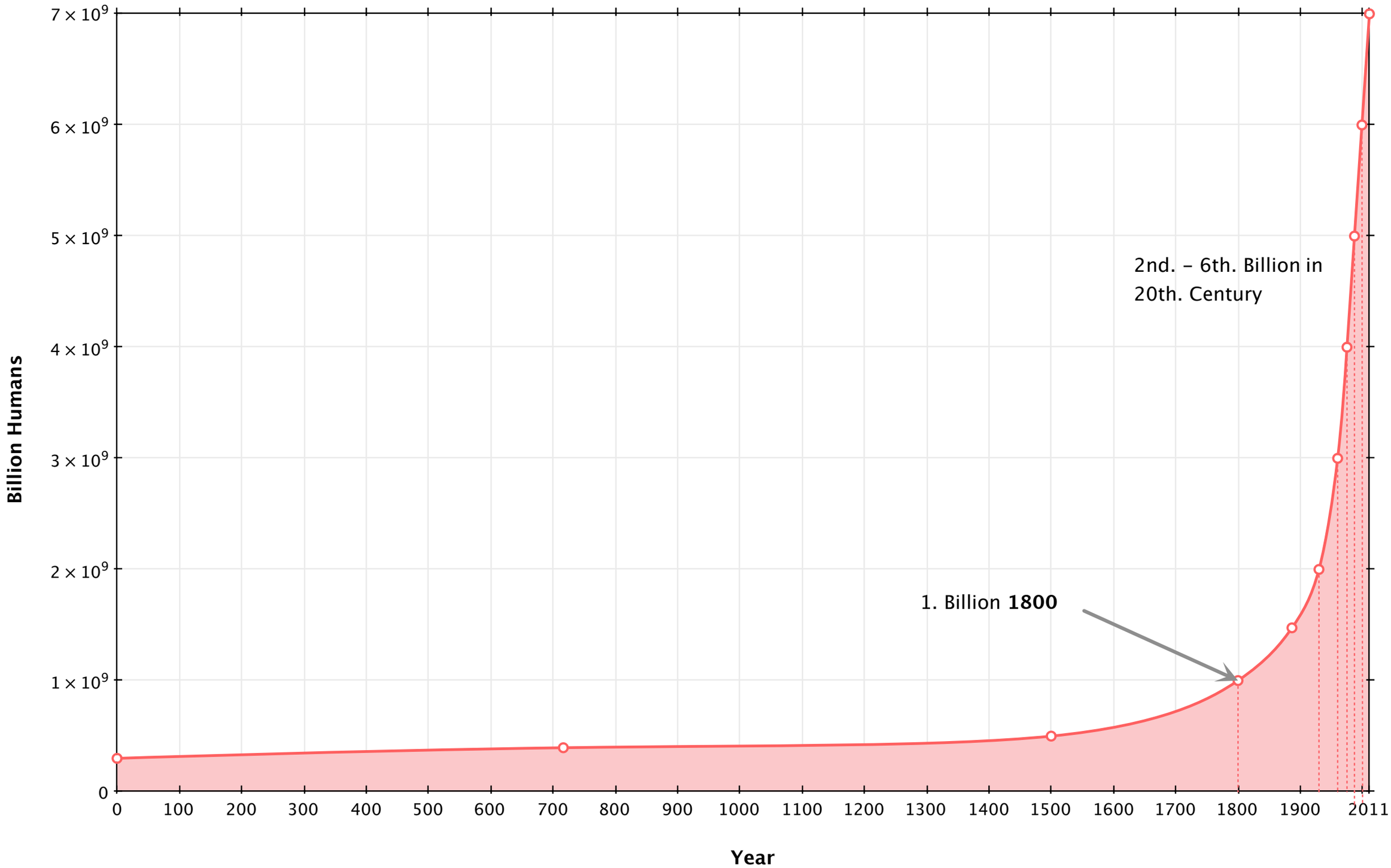
Getting *Nothing* Done?

Dr. Alexander Schatten
https://podcast.zukunft-denken.eu

The First Billion?

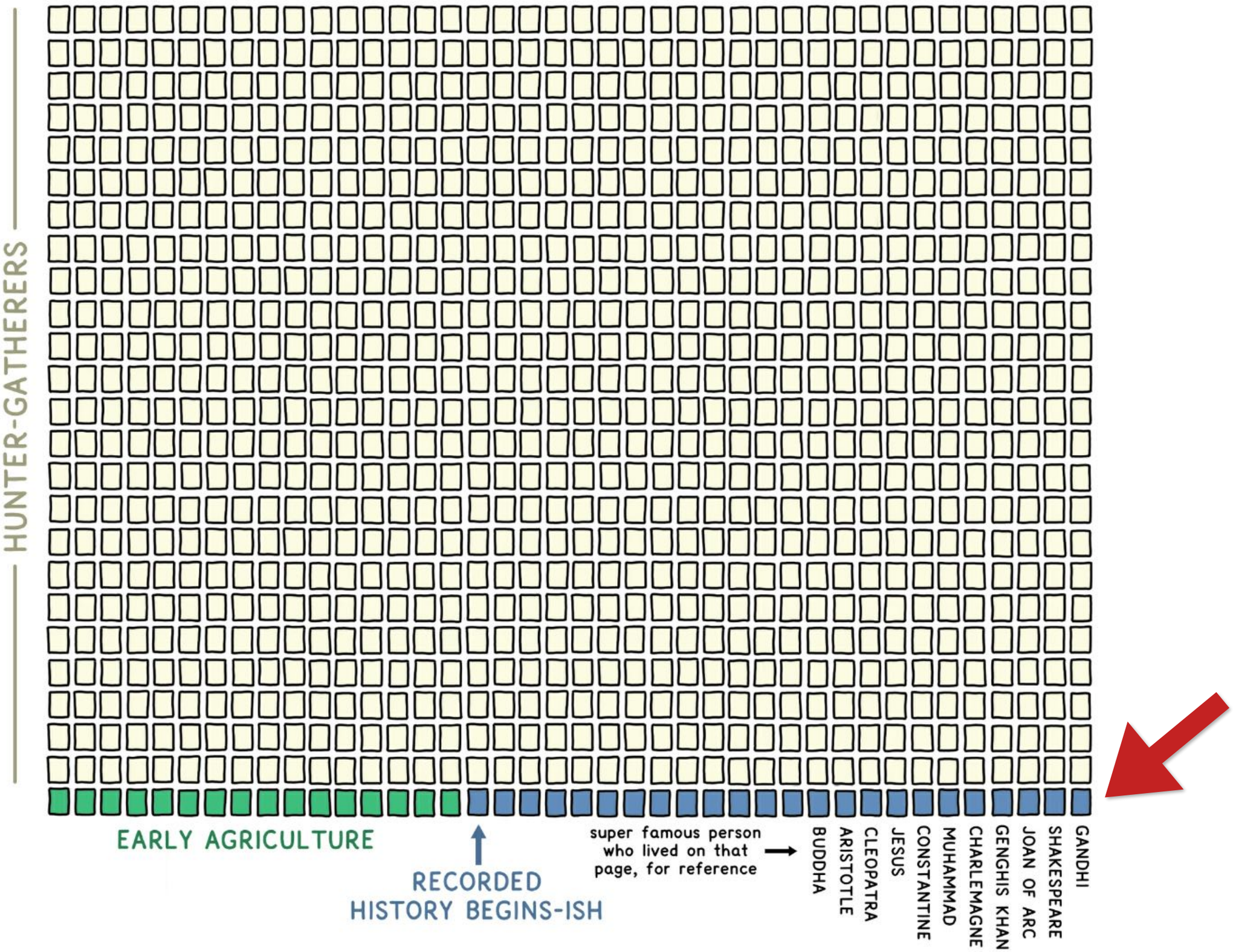


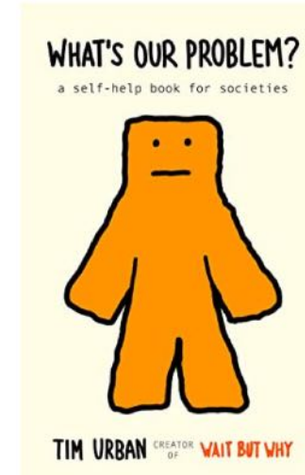
During my lifetime population **doubled**, during the lifetime of my father **tripled**.
A person who is 100 years old experienced a **quadrupling** of Earth's population.

IF HUMAN HISTORY WERE A 1,000-PAGE BOOK

250,000
YEARS AGO

EACH PAGE = 250 YEARS
EACH ROW = 10,000 YEARS





Context

1. What happened between 1800 and 1960?

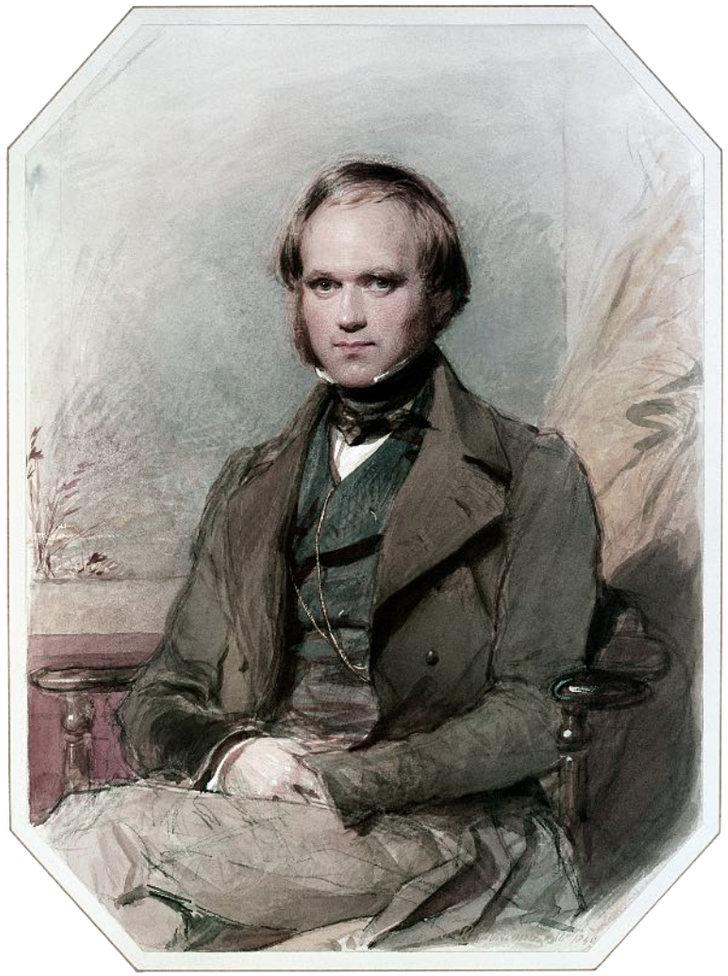
2. What happened in/since the 1970s?

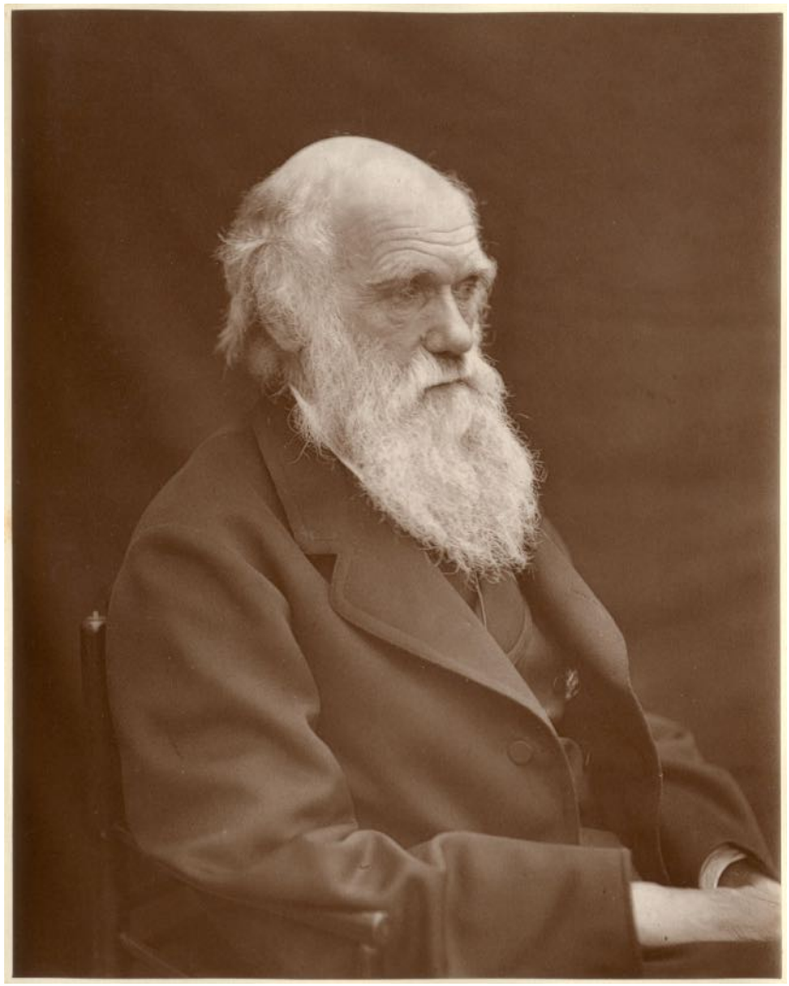
3. What does this mean for our future?

19th Century

The Life from the Perspective of
Charles Darwin — Science

Charles Darwin

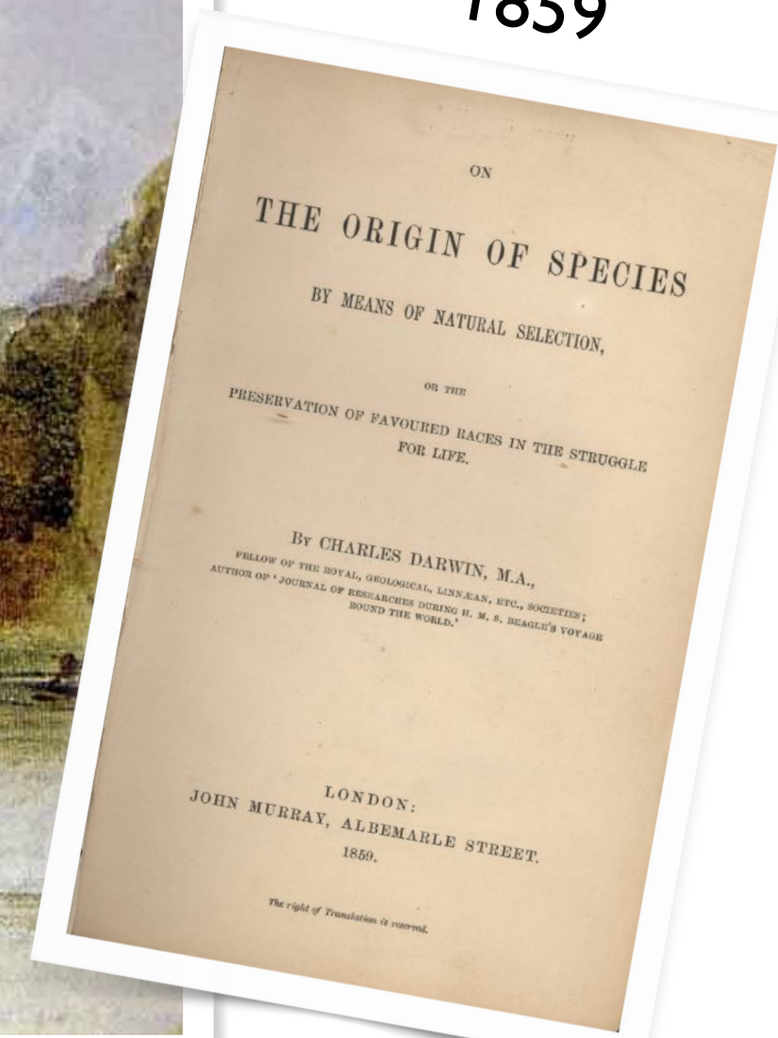




1809 – 1882

Darwin, The Beagle & The Origin of Species

1859



ON

THE ORIGIN OF SPECIES

BY MEANS OF NATURAL SELECTION,

OR THE

PRESERVATION OF FAVOURED RACES IN THE STRUGGLE FOR LIFE.

BY CHARLES DARWIN, M.A.,

FELLOW OF THE ROYAL, GEOLOGICAL, LINNÆAN, ETC., SOCIETIES;
AUTHOR OF 'JOURNAL OF RESEARCHES DURING H. M. S. BEAGLE'S VOYAGE ROUND THE WORLD.'

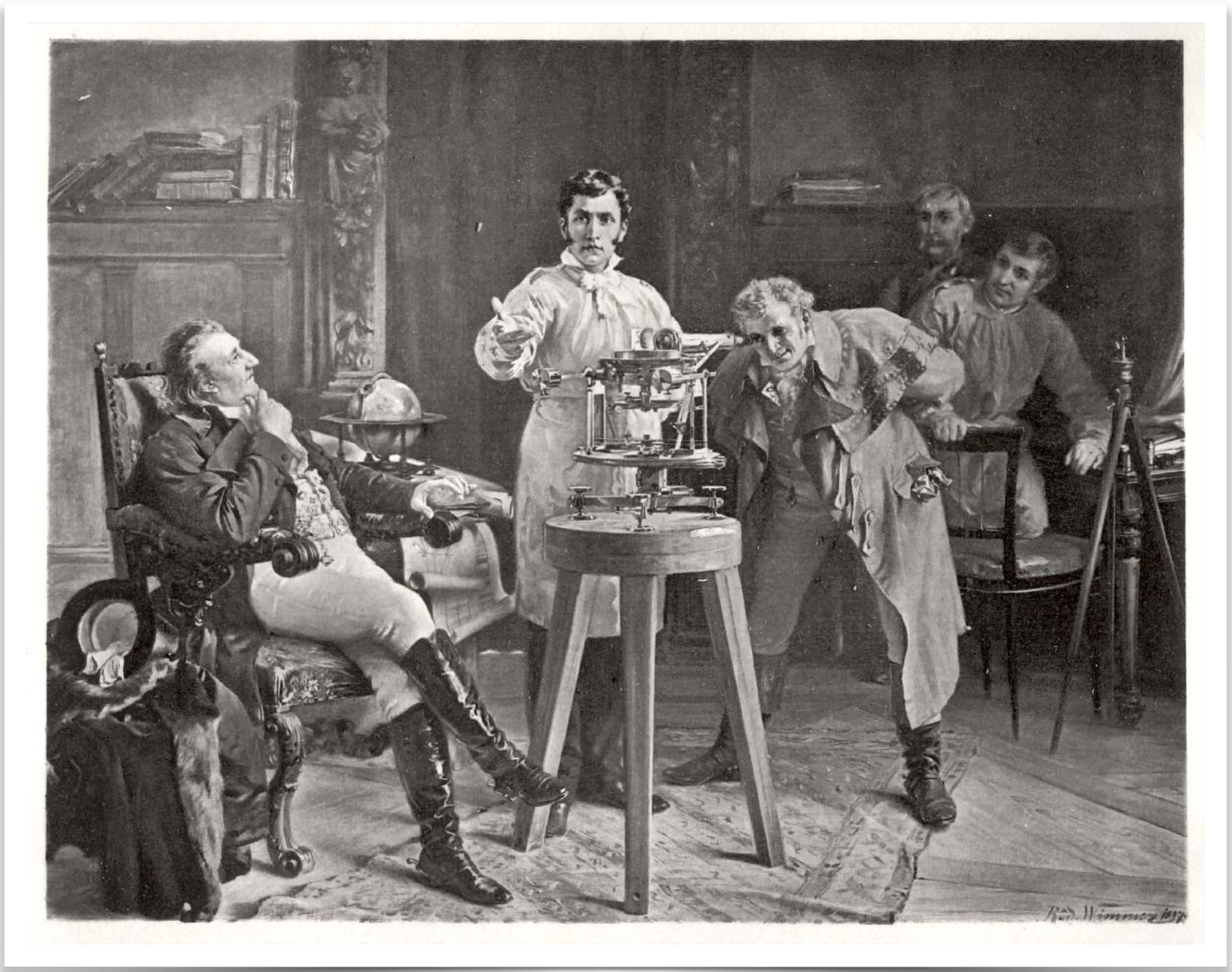
LONDON:
JOHN MURRAY, ALBEMARLE STREET.
1859.

