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## What's all this hoopla about XML? And what's it mean for us GIS users anyhow?

BY BROOKS E. KELLEY

XML — short for eXtensible Markup Language — is many things to many people. To some it's merely a markup language designed to supplement and ultimately replace HTML.

To others it's a language for data definition, storage, and modeling. To others still, it's a development or programming language. In truth, all these definitions are correct. XML is a tag-based language, like HTML, that can be used to describe, model, store, and manipulate information. However, while HTML is oriented towards the formatting and appearance of information, XML is oriented towards the organization or structure of information. This emphasis on structure is exactly what makes XML so useful. So useful, in fact, that industry heavyweights such as Microsoft and Oracle are making XML central to their future development plans.

Unlike HTML, XML has no predefined

elements such as <HEADER>, <BODY>, or <TABLE>. In XML, elements are user-defined by start (<>) and end tags (</>) e.g. <name> and </name>. Moreover, XML elements can be organized into user-defined hierarchical structures, for example:

```
<?xml version="1.0"?>
  <name>
    <first>Brooks</first>
    <middle>E</middle>
    <last>Kelley</last>
  </name>
```

Here we see a name element composed of three nested sub-elements called first, middle, and last denoting these portions of the author's name. These are entirely user-defined (nowhere in the XML specification is mention of the name, first, middle, or last elements). The elimination of predefined elements makes XML very flexible. But this flexibility comes at a cost.

It's estimated that 50% of the programming code in a web browser is written explicitly to overcome poorly authored HTML. This means HTML authors can be sloppy. However, because XML has no predefined tags, there can be only

# Who is doing What in GIS and Spatial Technology?

WHO: DETROIT EDISON

DETROIT EDISON'S SERVICE AREA:  
7,598 SQUARE MILES = 19,679 (km<sup>2</sup>)



Detroit Edison is an investor-owned electric utility that is the principal operating subsidiary of DTE Energy. Detroit Edison designs electrical systems and generates, transmits and distributes electricity while having interests in developing alternative sources of energy and transporting low sulfur coal. DTE Energy announced in October 1999 that it intends to merge with MCN Energy Group, parent company of MichCon, a natural gas producer and distributor. The combined expertise of the two companies will create an energy powerhouse in the region, offering customers the most innovative and varied energy solutions to meet their needs.

## STATUS OF YOUR PROGRAM:

Detroit Edison is deeply involved with the use of geographic information. This has its roots in manually drafted facility drawings and transmission line strip maps. The company also

has an historic archive of aerial photography that dates back to the 1940s. We began our movement into the computer mapping and GIS world in the 1970s.

Detroit Edison has developed its GIS projects primarily on Intergraph software products. The land base that is in use today was developed over the past two decades. It is primarily a right of way map for the utility's entire service area. Detroit Edison's electrical transmission and distribution network is built on our land base. When there are interruptions in service due to severe weather, the company uses its Outage Analysis System (OAS) to locate problems. OAS is a live operating GIS resolving real world operations issues.

Detroit Edison has a web-based GIS application named the Michigan Site Network (MiSiteNet). This is a web-based site selection tool. The application's focus is to attract and retain businesses in Michigan. This application is a collaborative effort between Detroit Edison, the Michigan Economic Developers Association and the Michigan Economic Development Corporation.

Detroit Edison has a staff of software developers who have built sophisticated applications like the OAS and the MiSiteNet, which are regarded as valuable contributions to the community at large.

## DESCRIBE YOUR GIS EFFORTS:

Detroit Edison has a number of GIS initiatives under way. The MiSiteNet is of primary interest because it contributes to the Michigan community as a whole. The current system was created in 1998. It is a centralized web application database that comprises all 83 counties in Michigan, with over 8,000 sites available on-line.

This web application allows customers in Germany, Japan and others around the world to use web-based technology to have easy access to evaluating sites in Michigan. Features such as GIS technology, virtual tours, brownfield redevelopment properties, and aerial and building photographs give customers a complete view of available real estate. Prospective users must request an ID and password from the site administrator in order to access the site.

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The site has been developed using Intergraph's GeoMedia Web Map software. Some of the technology and information on this site includes IPIX's Photobubble, Public Record Data, Brownfield Redevelopment Information, GIS Technology, Video Clips and the World Wide Web.

IPIX's Photobubble is a new technology that provides the opportunity to view photos in a 360-degree fashion. Public Record Data allows viewing of the historical list of property owners, deed transfers, legal description of the property, taxes and sale prices of a particular property. The Brownfield Redevelopment information is available because some of these properties are designated by the federal government as being available for incentives to revitalize neighborhoods. The GIS allows users to quickly display, search and analyze the map features in ways that are not possible on a paper map. The Video Clips provide a unique helicopter view of an area for

sites available in the Detroit Metropolitan Area. The World Wide Web allows us to have a home page and put a public face on the sites available for redevelopment.

