University of Redlands

November 19, 2020

Collecting and Connecting the Dots For COVID-19

Este Geraghty, MD, MS, MPH, GISP
Chief Medical Officer

esri
THE SCIENCE OF WHERE

GIS is Based on Geography the Science of Our World

. . . Providing Content and Context

. . . And a Common Reference System

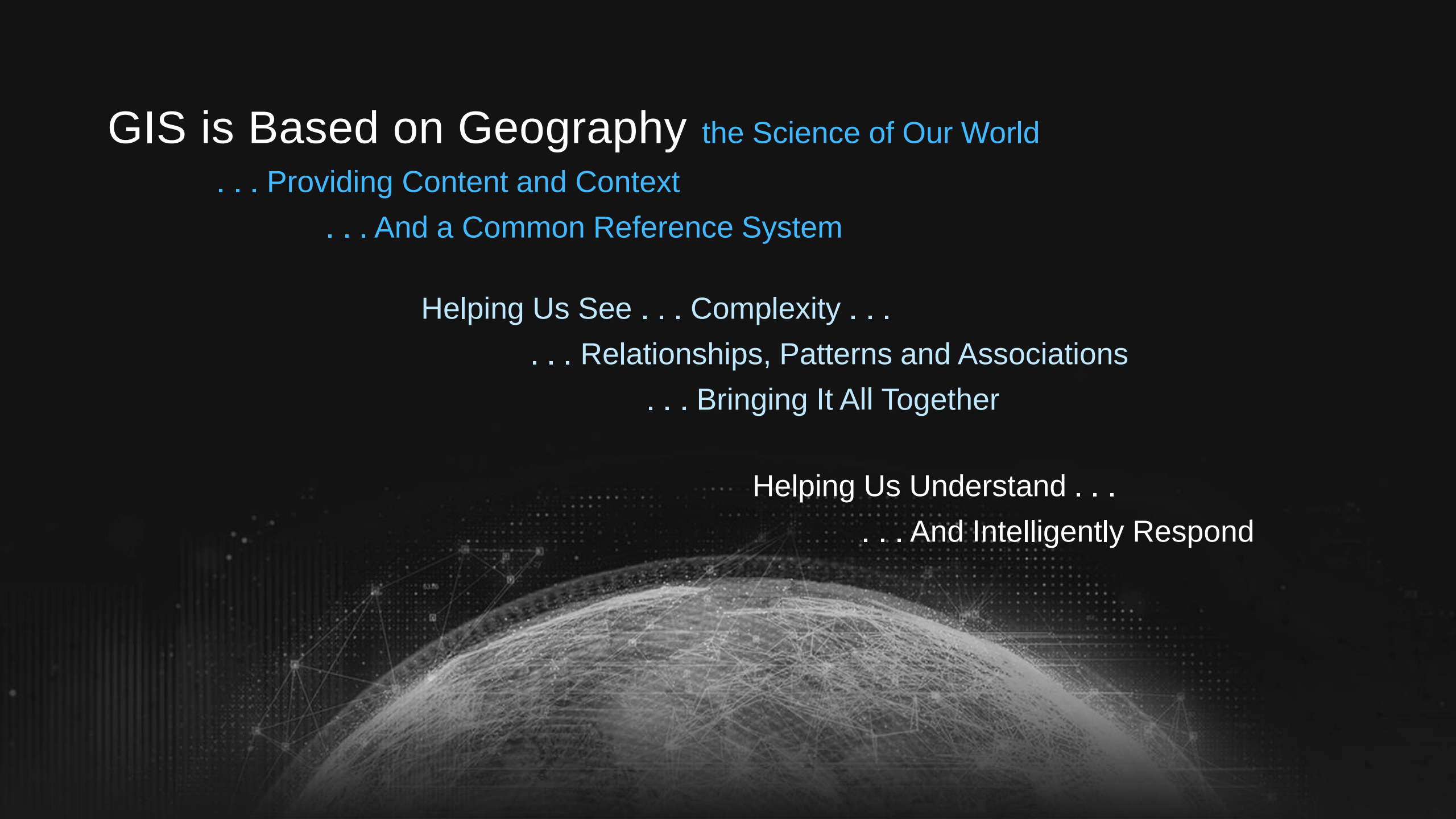
Helping Us See . . . Complexity . . .

. . . Relationships, Patterns and Associations

. . . Bringing It All Together

Helping Us Understand . . .

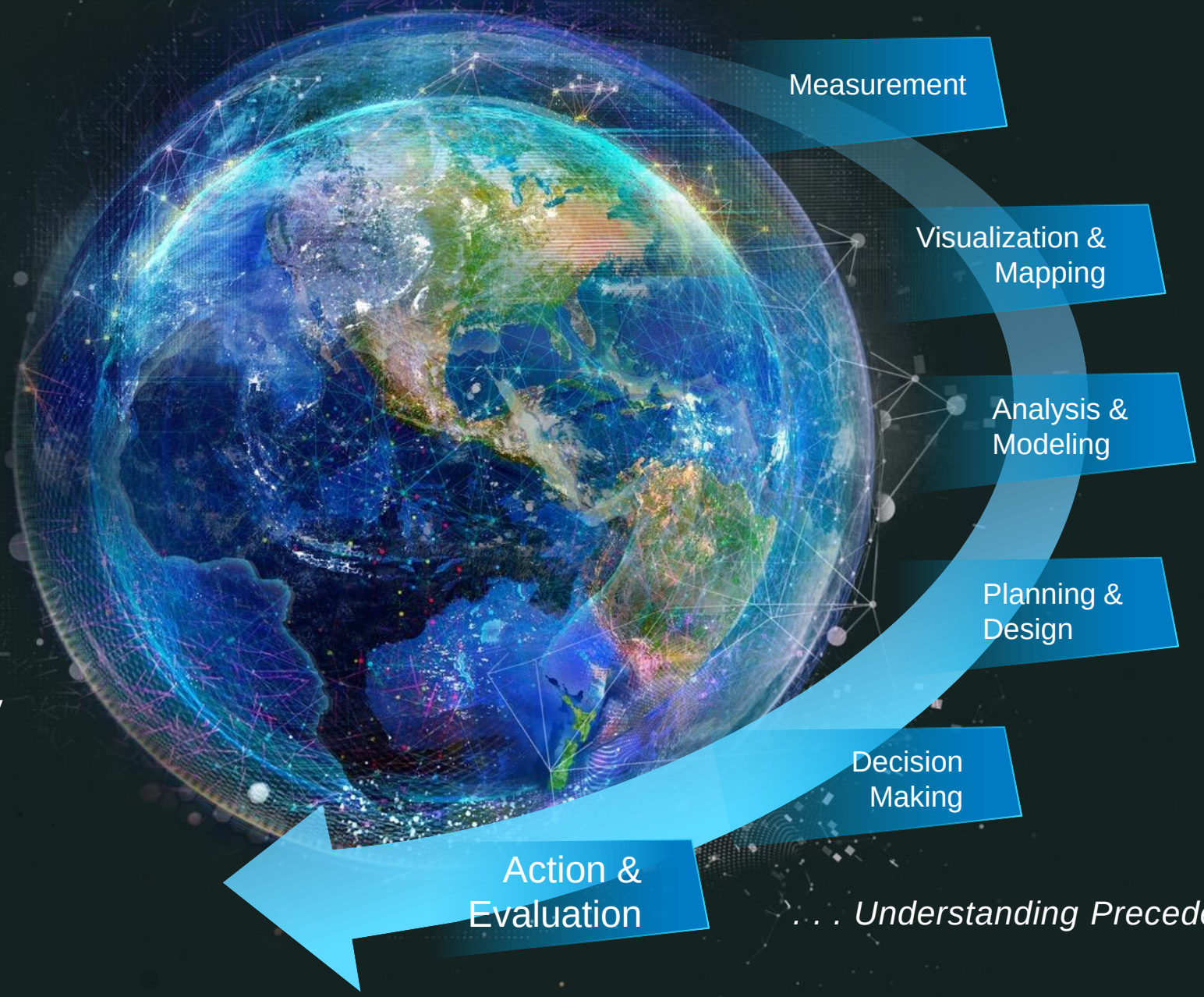
. . . And Intelligently Respond



GIS

Provides a Framework
and a Process . . .

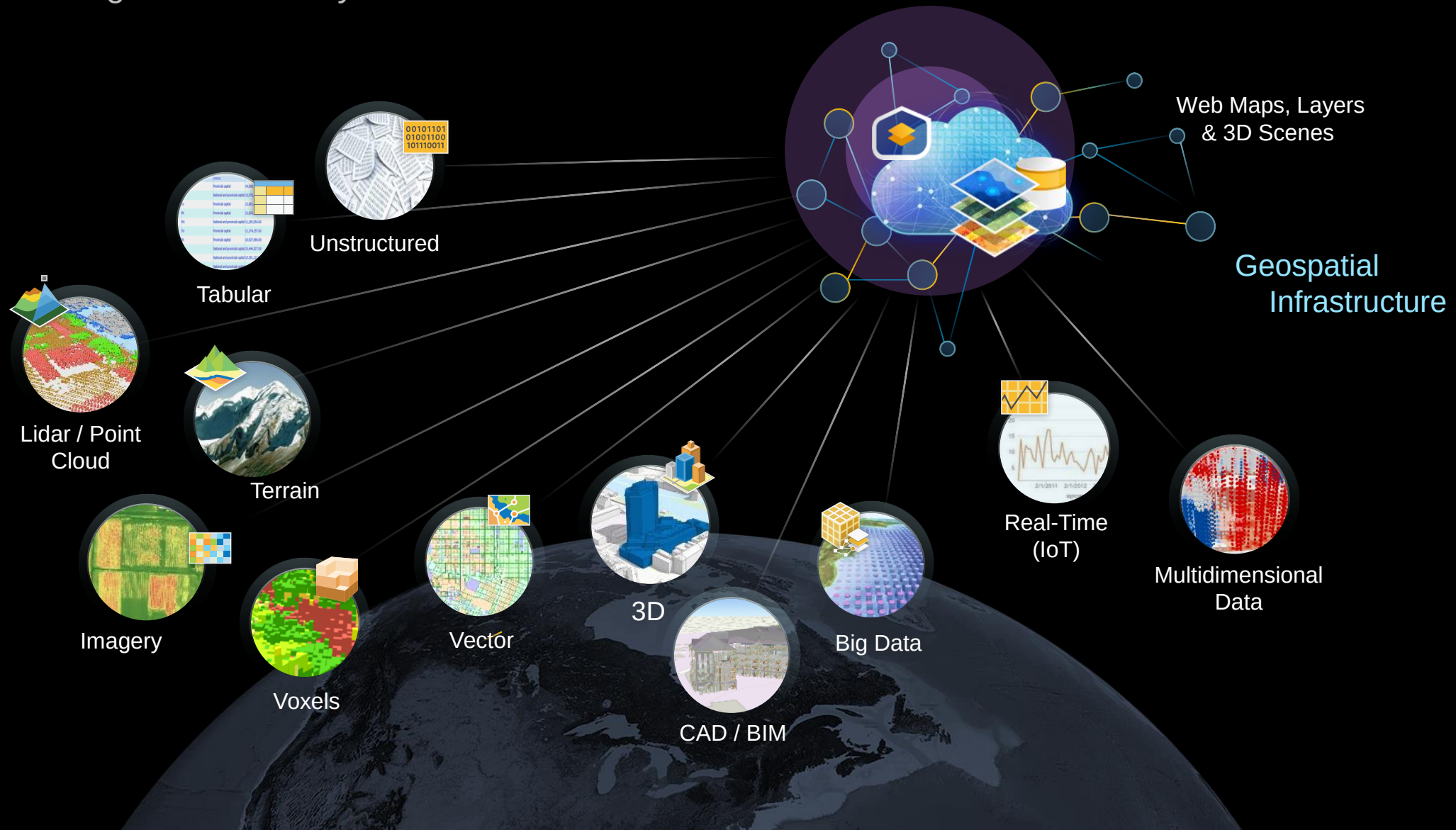
. . . for Creating and
Applying Geographic
Knowledge Widely



. . . Understanding Precedes Action

Integrating Every Type and Format of Data

. . . Making Them Directly Usable as Services



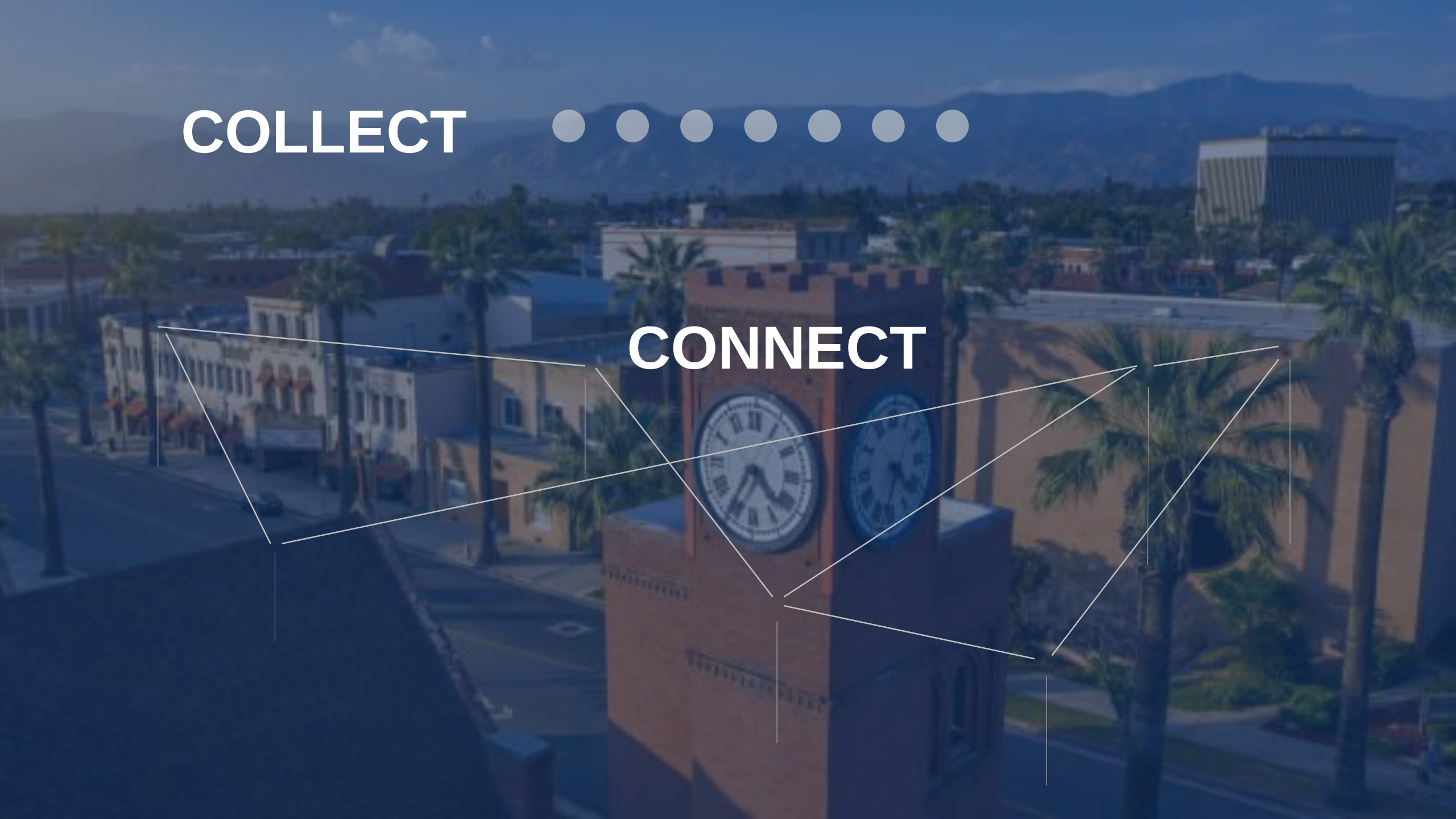
Innovation in a Crisis

Conditions for rapid, impactful change

- Uniting around a purpose
- Seeing the system differently
- Unfreezing the Organization
- Creating a bias toward action

Harvard Business Review

https://www.harvardbusiness.org/innovation-in-a-time-of-crisis/


COLLECT
CONNECT

Repeatable Patterns

Mapping & Monitoring Disease

Strategic Planning

Indoor Space Management

Analyzing Relationships & Gaps

Repeatable Patterns

Mapping & Monitoring Disease

Strategic Planning

Indoor Space Management

Analyzing Relationships & Gaps

COVID-19 Dashboard by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU)

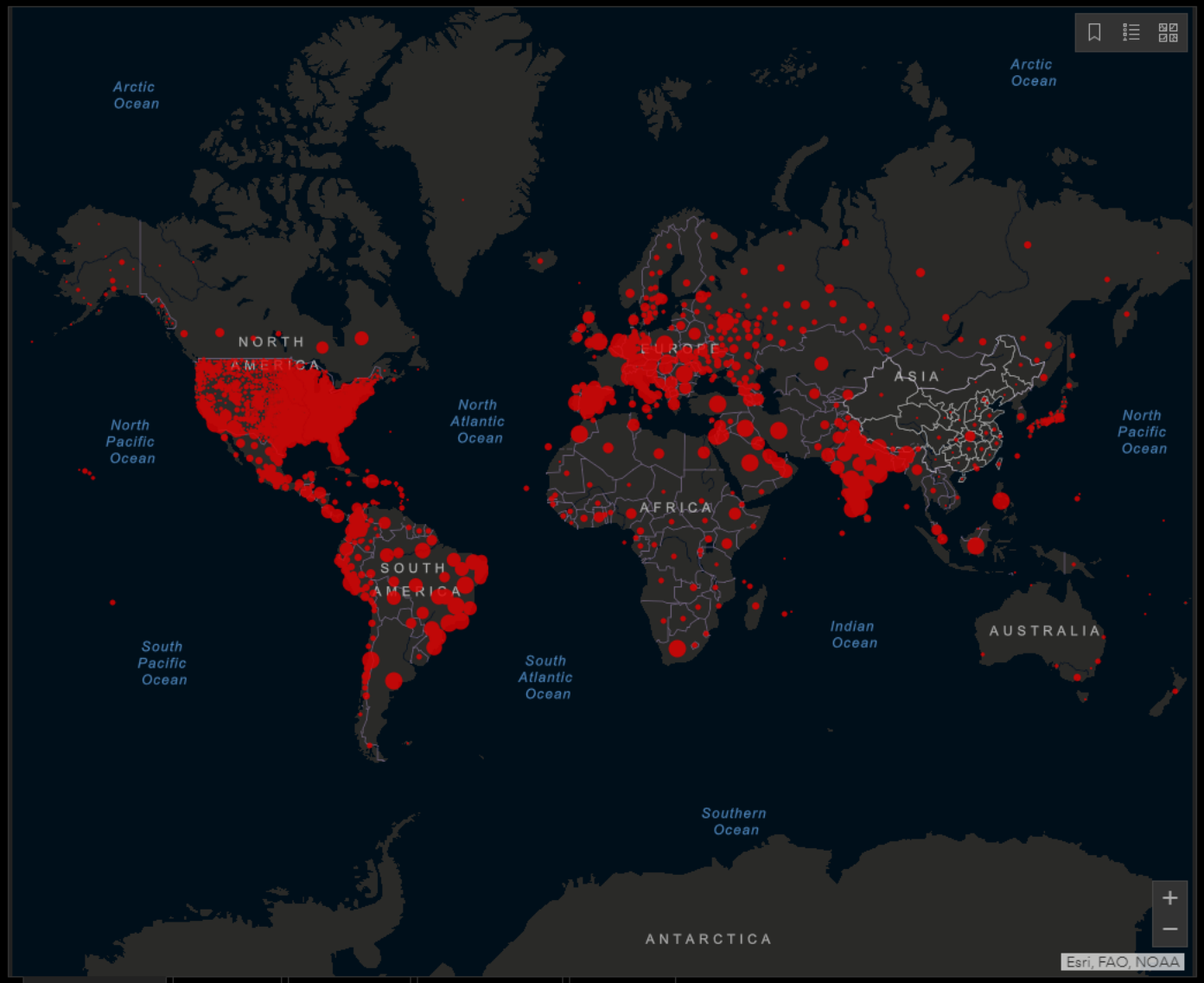
Global Cases
56,178,674

Cases by Country/Region/Sovereignty

11,525,149	US
8,912,907	India
5,945,849	Brazil
2,115,717	France
1,975,629	Russia
1,525,341	Spain
1,434,004	United Kingdom
1,339,337	Argentina
1,272,352	Italy
1,218,003	Colombia
1,015,071	Mexico
939,931	Peru
854,745	Germany
801,894	Iran
772,823	Poland
757,144	South Africa
586,522	Ukraine
540,605	Belgium
534,558	Chile
526,852	Iraq
478,720	Indonesia
475,284	Czechia

Admin0 | Admin1 | Admin2

Last Updated at (M/D/YYYY)
11/18/2020, 6:26 PM



Cumulative Cases | Active Cases | Incidence Rate | Case-Fatality Ratio | Testing Rate

191
countries/regions

Lancet Inf Dis Article: Here. Mobile Version: Here. Data sources: Full list. Downloadable database: GitHub, Feature Layer.
Lead by JHU CSSE. Technical Support: Esri Living Atlas team and JHU APL. Financial Support: JHU, NSF, Bloomberg Philanthropies and Stavros Niarchos Foundation. Resource support: Slack, Github and AWS. Click *here* to **donate** to the CSSE dashboard team, and other JHU COVID-19 Research Efforts. FAQ. Read more in this blog. Contact US.

Cases and **Death** counts include confirmed and probable (where reported).
Recovered cases are estimates based on local media reports, and state and local reporting when available, and therefore may be

Global Deaths
1,348,348

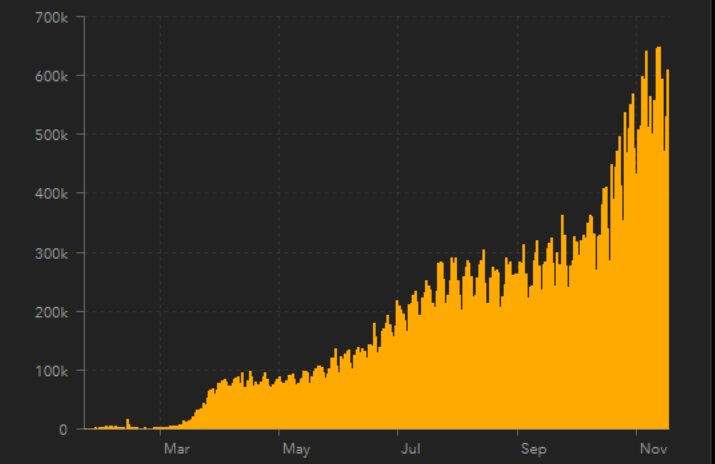
250,483 deaths	US
167,455 deaths	Brazil
130,993 deaths	India
99,528 deaths	Mexico
53,368 deaths	United Kingdom
47,217 deaths	Italy
46,772 deaths	France
42,941 deaths	Iran
42,039 deaths	Spain
36,347 deaths	

Global Deaths

US State Level
Deaths, Recovered

34,187 deaths, 82,022 recovered	New York US
20,338 deaths, 889,099 recovered	Texas US
18,453 deaths, recovered	California US
17,731 deaths, recovered	Florida US
16,655 deaths, 40,090 recovered	New Jersey US
11,468 deaths, recovered	Illinois US
10,407 deaths, 137,422 recovered	Massachusetts US
9,463 deaths, 186,022 recovered	Pennsylvania US
9,065 deaths, recovered	Georgia US
8,573 deaths, 138,862 recovered	

