

WMATA Enterprise GIS Architecture

Ed Wells, WMATA, GIS Manager

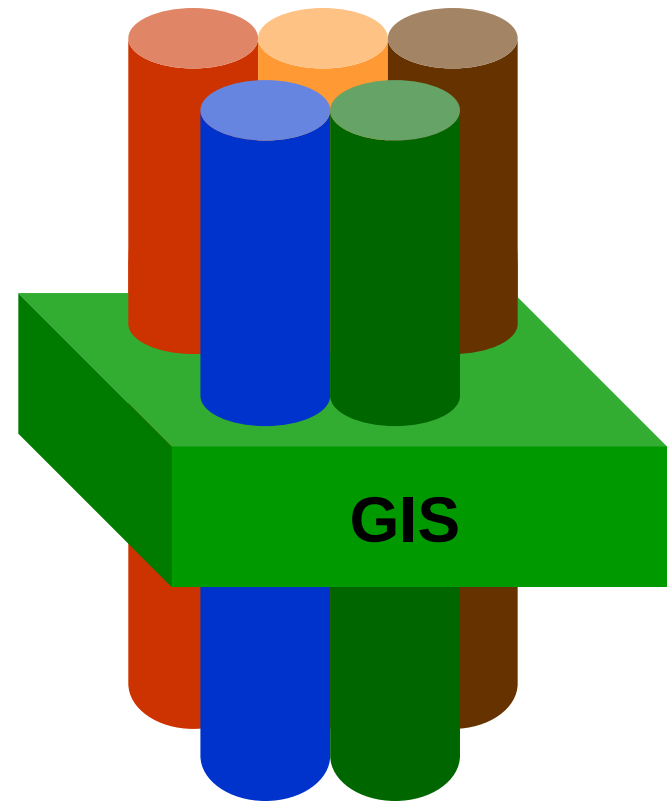
Anurag Mehta, Ela Consulting, GIS Architect

Role of GIS

GIS is a service, not an application.

GIS owns few business processes and supports many, in four ways:

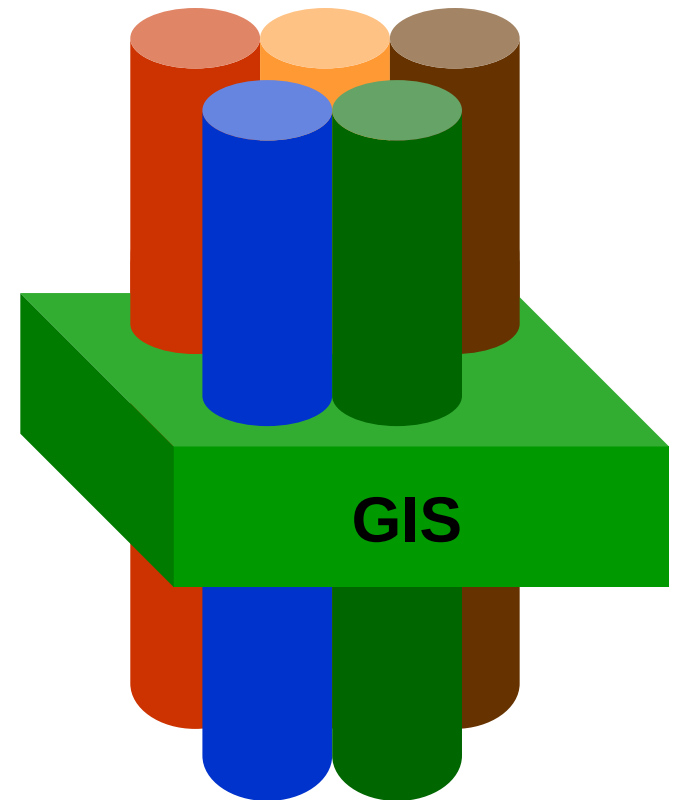
- **Geographic data base display**
- **Geographic data capture**
- **Data integrity testing**
- **Data integration**



