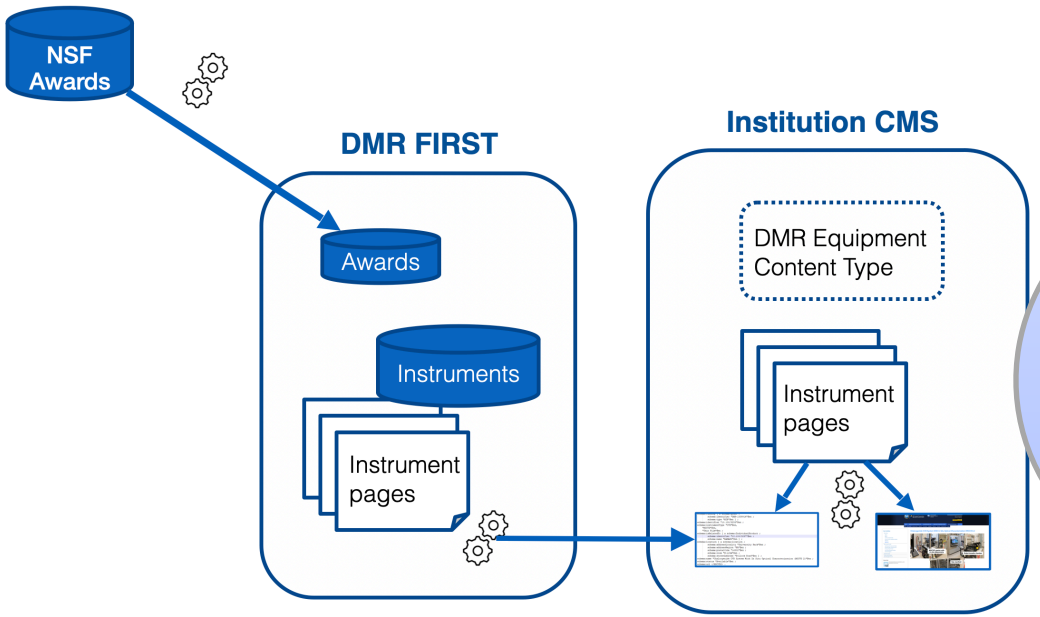
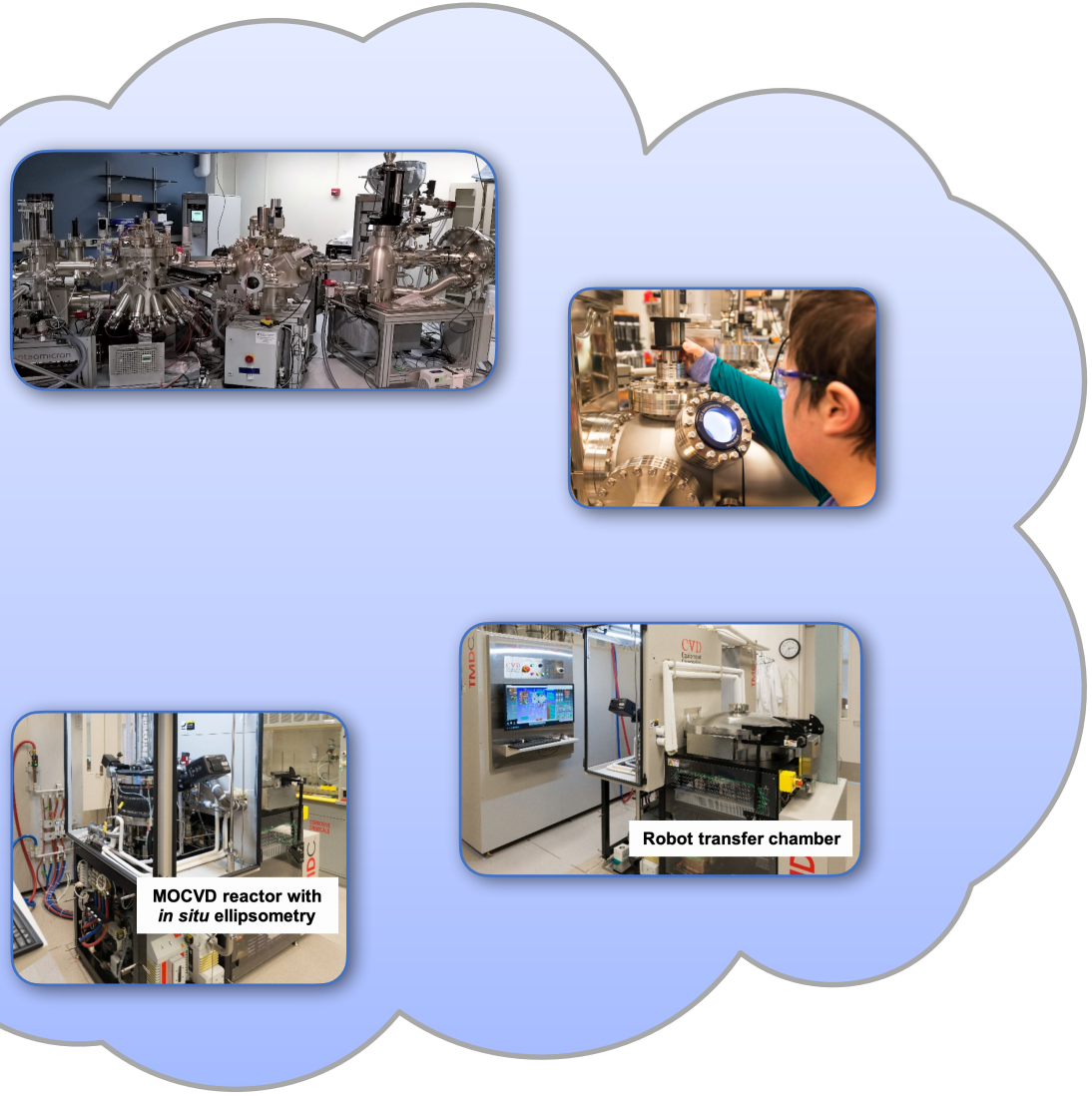
DMR-FIRST

