

Artificial Intelligence in the Survey Process: Use Cases and Challenges

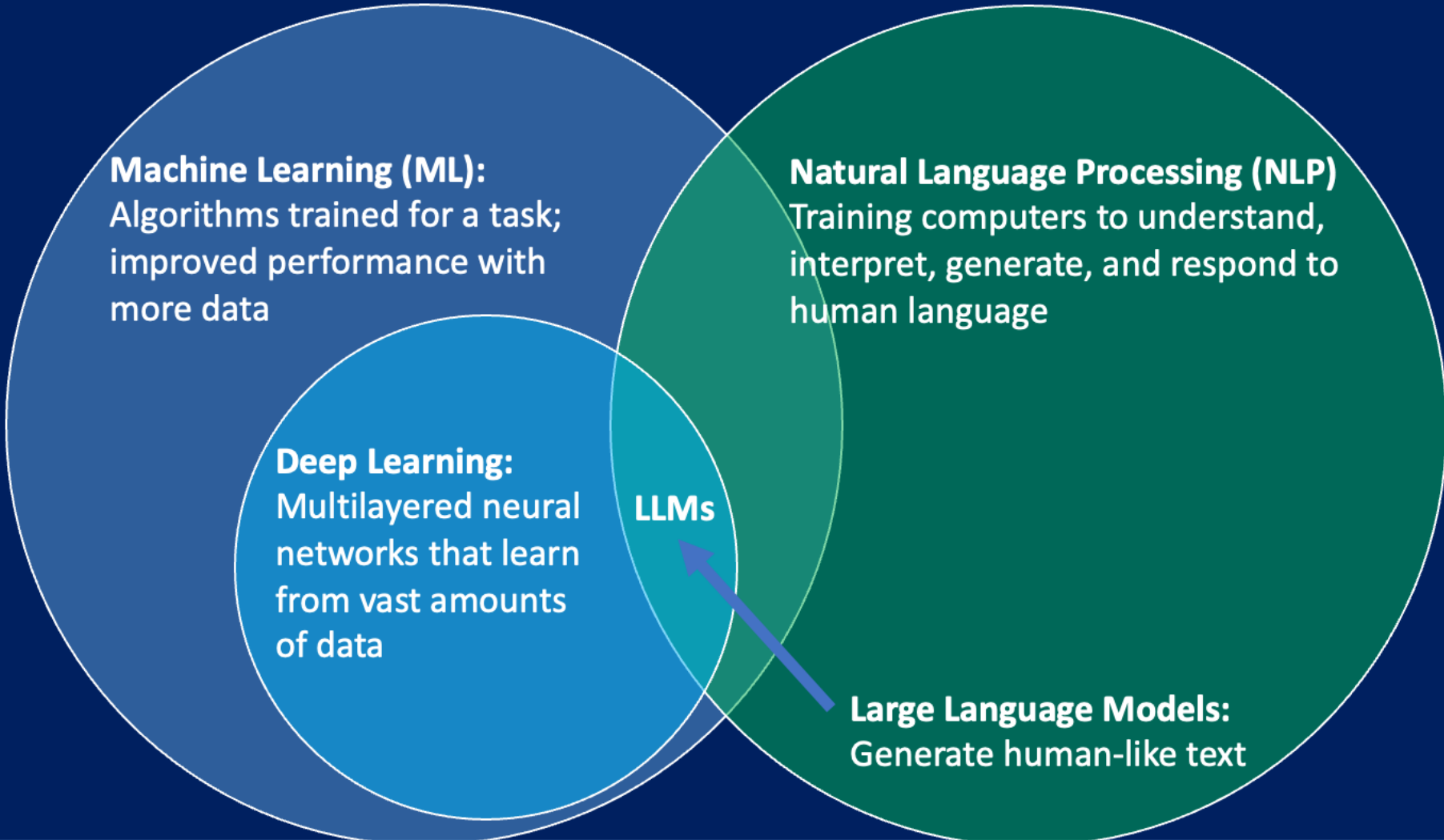
Gizem Korkmaz, Ph.D.
Associate Vice President, Westat

AI Day for Federal Statistics
May 2, 2024

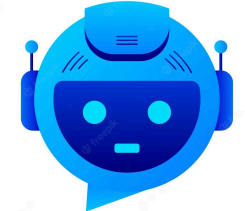
What is Artificial Intelligence?

