Hub4Everybody

Open-source framework for spatial knowledge sharing

František Zadražil

What and why ?

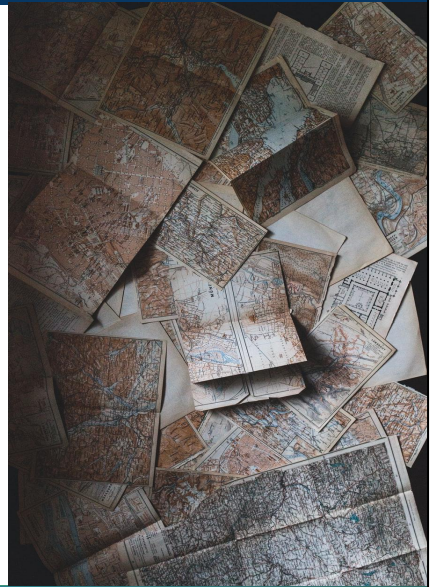Piling data sets from research & commercial projects

- how to **make it accessible** for colleagues & partners?

Need to share the results

Need to make publishing those results **as simple as possible**

- **everyone** must be able to do it

Without expensive enterprise **solutions**

What is Hub4Everybody and why have we come with it?
The need for such solution actually came from inside of our organization.
Many projects we have been cooperating on have produced many and many data sets over the time.
We needed some way to quickly and easily share the data and results with our colleagues or our partners in the projects.
The usual mechanism of such tasks is that one or a few GIS specialists take the raw data and publish it using some software in the form of service.
Even worse scenario is some shared folder is created from which other users take the data, make their own copies...and make a mess in it.

That is obviously not what we wanted. We wanted a simple tool so not only a few specialists are able to do the publishing, but anyone is able to do it.
There are for sure expensive enterprise solutions, but we always prefer solutions that are open and affordable.

Over the years we have been developing several so called digital innovation hubs, often as a part of some project and this gave us the chance to work
on the tools we need. So we have gathered the know-how and existing solitaire tools and have started to forge a complex and powerful data management workflow which is solely based on open source products that we have been developing completely or where we are contributing.
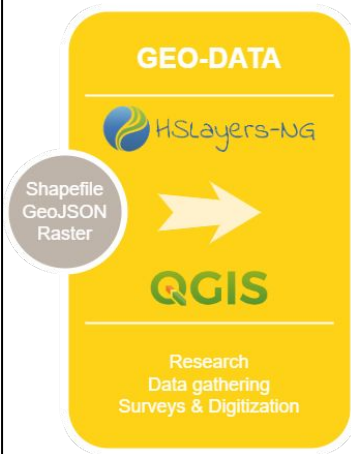
Web Portal solution to

publish geodata (OGC services)

create maps

share all of it

Hub4Everybody

The solution we have come up with is called Hub4Everybody. Web Portal complex solution for publishing geodata in the form of standardised services, for creating composite maps and for sharing all of those data with others.

Hub4Everybody Workflow

The workflow starts with your data in common formats like Esri shapefiles, GeoJSON files, KMLs or raster images. So you are a researcher who needs to publish the outcomes of your research, you are a students who needs to publish the result of student works, you are a local government administrative who is producing some data needed for decision making, maintenance, …eg. waterbodies, rivers, protected areas, …
Hub4Everybody ecosystem offers two applications to work with those data - web app based on HSLayers library, and QGIS desktop application with our plugin installed.

Hub4Everybody Workflow

Once you have such data, you can use web or desktop application to publish those data in the form of web map services. Those services are standardized by the Open Geospatial Consortium and described as WMS, WFS or time-aware WMS. When dealing with spatial data, we sure need to produce metadata as well.
So you take your data, no matter if you use the web app or QGIS app and publish the data as a service.

