San José Implementing GIS the "Spatial" Way

Addressing compliance, security, scalability, interoperability and open standards for business needs

CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY
10th Largest U.S. City

Overview

1. Key Strategy & Requirements
2. Building on Previous Success
3. Systems Integration Challenges
4. Data Modeling Requirements
5. Resulting Workflow Examples
6. Benefits
7. Conclusion

Profile – City of San José

1. Capital of Silicon Valley
2. Serves 944,857 residents
3. Covers 177.7 sq. miles
4. Budget of $3.34 billion
5. 10th largest City in US
6. Workforce of 7000+

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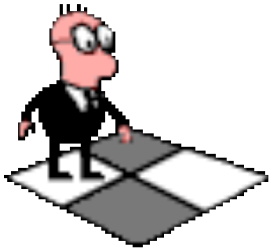
Key Strategies

1. Multi-Disciplinary Work Environment
2. Oracle Spatial DB Technology
3. Database Centric vs. GIS Application Centric Approach
4. Build Logic into Data Model/Databases vs. Client Tools
5. Workflow Integration with other Enterprise Business Systems

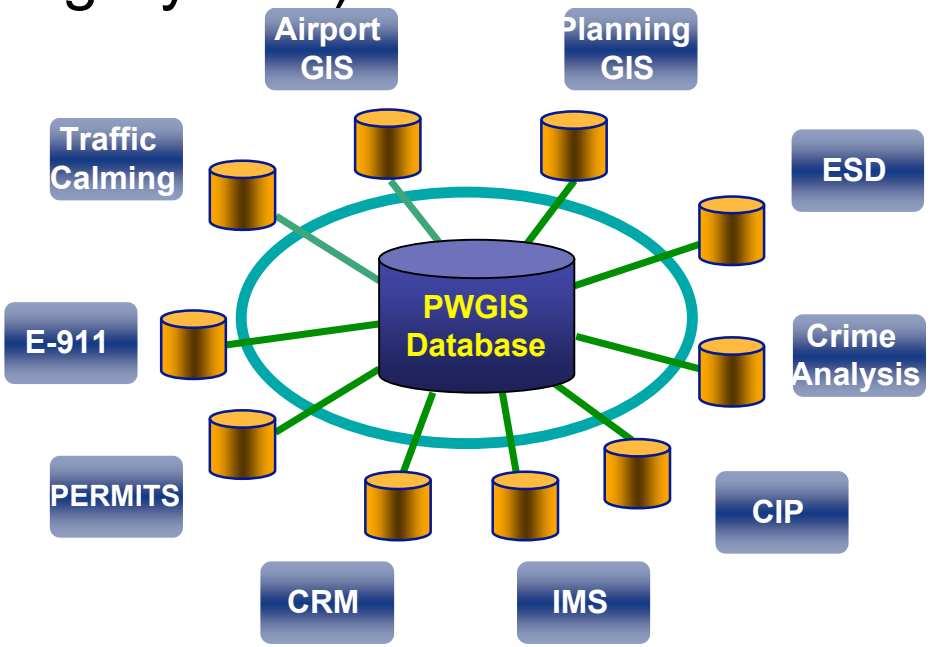


Building on Previous Success

1. Previous implementation of street centerline maintenance environment
2. Production environment has greatly improved efficiencies and reliability of the data
3. New products and inquiries can be easily addressed in a timely fashion
4. Confidence in the system and validation of key strategies

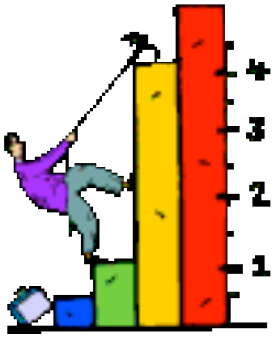
System Integration Overview

1. Planning Permitting System (CSDC-Amanda)
2. Public Safety / E-911 (Intergraph CAD)
3. Engineering Project Management Systems (in-house)
4. CUBS (Customer Utility Billing System)



