

What's in the PIPELINE for MidStream...

...a quest to implement
and leverage GIS.

Estes Park, Colorado

May 7, 2007



Roadmap for our journey...

- Some guiding thoughts....
- Where we've been.
- Where we're going.
- How we'll get there.
- Closing comments.
- Questions?





Position Fix

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The Future.....

- What? - The 'G' of GIS
 - Gee-Whiz?
 - Golfing?
 - Global?
 - Galactic?
 - Geographic!!
- Why?
- How?
- Management Concerns
 - Misunderstanding
 - Costs, Time, Resources
- Event or Process
 - A quest; a journey
 - Continuous learning

THE GIS ZONE





Guidance

- “Insanity – Doing the same things over and over again and expecting different results.” – Albert Einstein
- “If you don’t know where you are going, any road will take you there.” – Lewis Carroll
- To do “more with less” we not only need to work smarter; we need better methods and tools.
– Internal Anadarko sentiment





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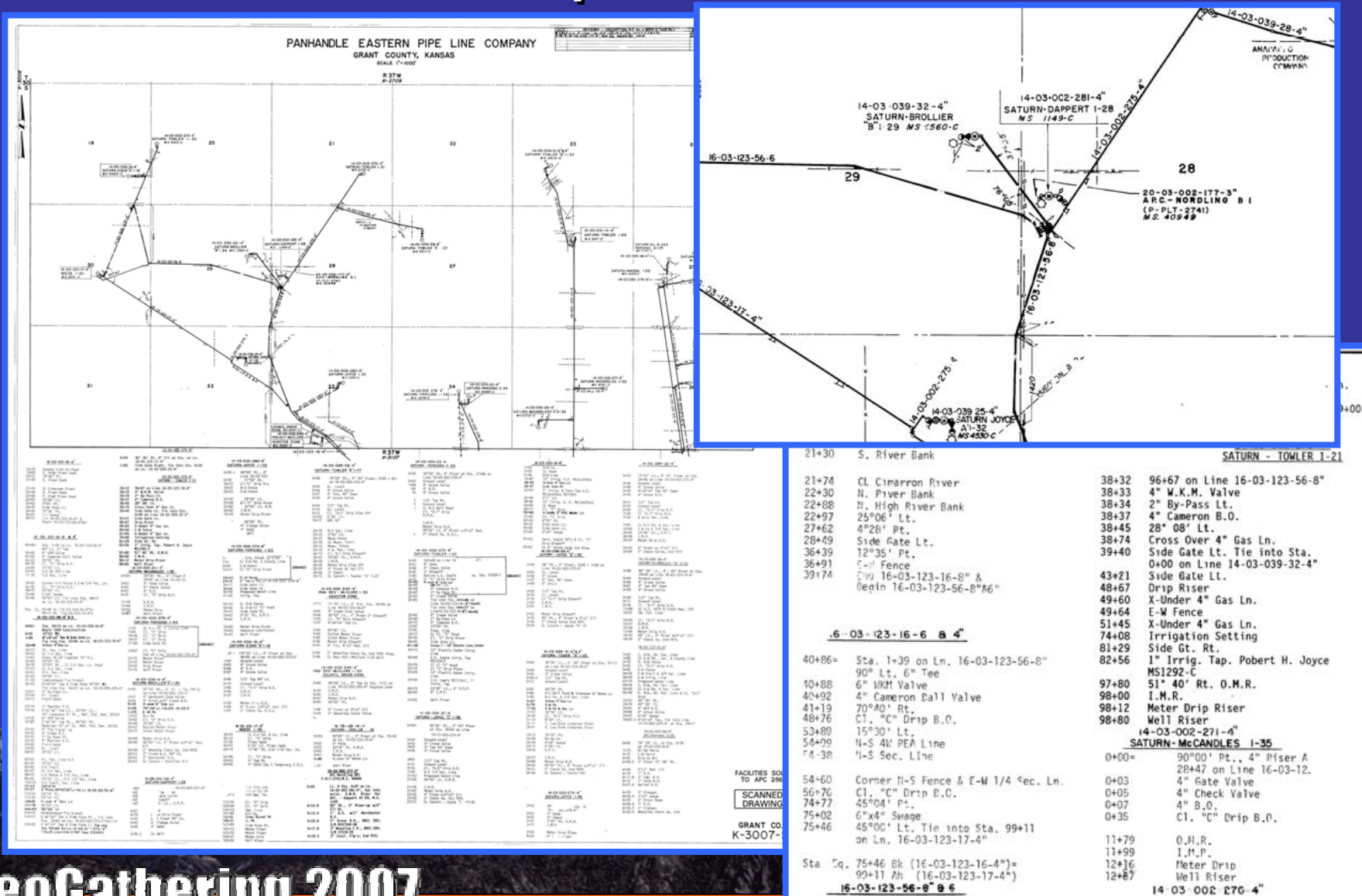


Asset Information

- Historical data capture on our pipelines?
 - Personnel knowledge
 - Hand written notes, Photographs
 - Various “Maps”
 - Hand sketches, 3rd party maps
 - Electronic representations (AutoCAD, PDF, JPG's, etc.)
 - Software: Excel, Access (for data capture)
 - Storage locations?!

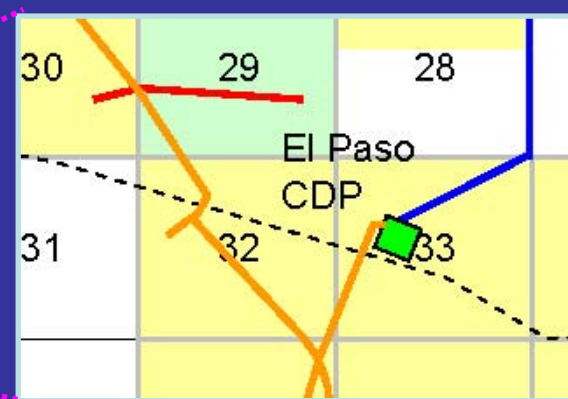
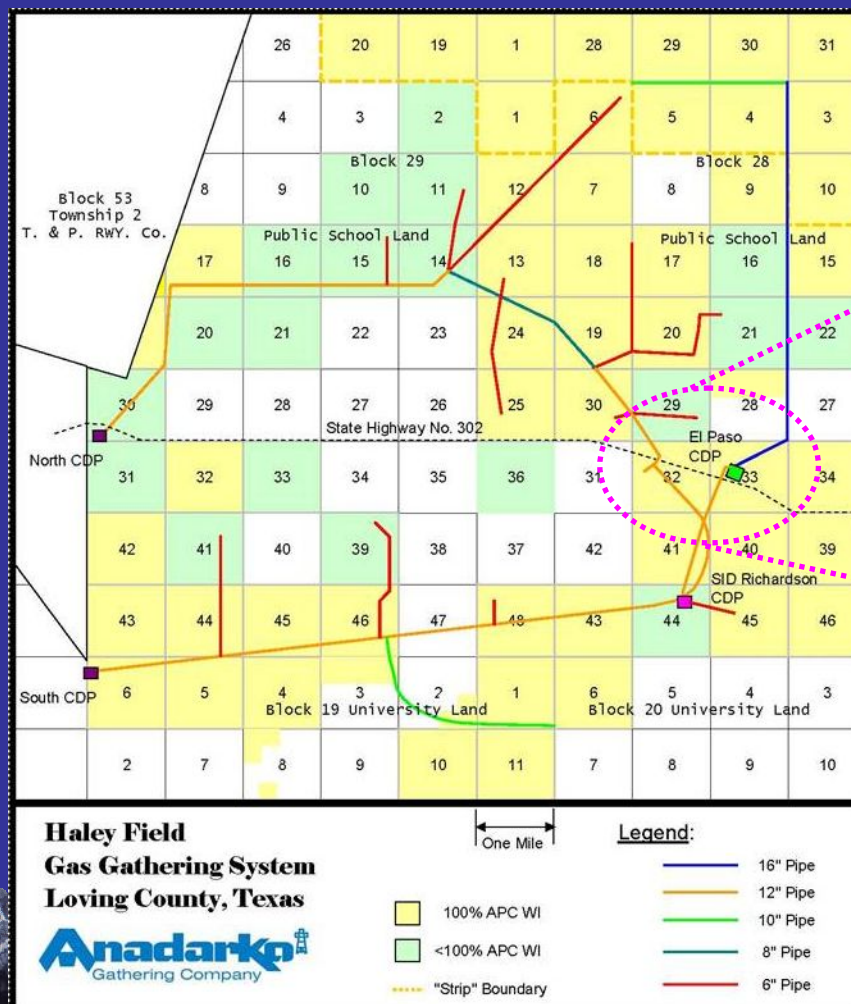


