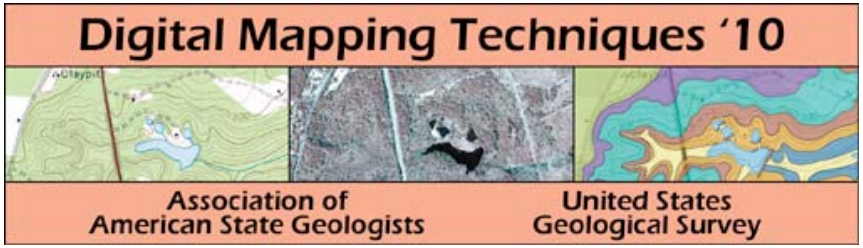


The following was presented at DMT'10 (May 16-19, 2010).

The contents are provisional and will be superseded by a paper in the DMT'10 Proceedings.

See also earlier Proceedings (1997-2009)
http://ngmdb.usgs.gov/info/dmt/

Nevada Digital Dirt Mapping Project

The ND2MP: An experiment in supervised 'crowdsourcing' for rapid geologic map development with ArcSDE

P. Kyle House, Heather Green, Abbey Grimmer
& The Nevada Digital Dirt Mapping Team

Rachel Wearne
Joanna Redwine
Molly Hunsaker
Alan Ramelli
Larry Garside
Luis Rodriquez
Ronna Bowers
Michelle Rose
Jason Man
Justin Skord
Jim Trexler
Pat Cashman
Rohit Patil
Jill Heaton

University of Nevada, Reno

desert conservation PROGRAM

nbmg

University of Nevada, Reno Geo Spatial Lab

The battle wages on…

'Crowdsourcing' / Multiuser Editing

Model: Distributive problem-solving and production

Pooling and coordinating skill-sets to generate scientific data (a geologic map)

High level of collaboration enabled by multiuser database editing capability

Division of effort by skill-set (geology / GIS)

E.g.: OpenStreetMap

Nevada Digital Dirt Mapping Project

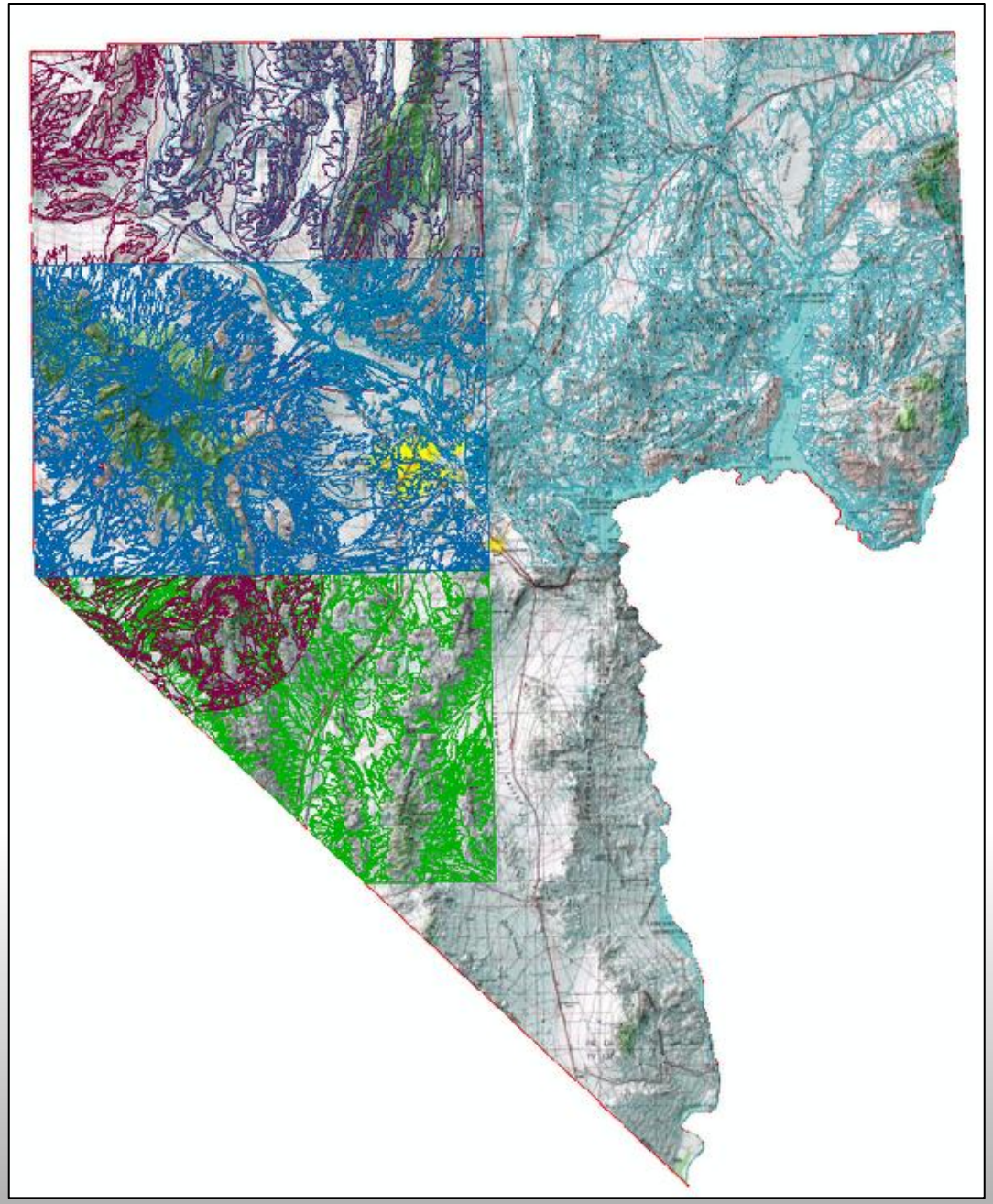
The Experiment: Big Map, Small Budget, 18 months

- Compile and organize
- Unify (harmonization of mapped units)
- Evaluate (field and remote check)
- Panic and assemble larger team
- Edit (modify, refine, and create)
- Distribute / Review / Publish

Solution: Multiuser, versioned database.

Nevada Digital Dirt Mapping Project

Perspective: Existing Small-Scale Data Sources



- Looks promising, right?
- Looks are deceiving
- 24k maps too detailed
- 250 k sources really problematic

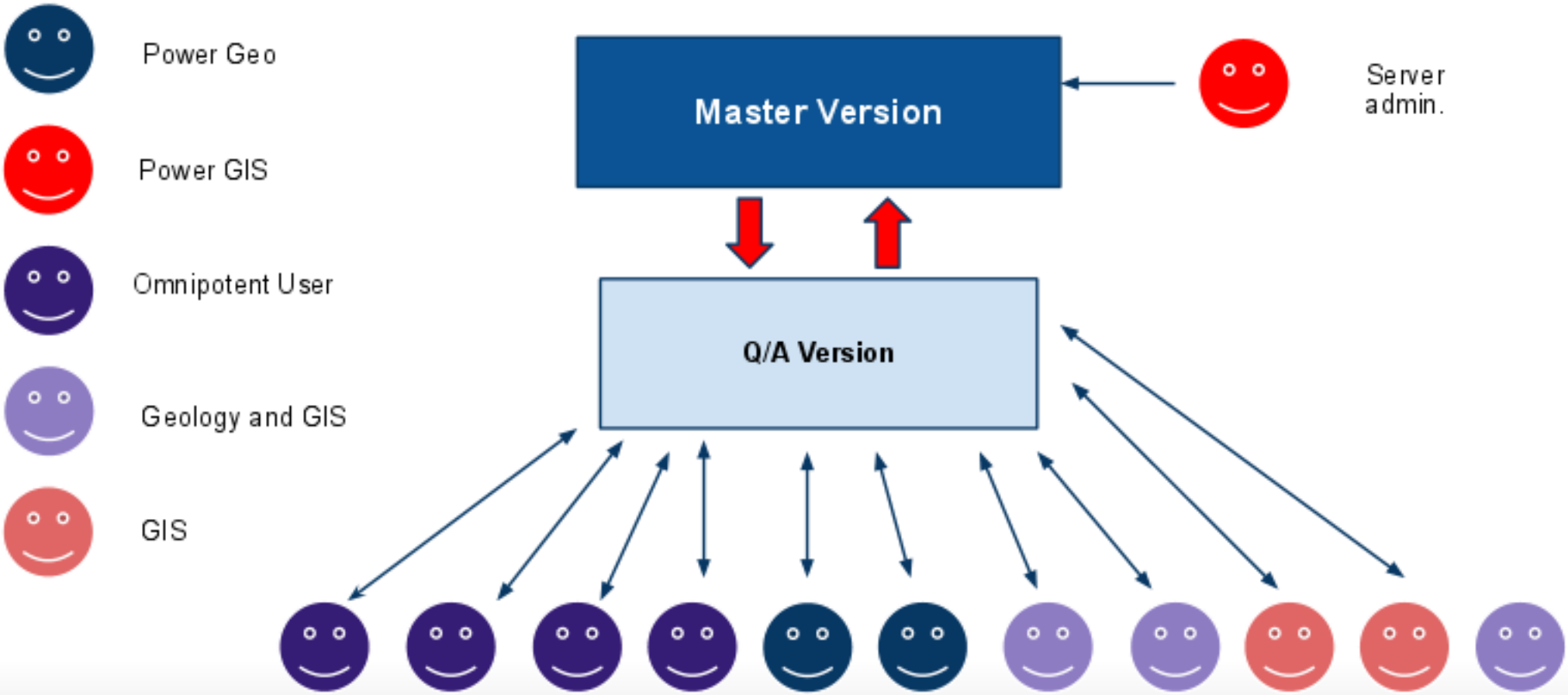
Nevada Digital Dirt Mapping Project

Poor but published mapping of surficial geology (e.g., NBMG, USGS)

Much larger problem than anticipated…we need a bigger team…fast.

