My Neighborhood Map

Building a Neighborhood Guide to Seattle

City of Seattle

Neil Berry
GIS Applications Developer
Department of Information Technology
City of Seattle
neil.berry@seattle.gov

http://www.seattle.gov/myneighborhood

My Neighborhood Map

For the Resident, a Neighborhood Guide to Seattle City Services

By: Neil Berry

Creating a rich user experience for Seattle residents is the goal of the new MY NEIGHBORHOOD SERVICES web application. Updating the My Neighborhood Services for the City of Seattle involves moving an existing ARCIMS/.NET application to ArcGIS Server 9.2 and incorporates new AJAX and ATLAS technologies. Making extensive use of the .NET Framework 2.0, the new application will be faster, more interactive, and provide greater data security. The tools included with ArcGIS Server 9.2 and Visual Studio 2005 allows robust application environment and maximum flexibility of site design. The new application is a multi-service application, tying together map web services created by ArcGIS Server and web services serving up data from Oracle and SQLServer databases. Presentation will include discussion of the pitfalls and solutions of putting new technologies together to create a truly unique local government website

http://www.seattle.gov/myneighborhood

My Neighborhood Map

It all starts with an idea.....

After a visit to Baltimore, Mayor Greg Nickels proposed a new City web map site loosely modeled after Baltimore's Citistat

- Serve as a one stop shop of City services, projects, and other information
  - Services: Neighborhood services such as police precincts, fire stations, libraries, parks, neighborhood service centers
  - Impacts: What is happening in the neighborhood that "impacts" quality of life or mobility.
  - Statistics: Departmental performance measures based on accountability agreements with the Mayor's office, such as crime statistics
- Simple intuitive user interface
- As a portal, furnish links to department end pages, minimizing mouse clicks
- Provide a coherent, uniform data reporting mechanism or format available to the public on what services City department

