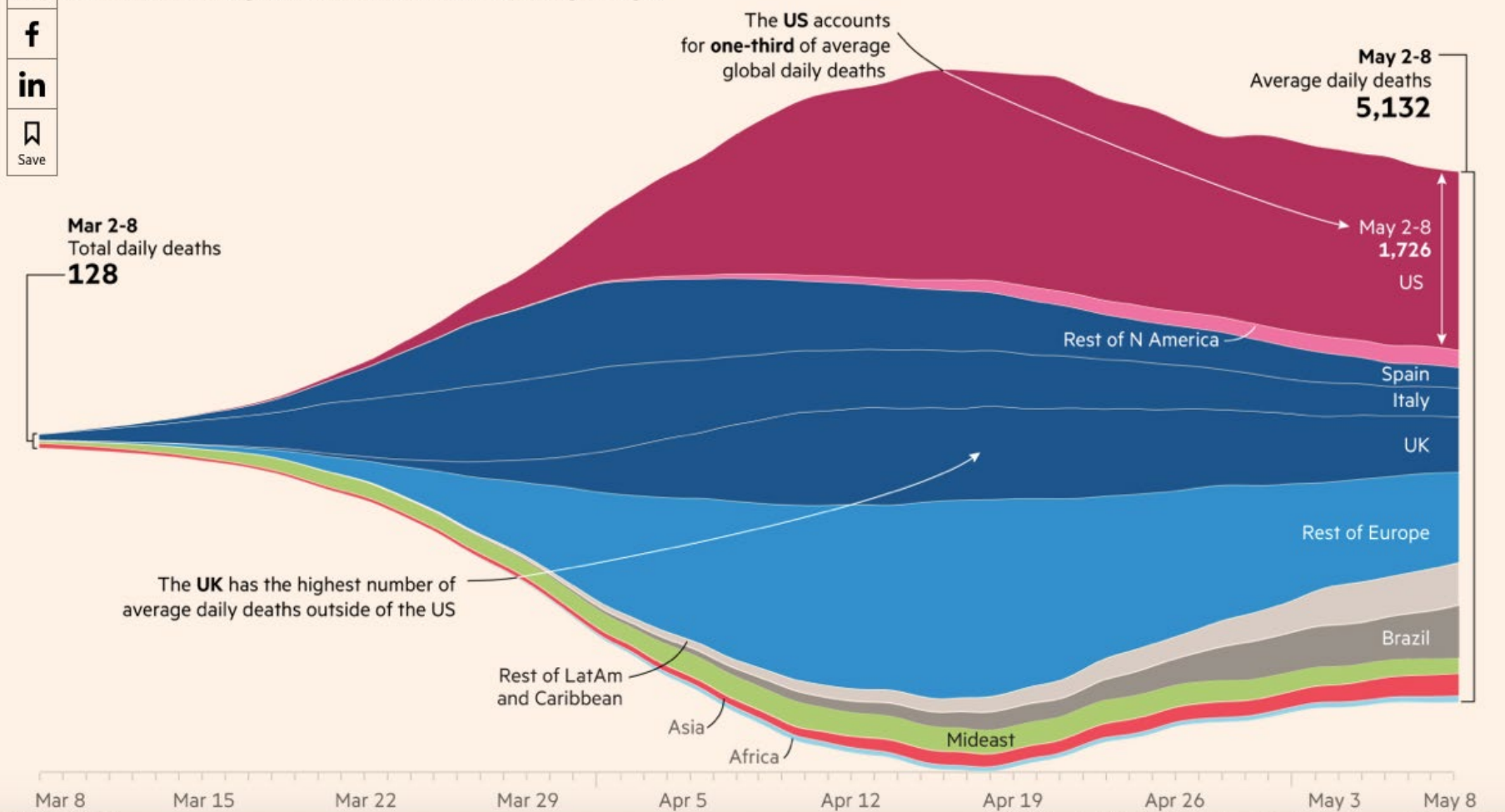


Innovation after the pandemic

The global Covid-19 death toll is finally easing

Daily deaths of patients diagnosed with coronavirus (7-day rolling average)



Issues thrown up by Covid-19

Zoonoses and
wildlife
markets

Globalisation
and trade
with China

Pandemic
preparedness

Health and
medical
innovation

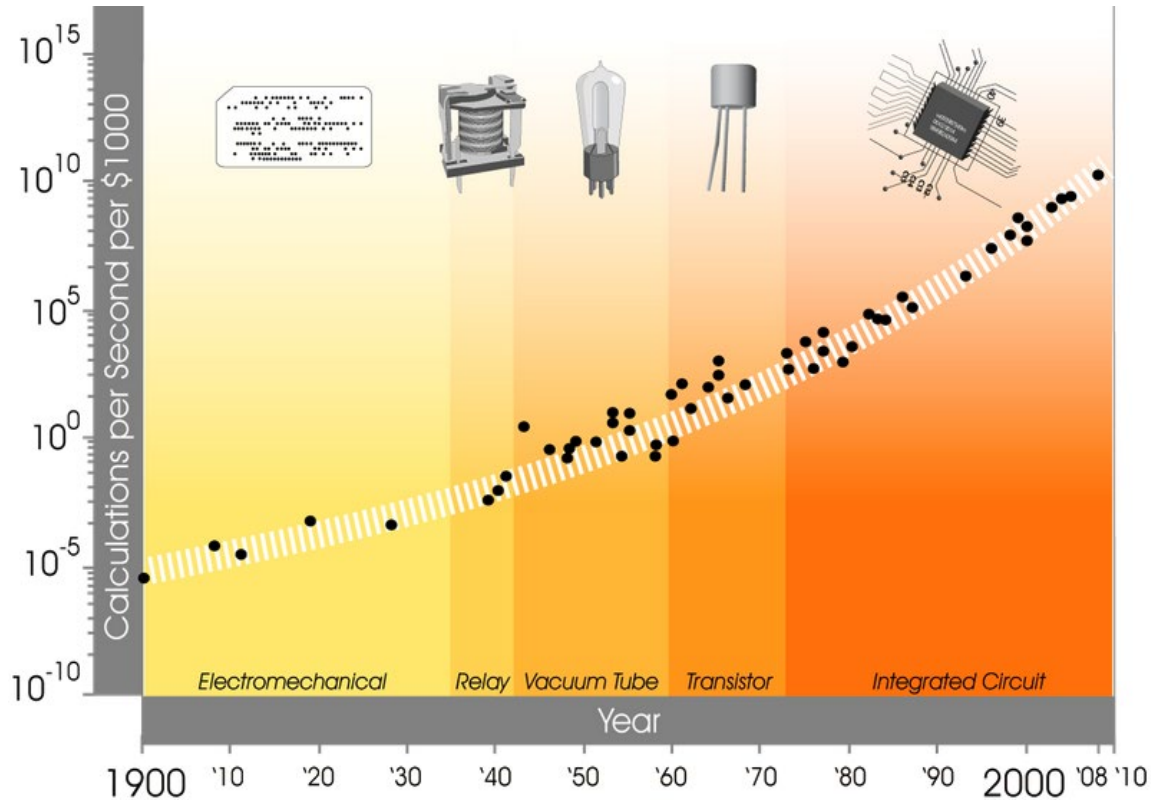
Economic
Recovery

Rational
Optimism

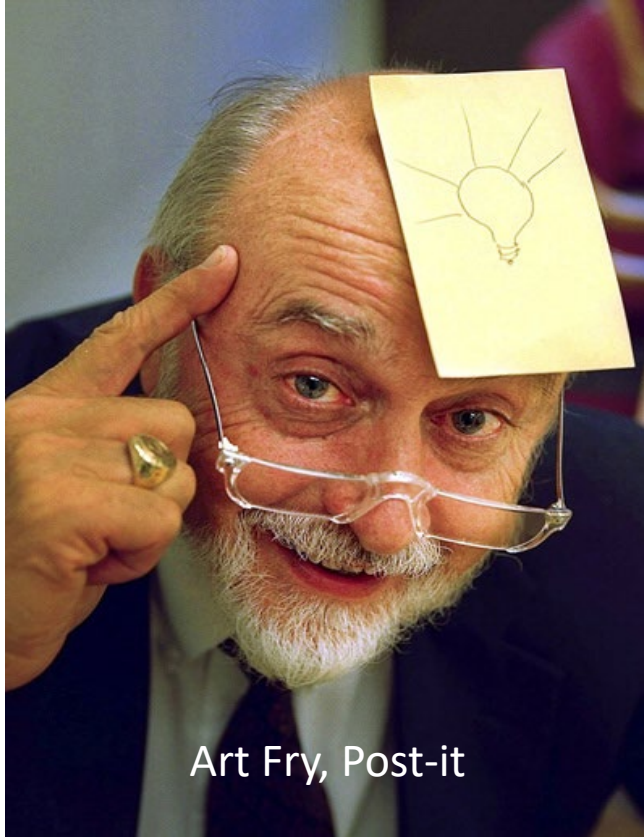
Innovation's essentials

- Gradual
- Serendipitous
- Recombinant
- Different from invention
- Trial and error
- Team sport
- Inexorable
- Hype cycle
- Fragmented governance
- Evolutionary
- Seed of science
- Creates jobs
- More from less
- Flourishes in freedom

