Westat

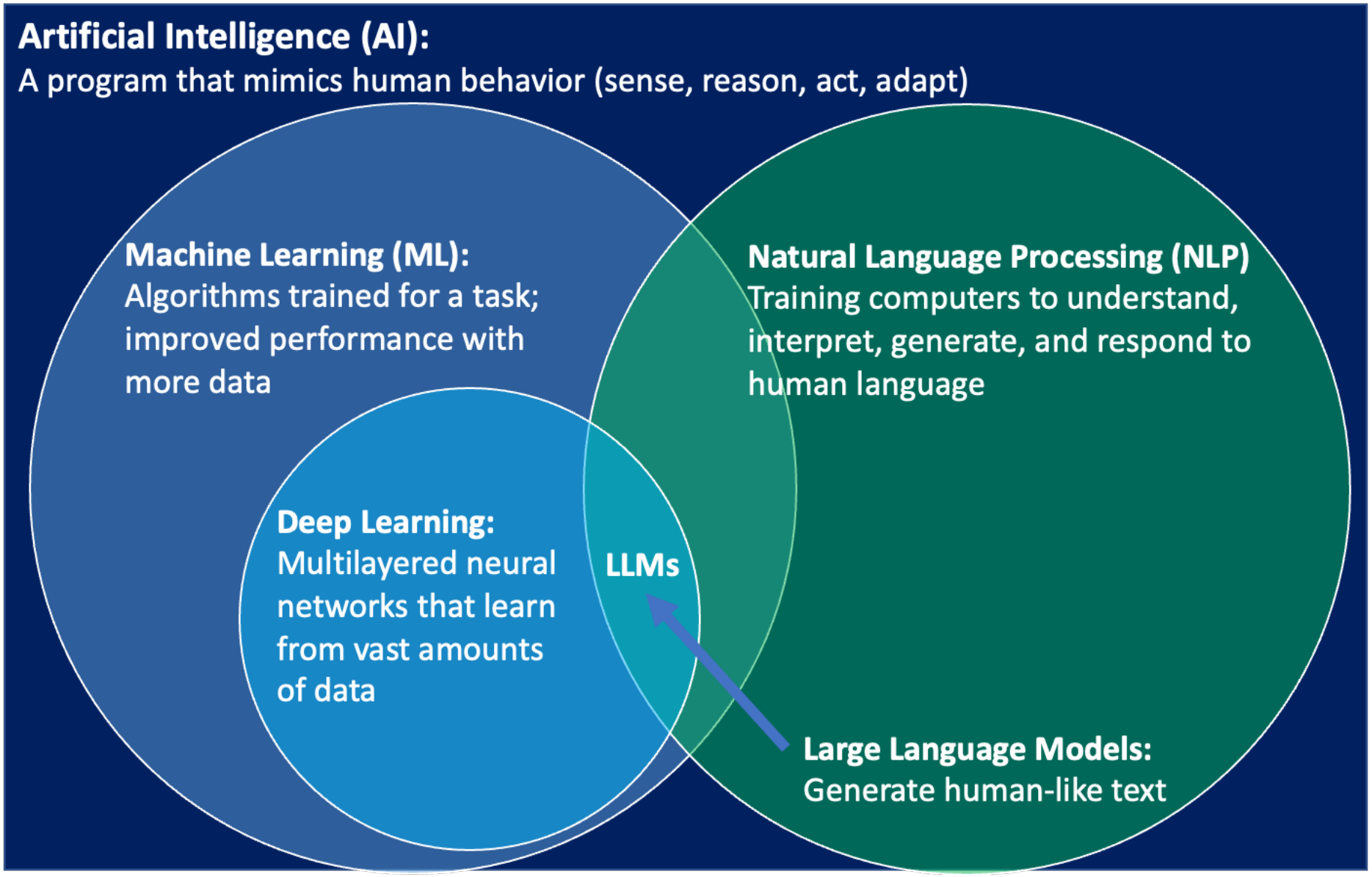
Improving Lives Through Research®

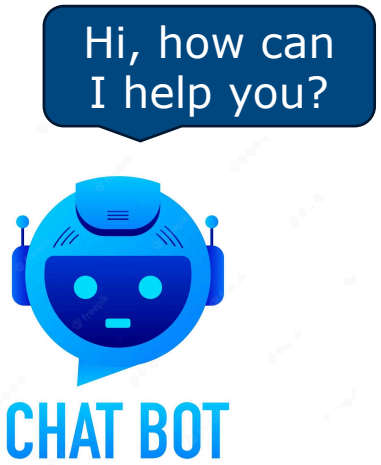
Artificial Intelligence in the Survey Process: Use Cases and Challenges

Gizem Korkmaz, Ph.D.
Associate Vice President, Westat

AI Day for Federal Statistics
May 2, 2024

What is Artificial Intelligence?





What is Generative AI?

