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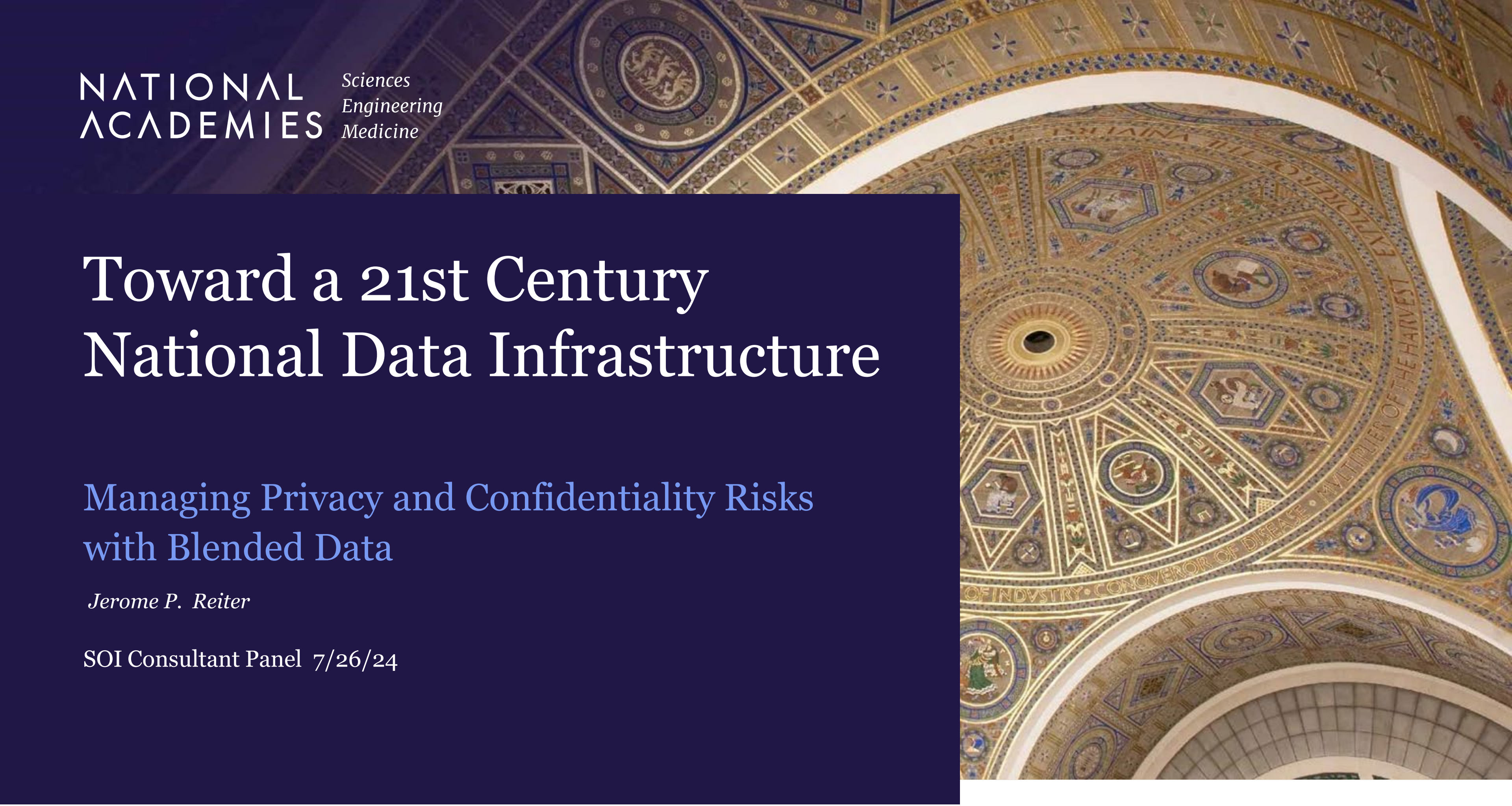


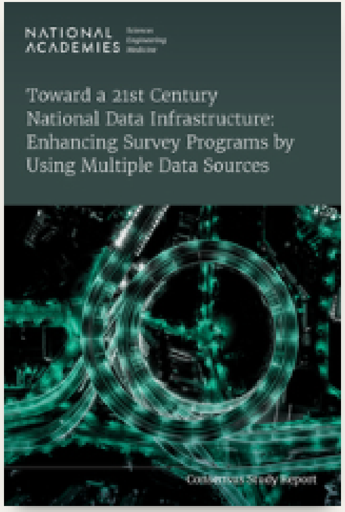
Toward a 21st Century National Data Infrastructure

