# GeoDataShare -Spatial SOA CityMap – Web 2.0 mapping



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Department of Information Technology & Telecommunications
City of New York

**New York City Technology Forum** 

A Government Technology Executive Leadership Forum



### Presentation Roadmap

- Objectives
- Infrastructure
  - Internet
  - Intranet GeoDataShare
- Issues with Current SDLC Model
- Why SOA? A strategic decision
- Current Status
- New York CityMap





### Objectives

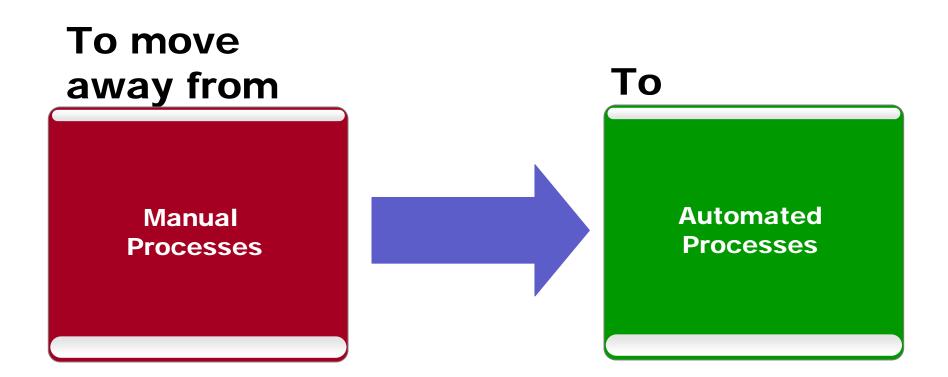
To provide a brief overview of the GIS intranet hosting architecture (GeoDataShare) which serves as the starting step in establishing Spatial Service-Oriented Architecture.

Demonstrate New York CityMap a WEB 2.0/Ajax based web mapping application.





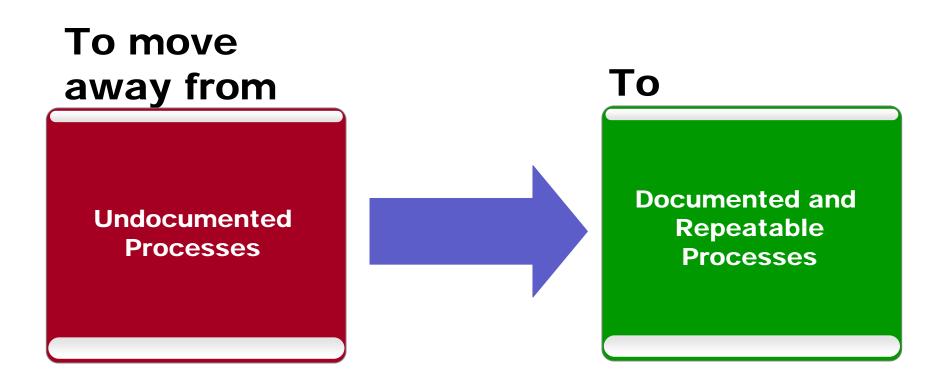
### Goals







### Goals





#### How?

- By reducing variability
- Sources of variability:
  - Poor Design
  - Skills and Behaviors
  - Unstable products/systems
  - Insufficient process capability





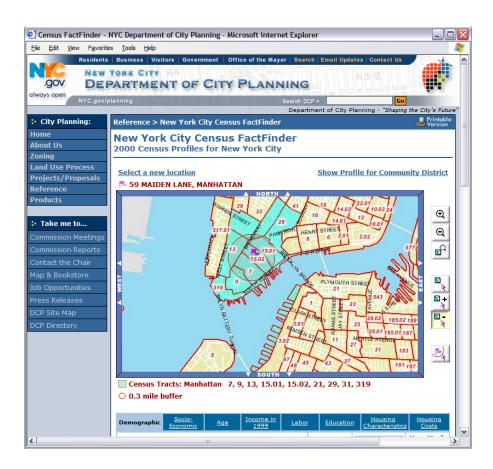
### Internet applications

- DoITT New York CityMap
- DoITT My Neighborhood
- DoITT Poletop Manager
- DoITT Map Portal
- **OPS My Neighborhood Statistics**
- **OEM EMOLS** 
  - Hurricane Evacuation
  - Cooling Centers
- DSNY Collection Schedule
- DCP Census Fact Finder
- DCP Address Translator
- DPR Wood Debris
- DPR Parks Locator
- NYCHA Internet Mapping
- BOE Pole site Locator















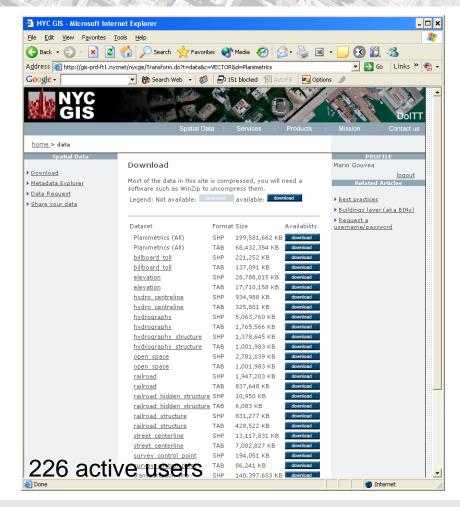
### Intranet applications

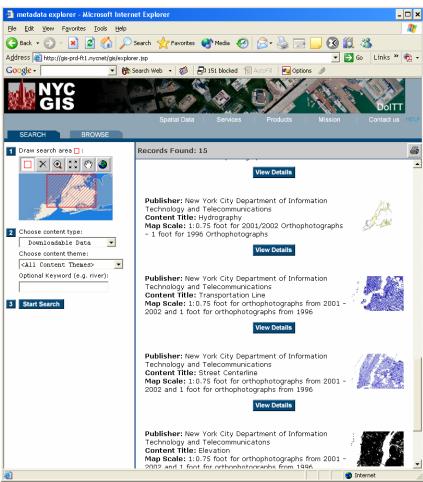
- Department of Finance PARM
- Department of City Planning GOAT
- NYC GIS Data Download Portal
  - Metadata Explorer
  - SharePoint portal
- 311 Pseudo-web service to broker address validation and geocoding requests





