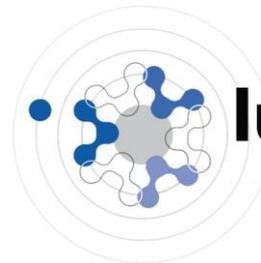


Birth, Death, and Immortality – Can people and companies live forever?

Mark Bünger
VP of Research
May 10, 2016

mark.bunger@luxresearchinc.com



luxexecutivesummit

Boston, MA • May 9 - 11, 2016

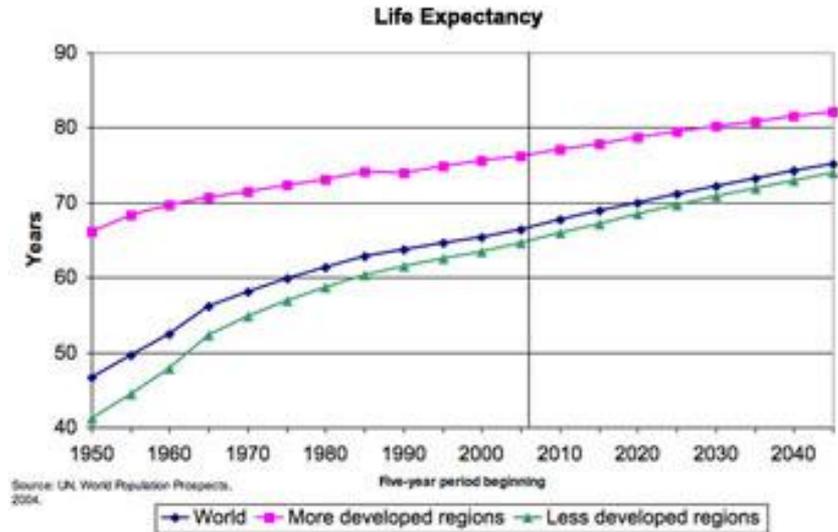
A simple truth

Growing old is hard
But it beats the alternative

Aging is no longer a death sentence

- Life expectancy continues to rise
- Active seniors and “aging in place”
- Golf course = Heaven’s waiting room

Is golf really worth living for?



The new retirement: Ironman



Otherlab Orthotics

Exoskeletons for elderly mobility



Elderly Mobility Assistance

Need	Trends	Market
\$ 30 B Annual US Direct Cost from Falls	30% Increase in Elderly (65+) Population over 15 years	\$ 4 B TAM for Sit to Stand Assistance Application
30% During Sit to Stand Transitions	7% Reduction in Working Age over that Time	1.2 M Annual US Falls from Weakness 3.4x Scalar for EU and Japan

First Product

Elderly Sit-Stand Assistance



Reduce Falls During Sit-Stand Target Price: < \$5,000 Target Weight: < 5 pounds
Value Proposition Reduce Fall Rates Extend Independence

Demoing the Otherlab Orthotics exoskeleton arm



Who wants to live forever?

You! Me! Everyone ever! Duh!

- Fountain of youth
 - As relevant in 2016 as 1546
- Ray Kurzweil
- Transhumanist party



Der Jungbrunnen (The Fountain of Youth)
Lucas Cranach the Elder 1546

ZOLTAN ISTVAN TALKS
WITH THE
DC TRANSHUMANIST
PARTY MEETUP
MAY 19, 2015

<http://www.transhumanistparty.org/>

**MIT
Technology
Review**

May 7, 2016
Weekend Reads:
Fountain of Youth

As a character in Shakespeare's *Henry IV* says: "O gentlemen, the time of life is short!" Medical advances in recent decades may have softened that lament, but many biotechnologists still think we might push death even further away, as these stories from the *MIT Technology Review* archives illustrate. Maybe something will work out. As another Shakespeare character says: "O excellent! I love long life better than figs."

An election-year message from Zoltan Istvan, Transhumanist Party's US Presidential Candidate



<http://www.zoltanistvan.com/>

VCs are taking immortality seriously... Seriously?

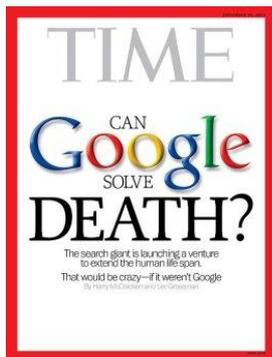
- Almost all health innovation increases average lifespan
- Now for the first time, serious scientists and companies are trying to increase maximum lifespan
- ...and venture capitalists are stepping up.

*“Our investors are a diverse group of individuals and companies who share our common goal and passion of changing healthcare, **tackling the diseases of aging, and extending the healthy human lifespan.**”*
Human Longevity Inc

Human Longevity Completes \$220M Series B Financing

Apr 04, 2016 | a GenomeWeb staff reporter

NEW YORK (GenomeWeb) – Human Longevity announced on Monday that it has completed a \$220 million offering of Series B preferred stock.



“Evidence is emerging that some existing drugs have modest effects on lifespan, giving an extra 10 years or so of life. ‘We can develop effective combinations for life extension right now using available drugs,’ says [Mikhail Blagosklonny](#) of the Roswell Park Cancer Institute in New York.”



Home | Opinion | Health | Life

LEADER 1 October 2014

Life-extending drugs take humanity into new territory

The reasons to be cautious about taking longevity drugs probably won't hold us back. They will just be too tempting to turn down



Google says humans could live for 500 YEARS - and is investing in firms hoping to extend our lives five-fold

- Google Ventures' Bill Maris said he thinks humans can live to 500 years old
- This will be due to medical breakthroughs and a rise in biomechanics



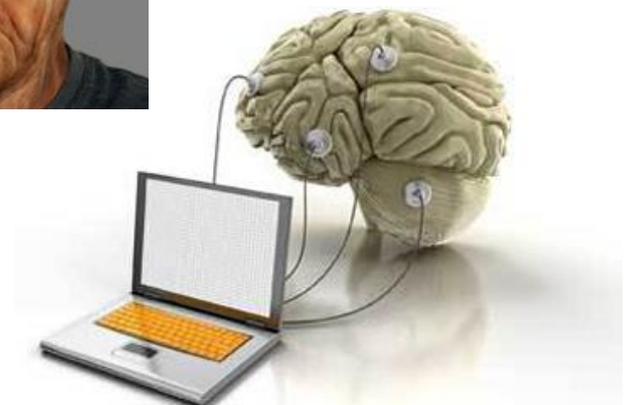
“Death is a choice” – choose life

VCs’ 3 technology strategies for disrupting death

- Quantified self
 - Sensors, data, analytics...
 - Foresee and prevent what kills you
- Regenerative medicine
 - Gene editing, stem cells...
 - Continuous rejuvenation
- Artificial intelligence
 - Hand-wavy gobbledygook
 - Upload your brain

Your physical body does not matter

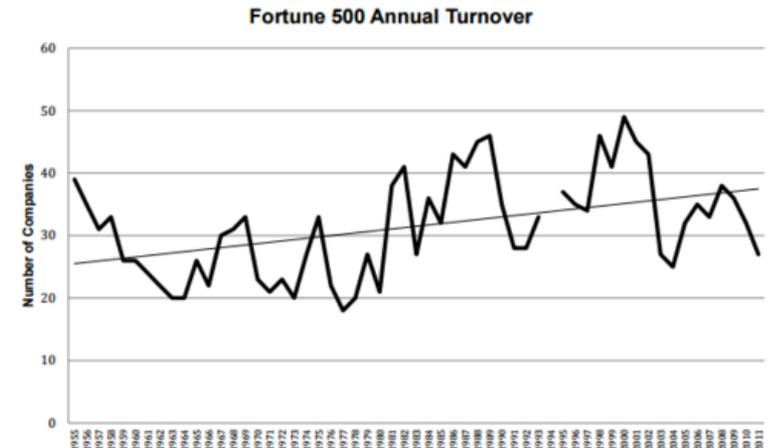
Your physical body does not matter



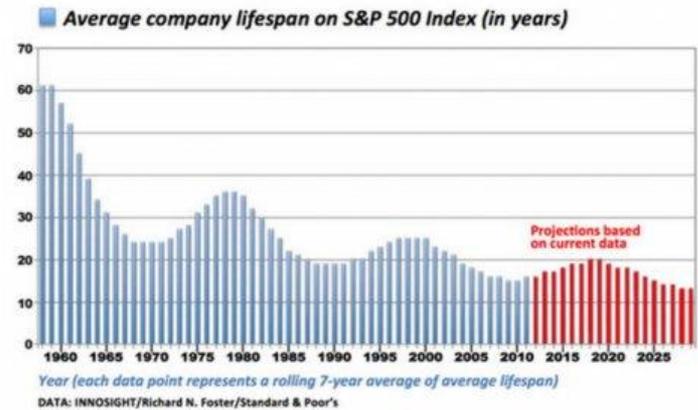
Companies have no such hope

Corporations are people – but their prognosis is TERRIBLE

- In 60 years, 88% of Fortune 500 has died
- And lifespan is SHRINKING
 - Five year company mortality risk for public companies traded in the US, is now at 32% compared with a 5% risk 50 years ago
- At this rate, what % of Global 1000 will be alive in 2075?
 - 0%!
 - Same attrition – decimated! - by 2027!
 - Corporate health crisis makes any human health crisis look like a mild cold
- AHHH!



Source: [Kaufmann Foundation](#)



Yet – many companies do live incredibly long lives

Unlike people, the oldest companies can live for CENTURIES

4 of the oldest companies make dolls

- 1650 [Koshuya](#) Japan
- 1656 [Kogatanaya](#) Japan
- 1657 [Nakayama Doll](#) Japan
- 1693 [Suzutame](#) Japan

3 of the oldest companies make drums

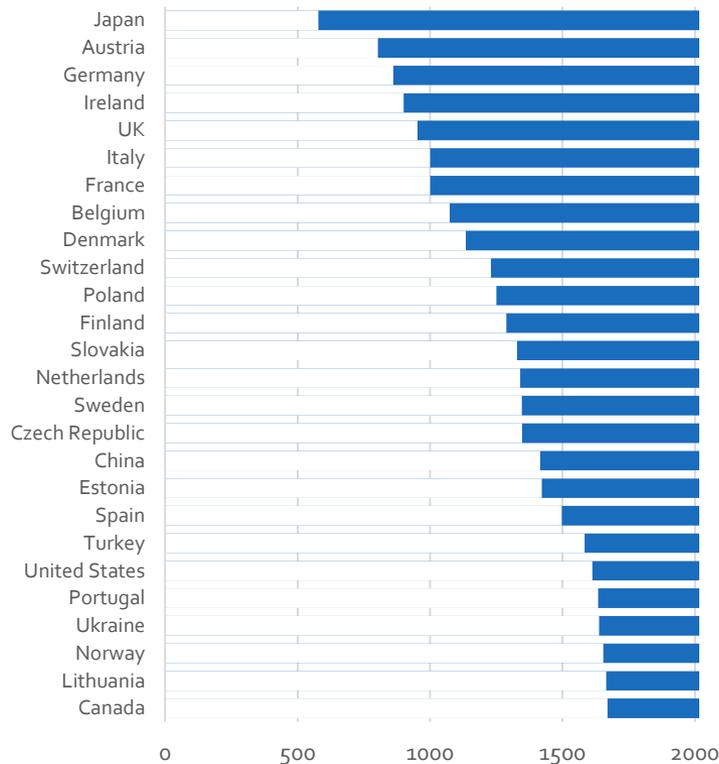
- 1609 [Asano Taiko](#) Japan
- 1689 [Nishino](#) Japan
- 1623 [Avedis Zildjian](#) Turkey



