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ENERGIC-OD

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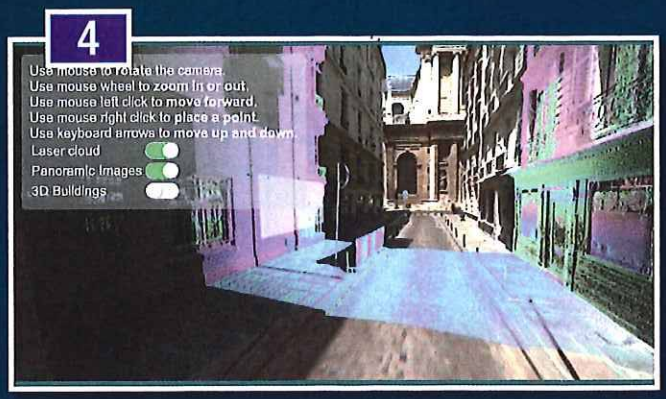

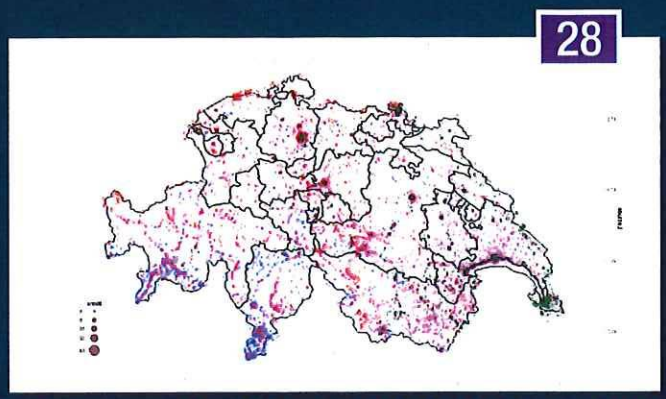

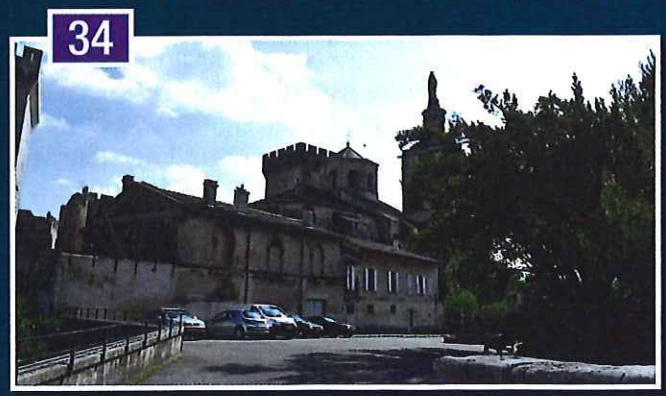

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THE ENERGIC-OD PROJECT

Funded by the European Commission, Energic-OD is a three-year project aimed at building a scalable infrastructure to access and disseminate open geospatial data managed by many different organisations. As this project comes to a close, Stefano Nativi, the project leader, draws a conclusion of those last three years.

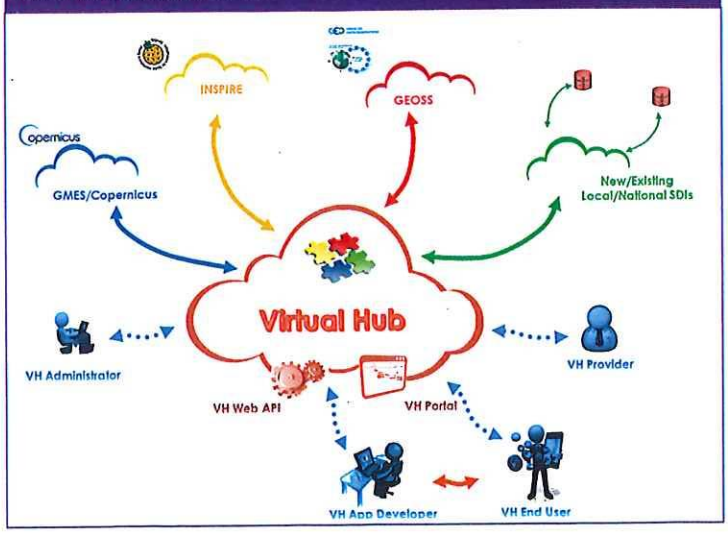
Could you describe ENERGIC-OD in a few words?

