

DIGITAL MAPPING TECHNIQUES 2019

The following was presented at DMT'19
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from the DMT Meetings (1997-2019)

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

A new field data acquisition tool

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Geologist's field work for the Geological Survey of Canada often occurs in isolated environments, with no internet access, and with field parties up to 30 geologists in the same camp. Hence, there is a need to collect data efficiently, backup at the end of each day, and manage a large number of photos.

We decided to develop a new tool for collecting data, to replace our old data collection system because Esri's ArcPad would not be supported in the future. In addition, our team had another look at new hardware and software technologies that have improved over time. This presentation is an overview of our development.



Government
of Canada

Gouvernement
du Canada

A new field data acquisition tool

An overview

Étienne Girard, Gabriel Huot-Vézina, Stephen Williams and Kaz Shimamura
Geological Survey of Canada

Context

Geologist's field work for the Geological Survey of Canada often work in isolated environments, with no internet access, and with field parties up to 30 geologists in the same camp. Hence, there is a need to collect data efficiently, backup at the end of each day, and manage a large amounts of photos.

We decide to develop a new tools for collecting data to replace our old data collection system as ArcPad from Esri was nearing it's end. In addition, our team had another look at new hardware and software technologies that have improved over time. This presentation is an overview of our development.



Presentation

- How did it comes to this ? ;-)
- Constrain and choice
- Hardware
- Three components
- Conclusion



Why

- Ending of ArcPad
 - Development of GanFeld and Shapefile was close to the end
- No internet connection in the field
 - Esri Collector need to have internet connection when we start development
- New hardware
 - Tablet are more efficient than ever but...



Constrain and Choice

CONSTRAIN

- Must be not to different than our previous acquisition tool
- Must have a GIS part
- Must be fast
- Must control scientific language
- Must work offline

CHOICE

- Choose Windows 10 instead of Android because we thought it's easier to develop and have less maintenance with OS update
- No cost
- Manage multi project
- Manage multi device



Hardware choice

Panasonic Toughpad FZ-M1 and FZ-G1

- I5 core, 128 gig, swappable batteries (large battery is good for 8 hours, small battery, 3 hours of work)
- Ruggedized
- Gps included
- Camera included but and maybe...



Behind the software

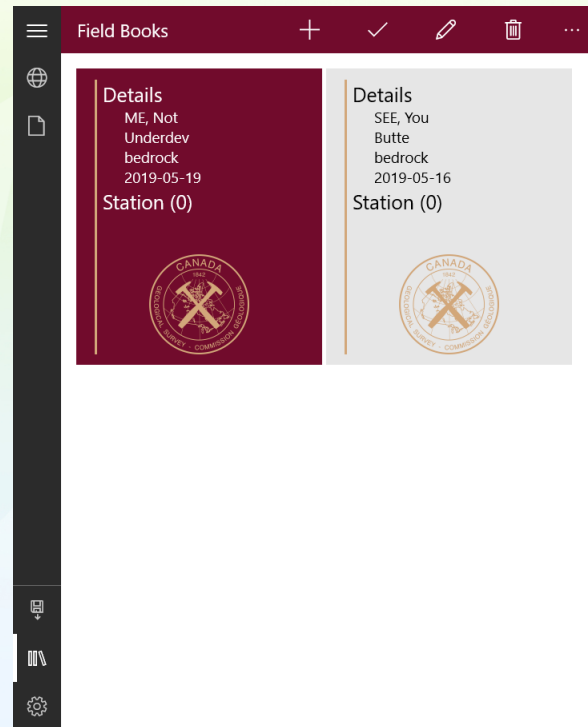
- Database: Sqlite
- Language: C#
- ArcGIS Runtime SDK for .NET
- Super programmer



Software

- Easy to install but must be in Dev environment
- Managing multi-project inside of it