Hub4Everybody Workflow
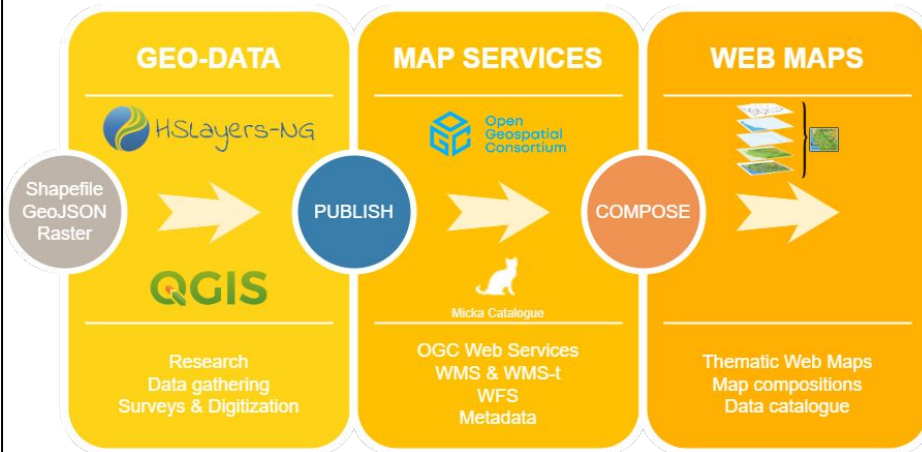
Once you published your datasets (eg. waterbodies, rivers, protected areas, …), you can take those and compose a thematic map from them. Or you can combine your data with other map services, eg. you take satellite images as a base layer of your map composition. Or you use some services provided by national providers, like cadastral service of parcels, etc. Hub4Everybody contains so called Data catalogue, where all your datasets and maps will be available. Depends on you to whom you will make it accessible.

Hub4Everybody Workflow
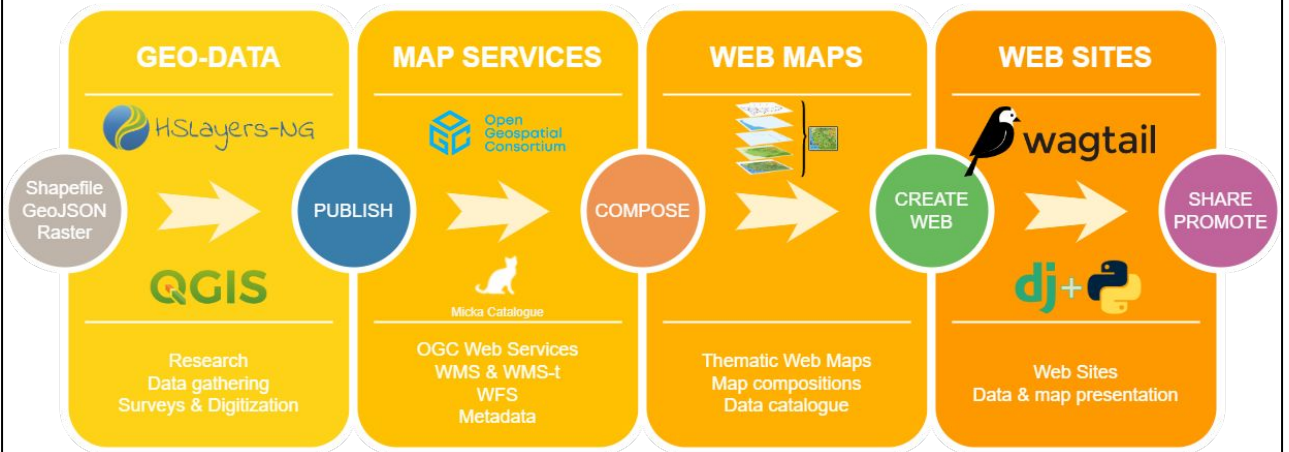
And there is one more step you can do at the end. Because the most understandable presentation of the data is probably not some map service, or even a map alone, but it can be really useful to present the map in some context. And that is when the web content management comes into play.