AI that generates new, diverse content (text, images, music), ideas, or data by learning from vast datasets

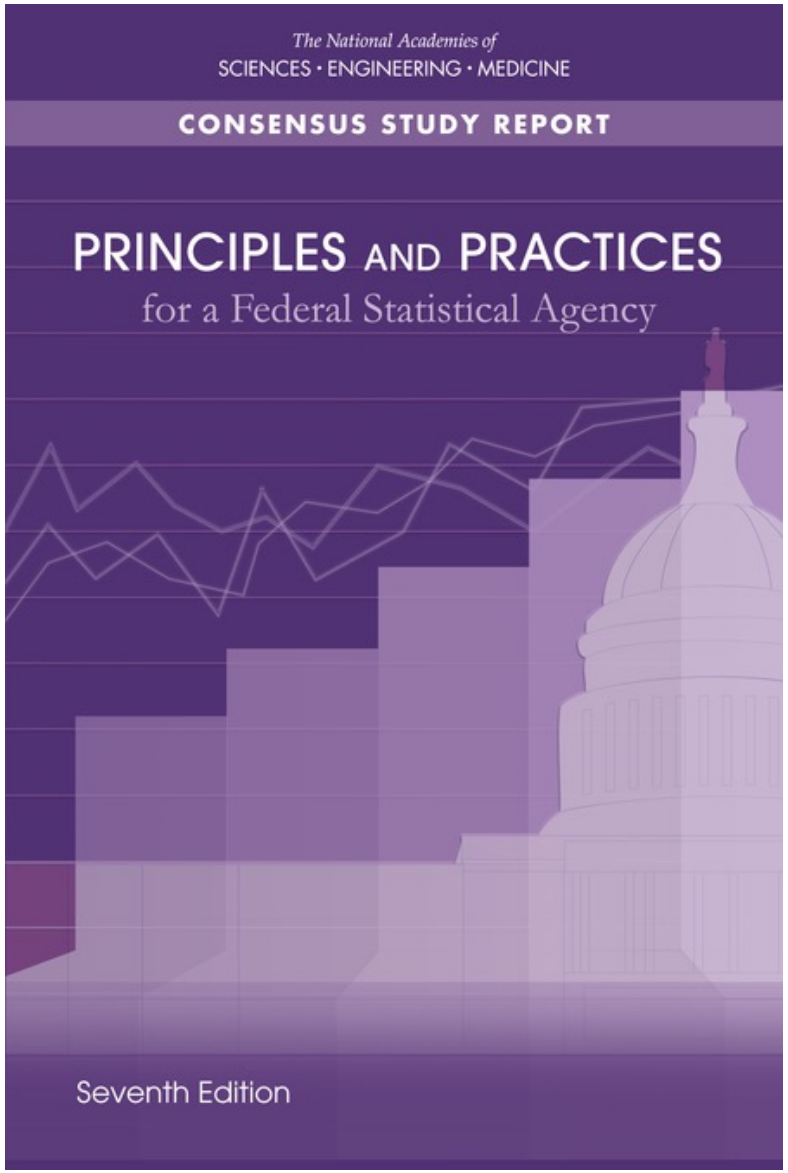
- Aids in discovery, research & development
- Accelerates creativity and innovation
- Enhances productivity by automating routine tasks
- Personalizes user experiences

Examples:

- Text generation: GPT series by OpenAI
- Image creation: DALL·E by OpenAI
- Code development: GitHub Copilot

Needs accurate and detailed prompts

AI as Innovation in the Federal Statistical System



PRINCIPLE 5

Continual Improvement and Innovation

Federal statistical agencies must continually seek to improve and innovate their processes, methods, and statistical products to better measure an ever changing world.

" [...]

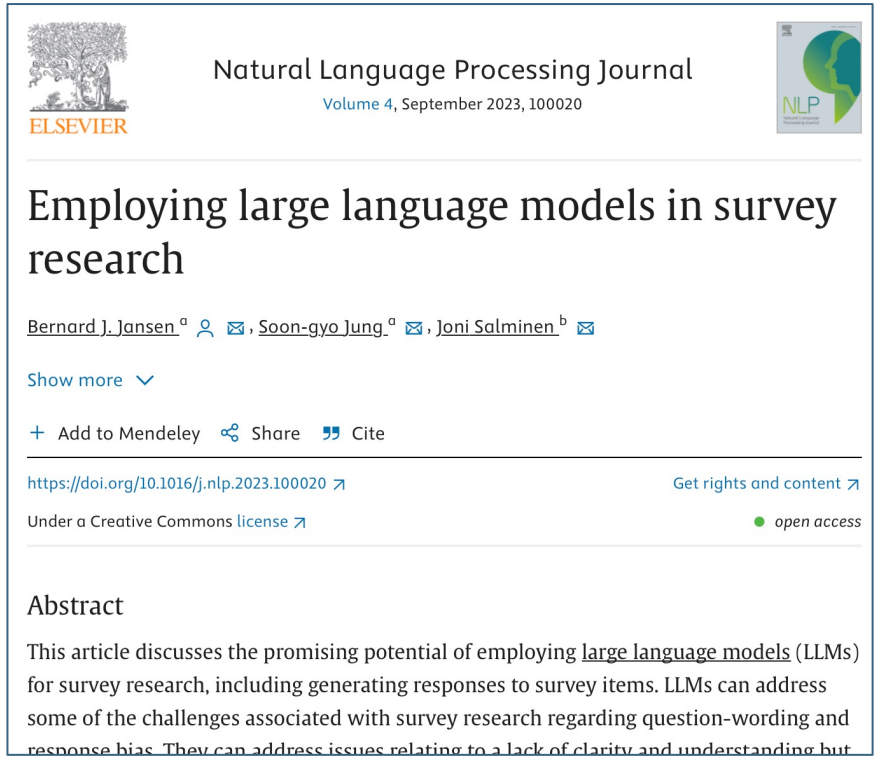
- *imputing missing data or for combining data from more than one source;*
- *data collection, processing, and dissemination;*
- *analyzing and processing data, such as* ***machine learning or artificial intelligence;***
- *addressing data confidentiality and disclosure avoidance;*
- *new kinds of and uses for data about collection processes (paradata).*