Nevada Digital Dirt Mapping Project

One map, many mappers*: Versioned Geodatabase in ArcSDE

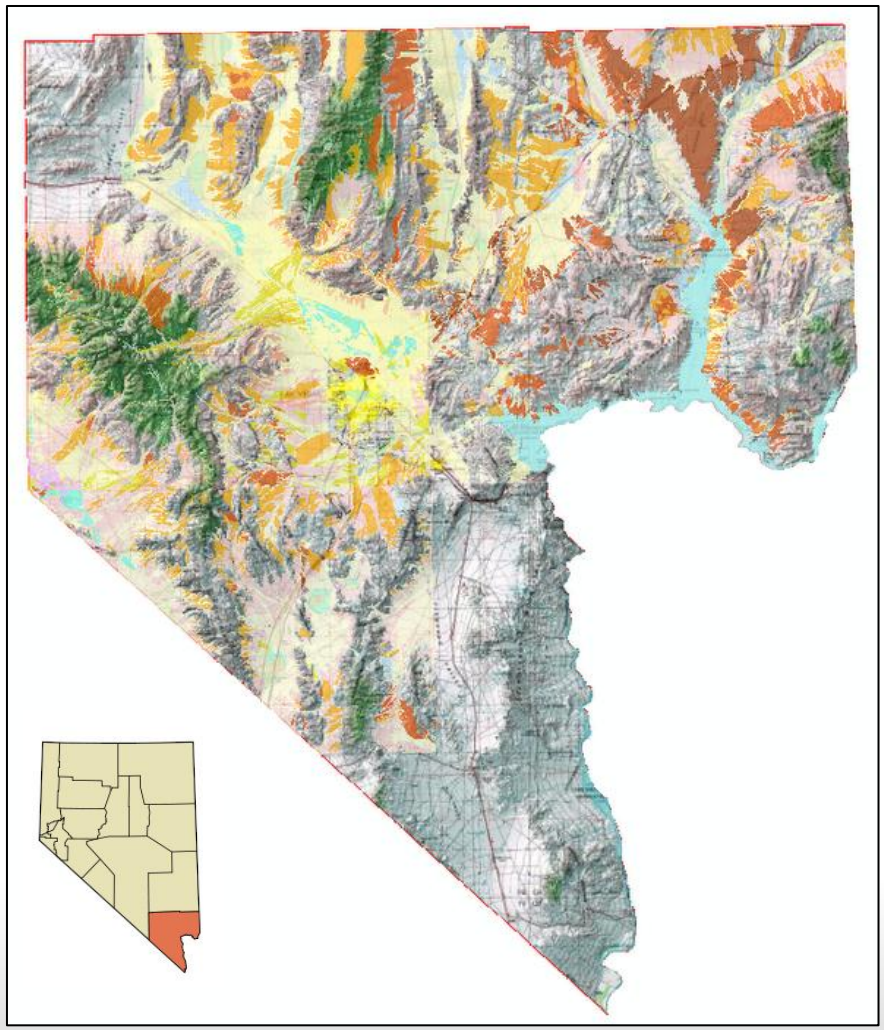


*Inspired by Declan DePoar, Old Dominion University, VA

Nevada Digital Dirt Mapping Project

The Approach: Divide and Conquer

1. Material division: surficial / bedrock
2. Genetic division: types of surf and Bdrk units
3. Age division
4. Spatial division of effort

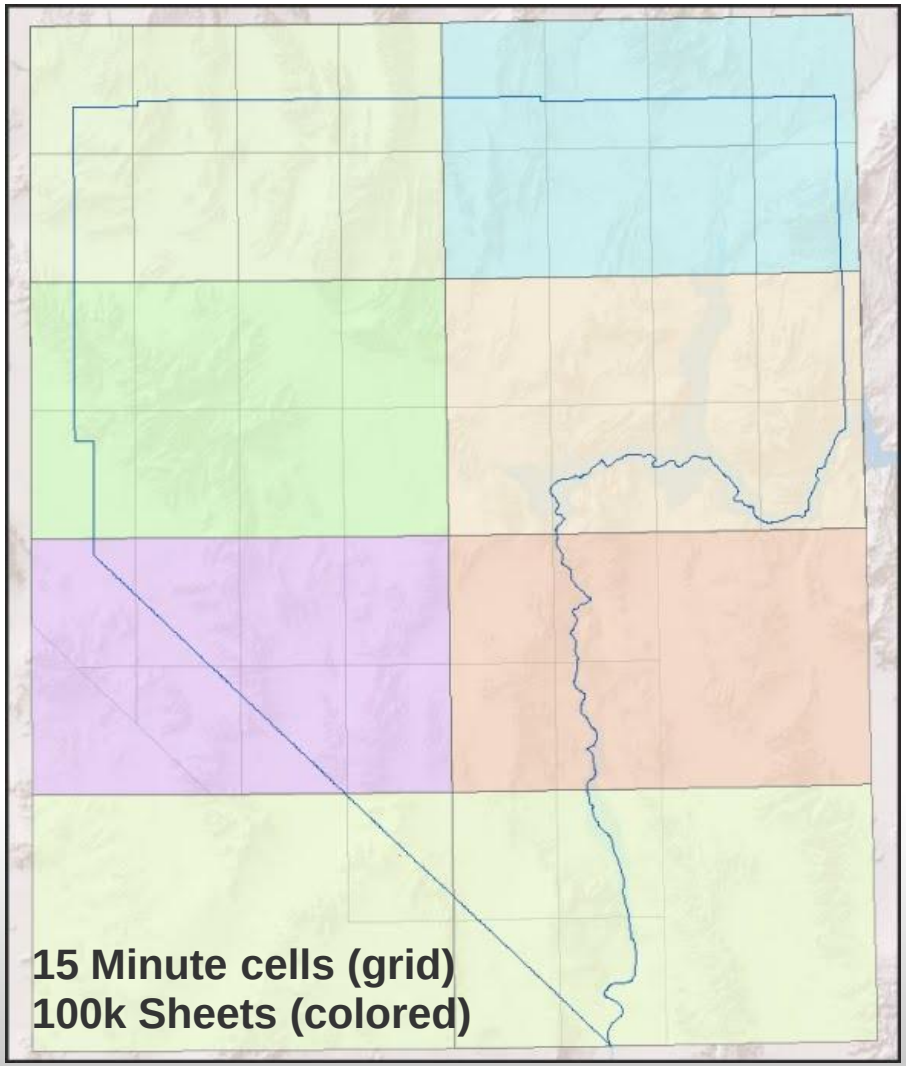


Clark County: 7,910 mi^2 (20,487 km^2)

Final map scale: 1:150,000

Nevada Digital Dirt Mapping Project

Grid-based effort division



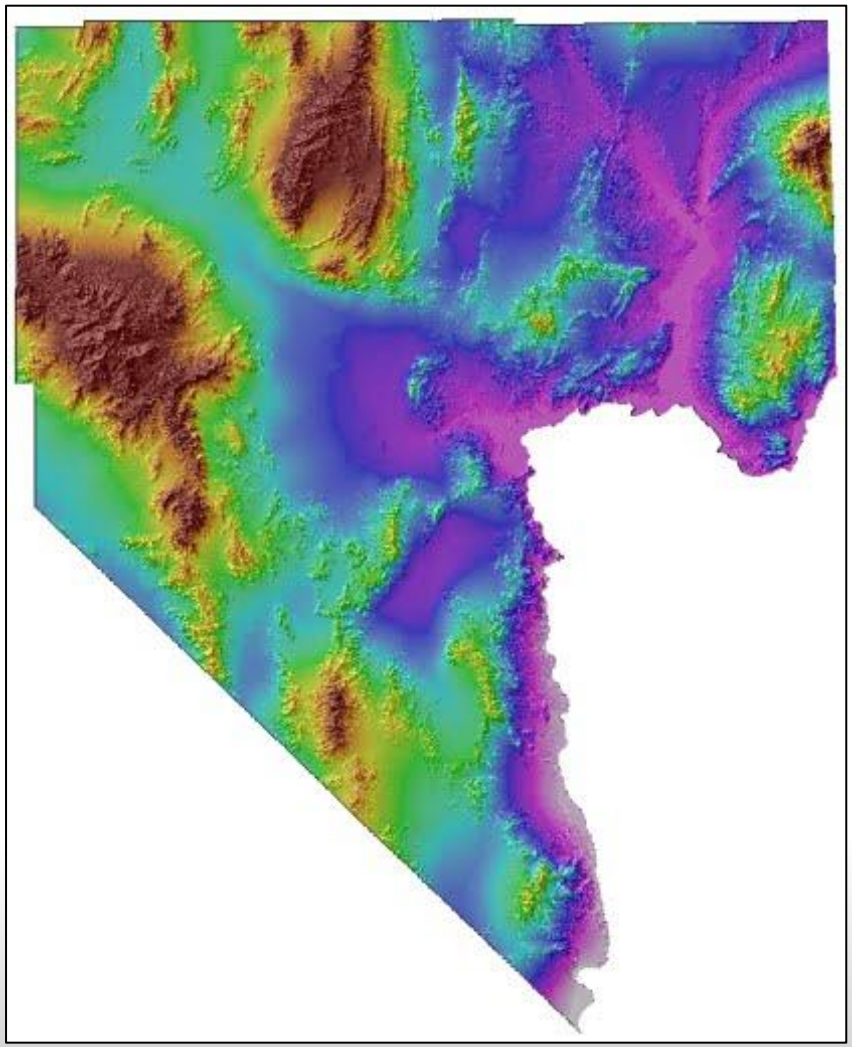
Assign work to grid cells: first small, then large

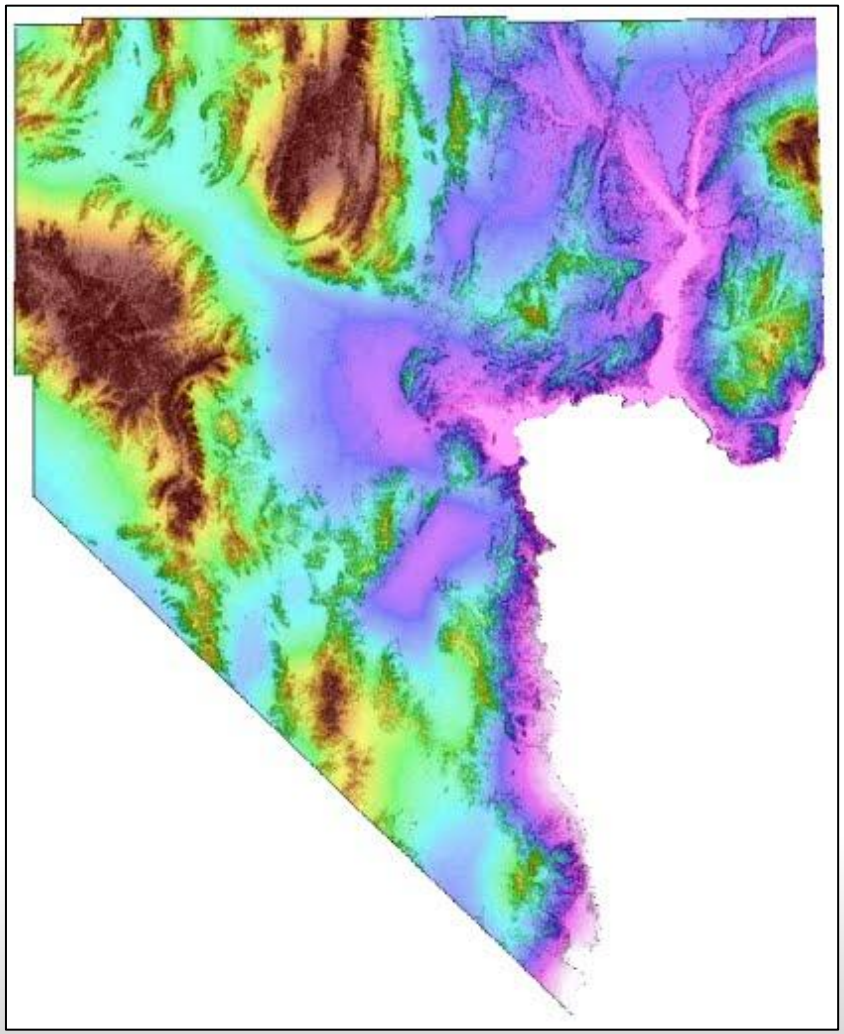
Minimizes conflicts in reconciling edits

