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From Cloak of Invisibility, to Chain of Custody, to Personal Oracle

A brief overview of digital identity

Michael Lu, Director Strategy (Security & Privacy)

September 3, 2020

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The Architects of Global Possibilities

The global leader in the development of licensable technology

- R&D outsourcing for semiconductor companies

Focused on freedom and flexibility to innovate

- Technology reused across multiple applications

With a partnership based culture & business model

- Licensees take advantage of learnings from a uniquely collaborative ecosystem

1,690+
licenses, growing by 100+ every year

500 licensees
Industry leaders and high-growth start-ups; chip companies and OEMs

155+bn
Arm-based chips shipped to-date

25+bn
Arm-based chips shipped in 2019

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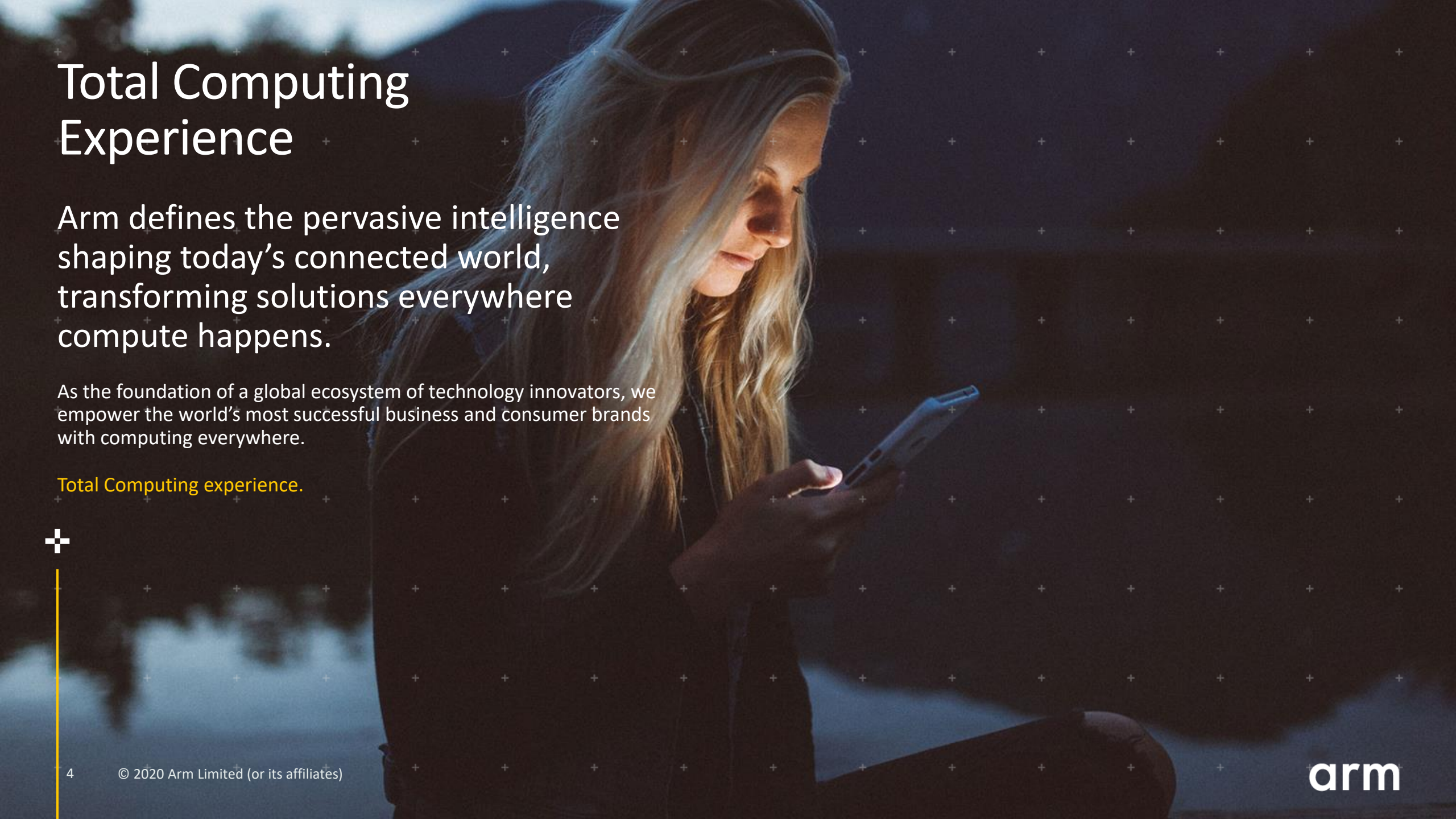
Total Computing Experience



Arm defines the pervasive intelligence shaping today's connected world, transforming solutions everywhere compute happens.