Also a series of tools to manage data



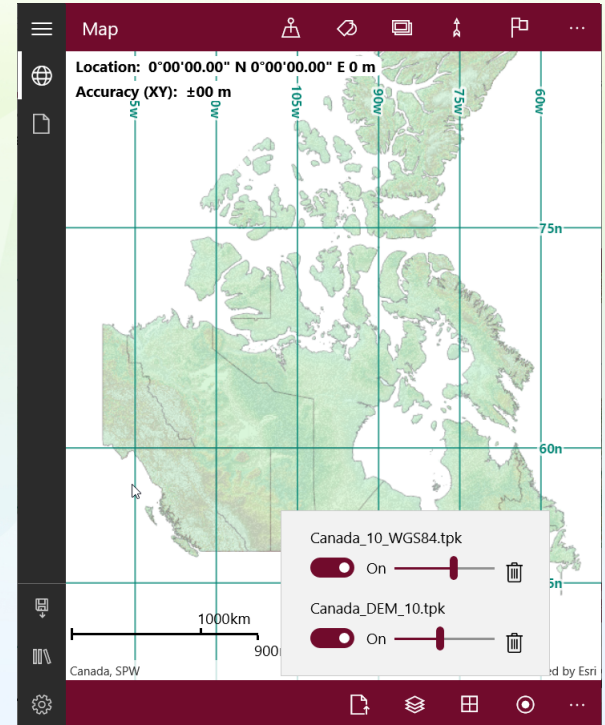
Software: 3 components

1. **GIS** to have the possibilities to see background data
2. **Data collection** with picklist to maintain integrity of the data
3. **Management**



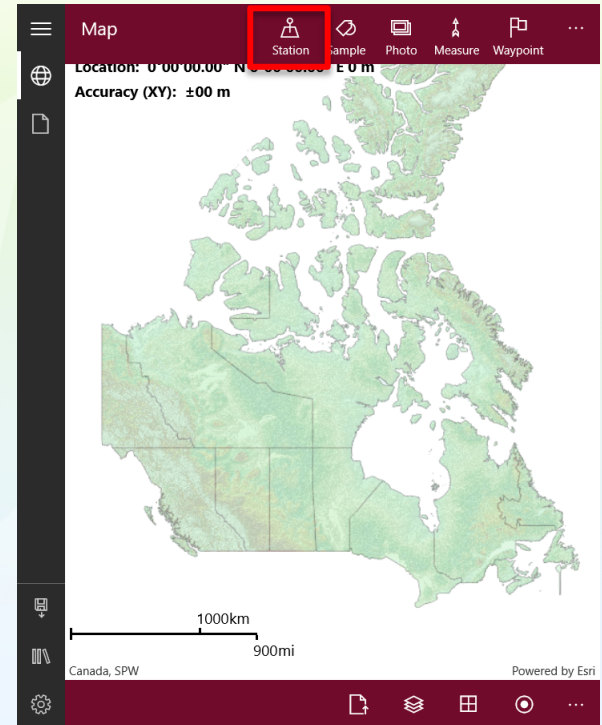
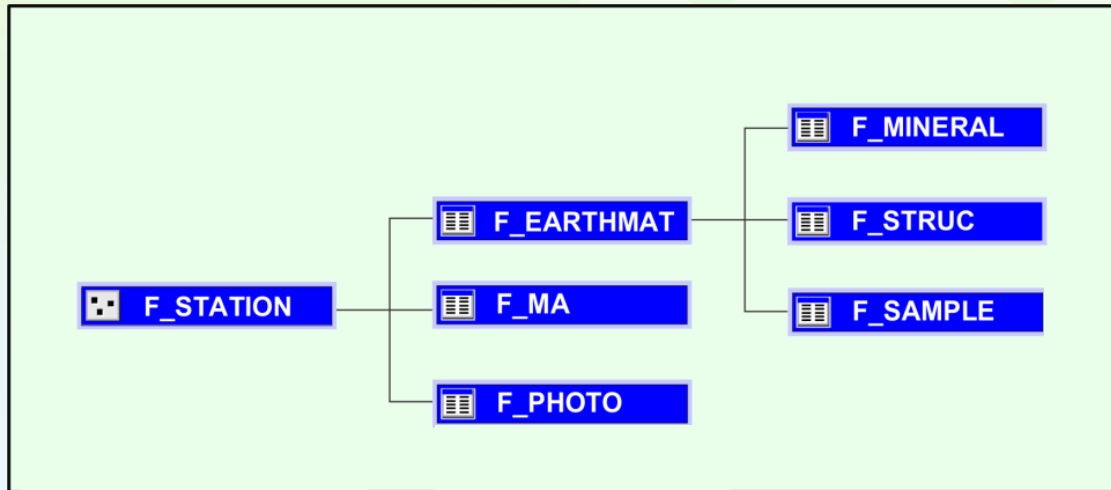
Software: GIS

