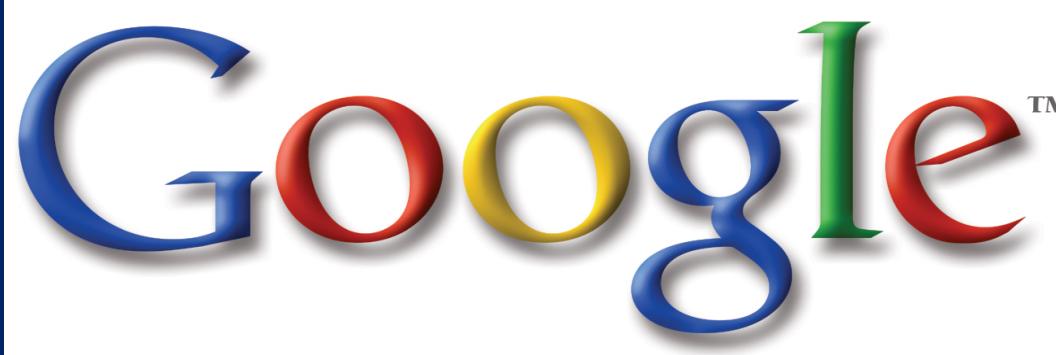
we
are

Larry Page &
Sergey Brin

Started Jun2000

MarketCap
2019: \$845bn
2016: \$394bn

Personal:
2019: \$54/56bn
2016: \$32bn each



Who wants to be a billionaire?

I am



Robin Li

Started Jan 2000

MarketCap
2019: \$36bn??
2016: \$77bn

Personal:
2019: \$6bn
2016: \$12bn
2014: \$16bn



[http://www.bbc.co.uk/
news/business-
18964661](http://www.bbc.co.uk/news/business-18964661)

Who wants to be a billionaire?

Baidu Market Cap: 35.72B for Sept. 30, 2019

View 4,000+ financial data types

Search

Add

Browse...

Market Cap Chart

[View Full Chart](#)

1d | 5d | 1m | 3m | 6m | YTD | 1y | 5y | 10y | Max

Export Data

Save Image

Print Image



BIDU

2016: \$12bn
2014: \$16bn

Who wants to be a billionaire?



Jack Ma

Started Jan 1999

MarketCap
2019: \$542bn
2016: \$231bn

Personal
2019: \$38bn
2016: \$23bn
2014: \$25bn

Who wants to be a billionaire?



**Mark
Zuckerberg**

Started Jun2004

MarketCap
2019: \$508bn
2016: \$244bn
2014: \$204nb

Personal
2019:\$68bn
2016:\$36bn
2014:\$35bn

facebook®

Who wants to be a billionaire?



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Who wants to be a billionaire?

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Technology

Zuckerberg and Chan aim to tackle all disease by 2100

By Leo Kelion
Technology desk editor

© 21 September 2016 | Technology

Share



Facebook's founder Mark Zuckerberg and his wife Priscilla Chan have pledged \$3bn (£2.3bn) to fund medical research over the next decade.

At a press conference in San Francisco, they said their ultimate goal was to "cure, prevent or manage all diseases by the end of the century".

Top Stories

Corbyn: We can climb electoral mountain

Jeremy Corbyn says he is convinced his party can climb an "electoral mountain" to power as he closes the Labour conference.

5 hours ago

MH17 missile 'brought in from Russia'

2 hours ago

Lawyer for child abuse inquiry suspended

19 minutes ago

Features



Short job quiz

Do you remember the people who didn't last long in their jobs?



Who wants to be a billionaire?



Adam
Neumann

Started 2010

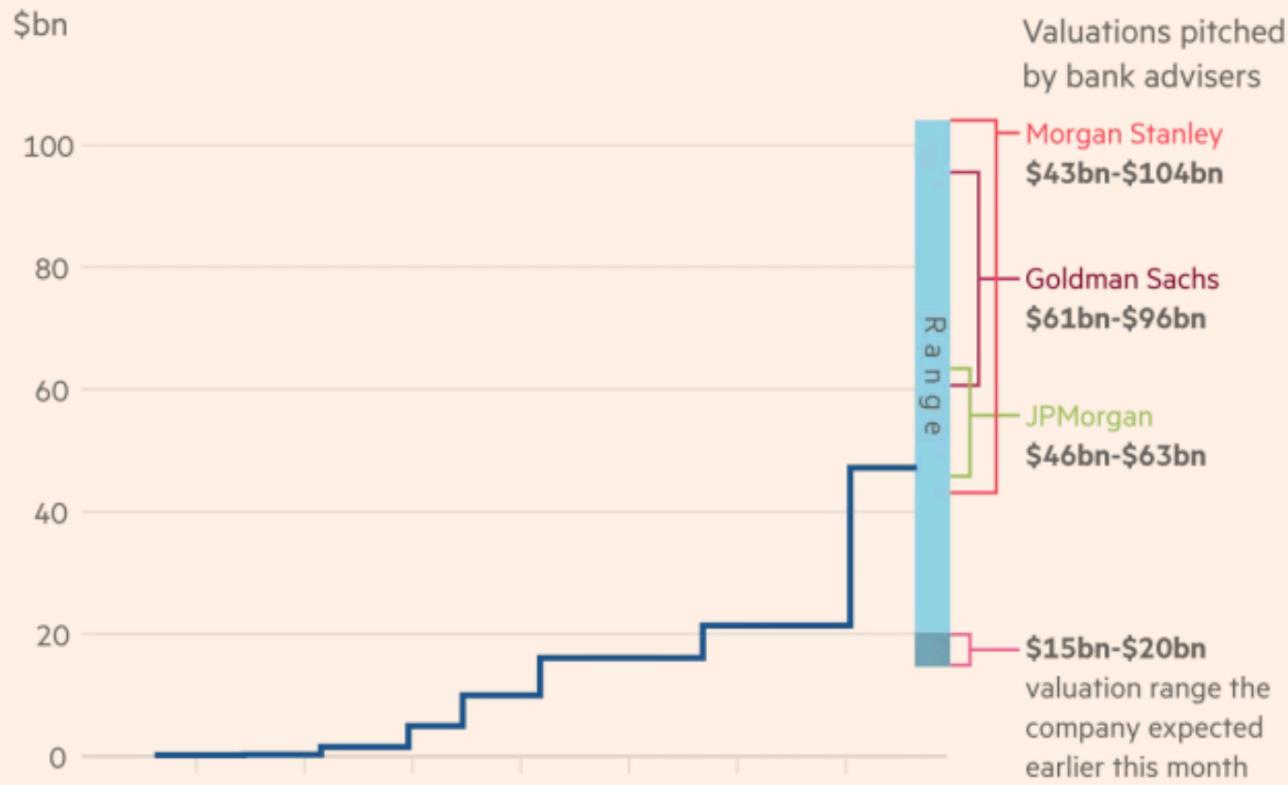
MarketCap
2019: \$WTF?

Personal
2019: c.2bn?

wework

wework

We've wide-ranging valuations



Sources: FT research; Crunchbase

© FT

The Financial Times, Sept 24, 2019

wework

We company's mounting losses

Operating losses (\$m)



Source: Bloomberg
© FT

The Financial Times, Sept 24, 2019

Le menu du jour

- The internet has allowed for some astonishing get-rich-quick successes
- Successes are major companies, with very wealthy founders
- So in that sense the ECONOMIC aspect is very clear
- Several of these success stories are due to ALGORITHMIC innovations
- So, today...
- A quick tour through the algorithmic & economic aspects of some notable success stories:
 - eBay & Amazon: *the economics of the long tail*
 - Pipelines and platforms
 - The “gig economy”
 - The future of work, and democracy

The worlds biggest bookshop, & biggest tat-bazaar

- Amazon and eBay made their founders enormously rich and created employment for lots of other people
- Before we get into the economics and the algorithms...
 - ... some important caveats:
 1. These two companies have won out for a whole host of factors
 2. History tends to concentrate on winners
 3. *Positive feedback* and *network externalities* can help elevate a company or product to success, even if it has superior rivals: the (slightly) big get bigger
 - E.g. Betamax vs VHS; any OS vs MSWindows
 4. Commonplace *product* can be sold via a strong *brand*
 - See, e.g., the chapter on Amazon.com in Cassidy's book *Dot.Com*
 5. Nevertheless, the internet did really change the economics of retail...

Successes of both Amazon and eBay are cited as examples of *The Long Tail*

The Long Tail

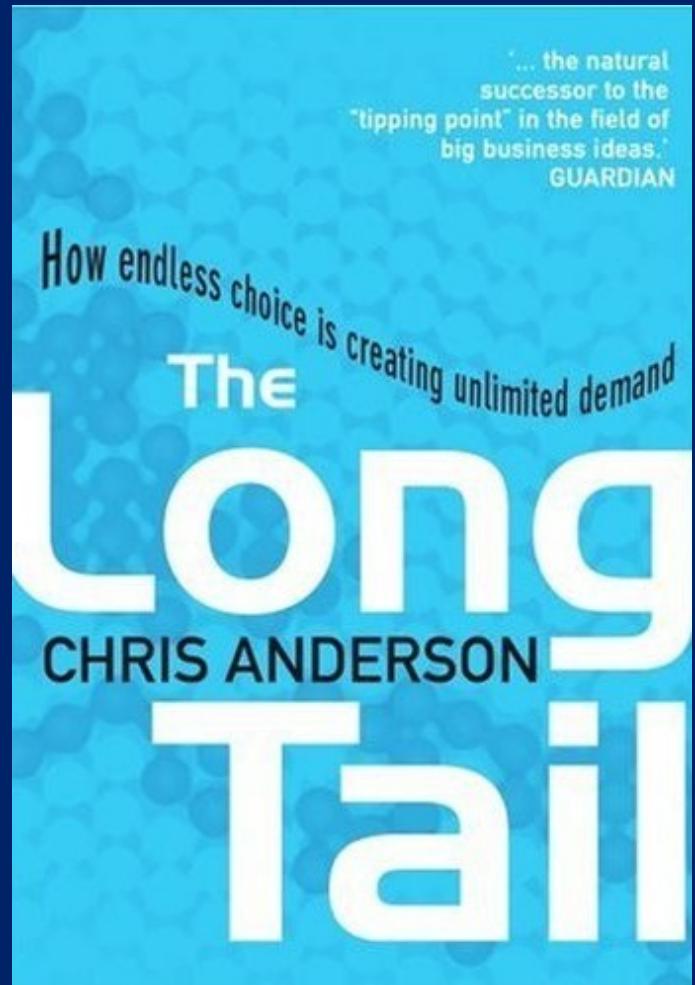
- 2004 *Wired* article
- 2006 book →
- Definitely read the article

www.wired.com/wired/archive/12.10/tail.html

- Optionally read the book
- Anderson also runs a blog:

http://longtail.typepad.com/the_long_tail/

for subsequent updates



Background

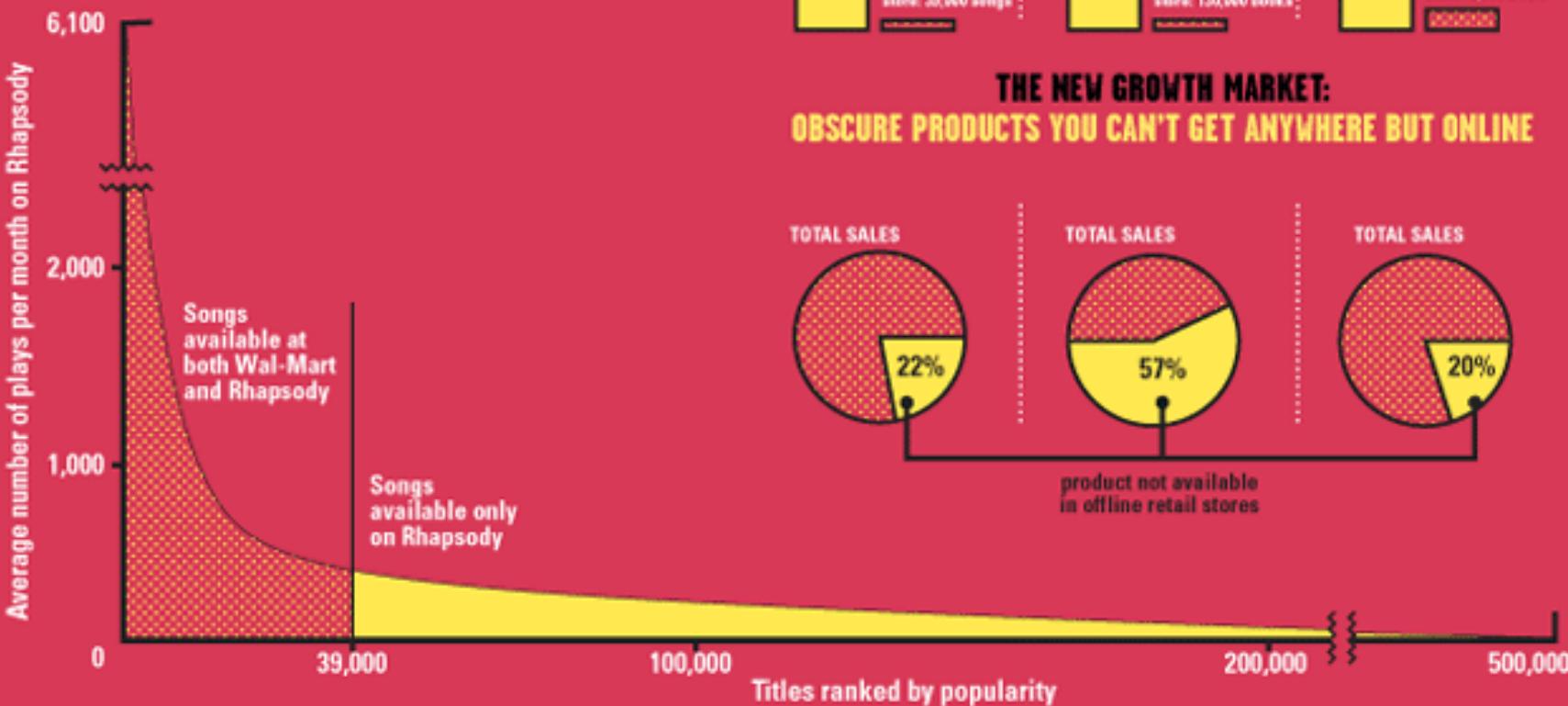
- In Ye Olden Days, pre-internet ...
- Retailers could make money
 - on high-volume low-margin goods (e.g. selling hotdogs)
or
 - on low-volume high-margin goods (e.g. selling Porsches)
- For margin m and volume v you can make $\$x$ via any (m,v) that satisfies $mv = x$;
- For this reason, low-volume low-margin retail tended to be a loser's game
- If you run a bricks-and-mortar shop, physical shelf space costs you money
- You want to maximise return on cost of shelf-space
 - by stocking the available space with high- (m,v) goods
- But what if shelf-space costs (almost) nothing, so is (effectively) almost infinite?