Artificial Intelligence (AI):

A program that mimics human behavior (sense, reason, act, adapt)



Hi, how can I help you?



CHAT BOT

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

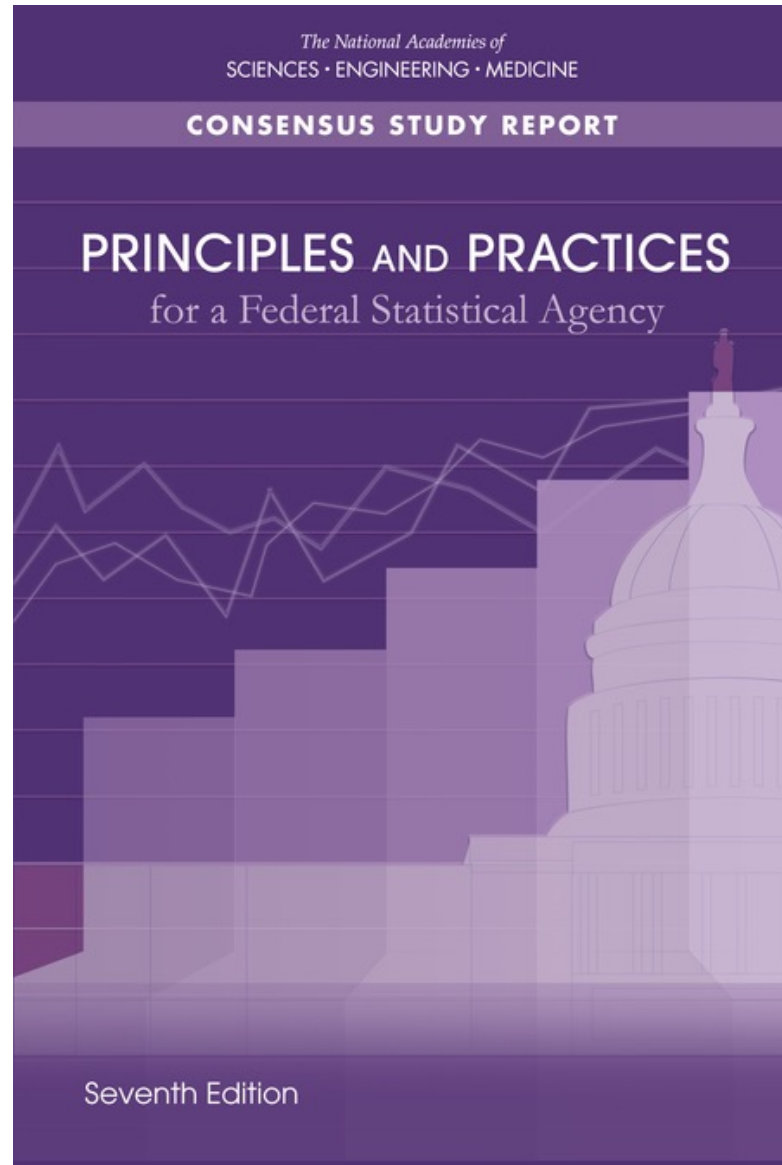
Needs accurate and detailed prompts



To replace programmers with robots, clients will have to accurately describe what they want.

We're safe.

