Introductory Remarks & Discussion: Federated Systems

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NIST Diffusion & CHiMaD CALPHAD Workshops
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Industry user just wants to know the diffusion coefficient at a given temperature for a given material.

\[ D = 2.16 \times 10^{-15} \text{ m}^2/\text{s} \]

\[ D = D_0 \exp \left( -\frac{Q}{RT} \right) \]

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Advanced expert wants to understand the diffusion mechanism.

Diffusion Coefficients
Diffusion Couple
Composition Profiles

Composition Profiles
Raw Data (i.e. Intensity vs Distance)

End Users: Different Types of Diffusion Data Needs

Federated data → Leveraging resources → Acceleration & Innovation
Federated Data System:
What is it & Why consider implementing?

**What:** Data Federation Architecture

Unified access to information about disparate, geographically distributed data sources

**Why:**
- Retain proprietary control & competitive edge
- Cultivate a culture of data sharing
- Leverage investment
- Encourage collaboration & partnership → innovation
Federated Data Repositories: Key Elements

• Focus on end user data needs
• Use with range of types of content
• Adopt common framework
  o storage repository platform
  o exchangable metadata and data formats
  o query and discovery service overlay
  o federation/search mediator
Storage Repository Platform

NIST DSpace repository platform

- easy to install and use
- generic, agnostic, & standards-based
- Adaptable for future needs

Capabilities

- link to files
- support simple & customizable metadata
- browse & search
- customize with own tools
- compatible with other repository systems
- export metadata (and data, if desired)
- assign persistent identifiers for data
- attach license for data use
Repository Platform: Sample Entry

Digital Identifier: http://hdl.handle.net/11315/51

Related Work:
- Dupin, N.; Andara, I.; Sundman, B. "Thermodynamic Re-Assessment of the Ternary System Al-Cr-Ni" (2013-02-03)

Similar Work:

Data files:
- Files in this Item
  - expSt2.zip
  - expSt1.zip

Offer licenses with attribution 3.0
Federated data repository system

✧ Low-maintenance storage & access for data
✧ Standards-based to ensure interoperability
✧ Compatibility with commercial & opensource DBs
✧ Easy metadata export to Federation Mediator
✧ Public/private efforts while protecting privacy
Federated systems

• Challenges of Coordination
  o Multiple sub-communities
  o Communication of strategy, process, & resources
  o Short time frames, rapidly moving research & accelerated industrial enterprises

• Potentials for Opportunities
  o Foundation for building on rich, diverse community
  o Connector to increasingly powerful set of tools
  o Teams of scientific partnerships for innovation
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*Content held behind OA repository may be free, for-a-fee or closed.
Federated Repository Architecture

Federation Search/Browse/Link Mediator

- Institutional OA Repository
- Professional Society OA Repository
- Corporate OA Repository
- Gov't Lab OA Repository

Data

- University Content* Tools Facilities
- Society Content* Tools Facilities
- Commercial Content* Tools Facilities
- Gov’t Lab Content* Tools Facilities

Exchange

Informatics

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Federated Repository Architecture

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Discussion:

Could federated systems help or hinder your work? How?

Common metadata & data practices? Who could do what? Should/Where to begin?

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