The Long Tail

Image source: www.wired.com/wired/archive/12.10/tail.html

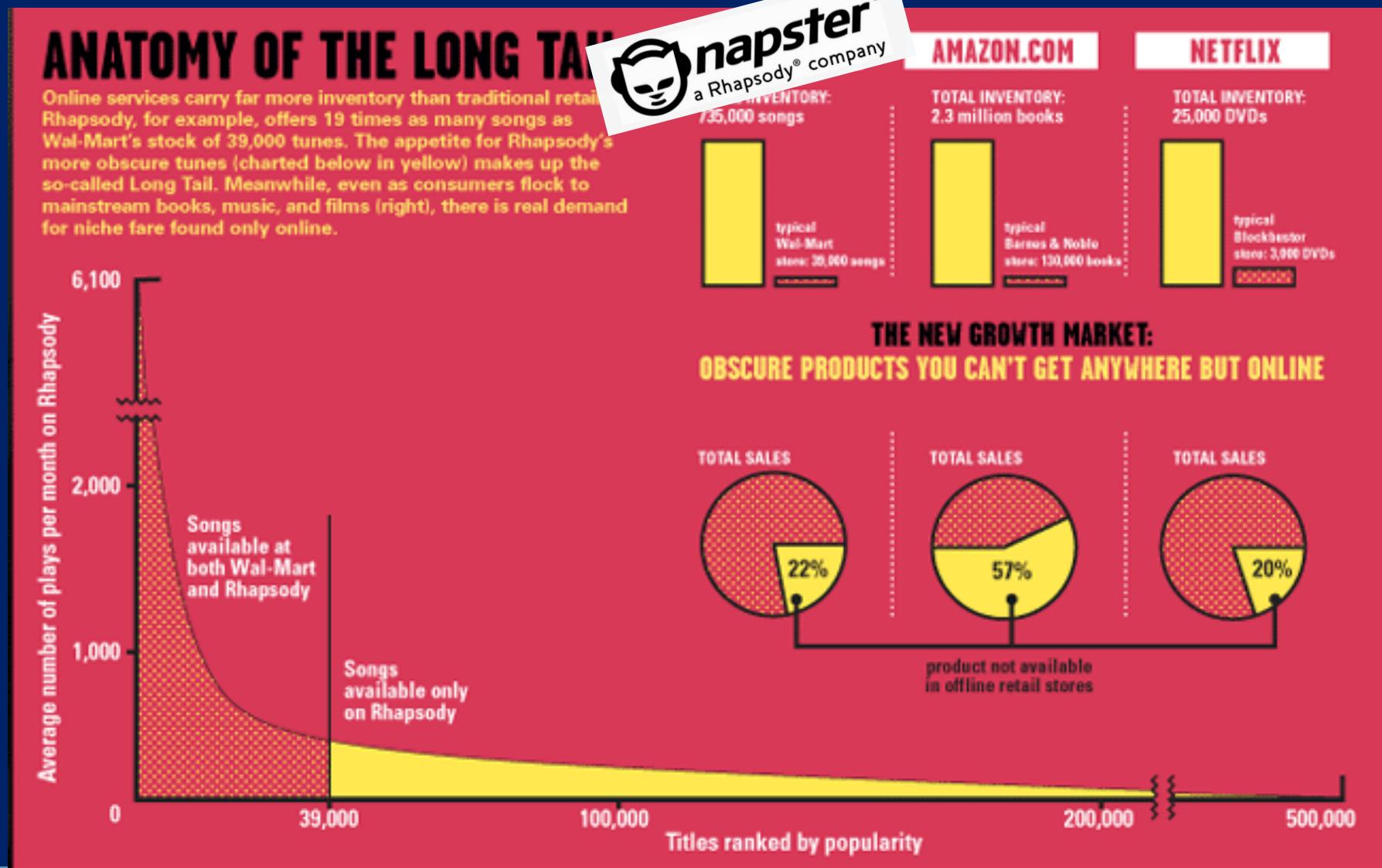
ANATOMY OF THE LONG TAIL

Online services carry far more inventory than traditional retailers. Rhapsody, for example, offers 19 times as many songs as Wal-Mart's stock of 39,000 tunes. The appetite for Rhapsody's more obscure tunes (charted below in yellow) makes up the so-called Long Tail. Meanwhile, even as consumers flock to mainstream books, music, and films (right), there is real demand for niche fare found only online.



The Long Tail

Image source: www.wired.com/wired/archive/12.10/tail.html



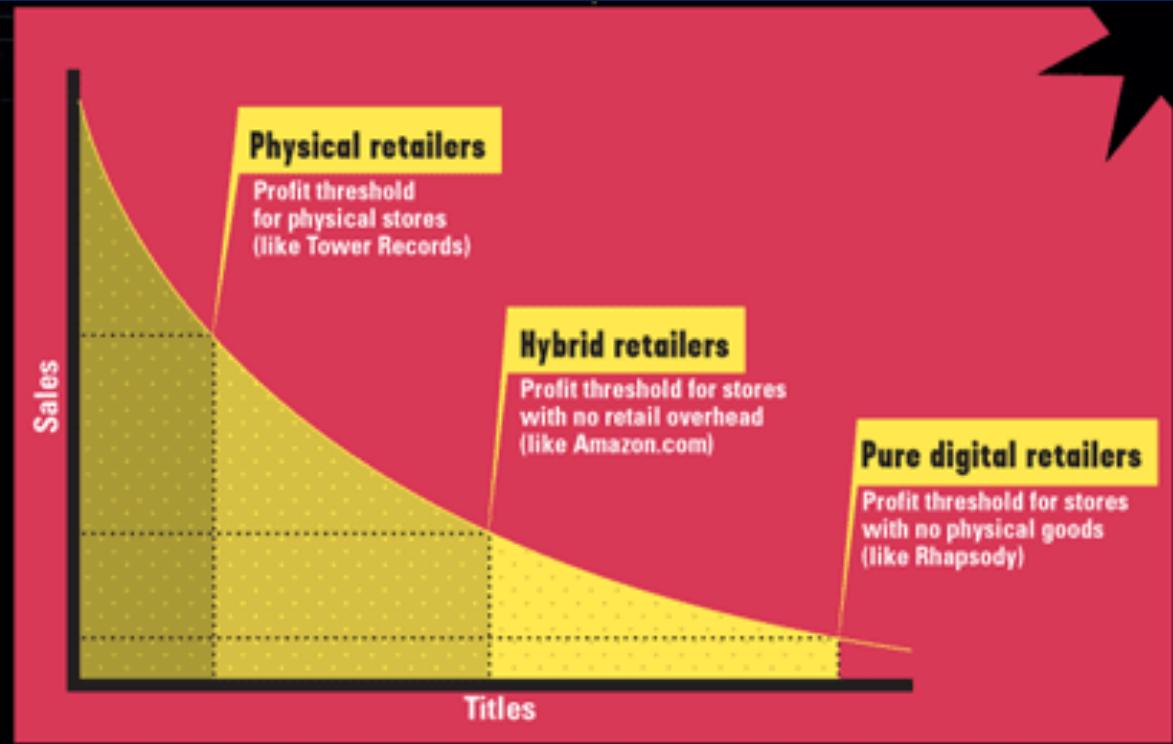
The Long Tail

Image source: www.wired.com/wired/archive/12.10/tail.html

THE BIT PLAYER ADVANTAGE

Beyond bricks and mortar there are two main retail models – one that gets halfway down the Long Tail and another that goes all the way. The first is the familiar hybrid model of Amazon and Netflix, companies that sell physical goods online. Digital catalogs allow them to offer unlimited selection along with search, reviews, and recommendations, while the cost savings of massive warehouses and no walk-in customers greatly expands the number of products they can sell profitably.

Pushing this even further are pure digital services, such as iTunes, which offer the additional savings of delivering their digital goods online at virtually no marginal cost. Since an extra database entry and a few megabytes of storage on a server cost effectively nothing, these retailers have no economic reason not to carry *everything* available.



The Long Tail

Image source: www.wired.com/wired/archive/12.10/tail.html



The Long Tail

Turns out the biggest money may well be in the smallest sales

Rules:

1. Make everything available
2. Reduce prices (economies of scale, elimination of Bricks&Mortar costs)
3. “Help me find it”

Amazon & other sites have made it also just as easy to buy used /pre-owned items as it is new ones.

NB “Reduce Prices” may have come at the cost of workers rights/pay.

The Lo

Turns o

Rules:

- 1.
- 2.
- 3.

Amazon

This article is more than 1 month old

Revealed: Amazon touts high wages while ignoring issues in its warehouses

Though it offers \$15 an hour, workers report injury claims denied, sweltering in warehouses and rising productivity demands



▲ Amazon has responded to criticism over its working conditions, but serious workplace issues remain. Photograph: Scott Sady/Associated Press

Amazon won praise when it raised its minimum wage to \$15 an hour in October 2018. Since then, the company has responded to criticism over its working conditions by claiming it is an industry leader in compensation, but a Guardian investigation has revealed many workers take issue with this messaging, as serious workplace issues remain that they say are still not being addressed.

They include claims workers are being

The Long Tail

- Amazon – makes \$\$\$ from long tail products
- eBay – sells many niche, one-off products
- Google – makes most of its money from **small** advertisers



People who bought that also bought these

- Amazon was not the first or only online bookstore
- Nor the biggest, according to Barnes and Noble
- Going online automates the *store*
 - Big stock, long shelves, gives long-tail benefits
 - But other online bookstores did that too
- Going online automated *customer community-building*
 - Customer reviews and recommendations attract buyers and build sales
 - Using recommendations forces demand down the long tail
 - But other online bookstores did that too
- Amazon also automated one of the key roles of the *bookseller*
 - Using the vendor's-eye view of the market to suggest new purchases

a http://www.amazon.co.uk/Dot-Con-Story-Internet-Bubble-Burst/dp/0141006668/ref=pd_rhf_p_t_3

Google



Go



Bookmarks



Pop-ups okay



ABC Check



Show Book Info



AutoFill



Settings



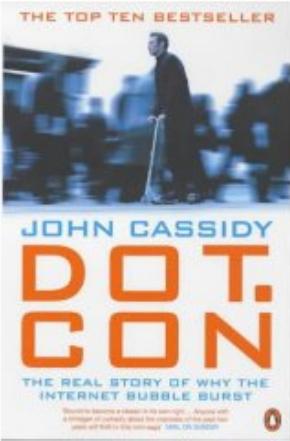
Page



Tools



a Amazon.co.uk: Dot.Con: The Real Story of Why t...



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Dot.Con: The Real Story of Why the Internet Bubble Burst (Paperback)

by [John Cassidy](#) (Author)

(11 customer reviews)

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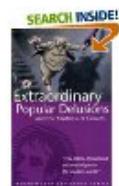
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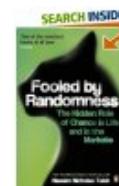
[Boo Hoo: A Dot Com Story](#)
by Ernst Malmsten



[F'd Companies: Spectacular Dot-Com Flameouts](#) by Philip J. Caplan



[Extraordinary Popular Delusions](#) (Wordsworth)



[Fooled by Randomness: The Hidden Role of Chance in the Market](#) by Nassim Nicholas Taleb



[When Genius Failed: The Rise and Fall of Long Term Capital Management](#) by Roger Lowenstein



Internet | Protected Mode: On



100%

Recommender Systems

- A specific type of Information Filtering (IF) technique that attempts to present information items (movies, music, books, news, images, web pages) that are likely of interest to the user.
-
- Typically, a recommender system compares the user's profile to some reference characteristics.
- These characteristics may be from the information item
 - *the content-based approach*
- or the user's social environment
 - *the collaborative filtering approach*
- Recommender systems are a useful alternative to search algorithms since they help users discover items they might not have found by themselves -- can involve graph databases

