Invest In Your Asset Inventory To Reap A Return On Investment: A Model

ESRI User Conference 2017

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PRESENTERS

- **Jose Carvalho,**

  Project Manager, Clark Nexsen Inc.

- **Joel Eastman, GISP**

  Director of Planning, Programming & Real Property

  Georgia Department of Defense

- **Chris Ogier**

  Owner, Foundation Spatial Associates

  formerly with *Spicer Group, Inc.*

Project Overview

- GIS Utility Collection: Provide SUE QL B/C Services
- GPS/GIS Data Collection –
  - Natural Gas
  - Water
  - Storm Water
  - Industrial Waste Water
  - Sanitary Sewer
  - Electric
  - Telecom
- 49 of 60 + locations for Army and Air Units

Data Dictionary

Feature Class	Description		Unique PK Code
camera_surveillance_point	The location of a video camera used for surveillance purposes.	AG	camp
comm_antenna_point	The location of a communications antenna.	AG	coap
comm_coaxial_line	A transmission line that consists of a tube of electrically conducting material surrounding a central conductor held in place by insulators that is used to transmit telegraph, telephone, and television signals of high frequency	UG	cocl
comm_duct_line	Any linear component of a path for cable routing.	UG	codl
comm_fiberoptic_line	Thin transparent fibers of glass or plastic that are enclosed by material of a lower index of refraction and that transmit light throughout their length by internal reflections	UG	cofl
comm_handhole_point	A chamber, just below the earth's surface, too small for a man to enter, in the route of one or more cable runs where cables may be accessed.	UG	cohp
comm_manhole_point	A subsurface chamber, large enough for a person to enter, in the route of one or more duct runs, and affording facilities for placing and maintaining the runs, conductors, cables, and associated apparatus.	UG	comp
comm_pedestal_point	An above-ground enclosure providing access to buried plant.	AG	copp
comm_pullbox_point	A box with cover used as an aid for pulling cable.	UG	cobp
comm_riser_point	A pipe-like structure used for the vertical conveyance of cable	UG	corp
comm_telephone_booth_point	The location of one or more outdoor telephones either in an open air bank or enclosed within a booth or other enclosure.	AG	cotp
comm_vault_point	A special structure for transitioning the outside cable plant from horizontal orientation to vertical orientation in preparation for termination on the distribution frame.	UG	covp
satellite_point	Communications Satellite. Used to retransmit signals from space.	AG	cstp
speaker_point	A device that converts an electrical signal into sound. Generally used as part of a public address, giant voice, or mass notification system.	AG	spep

Project Background

- " Statewide" initiative
- 49 sites including Army National Guard Main Headquarters in Marietta, GA (Clay)
- Average age of sites is 48 years old
- Over 800 acres
- 12 month schedule

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Project Objectives

- To develop a comprehensive utilities GIS database.
  - Accuracy
  - Connectivity
  - Asset Evaluation

Project Team Roles

- Above Ground -- Clark Nexsen Inc.
- Underground -- Spicer Group Inc.
- Project Management & Site Planning Logistics – Clark Nexsen Inc.

Project Methodology

- Templates created (MAGNET) for discipline specific collection on TOPCON Tesla GPS equipment
- Drop down selections for appropriate attribution for each feature class
- RTK Networks utilized: TopNet and eGPS

Topcon Tesla with Magnet

Project Methodology

- Site survey to establish control points
- Underground Scanning and Utility Identification (painted)
- Grid Maps with Aerial background to identify referenced targets and note new ones
- Image captured of each Feature
- Field Book to note FID and image numbering
- Feature and Attribution entered in GPS template

Typical Grid Map Mark-up

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Project Methodology

Typical Marked-up Map

- Draft linear overhead utilities and note function
- GPS points taken for discipline specific feature classes and attribution populated in tables

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Project Methodology

Control Points

- Site Control points established at each location and utilized by both teams to reconcile
- Image captured of control points for site reference
- Minimal of 3 points captured on each site.