Hub4Everybody is map oriented, but is still a web portal. So the basic thing you can do with it is to create web pages, web content. But here you can also closely integrate your maps into the web pages. So you can put the map along with some descriptions, legends, videos. You can make a so called story map, which displays the map in the context of some story, eg. you could make a web page about rivers in Argentina and support it with the interactive map.
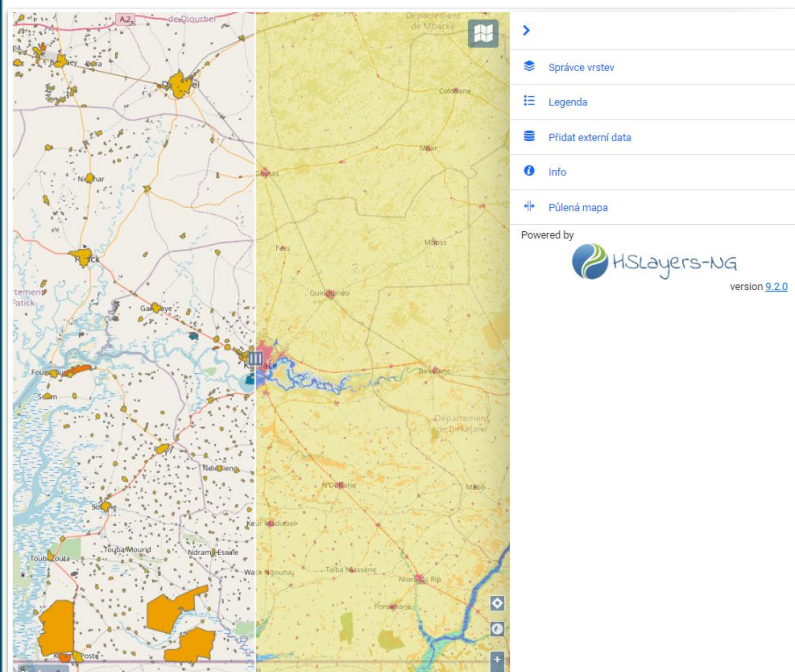
Demo

Web App

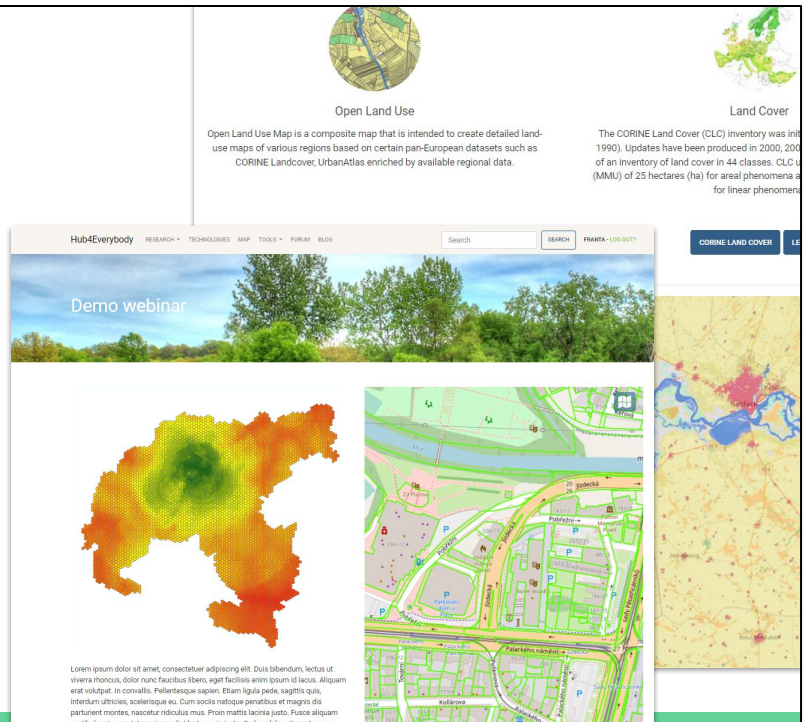QGIS plugin

CMS

Mobile

https://hub4everybody.com

Live demo of the data publishing workflow.

Hub architecture

- Map oriented Web Portal
  - Content management
  - Blog
  - Forum
- Web & desktop GIS clients
- Geo-data publishing service
- Metadata catalogue
- Mobile app connection

To wrap up what we have seen…

Hub4Everybody can seem to be a regular web portal that offers some content, blogs, forums. But the main difference is that Hub4Everybody is mainly oriented on maps.

There are tools dedicated to maps or to geo-data processing even if you don't have to necessarily see them as a user.

You will most likely use the web client or desktop GIS SW (we are offering a plugin for QGIS). You might want to search in the metadata through our catalogue or use your data on your mobile phone via the QField app which has been also recently connected to our hub solution.