Systems Integration Challenge

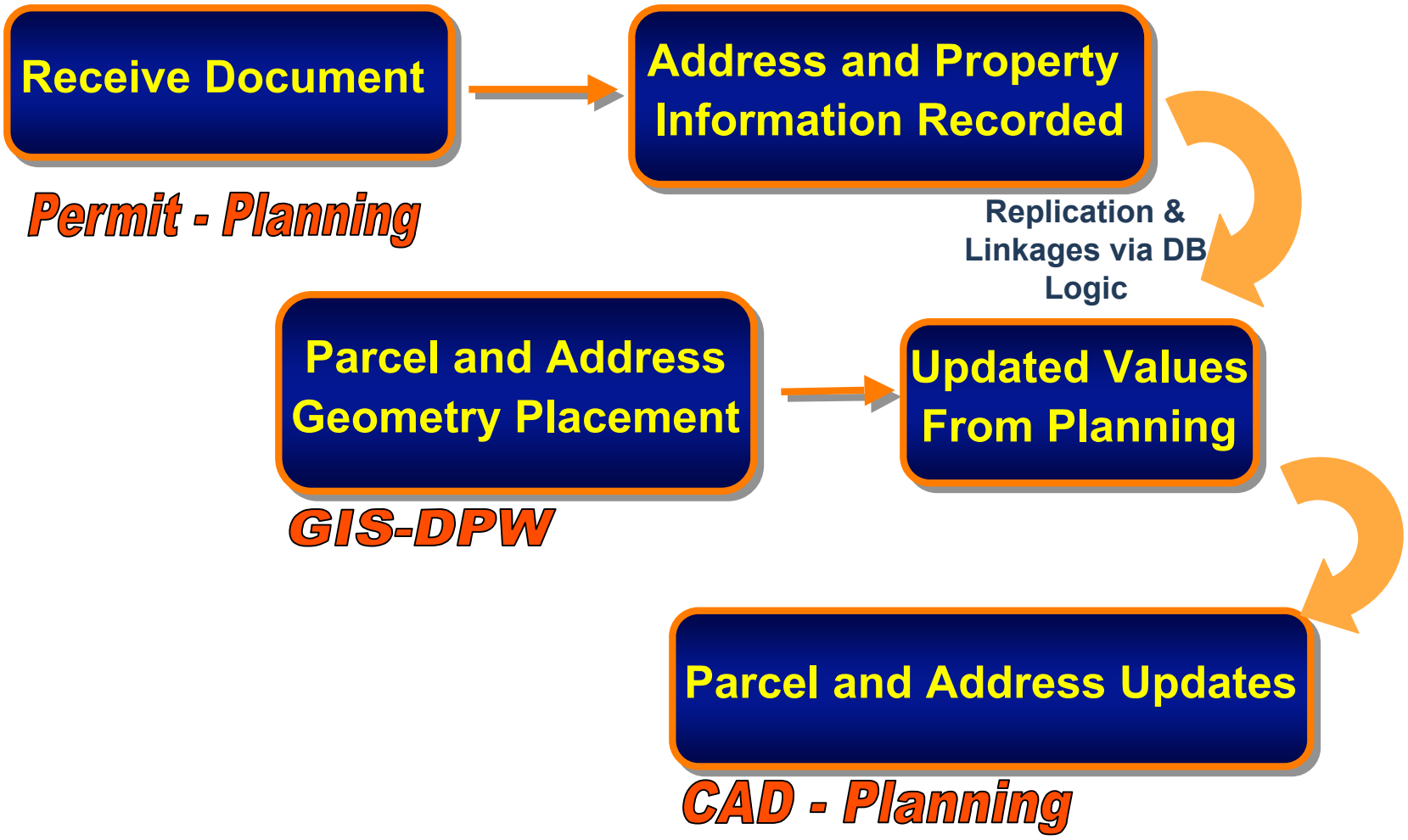
How best to integrate and update various systems at the City of San José?



