Loudon Stanford

Manager Digital Mapping

Idaho Geological Survey

stanford@uidaho.edu

idahogeology.org

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

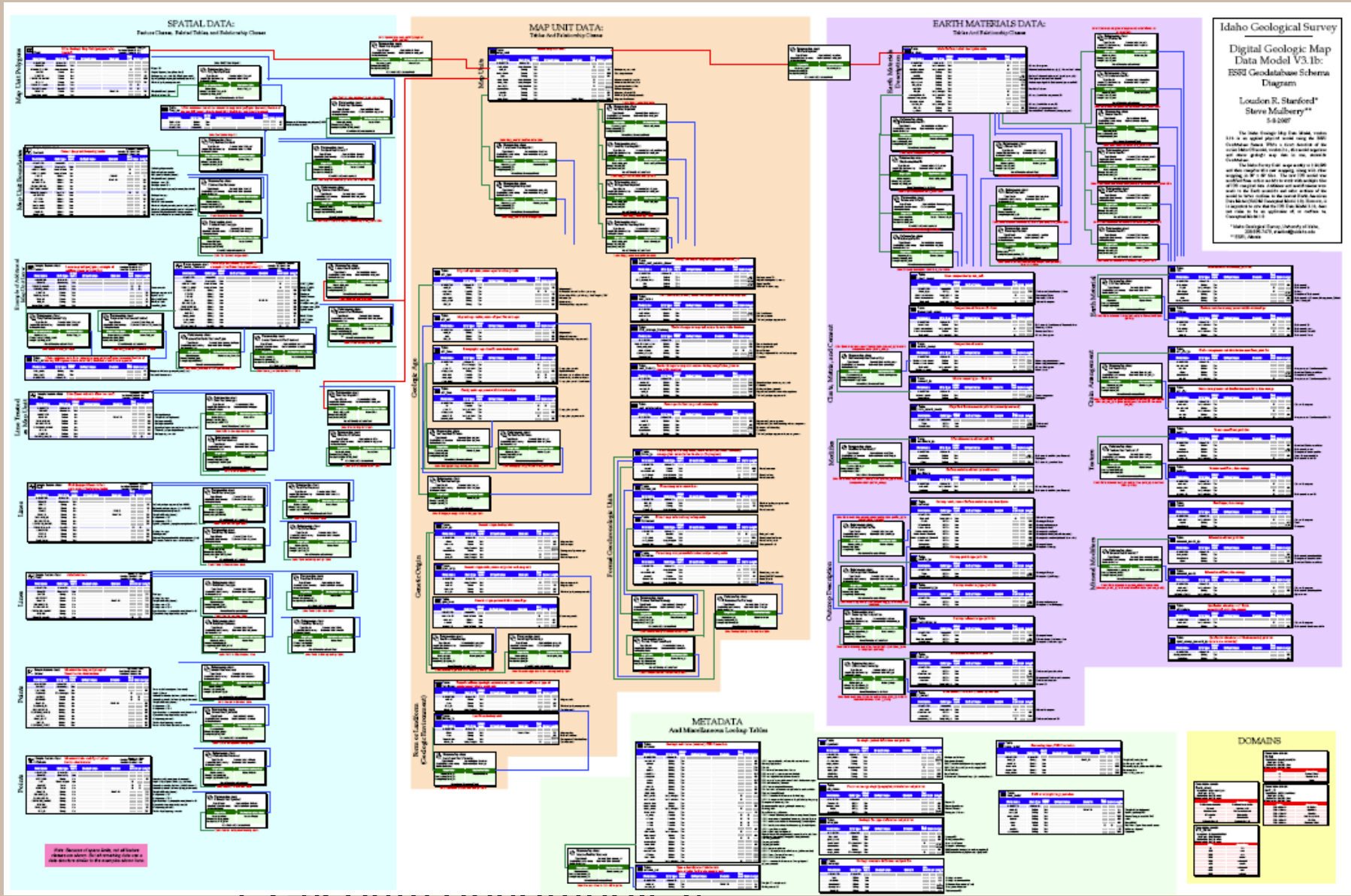
Don't Know About You,
But I Never Want to Work on
Another Data Model Schema,
Ever,

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

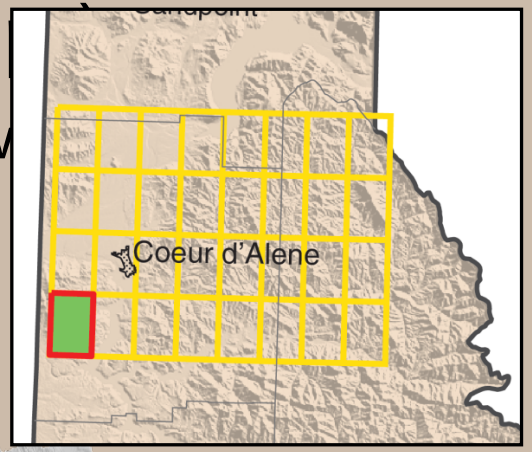


1:24 k data quadrangles)

Current Work Flow

DATA (TURE

- Digi using Wacom tablets in CAD using Cust ls (CadMap
  - A/QC/Review
  - k mapping



COMP

- Con x 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….

