

Interview 17

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| Interviewee | 19-OSG-O |
| Interviewer | Ashraf Shaharudin (TU Delft) |
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Interviewer

So my first question, could you please describe your role in OSGeo <redacted> and how long have you been working in this or a similar role?

Interviewee

So I've been involved with OSGeo <redacted> now since <redacted> and my role in it at the moment is to <redacted> OSGeo <redacted>. I suppose I've been in that leadership role since <redacted>. However, back in 2012 – 2012, 2011 was the formative time of the of OGD <redacted>, and we formally created OSGeo <redacted> chapter in around <redacted>. So we have that formal structure since around <redacted>. So that's the history of the of OSGeo <redacted> and my role within it.

Interviewer

Could you please elaborate on the vision and missions of OSGeo, particularly OSGeo <redacted>?

Interviewee

So OSGeo <redacted>'s mission and vision is very similar to the global OSGeo in that we have a focus on the use and education and the advocacy around the use of open source software for geo-related, so I tend to say GIS, but anything related to geomatics. So, the vision would be that there would be wider adoption, wider use of OSGeo tools, but not just OSGeo tools, open source tools that are capable of working within the open data, geo ecosystem.

And I suppose there's a usage mission, but there is also then that advocacy mission, but also the idea that there isn't a situation where we are trying to outcompete or point out flaws or otherwise in other approaches. It's more to show the advantages, the situations where an open source approach is more suitable for particular types of stakeholders.

Interviewer

And uh, so does it also include open data because you mentioned a lot about open software?

Interviewee

Yes. Sometimes that's almost a philosophical question because some people are very much focused on, within OSGeo, of the development, the maintenance and the delivery of software. And then that software is capable of processing open data, but also proprietary data etcetera. OSGeo's role and certainly OSGeo <redacted> would promote the use of open data and the access of open data, but not to the point where we are saying that we are providing a message that could be mixed, that could provide a mixed message that because we have open source software, you must use open data.

So we have to be careful that we do not confuse people there, that we would like you, if for example you're a researcher, we would like you to explore firstly the open data options and then obviously if no suitable options are available, you could look at proprietary but our software and the software

supported by OSGeo should be able to deal with any data regardless of where it is emerging or coming from.

Interviewer

Who are the target beneficiaries of OSGeo and how do they benefit?

Interviewee

So there's a number of target beneficiaries. I suppose we're looking at government, both national and local government, we're looking at research and education, and we're looking at companies, both large companies and SMEs. We're also looking at community groups, citizen groups, and mixtures of those citizen community, so, for example, citizen science projects.

The benefit, I suppose that any of those target beneficiaries have is within the idea of this being open source software, that they have much more control over the software, they have the ability to change, to configure the software specifically to their needs. Also, they have a much more freedom around the usage and deployment of that software than they would if they with a non-open source approach.

And then, of course, those beneficiaries, depending on their resources, I suppose financial and both technical human resources, they can then decide what level of support, for example, they want to have. So, they can decide to purchase a support contract from a third party, for example, or they can decide to simply benefit from the fact that this open source software is usually supported by a community who could provide support online or as face to face at meetings and things like that, essentially with the cost of free.

I think overall benefit is correlated with the expectations from the beneficiary, but also maybe what skill sets people in those organizations or communities have and what resources they have available, because you could have a situation where you have a small community group who has a very highly skilled developer as volunteers and they then have technical ability but maybe an SME may not have.

So I think that the benefit is very much -- there's a couple of dependent variables on your resources. But the benefit is definitely the flexibility and the ability to make your own choices around how you deploy and how you use the software.

Interviewer

And with all these amazing benefits and also the vision and missions of OSGeo <redacted>, what sort of activities do you carry out?

Interviewee

So principally, a lot of activities are around training, education and knowledge exchange I suppose. So we would organize things like invited lectures, where maybe the developer or a group of developers for a specific piece of software would come and give 1/2 day training course or something on their specific software. We might also have -- our flagship event is our annual meeting where we have a mixture of a traditional conference but also workshops that allow people to, for example, take 1/2 day workshop on PostGIS or take 1/2 day workshop on using GDAL for remote sensing or something.

