Artificial Intelligence: A NIST strategic priority

Elham Tabassi
Information Technology Laboratory, Chief of Staff

National Institute of Standards and Technology
U.S. Department of Commerce

National Institute of Standards and Technology

Article 1, Section 8, of the Constitution of the United States (1789), “The Congress shall have power...To fix the standard of weights and measures”

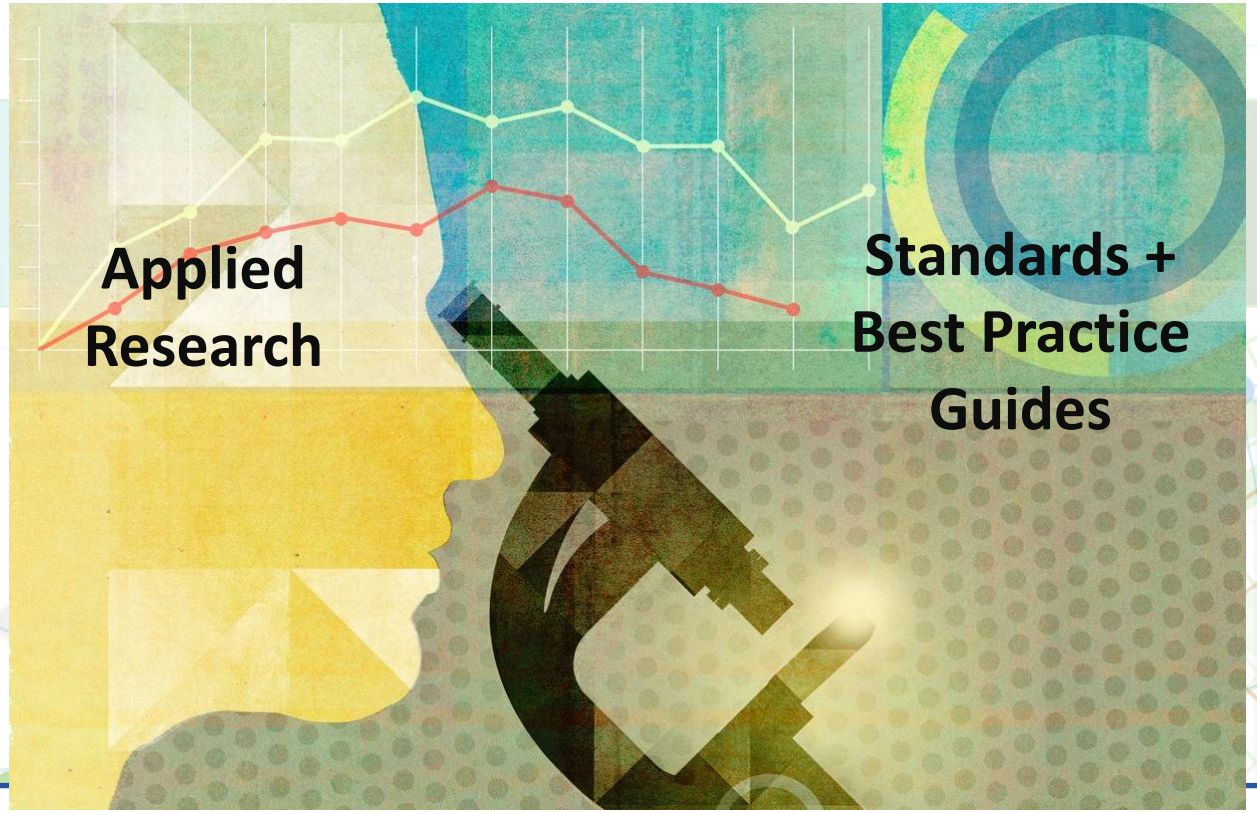
U.S. Congress on March 3, 1901 chartered the creation of the National Bureau of Standards (NBS)

