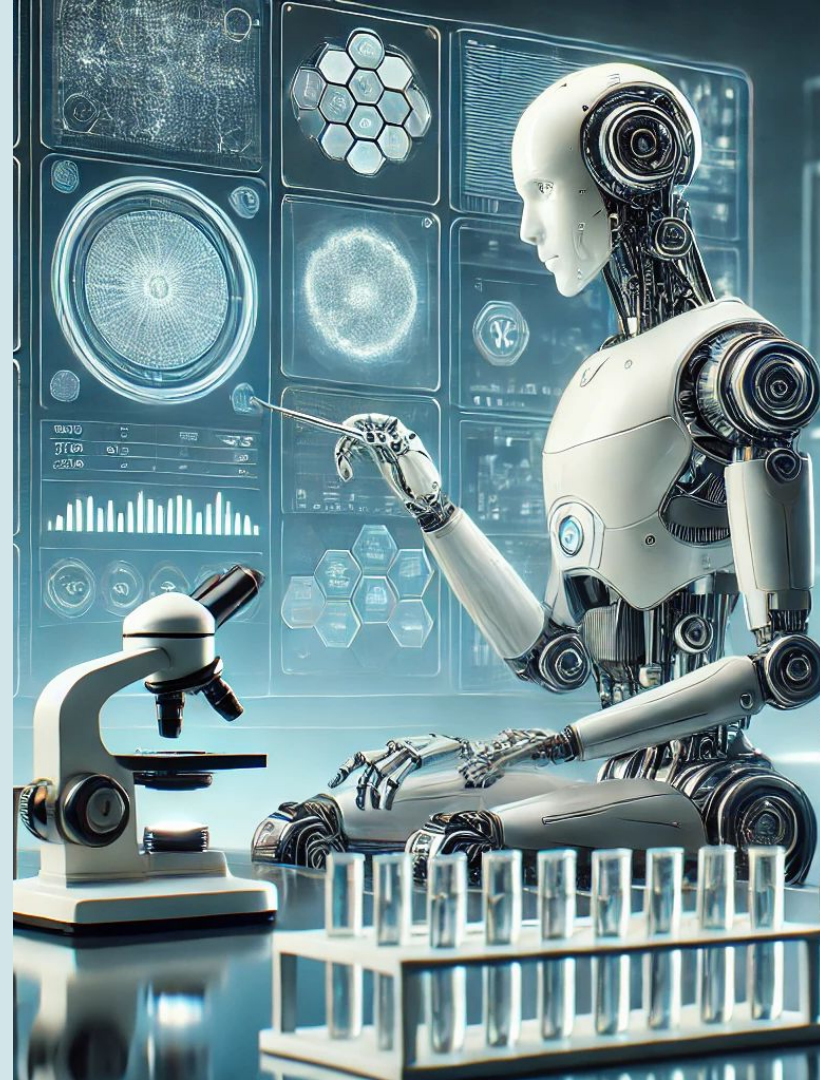


# Generative AI

## *Laws, Ethics and Best Practices*

Dr. Nikolaus Klassen  
NSF NCAR, Boulder, CO  
Oct 31, 2024



# AI crowned as scientific breakthrough of the year

Science & technology | The 2024 Nobel prizes

## AI wins big at the Nobels

Awards went to the discoverers of micro-RNA, pioneers of artificial-intelligence models and those using them for protein-structure prediction