Various Maps – Chain Notes



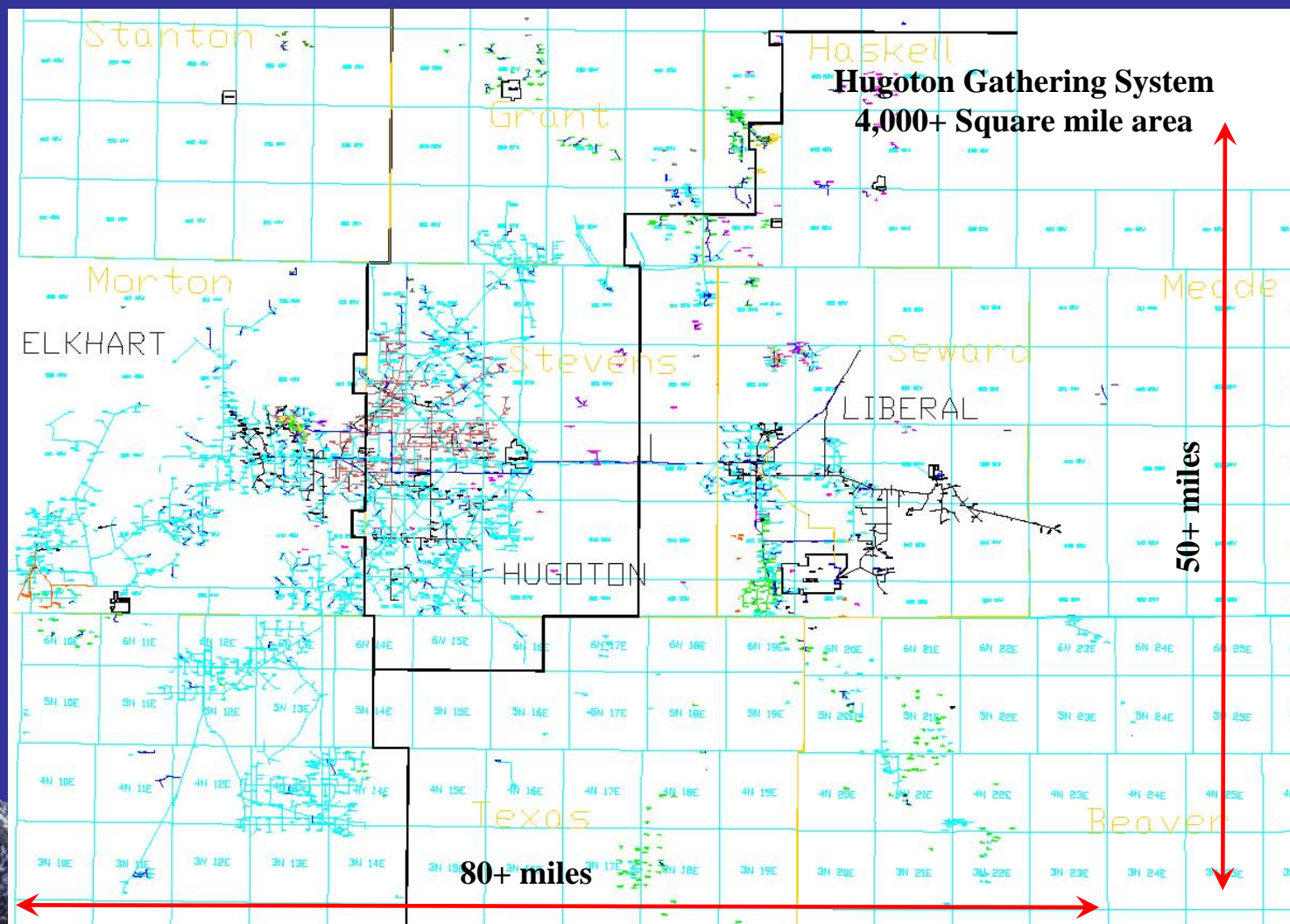


Various Maps – Excel Drawings





Various Maps - AutoCAD





Problems

- Common Faults with all the “maps”...
 - Minimal amount of data captured
 - Questionable quality
 - Limited functionality
 - Lack of consistent methods
 - Difficult to utilize with “other” data, such as:
 - Satellite Imagery, O&M data, Acreage Positions, Drilling Locations, Wetlands, School Districts, etc.





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Realizations / Goals

- Culture Shift
 - Pipelines are horizontal assets (~ wells)
 - Time delay and obstacles to installation
- Global Focus (“Think Global, Act Local”)
 - Regions: Domestic, International
 - Realms: Onshore, Offshore
 - Functions:
 - Transmission, Gathering, Production, Injection, Disposal



Solution Overview

- Capture the data once
- Collect what we need (“80/20” rule)
- Store it in a strategic database, that:
 - Leverages SAP, builds on existing tools, and provides graphical interfaces to data sources
- Address both new and legacy systems:
 - 1st Priority - “Stop the flow of blood” (new builds)
 - 2nd Priority - “Document our past” (legacy data)



Example Pipeline Data Capture

Dimensional / Characteristic Data

<u>No.</u>	<u>Item</u>
1	Pipe Outside Diameter
2	Pipe Inside Diameter
3	Wall Thickness
4	Pipe Material
5	Pipe Material Grade
6	Seamless or Welded
7	Special Treatment
8	External Pipe Coating
9	Internal Pipe Coating

Design Data

<u>No.</u>	<u>Item</u>
20	Design Pressure
21	Design Temperature
22	MAOP
23	Internal Products
24	Corrosion Allowance
25	Piggable
26	Connection Pressure Class
27	Over-Pressure Protection
28	Pressure Protection Method
29	Pipeline Service
30	Regulated Pipeline

Installation Data

<u>No.</u>	<u>Item</u>
40	Project Name / Number
41	Document Number
42	Single Segment Pipeline
43	PL Segment Start Point
44	PL Segment End Point
45	Linear Footage Installed
46	Buried
47	Pipe Protection
48	Pipe Location Aids
49	NDE Utilized
50	NDE Methodology
51	% Coverage by NDE
52	Pressure Tested
53	Test Pressure
54	Test Media
55	Test Duration
56	Cathodic Protection
57	CP Methodology
58	CP Test Points Installed
59	CP Test Point Interval
60	CP Test Points
61	# of Foreign Pipeline Crossings
62	Key Equipment Locations

Records / Documentation Data

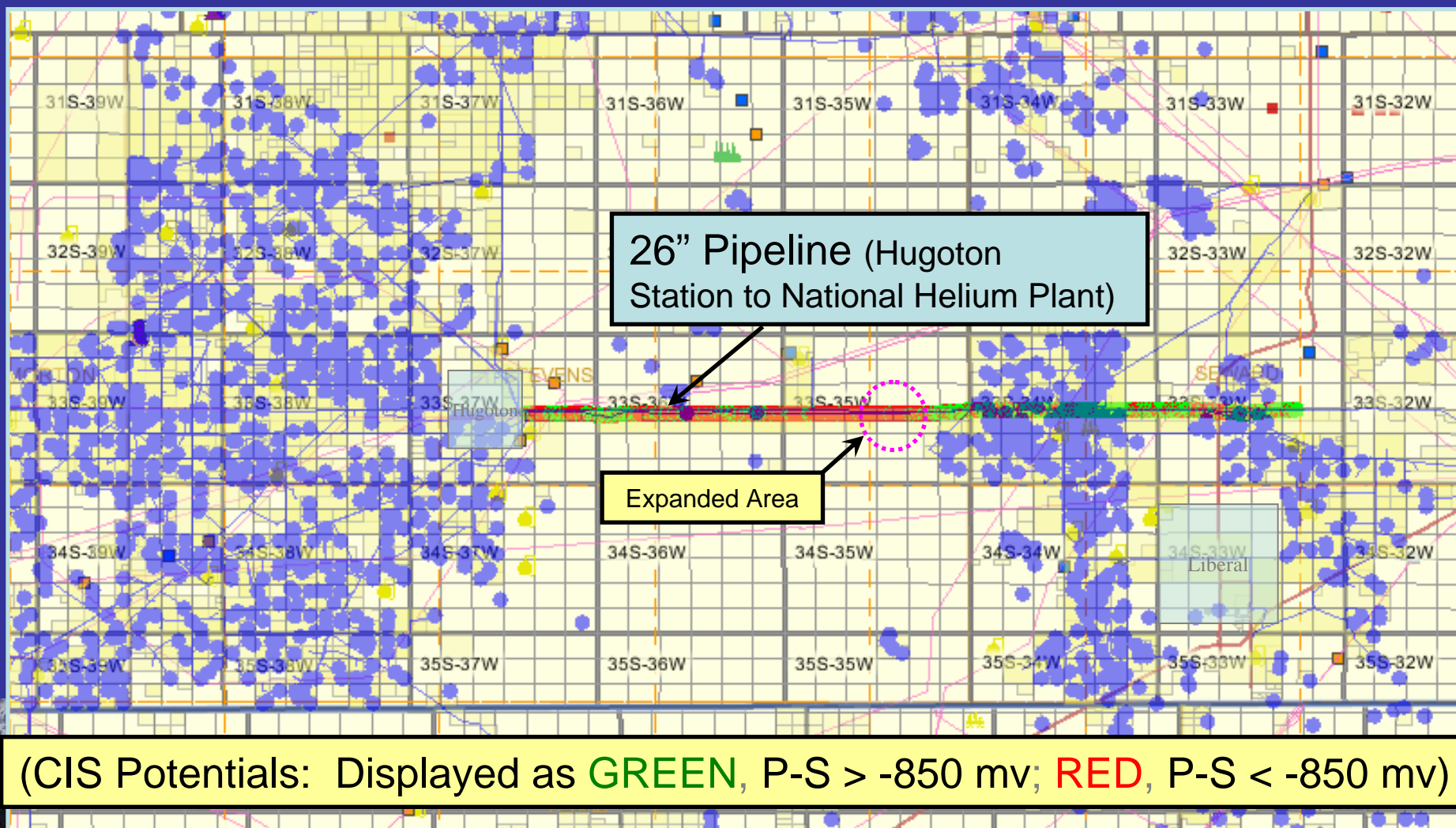
<u>No.</u>	<u>Item</u>
80	Pipeline System Name
81	Pipeline Segment Number **
82	Location of Test Records
83	Digital Images Available
84	Location of Digital Images

This is data that would be captured in addition to spatial data, such as that from an as-built survey, or a center-of-pipeline GPS collection effort.

