



BioSphere



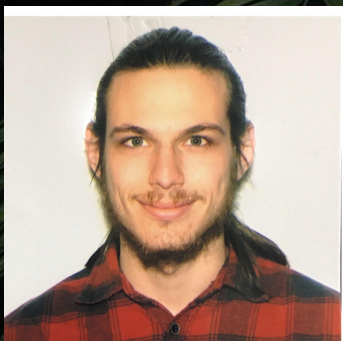
Project Biomapper

Sponsored by Dr. Christopher Doughty & Jenna M. Keany



Team BioSphere

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Our Sponsors and Mentor



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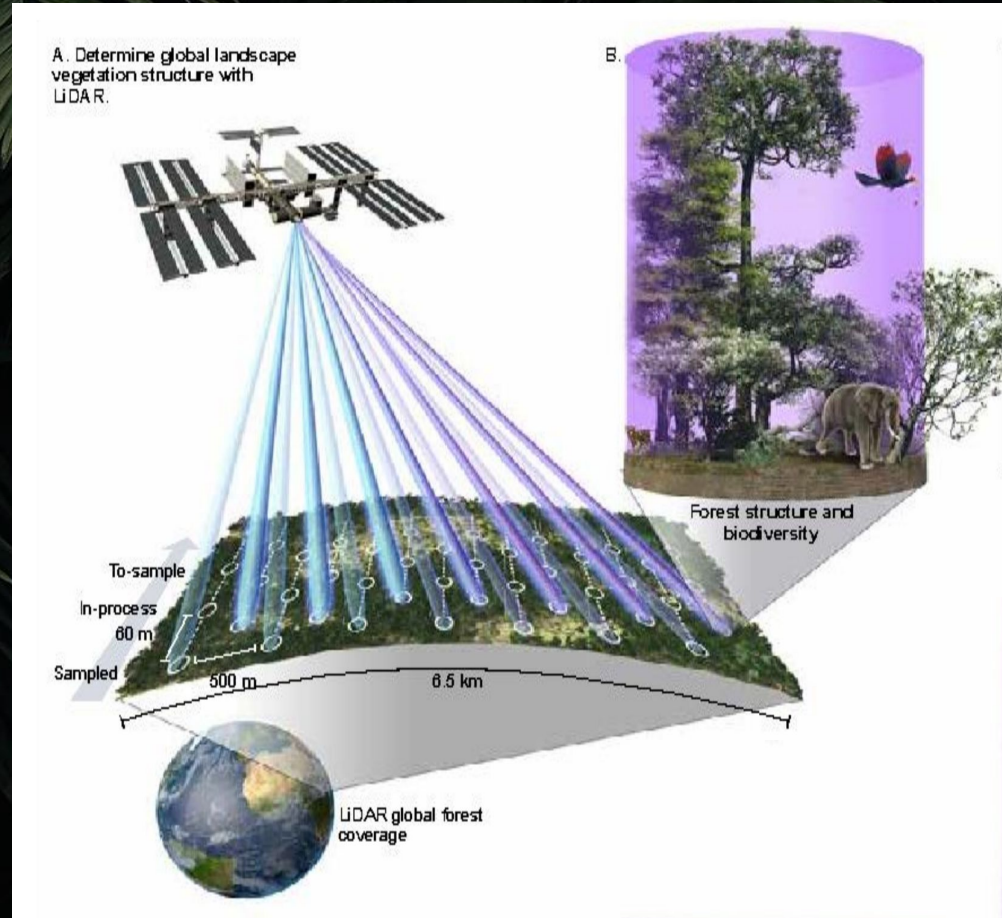


Melissa Rose

Mentor

Background

- Tropical forests are vital to the global ecosystem
 - Carbon storage
 - Species-rich
- Ecologists use lidar data to locate animals and draw conclusions about forests
- Policy makers use these conclusions to protect forests



Problem Statement

GEDI: Global Ecosystem Dynamics Investigation (Satellite lidar sensor)

