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- Paper
- Mylar
- CAD, heads up digitizing, fit to some real or imaginary grid
- Rectified photo enlargements
- GPS/GIS/Digital orthophotography
- Map re-engineering for the enterprise (Cooperative public/private effort)





- COST SAVINGS, ROI, EXPECTATIONS
 - Losing time and money due to inaccurate mapping
 - Does not overlay properly over orthophotography
 - Difficult to maintain and place new data
 - Degrades accuracy of other agency map layers
 - Cannot become the foundation of an enterprise GIS
 - The public and other agencies expect accuracy



SOLVING THE PROBLEM HOW TO GET STARTED

- UNDERSTAND YOUR CURRENT DATA AND MAPPING PROCESS
 - What do you have to use
 - How good is it
 - Does it need to be "cleaned up"
 - Can any existing digital map data be reused
- UNDERSTAND THE GOALS AND OBJECTIVES YOU WANT TO ATTAIN
 - Accuracy goals
 - Connection to other data systems (CAMA, Asset Management, etc.)
 - Sharing with other agencies
- INVESTIGATE OTHER SPATIAL INFORMATION AVAILABLE
 - LABINS for certified survey corner records
 - Right of way maps
 - Survey plats and deeds
 - Aerial photography
- WORK WITH OTHER AGENCIES TO CREATE A PLAN AND FUNDING ASSISTANCE
- INVOLVE AN EXPERT WITH PROVEN EXPERIENCE



OVERALL CONSIDERATIONS

ONE SIZE DOES NOT FIT ALL

- All counties have similar challenges but to varying degrees
 - Cost issues
 - Political issues
 - Organizational issues
 - In-house expertise (or not)
 - Outsourcing requirements
 - Maintaining the existing base while remapping

RURAL COUNTY CONSIDERATIONS

- Typically have less resources available
- Generally will have less survey control
 - Obtain survey control on township corners at a minimum or at least 5 control points within a township with accurate orthophotography
- Need contractor assistance to get the job done
- Should outsource the remapping program
- Need additional training for new system
- Consider outsourcing map maintenance
- Establish interlocal agreements with other county and city agencies for financial assistance



SUBURBAN COUNTY CONSIDERATIONS

- Typically have some resources available to start the process
- Should have survey control for most section corners
 - (1 mile survey grid of corners or best evidence with accurate orthophotography)
- May need contractor assistance
- Will need some additional training
- May want to outsource the remapping program
- Establish interlocal agreements with other county and city agencies for financial assistance



URBAN/SUBURBAN COUNTY CONSIDERATIONS

- May not have enough resources for a successful GIS project
- Should densify the survey control to section and quarter section
 - (1/2 mile grid of section and quarter section corners or best evidence)
- May need consulting to help manage the project
- Will need some additional training for the new system
- May want to outsource the remapping project
- Establish interlocal agreements with other county and city agencies for financial assistance



PROJECT FUNDING

- Multi-year budget funding
 - Phase-in approach
- Funding provided by interlocal partners (county and cities)
 - Property Appraiser
 - Public Safety
 - County Surveyor/Engineer
 - Utilities, Public Works
- Co-funding with Water Management District
 - Survey control densification
- School Board
 - School district boundaries, bus routing, new school locations
- Possible legislation to offer recording fees for GIS and mapping
- Grant funding



Grant Funding Sources

State Funding Grant

Department of Revenue

Federal Grant

- Homeland Security
- Federal Transportation Grants
- Economic Development Grants
- Federal Emergency Management
 Agency Software Grants

ESRI



- Use a pilot project area to start (a section or two)
- Use of survey data to create a geodetic framework
 - Obtain as many section and quarter section control points or best evidence in vicinity thereof
 - Calculate section corner locations where survey data is not available
- Use of orthophotography as a backdrop to assist in map placement
- Use of planimetric data (natural and man made features) to assist in map placement
- Use of COGO (coordinate geometry) to create accurate parcel geometry