The activities also stretched into supporting smaller events such as, maybe local groups or research groups or academic groups who are using open source software for their GIS or their geo needs, but

want some help or support in spreading the message and communicating to as wide an audience as possible. So we provide, I suppose, a support role there around communication and networking as well. So we may not organize the events, but we would support them, we would advertise them, we would maybe help recruit keynote speakers or provide some small financial support for the running of an event.

Interviewer

What sort of resources that you have to maintain to deliver all these activities?

Interviewee

That's a great question. I suppose the biggest resource that we have to maintain is actually the human resource because it's pretty much 100% volunteer driven. So no one in OSGeo <redacted> gets any remuneration for the time spent. So obviously if we have to travel somewhere and we incur a cost there, we try to pay some reimbursement. But in terms of the time involved in organizing, in advocating for open source software, in networking etcetera, it's very much the classical volunteered model there from the open source community of people who are willing to dedicate their own time as a major resource into this.

So we, we don't have any physical resources in that. We don't necessarily have an office or a building. We don't have IT, equipment etcetera. We do have some financial resources, and again, part of the OSGeo <redacted> committee, there's a small group of people who take care of the financial side. So they work through our financial reports each year, they deal with any payments out or costs etcetera.

But if I was to answer that question, it's definitely maintaining the human, and I don't really like to use the word resource in some sense for humans in that it's that volunteering time and energy there, and to try, and I say in quotes, recruit new people into OSGeo <redacted>. The person has to be willing to realize that actually working with something like OSGeo <redacted> means that it's an extra set of tasks on top of your day job and your personal life because sometimes, for example, an OSGeo event might happen on weekends and this is to allow for larger participation. But it also then puts pressure on people from a family point of view because weekend time is very precious.

So maintaining the people in the project is I think the most important and our key resource.

Interviewer

And I'm curious what's the background of most people who are active in OSGeo <redacted>? I know you are an <redacted>, but what about others?

Interviewee

I think the profile is -- the one cross cutting team is a GIS or a geo background of some type, be it from remote sensing all the way to developing web based, webgis type applications. At the moment we have several government and government related bodies involved. We have some academics and <redacted>, the academics are fewer, they're the minority rather than the majority. And then we have a couple of people who are involved with SME's and those SMEs are tech companies whose core business area is development and expertise around geo in in general. Some of them may provide support, for example, to government agencies. Some might be just an SME who is there to provide support and services to anyone. So I think there's three: there's the academics in the minority, there are SMEs who have a core business model around GIS, and then people who are

working in government agencies, but in agencies like forestry, agriculture, marine, all that very easily lend themselves to geodata and GIS related applications.

Interviewer

I'm also curious what's the main motivation of people being active in OSGeo <redacted>. Perhaps you cannot speak on behalf of others, but you yourself, what's the main driver or motivation for you to be active in OSGeo <redacted>?

Interviewee

That's a great question. I think if I go back to when I first got involved, I think that the wish to become involved was because that I had been using open source software for quite a number of years. If I go back to when I was doing my PhD, at that time, open source software was available, but very much you need it to be an expert to use open source software. You almost certainly had to use Linux or Unix at that time, and there was very little open data even in Europe. From my own PhD we used data that we got from the United States and Canada to test algorithms because open data was, in 2004, open data wasn't really a thing.

And then when I started getting involved in research and started using open source software and particularly GI related things, you realized that there's so much benefit.

I felt so much benefit from that that I just felt an inherent want to give back something to, to contribute back and also that sense of community that is around OSGeo. I remember, I think this is relevant to the answer, I remember attending the OSGeo global conference, it was in Lusane in Switzerland back in 2008 or 2007, and I think the moment that really grabbed me to become involved more was that I was using GeoNetwork at the time, and I was able to walk over and talk to the people who developed GeoNetwork and asked them questions. And these are the people who developed the software. So there was that closeness that the user could talk to the inventors and the developers of that software there in a room at the conference. And I've never forgotten that because I think that was a connection there. I was having problems connecting to a database or something and they were able to sit down and almost like, you know, a teacher and walk me through the solution.

And you still see that today at open source events where very well known or very well respected developers and leaders of open source projects will sit down with people and talk to them even if someone has an issue, have a bug that keeps appearing in the software or something. So that's what drove me then to become involved, I said this is a community I would like to be involved in and I felt that I could -- one of my roles that I could really play was around the advocacy and usage. So as an <redacted>, I always try to encourage <redacted> to use open source software and open data.

