A Principled Framework for Disclosure Avoidance

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Disclosure Avoidance Webinar Series

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13 U.S. Code

Section 8(b): "…the Secretary may furnish copies of tabulations and other statistical materials **which do not disclose the information reported by, or on behalf of, any particular respondent**…"

Section 9: "[The Census Bureau may not] make any publication **whereby the data furnished by any particular establishment or individual under this title can be identified**"

The Ever-rising Risk of Disclosure

- Any data release carries some risk of disclosure.
- Improvements in computing power and the explosion of third-party data mean that disclosure risks are constantly increasing.
- Protecting confidentiality means adapting and responding to these increasing threats.

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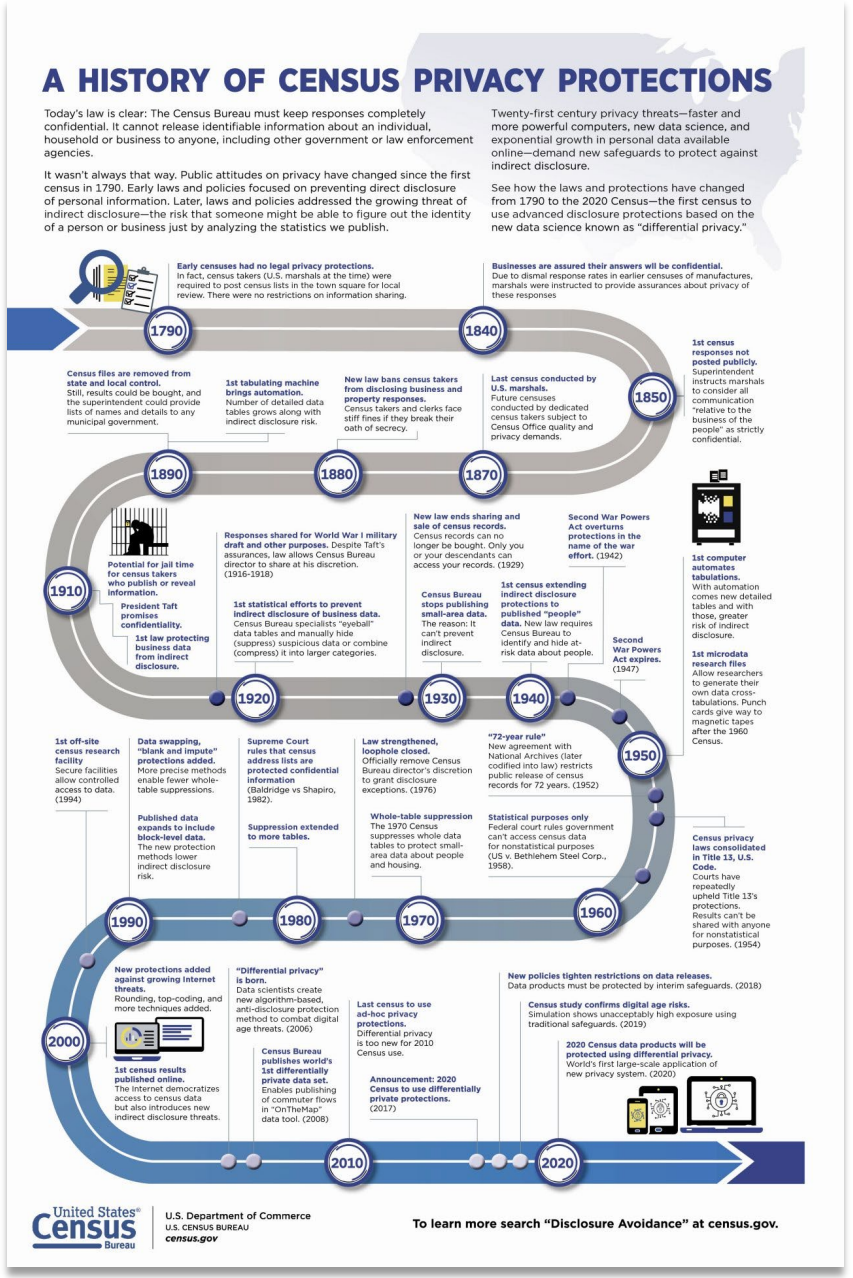
The Census Bureau has a history of continuous improvement of our privacy protections.

