

Design and Implement a GIS Metadata System

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Abstract

The Internet technology development has leveraged to publish geographic information to the mass public. To take advantage of the Internet, an integrated Metadata System has been designed and developed in the St. Johns River Water Management District. Its unique architecture and system will be presented in the paper.

Metadata for geographic data is often described as data about data. Many local governments have its mandate to share their GIS data. Metadata is a very important part of the data sharing.

This presentation will focus on the current Internet technology and its application in the GIS metadata system. The presenter will demonstrate the new St. Johns River Water Management GIS metadata server and its impact on the live data publishing. The application is located at: <http://arcimspub.sjrwmd.com/metadataindex/>.

Introduction

GIS Metadata has been in the daily works at the St. Johns River Water Management District (SJRWMD) over the last 7 years. The first metadata system was developed with ArcView 3 and ArcInfo 7 in 1997. The GIS users community has recognized the need to populate the metadata into a central repository and share it with each other. The ArcIMS version 4.0 provided a better platform to publish potential geographic and associated information through the Internet. The ArcSDE provides a central database location to store the metadata tables while the ArcCatalog provides a platform to publish metadata. To take advantage of the latest ESRI's technology, an integrated Metadata/Data publishing and retrieving system has been designed and developed with an aim to provide a platform to share data and metadata residing in the SJRWMD to its internal staff and public customers through the Internet. The system includes a Metadata publisher for customized entering and viewing metadata through ArcCatalog. It also includes a revised metadata explorer to search metadata. An ArcIMS data viewer is added to the system to display ArcIMS dynamic data service for each data layer.

Metadata for geographic data is often described as data about data. Metadata for geographic data typically describes the content, quality, type, collection date, and spatial location of the actual data. Looking at metadata can help you determine whether a particular dataset is appropriate for your use. In fact, it's often easier to judge the suitability of the data from its metadata than by examining the actual data itself. This is because metadata is generally much smaller and easier to share than the actual data. And it's the ability to share metadata—through an ArcIMS Metadata Service - that makes it so valuable. Sharing metadata allows you to see what type of data others have and also lets others see what you have.

Earlier System in the 1997

St. Johns River Water Management District (SJRWMD) started first metadata project in 1997. The system was built on the ArcView 3 (Avenue) and ArcInfo 7 (aml). The system generated metadata in individual text file to attach with the data set. A set of COLDFUSION programs were created to maintain and update HTML pages to search and view metadata. The system was efficient enough to maintain an Intranet and Internet data index pages on a weekly basis. The Internet was automatically updated every Monday night.

Following are some sample information from the first metadata project.

Layer name: Land Use/Land Cover - 2000 - SJRWMD
System location: SDE Database: gislib.lulc_2000
Feature type: Poly
Map unit: Phase1 , SJRWMD
Data Source: SJRWMD
Source scale: 58000
Projection: UTM_ZONE17 METER HPGN GRS80

Identification_Information:

Citation_Information:

Originator: St. Johns River Water Management District
Originator: Avineon, Inc. (formerly Agra-Baymont, Inc.)
Publication_Date: July 2002
Title: GISLIB.LULC_2000
Geospatial_Data_Presentation_Form: vector digital data
Publication_Information:
 Publication_Place: Palatka, Florida
 Publisher: St. Johns River Water Management District
Online_Linkage: <http://www.sjrwmd.com>

Description:

Abstract:

Land cover and land use in the St. Johns River Water Management District based on 1999 color infrared aerial photography.

Purpose:

This data layer was developed to support many of the District's critical projects or programs, including Pollution Load Reduction Goal Development, Land Acquisition, Land Management, Water Supply Planning, Floodplain Management, and Surface and Ground Water Quality Monitoring.

Supplemental_Information:

The photography for the DOQs upon which this layer is based was flown by the National Aerial Photography Program (NAPP) primarily from Jan 1999 through Dec 1999. See the item DOQ00_INFO in the attribute table of gislib.img_idx_doqs for specific photo dates.

The problems we had with this metadata server are as follows:

- It is very hard for user to create metadata.
- Text format files are hard to maintain.
- Text format metadata isn't easy to search.
- There isn't any security on the file, any one can edit and delete the file.
- It is hard to track who and what was edited on the metadata.
- The technology to create and maintain the metadata server is unstable.

