Get Ready for Real Time: Up-to-the Minute Data Exchange in Urban Information Systems
By Greg Sanders, Web Projects Manager, Chicago Metropolitan Agency for Planning (CMAP)

The Chicago metropolitan area is a big place, especially if you measure it parcel by parcel. The six-county Chicago region is home to more than 8.3 million people on some 2.7 million parcels; Cook County alone has 1.6 million parcels. Every parcel has dozens of attributes of interest to planning and development agencies like ours (the Chicago Metropolitan Agency for Planning, or CMAP). Factor in the frequency of change to those parcel attributes—changes in land use, ownership, residency, structural alterations, employment, zoning and transportation access, to name a few—and you have a challenging data management project. This falls under the Stephen Wright axiom: "small world, but I wouldn't want to paint it." If you insist on parcel-level data, you commit to millions of records and daily updates.

I always wanted to have access to the most up-to-date, accurate, detailed data for every parcel in the region whenever I needed it, without making phone calls or sifting through paper archives. We got that, in a sense, when city and county agencies began posting parcel data on the web. Go to the website, type in a street address and up pops a list of data attributes, or a list of building permits or property sales.

But the thrill of those early web-accessible databases wore off when I needed to integrate parcel-level data into my own web systems. I displayed links so users could jump to county and city websites, but the users clamored for a one-stop information site that would pull together data from all relevant sources in one place. Pulling it together was easy if you had good partners who frequently sent you their data, but some of the information was outdated as soon as you posted it. And for some reason our partners were unwilling to send data updates every 45 minutes.

Fortunately, public agencies can now provide up-to-the minute data to their partners without even working hard. City, county, regional, state and federal agencies can make data available via web services that can be called by other servers at any time. This means that all partners can incorporate the most current data available into their own systems. The data can be fetched as needed from the most authoritative source, then displayed on a web form, pulled into a predictive model or used to calculate aggregate statistics.

Web services deliver the goods rapidly, typically employing XML (extensible markup language) for information requests and responses. Web services are not difficult to create, perhaps a bit more difficult to consume. They can be secured in a number of ways, including tiered access levels. The primary barriers to widespread implementation of web services across government divisions are organizational—the need for agreement on data definitions, concerns about security and the reluctance of some agencies to share information. The same factors that have hampered data sharing in the past can restrict the deployment of web services. But today, the technology for real-time data exchange is at a point where the benefits of data sharing far outweigh the costs.

How it works
Web services are fairly simple in theory and in practice, although they get more complex as the need to protect confidentiality increases. The core function of web services is to provide something—often data—to another server that has submitted a request. In urban information systems the typical scenario is an application that requires data about some parcel, census block or other geographic location. The requesting server could call a local database within its own internal network, assuming a copy of the data has been stored locally. That’s how it was done in the past. But instead, the data can now be fetched from a remote server via the internet. This is not quite as fast as a local data fetch across an internal network, but it can be surprisingly fast with sufficient bandwidth, server capacity and well-designed services. A large data fetch across a good web connection can be executed in well under a second. The remote data is embedded directly into the web page, a process called “transclusion” or inclusion of part of one document into another document.

CMAP’s “Full Circle” parcel information system is a good example of how this works in the real world. Users of our data system conduct property surveys for a variety of zoning, economic development and other purposes. They walk up to the property with a smart phone, open a browser, select a property address from the list and click “Go”. This sends a data request to CMAP’s web server, which retrieves some internally-
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**October 20, 2006**  
Last day to submit abstracts for URISA’s 2007 GIS in Public Health Conference

**October 30-November 2, 2006**  
URISA Caribbean GIS Conference  
Bahamas

**March 4-7, 2007**  
11th Annual Integrating GIS & CAMA Conference  
Flamingo Hotel - Las Vegas, Nevada

**April 15-18, 2007**  
2nd Annual Geospatial Integration for Public Safety Conference  
Marriott New Orleans

**May 20-23, 2007**  
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stored data from CMAP databases. But our web server is smart enough to look elsewhere for the most detailed, up-to-date data about the property’s assessed value, ownership, building permits and so on. Our web server issues consecutive data requests to various county and city services, renders the resulting data into HTML and sends the whole batch down to the user’s browser. All within less than a second. Now our user is looking at the most current, authoritative data available for the specified property, without knowing or caring where the data was retrieved from, or how it was called.

