

# DIGITAL MAPPING TECHNIQUES 2013

The following was presented at DMT'13  
(June 2-5, 2013 - Colorado Geological Survey and Colorado School of Mines  
Golden, CO)

The contents of this document are provisional

See Presentations and Proceedings  
from the DMT Meetings (1997-2013)

<http://ngmdb.usgs.gov/info/dmt/>

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# Conversion Tools for Idaho Geologic Map Data:

## AutoCAD to NCGMP09 Geodatabase

Loudon R. Stanford—Idaho GS

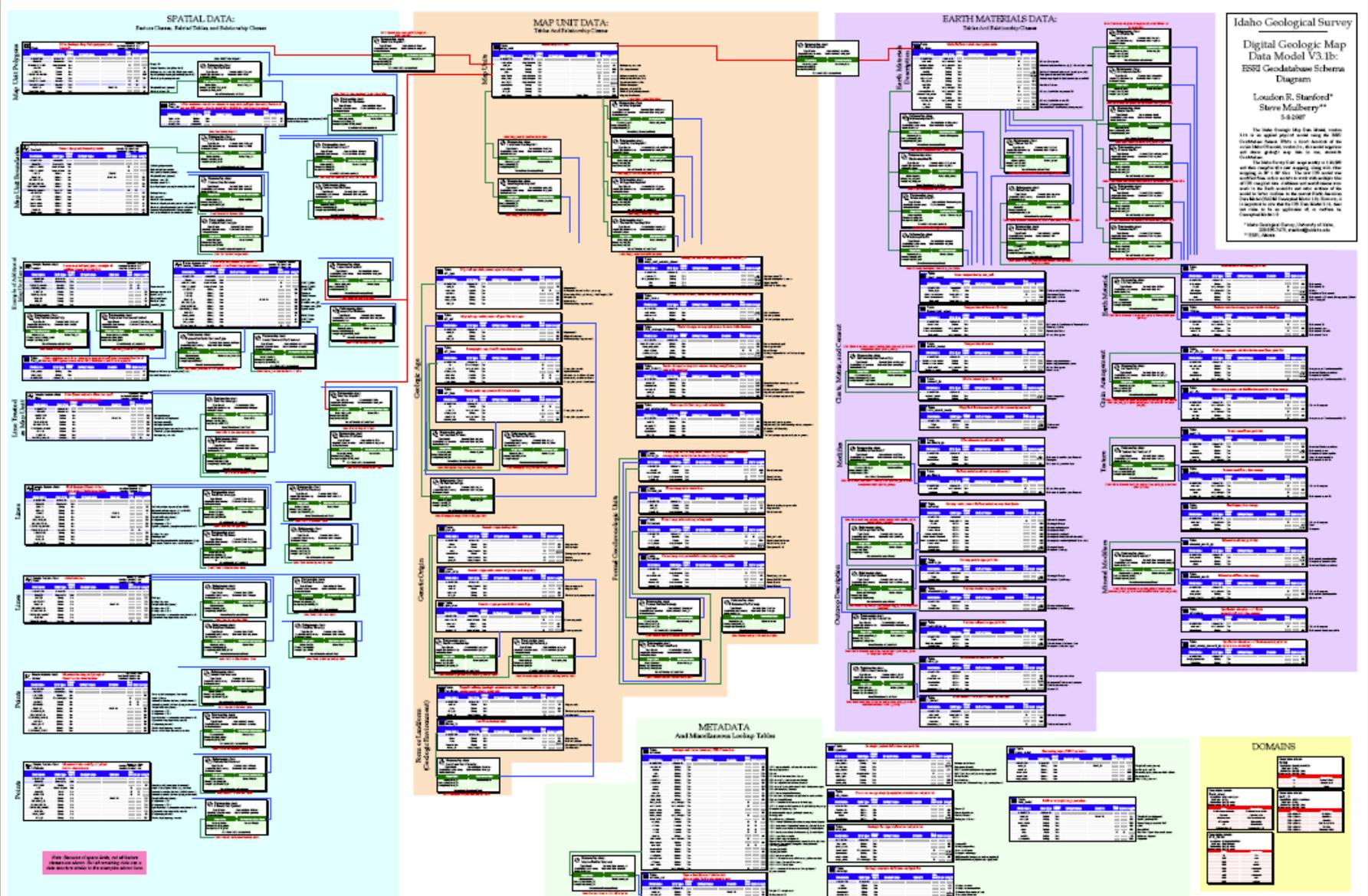
Bill Richards—Digital Mapping Consultant/  
North Idaho College Geology Professor

Don't Know About You,  
But I Never Want to Work on  
Another Data Model Schema,  
Ever,  
**EVER** Again

# Once a CAD, Not Always a CAD

# Why Am I Here?

- Idaho GS at a crossroads
- We have....“ISSUES”
- NCGMP09 is an answer.....I guess.
- Straw Man

