



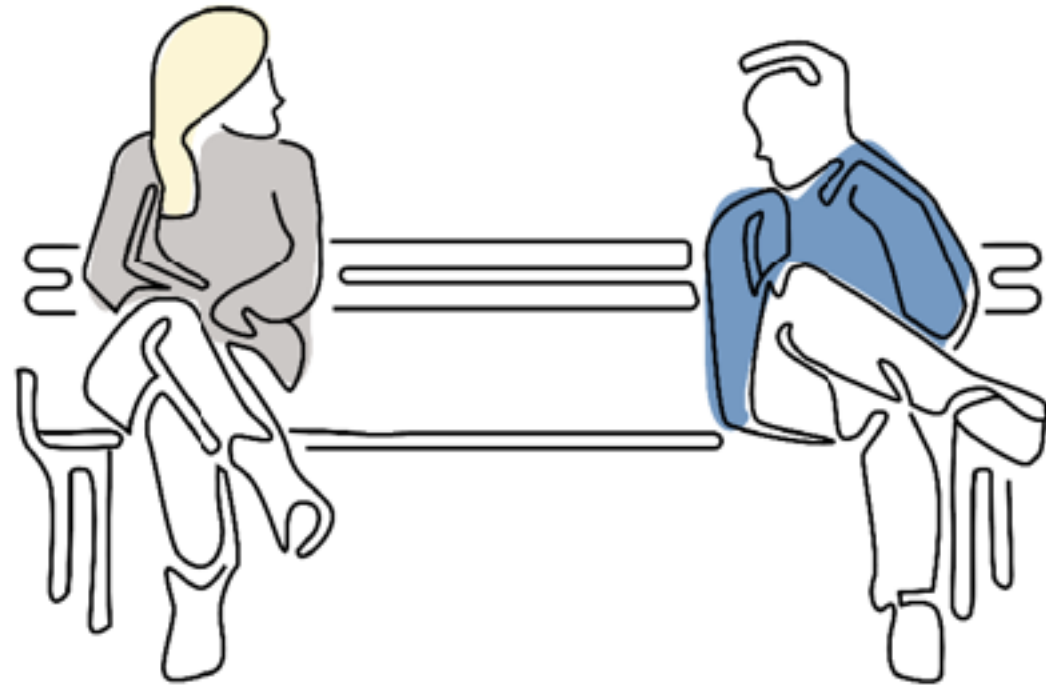
GAEN

Google-Apple Exposure Notification

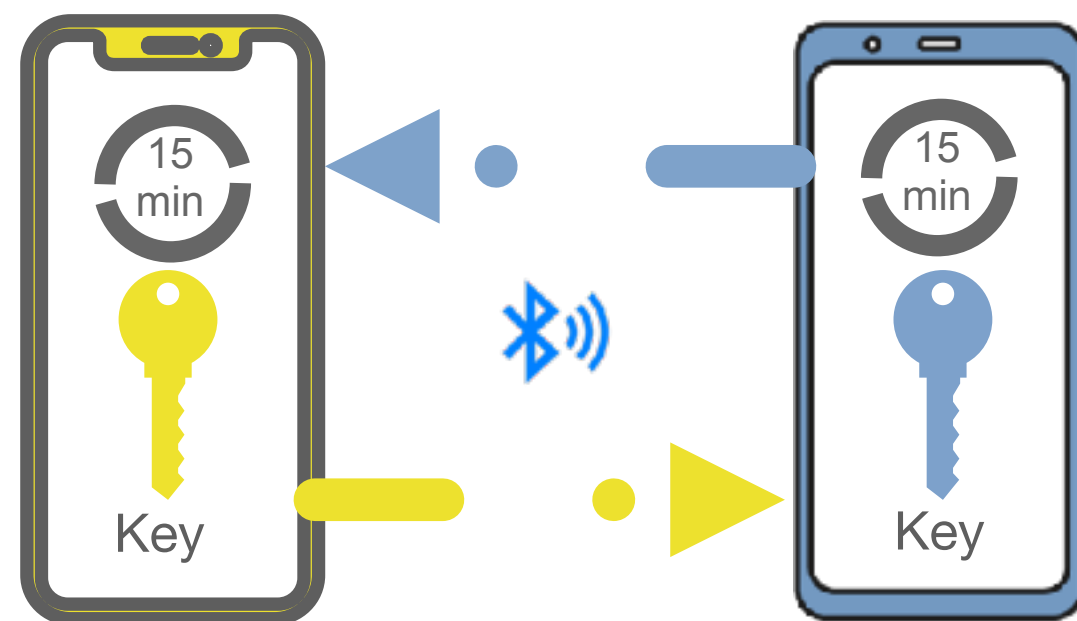


What is GAEN?

Alice and Bob don't know each other, but have a lengthy conversation sitting a few feet apart.



Their phones exchange non-identifiable bluetooth beacons, which change frequently.



A few days later...

Bob is positively diagnosed for COVID-19 and enters the test result in an app from his public health authority.



