
MAP Pilot
Machine Actionable Plans
University of California
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California Digital Library
ASSOCIATION OF RESEARCH LIBRARIES

Today's Speakers

- **Matt Carson**, Northwestern University
- **Briana Wham**, Penn State University,
- **Matthew Murray**, University of Colorado Boulder
- **Kat Koziar**, University of California, Riverside/California State University, Fresno
- **Matthew Harp**, Arizona State University

- **Maria Praetzellis**, California Digital Library (PI)

Other Project members:

- **Becky Grady**, California Digital Library
- **Cynthia Hudson-Vitale**, Association of Research Libraries
- **Judy Ruttenberg**, Association of Research Libraries
- **John Chodacki**, California Digital Library
- **Clare Dean**, Consultant & Project Manager

MAP Pilot

Matthew ~~Machine~~ Actionable Plans

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Today's Presentation

- Pilot Project Overview
- Case Studies from 5 Partners
- Advocacy and Insights

Project Website

https://bit.ly/mappilot

Pilot Project Overview

MAP Project Objectives

- Showcase potential of machine-actionable DMPs
- Track outputs connected to DMPs
- Investigate role of libraries in research data management and data policies
- Demonstrate value to our communities

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Pilot Overview

INSTITUTE of Museum and Library SERVICES
LG-254861-OLS-23

Goal:

- Test machine-actionable features and functionality in an institutional setting

Key Activities:

- Pilot integration of prototypes and workflows
- Implement new standards and functionalities for networked DMPs

Timeline:

- January - December 2024 active pilot phase

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Participating Institutions and Project Leads

IMLS Funded Cohort

Arizona State University, Jim Taylor

Northwestern University Feinberg School of Medicine, Matt Carson

Pennsylvania State University, Briana Wham

University of California, Riverside, Katherine Koziar

University of Colorado Boulder, Andrew Johnson

Extended Cohort

NYU Langone, Nicole Contaxis

Stanford University, Zach Chandler

University of California, Berkeley, Anna Sackmann

University of California, San Diego, David Minor

University of California, Santa Barbara, Renata Curty

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Common Themes: Highlights & Challenges from the Pilot

Highlights

- Growing Cross-Campus Collaboration
- Recognition of the Library as a Key Hub
- Balancing AI & Human Expertise

Challenges

- Unclear or Siloed Policy Creation
- Lack of Centralized Oversight
- Desire for a High-Level Data Governance Role

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Case Studies from 5 Partners

Northwestern University: Landscape Analysis of RDS

Long-term Goal:

*To **reduce** researcher burden, **improve** RDM workflows, and **deepen our understanding** of research data at NU*

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MAP Pilot Benefits

- Provides an opportunity to **engage and build trust with campus partners** around data management services
- **Demonstrates the value of maDMPs** to partners in their workflow
- Allows us to create a **more complete picture of the RDM services landscape at NU** (and to identify opportunities for improvement)
- **Creates the foundation for further maDMSP integration** with campus tools (e.g., research information management systems, institutional repositories, etc.)

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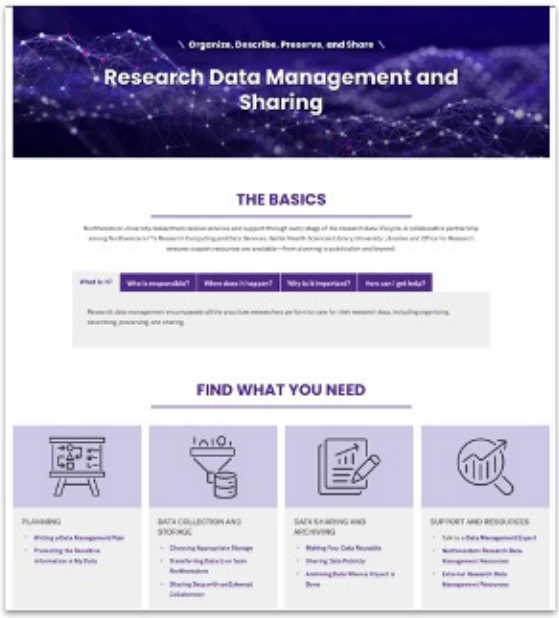
Improved Data Services Coordination Across Campuses

- Campus-wide RDM consultation service
- New centralized resource for:
  - RDM planning
  - Data Collection and Storage
  - Data Sharing and Archiving
  - Support and Resources
- RDM classes and guides incorporating DMP Tool
- Established regular cross-unit meetings
  - Quarterly Data Sharing for Administration, IT, Office for Research, Galter Library
  - Individual units across campus



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https://www.it.northwestern.edu/departments/it-services-support/research/data-storage/

Recurring Questions from Administration

- Easier to answer:
  - **Where are funders suggesting/requiring researchers at NU/Feinberg to share their data?** (*Provided by the NIH and other agencies, GREI*)

- Harder to answer:
  - **Where are NU/Feinberg researchers storing or planning to store their data?**
  - **How many researchers need support for sharing human subjects data?**
  - **How many DMSPs list expected data output of type 'x' will be generated?**
  - **How many projects will generate data that will not have a designated repository?**

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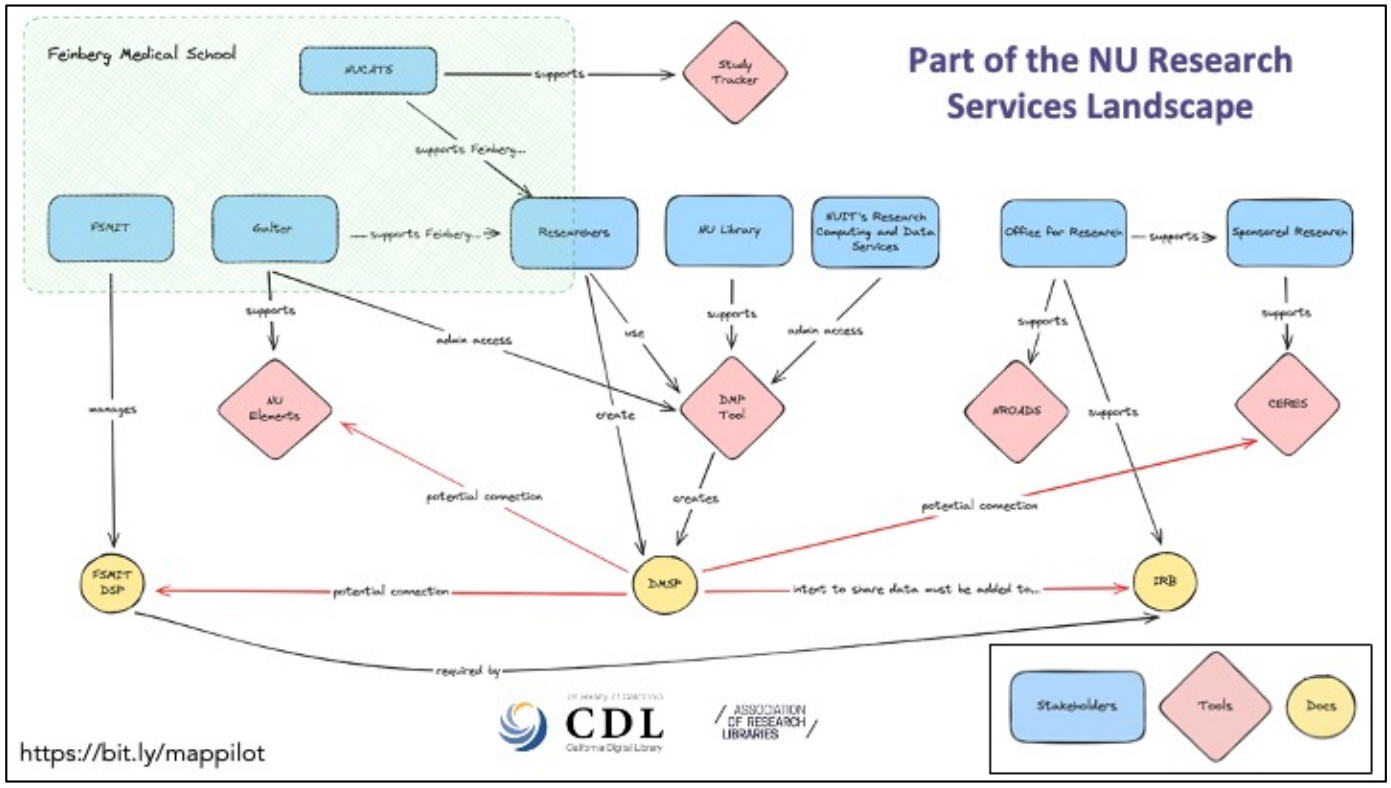
Part of the NU Research Services Landscape
Feinberg Medical School
#UCATS
supports
Study Tracker
supports Feinberg...
FSMIT
Gultor
supports Feinberg...
Researchers
NU Library
#UIT's Research Computing and Data Services
Office for Research
supports
Sponsored Research
supports
admin access
use
supports
admin access
supports
supports
manages
NU Elements
create
DMP Tool
#ROADS
supports
CERES
potential connection
creates
potential connection
FSMIT DSP
potential connection
DMSP
intent to share data must be added to...
IRB
required by
Stakeholders
Tools
Does
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Key Points

- It's difficult to monitor research progress and ensure compliance without structured and accessible data
- Centralized RDM resources provide clarity to researchers
- Siloing leads to duplication of effort and resource overlap
- Without outreach, communication, and training, services and resources are underutilized

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Core Project Team

Northwestern University NUCATS Clinical and Translational Sciences Institute

Galter Health Sciences Library & Learning Center

- **Matt Carson**, Head, Digital Systems Department, Galter Library, Project Lead
- **Sara Gonzales**, Senior Data Librarian, Galter Library
- **Kristi Holmes**, Director, Galter Library, PI

Northwestern | INFORMATION TECHNOLOGY RESEARCH COMPUTING SERVICES

- **Tobin Magle**, Lead Data Management Specialist, Research Computing and Data Services, NU Information Technology

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PennState

Exploring Cross-Campus Coordination Opportunities to Develop Scalable Data Management Services and Infrastructure

Goal

Improve understanding of maDMSPs across campus and explore how leveraging information within maDMSPs can enhance communication workflows among key campus units engaged in research data management