Standards provide a basis of trust for the U.S. consumer and International trade

Information Technology Laboratory

Cultivating Trust in IT and Metrology

Fundamental Research



Adoption

Image Credit: wsj.com

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Trustworthy AI

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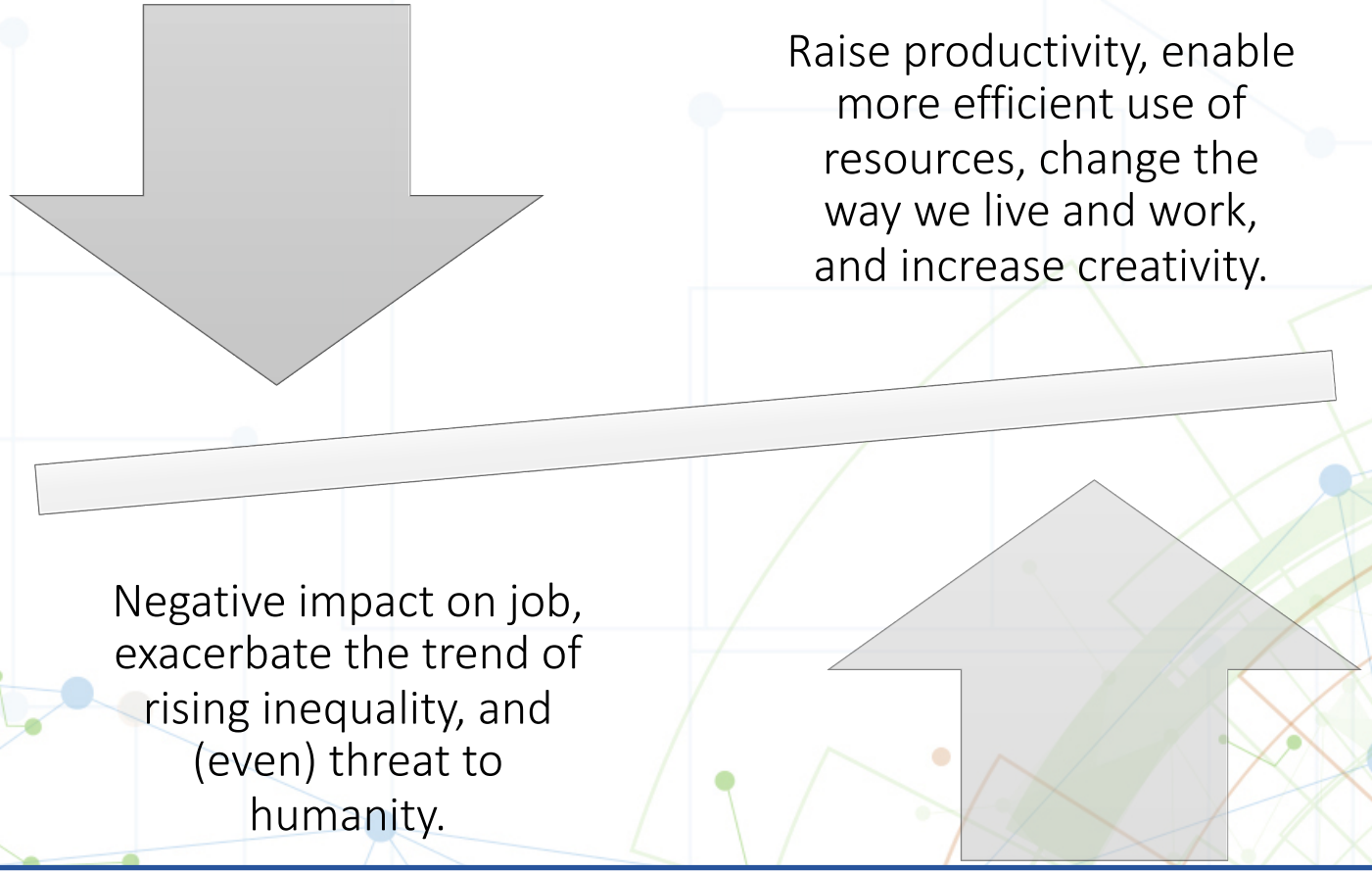
Major advances in artificial intelligence



Fundamental and Applied Research and Standards for AI Technologies (FARSAIT)

Fundamental	Applied
Measure and enhance the trustworthiness of AI systems.	Revolutionizing metrology at NIST from experiment design to research results.

NIST AI Program

Foundational Research

establish the needed scientific foundation for design, development, and assessment of trustworthy AI.