One recent focus has been the modernization of our disclosure avoidance methods to mitigate these new 21st Century threats.



https://www.census.gov/library/visualizations/2019/comm/history-privacy-protection.html

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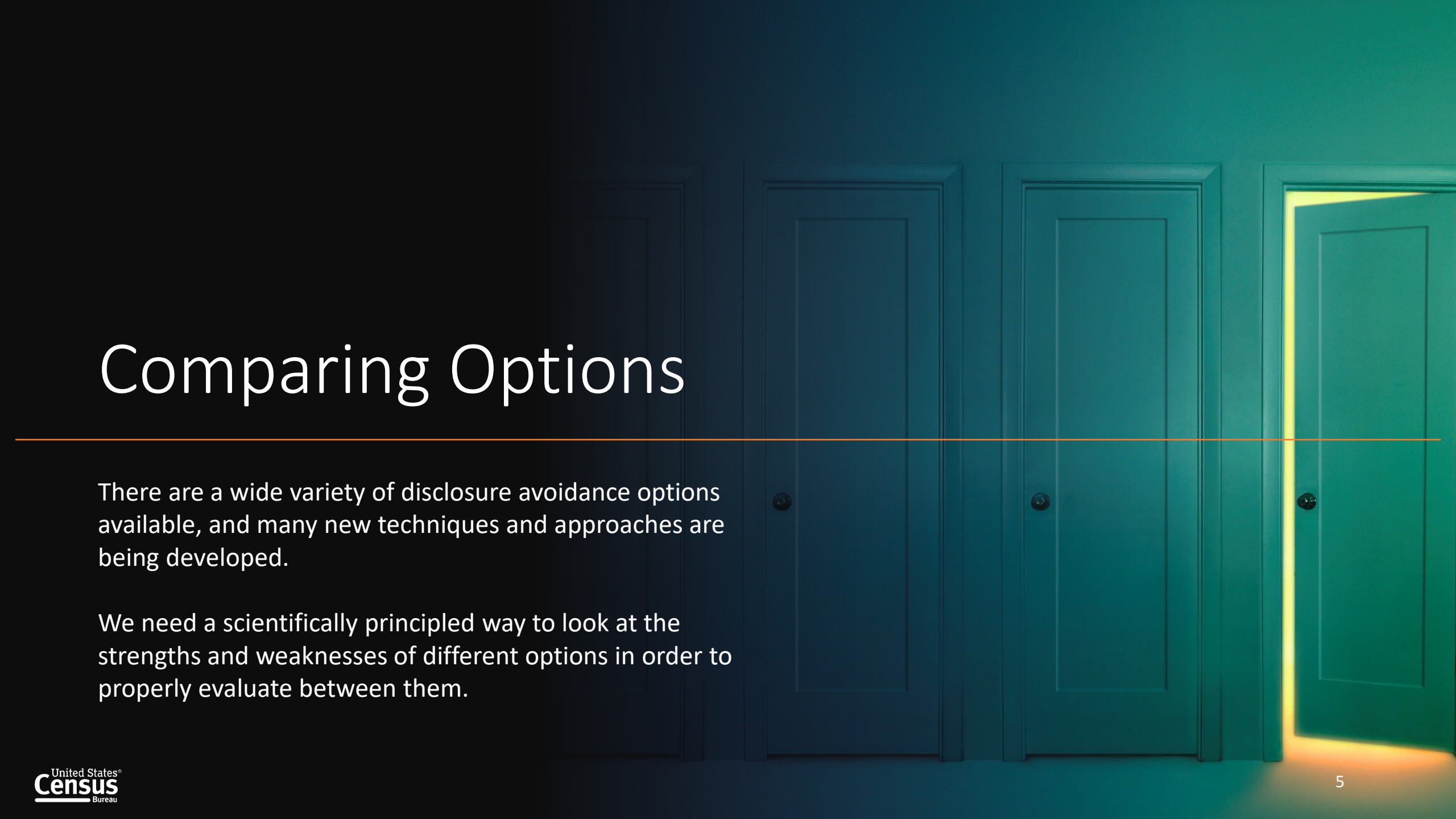
Comparing Options

There are a wide variety of disclosure avoidance options available, and many new techniques and approaches are being developed.