QA via review of grid cells

Nevada Digital Dirt Mapping Project

Refining the Bedrock / Surficial Contact

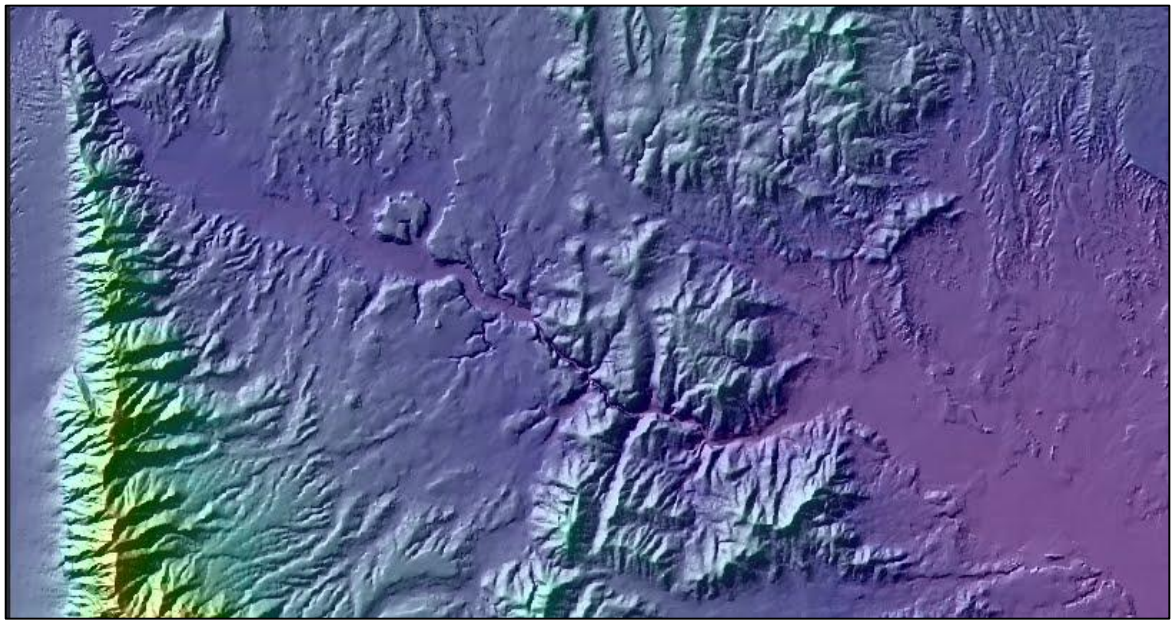




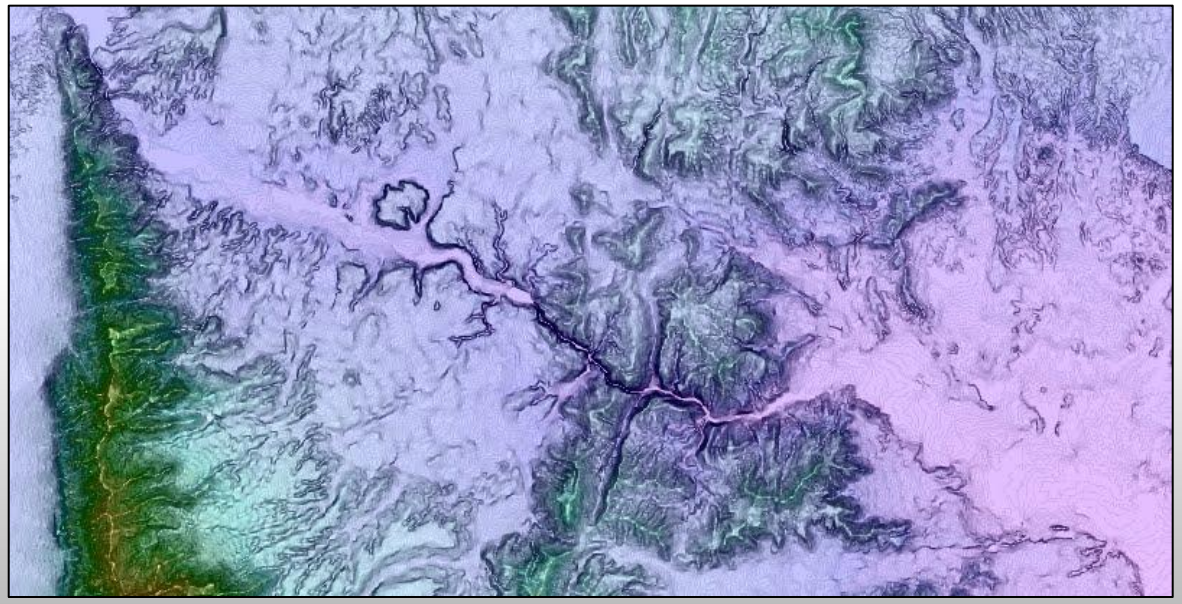
A fundamental flaw in every compiled data source (some far worse than others)

