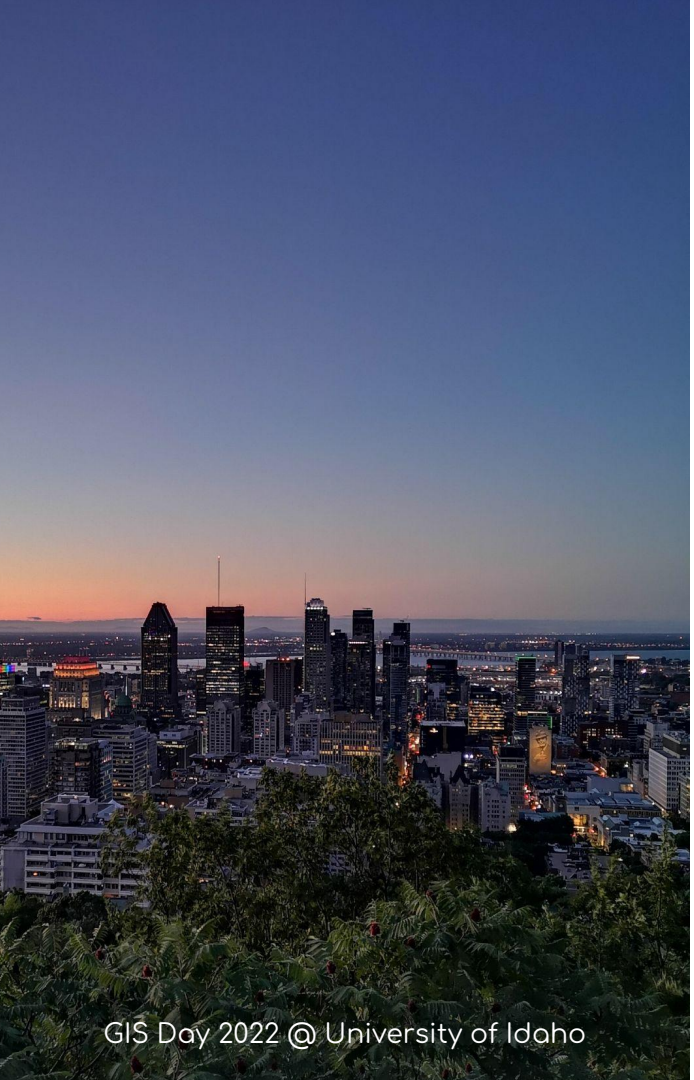

PRIVYTO

A platform for location sharing and geoprivacy preservation

Grant McKenzie

Platial Analysis Lab
Department of Geography
McGill University

https://platial.science
@platialanalysis

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Fitness tracking app Strava gives away location of secret US army bases

Data about exercise routes shared online by soldiers can be used to pinpoint overseas facilities

Latest: Strava suggests military users 'opt out' of heatmap as row deepens

Alex Hern
@alexhern

Sun 28 Jan 2018 16.51 EST

A military base in Helmand Province, Afghanistan with route taken by joggers highlighted by Strava. Photograph: Strava Heatmap

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By Mitchell Clark | Mar 4, 2022, 8:29pm EST | 6 comments

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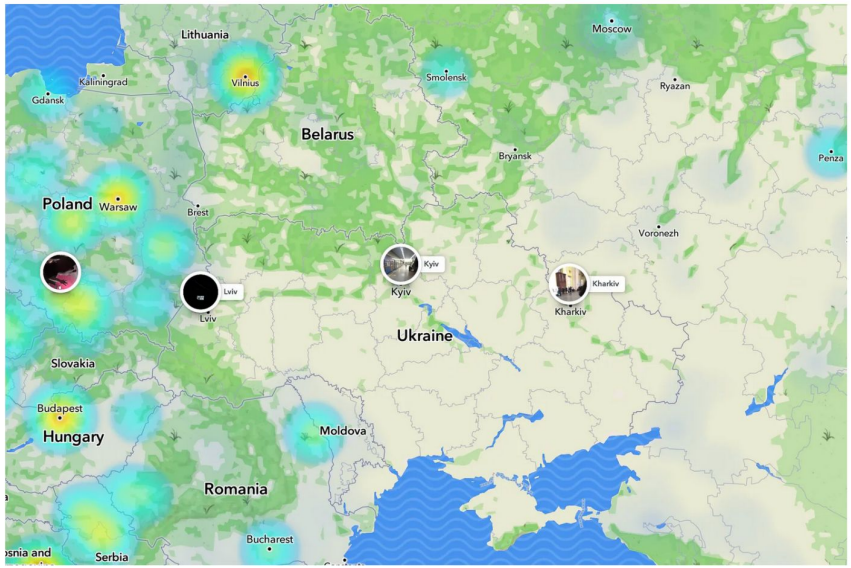

The heatmap shows how many people are submitting snaps in an area.

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Snapchat

Other companies hav

By Mitchell Clark | Mar 4, 2022,

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The heatmap shows how many pe

The New York Times

Roe v. Wade Overturned › | Tracking Abortion Bans | Your Questions, Answered | Read the Decision

Google Says It Will Delete Location Data When Users Visit Abortion Clinics

Under pressure from employees and supporters of reproductive rights, the company announced privacy changes for the post-Roe era.

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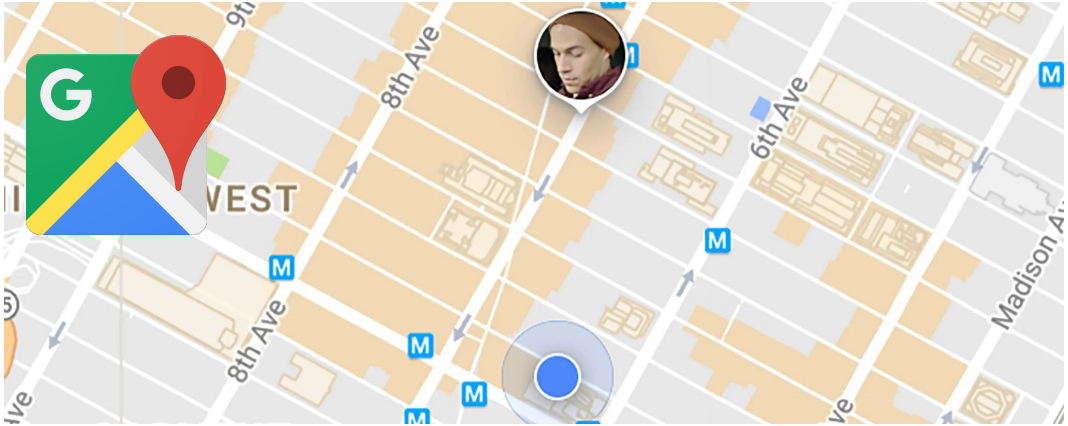
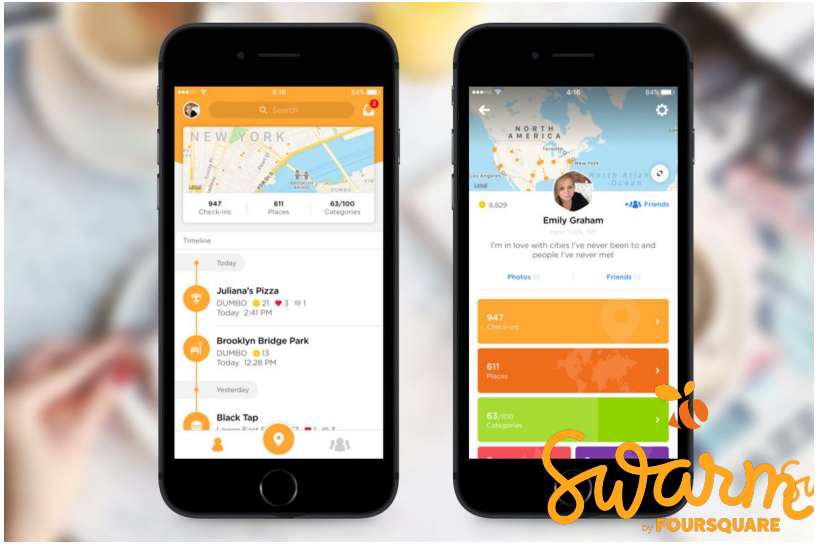
Opinion