Recommender Systems

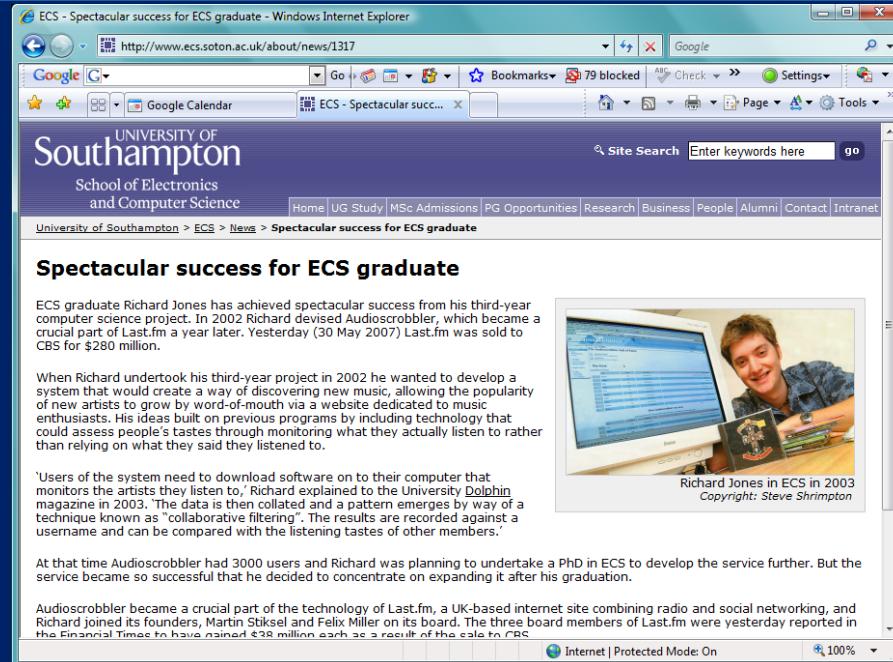
- Examples of **explicit** data collection include the following:
 - Asking a user to rate an item on a sliding scale.
 - Asking a user to rank a collection of items from favorite to least favorite.
 - Presenting two items to a user and asking him/her to choose the best one (“A/B Testing”).
 - Asking a user to create a list of items that he/she likes.
- Examples of **implicit** data collection include the following:
 - Observing the items that a user views in an online store.
 - Analyzing item/user viewing times
 - Keeping a record of the items that a user purchases online.
 - Obtaining a list of items that a user has listened to or watched on his/her computer.
 - Analyzing the user's social network and discovering similar likes and dislikes

Collaborative Filtering

- The process of filtering for information or patterns using techniques involving collaboration among multiple agents, viewpoints, data sources, etc.
- Typically involve very large data sets – “big data” analytics
- Applied to many different kinds of data including sensing and monitoring data; financial data; or in electronic commerce and web 2.0 applications where the focus is on user data, etc.
- The method of making automatic predictions (filtering) about the interests of a user by collecting taste information from many users (collaborating).
- The underlying assumption of CF approach is that those who agreed in the past tend to agree again in the future.

Collaborative filtering for music in *Last.fm*

- Richard Jones “Audioscrobbler” final-year UK undergraduate project at So’ton in 2003
- Became core of (pre-existing) www.last.fm personalised internet radio station
- May 2007: Jones nets \$38m by selling his share of Last.fm to CBS
- <http://www.ecs.soton.ac.uk/about/news/1317>
- Current users >>50 million (via FB)
- 2012 *Wired* interview with Jones: <https://www.wired.com/2012/11/richard-jones-scrobbing/>



How Last.fm works....

The screenshot shows the Last.fm homepage. At the top, it displays global listening statistics: "Right now, all over the world..." followed by "2,409 people are listening to Muse – Starlight", "299,021 people love Motion City Soundtrack", and "49 people are attending Grizzly Bear in Washington DC". Below this is a search bar and a "Login" button.

The main content area is divided into several sections:

- Music:** Shows album art for "The Killers" and "The Beatles", along with their respective Last.fm stats.
- Videos:** Shows a video thumbnail for "Rihanna Anytime" and its stats.
- Charts:** Shows chart entries for "Beck - Chemtrails" and "Ingrid - Sugar Rio".
- Events:** Shows event details for "A TEST FEST 2008" and "TELEMETRIK at Geha Lounge".
- Popular Artists:** Shows stats for "The Killers", "The Beatles", "Kanye West", "Metallica", and "Weezer".
- Popular Songs:** Shows stats for "Stronger", "When You Were Young", "Tired of England", "Pork and Beans", and "Love Me Already".
- Upcoming Events:** Shows events like "Left Behind" and "See more events".
- What's New:** Welcomes users to the new Last.fm and provides a link to the blog.
- Upload Your Music:** Links for artists and labels.
- About Us:** Links for contact, team, moderators, and careers.
- Help / Support:** Links for FAQ, web site support, last.fm software support, feedback, and forums.
- Resources:** Links for download software, widgets, plugins, extras, image charts, find users, and find groups.
- Footer:** Includes a quote ("Whenever There's a Snack Gap, Last.fm Fills."), copyright information (© 2002–2008 Last.fm Ltd. Terms of Use), and links for blog, API, playground, and subscribe.

Last.fm builds a detailed profile of each user's musical taste by recording details of all the songs the user listens to, either on the streamed radio stations or on the user's computer or some portable music devices.

This information is transferred to Last.fm's database ("scrobbled") via a plugin installed into the user's music player. The profile data is then displayed on the user's profile page. The site offers numerous social networking features and can recommend and play artists similar to the user's favourites.

Criticism of *The Long Tail*

- Does the long-tail effect really exist – is that the secret of success?
- Some recent research brings it into question
 - Anita Elberse, Harvard Business School, cites sales data which shows the Web actually magnifies the importance of “blockbuster” hits.
 - Anderson debates this and says it is where you define the head and tail, he states it in absolute values whereas Elberse goes on percentages.
 - Will Page & Andrew Bud found also that music sales exhibited a log-normal distribution rather than a power law curve. They reported that 80% of their music tracks available sold NO copies at all over a 1 year period.
 - Anderson responded by saying this study was difficult to assess without seeing the full data. (Huh?)

Criticism of *The Long Tail*

- But...
- Bynjolfsson, Hu, & Smith (2010) "The Longer Tail: The Changing Shape of Amazon's Sales Distribution Curve"
 - Shows the long tail has grown longer over time, with niche books accounting for a larger share of total sales. 2008, niche books accounted for 36.7% of Amazon's sales
- Zhou & Duan (2010) "Online User Reviews, Product Variety, and the Long Tail: An Empirical Investigation on Online Software Downloads"
 - Found a longer tail but also a fatter tail in an in-depth analysis on consumer software downloading pattern
- The demand side factor (online user reviews) and the supply side factor (product variety) interplay to influence the long tail formation of user choices. Increased product variety helps niche products to get more downloads.

Google

Founded September 1998 by Larry Page and Sergey Brin

Developers of the award-winning Google search engine

Google a brand now seen more as a verb than a noun – increased its brand value from 2011 by 7% and was knocked off number one position of most valuable brands by Apple.

In May 2011, the number of monthly unique visitors to Google surpassed 1 billion for the first time

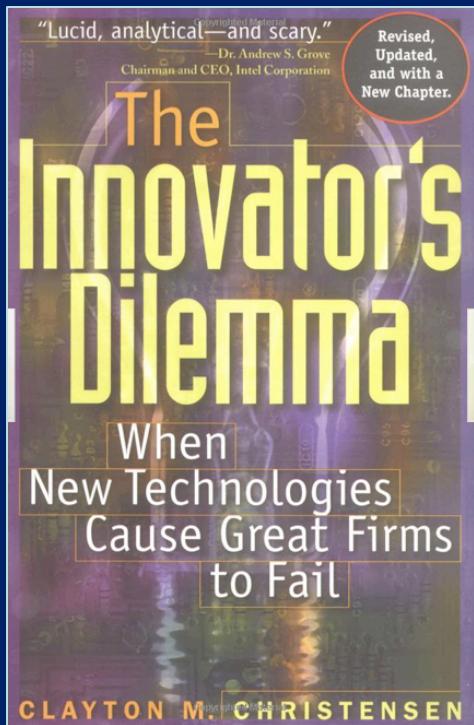
Providing the fastest, most accurate results required a new kind of server setup. Whereas most search engines ran off a handful of large servers that often slowed under peak loads, Google employed linked PCs to quickly find each query's answer. The innovation paid off in faster response times, greater scalability and lower costs. It's an idea that others have since copied (**Hadoop**), while Google have continued to refine their back-end technology to make it even more efficient: **Google App Engine** etc.

A **hugely** important concept...

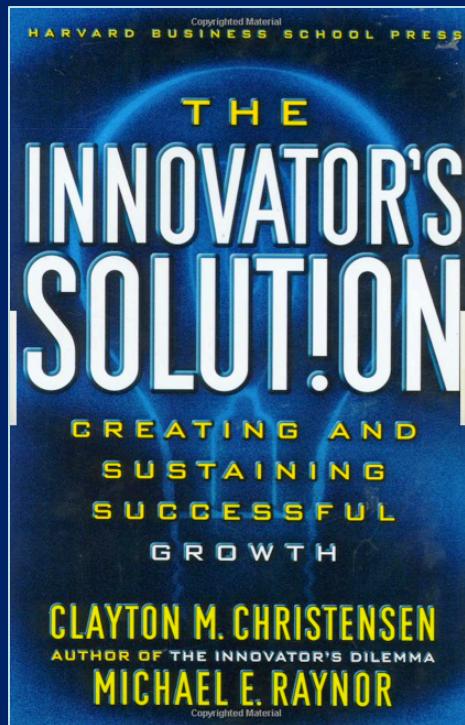
...disruptive technology

Christensen: Disruptions and Dilemmas

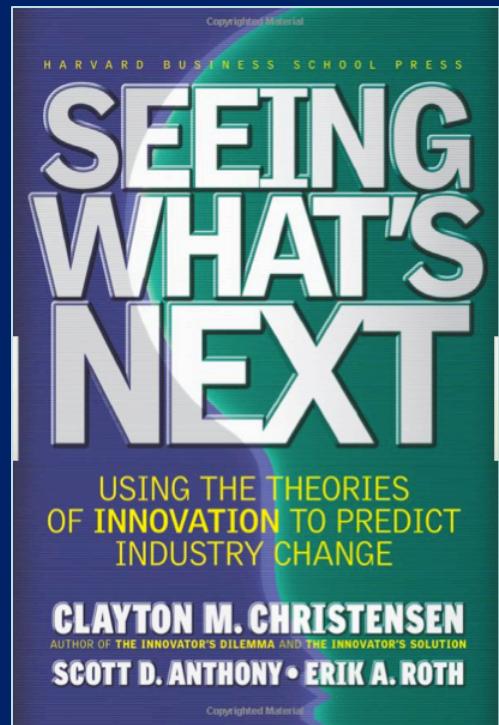
1997



2003



2004



Let's start at the beginning...

J. Bower & C. Christensen (1995) Disruptive Technologies: Catching the Wave. *Harvard Business Review*, Jan-Feb 1995, pp.43-53

The image shows the front cover of the Harvard Business Review (HBR) magazine from January-February 1995. The cover features the HBR logo at the top, followed by a decorative horizontal border with a repeating scroll pattern. Below this, the title 'Disruptive Technologies: Catching the Wave' is prominently displayed in large, bold, serif capital letters. Underneath the title, the authors' names, 'by Joseph L. Bower and Clayton M. Christensen', are printed. The main article begins with a paragraph starting with a large, stylized letter 'O'. To the right of the main text columns, there are two columns of smaller text, likely footnotes or additional content. At the bottom left, it says 'DRAWING BY CHRISTOPHER BING', and at the bottom right, the page number '43'.

HBR
JANUARY-FEBRUARY 1995

Disruptive Technologies: Catching the Wave

by Joseph L. Bower and Clayton M. Christensen

One of the most consistent patterns in business is the failure of leading companies to stay at the top of their industries when technologies or markets change. Goodyear and Firestone entered the radial-tire market quite late. Xerox let Canon create the small-copyer market. Bucyrus-Erie allowed Caterpillar and Deere to take over the mechanical excavator market. Sears gave way to Wal-Mart.

The pattern of failure has been especially striking in the computer industry. IBM dominated the mainframe market but missed by years the emergence of minicomputers, which were technologically much simpler than mainframes. Digital Equipment dominated the minicomputer market with innovations like its VAX architecture but missed the personal-computer market almost completely. Apple Computer led the world of personal computing and established the standard for user-friendly computing but lagged 6 years behind the leaders in bringing its portable computer to market.

Why is it that companies like these invest aggressively—and successfully—in the technologies necessary to retain their current customers but then fail to make certain other technological investments that customers of the future will demand? Undoubtedly, bureaucracy, arrogance, tired executive blood, poor planning, and short-term investment horizons have all played a role. But a more fundamental reason lies at the heart of the paradox: leading companies succumb to one of the most popular, and valuable, management dogmas. They stay close to their customers.

Although most managers like to think they are in control, customers wield extraordinary power in directing a company's investments. Before managers decide to launch a technology, develop a product, build a plant, or establish new channels of distribution, they must look to their customers first: Do their customers want it? How big will the market be? Will the investment be profitable? The more astutely managers ask and answer these questions,

Joseph L. Bower is the Donald Kirk David Professor of Business Administration at the Harvard Business School in Boston, Massachusetts. Clayton M. Christensen, an assistant professor at the Harvard Business School, specializes in managing the commercialization of advanced technology.