We need a scientifically principled way to look at the strengths and weaknesses of different options in order to properly evaluate between them.



We established a cross-directorate team

DA Futures Working Group

Michael B Hawes (ADRM) – Chair
Sallie Ann Keller (ADRM) – co-Chair
Michael J Walsh (ADRM/CED) – co-Chair

Evan M Brassell (ADDP/SEHSD)
Tony Caruso (ADEP)
Ryan R Cumings (ADRM/CED)
Jason Devine (ADDP/POP)
Cass Dorius (ADRM)
Dave Evans (ADRM)
Kenneth Haase (ADRM)
Michele C Hedrick (ADCOM)
Scott Holan (ADRM)
Cynthia D. Hollingsworth (ADDC/DCMD)

Eric B Jensen (ADDP/POP)
Dan Kifer (ADRM/CED)
Alexandra Krause (ADDP/POP)
Philip Leclerc (ADRM/CED)
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Matthew Spence (ADDP/POP)
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Towards a Principled Framework for Disclosure Avoidance

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https://www.census.gov/library/working-papers/2024/adrm/ced-wp-2024-005.html

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The Triple Tradeoff of Official Statistics

The more statistics you publish, and the greater the granularity and accuracy of those statistics, the greater the disclosure risk.

All statistical techniques to protect confidentiality impose a tradeoff between the degree of data protection and the resulting availability and accuracy of the statistics.

You can maximize on any two dimensions, but only at profound cost to the third.

Disclosure Avoidance Techniques and the Triple Tradeoff

Nearly any disclosure avoidance method can be applied to implement very different balances along the three dimensions, depending on the implemented parameters selected.

Suppression

- *Cell size thresholds, p% rules*

Coarsening

- *Rounding rules (e.g., 3, 10, 1000)*

Swapping

- *Swap keys, rates, geographies*

Differential Privacy

- *Privacy-loss budgets and allocations*

Objective

We need a set of overarching principles that an ideal, applied disclosure avoidance system should meet…

…while distinguishing those principles from any choices relating to the implementation of that system.

What is a Disclosure Avoidance System?

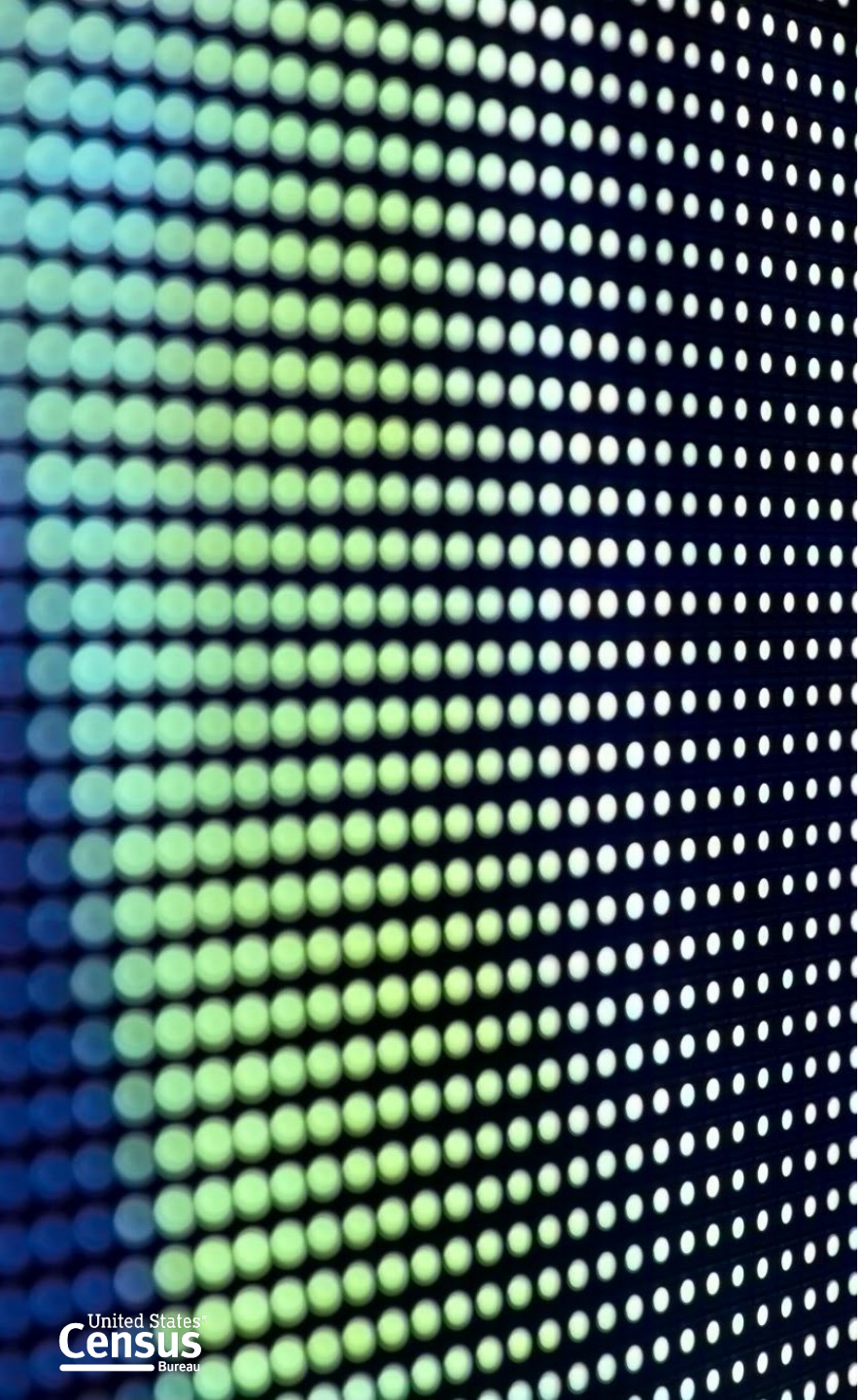
A Disclosure Avoidance System is a set of one or more statistical methods that transform confidential information (or data derived from confidential information) from or about individual data subjects into statistics that describe, estimate, or analyze the characteristics of groups, without identifying the data subjects that comprise such groups.