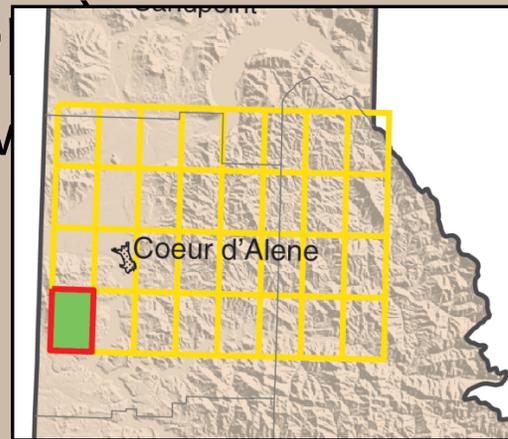


1.2 TB data quantities,

# Current Work Flow

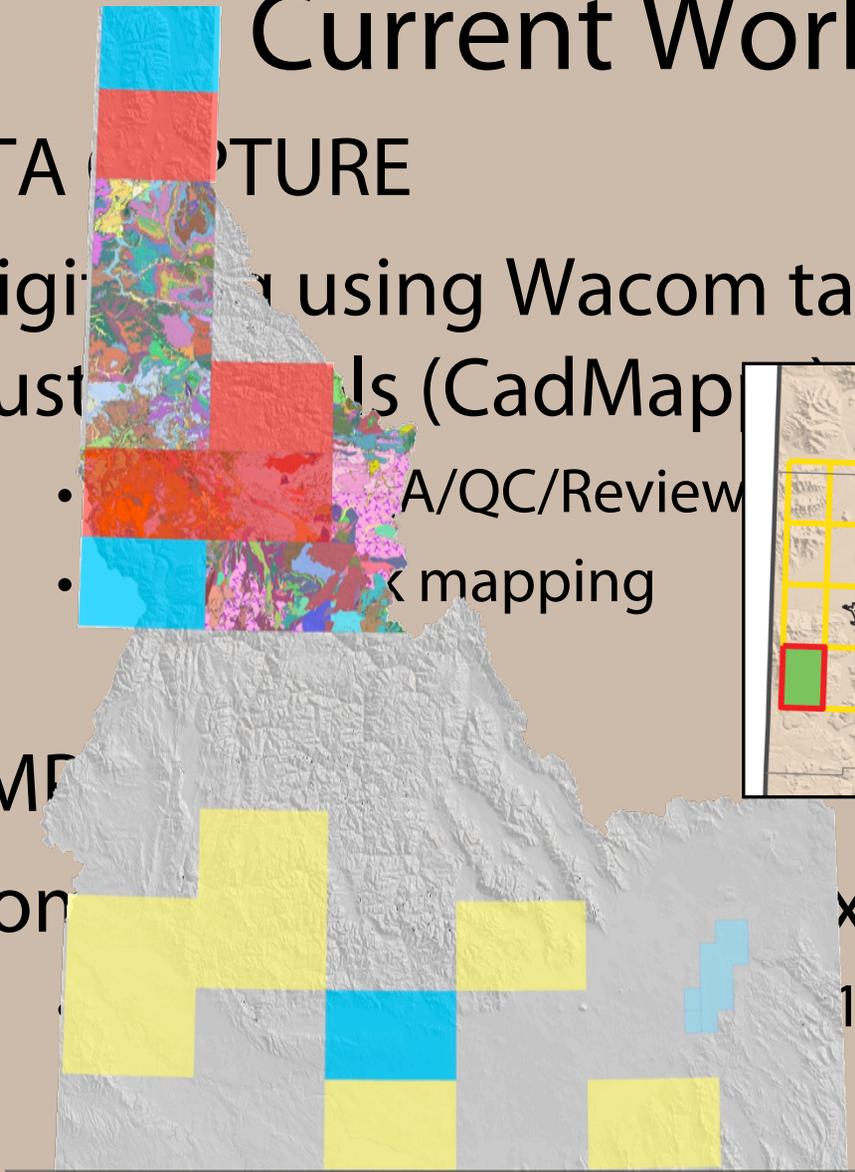
## DATA CAPTURE

- Digitizing using Wacom tablets in CAD using Custom Tools (CadMap)
- A/QC/Review
- $\times$  mapping



## COMPLETION

- Completion of 60 minute tiles
- 100k or 1:75k



# Current Work Flow (cont.)

## GIS MANAGEMENT — DELIVERY—TOOLS

- Export to Coverages/shape (set of scripts/tools)
- Tools to “merge” 30 x 60 tile into Statewide Geodatabase (Idaho Data Model Schema)

# Current Problems

- BOTTLE NECKS in production :
  - 24k quads and 30' X 60' tiles get done **but merging into Statewide GDB lags.**
- OBSOLETE TOOLS/SCRIPTS, still work in 9.3
- Could convert easily---Except for ACAD extended entity data (Xdata).

WHAT TO DO NOW??

# New Strategy and Work Flow

- Digitizing using Wacom tablets in CAD using Custom tools
- Create new tools to convert directly:
  - IGS CAD data → Geodatabase /NCGMP09 –*with additions*
  - *With the idea: New data could be merged into State Wide GDB later.*