The right of Translation is reserved.

Life in 1800?

- Pre modern life
- Start of industrial revolution, esp. England
- Cities grow in importance
- But huge social problems (e.g. Seven Dials slum in London, child labour, Manchester capitalism/Friedrich Engels; epidemics…)

Spectroscopy



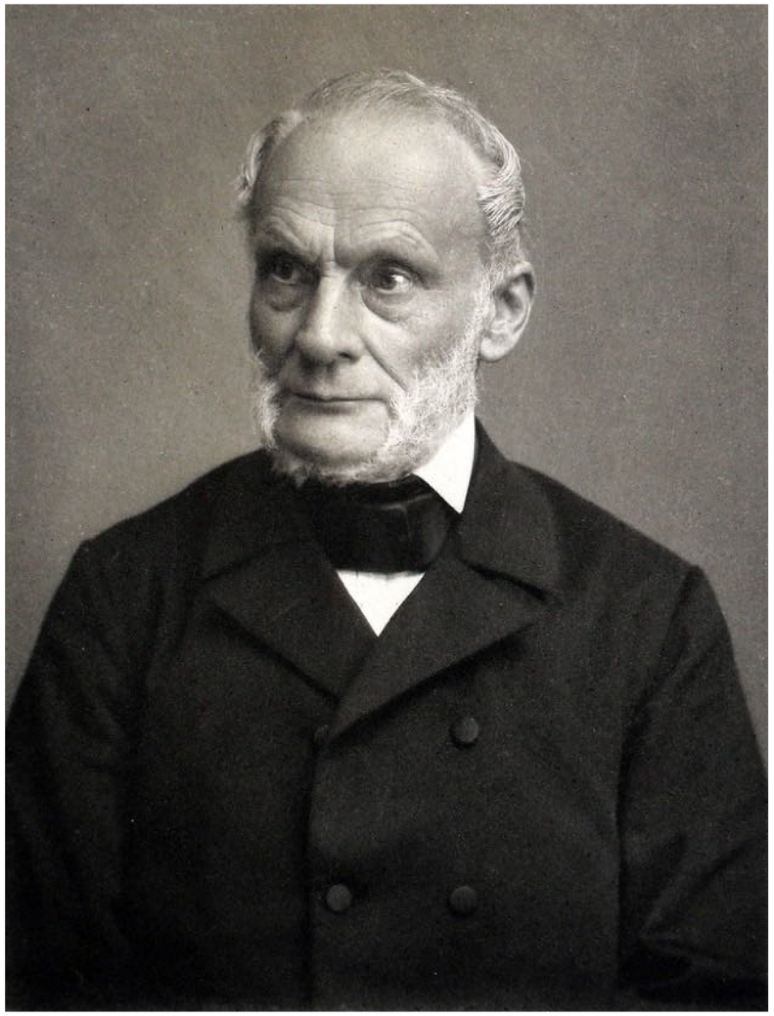
Joseph von Fraunhofer demonstrating spectroscopy

Thermodynamics

15

Sadi Carnot
How to design good steam engines
(1824)

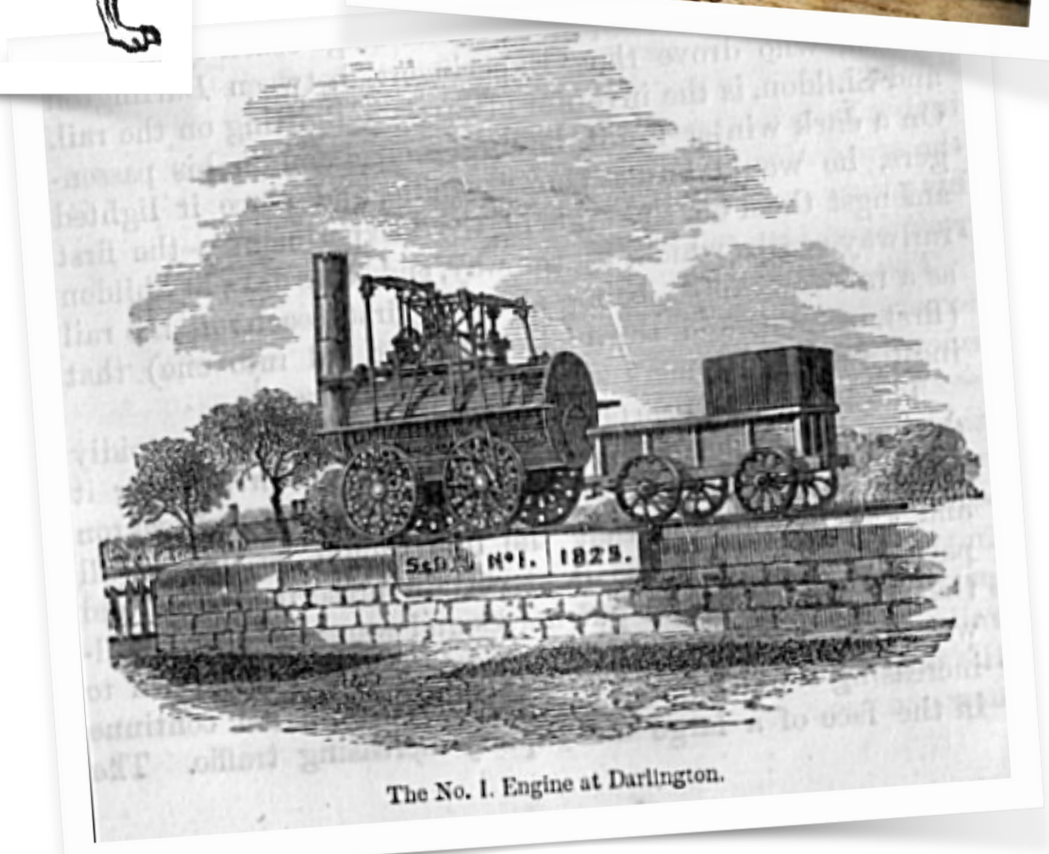
41



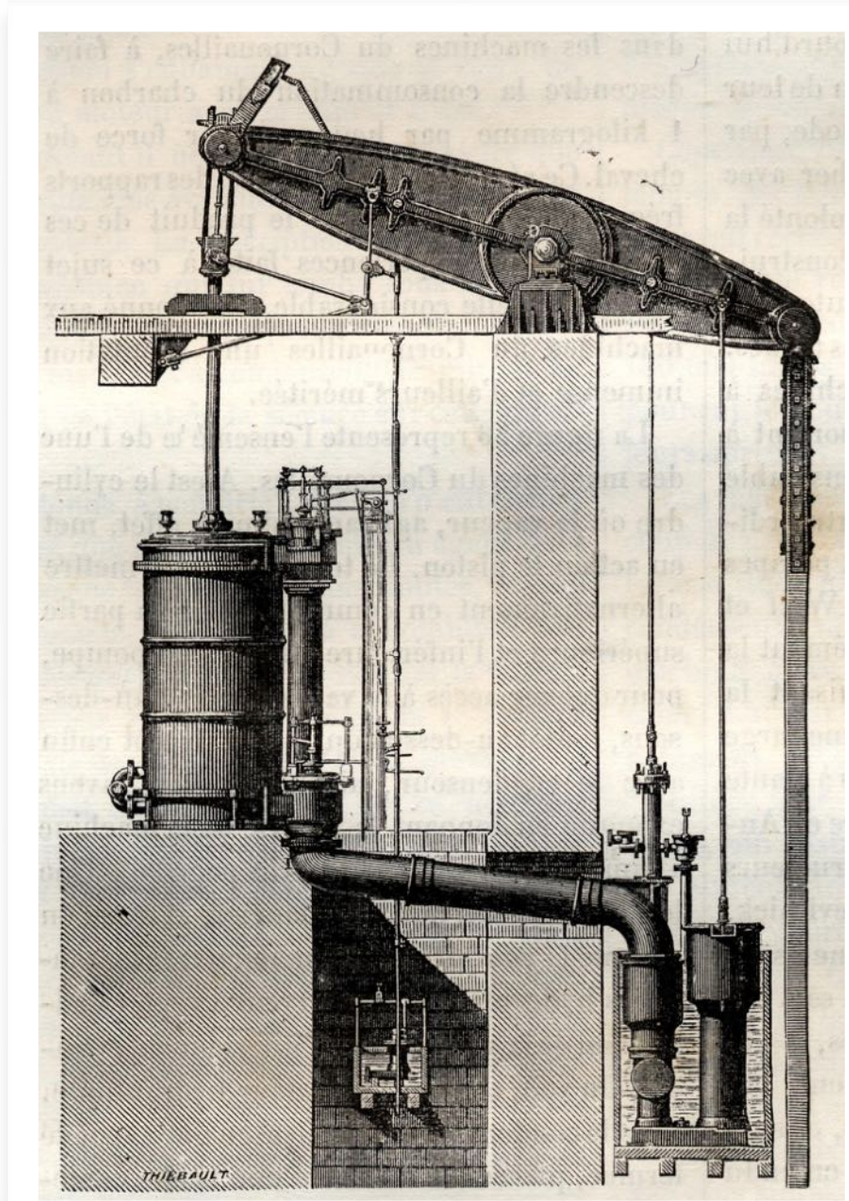
Rudolf Clausius
Second Law of thermodynamics
(1850)

Aeolipile
ca. 100 n. Chr

Steam Engine



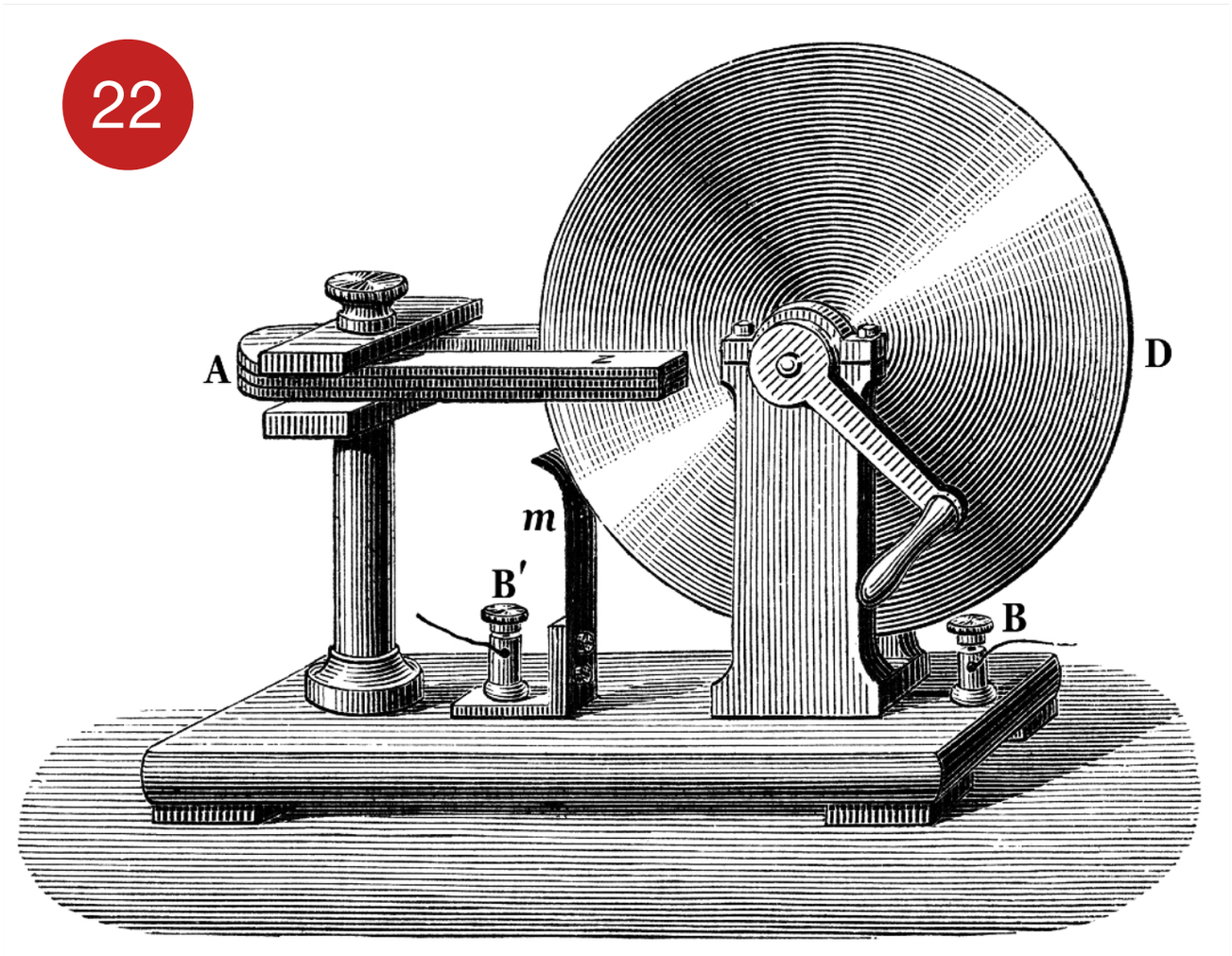
Stephenson No1
Stockton and Darlington Railway 1825



Cornish Engine

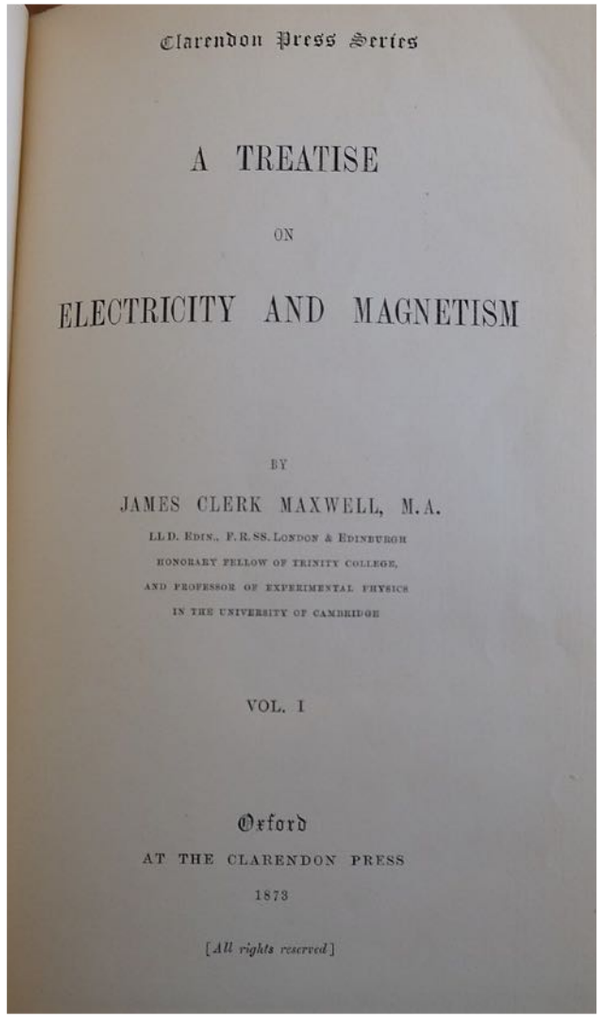
Faraday & Maxwell

22



Faraday Disc — Electric Generator
(1831)

64



Clarendon Press Series

A TREATISE

ON

ELECTRICITY AND MAGNETISM

BY

JAMES CLERK MAXWELL, M.A.

