

How to Design & Use Ethical Technologies for Health



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Allocation of scarce life-saving resources (*ventilators, ICU beds*)

- priority to whom?
- sickest, most likely to survive, first-come first-serve,...



Lockdown measures

- when and how long?
- harm to vulnerable groups (physically? socio-economically?), to essential workers, to youth

COVID-19 Contact Tracing



Ethical issues:

- reducing harm
- access to information (*agency*)
- patient privacy (*agency*)

Question: How to balance?

Challenge to traditional contact tracing

- respiratory transmission
- up to 14-day incubation
- asymptomatic contagion
- wide spread

<https://blog.petrieflom.law.harvard.edu/2020/03/30/anonymity-in-the-time-of-a-pandemic-privacy-vs-transparency/>



Ethical issues:

- ✓ reducing harm
- ✓ access to information (*agency*)
- ✓ patient privacy (*agency*)

Question: How to balance?

Digital contact tracing:

- privacy-by-design
- availability of information
- accuracy
- speed



Ethical issues: DESIGN

- ✓ reducing harm
- ✓ access to information (agency)
- ✓ patient privacy (agency)

Question: ~~How to balance?~~

POLICY +
DESIGN

Digital contact tracing:

- privacy-by-design
- availability of information
- accuracy
- speed

- (1) Adoption
Low rate of download & running
- (2) Response
*Unreliable response to test results
& exposure notifications*

<https://aiethicslab.com/contact-tracing/>



Dissecting racial bias in an algorithm used to manage the health of populations

 Ziad Obermeyer^{1,2,*}, Brian Powers³, Christine Vogeli⁴,  Sendhil Mullainathan^{5,*†}

+ See all authors and affiliations

Science 25 Oct 2019:
Vol. 366, Issue 6464, pp. 447-453
DOI: 10.1126/science.aax2342

BIAS IN HEALTH PREDICTION TOOLS

- “prediction algorithms to identify and help patients with complex health needs”
- “algorithm predicts **health care costs** rather than illness, but unequal access to care means that we spend less money caring for Black patients than for White patients”
- “Remedying this disparity would increase the percentage of Black patients receiving additional help from **17.7** to **46.5%**”

<https://science.sciencemag.org/content/366/6464/447/>



APPLAUSE^o



Dealing with biases in Artificial Intelligence

A discussion on the types of biases & on the importance of tackling them

webinar with Cansu Canca (AI Ethics Lab),
Laura Haaber Ihle (AI Ethics Lab & Harvard)

moderated by: Julia Zacharias (Applause)

Types of biases in AI systems:

- data (collection, labelling)
- algorithm (purpose, inputs)
- context and use

How to deal with them?

- datasets
- algorithm
- testing
- feedback loop



AI Research with Human Subjects (AI HSR)

- *The Belmont Report*

 - Principles of Biomedical Ethics*

 - respect for persons (autonomy)
 - beneficence – non-maleficence
 - justice

- Common ethical questions in AI HSR

 - data sets
 - *algorithmic bias; secondary use; re-identification; consent*
 - research participation
 - *black box / explainability; risk assessment; withdrawal; whose data?*
 - misuse
 - *dual use; function creep*



CITI Program Webinar

Artificial Intelligence (AI) and Human Subject Protections

Technology, Ethics, and Regulations

Covers various technologies and their associated ethical issues and governance approaches.

ORGANIZATIONS

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QUESTIONS?

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- + Artificial Intelligence (AI) and Ethics in Human Subjects Research **NEW**
- + Regulatory Approaches to Artificial Intelligence (AI) in Human Subjects Research **NEW**
- + Robotics, Ethics, and Healthcare Research **NEW**

<https://about.citiprogram.org/en/course/technology-ethics-and-regulations/>



AI / TECH ETHICS:

DESIGN

+

RULES

Content / product:

Developing *ethical* technologies

Process:

Ensuring *ethical* processes for tech development

Implementation:

Using and implementing tech *ethically*

RESEARCH

DESIGN

DEVELOPMENT

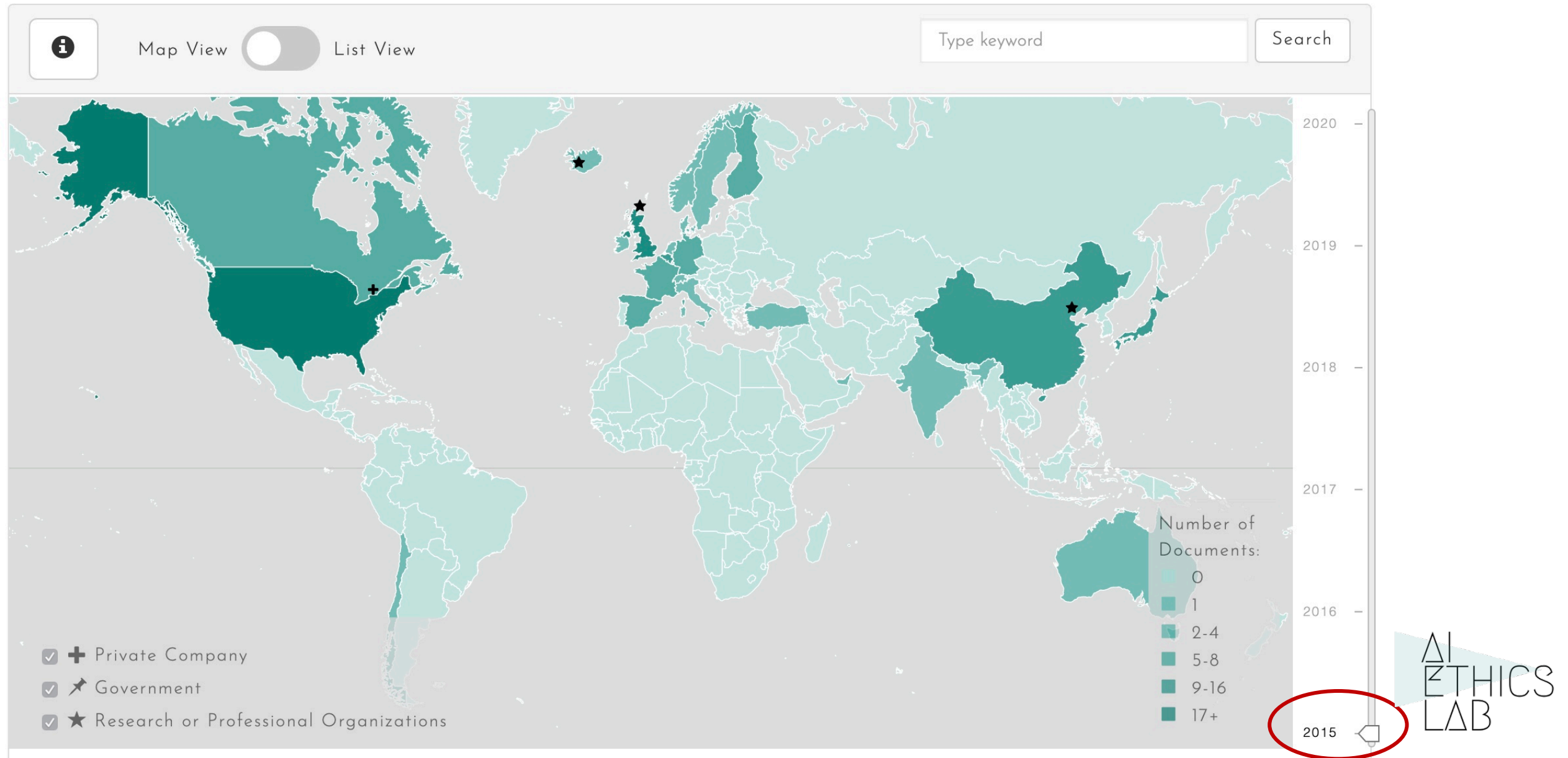
IMPLEMENTATION

UPDATE

ethics review
ethics approval

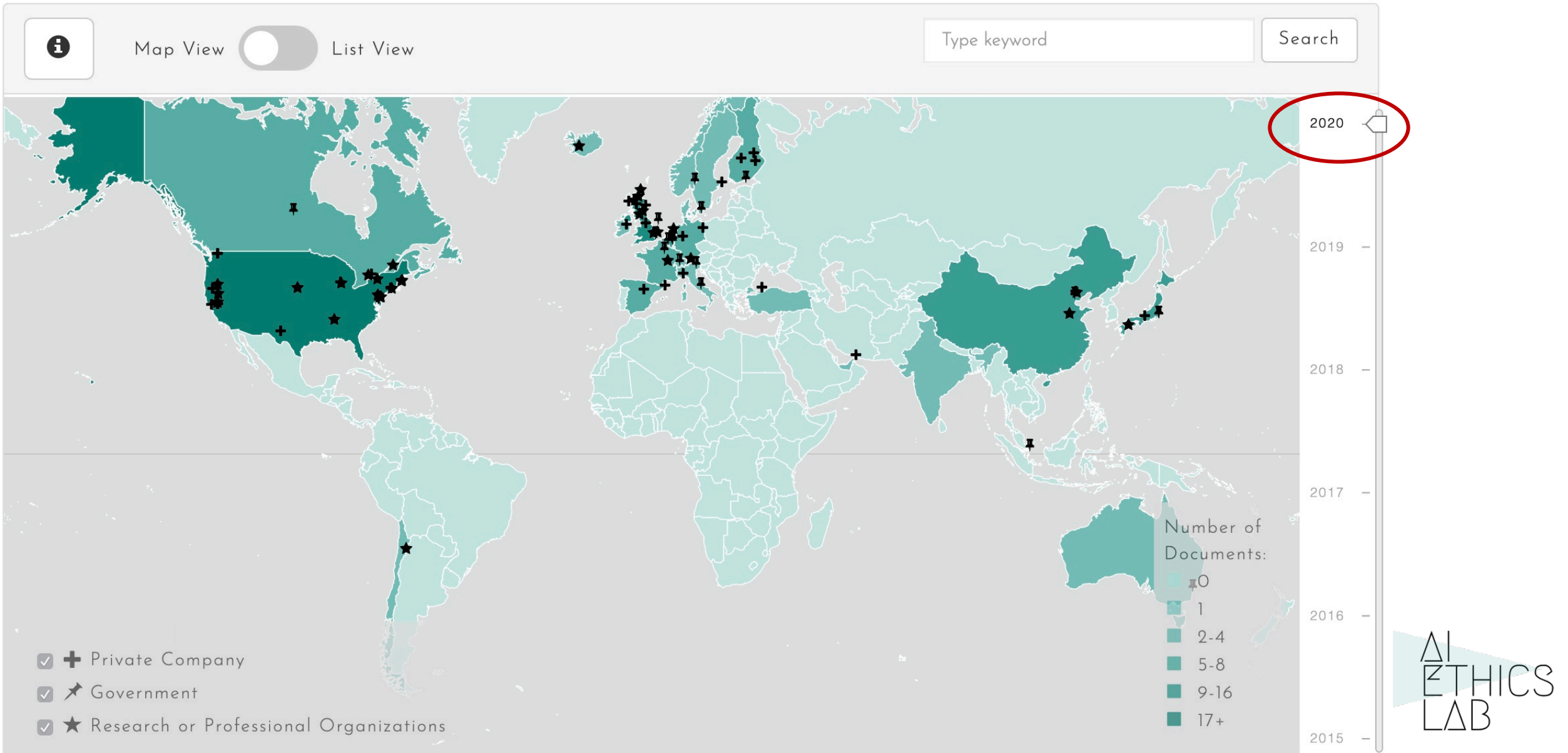
DYNAMICS OF AI PRINCIPLES

<https://aiethicslab.com/big-picture/>



DYNAMICS OF AI PRINCIPLES

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Framework for Trustworthy AI