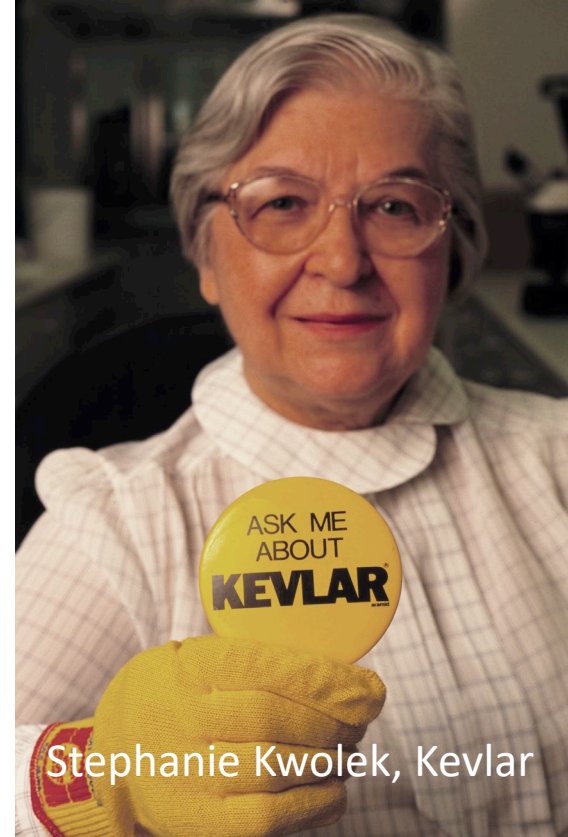
Innovation is gradual



Innovation is serendipitous



Art Fry, Post-it



Stephanie Kwolek, Kevlar

Innovation is recombinant

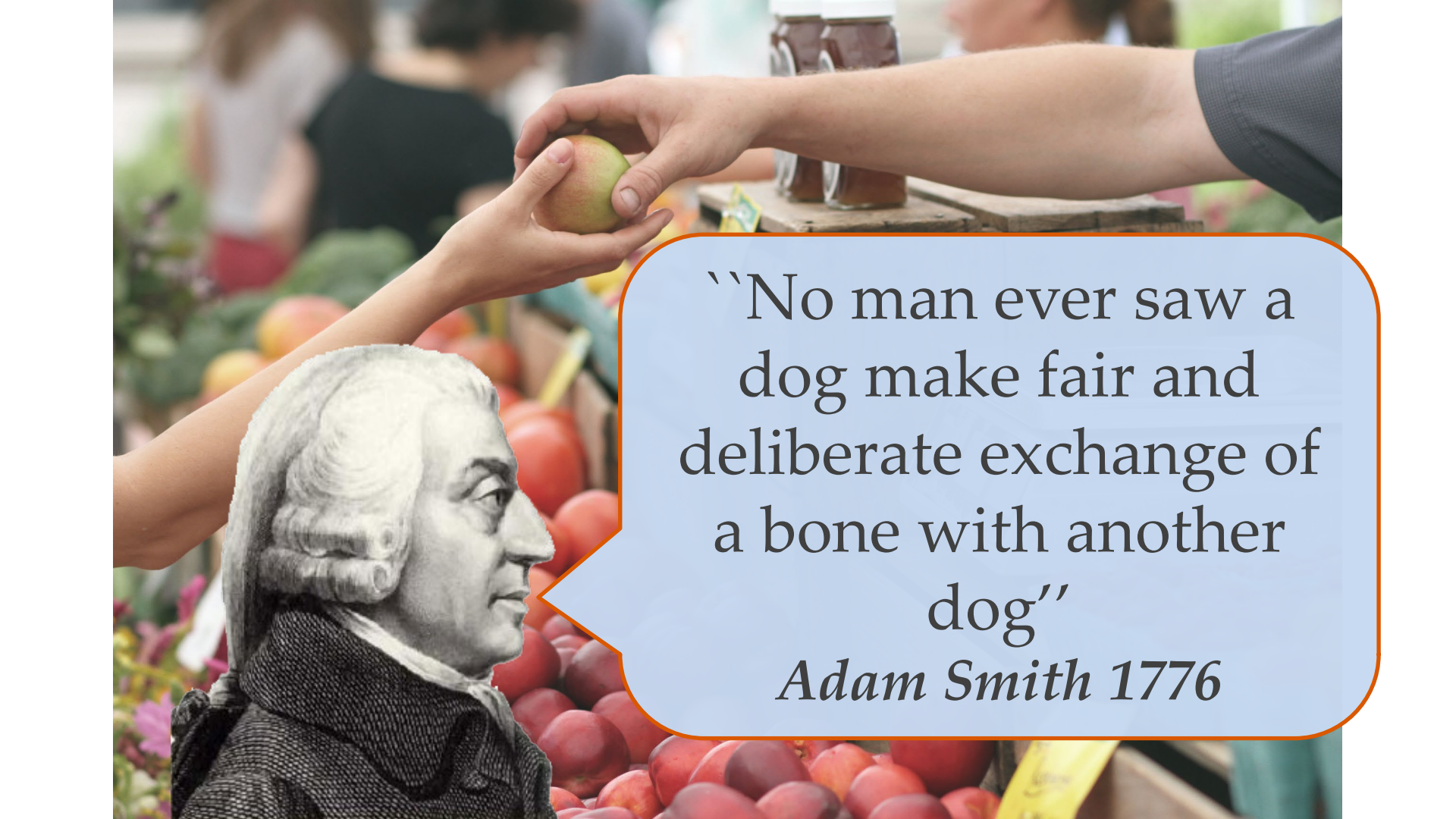




“I, Pencil”

By
Leonard
Reed





“No man ever saw a
dog make fair and
deliberate exchange of
a bone with another
dog”

Adam Smith 1776

Innovation is different from invention



The beaver said to the rabbit, as they looked at the Hoover Dam: “No, I didn’t build it, but it’s based on an idea of mine”



“The capitalist achievement does not typically consist in providing more silk stockings for queens but in bringing them within reach of factory girls.”

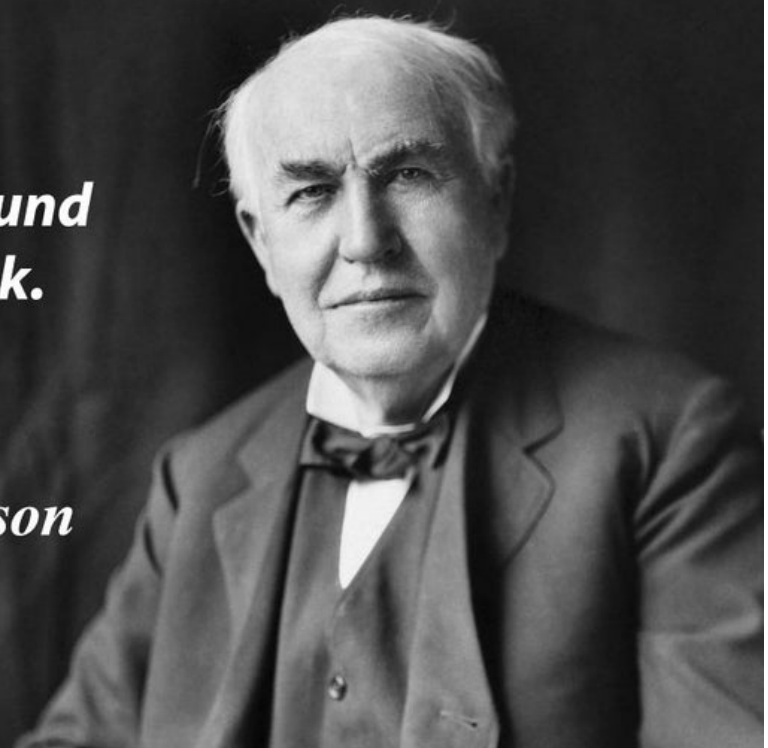
Joseph Schumpeter



Innovation requires trial and error

***I have not failed. I've just found
10,000 ways that won't work.***

~ Thomas Edison



Innovation is a team sport



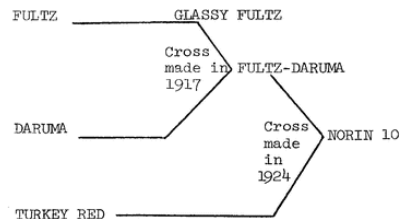
VARIETIES OF CLUB WHEAT

By J. ALLEN CLARK, *senior agronomist*, and B. B. BAYLES, *associate agronomist*,
Division of Cereal Crops and Diseases, Bureau of Plant Industry

CONTENTS	
Description.....	Page
Where grown.....	2
Varieties.....	3
Group 1—Heads beardless; chaff smooth, white or yellow; kernels white.....	4
Group 2—Heads beardless; chaff smooth, white or yellow; kernels red.....	8
Varieties—Continued.....	Page
Group 3—Heads beardless; chaff smooth, brown or red; kernels white.....	8
Group 4—Heads beardless; chaff veiny, white or yellow; kernels red.....	11
Group 5—Heads bearded; chaff smooth, brown or red; kernels red.....	11

DESCRIPTION

THE CLUB WHEATS have short, thick, and very compact heads and small kernels. Because of these distinctive characters, they usually are placed in a different division or so-called sub-



Innovation is inexorable

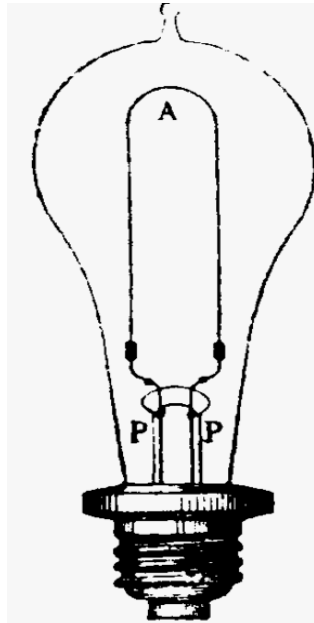
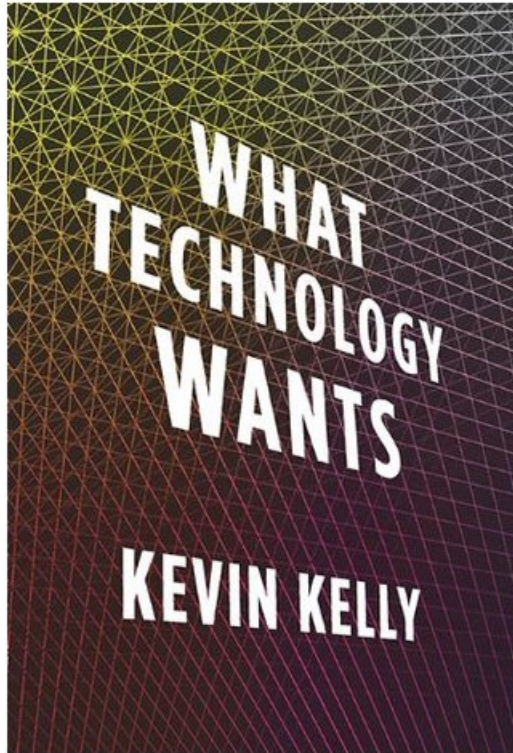


Fig. 9. Lampa
żarowa Edisona.

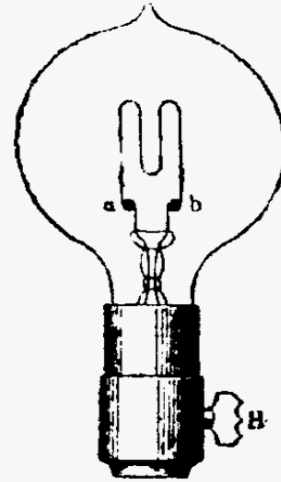


Fig. 10. Lampa
Maxime'a.

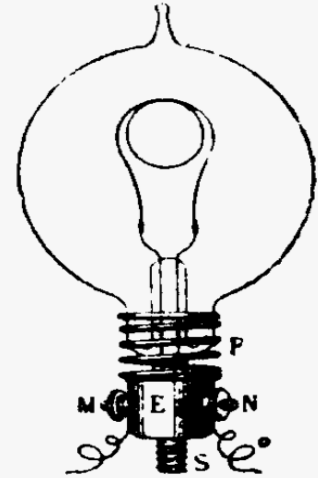


Fig. 11. Lampa
Swana.

Google™
YAHOO!®

Ask
.com

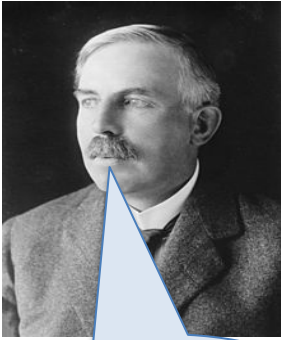
msn. 

bing™
About®

Search

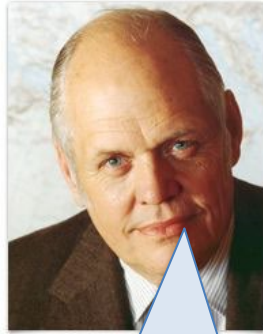


**Ernest Rutherford,
Nobel Prize Winner,
1933**



"Anyone who expects a source of power from the transformation of the atom is talking moonshine."

**Ken Olsen, chairman,
Digital Equipment
Corporation, 1977**



"There is no reason anyone would want a computer in their home."

**Paul Krugman,
Nobel-winning
economist, 1998.**



"By 2005 or so, it will become clear that the Internet's impact on the economy will have been no greater than the fax machine's."

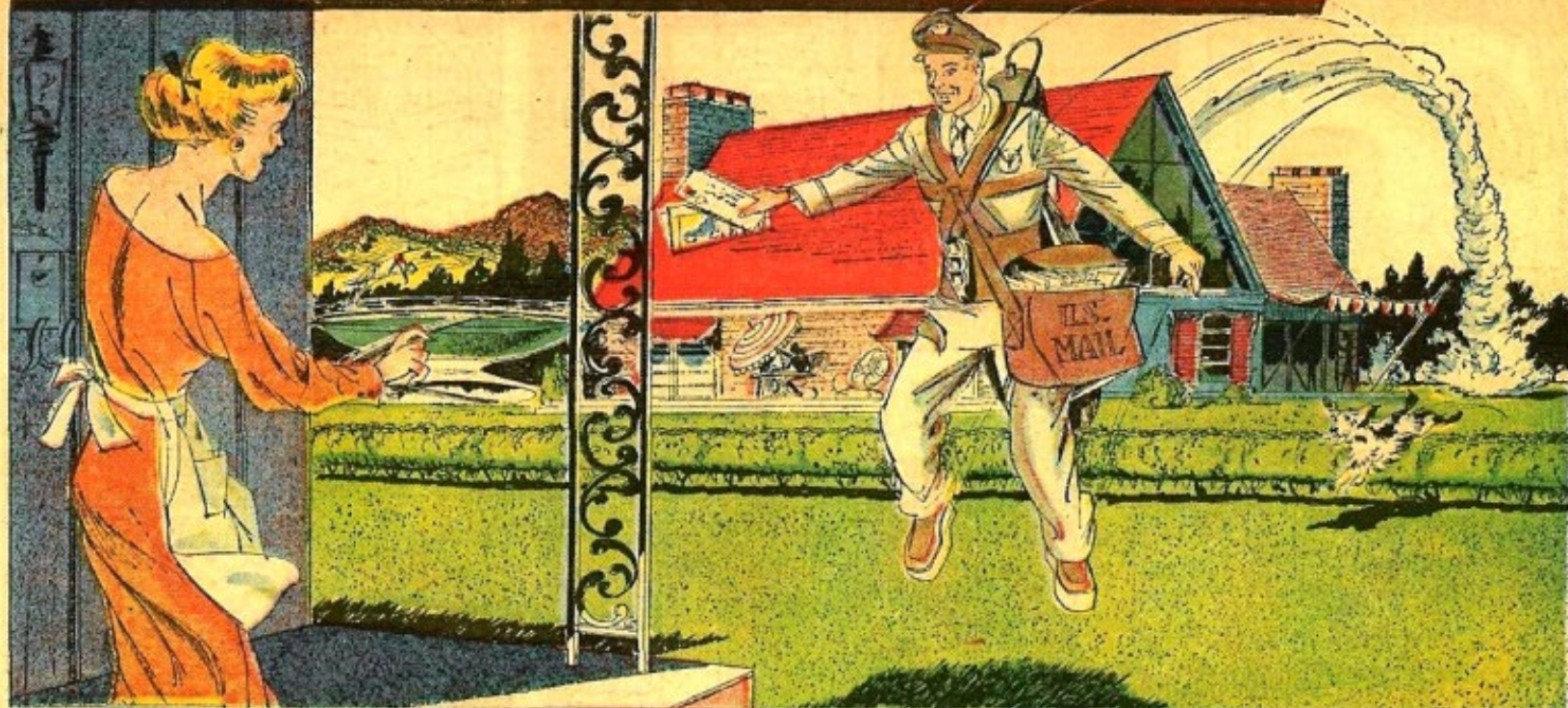
**Steve Ballmer, CEO,
Microsoft,
2007**



"There's no chance the i-phone is going to get significant market share. No chance."

