

# Mobile GIS Guide

Getting your mobile GIS project off the ground

## About The Author



Matt Sheehan is a mobile GIS pioneer. He and his staff at WebMapSolutions have been providing clients with mobile GIS solutions since the earliest days of smartphones and tablets.

We live in interesting times. Mobile and cloud computing are changing how and where we are able to use technology. No longer are we limited to our home or office. Today technology is accessible and usable wherever and whenever. And by technology we mean computers: smartphones, tablets and the new phablets. We are talking about mobile computers.

Mobility means changing location. This has made location and location based data and analysis suddenly terribly important. Geographic Information Systems or GIS, is location focused technology. It provides the means to collect, store, visualize and analyse any and all location data.

We are at the very beginnings of a revolution in location technology and GIS.

# Mobile GIS Guide

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## Introduction

In this guide we will discuss mobile GIS. We will walk through the key terms and areas of consideration when embarking on a mobile GIS project. Our goal is to help you better understand this exciting new technology, and how it can help your organization.

# Mobile GIS Guide

Getting your mobile GIS project off the ground

## Table of Contents

<b>1. Getting Started</b>	<b>4</b>
Mobile GIS: The Basics	
<b>2. Web and Native Mobile Apps</b>	<b>5</b>
Types of mobile GIS apps	
<b>3. GIS Cloud Technologies</b>	<b>6</b>
The engine of your Mobile GIS app	
<b>4. Offline Mobile GIS</b>	<b>7</b>
Finally offline mobile GIS is here	
<b>5. Mobile GIS Choices</b>	<b>8</b>
What are your mobile GIS app options?	
<b>6. Mobile GIS Frameworks</b>	<b>9</b>
Flexible mobile solutions	

# Mobile GIS Guide

Getting your mobile GIS project off the ground

## 1. Getting Started

### Mobile GIS: The Basics

Mobile GIS is the implementation of GIS on mobile devices such as smartphones, tablets and phablets. It provides ways to visualize and analyse location based data. Maps are the most common visualization method. This is often a combination of base map - satellite, road, topographic etc - and point, line or polygon overlays. Maps are interactive, so zoom and pan, with point, line and polygon layers overlaid. Tap a point which represents a museum and basic information about the museum appears in a pop up. Often tools are provided in mobile GIS apps such as geolocation ie. show my current location on the map, and search eg. Find and show people or places nearby. Tools are often geared to usage and user, so maintenance staff will require quite different options to tourists.

Mobile GIS is being used by an ever broader user base. No longer are they the bastion of those trained in GIS. This has some important implications.

There are two key types of mobile GIS applications: Web and native. Web GIS apps run in mobile browsers, relying on a URL. Native apps are those you download from online stores such as Google Play and Apple's App Store. These are installed applications. We will discuss Web and native mobile GIS apps in the next Chapter, and in particular the notion of cross platform.

Mobile GIS apps do not live in isolation. They all rely on cloud based GIS services. Gone are the days when we use shapefiles and Pdf's on mobile devices. Cloud based GIS means Esri's ArcGIS, MapBox, GISCloud and any number of other sophisticated cloud based services. Important choices need be made here.

Talk mobile technology and eventually screen size will be mentioned. Today we have a plethora of mobile screen sizes: from the smallest 4" smartphone through to 10" tablets and above. Screen size affect usability: the smaller the screen the more limited is usability. This often brings up questions around cross device mobile applications.

# Mobile GIS Guide

Getting your mobile GIS project off the ground

## 2. Web and Native Mobile Apps

Types of mobile GIS apps

Mobile GIS is confusing. We introduced some key terms and topics in the previous chapter. Let's discuss in this chapter one of those topics. The different types of mobile GIS apps: Web and native.

We are all familiar with Web applications. Often these are described as web pages. They have unique URL's and run in browsers. Mobile Web GIS applications run in mobile browsers. They are web applications designed for mobile devices. Pull up your mobile Chrome browser on your iPhone or iPad, Android or Windows device, type in a URL and your GIS app will load. All ready for use.

In contrast native mobile apps are installed applications, distributed via the various mobile app stores. These are applications written specifically for each platform. That is important. So one set of developers build the GIS app for all Apple devices. Another group for Android. That's one mobile app written in multiple programming languages by different development teams.

So which path do you follow for your mobile GIS project, Web or native? Much depends here if you are opting for an off the shelf product or custom solution, discussed more in Chapter 5. Let's presume here custom solution. From our experience 9 times out of 10 mobile Web is your best choice. Web is simply more flexible, and cost effective. A mobile Web application can be written which is both cross platform and cross device. Think about that. One application which runs on Apple, Android and Windows mobile devices. It also looks good and is usable on all smartphones, tablets and phablets.

One other advantage of mobile Web GIS applications. They can be converted into native apps. That's right. They can be turned into install-able apps distributed via the various mobile app stores.

# Mobile GIS Guide

Getting your mobile GIS project off the ground

## 3. GIS Cloud Technologies

The engine of your Mobile GIS app

Okay, lets next talk about the cloud. We need to consider which cloud GIS solution our app will use. All the GIS muscle used by our application will be driven by the cloud service we choose. More than that, all data we view or collect in the application will be stored centrally. No more working with shapefiles and Pdf's on your mobile device, now we will be using data accessible across the organization.

There are increasingly more cloud GIS services now available. These include Esri's ArcGIS, MapBox, GISCloud and many others. Budget and functionality will be key determinates of which makes the most sense for your project. Our preference is ArcGIS.