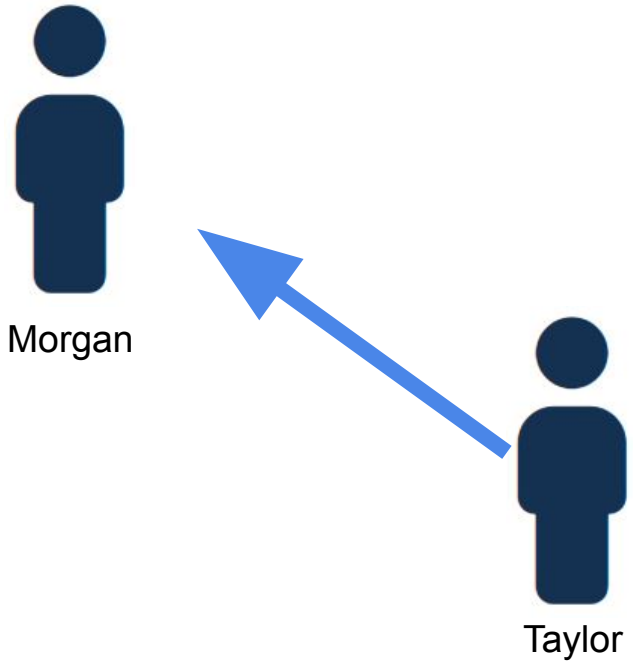
They Stormed the Capitol. Their Apps Tracked Them.

Times Opinion was able to identify individuals from a trove of leaked smartphone location data.


8th Ave
6th Ave
8th Ave
Madison A
VEST

Check in on
facebook
share with others where you are


NEW YORK
947
Check-ins
611
Places
63/100
Categories
Timeline
Today
Juliana's Pizza
DUMBO
Today 2:41 PM
Brooklyn Bridge Park
DUMBO
Today 12:28 PM
Yesterday
Black Tap
NORTH AMERICA
Emily Graham
I'm in love with cities I've never been to and people I've never met
Photos
Friends
947
Check-ins
611
Places
63/100
Categories
Swarm
by FOURSQUARE



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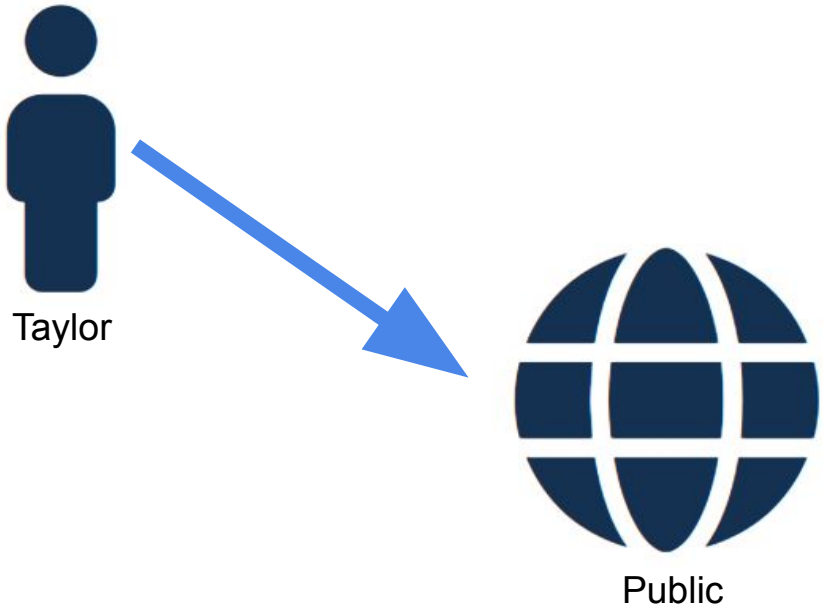
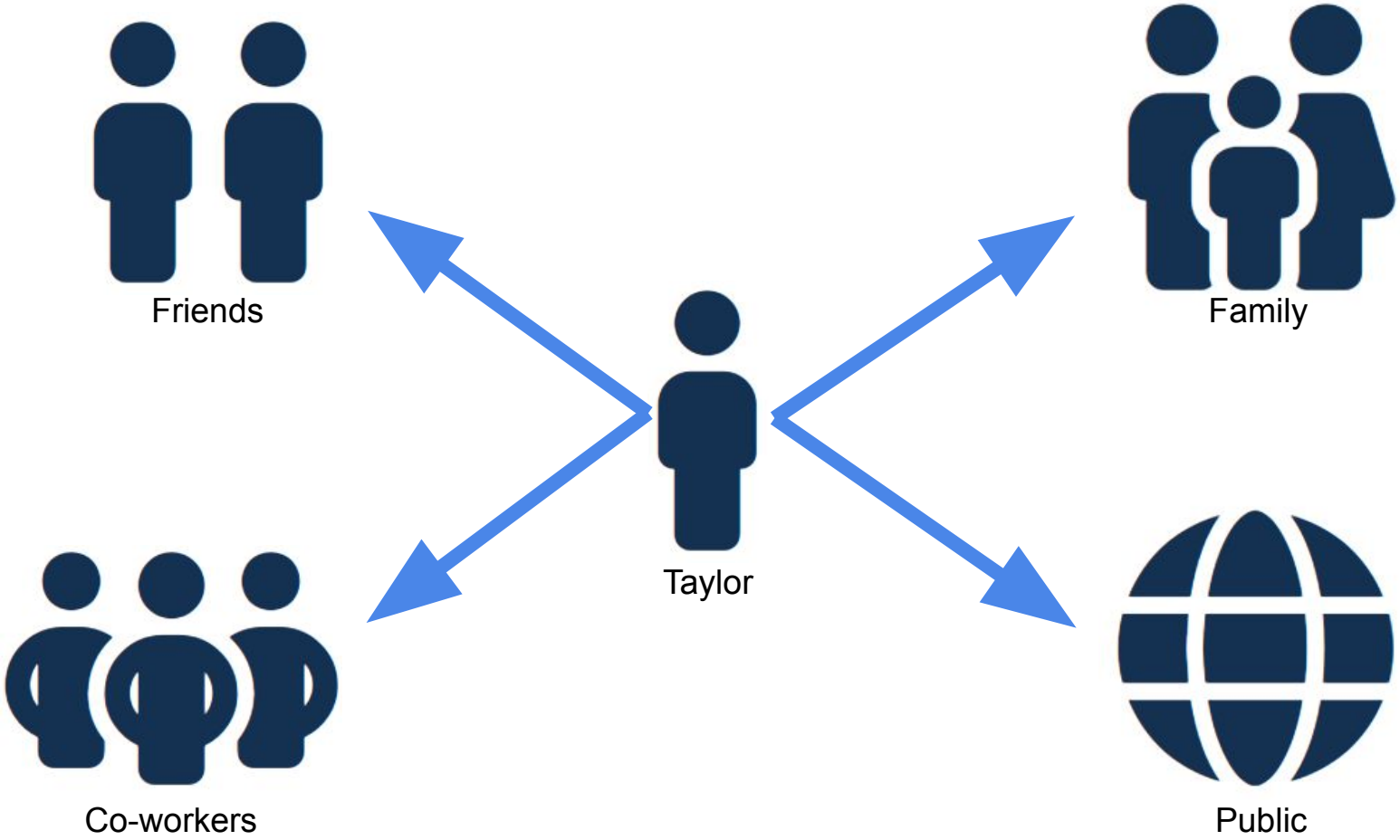
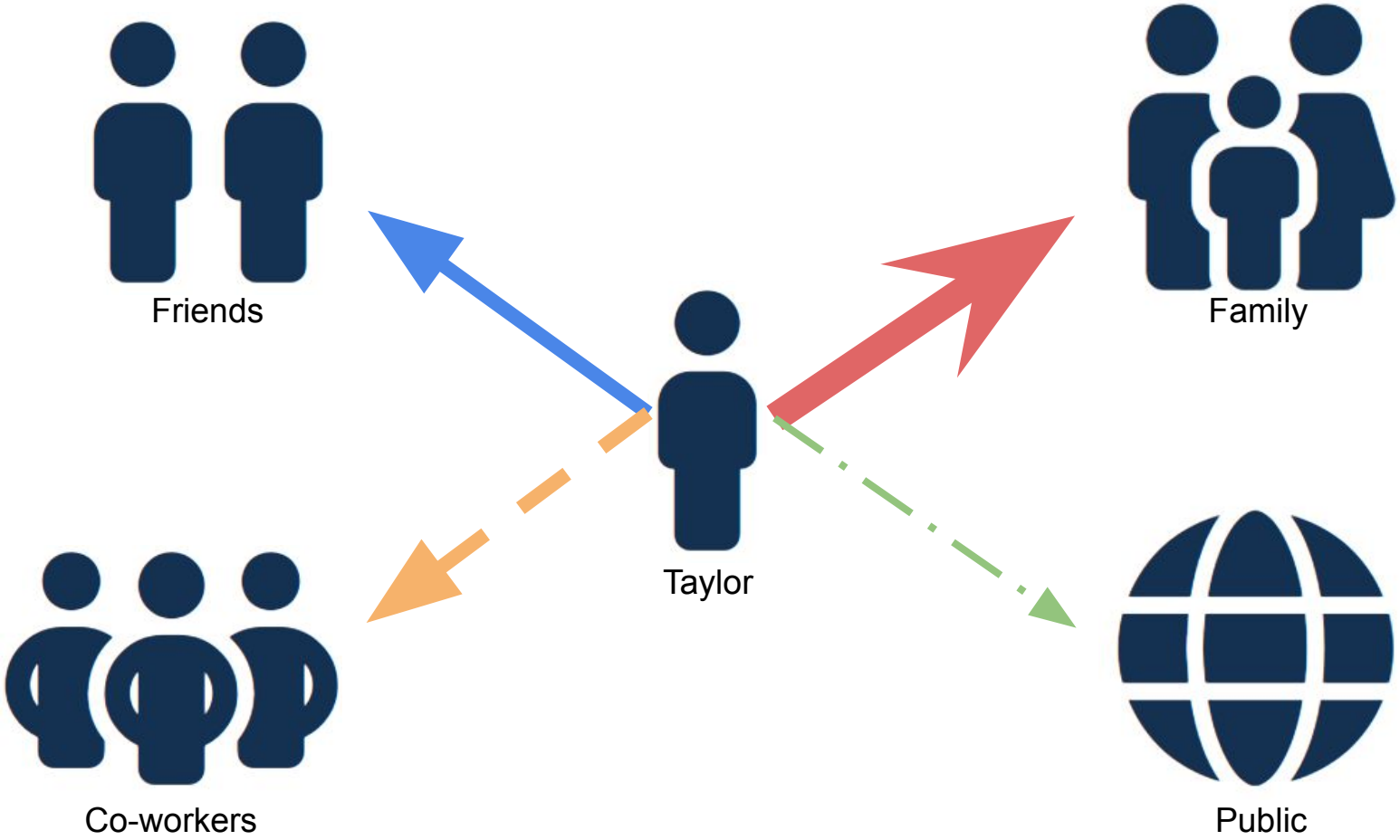