--- CLOSER THAN WE THINK!

by Ralphy



ROCKET MAILMEN Uncle Sam's mailmen can look forward to going faster, getting farther, and doing so with less effort than ever before. All it will take will be a device like the recently perfected "rocket assista" which were originally developed to help infantrymen leap like grasshoppers.

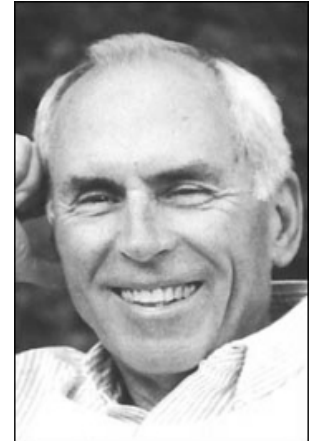
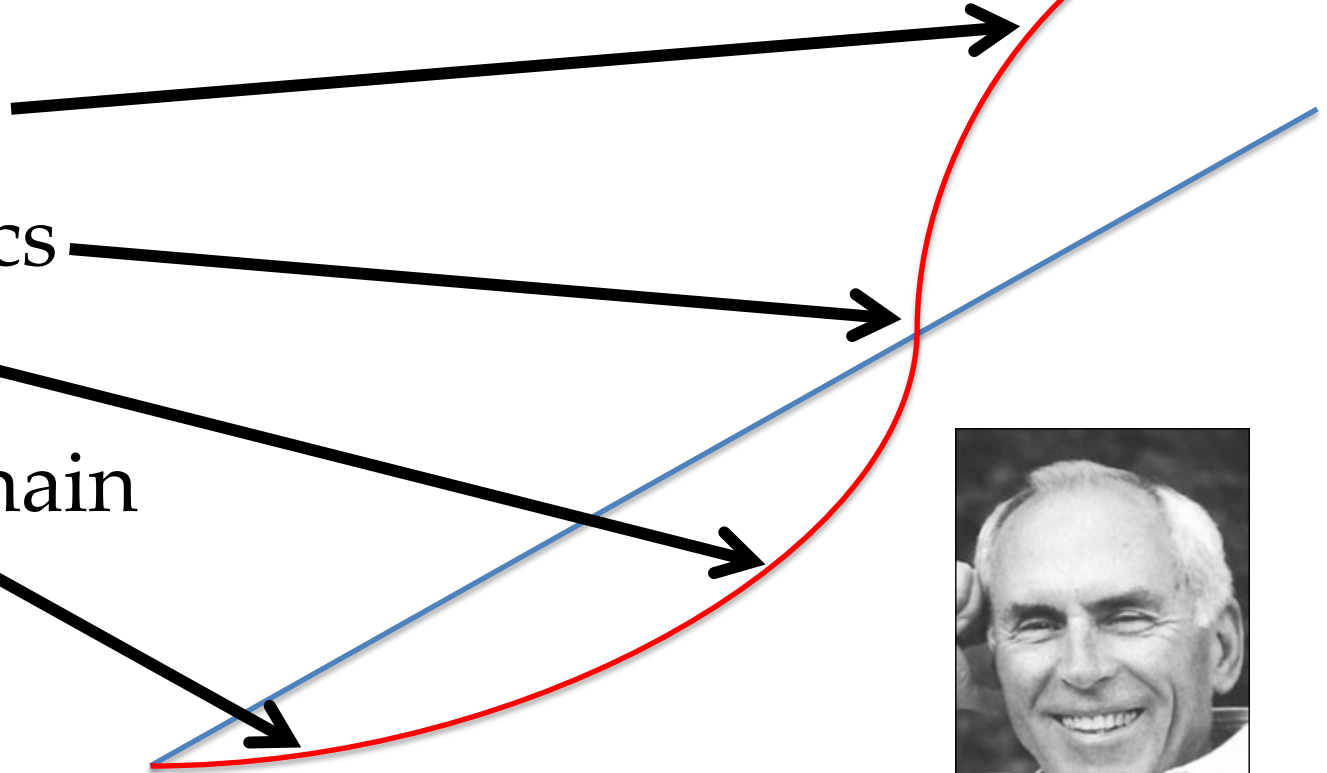
Just how such equipment works is still a military secret. The designer,

Reaction Motors, Inc., is not permitted to say how large the device is, or how long it fires, or what kind of fuel it uses. But best guess is that the rocket fires intermittently, so that the wearer can bound from spot to spot as he wishes, with no more energy than it takes to walk. Also the mechanism is believed to be of small size, simply constructed and low-priced. What a boon for mailmen and others whose work takes them from door to door!

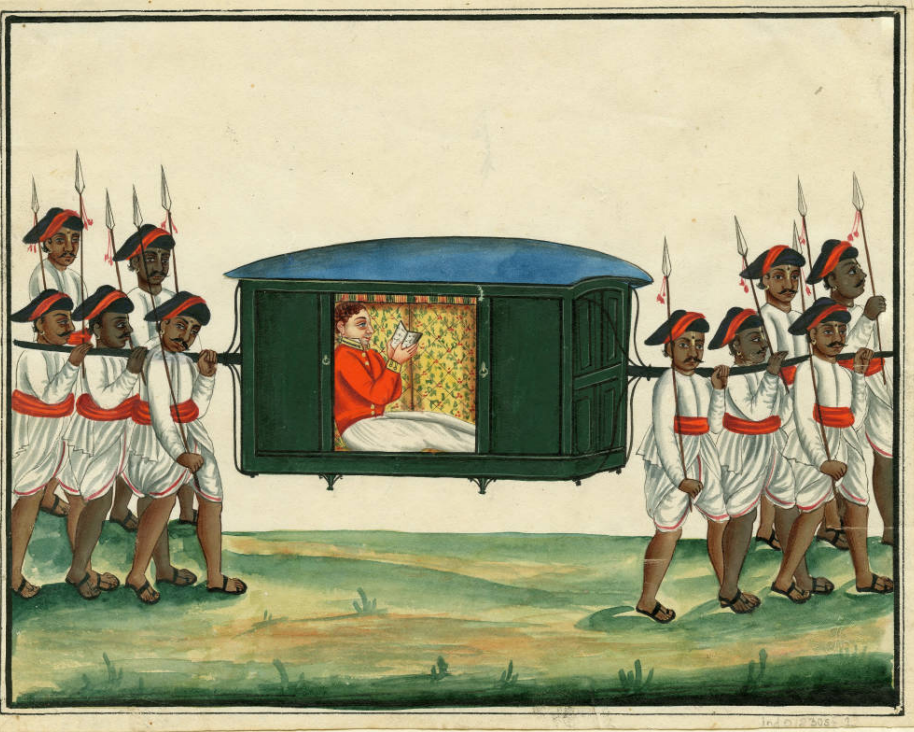


Amara Hype Cycle

- Internet
- Genomics
- AI
- Block Chain



Empires are bad at innovation



The EU is an empire in decay

It is Brussels – not Salvini or Orban – that is a threat to peace in Europe.



So are big companies



Innovation is an evolutionary process



“Alain” (Emile Chartier), 1908



“Every boat is copied from another boat... Let’s reason as follows in the manner of Darwin. It is clear that a very badly made boat will end up at the bottom after one or two voyages and thus never be copied... One could then say, with complete rigor, that **it is the sea herself who fashions the boats**, choosing those which function and destroying the others.”

Evolution of the Mobile Phone



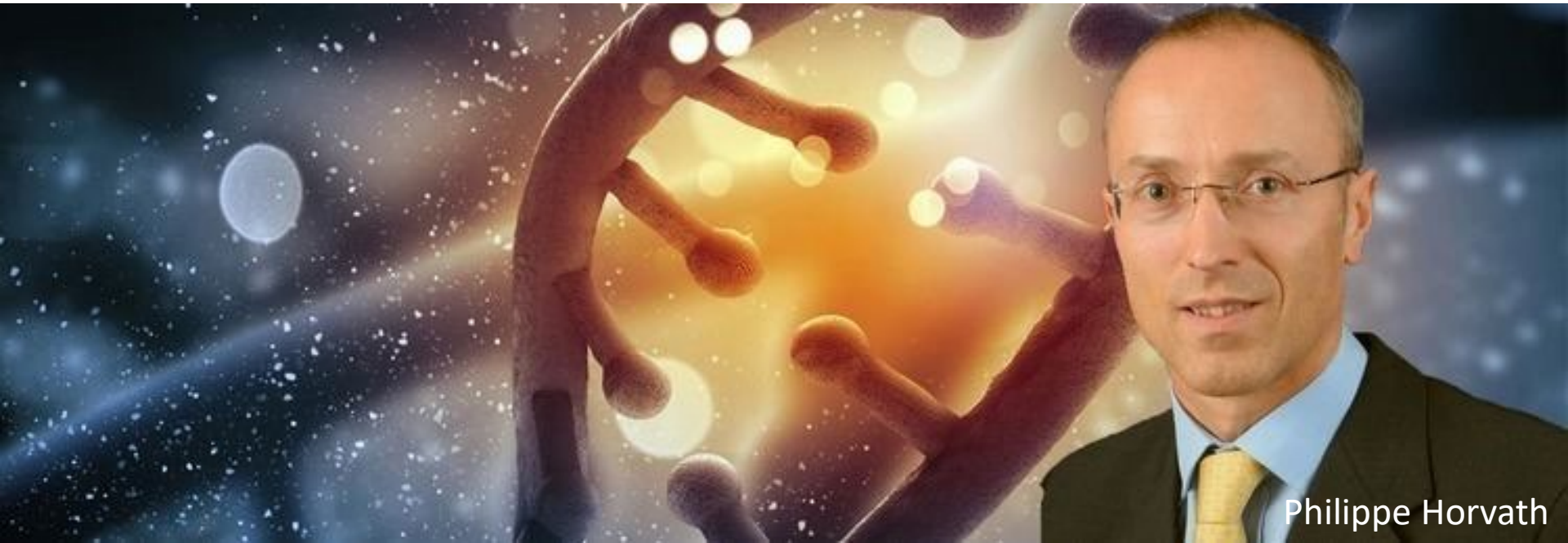
<https://busy.org/@akbarbadsha/the-evolution-of-technology>

“The result of human action, but not the execution of any human design”

