AN ESRI
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Facility Mapping Solutions for COVID-19 Response

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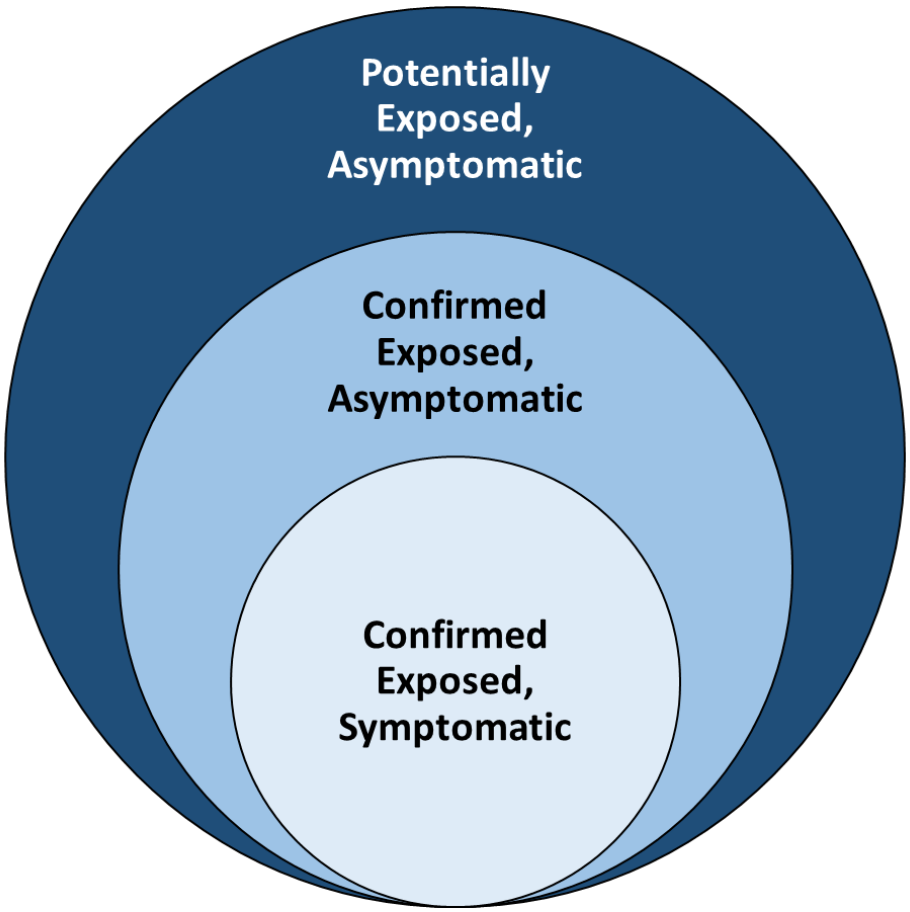
Facility Mapping Solutions for COVID-19 Response

Executive Summary

As people around the globe adapt and deploy creative solutions to coronavirus disease 2019 (COVID-19) issues, we are seeing facilities used in new, nontraditional ways.

In addition to the temporary structures being staged in response to the COVID-19 pandemic, there are universities, convention centers, hotels, and sports arenas allocated to the emergency response effort.

For instance, people at high risk of exposure—medical personnel, firefighters, police officers, emergency medical services—are being temporarily housed away from their homes so they won't potentially expose their families to the virus. We are also seeing facilities providing quarantine and medical treatment to people who may have been exposed but are asymptomatic, those who are confirmed exposed but asymptomatic, and those confirmed exposed and symptomatic but not needing hospitalization.



These new facility uses have driven several pressing questions:

- What facilities are at our disposal?
- Which areas are designated for which uses?
- How do we assign and track who is/was housed in which location/room?
- How do we help new visitors/occupants find their way around?
- How do we support new occupants with reporting facility issues such as burned-out lights, inoperable restrooms, exhausted resources (no toilet paper), water not working?
- How do we keep track of where people are going within our facilities?
- An individual just tested positive, where have they been recently?
- Can we get a notification when someone enters a facility or area they shouldn't enter?
- What work needs to be done to a facility before it is ready for someone else to use (for example, has a room been sanitized)?