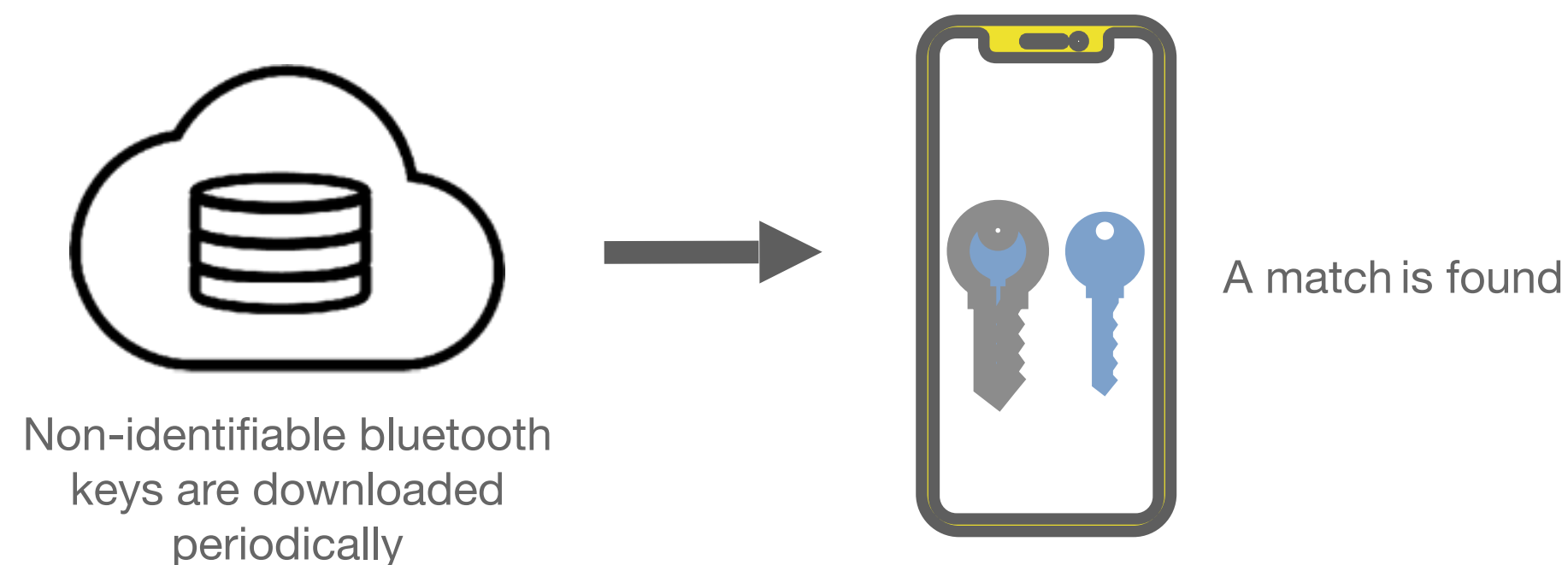
With Bob's consent, his phone uploads the last 14 days of his bluetooth keys to the server.



Alice continues her day unaware she had been near a potentially contagious person.

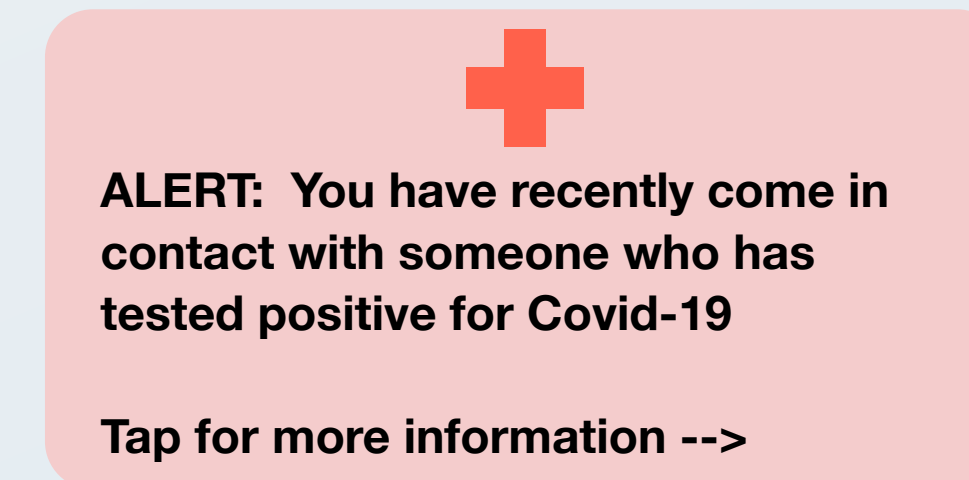


Alice's phone periodically downloads the non-identifiable bluetooth keys of everyone who has tested positive for COVID-19 in her region. A match is found with Bob's non-identifiable beacons.

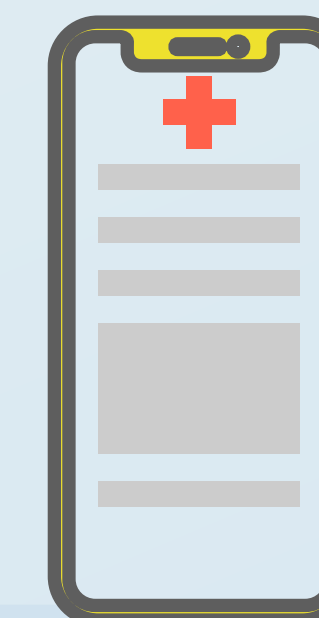


Sometime later...

Alice receives a notification on her phone.



The notification includes information about what to do next (e.g. to quarantine, monitor symptoms, get tested, call public health).

