DIGITAL MAPPING TECHNIQUES 2022

The following was presented at DMT'22
May 22 - 25, 2022

The contents of this document are provisional

See Presentations and Proceedings
from the DMT Meetings (1997-2022)

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

Workflows for construction of the Intermountain West Project seamless, intermediate-scale geologic map database using the SIGMa extension to GeMS

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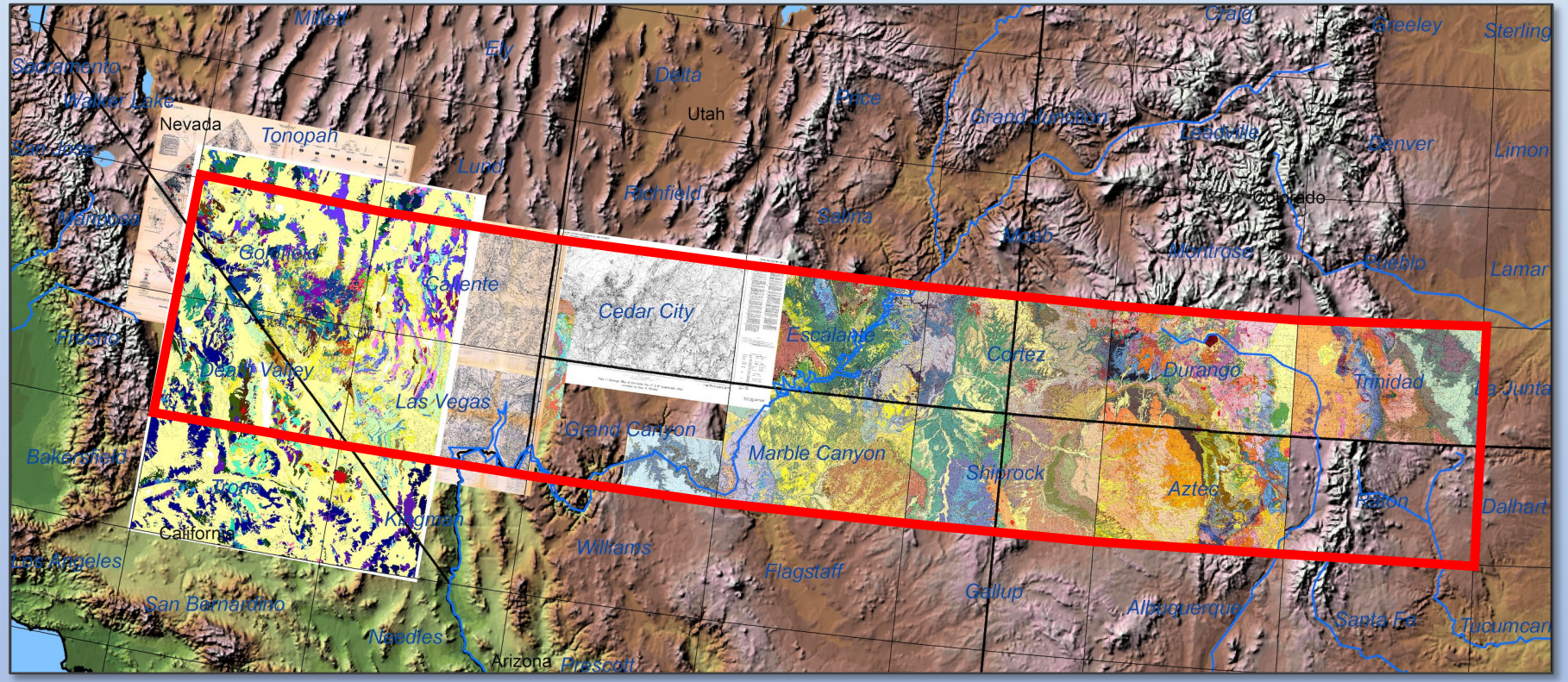
2 Currently with University Corporation for Atmospheric Research, Boulder Colorado

Intermountain West transect (phase 1)

- 14^{o} East-West
- 4^{o} North-South

(about the area of Colorado)

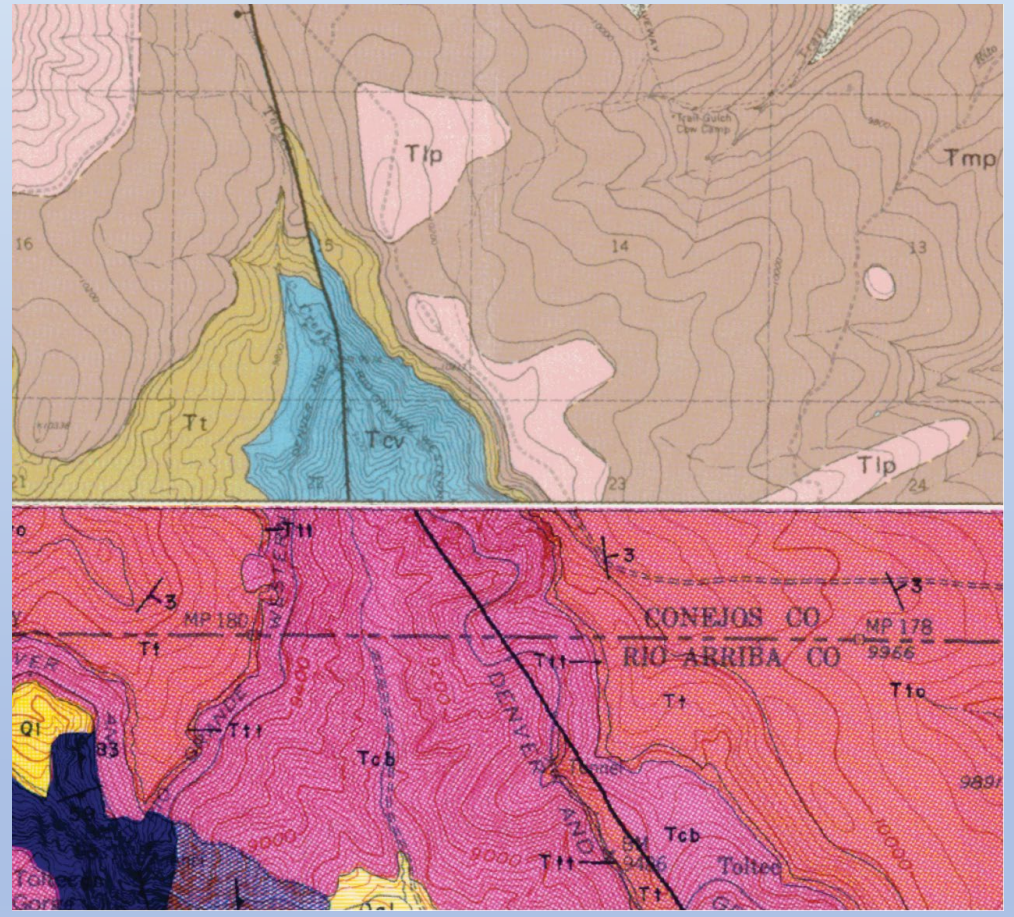


COMPILATION METHOD

- Nominal scale range—1 : 100k-500k

- Reinterpretation
  - Edge match vectors
  - Stratigraphic reinterpretation
  - Gaps in available mapping
  - Scale-appropriate detail

- SIGMa extension to GeMS
  - (**S**eamless **I**ntegrated **G**eologic **Ma**pping)
  - GeMS [https://ngmdb.usgs.gov/Info/standards/GeMS]



