

DIGITAL MAPPING TECHNIQUES 2013

The following was presented at DMT'13
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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/>



GEM

GMF Data Workflow from Field to Maps: A Normalized Project BedrockGDB

Étienne Girard , Pierre Brouillette
and Gabriel Huot-Vézina



Natural Resources
Canada

Ressources naturelles
Canada

Canada 

GMF Data Workflow from Field to Maps: One Normalized Project BedrockGDB

Outline

- Context
- Challenges
- Requirements
- Approach
 - Normalized database
 - Tools
- Conclusion
 - What we have learned
 - What we have learned with tools
 - Where are we going with all this...



Context

Recently, through the GEM Program, the GSC has undertaken the **Geological Map Flow** project (GMF) to develop protocols for:

- field data collection,
- compilation,
- interpretation,
- management, and
- dissemination of **bedrock and surficial maps**.



Context (2)

Success of the Geological Map Flow (GMF) project depends largely on its ability to **rapidly disseminate quality geological information**. To achieve this **goal**, it is critical to establish

- a **consistent data flow** that allows effective management of field data throughout the processes required by the GMF.

The presentation will therefore address the core of this GMF workflow that is the normalized Project Bedrock Geodatabase (PBGDB).



Challenges

- Overcome the paradigm of **human adaptation to new technologies** and the need to control it quickly and effectively,
- Users with **various levels of skill**,
- **Developed a robust, streamlined and integrated geological data flow from the field data collection up to the dissemination process** using the GSC corporate ESRI environment platform.



Requirements

- GMF's operational requirements (**integrated workflow** from field data collection up to data ready for dissemination processes),
 - **Field work specific requirements** (use of GanFeld system, traverse planification, backup processes, etc...),
 - **Post- field work requirements** (geological interpretation, data integration to corporate databases, etc...),
 - **Metadata requirements** (ensure the input of proper metadata at all stages of the workflow).
 - Ensure **data interoperability** by using common scientific language and standards.



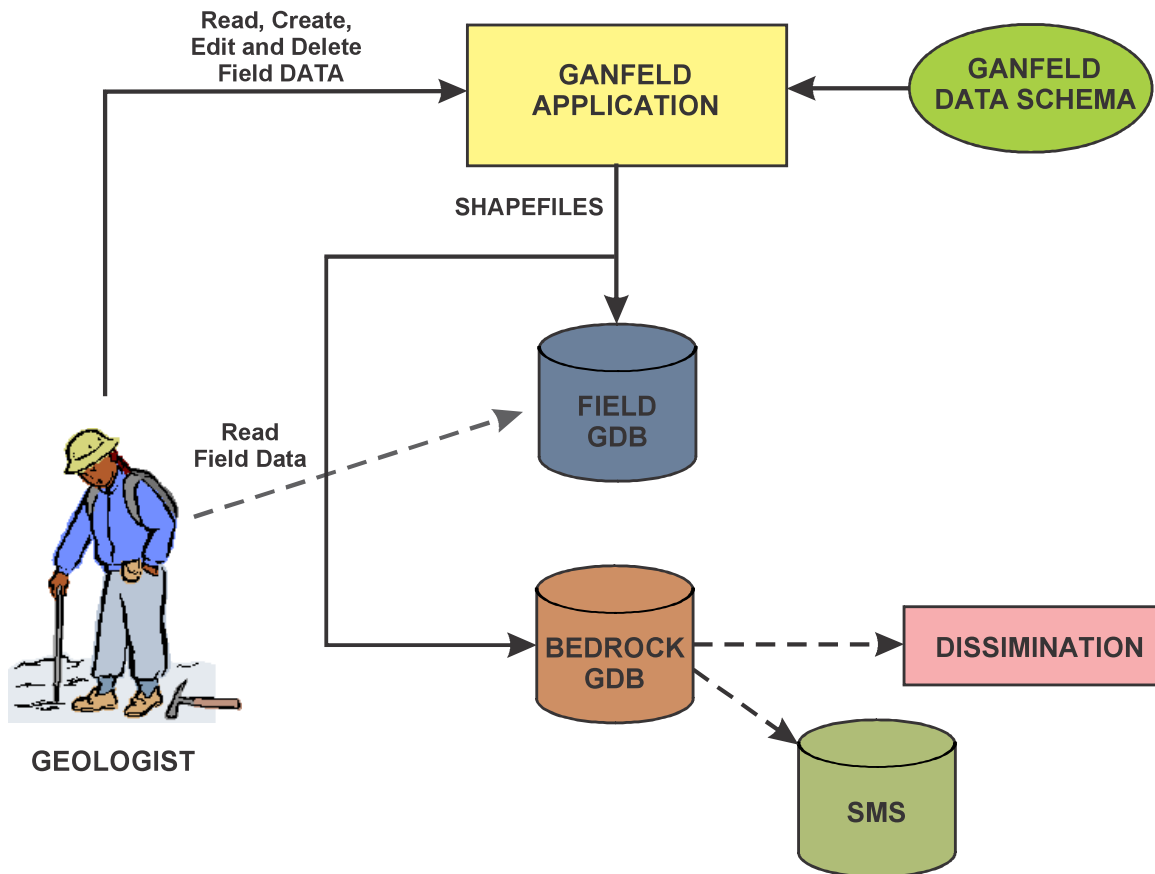
Approach

- Centralize all development around a **normalized database**,
- Develop **tools** that allow seamless data flow,
- Provide an **effective and easy to use** working environment.



