

## Interview 4

Interviewee	04-Esri-C
Interviewer	Ashraf Shaharudin (TU Delft)
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### Interviewer

My first question to you, could you please describe your role in [Esri distributor in country C]?

### Interviewee

So I'm <redacted>. I'm over 14 years now, actively working for Esri in [country C] and roughly <redacted> years as manager of our data services team. So I'm <redacted>, basically we call it <redacted> team and that team is responsible for building basically our services, which are leveraging open data intensively. So I can talk a little bit about that later during interview. So my responsibility for that team is I'm mainly responsible for <redacted>. And then in addition, I'm also managing <redacted>, which is not really directly related to our data offerings but is more of a general <redacted> for Esri technology on itself. So in total it's a group of <redacted> full time employees and in total in [Esri distributor in country C] we have a little over <redacted> FTE is currently.

### Interviewer

OK, the <redacted> are in both <redacted> and also in the <redacted> team?

### Interviewee

Yeah, yeah. So the data team itself consists of roughly <redacted> people.

### Interviewer

Yeah, OK. And how long have you been working in this or a similar role?

### Interviewee

Yeah, so I started at Esri -- I've had different roles but currently I'm a little bit over <redacted> years actively managing <redacted>. So it started basically with me on my own in <redacted>. So, I started <redacted>. And that kind of took an entire flight and now we have a group of roughly <redacted> people fully managing all those offerings.

### Interviewer

And when you started off with the base map, was it already open data?

### Interviewee

The base map consists of sources which are available as open data and then what we do is we combine all those data sets and we created – combined it with a specific cartography and we offer that to our customers. So the result itself is not open data, so to say, right, it's a base map based on open data offered to our customers.

### Interviewer

I'm going to move to the topic of open data services by [Esri distributor in country C]. Could you please describe the open data services offered by [Esri distributor in country C], including who are the services for?

**Interviewee**

So there's a different set of services that we offer to our customers. First of all, we build what we call our location services, which we built for our customers. So who is the audience? Basically, it could be any ArcGIS end-user. So that that is from each industry, right? It could be government, it could be local government, it could be main ports, architecture, engineering, construction, all wide for whatever users are leveraging our services. These location services can range from, let's say a simple base map -- topographic base map -- to more location services that also contain functionality. So you could think about that as for example, a network analysis service where you can use to create drive-time polygons or optimal routes. It contains geocoding services that helps you convert, let's say a spreadsheet with address information into a map with location. So basically that's sort of the first sort of set of services that we offer.

Then in addition, when you talk about open data services, we also have technology that we use to not only redistribute open data basically in the same form or the same structure, but we also have the technology to build derived products from that open data. So a good example -- for example -- will be regarding aerial imagery. So in [country C], there's large scale imagery available, including stereo imagery. And what we do is we have the technology to also reprocess that stereo imagery to create what we call a true ortho aerial imagery. That's a product where the input is open data, but we really produce intensively with a lot of computer resources, produce a new end product. That's something that we commercially offer to our customers, so that's sort of the second product.

So in the first location services it's roughly still the open data as input and what we output is similar structure as the open data right? We don't really change the data itself, it's just, you know, perhaps in a different web service format or in a different GIS format, but it's still the same open data in the same method. In the second option that I mentioned is where we really create derived data product.

And then as a third part that ...

**Interviewer**

I'm sorry. And then the second one is paid data?

**Interviewee**

Yeah, yeah.

**Interviewer**

OK.

**Interviewee**

And then in addition, we also have, so let's say a third way where it's not really about us leveraging open data, but it's us providing guidance and support to organizations that want to share their data as open data because we have the technology to also support sharing open data. So where we work, our team is working with ArcGIS ourselves, but in addition, all the knowledge that we get from that, we also give it to our customers so that if they want to do the similar stuff with our ArcGIS to directly share data that their data as open data in a usable way. We also provide so to say -- let's say -- consultancy and technology tools to help them create open data services.

**Interviewer**

OK, so these are services for data providers, it's more of like case to case basis of engagement instead of like a platform?

**Interviewee**

Yeah, it's more of case by case.