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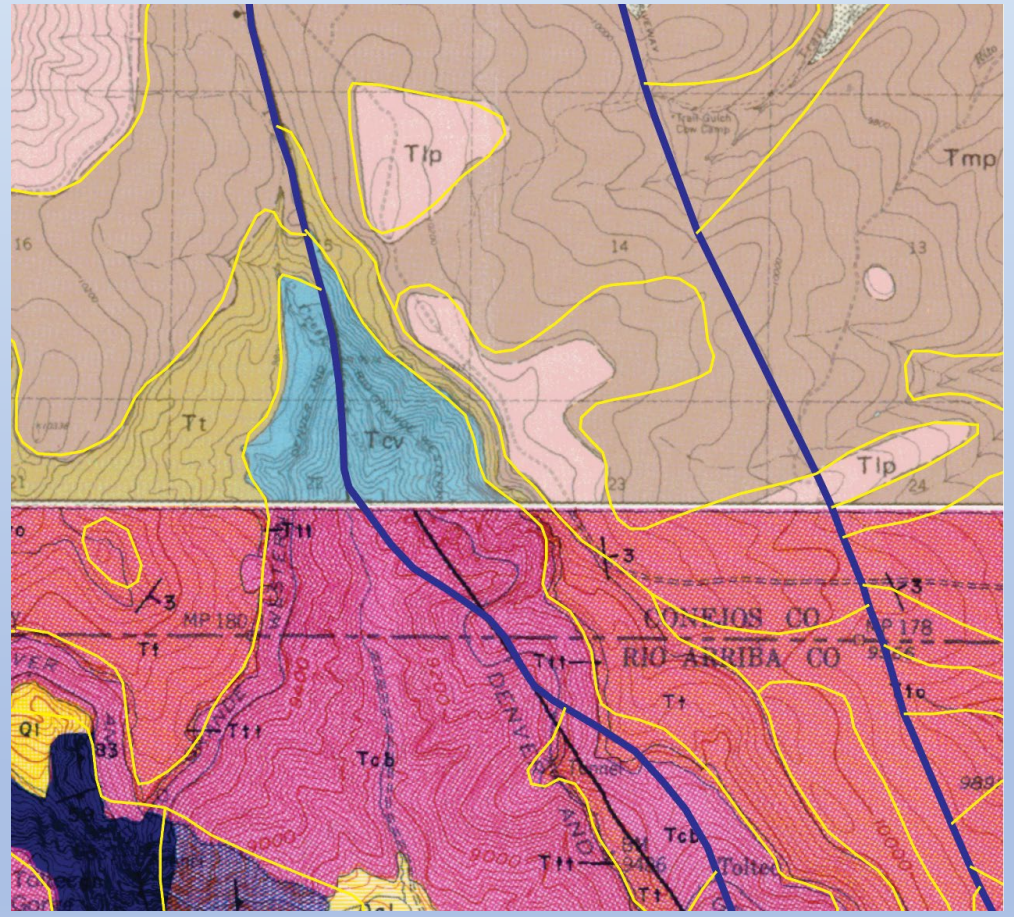