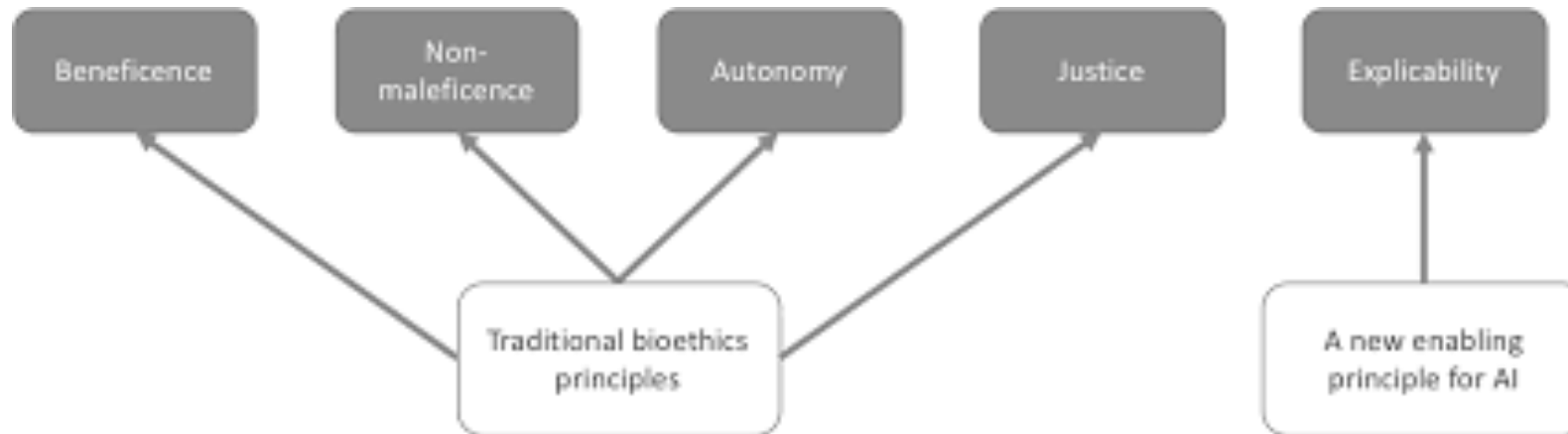
Foundations of Trustworthy AI




















Adhere to ethical principles based on fundamental rights

4 Ethical Principles

Acknowledge and address tensions between them

- Respect for human autonomy
- Prevention of harm
- Fairness
- Explicability

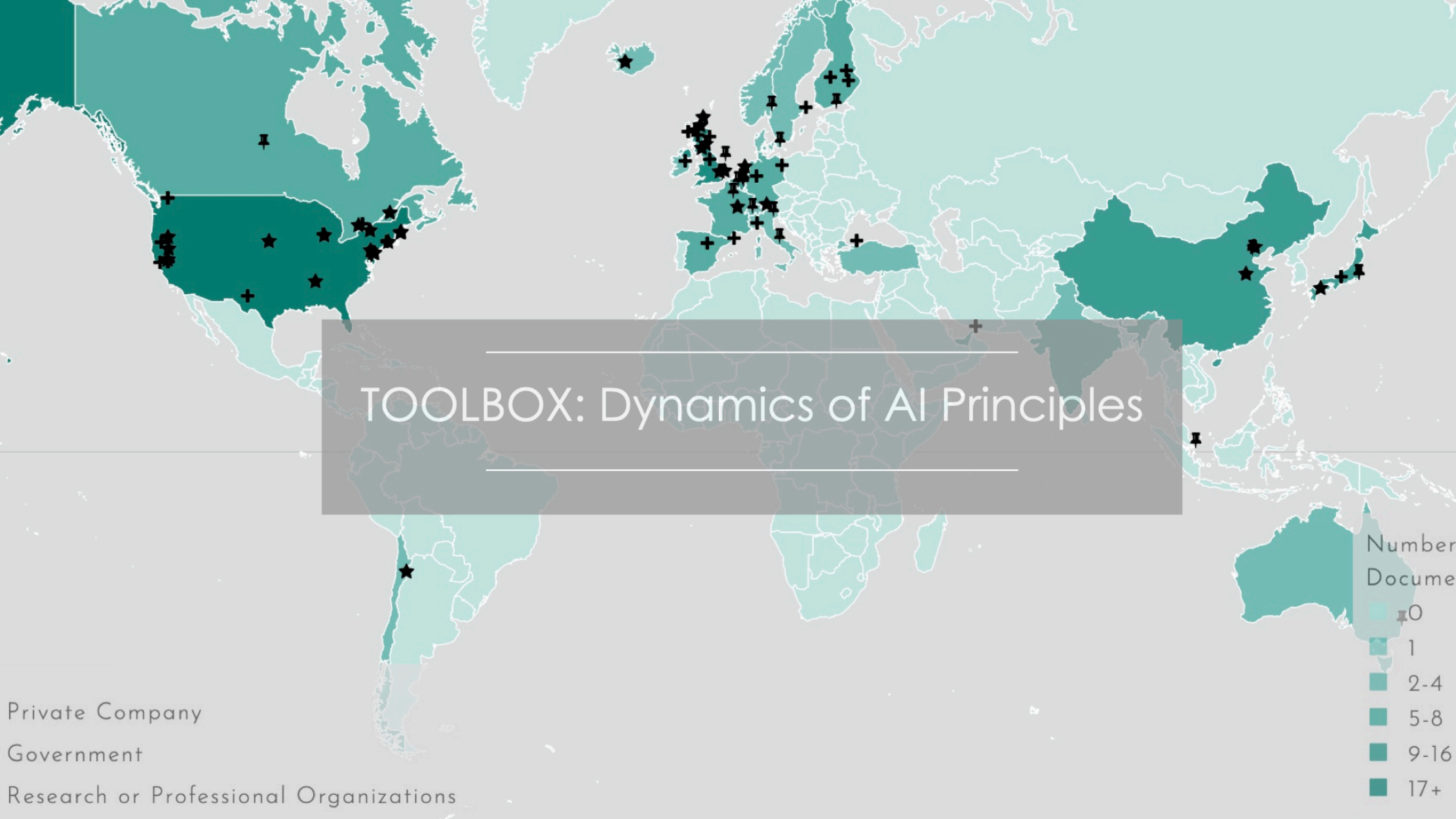


		None	Minimum	Medium	Maximum	How to use? 
Autonomy	Human control / oversight					N/A
	Transparency					N/A
	Explainability					N/A
	Information					N/A
	Agency					N/A
	Consent					N/A
	Privacy					N/A
Harm-Benefit	Accuracy / Reliability					N/A
	Security					N/A
	Safety					N/A
	Well-being					N/A
	Impact					N/A
	Efficiency					N/A
	Justice	Distribution of burden & benefit				
Equality / Non-discrimination						N/A
Protecting the vulnerable						N/A
Accountability						N/A
Contestability						N/A

<https://aiethicslab.com/the-box/>

Article: "Operationalizing AI Ethics Principles"

<https://aiethicslab.com/operationalizing-ai-principles/>



<https://aiethicslab.com/big-picture/>

PIE MODEL: PUZZLE-SOLVING IN ETHICS FOR AI INNOVATION

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RESEARCH

DESIGN

DEVELOPMENT

IMPLEMENTATION

UPDATE



ETHICS ROADMAP



ETHICS ANALYSIS



ETHICS STRATEGY



ETHICS TRAINING

PIE MODEL: PUZZLE-SOLVING IN ETHICS FOR AI INNOVATION

WHERE?

- Companies
- Incubators / Accelerators
- Research Institutions / Academia
- Governmental Organizations

WHO?