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Day 1 Schedule

October 1, 2024

TIME	TOPIC	PRESENTER(S)
9:00 – 9:30 AM	**1. Welcome Coffee & Light Breakfast**	Sarah Matthews
	Casual networking opportunity before the event begins with thinking prompts to fill out: - What are researchers' current challenges with data management? - What are you hoping to learn today?	
9:30 – 9:45 AM	**2. Opening Remarks**	Faye Chadwell Dr. Andrew Read Debra Thurley
	This session will provide an overview of the goals of the event and value to Penn State.	
9:45 – 9:50 AM	**3. Housekeeping & Overview of Event**	Dr. Courtney Kenneitz
9:50 – 10:05 AM	**4. Break**	
10:05 – 10:30 AM	**5. The Research Project and Research Data Lifecycles**	Dr. Briana Wham
	This presentation will provide a high-level overview of the stages of the research project lifecycle and where data management planning fits in.	
10:30 – 11:00 AM	**6. Activity: The Research Project and Research Data Lifecycles at Penn State**	
	This hands-on activity will provide participants the opportunity to reflect on where their work fits into the research project and research data lifecycles.	
11:00 – 12:00 PM	**7. Activity: Data Management Planning**	
	This interactive session will incorporate scenario-based activities where participants will explore data management plans as well as data management activities and tools.	
12:00 – 1:00 PM	**8. Lunch Provided – Panera**	
1:00 – 2:15 PM	**9. The Future of Research Data Management: Trends in Developing Scalable Data Management Infrastructure**	Cynthia Hudson Vitale Judy Ruttenberg
	This presentation will introduce maDMSPs, explaining what they are, how they work, and their potential for easily facilitating campus coordination for research data services.	
2:15 – 2:45 PM	**10. Break**	
2:45 – 3:30 PM	**11. Exploring maDMSPs Use Cases and Functionalities**	Pauline Krys Jim Taylor Matthew Murray
	A showcase of how maDMSPs could be practically used from pilot project institutions.	
3:30 – 4:00 PM	**12. Wrap-Up and Overview of Next Day**	Dr. Briana Wham

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Day 2 Schedule

October 2, 2024

TIME	TOPIC	PRESENTER(S)
9:00 – 9:30 AM	**1. Welcome Coffee & Light Breakfast**	Sarah Matthews
	Casual networking opportunity before the event begins with thinking prompts to fill out: - What was a key takeaway from yesterday? - What do you hope to dive deeper into today?	
9:30 – 10:00 AM	**2. Recap**	Dr. Courtney Kammelita
	A quick summary of Day 1, inviting reflections and feedback from participants	
10:00 – 10:50 AM	**3. Adoption of maDMSPs: Institutional Benefits and Challenges**	Dr. Tomasz Miksa
	Presentation on practical and diverse opportunities for implementation of maDMSPs exploring the benefits and challenges.	
10:50 – 11:00 AM	**4. Break**	
11:00 – 11:30 AM	**5. Data Management Initiatives at Penn State**	Dr. Courtney Kammelita Dr. Rick Gilmore Ashley Stauffer Natalie Mansell
	Panel presentation providing an overview of data management and sharing initiatives at Penn State.	
11:30-12:00 PM	**6. Activity: maDMSPs in Your Work Wireframing – Developing Workflow Solutions**	
	Collaborative working session where participants create a visual wireframe of how they could integrate maDMSPs into their current or ideal workflows.	
12:00 – 1:00 PM	**7. Lunch Provided – Roots Natural Kitchen Lunch**	
1:00 – 3:00 PM	**8. Activity: maDMSPs in Your Work Wireframing – Developing Workflow Solutions Continued**	
	Collaborative working session where participants create a visual wireframe of how they could integrate maDMSPs into their current or ideal workflows.	
3:00 – 3:45 PM	**9. Open Discussion: Moving Forward with maDMSP Adoption**	
	Open discussion session where participants share insights from the wireframing activity and discuss action steps.	
3:45 – 4:00 PM	**10. Wrap-Up and Key Insights**	Dr. Briana Wham Dr. Courtney Kammelita Sarah Matthews
	Summary of key takeaways and provide participants with resources for continued engagement.	

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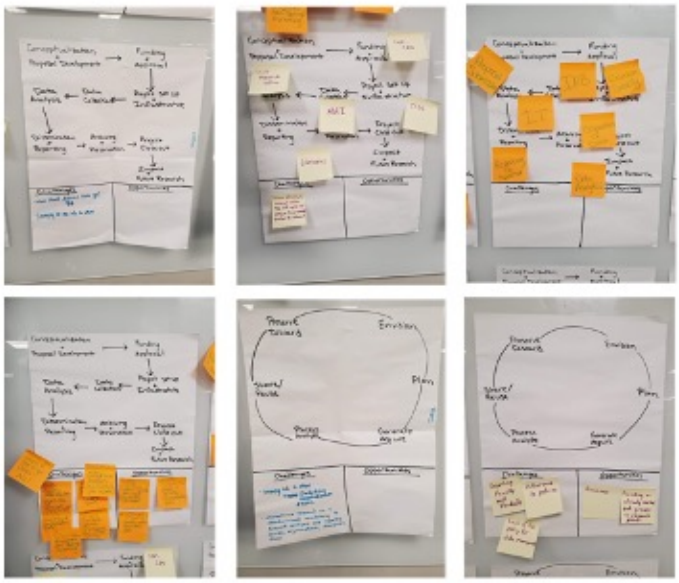
The Research Project and Data Lifecycles @ Penn State Activity



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Key Takeaways

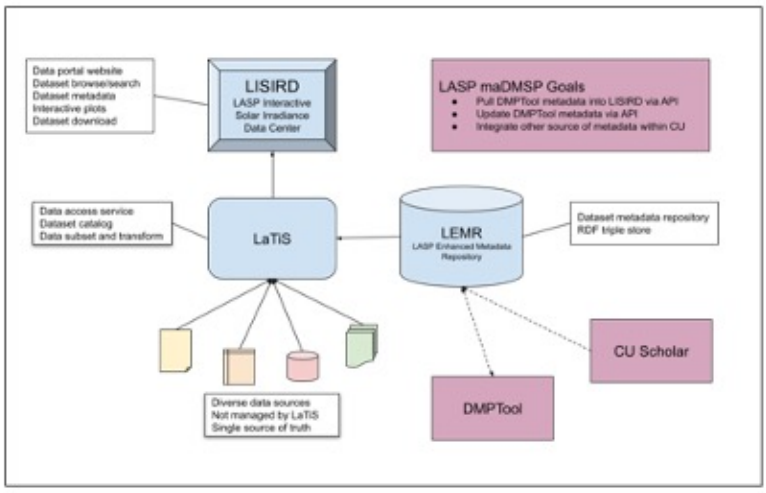
- **Continued Dialogue:** Attendees emphasized the need for ongoing discussions across units and departments to ensure effective stakeholder engagement and information sharing.
- **Improved Cross-Unit Collaboration:** Participants saw value in equipping all stakeholders with relevant information at proposal submission and award stages to streamline processes. Moreover, the creation of a research data management advisory committee was proposed to enhance coordination and visibility.
- **Development and Support of IT Infrastructure:** Participants voiced a need for IT support to integrate maDMSPs into existing research administration systems.
- **Institutional Research Data Stewardship Strategy:** The workshop underscored the need for a university-wide research data stewardship strategy and program to support long-term success and support for initiatives like institutional implementation and adoption of maDMSPs.

Next Steps

- Continue to collaborate across units to increase understanding of workflows and support coordination
- Develop mapping of information in DMSPs to service offerings, identifying gaps
- Explore leveraging information in DMSPs for service engagement, compliance monitoring, resource allocation and provisioning

University of Colorado Boulder: Connect DMPs to profiles

Laboratory for Atmospheric and Space Physics - Data Services



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- Connect existing research systems to DMP Tool API
- Pull information from DMP into local tools including research systems and faculty profiles
- Update DMP Metadata as details change in project

Exploring maDMSP Use Cases and Functionalities at University of Colorado Boulder

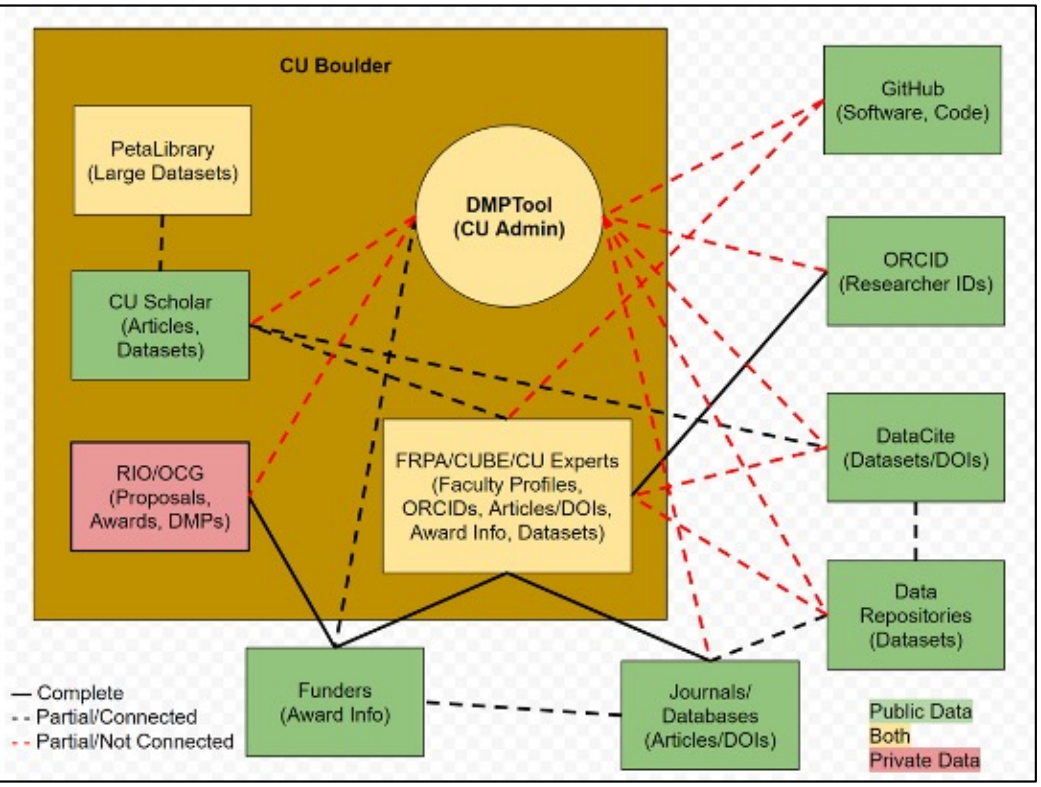
Goals

- Automate alerts for CRDDS personnel when CRDDS or its infrastructure resources (e.g. repository, large-scale storage system, HPC infrastructure, cloud computing resources) are included in DMSPs from awarded proposals
- Track research outputs and data deposits related to grants in order to meet funder requirements for public access to research data
- Streamline and centralize a collection of information about published data sets related to awarded DMSPs for reuse in other systems