And you could say that as a fourth scenario that we do find it important that if you really want to take open data to the next level, you need to reach everybody -- and who is everybody, right -- there are different user groups that have different needs. So the data location services that we provide are for the Esri GIS users, but what we also do -- that we do it ourselves -- on the service that we provide and we support our customers and also creating it for them are what we call promo apps. So these are let's say generic easy to use web applications that allows any user in a really friendly way to discover the data -- not to do a lot of advanced work with it but sometimes I think 80% of the users often don't need to do really advance things, but want to just quickly get a glimpse of the data, right? What is the power of the data? What does it contain? So we build a lot of what we call promo -- promotional apps that sort of leverage open data and really put a sort of a good front end so anyone can access it. So examples of those applications are, for example, the <redacted> viewer. <redacted> stands for the actual height of [country C]. And this for example, is an application publicly available on the Internet where you can view the entire [country C] elevation model. For example, we also have <redacted> -- <redacted> -- basically is that -- which is an application we created for the <redacted>, who celebrated <redacted> maps that they create. Well, that's beautiful. Where can I actually see <redacted>? So we created the <redacted> on the web where you can scroll through <redacted> topographic maps and also roughly <redacted> of aerial imagery, for example. So that's sort of basically where we put the data services in and then on top of those open data services, we build these promotional apps.

**Interviewer**

Yeah. And then these promo apps are available to anyone, even those who are not subscriber of ArcGIS?

**Interviewee**

Yeah, exactly.

**Interviewer**

OK.

**Interviewee**

So basically the reason why we build it is one for our customer relationship. So together with <redacted>, we want to make them successful with their data. So we help them create it. And in addition, it's good for us really because the more publicly good promotional apps are out there, the more people use that and see that it is powered by Esri. So that's for more like a marketing and brand awareness, that's the value for us.

**Interviewer**

And indirectly, you're also promoting open data.

**Interviewee**

Exactly.

**Interviewer**

And since when has [Esri distributor in country C] been offering open data services?

**Interviewee**

Well, I think it started roughly in 2011, 2012. So you could say quite at the start, when in [country C] really a lot of open data started coming available. So it's kind of concurred with the moment that as Esri we were releasing what we call ArcGIS Online. Which is our online SaaS based GIS; software as a service. And I always sort of like to give the example that if you would open up Google Maps without a map, it would be kind of weird application. And the same applies to any GIS application, in my opinion. If you open up the GIS application and there is no content ready available, you're just looking at a blank screen, right? You still need to have the tools, but in order to use the tools you will need to get access to the data, download it somewhere, find URLs and start loading it in. So when we started with ArcGIS online in 2010, we directly, as [Esri distributor in country C], decided to create our -- what we call our data strategy to make sure that we provide as much valuable data as part of ArcGIS Online. So it's not a premium data model, it's just something that every Esri customer has access to and it helps reduce the barriers. So it started, yeah, over let's say 10, 12 years ago already.

**Interviewer**

OK. And what are the benefits of offering these services to [Esri distributor in country C] itself?

**Interviewee**

So there are several. The first one is customer satisfaction. So our mission is to help our customers be successful with GIS. And in order to have them be successful, we think it's really important to reduce the barriers and reduce basically any barrier. So a company could start with GIS and could consider harvesting all these data portals themselves in order to have that data available in their GIS and then combine it with their own data that they have. But then right, that's sort of the pain that they need to go through. Then they need to invest in GIS administrators who can do those technical data handling where we believe is that if we reduce the barrier working with the data in our products, those companies can invest in the GIS uses that help create mapping applications for their business purposes instead of doing all the hard data lifting themselves right? So we take away that barrier to start and that the most impactful way that it contributed to our success is that it creates customer satisfaction. A customer can more easily start using ArcGIS – starts from day, one so to say. So that's really a big drive for customer satisfaction.

Then the other benefit to [Esri distributor in country C] itself is the competitive advantage. So if you compare it then to software competitors who don't have the data availability, the company can choose to either work with GIS from Esri and also have access to a lot of the data, or they can choose another company which doesn't offer the data and then they can invest in a lot of manpower to obtain the data themselves. So it's a competitive advantage and that sort of results in what we see an added value to our software subscription, so that helps grow our sales. It's not a direct sales, so we don't sell our data and also users don't purchase the software in order to access the data. But the more value we add to our subscriptions, the more valuable our technology becomes and the more easy it is or becomes to sell the technology.

And then another benefit to [Esri distributor in country C] itself is that we decided over 10 years ago to start building this infrastructure, leveraging our own technology, obtain data from those different open data providers and then put it in our technology and serve it out through our technology to our customers. And by doing that we use ArcGIS as if it were that we were a customer ourselves, right? So

we are using the technology that we also sell to our customers. By using the technology ourselves, we do a lot of, we learn a lot, we learn a lot of best practices: how do you can actually published data in a valuable way, how do you scale that environment to also be able to provide good performance on higher load and things like that. So the benefit to Esri itself also that we learn a lot of knowledge by doing it and that is knowledge that we again give back to our customers because again it's all about customer satisfaction and helping our users to be successful.

