Report 3: Future State of Evidence Use by Federal Policy Stakeholders

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Contents

1. Introduction

This report is a continuation of Report 2 and its findings from an examination of federal policymakers' data needs and challenges encountered in seeking evidence to inform policy decisions. These findings will inform the development of a future National Secure Data Service (NSDS). Through interviews with 12 senior federal officials, state government leaders, and policy experts, we identified critical needs and opportunities in the current federal data ecosystem and specific requirements for enhancing evidence-based policymaking across government. As we have learned not only *from* our work but also about our approach *to* the work, we have a new appreciation for the specificity of language used to describe our objectives. Thus, we realized that small clarifications should be made to improve the key focus questions[1] that guide our study. These minor edits allow us to clarify the *who*, *what*, and *why* of our study. Here are the small refinements made to the questions:

- What unique approaches and support do federal policy stakeholders need for evidence-based decision making?
- How can a data concierge service support the evidentiary needs of federal policy stakeholders?

1.1. Report Overview

1.1.1. Report Purpose
The purpose of this report is to continue reporting a summary of findings from our data collection efforts. In Report 2 (*Current State of Evidence Use by Federal Policy Stakeholders*), we described the methods of the user-inspired approach to our research and how we arrived at findings. Because Report 2 was focused on the current state, we focused on reporting findings on the recent past and current challenges with the federal data ecosystem.[2] We will build on what was shared in that report as we shift our focus to the future state—the proposed solutions, potential opportunities, and promising suggestions for a future NSDS. Therefore, in many ways, Reports 2 and 3 can be considered a two-part series covering what we have heard and learned about the present challenges and future solutions for access to and use of the federal data ecosystem, and those insights map to an NSDS. This report provides the preliminary findings from 12 key informant interviews (KIIs) and begins to synthesize across the findings to inform recommendations for a future NSDS design.

1.1.2. Organization of the Report
This report provides further details regarding the relevance of understanding the user experience to designing a future NSDS. In Report 2, we reported findings from the Insight, Interpretation, and Innovation Panel (I3P) KIIs and the use case, and provided an early rendering of a journey map based on what we learned. Building upon that foundation, we will continue weaving in the findings from across the 12 KIIs that can be helpful in surfacing possible solutions that can be explored as a bridge to the future state. This reporting includes key takeaways from these interviews and case study and their implications for a future NSDS, which will provide a better understanding for mapping the possible solutions based on the experience and expertise of a diverse group of federal data users. This mapping can offer a vision for a future NSDS that meets user needs. We close this report with an explanation of how we synthesized findings into user journey models and maps that can be used to inform the development and implementation of a future NSDS.

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[1] https://www.americasdatahub.org/wp-content/uploads/2024/06/ATT-1_Topic_Engaging-Policy-Stakeholders.pdf

[2] This includes data of all types including but limited to other systems and enclaves that house non-federal data (e.g., state/local/tribal government, private or commercial data systems).

1.2. Relevance of the User Experience to a Future National Secure Data Service

In Report 2, we explained why a Human-Centered Design (HCD) approach to this research was an appropriate and responsive option to address the key focus questions of this study. In summary, the HCD process affords an opportunity to identify pain points, prioritize the challenges, consider how to solve, dissolve, or resolve the top challenges, and test the possible solutions. As introduced in Reports 1 and 2, user personas and journey maps are critically important to identifying the types of relevant users and the paths of their experience navigating to and through the federal data ecosystem. A comprehensive journey map that describes the process by which any user could seek to navigate and use federal data will help NSDS designers consider the diverse demands of the system.

Furthermore, understanding if these factors are internal or external—or whether they are helpful or harmful—from the perspective of the federal data ecosystem can clarify how our findings could be used to inform a future NSDS design. These characteristics can be distinguished through a SWOT analysis,[3] which examines the **S**trengths (helpful and internal), **W**eaknesses (harmful and internal), **O**pportunities (helpful and external), and **T**hreats (harmful and external). In summary, a multi-modal approach to HCD research to understand the context and circumstances of the federal data ecosystem results in varied and complex user experiences. Continued clarification on the user personas, a comprehensive journey map, and a SWOT analysis are presented in this report to advance the discussion on potential design features of an NSDS.

2. Methods

2.1. Review of Methods from Report 2

As mentioned in Report 2, 12 KIIs were conducted with the I3P members[4] (see section 2.1 from Report 2). The Methods section in Report 2 further described the specific interactions with I3P members, how the interviews were conducted, and how the data were coded, analyzed, and synthesized. We described the process of enhancing trustworthiness and credibility of our findings to provide results that are both accurate and impactful. All the methods described in Report 2 apply to the findings shared in this current report, as the same data collection and analysis methods were used. While we will share additional findings that relate particularly to the future state of the federal data ecosystem, we will also continue to synthesize findings from both Reports 2 and 3 toward holistic recommendations for a future NSDS.

3. Findings

3.1. Future State: Solutions, Opportunities, and Suggestions

Initially, across all 12 KIIs, 112 themes of proposed solutions ("solutions"), potential opportunities, and promising suggestions arose for a future NSDS. After sorting all the solution themes together, we landed on thirty-one unique solutions. This reduction shows a considerable congruence among I3P members because of the overlap and duplication in their suggested solutions. A matrix of the coded solution themes aligned with a social or technical system[5]

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[3] https://guides.newman.baruch.cuny.edu/c.php?g=188239&p=1243104

[4] More information about the I3P members and the purpose of the Panel can also be found in section 1.2.4 in Report 2.

[5] Two sociotechnical systems, each with two components. The four unique components are: Social-Organizations, Social-Individuals, Technical-Tasks, and Technical-Technology.

(columns, each with two components) and part of the envisioned NSDS model[6] (rows) is shown in Appendix A, Table 1. This matrix only shows the coded solution themes in this report, while Table 2 in Appendix B shows the full matrix of both challenge and solution themes combined.