Facilities and **I**nstrumentation **R**esearch **S**earch **T**ool





2DCC-MIP

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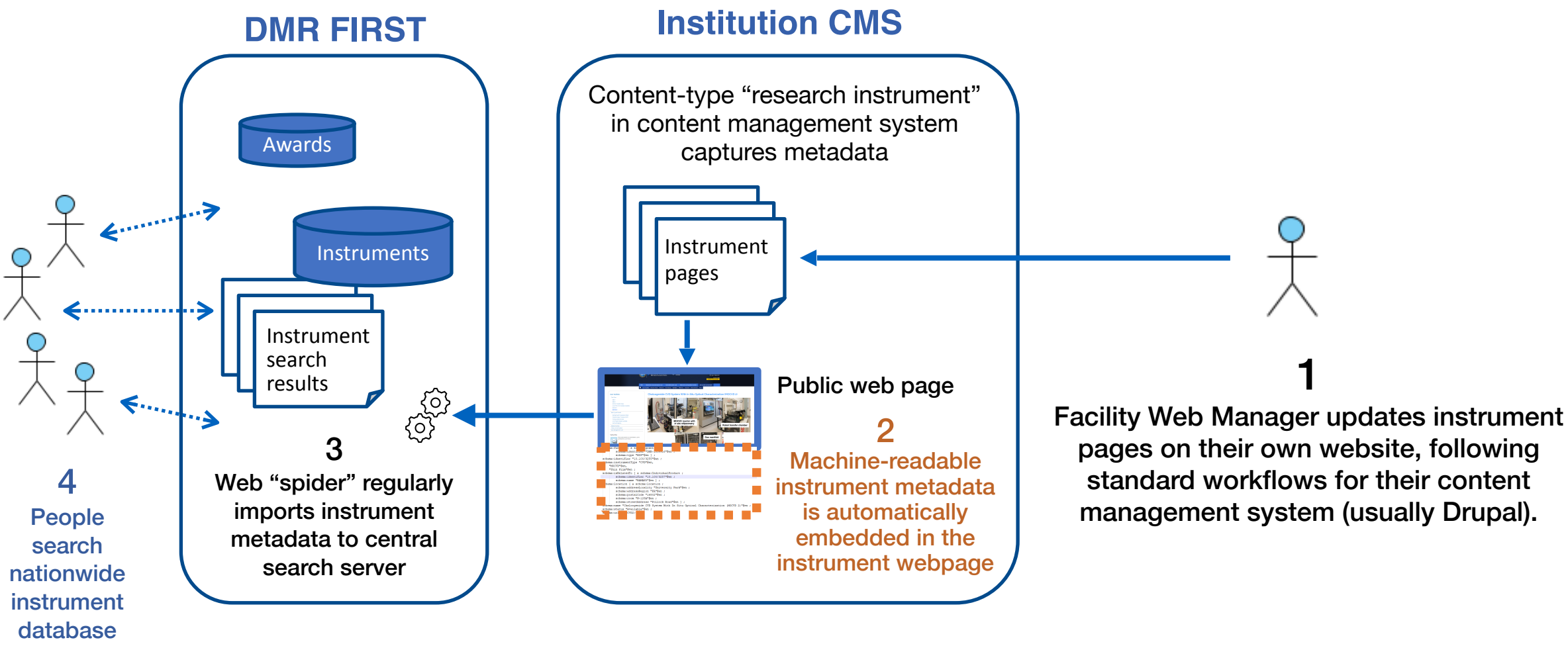
MRSEC Directors Meeting, January 19 2023