What is an Applied Disclosure Avoidance System?

An applied Disclosure Avoidance System is one that performs within the operational realities and production cycles of a national statistical office. As such, it acknowledges and is adaptable to requirements stemming from the legal, policy, scientific, resource, and stakeholder environments within which it is operating.

What is an Ideal, Applied, Disclosure Avoidance System?

An ideal, applied, Disclosure Avoidance System is one that conforms to a set of overarching principles or features relating to the efficiency, effectiveness, and flexibility of the system as it transforms confidential information from (or about) data subjects into quality statistics for public release.



Distinguishing these Principles from Implementation Choices

Principles

Reflect characteristics that all DA systems should ideally have, regardless of the specific technology or disclosure limitation mechanism being employed.

Should be universally applicable regardless of the type, format, or context of data being protected.

Implementation

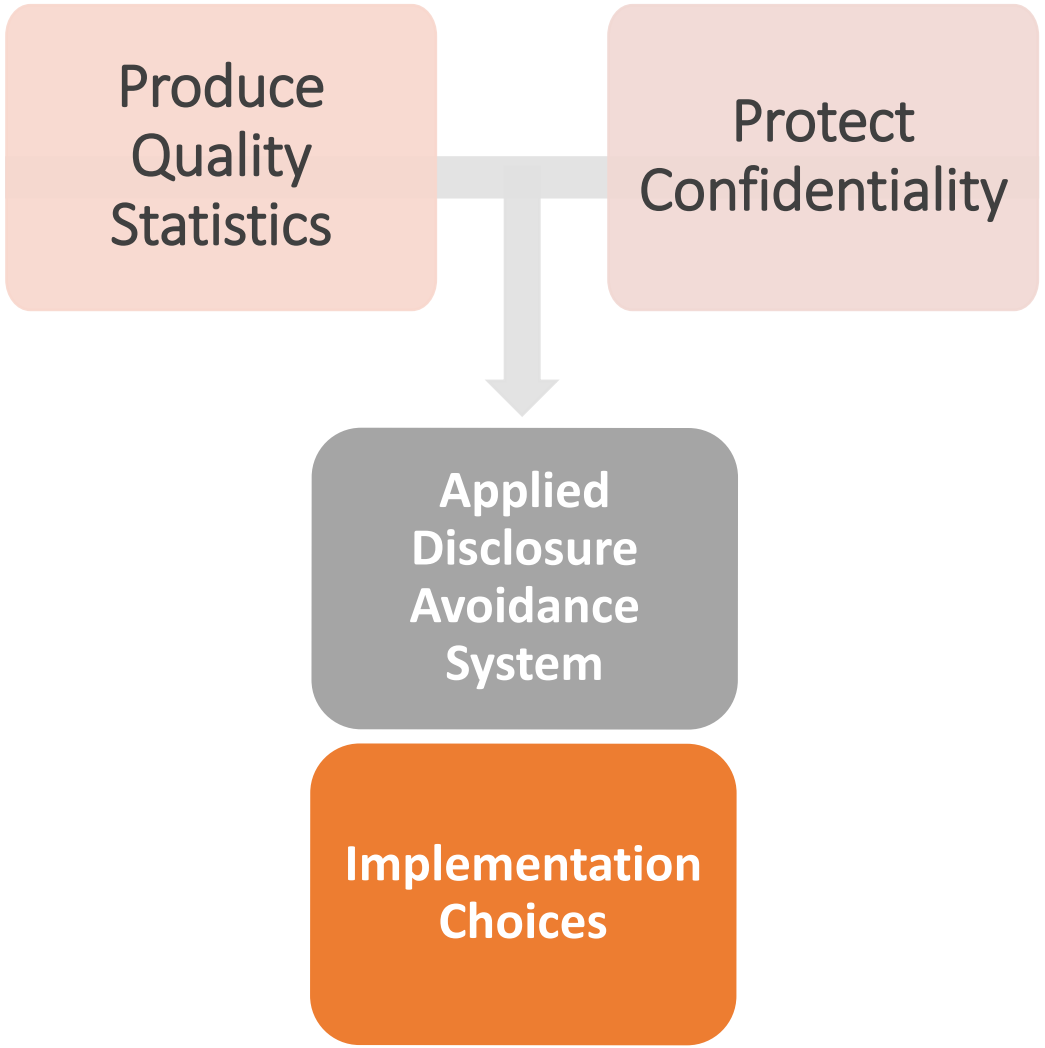
Reflect specific choices about the appropriate balance between data privacy, accuracy, and availability.

Should be informed by the characteristics of the data, the context of the statistical product, and the intended objectives and requirements of the agency and its stakeholders.

Balancing Our Legal Obligation with Our Primary Mission

The Census Bureau's mission is to produce high quality statistics and statistical products.

Title 13's confidentiality protections were established in support of that mission.



Characteristics of an Ideal, Applied Disclosure Avoidance System

Principle #1

It should support meaningful assessment of disclosure risk

Principle #2

It should support meaningful assessment of the impact of data protections on the availability and accuracy of the statistics

