

Impact of COVID-19 on Carsharing Usage Behavior

Interim Report Presentation

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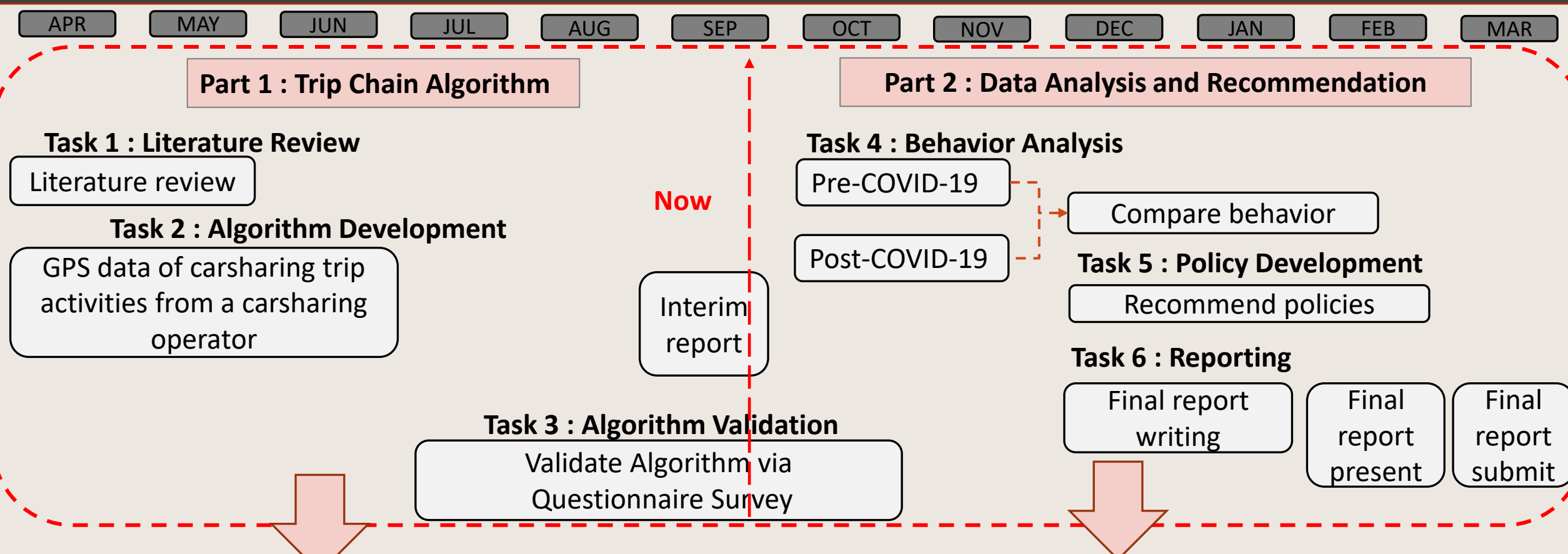


