

AI, Data Analytics, and STI: Impacts, Challenges, and Opportunities for Developing Countries

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17 November 2025
Geneva, Switzerland

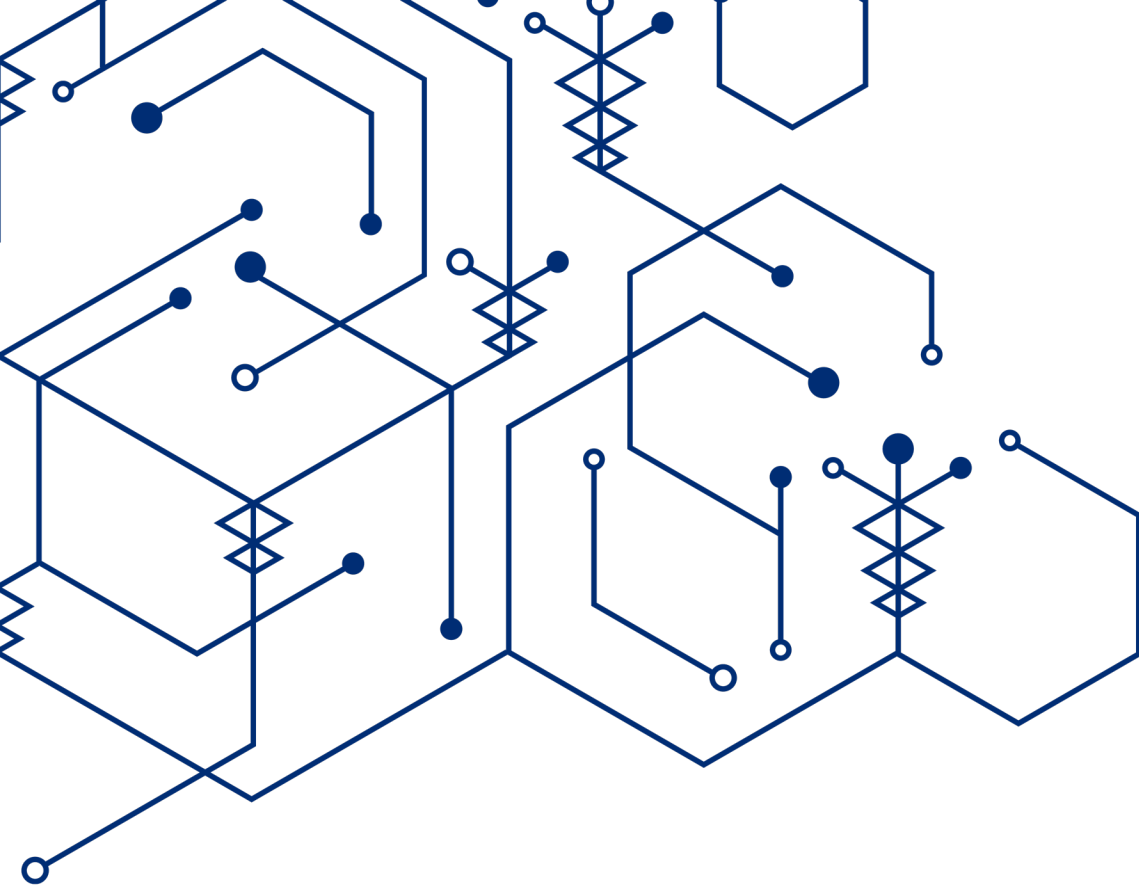
Issues Paper
On
Science, Technology and Innovation in the age of AI

Unedited Draft
Prepared by the UNCTAD Secretariat¹

¹ Contributions from the Governments of Algeria, Austria, Belize, Brazil, Burkina Faso, China, Colombia, Ecuador, Indonesia, Japan, Latvia, Peru, Portugal, Russian Federation, Switzerland, Türkiye and Uzbekistan, as well as the Economic and Social Commission for Asia and the Pacific (ESCAP), Economic and Social Commission for Western Asia (ESCWA), International Labour Organization (ILO), International Telecommunication Union (ITU), United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP), United Nations Educational, Scientific and Cultural Organization (UNESCO), United Nations Population Fund (UNFPA) and the World Health Organization (WHO) are gratefully acknowledged.
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Healthcare, Gender



Overview

- **The opportunity:** How AI is redefining discovery and innovation in healthcare
- **Challenges for developing nations:** Heterogeneous capabilities, risks, and consequences
- **Innovation and governance policies for healthcare:** How governments and institutions can enable AI-driven healthcare change responsibly
- **Role of open science and international collaboration:** How shared data, standards, and partnerships can ensure AI benefits are global.
- **Open questions and gender specific considerations:** Recommendations for national policy and strategy to effectively leverage AI

An AI-powered transformation in healthcare

An abstract graphic of white circuitry and geometric shapes on a dark blue background, located in the upper right and bottom right areas of the slide.

