CIM, ROADS & GIS – The Perfect Triangle

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Florida Department of Transportation
OVERVIEW

- CIM
- ROADS
- GIS
- FDOT Reorganization
- GIS in FDOT
- What’s next?
- Questions?
The FHWA has endorsed and defined a new concept: Civil Integrated Management.

Civil Integrated Management

The collection, organization, and managed access to accurate data and information throughout the life cycle of a transportation asset using enabling technologies.

Enabling technology - invention or innovation that can be applied to drive radical change in the capabilities of a user or culture.

https://en.wikipedia.org/wiki/Enabling_technology
Civil Integrated Management

Enabling Technologies

- Geographic Information System (GIS)
- 3D Engineered Models
- Light Detection and Ranging (LiDAR)
- Global Positioning System (GPS)
- Automatic Machine Guidance (AMG)
- Mobile Devices / Mobile Computing
- Cloud Computing
- Electronic Document Management Systems

Source: Advances in Civil Integrated Management (CIM), NCHRP Domestic Scan 13-02
Duane F. Brautigam, P.E. Design Expo 2015
Civil Integrated Management

- CIM concept may be used by all affected parties for a wide range of purposes

- CIM’s goal is to serve all functional areas and consistently deliver appropriate, accurate, and reliable information

https://www.fhwa.dot.gov/publications/publicroads/16janfeb/06.cfm
Civil Integrated Management

CIM has the potential to take project delivery and asset management to the next level by

- Integrating multiple emerging technologies
- A focus on digital practices
  - 3D models
  - e-Construction
  - e-Maintenance
  - Digital data
  - Geospatial referencing
- Incorporating the concept of integrated management

https://www.fhwa.dot.gov/publications/publicroads/16janfeb/06.cfm
The CIM concept lead FDOT to the ROADS initiative

- Reliable
- Organized
- Accurate
- Data
- Sharing

FDOT initiative that started in March 2015
Purpose

Develop and implement an integrated enterprise information management system that will provide reliable and accurate data, and can be quickly shared across the Department.

Goals

- Assess the organization
- Improve data reliability and accuracy
- Simplify data sharing across FDOT
CIM requires an overriding “framework”:

**ROADS & CIM**

- Data exchange mechanisms for sharing information across stakeholder, functional, and program areas
- Standard ways to define, organize, understand, and utilize data for the various Stakeholder Team components
- Ability to leverage various digital data, tools, and processes for the life cycle management of the transportation asset
The ROADS Approach

- Identified twelve key enterprise information management areas
The ROADS Data Governance Structure

- Champions Data Quality Improvement
- Represents Data Governance Stakeholders
- Prioritizes Data Issues
- Sets Data Governance Policies and Procedures
- Lead the Data Steward Work Group
- Report Directly to Data Governance Committee
- Ensure Data Governance Compliance
- Alignment with Functional Managers
- Work with Data Stewards and Custodians

**ROADS Executive Team**

- Business Function Expert
- Data Quality Metrics
- Business Rules
- Data Quality Champion
- Support BI/DW Initiatives
- Process and Standards Definition
- Data Definitions
- Business Glossary

**Enterprise Data Stewards**

- Technical Function Expert
- Data Quality Metrics
- Source Data Access Authorization
- Data Quality Defect Resolution

**Data Stewards**

**Data Custodians**
The awarded vendor of our recent Invitation to Negotiate (ITN) is SAS.

SAS will be our strategic partner for implementing tools to support our ROADS efforts.

The tool set includes:

- Metadata Management
- Extract, Transform & Load tools
- Data Quality tools
- Reporting tools

Preparing final contract now and plan to start the implementation of the project July 2017.
Geographic Information Systems

80% or more of the Department’s data is spatial

A system for
- visualizing
- questioning
- analyzing
- interpreting data
- working with 2D & 3D data simultaneously
- fast and easy sharing data on any device

Understand relationships, patterns and trends

CIM, ROADS & GIS

CIM

The Perfect Combination

ROADS

GIS
Data Management & Sharing is about the “BUSINESS”
GIS Mapping Office

- **CO - GIS Operational Planning meeting**
  February 13 & 14, 2017 – Burns Auditorium

- **District GIS Operational Planning meeting**
  March 8, 2017 – District 7 Headquarters

**Objectives**
- To evaluate current GIS solutions and support for the Department
- Describe how would a Successful GIS Program would look like for FDOT (Utopia)

**Attendees**
- GIS Coordinators/ GIS Office Representatives
- District Consultant Support
- Power GIS users
### GIS Mapping Office