And if I have 10 <redacted> and two [of them] go forward with that same mindset, the ecosystem grows. So I think that the community that I've seen OSGeo in was a community that I could see myself adding value to, but also a being welcomed in that respect.

Interviewer

That's great. How does OSGeo <redacted> obtain funds to support the development and fixed costs?

Interviewee

Mostly around sponsorship from organizations. That's the difficult part of running even a small local

chapter like OSGeo <redacted> – it's finding the funds. So how we've relied on obtaining funding is that, for example, one of my colleagues that that work in the Forestry Ministry, he can talk to his manager or supervisor and they might provide us with some support. The SME's then would supply some support. So it's very much relying on the generosity of others because our core structural setup is not to generate revenue or try to create profits.

I know this might be outside the scope, but within the Irish system OSGeo is almost considered in the same bracket as a charity organization. So we're not taxed on our revenue because we're not generating [profit] for example. So our funds are very much donations and contributions. So for example, when we organize our event, generally some of the people, but also the organisations who are involved or know of OSGeo will provide some contributions and then we can run the event and pay the costs or set up a set of guest lectures or workshops, things like that. So we work very much on the funding model of being able to pay for the events or the cost that we generate, but nothing more. Anything that is surplus is then put back for the next event or supporting some other activity.

Interviewer

Do you also run crowdfunding or membership fees?

Interviewee

No, not at the moment. We haven't really considered that yet.

Interviewer

What are the key challenges that OSGeo <redacted> encounters?

Interviewee

I suppose there's two and we've just talked about one, the funding issue. It's necessary to keep being very active around asking for support. I suppose the other is, maybe the best word, is visibility or kind of penetration in the ecosystem in that it may not always be clear to people what the benefit would be to join or to be active in OSGeo <redacted>, just the same as it would be in OSGeo Portugal or OSGeo Argentina, for example, because a lot of what we see here in <redacted> is a lot of users of open source software are probably predominantly already in technical environments, where all of their support needs are met and all of their education needs are met. So they don't really see the need for an additional organization or a body which is providing this conduit to educational activities, that is providing support etcetera, or even not just OSGeo <redacted> but the larger OSGeo ecosystem. So the challenge is that one of visibility really, is that trying to encourage more stakeholders to become involved.

What we found over the years with planning our annual events and our smaller events is that we tend to be drawing people from the same pool of people. And it's often very hard to get a new --it's almost like you have a river with species of fish and it's very hard to introduce a brand new person or a new species in there. And I don't know what the answer to that is, whether it means that we need more funding to be more a high profile or it's a signal to us that maybe the needs of open source software users are already been very well met in some other way that that, that we're not as needed as maybe in the past. So that's the challenge, funding our activities and our events and the visibility, trying to encourage more people to become involved because a lot of people like the idea of OSGeo <redacted> or the national OSGeo chapter but it's making that next step into becoming involved in the activities in some way is the challenge.

Interviewer

Who are the other stakeholders that you typically engage with? Because I'm thinking also, do you also work with QGIS association? I'm not sure if there is in <redacted>, for example.

Interviewee

So what happens a little bit in in <redacted> and <redacted> is that sometimes there may not be an <redacted> branch of, for example, QGIS, but there would be a huge QGIS user group in <redacted> that we would interact with. We have very good relationships with OSGeo <redacted>, for example and I suppose it's funny in terms of scale ourselves versus <redacted>, OSGeo <redacted> is probably scaled in the same way as ourselves. They would have a lot of the same challenges that we have despite, you know, differences in population and there's several countries involved there. So, they would be, OSGeo <redacted> would be a key stakeholder for us,

We would have interactions with, as I've said before, government institutions, the ministries, etcetera. And for profit companies. But usually what it takes is somebody in those organizations to put their hand up and say I'm interested, I like what you're doing. Can we essentially become a stakeholder of yours or vice versa?

And we would have interaction with various OSGeo projects, and I'm just gone blank on a couple of names at the moment, where maybe in the past we've invited speakers from those projects or people involved in OSGeo <redacted> are long term users of these software, they know people from the community and there's a relationship there. So for example, we might be able to then offer a master class or a training course on a specific piece of software as a result of that relationship.