AI as Innovation in the Federal Statistical System



PRINCIPLE 5

Continual Improvement and Innovation

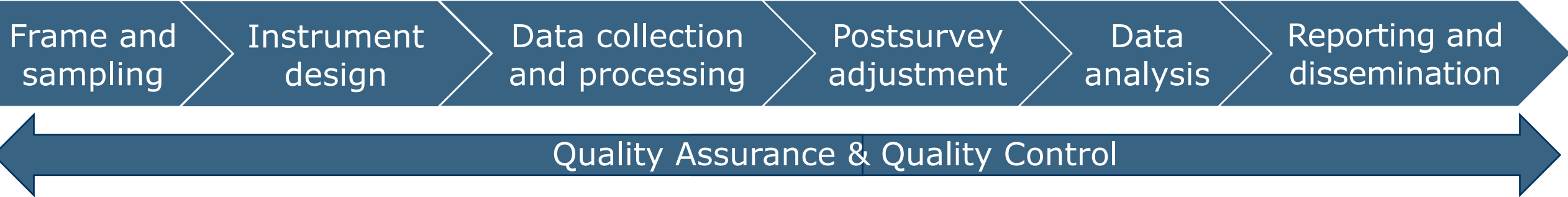
Federal statistical agencies must continually seek to improve and innovate their processes, methods, and statistical products to better measure an ever changing world.

“ [...]

- *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

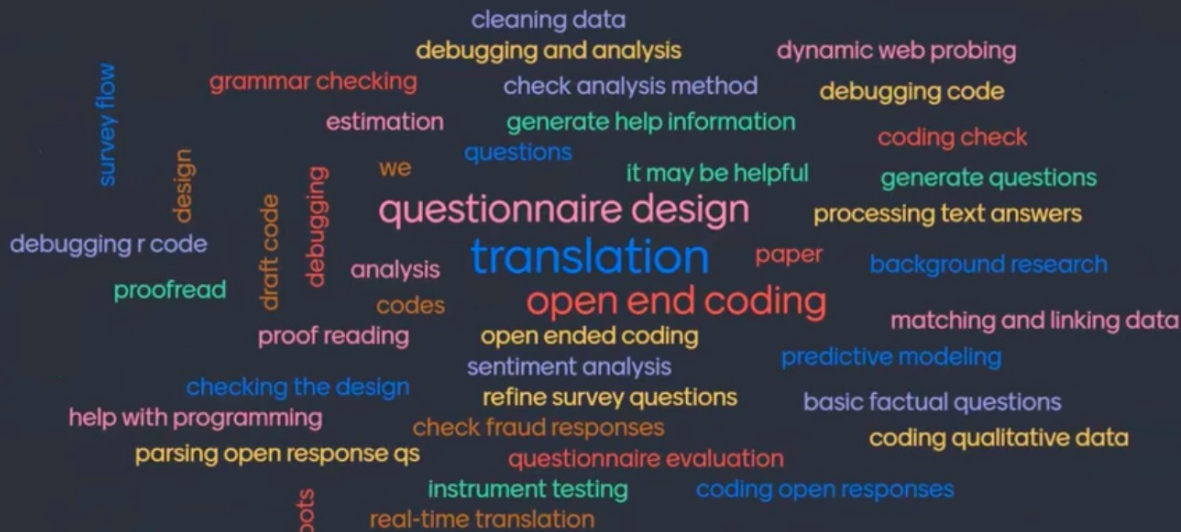


Leveraging AI for Survey Research

JPSM and SoDa Center, University of Maryland & LMU Munich

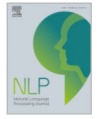
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How would you use AI in survey research?



