

# GPS, Centerline and APDM

Joe Bentley – NGT&S

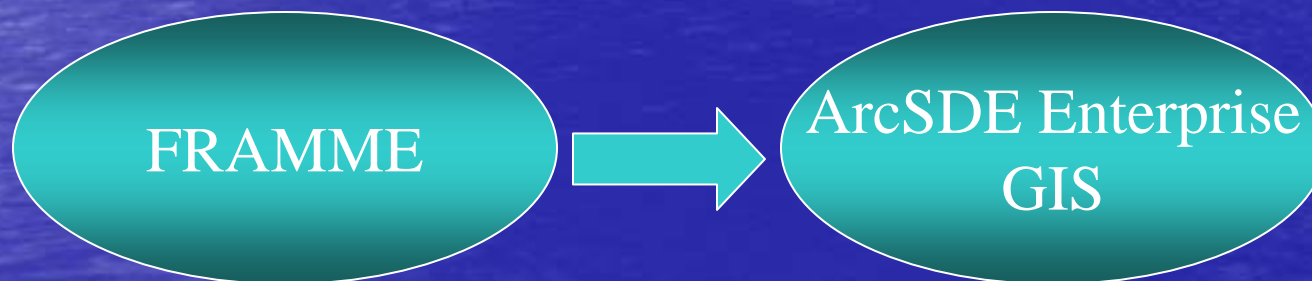
Carl Meinke - GE

James Moll - GE



# HISTORY

NiSource (NGT&S) and GE had just concluded a project of migrating all 17,000 miles of the NGT&S data from a FRAMME based system to an ArcSDE Enterprise GIS.



# FUNCTIONAL REQUIREMENTS

The system is designed to be an Enterprise GIS

- Repository for all pipeline facility data
- Full Life Cycle application
  - Business Analysis
  - Operations
  - Pipeline Integrity
- Distributed technology for geographically dispersed audience



# ACTIVITIES

- Pipeline data maintenance and mapping
- Web Applications – GIS Web Portal
- Feasibility, planning, operations
- Pipeline Risk Analysis
- HCA, Class and MAOP calculations
- Special Mapping
- Facilities Planning
- Project Planning
- Keys to making the GIS a true Enterprise solution

# MAINTENANCE PLATFORM

- ArcGIS (ArcSDE, ArcIMS, ArcServer)
- Oracle 9.x
- APDM data model
- PipeView for ArcGIS(PVAG)
- Production Tools
  - ASG
  - Arc PLTS, Arc Schematics, GPT
  - Report Generator

# APDM Data Model Design

APDM is based on the concept of Linear Referencing

- The centerline is a M-Aware polyline
- The features are linear and point events.
- Topology rules in effect



# NGT&S Challenges

- Discovery of pipeline location issues
- The need to reconcile pipeline location
- 17,000 miles of pipe
- What constitutes “correct” location? (Integrity driven)
- Needed GPS points
- Needed to complete quickly

# SOLUTION

- Columbia contracted Photo Science to GPS whole system.
- Data returned and centerline adjusted