Business Profile

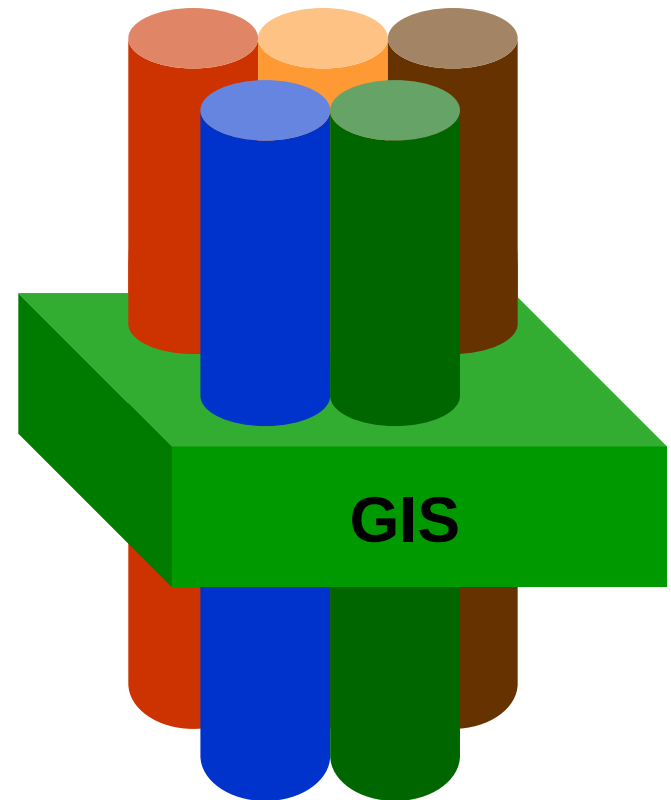
Common processes (15 departments):

- Land and fixed asset management
- Transit operations (rail, bus, van)
- Security
- Planning
- Public information



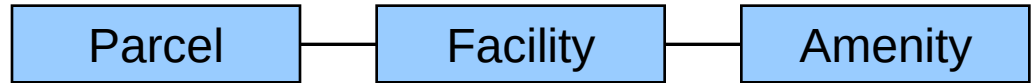
Key Business Application Interfaces

- **Asset Management**
 - Maximo, Optran, PeopleSoft,
 - AutoCAD, AutoCAD Map
- **Bus and rail operations and planning**
 - ROCS, AIMS, RPM
 - Trapeze, Orbital, Clever, Farebox, ATIS
 - ArcView, TransCAD
- **Security**
 - PSSI

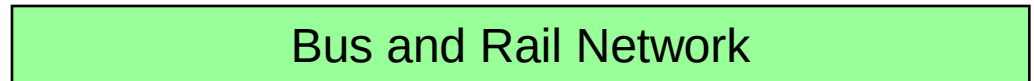


Core GIS Data Architecture

Fixed Asset Inventory

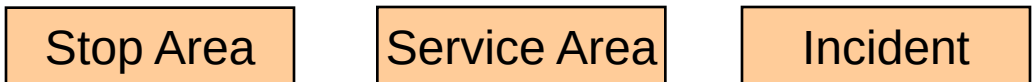


Transit Operations



- Stops, time points, chain markers, waypoints
- Patterns, routes, lines
- Performance (vehicles, trips, blocks)

Areas and Events



External Data



Enterprise GIS Architecture: Business Considerations

- **Key Business Needs**

- Serve available data
 - *CAD data, Documents, GIS data*
 - *Add “GeoSpatial” Value*
- Make simple apps available
 - *Web viewers, Desktop software, Dashboards, Reports*
- Define and set standards/practice/key datasets
 - *Metadata, common base layers, remove duplication*
- Enable mobile architecture
 - *Hand-held devices, versioning*

Enterprise GIS Architecture: Operational Considerations

- **Key Enterprise Needs**

- Low level integration
 - *Calls from Oracle-based apps: SQL functions*
- High level integration
 - *Interface to interface: Web map call to Maximo service*
- Systems/Data integration
 - *Data exchange, maintenance, overnight updates, Oracle jobs: AVL, Asset Mgmt.; Document repository*
- Enterprise environment
 - *Automated deployments, patch management, license management*
- Nimble application development
 - *Architecture, development/staging/training environments*

