

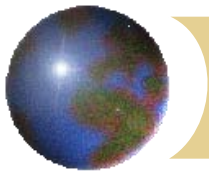
City of Cambridge Enterprise GIS Update

Spring NEARC - Northampton, MA

May 17, 2011

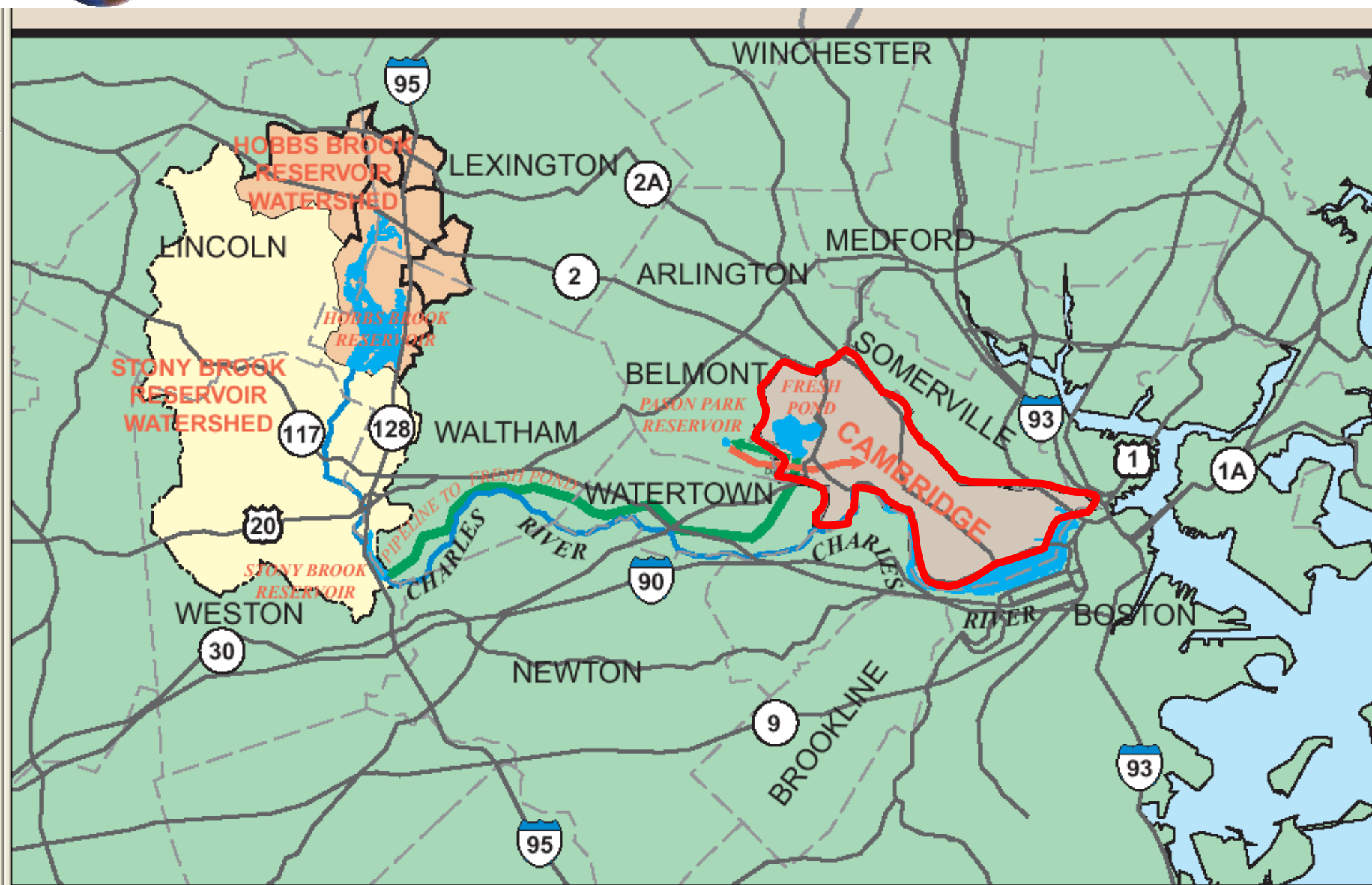
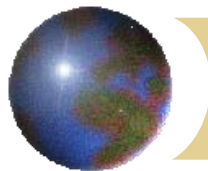
Jeff Amero, GIS Manager, City of Cambridge

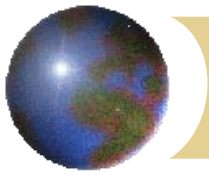
Sean Sweeney, GIS Specialist, City of Cambridge



Presentation Overview

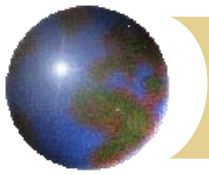
- ⊕ Upgrade of Enterprise GIS
- ⊕ Upgrade hardware and database software
- ⊕ Upgrade data and data schemas
- ⊕ Upgrade ArcGIS and users workflow
- ⊕ Coordinating all the upgrades





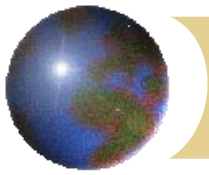
Perfect Storm of Change?