S. N.: *Energic-OD* is a three year project sponsored and funded by the Commission, which was started in September 2014 and thus is going to end next September. The project was focussed on two main goals:

1. Implement a network of servers, called *Virtual Hubs*, to provide access and disseminate distributed geospatial data. Those servers also run a variety of services to help people discover what data they can access, and provide the data under the format best suited to their needs. Those data can be shared by any organisation, as long as they are open licenced. Public agencies can, for example, share general interest data as required by the INSPIRE directive. *Energic-OD* is not a part of INSPIRE, but the two work together to provide the users with the data they're looking for. So far, many spatial agencies have contributed to the project: CNES, ESA, etc.

2. Develop ten applications that use the data accessed via the Virtual Hubs and offer valuable information to their users. At this point, we only have six applications fully functional.

Le système Energic-OD fonctionne en tant de proxy et permet de lier l'utilisateur qui recherche une donnée à son fournisseur.
Energic-OD acts as a proxy, mediating ("brokering") the access to the data by "plugging" the user in to the correct server.



Since the project is about to end, we plan to organise a wrap-up session during the INSPIRE conference which will take place in Strasbourg this September.

Can you detail some of those mobile apps?

S. N.: Sure. One of them allows the user to browse the historical map archive of Zaragoza, the Spanish city. Each map has been scanned and is digitally stored as a raster file in the city's open data server. So what are the benefits of this application? It's mainly behind the scenes: the *Virtual Hub* infrastructure will act as a proxy, managing the access to the raw material, caching it to enhance performance and carrying out the various raster operations needed to match the users' requests. This application can be useful to urban planners, *Open Street Map* contributors and also any Zaragoza citizen curious to discover how their city evolved with time.

Another interesting application is OnoMaP. It has been developed by the French CNRS. In this case, the

smartphone the application runs on acts as a microphone. It measures the level of ambient noise as its owner walks, georeferencing every sample using the embedded GPS. The noise figures are then shared through the hub infrastructure, and can later be averaged out (assuming many people follow the same path) or sorted by hour, etc. and displayed on a map. While big cities are required to produce noise maps under current European regulations, smaller cities are not. This application could help making those maps available in middle/small cities thanks to crowdsourcing.

In the field of health services, another application will use open datasets such as doctor's offices, hospitals or pharmacies locations to compute access times or availability figures (e.g. the number of pharmacies within a ten kilometre radius or a ten minute drive) and help pointing out the areas in which medical care is insufficient or even inexistent.

Finally, I would like also to mention the *Eye2Eye* application. In this case, the user can explore a map where current building works are displayed. If a specific project catches the user's eye, more information can be asked for (e.g. the official documentation), or comments entered. The underlying infrastructure makes use of a wide assortment of data such as cadastre, *Open Street Map*, *Copernicus* satellite images, etc.

How is the network built?

S. N.: At the moment, we use five servers, one in Italy, one in France, one in Spain, one in Poland and the last in Germany. These servers are all linked together, and contain national data. On top of that, there is a unique European gateway which routes the queries to the relevant server. Since we designed a scalable architecture, it is always possible to add – or remove – a server at any time.

