at the internet site <http://columbo.nrlssc.navy.mil/ogcwms/servlet/WMSServlet/Alexander_County_NC_Maps.wms?SERVICE=WMS&REOUEST=GetCapabilities>.

If a discovered URL validates, it is stored in a database **240** that the WMS Driver component checks periodically for new findings. Because different WMS URLs can point to a WMS Server offering the same map content, the newly discovered WMS Server's Capabilities XML document tree is tested for equivalence against previously discovered WMS Servers to avoid duplicates within the Portal. As the WMS Driver **250** makes the new WMS Server known to the GIDB Portal, the portal's size grows by the amount of map content available in the server. By feeding the web crawler URL seeds from GOOGLE™ APIs, queries of the form "url: REQUEST=GetCapabilities" should retrieve at least as many discovered WMS Servers as a Refractions Research OGC Web Services Survey.

WMS Server Database **240** maintains a set of HTTP URLs pointing to the unique WMS server capabilities documents on the web for future use by the WMS driver **250**. The system periodically re-validates the HTTP URLs stored in the WMS Server Database, and periodically conducts new searches for new WMS Server HTTP URLs. The search would typically be carried out once a week, although it can be done more or less frequently.

The GIDB portal system described herein configures the new WMS Server URL into the GIDB Portal System WMS Driver automatically. The described portal system provides potential users a single access point to all of the services discovered by the search algorithm (identifying a first set of HTTP URLs, webcrawling the first set of URLs to identify other URLs, querying the URLs to find which URLs contain files that comply with the WMS XML schema. This allows users to search, connect and retrieve data from the services all from one point, with all the WMS files being accessible to the user through the GIDB portal system and appearing to come from the single source of the GIDB portal. This is a significant savings of time and energy.

The web service interface to this portal also makes available a highly interoperable and platform independent programmatic access to sources that may have little platform independence and are not compatible with other GIS applications. The larger the number of sources integrated into a web portal, the greater its value is as a service.

Previously, searches and discovery of new sources of mapping information have been done manually by using search engines and catalogs. The system described herein provides a scalable automated solution. By utilizing a topic driven web crawler configured to search for structured XML documents that validate to a public schema, the system of integrated components presents a fully automated means for search, discovery, binding, and integration of Geospatial Web Services, thereby reducing the cost and manual labor needed to search for and configure new Geospatial Web Services into the portal.

The system presented is implemented in the platform-independent Java programming language and designed with a modular and scalable approach. While the system process of discovering new services is catered towards Geospatial Web Services, the same approach can be employed to other Web Services that are advertised by an XML document that validates to a common XML Schema.

In addition to being stored for future retrieval, the list of valid URLs and the query and responses from the URLs can also be printed, transferred to a remote computer, and displayed to a local or remote user.

Embodiments of the invention are also directed to computer based systems, methods, and computer readable media for controlling the computer components and accomplishing the methods described herein.

Users at remote sites have computers or PDAs for selecting WMS data sources from the GIDB portal system, and using the thick client or thin client GIDB software, can assemble maps with overlaid different layers of data, and can store, print, display, modify, and transfer the resulting maps, layers, and map data to other users. The software can also be integrated into other local ore remote computer systems for automatic retrieval of map data and integration of the resulting maps or map data into computer databases or systems.

The invention has been described with reference to certain preferred embodiments. It will be understood, however, that the invention is not limited to the preferred embodiments discussed above, and that modification and variations are possible within the scope of the appended claims.

What is claimed as new and desired to be protected by Letters Patent of the United States is:

1. A computer-based method for providing a single point of access to geospatial information system web services, comprising:

providing a single point of access to geospatial information system web services including the steps of:

automatically periodically performing a general, non-directory, non-catalog search, by computer software stored on a non-transitory computer-readable medium, of the internet with an internet search algorithm and URL string patterns that identify WMS services for HTTP URLs that include WMS Servers or links to WMS Servers;

determining whether a web service found by the internet search algorithm is valid by automatically engaging, by the computer software stored on the non-transitory computer-readable medium, the web service in a query-response interchange; and

storing the valid web service in a list of available web services.

2. The method of claim **1**, further comprising:

receiving, by a geospatial portal, a map request from a remote computer; and

transferring documents on the stored list of valid web services from the geospatial portal to the remote computer.

3. The method according to claim **2**, wherein the transferred documents appear to the remote computer user to come from a single service.

4. The method according to claim **1**, further comprising:

designating sources of information or web services which return a valid response as valid; and

adding the valid sources of information or web services to the list of sources available to users.

5. A computer-based system for providing a single point of access to geospatial information system web services comprising:

a server connected to the internet and having software for providing a single point of access to geospatial information system web services, the software stored on non-transitory computer readable media having instructions configured to:

automatically periodically perform a general, non-directory, non-catalog search of the internet with an internet search algorithm and URL string patterns that identify WMS services;

automatically determine whether a web service is valid by engaging the web service in a query-response interchange; and