Imagine a federated database of DMR-supported instruments that *updates automatically* as facility web managers update their own websites, with a central server that enables global search of rich instrument metadata.

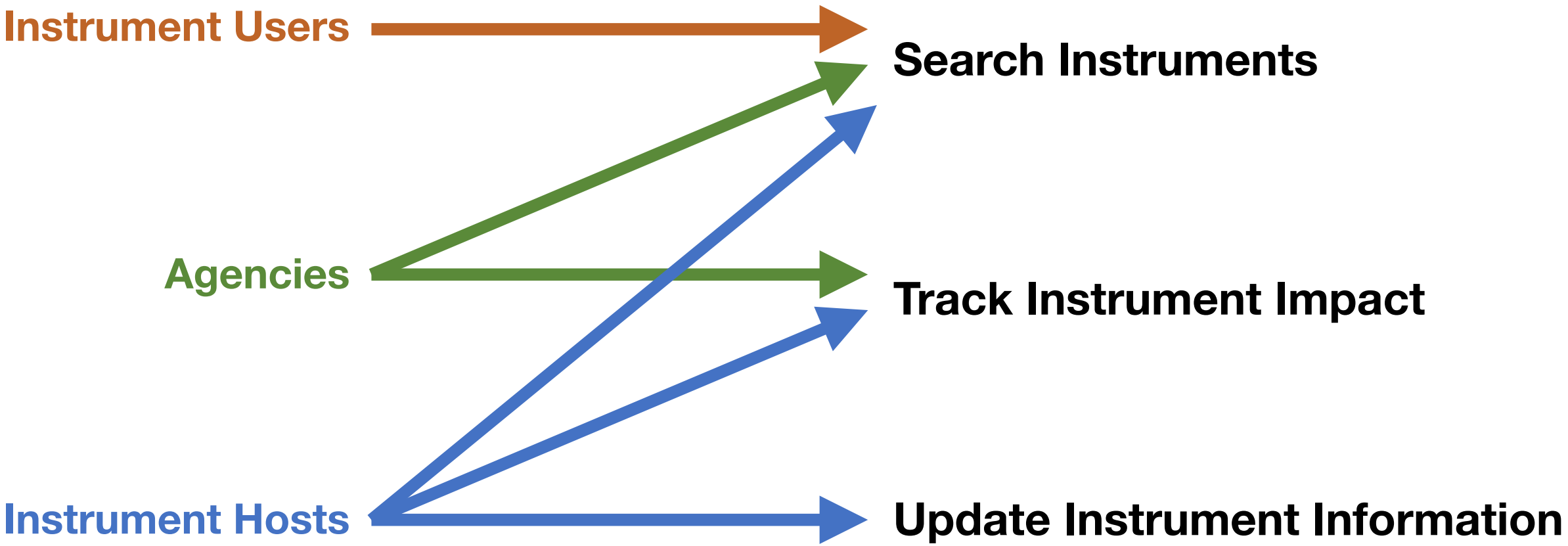


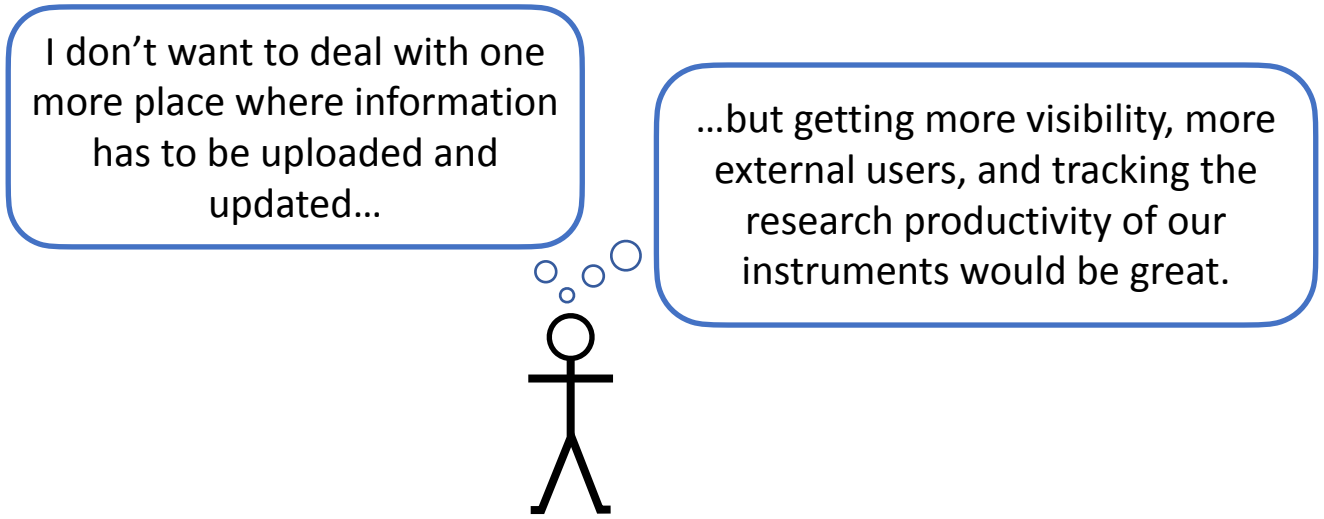
Facilities and **I**nstrumentation **R**esearch **S**earch **T**ool

DMR-FIRST – A federated database of DMR-supported instruments

- Instrument data is entered & updated by PIs and their delegates in their own facility websites following current workflows. If an instrument lacks a website, the DMR-FIRST server can provide one that can be inserted into the institutional web presence.
- The facility's content management system automatically embeds machine-readable instrument metadata into the instrument webpage, using a "research-instrument" content type provided by DMR-FIRST.
- The DMR-FIRST server spiders these pages (similar to how a search engine gathers information) to populate and update the central database.
- Instruments can be searched by location, capability, access, per-publication, etc.
- Instrument DOIs are automatically assigned and can be used in publications, etc. to document instrument use and impact.

