

The background image shows two young girls, likely from an African country, wearing traditional white headscarves with black and red floral patterns. They are both smiling and looking intently at a tablet computer held by the girl on the left. The girl on the left is also wearing large black headphones. The background is a textured wall made of woven reeds or bamboo. The text is overlaid in white, with the main title in a large, bold, sans-serif font and the subtitle in a smaller, italicized font.

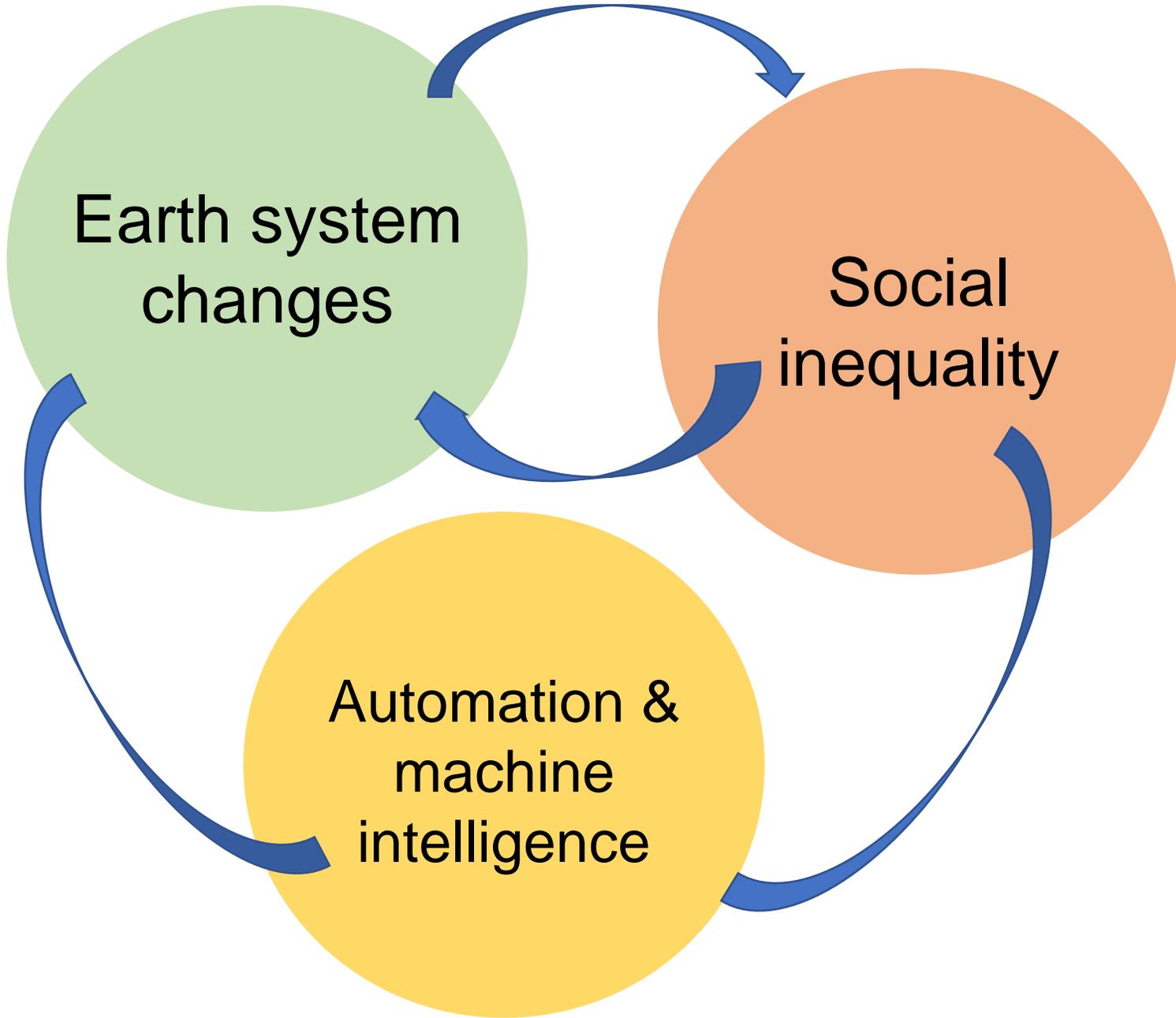
Nature & Machines – Making AI work for People & the Planet