Hub architecture
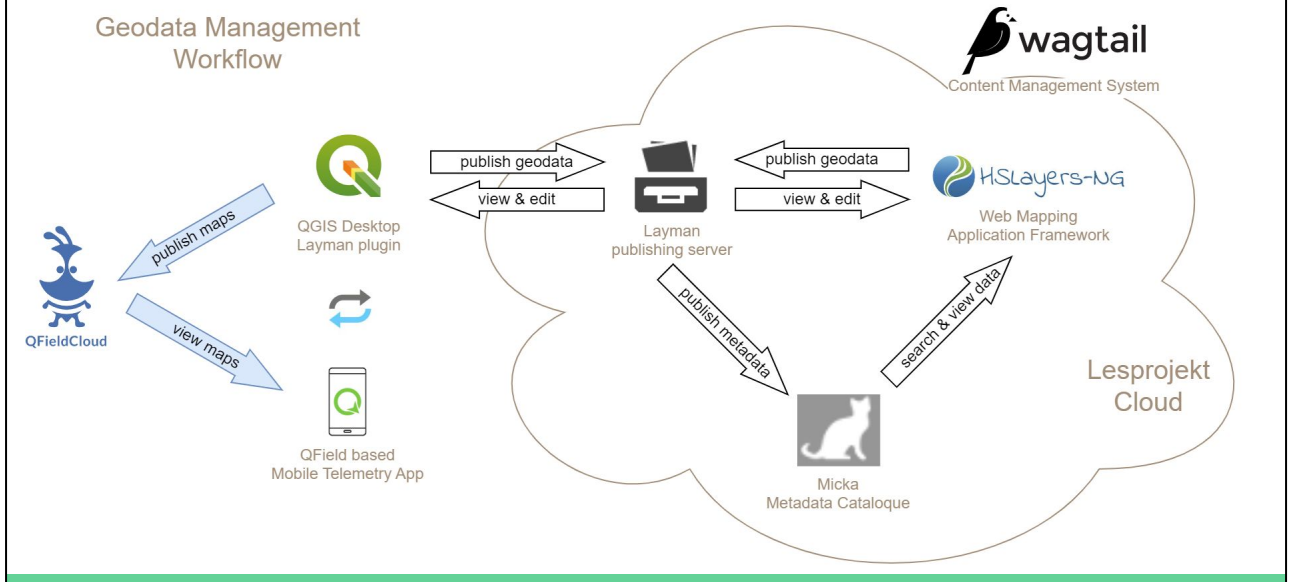
We said there is some geodata management behind that portal. Let's briefly introduce this workflow and its components. We can now overview what components are there and what is their purpose.

All the web portals must be built on top of some content management system. We have recently moved to less complex but much more user friendly and easy to understand CMS called Wagtail. The main task of CMS is to build the web content like pages, blog posts, forum threads or web forms. So for the user, Wagtail represents the entry points of the system. But there are many more and important components behind.

For years we have been developing web map framework for building interactive maps. That framework is called HSLayers and I will show you this in more detail in a minute.

And while we are talking about publish geodata, there must be something which will do the actual publishing. And that is Layman. Layman is basically a web service which turns your geodata stored in physical files like geojsons or shapefiles into the OGC standardized services like WMS and WFS.

Of course if you are dealing with geodata, you will probably want to store its metadata as well. That is the task for Micka metadata catalogue. It actually works automatically, so everytime you publish some layer or create a new map, it is instantly propagated into the metadata catalogue. And that applies also to any later changes.

It is important to say that it is not a single monolithic SW, but a collection of components integrated together. But each of it can work even as a separate instance. The two remaining components, you see, are outside the portal. Those are desktop and mobile clients and something that is called QField Cloud.

The desktop client in our case is QGIS, or more specifically the QGIS Layman plugin. This client is naturally outside the web solution, but it still shares the user identity. So if you are

working with any of those components, either on the web or in QGIS, you are still using your one identity stored in the CMS. In brief, you can actually choose whether to publish your data from web application or from QGIS.
But either QGIS or Web app stores the data in one place, so once you publish it e.g. via the web app, the data are available also from the QGIS at once.

And we have recently adopted a new components to the workflow. The first one is basically the mobile version of QGIS called QField. We are usually not using it directly, but building mobile apps based on it.

