Project 3

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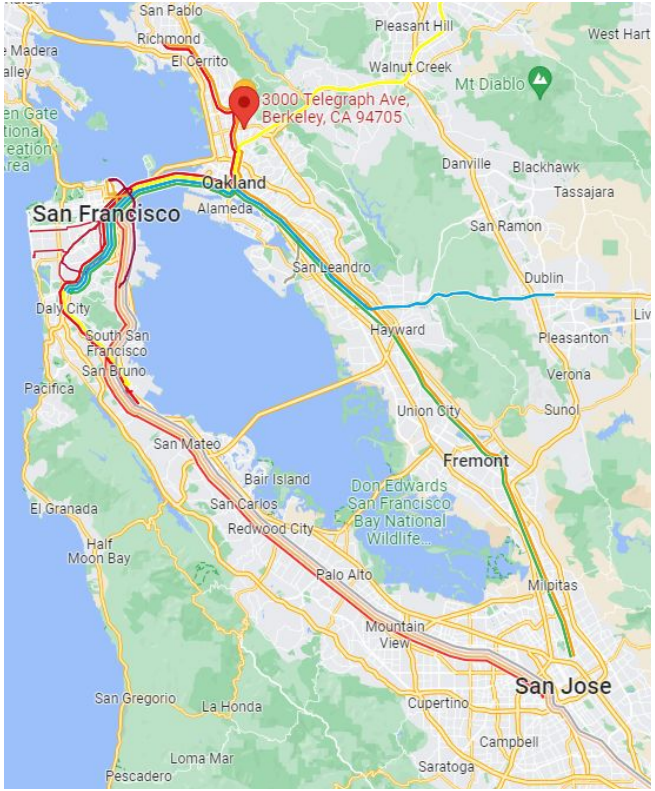
Context

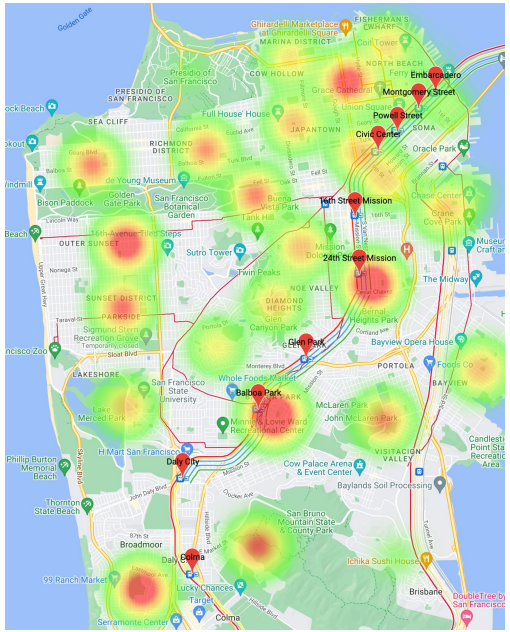
Acme Gourmet Inc.