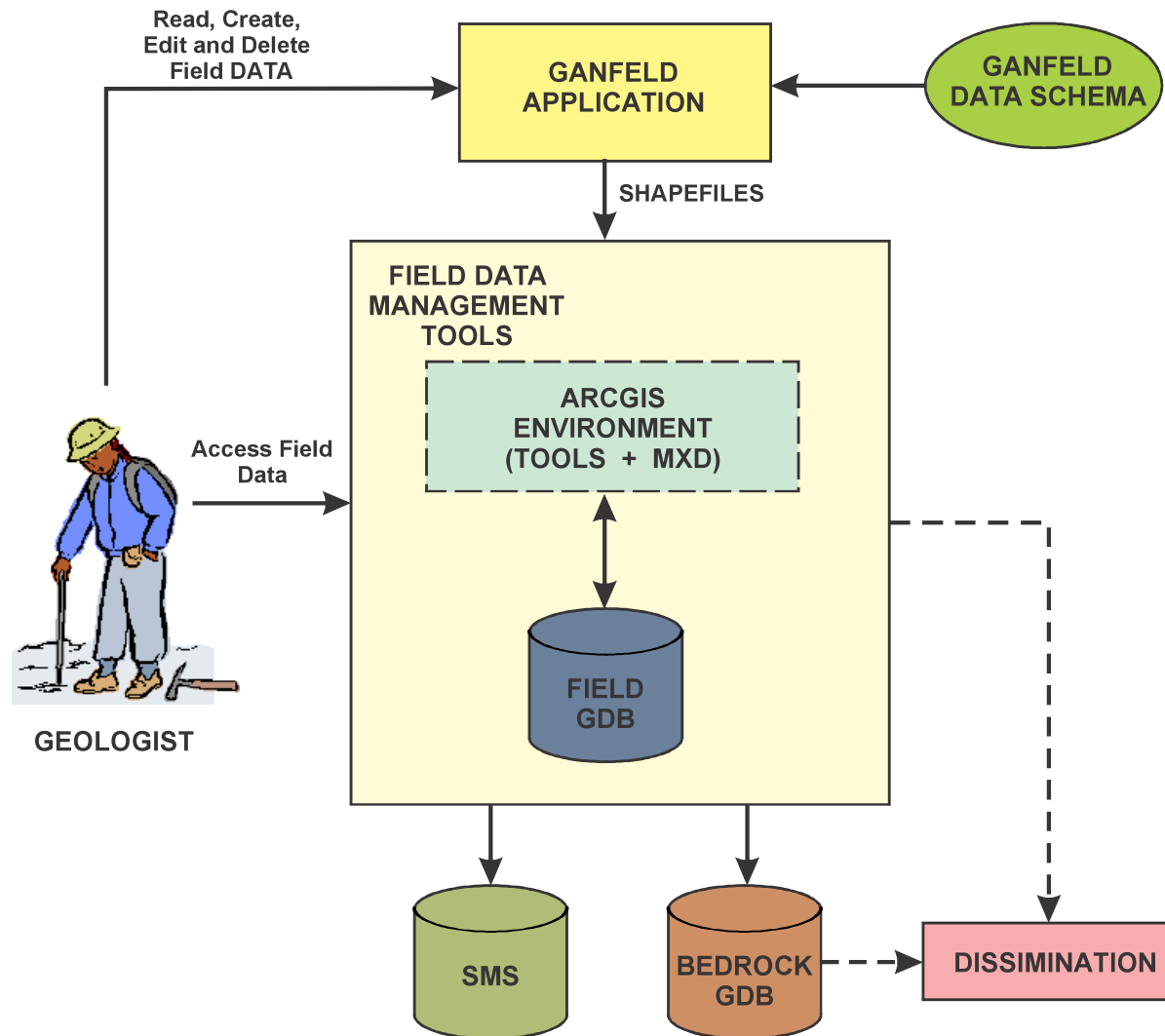
Approach

Flow change: Ganfeld centric / different databases



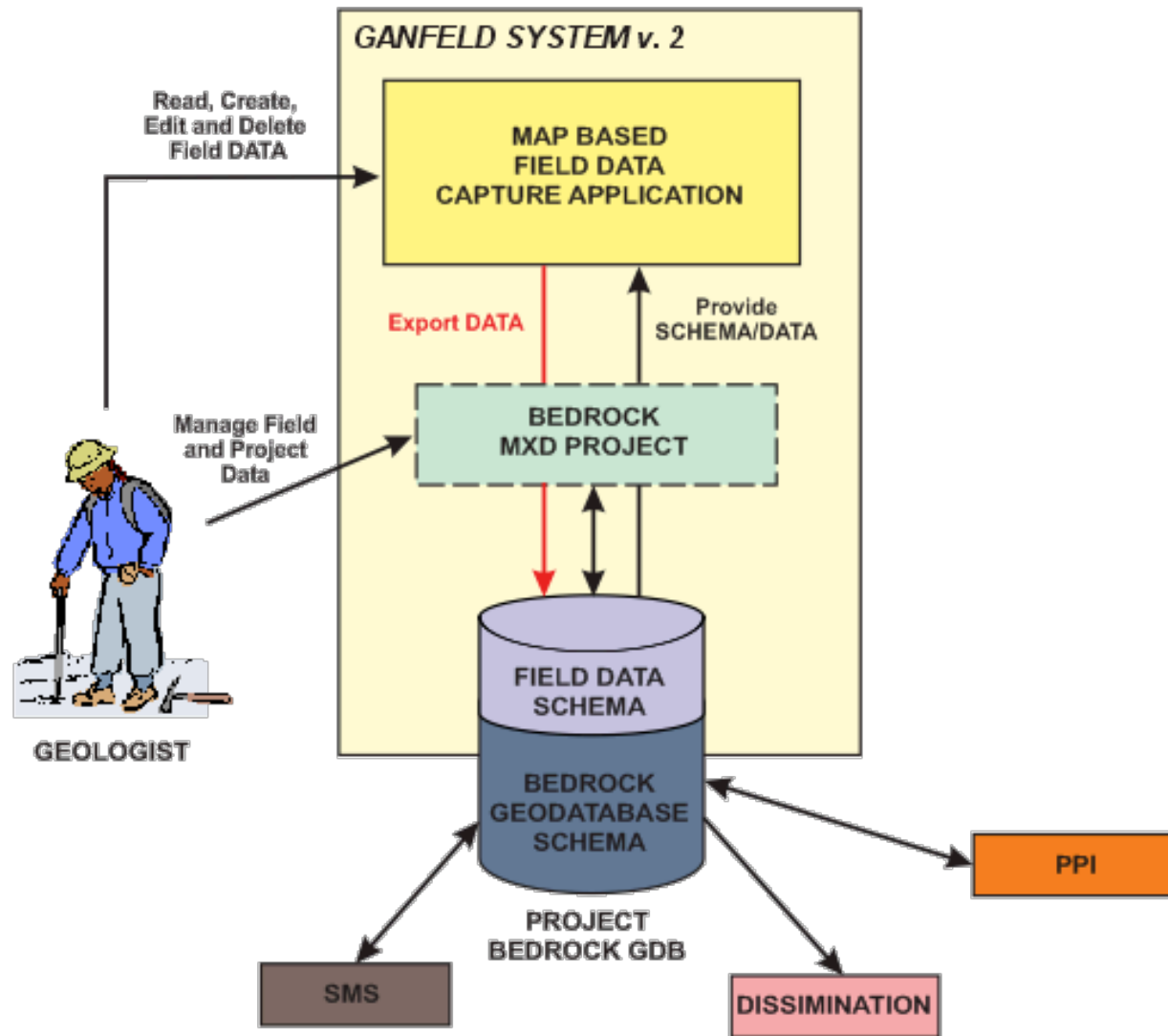