All of these questions are tied to location and can be answered by analyzing relevant data on a map-based dashboard. At Esri, we are working around the clock to support COVID-19 responders across industries in setting up dashboards and connecting to key data.

Development Levels and Capabilities

For professionals dealing with facilities, Esri has defined three levels of use of location technology to help address and answer crucial questions. We outline a quick response approach that enables mapping at the campus scale—including building footprints, hardscape, softscape, and site boundaries—as well as outdoor tracking where appropriate. You can transition this quick response capability to a longer-term response solution for higher-detail mapping at the building floorplan and room level. With additional effort and hardware, you can implement a more robust capability set to support you in managing dynamic resources and assets including tracking individuals inside a building.

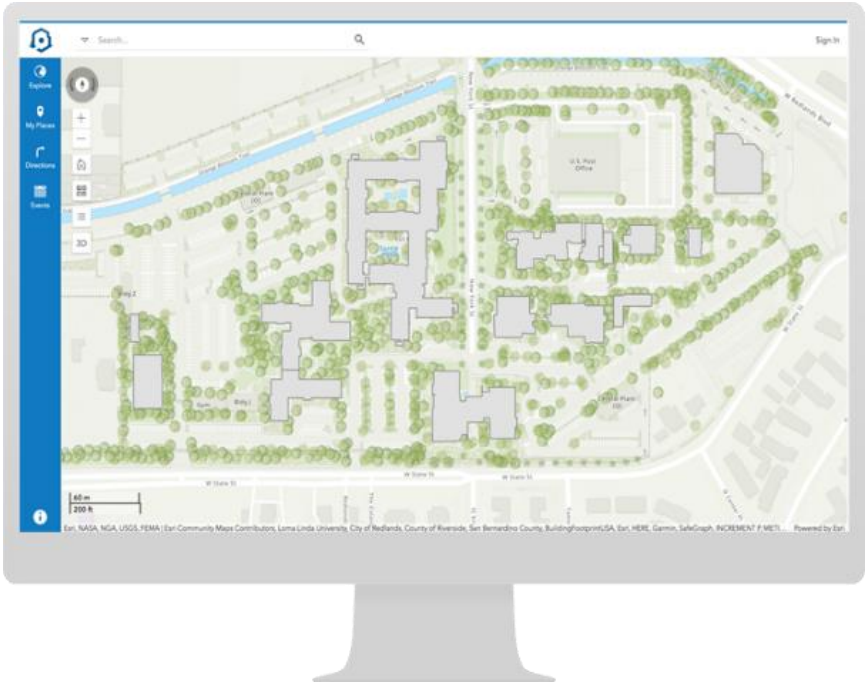
Level 1: Quick Campus Mapping

With the Level 1: Quick Campus Mapping is a rapid-response fast configuration that allows you to get basic mapping online in a short period of time—typically 3 to 5 days to achieve basic levels of situational awareness. The solution provides a common operating picture (COP) containing a campus map with detail down to the building footprint. The COP gives you a way to share relevant information and coordinate and assign resources. You can use the COP to see where staff, medical personnel, first responders, and patients are assigned housing and where they traveled while on-site. In short, you gain the situational awareness you need for decision support and incident management.

The Quick Campus Mapping configuration empowers you to understand, at a campus scale, where people and assets are located, which facilities are being used, and for what purpose. From there, you can track and record outdoor movement within the campus. People can be tracked outside of facilities to provide their last known location as well as to review where they have been if the need arises.

With this approach, users can quickly create an account and gain access to the system. It is based on an ArcGIS® Online organizational account and uses Survey123 for ArcGIS to facilitate creating user accounts and Tracker for ArcGIS to collect individual tracks. Tracking can be viewed using various technologies from Esri including the Track Viewer web application, ArcGIS Online, and ArcGIS Pro. You can also view the COP from a mobile device using Explorer for ArcGIS. Ideally, you can create a simple campus-scale

map with building footprints using the ArcGIS Community Maps Editor and host it in ArcGIS Online. Once created, the campus-scale map can be shared via out-of-the-box Esri applications such as web maps, ArcGIS StoryMaps℠, Explorer for ArcGIS, and others.