Pervasive and Wide-Ranging

AI-powered R&D: accelerating design generation, research operations and design evaluation



Clinical and Biomedical Research

- Predictive modelling
- Phenotyping and patient stratification



Genomics Research

- AI driven interpretation



Medical Devices and Diagnostics

- Smart sensor data analytics
- Digital biomarkers identification



Clinical Trials and Translational Research

- Digital twins
- Patient recruitment



Public Health and Population Research

- Epidemiologic modelling
- Health equity analysis

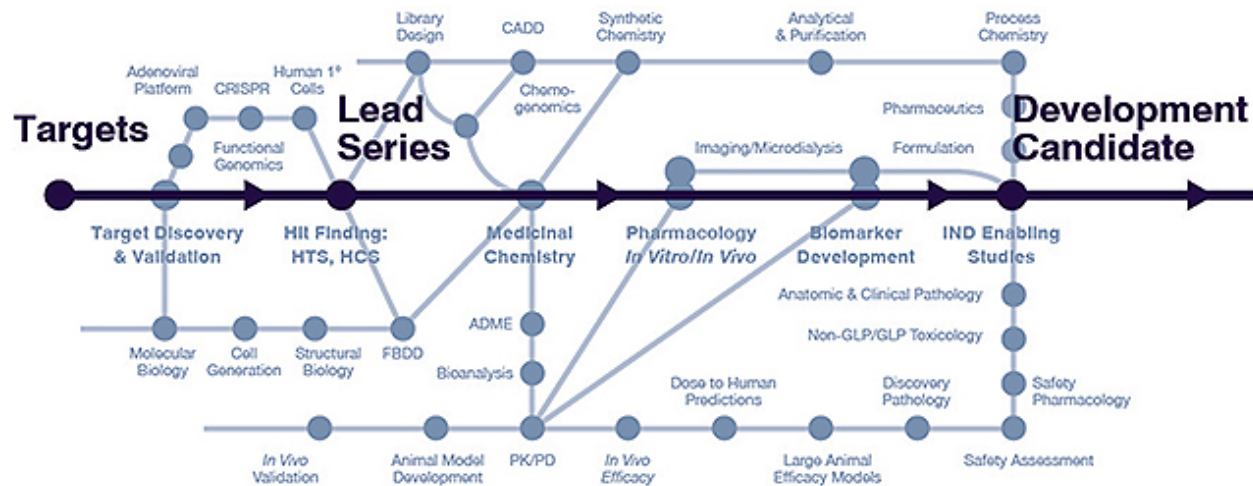


Healthcare Operations and Outcomes

- Workflow and efficiency modelling
- Cost effectiveness and policy modeling

Transformation Across Healthcare

Transforming Drug Discovery



Drug Development & Delivery, 2024

NVIDIA

Home AI Data Center Driving Gaming Pro Graphics Robotics Healthcare Startups AI Podcast NVIDIA Life

Screening for COVID-19: Japanese Startup Uses AI for Drug Discovery

July 8, 2020 by Isha Sallan

PRESS RELEASE | ARGONNE NATIONAL LABORATORY

Argonne accelerates COVID antiviral discovery with AI

NVIDIA Unveils Large Language Models and Generative AI Service to Advance Life Sciences R&D

Part of NVIDIA AI Foundations, New BioNeMo Cloud Service Accelerates Life Sciences Research, Drug Discovery and Protein Engineering; Amgen and a Dozen Startups Among Early Access Customers

AI-driven drug discovery picks up as FDA pushes to reduce animal testing

By Sneha S K and Puya Singh

September 2, 2025 4:53 PM EDT · Updated September 2, 2025

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Heterogeneous capabilities, risks, and consequences

