

Geological data collection on your smartphone? Yes, you can.

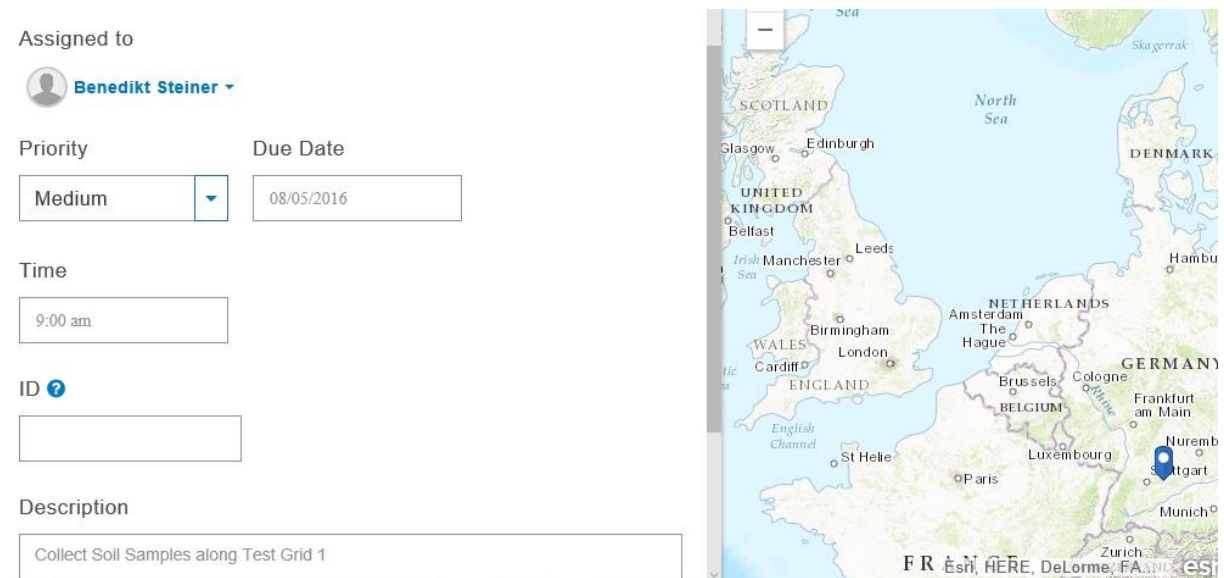
I am sure that everyone still remembers the old university days when we were first introduced to taking notes during field trips. Probably many also cursed when their apparently waterproof notebook fell into a stream whilst inspecting an outcrop.

I am still very fond of the notebook collection that I have in my archive because it allows me to go back and search for information about an outcrop or location that I have noted down 5 years ago. In this respect, I consider myself old-school and to this date, I always take my notebook to the field.


The last few years, however, have shown a rapid development in mobile data capture and management solutions. I believe that modern geoscientists should be open to new developments, but at the same time still apply proven, traditional methods. I was first introduced to the concept of mobile data capture whilst mapping an area in the Namib Desert. My mapping partner at the time brought a GIS-compatible Toughpad into the scorching heat which I found a very useful addition to my mapping gear.

Recently, I looked into using ESRI products and apps to set up easy-to-understand mobile sampling solutions. What I like about the aforementioned product range is that data collection in the field involving multiple users can be coordinated by an administrator who has real-time access to the data acquired as soon as the samplers uploaded and shared the data online. This allows management in the UK, for example, to see, download and work with data (geodatabases) collected in Central Asia the same day.

The workflow – in this case a soil sampling programme - starts with setting up a project and sampling schedules through ESRI Workforce. Multiple users can be assigned areas or grids where they collect samples or map the geology.




Reminders can be set that will appear on the samplers' smartphones - currently Apple, Windows and Android products are supported and can use the ESRI apps.


My Projects > Soil Sampling Survey

Assign ▾
Filter by type, location or ID
+ Assignment

Status ▾
Due ▾
Priority ▾
Assignee ▾
Sort ▾

1 assignment

Soil Sample Collection


48,755940 9,745955

Medium Priority | ⌚ Due in 21 hours

ESRI currently works on the Navigator app, which linked to Workforce, will direct the sampler to the sample locations. This is a similar feature to Google Maps.

When the sampler arrives on site, data collection through Survey123 starts with a sample collar form that captures all relevant background information related to this sample. Information to be entered can be:

Sample Collar Form

Project Code

Date and Time

Sample Number

Sampler

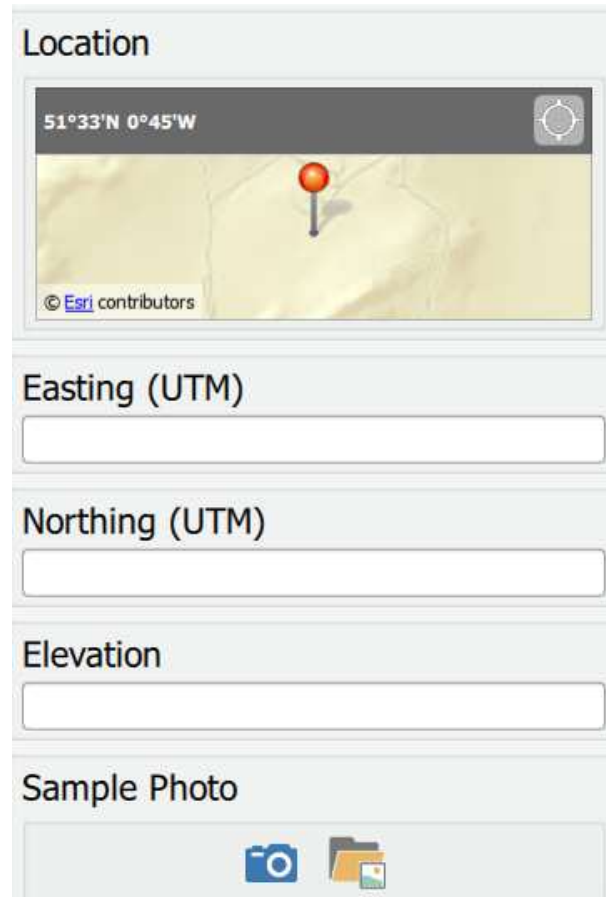
 Benedikt Steiner
 James Barnet

Organisation

Survey Method

Grid Used

Capturing the location and a sample photo is also possible in the collar form. The application has been tested in remote parts of the UK with average cell phone signal. From experience in other parts of the world, the downside in remote areas with poor cell phone coverage is that location precision will probably be equally poor. In this case it is recommended to link a GPS signal enhancer to the mobile phone. Alternatively coordinates can be double checked using a separate handheld GPS and subsequently entered manually in the provided UTM and elevation fields.



The screenshot displays a mobile application interface for data collection. It features several sections:

- Location:** A map view showing a red location pin. Above the map, the coordinates $51^{\circ}33'N$ $0^{\circ}45'W$ are displayed. A compass icon is visible in the top right corner of the map area. Below the map, the text "© Esri contributors" is present.
- Easting (UTM):** A text input field for entering the Easting coordinate.
- Northing (UTM):** A text input field for entering the Northing coordinate.
- Elevation:** A text input field for entering the elevation.
- Sample Photo:** A section containing two icons: a camera icon and a folder icon with a photo thumbnail, used for selecting or capturing a sample photo.

When sample collar information has been added, the sampler then enters specific sample data obtained from the field. A selection of options is provided in the image below:

Sample Details

Sample Type	SievedSoil ▼
Soil Horizon	B ▼
Regolith Category	InSitu ▼
Regolith Specification	Saprock ▼
Colour	Brown ▼
Unsieved Texture	Silty ▼

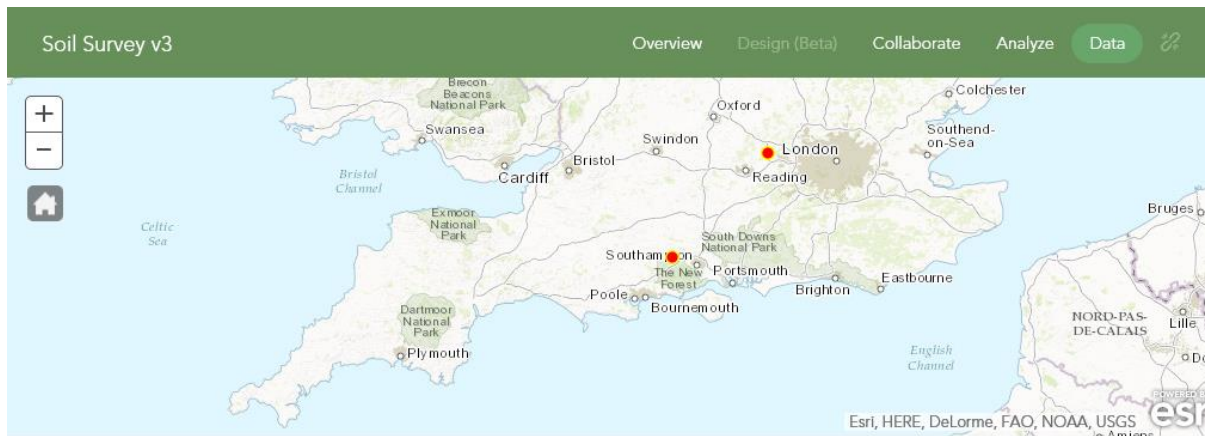
Every geological sampling campaign should have a quality control process in place. This is commonly referred to as QAQC and involves the insertion of standards, duplicates and blanks. The developed application allows to capture QAQC data through a number of dropdown lists and data entry fields.

QAQC

StandardID	Test_Standard ▼
QAQC Stage	S ▼
DuplicateID (parent sample)	<input type="text"/>

When a sampling campaign is finished, all samplers can upload their data to ArcGIS online and share the results with the team. Exports are available into .csv, .shp or fgdb formats and

make it a straightforward process to load the collected information into GIS systems.



Colour	Unsieved Texture	Moisture	Sieved	Mesh Size	Contamination	Topography
Brown	Silty	Dry	SievedDry	#200	Agricultural	Flat
Brown	Silty	Dry	SievedDry	#200	Agricultural	Flat
Grey	Silty	Dry	SievedDry	#200	NoneObserved	Flat

In summary, mobile mapping and sampling workflows have become more and more common in the geology and environmental sector. Using advanced apps on smartphones now allow teams of samplers to collect data in the field and upload the data to a secure server. Real-time data sharing further facilitates decision making further up the management ladder.

Benedikt Steiner, 20.08.2016