Principle #3

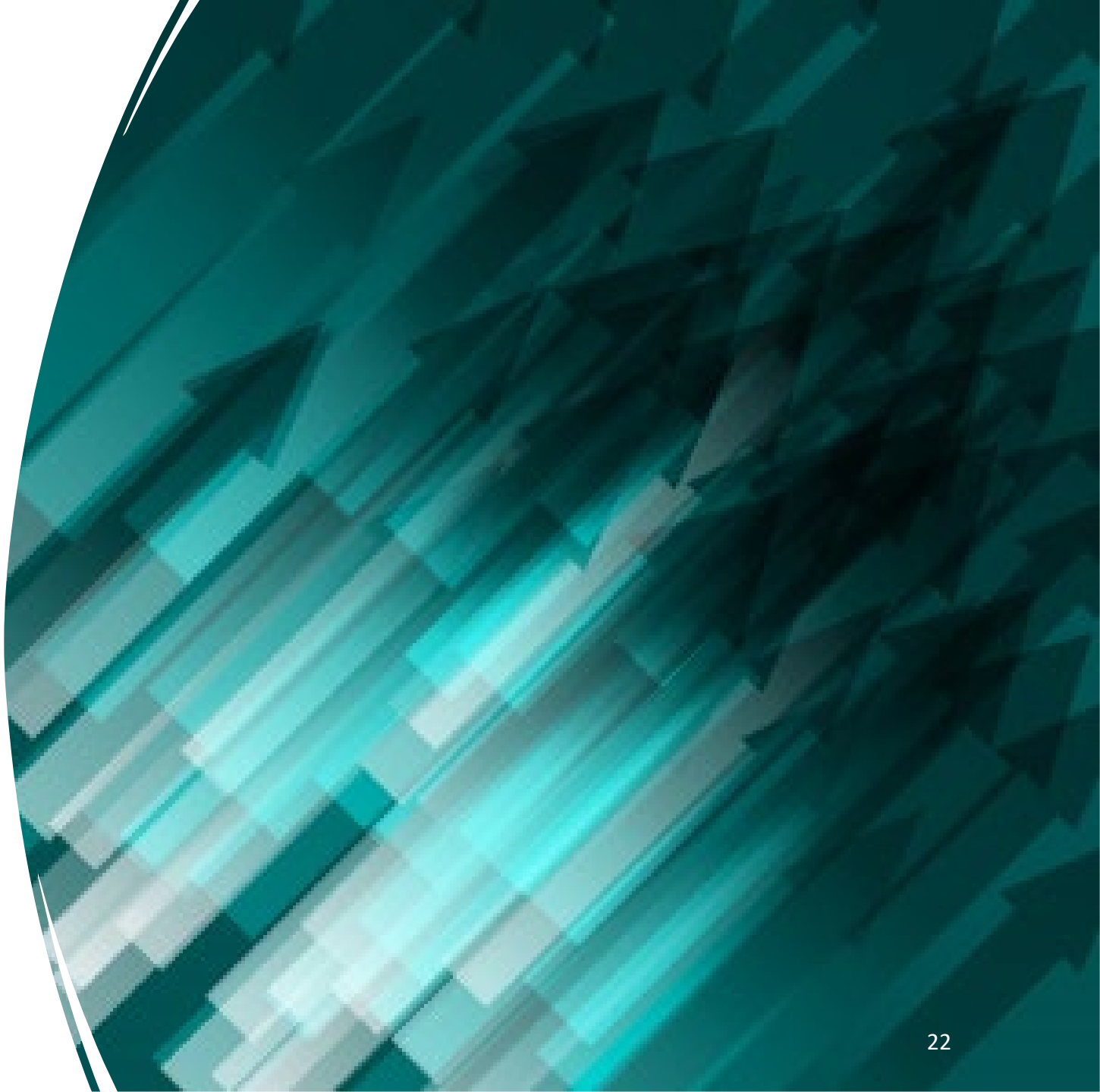
It should be able to target protection

Principle #4

It should be able to target data accuracy

Principle #5

It should track cumulative disclosure risk over time



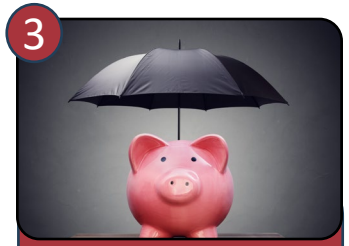
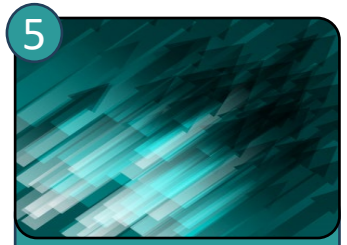
Principle #6

It should be transparent

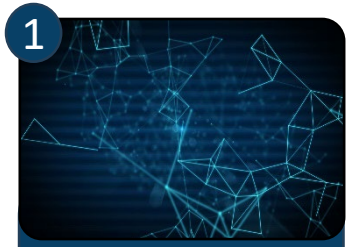
Principle #7

It should be feasible

The 7 Principles of an Ideal, Applied Disclosure Avoidance System

1. 
   Support assessment of disclosure risk
2. 
   Support assessment of the impact on the availability and accuracy of statistics
3. 
   Target protection
4. 
   Target data accuracy
5. 
   Track cumulative disclosure risk over time
6. 
   Be transparent
7. 
   Be feasible

There can be tension between these principles

1. 
   Support assessment of disclosure risk
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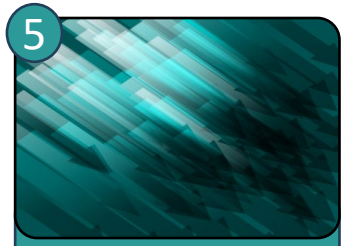
3. 
   Target protection
4. 
   Target data accuracy
5. 
   Track cumulative disclosure risk over time
6. 
   Be transparent
7. 
   Be feasible