US Deaths, Recovered



Daily Cases

Uptake

World leaders depended on the dashboard

Department of Health and Human Services Secretary’s Operations Center at ASPR

Uptake

World leaders depended on the dashboard

Members of Germany’s emergency task force sit down for a coronavirus briefing

Uptake

World leaders depended on the dashboard

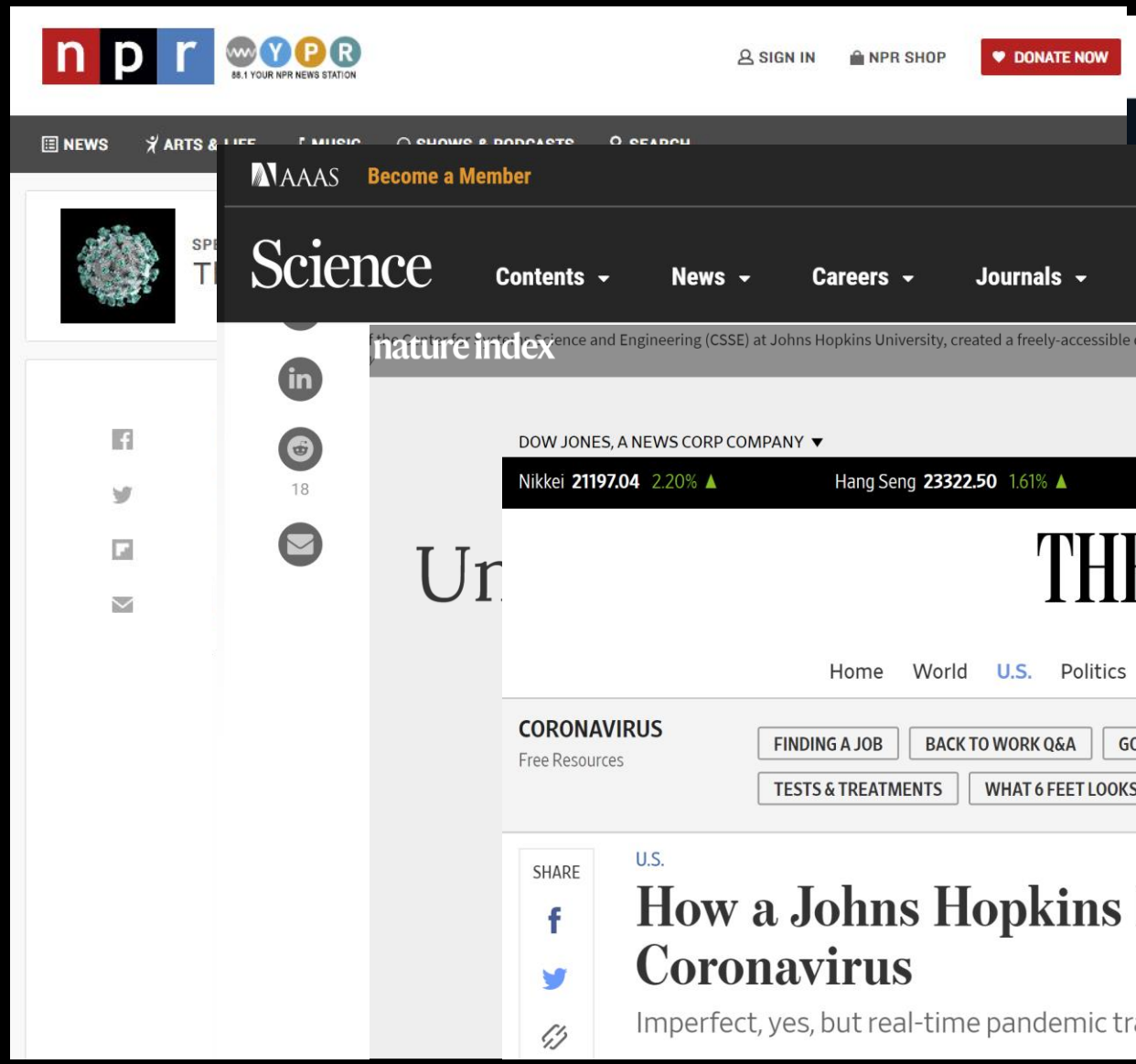
Coronavirus briefing in Italy

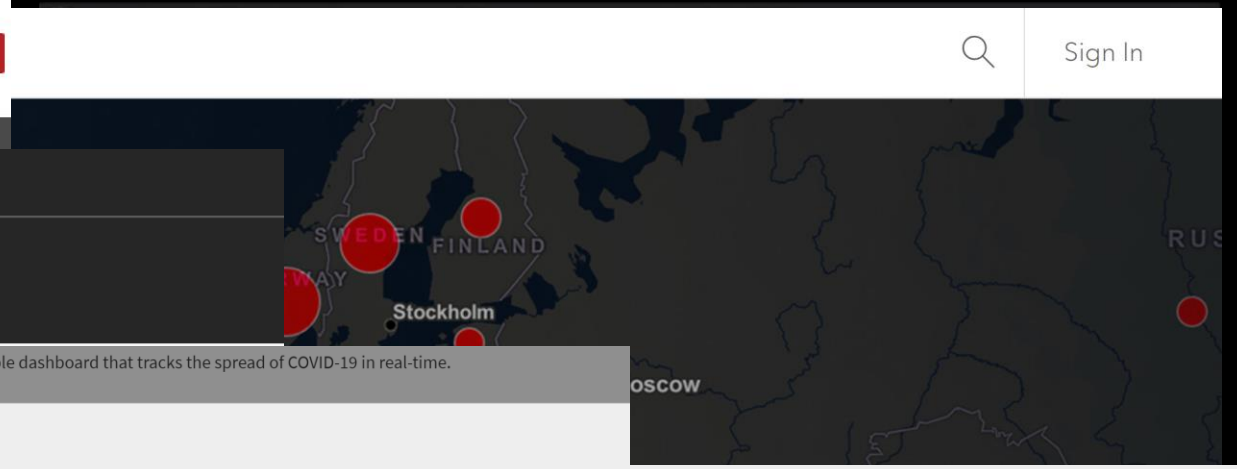
Uptake

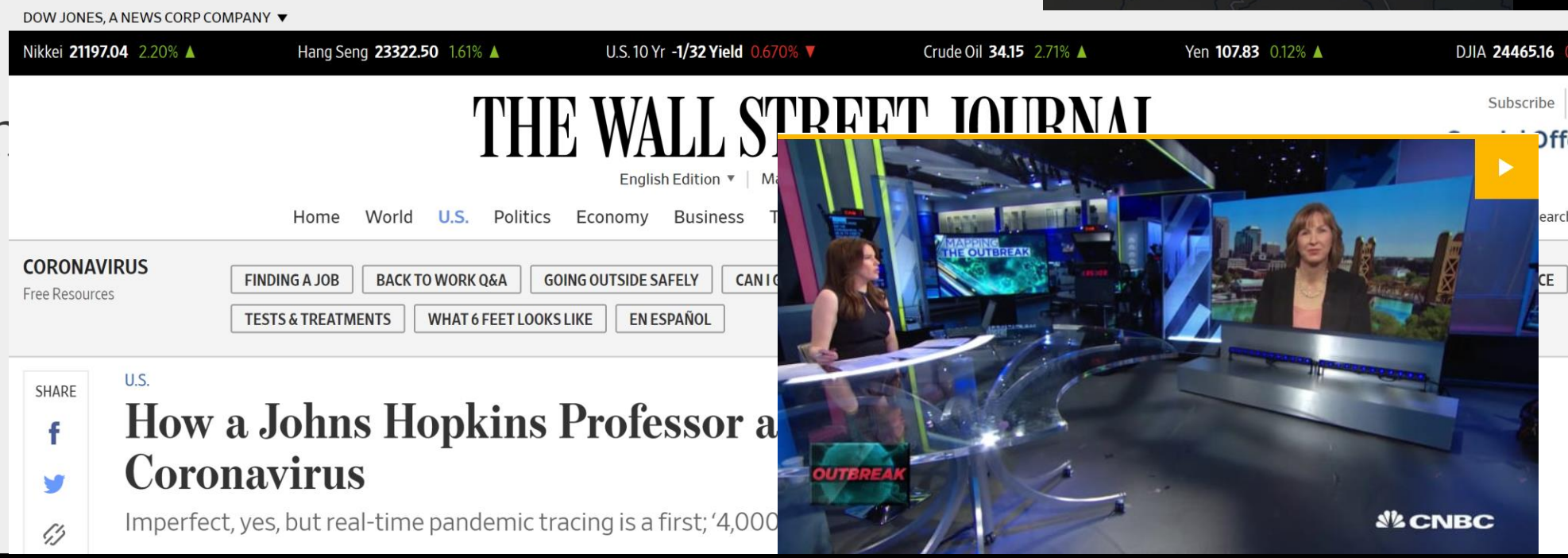
World leaders depended on the dashboard

News in Dublin, Ireland

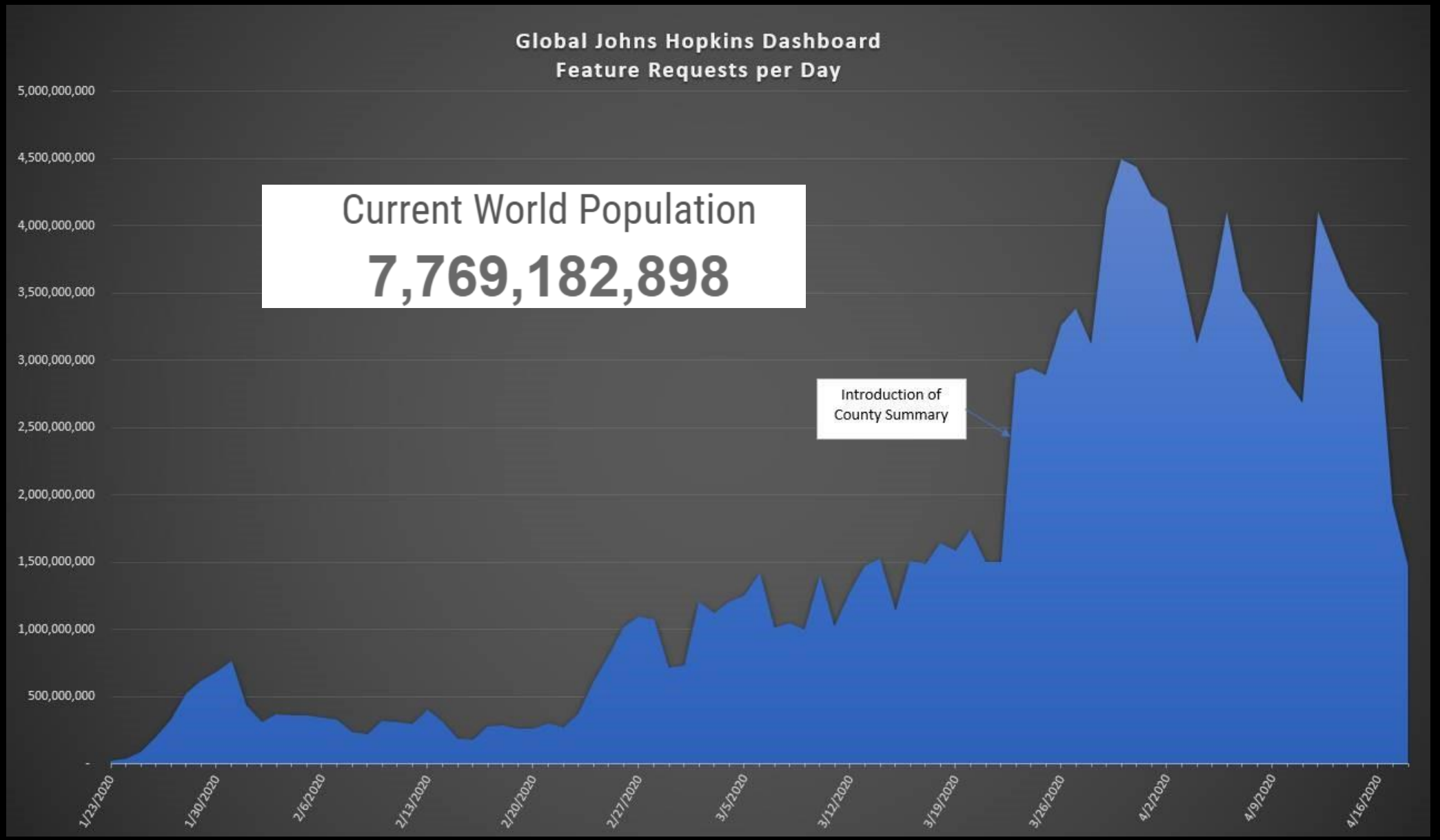
Taking Notice
Journalists shared the story







Going Viral
Feature layer requests



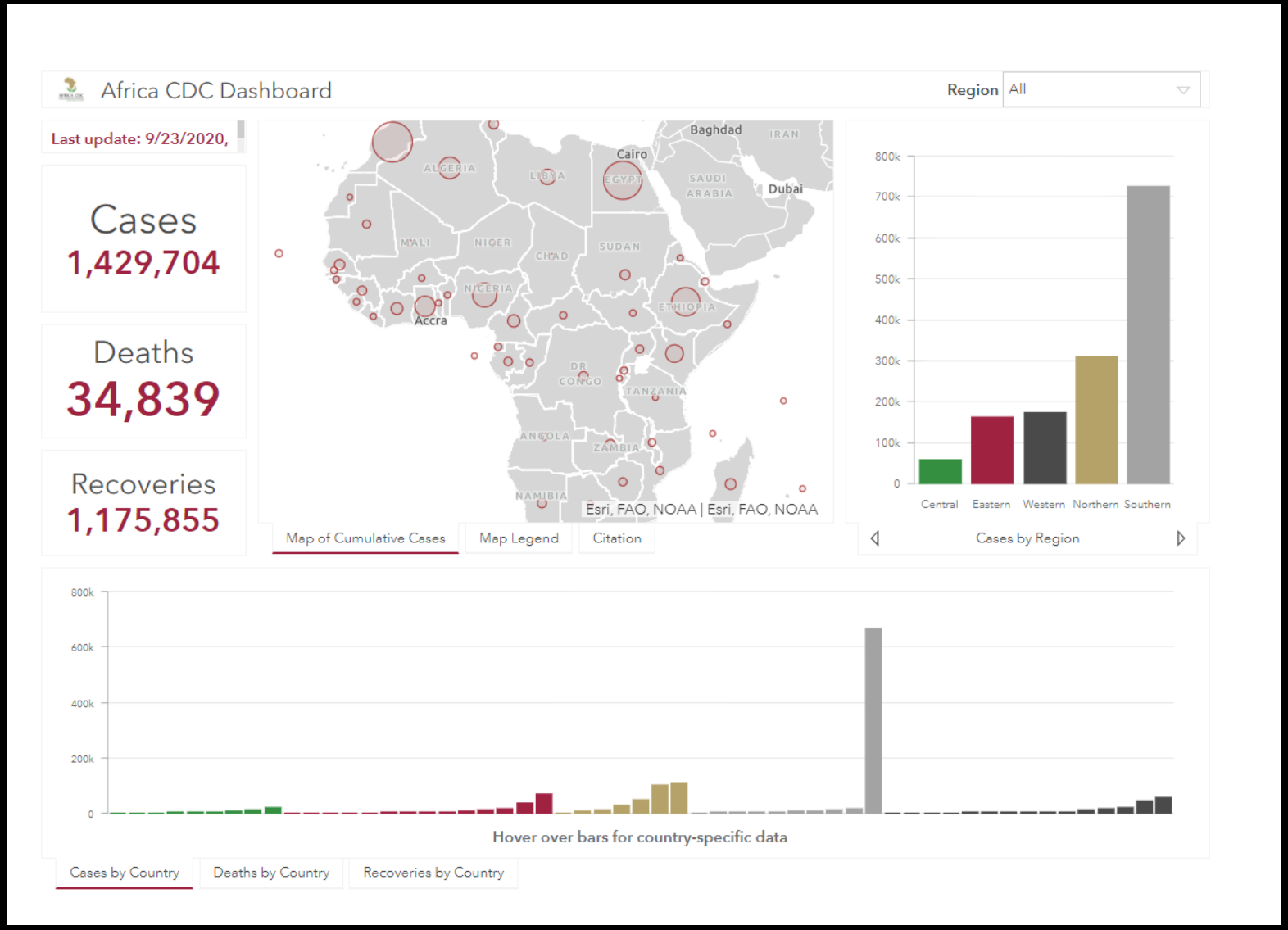
Impact

Key outcomes from this single dashboard

- Demonstrated the value of GIS for health on a global scale
- Promoted data sharing
- Exposed gaps in public health data sharing and interoperability
- Inspired questions about who should be the authoritative data resource
- Built expectations for real-time data

Inspired

The world creates localized dashboards



Reporte

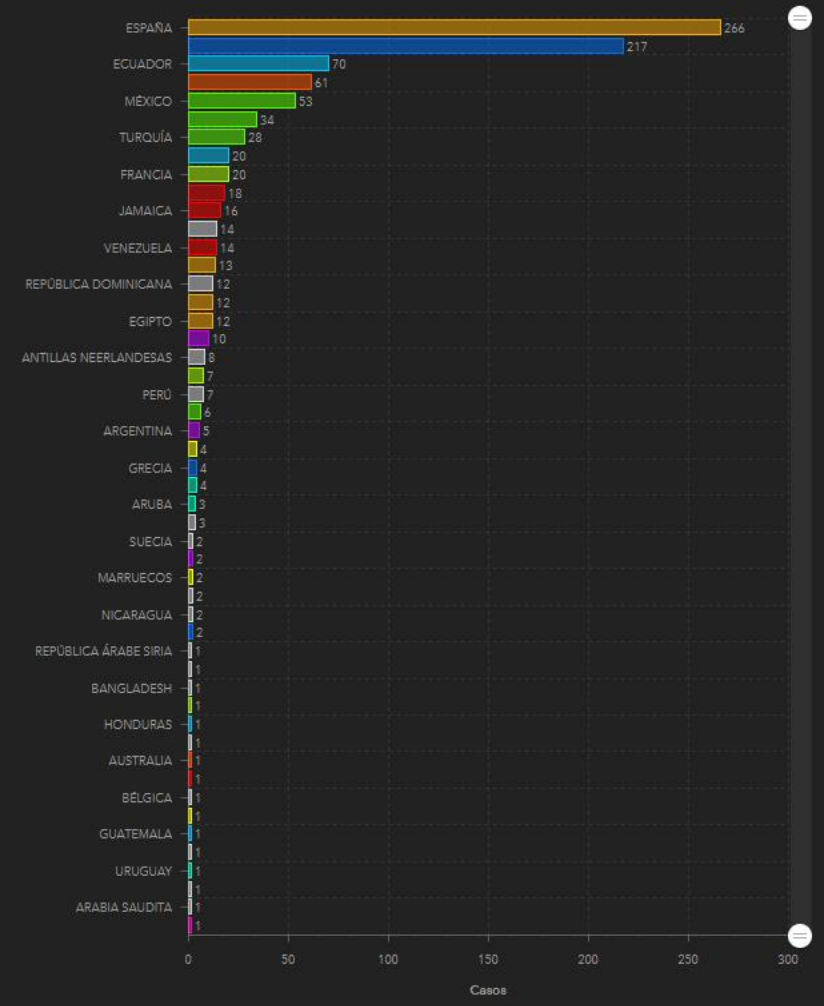
A Story Map

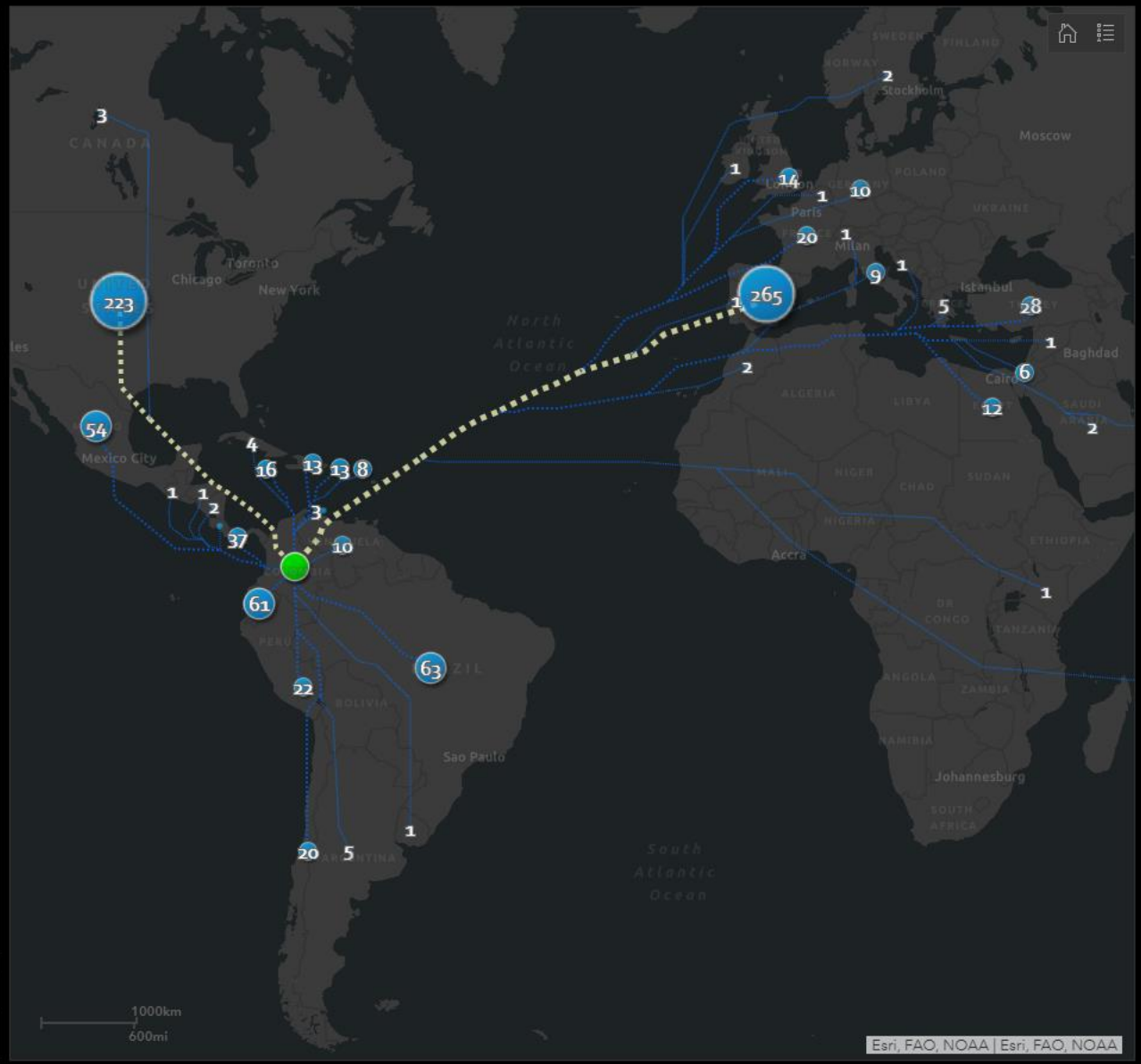
COVID-19 Colombia | COVID-19 Colombia (procedencia) | COVID-19 Mundo

Casos confirmados de COVID-19 con procedencia importada a Colombia

Esri Colombia

País de procedencia





Tipo importado

981

Tipo relacionado

40,456

Tipo en estudio

742,831

Para los casos de procedencia importada de personas en transito por diferentes países mostrados en el mapa, se tomó el primer país en el reporte del INS, por ejemplo:
Para 'España-Croacia-Bosnia' se toma 'España' como el país de procedencia.

Reporte de Coronavius COVID-19 en Colombia
Fuente datos coronavirus en Colombia: Coronavirus en Colombia, Instituto Nacional de Salud, Ministerio de Salud de Colombia
https://www.ins.gov.co/Noticias/Paginas/

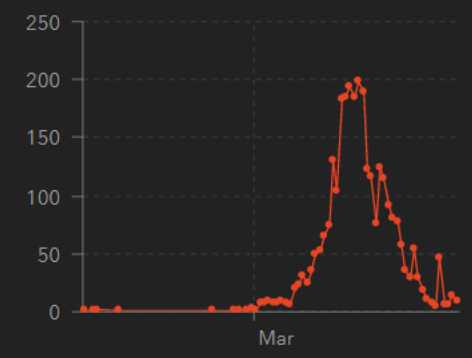
COVID-19 Colombia | Reporte 23-09-2020-Corte 9:30 PM

NSW COVID-19 Cases and Community Profile by The University of Sydney

Total Reported Cases*

2,957

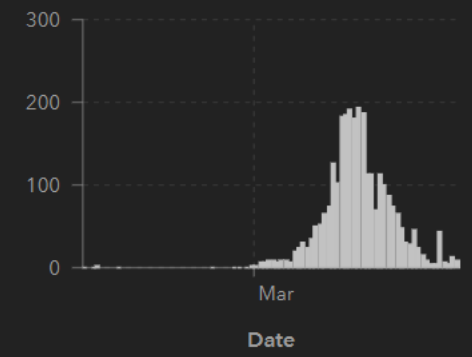
* Source https://data.nsw.gov.au/nsw-covid-19-data

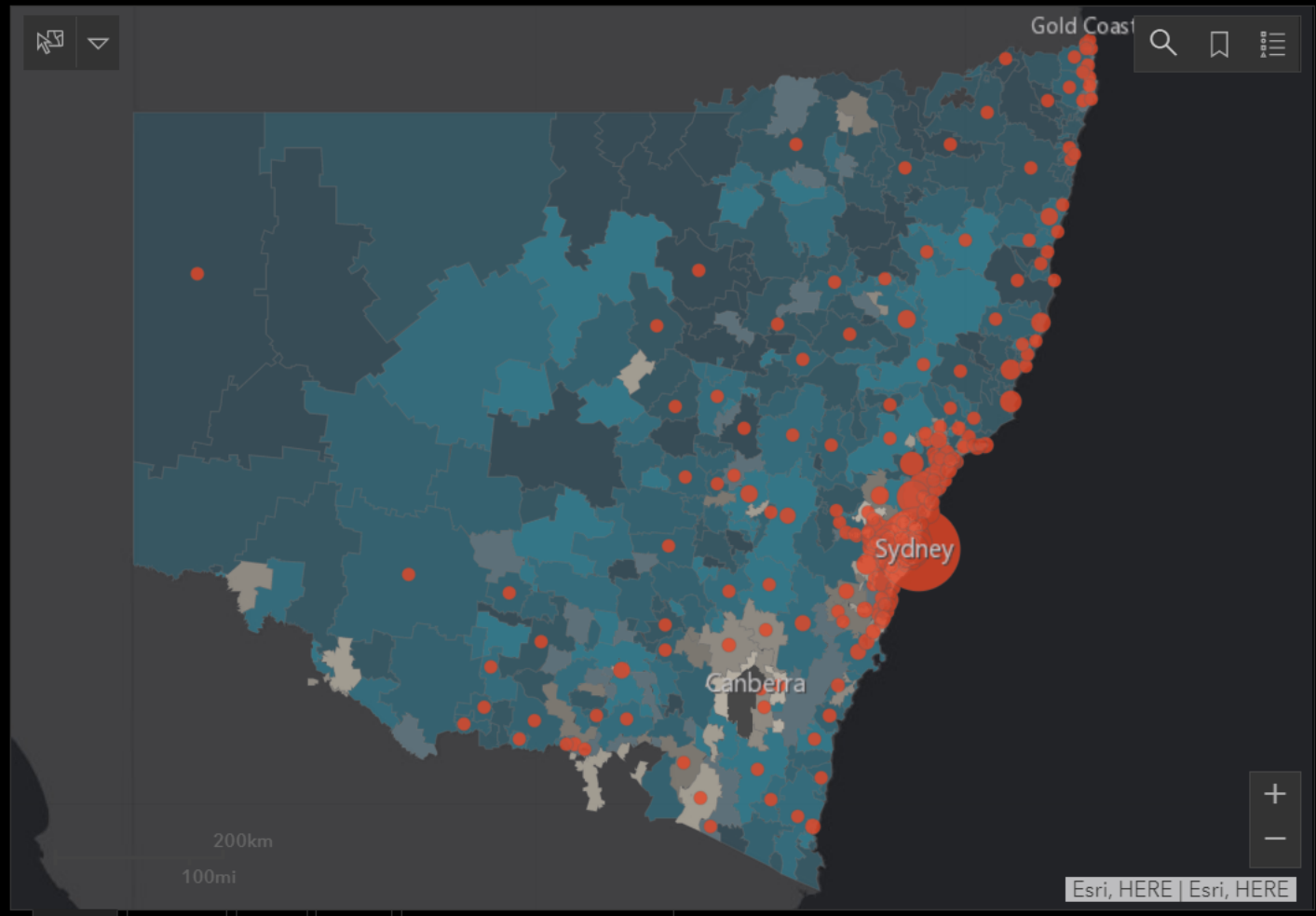


Daily cases | Total cases

Selected Cases in NSW
2,819

Unmapped Cases
138



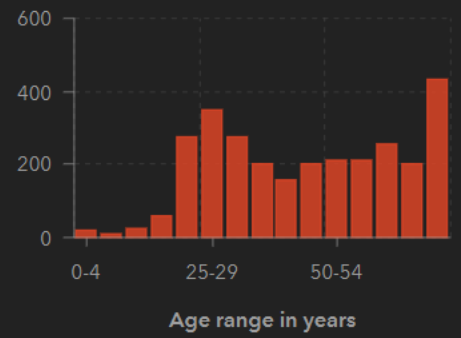


IRSD | IRSAD | IER | IEO | Population aged 60+ (%)