"

Survey Process & AI

Frame and sampling → Instrument design → Data collection and processing → Postsurvey adjustment → Data analysis → Reporting and dissemination

Quality Assurance & Quality Control



AI Use Cases

Frame and sampling

- Use of unstructured data
- Adding auxiliary information
- Multiple-frame sampling
- Automated sampling

❖ Concerns about bias in the datasets that can lead to coverage error

FedCASIC

2024 Federal Computer Assisted Survey Information Collection Workshops

Using Natural Language Processing To Help Develop A Frame Of Energy Suppliers

Meghan Martin, Westat*; Cindy Good, Westat; Francisco Cifuentes, US Energy Information Administration; Michelle Amsbary, Westat

The frame for the Residential Energy Consumption Survey (RECS) Energy Supplier Survey (ESS) is developed by identifying the correct names of energy suppliers reported by respondents in the RECS household survey. In the 2020 RECS, 19,000 respondents provided nearly 30,000 entries of electricity, natural gas, fuel oil, and propane supplier names in open text fields of web and paper questionnaires. A single energy supplier might be reported in multiple ways, due to abbreviations, nicknames, misspellings, and typos. In prior RECS ESS cycles, human coders manually compared these name variations against a reference list of known energy suppliers to clean up and deduplicate entries. This was a labor-intensive and timeconsuming task. To increase efficiency in the

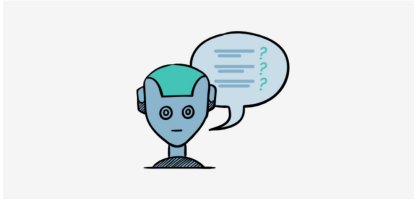
AI Use Cases

Frame and sampling | Instrument design

- Developing survey questions, e.g., phrasing and ordering
- Instrument translation
- Questionnaire evaluation and testing
- Accessibility, e.g., 508 compliance

❖ Concerns about validity and reliability

BigSurv
BIG DATA MEETS SURVEY SCIENCE



Using ChatGPT to Write Survey Questions

CONCURRENT SESSIONS B Session 1: Humans Chatting About Chatbots:

Promises and Challenges of Large Language Models for Survey Research

While Chatbots have many answers, do they have good questions? An Experimental Study Exploring the Creation and Evaluation of Survey Questions using Automated Chatbot Tools

- Dr Trent Buskirk (Bowling Green State University) - Presenting Author

Evaluation of GPT models and prompts to create tailored questionnaires

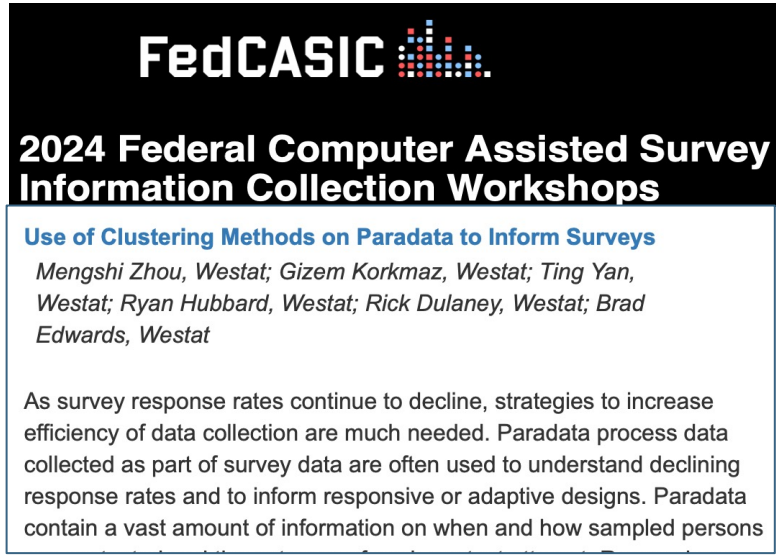
- Ms Zoe Padgett (Momentive.ai) - Presenting Author

AI Use Cases

Frame and sampling | Instrument design | Data collection and processing

- Real-time monitoring of data quality for errors or inconsistencies
  - Response quality
  - Interviewer productivity
- Chatbots and virtual assistants
- Training and management of data collectors
- Use of paradata and predictive analytics
- Automating data cleaning and processing

