Association for Public Data Users
2013 Annual Conference:

A Sea Change for Public Data

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Overview

• Resetting Perceptions
• What is the Data Enclave?
• How do you balance data utility & confidentiality?
• How do users access the enclave?
• What functionality is available?
• How do I import and export files?
• How do I collaborate with other researchers?
The Licensing ("Trust") Model
• Develop data access methods that achieve the often conflicting goals of:
  - Data confidentiality
  - Protecting privacy
  - Maintaining data quality, and
  - Making data more conveniently accessible
Resetting Perceptions

- Fundamental perceptions need to be revisited and adjusted for accessing sensitive data
- Classic dissemination models need to change
- No longer pushing out sensitive data (e.g., via CDs and contracts to “trusted researchers”)
- Pulling in trusted researchers through safe access nodes to secure systems
- Ensuring safe outputs / statistical disclosure control
What is the Enclave?

The Enclave is an environment that allows for secure remote access to confidential microdata.

Through the use of a secure terminal VPN session, researchers analyze sensitive data in a secure, convenient and cost-effective manner; data never leave the FISMA compliant secure data center.
The NORC’s Data Enclave IT Security Plan is fully compliant with the Federal Information Security Management Act (FISMA), provisions of mandatory Federal Information Processing Standards (FIPS), and meets all of NIST’s IT, data, system, and physical security requirements.

Per the Federal Information Security Management Act and provisions of mandatory Federal Information Processing Standards (FIPS) 199 and NIST Security Plan 800-60, and 800-53 NORC’s Data Enclave system impact levels have been determined as follows:

<table>
<thead>
<tr>
<th>NIST Sensitivity Element</th>
<th>NIST Impact Rating</th>
<th>Short Description of Basis for Rating</th>
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<tbody>
<tr>
<td>Confidentiality</td>
<td>Moderate</td>
<td>The Data Enclave contains information of a proprietary nature. If this proprietary information were disclosed, it could result in serious loss of customer trust for the Federal Statistical Agency.</td>
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How Do I Access the Enclave?

- Trusted User (with secure credentials)
- Trusted Token (second authentication factor)
- Trusted Endpoint (Thin Client)

Diagram:
- Trusted User
  - Trusted Token
  - Trusted Endpoint
- VPN
- Virtualization Servers
- VPN
- Secure Data Storage
The Data Enclave exists along a continuum of access modalities for sensitive data.

- Every data producing organization that seeks to disseminate data must determine what their goals and objectives are with respect to risk tolerance and the desired audience for data.

- In practice this means making decisions about the tradeoff between disclosure risk and analytic utility.
Risk-Utility Tradeoff (cont.)

- Confidentiality
  - Statistical Tables and Data Cubes
  - Synthetic Micro-Data
  - Public Use Data-File
  - Remote Batch Processing
  - Licensing

- Analytic Utility

- Physical and/or Remote Access Data Enclaves
RDC vs. Remote Access

- Data security – the ability to control disclosure risk, ensure privacy, and thus maintain data confidentiality
- Both RDCs and data enclaves allow secure microdata access: similar level of data analytic utility
  - **RDC**: researchers physically access data stored at a secure physical facility
  - **Data Enclave**: researchers remotely access data stored at a file server through a secure system on a virtualized environment
- Both modalities provide high confidentiality protection: information inflow & outflow are monitored and controlled.
Data Access: Convenience

- Confidentiality and utility are not the only factors that influence the choice of data access modality
- The third factor: Convenience

**Producers’ perspective:**
- How costly is it to implement an RDC or enclave?
- How easy is it to update and document the data?
- How easy is it to monitor researchers’ work and output requests?