Managing Privacy and Confidentiality Risks with Blended Data

Jerome P. Reiter

SOI Consultant Panel 7/26/24

The Data Infrastructure Visioning Series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Consensus Study Report

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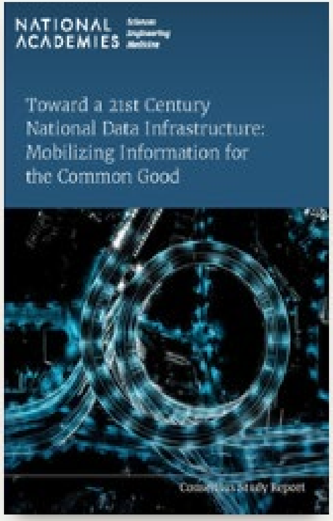
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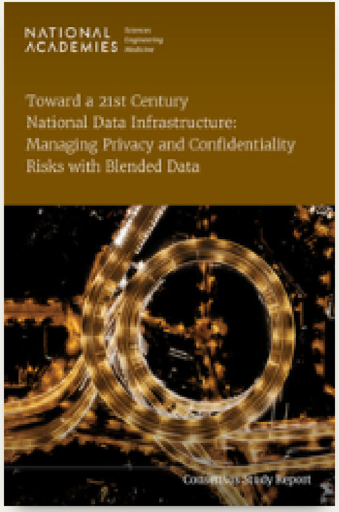
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Also see https://nap.nationalacademies.org/resource/26688/interactive/

Panel Members

- **Jerry Reiter,** Duke University
- **Claire Bowen**, Urban Institute
- **Aloni Cohen**, University of Chicago
- **Diana Farrell**, National Bureau of Economic Research
- **Robert Goerge**, University of Chicago
- **Nick Hart**, Data Foundation
- **Hosagrahar Jagadish**, University of Michigan
- **Dan Kifer**, The Pennsylvania State University
- **Karen Levy**, Cornell University
- **Salomé Viljoen**, Michigan Law School
- **Mark Watson**, Federal Reserve Bank of Kansas City (formerly)

Structure of the Report

1. Introduction
2. Technical Approaches to Managing Risk When Sharing Blended Data
3. Policy Approaches to Managing Risk When Sharing Blended Data
4. A Model Framework for Decision Making When Sharing Blended Data
5. Conclusions

Issues In Managing Blended Data Risk:

Risk Spans the Blended Data Life Cycle

- The blended data life cycle spans:
  - initial conceptualization of blended data;
  - identifying and accessing ingredient data sources;
  - blending the data from those sources; and
  - sharing the resulting data products.
- Each of these stages presents potential risks to privacy and confidentiality, and subsequent harms to data subjects and data holders.
- Disclosure risks and harms can be magnified in blended data.

Issues In Managing Blended Data Risk:

Risks In Blended Data Can Be Managed

- No non-trivial data release method guarantees zero risks to privacy. Generally, providing greater access enhances usefulness, but also increases disclosure risks for data subjects.
- As a general rule, enhancing the usefulness of blended data requires accepting greater disclosure risks.

Trade-offs in disclosure risks, disclosure harms, and data usefulness are unavoidable and are central considerations when planning data-release strategies, particularly for blended data. Effective technical approaches to manage disclosure risks prioritize the usefulness of some analyses over others. (Conclusion 2-1)

Tools for Managing Risk in Blended Data

- The report describes the potential and limitations of existing technical approaches including:
  - Secure multiparty computation
  - Synthetic data with validation/verification
  - Classical statistical disclosure limitation
  - Formal privacy
- Policy approaches (e.g., laws, regulations, data enclaves and licenses) are essential components of the life cycle of blended data. They describe relationships of trust in data use.

Key Attributes of a Framework for Managing Risk:

Responds to Stakeholder Interests

- Engagement with stakeholders, including data holders, data users, and decision makers, is important for effective management of trade-offs.
- Ideally, this occurs throughout the design and implementation of privacy-protection strategies.
- Communication plans may differ depending on the needs of relevant groups:
  - For the public, use plain language to describe context-specific protections.
  - For data users, include methods for demonstrating data quality after privacy protections are applied.

Effective communication with data holders and data users can help agencies understand and better manage disclosure risk/usefulness trade-offs. (Conclusion 2–2)

Key Attributes of a Framework for Managing Risk:
Adapts to Policy and Technology Changes

- As policy priorities change, data availability can change. As more data are made available, the potential for privacy risk also increase. Technical approaches to limit privacy risk are advancing.
- Even when regulatory guidance and procedures for managing privacy risks are established, social acceptance of sharing and use of blended data will change.

