Capturing, Managing, and Analyzing Polygons in SMART - Brainstorming

Background

SMART has received requests to support the capture of polygons (including lines) as part of mobile data collection covering at several use cases:

1. There is a request to capture a polygon to group together a group of observations within ecological monitoring.
2. There is a request to capture a polygon as an attribute for observation, with different end uses:
    - Use of the polygon itself in SMART queries/reports
    - Ability to walk/mark an area with Mobile and then have SMART generate an estimated area of the polygon.
        - For example - area of crops damaged - some users might just want the value for the area damaged, while some may want the specific polygon, and some may want both.

We need to fully scope out this requirement for a number of reasons. Firstly, we need to architect a solution that meets current and likely future needs. Secondly, as SMART processes evolved, we have committed to ensuring we take a holistic approach including creating and updating documentation and ensuring we round out features to include core features reporting and making data available through APIs.

Broader Implications

We need to brainstorm broader implications such as:

- SMART records observations at a single location at a single point in time. By recording polygons, we also potentially introduce events that happen over a period of time.
- How do we architect for polygons that cover multiple observations? Do they become an attribute of each? Does this evolve our thinking on groups of observations? Does this lead us into also consider how we support linking observations by an organizing concept such as an event (e.g. an encroachment by a poacher that generates multiple disparate observations).

- Do we need to support multiple and related polygons? If we have polygons that are used to group observations, can only observation be in multiple polygons? Do we need to associate a polygon with an attribute e.g. the path or direction two different poaches ran off in? How about relating polygons? When we record the poacher camp, are there other polygons people would want to record?
- What level of reporting do we want to support? Is displaying on a map for reporting enough for an MVP? How about geospatial querying, e.g. polygons within an area, observations that a geographically close to a certain distance of a polygon.
- Does the functionality require us to be able to support recording multiple observations at the same time? For example, if I am recording the boundary of an area of land that was cleared in a forest as an attribute of forest clearance observation, and I come across other observations, how does SMART support going between observations?
- Where do we need to update documentation and supporting material?

Defining an MVP and a Vision

A possible MVP would be supporting:

1. Capturing single polygons (including lines) as an attribute of observation
2. Supporting the ability to include polygons in query results.
3. Supporting the display of these on SMART maps
4. Making the geojson (sets of points) available as part of exports and API calls
5. Updating all documentation on map reporting

Other items that we would want to price out as options that we would execute based on cost would be:

1. Basic spatial statistics e.g. polygon length, perimeter and area.
2. Ability to record objects remotely e.g. without having to physically walk around a place (the area could be large or observed at a distance)
3. Ability to edit/tweak the polygon
4. Ability to record if the polygon way entered via gps or manually, and if it was manually tweaked
5. Ability to query all observations within a polygon
6. Ability to type or group polygons
7. Ability to query all polygons by type or group
8. Ability to display on polygons by type or group
9. Ability to combine polygons

Items that we assume would be part of a future version, but should be included in the MVP if costs/effort is marginal and they don't limit future options include:

1. Ability to decide whether polygon is a feature of an incident, an observation, or a features of a collection of observations and/or incidents. This supports a number of use cases including the idea of an incursion - the architecture for a collection of observations

and/or incidents should support creating a collection without having a geography. This raises the wider issue of whether we support incident attributes.

2. Abilty to create a polygon as a line segment or a minimum convex polygon from a set of observations (either all sequential or selected)
3. Ability to run geoprocessing queries, e.g. all observations matching a criteria within a certain type of polygon (see https://www.wavespartnership.org/sites/waves/files/images/Basic%20GIS%20Operations.pdf for examples)
4. Ability to record multiple observations at the same time e.g. as part of recording observations within a polygon (main issue here is keeping observations “open” and easy to access from a user perspective, and making sure they are finalized with required fields). This approach will support the request to record a line for the start and end of a set of observations for ecological monitoring.