Why web services make sense for IT staffs
Web services can increase efficiency, interoperability, transparency and data quality. I’ve witnessed many over-hyped technologies over the years that turned out to be more headache than help, but web service architecture is a no-brainer. It’s a fairly simple, reliable path to more accurate data, less duplication of effort and fewer hours spent importing and exporting data. And it can deliver what some people still believe is a pipe dream: government agencies that share information in real time. Government systems that talk to each other. Here are some reasons why government IT staffs might want to adopt web services.

- **Reduce data discrepancies:** Web services can eliminate the need for multiple organizations to maintain separate copies of the same data. “Any time you have redundant copies of the data, you introduce the possibility of inaccuracy and discrepancies,” says Eric Sweden of the National Association of State Chief Information Officers (NASCIO). As soon as we import any dynamic dataset from a partner, it is obsolete. Without web services, we have to choose between posting outdated data in my applications or leaving the data out altogether.

- **Reduce duplication of effort:** Tally up all the hours you have ever spent importing other people’s data, or exporting your data to others. Is this a productive use of your time? If you could write a few lines of code to export or import the data in small, precise batches just at the moment it is needed, wouldn’t that make your life easier? After you have imported the data, you spend hours maintaining it. Wouldn’t you rather let the database owner maintain the data, and send you pieces of it as needed? (Trust is a key factor here—data consumers need to trust not only that the data is accurate, but that the provider’s web service will always be up and running.) If nothing else, think about the FOIA requests you handle on a case-by-case basis. You could be referring all FOIA requests to a web service portal.

- **Rationalize data access:** Traditional data sharing arrangements often depend on personal relationships between data providers and data consumers. If you know someone who works at the county clerk’s office, lucky you! But when your friend leaves to pursue a lifelong dream of becoming a master chef, you have to get acquainted with a new provider. Each time such changes occur, the data flow stops until you take the time and energy to get it going again. With web services, the servers keep on humming through reorganizations and early retirements.

- **Speed up the flow of data:**Traditional import processes are too slow to be useful in any rapidly-changing situation. Emergencies are a case in point. At a time of crisis, are IT managers likely to stop their work to send out updated disks or post updated files on FTP servers? With web services, all partners can operate from the exact same data at the same moment. Governments have been criticized for lacking systems that “talk to each other.” Web services do exactly that—they communicate information, at the system level, without any costly human intervention. Even non-emergency situations sometimes call for more rapid data dissemination than traditional methods allow. In Chicago, neighborhood gentrification (a steep rise in property values and rapid conversion of apartments to condominiums) sometimes happens in a matter of months, not years. Quarterly downloads of building permits, property transaction and land use data from city and county sources might be too infrequent to allow a timely response to such changes.

**Targeted cost recovery and improved customer service:** Public agencies often charge a fee for providing data, as a way of recovering costs associated with their data systems. Web services can allow agencies to provide targeted data feeds (say, tailored to a user’s own neighborhood) for a much lower cost than they might need to charge for exporting an entire data set. This is a win-win situation, since the customer can now get regular updates from the web service, and the provider can now market to smaller customers who can afford the limited service. Each user’s login ID can determine what data, and how much data, the user is permitted to extract.

Why web services make for better government

- **Efficient government:** Information is an under-utilized asset in government, according to Eric Sweden of the National Association of State CIOs. “Information that is not shared can’t be used by anyone other than the holder of that information. Information is an enterprise asset. If it’s not shared, are we getting the value out of it? We have a cost to maintain it, archive it, and protect it, but if we’re not sharing it, the enterprise is not benefiting from its full value. If information is not shared across the enterprise, then we find ourselves in the common scenario of maintaining
DenverGIS serves criminal offense data over the Web as part of its service delivery goals to keep citizens better informed.

3D view of downtown Denver’s infrastructure from an underground perspective

"GIS and related Web services are integral to daily business operations, strategic decision making, public communication and provide the foundation for the implementation of Denver’s 311 service delivery."

David Luhan,
GIS Manager, DenverGIS

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Michael Locatis,
Chief Information Officer, City and County of Denver

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This last column caps a whirlwind year for me, a year which gave me the chance to meet more of you, the truly amazing members of this great association. I have had the opportunity to see the strength of URISA’s positive core in action. Where Technology, Policy and Passion intersect, we find our members, the heart of URISA.

