

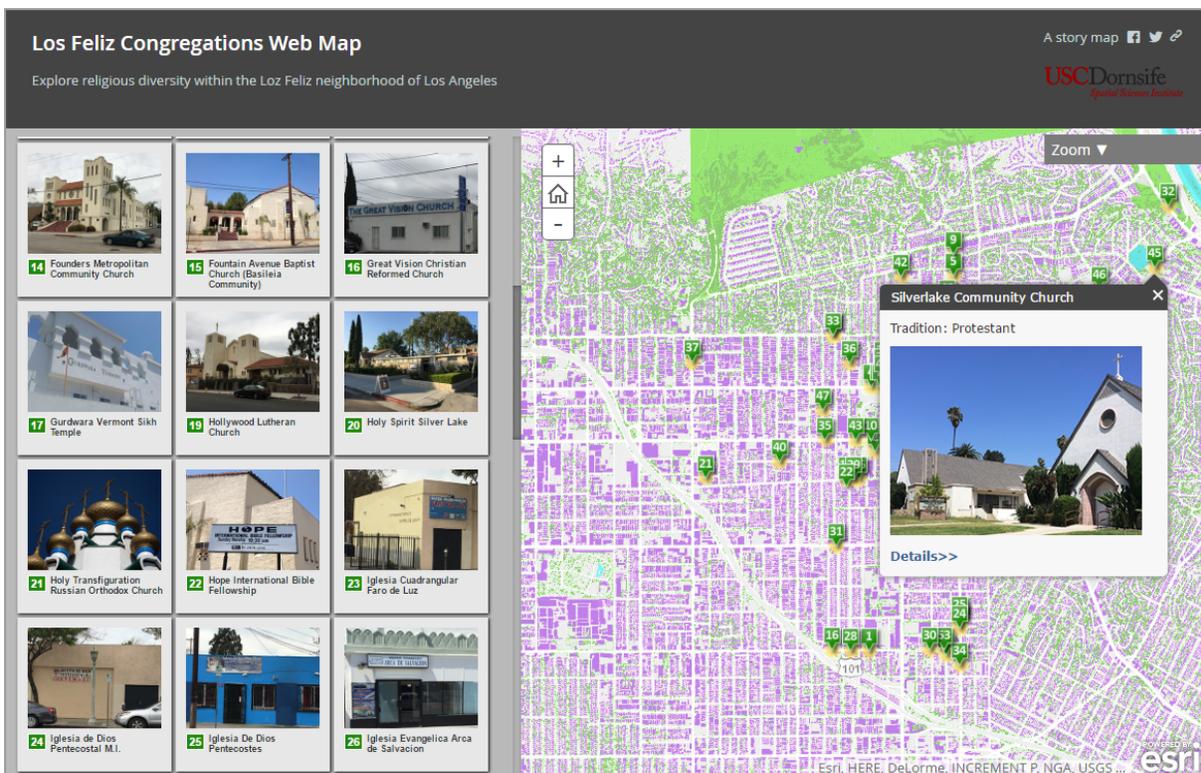
Congregation Mapping Application

USC Center for Religion and Civic Culture
USC Spatial Sciences Institute

About the Mapping Application

Apps, mobile devices, online maps, and cloud-based services have become familiar tools. To create our congregation mapping application, we used Geographic Information Science (GIS) software to integrate these products and gather spatial and tabular data. All of these technologies are continually evolving. We explain our project and the process we used to build it in more-general technical terms so that it will continue to apply to what others would like to accomplish. We include links to relevant websites and encourage others to explore new possibilities to collect, display, and share information about religious congregations and other community organizations.

A touch-responsive map interface is used to plot the field location, using a smart phone, iPad, tablet, or other GPS-enabled mobile device. Survey data are entered into specific fields in a form-based window; we collected many different types of data, including information about outreach and community-service programs, times of day for religious services, when the congregation was established, and observations about the neighborhood. Photos or videos taken with the device's camera or from other sources can be attached to an individual record, and all information associated with a given site is uploaded. Clicking on the point icon displayed on the map accesses the related data. Data stored in a geodatabase on a server or online are easily integrated into an organization's GIS. Information about a site can also be updated or input offline by tapping on the map, and syncing later. Data can be explored with geospatial analysis tools; downloaded for use in quantitative or qualitative analyses; or shared in many ways, including in online visualizations like Story Maps that incorporate maps, text, and images.