There are many patterns that can be observed from the solution themes. First, there are seven solutions that map to the Discovery and Navigation layer, ten solutions that map to the Shared Services and Resources layer, and five solutions that map to the Access and Linkage Infrastructure layer of the vision for NSDS.[6] Notably, all themes in the Discovery and Navigation layer map to the Social-Individuals, Technical-Tasks, and Technical-Technology systems. This mapping means that the potential solutions in this layer relate more to the individual people, processes, and technology. For Shared Services and Resources, these solution themes are aligned with Social-Organizations, Social-Individuals, and Technical-Tasks systems. Lastly, the Access and Linkage Infrastructure, like the challenge themes, only involved Technical-Tasks and Technical-Technology.

Although the matrix in Appendix A shows only the solution themes, Appendix B presents a table with a full list of challenges and solutions. When combined, what seems to stand out more is when considering the gaps in the grid (i.e., where there are no challenges or solutions mapped to the proposed NSDS layer or a particular component of the sociotechnical system). In the Discovery and Navigation layer, it can be observed that there are neither challenges nor solutions that map to the Social-Organizations system. What can be inferred from the challenges and solutions offered by the I3P members is that finding and navigating data is most influenced by the relationships among data users as opposed to the formal data governance processes from organizations.

For the Shared Services and Resources layer, there are neither challenges nor solutions that map to the Task component of the Technical system which means that the challenges and solutions shared by the I3P that mapped to this layer are not focused on technology infrastructure but on how organizations or people are connected and supported, using technology to perform tasks. Lastly, there are no Social-Organizations or Social-Individuals solutions for the Access and Linkage Infrastructure because the challenges and solutions in this layer focus on the technologies that enable secure computing and data linkages. In summary, these findings point to potential features for each NSDS layer. This insight expands the utility of this research beyond the original intent to explore the ways that unmet needs of policy stakeholders could be addressed through the Discovery & Navigation layer and the Data Concierge.

Additionally, as was true for the challenges, there were solutions that do not map to the NSDS, which implies that there are problems and solutions that are beyond the scope of the envisioned NSDS 1.0 model. In other words, these are solutions that are related to climate, behavior, and culture of organizations, individuals, and processes that an NSDS cannot (and, likely, will never be able to) act upon alone because of the source and complexity of the underlying issues. These are the nine proposed solutions to external cultural and environmental factors that emerged from the findings:
- Emphasis on Cross-Agency Collaboration and Coordination
- Top-Down Endorsement to Promote Systems-Wide Culture Change about Evidence Use
- Facilitate Regional Coordination on Local Data Sources

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[6] The proposed NSDS model (Vision for a Future NSDS | NSF - National Science Foundation) is envisioned to have three layers: Discovery and Navigation, Shared Services and Resources, Access and Linkage Infrastructure.

- Focus on Congressional Engagement as Champions
- Prioritize Building and Maintaining Trust and Independence
- Clearly Communicating Awareness and Value to Range of Users
- Strengthen and Leverage Evidence Act Leaders as Champions and Drivers
- Create Networks to Support Professional Development
- Incorporate Robust Tools and Methods to Support Analytics

3.2. Detailed Summary of Solution Themes with Descriptions

The following are detailed descriptions of each of the thirty-one solution themes that emerged from KIIs with I3P members. These themes represent the attitudes, knowledge, and experiences of the informants. Embedded quotations reflect direct statements that were made by deidentified I3P members.

3.2.1. Data Discovery and Navigation Solutions

3.2.1.1. Embedded Concierge Services Within Agencies

Informants envision that NSDS staff are embedded directly within agencies to provide dedicated data governance support and systematic understanding of agency data landscapes. This model involves conducting regular interviews with agency personnel to map data capabilities and provide ongoing guidance, helping agencies develop standardized frameworks and active data catalogs while building internal capacity for evidence-driven decision making.

3.2.1.2. Data Concierge as a Knowledge Broker and Partner

The data concierge is conceptualized as a collaborative problem-solving partner who helps users deconstruct and reconstruct their questions effectively, functioning "almost like a therapist" to understand real information needs that are at the root of data problems. This role requires both technical data knowledge and ability to understand user context, providing guidance on data sources, linkages, and analytical possibilities while helping translate broad policy questions into specific, analyzable components.

3.2.1.3. Human Experts Available for Special Support

Informants emphasize the critical need for human expertise rather than purely automated systems, particularly for complex policy questions that require domain knowledge and contextual understanding and the complex interactions between knowledge and understanding. The model envisions dedicated human experts available for large-scale, long-term initiatives, with a "TurboTax approach" offering self-service capabilities backed by 24/7 expert consultation for complex situations (e.g., help desk).

3.2.1.4. Facilitate Interagency Data Awareness and Use

Users need enhanced ability to discover similar or relevant work and data across agencies, as individuals in one agency or even a department within an agency are often unaware of related activities by colleagues in other departments; knowledge of which could lead to collaboration and reduced burden. The system should enable rapid portfolio analysis and inter- and intra-agency discovery to support initiative development and informed partnership discussions without relying on extensive personal networks.

3.2.1.5. Segment Navigation by User Patterns and Needs

Different user types require tailored approaches. Congressional staff need quick, simple information (e.g., already analyzed, synthesized, and visualized), while researchers require detailed knowledge of the data sources and their idiosyncrasies. The system should provide multiple pathways and routing intelligence based on user sophistication levels, with different

concierge levels and service models appropriate for varying technical comfort levels and time constraints.

3.2.1.6. Incorporate Advanced Tools for Locating and Disaggregating Relevant Data

Users need sophisticated search and discovery capabilities that go beyond current fragmented systems, with tools that can identify linkage opportunities and relevant datasets across agencies. This is important because the system needs to support both simple and complex analytical questions while enabling exploration of available data for question generation in addition to query processing.