Begin converting

# Why NCGMP09?

***Because it's there....***

***AND..***

***It's simple and expandable***

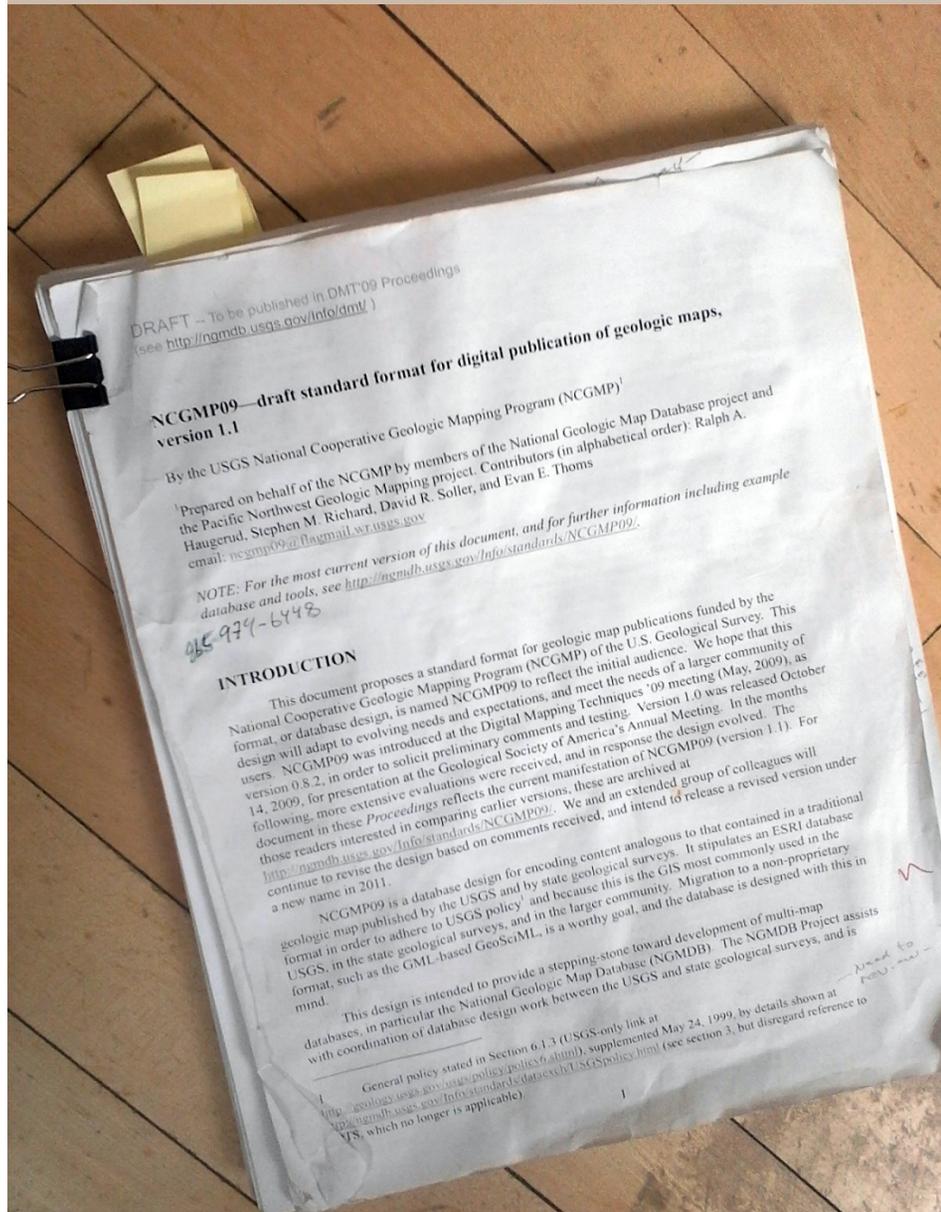
# Three? Strategies

- TRANSLATE
  - OTHER GIS to GDB
  - SHAPE to GDB
  - ETC. to GDB
- (DATA STORAGE/Management)
- WORK NATIVELY in a NCGMP09 GDB

# CAD → GDB Design:

Three power tools to promote conversion:

– NCGMP09 Bible

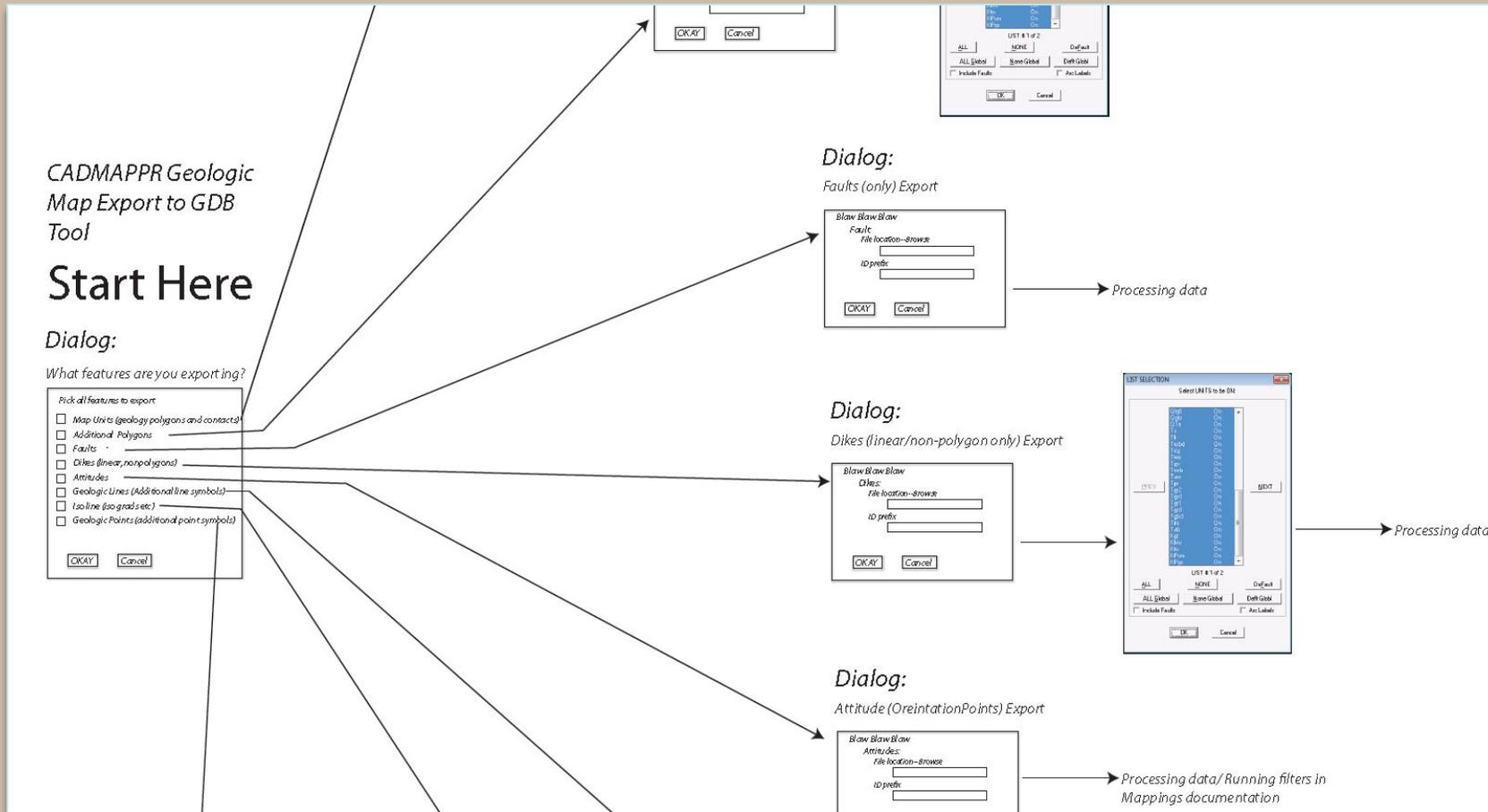


# CAD → GDB Design:

	CAD_item	Action	FC_field_name	Field_type	notes
109	RefID4		Label	Text, 255	
110	RefID2		DataSourceID	text, 20	
111			Notes	Text, 255	
112	RefID1		DataTileID	Text, 25	
113	RefID3		DataSourceID2	Text, 20	
114	Ftype		FaultType	Text, 70	
115	Fside	concat "Ftype"+"_"+"Fside". IF Fside is missing, AND "Ftype" is not null in Cadmappr Assoc list (i.e., fault but movement not	FaultMovement	Text, 70	
116	Ftype (processed)	Default is "y". For all Cadmappr derived items.	FaultMoveCapture	Y/N	This is here to accomidate data digitized in Arc
117	RefID5		FaultCode	Text, 25	This is a place holder for Active Fault database.

– Database mappings

# CAD → GDB Design:



– Application flow chart

# [IGS] AutoCAD Data: Things to Know

- One file with:
  - Layers
  - Objects (Entities)
  - Extended Entity data (Xdata)
- Attributes:
  - Line type
  - Fault type
  - Fault Movement
  - Source(s)
  - Feature labels
  - More...