The Technology Leverage

Location, Location, Location

- Efficiently Establishing Site Control From Datum was Critical to the Project's Success
- GPS, Privatized Reference Stations (eGPS) Total Station Technology
- The latest in Survey Technology was utilized
- Underground Survey
  - LEVEL B

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The Ground Penetrating Radar Dilemma In Georgia

- Great technology but highly susceptible and sensitive to underlying geologic conditions

GEORGA SOILS = CLAY

- High clay content in soils and substrate rendered most of GPR use and potential for the project as ineffective

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The Acoustic Sounding Technology

- Great "of Age" technology for establishing underground connectivity from and to known existing point
- Fills in the Voids…or rather identifies them!

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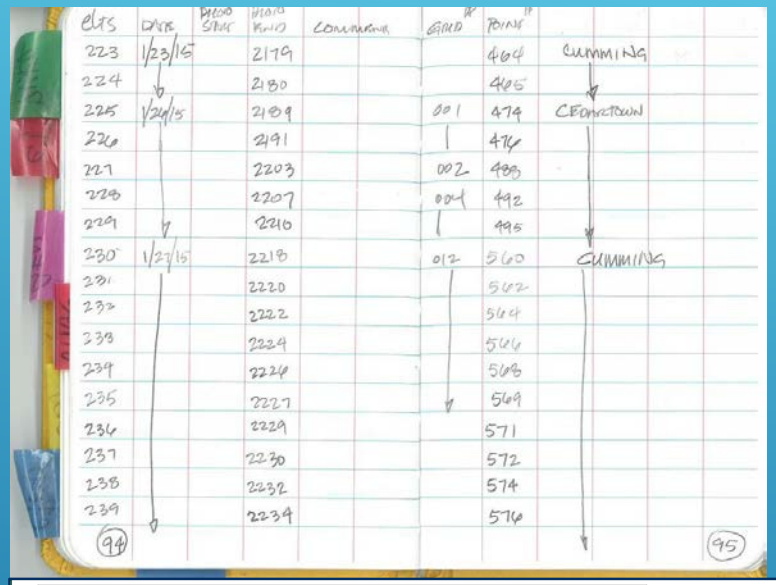
Data Quality

Field Book Notes



- Field logs
- Checklists
- ArcGIS Data Reviewer
- Geometric Networks
- Visual QC

	A	
1	**Bookmark**	**Spicer Action Taken**
2	1.Where is the outfall for the manhole OID69? Photos do not support the configuration. Please Advise.	
3	2. We have a juction located here. There is no feature located here in the Spicer data.	
4	3. Is there a purpose for this run of Spicer storm line?	
5	4. Line OID 5257 has no outlet or structure?	
6	5. Downspout ID 474, 480, 481, 488, 2, 8,10, 214 & 489 are not attached to the storm system?	
7	6. Bldgs 655 and 407 only have 1 downspout each?	
8	7. Storm line OID 5412 does not connect to Structure 395?	
9	8. Inlet OIDs 394 and 393 are not connected to anything?	
10	9. Line segment between DS point OID 524 and 525 should be service line?	
11	10. DS OID 160 does not connect to anything?	
12	11. Service lines on bldg 447 do not attach to DS points?	
13	12. DS on Bldgs 63, 214, 201, 200, 53 and 54 do not attach to service lines?	
14	13. Line OID 5030 runs under building 8?	
15	14. Culvert Point OID 55 may not be needed. Not sure if Line OID 5427 is a culvert line.	
16	15. Does Line OID 5124 actually go under bldg 79?	
17	16. Is there no pipe between Inlet OIDs 225 and 226?	
18	17. LIne OID 5413 needs to be broken at Inlet OID 376 and attributes corrected.	
19	18. Where do Cleanout OIDs 76, 117, 78 and 79 at building 30 connect to system?	
20	19. Are there no cleanouts around building 1, 2 and 350?	
21	20. Junction OID 221 is in conflict with flow. Two pipes come in and the one leaving is capped (see photo) however there is no stub	
22	21. Pipe OID 5374 Should probably be a service line.	
23	22. We have a 6" service line OID 5372 coming into a 4" main OID 5063?	
24	23. Concrete lined ditch OID 19 is missing a headwall and Culvert point.	
25	24. Should line OID 5059 be broken at valve OID 3?	