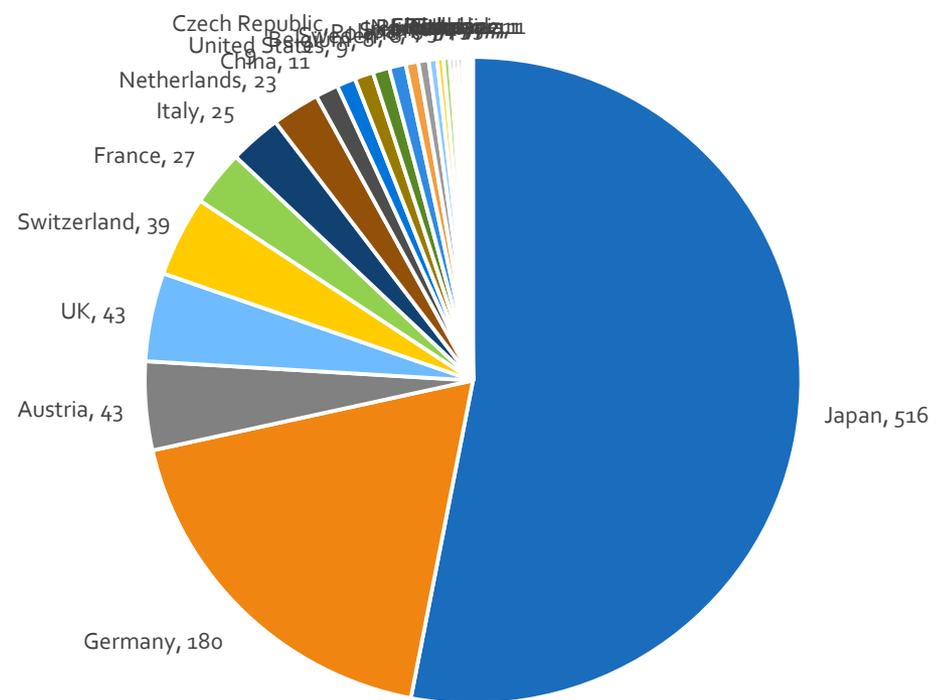
Are there national “diets” and “genes” for corporate longevity?

- How many companies founded before 1700 are alive today? 973!
- Which country has the oldest companies? Japan!

Countries - year oldest co founded



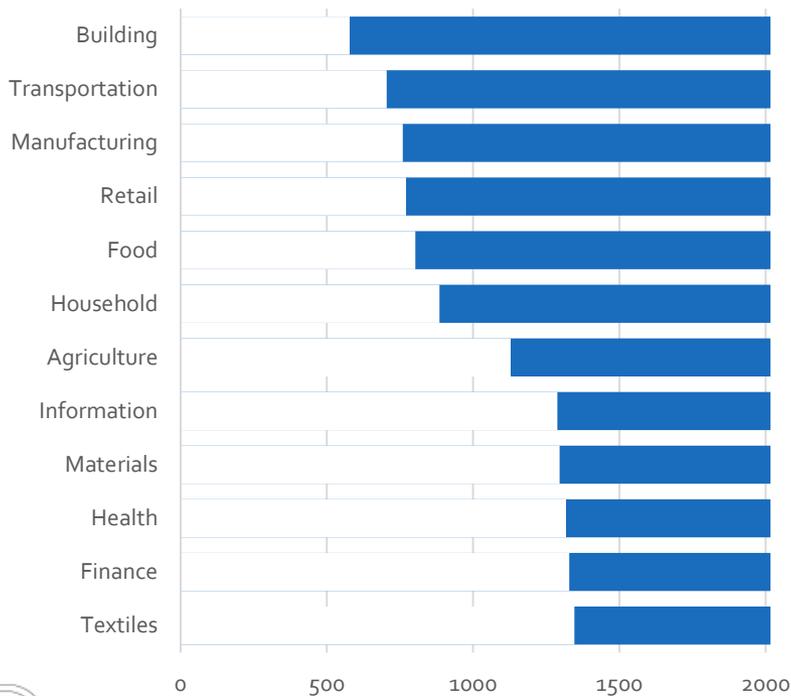
Count of Company



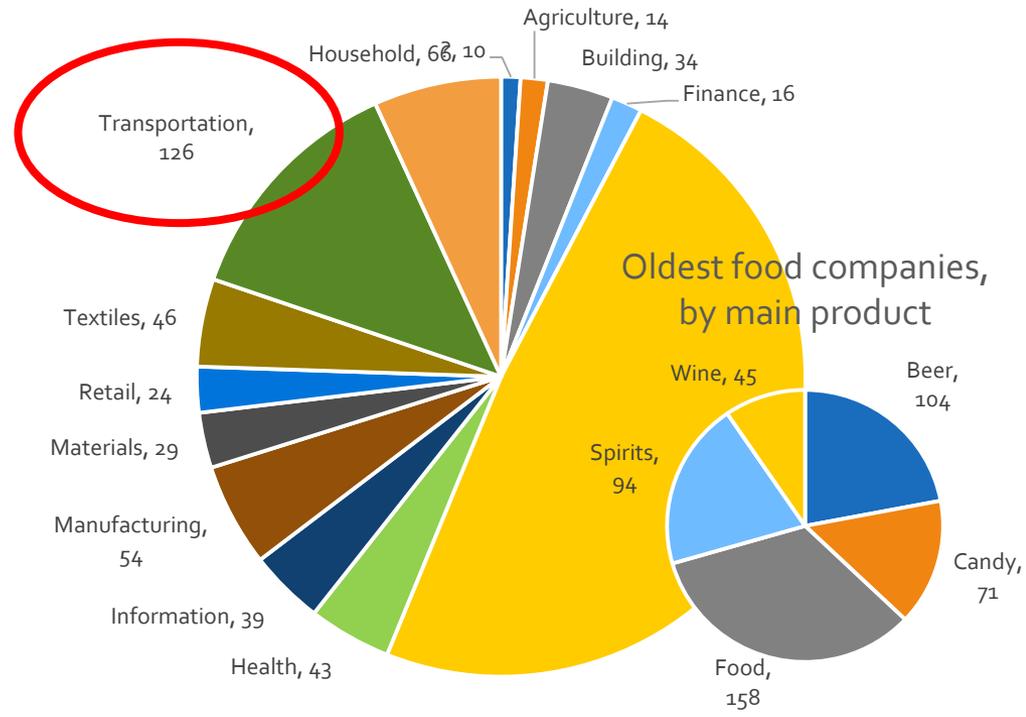
What industries have the longest-lived companies?

- The oldest company (Kongō Gumi, est 578) is in construction
- Food and beverage dominates, with 472 companies
- What kind of “food”? Alcohol and candy (67% of companies)

Industries - year oldest company founded



Living companies founded before 1800



Transportation

- Unlike people, companies are not an end in and of themselves
 - They are a means to an end, and that end is risk
- Corporations – corpus, body - Limited liability person – share the risk so we can take more of it
 - Shipping was dependent on this structure because the risks were so big



Another simple truth

A ship is safe in a harbor
But that's not what a ship is for

Beyond “open innovation” lies jackass innovation

- Overconfident amateurs
 - Mercedes + soda can = self-driving car
 - “Moron” Infiniti driver
- Desperate patients and self-medicating people
 - Home brain zapping (tDCS)
 - DIY FMT
- Artists, criminals, and preppers
- Really crazy startups and inventors

If something sounds like a good idea to you, it's not inconceivable

If it sounds like a terrible idea, it's probably worth checking out

This Simple Hack Lets Your Mercedes S-Class Become Semi-Autonomous

Travis Okulski
Filed to: CAR HACKS 7/29/14 6:03pm

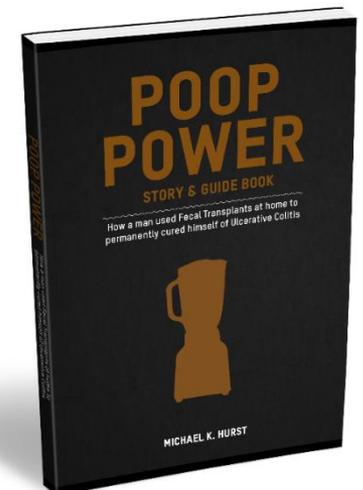
37,099 14 ★



Total Moron Endangers Entire Highway To Prove Infiniti Can Drive Itself

Damon LaRicc
Filed to: SELF-DRIVING 8/27/14 7:20pm

38,548 22 ★



These ships are in the harbor's museum

- Dolls, drums, old spirits...
 - Ancient markets = not growing
 - Candy = bad for you
- Innovation = None of them
 - Desirable precisely (only?) because they are old



=

- These are not the industries of the future
- None of us have 500+ years to wait

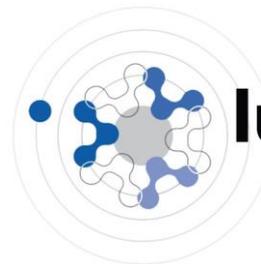
Can longevity and growth be reconciled?



Learning from the learned

“You must learn from other people’s mistakes. You can’t possibly live long enough to make them all yourself.”