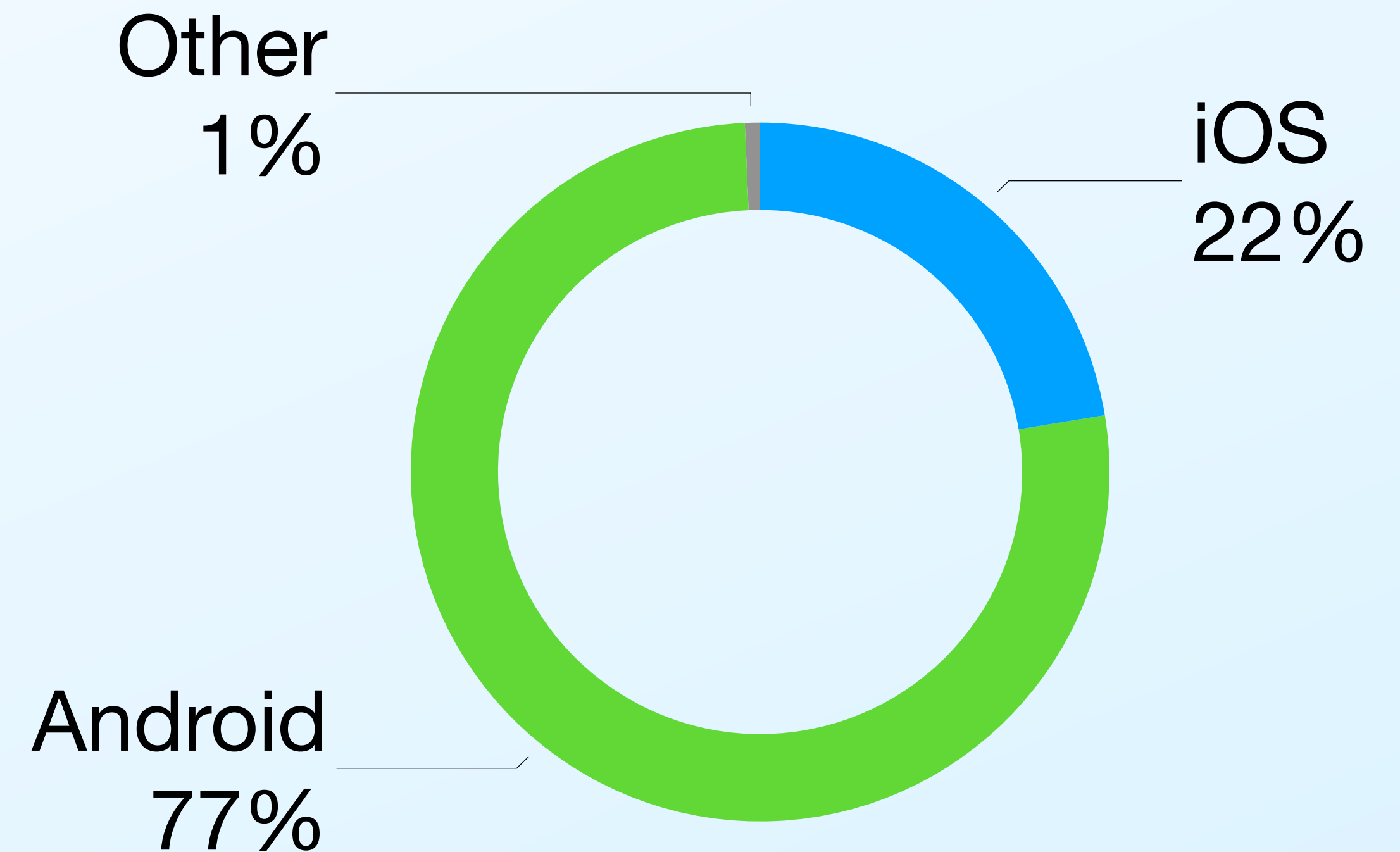


Additional information is provided by the public health authority app

Why Google and Apple?

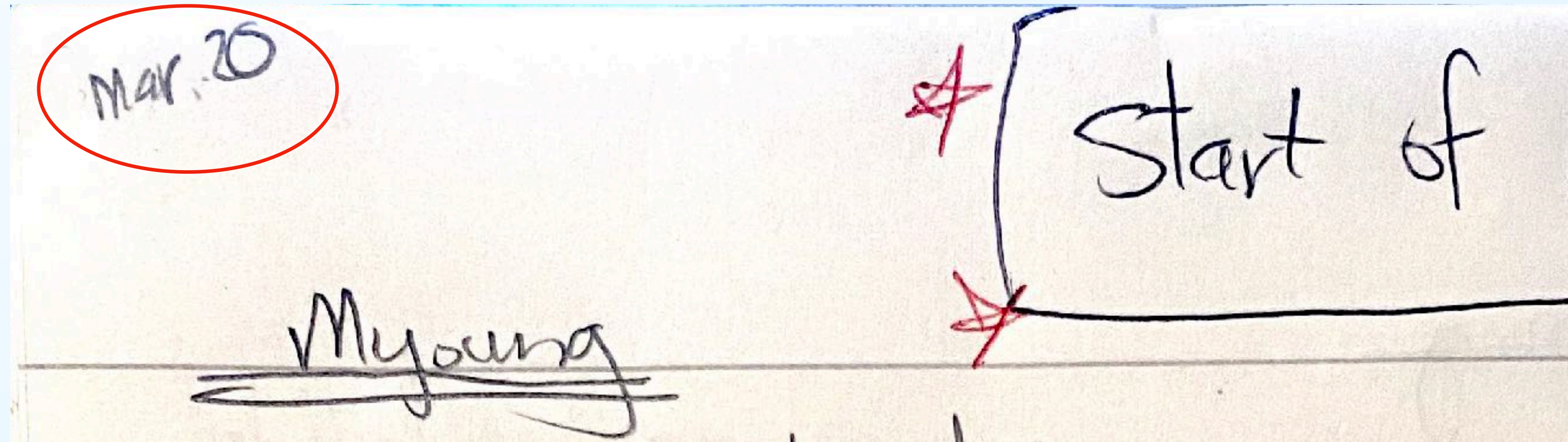
Smartphone Marketshare... 2020

90% of Working Adults owned a Smartphone



The Beginning

March 20th, 2020



We Shipped 8 weeks later!

