Mango

Online GIS for Local Government

How to make your web maps work harder for colleagues, clients, and communities.

Online GIS for Local Government

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Are Your Local Government Web Maps Passed Their Expiry Date?

Difficult to update. Temperamental. Dated. Not mobile friendly. Sound familiar?

If so, Mango will be a breath of fresh air, we give you everything you need to quickly and easily move your web maps to a modern cloud based system that your users and GIS team will love.

To help you get started we've put together this book to help you understand the key benefits of a modern Online GIS, show you how other counties are already getting a head start with Mango, and give you some practical ideas on how to put together fantastic looking web maps.

So, without further ado, please read on to find out more!

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Online GIS for Local Government

CLOUD MAPPING FOR COUNTIES

The paradigm shift to cloud based computing is driving one of the most transformational periods in history for business and government.

Cloud mapping is driving enormous change in the way local government communicates with residents and business.

Just over decade ago, Google introduced the world to a new way to discover, search, and interact with our own communities via online street maps and satellite imagery in Google Maps. It cleared a path forward for the application of GIS via simplicity and accessibility.

Legacy mapping systems in use across the US have reached a point where they're more burden than benefit. A glance across the applications being served today and you'll find ancient bespoke applications with long expired support agreements which are expensive and specialized to maintain – if they can be maintained at all. They're opaque and maze-like, and all too often these systems fail to deliver the most important element: delivering answers. They exclude the public through technical language and byzantine processes familiar only to GIS professionals.

Democratizing local mapping requires a high level of usability and accessibility – users demand always-on services, instant access, on any device. Sounds complex, and complexity means cost – but it doesn't have to be that way.

REIGNING IN COSTS

In an economy where the purse strings are forever tightening, physical on-site setups are no longer feasible, nor necessary. Suggesting an in-house server setup in a small government agency today would probably have your colleagues reaching for the straight jacket.

Supposing you have the expertise on hand, you've got to establish your needs, procure appropriate hardware, procure software with complex pricing and licensing restrictions, setup dedicated network infrastructure, and configure dozens of applications. You need physical space, cooling, and you've got to keep it running 24/7 with fallback UPS's. And then, you've got to back it all up, regularly.

Existing systems are equally problematic and expensive to maintain. Your IT staff (pro tip: for most small local government offices, that's you, and when that on-site server inevitably goes down, Murphy's law says you'll be on a beach with your family) will need to be continually maintaining on-site infrastructure, and in the case of hardware failure, replacing and

re-configuring. Specialist equipment may also need contract staff to deal with configuration and repairs.

When your installation reaches it's maximum workload, scaling on-site servers is a new procurement - not something that can be initiated in minutes.

INSTANT IMPLEMENTATION

The idea of "moving to the cloud" has become so ubiquitous that it's almost cliche. We all know it's probably the right thing to do, so let's look at some tangible benefits that counties and townships can deliver to constituents and local business right now.

Cloud implementations benefit from drastically faster roll-outs. Web GIS platforms like Mango have the infrastructure already worked out, so you can dive straight into into creating map applications. Open up a browser and you're ready to go.

You can have a suite of maps styled and published along with an open data portal of public datasets up and running in just days, and all without writing a single line of code.

Even without dedicated GIS team, data rich visualizations with ready made customer queries can be configured easily. Mango offers a simple interface for visualizing and styling datasets, what-you-see-is-what-you-get editing panels for enriching maps with complementary images, video, or instructions, and targeted tools that let users dig deep for answers.

Mango is an innovative cloud platform that incorporates mobile, social and analytics technologies ensuring your reach is maximized and you can leverage data to continually improve the services you offer.

Cloud mapping is surprisingly cost-effective, but it's primary differentiation is *simplicity*. Initial setup costs are next to nothing – not to mention life-time costs.

Mango offers a straightforward pricing model that means you always

know what you'll pay. No calculators, no credits, no complex licenses, and no unexpected surprises on your invoice. It's also extremely flexible. Need more storage? Click to upgrade, and keep on working.

Expenditure on hardware, utilities and IT labor will be greatly reduced. Switching to cloud mapping frees your IT team from dealing with data storage and server management, and allows them to focus on other priorities, and opportunities for cost savings throughout the county.

Information security and compliance is a critical ingredient, and most counties will find that the infrastructure behind services like Mango offer increased security when compared to self-managed on-site solutions, and adhere to dozens of compliance programs including PCI and ISO.

COMMUNITY BENEFITS

A web GIS platform is easier to implement, easier to maintain, and most importantly, provides efficiencies that legacy systems simply can't.

Systems that make updating dataset and maps a laborious prospect belong in the past. Now, with tools like data synchronization, your maps can be kept updated near-real-time with workflows that integrate seamlessly into existing practices. Your road works crew can be providing on-the-ground repair information that updates public maps on the hour.

Cloud based mapping means delivering maps that enhance civic engagement and helps local business, but it doesn't have to mean high level of cost. Counties are ideally placed to recoup the benefits of cloud mapping with surprisingly low barriers to entry.

One of the greatest problems with old models of service delivery is the slow entropic march of bureaucracy. Lines and request forms really can be a thing of the past. New models of service delivery such as cloud based mapping are unlocking citizen participation and satisfaction.

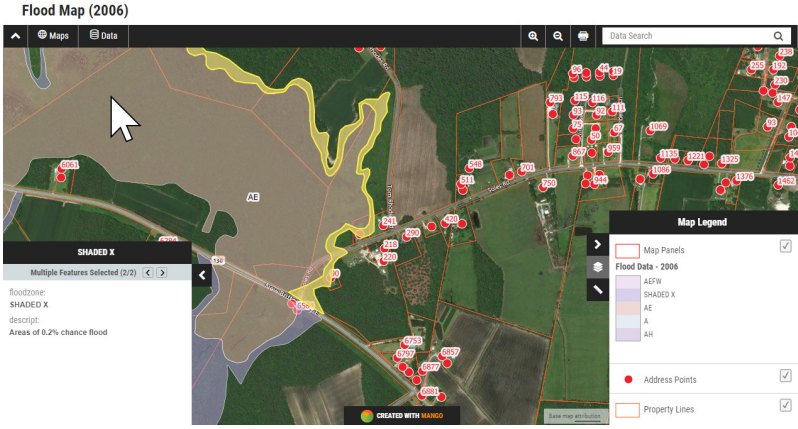
Static mapping is dead – at least in the traditional sense. Locking up maps in paper in offices means the burden on county offices to provide services remains.

We can remove inefficiencies of hand processing requests for GIS maps by empowering citizens to find their own answers, and generate relevant, localized maps for printing – on-demand – with whatever data layers they need. Goodbye GIS map request inbox.

When it's so simple to publish land and parcel maps to make them easily accessible to the public for viewing and downloading, the question isn't why, but why not?

Mango works with counties that have a genuine commitment to deliver meaningful differences in local communities, and they're seeing amazing results from serving their community data through simple, targeted cloud map applications.

With an online parcel mapping, Joe Appraiser visits a plot of land, opens a flood map on his mobile, geolocates himself, and generates a localized map of the 1 in 100 year flood hazards within or near the property to include in his appraisal report. Joe can also view deeds and property tax history with bi-directional links between maps and county databases.



SWITCHING MAKES SENSE

To a large extent, the public knows how to extract answers from maps already–they're answering questions every day about their world–so it's our job to simply give them access to a greater breadth of data and provide simple but effective tools that can extract answers. Tools that let them keep abreast of their community: hazards, disaster recovery efforts, public health inspection reports, pothole repairs or street closures.

They need maps that allow them to query data and drill down to find highly relevant answers. Mango's cloud mapping platform for local government can deliver those answers, and deliver counties significant cost savings in the process.

The public are engaging with maps at a level and complexity not seen before. That endless supply of data in everyone's pocket is slowly but surely eroding the barriers of specialized technical systems and enabling democratic access.

Those barriers still exist, and they're rooted in the old systems sitting on servers in local government offices across the country.

"Mango is a great out-of-the-box product that will allow you to get a professional product with minimal outlay of time and money."

— CHARLEVOIX COUNTY, MICHIGAN

IN FOCUS: WHY LOCAL GOVERNMENT IS MOVING TO MANGO

Let’s face it: GIS is a complex beast, but empowering citizens and local business with the insights locked inside geospatial data doesn’t have to be rocket science.

Until now, web GIS viewers have been designed with the GIS professional in mind — not the end users of web maps. They're clunky, ugly, confusing for the lay-user and simply don't work on all browsers. Mobile? Forget it.

They run on expensive proprietary systems with overheads that would make the captain of a Spanish Armada ship blush, require extensive programming knowledge to code and deploy, or require users to download yet another update (looking at you, Java),

or Flash,

or *shudders*

Silverlight.

We built Mango to be the antidote to all that's wrong with online GIS.

5 Reasons Why Counties and Townships are Moving to Mango

1. YOU'RE IN CONTROL

Mango is more than just a web map viewer; it's an online portal for all your county's maps and public datasets. Mango integrates into your existing website with ease with custom domain control, and a ready made portal for your public maps and data.

You don't need consultants to create and host your maps, or pay them each time you need to update your data. Your data remains in your hands.

2. YOUR MAPS ARE ACCESSIBLE ANYWHERE, ANY TIME—ON ANY DEVICE

A recent Accenture survey revealed two-thirds of US citizens want increased digital interaction with their government; a third want access to government services on their terms — that means whenever they need it, and on whatever device they have in their hand.

Mango just works. Everywhere. Any device, any platform. Even IE6.

OK, not IE6.

3. IT'S POWERFUL

Mango works with your existing data, in all the major geospatial file formats:

- Shapefile
- CSV
- KML
- TAB
- FileGDB
- GeoJSON
- GeoTIFF
- WMS

Once uploaded, your data is ready to style with one-click visualization, custom symbology, easy labelling, customizable feature popups, and more.

Mango's powerful GIS analysis tools can be configured through simple wizards.

For your map users, an intuitive, familiar interface bridges the gap for those who aren't familiar with GIS-speak.

From simple tax parcel lookups, performing calculations using your data's attributes, or extracting deeper insights through proximity analysis, Mango is made for rapid information gathering and decision making.

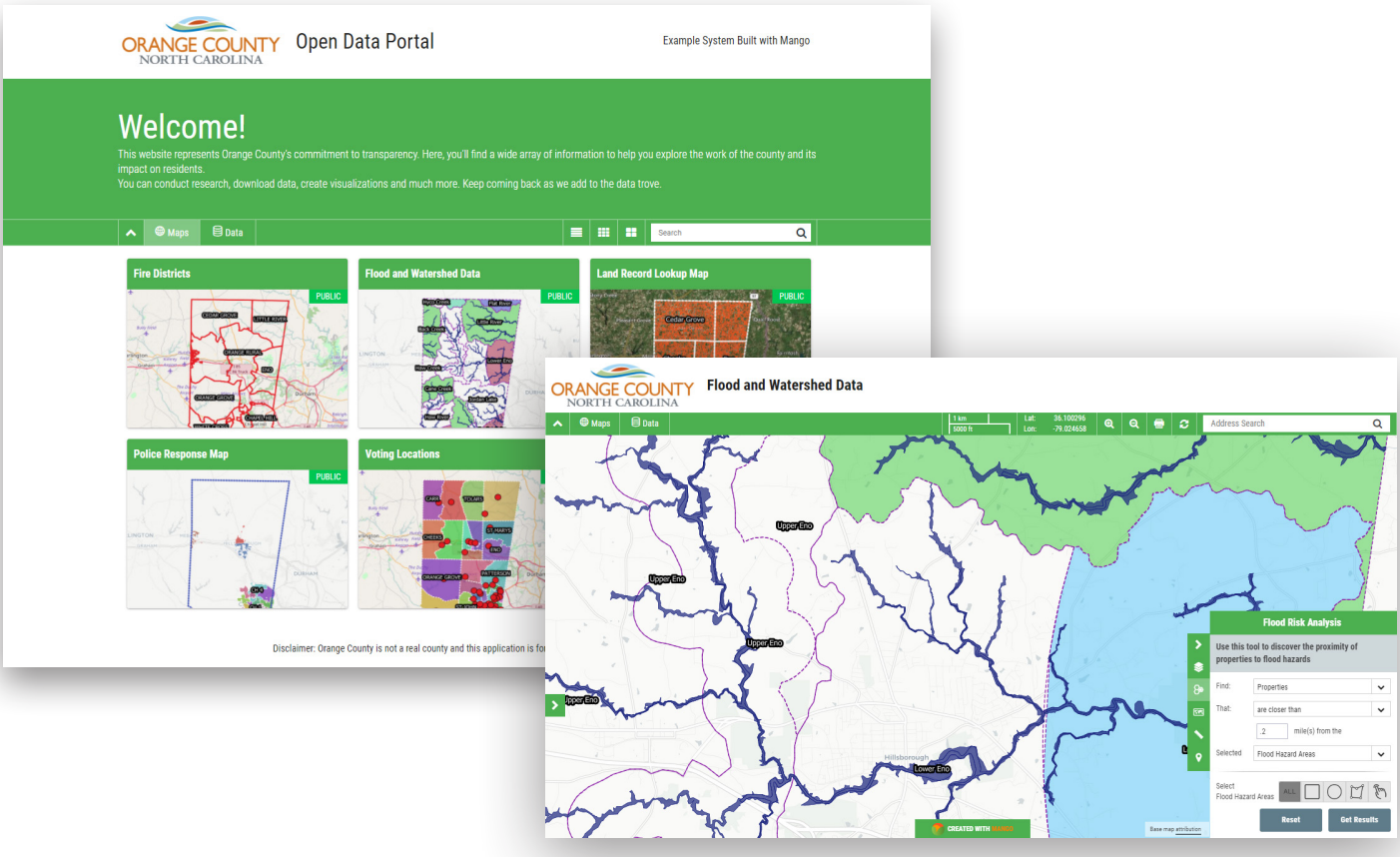
4. NO CODING, NO SERVERS, NO COMPLEX LICENSING

"In one hour last night I managed to achieve things I have been attempting on and off via Carto, fusion tables and custom JavaScript for over a year."

Mango is easy. Our customers tell us this every day.

Build maps on desktop or laptops, using any browser—Mango lets you work fast, wherever you are.

Cloud-based and built on a powerful open source technology stack, means no coding, no servers to maintain, no complex licenses, credits, or layer limits. Just rapid development, instant deployment, and maps that work on any device, with powerful GIS tools baked right in, and no headaches.



5. FLAT RATE PRICING = NO SURPRISES.

No view limits, no layer limits, no credits to renew.

Pound for pound, Mango does more for less. Check the competition.

Simplify your budget: flat rate pricing means you know exactly what you'll pay every month — or year, if you'd like a 20% discount.

The end of the 2015/16 fiscal year is fast approaching — will you continue to serve your county's GIS data on a platform that makes it hard for citizens to find what they're looking for? Migrating to Mango takes most of our local government customers a week, so now is your opportunity to unburden yourself from complex tools and unnecessary expense and move to Mango.

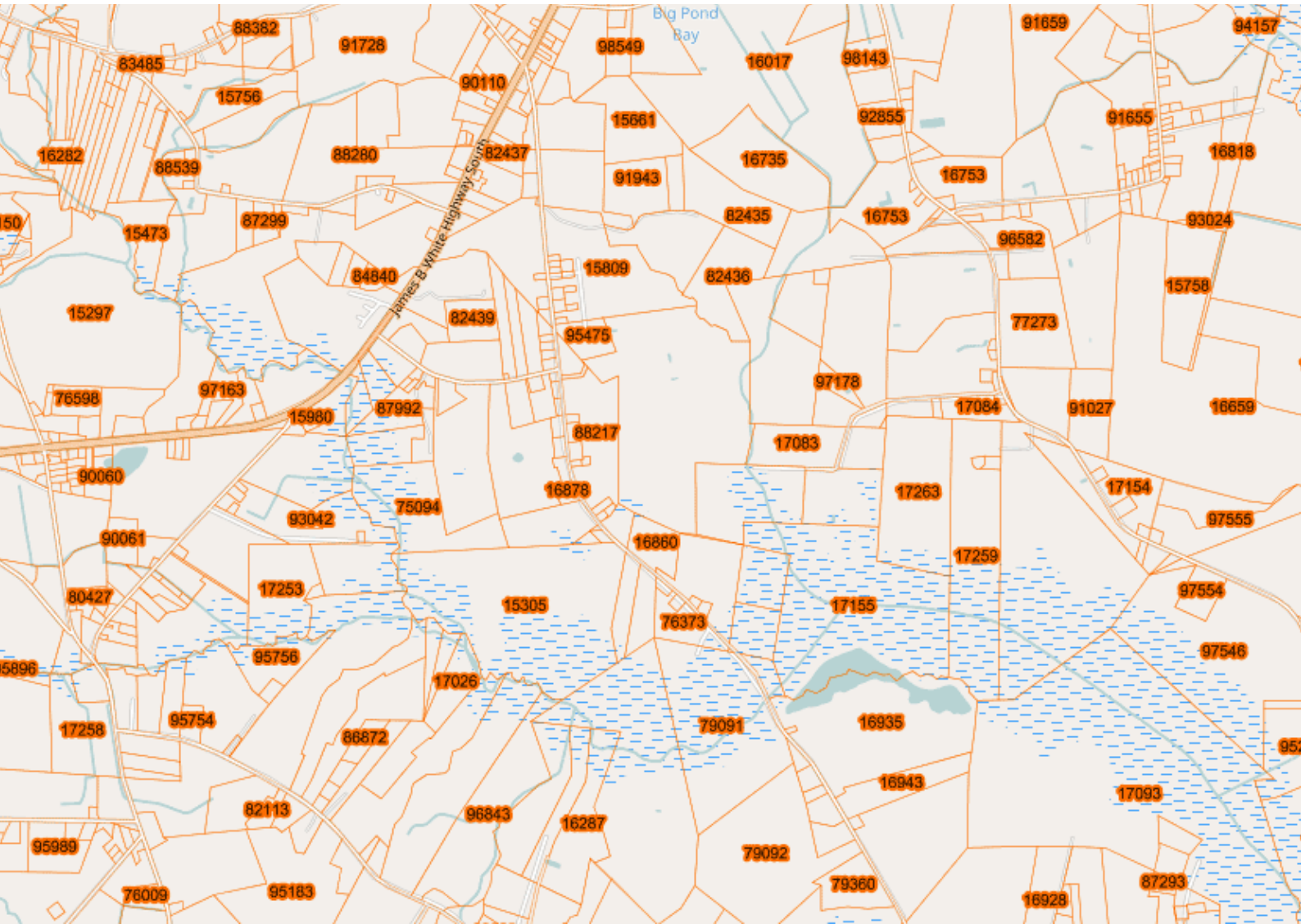
"Mango was the one company we researched that met all of our expectations for a fraction of the cost other vendors were charging."

