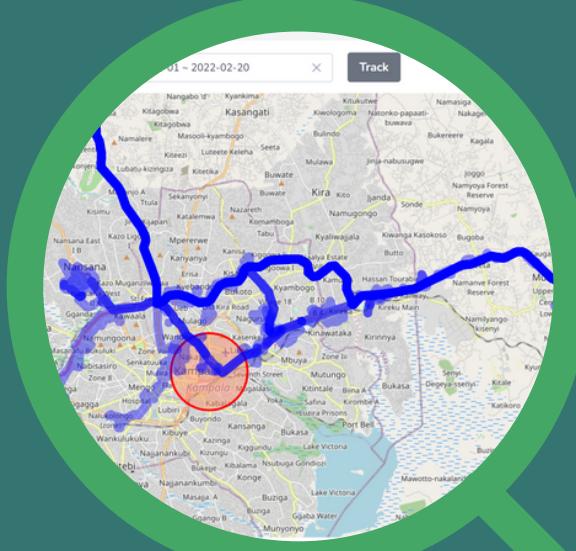


# THEA-DCT

Technology development presentation and update

December 2022

*Emmanuel Robert Ssebaggala (CEO/Bodastage Solutions)*



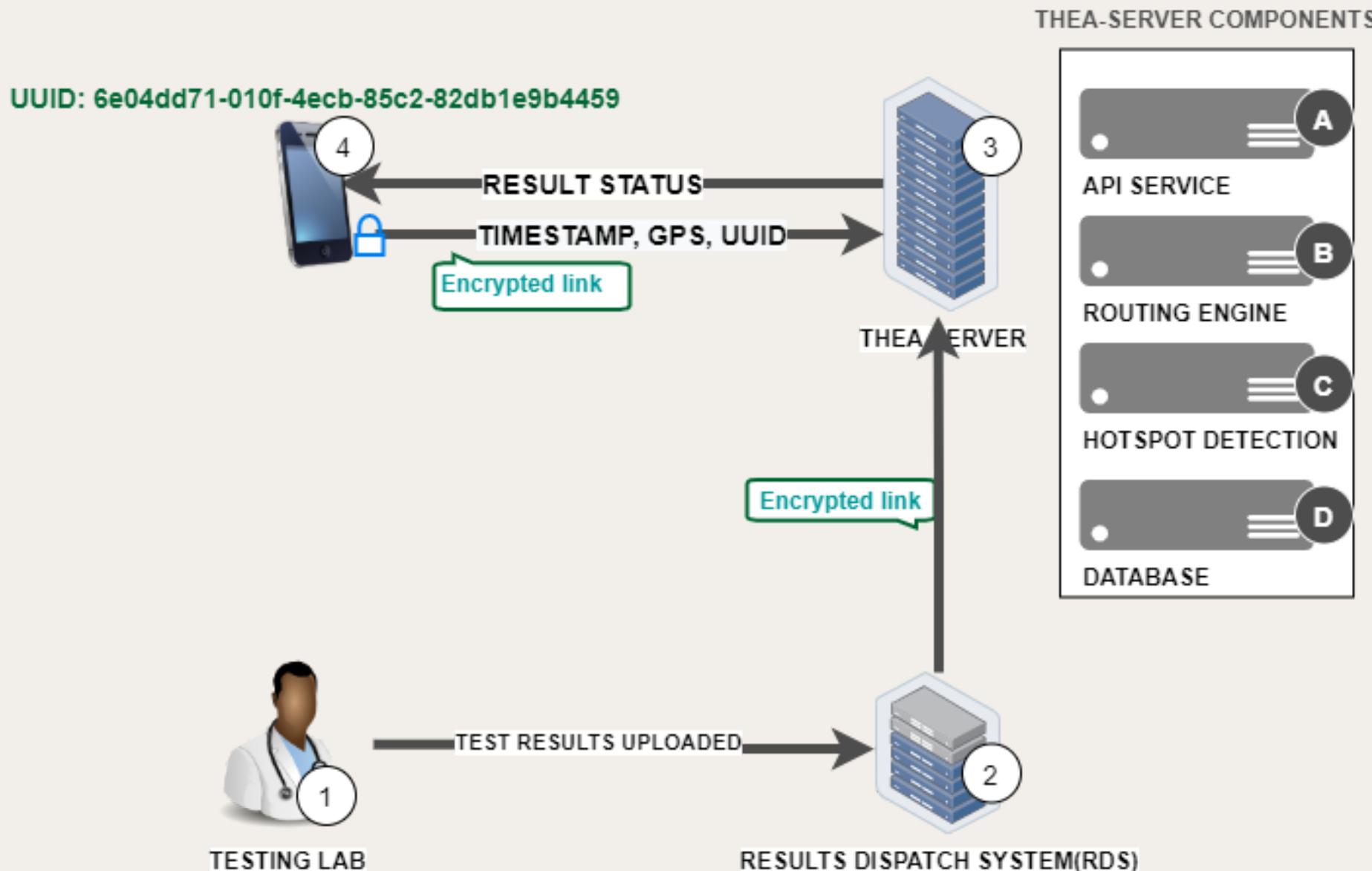
# OBJECTIVES



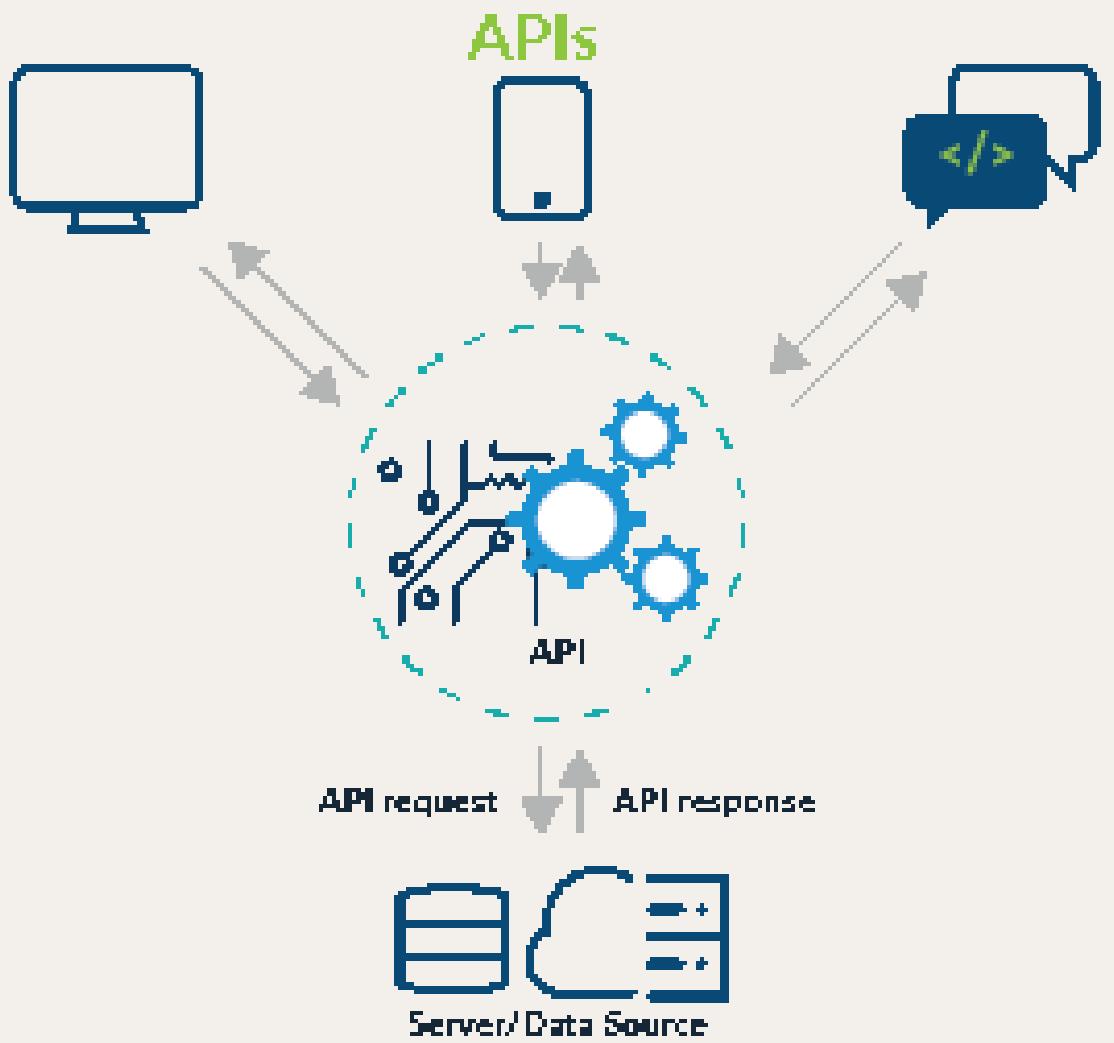
Technology development objectives

- A Develop digital contact tracing system based on mobile phone technology
- B Confine tracking of the drivers to the road infrastructure