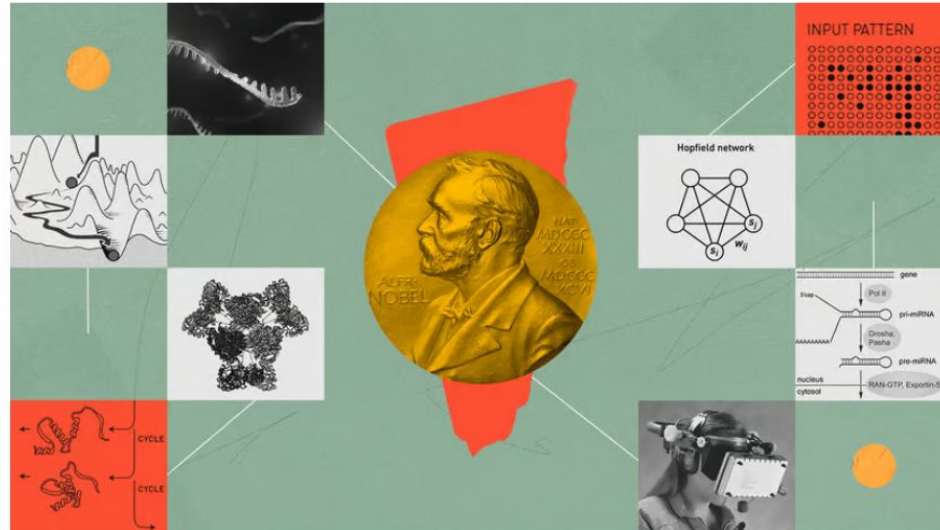
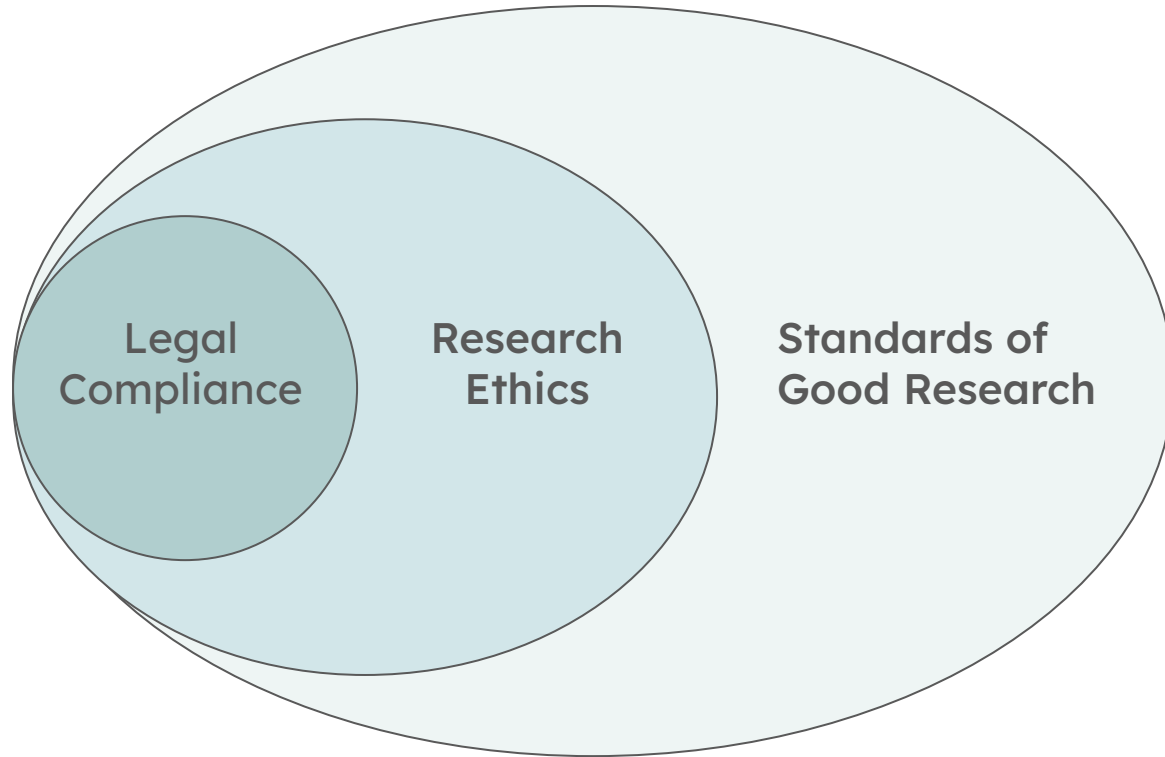