Nevada Digital Dirt Mapping Project

Improving the Bedrock / Surficial Contact: Here's a Strong Start



Hillshade



Slopeshade

File under: amazingly useful

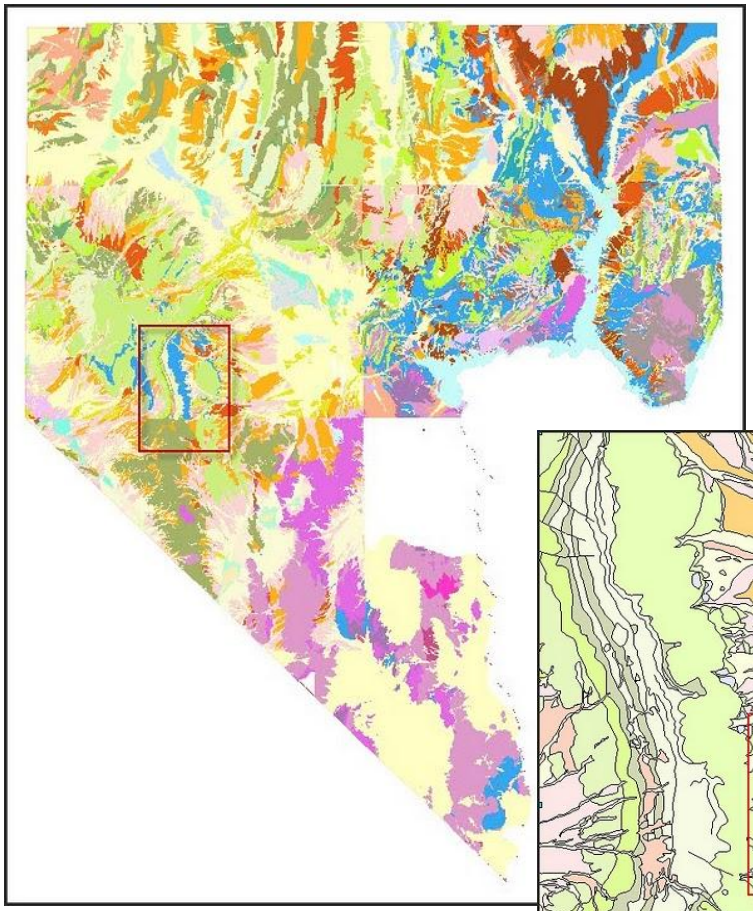
Nevada Digital Dirt Mapping Project

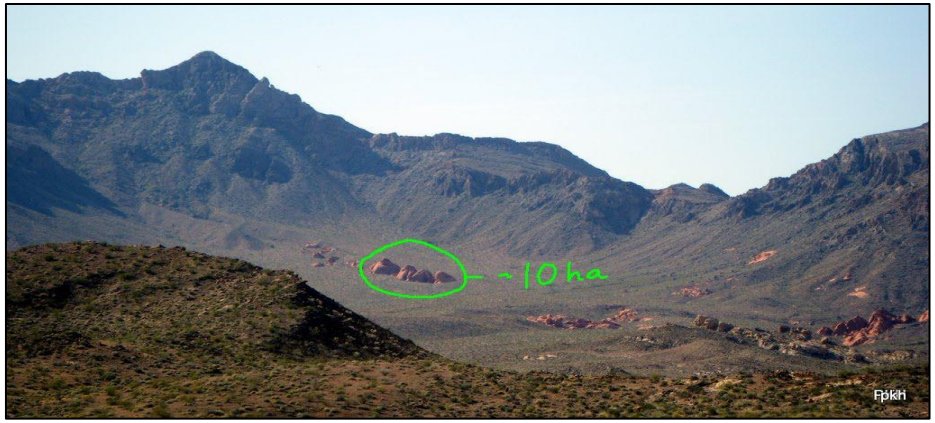
The generalization black hole

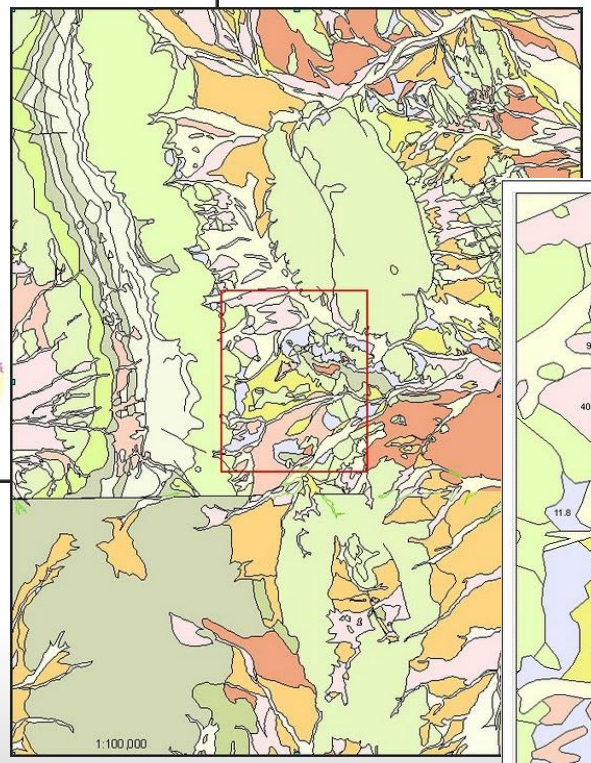
House et al., 2005

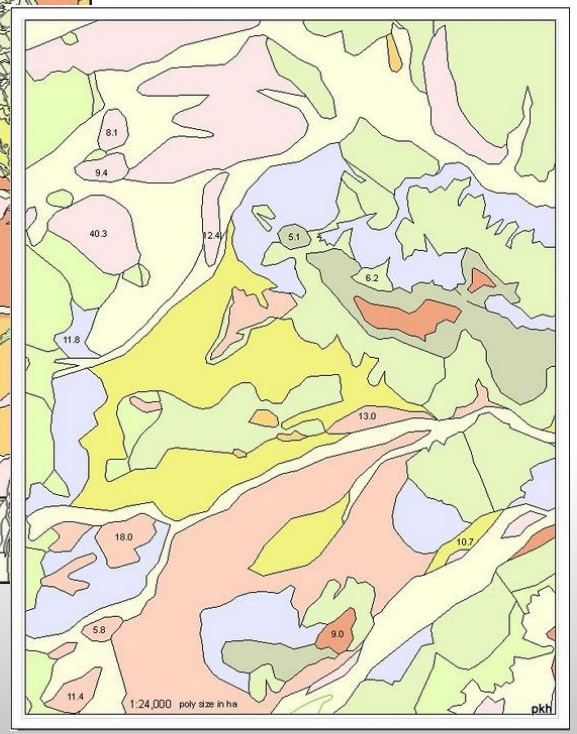
Schmidt and McMackin, 2006

Nevada Digital Dirt Mapping Project







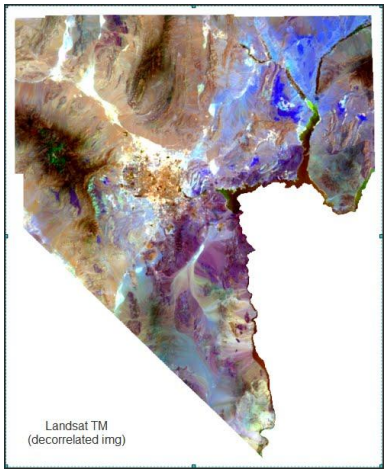


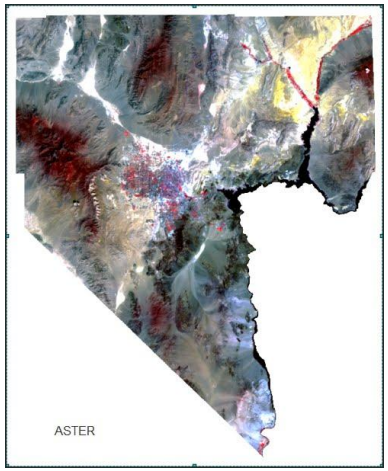
Dealing with the Minimum Mappable Unit

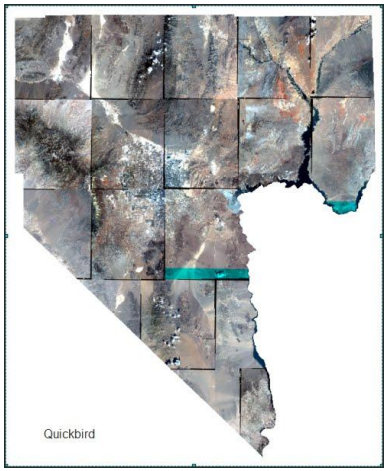
Nevada Digital Dirt Mapping Project

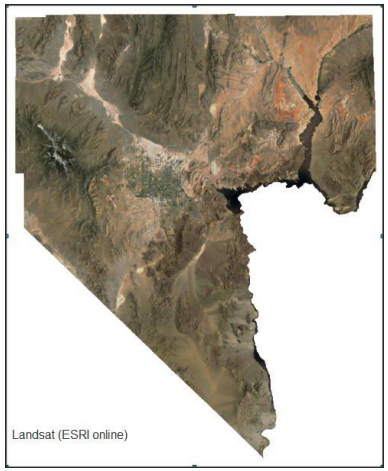
Workflow Innovations

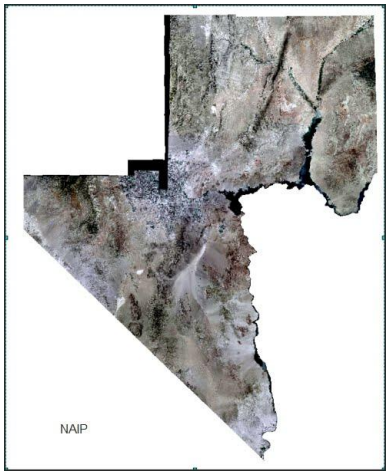
Served and Local Images

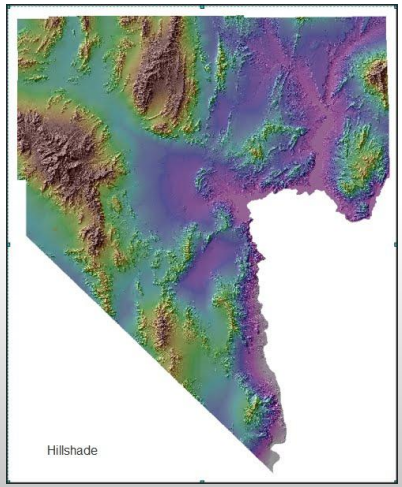


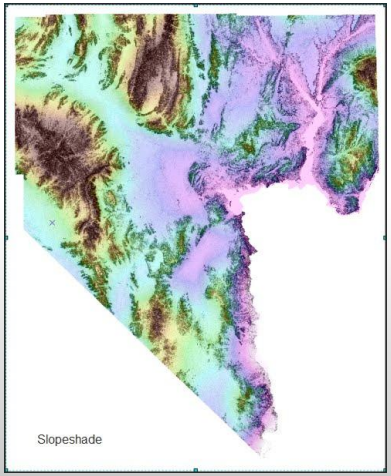








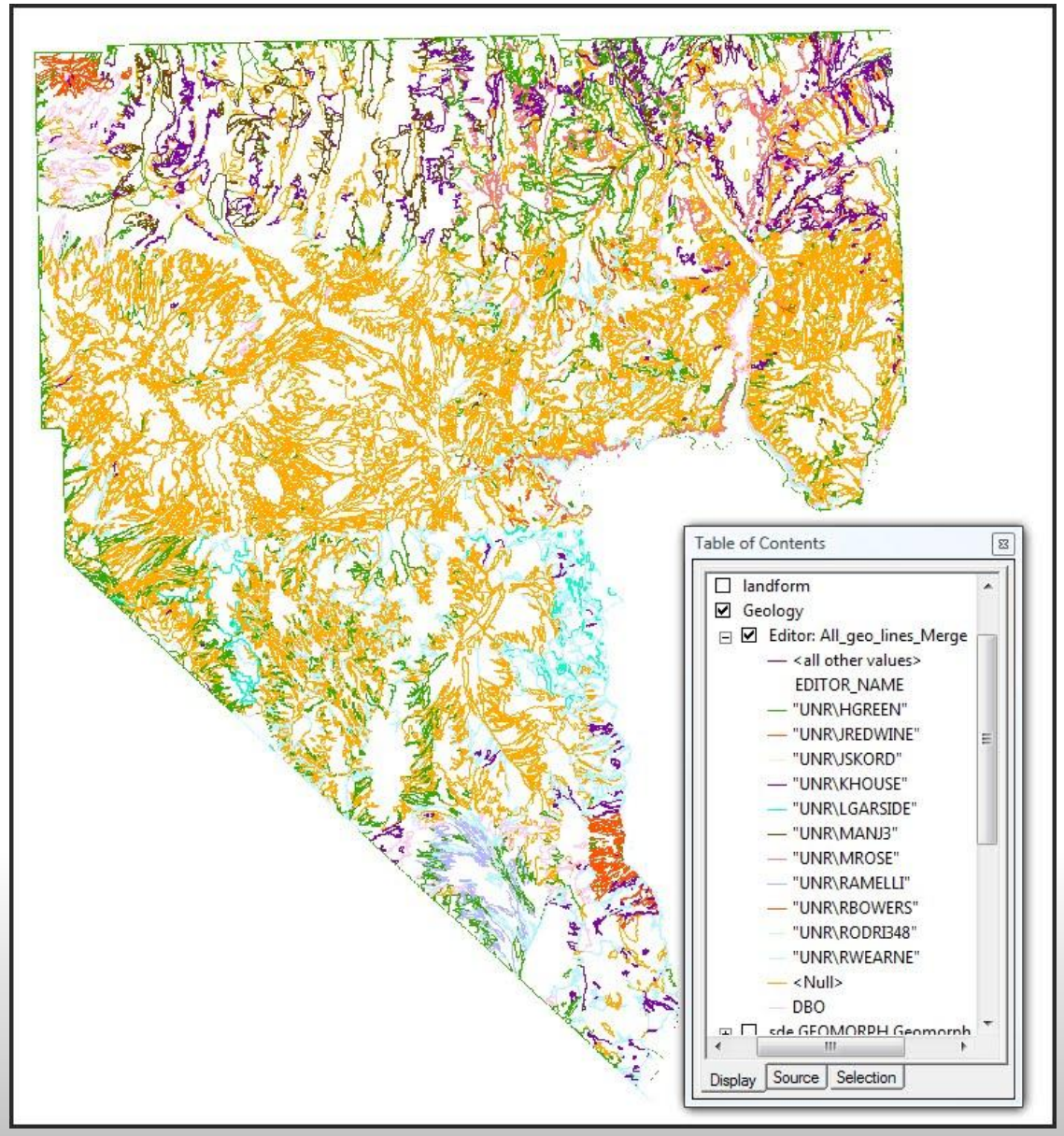




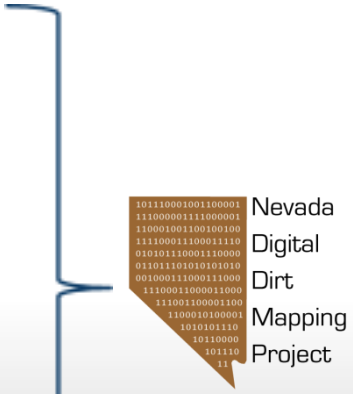
File under: Finally!

Nevada Digital Dirt Mapping Project

Tracking Edits: By Editor

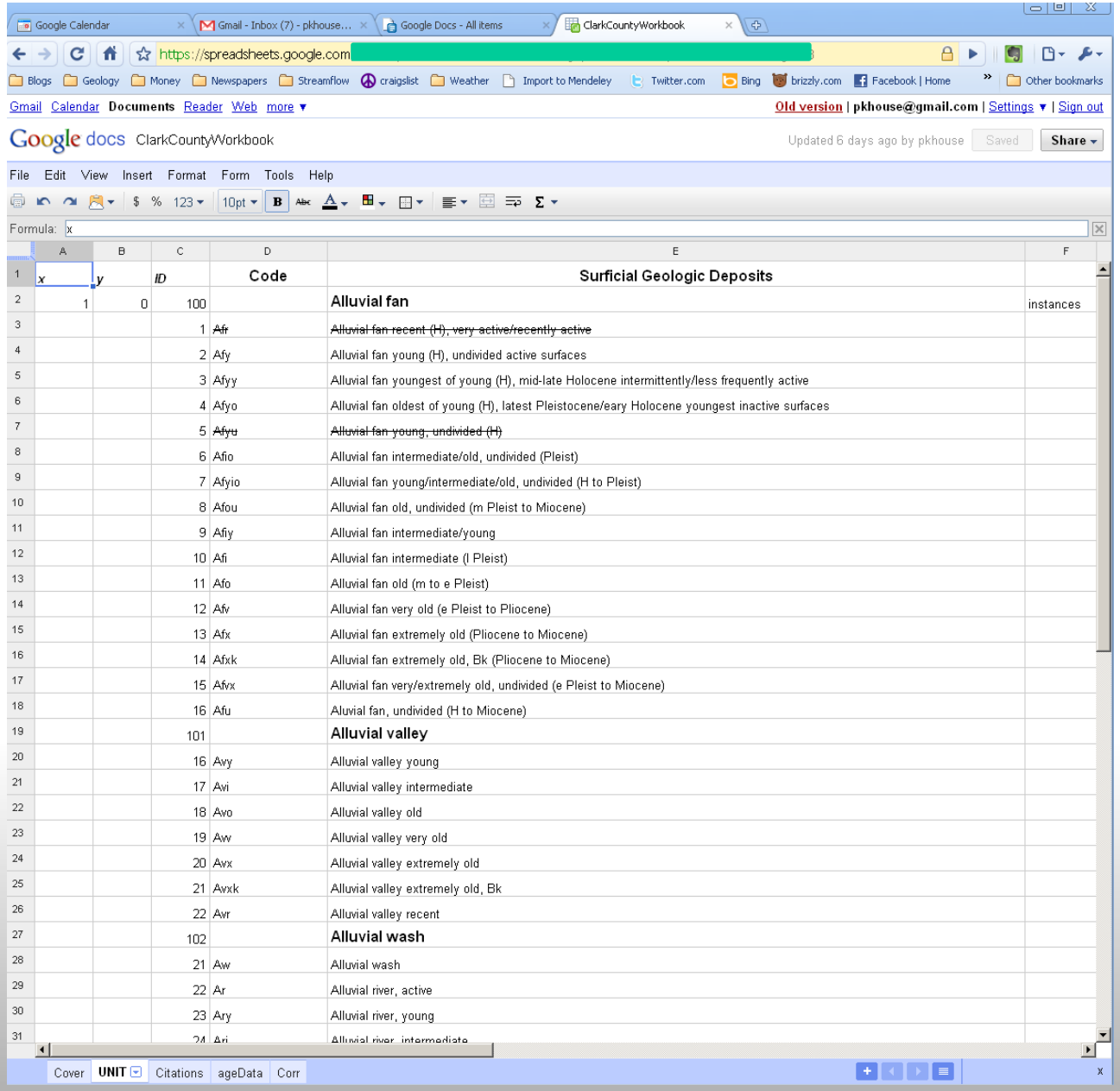


- Workflow monitoring
- Q/A
- Culling / re-assigning
- Motivation



http://arcscripts.esri.com/details.asp?dbid=15694

Sharing project documents online



Google Calendar | Gmail - Inbox (7) - pkhouse... | Google Docs - All items | ClarkCountyWorkbook

https://spreadsheets.google.com

Blogs | Geology | Money | Newspapers | Streamflow | craigslist | Weather | Import to Mendeley | Twitter.com | Bing | brizzly.com | Facebook | Home | Other bookmarks