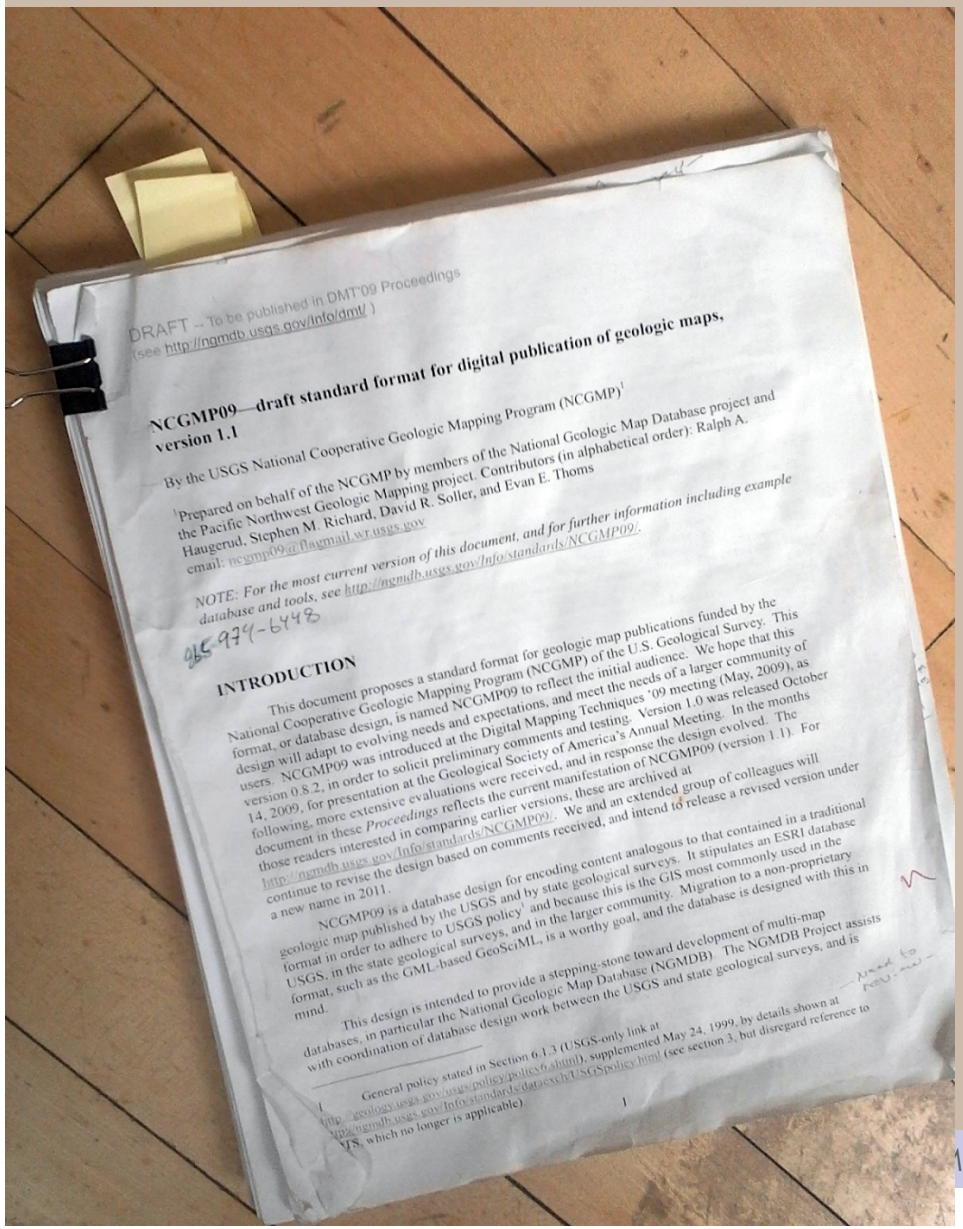
AND..

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:



DRAFT -- To be published in DMT'09 Proceedings
(see http://ngmdb.usgs.gov/Info/dmt/)

NCGMP09—draft standard format for digital publication of geologic maps, version 1.1

By the USGS National Cooperative Geologic Mapping Program (NCGMP)[1]

[1]Prepared on behalf of the NCGMP by members of the National Geologic Map Database project and the Pacific Northwest Geologic Mapping project. Contributors (in alphabetical order): Ralph A. Haugerud, Stephen M. Richard, David R. Soller, and Evan E. Thoms
email: ncgmp09@flagmail.wr.usgs.gov

NOTE: For the most current version of this document, and for further information including example database and tools, see http://ngmdb.usgs.gov/Info/standards/NCGMP09/.

415-979-6448

INTRODUCTION

This document proposes a standard format for geologic map publications funded by the National Cooperative Geologic Mapping Program (NCGMP) of the U.S. Geological Survey. This format, or database design, is named NCGMP09 to reflect the initial audience. We hope that this design will adapt to evolving needs and expectations, and meet the needs of a larger community of users. NCGMP09 was introduced at the Digital Mapping Techniques '09 meeting (May, 2009), as version 0.8.2, in order to solicit preliminary comments and testing. Version 1.0 was released October 14, 2009, for presentation at the Geological Society of America's Annual Meeting. In the months following, more extensive evaluations were received, and in response the design evolved. The document in these *Proceedings* reflects the current manifestation of NCGMP09 (version 1.1). For those readers interested in comparing earlier versions, these are archived at http://ngmdb.usgs.gov/Info/standards/NCGMP09/. We and an extended group of colleagues will continue to revise the design based on comments received, and intend to release a revised version under a new name in 2011.

NCGMP09 is a database design for encoding content analogous to that contained in a traditional geologic map published by the USGS and by state geological surveys. It stipulates an ESRI database format in order to adhere to USGS policy[1] and because this is the GIS most commonly used in the USGS, in the state geological surveys, and in the larger community. Migration to a non-proprietary format, such as the GML-based GeoSciML, is a worthy goal, and the database is designed with this in mind.

This design is intended to provide a stepping-stone toward development of multi-map databases, in particular the National Geologic Map Database (NGMDB). The NGMDB Project assists with coordination of database design work between the USGS and state geological surveys, and is

Need to revise

1 General policy stated in Section 6.1.3 (USGS-only link at http://geology.usgs.gov/usgs/policy/policy6.shtml), supplemented May 24, 1999, by details shown at http://ngmdb.usgs.gov/Info/standards/dataexch/USGSpolicy.html (see section 3, but disregard reference to NYS, which no longer is applicable).