- C Preserve driver's privacy
- D Open source implementation for use in global south

# ARCHITECTURE

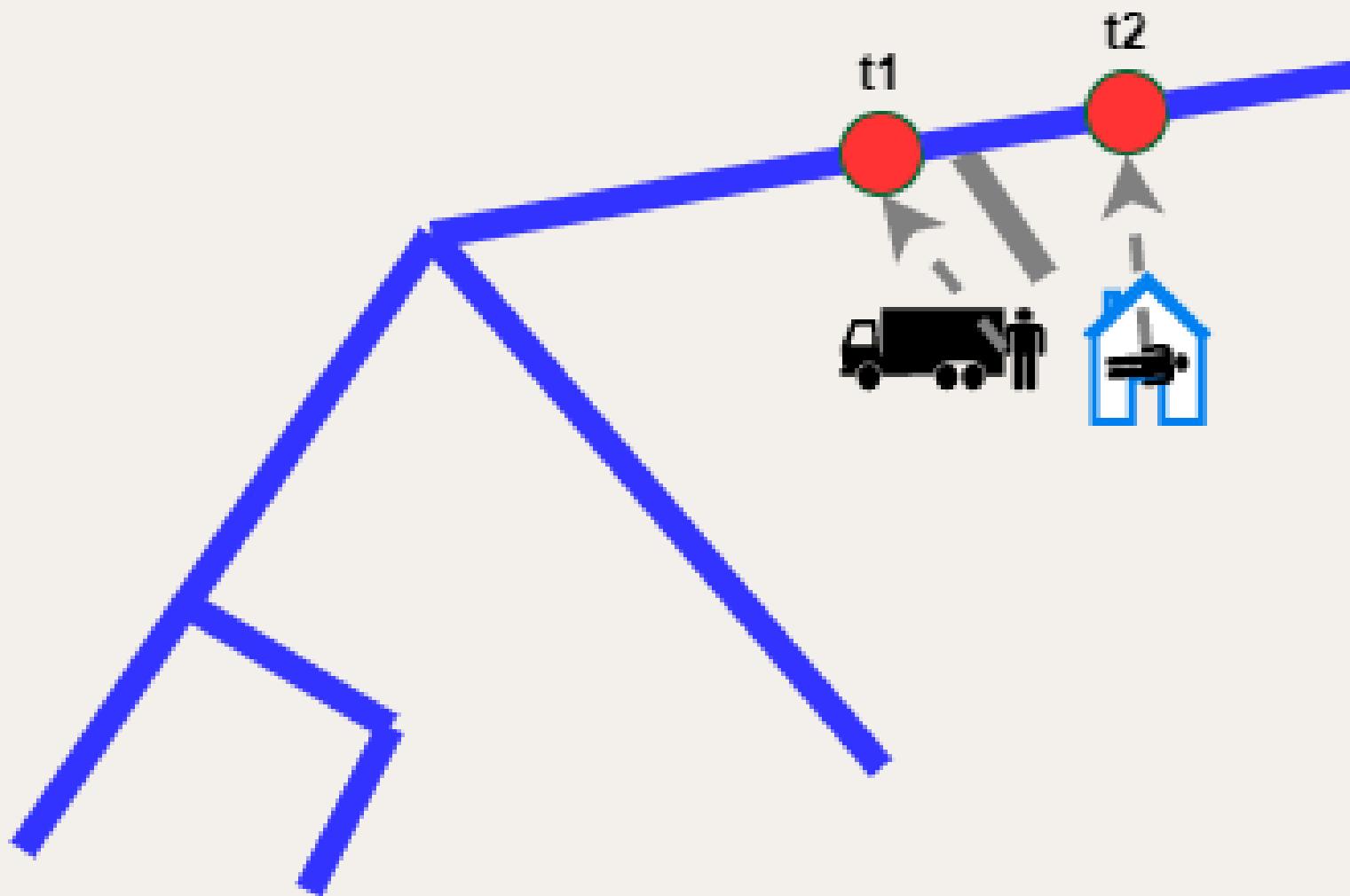


# API SERVICE



- A** Receives timestamped GPS coordinates from driver's phone
- B** Collects results from RDS and sends them to driver's phone
- C** Sends exposure notification notice to drivers
- D** Integration with external services e.g. other LIMs