- ⊕ New data from 2010 flyover
- ⊕ New database server
- ⊕ New database software
- ⊕ New schema for databases
- ⊕ ArcGIS 10



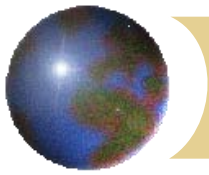
Last Changes for our User Community

- ⊕ Last big change in 2002 - 2004
 - ⊞ ArcView 3.2 to ArcGIS 8
 - ⊞ Arc/Info Workstation to ArcGIS 8
 - ⊞ Oracle to SQL Server
 - ⊞ ArcFM retired
 - ⊞ Hansen to Remedy



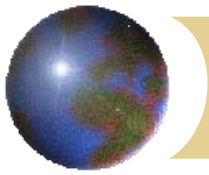
New Changes for our User Community

- ⊕ All at once?
- ⊕ Hold back new data?
- ⊕ How savvy are our desktop users?
- ⊕ How can we make this less painful?
- ⊕ Can we do this systematically?



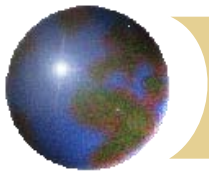
Our User Community

- ⊕ 6 Power users (GIS, Planning, & DPW)
- ⊕ 6-8 editors (using versioning)
- ⊕ 25 viewers or task based users
- ⊕ 20+ non users
- ⊕ Web users



User Considerations

- ⊕ Ability to accept change
- ⊕ Desire for new data
- ⊕ Give them a reason to want to change
- ⊕ Tools for seamless change



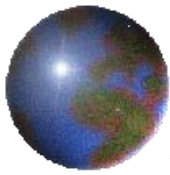
GIS Dept. Considerations

⊗ Other enterprise systems tied into GIS

- ⊠ Work order management (Remedy)
- ⊠ CAMA (Vision)
- ⊠ Master Address Database
- ⊠ GIS Web Tools

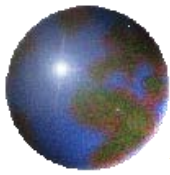
⊗ Third party software

- ⊠ Hydraulic modeling (Innovyze aka MWH Soft)
- ⊠ Pavement Management (VHB)
 - Dropped in favor of Cartegraph
- ⊠ Abutters Tool (Desktop extension by AppGeo)
- ⊠ Other unknowns??



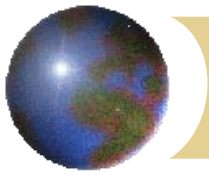
ArcGIS 10 Considerations

- ⊕ Acceptance by user community
- ⊕ 9.3 stable after issues with 9.2
- ⊕ Can the computers run software?
- ⊕ Data Driven Pages
- ⊕ VB custom scripts
- ⊕ ArcEngine users
- ⊕ ArcPad (should have been on list!)



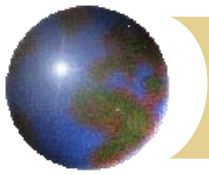
Timeline

- ⊕ Flyover in April 2010
 - ⊕ Data back in October
- ⊕ ArcGIS 10 first installed summer 2010
- ⊕ New server in late 2010
- ⊕ ArcGIS 10 service pack released Nov.15
- ⊕ First database live – January 15
- ⊕ All databases live – March 15
- ⊕ Retire old server - TBD