LL.D. EDIN., F.R.SS. LONDON & EDINBURGH
HONORARY FELLOW OF TRINITY COLLEGE,
AND PROFESSOR OF EXPERIMENTAL PHYSICS
IN THE UNIVERSITY OF CAMBRIDGE

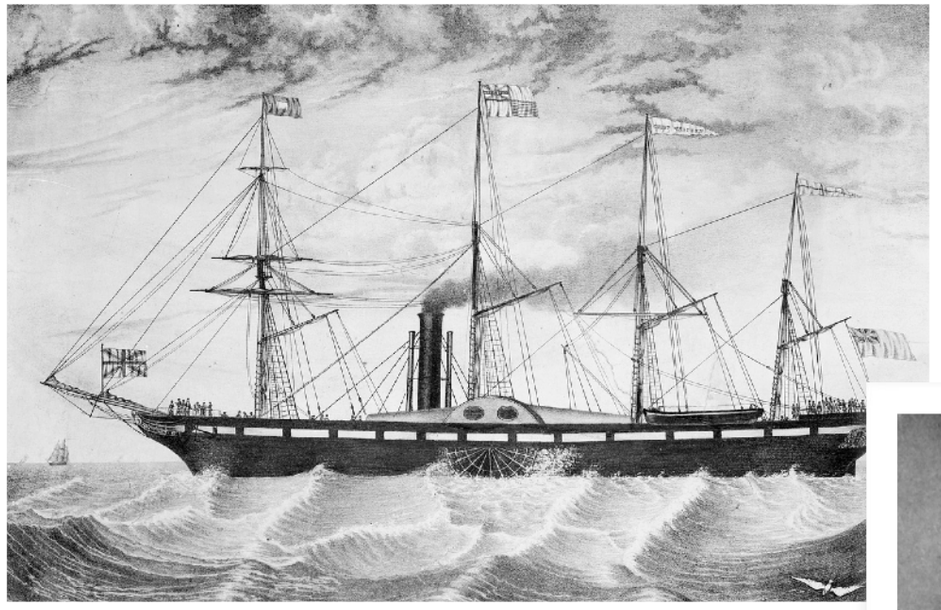
VOL. I

Oxford
AT THE CLARENDON PRESS
1873

[All rights reserved]

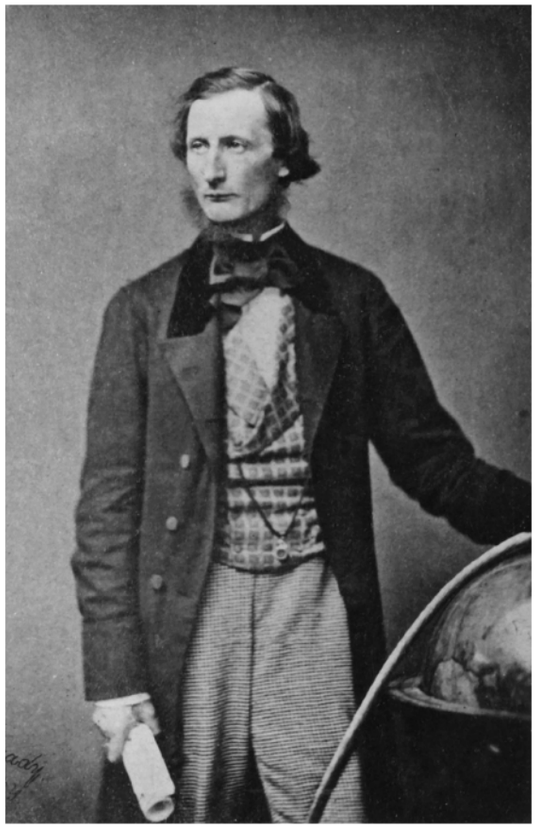
James Clerk Maxwell
Treatise on Electricity
and Magnetism
(1873)

Transatlantic Exchange

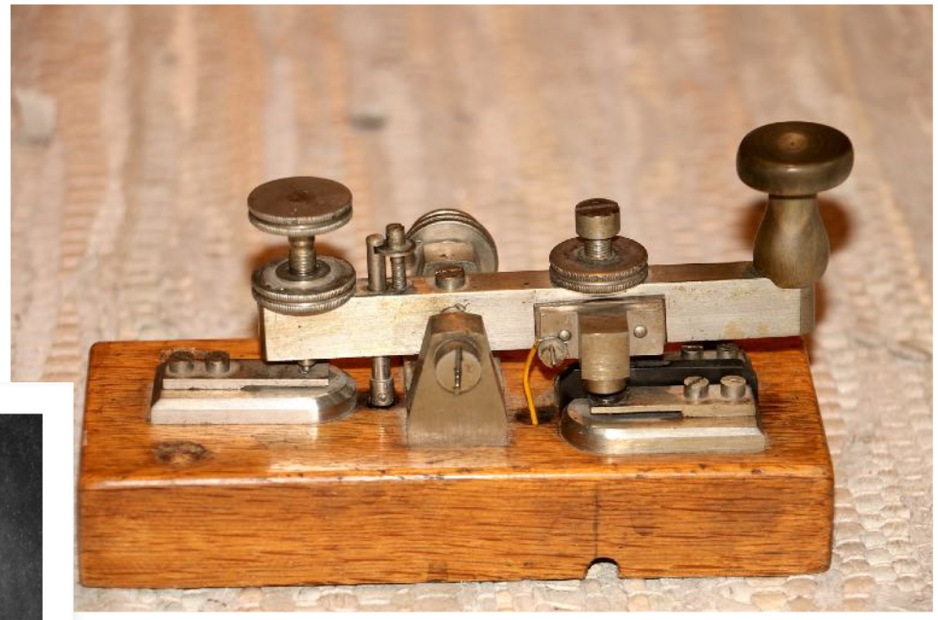


28

SS Great Western
Isambard Kingdom Brunel
(1837)



Cyrus Field, Transatlantic Cable
(1858)



Morse Code & Telegraph
(1844)

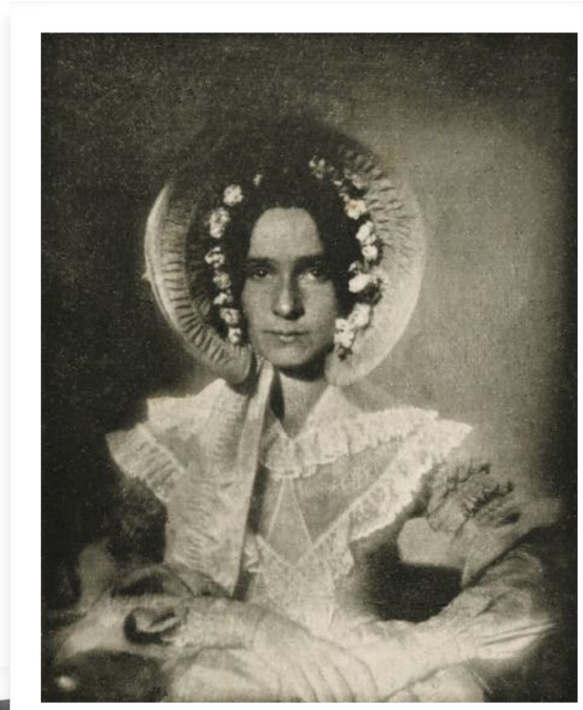
35

49

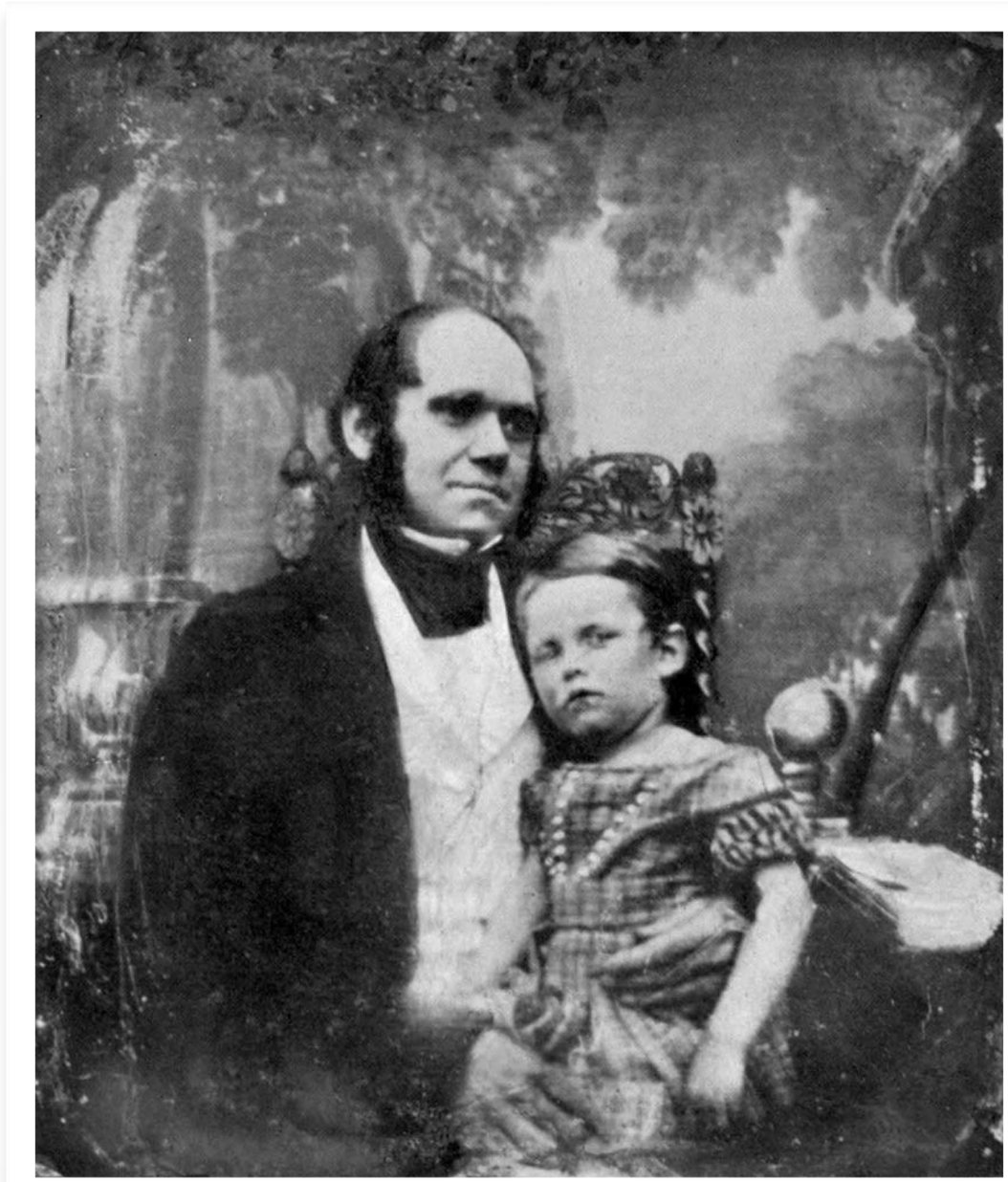
https://commons.wikimedia.org/wiki/File:Morsetaste.jpg