THE REMAPPING PLAN cont'd

- Remap to control points over orthophotography one township at a time
- Create consistency for all map annotation and symbology
- Create appropriate design schema
- Automate the process (modern GIS parcel mapping program)
- Consult with an expert with proven experience
- Use contractors as necessary



MAP PREPARATION



Parcel Polygons
Annotation
Lot and Parcel Lines
Right-of-Way
Orthophotography

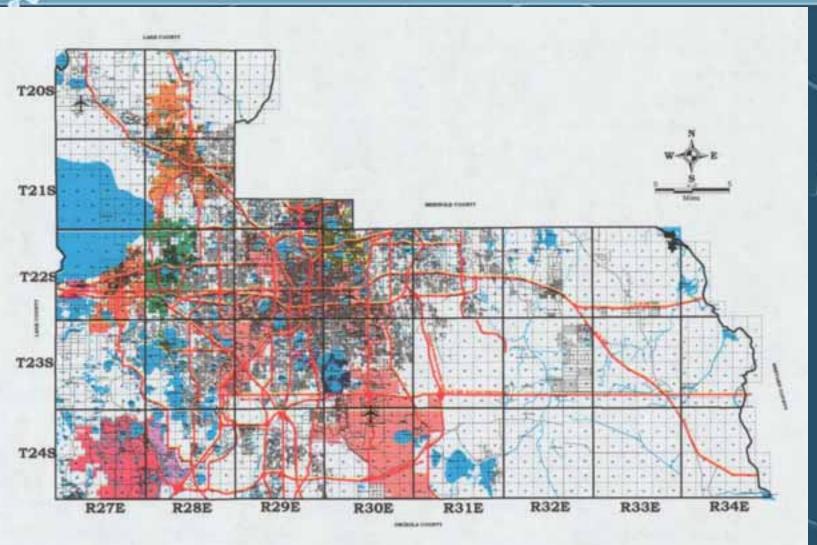








ORANGE COUNTY A CASE STUDY





CASE STUDY TOPICS

- HISTORICAL BACKGROUND
- TIME FOR IMPROVEMENT
- CONVERSION FROM GEOVISION TO ESRI
 - Migration of Legacy System to Open System
- NEW GIS APPLICATIONS DEVELOPED AND DEPLOYED
 - CAMA/GIS integration, parcel mapping, Internet, public access
- PARCEL MAP RE-ENGINEERING PROJECT
 - Accuracy and quality improvement
 - Interlocal agreements
 - Data sharing
 - Foundation of a countywide Enterprise GIS



ORANGE COUNTY GIS HISTORICAL BACKGROUND

- 1985: HDR consultant hired to develop GIS plan for BOCC, Property Appraiser, & City of Orlando
- 1988: Baymont Engineering selected for base map & record automation
- 1990: Conversion of base map completed
- 1993: Geovision went into receivership
- 1993: GIS partnership between BOCC, Property Appraiser, & City of Orlando is dissolved
- 1993: GIS Project Coordinator contract not renewed;
 8 consultants released
- 1993-98: Property Appraiser enhances CAMA with Field Link, creates Quik Map, creates property Internet site