May 20th, 2020



5 Sponsors, 34 Teams, 136 People + Google





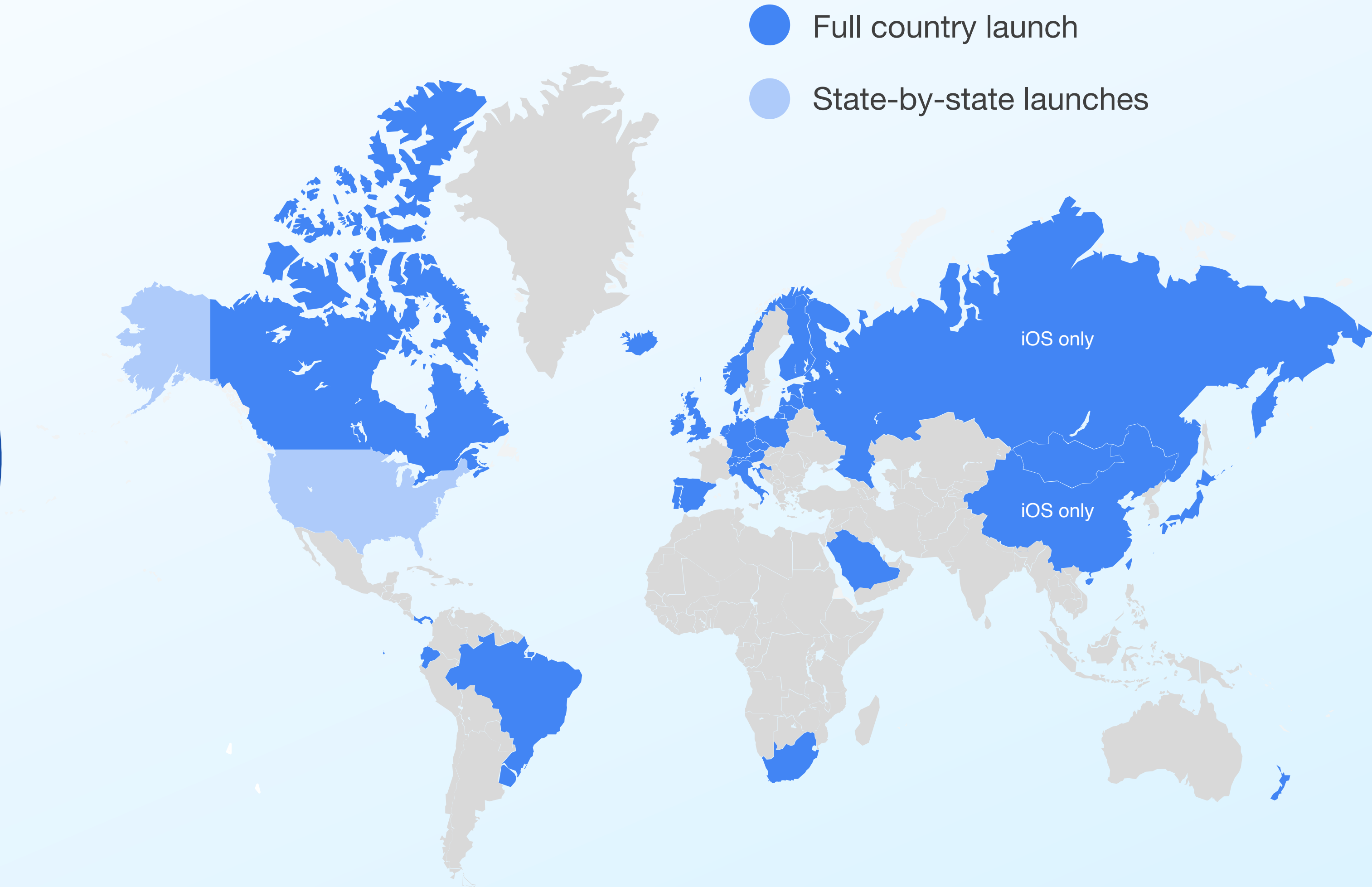
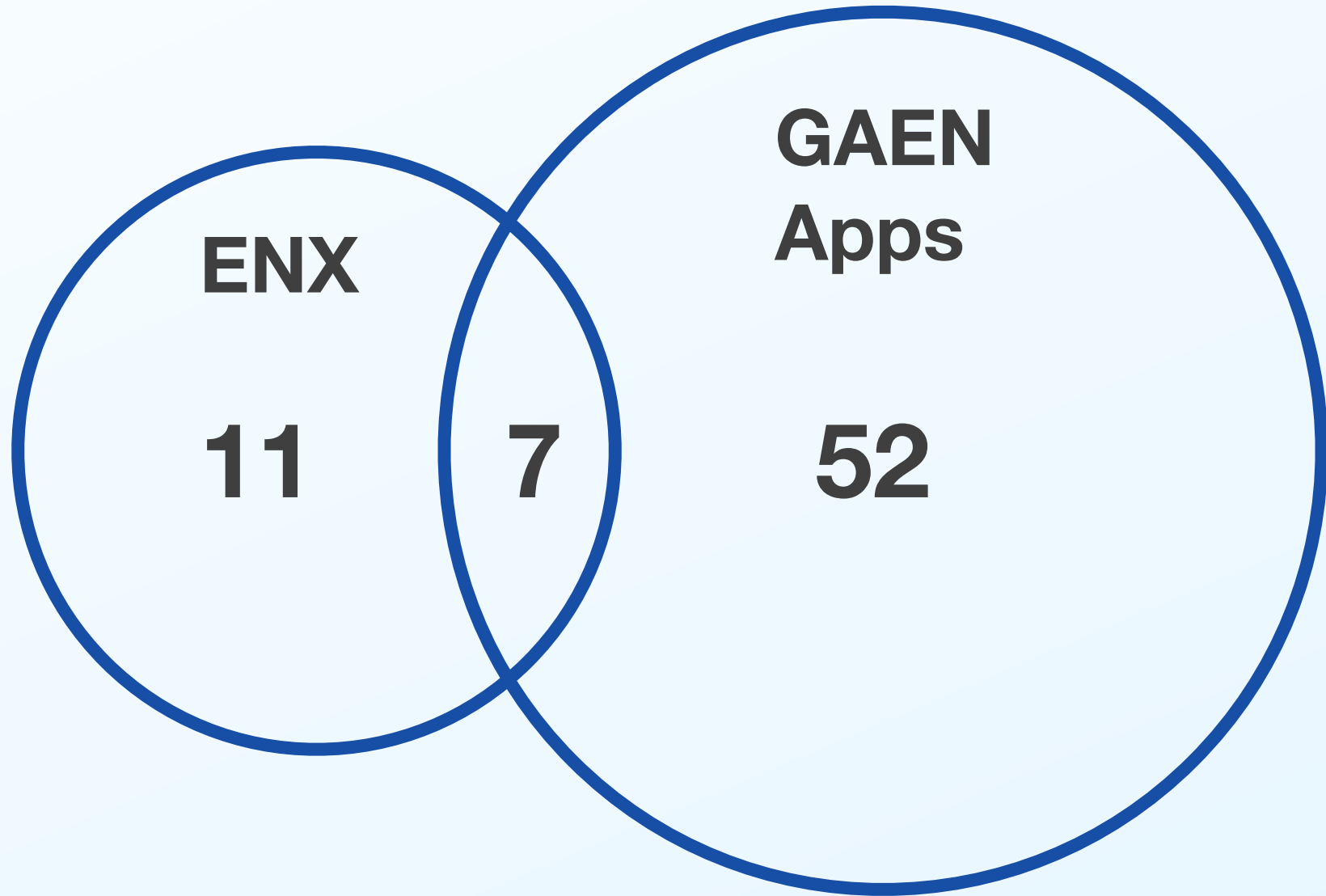
Collectively **over 300 people** worked on EN