ILLUSTRATION: JAVIER PALMA

# 3 areas to consider when using generative AI



# *Laws*

**Building foundational  
models and data  
collection,  
fair usage**

# AI laws are still mostly under development

**Canada:**  
Artificial  
Intelligence  
and Data Act  
(Proposed)

**UK:**  
AI White  
Paper  
(guidelines)

**Japan:**  
Governance  
Guidelines for  
Implementation  
of AI Principles

**Brazil:**  
Artificial  
Intelligence  
Bill (No. 21/20)  
(under review)

**US:**  
Algorithmic  
Accountability  
Act  
(Proposed)

**European  
Union:**  
AI Act  
(proposed)

# Mandating accountability for high risk models

## **EU AI Act:**

General Purpose AI Systems can perform different tasks across domains

## **US Algorithmic Accountability Act:**

Systems that can be adapted for various tasks beyond their initial training

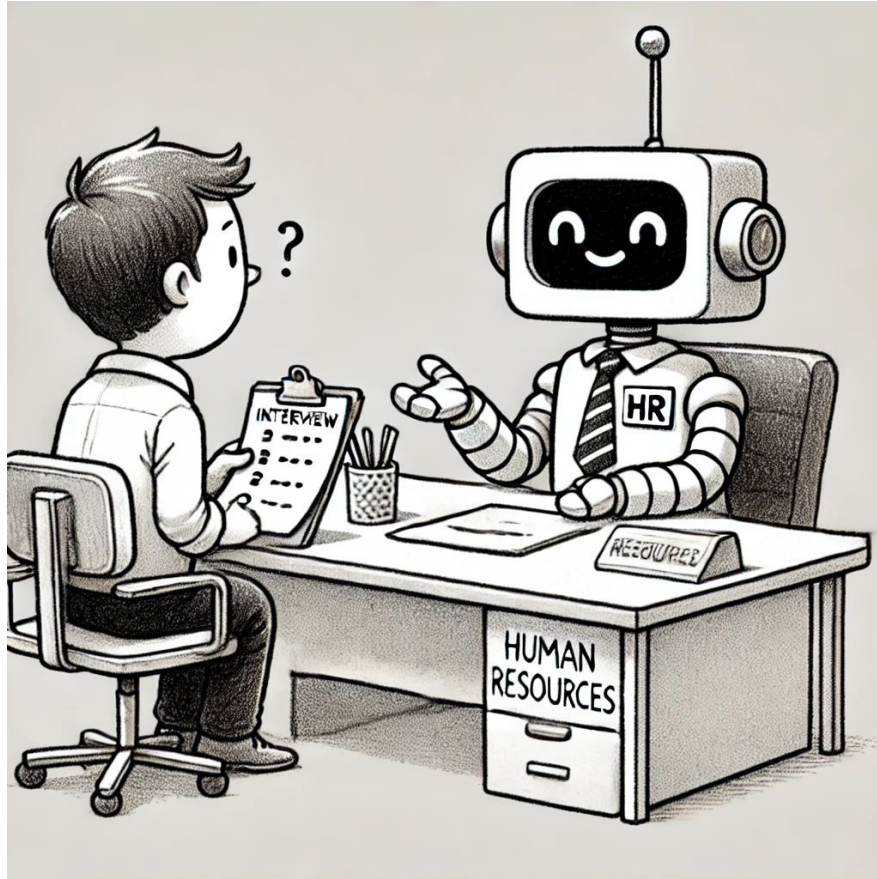
## **Canada Artificial Intelligence and Data Act:**

High impact systems that can influence human rights, health and wellbeing

## **UK AI White Paper:**

General purpose AI models that can be adapted to different needs and applications

# Fair usage: Transparency and attribution



Cartoon generated  
by ChatGPT 4o  
Oct 30 2024

“Design a cartoon in the style of a simple pencil drawing. It should show a human interacting with a robot who works in the Human resources department.”

# *Ethics*

**Bias mitigation,  
traceability and  
attribution**



# Bias mitigation: IBM Watson and synthetic cancer data

Several studies have compared Watson for Oncology's cancer treatment recommendations to those of hospital oncologists. The concordance percentages indicate how often Watson's advice matched the experts' treatment plans.

Bumrungrad International  
Hospital, Thailand:  
83% concordance



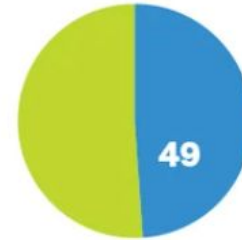
211 patients with breast, colorectal,  
gastric, and lung cancer