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Research Framework



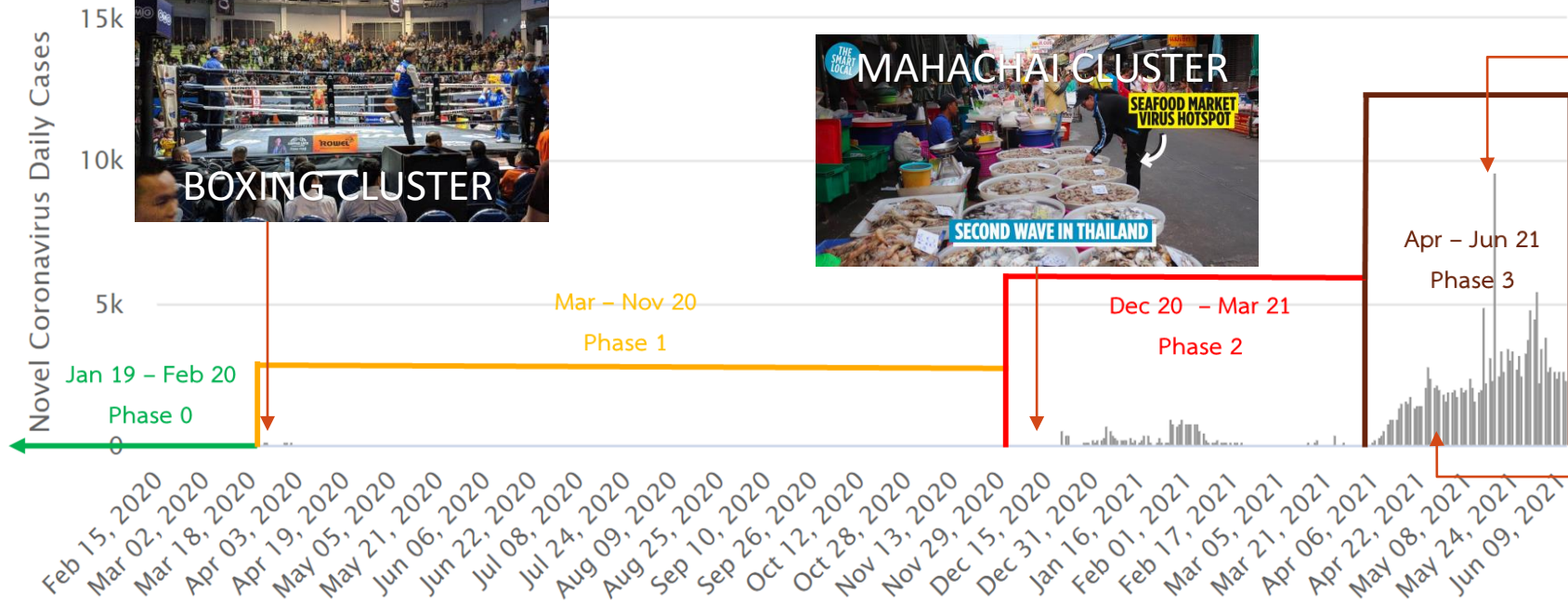
- Understand impacts of the COVID-19 and its effects on shared mobility with a focus on carsharing services.
- Develop trip-chain algorithm from GPS data and user interviews.

- Understand changes in traveler behavior.
- Propose policies related to carsharing.

COVID-19 Situation in Thailand

Daily New Cases

Cases per Day
Data as of 0:00 GMT+0



Study Phasing

Based on the COVID-19 situation in Thailand, we divided carsharing usage data into 4 phases as follows:



Jan 2019



Phase 0

January 2019 - February 2020



Phase 1

March - November 2020



Phase 2

December 2020 - March 2021

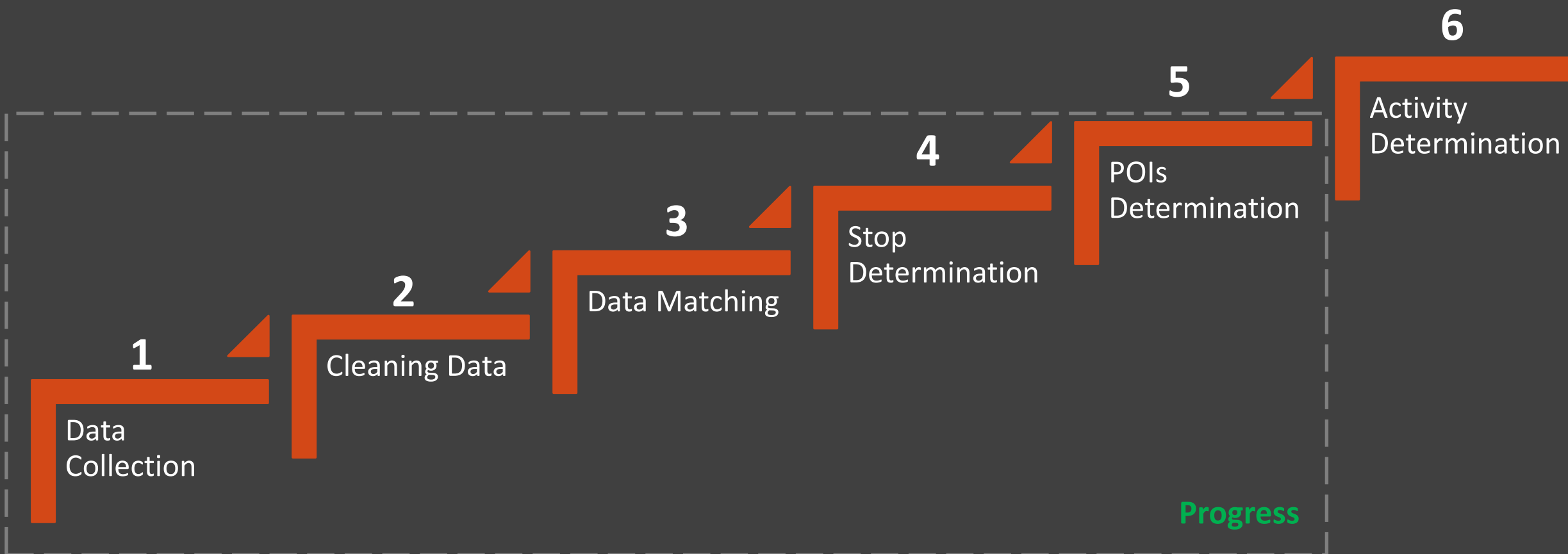


Phase 3

April - June 2021

Present

Algorithm Development



1. Data Collection

Reservations Data

- Reservation number
- Reserved hours
- Reservation start time
- Reservation stop time

Vehicle Trajectory Data

- Position
- Speed
- Engine state
- Door lock state

Users Data

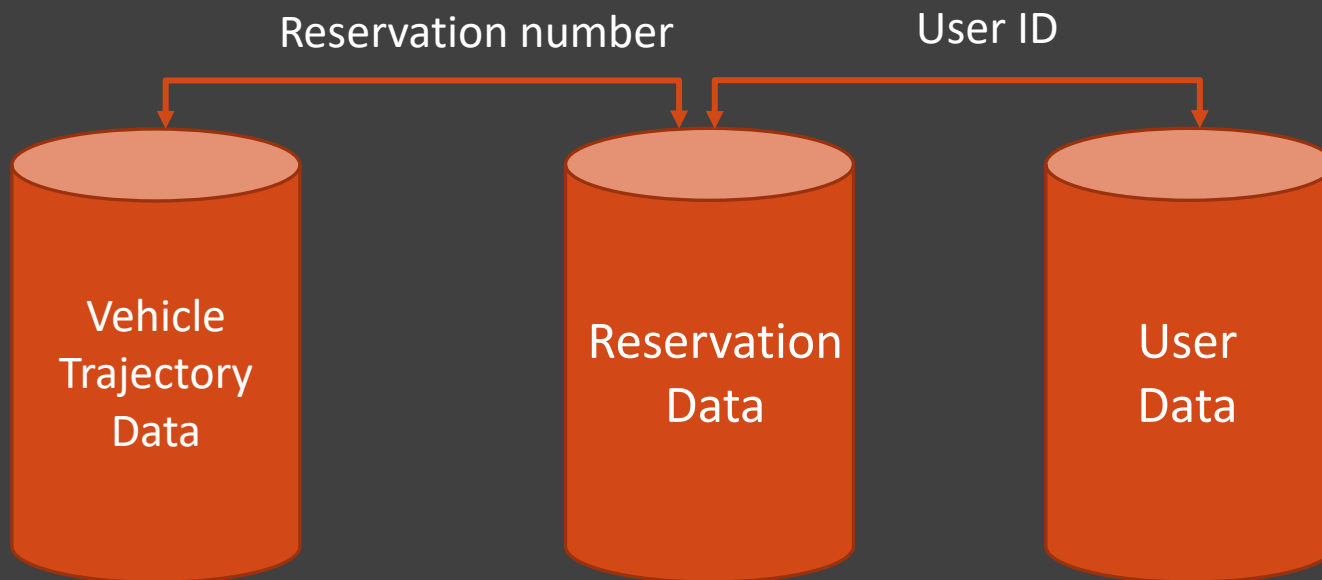
- User ID
- User type
(General/Student)
- Gender (Male/Female)

