GIS Utility Needs Assessment

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The CEDRA Corporation

1985 The CEDRA Corporation is established.

1987 CEDRA begins a long standing relationship with Esri.

1993 CEDRA becomes an authorized Esri Business Partner and Developer.

CEDRA offers engineering/GIS solutions in the form of software and services to governmental agencies, engineering consultants, tax assessors, oil companies and various utility enterprises.

Who Likes Puppies

City Background

- Located in southwest portion of Florida.
- The Utilities Department was the driving force in this project.
- Utilities Department provides water and sewer service to customers both inside and outside the City Limits.
- Since 2004, the City has had an interest in developing a Utility GIS.
- Population of approximately 20,000.
- City has an Enterprise License Agreement with Esri.

Utility GIS Implementations

- Many County Appraisers have developed GIS databases for their parcels.
- Utility Departments, however, have typically lagged behind in implementing GIS.
- The reason for this varies from lack of funding, lack of staff, lack of expertise and so forth.
- For Utility Departments who do finally commit to implementing GIS the first step in this process is the development of a GIS Utility Needs Assessment document.

Goals of the Report

- The GIS Utility Needs Assessment document or GIS Design Study report as it is sometimes referred to as represents a road map or play book for implementing GIS.

- This document typically contains an assessment of current work flows and data and a plan for converting existing data into the GIS and the development of pertinent applications.

The City of Punta Gorda

- Developers ask if water and sewer service is available in their areas of interest. To address their request the paper maps of the Map Atlas are referenced to determine whether water and or sewer service is available or not in the area of interest.

- The City's records are in the form of a Map Atlas, comprised of approximately 80 paper maps containing water and wastewater lines.

- The City has shapefiles representing the geometry of the water and wastewater systems but there are no attributes assigned to the features and the position of the features is not very accurate.

Project Approach

5 Month Time Frame using a Three Step Process

- Begin with a General Approach and Understanding of the GIS and its Implementation
- Determine the GIS database design and applications (months 2 and 3)
- Develop Detail Information for the GIS Implementation (months 4 and 5)

1

2

3

Project Scope

- Investigate existing plans, records, maps of Utility facilities.
- Design the GIS Database Structure.
- Describe the GIS tools to view and analyze utility data.
- Define methods to collect and input utility data.
- Describe a Utility Map Book method to view, display and print utility data.
- Establish a timeline for bringing the GIS online.

Assessment of Current Esri Software and Hardware

- Type of Esri Software used (ArcGIS 10.x, ArcGIS Pro, ArcGIS Server, etc.)
- License Level (Basic, Standard, Advanced)
- Number of Licenses
- Utilization of ArcGIS Online
- Utilization of Collector, Survey 123
- Utilization of GPS Technology
- Hardware available for GIS Implementation

Assessment of Existing Records

- Identify Departments to be considered in the GIS Development
- Availability of Aerial Photography & other Digital Information
- Department by Department Review
- Availability of Existing Plans (paper, digital, microfilm, etc.)
- Magnitude of Data (# drawings, # projects, hydrants, manholes, etc.)
- Condition of Existing Records (good, fair, poor)
- Existing Data Conversion Methodology to be used (COGO, Scanning, GPS, Combination)

Department Commitment

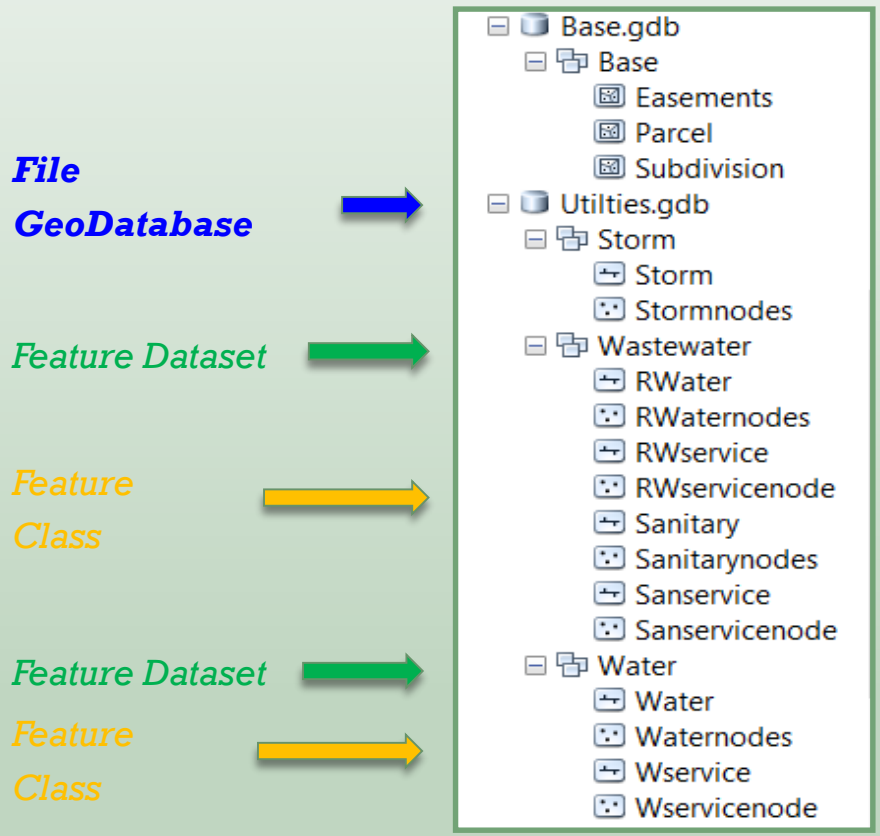
- Assess Department's Interest Level in GIS
- Develop methodology to spur interest & address department's needs
- Communicate the possibilities of a successful GIS Implementation
- Set Goals at various stages of the Implementation
- Establish a GIS Steering Committee
- Emphasize the benefits of implementing a GIS
- Establish Good Communication with Stakeholders