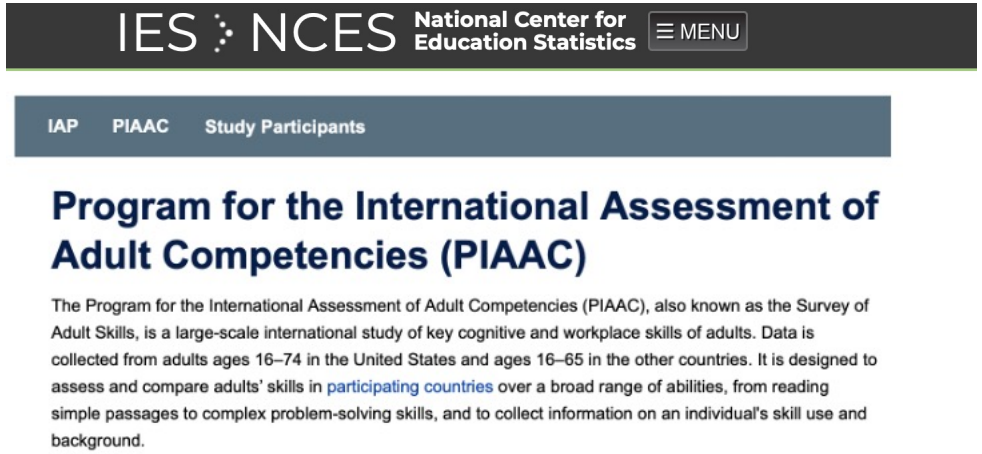
❖ Concerns about validity and reliability

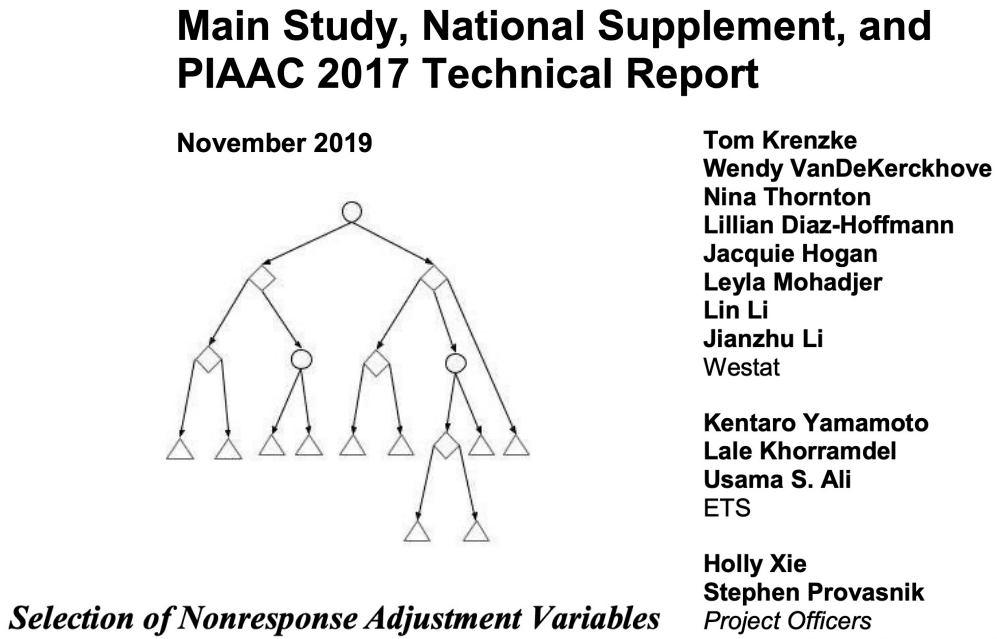


AI Use Cases

Frame and sampling | Instrument design | Data collection and processing | Postsurvey adjustment

- Machine learning for weighting to adjust for unit or item nonresponse





❖ Concerns about bias and validity

AI Use Cases

Frame and sampling | Instrument design | Data collection and processing | Postsurvey adjustment | Data analysis

- Pattern recognition and insights
- Coding and debugging code
- Analysis of open-ended questions, qualitative data analysis
- Combining survey data with other sources
- Privacy protecting record linkage

❖ Concerns about transparency and replicability

SDSS SYMPOSIUM ON DATA SCIENCE & STATISTICS
BEYOND BIG DATA: BRIDGING THE GAP BETWEEN THEORY AND PRACTICE
RICHMOND, VA • JUNE 4–7, 2024

Exploring Computational Approaches for Coding Qualitative Responses in the Medical Expenditure Panel Survey

Mengshi Zhou, Oliva He, Chris Barzola, Alexandra Marin, Michael Raithel, Jeannie Hudnall, Kevin Wilson
Westat, Rockville, MD