#### Successful Enterprise GIS Program (Utopia)

<table>
<thead>
<tr>
<th>Central Office</th>
<th>Districts</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Fast</td>
<td>• Right People</td>
</tr>
<tr>
<td>• Current</td>
<td>• Management Buy-in/Everyone else</td>
</tr>
<tr>
<td>• <strong>Consistent</strong></td>
<td>• Resources/Consistency</td>
</tr>
<tr>
<td>• GIS-Driven</td>
<td>• Sharing</td>
</tr>
<tr>
<td>• Documented</td>
<td>• Clear Action Items</td>
</tr>
<tr>
<td>• Analytical</td>
<td>• Common Goals</td>
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<tr>
<td>• Maintainable/Reliable</td>
<td>• All Ideas</td>
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<tr>
<td>• Solution-Driven</td>
<td>• Transparency</td>
</tr>
<tr>
<td>• <strong>Resource Allocation</strong></td>
<td>• Innovation</td>
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</table>

- Discoverable
- Scalable/Customizable
- Georeferenced
- **Accessible**
- **Management Supported**
- Meets Needs
- Flexible
- Training
- Marketing/Exposure

- Proper hardware
GIS Mapping Office  Successful Enterprise GIS Program (Utopia)

**Districts**

- Best practices
- Reduce redundancy
- Continuity of core positions
- Dedicated staff
- One stop data library
- **Better transfer of knowledge**
- Educated support
- **Better access**
- Internal branding
- **Better training/PR**
- External database
- Flexible

**GIS Mapping Office**

- Better communication of change control
- Standard data structure
- Standardize method of data input
- Standard map services from enterprise databases
- 21st century map services
- **Money - more strategic spending & planning**
- Resource allocation ($) wise
- Developing applications with any available budget
- Centralized public facing site
- Vendors supply digital as-builts
GIS Mapping Office

Recommendations - CO

1. Dedicated Funding Vehicle for Location Intelligence
2. Develop Platform (Web, Server, Mobile, Desktop) for all users
3. Develop security & access policies and procedures
4. Leverage ROADS to proceduralize (who needs to be included)
5. Advertising/PR/Training/Marketing/Exposure
GIS Mapping Office

Recommendations - Districts

1. Leverage current resources available to the Districts
2. Centralized budget
3. Create standard data structure for projects
4. Standardized GIS scopes for contractors
5. Localize change control procedures
   a. Changes (patches and such) will be better communicated
6. Better relationship between GIS & other user offices
7. Structured training programs
   a. External training opportunities
8. Consolidation of silos - ROADS
GIS in FDOT

FDOT GIS Organizational Structure

Functional Steering Committee

- District 1
- District 2
- District 3
- District 4
- District 5
- District 6
- District 7
- Florida’s Turnpike
- State Materials
- State Maintenance
- Systems Planning
- CO – Surv. & Mapping
- Freight & Logistics
- Env. Mgmt. Office
- Safety Office
- Transportation Statistics
- OIT-Infrastructure
- FDOT GIS Coordinator
- Management Steering Committee
- FDOT Executive Committee

GIS Dataset Providers
- Power Users
- Viewers

https://fldot.sharepoint.com/sites/CO-GIS/Lists/FuncSteeringContact/AllItems.aspx
District 1

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GIS in FDOT

GIS Platform

Enterprise Cloud GIS

Open Data Portal

Mobile

Data & Apps

Enterprise GIS (Internal)

Flow of Data

Data & Apps

Districts & TP

Organizations
Office of Transportation Technology
Office of Civil Integrated Management

• Governance
• Tools
• Standards

CIM Information Data Decisions

2017 Design Training Expo
GIS in FDOT

FDOT utilizes Esri's Platform for GIS

ArcGIS Enterprise at 10.5

Advanced
Standard
Basic
Spatial Analyst
3D Analyst
Network Analyst
Data Interoperability

8 % FDOT Staff
502 AG Desktop Users
FY 2016-2017
GIS in FDOT

ArcGIS Desktop

- AG License Managers (LM): 9
  - Primary LM 1
  - Backup LM 1
  - Secondary LM 7

- AG for Desktop Licenses: 191
  - Concurrent 119
  - Single Use 72
GIS in FDOT

- Prior to Consolidation
  - $126,000.00 / yr.

- After Consolidation
  - $67,787.94
    (Prorated licenses 2015)
  - $108,000.00 / yr.