**Researchers’ perspective:**
- How far do they need to travel to the nearest RDC?
- How easy is it for them to conduct follow-up work?
- How quickly does the RDC review and approve output requests?
- How easy is it for them to seek assistance?
- Is there any peer-to-peer researcher interaction?
Value-Add: Remote Access

Value provided with a secure physical enclave

Value added with a secure remote access enclave
Objectives of a Modern Data Access Facility:

- Secure
- Flexible
- Low Cost
- Convenient
- Meet Replication standard
- Metadata documentation / data lifecycle
Holistic Security Protocol

- **Safe Projects**
  Must have institutional approval and backing

- **Safe People**
  Trained Researchers

- **Safe Setting**
  Data and processing housed in secure network
  Users access environment over secure connection
  Access limited to secure machines

- **Safe Outputs**
  Strict disclosure review of all exports

= Safe Use
Statistical Applications:

- SAS
- Stata
- SPSS
- R
- MATLAB
- LISREL
- NLOGIT

Productivity Tools

- StatTransfer
- Microsoft Office (with Office Communicator)
- IHSN Microdata Management Toolkit
- Notepad ++
- Ultraedit
Streaming Applications
Data Analyses

Data Queries Run on Advanced Computational Engines

• As the size and complexity of the data grows, a straightforward virtual desktop infrastructure can become inefficient. Advanced data engines are necessary to provide adequate functionality:
  • Parallel Processing
  • Advanced Databases
  • Tabulation Engines
  • Extraction Tools

Efficient Access

• Less time spent waiting for analyses to complete
• More time available for interpretation
• Increased publication quality and volume potential
Big Data Solution

Data Enclave Environment

MPP Master Server

MPP Segment Server
12 x 2.6 GHz CPU
128 GBs RAM

MPP Segment Server
12 x 2.6 GHz CPU
128 GBs RAM

MPP Segment Server
12 x 2.6 GHz CPU
128 GBs RAM

Segment Server MPP Array
Total Processing Power: 36 x 2.66 GHz Processors and 348 GBs of RAM
Output Control

Secure Lab

Data

Work Area

Disclosure Review

Exports/Output

Online transfer site

Imports/Input

Researcher Logs in
• All research results must be reviewed for disclosure risk and approved by NORC disclosure analysts before the results can be shared with approved researchers.

• NORC performs extensive disclosure analysis on all output and makes recommendation to producer
  • Primary disclosure
  • Secondary disclosure
  • Residual disclosure
For exports out of the environment, users are sent a link to approved files which can be downloaded from the Accellion transfer site. All files saved on the Accellion transfer site are encrypted at rest and in transit.

For imports into the environment, users need to request an import workspace from Enclave staff. Once this workspace has been created users can upload files and notify Enclave staff by email for transfer. Small files under 5MB can be emailed directly to dataenclavemanager@norc.org
Researcher Collaboration

PRODUCER PORTAL

GENERAL INFORMATION
- Background info
- Announcements
- Calendar or events
- About
- Topic of the week

KNOWLEDGE SHARING
- Discussion groups
- Wiki
- Shared libraries
  - Metadata / Report
  - Scripts
  - Research papers

SUPPORT
- Frequently Asked Questions
- Technical Support
  - DE usage
  - Data usage
  - Quality

Content fully editable by producers and researchers using a simple web based interface

Private research group portals with similar functionalities are configured for each research project
Collaboration Tools

NCSES Data Enclave Portal Site!

About the Data Enclave

NORC Data Enclave provides a wide range of data services to researchers and data producers. We offer the full cycle of data services, ranging from study design and concept to data archiving and access. In addition to our main service of providing a confidential, protected environment within which authorized researchers can access sensitive microdata remotely, we provide a comprehensive set of analytic services. Members of our team come from a wide range of backgrounds and are thoroughly trained in research methods, statistical analysis, and can leverage this full array of analytic capabilities of NORC.

About NCSES

Formerly the Division of Science Resource Statistics, the National Science Foundation’s National Center for Science and Engineering Statistics’s focus is the collection, interpretation, analysis and dissemination of objective data on the fields of science and engineering. Expanding upon SERC’s mission, NCSES now plays a key role in assessing the status of the U.S.’ competitive advantage in science, engineering, technology, R&D – including the condition of STEM education in the U.S. NCSES not only plays an individual role in the development of the science and engineering enterprise, but a collaborative one as well. They have collaborated with various federal and international agencies and served on interagency committees. As one of 10 federal statistics agencies, NCSES continues to design, support, and direct a variety of surveys, data collection, and other research projects. Additionally, NCSES continues to uphold its mission to provide useful information to its various users through the creation of over 30 reports a year, data, and data tools and resources.
Instant Messaging
Thank You!

Data Stewardship Week
February 11-15, 2008

“Protecting Our Data Everyday”

US CENSUS BUREAU

NORC at the UNIVERSITY of CHICAGO

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