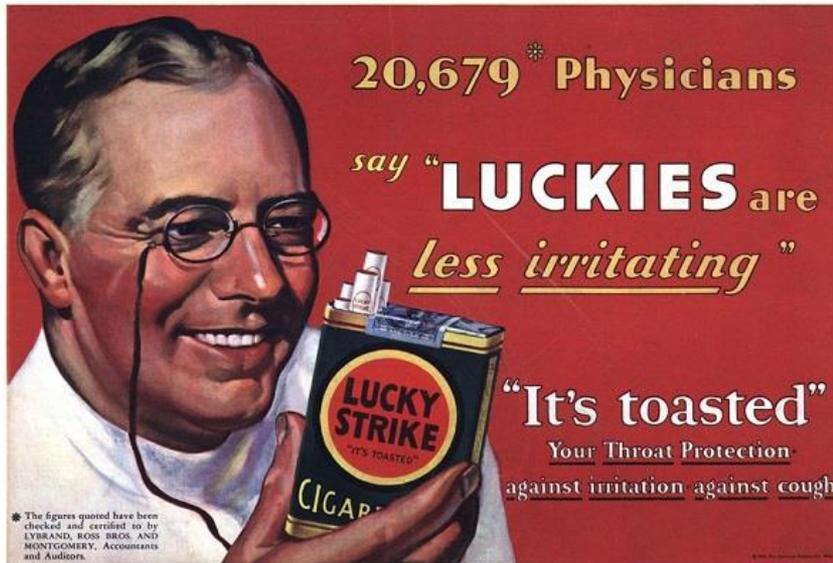
Sam Levenson



lux executive summit

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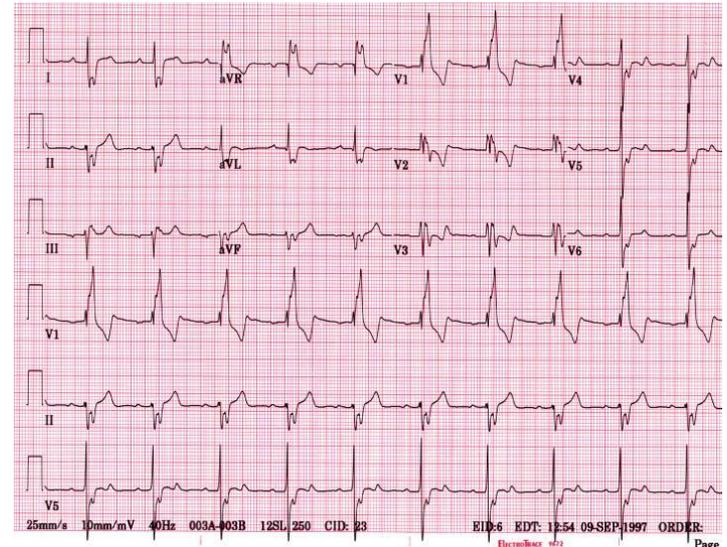
Before we try to live forever, let's try to just survive a normal lifespan



Stop doing what kills you

What's the equivalent of smoking, sedentary lifestyle, etc for companies?

- Thought to be OK, but not
- Easily preventable
- Gross



Keep doing what's healthy

What's the equivalent of weight, EKG, etc for companies?

- Basic measure of vitality
- Easy to measure
- Nice

A detailed analysis of the F500

- 500 companies over 60 years
- 12 of original 500 remain
- 488 entered and remain
- 1575 exited – why?!?

The logo for the Fortune 500, featuring the word "FORTUNE" in a gold, serif font above the number "500" in a large, bold, gold, sans-serif font. The numbers have a 3D effect with highlights and shadows.

Contributions:

- Analysis by [Sam Arbesman](#), then [Kaufmann Foundation](#)
- Visualization by Ben Fry, [Fathom](#)

The Fortune 500

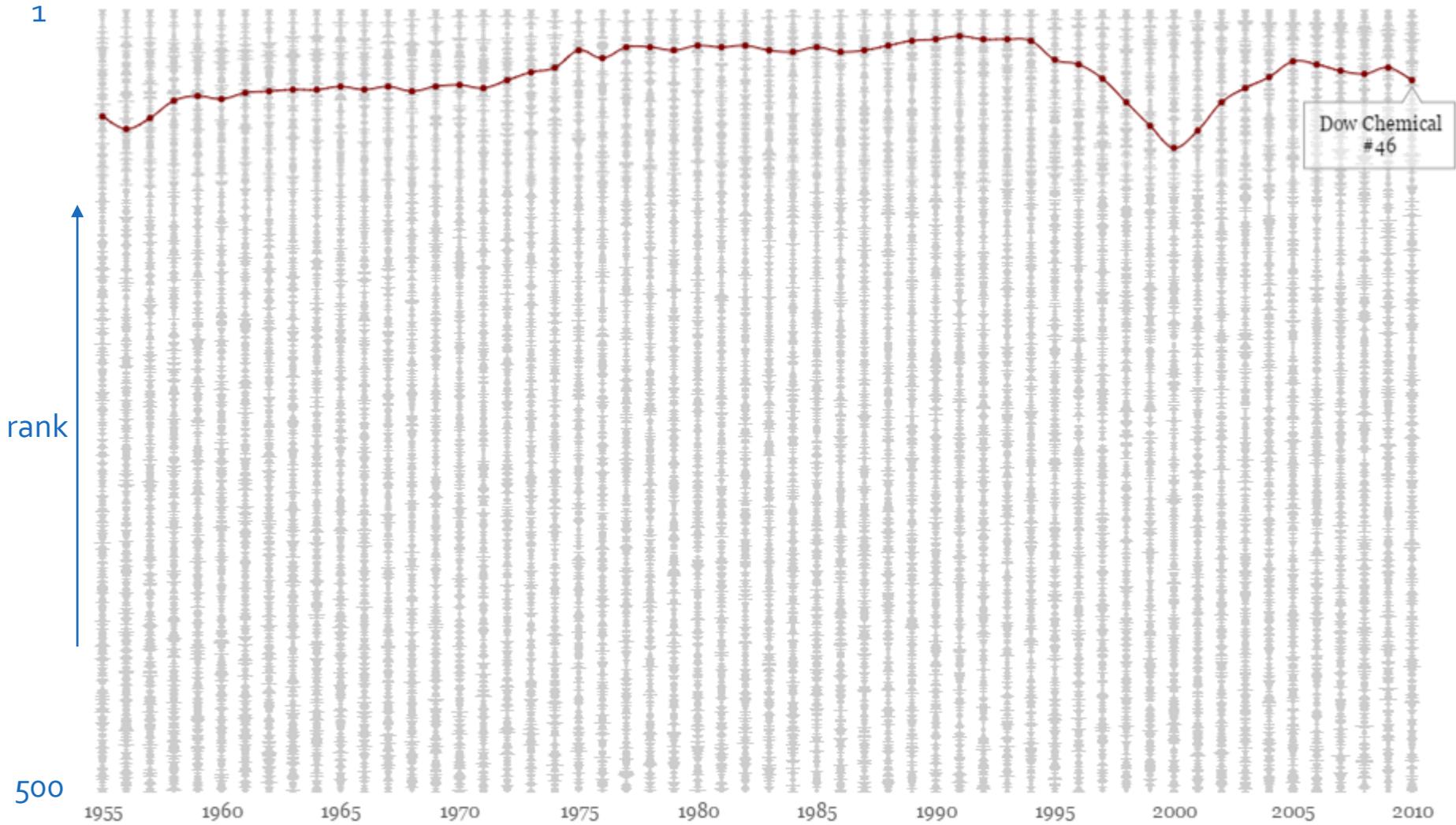
order by:

RANK

REVENUE

PROFIT

adjust for inflation



Dow Chemical

The Fortune 500

order by:

RANK

REVENUE

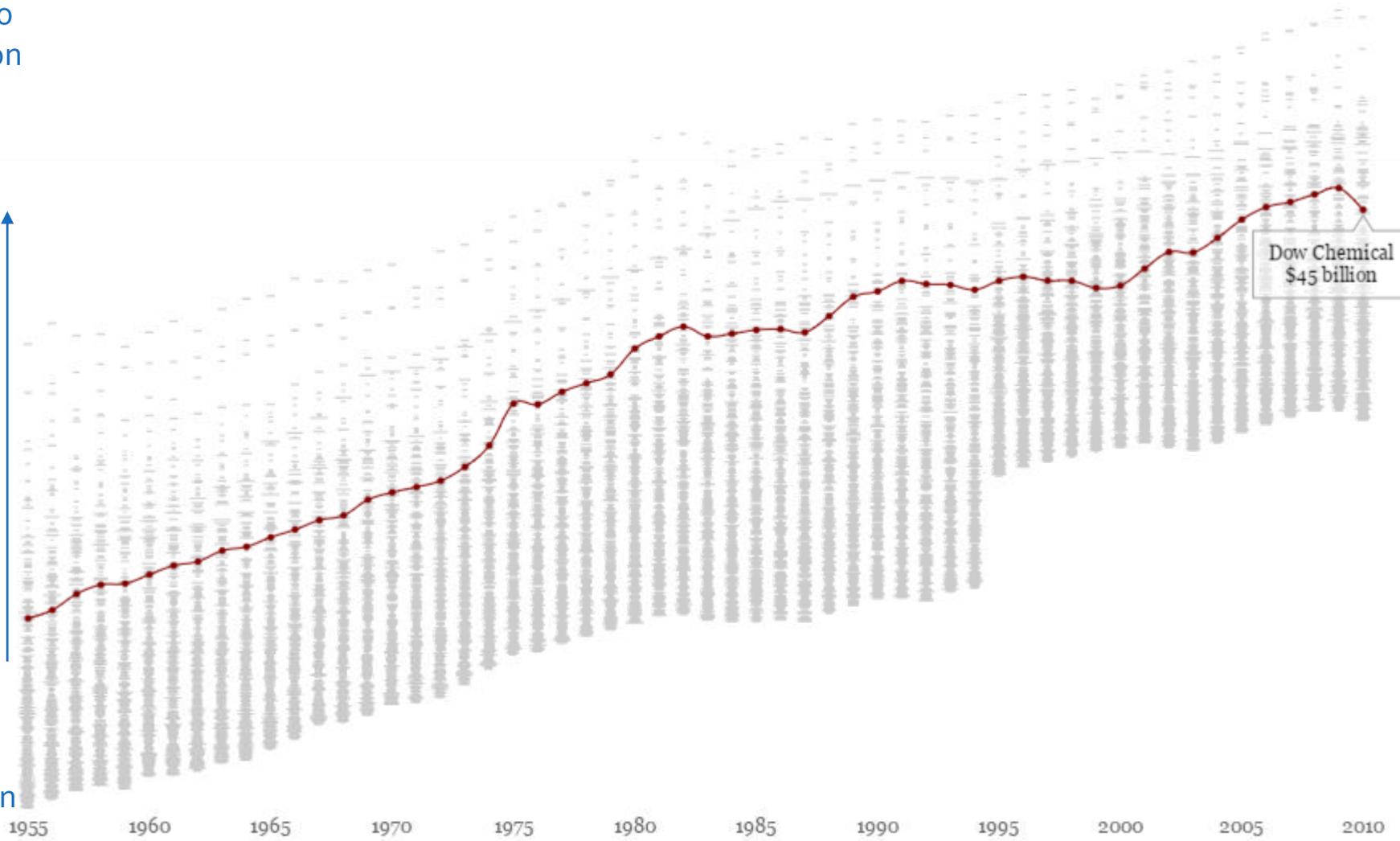
PROFIT

adjust for inflation

\$500 billion

\$

\$50 million



Dow Chemical

The Fortune 500

order by:

RANK

REVENUE

PROFIT

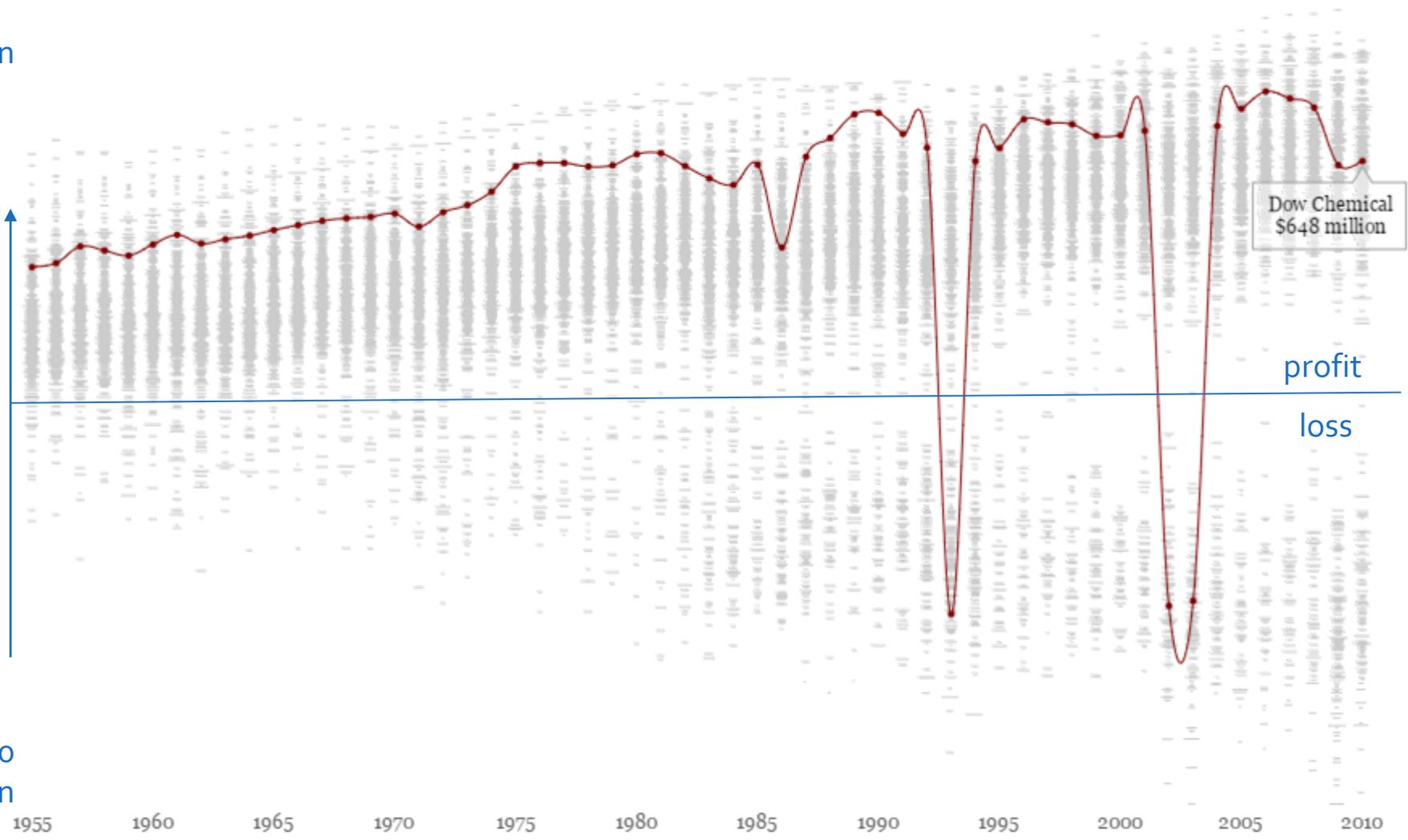
adjust for inflation

\$50 billion

\$

\$

-\$100 billion



Dow Chemical
\$648 million

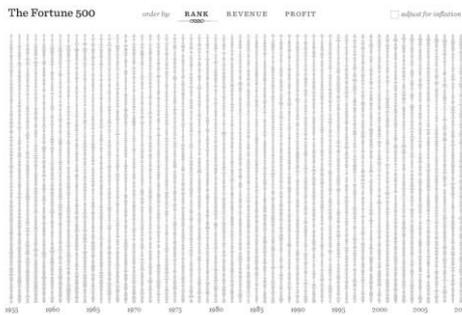
profit

loss

Dow Chemical

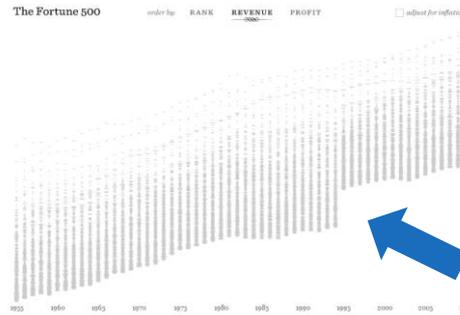
Evolution (1995-2010) of Fortune 500 companies by Rank, Revenue, and Profit

Rank



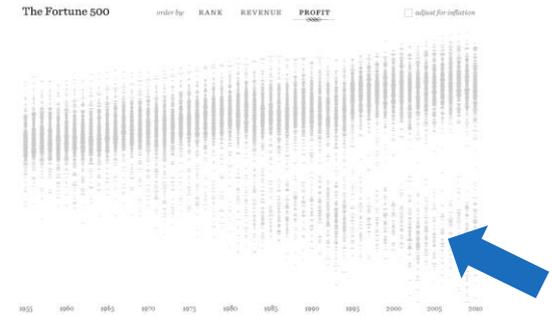
Units: number
High: 1
Low: 500

Revenue



Units: \$US, log scale
High: \$500 billion
Low: \$50 million

Profit



Units: \$US, log scale
High: \$50 billion
Low: \$100 billion loss

So, let's find some losers! (and survivors)

What gives long life? Steady as she goes

Pepsico, Exxon, and Procter & Gamble made it all the way

The Fortune 500

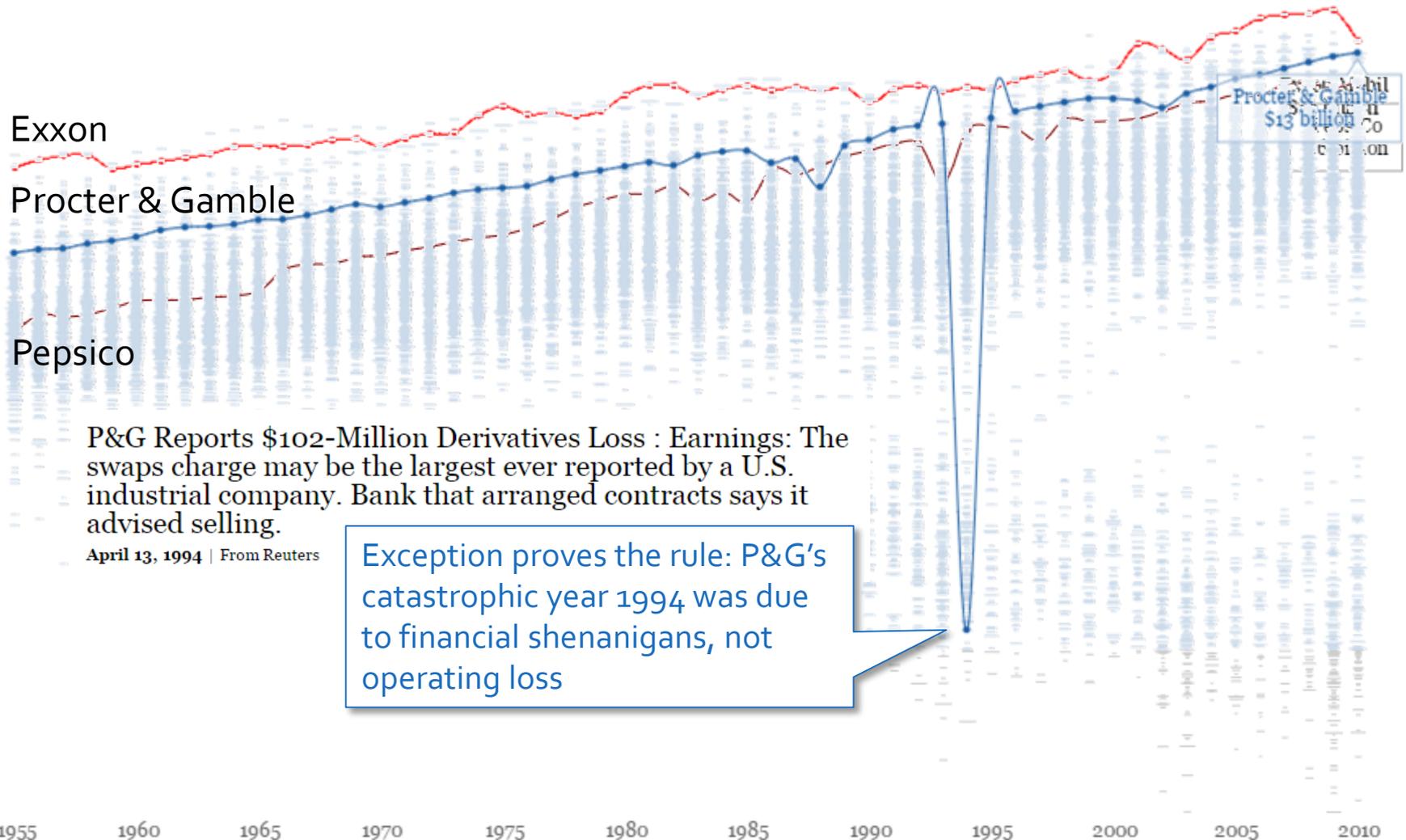
order by:

RANK

REVENUE

PROFIT

adjust for inflation



P&G Reports \$102-Million Derivatives Loss : Earnings: The swaps charge may be the largest ever reported by a U.S. industrial company. Bank that arranged contracts says it advised selling.