Gmail Calendar **Documents** Reader Web more ▾ — Old version | pkhouse@gmail.com | Settings ▾ | Sign out

Google docs ClarkCountyWorkbook — Updated 6 days ago by pkhouse — Saved — Share

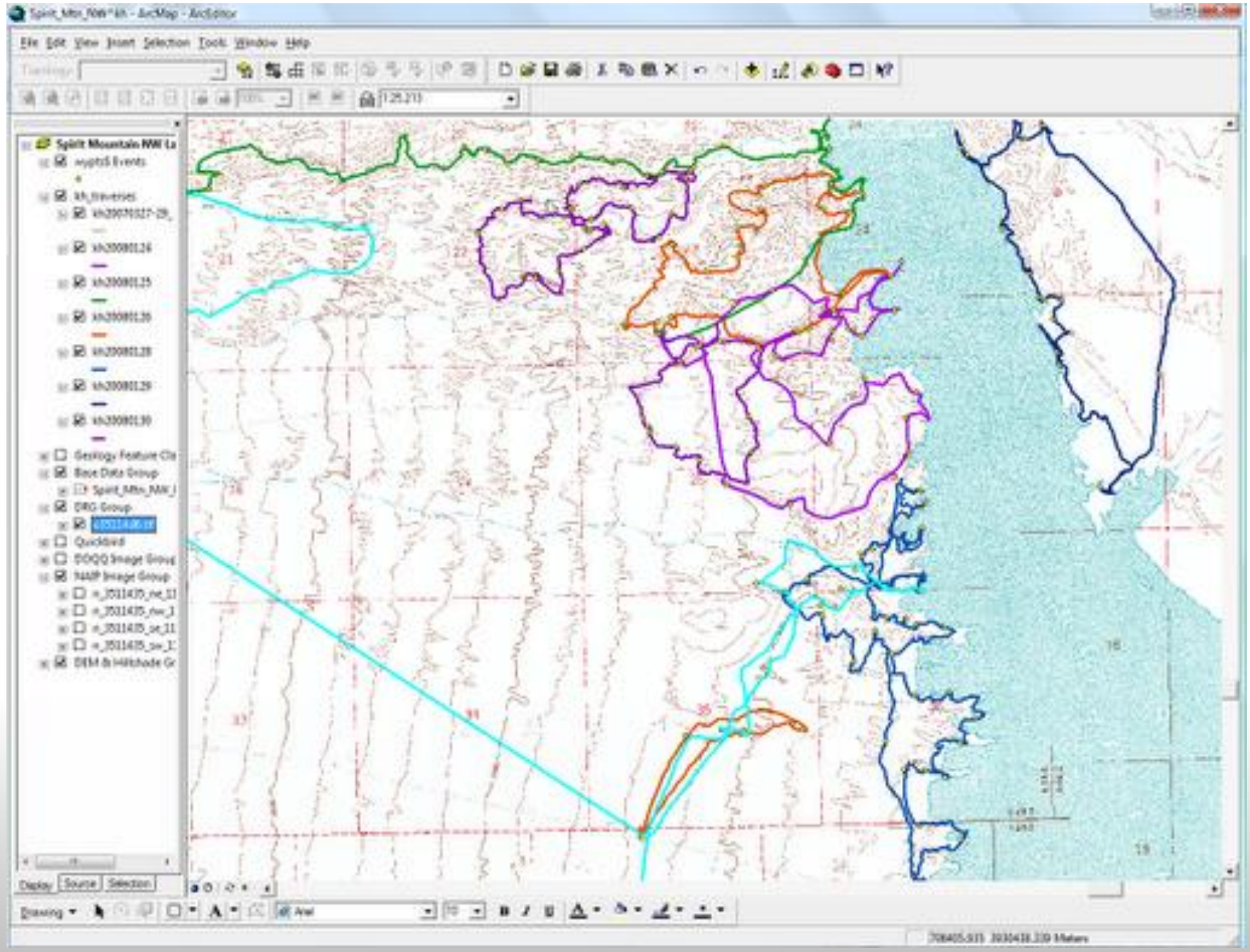
File Edit View Insert Format Form Tools Help

Formula: x

	A	B	C	D	E	F
1	*x*	*y*	*ID*	Code	Surficial Geologic Deposits	
2	1	0	100		**Alluvial fan**	instances
3			1	Afr	~~Alluvial fan recent (H), very active/recently active~~	
4			2	Afy	Alluvial fan young (H), undivided active surfaces	
5			3	Afyy	Alluvial fan youngest of young (H), mid-late Holocene intermittently/less frequently active	
6			4	Afyo	Alluvial fan oldest of young (H), latest Pleistocene/eary Holocene youngest inactive surfaces	
7			5	~~Afyu~~	~~Alluvial fan young, undivided (H)~~	
8			6	Afio	Alluvial fan intermediate/old, undivided (Pleist)	
9			7	Afyio	Alluvial fan young/intermediate/old, undivided (H to Pleist)	
10			8	Afou	Alluvial fan old, undivided (m Pleist to Miocene)	
11			9	Afiy	Alluvial fan intermediate/young	
12			10	Afi	Alluvial fan intermediate (l Pleist)	
13			11	Afo	Alluvial fan old (m to e Pleist)	
14			12	Afv	Alluvial fan very old (e Pleist to Pliocene)	
15			13	Afx	Alluvial fan extremely old (Pliocene to Miocene)	
16			14	Afxk	Alluvial fan extremely old, Bk (Pliocene to Miocene)	
17			15	Afvx	Alluvial fan very/extremely old, undivided (e Pleist to Miocene)	
18			16	Afu	Aluvial fan, undivided (H to Miocene)	
19			101		**Alluvial valley**	
20			16	Avy	Alluvial valley young	
21			17	Avi	Alluvial valley intermediate	
22			18	Avo	Alluvial valley old	
23			19	Avv	Alluvial valley very old	
24			20	Avx	Alluvial valley extremely old	
25			21	Avxk	Alluvial valley extremely old, Bk	
26			22	Avr	Alluvial valley recent	
27			102		**Alluvial wash**	
28			21	Aw	Alluvial wash	
29			22	Ar	Alluvial river, active	
30			23	Ary	Alluvial river, young	
31			24	Ari	Alluvial river, intermediate	

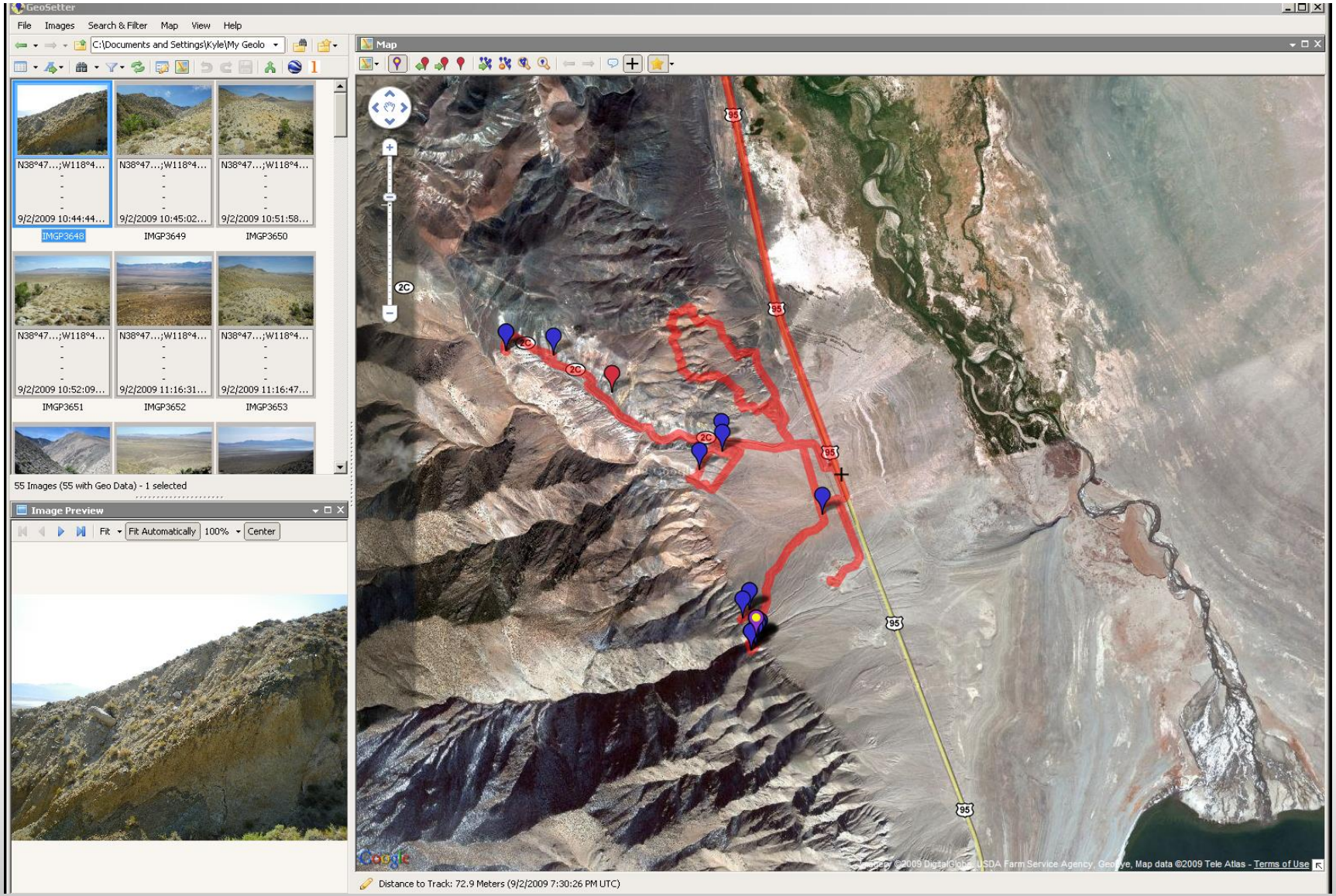
Cover | UNIT | Citations | ageData | Corr

Use your GPS…it knows where you go!



