Defining the Puzzle Pieces of a School District GIS System

Will Davis, GISP & Harry Fix, AICP
Lake County Schools

LAKE COUNTY SCHOOLS

Organizational Level's Use of GIS?

- Aa Not sure
- Bb Planning & Student Assignment
- Cc Transportation & Student Routing
- Dd Planning & Student Transportation
- Ee Other Additional Departments

What is your level of GIS knowledge?

- **Aa** Have only heard of it in passing
- **Bb** Seen others use it before (intrigued)
- **Cc** Have a basic knowledge of its capabilities
- **Dd** Have a good working knowledge
- **Ee** I consider myself an expert or power user

LAKE COUNTY SCHOOLS

Has GIS paid for itself in your organization?

- Aa We don't currently use GIS
- Bb GIS has been a negative drain on our efforts
- Cc The benefits don't outweigh the cost/effort
- Dd GIS is most likely a break even proposition
- Ee GIS has been a positive asset for the effort

LAKE COUNTY SCHOOLS

Effective Organizational Use of GIS?

- Aa — We currently don't have GIS with no interest to use it
- Bb — Don't have GIS but currently looking with interest
- Cc — Consultants do most of our GIS work
- Dd — We use it, but not nearly to its full potential
- Ee — We make full use of GIS in many departments

LAKE COUNTY SCHOOLS

Points of Discussion

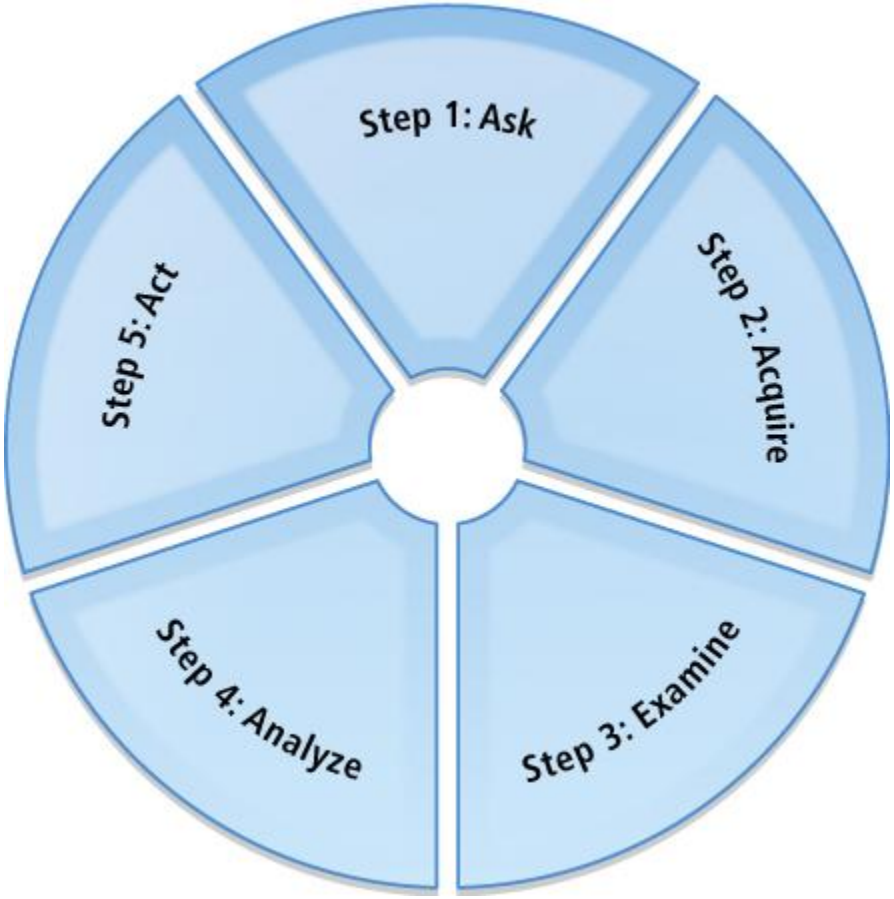
- What is it and why do I need it
- Realistic benefits
- What can I do with it
- Goals for implementation
- Management & operational issues
- What essentials do I need to start
- Where do we get started
- How can my District best utilize it

What is GIS?

GIS is an abbreviation for "*geographic information systems*" which is a **set of tools** that captures, stores, analyzes, manages, and **represents data** that are **linked to locations**. In the simplest terms, GIS is the merging of cartography, statistical analysis, and database technologies to develop better solutions and **make better decisions**.

LAKE COUNTY SCHOOLS

What is Geographic Approach?