So I know on the question sheet there, you had nonprofit, I supposed OSM <redacted> would be a nonprofit and OSM <redacted>, we would be talking about that soon. And those type of bodies, I think that the key to their relationship there as stakeholders is that we are all very similar communities, and by these small communities joining together they can become a much more coherent in the messages that are communicated but also in just information and knowledge sharing even if it's just the organization of a workshop. OSGeo <redacted> might say: OK well, we tried streaming last year, it didn't work, here's 10 things to do if you try to stream again.

But I suppose where we've not managed maybe to move to in terms of stakeholders is outside of key stakeholders that are not already aware of OSGeo in some way. There could well be a local community group out there who are using QGIS or they're using Leaflet or something, even if it's just something small like that, they may not have any awareness that we exist. There's an information vacuum, there is how we can get to connect with them and how we can show that we would have a benefit to that type of stakeholder.

Interviewer

OK, I'm gonna move to the topic of Esri. What is your general perception of Esri?

Interviewee

So contrary to what a lot of people might think I have as a an open source, I have no ill will or otherwise towards Esri. I think what Esri have done in some way is analogous to how Windows helped Linux and some open source products become very -- because the very first time I use Linux it was an install true Windows, the very first time I used Openoffice, it was on Windows, and so now in

recent years it's possible that you can just get a computer that has only Linux installed and that's fine.

I think Esri have been such a huge influence on GIS and geographic data and information over the last, well, if I just say over the last 20 years, the span of my career. What I've seen is that you have seen people who started off as being as Esri users, Esri students, beneficiaries of Esri, but as time has passed, maybe they've changed position. They've changed job, they've changed mindset. That knowledge that they gained there has been transferred to open source software for GIS. So I would encounter a lot of <redacted>, for example, and I would notice by their use of QGIS and others and they are skilled. And I'd say: where did you learn QGIS? They'd say well, actually we learned Esri in our undergraduates and you know, we're surprised that everything is so similar in the open source world.

So the perception of Esri is one that they certainly did have that monopoly on the GI world for many years but they handled that very well. I think I had lots of interactions with Esri over my career. The people who worked there were very knowledgeable. The people who worked there generally were not just sales people, they were someone who was talking about ArcGIS, probably knew how to use ArcGIS very well, rather than being a salesperson who told you lots of sales information about the product. So in that way, I feel that there's been a lot of benefits with having Esri; a bit like Jupiter in the solar system, it's there, it's a really big player, but what really positive is that in the last two decades, particularly the last decade, there has been, there is now plenty of room for others. What Esri has never done is Esri has never come out and made statements to say, listen, don't use open source software, there's this problem, this issue.

They have just gone on with dealing with their own outlook on the GIS world and I think that's to be commended. Obviously we can, I and anyone involved in open source can be envious of their vast resources to be able to you know be so influential, but I think over time, if we look at where we've started from OSGeo to where we are now, it's quite a very good journey of starting with small communities. And that idea of small communities then joining to become bigger communities is really excellent.

If you go to an OSGeo Europe or an OSGeo global conference, you will get Esri people there. And so overall perception is there's no hard feelings. I think they have helped educate a lot of people in this domain and that has benefited us as a result. Some people then may have been using Esri products and maybe for some reason maybe found them too resource-intensive technically or financially and move to us. Or they might have just wanted to move for some other reason. So I think overall they have had a benefit of being there, but they do allow other people to operate in the space at the same time.

Interviewer

And what do you think of Esri's role with regard to open data?

Interviewee

So I suppose I'm not as maybe clear -- so not being an Esri user, I may not be as clear. So a lot of this is just my opinion on my observation, but I think where Esri has been very strong in open data is related to how they have managed to build relationships with open data suppliers or sources of open data over the years. Now some people might complain that these relationships are based on maybe

a commercial contract that initially started or something else, but through things like story maps and those type of venues, you get paper creating GI products and maps etcetera using open data that at the end of the day actually, while it's Esri is the logo on the page, it's providing a great benefit to open data.

So I think that the advantage that's hidden under that is that Esri's interaction with open data benefits Esri, but also benefits everyone else because it shines a light, shines a stronger light onto open data, it shows the possibility. It might even, and I don't have evidence for this, but just from an anecdotal point of view, Esri could be the type of stakeholder that could encourage someone who has a closed data set to make it opened because they could explain the advantages, they could explain the downstream effects that your company or your organization might feel if you made something openly available.

