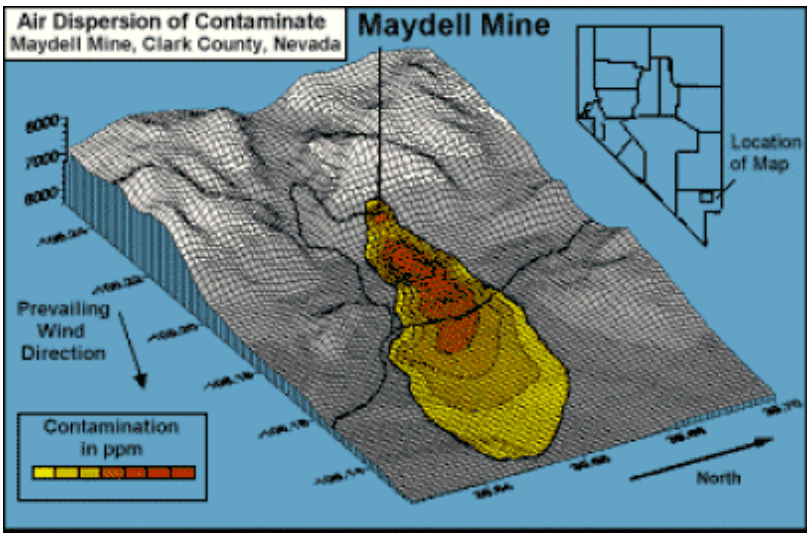
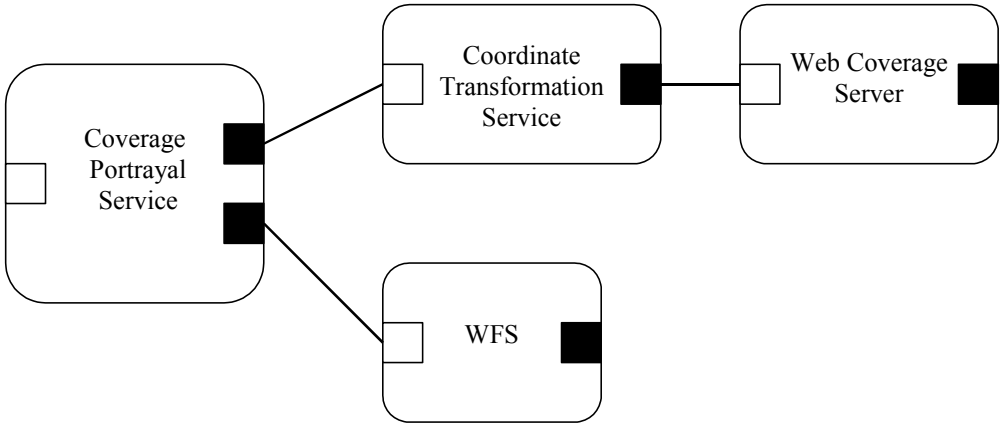
1 Case Study

Consider what might be required in building a display such as the following out of OGC web services:



We suppose that there will be feature data in some coordinate system for the contamination plume from the mine, and for the road leading to the mine entrance, and that this data is served by a WFS. We also suppose that there will be DEM or DTED data that is served by a WCS, and we will assume that this data is in a different coordinate system. And we suppose that the user wishes to view the combination of these two data sources from a certain viewpoint, as is shown above.

Naively, we can represent the way these services will be chained together as follows:



(Note that we have omitted any consideration of how services are located. We assume that somehow they have already been located. We also assume that requests are for a particular server, rather than for a particular ***type*** of server.)

The Coverage client viewer, which is not shown here, will submit a request to the Coverage Portrayal Service (CPS). Information about the viewpoint (pitch, yaw, depth of field) that is contained in the request will be interpreted by the CPS and applied to the merged ("overlayed") information from the two data sources. But the request will also have to contain information that is not interpreted by the WCS, information about which features from which WFS to get, and also information for and about the Coordinate Transformation Service (CTS), and indirectly, information for and about the WCS. We can think of this as a WCS request wrapped inside of a CTS request wrapped inside of a CPS request, which also contains a wrapped WFS request.