—PLUMAS COUNTY, CALIFORNIA

Case Studies

COLUMBUS COUNTY, NC

THE NORTH CAROLINA COUNTY
WEB MAP PORTAL WITH OVER
17,000 VISITORS PER MONTH



Columbus County in North Carolina is the third largest county in the state, home to nearly 60,000 residents. Services are provided to citizens of the county across a variety of departments from Emergency Services to Animal control. The county maintains a wide range of geographic information to support delivery of these services and provided access to information to citizens and the private sector.

Like many counties, Columbus has been using GIS for many years, preparing maps and reports to those requesting them, using desktop software and databases to store and manage the information.

The information in these databases changes daily, whether it be the record of deed transfer on a property or the re-surfacing of a section of road maintained by the county. Making sure everybody has access to the latest information is crucial for functions including asset management, tax assessment and planning to name a few.

The challenge therefore, was how to deliver such information to end users via the internet, tapping into existing systems and databases in a secure, easily maintained manner?

ENTER MANGO.

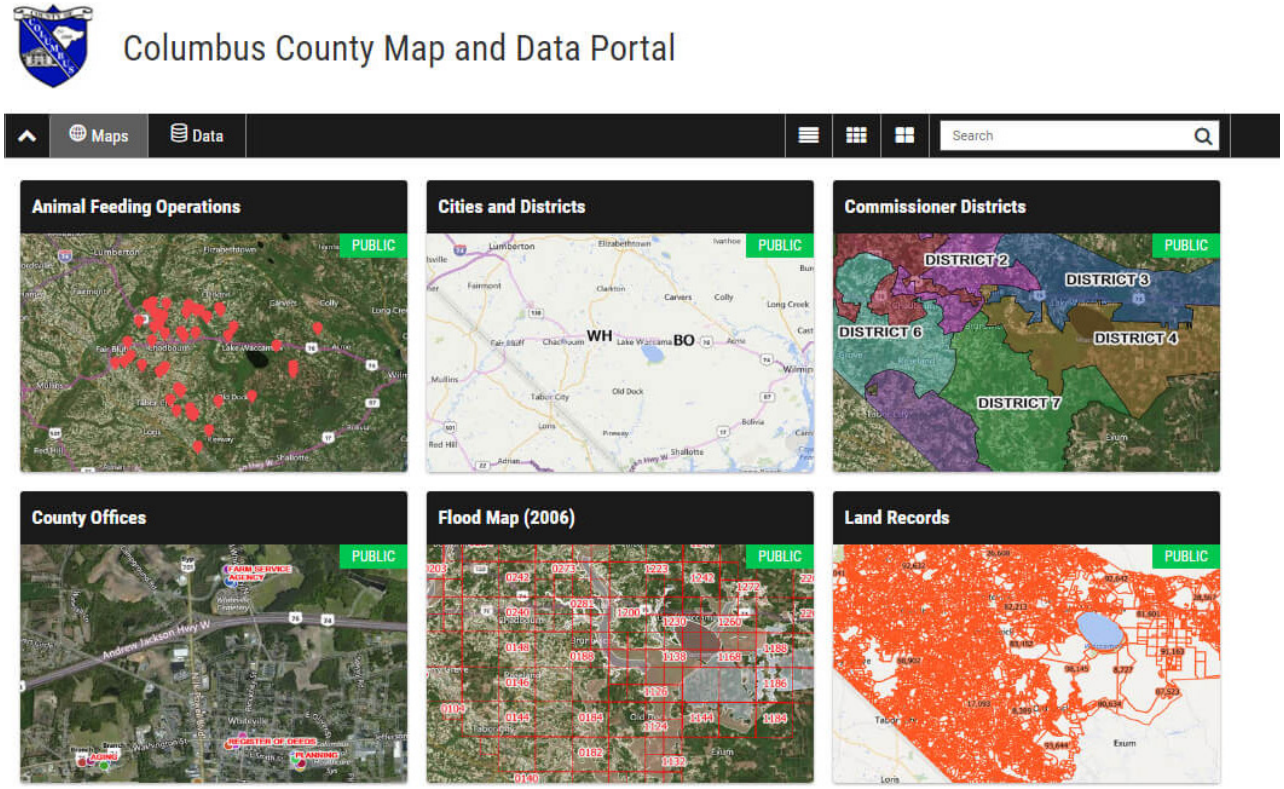
Alan James from the County's Management Information Department led the search for a Web GIS that provides such functionality and deliver the benefits of open, accessible information.

The county was seeking to replace an older server based system that according to Alan was antiquated, expensive to maintain and lacked the functionality of more modern systems such as support for modern browsers, support for mobile devices and the assurance of availability in the Cloud.

Experienced with traditional desktop GIS software, Alan cites the "simplicity, ease of use and short learning curve" as key reasons he initially was drawn to Mango.

Working with various departments Alan was able to develop around a dozen thematic maps, each focused on a particular service area from Land Records to Flood Mapping to School Districts.

Gaining early traction and support by other departments for the maps Alan was able to deploy the map portal and make it accessible on the county's website.



And due to the attractive pricing, he was able allocate existing budget and deploy the system without having to get high level approval or wait for the next budget cycle.

In addition to uploading and publishing their own GIS data, Columbus county was also able to tap into other systems and integrate the content in the maps. For example, they were able to add current, high resolution aerial photography from the "NC OneMap" initiative as a WMS layer. This gives users a birds-eye view of what going on "on the ground" across public and private land.

Another example is linking to documents from the County's other databases, including electronic copies of tax statements, deeds and property cards – all in the one place!

A CUSTOMER OF MANGO FOR OVER THREE YEARS NOW, THE PROOF OF SUCCESS, AS THEY SAY, IS IN THE PUDDING!

The Columbus county's Web Map portal has been a huge success, with over 17,000 views a month, coming from citizens, county staff, appraisers to name a few.

		17,878 % of Total: 13.73% (130,182)	17,878 % of Total: 13.73% (130,182)
1.	/columbusmis/maps	6,888	38.53%
2.	/columbusmis/maps/16952/land-records-	5,700	31.88%
3.	/columbusmis/data	1,565	8.75%
4.	/columbusmis/maps/16952/Columbus County Land Records	1,336	7.47%

County webmap and Portal view stats for Columbus County, NC

And Columbus County is not stopping there.

With the ever increasing demand to map-linked information, the county is looking at deeper integration of Mango into their property parcel database to allow users browsing the conventional database to view that record on a map. And you can expect to see more tweaks and improvements to come!

"What immediately impressed me was how quickly I was able to upload data and get a useful map published. Other products I tried required more time in the learning curve than I could afford."

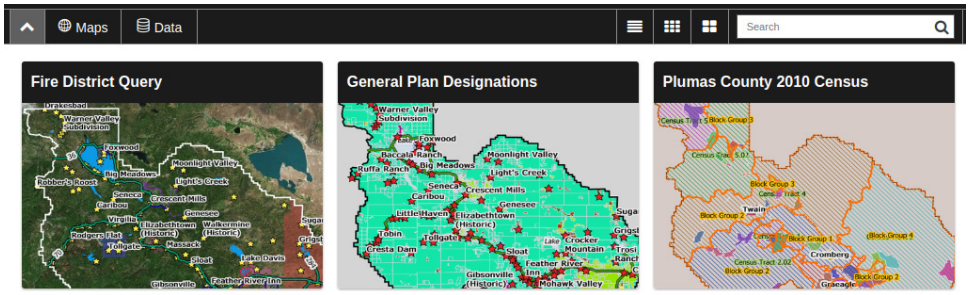
— ALAN JAMES. DIRECTOR, MANAGEMENT INFORMATION SYSTEMS, COLUMBUS COUNTY, NC

PLUMAS COUNTY, CA

Mango is “Easy To Use”, and
“Extremely Cost Effective”

Over a year ago, Plumas County's GIS division was actively looking to replace our public-facing Internet mapping platform that was out-of-date and did not have the county's desired functionality requirements and operational goals.

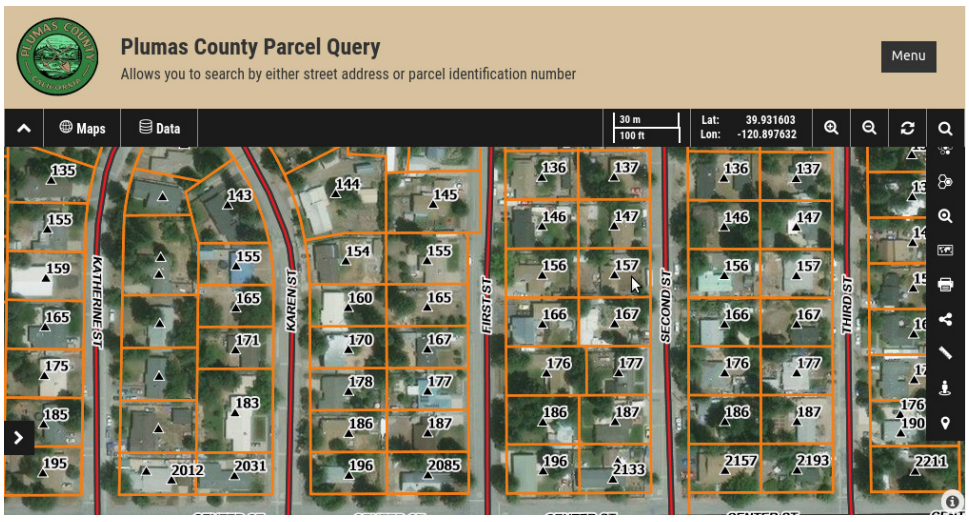
We needed to find a replacement product that utilized the existing county data, securely stored that data, and included the capability to group data into thematic groups for navigation and display without the use of a dedicated server. We also desired a system architecture that would allow individual county administrators to be able to quickly and easily update GIS layers and datasets as a map web service.



Mango was the one company we researched that met all of our expectations for a fraction of the cost other vendors were charging. Mango's interface is intuitive, easy-to-use, and extremely cost effective.

We are able to produce a variety of different maps easily without having to write any complex code or hosting servers. Not only is our online GIS data more manageable, comprehensive, and accessible....it is easier to share. Since implementing Mango into our GIS department's website, we went from "basic and boring"... to "WOW!"

The old saying, 'A picture's worth a thousand words' – is so true with



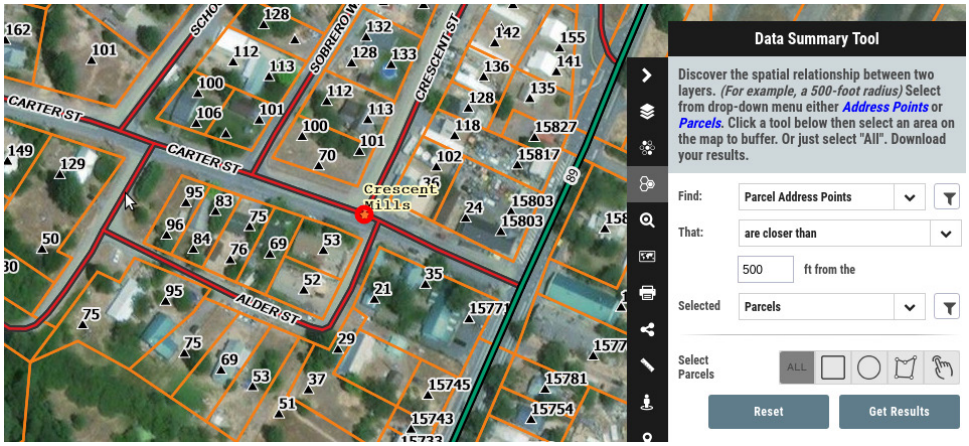
“Since implementing Mango into our GIS department’s website, we went from ‘basic and boring’... to ‘WOW!’”

— BECKY OSBORN, GIS PLANNER, PLUMAS COUNTY, CA

Mango's mapping application. Our users can zoom in to look at a property or query the land use. Having a picture of what's on the land helps clarify and support the descriptions and Mango's visualization tools are simply superb.

Our users get the complete picture of what's out there in our county. Different departments within our county system are using Mango to evaluate data for a variety of uses and to assist in part of their decision-making process.

Different mapping tools within the platform allow users to perform spatial relationships, search and query attributes, download data, and many more. We also have received positive feedback from the public and commercial users.



From the start, Mango made it effortless for us.

They exemplify customer service. It is a genuine pleasure to work with professionals who are progressive in their fields and take their work seriously.

I encourage anyone contemplating either a new or upgraded mapping interface or for those who wish to publish their GIS data on the Internet at a low cost (that includes a constant expanding array of functionality), to give Mango a try!

—Becky Osborn, GIS Planner, Plumas County, California

How to Create the Ultimate Land Records Map

The land record map is by far the most heavily accessed map in a city or county web map portal and in this chapter I'm going to be showing you the elements that make up a superb interactive land record map.

Through my work at Mango I've created dozens of land parcel maps and viewed countless more from counties and cities across the country using our web GIS. Some get it right, but many don't. Following the steps in this video will allow you to be one of the ones that get it right.

You might have been making maps for years, but often these maps were either for your own use or only shared with a small knowledgeable group within your organization. I know that the thought of opening up our work to the entire internet can be a little daunting to say the least. But fear not, if you follow the simple steps in this tutorial you will have a land records map that residents, assessors and appraisers will love.

The first step in getting it right is a shift in perspective. One of the biggest mistakes in design is to assume that everyone else sees the world in the same way we do, but if we take a step back and look at the application from the point of view of our users it's easy to make design decisions that work.

Really we only need to know two things about our users. Who are they? And, what do they want to do? It's our job to take them from point A to point B in the smoothest way possible.

So let's jump straight in and look the core elements of any land record map.

MAKE YOUR PARCEL LAYER STAND OUT

Of course the most important element of any land parcel map will be the land parcel layer so we will start with that.

An orange outline with no fill has become the defacto standard for parcel boundaries which as of course the most important layer on a land records map.

On a desktop GIS we often aren't using a base map, so any dark color will offer good contrast, but your web map users will demand a base map below your data in order to give them context.

The base maps will either be a street map or a satellite map and this makes an orange outline ideal because it gives good definition for both. Especially the imagery which for most places outside of Nevada and Arizona will be predominately green.

GIVE THE USER CONTEXT

We would all love our map users to use our carefully crafted search tools, but the reality is that most users will just drag and zoom their way to their area of interest. This means we need to give them as much context as possible.

BASE MAP

The first consideration is a base map layer. A hybrid view that has the road and neighborhood names above satellite imagery is a good default choice, but it's also important to allow users to switch the base map so more advanced users can choose the basemap that's best suited to their specific requirements.

AERIAL PHOTOGRAPHY

If you have access to recent aerial imagery you should also consider using this as the base imagery provided by companies such as Bing may not be as up to date and will offer lower levels of detail. These should either be uploaded to your web mapping system or better yet added as a WMS map service in order to avoid having to do large uploads.

GOOGLE STREET VIEW

Another nice feature for adding context is integration with Google Street View. This allows users to click on a place on the map and then explore as if they were walking along the street rather than looking at it from above. This is especially beneficial for appraisers looking to gain a greater understanding of the area.