So I think the role is my feeling again as a non-Esri user is positive. I think it's the unintended consequences, the positive unintended consequences, that if Esri are involved in open data, it's likely that a lot of people will learn about open data and that has a consequence of maybe shining the light then on open data, and then suddenly people are looking at open source and open source software and more people are getting involved overall.

Interviewer

How does what OSGeo does, complement or challenge the business model of Esri?

Interviewee

Well, I suppose that the challenge to Esri's business model is, of course, the fact that the open source model is completely tangential to it. So the main challenge there is that there are open source tools managed and promoted by OSGeo that are equivalently as good and as powerful and as flexible as the equivalent Esri's tool. So I think if we -- rather than comparing tool for tool or package for package, the obvious differences in cost are a major advantage. The difference is in how you would develop a service role or a support role are very different, so essentially what OSGeo is providing to a stakeholder is the software and then the stakeholder has a lot more flexibility around how they control their support both technically and human resource support, people to work with the software, whereas maybe with the Esri model there's a lot of built-in packages for support, there maybe some restrictions on the deployment of the software that are there for Esri.

So I suppose that -- and this might sound like it's an answer to get out of the answer, but I think what the key aim for OSGeo is to show that there is an alternative rather than prove that that alternative is better or worse in whatever circumstance. If we just take QGIS versus ArcGIS. If I take my experience from an undergraduate lab, no difference, absolutely no difference but a very proficient power user of QGIS and ArcGIS may see differences. But for the majority of users the two tools are almost complementary. So I think what OSGeo would try to do there is to say that, well, there is this alternative option to, for example, ArcGIS and you can you have much more freedom using it etcetera. But ultimately the choice will be up to you and your organization and so the aim there is not is not the point out flaws in the competitor, but rather to try and show all the positives around the offerings that OSGeo have. The fact that the software is freely available, that there is a real community there that can provide support and that you, as the user can be part of that community, so it can be cyclical, if you see a problem, you can actually go about fixing it. So you have a sense of empowerment that you may not have, for example, as an Esri user.

Interviewer

OK, I'm gonna move to the topic of OpenStreetMap now. How does OSGeo <redacted> engage with OpenStreetMap?

Interviewee

OSGeo <redacted> engages with OpenStreetMap directly through OSM <redacted>. So there's an OSM <redacted> chapter there. The advantage of <redacted> being a small country in terms of population is that many of the people that are involved in OSM <redacted> know the people in OSGeo and vice versa. Very often, I suppose the Venn diagram of the two has a very major intersection in the middle. The engagement then happens around events, workshops, etcetera, on the mailing list, for example, and the fact that as we spoke at the very beginning of this interview, very often people involved with OSGeo <redacted> or OSM <redacted> as an additional voluntary contributions. So people are crossing over at events related to their work. So for example, I might meet some OSM <redacted> people at a GIS conference or a workshop or something. But the formal engagement happens around the organization of those events, those workshops, and an agreement, I suppose, to support and advocate for each other's events. So when OSM <redacted> are having an event, we would support that communicated to our networks and vice versa.

And we have done some and support in terms of a resource supporting, for example. So if OSM <redacted> are looking for a venue to host an event, maybe we could supply the venue, for example, or pay for the catering. It sounds small, but those types of engagements are very important because it allows the other group to actually hold their event and see positive outcomes from that engagement, interactions. There is the formal engagement of supporting each other's events, and being involved in the promotion and advocacy of each other's events and activities.

Interviewer

My next question, but I'm not sure if you're familiar with Overture Maps Foundation to talk about it?

Interviewee

So I'm familiar enough that I just know about it from an OSM point of view. I suppose that at this point I haven't still managed to form a very strong opinion on it. I suppose it comes from the fact that my interaction with OSM over the years has been in a kind of --there's almost been 3 modes of interaction: I've contributed towards them as an individual volunteer with local data. I've also been very heavily involved in OSM-based research where OSM is the import to our research, so a lot of that research would not have happened if OSM didn't exist. And then the 3rd way then is around the advocacy and the communications around OSM. So I've been involved in conference organization, workshop organization, special issues and journals, and things like that.

I suppose then where I'm seeing the Overture Maps Foundation is that there appears to be a lot of advantages for OSM in that this would be a foundation which is a combination of some very powerful tech companies and players and they are willing to use OSM data. The fact that such influential players are using the data must have a positive effect because people who would never have interacted with OSM before -- again, it's all about the scale thing that if 10,000 people see that OSM is involved, well if 100 people take action on that, that's 100 people who weren't involved or knowledgeable before. Because the scale of these companies are not in the thousands, there in the millions and hundreds of millions. That's a positive there.