** Desired / Required: A standard system for uniform identification of pipelines and segments.



Close-Interval-Survey Example



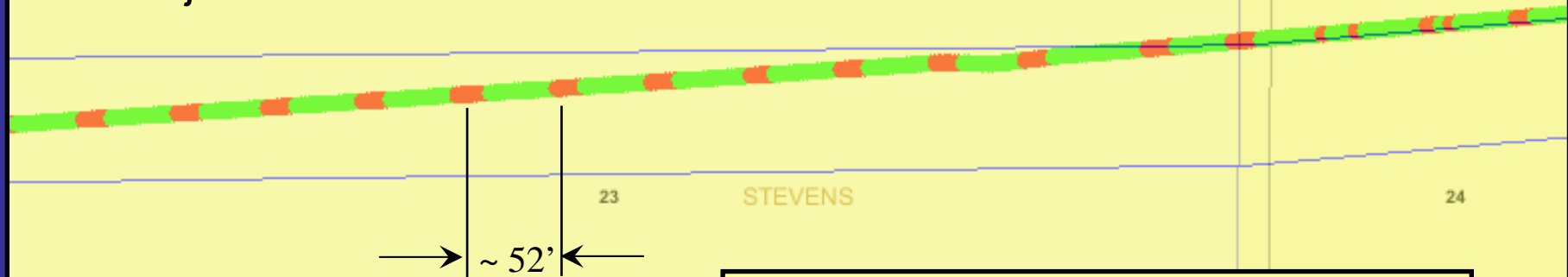


Close-Interval-Survey – “Results”

Historical Details

- Pipe installed circa 1949, by PEPL
- Coated at the factory with coal tar
- Weld joints coated in the field

Expanded Area



Conclusions

- Preferential coating disbondment
- Corrosion risk at the weld joints
- Increased current requirements
- GIS – useful method for review



One-Call Tickets

My Options My Account Help Contact Us Exit

Tools Layers Documents

Tool Category _____

Members Research Tools

- ☐ Locate Tickets Near Address
- ☐ Locate Ticket By Number
- ☐ View Tickets By Contractor
- ☐ View Tickets by Address
- ☐ View Service Area
- ☒ View Ticket Density Map
- ☐ Ticket Tracking Report
- ☐ View Audit Report
- ☐ Contractor Report Card

View Ticket Density Map

Select a Dispatch Center and the number of days previous to the current date then press the Apply Filter button.

Dispatch Center: T10073

Time Period: 1 Week

Display color:

Remove Filter

Monitor system activity and hotspots.

celeritas-cw-tm 09/01/2006 5:44

Tool Result-10 X

Damage prevention; call before you dig; line location activities.

Map Legend

- Filtered Ti
- Filtered S
- Airports
- CW Center
- Railroads
- CW Cenet
- Buffer Poi
- States
- Zip Code
- Area Code
- Water
- Major Lak
- Parks
- City Place
- Counties



Maintenance

Locate equipment; plan maintenance; evaluate nearby opportunities.

Selected Feature in GIS

Additional Details Given

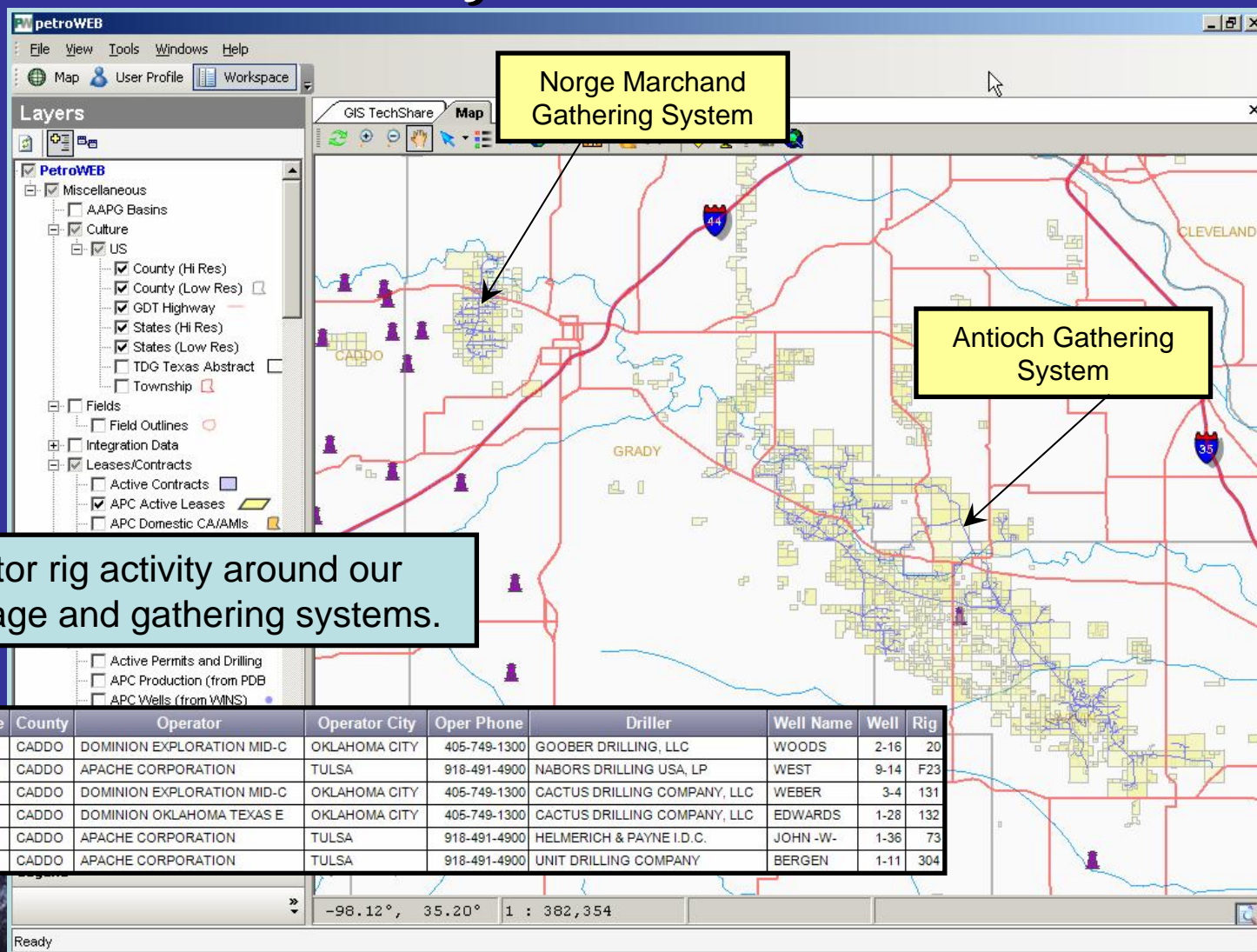
Details from other data sources.