When I was talking with one of our members last week, he asked me what I say if someone asks, “What has URISA done for me lately?” I said here are some things for you to share.

- We have 26 great Chapters in the US and Canada sharing the URISA name doing the work at the local level. URISA Chapters have presented amazing conferences and educational programs during the past year. Hopefully, you’ve had a chance to participate in one or more of their events.
- We represent our members’ interests with the Federal Geographic Data Standards Committee in Washington, DC.
  - Wendy Francis, our Executive Director, has coordinated a unified response from URISA members to inform this key US federal agency. FGDC looks to URISA on issues key to development of national geospatial policy.
- Vitaly involved URISA members have crafted, in collaboration with the nationwide community of interest, an Addressing Standard currently under review by the Census Bureau.
  - Martha Lombard, Hilary Perkins, Ed Wells, Sara Yurman and Carl Anderson gathered and sifted mountains of information from local expert contributors across the US to forward the best practices template. Take a look at it at www.URISA.org.
- Our members and board, led by Shoreh Elhami and Juna Papajorgji, created GISCorps. GISCorps is at the heart of volunteer efforts for GIS professionals willing to give time and talent to helping in international needs and national disasters.
  - GISCorps, begun in 2003, has initiated nineteen projects on six continents in seven countries. Volunteers have given over 5,000 hours of volunteer time in GIS database design, web applications, disaster response and training. Our 1,016 volunteers live in 55 countries on all six continents. See www.URISA.org/giscorps.
  - GISCorps partners include the United Nations, GSDI, Peace Corps, CATHALAC, and other NGO’s around the world.
  - GISCorps transforms GIS into Giving International Service.
- The URISA Board provided an in-depth response to the Geospatial Line of Business Presidential Initiative Request for Information.
  - Among other things, we stated that, “enterprise computing requires agencies to work as partners, not competitors, and that they shift from independence to interdependence.” And that “...the first critical factor for coordinating the use of geographic information is the commitment to a clear, consistent governance model which fosters intergovernmental cooperation and makes a compelling business case for local participation. Open communications, decentralization of control, and respectful partnership agreements are key components to success.”
  - The RFI listed three scenarios for use of geospatial data. Please see our full text response, particularly Scenario 1, Emergency Response, at www.URISA.org.
- We have responded to cuts in the 2010 Census budget by asking Congress to reconsider and reinstate vitally necessary dollars to the budget.

In a letter to the Congressional Subcommittee on Commerce, Justice and Science, Committee on Appropriations, the URISA Board strongly supported full funding for the US Census Bureau in Fiscal Year 2007. We urged Congress to restore the funds cut by House and Senate Appropriations Committees and to oppose any proposals that would further reduce the total to pay for other programs.

- The letter, which was made available to all URISA members for reproduction to be sent to their US Congressional delegations, is on our website at www.urisa.org.
- We have endorsed and fully support the National States Geographic Information Council’s (NSGIC) Imagery for the Nation proposal. See www.nsgic.org for details of the proposal.
- URISA served as the founding member of the GIS Certification Institute (GISCI). GISCI organizations now include AAG, NSGIC, UCGIS and URISA. Launched in January of 2004, the program is now 1,268 GIS Certified Professionals strong.

Looking ahead, we have some wonderful educational opportunities. Check out the conference calendar on page 2 of this issue and plan to attend one or more events in 2007.

We are also growing a Professional Development program, have built a new website, and shared our vision of the geospatial professional with the Department of Labor. When I describe URISA to my friends and colleagues who are not familiar with us, the list of worldwide accomplishments and activities goes on and on. I have no doubt that we will continue to change the world. Thank you for the opportunity to serve in this amazing organization. I end my last column with my favorite quote that I shared with you earlier this year, one that describes URISA perfectly. These are the sentiments of a visionary who would have loved URISA.

“Never doubt that a small group of committed people can change the world; indeed, it is the only thing that ever has.”

—Margaret Mead
multiple instances of the same information. Without proper administrative controls to keep those instances in sync, we face the potential risk of inaccurate or inconsistent information which can significantly impact the effectiveness and efficiency of business decision making. It’s more expensive to maintain because those who need it are maintaining it redundantly.”