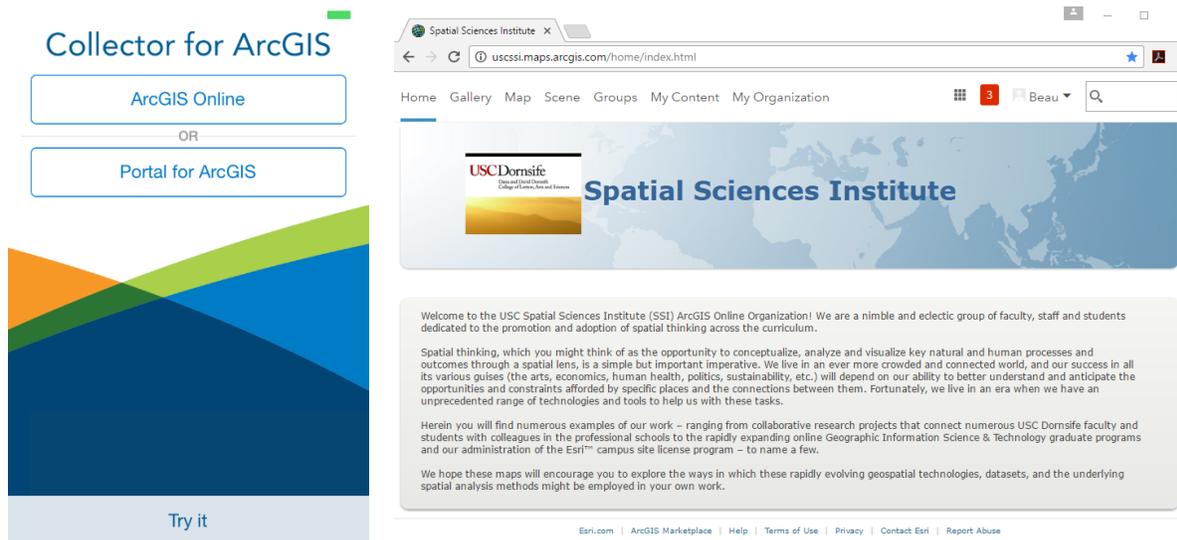
This Esri “Shortlist” Story Map is a web application that combines images, text, and a map to display information collected in one region of our study area. Clicking on pictures or map locations lets people discover, explore, and

visualize data. As you pan the map or zoom in, images in the left panel change to reflect those within the map area. The app can be set up with multiple tabs and customized as desired.

Requirements for the Mapping Application

To deploy a mapping application like ours, you need the Esri Collector for ArcGIS application installed on a GPS-enabled mobile device (Android, iOS, and Windows 10 versions are available), and an Esri ArcGIS organizational account (ArcGIS Online and Portal for ArcGIS 10.3.1 and later are supported). Download and install the Esri Collector for ArcGIS app on your mobile device: <http://doc.arcgis.com/en/collector/>.

To obtain access to an Esri ArcGIS Online organizational account, work with your campus Geography or GIS Department or with whomever administers your Esri Educational Site License. They can help you learn about additional Esri software and training services. Contact Esri (<http://www.esri.com>) Higher Ed: Angela Lee, Esri Education Manager, alee@esri.com or <http://www.esri.com/industries/education/higher-education>.



Collector for ArcGIS, iOS version (left). Example of an Esri ArcGIS organizational account’s website (right). Menu items on an organizational account website are standardized, and include “Home,” “Gallery,” “Map,” “Scene,” “Groups,” “My Content” and “My Organization”; several of these are referred to in the next section with general instructions for the mapping app.

Many software types are available under an Esri Educational Site License. We used ArcGIS for Desktop software (ArcCatalog and ArcMap) to develop our geodatabase to organize and store data we collected; create a feature class (for data points) and enable it to store attachments (photos); create domains (organized lists to become drop-down menus); add correct field types and configure them to make the survey data collection form; build a map; and then publish a feature service from the map. ArcGIS for Server can also be used to publish feature services. Many desktop GIS tasks can be done now within ArcGIS Online or with ArcGIS Pro, cloud-based Web GIS platforms that will gradually replace most ArcGIS desktop apps.