As the foundation of a global ecosystem of technology innovators, we empower the world's most successful business and consumer brands with computing everywhere.

Total Computing experience.

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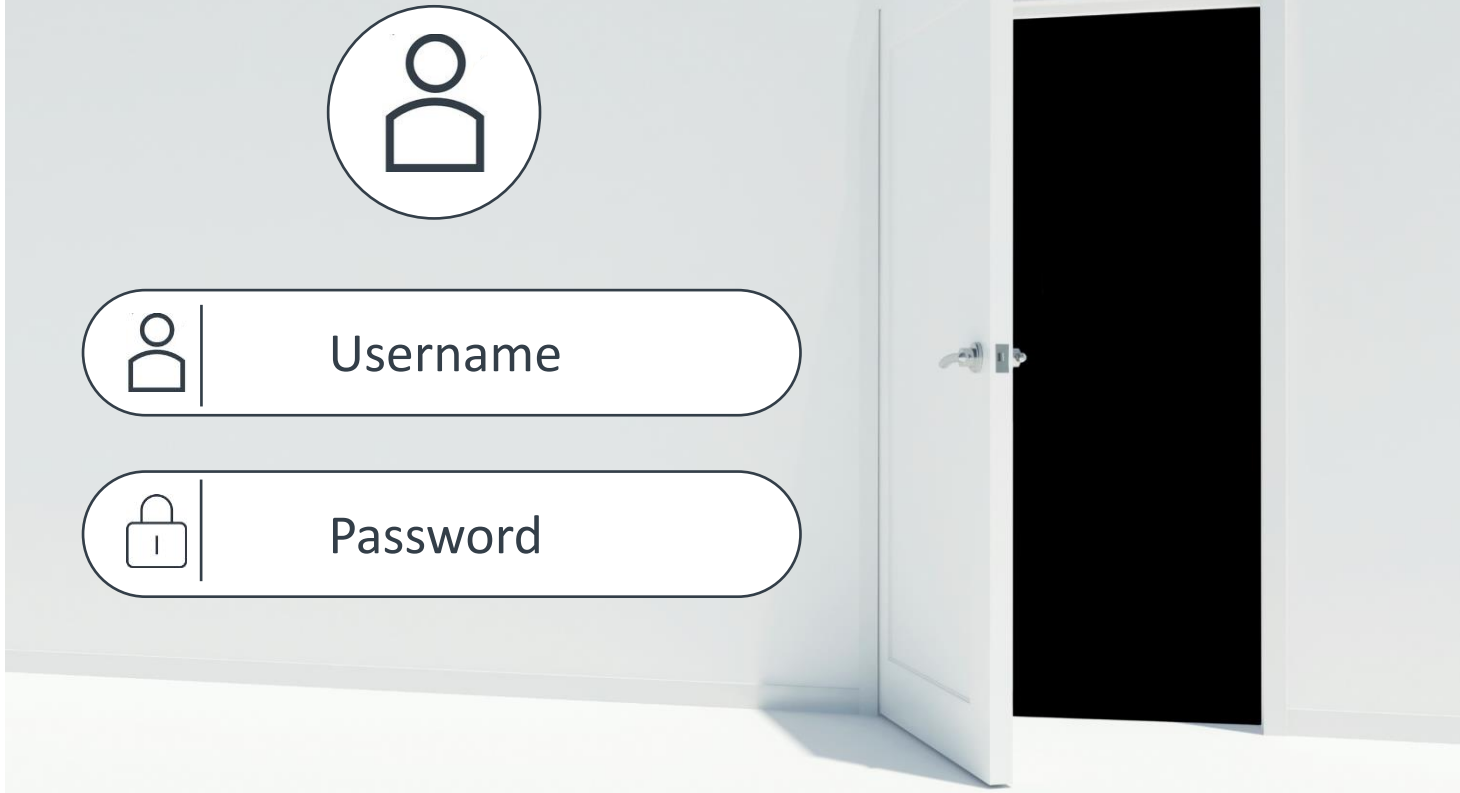
1993