http://www.seattle.gov/myneighborhood

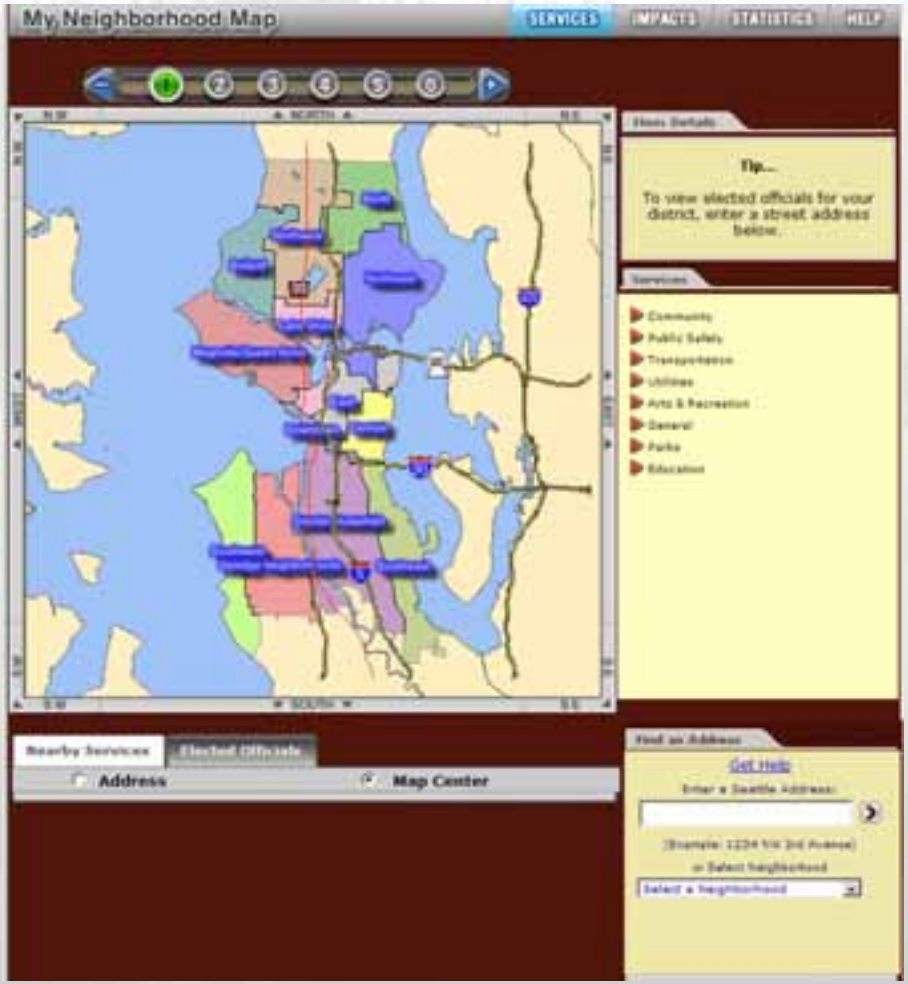
My Neighborhood Map

- Design Goals
  - Minimum number of clicks to end page
  - Consistent user interface
  - Minimal use of tools – no identify tool
  - Fixed map size
  - Fixed zoom levels
  - < 5 second response time
  - Ease of adding new services, impacts, statistics to application
  - No data creation, only use available departmental GIS data

- Design Constraints
  - City policy dictates development at 800X600 pixel resolution
  - No plug-ins other than Acrobat Reader

My Neighborhood Map

- Meeting Design Goals
  - Only tools: pan and zoom
  - Fixed zoom extents
  - Map click centers map
  - Icon click raises additional item detail
  - Icons have rollover behavior
  - Adding new point data easily accomplished without scheduled deployment
  - From time icon is available and visible, 2 clicks to end page
  - Response time < 5 seconds
  - T We do create data often
  - T Impacts and Statistics are in fact mini applications



http://www.seattle.gov/myneighborhood

My Neighborhood Map

- Implementation goals (wishes and dreams)
  - Implementation in phases and commenced July 2005
  - Mileposts called for initial rollout by end of 2005, an aggressive schedule!
    - Phase 1 to start with limited (16) departmental services
    - Phase 2 to rollout first statistics and impacts by end of June 2006
    - Complete implementation by end of 2007

- How it actually happened
  - Hired professional PM September 2005
  - Programming commenced October 2005
  - Delivered first prototype January 2006
  - Deployed to production March 2006 with 16 services
  - Deployed first Statistics application, Crime Stats, September 2006
  - Deployed first Impact application, Real-time Fire 911, February 2007

Bumps along the way

- Architecture change
  - Initial approved plan was to distribute ArcIMS components across a firewall and write output image to the DMZ.
  - Plan was disallowed 2 months after programming had started
- Prototyping
  - To reach the design goals we had to figure how to use ArcIMS minimally
    - MXD's were too cumbersome
    - AXL gave us better cartography
  - Without a complete .NET connector, spend time building one
    - Was much easier to build than expected
    - .NET is easier to work with than AXL

More Bumps

- Data
  - By far the biggest impact on schedule and development has been lack of data.
  - Tabular data on SQL Server and spatial data on Oracle
  - Departmental resistance
- Learning curve
  - Oracle's SDO_geometry functions have not been easy to master or tune
  - Some SDO_geometry functions are very expensive to implement and figuring out which worked best took time
  - Getting all the custom javascript just right was labor intensive

Solutions

- Spatial queries
  - Use native SQL spatial extension if available (Oracle Spatial, DB2, Informix)
  - At 9.2, using ST geometry data type, most of the functions that MNM uses can be duplicated without Oracle Spatial
    - Oracle's10g Express edition is free, stripped down, very useful for prototyping. Load the data as ST geometry and develop, tune, and promote working code to production.
    - Oracle 10g Standard Edition One @ $750 for minimum of 5 users up to $4995/cpu (max 2 cpu's) for unlimited users, will handle 500Mb data, includes Locator, but ESRI's St geometry data offers more spatial SQL functions
  - When aggregating features consider the number of features being unioned and performance may be enhanced by multiple nested unions.
  - Use intersection and pointonsurface functions for labeling features over the map. An easy way to label any polygon feature
  - Allows MNM to depict points with icons to have click and hover events independent of the map image -- no identify tool