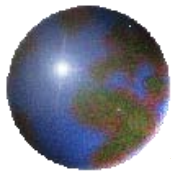
Enterprise GIS Update

Upgrade Hardware
and Database Software

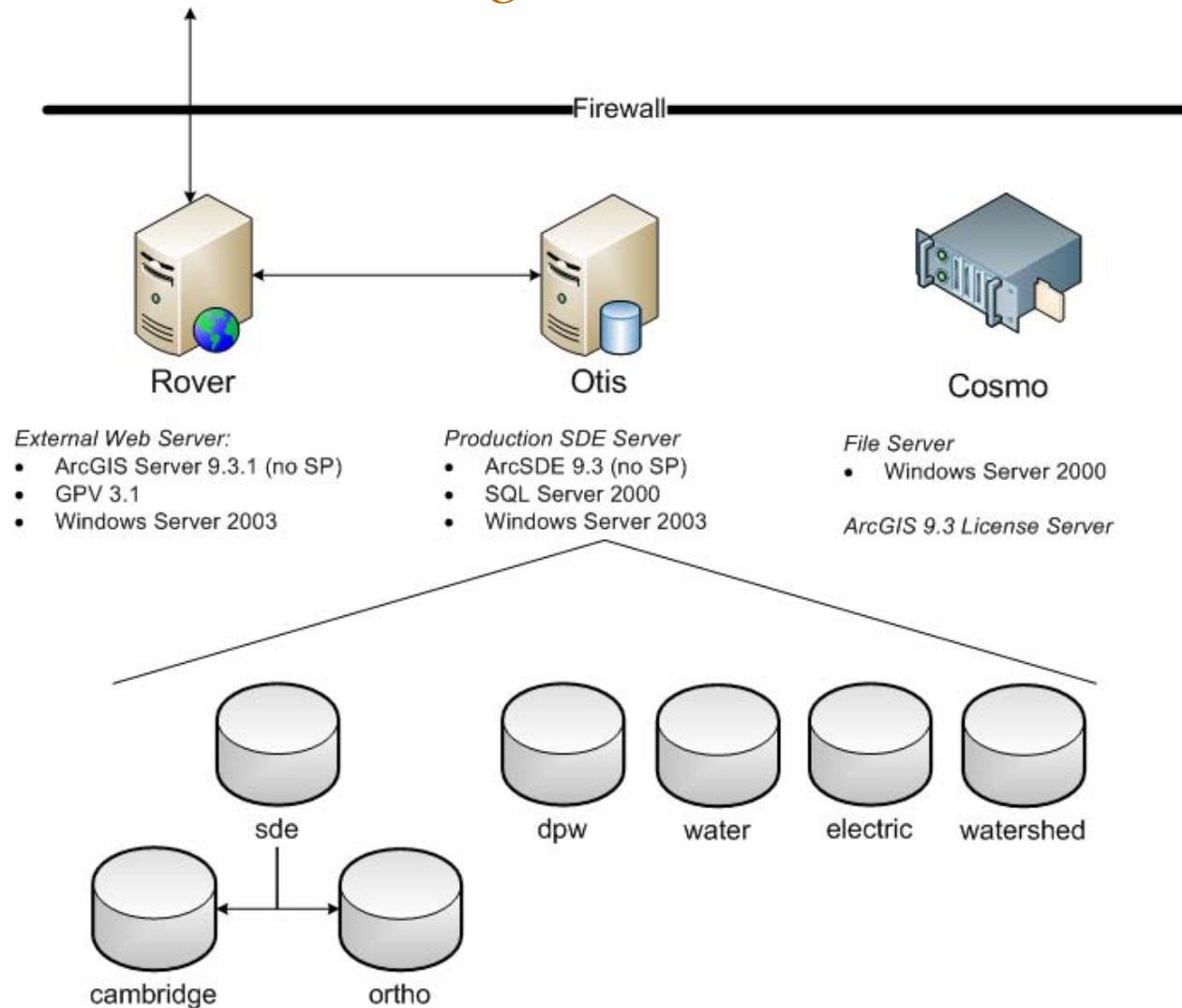


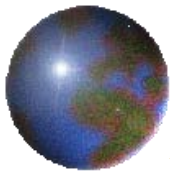
Existing Conditions

- ⊕ Server was 7+ years old
 - ⊕ Windows 2003
- ⊕ SQL Server 2000
 - ⊕ Not supported by Microsoft or ESRI (10)
- ⊕ Researched SQL Server licensing
 - ⊕ Went to new 2008 instead of existing 2005
- ⊕ 2 Web servers
 - ⊕ One outside presence, one internal
- ⊕ 1 file server



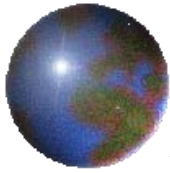
Previous Cambridge GIS Architecture





Research New Server Specification

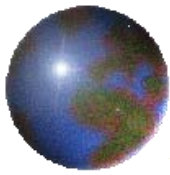
- ⊕ ESRI/Dell packaged solution for Server Enterprise Basic 9.3.x
- ⊕ SQL Server 2008 R2 system requirements
- ⊕ ArcGIS Server 10 Enterprise Basic system requirements



New Database Server Specs

⊕ Dell PowerEdge R710:

- ⊞ Dual quad-core 2.4 GHz Intel Xeon E5620, 12M Cache
- ⊞ 12GB Ram
- ⊞ 2 x 146 GB + RAID 1 for the system disk
- ⊞ 4 x 300 GB + RAID 5 for the data disk



Rollout Checklists

ArcGIS 10 Rollout – Testing Phase

Testing Checklist

- | | |
|---|------------------------------|
| x | License server install |
| x | License server testing |
| x | <u>ArcSDE</u> install |
| x | <u>ArcSDE</u> testing |
| x | <u>ArcGIS</u> Server install |
| x | <u>ArcGIS</u> Server testing |
| x | Desktop Install on XP |
| x | Desktop testing on XP |
| x | Desktop install on Windows 7 |
| x | Desktop testing on Windows 7 |