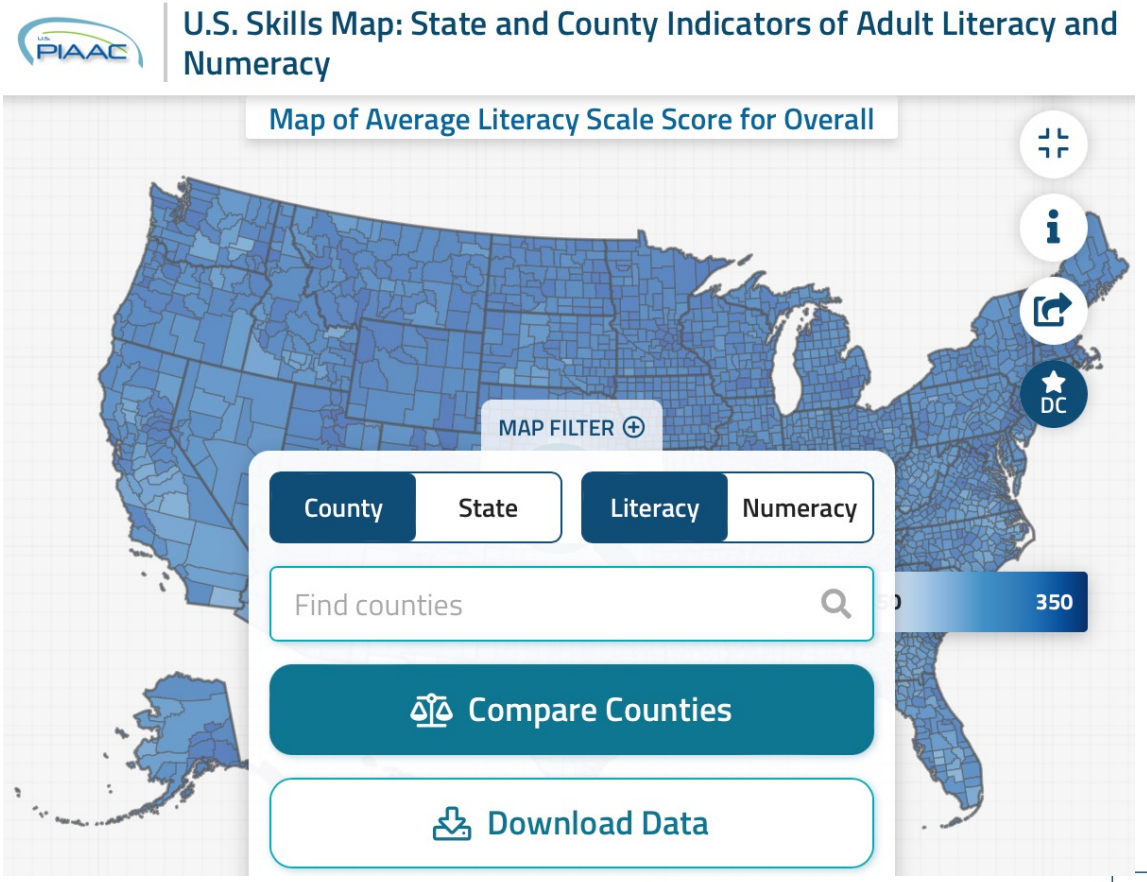
The Medical Expenditure Panel Survey (MEPS) is a widely utilized nationally representative survey designed to explore healthcare utilization and expenditure patterns within the U.S. Information in the MEPS, such as the use of healthcare services, is represented by both quantitative (close-ended) and qualitative (open-ended) responses. One of the primary challenges when working with MEPS data involves the process of coding open-ended responses into standardized categories. Manual coding of text data from open-ended questions is time-consuming and costly. The accumulated manual coding data in MEPS has enabled the training of computational models to automate the process of coding qualitative responses. However, such efforts have not been undertaken within the context of MEPS.

AI Use Cases

Frame and sampling | Instrument design | Data collection and processing | Postsurvey adjustment | Data analysis | Reporting and dissemination