### Data Download/Metadata

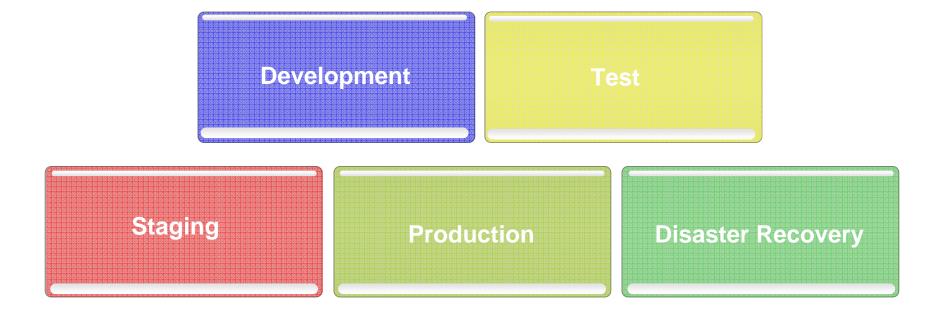








## Software Development Life-Cycle







# Sample App. Dev. Scenario





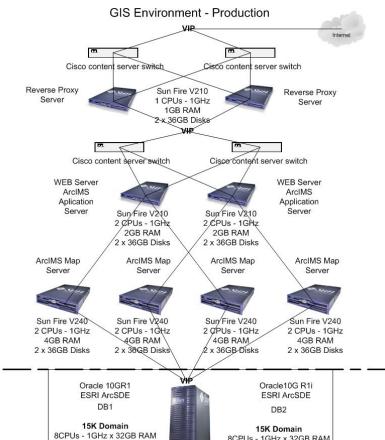


#### Infrastructure - Internet

25 Sun Servers

DEV, TST, STG, PRD and DR

24x7 Operation



**Shared Unix Services** 



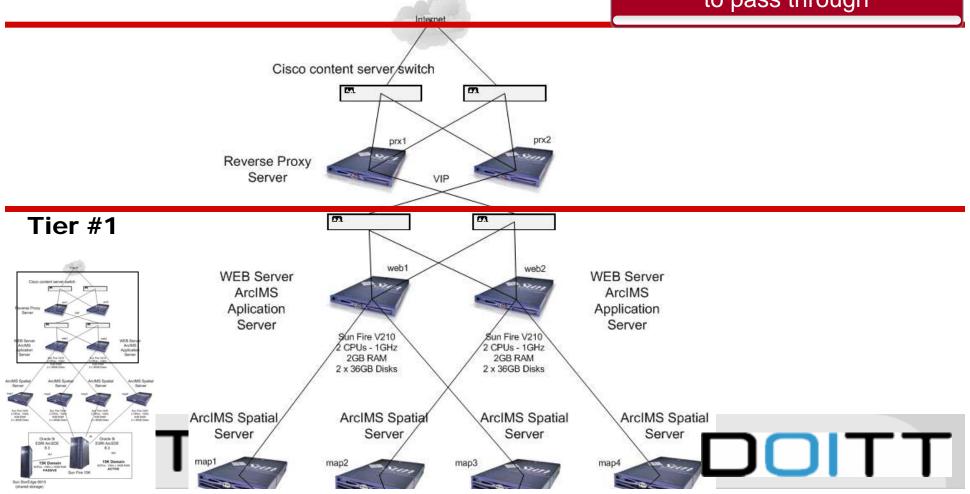
SAN Storage





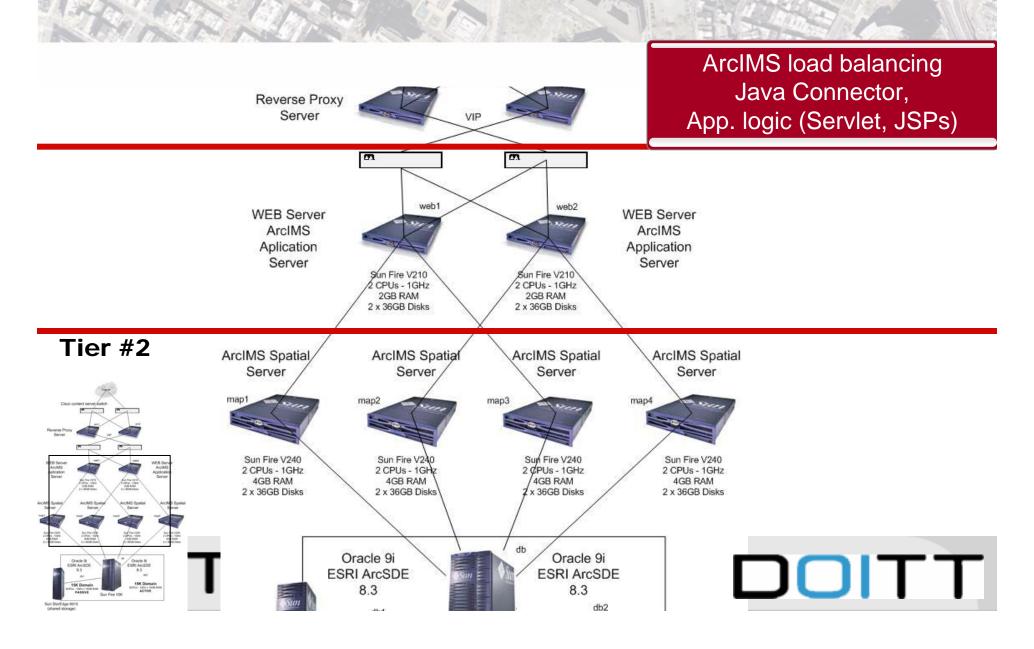
# Reverse Proxy

Only allows requests to specific URLs to pass through



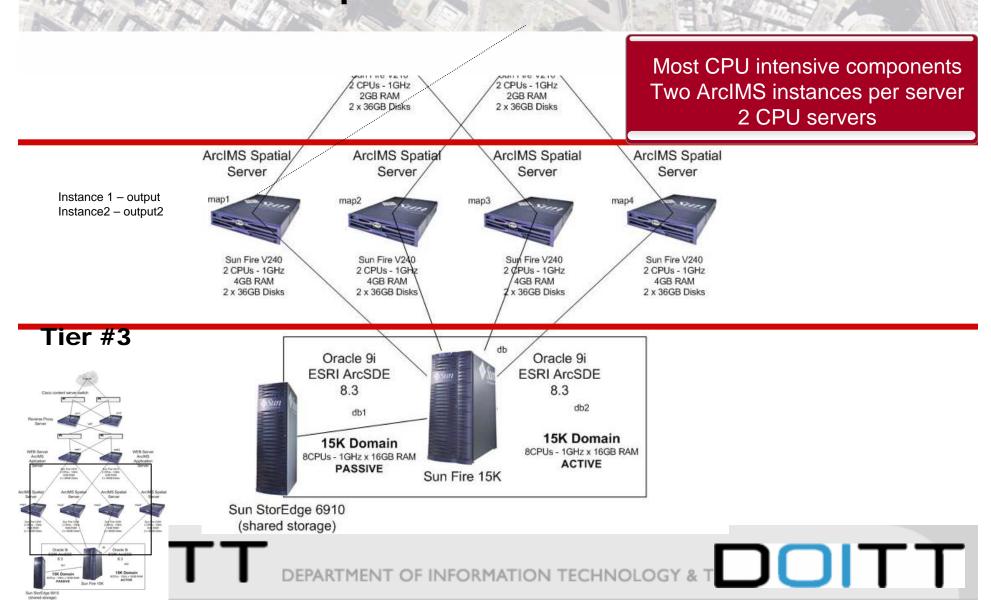


### Web/ArcIMS App Server



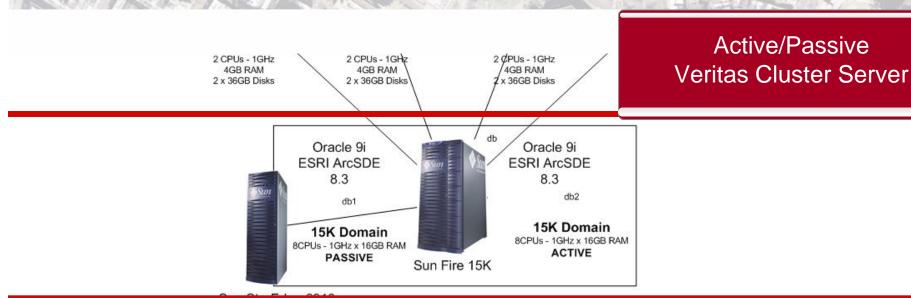


### **Spatial Servers**



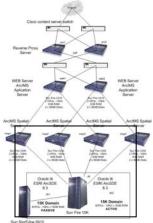


### Database/SDE Servers



Tier #4

(shared storage)