WORKFLOW

Geologic maps

New mapping

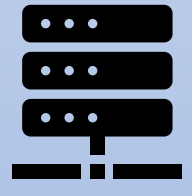
Geochronology

Structural models

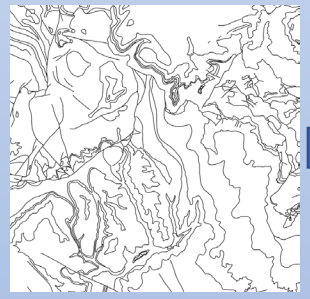
Stratigraphy

Peer-reviewed literature

10+ people



Enterprise database



Internal Review

External Review

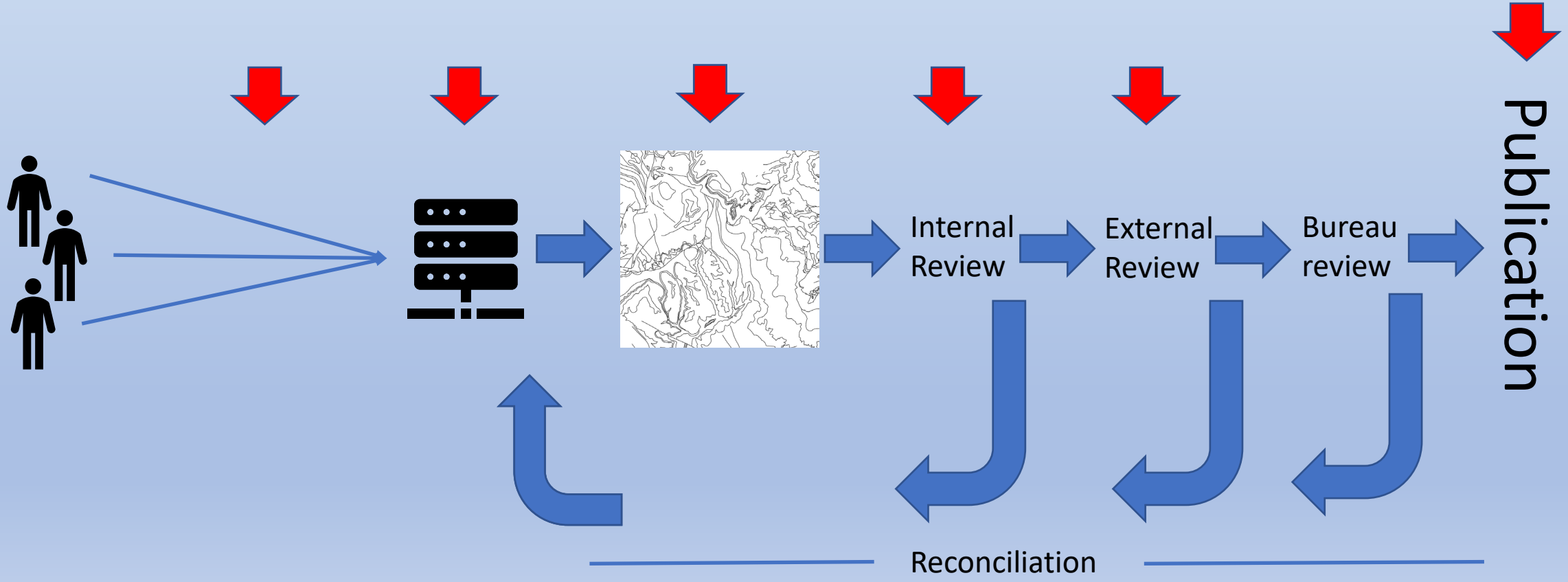
Bureau review

Publication

Reconciliation

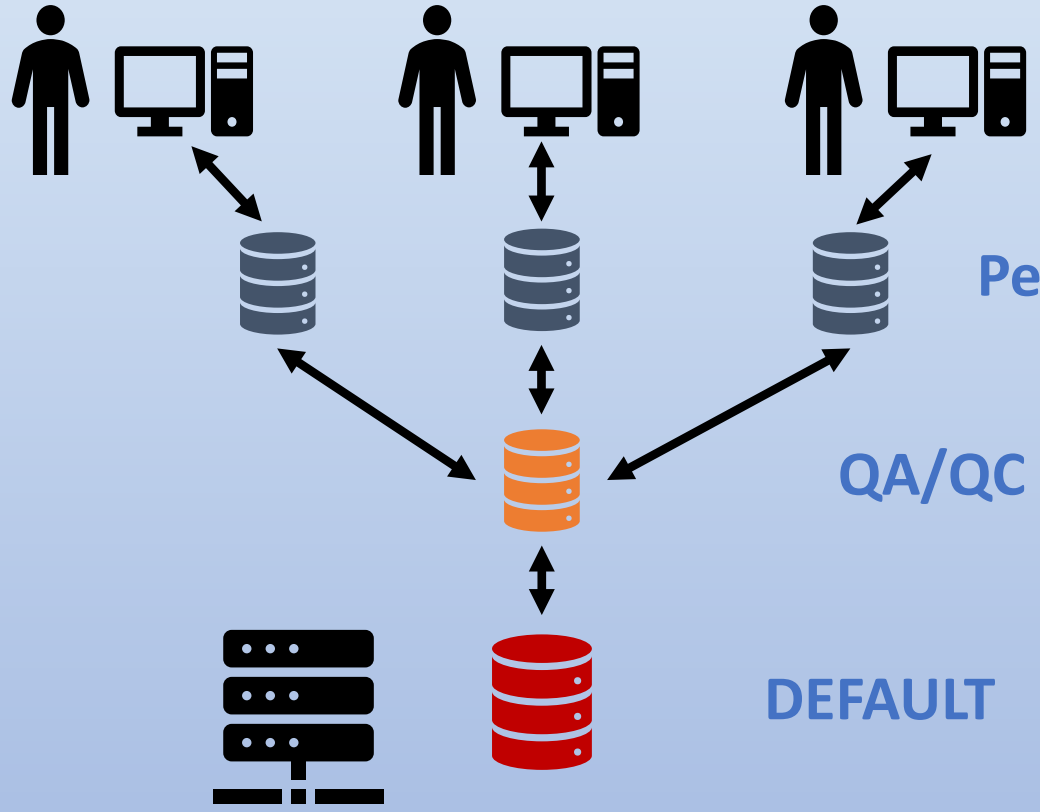
WORKFLOW

New workflows (to us) along the way



DATABASE & CONNECTIONS *(pre-Covid)*

On-site workstations



Personal versions

QA/QC version

On-site server

DEFAULT

Enterprise Database / *PostgreSQL RDMS*

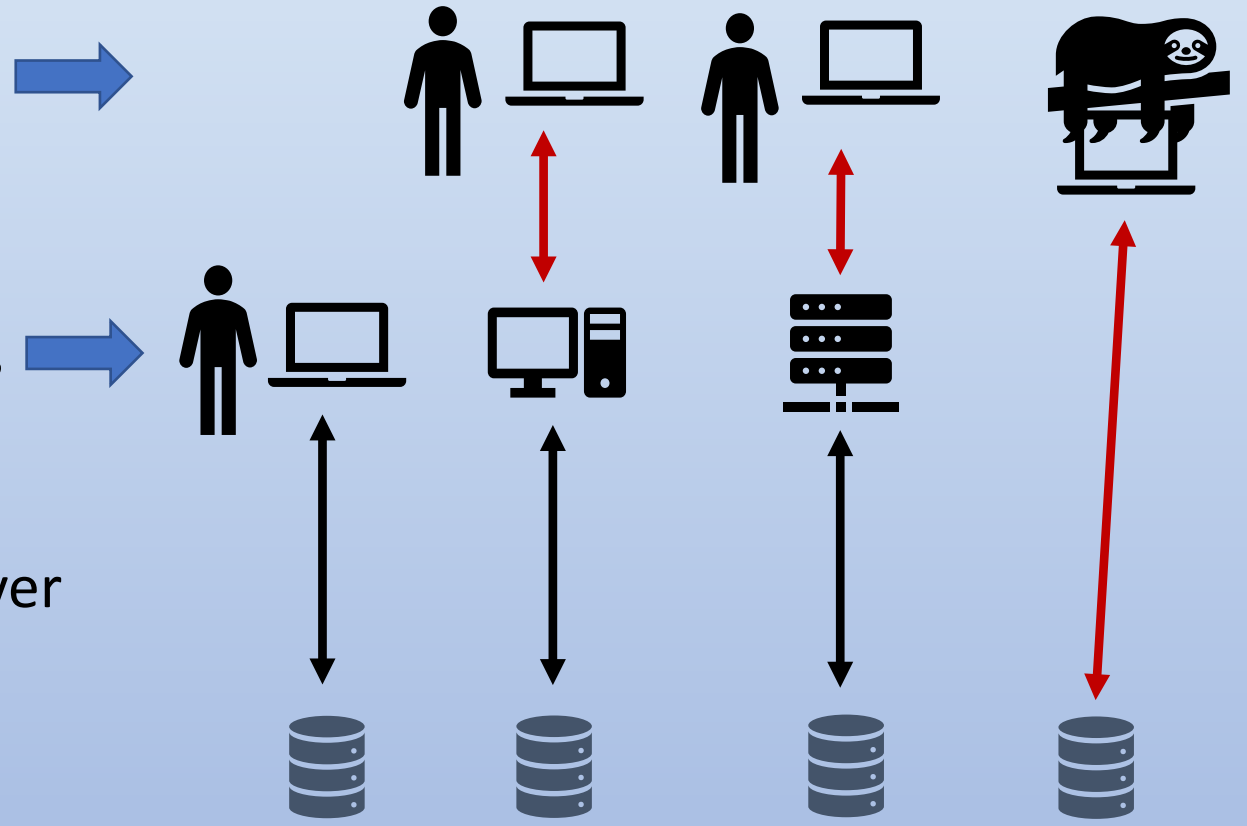
- Traditional versioned database
- Direct connection
- Weekly compression

DATABASE & CONNECTIONS *(post[syn?]-Covid)*

Remote

On site:

- Workstations
  - Shared
  - Personal
- Direct to server



Personal versions

VPN/Remote desktop connection

Negative impacts:

1. Latency
2. Additional hardware
3. Software[?]

Not the best approach: But it works

DATABASE & CONNECTIONS *(post[syn?]-Covid)*

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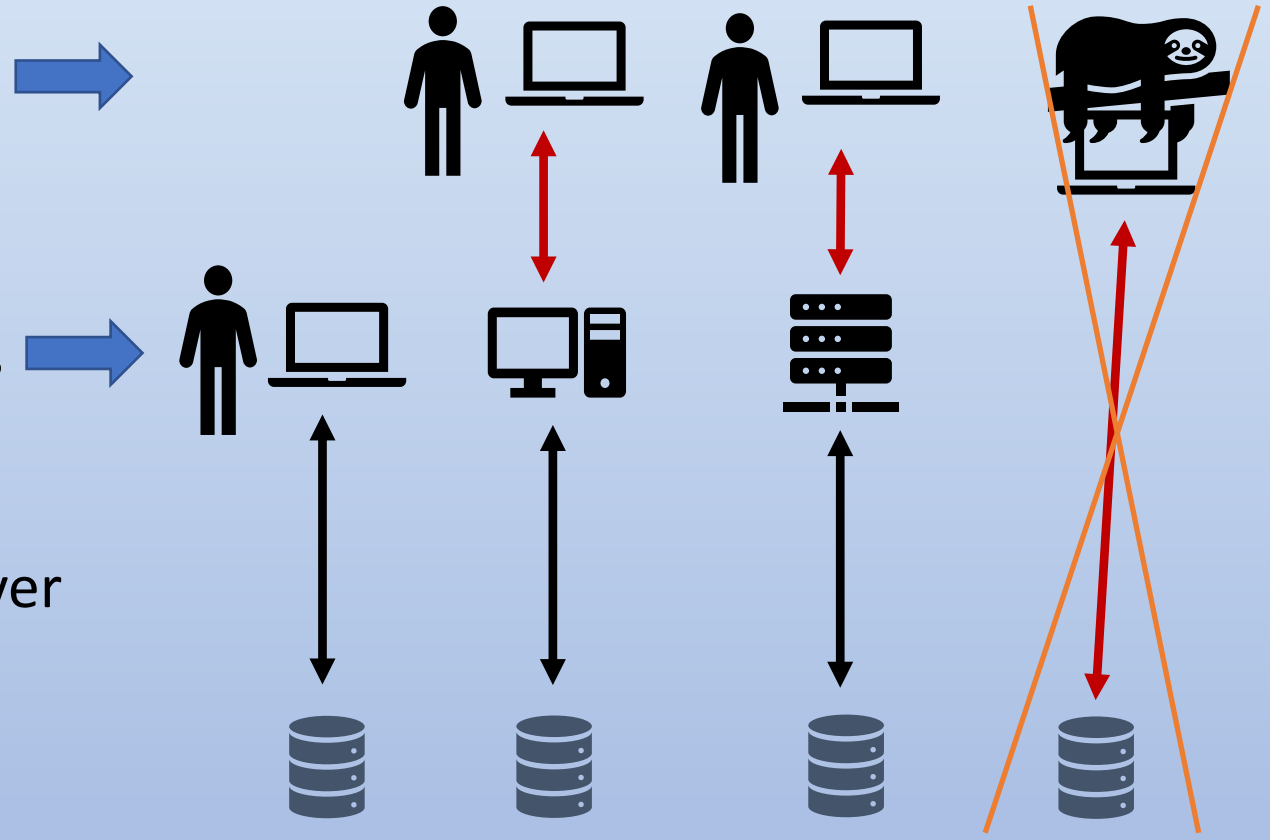