Use cases

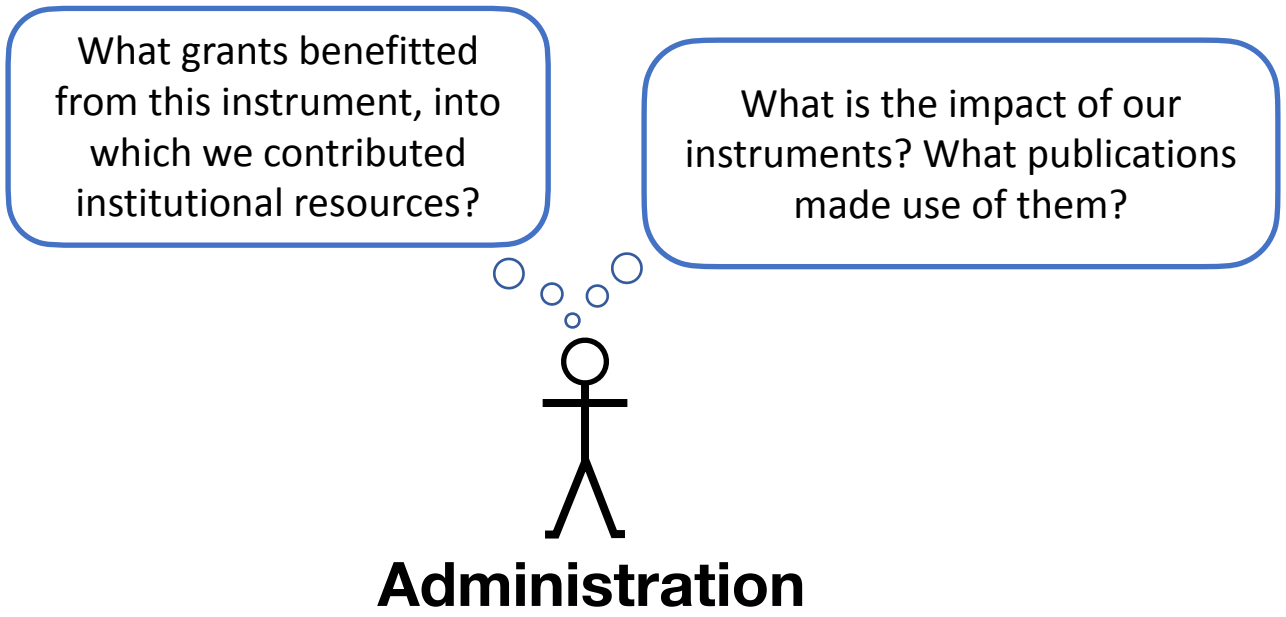

Instrument Users
Agencies
Instrument Hosts
Search Instruments
Track Instrument Impact
Update Instrument Information