Asset Selection
Select a Layer: SDE.ServicePoint
SAP id: GISDEM-SERV-2324, SAP type: Equipment

Orderid	SAP Fields	Equipment	Funcloc	ESRI feature id	Order
000000813523		GISDEM-SERV-2324		SERV2324	PN
000000813608		GISDEM-SERV-2324		SERV2324	PN
000000813609		GISDEM-SERV-2324		SERV2324	PN

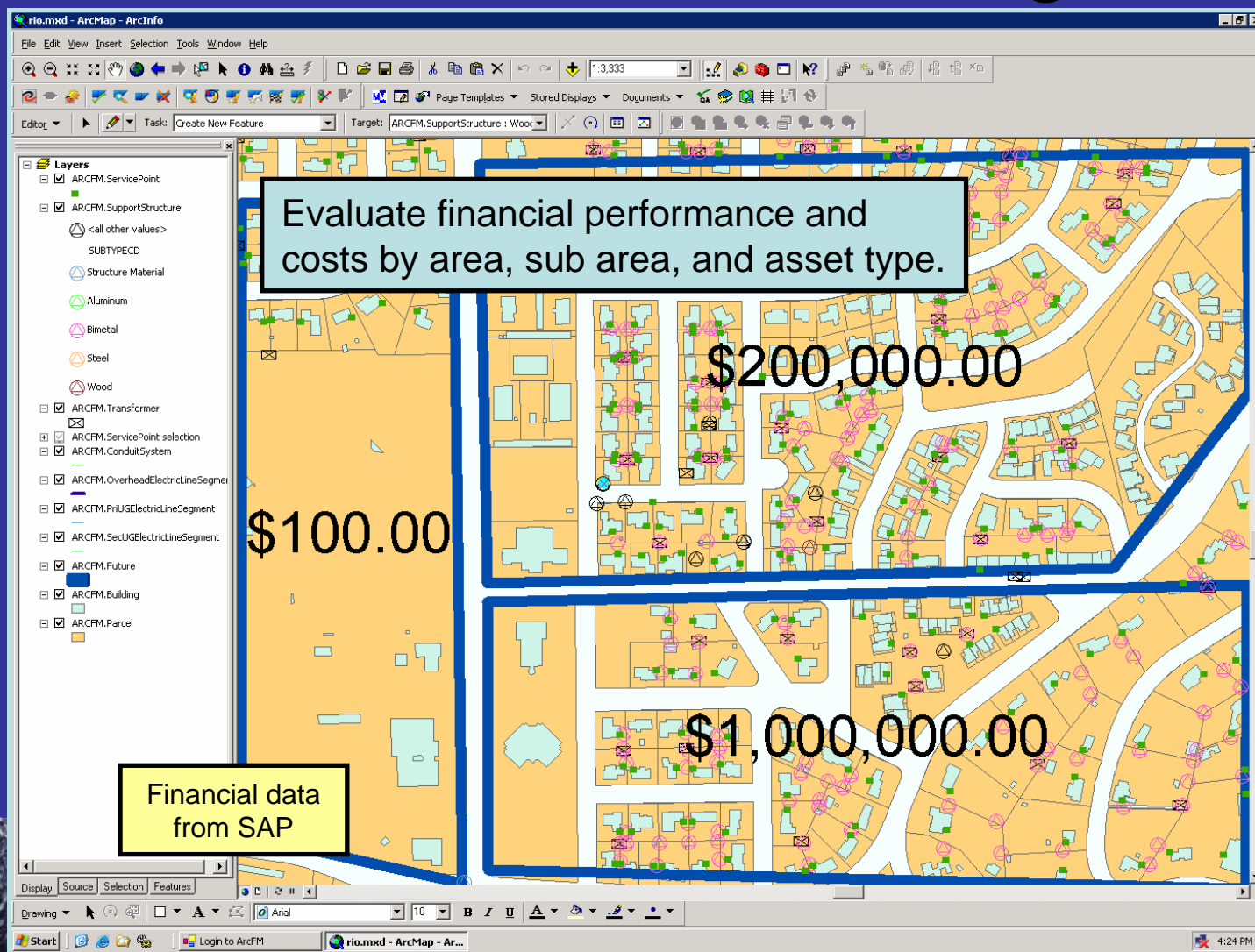


Activity Surveillance