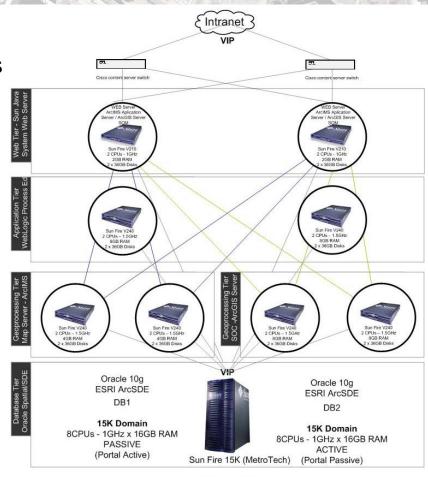


### Infrastructure - intranet

19 new Sun Servers

new PRD and DR environments

Shared DEV, TST, STG environments

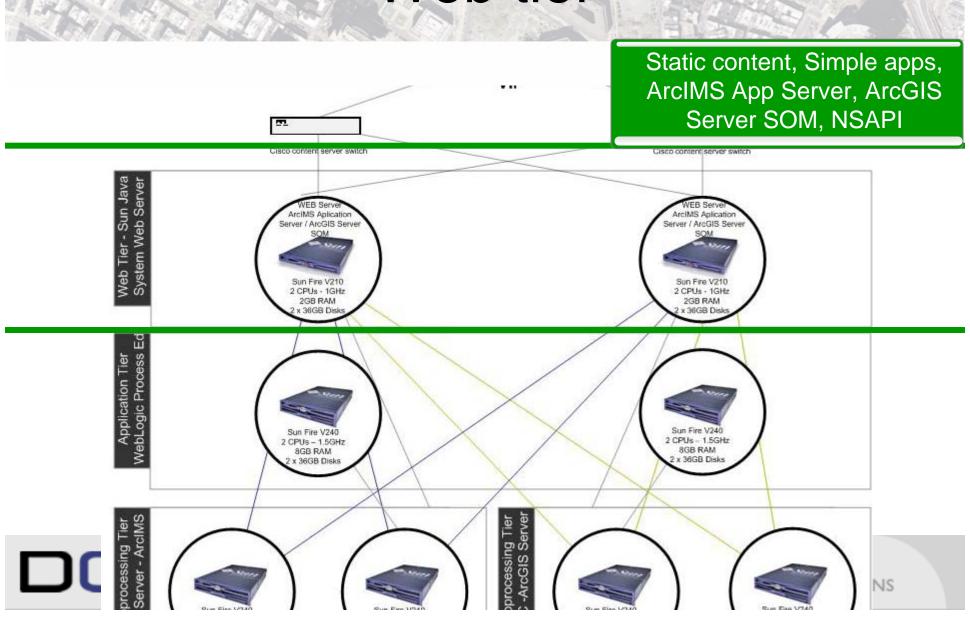


Storage: SAN



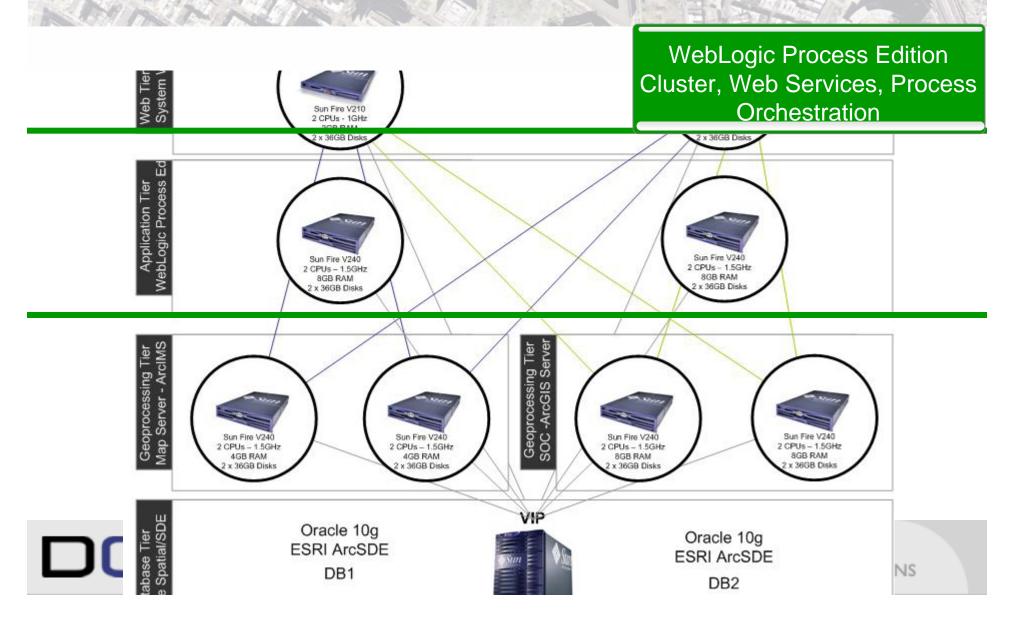


### Web tier



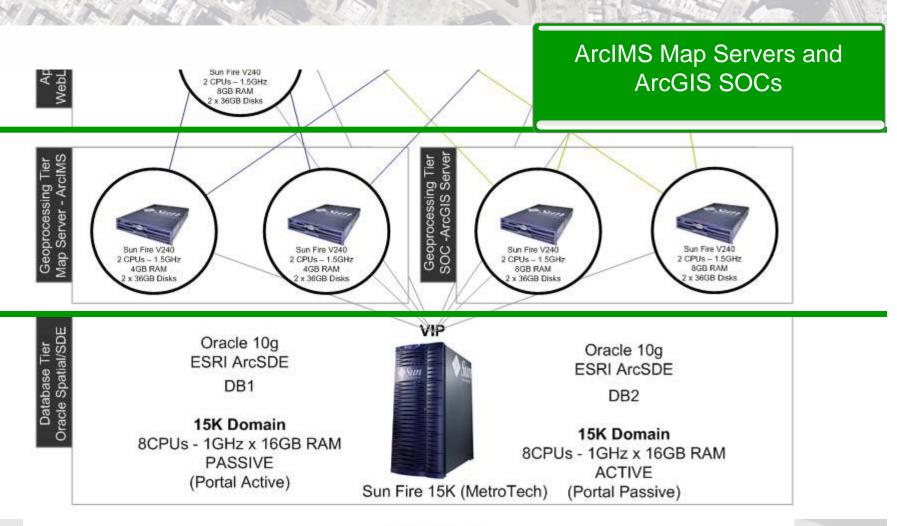


# Application Server (J2EE)





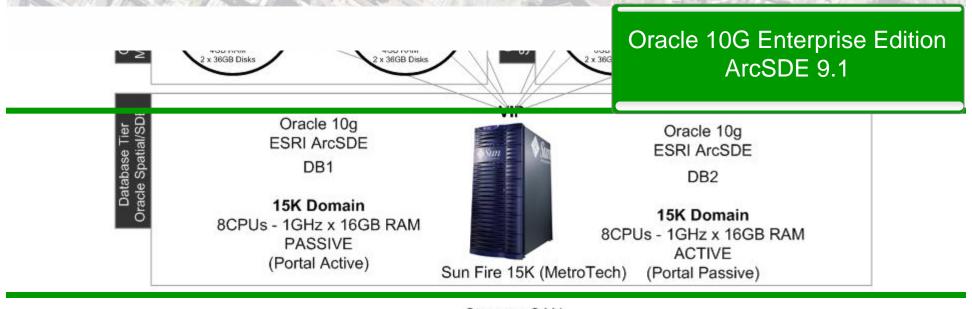
# Map and Geoprocessing Tier







#### Database Tier



Storage: SAN





### Infrastructure Software

Internet:

Sun Java System Web Server 6.1

ESRI ArcIMS 9.1 SP1

ESRI ArcSDE 9.1 SP1

Oracle 10G Enterprise Edition (Spatial)

Solaris 8

Intranet:

Sun Java System Web Server 6.1

**BEA WebLogic Process Edition 8.1** 

**ESRI ArcGIS Server 9.1** 

**ESRI ArcIMS 9.1 SP1** 

**ESRI ArcSDE 9.1 SP1** 

**Oracle 10G Enterprise Edition (Spatial)** 

Solaris 10





### Software Development Tools

- IDEs:
  - Eclipse (WTP),
  - BEA Workshop (BPM JPDs)
- Data Management
  - ArcCatalog,
  - TOAD,
  - Oracle SQL Developer
- Testing
  - Mercury Load Runner
  - Mercury Quick Test Professional
  - Junit, Jsunit
- Misc tools and frameworks: Ant, Tomcat, CVS, Spring, Struts, Hibernate, etc...





#### Issues with Current SDLC Model

- Hosting multiple application silos
- Data duplication maintenance issues
- Duplication of efforts Code reuse
- Cost, project duration
- Proprietary APIs
- Point-to-Point integration
- Change Management





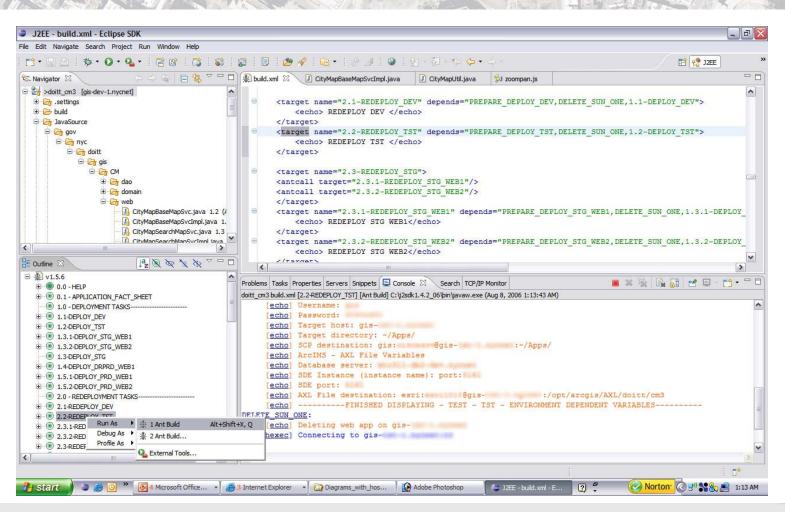
#### Issues with Current SDLC Model

- Increasing demand for services: City Agencies want new applications built that are better, faster
- Increasing Complexity, 44 servers to manage
- Islands of information: multiple versions of same data
- Time to deployment
- Learning Curve





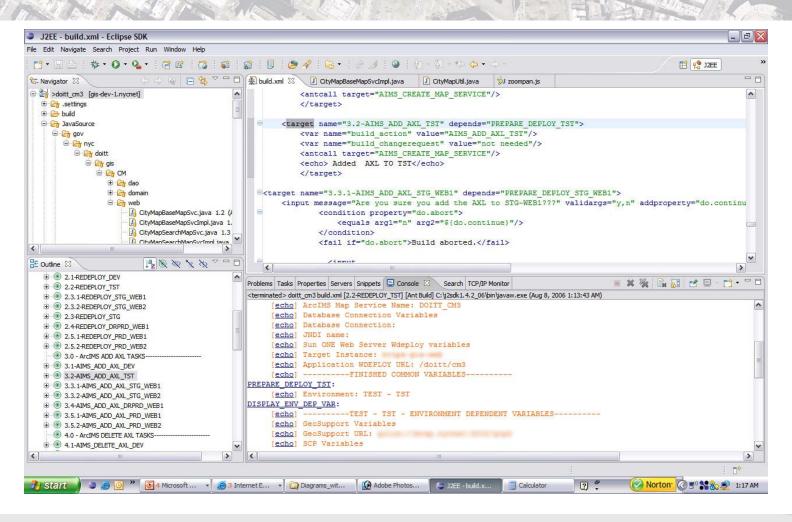
# Automated Deployment Scripts







# AXL deployment







# Why SOA? A Strategic Decision

- Agility
- Flexibility
- Enables innovation
- Exposes GIS functionality to non-GIS users





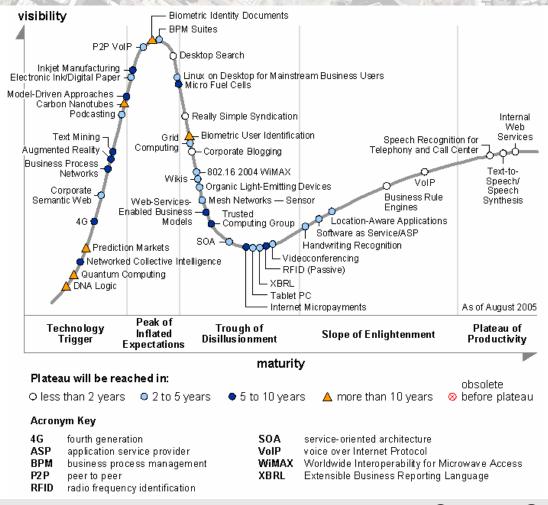
#### Benefits of SOA

- Reduce time to market for new services
  - Focus on delivering unique business logic
  - Enable the creation of composite applications by integrating one or more services
  - Allow services to be choreographed using BPM
- Reduce total cost of ownership of IT infrastructure and business services
  - Shared service infrastructure
- Business driven application development





# SOA Gartner's Hype Cycle

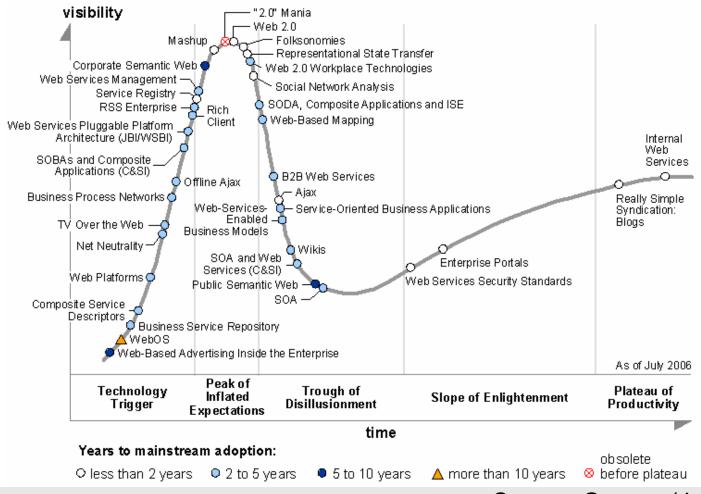




Source: Gartner (August 2005)