REMAINING COUNTY OBJECTIVES

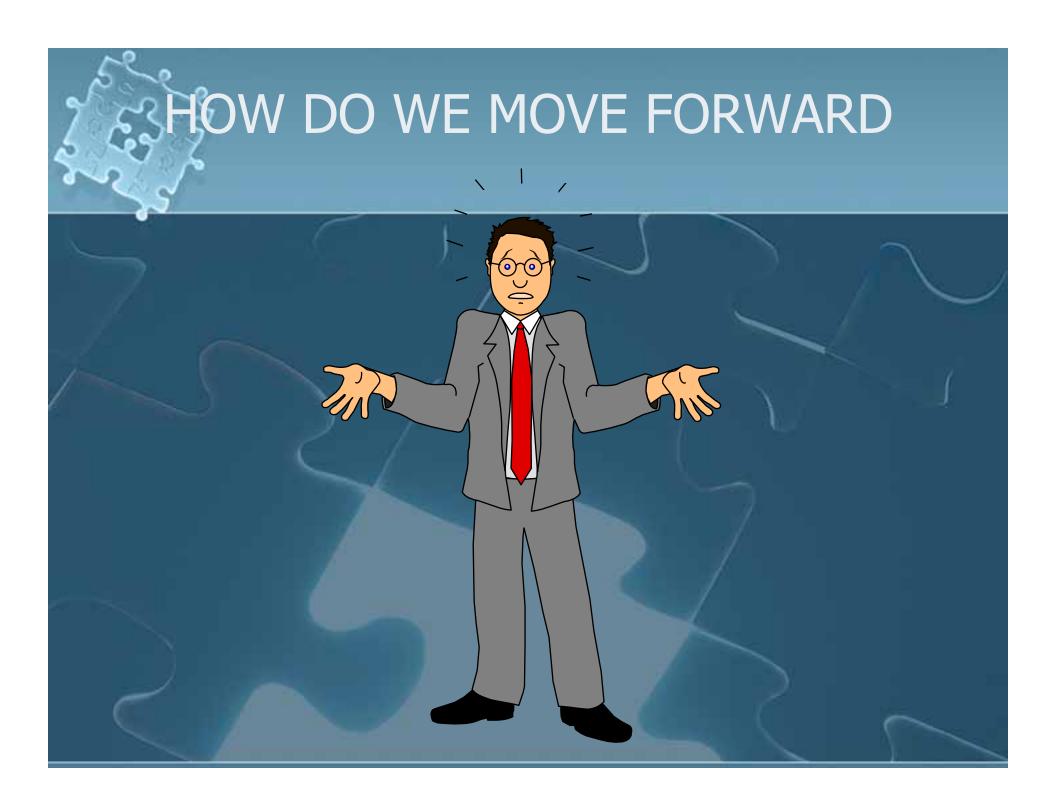
- Establish GPS/geodetic coordinates on section/quarter section survey points
- Create photogrammetry & natural features data base
- Public access to GIS data
- Other:
 - GIS street name petition application
 - Link permitting system to GIS
 - Image processing data base
 - Public Safety interface
 - Traffic sign inventory
 - Zoning code enforcement application



GIS PROBLEMS TO BE RESOLVED



- Not user friendly
- Difficult to program
- County/City departments don't have access
- The Public doesn't have access
- Spatially inaccurate to real world coordinates
- Map layers constantly shifting
- Inconsistency of quality and annotation





MOVING FORWARD

- Take Inventory of What All You Currently Have
 - The good, the bad, and the ugly
- Needs Analysis (what do we want and why)
- Project Definition (what, when, where, and how are we going to do it)
- How Are We Going to Pay For It?
- Project Leadership
- Project Management
- The Beginning of an Enterprise GIS



CONVERSION TO ESRI



- Negotiate Software from the Vendor
- MARCH 1999 Start Conversion Process
- Load Converted Data into Spatial Data Engine (SDE) with Oracle for Countywide Access
- Implement Client/Server Windows Based Desktop Access
- NOVEMBER 1999 Conversion Complete



PROGRAMS DEVELOPED

- Parcel Maintenance
- Data Exchange Programs
 - ...for Government Agencies & the Public
- Internet Map Server
 - ...for Public Access to Digital Maps
- Created ProMap (CAMA/GIS Integration)
 - CAMA GIS Access and Analysis
- Shared Data Access
 - Provided BCC with 25 Network Connections
 - ...at No Additional Cost