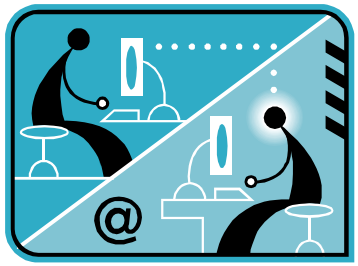
Solution:

1. Use Public Works Enterprise Data Model as the focal point for systems integration
2. DB Linkages and Oracle Replication – Materialized Views into other Business systems
3. DB Views for Dynamic and Timely Snapshot Updates into Other standalone Systems
4. DB Triggers and Procedures to perform complex updates and linkages

Multi-Departmental Work Environment



Oracle Spatial Technology



Requirements:

1. San José data is only an SQL statement away…
   - Analysis not dependent on software tools
   - Leverage Oracle Spatial operators
   - Improved performance
2. System Integration at DB level
   - DB views, DB linkages and Materialized Views to other systems provide a seamless enterprise view of the production data and a central mechanism for data warehousing
3. Licensing
   - No 3rd party licenses are required to access, view and manipulate the data (vendor independence)

Vendor Selection:

4. Oracle/Intergraph
   - Multi-Vendor support (Intergraph/Bentley/MapInfo/ESRI/Auto Desk)
   - Intergraph chosen for most open and interoperable GIS maintenance environment and web publishing environment

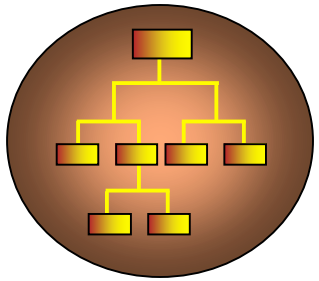
Interoperability Challenges

1. Diverse user community utilizing various tools in different departments (Intergraph/ESRI/MapInfo/Bentley/Auto Desk)
2. Increased data visibility requires increased data accuracy
3. Other technical challenges:
   - Synchronization with Disparate Systems
   - Best Linkage Mechanisms/Routines to Other Systems
   - Update Mechanism for Dependent Systems

Enterprise Spatial Database

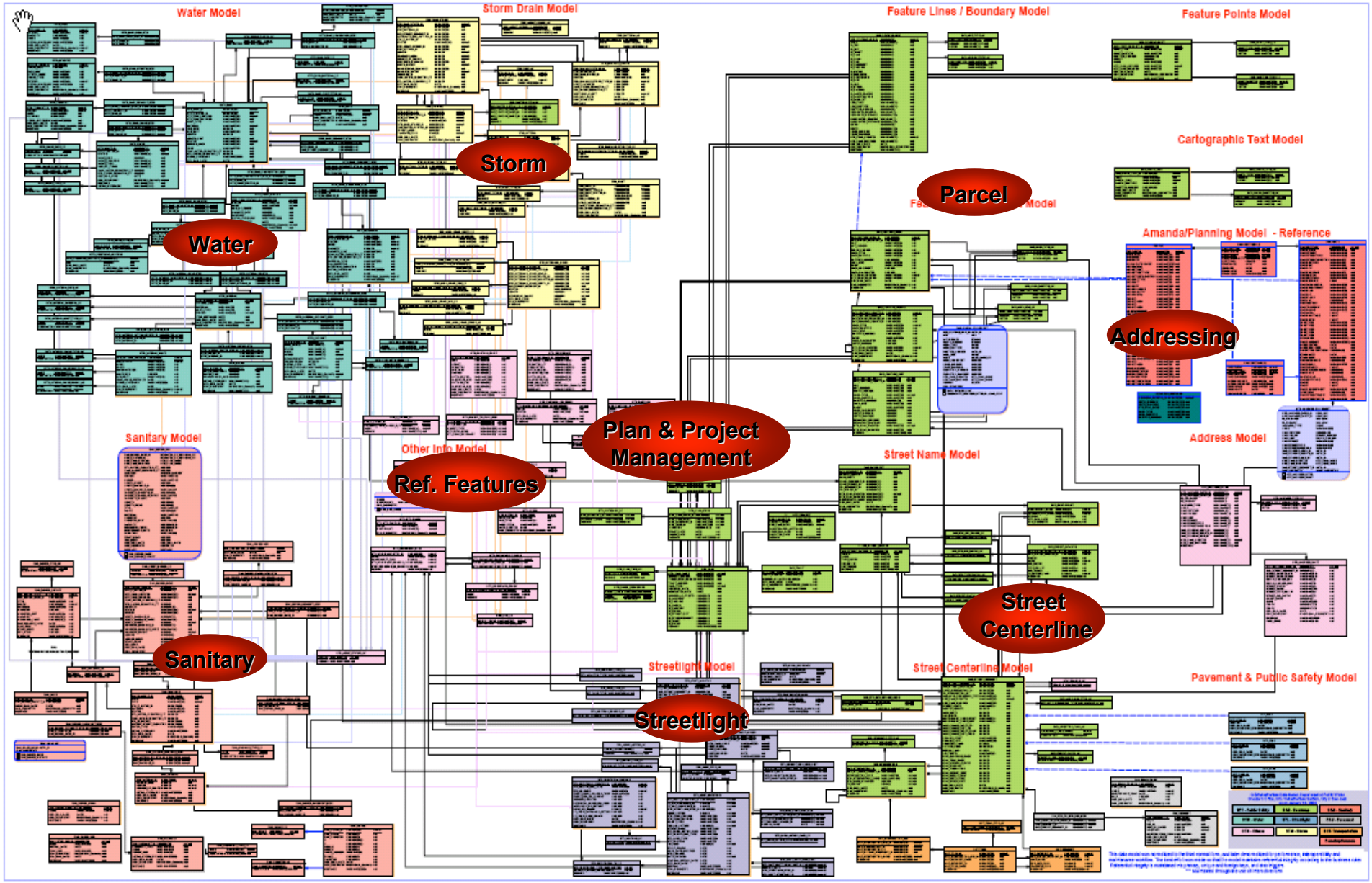
1. Street Centerline Model (Street network, master street names, synonym street names, etc… Official Situs Addresses - Fed from Planning System)
2. Parcel Mapping Model (multi-tagged line work, tax parcels, recorded parcels, condominiums, easements, etc..)
3. Underground Services Model (sanitary sewer, storm drain and water distribution)
4. Streetlight Model (lights, poles, connect orders, billing)
5. Management Model (project management, document management and resource management)