**Interviewer**

Wow, that's fantastic: the learning part. Do you notice that since you offer open data services, are there any like a rise in subscription of ArcGIS software or people are more interested with ArcGIS for example? Do you notice that?

**Interviewee**

So basically you -- there's some interesting pattern that you could sort of see the adoption of ArcGIS Online and the adoption of our content services is sort of in line with each other. So year over year when it comes to our contents, our open data services, we see our obviously the first years, I mean the first year like 12 years ago when we first released the base map, we were quite happy with one million hits a year, then it was one million hits per month, then per day. And on average, nowadays we have between 25 and 45 million requests per day on our open data services. And if you look at the number of, for example, users, the number of unique IP addresses accessing those services, it keeps on growing not with the same percentage as the first years, but still in general this year only, for example, we still grow with over 15% on year by year basis. And the same growing number applies to our ArcGIS Online. So although I cannot provide sort of a good proof that there is a direct relationship between those two, but there is a similar growth. And you could sort of make the assumption that in order to use the data services, you want to be a subscriber to ArcGIS and once you have ArcGIS it will be quite weird if you do not leverage the data, right? Because you have it there, it's part of your subscription, so why not use it? So the more and more activations we see in our ArcGIS Online, the more and more our content users just growing. But you could also say the content, the open data services usage, is growing by two reasons; one is new users and second one is growing the user rates within organizations. So more intense use of companies that already work with GIS but are increasingly onboarding more and more users in organizations or are more and more actively working with GIS.

**Interviewer**

Yeah. So in a sense, you are keeping the already existing customer base to stay with ArcGIS. What are the main technical and non-technical activities that you carry out to offer these services?

**Interviewee**

Yeah, there's several of them. So the first one is a more technical one: it's the conversion of data, right? So what we want to make -- what we try to achieve is that the data is as easily usable as possible. So that means that we provide it through web services. But if you want to change the symbology or if you want to do an analysis, we want to make sure that those web services are allowing you to do all of that. You don't need to download the data, right? We don't want you to download the data. You should be able to work directly on web services. But in order to publish the web service, we first need to gather the data. So to get the data our team needs to do a lot of conversion of data, so that's a lot of technical work. Another technical piece of activity that we need to do is, in addition to converting the data, it's also about building data routines to convert the data. So that could be our out-of-the-box ArcGIS

technology that we leverage or it could be custom tools that we develop for example to parse really specific data. The [country C] government, for example, publish quite a lot of open data also from our key registrations, like the building address footprint database, but those datasets, if you want to provide a daily current version, those datasets are not offered in a really end-user friendly way. So it's in a particular format. So we build technology to download that on a frequent daily basis, translate everything into our data model and do that all <inaudible> create web servers out of that. So that's building routine that we need to do.

Another activity that's really important for our team is that -- and that's why we have cloud engineers working in our team -- is we need to do, we need to set up our infrastructure to publish our open data service. So it's not only about technical expertise of the datasets itself, it's also about how can you set up web servers in the cloud infrastructure that scale, that can handle large loads during peak moments, so that's another activity.

Then related to that we have the activity of monitoring because we need to monitor: Who is using it? What are they using? How often are they using it? And that's not because we want to know exactly who is doing what, that's totally none of our interest. What we want to ensure is that if they use it, it performs well. So we need to monitor the environment to see if the request times are still, let's say within a second or if new applications are using our technology, we need to learn: What applications are they? What type of queries do they do? Do we need to optimize the queries for enhanced performance? And things like that. Also, we want to know, let's say if there's something happening in the news and some of some of our maps are being used, we want to know if there's more and more users currently on those services because we need to scale the environment. So we have a large monitoring environment, for example, with push notifications on our mobile phones because it happened quite often in the past. So we allow our customers to use our open data service to do whatever they like basically and also we want to make them successful. So if they want to create a public facing application, that's just fine. But the challenge with the public facing application is that you cannot really predict how many people are using it. And it was -- I think it was <redacted> when there was quite a large <redacted> in [country C], in the <redacted> [country C], and during that incident, the elevation maps are really crucial for communicating and a lot of people, including citizens in [country C], we're going to look at the <redacted> and to see like, OK, how high am I living? And do I get threatened if there is a <redacted>, for example, and those are really peak moments where we need to scale our infrastructure. Monitoring is a key activity for our team.

