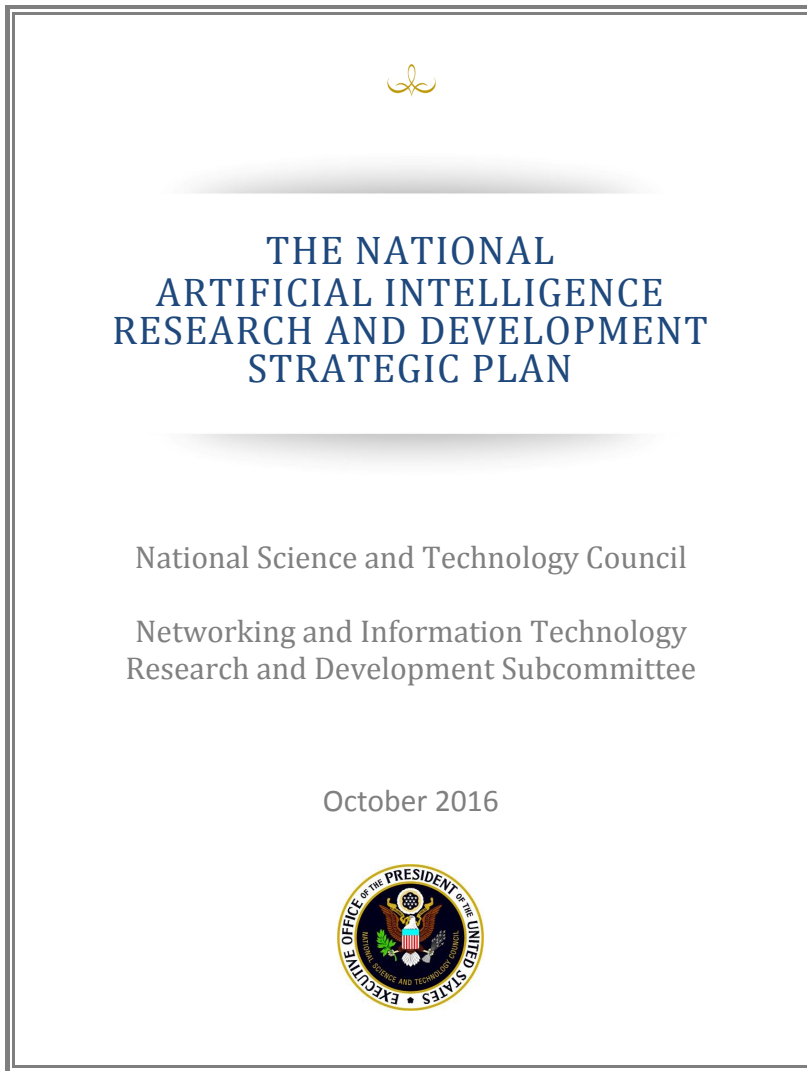# Overview:
National AI R&D Strategic Plan

Lynne E. Parker, Ph.D.

Division Director, Information and Intelligent Systems
Computer and Information Science and Engineering Directorate
National Science Foundation

Email: lyparker@nsf.gov

November 2016

National AI R&D Strategic Plan

THE NATIONAL
ARTIFICIAL INTELLIGENCE
RESEARCH AND DEVELOPMENT
STRATEGIC PLAN

National Science and Technology Council

Networking and Information Technology
Research and Development Subcommittee

October 2016

Prepared by:

- White House Office of Science and Technology Policy (OSTP)

    - National Science and Technology Council (NSTC)

        - Networking and Information Technology Research and Development Subcommittee (NITRD)

            - **Task Force on AI**

Developed:

June-September 2016

Released:

October 2016

NITRD Task Force on AI

Co-Chair **Lynne Parker**	*Co-Chair* **Jason Matheny**
Division Director Information and Intelligent Systems National Science Foundation	Director Intelligence Advanced Research Projects Activity
Milton Corn National Institutes of Health	**Nikunj Oza** National Aeronautics and Space Administration
William Ford National Institute of Justice	**Robinson Pino** Department of Energy
Michael Garris National Institute of Standards and Technology	**Gregory Shannon** Office of Science and Technology Policy
Steven Knox National Security Agency	**Scott Tousley** Department of Homeland Security
John Launchbury Defense Advanced Research Projects Agency	**Faisal D'Souza**, *Technical Coordinator* National Coordination Office for Networking and Information Technology Research and Development
Richard Linderman Office of the Secretary of Defense	