Use-inspired Research

advance AI as a tool to accelerate scientific discoveries and technological innovations

Evaluation

benchmarks to understand the theoretical capabilities and limitations of AI

Standards

tools and guidelines for vocabulary, data, metrics and testbeds for AI

Engagements

forums and research to engage scientists, engineers, psychologists and lawyers on issues of trustworthiness

Technical requirements for trustworthy AI

NIST

accurate

secure

robust

explainable

objective

reliable

and more …

AI happenings in Summer 2020

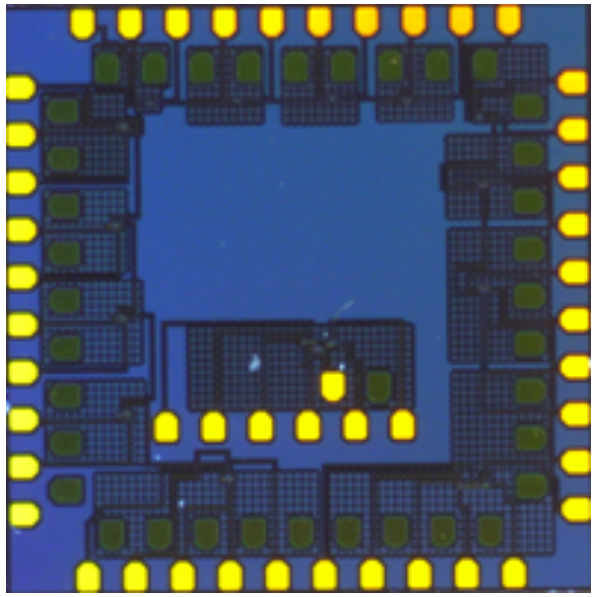
Develop a shared understanding of what constitutes trustworthy AI (e.g., accuracy, security, explainability, reliability, free from bias) and establish the needed scientific foundation for design, development, and assessment of trustworthy AI.

Bias in AI: workshop on August 18, 2020.

Secure AI: Terminology and Taxonomy; NISTIR 8269 final draft expected late Fall.

Explainable AI: NISTIR 8312 draft for public comment till October 15, 2020.

Novel computational paradigms for AI



Establishing metrics and benchmarks for AI hardware.

Foundational analysis of the computational capacity of a physical system.

Analysis and development of algorithms for spike-based computation.

Schneider, M.L., Donnelly, C.A., Haygood, I.W. et al. Synaptic weighting in single flux quantum neuromorphic computing. Sci Rep 10, 934 (2020)

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Open and public data

NIST Special Database 19 NIST Handprinted Forms and Characters Database

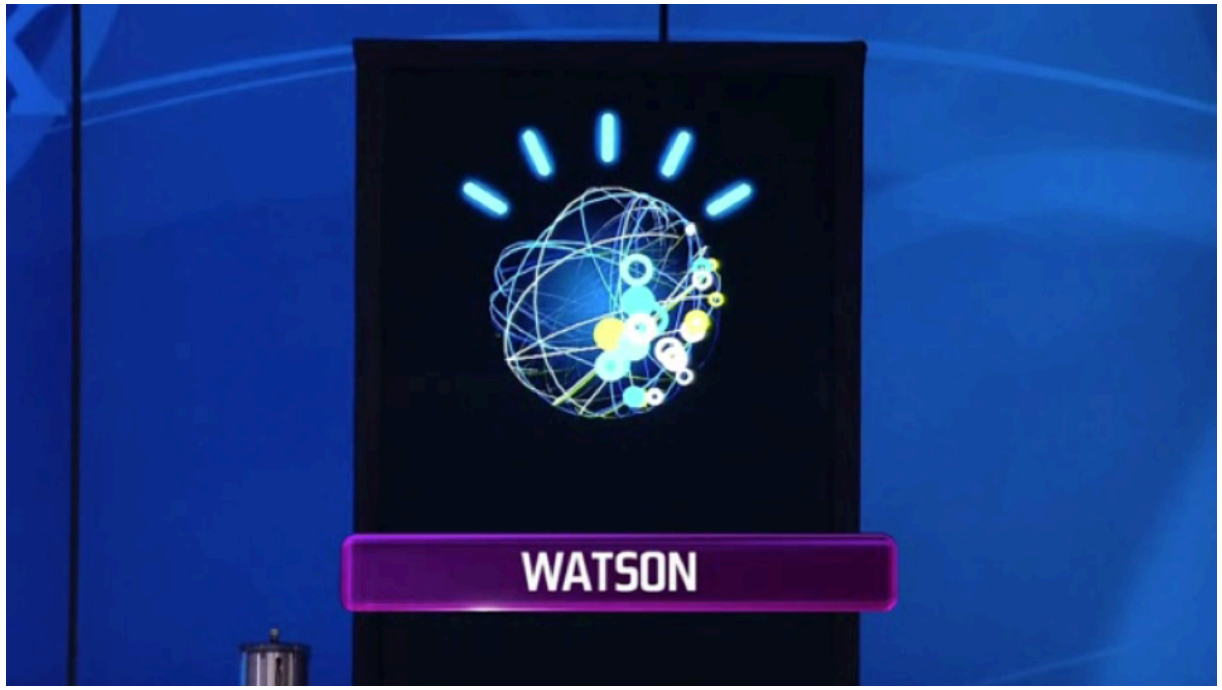
www.nist.gov/srd/nist-special-database-19