- Cost savings of $18,000.00 / yr.
• Primary PLM
• Backup BKLM
• Secondary SLM

Current ArcGIS License Managers (LM) Structure
GIS in FDOT

- New Users & Existing Users
  - Contact your District GIS Coordinator / Office Representative for access or software upgrades
  - Download software installs from the Enterprise GIS SharePoint site

Purchasing New Licenses

- Individual offices are responsible for justifying and purchasing new ArcGIS Desktop licenses when needed.
- All new licenses and extensions should be purchased under the Esri’s Primary Customer Number for FDOT
- First year license maintenance is included with the license purchase
- Subsequent annual license maintenance is funded through Esri’s Primary Customer Number for FDOT
GIS in FDOT

Purchasing New Licenses

• Request quotes
  
a. FDOT Desktop License Administrator and/or FDOT GIS Coordinator
     Ana Nowak      ana.nowak@dot.state.fl.us
     Jared Causseaux jared.causseaux@dot.state.fl.us

b. District GIS Coordinator / Office Representative
# ArcGIS Desktop Licenses and Maintenance Entitlements

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<td><strong>165</strong></td>
<td><strong>165</strong></td>
<td><strong>10</strong></td>
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GIS in FDOT

ArcGIS License Utilization Reporting Tools (ALURT)

Reader Tool

- Installed on the server hosting the ArcGIS License Manager

- The Reader tool extracts the utilization data from the log file ‘lmgrd9.log’ and stores it in the ALURT database

- The Reporter tool generates several license utilization reports, including graphs of license utilization
ArcGIS License Utilization Reporting Tools (ALURT)

Concurrent license usage from January 1 to May 23 for Desktop Basic

- Desktop Basic
- Max licenses for Desktop Basic

Graph showing usage trends from 1/1/2017 to 5/1/2017.
GIS in FDOT

FDOT’s ArcGIS Online Organization

- Implemented in November 2014
- Lightweight maps & applications
- Data sharing for both internal and external use without taxing our existing IT infrastructure
GIS in FDOT

FDOT’s ArcGIS Online Organization

- Named Users 245 of 265
- Credits 19,574
  - Expire 8/31/2017
  - 17,500 credits/yr.
- 57 Groups (organizational structure)
GIS in FDOT

FDOT’s ArcGIS Online Organization

- **779 Layers**
  - Most Popular:
    - Active Construction Projects
    - District Boundaries
    - Mile Markers

- **288 Apps**
  - Most popular:
    - TP Work Program
    - FDOT Adopted Work Program 2016
    - FDOT State Map Revisions App
GIS in FDOT

FDOT’s ArcGIS Online Organization

Credit Usage
June
2016-2017
19,488
GIS in FDOT

FDOT’s ArcGIS Online Organization

- GIS@FDOT Best Practices & Governance document
  - Best Practices
  - User rolls
  - Member usage
  - Groups
  - Sharing and publishing content, especially with the public
  - Metadata/ data disclaimer
  - Thumbnail images
  - Content Management
  - Credit management and usage

https://fldot.sharepoint.com/sites/CO-GIS/Shared%20Documents/GIS%40FDOT/GIS%40FDOT_BestPractices.docx
GIS in FDOT

- Technical support

  - GIS@FDOT Home Page
  - District GIS Coordinator
  - GIS@FDOT Administrators
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GIS in FDOT

- **Accessing GIS@FDOT**
  - FDOT Maps & Data Internet web site
    http://www.fdot.gov/agencyresources/mapsanddata.shtm
  - Enterprise GIS SharePoint site
    https://fdot.sharepoint.com/sites/CO-GIS/SitePages/Home.aspx
GIS in FDOT

- **AGOL Help**
  

- **Getting starting with GIS (Desktop or AGOL)**
  

- **ESRI site - Get started with ArcGIS Pro**

  **Installation**
  

  **Tutorials**
  
GIS in FDOT

GIS Training

Preventing for Network Analysis
One of the first steps for transportation network analysis projects is to create the data modeling infrastructure. Learn the basic concepts of network data modeling in ArcGIS and how to use the ArcGIS Network Analyst extension to create a...

For access contact Ana Nowak ana.Nowak@dot.state.fl.us
What is next?

- GIS Program
- More Mobile Solutions
- Adopting ROADS governance
- Enterprise GIS platform meeting ALL needs
Utilize ArcGIS as a System of Systems

- Collection of configurable apps, organized by business function
- Apps consuming one or more services
- Capitalize on the value from existing IT investments and data governance

### System of Engagement (SOE)
- One Destination
- Manage users
- Access on any device
- Collect new data
- Share with others
- Reusable services to read/write data to/from data groups
A Swift Path to SOE

Develop Initial Operating Capability

Configure Foundational Apps

“GIS Ready” Data

Integrate Business Systems

Build Custom Apps

Configure Apps

Data Services

Business System Data From Functional Areas

http://www.esri.com
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