# SOA Gartner's Hype Cycle

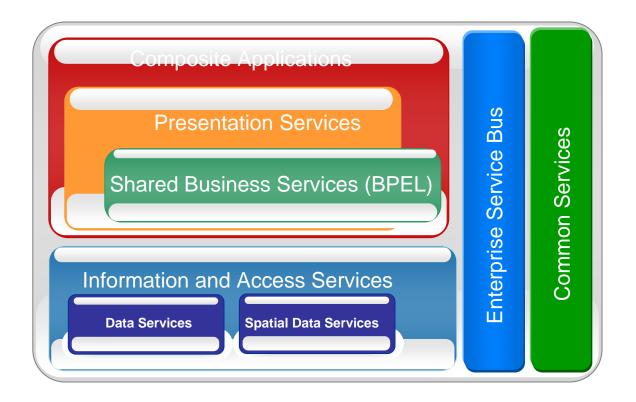




Source: Gartner (July 2006)



### SOA







#### **Current Status**

- Project approved
- System architecture reviewed
- Intranet infrastructure built
- First phase completed September 15, 2006
- Second phase enable geospatial data services - February





#### GeoDataShare Goals

- Host intranet ArcIMS applications In progress
- Host intranet GIS applications DONE
- Replace intranet GIS data repository DONE
- Provide agencies with access to live data using OGC services – In progress
- Enable 'real-time' geospatial data update and distribution – In progress





### **Next Steps**

- Develop granular web services:
  - Address validation/Geocoding
  - Building information
  - Geopolitical data (geospatial data services)
- Create composite services
- Use on internal applications
- Publish on Citywide UDDI directory (when available)





## New York CityMap





## New York CityMap

- Google map raised the standards for mapping applications
- Small/slow maps no longer acceptable
- Users expect large maps, interactive and responsive applications





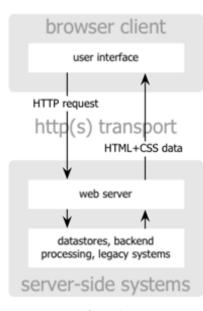
## New York CityMap

- Users wanted to:
  - Be able to browse the map without entering address
  - View administrative boundaries
  - Search by address and intersection
  - Be able to find nearest Point of Interest
  - Find more information about Subways

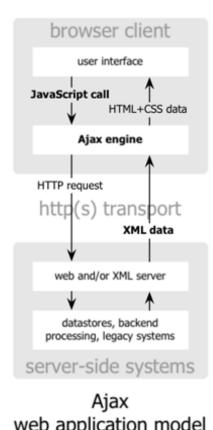




## Ajax web application model



classic web application model



web application model

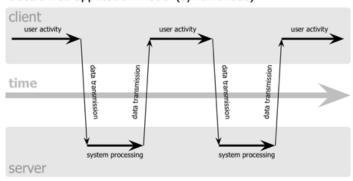
Source: http://www.adaptivepath.com/images/publications/essays/ajax-fig1\_small.png



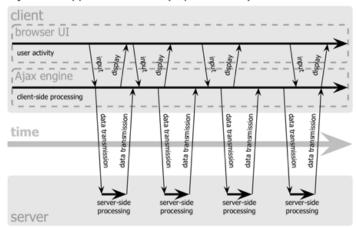


# Ajax web application model

#### classic web application model (synchronous)



#### Ajax web application model (asynchronous)



Source: http://www.adaptivepath.com/images/publications/essays/ajax-fig1\_small.png





# CityMap Data

- Buildings: > 986000
- Tax Lots: > 850000 (Pluto DCP)
- Points of Interest: > 9500
- Administrative Boundaries: 10
- Live links to other City Applications: 10
- Elected Officials





### Points of Interest

- Transportation
  - Subway Station
  - Subway Entrance
  - Ferry Terminal
  - JFK Airtrain Station
  - Long Island Rail Road
  - Metro North RailStation
  - PATH Station

- Education
  - After School Program
  - College/University
  - Head Start Program
  - School
- Public Safety
  - Fire House
  - Police





### Points of Interest

- Resident Services
  - Day Care Center
  - Hospital
  - Post Office
  - Senior Center

- City Life
  - Cultural Center
  - Green Market
  - Library
  - Park
  - Recreation Center
  - Wifi Hotspot





## Technologies

- Solaris, Oracle Spatial, ESRI ArcIMS, ESRI ArcSDE, Sun Java System Web Server, ESRI ArcMap/ArcInfo
- Java 1.4, Spring framework
- DWR Direct Web Remoting (Ajax)

265645 image tiles





## Administrative Boundaries

- Borough
- Zip Code
- School Instructional Region
- School District
- Fire Company
- Police Precinct
- Landmark District
- Business Improvement District
- City Council District
- Community Board





## **Next Steps**

- Add bus routes
- Improve Map quality
- Add street directions
- Implement multi-modal routing (directions)
- Add new points of interest
- Update Ortho photography (when available)