Detroit Edison has made information available for site selection for decades. The use of computer technology has been integral in providing these services since the 1980's. The address for this site is [www.misitenet.com](http://www.misitenet.com).

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## Message from IMAGIN President, Jim Bennett

Hello everyone, it's nice to have the opportunity to talk about some of the exciting things happening with IMAGIN these days. The big news is that after three years of quality work for us, Debbie Schutt is moving on to slay other dragons. I speak for the entire Board of Directors when I say that Debbie has done an exceptional job for the organization and basically brought us from a very volunteer-based operation, where getting tasks done was often problematic and time consuming, to a firmly rooted infrastructure and solid financial basis. Most importantly, she has planted our feet on the ground and helped us define as a group IMAGIN's mission: to be the premier GIS professional society in Michigan. For these accomplishments and many more, we thank Debbie and wish her continued success in her endeavors.

The latest and best news is that we have successfully found another very qualified Executive Director. Her name is Tracey Breen and she has been working with the Village of Bingham



Farms for the last seven years. The Board of Directors conducted an extensive campaign to find someone of Debbie's caliber to fill this all-important position with the organization and we received a great response from some extremely qualified people. Out of these, IMAGIN's Executive Committee selected and then interviewed a slate of the most capable and experienced. We were very impressed with everyone we talked to but feel most fortunate to have Tracey agree to work with us — she truly stood out and we're very excited to have her expertise to help IMAGIN grow and evolve. Please help me in welcoming her and making her feel comfortable.

There is much more to discuss and I hope to periodically bring you some of the latest news and issues facing IMAGIN and our profession. IMAGIN is your organization and all of us who serve are eager to hear any comments or suggestions you might have. We encourage you to become active in committees and discussions to continue to make GIS in Michigan truly outstanding. Talk to you again soon.

limited error trapping i.e. software such as browsers cannot “interpret” poorly formed XML. This means the author must ensure their XML code is “well formed” meaning that all start tags have matching end tags, and other XML syntax rules, such as nesting, are obeyed.

So, XML is a highly structured yet flexible means of representing information. But how is it applicable to GIS?

New GIS technologies such as ArcInfo 8, ArcIMS, and AxioMap are built largely on XML. In ArcInfo 8.x (and presumably the forthcoming release of ArcView 8) XML is omnipresent, used to model everything from address styles to theme metadata. ArcIMS uses XML to model views (view as in the ArcView not RDBMS sense) within map configuration files and as a messaging syntax between a client and server-side map service. AxioMap — an exciting Internet mapping technology originally developed by ELZA Research and now maintained and distributed by LandV — uses XML in conjunction with VML (Vector Markup Language — an XML-compliant specification built by Microsoft for displaying 2D vector graphics in a browser) to facilitate interactive mapping over the Internet. All these products use XML to describe and/or store GIS information.

## ARCINFO 8.X: XML-BASED METADATA

Maintaining GIS metadata is analogous with flossing one’s teeth, in that it is something we really should, yet hardly ever, do. Hopefully, ArcInfo 8.x will help change our ambivalence. Metadata created and/or maintained via the ArcCatalog module of ArcInfo Desktop is stored in XML format alongside the data itself — as a file in the case of a file-based dataset such as a coverage, grid, or shapefile; or within the geodatabase of an RDBMS-based dataset such as an SDE layer. This information is then presented to the ArcCatalog user as a HTML web page in either “raw” XML format or using a stylesheet. A stylesheet defines how XML data is presented. Remember, unlike HTML, XML defines structure, not style. Stylesheets are created using XSL (XML Stylesheet Language) — a series of specified XML tags defining the manner in which XML data is presented to the user. ArcCatalog comes with two predefined stylesheets referred to as ESRI and FGDC. The FGDC stylesheet presents the XML-based data in a format consistent with the Federal Geographic Data Committee’s (FGDC) *Content Standard for Digital Geospatial Metadata*

while the ESRI stylesheet presents this data in a different format. Each of these presents a stylesheet-specific subset of the actual XML data to the user and each may be appropriate for different uses. For example, when contributing data to the NSDI, you may wish to publish the FGDC format stylesheet while utilizing the ESRI one in-house. If you prefer, you can create your own stylesheets using XSL.