Adam Ferguson, 1767

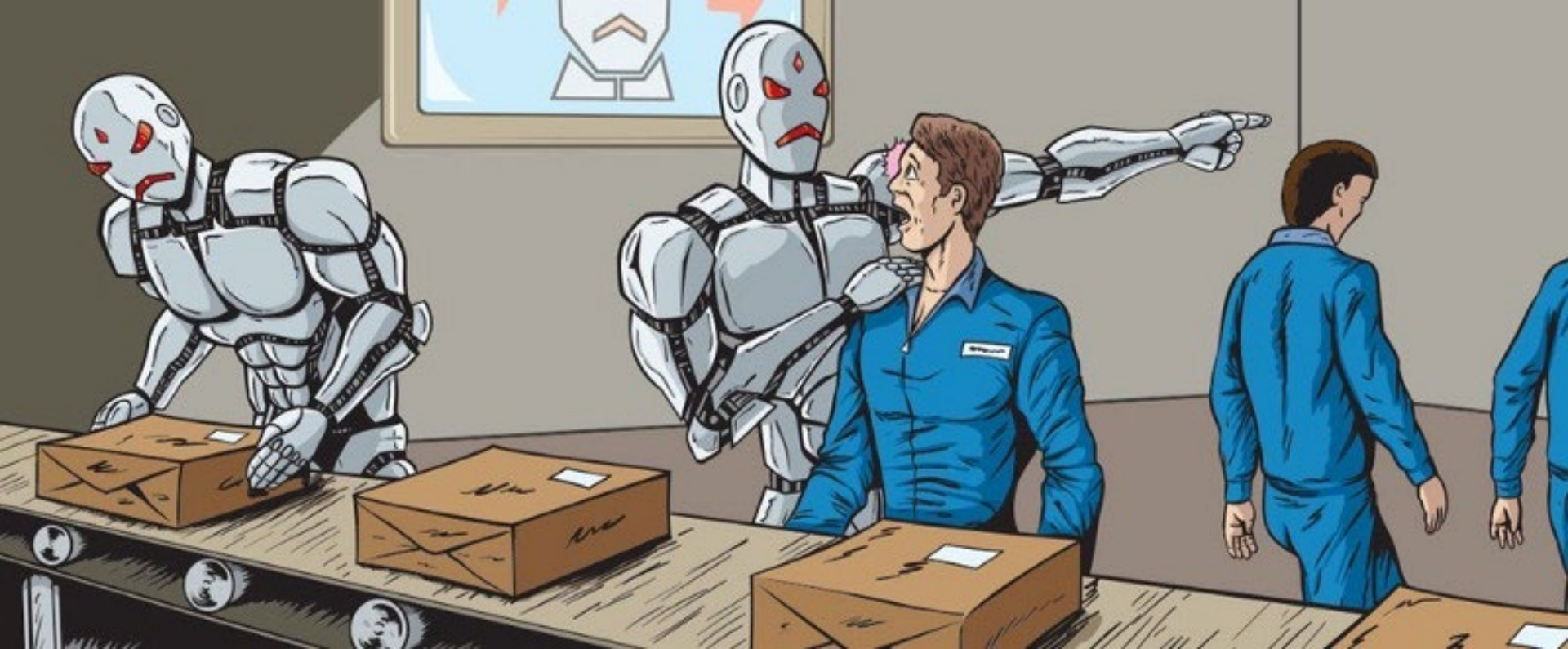


Technology is the seed of science as
well as the fruit



Philippe Horvath

Innovation does not destroy jobs

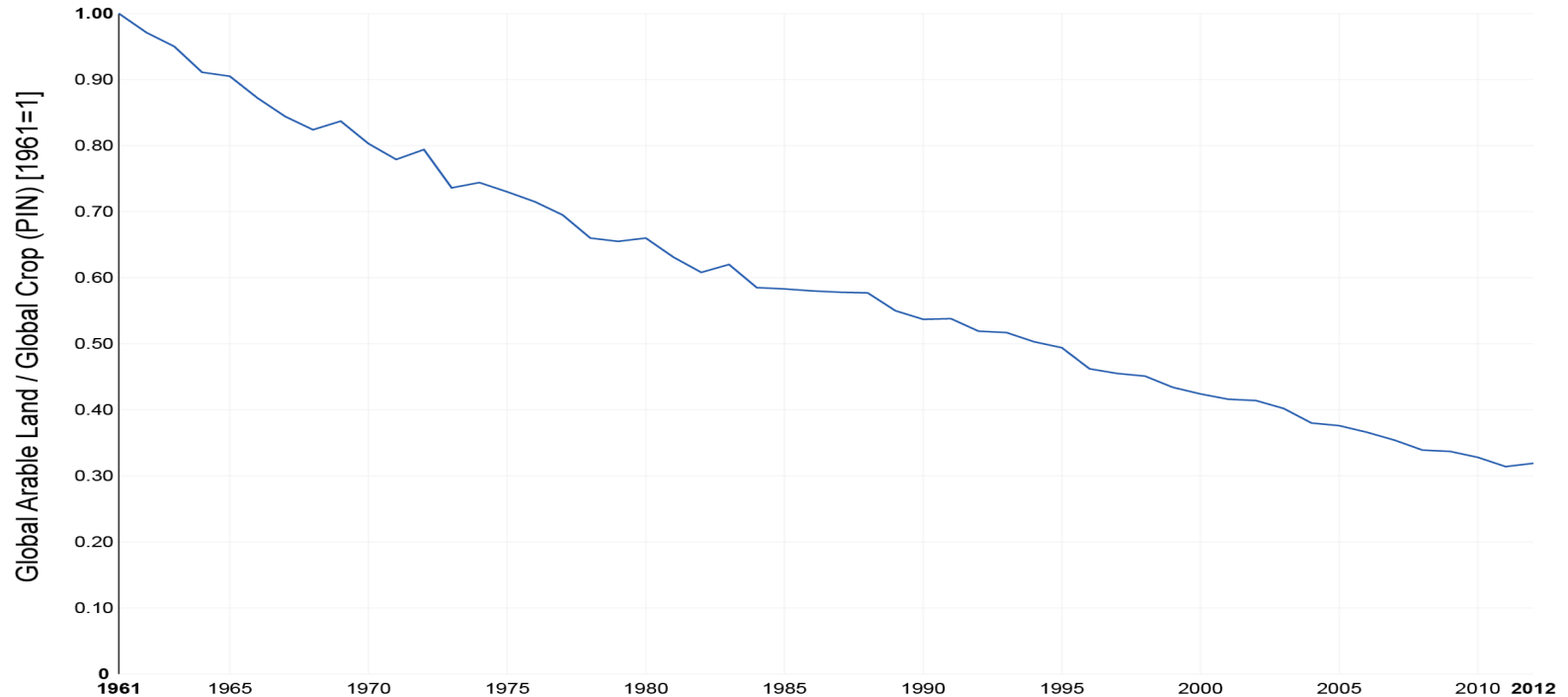


More from less

Our World
in Data

Global Arable Land / Global Crop (PIN) [1961=1]

After 50 years the world uses 68% less land to produce the same amount of food



Data Source: FAO

Data Visualisation: www.OurWorldinData.org

A PROCLAMATION

FOR THE

Suppression of Coffee-Houses.

CHARLES R.

[illegible][illegible]

Given at Our Court at Windsor, this Nine and twentieth day of December 1675. in the Seven and twentieth year of Our Reigne.

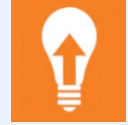
God save the King.

LONDON.

Printed by the Assigns of John Bill, and Christopher Barker,
Printers to the Kings most Excellent Majesty, 1677.

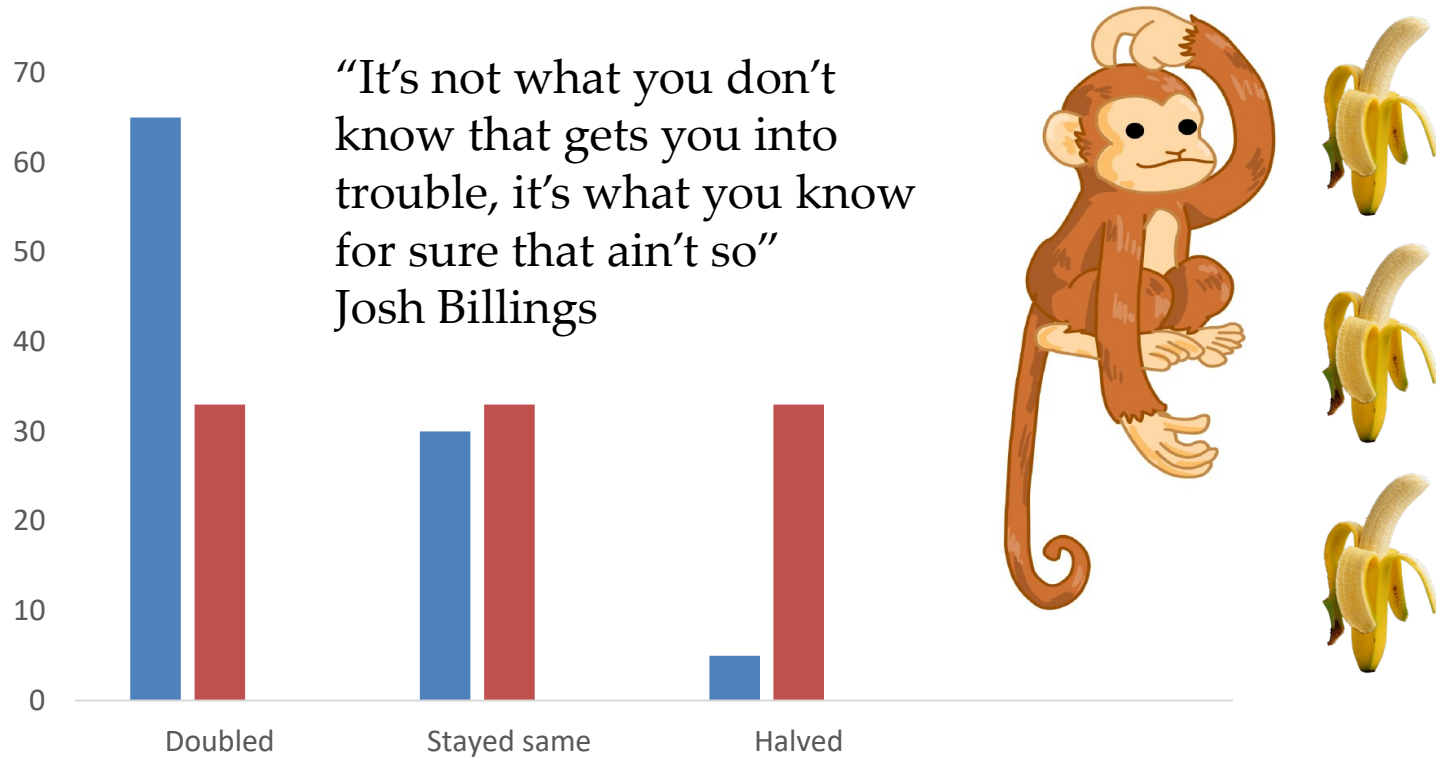
The Digital Millennium Copyright Act





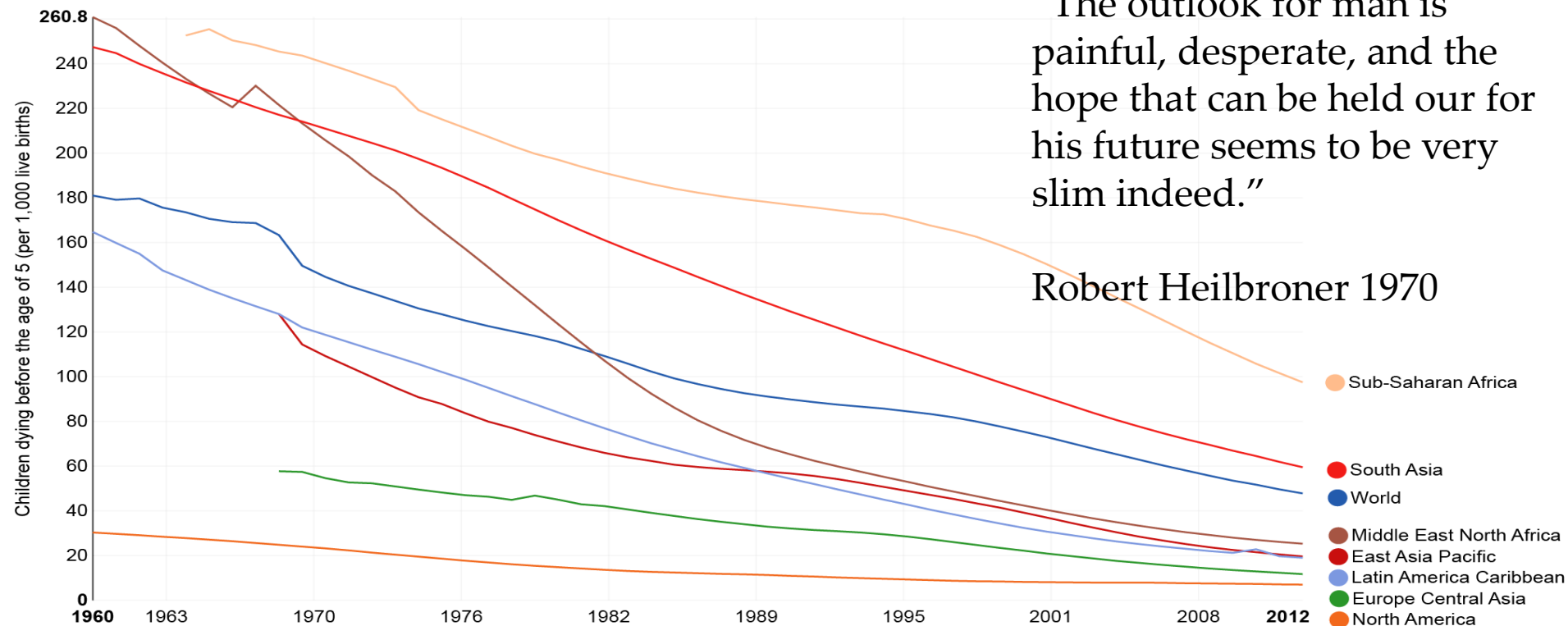
Rational optimism

In the last 20 years the proportion of the world living in extreme poverty has....