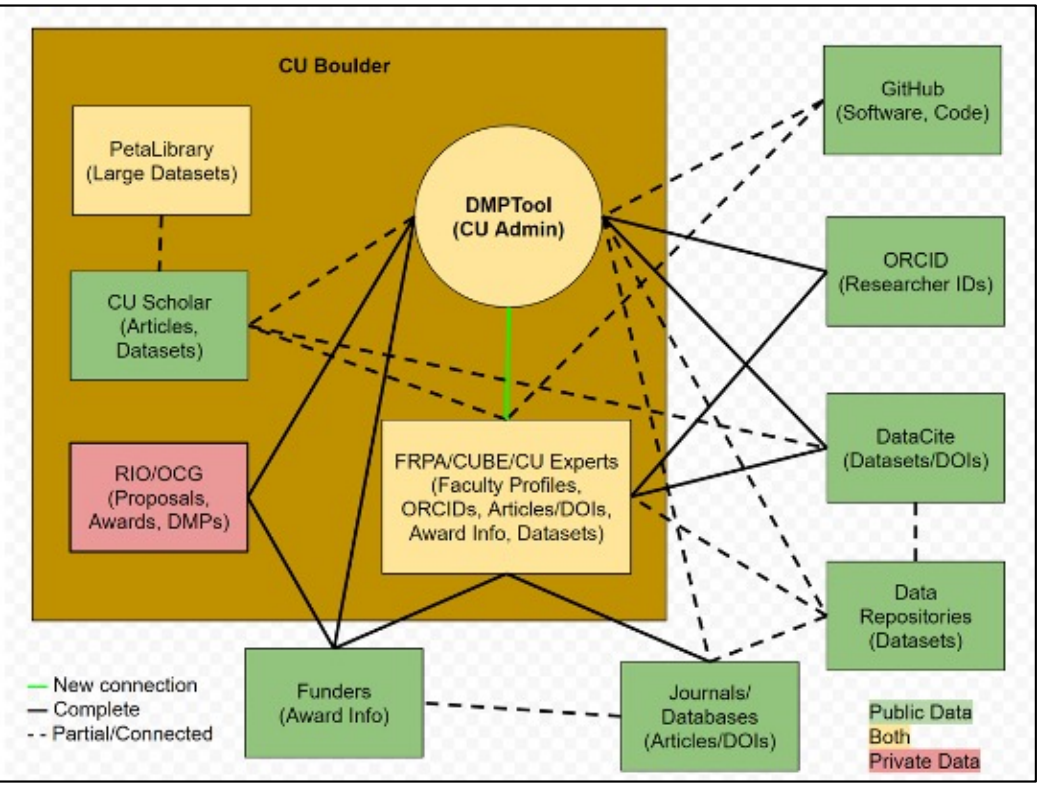
Goals

- Incentivize researchers to deposit research data in our repository (and other repositories)
- Develop system for associating datasets with grants
- Link, read, and update metadata in the relevant data management plans via the DMPTool API
- Pull content from maDMSPs into existing campus services
  - e.g. faculty activity databases, expert profile platforms, grants management systems, institutional repository, etc.

Current connections



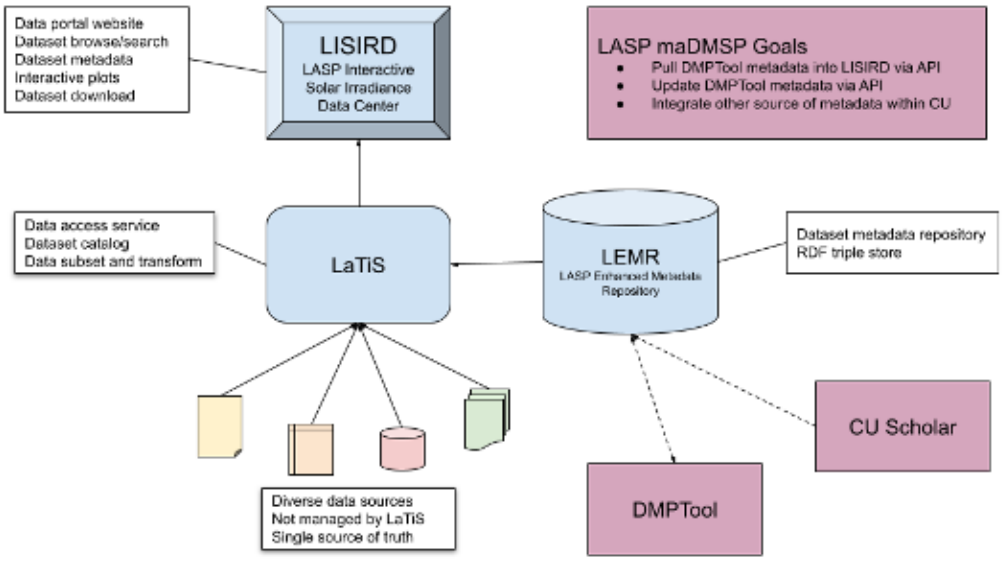
Future connections



Laboratory for Atmospheric and Space Physics

- LASP is a large research institute at the University of Colorado Boulder, with custom built scientific instruments gathering data around the solar system.
- LISIRD data portal provides access to a variety of data sources via the LaTiS web service interface.
- Supporting this portal is the LEMR metadata repository which houses properties (RDF triples) about the datasets.

Laboratory for Atmospheric and Space Physics - Data Services



Problem 1: Getting access to DMSPs

- Difficult and labour-intensive to obtain DMSPs
- Required to get permission from each PI in order to access their DMSPs
- Need to adhere to high security standards for certain research projects working with sensitive data
- Used a small number of DMSPs as test cases

Problem 2: Published DMPs are not final DMPs

- Some DMSPs are published on DMPTool
- Published DMSPs are not necessarily the same version that was submitted to a grant
- Researchers are very unlikely to return to their DMSPs after the proposal stage
- No easy way to tell if a DMSP was part of a proposal that was awarded or even submitted

Problem 3: Datasets don't identify grants

- Publications (e.g. journal articles) often acknowledge grants/awards in acknowledgements or similar sections
- Published datasets (including software) rarely say which grants/awards they're associated with

Takeaways

- CRDDS/the Libraries improved connections with other units on campus
- Better understanding of how maDMSPs fit into the research information ecosystem
- We learned there is a surprising lack of integration and connection across systems and sources of information (e.g. tying datasets directly to awards)
- No “one size fits all” solution for institutions using maDMSPs

University of California, Riverside: Provision Resources

Project Goals

Technical

- Automate Computational Resource Deployment
- Investigate LLMs to help extract meaningful info

Communication

- Track research outputs
- Automatic notifications of Data Security Plan requirements

Cross-Division Team

- Sherie Donahue, Research Integrity Analyst/Proposal Development Officer, Research & Economic Development
- Victor Hill, Director of Research Computing, Bourns College of Engineering
- Taaha Sayed, Research Software Developer, Bourns College of Engineering
- Kat Koziar, Librarian

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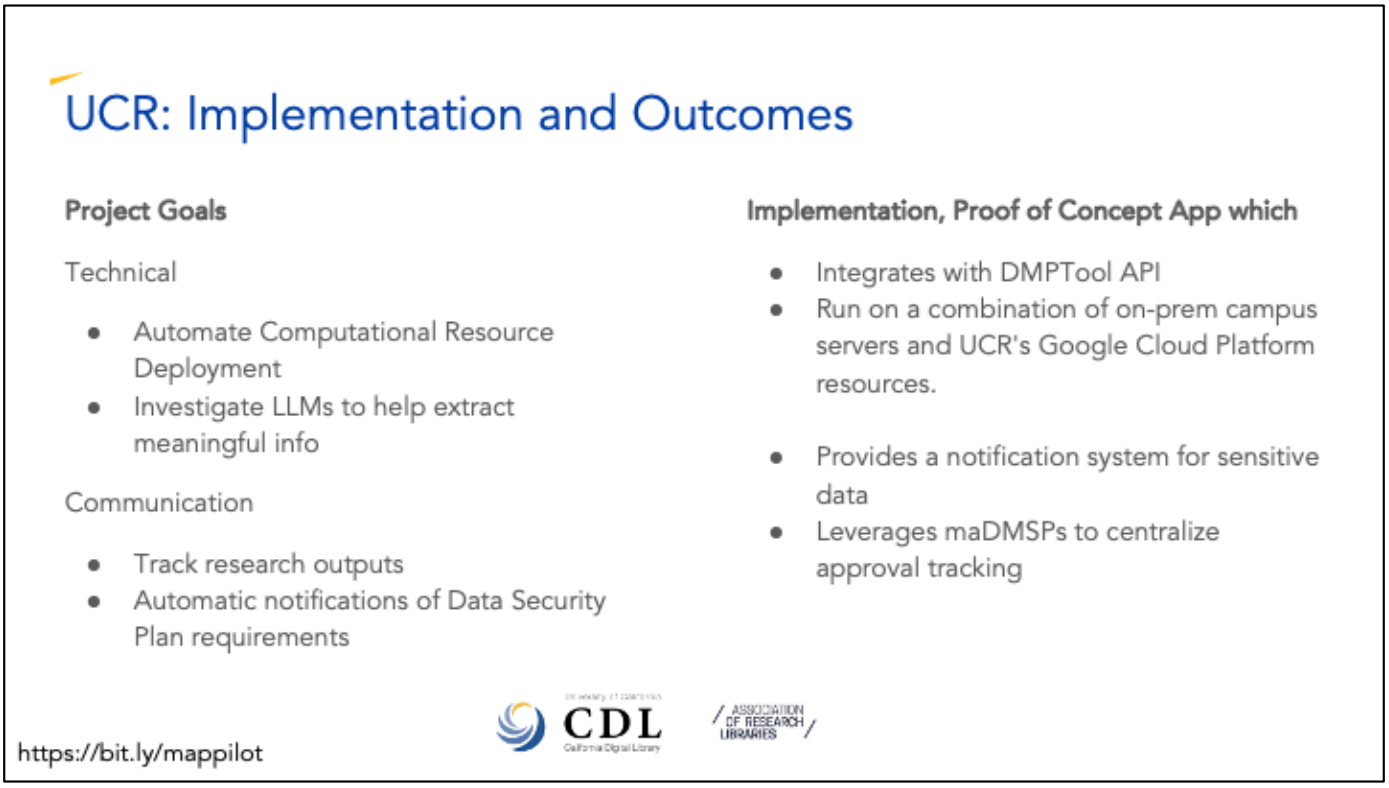
- Tool to use DMP as source of truth for resource computing resources
- Get comments and feedback on needs through departments
- Go from DMP to storage allocation within one tool



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- Go from DMP to storage allocation within one tool

UCR: App Overview: maDMSP as a **Source of Truth**

Implementation, Proof of Concept App which

- Integrates with DMPTool API
- Benefits: Will be able to track research outputs the DMPTool identifies, so PI only needs to go to one place to view for reporting purposes
- Challenges: currently read-only

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UCR: Deploy Computational Resources for Research

Implementation, Proof of Concept App which

- Runs on a combination of on-prem campus servers and UCR's Google Cloud Platform resources.
- Benefits: keeps track of detailed research metadata
- Challenges: selection of machine type, operating system, configuration, etc, at this point is manual

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UCR: Track Actions and Approvals Associated with Project

Implementation, Proof of Concept App which

- Leverages maDMSPs to centralize approval and other tracking
- Benefit: Saves prompts and other comments when using LLMs to gather details from DMPs
- Challenges: DMPs sometimes lack specific details. Possible issue of older DMPs originally used for project.