Invention of Photography

30



Roundhay, 1888 original 20 frames
Louis Le Prince

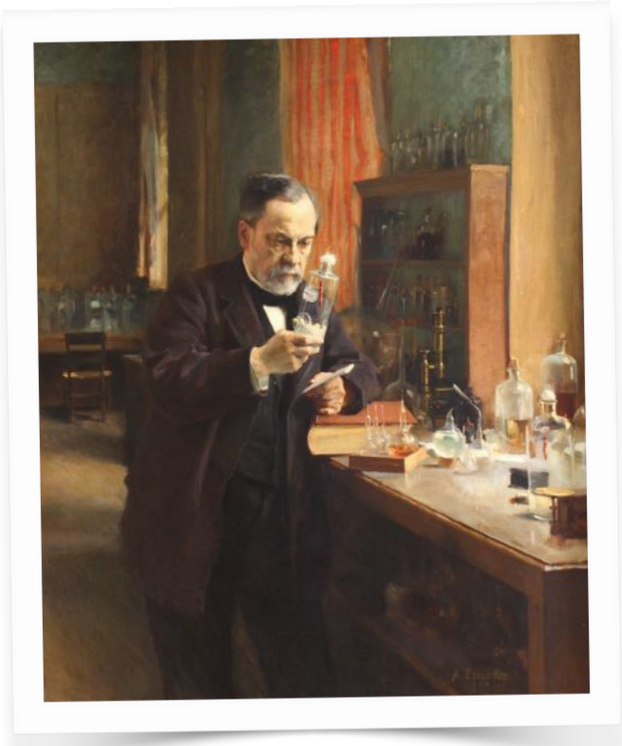


33

Medicine

37

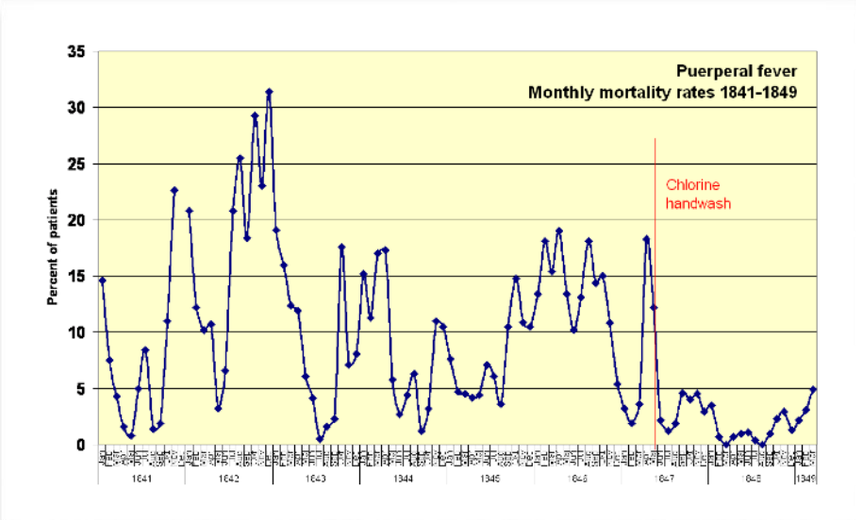
Anesthesia 1846



Pasteur / Anthrax 1881

72

38

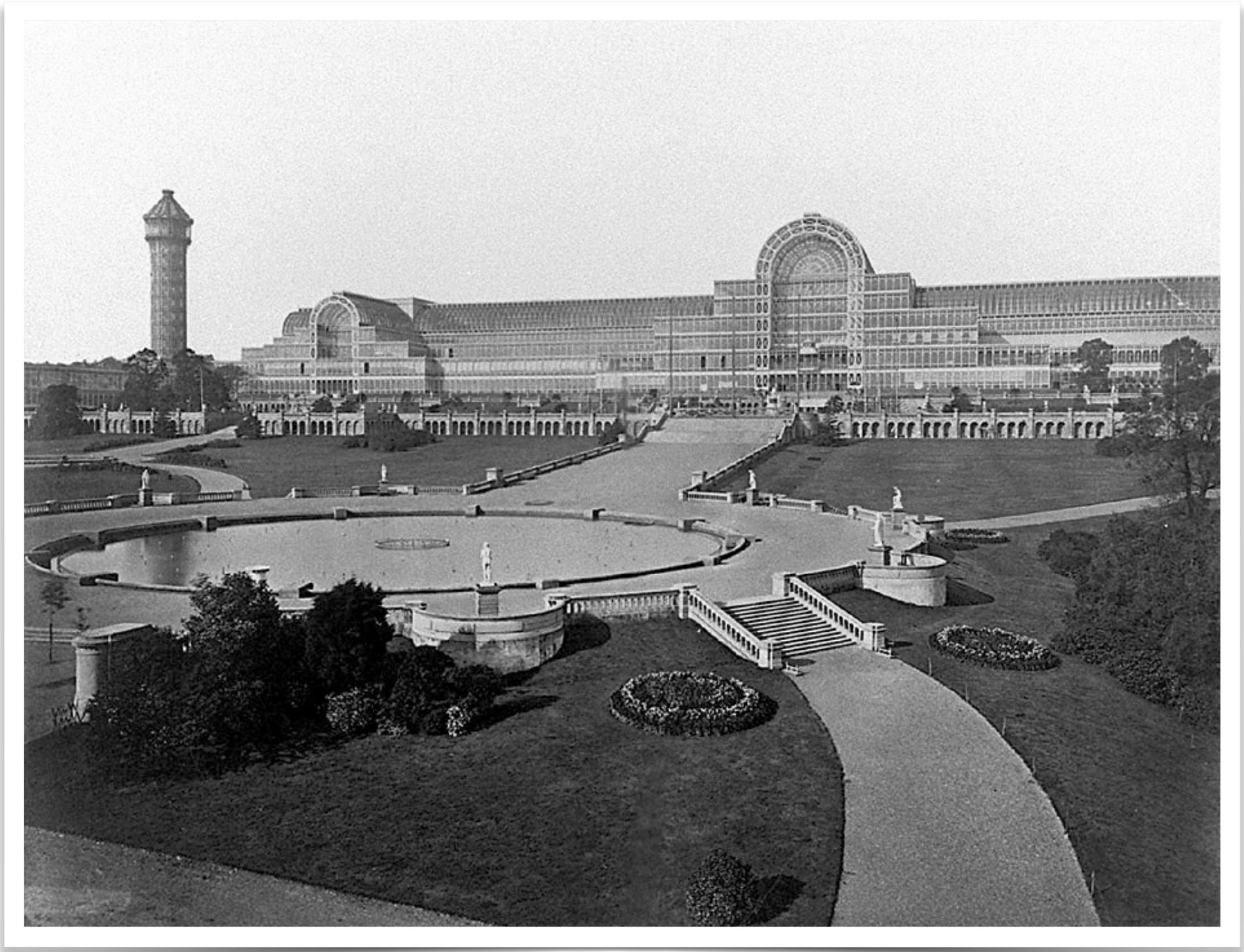


Iganz Semmelweis 1847

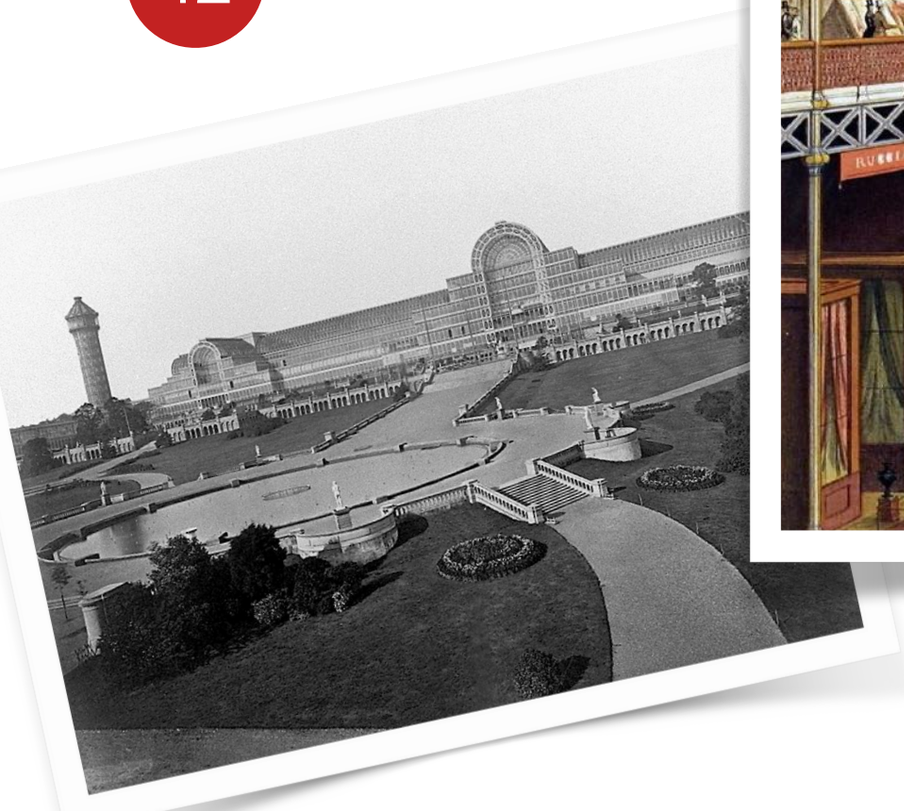
75

Robert Koch / Cholera 1884

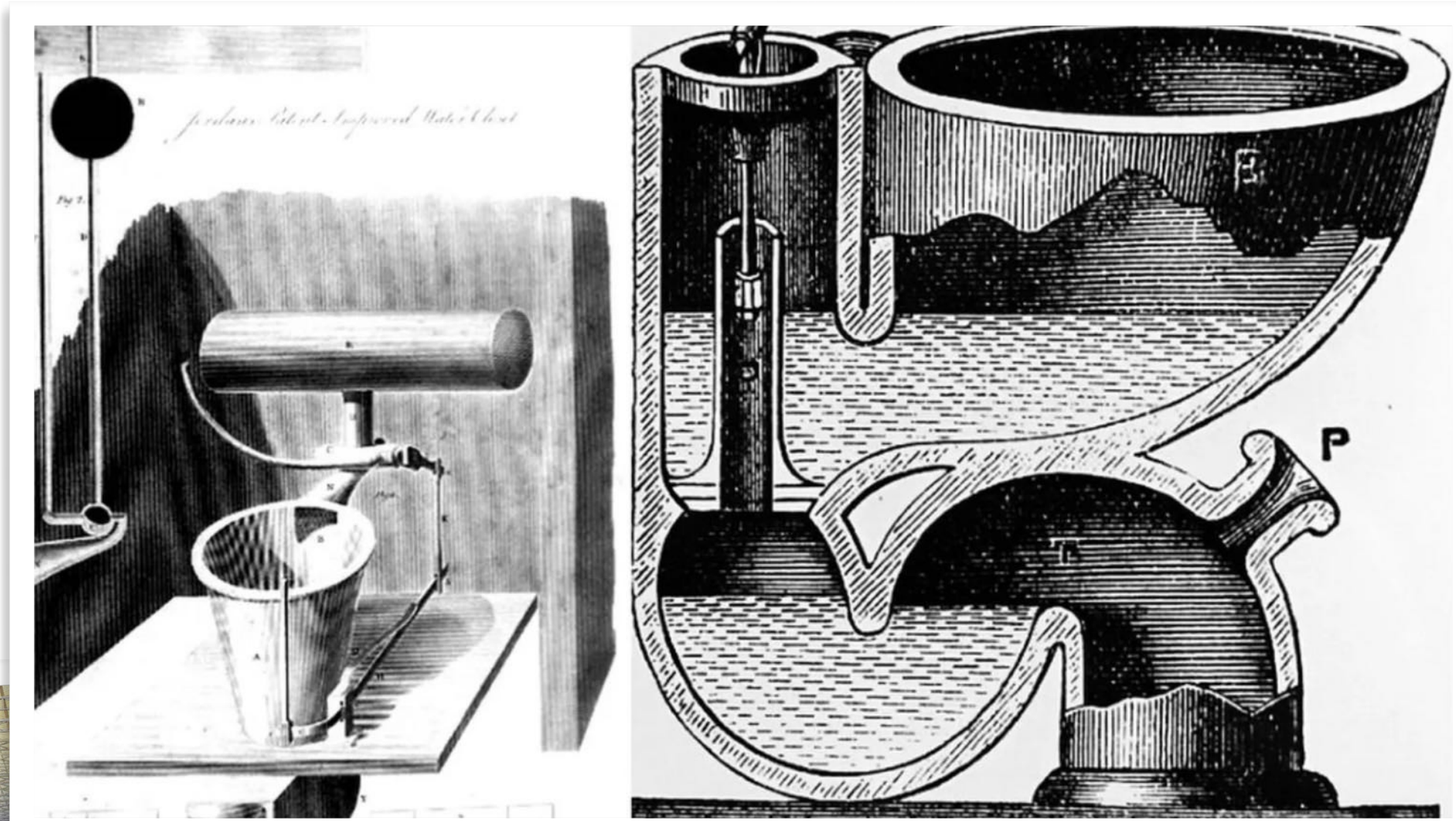
Crystal Palace (World Expo 1851)

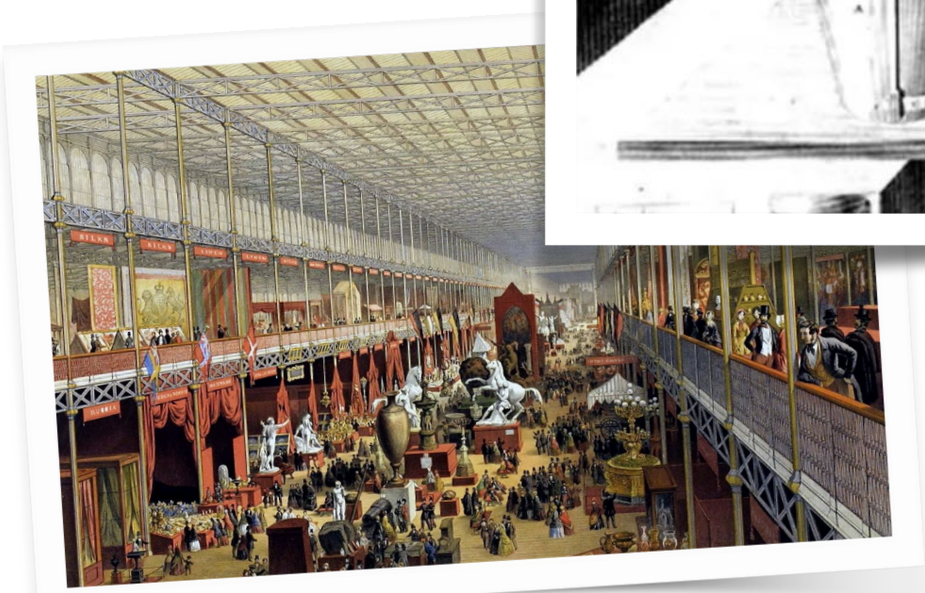


Crystal Palace (World Expo 1851)



Crystal Palace (World Expo 1851)





Monkey Closet by George Jennings

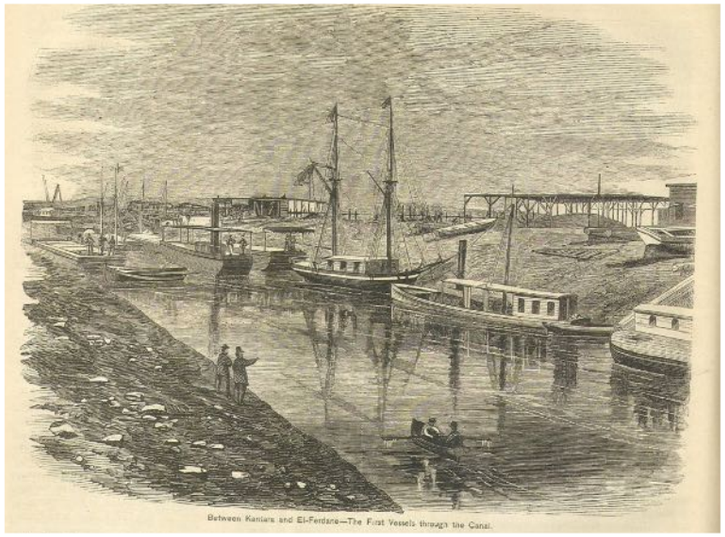
Modern Chemistry: Dmitri Mendeleev

Reihen	Gruppo I. — R^2O	Gruppo II. — RO	Gruppo III. — R^2O^3	Gruppo IV. RH^4 RO^2	Gruppo V. RH^3 R^2O^5	Gruppo VI. RH^2 RO^3	Gruppo VII. RH R^2O^7	Gruppo VIII. — RO^4
1	H=1							
2	Li=7	Be=9,4	B=11	C=12	N=14	O=16	F=19	
3	Na=23	Mg=24	Al=27,3	Si=28	P=31	S=32	Cl=35,5	
4	K=39	Ca=40	—=44	Ti=48	V=51	Cr=52	Mn=55	Fe=56, Co=59, Ni=59, Cu=63.
5	(Cu=63)	Zn=65	—=68	—=72	As=75	Se=78	Br=80	
6	Rb=85	Sr=87	?Yt=88	Zr=90	Nb=94	Mo=96	—=100	Ru=104, Rh=104, Pd=106, Ag=108.
7	(Ag=108)	Cd=112	In=113	Sn=118	Sb=122	Te=125	J=127	
8	Cs=133	Ba=137	?Di=138	?Ce=140	—	—	—	— — — —
9	(—)	—	—	—	—	—	—	
10	—	—	?Er=178	?La=180	Ta=182	W=184	—	Os=195, Ir=197, Pt=198, Au=199.
11	(Au=199)	Hg=200	Tl=204	Pb=207	Bi=208	—	—	
12	—	—	—	Th=231	—	U=240	—	— — — —

Periodic table 1869

Construction

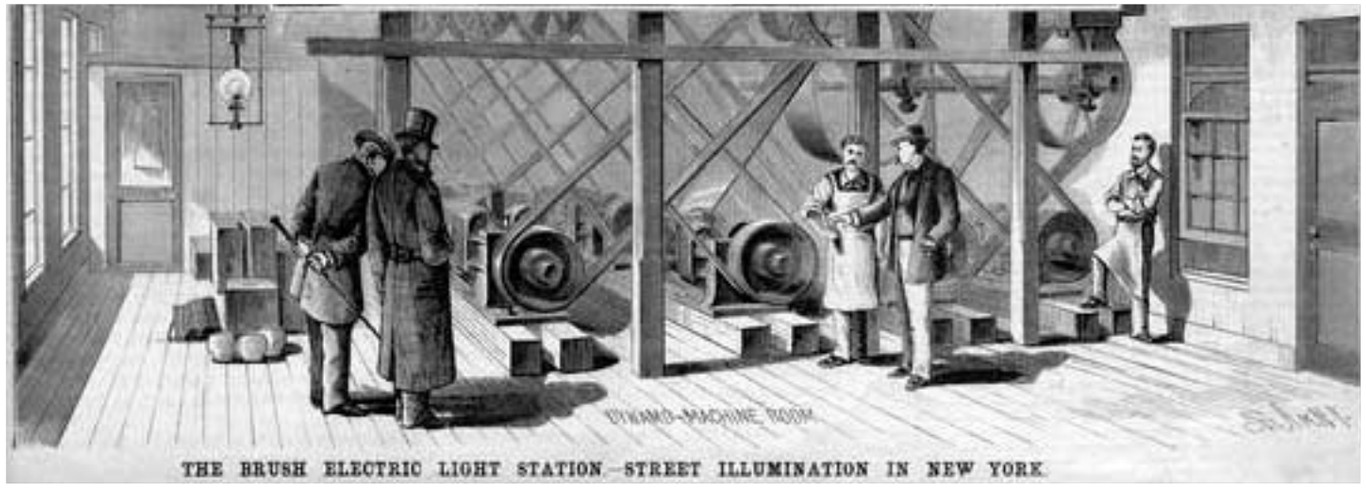
60



Suez Canal Opening 1869

Wiener Hochquellwasserleitung 1873

64



71

First Central Power Generation New York1880

- What a time to live! In terms of science, technological, economical advances!
- But: the actual life of Darwin (and most "ordinary"people) changed less over his lifetime than one might expect
- However
  - from 1/5 people in cities to nearly 3/4
  - wealth per person ~ doubled, before 1800 ~0%
  - Europes last famine: Ireland (1845–1852)
  - Foundations for modern life in cities
  - Arctic & Antarctic last terra incognita
- **Technology of modernity did not scale**
- **Yet!**

»Wir zogen in die Stadt zu einem alten Ehepaar in eine kleine Kammer, wo in einem Bett das Ehepaar, im andern meine Mutter und ich schliefen. Ich wurde in einer Werkstätte aufgenommen, wo ich Tücher häkeln lernte; bei zwölfstündiger fleißiger Arbeit verdiente ich 20 bis 25 Kreuzer im Tage. Wenn ich noch Arbeit für die Nacht nach Hause mitnahm, so wurden es einige Kreuzer mehr. Wenn ich frühmorgens um 6 Uhr in die Arbeit laufen mußte, dann schliefen andere Kinder meines Alters [ca. 11 Jahre] noch.«

Adelheid Popp ca. 1880

The 20th Century

Technology scales; Modernity
(and Existential Risk)

Attila Hörbiger

1896 – 1987

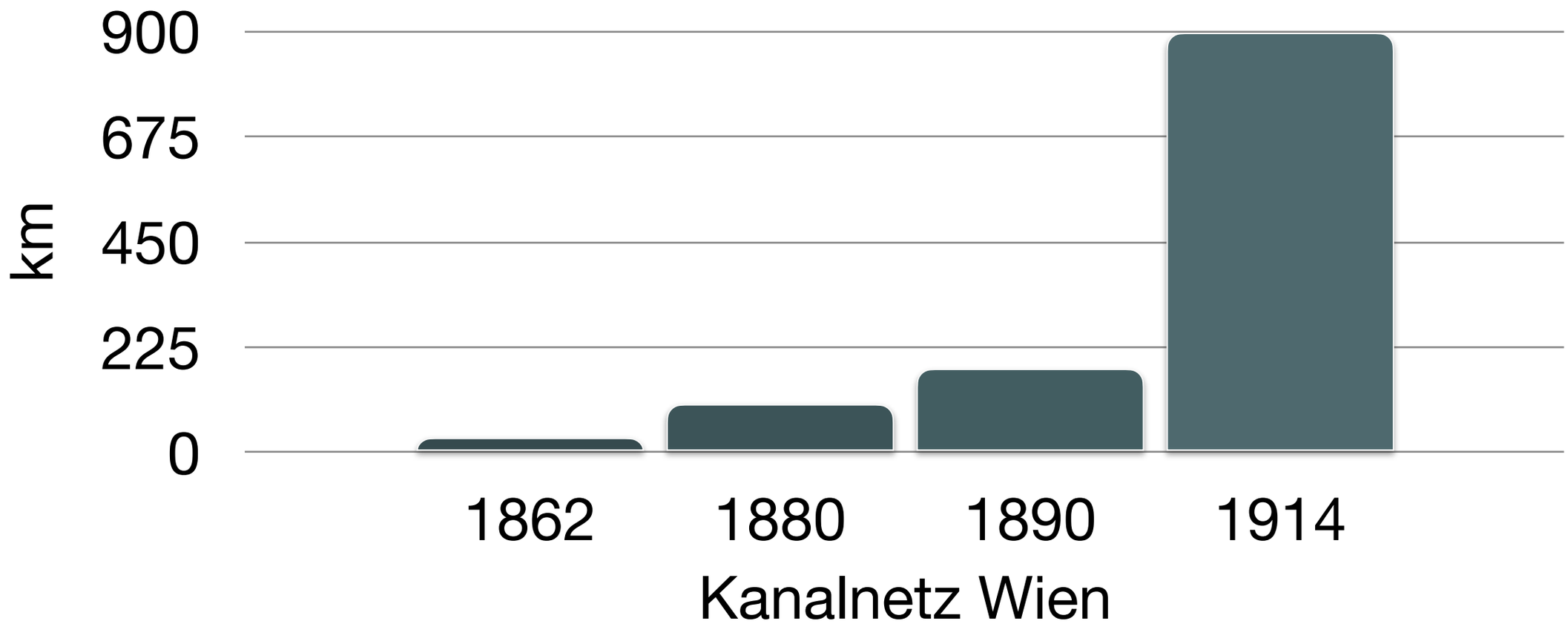
Paul Hörbiger

1894 – 1981

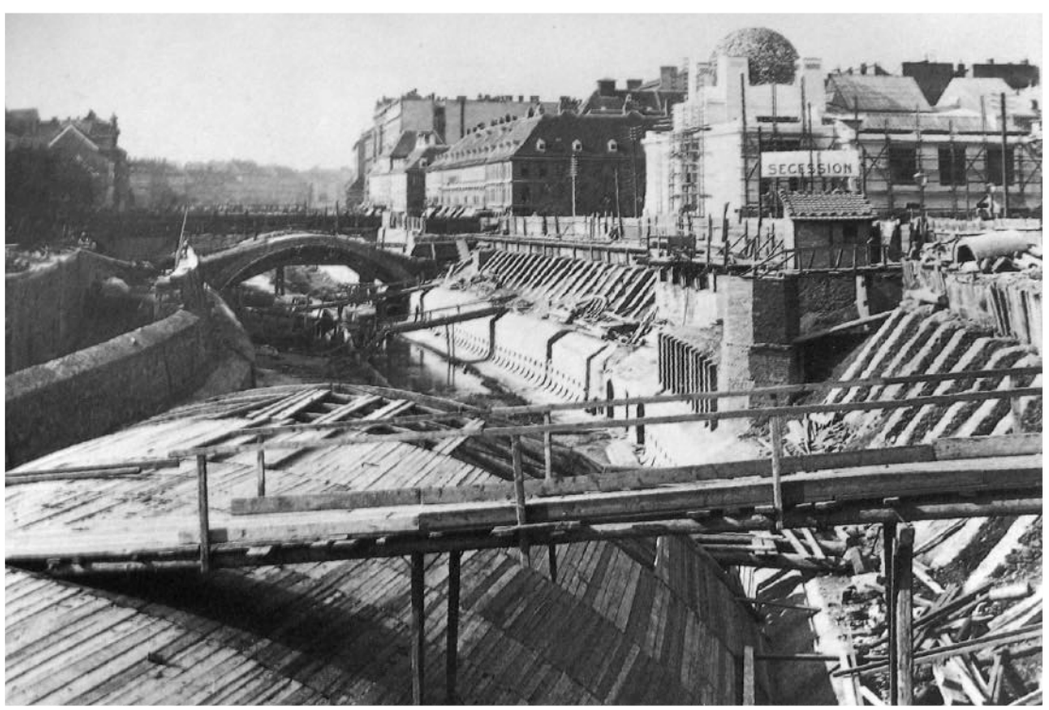
Childhood (1890s) like Darwin!

- no electricity
- no water in apartment
- no water toilet in apartment
- no phone
- no car, airplane, etc.
- no household appliances
- no movies
- … hardly anything we would identify as modern living.