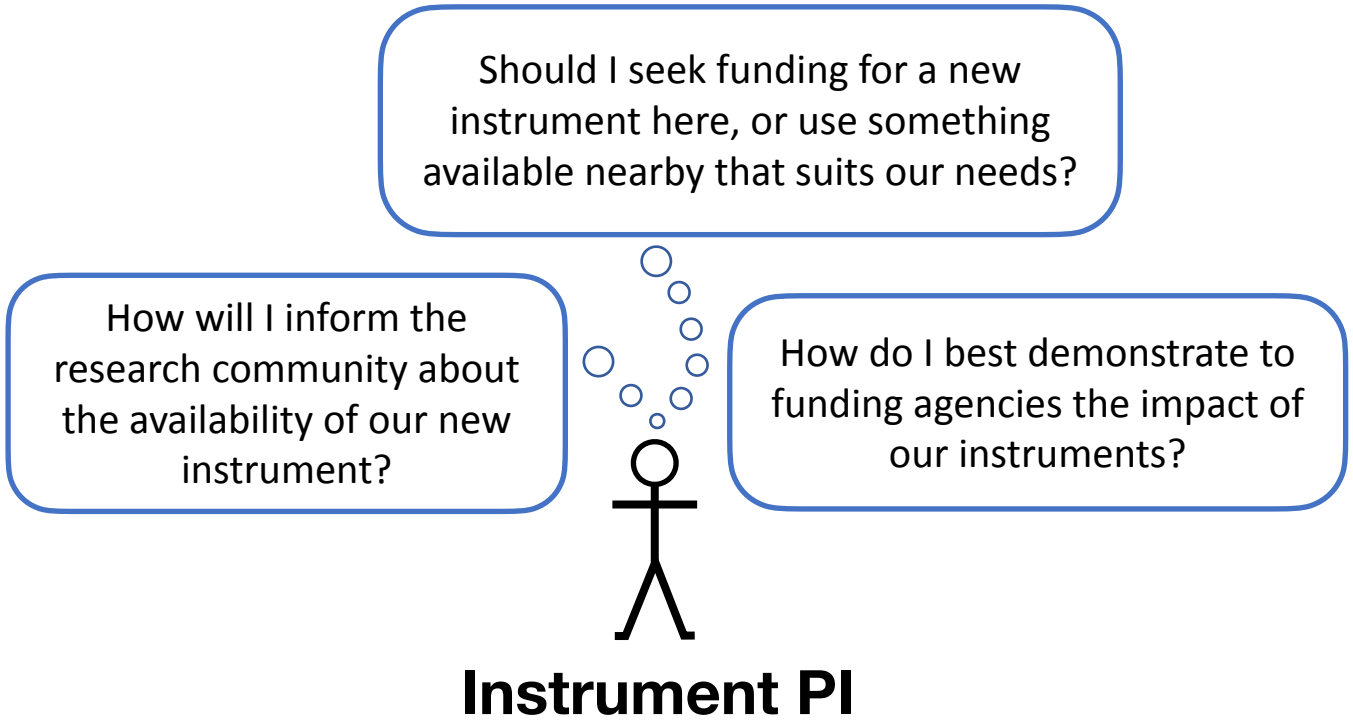
Facility Manager, MRSEC Director

Manage instrument data entirely within the existing institutional content management system (CMS) using current workflows, by means of a DMR-FIRST CMS plugin that can be styled by web managers.

Data on instrument impact via instrument DOIs in publications can help make the case to administration for institutional resources, and to NSF for instrument impact.



