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GIS Geospatial Allocation System

Maricopa County, Arizona

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GIS Geospatial Allocation System

Recorder/Elections Maricopa County, Arizona

1. Abstract

The foundation of our electoral system is comprised of building blocks into which voters must be placed. These blocks determine the voter's representation at all levels of government as well as what taxes they will be assessed. Correct voter placement and boundary creation is critical. Our Geospatial Allocation System assigns voting districts (city, fire district, school district, voting precinct, etc...) to individual voters and establishes the spatial relationship of districts for ballot creation and a variety of other customized uses.

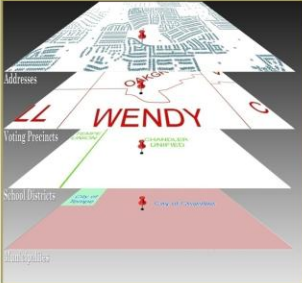
2. Description

Prior to implementing the new system, the GIS department maintained a bifurcated system; the digital mapping system and the traditional street segment system. Seeking a more accurate and efficient process resulted in the implementation of a purely spatial approach.

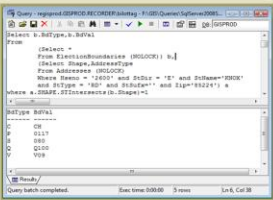
Upon identifying a voter's address, the system will give the voter a latitude/longitude coordinate and then allocate districts using spatial querying technology:

Assigning Districts to Voters

- When a voter registers or changes their address, districts are assigned based on the given address.



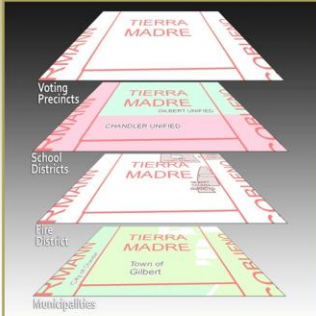
Spatial databases can make integrating GIS in existing applications easier.



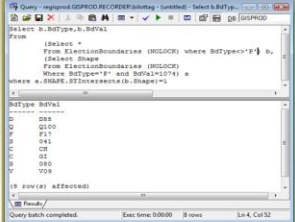
```
SELECT b.BidType, b.Suffix  
FROM  
(  
  SELECT *  
  FROM ElectionBoundaries (NOLOCK) a  
  WHERE Shape, AddressType  
  FROM Addresses (NOLOCK)  
  WHERE Name = 'Wendy' and Suffix = '1' and Shape = 'POINT'  
  and Suffix = '1' and Suffix = '1' and Suffix = '1'  
  WHERE a.Shape.STIntersects(b.Shape) = 1  
) a  
WHERE b.BidType = 'Voting Precinct'
```

Election Setup

- Determine which voting districts fall within a voting precinct for ballot creation.



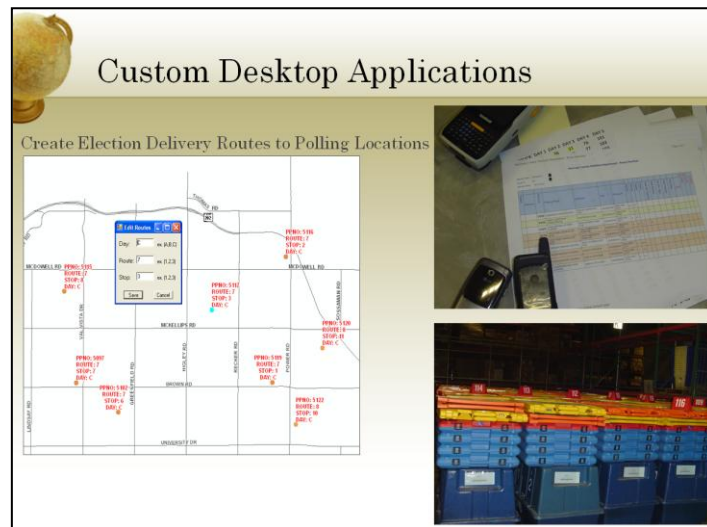
SQL Spatial Query



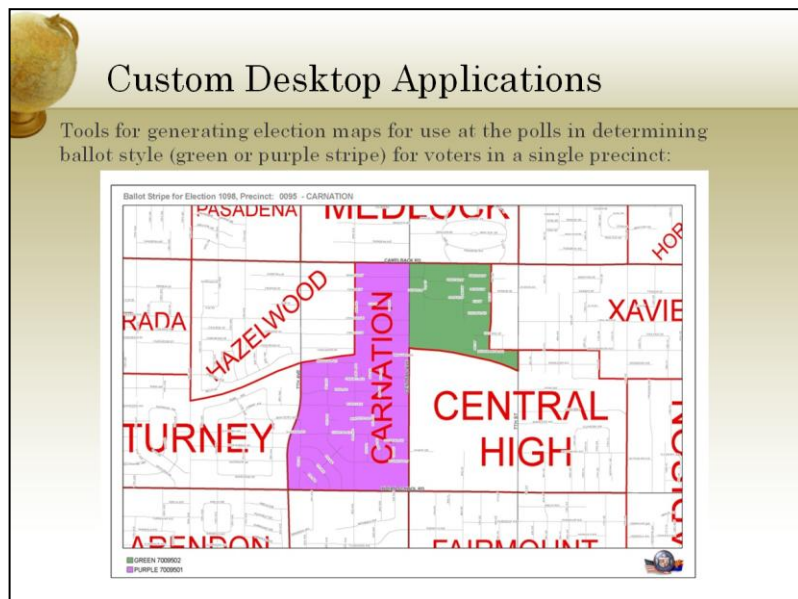
```
SELECT b.BidType, b.Suffix  
FROM  
(  
  SELECT *  
  FROM ElectionBoundaries (NOLOCK) a  
  WHERE Shape, AddressType  
  FROM Addresses (NOLOCK)  
  WHERE Name = 'Wendy' and Suffix = '1' and Shape = 'POINT'  
  and Suffix = '1' and Suffix = '1' and Suffix = '1'  
  WHERE a.Shape.STIntersects(b.Shape) = 1  
) a  
WHERE b.BidType = 'Voting Precinct'
```

Once the spatial data has been input into the database, the resulting dataset is used in voter registration and ballot creation.