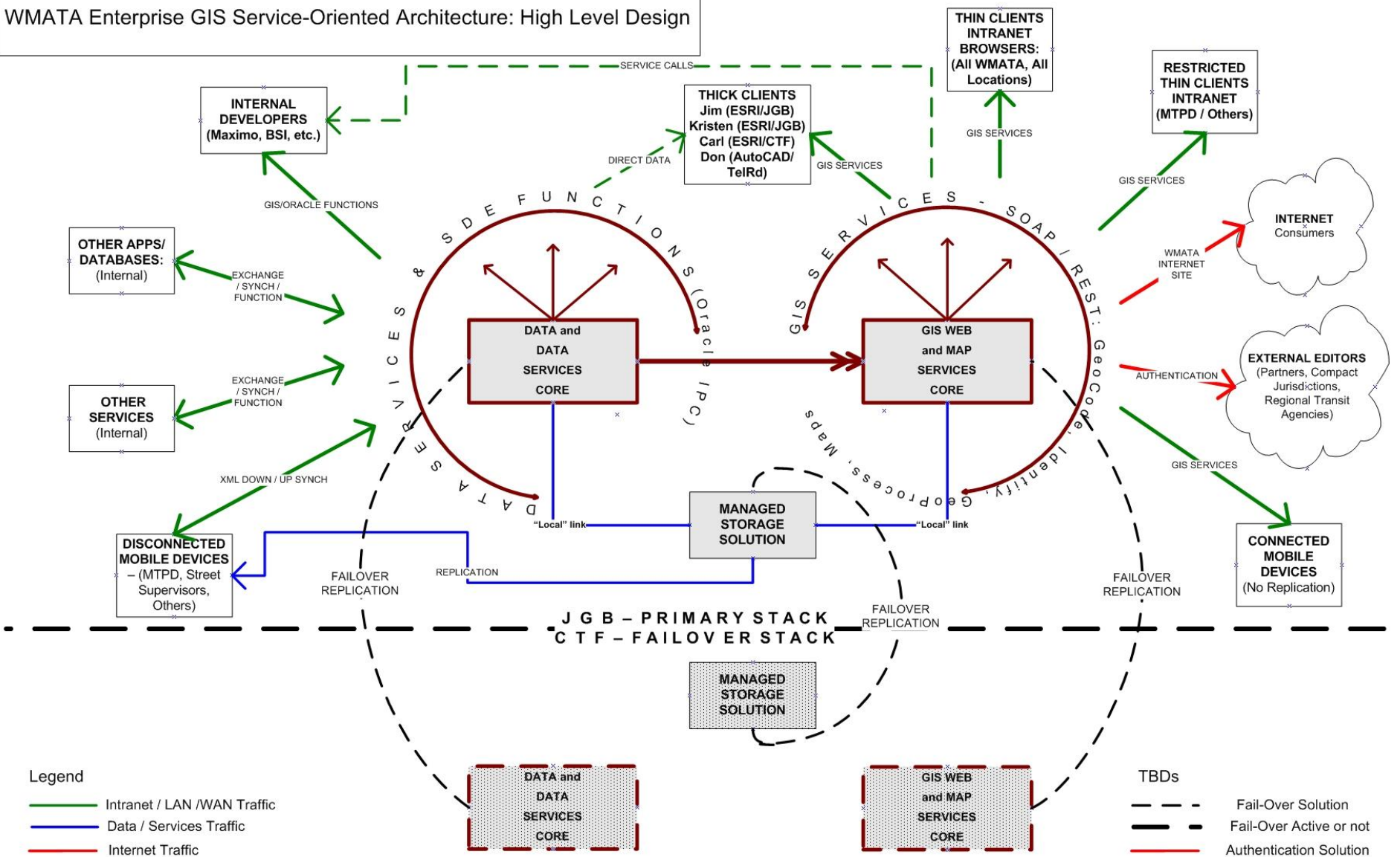
Enterprise Architecture Design Components

- **Five Components to Design**
 - Architecture Strategy and Design
 - *What are the information flows and standards*
 - Infrastructure and Systems Architecture
 - *How will physical realization occur, how will users interact*
 - Data Architecture
 - *What data will be stored, reported*
 - Process Architecture
 - *How will data be maintained and standards followed*
 - Applications Architecture
 - *How will information be used, how will value addition occur*

WMATA Enterprise GIS Architecture

- **Architecture Design**
 - Services Oriented Architecture
 - *SOAP compliant web services*
 - *Integrate with Enterprise Services via Enterprise Bus*
 - *Support nimble Applications Arch.: Mashups, API overlays*
 - *Flexible presentation layer – lots can happen at interface level*
 - *Eg: Track Signal (Asset) and GIS*