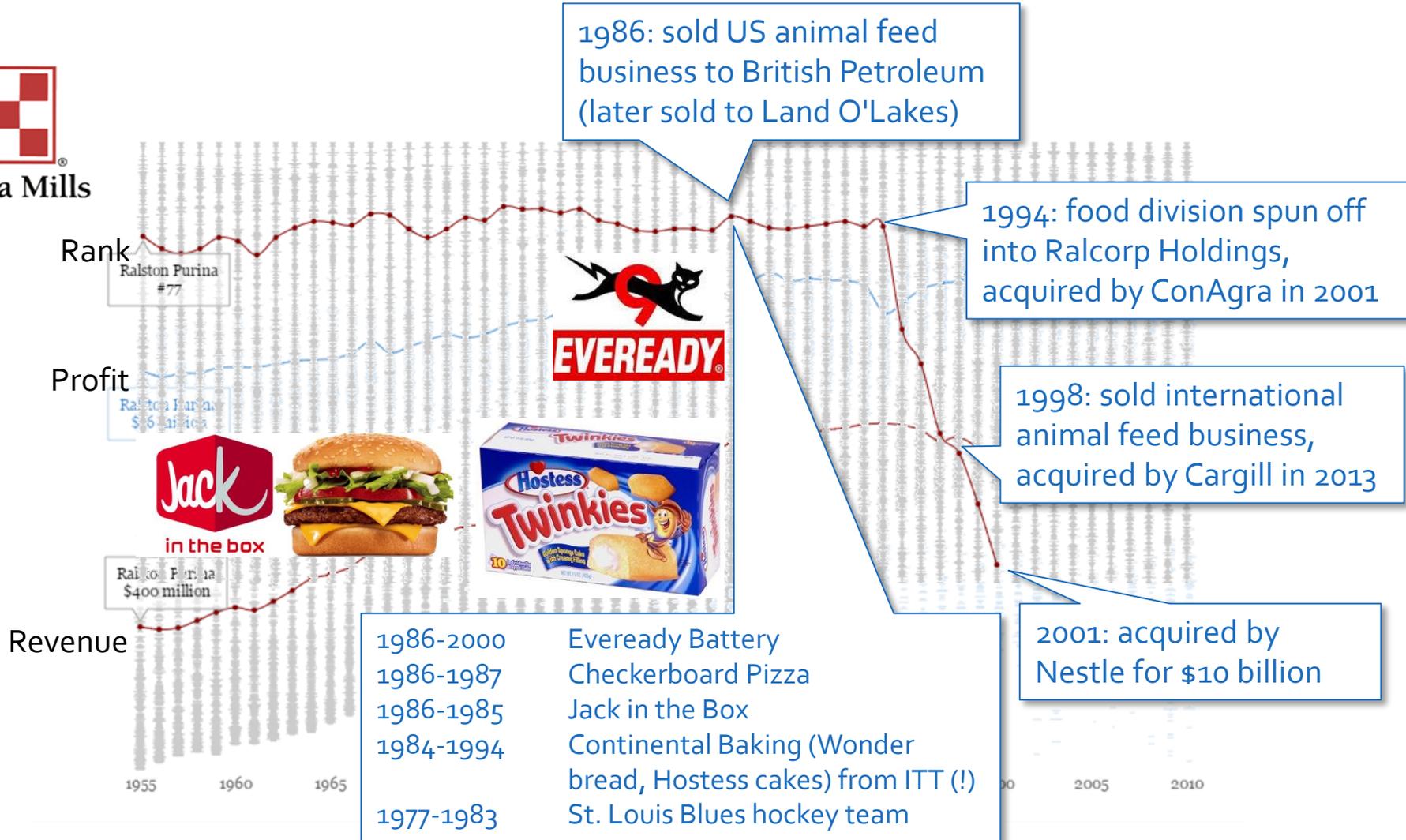
April 13, 1994 | From Reuters

Exception proves the rule: P&G's catastrophic year 1994 was due to financial shenanigans, not operating loss

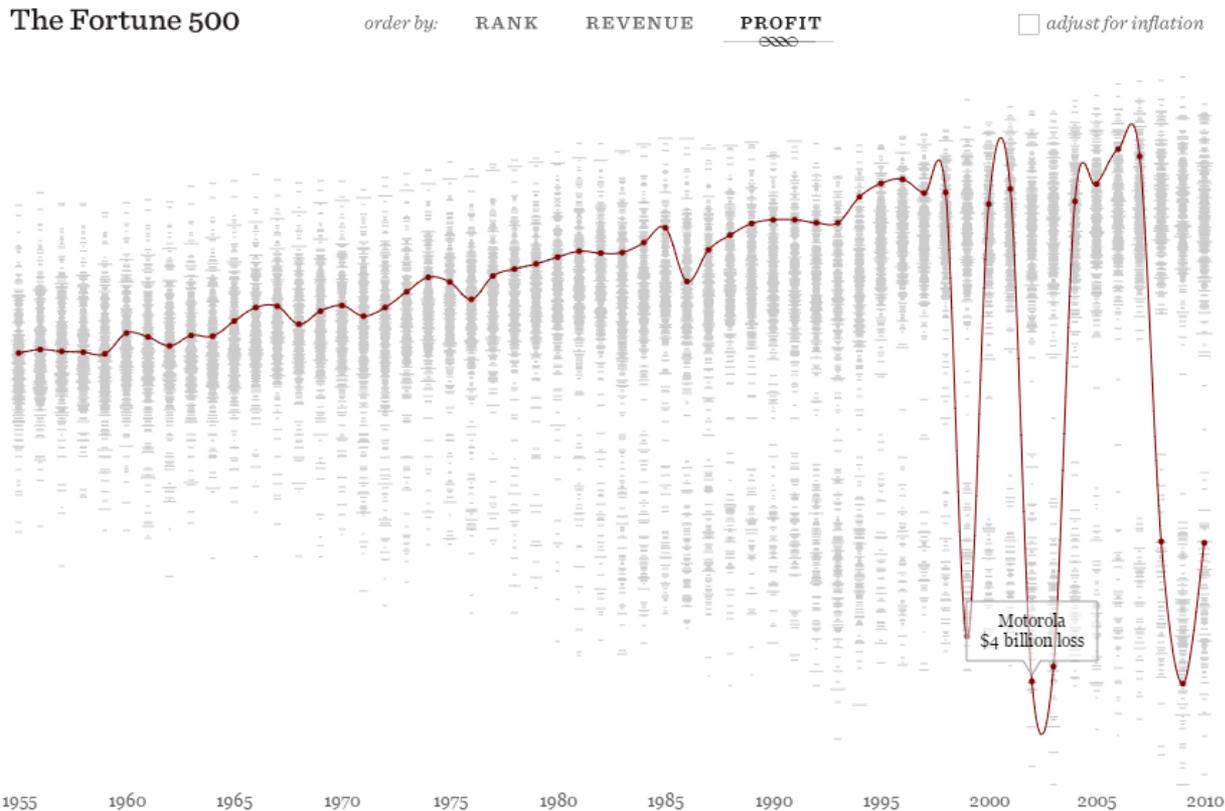


The graceful exit: Getting all your affairs in order

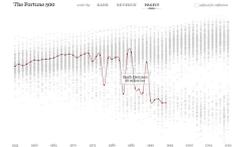
Ralston Purina, 1894-2001



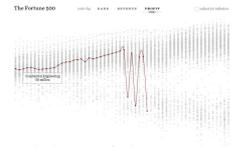
Sudden death is rare – most failures flail for 10-20 years before collapse



Zenith
1911-1995



Combustion
Engineering
1912-1990



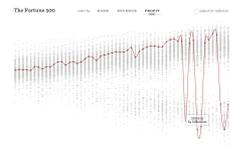
ARMCO
1899-1994



Maxus Energy
1928-1995

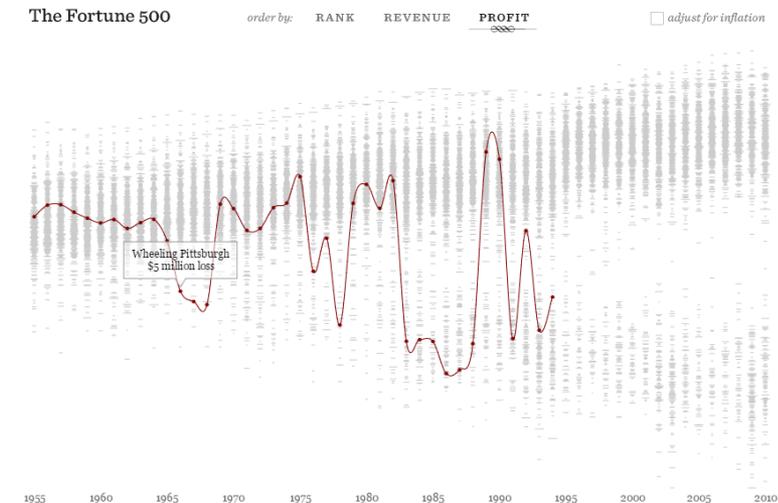
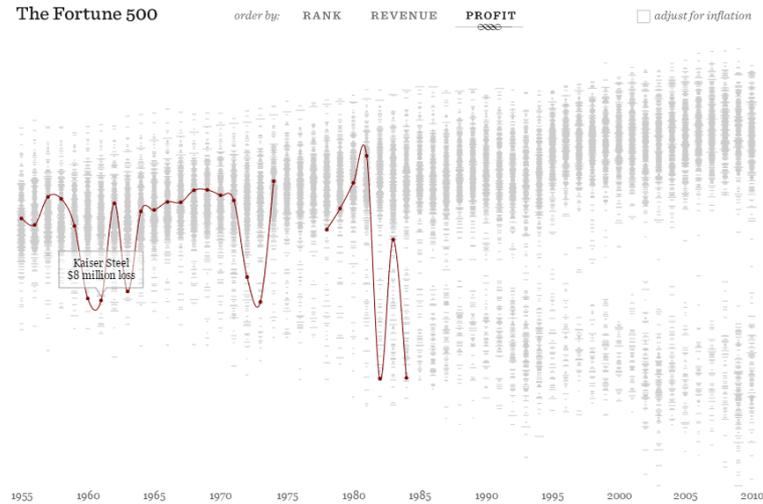
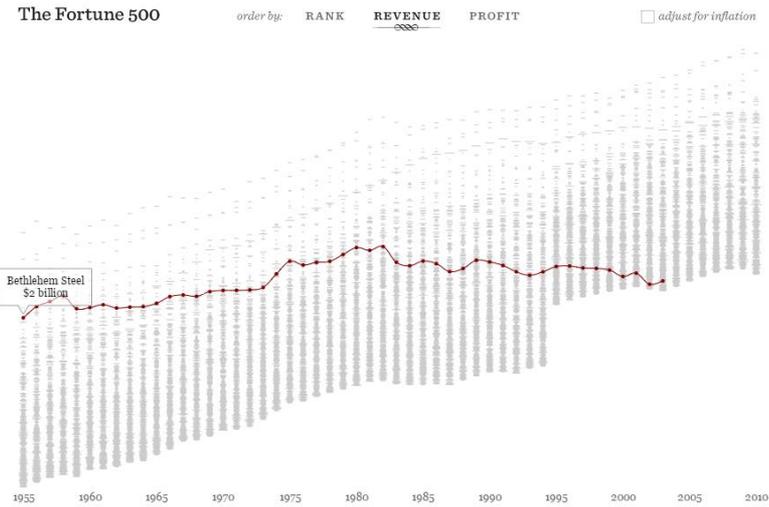


Motorola
1928-2011



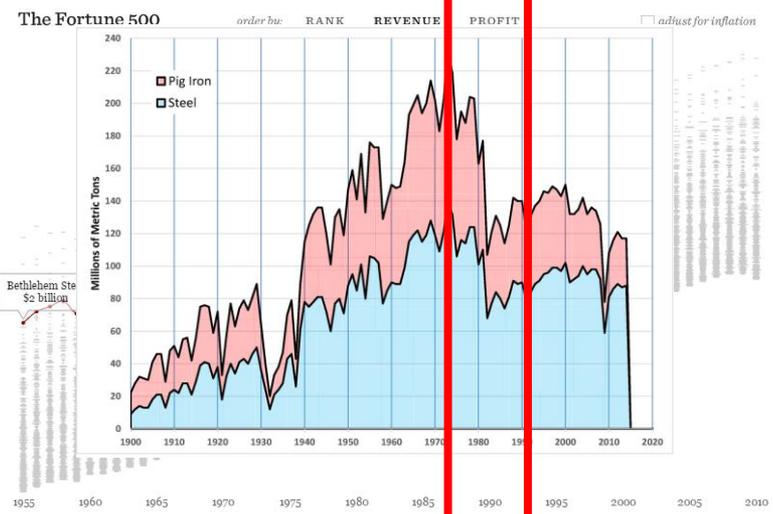
What kills companies? Low growth and new tech