New System in 2002

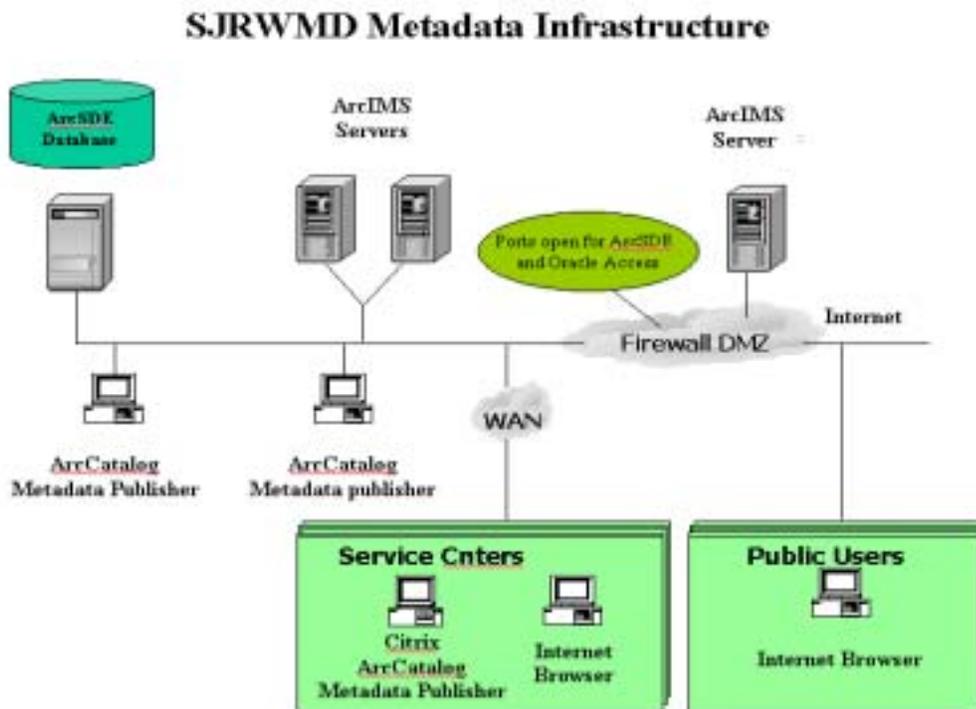
When ESRI released Metadata Server in the ArcIMS 4.0 in 2002, we jumped on the opportunity. After initial testing and analyzing the ArcIMS metadata server, we found that the technology is mature enough to be deployed in an enterprise environment.

ESRI's Metadata Service provides a forum for sharing metadata. If you don't have data but need some, you might search, or browse a Metadata Service to find what you need. Similarly, if you have data that you want to share with others, you can share, or publish it to a Metadata Service where others can see it.

SJRWMD GIS Infrastructure

SJRWMD built a hardware and software infrastructure to store, process, analyze and present data in an enterprise wide environment. Several dedicated GIS servers are used for ArcSDE and ArcIMS applications. Oracle database is used as enterprise wide database management solution.

SJRWMD's Metadata Infrastructure



Setting up SJRWMD's Metadata Service

First you need to create a SDE database to host metadata tables. Since we have an operational ArcSDE database already in place, we decide to put metadata files in this database. ArcIMS administrator will create 10 metadata tables based on your requirements. ArcCatalog or your customized Metadata creators will populate these tables. These tables will also be read by your metadata explorer to present metadata information to end users.

A Metadata Service provides two fundamental operations allowing people to:

- Publish a metadata document to a Metadata Service.
- Retrieve metadata documents from a Metadata Service.

SJR Metadata Publisher

A customized metadata input screen was designed and used to publish the metadata through ArcCatalog. The metadata information was saved and stored into ArcSDE database.