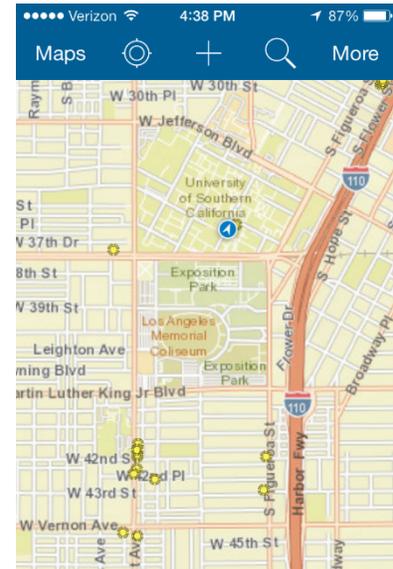
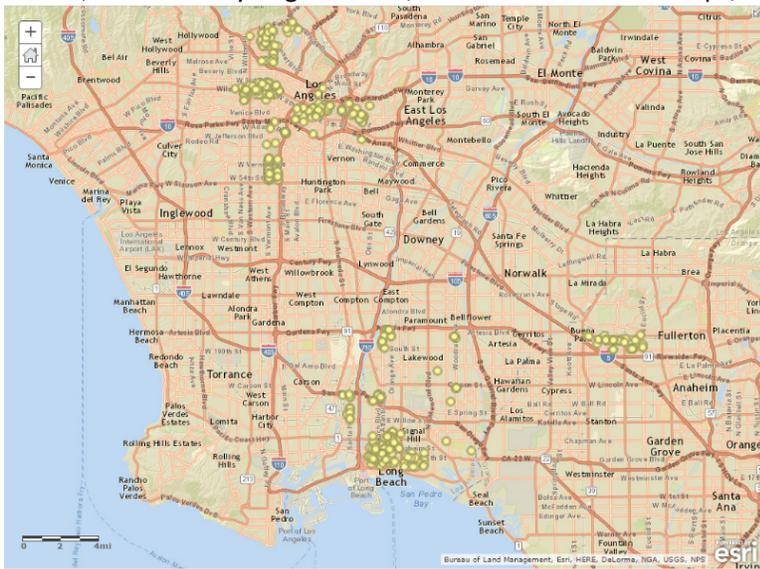
A feature service is an online collection of geographical features – represented by points, lines, or polygons – that supports visualization, querying, and editing. Adding point features when you collect data is a form of editing. A “hosted” feature service includes data that are hosted on ArcGIS Online, Portal for ArcGIS, or ArcGIS for Server. In a web map to be used in a data collector web app, it is the editable layer (the hosted feature service) that drives the map. Maps created for data collection can include data that is editable, plus reference data to provide context to data collectors, in addition to your choice of base map. In ArcGIS Online, feature services with base maps, and with other layers, if desired, become web maps. Web maps can then become part of web apps – including the Collector app and Story Map apps. Web maps and feature services can be re-used

within many different apps.

General Instructions for the Mapping Application

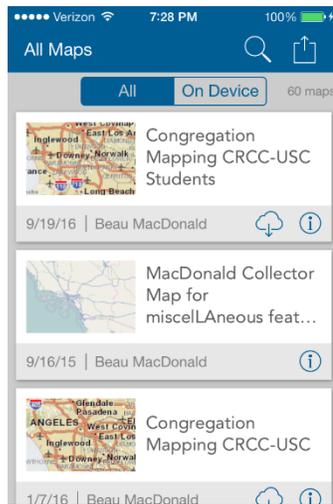
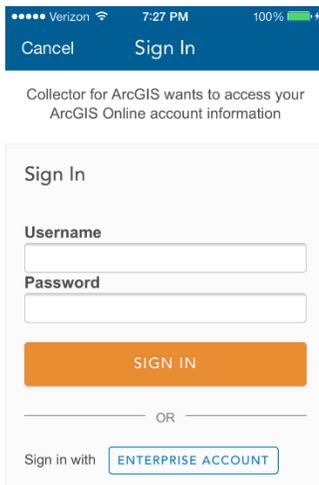
As with any research endeavor, we considered our proposed data analysis and the end products desired before determining the types of data to be collected and configuring the mapping app database. We used Esri ArcMap, ArcCatalog, and ArcGIS for Server in this part of our workflow. First, create a geodatabase workspace and a point feature class. Create domains (organized lists) next, which make data collection more efficient, but are not mandatory. Our “Tradition” field, for example, has a drop-down list of various denominations, including “Protestant,” “Catholic,” “Buddhist,” “Muslim,” “Other,” and several more. Enable feature class attachments (we captured photos; videos are possible but file sizes can be large) to be added, and add the feature class to a blank map. Then, publish the feature class as a hosted feature service from the map, ensuring that the service is shared with the intended audience (we selected “My Organization”).