# Overview of Design



AutoCAD

ArcGIS

Geologic Map:  
ACAD Layers;  
Objects w/ Xdata

INPUT

Processing  
Visual Lisp

SPATIAL  
DXF Files

GeoProcessing  
ArcPy-Python

Feature Class  
O  
C  
M  
Feature Class  
Faults

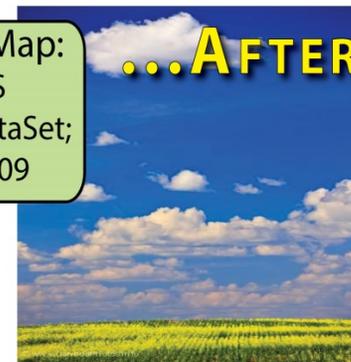
Meta Data

- "Glossary"
- Sources
- Descriptions
- Other Metadata
- Lithology

ATTRIBUTES  
Tables-MDB

GeoProcessing  
ArcPy-Python

Geologic Map:  
ArcGIS  
Feature DataSet;  
NCGMP09



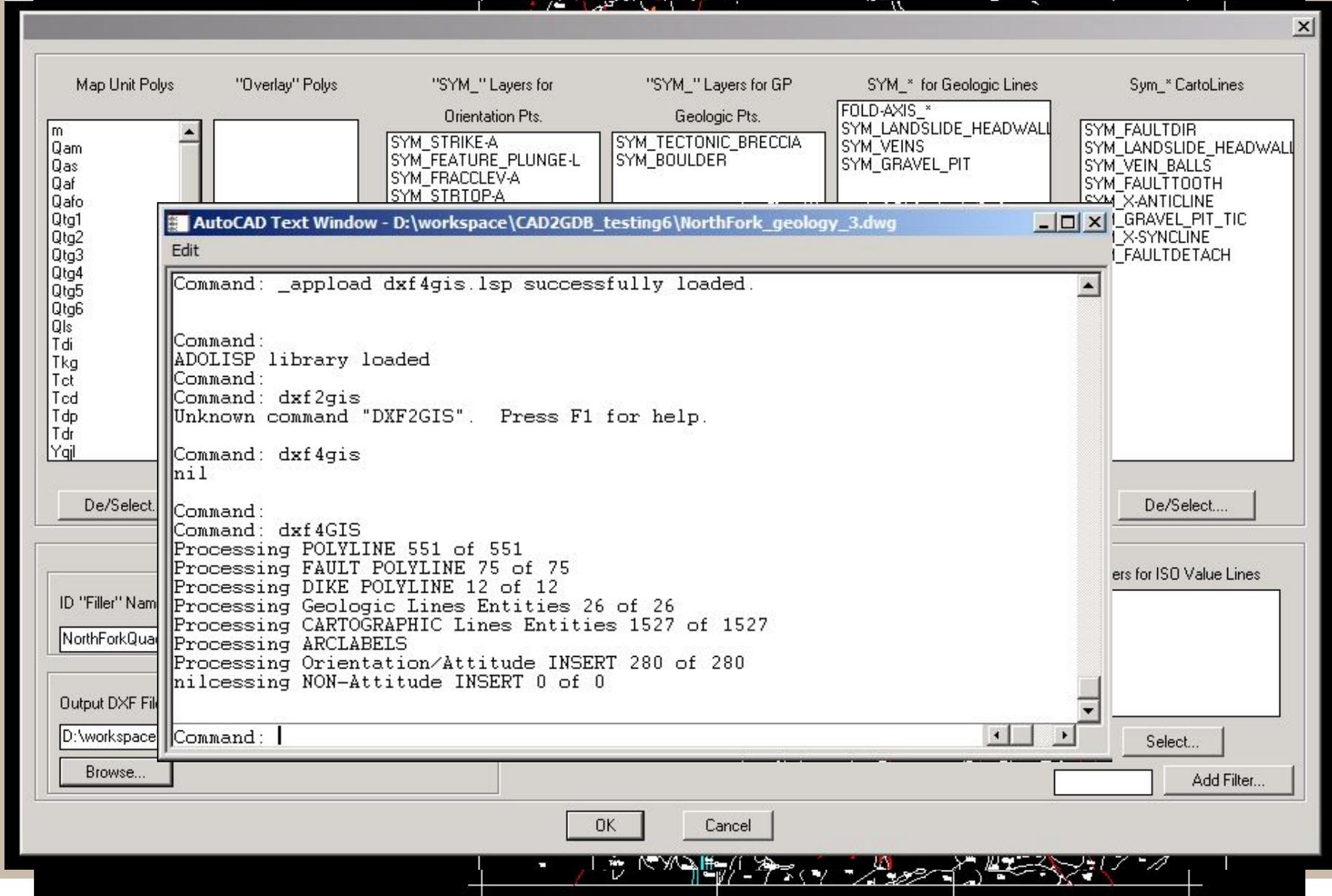
# CAD→ GDB: CAD Processing

- Visual Lisp processing on the AutoCad-based map
- Attribute information written to tables in an Access-based database
- Geometry in ascii DXF file format

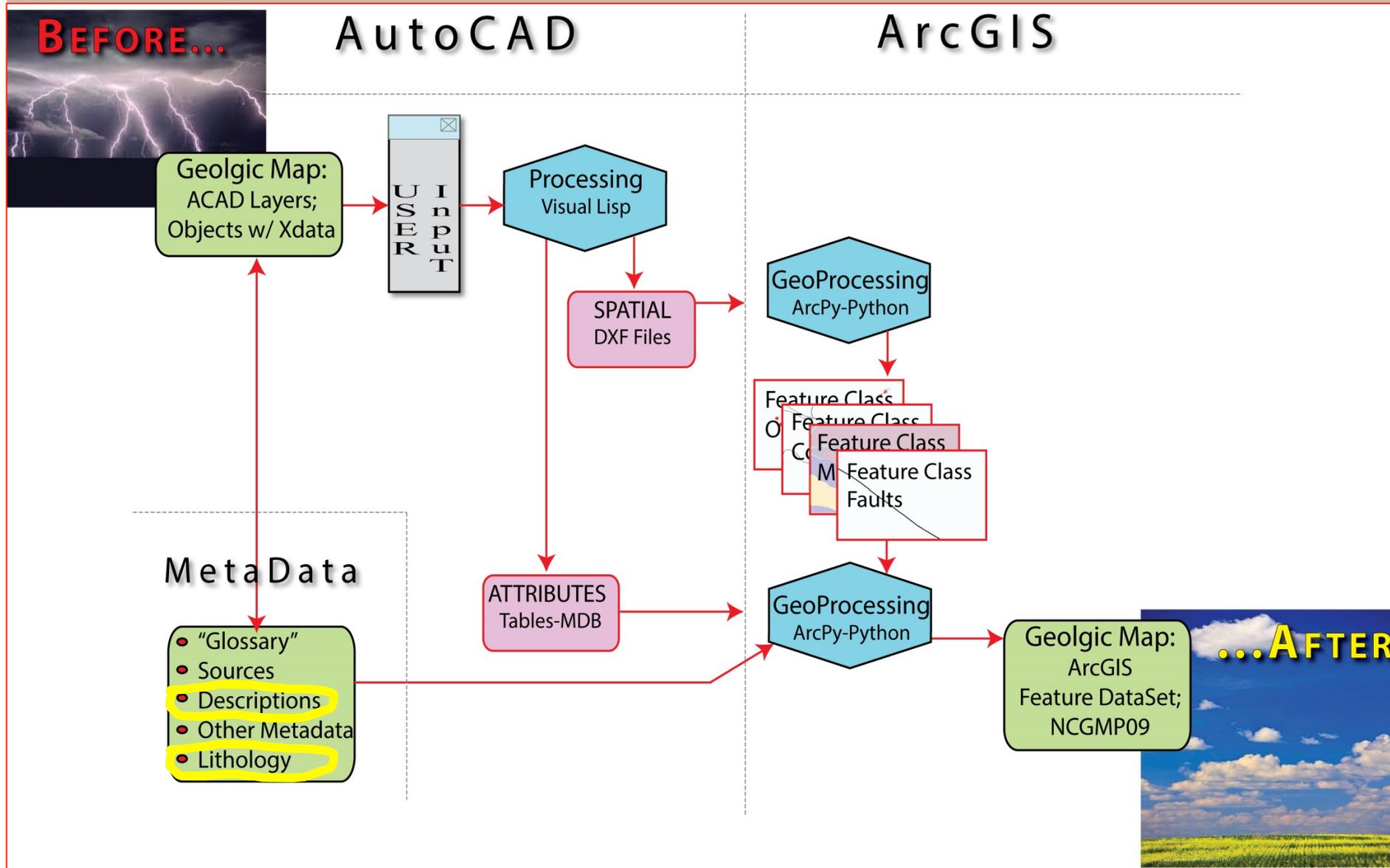
# CAD → GDB: CAD Processing (cont.)