Source: Gapminder and Novus, n=1005

Child Mortality by World Region Since 1960



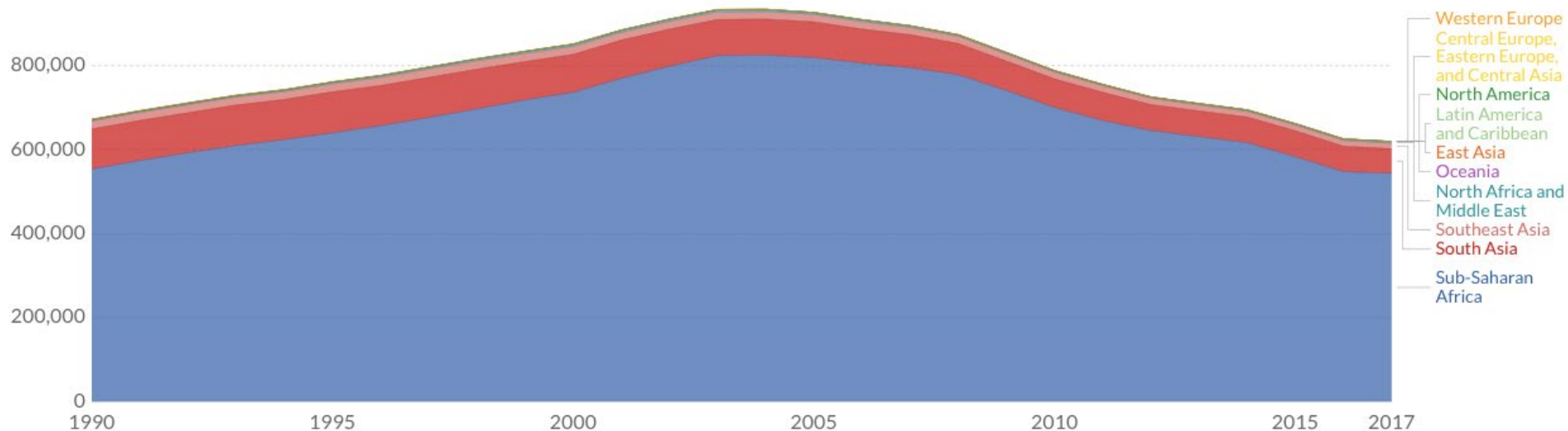
“The outlook for man is painful, desperate, and the hope that can be held out for his future seems to be very slim indeed.”

Robert Heilbroner 1970

Malaria

Malaria deaths by region

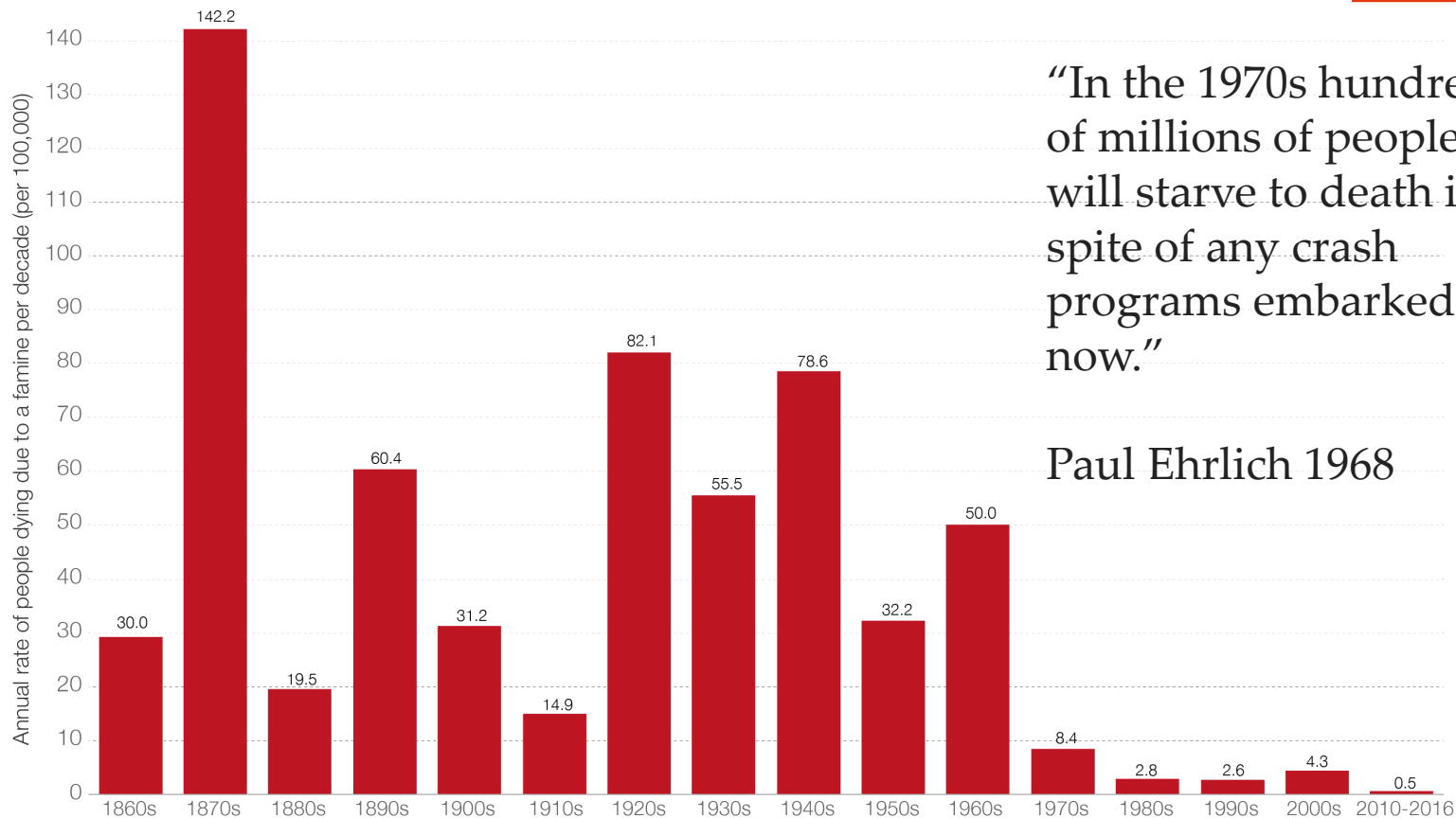
Annual number of deaths from malaria across all ages and both sexes, differentiated by region. Europe and North America are not shown since IHME report zero deaths from malaria over this period.



Source: IHME, Global Burden of Disease (GBD)

OurWorldInData.org/malaria/ • CC BY

Annual rate of people dying due to a famine globally, per decade

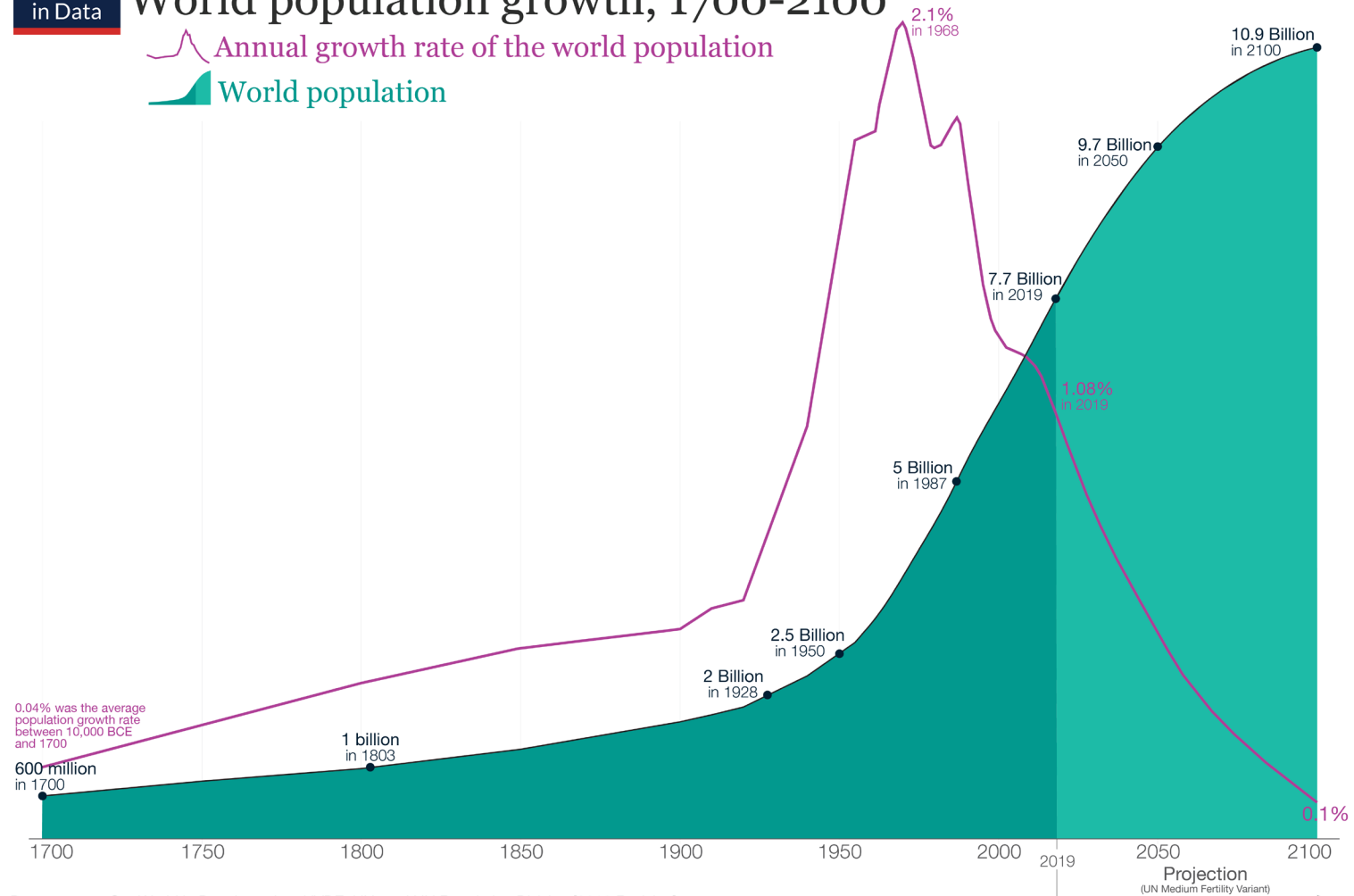


“In the 1970s hundreds of millions of people will starve to death in spite of any crash programs embarked upon now.”