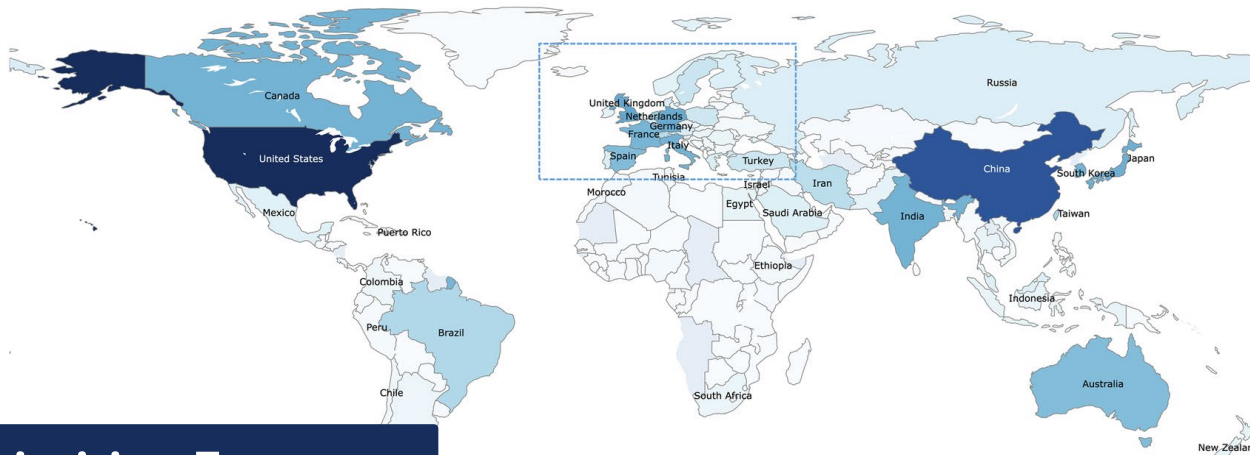


**“THE FUTURE IS ALREADY
HERE – IT'S JUST NOT
EVENLY DISTRIBUTED.”**

WILLIAM GIBSON, *THE ECONOMIST*, DECEMBER 4, 2003

@DANCHARVEY #DYSTOPIA

Developing Nations and Research Output

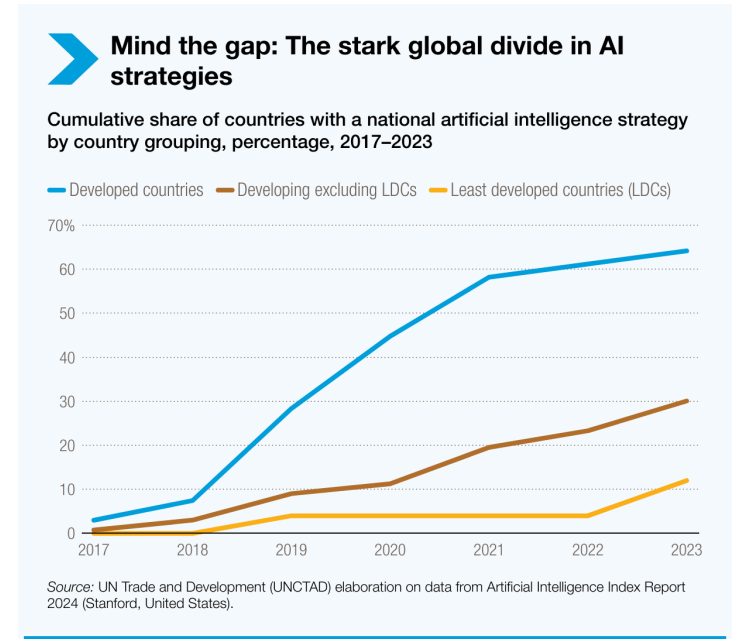
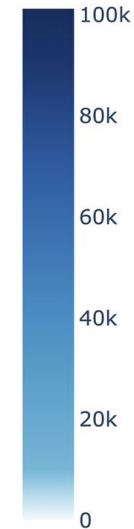
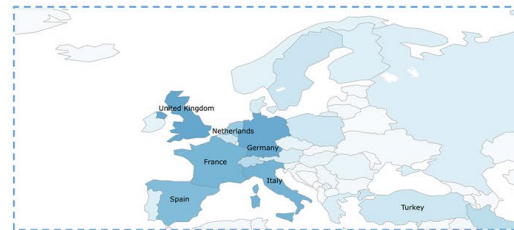


Limiting Factors:

- Data
- Resources
- Talent

Counts of AI-focused life science articles by country, cumulated for the years 2000 to 2022
($n = 397,967$)

Schmallenbach et al. 2024



AI is transformative, but access and implementation are uneven, creating a critical need for **tailored strategies**

AI in Medical Imaging

Marey et al. *European Radiology*
<https://doi.org/10.1007/s00330-025-12031-z>

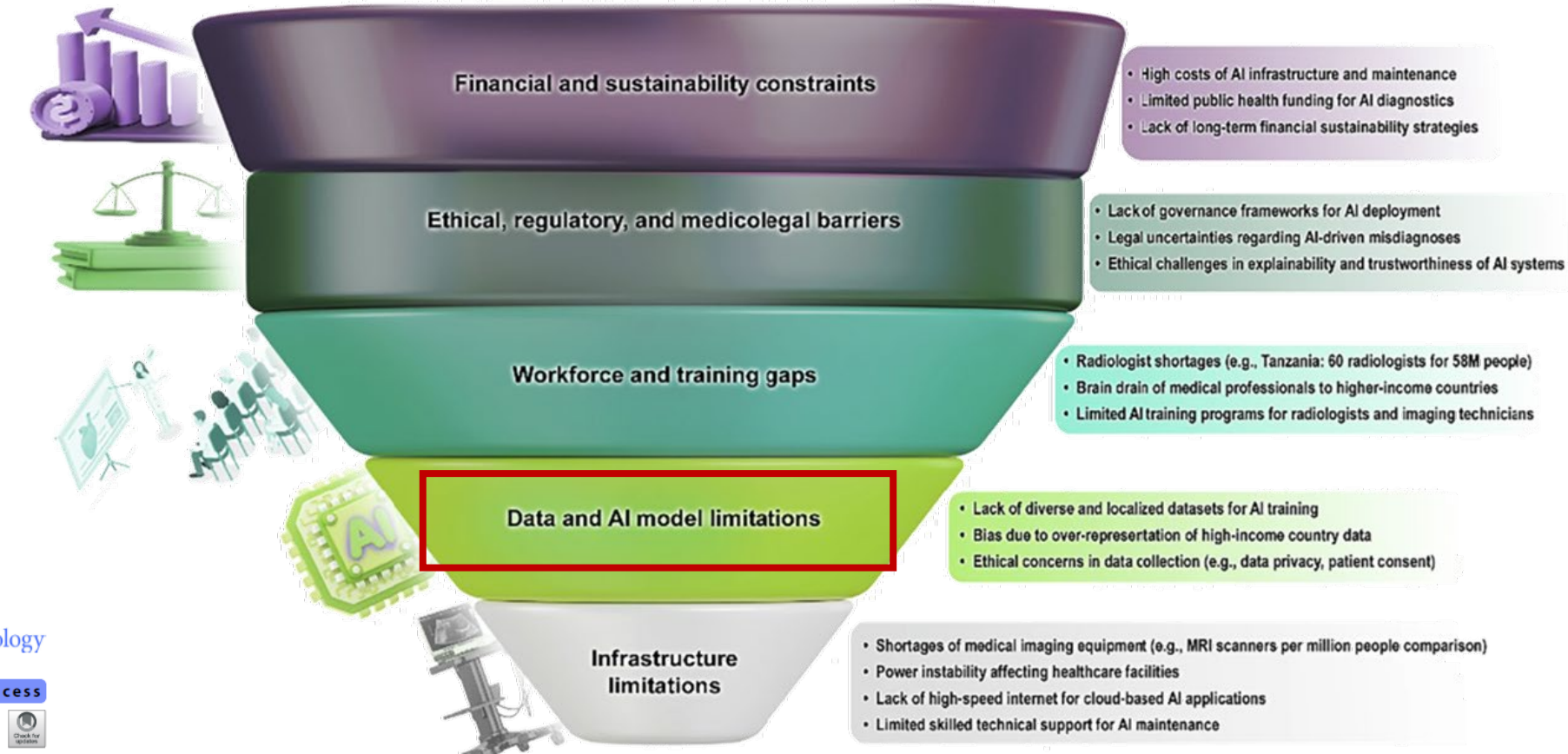
EUROPEAN SOCIETY OF RADIOLOGY
European Radiology