And the very newest feature allows to publish existing maps from QGIS through the QFieldCloud directly to the mobile app. That one is still only experimental feature, but already working for the basic scenarios.

You can notice that those portal components are wrapped inside something which is called Lesproject Cloud…
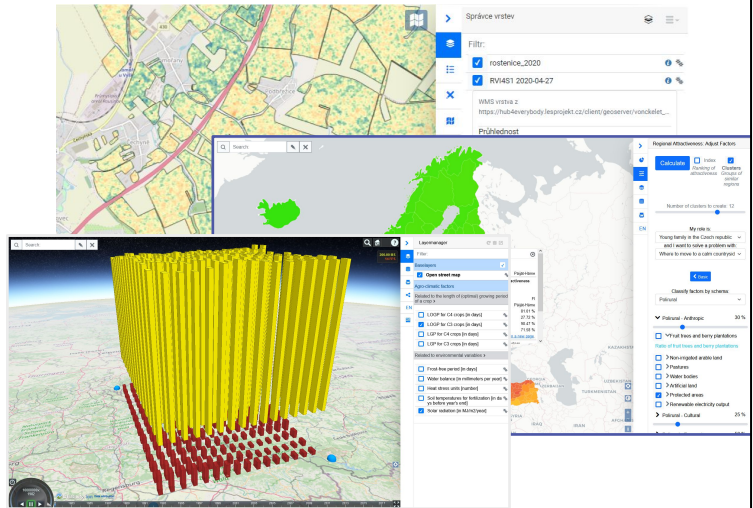
Web maps

HSLayers-NG

https://ng.hslayers.org

OpenLayers based framework

open source, published under MIT license

- publish geo-data
- compose thematic maps
- share
- **configurable** simple projects
- **extendable** full-featured applications
- optional **3D** view

All of our web map applications are based on the HSLayers framework. That is an open source framework which is based on Open Layers and developed in Angular and builds a complex user interface, which can be easily extended with new tools. So for one user the app can look different that for other.
Of course HSLayers offers some common GIS features like measuring, printing, legend, etc.
But for us today are the most important tools those that has something to do with publishing or sharing geo-data.
HSLayers can also work with 3D data using the Cesium platform.
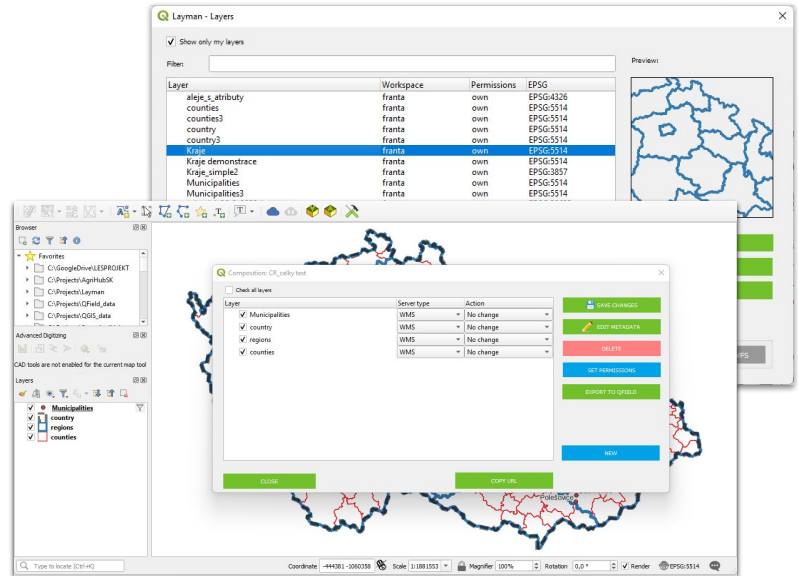
Desktop client

QGIS Layman plugin

- ○ publish geo-data

- ○ compose thematic maps

- ○ share

- ○ connection to QField

https://qfield.org

https://app.qfield.cloud

https://youtu.be/_t5mtReGjN4

We have also seen the QGIS Layman plugin. It allows you to do the very same as the web map, but has some more flexibility as it is built on top of a complex GIS SW.
And as I have mentioned, there is a new feature which allows you to publish your maps also to QField applications.