Natural Language Processing Journal

Volume 4, September 2023, 100020



Employing large language models in survey research

Bernard J. Jansen^a, Soon-gyo Jung^a, Joni Salminen^b

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<https://doi.org/10.1016/j.nlp.2023.100020>

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Abstract

This article discusses the promising potential of employing large language models (LLMs) for survey research, including generating responses to survey items. LLMs can address some of the challenges associated with survey research regarding question-wording and response bias. They can address issues relating to a lack of clarity and understanding but

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

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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

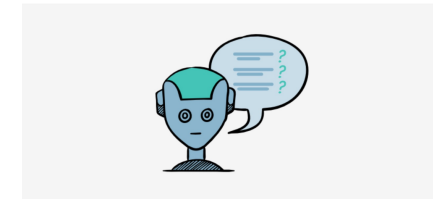
The frame for the Residential Energy Consumption Survey (RECS) Energy Supplier Survey (ESS) is developed by identifying the correct names of energy suppliers reported by respondents in the RECS household survey. In the 2020 RECS, 19,000 respondents provided nearly 30,000 entries of electricity, natural 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 2020 RECS, Westat turned to natural language processing (NLP). This presentation

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



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

Articles

Vol. 16, Issue 1, 2023 · July 27, 2023 EDT

Applying Machine Learning to the Evaluation of Interviewer Performance

Hanyu Sun, Ting Yan

machine learning interviewer monitoring Computer Assisted Recorded Interviewing

• <https://doi.org/10.29115/SP-2023-0007>

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2024 Federal Computer Assisted Survey Information Collection Workshops

Use of Clustering Methods on Paradata to Inform Surveys

Mengshi Zhou, Westat; Gizem Korkmaz, Westat; Ting Yan, Westat; Ryan Hubbard, Westat; Rick Dulaney, Westat; Brad Edwards, Westat

As survey response rates continue to decline, strategies to increase efficiency of data collection are much needed. Paradata process data collected as part of survey data are often used to understand declining response rates and to inform responsive or adaptive designs. Paradata contain a vast amount of information on when and how sampled persons

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

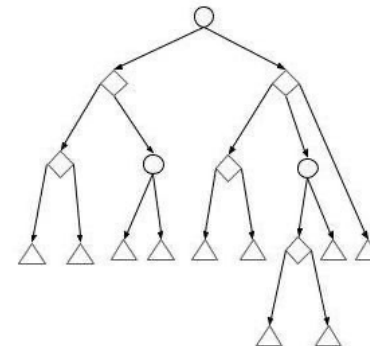


Program for the International Assessment of Adult Competencies (PIAAC)

The Program for the International Assessment of Adult Competencies (PIAAC), also known as the Survey of Adult Skills, is a large-scale international study of key cognitive and workplace skills of adults. Data is collected from adults ages 16–74 in the United States and ages 16–65 in the other countries. It is designed to assess and compare adults' skills in [participating countries](#) over a broad range of abilities, from reading simple passages to complex problem-solving skills, and to collect information on an individual's skill use and background.

Main Study, National Supplement, and PIAAC 2017 Technical Report

November 2019



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Selection of Nonresponse Adjustment Variables