Victor Galaz, Stockholm Resilience Centre

***Resilience* is the long-term capacity of a system to deal with change and continue to develop.**

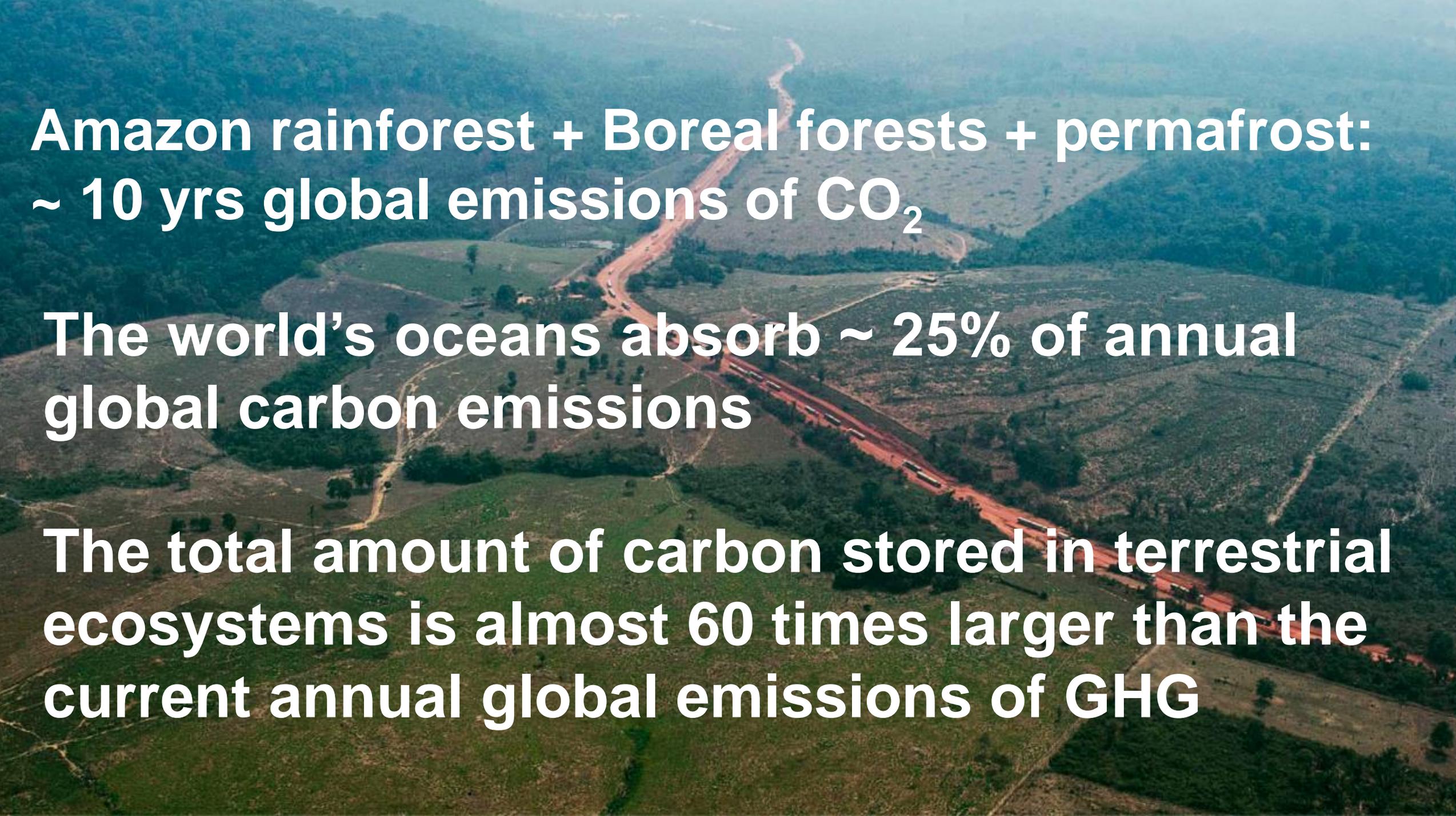
It entails both the capacity to '*bounce back*', *adapt* and (when needed) *transform in the face of changing circumstances.**

Human-Environment-Machine





Earth system
changes

An aerial photograph showing a wide, reddish-brown dirt road that has been cleared through a dense green forest. The road winds through a landscape of cleared land, some remaining trees, and patches of forest. The background shows more forested hills under a hazy sky.

**Amazon rainforest + Boreal forests + permafrost:
~ 10 yrs global emissions of CO₂**

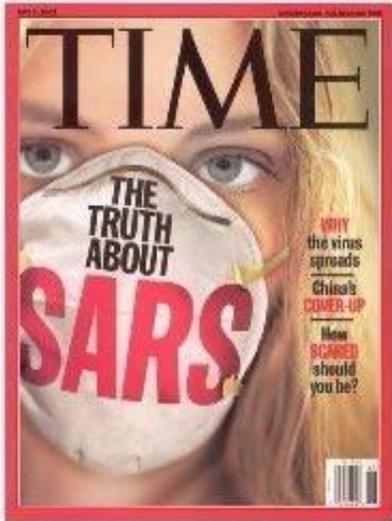
**The world's oceans absorb ~ 25% of annual
global carbon emissions**

**The total amount of carbon stored in terrestrial
ecosystems is almost 60 times larger than the
current annual global emissions of GHG**