	A	B	C	D	E
1	**Layer**	**Field**	**OID**	**Total**	**Comment**
2	storm_culvert_point	FKMediaID	232	1	Missing Data
3		MatDOM	232	1	Unknown Data
4	storm_sewer_discharge_point	FKMediaID	78, 79, 80, 83, 87, 88, 89	6	Missing Data
5	storm_sewer_junction_point	PKManholeID	NA	NA	Missing 13927-ssjp-000117, 000128, 000130, 000131, 000135, 00041, 000142, 000143, 1000144, 000145, 000146
6		MatDOM	61, 91, 92, 191	4	Other Material type, need an answer on this.
7	storm_sewer_fitting_point	MatDOM	210-325	109	Missing Data
8		SizeDOM	210-325	109	Missing Data
9		CoordZ	244-313, 317, 324-325	69	Missing Data
10	storm_sewer_valve_point	ValveElv	3	1	Missing Data
11	storm_sewer_inlet_point	FKMediaID	427-436	10	Missing Data
12	storm_sewer_downspout_point	TypeDOM	417-523	99	Unknown and Other Data
13		MatDOM	417-525	108	Unknown and Other Data
14		SizeDOM	417-418, 438, 515-519	7	Unknown Data
15	storm_sewer_line	TypeDOM	5137, 5161	2	Other Type needs to be discovered
16		MatDOM	5118-5122, 5203, 5255, 5319-5345, 5347, 5349-5353, 5355-5361, 5364-5368, 5384-5385, 5390, 5412	55	Unknown Data
			5126-5128, 5255, 5319-5345, 5347, 5349-5353,		

Feature Class	**Missing photos**
storm_culvert_point	13927-sscp-000129
	13927-sscp-000130
	13927-sscp-000132
storm_sewer_discharge_point	13927-ssdp-000132
	13927-ssdp-000133
	13927-ssdp-000134
	13927-ssdp-000135
	13927-ssdp-000136
	13927-ssdp-000137
	13927-ssdp-000138
	13927-ssdp-000140
storm_sewer_inlet_point	13927-ssip-000277
	13927-ssip-000310
	13927-ssip-000311
	13927-ssip-000312
	13927-ssip-000313
storm_sewer_pump_point	13927-sspp-000100
Photos Missing Points	*13927-sodl-000120*
	13927-sodl-000121