Presented below are the raw XML and ESRI stylesheet-formatted data describing the geographic extent of a nationwide ArcInfo coverage:

```
<spdom>
  <bounding>
    <westbc>-158.105670</westbc>
    <eastbc>-67.781289</eastbc>
    <northbc>61.471756</northbc>
    <southbc>21.281382</southbc>
  </bounding>
</spdom>
```

### Bounding Coordinates

#### Horizontal

#### In Decimal Degrees

West: -158.105670  
 East: -67.781289  
 North: 61.471756  
 South: 21.281382

While the raw XML data is “well formed” and easily read by browsers and other software, it is nonetheless cryptic to our human eyes. The stylesheet is used to format and present this data in a manner that can be easily understood by us.

## ARCIMS: MAP CONFIGURATION FILES AND XML-BASED COMMUNICATION

ArcIMS uses XML for a variety of purposes. Foremost among these is as a means to describe the structure of views (extent, map units, theme data sources, theme order, line color and type, marker symbols, etc.) within map configuration files and as a means of formatting messages passed between a client and server-side map service.

Map Configuration files are used to store information describing the structure and appearance of a view. The following example (taken from ESRI’s ArcXML Programmer’s

Reference Guide) provides an example of an ArcXML map configuration file:

```
<?xml version="1.0" encoding="Cp1252"?>
<ARXML version="1.0.1">
  <CONFIG>
    <MAP>
      <PROPERTIES>
        <ENVELOPE minx="-125" miny="25" maxx="-67" maxy="50"
          name="Initial_Extent" />
        <MAPUNITS units="DECIMAL_DEGREES" />
      </PROPERTIES>
      <WORKSPACES>
        <SHAPEWORKSPACE name="shp_ws-0" directory="C:\ESRDATA\USA" />
      </WORKSPACES>
      <LAYER type="featureclass" name="STATES" visible="true" id="0">
        <DATASET name="STATES" type="polygon" workspace="shp_ws-0" />
        <SIMPLERENDERER>
          <SIMPLEPOLYGONSYPMBOL fillcolor="0,0,255" filltype="solid" />
        </SIMPLERENDERER>
      </LAYER>
      <LAYER type="featureclass" name="CITIES" visible="true" id="1">
        <DATASET name="CITIES" type="point" workspace="shp_ws-0" />
        <SIMPLERENDERER>
          <SIMPLEMARKERSYPMBOL color="255,0,0" width="6" />
        </SIMPLERENDERER>
      </LAYER>
    </MAP>
  </CONFIG>
</ARXML>
```

Here we can see that this view is composed of two visible themes: states and cities, and that the states theme is shaded in blue (RGB 0, 0, 255) while the cities theme is displayed as red (RGB 255, 0, 0) points. Moreover, we can see the view's extent is defined by an "envelope (-125° d" x d" -67° and 25° d" y d" 50°) and its map units are set to decimal degrees. Please note the XML trick of ending the current element with the </> end tag instead of a more verbose one with the element name typed out e.g. </DATASET>.

Now suppose the client looking at this view decided they wanted to 1) zoom in to an extent defined by a new envelope (-88° ≤ x ≤ -30° and 50° ≤ y ≤ 67°), 2) shade the state theme in yellow (RGB 255, 255, 0) instead of blue, and 3) have the result put into an 350x500 pixel landscape image. To accomplish this, the client software would formulate an XML

formatted request (note "REQUEST" element) and send it to the particular ArcIMS map server instance.

```
<?xml version="1.0"?>
<ARXML version="1.0">
  <REQUEST>
    <GET_IMAGE>
      <PROPERTIES>
        <ENVELOPE minx="-88" miny="30" maxx="-67" maxy="50.0" />
        <IMAGESIZE width="500" height="350" />
        <LAYERLIST>
          <LAYERDEF id="0" visible="true" >
            <SIMPLERENDERER>
              <SIMPLEPOLYGONSYPMBOL filltype="solid"
                fillcolor="255,255,0" />
            </SIMPLERENDERER>
          </LAYERLIST>
        </LAYERDEF>
      </PROPERTIES>
    </GET_IMAGE>
  </REQUEST>
</ARXML>
```

The map server would then respond (note "RESPONSE" element) to this request by returning the following XML code to the client identifying the name of the location of the resultant map image i.e. "usa\_RASTRO2953026.jpg" in the "C:\ArcIMS\output" directory.

```
<?xml version="1.0"?>
<ARXML version="1.0">
  <RESPONSE>
    <IMAGE>
      <ENVELOPE minx="-87.5" miny="30.0" maxx="-59.5" maxy="50.0" />
      <OUTPUT file="C:\ArcIMS\output\usa_RASTRO2953026.jpg"
        url="http://rastra/output/usa_RASTRO2953026.jpg" />
    </IMAGE>
  </RESPONSE>
</ARXML>
```

These examples demonstrate ArcIMS' use of XML for both data modeling and as a means of structured communication.