❖ 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



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

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adjustment

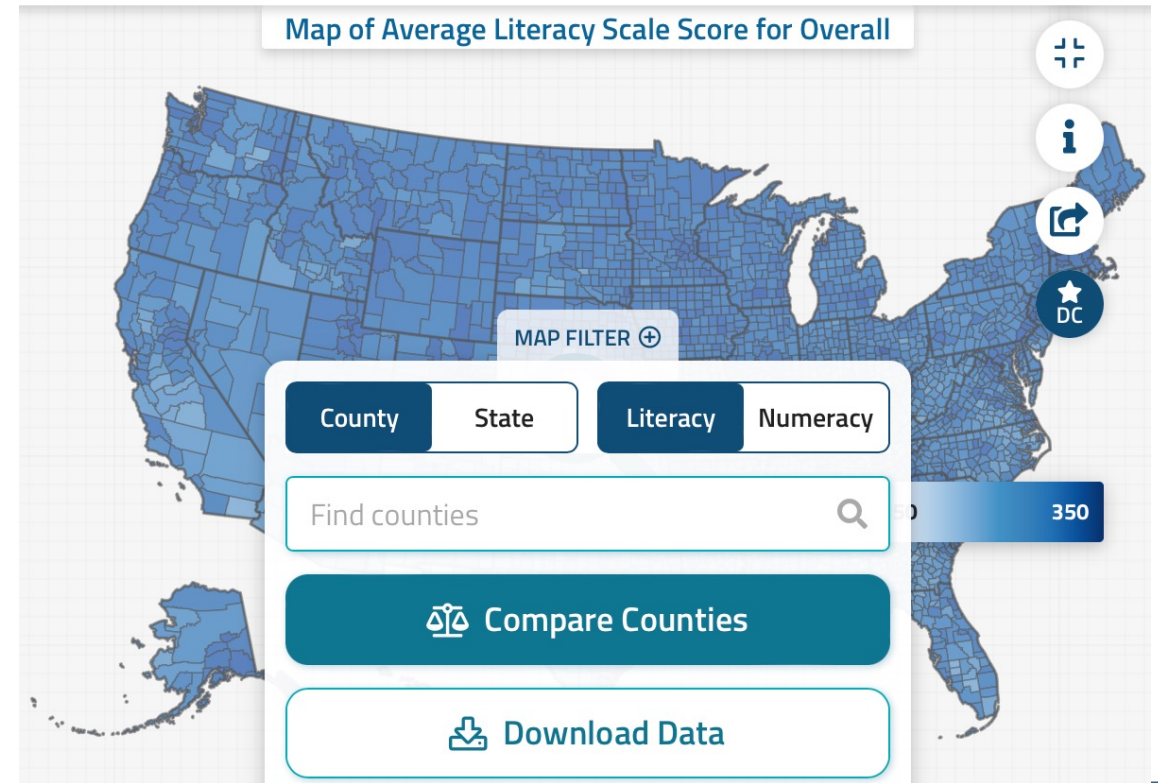
Data
analysis