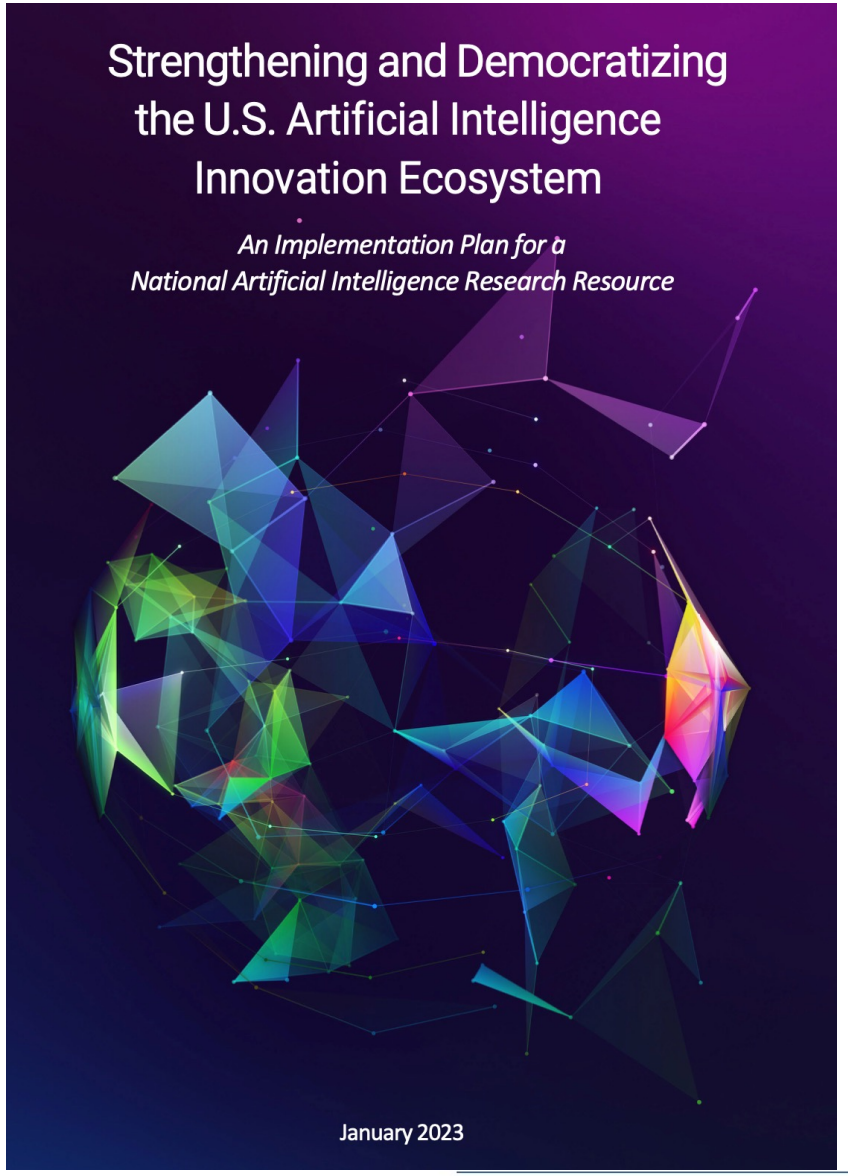
- Automated report generation, including analytics and visuals
- FAIR (findable, accessible, interoperable, reusable) data products
- Synthetic data for data confidentiality and disclosure avoidance
- Customizable reporting tailored to the needs of different stakeholders

❖ Concerns about accessibility and security

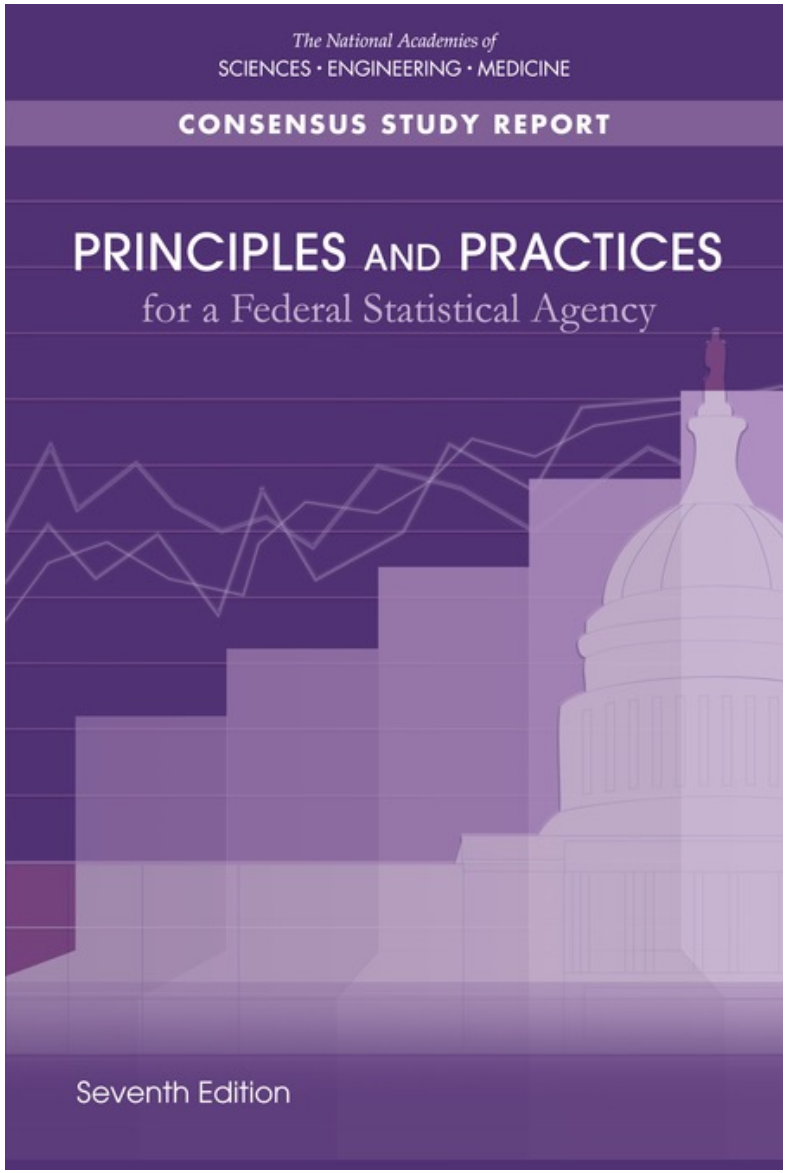


Conclusion

- AI-driven discoveries and capabilities hold the potential to drive practical solutions to address critical global challenges
- AI and Gen AI will continue to evolve and influence survey methodologies
- Empowering surveys by enhancing efficiency and accuracy
- Efforts to overcome access divide
  - National AI Initiative and the National Artificial Intelligence Research Resource (NAIRR) Task Force