Licenses

License Server

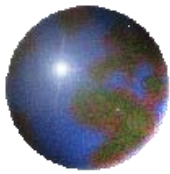
ArcGIS 10 Rollout – Production Phase

Production Rollout Checklist

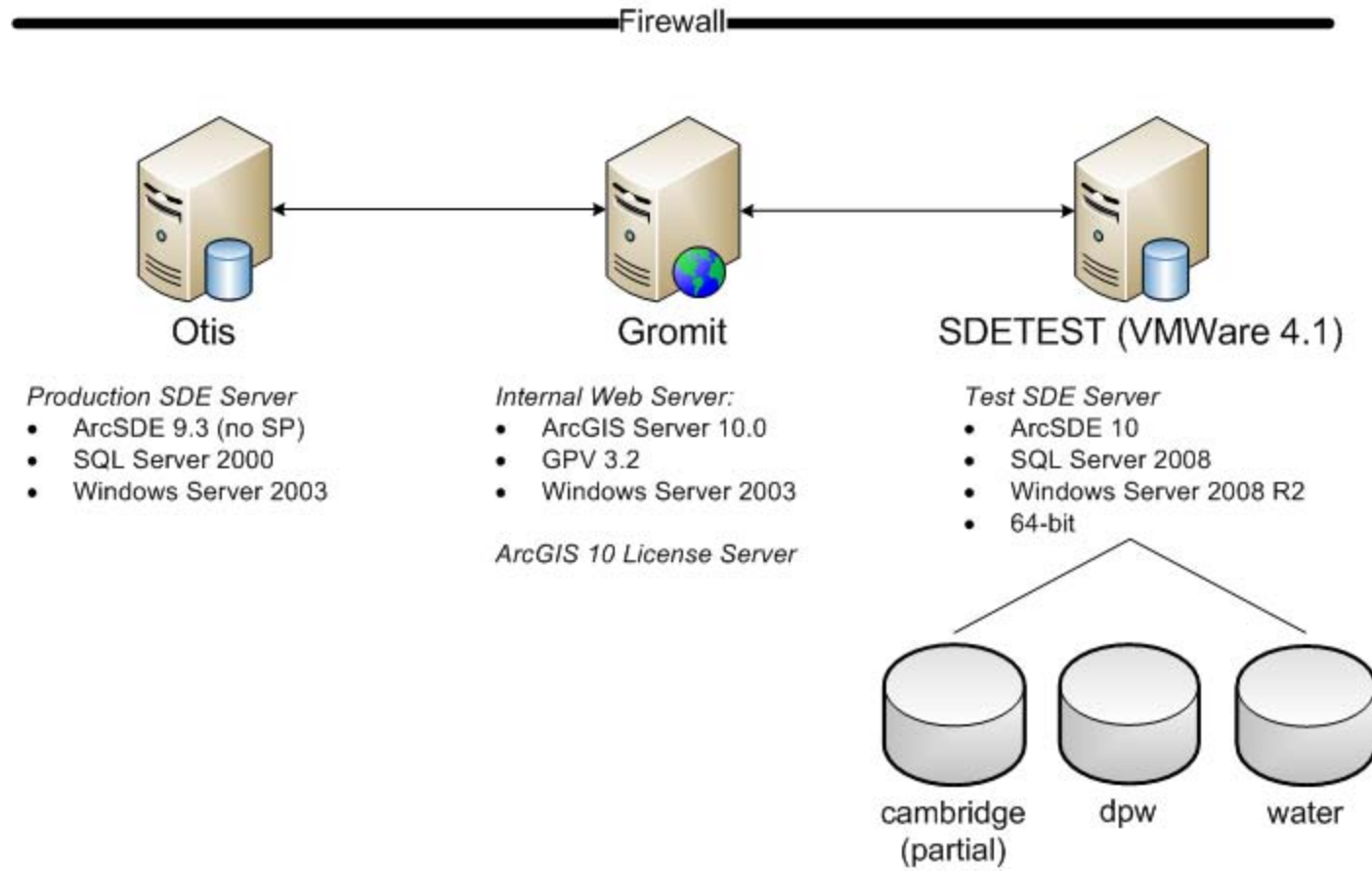
- | | |
|---|------------------------------|
| x | License server install |
| x | License server testing |
| X | <u>ArcSDE</u> install |
| x | <u>ArcSDE</u> testing |
| x | <u>ArcGIS</u> Server install |
| x | <u>ArcGIS</u> Server testing |
| x | Desktop Install on XP |
| x | Desktop testing on XP |
| x | Desktop install on Windows 7 |
| x | Desktop testing on Windows 7 |