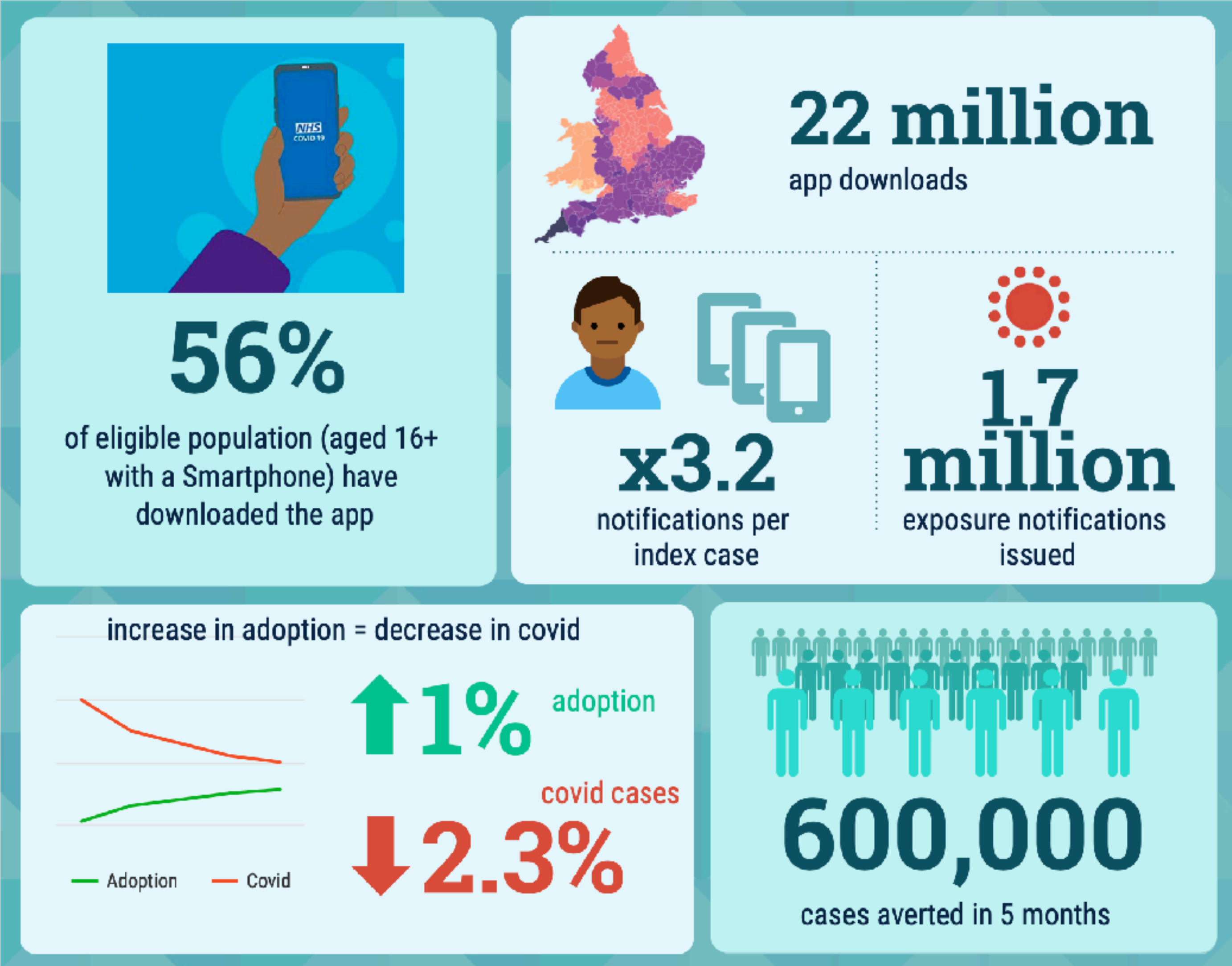
GAEN: 1 year mark

203+ Million Users

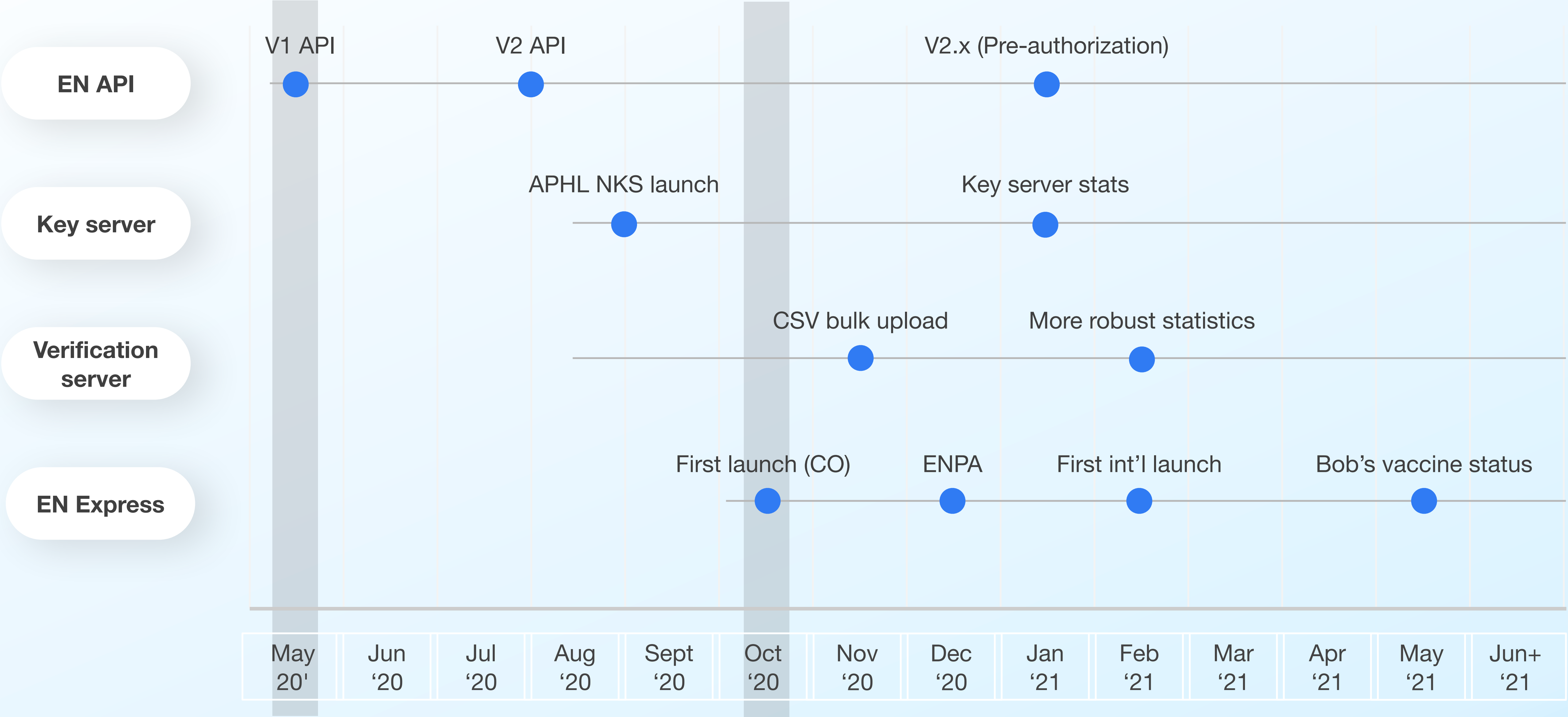
70 Regions



NHS Study



The evolution of EN