- TPK format
 - Very efficient
 - Support scale dependencies
 - Esri properties only
- Minimum capabilities
- Layers transparency



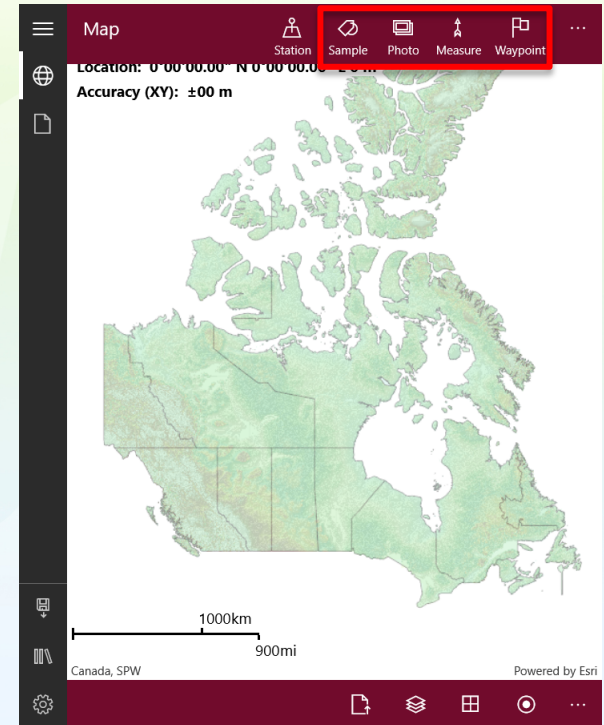
Software: Collecting Data

- Flow base



Software: Collecting Data

- Flow base
- Or specific feature (Quick)
 - Sample
 - Photo
 - Measure
 - Waypoint



Software: Flow base

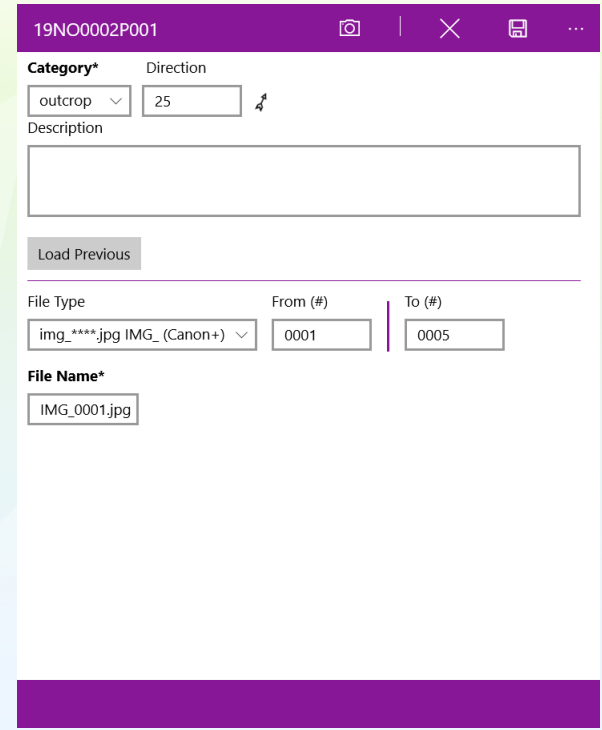
Station 19NO0002	Earth Material 19NO0002A	Sample 19NO0002A01	Structure 19NO0002A01
Observation Type* <input type="text" value="visited outcrop"/>	Lithology <input type="text" value="Entry rock type ie. basalt"/> <input type="text" value="metaplutonic - intermediate ; quartz diorite"/>	Type* <input type="text" value="hand, single"/>	Type <input type="text" value="planar - fault plane ; normal"/>
Outcrop Quality <input type="text" value="good outcrop"/>	Lithologic Modifiers Structural <input type="text" value="massive"/>	Purpose* <input type="text" value="geochronology, Pb-Pb"/>	Azimuth* <input type="text" value="25"/> Dip/Plunge* <input type="text" value="63"/> Related <input type="text"/>
Outcrop Size <input type="text" value="50"/> Air Photo # <input type="text"/> Traverse # <input type="text" value="0"/>	Textural <input type="text" value="heterogeneous"/>	<input type="text" value="geochronology, Pb-Pb"/>	Method <input type="text" value="measured at station"/> Format* <input type="text" value="right-hand rule"/>
Notes (current station) <input type="text" value="Informative Note"/>	<input type="text" value="massive"/> <input type="text" value="heterogeneous"/>	Notes <input type="text"/>	Attitude <input type="text" value="inclined"/> Younging <input type="text"/> Generation <input type="text"/> Strain <input type="text"/>
Notes (since last station) <input type="text" value="SOS"/>	Compositional <input type="text"/>	Format <input type="text"/> Azimuth <input type="text"/> Dip/Plunge <input type="text"/>	Flattening <input type="text"/>
	Grain/Crystal Size <input type="text" value="medium grained 1-5 mm"/>	Quality <input type="text"/>	Fabric <input type="text"/>
	<input type="text"/> <input type="text" value="fine grained <1 mm"/>		