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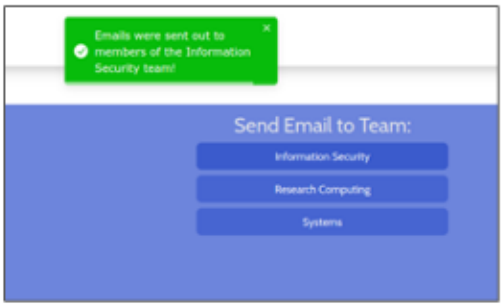
UCR: Support Data Security Plan Creation



Implementation, Proof of Concept App which

- Provides a notification system for sensitive data
- Leverages maDMSPs to centralize approval tracking
- Benefits: tracks notifications, comments, and approval of documents, such as Data Security Plans, which are usually created in parallel to DMPs.
- Challenges: None really. UCR Risk Management really likes this feature.

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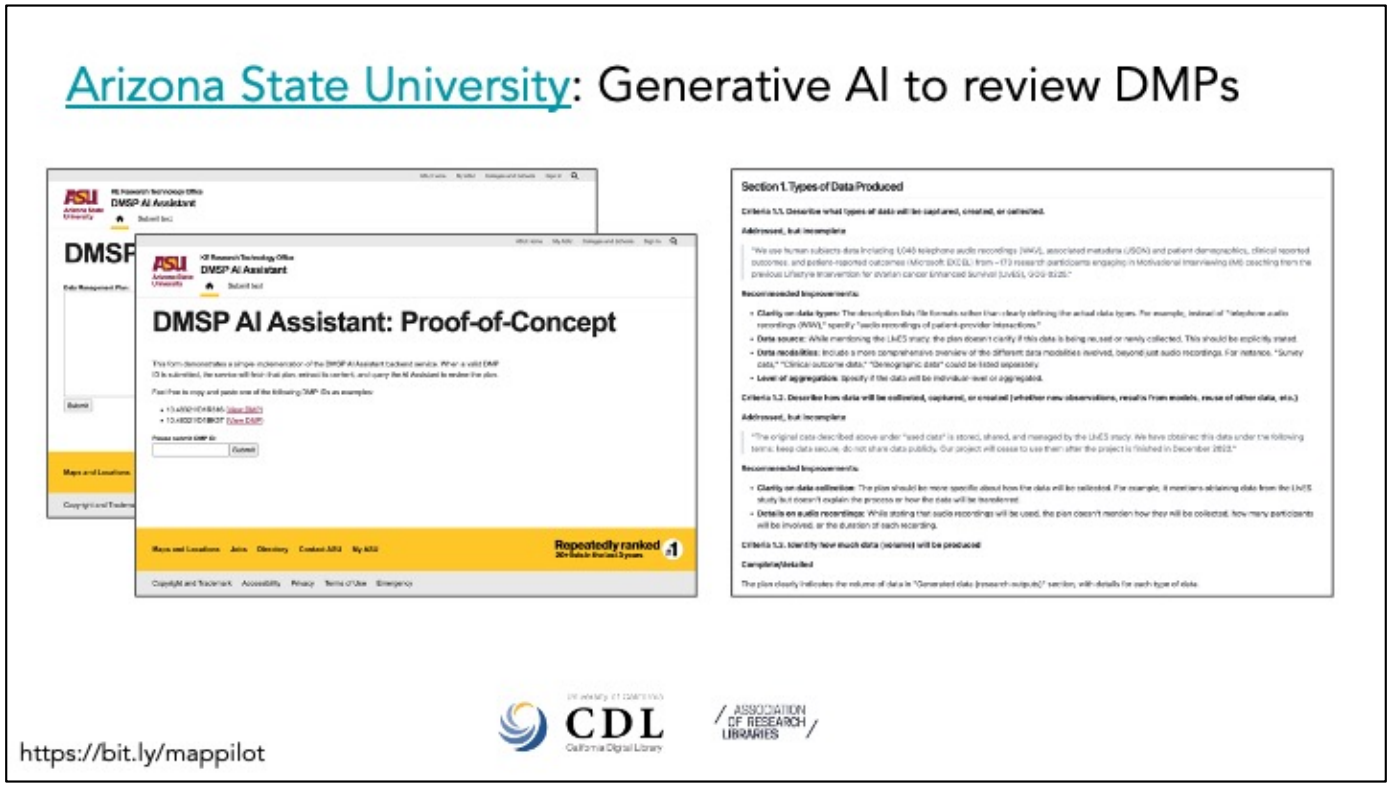
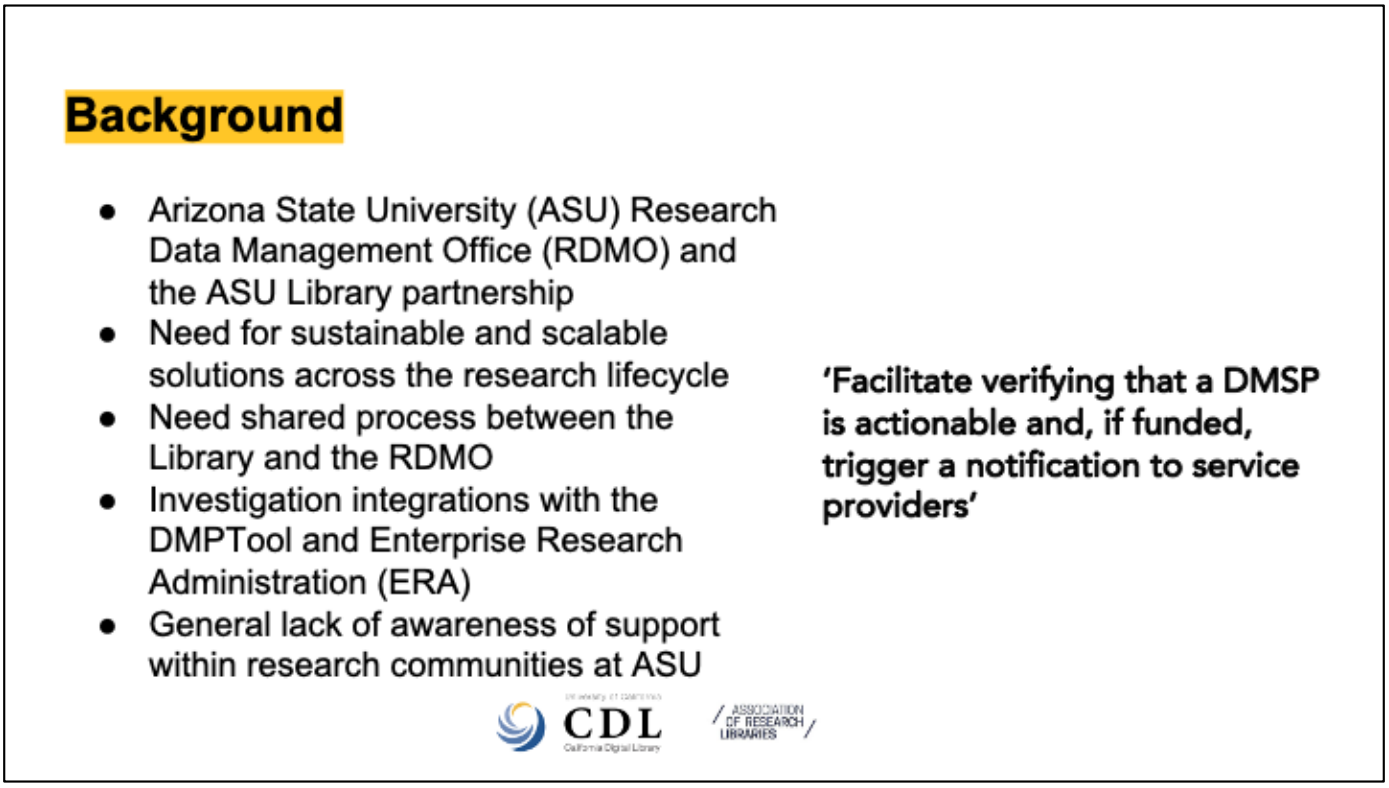


ASU's contribution to the MAP Pilot was the prototyping of data management plan feedback through generative AI that would provide nearly immediate response to requesters instead of the traditional the three to four business days. And I want to give a shout out to Nathan Rollins an ASU Map Pilot team member who was the key designer of the agent