- **Frame the question**
- **Find the data**
- **Examine the data**
- **Analyze the data**
- **Share the results**

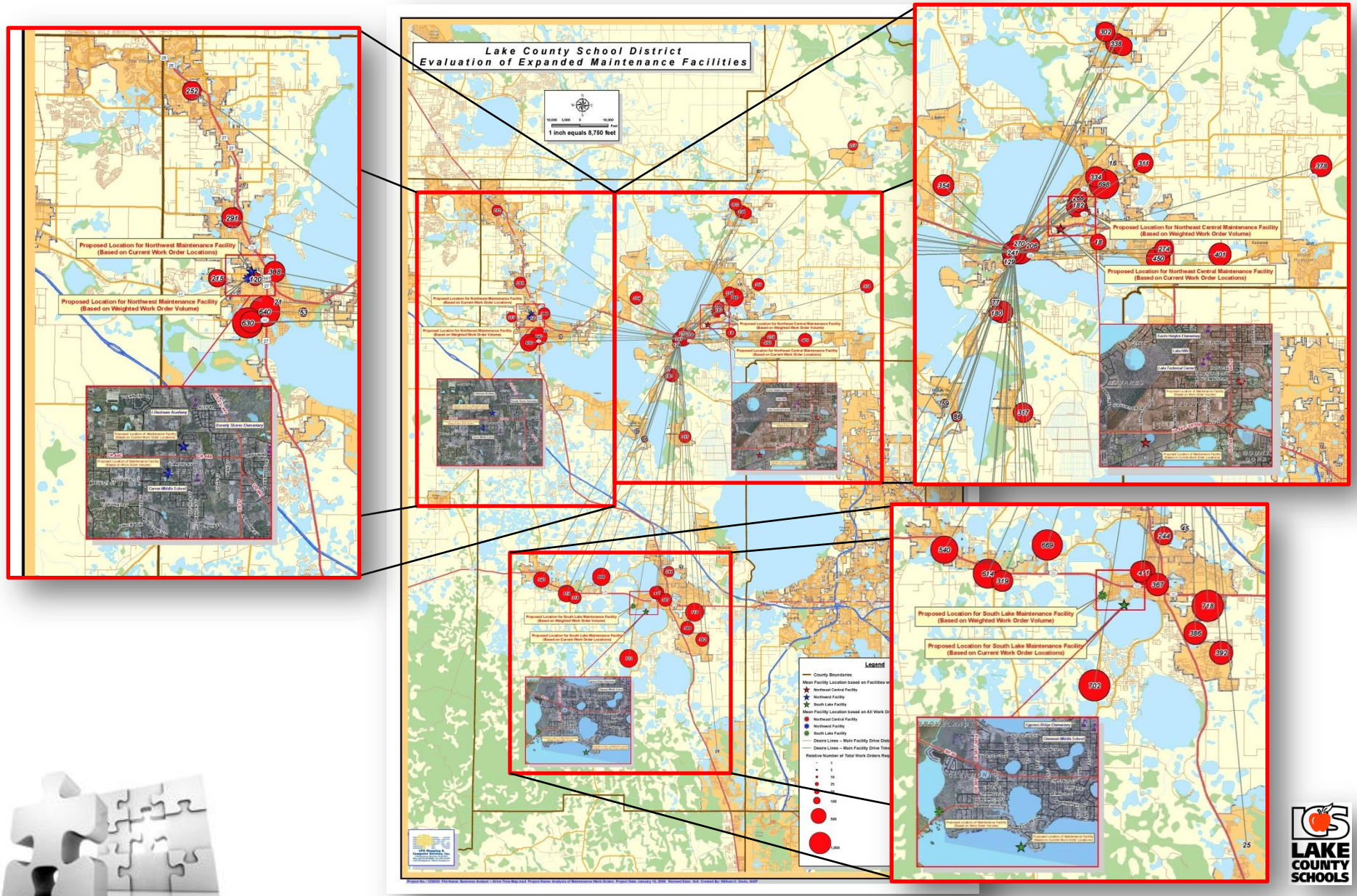
Why do I need GIS?

- **Pictures are worth a 1,000 words**
  - **Absorb large amounts of data quickly**
  - **Rapidly visualize complex data & ideas**

- **Visual-spatial learners**
  - **We tend to think in pictures rather than words**
  - **63% of us are right brain thinkers**

LAKE COUNTY SCHOOLS

An Example of Picture is Worth a 1,000 Words



LAKE COUNTY SCHOOLS

Why do I need GIS?

- **Geospatial reasoning & spatial awareness**
  - **Three-dimensional mental models**
  - **Forth-dimension of time**
  - **Recall previously observed objects (object location memory)**
  - **Integrate observation-based learning (separating objects by location or area)**
  - **Understanding spatial context (right/wrong space)**
  - **Recognition of spatial schemes (patterns & shapes)**

LAKE COUNTY SCHOOLS

Top Five Benefits to Using GIS?