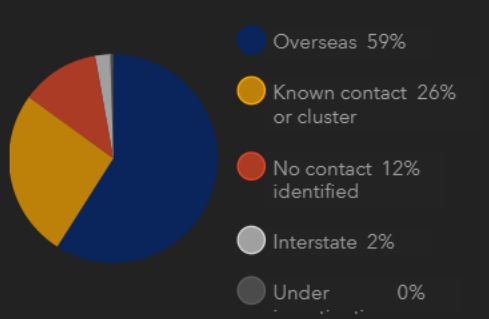
Hover over each chart for further information or **click on the circle in the top right of each panel** to expand the content.
Find a postcode on the map using the search tool. In the popup window, click on the arrow button on the bottom to select the postcode. Cases for this postcode will plot in the lower left. **Zoom in** to spatially select postcodes using the select arrow button in the top left of the map. **Click the cross to clear.**

School of Geosciences | Faculty of Science
School of Social and Political Sciences | Faculty of Arts and Social Sciences
School of Medical Sciences | Faculty of Medicine and Health

Total NSW cases by age range



Total NSW cases by likely source of infection



Socio-Economic Indexes for Areas (SEIFA)
The Australian Bureau of Statistics SEIFA indexes rank areas across Australia relative to socio-economic advantage and disadvantage based on census information. There are four indexes each

SEIFA

Most recent case provided was reported on 4/17/2020, 5:00 PM (mm/dd/yyyy)

Last update: a minute ago

NSW COVID-19 Cases and Community Profile by The University of Sydney

Select IRSD Range

1 3

Select IRSAD Range

1 10

Select IER Range

1 10

Select IEO Range

1 10

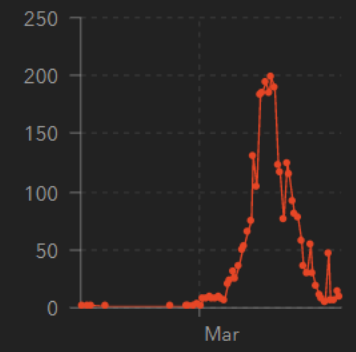
Select Percentage of Population Over 60

30 100

Total Reported Cases*

2,957

* Source https://data.nsw.gov.au/nsw-covid-19-data



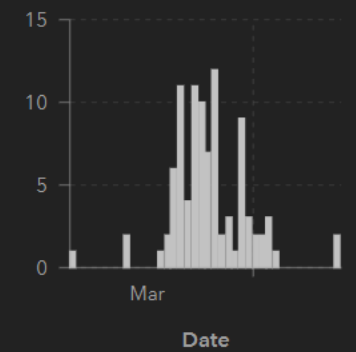
Daily cases | Total cases

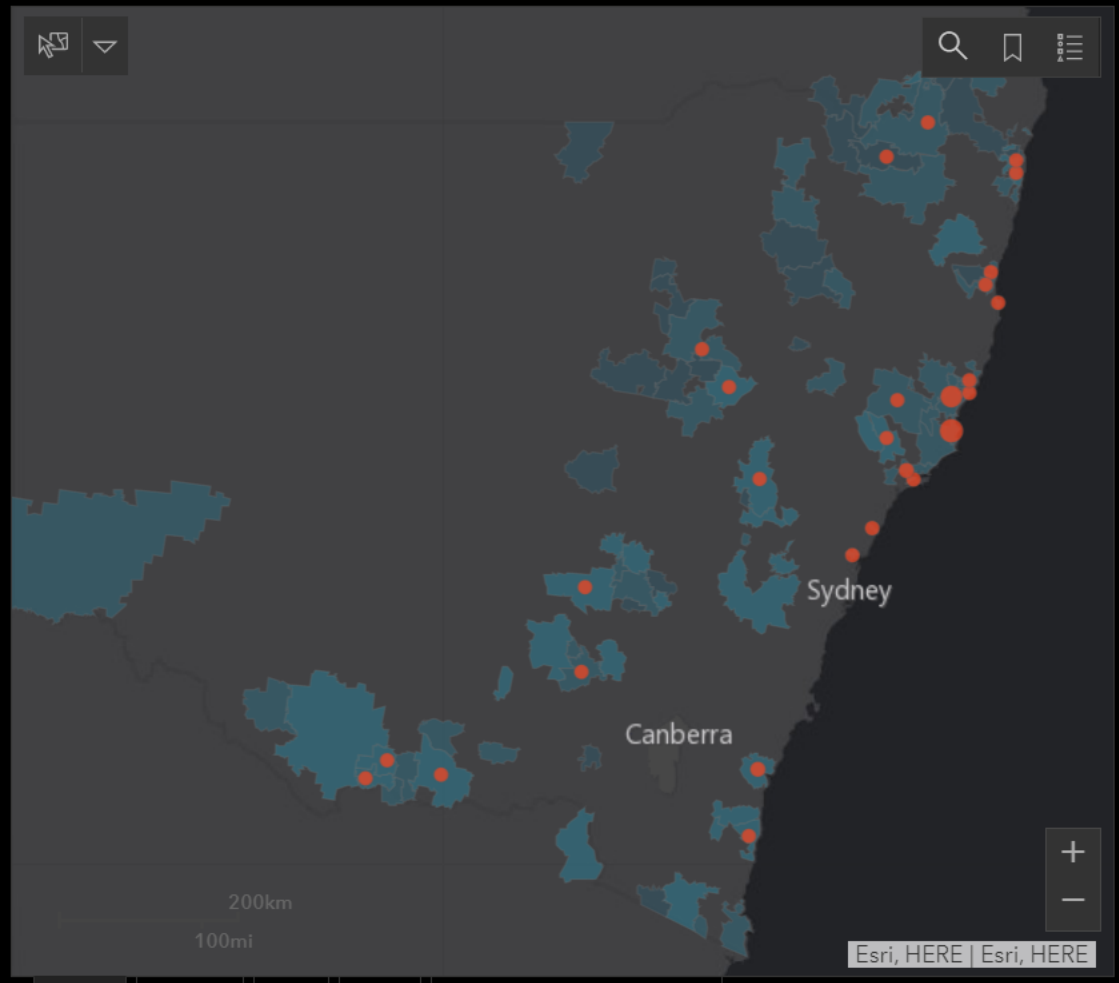
Selected Cases in NSW

95

Unmapped Cases

138





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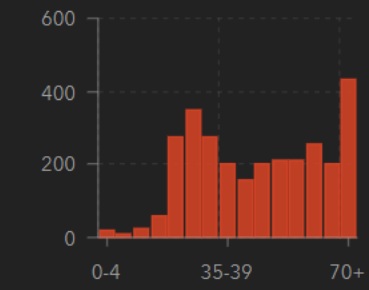
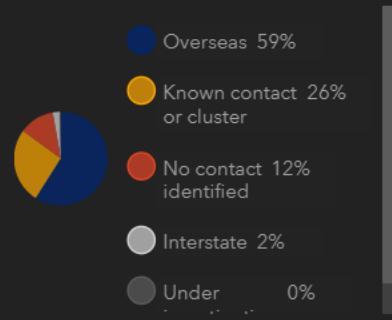
School of Geosciences | Faculty of Science
School of Social and Political Sciences | Faculty of Arts and Social Sciences
School of Medical Sciences | Faculty of Medicine and Health

Total NSW cases by age range



Total NSW cases by likely source of infection



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SEIFA

Most recent case provided was reported on 4/17/2020, 5:00 PM (mm/dd/yyyy)

Last update: 4 minutes ago

2019冠狀病毒病-香港最新情況

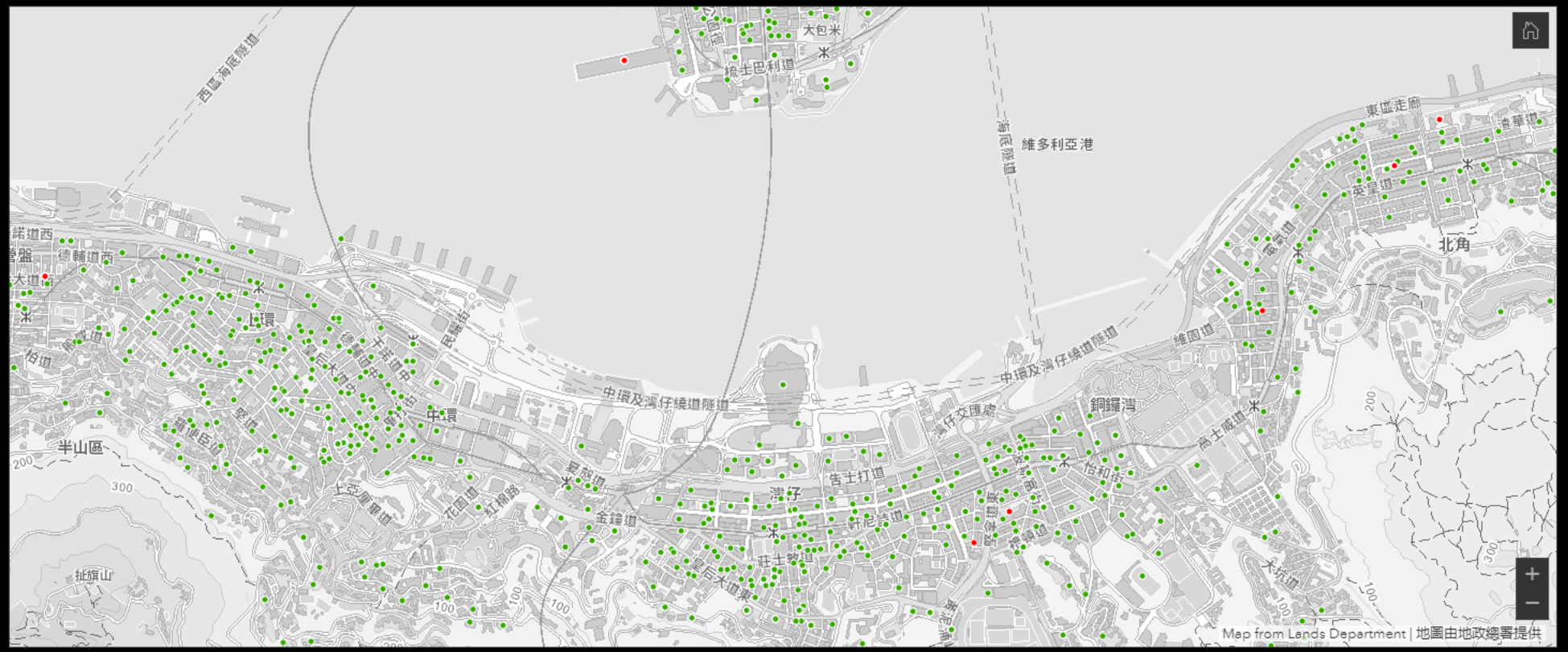
確診/疑似
5,057
▲7

出院
4,758
▲9

住院
160
▼7

危殆
13

死亡
104
▲0

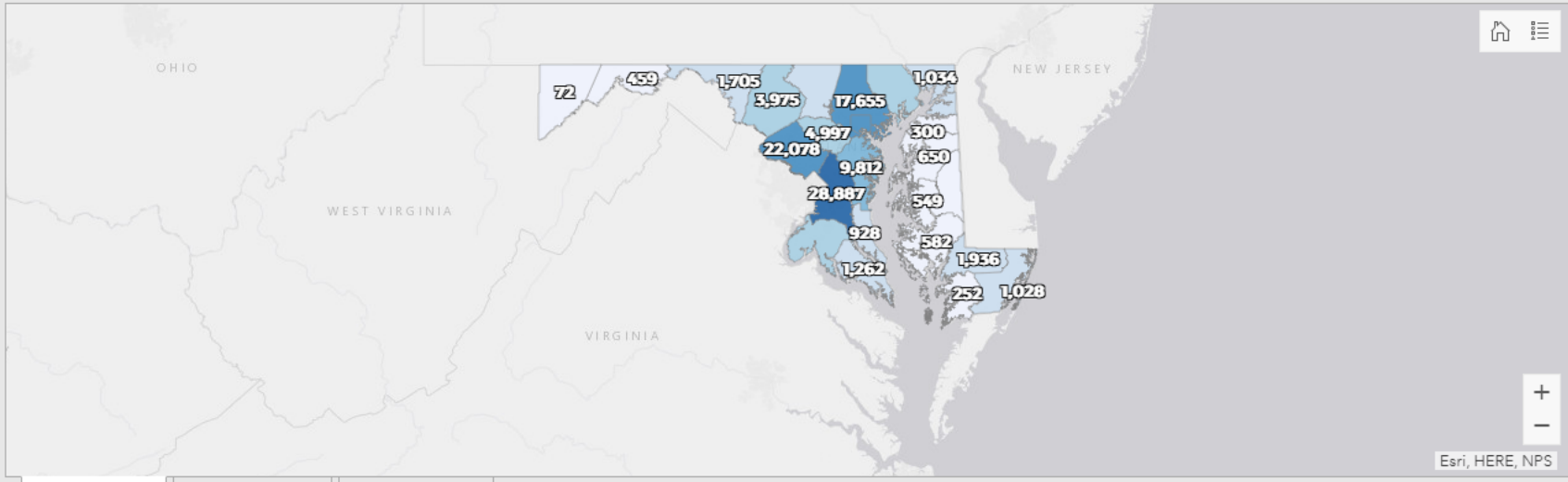


14天內居住 / 到訪過的建築物
超過14天居住 / 到訪過的建築物

個案 5057: 女 50歲 24/09/2020 確診
個案 5056: 女 44歲 24/09/2020 確診
個案 5055: 男 52歲 24/09/2020 確診
個案 5054: 女 40歲 24/09/2020 確診
個案 5053: 女 40歲 24/09/2020 確診
個案 5052: 女 31歲 24/09/2020 確診
個案 5051: 女 32歲 24/09/2020 確診
個案 5050: 女 64歲 23/09/2020 確診
個案 5049: 男 4歲 23/09/2020 確診
個案 5048: 女 41歲 23/09/2020 確診

個案詳情

Maryland COVID-19 Data Dashboard

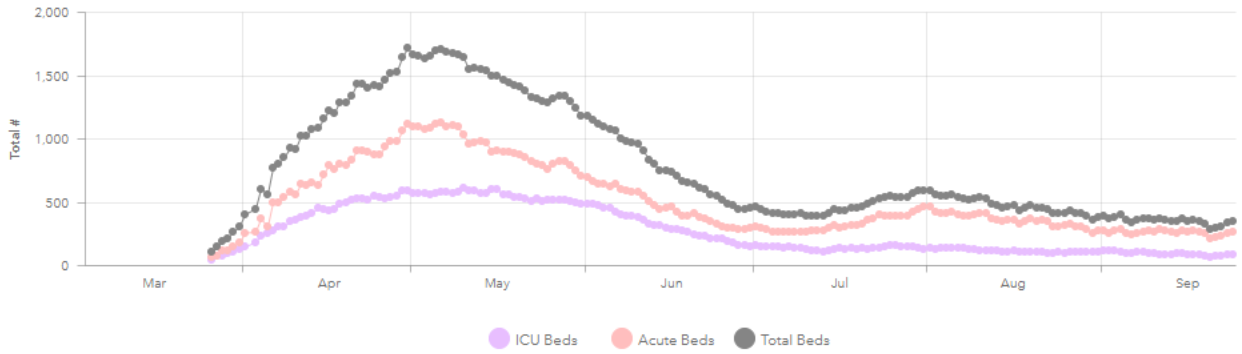


Affected Counties:

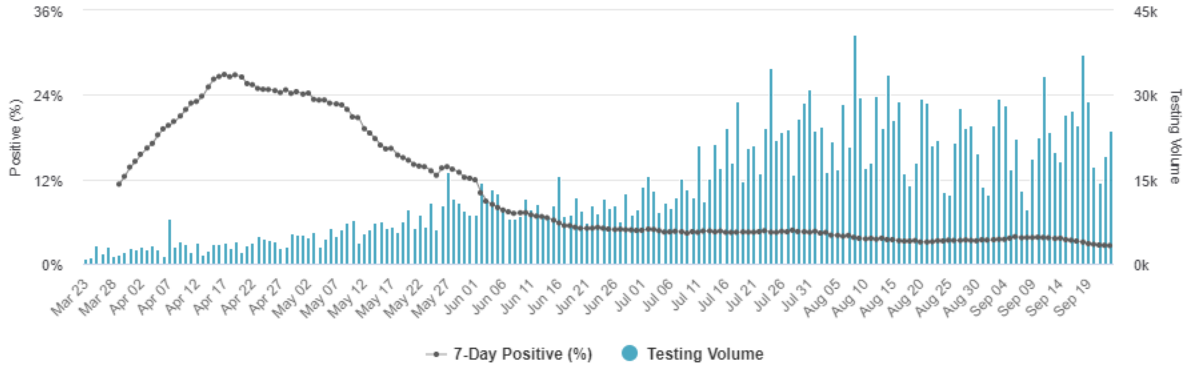
- Prince George's - 28,887
- Montgomery - 22,078
- Baltimore - 17,655
- Baltimore City - 15,374
- Anne Arundel - 9,812
- Howard - 4,997
- Frederick - 3,975

Cases by County | Cases by ZIP Code | Testing by County

ICU and Acute Hospital Beds for COVID-19, Currently in Use



Testing Volume, Tests per Day and Percent Positive Rate (7-Day Avg) - Methodology



Positivity Rate

Hospitalizations, Current | Positivity and Testing by Age Group | Age Distribution | Gender Distribution | Racial Distribution

Confirmed Cases
121,800
24hr Change: +503

Persons Tested Negative
1,439,779
24hr Change: +8,971

Testing Volume
2,464,927
24hr Change: +23,702

Testing % Positive
2.57%
24hr Change: -0.03

Confirmed Deaths
3,765
24hr Change: +9

Currently Hospitalized
349
24hr Change: 17

Maryland/DC Invasive Ventilator Utilization in Response to COVID-19

Show: Regions | MD/DC | Total

Invasive Ventilators

618

Total Units

Ventilators in Reserve

459

Available Units

Intubated

15

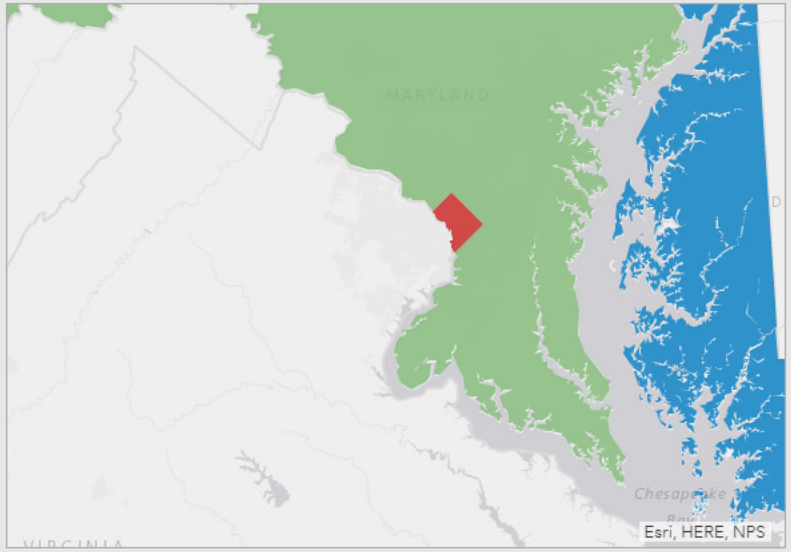
COVID-19(+) Patients

Non-Intubated

105

COVID-19(+) Patients

Data are self-reported daily by hospitals. Therefore, values may not represent total participation.



Select Region

District of Columbia: 17%
2 of 12 hospitals

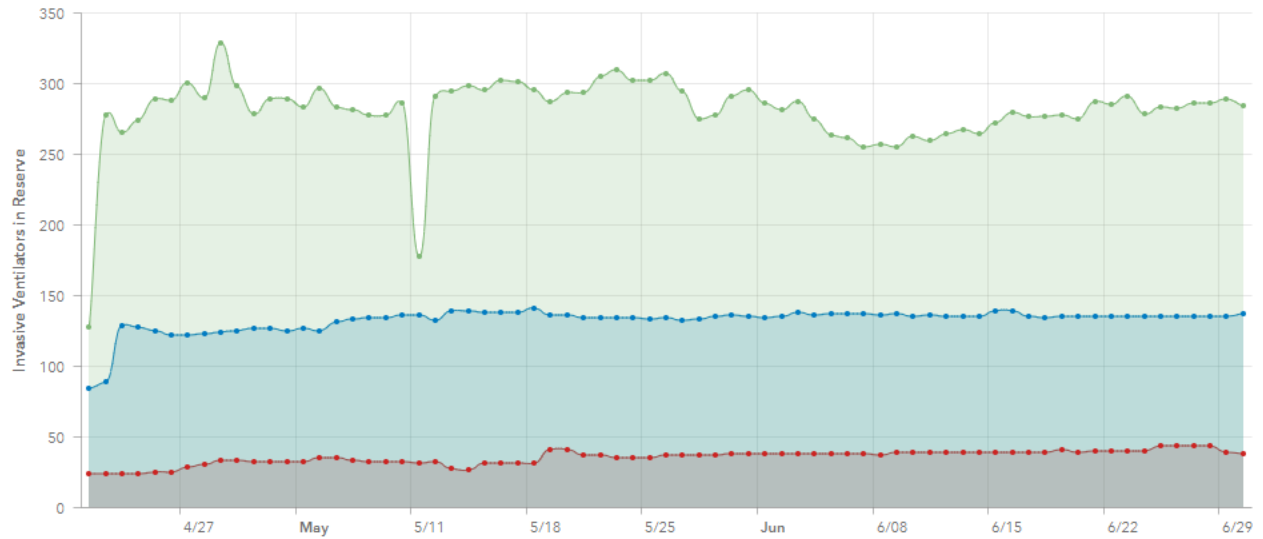
Eastern Shore: 71%
5 of 7 hospitals

Western Shore: 12%
5 of 42 hospitals

Today's Participation | Historic Participation

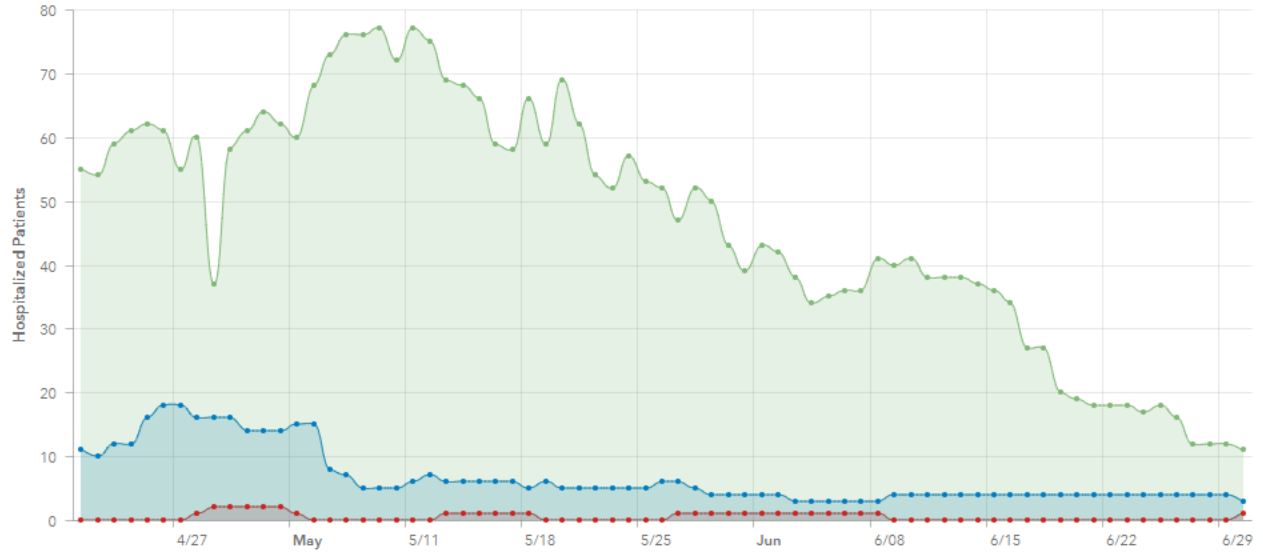
Last Updated:
June 30, 2020 @ 12:01AM

Invasive Ventilator Availability



Available | % Available

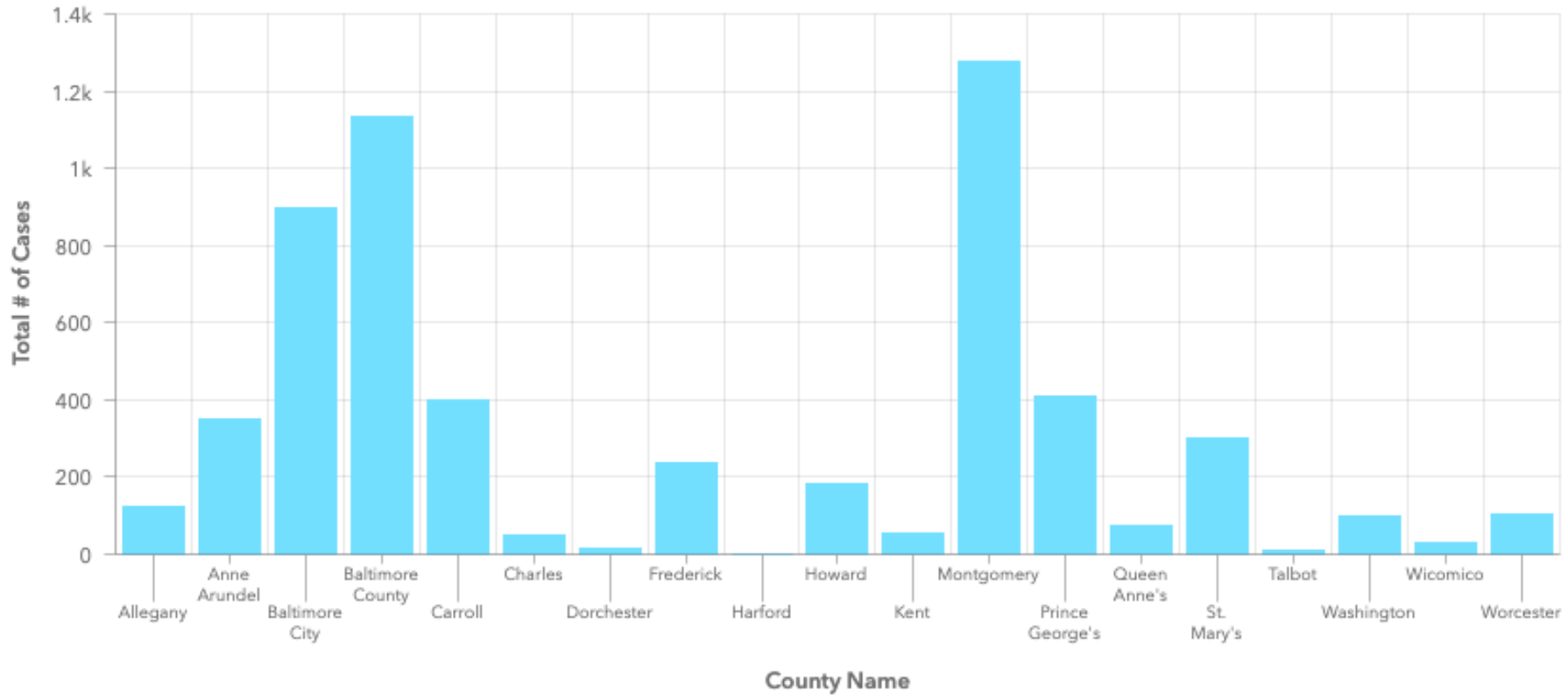
Intubated & COVID-19(+)