Amazonas 2019. Video: Avener Prado//The Guardian

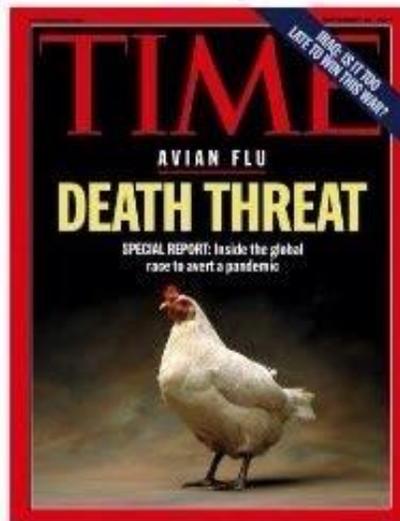
2003



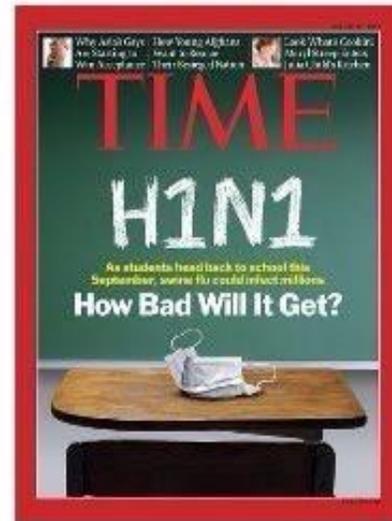
2004



2005



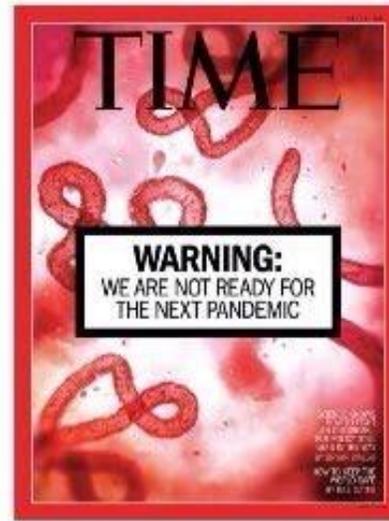
2007



2009

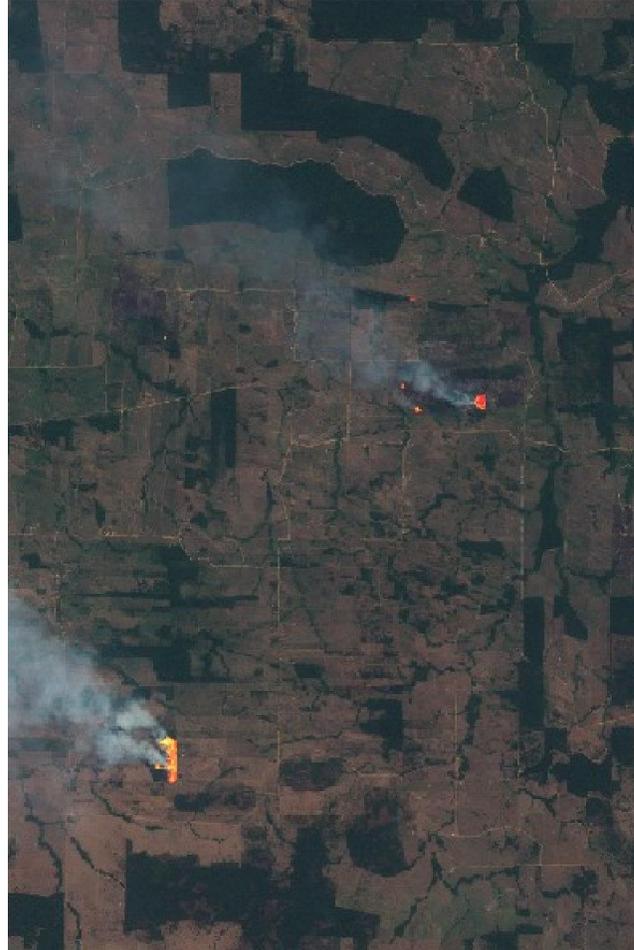
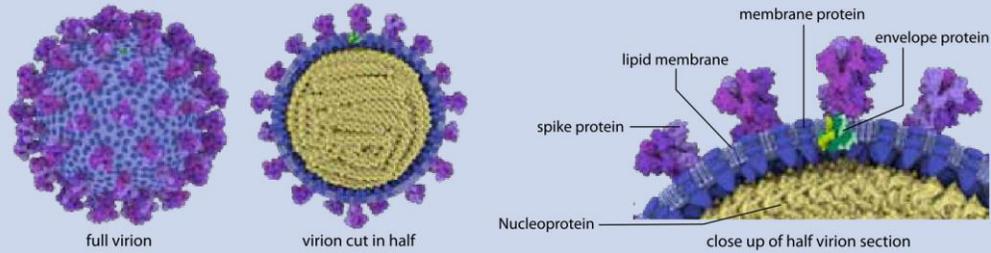