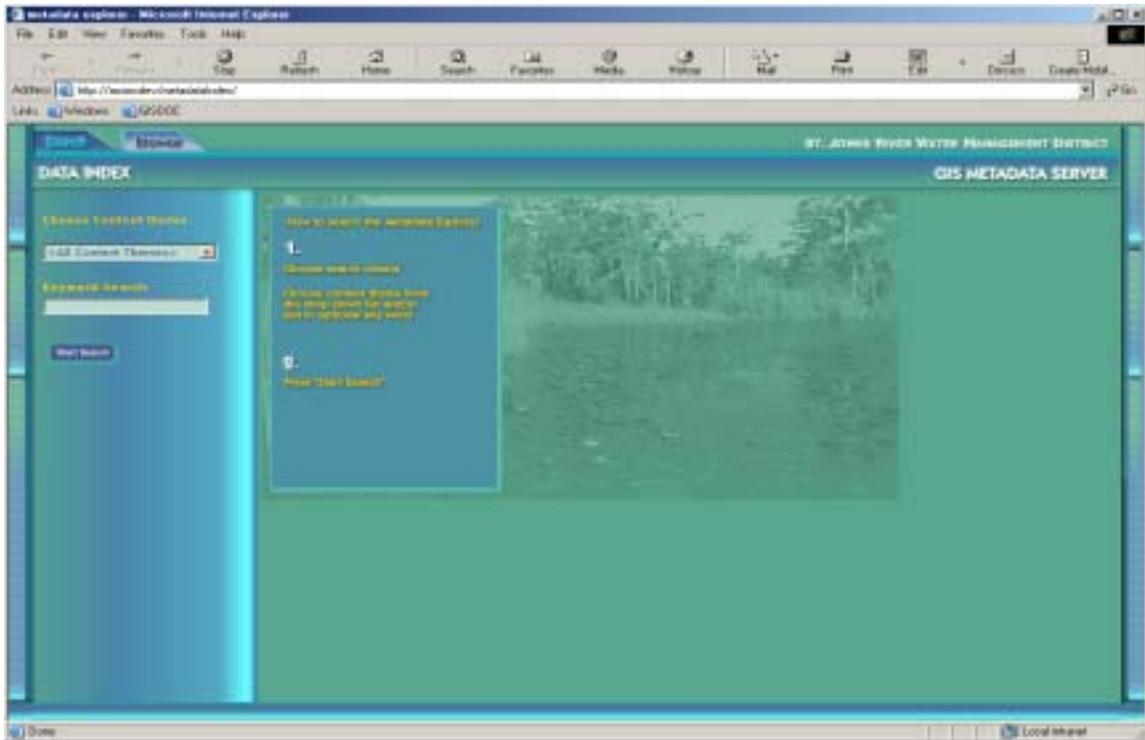
Metadata Web Service

A metadata web service was created for publishing metadata to the web. ArcCatalog is used to copy and paste metadata information from ArcSDE to a set of metadata tables.

SJRWMD Metadata Explorer

ArcIMS 4.0.1 Metadata Explorer was used as a basis for customization. Since all our data are district wide and have similar range and geographic extents, we didn't implement a geographic extents search tool. We found the geographic search tool creates confusion and technical difficulties for our data users.

The ArcIMS default web page was redesigned to better reflect water management theme. We also implemented a key word search tool that is based on the content text and title.



In the Browse window, we modified the existing theme list and made it more towards our business requirements.

When the data is a downloadable data type, an instant ArcIMS viewer is implemented to view the ArcSDE data in real time. The metadata and ArcSDE data are integrated into one working frame. The full functional ArcIMS viewer provides a real time download button for user to download any vector data in the viewing window. The data will be clipped out from the SDE database and packaged into a zip file that contains a set of shape file.

Conclusion

Build a metadata system is very important for any organization that maintains and develops geo-spatial data. We concluded that it has save our budget and development efforts on building a metadata system on the existing ESRI's technology. The technology is mature enough for maintaining and distributing geo-spatial metadata information over the Internet.

The metadata system should be in the scope with data user's needs and requirements. We think that a metadata system should consist of:

- Data stored as ArcSDE database
- Metadata entered through ArcCatalog
- Metadata managed by ArcCatalog
- Metadata published to ArcIMS service
- Metadata searched from a revised metadata explorer
- Data download from ArcIMS extract server

The District learned many lessons during the system development. These lessons are:

- Create organizational metadata standard
- Determine the levels of detail of metadata collection
- Select commercial software for creating, storing and retrieving metadata
- Use commercial available solution as much as possible
- Long term commitment for gathering metadata
- Use one of the industry standard (FGDC Metadata Standard)
- Obtain or convert metadata to FGDC Standard
- Specify metadata requirements in your data acquisition
- Obtain metadata in digital form from contractor

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