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

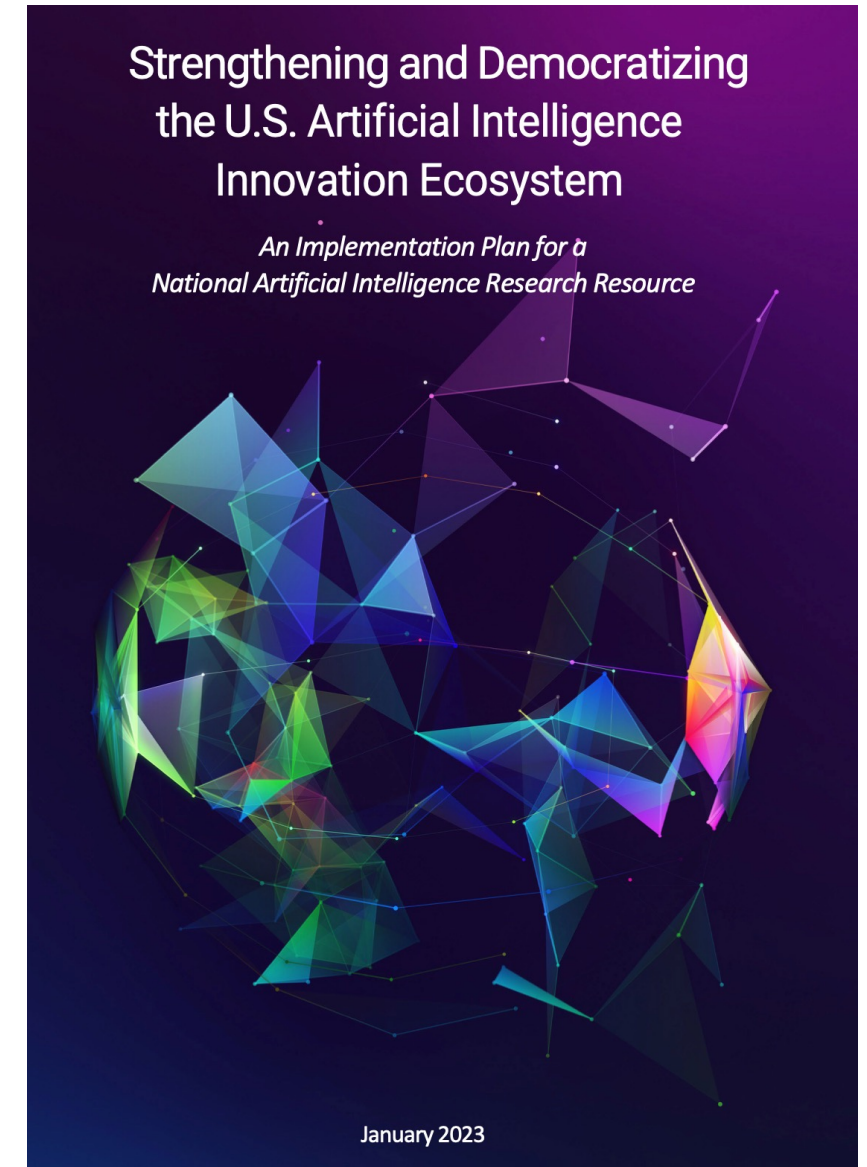


U.S. Skills Map: State and County Indicators of Adult Literacy and Numeracy

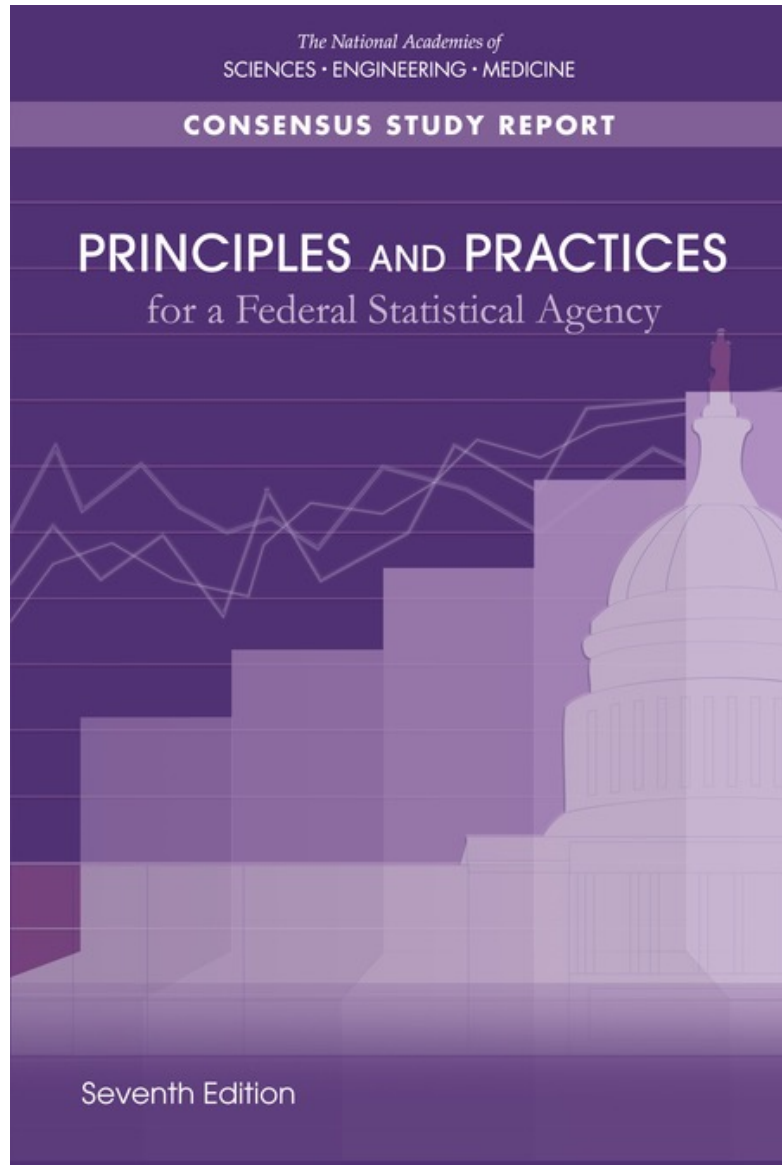


Conclusion

- 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