Data Modeling Requirements



1. Large seamless integrated dataset natively supported
2. Multi-user access (pessimistic and optimistic locking with conflict resolution) – Workspace Manager
3. Industry Standard DB Modeling & Administrative tools are utilized (Power Designer)
4. Ability to rely on in-house DBA resources and Consultants
5. Security at the DB level
6. Historic data tracking
7. Management of system date as well as effective date activities
8. Management and storage of lineage (parent/child) relationships

Sneak Peek of Data Model



Benefits of using Spatial DB

1. Client vendor independence and no 3rd party server middleware required (standard spatial geometry types)
2. Data entry rules and validations at the DB level (DB procedures - advanced linking routines and data updates)
3. Automated processes in the DB to create and manage data elements and relationships to other elements spatially (DB Spatial Analysis)
4. Automatic refresh of data from other systems (DB links and materialized views)

Linking to Spatial DB & Spatially Enabling Property Records

1. Data in the Planning DB (Amanda) system is 100% tabular
2. Tabular data is related to spatial features in Public Works via complex logic to establish the best linkages
3. Planning DB can be readily updated with more accurate attributes and spatial values
4. Other systems are updated based on the combined data
5. DB views provide a view of the data in the target system before the data are exported to the public safety system

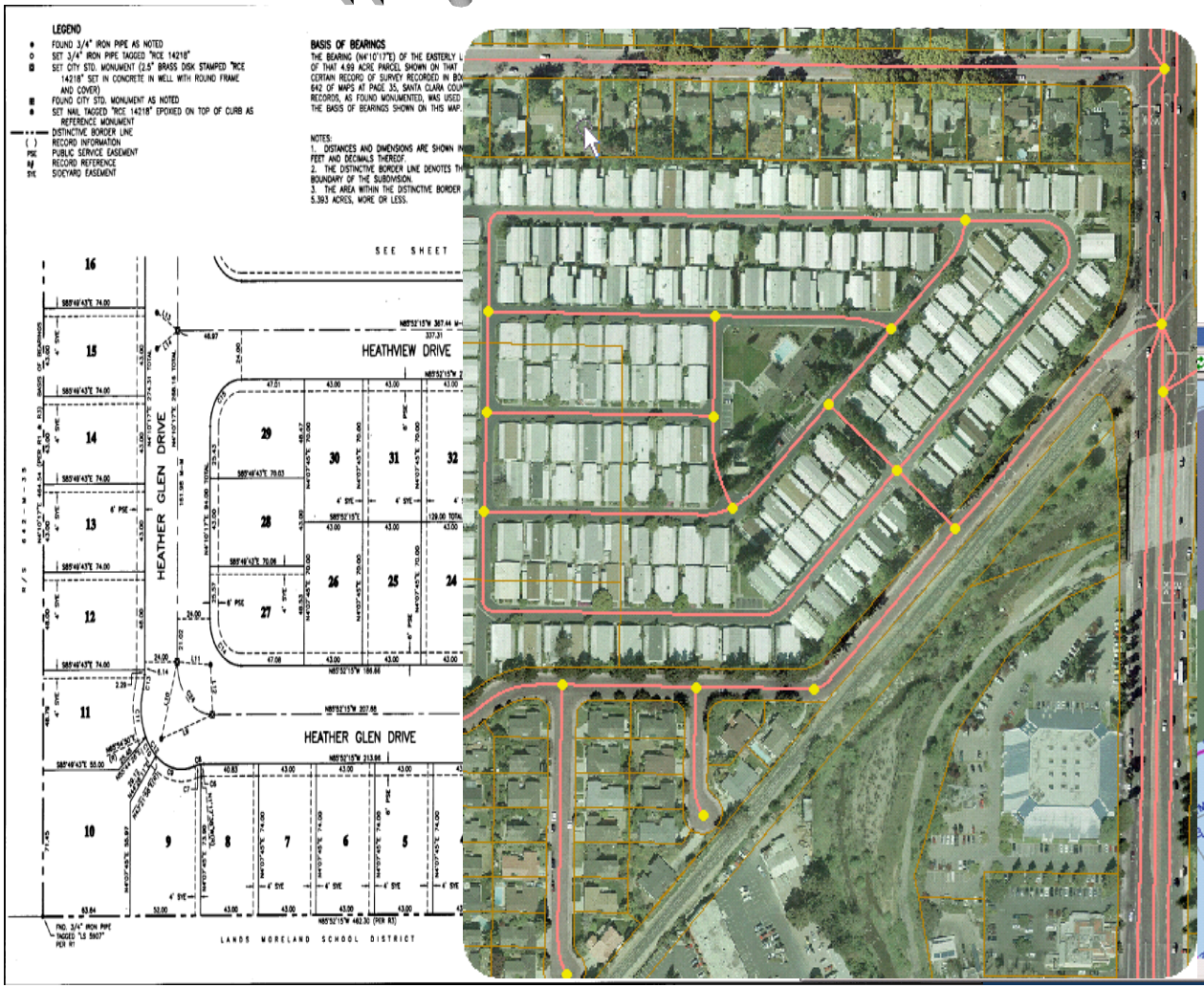
Workflow Benefits

1. Data linkages performed on feature updates
2. Dynamic linking and attribute updates
3. No manual data entry duplication
4. User focus on primary data sets
5. No data loss, redundancy, or conflict
6. Temporal components
7. Spatially enabling of non-spatial data
8. Centralized updates to other systems
9. Added QA/QC steps