Campus-scale maps can be created either from your data or from information available through Esri sources, like the online imagery basemap or high-resolution orthophotos. While the Level 1: Quick Campus Mapping configuration is a good starting point to rapidly enable a basic-level facility mapping and individual tracking, many organizations choose to subsequently move to Level 2 workflows and capabilities. Esri strongly recommends use of the ArcGIS Indoors™ Information Model in your Level 1 mapping to allow a straightforward path to Level 2 with no future migration of the Level 1 data required.

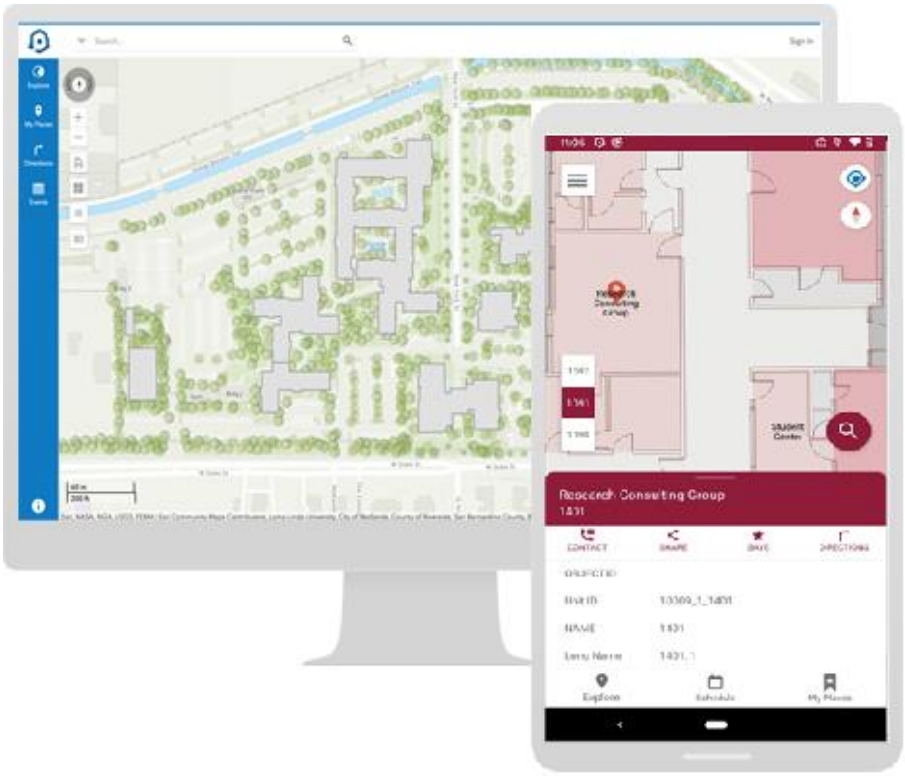
Esri can provide assistance with the map creation or technology configuration if needed.

Level 1 Summary	
Environment	ArcGIS Online
Account Creation	Survey123 for ArcGIS
Tracking	Tracker for ArcGIS
Map Mobile Viewing	Explorer for ArcGIS
Map Level of Detail	Building footprints
Outdoor Location	GPS
Routing	No
IPS	No
Time to Launch	3–5 days

Level 2: Indoors Facility Mapping

The Level 2: Indoors Facility Mapping capabilities extends Level 1 by providing

- More detailed data on the map, down to the floorplan level (i.e., indoor scale).
- A baseline implementation of ArcGIS Indoors in a cloud environment to view and interact with more detailed data.
- GPS-based outdoor tracking.
- A mobility solution that leverages proximity so users can visually orient themselves from where they currently are to where they want to go.



Capabilities of Level 2: Indoors Facility Mapping include attribution for campus and indoor-scale features (e.g., floorplans) for better situational awareness and reporting. In other words, you can see whether a facility is empty or occupied, who is assigned to a particular room, what their health status is, and other key details. As in Level 1, this solution allows you to track people outdoors to provide their last known location as well as review where they have been if the need arises.

