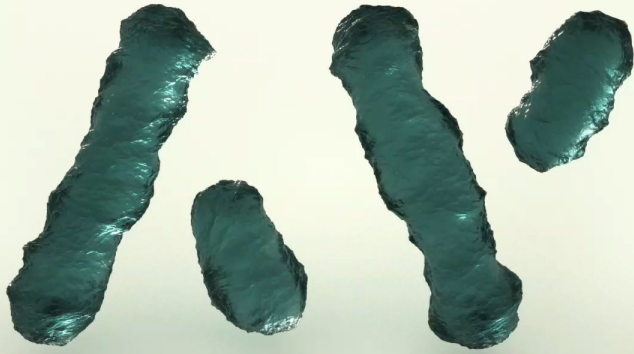


Map Whiteboard

02.12.2022

Stu Peter Beghin



We are going to speak about something that we call Map Whiteboard. That is not sth that I have come with on my own. It is a collective product of Plan4All, CCSS, Lesproject and BOSC organizations.

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(Stein) Runar Bergheim

Asplan Viak Digital services

- Alive since 1974
- Spatial planning & GIS since 1995
- Large carbon footprint since 1998
- Working at Asplan Viak since 2001
- Operating out of Brussels since 2014

- Professionalisation: R&D, land use planning, natural resources, system development
- Experience from Norway, Europe, Middle East and Northern Africa as well as a "smattering" of activities in Sub-Saharan Africa, South East Asia and the



I am Runar, I am working for a norwegian company Asplan Viak Digital services and I have a spacialization in research and development, land use planning, natural resources management and system development.

Google Docs for GIS?

What if we could collaboratively make maps and spatial data the same way we do with text documents using Google Docs?

The Map Whiteboard is essentially inspired by Google Docs. Back in the Dark ages when we were working on the same document with colleagues, the administration of it was quite a difficult task. Trying to synchronize the work of many people into one document, no matter if it was a research article, project proposal, etc. With the arrival of Google Docs, there could suddenly be 20-30 editors of the same document which in one way is a nightmare, but on the other hand, makes it possible to create content collaboratively and rather efficiently. So we've gotten rather used to writing documents collaboratively, but we are mostly dealing with GIS in our jobs, so we have started thinking, why wouldn't we apply the same principle on maps?



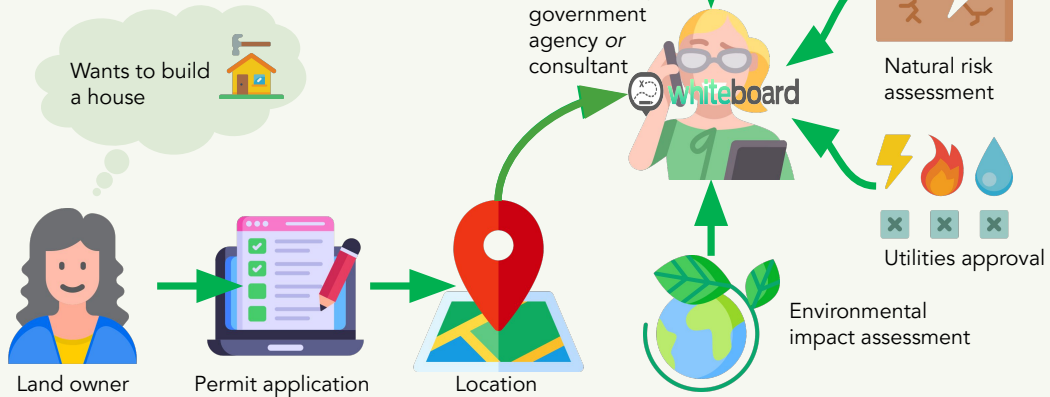
Collaborate on the Map

And we came up with the concept of the Map Whiteboard, which is ment to take away and digitalize some of the precesses that usually take place in the meeting rooms over the maps.

Let's consider a process where
Map Whiteboards may be useful?