Intubated | Non-Intubated

Maryland COVID-19 in Congregate Facility Settings: Week of July1, 2020

Confirmed Staff Cases	Confirmed Staff Deaths	Confirmed Resident Cases	Confirmed Resident Deaths
1,961	16	3,783	866



Affected Facilities

Week of July 1, 2020

Anchorage Healthcare Center
Staff Cases: 7
Staff Deaths: 0
Resident Cases: 25
Resident Deaths: 4

Arbor Terrace Fulton
Staff Cases: 16
Staff Deaths: 0
Resident Cases: 19
Resident Deaths: 4

Arbor Terrace Waugh Chapel
Staff Cases: 6
Staff Deaths: 0
Resident Cases: 3
Resident Deaths: 1

Arden Courts of Pikesville
Staff Cases: 3
Staff Deaths: 0

Select a bar in the graph to filter the list of facilites and the number totals by county Click in empty space in the graph to reset to the statewide totals

Facilities: Nursing, Assisted Living, Group Homes | Facilities: State and Local

University of Aegean / YOUTHShare - Coronavirus Covid-19 Cases and Statistics in Southern EU Regions

(Greece, Cyprus, Italy, Spain, Croatia, Portugal, Malta, France)

Total Confirmed
740,902

Last update: 4 minutes ago

Croatia -
Confirmed : 2,777
Active : 515
Deaths : 107
Recovered : 2,155

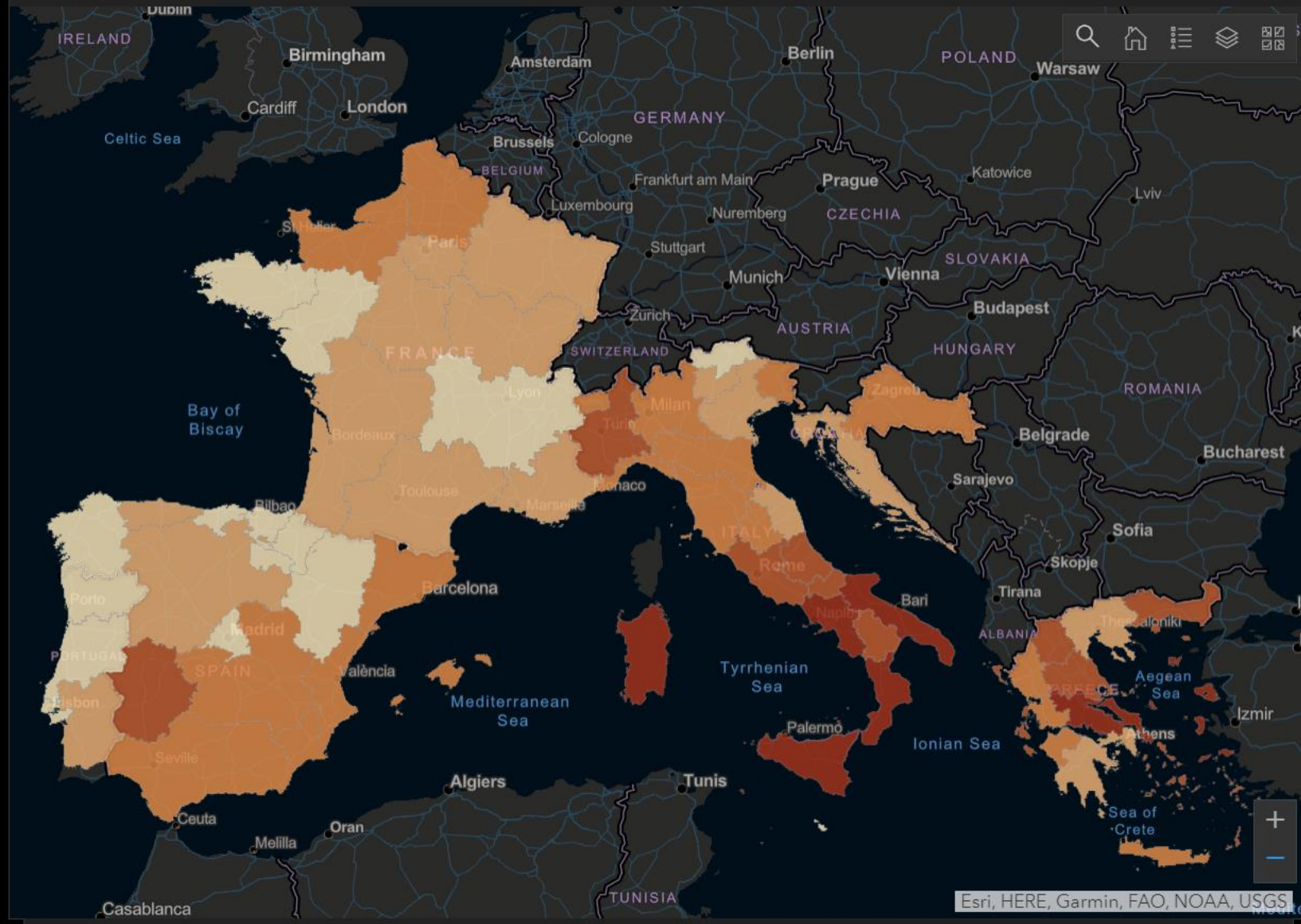
Cyprus -
Confirmed : 996
Active : 144
Deaths : 19
Recovered : 833

France -
Confirmed : 194,109
Active : 92,778
Deaths : 29,736
Recovered : 71,595

Greece -
Confirmed :

Last update: 4 minutes ago

Neet Rates (%) 2019



Neet Rates (%) 2019

Greece (cases per Nuts-2 region)

- Voreio Aigaio : 15 (14) (1) ()
- Notio Aigaio : 15 (15) (0) ()
- Peloponnisos : 200 (199) (1) ()
- Thessalia : 186 (184) (2) ()
- Sterea Ellada : 85 (85) (0) ()
- Attiki : 1,695 (1,614) (81) ()
- Kriti : 21 (20) (1) ()
- Ionia Nisia : 14 (12) (2) ()
- Dytiki Ellada : 85 (80) (5) ()
- Anatoliki Makedonia, Thraki : 333 (311) (22) ()
- Kentriki Makedonia : 210 (192) (18) ()
- Dytiki Makedonia : 166 (137) (29) ()

Last update: 4 minutes ago

Greece

The **'COVID-19_Regional_Labour'** dashboard presents regional statistics for Coronavirus Covid-19 in **Greece, Cyprus, Italy and Spain**. It includes certain useful indices, such as the per capita shares, while it aspires to study the impact of Covid-19 upon (youth) employment.
The data are from Eurostat, Johns Hopkins University (JHU), WHO, Statista, Wikipedia, relevant national authorities etc.
COVID-19_Regional_Labour and its contents herein, including all data, mapping, and analysis, copyright 2020 University of the Aegean/ YOUTHShare

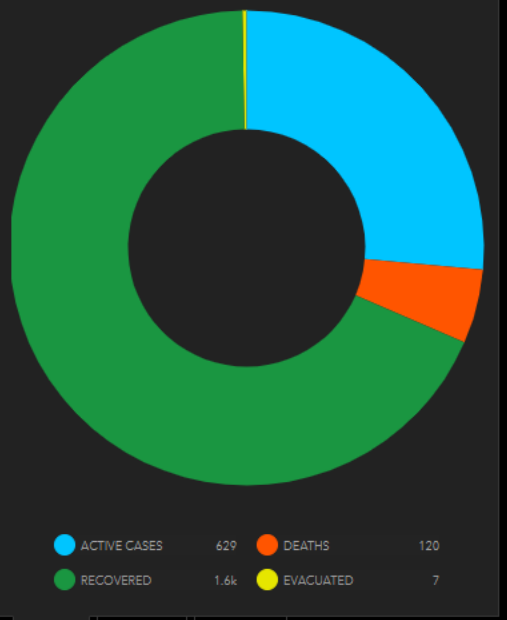
Mali: Coronavirus Disease (COVID-19) Dashboard

2,370
CONFIRMED

629
ACTIVE

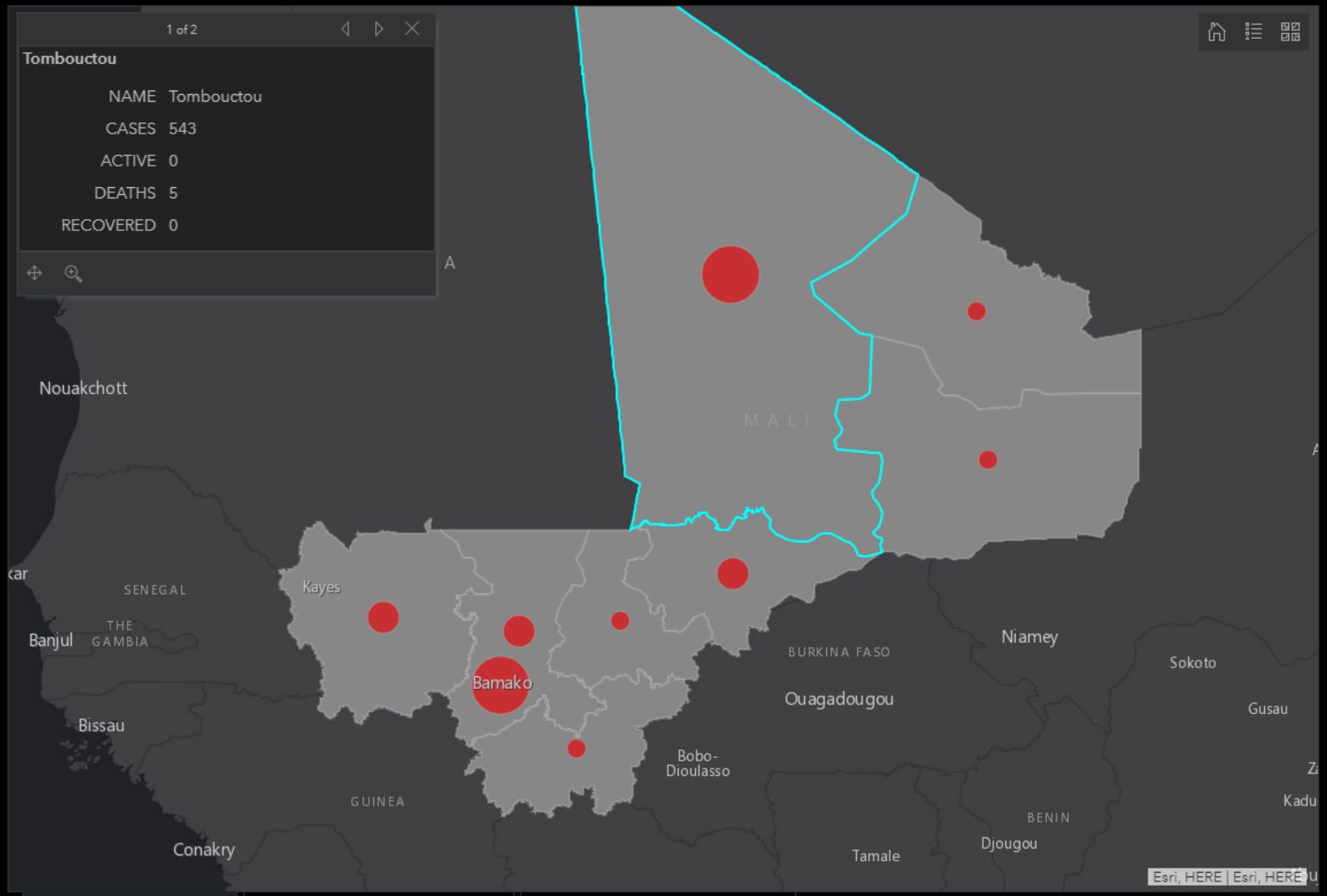
120
DEATHS

1,621
RECOVERED

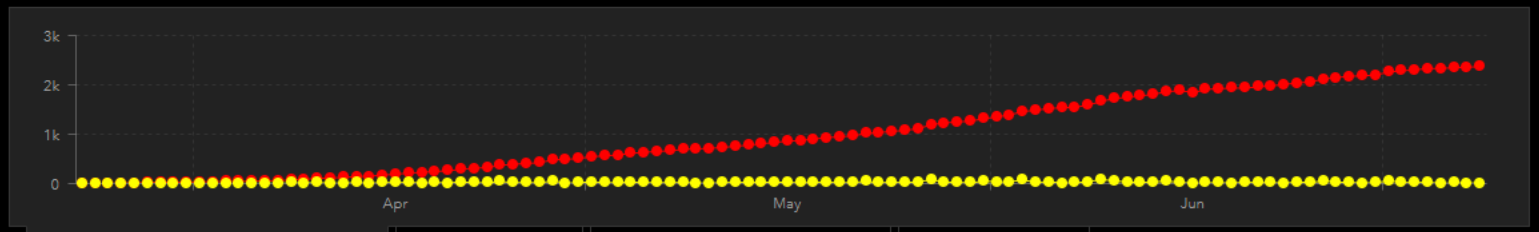


Cases | Gender | Regions

Last Updated: 09/07/2020, 14:03



Cumulative Confirmed Cases | Bamako Cumulative Confirmed Cases | Regional Cumulative Confirmed Cases



Daily Cumulative Confirmed and New Cases | Demographics (Age) | Daily Active, Recovered, and Deaths | Case Status (Regions)

9
Affected Regions

Cases by Region

Bamako Region
1,145 Confirmed, 79 Deaths, 1,489 Recovered

Timbuktu Region
543 Confirmed, 5 Deaths, 0 Recovered

Mopti Region
245 Confirmed, 18 Deaths, 0 Recovered

Koulikoro Region
159 Confirmed, 3 Deaths, 57 Recovered

Kayes Region
112 Confirmed, 4 Deaths, 1 Recovered

Sikasso Region
50 Confirmed, 2 Deaths, 0 Recovered

Kidal Region
47 Confirmed, 0 Deaths, 0 Recovered

Gao Region
33 Confirmed, 3 Deaths, 0 Recovered

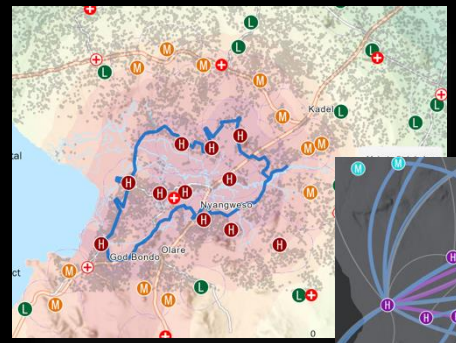
Ségou Region
24 Confirmed, 5 Deaths, 0 Recovered

Data Source: Ministere de la Sante et des Affaires Sociales, Mali.