2. Data Cleaning

We filtered out reservations with the following conditions:

- Reservations with the duration ≥ 720 hours (monthly rental)
- Reservations with no rental fee (promotional reservations)
- Reservations with zero driving distance (no show reservations)
- Datapoints with speed > 200 km/hr (erroneous GPS data)

3. Data Matching



- Jan 2019 – June 2021
- 30 months
- 7,630 users
- 19,464 reservations
- 14,573,926 GPS records

4. Stop Determination

We determined where the carsharing users intentionally stopped during their trips with following conditions:

- Speed is less than 5 km/hr,
- Engine state must be OFF,
- Door lock state must be UNLOCKED, and
- Stop duration is at least 15 minutes.

The results of destination stops:

- 86,646 destination stops
- Hourly reservation = 1.54 stops/reservation
- Daily reservation = 6.98 stops/reservation

5. Point of Interest (POI) Determination

We used POIs data (from baanai.com) within the 100-meter radius from the destination stops and there are 12 categories of POIs including:

Lodging

Tourist attraction

Restaurant
/Cafe

School
/University

Shopping mall
/Supermarket

Office
/Manufacturing

Gas Station

Health
/Hospital

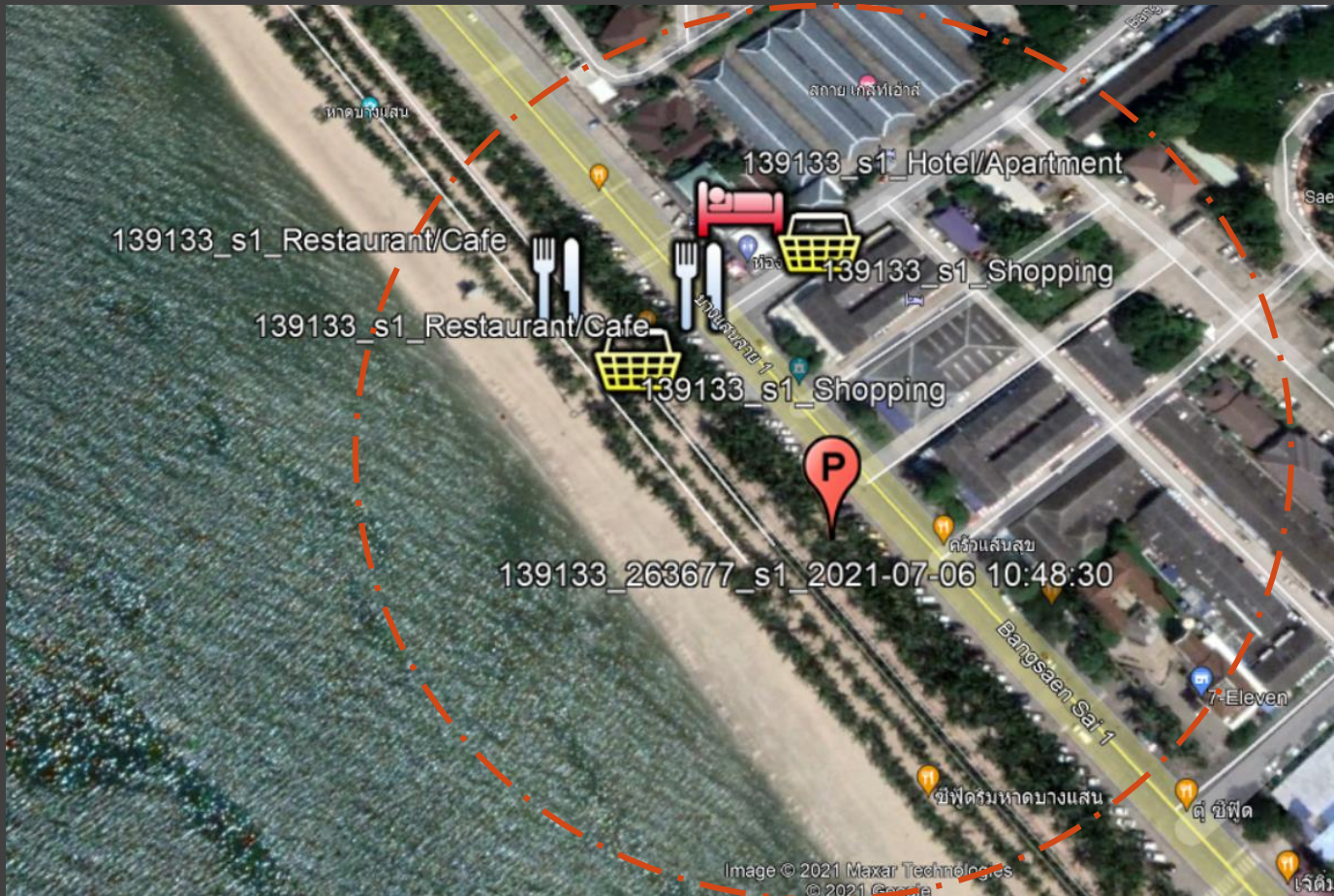
Historical
Landmark

Outdoor/Park

Toll road rest
stop

Airport
/Railway/Pier

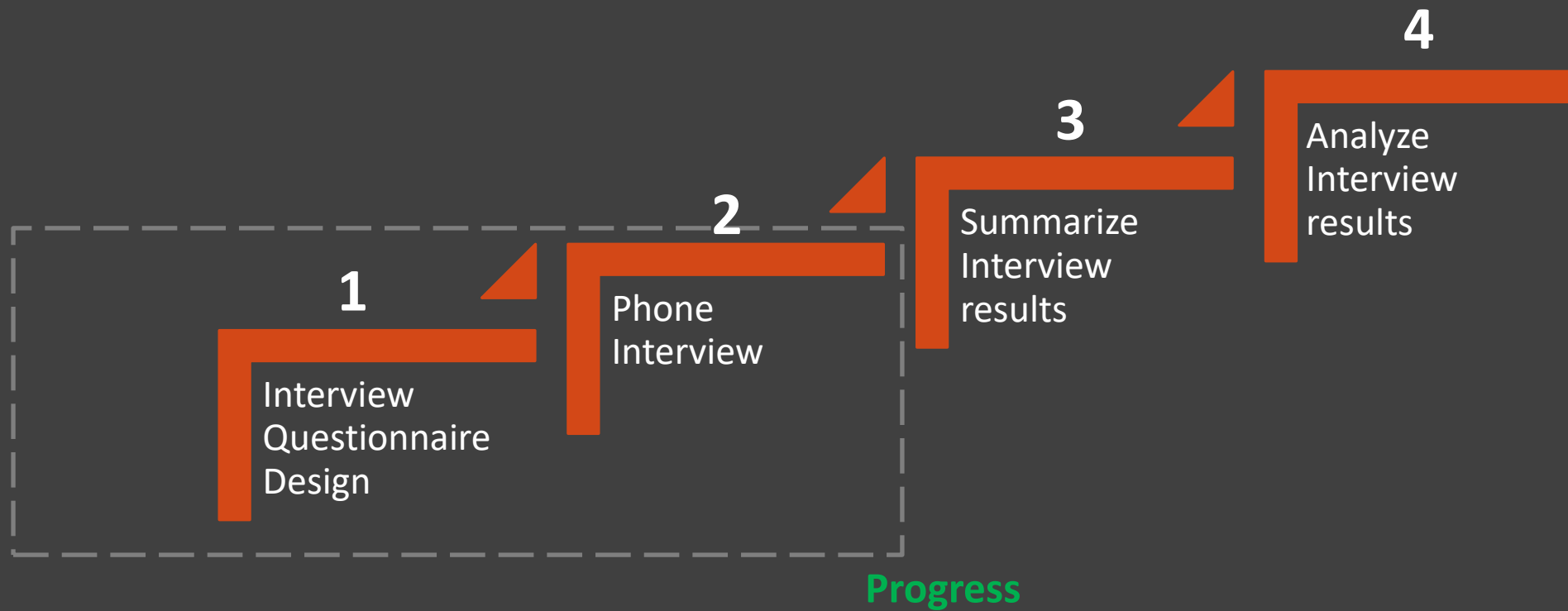
5. Point of Interest (POI) Determination