DMR-FIRST instrument DOIs can track publication impact and provide this information on instrument web pages, while co-occurring instrument DOIs and grant acknowledgments can reveal which grants benefit from which instruments.



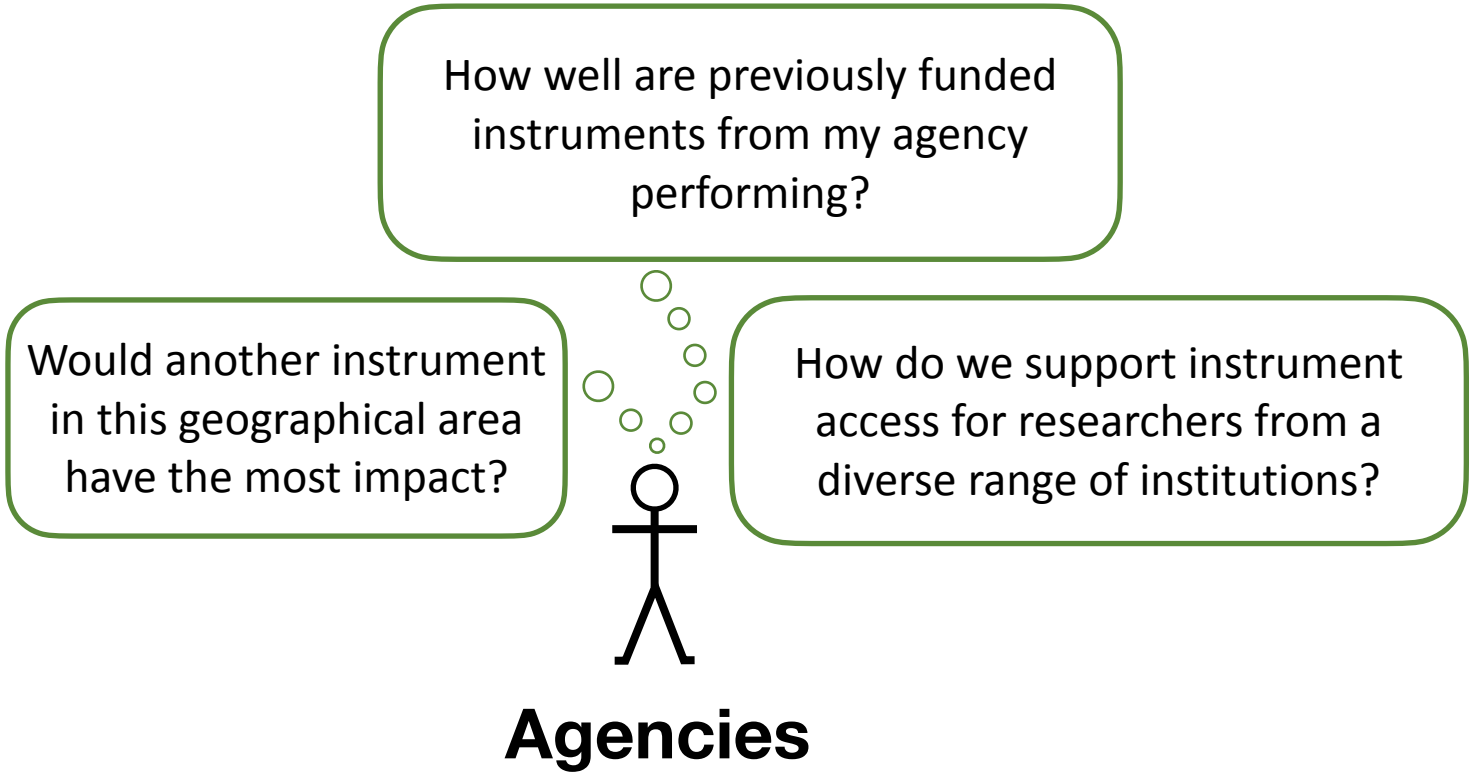
Pre-award, instrument discovery helps to decide whether to seek new instrument funding and helps make the case that one can secure a broad base of instrument users.