Repeating the Pattern
For mapping and monitoring disease

Infectious Disease

Malaria Transmission



UC Irvine
Kenya

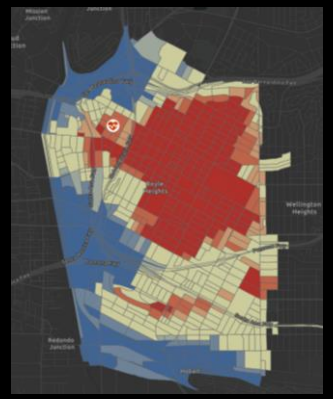
African Swine Flu

Paju
South Korea

Chronic Disease

Smoking & Drinking

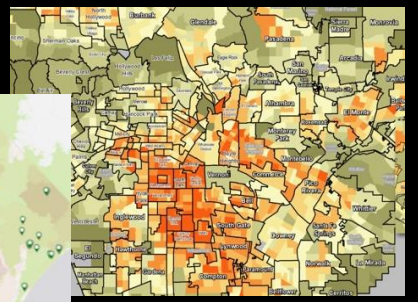
Diabetes Hot Spots



Boyle Heights
California

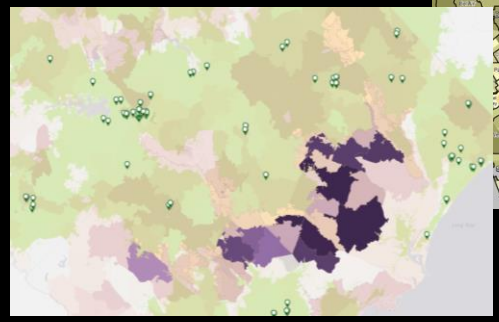
Environmental/ Contextual Concerns

Lead Poisoning



Department of Public Health
Los Angeles

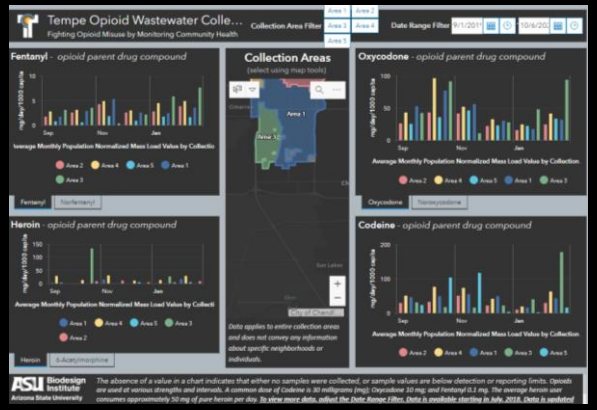
Low Birthweight Babies



State of South Carolina

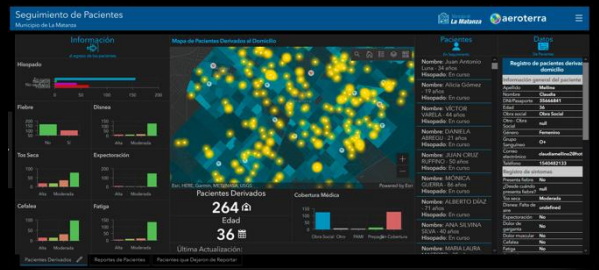
Operational Efforts

Opioids in Wastewater



Arizona State University
Tempe, AZ

Hospital Admissions and Patient Status



Aeroterra
Argentina

Repeatable Patterns

Mapping & Monitoring Disease

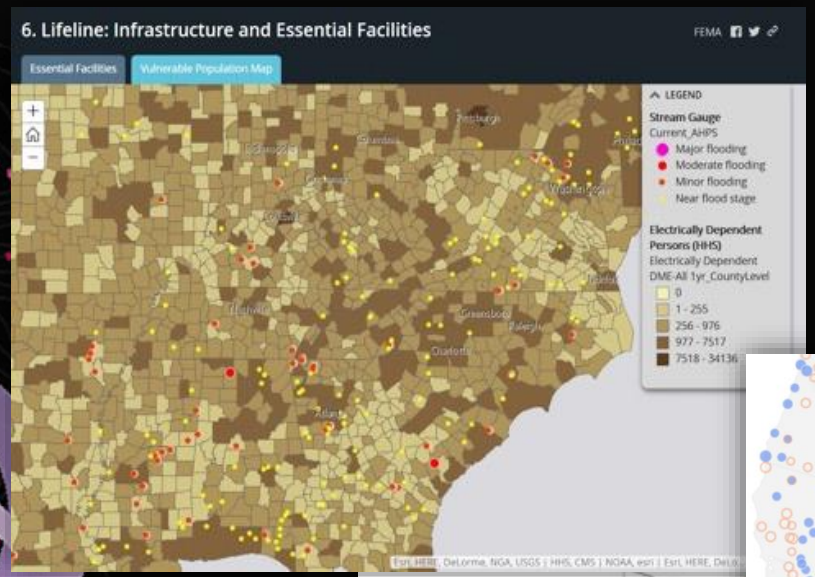
Strategic Planning

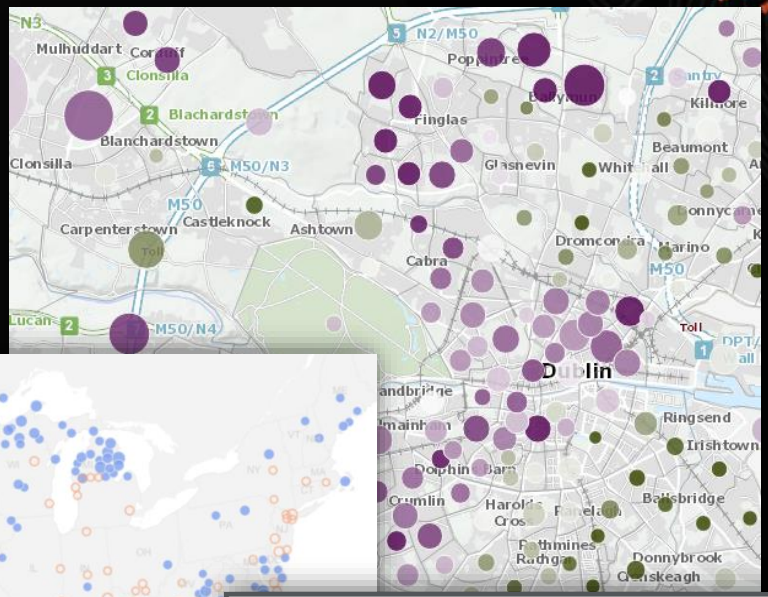
Indoor Space Management

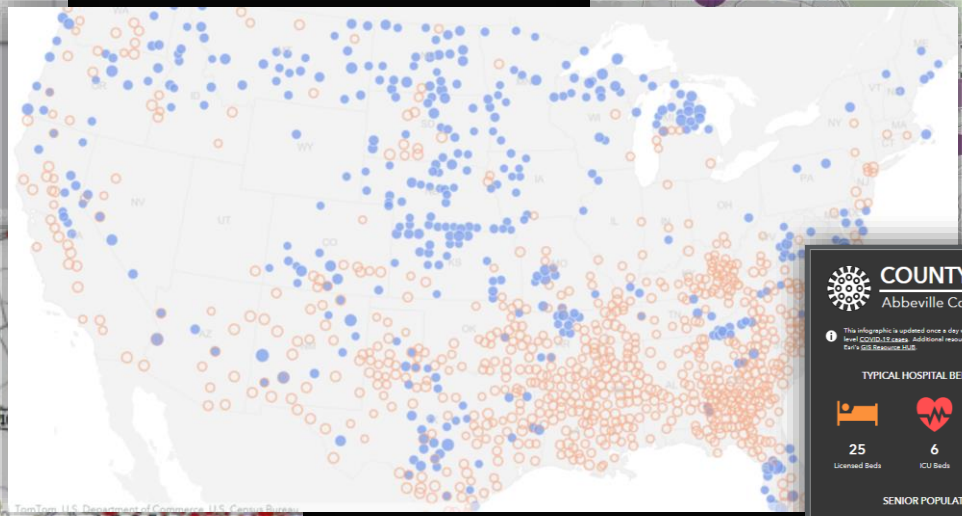
Analyzing Relationships & Gaps

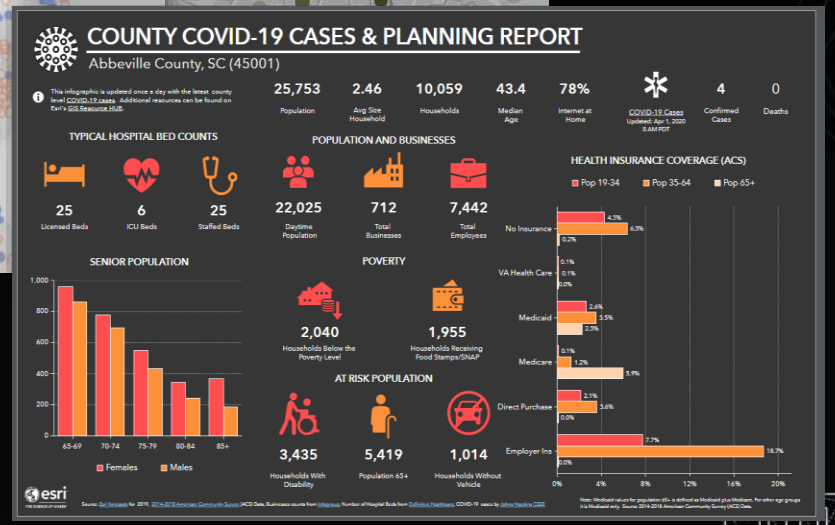
Map Vulnerable Populations

Promoting health equity for all



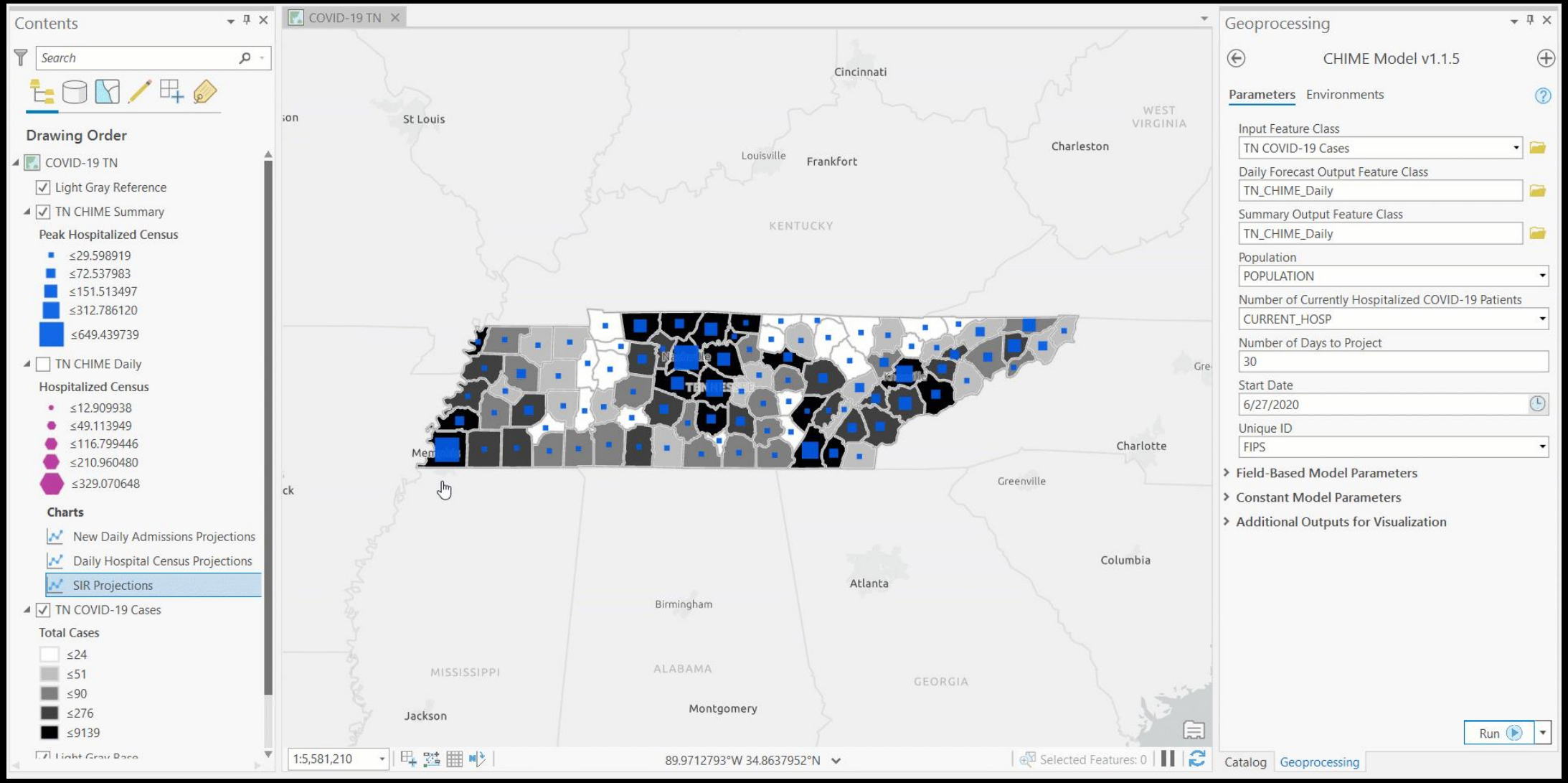






Mapping Capacity

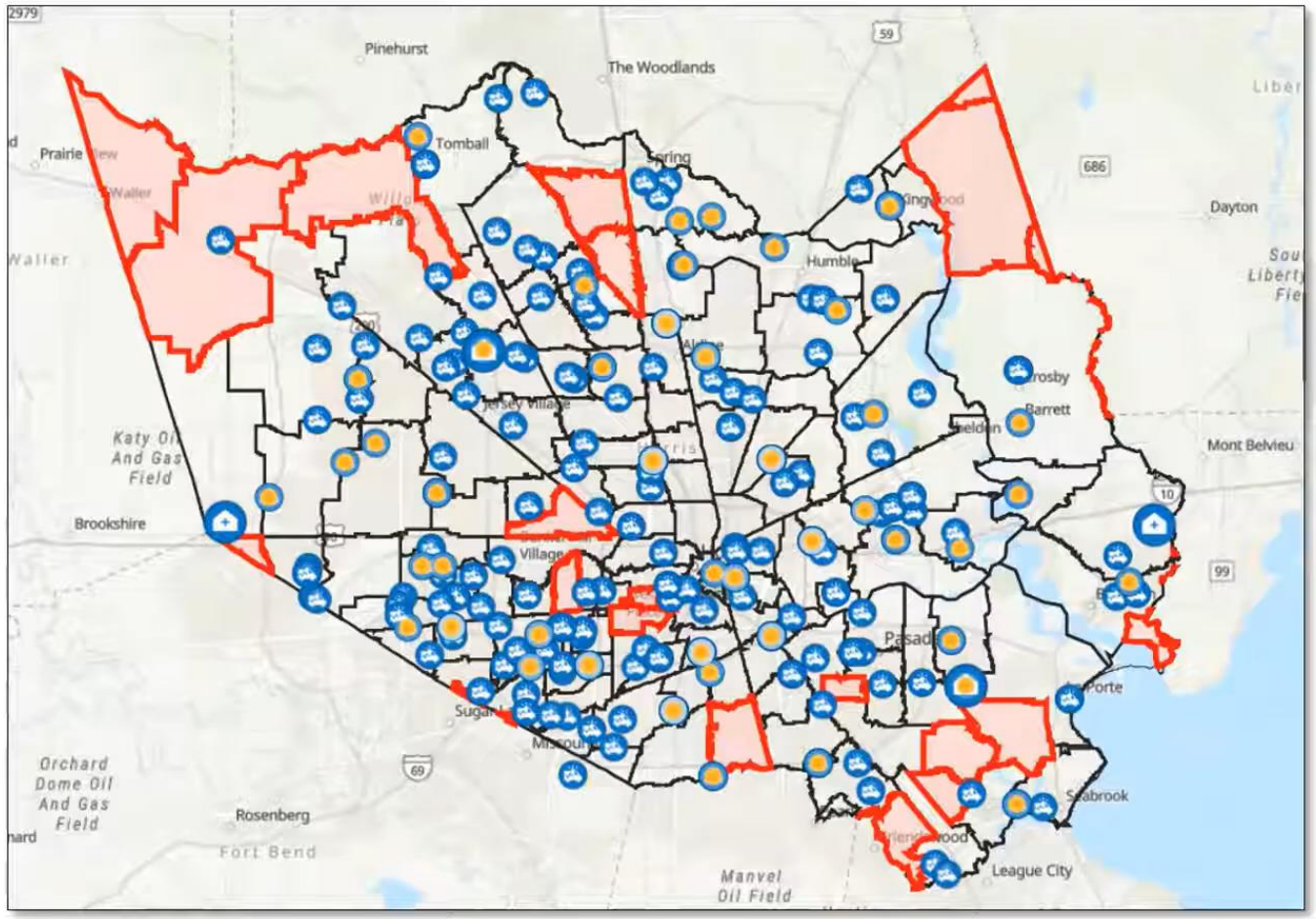
Determine your ability to respond



Predicting Spread and Impacts on Hospitals

Mapping Capacity

Harris County, Tx coins term “Testing Deserts”



HARRIS COUNTY ZIP CODES WITH NO TESTING SITES RECORDED

VIEW OF SITES ORGANIZED BY HCPH, COH, TDEM, & OTHERS

COVID-19 Test Sites (Open After Aug 1)

COVID-19 Test Sites (All)

- Other
- Stationary

Zip Codes (No Scheduled Testing)

Harris County Zip Code Boundaries

Harris County Public Health
Building a Healthy Community

2016 Local Health Department of the Year Award

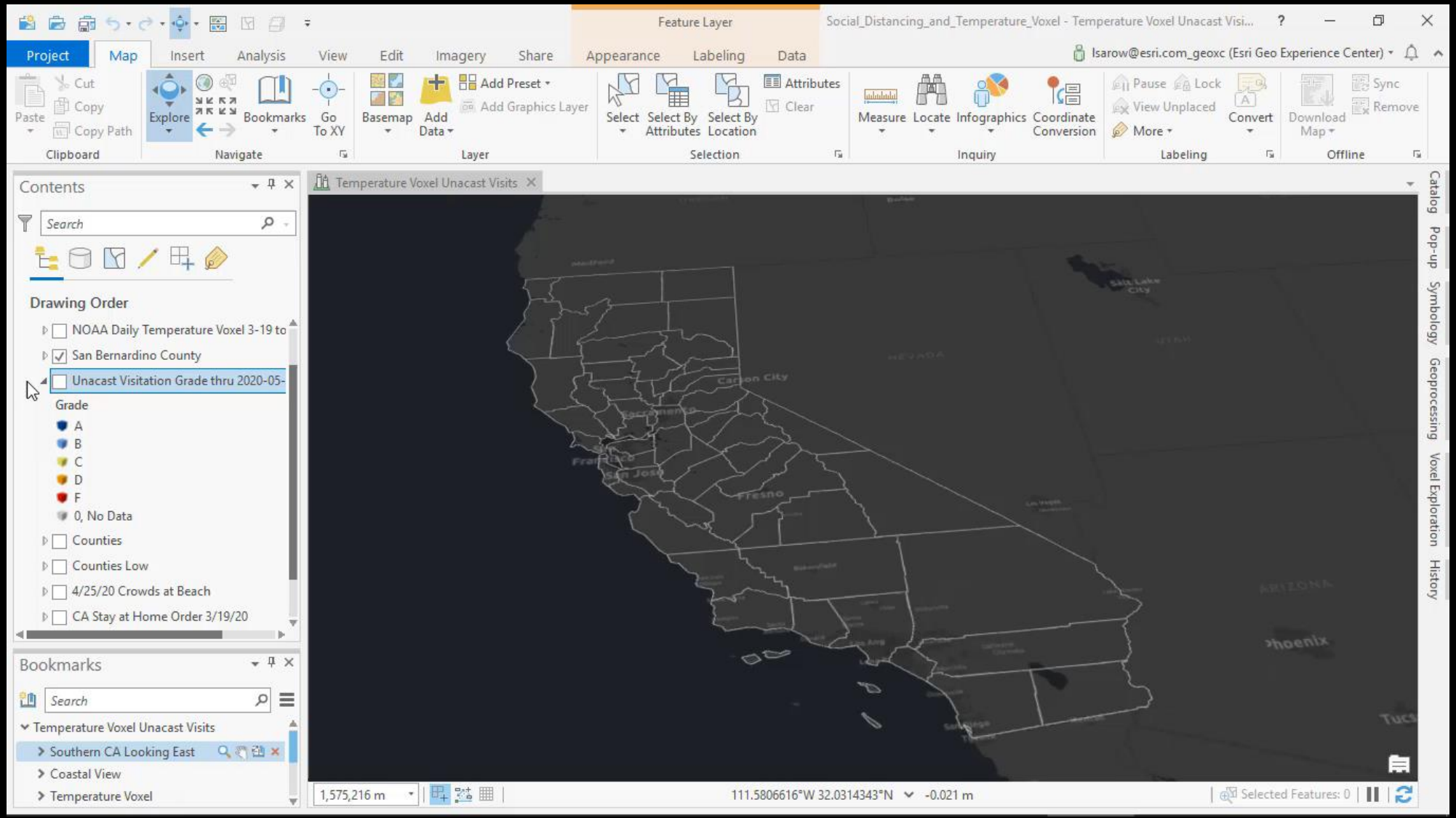
#INVISIBILITYCRISIS | TWITTER: @USHAHMD @HCPHTX

WWW.HCPHTX.ORG

Harris Cares: Focus Issues

Chronic Diseases | Family Health | Emergency Preparedness | Environmental Health | Infectious Diseases | Injury | Mental and Behavioral Health