# Examples

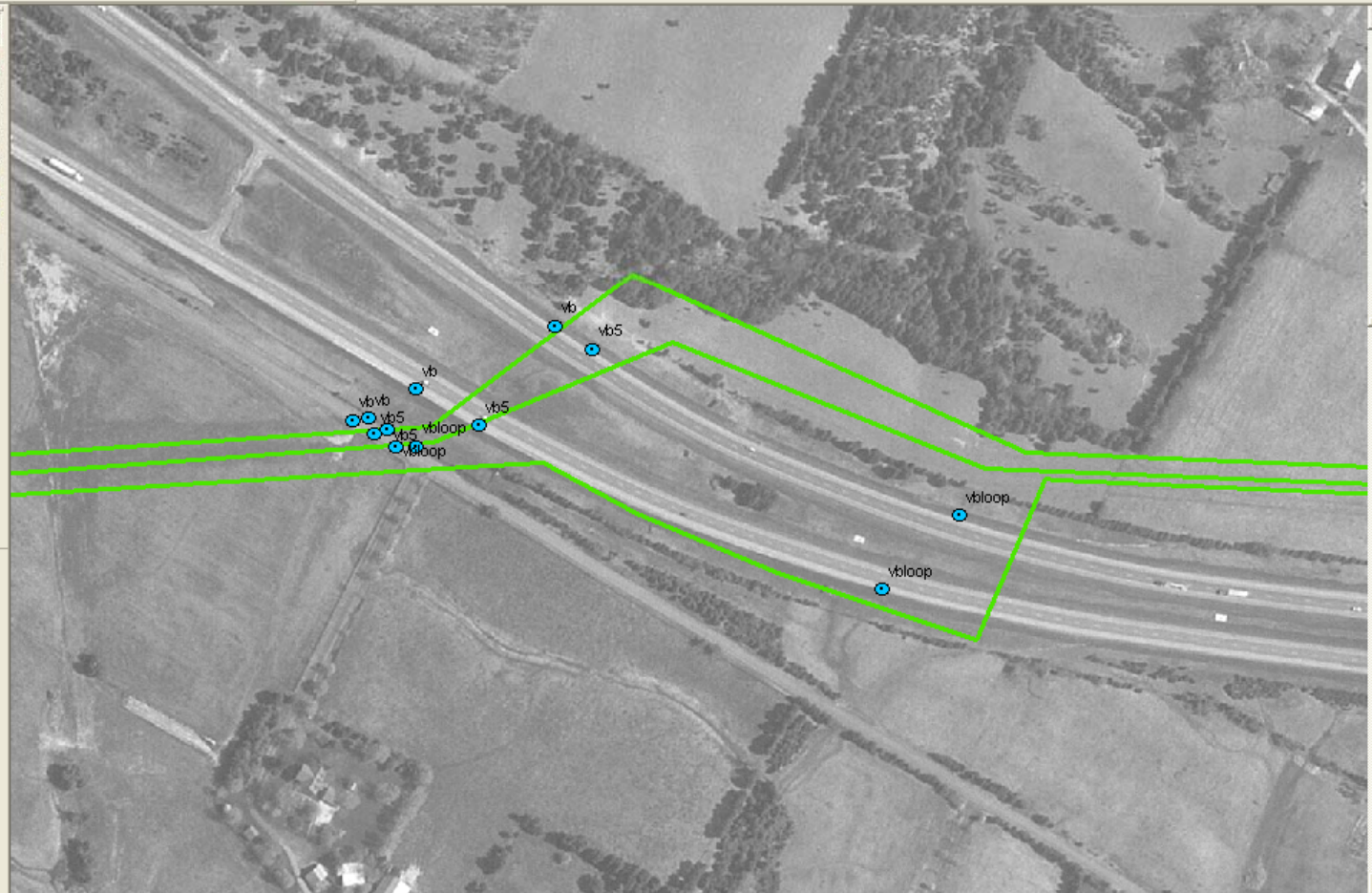
**Layers**

- Asset10\_Roads
- ControlPoint
  - <all other values>
  - SUBTYPECD
  - Continuous (ARM)
  - Horizontal (PRM)
  - Mile Post (ARM)
  - Unspecified (URM)
  - Valve Segment (ARM)
- TCO\_FINAL\_Roads\_Albers
- TCO\_FINAL\_RR\_Albers
- TCO\_FINAL\_Water\_Albers
- StationSeries
  - Final Pipeline
  - PIPipeline Location
- TCO\_Pipe
- aerialcutsheet06





- Layers
  - Asset10\_Roads
  - ControlPoint
    - <all other values>
    - SUBTYPECD
    - Continuous (ARM)
    - Horizontal (PRM)
    - Mile Post (ARM)
    - Unspecified (URM)
    - Valve Segment (ARM)
  - TCO\_FINAL\_Roads\_Albers
  - TCO\_FINAL\_RR\_Albers
  - TCO\_FINAL\_Water\_Albers
  - StationSeries
    - Final Pipeline
    - Pipeline Location
  - TCO\_Pipe
  - aerialcutsheet06





# NGT&S next challenge



- Utilized PVAG to maintain data in the APDM rather than utilizing core ArcGIS functionality
- Topology rules were in effect.
- Edits were painfully slow. (unexpected)
- Routine work had to continue
- Time and resources



# NGT&S Conclusion

- Hire a larger staff and stop all other work (NOT!)
- Needed to solve that problem NOW!



# SOLUTION

- Columbia approached GE with the problem
- GE proposed a solution
  - a leaner data model utilizing:
    - Event tables, (from features based to events based)
    - Core ArcGIS functionality
    - Customized light weight toolbar stack



# RESULTS

- Higher productivity rate
- Data integrity maintained
- Toolbar helped to drive placement of new events where needed, and ArcGIS managed the rest.
- Quick turnaround of project

Asset BUC.mxd - ArcMap - ArcEditor

File Edit View Insert Selection Tools Window Help

1:3,197

Change Version... Feature Analyst

No Current Activity Linked Documents Saved Objects Spatial Adjustment GapTool

Editor Task: Create New Feature Target: GapTool

Drawing Arial 10 B I U Georeferencing Layer:

Layer: Asset10\_Roads 1300 Labeling Fast 100%

Centerline Editing Feature Editing Reference Mode Advanced

Page Templates Stored Displays Documents

**Layers**

- Asset10\_Roads
- ControlPoint
  - <all other values>
  - SUBTYPECD
  - Continuous (ARM)
  - Horizontal (PRM)
  - Mile Post (ARM)
  - Unspecified (URM)
  - Valve Segment (ARM)
- TCO\_FINAL\_Roads\_Albers
- TCO\_FINAL\_RR\_Albers
- TCO\_FINAL\_Water\_Albers
- StationSeries
  - Final Pipeline
  - Pipeline Location
  - TCO\_Pipe
- aerialcutsheet06

Display Source Selection Hierarchy

4679172.68 1148836.59 Feet



# SUMMARY

- NGT&S put 20 users on the project - completed it in 2 months rather than years
- Met the deadline
- GE had the GIS up and running on APDM/PVAG production system within a week of the completion of the edits.
- Credibility maintained by delivery
- Improved data



# LESSONS LEARNED

- GIS applications can have many purposes and uses
- Designs that work well for their initial need may fall short when pressed into service for other purposes.
- This was a good training opportunity for practical experience in a production environment.
- Ask the questions

# BENEFITS

- NGT&S and GE were able to leverage talents
- Faster turnaround, credibility maintained
- Because data integrity was enforced, GE was able to manipulate the database design easily for smoother transitions and apply knowledge in future products and enhancements
- NGT&S was able to control cost and schedule
- Better data for calculations and analysis



Questions ?