3.2.1.7. Build in AI to Automate and Enhance Navigation

AI should be integrated to enhance routine tasks of data discovery and navigation, particularly for initial triage and routing of basic questions, while enabling natural language processing for user queries. However, AI must be combined with human oversight and expertise, as automated systems alone are insufficient for complex policy questions requiring contextual interpretation and domain knowledge.

3.2.2. Shared Services and Resources Solutions
3.2.2.1. Issue-Based Councils for Collaboration and Coordination

Inter-agency councils organized around specific policy areas provide models for information sharing, coordinated research dissemination, and joint problem-solving across government. Such councils can serve as venues where collaborative questions develop organically, and agencies can pool resources for shared analytical efforts on cross-cutting issues.

3.2.2.2. Build Communities of Practice for Direct Users to Support Rapid Knowledge Exchange

Practitioners need networks for sharing methods, approaches, and technical solutions, including connecting analysts across agencies who face similar challenges. These communities should include both federal staff and external partners, fostering multidisciplinary collaboration and code sharing to reduce duplicative efforts across agencies.

3.2.2.3. Enhance Partnerships with Other Levels of Government and Sectors

Federal agencies need better coordination with state and local governments, as well as academic and private sector partners, to leverage existing data resources and analytical capacity. Successful models include technical assistance programs where federal agencies help states develop data linking capabilities, demonstrating scalability of federal approaches to broader government levels.

3.2.2.4. Bridge the Gap Between Policy and Evidence

There is a fundamental disconnect between the speed of policy decision-making and the time required for rigorous evidence generation, requiring systems that support both monitoring needs and evidence generation. The challenge involves distinguishing between data-driven approaches (dashboards and real-time monitoring) and evidence-based decision making (controlled studies with causal understanding), while accommodating political realities where decisions often cannot wait for comprehensive analysis.

3.2.2.5. Provide Fit-for-Purpose Staff Based on Portfolio Expertise

NSDS should offer portfolio-based expert support with analysts assigned to agency clusters, providing ongoing relationships rather than transactional services. This approach enables cross-agency knowledge sharing about data capabilities and standardized approaches to common analytical challenges, while building expertise in specific policy domains.

3.2.2.6. Create Shared Spaces for Capacity Building and Guidance for Analysts

Agencies need centralized resources for technical training, methodological guidance, and template sharing to address widespread capacity constraints, particularly for smaller agencies with limited funding. These spaces should provide both skills development and standardized approaches that can be adapted across different agency sizes and missions.

3.2.2.7. Safe Sandbox with Dedicated Live Support

A secure environment where agencies can experiment with synthetic or test data before moving to real analysis provides risk reduction and relationship building opportunities. This sandbox approach[7] allows users to understand system capabilities and demonstrate project value to leadership without exposing sensitive information, supported by analysts who can conduct analyses rather than requiring users to develop technical skills.

3.2.2.8. Precedent and Success Story Development

Documenting successful data sharing examples and creating reference libraries helps overcome risk aversion in agencies that avoid sharing data without established precedents. These precedents are particularly crucial for agencies handling sensitive data (law enforcement, national security, health), as visible success stories can build credibility and encourage broader adoption.

3.2.2.9. Identify and Curate High-Usage Data Sources

Focus should be placed on frequently requested federal datasets that are used across multiple agencies and research purposes, such as Census survey data, Department of Labor employment data, and large national survey programs. Prioritizing these high-usage sources can provide immediate value to the broadest user base while building institutional credibility.

3.2.2.10. Shared Access with Fee-for-Service Consultation Model

A tiered service model could include free guidance for publicly available data navigation, with fee-for-service expert consultation for complex linkages and custom product development. This approach must demonstrate clear value above existing agency responsibilities, with users willing to pay for new services but resistant to paying for capabilities agencies are already funded to provide.

3.2.3. Access and Linkage Infrastructure Solutions
3.2.3.1. Expedited Data Access and Linking

Current data access processes can "easily take a year, if not more," requiring streamlined approaches that reduce time spent on data use agreements and procurement processes. Pre-established linkages and routine analysis capabilities could enable agencies to bring more work in-house and reduce costs while making complex linking more standardized.

3.2.3.2. Sandbox for Rapid Prototyping and Testing

NSDS could serve as a testing environment for simulating policy interventions before full implementation (e.g., using synthetic data, if necessary), enabling rapid cycle testing and timely support for policy development. This approach allows for flexible iteration and real-time analytic adjustments based on data feedback, supporting more responsive and adaptive government decision-making.

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[7] https://incubator.opendatapolicylab.org/files/DataSandboxesPrimer.pdf

3.2.3.3. Data are Validated, Focused, and Relevant
Users require comprehensive data quality assurance with clear protocols for validating datasets are complete, clean, and properly documented with guidance on appropriate uses and limitations. The system should identify the most robust data sources among multiple options and provide quality certification mechanisms to build user confidence in analytical results.

3.2.3.4. Develop an Infrastructure that Serves Cross-Agency Evidence Building Needs
The infrastructure should enable linking of different types of administrative and survey data to answer policy questions that span multiple agencies and programs. This requires coordination between different data managers, IT systems, and legal frameworks while facilitating reuse of successful data linking models.

3.2.3.5. Build a Trusted and Secure Platform for Data Access and Integration
The platform must establish credibility with agencies handling the most sensitive data by demonstrating secure capabilities with law enforcement, HIPAA-protected, and national security information. Success requires building trust through proven track records and providing alternatives to complex agency onboarding processes that currently create barriers to data sharing.

3.2.4. External Cultural and Environmental Factors
3.2.4.1. Emphasis on Cross-Agency Collaboration and Coordination
Enhanced coordination requires breaking down silos between agencies, standardizing methodologies across government, and enabling resource sharing to avoid duplicative efforts. This involves both formal mechanisms like inter-agency councils and informal networks that supplement personal relationships for cross-agency coordination.