# ROUTING ENGINE



A

ingests timestamped GPS coordinates and returns a point on the nearest road segment

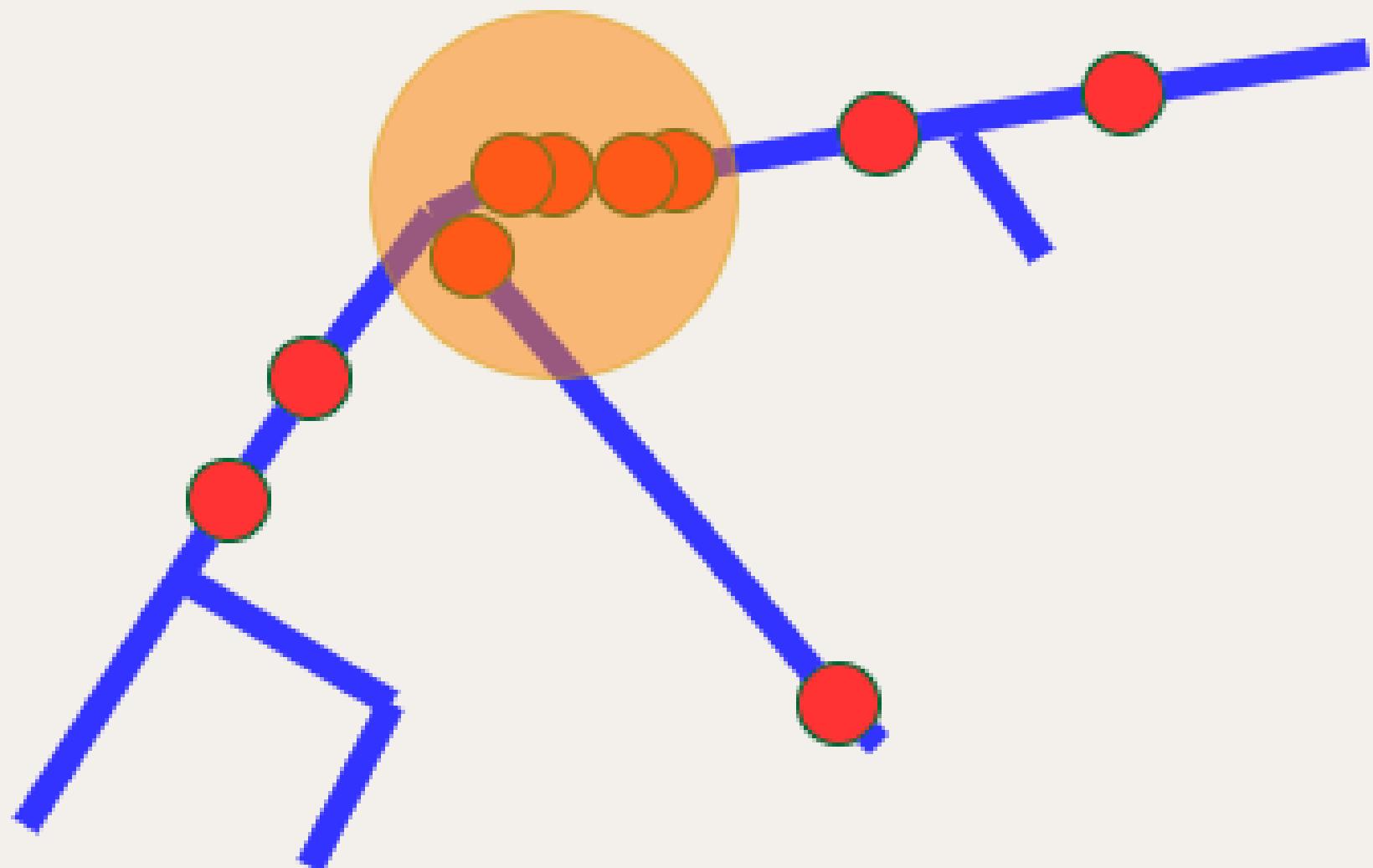
B

This with other strategies ensures we meet our privacy objectives

C

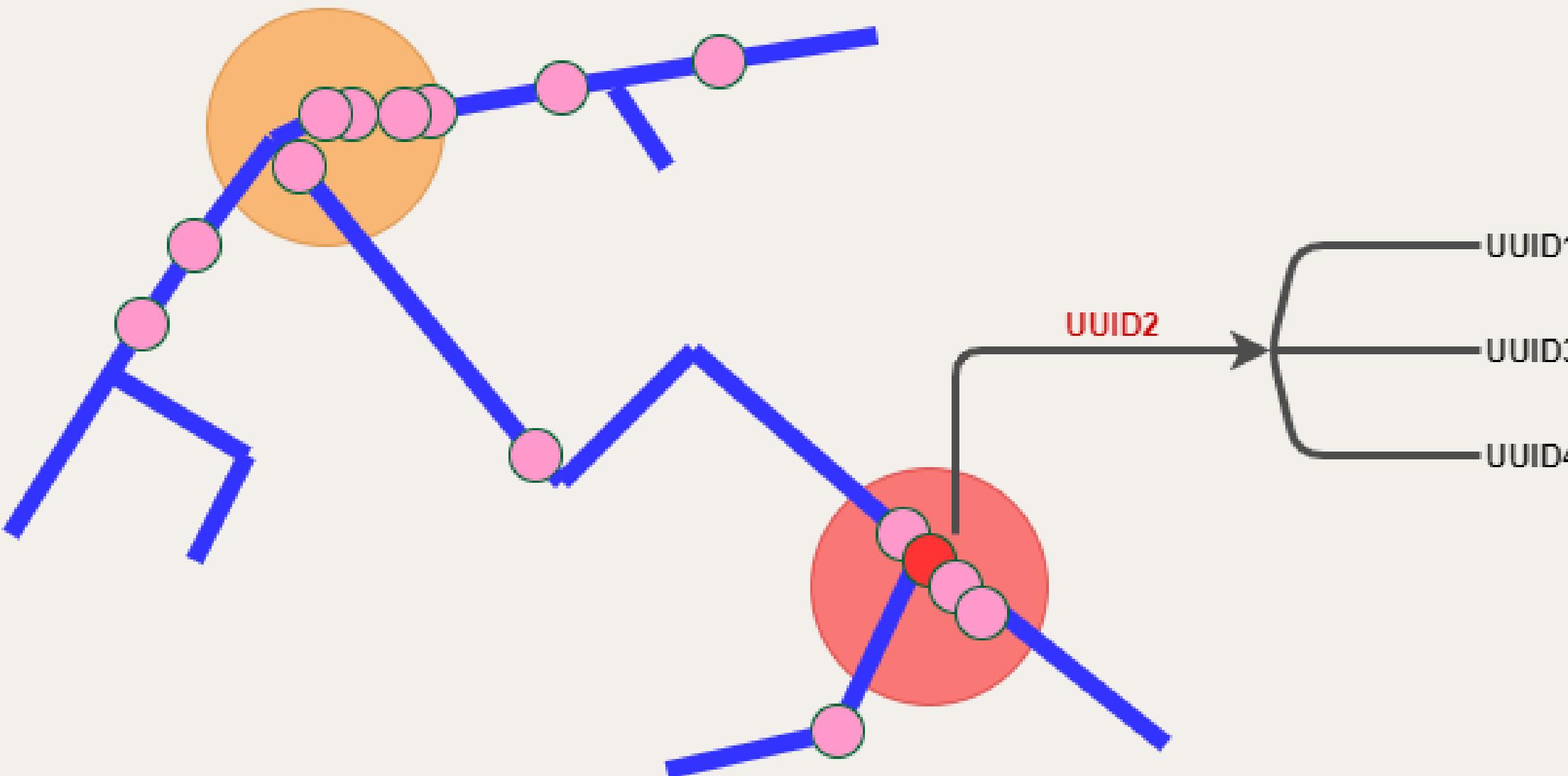
Near real time

# HOTSPOT DETECTION



- A Automatic detection of infection hotspots
- B Considers time, distance, and landmarks
- C Uses novel clustering algorithm based on K-means clustering
- D forms basis for exposure notification