Steel, 1980-1990



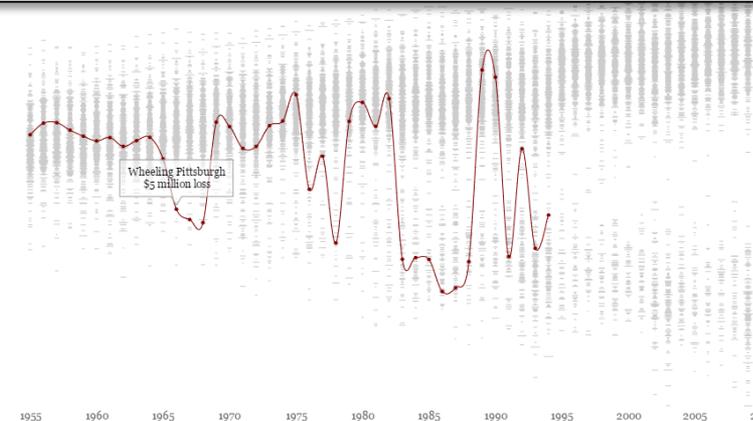
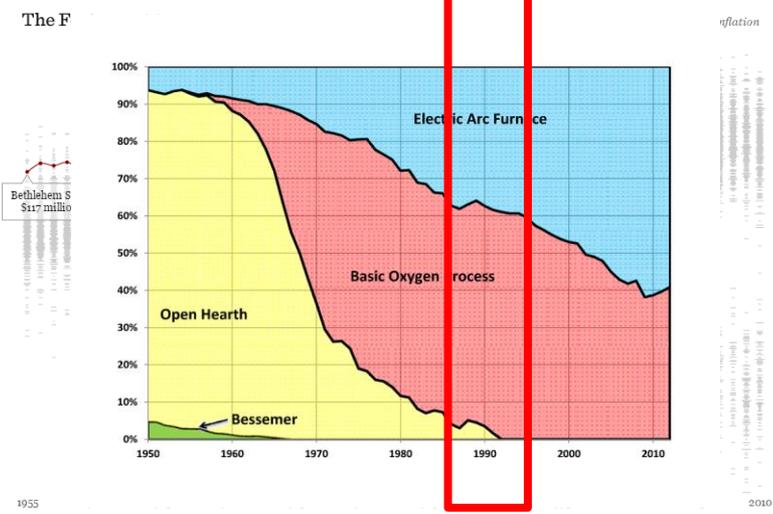
What kills companies? Low growth and new tech

Steel, 1980-1990



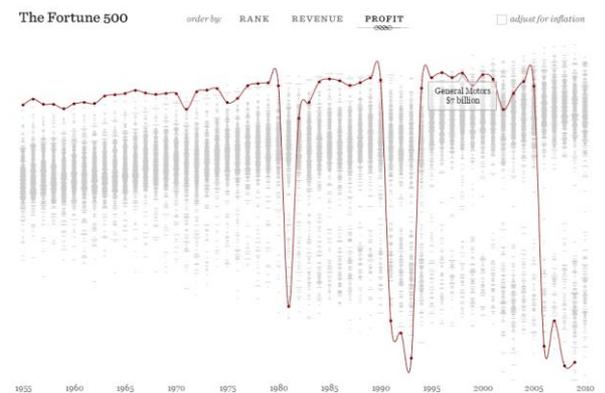
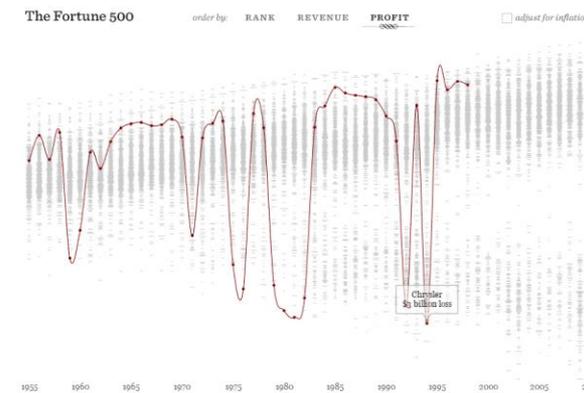
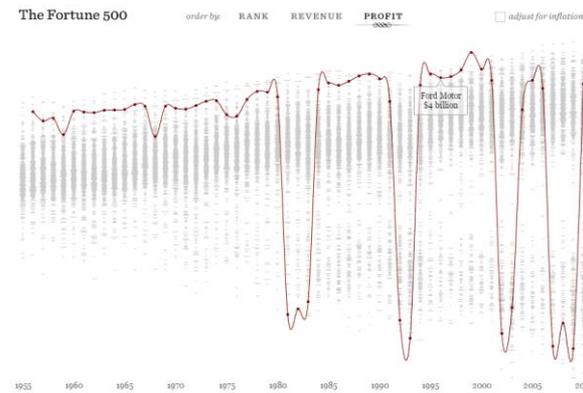
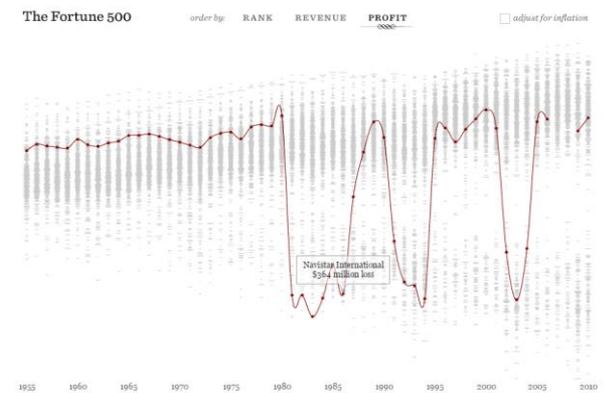
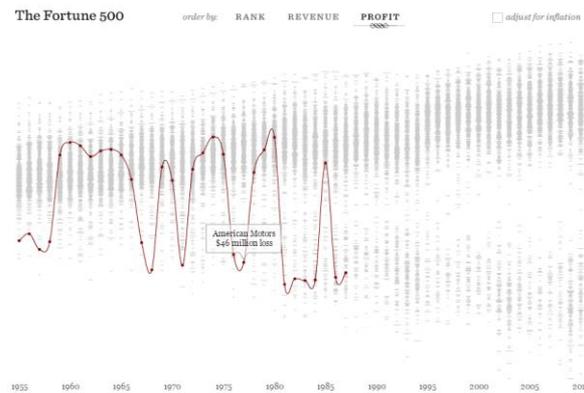
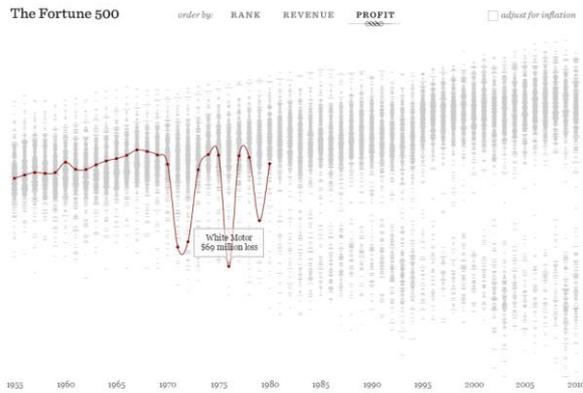
1980

- Recession = Market shrank
- New technology = size of plant shrank



What kills companies? Low/no growth alone

Carmakers 1980, 1992, 2001, 2008

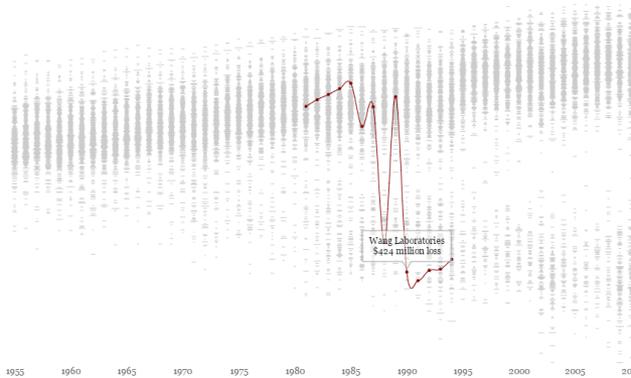


- With every recession, a carmaker goes under
- Who is next?

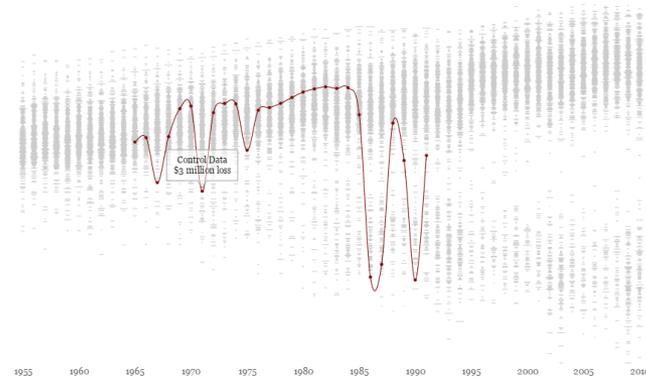
What kills companies? New technology alone

Mainframe computers, 1985-1995

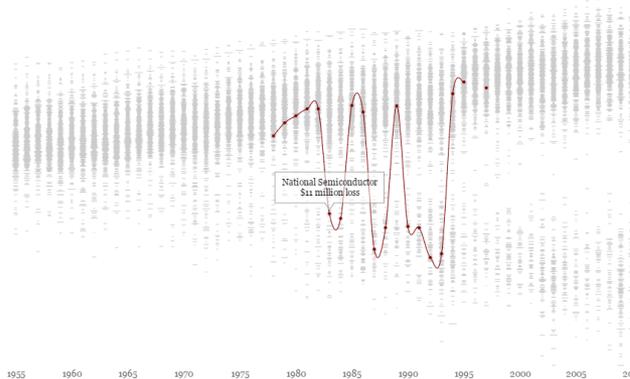
The Fortune 500 order by: RANK REVENUE **PROFIT** adjust for inflation



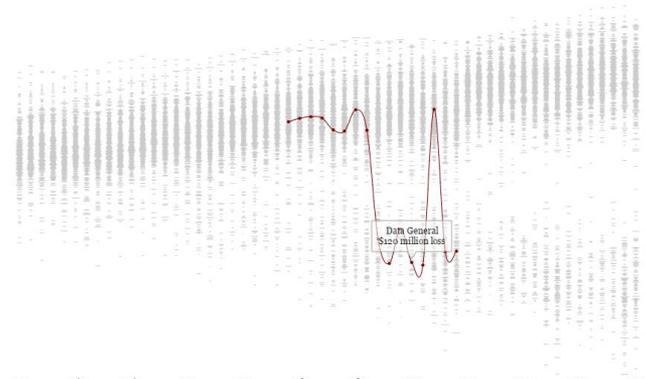
The Fortune 500 order by: RANK REVENUE **PROFIT** adjust for inflation