Some SDO_geometry Examples

- Projecting (latlong to State Plane North)

```
procedure getLatLong(lat in float, lon in float, rfc  out rfcResult) as latlon MDSYS.SDO_GEOMETRY;
xy MDSYS.SDO_GEOMETRY;
vDistr  varchar2(63):='';
x float:=0;  y float:=0;
begin
latlon := MDSYS.SDO_GEOMETRY(2001, 8265, mdsys.sdo_point_type(lon, lat, NULL), NULL, NULL); xy :=
SDO_CS.TRANSFORM(latlon, 41177);
```

- Query (get park polygon centroid within extent

```
SELECT PMA ID, PMA_NAME NAME, ADDRESS, X, Y
FROM ( SELECT PMA,PMA_NAME, INITCAP(NVL(LU.STREETADDRESS,A.ADDRESS))
ADDRESS, TT.X, TT.Y, RANK() OVER (PARTITION BY PMA ORDER BY OBJECTID DESC) R
FROM SEASTATS_PARKS A,
TABLE(SDO_UTIL.GETVERTICES(SDO_GEOM.SDO_CENTROID(A.SHAPE,0.0005))) TT, LAYERSURL LU
WHERE A.PMA!=0 AND a.USE!='GF' AND LU.LAYID=:layid AND LU.SITEID=A.PMA
AND TT.X>=:minX AND TT.Y>=:minY AND TT.X<=:maxX AND TT.Y<=:maxY
AND A.OBJECTID IN ( SELECT TT.OBJECTID FROM SEASTATS_PARKS TT
WHERE SDO_FILTER(tt.shape, mdsys.sdo_geometry(2003,NULL,NULL,
mdsys.sdo_elem_info_array(1,1003,1), mdsys.sdo_ordinate_array(:minX ,:minY ,:maxX,:maxY)),
'querytype=WINDOW') = 'TRUE' ) ) WHERE R=1
```

Solutions Continued

- Stored Procedures
  - Well tuned stored procedures increased performance on average of 1 to 1.5 seconds
- AJAX and iCallback to the rescue
  - Make many short round trips to DB rather than one large query
  - Truncate geometry strings returned to client. Rounding a coordinate strings to an integer greatly reduces the xml payload.
  - Dropped complex and heavy weight .NET server controls in favor of light weight HTML controls
  - Reduced code by 2/3 and overall dropped total response time to average of 4.5 seconds or less
- Web Services
  - Using web services as a vehicle to access the DB works very well but have not bench marked it. There maybe some performance considerations
  - Gives good performance for geocoding addresses
- Moved all database tables to Oracle
  - Without cross platform joins, performance improved by at least a second per query

My Neighborhood Map

- Data and Politics
  - Work more closely with departments to gain access to data
  - By demonstrating successful deployment and site statistics, departments are working hard to prepare data for mapping
  - Provide mashup capabilities for departments to add their own data using MNM maps

My Neighborhood Map

- On going development
  - Exposing our API to other city departments to let them call our application within their page to provide “map to” functionality
  - Polygon and line rendering with GML
    - Impacts such as street closures, residential parking zones, emergency detours, street construction or utility work need representation that allows user to click on a line or hover on a line and link to end page the same way as point data now works
  - Drag and drop panning
  - Pre cached map tiles
  - Geocoding by common place name and intersection
  - User query function
  - Routing

My Neighborhood Map

Neil Berry
GIS Application Developer
City of Seattle
PO Box 94709
Seattle, WA 98124-4709
206-386-1125
Neil.berry@seattle.gov