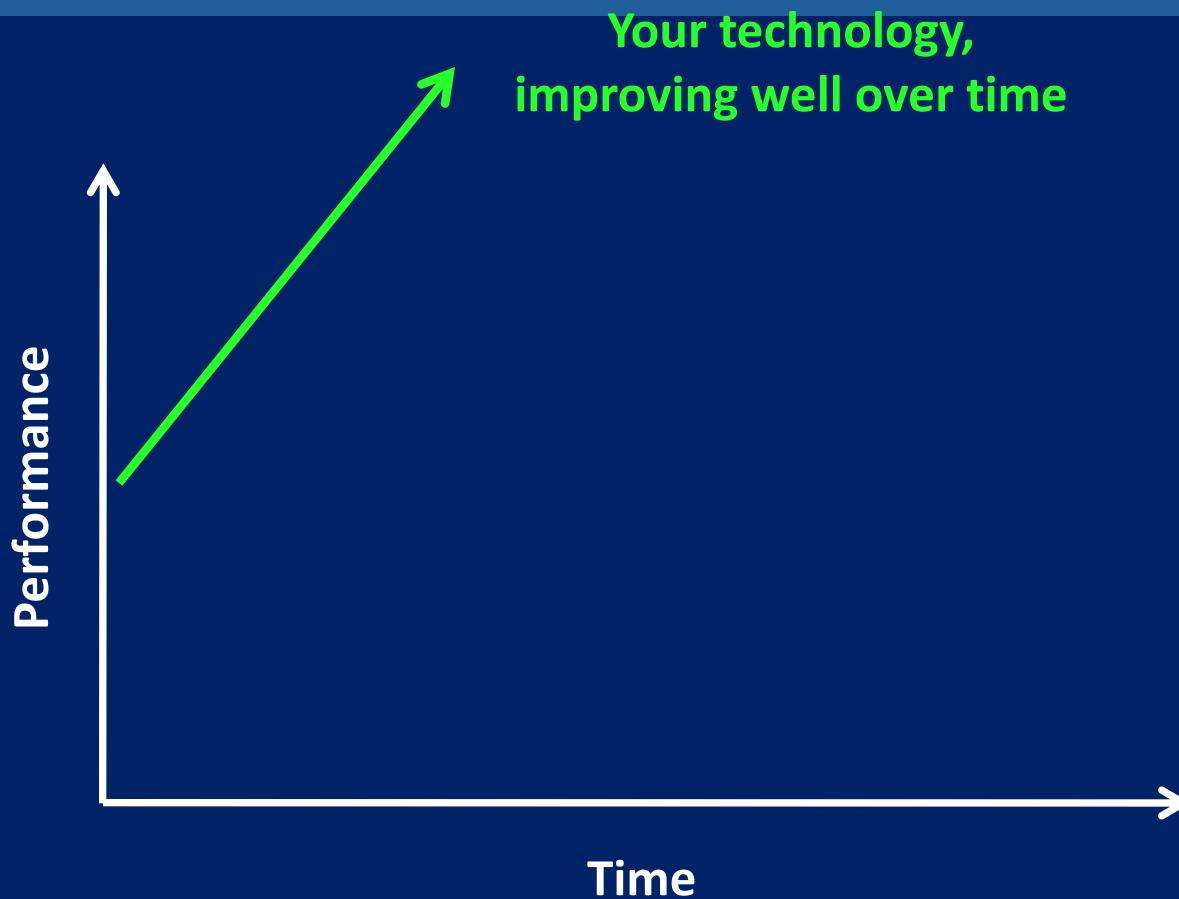
DRAWING BY CHRISTOPHER BING

43

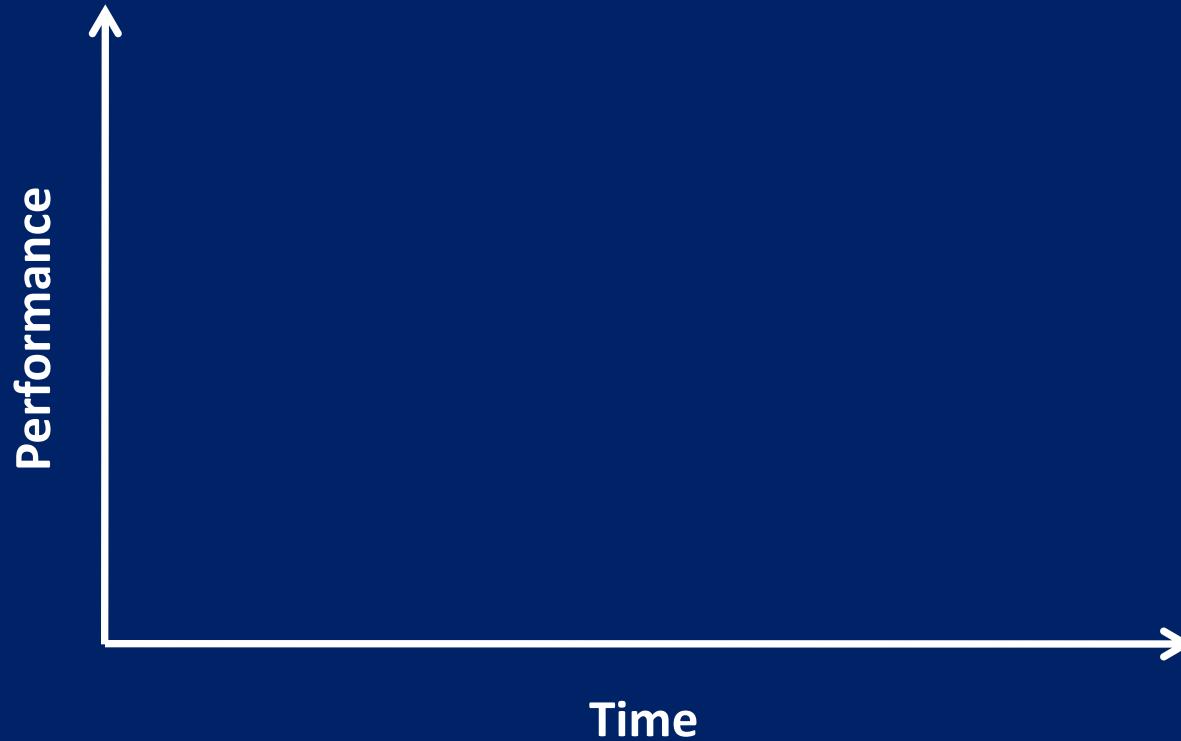
Plot of performance over time



Incumbent business: your future's looking good



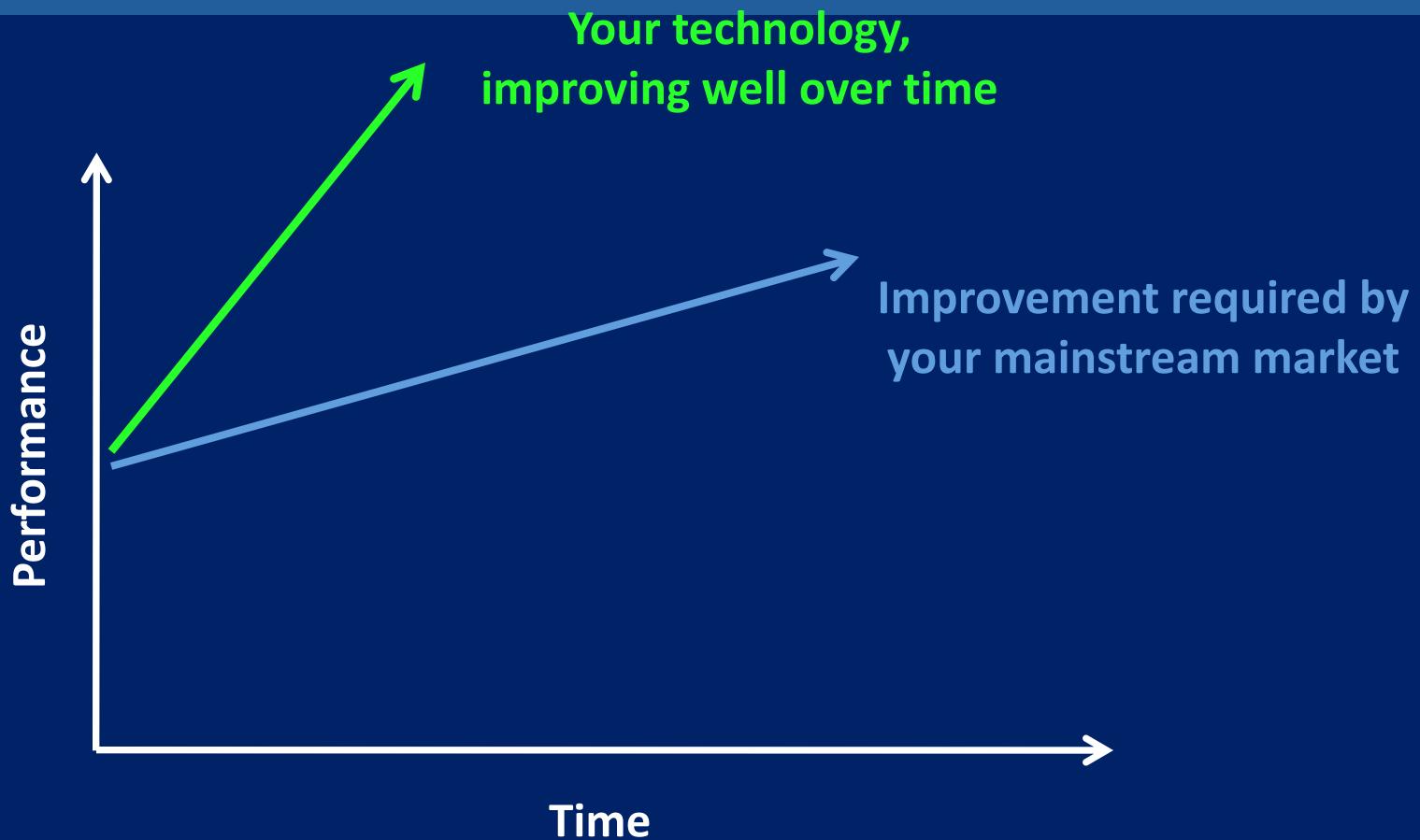
Performance over time...



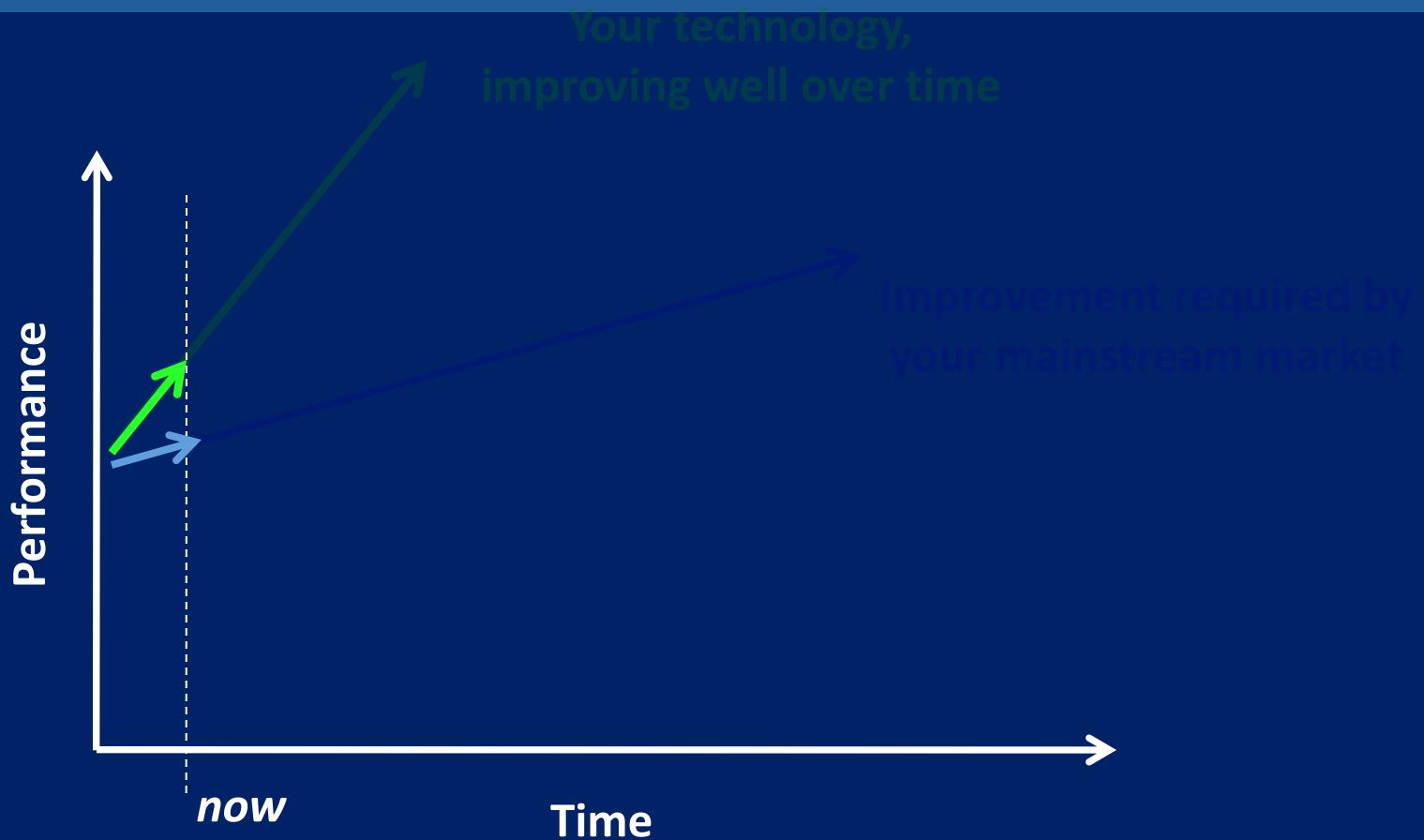
Future increases in customers' needs...