- **Cost Savings and Increased Efficiencies**
- **Better Decision Making**
- **Better Recordkeeping**
- **Managing Organization Geographically**
- **Improved Communications**

What Can You Do with GIS?

- **Map where things are** (visualize patterns)
- **Map quantities** (quantities by location or criteria)
- **Map densities** (feature size & distribution)
- **Find what is inside** (buffers or drive-times)
- **Find what is nearby** (proximity awareness)
- **Map change** (anticipate the future or evaluate the past)

LAKE COUNTY SCHOOLS

PART 1 -- Target Goals of Implementing GIS!

- **Improved efficiencies**
- **Effective management of resources**
- **Automate workflow processes**
- **Comply with regulatory mandates**
- **Improve communication, coordination and collaboration**
- **Increase productivity**
- **Improve data accuracy & processing**

PART 2 -- Target Goals of Implementing GIS!

- **Improve data accuracy & processing**
- **Save time**
- **Make better quality & more effective decisions**
- **Save money**
- **Share data resources with others**
- **Improve information processing**
- **Respond quicker to stakeholder request**

PART 1 - Management Issues to be Considered!

- **Leadership** (who's carrying the torch)
- **Plan** (Strategic Implementation Plan)
- **Cost** (manpower & technology)
- **Responsibility & Accountability**
- **Data availability**
- **Timeframe**
- **Organizational Cooperation**
  - **Internal** (IT Department)
  - **External** (state, regional & county)

LAKE COUNTY SCHOOLS

PART 2 - Management Issues to be Considered!

- **Communications**
- **Development vs. maintenance**
  - **Internal (District staff)**
  - **Consultant(s)**
- **Build tools to enable end users**
- **Return on Investment (ROI)**
- **Cost Benefit Analysis (CBA)**

NOTE: CBA means everything is essentially translated into dollars — the inputs and the outputs, where ROI represents money saved, is contrasted with the amount of money spent on the program.

LAKE COUNTY SCHOOLS

Operational Things to be Considered!

- **Availability of existing data**
- **Accuracy (scale)**
- **Geographic reference (grid)**
- **Target Audience**
  - **Internal (staff)**
  - **External (public, parents & community stakeholders)**
- **Development priorities**
- **Centralized or decentralized**
- **Onsite infrastructure**

LAKE COUNTY SCHOOLS

What are the parts of a GIS?

- **Hardware**
  computers, printers, servers
- **Software**
  programs, applications
- **Data**
  information, tables, spreadsheets, databases
- **Methods**
  how to ask questions
- **People**
  creaters & end users

LAKE COUNTY SCHOOLS

Integrating the Parts to see the BIG Picture!

Students, Facilities or Addresses

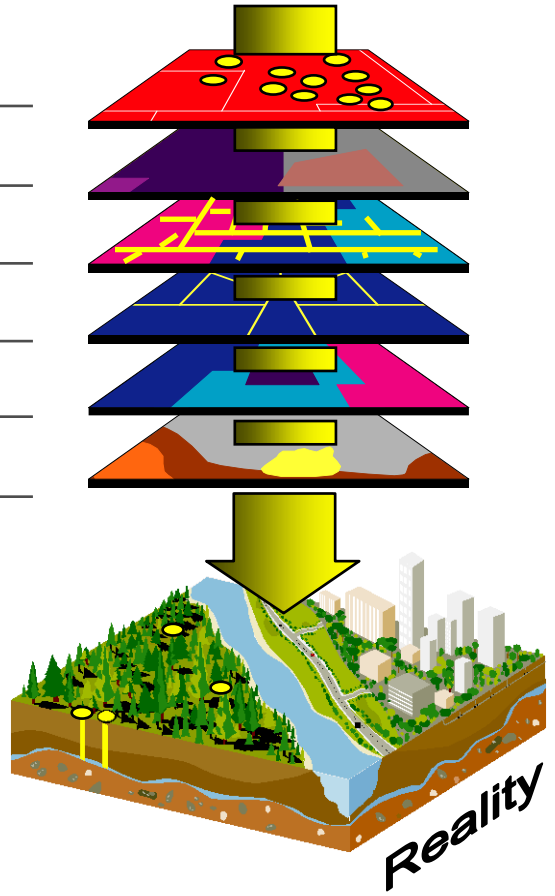
Transportation Zones

Streets & Bus Routes

School Attendance or Student Analysis Zones

Tax Parcels, Facility or District Ownership

Aerial Photography



LAKE COUNTY SCHOOLS

What are the Most Important Puzzle Pieces?