Taylor
Public


Friends
Family
Taylor
Co-workers
Public

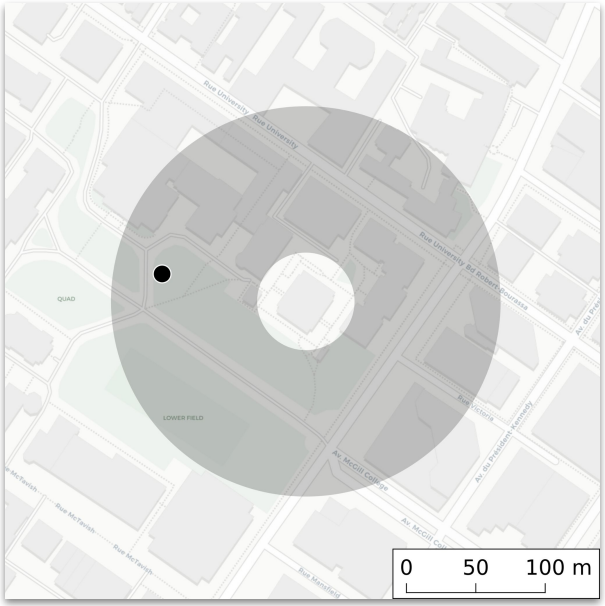

Friends
Family
Taylor
Co-workers
Public

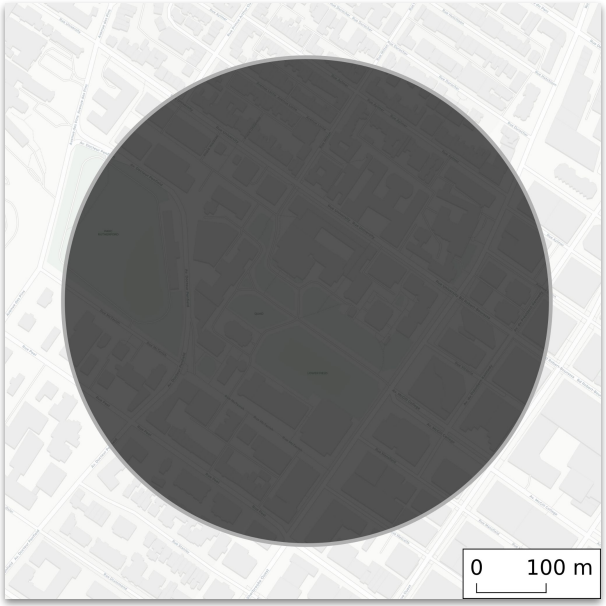
Design Goals

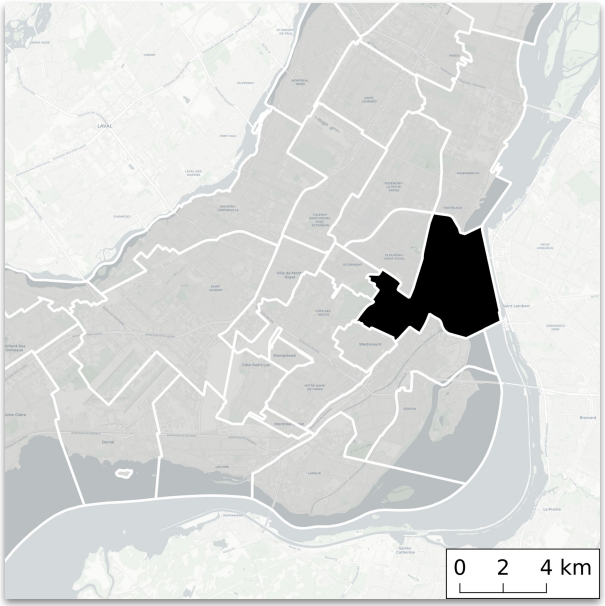
Any privacy-preserving location sharing platform should allow a **user** to:

- **Obfuscate** their location
- **Encrypt** their location
- **Share** their location

Obfuscation







A sample of common geomasking techniques

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Encryption

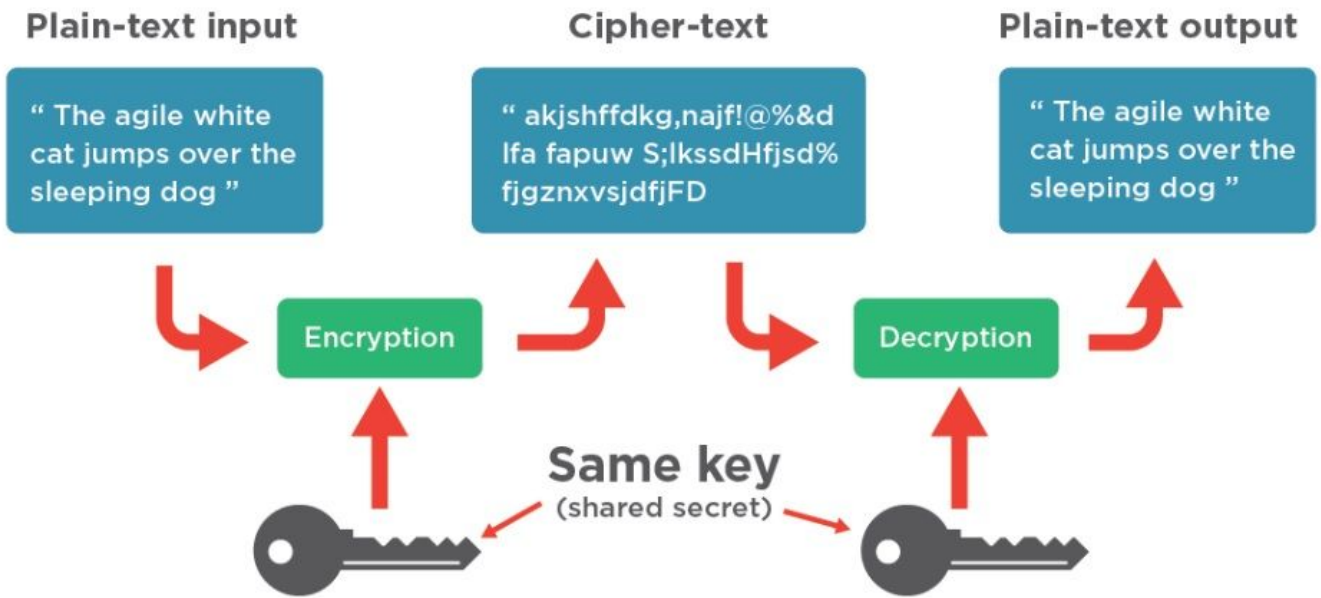

Figure: Transcend (2022) https://us.transcend-info.com/embedded/technology/aes-encryption

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Sharing

My current (encrypted) location:

```
U2FsdGVkX1/P5/5ixQpgG7MmsjBIJI0/p34dLBuQsi9v7ilJDnM+e
D4k9x10Mj9Cp4Xgdl+l5EajGurX5IJ3wAyi5fMMoEMVzjfHYYUAX3
lU0T7XGp9Sud3EUJKkJJR9pMGpQj7dOVCLabKQB3RbP9SmhNPq4NA
P7S/Nhi6/Bb4wPYicoO45kccl8hYkHVUOmnpDFQnH4KoG+9CTr0Ej
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e2JGFkU0wQWJzZsvVXiiByoLCnm3VteleTa8+s5hff/8/Sl0Wcej9
iDG7ATEUsYHo8
```

Publicly share the encrypted information

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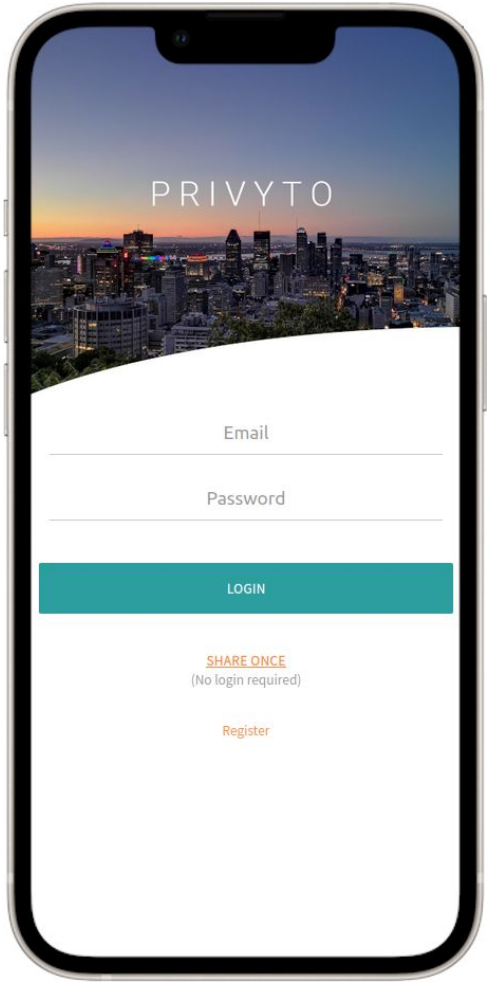
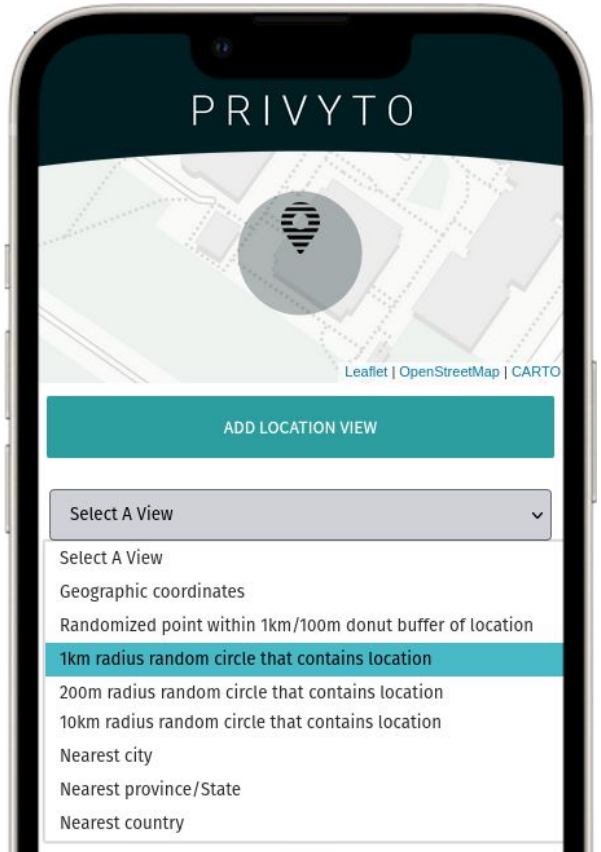
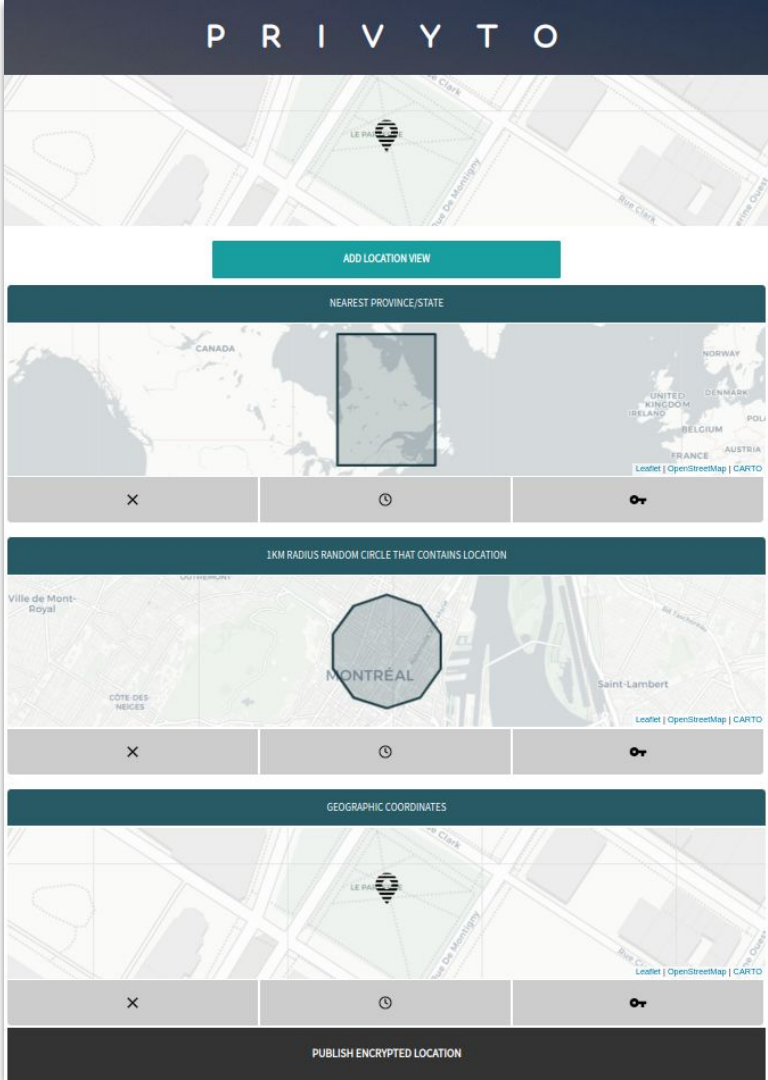