• **Better service delivery:** Web services can also enhance delivery of government services, Sweden says. “We’ve got a generation of people growing up here who ask ‘why not?’ They are saying to individual agencies, ‘Why do I have to tell you the same information again? I just gave the same information to this other agency. Aren’t you connected?’ They’re going to be challenging government, saying ‘I don’t want to go through this again.’ They’re looking for convenience, they’re looking for access to government via the web because they don’t want to make a physical trip to an office…. They’re computer-literate, they’re comfortable with computers, they do almost everything on a computer and they’re saying ‘Why can’t I deal with government on my computer?’”

• **Leveraging citizen participation:** Phil Windley, former Chief Information Officer for the state of Utah, sees value in going beyond government-to-government data exchange, by making some web services accessible to the public. “Putting data out—not just building e-government applications, but putting data out—helps you leverage an entire set of developers, product managers and other people who are interested in building applications with that data, in a very similar way to the way open source works. Call it ‘open data’…. The same reason why open source is successful in leveraging other people is a good reason to suspect that we can leverage other people if we make data available.”

• **Breaking down silos:** Silo-smashing is another fundamental benefit that web services can bring to government. Brand Niemann of the U.S. Environmental Protection Agency (EPA) says that data silos are “a systematic problem in the government. Congress funds IT systems by program within each agency…. We have 32 major systems that the states collect data for. We have legislation mandating these data silos. You’re not going to change that, but you can use web services to pull data together.” Both Niemann and Windley see data silos as inevitable in a decentralized government structure like ours in the United States. Both see the decentralization as generally positive, but the resulting data silos as problematic. Windley notes that “Web services allow us to keep the decentralized nature of government, and maintain the benefits that we see from that in terms of governance, and at the same time break down the barriers to providing good service to citizens. What you’d like is an application that takes data from at least three different agencies to build a single application…. With web services we can build that application because the data is available. Everybody gets to keep their own data, everybody keeps their own business processes, and yet the application can still be built and managed by some group. We keep the decentralization and the benefits that it has, and we can mitigate some of the disadvantages, particularly in the area of IT.”

• **Better decision-making:** Better decision-making is also at stake in the campaign for web-based information sharing. “If decision-makers have the information in front of them, they can make better decisions about where to direct resources,” Sweden says. “If that information is held back, they’re going to make decisions based on just what they know. If they don’t know everything, then clearly their decisions are going to be less effective. That’s where we get down to the value of information. If it is not shared, then it’s not impacting decision-making in all the circumstances where it could or should be.” Officials with an “executive dashboard” of data provided by various services, Sweden adds, can base their actions on the best information available.

• **Government transparency:** Windley sees value in the transparency that public web services can provide: “It does increase government transparency and accountability. Some people don’t like that but I think it’s probably what is required for good government.” This principle is echoed by District of Columbia city administrator Robert Bobb on DCStat web site: “The guiding principle for streaming city agency information to the web is to enable residents to better understand our government’s activities, thereby offering more opportunities to participate in improving the quality of life and promoting economic development in the District.”

• **Emergency response:** Lack of interoperability has been frequently cited as a contributing factor that hampered government responses to the 9/11 and Katrina disasters. Web services can deliver interoperability. No other current technology has a realistic chance of linking many disparate units of government in real time.

What is XML?
Extensible markup language is “a markup language for documents containing structured information.” (www.xml.com) XML has many uses, but since this article is about data we can focus on the fact that XML is a way of structuring data within a text document that travels easily over the internet via HTTP. Virtually any computer can request data from an XML web
service and read in the data contained in that document. The data may then be pulled into an application, displayed on the screen or stored for future use on a network hard drive.

They call XML extensible because it is not limited, the way HTML is, to a small set of standard tags like <TABLE>. XML tags can be devised to fit the data they represent. For example, address data can be sectioned into logical components (address number, street, and so on). Moreover, XML supports hierarchical data—data in which a single attribute may have one or more “child” attributes. For example, a property may (or may not) have one or more building permits, code violations or ownership transactions. These can be embedded in the XML, with the child data clearly shown at a more detailed logical level than the property itself.

XML’s greatest strength—its flexibility—is also the reason why it demands a great deal of agreement among users of a particular XML service.