- Creators
- Leaders
- Users
- Investors



ETHICS ROADMAP



ETHICS ANALYSIS

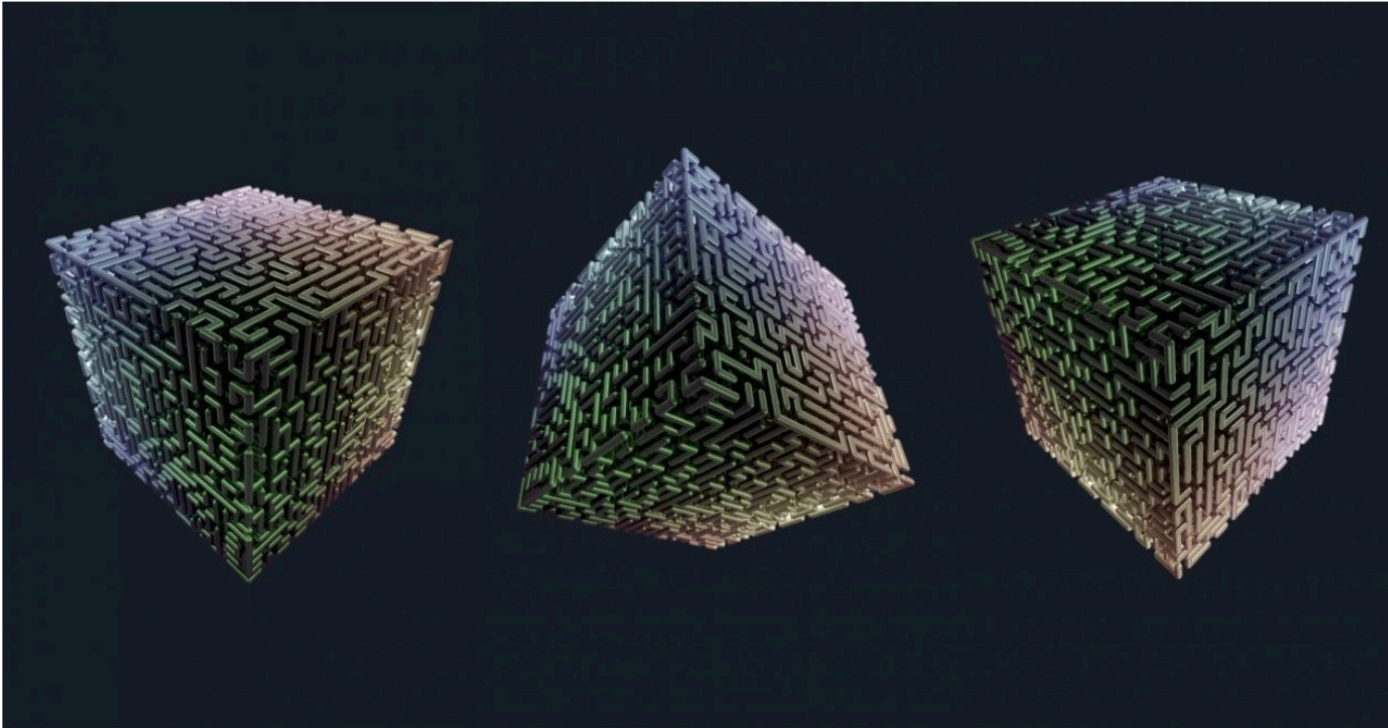


ETHICS STRATEGY



ETHICS TRAINING

PIE MODEL: A NEW ETHICS MODEL FOR INNOVATION



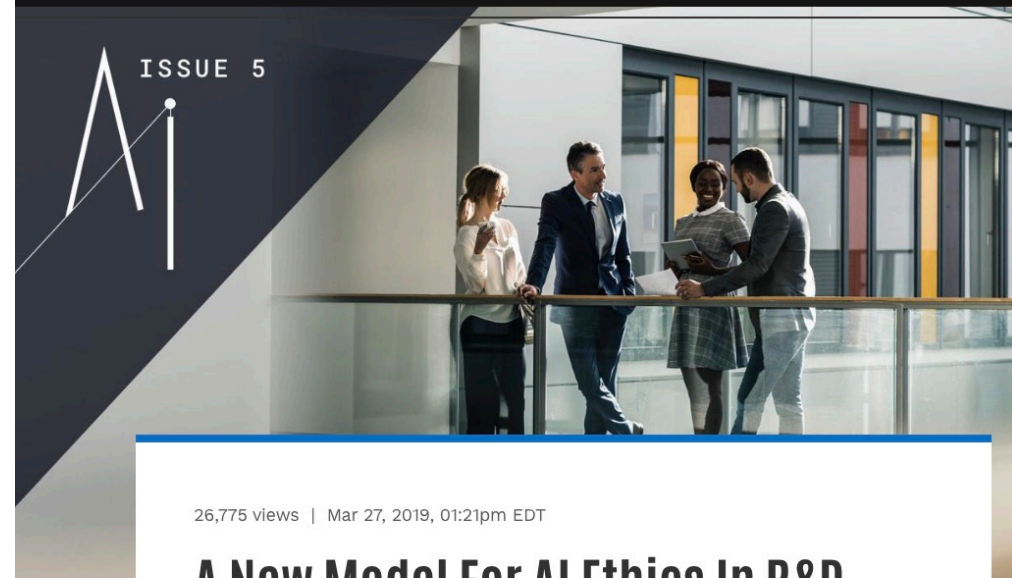
The PiE (Puzzle-solving in Ethics) Model

Ethics is about answering one crucial question: *"What is the right thing to do?"*

In practice, we often seem to forget this main purpose of ethics and get lost in rules, regulations, and approvals. Real ethical questions are like puzzles: We do not know the right answer in these complex situations.

The **PiE (puzzle-solving in ethics) Model** focuses on this main purpose of ethics in a systematic manner, integrating ethical puzzle-solving into the whole process of innovation to ensure that ethical issues are handled in the right way and at the right time.