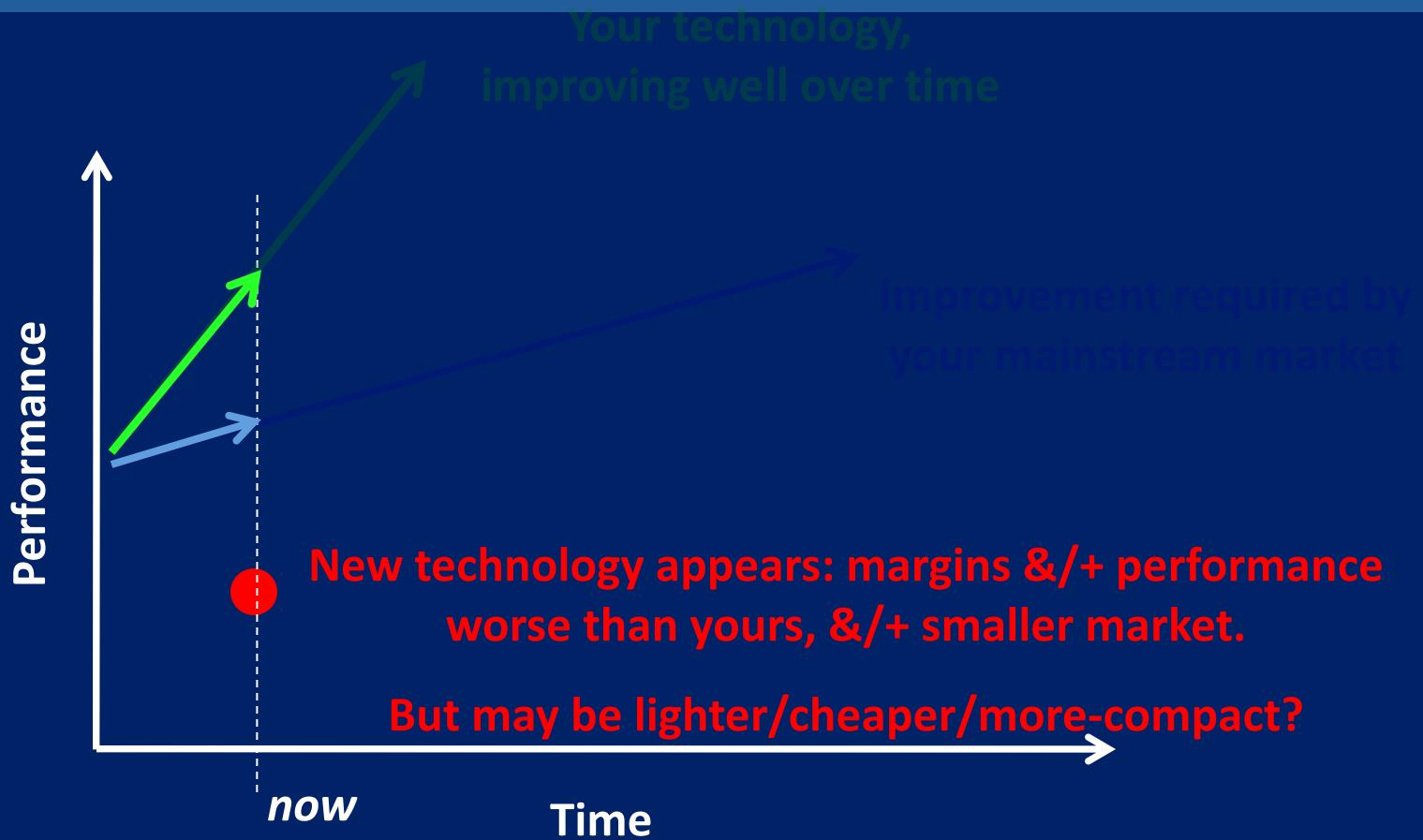
Incumbent business is looking good for the future



