

“Geospatial and Internet Technology Integration for The National Lewis and Clark Education Center”

EOS Education Project White Paper #2

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1) Interactive “Image, Map, and Document Services”:

The University of Montana’s National Lewis and Clark Education Center (NLCEC) develops and delivers interactive Lewis and Clark online mapping services based upon ArcIMS (Internet Map Server) software produced by ESRI Inc. ESRI has donated the necessary software for this effort as part of their contribution to the Lewis and Clark Data Consortium, which was formed in December of 1999 to promote the development and distribution of accessible geospatial and multimedia data related to the Lewis and Clark Expedition. In developing Lewis and Clark historical and contemporary geospatial data, the NLCEC has worked to standardize file types, geographical information, and metadata to facilitate ease of use and the ability to deliver the geoinformation across a wide variety of platforms: ArcIMS, DVD, and CD-ROM. Most, if not all, data are provided in standardized projection (Albers Equal Area Conic, USGS standard), and common file types such as ESRI’s .shp file format and LizardTech’s compression file format .sid (selective image decompression). Geospatial data will also be made available in standard decimal degrees. With vector and raster data having a common projection and the interoperability of online and on-site delivery, the NLCEC and its partners will be able to deliver the Lewis and Clark data sets and online interactivity virtually anywhere in the world.

The distributed Lewis and Clark GIS utilizes the most advanced technology available for the delivery of large amounts of vector and raster imagery directly into the classroom. This technology then allows for the incorporation of a variety of remote sensing imagery (Landsat 7, Terra, Ikonos, aerial photographs, DOQs), as well as other raster products, such as DRGs, DEMs, and color physiographic relief base layers. This can be combined with a variety of vector data, including very accurate Lewis and Clark trail and encampment data. In addition, all data will be available to educators via Internet download (file-transfer-protocol) for use independent of a web browser. Free GIS viewing software such as ArcExplorer 2.0, ArcExplorer 3.0 (Java), and ArcVoyager 5.0 can be downloaded by educators.

2) Lewis and Clark Image Service:

In addition to the Lewis and Clark GIS, the NLCEC will also provide an interactive image service utilizing telecommunications software provided by LizardTech Inc. The Earth Observing System Education Project (EOSEP) has been using MrSID image server technology for the past two years as a means of delivering high-resolution, georeferenced, and multispectral remote sensing imagery directly in the global classroom. Using LizardTech's compression software, in combination with the server software, will allow the university partners to provide a rich, multimedia experience to the Lewis and Clark interpretation. This technology allows for the delivery of imagery of a variety of types that heretofore would have been impossible to transmit via the Internet. Moreover, when combined with customized Java Applet provided by LizardTech, teachers and students can view and interact with the imagery online. As in the case of the Lewis and Clark GIS, this image service allows for the rapid download and manipulation of the imagery on local networks, desktop computers, and handheld devices. The NLCEC will aggregate Lewis and Clark imagery across a variety of themes, ranging from the historical cartography to the flora and fauna specimens collected along the expedition route. Historical works of art, student posters, rare manuscripts, and a variety of additional media can be easily converted, compressed, encoded, and delivered via the Internet for unprecedented learning opportunities. When combined with the interactivity and hypermap functionality of an ArcIMS, the Lewis and Clark image service will provide an outstanding digital backbone to Lewis and Clark education experiences.

3) Lewis and Clark Document Service:

The Lewis and Clark document service represents the final component to the internet-based delivery of geospatial and multimedia digital components to the K-16 classroom environment. Utilizing the advanced technology of AT&T labs' DjVU file compression and delivery technology (recently acquired by LizardTech), the EOSEP has been experimenting with the digitization of the Lewis and Clark journals, in cooperation with the University of Nebraska Press and the American Philosophical Society. As a result, the technology is now available whereby the student of Lewis and Clark could be reading (viewing) a high-resolution, digital facsimile of a Lewis and Clark journal document. In the passage reference to the grizzly bear near the Great Falls of the Missouri, the student could immediately click to online GIS and view geospatial data about *Ursus arctos horribilis* current habitat in the Northern Rockies, compare this information to its historical range, view where Lewis and Clark recorded seeing grizzly along the trail, and quantify this information all through the Internet. Yet another click away and the student could view the works of Carl Bodmer and his depictions of the habitat in the Upper-Missouri roughly thirty years after the Lewis and Clark expedition.

3) Distance Learning:

In order to assist educators in learning such technologies as GIS, MrSID, and DjVU, the NLCEC will expand upon its online instruction base in GIS, and develop three advanced courses to be delivered online to educators anywhere, anytime. Utilizing the software platform provided by eCollege Inc., a world leader in online instructional mediums, and the data repository provided by the Lewis and Clark Data Consortium, the NLCEC will reconstruct and deliver these courses as online Lewis and Clark learning communities for K-16 educators.

The NLCEC will deliver the following instructor-lead ArcView courses: Introduction to ArcView 3.2, Intermediate ArcView 3.2, and Advanced ArcView 3.2 (extension intensive). These courses will be developed around the Lewis and Clark geospatial resources. In terms of this project, the GIS courses will be infused with Lewis and Clark data that would be used by the students to craft their own GIS lesson or project. These new lessons in turn could be shared with other educators who are interested in finding ways to use GIS technology in their classroom, especially those interested in the upcoming Lewis and Clark Bicentennial 2003-2006.

4) UMT Online Learning Series:

In addition to the more robust and intensive GIS distance learning courses, the NLCEC will also develop a more informal and immediate form of online instruction for the teacher-student user. The NLCEC has been developing and will continue to expand its online learning series that provides intelligible, step-by-step instruction for online users about site terminology, the graphical user interface (GUI), and the necessary mechanics to achieve desired results in terms of site productivity and efficiency. Increasingly, the EOSEP has also devoted attention to this type of instruction during short, one to three day instructional workshops and demonstrational conferences.