Department Commitment

- Key Return on Investment Opportunities with a successful GIS Implementation
- Increase Productivity (optimize work order processing, location of underground infrastructure, production of maps and reports)
- Target areas to perform work, more responsiveness to citizen requests
- Save Time (capital projects using GIS to find background data instead of going to multiple sources)
- Save Money (data can be queried quickly reducing time spent researching records, providing electronic copies of maps to customers reducing printing costs)
- Compliance with Regulatory Requirements (mapping of storm water outfalls and other assets)

GIS Database Design Custom

- File GeoDatabase Based
- Datasets and Feature Classes
- Tailored for City Requirements
- Great Flexibility in Design of Datasets and Feature Classes
- Use Previous work as a Template and Refine for City specific requirements



GIS Database Design
LGIM

Local Government Information Model GeoDatabase

- File or Enterprise GeoDatabase Based stored Locally or in the Cloud

- 14 Feature Datasets and 150 Feature Classes (Database Templates/Schemas)

Address	CadastralReference	Demography
ElectoralDistricts	Elevation	FacilitiesStreets
FireServiceOperations	InfrastructureOperations	LandUsePlanning
LawEnforcementOperations	ParcelEditing	ParcelPublishing
PublicSafetyPlanning	ReferenceData	

- Fixed Database Design although can be modified (add fields, modify aliases)

- Integrated with Esri's ArcGIS Solutions

  Industry-Specific Configurations (maps and applications) for ArcGIS

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Local Government Information Model GeoDatabase – ArcGIS for Water

- Sewer, Water and Storm water are included as part of the ArcGIS Solutions
- http://solutions.arcgis.com/gallery/#s=0&md=industries:water
- ArcGIS for Water provides maps and applications to maintain comprehensive water, sewer, and storm water records; coordinate and plan capital projects; and improve the operations of utility networks that provide clean drinking water and protect public health
- Deployed using ArcGIS Online (Esri hosted) or Portal for ArcGIS (City hosted)
- The Design Study Report will contain a cost comparison between the Custom and the LGIM approaches

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ArcGIS Solutions – The Maps and Apps of Main Interest to the City Utility Department

- **Sewer Utility Network Configuration**

  Configures a utility network to behave like a sewer network.

- **Stormwater Utility Network Configuration**

  Configures a utility network to behave like a storm water network.

- **Water Distribution Utility Network Configuration**

  Configures a utility network to behave like a water distribution network.

The above create the Feature Datasets and Feature Classes used in a LGIM for Sewer, Storm water and Water Utilities

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ArcGIS Solutions – Additional Maps and Apps of Interest to the City

CCTV Manager	Use CCTV Manager to view CCTV condition data and associated videos and photos.
Watering Violations	Enables field crews to log water conservation violations on a smartphone or tablet.
Lead Service Management	Enables an organization to inform the public and internal stakeholders about the status of lead in service lines.
Water Service Request	Enables customers and the public to report issues with water, sewer, or storm water infrastructure.
Water Restrictions	Informs the public about watering restrictions, permitted water uses, and allowed watering times by service area zone.
Water Leak Investigator	Enables field staff to record the location and details of leaks.
Valve Exercising	Enables utilities to capture valve exercising data on a smartphone or tablet.
Utility Isolation Trace	Enables a utility to deploy a web application informing staff which valves to close to isolate a main break and what customers and assets will be affected.