Manipal Comprehensive  
Cancer Center, India:  
73% concordance



638 patients with  
breast cancer

Gachon University  
Gil Medical Center, South  
Korea: 49% concordance

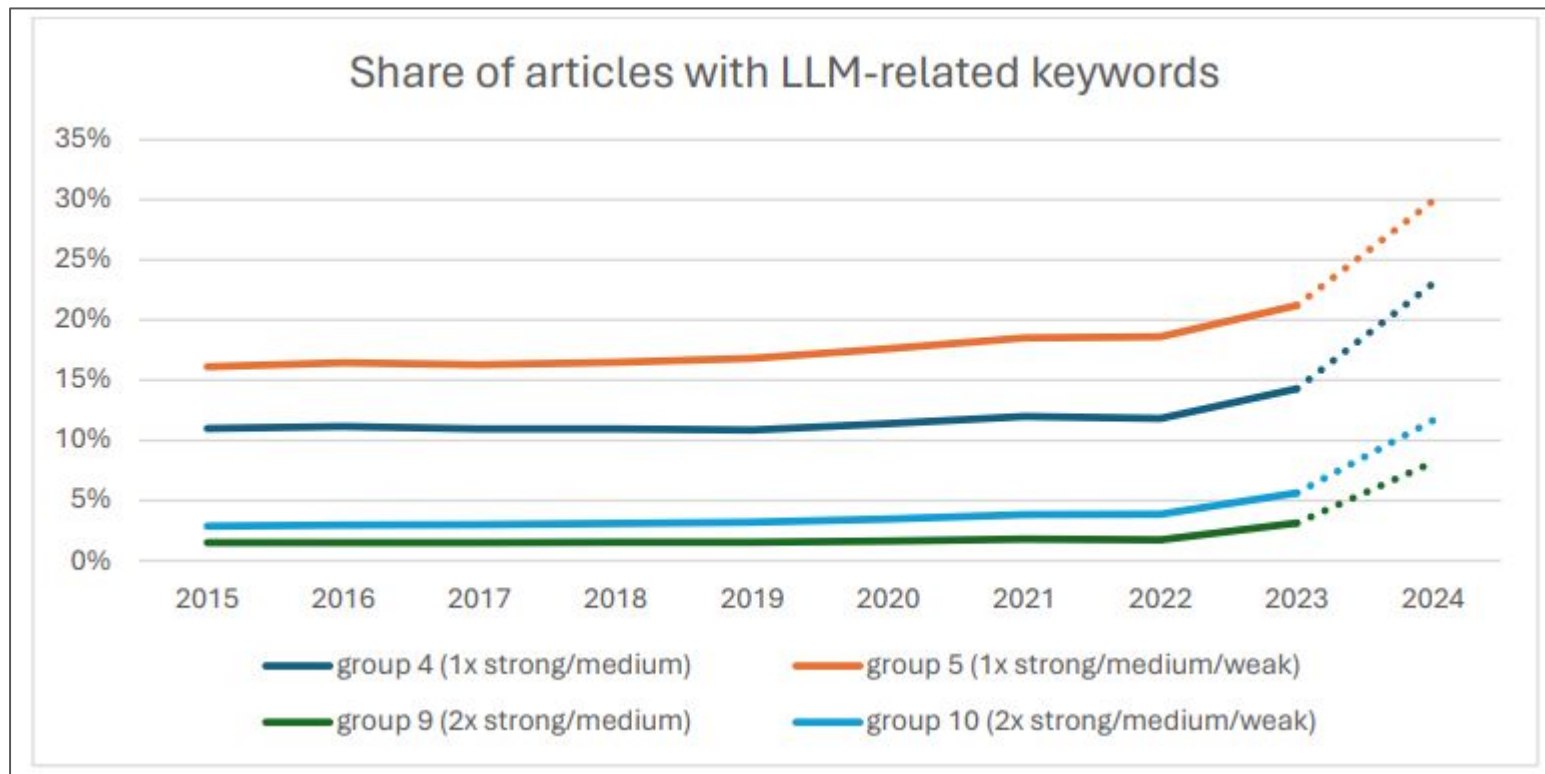


656 patients with  
colon cancer

# Bias mitigation: Rule of thumb

**Is there a meaningful discrepancy between the historical setting in which the data was generated, and the current setting in which the model is used?**