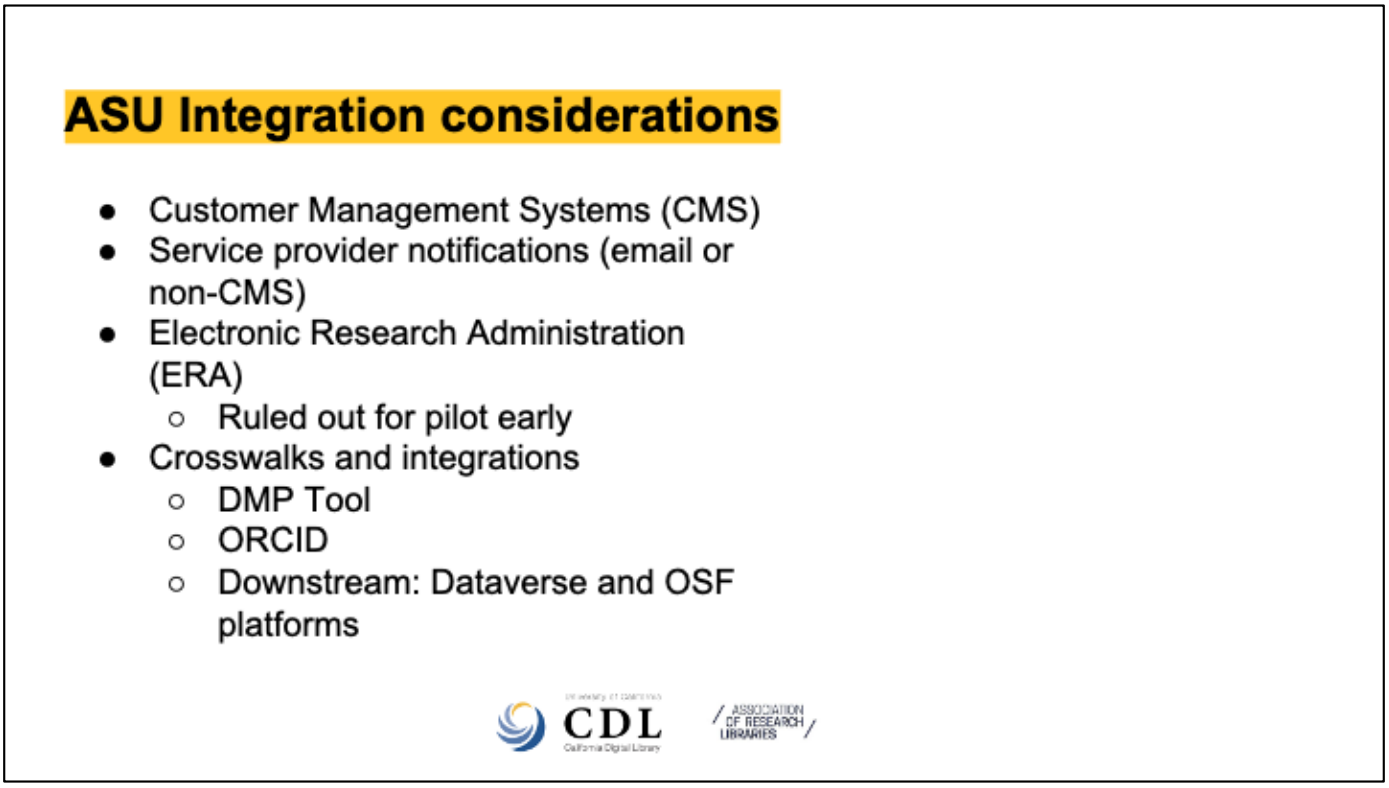
ASU is a large institution and we have a relatively small dedicated support network for the thousands of researchers at our institution and many of those feedback requests come at the last minute. How many of you get those last minute DMP requests on a Friday afternoon at 3pm?

So our goals is an AI agent where:

- DMPs can be pasted into a text box or entered with their DMP ID
- Model is hosted through ASU and is general LLM model, no special training required for the end user
- The Model is prompted with 18 pages of instructions, policies, and output format

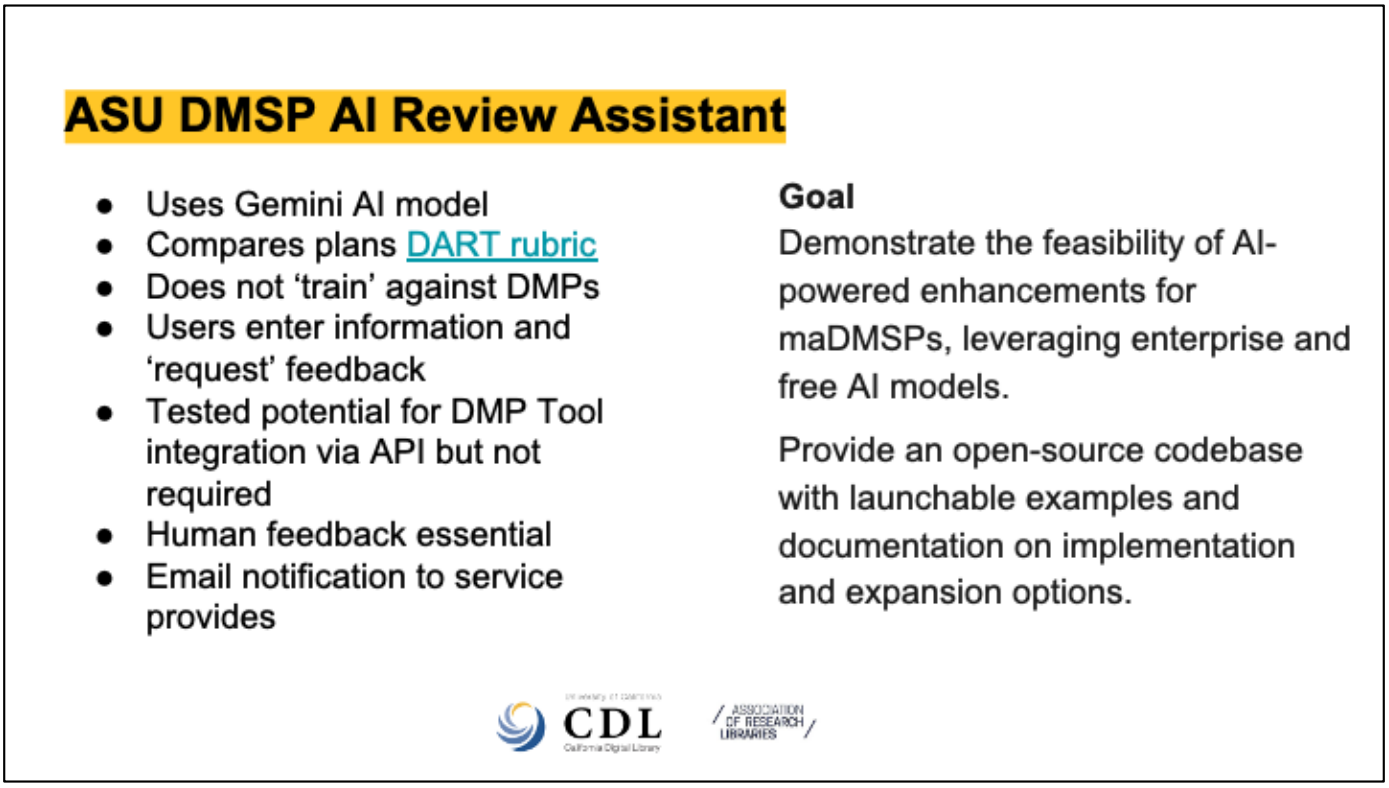


The Research Data Management Office and the ASU library have a long term formal partnership and we recognized a need for a scalable solution that could provide consistent DMP feedback. Over the years, despite our outreach there is a general lack of awareness for our support capabilities so plans, while funded may not be actionable. We initially were looking at ways to integrate the DMP Tool with our Enterprise research Administration system as a way to notify service providers while proposals were being developed, but we ended up focusing on providing more immediate DMP feedback first.

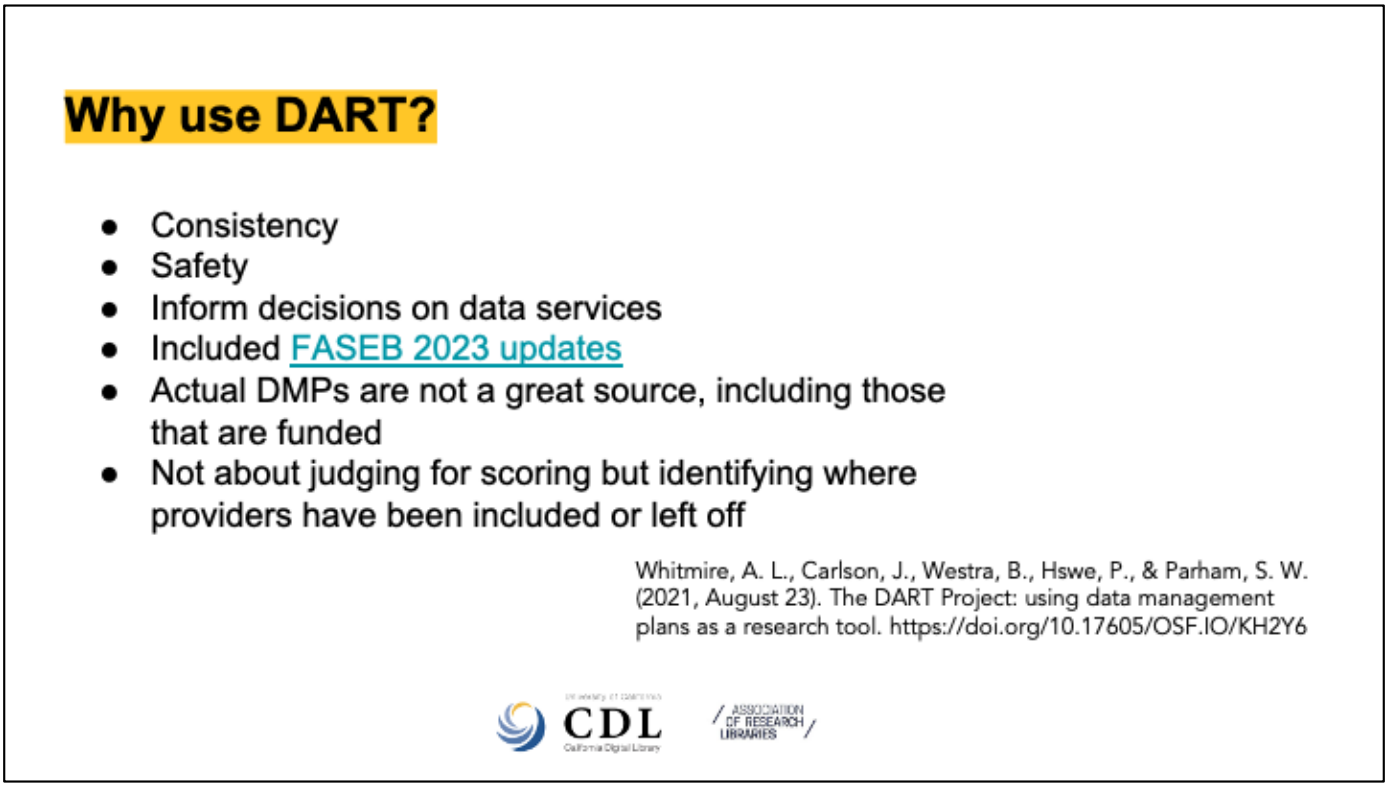


Some challenges included the fact that both the library and the data management office use separate customer management systems, and we needed to remediate responses to requestors in a more effective way. A few weeks into the project we ruled out the ERA system, because there is not an established development environment and experimenting with a critical system for grant proposals, and setting up false expectations, was too risky.

We then considered what kind of crosswalks integrations were available for notifications including the DMP Tool, Orchid IDs, and then downstream data sharing service providers such as our research data repository that typically do not get notified until the end of a project.