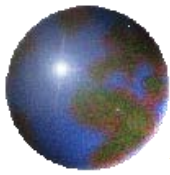
Licenses

License Server



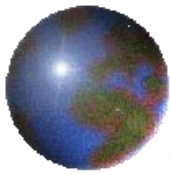
Testing Architecture





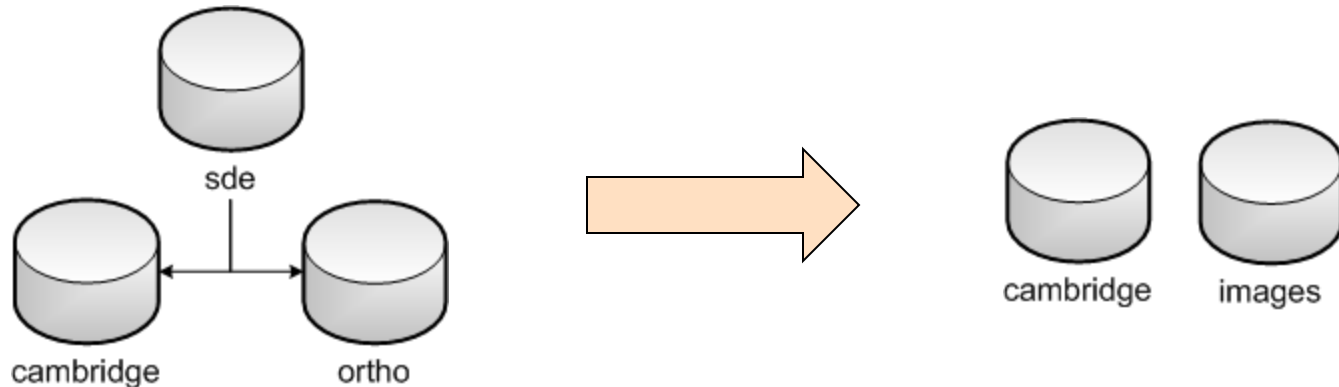
SDE Decisions

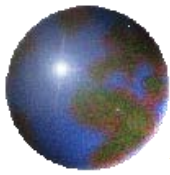
- ⊕ Single- vs. Multi-database model
- ⊕ Ortho storage
- ⊕ Windows vs. SQL Server authentication
- ⊕ Direct Connect vs. Application Server
- ⊕ Geometry vs. SDE_BINARY
- ⊕ Feature datasets as folders
- ⊕ How to move data?



SDE Decisions

- ⊕ Single- vs. Multi-database model
- ⊕ Ortho storage
 - ⊠ Multi- no longer recommended by ESRI
 - ⊠ Non-standard SQL server configuration (cross-DB queries, etc)
 - ⊠ Kept orthos in separate database for backup management





SDE Decisions

⊕ Windows vs. SQL Server authentication

⊞ Windows for:

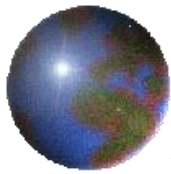
- data readers
- data editors

⊞ SQL Server for:

- SDE admin and data owner (gisdata)
- Web viewers
- Public Safety – separate untrusted domain

⊕ Pros

- ⊞ Manage reading via Active Directory
- ⊞ Passed map docs don't pass credentials
- ⊞ Layer files don't pass credentials



SDE Decisions

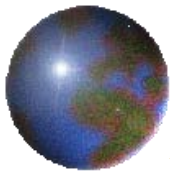
⊕ Direct Connect vs. Application Server

⊕ Direct connect

The screenshot shows a 'Spatial Database Connection' dialog box with the following fields and options:

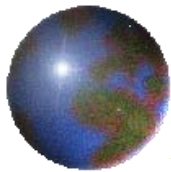
- Server:** Text box containing 'mojo'.
- Service:** Text box containing 'sde:sqlserver:mojo'.
- Database:** Text box containing 'cambridge'.
- (If supported by your DBMS)**
- Account** section:
 - ☐ Database authentication
 - Username:** Text box containing 'gisdata'.
 - Password:** Text box (empty).
 - ☒ Save username and password
 - ☒ Operating system authentication
- Connection details** section:
 - The following transactional version will be used:
 - Text box containing 'sde.DEFAULT'.
 - Change... button.
 - ☒ Save the transactional version name with the connection file.

At the bottom are three buttons: 'Test Connection', 'OK', and 'Cancel'.

