

Executive Summary

Washington, DC's Geographic Information System (GIS) Master Address Repository (MAR) is a database of addresses, web services, and web pages. The capabilities of the MAR are made available to DC agencies and the public as a series of services that receive ASCII strings and return XML. The MAR was developed by DC's Office of the Chief Technology Officer (OCTO) and supports:

- **Validating addresses** - confirms that an address exists in the District with correct spelling and formatting.
- **Geocoding addresses** - locates addresses to specific structure rather than prorated along a street.
- **Serving as a powerful gazetteer** - In addition to locating addresses, the MAR also finds intersections, [4th Street, NW, and D Street, NW], blocks [4th Street, NW between D Street and E Street, or the 400 block of 4th Street, NW], and place names [White House].

Historically, the format and quality of address information has varied greatly across government systems. There was no official source of correct addresses. This made it nearly impossible for governments to identify all the activity associated with a given address. Now, addressing standards are built into the MAR. These standards define the valid components of DC addresses (AID, Number, Street Name, Street Type, and Quadrant), including their correct formatting and spelling.

The MAR allows the District government to compare information across databases and agencies more easily. For example, former Mayor Anthony Williams and current Mayor Adrian Fenty have attempted to maintain a "no wrong door" policy for residents seeking human services. However, this requires that systems be able to track clients across human services agencies. Addresses are the key component of that problem. The Office of the Chief Technology Officer's Human Services Modernization Program (HSMP) has to normalize, validate, and match address data coming from various departments and agencies in real time.

The MAR employs a Service Oriented Architecture (SOA), and is easily deployable and widely used throughout the District. This is critical since an address is the most common and important location key in government.

The MAR has been in operation since August 2005. To view, visit:

:

- MAR Sample Client: <http://dcatlas.dcgis.dc.gov/mar/>.
- MAR Explanation: <http://dcgis.dc.gov/dcgis/cwp/view,A,1192,Q,492656.asp>
- MAR Web Services:
<http://citizenatlas.dc.gov/newwebservices/locationverifier.aspx>
- Public Websites employing the MAR:
<http://dcgis.dc.gov/dcgis/cwp/view,a,1191,q,490745,dcgisNav,%7C30634%7C.ap>

A. Project Title

Washington, DC Master Address Repository

B. Description of Business Problem and Solution

Washington, DC's Geographic Information System (GIS) Master Address Repository (MAR) is a database of addresses, web services, and web pages. The MAR has been in operation since August 2005. The capabilities of the MAR are made available to DC agencies and the public as a series of services that receive ASCII strings and return XML. The MAR was developed by DC's Office of the Chief Technology Officer (OCTO) and supports:

- **Validating addresses** - confirms that an address exists in the District with correct spelling and formatting.
- **Geocoding addresses** - locates addresses to specific structure rather than prorated along a street.
- **Serving as a powerful gazetteer** - In addition to locating addresses, the MAR also finds intersections, [4th Street, NW, and D Street, NW], blocks [4th Street, NW between D Street and E Street, or the 400 block of 4th Street, NW], and place names [White House].

Innovations employed by MAR include:

1. Through Service Oriented Architecture (SOA), the MAR is easily deployable and widely used throughout the District. This is critical since an address is the most common and important location key in government.
2. A GPS/mobile video survey was used to confirm 130,000 locations and identify any additional addresses that may have been missed.
3. As a densely developed urban area, the District has a many-to-many relationship between addresses and properties (land). The MAR was developed to handle this relationship and promote property and address interaction and use regardless of the complexity of relationship between the two primary keys.
4. The MAR geocoding service employs a Commercial-off-the-Shelf (COTS) spell checker that uses a custom dictionary to accommodate multiple spellings and input from users. The dictionary contains only valid DC street and place names.
5. In any geocoding system, there is an inherent tradeoff between the need to help users handle incorrect or misspelled addresses and the risk of returning a false positive match. The MAR Web Services assigns a "confidence score" for each candidate address returned to a user. The service empowers the user to decide which candidate address to select.
6. There are occasions when a user believes he or she has a real address that is not in the MAR. If a submitted address does not score a 100 percent match to a structure, but does match a street address range, the service returns a link to a web page where the address can be submitted for DC GIS staff review. A tracking number is assigned, allowing users to follow the progress of their address in the MAR on the web.