SPECIAL REPORT

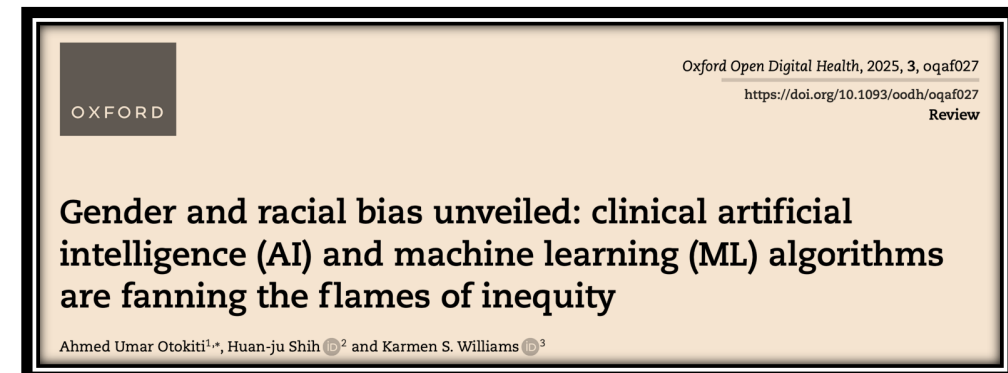
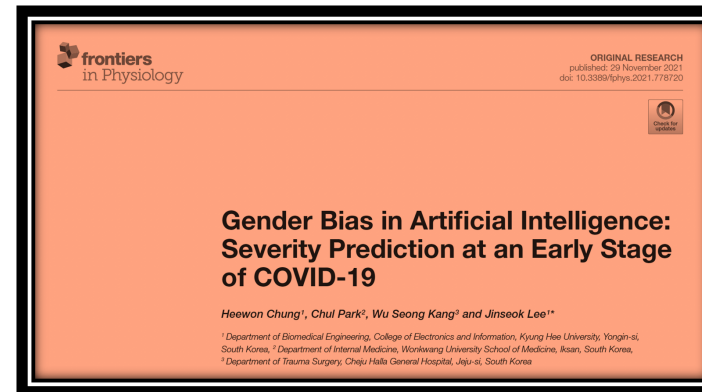
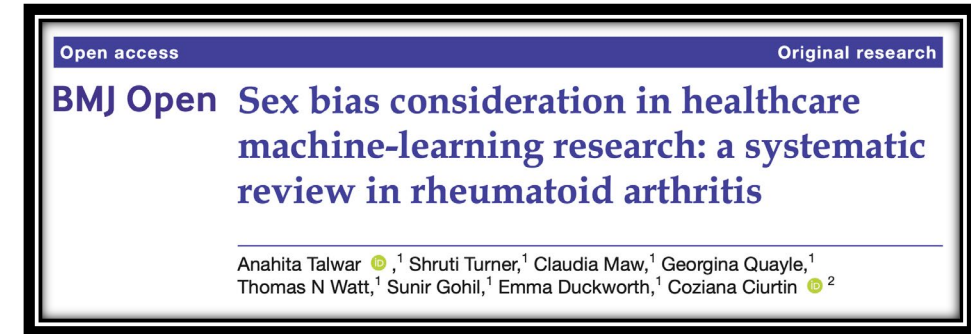
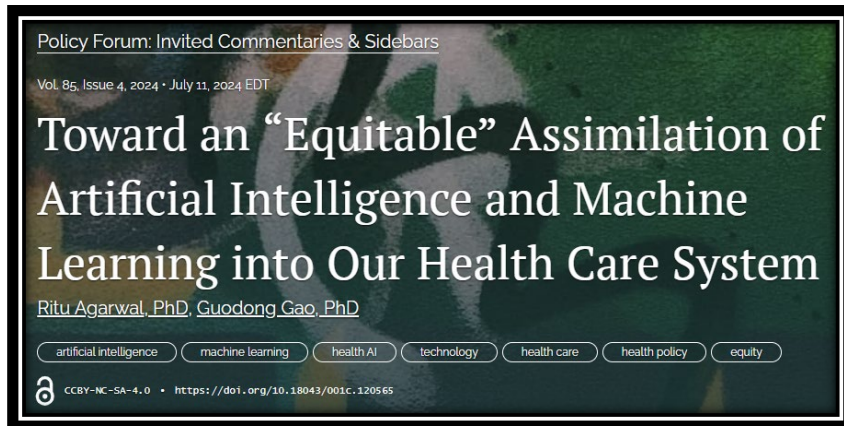
Open Access