Esri are the worlds largest GIS solution provider. With over 40 years in the business, they have the greatest breadth and depth in terms of services and solutions. With the popularity of cloud technology, they have evolved their flagship ArcGIS product line into a platform. What does that mean? Simply that mobile, Web, desktop and server GIS solutions are now integrated into one larger whole.

Let's provide a solid example to show why we think a platform based GIS solution is important. Imagine a maintenance team collecting data about work done in the field using their mobile GIS Web app. The mobile app is pushing this data automatically to ArcGIS server or ArcGIS Online in the cloud. Once uploaded the data can be viewed and analysed across the organization. That means managers using executive dashboards, GIS analysts using ArcMap, and much more.

The ability to share GIS data across an organization, and use tools which allow integration and collaboration around this data is why we favor the ArcGIS platform as the engine of mobile GIS apps.

# Mobile GIS Guide

Getting your mobile GIS project off the ground

## 4. Offline Mobile GIS

Finally offline mobile GIS is here

Offline mobile GIS has been a hot topic over the last few years. Mobile GIS users have been crying out for the ability to continue using their mobile GIS apps in remote areas without wi-fi connectivity. Well finally offline mobile GIS is here.

In this eBook we could have mentioned offline in passing rather than devoting a chapter to the topic. But offline is important. One might argue crucial for any and all mobile GIS apps.

Offline GIS provides the ability to view maps and to edit data in areas which lack Internet connectivity. Let's touch on the mechanics of offline. With no connectivity we cannot view base maps, nor can we view our point, line and polygon layers. How do we get past this problem? We store the base map and the layers on the mobile device itself. Before we go offline, base maps can be downloaded dynamically. So select the area you wish to view offline and wait as the base map tiles are downloaded to your device. Another method is download already prepared base map packages. Layers similarly will need to be stored on the mobile device. Usually a database on your mobile devices is where all this data is stored.

Advanced GIS functionality, is not usually available in offline mode. So if your mobile GIS app relies on ArcGIS server for example to process a request, while offline this will not be available. But many other tools will be available. An important one being geolocation. The GPS on a mobile device works regardless of wi-fi connectivity. So even in the most remote areas you will still be able to find and view your current location.

Offline data collection and editing is also now possible. So drop a point on the map for example, add attributes, attach an image then store in the local database. Once back online this data is pushed up to the GIS cloud based server.

# Mobile GIS Guide

Getting your mobile GIS project off the ground

## 5. Mobile GIS Choices

What are your mobile GIS app options?

When one considers the best option for any mobile GIS project, usually one has to choose between an off the shelf product or custom solution.

Let's discuss off the shelf mobile GIS products first. Off the shelf means products which have been built for a specific purpose. Search through Google Play or the Apple App Store and you will find a list of apps which are labelled GIS. Be careful, if they are not tied to a cloud GIS service they are very limited. For example, if shapefile is listed avoid.

As mentioned in Chapter 3, any decision you make on a mobile GIS app need be made in parallel with your choice of GIS cloud service. Esri have two popular mobile apps ArcGIS and Collector for ArcGIS available for Apple and Android devices. These apps are tied to the ArcGIS Online cloud service. The app is free ArcGIS Online is not. GISCloud and others have similar offerings.

If you have a fixed workflow in mind for your mobile GIS app, and these needs are satisfied by an off the shelf product. Fantastic. As an example, Collector for ArcGIS has been built for online and offline data collection and editing. It is a well designed, highly functional mobile app. There are tools a plenty to satisfy many of your mobile editing needs.

But, there are some key areas off the shelf mobile GIS products fall down, namely:

- \* They are usually not configurable.
- \* Cannot be extended to add functionality.
- \* Have fixed workflows which may not suite how your field based staff work.

Lets imagine we need a mobile GIS app which is to be used by non-GIS trained staff. So simple workflows. You need to load both ArcGIS Server and ArcGIS Online layers directly. And need custom forms which can be generated both online and offline. Imagine also the apps requirements may change over time. No off the shelf product will provide this flexibility.



# Mobile GIS Guide

Getting your mobile GIS project off the ground

## 5. Mobile GIS Frameworks

Flexible mobile solutions

Let's step back and summarize where we are. We've discussed the difference between Web and native apps, and suggested we prefer the flexibility of Web. Cloud GIS services are a must for all mobile GIS projects, and we lean towards Esri's ArcGIS platform due to the range of tools and level of integration. Offline we see as an essential component of any mobile GIS app. We like off the shelf products but bemoan their lack flexibility.

If you get the idea that we favor flexibility, you are correct. One mobile GIS application which runs across all popular mobile platforms: Apple, Android and Windows, and devices: smartphones, tablets and phablets. A configurable application which can be styled according to your needs, works both online and offline and can load data from different sources. An application which is simple to use, designed for your specific workflows and can be extended to provide custom functionality.

Step forward mobile GIS frameworks. In the crudest terms a mobile framework provides the nuts and bolts to build custom mobile GIS applications. No need to reinvent the wheel each time you need a mobile app. A framework helps make producing any mobile GIS app fast and easy.

Years ago we yearned for a mobile GIS framework. With none available we went ahead and built one. Its Web based, works online and offline, is configurable, and extensible.

This framework has transformed our mobile GIS app development process. Not only are we building a vast array of apps using the framework. We can integrate it with existing Web apps. Have a Web app you'd like to extend, maybe add GIS or offline, simply use our framework.

Looking for maximum flexibility from your mobile GIS app: look to frameworks to do the heavy lifting.

# Mobile GIS Guide

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These are exciting times for GIS. Mobile and cloud technology are transforming how and where GIS is being used. Hopefully this guide provided you some useful information. Good luck in your mobile GIS project journey.

**Want to know more about mobile GIS frameworks?**

**Contact Us**