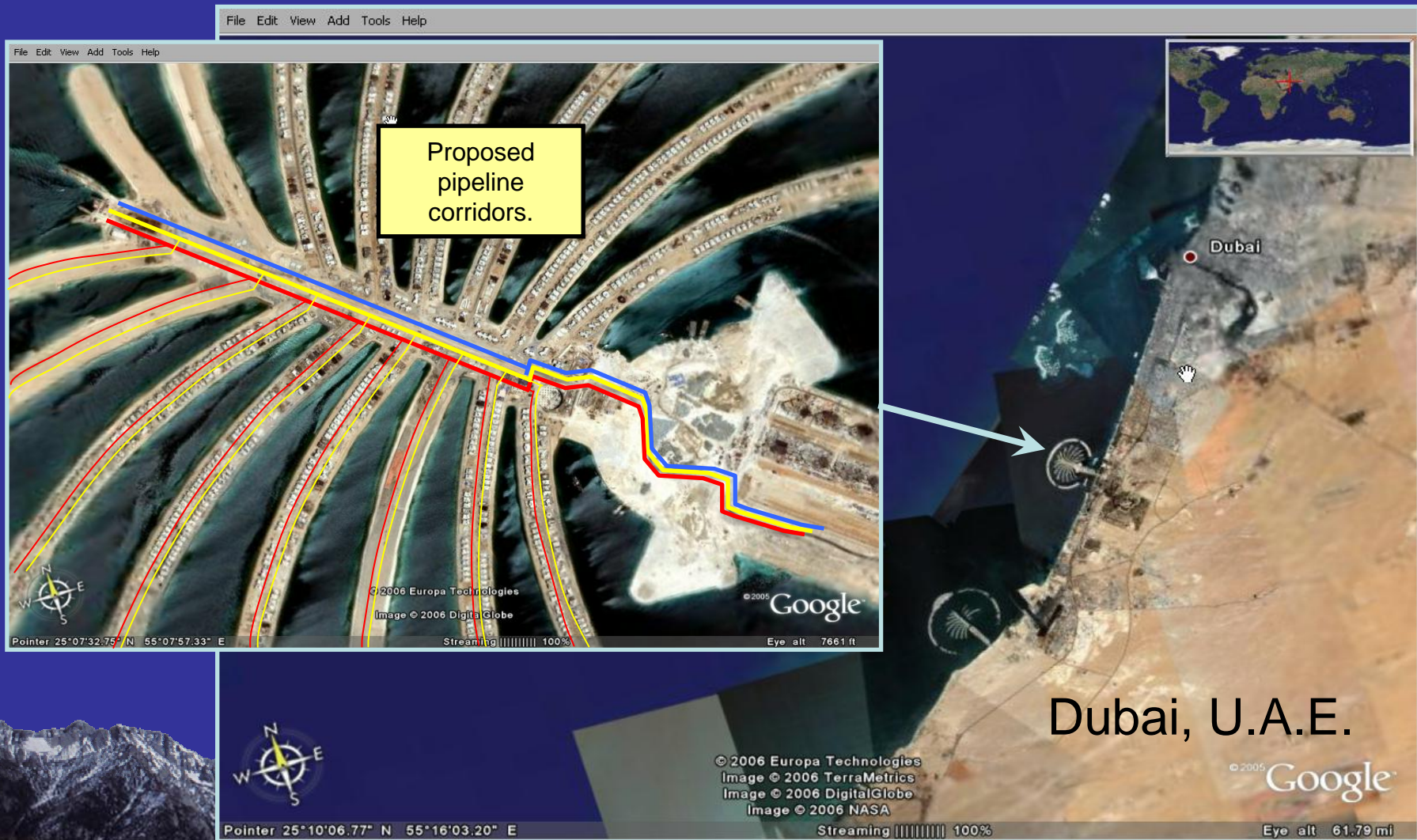


Financial Monitoring



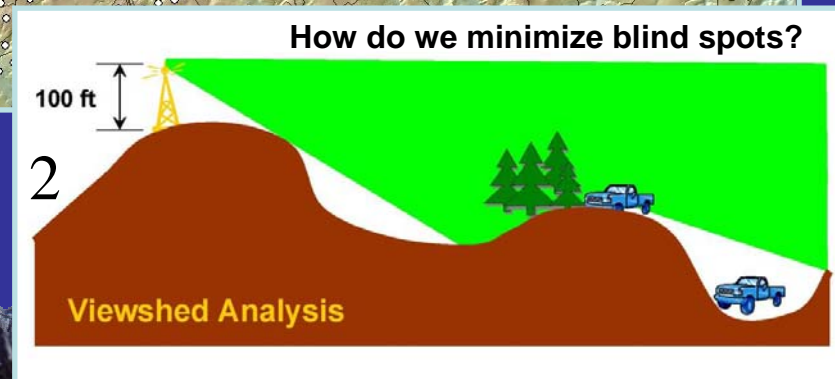
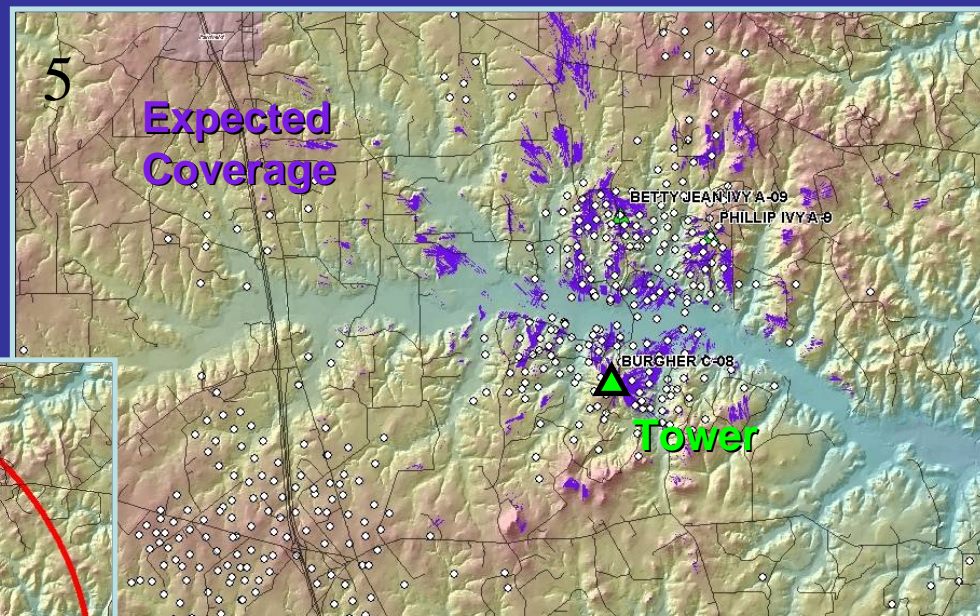
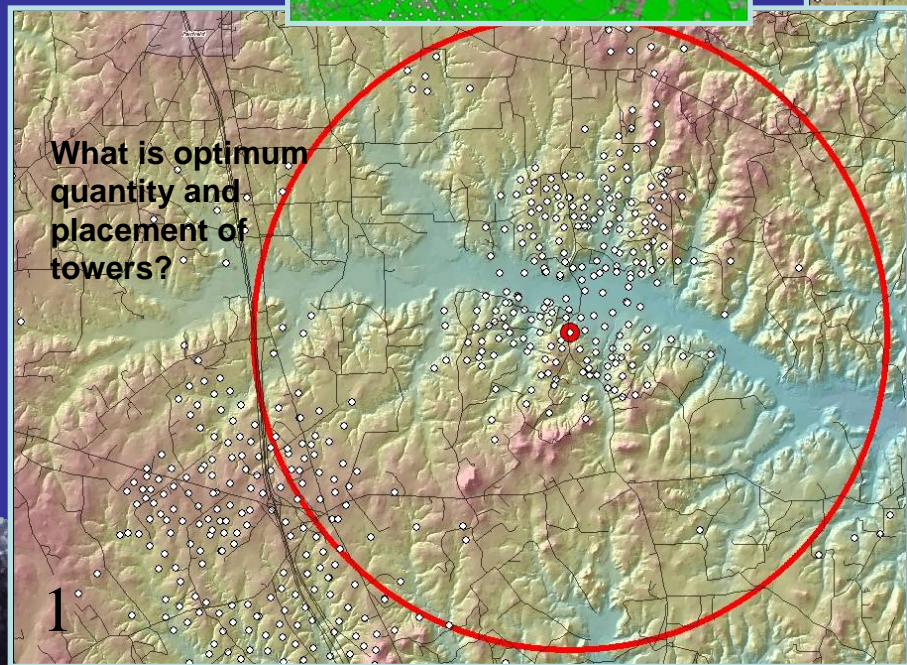
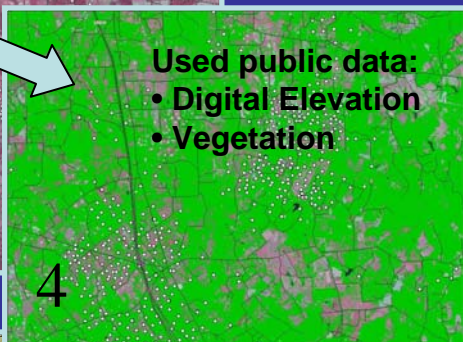
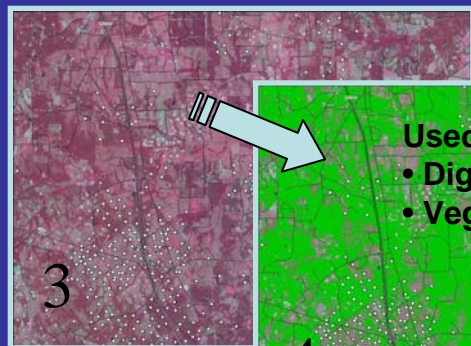


Conceptualization & Planning



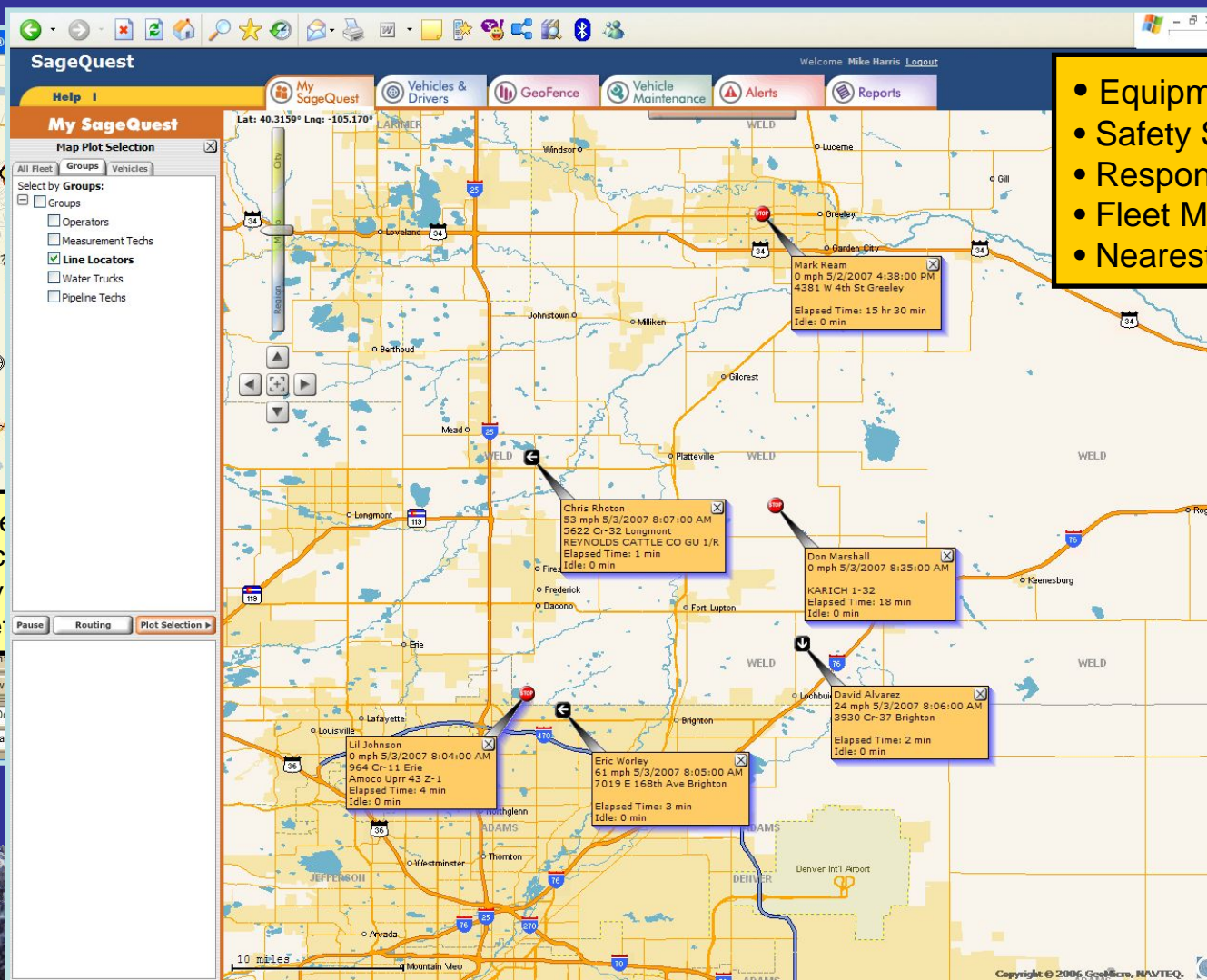
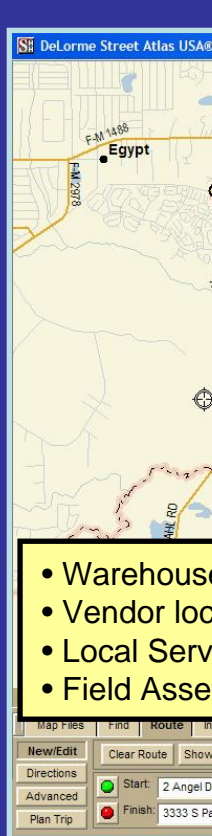