Then in addition, we have the activity of building those promo apps and that also comes with a sort of non-technical activity and that is that in order to build those apps, we also need to promote it. So marketing is also basically an effort that we need to all take. We actively, on a weekly basis, communicate, for example through LinkedIn on new developments or inspiration, could be any kind of communication.

And there's also another activity which is supporting our customers. So if they have questions, concerns, ideas, wishes, that is sometimes technical related, sometimes it's just non-technical, it's gathering feedback for users and how we can improve our open data offerings.

And then I think, last, we have a website that we created which we call our content hub, basically it's our open data hub website where we sort of put everything together with our latest information, our change log, like what data set did we update for the last time. We put the knowledge based articles. So

that's sort of our go to place if the user has any questions or want to follow what we're doing. Is that a technical or non-technical activity? It's at least not technical from working with technology, it's more like how do we engage with our end users. And I think that's important because if you look at the open data services from let's say, the open data providers themselves or from other organizations that act as intermediary, I think a lot of them are good at just putting -- pushing the data out there. But I think the goal is not to publish data out there, the goal is to make data usable and make use and in order to do that you also need to be reachable. People need to be able to get -- if they have any questions they need to answer it somewhere, and I think it's important that we sort of create a face for our customers where they can get more knowledge. So that's also an activity that we actively do.

**Interviewer**

Yeah, I have a follow up questions. So for example, you mentioned the cloud service, the monitoring infrastructure, are these all done in-house, meaning that you do have resources to do those things?

**Interviewee**

Yes, it's a good question. So basically what it means is -- there's two components to it: there's the infrastructure component and there is the knowledge component. So we have the knowledge in house with cloud engineers who actually can build cloud environments and know all the specs about hardware, software and scaling. Then the second part is like, where do you put your hardware? Is it internal or external? And for this type of applications we all do it externally. So we leverage larger cloud providers. They are responsible for the hardware and things like that and the network but our client cloud engineers, they configure all those components and make it scalable and things like that. But we don't do -- the production environment for our customers is all in cloud infrastructure and it could be different cloud providers. We work typically with the local cloud provider [country C] for optimal performance in the in the local [country C] area. And it doesn't mean we don't have any hardware on premises in our company or at another data center. We also have that but that's more like where our team is internally working on versus what is the production environment where we serve our data to our customers.

**Interviewer**

And so the monitoring notification that you mentioned is also in house.

**Interviewee**

Yeah, that's all built by ourselves and maintained by ourselves, yeah.

**Interviewer**

Do you also get support or knowledge sharing from other Esri or Esri in the US?

**Interviewee**

Yeah, definitely. So when we did the sort of introduction to each other, I asked you like, which are the other distributors that you're talking to. So I obviously mentioned that I know that. And that's also because we do actively do knowledge sharing. I mean every country is different and [country C] is quite, I think far when it comes to the open data policy. So we have many more, many, many more data sets available to us [Esri distributor in country C] compared to other countries, so that's sort of a luxury position for us. But it also makes that our strategy for [Esri distributor in country C] different compared to the strategy to some other Esri countries. Basically because we don't really have to purchase data in order to serve it out to our customers; we need to invest in people, time and hardware software but we

don't have to purchase data itself. But in some other countries those data sets are not available as open data, you need to purchase it. That's a whole different business model, right?

So we do a lot of knowledge transfer. We have this both with Esri US and with European colleagues. So we do typically two events per year where we come together and share the knowledge and share the strategies across countries. We learn from each other the differences, but also we try to figure out with each other where we can collaborate on each other. So for example, in addition to local data, we also together with all of us, we built global base map for the entire world. So that's something where, [Esri distributor in country C] are providing data to Esri US, which incorporate it in the world datasets and that is applicable to every country, right? So yeah, we do that a lot, on a technical level and on a management level.

**Interviewer**

OK. How many staff are involved in the open data services in [country C] and what are their skills? You mentioned <redacted>?

**Interviewee**

So what I mentioned is, I think if you look at full time employees, it should be roughly <redacted> full time employees, but it's in total it's <redacted> persons. Not everybody is working the entire week and there's a variety of roles or skills in our team. So you could basically bring it back to five roles. And that's basically: the developer or developers who are building the routines. Then we have the cloud engineers which I mentioned about the infrastructure and monitoring. We have data engineers where the developers create data routines, the data engineers then use the data to create for example base maps or other derived products. We have cartographers, basically people experienced about how does the map actually need to look in order to make it useful and easy to use and things like that. And then you could call a group of people which are more related to either coordinating the team or doing product management. <redacted>.