The Fortune 500 order by: RANK REVENUE **PROFIT** adjust for inflation



The Fortune 500 order by: RANK REVENUE **PROFIT** adjust for inflation



- The market for computers was growing rapidly
- But PC (Intel x86) technology beat mainframes on cost/performance

Resurrecting yourself: in 1991-93, even IBM “died” - and shifted to integrated services

The Fortune 500

order by:

RANK

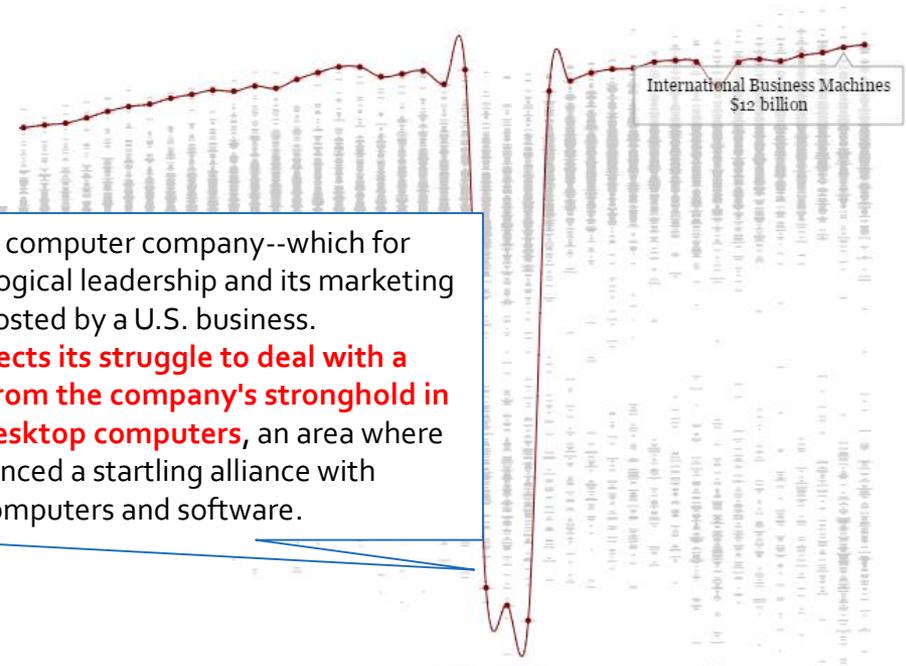
REVENUE

PROFIT

adjust for inflation

IBM Reports First Loss--\$2.8 Billion : Business: The 1991 decline is blamed on the recession and costs of staff reductions. The firm's stock has fallen, but analysts believe it will weather the storm.

January 18, 1992 | SUSAN MOFFAT | TIMES STAFF WRITER



The \$2.8-billion loss for all of 1991 recorded by the world's largest computer company--which for more than half a century has represented both America's technological leadership and its marketing might around the world--is one of the largest yearly losses ever posted by a U.S. business. (In addition to the recession)... **IBM's poor performance also reflects its struggle to deal with a fundamentally changed computer market, one moving away from the company's stronghold in large, centralized mainframe computers and toward smaller desktop computers**, an area where nimbler competitors have stymied the giant firm. In July, it announced a startling alliance with competitor Apple Computer Inc. to develop advanced personal computers and software.

11/11/2002 @ 9:00AM

How Lou Gerstner Got IBM To Dance

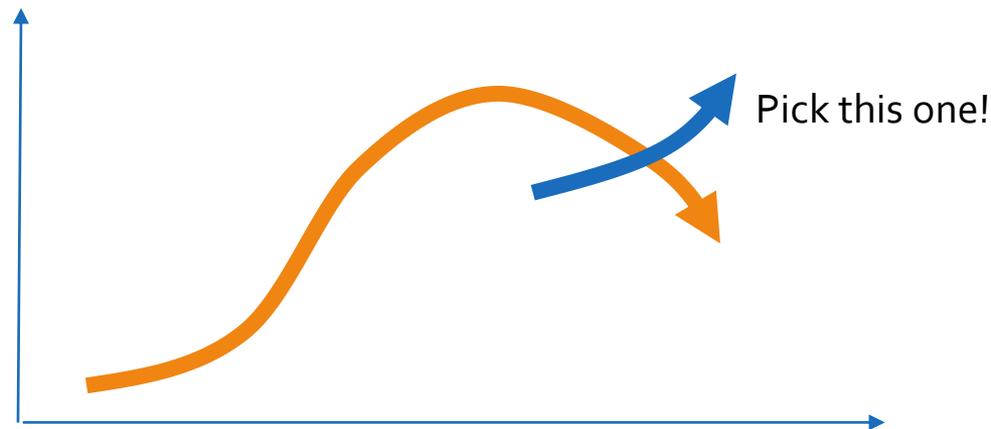
He famously put the brakes on a plan, which was already well under way, to **break up the company into several operating units**. The rationale behind it was to leverage all of the pieces of IBM—hardware, services and software—to deliver top-to-bottom technology solutions. Gerstner writes that his colleagues were “unwilling or unable to accept” that **OS/2 was a “resounding defeat”** that, despite its technical superiority, “was draining tens of millions of dollars, absorbing huge chunks of senior management’s time, and **making a mockery of our image.**” But even worse, focusing on the desktop ran counter to IBM’s view of where the tech world was headed. By the end of 1994, IBM ceased new development of OS/2 software.

What kills companies... and industries?

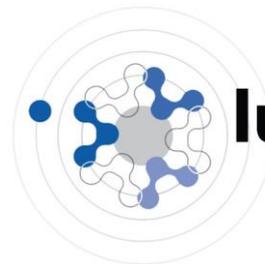
Companies flail when their industries fail – and every industry eventually does

- No growth
- New tech
- No change
- Death is a choice. It can be
 - Graceful
 - Messy
 - Rebirth

As hard as it is, it beats the alternative



Market and technology shifts are coming – choose life now

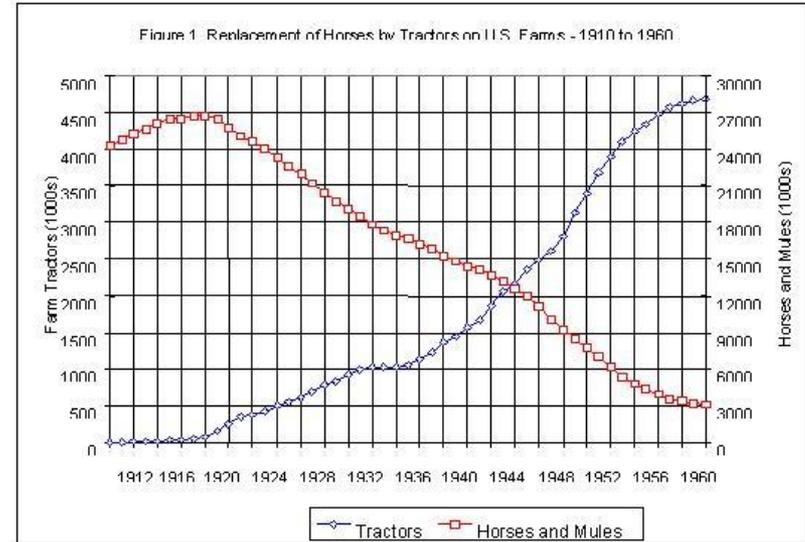


lux executive summit

Boston, MA • May 9 - 11, 2016

Death comes knocking for everyone

- Historically
 - Tractors replaced horses
 - Quartz watches replaced mechanical
- Even the mighty fall
 - Intel layoffs
 - Apple sales decline
 - Every company in F500 faces crisis
- Eventually...
 - Tesla will be like Oldsmobile
 - People will complain about the food on Virgin Galactic
- But a lot will happen between now and then. Like what? Where are market and technology forces converging?



“When Swiss companies declined to make quartz devices, inexpensive Japanese watches from companies like Seiko became popular around the world. The **“quartz crisis”** killed off so many Swiss watchmakers that by the end of the 1970s, the number of workers in the industry had shrunk to 30,000 from 90,000. Brands in existence for centuries vanished in a puff of disruption.”

- [NY Times, June 3 2015](#)

Transportation and food – what's next?



April 1956. Malcom McLean [shipped 58 containers](#) in a retired WWII oil tanker from Newark to Houston – the first intermodal shipment, now a global standard



April 1973. Fred Smith's team sat at a card table and sorted 186 packages, then loaded them onto 14 Dassault Falcon jets – [the dawn of FedEx](#), and global next-day delivery



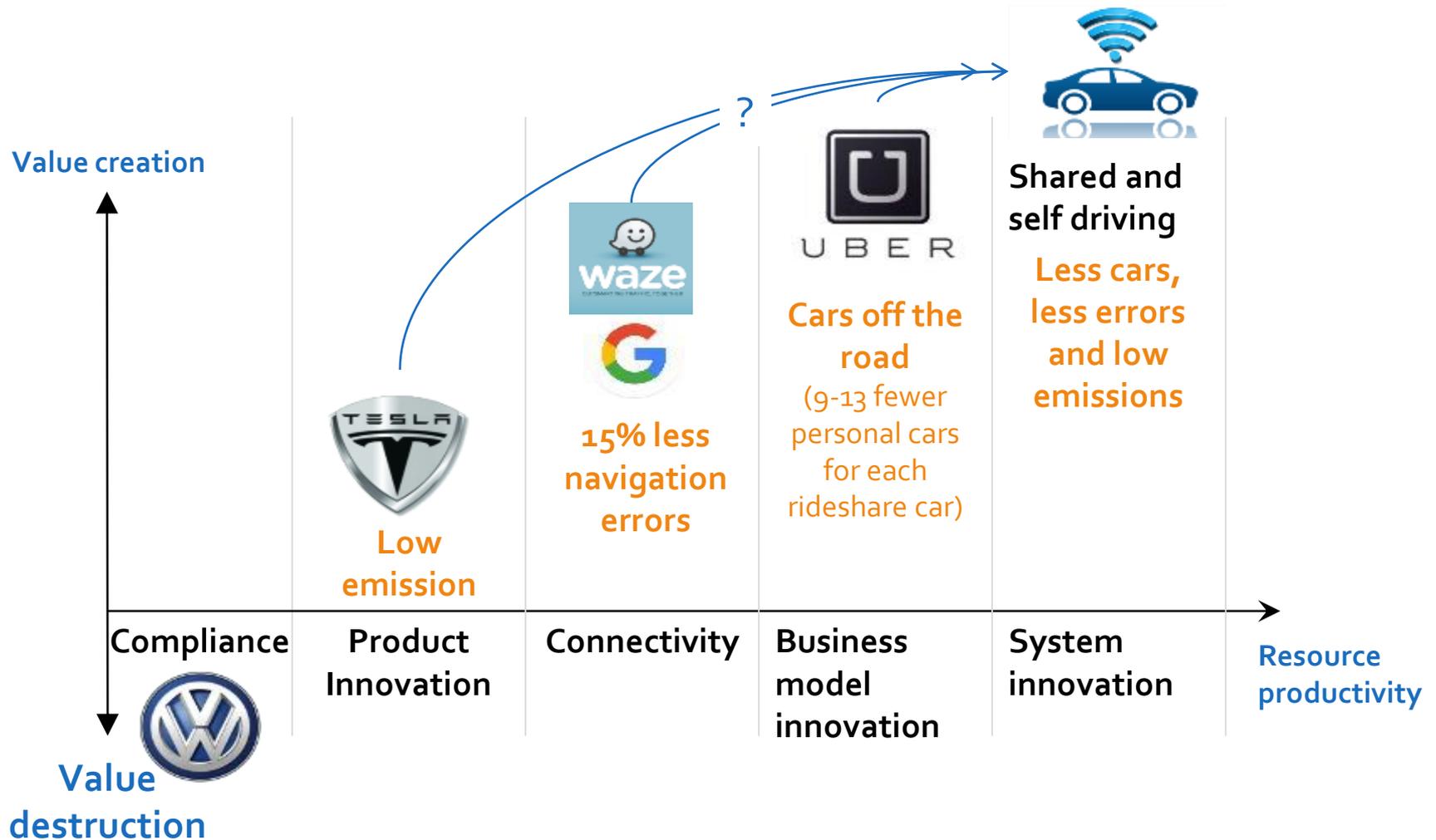
April 1994. Jeff Bezos read that the number of Internet users was growing at 2,300% annually – so he got a garage and some servers and [started Amazon](#), a store with global reach, infinite selection, zero inventory, and no storefront