- Process:
  - Geologic map unit boundaries
    - Contacts
    - Map unit polys
  - Faults
  - Dikes
  - Overlay polygon layers
  - Orientation points (Attitudes)
  - Point symbols
  - Cartographic lines
  - Isograd lines
  - Geologic lines

# CAD → GDB: CAD Input



# Overview of Design

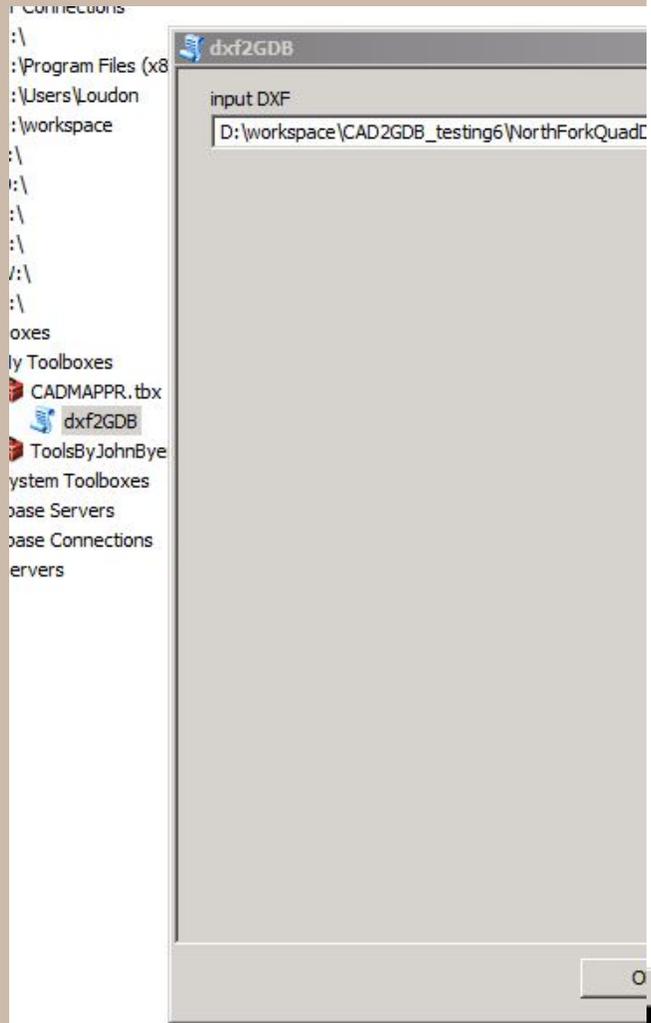


# CAD → GDB: ArcPy Processing

## ArcPy-based processing to build Geodatabase:

- The DXF files are processed with ArcPy geoprocessing commands to build the Feature Classes required.
- AutoCad-assigned “handles” maintained as primary IDs
- Polygonal feature layers from the line geometry and centroids.
- Geodatabase feature classes now processed to create polygon topology
- The attributes joined to the geodatabase from Access-based attribute table using ACAD “Handles”
- Cleanup