Where you are now: predictions panning out



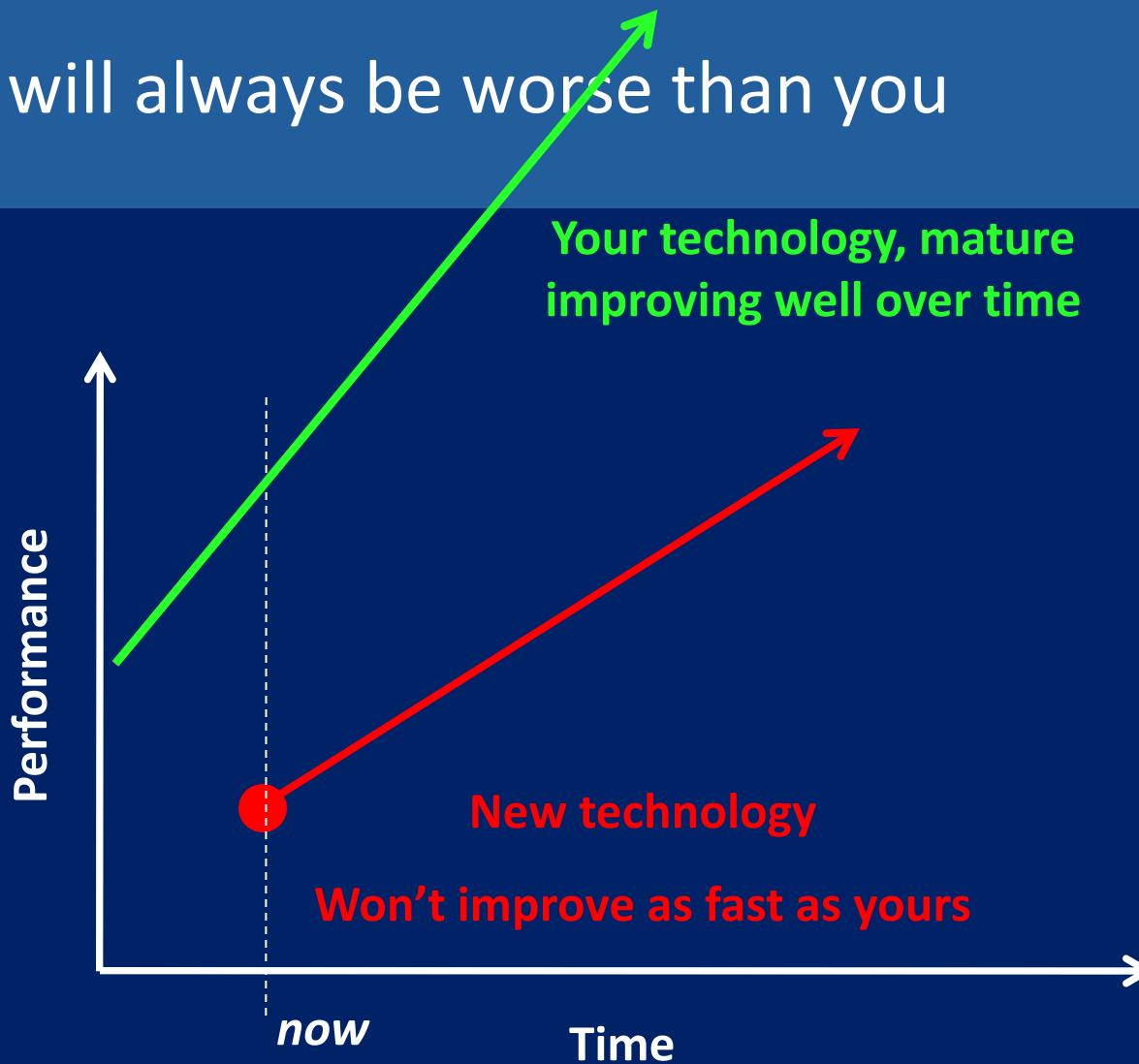
A new kid on the block



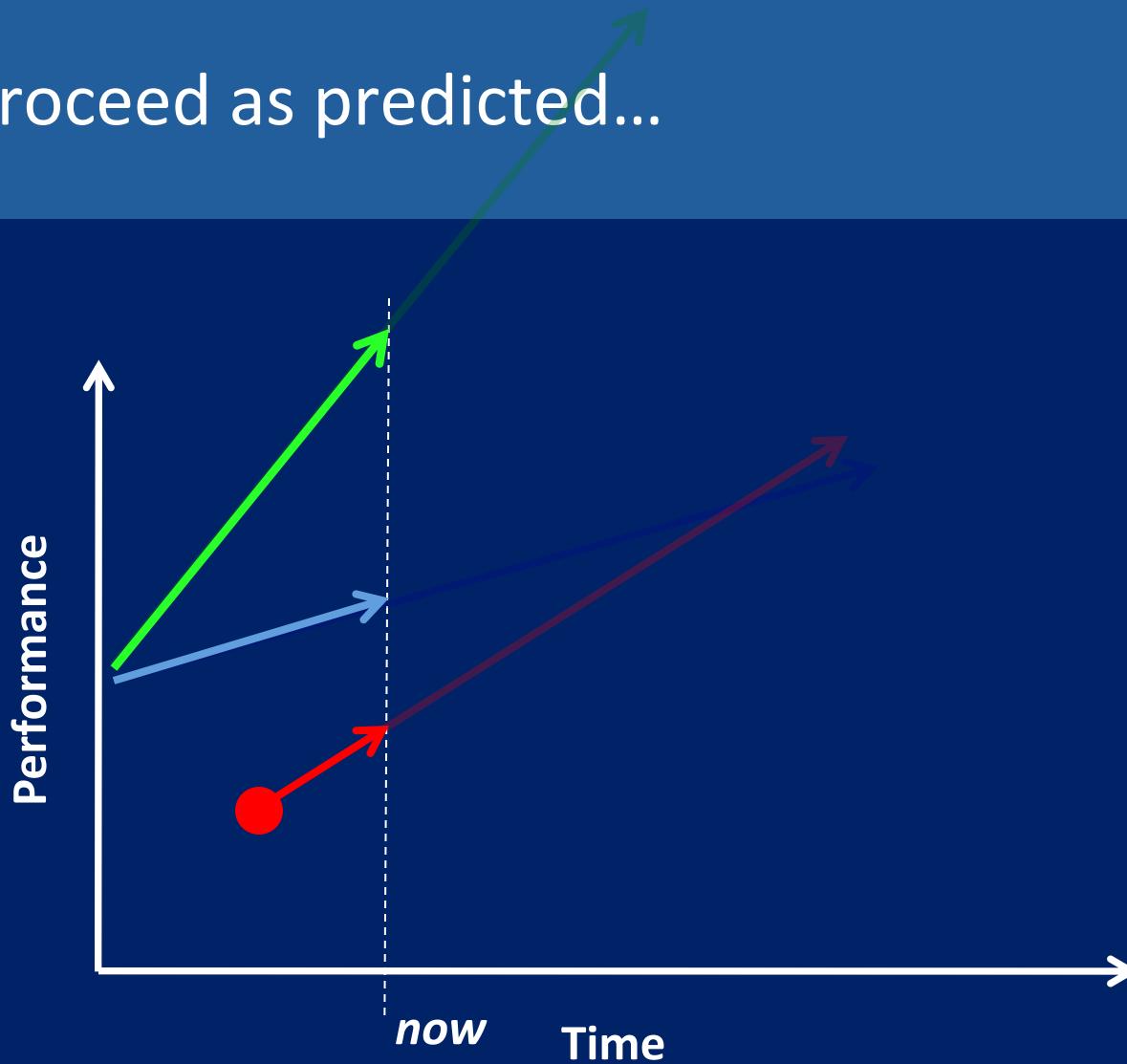
Predict the future of the new kid



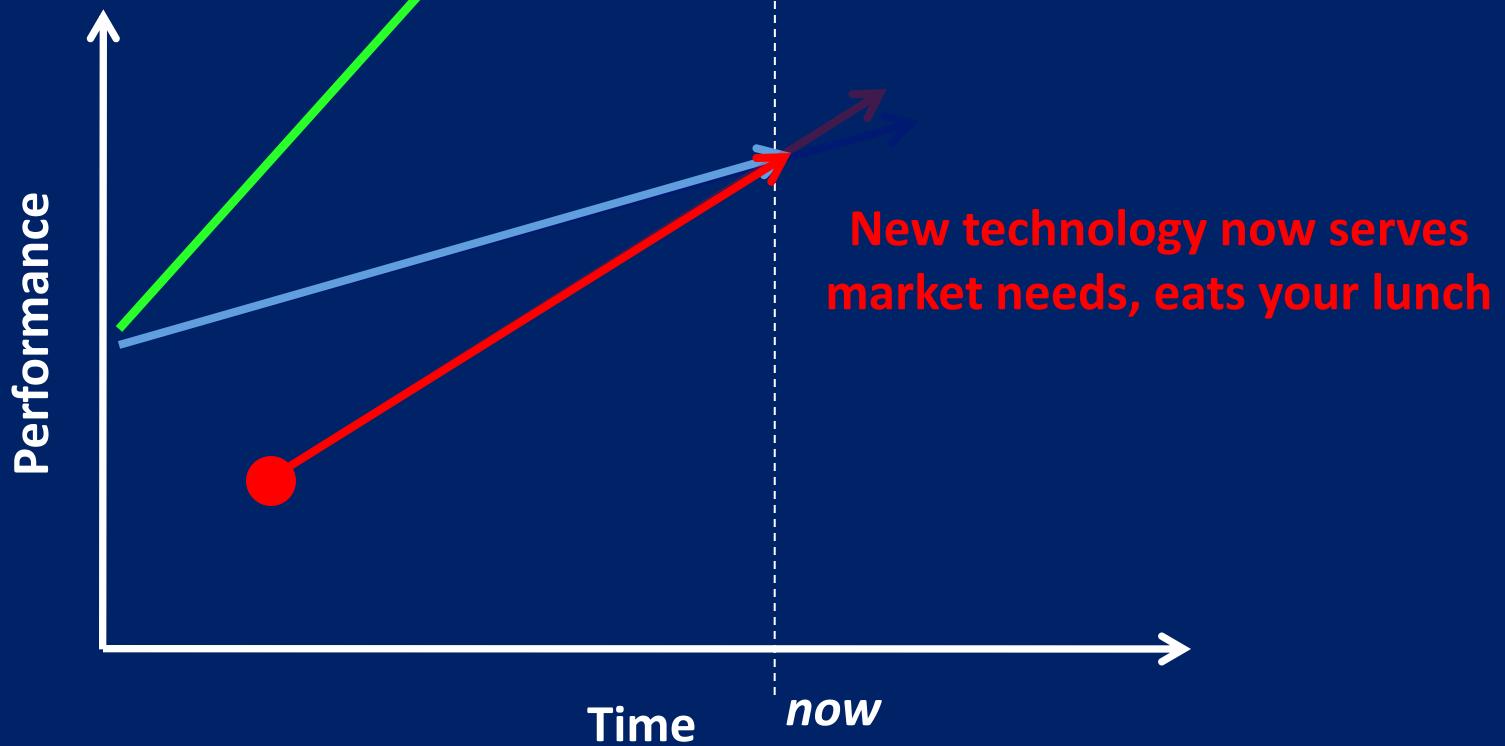
New kid will always be worse than you



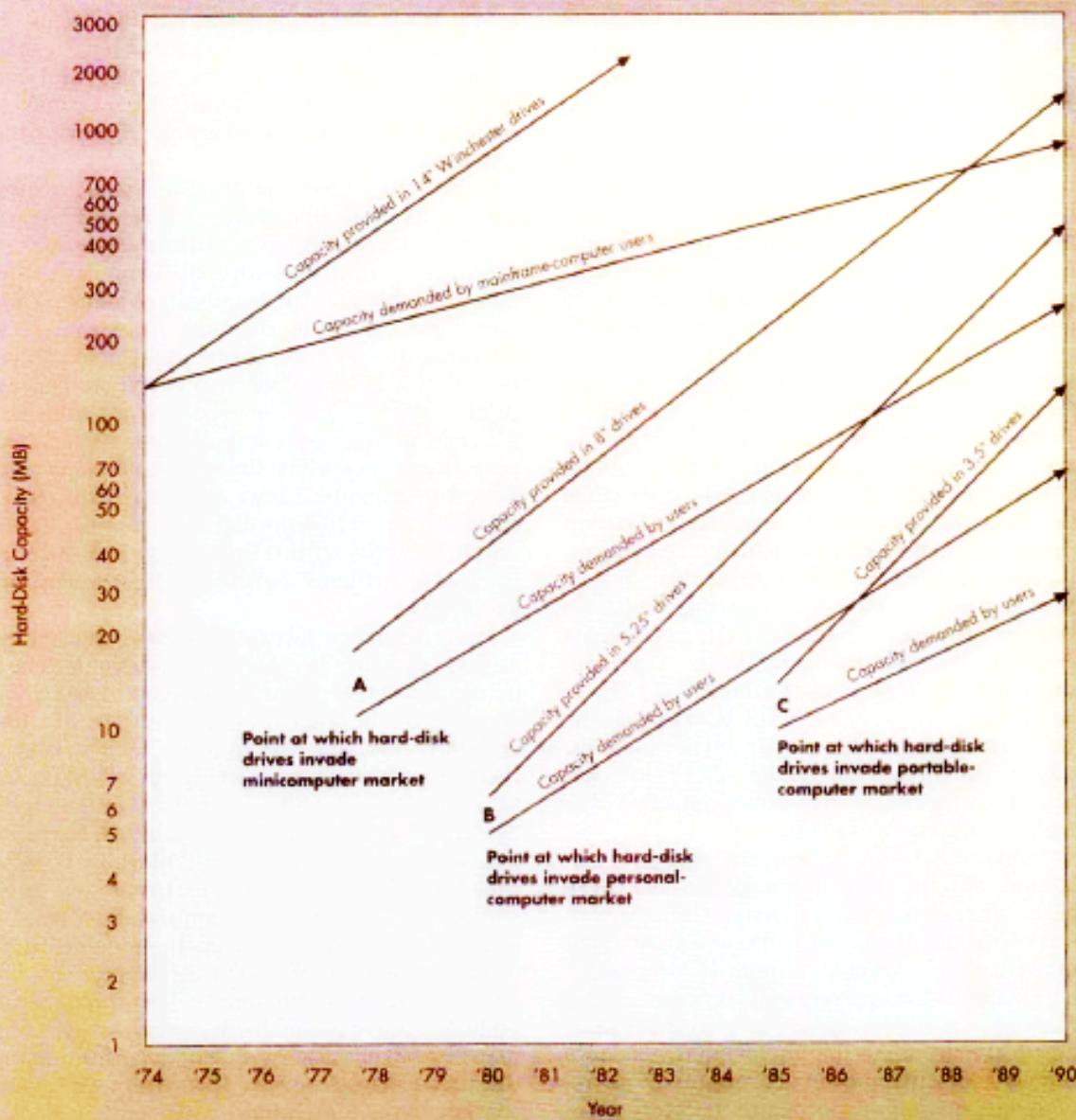
Things proceed as predicted...

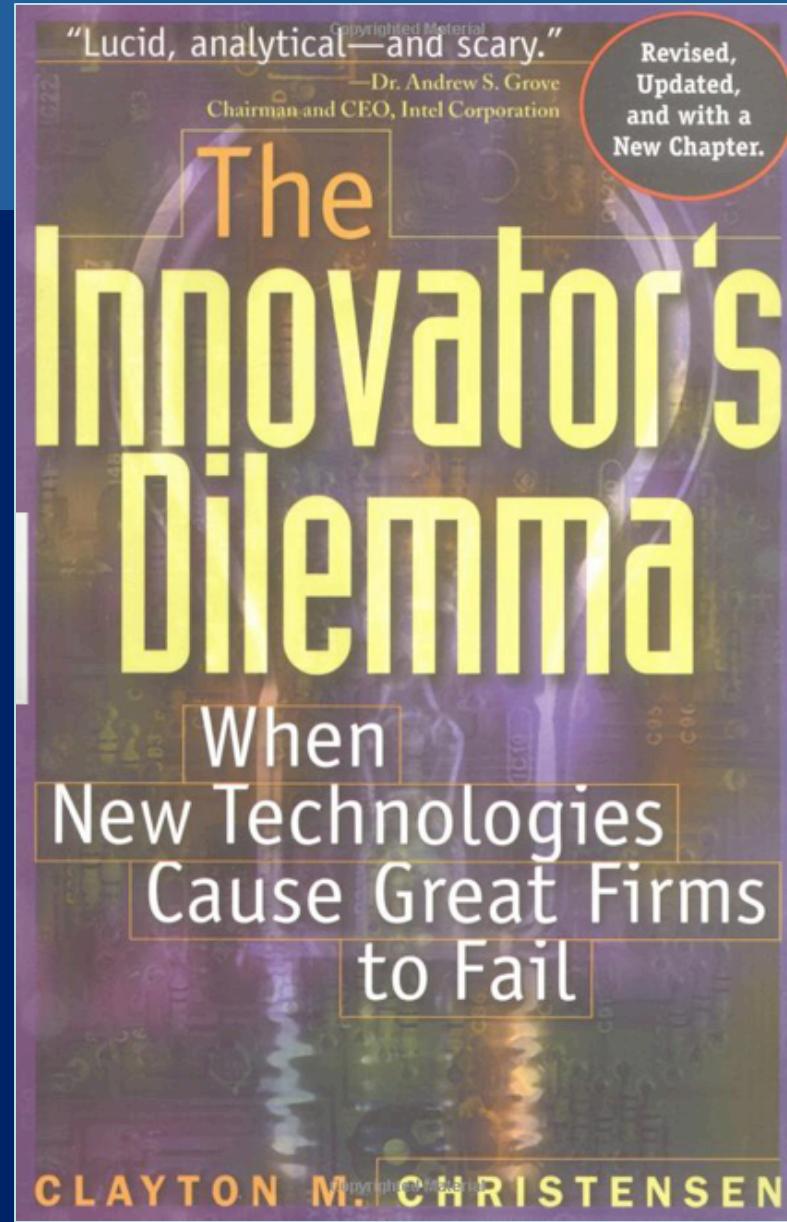


...and you're toast



How Disk-Drive Performance Met Market Needs





The Innovator's Dilemma

Distinguishes between two types of innovation:

- **Sustaining Innovations:** incremental improvements on existing products or services, attractive to existing customers (e.g. better price/performance) and existing business model (e.g. increase margins); eventually, you offer more than the customer wants
- **Disruptive Innovations** perform less well than existing products, may be lower quality and less sophisticated, but they are also simpler, cheaper, more user-friendly

Disruptive innovations can cause strong incumbent companies to fail/falter, not because of weaknesses in those companies, but because they do the right short-term thing of serving the (higher-margin, higher-volume, market-leading) established technology to established customers, and leave the low end of the market to others, to preserve brand.

The Dilemma: doing what made the company a success in the first place can lead it to failure; a sequence of individually sensible business decisions can, in hindsight, appear to be disastrous

Implication: sometimes successful incumbents need to invest in doing the wrong thing

The Innovator's Dilemma, step by step

- Very often, the disruptive technology is developed by the incumbent company
- IncumbentCo's existing customers are unimpressed
- IncumbentCo doesn't develop the disruptive technology, concentrates on sustaining innovations
- New companies form (sometimes formed from disgruntled ex-employees of IncumbentCo) and develop new markets for the disruptive technology
- As the disruptive technology matures and improves, it moves up the chain
- IncumbentCo realises there is a significant new market, attempts to enter it as a latecomer, fails due to unassailable lead built up by new companies.
- *Innovator's Dilemma* is a classic, but concentrated on identifying and demonstrating the existence of disruptions and the dilemma; later books addressed the issues of what to do about it, and how to use it to your advantage...

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SEEING WHAT'S NEXT

USING THE THEORIES
OF INNOVATION TO PREDICT
INDUSTRY CHANGE

CLAYTON M. CHRISTENSEN

AUTHOR OF **THE INNOVATOR'S DILEMMA** AND **THE INNOVATOR'S SOLUTION**

SCOTT D. ANTHONY • ERIK A. ROTH

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Seeing What's Next

Summarises the two previous books: *Innovator's Dilemma* & *Innovator's Solution*.

Commits to an empirical, theory-based **predictive** approach

Argues for a service/performance-based perspective, even on product industries

- Successful companies offer new/better possibilities for getting things done
- Disruptive innovations are easier to spot in advance under this view

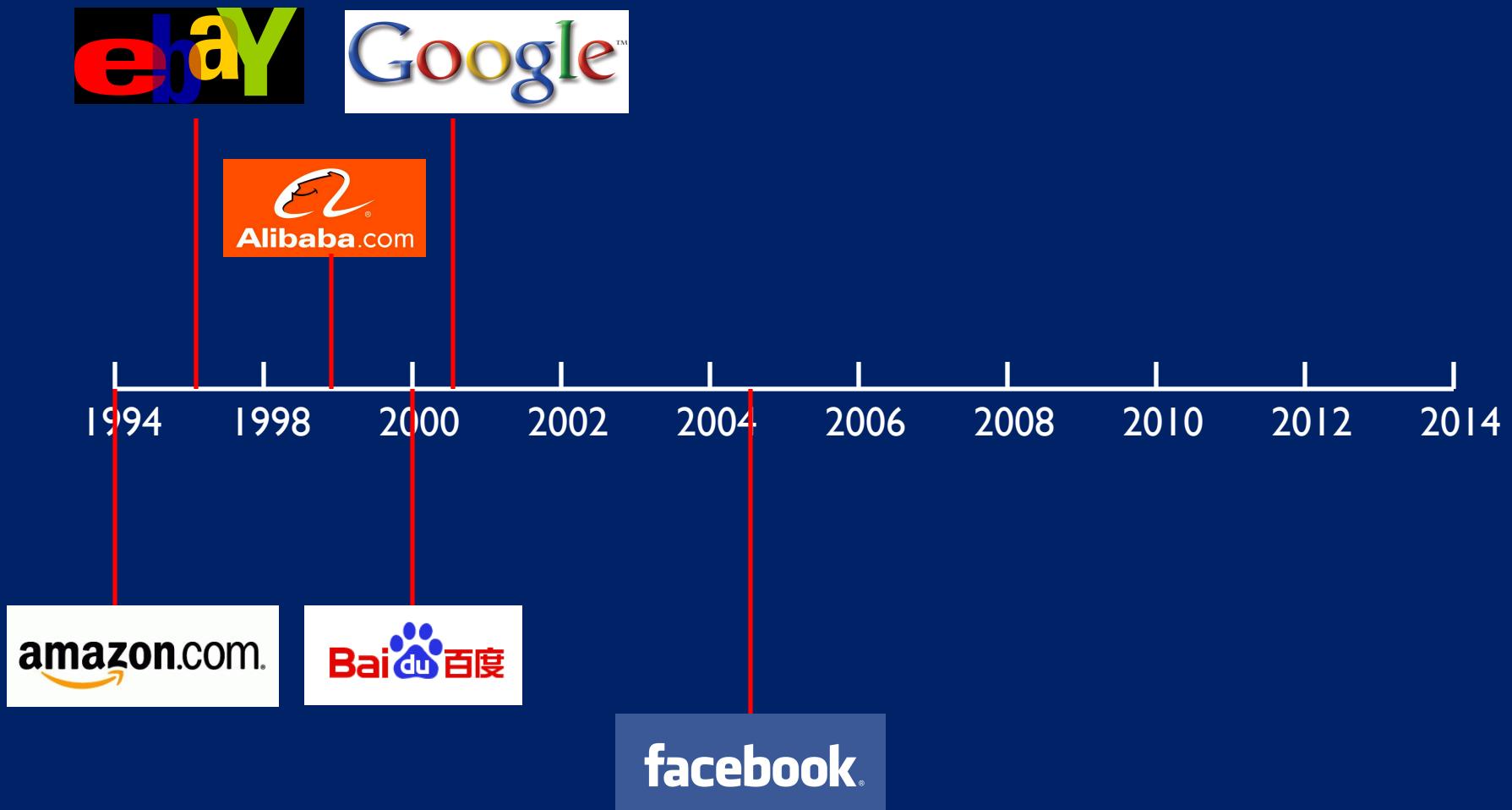
Three different styles of innovation:

- A. Sustaining innovations, for existing products & high-margin markets/customers where there is real need/demand for improvements
- B. Low-cost alternatives for low-end markets/customers who do not need improvements but would happily pay less for the same functionality
- C. New products/services to create new markets, recruit new customers, who are not currently interacting with the company

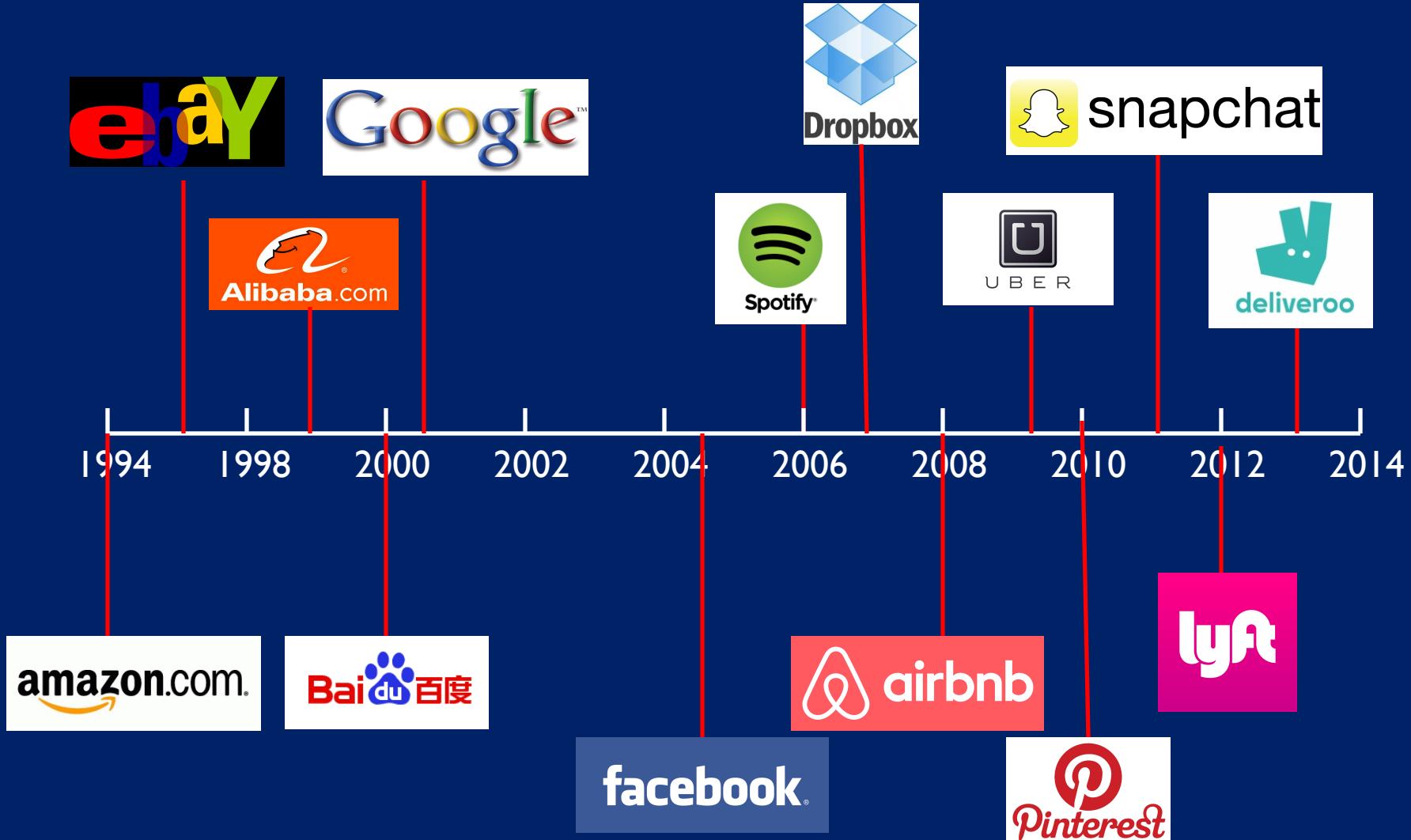
Track the competition and try to identify “undefended hills”

Sometimes best to give disruptive technology to a spin-out,
...separate from existing culture+brand

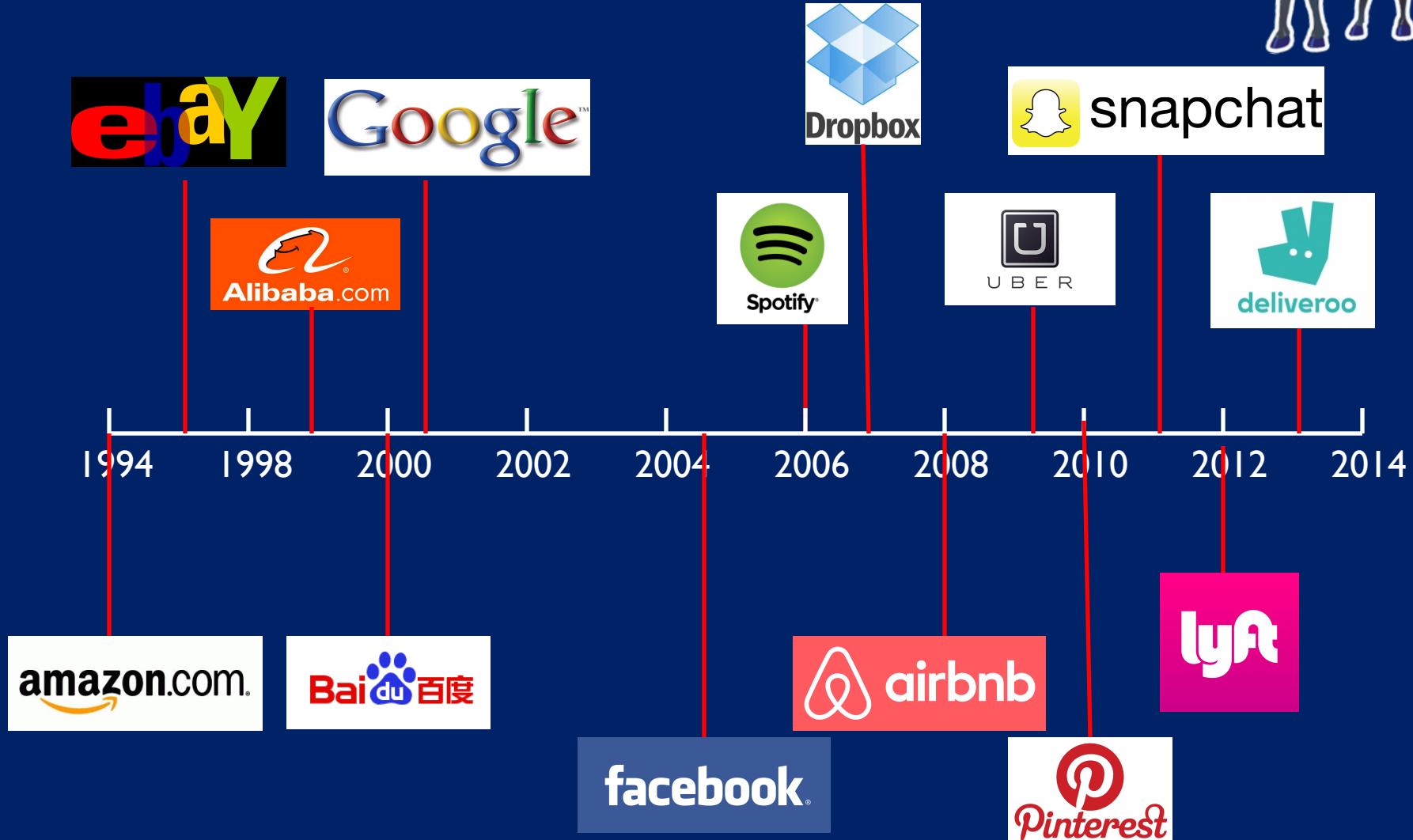
Timeline



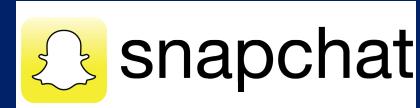
Timeline



Timeline



Timeline



2000

2002

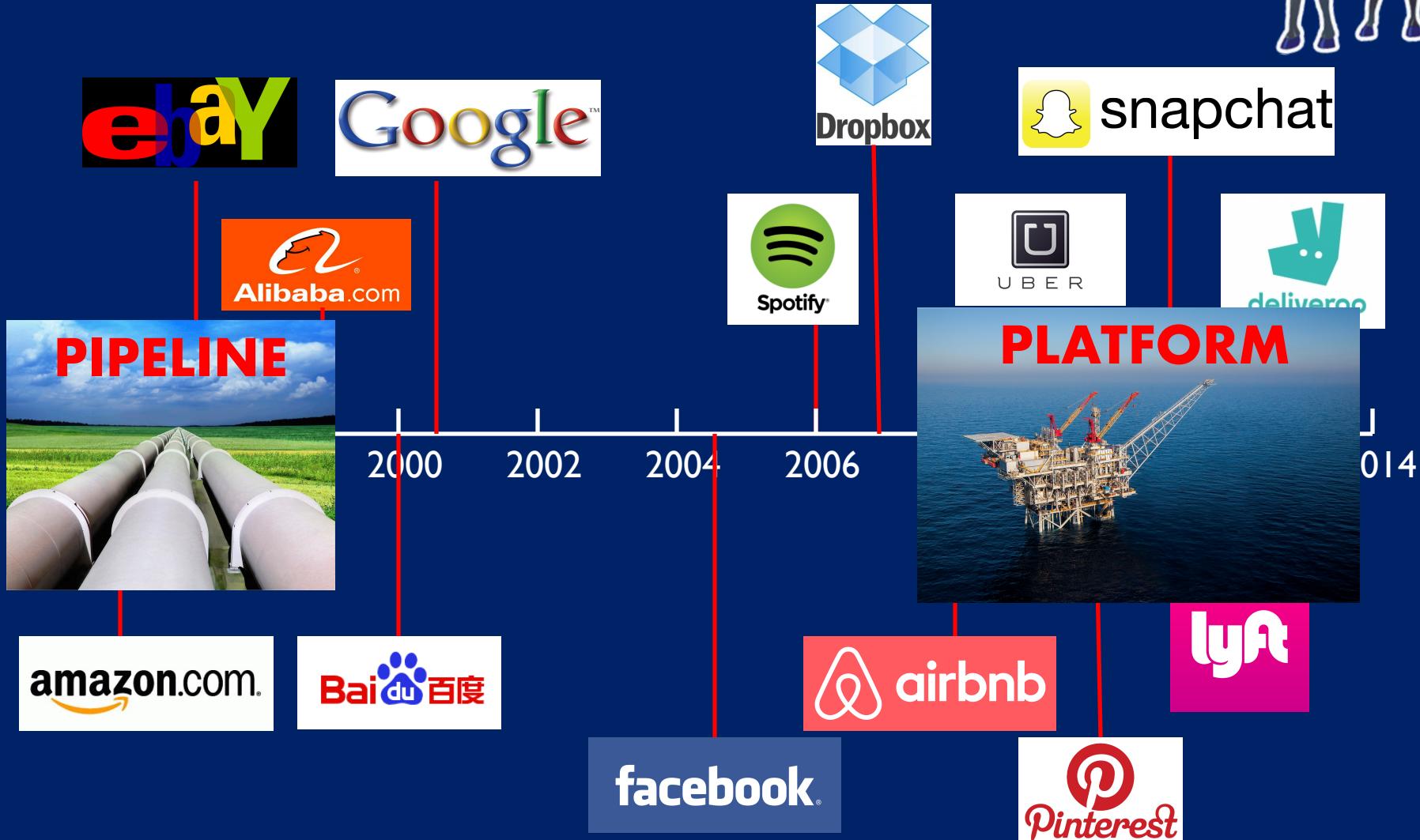
2004

2006

2014

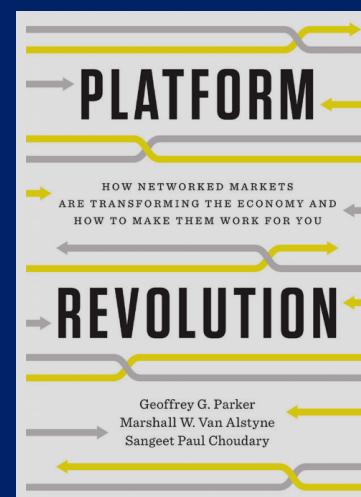
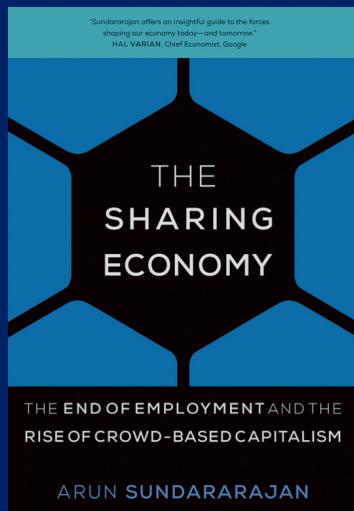


Timeline



Platform businesses

- Many early web disruptions/successes were *pipeline* businesses
 - E.g previously physical-media pipelines (CDs, newspapers, etc) replaced by digital-media: faster, cheaper
- Companies such as Uber and AirBnB are *platform* businesses: they create an online venue for matching demand (customers) to supply (people providing work, or access to assets).
- Technically a *two-sided matching problem* (generalisable to *multi-sided*).