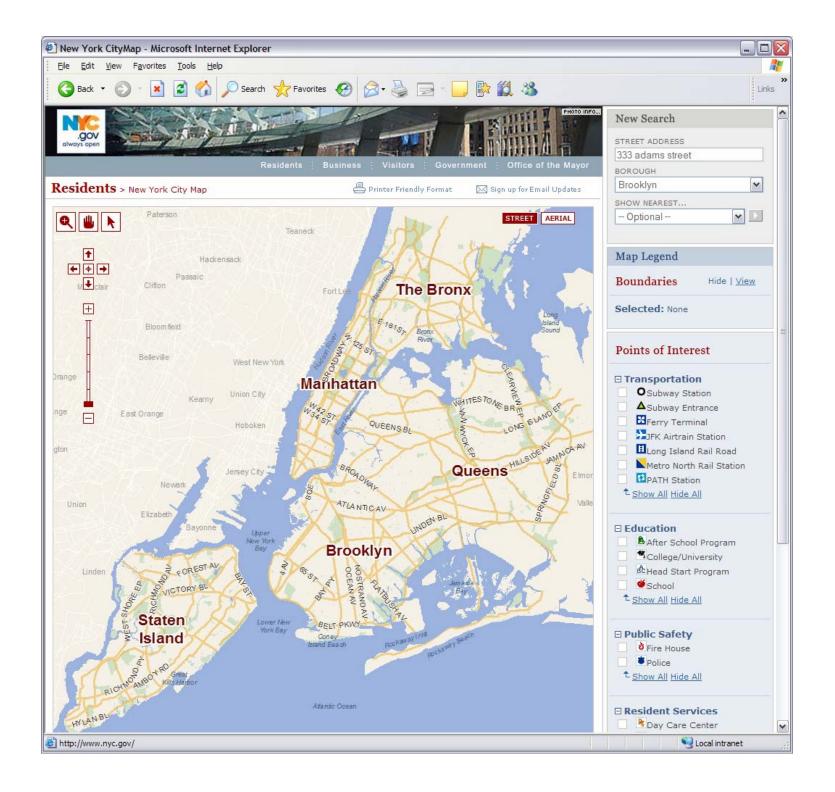


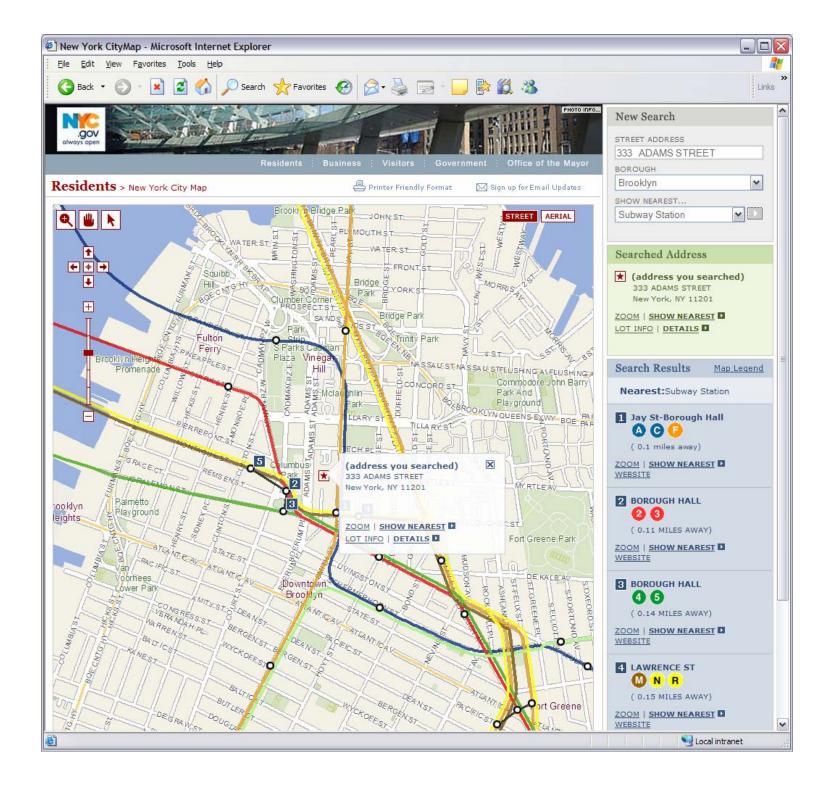


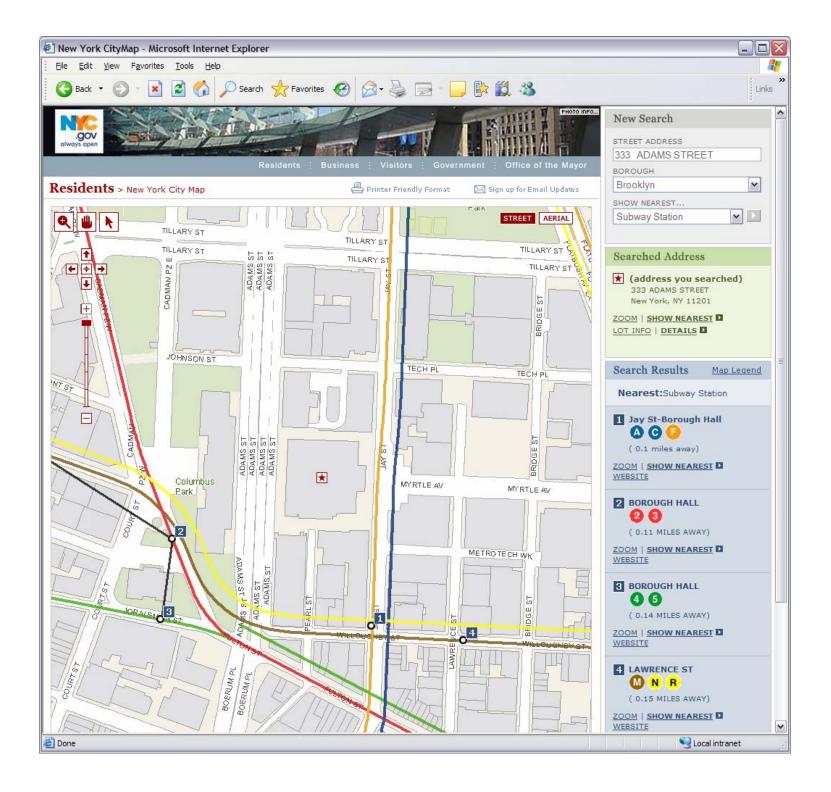
### Screen Shots

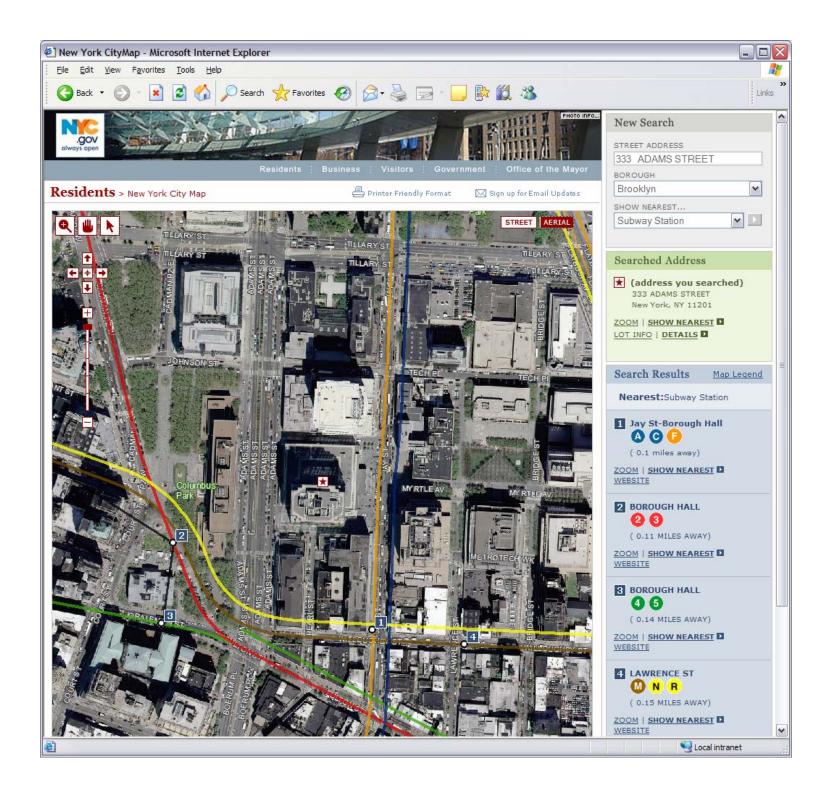
 New York Marriott Brooklyn 333 Adams Street Brooklyn, NY 11201