The exact configuration of each hub depends on the amount of data it stores. For instance, if the hub must perform deep searches on huge amounts of data (or metadata), it is crucial to provide it with enough memory. As a rule of thumb, during the development phase, the middle-of-the-road *Virtual Hub* was made up of three PCs with 2 CPU Intel Xeon E5-2670 v2 (Ivy Bridge) and 8 GB RAM. Alternatively, full-cloud (like Amazon) servers can be used, in which case the configuration can be fine-tuned to meet the requirements at any time.

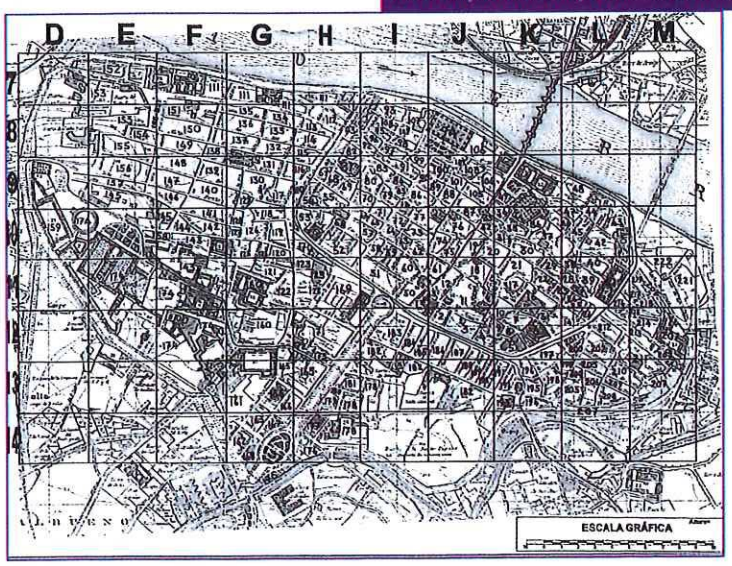
Each server publishes a set of web services which are HTTP based, such as the series of OGC standards, OpenSearch standards and less standard but widely used CKAN. It can either handle a query, or pass it to a *"sub-server"*: in the case of Germany, for example, the nation-wide server can forward a specific query to a regional (Land) server which can itself hand it over to a city server. Once the data has been found, it travels the other way round, from bottom to top, like a pail in a bucket brigade. The performance is good: if the user has a fast Internet access, any search can return results within three or four seconds. For the actual downloading, it naturally depends on the size of the dataset.

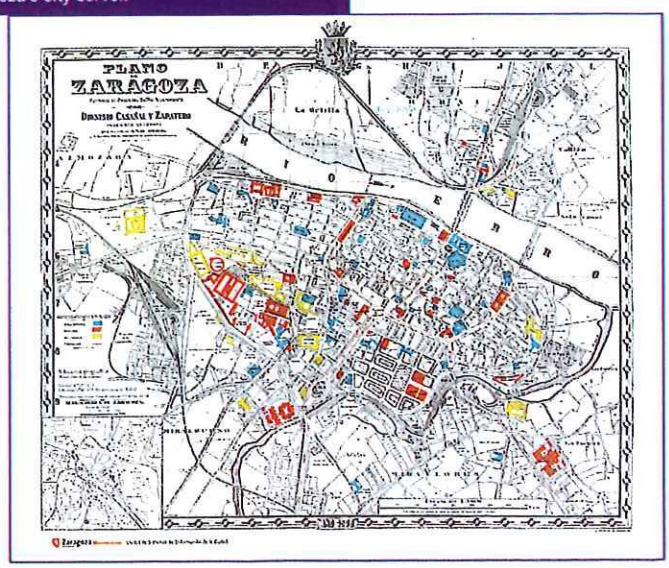
From the user's point of view, a unique website acts as a global portal to the infrastructure, and masks the complexity of the underlying system.

How many dataset are currently stored on the virtual hub?