The effectiveness of a framework for making decisions about acceptable disclosure risks given expected usefulness of data depends on whether that framework is dynamic. A dynamic framework allows for changing policy needs and data availability over time, in a way that accounts for the interests of data subjects, data holders, and data users. (Conclusion 3–1)

Key Attributes of a Framework for Managing Risk:
Reflects Different Levels of Risk and Usefulness

- Acceptable disclosure risk is a policy decision.
- As uses and users of blended data may have differing needs, policy can establish tiered access, describing levels of potential risk, harm, and usefulness and procedures in place to secure data access.

  Tiered access for data users and agencies is a key component of a dynamic disclosure risk/usefulness framework, to reflect differences in acceptable risks given policy priorities. (Conclusion 3–2)

Key Attributes of a Framework for Managing Risk:
Provides a Common Lexicon For Communication

- Coordinating best practices for risk management across data holders and data users across disciplines requires a shared language reflecting the concepts of risk, harm, and usefulness.
- Shared language also enables quantification of these concepts, enabling them to be considered when managing trade-offs.

A common, cross-disciplinary language and lexicon describing privacy and confidentiality risks and harms, as well as data usefulness, is needed. Interpretable and measurable terms can promote meaningful discussions among stakeholders, including data subjects and decision makers. (Conclusion 3–3)

A Model Framework for Managing Risk:

Six Steps Supported with Guiding Questions

- Drawing from the panel's review of technical and policy approaches, the panel provides a framework that accounts for the attributes of blended data for making decisions about data-protection methods.
- Framework encourages agencies to answer a set of questions at each stage of the data-blending lifecycle to aid decision-making. Rather than attempting to cover all data-blending scenarios or stipulate precise approaches, the framework provides a lens to promote careful consideration of key questions.

  Technical and policy approaches in combination are necessary for effective management of disclosure risks. (Conclusion 4–1)

The Six Steps

1. Determine auspice and purpose of the project

- What are the anticipated final products of data blending?

2. Determine ingredient data files

- What data sources are available to achieve blending? - What are data holders' interests?

3. Obtain access to ingredient data files

- What are the disclosure risks associated with procuring ingredient data?

4. Blend ingredient data files

- When blending requires linking, what linkage strategies can be used?
- Are resulting data sufficiently useful to meet the blending objective?

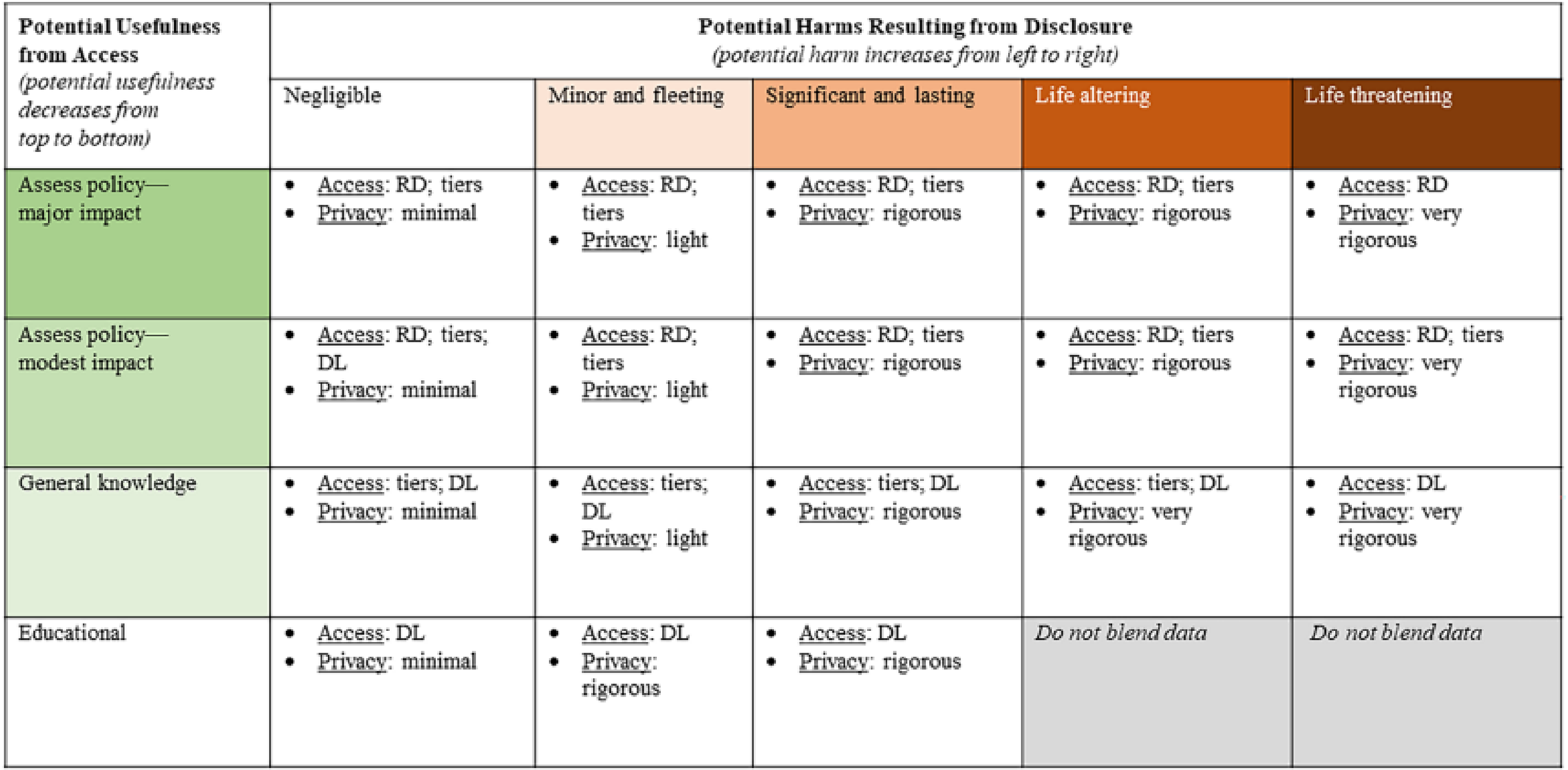
5. Select approaches that meet the end objective

