Alfred University

# Using Tablets to Disrupt a Field Methods Course

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## Introduction

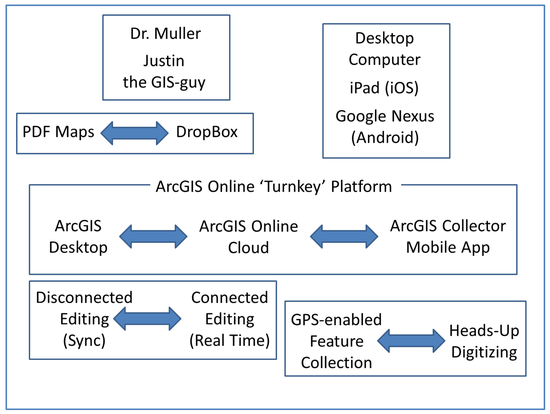
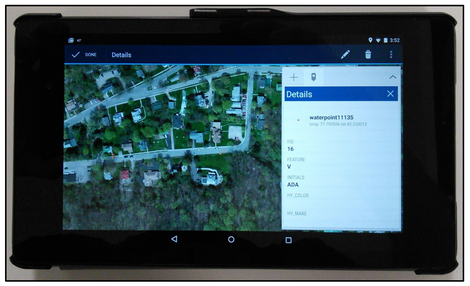



*Diagram of the hardware, software and data acquisition variables considered at the outset of the course.*

The Field Methods course [GEOL 206] at Alfred University has been expanded to utilize tablet computers for data acquisition in the field. For a breadth of experience, students were introduced to PDF Maps and ArcGIS Collector on both iPad 2's and Nexus 7's. To simulate real field conditions the devices were operated without internet/data connections during data acquisition. Data was uploaded to a central repository once back in the classroom.

## Data Acquisition Process

Alfred University's field methods course has traditionally been seven weeks in length, with a focus on non-digital field equipment and methods. In the fall 2014 semester, the course was expanded to a fourteen week (full semester) course with the additional seven weeks dedicated to field collection using tablets. Five of the seven weeks involved actual data collection in the field. The first two of these were spent familiarizing students with the hardware, software and data acquisition processes. The final three weeks were focused on the collection of water utility infrastructure in the community adjacent to Alfred University's campus.




*Field data collection using ArcGIS Collector on a Google Nexus 7.*


*Field data collection using PDF Maps on an iPad 2.*


*The field collection area was divided into quadrants. Students were assigned to quadrants in an overlapping pattern.*

## Data Acquisition Challenges
### or Who Is This Course Disrupting?

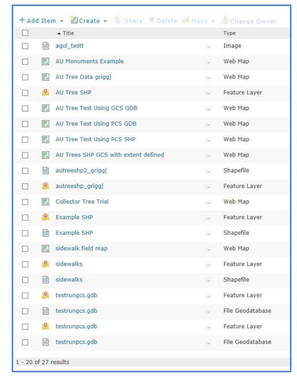
The desire to introduce students to multiple hardware and software combinations, combined with a desire to craft an "individually reproducible" field data collection process, created a higher than expected amount of pre- and post-processing work for the course instructors.

"Individually reproducible" was loosely defined as a process students could accomplish in the 'real world' using skills they learned in courses at Alfred University. A prime example of how this impacted field data collection is multi-user databases supporting topology rules, versioning, etc. were avoided. Off-the-shelf cloud solutions were used, for example ArcGIS Online (AGOL) and Dropbox.

Pre-processing tasks include configuring devices, creating base maps, schema design, feature class creation, administering accounts and groups on ArcGIS Online for the ArcGIS Collector field data and Dropbox for the PDF Maps collected data.

To maximize the efficiency of time spent in the field, the data acquisition process was well tuned prior to class time. This required fairly substantial, time-intensive lab and field testing by the instructors. Even with this 'beta' testing, once students were involved a small number of necessary changes to the data acquisition process were required. These took the form of "When in the field today, don't use the ____ feature." or "When uploading your data, be sure to uncheck the ____ box."