QUALITY CONTROL

Gravity Systems

- Industrial Waste Water
- Sanitary Sewer
- Storm water

Non-Gravity Systems

- Potable Water
- Natural Gas
- Electrical
- Communications

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Project Flow Diagram

Grid Maps

GPS, Templates, configuration and calibration

GPS Cameras

Ground Control Points

Above Ground

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Data, photos

Spicer Group

SUE

Below Ground

Downloaded to Laptops

Uploaded to office Server

Data Ready for Development

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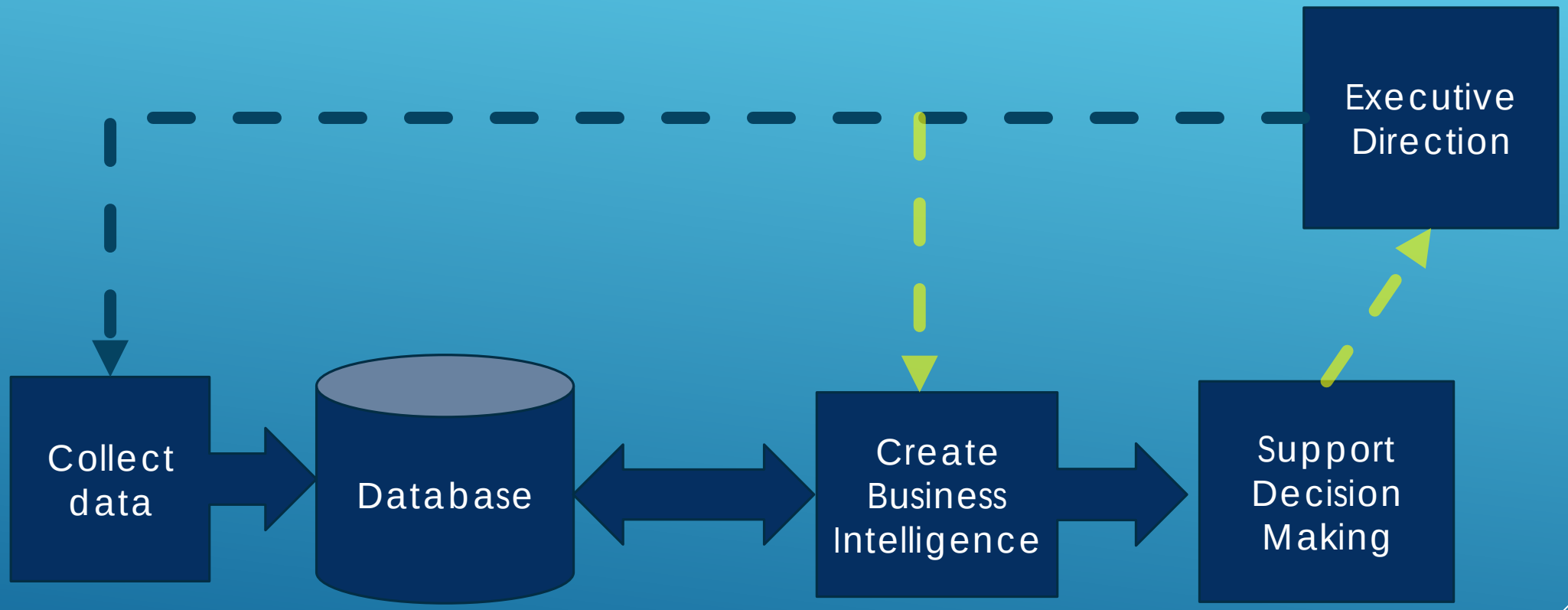
GIS Driven Facility Management Process



To What Objective?

- FHWA /Purdue Study / DEC 1999 - https://www.fhwa.dot.gov/programadmin/pus.cfm#conclusions
  - $4.62 in savings for every $1.00 spent on SUE.
  - Qualitative savings
    - non-measurable
    - significant
    - may be many times more valuable than the quantifiable savings

General Benefits Of Geospatial Technology

- Increase in
  - Efficiency
  - Accountability
  - Productivity
  - Bottom line
- Greater visibility – equipment & maintenance ecosystem
- Identify problems early on, in a planning process / initiative
- Improved customer service