3.2.4.2. Top-Down Endorsement to Promote Systems-Wide Culture Change about Evidence Use
Cultural change requires leadership mandates from top government officials rather than just nudges or voluntary adoption, with formal requirements through OMB leadership targeting chief operating officers and making NSDS consultation an expectation for new policy initiatives. Technical solutions alone are insufficient without organizational culture change supported by proper incentive structures.

3.2.4.3. Facilitate Regional Coordination on Local Data Sources
State and regional governments need support for data coordination and sharing, particularly around workforce development, education data linkage, and economic development initiatives. Proposed models include technical assistance programs and regional networks that help overcome insularity and enable states to learn from each other's successful approaches.

3.2.4.4. Focus on Congressional Engagement as Champions
Congressional staff represent a high-need user base—with relatively less technical skills in data analysis and use—who could benefit significantly from NSDS services, particularly for rapid response to policy questions and creation of visualizations for legislative purposes. Buy-in from Congress will create strong institutional advocacy for a NSDS, as these users control funding and could serve as influential champions for broader adoption. Focusing on adequately supporting congressional analysts—through the Congressional Research Service—to find, access, and use data for policy purposes will be a critical catalyst to NSDS implementation.

3.2.4.5. Prioritize Building and Maintaining Trust and Independence

Trust building requires demonstrating non-partisan analytical capacity, institutional credibility similar to the Congressional Budget Office model, and transparent methodologies with replicable approaches. The system must maintain neutrality across different administrations while providing quality assurance that meets rigorous standards for reliability and accuracy.

3.2.4.6. Clearly Communicating Awareness and Value to Range of Users

Success requires aggressive outreach and marketing strategies to overcome the discovery problem, as potential users often do not know what resources exist or how they could be valuable. Communication must be tailored to different user types, with clear value propositions that translate technical capabilities into policy-relevant benefits and concrete examples of successful applications.

3.2.4.7. Strengthen and Leverage Evidence Act Leaders as Champions and Drivers

Chief Data Officers, Evaluation Officers, and Statistical Officials across agencies represent key networks for NSDS awareness and adoption, despite current limitations in their authority and staffing. These professionals understand both the challenges and opportunities in evidence-based policymaking and can serve as entry points for agency collaboration and culture change initiatives.

3.2.4.8. Create Networks to Support Professional Development

Professional associations and communities of practice for data users, evaluation professionals, and policy analysts provide essential channels for sharing knowledge, methods, and best practices. These networks should connect both federal staff and external partners, facilitating career development and skill building while supporting the broader goal of improving analytical capacity across government.

3.2.4.9. Incorporate Robust Tools and Methods to Support Analytics

The system needs sophisticated analytical capabilities including statistical analysis tools, translation tracking systems for measuring research impact, and outcome measurement tools for assessing program effectiveness. These tools should support both hypothesis testing and hypothesis generation, with capabilities for complex statistical analysis, data linking, and modeling that bridge the gap between policy questions and technical implementation.

3.3. Identifying Strengths, Weaknesses, Opportunities, and Threats

One of the ways in which themes (i.e., both challenges and solutions) were coded was in determining whether it is a strength, weakness, opportunity, or threat of or to the federal data ecosystem as a part of a SWOT analysis (see Figure 1). The definitions of these codes are shown in the codebook for this study (see Appendix D in Report 2). In Report 2, all of the challenge themes were inherently harmful but were differentiated between harmful internal factors (weaknesses) vs. harmful external factors (threats). We further expand on these findings to draw out the helpful internal factors (strengths) vs. helpful external factors (opportunities).

Figure 1. SWOT Analysis Quadrants[8]

Table 2 in Appendix B is a display of all the themes across both challenges and solutions with the themes color coded to correspond with the SWOT categories. In that table, only strengths and weaknesses are mapped to the proposed layers of NSDS, while opportunities and threats can be found in the row labeled "External Cultural and Environmental Factors." While this layout may seem intuitive, it is worth noting that the types of challenges and solutions across the layers primarily refer to sociotechnical features of a potential NSDS while the factors external to the federal data system are mostly macrosystemic factors that influence the efficacy and effectiveness of NSDS implementation and use (i.e., external influences on a future NSDS, not influenced by it). As described in Report 2, these external factors still require attention but cannot be addressed solely through the creation and implementation of the future NSDS.

3.4. Guiding Principles for Successful NSDS Implementation and Use

These Guiding Principles were still mapped to the sociotechnical systems as also described in Report 2. While there were no principles that aligned with the Social-Individuals system (because these principles exist and influence at a higher systems level), there were three principles under Social-Organizations, four principles under Technical-Tasks, and five principles under Technical-Technology. Figure 3 in Appendix C shows the full list of Guiding Principles organized by sociotechnical systems.

Another way to interpret or employ these Guiding Principles is to consider them indicators of success for NSDS design and implementation. Should there be efforts in the future to evaluate the efficacy and effectiveness of the NSDS to support federal evidence use, these Guiding Principles would be incorporated in a framework for considering what and how to measure success. Regardless of any formal plans to evaluate the design, implementation, and use of the NSDS, these Guiding Principles still offer insights into the related global factors that offer signals of important priorities for federal data users.

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[8] https://guides.newman.baruch.cuny.edu/c.php?g=188239&p=1243104

3.5. Three Universal Solutions Shared Across I3P Members

The most common overall solutions articulated by nearly every informant was that the **data concierge model be human-centered**. This focus can be operationalized in three ways. First, the system should have a **user-friendly interface** with functionality that is responsive and accessible to different users and for different purposes (e.g., 508-compliance, at a minimum). Second, this also means that—although most informants mention the benefit of leveraging automation and artificial intelligence to make the data concierge service more efficient and effective—there should also be a quick and easy to reach **human element to support** complex queries or analyses that need specialized subject matter expertise or navigation of data systems. Last, it also means that **strategic communications** need to resonate with probable users by clarifying the value proposition and establishing champions to steward earlier pilots and adoption of the system.