1

Three power tools to promote conversion:

– NCGMP09 Bible

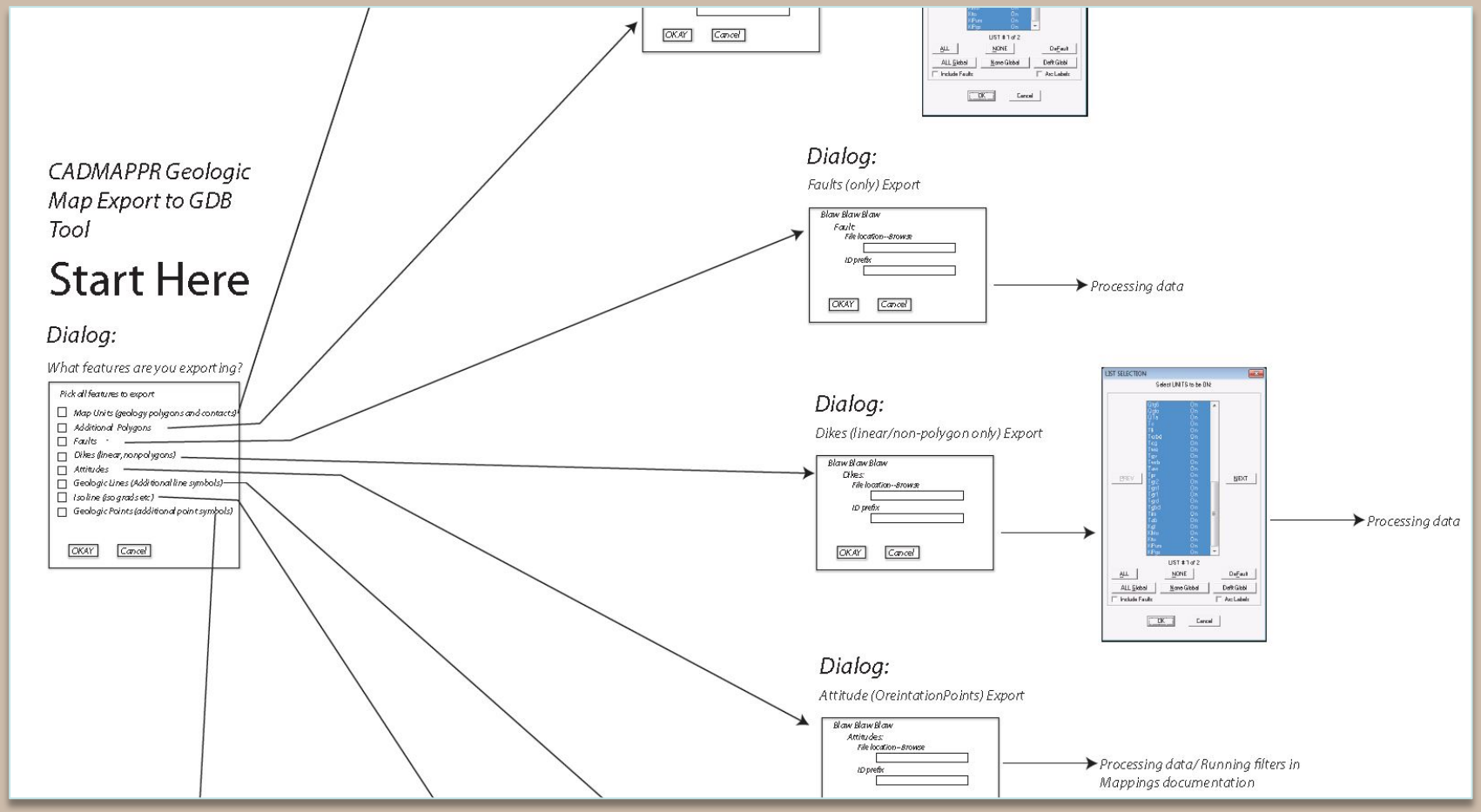
CAD→ GDB Design:

Poly | Contacts

	CAD_item	Action	FC_field_name	Field_type	notes	Cl
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:

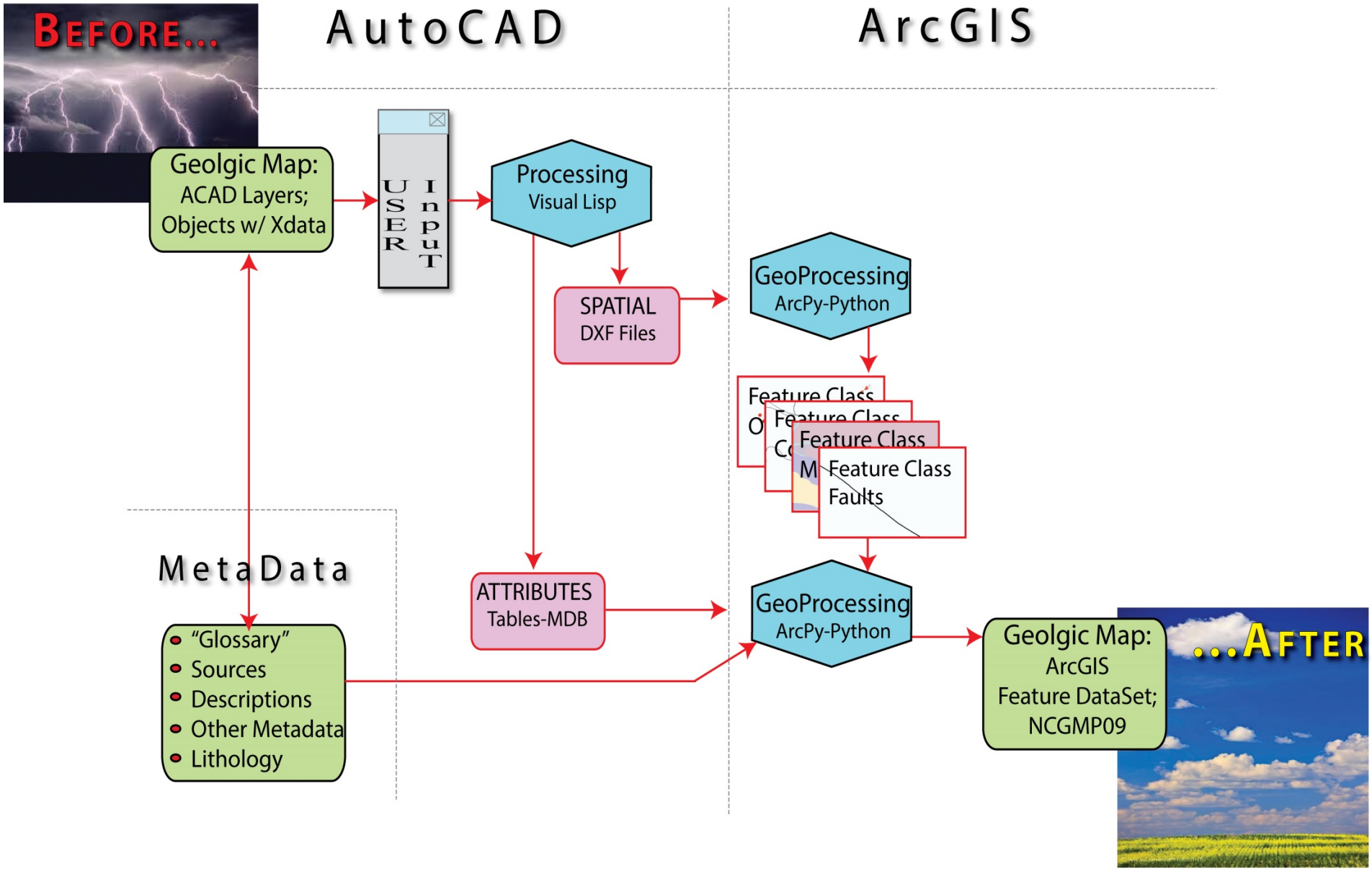


– Application flow chart

[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



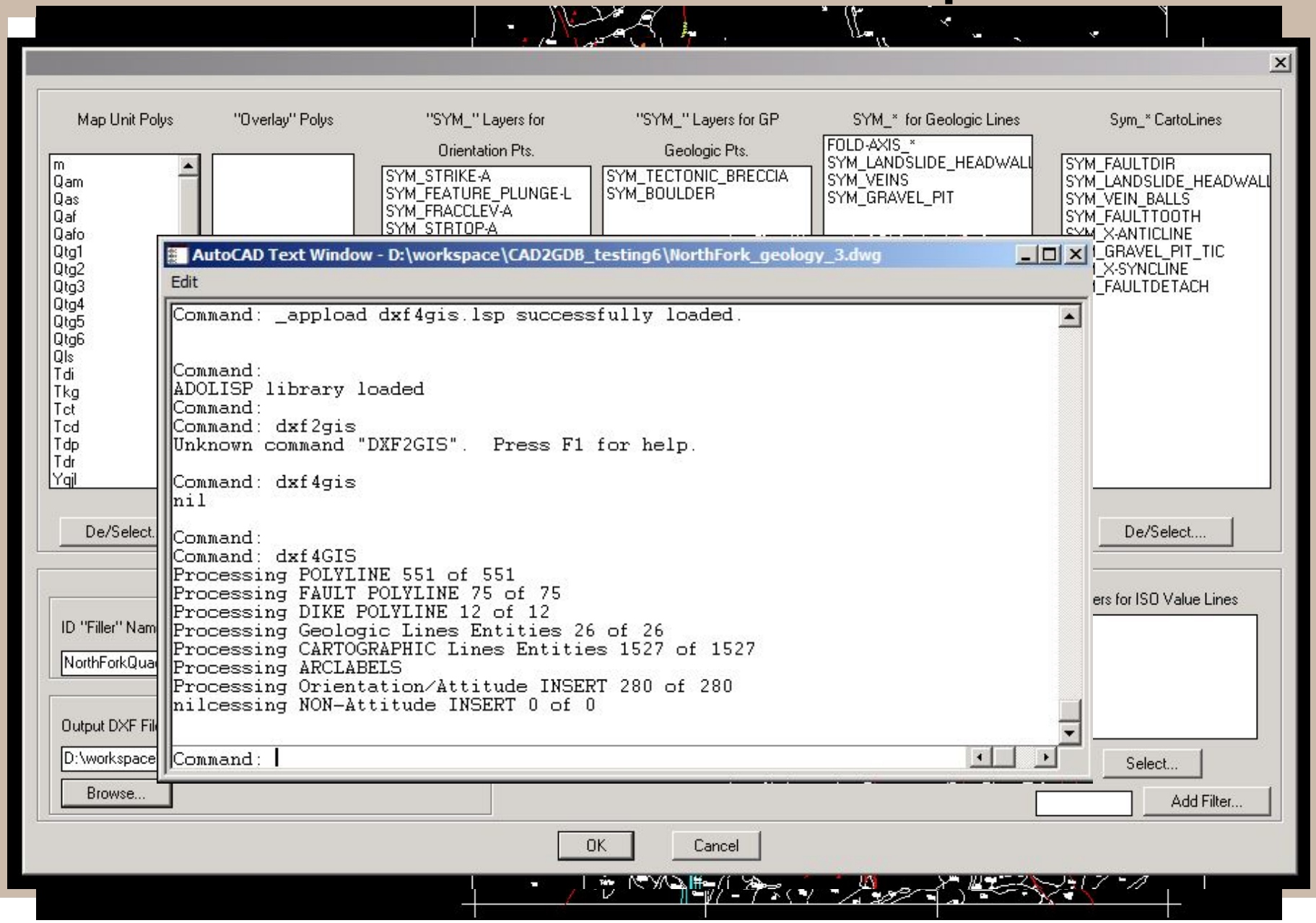