- New (2018) lidar system with near-global coverage
- Measures the 3D structure of the Earth
 - Canopy height
 - Surface elevation
 - Canopy vertical structure
- GEDI data is complex, difficult to process, and hard to obtain



Problem Statement

- Ecologists and researchers struggle to obtain and view the GEDI data they need
- Our clients can process GEDI data for us
- Need for a tool to visualize the processed data
 - Google Earth Engine exists, but is inadequate

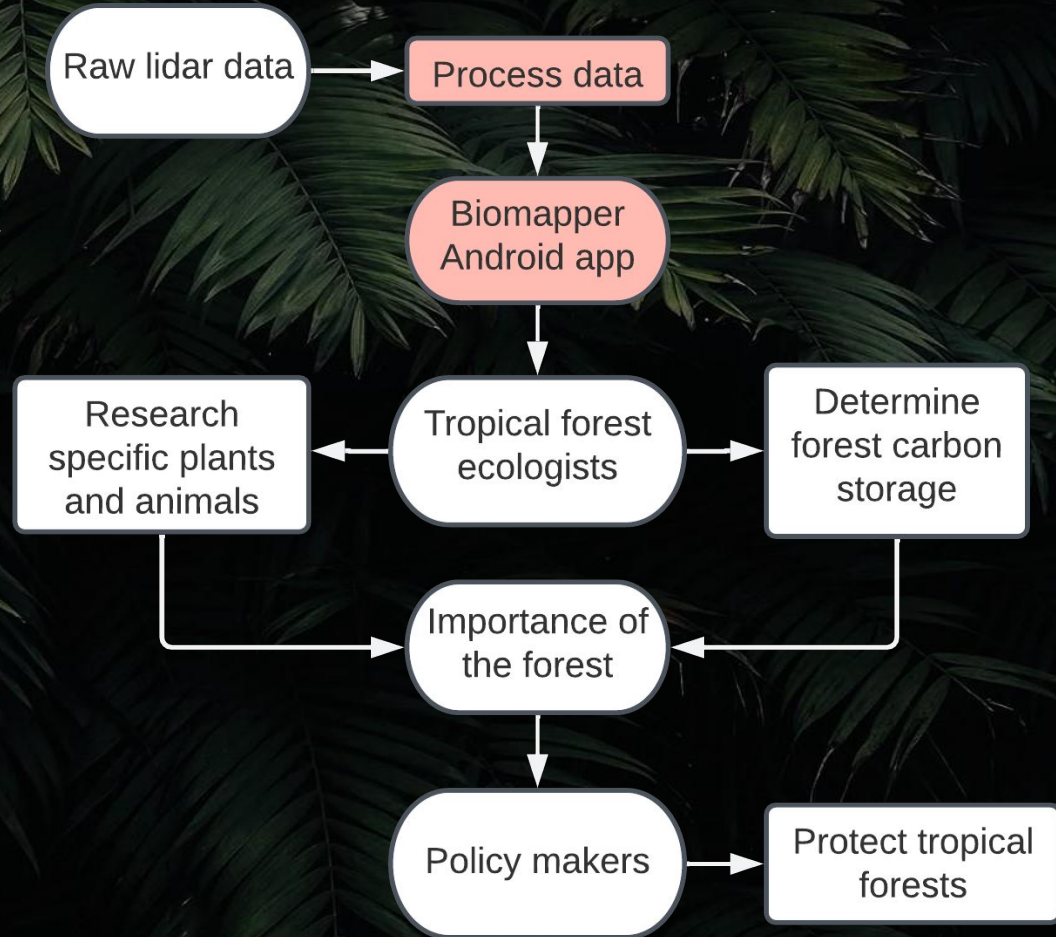
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Solution Overview

Android application - Biomapper

- Provides ecologists with an easy-to-use tool
- Includes a map for visualizing lidar data
- Gives ecologists access to data wherever they go