Software: Flow base

For Photo

- One or more
- If you want to describe you must add 1 by 1 or later



19NO0002P001

Category* Direction

outcrop 25

Description

Load Previous

File Type From (#) To (#)

img_****.jpg IMG_ (Canon+) 0001 0005

File Name*

IMG_0001.jpg

Software: Quick info

Sample 19NO0001A01

Type*
hand, single

Purpose*
geochronology, U-Pb

geochronology, U-Pb

Notes
Take a note

Format Azimuth Dip/Plunge Surface
right-hand rule 25 65 upper

Quality
leached

Warning to
indicates
incompleteness

Field Notes

Daily Traverses
2019-05-20

Observation Themes

Station
19NO0001

Earth Material
19NO0001A

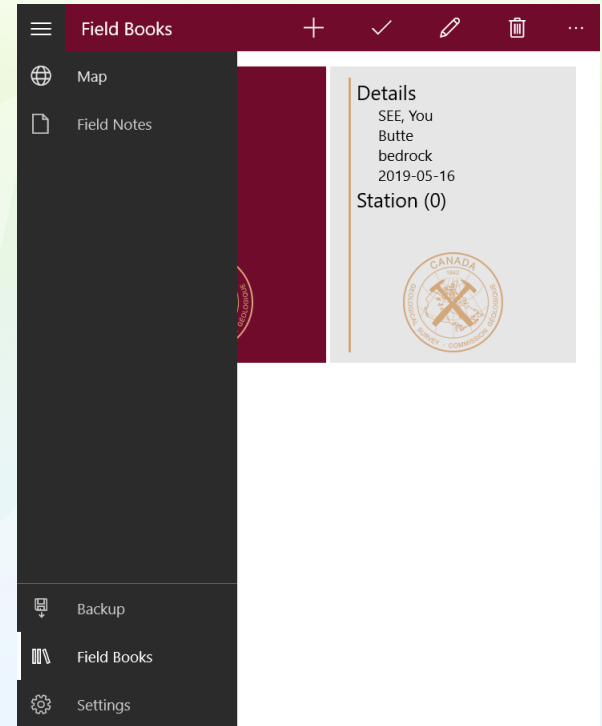
Sample
19NO0001A01
hand, single
geochronology, U-Pb