**Service-Oriented Architecture (SOA) and Enterprise Architecture (EA)**

Web services are not just for data exchange with external partners; they also work well for cross-departmental sharing. A city government wishing to provide a one-page parcel profile for use by city employees might create a web form that pulls together property ownership, permits, physical characteristics, business licenses, court records, crime data, any public financing or subsidies, historic value of the structure, building condition and many other attributes. If a central IT department has control over all this data, great! You may not need web services. But typically these bits of information are housed and owned by various data stewards across several departments. A series of lightweight web services could be deployed as interfaces between departments.

But while web services work very well as add-ons to legacy systems, they are much more powerful when integrated into the core of an enterprise architecture. SOA, or service-oriented architecture, enjoys a great deal of support from IT professionals because of its loose coupling, code reuse, flexibility and emphasis on business process documentation. In these respects SOA is a specific form of Enterprise Architecture (EA), which is now strongly endorsed by many IT standards bodies—most notably within the federal government. The Federal Enterprise Architecture initiative led by the Office of Management and Budget (OMB) is changing the way federal agencies operate. OMB defines EA as “The explicit description and documentation of the current and desired relationships among business and management processes and information technology.”

**A Chicago web services network**

Data sharing via XML has such potential that in Chicago we formed a partnership of government and non-profit agencies dedicated to exchanging data in real time via web services. The partnership includes the City of Chicago, the Cook County Assessor and CMAP as well as several non-profit planning and research organizations (see www.chidataexchange.net). We call the partnership Illinois Data Exchange Affiliates (IDEA), optimistically hoping that our Cook County coalition will expand into a statewide network of linked services in the near future.

Chicago is not the only metropolitan area investing in web services for tracking administrative data. The District of Columbia’s DCStats (see http://dcstat.octo.dc.gov/dcstat/cwp/view,a,1204,q,491690.asp) currently sets the standard for real-time web services in municipal data systems. The DCStats website calls this a growing trend: “The District of Columbia is joining the national trend of local governments by providing public access to city operational data directly through the Internet. The District will stream data that the agencies gather through normal operations.

IDEA works on both technical and the policy questions related to data sharing. Many unanswered questions remain on the policy side, concerning security and confidentiality, obligations of public agencies to make data accessible via the web, and other thorny issues. On the technical side, IDEA recommends best practices and holds information sessions to encourage the deployment of web services.

IDEA’s core messages are:

- Government works best when information is shared across divisions
- Society works best when public information is widely available
- Web technology gives unprecedented opportunities for making data available
- Ensuring access to public data requires clear guidelines on how, when and with whom data is to be shared

As a result of the IDEA collaborative, CMAP’s partners from planning and development agencies can log in to our web site and see not only all the data that CMAP has on file, but also a batch of data fields retrieved in real time from the Cook County Assessor’s office. The latest data, straight from the source. Since the Assessor’s teams continuously sweep through various parts of the county updating assessments, this is an important feature. Other IDEA-enabled web sites include data applications developed by non-profit organizations to fetch building permits or property transactions matching user-entered criteria from city and county databases.

John Karnuth, Deputy Commissioner of the City’s department of Planning and Development, says “Generous sharing of information and its standardization contributes to better decision-making, efficient program development and delivery of services. The mission and purpose behind IDEA is to create policies and standards that will allow for the free flow of information between government agencies, not-for-profit organizations, community groups, average citizens, and even business interests.”

Derrick Thomas, IT Director for the Cook County Assessor’s office, says “sharing data with IDEA via highly efficient web services helps the Assessor’s Office maintain a level of transparency, continued on page 9
Welcome New Business Members

North River Geographic Systems, Inc. provides geographic systems and services to both public and private organizations. Although a new company, we have 14 years experience in the field of Geographic Information Systems.

Here are a few of the services that North River Geographic Provides:
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URISA’s GISCorps received a 2006 Special Achievement in GIS Award at the ESRI User Conference in San Diego.

URISA News
as we pride ourselves on providing accurate data and fair assessments."

Cliff Wagner of Topiary Communications, who coded the Cook County Assessor’s web service, says the service was designed for agility and easy re-use. “My goal was to design something that was flexible. Right now it’s going to be feeding off a SQL Server and the primary consumer of the data will be CMAP. But [the Assessor’s office] already knew that there were other people who want access to the data. The database component I have completely separated, so that if they need to switch over to IBM or Oracle, they would be able to quickly port this over to another system.”