In Level 2, you also have the option of GPS-based outdoor routing, which requires additional data processing time to create a routable network. You can enable indoor routing for facilities with floorplans available in ArcGIS Indoors, but this also requires additional data processing time to create the network.

To get the full benefits of Level 2, you will migrate your BIM/CAD floorplans representing the indoor-scale data you want to include in the ArcGIS Indoors environment to GIS. If you cannot process this data yourself, Esri can provide the service.

While Level 2: Indoors Facility Mapping provides you with an ArcGIS Indoors environment and ArcGIS Indoors capabilities, it typically requires a longer implementation timeline—from 10 to 15 days. This timing accounts for the indoor-scale data processing needed to enable the ArcGIS Indoors functionality. The more floorplan data that needs to be processed, the longer the overall timeline. However, processed data can be deployed incrementally and in parallel so you can begin using ArcGIS Indoors capabilities as facility floorplans are completed.

Level 2 Summary	
Environment	ArcGIS Enterprise
Account Creation	Survey123 for ArcGIS
Tracking	ArcGIS Indoors (Mobile)
Map Mobile Viewing	ArcGIS Indoors (Mobile)
Map Level of Detail	Building footprints & floorplans
Outdoor Location	GPS
Routing	With additional data processing
IPS	No
Time to Launch	10–15 + days

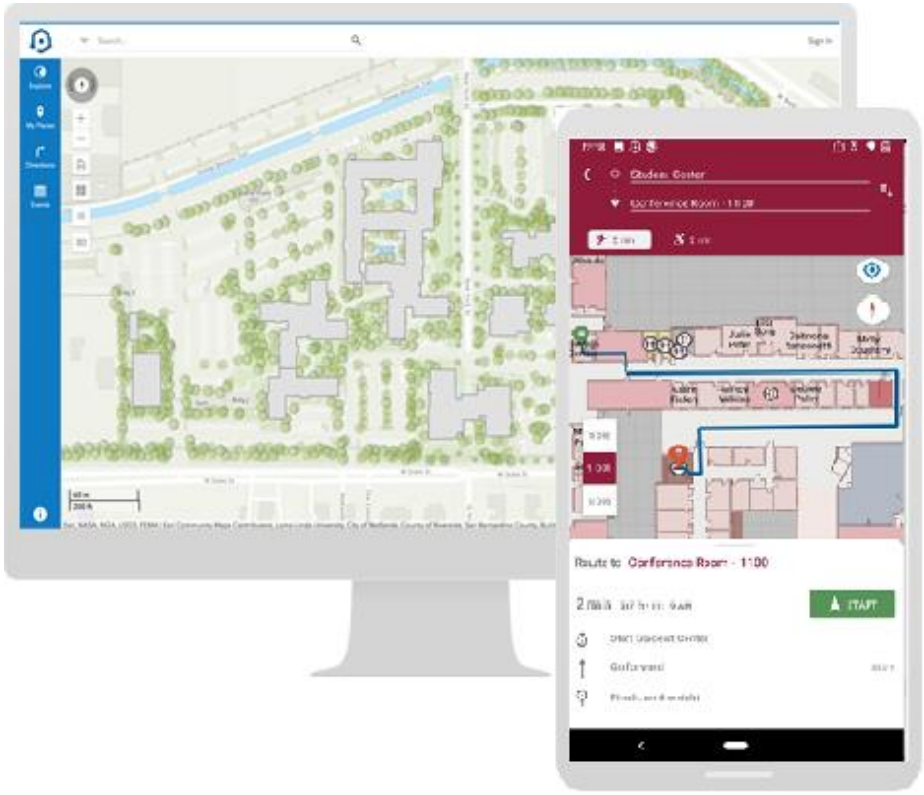
Level 3: Indoors Facility GIS

The Level 3: Indoors Facility GIS workflows go beyond the Level 2 capabilities to provide indoor positioning, routing, geofencing, work order visualization, and additional data processing. In the midst of the COVID-19 crisis, most organizations will not be able to achieve Level 3 unless they have previously done work that can act as a foundation and accelerator. That said, this level of indoor mapping can be immensely beneficial for containment, response, and management in the future. Because these levels build on one another, an organization that works at Level 1 or Level 2 during COVID-19 response will be well positioned to continue to Level 3 quickly. Any organization at Level 3 in its facilities will be in a much better position for future scenarios, whether related to the pandemic or normal business operations.