Episode 71
Episode 44



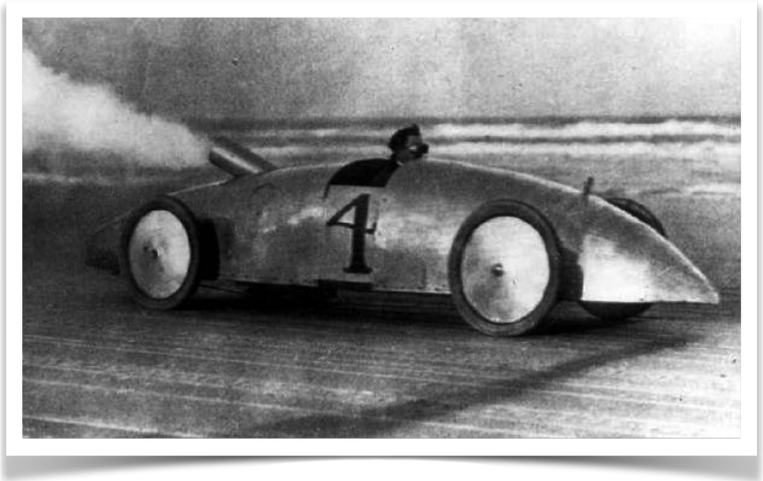
Wien, 1822



Wienflussregulierung, 1898

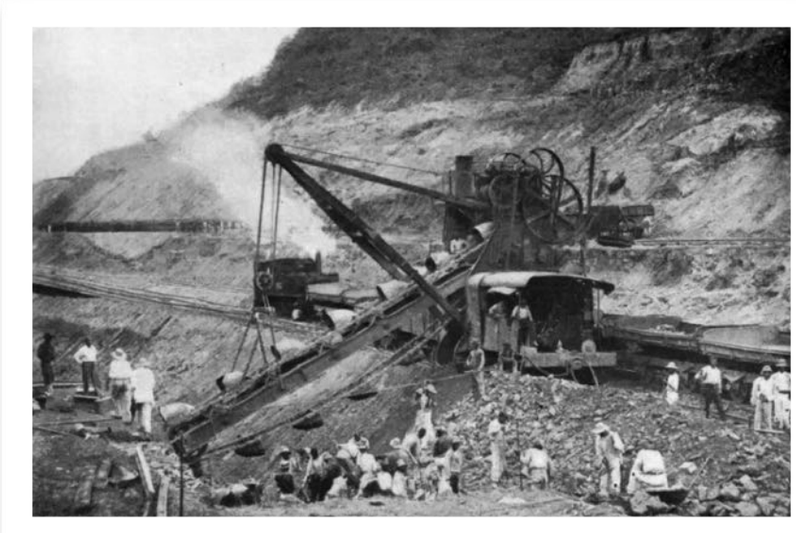
Turn of the Century

Brothers Wright (1903)



Stanley Steamer (1903)

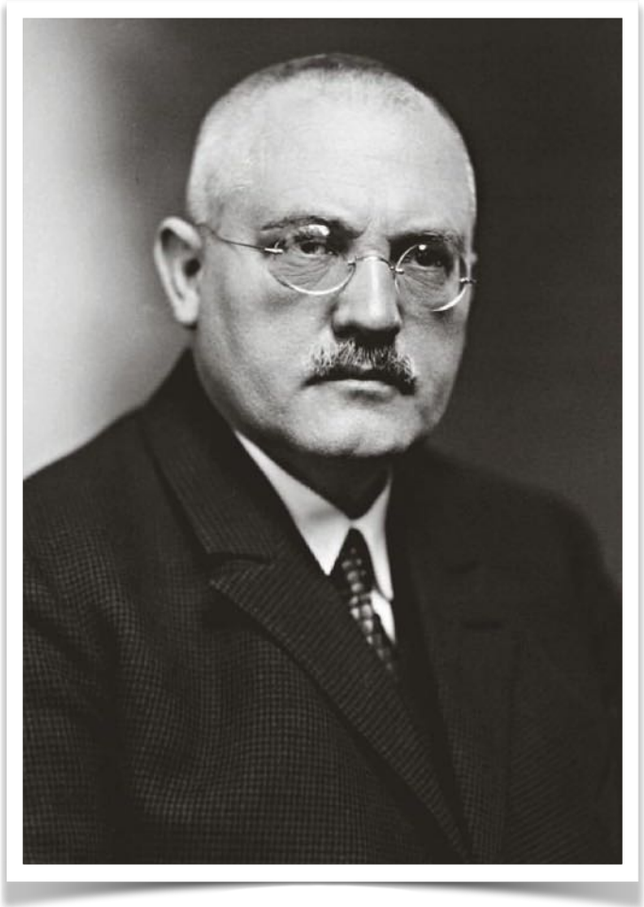
Steam Turbine (1910)



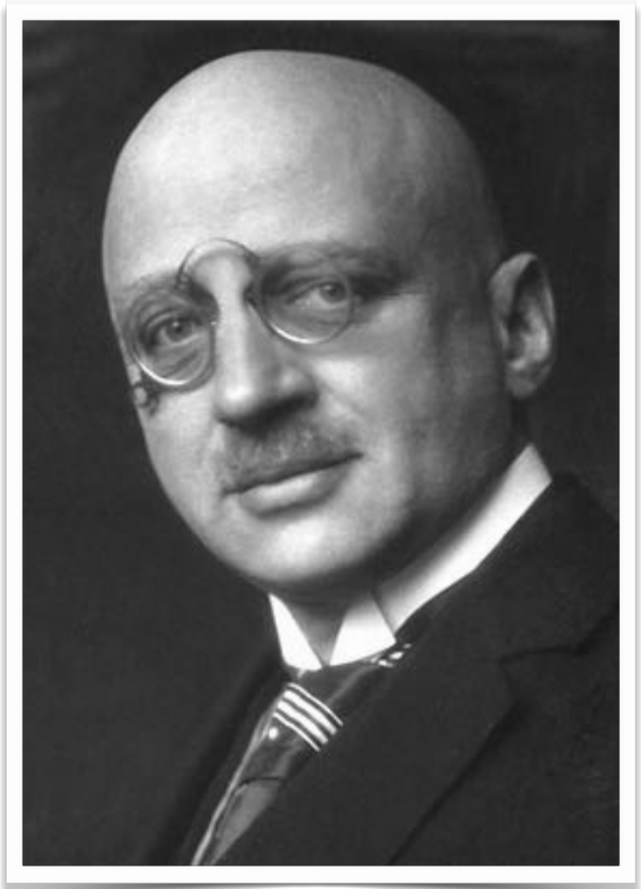
Panama Canal(1904)

Haber-Bosch & Green Revolution

13



Carl Bosch

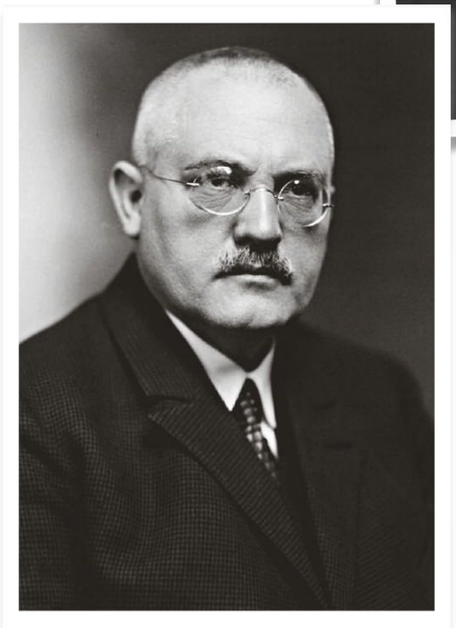


Fritz Haber

https://commons.wikimedia.org/wiki/File:1908_Carl_Bosch_(1874-1940).jpg

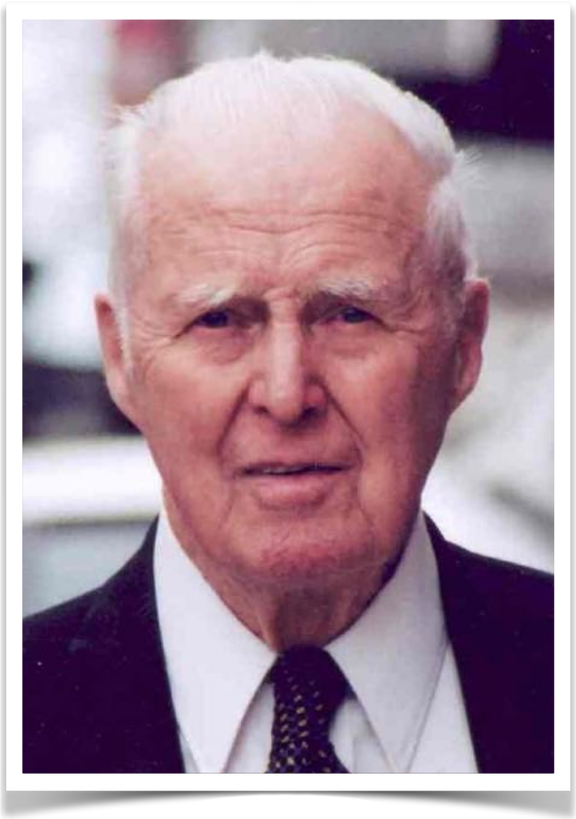
Haber-Bosch & Green Revolution

13



https://commons.wikimedia.org/wiki/File:1908_Carl_Bosch_(1874-1940).jpg

Norman Borlaug saves
one Billion People from starvation



65

Water & Water Toilets

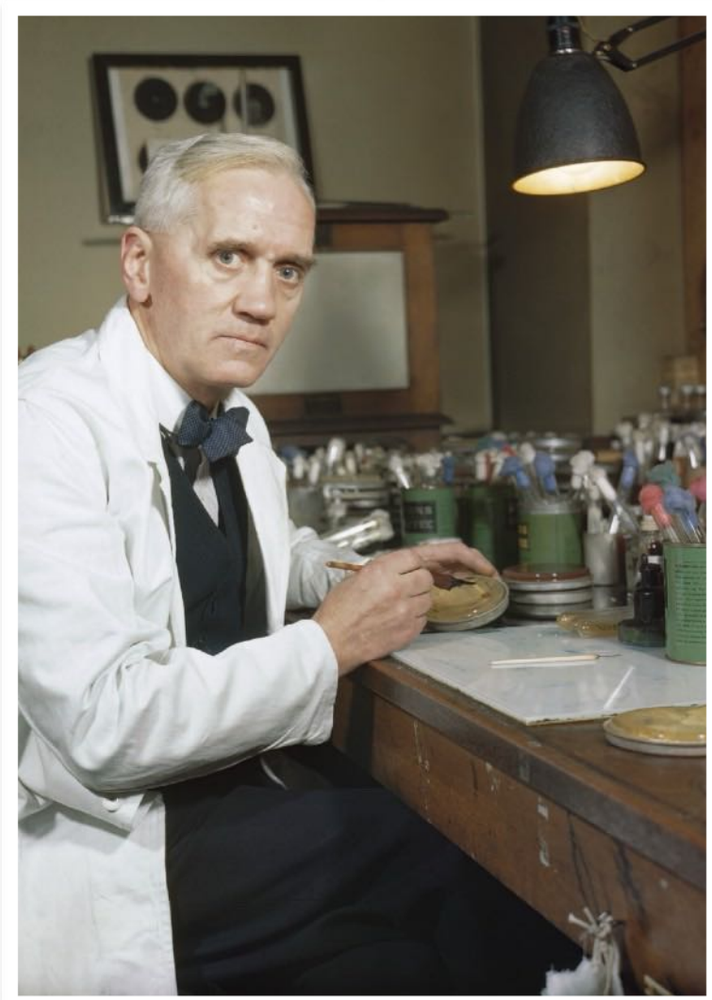
Hot Shower?