- What are best-available scientific methods for disclosure limitation to accomplish the blended data objective? - How can stakeholders engage in the decision-making process?

6. Develop and execute a maintenance plan

- How will agencies track data provenance and update files when beneficial?
- How will decisions about access and sunsetting be made and communicated?

Figure 4-1. Model decision matrix of disclosure-protection strategies given potential harms and usefulness.



Potential Usefulness from Access *(potential usefulness decreases from top to bottom)*	**Potential Harms Resulting from Disclosure** *(potential harm increases from left to right)*				
	Negligible	Minor and fleeting	Significant and lasting	Life altering	Life threatening
Assess policy—major impact	• Access: RD; tiers • Privacy: minimal	• Access: RD; tiers • Privacy: light	• Access: RD; tiers • Privacy: rigorous	• Access: RD; tiers • Privacy: rigorous	• Access: RD • Privacy: very rigorous
Assess policy—modest impact	• Access: RD; tiers; DL • Privacy: minimal	• Access: RD; tiers • Privacy: light	• Access: RD; tiers • Privacy: rigorous	• Access: RD; tiers • Privacy: rigorous	• Access: RD; tiers • Privacy: very rigorous
General knowledge	• Access: tiers; DL • Privacy: minimal	• Access: tiers; DL • Privacy: light	• Access: tiers; DL • Privacy: rigorous	• Access: tiers; DL • Privacy: very rigorous	• Access: DL • Privacy: very rigorous
Educational	• Access: DL • Privacy: minimal	• Access: DL • Privacy: rigorous	• Access: DL • Privacy: rigorous	*Do not blend data*	*Do not blend data*

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Key: RD =restricted data; DL=disclosure limitation Tiers=tiered access.

Summary of Conclusions (1)

- Agencies, policymakers, data users, and data subjects need to recognize that any blended (or nonblended) data release that offers nontrivial usefulness introduces disclosure risks; it is not productive or correct to think of disclosure risks as a “yes or no” feature.
- Data-release strategies need to balance disclosure risks with data usefulness. When usefulness is high, stakeholders may be willing to accept greater risks to realize the benefits. Agencies can use various disclosure-protection methods for differing data-analysis objectives, such as tiered access approaches.

Summary of Conclusions (2)

- Successful risk-management strategies are likely to involve both technical and policy approaches. Some existing approaches can be gainfully applied with blended data, but others are less effective given the magnified disclosure risks in blended data.
- Disclosure risk management approaches need to be dynamic, involve stakeholder input, and rely on best practices. These characteristics can help determine desirable disclosure risk/usefulness trade-offs.
- Agencies can be (and should be, in the panel's opinion) intentional in examinations of risks at all stages of the blended data lifecycle.

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