A perspective on AI implementation in LMICs: challenges, priorities, and strategies

Ahmed Marey^{1*}, Ona Ambrozaitė², Ahmed Afifi³, Ritu Agarwal⁴, Rama Chellappa⁵, Sola Adeleke⁶ and Muhammad Umair⁷



Looming Risks: AI Bias

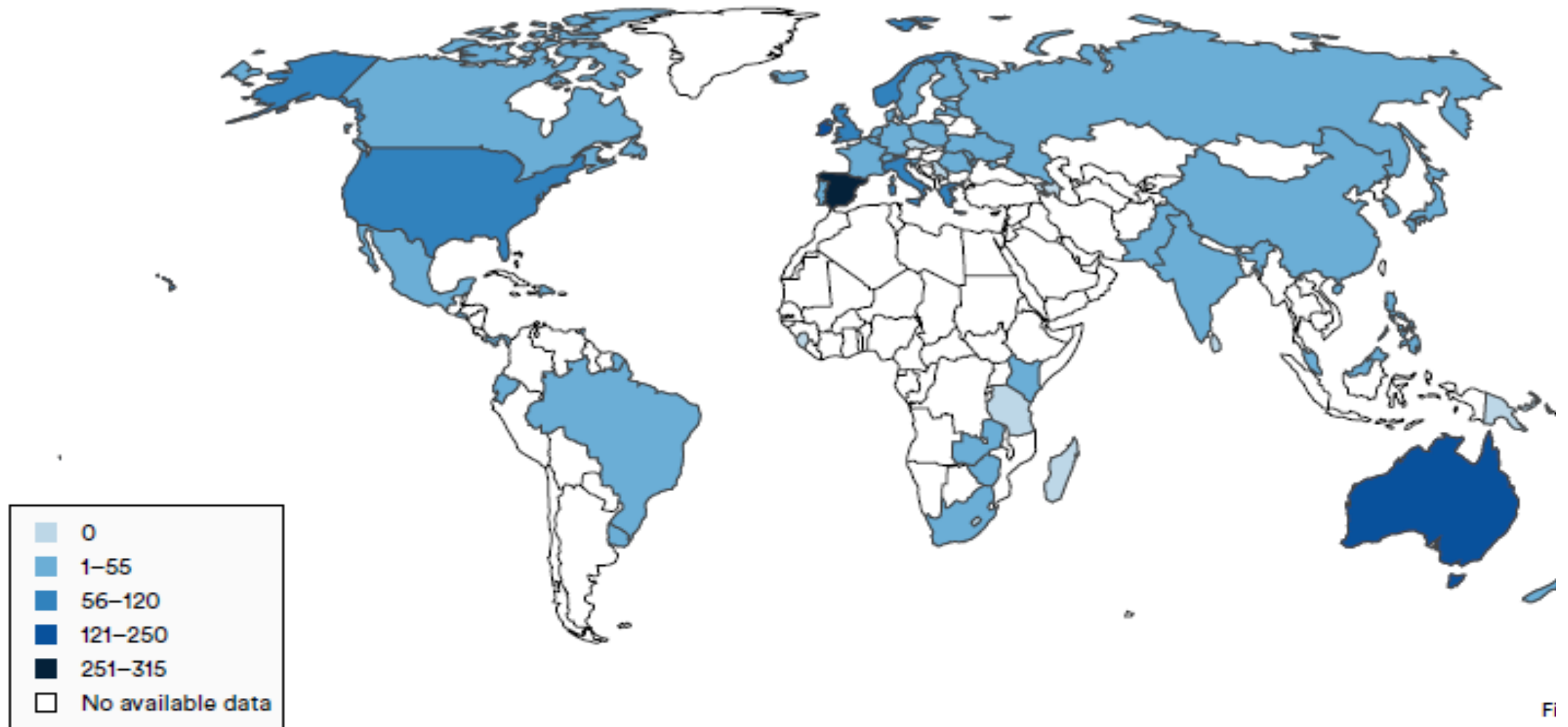




Innovation and governance policies

Number of mentions of AI in legislative proceedings by country, 2024

Source: AI Index, 2025 | Chart: 2025 AI Index report



Policy and Innovation Strategies in Healthcare

Promoting Agile and Adaptive Policymaking

Regulatory sandboxes for digital health (World Bank)

Pilot deployments to inform policy (WHO)

WHO's guidance on iterative governance

Fostering Collaboration

Public-Private Research Centers and Centers of Excellence (i.e. South Africa's CSIR CoE)

Shared data trusts for approved research with framework

Frugal Innovation: Leverage cross-sector partnerships

Strengthening AI & Data Governance

WHO's six ethical principles for health and AI

Third Party/Independent evaluation

Minimum data set and interoperability standards

Pilot Deployments: TRInage for Mothers using AI (TRIM-AI)

- AI/NLP tools can meaningfully augment maternal health services in resource-constrained settings
- Pilot deployment (started June 2022), TRIM-AI improved accuracy in predicting high-risk conditions by ~17 % over the prior baseline model and reduced help-desk agent workload by ~12 %