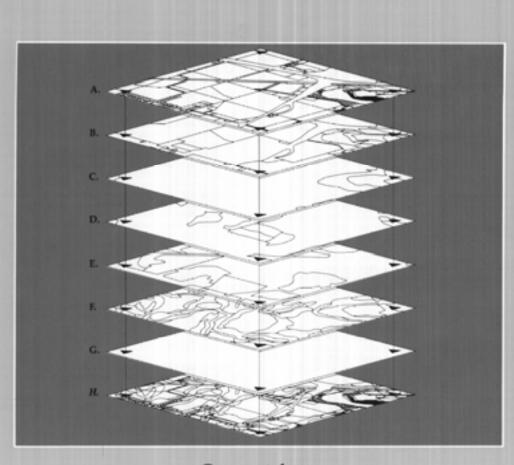
- The need for a spatially accurate parcel base map
 - Survey control required

- ...provide new leadership
- ...funding through interlocal agreements





SURVEY CONTROL



Concept for a Multipurpose Land Information System



PROJECT DEFINITION

- Densify high precision survey grid
 - County-wide (1/2 mile)
- Obtain digital ortho rectified photography
- Obtain base planimetric data, including roads & water bodies
- Augment staff with eight additional mapping personnel
- Map new parcel base legal descriptions to survey control points using COGO (coordinate geometry) with the orthophotography and planimetric data as a backdrop
- Coordinate new map delivery with existing parcel maintenance



SELLING THE PROJECT

BRING IN THE PARTNERS

- Major benefit for County Surveyor, Public Safety, Public Works, Utilities, and others
- ROI, stop the constant map layer shifts from department to department
- It has the ability to reinvent government to leverage all data



SELLING THE PROJECT (Cont'd)

INTERLOCAL AGREEMENTS

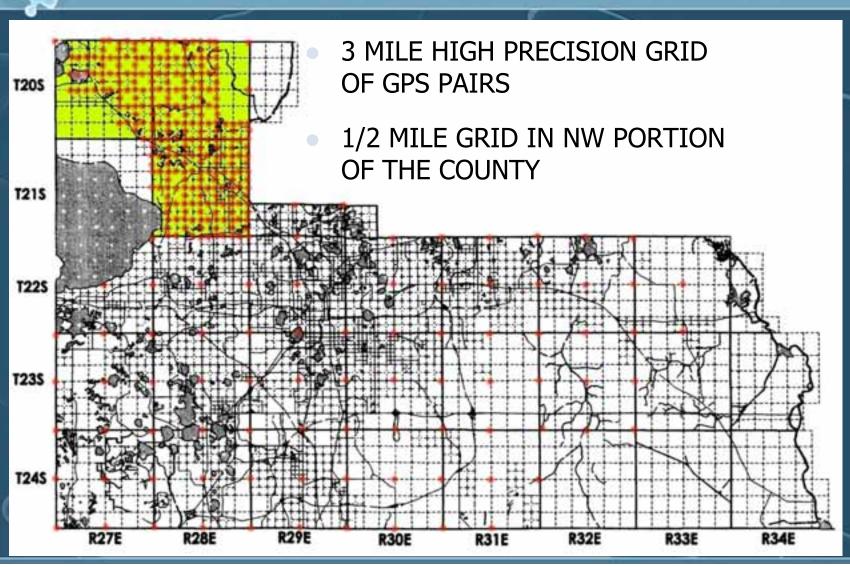
- County funds survey control, planimetric data
 & aerials, and 8 contract mappers
- Property Appraiser provides hardware, software, & project leadership and project management personnel
- Cities provide funding for planimetric data & aerials in city limits, mapper, & maintenance



- OCPA GIS MANAGER: Base map Project Manager
- OCPA GIS PROGRAMMER: Enhance applications
- PLS MAPPER: Coordinate with County survey crew, create geodetic layer & subdivision lines
- COGO MAPPERS (Contractors)
- CITY COGO MAPPER (1 for each city)
- OCPA SUPERVISOR & CARTOGRAPHER: Provide final quality control/assurance
- OCPA GIS TECHNICIAN: Maintain production & public access to GIS libraries
- COUNTY SURVEYOR