# EXPOSURE NOTIFICATION

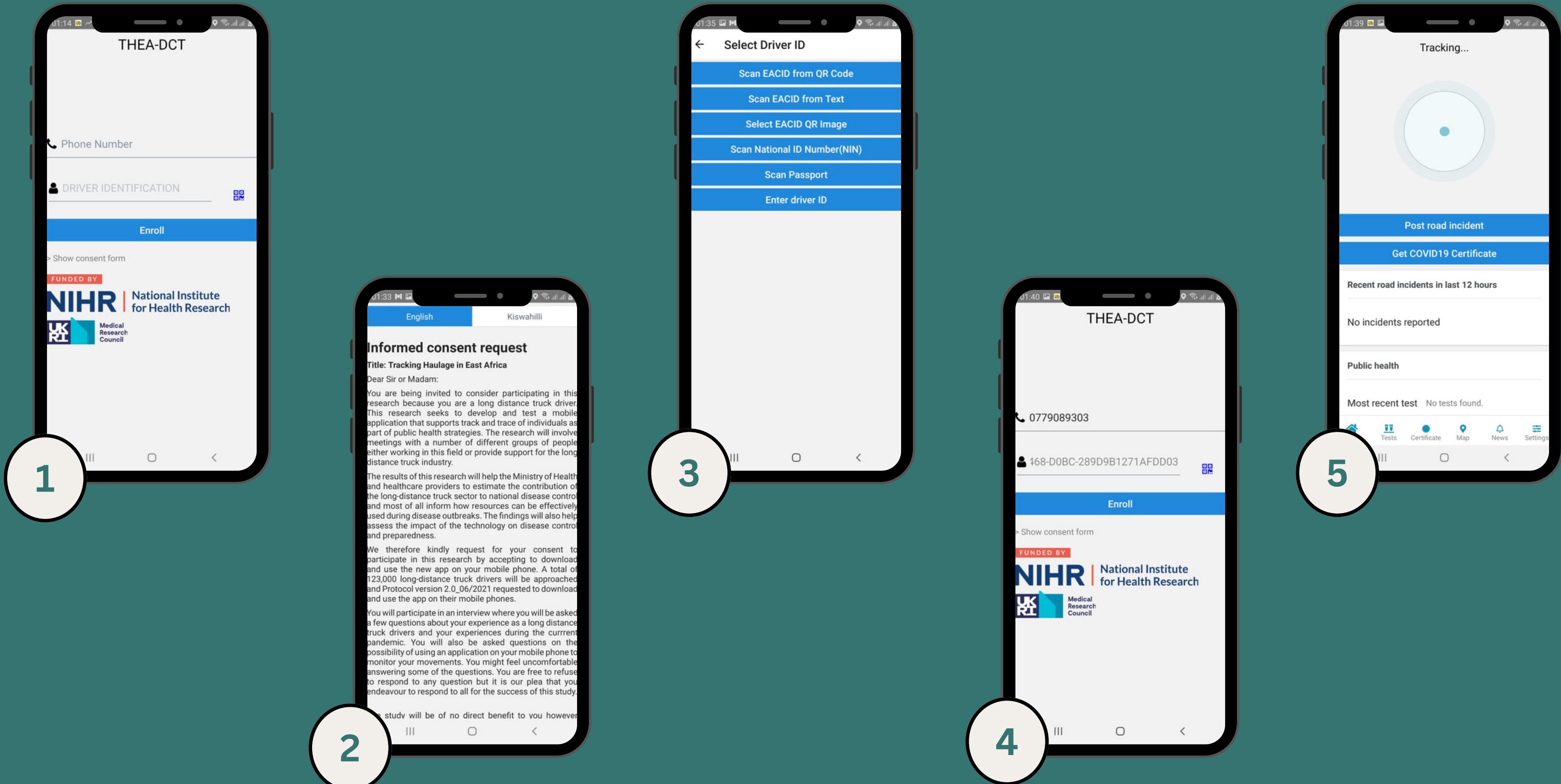


# DATABASE

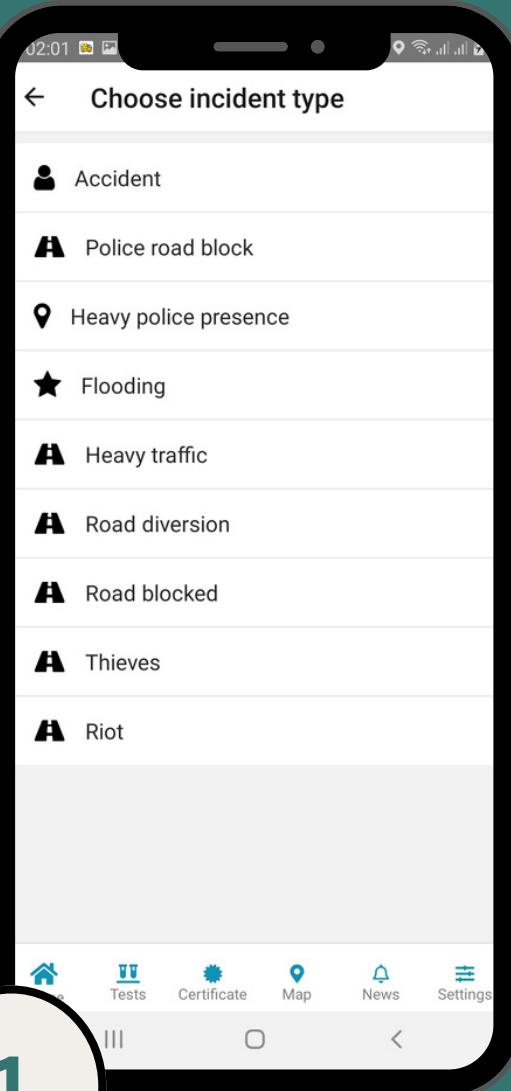
<b>UUID</b>	<b>LATITUDE</b>	<b>LONGITUDE</b>	<b>phone</b>
15a77de4...	0.4536474	32.678956	nFGd617a5MnY n9QsAGBNXQ==
15a77de4...	0.5344444	32.678956	nFGd617a5MnY n9QsAGBNXQ==

- A** stores the timestamps, gps, encrypted phone numbers
- B** phone numbers are encrypted with the 128 Advanced Encryption Standard(AES) using a 16 character password
- C** Locations are the GPS coordinates points on road segment