2016

2016

2016

The “gig economy”

- For years, musicians have referred to their live performances as “gigs”
 - You turn up, play some music or sing some songs, get paid for doing so, and go home.
 - If you don’t turn up, & play/sing, you don’t get paid.
- Other trades and professions are similar in nature
 - Taxi-drivers only get paid for each trip they drive for customer(s) in their cab
 - Photographers get paid for each “shoot”;
 - Everyone involved in an independent movie or TV production gets paid per project.
 - Lots of independent/freelance/self-employed people (lawyers, carpenters, builders, plumber, decorators) are paid similarly: not a salaried employee of a company
- Platform businesses act as **re-intermediators** and **aggregators**
 - Lower barriers to entry for suppliers, makes it easier for people to do this work
 - Aggregation of supply makes them attractive to customers: ease of finding a supplier soon
 - Large number of customers make joining the platform attractive to suppliers.

The gig economy

≡ MENU SEARCH

FINANCIAL TIMES

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Gig Economy + Add to myFT

When your boss is an algorithm

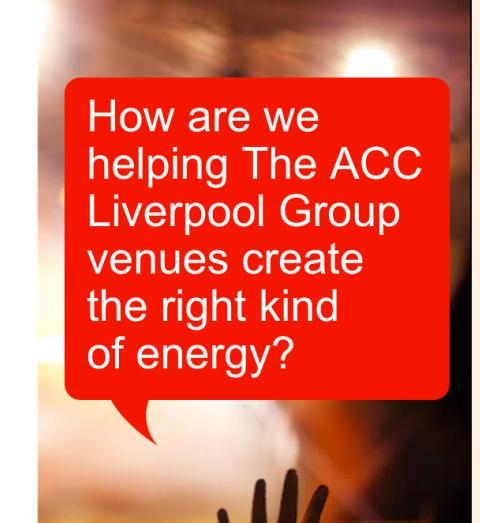
In the gig economy, companies such as Uber and Deliveroo manage workers via their phones. But is this liberating or exploitative?



Read latest:

Concern as pay-as-you-go tax plan targets Airbnb owners

8 HOURS AGO



How are we helping The ACC Liverpool Group venues create the right kind of energy?

The gig economy



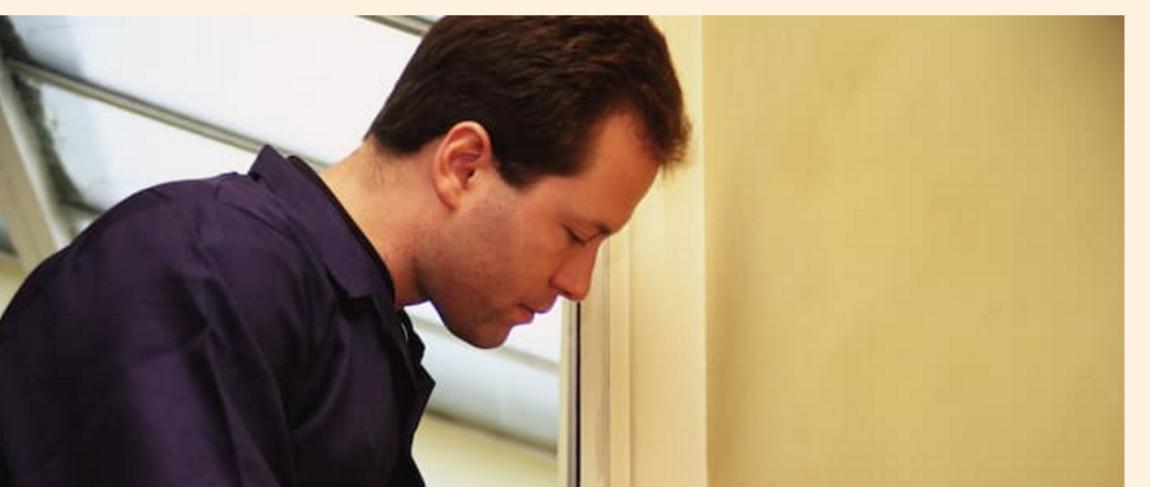
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Gig economy poses tough questions for US

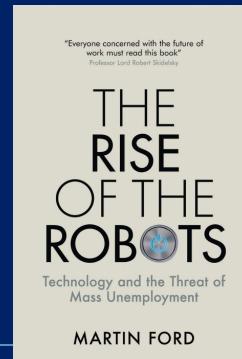
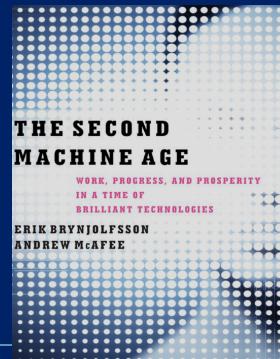
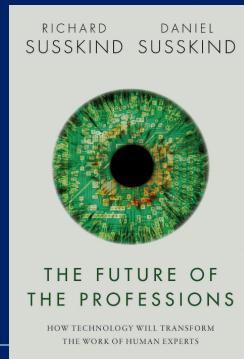
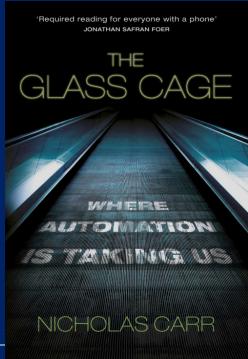
Workers and legislators want health and welfare regulations updated for new marketplace



Read latest:
Concern as pay-as-you-go tax plan targets Airbnb owners
8 HOURS AGO

The future of work

- The internet/web lowers cost of discovery: digital goods have v low transport costs
 - Multi-sided matching platforms enable buyer/seller discovery
 - Uber, AirBnB: both buyer and seller are humans with resources
 - But what if the seller is a machine, and the resource being sold is intelligence?
 - Artificial Intelligence and Machine Learning (AI/ML) are maturing rapidly
 - Cheap remotely-accessed cloud computing means AI/ML no longer so compute-limited
 - Convergence of internet/web, cloud, and AI/ML automation makes it possible/likely that very many skilled-human jobs will be eliminated
 - E.g. self-driving vehicles: taxi/Uber drives; trucks/lorries; etc
 - E.g. Google Translate: localisation services; human translators



It's not just about jobs

The future of democracy

Apr.2019

The screenshot shows a TED talk page. At the top left is the TED logo with the tagline 'Ideas worth spreading'. To the right are navigation links: WATCH, DISCOVER, and ATT. Below the header is a large video thumbnail featuring a woman with blonde hair, Carole Cadwalladr, speaking on stage. A play button icon is overlaid on the video. To the right of the video are four circular sharing options: Share (up arrow), Add to list (list icon), Like (heart icon), and Recommend (heart with speech bubble icon). Below the video, the title 'Facebook's role in Brexit — and the threat to democracy' is displayed in large white text. The subtitle 'Carole Cadwalladr | TED2019' is visible. A progress bar at the bottom of the video area shows the current time as 15:07. To the right of the progress bar are icons for volume, captions, settings, and full screen. Below the video, there is a horizontal menu with five items: Details, Transcript, Reading List, Footnotes, and Comments (706). The 'About the talk' link under 'Details' is underlined. The transcript section indicates 22 languages. The reading list section says 'Further learning'. The footnotes section says 'Notes + references'. The comments section says 'Join the conversation'. At the bottom of the page, a summary of the talk is provided: 'In an unmissable talk, journalist Carole Cadwalladr digs into one of the most perplexing events in recent times: the UK's super-close 2016 vote to leave the European Union. Tracking the result to a barrage of misleading Facebook ads'. To the right of this summary are the view count '2,975,164 views' and the date 'TED2019 | April 2019'.

TED Ideas worth spreading

WATCH DISCOVER ATT

Share

Add to list

Like

Recommend

Carole Cadwalladr | TED2019

Facebook's role in Brexit — and the threat to democracy

15:07

►

Details Transcript Reading List Footnotes Comments (706)

About the talk 22 languages Further learning Notes + references Join the conversation

In an unmissable talk, journalist Carole Cadwalladr digs into one of the most perplexing events in recent times: the UK's super-close 2016 vote to leave the European Union. Tracking the result to a barrage of misleading Facebook ads

2,975,164 views

TED2019 | April 2019

Who wants to be an authoritarian?

NB, Carol Cadwalladr's point

is NOT about pros/cons of Brexit (that's where she starts);

it's about the impact/control that global social media companies can have on the democratic process in well-established liberal democracies.

The media companies provide the platform/pipeline: but are they responsible for the content that is transmitted via their pipes?

"My question to you is: is this what you want? Is this how you want history to remember you? As the handmaidens to authoritarianism?"

Who is she asking that question of?

Who wants to be an authoritarian?

NB, Carol Cadwalladr's point

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The media's
responsibility

*"My quest
remembered"*

Who is silencing

Are they
good or bad?

Want history to
repeat itself?



Cambridge
Analytica

The future of democracy

Jul.2019



The future of democracy

Published Jan. 2019

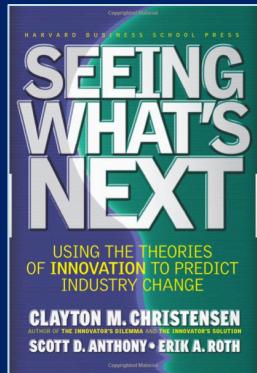
THE AGE OF SURVEILLANCE CAPITALISM

THE FIGHT FOR A
HUMAN FUTURE
AT THE NEW
FRONTIER OF POWER

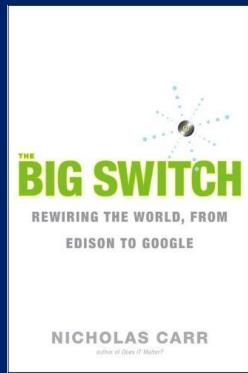
SHOSHANA
ZUBOFF

Shortlisted for FT Book
of the Year 2019

If you only read 12 books on this stuff...



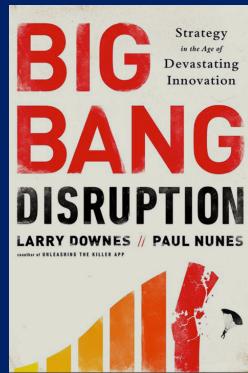
2004



2008



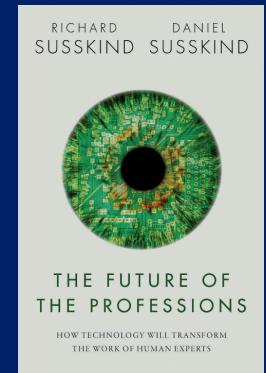
2014



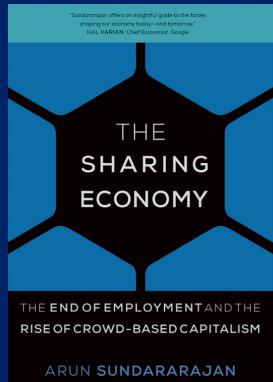
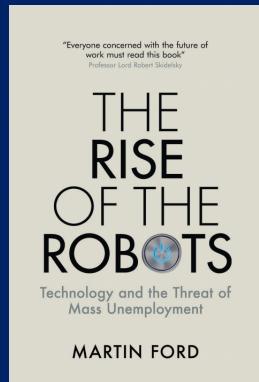
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2015



2015

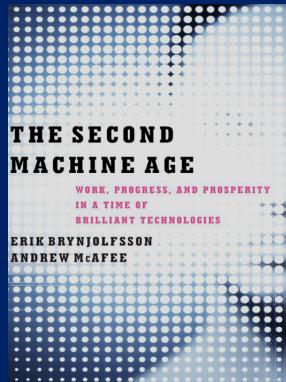


2015

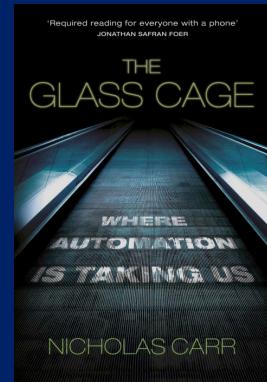
2016

2016

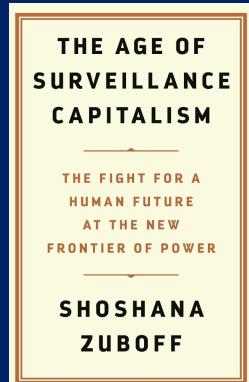
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2016



2016



2019

Knowing current thinking/debate is part of being a fully-formed scientist/engineer/practitioner.

You should know what these kind of books say, even if you don't read the whole text of each one.

Summary

- Major fortunes (dynamic amounts) have been made by exploiting algorithmic and economic opportunities on the global scale presented by the internet
- Online web-based retail (Amazon, eBay, etc) – a different game?
 - Long Tail (or not?)
 - Automated recommender systems & collaborative filtering
- Disruptive technologies
- Digital matching platforms: big business, enabling the gig economy
- The end of work? The end of democracy?

- Next four lectures (John C):
 - Economics of the Internet I, II, III, & IV
- And then...
 - Overview of Cloud Computing ([video](#))
 - Market-Based Systems I ([video](#))

Summary

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Real live market
experiment in the
classroom

Illustrative Exam Questions (short)

Jan 2013

Q 1.

(A) Name and define two types of (non-hybrid) recommender systems. What is the role of recommender systems in a long-tail business strategy?

[3 marks]

Jan 2012

Q 1.

A)

(i) Briefly describe the ‘long tail’ strategy in sales.

[1 mark]

(ii) Give three reasons why it easier for iTunes to exploit the long tail than a high-street CD retailer?

[3 marks]

Illustrative Exam Questions (essay-length)

Jan 2010

- Q 2.** Chris Anderson wrote a very influential “Wired” article in October 2004 that introduced “The Long Tail”, a phrase which was also the title of his subsequent highly influential book. In 2008/2009 research was carried that argued against his popular theory. With aid of diagrams describe how Chris Anderson’s “Long Tail” explained the success of online retailers such as Amazon, in comparison to traditional “bricks and mortar” retailers. Then describe why researchers, such as Anita Elberse, Will Page and Andrew Bud, disagree with his theory.

[20 marks]