



# Networked Collaboration Features for Moon Trek

Senior Design 2021 - 2022

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Liaison: Emily Law

01

Introduction,  
Overview &  
background

02

Timeline &  
Dev Cycle

03

Data Flow &  
Features

04

Wrap up &  
Next Steps

# Agenda

Srivats Venkataraman

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# 1. Introduction, Overview & Background



Srivats Venkataraman

# Introduction

## Sponsor

Jet Propulsion Laboratory (JPL)  
Liaison: Emily Law  
JPL Team: Eddie Arevalo, George Chang, Richard Kim, Shan Malhotra

## Faculty Advisor

Dr. David Krum

## Goal

- Migrate last year's project to Moon Trek framework
- Ensure it meets the deployment standards

Srivats Venkataraman



# The Team

Sean Chung	Document Lead
Aldo Gil	Researcher
Tommy Lay	Lead Developer
Allen Marquez	Customer Liaison
Tam Nguyen	Project Co-Lead
Alex Sahakian	Component Lead
Andy Tsan	Researcher
Srivats Venkataraman	Project Lead
Jian Wu	Researcher
Anna Yesayan	Researcher

Jian Wu

# Overview

## Solar System Treks (SST)

- Underlying software for Trek Lite
- Provides data of planets, asteroids and moons
- Gathered by NASA and international space agencies
- Provides various features such as satellite images, 3D terrain models etc.

## Collaborative Visualization (CV)

- User's can join rooms to view the same data together- chat capabilities, waypoints, and markup drawings.
- Collectively work on new ideas and projects in real time
- Ultimately, CV is useful since it will allow people (scientists, students, etc.) analyze the enormous planet surface maps provided by NASA together in real time.

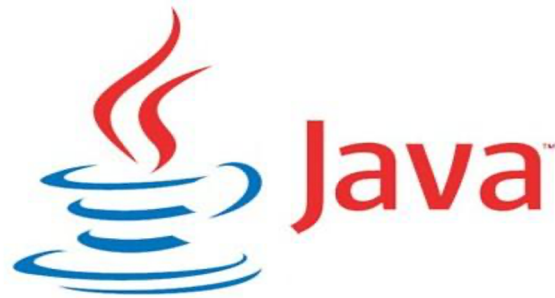
Jian Wu

# Languages/Framework

## Frontend



## Backend



RESTful Web Services in Java.

Sean Chung



## 2. Timeline & Dev Cycle

Sean Chung

# Project Planning: Software Development Cycle

## Waterfall Project Management

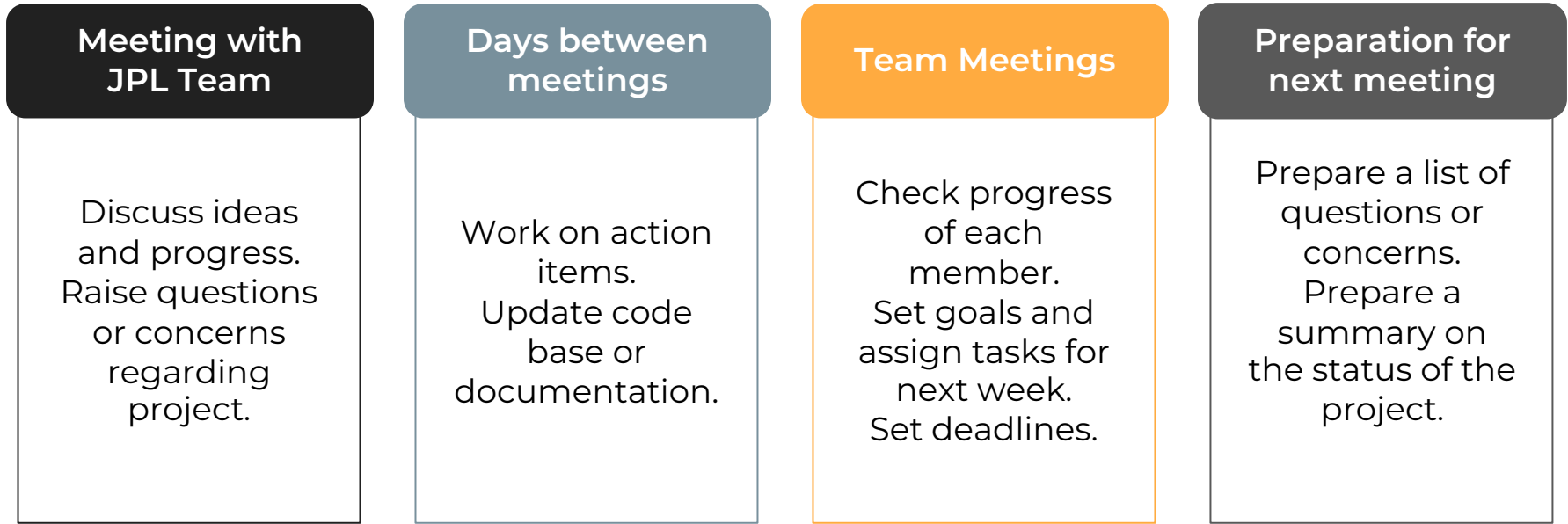
- More linear methodology of project management
- Phases are only begun once the previous phase of the project is completed
- Executed during the construction of the SDD and SRS documents and preplanning stages of the software application.