Frugal Innovation in Healthcare

- Using a highly efficient surgical model and variable pricing, Aravind Eye Hospital in India has reduced cataract blindness by more than 50 percent and serves all patients regardless of ability to pay
- Collaborated with Seva Foundation, local suppliers, training institutions, and government programs to scale low-cost cataract surgeries

JAMA Ophthalmology

Home | JAMA Ophthalmology | Vol. 112, No. 7

Article

Attacking the Backlog of India's Curable Blind The Aravind Eye Hospital Model

G. Natchiar, MD; Alan L. Robin, MD; Ravilla D. Thulasiraj, MBA ; [et al](#)

[Author Affiliations](#)

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Arch Ophthalmol

Published Online: July 1994

1994;112;(7):987-993. doi:10.1001/ar-

chopht.1994.01090190135035

Eye (2021) 35:1895–1903

<https://doi.org/10.1038/s41433-020-0954-5>



ARTICLE

Seven-year trends in cataract surgery indications and quality of outcomes at Aravind Eye Hospitals, India

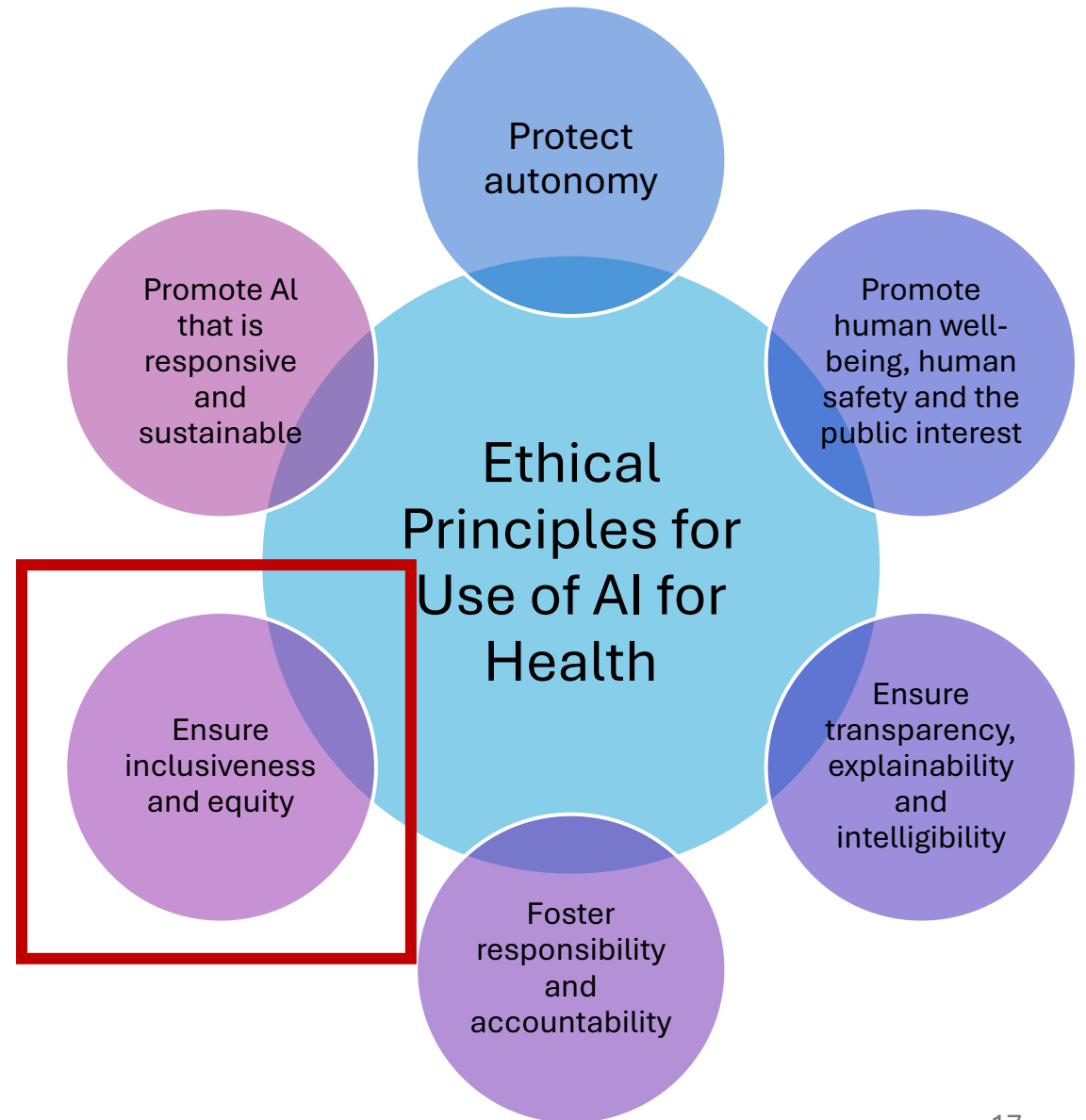
Ravilla D. Ravindran¹ · Sachin Gupta² · Aravind Haripriya³ · Thulasiraj Ravilla⁴ · Ashok Vardhan S⁵ · Ganesh-Babu B. Subburaman⁴

WHO Ethical Principles as a Strategic Framework for Developing Countries



South-East Asia

Example: WHO SEARO investing in strengthening health information systems to collect sex- and gender-disaggregated data and monitor disparities