- **Data, Data, Data**
  - **Internal**
    - Who has it
    - Can we extract it out
    - Can we import it back in
    - Is the quality acceptable
  - **External**
    - Base-feature elements
- **Hardware**
  - **Onsite**
  - **Cloud**
- **Software**
  - **Proprietary**
  - **Open source**
- **Methods/People**

DATA – The Most Important Puzzle Piece!

- **Student data**
  - **Usability**
  - **Exportable/importable**
  - **Accuracy**
  - **Easily accessible**
  - **Able to geocode**
- **Tax parcel boundaries**
- **E911 addresses**
  - **Point**
  - **Polygon**
- **Road centerlines**
  - **Network routable**
  - **Address ranges**

How Do We Get Start?

- **Determine priorities**
  - **Strategic Implementation Plan**
    - Needs assessment
    - Conceptual design
    - Survey of available data
    - Survey of hardware & software
    - Database planning & design
    - Database construction
    - Pilot study & benchmark testing
    - GIS system integration
    - GIS application development
    - GIS use and application
  - **Database planning**
    - Local
    - Corporate
  - **Identify participants**
    - Developers
    - Analyst
    - Users

Starting with Transportation

- **Transportation Department**
  - **Student geocoding**
    - Address points
    - Street centerlines (address ranges)
  - **Create facility & critical points**
    - Schools
    - Bus stops
    - Transportation depots
    - Facility access points
      - Bus
      - Staff
      - Parent pickup & drop-off
      - Pedestrian
  - **Networkable street layer**
    - Purchase license (NAVTEQ)
    - Obtain or create from local government
  - **Other important data lookup tables**
    - Vehicle
    - Driver

Starting with Planning

- **Planning Department**
  - **Student geocoding**
    - Address points
    - Street centerlines (address ranges)
  - **Create facility & critical points**
    - Schools
    - Administrative
  - **Planning boundaries (from tax parcels)**
    - Student Analysis Zones (SAZ's)
      - Utilized existing boundaries as template
      - Evaluate against other local government boundaries
        - » Transportation Analysis Zones (TAZ's)
        - » Census Blocks
        - » Local planning areas
    - Attendance zones (built from SAZ's)
  - **Student export tables**
    - Student assignments
    - Zone status
    - Add in transportation boundaries (if available)

LAKE COUNTY SCHOOLS

How can GIS be utilized in my District?

- **Planning**
- **Transportation**
- **Facilities Department**
- **Information Technology Department**
- **Finance Department**
- **Safe Schools**

Planning Department

- **Student demographic analysis**
- **Facility siting**
  - **SREF (State Requirements for Education Facilities)**
  - **Redistricting assessments**
  - **Transparency of assessment process**
- **Growth projections**
  - **Residential density changes**
  - **Areas of growth projection potential**
  - **Future transportation issues**
  - **Local government collaboration**
- **Student & program assignments**

Transportation Department

- **Student locations & mapping**
  - **Primary residence**
  - **Secondary pickup and drop off sites**
  - **Category assignments (HWR, PRZ & FTE)**
- **Depot facility siting**
- **Transportation logistics (routing)**
  - **Student bus stop assignment**
  - **Bus stop assessments**
    - Safety
    - Location
    - Distance
  - **Routing efficiencies & optimization**
  - **Sexual Predator / Offender**
- **Customer service**

LAKE COUNTY SCHOOLS

Information Technology Department

- **Student Information Systems**
  - **General automation**
  - **Record audits**
  - **Attendance assignment**
  - **Student eligibility**
  - **Transportation FTE & HWR**
  - **Zone waiver accountability**

Facilities Department

- **Construction management**
  - Design visualization
  - Site limitations (physical & environmental)
  - Track & record construction process
- **Physical plant**
  - Florida Inventory School Houses (FISH)
  - Facility utilization
  - Maintain site infrastructure
  - Portability of information
- **Maintenance logistics**
  - Facility siting
  - Cost of Ownership
  - Efficient work order assignments

LAKE COUNTY SCHOOLS

Finance Department

- **Mileage assessments**
- **State & local budget comparisons**
- **Charter school reimbursement**
- **Financial assessments & comparisons**

Safe Schools

- **Emergency planning & preparation**
- **Law enforcement coordination**
- **Depiction of incident**
- **Staff resource allocations**
- **Tracking sexual predators/offenders**

Things to Remember about GIS

- **Great tool for getting your message out**
- **Produces quantifiable results**
- **Gain efficiencies**
- **Save both time & money**
- **Has functional purpose organization-wide**
- **KISS -- Start slow and gain momentum**
- **Don’t work within a vacuum**

LAKE COUNTY SCHOOLS

Presentation Takeaway

QUESTIONS

Contact & Presentation Information

Will Davis – DavisW@lake.k12.fl.us

http://bit.ly/L3GJ6J

QR Code to Download PDF Version of Presentation