<https://aiethicslab.com/pie-model/>



26,775 views | Mar 27, 2019, 01:21pm EDT

A New Model For AI Ethics In R&D

Cansu Canca Insights Contributor

Forbes insights

Intel AI FORBES INSIGHTS | Paid Program
Innovation



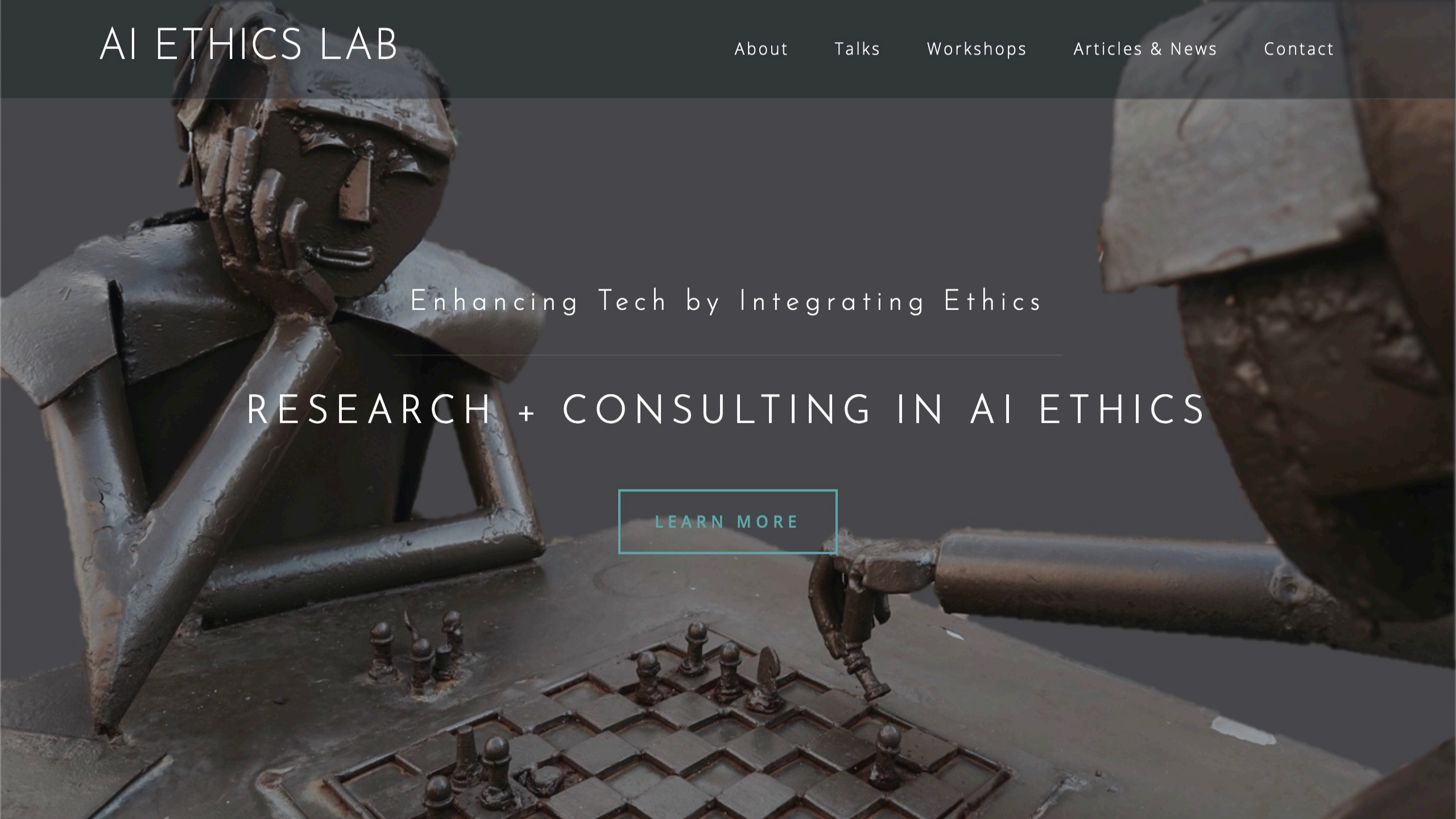
In recent years, the topic of ethics in artificial intelligence (AI) has sparked growing concern in academia, at tech companies, and among policymakers here and abroad. That's not because society suddenly woke up to the need, but rather because trial and error has brought ethics to center stage. Facial recognition technology, for example, has been shown to be vulnerable to racial bias. Similarly, AI-powered tools designed to conduct objective [screening of job applicants](#) evaluated women candidates more negatively than men. One crucial question is often absent in these discussions: What is an effective model

<https://aiethicslab.com/forbes-ai/>

Enhancing Tech by Integrating Ethics

RESEARCH + CONSULTING IN AI ETHICS

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THANK YOU

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