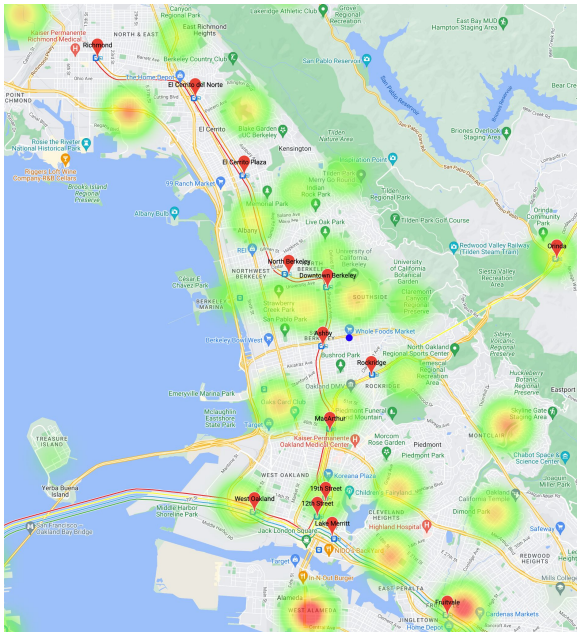
Adding Pickup Locations

Pickup Locations at BART Stations

population density



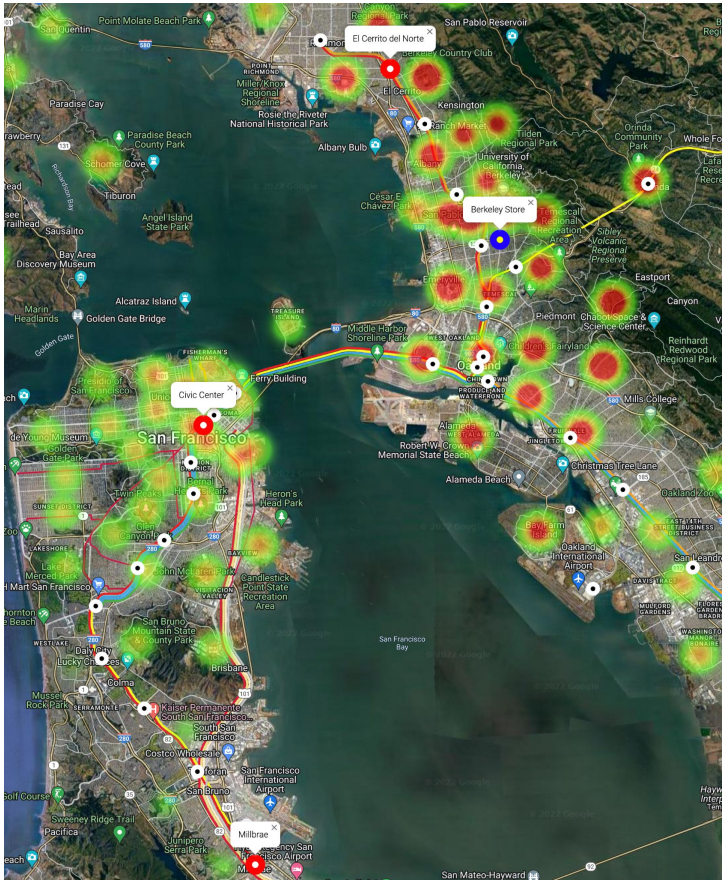
population density



Phase 1: Proof of Concept

Pickup locations near customers

Phase	Destination BART station
1	El Cerrito del Norte
1	Civic Center
1	Millbrae



Phase 2: Expansion

Pickup locations near population density

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pop_per_cost = population_within_mile / travel_cost
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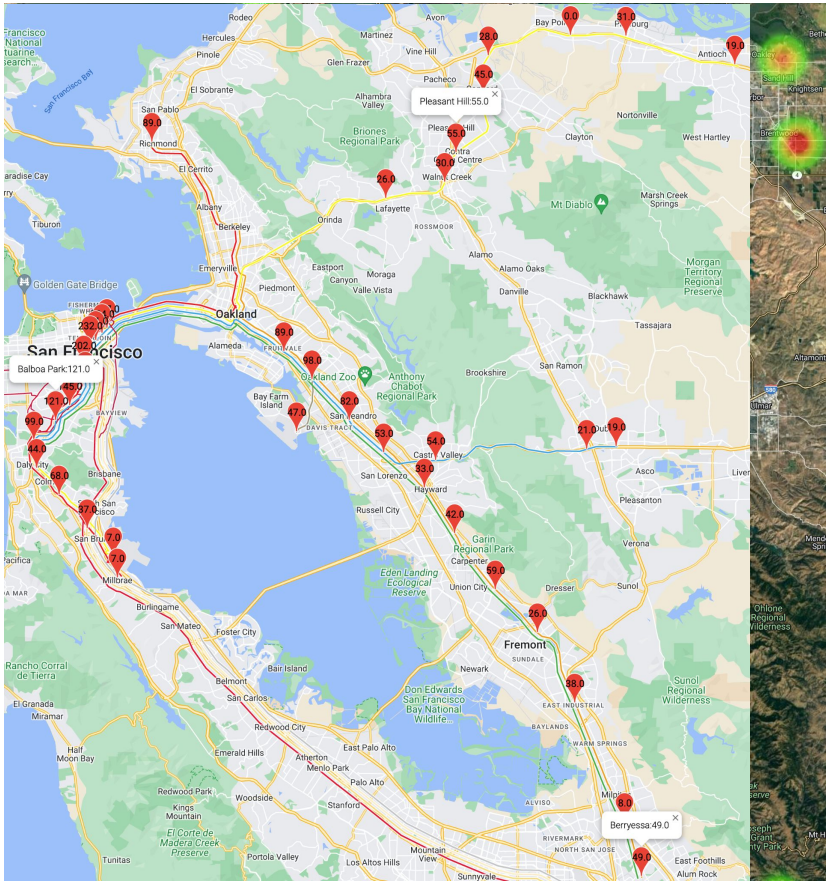
Phase	Destination BART station
2	Pleasant Hill
2	Balboa Park
2	Berryessa



Proposed BART Stations for Pilot Program

Phase	Destination BART station	Nearby Customers (2 miles)	Nearby Population (1 mile)
1	El Cerrito del Norte	580	*70,000*
1	Civic Center	810	*345,000*
1	Millbrae	11*	*23,000*
2	Pleasant Hill	*170*	86,000
2	Balboa Park	*280*	253,000
2	Berryessa	*0**	198,000

* *strategic location*

Plan

START

Data Analysis

Investigate at a preliminary level: adding more pickup locations, using public transportation to transport deliveries, using delivery drones, using delivery robots, a hybrid approach of any combination of these options.