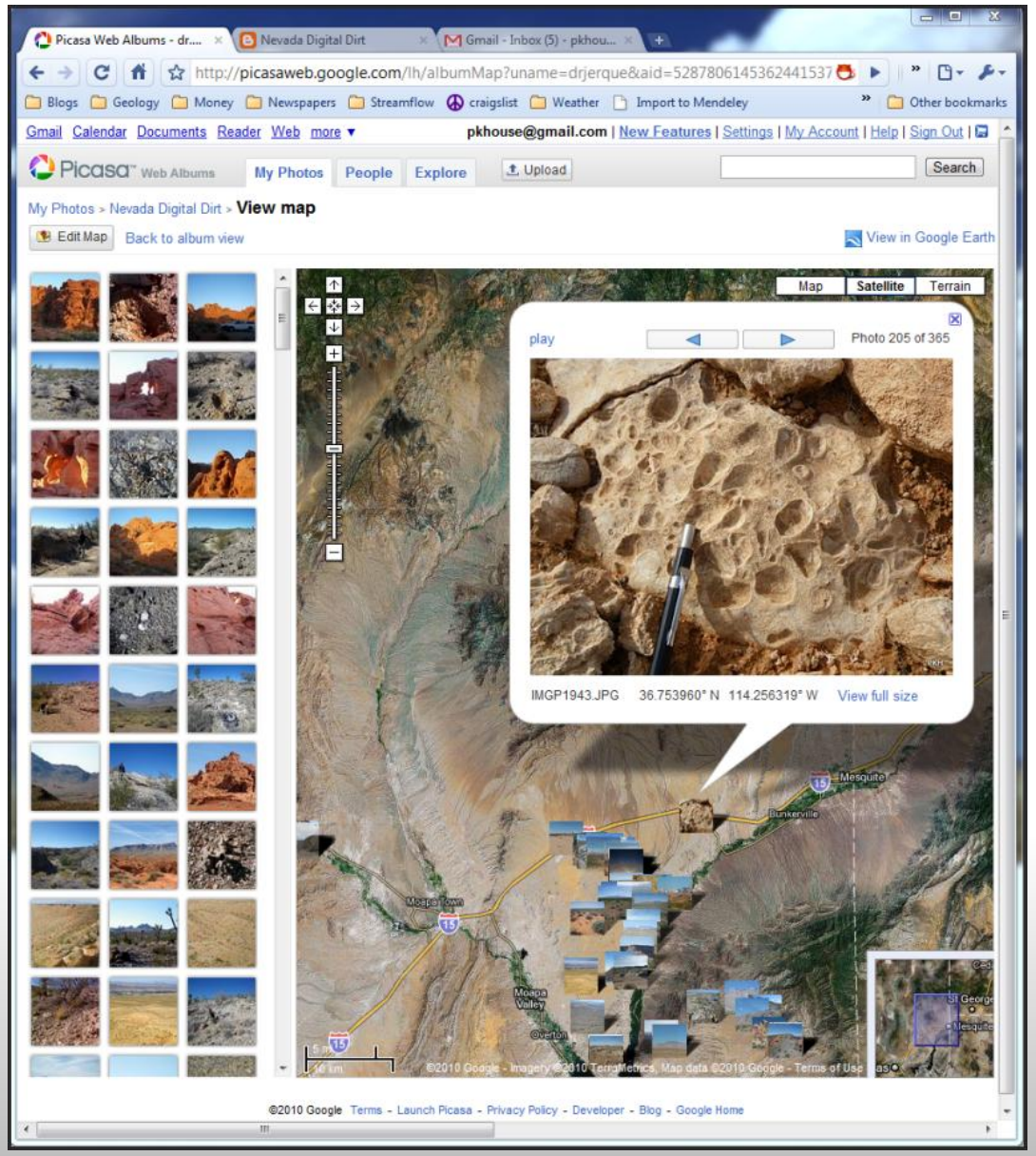
Your traverses are GIS-able data! **Why wouldn't you do this?**

Geotagging—painfully obvious and painfully simple



Google this: geosetter’