2017

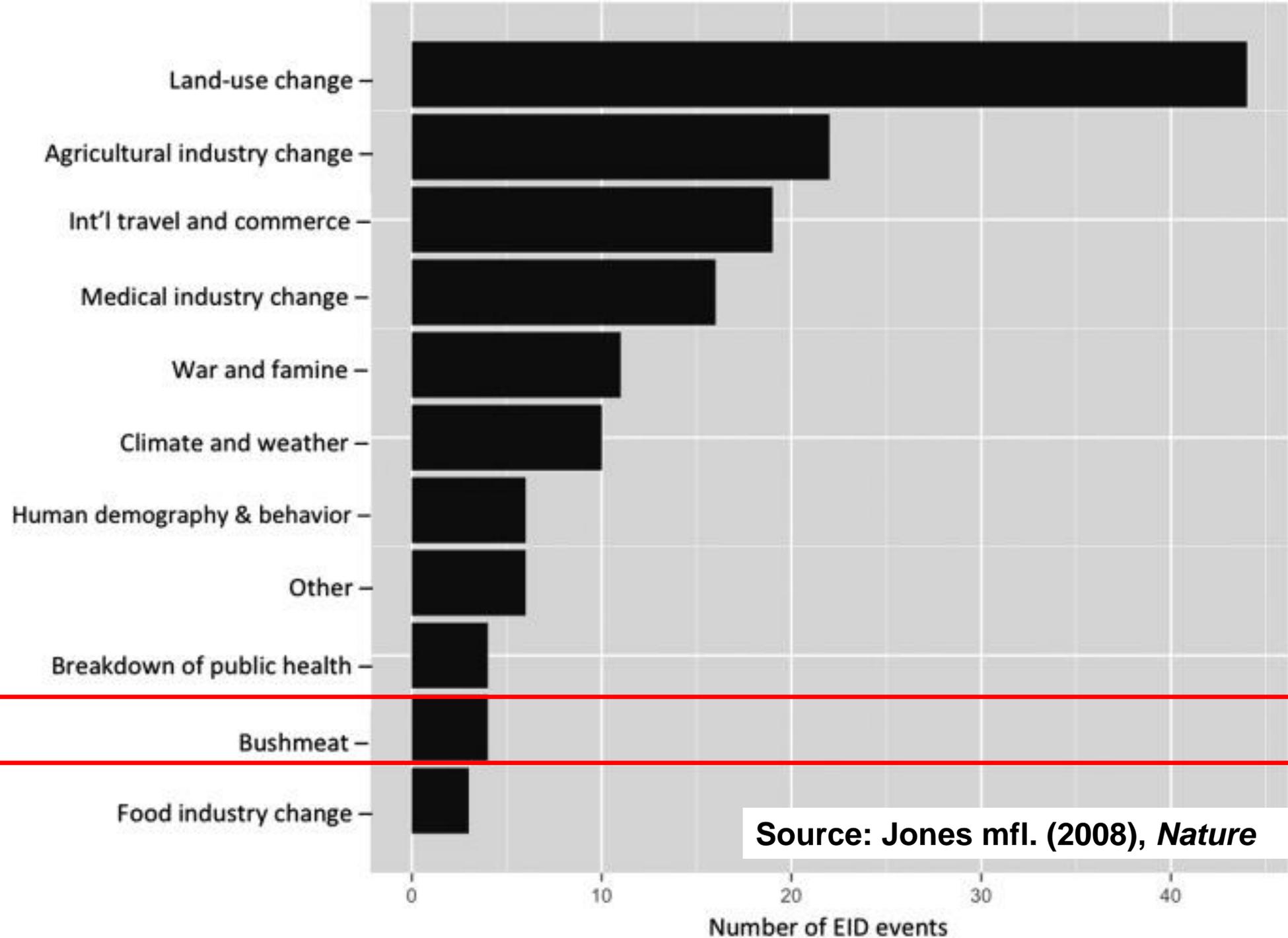


A Changing planet

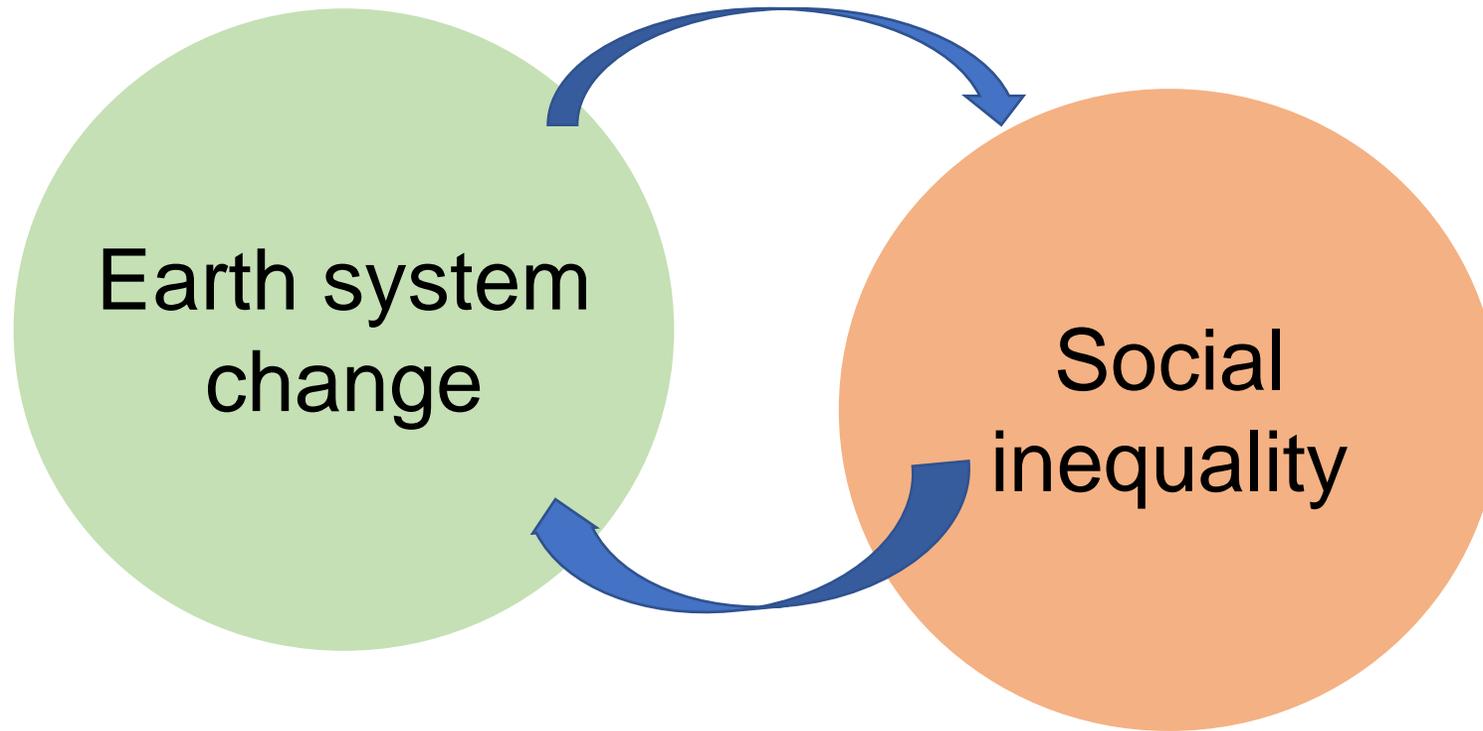
SARS-CoV-2



A market in Guangzhou, China
Photo credit: tostphoto / Shutterstock.com



Source: Jones mfl. (2008), *Nature*



World's top 10% of income earners are responsible for between 25 and 43% of environmental impact.

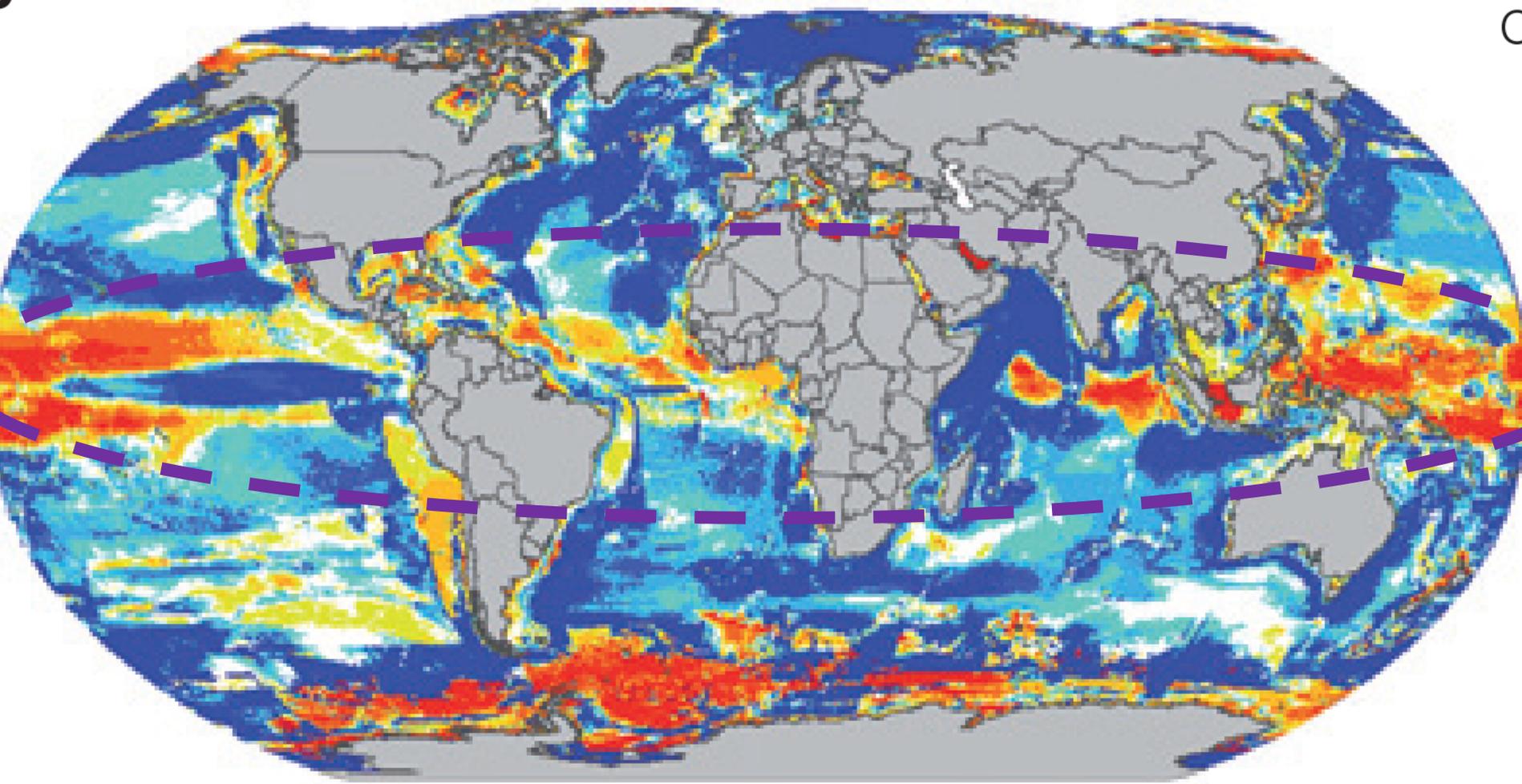
World's bottom 10% income earners exert only around 3–5% of environmental impact.