Approach

Flow change: adding tools to manage flow



Approach

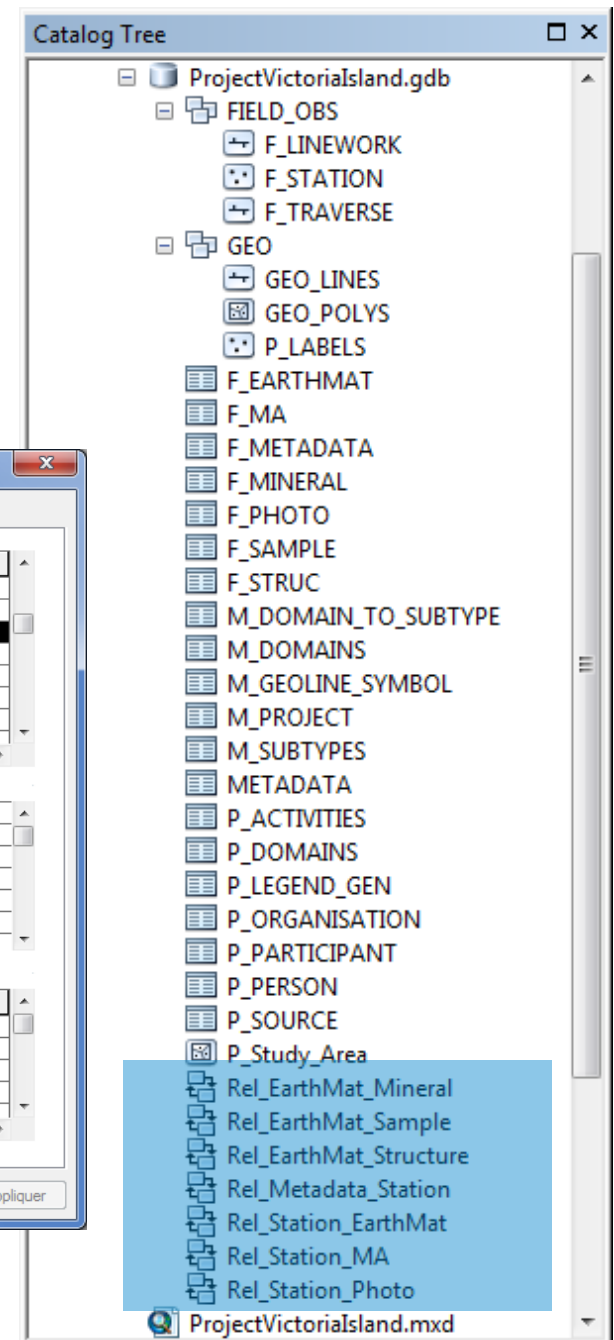
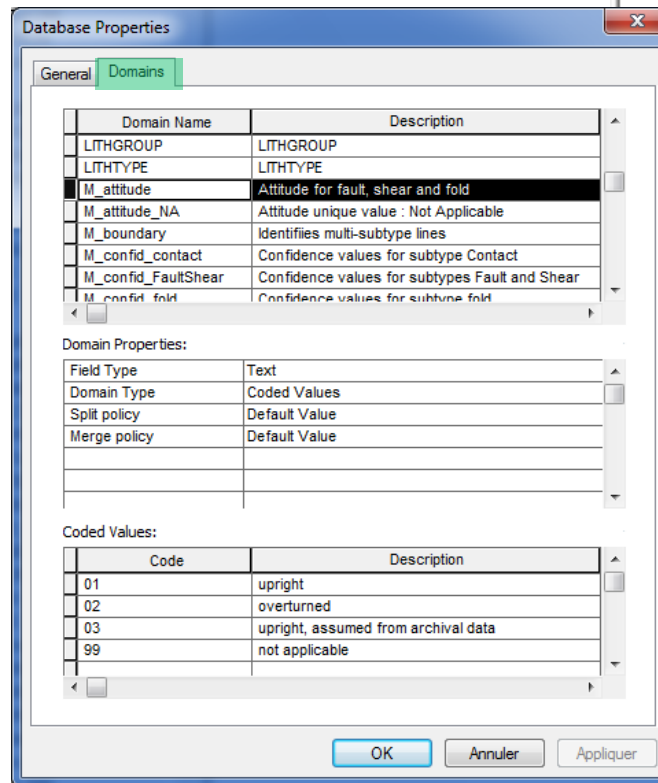