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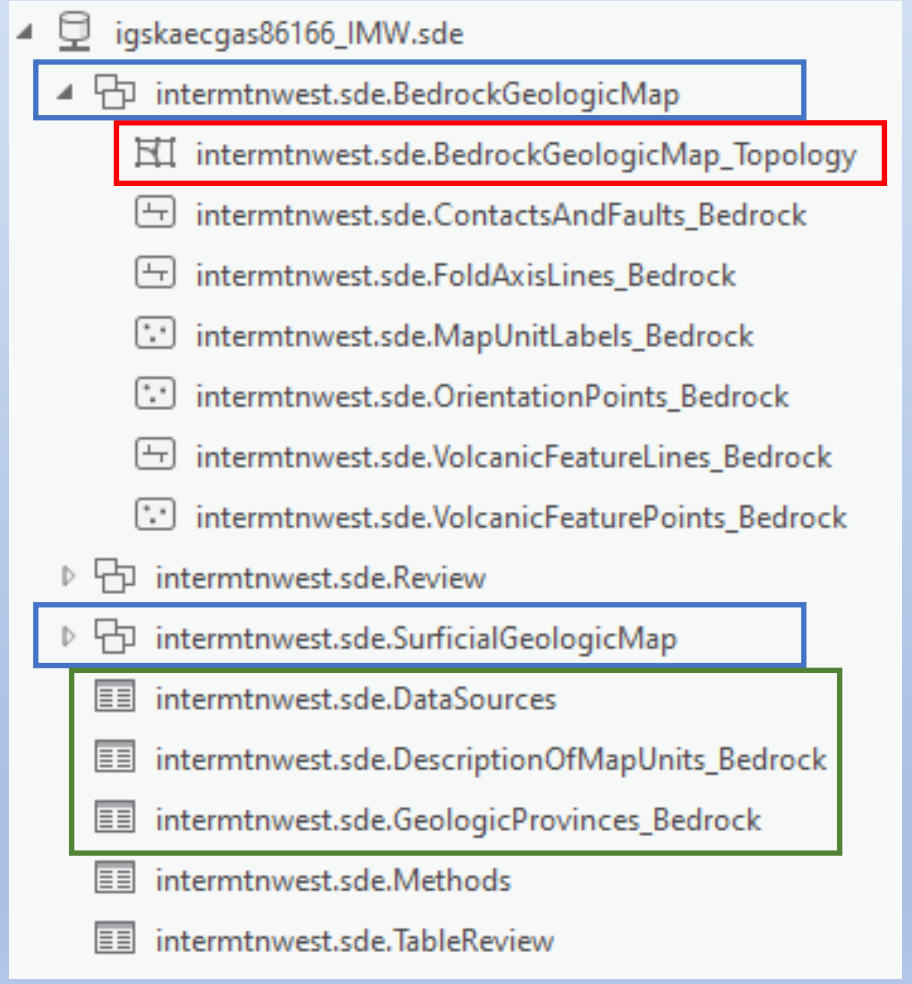
WORKING DATABASE—SIGMa-GeMS

- **Surficial and Bedrock datasets**
  - NO topological connection
  - Shared DataSources table
- **Enterprise database topology class**
  - Everyone has access
  - Lines only
- **Table attribution**
  - DataSources: Includes all sources
  - Surficial DMU and GeologicProvinces tables included with published database
  - DMU and GeologicProvinces specific to bedrock
  - Hidden relationship classes