## Agile Project Management

- More flexible methodology of project management
- Phases are not completely defined
- Flexibility to adjust project during development cycle based on feedback
- Implemented during the development phase of the software application

Sean Chung

# Project Planning: Communication Cycle



Andy Tsan

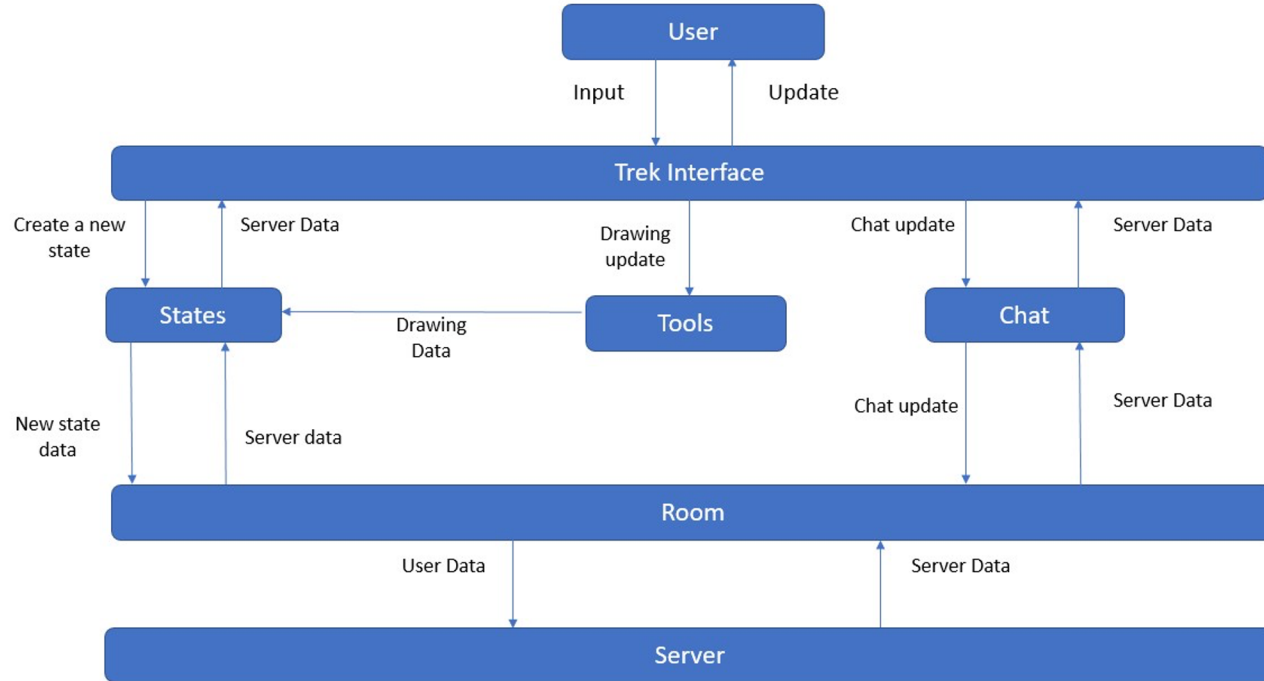


### 3. Data Flow & Features



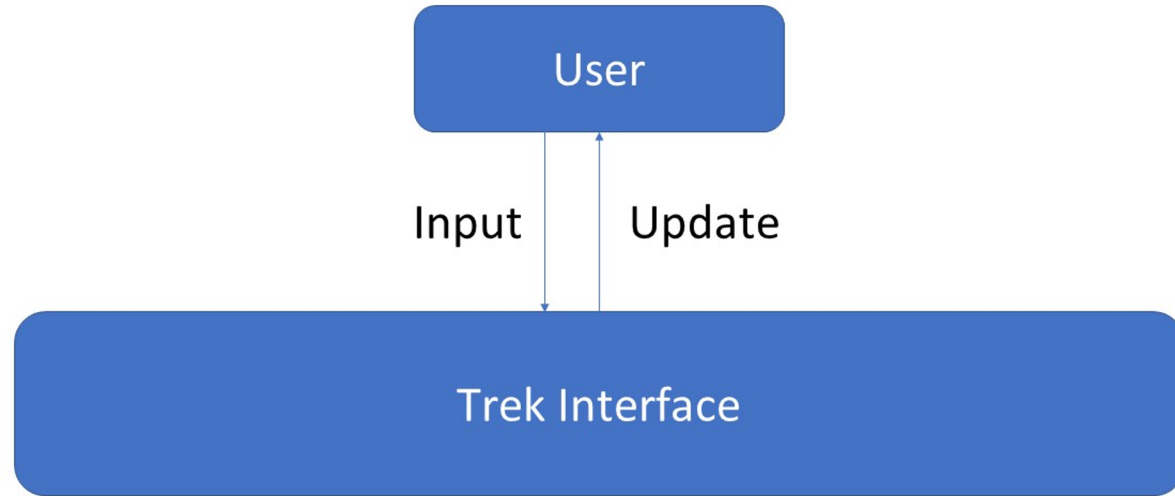
Tam Nguyen

# Data Flow



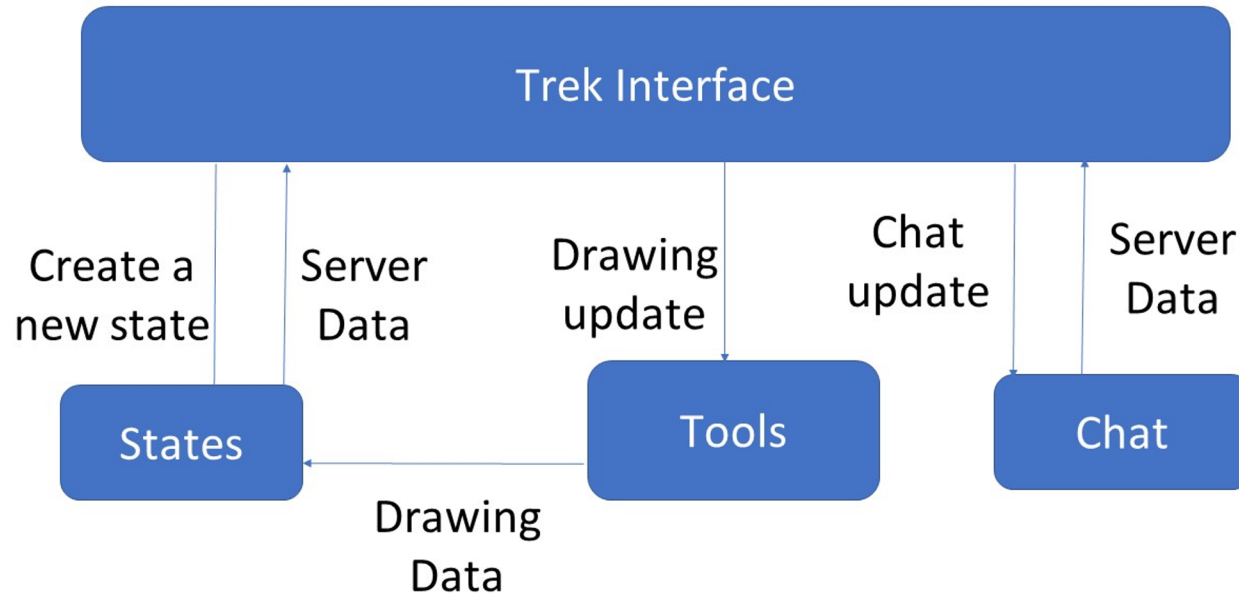
Tam Nguyen

# Data Flow



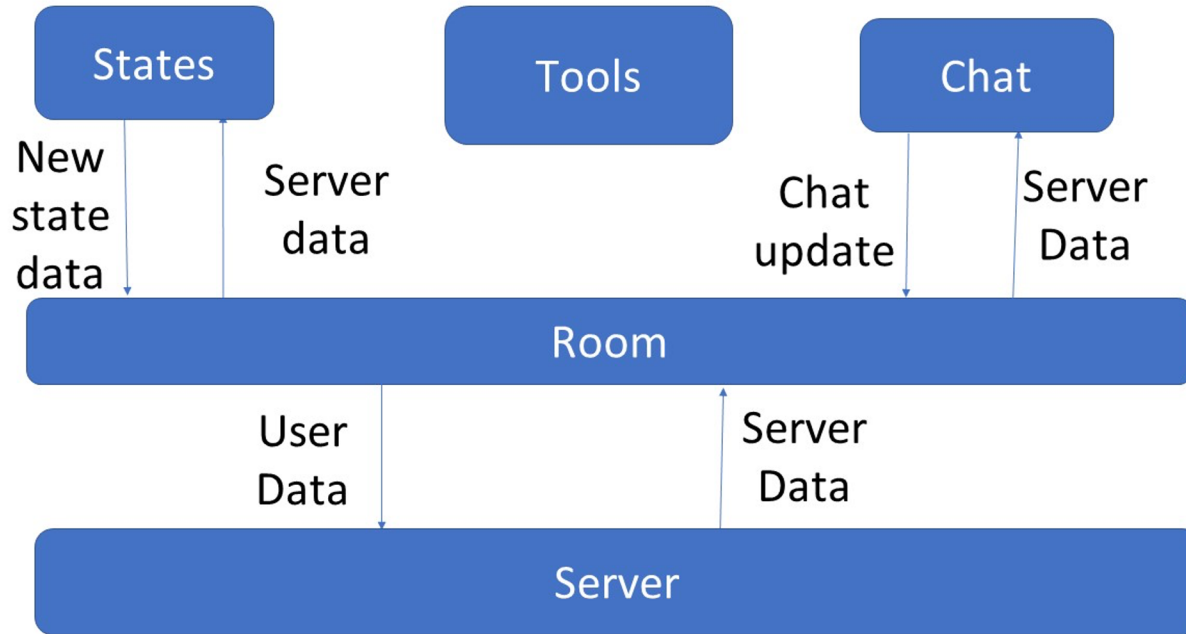
Tam Nguyen

# Data Flow



Tam Nguyen

# Data Flow



Tam Nguyen

# Feature List



## Collaboration Rooms

Users can create and invite collaborators to rooms for interacting with diagrams



## State(s)

Users can edit and switch between multiple states



## Annotations

User have the ability to create markups on the terrain



## Waypoints

Users have the ability to place markers on the diagram to specify a certain location



## Fly To

Users can easily pan to a location in the map without having to use the mouse to drag



## Text Chat

Users can use the integrated chat system to converse with each other in real-time

Aldo Gil





# Collaborative Rooms

## Accomplishments

- Users are able to join or create rooms for collaboration
- Users are able to see other users that are within the same room

## How It Works

- Open the room module located in the menu
- Creating a room will generate a session ID
- Joining a room will require a session ID
- Participants are then showed within the same menu component

Room

Create/join a room

^

Username

tommy

Create Room

Join room

Room

Create/join a room

^

Session:

8b20229a-24e2-4d61-985e-31e7d4d51b7e

Participants

tommy

Aldo Gil



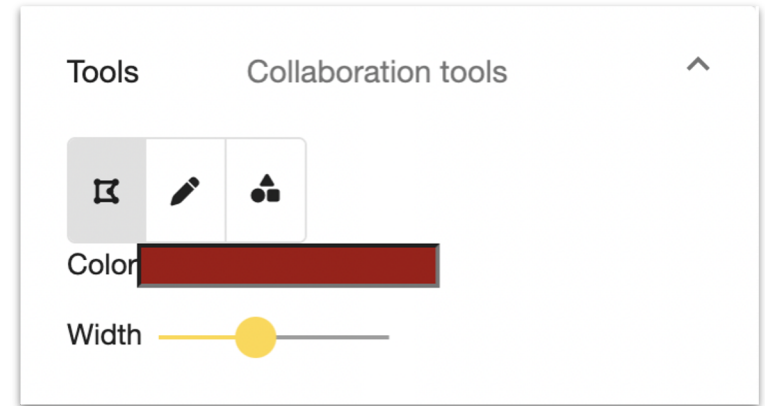
# Annotation

## Accomplishments

- Users are able to use multiple markup tools that include multi line, freehand and shapes
- These markup tools provide customization for color and width
- All users in a room can see these drawings updated in real-time

## How It Works

- Select a tool under the tools component
- Customize color and width once tool is selected
- Drawing on the map



Tommy Lay

## Accomplishments

- Users are able to create and switch between different states
- Multiple users can be working on different states at the same time

## How It Works

- Switch states by selecting a state in the drop down list
- Add a state by clicking on the Add State button
- Drawing in a state will only show if you have that state currently selected

**States** Change, create or delete states ^

States

initial state ▼

Add State Delete State



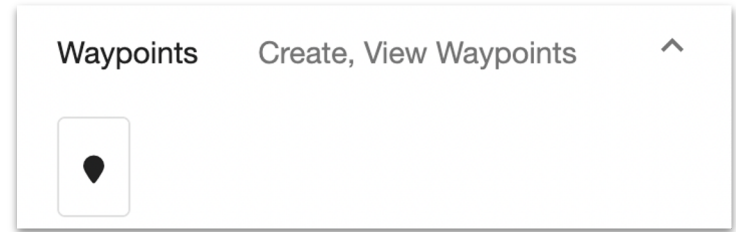
# Waypoints

## Accomplishments

- Users are able to save waypoints to state

## How It Works

- Click on the waypoints marker
- Click to select a lat/long point on the map
- Upon entering the name of the waypoint, this will be saved to the current state



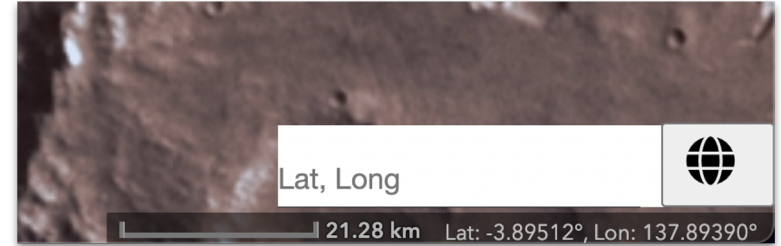


## Accomplishments

- Users are able to pan the map to a certain coordinate location, where a temporary graphic will be shown on the exact coordinate

## How It Works

- Click on the Fly To button and provide a lat, long coordinate



Tommy Lay

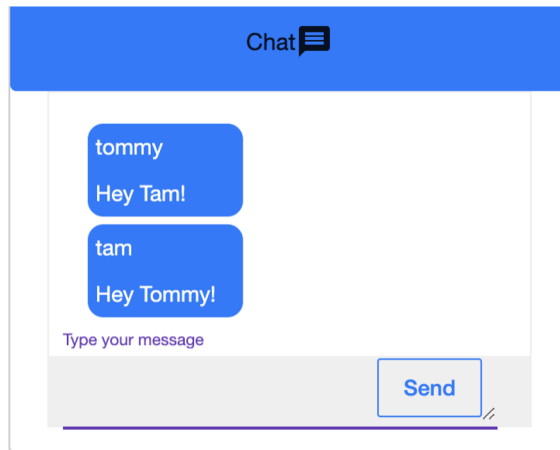
# Chat

## Accomplishments

- Users joined in the same room are able to communicate with each other through text