7. The MAR includes public housing, private and federal campus, and military base addresses that used to be glaring omissions in District government address records. Staff contacted each institution and assigned addresses to each structure using the institution's naming/address system.

C. Significance of the Project to the Improvement of Operation of Government

Historically, the format and quality of address information has varied greatly across the District of Columbia government systems. There was no official source of correct addresses, making it nearly impossible for governments to identify all the activity associated with a given address. Now, addressing standards are built into the MAR. These standards define the valid components of DC addresses (AID, Number, Street Name, Street Type, and Quadrant), including their correct formatting and spelling.

The MAR has been in operation since August 2005. The MAR allows the District government to standardize and compare information across databases and agencies more easily. For example, former Mayor Anthony Williams and current Mayor Adrian Fenty have attempted to maintain a "no wrong door" policy for residents seeking human services. However, this requires that systems be able to track clients across human services agencies. Addresses are the key component of that problem. The Office of the Chief Technology Officer's Human Services Modernization Program (HSMP) has to normalize, validate, and match address data coming from various departments and agencies in real time.

As shown in Figure 1, the MAR employs a Service Oriented Architecture (SOA) and is easily deployable and widely used throughout the District. This is critical since an address is the most common and important location key in government. The following DC agencies are using the MAR in their daily business processes via various applications:

- Child and Family Services Agency (CFSA)
- Department of Consumer and Regulatory Affairs (DCRA)
- Department of Health (DOH)
- Department of Human Services (DHS)
- Department of Mental Health (DMH)
- Department of Parks and Recreation (DPR)
- Department of Public Works (DPW)
- Department of Small and Local Business Development (DSLBD)
- Department of Youth Rehabilitation Services (DYRS)
- District Department of the Environment (DDOE)
- District of Columbia Public Schools (DCPS)
- Homeland Security and Emergency Management Agency (HSEMA)
- Mayor's Citywide Call Center
- Metropolitan Police Department (MPDC)
- Office of Planning (OP)
- Office of the Chief Technology Officer (OCTO)
- Office of Unified Communications (OUC)

