A proposed study: Information seeking behavior of geologists when searching for physical sample materials

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Geoscience repositories

Geoscience repositories are examples of object-based scientific collections 'or "science collections"' which are a valuable part of research infrastructure (NSTC, 2009). According to the National Resource Council (2002), "***Geoscience data and collections*** (e.g., ***cores, cuttings, fossils,*** geophysical tapes, paper logs, rocks) are the foundation of basic and applied geoscience research and education, and underpin industry programs to discover and develop domestic natural resources to fulfill the nation's energy and mineral requirements" (p.1). These data and collections continue to remain useful beyond their initial purpose and would be costly and/or impossible to replace (NRC, 2002).

Among their many functions, science collections "document the results of research", "allow earlier findings to be confirmed and extended", may be "re-analyzed" to provide "new data and insights from old specimen", provide a longitudinal or trend based view, and finally may have many unanticipated uses – particularly in fields other than in which they were collected (NSTC, 2009, p. 11).

Methods

This study will focus on users of cuttings and core repositories such as federal core repositories, state geological surveys, private collections including corporate collections from the oil and gas industry, and small academic collections. Focusing on one location, this research will employ a case study approach in order to create a model of behavior that may be tested at other repositories.

Qualitative methods will be used for data collection, including in-depth interviews and observations with collection users as well as content analysis of documentation relating to collection management.

Expected outcomes

The results of this research will impact processes for data access, workflows for data preservation, and the development of cyberinfrastructure systems connecting users with physical object information sources.

Example of a science data repository: The repository at the Florida Geological Survey. Houses over 19,000 sets of core and cutting samples.

Examples of geoscience knowledge

Explicit (*Conventional/Digital*) - textbooks, indexes; procedure manuals; papers, reports, map explanations; maps, sections, diagrams; field notes, data files, ephemera; recorded field or lab observations/data; digital 3D and process models; computer code; frameworks, ontologies, metadata; embedded in digital field support; hypertext sequences, workflows; GIS, spatial models; databases

Implicit - unrecorded field observations; trains of thought supporting models or interpretations, e.g. what data has been considered or ignored, and why; certainty/uncertainty re. observations/models

Tacit - experience in analysis, e.g. seismic/petro-physical interpretation; spatial judgment, e.g. geology of underground or open pit mine design

(Loudon & Laxton, 2007 and Howard, Hatton, Reitsma, & Lawrie, 2009)

Workstation: Desk of a geologists conducting research on a set of core samples. Center: forms for capturing lithological descriptions.

RQ 1: Ellis's Models of Information seeking behavior

Potential new category?

Subject Group	Categories							
Social Scientists	Starting	Chaining	Browsing	Extracting	Monitoring	Differentiating		Ending
Chemists	Starting	Chaining	Browsing	Extracting	Monitoring	Differentiating	Verifying **	Ending
Physicists	Initial Familiarisation	Chasing			Maintaining Awareness	Source Prioritisation	Locating **	
Engineers and Research Scientists	Surveying	Chaining	Browsing	Extracting	Monitoring	Distinguishing /Filtering*		Ending

**These are two separate categories but both map to differentiating and source prioritization. **These categories do not map to any other categories.*
Table compiled from definitions in– Ellis, 1993; Ellis, Cox & Hall, 1993 and Ellis & Haugan, 1997

Ellis's current model has not yet been tested for conducting searches for data. It is currently limited to publication and print materials. If we consider physical objects to be information sources, how would information seeking models change?

- Does Ellis's model fit the search behaviors of geoscientists when searching for data, e.g. physical objects?
- What behaviors do scientists exhibit when they are unable to access data such as physical materials?
- When access to data is restricted, is the alternative to conduct field work to collect new data?

RQ1 What information seeking strategies do geologists employ in searching for physical sample materials?

RQ2 What barriers do users encounter while searching for physical sample materials, and how are they different from the internal vs. external user perspective?

RQ3 Based on role, what skills or training are needed to successfully interact with hybrid collections which include physical and digital materials?

RQ 2: Internal vs. external users

Users who work within an organization which is collecting or archiving physical materials (internal users of collections) may have a different perspective and different levels of access to data sets then users who are not members of the organization (external users). This includes knowing more about how the data was actually collected, information related to metadata capture, and other factors.

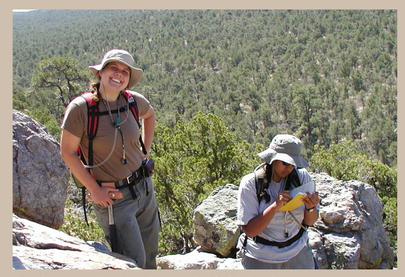
- What barriers do users encounter when searching for physical sample materials?
- Do external users encounter different search barriers or search experiences than the internal user?
- Does limitations of organizational knowledge impact access to data by external users?
- How can we mediate these differences in the future?

RQ 3: Skills and training needs

Skills or training needs operate on two levels: 1) training individuals for the stewardship of hybrid collections (e.g. data creators developing documentation and metadata for their materials or data managers overseeing the data throughout its lifecycle); and 2) training individuals (e.g. researchers) to successfully search within these collections.

For each of these groups:

- What skills are needed to search within a physical collection as opposed to a print collection?
- Do those skills differ among various communities of practice?



Geologists collecting data in the field. Author is seen on the right recording observations in a field notebook.

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"[A] fossil shell, petrifaction, or mineral is useless to the geologist, unless it be accompanied with a proper description of the stratum, and of the exact place from whence it was obtained: hence it is necessary that a descriptive catalogue should always accompany a collection of geological specimens. (Philosophical Magazine, 1817, p. 269)