Open but Cautious

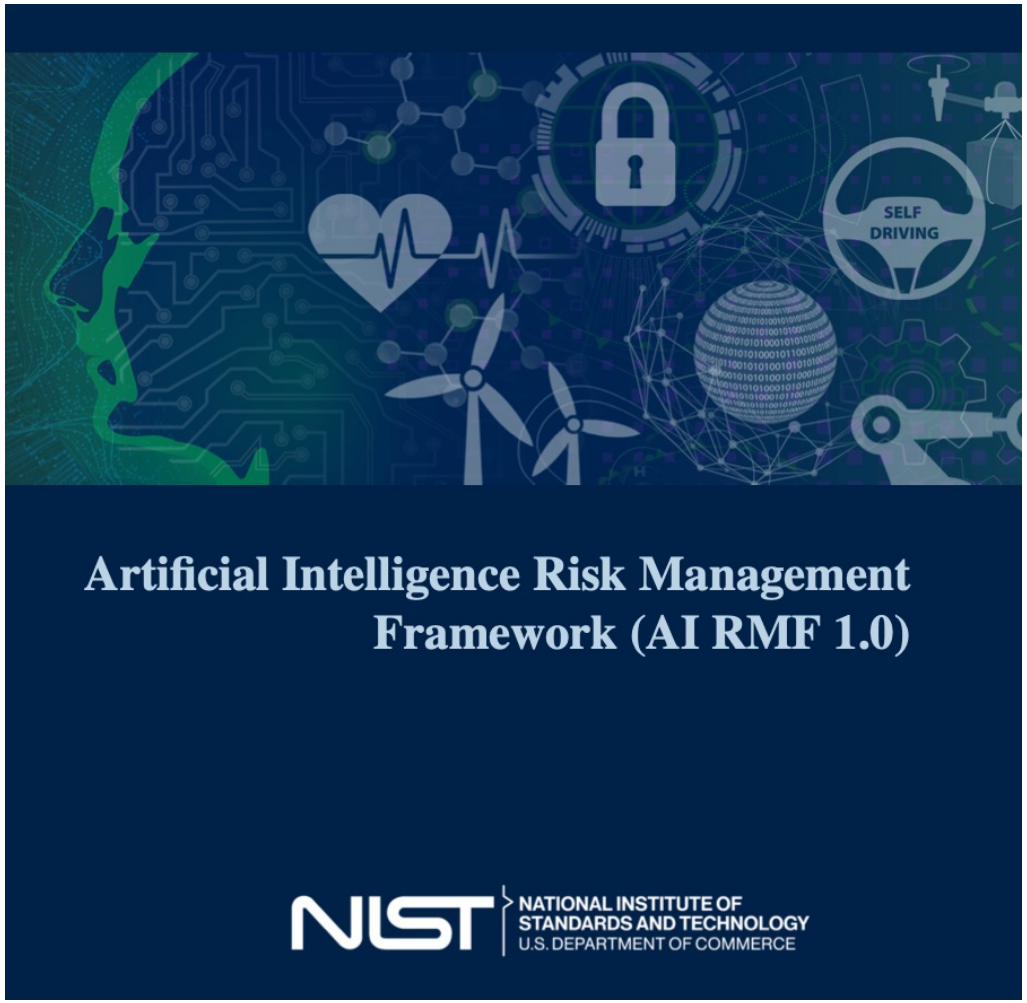


Federal statistical agencies and units have important statutory responsibilities to

1. produce and disseminate **relevant and timely** statistical information;
2. conduct **credible and accurate** statistical activities;
3. conduct **objective** statistical activities; and
4. protect the trust of information providers by ensuring the **confidentiality and exclusive statistical use** of their responses.

Responsible and Ethical AI

- Valid and reliable
- Accountable and transparent
- Explainable and interpretable
- Privacy-enhanced
- Fair – with harmful bias managed
- Safe, secure and resilient



AI Governance

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

THE DIRECTOR

March 28, 2024

M-24-10

MEMORANDUM FOR THE HEADS OF EXECUTIVE DEPARTMENTS AND AGENCIES

FROM: Shalanda D. Young

SUBJECT: Advancing Governance, Innovation, and Risk Management for Agency Use of Artificial Intelligence

Artificial intelligence (AI) is one of the most powerful technologies of our time, and the President has been clear that we must seize the opportunities AI presents while managing its risks. Consistent with the AI in Government Act of 2020,[1] the Advancing American AI Act,[2] and Executive Order 14110 on the Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence, this memorandum directs agencies to advance AI governance and innovation while managing risks from the use of AI in the Federal Government, particularly those affecting the rights and safety of the public.[3]

1. OVERVIEW

While AI is improving operations and service delivery across the Federal Government, agencies must effectively manage its use. As such, this memorandum establishes new agency requirements and guidance for AI governance, innovation, and risk management, including through specific minimum risk management practices for uses of AI that impact the rights and safety of the public.