- Our goal was to enhance the process and not work against it or create confusion for end users.
- The review assistant uses Google's Gemini AI model and compares submitted plans against the DART rubric and support documentation related to services at ASU. It does not train or compare submissions against other DMPs.
- Nathan tested the potential integration via the DMP Tool API but it's not required since we provided the option for a plan to be entered through a text box. Human feedback is still essential so we had to have a mechanism for email notification to both the requester and the service providers.
- Dart Rubric: https://doi.org/10.17605/OSF.IO/KH2Y6



The DART Rubric, a 2015 project to standardize the review of data management plans, serves as a framing device. The DART score sheet provides a structured but basic breakdown of each section. Using the rubrk instead of other plans prevents bad information from being reused and it's not about judging the DMSPs for scoring purposes but identifying within a given section by utilizing DMPTool template structures where a service provider has been identified or left off.

We also utilized the 2023 FASEB Dataworks update which combines the Belmont forum and Dart adding additional and more current elements to the scoring. The review gauges whether they answered a specific question against the expectations laid out by the rubric not whether the information matched a funded or unfunded plan.

Dart Rubric: https://doi.org/10.17605/OSF.IO/KH2Y6

Federation of American Societies for Experimental Biology (FASEB) 2023 updates to the rubric https://www.faseb.org/getmedia/cb681545-2ed5-4970-b167-e1b47b1f225e/Rubric-for-DataWorks-DMP-Challenge-12-14-21.pdf

Common Questions

Will my data be used by AI vendors to train their models?

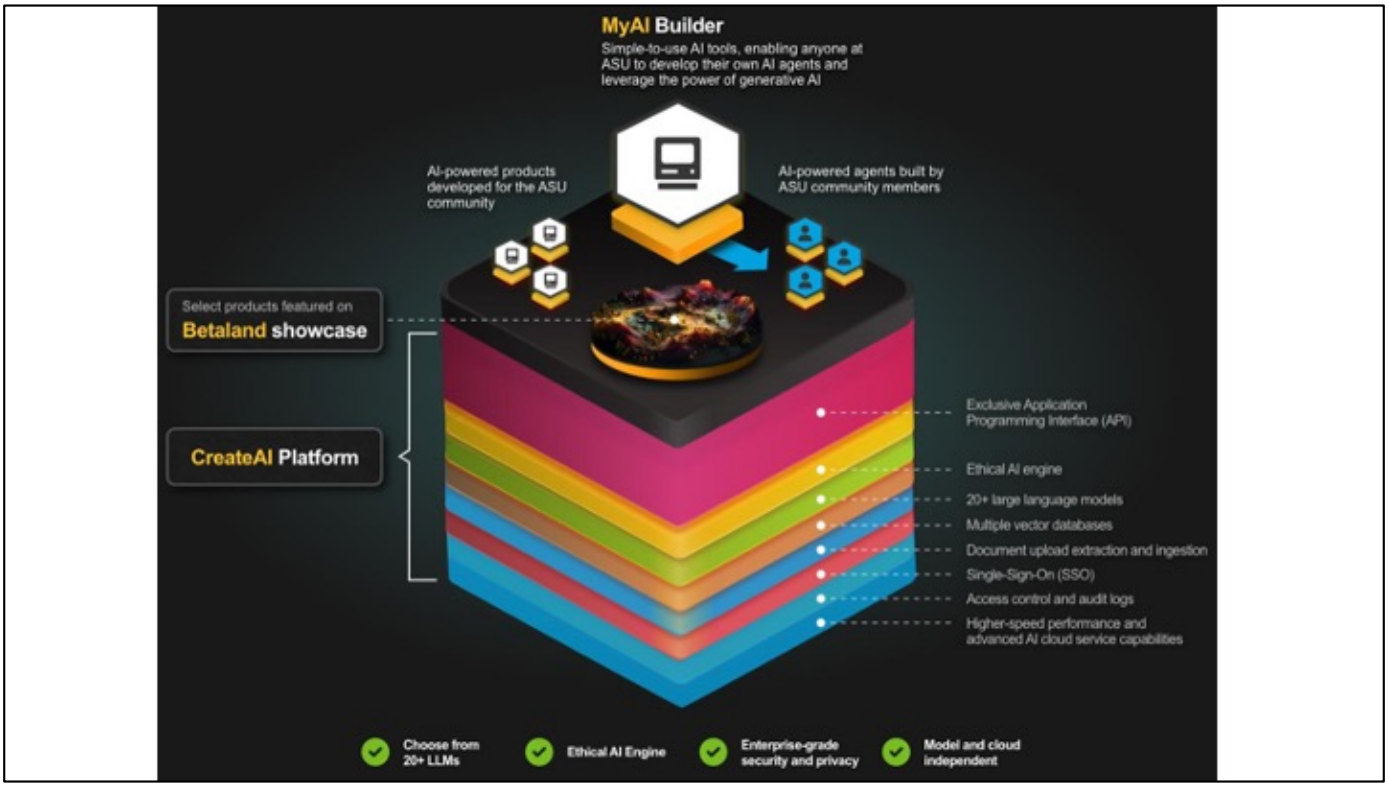
- ASU has enterprise licensing agreements with AI vendors, protecting all data from used without our permission.
- ASU is not using public AI models. These are in environments dedicated to ASU.

Can I trust the responses? How reliable are they?

Codebase is modular and proof of concept available on GitHub: github.com/ASU-KE/rtic-gcp-ai-dmsp-assistant

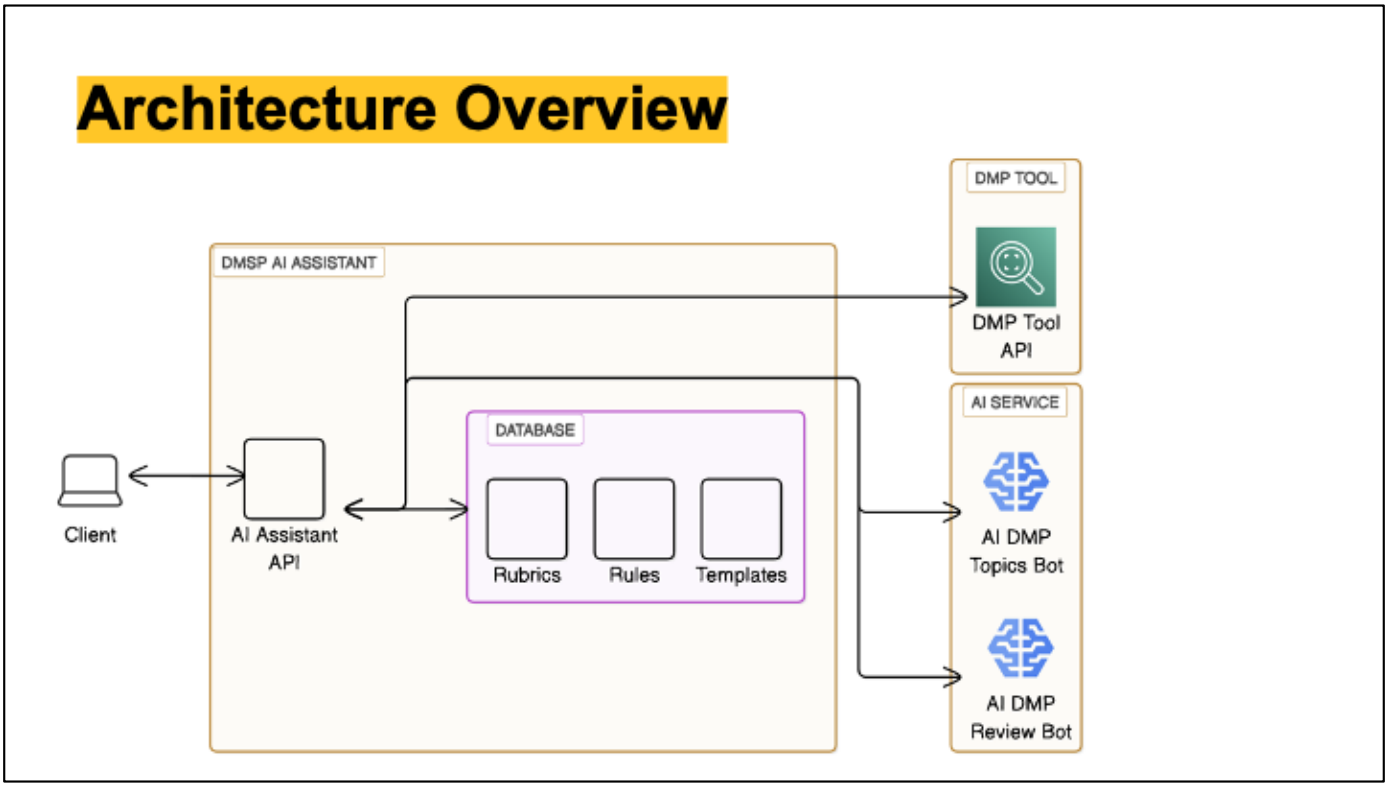
Going into the project establishing trust was an essential component and we are utilizing our licensing agreements with our AI vendors that protect user information from being used in public AI models. We also found that only was the outputs far more consistent, but the feedback was indeed reliable. However, we cannot rely on just automation when providing feedback.