INFORMATION SIDEBAR

From experience you will have a feel for the technical ability of your user base; if the technical ability is generally low then it can be a good idea to include a side panel on the map with instructions explaining how the system is intended to be used.

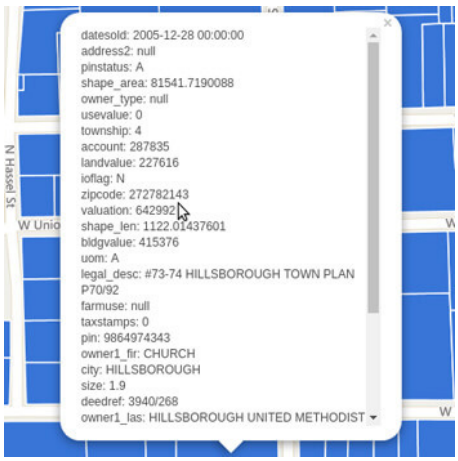
Alternatively you could also include a help link in the title bar that opens a popup with instructions.

PARCEL LABELS

Lastly, add labels to your parcel layer. Preferably this will be the APN (Assessor's Parcel Number) as this will make it easy for users to find multiple closely located parcels from a list.

MAKE THE POPUP WINDOWS POP

A common mistake on land parcels maps is to pay little attention to the popup that's displayed when a parcel is clicked. We see too many maps that is just a dump of all the attribute values for that parcel in no particular order and containing some attributes that are of no use to the end user.

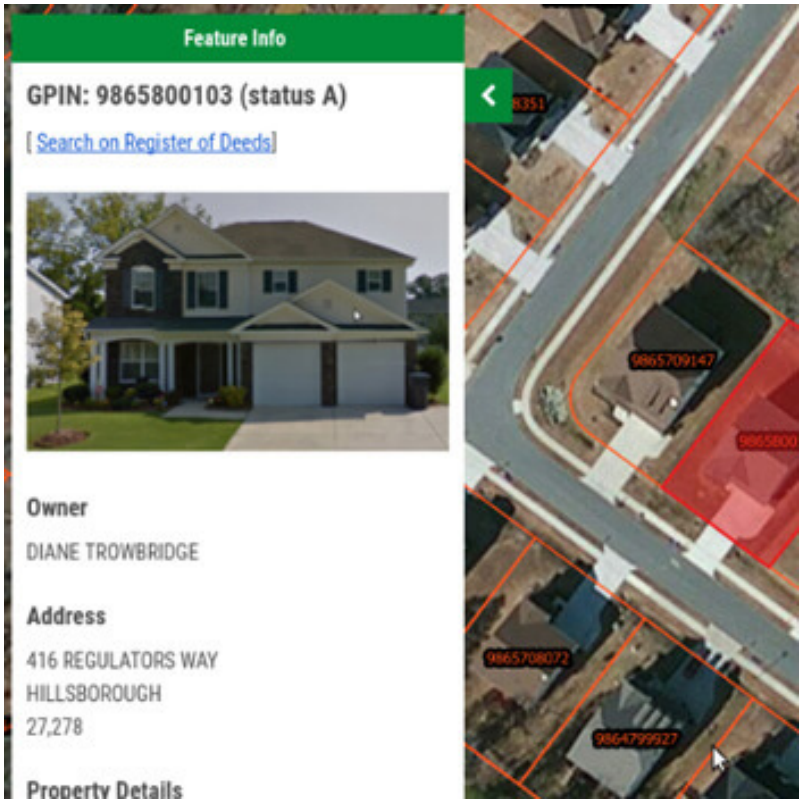


A good practice is to make the title of the popup window either the APN or the property address.

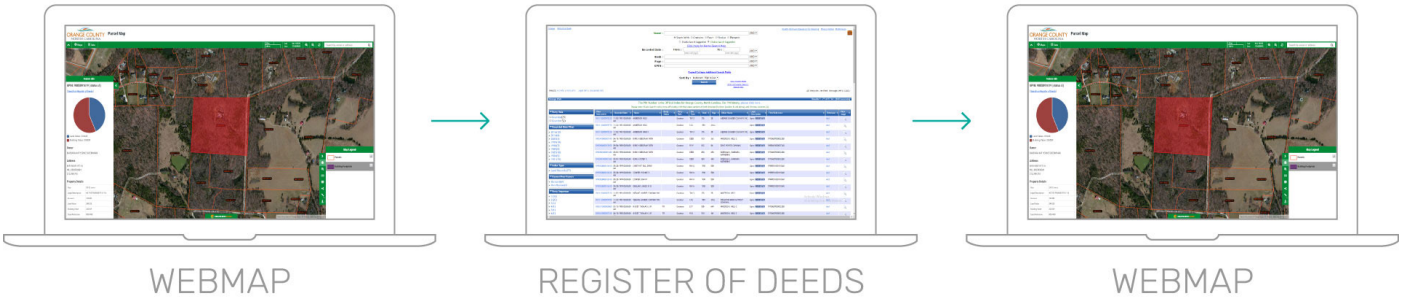
The body of the popup should then contain only the information that the end user needs to see, formated in an easy to read manner. If your data contains links or images these should be displayed as such. For example a photo of the property.

If imagery exists in your data, ***you should be displaying it.***

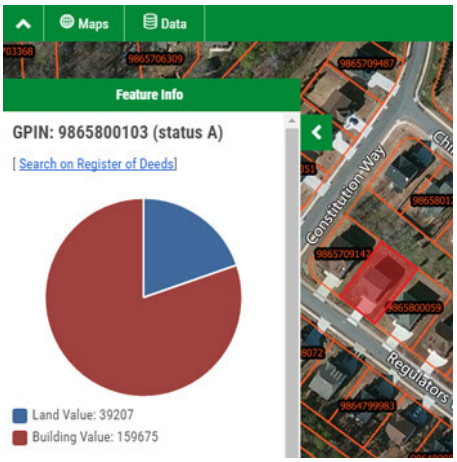
A very important feature is a link from the parcel popup to any other web based systems that contain information for the parcel such as the register of deeds, property cards or tax statements.



A best practice is to also have a link from these external information systems back to the parcel on the map, this means the user can navigate seamlessly from one to the other and back again.



Popups can also benefit from videos and charts providing your data contains suitable information for these.



Charts using attribute values add a secondary layer of insight.

PROVIDE TOOLS TO SIMPLIFY WORKFLOWS

Your parcel map will be used by a wide range of people. Some will be residents looking for information but others such as appraisers will be power users that are interacting with the system on a daily basis.

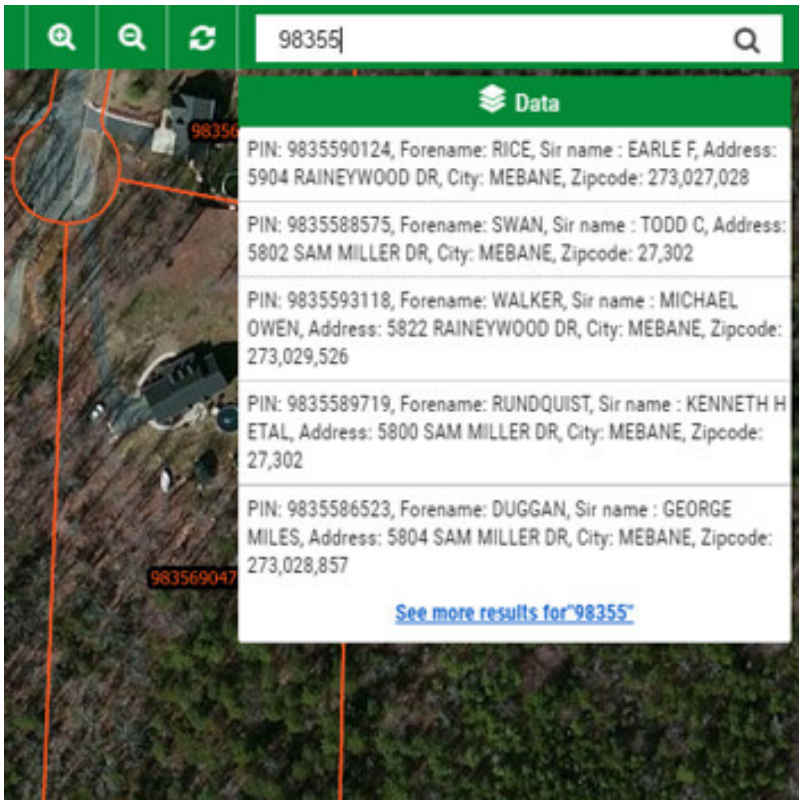
It's important to strike a balance in which the system is simple to use for new users such as residents but also efficient to use for power users such as appraisers.

So rather than just adding every tool we can we should think about how the map is commonly used and how to streamline that process.

The most common workflow will be to search for an address or APN, view the parcel information in the popup and then do a print.

To simplify this process we should have a single Google style search box that allows search using a partial piece of text, either the address or APN number.

Familiar, predictive search functionality is critical to data discovery.



What we want to avoid is a GIS style search system with a form where users enter values into fields, as this type of search is unnatural to most web users and they also tend to be quite unforgiving in terms of the matches returned.

Once the user click on the result they should be taken to the parcel on the map, have the parcel highlighted and the popup window with the parcel data displayed. The user can then choose to either make notes of the information, print the map or follow the links to external system such as the register of deeds, property cards or tax information.

PROVIDE SUPPLEMENTAL LAYERS

You parcel map should provide supplemental layers that add something to the workflows rather than distract from them.

For example layers such as roads which are already contained in the base map or parcel centroids which don't provide any additional information should be avoided, whilst layers such as building footprints or recent aerial imagery will add to the experience and complement the parcel data.

INTEGRATE YOUR PARCEL MAP WITH YOUR MAP PORTAL, WEBSITE, AND BRAND

You might not think that as a branch of government that you have a brand, but you do. A brand isn't just about advertising, it's about trust and authority.

When your users are viewing the map how to they know it's authoritative? How do they know the information is from a trusted source? Remember that the vast majority of the users of your map will have entered the map from Google rather than link on your City or County website.

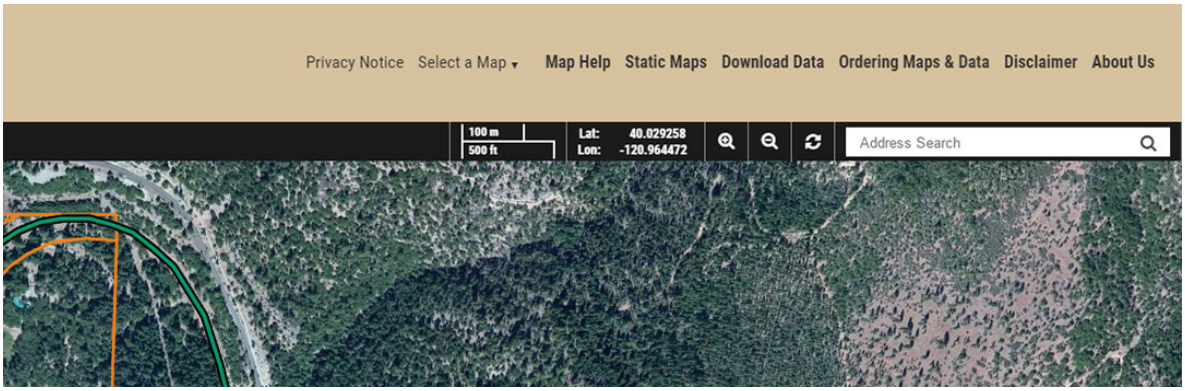
ADD YOUR LOGO

A logo lets users know who published the map. Ensure your residents know their local government is working hard to provide valuable services.

MATCH THE COLOR SCHEME WITH YOUR WEBSITE

Branding is about consistency; your users should feel a consistency when navigating between your website and your maps. Therefore it's important to have a consistent color scheme across both your website and your map pages so the users feel they've entered another section of your site rather than left your site a entered another one.

NAVIGATION BETWEEN YOUR MAP AND WEBSITE



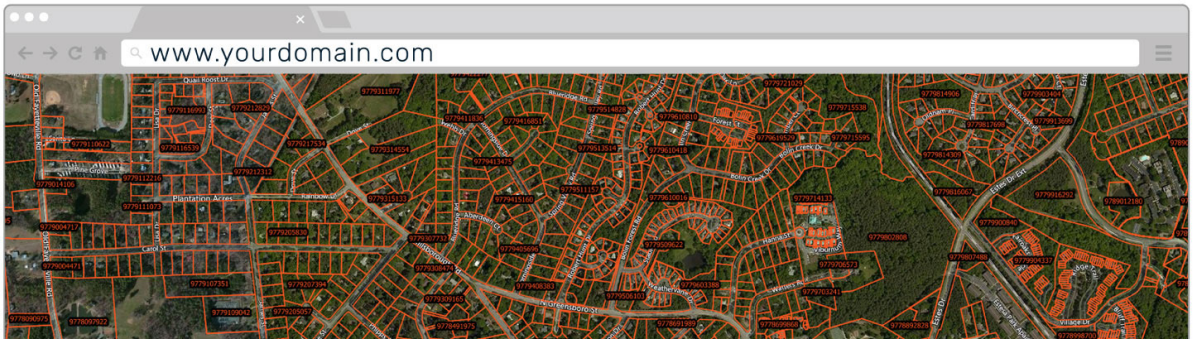
Navigation should be two way, your users should be able to navigate from your main website to the map and from the map back to your website. This kind of cross linking builds trust and provides users with a seamless experience.

Users should also be able to navigate easily between your other published maps.

USE YOUR OWN DOMAIN NAME

The gold standard for trust is to use your own domain name. Anyone can create a map and put your logo and color scheme in place but by seeing your domain name your users are certain of the source.

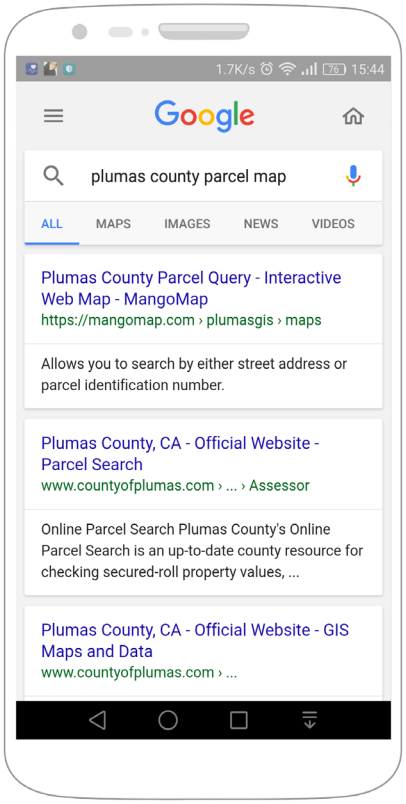
Too many Cities and Counties using cloud based mapping systems continue to use the domain name of the cloud map provider rather than their own which causes many users to question the authority of the source.



MAKE YOUR MAP SEARCH ENGINE FRIENDLY

Google doesn't magically know what a webpage is about, it uses text to figure out what "keywords" a page is relevant to and as our data at Mango shows us that the majority of map visitors arrive from Google rather than the client's main website, pleasing the Google Gods is important.

A web map usually contains very little text so we must ensure that the limited text we do have control over is put to good use, that means it should be descriptive. Here's an example of a bad map title:



Parcel Map

Where is this map? Who is it for? This is much better:

Parcel Lookup Map for Plumas County, CA

Better yet, we can add a description to double down on our main keywords and descriptiveness - what can this map do for Joe Public?

Search for parcels in Plumas County, CA and access deeds, property cards and tax records.

Now if someone searches for "Plumas County tax records" or "Plumas County parcel map" your site will likely be discovered.

Too many Cities and Counties **underestimate the importance of Google as an access point to their content,** but the reality is that if your maps aren't discoverable in Google they will receive at least half as many visitors and therefore provide half the return on your investment.

SUMMARY

As you can see, when it comes to producing a high quality parcel map there's a lot more to think about than simply uploading your parcel data and putting it online. For your map to maximize its potential you need to cover all the bases, luckily if you follow most of the instructions in this chapter, you should hit the mark.

Best Practices: A Guide to Online GIS for Local Government

Best Practice #1:

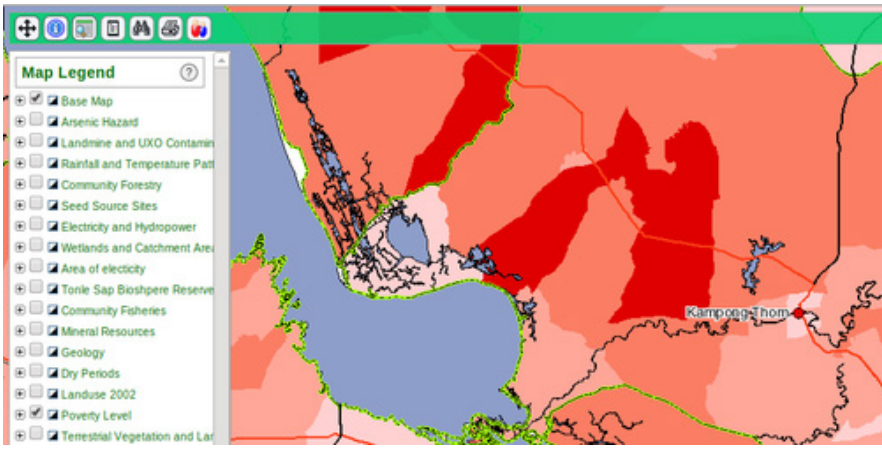
WEBMAP PORTALS MUST DIE

Web map portals weren't invented because they were a sensible design decision, they were invented to reduce cost.