“The big thing was setting up an authentication system where based on the user, different things are possible,” Wagner says. “One thing they’ve suffered through recently is data miners who essentially screen-scrape their application. Their service gets hit on a regular basis by lawyers and real estate-related industries. They started cutting those people off, but they hope to offer the web service so that a lawyer in Evanston, for instance, could subscribe to the service--and for less than the cost of buying the full tables of all the county data, they would be able to get only Evanston data. That’s all that they want so that’s all they would pay for. It would give the opportunity for more of an a la carte approach, and it would also allow for limiting the number of searches that an organization could pull in a day.”

Web service networks at the federal level

In 2001, the EPA’s Brand Niemann had a small problem with an expensive solution. “We had a need to upgrade a web site for the Local Emergency Planning Committee or LEPC to put this database on the web and eventually to make it accessible by telephone,” Niemann says. “Like many software projects, we asked the contractor to estimate the project. But EPA needed to do it for less money and deliver it faster. At about the same time, I became aware of VoiceXML… I

said, ‘we can do this for $2000 with in-house stuff in a few weeks…. The result was that you could dial an 800 number, enter your ZIP code, and it would read the database.’

Niemann went on to chair the federal Chief Information Officers (CIO) Council’s XML Web Services Working Group. As the EPA’s self-described “web services evangelist,” Niemann knows both the power and the problems associated with broad web services implementations. Over the past few years web services have become widespread in the federal government, from EPA to the Departments of Justice and Homeland Security.

In 2002 the E-Government Act was signed into law, requiring, among other things, that the Office of Management and Budget establish “policies which shall set the framework for information technology standards for the Federal Government developed by the National Institute of Standards and Technology … maximizing the use of commercial standards as appropriate, including the following:

(A) Standards and guidelines for *interconnectivity and interoperability* as described under section 3504 (italics added).

(B) Consistent with the process under section 207(d) of the E-Government Act of 2002, standards and guidelines for categorizing Federal Government electronic information to enable efficient use of technologies, such as *through the use of extensible markup language* (italics added).

(C) Standards and guidelines for Federal Government computer system *efficiency and security*” (italics added).

For federal project administrators, some of the biggest challenges have been (a) motivating data managers to adopt standard practices, and (b) achieving “semantic interoperability” across governmental divisions. As for motivating data managers to participate, Niemann says, “You’ve got to have a people process to make that happen. We call that ‘communities of practice.’ You bring them together, show them this new way of doing things—and that you have a mandate. Carry it out collectively: everybody steps up to do a little piece of it. You begin to see win-win situations. People discover the benefit of it through networking.”

But with widespread participation come new headaches. “We knew our own vocabulary, but we weren’t working with anyone else’s data. So we had to solve the problem of what we call semantic interoperability.” Semantic interoperability refers to the mapping of terminologies from one “namespace” (department, community, discipline, etc.) to another namespace. Data applications that cross organizational divisions usually encounter differences in terminology, ontology and taxonomy. Semantic interoperability is what allows these applications to structure such diverse information in meaningful ways.

Today, EPA manages the National Environmental Information Exchange Network (www.epa.gov/onestop/index.html) for exchanging data from the federal to the state and local levels. Meanwhile, in 2002 the Department of Justice (DOJ) put together a task force of 32 federal, state, local and international organizations to design an XML standard specifically for criminal justice. The result was the Global Justice XML Data Model (JXDM). The purpose of the Global JXDM was “to provide a consistent, extensible, maintainable XML schema reference specification for data elements and types that represent the data requirements of the general justice and public safety communities.” The JXDM was specifically intended to link the federal DOJ with their state partners.

In 2005 the U.S. Department of Homeland Security (DHS) joined DOJ in announcing the first release of the National Information Exchange Model (NIEM). NIEM “establishes a single standard XML foundation for exchanging information between DHS, DOJ, and supporting domains, such as Justice, Emergency Management, and Intelligence.” The NIEM was designed to expand the Global JXDM data model, adding new data components while maintaining compatibility with JXDM.