GETTING STARTED GPS PAIR DENSIFICATION



PRODUCTS AND SERVICES

(Consultants Competitive Negotiation Act) Florida Statutes 287.055

- RFQ FOR ORTHOPHOTOGRAPHY AND PLANIMETRIC DATA
 - Resolution and accuracy
 - Reputation of the vendor
 - Time table for delivery
- RFQ FOR SURVEY SERVICES
 - Negotiate for existing survey points
 - Use several firms or sub work through primary contractor
 - Reputation and time table for delivery

CONTRACT MAPPERS

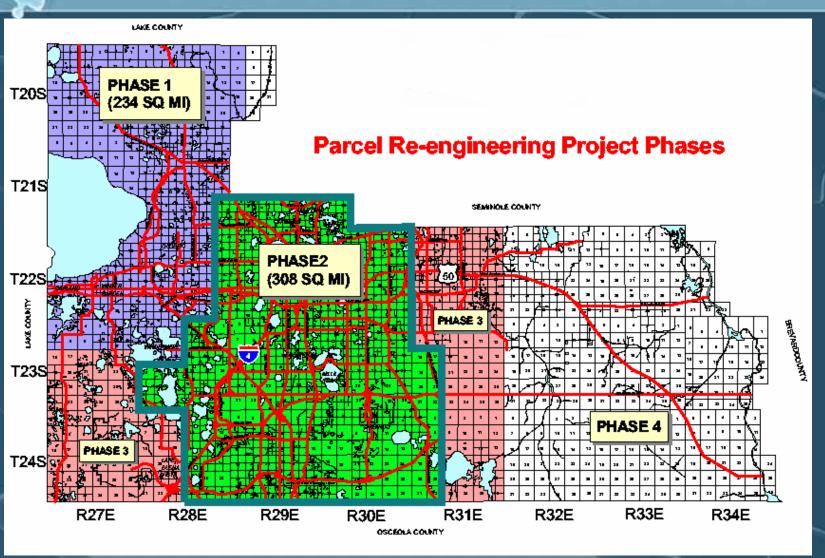
 Contract mapping firms that provide management, coordination, and guarantee delivery within time table or hire contract mappers and manage in-house

PROJECT COORDINATION

 Keep all contractors informed about the work plan and progress on a regular basis (everyone needs to be on the same page)



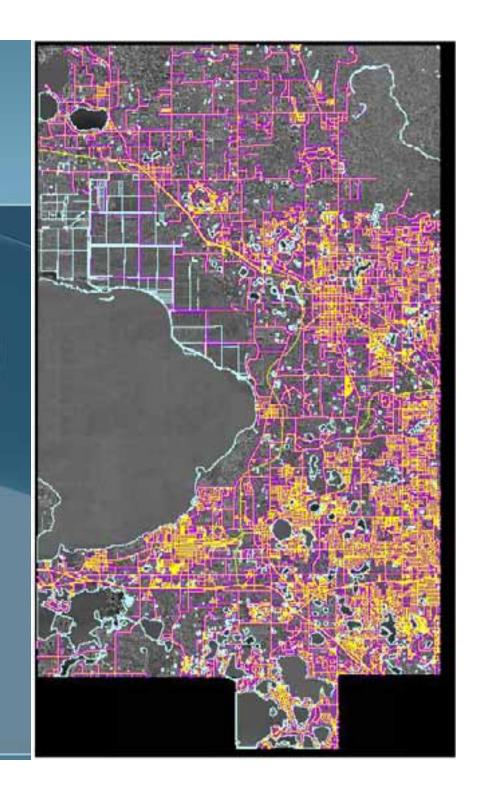
AERIAL PHOTOGRAPHY FLIGHT PLAN





PHASE 1

- Photogrammetric Data Products
 - Orthophotography
 - Planimetric Data
 - Edge of pavement
 - Centerline of roads
 - Hydrography
 - Railroad tracks
 - Bridges
 - Culverts

