



# The IoW Technology Adoption Program in New Mexico

Lilli Watson • March 2023

A culture of modern data management has begun to take hold in the water management community. Leaders in state agencies across the country are beginning to recognize that better water data infrastructure helps them to be more effective and efficient in managing their water resources. The path to reach this goal, however, is still often unclear.

Data infrastructure modernization at public agencies is a complex process. It depends not only on the adoption of modern technologies, but also on an organizational and cultural evolution in how data are managed, shared, and deployed for decision-making. The Internet of Water (IoW) [Technology Adoption Program \(TAP\)](#) was designed to address both aspects of water data modernization. Informed by a

[Duke University research project](#), TAP includes an introduction to and training on available technologies and close engagement with public agency staff and leadership to facilitate the organizational transformation needed for the adoption of modern technologies and approaches.

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## OPEN SPACE TECHNOLOGY

The philosophy that guides TAP in-person engagement sessions is [Open Space Technology \(OST\)](#), a self-managed, participatory process specifically designed to address organizational change. OST “thrives in situations in which there is a

diverse group of people who must deal with complex and potentially conflicting material in innovative and productive ways.”

In OST engagements, participants identify a series of topics they want to address. The participants then break up into small groups to work collaboratively on the topic of their choice. Each participant chooses which topic group they want to join and can move from one group to another at any point in the work session. The purpose of the small working groups is not necessarily to provide solutions, though suggestions for solutions are welcome, but instead to gain a better, more nuanced understanding of the topic and suggest a path to a solution.

## WATER DATA INFRASTRUCTURE MODERNIZATION IN NEW MEXICO

In September 2022, the Duke IoW team led a pilot TAP engagement with the five New Mexico state agencies that are collaborating to modernize New Mexico’s water data infrastructure through the [New Mexico Water Data Initiative \(NMWDI\)](#). The NMWDI is convened by the [New Mexico Bureau of Geology and Mineral Resources \(NMBGMR\)](#) and was established in 2019 with the passage of the [New Mexico Water Data Act](#). The goal of the Water Data Act is to make finding water data simple by coordinating data integration efforts across multiple state agencies and working with regional and federal data providers.

Since 2019, the NMWDI has made substantial progress toward data infrastructure modernization – building collaborations, working groups, and data catalogs and implementing data standards – but there is significant work ahead. Currently, the efforts of the NMWDI focus on facilitating communication between and within agencies, implementing water data plans at each agency, developing success stories, offering a range of support for agency-specific needs, improving data literacy, building a water data community, and providing opportunities for data users to share feedback. As part of these efforts, the NMWDI partnered with the Duke IoW team to pilot a TAP engagement, focused on identifying and addressing organizational barriers to data modernization.

## THE TAP ENGAGEMENT PROCESS

The goals of the IoW TAP engagement with the NMWDI were to:

- Promote meaningful dialogue across New Mexico water agency leaders related to modernizing data collection, storage, access, and security

- Identify key issues and obstacles related to data infrastructure modernization
- Establish prioritized data modernization strategies for each agency
- Identify lessons from the New Mexico pilot program that can be applied to other states' modernization initiatives

Before the TAP engagement, A 20-question survey was distributed to all staff of the five New Mexico water agencies. As part of the survey, participants were asked to comment on what they would change about how their agency manages water data. These comments were classified into 11 categories:

- Centralization: Combining multiple data platforms or management systems into a single system
- Legacy data or systems: Updating legacy data systems
- Standardization: Standardizing data across divisions or agencies
- Capacity: More staff time or training
- Discoverability: Making it easier to find data
- Data entry: Improving data entry systems
- Collaboration: Increasing interagency or inter-division collaboration
- Data extraction: Improving data extraction systems
- Funding: More funding to implement data infrastructure modernization
- Data visualization/analytics: Enabling data visualization and analytics
- Other