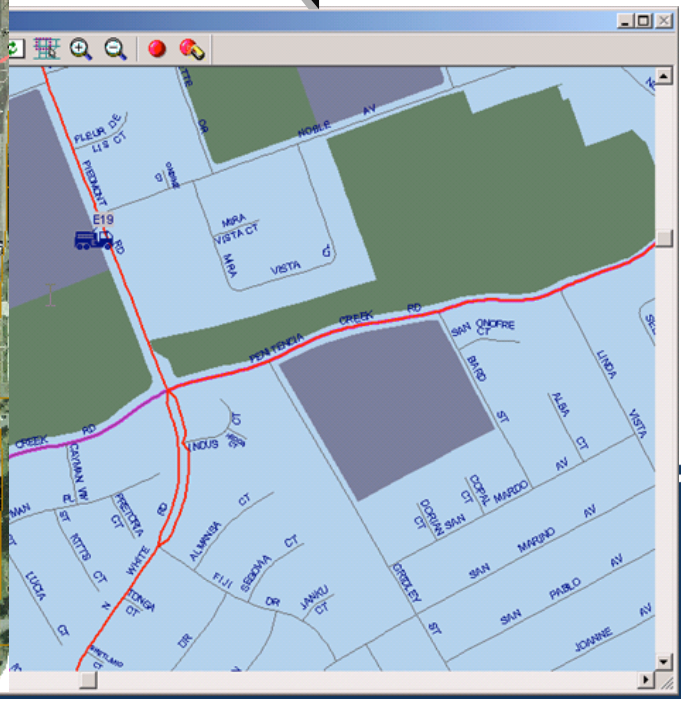
Resulting Workflow Example

Hardcopy Documents to Lifesaving Information System

Parcel Mapping

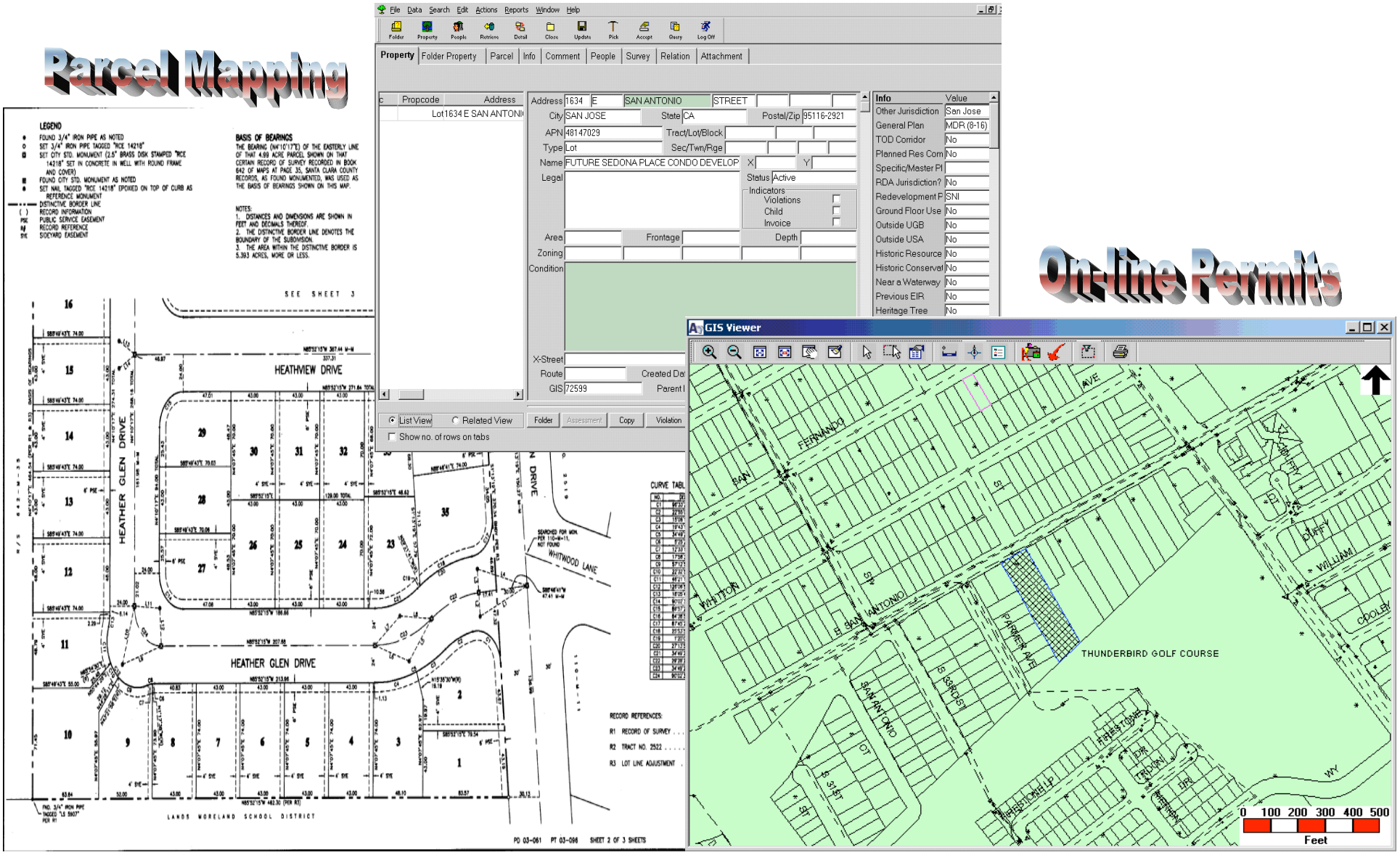


Computer Aided Dispatch



Resulting Workflow Example

Hardcopy Documents to Decision Making System



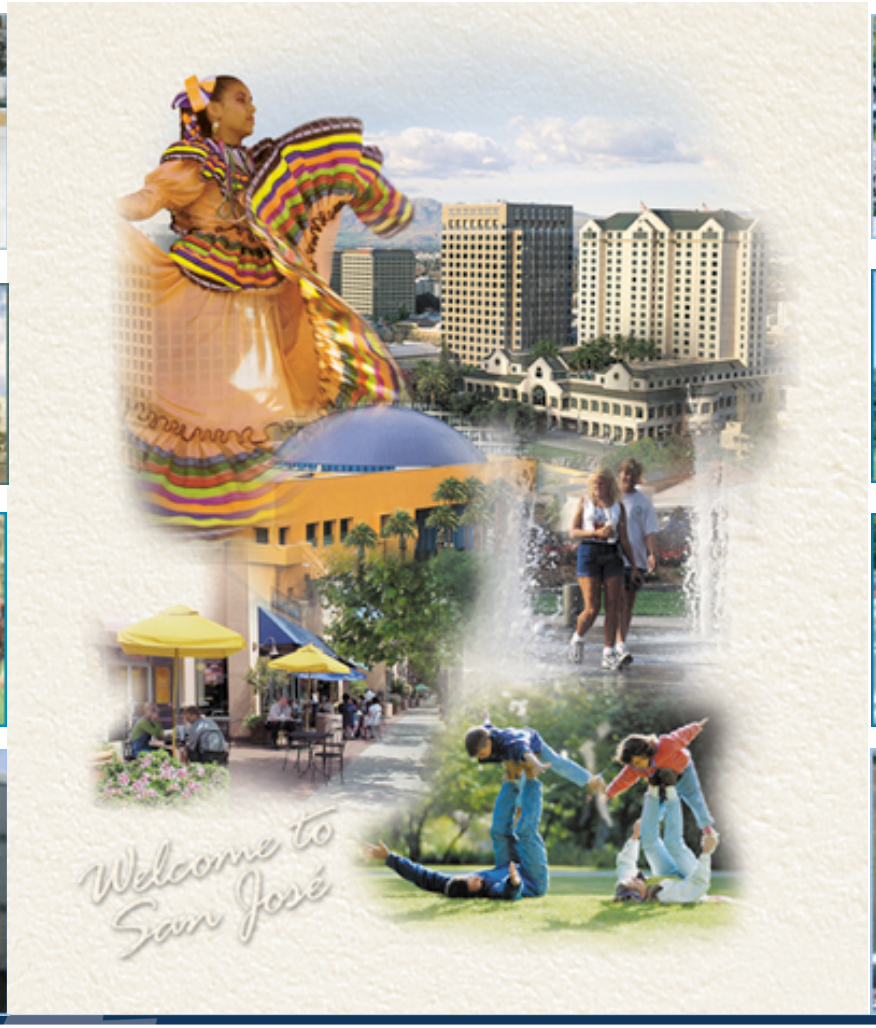
Conclusion

1. The City has invested in an open and integrated data model
2. Some of the key Oracle components and capabilities utilized include:
   - spatial
   - long term transaction management
   - database triggers and procedures
   - security and replication capabilities
3. The model:
   - Satisfies the City's GIS requirements
   - Services a diverse multi-departmental user community
   - Is accessible by various industry GIS and CAD tools
   - Supports better scalability
   - Enables accurate resource allocation
   - Provides data history
   - Minimizes data entry error though automated routines and relationships to other systems, pick list, domains etc..
4. Better security management
5. Data usage and storage is optimized; Workflows are optimized
6. Data managed in other systems are linked into the enterprise GIS
7. San José has maximum operating flexibility and control over its data
8. Cost savings due to streamlined workflow and use of proven technology

City of San José







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