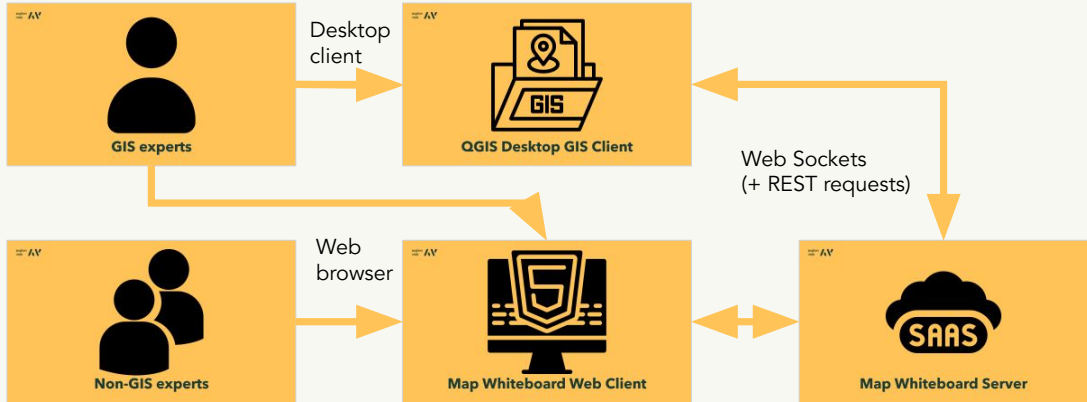
So let's consider some typical processes or use-cases where such a "Google Docs for maps" can be useful.

Improving the speed & efficiency of planning permit processes



We can imagine one very typical process. There is a land owner who wants to build a house. She doesn't know yet about all the cons of such endeavor, so she files a permit application. No matter if the permit application has been already digitalized, depends on the country you live in, it will always expect some way of specifying the location of the house, its desired plan, sizes, ... And then couple of organizations and government agencies has typically few weeks to assess the application, whether the house doesn't interfere with public roads, utility networks, isn't prone to some natural risks, etc. And each of those agencies has its own GIS system to assess the application, independently. And each of them will take some time for it. Map Whiteboard aims to bring those parties together and help them decide together and much faster, using one system and seeing the same as all the others in real time, sharing their maps and their knowledge. So that is the philosophy of it.

The Map Whiteboard Concept



So we have then put together a concept of such solution, that is supposed to work for GIS professionals, non-GIS experts and laic users and all of them must be able to use it. Ideally in their own GIS systems, or just a web map application, simple enough for regular users.



A tool for "everyone"

Simply said, we need a system for everyone. And who is the "everyone"?

Who is this «everyone»

Any professional in fields other than GIS

- A planner...
- A utility manager...
- An analyst...
- A farmer...

- People who may be tangentially familiar with GIS
- People who may be aware that there exist a social recluse in a neighboring office that works with GIS

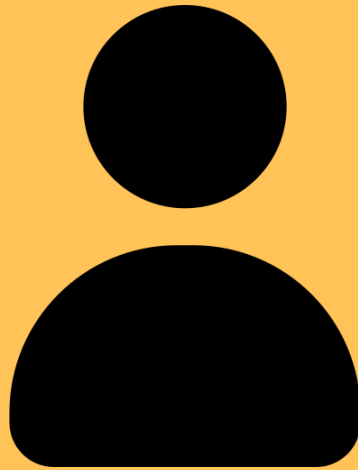
«People»

- A citizen...
- A resident...
- A visitor...
- A pupil...
- A student...

- Someone who'se relationship to maps principally is «Google Maps» (or clones thereof)
- Showing where something is located

In the process we have just described, it can be the land owner, a planner, the maintainer of utilities, local government associate, it can even be the public. Simply, anyone who is somehow related to the issue that is being discussed. People with simpler approach to maps, that don't necessarily have deeper knowledge of the whole "geo" world.

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A tool for "GIS people"

The GIS user on the other hand...

Who is a «GIS person»?

Someone who understands «language»
like this

- Maps
- Themes
- Datasets
- Data sources
- Tools
- Buttons
- Interaction
- Selection
- Features
- Geometry
- Attributes
- Geodata file formats
- «At home» in tools like QGIS, ArcGIS etc.

...is someone with the know-how of how GIS works, what is needed to work with geo-data and how do they relate to the real life situations. Someone who knows how to use the tools for geospatial data management and analyses, no matter if they work with open-source like QGIS or commercial solutions like ArcGIS.