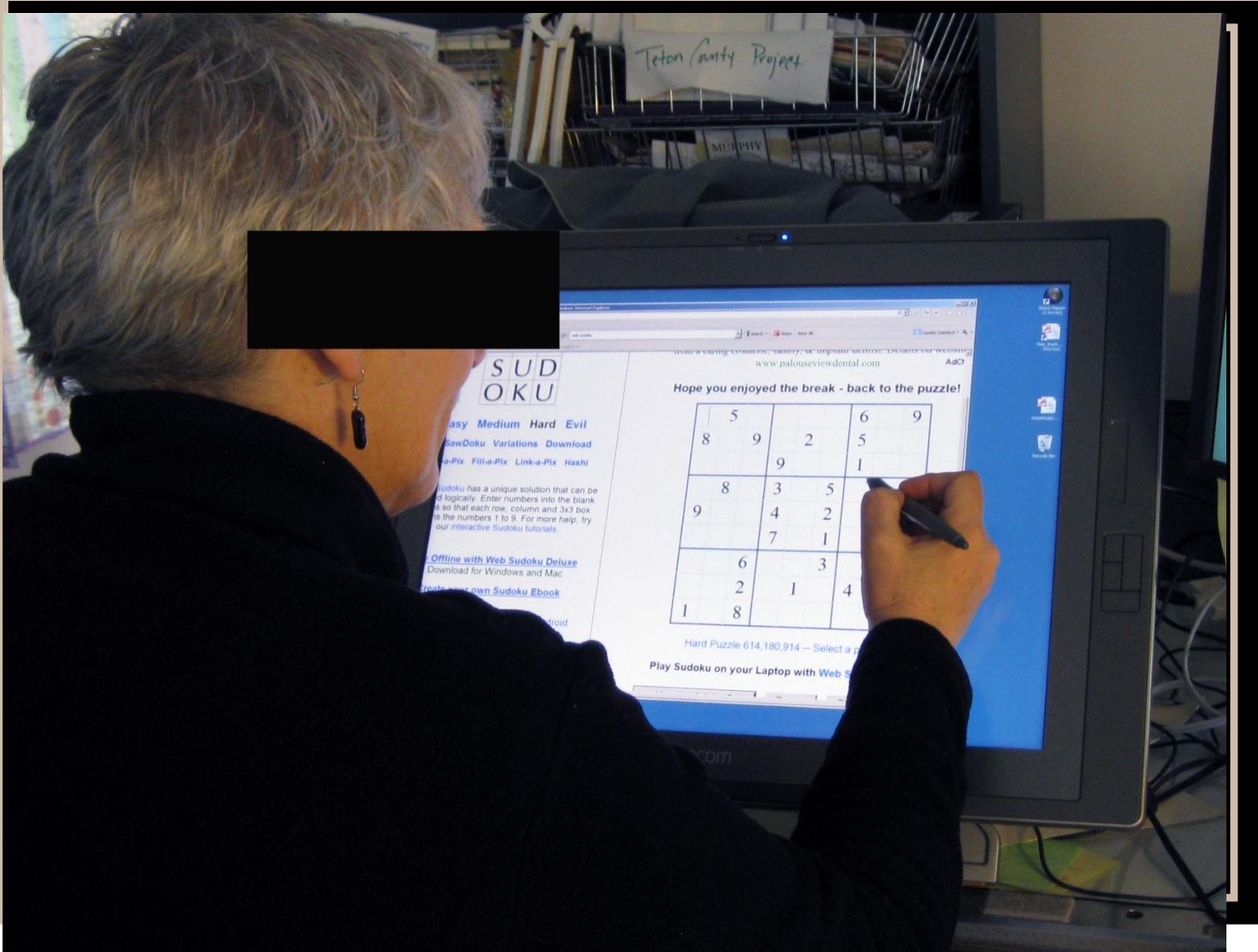
# CAD → G



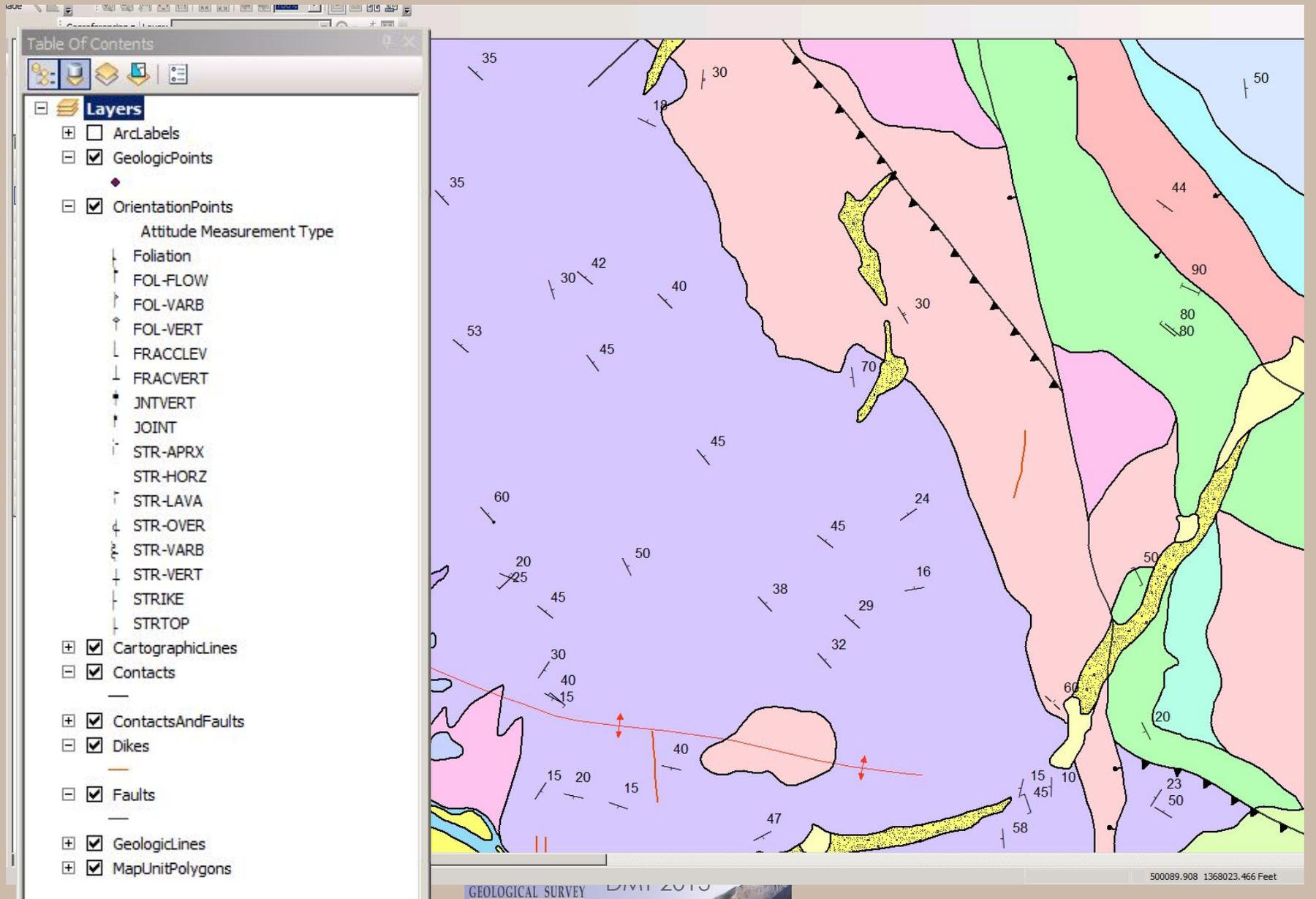
```
dxfg2GDB
Completed
Close
<< Details
 Close this dialog when completed successfully

Executing: dxfg2GDB D:\workspace\CAD2GDB_Testing_5\NorthForkDXF.dxf
Start Time: Wed May 22 16:37:13 2013
Running script dxfg2GDB...
Executing: FeatureToPolygon D:\workspace\CAD2GDB_Testing_5\NorthForkDXF.dxf\Polyline D:\workspace\CAD2GDB_Testing_5\MapUnitPolygons.shp # ATTRIBUTES D:\workspace\CAD2GDB_Testing_5\NorthForkDXF.dxf\Annotation
Start Time: Wed May 22 16:37:16 2013
Reading Features...
Cracking Features...
Assembling Features...
Succeeded at Wed May 22 16:37:18 2013 (Elapsed Time: 2.00 seconds)
Executing: FeatureToLine D:\workspace\CAD2GDB_Testing_5\NorthForkDXF.dxf\Polyline D:\workspace\CAD2GDB_Testing_5\Contacts.shp # ATTRIBUTES
Start Time: Wed May 22 16:37:19 2013
Reading Features...
Cracking Features...
Assembling Features...
Succeeded at Wed May 22 16:37:20 2013 (Elapsed Time: 1.00 seconds)
Executing: FeatureToLine D:\workspace\CAD2GDB_Testing_5\NorthForkDXF-faults.dxf\Polyline D:\workspace\CAD2GDB_Testing_5\Faults.shp # ATTRIBUTES
Start Time: Wed May 22 16:37:21 2013
Reading Features...
Cracking Features...
Assembling Features...
Succeeded at Wed May 22 16:37:21 2013 (Elapsed Time: 0.00 seconds)
Executing: FeatureToPoint D:\workspace\CAD2GDB_Testing_5\NorthForkDXF.dxf\Point D:\workspace\CAD2GDB_Testing_5\OrientationPoints.shp CENTROID
Start Time: Wed May 22 16:37:22 2013
Succeeded at Wed May 22 16:37:23 2013 (Elapsed Time: 1.00 seconds)
Executing: FeatureToPoint D:\workspace\CAD2GDB_Testing_5\NorthForkDXF-symmonatt.dxf\Point D:\workspace\CAD2GDB_Testing_5\GeologicPoints.shp CENTROID
Start Time: Wed May 22 16:37:23 2013