Building web maps wasn't always as straightforward as it is today. In fact, you don't need a very long memory at all to remember a time when it was normal for web map deployments to cost tens or even in some cases hundreds of thousands of dollars.

With prices like that it's not surprising that clients wanted to get the maximum bang for their buck by trying to cram as much map data as possible into a single web map deployment.

These map portals—as they were known—were a disaster from a usability perspective. They weren't trying to tell the story of the data they contained in a unique and focused way that would present the user with focused and productive experience.



In reality, they were really nothing more than a data dump which left the user the task of wading through the data in an attempt to make sense of it all.

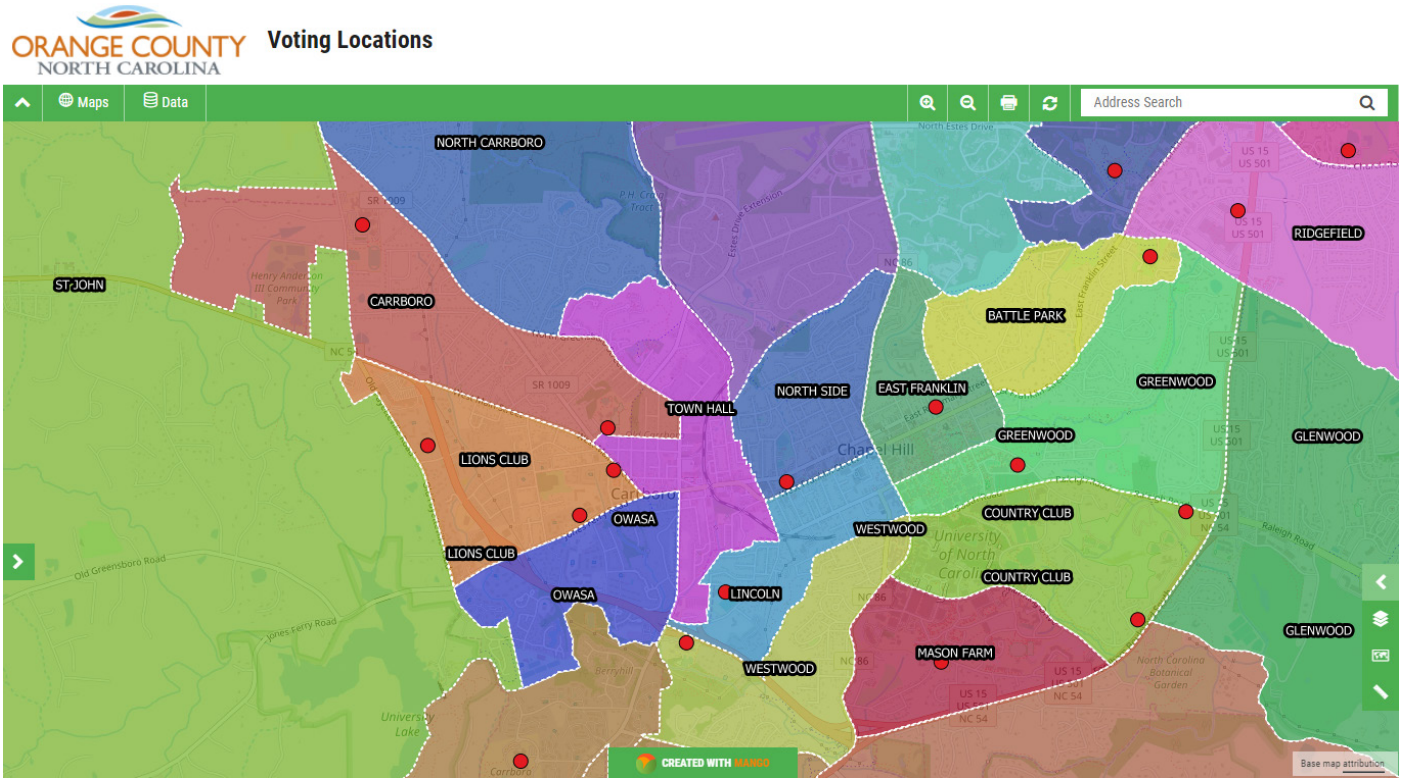
Fast forward to the present day, and we now live in a time where, thanks to the fantastic work of the opensource GIS community and massive advances in cloud computing, we have web map publication platforms that allow **anyone with a web browser and some data to put together a web map in a matter of hours.**

The cost of web map deployments have dropped to a point where the case for web map portals that revolves around cost saving is no longer valid and **now they must die.**

Web maps free from the constraints of price and complexity can be super targeted in terms of data, users, scope and length of relevance. In days gone by the idea of making a map that will only be relevant for a few days, or only shared with a handful of people would have been completely unthinkable. Now, it's a reality and we need to change our behaviour as mapmakers to match that reality.

The map below is the opposite to a map portal. It's laser focused, and lets the user know immediately what they are looking at and the story that the map wants to tell. Notice that the map doesn't include anything that doesn't need to be there. There are no supplemental layers to be toggled on and off, and no tools that don't make sense in the context of the map.

Next time you are building a web map and consider adding another layer, ask yourself this: ***Is this layer going to add to the story, or just be an unnecessary distraction?***



Best Practice #2:

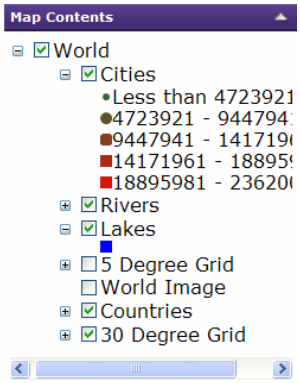
DON'T MAKE YOUR WEB MAP LOOK LIKE A GIS

The most common mistake in design is to assume that the users of your design see the world in the same way as you.

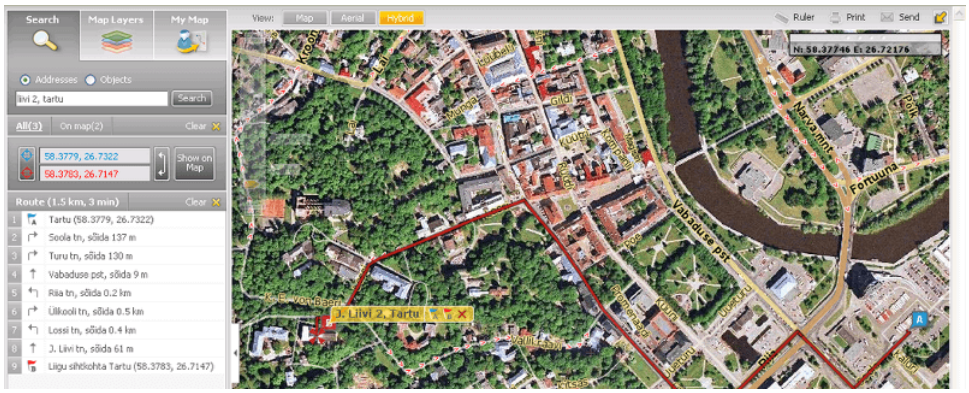
The majority of web map deployments are overseen by someone with a strong background in GIS, therefore it's not surprising that the interface of web maps starts to look like that of a desktop GIS.

Does your web map tool bar look like this?

Does your web map have lots of layers than can be turned on and off using a check box like this?



Does your web map not have a clearly visible title?

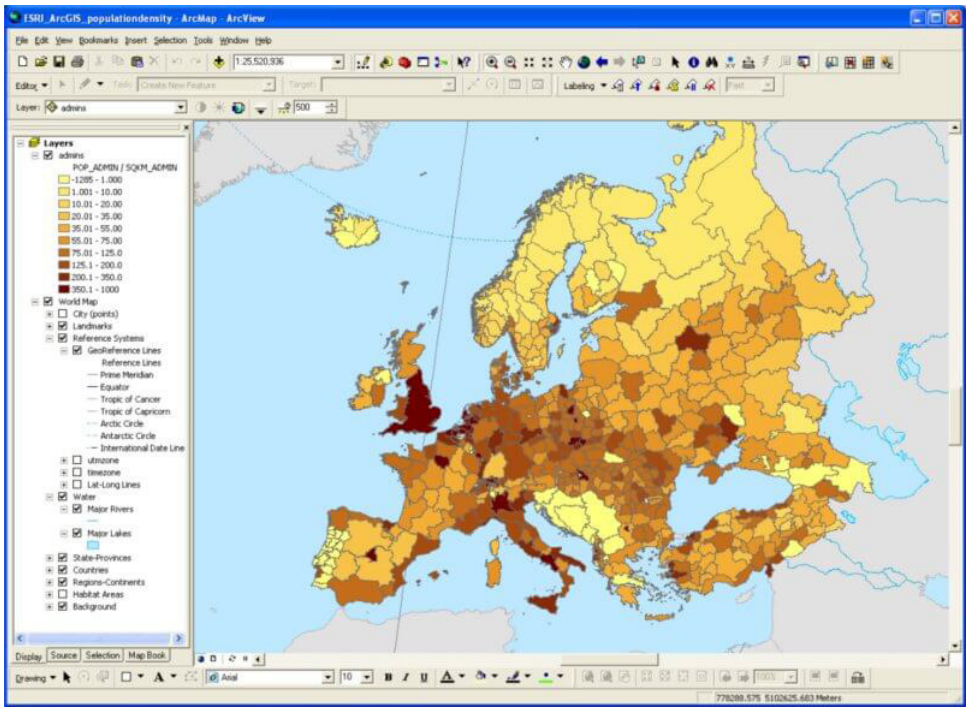


If the answer is yes to all (or some) of these three questions then the

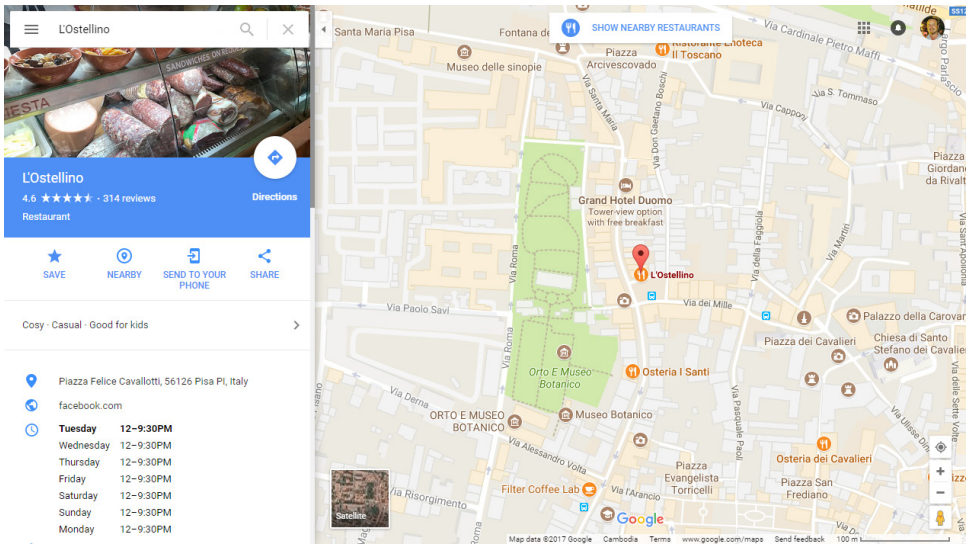
design inspiration for the web map has come from desktop GIS and this is usually a colossal mistake.

WHY?

When a GIS user interacts with a map it looks like this:



When a Joe Blogs interacts with a map it looks like this:



Unless we're creating a web map that's targeting users of desktop GIS, then we should avoid trying to imitate GIS systems.

Instead, we need to take our design cues from systems that will be familiar to our users.

BEST PRACTICE #3:

5 COMMON WEBMAP DESIGN MISTAKES TO AVOID

As most of us are already aware, the days of sharing maps via PDF or zipped shapefiles are numbered. Interactive web maps are now the method of choice when it comes to publishing and sharing Geodata.

If you're not designing web maps already, it's only a matter of time before you will be, so we've prepared this short list of the most common web map design mistakes you need to avoid.

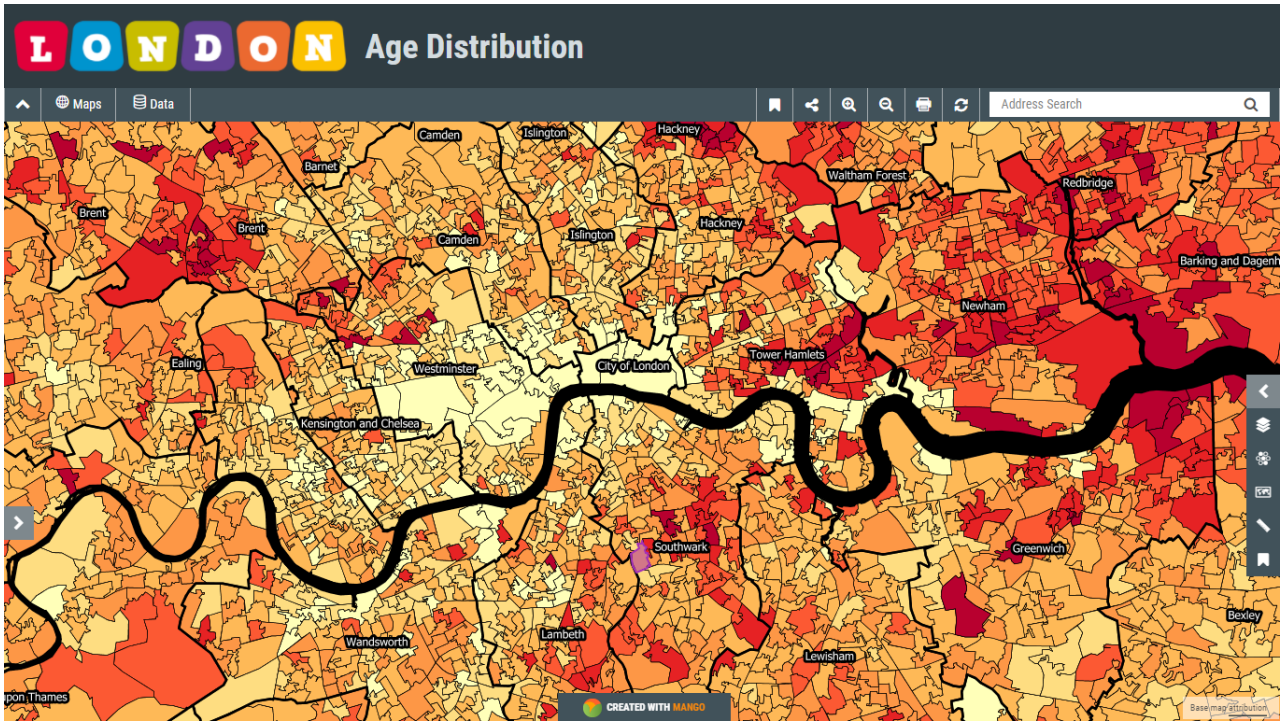
1. MAKING MAPS THAT AREN'T VISUALLY ENGAGING

The internet is the home of the limited attention span. When making desktop maps you're usually assured of a captive audience but for web maps nothing could be further from the truth.

Your web map will be competing with a host of other open browser tabs all containing colourful and engaging websites that are vying for your users attention.