PRIVYTO
Email
Password
LOGIN
SHARE ONCE
(No login required)
Register

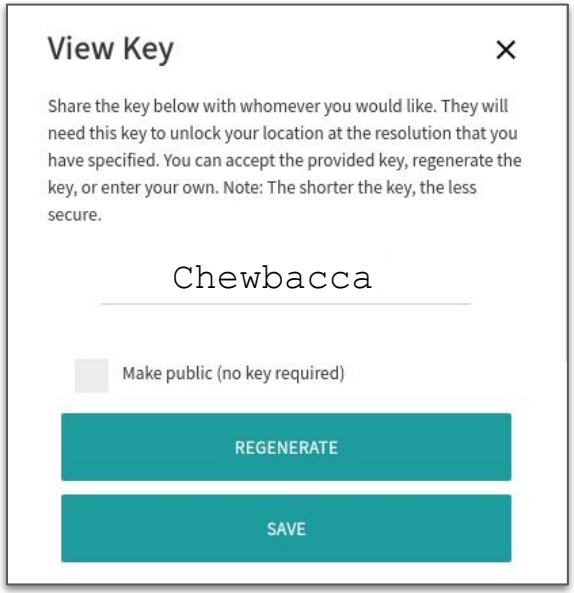
Location Views





Location Views

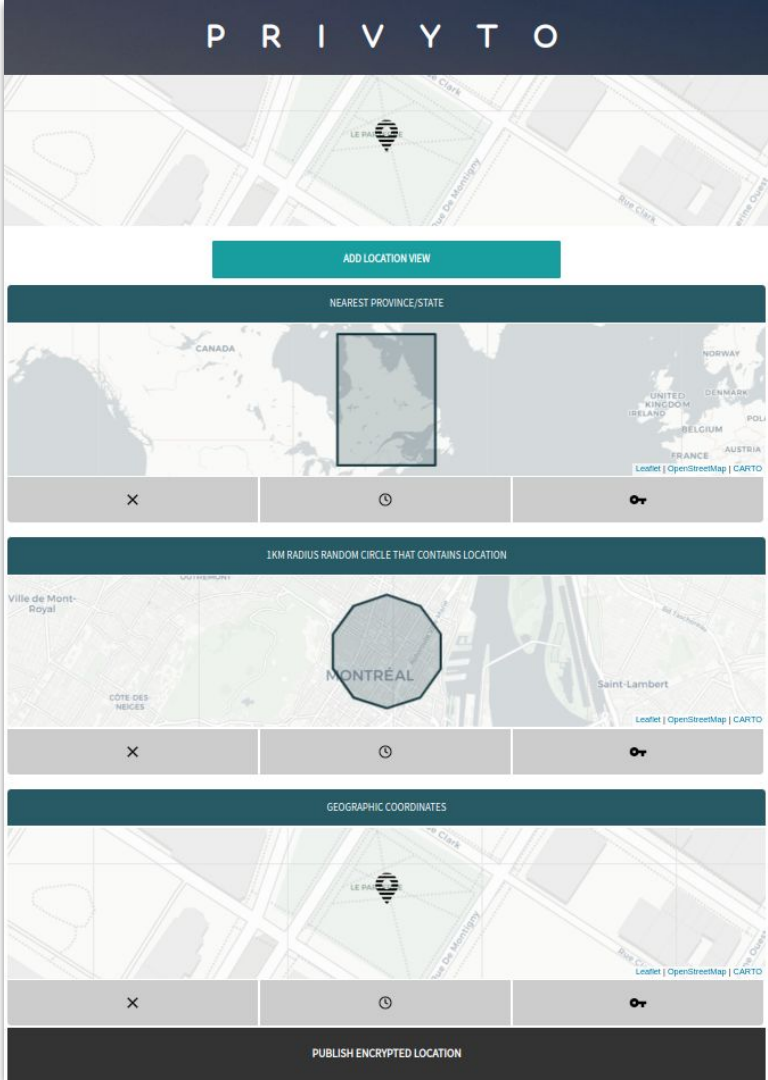
Keys



<No Key>

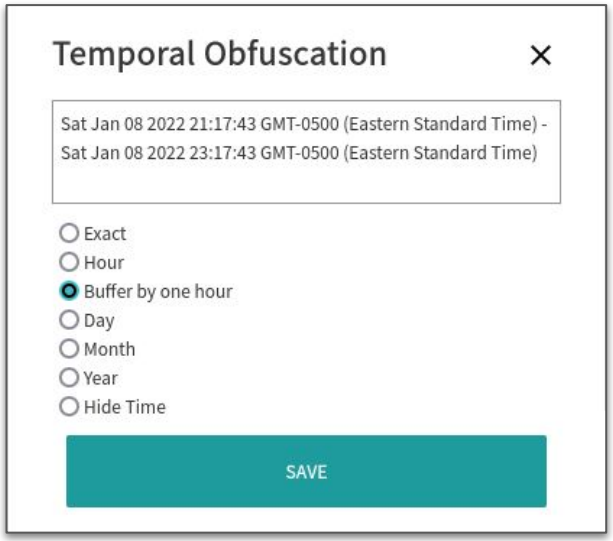
Chewbacca