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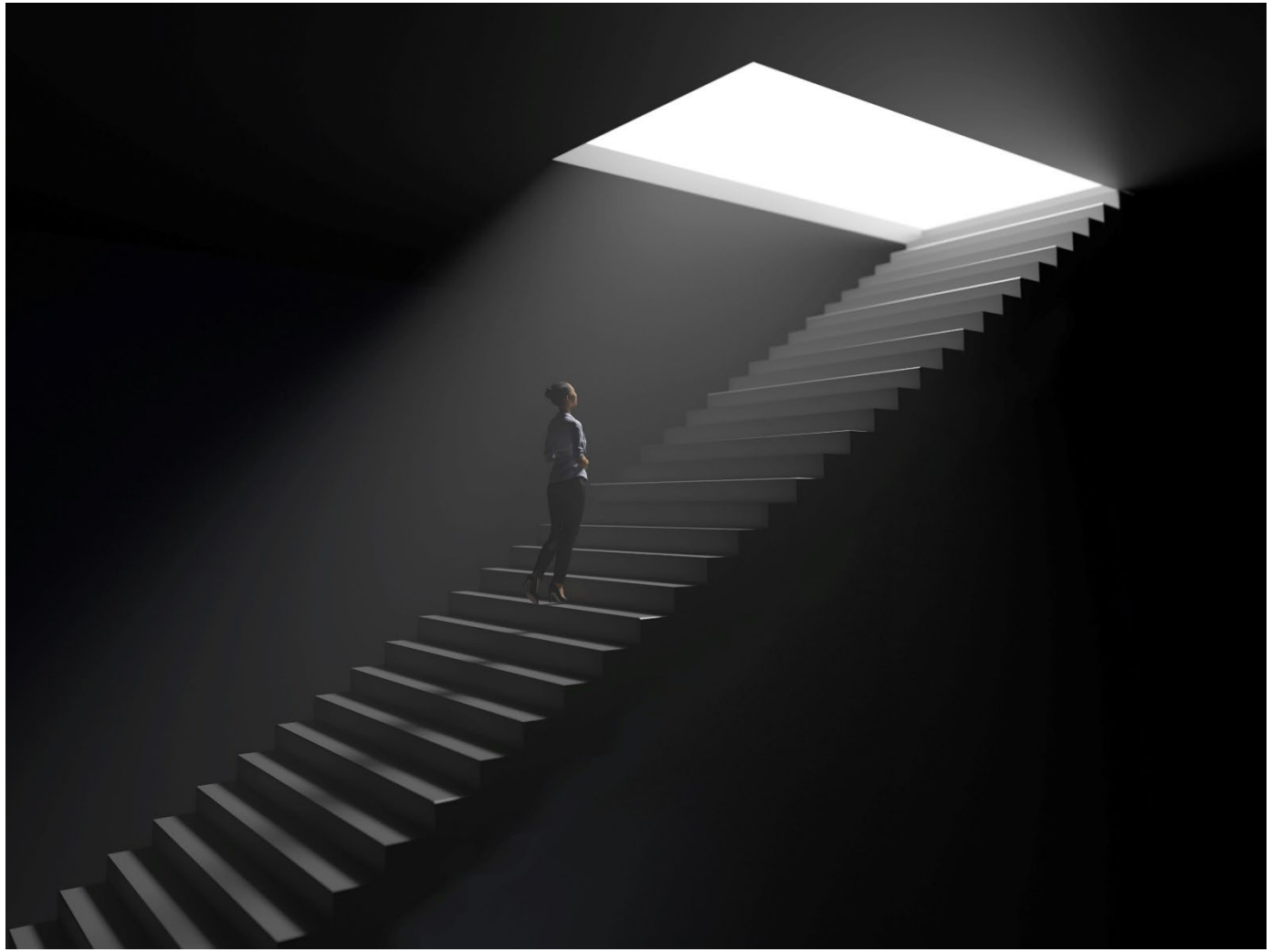
The principles can get us partway to our goal…



Examples of implementation choices independent of the selection of a DAS

How protected is protected enough?