With agency input/approval from:

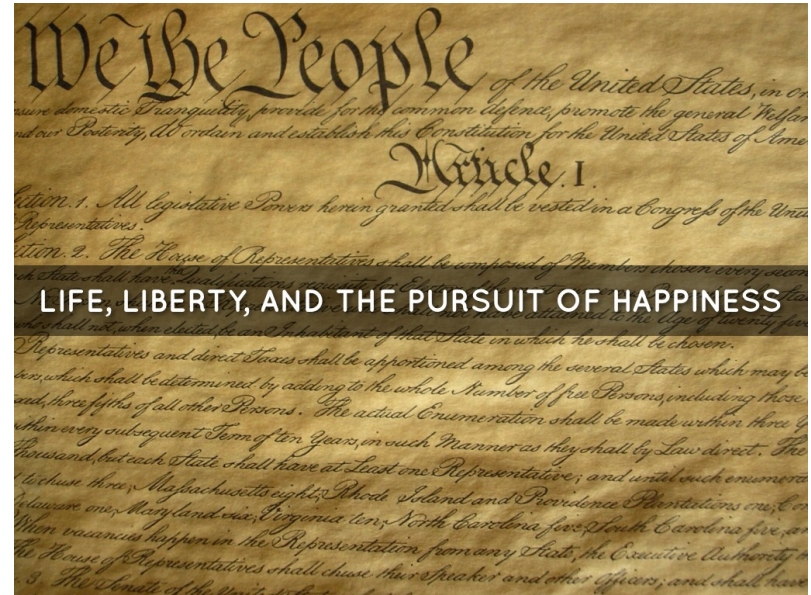NSF, NIH, DoD, DARPA, OSD, NIST, DOE, NASA, DHS, NSA, IARPA, DOT, EPA, NIJ, FBI, ODNI

National AI R&D Strategic Plan

Government / Industry

- Looks beyond near-term AI capabilities toward longer-term transformational impacts

- Federal government: primary source of funding for long-term, high-risk research initiatives, and near-term research for agency-specific requirements that industry does not pursue