I think where I'm feeling that the negative impact is around: Is it possible that OSM loses control or loses its direction as a result of this. There's been a lot of work and a lot of conversation over the last number of years about AI-based mapping, about the replacement of, I suppose, automated mapping approaches over local knowledge and local data generation. It would be great to have an OSM database that was really, really complete and always up to date with rich data, but I wouldn't want to see that at the cost of local contributions and local communities not being able to be involved in the future because it's that local grassroots ability to just go from -- well, I can map the tree that's outside my house to I can map all the trees in my town, city, etcetera and that means something. That's a contribution that's not just a signal that I like mapping trees, but someone else will find use for that. And that's a direct impact.

So I think it's great to have the visibility potential that Overture offers but my concern would be, over time, if it's a case that there's a lot more mapping data being introduced to OSM via other means, via Google Footprints or something, or by AI means, some grassroots mappers or communities might say, well, why are we collecting data when it's just being generated by an AI or generated by some other means? And it could be other open data for example.

So because the beginning of OSM was that local that if you map your area and I map my area and we join together and lots of people do that, we suddenly have a global product. I would hate to lose that. It's the kind of thing that could be lost but it's not immediately evident. We could have this conversation again next year and nothing might have changed, but maybe in five years time, it will have changed, but it's not easy to see that happening on a daily basis. You need the hindsight of five or ten years of time to have seen it happening.

Interviewer

My last question, what are your wishes for the local or global open data and open source ecosystem?

Interviewee

From a local point of view, and so speaking in the Irish context, we would be hoping for more data sets of local importance, at a national scale, to be made available as open data. There are still some key datasets that are available, but there is a cost or a licensing barrier there to people. Regardless of whether they're using OSGeo software or otherwise, the cost and the licensing and other constraints are barriers.

From the global data, I think what is needed there is probably a longer conversation is the fact that you have some countries who are very much the global leaders in open data and then for various reasons, you have other countries who have maybe no open data culture whatsoever. I think there has to be some way of trying to close that gap because it shouldn't be a situation that where you live determines what type of quality of access to data that you have. I think what some countries need to do is to maybe offer more support to countries or neighbors that don't have the skill sets, the knowledge, maybe don't have the resources. It'll often come down to the financial resources, the leadership, the policies etcetera

The global data ecosystem, open data ecosystem, keeps promoting the positives around open data and never strays from the path of that promotion. As I said, just to repeat again like 20 years ago, doing my PhD, open data was essentially -- no one had heard that term in <redacted> and maybe even <redacted> to an extent. But now you know, we're talking about open data ecosystems in both

of those countries that are very, very healthy, very, very strong. So that's happened over 20 years, so maybe the wish for in 20 years time would be that a lot of other countries who are just starting that journey now would be at the position that we're at where we have lots and lots of open data at a local or a national level, there's still some that we would like. But maybe the next five years, then we look back and suddenly that problem is solved

From a local open source, universities, colleges, schools have a huge role to play in helping spread the word about the use of open source software, including open source software for GIS. So I think a major step forward for <redacted> and I'm sure for many other countries is that in high school or secondary school now, lots of countries are introducing computing and technology to young students before they start their third level education. I think it's important there that the options are shown to students that it's not just necessarily, and I don't mean this in a bad way, and that okay we're going to learn about Esri story maps today. Because around the scale -- if all of the school children of teenage years now are shown some open source software and some closed source, a small percentage of them moving forward wanting to be involved in open source software would make a huge difference. So I think the wish for us is that that would happen.

We're very lucky in <redacted> here that we have but very, very vibrant tech economy and tech sector, people are coming from all over the world to work here, that the tech sector might be a bit more willing to share their experiences. Very often we see the products that companies make or the services that they generate but very often we've no idea whether they're using open source or closed source software. A nice vision would be that it wouldn't be a trade secret to say that you're using PostGIS server rather than Oracle. Just knowing that can help influence people to maybe consider using open source software even if it's just on a small scale. As the saying, it's all these small changes gathered together over time, it can have a huge benefit to both the local and the global ecosystems.

Interviewer

Thank you. That's the end of my question.