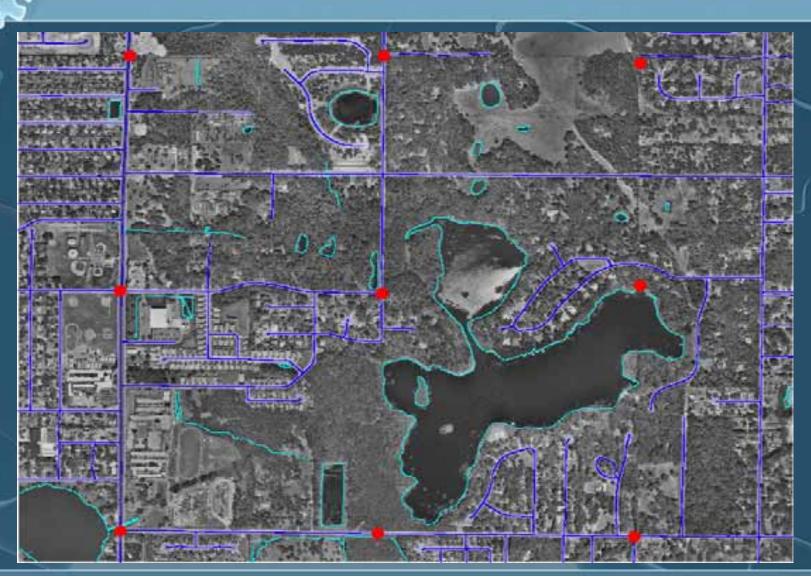




Survey Field Work

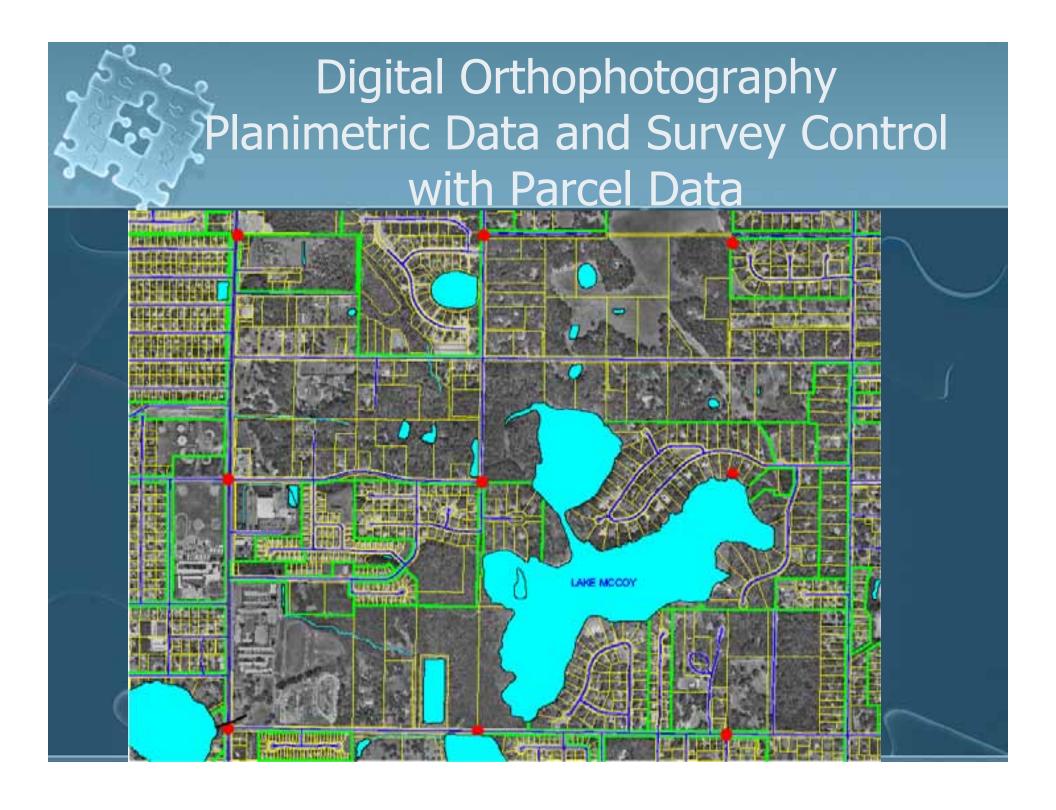














CORE GIS LAYERS

- 1. Survey Control Points (Base Map)
- 2. Geodetic Lines (PLSS)
- 3. Rectified Orthophotography
- Planimetric Data (natural & man made features Hydro; Intelligent street centerline, etc.)
- 5. Subdivisions
- 6. Blocks
- 7. Lots
- 8. Parcels
- 9. Adjustment layer
- 10. Misc (platted hydro lines, ROW lines, etc.)
 - * Including Annotation (text) & Attributes (for SDE business table)