- "… emphasize AI investments in areas of strong societal importance that are not aimed at consumer markets—areas such … as long-term research that accelerates the production of AI knowledge and technologies."
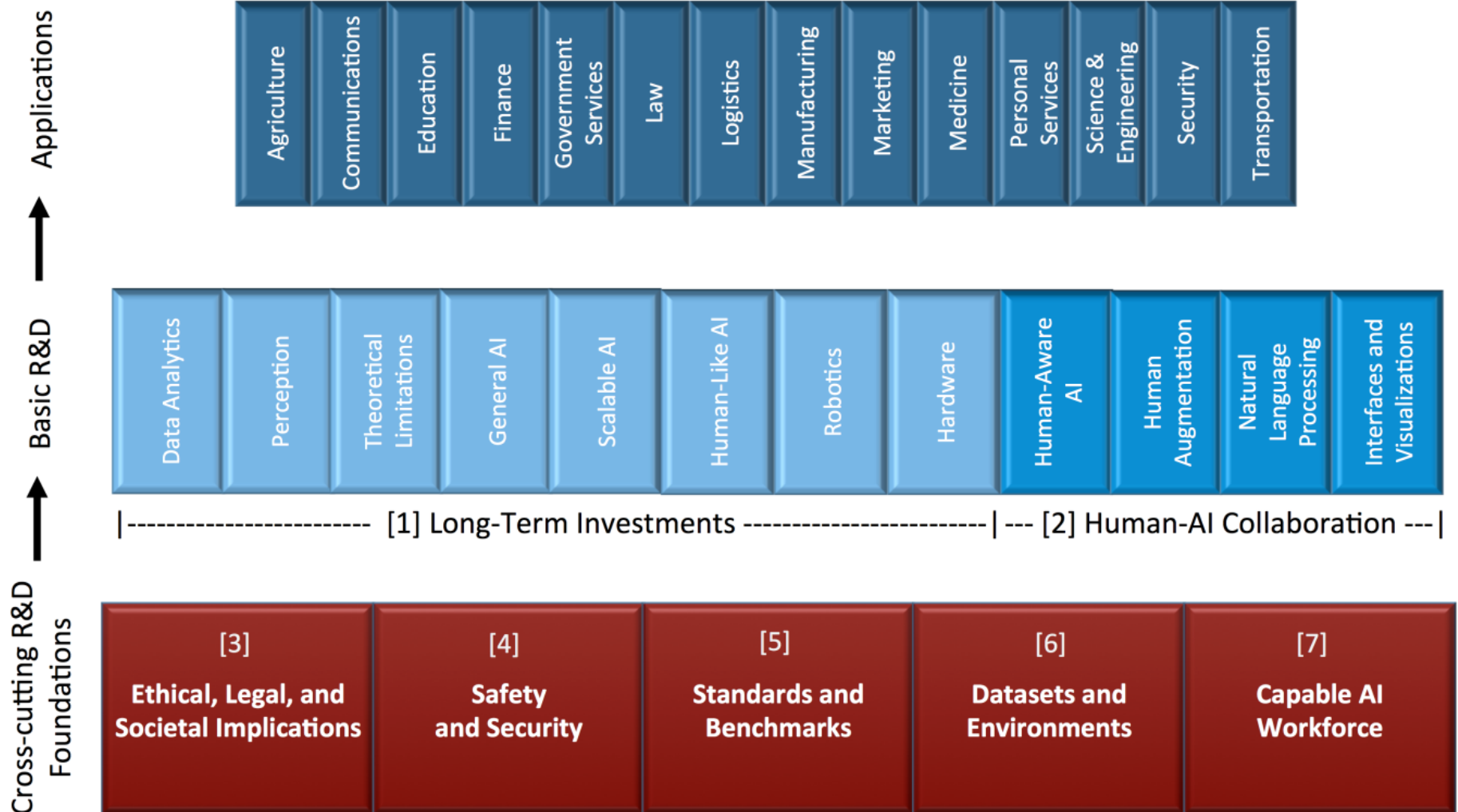
Emphasizes Impacts on National Priorities

- Increased economic prosperity:
  - Manufacturing
  - Logistics
  - Finance
  - Transportation
  - Agriculture
  - Marketing
  - Communications
  - Science and Technology

- Enhanced national and homeland security:
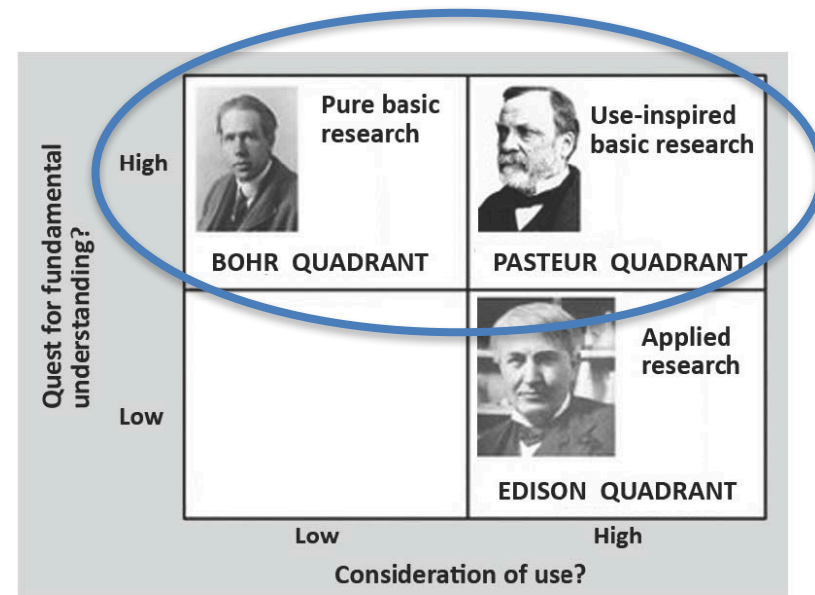 - Security and law enforcement
  - Safety and prediction