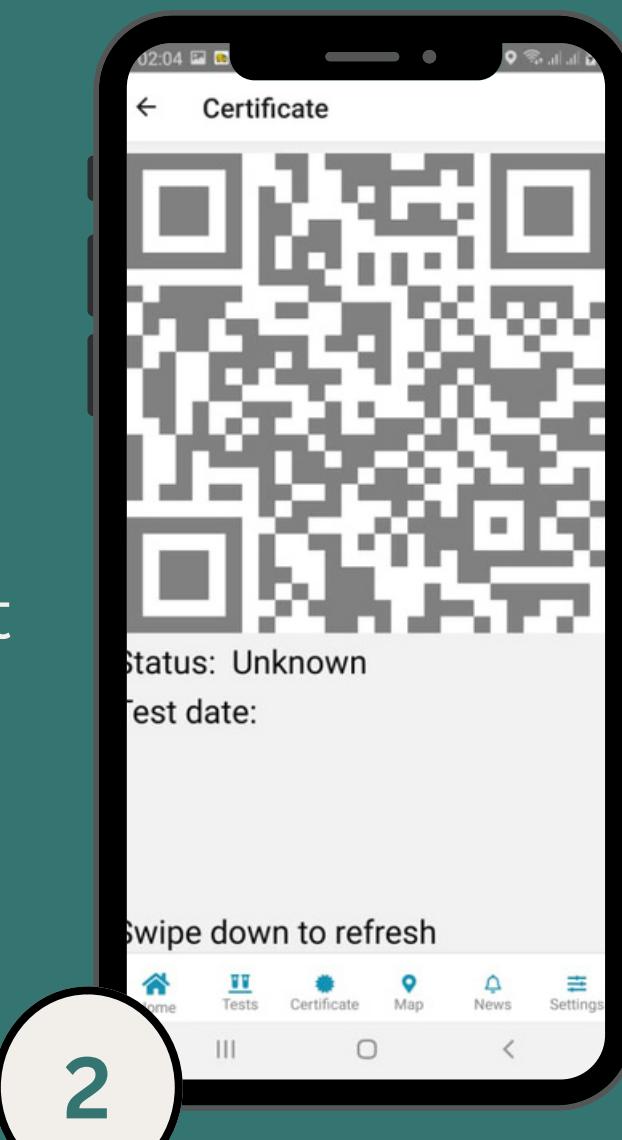
# DRIVER ENROLLMENT



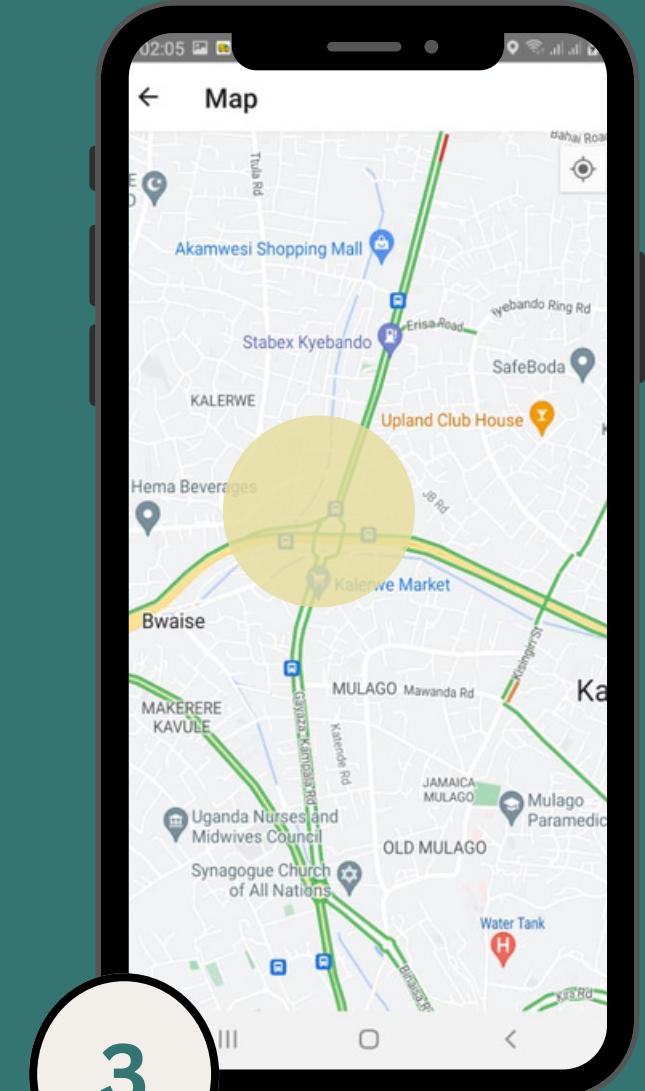
# APP FEATURES



Report road incident



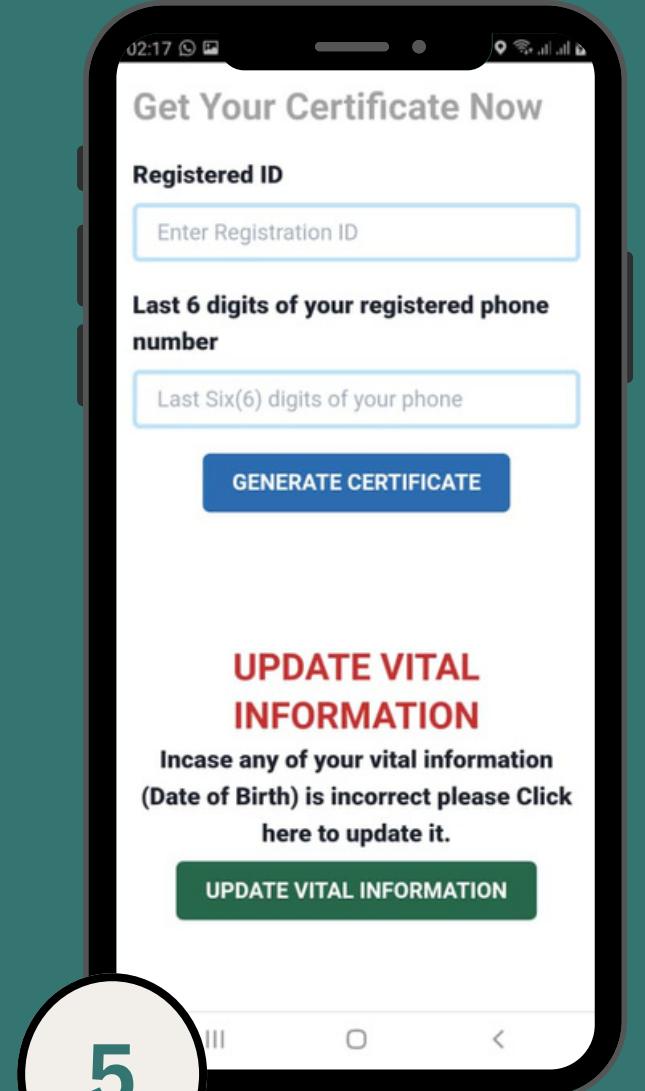
Recent test resultt



traffic and hotspot map

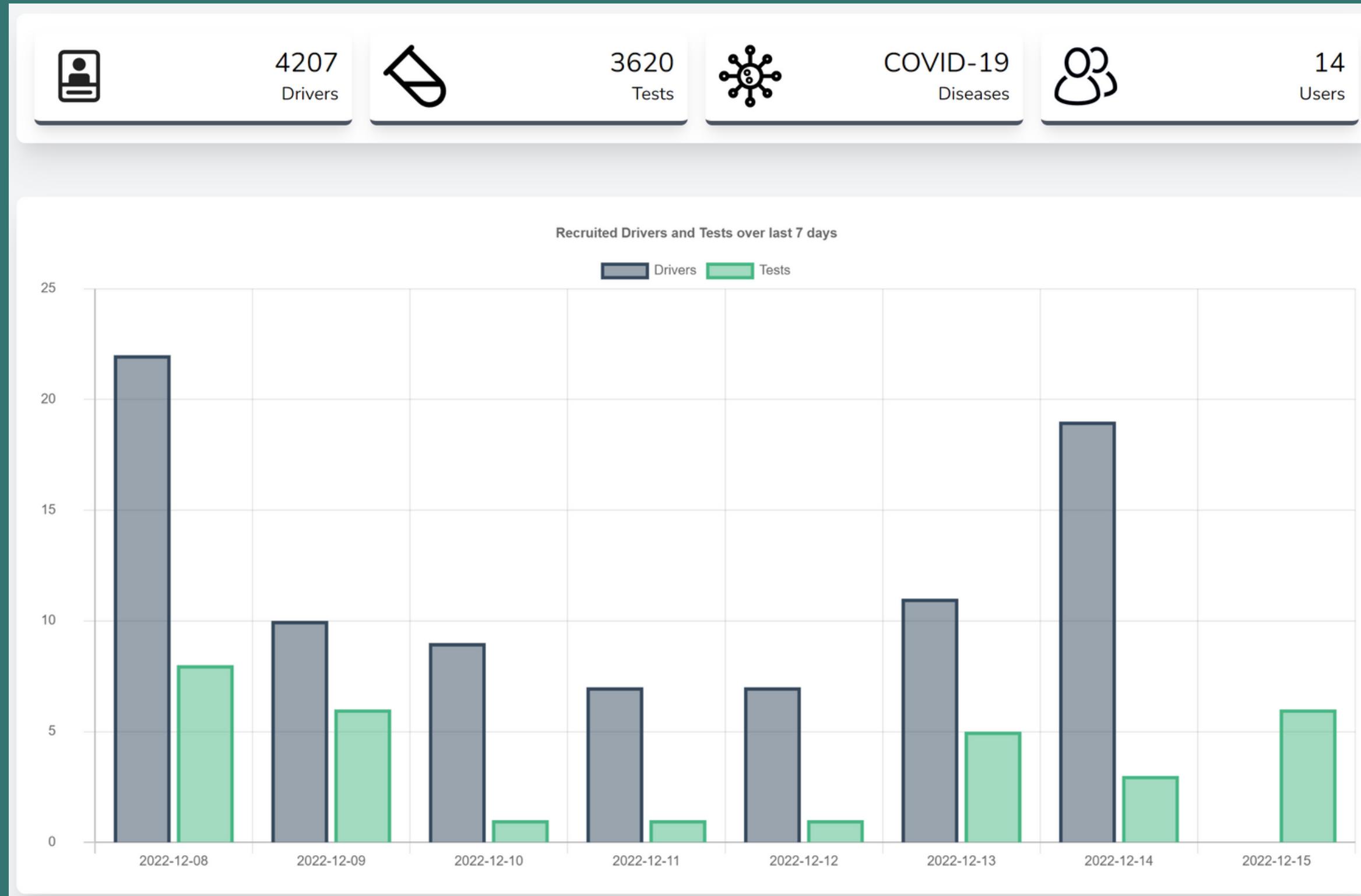


Test history



Get Covid certificate

# WEB - DASHBOARD



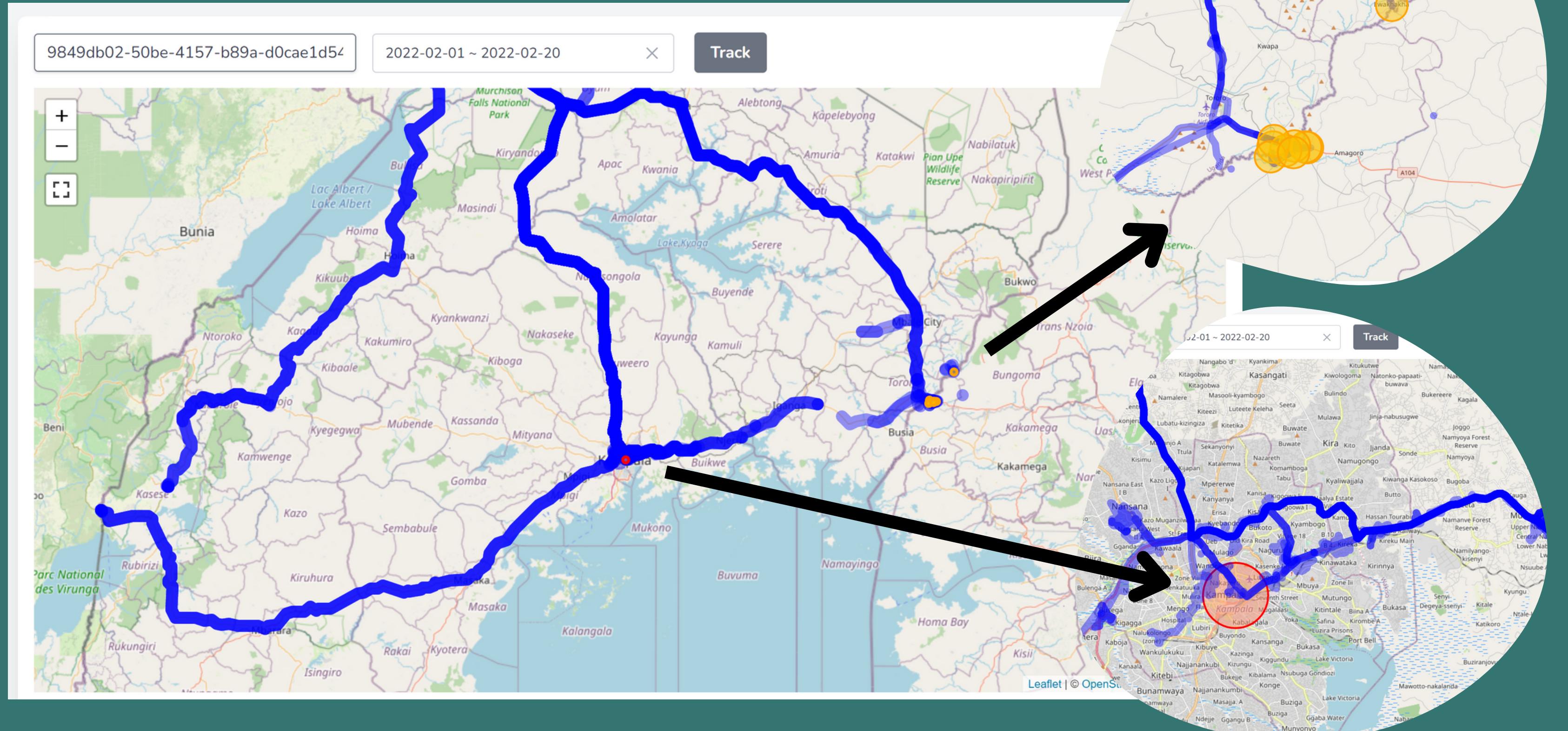
# WEB - ENROLLED DRIVERS

Enrolled Drivers			
Unique ID	Registration Date	Actions	
cba13047-e9c6-4eff-a795-cd2eb2adbfcf	2022-12-14 18:12	<a href="#">+</a>	<a href="#">Edit</a> <a href="#">Delete</a>
7993f1f5-d3e4-43ef-8852-3e7e6db7b7b9	2022-12-14 17:37	<a href="#">+</a>	<a href="#">Edit</a> <a href="#">Delete</a>
e6e7b8cb-ca1c-4a48-89de-7e289a88df3a	2022-12-14 17:03	<a href="#">+</a>	<a href="#">Edit</a> <a href="#">Delete</a>