Assembly Line Production

- 1. Research & obtain plats, ROW surveys, deeds, etc.
- 2. Prepare survey data
- 3. COGO
- 4. Attributes & annotation
- 5. Automated verification
- 6. Quality assurance
- 7. Revisions
- 8. Final Q/A-Q/C
- 9. Load into SDE
- 10. Normal maintenance



PROJECT BENEFITS

Save Time, Effort, and Money!

- Accurate Base Map for Multi-Agency Use [Public Safety (911, cell phones), Public Works/Public Utilities Facility Inventories using GPS, Property Appraisal, Zoning, Real Estate, Storm Water Management, etc.]
- No "Moving Targets" (no base map & layer shifts)
- Section Corner Preservation [Coordinates Preserved Forever, Future County Projects (e.g., transportation planning, aerial targets, storm water management, capital improvements, etc.)
- Accurate Aerial Photography & Planimetric Data
- Inter-governmental Coordination, Cost-Sharing, Data Exchange, Sharing Computer Programs, Address and Data Standards



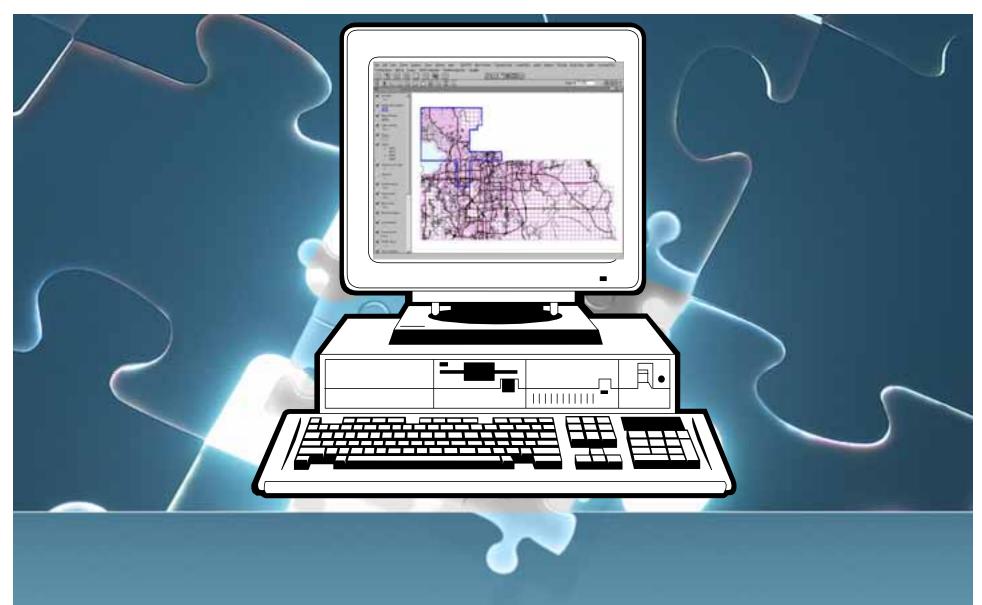
PROJECT FUNDING

- Multi-year funding over 5 years
- Property Appraiser is project manager/coordinator
- Property Appraiser provides hardware/software for base reengineering
- Funding provided by interlocal partners (county and cities)



Future Funding Sources

- Normal annual funding for maintenance
- Continued interlocal agreements
- Additional interlocal agreements
- Sale of GIS products
- Grants