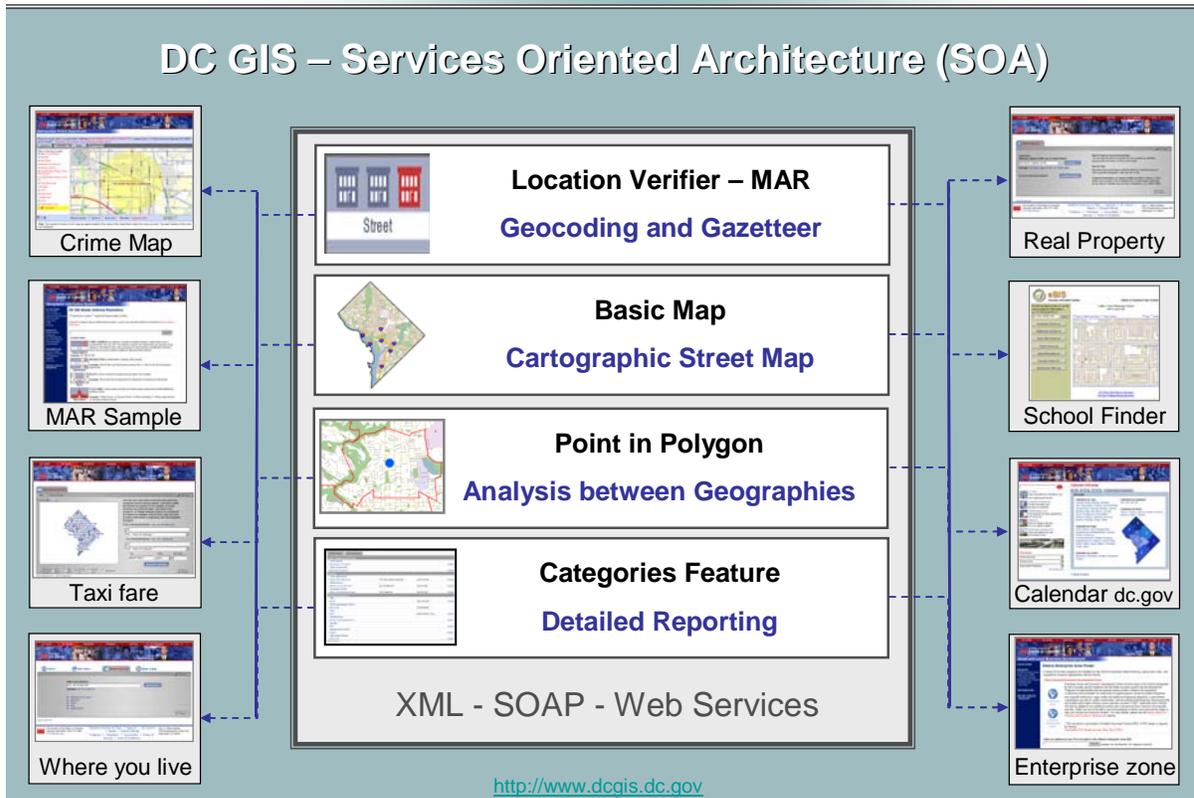


Figure 1: The middle column of shows the family of DC GIS Web Services of which the MAR is part. The services including the location verifier can be chained together to form applications like those in the left and right columns. Clicking on the diagram will take you to various <http://DC.gov> applications supported by the MAR.

D. Public Value of the Project

The MAR cost the District approximately \$400,000 to develop. The majority of the funding was for data collection and processing. The MAR is now staffed by a part-time employee and one full-time contractor. The MAR database averages 2200 calls per hour. The calls come from numerous websites and agency systems.

The real value has come from the MAR's widespread adoption and application to task across the District government. The District has a complex government that includes state, county, and local functions, and the MAR improves the speed and accuracy of transactions across a broad spectrum of services.

- 911 dispatchers can find locations they couldn't locate before.

2007 NASCIO Award Submission: Digital Government: Government to Government
Washington, DC Master Address Repository

- Budget analysts geocode the addresses of taxpayers. The returns can then be compared with land use trends to help predict future revenues. The MAR is just the geocoding service; the private taxpayer application remains in its native system.
- City planners have embedded the MAR in several applications, including one that compares the address with historic structures and districts.
- Homeland Security managers are embedding the MAR in DC's latest version of WEBEOC so that locations are verified and mapped upon entry during emergency events.
- Firefighters geocode all their calls against the MAR, then use the data to measure their own performance.
- GIS analysts benefit from the MAR because end users can do their geocoding and give them clean data to work with.
- Permit reviewers can now enter one address and then use the address identifier to pull data from several different systems.
- Police officers' forms are being automated so that the address is verified and spelled correctly in field.
- Service requests phoned into the Mayor's Call Center are geocoded within five minutes of the call.
- Social workers across various programs are able to identify common clients based in part on their MAR-assigned address identifier.

Most importantly, the MAR allows the District government to compare information across databases and agencies more easily. For example, former Mayor Anthony Williams and current Mayor Adrian Fenty have attempted to maintain a "no wrong door" policy for residents seeking human services. However, this requires that systems be able to track clients across human services agencies. Addresses are the key component of that problem. The Office of the Chief Technology Officer's Human Services Modernization Program (HSMP) has to normalize, validate, and match address data coming from various departments and agencies in real time.

Another example is from the DC Office of Planning. To quote the Chief Information Officer of the DC Office of Planning, "When I joined DC government, the city had 'master' address lists from more agencies than I could count, but no one authoritative source that could tell me the addresses that actually existed. The Master Address Repository [MAR] assembled by the Office of the Chief Technology Officer's DCGIS staff was an essential element in a revolutionary change in how spatial information is managed in DC. Its impact has been much more significant than simply being a combination of all of the other master lists. It established the principle that DC agencies look to a common repository for spatial data—not just a central bucket holding all of their individual data sets, but shared ones managed for the benefit of all. It was the first major example of spatial web services in the District, and was immediately seized upon by a variety of users."

To view, visit:

- MAR Sample Client: <http://dcatlas.dcgis.dc.gov/mar/>.

2007 NASCIO Award Submission: Digital Government: Government to Government
Washington, DC Master Address Repository

- MAR Explanation: <http://dcgis.dc.gov/dcgis/cwp/view,A,1192,Q,492656.asp>
- MAR Web Services:
<http://citizenatlas.dc.gov/newwebservices/locationverifier.asmx>
- Public Websites employing the MAR:
<http://dcgis.dc.gov/dcgis/cwp/view,a,1191,q,490745,dcgisNav,%7C30634%7C.ap>