Structure



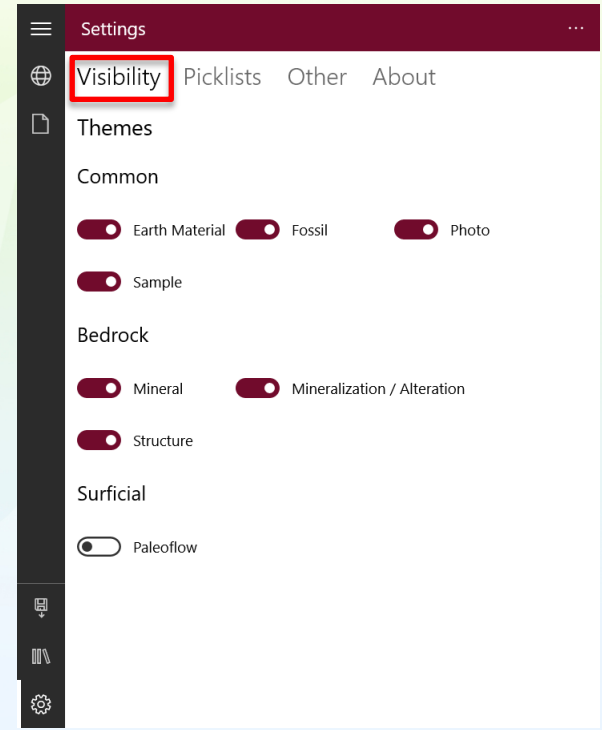
Software: general management

- Switch between Map and Field Notes
- Backup Data
- Select Field Books
- Setting



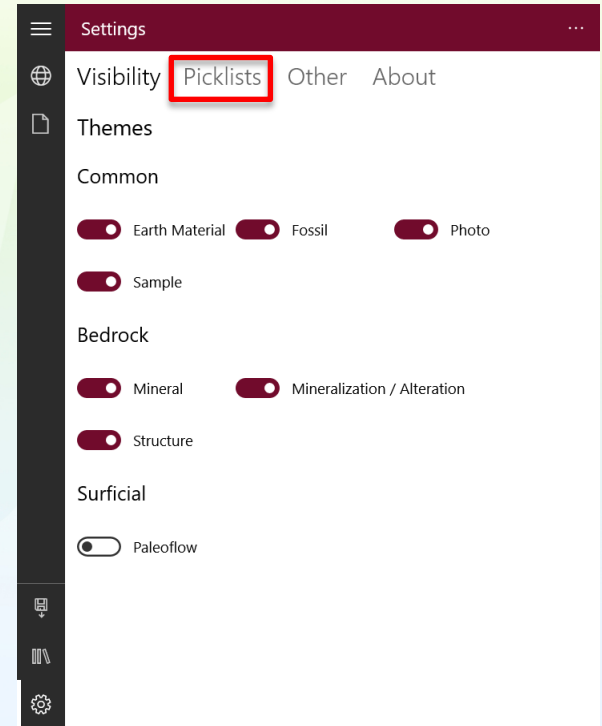
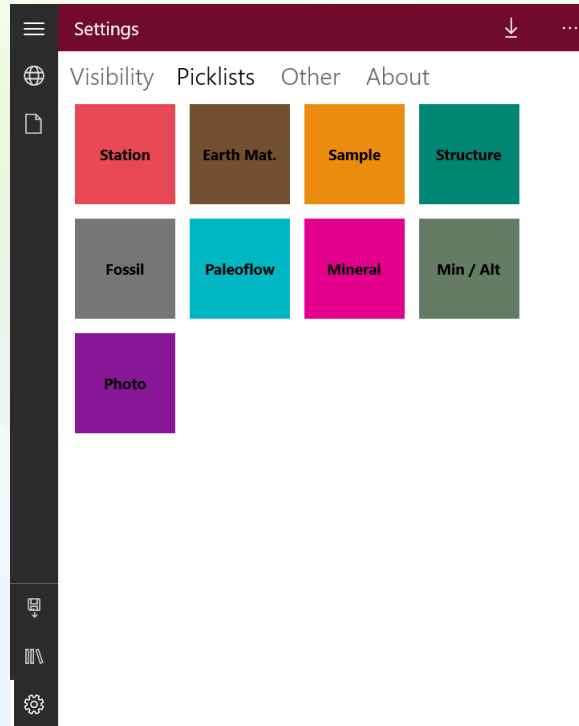
Software: Setting