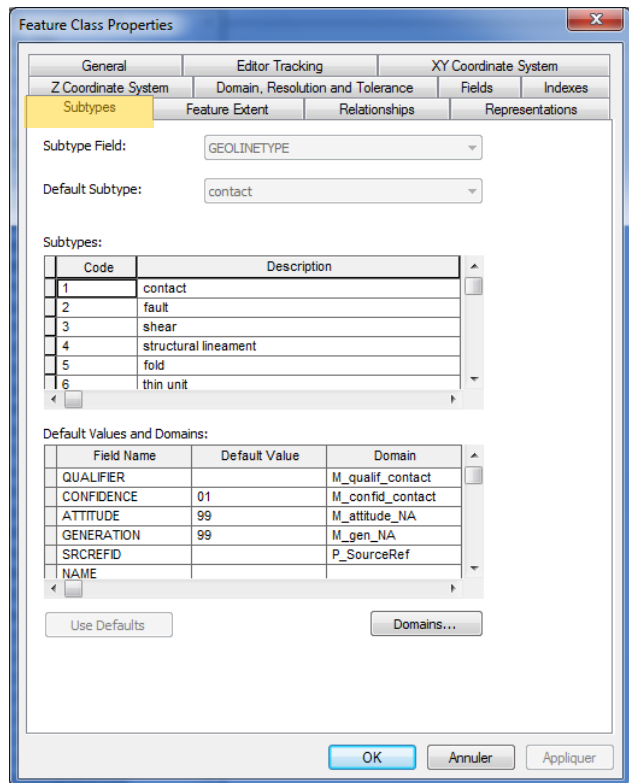
Flow change: A normalized database and its tools for flow management.



Approach: Normalized Database

Structured to:

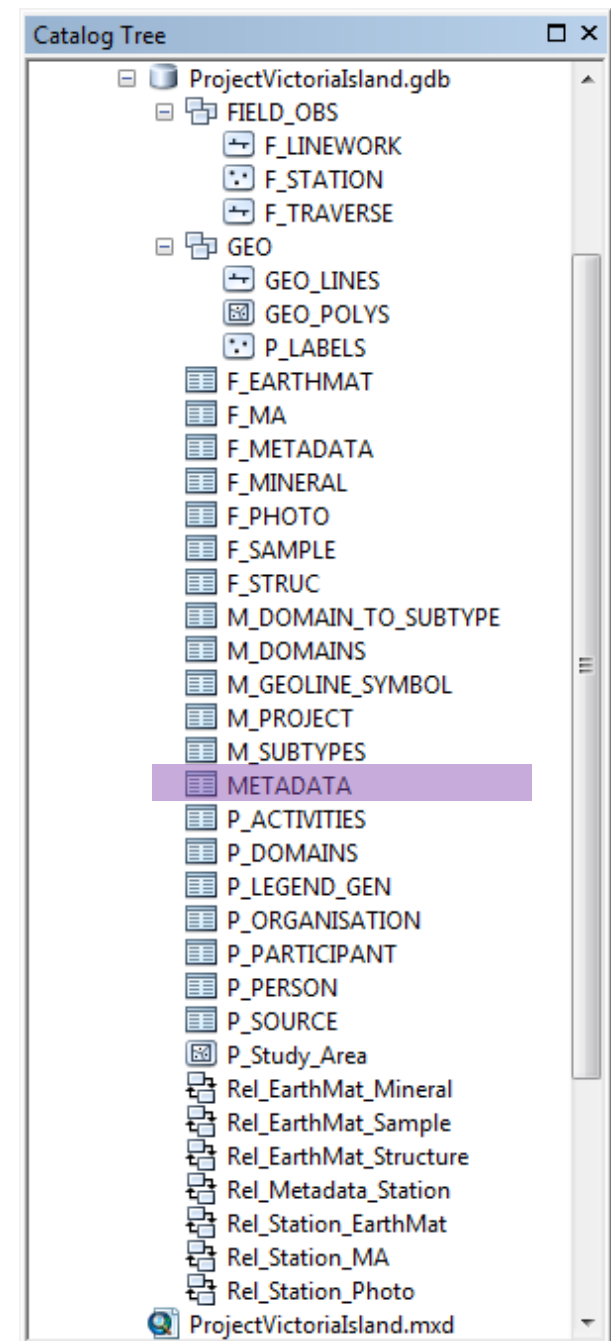
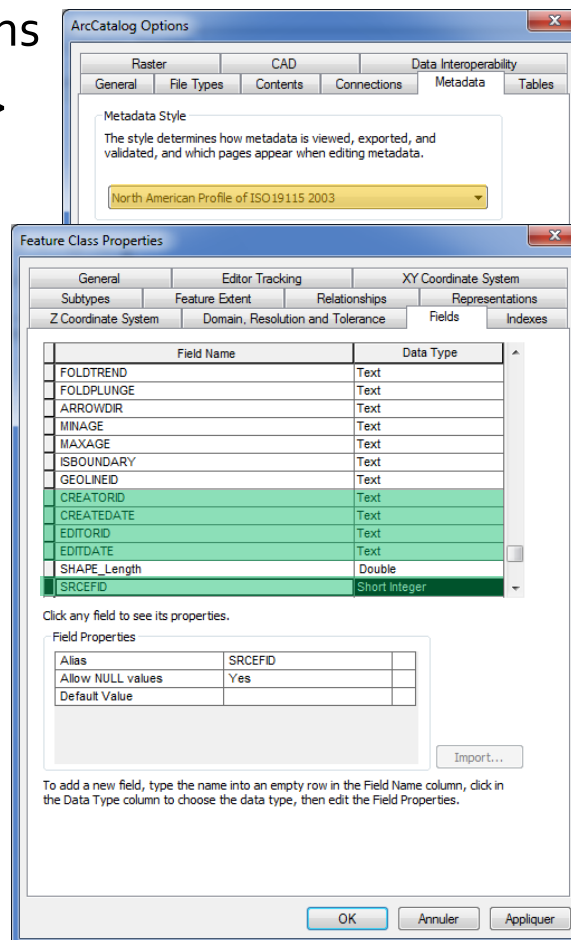
- maintain integrity of data -> **subtypes**, **domains** and **relations**



Approach: Normalized Database

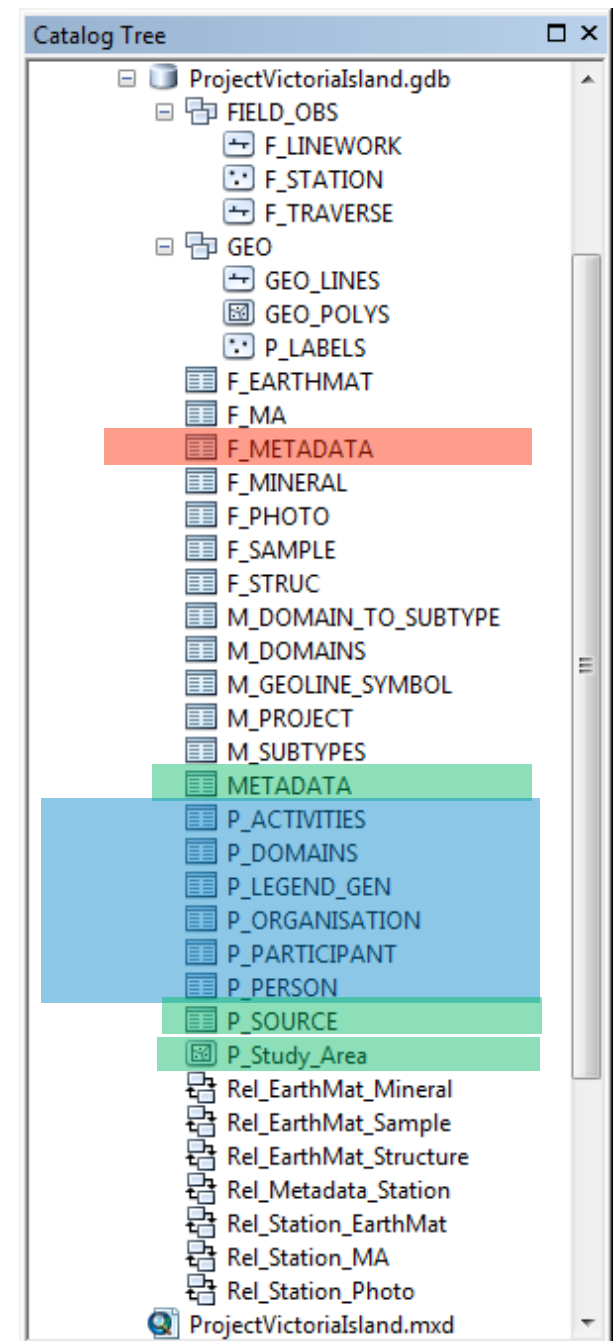
Structured to:

- maintain integrity of data -> subtypes, domains and relations
- support metadata ->
 - at all level
 - Features
 - Project
 - Documents



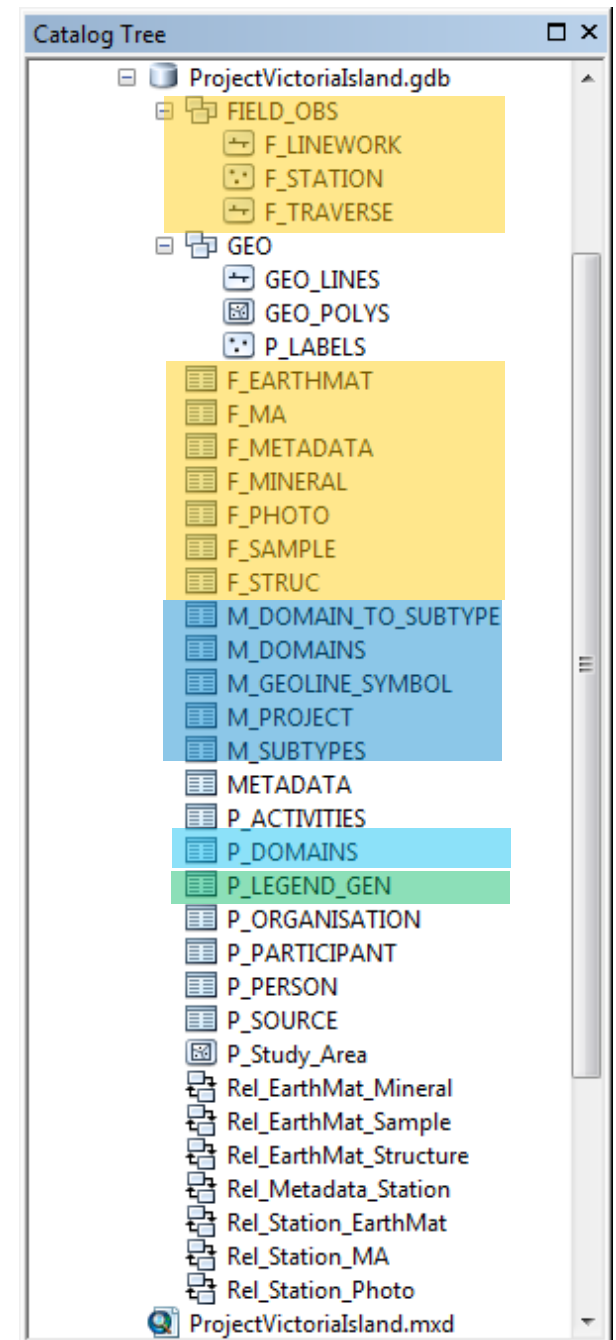
Approach: Normalized Database

- Structured to:
 - maintain integrity of data -> subtypes, domains and relations
 - support metadata ->
 - at all level
 - Feature
 - Project
 - Documents
 - in each step
 - Pre-field
 - Field
 - Publication