72322c79-9d48-43e1-8445-c1158dc83708	2022-12-14 15:39	<a href="#">+</a>	<a href="#">Edit</a> <a href="#">Delete</a>
58a6959e-edc6-40df-a2d0-d7e7d026ac33	2022-12-14 13:19	<a href="#">+</a>	<a href="#">Edit</a> <a href="#">Delete</a>
<a href="#">« Previous</a>	<a href="#">1</a>	<a href="#">2</a>	<a href="#">3</a>
<a href="#">4</a>	<a href="#">5</a>	<a href="#">6</a>	<a href="#">7</a>
<a href="#">8</a>	<a href="#">9</a>	<a href="#">10</a>	<a href="#">...</a>
<a href="#">841</a>	<a href="#">842</a>	<a href="#">Next »</a>	

# WEB - TESTS

a0														
Test Date	Unique ID	Disease	Status	Test Lab										
2022-10-28 08:03:02	7aac98a0-74ce-4aef-8c1e-c634daafb6f3	COVID-19	Negative	Maia Medical Group Testing Labs										
2022-10-25 11:17:43	ba0ddabd-5006-496f-bc10-60b4d2609584	COVID-19	Negative	Maia Medical Group Testing Labs										
2022-10-22 03:10:32	2035b9a9-837f-47b3-8515-1a22a0c791d4	COVID-19	Negative	Test And Fly Laboratory										
2022-10-19 09:22:00	a0515be2-b5d4-483d-9924-bd295035c7b7	COVID-19	Negative	BUSIA POE										
2022-09-30 06:08:25	929496ef-7da8-4e71-8f9f-8be5da0f1659	COVID-19	Negative	Makerere University College of Health Sciences										
<a href="#">« Previous</a>	<a href="#">1</a>	<a href="#">2</a>	<a href="#">3</a>	<a href="#">4</a>	<a href="#">5</a>	<a href="#">6</a>	<a href="#">7</a>	<a href="#">8</a>	<a href="#">9</a>	<a href="#">10</a>	<a href="#">...</a>	<a href="#">80</a>	<a href="#">81</a>	<a href="#">Next »</a>