Telecommunications

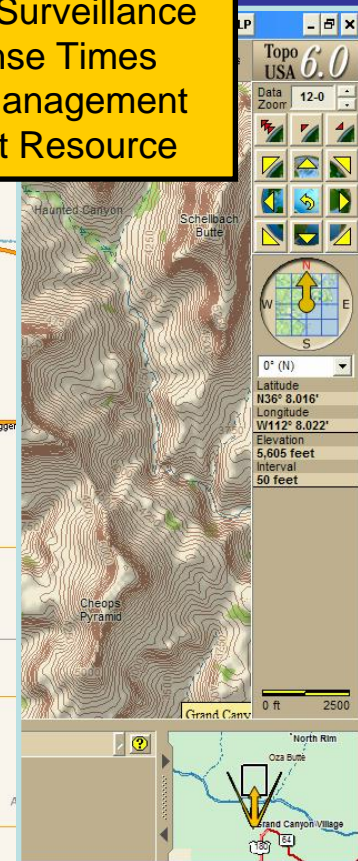




Route Planning



- Equipment tracking
- Safety Surveillance
- Response Times
- Fleet Management
- Nearest Resource

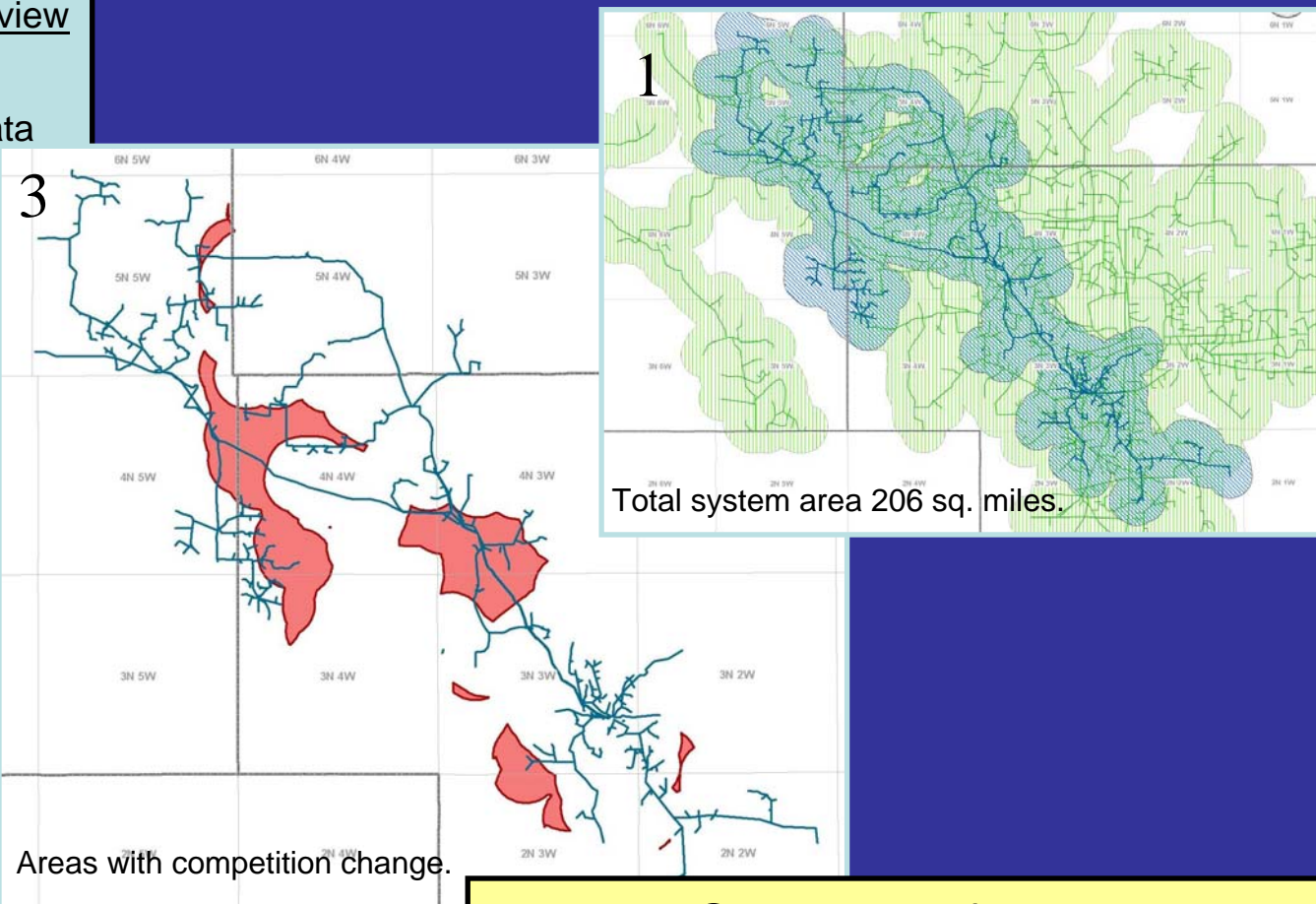




Regulatory (A&D)

Competitive Position Review

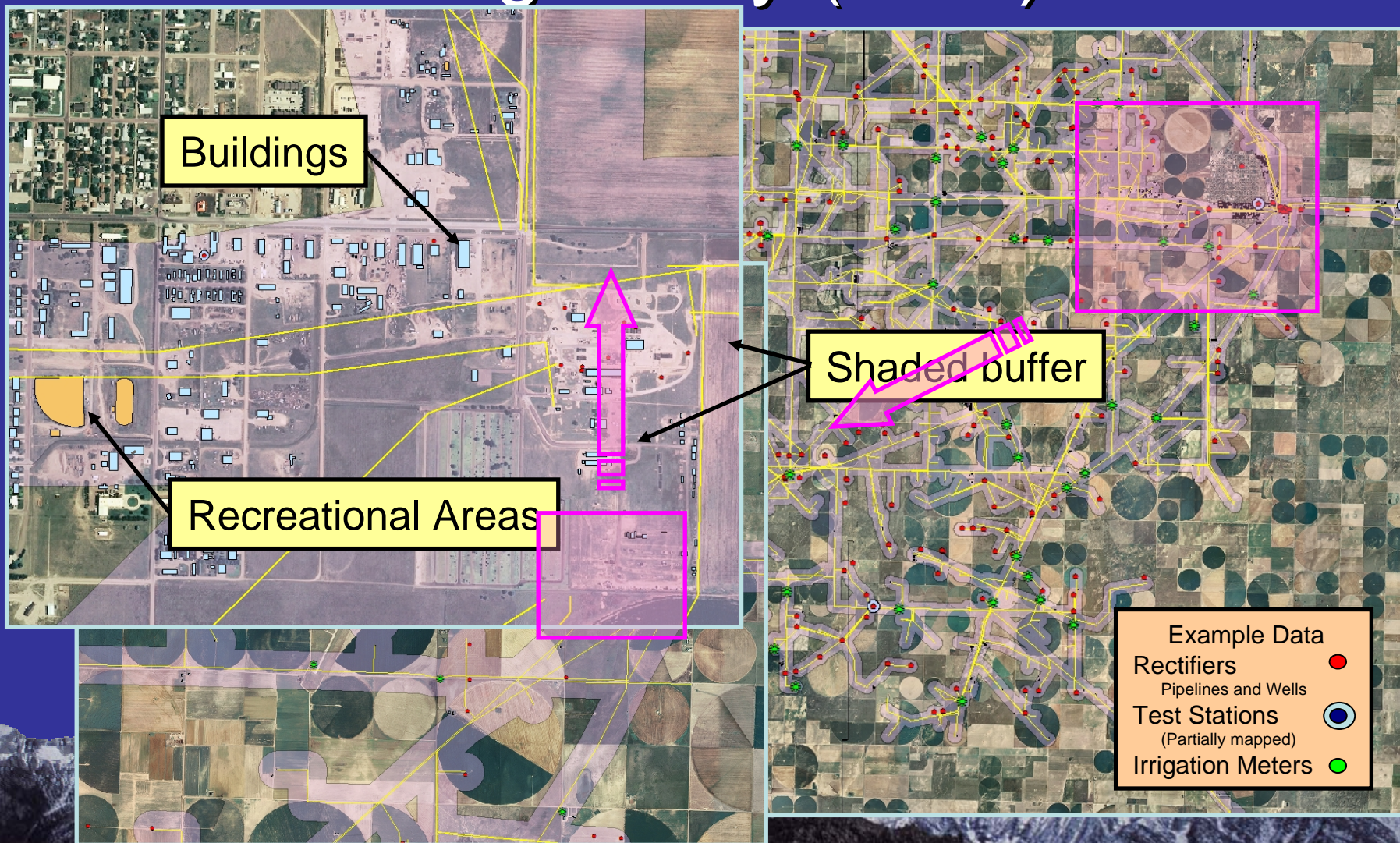
- Spatial analysis*
- Pipeline subscription data
- 1 mile economic connection limit
- 3 or more providers considered sufficient



Results: Only 13% of the system extent had a change in competition.