- Visibility



Software: Setting

- Visibility
- Picklist



Software: Setting

- Visibility
- Picklist

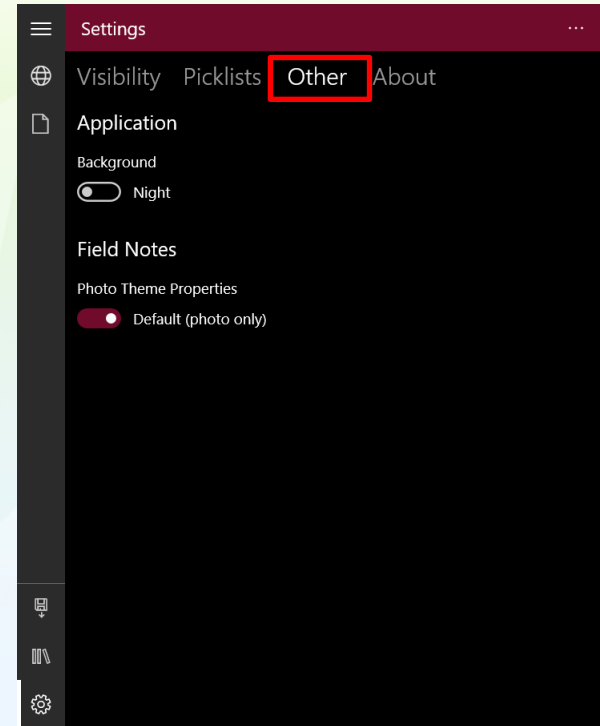
The screenshot displays the 'Settings' application window. The 'Sample' picklist is highlighted with a red box. The 'Sample Theme' window is open, showing the 'Sample Purpose' dropdown set to 'Sample Purpose'. The 'Add / Modify Term' field contains 'mineral fabric relationship'. The 'Terms' list includes:

- geochronology, Re-Os ✓
- geochronology, Lu-Hf ✓
- geochronology, Sm-Nd ✓
- geochronology, U-Pb** ✓
- geochronology, detrital zircon ✗
- mineral fabric relationship ✗
- mineralogy ✓

The 'Default' row shows 'Visible' checked and 'Hidden' unchecked. The 'mineral fabric relationship' term is highlighted in a grey row.

Software: Setting

- Visibility
- Picklist
- Other



Software: Setting

- Visibility
- Picklist
- Other
- About

Settings

Visibility Picklists Other **About**

GSC Field App

Geological Survey Canada, Natural Resources Canada
Version 1.0.128.0

Contact

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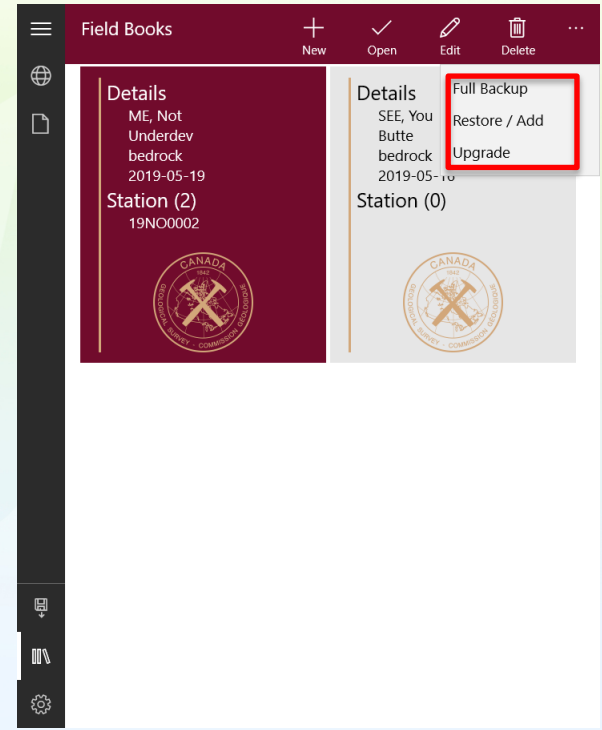
Team

Brouillette, Pierre – Geological Data Flow Project Leader
Cocking, Robert – Training and Advisor
Girard, Étienne – Data Model Analyst
Huot-Vézina, Gabriel – Lead Developer
Shimamura, Kaz – Data Collection Activity Leader
Williams, Stephen - Developer




