Data Conservancy: A Web Science View of Data Curation

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Data Curation

The Data Conservancy embraces a shared vision: data curation is a means to collect, organize, validate and preserve data so that scientists can find new ways to address the grand research challenges that face society.
Goal

The overarching goal of DC is to support new forms of inquiry and learning to meet these challenges through the creation, implementation, and sustained management of an integrated and comprehensive data curation strategy.
Partner institutions

• Johns Hopkins University (Lead institution)
• Cornell University
• DuraSpace
• Marine Biological Laboratory
• National Center for Atmospheric Research
• National Snow and Ice Data Center
• Portico
• Tessella, Inc.
• University of California Los Angeles
• University of Illinois at Urbana-Champaign
...not a rigid road map but principles of navigation. There is no one way to design cyberinfrastructure, but there are tools we can teach the designers to help them appreciate the true size of the solution space – which is often much larger than they may think, if they are tied into technical fixes for all problems.
Principles

Our strategy focuses on connection of systems into infrastructure through a program informed by user-centered design and research, sustained through a portfolio of funding streams, and managed through a shared, coordinated governance structure.

Build on existing exemplar scientific projects, communities and virtual organizations that have deep engagement with citizen scientists and extensive experience with large-scale, distributed system development.
Objectives

• Infrastructure research and development
  – Technical requirements
• Information science and computer science research
  – Scientific or user requirements
• Broader impacts
  – Educational requirements
• Sustainability
  – Business requirements
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Data Flow (Levels of Data)

- Pixel data collected by telescope
- Sent to Fermilab for processing
- Beowulf Cluster produces catalog
- Loaded in a SQL database
Domain coverage/methods

- Multi-site user research methods are a blend of:
  - Case study & domain comparisons
  - Depth & breadth
  - Local & global

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<thead>
<tr>
<th></th>
<th>Astronomy</th>
<th>Earth Sciences</th>
<th>Life Sciences</th>
<th>Social Sciences</th>
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</thead>
<tbody>
<tr>
<td><strong>UCAR</strong></td>
<td>Task-based design and usability testing ⇒ Use cases, data requirements, system recommendations</td>
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<td>UCAR</td>
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<td><strong>UCLA</strong></td>
<td>Ethnography, virtual ethnography, oral histories ⇒ Use cases, data requirements</td>
<td>Interviews, Surveys, Worksheets, Content analysis ⇒ Curation requirements, taxonomy, metadata/provenance framework</td>
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<td>UIUC</td>
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Information science research

Technical Architecture

Data Framework

UCAR
Task-Centered Design

UCAR coordinates 6 mos. iteration

UIUC
Comparative Analyses

UIUC coordinates 6 mos. iteration

shared data collection instruments and results

UCLA
Deep Case Study

Education and Outreach
Data Framework

• Start with a common conceptualization that applies across scientific domains
• Exploit semantic technologies
• Leverage existing work
• Prototype the framework in target communities
  – Iteratively refine, learn from experience
  – Demonstrate success, measured in terms of new science
Common Conceptualization

Observations are the foundation of all scientific studies, and are the closest approximation to facts.

Emergence

• Emergence: The Connected Lives of Ants, Brains, Cities, and Software by Steven Johnson

• The movement from low-level rules to higher-level sophistication is what we call emergence.
Data Model using OAI-ORE
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