WMATA Enterprise GIS Service-Oriented Architecture: High Level Design



WMATA Enterprise GIS Architecture

- **Infrastructure and Systems Architecture**

- Separate Data and Application Nodes

- *Data node: support for spatial functions and SQLnet calls*

- *Data node supports Application node via SQLnet service*

- *App node: hosts web services and web applications*

- *Both nodes expose APIs*

- *Illustration of a SQL function call:*

- SELECT bt.bus_id*

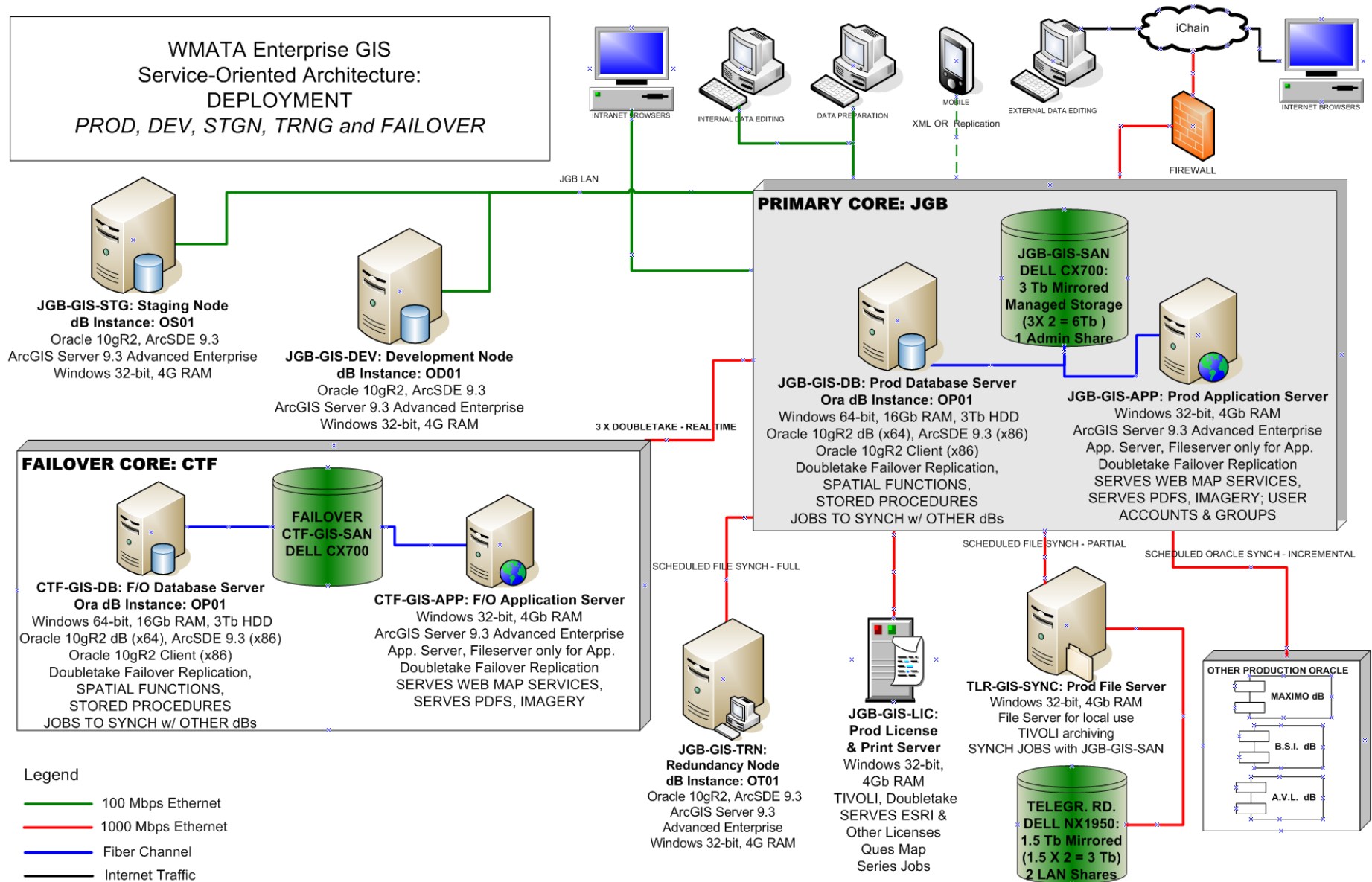
- from bustable bt, counties ct*

- where bt.avltime=(SELECT CURRENT_TIMESTAMP from DUAL) and*

- ct.name = 'Arlington' and*

- sde.st_within (bt, ct) = 1;*

WMATA Enterprise GIS
Service-Oriented Architecture:
DEPLOYMENT
PROD, DEV, STGN, TRNG and FAILOVER



WMATA Enterprise GIS Architecture

- **Architecture Deployment**

- Production, Development, Staging, Education, FailOver
 - *64-bit, 16Gb RAM, 6Tb HDD servers*
 - *All servers on same subnet*
 - *Flexibility with or without SAN*
 - *Lowest cost for needed scale*
 - *Supports editing, viewing, services, caching, applications and security*
 - *Fully replicated development and staging environments*

Questions and Discussion

Ed Wells, ewells@wmata.com

Anurag Mehta, amehta@wmata.com