GAEN Things that were Most Important to Apple & Google

To Assist: To help fight the spread of COVID-19

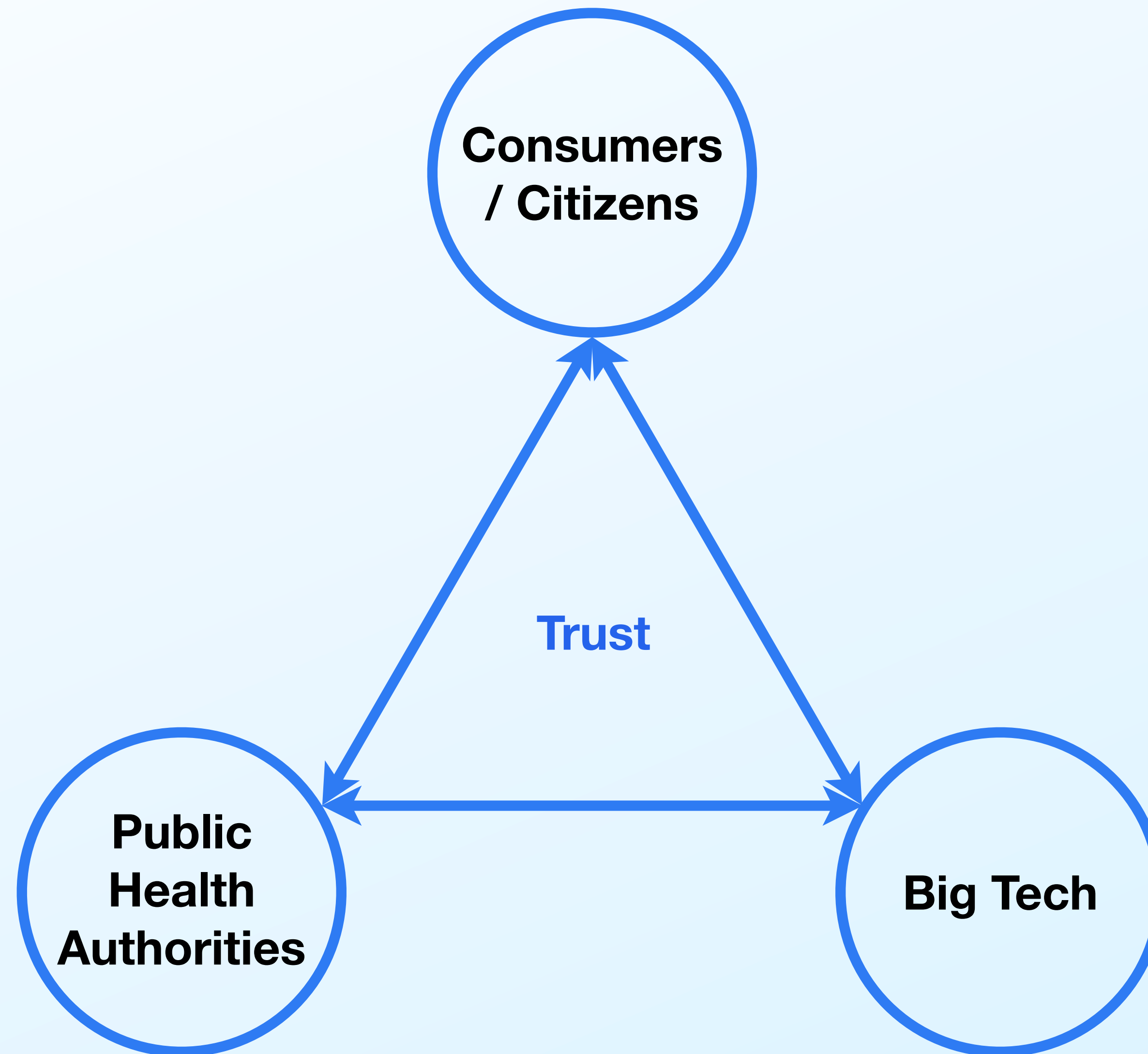
Privacy Preservation: Insisted user data & location remained private