My first digital identity



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Authentication

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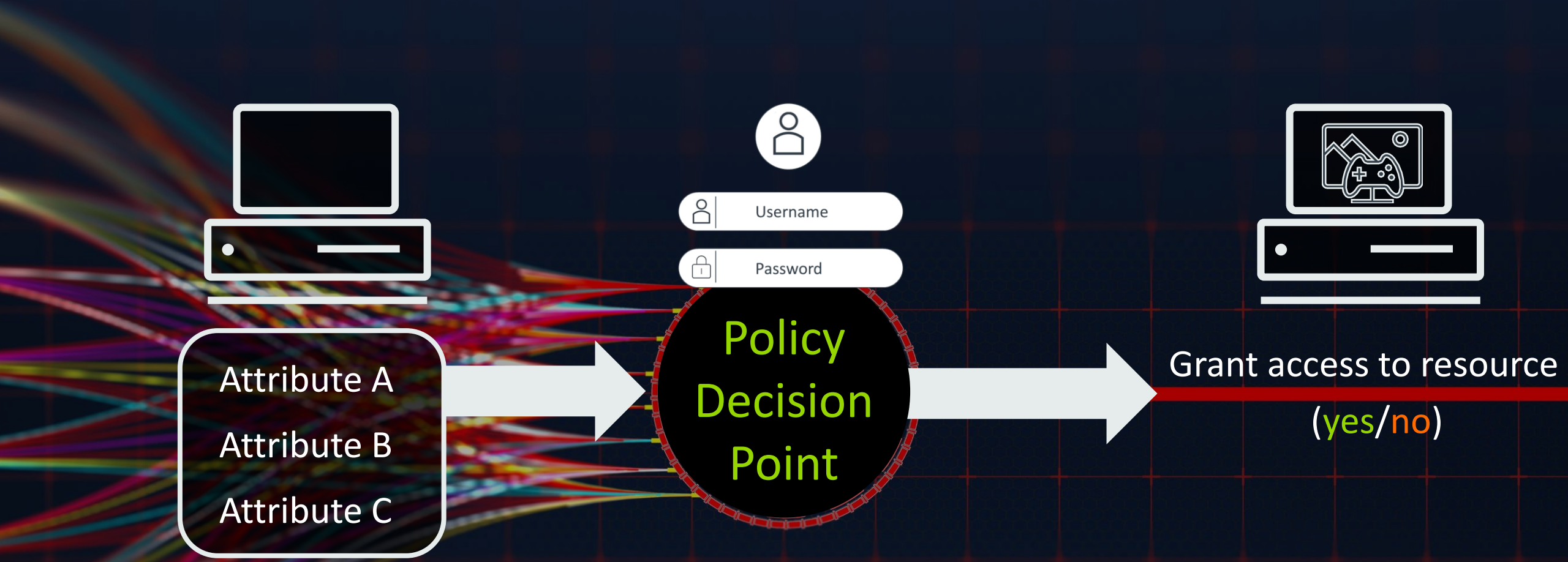
Why?