- Multiple POIs within 100 m-radius
- 5 POIs around 1 stop
- Selected possible POIs from distance and duration time of activity

Algorithm Validation

Process



1. Interview Questionnaire Design



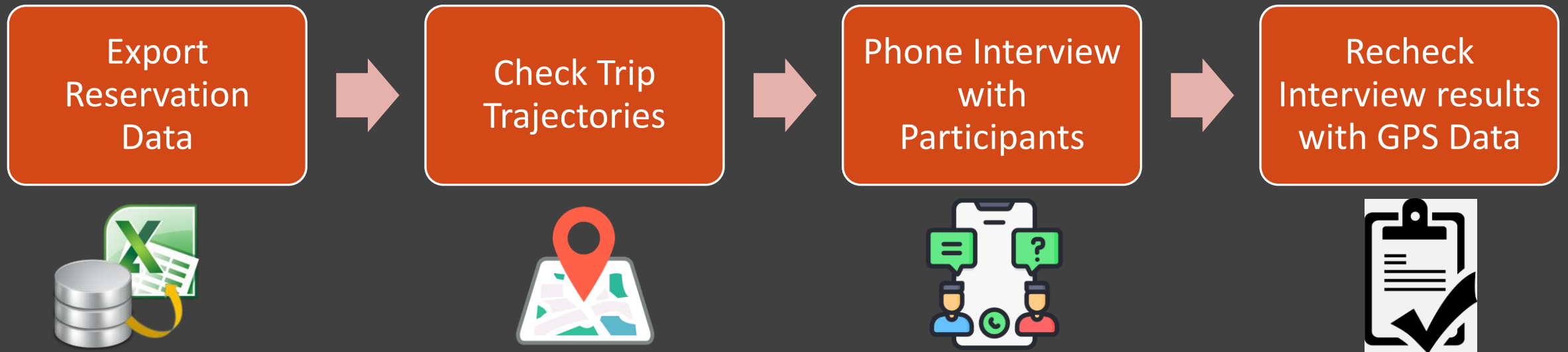
Socioeconomic Data

Carsharing Usage Data

Impact of COVID-19 on
The User's Travel Behaviors

2. Phone Interview

Interview Process



Results

Interview Results

Example:

Socioeconomic

- Gender: Male
- Age: 30 Years old
- User type: General
- Veh/HH: 3

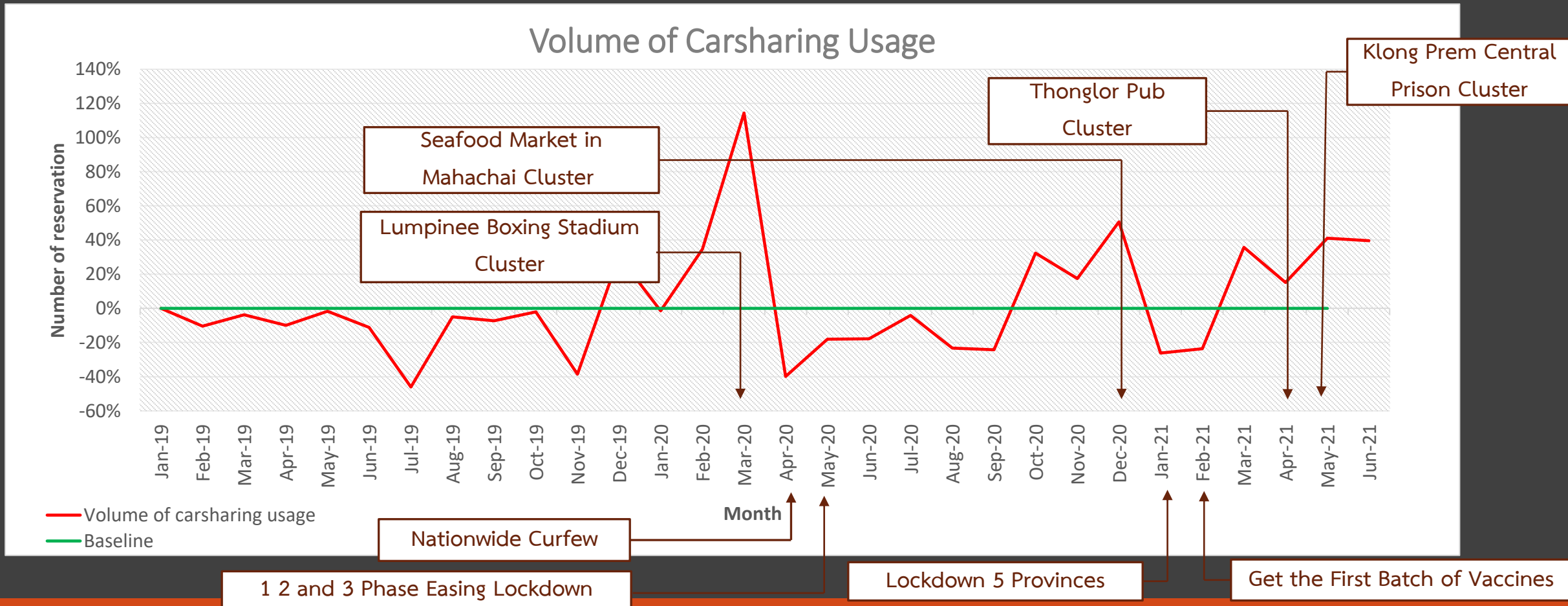
Usage Data

- Reservation: 24 hours
- Access CS by taxi
- Trip chain: ATM/Bank, tourist attractions (outside BKK), dinner, drop off friend.

Impact of COVID-19

- Travel more often.
- Use carsharing more often.
- Concerns about public transport's hygiene.

Volume of Carsharing Usage in each Month



Travel Behavior Results

Compare phase	Item	Phase 0	Phase 1	Phase 2	Phase 3
0→1	Reserved hours/Reservation (hour)	17.1	20.6		
	Distance/Reservation (km.)	156	163		
	Stop duration of stop (min/stop)	124	150		
0→2	Reserved hours/Reservation (hour)	18.5		24.4	
	Distance/Reservation (km.)	165		228	
	Stop duration of stop (min/stop)	127		140	
0→3	Reserved hours/Reservation (hour)	16.4			27.2
	Distance/Reservation (km.)	139			172
	Stop duration of stop (min/stop)	119			169