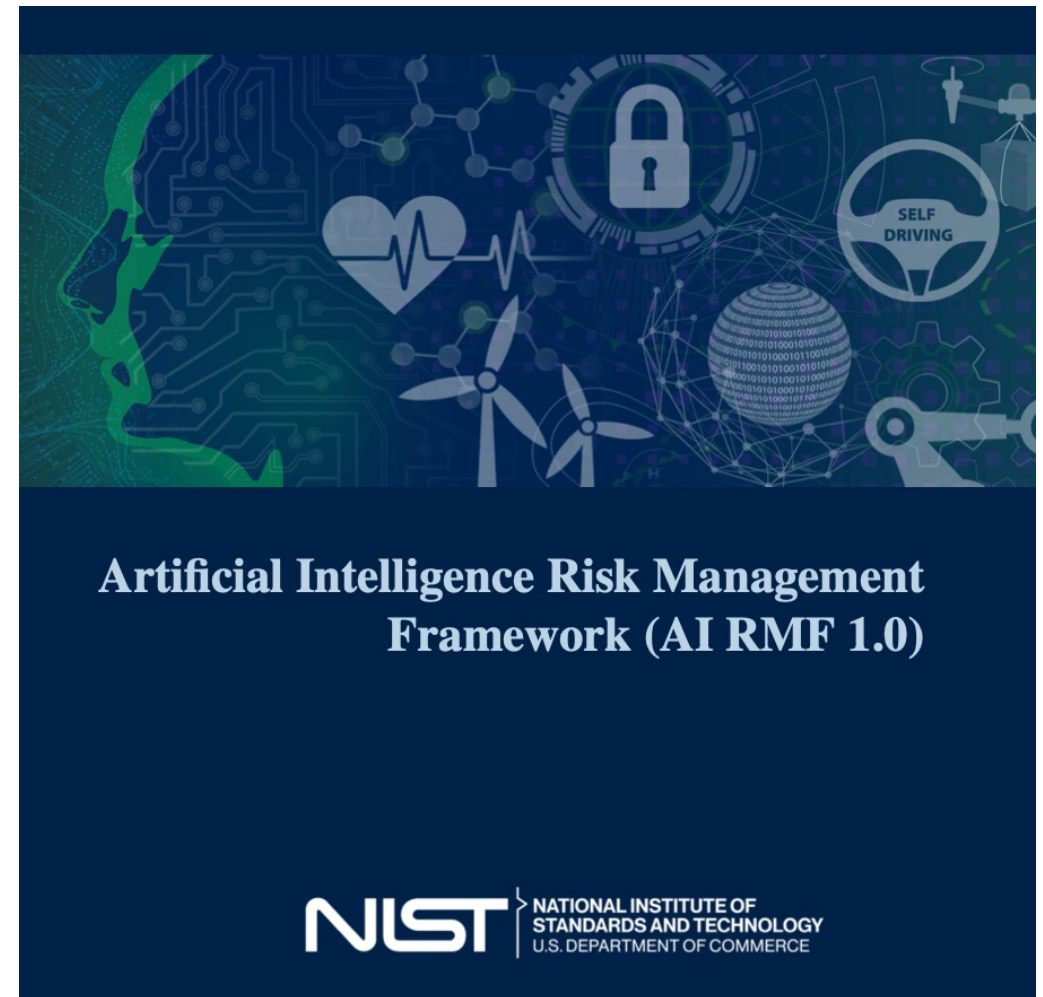


Federal statistical agencies and units have important statutory responsibilities to

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 *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!