# Attribution: Using AI in publications



# *Best Practices*

**Research integrity  
and the law of the  
instrument**

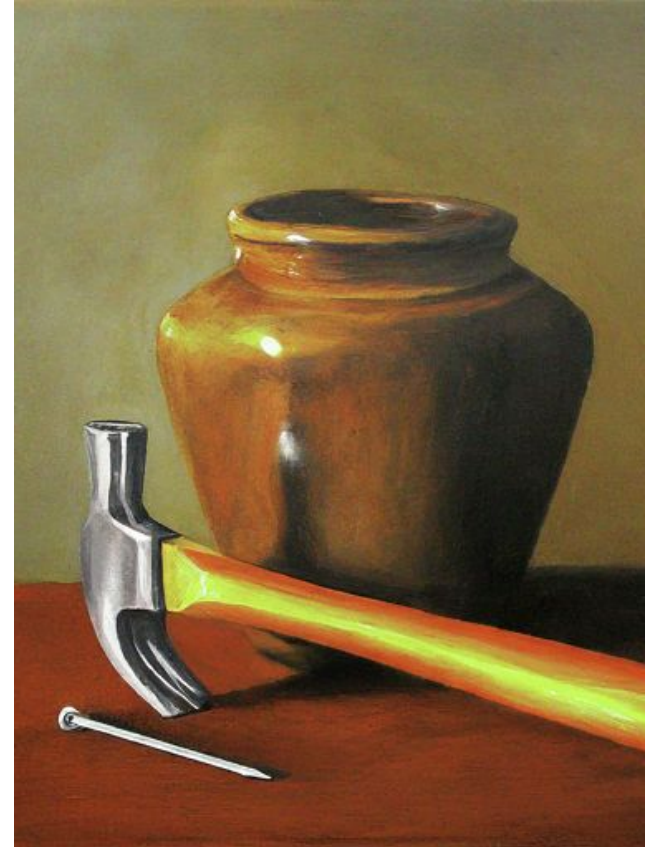
# AI tends to deepen replication crisis



# Law of the instrument (Maslow's Hammer)

"It is tempting, if the only tool you have is a hammer, to treat everything as if it were a nail."

Abraham Maslow



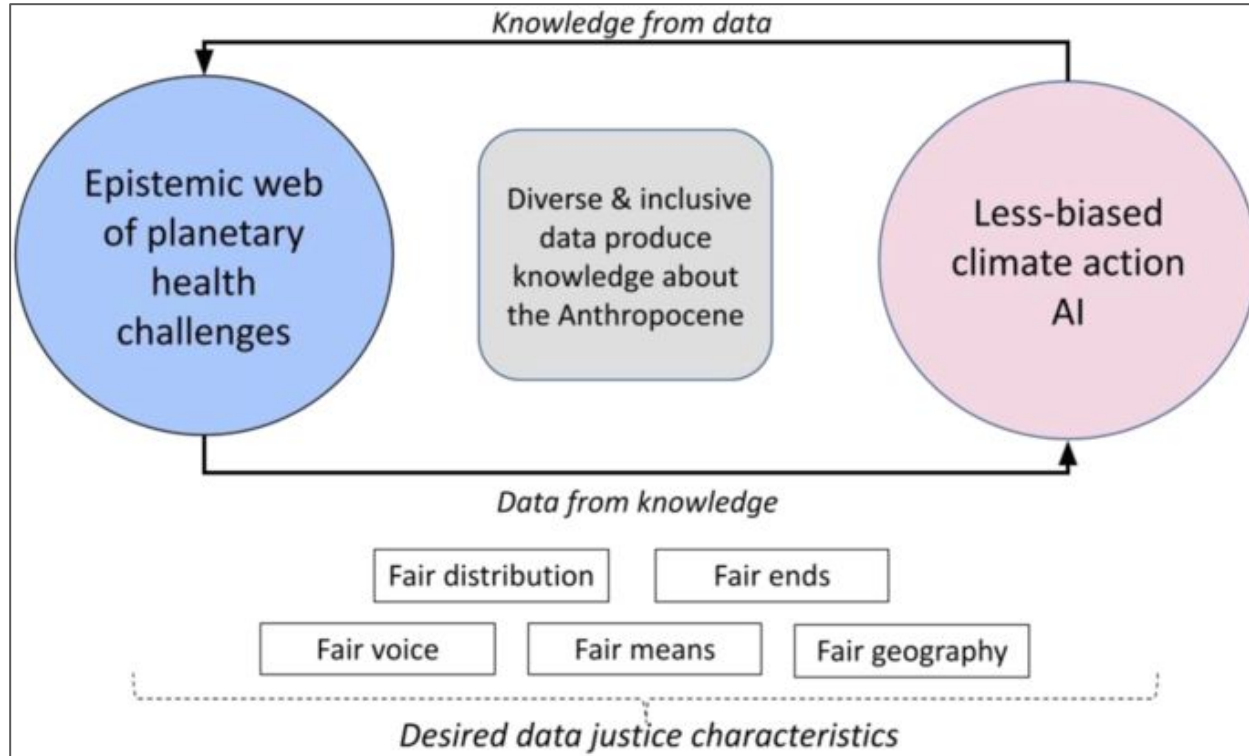
AI is a new *tool*,  
not a new **scientific**  
*paradigm*

**Thank you for your  
attention**



# *Appendix*

# Traceability and attribution: The Epistemic Web of planetary challenges



Debnath, R., Creutzig, F., Sovacool, B.K. et al. Harnessing human and machine intelligence for planetary-level climate action. *npj Clim. Action* 2, 20 (2023).