CAD→ GDB: CAD Processing

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

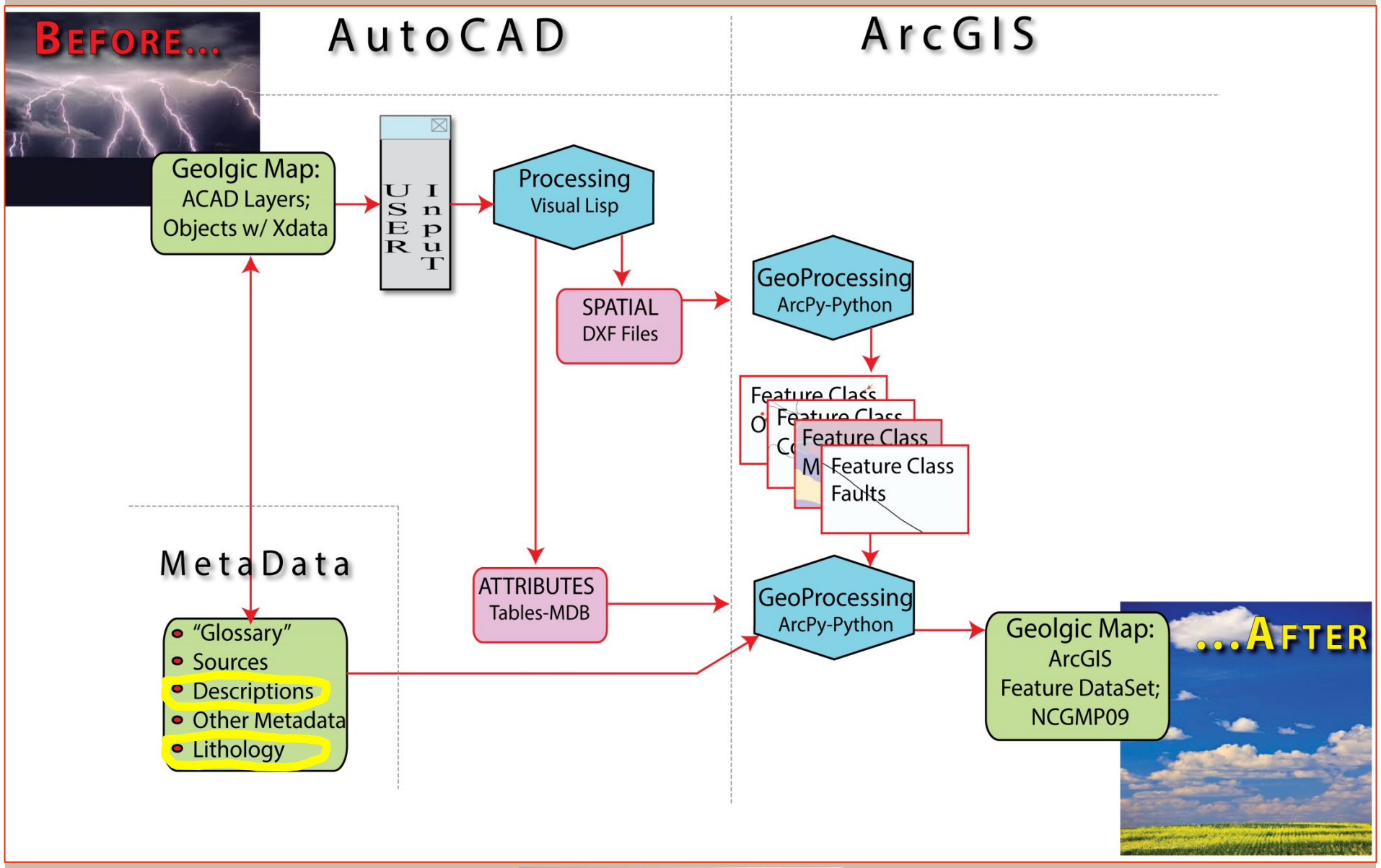
CAD→ GDB: CAD Processing (cont.)