Software: project

- Full backup
- Restore / Add
- Upgrade

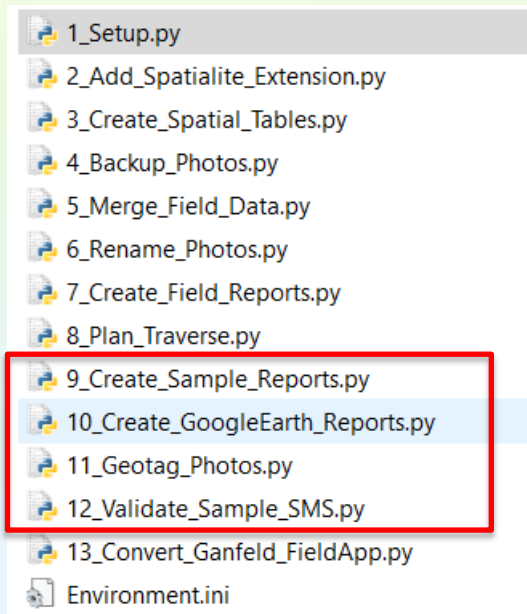


Tools to manage data outside

1_Setup.py
2_Add_Spatialite_Extension.py
3_Create_Spatial_Tables.py
4_Backup_Photos.py
5_Merge_Field_Data.py
6_Rename_Photos.py
7_Create_Field_Reports.py
8_Plan_Traverse.py
9_Create_Sample_Reports.py
10_Create_GoogleEarth_Reports.py
11_Geotag_Photos.py
12_Validate_Sample_SMS.py
13_Convert_Ganfald_FieldApp.py
Environment.ini

Station - 15WGA-L003			
Station Id 15WGA-L003			
Date	2015-07-02 00:00:00	Time	9:09:53 AM
Easting	607966.61 m	Northing	7158039.14 m
Latitude	64.53043812° (64° 31' 49.6")	Longitude	-90.74952619° (-90° 44' 58.3")
Obs Type	visited outcrop	Environ	open ground
Oc quality	excellent outcrop	Oc size	
Note monzo			
Entry type	GPS	PDOP	1.90
		No. Sats	9
Earth Material			
Earthmat Id	15WGA-L003A		
Group	metaplutonic	Type	felsic
		Detail	monzogranite
Interpretation	monzo w/ boudins of hb-rich rock w/ ton gneiss	Confidence	
Mapunit		Occurs as	layer
Structure (modifier)	gneissic		
Texture (modifier)	heterogeneous		
Composition (modifier)	felsic		
Grain/Crystal size	coarse grained 5-30 mm		
Deformation fabric	gneissic		
Bed thickness	thinly laminated 1-3 mm		
Mineral(s)	l-biotite-P m-hornblende-P		
Colour index	0	Mag sus	0.0 x 10 ⁻³ SI units
Structure			
Struc Id	15WGA-L003A01		
Class	planar	Type	foliation
		Detail	foliation
Format	RHR	Azimuth	226 °
		Dip/Plunge	38 °
Photograph			
Photo Id	15WGA-L003P01		
Category	outcrop	Filename	RIMG0037.JPG
		Azimuth	0 °
Caption	bnds		
			

Tools to manage data outside



- 9. Make a sample reports for each geologist to check if there is some mistake
- 10. Google Earth kml to look at the data without ArcGis or our software
- 11. Geotag to include xy coordinates to the photo and some metadata (geologist, description of the photo)
- 12. Prepare Excel sample template to upload data in our corporate system

Conclusion: Positive

- Managing dictionaries is a main enhancement
 - (adding new terms, control order of the pick list, shown not shown, default value)
- TPK is very efficient but specific to Esri
- More control on validation (structure measurement)
- Use real view due to Sqlite instead of Shapefile
- Multi project
- Windows 10 on different hardware



Conclusion: Negative

- Windows 10 is under development
 - Newer version give us problems
 - Windows version vs esri extension
 - Windows version vs Panasonic tools (pen)
- Esri extension is under development
 - We have to adjust code to newer version
- Sqlite was suppose to be editable in ArcGis but still not. Editable in QGIS, and you can directly edit in our app.



More for field...

- Managing photos
- UAV and cliff
- Power in the field



More

- New unified data model
- Tools for compilation in ArcMap