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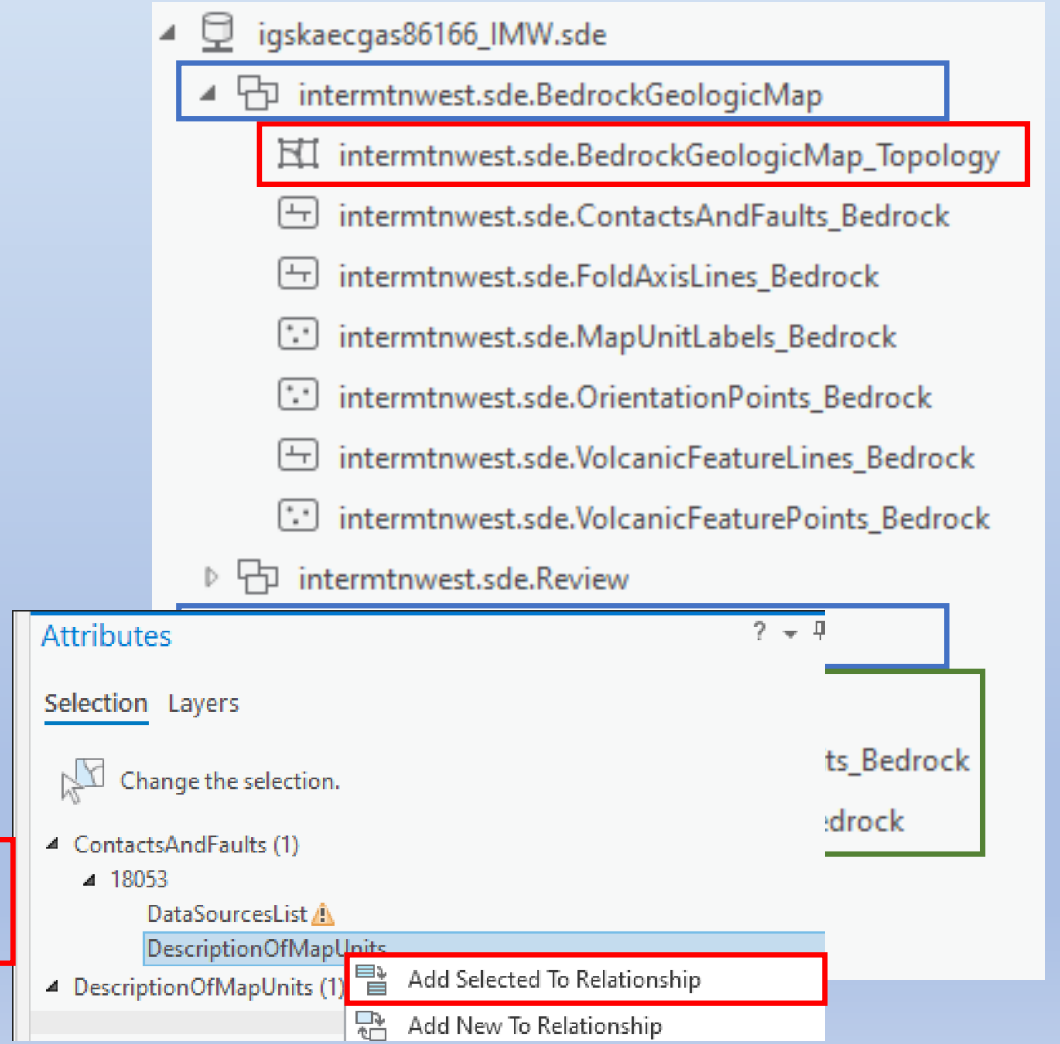
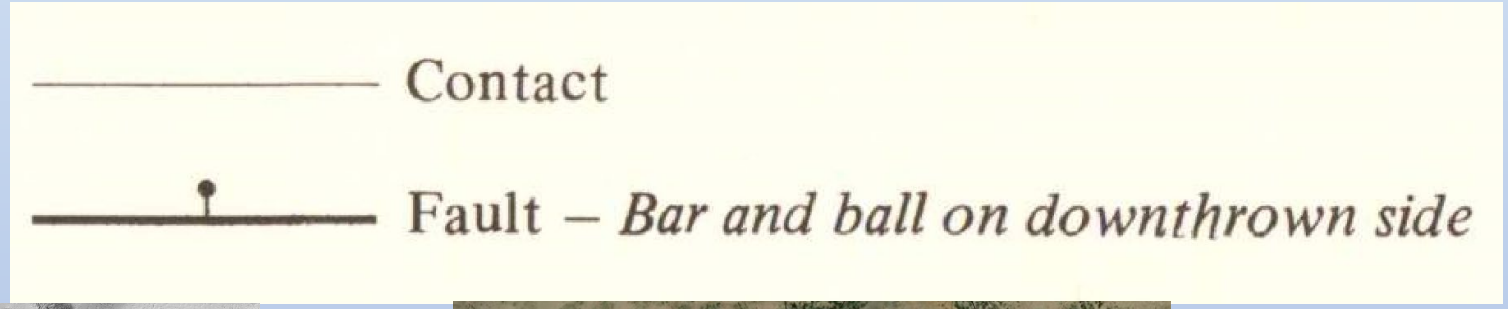
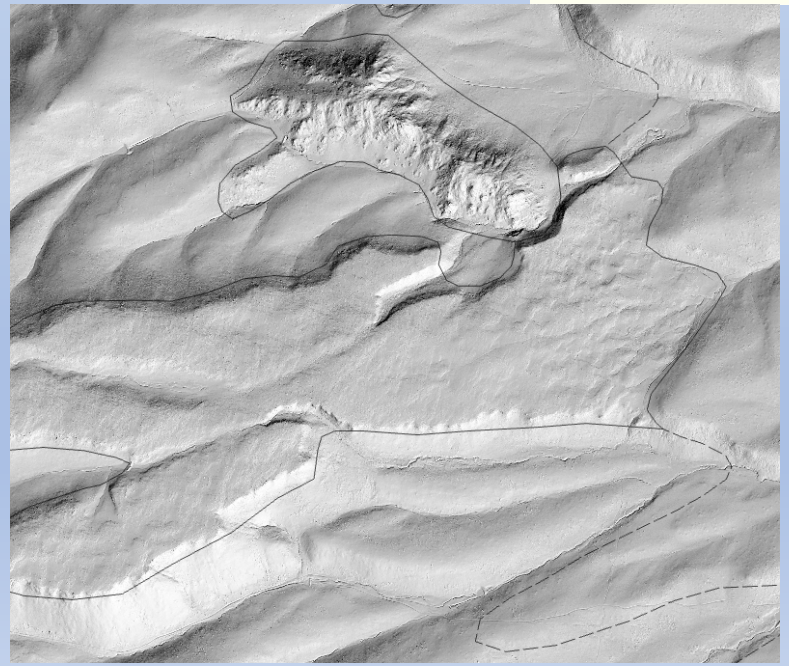


GEMS ATTRIBUTES—LEGACY DATA

- How to assess locational and scientific uncertainty on legacy maps?
  - Imagery and lidar





ATTRIBUTE MATRIX

FGDC term	IsConcealed	LocationConfidenceMeters	ExistenceConfidence	IdentityConfidence
accurate	n	100	certain	certain
approximate	n	200	certain	certain
approximate	n	-9999	questionable	questionable
inferred	n	300	certain	certain
inferred	n	-9999	questionable	questionable
concealed	y	-9999	certain or questionable	certain or questionable

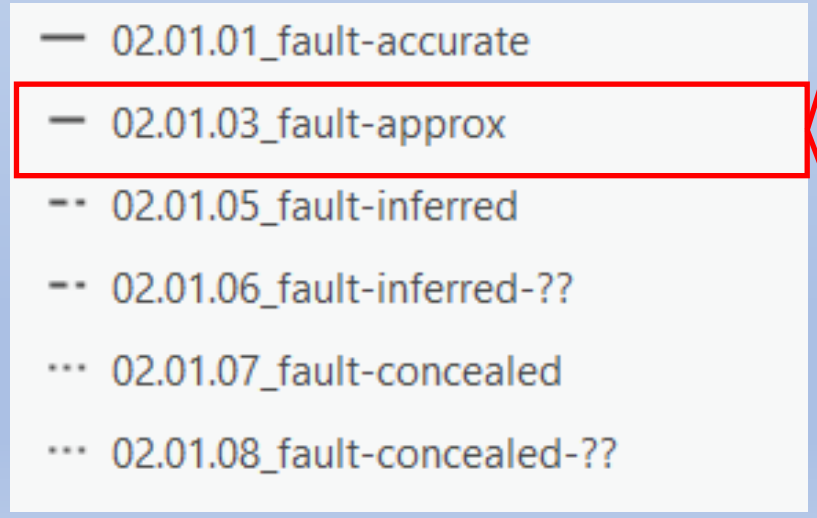
contact line weight = 0.15 mm @ 1:250k = 37.5 m

\+ line width buffer = ~112m

- Round down to 100 m for simplicity
- double and triple for approximate and inferred, respectively

FEATURE ATTRIBUTION

- Attributed templates
  - *.lyr file
- ContactsAndFaults



Type	fault
IsConcealed	no
LocationConfidenceMeters	200
ExistenceConfidence	certain
IdentityConfidence	certain
Symbol	02.01.03
Label	<Null>
UnitCode	<Null>
Name	<Null>
LocalStratName	<Null>
OrigMapUnit	<Null>
MethodID	<Null>
DataSourceID	<Null>
Notes	<Null>
MapUnit	<Null>

Attributed fields

Feature specific values:

- keyed in
- select and calculate
- domains

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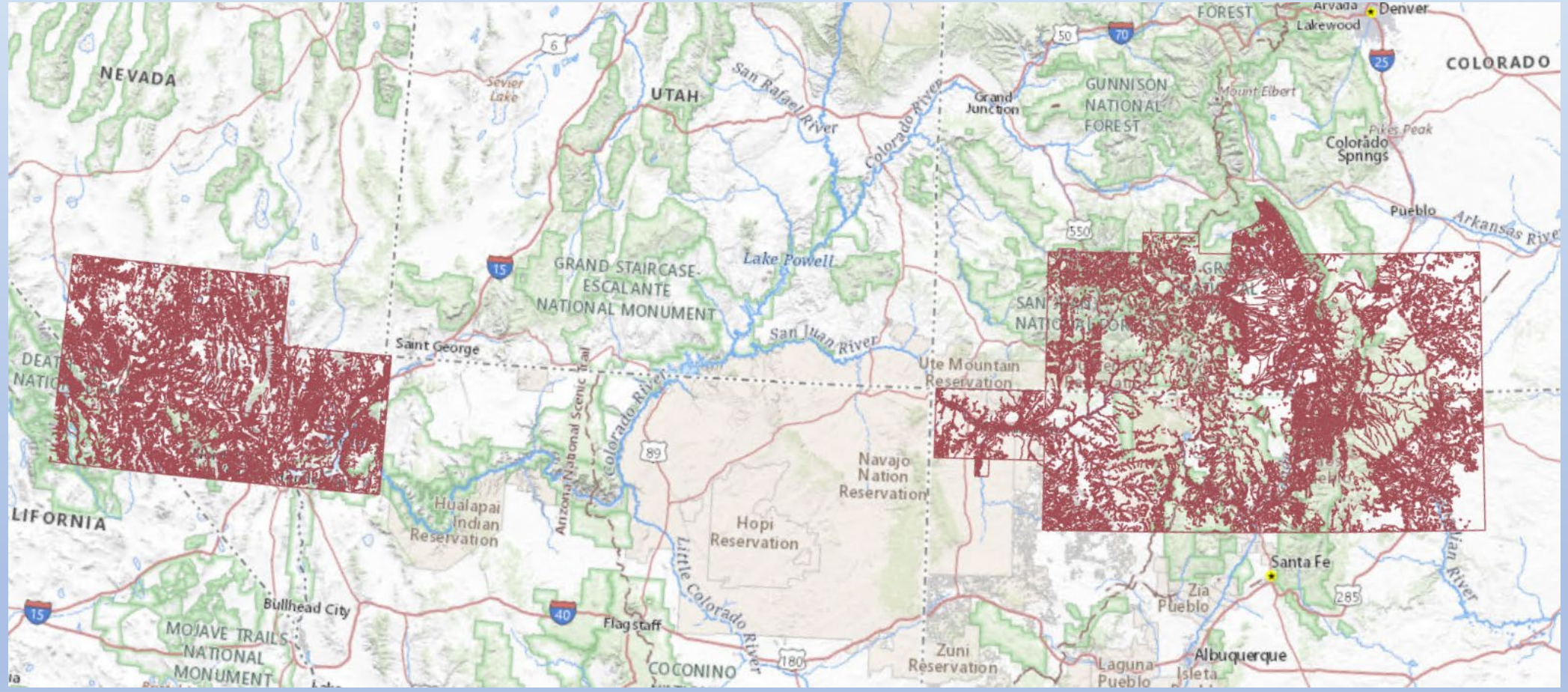
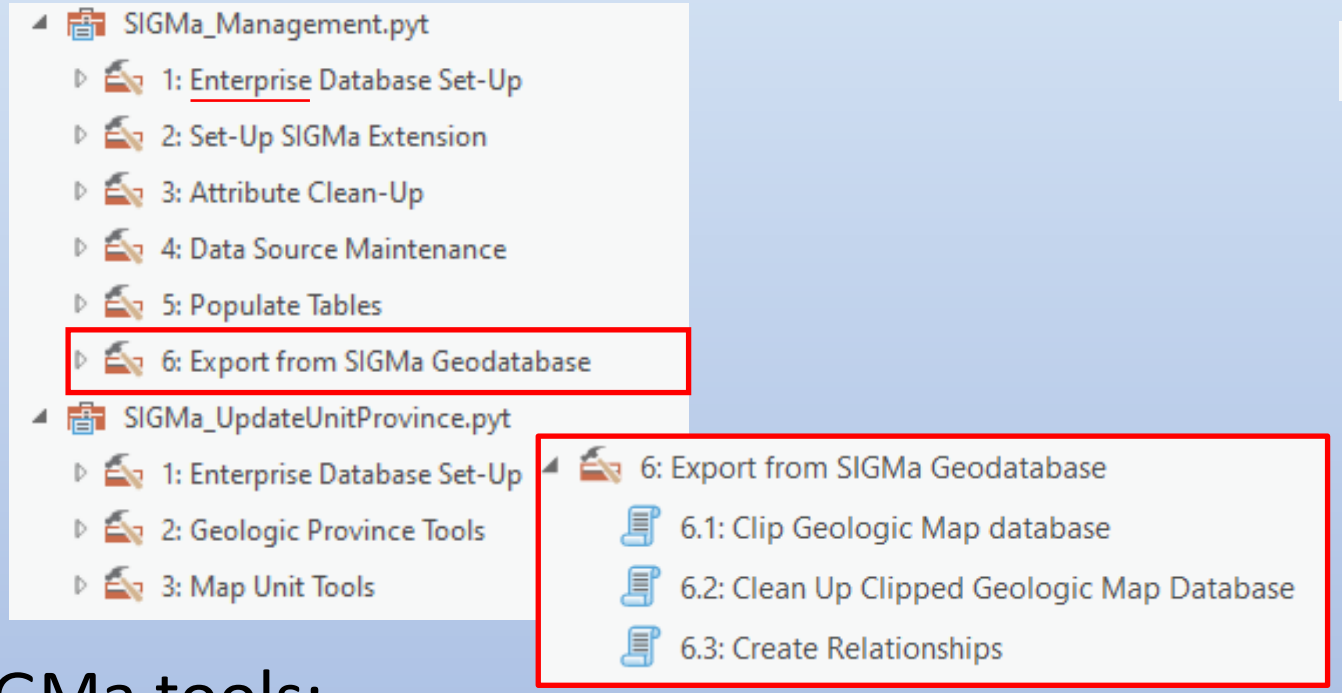
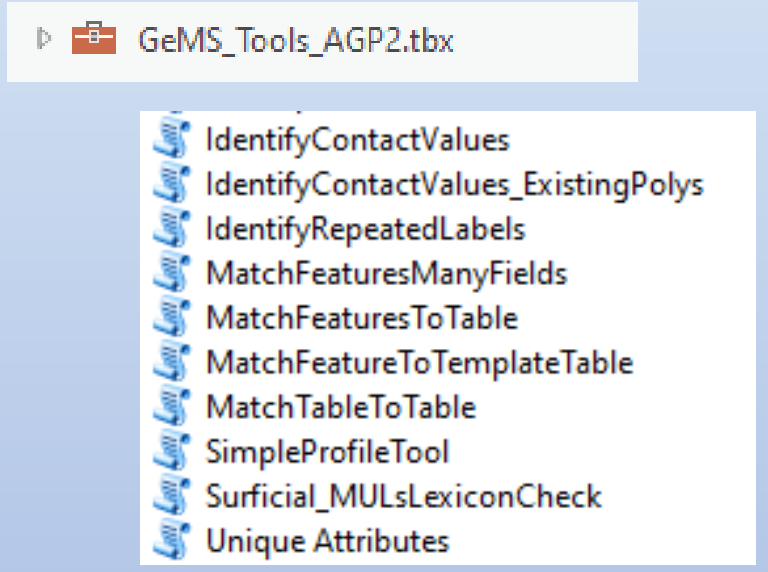
WORKING SEAMLESS DATABASE



ArcToolboxes—Python [ArcMap/ArcPro]