Geotagged field photo archives



File under: uncannily obvious

Data archive

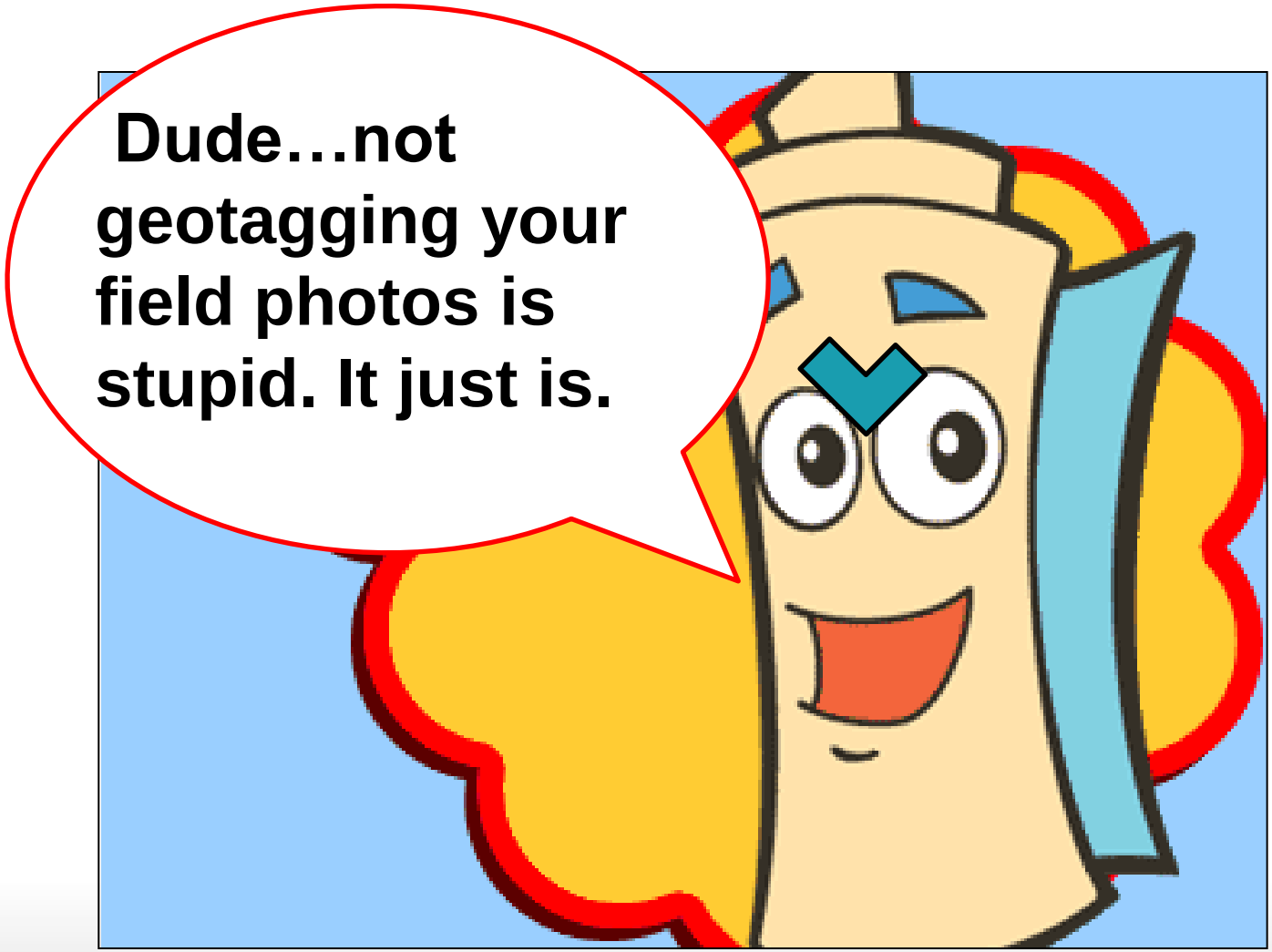
Field note complement

Traverse documentation

Quality assurance

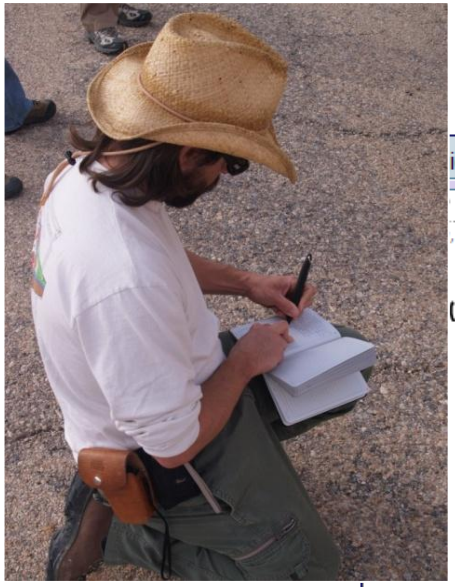
Field check / Review

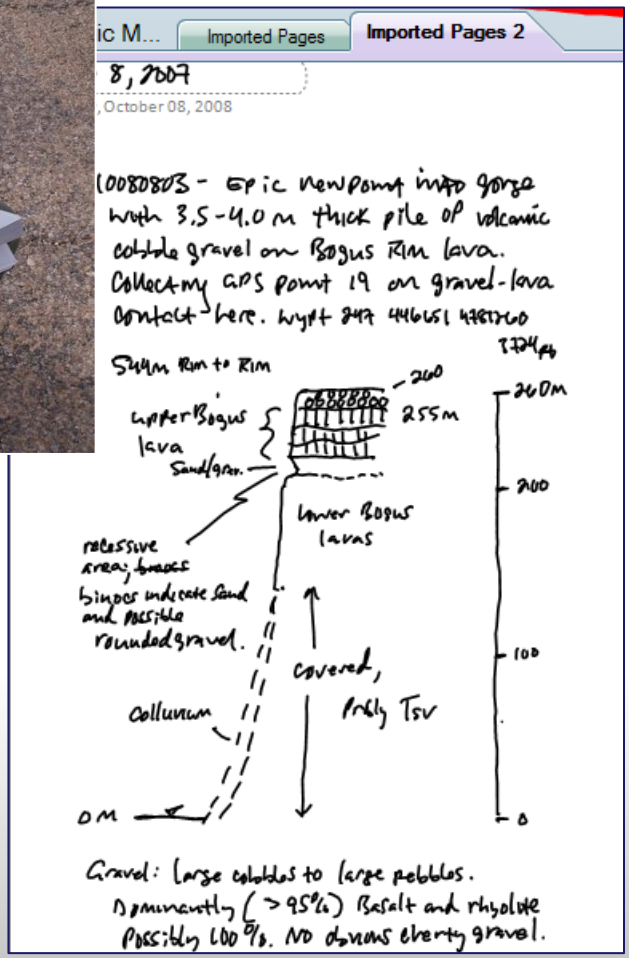
Nevada Digital Dirt Mapping Project



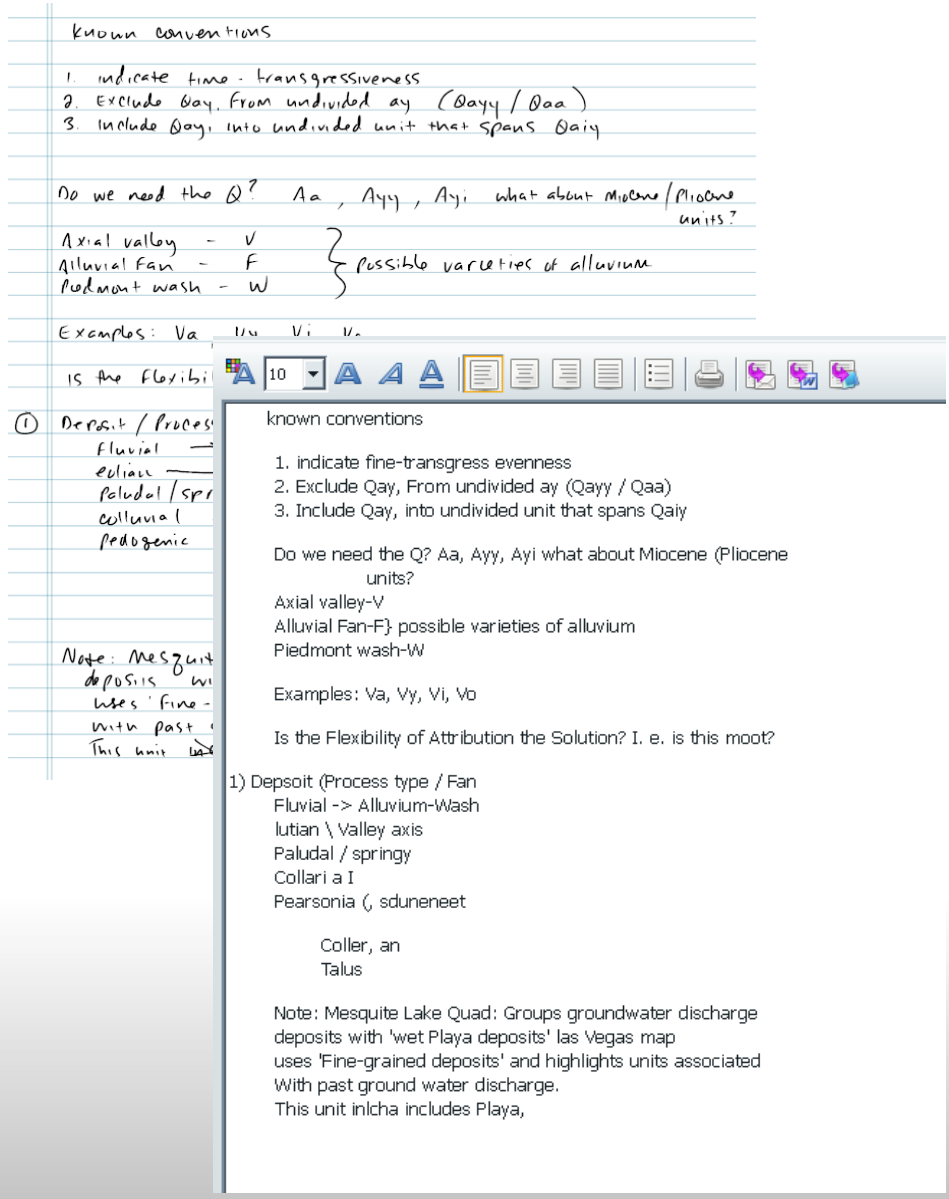
Everyone's busy….just grab a straw and take an hour to figure it out.

Using analog ink to create digital data…





Adapx.com



Livescribe.com

Essential Tools for Office Compilation

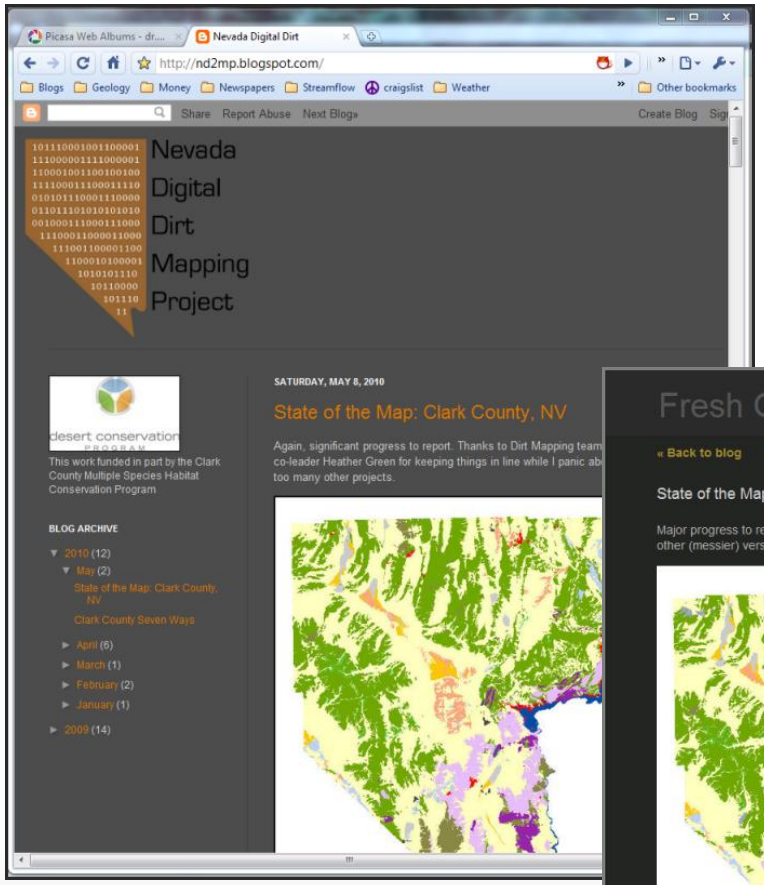
You can’t sign your name with a computer mouse.
What makes you think you can map with one?

Digitizing Tablet: good

Digitizing LCD Panel: amazing

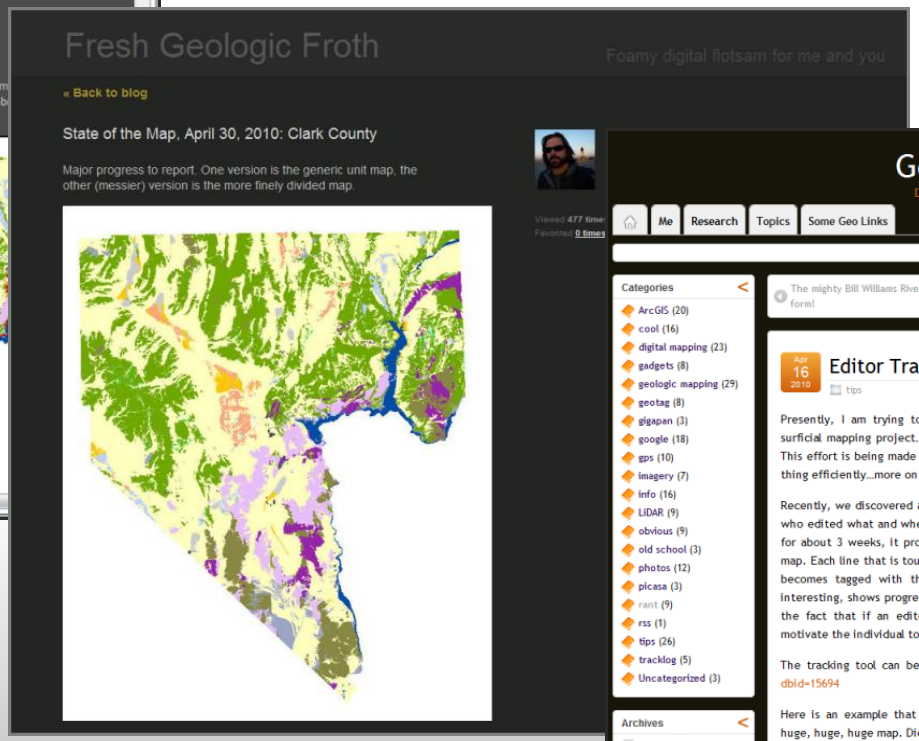
Wacom Cintiq 21ux
Worth every penny.