To play Doom

Source: Doom® - Bethesda.net

The Point of Identity Systems is to Manage Resources



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2019 – New World of Apps

8.9

Million Apps in App Stores Worldwide in 2019

source: RiskIQ

204

Billion App Downloads in 2019

source: App Annie State of Mobile 2020

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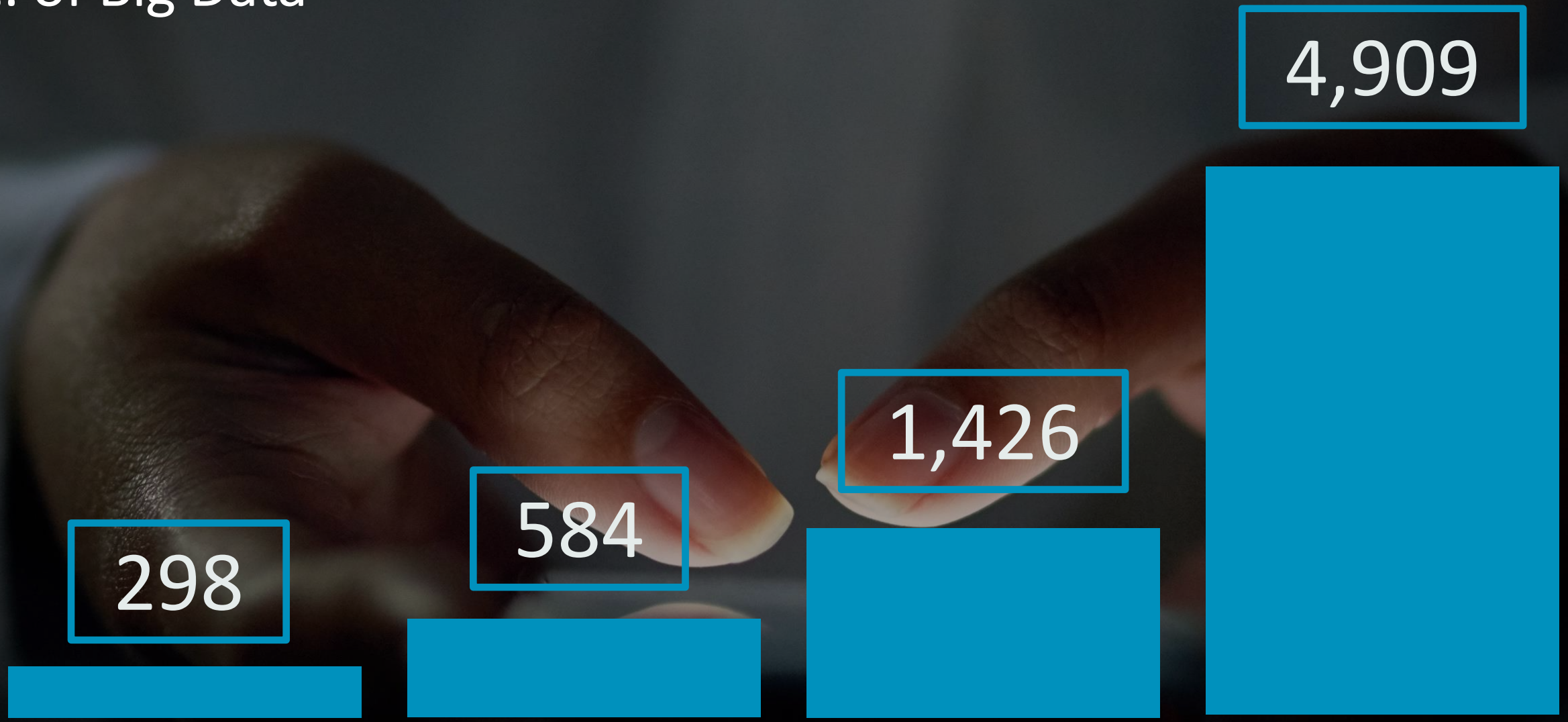
… of Big Data



** Data Age 2025: The Digitization of the World. IDC and Seagate Dec. 2018 https://www.seagate.com/our-story/data-age-2025/*

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…and Data Trails, of Ourselves, Across All the Apps We Use

SECURITY/USABILITY ISSUES

- Honey pots of passwords
- Surveillance

DATA TRAILS

- Correlation, identification
- Secondary storage and usage
- Behavioural Nudging