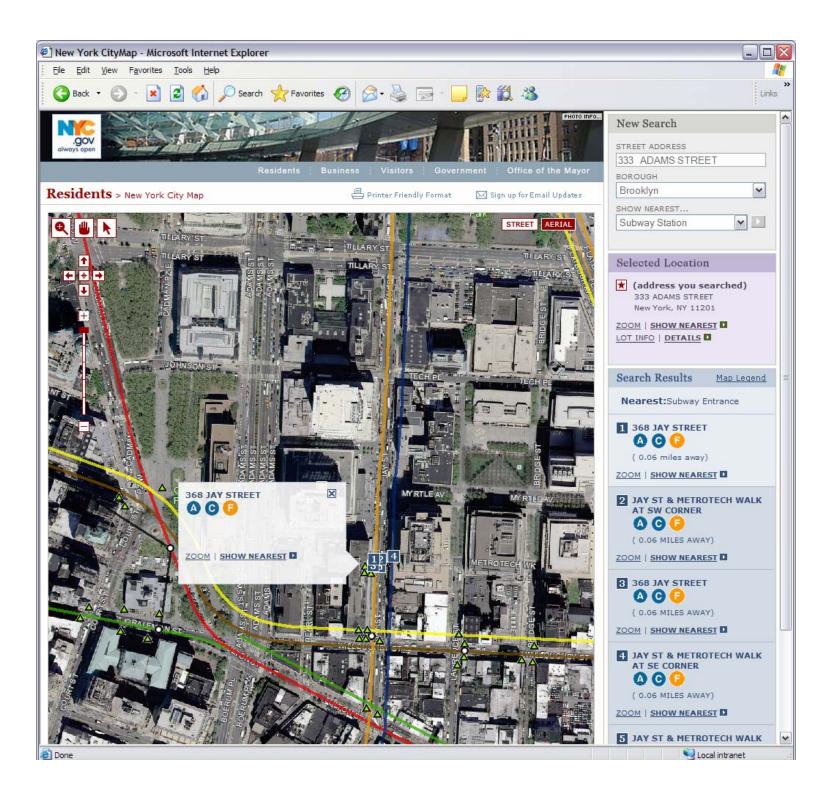


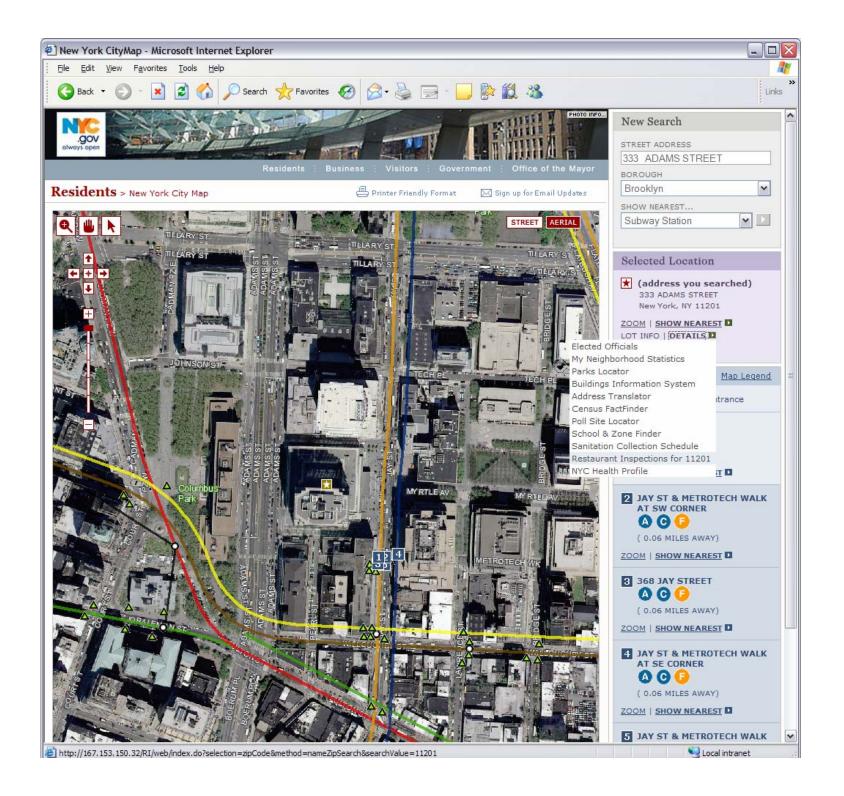


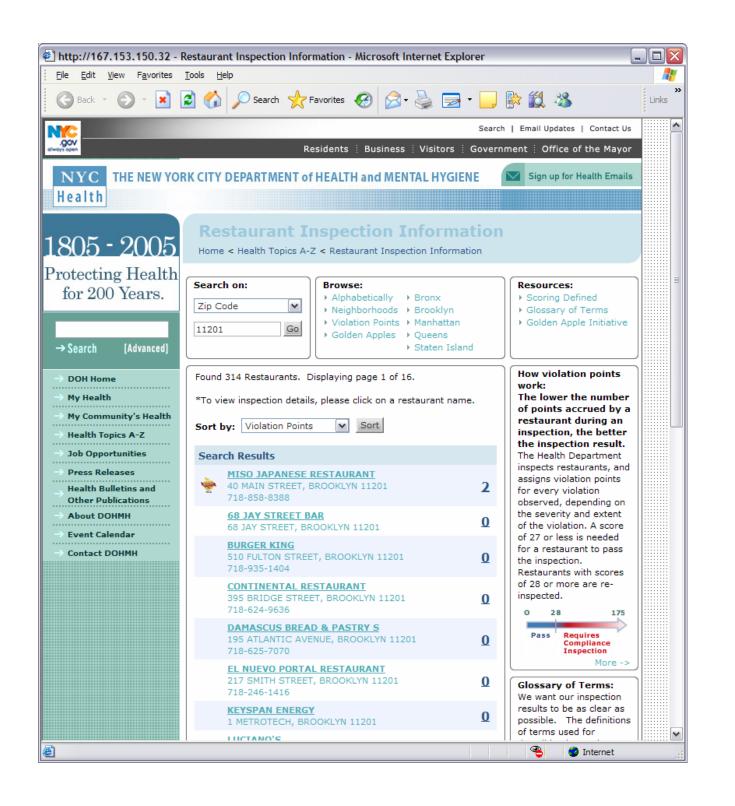


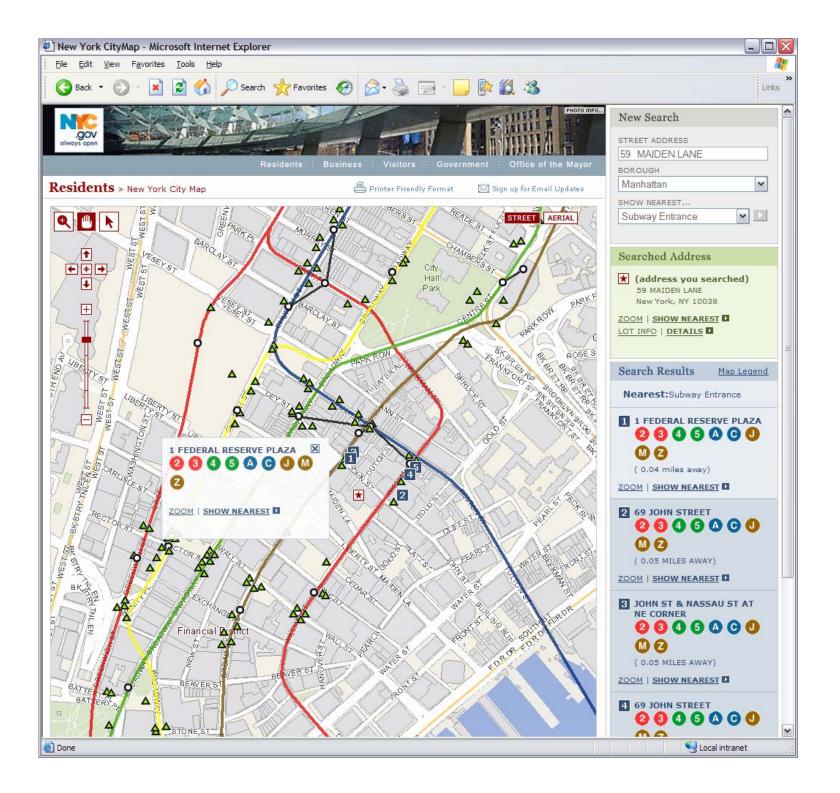