Paul Ehrlich 1968

Data source: The rate of the excess mortality due to famines shown here is presented in detail on OurWorldinData.org/famines [The dataset was constructed by Joe Hasell and Max Roser].
How the rate is calculated: The annual rate is calculated for each decade by dividing the total number of famine victims in each decade by the average size of the world population in that decade and dividing the resulting ratio by 10 (and for the data from 2010 to 2016 it is divided by 7) to arrive at a yearly rate. To express it as the rate per 100,000 people, this annual rate is then multiplied by 100,000.
For famines that happened at the end of a decade and the beginning of the next decade the famine victims are split by decade on a year by year basis.
For famines for which different excess mortality estimates are published the midpoint between these estimates was chosen here.
This visualization is available at OurWorldinData.org. There you find the full dataset and more research and visualizations on famines and global development.

World population growth, 1700-2100

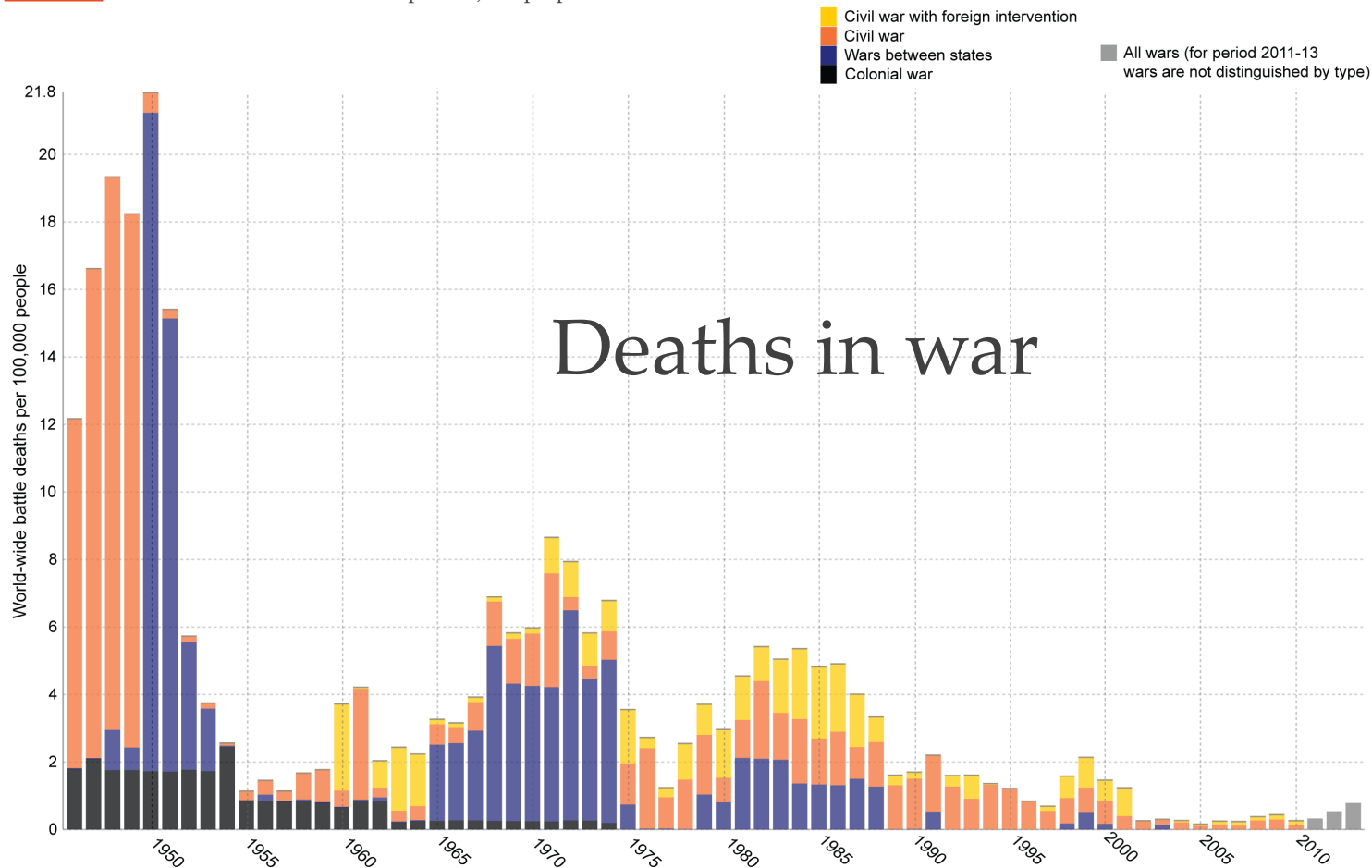
 Annual growth rate of the world population World population

Data sources: Our World in Data based on HYDE, UN, and UN Population Division [2019 Revision]
This is a visualization from [OurWorldinData.org](https://ourworldindata.org), where you find data and research on how the world is changing.

Licensed under CC-BY by the author Max Roser.

Battle death rate in state based conflicts by type (1946-2013) – by Max Roser

Annual world-wide battle deaths per 100,000 people

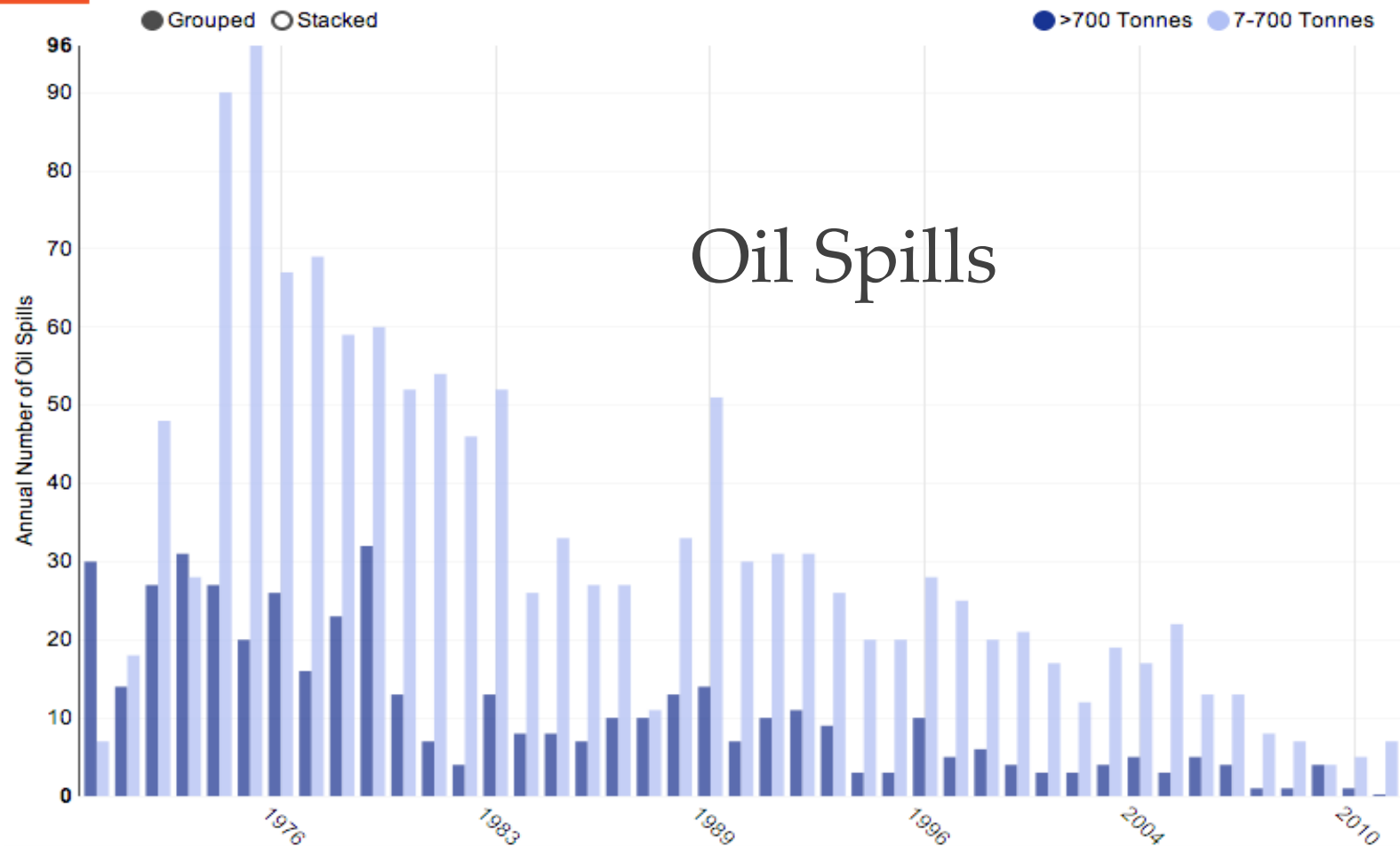


Deaths in war

Data source: PRIO Battle Deaths Dataset (1946-2007) and data provided by Steven Pinker for 2009 and later (based on UCDP and PRIO).

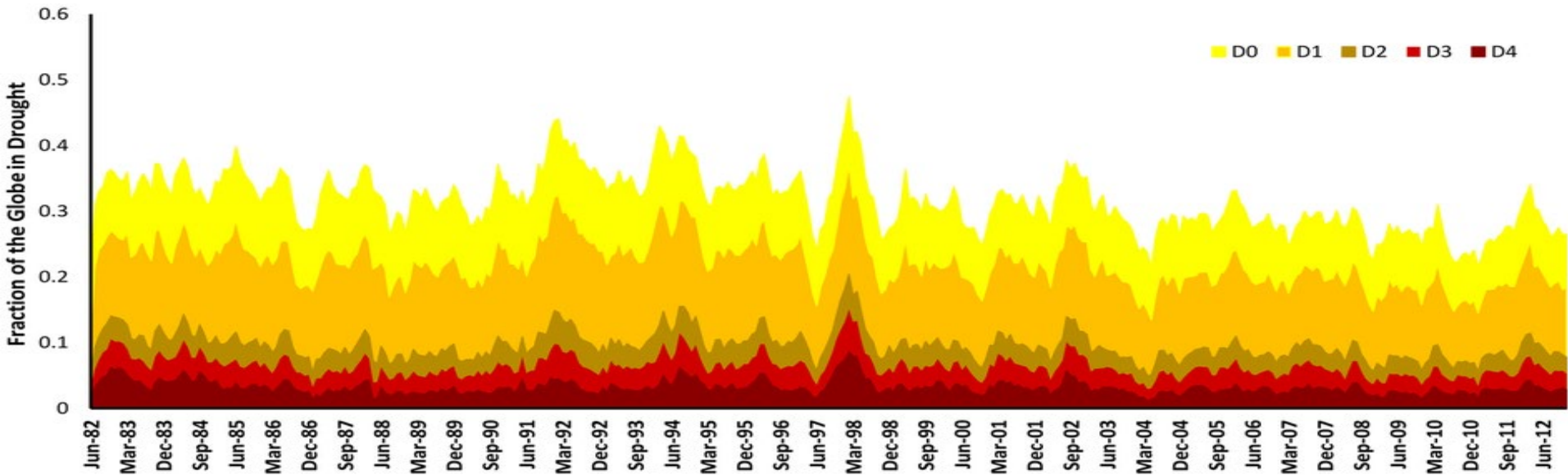
The interactive data visualisation is available at OurWorldinData.org. There you find the raw data and more visualisations on this topic.

Licensed under [CC-BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) by the author Max Roser.