Post-award, DMR-FIRST can provide a webpage (in the institutional context) that can act as the instrument's public face without additional burden on local web managers.

DMR FIRST helps find instruments nearby (or with remote access), including contact information for instrument experts.

Standardized, up-to-date information facilitates instrument comparisons, while publications linked to instruments provide examples of instrument capabilities to confirm their alignment to researcher needs.

Data scientists can make use of instrument DOIs for e.g. instrument usage analytics.



DMR FIRST can increase awareness and access to instruments, and enable analytics of instrument search, distribution, use and impact to inform resource decisions.

Relation of DMR-FIRST to MGI, FAIRE data:

Findable: Instruments are searchable through the DMR-FIRST database and instrument-associated data is findable through the instrument DOI.

Accessible: System is open, can also provide API access to the central database.

Interoperable: Instrument metadata is embedded into public webpages using open standards. Anyone can read it, given the list of DMR-FIRST sites (also public).

Reusable: Rich metadata is provided, with connections to other federated databases (ORCID, Instrument DOIs, etc.)

Easy: Maintenance of the distributed instrument database happens automatically as folks follow their normal daily workflows.

New types of data analysis may be made possible by connections between instrument DOIs and publications, awards, instrument data, etc. We can ask new questions about how instrumentation fits into the world of data.

DMR-FIRST Instrument Tool

SEARCH TOOL

Use my Current Location

Find instruments near

Maximum Distance

US

Instrument Category

Instrument Type

Keywords (capabilities, manufacturer, m...

Award Number

Include retired instruments

SEARCH

RESET

COLUMNS FILTERS DENSITY EXPORT

Search...