APPLICATIONS THAT BENEFIT FROM ACCURACY

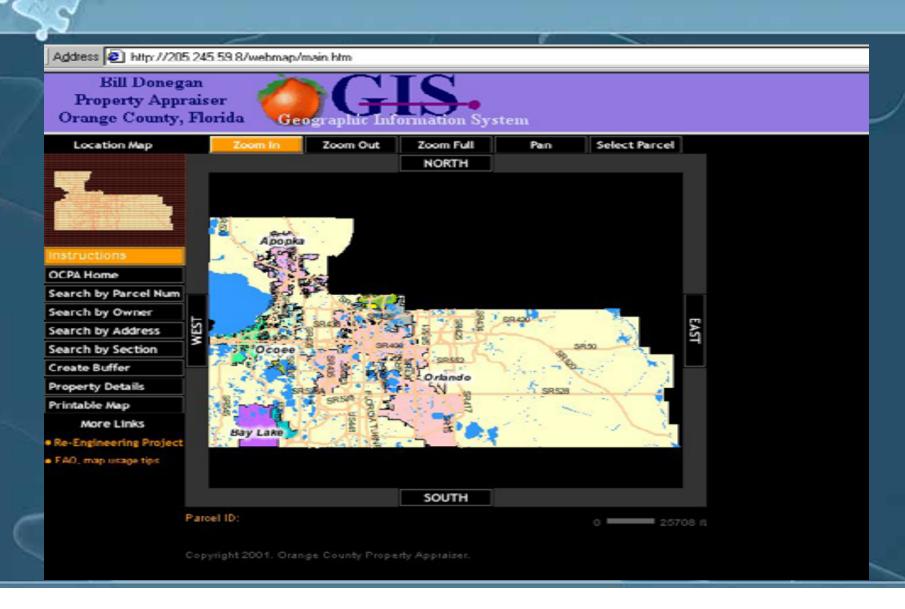
VALUE ADDED APPLICATIONS

- Property value assessment:
 - Identify features with orthophotography
 - Real time use of GPS for field work
- Able to use GPS to geo-locate and place new features
- Data base quality assurance:
 - Verify city, millage, & other codes
- Emergency damage assessment



- Streets and Addressing
- Zoning
- Current and Future Land Use
- Flood Plain
- City Limits
- Residential and Commercial Buildings Features
- Jurisdictions
- Utilities (Electric, Water, Storm & Sanitary)
- Elections
- Capital Improvements
- Public Safety (Police, Fire, Sheriff)
- Public Works
- Permitting
- Health Department
- Economic Development

Accurate Internet Map Data



Ortho Photo Re-engineered Parcels on the Internet





AWARD WINNING GIS



- 6/2000: SIG Award, ESRI International GIS User Conference
- 6/2000: "Best Software Integration" at the Map Gallery, ESRI International GIS User Conference
- 9/2000: Nominated for Distinguished Assessment Jurisdiction Award
- 11/2000: White Paper of the Month, *GISVision* magazine (www.Giscafe.Com/gisvision/)
- 7/2001: People's Choice Award, ESRI International GIS User Conference
- 7/2001: Avenue Programming Award, Applications Fair, ESRI International GIS User Conference



AWARD WINNING GIS



- FACM "Outstanding Achievement" Award, OCPA's Cadastral Mappers, Contract Mappers and GIS Team (2005)
- "In recognition of their phenomenal team effort bringing the 'Orange County Base Map Reengineering Project' to completion in exactly five years, well under budget, and developing what is believed to be one of the finest, most accurate and comprehensive cadastrals available nationwide"



Testimonial

"Hardly anyone will know but this was the best investment Orange County has ever made for a return on investment"

> ----Orange County Mayor Richard Crotty



In Conclusion

- Understand what you have and don't have
- Determine your goals and objectives
- Determine the funding needed
- Develop interlocal agreements
- Secure the funding resources
- Follow a proven plan
- Provide professional project management
- Consult with an expert
- Leave room for innovation and new technology