Analyze Relationships
Social distancing and weather

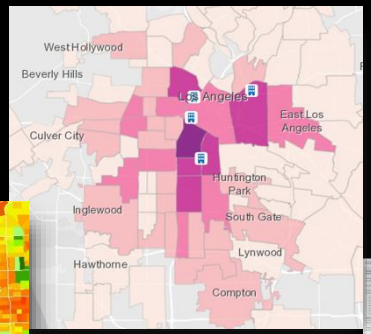


Repeating the Pattern
For analyzing relationships and gaps

Social Vulnerability

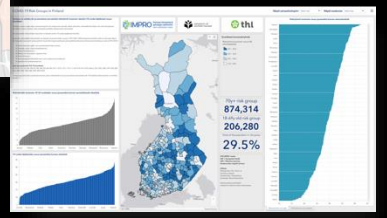
Arcadis
Florida

Racial and Ethnic Disparities



USC
California

Vulnerable Populations

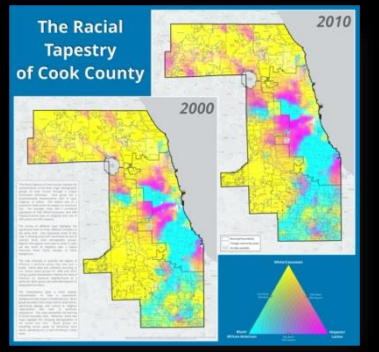


University of Eastern Finland
Finland

Disadvantaged Neighborhood Survey

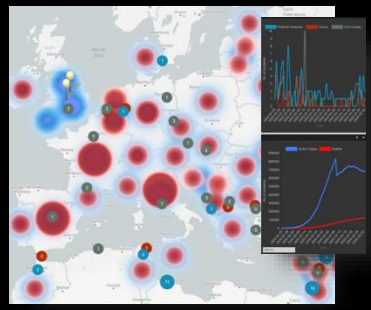
UN-Habitat
Lebanon

Racial Tapestry



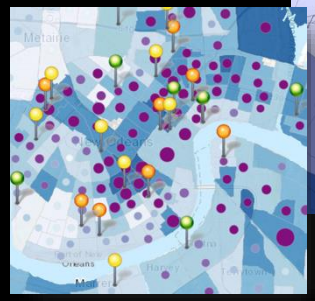
Cook County Government
Illinois

Pandemic and Civil Unrest



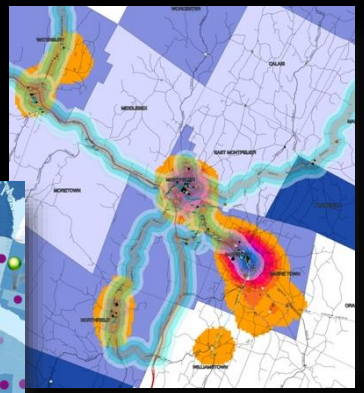
HawkSight
Europe

Food Access



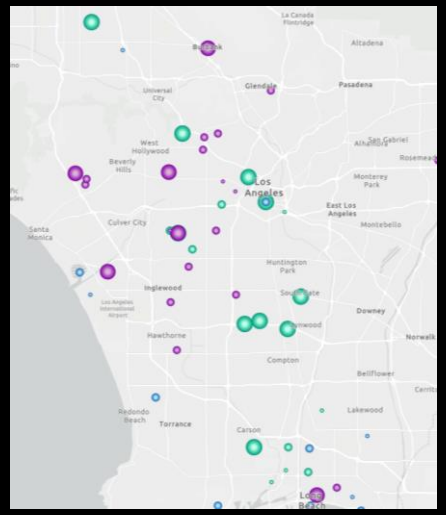
W.K. Kellogg Foundation
Louisiana

Access to Food Retailers

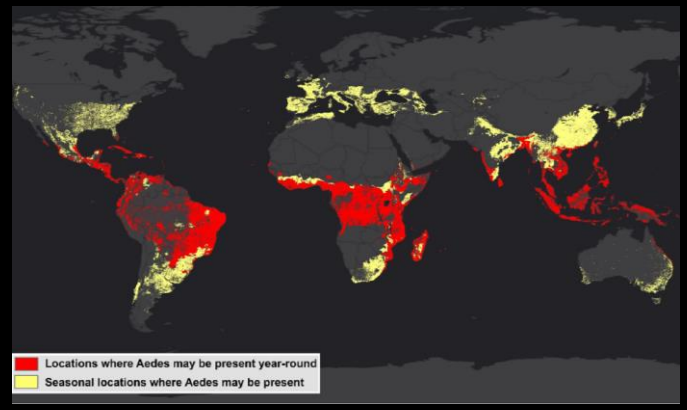


Central Vermont Regional Planning Commission
Vermont

Risk Factors for Homelessness



Aedes Mosquito Habitats



Social Distancing Sidewalk Analysis

City of London Corporation
United Kingdom

Repeatable Patterns

Mapping & Monitoring Disease

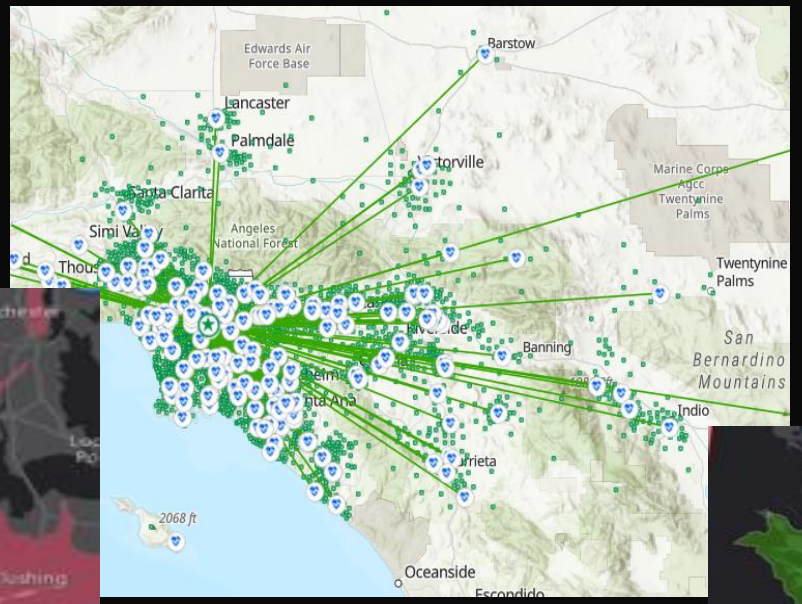
Strategic Planning

Indoor Space Management

Analyzing Relationships & Gaps

Strategic Planning
Site new resources

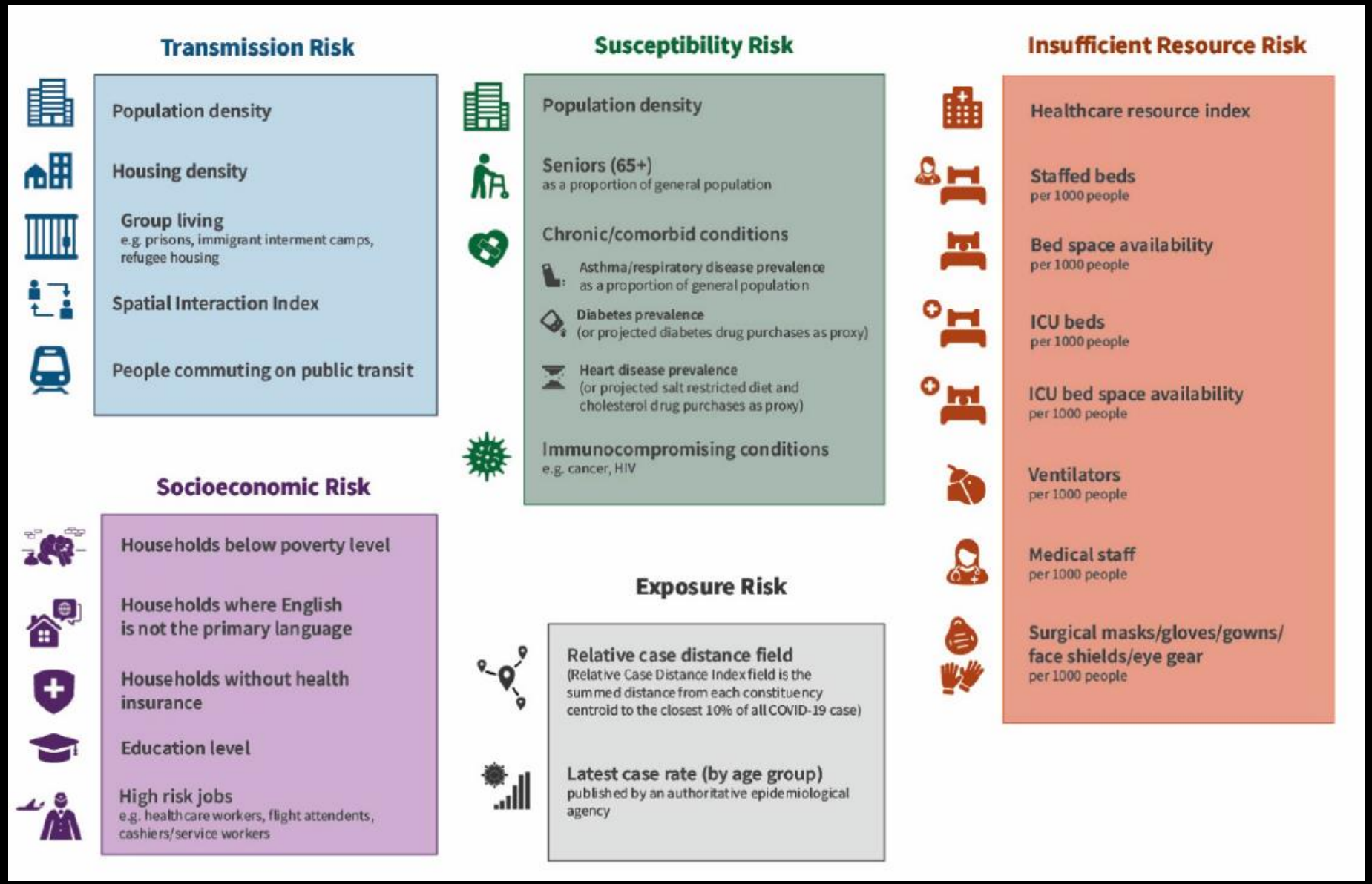
Allocation of Critical Resources



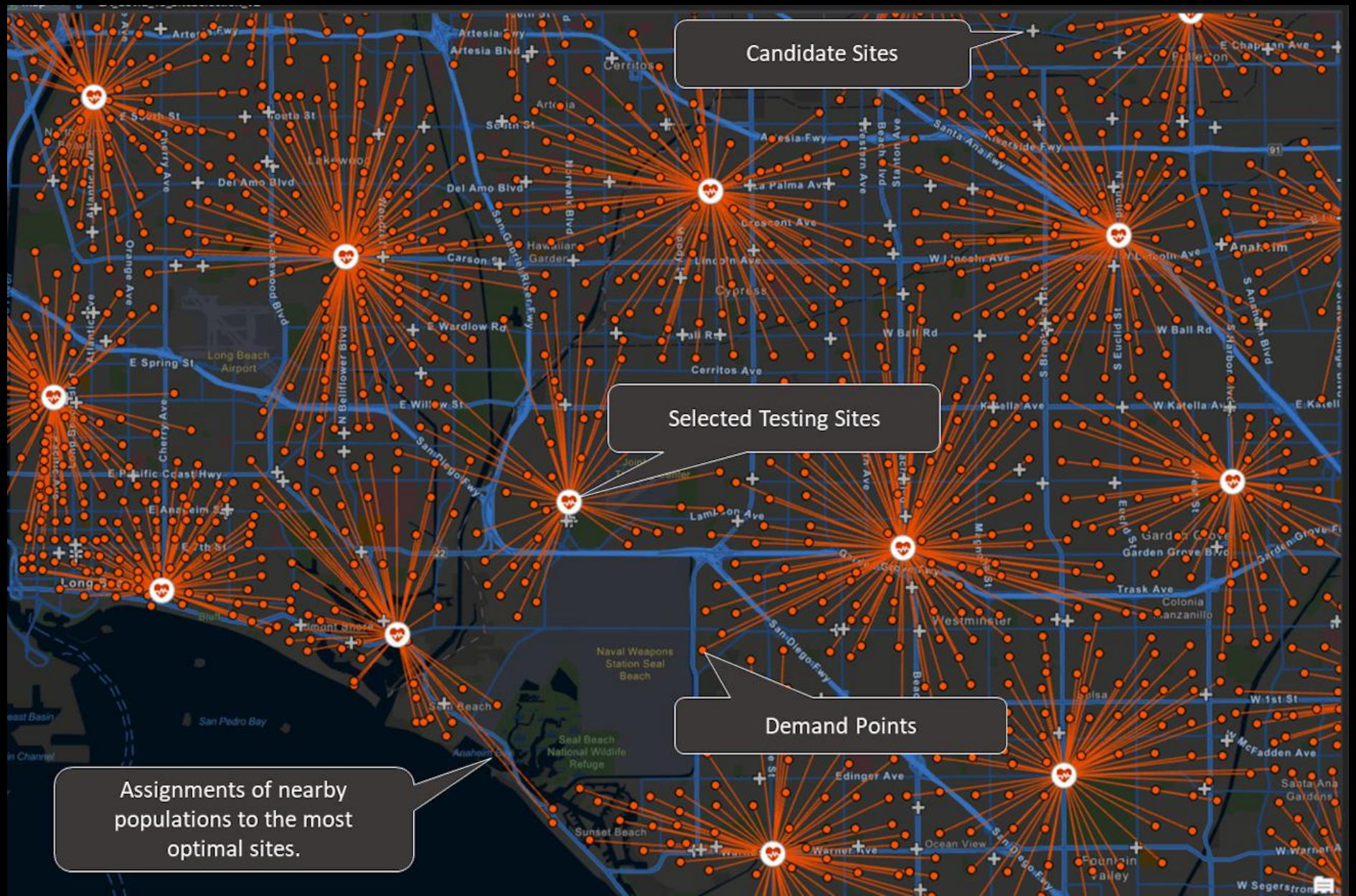
Access to Care

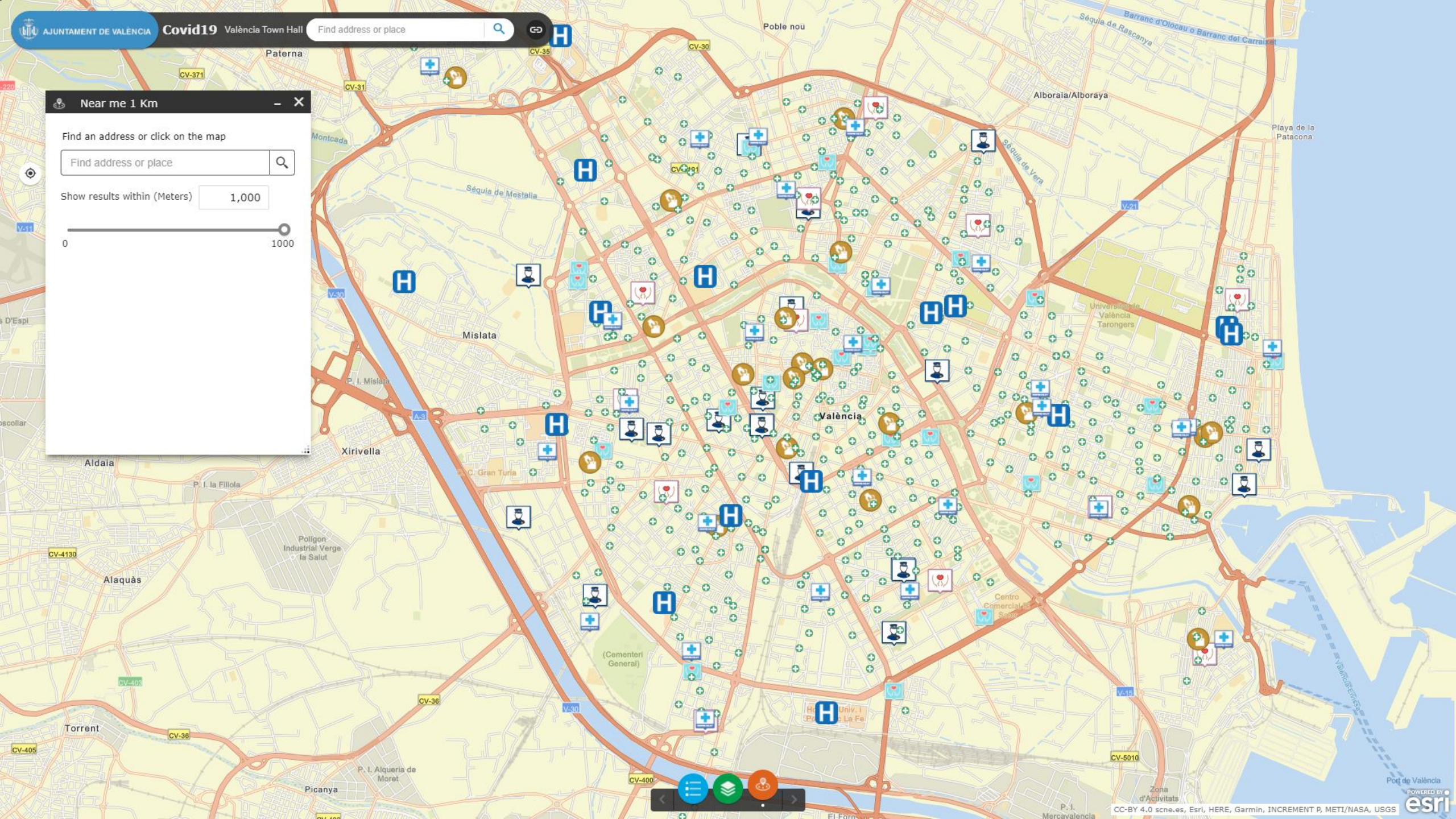
Selecting Centers

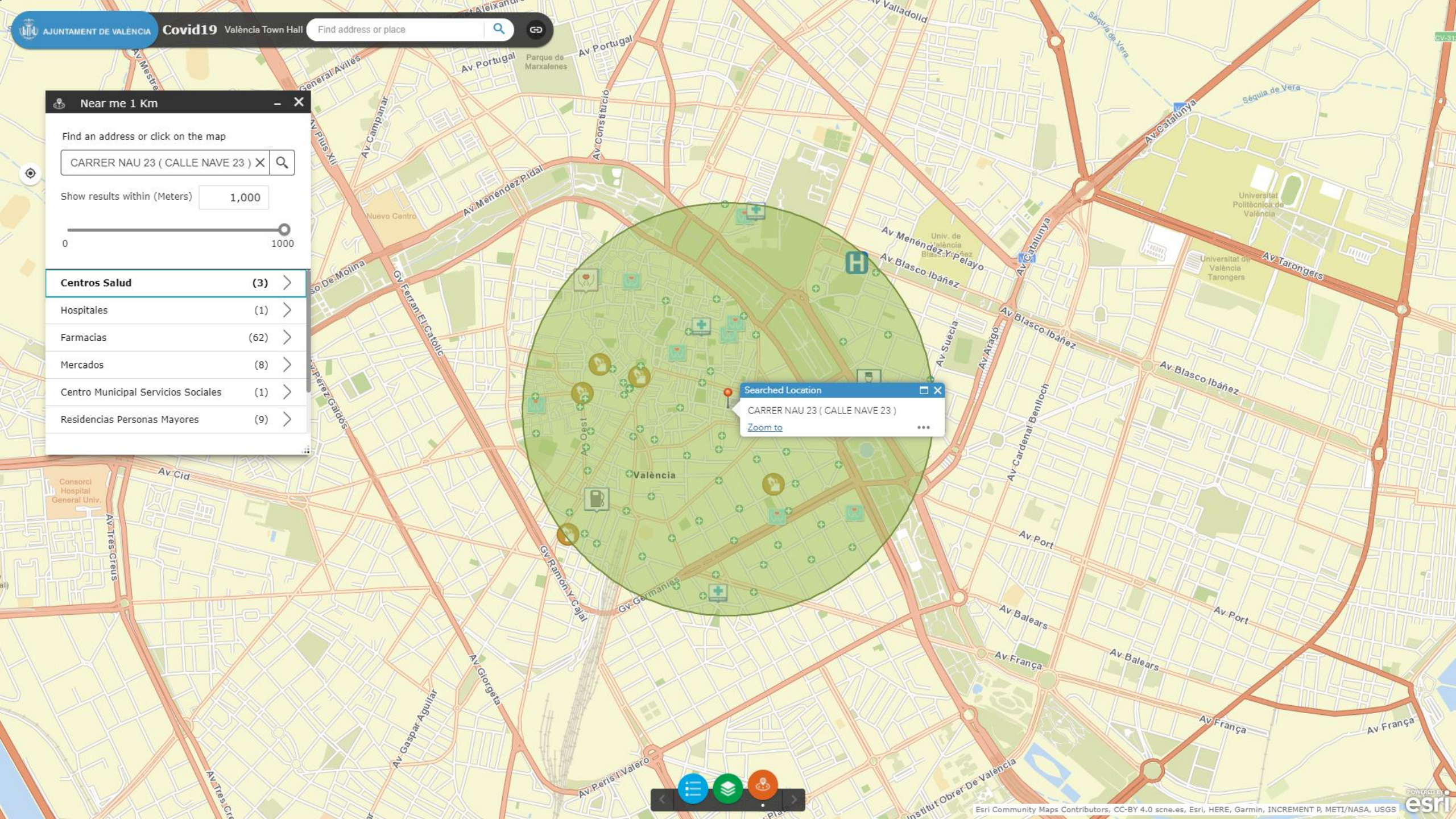
Strategic Planning
Calculate population demand (need)



Strategic Planning
Perform location-allocation




AJUNTAMENT DE VALÈNCIA
Covid19 València Town Hall
Find address or place
Near me 1 Km
Find an address or click on the map
Find address or place
Show results within (Meters)
1,000
0
1000
Poble nou
Paterna
Alboraia/Alboraya
Mislata
València
Xirivella
Aldaia
Alaquàs
Torrent
Picanya
Séquia de Mestalla
Séquia de Rascanya
Séquia de Vera
Barranc d'Olocau o Barranc del Carraixet
Playa de la Patacona
Universitat de València Tarongers
P. I. Mislata
P. I. la Fillola
Polígon Industrial Verge la Salut
(Cementeri General)
Centro Comercial
Zona d'Activitats
Port de València
CV-30
CV-35
CV-371
CV-31
CV-2491
V-21
V-30
V-11
A-3
CV-4130
CV-403
CV-36
CV-405
CV-400
CV-5010
V-15
CC-BY 4.0 scne.es, Esri, HERE, Garmin, INCREMENT P, METI/NASA, USGS
esri


AJUNTAMENT DE VALÈNCIA
Covid19 València Town Hall
Find address or place
Near me 1 Km
Find an address or click on the map
CARRER NAU 23 (CALLE NAVE 23)
Show results within (Meters)
1,000
0
1000
Centros Salud (3)
Hospitales (1)
Farmacias (62)
Mercados (8)
Centro Municipal Servicios Sociales (1)
Residencias Personas Mayores (9)
Searched Location
CARRER NAU 23 (CALLE NAVE 23)
Zoom to
València
Av Portugal
Av Menéndez Pidal
Av Blasco Ibáñez
Av Catalunya
Av Tarongers
Av Cid
Av Port
Av Balears
Av França
Av Giorgeta
Av Gaspar Aguilar
Av Peris i Valero
Gv Ramon y Cajal
Gv Germanies
Av Cardenal Benlloch
Av Aragó
Av Suecia
Av Constitució
Av Campanar
Av Pius XII
Gv Ferran El Catolic
Av Tres Creus
Parque de Marxalenes
Nuevo Centro
Universitat Politècnica de València
Universitat de València Tarongers
Consorci Hospital General Univ.
Esri Community Maps Contributors, CC-BY 4.0 scne.es, Esri, HERE, Garmin, INCREMENT P, METI/NASA, USGS
esri

Real-Time Data | Shorter wait times for testing in Slovakia

HOW-TO
STEPS

CONTACT TRACING

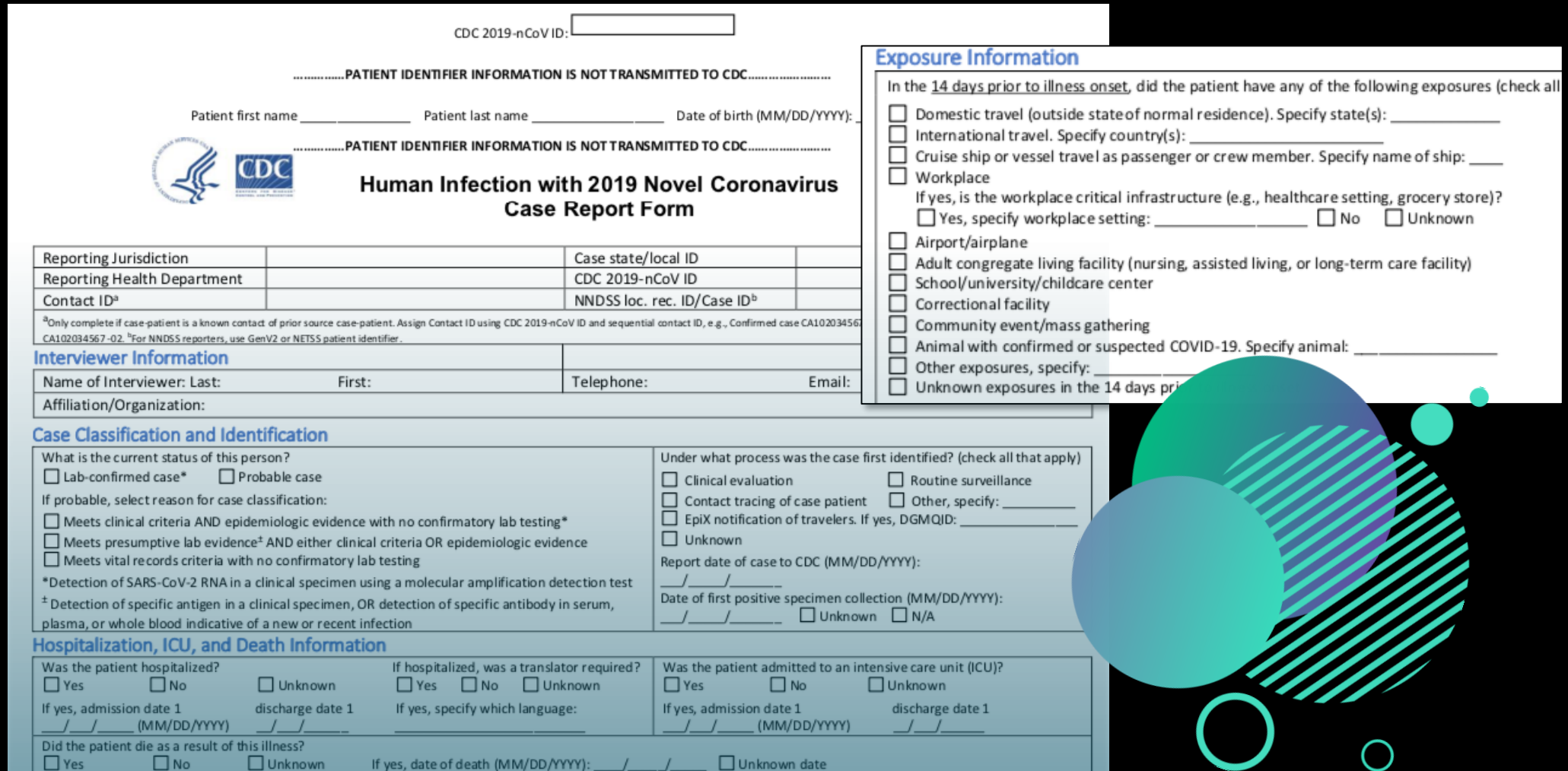
01 COLLECT & MANAGE DATA

02 PERFORM ANALYTICS

03 EVALUATE & MAKE DECISIONS

01 COLLECT LOCATIONS

Ask for Location During Your Case and Contact Interview



CDC 2019-nCoV ID: _____

.....PATIENT IDENTIFIER INFORMATION IS NOT TRANSMITTED TO CDC.....

Patient first name _____ Patient last name _____ Date of birth (MM/DD/YYYY): _

.....PATIENT IDENTIFIER INFORMATION IS NOT TRANSMITTED TO CDC.....

Human Infection with 2019 Novel Coronavirus Case Report Form

Reporting Jurisdiction		Case state/local ID	
Reporting Health Department		CDC 2019-nCoV ID	
Contact ID[a]		NNDSS loc. rec. ID/Case ID[b]	

[a]Only complete if case-patient is a known contact of prior source case-patient. Assign Contact ID using CDC 2019-nCoV ID and sequential contact ID, e.g., Confirmed case CA102034567 CA102034567-02. [b]For NNDSS reporters, use GenV2 or NETSS patient identifier.

Interviewer Information

Name of Interviewer: Last: First:	Telephone: Email:
Affiliation/Organization:	

Case Classification and Identification

What is the current status of this person?
☐ Lab-confirmed case* ☐ Probable case

If probable, select reason for case classification:
☐ Meets clinical criteria AND epidemiologic evidence with no confirmatory lab testing*
☐ Meets presumptive lab evidence± AND either clinical criteria OR epidemiologic evidence
☐ Meets vital records criteria with no confirmatory lab testing

*Detection of SARS-CoV-2 RNA in a clinical specimen using a molecular amplification detection test
± Detection of specific antigen in a clinical specimen, OR detection of specific antibody in serum, plasma, or whole blood indicative of a new or recent infection

Under what process was the case first identified? (check all that apply)
☐ Clinical evaluation ☐ Routine surveillance
☐ Contact tracing of case patient ☐ Other, specify: _____
☐ EpiX notification of travelers. If yes, DGMQID: _____
☐ Unknown

Report date of case to CDC (MM/DD/YYYY):
__/__/____

Date of first positive specimen collection (MM/DD/YYYY):
__/__/____ ☐ Unknown ☐ N/A

Hospitalization, ICU, and Death Information

Was the patient hospitalized?
☐ Yes ☐ No ☐ Unknown

If yes, admission date 1 discharge date 1
__/__/____ (MM/DD/YYYY) __/__/____

If hospitalized, was a translator required?
☐ Yes ☐ No ☐ Unknown

If yes, specify which language: _____

Was the patient admitted to an intensive care unit (ICU)?
☐ Yes ☐ No ☐ Unknown

If yes, admission date 1 discharge date 1
__/__/____ (MM/DD/YYYY) __/__/____

Did the patient die as a result of this illness?
☐ Yes ☐ No ☐ Unknown If yes, date of death (MM/DD/YYYY): __/__/____ ☐ Unknown date

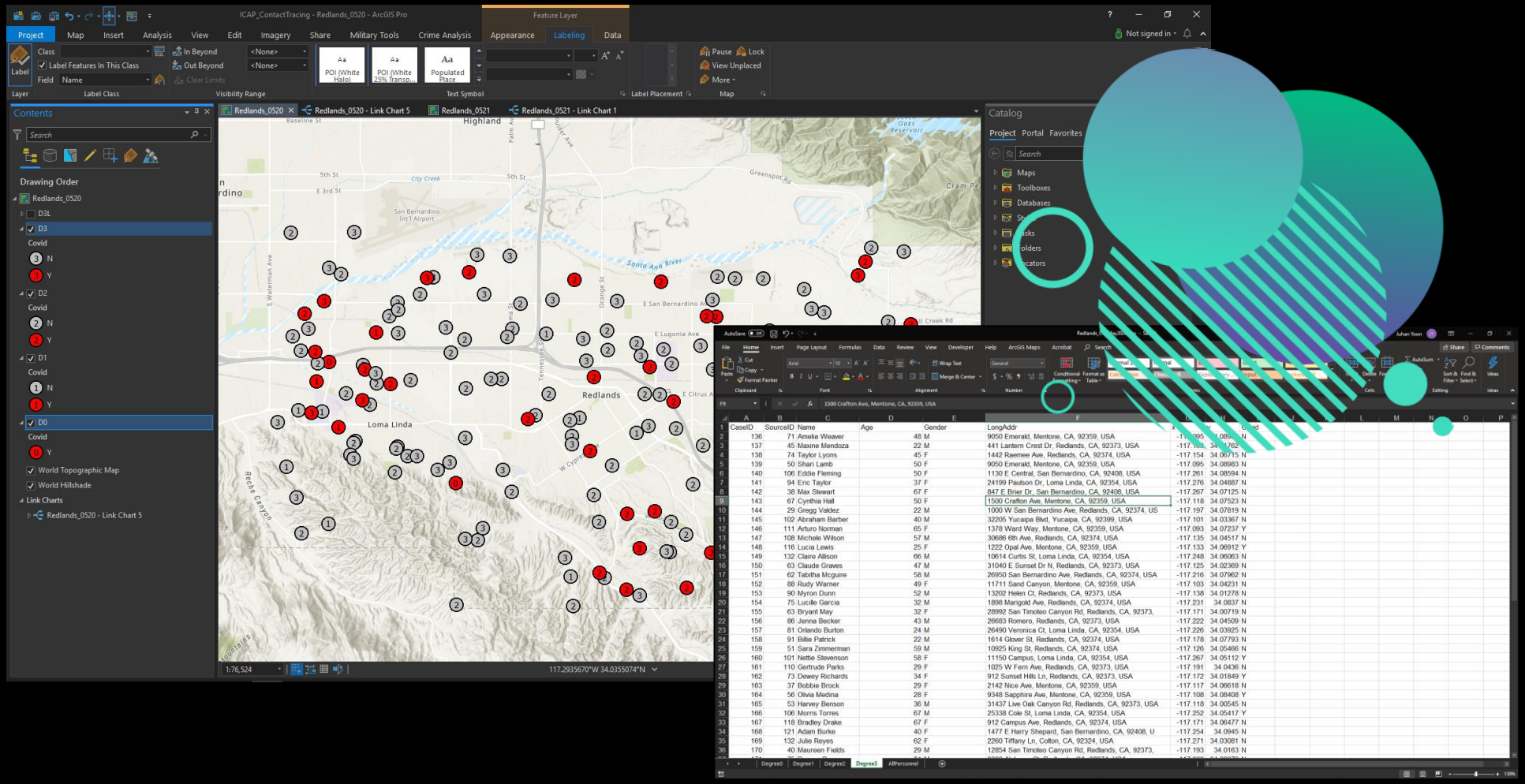
Exposure Information

In the 14 days prior to illness onset, did the patient have any of the following exposures (check all

☐ Domestic travel (outside state of normal residence). Specify state(s): _____
☐ International travel. Specify country(s): _____
☐ Cruise ship or vessel travel as passenger or crew member. Specify name of ship: ____
☐ Workplace
If yes, is the workplace critical infrastructure (e.g., healthcare setting, grocery store)?
☐ Yes, specify workplace setting: _____ ☐ No ☐ Unknown
☐ Airport/airplane
☐ Adult congregate living facility (nursing, assisted living, or long-term care facility)
☐ School/university/childcare center
☐ Correctional facility
☐ Community event/mass gathering
☐ Animal with confirmed or suspected COVID-19. Specify animal: _____
☐ Other exposures, specify: _____
☐ Unknown exposures in the 14 days pri