Source: Teixidó-Figueras, J. et al. *Ecol. Indic.* 62, 163–173 (2016).

**Earth system change –
the "invisible hand" of
increased social inequality**



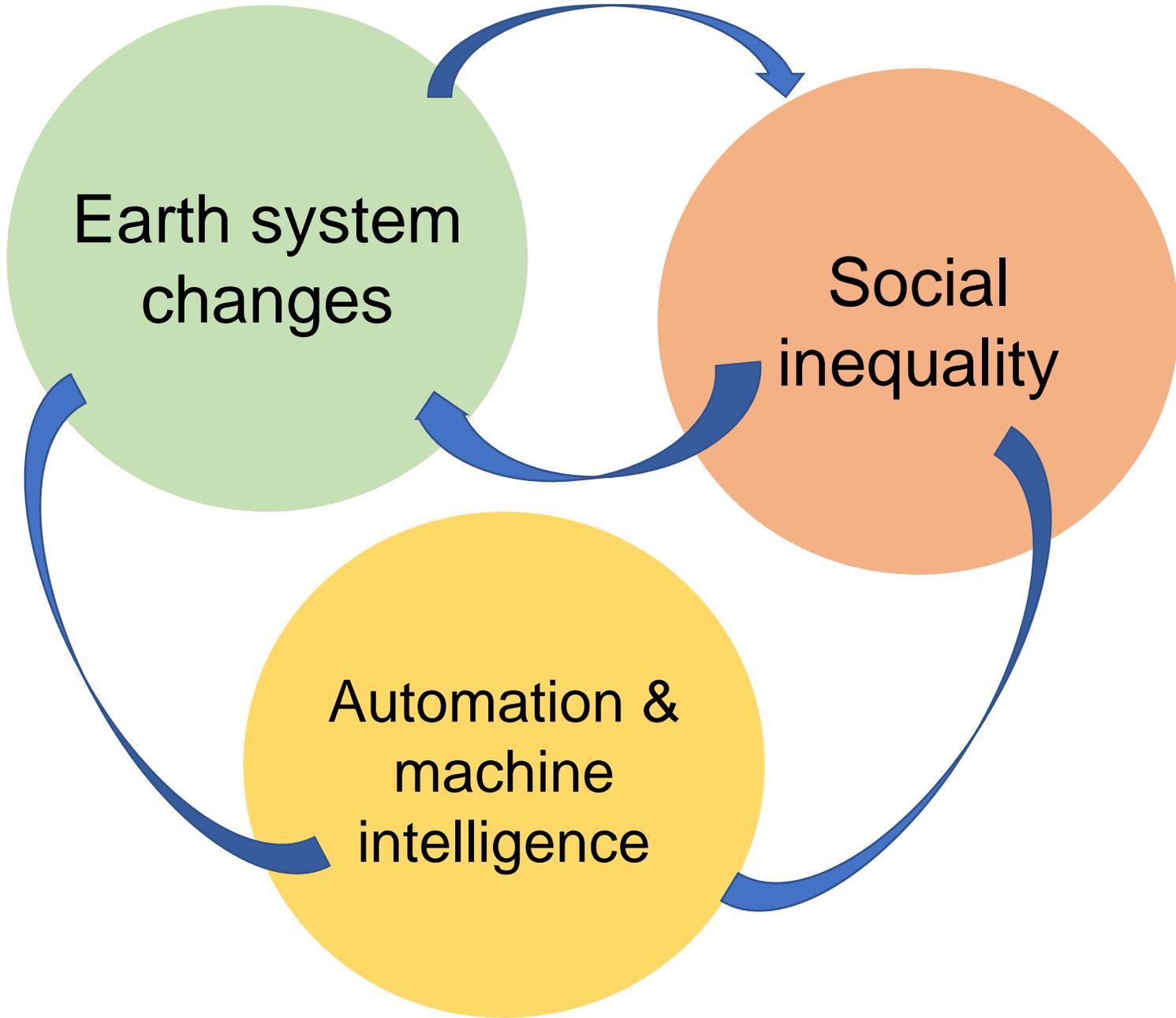
Sumaila et al. (2011), *Nature Climate Change*

