

A situated representation of GIS resources and GIS users

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In GIS and most other computational systems, datasets, methods and other electronic resources are treated as objective entities. However, they were created for, and are applied to, specific situations. These situations are generally not captured or represented in any way, except perhaps in the minds of the people involved. And when data producers and data consumers do not share such situational knowledge, the chances of misunderstanding and misapplication increase. Such a situation is very common among agencies and organizations whose primary role is in the creation of information products, such as NGA.

Some aspects of the situations surrounding creation and use of resources can be harvested, remembered, mined, visualized and applied to help increase subjective understanding, and to compliment the more objective, top-down knowledge that might be provided by computational ontologies. The result is an intricate web of relationships linking people, methods, data, places, times, concepts, tasks and more that builds up over time as resources are created, modified and used by communities of researchers. Such provenance information can be accumulated over time via a coordinated GRID infrastructure that can log specific use-cases to a central node and a harvesting system that uses association rule mining to isolate trends and significant relationships. Resources are thus contextualized in a manner that reflects, to a limited extent, similarities and differences in the way they are understood by their users, *through* the way they are used. Users can choose to commit to various levels of logging, and can also choose with whom they wish to share both the resources they produce and information concerning the resources they employ.

The resulting webs can also contain more formal knowledge, such as concept maps and ontologies, and in fact these resources receive exactly the same treatment as datasets and

methods in that they can be tracked and contextualized through their use by a community of scientists or analysts. Procedural or task knowledge can also be added, so that user workflows and logged actions can be included, in which case the entire history of how a product or method was created and how it has since been used can be explored and utilized for a variety of ends: Who made this? How? Who has used it? How? Who has modified it?, etc.. The (spatial) webs are thus an amalgam of resources, formal descriptions, informal situations (use cases), procedural knowledge, social networks of people and a geographical context involving space, time and scale.

Some of these ideas are demonstrated via a Web Portal (Codex) that forms a gateway to e-resources for groups of researchers working together. Specific examples are drawn from the user-communities within the Geosciences Network (GEON: www.geongrid.org) and the Human-Environment Regional Observatories (HERO: <http://hero.geog.psu.edu>). Examples are used to show how the knowledge derived from situations can be utilized to help contextualize unfamiliar resources.