PHASE 1

Implement Pilot Program

Add pickup locations by BART stations that are near existing customers.

PHASE 2

Execute Expansion

Add pickup locations by BART stations in highly populated areas.

FINAL

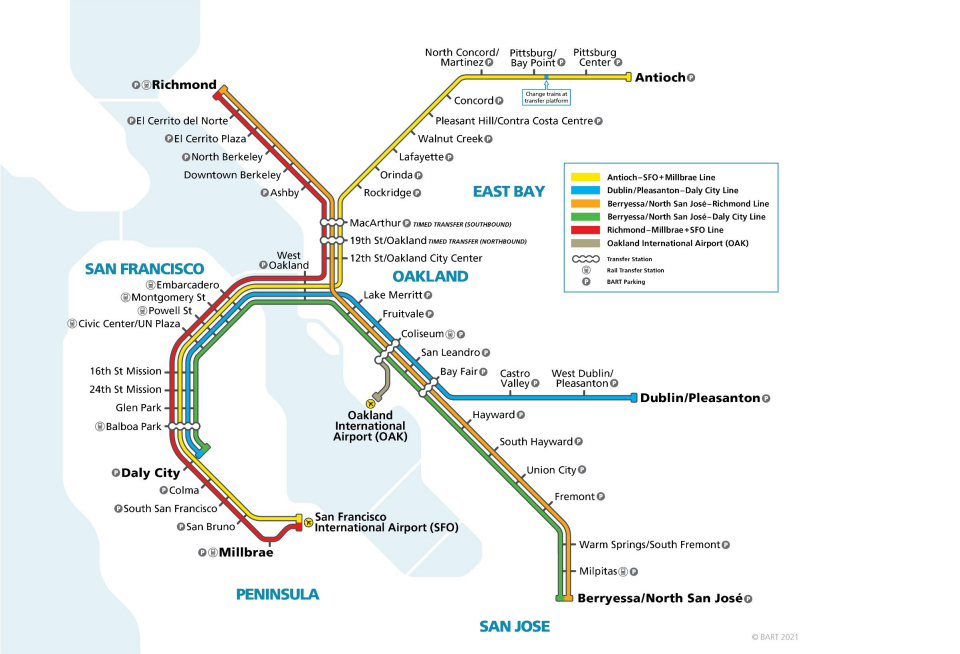
Analyze Results

Analyze business impact for AGM and refine process to begin new plans for additional cities where AGM has stores.

Store to Station Delivery

What options did we look at?

1. Public transportation
2. Delivery vans



Public Transit

Dedicated Trains

Images credit: BART Freight Report

Courier

Image credit: DoorDash Blog

Delivery Vans

Electric

Image credit: Inside EVs

Traditional

Image credit: connecteam

Time from store to station by option and pilot station

Phase	Destination BART station	Van (driving at 8am on Sunday)	Public Transportation (BART from Ashby station)
1	El Cerrito del Norte	18 min	11 min
1	Civic Center	23 min	25 min
1	Millbrae	34 min	57 min
2	Pleasant Hill	22 min	25.98 min
2	Balboa Park	25 min	35 min
2	Berryessa	54 min	67 min

Comparison & Recommendations: Store to Stations

	Van (driving)	Public transportation (courier or freight goods program)
Marketing	**Negative**: consider emissions	**Positive**: eco-friendly, something different, marketing to BART customers
Feasibility	**High**: commonly implemented	**Medium**: study previously done by CALTrans but no pilot program yet
Cost	**High**: maintenance and fuel/taxes	**Low**: public service

Last-Mile Delivery

What options did we look at?