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Map Whiteboard Web Client

And all those users will meet in one place and that is the Map Whiteboard Web Client.

Landing page

Describes what Map Whiteboards are about

Introduction and entry point for application

Demo video

Getting started



That is an HTML 5 application which runs in the browser like any other web page out there.

Content manager

Emulates the «file manager» in Google Drive

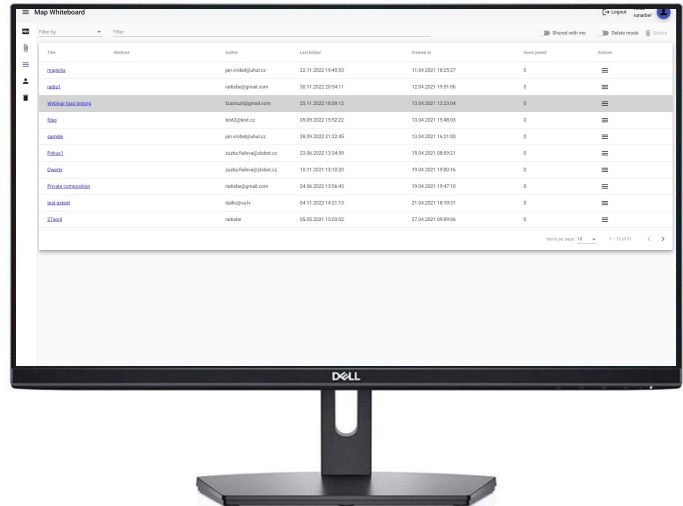
To collaborate, it is necessary to create a shared map

The equivalent of a Google Docs document

Maps can have preconfigured content and start-up extent

Maps gets a unique URL

Users can connect to the URL subject to access control



The core of this application lies in the content manager which allows anyone to create, upload, edit or share maps. All of it in the same manner as you go to the Google Drive and create, edit or share a Google document. Each of the maps created has a unique URL that you can take and share with anyone and subject it to access control, like who is able to get to the map, who can only read, who can edit.

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Map Whiteboard

Web map client based on Open Layers & HSLayers NG

Web GIS user interface with exploration and analytical tools

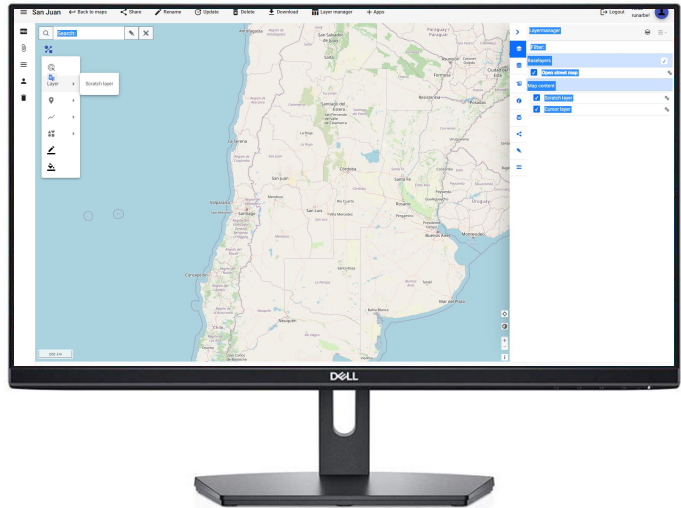
Can see the cursors of other connected users together with the name of the user

Emulate pointing on a map

Can collaboratively create and edit data

I create a feature, you edit it, a third person adds an attribute, a fourth downloads the resulting dataset

I can add KML, GeoJSON and WMS layers, you can see and edit them



When you open the map, you get to a web application. Application which is based on the Open Layers library and has been developed by us for a few years. Application that offers quite a broad set of tools and features, which can be extended by any other tools if needed, eg. some GIS analytics.

So, what do we need to meet the requirements of the building permit assessment process?

If we get back to our original use-case of a permit to build a house. What are the actual tools that we need to actually use in the collaborative process for maps.

Pointing: the index finger is our most important tool

No matter how trivial it can look, one of the most important tools is to be able to see where the other person is pointing to. So to see the cursor locations of other editors in real-time. Similar to the collaborative document editing where you can see anyone's current positions in the text. So in the web map client, you can watch the cursors of other connected users in the map.