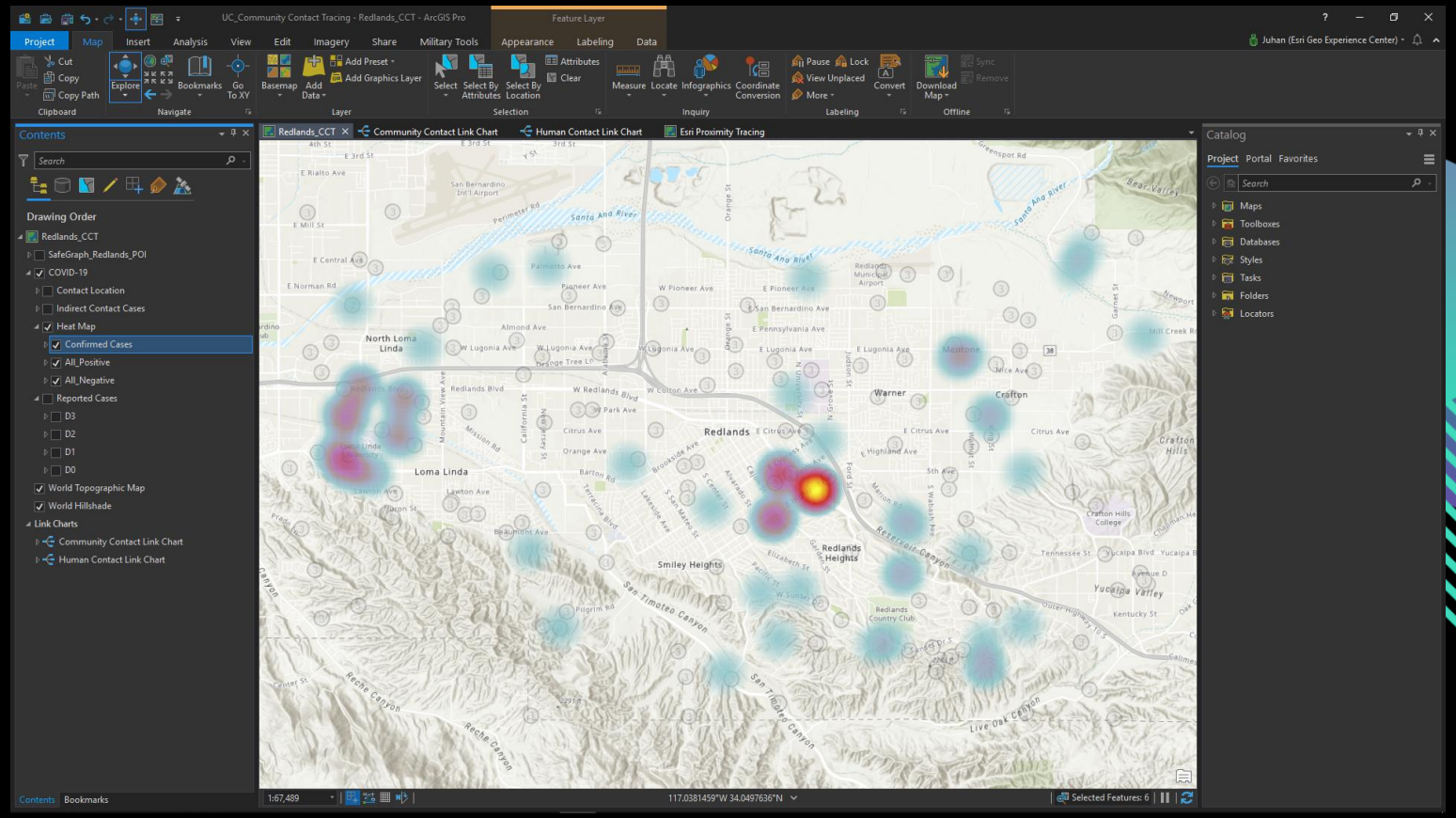
02 VISUALIZE LOCATIONS

Use Location Services to Geocode Addresses



02 PERFORM ANALYTICS

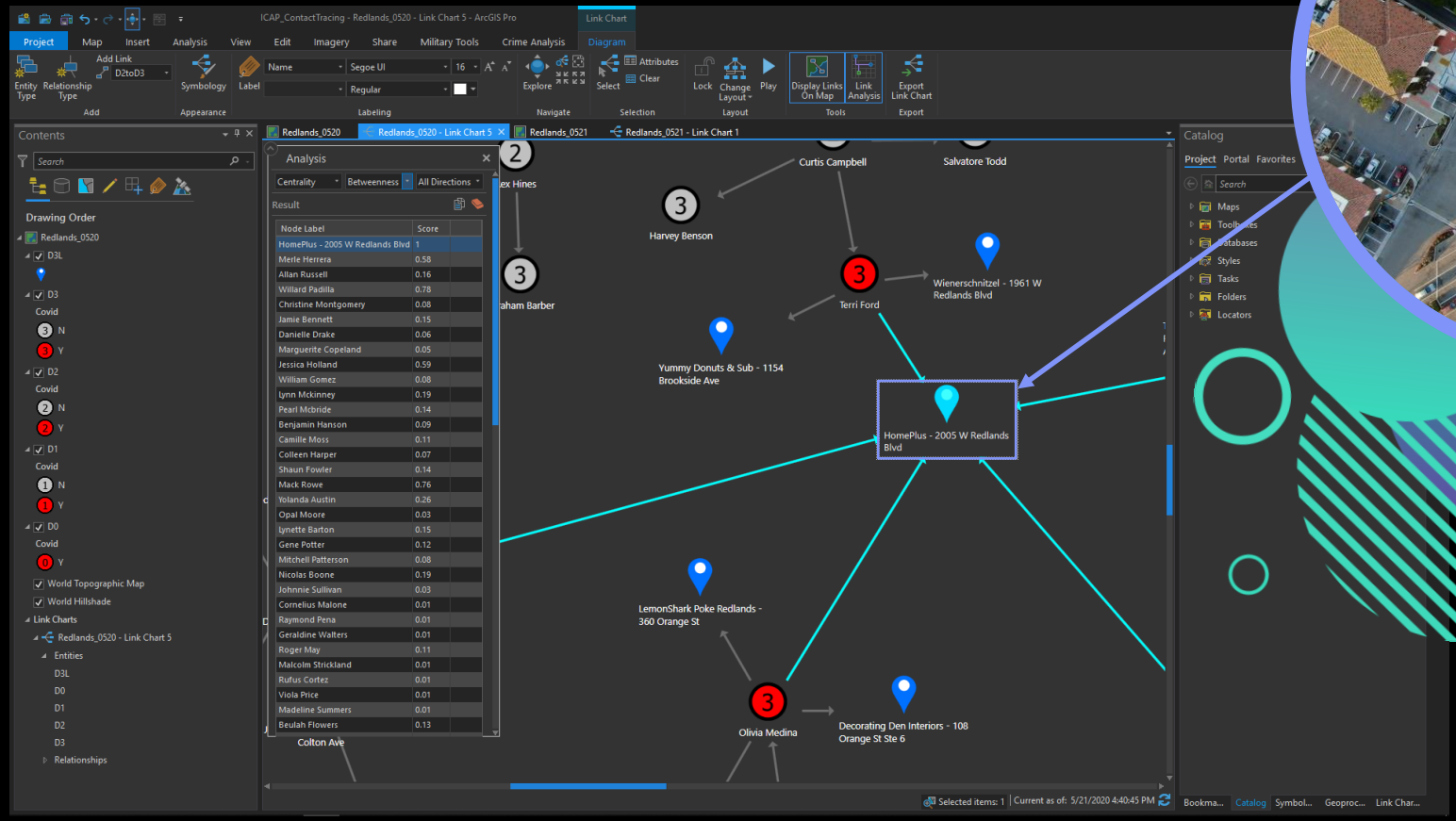
Identify High-Risk Areas In the Community



Showing Density of Cases

02 UNDERSTAND CONNECTIONS

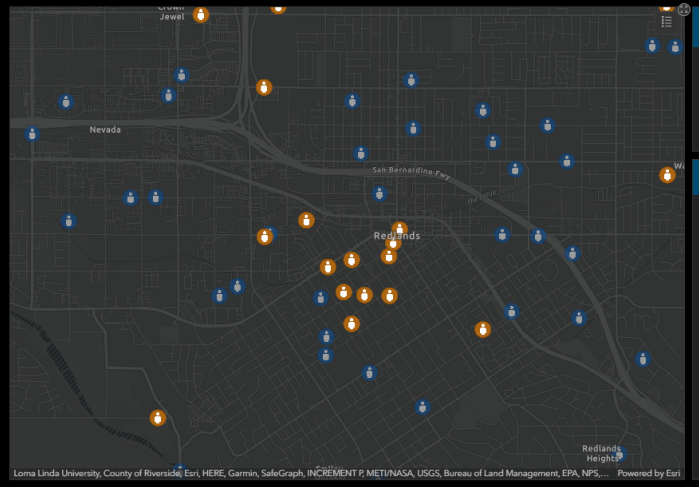
Perform Link Analysis & Apply Graph Theory

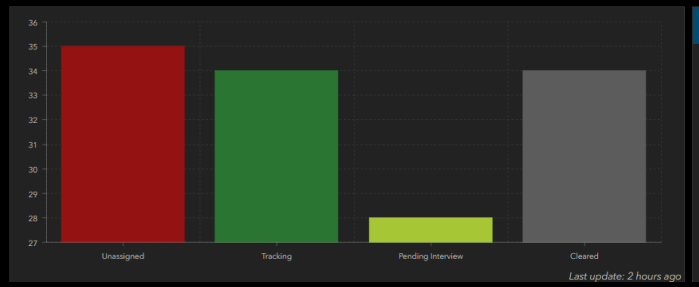


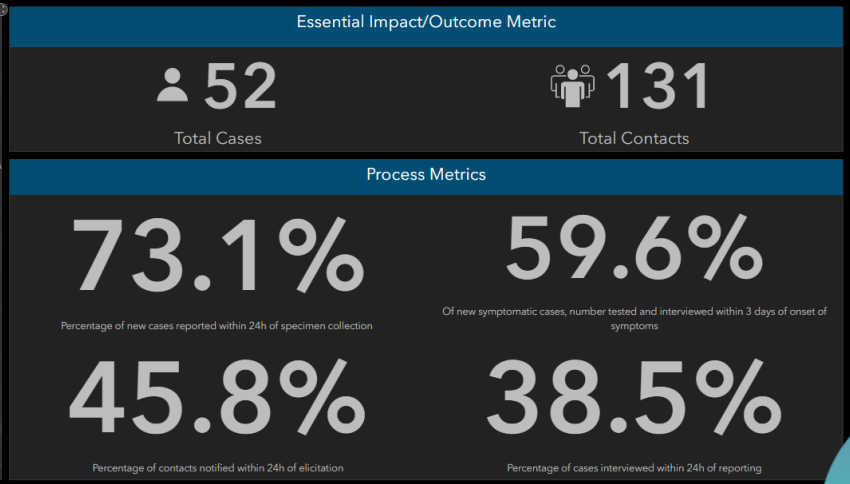
Showing Person-to-Person-to-Place Connections

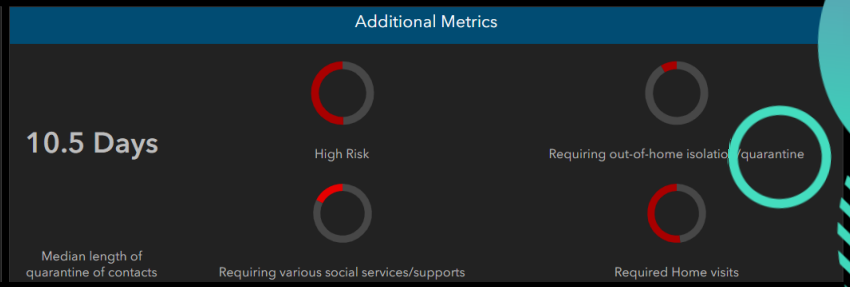
03 EVALUATE AND MAKE DECISIONS

Share Information, Insights, and Metrics





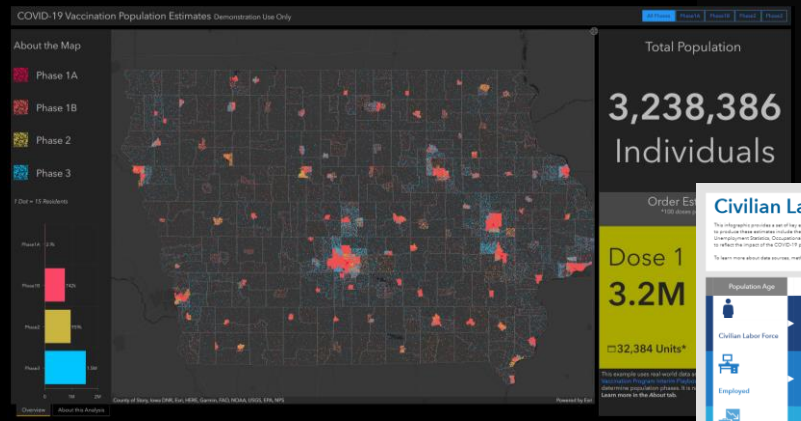


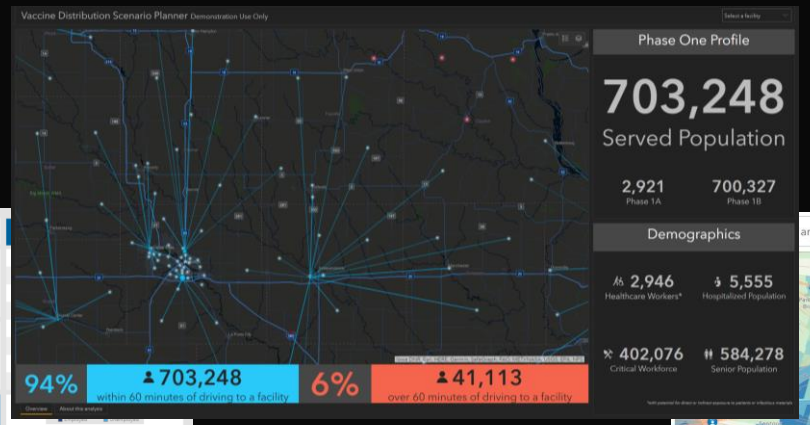


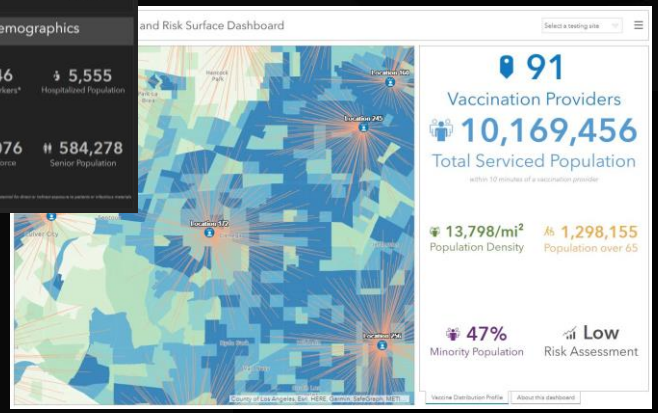
Global COVID-19 Vaccination

Equitable and efficient vaccine distribution

1. Identify facilities capable of storing and distributing vaccine
2. Identify and prioritize critical populations
3. Identify gaps in access and formulate alternative distribution options
4. Implement a vaccine management and inventory system
5. Provide transparency and accurate communication