**Interviewer**

And what are the costs of offering these services to as you [Esri distributor in country C], financially or otherwise?

**Interviewee**

Yeah. So basically I think, the cost -- first we need to invest in staff. That's the biggest investment. So basically we need to have our team ready to do the offerings. And in addition to staff, it's hardware. We need to have a lot of hardware, whether it's cloud resources or internal service. We have to have a lot of hardware in order to handle those quite large datasets, it's several hundreds of terabytes of data. So that obviously you need some <inaudible> for it. Then obviously there's a cost in getting, having the right knowledge, so we invest a lot in training, in knowledge to know the latest and greatest and be able to advise our customers also in a proper way. So training is really something that we invest in.

And then software, not so much, because that's the luxury position as Esri, we have our own technology, right. So we use leverage our own technology to publish the data. So we don't really have to invest a lot in specific commercial third party software. And then I think what differentiates [Esri distributor in country C] to some other countries is that we don't typically really have to -- the cost of offering open data is not so much in purchasing data because in [country C] a lot of data is already available, and if we do need to pay something, it's more like we need to pay an administrative fee for obtaining the data.

So for example, the large aerial photographs are [a lot of] data, [then] we need to pay a particular amount in order to have <redacted> to share the data with us. We don't purchase the data, so to say, we just pay an administrative fee in order to do those data shifting between those organizations. Basically those are, I think, the main cost of offering open data services.

**Interviewer**

Do you get support or sort of like subsidies from Esri Inc, for example in terms of like, the server, the cloud hosting?

**Interviewee**

Well, no, not directly. So obviously we leverage our ArcGIS Online a lot for data hosting, but ArcGIS online itself is also clouds and runs on cloud infrastructure. So Esri will have to pay bills towards, let's say, an Amazon or an Azure Microsoft or others if they are using those cloud components. So [Esri distributor in country C] we purchase or we pay for what we use. It's pay-per-use system so we pay for what we use because we also benefit from what we provide there and sell to our customer. So hopefully we have some - because of the scale that we do it, we have some sort of discounts and benefits from it. But yeah, in general we all pay and leverage those environments ourselves as [Esri distributor in country C].

**Interviewer**

What are the challenges encountered by [Esri distributor in country C] in providing open data services?

**Interviewee**

Well, I think one challenge would be that sometimes the data itself is not really that useful, so you need to invest quite a lot in knowledge and building data to really make it work for your purpose. But I mean that's then something that we just need to build and invest in; knowledge. The challenge is that sometimes we figure -- we find data quality really important. So what we do is we build a lot of checks that helps us verify whether if we download for example at the current night, we download the building address footprint data, and we expect that it is in this particular structure, that it should not be outside [country C] that well, there's a data model behind it, so you can check the validation against the data model. And quite often we detect errors in the data and then it's becomes a challenge: are we going to process data which we detect errors on and redistribute that error to our customers or we're going to shut down the process, so to say, keep our customers then on a not current version anymore, it's a day off, for example, and provide feedback to, for example, <redacted> or whatever provider is there? But I mean it has impact, right? So and those are if -- I mean an issue can always happen also in technology and the software can happen. But it's interesting when some of those errors are reoccurring more often in the year because it takes a lot of our resources if we need to figure out the error, troubleshoot it and then report back to the open data provider. It takes a lot of our efforts and we could also provide that effort to other projects that we want to work on. In general, I think nowadays it's a little bit better. But in 2020-2021, I would say that roughly 1 FTE of our eight FTEs is fully busy troubleshooting errors that we get from updates in the open data sources.

**Interviewer**

OK. And yeah, and are these mistakes repeated mistakes? Are they the same error?

**Interviewee**

Yeah, sometimes they are. And those are then errors that they don't validate on or don't check and I think we find it, it's in our best interest, in our customers interest that we do those data checks. But ideally, we shouldn't be doing them and they should be done at the source. And it gets better and better because based on our feedback we quite often see that those open data providers are enhancing their review. But still I mean -- and it's understandable, issues can happen, but I mean ideally the less frequent the better it is because it takes a lot of our resources and my concern is that if we weren't -- if we would not do it that actively, a lot of companies would trust the data, right? And in this case, we're talking about key registrations in [country C], which is a mandatory dataset for governments to be used, which sometimes contains an error but it's not being communicated that there is an error. So we decide that we actively communicate about it because we want to ensure that if someone is trusting the data, they need to understand how current the data is, what are some of the concerns and things like that. So that's one challenge.