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Technology Response

DISSOCIATE SENSITIVE DATA FROM ONLINE ACTIVITIES

Sign in with …

Self-sovereign Identities

Platform COVID Bluetooth APIs

Cloak of Invisibility

Policy Response – Chain of Custody

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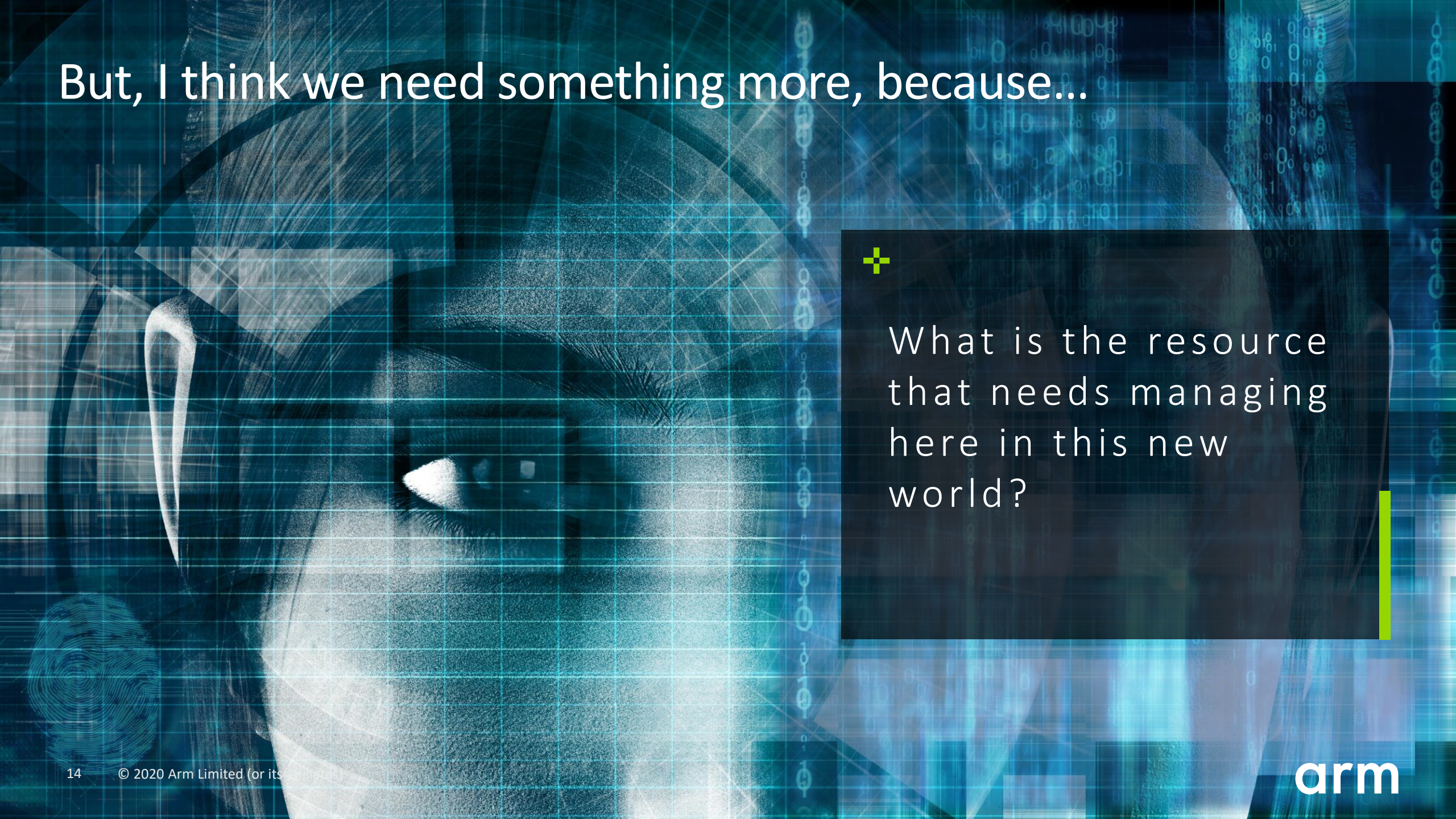
But, I think we need something more, because…



What is the resource that needs managing here in this new world?

Fundamental Change in Nature of Computing

Direction
Manipulation

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Fundamental Change in Nature of Computing

Intention Driven, needs Context and Data

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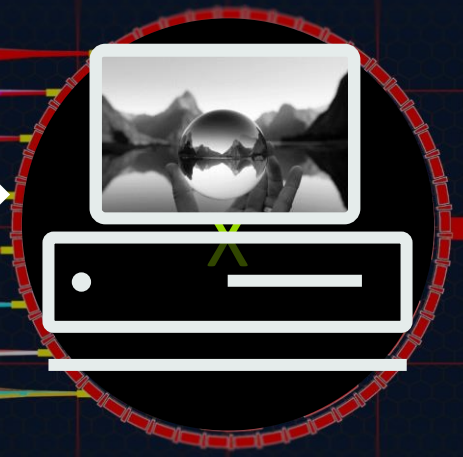
Economic Issue
The valuable resource now is our spending, our relationships

$ value

External/3rd party oracle



Wouldn't it be good to have a personal oracle to navigate the new digital landscape ?