Open science and international collaboration



International Organizations and Healthcare

Bridging Gaps in Access

- **AI4GH:** Brings together research institutions across four countries (Bangladesh, Nepal, Pakistan, Sri Lanka) to share data frameworks and open research pathways to enable cross-country learning and scalable solutions for SRMH research

Building Local Capacity

- Organizations like UNESCO, WHO, OECD, UN CSTD, and the World Bank enable training, infrastructure support, and technology transfer (Khan et al., 2024)

Aligning Global Standards

- International Telecommunication Union (ITU) & WHO Focus Group on AI for Health
- Creates benchmarking frameworks and shared standards for AI in health

Empowering Local Innovation

- George Institute for Global Health India
- SMARThealth Pregnancy system uses AI to support frontline health workers in delivering high-quality prenatal and postnatal care in rural India

Partnerships for Equity

- NIH Common Fund's DS-I Africa program and the Wellcome Trust-funded H3Africa initiative, which aim to build research capacity, infrastructure, and ethical governance in Africa (Adebamowo et al., 2023)

Collaborations in the Global South



SUB-SAHARAN AFRICA

Hub for AI in Maternal, Sexual, and Reproductive Health (HASH)



Strengthening Maternal, Sexual and Reproductive Health (MSRH) systems through AI

Led by Infectious Diseases Institute (IDI), Sunbird AI, and Makerere University COCIS; funded by IDRC and Sida

Engages **researchers, innovators, and organizations** across multiple Sub-Saharan African countries

Innovators: **~10 teams from 7 countries** developing AI tools, including chatbots, predictive analytics, and image analysis

Prioritizes **ethics, gender equity, inclusion,** and context-specific AI design

Provides **capacity building** through the HASH Network: collaboration, mentoring, training, and stakeholder engagement

GLOBAL EFFORTS

AI4PEP/AI4Mpox



Multi-Region Reach:

- Connects researchers, data scientists, and public-health experts across Africa, Asia, Latin America, and MENA, creating a global network

Shared Learning & Rapid Response:

- Global collaboration enables cross-country learning from outbreaks and interventions, accelerating public-health solutions

Standardized, Scalable Approaches:

- Development of frameworks, AI models, and tools that are adaptable
- Ensures ethical, equitable, and context-sensitive AI practices are shared globally

Policy & Equity Impact:

- AI4PEP can influence regional and international policy, strengthen equity-focused decision-making, and foster trust in AI solutions across borders

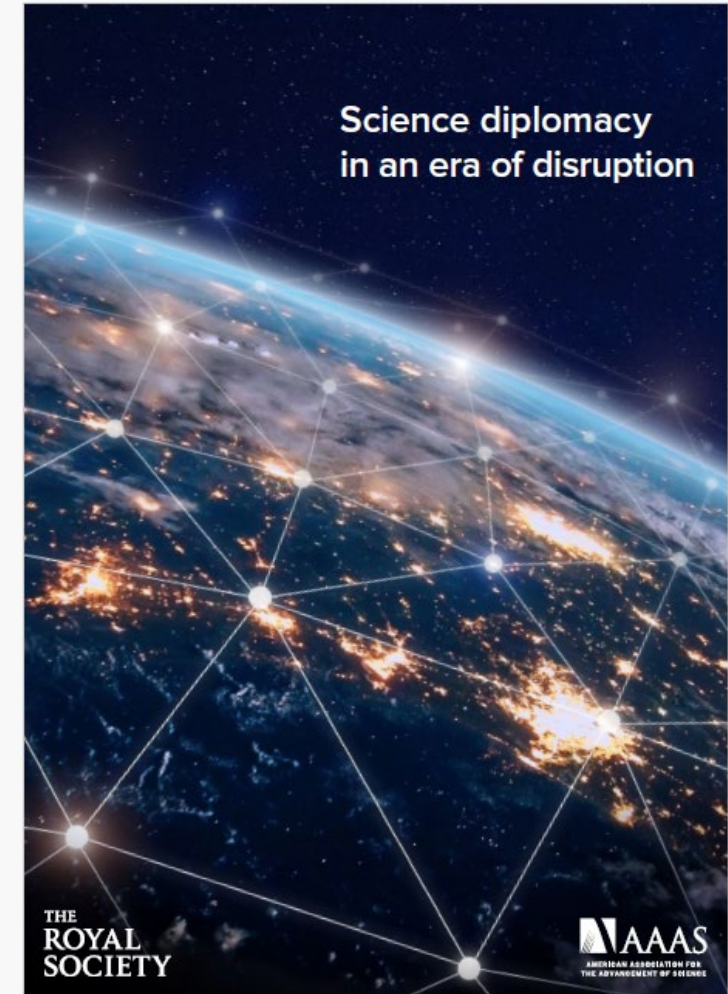
AI4MPox – a project using AI to track, model, and predict monkeypox outbreaks across countries, informing timely policy and resource allocation



AI4Mpox
INITIATIVE

A Potential Tool

1. Centrality of science in foreign policy and vice-versa
2. Vigilance to national security risks
3. The need for trust in practitioners
4. Elevating trust in science
5. Role of non-state actors
6. Inclusive international scientific collaborations



Open questions, opportunities and gender-related considerations



Uneven Benefits of AI

The proposed capacity-building initiatives must close the digital divide between developed and developing countries