And I think another challenge is when it comes to us providing open data services is that it's always a struggle like what is the role of the market and what's the role of the government itself? So in this case, I think in [country C] there's <redacted>, which is the -- sort of the SDI for [country C] where a lot of data is also shared openly. It's a great platform, we leverage it a lot also to download the data. But what you sometimes see from, on a longer time frame, is that the scope sometimes gets a little bit broader from those SDI. So instead in addition to just offering the data, they also start building location services, let's say, a geocoding service. And that's sort of becomes then the discussion like what's the role of the government? Where should the government stop in their SDI efforts? And where should the markets provide added value on top of those data services? So that's something that that sometimes provide a challenge because we have been working -- we have been building systems which are operational and then by a decision of a government organization, sometimes some users will migrate to free public version that the government is offering then because they decided that it was big enough or important enough for them to also provide it.

**Interviewer**

Yeah. OK. Whereas you've already invested in developing these products.

**Interviewee**

Yeah, yeah. And also, I mean the they will need to invest in developing it themselves also. So often the government doesn't purchase an existing technology then for it, but they build the technology themselves by open source. But there is already commercial software out there that's providing the capabilities. So then you are like rebuilding something that is already being built and invested in. And you could challenge if that's the lowest cost for the taxpayer.

**Interviewer**

OK, one of the activities you mentioned is data routine and if I understand correctly it means that you need to create a routine where you regularly update the data. So do you also face issues where data is irregularly updated? Then do you have to redo your data routine or adjust it? Is it an issue?

**Interviewee**

Yeah, definitely. So there's two hues on it. So the first is that some sources are not updated on the same, let's say, timestamp. So ideally it should be for example daily, but sometimes due to let's say unforeseen issues on the provider side, they haven't been able to update it during the night. And our

routine run during the night and then you indeed need to do it either manually rerun the process or you will be delayed a day, so to say. So you have that perspective.

And then there's another perspective is that sometimes those sources are being updated, so the structure itself is changing and that has big impact obviously. So I think a good example is for example the building address footprint registration again. Currently we call it the <redacted>, which is now a thing <redacted> years old or something. But the previous version had a different data model. And well, the good thing is they don't sort of change that on the default day and don't communicate about it, but these are impactful projects, right? So let's say -- and that also is happening for the cadastral map for example, or the small scale topography, it's also a good example. Currently we call it the <redacted>, it's the small scale base map and that is being changed to a new version which is called <redacted>, and that's a project longer term, but in the end, probably end of 2023, perhaps a little bit longer, the current way that the distributed data will change to a new data model. And that means that we have to recreate our data routines, investigate the impact on all of our data products that say. So we use data format A, we converted it to our data structure and we use it in the base map. The source change, our data routines need to be changed, our data structure needs to be changed and also our base maps that leveraging the data also have impact because the names are changing; let's say, we visualize buildings on a particular field that contains a name, but now the field is no longer called a name but something else. I mean those are all breaking changes, right? So those are really impactful projects and the good thing is -- the compliments -- the government is actively communicating about those changes. But still, let's say they would, from a conceptual perspective, say in three months, we're going to release this, is three months enough for us to redo our entire routine, right? For small projects it is. But we also have other work plans, right? So, often you will need a longer period of time, and sometimes it also means that you simply -- it is really a breaking change. So for the building administration what we did is we have version 1.0 and we had a web service to our customers on version 1.0. Then <redacted> started building on version 2.0 and we also started providing web service on version 2.0. So we can have customers determine themselves the speed of which they want to migrate to the new offering, because this is a breaking change. We don't want to force working application for customer gets broken because we change the data right. They need to actively migrate. So that's something that really impactful, but it also brings up the reason why we are doing this; because, we need to change those data routines now [and] can you imagine if we would not be providing those open data services, but each end customer would have built their own data routines? Then the work that we do would actually need to be redone at every customer side. So if you look from an economy of scale perspective, it's far more efficient that we do it, and then serve those services out to our customers instead of having each organization go through that struggle and hurdle.

**Interviewer**

Yeah, I'm. I'm going to skip some of the questions I think you've covered some of them. Do you have any examples of projects or cases where Esri open data services demonstrated impacts?