Domain-Level Requirements

Display a map that can be navigated

- Scroll and zoom color-coded maps
- Can select one of three data types

Tools for locating areas of interest

- Ability to filter data
- Get data value for a selected point

Offline functionality

- User can specify the region of interest and data types to download

The app will support French and English

- User can switch between them

Default center location

- Either the region of interest or the device location

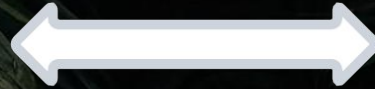


Implementation Overview

Mobile App



Map Data
Retrieval



Web Server



Implementation Overview

Android app responsibilities

- Displaying the data on a map
- Downloading for offline use
- Getting data value for a selected point (when offline)
- Including French and English translations



Server responsibilities

- Storing map data
- API for filtering map data
- API for getting data value for a selected point



Android App Demo

Use case #1 - Finding a region of interest (ROI)

- You are a tropical forest ecologist looking for a specific species of bird
- You know the bird lives in trees of medium height (about 25 meters tall)

Android App Demo

Use case #2 - Downloading a ROI

- You have found a region of interest
- Now you want to download that area for a specific set of data types

Android App Demo

Use case #3 - Switching language

- Device is in your native language (English)
- You want to temporarily let another ecologists see the app, but they prefer a different language (French)

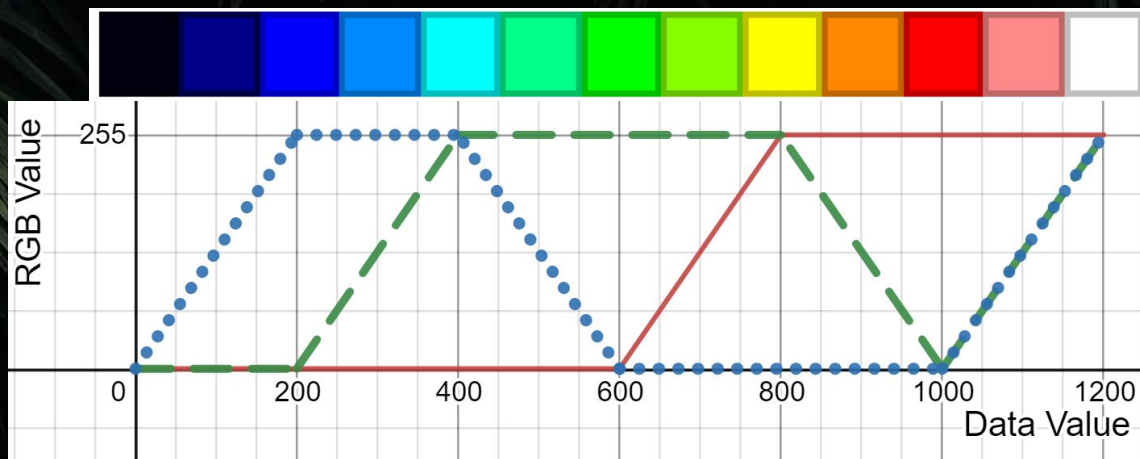
Challenges and Resolutions

Tiling datasets is a multi-step process

- Looking for a quick and easy process

Accuracy of RGB values to data

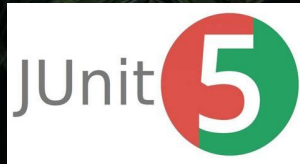
- Alternative: second set of raw data
- not cost effective