Interview limitation

Government measure affecting carsharing behavior

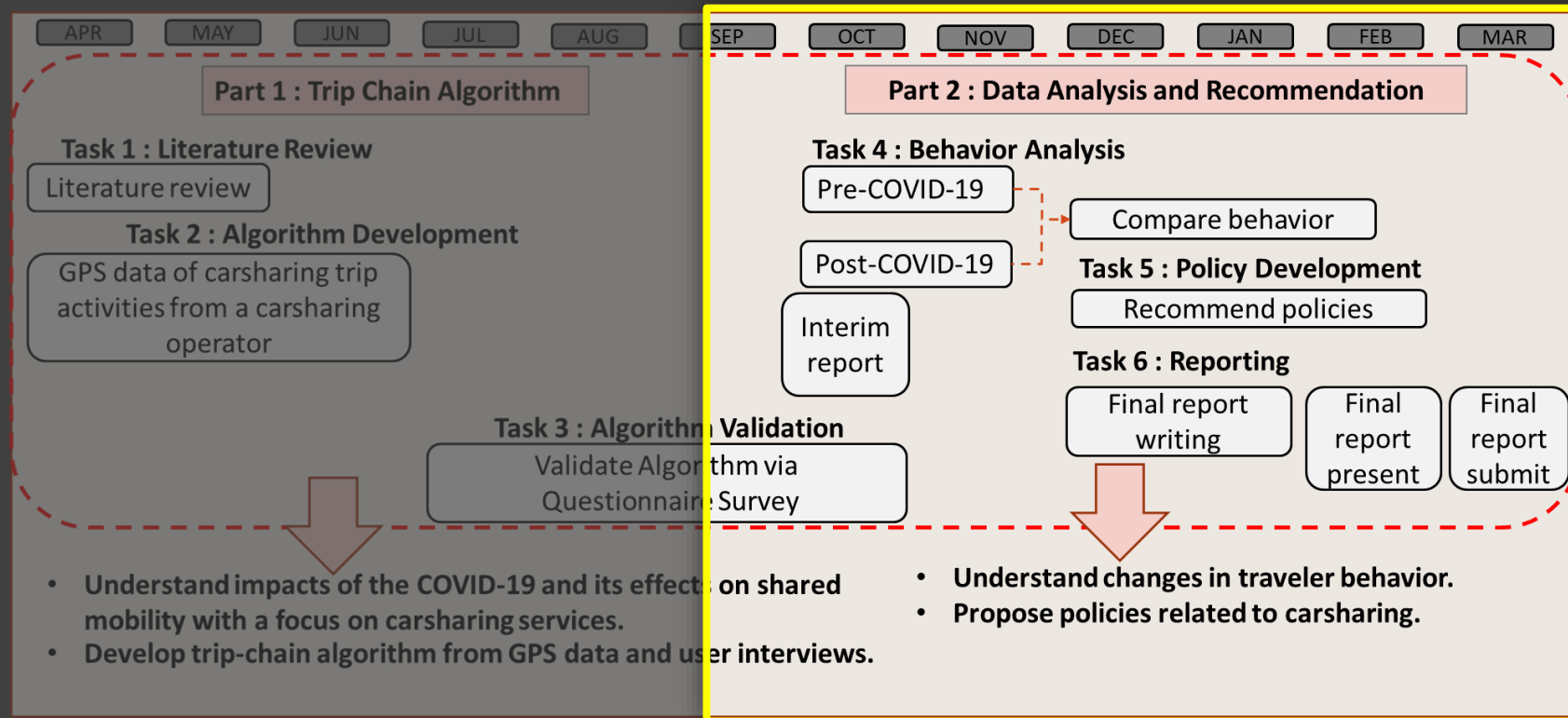
- User did not remember trip details, even within 48 hours.
- Lockdown (shopping mall, restaurant takeaway) affects travel behaviors.
- User did not pick up the phone.



Revised stop determination conditions

- Speed is less than 5 km/hr,
- Engine state can be **both ON and OFF**, and
- Door lock state must be UNLOCK

Next Steps



- ❑ Phone interview: 200 trips (to be done by mid-Oct 2021)
- ❑ Trip chain identification algorithm development analysis
- ❑ Compare interview results with trip chain identification algorithm development