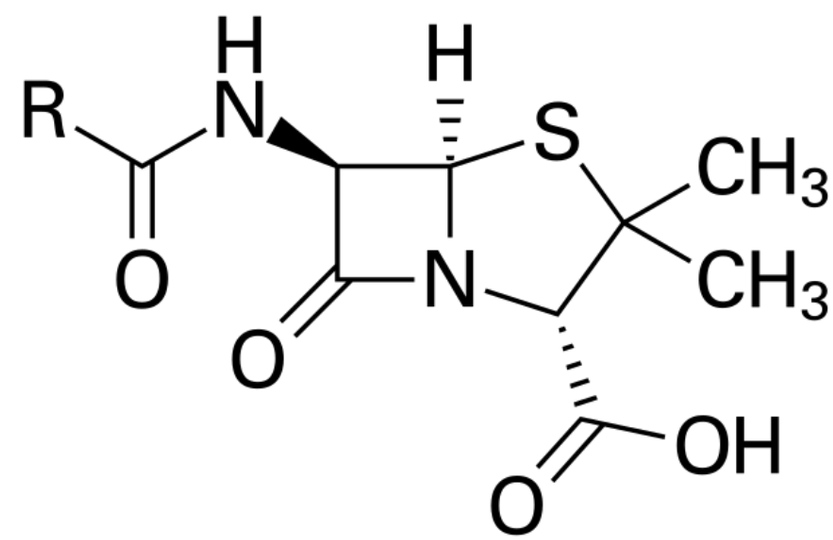
First World War

1924 Calvin Coolidge Jr.

Son of US president dies age 16
due to infection after tennis game

1928/1930s Alexander Fleming





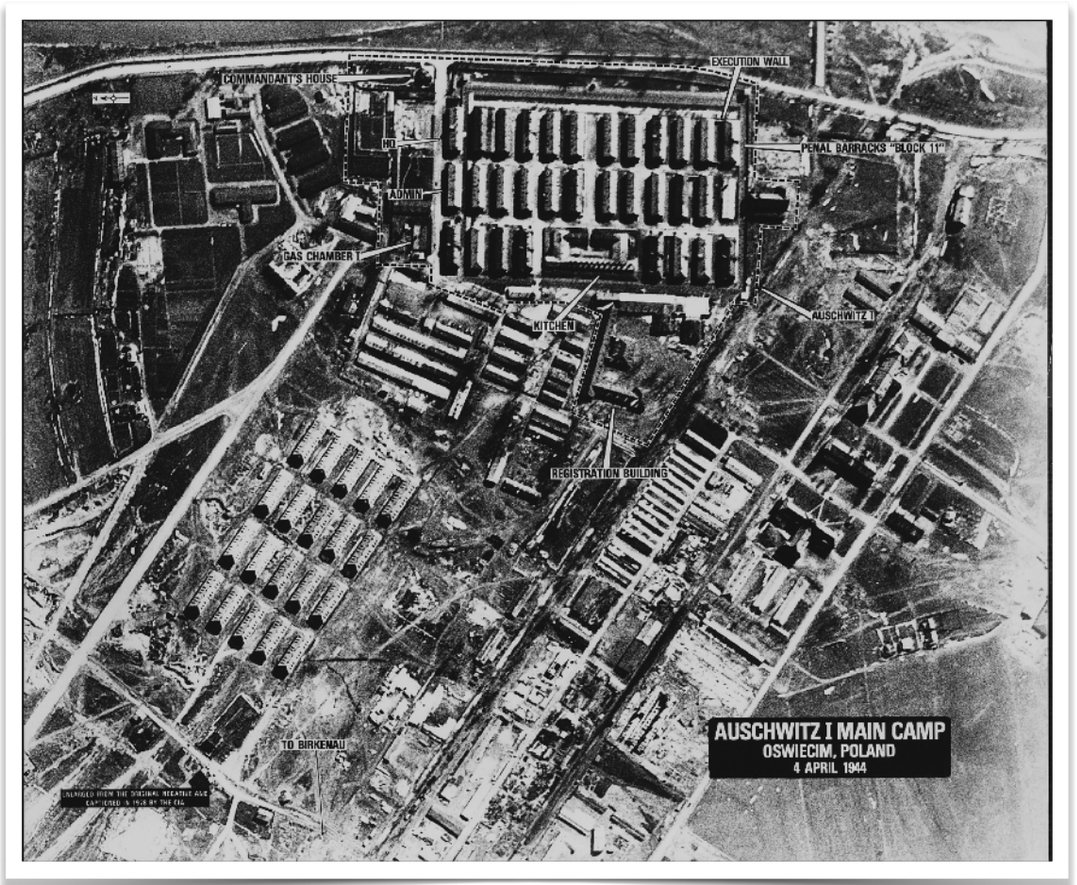
Empire State Building & Hoover Dam

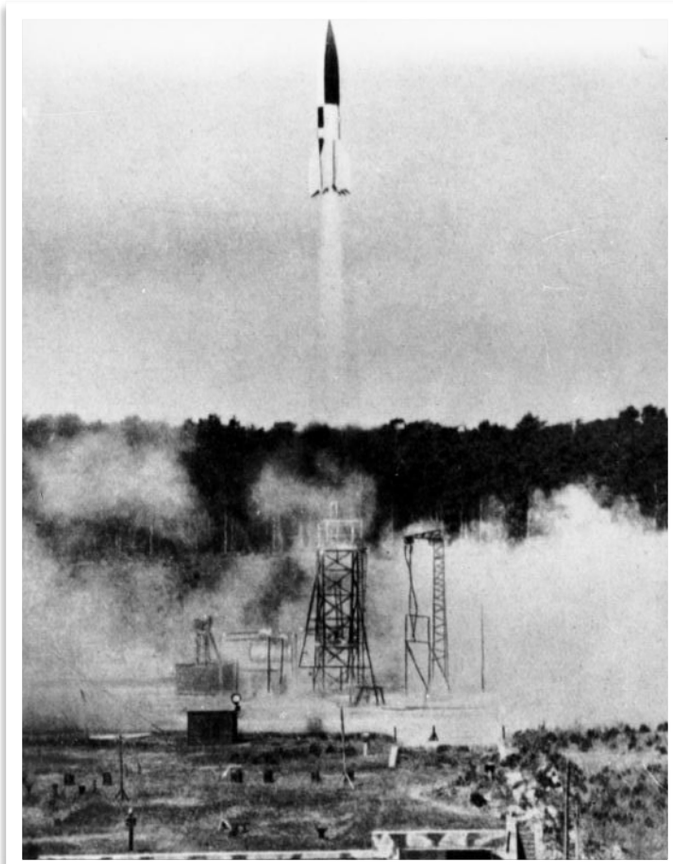
35

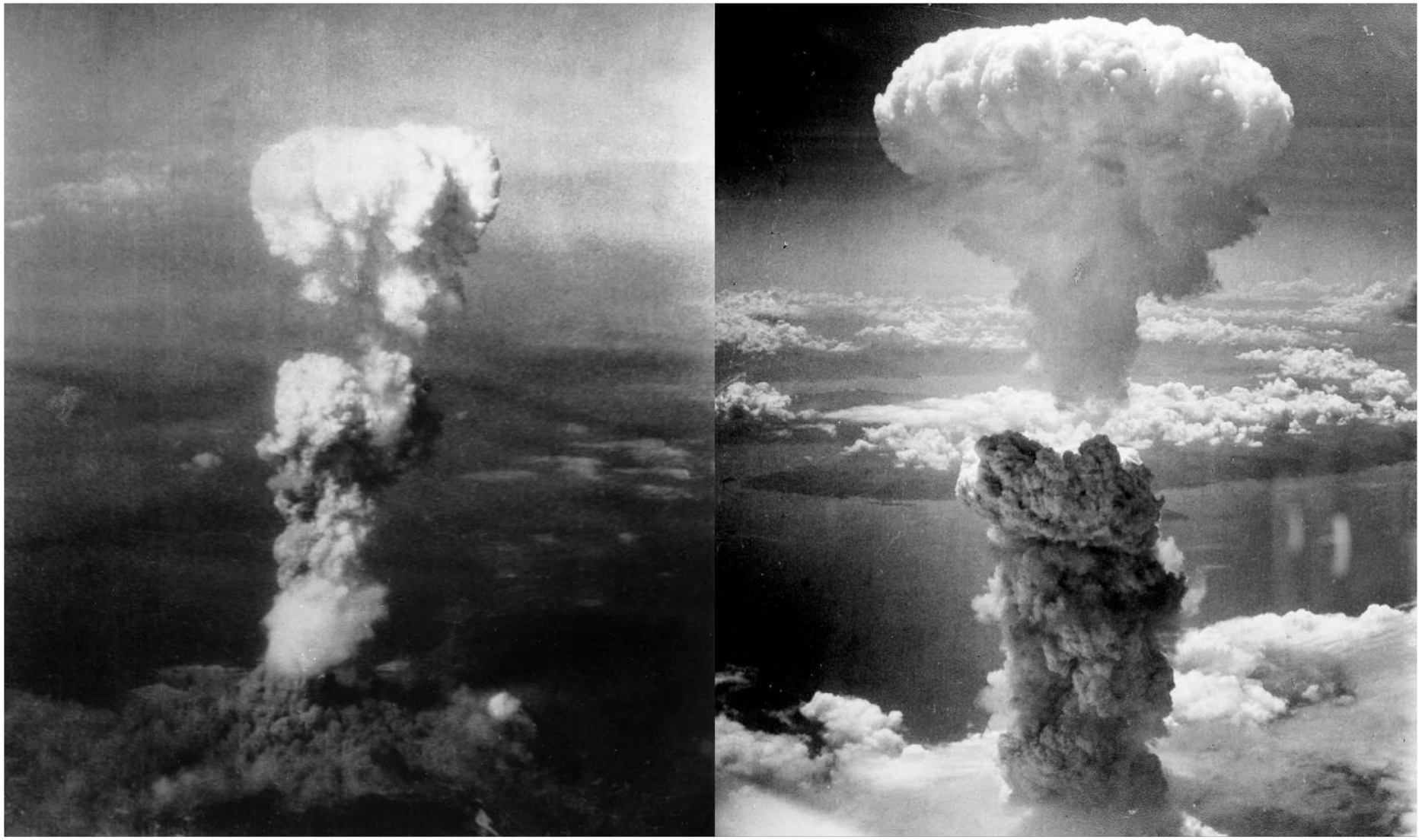
Empire State Building 1930

Hoover Dam 1936

Second World War



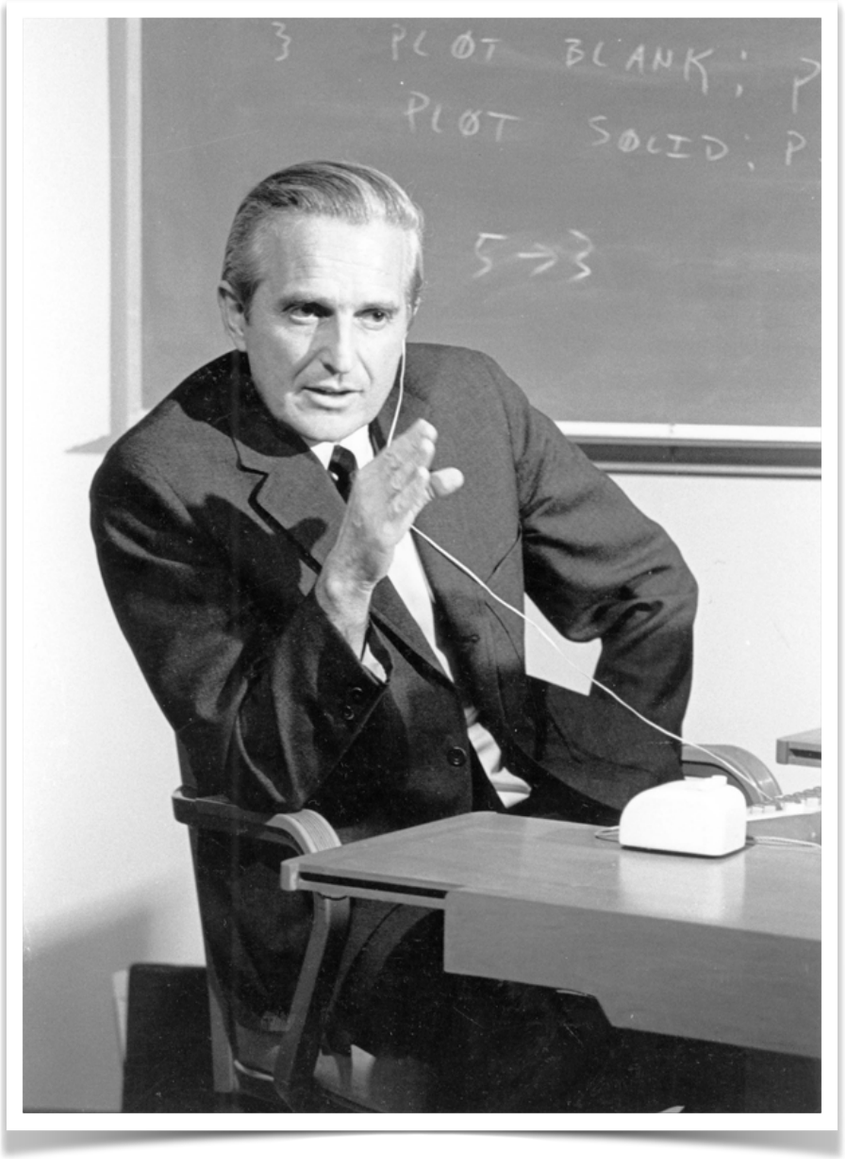




Household Refrigerators

“Mother of all Demos” Douglas Engelbart 1968

- windows & graphics
- hypertext
- command input
- video conferencing
- computer mouse
- word processing
- revision control
- a collaborative real-time editor

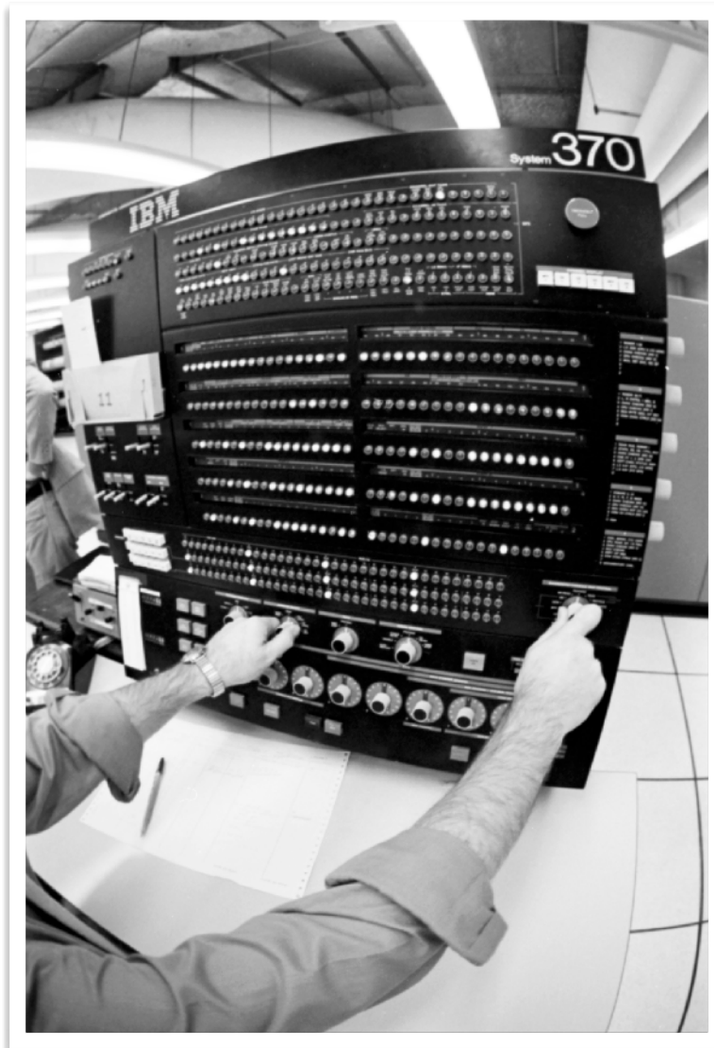


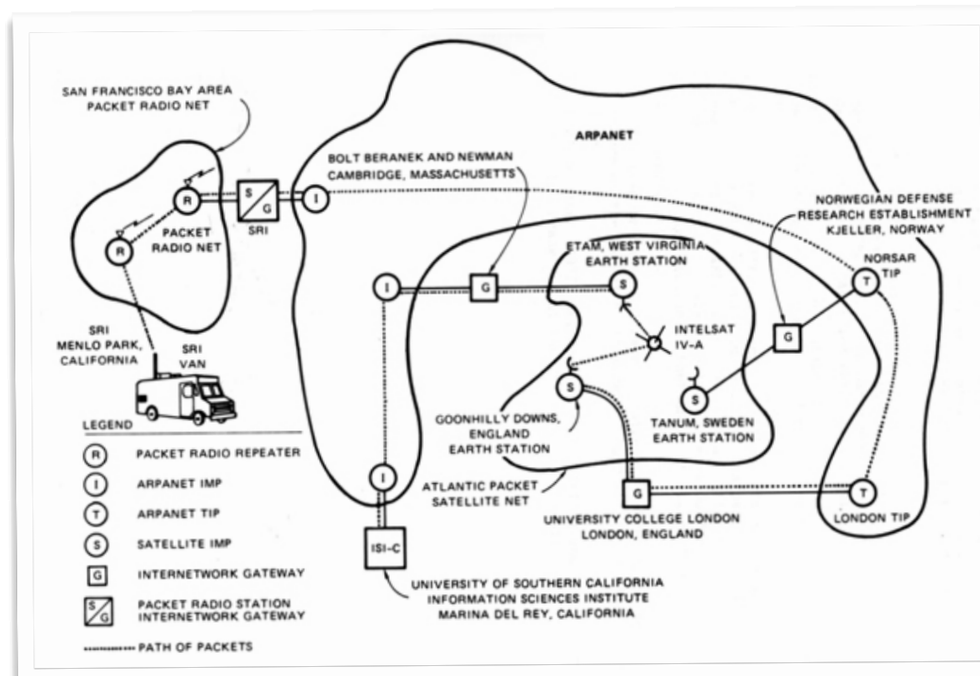
https://en.wikipedia.org/wiki/The_Mother_of_All_Demos#/media/File:SRI_Douglas_Engelbart_1968.jpg

Apollo Mission 1969

Apollo Mission 1969

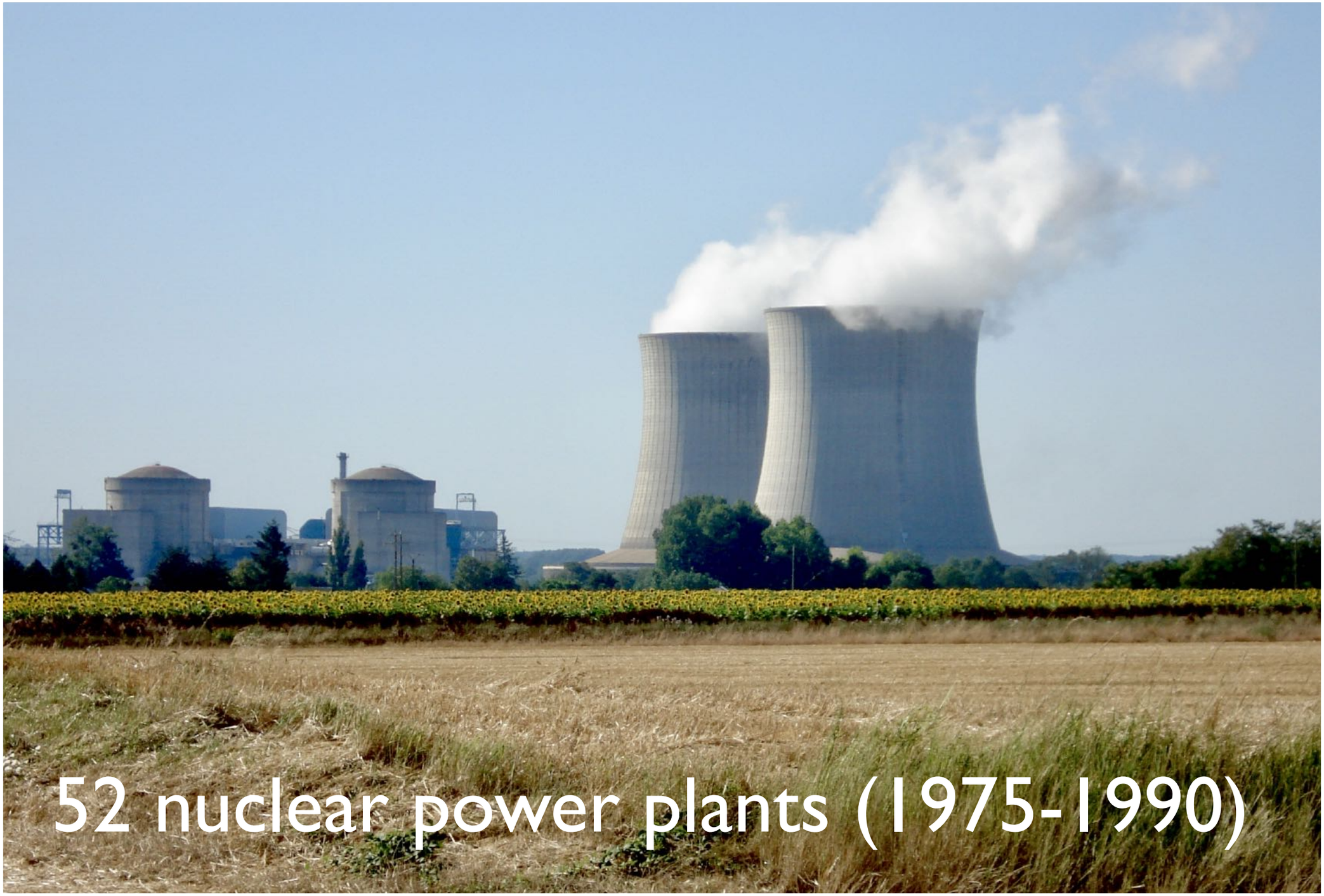
Mainframe Computer & Internet



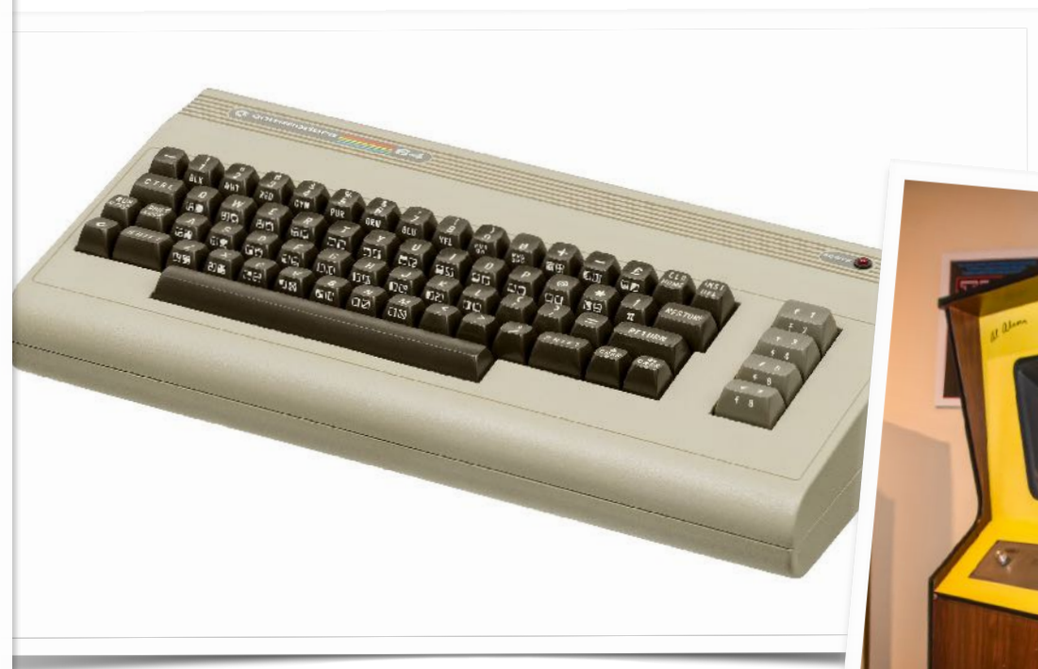


https://en.wikipedia.org/wiki/IBM_System/370#/media/File:Ordinateurs_centraux_348-3-001.jpg

Messmer Plan France



Home Computer and Video Games



https://de.wikipedia.org/wiki/Arcade-Spiel#/media/Datei:Donkey_Kong_arcade.jpg

https://en.wikipedia.org/wiki/File:Signed_Pong_Cabinet.jpg

- Darwins Life and especially the life of average people **barely changed** while science exploded and industry formed
- During Hörbigers lifetime **everything changed:** science and technology exploded and **scaled**
- **Nearly everything that makes modern life is introduced in this lifetime**

The Last 50 Years?

Episode 15
Episode 16
Episode 18

Me, as a 12-year-old
sent to 2023?

Lustiges Taschenbuch #40
1976

Ergebnisse der RAND-Studie von Helmer (1965)

- 1975 provisorische Mondbasis,
- 1980 Wettersteuerung auf der Erde,
- 1985 Rohstoffgewinnung auf dem Mond,
- 1990 Forschungsstationen auf erdnahen Planeten,
- 1995 weltweiter Flugverkehr auf ballistischen Bahnen,
- 2000 Autobahnen für automatisches Fahren,
- 2005 ständige Marsbasis,
- 2010 Symbiose Mensch–Maschine,
- 2015 Medikamente zur Intelligenzsteigerung,
- 2020 Umfliegen des Pluto,
- 2025 intergalaktische Nachrichtenverbindung,
- 2025 lang anhaltendes Koma, das lang dauernde Weltraumreisen erlaubt.

0 : 12

Quelle: Pillkahn, 2010

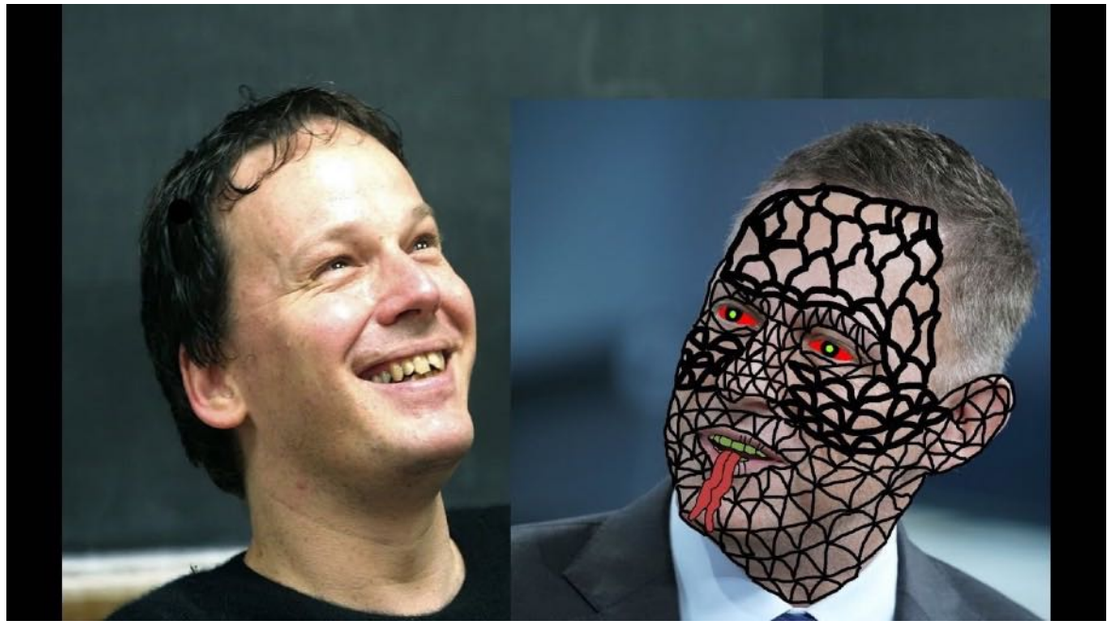
Getting Nothing Done?