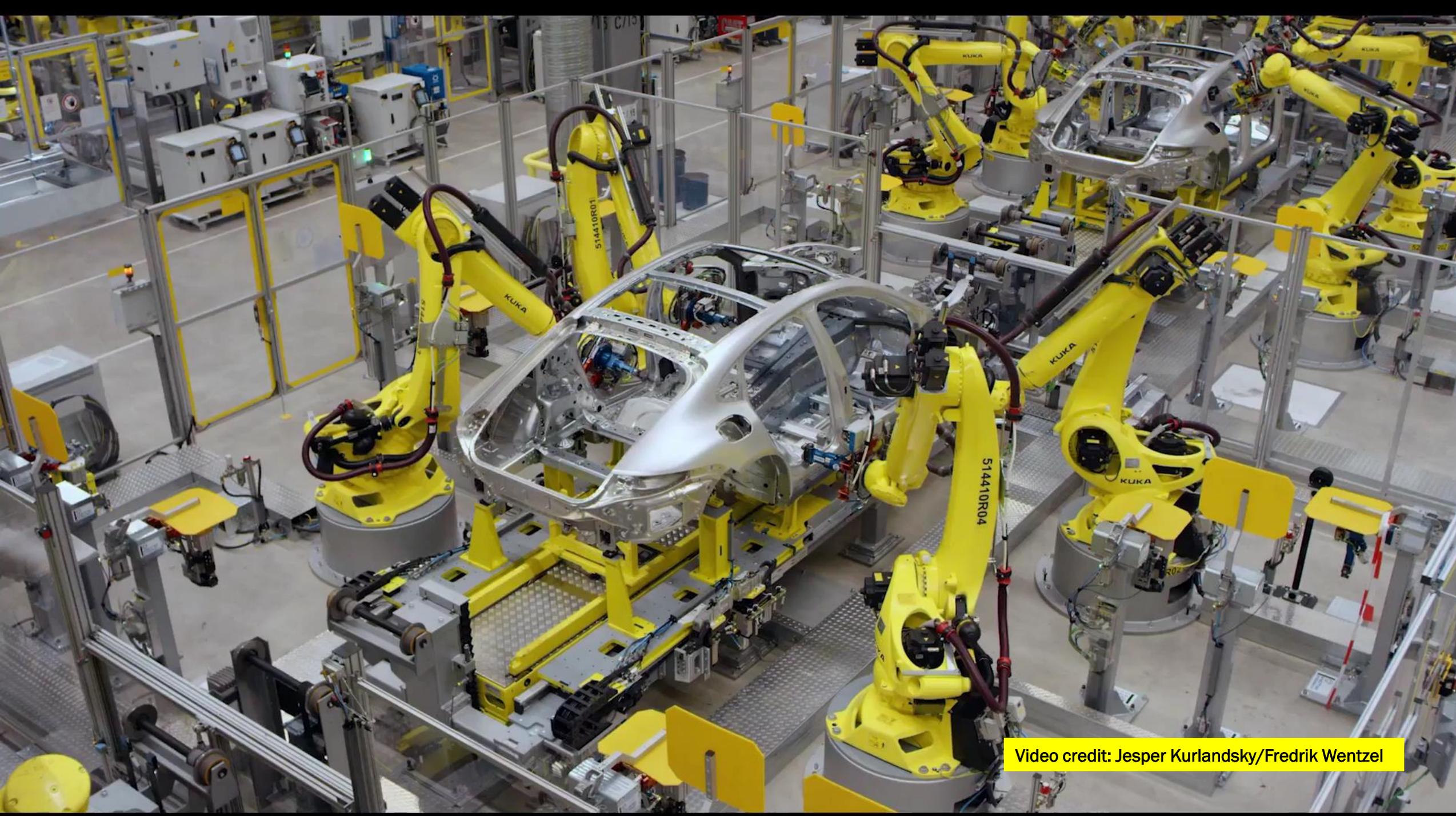


Change in catch potential
(% relative to 2005)

- <-50
- -50 - -30
- -29 - -15
- -14 - -5
- -4-5
- 6-15
- 16-30
- 31-50
- 51-100
- > 100

Sumaila *et al.* (2011), *Nature Climate Change*





Video credit: Jesper Kurlandsky/Fredrik Wentzel

The Robots are Coming to Harvest Your Food. What and

The pandemic is making a
say not



☰ Menu

The European Green Deal and Digitalisation

Conversation Will the EU witness a Digital Green Deal? Strengths and weaknesses of the digital age have become more apparent over the course of the pandemic, but how can policy makers address these challenges and interlink them with a comprehensive and ambitious ecological approach?

20 July 2020 by [Martin Keim](#)





**HUMAN
IN
THE LOOP**

ID	Name	Address	City	State	Country	Phone	Email	Website
1001	John Doe	123 Main St	New York	NY	USA	212-555-1234	john.doe@abc.com	www.abc.com
1002	Jane Smith	456 Elm St	Los Angeles	CA	USA	310-555-5678	jane.smith@def.com	www.def.com
1003	Mike Johnson	789 Oak St	Chicago	IL	USA	312-555-9012	mike.johnson@ghi.com	www.ghi.com
1004	Sarah Lee	101 Pine St	San Francisco	CA	USA	415-555-3456	sarah.lee@jkl.com	www.jkl.com
1005	David Kim	202 Cedar St	Seattle	WA	USA	206-555-7890	david.kim@mno.com	www.mno.com
1006	Emily White	303 Birch St	Portland	OR	USA	503-555-2345	emily.white@pqr.com	www.pqr.com
1007	Chris Brown	404 Spruce St	Denver	CO	USA	303-555-6789	chris.brown@rst.com	www.rst.com
1008	Alex Green	505 Ash St	Phoenix	AZ	USA	602-555-0123	alex.green@uvw.com	www.uvw.com
1009	Mia Black	606 Hickory St	San Diego	CA	USA	619-555-4567	mia.black@xyz.com	www.xyz.com
1010	Noah Gray	707 Walnut St	Austin	TX	USA	512-555-8901	noah.gray@abc.com	www.abc.com

Covid-19 and automation

Figure 1: Relationship between furlough take-up and automation risk (RSA analysis of HMRC Coronavirus Job Retention Scheme statistics and ONS, the probability of automation in England)