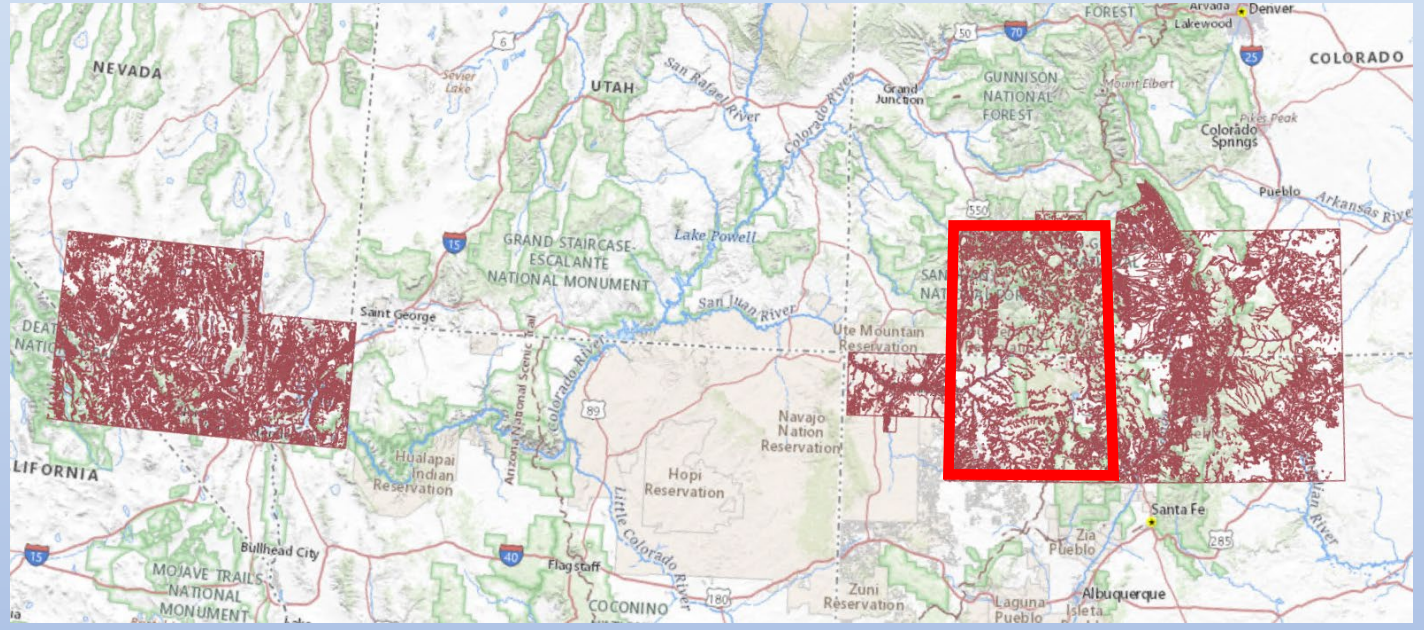




- SIGMa tools:
  - Add map units [1 or many]
  - Add provinces [1 or many]
  - **Export toolbox**
- QAQC
  - GeMS toolbox
  - Custom scripts

EXPORT TOOLBOX

- Export for review/publication
  - Clip features
  - Identify related records
  - Remove unnecessary
    - Data sources
    - Map units
    - Geologic provinces
  - Establish all relationship classes



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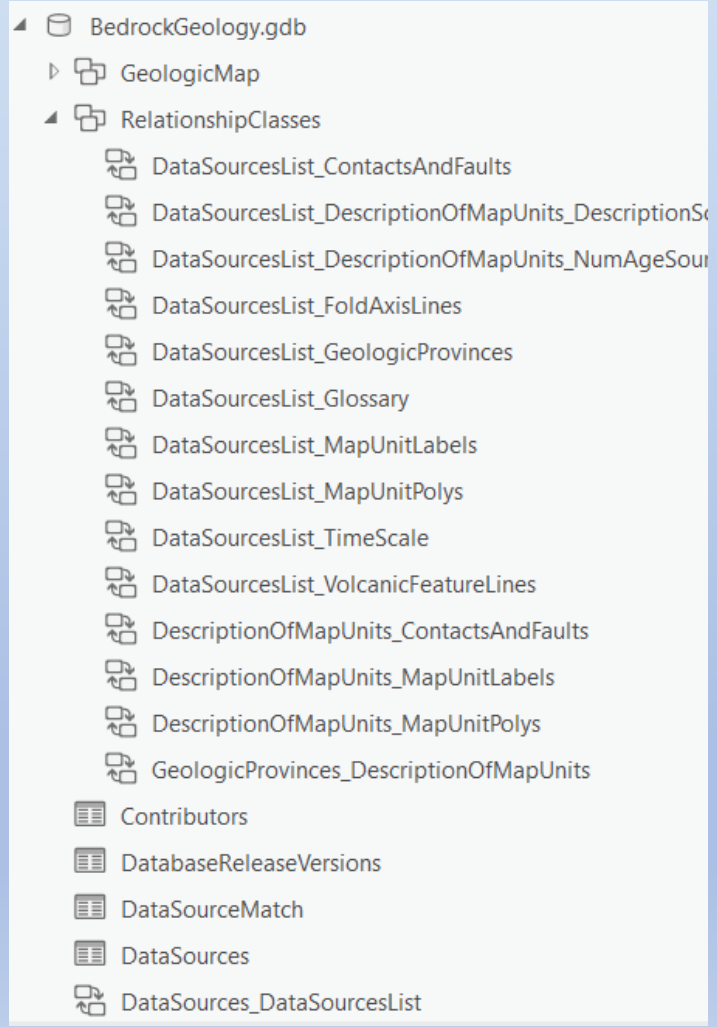
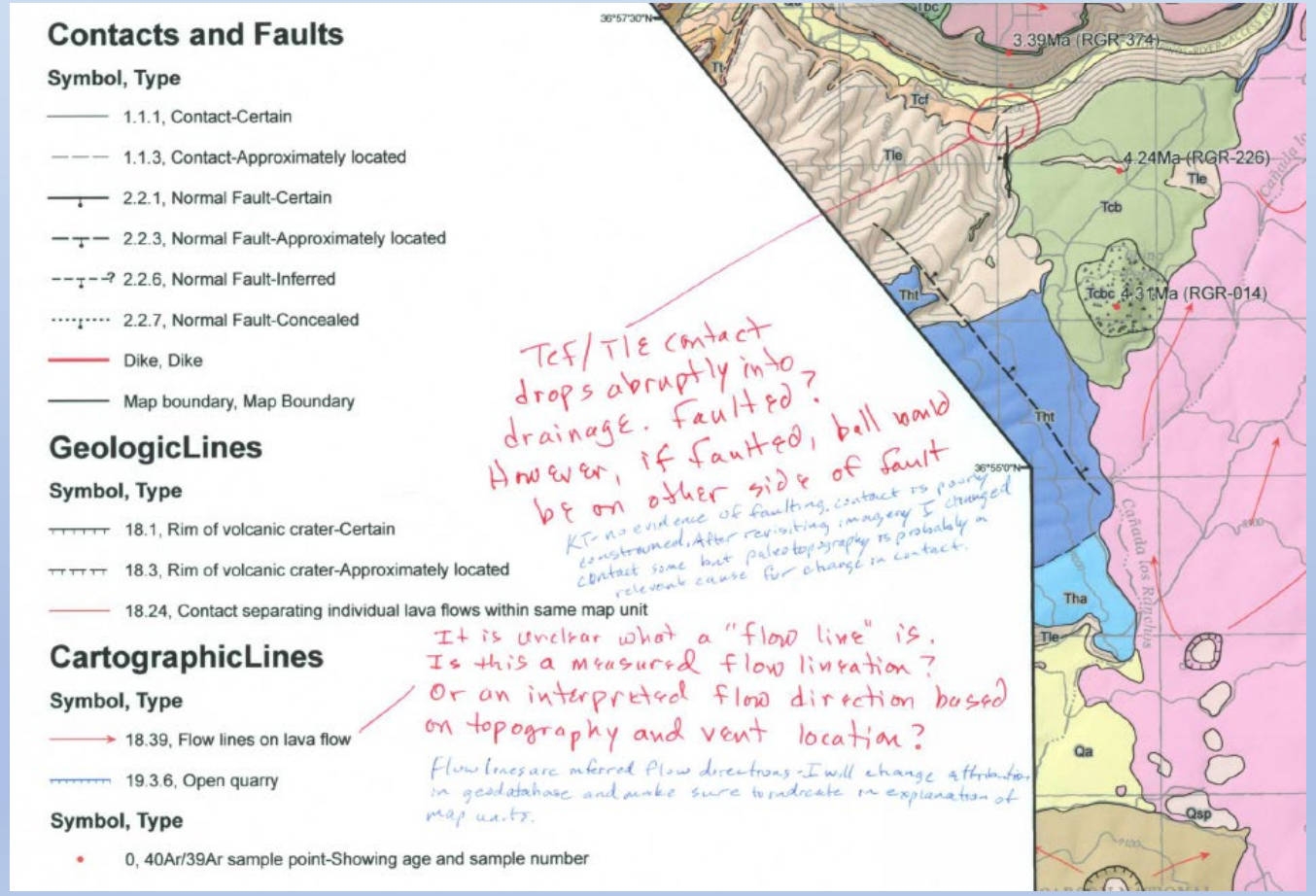
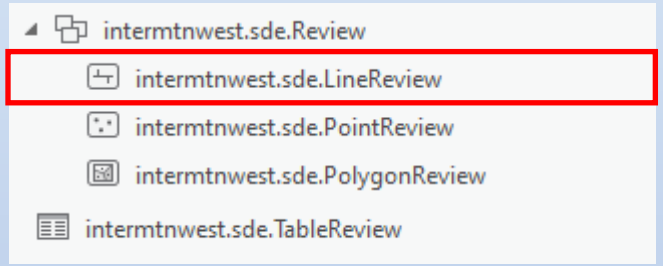