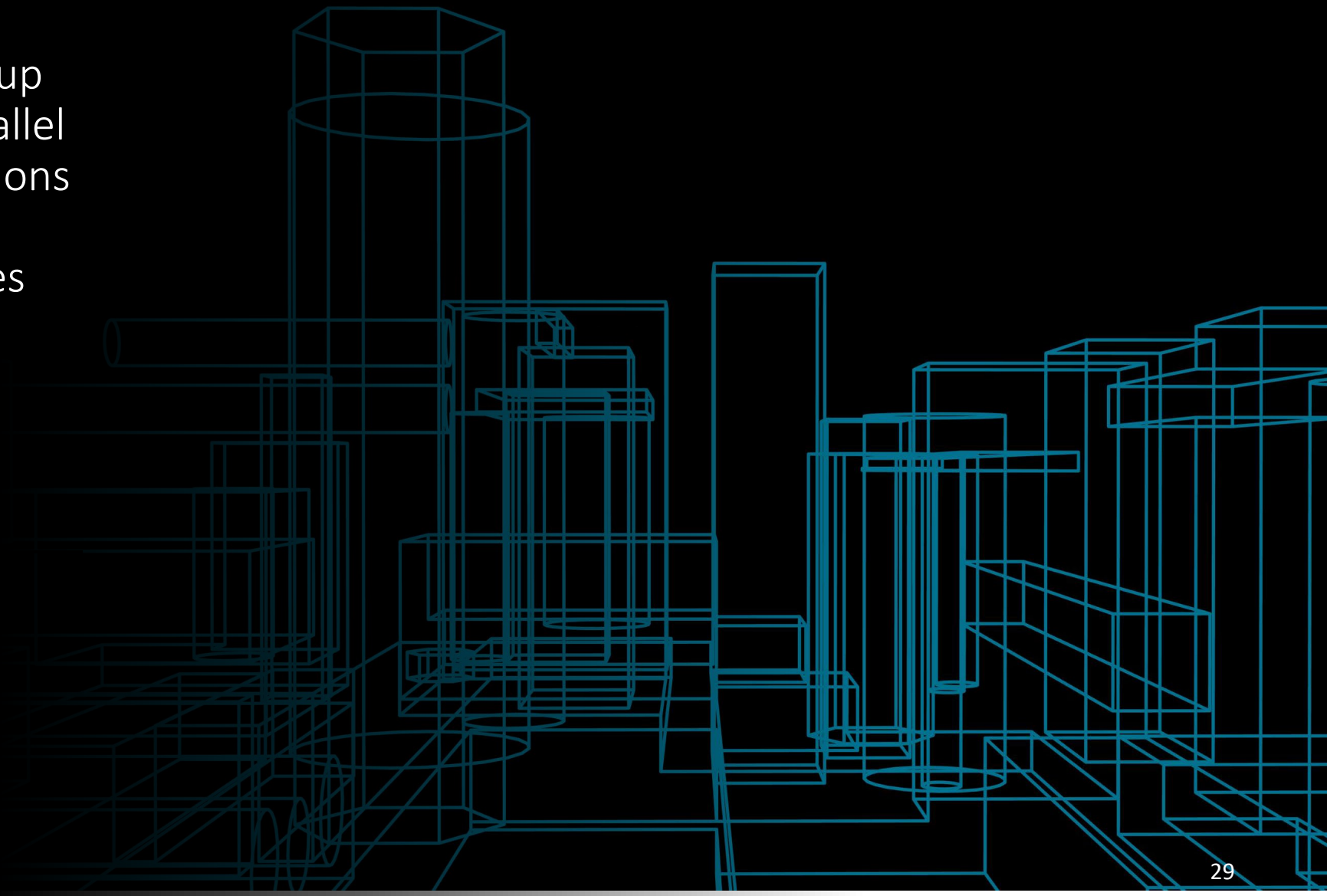
Which use case(s) require the greatest accuracy?

Should any data elements be excluded from protection?

What level of granularity is necessary to ensure equity?

The DA Futures Working Group is currently developing a parallel framework to inform discussions and decision-making about these implementation choices and achieving the proper balance under that Triple Tradeoff.

We look forward to sharing that framework in the near future.



Stakeholder Engagement is Essential

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Questions

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