Your web map needs to be able to stand shoulder to shoulder with those distractions by using the same tactics as regular websites:

- Bright / bold colours
- Large, easy to read fonts
- A clean uncluttered interface

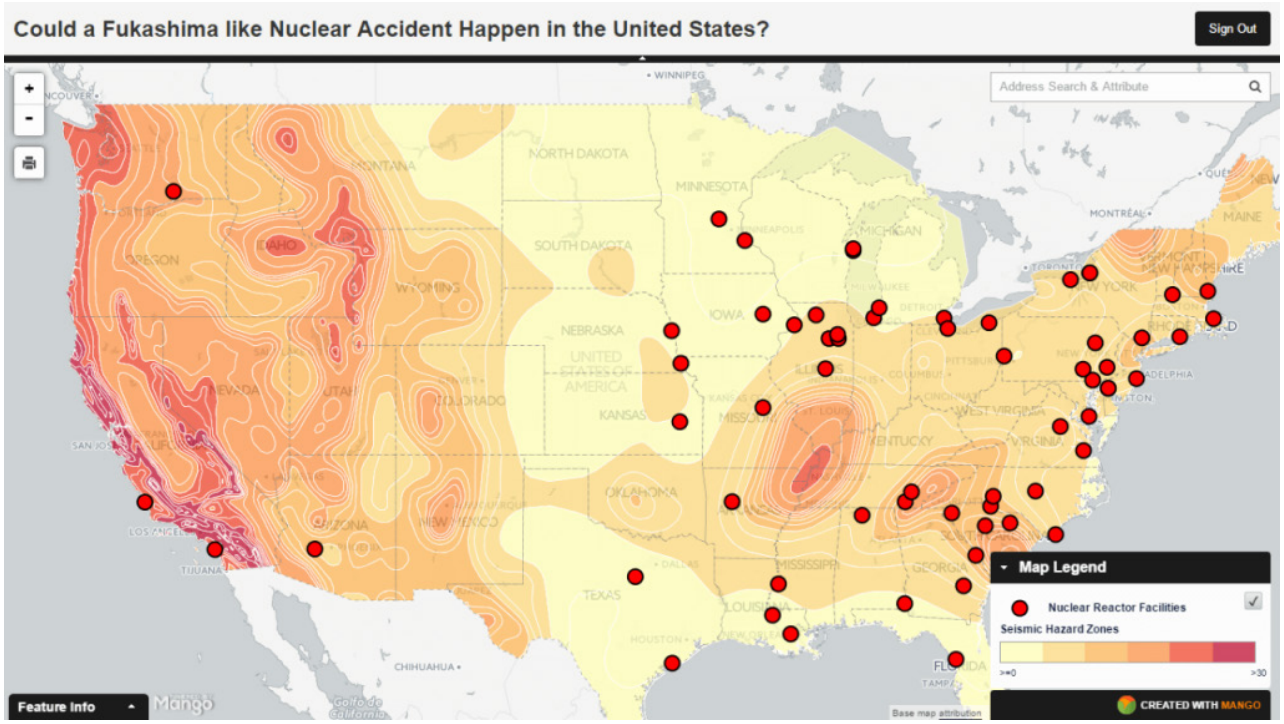


London Demographics map

2. MAKING MAPS THAT DON'T TELL A STORY

Once again to push back against the limited attention span of web surfers, your map needs to get straight to the point.

You need to produce focused maps that try to convey a single message in a clear and concise manner. You need need to follow the advice of Steve Krug's classic 2005 book *"Don't Make Me Think"*. If the message contained in your map isn't loud and clear your web map will experience a high abandonment rate.

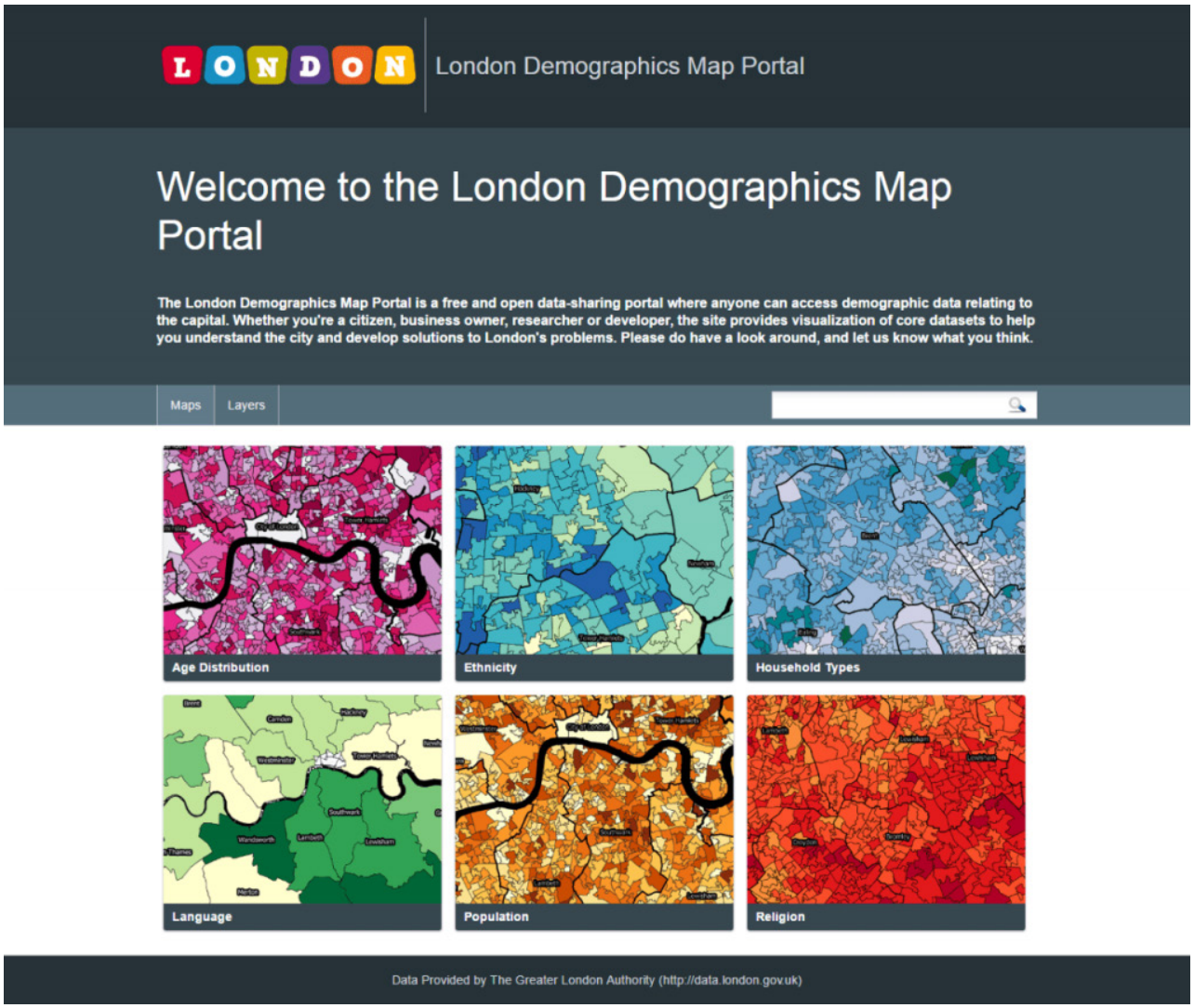


Could a Fukushima link Nuclear Accident Happen in the United States?

3. CREATING WEB MAP PORTALS THAT CONTAIN TOO MANY DATASETS

This point follows on from the last. The opposite of the “map story” is the map portal. A web map portal tries to cram as many datasets as possible into a single web map. This may be the easiest way to publish your data, but it is far from the best user experience and most users simply won’t have the patience to explore all of the layers presented.

Your users will be better server by a web portal that contains a separate page for each dataset with a link to a story map that best showcases the usage of that specific dataset. Individual pages will also make it much easier for your users to discover the datasets via a search engine.



London Demographics Portal

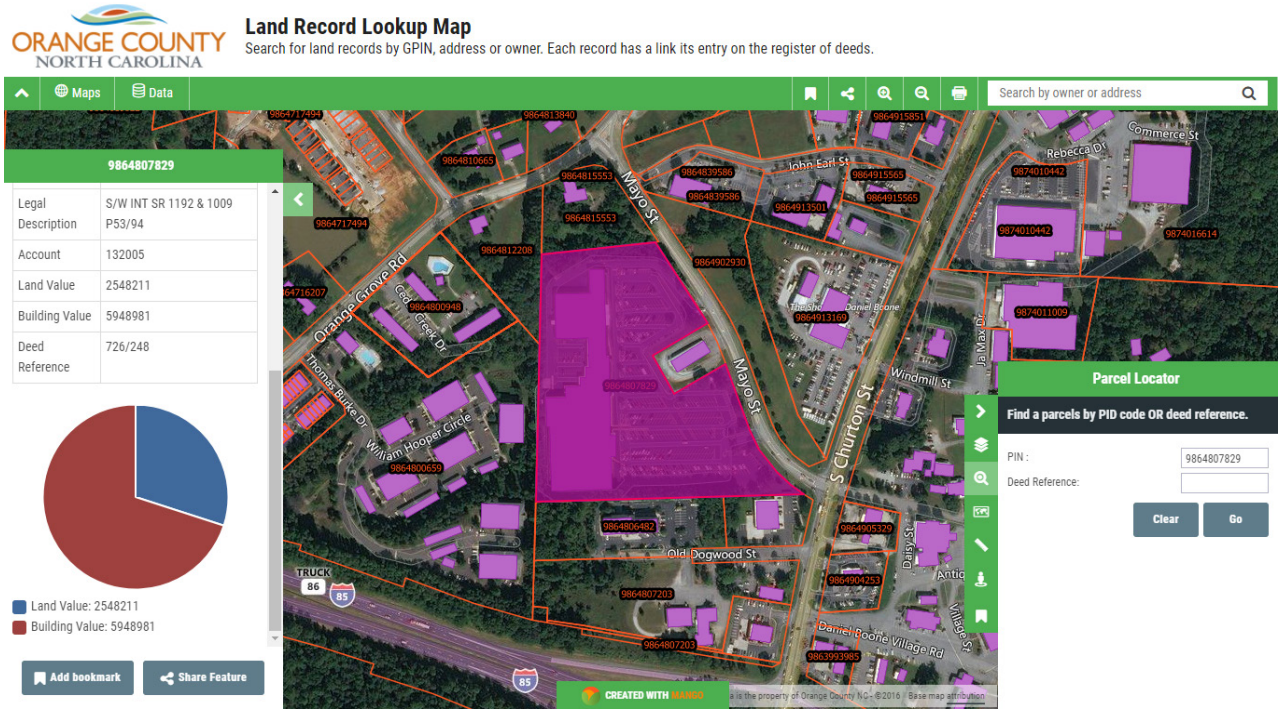
4. MAKING YOUR WEB MAP LOOK LIKE A DESKTOP GIS

"The most common mistake in design is to assume that the users of your design see the world in the same way as you."

Most users of your map will have never used desktop GIS software and their interactions with digital maps will most likely have been with Google Maps. They will expect the same level of simplicity in your web map application.

Try to avoid:

- Big legends with many layers that can be turned on and off
- Mouse navigation that differs from Google Maps
- Not having a clear map title or description
- Complex toolbars full of non-essential tools



A parcel lookup map should be laser focused to deliver answers without any unnecessary clutter.

5. IF IN DOUBT, TAKE IT OUT

In short, you should strive to make your application **as simple as possible** in order to improve usability. You should strive to *remove* features from your web map, rather than add them—and the more you can remove the better.

It's time for that measuring tool and overview map to get the chop! Does your thematic map of U.S state poverty rates really need a search function?

If a feature doesn't in some way help to convey the story of your map then it has no place being there and should be removed. The same goes for map layers, if a layer isn't adding something to the narrative of your map story then it needs to go. Also remember to remove any attributes from your identify popup windows that aren't related to the theme of the map, they are nothing but a distraction.

SUMMARY

Web mapping isn't a new paradigm it's simply a new medium; a medium that's very easy to transfer your existing map making skills to—provided you remember that when it comes to the world of the web:

less is always more.

Best Practice #4:

5 THINGS GIS PROS SHOULD CONSIDER WHEN BUILDING A WEB GIS

Web GIS applications are becoming an ever more common requirement in GIS projects and as GIS professionals we are often being taken out of our comfort zone when it comes to developing and deploying these online systems.

Tools like Mango are removing most of the pain from web mapping by allowing applications to be built without writing any code or managing any servers, but there are still some important considerations to be made when moving our maps from the desktop to the web. Below are some of the most important.

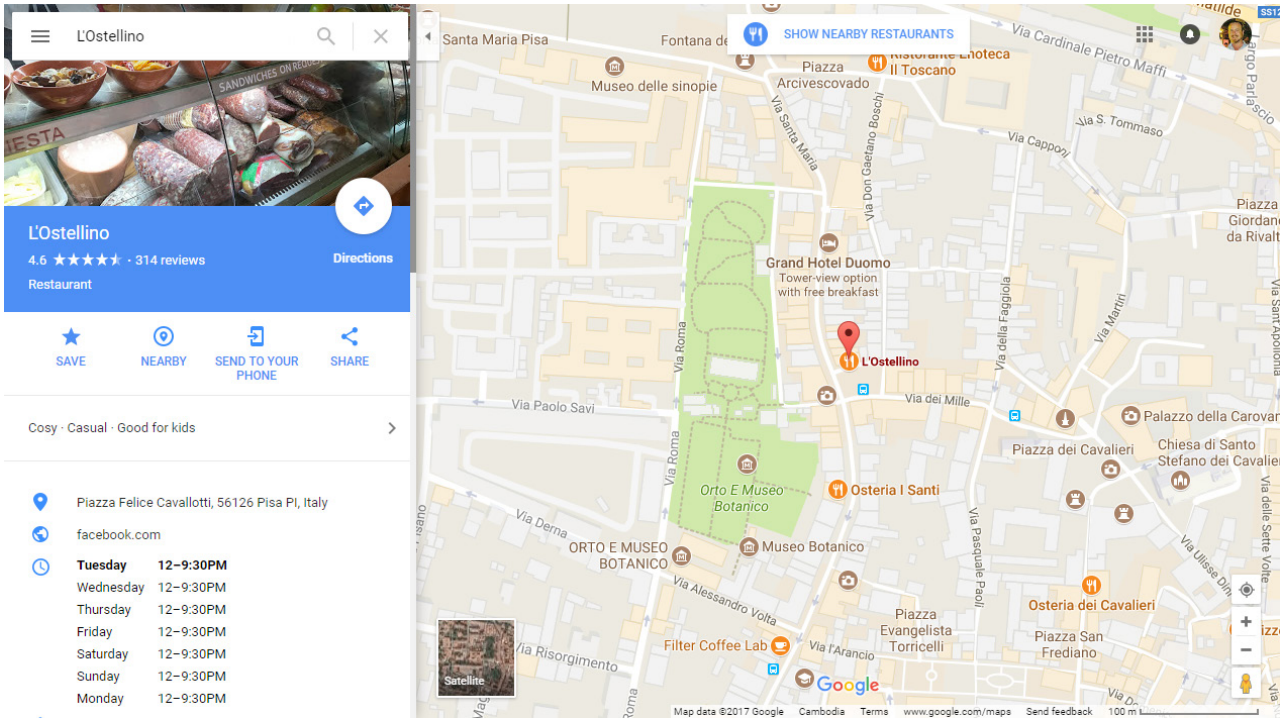
1. MOST WEB MAP USERS DON'T KNOW WHAT A GIS IS

> ***"The most common mistake in design is to assume that the users of your design see the world in the same way as you."***

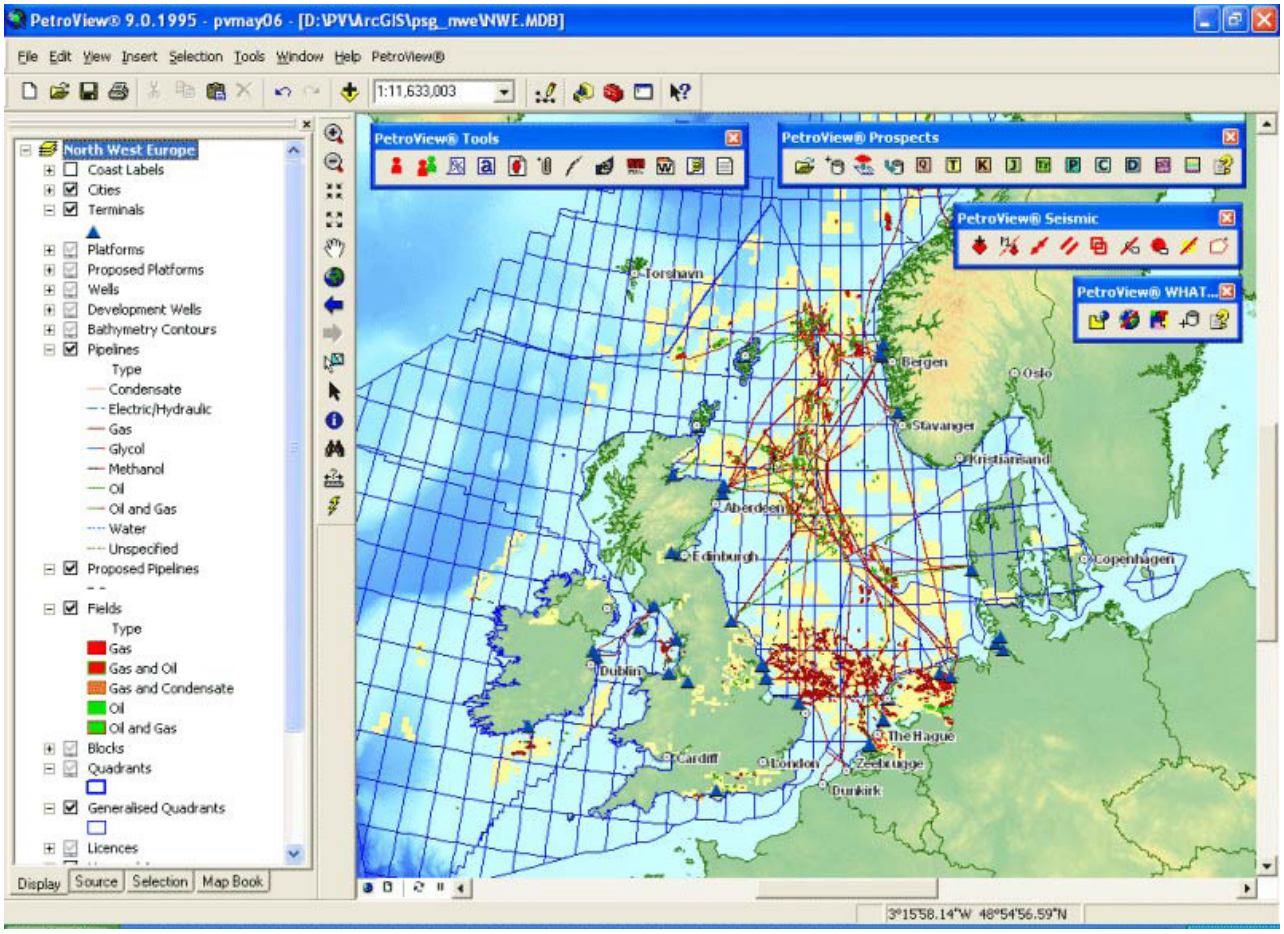
In most cases the vast majority of web map users won't even know what a GIS is, never mind know how to operate one. This is actually the great attraction of web maps, it gives us the opportunity to put the power of GIS in the hands of a much larger audience, but at the same time we need to consider how to serve up that power and insight in a format that is user friendly, accessible and intuitive.