Another universal solution suggested was to **enable cross-agency data discovery and coordination**. This suggestion is two-fold, being both about data infrastructure and governance. Informants stated that the **data infrastructure** needs to allow for better cross-agency linkages that serve evidence needs, which required coordination across agencies to be strategic about data collection, storage, sharing, and integration on common policy issues. Furthermore, cross-agency coordination and collaboration are needed so that federal data have a shared **governance framework** that clarifies data definitions and standards.

The last universal solution expressed by every informant was a dire request for **expedited and established agreements for data access and sharing**. This solution harkens back to the third universal challenge expressed by nearly all informants (see section 3.4 in Report 2). They mentioned the long, arduous processes required to obtain data sharing agreements and the myriad barriers, including complex legal and regulatory requirements, that stand in their way of critical data. Given the timeline and process to gain access to data, these delays were the primary contributor to the first universal challenge listed in Report 2 regarding the mismatch between policy needs and timing of available (and accessible) data. Furthermore, the requests and subsequent processes often need to be repeated for additional data with the same agencies. Informants believe it would save months if the federal data ecosystem had an expedited process for data access and sharing with an option for standing agreements.

3.6. Extending the Journey Map to and through the Federal Data Ecosystem

In Report 2, we introduced a generic journey map for any inquiry to and through the federal data ecosystem. In that report, we also expanded the journey map graphic to include a mapping of challenge themes across the journey map to show the nuances of the policy context. As another advancement of the journey map, Figure 4 in Appendix D extends previous representations of the journey map to include relevant solutions across the journey.[9]

3.7. Clarifying the Relationship Between User Capacity and Question Complexity

In addition to the findings reported thus far, we tried to observe the factors that seem to be most influential in navigating and using federal data. One of the most important findings that emerged from our analysis is the relationship between direct data user[10] capacity and policy question

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[9] Both challenge and solution themes that are included on the journey map are at the systems-level, not at the task-level.

[10] In Report 2, it was clarified that direct data users of federal data are subject matter experts and data providers, designers and technicians of data systems and infrastructure to support generation and use, or data specialists who generate, analyze, and integrate evidence. Examples of direct federal data users are Program Implementation Staff, Operational Staff, or Analysts.

complexity. This means that direct data users' ability to find and use federal data efficiently and effectively largely depends on their capacity (e.g., awareness of data sources, data wrangling, and analytics skills) and the degree to which the question is complex. Question complexity could be related to several different factors, such as the:
- number of people or groups involved and the degree to which their priorities for the question align,
- degree to which the policy question is answerable with available data, or
- amount of resources (e.g., data, time, skills) needed to answer the question.

In Figure 2, the relationship between these two critical factors—direct data user capacity and question complexity—are displayed in a two-by-two grid. Although both factors exist on a continuum, for simplicity, the quadrants of the grid represent the intersection between direct data user capacity (low or high) and question complexity (simple or complex). What emerged across the KIIs was a deeper understanding of the level of support that is needed changes when these factors change. For example:
- **Simple Question, Low Capacity:** When the question is simple and the direct data user has low capacity, they likely need some support but not much. Advanced tools and technology are not necessary to answer the question, but direct users may need help identifying and locating the relevant data. Despite their low capacity, it may be sufficient for the level of analyses required. This circumstance could possibly only require engagement with the Discovery and Navigation layer of the proposed NSDS model.
- **Simple Question, High Capacity:** When the question is simple and the direct data user capacity is high, less support is necessary and these direct data users may even serve as members of evidence council, communities of practice, resource generators, data experts or sharers, or other collaborative groups that help other direct data users seeking additional support. This circumstance may also only require engagement at the Discovery and Navigation layer of the proposed NSDS model but could involve the Shared Services and Resources layer as well.
- **Complex Question, Low Capacity:** When the question is complex, but the direct data user capacity is low, the direct data user would require more support to be able to answer the question appropriately. They may need more analytic skill capacity, greater awareness of or access to data, or more robust tools and systems to facilitate analyses. The effort and resources required to answer the question could be supported through the Shared Services and Resources layer of the proposed NSDS model or the Access and Linkage Infrastructure layer.
- **Complex Question, High Capacity:** When the question is complex and the direct data user capacity is high, the direct data user would not likely need very much support to answer the question, but they may require access to sensitive or private data, advanced tools or technology, or a secure computing environment to conduct analyses. This best environment for this circumstance could be concentrated in the Access and Linkage Infrastructure layer of the proposed NSDS model.
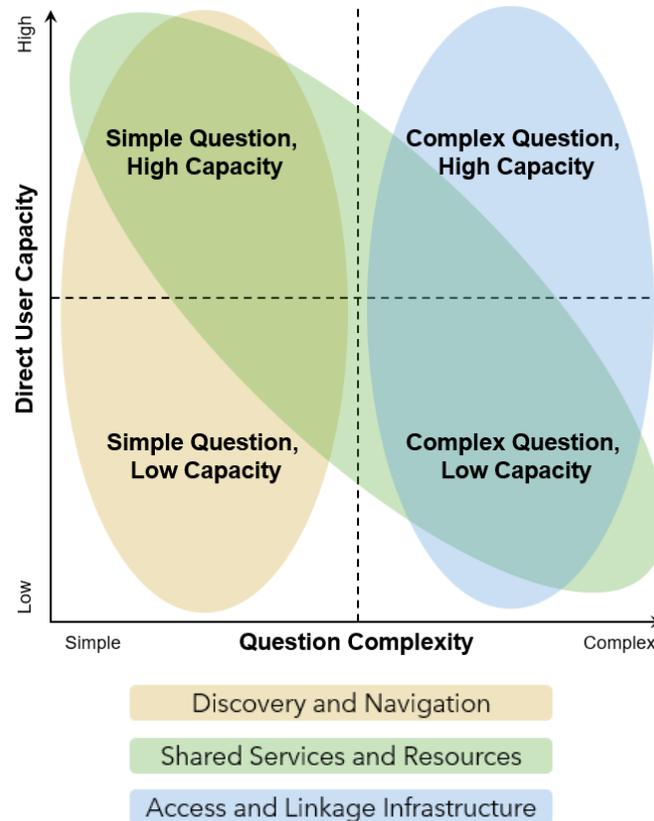
Figure 2. Interaction with Proposed NSDS Direct User Capacity and Question Complexity