System Of Record, GIS, And Financial Sustainment $$

- Utility GIS/GPS Data Collection
- SDSFIE database

GIS Investment

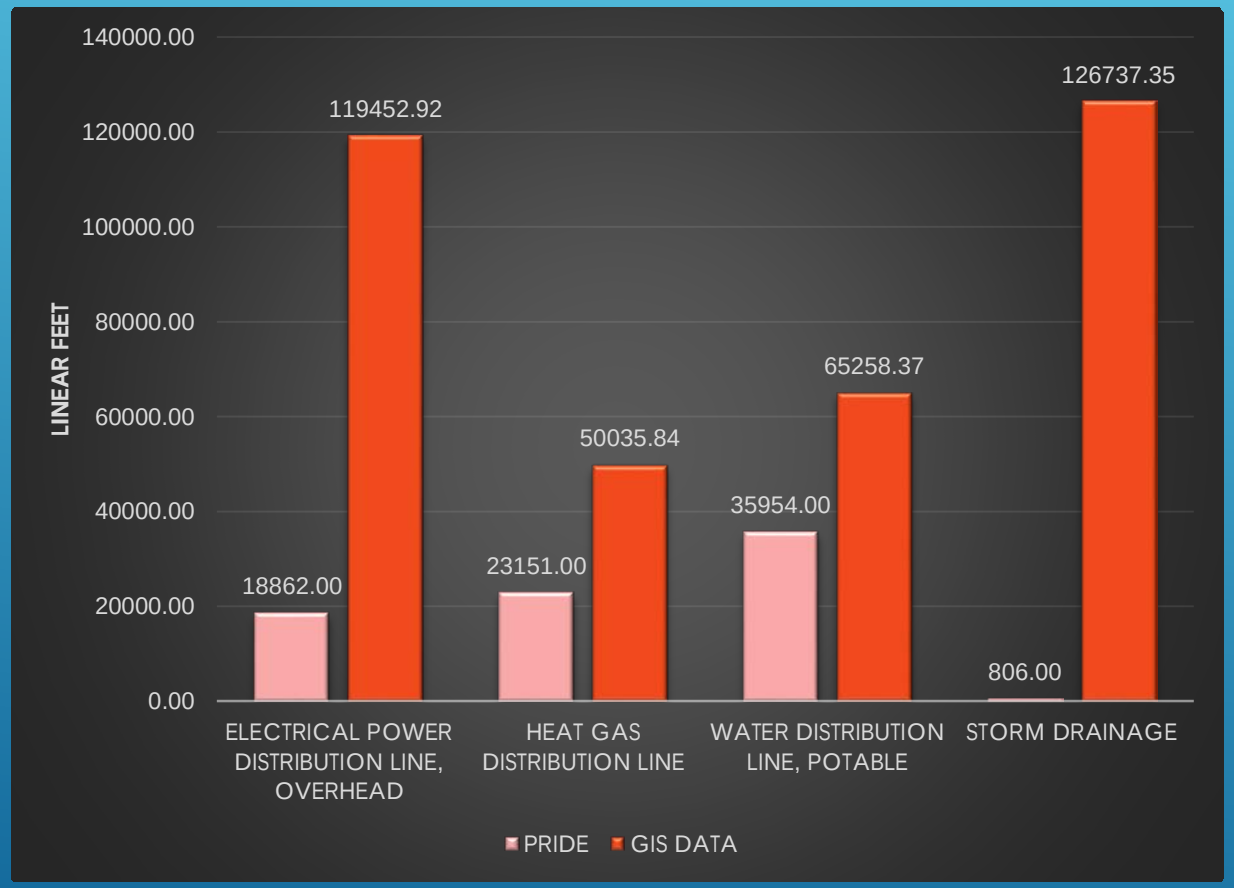
Time Interval

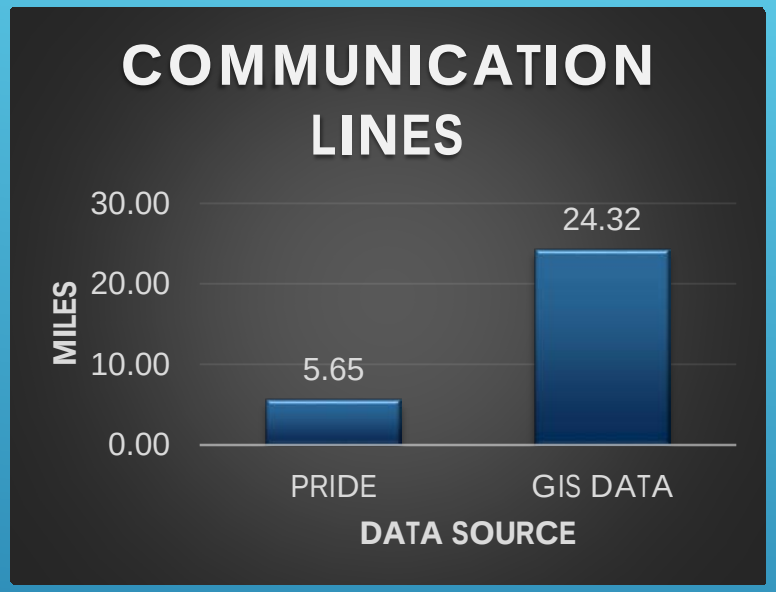
- DoD – System of Record for Financial Sustainment
- **PRIDE** -- **P**rogram **R**esource **I**nternet **D**atabase **E**nvironment

