

Attachment I -Project Topic

Secure Multiparty Computation: A Case Study

Key Objective

This project seeks a coordinated effort to integrate data across government and the private sector, utilizing privacy enhancing technologies (PETs). The integration of government and private sector data increases privacy concerns and therefore requires special tools to ensure privacy protection while integrating. The key objective of this project is to use secure multiparty computation to access, exchange, and integrate data and ultimately publish these statistics after establishing the agreements and protocols needed to enable data acquisition.

Background

The National Secure Data Service

This project is part of the National Secure Data Service (NSDS) Demonstration project. The NSDS Demonstration project under PL 117-167 calls for activities to "develop, refine, and test models to inform the full implementation of the Commission on Evidence-Based Policymaking recommendation for a governmentwide data linkage and access infrastructure for statistical activities conducted for statistical purposes, as defined in chapter 35 of title 44, United States Code."

The [Advisory Committee on Data for Evidence Building: Year 2 Report](#) recommended several focus areas for the NSDS to support an evidence-building ecosystem, including the use of privacy-preserving technologies (recommendation 3.12) and creation of tools and support to users in conducting secure, accurate, and scalable analyses (recommendation 5.5). In addition, this project could support the [Executive Order 14243, Stopping Wast, Fraud, and Abuse by Eliminating Information Silos](#) by maximizing the use of data while still protecting privacy.

Current State

Data sharing across government and the private sector has challenges, including but not limited to privacy and security concerns, data governance guardrails, and ensuring data quality standards are met. Advances in PETs aim to address some of these challenges. While PETs offer cryptographic techniques to protect privacy while maintaining utility, many federal statistical agencies lack the resources to resolve some of these administrative and legal challenges to successfully integrate data across government and the private sector.

Future State

An approach can be developed where an NSDS would serve as a coordinating entity to support the use of PETs like secure multiparty computation techniques such as private set intersection

for data integration across government and the private sector. The NSDS would support the administrative and legal challenges while offering a secure compute environment to deploy these technologies. This work could be done through a pilot study that would use secure multiparty computation to integrate government and private sector data to support producing statistics that could not have been previously calculated by any one source alone.

Request for Solution

This project seeks options for developing an open-source end-to-end secure multiparty computation tool for calculating statistics within the NSDS Secure Compute Environment. The project will include developing agreements, data access, secure multiparty computation for data integration between government and private sector data, and publication of at least one new statistic. The project should identify the risks and limitations associated with the proposed methods and provide mitigation strategies to handle these risks.

Respondents to this RFS should propose a solution that will be informative for the process of using secure multiparty computation for data integration. The project should include a case study that tests using secure multiparty computation to integrate data relevant to creating a complete income picture like household income, consumption, and wealth as noted in the 2024 National Academies of Sciences, Engineering, and Medicine report, [*Creating an Integrated System of Data and Statistics on Household Income, Consumption, and Wealth: Time to Build*](#) (e.g., recommendations 6-1 and 6-2). This specific case study will demonstrate how secure multiparty computation can offer alternative approaches to constructing complex earnings statistics, combining government and private sector data, while creating an infrastructure to expand this capacity to other policy areas of interest. This work should complement [current NSDS projects](#) assessing privacy enhancing techniques.

Information Gaps

A successful project will identify:

- A state-of-the-art secure multiparty computation tool for integrating data across sectors while protecting privacy;
- Methods that can be applied to ensure that the results meet data quality standards (e.g., [FCSM Framework for Data Quality](#)), including replicability so the tool can be expanded for other policy relevant areas of interest.
- Strategies to implement the tool in the NSDS secure compute environment;

Key Evidence-Building Considerations

Key focus questions to assess feasibility:

- How can secure multiparty computation be leveraged to expand research in the use of government and private sector data for complex statistical and policy relevant questions?
- What are the limitations and risks of using secure multiparty computation and how can those risks be mitigated?
- How can secure multiparty computation be expanded to create statistics for other policy areas of interest?

Deliverables

At a minimum, offerors will provide the following if selected for an award. Additional deliverables may be required.

- Monthly status reports on progress toward project objectives.
- Quarterly lessons learned based on what has been learned during the last quarter that will inform a future NSDS. This will include addressing the administrative, legal, and technical challenges faced by data integration from government and private sector data.
- Identify and recommend sources that can be linked and used to calculate a statistic representing a complete income picture like household income, consumption, and wealth.
- Development and execution of the necessary data sharing agreements.
- Development and delivery of an open-source end-to-end tool using secure multiparty computation, with a use case that informs the calculation of a complete income picture.
- All code used in the project, including but not limited to, data preparation, configuration, and deployment of the tool provided in a reproducible, and if applicable, open-source format (e.g., R, python, etc.).
- Sufficient data and/or documentation of data needed to reproduce the results of all derived statistics.
- A final report covering the project objectives, processes, and outcomes, including the methods used to conduct data integration with secure multiparty computation and description of the risks and potential mitigation strategies for those risks. In addition, the final report should address the administrative, legal, and technical challenges to successfully integrate government and private sector data and calculate a new statistic.
- A communications and outreach plan that is integrated into the services offered within an NSDS, with accompanying implementation plan, for communicating with stakeholder groups about using secure multiparty computation in a shared service environment and metrics to highlight the value proposition for using secure multiparty computation.