This finding suggests an opportunity to **focus on capacity building and question formulation as high priority solutions**. While all three proposed layers of the NSDS model are integral to the success of the entire system, this finding emphasizes the **importance of the Discovery and Navigation layer** in the role of helping direct data users:

- identify sources and triage based on user capacity and policy question complexity,
- offer immediate refinements when applicable (i.e., much like when a search engine asks for clarification or refinement when a search prompt is unclear), and
- help the user navigate to the necessary resources or services to support fulfilling their inquiry.

Subsequently, the Shared Services and Resources layer will be a critical layer because it is envisioned to include a capacity building center that could meet user needs regardless of research or policy purpose by building direct user technical skills in data analytics, developing cross-agency relationships around common topics, providing tools and resources on data standards, guides, or protocols, offering specialized support on data subject matter expert, cleaning, analysis, or reporting, and supporting better question formulation by refining or clarifying existing policy questions.

These Shared Services and Resources would help increase direct user capacity and work to clarify the policy or research question to its simplest form. Although there will always be complex policy and research questions, assuring that the questions, as posed, can be addressed—while also increasing direct user capacity—will support better capability to locate the relevant sources of data, identify clear and appropriate methods for analysis, and answer the question.

4. Conclusions

In summary, we set out to document experiences from a breadth of perspectives across I3P members. These perspectives offered a rich experiential base with understanding of the federal data ecosystem across the policy lifecycle—including the relevance and linkages to other external data systems at other levels of government and through private data sources.

Across the challenge and solution themes, data saturation was reflected in a comprehensive journey map which was validated and corroborated by I3P member stories. These themes were mapped across sociotechnical systems and classified as strengths, weaknesses, opportunities, and threats. There is also a clear alignment of the challenge and solution themes with the proposed NSDS model. Most of the themes could be mapped directly to a proposed layer of the NSDS model while others—still notable and relevant to the federal data ecosystem—were external opportunities and threats that require some attention and action.

There were several challenges and solutions repeated across informants from different perspectives and contexts but with similar present impact (challenges) or potential benefit (solutions) on their work. While there are many challenge themes (n=21), there are an even greater number of ideas about proposed solutions, potential opportunities, and promising suggestions to combat the existing challenges (n=31). Federal policy and data experts have a great deal of excitement and anticipation—and a few cautions—about the future NSDS. Their shared experiences under different circumstances provide a rich picture to collectively make explicit the varied implicit issues and opportunities that are prevalent across the enterprise.

5. Next Steps and Timeline

The challenge and solution themes mapped to the steps in the journey map provide a framework for what the NSDS should address. Continuing the human-centered design approach to this study, next we will engage the I3P members in a facilitated exercise to help us identify priority challenges and promising solutions. This exercise will highlight a set of actionable insights that will inform decisions about the features and immediate priorities for the NSDS 1.0. Report 4 will further build upon this framework to describe opportunities to create and sustain organizational change to improve evidence generation and use for policy purposes.

6. Appendices
Appendix A: Matrix of Solution Themes by System and Mapped to NSDS Model

Table 1. Matrix of Solution Themes Organized by System and Mapped to NSDS Model

	Social - Organizations	Social - Individuals	Technical - Tasks	Technical - Technology
Discovery and Navigation	● No Solution Themes	● Embedded Concierge Services Within Agencies ● Data Concierge as a Knowledge Broker and Partner* ● Human Experts Available for Special Support*	● Facilitate Interagency Data Awareness and Use*	● Segment Navigation by User Patterns and Needs* ● Incorporate Advanced Tools for Locating and Disaggregating Relevant Data* ● Build in AI to Automate and Enhance Navigation*
Shared Services and Resources	● Issue-Based Councils for Collaboration and Coordination* ● Build Communities of Practice for Direct Users to Support Rapid Knowledge Exchange* ● Enhance Partnerships with Other Levels of Government and Sectors*	● Bridge the Gap Between Policy and Evidence* ● Provide Fit-for-Purpose Staff Based on Portfolio Expertise* ● Create Shared Spaces for Capacity Building and Guidance for Analysts* ● Safe Sandbox with Dedicated Live Support*	● Precedent and Success Story Development ● Identify and Curate High-Usage Data Sources ● Shared Access with Fee-for-Service Consultation Model*	● No Solution Themes
Access and Linkage Infrastructure	● No Solution Themes	● No Solution Themes	● Expedited Data Access and Linking ● Sandbox for Rapid Prototyping and Testing*	● Data are Validated, Focused, and Relevant* ● Develop an Infrastructure that Serves Cross-Agency Evidence Building Needs* ● Build a Trusted and Secure Platform for Data Access and Integration*
External Cultural and Environmental Factors	● Emphasis on Cross-Agency Collaboration and Coordination ● Top-Down Endorsement to	● Strengthen and Leverage Evidence Act Leaders as Champions and Drivers ● Create Networks to Support	● Incorporate Robust Tools and Methods to Support Analytics*	● No Solution Themes

	Promote Systems-Wide Culture Change about Evidence Use* ● Facilitate Regional Coordination on Local Data Sources* ● Focus on Congressional Engagement as Champions* ● Prioritize Building and Maintaining Trust and Independence* ● Clearly Communicating Awareness and Value to Range of Users	Professional Development*		