LIFE, LIBERTY, AND THE PURSUIT OF HAPPINESS

- Improved educational opportunity and quality of life:
  - Education
  - Medicine
  - Law
  - Personal services

Organization of the AI R&D Strategic Plan

Applications

| Agriculture | Communications | Education | Finance | Government Services | Law | Logistics | Manufacturing | Marketing | Medicine | Personal Services | Science & Engineering | Security | Transportation |

Basic R&D

| Data Analytics | Perception | Theoretical Limitations | General AI | Scalable AI | Human-Like AI | Robotics | Hardware | Human-Aware AI | Human Augmentation | Natural Language Processing | Interfaces and Visualizations |

|------------------------------ [1] Long-Term Investments ------------------------|--- [2] Human-AI Collaboration ---|

Cross-cutting R&D Foundations

| [3] Ethical, Legal, and Societal Implications | [4] Safety and Security | [5] Standards and Benchmarks | [6] Datasets and Environments | [7] Capable AI Workforce |

6

Strategy 1: Make Long-Term Investments in AI Research

- Data-focused methodologies for knowledge discovery
- Perceptual capabilities of AI systems
- Understanding theoretical capabilities, limitations
- General-purpose AI
- Scalable AI systems
- Human-like AI
- More capable and reliable robots
- Hardware for improved AI
- AI for improved hardware

Strategy 2: Effective Methods for Human-AI Collaboration

- New algorithms for human-aware AI
- AI techniques for human augmentation
- Visualization and AI-human interfaces
- More effective language processing systems

AI R&D Strategic Plan: Strategies 3 & 4

3: Ethical, Legal, Societal Implications

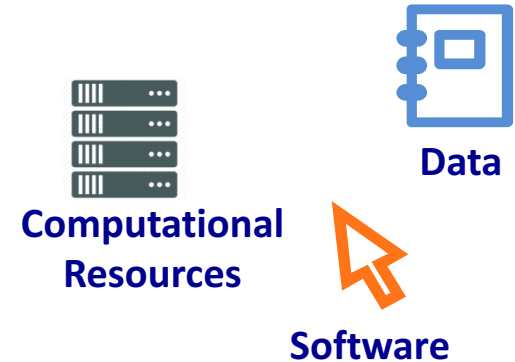- Fairness, transparency, and accountability-by-design
- Ethical AI

4: Safety and Security of AI Systems

- Explainability and transparency
- Building trust
- Verification and validation
- Securing against attacks

AI R&D Strategic Plan: Strategies 5-7

- **Strategy 5:** Develop Shared Public Datasets and Environments for AI Training and Testing

- **Strategy 6:** Measure and Evaluate AI Technologies through Standards and Benchmarks

- **Strategy 7:** Better Understand the National AI R&D Workforce Needs

Computational Resources

Data

Software

AI R&D Strategic Plan: Recommendations

- **Recommendation 1:** Develop an AI R&D implementation framework to identify S&T opportunities and support effective coordination of AI R&D investments, consistent with Strategies 1-6 of the plan.

- **Recommendation 2:** Study the national landscape for creating and sustaining a healthy AI R&D workforce, consistent with Strategy 7 of the plan.

Next Steps?

- (Perhaps) Develop NITRD Inter-Agency Working Group on AI
  - Coordinate AI investments across Federal agencies
  - Develop future areas for priority funding
- Future initiatives??

https://www.nitrd.gov/PUBS/national_ai_rd_strategic_plan.pdf

THE NATIONAL
ARTIFICIAL INTELLIGENCE
RESEARCH AND DEVELOPMENT
STRATEGIC PLAN

National Science and Technology Council

Networking and Information Technology
Research and Development Subcommittee

October 2016