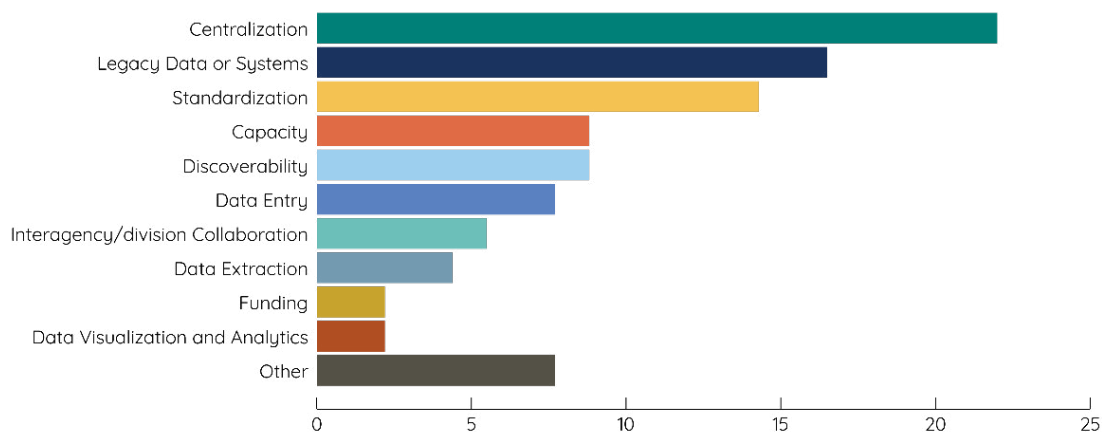


Figure 1: Categorized comments from agency staff on what they would change about how their agency manages water data



Based on this analysis, participants were most focused on developing agency-wide centralized systems for data, updating legacy data systems, attention to data and metadata standards, and an increase in capacity across agencies and divisions.

During the engagement, participants introduced six topics for discussion: the development of “killer apps;” data integration; data integrity, management, and standardization; vision and leadership; turning data into information, knowledge, and wisdom; and legacy data. Participants self-organized into inter-agency working groups based on these identified topics and produced a report-out that outlined the problem or opportunity statement, why the topic is important, various perspectives and differing opinions on the topic, recommendations or conclusions, people or agencies who may take the topic further. Participants were then asked to convene with their affiliated agency to reflect on lessons learned from the cross-agency collaboration and establish next steps for their agency.



East Fork Jemez River, New Mexico | Stephanie Klepacki, Unplash

## NEW MEXICO TAP ENGAGEMENT RESULTS

After the engagement, the Duke IoW team developed the following recommendations based on the report-outs from each agency and each inter-agency topic group.

- **End reliance on paper data.** Cease acceptance and production of paper data to reduce the growing burden of legacy data through the adoption of electronic data collection and management requirements for electronic data submission, electronic forms, and the requirement for third-party vendors to submit data in electronic formats.
- **Diversify funding mechanisms for water data modernization.** Use mechanisms such as updating and increasing fees; reduce agency reliance on the legislature for funds to support water data modernization.
- **Review and update procurement and hiring practices.** Review and update practices that trap agency resources in proprietary software, refine contracting requirements to reflect overall data modernization efforts, and recruit and retain a workforce with the appropriate data skills.

- **Focus on API development.** Prioritize building services, like APIs, that facilitate the accessibility and integration of data across agencies.
- **Increase education and guidance from NMWDI.** Provide guidance on appropriate data and metadata standards as well as education on how divisions and agencies can connect with the NMWDI catalog and services.

To conclude the engagement, each participant was asked to name a single word or phrase that described their experience with the engagement. Their closing thoughts are represented in the graphic on the right.

The collaborating agencies behind the New Mexico Water Data Initiative are now working to implement the recommendations that came out of this engagement. The Duke IoW team will reconvene meeting participants for a roundtable later this year to discuss the progress that agencies have made, identify roadblocks, and develop solutions to surmount them.

Data Literacy  
**REFRESHING**  
 Learned a lot  
**ABOVE THE LINE**  
 Encouraging **HELPFUL**  
**STRONG RELATIONSHIPS**  
 FASCINATING **Informative**  
**Educational** Eye-opening  
 CAUTIOUSLY OPTIMISTIC **Positive**  
**Common Cause** **VALIDATING**  
 ILLUMINATING Common Needs  
**Enlightening** **NEW AND OLD**  
 Integrating Minds **REVEALING**  
**WEALTH OF IDEAS**  
 Reassuring

## NEXT STEPS FOR THE TECHNOLOGY ADOPTION PROGRAM

Following the success of the TAP pilot in New Mexico, the Duke IoW team hosted a similar TAP engagement in Oregon to support the development of the [Oregon Water Data Portal](#). With each engagement, we learn more about how best to support collaboration across agencies to develop modern water data infrastructure and practices. To learn more about this program contact [internetofwater@duke.edu](mailto:internetofwater@duke.edu).

Header Photo: Robin Sommer

Footer Photo: Jonathan Saleh