Post-processing tasks were just as varied. The PDF Maps output was a Google Earth .kml file while the ArcGIS Collector output was an ESRI shapefile. Bringing these data types together was done in ArcGIS Desktop and was complicated by the number of student data files and imperfect implementation of the schema. While we introduced the fundamentals of GIS and Google Earth software / spatial data types in class, creating student proficiency in the pre- and post-processing tasks was determined to be beyond the scope of the course.




*A screen capture showing some of the AGOL trial and error work prior to implementing the tablet data collection process.*

**ArcGIS Collector Process Instructions**

ON A DESKTOP COMPUTER
1. use Microsoft Outlook to open email containing feature class - save .zip to your u drive
2. sign in to AGOL (arcgis.com)
3. upload .zip to AGOL (the "cloud") with month, day, team at end - e.g. 'waterpoint11137'* [create a feature service for the feature class (that is the default setting when uploading)]
4. edit feature service properties to allow editing, export and sync
5. add feature service to a web map and save (publish) the web map*

ON A TABLET
6. sign in to ArcGIS Collector
7. download map, make sure work area covers your grid cells*
8. collect data in the field
9. if disconnected feature creation, once connected, sync feature service
10. sign out of ArcGIS Collector

ON A DESKTOP COMPUTER
11. sign in to arcgis.com
12. click 'My Content'
13. check box to the left of your Feature Layer
14. click Share in menu above your content list
15. check 'These groups' and 'FieldCraft_14'
16. click OK [in your My Content list, Shared status should say 'Group']

*It is possible you will need to create 2 web maps / work areas to cover your assigned grid cells. If this is the case, you should upload waterpoints a second time (with 'a' at the end) to avoid versioning issues.

*ArcGIS Collector data acquisition instructions provided to students. Note the actual field collection process is one step of fourteen.*

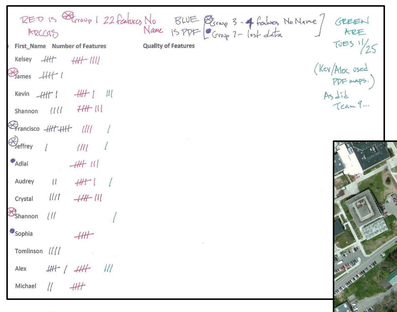
**PDF Maps & Dropbox Process Instructions**

ON A LAPTOP COMPUTER
1. use MAPublisher to create a GeoPDF from a downloaded digital orthoimage of the field area
2. use PDF Maps to create schema file(s) - includes building dropdown 'pick lists' for attributes
3. export schema files from PDF Maps as .kml files
4. create a 'class account' on Dropbox
5. upload the digital orthoimage GeoPDF and .kml schema to Dropbox

ON A TABLET
6. launch PDF Maps
7. import map (GeoPDF) and schema from Dropbox
8. collect data in the field
9. upon returning to an area where WiFi is available, upload data in .kml format to Dropbox; file names must be unique (monthdaygroup#schema) - i.e. 032401v.kml

ON A LAPTOP COMPUTER
10. download student files from Dropbox
11. open all in Google Earth and merge into a single file
12. [optional] open merged kml in a text editor to customize (for example, to remove Google Earth placemark time stamps)
13. [optional] to facilitate sharing with ArcGIS Desktop open the merged .kml file in MAPublisher and export the attribute table as an .xls file

*PDF Maps / Dropbox data acquisition instructions.*



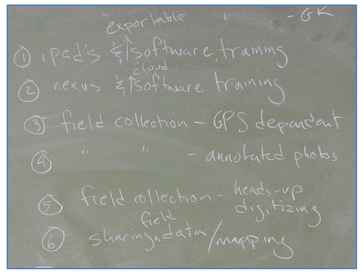

*Tracking students' work in the field.*

*Example of data collection results viewed in ArcGIS Desktop.*


*.kml files uploaded to Dropbox.*

## Conclusions / Next Steps

Planning for the fall 2015 offering of the course has already begun. Discussions are focused on how to sustain the goal of introducing students to "individually reproducible" field data collection processes on multiple hardware and software combinations while also reducing the amount of pre- and post-processing required of the instructors.




*Notes regarding goals for the course taken from a planning meeting for the fall 2015 offering.*