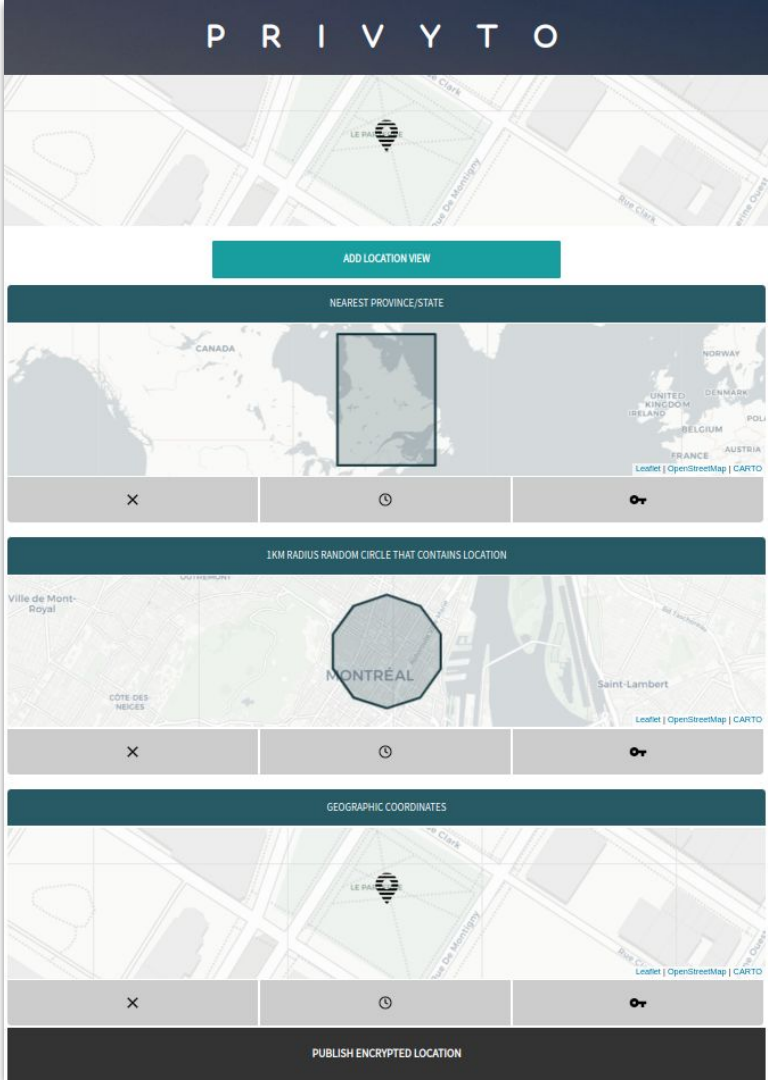
Skywalker



Location Views

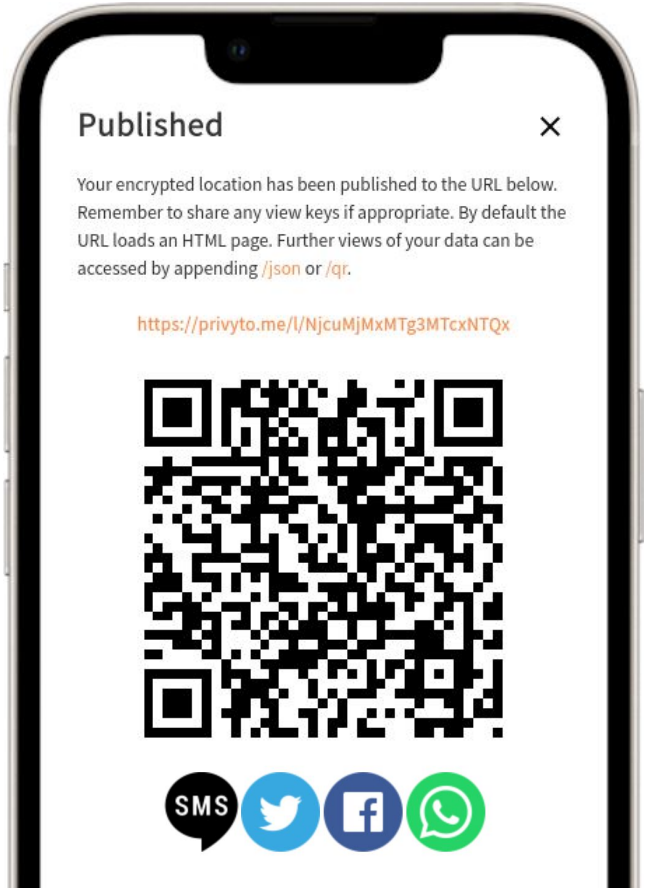
Time

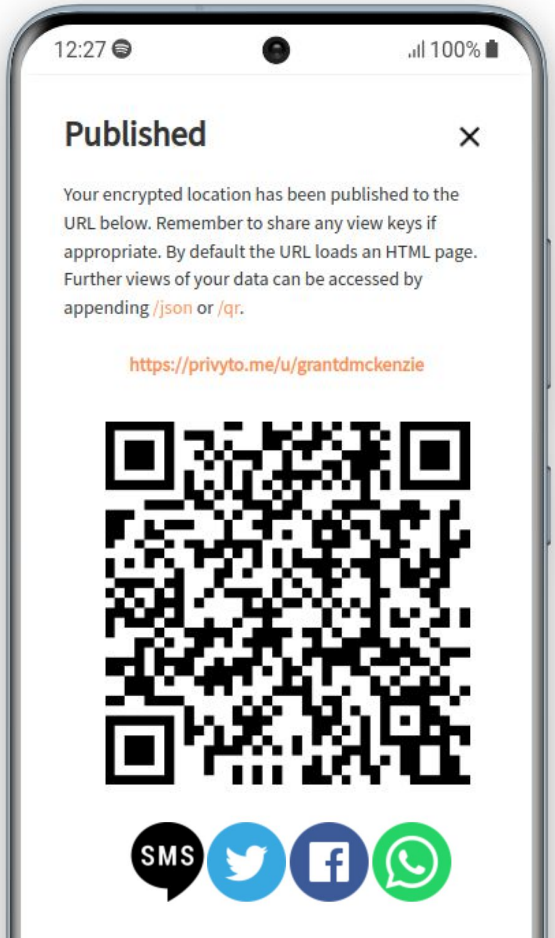




Location Views

Publish

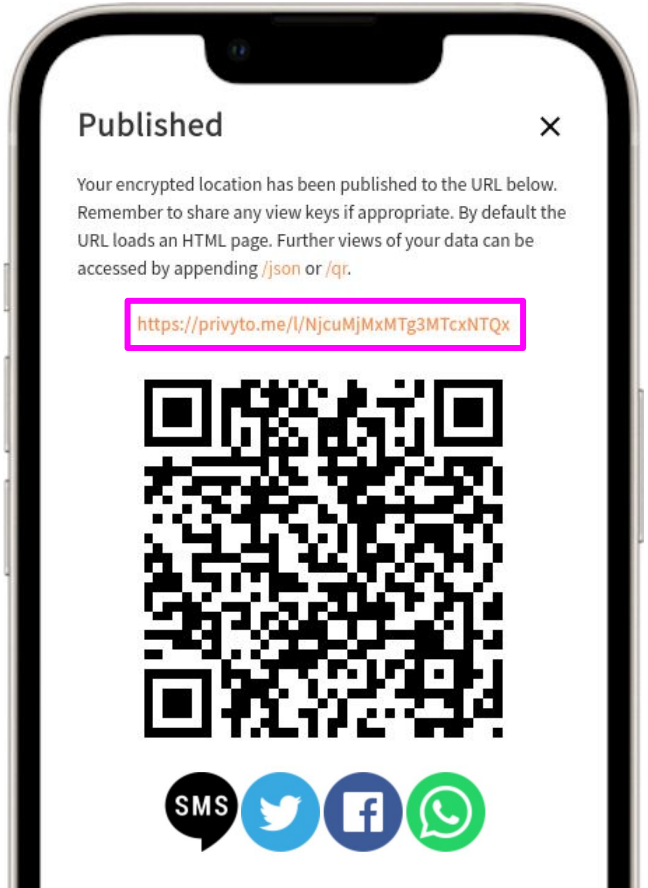


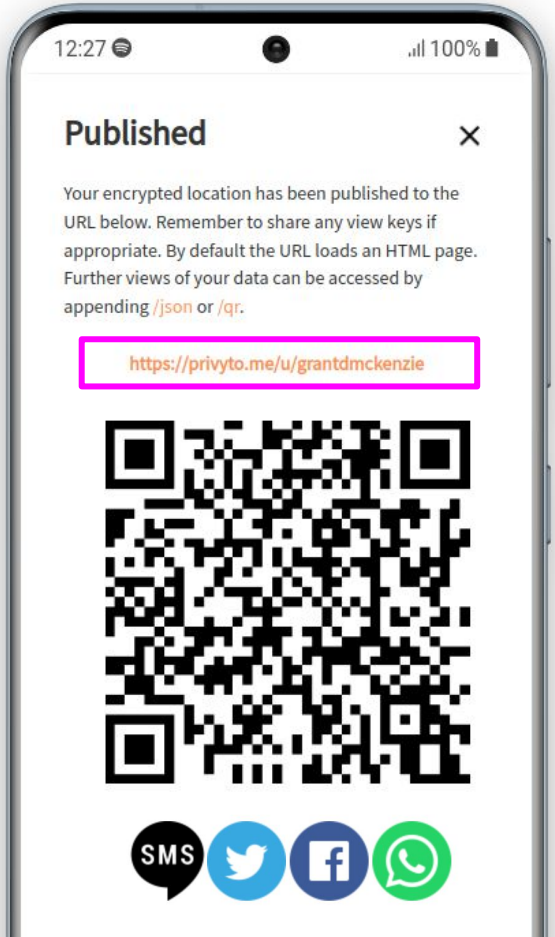