Color Coding: Strengths; Weaknesses; Opportunities; Threats.
* Composite themes that represent several individual but similar themes

Appendix B: Matrix of <u>All</u> Themes by System and Mapped to NSDS Model

Table 2. Matrix of Themes Organized by System and Mapped to NSDS Model

	Social - Organizations	Social - Individuals	Technical - Tasks	Technical - Technology
Discovery and Navigation	• No Challenge or Solution Themes	• Embedded Concierge Services Within Agencies • Data Concierge as a Knowledge Broker and Partner* • Human Experts Available for Special Support* • Identifying and Mapping Relevant Stakeholders* • Congressional Data Literacy Gap	• Facilitate Interagency Data Awareness and Use*	• Segment Navigation by User Patterns and Needs* • Incorporate Advanced Tools for Locating and Disaggregating Relevant Data* • Build in AI to Automate and Enhance Navigation* • Limited Information Discovery and Synthesis • Difficulty Navigating Existing Data Sources*
Shared Services and Resources	• Issue-Based Councils for Collaboration and Coordination* • Build Communities of Practice for Direct Users to Support Rapid Knowledge Exchange* • Enhance Partnerships with Other Levels of Government and Sectors*	• Bridge the Gap Between Policy and Evidence* • Provide Fit-for-Purpose Staff Based on Portfolio Expertise* • Create Shared Spaces for Capacity Building and Guidance for Analysts* • Safe Sandbox with Dedicated Live Support* • Questions Limited by Policymaker Data Awareness and Literacy* • Need to Increase Staff Capacity and Skills*	• Precedent and Success Story Development • Identify and Curate High-Usage Data Sources • Shared Access with Fee-for-Service Consultation Model* • Question Formulation Challenges • Complexity of Accessing Data*	• No Challenge or Solution Themes
Access and Linkage Infrastructure	• No Challenge or Solution Themes	• No Challenge or Solution Themes	• Expedited Data Access and Linking • Sandbox for Rapid Prototyping and Testing* • Complexity of Aggregating	• Data are Validated, Focused, and Relevant* • Develop an Infrastructure that Serves Cross-Agency Evidence Building Needs*

	Strengths	Opportunities	Weaknesses	Threats/Solutions
			• and Coordinating External Data Sources* • Interoperability and Metadata Challenges • Onerous Processes to Access and Share Data* • Poorly Defined Data Governance and Usability Responsibilities*	• Build a Trusted and Secure Platform for Data Access and Integration* • Data Infrastructure and Integration Issues* •
External Cultural and Environmental Factors	• Emphasis on Cross-Agency Collaboration and Coordination • Top-Down Endorsement to Promote Systems-Wide Culture Change about Evidence Use* • Facilitate Regional Coordination on Local Data Sources* • Focus on Congressional Engagement as Champions* • Prioritize Building and Maintaining Trust and Independence* • Clearly Communicating Awareness and Value to Range of Users • Incongruence Between Policy Needs and Evidence Timing* • Resource vs. Demand Imbalance* • Cultural Resistance to Sharing and Using Data* • Shifting Priorities and Unstable Trust* • Evidence Act Implementation Limitations*	• Strengthen and Leverage Evidence Act Leaders as Champions and Drivers • Create Networks to Support Professional Development* • Influence of Organizational Culture on Individuals • Staffing and Institutional Knowledge Loss* • Dependency and Overrepresentation of Usual Contractors*	• Incorporate Robust Tools and Methods to Support Analytics*	• No Challenge or Solution Themes

Color Coding: Strengths; Weaknesses; Opportunities; Threats.
* Composite themes that represent several individual but similar themes

Appendix C: Guiding Principles for Successful NSDS Implementation and Use

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Guiding Principles for Successful NSDS Implementation and Use

Social-Organizations
1. Relevance for Budget and Policy Issues*
2. Use Existing Successful Models as a Foundation*
3. Establish Champions who Demonstrate a Strong Governance-First Architecture*

Technical-Tasks
4. Produce Accessible Data Reporting for Diverse Audiences
5. Timing and Responsiveness Critical
6. Build a Tiered Service Model Based on User Type*
7. Develop Comprehensive Governance Framework to Promote Better Data Quality*

Technical-Technology
8. Enable Appropriate Access with Goal of Making More Data Publicly Available*
9. User-Centered Design and Interface*
10. Integrate AI to Advance Capabilities and Usability*
11. Incrementally Scope and Scale the Initial Build*
12. Emphasis on Flexibility and Customization*

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* Composite themes that represent several individual but similar themes

