International Materials Resource Registries
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As the wealth of digital data grows, it becomes increasingly difficult for researchers to learn what data exists.

- National initiatives for materials science (e.g. Materials Genome Initiative) are driving that growth
- Researchers want to search for data using concepts of their domain: e.g. looking for simulations of semiconductors
- Start with what high-level resources—repositories, databases, portals, software—exist.
- A registry-based discovery system is a practical, extensible start

Looking for solution can be owned, shared by a community
- Connect users to data providers’ sites and tools
- Enable data providers, experts to control curation of metadata
- Robust against failure (including funding failure)

This discovery problem applies to all domains
- Can we use materials science to pilot a solution that can be adapted to other domains?
A blueprint for a creating registry federation for data discovery
- No central or primary registry
- Each of the distributed registries collects resource descriptions for a sub-community
- Registries trade resource descriptions via OAI Protocol for Metadata Harvesting

Enumeration of required standards

A materials science resource metadata XML schema
- Generic + domain-specific extension

Materials Vocabulary
- Basis for materials science-specific metadata
- SKOS definition

Open-source registry software featuring APIs and plugin schemas

Working pilot: 2-node registry federation
- Over 300 data resources described
Two nodes

- NIST: https://materials.registry.nist.gov
- Materials Data Facility: http://registry.materialsdatafacility.org/

Software available at https://github.com/usnistgov/MaterialsResourceRegistry
Impact of the Recommendation

- Scalable, sustainable network of registries for discovering materials science data
- A recipe and toolset for establishing registries supporting other communities
  - Adaptable to other metadata formats, exchange protocols
- A foundation for developing a variety of deep search capabilities
  - Leveraging archive-level search services
  - Integration of search services into third-party tools
Endorsements/ Adopters

- Sufficient take up in materials science to continue further development
  - Continue to encourage community to register resources
  - Fostering partnerships to establish additional registry nodes
  - Prototyping advanced searching capability

- Have adapted model and software to set up registries for other communities
  - Greenhouse Gas research community