Location Views

Publish

Single use





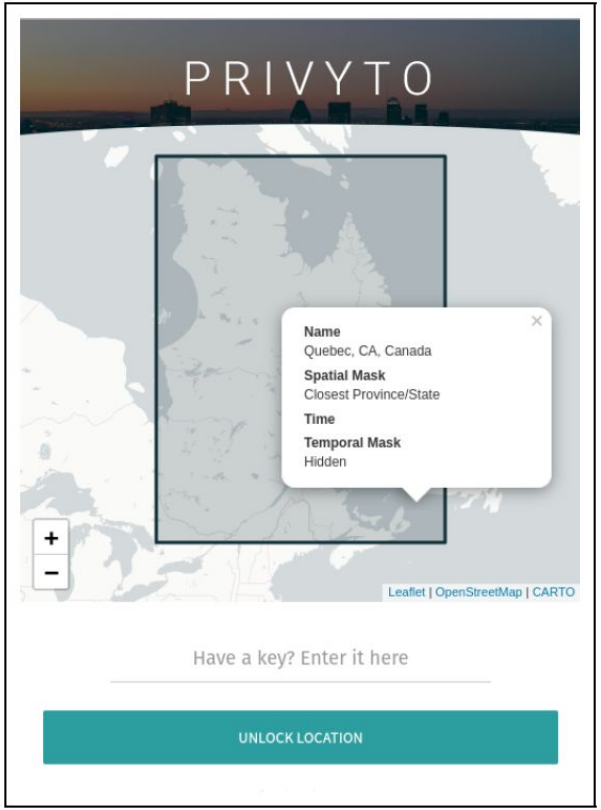
Signed in

PRIVYTO

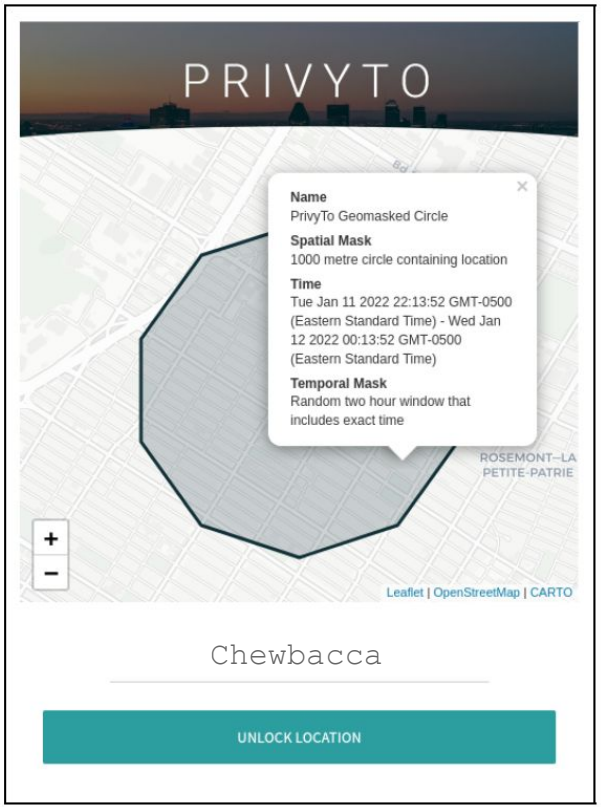
Have a key? Enter it here

UNLOCK LOCATION

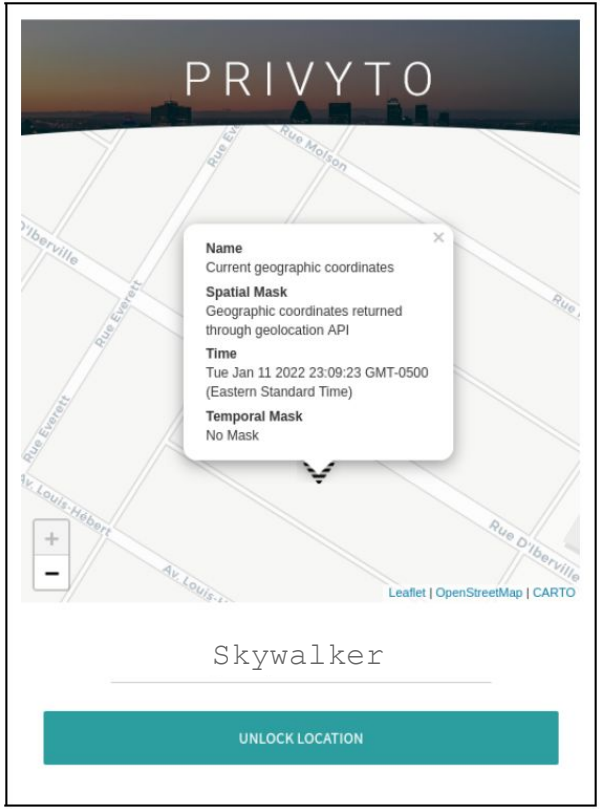
What is PrivyTo?