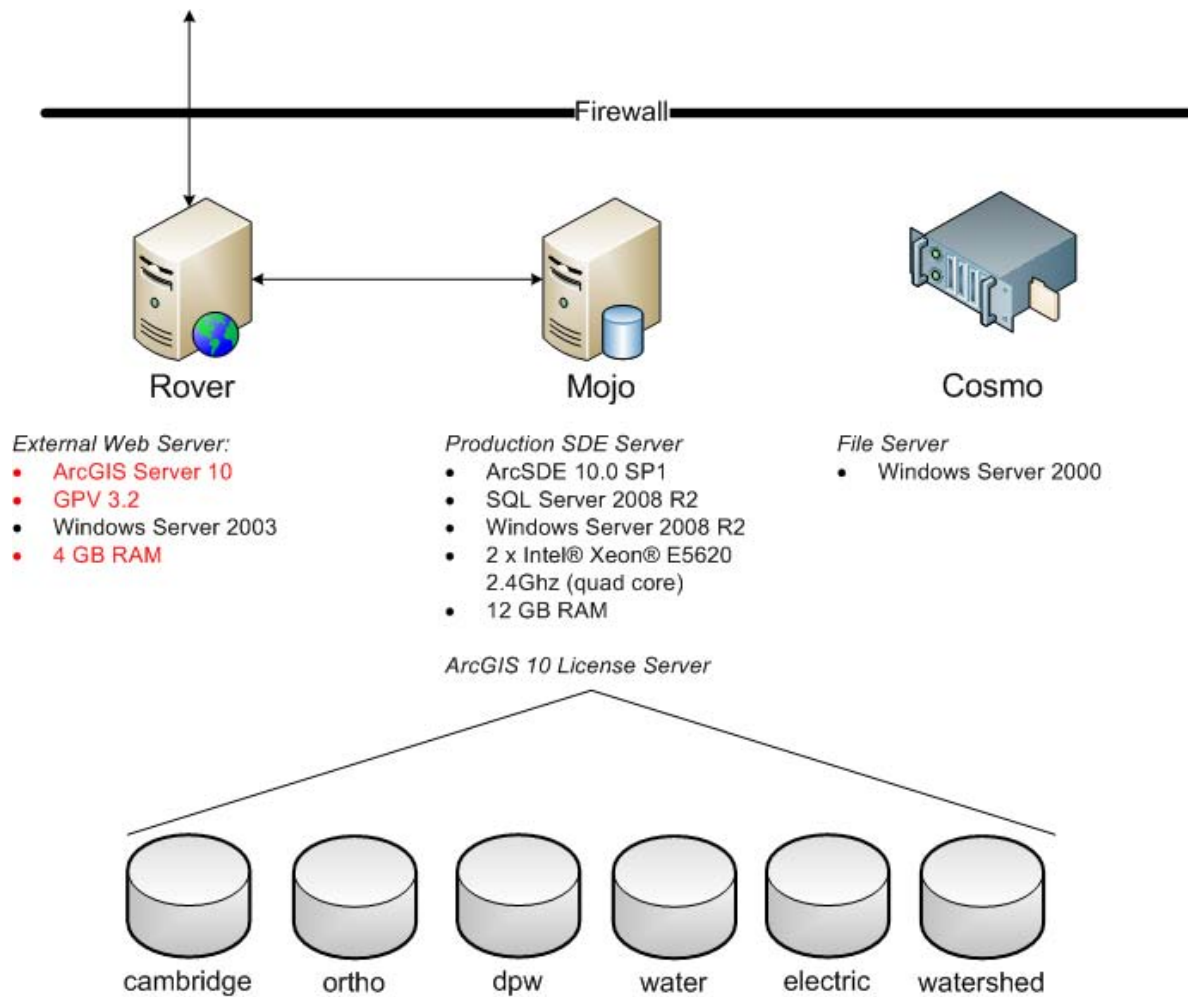


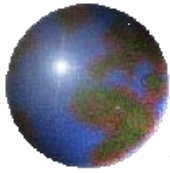
SDE Decisions

- ⊕ Geometry vs. SDE_BINARY
 - ⊠ ESRI recommended Geometry
 - ⊠ Testing showed better performance with SDE_BINARY
 - ⊠ Settled on SDE_BINARY as default
 - ⊠ Will update as needed with *Migrate Storage (Data Management)*



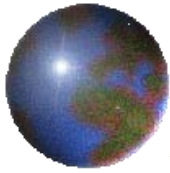
Current Architecture





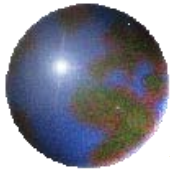
SDE Decisions

- ⊕ Feature datasets as folders
- ⊕ How to move data?



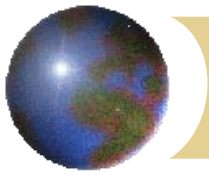
Enterprise GIS Update

Upgrade Data and Data Schemas



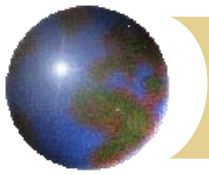
Data, data, data...

- ⊕ New data from flyover
- ⊕ New schema for base map layers
- ⊕ Data in 6 SDE databases
- ⊕ Data layers outside of SDE
- ⊕ Imagery
- ⊕ Repathing data was a primary concern



Research Data Organization Best Practices

- ⊕ Our data was all in feature datasets
- ⊕ Visited Jim McAbee at ESRI
- ⊕ Asked other SDE users
 - ⊞ Boston, Worcester, Amherst...
- ⊕ Web research for standards
 - ⊞ Anchorage, National Park Service, others...
- ⊕ Feature Datasets
 - ⊞ Almost only when topology or geometric network present
- ⊕ Prefix for all other layers
 - ⊞ BASEMAP, ELECTIONS, ELEVATIONS, etc.



Worked with Each Department to Organize and Clean up Databases

- ⊗ Water

- ⊠ Water Department users

- ⊗ Cambridge

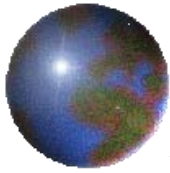
- ⊠ GIS
- ⊠ Community Development
- ⊠ Traffic & Parking