- Sustainment Dollars

Benefits flow as $$$$

Change In Asset Inventory Quantities





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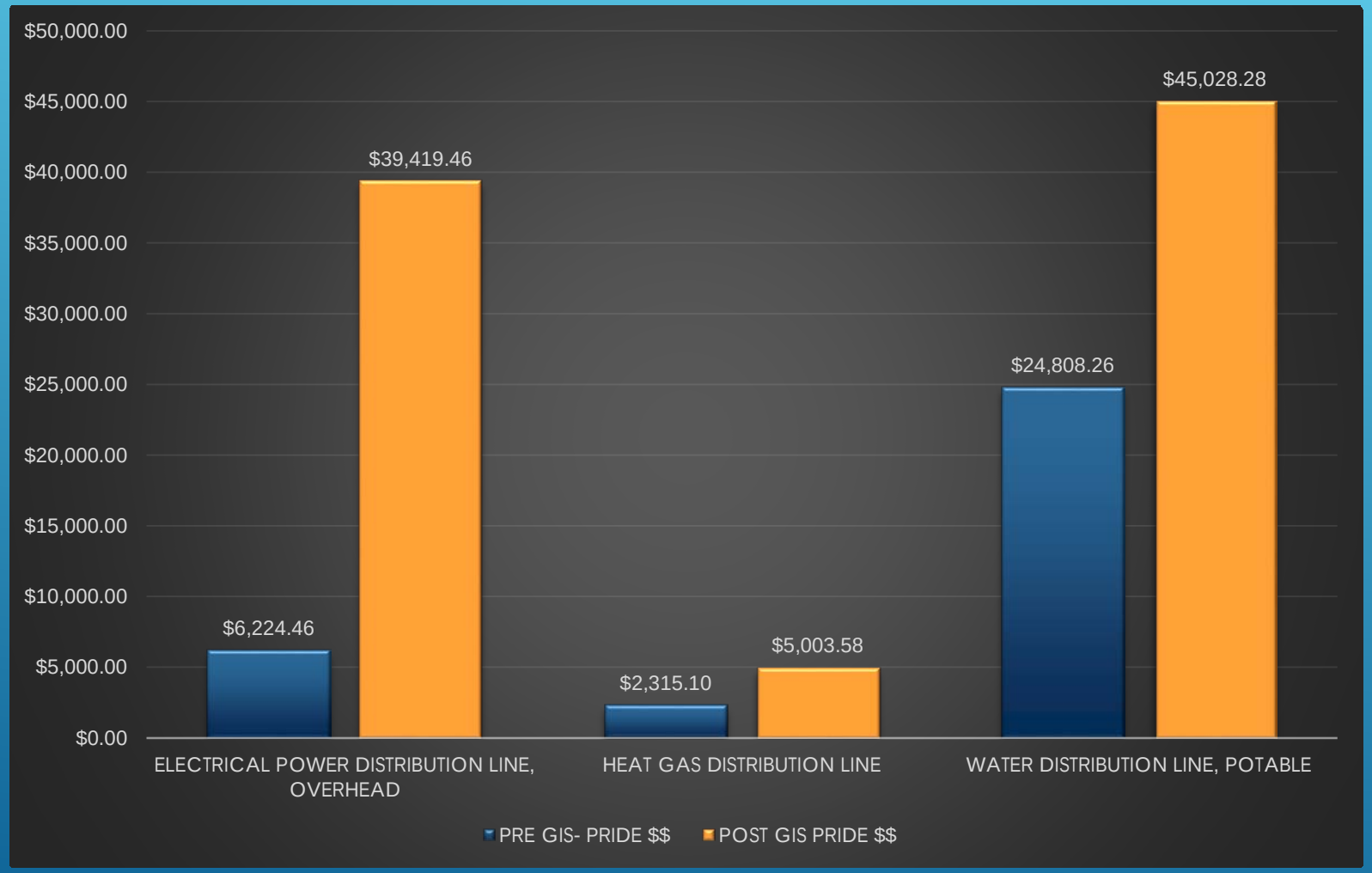
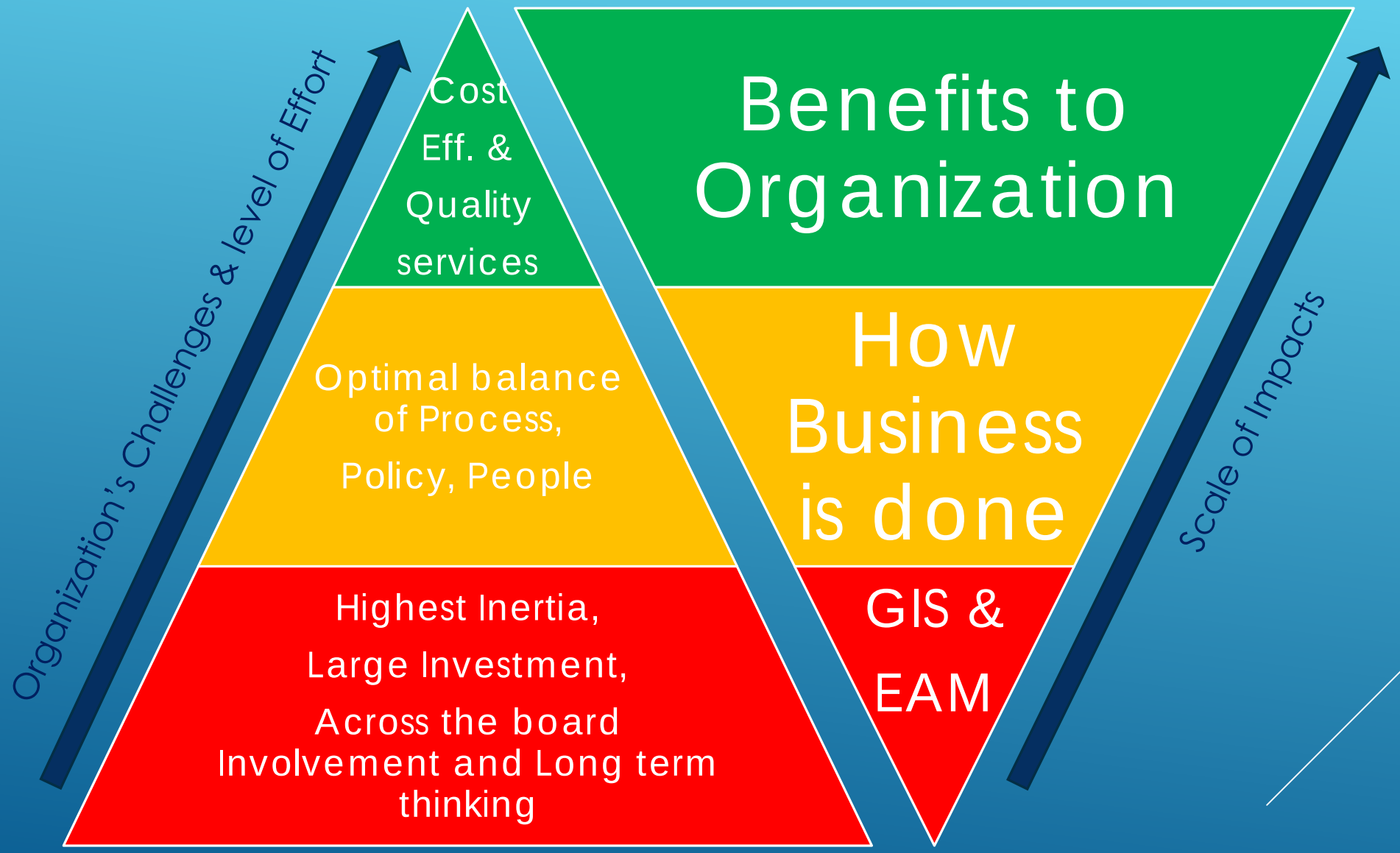
Change In Sustainment Dollars



Updates Made To Pride From GIS Data

- Asset Quantity capture increase – 169%
- Financial Sustainment increase –51%

RETURN ON INVESTMENT



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Continuous Process

- GIS DATA Currency --Constant Monitoring and Measurement
- Data Driven Case to show increased Financial Sustainment as Return on Investment
- Better quantitative infrastructure decision making

WRAP UP VIDEO- JOEL EASTMAN, GISP

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Thank You!

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