We used ArcGIS Online to configure and publish a web map to complete our Collector for ArcGIS app. Open ArcGIS Online and sign in. Check “My Content” to verify that the service has been published and is shared within “My Organization.” Create a “Group” within the organization; groups allow data sharing with a research team or limited subset of people. Create a web map in ArcGIS Online: click Map to open a new map, search for Layers to find the new feature service, and add the feature service to the map. Symbolize data points as desired using the table of contents (legend) at the left to access the symbols; try different colors or symbols. Many base maps are available in ArcGIS Online; different styles include streets data, which we found useful for mapping religious congregations and community organizations. Save Map. Click Save As: add a title, tags, and a description for the map. Zoom the map to where it should open – perhaps in a specific part of your community – and Save Map. Click Share; check off My Organization, Members of these Groups, and

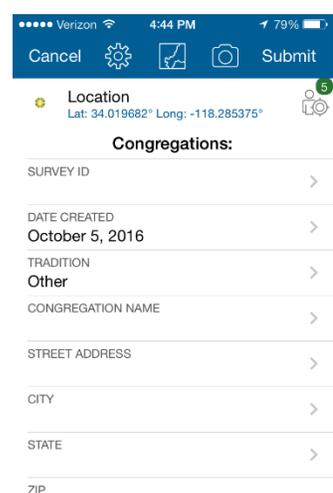


your Group. The web map is now available to the mapping app.

In the ArcGIS Online web map (left), congregation points are editable data in a hosted feature service. The web map is then “consumed” within the Collector for ArcGIS app (right), which uses the web map to allow more features to be collected. Tool icons on the top bar allow for the addition of points, zooming, and more. The same web map could be used in a Story Map, or in another type of web app. The same hosted feature service could be added to a different map, online or offline. Each web map and feature service has an individual URL; this unique identifier allows them to be referenced by other applications and then integrated in different ways.



To use the mobile device app, tap on the Collector for ArcGIS icon. After it loads, sign in to an ArcGIS Online organizational account (left). A toolbar and one or more maps will then display (right). Select the map for your specific data gathering effort; Collector supports multiple projects. A warning is shown if a strong-enough GPS-signal cannot be acquired; inside a building, for example.



Once the map loads, the toolbar changes (left). Click on the circle to show your location. Zoom and pan appropriately to your location. Click on the crosshairs to plot a point. When a data point has been captured, “Location” indicates the geographical coordinates (latitude, longitude).

A data-collection screen can now be accessed (right). Tool icons now include settings, photo collection, Submit and Cancel options. Click on the arrow at the right to enter information. Field names and behavior are as set up initially in your geodatabase; it’s a good idea to test your app and make changes based on trials. A survey ID (we used surveyor’s last name, date, and 24-hour time) is a useful field, although the geodatabase should also be set up to automatically generate a GUID – global ID). Fields with lists based on domains are useful to enter data on small screens. One or more open-ended text fields are important.

General Instructions for Story Map Apps

Esri Story Map apps (<http://storymaps.arcgis.com/en/>) can integrate all data types collected with the Collector mapping app, and display it in a way that encourages others to explore the information in an intuitive manner – whether that’s to select locations because an image intrigues them, or by panning or zooming within the map to discover someplace new, or by finding a familiar location, or to click the “Details” link on the popup box to find more data, including links to congregations’ websites or additional video clips. Story Maps access your images and raw data, downloaded from your geodatabase. Images formatted to specific sizes and uploaded are used in popups and thumbnails. Data formatted to incorporate within popups as desired is saved as a csv file with one record for each location, and added to a new web map – or the existing web map could be re-purposed. The Story Map template code pulls the pieces together.

Explore various templates to select the one that works best for your situation. We use “Shortlist.” The Shortlist app (<http://storymaps.arcgis.com/en/app-list/shortlist>) has been available as a configurable app that could only be deployed by downloading the app or the code, and then hosting it on your own server or website. We use this option, which provides more control over appearance and content. Another option is the developer-friendly source code available on GitHub. The newest and easiest Shortlist option is to create the Story Map using the template within ArcGIS Online, which includes an interactive drag-and-drop app builder. Given Shortlist’s popularity, it is likely this feature will be well supported. In general, apps are either configured, extended, or developed, depending on the amount of time one can spend, the level of customization desired, and the skill level of the creator. Newer templates available for download allow “configured off-the-shelf” apps or those modified only slightly to quickly look polished and professional.

