



# The Oregon Imagery Explorer

## Data, Information and Knowledge Management

### Sponsor

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<http://www.oregon.gov/DAS/EISPD/GEO>

<http://www.oregonexplorer.info/imagery>

## **Executive Summary**

Geospatial data use is now a part of routine operations for Oregon government agencies. These data are used in projects ranging from emergency response operations to natural resources planning. As a result, agencies receive many requests from organizations throughout the State for geospatial data, particularly orthoimagery and aerial imagery. Distributing these imagery datasets via CD/DVD, portable hard disks, or FTP sites is time-consuming and burdensome. As the resolution of the imagery increases, the distribution of significantly larger datasets becomes even more cumbersome.

To bring together more coordinated and efficient services with seamless statewide geospatial data layers, the Oregon Department of Administrative Services Geospatial Enterprise Office (GEO) worked together with the Oregon Geographic Information Council (OGIC) and volunteer-based data standard groups called Framework Implementation Teams (FIT) to develop a high-level vision called navigatOR.

GEO, Oregon State University (OSU) Libraries, the Institute for Natural Resources (INR), and the Oregon Orthoimagery Framework Implementation Team (OrthoFIT) collaborated to create a navigatOR portal application for viewing and distributing imagery framework data that:

- Distributes and displays statewide half-meter color orthomimagery products built upon image acquisition by USDA's Farm Services Agency National Agriculture Imagery Program (NAIP);
- Adheres to Federal Geographic Data Committee (FGDC) and Open Geospatial Consortium (OGC) standards;
- Allows a user to select an area of interest (AOI), clip that area from the database, compress those images for efficient transfer, and electronically ship them to the user. Once received, users have the option to uncompress the images. FGDC Metadata accompanies all shipments;
- Streams the imagery into applications through an Open Geospatial Consortium (OGC) compliant Web Map Service (WMS);
- Provides 24-hour/7-day-a-week operational accessibility;
- Is designed to support future geospatial data access and distribution; and
- Is integrated with OSU's Oregon Explorer Natural Resources Digital Library portal.

The result of this effort is the web-based "Oregon Imagery Explorer" which was launched in October of 2007.

## **Description of Business Problem and Solution**

In 2005, the Department of Administrative Services (DAS) Geospatial Enterprise Office (GEO) made a significant investment in digital color orthoimagery covering the entire state of Oregon. GEO partnered with Local, State and Federal agencies to update black and white orthoimagery that had been created in the year 2000. The following agencies provided funding: USDA's Farm Service Agency, Natural Resources Conservation Service, and US Forest Service, the Department of the Interior's Bureau of Land Management (BLM) and the US Geological Survey, some Tribal government agencies, several State of Oregon agencies, numerous counties, and an irrigation district.

To leverage such a substantial investment, DAS GEO wanted to provide users throughout the state easy access to the data. User needs typically go beyond simple viewing to include such features as clipping data for an area of interest, compressing these datasets, and shipping them to the user and seamlessly integrating with other geospatial internet applications. A Web-based Internet portal application providing access to and distribution of public domain, statewide orthoimagery would meet the majority of users' needs.

The Oregon Imagery Explorer Project occurred in two phases. In Phase 1, staff from OSU worked with DAS to scope the project. Phase 1 included an assessment of existing software solutions that meet the required and desired functionality identified for the imagery portal.

Using a list of high-level functional requirements provided by the Orthoimagery Framework Implementation Team (OFIT), the OSU team refined this list to articulate required and desired functionality for the portal in the areas of 1) image provisioning, 2) providing image services, and 3) ingestion, setup and administration. The team then gathered information about software solutions that were available from vendors and assessed the ability of these to meet functional requirements and desirables. The scoping focused on solutions proposed by four vendors: Environmental Systems Research Institute, Inc. (ESRI), Intergraph, IONIC Software, and SANZ.

After assessing the available vendor solutions, the team evaluated the software packages relative to seven criteria: 1) Ability to provide an image provisioning web application, 2) Strength of web map service (WMS) server, 3) Licensing model, 4) Relative cost of licensing, 5) Demonstrated use of product, 6) Likelihood for on-time delivery of product, and 7) Ability of the product to integrate with navigatOR.

The OSU Team found no single vendor solution that offered truly off-the-shelf functionality meeting both the image provisioning and image service needs. Findings from Phase 1 scoping were used to develop a comprehensive Request for Proposals

(RFP) that clearly articulated the needs to be addressed by the software solution, the technical specifications of the portal, anticipated workflow during the portal development and implementation process, and other critical details about Phase 2 implementation of the Oregon orthoimagery portal application.

In Phase 2, OSU led the RFP process and oversaw implementation of the orthoimagery viewing and extraction application within the Oregon Explorer Imagery Portal. Through a competitive procurement process, Leica Geosystems Geospatial Imaging (formerly ER Mapper) was selected to develop a software application to meet the needs of users. Leica Geosystems' Image Web Server allowed for the storage of terabytes of data, extraction of image subsets and management of metadata.

