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US National Geothermal Data System: Web feature services and system operations

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The US National Geothermal Data System is being developed with support from the US Department of Energy to reduce risk in geothermal energy development by providing online access to the body of geothermal data available in the US. The system is being implemented using Open Geospatial Consortium web services for catalog search (CSW), map browsing (WMS), and data access (WFS). The catalog now includes 2427 registered resources, mostly individual documents accessible via URL. 173 WMS and WFS services are registered, hosted by 4 NGDS system nodes, as well as 6 other state geological surveys.

Simple feature schema for interchange formats have been developed by an informal community process in which draft content models are developed based on the information actually available in most data provider's internal datasets. A template pattern is used for the content models so that commonly used content items have the same name and data type across models. Models are documented in Excel workbooks and posted for community review with a deadline for comment; at the end of the comment period a technical working group reviews and discusses comments and votes on adoption. When adopted, an XML schema is implemented for the content model. Our approach has been to keep the focus of each interchange schema narrow, such that simple-feature (flat file) XML schema are sufficient to implement the content model. Keeping individual interchange formats simple, and allowing flexibility to introduce new content models as needed have both assisted in adoption of the service architecture.

One problem that remains to be solved is that off-the-shelf server packages (GeoServer, ArcGIS server) do not permit configuration of a normative schema location to be bound with XML namespaces in instance documents. Such configuration is possible with GeoServer using a more complex deployment process. XML interchange format schema versions are indicated by the namespace URI; because of the schema location problems, namespace URIs are redirected to the normative schema location.

An additional issue that needs consideration is the expected lifetime of a service instance. A service contract should be accessible online and discoverable as part of the metadata for each service instance; this contract should specify the policy for service termination process–e.g. how notification will be made, if there is an expected end-of-life date. Application developers must be aware of these lifetime limitations to avoid unexpected failures.

The evolution of the the service inventory to date has been driven primarily by data providers wishing to improve access to their data holdings. Focus is currently shifting towards improving tools for data consumer interaction–search, data inspection, and download. Long term viability of the system depends on business interdependence between the data providers and data consumers.