The majority of web map deployments are overseen by someone with a background in GIS, therefore it's not surprising that the interface of many

web maps look quite a lot like that of a desktop GIS, this is something we should aim to avoid. What users are familiar with is Google maps, so when making your web map, your are aiming **for this:**



Not this:



Google Maps is really a different beast to what we are producing in terms of web maps as GIS professionals, but we should certainly take inspiration from its simplicity and accessibility.

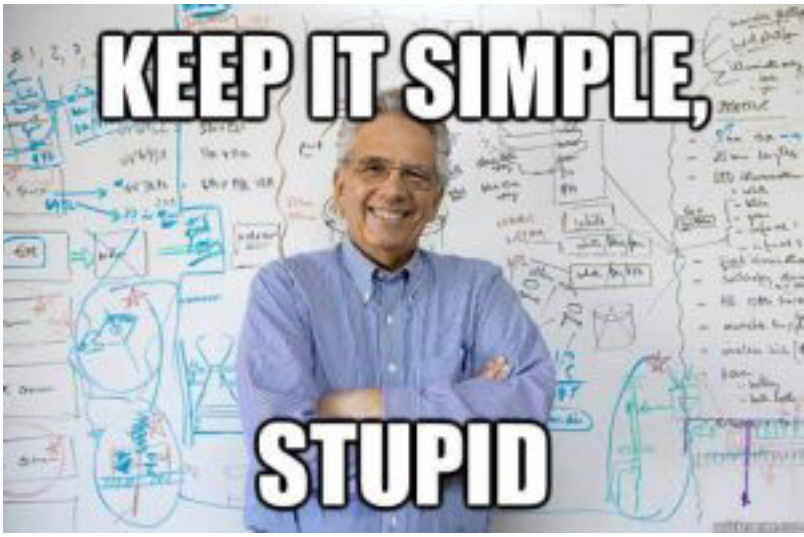
> *"Any intelligent fool can make things bigger, more complex, and more violent.* ***It takes a touch of genius — and a lot of courage to move in the opposite direction."***

— E.F. SCHUMACHER

2. LESS IS ALWAYS MORE & THE KISS PRINCIPLE

The most common mistake we as GIS professionals make when creating web maps is to try an make a single map do too much. This means it's either conveying too much information or is drowning the user in tools and buttons. Web users don't have the patience for a learning curve, they will just hit the back button the second they feel overwhelmed.

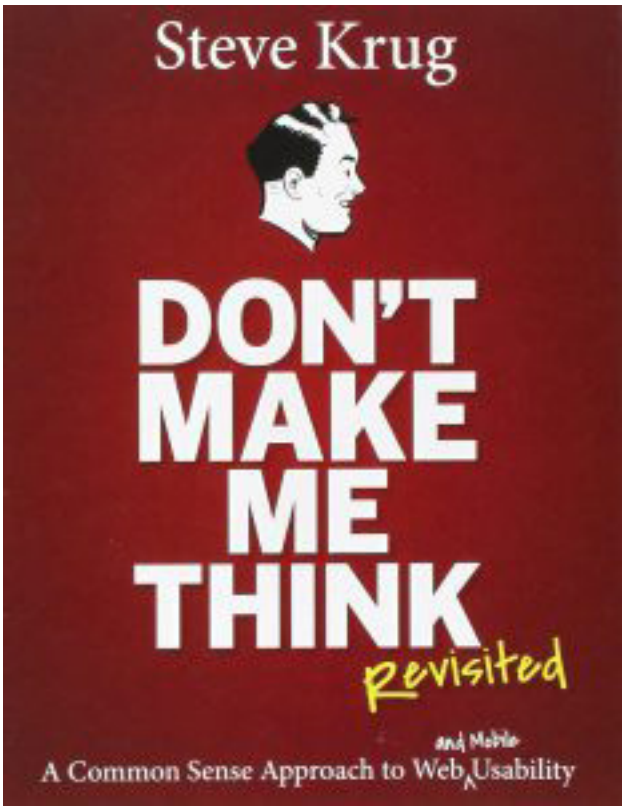
In short, you should strive to make your web map as simple as possible in order to improve usability. You should strive to remove features from your web map rather than add them and the more you can remove the better. It's time for that measuring tool and overview map to get the chop! Does your thematic map of U.S state poverty rates really need a search function?



If a feature doesn't in some way help to convey the story of your map then it has no place being there and should be removed. The same goes for map layers, if a layer isn't adding something to the narrative of your map story then it needs to go. Also remember to remove any attributes from your identify popup windows that aren't related to the theme of the map, they are nothing but a distraction.

3. DON'T MAKE YOUR USERS THINK

If we look at the evolution of the map it went from hand drawn, to print, to digital and now to the web, with each iteration in this evolution the attention span of the audience has decreased.



A web map is now vying for the attention of its users in a sea of content and online distractions.

When a visitor sees our map for the first time we have a matter of seconds to convince their conscious and unconscious mind that there's something here worth seeing, otherwise the user will be reaching for the back button.

This means that the user shouldn't be left guessing what the map is about. The map should have a clear title, a simple clear legend and an obvious message or narrative. It's better to make a series of small, simple, laser focussed maps than it is to try and make a single map that tries to do it all.

4. WEB MAPS NEED TO BE OPTIMIZED FOR SEARCH ENGINES

For most users the gateway to your web map will be Google. Search engines are the maps of the internet, without them we are completely lost and unless we please the Google gods we will never be given a prominent position. On this metaphorical map we need to ensure our web map is a capital city, with a prominent symbol and large typeface. We definitely

don’t want to be a small village with a tiny symbol and a label that can only be made out by those with the keenest of eyesight.

Google uses the text on the page to figure out what the map is about and include it in the results for relevant search queries. If you followed the rules in the previous section about making it clear for users what the map is about, then is will be clear also for search engines by default.

5. WEB MAPS NEED TO BE OPTIMIZED FOR SPEED

When making maps on the desktop we rarely need to think about speed, all of our data is on the same machine or network as the client. With web maps we don’t have this luxury, the data we display on the map needs to be downloaded from the server to the web browser.

Rather than using vector data (that contains the raw geometry) the de facto standard in web mapping is render the map layers as a bitmap image and send them to the web browser as tiles.

The average web map tile is around 60KB, it doesn’t matter how many layers it contains the size will remain around the same. So it doesn’t matter whether a single tile set contains one layer or twenty, it will still have the same size and take the same time to load.

In a desktop GIS we are able to turn all of the individual layers on and off. In web map we can do the same, but each layer or group of layers that we allow to be turned on or off in the legend is a new tile set, with each tile set stacked on top of the other.

Every additional layer that we add as an individual tile set will double

the number of tiles that need to be downloaded. Therefore the larger the number of tile sets on a single map, the slower the map will become.

In order to keep your maps fast it's best to use as few tile sets (called layer groups in Mango) as possible.

For example this would be slow:

- Layer group 1: roads
- Layer group 2: rivers
- Layer group 3: cities
- Layer group 4: hospitals
- Layer group 5: GDP by county
- Layer group 6: Employment rate by county

If we put all of this in just **two layer groups**, it will load much faster:

- Layer group 1: Employment rate by county (off by default)
- Layer group 2: roads, rivers, cities, hospitals
- Layer group 3: GDP by county

In the first example the browser needs to load six tilesets when it loads. In the second example it only has to load two and the user has the option to also later turn on the Employment rate by county. By putting the employment layer on top, it will draw over the other layers when the user comes to turn it on, aiding discoverability and usability.

A web map server should also use caching so that the map image only needs to be rendered by the web map server once, on subsequent requests it just fetches the previously rendered map tiles from the file system which is much faster. Mango uses multiple levels of caching and as a result a map becomes faster once it's in active use because the caches have been warmed up.

SUMMARY

As you can see when it comes to web mapping there are many factors that need careful consideration above and beyond what we are used to when creating maps on the desktop, but with a little planning and a focus on speed and simplicity these challenges can easily be overcome.

Integrating with Mango

Mango fits seamlessly into your existing workflows and processes.

INTEGRATING WITH YOUR DESKTOP GIS

Desktop or server-based GIS are commonly used by local government to store, manage, and analyze geospatial data. However, they provided limited scope for sharing maps within the organization or the public.

This is the strength of an Online GIS.

The goal here is not to completely replace desktop GIS, but to leverage the strengths of each system to bring maximum benefit to an organization and the public it serves.

One of the main considerations is how to ensure that updated data stored in a Desktop GIS is also available in your Online GIS. Having your colleagues or the public take decisions based on outdated information could lead to costly mistakes. Having up to date information at all times is crucial to the function of your organization.

Mango takes the pain out of synchronizing your offline GIS data with your online maps and data with a couple of easy to configure tools.

Data Re-upload

The first method, “Data re-upload” is a manual process suitable to situations where data changes infrequently and you want to have full oversight of the update process. For example, if you have quarterly or annual updates to apply, then this tool is perfect for that process.

By simply locating to your dataset in Mango, you can click the Re-upload button, browse to your data and select the new files. Once the upload is complete, your maps will automatically update with the new version of the data.

We have inbuilt validation tools to ensure the integrity of your data in Mango to ensure that nothing goes wrong in the re-upload process, thus giving your peace of mind when applying important updates. The main benefits of this tool are:

- Update your background data without having to touch your web maps
- Automated checks and validation during the re-upload process
- Save time when applying data updates to your Online GIS

Automated Data Sync

Imagine — you work on your data in your desktop GIS, and magically, your web maps just.. update. Why work harder when you can work smarter?

Synchronizing your offline GIS data with your Online maps is a key challenge to address when choosing and setting up an Online GIS. Yet most solutions out there cost an arm and a leg and normally require an enterprise database and enterprise GIS on top of it, both of which are complicated to setup and costly setup and to maintain.

That's where our Data Sync tool comes into the picture.

This tool is suitable in cases where the data is updated frequently and the manual re-upload would become too time-consuming.

Data Sync lets you do complex work on datasets in your desktop GIS or spreadsheet application, and have changes updated on your web maps, without even logging into Mango.

After an initial data upload, simply point to a Dropbox folder containing that data and link it to Mango. Any changes to the data stored in Dropbox will automatically upload to Mango and update on any maps using that data.

This tool is a great time saver and gives you peace of mind that your users are always seeing the most up-to-date information in your maps. The main benefits of the tool are:

- Does not require a complicated back-end database to ensure data sync
- Does not require expensive server software
- Very easy to setup and administer
- Automated notifications if issues are encountered
- Never have to worry about whether your Online GIS maps are out of date

Best of all, your core data need not be stored in Dropbox; you can simply copy and paste new files to that folder, or write a script to export from your spatial database of choice to the Dropbox folder.

These two tools provide a way to update your data from a desktop/server environment to an online environment.

Of course, you can also go the other way; if you are editing or updating data in Mango, you can download that data in a spatial format and use in your offline environment. This gives you full access to your data to use it in your chosen Desktop GIS.

Additionally, Mango offers a number of possibilities to integrate your information stored in an external database such as a property deed or tax information with your online maps.

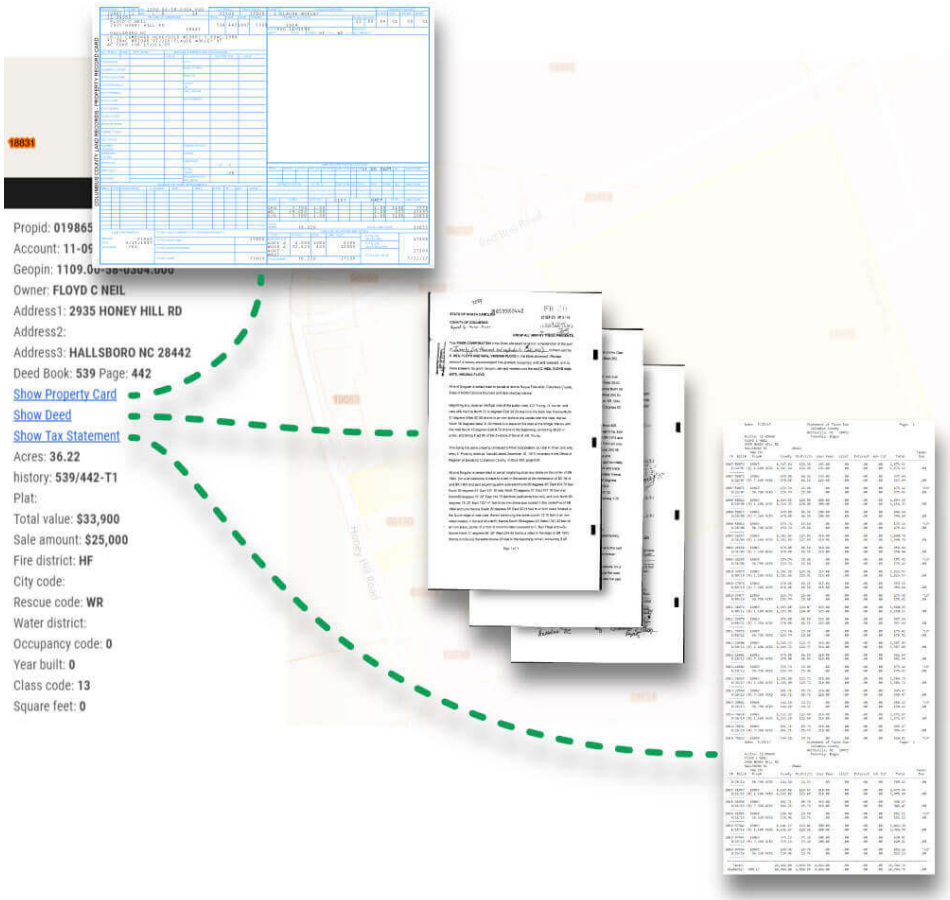
INTEGRATE MANGO WITH INFORMATION STORED IN A CMS

Mango offers useful ways to integrate your information stored in an external content management system or database.

Here are some ways you can set it up.

LINK FROM MANGO TO RECORDS, FILES, OR IMAGES STORED IN ONLINE CONTENT MANAGEMENT SYSTEMS

If you have documents, such as title deeds, photos or inspection reports stored in an online document management system, you can link these to features in a map in Mango. In the example below, three URLs are available to the user to access information about a property.