Now this is not the only way (and probably not even the best way) service chaining could work. But ***if*** service chaining works in this or some related way, then we see that that has implications for how service interfaces are defined. An interface definition not only has to talk about what service is provided, what it does or doesn't do, etc., but it also has to say something about what other services can live down the chain from it, and what this service can do with them.

Note that there is a potential difference between the kind of service chaining which OGC services will need to use, and the sort of service chaining that is used in supply chains in the manufacturing industry. In the supply chain case, it is not usually the case that a consumer will include in a request to a supplier details and particulars about suppliers which sit several hops up the chain. But in the OGC case this is in fact the norm. For example, in the case above, the request to the CPS will not only contain details, such as as the latitude and longitude of the boundaries of the request, details which will have to be forwarded all the way up to the ends of the chain, but also particulars about which WCS, which WFS, and which features are intended.

2 Glossary

Coordinate transformation– computational process of converting a position given in one coordinate reference system into the corresponding position in another coordinate reference system. A coordinate transformation can require and use datum and ellipsoid parameters.

Coverage– Coverages are spatial functions that describe characteristics (the "range") of a set of spatial locations (the "domain"). Examples include: soil maps (soil types of specific land areas), a satellite images (brightness of a set of pixels), or digital elevation models (gridded elevation data, or triangulated spot elevations).

Feature– A feature is an abstraction of a real world phenomenon; it is a geographic feature if it is associated with a location relative to the Earth. Vector data consists of geometric and topological primitives used separately, or in combination, to construct objects that express the spatial characteristics of geographic features. Features are described by Feature Attributes.

WFS– A Web Feature Server (WFS) provides access to geospatial feature data, specifically OGC Simple Features (feature instances). Therefore, whereas WMS delivers a map as a picture, WFS supports the dynamic exploitation and access of feature data. This capability opens the door to enhanced spatial analysis, modeling and other operations that require fine grain manipulation of feature data.
Clients access the data through a WFS by submitting a request for just the feature data that is needed for their application. The request is generated on the client and is posted to a WFS server. The WFS Server "reads" and executes the request returned a feature set as GML. A GML enabled client then can use the feature set. Beyond feature access, there is an additional set of interfaces in the WFS for supporting simple transactions: Create a feature, Delete a feature, and Update a feature

WMS– A Web Map Server (WMS) produces maps either as rendered bitmaps or as a series of displayable graphic elements. In the case of bitmaps, Web Map Servers typically support GIF, JPEG, or PNG and are increasingly able to support WBMP (WAP Bitmap) format. SVG (Scalable Vector Graphics) is the most common graphic element format. Clients request maps from a WMS in terms of named layers and provide parameters such as the size of the returned bitmap as well as the spatial reference system to be used in drawing the map. In this way, a client can make requests to different WMS implementations and the results can be overlaid to form a rich layering of map information.

WCS– The current Web Coverage Service provides access to "gridded" geospatial data, such elevation data (e.g. coded grids), or image data that is gathered by aerial, ground or space sensors. Using a WCS, a Web Coverage Client can retrieve coverage data values for analysis or visualization (e.g. by creating transects or trend-lines, perspective or hill-shaded views, spectrally classified images, or statistical point-clouds). Alternatively, a Coverage Portrayal Service may perform these visualizations and present them to a simple viewer client using a Web Mapping Service interface.

CPS– A Coverage Portrayal Service produces a visual picture from data returned by a Web Coverage Service. This service will facilitate wider use of coverage data by making it accessible to thin clients. To the client, the Coverage Portrayal Service appears as a Web Map Service, but with additional parameters to control the retrieval and /or rendering of coverage data. The Coverage Portrayal Service may require the client to specify the targeted Coverage Service. Here are a few important examples of Coverage Portrayal:

- Client-specified assignments of multispectral bands to color channels in a picture;
- Creating chloropleth maps from coverage data using a client-specified set of color-coded "bins";
- Preset rendering mechanisms such as hill-shaded elevation.
- Combining multi-spectral pixel values according to client-specified or server-defined formulas (e.g., the Normalized Difference Vegetation Index);

Many other kinds of coverage portrayal are possible besides these examples.