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ArcGIS Solutions – Additional Maps and Apps of Interest to the City

Stormwater Construction Site Violation	Enables field staff to record construction site storm water violations.
Sewer Service Lookup	Helps the public determine if a utility's services are available at location.
Manhole Inspection	Enables field staff to inspection manholes using a smartphone or tablet.
Outage Viewer	A self service website for customers to look up water service outages at locations.
Proposed Water Design	Enables users to rapidly lay out a proposed water network.
Main Break Notification	Provides real time notifications and alerts of main breaks.
Leak Logger Analysis	Provides tools to plan the placement of leak listening devices, manage device collected data, and perform notifications for an identified leak.
Illicit Discharge Trace	Enables utilities to find potential sources of storm water pollution by identifying upstream business customers.

GIS Database Design
LGIM

ArcGIS Solutions – Additional Maps and Apps of Interest to the City

Hydrant Maintenance Inspection	Enables utilities to use a smartphone or tablet to perform fire hydrant inspections.
Drinking Water Advisory	Enables utilities to communicate with the public about drinking water alerts and advisories.
Backflow Inspection	Enables field crews to inspect backflow prevention devices.
Map Change Request	Enables staff to log discrepancies between a utility's maps and reality I the field.
Capital Improvement Plan	Capital Improvement Plan can be used by the general public and other interested parties to review projects included in the Capital Improvement Plan.
Capital Project Review	Capital Project Review can be used by plan review staff to examine proposed

GIS Database Design
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ArcGIS Solutions – Additional Maps and Apps of Interest to the City

Capital Improvement Planning	Estimate the costs of capital improvement projects and share results with organization.
Capital Project Reports	Capital Project Reports can be used by project leads to communicate the schedule, cost, and quality of active capital projects to executives.
Capital Project Dashboard	Capital Project Dashboard can be used by public works executives t monitor the status of active capital projects in their community.
Capital Project Locator	Capital Project Locator can be used by the general public and other interested parties to review the status of capital projects under construction in their community.
Capital Project Plans	Capital Project Plans can be used by project leads to organize new capital project plans and revise project information during the planning process.
Adopta	Adopta can be used by government agencies and other organizations to engage the public in the maintenance of natural and man-made assets.

Tools to view and analyze utility data

Custom GIS Database Design

- Create custom ArcGIS Desktop, ArcGIS Server or ArcGIS Online applications offering the desired functionality
- Native ArcMap functionality, as well as existing CEDRA developed applications

LGIM GIS Database Design

- ArcGIS Solutions are downloaded and configured for use
- Functionality in these applications are fixed
- Over 25 applications presently and increasing
- Native ArcMap functionality

Methods to Collect and Input Utility Data

Converting Existing Record Information into a GIS

- The Desired Level of Accuracy (LOA) will control the method that is used

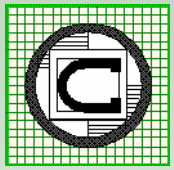
  > 3’ 1’ - 3’ < 1’

- Coordinate Geometry (COGO) transcription
- Heads-up Digitization
- Supplement with GPS information (valves, hydrants, manholes, inlets, etc.)
- Scanning Existing Drawings hyperlinked to GIS features
- Utilization of Survey 123 and/or Collector

Utility Map Book Creation

- Define the Contents of the Map Book (Title Page, Index Page, Map Pages, etc.)
- Create an ArcMap Document File for the:

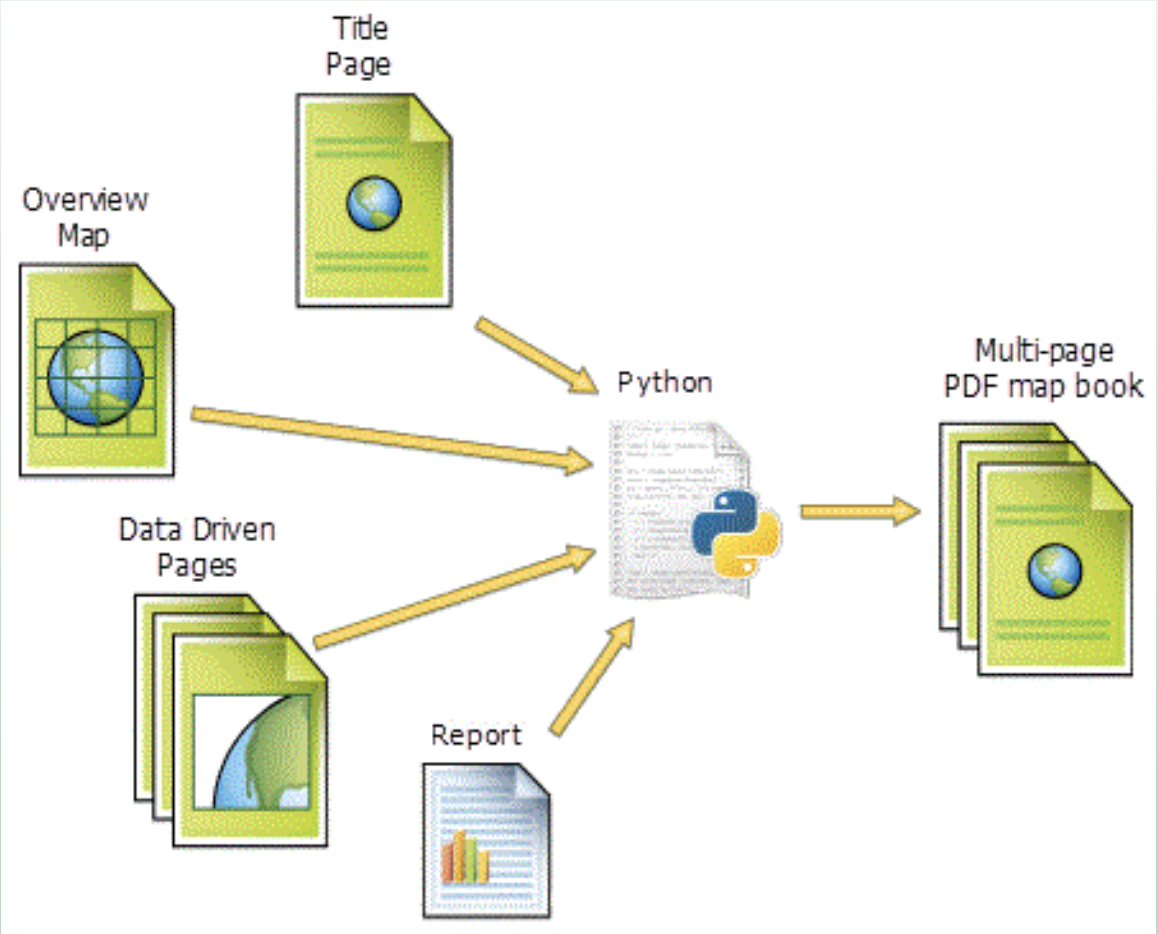
  Title Page
  Index Page
  Map Page
- Utilize ArcMap's Data Driven Pages functionality to mass produce the Map Pages
- Employ Esri's Python scripting module, arcpy.mapping, to produce a complete Map Book



Utility Map Book Creation

Schematically speaking this is how building a Map Book would look.

Separate ArcMap Document Files with one Document File incorporating Data Driven Pages, note requires an Index Layer.



GIS Needs Assessment Survey Form

Topics covered in the Questionnaire

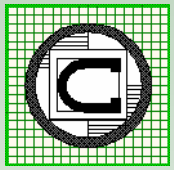
- Computing Environment
- Software
- Data
- Field Work

Computing Environment

1. Describe your PC configuration
2. Is your digital data backed up?
3. Do you use GPS surveying equipment
4. Does the Department have access to a scanner
5. Does the Department have access to a printer

Software

1. Are you using Esri ArcGIS Software?
2. Are you using Esri ArcGIS Online?
3. Have you had formal ArcGIS training?
4. Do you use CAD software (AutoCAD, MicroStation, etc.)
5. Do you use PCSWMM stormwater modeling?
6. Do you use InfoSWMM hydrologic, hydraulic and wastewater modeling?
7. Do you use EPANET water modeling?
8. Is there other modeling software that is used in the Department?



Data

1. Do you share information with other Departments, Agencies?
2. Do you use information from other Departments, Agencies?
3. Is there information that you do not have that would be helpful?
4. Do your maps use the Florida State Coordinate System ?
5. Are there other coordinate systems that you deal with?
6. Do you use aerial imagery in your operations?
7. How often do you need to reference record information
8. Do consultants provide project data in digital format (DXF, DWG, etc.)?
9. Does the Department make data available to the Public?
10. Does a software package manage your Work Orders?
11. Are as-builts drawings scanned?
12. What documents would be of benefit to have hyperlinked to a GIS feature.

Field Work

1. Is there a need for Automated Vehicle Tracking (AVL) for field crews?
2. Do the field crews have a need for routing functionality?
3. Do the field crews use mobile computing devices?
4. What are the typical field operations that are performed.

Design Study Report Outline

Chapter 1	Utility Department Overview
Chapter 2	Department Commitment
Chapter 3	Needs Assessment
Chapter 4	Integration with City GIS
Chapter 5	Data Collection Methods
Chapter 6	Geodatabase Design
Chapter 7	Symbology and Classification
Chapter 8	Application Software
Chapter 9	Pilot Project Identification
Chapter 10	Data Collection/Conversion Methodology
Chapter 11	Data Collection/Conversion Schedule
Chapter 12	Training and Costs

Thank you!

Questions
And
Answers