# WEB - HOTSPOTS



# WEB - EXPOSURE NOTIFICATION

## Drivers on the move during this period

#	Driver ID
1	9849db02-50be-4157-b89a-d0cae1d54ce6
2	c66c0f5b-63bc-466b-83f7-f5a88726ece6
3	60717546-79ba-4bf2-a240-28539630018f
4	a708a3ce-1803-48fa-b073-566e2bb6bf9b
5	8ef39fd2-1ce6-4850-804d-b6ccdea96ad8
6	b4c654a1-34aa-4e00-b147-92196de3fe35
7	c2bee5d1-5e25-4415-8527-27f51770fab5
8	33d07da6-943a-4f83-9f32-237094e12579
9	aabe241c-f95f-4660-a1ed-543c10b25119
10	863c4589-3d7b-4016-a8d4-658b6641065d
11	205d7268-09fc-4040-9536-50e76612608a
12	1a130706-da83-45cf-8e26-10cb172b47a6
13	6bf6d016-acc4-478f-8e3d-6b799be6f689
14	0ae4c71f-18b6-462b-b20d-6d6248f462f3
15	163322f7-325e-45d3-84e2-c8738d4a1c21
16	86a6974d-6dc2-42af-968d-9f875b36fdb9
17	11ccde0e-9c32-42db-9f85-590448d984de
18	7e1a5818-6800-4514-b90a-a84d03ee19fd
19	5fd6e9c5-a17f-4020-9032-14a82972b1b5
20	b4e623e6-b807-40ed-9316-b88aae6459c5

## Exposure notification list

-d203-4616-97f6-464265977ffa →

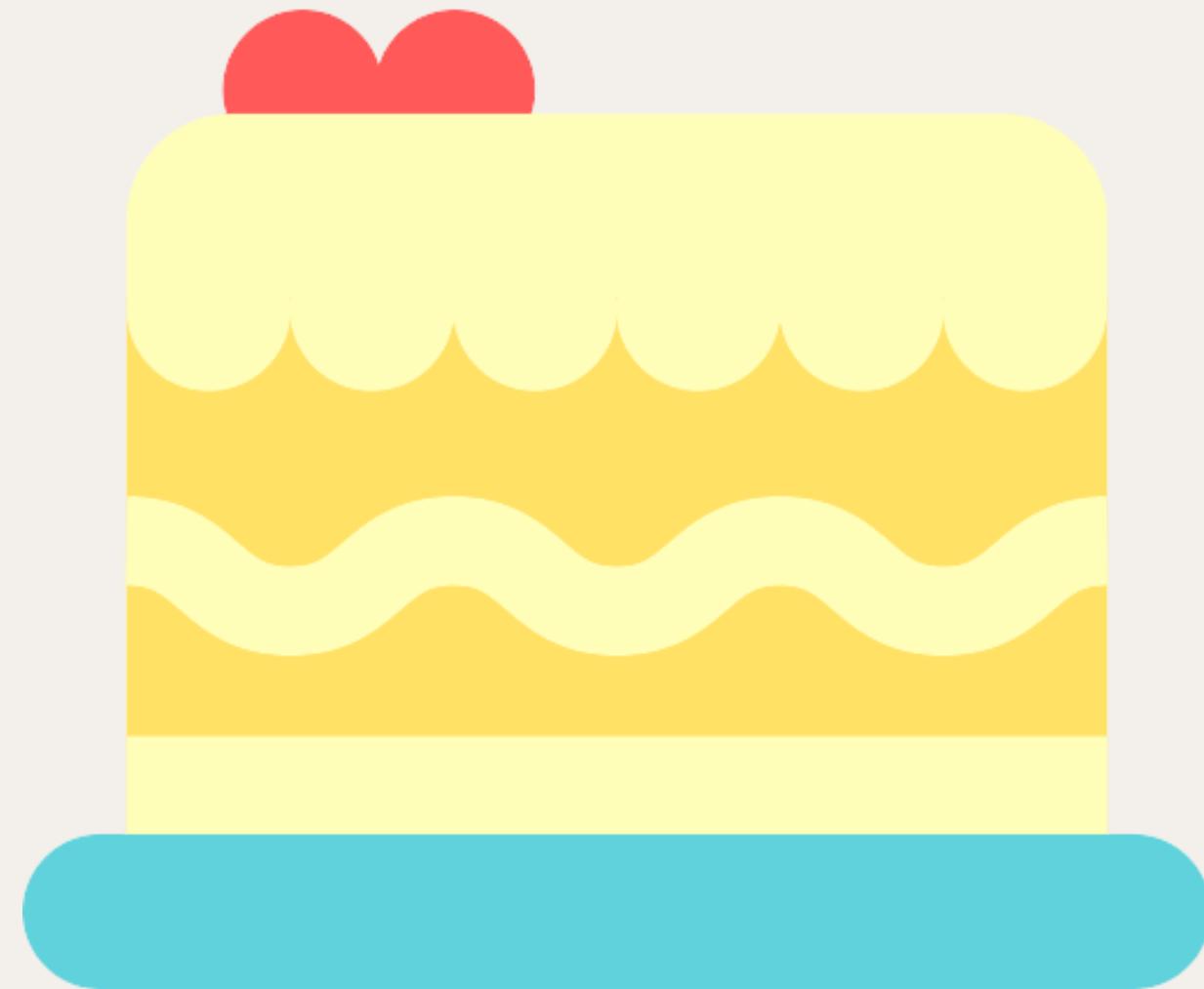
- dhca4739-b3ee-4d40-8597-a11
- 5fe4ea7d-202c-4c71-b992-608
- 773a7d27-a852-4980-9fr4-d82
- 24534f9c-c56f-4d83-a7ch-e816
- da8b36e4-a747-4nfh-9e96-c99
- c2bee5d1-5e25-4415-8527-27f

Test Date	Number Exposed	Number Infected in 14 days	Infection Rate
2022-02-02 00:00:00	4	0	0%

# KEY PERFORMANCE INDICATORS

KPI	Value
Case notification speed	<b>45min</b>
Contact notification speed(sensitivity)	<b>45min</b>
Request per second	<b>1000/s</b>
Percentage of notified drivers that test positive(infection rate - what percentage of the exposed drivers tested positive in the following 14 days)	<b>15%</b>
GPS Points	<b>&gt; 60 million</b>
Data size	<b>~ 300 GB</b>

# INCENTIVES



- A Traffic information
- B Road incidents
- C Jobs
- D Information and news
- E Blackspots

# OPEN SOURCE

<https://project-thea.github.io/thea-gs/>

- A** Available to the global south
- B** Minimal and generalized version of the THEA-DCT
- C** Allows integration with LIMS for results collection
- D** We continuously improving it with regular updates

# THANK YOU!

<https://project-thea.org>