Testing Plan

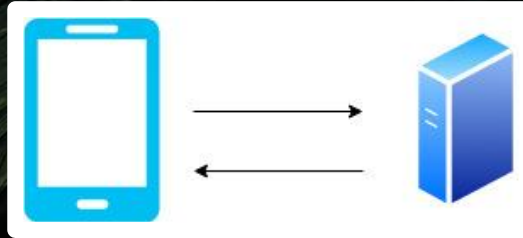
Unit Testing

- Jasmine and JS-ImageDiff tool
- JUnit



Integration Testing

- Tested HTTP requests sent from app to server

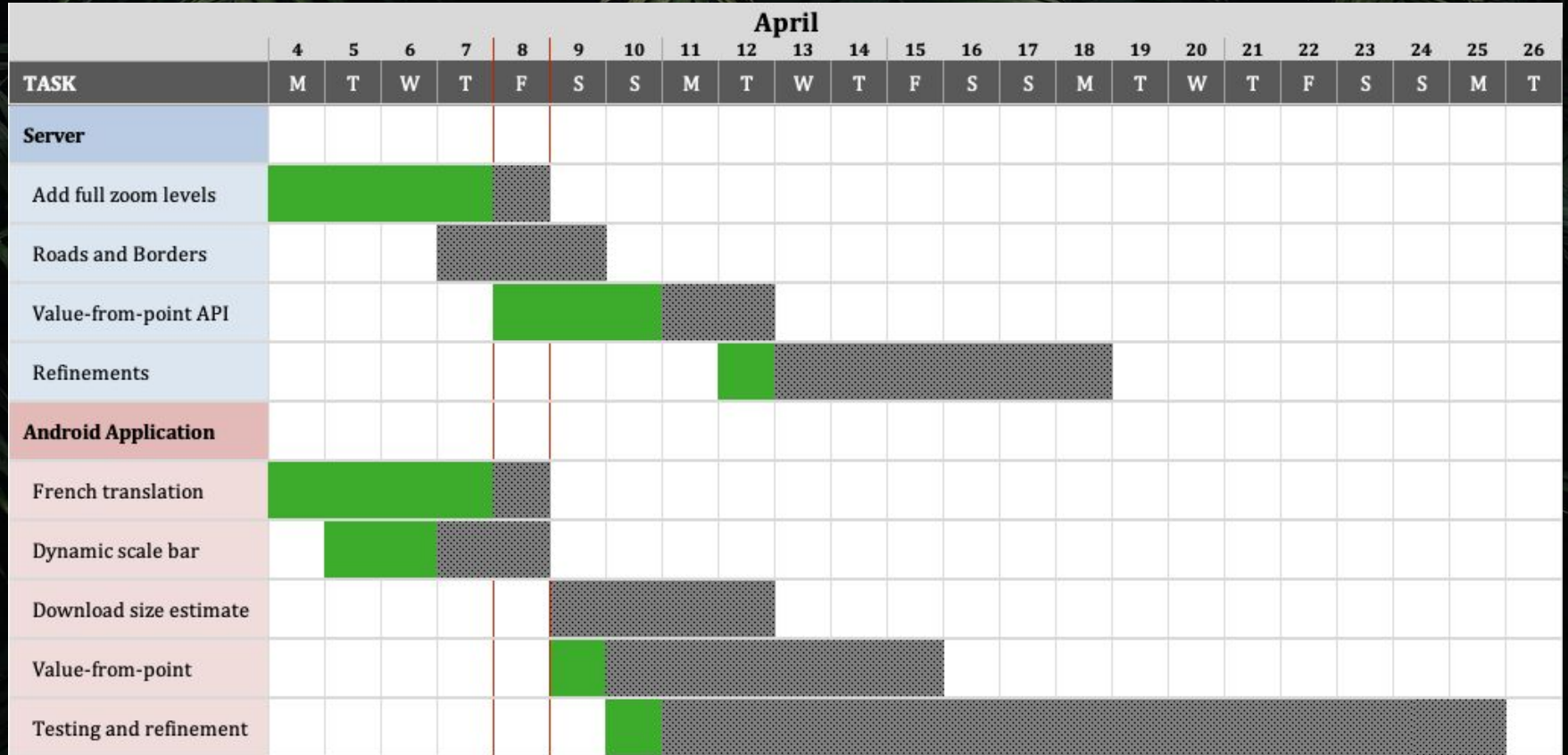


Usability Testing

- Client is scheduling a meeting with their team
- Questions based on simplicity, ease of navigation, usefulness



Schedule



Conclusion

- Problem: Ecologists and researchers struggle viewing lidar data from GEDI
- Solution: Mobile application with offline functionality and data visualization
- Plan: Finish remaining elements and usability testing





Thank you for your time

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We are open to answering questions