REVIEW—
WHAT WE ARE ACCUSTOMED TO



REVIEW PROCESS

- Reviewer comments & suggestions
- Track progress of reconciliation
- Feature dataset and non-spatial table
  - Enterprise features/table [internal]
  - Feature services/ArcGIS online [external]



Alias	Domain
OBJECTID	
Reviewer	Reviewer
Responder	Responder
Progress	ReviewProgress
FeatureDataset	FeatureDataset
FeatureClass	FeatureClass
CommentType	
Comment	
Comment2	
AuthorResponse	
ApprovingOfficialComment	
Approval	ReviewApproval

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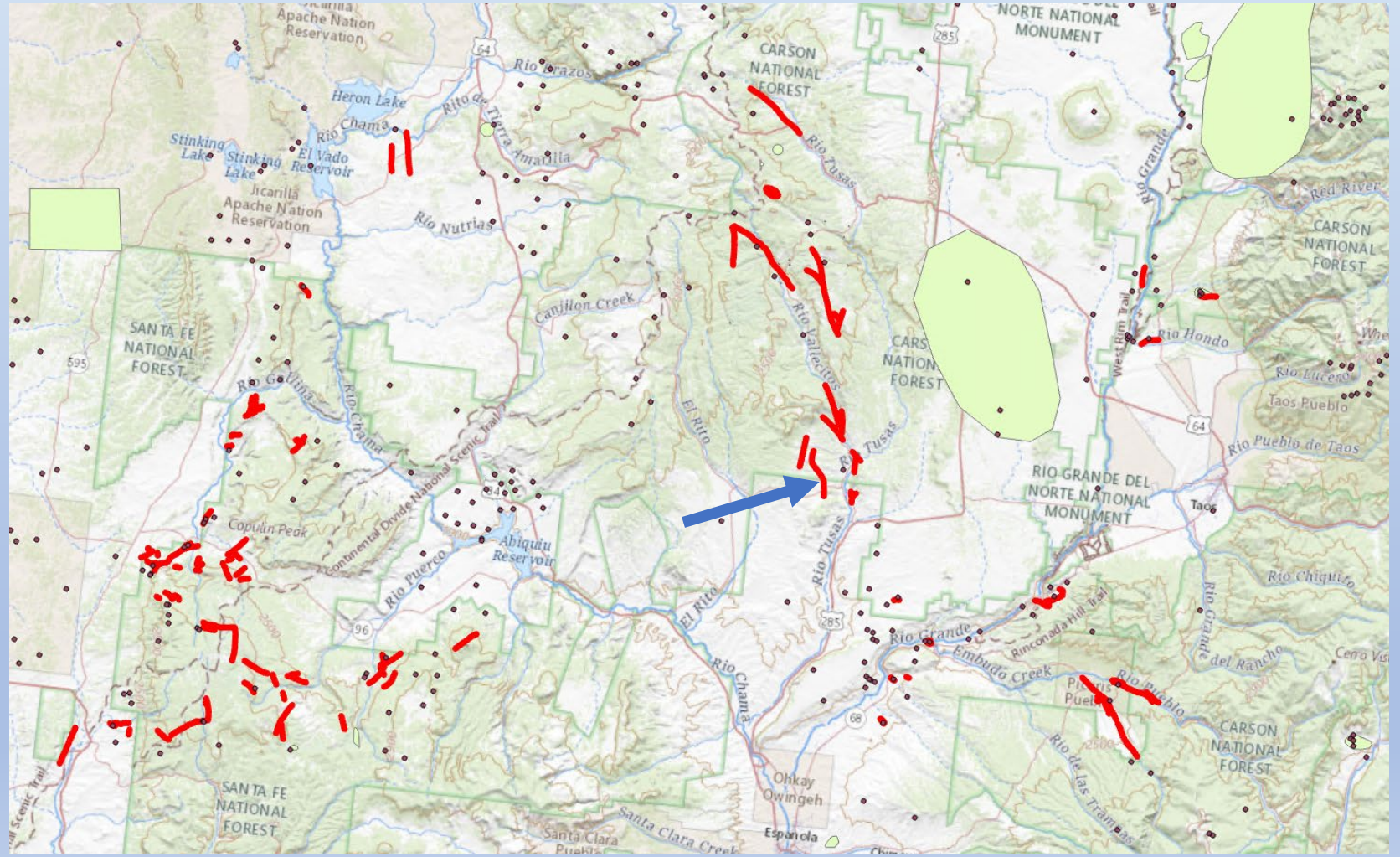
REVIEW FEATURES



REVIEW EXAMPLES

DOMAINS

Could possibly set up domain

Reviewer	Responder	Progress	FeatureDataset	FeatureClass	CommentType
Workman	Turner	not reconciled	BedrockGeologicMap	ContactsAndFaults	fault
Workman	Turner	not reconciled	BedrockGeologicMap	ContactsAndFaults	fault
Workman	Turner	not reconciled	BedrockGeologicMap	ContactsAndFaults	fault
Workman	Turner	not reconciled	BedrockGeologicMap	ContactsAndFaults	geometry

Comment	Comment2	AuthorResponse
several suggested fault traces to smooth the strange fault geometries on source maps	<Null>	<Null>
could this be a normal fault hiding in here that cuts the thrust and then drops upper plate to west against lower plate to the east; explains Ritito/pC geometry a...	<Null>	<Null>
instead of the folds trending south to follow the "thrust" (see other comment) I'd suspect they stay on nnw trend a bit more and are cut by a younger normal fa...	<Null>	<Null>
could this El Rito extend farther south below the Sante Fe and be faulted against the basement? El Rito must be dipping south off of the basement to north	<Null>	<Null>