Drawing: scribbling on maps is the necessary

Then the editors must be able to do make some sketches in the map to annotate or highlight certain locations. Those can be compared to the comments in text documents.

Adding information about

And, of course, to be able to add our own resources, data sets and map layers, that are somehow related to the problem, to the map. So you can add any existing external web mapping services to the map and immediately see the layers other users are adding. You can create new layers and draw point, line, polygon or text features to it. And all of this is synchronized to the other clients in real-time.

Eg. you may want to upload your data with the new building in GeoJSON, others will immediately see it in their map client. They can edit, point to it, comment. Utility network manager can add the WMS of their networks into the map and assess the conflicts with the building while others can see it too. But that is only one small example, of course. So that was the Map Whiteboard Web Client.

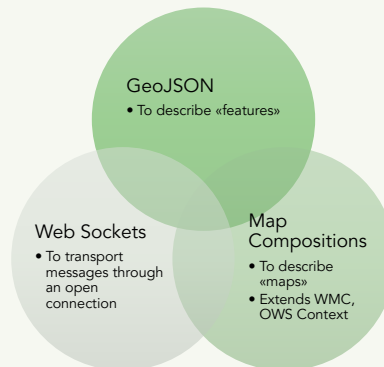


Map Whiteboard Server

Now, what is required on the server for this magic to happen.

What the Map Whiteboard Server does?

- Sharing state of cursors
 - You can see my cursor
 - I can see your
- Sharing state of spatial data
 - I can add a feature
 - You can see it
 - You can edit it
- Sharing map content & state
 - I can add a layer
 - You will see it
 - You can turn it on/off
- Node.js + MongoDB



We need some mechanism to exchange the location of cursors that move around. If I want to see the smooth movement, it requires to transfer the cursor info approximately 15 times a second. Then you can see my cursor, I can see yours.

You can add some features to the map, I see it too and edit it, change its attributes, etc. I can add a layer, others will see it, can turn it on and off. And all of this data must be synchronized all the time as quickly as possible.

The server is based on the Node.js technology with a MongoDB database and then there are three standards or specifications that allow us to describe all that is needed to transfer from one client to others.

GeoJSON is used to describe the cursor position as well as the map features that we are drawing in the map. But we don't want to share just single layers or data sets, we want to share the whole map. So there must be some format for map description. In the OGC universe there exist standards like WMC or OWS Context, but none of it would allow the level of interaction that we need for the Map Whiteboard communication. So we have made our own format for describing maps based on the JSON format. And finally, we use Web Sockets which allows to quickly and very efficiently transport messages through an open connection.



QGIS Desktop GIS Client

As mentioned before, we have the challenge to have a tool that suits everyone. The GIS experts and people that don't know, and doesn't want to know, anything about GIS. The Web Client we have seen should be sufficient for the latter group of users.

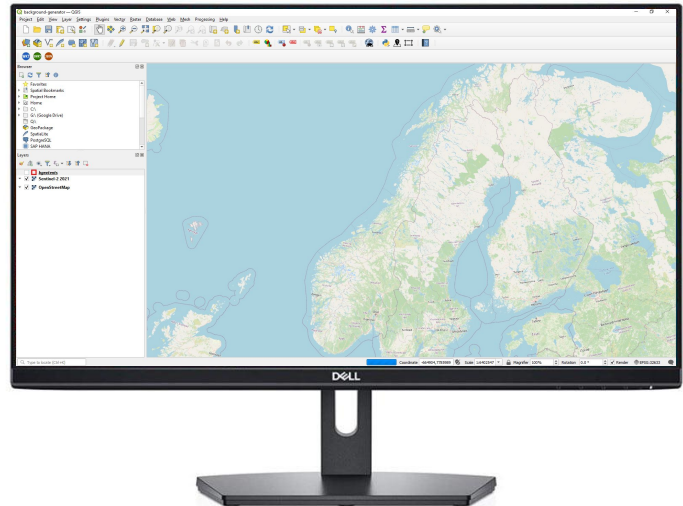
What if I need to do something complex?