Public



Friend / Colleague



Family

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Location Views

https://privyto.me/u/grantdmckenzie/**json**


```
{
    "data": [
        "{\"type\":\"Feature\",\"bbox\":[-79.765614,44.99803,-57.100331,62.593817],\"properties\":{\"method\":\"Closest Province/
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    "meta": {
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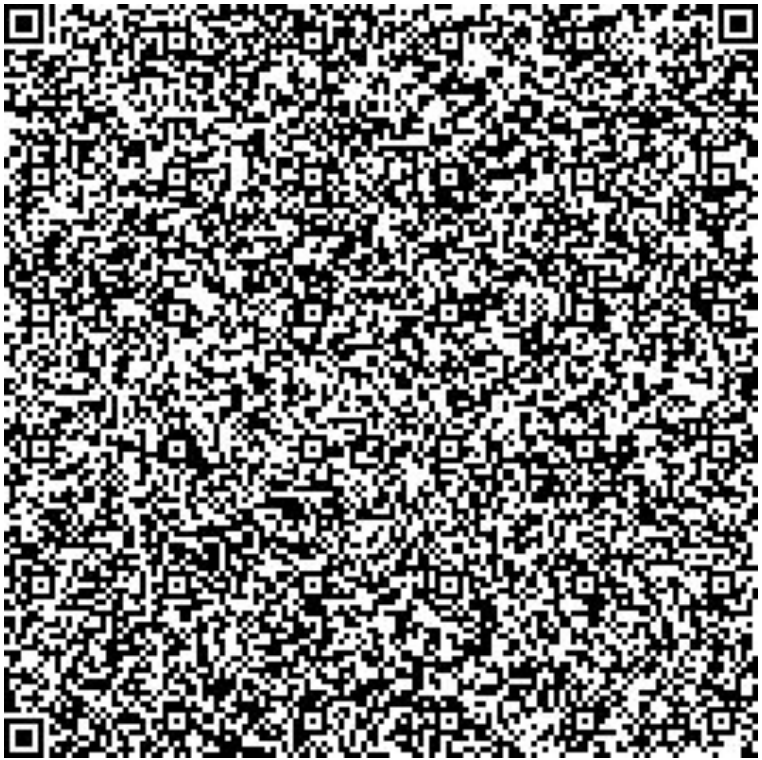
Location Views

https://privyto.me/u/grantdmckenzie/**qr**



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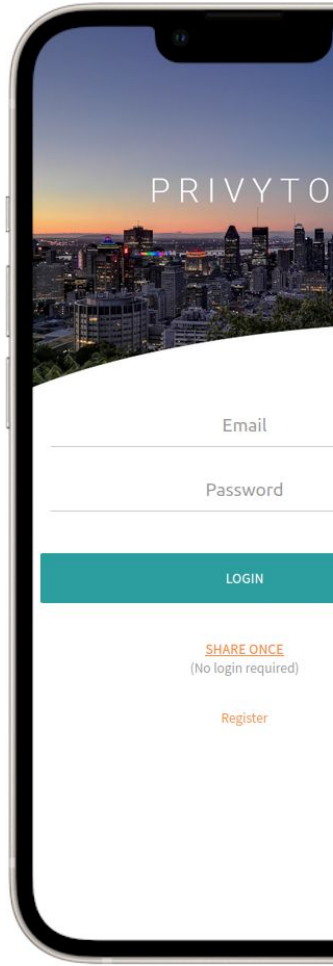
How

- Obfuscation and encryption **all** happen on your **device**
- Only encrypted location views are published to the server
  - PHP
  - PostGreSQL
- Leverage existing Javascript frameworks
  - Crypto-js (encryption)
  - Turfjs (obfuscation)
  - Leaflet (mapping)
  - jQuery mobile (object manipulation library)



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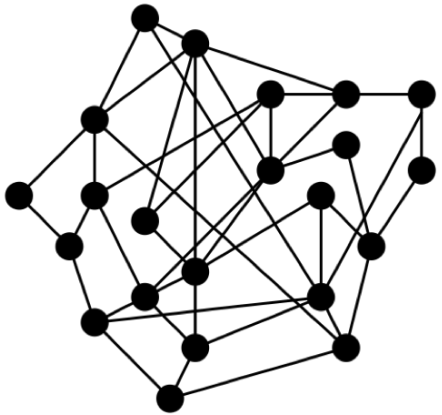
Next steps

- Native applications (via React-native vs. Flutter)

- Additional geomasking techniques (e.g., POI and check-ins)
- Android OS integration

- Decentralized storage (distributed ledger)



PRIVYTO still exposes your location to a third party.
Who? How?

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Map tile server
(currently CARTO)

privyto.me

SPATIAL ANALYSIS LAB

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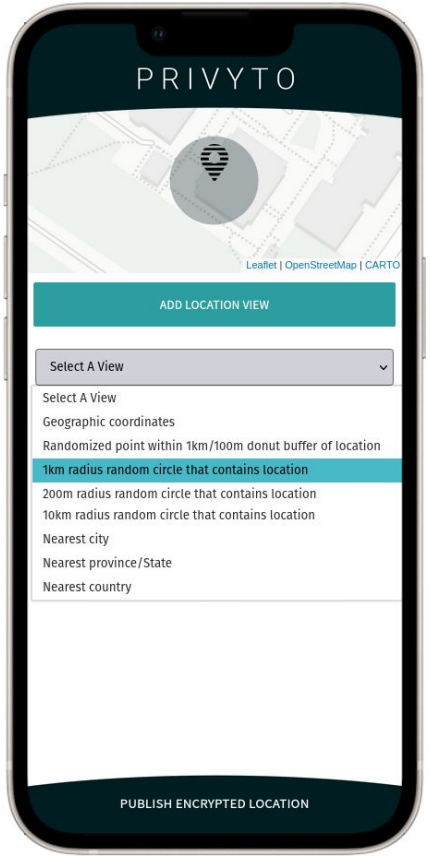
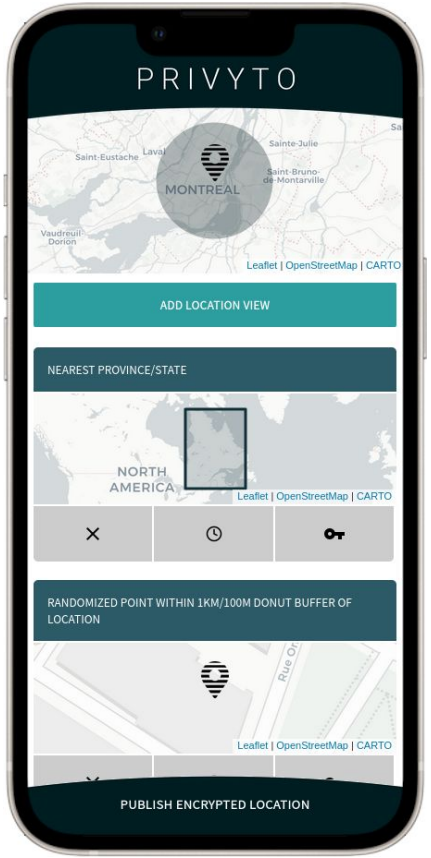
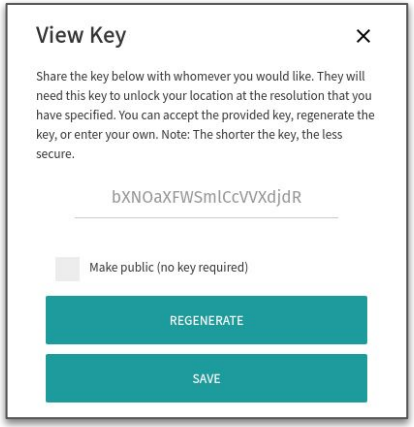
cira
NSERC CRSNG
SSHRC CRSH
Social Sciences and Humanities Research Council of Canada
Conseil de recherches en sciences humaines du Canada
Fonds de recherche Société et culture Québec
McGill Sustainability Systems Initiative | Initiative Systémique de McGill sur la Durabilité

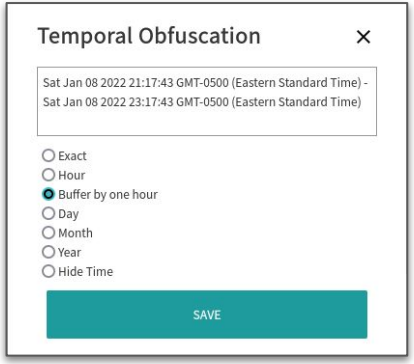
https://platial.science

@platialanalysis









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PRIVYTO

LOCATION PRIVACY REIMAGINED