"Yet another advice: don't get fooled by people who claim to have a solution to Artificial General Intelligence. Ask them what error rate they get on MNIST or ImageNet."

Yann LeCun, 2014.
Director of AI Research, Facebook
and NYU professor

www.reddit.com/r/MachineLearning/comments/25lnbt/ama_yann_lecun/

Advance scientific disciplines via evaluations



"Our prior QA work took shape in the form of a QA system called PIQUANT. PIQUANT development started in 1999, predating our work in UIMA, and was funded by government research grants and tested against NIST evaluation data in the Text REtrieval Conference (TREC) QA track between 1999 and 2005."

Introduction to "This is Watson". IBM Journal of Research and Development (Volume: 56, Issue: 3.4, May-June 2012)

Coordination Activities

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Interagency coordination and leadership

AI Select Committee
Chaired by OSTP, NSF, DARPA

Office of Science and Technology Policy

NSTC

MLAI Subcommittee
Chaired by NIST, OSTP, DoE

USG AI Standards Coordinator

Networking and Information Technology R+D (NITRD)

AI Interagency Working Group

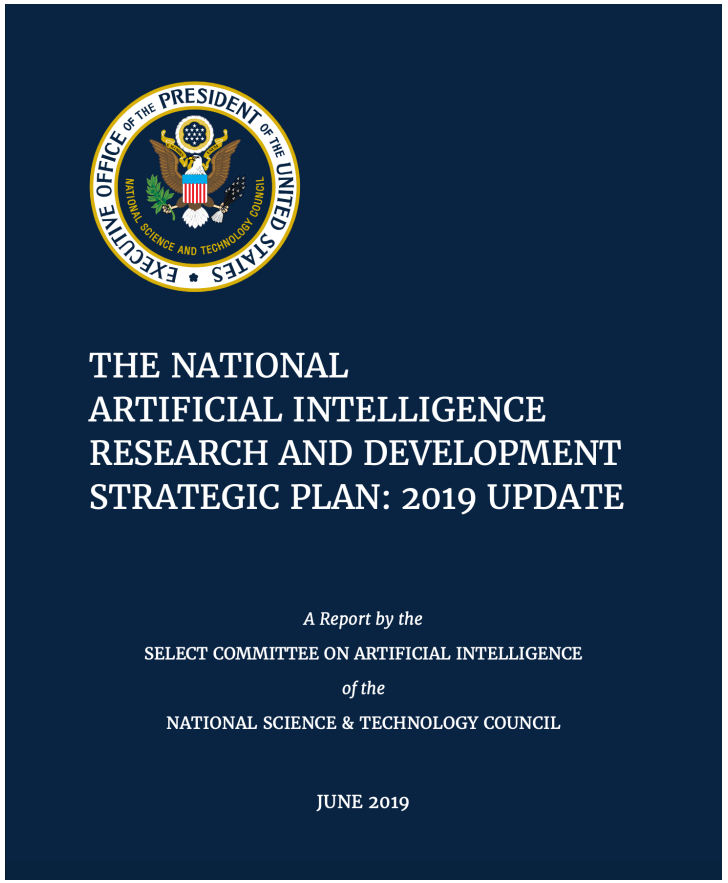
National Security Commission on AI
Chief Technical Advisor