User Choice: Users had to explicitly opt-in

PHA Driven: Only deployed at the request of official Public Health Authorities

Decentralized: Insisted the matching take place on-device only

GAEN: Triangle of Trust



Fictional Example of Potential Misuse

- (If background location tracking was allowed and identities were revealed)
- Some countries were asking for this for traditional contact tracing
- Apple and Google DIDN'T allow it in GAEN
- Imagine if we did, the following fictional scenario:

Fictional Dictator hates Dogs



Nefarious Actor visits the Dog Park & the Smartphones pair in the background



Identities of dog-owners are revealed and they are rounded up and put in jail



Now imagine if it wasn't the dog park, but rather a political rally, or a cultural event for one ethnicity, or a nightclub for LGBTQ... (for example)

GAEN Things Apple & Google were Uncomfortable Doing

Hosting Servers: Preferred not to be the one to store the data (APHL did)

Hosting Analytics: Dually Hosted by Linux Foundation & Mitre

Public Outreach: Left this to the PHA's

Long-term Maintenance: The goal was always to “sunset” GAEN

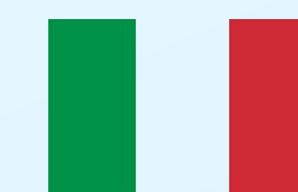
Other Key Participants in GAEN



Department
of Health &
Social Care



England



BENDING
SPONS



The
Alan Turing
Institute



Deutsche
Telekom

Plus more...

GAEN

What Apple & Google Got out of It

The Chance to Help Save Lives

DPHF: Project “Day 1”