Regulatory (DOT)





Position Fix

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Data Collection

- “It’s all about the data!”
 - Garbage in, garbage out. (~ bad decisions)
- Sources
 - Contractors
 - Survey Crews
 - Field Staff
- Precision – The “best” we can get. (~cost / benefit)





The path we are following....

- Phased approach
 - Manage the quest
 - Smaller, controllable projects
 - Limit the cost and impact to resources
 - “Learn and Refine” as we progress
- Primary phases
 - 1 – Collection, 2 – Storage
 - 3 – Utilization, 4 – Integration





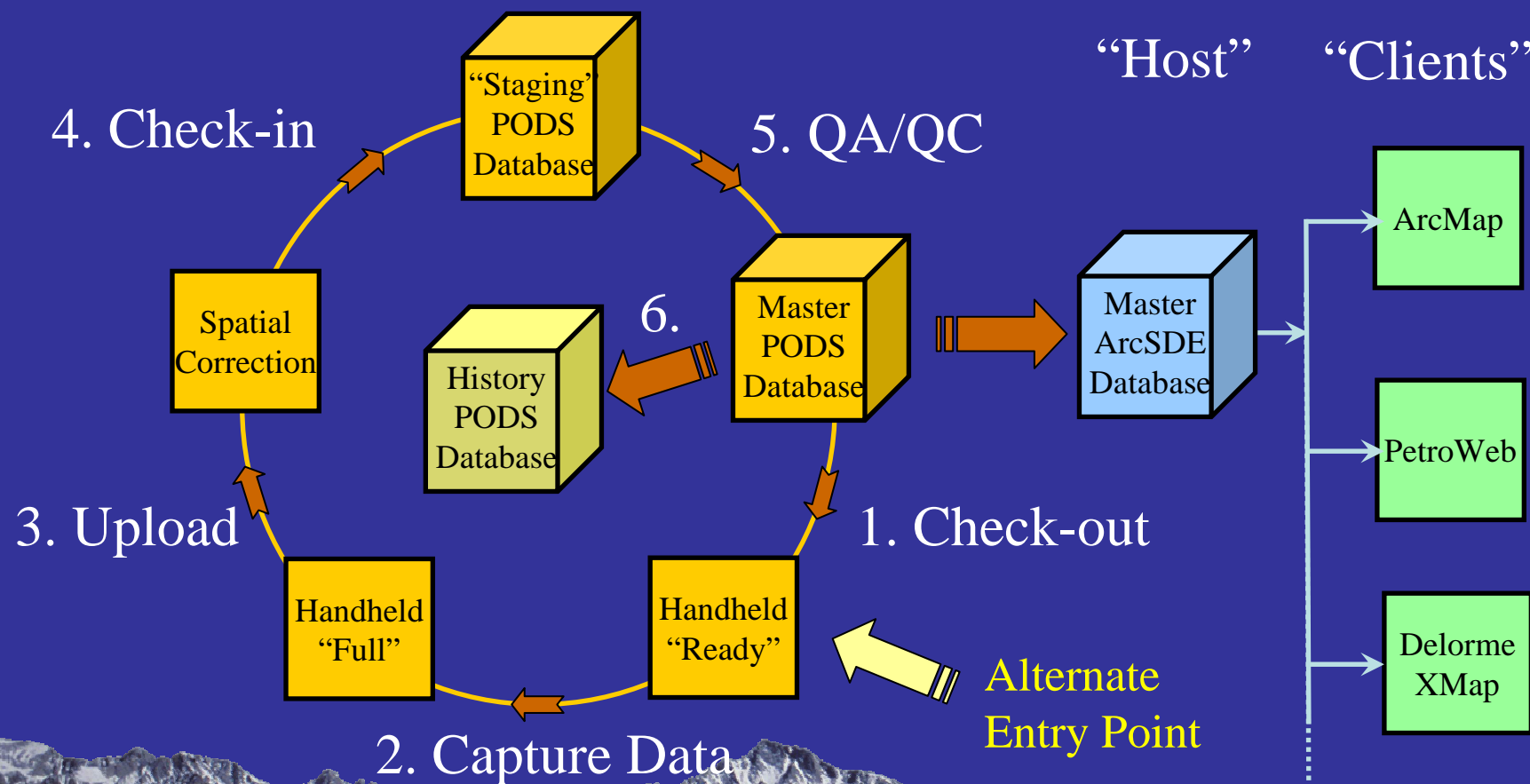
The path we are following....

- Current Status & Priorities
 - Point forward (“Stop the flow of blood”)
 - Advance field use of GPS
 - Create standards and workflows
 - Develop improved data collection tools
 - Implement PODS
 - Interim lease of tools and applications
 - Bid “Utilization” and “Integration” phases
 - Proposed Timing





Data Capture Carousel





Hardware

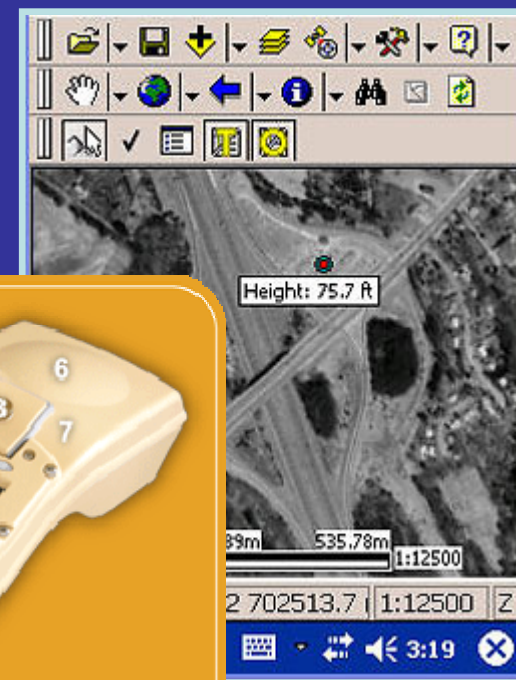
GeoXH



Juno ST



Ike 304



+ Recreational
Grade GPS Units

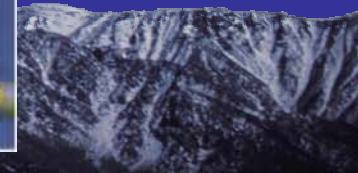
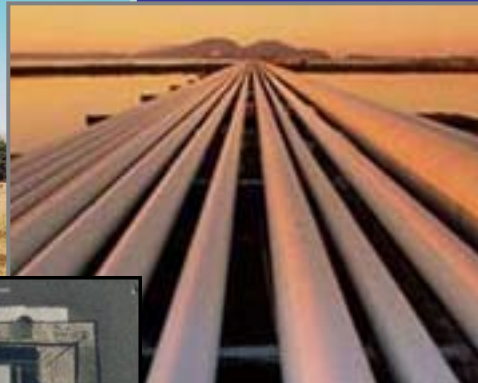




Contractor Data / Surveys

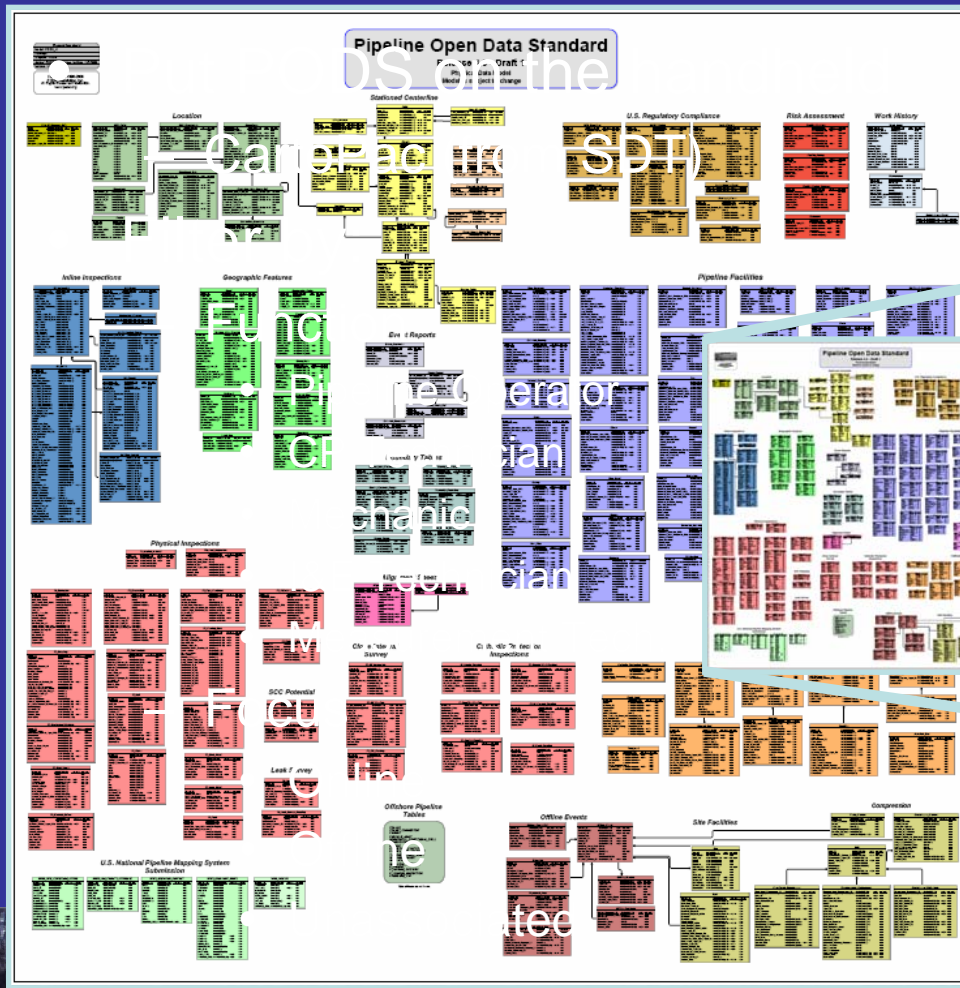
- Proposed routes
- Regulatory data
- Engineering data
- Construction data
- As-built data (“pedigree”)
- **Provide Standards**
 - Collection & attributes