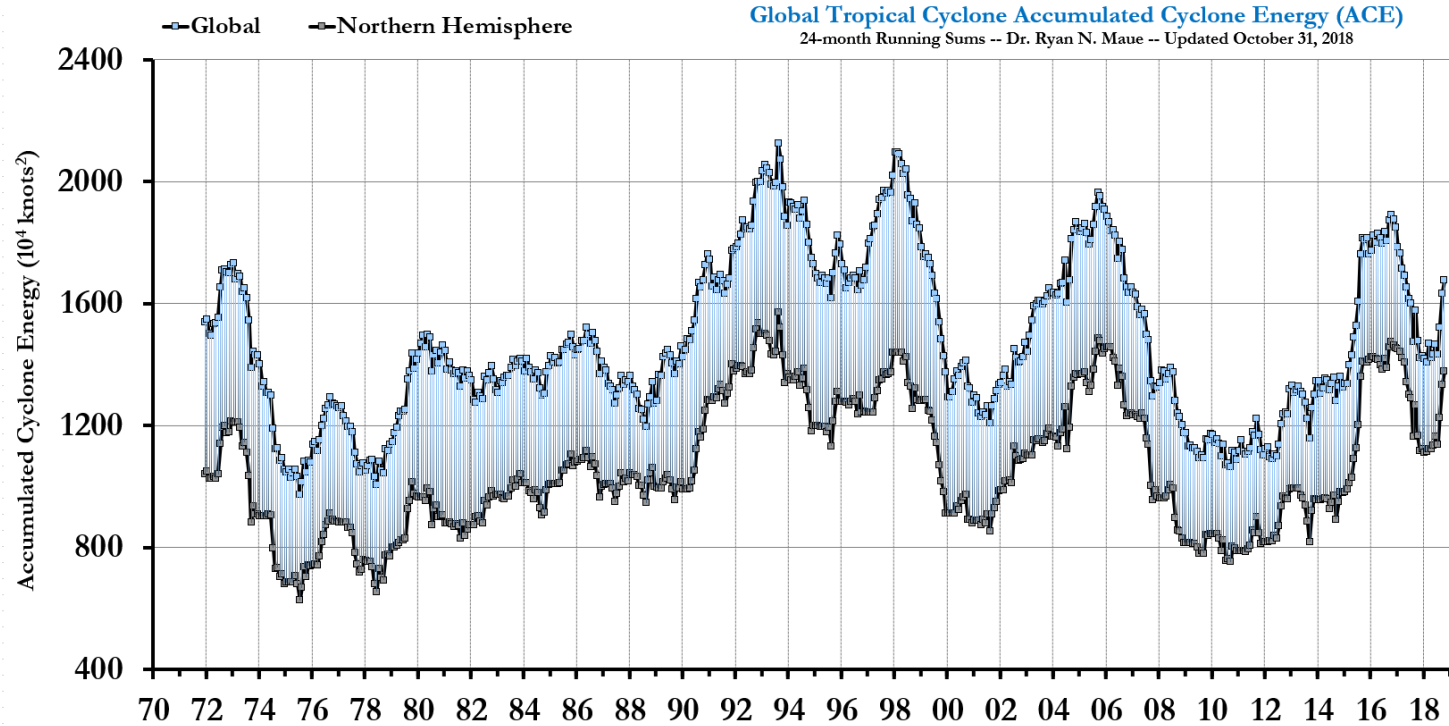




Drought



Tropical cyclones



Sea level rise

SATELLITE DATA: 1993-PRESENT

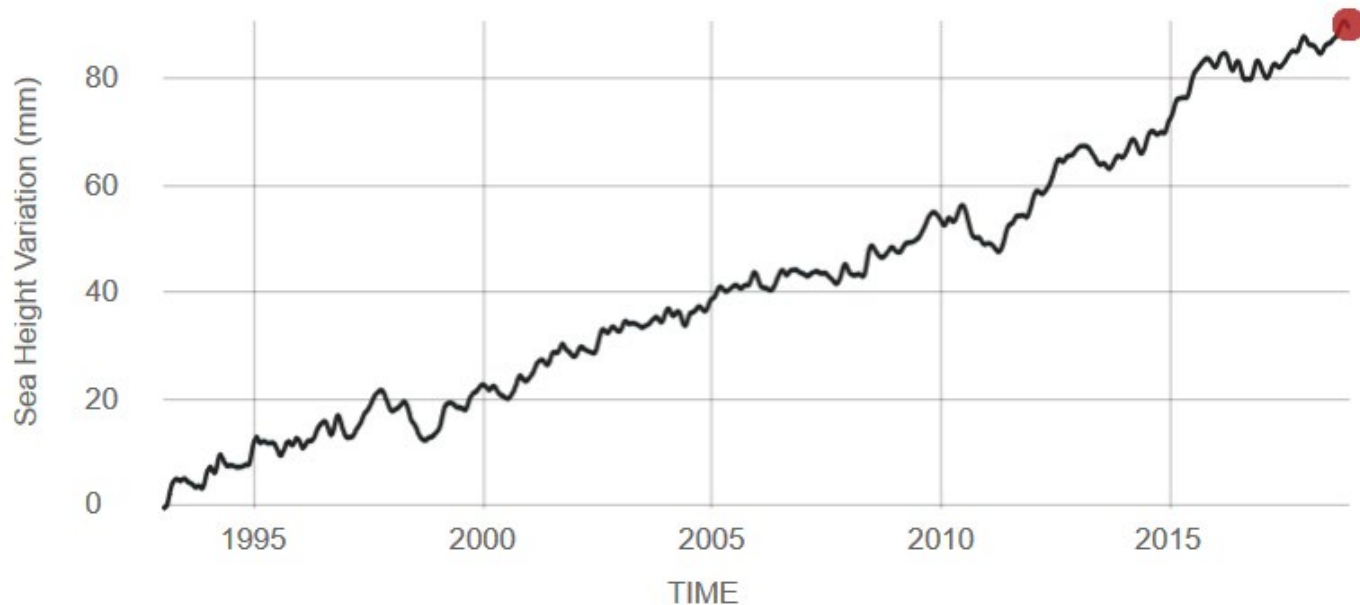
Data source: Satellite sea level observations.

Credit: NASA Goddard Space Flight Center

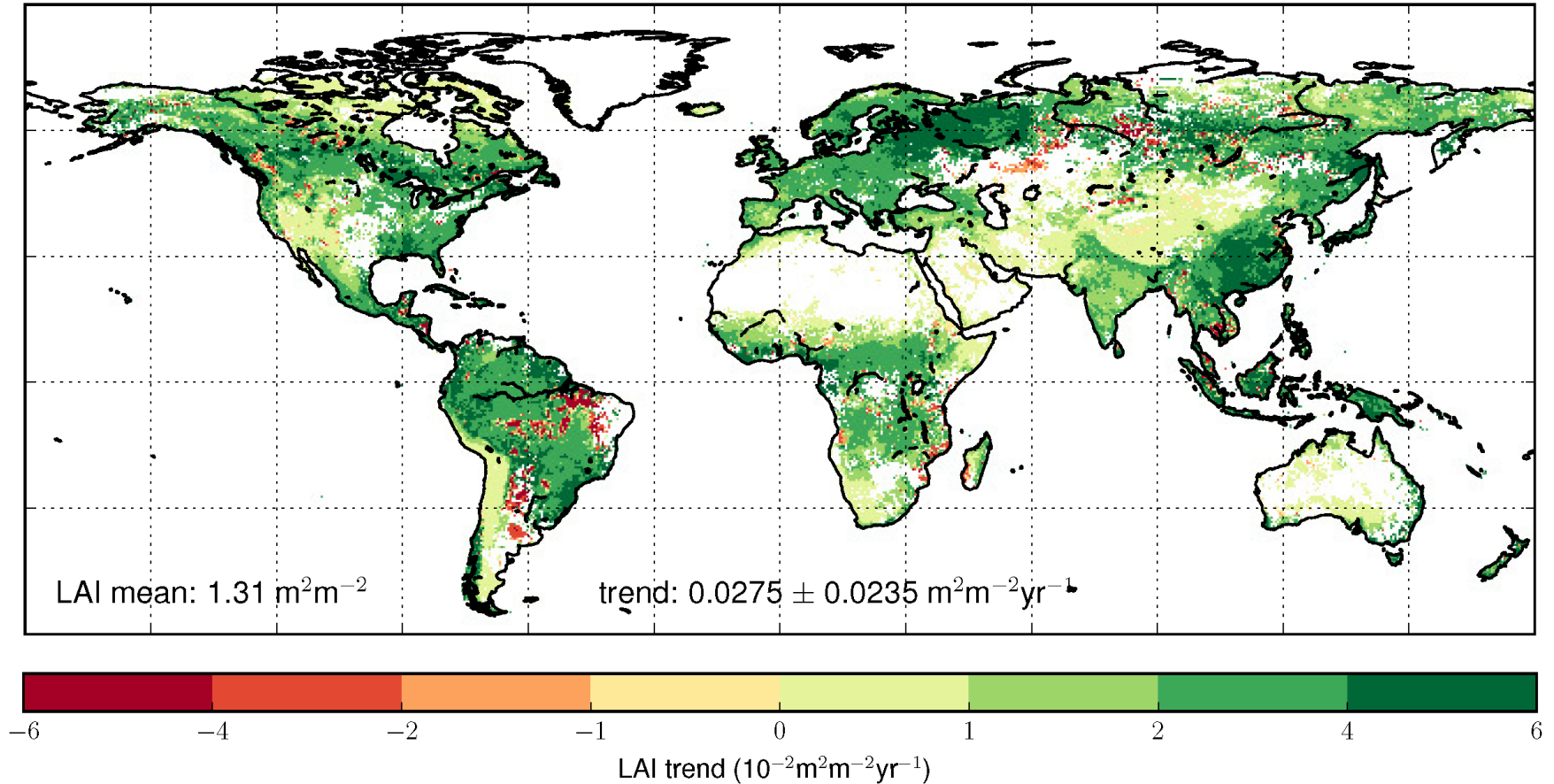
RATE OF CHANGE

↑ 3.3

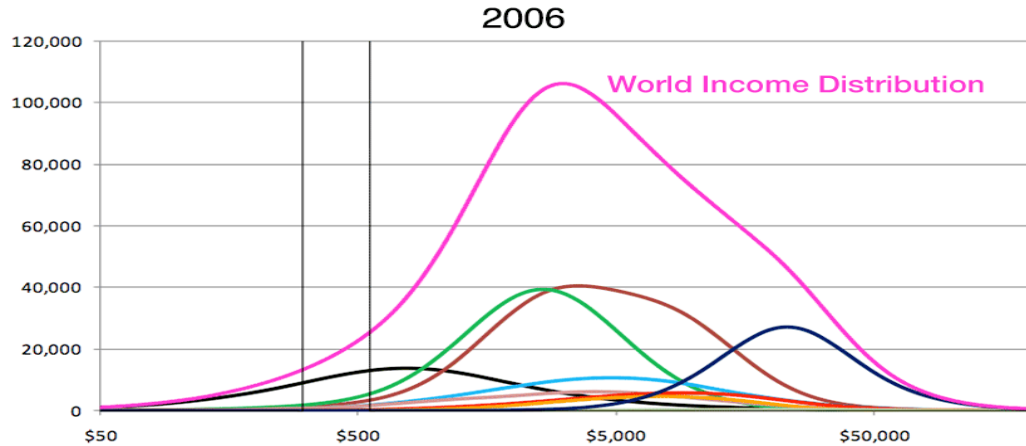
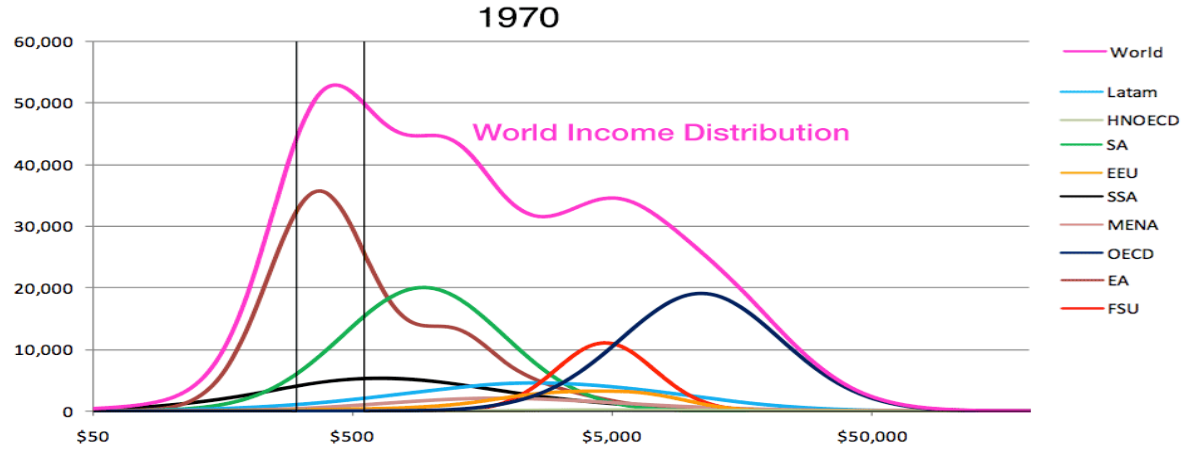
millimeters per year