Be Ready to Flip the Switch

Technical Solutions for Most-likely Scenarios

Improve accuracy, efficacy, and adoption

Servers & Analytics

Apple, Google, & Other Tech Orgs Interface

Enlist the Assistance of Ethical AI

Assist PHA's

GAEN Unsolved Challenges

Roaming: traveling from country to country with EN

Indoor / Outdoor Detection: different for air-borne

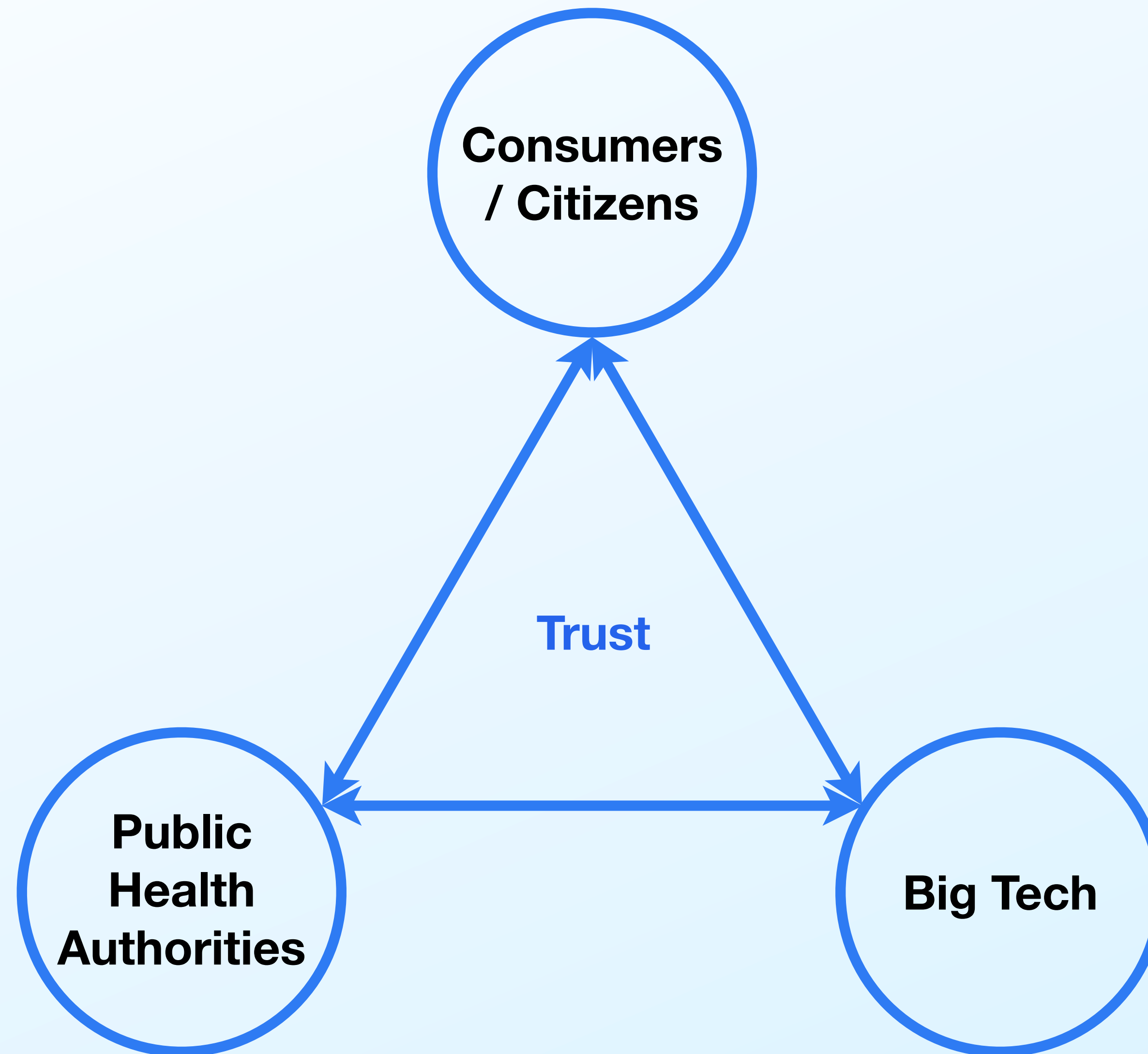
Wireless Ranging: UWB, Wearables, LiDr

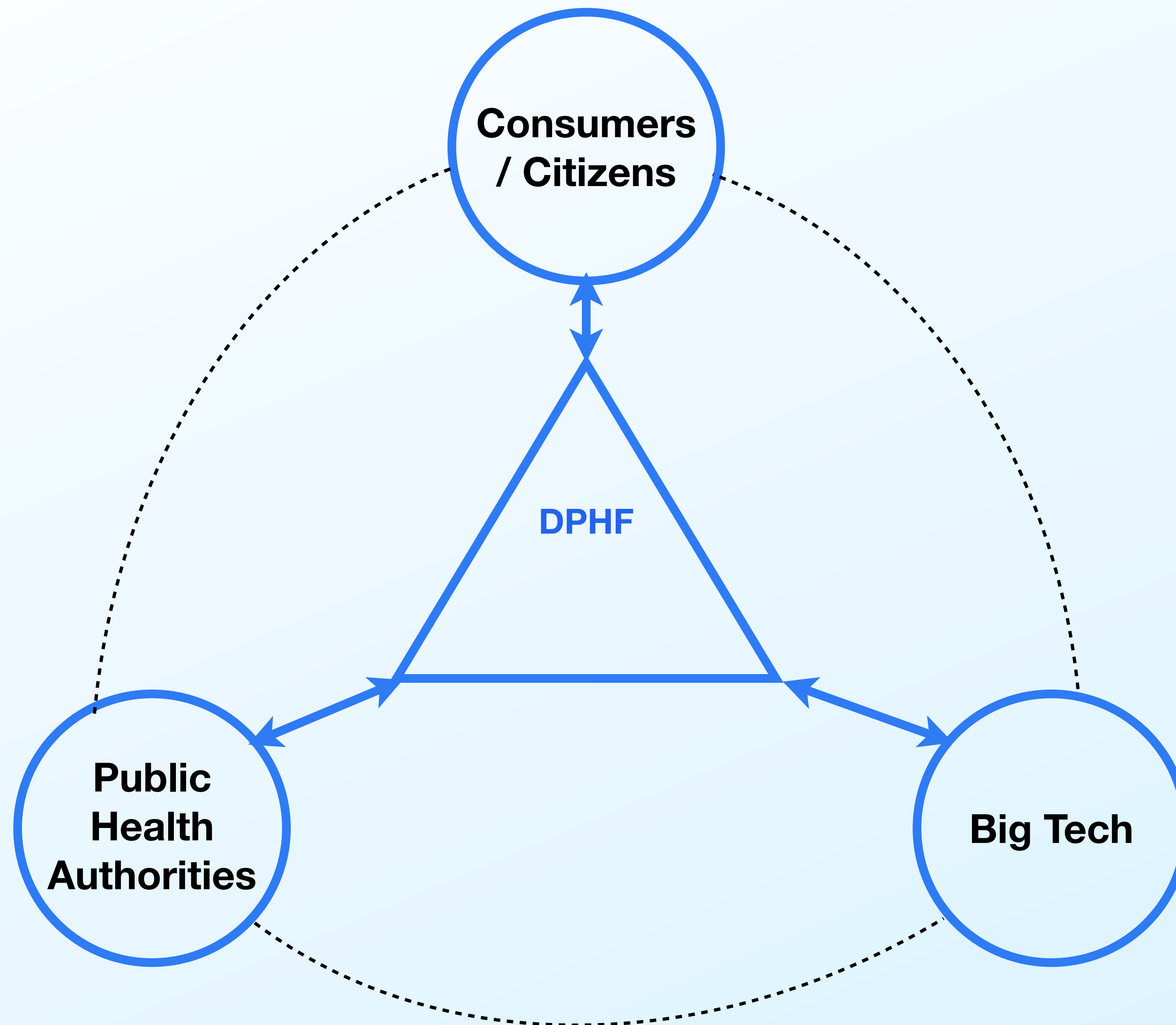
Virus Behavior: prepare for all transmission possibilities

Vaccination Inputs: adjusting the notification

Ring Vaccination: using EN to conduct ring vaccination & anti-virals

GAEN: Triangle of Trust





Thank You!

Disclaimers:

- I was the project lead at Apple for GAEN during the pandemic
- I no longer work at Apple
- I no longer represent Apple or Google in an official capacity
- They are OK with me giving this presentation

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