

September 27, 2023 Meeting

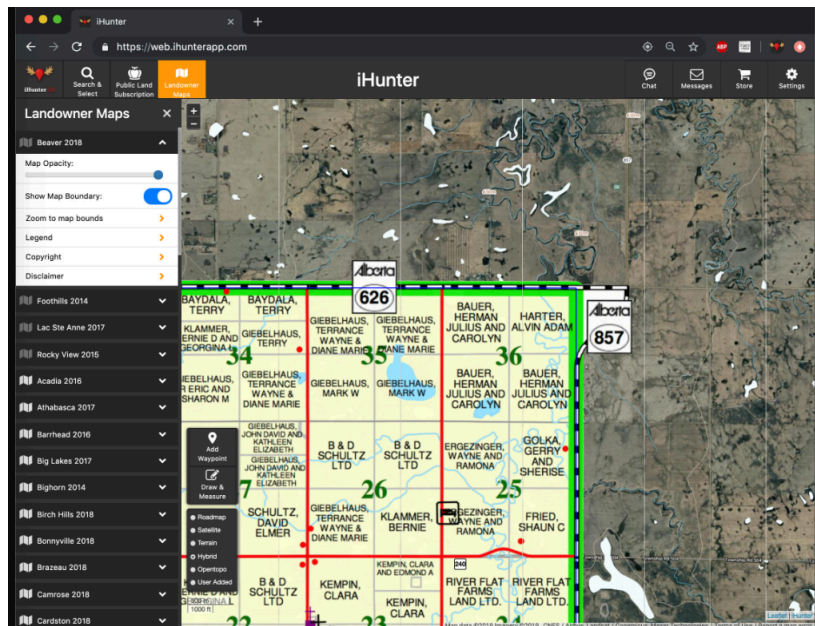
Process

- Data Flow of On-Combine
 1. On-combine camera scans crop for characteristics
 2. Info gets processed and stored in the Jetson Nano (microcomputer)
 3. The Jetson nano sends the JSON info to the tablet
 - a. Tablet does not save/store the info only the Jetson
 4. Geolocation of combine is available via subscription to Jetson Nano
 - a. A table will store historical data
 5. If internet connection available, send to Google Cloud Platform
 6. GCP info will be available to main phone or “buyer” to able to view data
 - a. If data connection on combine then can view data in real time through cloud
 - b. If no data connection is available then it is not real time, have to wait until tablet is in range of data source.
 7. GCP sends final data do web application for final analytics and view
- Distributor
 - Seller notes serial numbers of units and associates with accounts. 1 account may have many combines.
- Benchtop
 - Farmers want to test their grain post-crop
 - Benchtop camera scans sample of crop
- Grade appraisal
 - Contract grain earlier in season to get more money
 - Don't want to upgrade contracts if don't have to/miss targets

Tech Stack (google based)

- Current
 - Mobile:
 - Dart language
 - Flutter framework
 - backend framework?
 - Web
 - Ionic Angular
 - Java backend
 - Backend framework?
 - Cloud
 - Google cloud platform
 - Google firebase

- Potential Integrations
 - Openremote.io (3 tiers)
 - Location services (modifiable map, geofencing trigger)
 - Data visualization
 - Multi tenancy access - roles, device access
 - Gateways, central access, synchronization
 - Rules, notification
 - Land title
 - Land does not equal crops
 - API
 - Land titles typically handled by provincial/territory governments
 - Contact about api/db access?
 - Existing applications
 - iHunters (pay for application, likely no api available - contact them)



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- Official website of sask land titles registry
 - <https://www.isc.ca/LandTitles/FindTitle/Pages/MapSearch.aspx>
 - Free but need an isc account
- Do we even need the land titles? The mobile app will show real time location and progress so we could just show the boundaries of their path as they progress.

Requirements (functional/non functional) and features

- General
 - Must adhere to Ag data transparency
 - Private data (unhackable, secure)
 - Host on GCP
 - Simplify onboarding as much as possible (find nearby land, farmers already have too many apps to juggle)
 - Tenant management
 - Everything is through one database. Tenant id must be used for every db call to ensure private access to data
- Mobile
 - Must be able to integrate into existing on combine application
 - Mobile phone and tablet
 - Must be able to handle cases:
 - Base case: not enough bandwidth, farmer periodically uploads data from the tablet
 - Alternative case: if enough bandwidth, tablets can upload data in real time
 - Map data
 - Real time overlay of harvested grain for map
 - Farmer sees map filling up as combines are harvesting
 - See relevant data that is most important
 - Which aspect is lowering the grade
 - Each factor has different threshold values
 - Visual representation of grade levels and threshold values (speedometer?)
 - Image collection
 - Implemented by GTA, tab over to check results (farmers like seeing the image)
 - Images not stored (size is too large)
 - Land designation
 - Farmers will want to mark subzones (different crops)
 - Identify boundaries and subdivide/extend boundaries
 - Gamification?
 - Mini competitions between farmers
 - targets/thresholds
- Web app
 - Comprehensive analytical tools
 - Farmers will use historical data and put in their agronomy app
 - Finance
 - Grain management tools
 - Farmers may have grain from one field in one bin and grain from another in bin 2, if they move these bins into a bigger bin, it gets retested. We should predict/calculate the aggregate's grade
 - How is grain to bin tracked? Based on the benchtop app data?

- GTA Admin Web App
 - Monitor and manage devices on a combine
 - Differentiate whose data belongs to whom
 - If farmers have trouble with combine tech, GTA should be able to see activities of the farmer's application
- Bench top app
 - Grain data and predictions

Solution planning

- Considerations
 - Ag data transparency (related to admin app)
 - Must build to follow guidelines (farmers own their data and should know/give consent to everything done with their data)
 - Must be able to open/close doors for specific use cases
 - Admin app to search a client, view dashboard as admin?

Resources

- Contacts
 - Divyesh - COO, main contact
 - Jojo - Full stack developer
 - Bhumit - Mobile app developer
 - Aamir - Jack of all trades, ML lead
- Data
 - Quality grain data with GPS coordinates
 - Sensor data
 - Provided from field trials, can mock it out for testing purposes
- Farmers/users
 - 2 farmers on advisory board (tech savvy, interested in precision)
 - Ron Folk (less tech savvy)

Future plan (estimate)

- Week of October 2: Clarify functional and nonfunctional requirements (not features)
- Week of October 9:
 - User storyboard/research with farmers
 - Define analytical tools, modes of display, and alternatives
 - Database/architecture design
 - Entity diagram
 - Data flow diagrams

- Need to learn how ground truth ag. models their data/how it interacts.
 - Begin prototyping
- Week of October 23: Present prototypes, gather feedback
- Week of October 30: Begin development/iterate prototypes
- End of November: MVP1 complete/near complete

Questions

- For farmers
 - What types of analysis do farmers want to have? User research needed.
- For Ground Truth a g.
 - Are we working on a separate mobile application designed to be integrated into the on combine app at a later time? Or are we integrating/working directly on the on combine application
 - Are our mobile/web applications going to live in our repository or yours? (add as collaborators for both)
 - Dillan/Brandon will be added to a github owned/created by GTA
 - User login
 - Distributor's portal will handle account setup and update database with new user credentials?
 - Relationship between users & combines/tablets? 1 to many?