Approach: Normalized Database

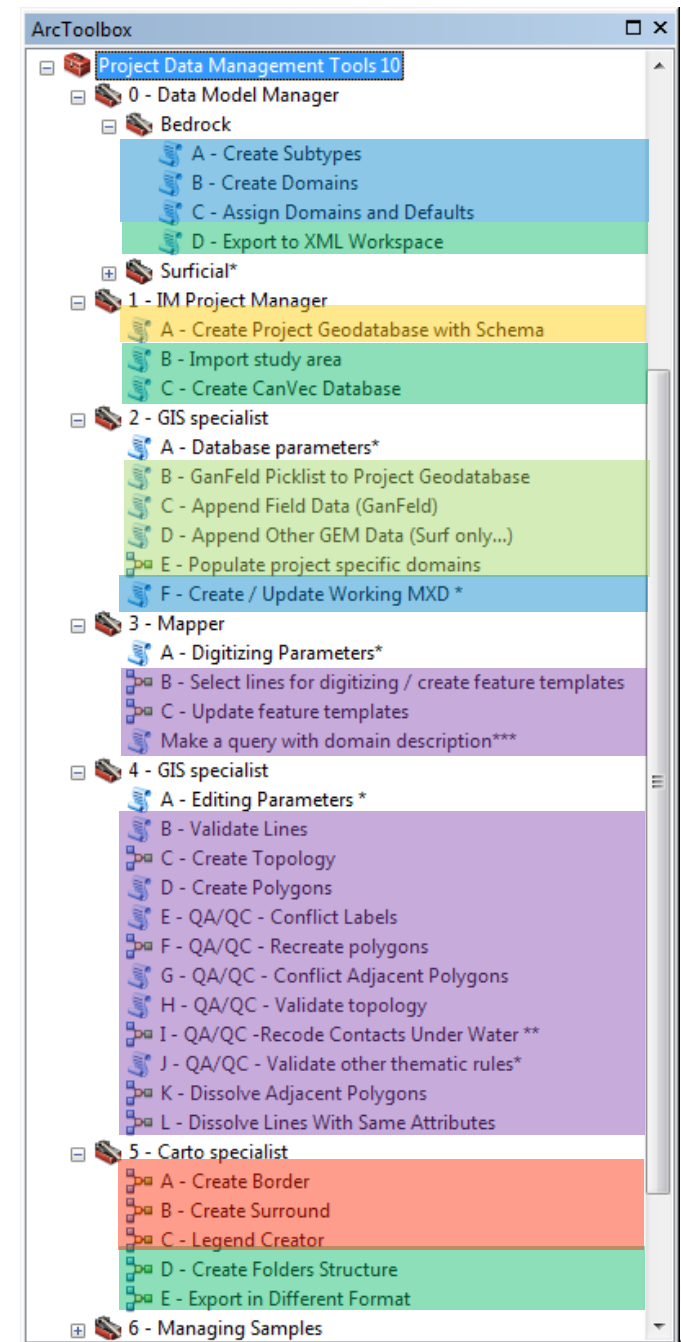
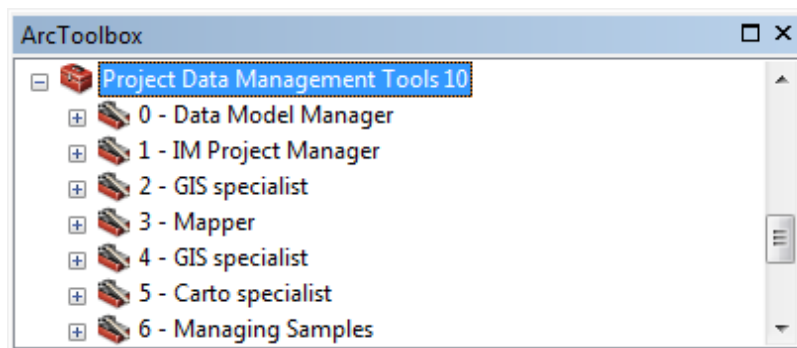
- Structured to:
 - maintain integrity of data -> subtypes, domains and relations
 - support metadata ->
 - at all level
 - in each step
 - collect field data -> axf structure or...
 - use common scientific language -> standard dictionary
 - Use specific project language -> will have to be standardized
 - Facilitate thematic mapping and legend -> specific table used for mapping but also for descriptive notes



Approach: Tools

Development of tools are:

- Proposed with a flow based on actors and time
- File management
- Data management
- Simplify interaction with ER database
- Simplify digital maps management
- Maintain easy interoperability
- Simplify standard map creation...



What we have learned

- Need special features to get the seal of approval :
 - Feature templates
 - XML Report with hyperlink

The image displays two screenshots of a web application interface. The left screenshot shows an XML report for station 11RAT-DT048. The report includes the following data:

Station - 11RAT-DT048	
Station Id	11RAT-DT048
Date	06-07-2011
Time	3:31:32 PM
Easting	550034.8 m
Northing	7887225.34 m
Datum	NAD_1983_UTM_Zone_11N
Latitude	71.08300284° (71° 04' 58.8")
Longitude	-115.61709342° (-115° 37' 01.5")
Obs Type	visited outcrop
Environ	open ground
Oc quality	excellent outcrop
Oc size	
Entry type	GPS
PDOP	3.00
No. Sats	8

Earth Material

Earthmat Id	Group	Type	Detail
11RAT-DT048A	sedimentary	sandstone	quartz arenite

Interpretation

Mapunit	Occurs as	Confidence
Kuujuua Formation	bed	

Structure (modifier)

Structure
trough cross-bedded cross-bedded

Grain/Crystal size

Grain/Crystal size
medium sand 0.25-0.5 mm coarse sand 0.5-1.0 mm

Colour index

Colour index	Mag sus
0	0.0 x 10 ⁻³ SI units

Photograph

Photo Id	Category	Filename	Azimuth
11RAT-DT048P01	panoramic	IMG_0164.JPG	100 °

Caption: kuujuua and natkusiak contact?

Photo Id	Category	Filename	Azimuth
11RAT-DT048P02	outcrop	IMG_0165.JPG	0 °

Caption: representative outcrop photo

Report compiled on 03-02-2012 10:14:46

The right screenshot shows a photograph of a rocky hillside with snow patches, overlaid on a map interface. The map interface includes a 'Construction Tools' panel with options for Line, Rectangle, Circle, Ellipse, and Freehand. The map shows a satellite view of the terrain with a red location marker.