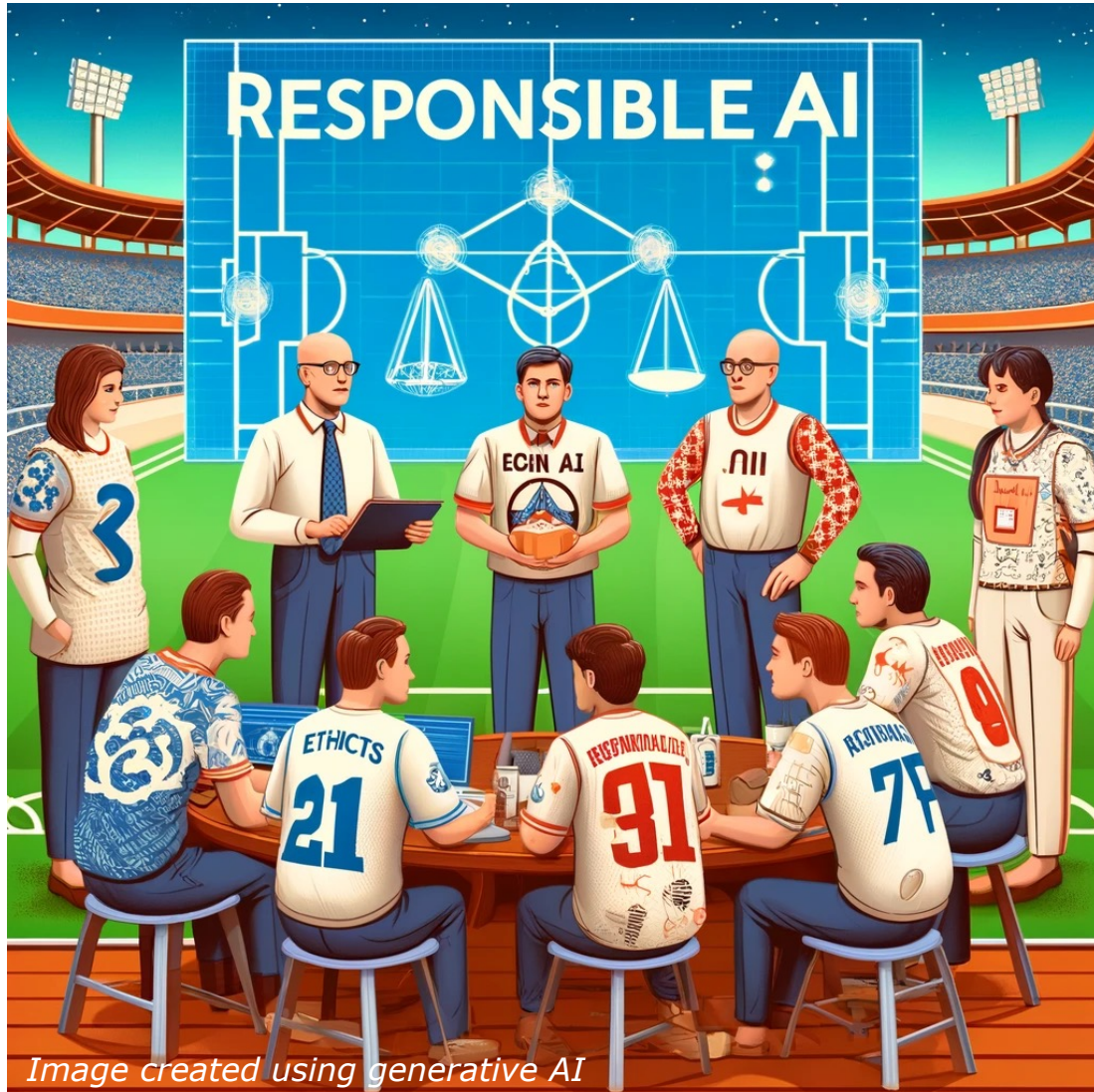


Image created using generative AI

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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