Integrate





PODS



- Oracle Database
- Stores pipeline and peripheral asset data

GeoXH



- Maturing
- 179+ data tables



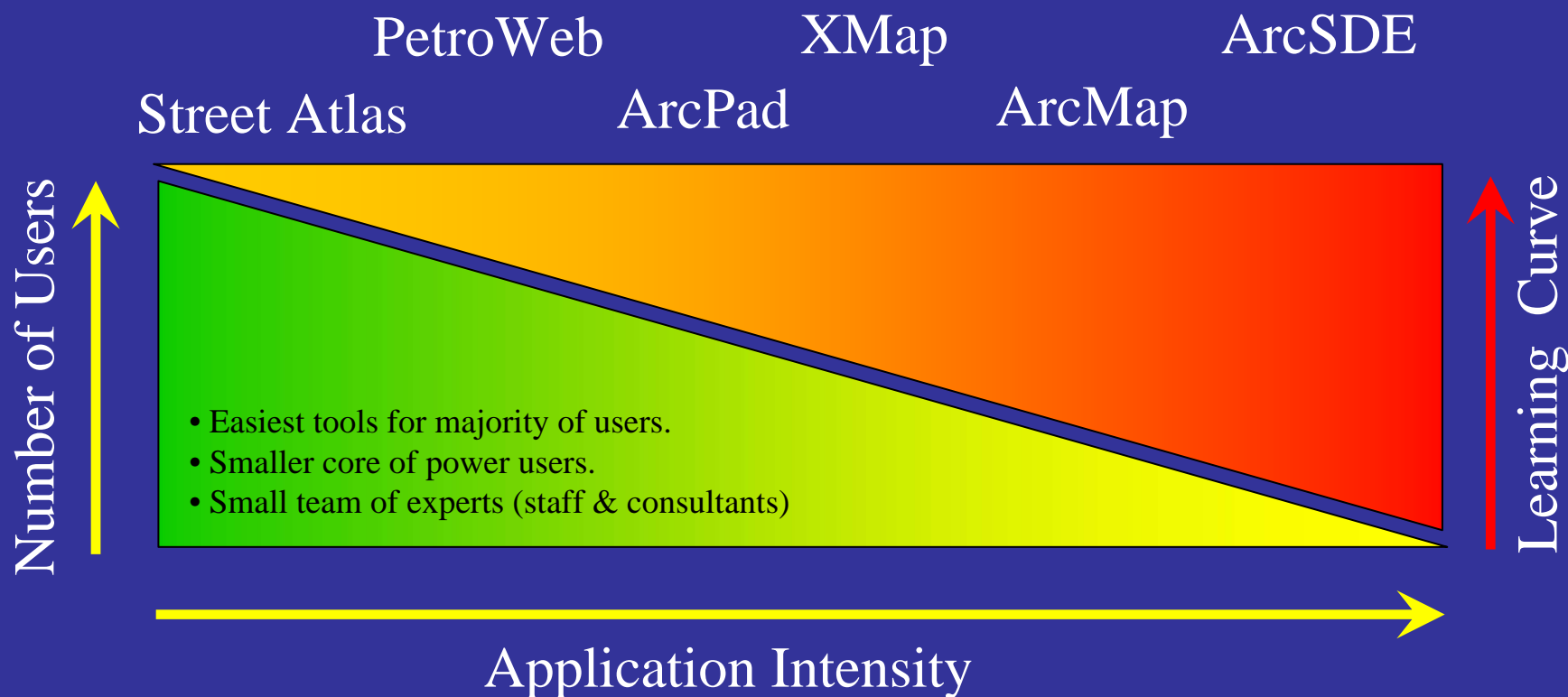
Software

- ESRI Applications
 - ArcGIS 9.1 (migrating to 9.2)
 - ArcIMS, ArcSDE, ArcPad
- PetroWeb
- Delorme
 - Street Atlas, Topo USA, XMap
- Others (Pathfinder Office, TerraSync, CartoPac)





Software Spectrum





SAP Integration

Data Item

Spatial Info.

Web Portal:
Equipment,
Material,
Resources,
Production,
Utilization...

*Spatial
Reference*

Asset Management:
Equipment ID,
Account Depreciation

*Spatial
Reference*

Maintenance:
Work Orders,
Equipment History,
Failures,
Inspections

*Spatial
Reference*

Environmental Health
And Safety:
Source Material,
Source Type,
Permit Limits

*Spatial
Reference*

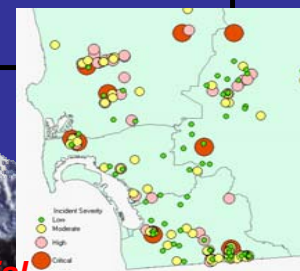
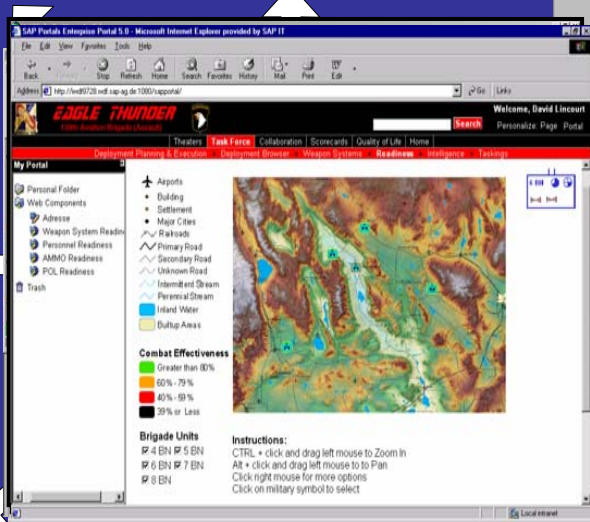
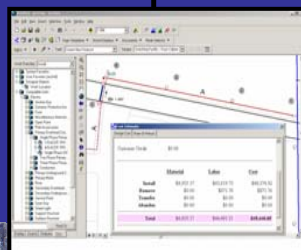
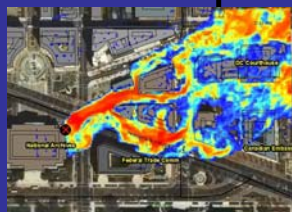
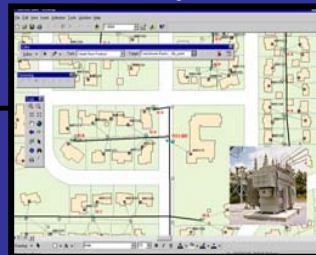
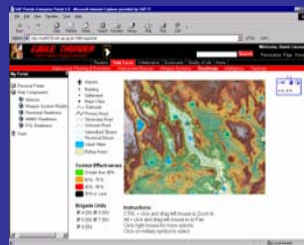
Projects:
WBS No.,
Network

*Spatial
Reference*

Field Users:
Mobile Technology,
Routing, Equipment

CRM/Call Center, or
Incident Management:
Incident No.,
Incident Type

*Spatial
Reference*





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Competition (in GIS)

- Who?
 - Not each other
- What?
 - Regulatory Compliance
 - HS&E Goals
 - Difficult Environments
 - Skilled Staff Availability
 - Rising Labor Costs
 - Frequent A&D Activities
- Rising “Price of admission”
- Public Opinion
- Market Expectations
- Commodity Prices
- Cost of Failure
 - Failure of One, Impacts All
 - Less Energy, Higher Costs

**** Team-up to advance
Standards & Methods**



Closing Comments

You unlock this door with the key of
imagination.

Beyond it is another dimension.

A dimension of sound, a dimension of sight, a
dimension of mind.

You're moving into a land of both shadow and
substance, of things and ideas.

You just crossed over into.....the **GIS Zone**.

Enjoy the journey!



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Thank You!

Questions! & Answers?