Stagnation or Unimaginable Progess?

Episode 64
Episode 65

Stagnation since the 1970s?

- Robert Gordon: *Productivity high until 1970s then significantly down*
- Tyler Cowen: *The great stagnation*
- Peter Thiel: "stagnation started in the late 1970s, with exception of digital technologies"
- David Graeber: "scientists […] convince potential donors they already know what they are going to discover."

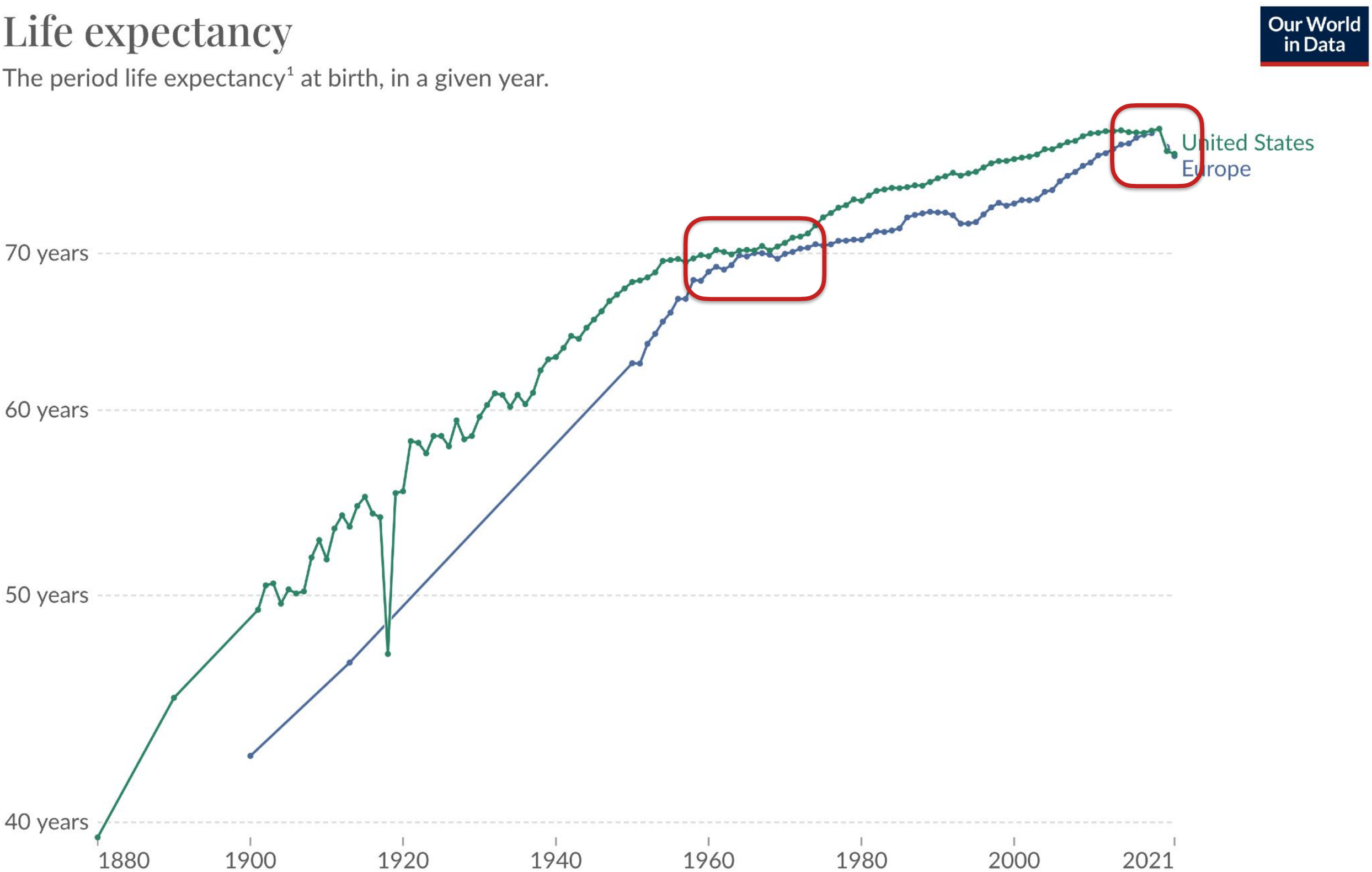


Hochquellwasserleitung: 100km, inkl. Vienna (1873)	4 y
Crystal Palace, 560mx120m (1851)	8 m
Empire State Building (1931)	18 m
Hoover Dam (1936)	5y
Golden Gate Bridge (1937)	4y
Manhatten Project (1945)	3y
Messmer Plan: 52 nuclear power plants	15y

Semmering Basistunnel 27km	18y (?)
Elbharmonie	9y (77Mio→ 800Mio)
California High Speed Rail LA → SF	stopped? (33 → 100 Bio)
Honolulu rail transit 32km	20y(?) 125 Mio → 4 Bio
Airport Berlin	14y
New York East Side Extension 10km	17y (2.2→ 11Bio)
Olkiluoto Block 3	18y

Life expectancy

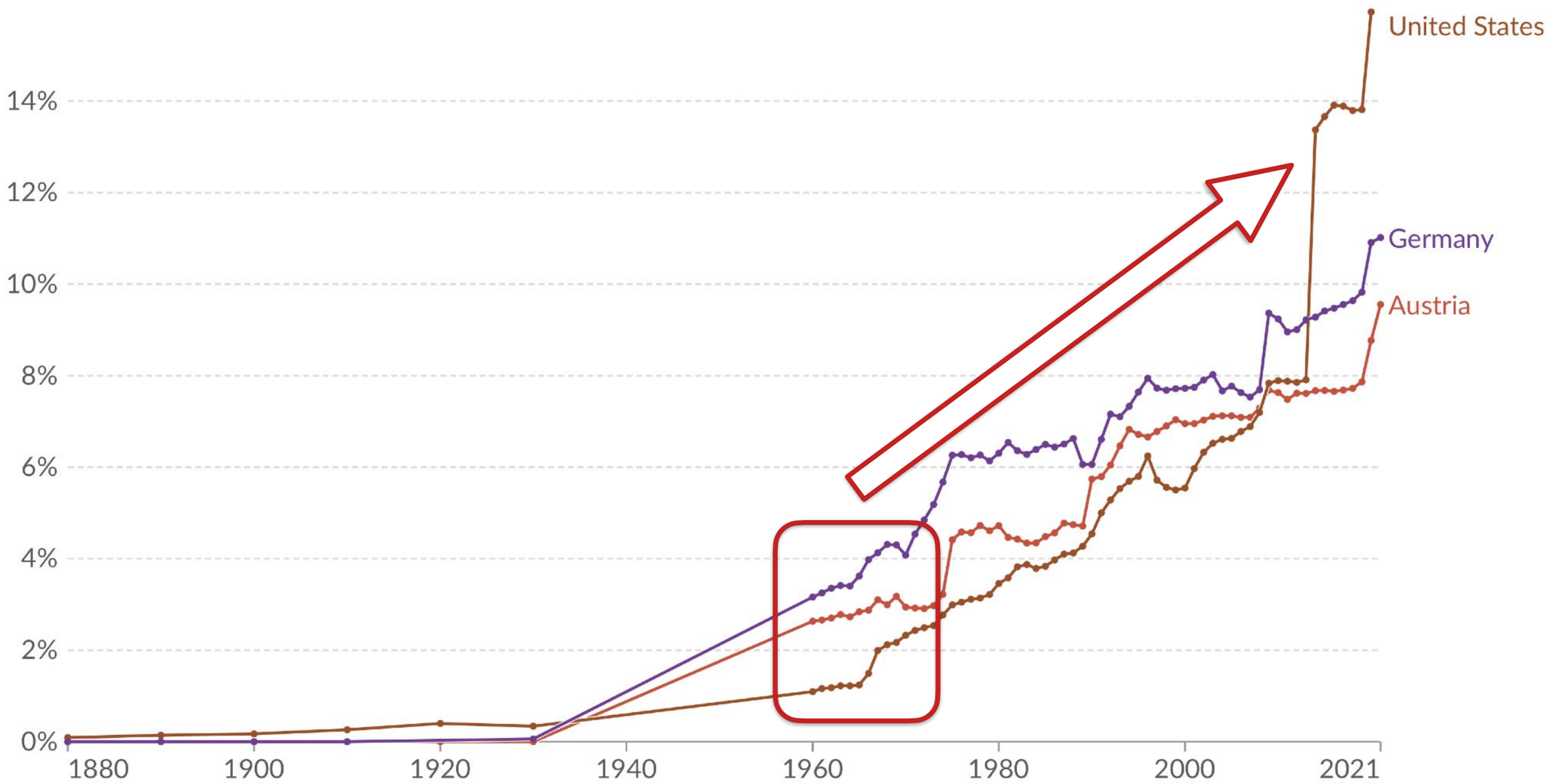
The period life expectancy[1] at birth, in a given year.



Government health expenditure as a share of GDP, 1880 to 2021

Our World in Data

This metric captures spending on government funded health care systems and social health insurance, as well as compulsory health insurance.



But certainly, Software is Easy?

"McKinsey researchers had started investigating major information technology projects—the biggest of which cost more than $10 billion—and their preliminary numbers were so dismal that they said it would take a

big improvement for IT projects to rise to the level of awfulness of transportation projects."

Episode 19
Episode 20
Episode 31
Episode 40

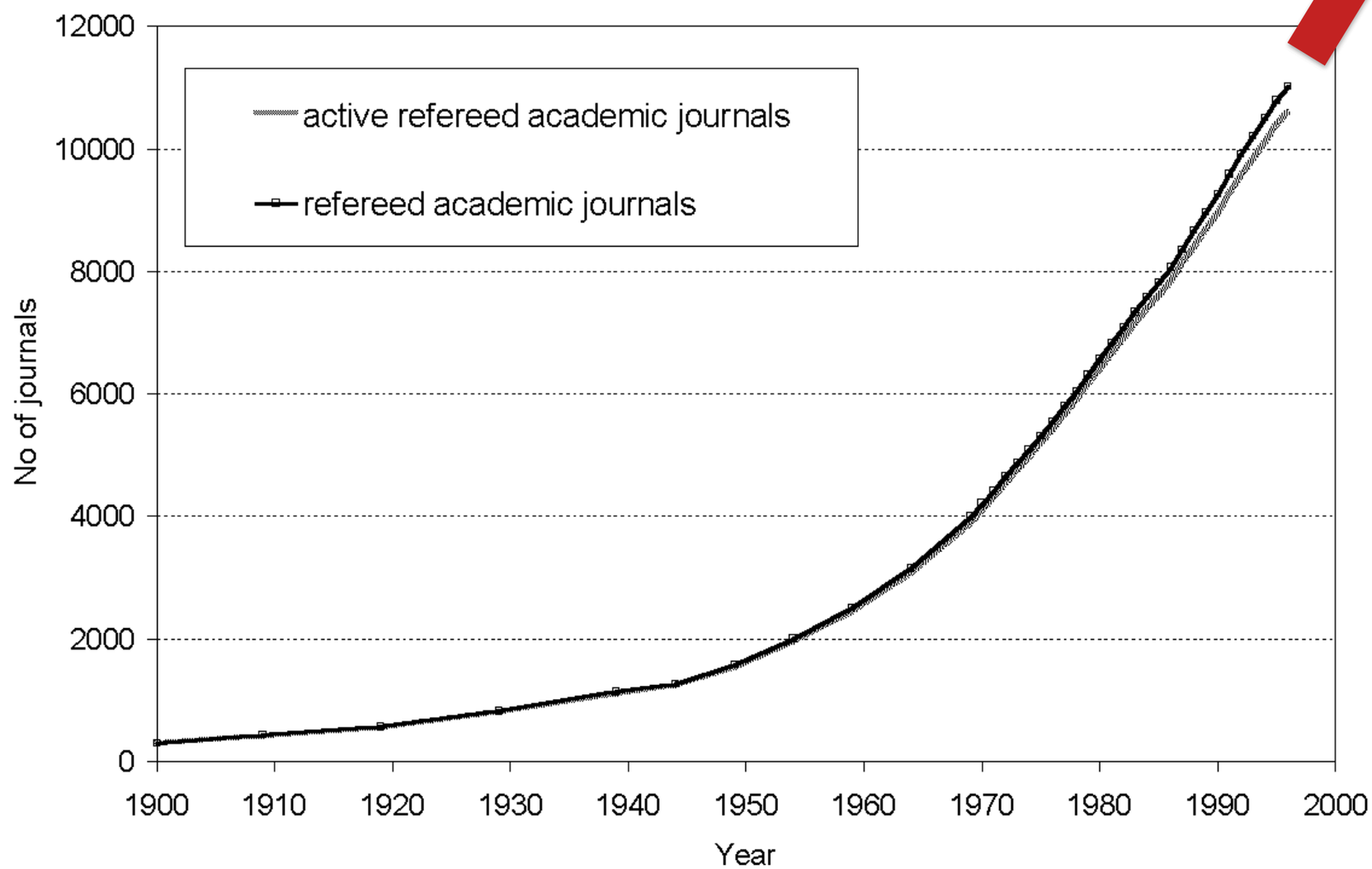
Strategic Misrepresentation

"In the world of civic projects, the first budget is really just a down payment. If people knew the real cost from the start, nothing would ever be approved."

Bent Flyvbjerg

AI / LLM?

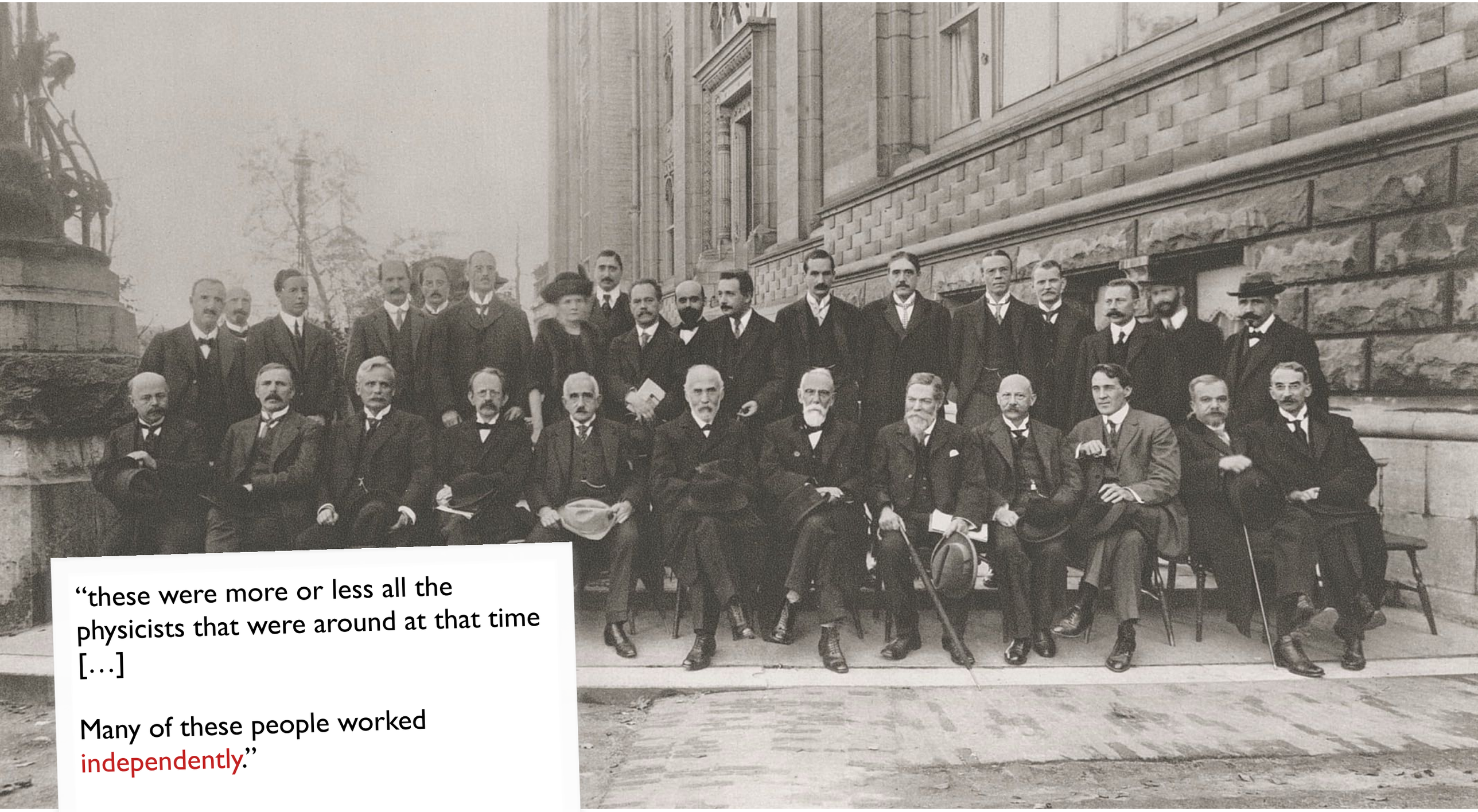
Ludwig Fahrbach — Growth of Science (2009)



»80 to 90 percent of all the scientists that have ever lived are alive now.«

Episode 28
Episode 67

Are Ideas Getting Harder to Find?