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Web service networks at the state level

While serving as the state of Utah’s CIO, Phil Windley published a “Web Services Manifesto” (see www.windley.com/archives/2002/07/03.shtml), encouraging state agencies to post information via web services whenever possible: “Let’s face it, if we’re going to build an application that lets someone query a database, it’s a shame not to return XML since we can do it for little additional cost and the potential benefits are huge.” The policy implications were clear: “All queries for data from a web server should produce at least XML. If human readability is required, post process the XML with XSLT. As an example, if I go to the professional licensing division and query about doctors, the application should, at a minimum, produce XML.”

In 2005, the National Association of State CIOs (NASCIO) issued a “call to action,” advocating information sharing within and between state governments. Eric Sweden, editor of the NASCIO publication PERSPECTIVES - Government Information Sharing: Calls to Action says NASCIO’s position speaks to “the need to share information across government lines of business, and also to share information across various levels of government: from federal to state to local government. Some of the circumstances that are driving that need include public health and the war on terrorism. In pandemics, epidemics, terrorist events, we have to have fast, effective communication across jurisdictions to prevent, mitigate or respond to these kinds of events. That’s what NIEM is all about.”

Examples of web service implementations here in Illinois include the Illinois workNet web system. Several departments each owned a subset of the data pertaining to federal employment training programs, according to Illinois workNet Coordinator Jeanne Kitchens. By adopting services, the various data sources could continue to be maintained by their current stewards, but accessed by all the partners.

Bridging the gap between federal, state and local agencies

There is a growing realization that no government data system is complete unless it connects with all tiers from federal to local. The NIEM project is a good example: state CIOs have gotten involved with this federal effort in order to link their own networks with those of their counterparts at other levels. Sweden says, “The NIEM project is actively seeking participation from state and local governments in this initiative. The interests of state and local government are extremely important to the NIEM initiative. NIEM has named a director of outreach and he is specifically devoted to state and local government, to gain their active participation.”

NIEM Outreach Director Tom O’Reilly can be reached at toreilly@ncja or 202-204-6026.

Barriers to web service implementation

Three big challenges must be overcome before a vibrant web services network can be created. First, security and confidentiality must be managed; second, data definitions and terminology must be agreed upon and standardized; and third, a general reluctance to share data must be overcome.

Managing security is always a concern, Sweden says. “That is a requirement when we talk about information sharing—maintaining security, privacy, authentication…. Along with that information going from agency to agency, we’ve got to be sending information about authentication and authorization: the metadata regarding security and privacy.”

Still, there is always the risk that data will fall into the wrong hands whenever it leaves the home office. This is not unique to web services, but is inherent in all data sharing. “Opening up information carries risk,” says NASCIO’s Eric Sweden. “You will never get to zero risk.” But, Sweden adds, “Information that is not shared cannot be used. Think of information as an asset. Are we getting full value out of the asset?”

Agreeing on data definitions can be as daunting as wrestling with confidentiality concerns. If you think concepts like “address” are simple and straightforward, read the Federal Geographic Data Committee’s “Street Address Data Standard” (http://urisa.org/node/227). Be sure to read and memorize all four parts.

Finally, many public agencies are unsure of their obligations to provide or withhold access to data. The Freedom of Information Act (the federal statute and its state-level counterparts) is generally vague about the obligation to provide web access to digital records. Some agencies struggle with HIPAA (Health Insurance Portability and Accountability Act of 1996) and counter-terrorism guidelines that restrict the release of some data.

A note on GML and PMML

XML’s great strength—its almost infinite extensibility—also dictates that to be useful, XML schemas must be agreed upon by all parties in an exchange network. That’s why major IT industry players have banded together to hammer out specific XML standards for specific purposes. Two of these are Geospatial Markup Language (GML) and Predictive Model Markup Language (PMML). GML allows geospatial data to be transported as XML, while PMML does the same thing for statistical and data mining models. Both these technologies are maturing to the point where we are starting to see applications in production. Either could be the subject of dedicated articles, but I at least wanted to mention them here.

Conclusion

The time is now for real-time data linkages among public entities, and real-time data feeds to the public. As long as sufficient attention is paid to issues of standards and security, data sharing becomes relatively simple and sustainable. Government efficiency, accountability and performance can be enhanced, while the public’s role in deriving meaning from the available data can be encouraged.
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