The interaction between GIS/data analysis professionals and other users may be asymmetric

An expert may work in a sophisticated desktop GIS-tool with custom modules and extensive analysis capabilities

Other parties may optionally view and interact through the web browser

Right tool for the right job; level of complexity adapted to user type

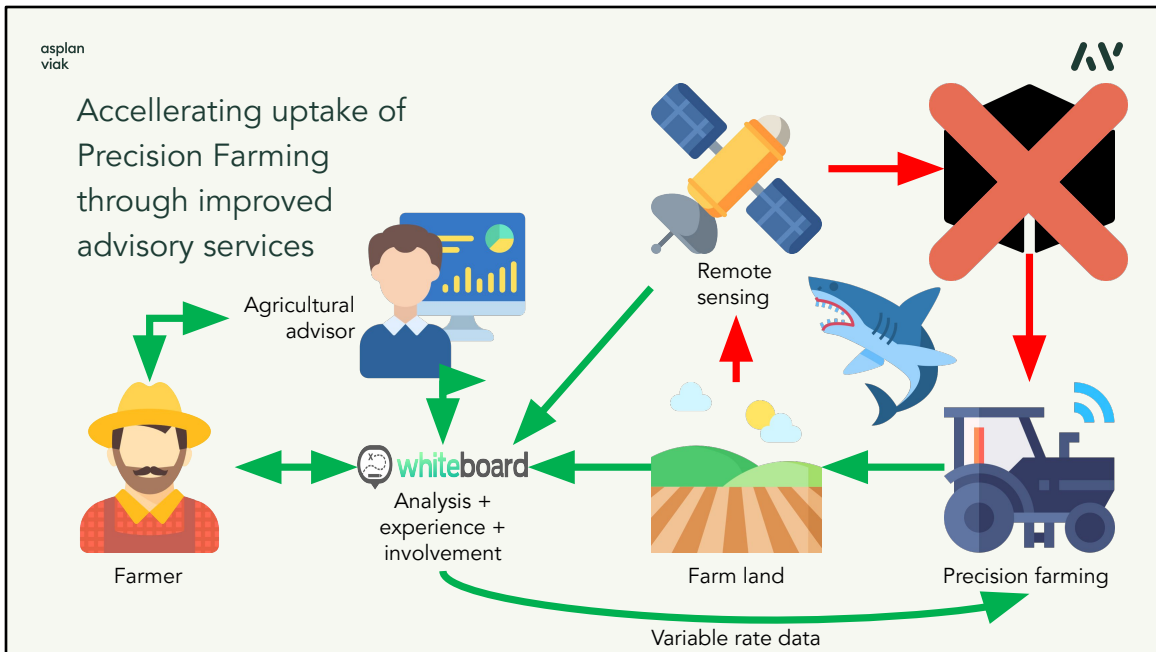


But for GIS users, we conceived we need a powerful desktop client for them too. And that is simply because there will definitely occur some cases where more complex tools or analyses will be needed to process the case. So we have faced a decision whether to try to integrate all into one client and possibly ruin the simple user interface for users that don't care or need anything else than to see a map, point at it and maybe draw something. Or we could make a plugin for a professional GIS tool like QGIS, that would allow us to have an asymmetric scenario where one user would be the expert using his or her sophisticated analyses and share only the results of it in the much more simple Web Client to others. And that is the way we used, so no matter if you connect through the Web Client or QGIS, you can still see the same map with the same content, but with very different user interface.

A long time in the making...

... but nine women can't make a baby in a month

All of this has been quite some time in the making. But again it is not so easy to do it and keep all the possible circumstances in mind.



What we are trying to do now is to develop some more business cases for the technology. And one of them is the uptake of more sustainable farming practices. For medium to large sized farms we believe the precision farming has an important role in that. What we observe is that although the concept of it is well known, the adoption in practice is very limited. We believe the reason is that the farmer can today talk to an agricultural advisor who can advise precision farming, but when the farmer asks for the tools for that at the equipment manufacturers, they mostly offer a black box solution that gather the remote sensing data for the farm and somehow processes them, but the farmer has no trust in the black box as it is, because the inside is not revealed and doesn't take into account local conditions and farmers experience.