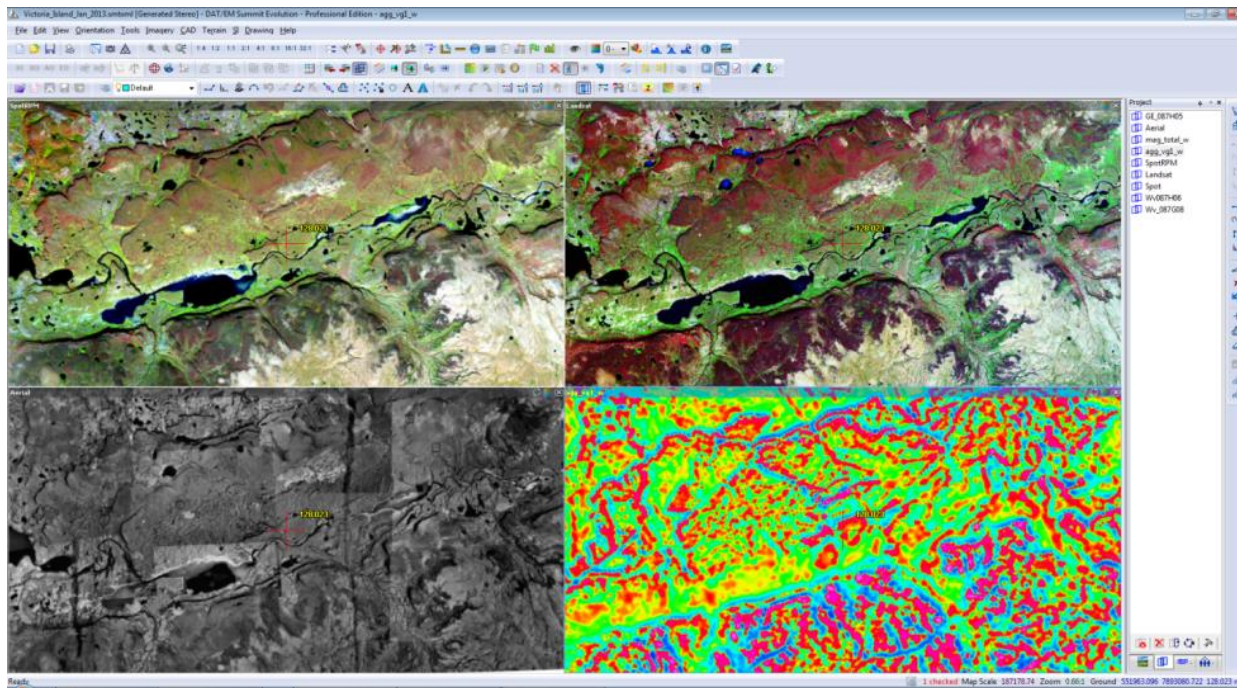
What we have learned

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 - Digitize in 2.5 D



What we have learned

- Need special features to get the seal of approval :
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 - XML Report with hyperlink
 - Digitize in 2.5 D
 - Multi-source data



What we have learned

- Need special features to get the seal of approval :
 - Feature templates
 - XML Report with hyperlink
 - Digitize in 2.5 D
 - Multi-source data
- Facilitate data migration to corporate databases
 - Sample Management System (SMS)
 - Photo library (metadata)
- Need interface for non GIS person for query and entering data
- Will have to find new hardware to collect data
- **People and knowledge are the most important...**



What we have learned with tools

- Pros
 - Easy to recommend a flow
 - Less manipulation of files
 - Easier to maintain integrity of data
 - Use a configuration file, declare general variables and process in one script,
 - Use model builder to plan our development and python to implement tools
- Cons
 - Black box
 - Export from model builder to python is not working



Where are we going with all this...

- Tools development
 - For entering metadata at each step
 - Domain/Subtypes --> Being able to query with description instead of code
 - For geologist... user requirement first...
- Incorporate carto representation
- Make Maps...



Thanks to

- Christine Deblonde for the model... the bedrock database is based on the Christine's development on surficial geodatabase
- Andy Moore for pushing GMF
- GanFeld Group for development and ideas
- and future collaborators...



Probably more of a "Geo Data Flow"

- As we start from the very first step, the field,
- As we maintain more data than the map can show -> scale representation limitation
- As we maintain more metadata than a paper map can show -> feature level metadata
- As we use dictionary, topology, process.



Good times in field give us a lot of idea



Other Link...

- Field data capture
 - <http://pubs.usgs.gov/of/2004/1451/buller/>
- Ganfeld supporting TOOLS for Field Data Management
 - http://ngmdb.usgs.gov/Info/dmt/docs/DMT12_Brouillette.pdf
- Other Field data capture
 - [BGS SIGMA 2012 - Open Source - v1.0](#)
- Digitize in 2.5D
 - <http://www.datem.com/summit-evolution>
 - <http://www.datem.com/capture-for-arcgis>
- IkeGps Esri Partner
 - <http://www.ikegps.com/download-case-studies>
- Why not - Ballon kit...
 - <http://publiclaboratory.org/wiki/balloon-mapping-kit>