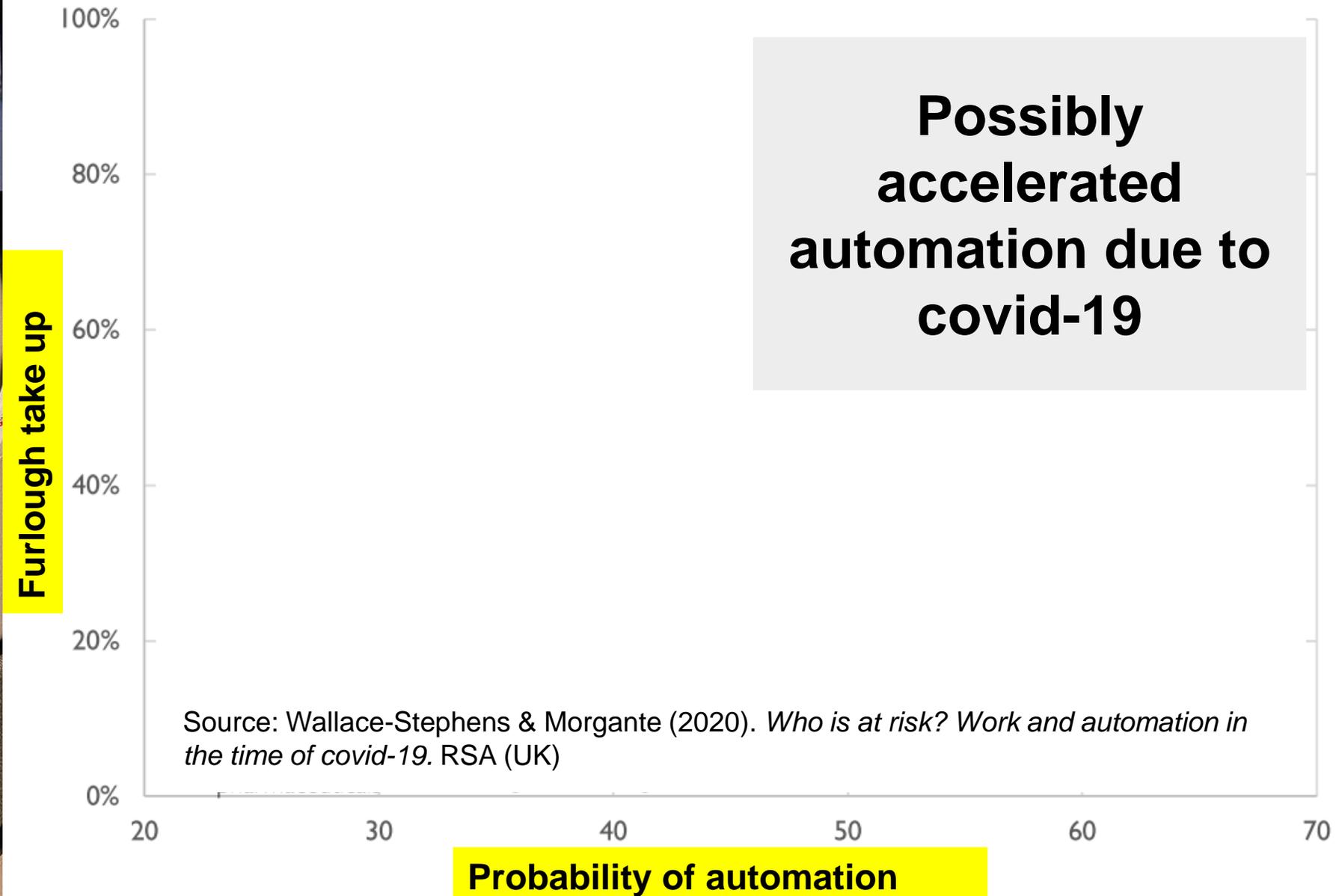
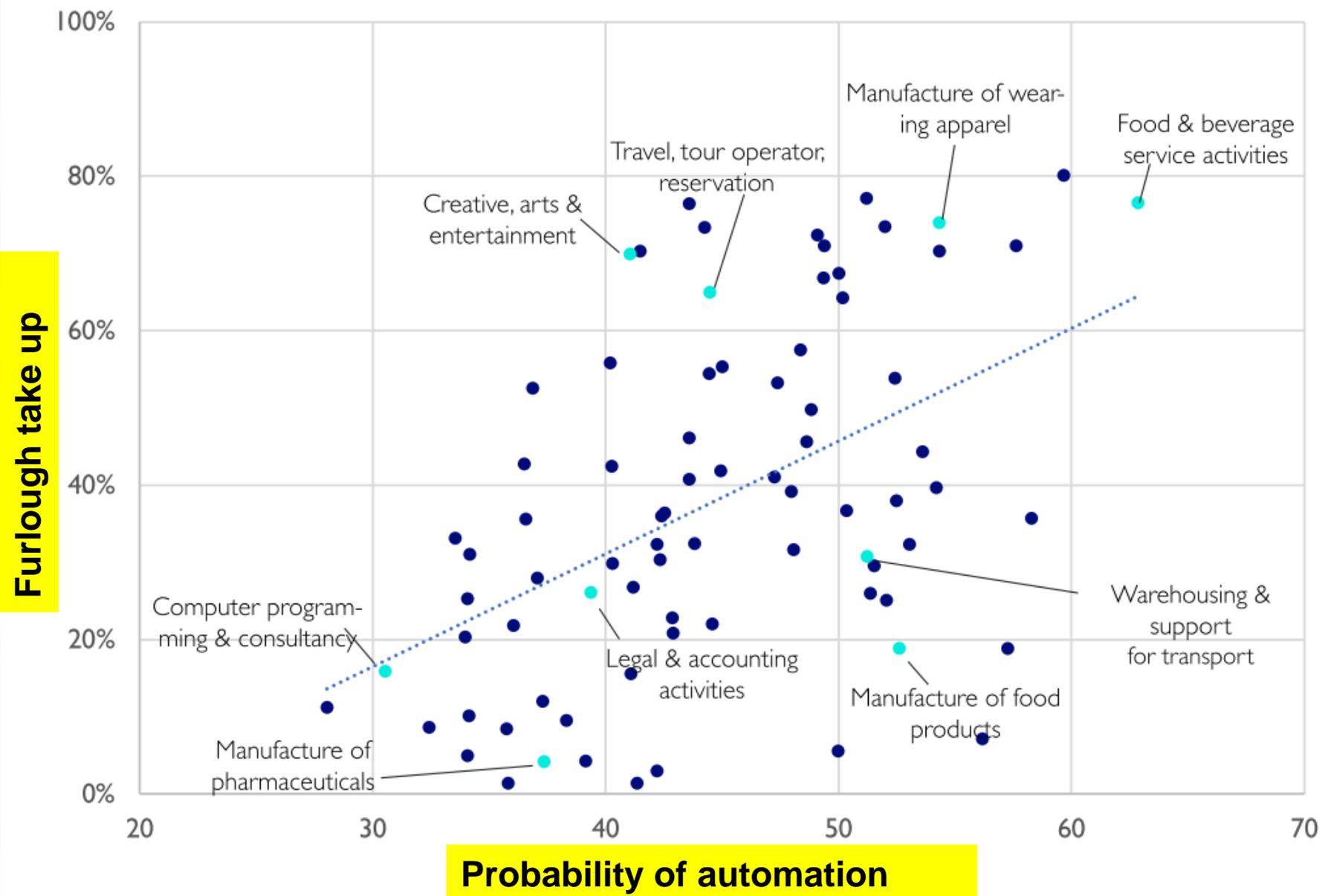