WARNING 000117: Warning empty output generated.
Succeeded at Wed May 22 16:37:23 2013 (Elapsed Time: 0.00 seconds)
Executing: FeatureToLine D:\workspace\CAD2GDB_Testing_5\NorthForkDXF-dikes.dxf\Polyline D:\workspace\CAD2GDB_Testing_5\Dikes.shp # ATTRIBUTES
Start Time: Wed May 22 16:37:23 2013
Reading Features...
Cracking Features...
Assembling Features...
Succeeded at Wed May 22 16:37:23 2013 (Elapsed Time: 0.00 seconds)
Executing: CopyFeatures D:\workspace\CAD2GDB_Testing_5\NorthForkDXF-GL.dxf\Polyline D:\workspace\CAD2GDB_Testing_5\GeologicLines.shp # 0 0 0
Start Time: Wed May 22 16:37:23 2013
Succeeded at Wed May 22 16:37:24 2013 (Elapsed Time: 1.00 seconds)
Executing: CopyFeatures D:\workspace\CAD2GDB_Testing_5\NorthForkDXF-CL.dxf\Polyline D:\workspace\CAD2GDB_Testing_5\CartographicLines.shp # 0 0 0
Start Time: Wed May 22 16:37:24 2013
Succeeded at Wed May 22 16:37:25 2013 (Elapsed Time: 1.00 seconds)
Adding Feature Classes/SHP's to GeoDatabase:
Executing: FeatureClassToGeodatabase D:\workspace\CAD2GDB_Testing_5\MapUnitPolygons.SHP;D:\workspace\CAD2GDB_Testing_5\Contacts.shp;D:\workspace\CAD2GDB_Testing_5\OrientationPoints.SHP;D:\workspace\CAD2GDB_Testing_5\Faults.shp;D:\workspace
```

# Making the Sausage



# CAD → GDB: The Geodatabase





# Additions IGS has OR will make to NCGMP09

- Fields necessary for
  - Statewide database.
  - Fault information
- Polygon topology stored in contacts
- Sources to Polygon Relate table (not done)
- Code to extract “Glossary”, Metadata, Sources from enterprise database to map GDB. (not done)

# Conclusions

- “NCGMP09” is hard to say.
- Not that onerous
- We NEED (Our community) A GENERIC TRANSLATOR TOOL.
- Lithology (Earth Materials) is a problem.
- I’d rather be boating.