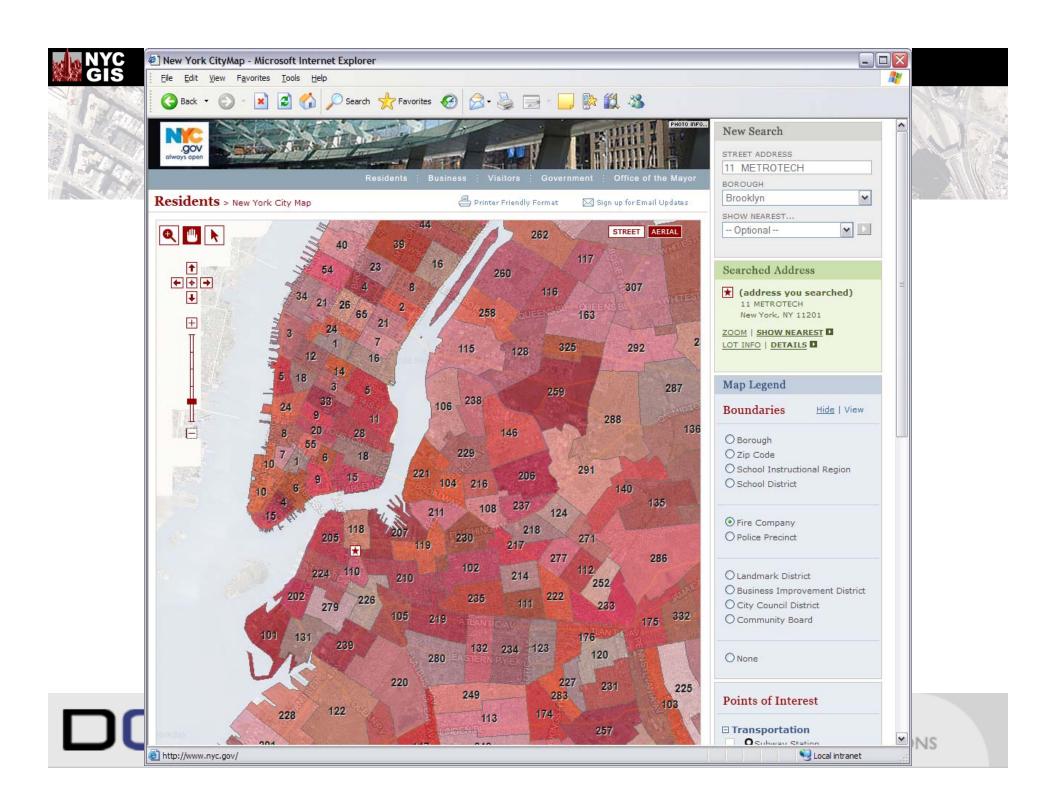


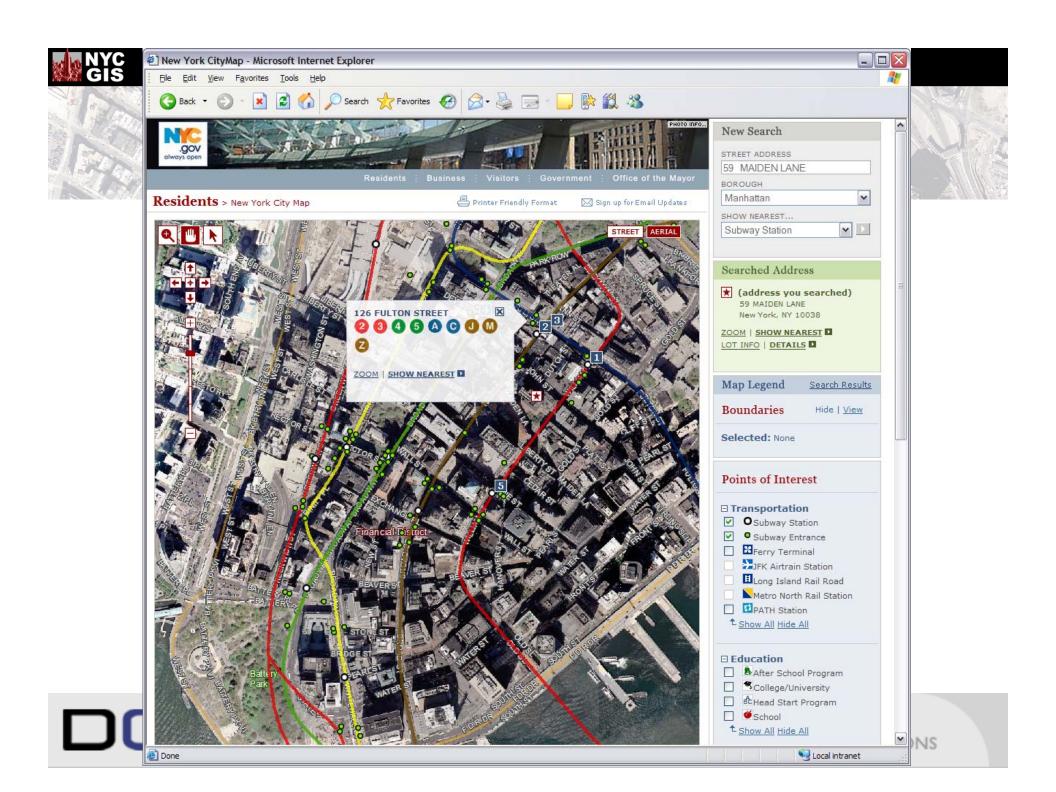


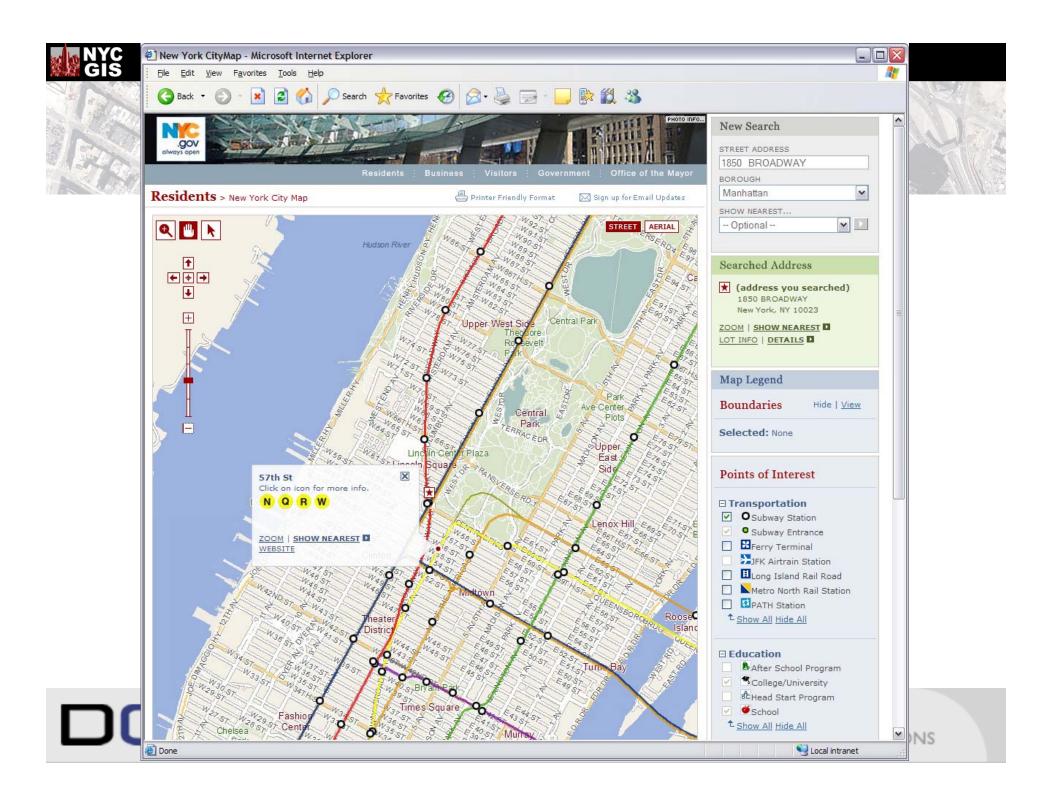














## Questions?

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