Figure 3. Guiding Principles for Successful NSDS Implementation and Use

Appendix D: Extending the Journey Map to Include Solution Themes

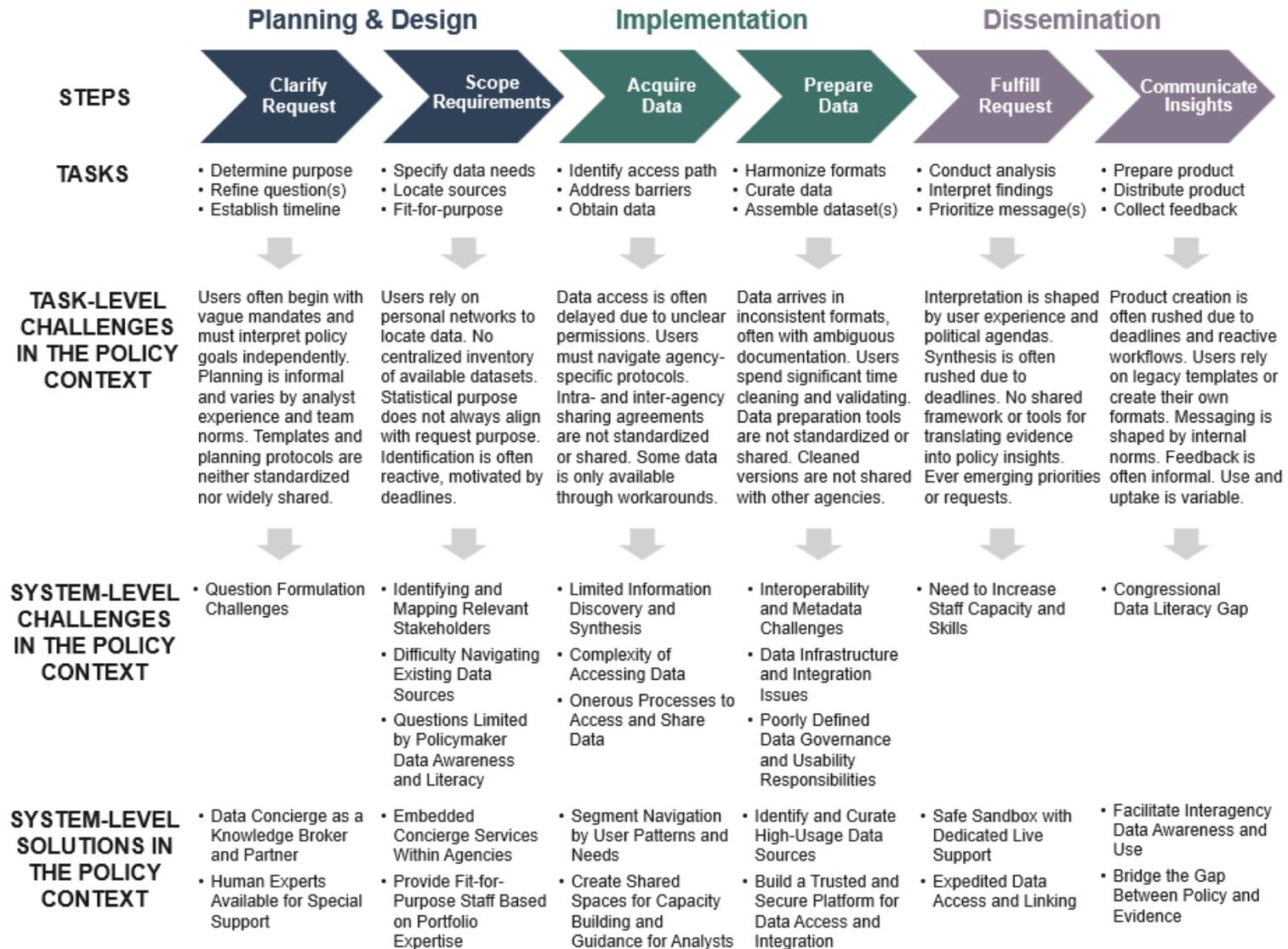|	**Planning & Design**		**Implementation**		**Dissemination**	
STEPS	Clarify Request	Scope Requirements	Acquire Data	Prepare Data	Fulfill Request	Communicate Insights
TASKS	• Determine purpose • Refine question(s) • Establish timeline	• Specify data needs • Locate sources • Fit-for-purpose	• Identify access path • Address barriers • Obtain data	• Harmonize formats • Curate data • Assemble dataset(s)	• Conduct analysis • Interpret findings • Prioritize message(s)	• Prepare product • Distribute product • Collect feedback
TASK-LEVEL CHALLENGES IN THE POLICY CONTEXT	Users often begin with vague mandates and must interpret policy goals independently. Planning is informal and varies by analyst experience and team norms. Templates and planning protocols are neither standardized nor widely shared.	Users rely on personal networks to locate data. No centralized inventory of available datasets. Statistical purpose does not always align with request purpose. Identification is often reactive, motivated by deadlines.	Data access is often delayed due to unclear permissions. Users must navigate agency-specific protocols. Intra- and inter-agency sharing agreements are not standardized or shared. Some data is only available through workarounds.	Data arrives in inconsistent formats, often with ambiguous documentation. Users spend significant time cleaning and validating. Data preparation tools are not standardized or shared. Cleaned versions are not shared with other agencies.	Interpretation is shaped by user experience and political agendas. Synthesis is often rushed due to deadlines. No shared framework or tools for translating evidence into policy insights. Ever emerging priorities or requests.	Product creation is often rushed due to deadlines and reactive workflows. Users rely on legacy templates or create their own formats. Messaging is shaped by internal norms. Feedback is often informal. Use and uptake is variable.
SYSTEM-LEVEL CHALLENGES IN THE POLICY CONTEXT	• Question Formulation Challenges	• Identifying and Mapping Relevant Stakeholders • Difficulty Navigating Existing Data Sources • Questions Limited by Policymaker Data Awareness and Literacy	• Limited Information Discovery and Synthesis • Complexity of Accessing Data • Onerous Processes to Access and Share Data	• Interoperability and Metadata Challenges • Data Infrastructure and Integration Issues • Poorly Defined Data Governance and Usability Responsibilities	• Need to Increase Staff Capacity and Skills	• Congressional Data Literacy Gap
SYSTEM-LEVEL SOLUTIONS IN THE POLICY CONTEXT	• Data Concierge as a Knowledge Broker and Partner • Human Experts Available for Special Support	• Embedded Concierge Services Within Agencies • Provide Fit-for-Purpose Staff Based on Portfolio Expertise	• Segment Navigation by User Patterns and Needs • Create Shared Spaces for Capacity Building and Guidance for Analysts	• Identify and Curate High-Usage Data Sources • Build a Trusted and Secure Platform for Data Access and Integration	• Safe Sandbox with Dedicated Live Support • Expedited Data Access and Linking	• Facilitate Interagency Data Awareness and Use • Bridge the Gap Between Policy and Evidence

Figure 4. Comprehensive User Journey Map to and through the Federal Data Ecosystem