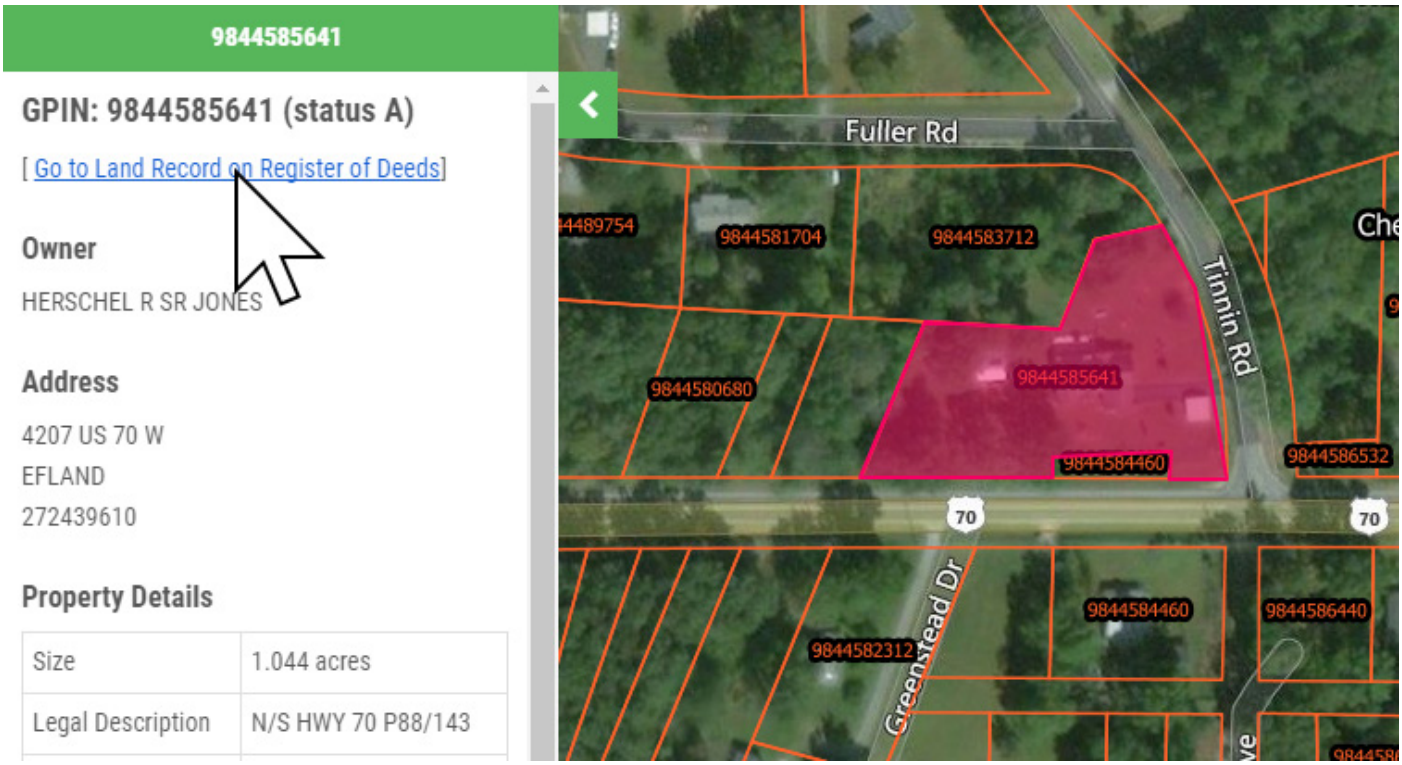
Using the Mango custom popup tool you can build custom URL's that include values from the selected feature. For example, if in our dataset we have a column called `ID` that contains the unique identifier for a deed, we can build a URL from within the Mango custom popup tool that links to our deed document in the following format:

```
https://orange-county.com/deeds?id={ID}
```

The `{ID}` component of the URL will be replaced by the ID of the feature clicked by the user, e.g:

```
https://orange-county.com/deeds?id=019865
```

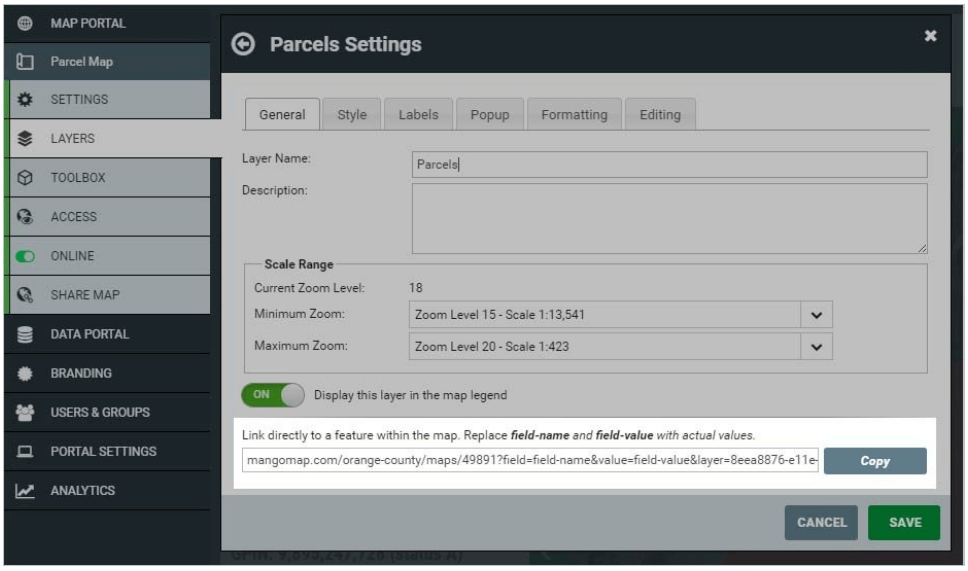
When clicked, the user will be taken to the specific deed in the County's external deed management system with that URL.



LINK FROM A RECORD IN A CONTENT MANAGEMENT SYSTEM TO A FEATURE ON YOUR MAP

In this scenario, we have some form of existing content or records management system and we would like records in that system to have a clickable link that when clicked opens your map then zooms to the feature, highlights it and opens the attribute popup.

To achieve this the first step is to upload our GIS data to Mango and retrieve the URL template for that layer as shown below.



Then in your content management system you can insert the relevant variables into the URL template in order to make a URL that links to that feature in Mango. For example, we change:

```
mangomap.com/orange-county/maps/49891?field={field-name}&value={field-value}
```

to

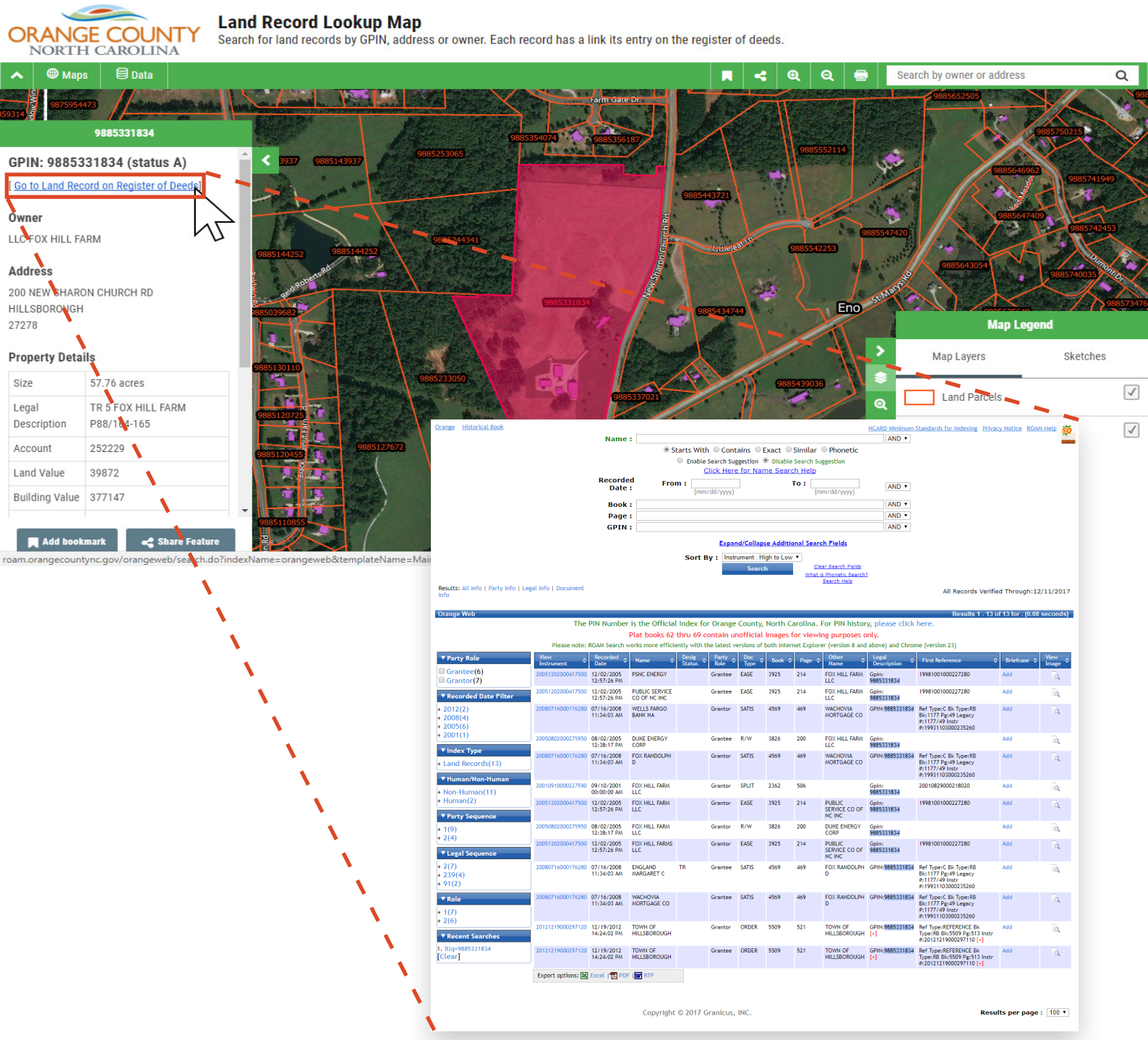
```
mangomap.com/orange-county/maps/49891?field=pin&value=9799028061.212
```

Where pin is the name of the attribute (or column in a spreadsheet or database) and `9799028061.212` is the value of the PIN column for the record we want to open in Mango.

> Tip: You will likely need to ask your web developer to create the links in this format in your content management system.

Clicking the link in your content management system will then open a web browser and take you to that record in Mango, highlighting the feature and showing information in a popup, as shown in the example map below.

We can also offer the reverse path - using the PIN value, we can also create links that take users directly from the parcel map to the register of deeds.



Increasing Visibility & Tracking User Statistics

INCREASE THE VISIBILITY OF YOUR WEB MAP

Never before has it been so important to work hard on improving the accessibility of your web application.

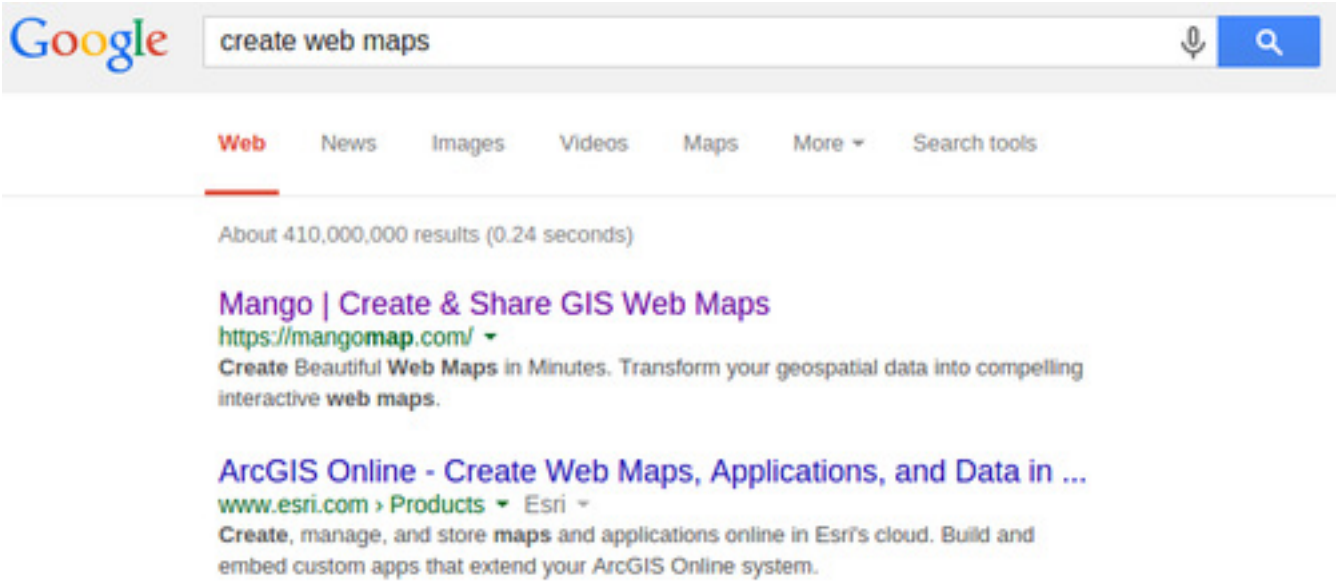
With over five hundred million active websites online, your shiny new web map is fighting for attention in a huge ocean of content.

As mapmakers, it's all too easy to spend too much time focusing on cartography and tools and forget that both are useless if our target audience can't find or access our map in the first place.

In this chapter we'll look at the four most important tips that will increase the visibility and accessibility of your web map.

1. MAKE YOUR MAPS SEARCH ENGINE FRIENDLY

Search engines are the maps of the internet. Without them, we are completely lost, and unless we please the Google gods, we will never be given a prominent position. On this metaphorical map we need to ensure our web map is a capital city, with a prominent symbol and large typeface. We definitely don't want to be a small village with a tiny symbol and a label that can only be made out by those with the keenest of eyesight.



So how do we get noticed by search engines? Firstly they need to know we exist, secondly they need to know what we are about and lastly they need to be given reason to think that we are important.

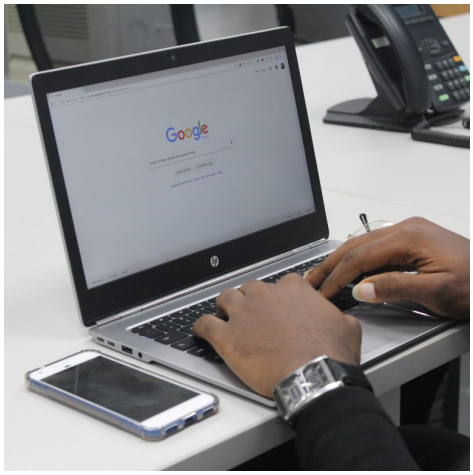
INDEXING

To be included in search engine results our site needs to be indexed. Indexing is carried out in one of two ways: the first is by programs known as “spiders”, these spiders crawl the web following links from one page to another. When they discover a web page that hasn’t previously been indexed, they send the content back to the search engine so that it can be listed. This means in order to get discovered in this way, another website or webpage that has already been indexed must have a link that directs to your web map.

The second way to get indexed is using something called a sitemap. A sitemap is submitted to Google and other search engines and basically says “here are a list of pages I would like you to go index”. Luckily for users of Mango, we automatically submit a sitemap of all your public maps to Google for you, so your maps will be included automatically.

PLACEMENT

Once Google knows that your web map exists it needs to figure out which search engine results page (SERPs) to place it.



It does this by analysing the text on the web page to try and figure out what the page is about. It places more importance on words and phrases (known as *keywords* in the search engine world) that are used in the URL, the page title, and any text that is using HTML header tags (H1, H2, H3 etc) or is more prominent on the page.

If your map is about national parks in Texas, you want to make sure that the works “Texas”, “national” and “park” are featured prominently on your page so that the search engines know they are important. This means making sure they are included in the page URL, in the page title (contained in the `<title>` HTML tag in the page header), and that they are used in the most prominent text on the page—which should be the map title—preferably using `<h1>` HTML tags.

It's also helpful to have the words in other sections of the page, but try not to go overboard and use the keywords in an unnatural way. Google and other search engines are very smart and know when people are trying to game the system, and will actually penalize your page if it thinks you are excessively loading the page with keywords.

Maps, by their visual nature, tend not to have a lot of plain text that can be read by search engines. Remember, **search engines can't see the text in images,** so can't use the labels or other layers displayed on your map.

This means that as mapmakers, we need make the most of the few areas of text that we do have. We need to pay careful attention to the names we give our maps, the names we give our layers in the legend, and make the most out of any other places where we can place text, such as layer descriptions or map landing pages.

The best strategy is to pretend the search engine is a human visitor who knows nothing about you, or your project, and can't see any of the images on the page.

Ask yourself whether a new user to this page is given a clear and concise description of what the map is about and what it contains. If the answer is yes, it's safe to assume that Google will index it correctly.

Once again, users of Mango don't need to overly concern themselves with this. We automatically insert the map name in the URL, the page's `<title>` HTML tag, and use the correct HTML tags to let the search engines know which text is important. We also give you plenty of places where you can add additional text such as the map description, layer descriptions, as well landing popups for the map.

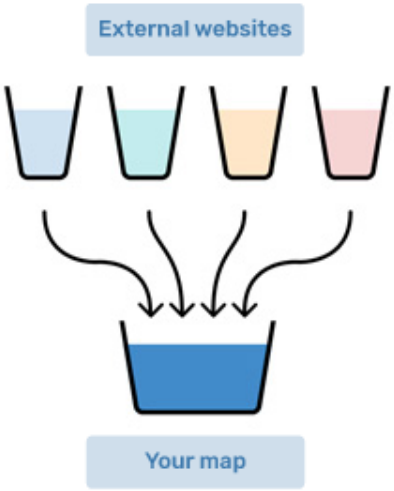
RANKING

So now Google knows that your site exists and hopefully it has a good idea what your site is about we can start thinking about pagerank. Pagerank is the position that your web page appears in the search engine results (SERPs) for a given search phrase, e.g.: *"map of Texas national parks"*. Obviously in order to increase discoverability we want to appear as close to the top of those results as possible.