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What is a personal oracle – one perspective

Acts on our behalf and extends our control

Ensuring we are the main beneficiary

Involves us in decision making

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Arm's role

Key Future Challenges

- How do we address privacy concerns while still enabling analytics
- How do I convince consumers that their data does not leave their device?
- How do I control and protect data I have given someone else?
- How do we make it widely accessible to developers
- How do I prove that my system is trustworthy

What's needed

Architecture support for Secure Enclaves that are:

- **Secure** – protects data and applications in use
- **Attestable** – Providing assurance, Emphasis on HW and Firmware provenance
- **Dynamic** – flexible workloads and accessible to developers

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Trust Manifesto

arm AI

November 6th, 2019

Toward Trustworthy AI Development: Mechanisms for Supporting Verifiable Claims*

Miles Brundage[1†], Shahar Avin[3,2†], Jasmine Wang[4,29†‡], Haydn Belfield[3,2†], Gretchen Krueger[1†], Gillian Hadfield[1,5,30], Heidy Khlaaf[6], Jingying Yang[7], Helen Toner[8], Ruth Fong[9], Tegan Maharaj[4,28], Pang Wei Koh[10], Sara Hooker[11], Jade Leung[12], Andrew Trask[9], Emma Bluemke[9], Jonathan Lebensold[4,29], Cullen O'Keefe[1], Mark Koren[13], Théo Ryffel[14], JB Rubinovitz[15], Tamay Besiroglu[16], Federica Carugati[17], Jack Clark[1], Peter Eckersley[7], Sarah de Haas[18], Maritza Johnson[18], Ben Laurie[18], Alex Ingerman[18], Igor Krawczuk[19], Amanda Askell[1], Rosario Cammarota[20], Andrew Lohn[21], David Krueger[4,27], Charlotte Stix[22], Peter Henderson[10], Logan Graham[9], Carina Prunkl[12], Bianca Martin[1], Elizabeth Seger[16], Noa Zilberman[9], Seán Ó hÉigeartaigh[2,3], Frens Kroeger[23], Girish Sastry[1], Rebecca Kagan[8], Adrian Weller[16,24], Brian Tse[12,7], Elizabeth Barnes[1], Allan Dafoe[12,9], Paul Scharre[25], Ariel Herbert-Voss[1], Martijn Rasser[25], Shagun Sodhani[4,27], Carrick Flynn[8], Thomas Krendl Gilbert[26], Lisa Dyer[7], Saif Khan[8], Yoshua Bengio[4,27], Markus Anderljung[12]

[1]OpenAI, [2]Leverhulme Centre for the Future of Intelligence, [3]Centre for the Study of Existential Risk, [4]Mila, [5]University of Toronto, [6]Adelard, [7]Partnership on AI, [8]Center for Security and Emerging Technology, [9]University of Oxford, [10]Stanford University, [11]Google Brain, [12]Future of Humanity Institute, [13]Stanford Centre for AI Safety, [14]École Normale Supérieure (Paris), [15]Remedy.AI, [16]University of Cambridge, [17]Center for Advanced Study in the Behavioral Sciences, [18]Google Research, [19]École Polytechnique Fédérale de Lausanne, [20]Intel, [21]RAND Corporation, [22]Eindhoven University of Technology, [23]Coventry University, [24]Alan Turing Institute, [25]Center for a New American Security, [26]University of California, Berkeley, [27]University of Montreal, [28]Montreal Polytechnic, [29]McGill University, [30]Schwartz Reisman Institute for Technology and Society

April 2020

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Looking forward

Additional Industry and Policy collaboration

Industry Collaboration

Assurance for TrustWorthy AI

Policy Research and Data Points to guide

https://www.arm.com/blogs/blueprint/arm-ai-trust-manifesto
https://confidentialcomputing.io/

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Thank You
Danke
Merci
谢谢
ありがとう
Gracias
Kiitos
감사합니다
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شكرًا
ধন্যবাদ
תודה