The system has also been customized to allow for the creation of voting equipment delivery routes for the warehouse to use to get materials to the polling locations in the most efficient manner possible:



It has also been customized for the creation of precinct-specific maps reflecting district overlaps for poll workers to use at the polls to validate that the voter is in the correct location, or that the voter is being provided with the correct ballot:



3. Worthiness

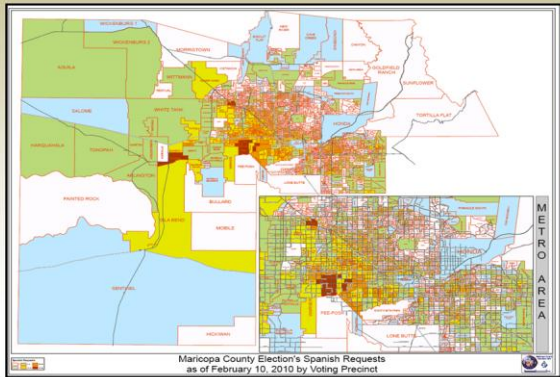
An accurate foundation results in an accurate election—if voters are not placed into the correct district, are not provided with the correct ballot, do not have their results correctly reported then it is possible that the outcome of an election of a candidate (or for an issue) would be illegitimate. But this system does so much more than that, it provides the ability to take the same foundation, but then customize the output and build many different houses.

Supplemental Information

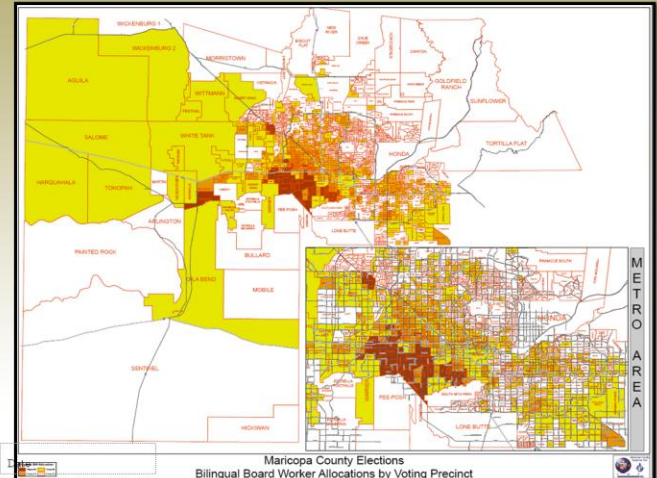
Numerous aspects of the new system have been exploited to aid in the administration of elections. Mapping of where Spanish-language ballot requests come from aid in the allocation of pollworkers to recruit:

Custom Desktop Applications

Mapping of minority language ballot requests assist in determinations of where to place bilingual pollworkers on Election Day:



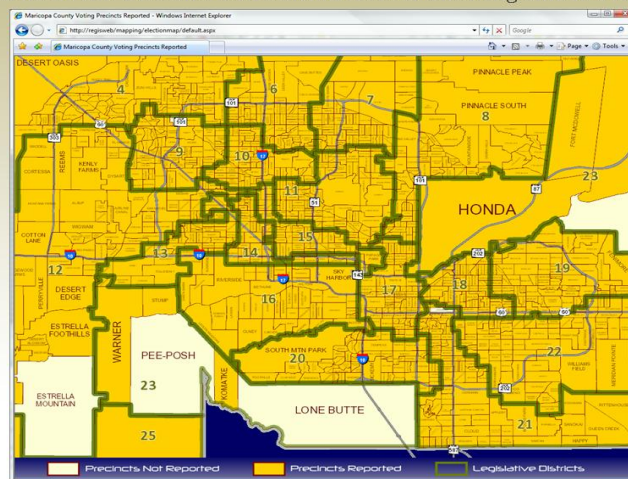
Custom Desktop Applications



This program also, literally, ties into results in that we are now able to coordinate election results into our GIS system to give a visual representation on election night for the media and public:

Custom Web Applications

Candidates, the media, and election officials are interested in knowing which precincts have reported results on election night. An internet map on election night as well as at the Phoenix Convention Center showing this is very helpful.



Cost

This project was a multi-year consisting of the commitment of multiple GIS and IT staff who worked on it full, and part time. Maricopa County has almost 2 million active voters and an additional quarter million inactive—assigning each of those addresses into the new system took a herculean effort. Couple that project with the additional need to create all of the existing districts and political boundaries in the new system and this was an undertaking that required resources and resolve:

GIS Administrative allocation of address and boundary points:

16,640 hours (4 years, multiple staff) x \$40 hr = \$665,600

IT Programming to bring voter registration system onto the geospatial platform: 408 hours x \$34.00 = \$13,872

TOTAL COST: \$679,472

Results

Utilizing this more accurate approach (spatial data is point and polygon driven rather than linear) and gaining efficiencies by maintaining one system rather than two, the end result benefits the voting population by ensuring their accurate placement and good stewardship of the public's resources. One example of this is the estimated \$1 million dollars that we will save each federal election cycle based on the consolidation of precincts during our recent redistricting efforts due to many of our voters now voting by mail. The placement system allowed for the visual representation of where those voters reside to aid in the consolidation of the precincts with minimal impact on voters.