Institution	Facility	Instrument Type	DOI	Manufacturer	Model	Instrument

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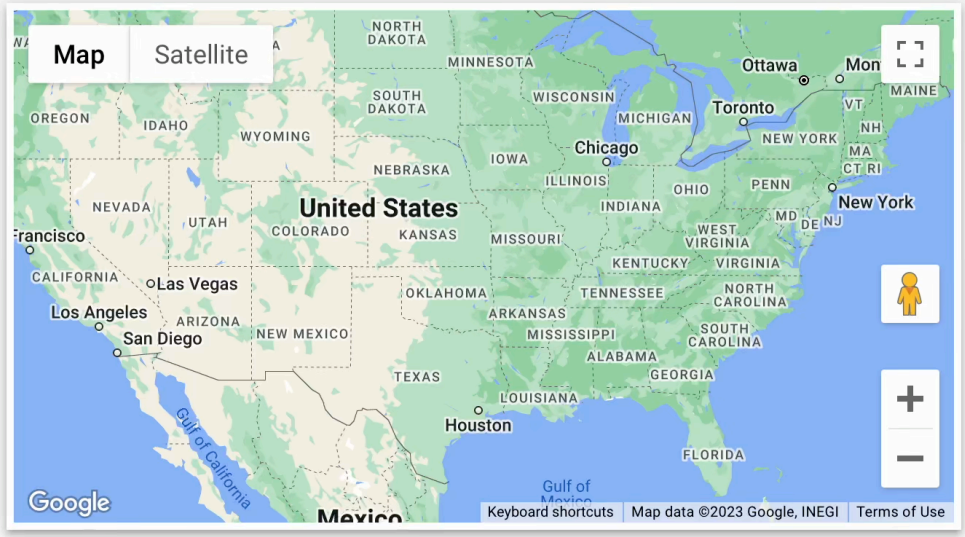
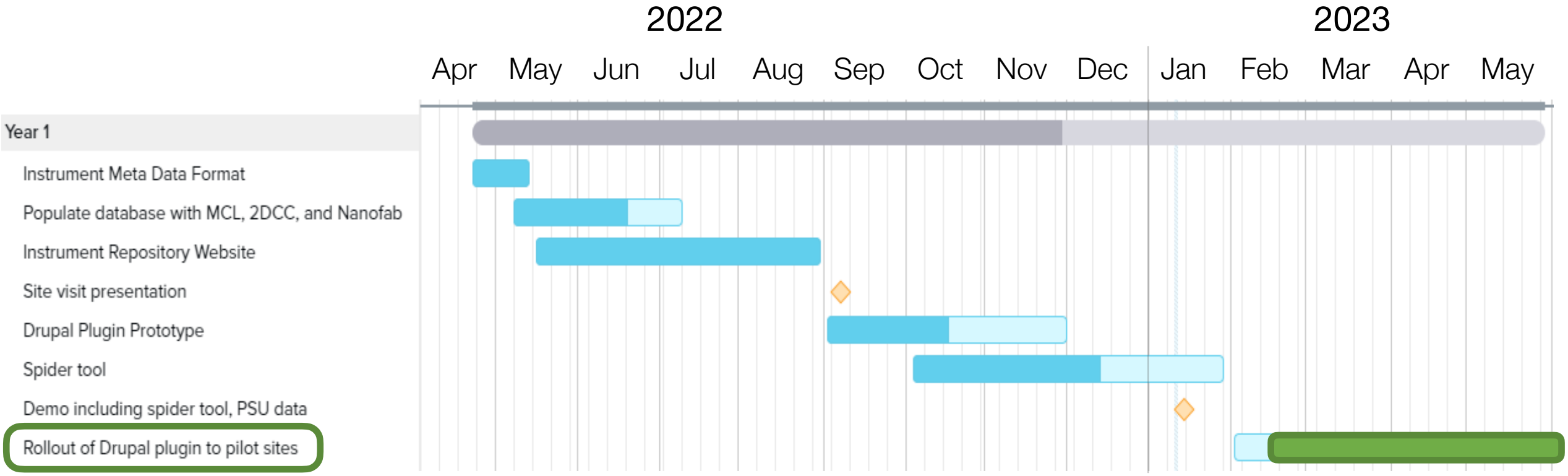


Status

1. Instrument search and database initially populated with ~150 Penn State instruments.
2. “Research instrument” plugin installed in a clone of the PSU Materials Research Institute website.
3. Spider can read data from instrument webpages and populate instrument database.



+ outreach to user community

Relation to MRFN.org

MRFN was implemented by Irina (pre-KZN) and has been running, without technical or design updates, since that time. Instrument updates are somewhat erratic.

There exists a Drupal “feed” that can import XML data on instruments from MRSEC facility sites, but only Santa Barbara has implemented this. Other sites update via login to MRFN.org and editing within the generic Drupal admin interface (with coarse access controls).

The DMR-FIRST “research instrument” content type is designed to perform the job of the feed in a simpler, more easily adoptable, and more interoperable way.

DMR-FIRST could track instruments that are MRSEC-related and…

- **Produce a more modern MFRN.org site as a MRSEC-specific “view” into the instrument database, layered with additional MRSEC-related editorial content.**
- **Highlight MRSEC instruments within global searches in the main search tool.**
- **Provide an instrument ontology and DOIs that can be used to tag MRSEC Highlights and News that make use of MRSEC instruments.**
- **More?**