Blogging: report progress, share data, and solicit input

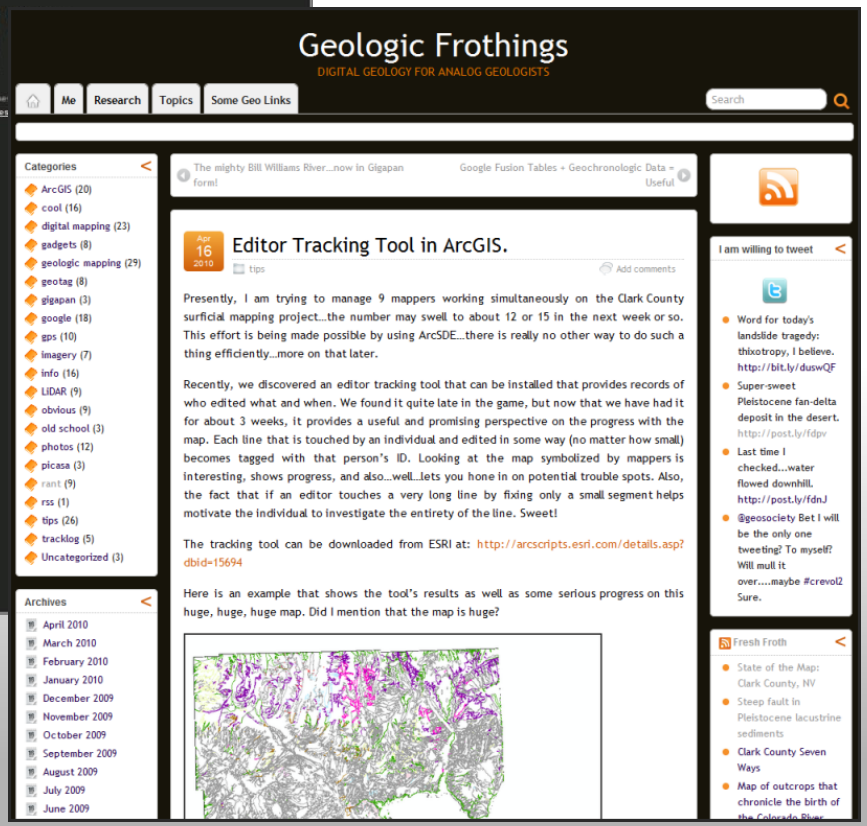


http://nd2mp.blogspot.com

http://posterous.geofroth.com

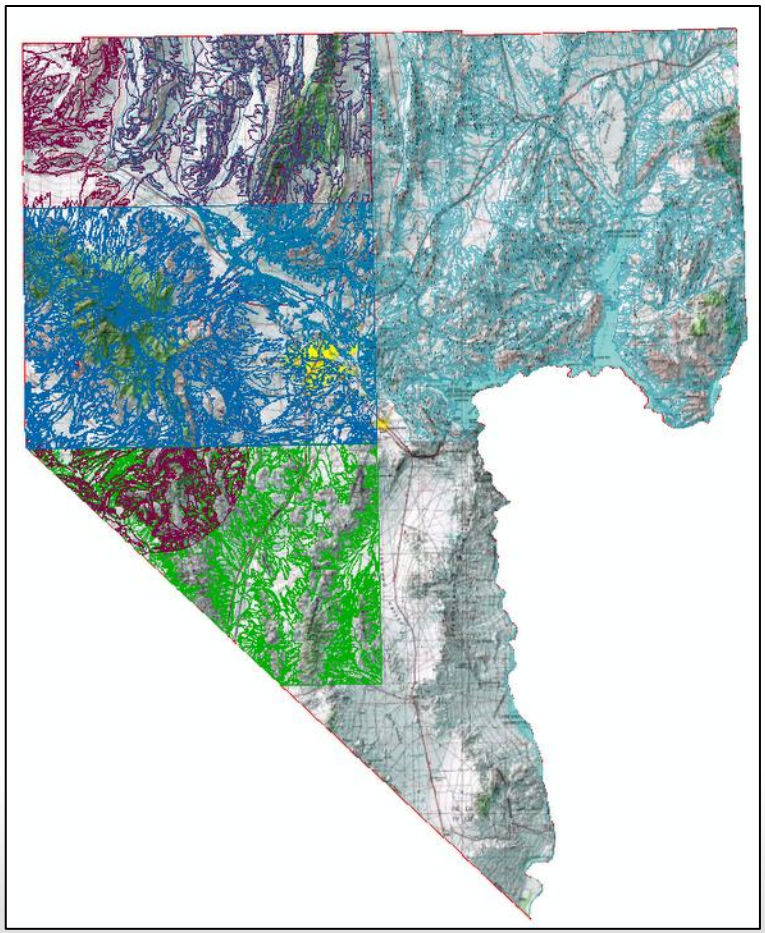


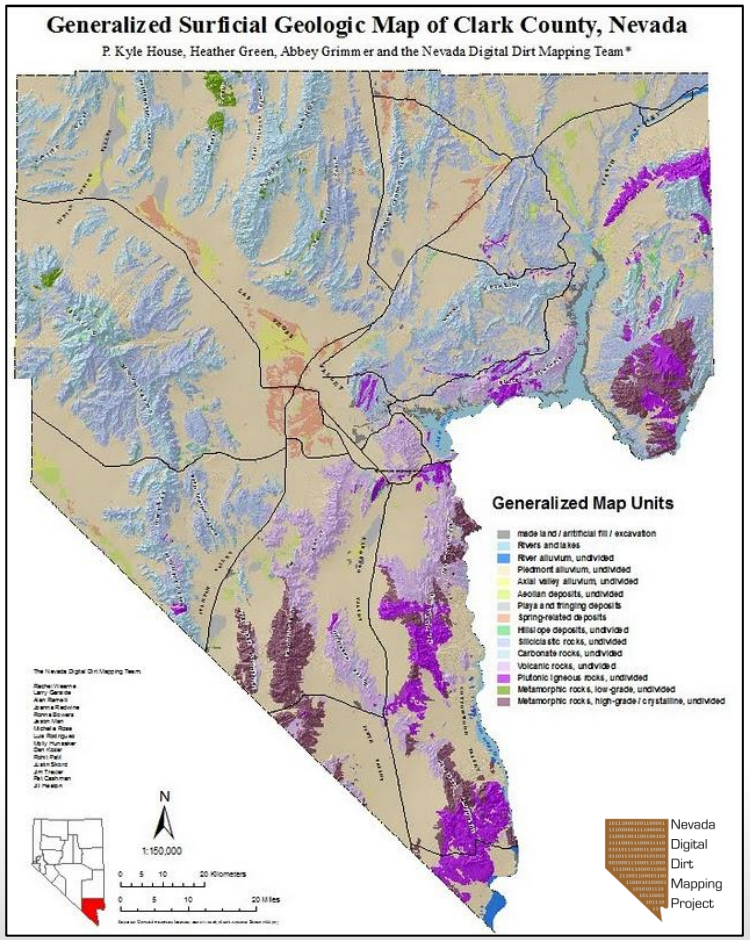
http://geofroth.org



Nevada Digital Dirt Mapping Project

Progress to date: 16 months, 18 mappers:



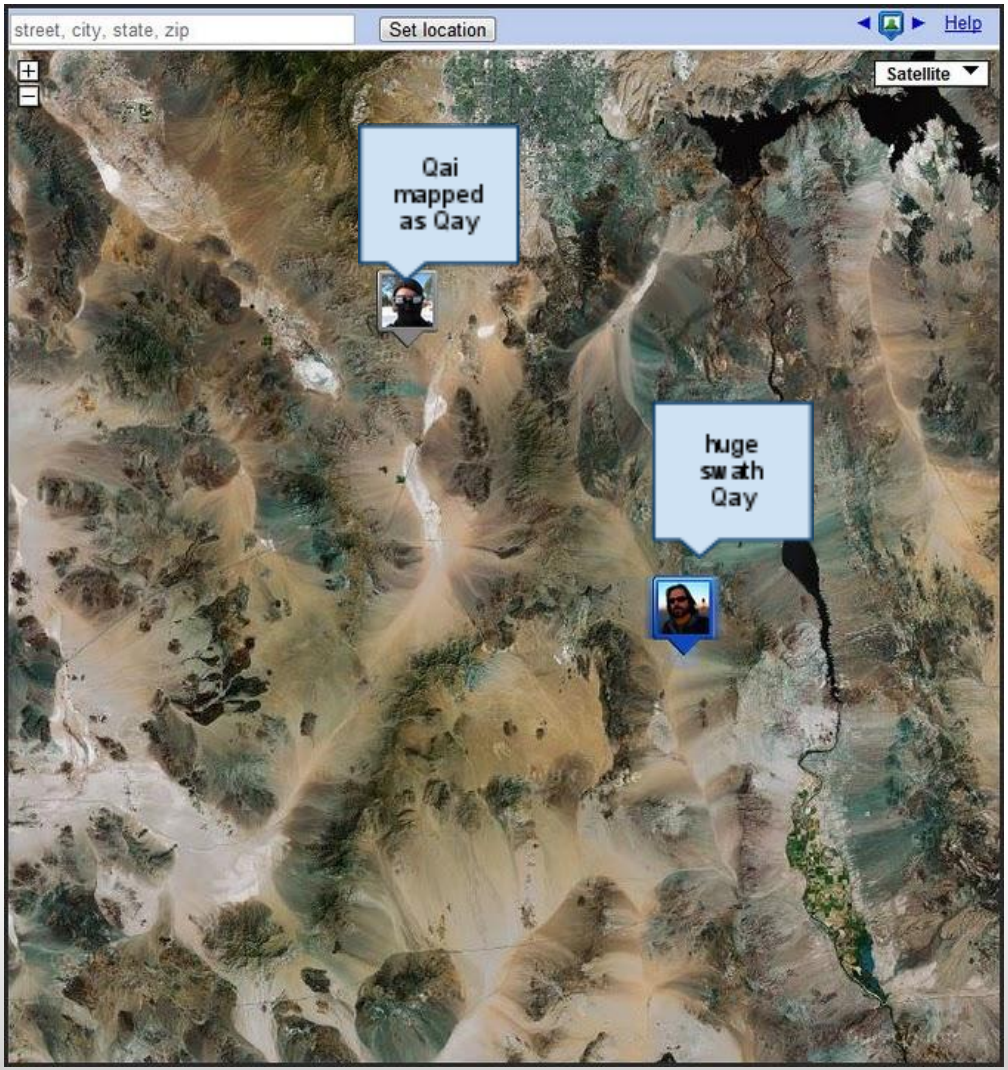


What is next?

- More planning
- More money
- More time?
- More expertise
- More mobility
- More mapping!

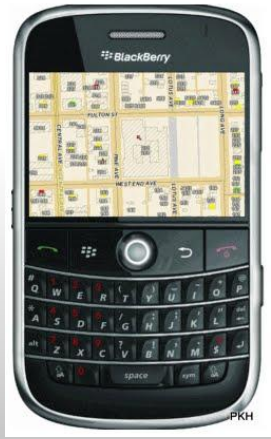
Nevada Digital Dirt Mapping Project

Improved integration of mobile data collection



Google Latitude + sms / Google Talk

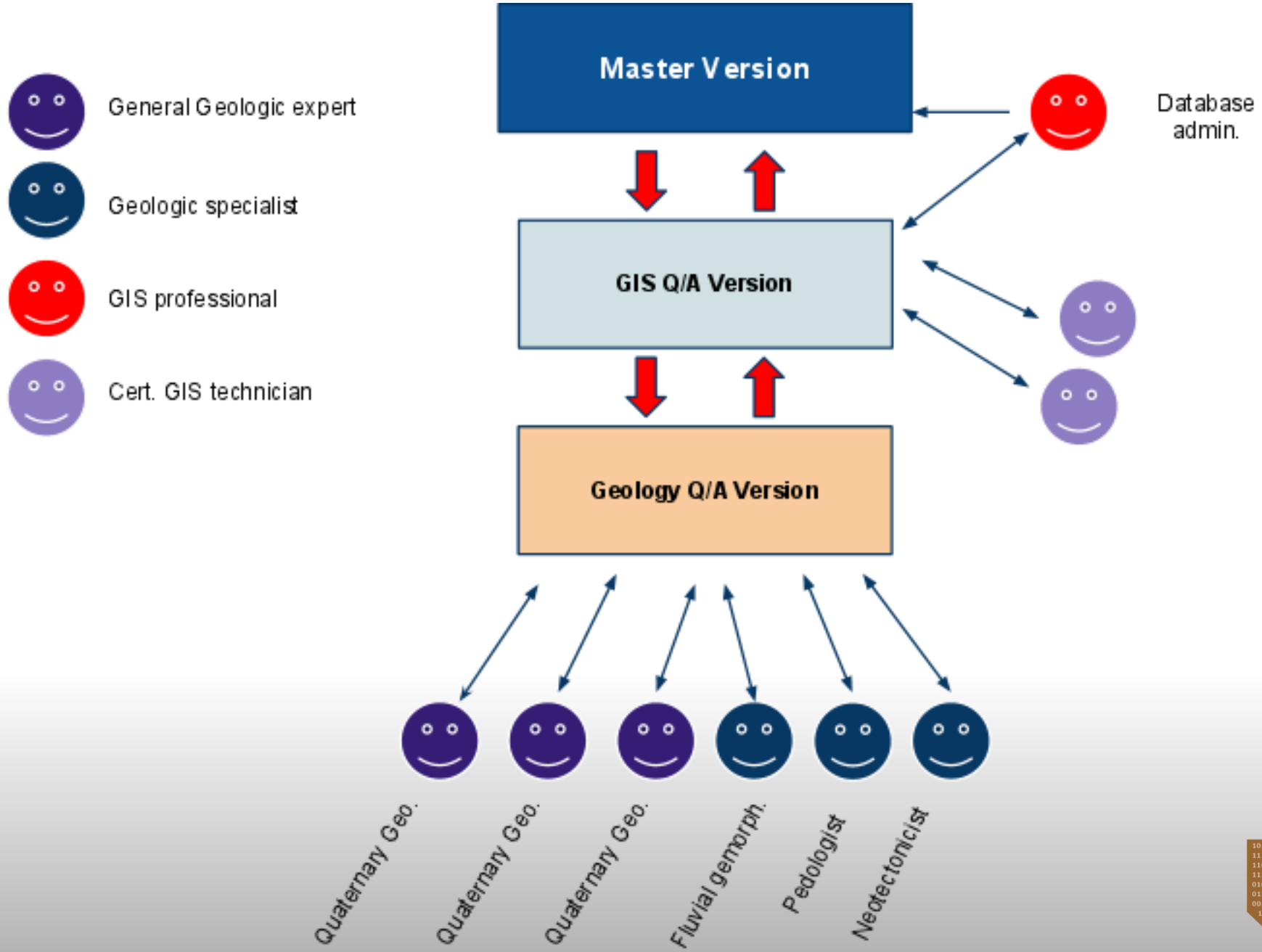
Bing Maps + Twitter App.



File under: useful, handy, not scary

Nevada Digital Dirt Mapping Project

Vetted Peersourcing: The Model for a better map



Nevada Digital Dirt Mapping Project

Lessons:

- Multi-user databases enable rapid map production
- Peer-sourcing model leverages dispersed skill set and maximizes results
- Existing maps can have big problems
- Image services are essential
- Modern digitizing tools are money well spent
- Static maps are inferior to dynamic maps…Face it.
- The old map model is the old map model
- Many other innovations possible..embrace change.