**Interviewee**

I mean, yeah. Can you define a little bit your sort of idea about your impact?

**Interviewer**

Yeah, it could be something like it's either social impact for example, you see that certain products were very visible and people are quite happy about it because it gives some social impact or it gives them, you know, impact to certain groups.

**Interviewee**

I think I have 3 examples that I could share with you. I mean, first one is just if you look at how our usage has been grown over the years, I think that's basically the best demonstration of impact because if customers would not be satisfied or trusting those services, they would not be using it. And those services are being used by tens of thousands of unique IP addresses each day, and that that is from a whole wide variety, it includes, for example, mobile field workers that are inspecting, for example, <redacted>. And that's important right? Because in [country C], it's important to have <redacted>, we are largely <redacted>, so to say. And even though it's just the base map that those field workers are using, they use the base map to orient themselves: where are they and where are our assets located that we need to inspect. But the fact that we have each day thousands of users trusting our base maps simply for orienting themselves in the field is, so to say, an example of impact. I mean the fact that they're using on a daily basis, they trust on it, that's sort of really important.

If you go a little bit more practical, I think one of the promo apps that I'm most proud of is the one that we built for the <redacted>, which is <redacted>. Have you seen it?

**Interviewer**

Yes, <redacted>.

**Interviewee**

Yeah, exactly. I mean that application I think is really an example of impact because it's so easy to use and people outside of our GIS community are using it. So it could be my parents, let's say at the birthday party explaining to others where they were born and how <redacted>. It's really reaching mapping on a personal level. But also for example there was just an article on the news where <redacted> was used -- how do you call it in [country C], someone who's studying history and lost objects. They are using it also -- if they are somewhere, go through history and figure out like what was here. I think that's also really an impactful way of demonstrating how it's being used because it's reaching this all these different types of users -- where sort of it reaches the mapping at the heart of a person instead of just for a business perspective. And I think that's really impactful. Yeah, I think those are most important ones.

**Interviewer**

OK, now I'm going to talk about Esri in the open data ecosystem. Do you have any suggestions or wishes of what other actors could or should do to improve the current open data ecosystem. What are your wish lists from the point of view of Esri?

**Interviewee**

For data providers or for other intermediaries, right?

**Interviewer**

Yeah, for data providers, for other data intermediaries. Or for users. Or for standards body.

**Interviewee**

Yeah, and so when it comes from your questions is this question 15, 16 or 17?

**Interviewer**

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**Interviewee**

Yeah, yeah, yeah, yeah. I mean, I think in general, I think most parts in [country C] are doing a really good job. I think if there would be one area where we could see some improvement is I think after -- Esri is quite large and Esri is also actively contributing a lot to open standards and to open source also. And when you for example look at quite a new area regarding 3D. 3D currently there's no formal OGC standard, but there are however, two community OGC standards and that is 3D Tiles and that is I3S. Now the interesting part is that 3D Tiles has been built by Cesium and provided to OGC as a community standard which is accepted. The same applies to I3S, which has been created by Esri, has been shared to OGC and gave an approval as community standards, so there's two standards. What we sometimes see is that a provider of data is then choosing either one of those standards to publish their data. But I mean there are two standards, there is not one standard. So by choosing one of those two, you are sort of limiting the potential users because you are outruling one of those services. So let's say a technology has created support for standard A and not for standard B, you're ruling out that. So I think in general - and that happens -- I see that quite a lot for 3D that it is quite often shared as 3D Tiles and not as I3S, but both are community standards. And I think if you choose to provide data as open standards it should be reaching all the standards that are out there. So that's one of the, I think, recommendations that I would do: go for other use cases possible and also allow your data to be accessed in the most broad approaches.

**Interviewer**

Yeah, but from the point of Esri, do you think then it would be a good idea to harmonize these two standards, like OGC should step in and harmonize?

**Interviewee**

I mean ideally, yes. I mean if to eliminate this confusion, just make sure that the new standard is being created by OGC leveraging either one of them, or the best of both. But that's always like -- in this case, the industry, the commercial businesses have been a little bit faster when it comes to offering new types of 3D services and they have been contributing to OGC to create community standards. So that's great. But then if there's double truth, so to say, indeed it is confusing. Esri is really committed to providing support for open standards, so we would prefer that there becomes a clear open standard for 3D so we can ensure that we start supporting that.