USG AI standards Coordinator

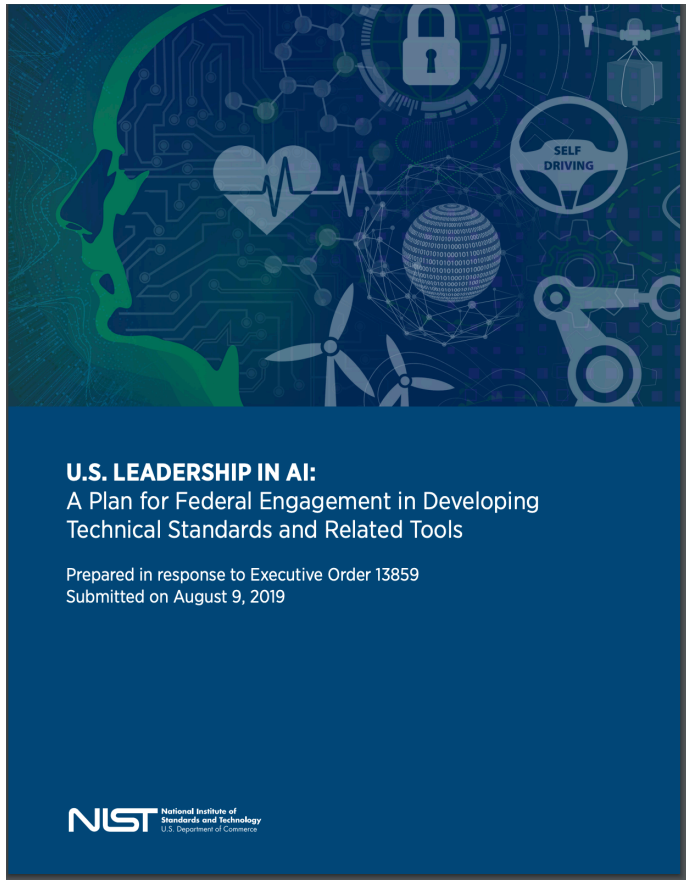
Outreach to connect with all known federal efforts relating to AI standards development and use with the goal of community participants leveraging and learning from the successes of other participants.

Will facilitate ongoing discussions between the U.S. private sector and federal agencies to strengthen private-public sector coordinator

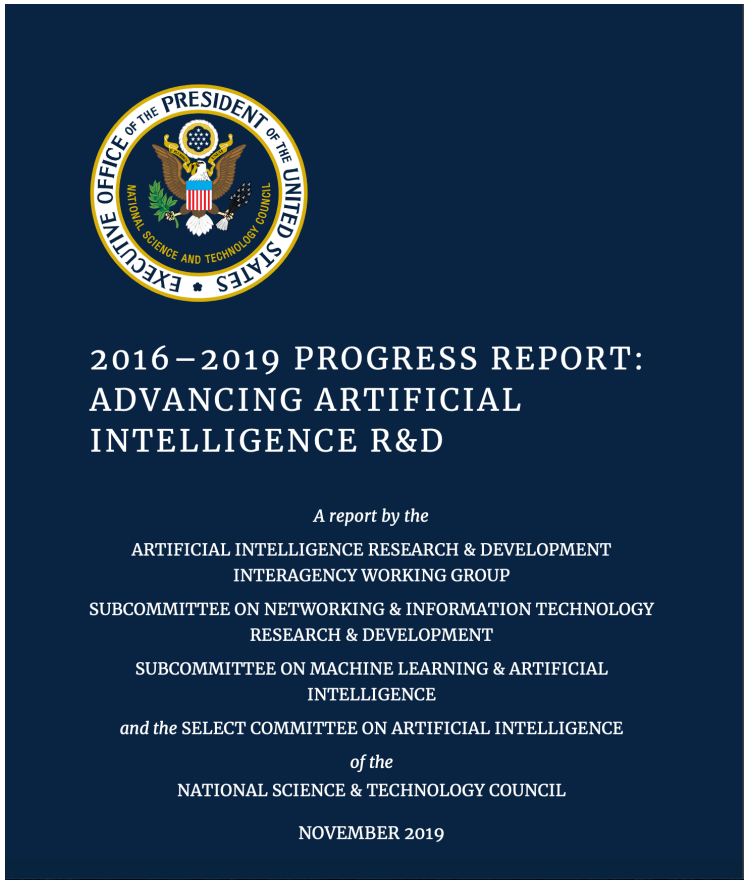
Policy documents in 2019



www.nitrd.gov/news/AI-Progress-Report-2016-2019.aspx



www.nist.gov/sites/default/files/documents/2019/08/10/ai_standards_fedengagement_plan_9aug2019.pdf



www.nitrd.gov/pubs/AI-Research-and-Development-Progress-Report-2016-2019.pdf

QUESTIONS?