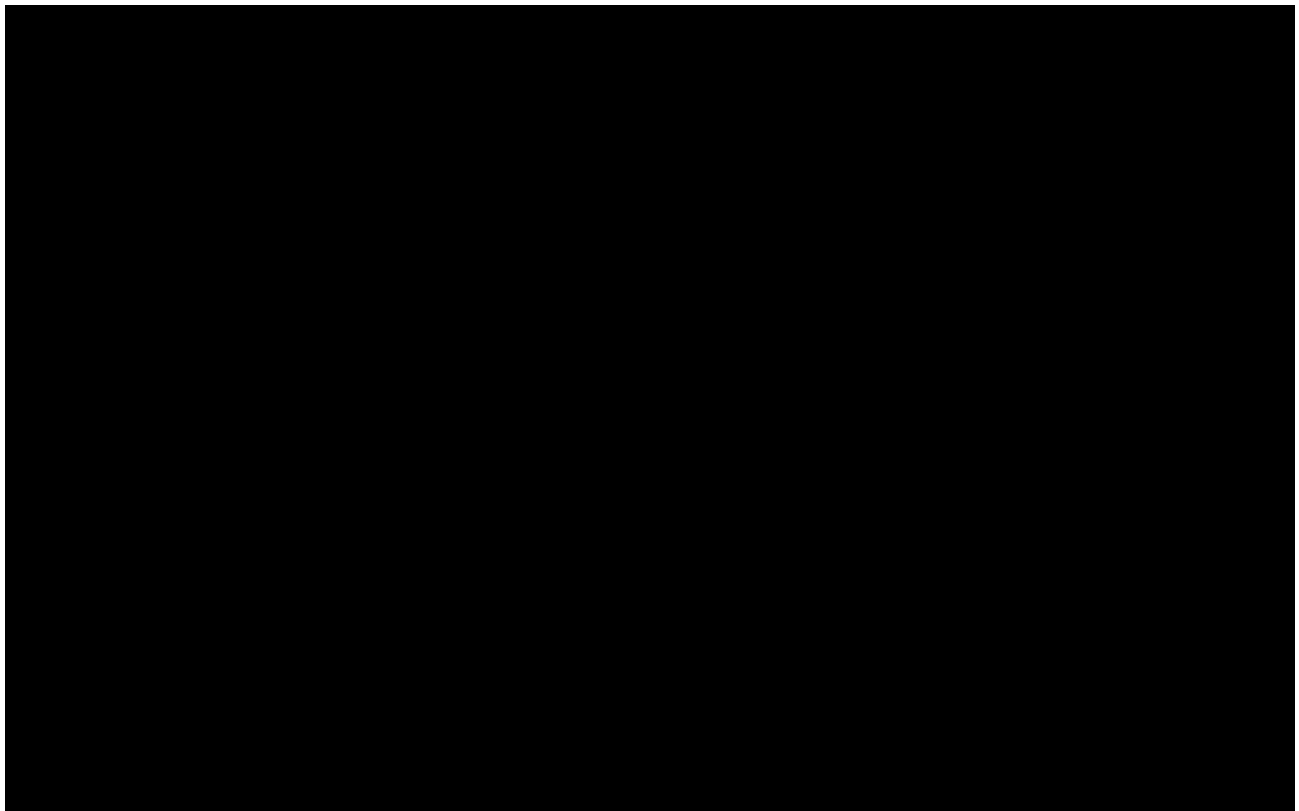
## How It Works

- Open the chat component located at the bottom of the window
- Messages will send to all clients in the same room



Tommy Lay





# Next Steps

01

Improvements  
on collaborative  
features

02

Allow users to  
extract and  
share session  
states to other  
users

03

Implement  
State  
Management in  
the frontend

04

Add VR and AR  
functionality to  
the software  
application

Alex Sahakian

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01. Who is this project for?

02. Waterfall & Agile

03. Integration of collaborative features & documentation

04. Accomplishment, Reflection and learning

# Conclusion

Allen Marquez

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## Annotation

### **Accomplishments**

- Users are able to use multiple markup tools that include multi-line, freehand and shapes
- These markup tools provide customization for color and width
- All apps in ecosystem can see these markings, updates in real-time

### **How it works**

- Select a tool under the handy component
- Customize color and width of tool is selected
- Drawing on the map



Download the Toolkit App



# Thank You!

Does anyone have any questions?



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