Information we collected:

LOCATION [latitude, longitude populated when point captured]

SURVEY ID [e.g., surveyor's last name, date, 24-hour time]

DATE CREATED

TRADITION [Protestant; Catholic; Buddhist; Jewish; Orthodox (Christian); Other Christian; Muslim; Sikh; Hindu; Other]

CONGREGATION NAME

STREET ADDRESS

CITY

STATE

ZIP

PHONE NUMBER 1

PHONE NUMBER 2

WEBSITE URL

MEETING TIMES FRIDAY

MEETING TIMES SATURDAY

MEETING TIMES SUNDAY

MEETING TIMES OTHER

EMAIL

SOCIAL MEDIA 1

SOCIAL MEDIA 2

LEADER NAME

YEAR CONGREGATION FOUNDED

AVERAGE WEEKLY ATTENDANCE

TOTAL # STAFF MEMBERS

OTHER INFORMATION ON CONGREGATION

BUILDING TYPE [Church; Synagogue; Mosque; Temple; School building, Private home, Community center; Store front; Hotel, theater or shopping center; Other (specify)]

BUILDING TYPE OTHER

BULDING SIZE [25 TO 50 PEOPLE; 51 TO 100; 101 TO 250; 251 TO 500; MORE THAN 500 PEOPLE]

PRIMARY MEETING AREA PERCENT

BUILDING IS STORE FRONT [Y/N]

DESCRIBE BUILDINGS ON RIGHT

DESCRIBE BUILDINGS ON LEFT

HAS PARKING LOT [Y/N]

NUMBER OF CONGREGATIONS [Enter a number between 1 and 50]

NAME OF CONGREGATIONS

NEIGHBORHOOD TYPE [Residential; Main street; Mixed business/commercial; Mixed business/residential]

STREET ACTIVITY IN NEIGHBORHOOD [Deserted; Moderate activity; Active]

STREET TRAFFIC IN NEIGHBORHOOD [Mostly pedestrian traffic; Mostly automobile traffic; Mixed]

LANGUAGES IN COMMUNITY

OTHER LANGUAGES IN COMMUNITY

LANGUAGES IN CONGREGATION

HAVE MEMBERSHIP PROCESS [Y/N]

HAVE FEEDING MEALS PROGRAM [Y/N]

HAVE KITCHEN [Y/N]

HAVE CLOTHING ASSISTANCE [Y/N]

HAVE YOUTH CHILDRENS SERVICES [Y/N]

HAVE DAY CARE – CHILD/INFANT [Y/N]

HAVE SENIOR SERVICES [Y/N]

HAVE DAY CARE SENIORS [Y/N]

HAVE HOUSING SERVICES [Y/N]

HAVE HOMELESS SERVICES [Y/N]

HAVE HOMELESS SHELTER [Y/N]

HAVE PRISON JAIL MINISTRY [Y/N]

HAVE PRISON RE-ENTRY [Y/N]

HAVE EMPLOYMENT SERVICES [Y/N]

HAVE HEALTH CARE CLINIC [Y/N]

HAVE MENTAL HEALTH SERVICES [Y/N]

HAVE 12 STEP/RECOVERY/COUNSELING [Y/N]

HAVE HIV/AIDS MINISTRIES [Y/N]

HAVE GLBTQ SERVICES/MINISTRIES [Y/N]

HAVE COMMUNITY ORGANIZING [Y/N]

HAVE IMMIGRATION SERVICES [Y/N]

HAVE SPORTS PROGRAMS [Y/N]

HAVE AFTER SCHOOL PROGRAMS [Y/N]

DESCRIBE OTHER PROGRAMS

NEIGHBORHOOD RACE MAKEUP COMMENTS

NEIGHBORHOOD SOCIO ECONOMIC CLASS COMMENTS

BRIEF OBSERVATIONS OF NEIGHBORHOOD

IMAGE FILE 1 URL

IMAGE FILE 2 URL

VIDEO FILE 1 URL

VIDEO FILE 2 URL

DATE LAST EDITED

LAST EDITOR

APPROVED [Y/N]

DATE APPROVED

APPROVER NAME

COMMENTS

GUID [global ID generated with data entry]