Google places pages that it thinks are important for a given keyphrase at the top, so how does it decide what pages are important?

Firstly, it wants to see that the given search phrase is featured prominently on the page (as discussed in the previous section), but more importantly it wants outside sources to confirm that the content is important for a given search phrase. It does this by analysing the outside web pages that link to your page.

Websites that link to your page that rank well for your particular phrase and that have a high search rank themselves are the most valuable. For example if we want to rank well for "map of Texas national parks", having the National Parks Service (`www.nps.gov`) link to our map would be very beneficial.

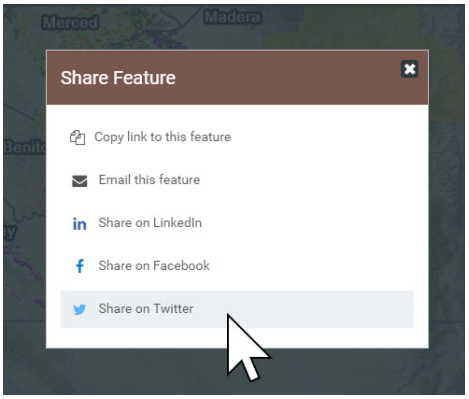


So you might be wondering what is the best way to get other sites to link to our map page? The answer is simple: **build a fantastic map that people want to share!**

In search engine optimization, content is king. If you build a great web map, people will naturally want to share it either by linking to it from their site or blog, or sharing it across social networks, all of which will help your web map climb up the search engine rankings.

2. MAKE IT EASY FOR USERS TO SHARE YOUR MAP

In the previous section we learned how important it is for your map to feature prominently on search engines if you want to ensure visibility and increase the number of people who can benefit from your map. We also learned that most important way to achieve that is by having people link to your map and share it across social networks.



This is why you should strive to make it as easy as possible for users to share your maps. You should enable users to share the map across social networks with a single click and provide snippets of code that can be used to easily embed the map in web pages, blogs or emails.

These sharing tools shouldn't be hidden away, instead they should be very visible and their use strongly encouraged.

In Mango we have a social sharing bar displayed by default on all maps which allows the map to be shared on Twitter, Facebook or LinkedIn with a single click. You can easily add social sharing buttons to your web map using free and simple tools such as AddThis or Shareaholic.

3. DON'T EVER, EVER, USE FLASH, JAVA, OR SILVERLIGHT

If you value visibility and accessibility the use of Flash, Java or Silverlight is the worst technology choice possible. These technologies are browser plugins and have nowhere near complete adoption. If you choose to use a technology that's based on a browser plugin, you will effectively be closing the door on more than 30% of your potential visitors.

I just checked the site analytics for Mango. The site receives tens of thousands of visitors per month and of those visitors 22% *didn't* have Flash support, 25% *didn't* have Java, and a massive 68% *didn't* have Silverlight.

In fact, Adobe has sunsetted Flash - it is no longer under active development, and isn't supported. Its obsolete.

Flash and Silverlight for webmaps: Just say NO!

Flash and Silverlight also aren't supported on mobile by either Android or iOS, which brings us nicely onto our next tip.

4. MAKE YOUR WEB MAPS MOBILE READY

With over 60% of global internet traffic now coming from mobile devices your web map needs to go mobile or go home. Never has mobile support been so important to the accessibility of your web mapping application and offering mobile support is no longer a novelty, it's a necessity.

Business applications often ignore mobile at their peril. They believe that business is still done on the desktop, and mobile can be put on the back burner.

This is very shortsighted.

Mango for example, primarily caters to business users and I can confirm from our own logs that over 25% of the traffic to the maps published on our platform came from mobile alone, up from just 20% last quarter.

Not only do you need to "support" mobile, you need to make it a first class citizen and ensure that the experience for the user is equally as rich and engaging as it is on the browser. Users will no longer stand for a stripped down "lite" version of your web map application on mobile, they want the full sugar, full caffeine version in the palm of their hand, 24 hours a day, from anywhere in the world.

"I would highly recommend Mango to anyone in local government, as it can become such an asset to your staff and community."

—GRAHAM SCOTT, GIS COORDINATOR/TECHNICIAN,
TOWN OF STETTLER, ALBERTA, CANADA

WEBMAP ANALYTICS

You created your shiny new fully featured web map, and now you are wondering how much impact is it having. Rather than relying on user feedback, wouldn't it be nice to know to have comprehensive and actionable data?

If something can’t be measured, then it can’t be improved. In this chapter, I'm going to show you how you can use analytics systems to answer questions that gauge the success of your web maps.

Questions such as:

- “How many people are viewing my map?”
- “How long are they using the map for?”
- “Where are the map visitors located?”
- “Where in the map are the viewing most frequently?”

These questions and many more can be answered using third party analytics platforms. After reading this chapter your will be up to speed on the two leading options when it comes to tracking your web maps. Google Analytics (free) and Maptiks (paid).

GOOGLE ANALYTICS

Google Analytics is a massively popular analytics tool on the web, and is the default choice for all web designers. It is currently used to collect traffic data for over 50% of all websites on the internet.

Google Analytics is a free tool and is simple to use. All you need to begin is insert a small snippet of tracking code on each page of your website, or in our case on each map.

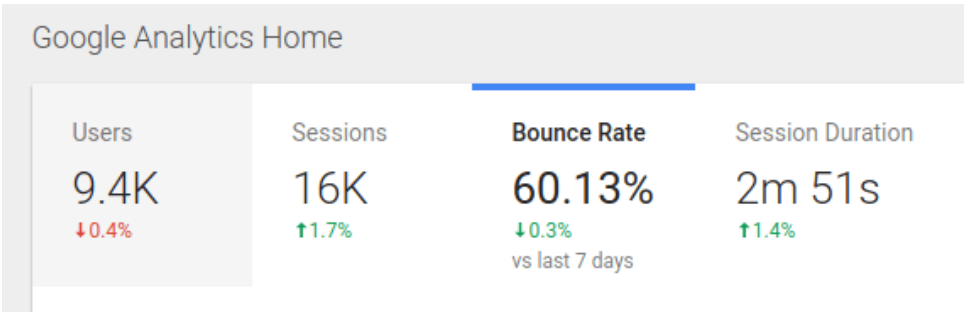
```
<script type="text/javascript">

  var _gaq = _gaq || [];
  _gaq.push(['_setAccount', 'UA-XXXXX-X']);
  _gaq.push(['_trackPageview']);

  (function() {
    var ga = document.createElement('script'); ga.type = 'text/javascript'; ga.async = true;
    ga.src = ('https:' == document.location.protocol ? 'https://ssl' : 'http://www') + '.google-analyt
    var s = document.getElementsByTagName('script')[0]; s.parentNode.insertBefore(ga, s);
  })();

</script>
```

Once installed you will begin seeing data in near real time and can view aggregate data for any period of time across all maps, or individual maps.



Google analytics dashboard for viewing map analytics

The key metrics tracked using Google Analytics are:

USERS

This is the total number of unique visitor to your site. When users visit, Google places a cookie in their browser, so next time they come they can detect if they are a new or returning visitor.

SESSIONS

The is the total number of times your site was visited and interacted with. This number is usually larger than users, as a single user might have had multiple sessions during the time period you are reviewing.

BOUNCE RATE

A bounce is when a user visits a single page your website (or map portal in this case) and leaves without visiting another page. For normal websites, a high bounce rate can indicate that the user hasn't found what they are looking for.

This metric is less relevant to maps as the map is a single page, and whilst using that single page the user can perform lots of different actions.

SESSION DURATION

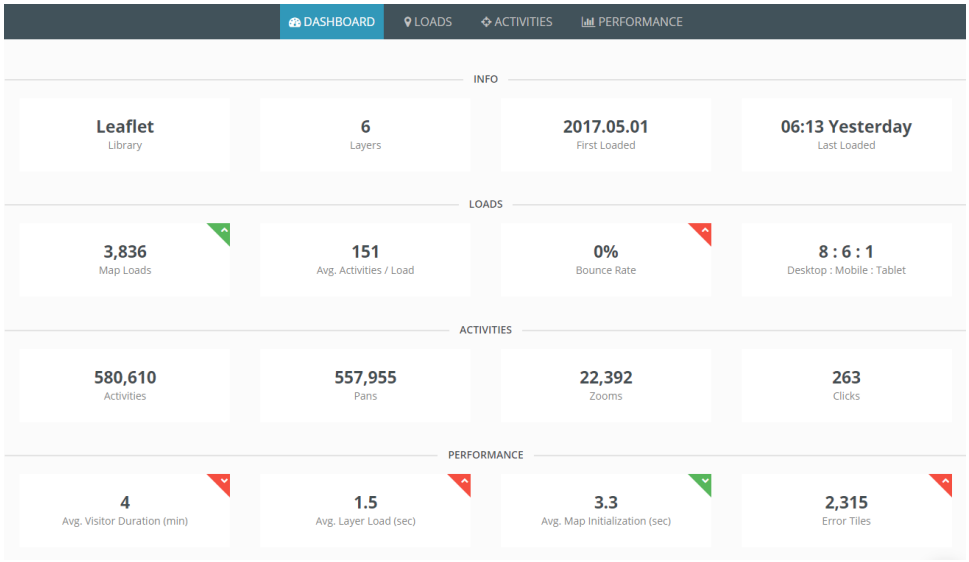
This is the average time that users spent on the site/maps. This metric is much more important for web mapping than bounce rate. A high average time on site would indicate that users find your map useful and stick around to use lots of features.

In addition to these key metrics there are dozens of other data points that can be viewed, such as the user's location, which device they are using to access the map and which website the user came from before viewing your map(s).

This data is often actionable and can be used to assess the impact of any changes or updates you have made. For example, an increase in average session duration would indicate that your maps are becoming more useful, or an increase in the number of visitors could indicate that marketing efforts are bearing fruit.

MAPTIKS

Maptiks is similar to Google Analytics and offers many of the same data points, but unlike Google Analytics, Maptiks was designed specifically for web maps and gives you access to some map specific metrics.



The Maptiks dashboard

The key metrics tracked using Maptiks include:

PANS & ZOOMS

This allows you to see how active the user was on the map. A high number of pans and zooms indicated high levels of engagement.

LAYERS

See how many individual layers the user viewed during the session.

ACTIVITY

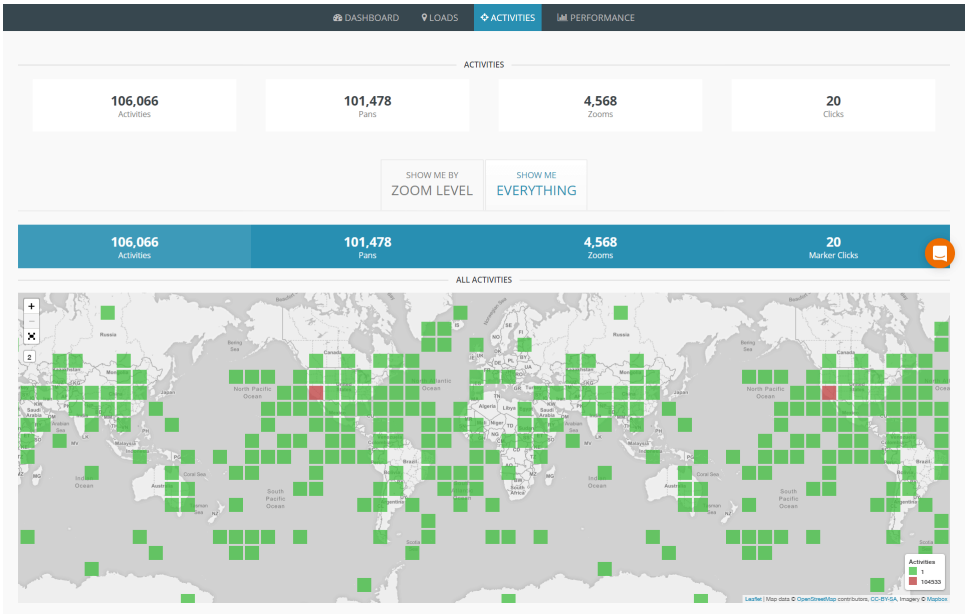
The number of clicks and queries the average user made during their session.

ACTIVITY HEAT MAP

See the areas on your map which had the most activity (pans, zooms, clicks). This will allow you to quickly build a picture of the areas within your map that are of most use to your users.

DEEPER INSIGHTS

Unlike Google Analytics, Maptiks is a paid service with plans starting from



$39 per month, but it offers real insights into both how and where your users are interacting with your maps.

Usage heatmap lets you analyze where users are viewing and interacting with your maps.

If you are investing heavily in your web mapping system, it's a sensible investment as it will give you a much clear picture of how your maps are performing and how they are being used.

The #1 Web GIS Choice for Local Government

Mango is about making the complex simple and transforming your data into answers for your community. To help you understand why Mango is the right choice for your local government's online map deployments, here's a run down of where Mango leads the way.

MANGO VS. ArcGIS ONLINE

Hundreds of organizations have chosen Mango over ArcGIS Online for their web mapping requirements and the reason is simplicity.

Mango is easier for you, easier for your accountant and most importantly of all it's easier for your users. Mango offers you the following benefits:

- ✔ **AFFORDABLE PRICING, NO CONFUSING SERVICE CREDITS**
  With prices that are super competitive, set in stone, and very easy to understand, you'll always know exactly how much your web map deployments will cost.

- ✔ **RESPONSIVE AND PERSONALIZED CUSTOMER SUPPORT**
  As a Mango customer you will be assigned an account manager with the experience and authority required to overcome any obstacles quickly and easily.

- ✔ **ADDITIONAL ACCOUNT USERS WON'T BREAK THE BANK**
  No need to purchase a license for every person you want to share a private map with. With Mango you can password protect maps or invite unlimited private users.

- ✔ **UNLIMITED NUMBER OF FEATURES IN A DATASET**
  Unlike ArcGIS Online, Mango has no feature limits in a dataset. It's as simple as uploading the data and styling it. No building tilesets or other complicated steps.

MANGO VS. ArcGIS ENTERPRISE (SERVER)

With a full server setup with ArcGIS Enterprise priced around $30,000, it's not for everyone. Consider additional management and security issues with on-site servers, Mango can offer the following advantages for small and medium GIS offices:

✔ WE GET UP IN THE MIDDLE OF THE NIGHT SO YOU DON'T HAVE TO

Anyone that's worked in IT knows that it's a fact of life that sometimes servers will fail. A hard disk might stop functioning, backup power might fail causing a hard shutdown or your ISP has a meltdown. And you can guarantee that the server will choose the worst possible time to fail. With Mango you can fully enjoy your summer vacation or Christmas lunch, with the peace of mind that we are monitoring the servers so that you don't have to.

✔ FIXED COSTS

Hosting your own server is like owning your own car, it needs regular maintenance and will likely throw up some expensive surprises from time to time. Mango's pricing is fixed, meaning you know exactly how much your web mapping system will cost and can budget accordingly.

✔ NO CODING

All of Mango's features can be configured and deployed in just a few clicks. Even complex spatial analysis and query tools can be setup in just minutes.

✔ FULLY MANAGED CLOUD STORAGE AND COMPUTING

With Mango, you don't need to lift a finger to keep your web maps online. That's our business, and we take care of the secure, reliable, and fast web map hosting for you, meaning fewer late nights updating and maintaining servers, and more time to do what counts.

MANGO VS. DIY

There's few things as satisfying as rolling your own web maps. Bespoke webmaping is an art in itself; assembling the many elements and coding them into a hyper-focused web map deployment. But it requires certain luxuries we don't all possess - coding skills across a range of programming languages, knowledge of the full stack of libraries, and not least significant time it takes to put together a coherent and comprehensive web map application.

For those that aren't full stack map spinners, Mango let's you build and deploy incredible interactive web maps, in minutes.

✔ COMPREHENSIVE SECURITY AND USER MANAGEMENT

Unlimited add-on named users, and robust user and group access policies that provide granular security access controls for internal and external users.

✔ NO CODING. EVER.

All Mango features are configured via an easy to use GUI. Database queries, spatial analysis, print tools - all can be deployed in minutes with a few clicks.

✔ ALWAYS UP TO DATE

Bespoke web maps look and work great - until something breaks. Libraries update, code corrupts, servers go down. Mango is a fully managed platform that is kept in tune, up to date, and monitored 24/7. We do the heavy lifting so you can spend more time doing what matters to your community.

Ready to get started?

Dive straight into GIS web mapping with a 30-day free trial of Enterprise plan on Mango.

Sign up at www.mangomap.com/sign-up

Questions?

If you have questions about Mango, we'd love to talk!

You can request a demo from one of our amazing team members. Just click the link below to book an appointment, and we will be in touch!

Talk to you soon.

Book an appointment at www.mangomap.com/contact

The Simple Online GIS

Make Amazing Interactive Web Maps That You and Your Users Will Love!