- ⊗ DPW

- ⊠ Public Works user

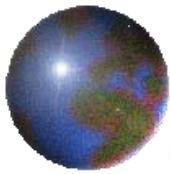
- ⊗ Watershed

- ⊠ Watershed users

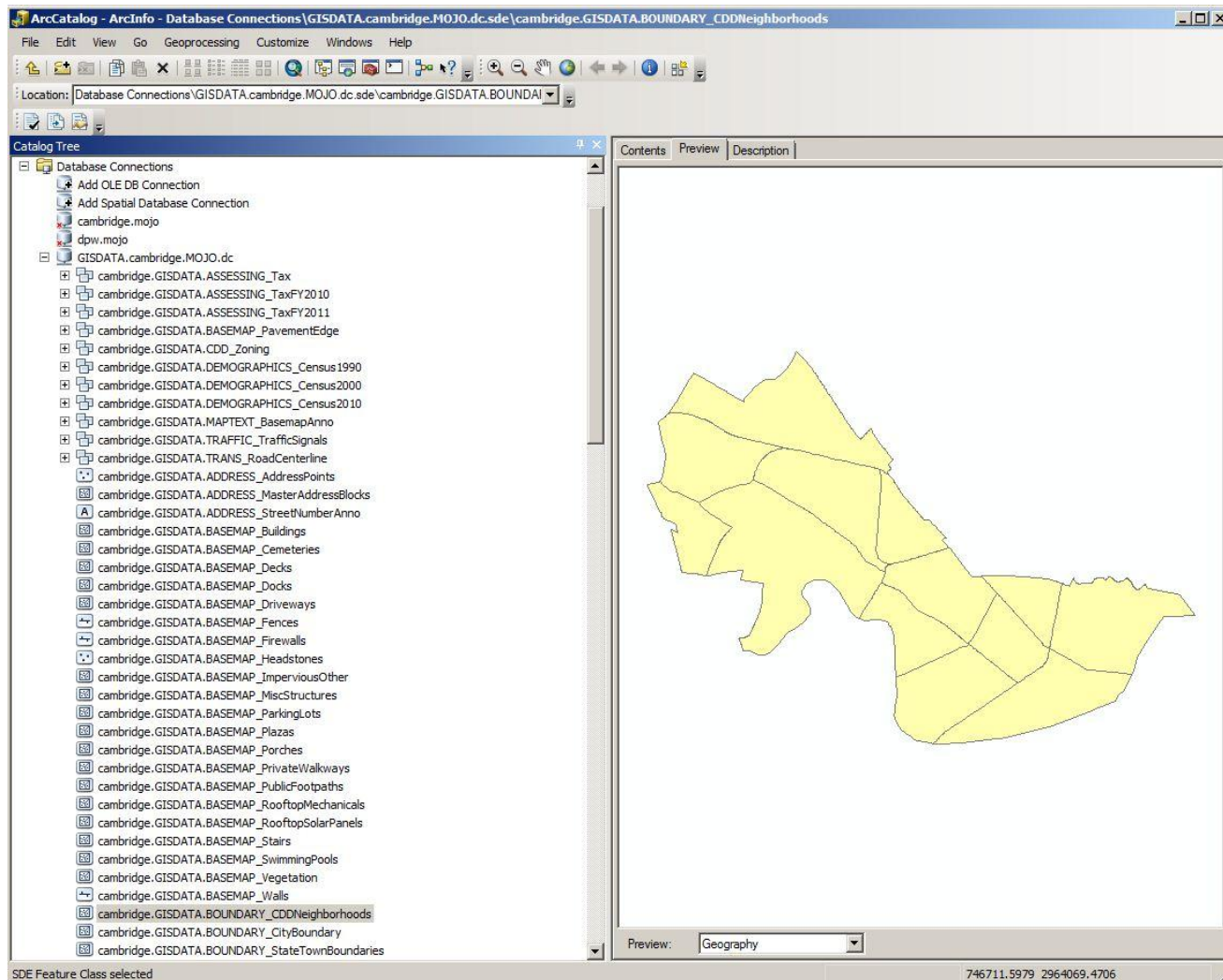


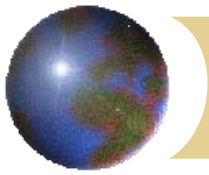
Data Schema Changes

- ⊕ Completely reorganized Cambridge database and much of DPW database
- ⊕ Only a few feature datasets
- ⊕ New data integrated
- ⊕ Data was given a prefix before name
- ⊕ Data taken out if there was no maintenance plan



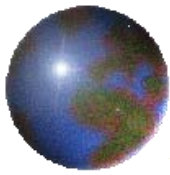
Example of Schema Change





Repathing Tools - Requirements

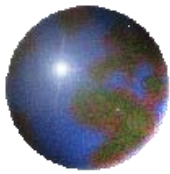
- ⊕ Change SQL Server instance
- ⊕ Change from Application Server to Direct Connect
- ⊕ Move data in and out of feature datasets
- ⊕ Rename feature classes
- ⊕ Fast and easy to run



Repathing Tools – Python/ArcPy

- ❏ First attempt: loop and change one layer at a time
- ❏ Second attempt – *findAndReplaceWorkspacePaths()* then search for broken links
- ❏ Third attempt – *findAndReplaceWorkspacePaths()* for some databases and loop for others

Other limitations: see *Updating and fixing data sources with arcpy.mapping* in web help



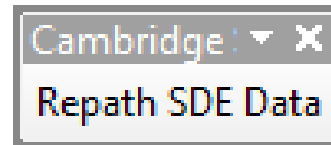
Repathing Tools – C# Add-In

☉ Pros:

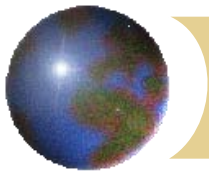
- ❏ Super fast
- ❏ Easier to tailor to needs
- ❏ Renaming controlled via DB table
- ❏ Easy deployment & user experience

☉ Cons:

- ❏ Longer development

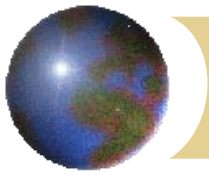


```
<ESRI.Configuration xmlns="http://schemas.esri.com/Desktop/AddIns" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://schemas.esri.com/Desktop/AddIns http://schemas.esri.com/Desktop/AddIns/ESRI.Configuration.xsd">
  <Name>repathSdeData</Name>
  <AddInID>{2360d9de-ce4e-4730-b4a8-e18955c112e2}</AddInID>
  <Description>This tool can be used to repath all SDE data in the current workspace</Description>
  <Version>1.4</Version>
  <Image>Images\repathSdeData.png</Image>
  <Author>Sean Sweeney</Author>
  <Company>City of Cambridge GIS</Company>
  <Date>03/25/2011</Date>
  <Targets>
    <Target name="Desktop" version="10.0" />
  </Targets>
  <AddIn language="CLR" library="repathSdeData.dll" namespace="repathSdeData" />
  <ArcMap>
    <Commands>
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    </Commands>
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</ArcMap>
</AddIn>
</ESRI.Configuration>
```