The Oregon Imagery Explorer was made public in October of 2007. The portal's Image Viewing and Extraction Tool enables imagery to be "clipped-zipped-shipped." Users may extract and download an image file with accompanying metadata for a selected area of interest.

After launching the Image Viewing and Extraction Tool, users are presented with an interactive map containing images that are available for viewing and downloading. Users may locate their area of interest by panning, zooming, or searching for a specified location. If users would like to extract only part of the image, they may draw a clip rectangle defining the region to be extracted. By selecting resampling and projection options, they may define the resolution and select the datum and projection. They may also select output options by selecting a file format and compression. Once the extraction is completed the image will be delivered directly back to their browser (if the image is small) or they will be advised via email (if the image is large.) Once they have placed their first order for imagery, user settings such as output format and projection will be remembered for future orders if requested. Per user, extractions are limited to 100 MB per file (for immediate download) and a total of 2000 MB per 24 hours.

The imagery is also available through an Open Geospatial Consortium compliant web map service (WMS). The WMS allows users to stream the entire state-wide imagery in the Oregon Imagery Explorer into their GIS or web application, such as ESRI's ArcGIS or Google Earth, without downloading terabytes of data. The Oregon Imagery Explorer WMS produces images in ECW and Joint Photographic Experts Group (JPEG) 2000 formats, both which implement built-in pyramiding and indexing for efficient generation of image views at any scale.

## **Significance**

There is a critical need to coordinate, develop and maintain geographic information and the computer systems that manage it. The Geospatial Enterprise Office (GEO) works to ensure the quality and usefulness of Oregon's geographic information. The heart of the GEO governance model is a program called navigatOR. The aim is to deliver better coordinated and more efficient government services, and reduce duplication through coordinated geospatial investments across state government. The Oregon Imagery Explorer is an important part of implementing this vision.

**Improved Access to Geospatial Data:** State, regional, local, tribal, and federal agencies, and academic institutions along with not-for-profit organizations, businesses and the general public now have easy access to high-resolution color orthoimagery. The Oregon Imagery Explorer delivers a complete picture of Oregon's landscape in a few clicks.

In addition, the imagery can be downloaded to a user's desktop after selecting an area of interest. The download can be accomplished in multiple standard imagery formats and projections to accommodate nearly any user's needs, thus providing a means for users to perform detailed image analysis in various image software packages.

Furthermore, the imagery can be streamed in to GIS software environments and integrated with various detailed thematic data, either vector or raster, and manipulated with the GIS toolkit to provide a backdrop, for detailed change analysis, or for any number of geospatial analysis purposes.

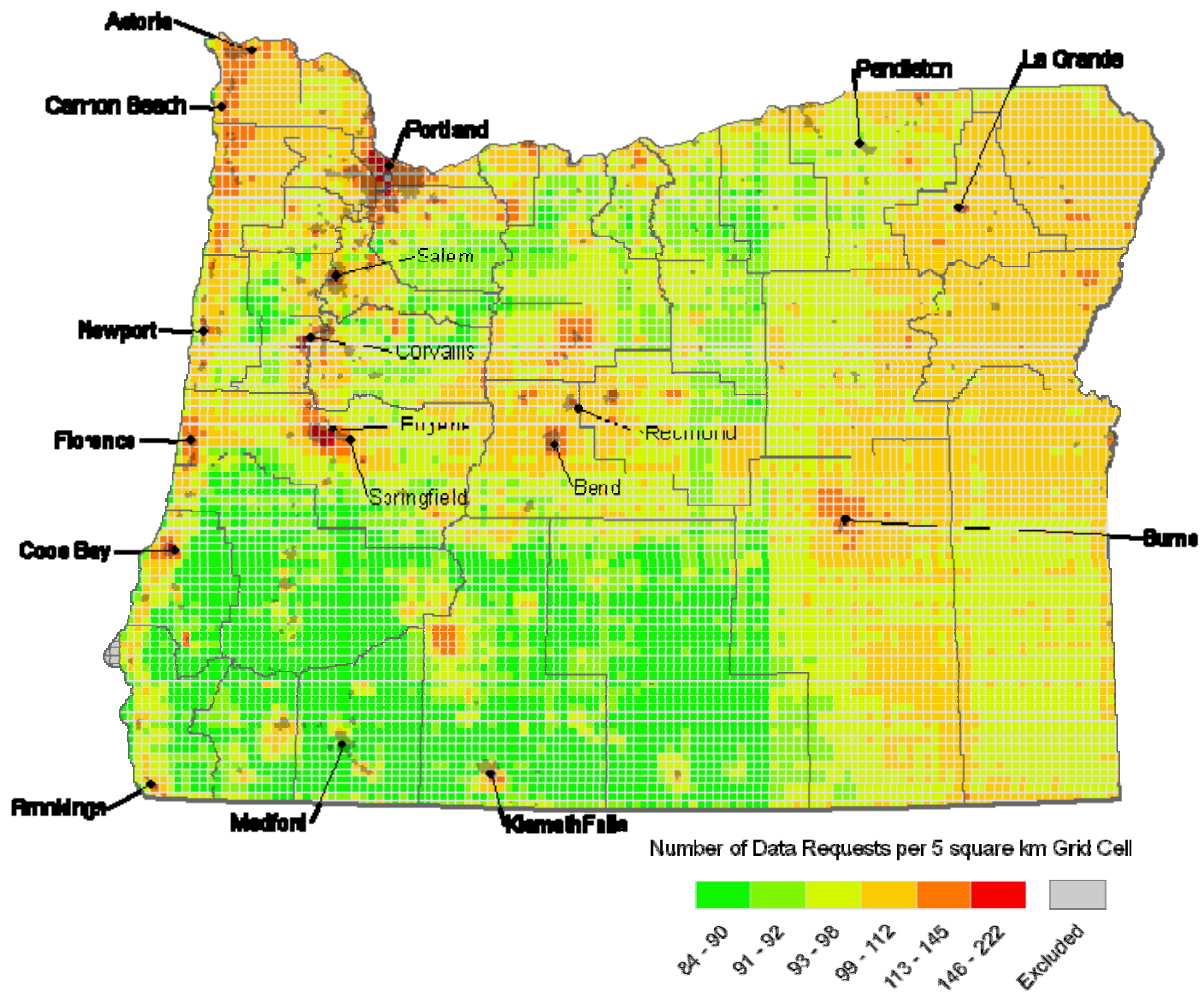
**Improved Data Searching:** The Oregon Imagery Explorer portal interface provides sophisticated data searching, filtering the list of available imagery by date of acquisition, native resolution, sensor type, positional accuracy, and keyword search of image metadata. The user may also select an area of interest by panning and zooming; entering coordinates; entering an address; selecting a quadrangle name; entering a township, range, and section; selecting a county; selecting a 4<sup>th</sup> field hydrologic unit; entering a 5 digit zip code; selecting a 911 center; or entering a highway milepost.