1. Robots
2. Vans
3. Drones

Option 1: Delivery Robots from Station to Customers

Driving

Image credit: Nuro

Walking

Image credit: Kiwibot

Driving Robots

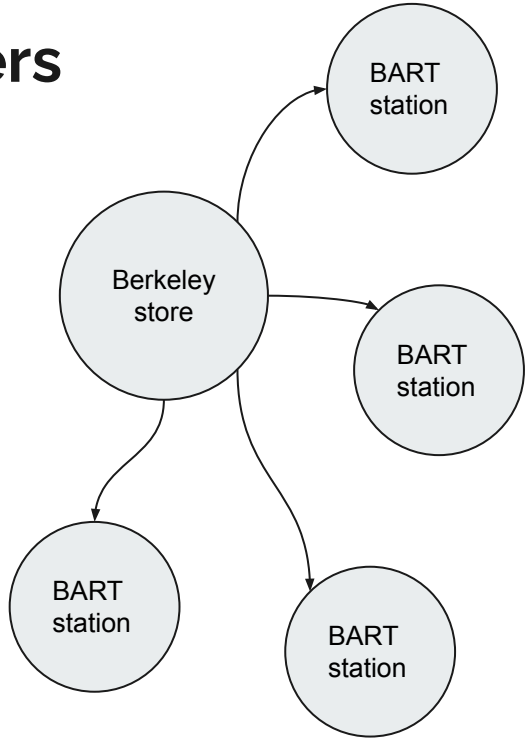
Walking Robots

Image credit: dot.LA

Delivery Drones for Stations to Customers

Image credit: Shutterstock

Image credit: esri



Comparison & Recommendations: Last Mile to Customers

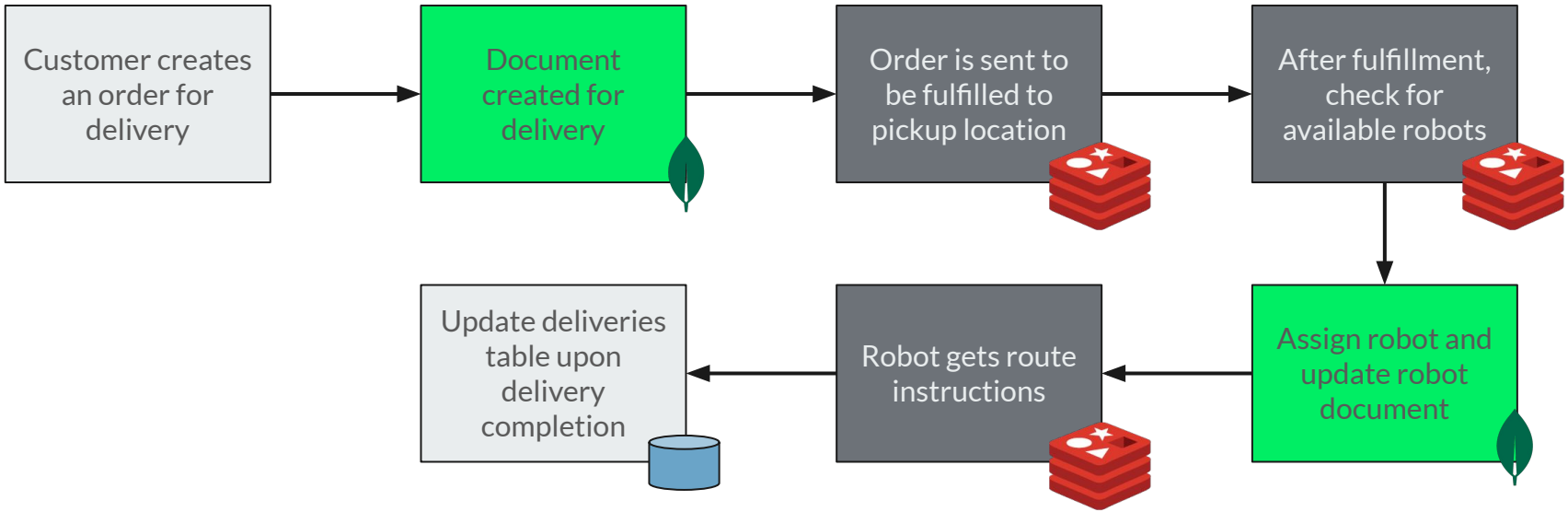
	Delivery drones	Delivery vans	Delivery robots (walking)	Delivery robots (driving)
Weight Limit	2-10 pounds	2,000 lbs	20 lbs	500 lbs
Speed	Up to 65 mph	Up to 10 below the speed limit	4 mph	Up to 25 mph
Delivery Radius	Up to 12 miles	Up to 200 miles	3-4 miles	Up to 12 miles
Range	Up to 3 hours	Up to 4 hours	Up to 18 hours	Up to 3 hours

Data Structure

Database Use Cases

- **MongoDB** for maintenance and fulfillment (to pickup stations)
- **Redis** for translating a customer order for delivery into instructions
- **SQL relational** database for single point of truth
- **Neo4j** graph database for meta-analysis

Sample workflow



Thank you