"these were more or less all the physicists that were around at that time […]

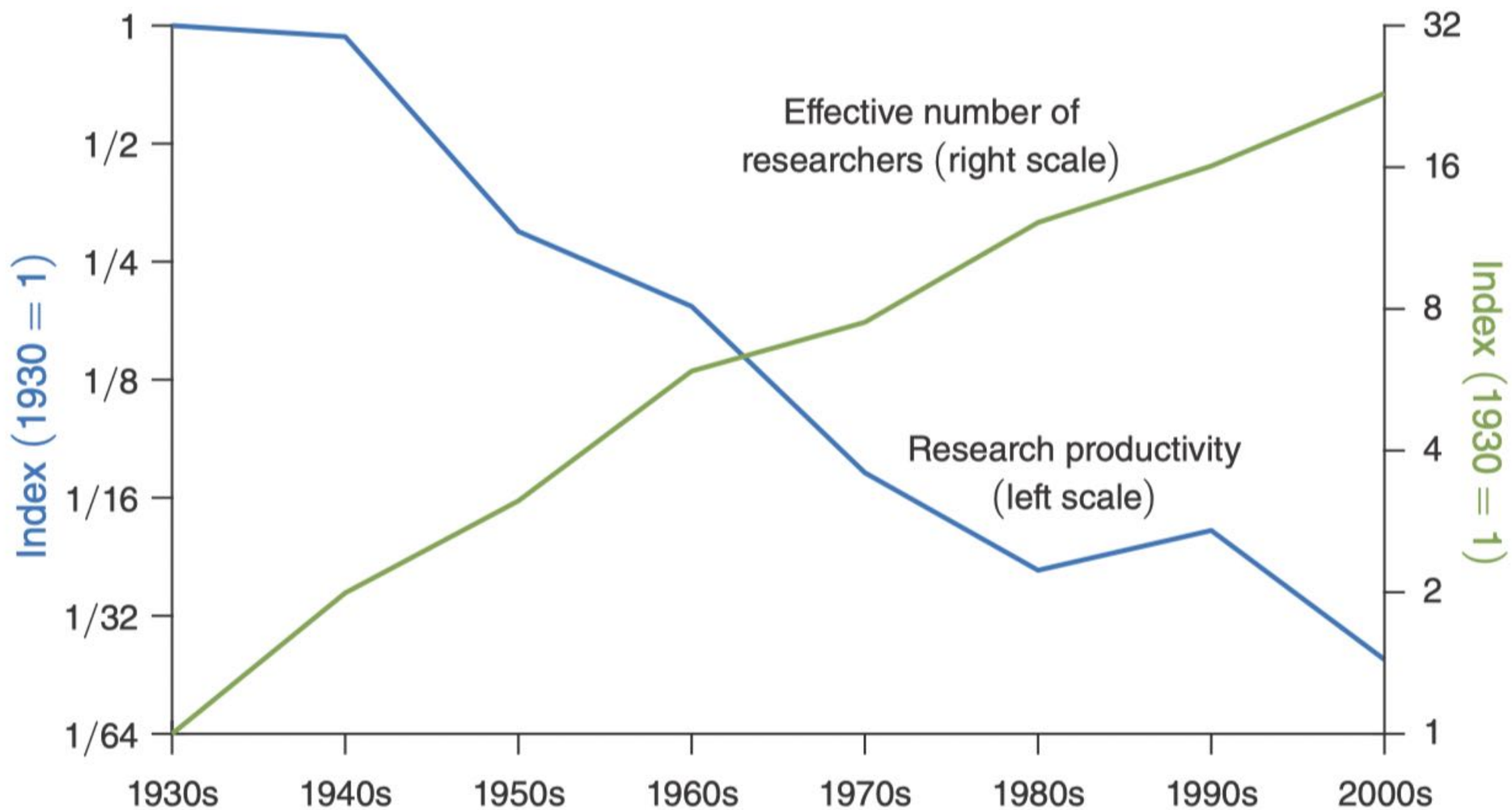
Many of these people worked independently."

David Deutsch

Solvay Conf. 1913

Are Ideas Getting Harder to Find?

Episode 72
Episode 91



"it takes around 13 years for research productivity to fall by half.
Or put another way, the economy has to double its research efforts every 13 years just to maintain the same overall rate of economic growth."

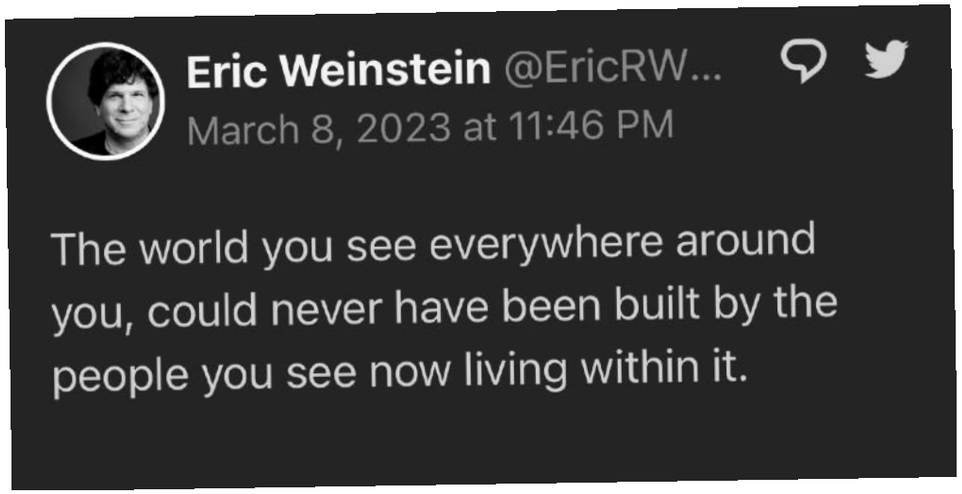
Nicholas Bloom, Are Ideas Getting Harder to Find?

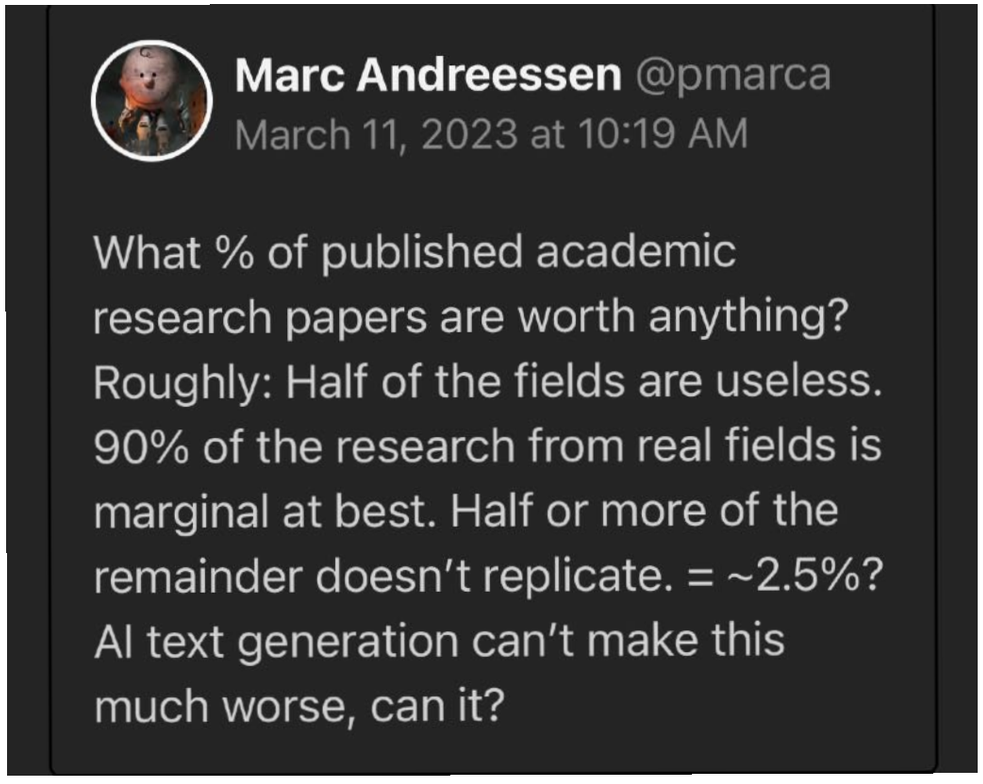
"Progress has definitely slowed down, not just in fundamental physics.

David Deutsch (2023)

"my generation has been stunningly unsuccessful [...] for more than thirty years now we have not been able to improve the foundations of physics.",

Sabine Hossenfelder, Lost in Math (2020)





"I contrast the now common belief in an ever-faster pace of innovation with the many unmistakable signs of technical stagnation and slowing advances: there are limits to everything, and invention and innovation cannot be exceptions."

Vaclav Smil, Invention and Innovation (2023)

Digitisation Disappointment

- Digitisation as productivity improvement, enablement
- Digitisation as distraction, complexity and box ticking amplification

"If we turn away from technology for a moment, and look instead at culture, we absolutely do *not* find rapid change. We see the exact opposite.", Ted Gioia

Episode 24
Episode 30
Episode 61

What’s Next?

Will stagnation continue?

What could we discuss?

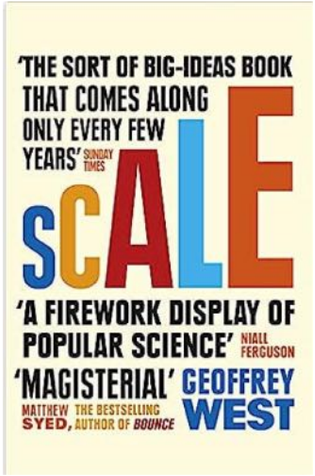
How can we improve?

Steampunk Future

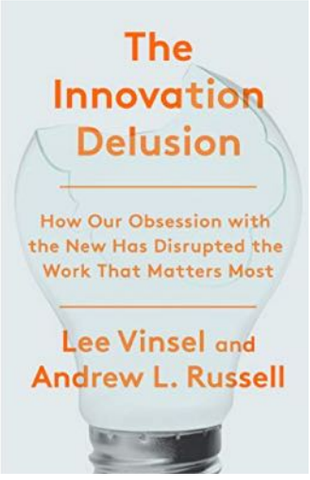
- Things move much slower than expected by most (in the real, material world)
  - Large consequences for those who believe we will innovate ourselves out of problems (e.g. energy, 4 pillars)
- **Steampunk Future?**
  - Struggling with tech we knew how to do 100 years ago
  - But in some fields extreme progress (AI, biotech?)
  - Very uneven globally

Episode 10
Episode 27
Episode 37

Complexity, Scaling & Wicked Problems

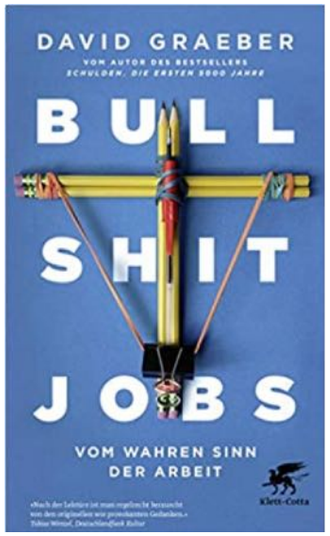


- Two sides of **scaling and interconnection**
- → **Complexity &** Wicked Problems
- Innovation → **Infrastructure** → Maintenance → …
- **Systemic archetypes**

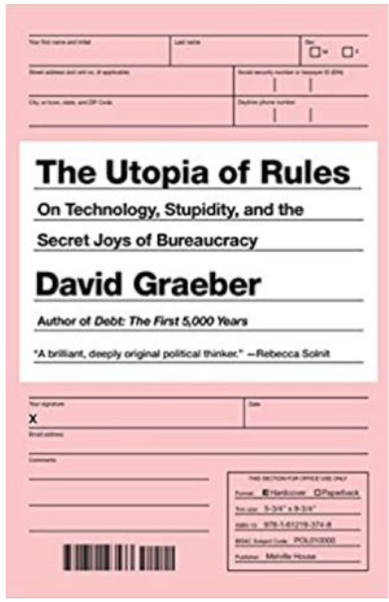


Episode 10
Episode 27
Episode 37

Regulation, Bureaucracy

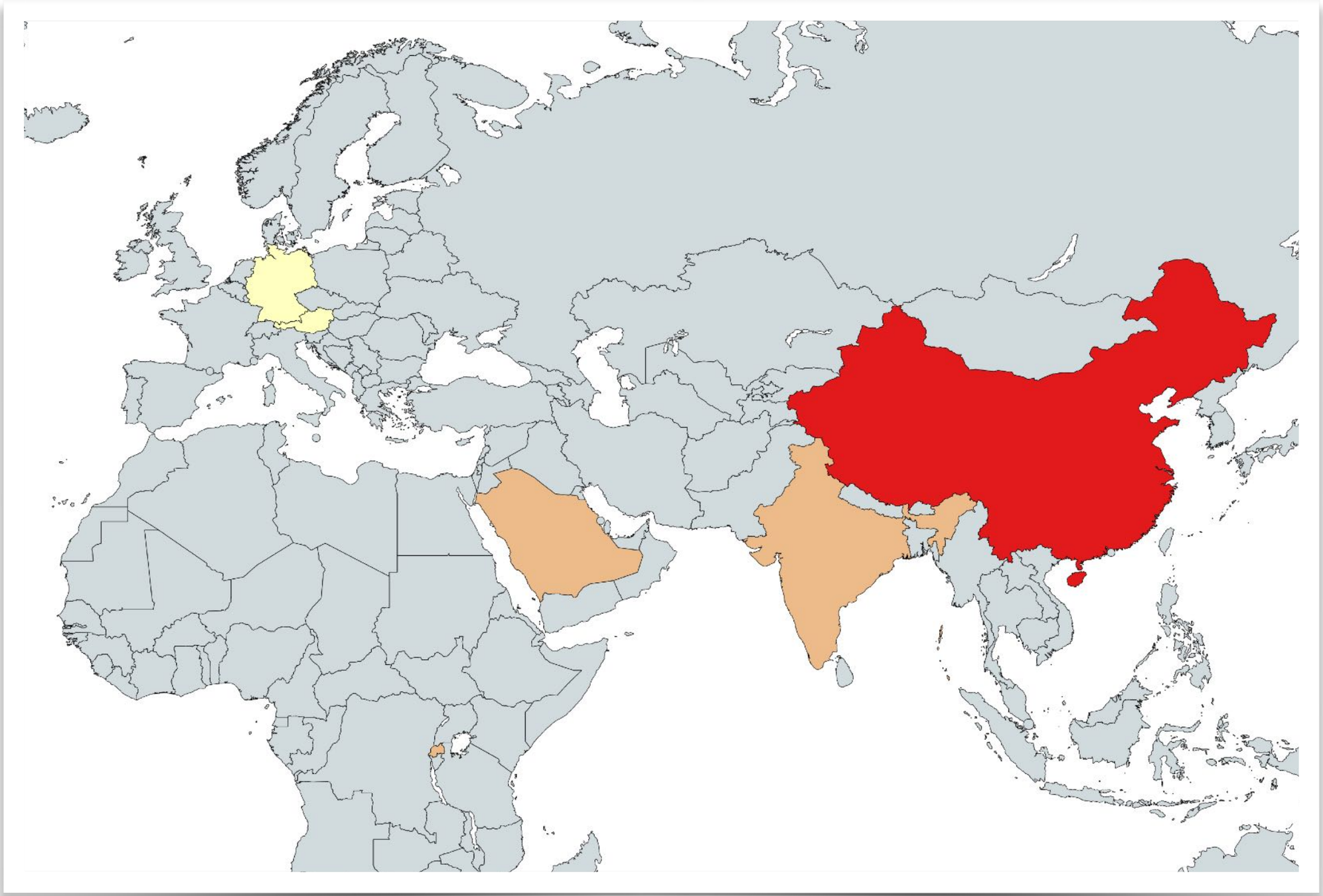


- "Regulation is the disease of which it pretends to be the cure.", Niall Ferguson
- Stuck in red tape
  → Box ticking (David Graeber)
- Computer as bureaucracy amplifier
- *festina lente*



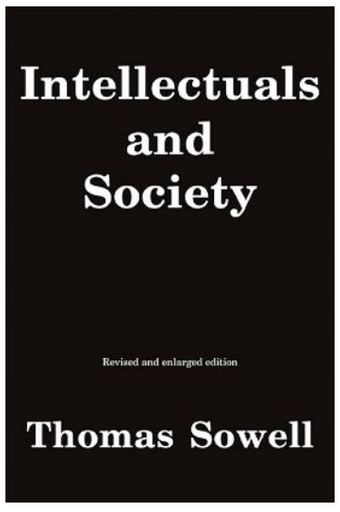
Episode 58
Episode 72

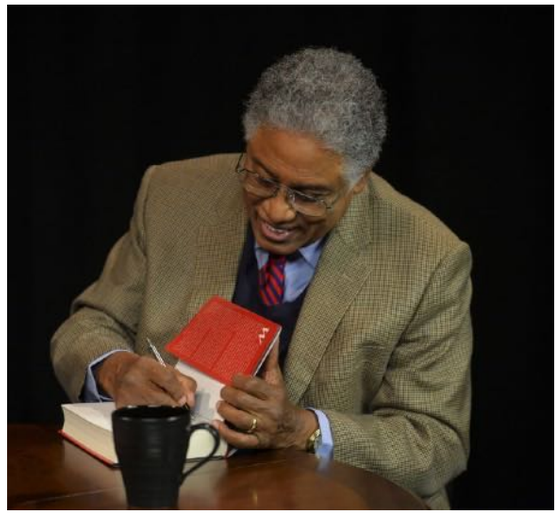
Who is in the Driving Seat in the New Cold War?



Expertise

Knowledge





"Why the transfer of decisions from those with personal experience and a stake in the outcome to those with neither can be expected to lead to better decisions is a question seldom asked, much less answered.", Thomas Sowell

Photo: http://www.tsowell.com/

Episode 80
Episode 92

Conclusion

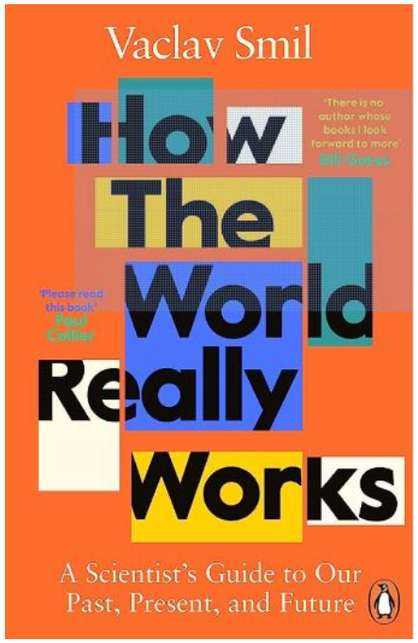
1. Science is in Significant Troubles

2. Innovation is not Progress

3. Knowledge is not Expertise

4. Hardly anything follows Moore's Law

5. Humility and Hard Work, not Hype and Wishful Thinking



Dr. Alexander Schatten

SBA-Research

aschatten@sba-research.org

podcast.zukunft-denken.eu

www.schatten.info

»Mit dem Erfolg wuchsen die Ansprüche–und der Mensch hatte alles Recht dazu, anspruchsvoll zu sein. Was ihm als ein begeisterndes Versprechen gegolten hatte, erschien ihm jetzt als unzureichend, das Tempo des Fortschritts als viel zu langsam, und in den Prinzipien, die diesen Fortschritt in der Vergangenheit ermöglicht hatten, sah man schließlich mehr ein Hindernis für seine Beschleunigung, das auf dem raschesten Wege beseitigt werden müsse, statt einer Vorbedingung für die Erhaltung und Weiterentwicklung des bereits Errungenen.«

Friedrich von Hayek, Der Weg in die Knechtschaft