**Interviewer**

Now I'm going to ask. What would you think are the wishes for Esri, what Esri could do better?

**Interviewee**

I think. Well, we could do better I think is perhaps create -- we have a community of users and how can we have our community more actively come together and share feedback, learn from each other, provide feedback because sometimes they provide feedback to us, but it's not about us and the technology, it's about, for example, feedback about the core registration. So we could perhaps intensify our role as intermediary to also bring together our users and the provider of the data itself because we are sort of in between. And we collect feedback from the one side and we can provide it to the other side, but there's hardly any collaboration where let's say the three parties are sitting at the same table. So I think as an intermediary that's an area where we could be perhaps improving and more facilitating.

We are already doing it by sharing, let's say, monitoring reports to the providers, but it could be more human way of interacting.

**Interviewer**

What do you think about the emergence of open source software like QGIS and open database like OpenStreetMap? Does it change the way Esri does things?

**Interviewee**

No, I don't think it changes anything in our, at least in our approach in [Esri distributor in country C]. I'm a big, how you say, that a fan or a promoter of OpenStreetMap, I think it's a really powerful initiative, which we also as Esri globally actively support. We support it in different ways. So we leverage OpenStreetMap data for example in our data offerings. But also we contribute a lot to OpenStreetMap itself by donating, so there's payments involved to supporting the OpenStreetMap community, there's tools that we support. And for example, as [Esri distributor in country C], we have some really nice looking elevation maps, and for example, any OpenStreetMap user, for example, that's leveraging JOSM as an online editing tool -- that's not an Esri user, right? -- but they can just e-mail us and we will provide them with our written approval that they are allowed to use our data services in JOSM because we want to make sure that they are empowered with the right data to edit OpenStreetMap data, because that's of the benefit in everybody in the world, including us as well. So we sort of really actively support those initiatives and then also -- it can be seen in the Overture Maps initiative, for example, that some -- where you can actually see that a few large tech companies are collaborating with public companies in order to create sort of additional value in a new open data map of the world. And similar to that, if you look at other technologies, for example, I mean the more easy to use tools are becoming available for organizations to work with data and to share their data as open data, it's a welcome improvement. I mean, either we as Esri should be building them or someone else will build them. So, any good tool that's coming out there that is beneficial for everybody.

And in addition, I would say -- I mean, you can see the emerge of open source software and database but I think the reason why I'm saying it doesn't change our strategy is because there's so much more involved than just technology. Being successful with open data and building those services, and also having users work with those services also comes with how do you support those customers? How do you keep the technology up to date? How does it match security demands? How do you invest in new developments to keep your software up and running and supporting the latest and greatest when it comes to hardware, software, browsers, things like that? So yeah, I think it's not changing anything. What I do see is that it's further accelerating the usage of open data and also it raises awareness of the actual lowering the barrier that we are doing. So we see quite a lot of -- we actively engage on forums for example, on the web and we often see references to like I would like to try this and this and this, similar to how for example Esri is doing it in their viewer. So I think people are inspired by what we're doing and that's just fine. And if they want to do it in other technology, that's fine. I mean, the more and more technology that's out there to make data usable is the benefit for everybody and it's up to us to improve our technology that ours is standing out.

**Interviewer**

OK. My last question is a bit an additional question. With the development of SDIS in Europe, especially since INSPIRE, what would you say are key lessons learned? What should have been done differently, for example?

**Interviewee**

I think in all situations it should be all about the user, the end user. So it should all be about what the end user needs. So I think looking back at what I've seen in SDI in [country C] and Europe, and also with INSPIRE, also regarding OGC, we are used in our geo environment, in our GIS work, we talk about GIS, so we find GIS special. We build special standards for it like WMS and WMTS and WFS. And I think as Esri, we -- it's a long time ago -- we already started building rest API endpoints. Because we wanted to ensure that data also gets exposed to, let's say, non GIS developers; so these are developers that are common using web patterns and techniques that are not GIS specific. But there is a big gap between that audience and then the GIS audience. And I think looking back, put the user first and you should be building standards and offering standards based upon those users and don't think about being so special. Try as GIS community -- trying to be just as a commodity as any other Web API, because that will actually open up to not only let's say a few 100 thousands of GIS developers, but let's say the 25 million global developers that are out there in IT.

**Interviewer**

Thank you so much. So those are my questions before we end the recording. Do you have anything that you would like to share with me that you like to add anything that you haven't said that perhaps is important?

**Interviewee**

No, I think you have more than enough.