April 2016. About every twenty years, a logistics revolution begins – **what might this one mean?**



Threat/opportunity: connected cars means fewer cars



Connected/autonomous transport could decimate the auto industry, reshape cities, and save millions of lives

"If autonomous vehicles can drive 500% more densely in platoons, and park away from main roads, maybe we never need to widen roads again, build out parking spaces, or invest in rail or buses."

- City planning participant in Lux/SRI Intelligent Transportation workshop

Car-sharing is taking cars off the road. There are about a million car-sharing members in the U.S., said Susan Shaheen of UC-Berkeley's Transportation Sustainability Research Center. While some studies estimate that up to 32 cars are taken off the road with every car-sharing vehicle, Shaheen's research has yielded more cautious numbers. "Between nine and 13 vehicles are removed — which includes postponed vehicle purchases — when a car-sharing vehicle is put in place," Shaheen said. "Of that total, four to six vehicles are actually sold." It may not be 32, but "I have never seen anything have this kind of impact on behavior," she said. "It's stunning." Fifty percent of respondents in her 7,000-person study said they had either delayed purchasing a car or had sold a car.

Great Mileage

Some Benefits of the Driverless Car

Google's Aspiration	Potential Annual Benefits (US only)
<ul style="list-style-type: none">• 90% reduction in accidents	<ul style="list-style-type: none">• 4.95 million fewer accidents• 30,000 fewer deaths• 2 million fewer injuries• \$400 billion in accident-related cost savings
<ul style="list-style-type: none">• 90% reduction wasted commuting	<ul style="list-style-type: none">• 4.8 billion fewer commuting hours• 1.9 billion gallons in fuel savings• \$101 billion saved in lost productivity and fuel costs
<ul style="list-style-type: none">• 90% reduction in cars	<ul style="list-style-type: none">• Reduce cost per trip-mile by 80% or more• Increase car utilization from 5-10% to 75% or more• Better land use

Carmakers have seen the threat and are responding

TECH

GM Invests \$500 Million in Lyft, Plans System for Self-Driving Cars

Auto maker will work to develop system that could have autonomous cars appear at customers' doors

APPS | TECH | TRANSPORTATION | AUDI | BREAKING

Nokia sells Here maps unit to Audi, BMW, and Mercedes for \$3 billion

By [Sam Byford](#) on August 3, 2015 01:45 am [Email](#) [@345triangle](#)

GM Spent Over \$1 Billion on Self-Driving Startup to Keep Up With Google, Apple

A hefty sum for driverless tech.

BY [JOHANA BHUIYAN](#) · [@JMBOOYAH](#) · MAR 11, 2016, 7:07A

Ford's Autonomous Car Will Be Affordable And Not Necessarily Made With Google



Andrew P Collins
1/05/16 11:26am · Filed to: CES

4.5K 61

“We do not plan to become the Foxconn of Apple”

Dieter Zetsche, CEO Daimler Sept 17, 2015

*“In 2007 I pledged that – by 2010 – Nissan would mass market a zero-emission vehicle. Today, the Nissan LEAF is the best-selling electric vehicle in history. **Now I am committing to be ready to introduce a new ground-breaking technology, Autonomous Drive, by 2020, and we are on track to realize it.**”*

“We have seen what Google did to phone manufacturers, and we don’t want that to happen to us.”

-Nissan CEO Carlos Ghosn

Silicon Valley vs. Detroit: The Battle For The Car Of The Future

This story appears in the May 27, 2013 issue of Forbes.

9 comments, 4 called-out + Comment Now + Follow Comments



- The auto industry utterly failed in telematics; will they repeat?
- Carmakers must make networked vehicles now, to prevent the rise of third-tier OEMs
- Consortia are collapsing into proprietary, competitive programs



Manufacturing: Not Daimler, but *Foxconn* might be the “Foxconn of automotive”

- Foxconn (contract manufacturer of iPhones, Tesla components, and other electronics) rumored to be investing \$800 million in automotive plant
- Chinese automakers BAIC and SAIC working on electric vehicles and autonomous vehicles
- BAIC has partnership with Silicon Valley battery startup Atieva
 - Goal is now electric, autonomous vehicles
 - \$100M+ investment
 - Hiring >10 autonomous vehicle engineers

NEWS

Foxconn invests in building electric cars in China

The company is already a partner with Tesla Motors

— MORE LIKE THIS

By Michael Kan [FOLLOW](#)

IDG News Service | Sep 4, 2014 5:32 AM PT

Foxconn turns sights to robots, electronics, wearables

Foxconn CEO blames next worker

From the press release:

Beijing Electric Vehicle Co, an affiliate of government-owned BAIC Motor Corp Ltd ([1958.HK](#)), said its new tech center outside San Francisco will focus on development of EVs and eventually self-driving cars.

BAIC follows another large state-owned Chinese automaker, SAIC Motor Corp ([600104.SS](#)), which also is setting up a research facility in Silicon Valley and is developing electric and self-driving cars.



Drones deliver anything you can imagine



...and some things
you never would
have imagined

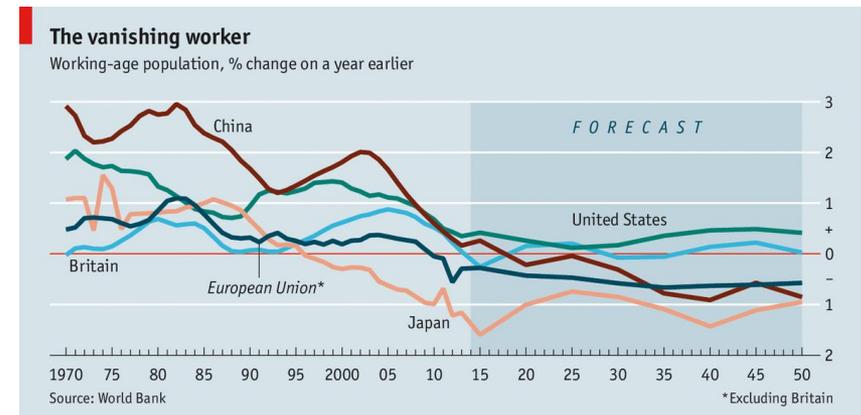
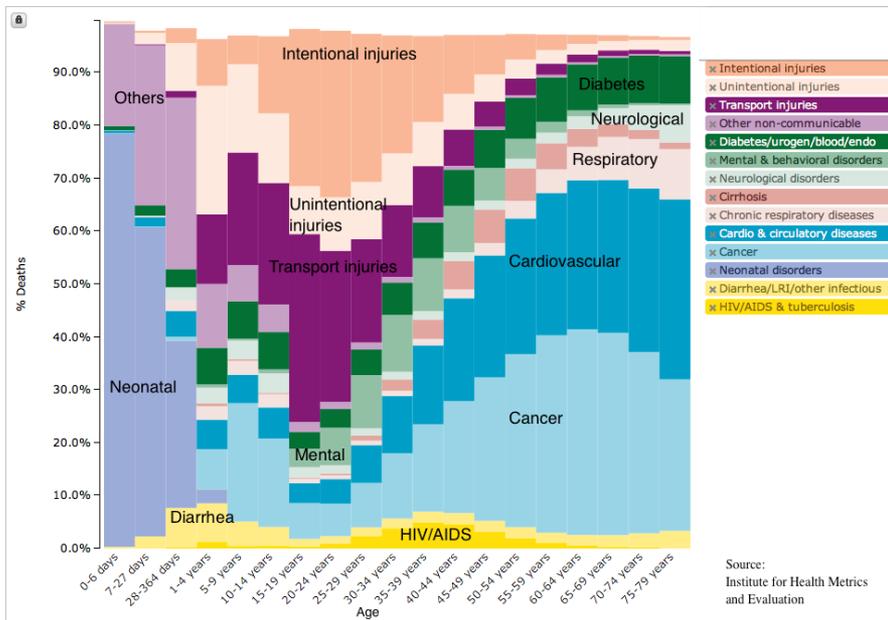


Threat/opportunity: streaming food like music



- Big data, predictive analytics, anticipatory logistics, persuasive technologies, precision nutrition... who decides what I want to eat?
- Streaming CPG – subscribe to razors, why not food?
- The streaming music model comes to food: will we ever eat the same meal twice?
- Food storage: Does the pantry go the way of the CD rack?
- Food prep/tools: What's the next-next gadget, and who is making it?
- Food and family: Does the kitchen become the home workshop?

Threat/opportunity: Human health and longevity



- Preventing causes of death = health issue
 - Multiple multibillion-dollar markets
 - Include accident and crime prevention

- Extending human lifespan = economic issue
 - Extend healthy, economically productive years
 - Reverse population decline and economic stagnation



Transportation, food, and you

- Fear of death is just FOMO - fear of missing out
- We are already immortal – by historical standards
 - If we ever cure aging, we will rebel against other limitations of time and space – that's just what curious humans do
- What we need is not a corporate version of longevity, but of curiosity
 - Leaders – YOU – need to provide it



Good news for human and corporate longevity

➤ Red wine is still good for you, maybe!

➤ Microbreweries are still on the rise!



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News

Home / News / New Study Validates Longevity Pathway

New Study Validates Longevity Pathway

Findings identify universal mechanism for activating anti-aging pathway

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By DAVID CAMERON March 7, 2013

A new study demonstrates what researchers consider conclusive evidence that the red wine compound resveratrol directly activates a protein that promotes health and longevity in animal models.



Thank you