Enterprise GIS Update

Upgrade ArcGIS and Users Workflow



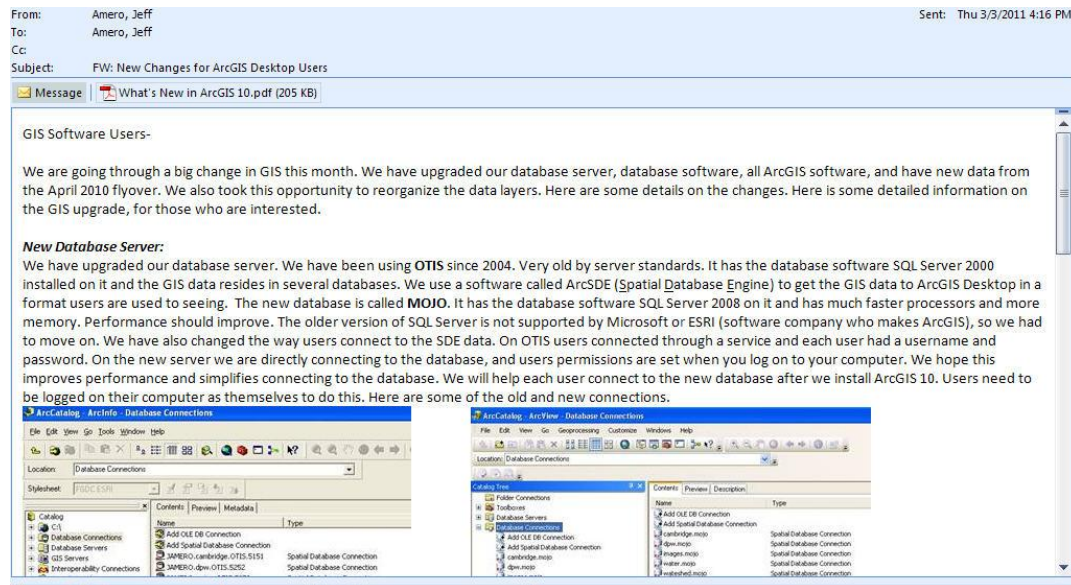
Phased approach to roll out

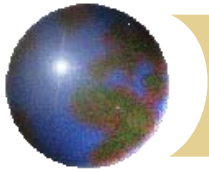
- ⊗ Started with Water Department
 - ⊠ Rolling interns who edit
 - ⊠ Minimal changes to database schema
 - ⊠ Set up test database on virtual server
 - Versioned editing via remoting into GIS PC
 - Rewrote VB script for hydrant flow data
 - Good user to test
 - ⊠ Live editing in mid-January 2011
 - ⊠ User training at IT Dept.
 - ⊠ Copy data back for 2 casual users with 3rd party software



Phased approach to roll out

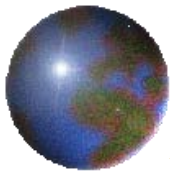
- Moved Community Development & Traffic early February
- More user training – both classroom and one-on-one
- Send users information as we upgrade
- Help repath the paved surface layer





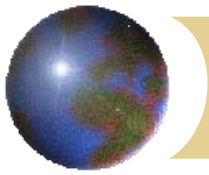
Phased approach to roll out

- ⊕ DPW – late February
- ⊕ Watershed – early March
- ⊕ Web GIS – April
- ⊕ Still to go:
 - ⊞ Historical
 - ⊞ Inspectional Services
 - ⊞ A few others



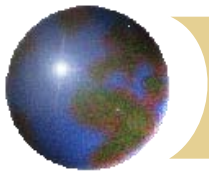
Issues

- ⊕ Python 2.5 uninstall on XP boxes
- ⊕ Remedy
- ⊕ Third party tools slow to catch up to 10
- ⊕ Some user frustration
 - ⊕ Editing
 - ⊕ Snapping
- ⊕ Data driven pages
- ⊕ ArcPad 8
 - ⊕ Need ArcPad 10 to run toolbar in ArcGIS 10
- ⊕ Windows Authentication at Public Safety



Current Situation

- ⊕ All but 15 users upgraded
- ⊕ Many users 'left behind' on purpose
- ⊕ Problems between work order management SQL 2000 database
- ⊕ User community overall happy with upgrade
- ⊕ Still need help with 3rd party software
- ⊕ Still have some work to do on metadata, data dictionary



For more information about Cambridge GIS

Jeff Amero - GIS Manager

City of Cambridge

617-349-6015

jamero@cambridgema.gov

Sean Sweeney – GIS Specialist

City of Cambridge

617-349-4239

ssweeney@cambridgema.gov