Mobile maps

- Extension of QGIS Layman plugin

- Allows to

  - Create new cloud map

  - Upload data to an existing map

- Access the map from the QField app

That is it!
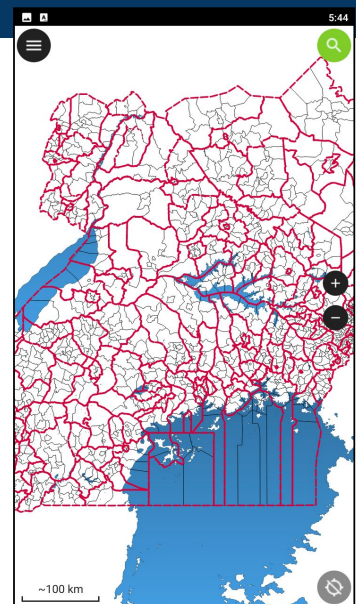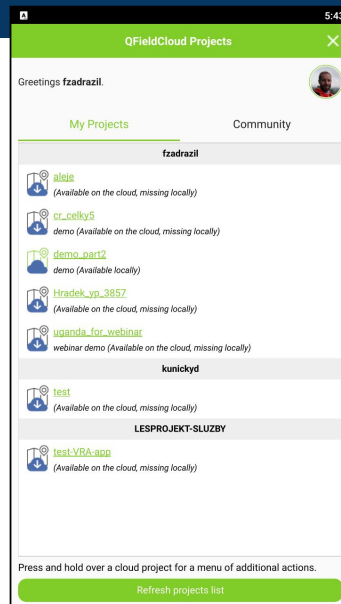
The QGIS Layman plugin was extended to allow you to do the Cloud publishing so now you can either create a new Cloud map or add your map content to an existing one.
Once you do that, you can access the map on your mobile device.

Web pages with maps

- Wagtail Content Management System (CMS)

- Map widget with configuration

- Multiple maps on one page

Used by small to large enterprises including Google, NASA

Large community

Support for common authentication mechanisms

Role based authorization

Wagtail + CodeRed CMS

https://wagtail.org

https://www.coderedcorp.com/cms/

5 minutes install and setup

Easy Python based customization

wagtail
CodeRed

The CMS is based on the Wagtail platform which is further enhanced by CodeRed extensions. Wagtail is in fact very widely used CMS even by large organizations as Google or NASA.
It is based on widely known Django platform, it has very simple and fast installation and since it is completely coded in Python, it can be very easily extended based on the users needs. We have already tried such extensions and I have to say it is really straightforward and if you know basics of Python, it is a matter of days to develop most of the components that might be ever needed.

There is also a very large community of developers so there is a good chance that the feature you need has been already done by someone else. And that is also an example of different authentication systems that are out there, like OpenId, Windows AD, etc.

Where is the Hub?

What I showed you today is Hub4Everybody deployed on our infrastructure which we call Lesprojekt Cloud.

This deployment of the portal is meant for personal use for anyone, simple registration is required and all the tools are available to you. It is fair to say here that
this specific portal is still developing rapidly and new features and fixes are applied on a daily basis.

But we can also offer organizations the option to deploy this portal in separate instance dedicated solely to the organization and that deployment can be
either on our servers dedicated for that or even on the infrastructure of the customer.

It is suitable for any kind of organization from public institutions, through schools, universities to SMEs.

So that is the current state of the solution of Hub4Everybody, but we are still thinking of how to make it better. The next steps will be to develop closer integration with systems like Grafana Dashboards, SensLog service for collecting sensor data or Jupyter notebooks for real time coding inside the portal.

You probably know all of those mentioned systems here but Map Whiteboard. That is another product of ours we are preparing for public introduction. It is a tool for collaborative map creation and editing in real-time. We call it internally google docs for maps. It allows you to create a map, share it through the link with other people. And then you or someone else can modify the map or create new data while others can see your actions immediately including your cursor track. We are currently working on an integration of this into some of the popular online conferencing tools like Google Meet and testing some use case scenarios.

Thank You...

... and join us to make our Hub better

with your feedback and ideas.

fzadrazil@gmail.com

h4e@lesprojekt.cz

https://hub4everybody.com

@AllPlan4

LESPROJEKT
sluzby

Plan4all