GitHub project repository: http://github.com/ASU-KE/rtic-gcp-ai-dmsp-assistant

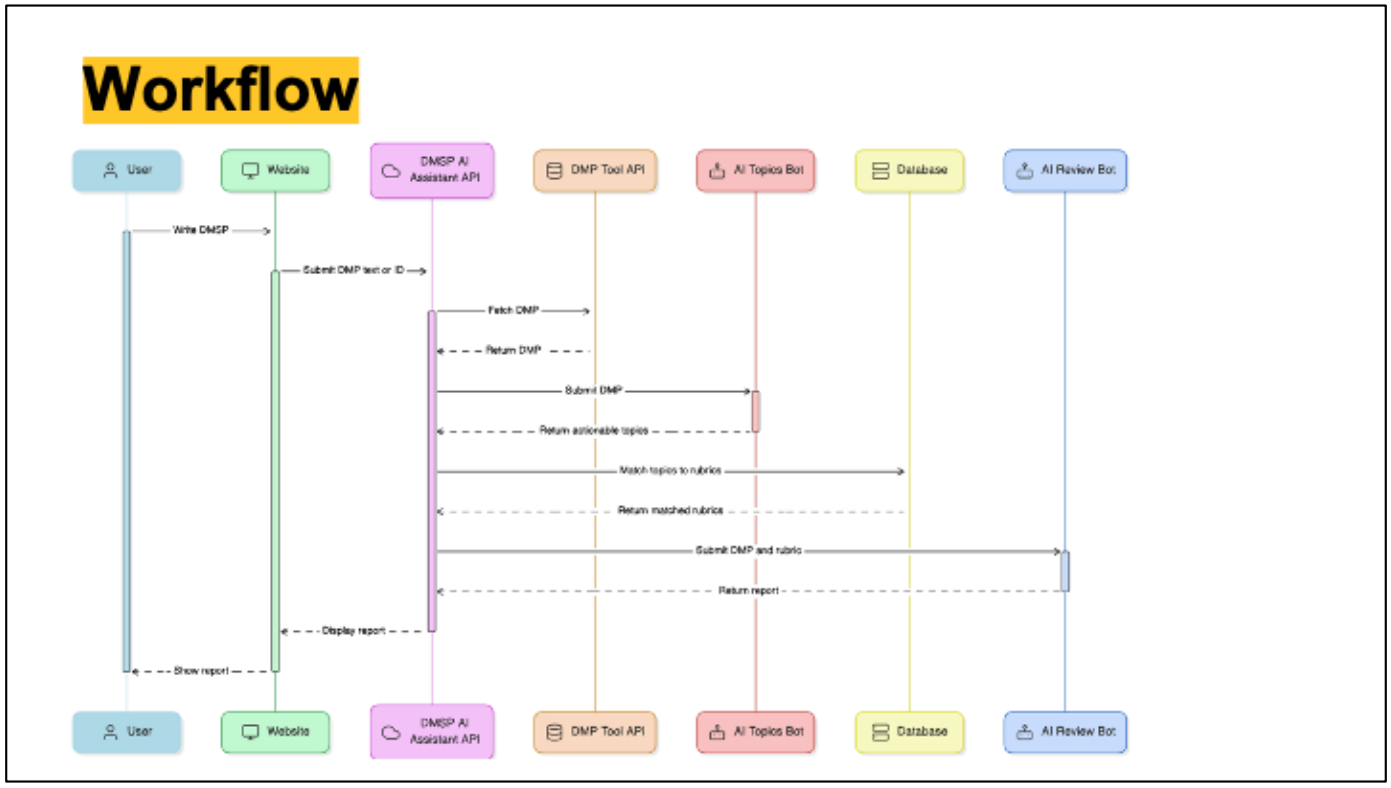


This slide represents the overall working environment at ASU. MyAI Builder is a layered model including Betaland and the CreateAI Platform, a modularized approach to development we can switch out and add on components.

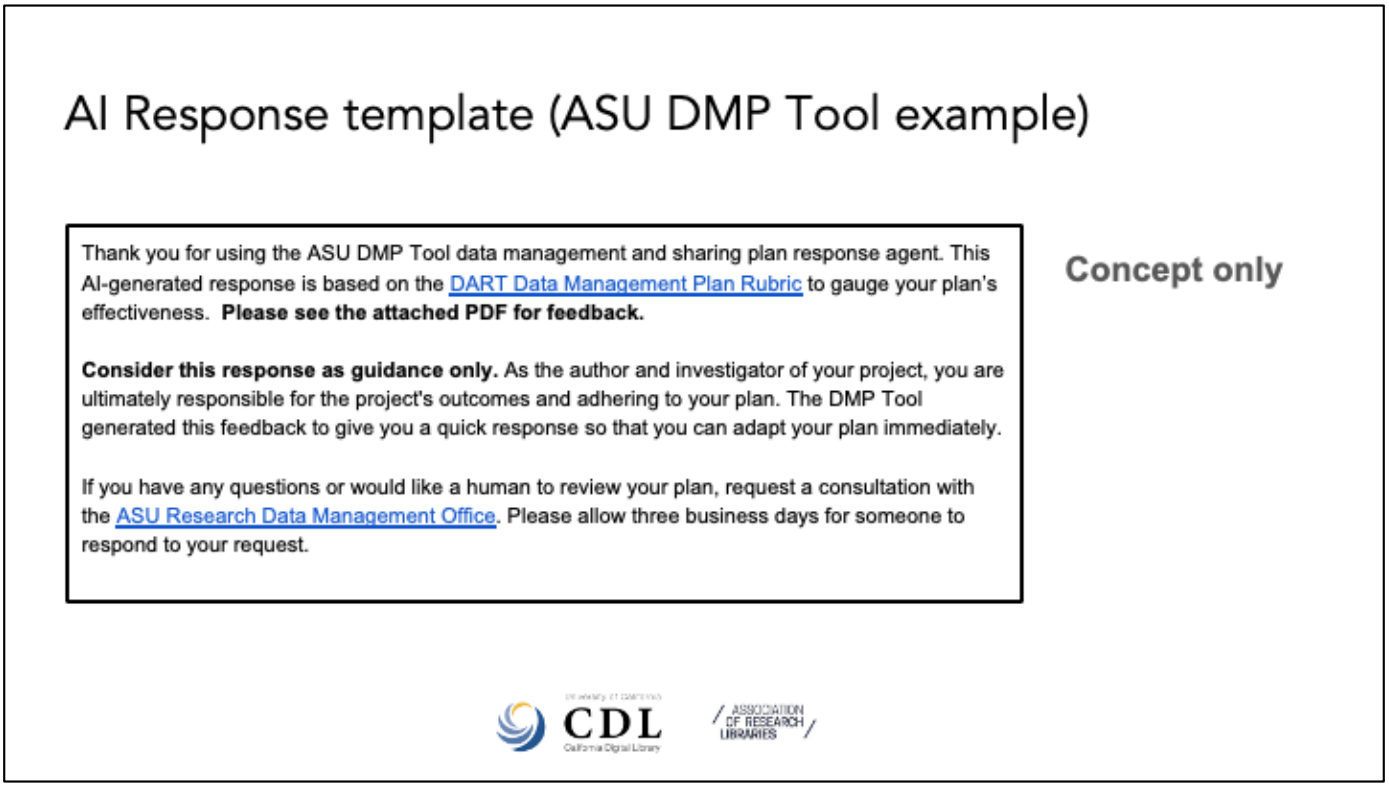
- Ai at ASU: https://ai.asu.edu
- Create AI https://ai.asu.edu/technical-foundation
- Betaland information: https://ai.asu.edu/beta-land



ASU has a basic architecture for the agent. On the right the client/user interface where the DMP is entered to the agent working against the rubrics, rules and funder templates processed by the AI DMP topics and and DMP Review bots. The final product is then sent back to the client interface. The same interactions can happen via the DMP Tool API when a user uses the DMP Tool ID.



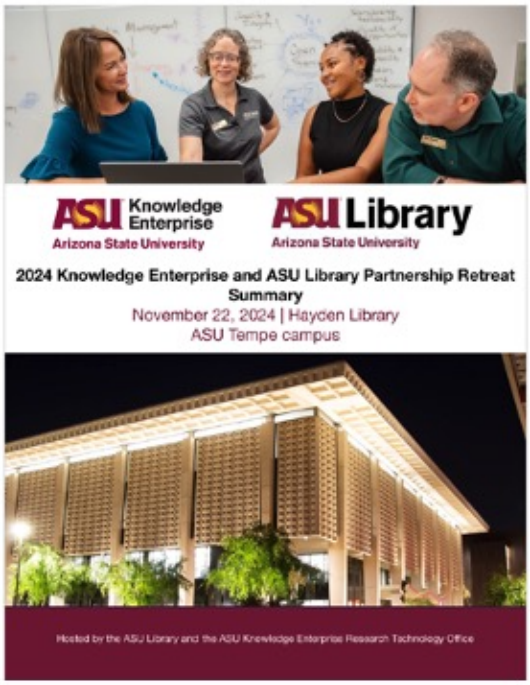
This diagram demonstrates the user entered information processing through the APIs and the reports returning back to the end user.



Throughout the process our sense of context, transparency and human interactions was key. We want to make sure that researchers know what is happening when they click the request feedback button in whatever system they are using and that there is always an opt out option. If they do choose the more immediate AI driven response they will receive a message noting that this is an auto generated AI response that may not be accurate. Every request will be sent to our team for a review and possible follow for either corrections, additional advice and also a heads-up that respective support providers may be reaching out to the researchers. This promotes accountability and lets them know we care about their projects. We will provide a human centered review if they prefer but the caveat is that it will take more time.

Outcomes and Next steps

- Strengthened Knowledge Enterprise and ASU Library partnership
- Raised awareness of the library's researcher support role
- Underscored the 'why' behind research tools
- Looking to expand pilot and user test AI DMP feedback