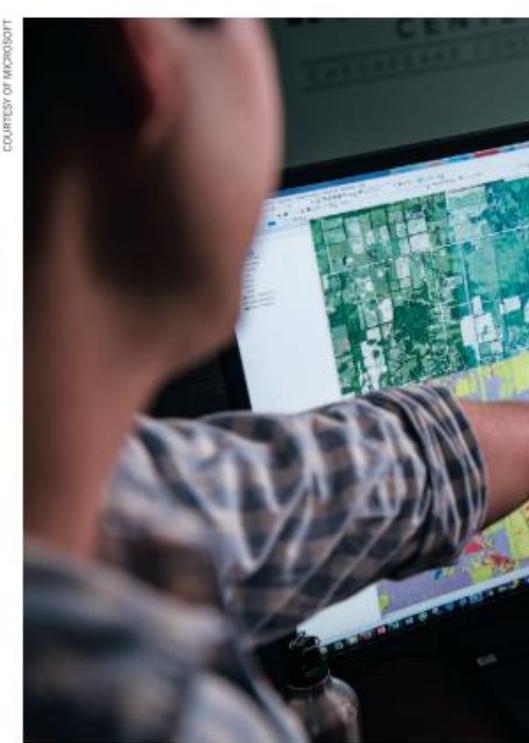
Figure 1: Relationship between furlough take-up and automation risk (RSA analysis of HMRC Coronavirus Job Retention Scheme statistics and ONS, the probability of automation in England)



Agricultural data business in Af



Alphabet
Google



Earth system changes

Fourth
Har
Intellig
Ear



How AI can enable a Sustainable Future

Executive Summary

NITROGEN
19ppm

Recommendation:
25ppm

MOISTURE

ESWORTH

Automation & machine intelligence

In Collaboration with PwC and S

January 2018

Microsoft, in collaboration with others, is using algorithms to convert satellite

AI for

Create an artificial-intelligence plat

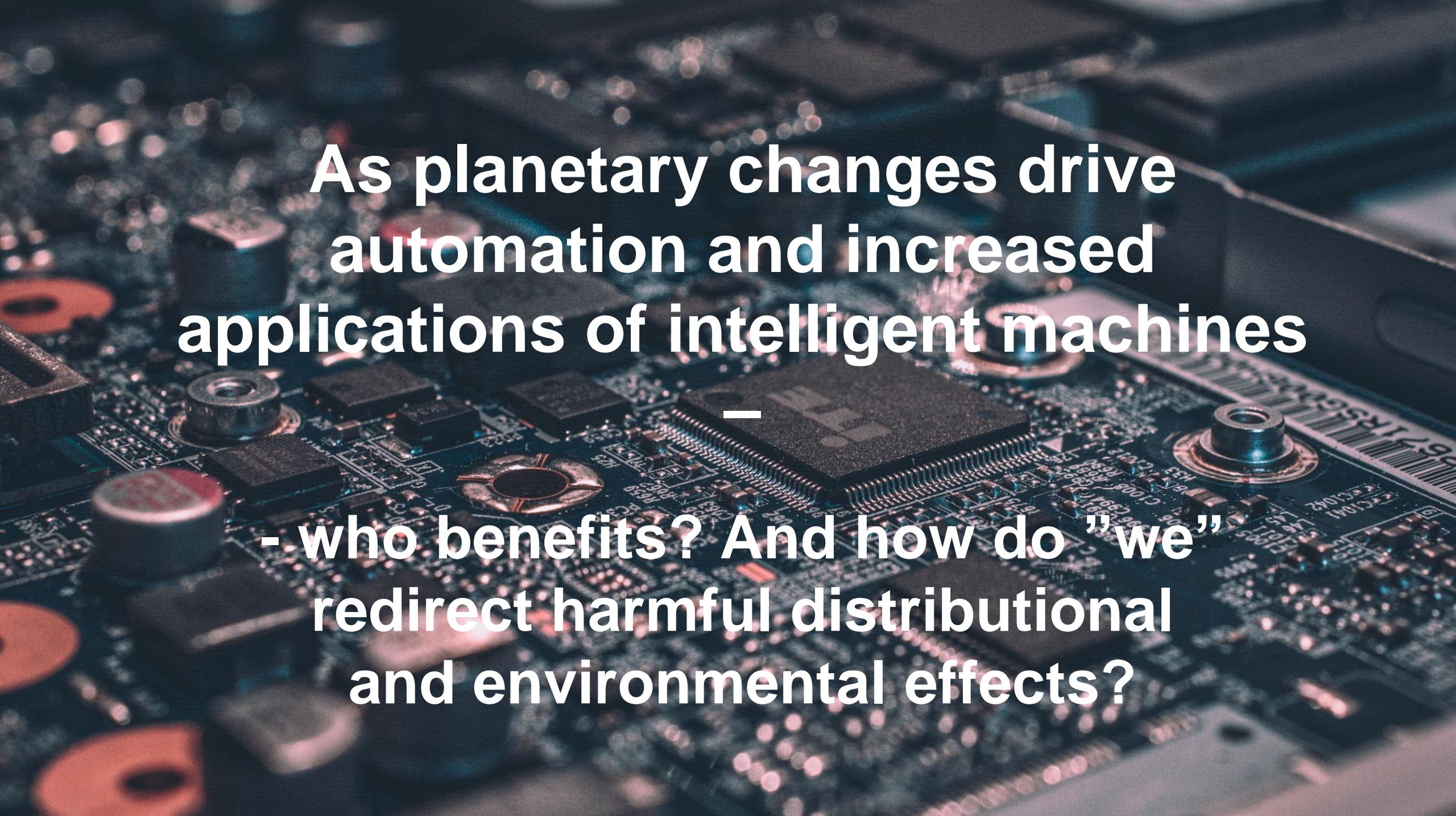
Earlier this year, I became Microsoft's first chief environment scientist. I've been tasked with deploying the company's deep investments in artificial intelli-

business. And th of the type that I developing can why, in 2017, M

The "digital divide" is growing for modern technologies (HDR 2019)

Automation in farming economic at large scales -> simpler ecosystems (monocultures)

Data ownership, transparency of data use, distribution of risks



**As planetary changes drive
automation and increased
applications of intelligent machines**

—

**- who benefits? And how do "we"
redirect harmful distributional
and environmental effects?**

Resilience principles





Thank you

E-post: victor.galaz@su.se

Twitter: [@vgalaz](https://twitter.com/vgalaz)

www.stockholmresilience.su.se



GLOBAL ECONOMIC DYNAMICS
AND THE BIOSPHERE
THE ROYAL SWEDISH ACADEMY OF SCIENCES

Beijer
Institute
OF ECOLOGICAL ECONOMICS



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