Global greening

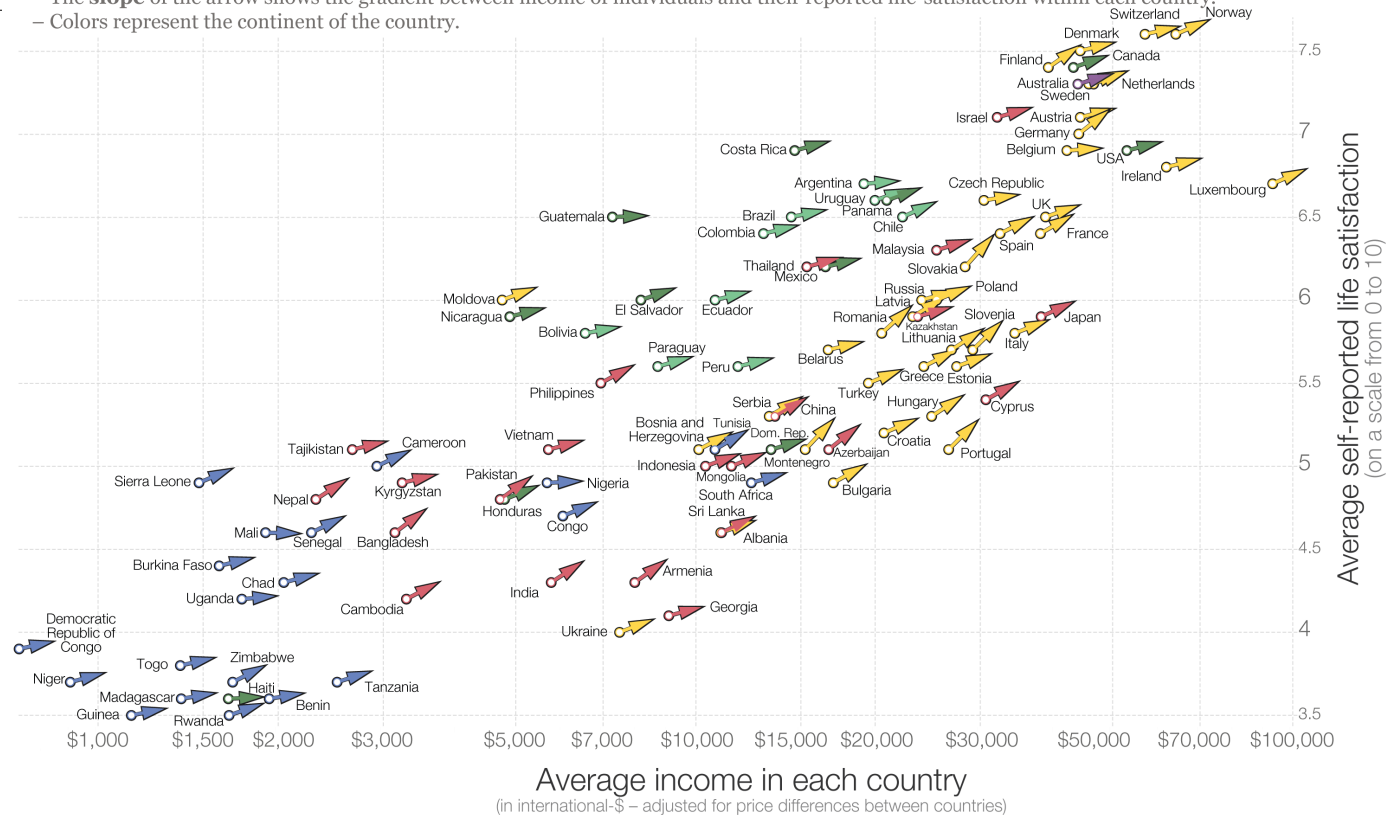


Inequality



People in richer countries tend to be happier and within all countries richer people tend to be happier

- The **position** of the arrow shows the average life satisfaction reported by the population of a country (vertical axis) and the average income of that country (horizontal axis).
- The **slope** of the arrow shows the gradient between income of individuals and their reported life-satisfaction within each country.*
- Colors represent the continent of the country.

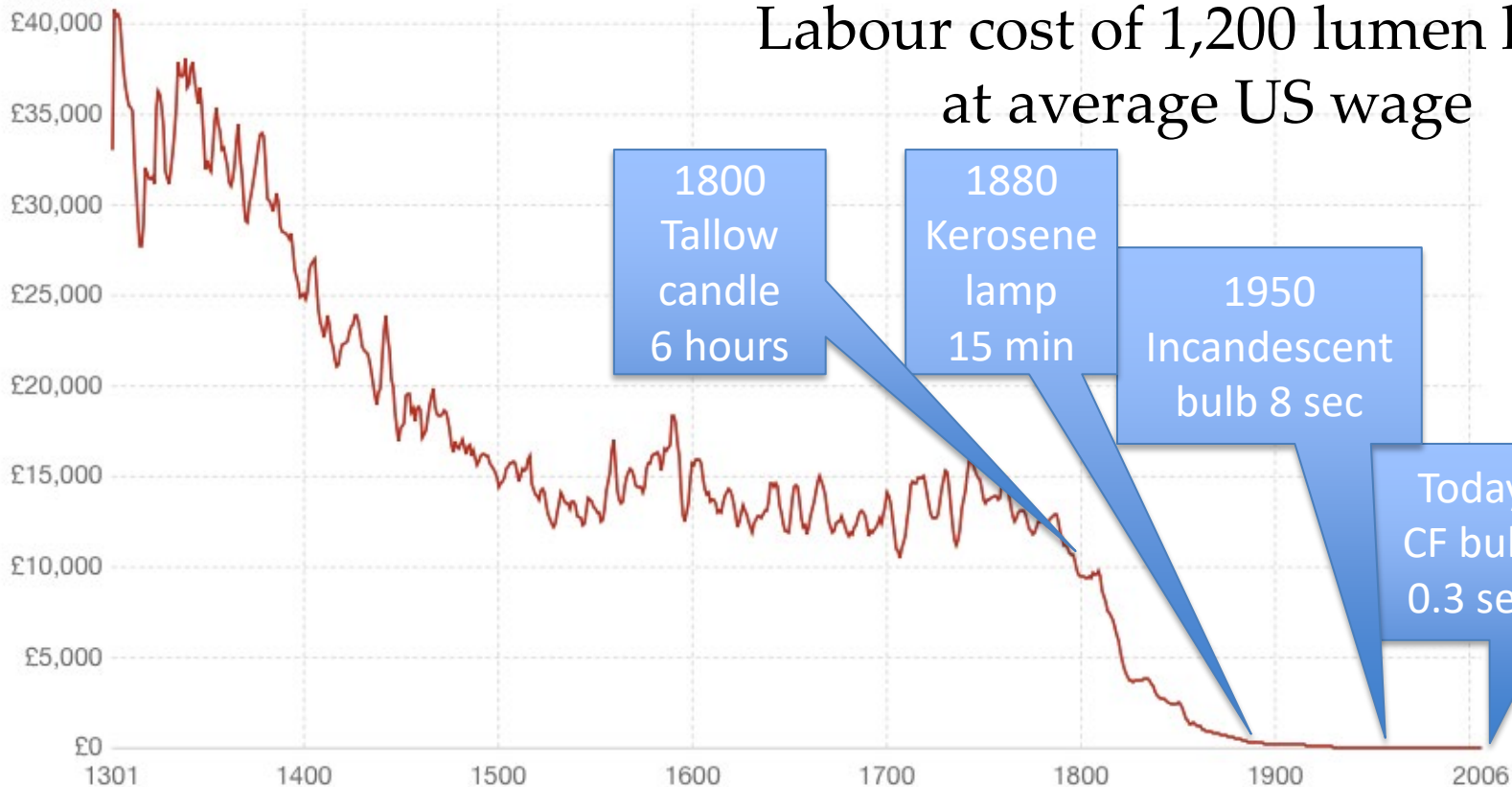


* The gradients correspond, country by country, to the regression coefficients between income quintiles and the related average life satisfaction reported by people within each income quintile.
Data sources: World Bank for data on incomes by quintile (based on income shares by quintile and GDP per capita as the mean income); Gallup World Poll for life satisfaction by income quintile.
The visualization is available at OurWorldinData.org. There you find the research and more visualizations on life satisfaction.
Licensed under CC-BY-SA by the author Max Roser.

The Price for Lighting (per million lumen-hours) in the UK in British Pound

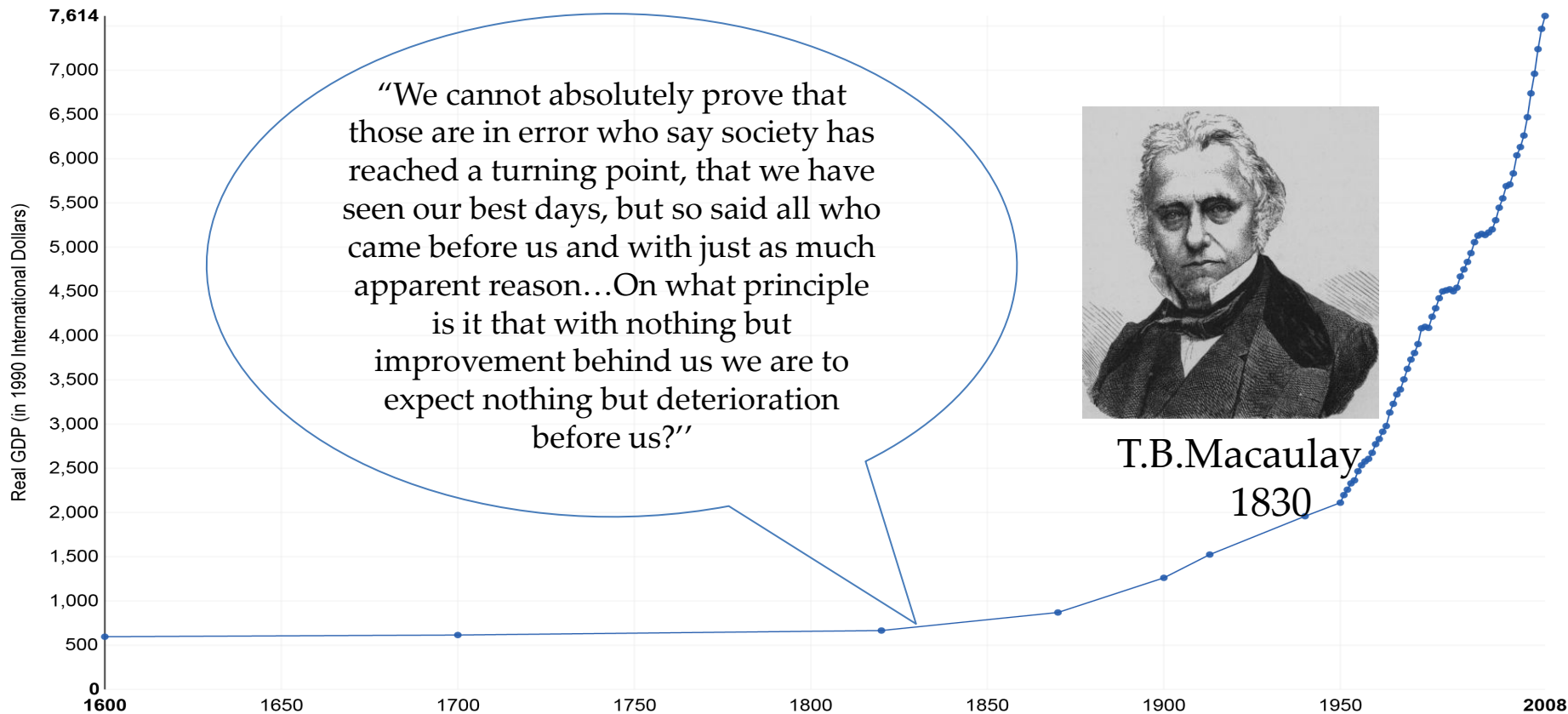
1 lumen hour is equal to the luminous energy emitted in 1 hour by a light source emitting a luminous flux of 1 lumen. For comparison: a standard 100W incandescent light bulb emits ± 1700 lumen.

⚙ LINEAR



Labour cost of 1,200 lumen hours
at average US wage

Real World Average GDP per Capita Since 1600





The End