And we see a place for Map Whiteboard here, where the farmer and his advisor can use their shared experience and work together. The advisor can access remote sensing data, run analyses on them using the advanced GIS tools, consult the results with the farmer and projects his remarks into the process. And produce eg. the variable rate map that can be sent to the machinery. Because the farmer will not usually blindly believe some black box, he needs to be involved in the processing.



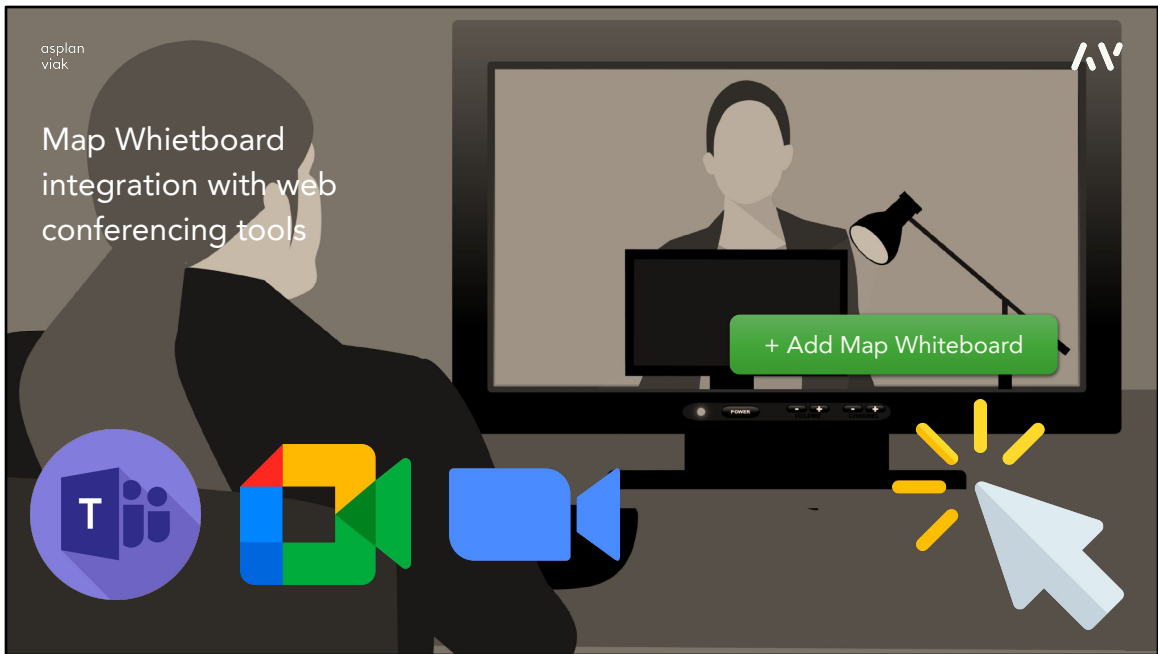
Massive increase in online meetings "since" the pandemic

Through the last years we have had a massive increase in online meetings due to the pandemics and people has grown comfortable with those.

Miro & Mentimeter have paved the way for augmented meetings



And part of that is that people started to use tools for so called augmented meetings where one can stick a yellow notes on the board shared in the meeting room, draw a SW solution schema together (Miro), fill in surveys (Mentimeter), etc.



And that is an opportunity for Map Whiteboard to become first geo-spatial aware plugin integrated into the conferencing tools. And that is something we have been currently working on and something that could help to make Map Whiteboard a widely used product.

Demonstration

by František Zadrazil

We now show the three basic concepts of Map Whiteboard in the live demonstration. There is a Web Map client on the left side and the QGIS on the right side. Both of them connected to one map created as a Map Whiteboard. The first tool or concept is the synchronization of cursor position.

The second way of interaction is the transfer of map layers data. I can use QGIS to run a geoprocessing analysis that creates a buffer around a polygon layer and the result layer is immediately synchronized to the Web Client.

The last concept covers the possibility to draw and highlight something in the map. I can create or select an existing layer and draw points, line or polygons into the layer and see it synchronized to the other client.

Thanks for the Attention

(providing you paid any)

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So what we have tried to show is a tool that can bring together experts and non-experts from different fields to solve a problem. To discuss over an interactive map without the need to gather all relevant parties at one place at a time. And we believe that Map Whiteboard can bring a new level of interaction into the map making.