Indoor Positioning: To enable location and tracking within facilities, you will need to implement an indoor positioning system (IPS). With the current COVID-19 situation, the most practical approach is to use Wi-Fi access points. Esri will work with you to review your campus/facility access points and assess whether they are sufficient and able to support Wi-Fi-based positioning. If Wi-Fi access points can potentially be used for IPS, or you are able to add additional access points as needed, Esri can help your staff conduct a Wi-Fi site survey. We will process the survey data, review the results, and provide recommendations for access point changes or additions to improve coverage and positional accuracy.

Routing: You can use ArcGIS Indoors to generate routes and waypoints that help users get from one location to another. For implementations where the map

scale is only to the building footprint, and where GPS is used for positioning, you can create a network to enable routing from one facility to another. For implementations where the map detail includes facility floorplan information and where an IPS has been implemented, you can create a network for routing between rooms within or between facilities. Creating routable networks requires additional processing time of the ArcGIS Indoors map data.



Geofencing: You can use geofencing to set up zones—such as areas for people who are well, exposed/asymptomatic, exposed/symptomatic or personnel housing—to meet your operational needs. These zones can coordinate with individual tracking, enabling notifications or alerts if, for example, a well person enters a zone housing exposed people. Clients familiar with ArcGIS GeoEvent™ Server can easily set up these geofences and alerts. You can easily update your floor-aware incident status dashboard with track data and geofences to monitor response activities and measure progress.

Work Order Visualization: You can add more geospatial information to your ArcGIS Indoors common operating picture. For example, you may want to view work orders within a facility to get a picture of what work needs to be performed at which locations. This capability can be quickly implemented by connecting to your asset/work order management system. At the most basic level, a spreadsheet file can be exported from work order systems and uploaded to ArcGIS Indoors. If there is a common key, such as a unit ID, in both the ArcGIS Indoors environment and the extracted data, you can map the work order

information. Plus, you can set up filters to easily display the type of work order, like broken equipment or room in need of sanitization.

Additional Data Processing: To expand the number of facilities included in your ArcGIS Indoors environment, you must be able to process each floorplan. Demands on your GIS staff during COVID-19 response may hinder this effort, but Esri can assist you with bulk data processing to increase the number of facilities included in your ArcGIS Indoors environment.

While Level 3 is the most sophisticated capability, allowing for advanced and robust workflows to support facility management and workplace navigation, it requires experience and time to achieve. Esri and our partner network can help empower you with best practices, enable your staff, or provide more substantial help in fielding an indoor GIS.

Summary

The COVID-19 pandemic is driving the need for time-sensitive, geospatially based decisions as part of our overall national response to the crisis.

Current demands require awareness of what facilities are available for use; where people such as medical professionals, first responders, and patients can be housed; and where people have traveled during a certain number of days. In support of COVID-19 response, Esri recommends planning for facility mapping based on these three implementation levels. Esri staff and software are able to help you get started quickly while enabling an incremental delivery of additional functionality to meet your specific mission requirements.

About ArcGIS Indoors

ArcGIS Indoors is a complete indoor mapping system for smart building management. Through an extended version of ArcGIS Pro, native web and mobile applications, and an indoor information model, ArcGIS Indoors provides a common operating picture for executives, workplace services personnel, and other employees and visitors to understand, manage, and use their workplace environment. Additional product information can be found at esri.com/en-us/arcgis/products/arcgis-indoors.

Please contact smartbuildings@esri.com for more information or to request assistance using ArcGIS Indoors for COVID-19 response.

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Since 1969, Esri has helped customers unlock the full potential of data to improve operational and business results. Today, Esri software is deployed in more than 350,000 organizations including the world's largest cities, most national governments, 75 percent of Fortune 500 companies, and more than 7,000 colleges and universities. Esri engineers the most advanced solutions for digital transformation, the Internet of Things (IoT), and location analytics to inform the most authoritative maps in the world.

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