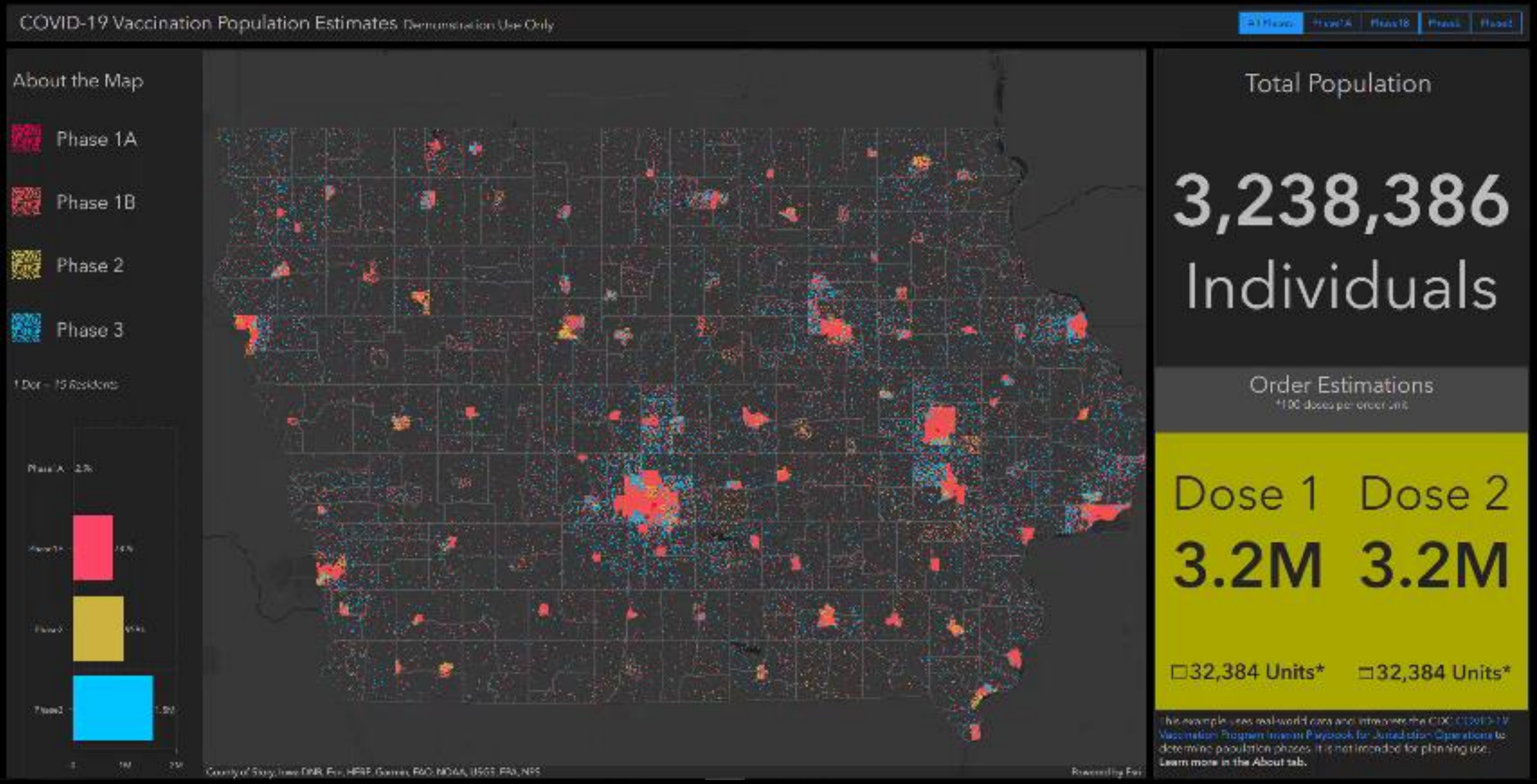






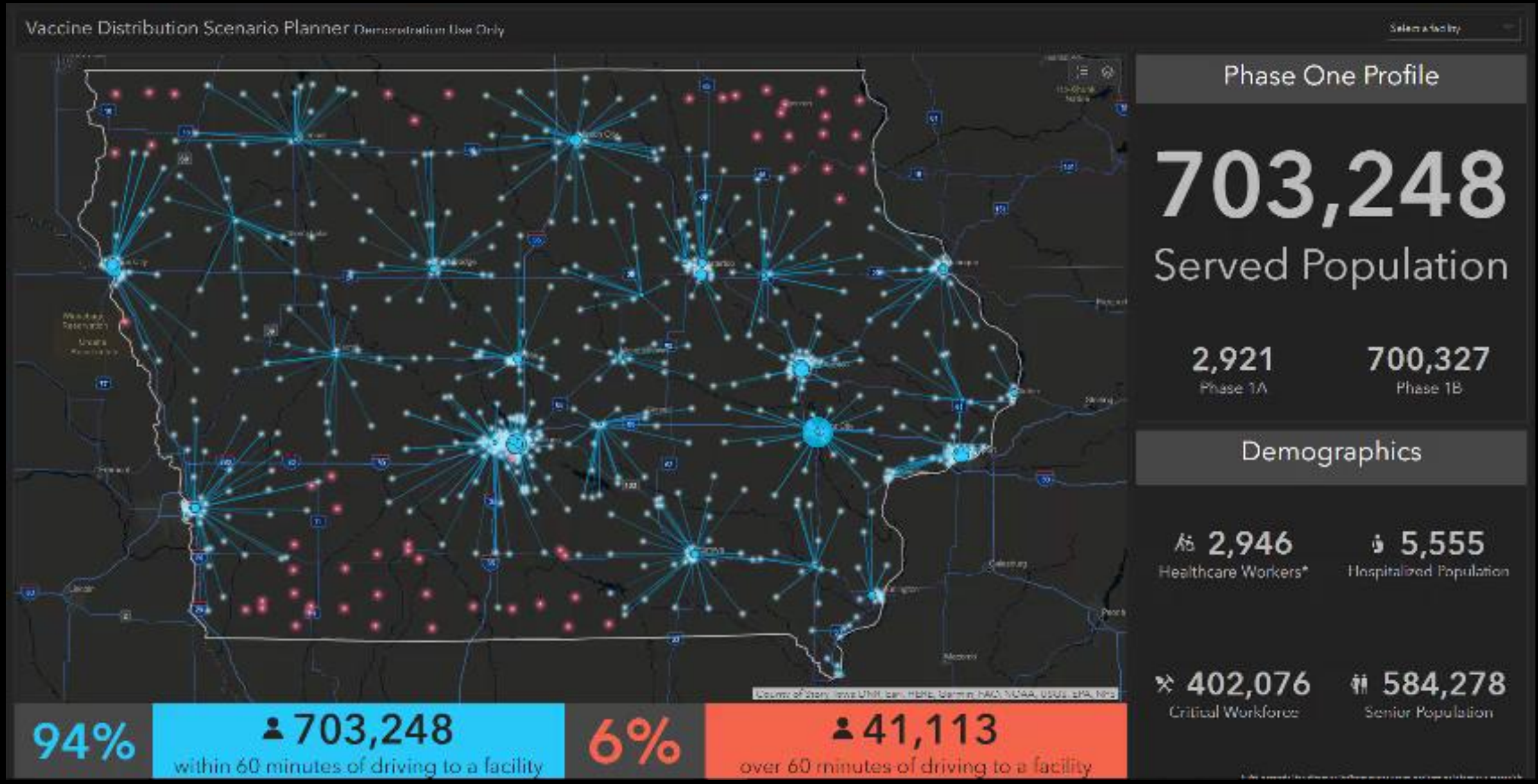
Population Estimates

Microplanning for prioritization of vaccine delivery



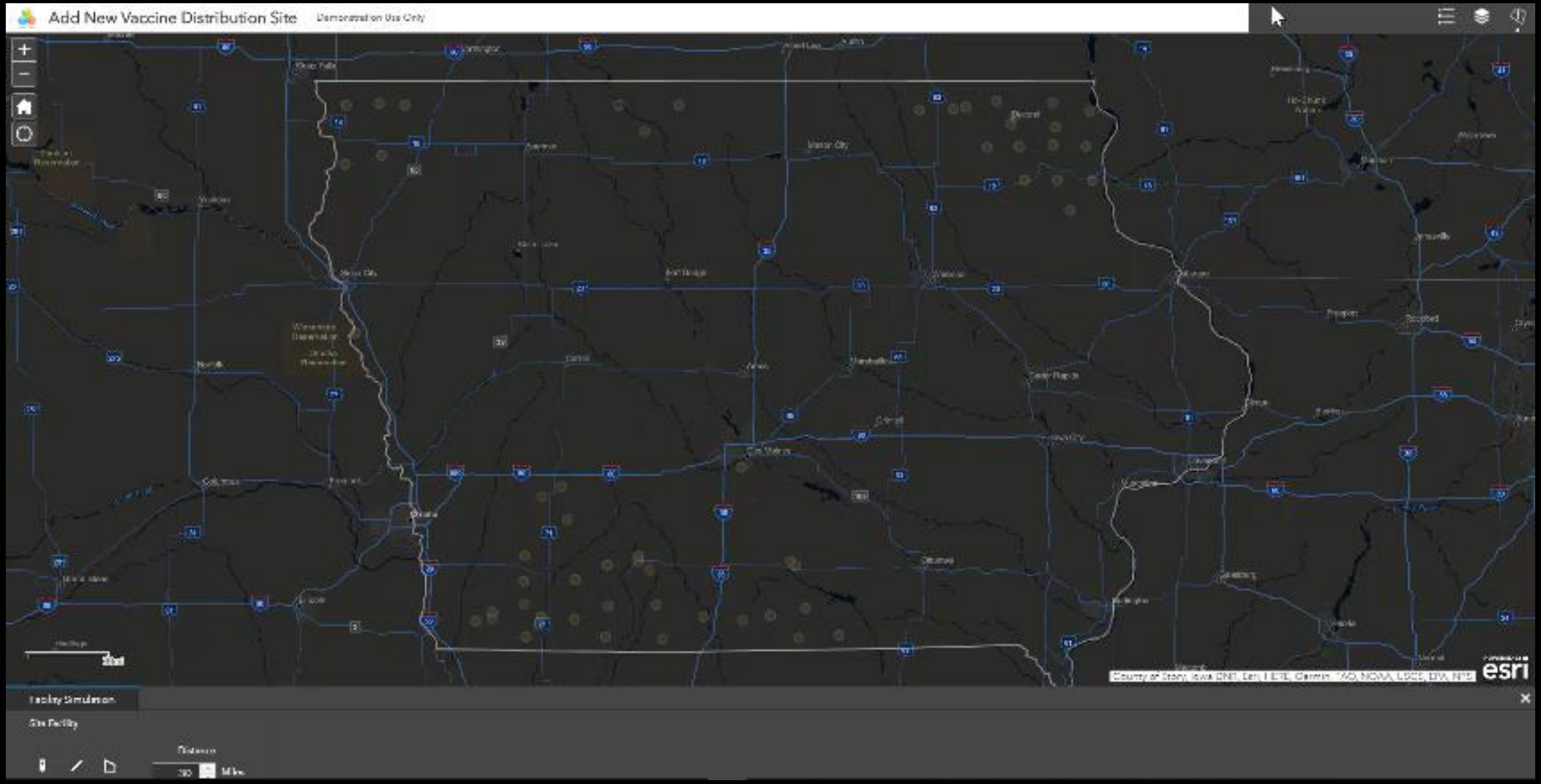
Scenario Planning

Covering the critical populations



Add New Vaccine Distribution Site

Reach underserved or distant populations

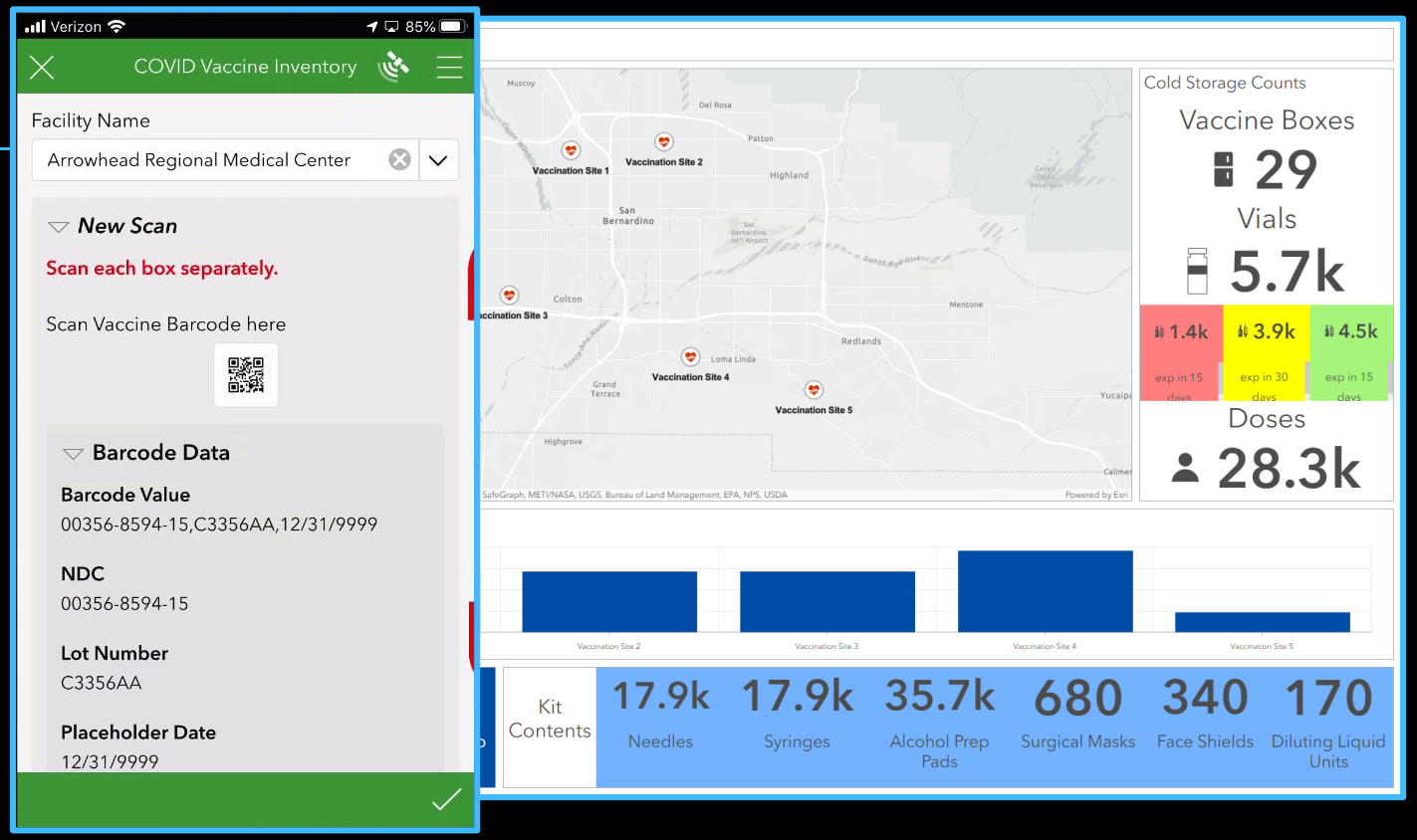


Track & Manage Inventory

Monitor supplies and expiration dates

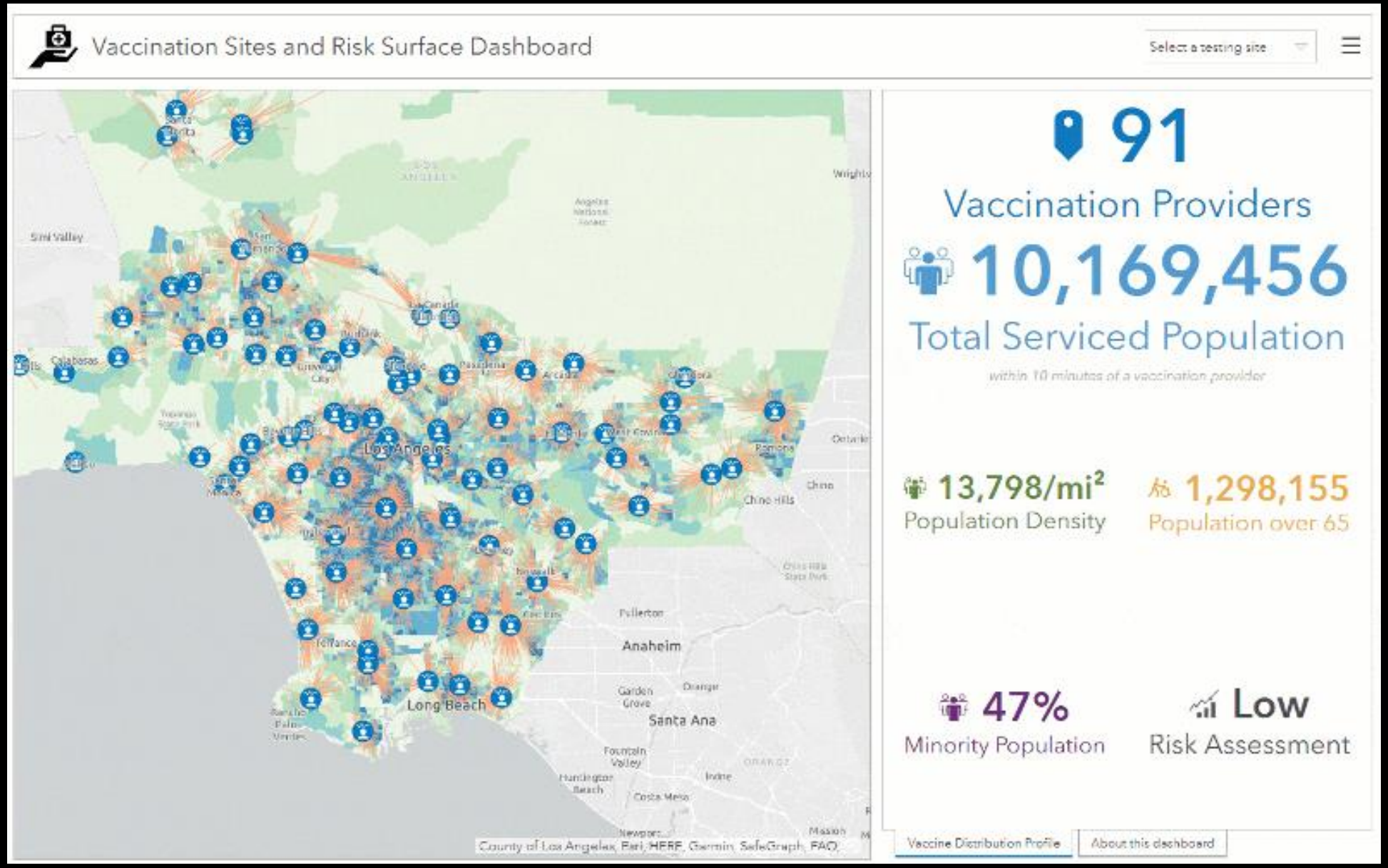
Needs

- **Accept Inventory In:** Quickly enter vaccine barcodes, distribution kits, PPE
- **Check Inventory Out**: Track when supplies are taken from inventory for use
- **Monitor Inventory Status**: Check status by facility or region in real-time



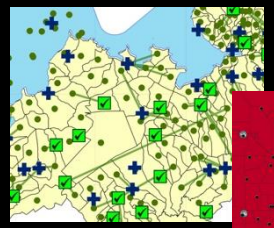
Vaccine Progress

How is the community doing?



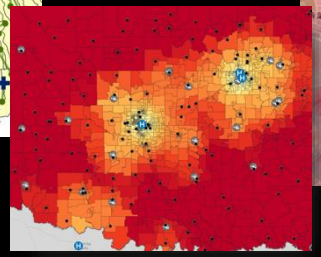
Repeating the Pattern
For strategic planning

Health Facilities Siting



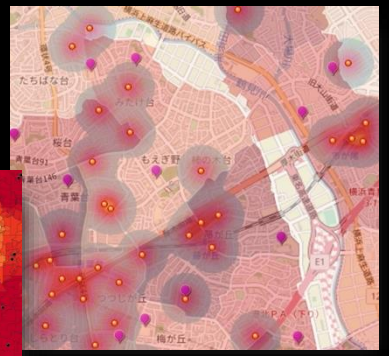
OSEP
Kenya

Trauma Center Coverage



Coalition for National Trauma Research
Oklahoma

Infants & Disaster Prevention Centers



Toin Gakuen
Japan

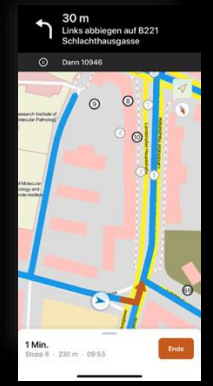
Public Transit & Ride Sharing

SPIN
Massachusetts

Managing Bus Routes

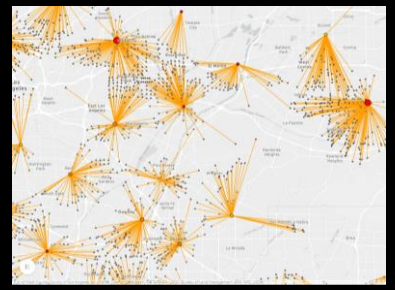
City of Longview
Texas

Optimal Routing & Scheduling

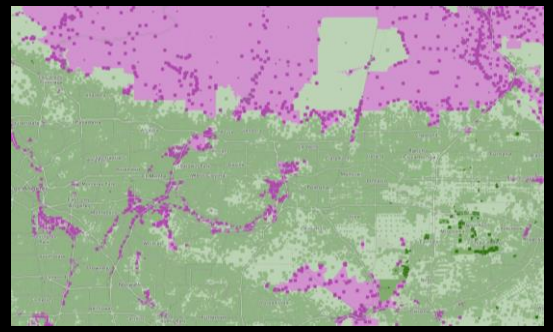


SynerGIS
Vienna

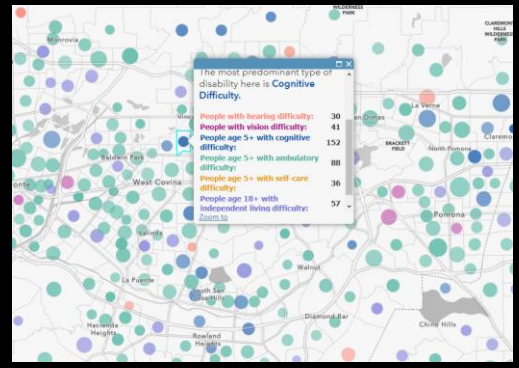
Assessing Travel Burden



Telehealth – Broadband Coverage



Predominant Population Disability



Repeatable Patterns

Mapping & Monitoring Disease

Strategic Planning

Indoor Space Management

Analyzing Relationships & Gaps

"All identified outbreaks of three or more cases occurred in an indoor environment, which confirms that sharing indoor space is a major SARS-CoV-2 infection risk."

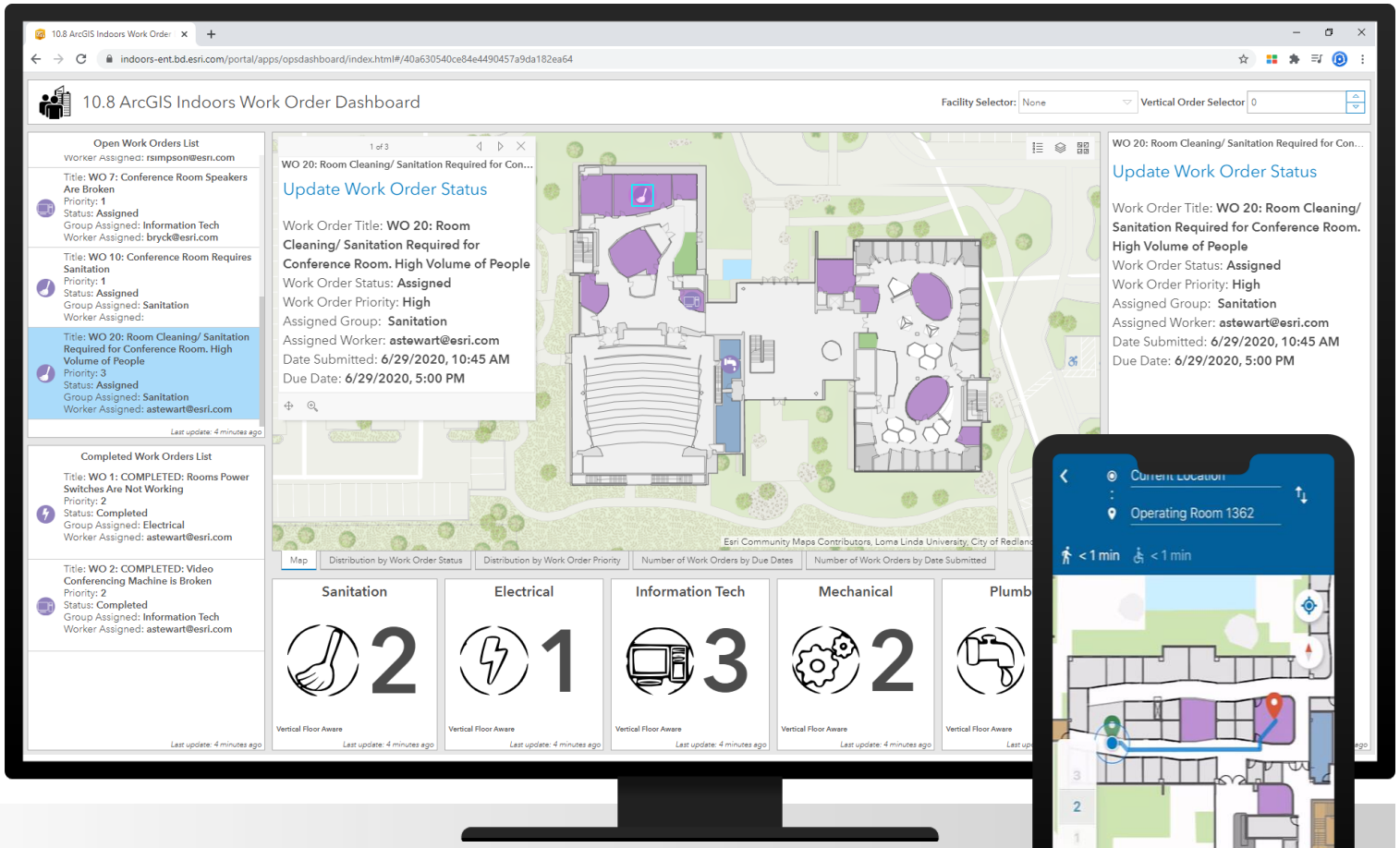
Indoor transmission of SARS-CoV-2 (The University of Hong Kong / Southeast University) / April 2020

Space Planning
For strategic planning

- Analyze seating arrangements
- Make adjustments
- Keep employees safe

Manage Sanitation & Safety Operations

Respond more quickly to needs

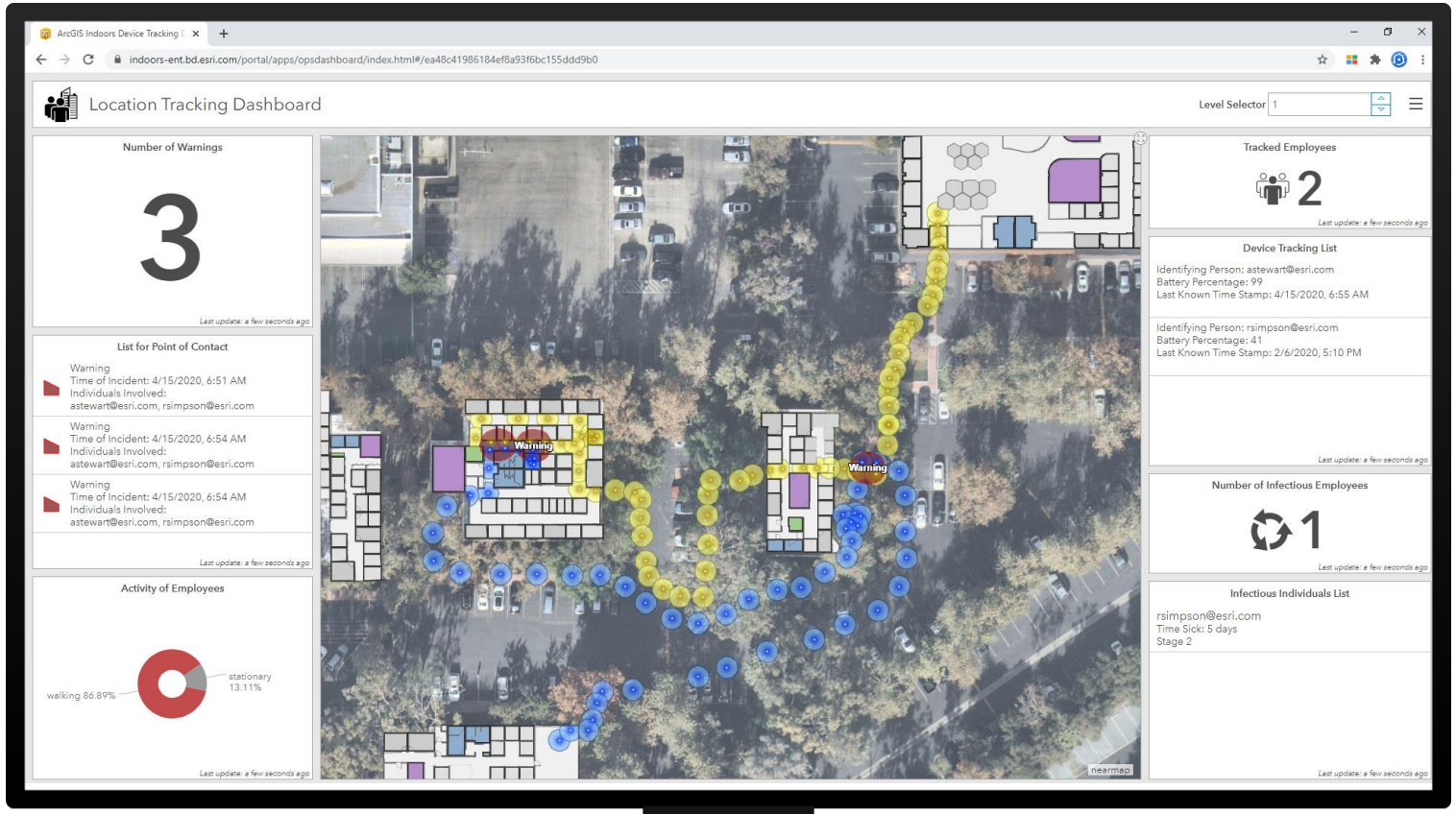


- Plan health & safety protocols
- Request services
- Track progress

Device Tracking & Proximity Tracing

Assist in contact tracing efforts

- Track devices indoors and outdoors across your campus
- Measure dwell times and proximity
- Find areas of high traffic



Repeating the Pattern
For indoor space management

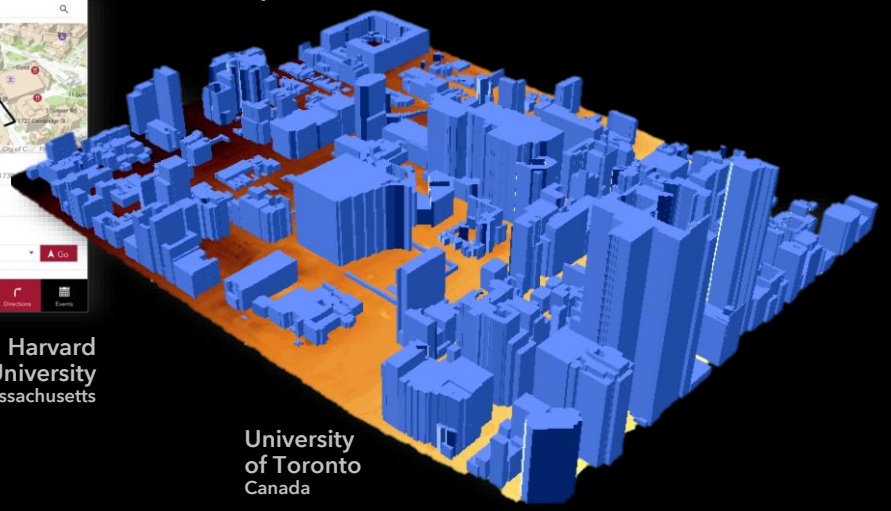
BIM Visualization

Geodata
Norway

Campus Navigation App

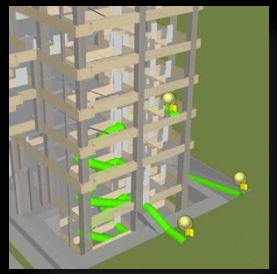
Harvard University
Massachusetts

Campus Visualization



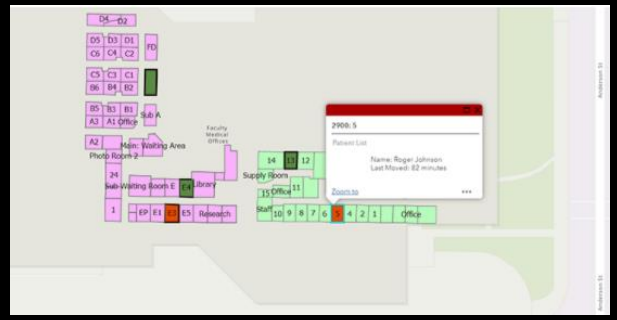
University of Toronto
Canada

Emergency Evacuation



Universitas Gadjah Mada
Indonesia

EHR Integration for Patient Flow



Loma Linda University Health
California


COVID-19/CORONAVIRUS


Social Distancing
Stand Here

Lessons Learned
Applying them to build resilience

Northridge Earthquake

1994

Local Emergency Preparedness

9.11

2001

Integrating Our Information Infrastructure

Hurricane Katrina

2005

Better National Preparedness

Arab Spring

2010-12

The Power of the Crowd

Camp Fire

2018

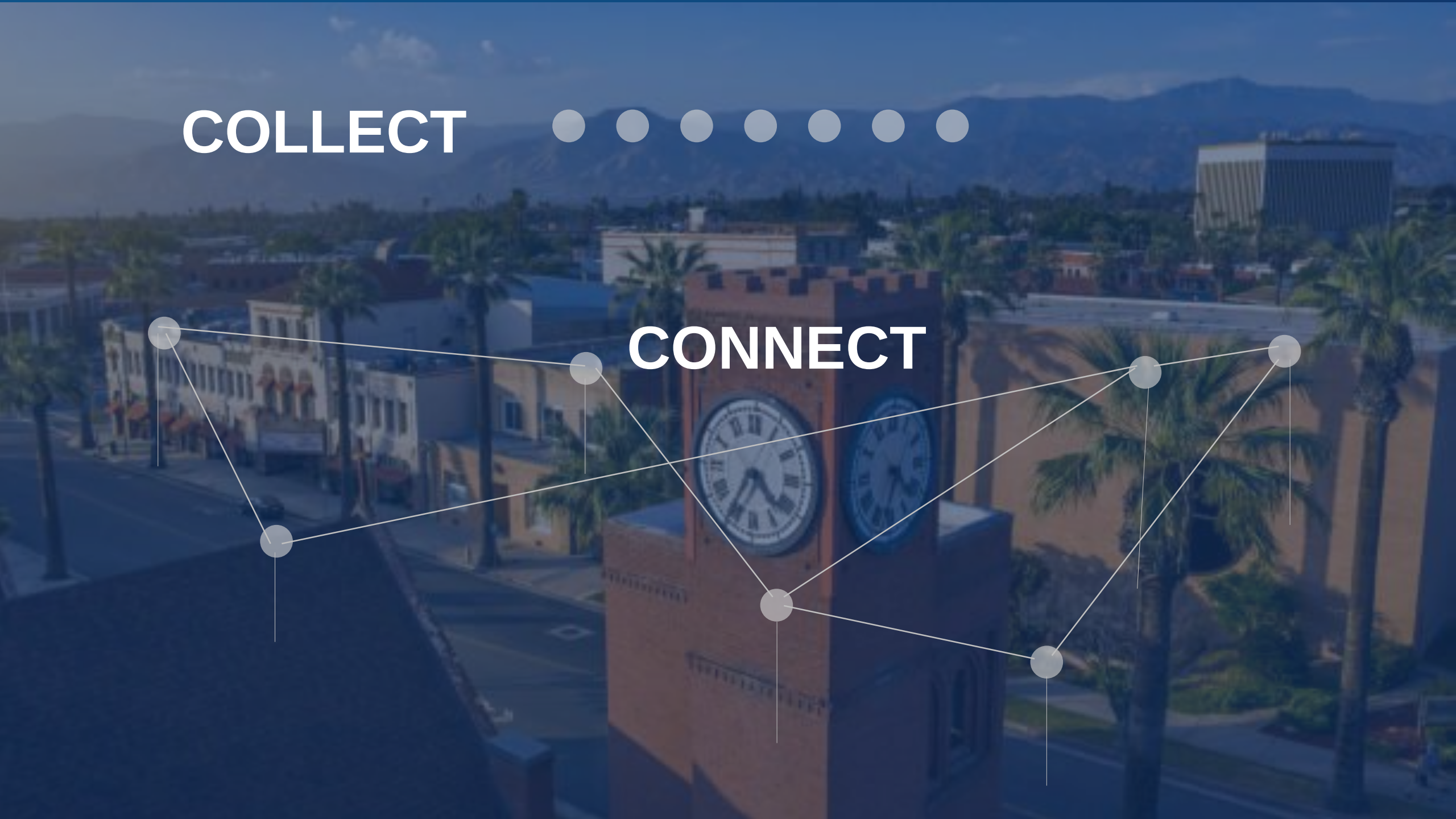
Importance of Communication and Coordination

. . . Creating Resilient Communities and Interconnected Societies

2019-2020+

COVID-19

- Never Prepared Enough
- Interconnect Systems Across Communities
- Finer-Scale Mapping
- Accurately Assess the Risks
- Coordinate Local, State, National and International Responses
- Greater Coordination and Sharing
- Science-Based Decision Making


COLLECT
CONNECT