## AXIOMAP: XML-BASED GEOGRAPHIC DATA STORAGE

AxioMap is a different type of Internet mapping technology. First generation IMS technologies, exemplified by products like

*XML continued on page 6*

ESRI's MapObjects IMS, facilitated map display through run time generation of web standard image files i.e. \*.GIF or \*.JPG. This process is referred to as "image rendering." Second generation IMS technologies, such as ArcIMS, can operate in both image rendering and "feature streaming" modes. Feature streaming is the process by which vector GIS data is transferred from server to client (and optionally compressed/decompressed en route) and then processed by client-side applets. Feature streaming is powerful. It facilitates client-side interaction with data in its native format, thus facilitating resource intensive processes like spatial analysis, thematic mapping, and labeling by the client.

AxioMap avoids runtime vector-to-raster conversion or the need for client-side applets by actually storing vector GIS data in XML and VML (both supported, sans plug-ins, by Internet Explorer 5) and streaming that information to the client as plain text. To use AxioMap, data must first be converted into XML/VML format. This can be done using a translator supplied with AxioMap in the form of an ArcView extension. Using this extension, themes within the view are translated into a series of XML/VML files while the overall structure of the view (theme order, symbology, names, etc.) is stored in a file called layers.xml. These files are then placed in a folder on the web server adjacent to the AxioMap folder (which contains point symbols, help files, and several HTML pages).

When clients access an AxioMap-format site, standard HTTP links identify the location of the layers.xml and theme-specific XML files. These are then transferred to the client and rendered right inside the browser. Put another way, there is no map server software — XML files are simply transferred from server to client via HTTP. Depending on the amount of data being transferred, there will be an initial lag. However, once complete, map-rendering performance is impressive, especially with regard to thematic, or other attribute-based, mapping. There are several interesting demos of AxioMap, including a Michigan Atlas, at the following URL:  
<http://www.elzaresearch.com/landv>.

In closing, XML is a big deal. Not only will it likely transform the World Wide Web, it will also be working its way into web-oriented products such as ArcIMS and AxioMap as well as

traditional software applications such as ArcInfo and ArcView. XML provides a robust means of describing and modeling data and processes. GIS, which by its very nature is data and process oriented, is an ideal area for XML. Expect to see it more often.

#### REFERENCES

*The ArcIMS 3 Architecture: An ESRI White Paper* Redland CA: ESRI Press (2000).  
*ArcXML Programmer's Reference Guide* Redlands CA: ESRI Press (2000).  
*AxioMap: Application of XML for Interactive Online Mapping*. LandV. 2000.  
[http://www.elzaresearch.com/landv/axiomap\\_ie5.html](http://www.elzaresearch.com/landv/axiomap_ie5.html)  
*AxioMap User's Guide*. La Jolla CA: LandV (2000).  
 Cagle, Kurt. *XML Developer's Handbook* Alameda CA: Sybex, (2000).  
 Marchal, Benoît. *XML by Example* Indianapolis IN: Que, (2000).  
 Taig, Damin. *Creating a GIS-Enabled Web Site* ArcUser, Vol. 3, No. 4 (Oct/Dec 2000).

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## Announcement — Foundation Planning Tool

To borrow from a well-known slogan, The Orton Family Foundation is "looking for a few good communities" to put its CommunityViz™ ArcView extension through real world "paces" and applications. The Foundation started research and development of this new decision support tool in 1997.

CommunityViz™ is now ready for use in a select number of communities. The Orton Family Foundation is recruiting a core of dedicated users who can make the commitment of time and resources to help test CommunityViz™ applications, along with its training and support infrastructure, before the software is generally released. In return, communities selected by the Foundation for this Limited Release will have the opportunity to benefit from this forward-looking software tool to help visualize, comprehend, and quantify community planning and growth issues. To be considered, communities are asked to complete a Request for Qualification/Request for Proposals (RFQ/RFP) form that can be obtained at the CommunityViz™ Web site:  
[WWW.ORTON.ORG](http://WWW.ORTON.ORG)





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IMAGIN is a nonprofit 501(c)3 organization comprised of individuals and organizations interested in the use and application of geographic information system (GIS) technology in Michigan. Our members are committed to improving the quality and availability of digital data necessary to make good use of GIS. We believe that cooperation and open communication are necessary to achieve these objectives.

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Frank Sobie, Board Liaison/Information Resources Committee  
Erick Phillips, Chair/Information Resources Committee

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