Balancing Openness and Security

Openness increases the risk of misuse



Impact on Researchers and Research

Concern of over-reliance on AI tools and potential research fraud



Environmental Impacts

There is significant energy consumption and carbon footprint of training large AI models



AI and (Gender) Equity

AI must address gender disparities in STI, such as through targeted programs for women in AI research



Future Workforce

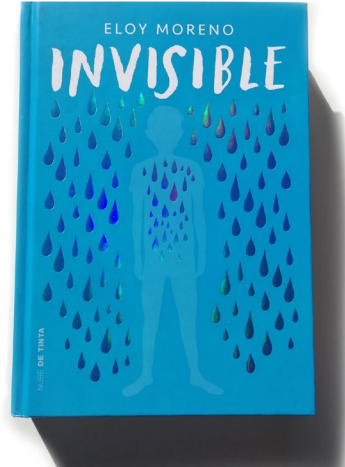
AI can transform education systems and workforce training to prepare future generations for AI-driven economies

AI, STI, and Gender: Critical Exclusion Gaps



Limited “voice”

Involvement in AI Research,
Conceptualization and Design



Limited “benefit”

Invisibility in AI Training Data
Sets: Health “Data Poverty”



Constraints on “innovation”

A Looming AI Adoption and
Use Divide

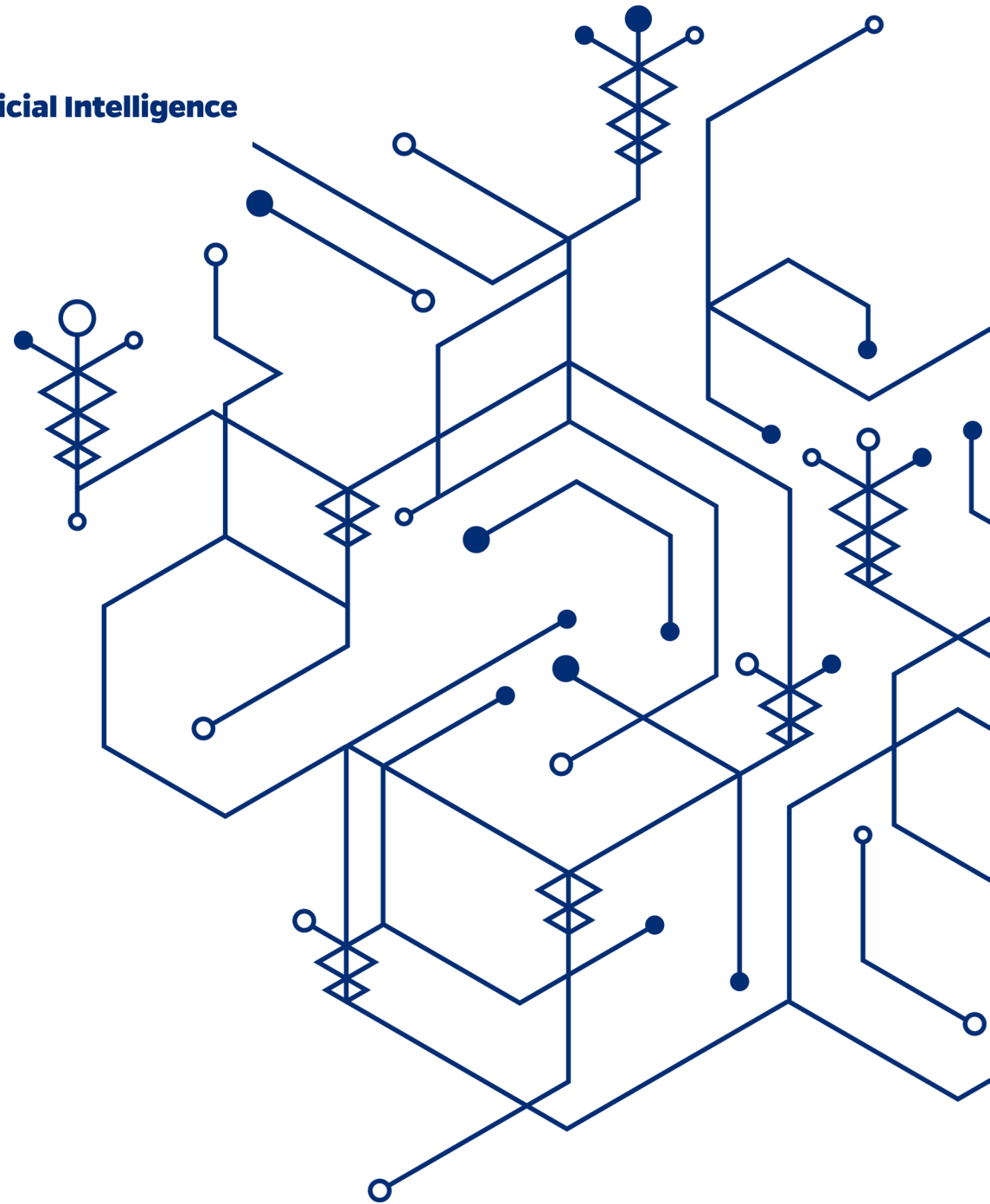
Recommendations for Member Governments

Successful transformation requires integrated STI policies that position gender inclusion as core competitive strategy rather than compliance burden.



With great power comes great responsibility

The Promise and Perils of AI



Thank you.

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