**Improved Data Integration:** The imagery is ortho-rectified and all other geospatial data, both vector and raster, available from the geospatial data clearinghouse has been registered to the imagery. When users overlay linework, such as roads, surface water, or parcels, or raster data such as digital raster graphics or elevation, the vector and raster data matches the imagery. This enables the graphic and tabular data from many sources at multiple levels of government to be integrated in ways that make problem-solving and decision-making easier and more effective.

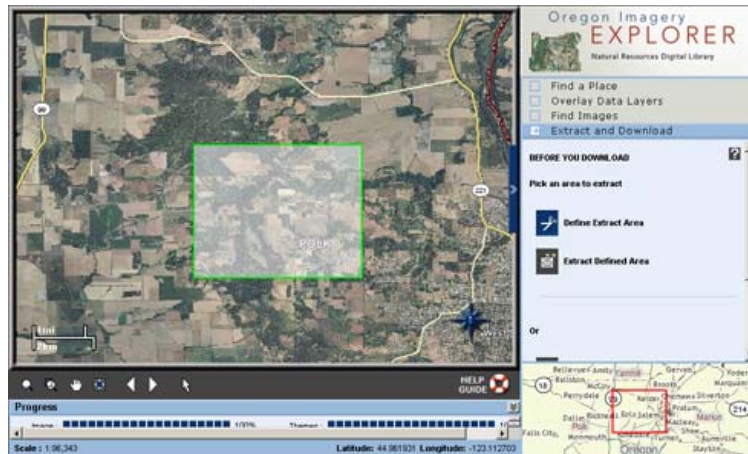
## Benefit of the Project

Oregonians now have access to high quality, high resolution aerial photographs through a state-of-the-art Web site. This technology — the [Oregon Imagery Explorer](#) — can deliver a staggering 46,000 map requests per hour.

This map shows both the geographic extent and frequency with which the 2005 half-meter color orthoimagery was requested for the Oregon Imagery Explorer from 2007-2009.



Oregon's state and local governments use aerial imagery for many purposes, including locating structures during a forest fire, managing invasive plants, managing timber land, planning roads, evacuating vulnerable people during emergencies and many other critical uses. Agencies also receive many requests for aerial imagery and photography for a variety of commercial purposes. One of the benefits of the Oregon Imagery Explorer is that it interacts seamlessly with other online tools that provide geographic information.



*Everyone from the local GIS officer to the local citizen can use the Explorer.*

Oregon has taken an innovative approach to obtaining and sharing high resolution imagery on a statewide scale. Making this data available via the Web eliminates the need for duplicate acquisition, storage, and distribution efforts, thus saving taxpayer dollars. In addition, the broad functionality of this tool provides great advantages for users in comparison to other commercially available tools, such as GoogleEarth.

The infrastructure that was developed for Imagery Explorer will be used for all future imagery acquisitions. Acquisition is now underway for the 2009 National Agriculture Imagery Program, in which Oregon will acquire statewide half meter and color infrared imagery to be served from Imagery Explorer. Older imagery will also be available soon in this environment. This enterprise application keeps multiple agencies at all levels from having to make individual infrastructure investments in order to provide imagery access to their customers.