Cover Page: 2024 Knowledge Enterprise and ASU Library Retreat Summary

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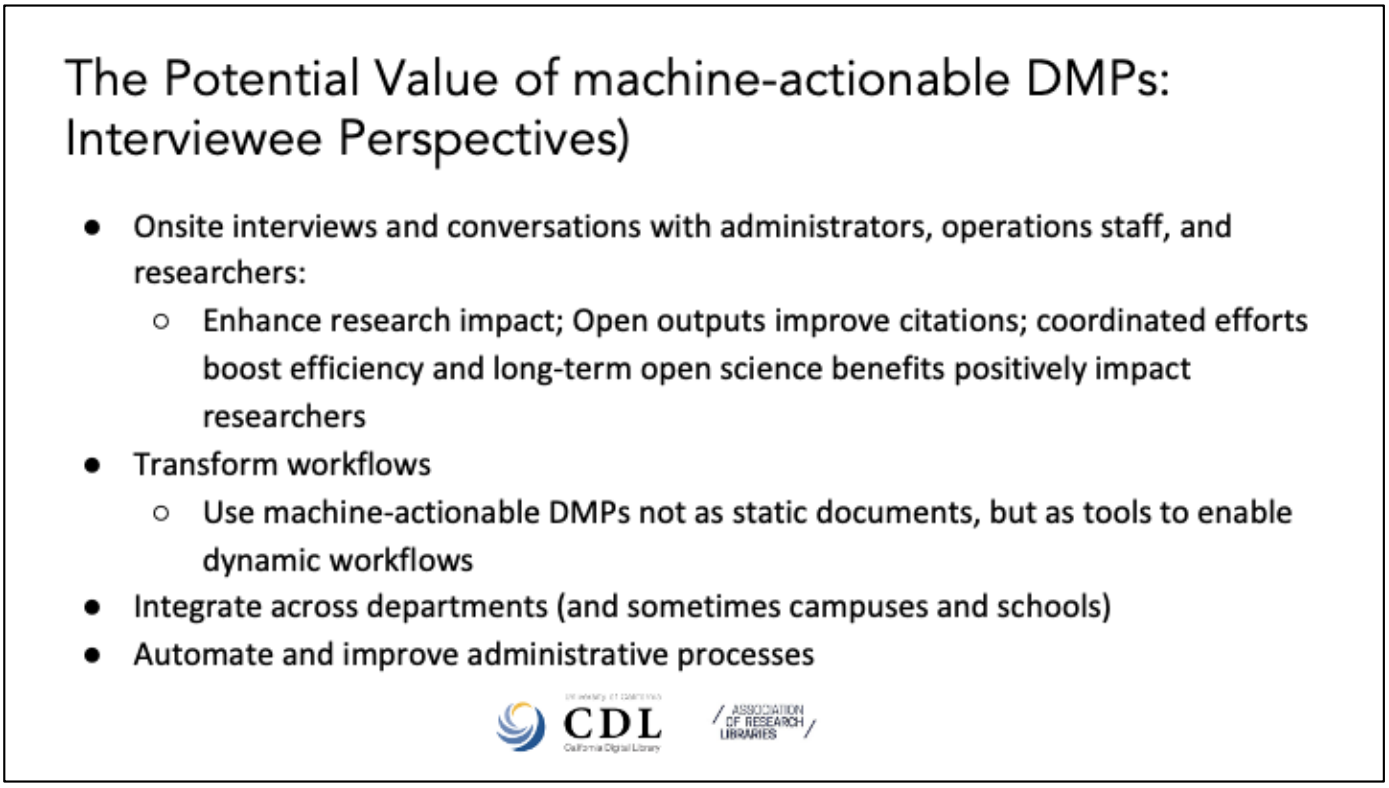
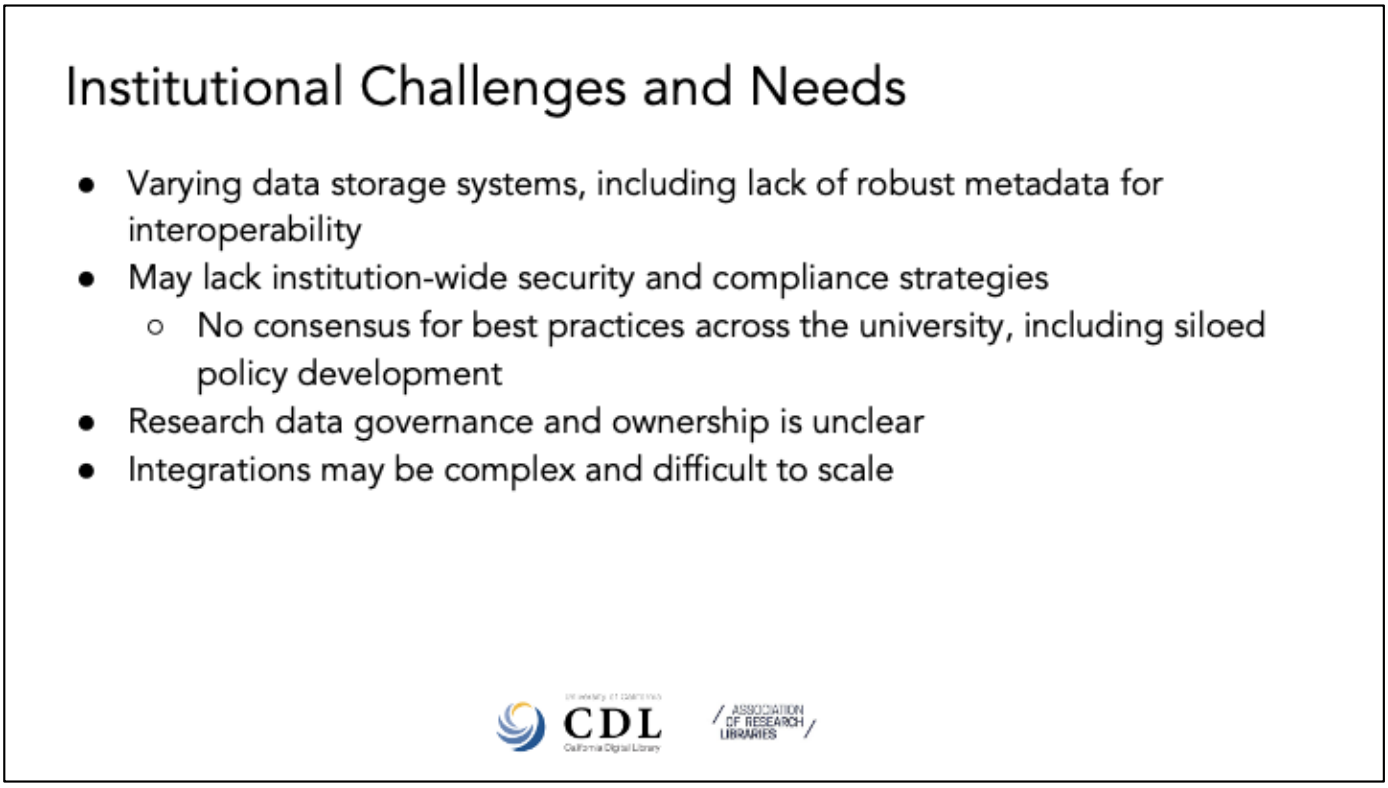
Now, I'll dive into some of the key takeaways from the MAP Pilot, focusing on the value of machine-actionable DMPs, the challenges institutions face, and strategies for effective adoption.



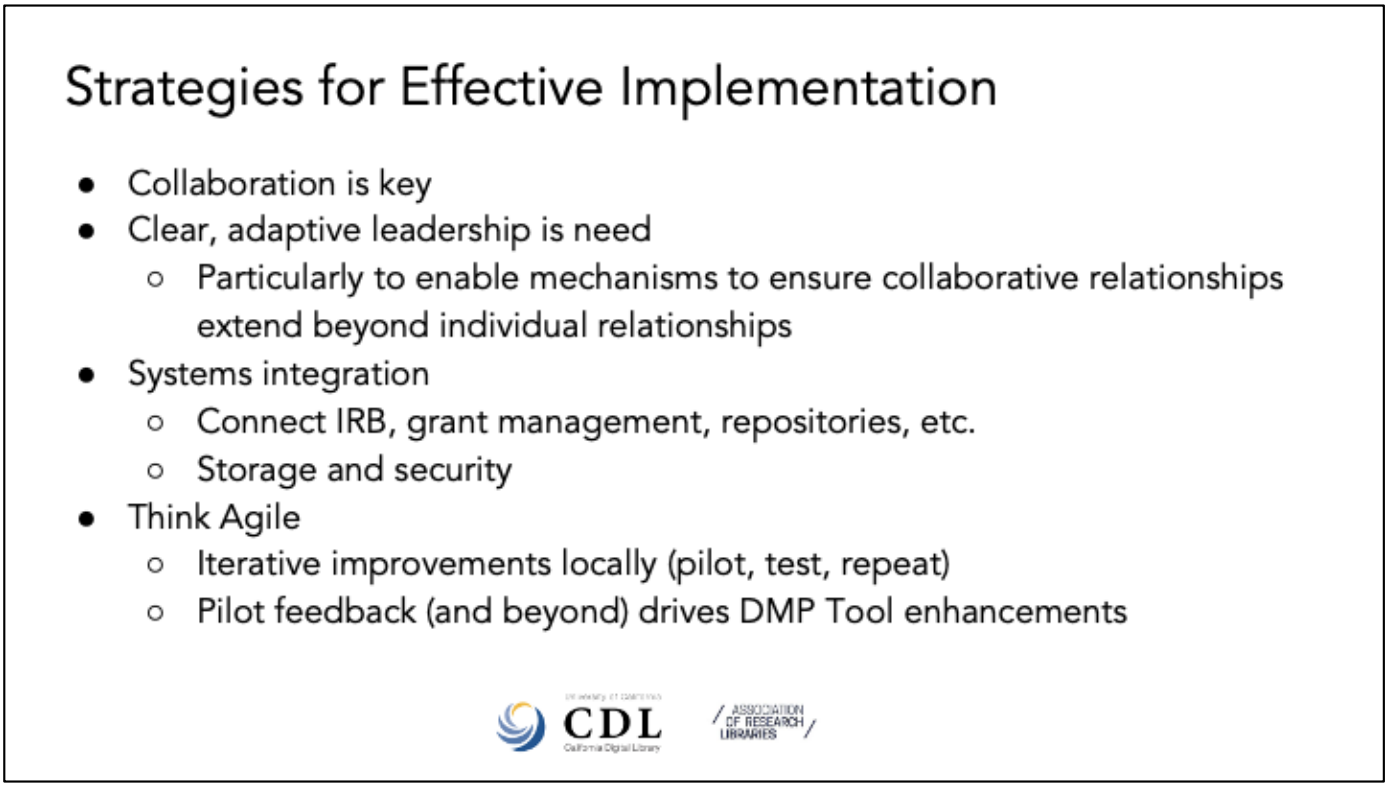
In the fall of last year, CDL and ARL teams visited each of the funded pilot sites to better understand the pilot projects, including the impact of machine actionable DMPs and challenges to their implementation. During these in-person site visits, interviews and structured conversations were arranged with administrators, researchers, and the operations teams implementing the pilot projects.

Many interviewees emphasized the ability of machine actionable DMPs to make research outputs easier to track, improving long-term access and reducing manual reporting. Others saw them as a way to improve coordination—ensuring different campus groups are working with the same information rather than duplicating efforts. Automated coordination could also simplify compliance processes by early alerts in the research workflow.



Institutions face challenges in managing research data effectively, from inconsistent metadata standards to siloed storage systems that make integration difficult. Security and compliance requirements are also changing rapidly, yet many institutions lack coordinated policies for governance and data security. At the same time, connecting machine-actionable DMPs to existing systems remains complex, requiring alignment across multiple platforms and stakeholders

Despite these challenges, we've seen institutions make progress using a few key strategies.



Implementing machine-actionable DMPs is not just about refining the DMP Tool —it requires rethinking workflows, fostering collaboration, and ensuring integration with existing systems that researchers actually use. Institutions that take a coordinated approach, linking DMPs to existing systems and fostering sustained collaboration across departments, are likely to see the most progress. Success also depends on iterative development, where piloting, testing, and refining ensure that these tools remain practical and responsive to researcher and institutional needs.

We are, of course, interested in how our pilot institutions adopt machine-actionable DMPs, but we are also using these insights to explore broader applications.

Beyond their role in research data management, DMPs are increasingly relevant for security and compliance, as persistent identifiers and structured metadata become key components of institutional security strategies. Libraries and research offices play a critical role in ensuring DMPs are not just compliance tools, but strategic assets that enhance institutional efficiency and coordination.

So, thank you!

That wraps up our presentation. If you're interested in learning more, we encourage you to check out our website. https://bit.ly/mappilot This year, we'll be hosting webinars describing each of the pilot projects in detail, sharing final reports, project summaries, and other resources from the MAP Project. With that, we're happy to take any questions.