- 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

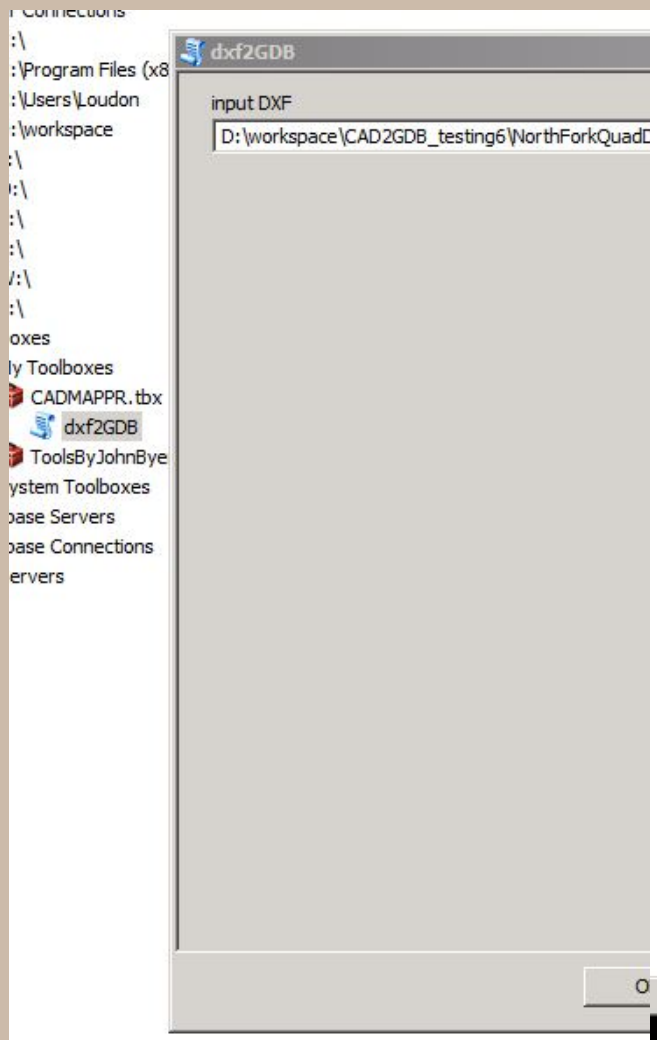


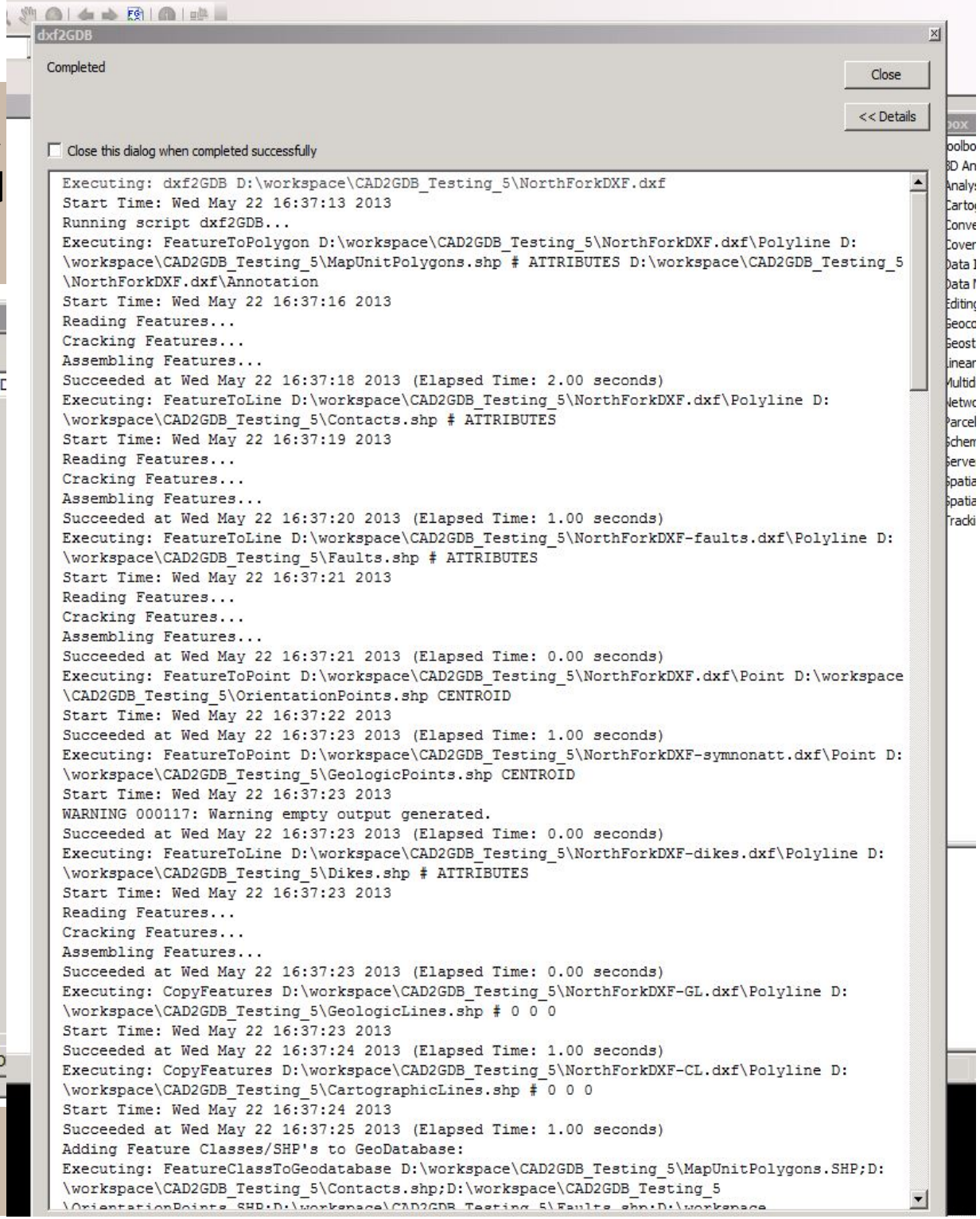
CAD→ GDB: ArcPy Processing

ArcPy-based processing to build Geodatabase:

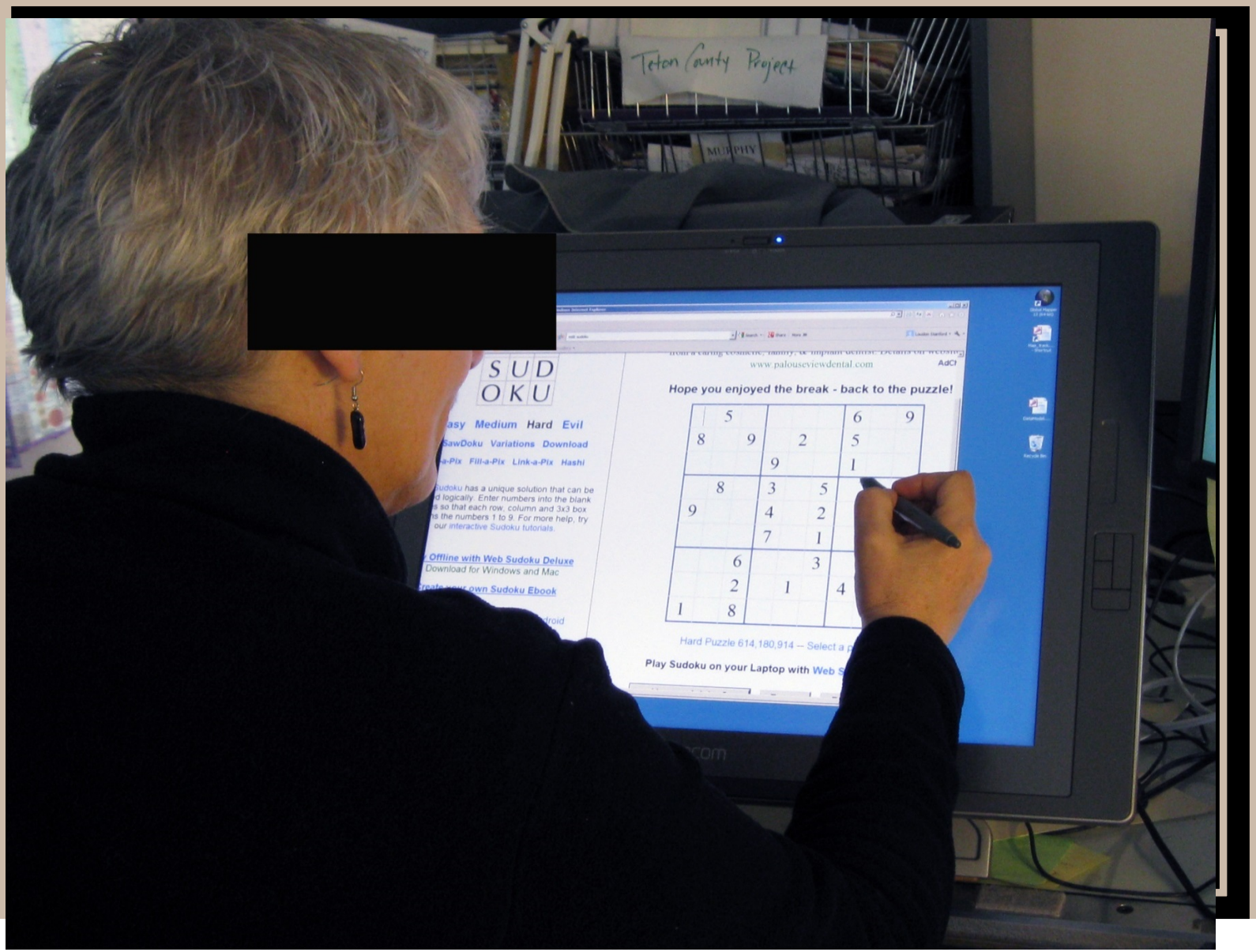
- The DXF files are processed with ArcPy geoprocessing commands to build the Feature Classes required.
- AutoCad-assigned "handles" maintained as primary IDs
- Polygonal feature layers from the line geometry and centroids.
- Geodatabse feature classes now processed to create polygon topology
- The attributes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

CAD→ G

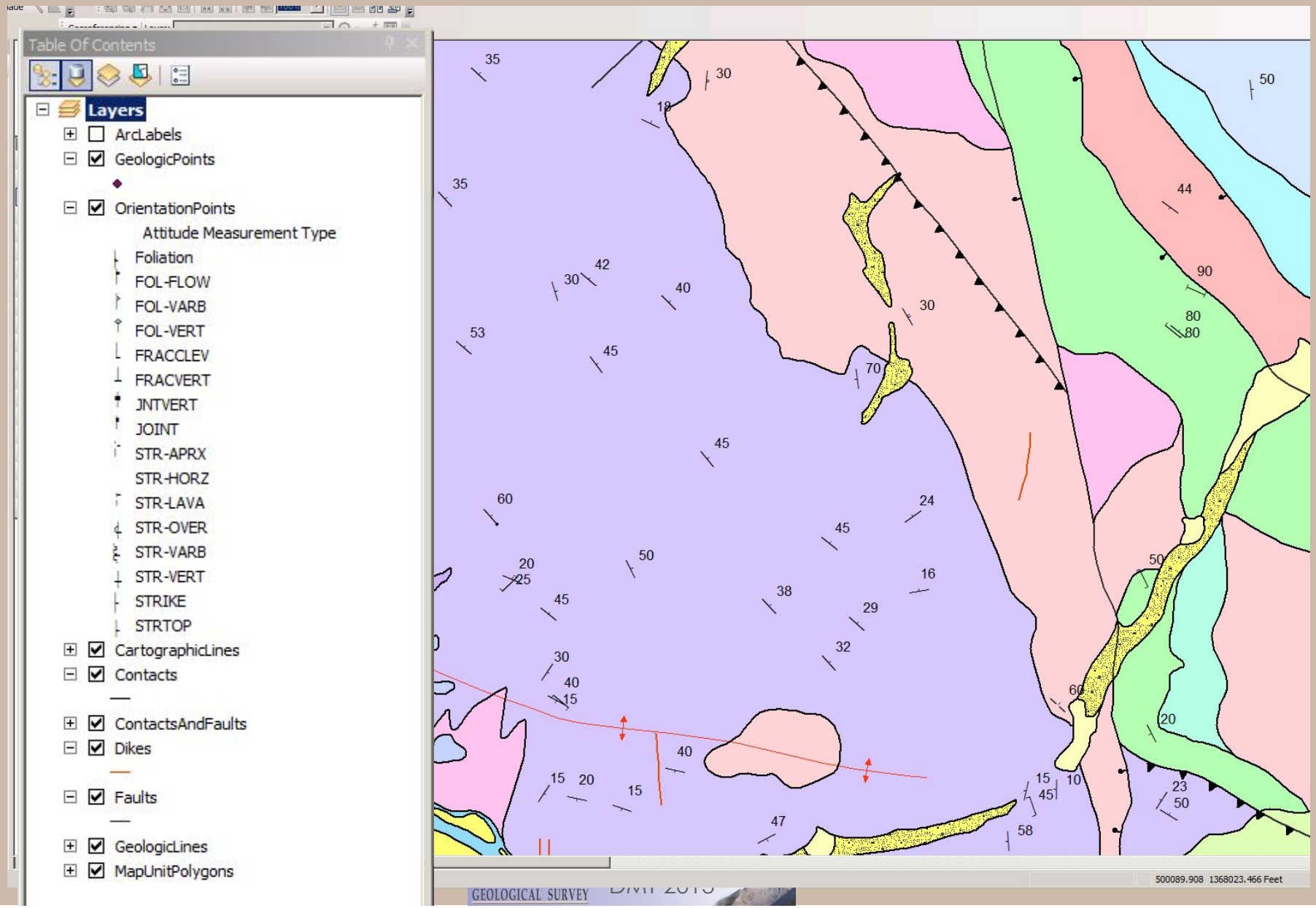

dxf2GDB
input DXF
D:\workspace\CAD2GDB_testing6\NorthForkQuadD
:\Program Files (x8
:\Users\Loudon
:\workspace
oxes
ly Toolboxes
CADMAPPR.tbx
dxf2GDB
ToolsByJohnBye
ystem Toolboxes
base Servers
base Connections
ervers


dxf2GDB
Completed
Close
<< Details
Close this dialog when completed successfully
Executing: dxf2GDB D:\workspace\CAD2GDB_Testing_5\NorthForkDXF.dxf
Start Time: Wed May 22 16:37:13 2013
Running script dxf2GDB...
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-symnonatt.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