Strengthening AI Governance. Managing AI risk and promoting AI innovation requires effective AI governance. As required by Executive Order 14110, each agency must designate a Chief AI Officer (CAIO) within 60 days of the date of the issuance of this memorandum. This memorandum describes the roles, responsibilities, seniority, position, and reporting structures for agency CAIOs, including expanded reporting through agency AI use case inventories. Because AI is deeply interconnected with other technical and policy areas including data, information technology (IT), security, privacy, civil rights and civil liberties, customer experience, and

Responsible AI is a team sport!

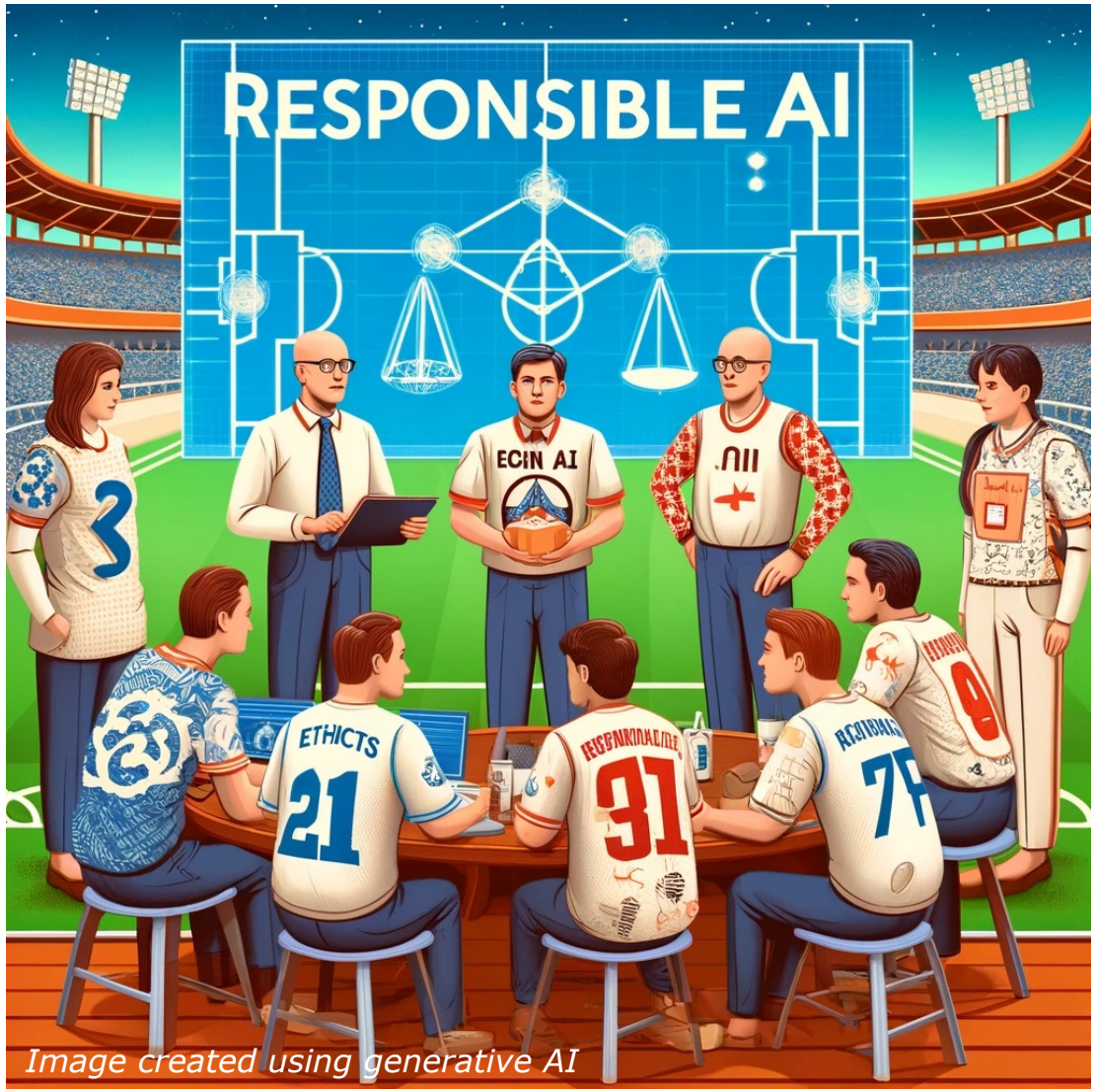


Image created using generative AI

We are in this together!

- Subject matter experts
- Survey statisticians and methodologists
- Data scientists
- Social scientists
- Federal statistical agencies

Thank You!

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