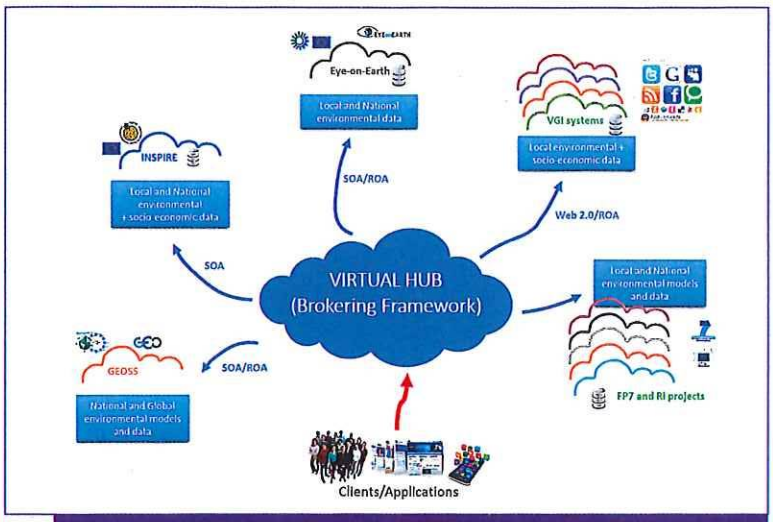
Currently, each manager responsible for one of the virtual hubs has chosen and uploaded datasets according to their relevance.

Deux exemples de cartes anciennes disponibles sur le serveur de la ville de Saragosse.
Two examples of old maps available on Zaragoza's city server.





We can estimate between thousands and hundred of thousands depending on the hub. If we take into account the Sentinel and Landsat 8 archives, 30,318,000 datasets are available for search and downloading on the European global virtual hub. Of course, that's preliminary, since the access is still restricted to project's partners. When the doors will be opened to anyone, in September, we expect this number to rise significantly.



À terme, Energic-OD devrait être connecté à une variété d'autre services de catalogage.
In the short term, Energic-OD should be linked to a variety of other cataloguing services.

Is the project linked to the various "Geocatalogues"

S. N.: No, unfortunately both projects were developed independently. Geocatalogues are the offsprings of each Member state, while *Energic-OD* is a Europe-wide effort. But we are conscious that linking to those national Geocatalogues would be a huge boost for *Energic-OD*, as well as enable people to locate datasets outside the borders of their countries (or straddling on the borders). So we will, in the future, work to integrate those catalogues into our infrastructure.

What are the main challenges you had to face?

S. N.: Of course, there were a lot of them throughout the project. A major one was to break cultural habits and convince people it was a good thing to share data. One of the other challenges was to figure out what the future needs would be. *Energic-OD* is not a R&D project: it was, from the start, designed with users in mind. So we had to ask small and medium businesses what they expected from it, and we tried to define the various services accordingly.

What are the main expected users of this infrastructure?

S. N.: So far only project's partners - apps developers - have had access to the infrastructure, so in principle it's difficult to answer such a question. However, we have organised various events around *Energic-OD*, especially a hackathon in London. On the basis of the attendees, we have been able to assess who was interested in the project. We had a couple of micro or small businesses, around fifteen regular companies. Half of the participants were public bodies. So, if that is anything to go by, we can estimate the public and private sector would be quite balanced in a future user panel. The biggest unknown here is how many individuals will get involved.

The project will come to an end in September. What still remains to be done?

S. N.: First of all, I wish we had time to complete the development of all ten applications. Some are nearly completed, but some still need more development. We must also work on tying the national geocatalogues into the main infrastructure.

Now, the main challenge to face is how to extend the lifetime of the project after September, when the EU will cease funding it, as we do not plan to unplug all the machines and destroy everything we worked on during three years. We have already committed to secure twelve additional months, that can be stretched to forty-eight in a pinch. This gives us leeway to contact and maybe strike a deal with an organisation which will accept to pay for the maintenance of the infrastructure. It seems that the *EuroGeographics* association could be interested, but nothing solid has been agreed on yet. ◻