Making the Sausage



CAD→ GDB: The Geodatabase



CAD→ GDB: Contacts

Table

Contacts

Contacts_TYPE	IsConcealed	LocationConfi	ExistCor	DataSourceID2	FaultType	FaultMovement	FaultM
contact	0	-9	certain				
contact	0	-9	certain				
fault contact	0	-9	certain		normal	normal_L	
fault contact	0	-9	certain		thrust	thrust_R	
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
contact	0	-9	certain				
fault contact	0	-9	certain		normal	normal_R	
contact	0	-9	certain				

1 (0 out of 551 Selected)

Contacts

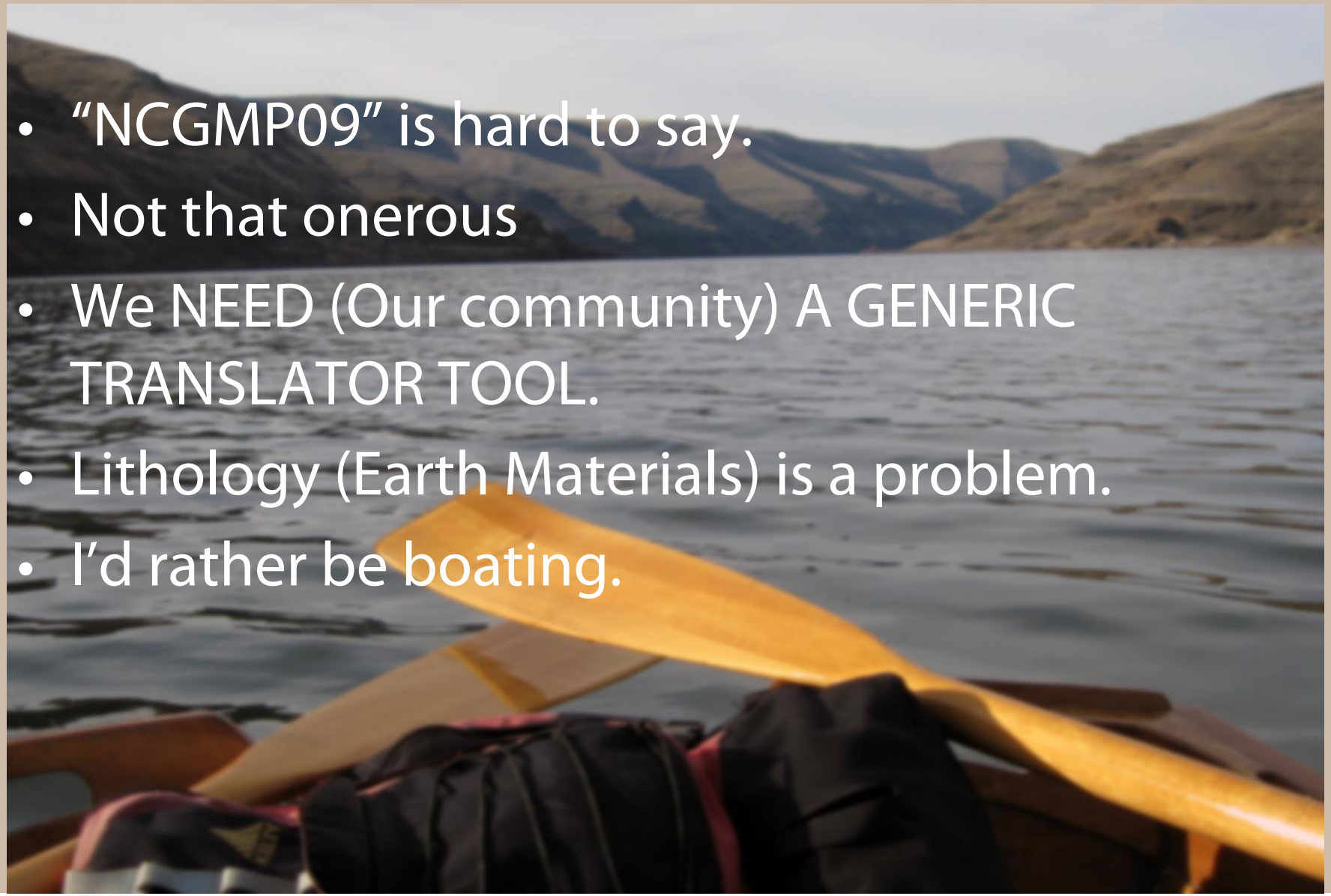
Contacts

Field Name	Data Type	Description
OBJECTID	AutoNumber	
Shape	OLE Object	
FID_Contacts	Number	
FID_Polyli	Number	
LEFT_MapUnitPolygons	Number	
RIGHT_MapUnitPolygons	Number	
Shape_Length	Number	
Contacts_ID	Text	
HANDLE_1	Text	
cad_HANDLE	Text	
Contacts_TYPE	Text	
IsConcealed	Number	
LocationConfidenceMeters	Number	
ExistConfidence	Text	
IDConfidence	Text	
AuthorLocConfidence	Text	
Symbol	Text	
Label	Text	
DataSourceID	Text	
Notes	Text	
DataTileID	Text	
DataSourceID2	Text	
FaultType	Text	
FaultMovement	Text	
FaultMoveCapture	Number	
FaultCode	Text	
L_Unit	Text	
R_Unit	Text	

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.