Geographic Information Systems
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Lecture - 61
Open Geospatial Consortium (OGC)

Hello namaste, welcome back to the course on Geographic Information System. Today, I am here back with as I said I would speak about the Open Geospatial Consortium or I mean this is also called as open source Geospatial Consortium. So this OGC and OG standards are the standards that are much referred. So whatever we spoke about the standardization in our previous class, OGC is one consortium, which actually is responsible for developing of standardization.

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So we look at more of it, how it evolved as an organization, how for example when we look at OGC, what are its domains? What are its standards? What is the structure of that particular organization? How can one be a member of that particular organization, and how can the collaboration of particular standardization can happen through OGC.

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So when we say Open Geospatial Consortium, it is an international voluntary consensus standard organization. As I said previously, was established in 1994. In OGC, we have at least 500 commercial, governmental, nonprofit and research organization worldwide that collaborate in a consensus process encouraging development and implementation of open standards, okay.

So I am not speaking here with open source. So I am speaking about open standards, okay. So please keep that in mind in quotes, open standards. So OGC is member-driven consensus process, create royalty free so there is no royalty for this. Publicly available open geospatial standards. So whenever this are there is a new geospatial standards that is involved it is always publicly available and are royalty free, okay.

So it is normally created by the organizations, or those organizations which collaborate worldwide and encourage in development of open standards.

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So when you are looking at open space Open Geospatial Consortium. So now vision, the main vision when we look at this, for example, let us say using location. If you have a particular location, what it says is we can connect people of that particular location, communities, maybe across communities, across locations, across technologies, and decision making to create a sustainable future.

Which means to say that whenever you create a data okay, I create a data there are someone else who will create a data, maybe Chandan creates a data, Mr. Prakash PS who creates a data. So if this data is in a proper shape, in a proper standard, in a proper using a proper technology, so the decision making would become extremely easy okay.

It can cross barriers and define decisions which can be easily interpreted even without looking at what kind of I mean decision is actually being reviewed without having any influence of any other intellectuals or any other influential attributes in terms of data that you have, okay. So it is very essential in order to connect people. It is very essential in order to connect communities.

It is very essential in order to develop technologies which address these issues and will help in creating a sustainable future for us or and children and the future generations. That is what is the main vision, which means that the data that is serving us today will be also the serving point in the future. So very important thing is that we have to create data which is future usable.

And for example, if someone asks you can you give me a data of land use of 1950 it may be extremely, I mean, we may not have any data records. Though we have government records, it is extremely difficult in order to digitize those government records and exactly put it on a spatial surface.

So it is very important today if we have created a particular data standard created particular data, even after 20, 30 years, this particular data can be used for any looking at any temporal decisions, temporal change decisions that has to be taken by any of the policymakers. So it is extremely important in order to create a good standard data and the data that can be used by many.

Then when you look at the mission of Open Geospatial Consortium, it is to serve the global forum for making location findable, please be very careful here. The location is very specific. Location findable, accessible, interoperable. When I say interoperable it is between the data and the data standard and reusable, okay via of proven consensus based collaborative and agile process.

So why do I mentioned as agile is a process that where whenever we have a collaborative and a consensus based process, always the whatever the hand holding happens, it is through agile process. It is quite agile in terms of how the process happens. And when you are looking at combining standards and innovation and partnership, it is extremely agile.

So that is why when you are looking at all of these there should be striking balance. Otherwise, you know once if you do not have a striking balance, either the data quality would go low or the production quality would go low. So one of these would surely miss balance in terms of how you create data and data and process it.

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Now once you have understood this, we have certain domains that OGC actually conforms to. So it means to say that there are different domains where OGC has its own ways of interpreting data. For example, its aviation, you have built environment and 3D okay 3D of built environment is extremely important in today's context, whether it is application of natural resource management.

Or whether it has usage of in terms of development of certain scenarios for how we can use a viewable energy or it is with your with applications towards how improvement can be done to the cities in terms of whatever the program of Government of India like the Smart City Mission or any of those such missions that are there. Then all of this in today's context the 3D becomes a very important aspects for any city and city information.

So if you can follow the how that particular 3D information is extracted through the OGC standards, then it would be much easier for you to represent that data. Then the business intelligence extremely important in terms of GIS. Defense and intelligence has also gone through OGC standards. Then you have emergency response and disaster management.

Yes, though it is not existent as of now in India much but yes it is growing up that you could probably see the yearbook of disaster management that was released by the Minister just about few months before. So you could see, there are also a mention of

different standards. Then you have energy and utilities. Then you have geoscience and environment.

So this is where the major applications of standardization has been seen over a period, over few years. Government and spatial data infrastructure. The spatial data infrastructure is the concept that is actually coming up in a large way. So the spatial data if that has to be created, then that the pool of data has to be interacting with each other. If the pool of data has to be interacting with each other it means to say that the data has to be standardized.

Data has to have its own location, has to know what it is, where it is, what kind of data is stored. Only then you will be able to make the data interactive in that entire pool and then develop the spatial data infrastructure. Then the mobile internet and location services what kind of location services are there, what is a mobile internet service, how it how the services are tendered to the user also is gone by OGC.

Then you have sensor webs. Universities and research are also where the data is used the OGC also forms its own domain of how it has to be represented, okay.

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So when you are looking at this, normally when you look at OGC standards the baseline comprises at least of more than 30 standards as of today. So that includes first one is the CSW, which is catalog service for web. This is accessing the catalog information through the web services. Then GML. Today, if you look at the web

based services GML marks up a very good very important way of how the data is captured geographically.

So geography markup language, the XML format based geographic information is one of those OGC standards that are used. Then GeoXACML or XACML is geospatial extensible access control markup language. Then you have KML. Very well-known Google Earth uses the KML language that is a keyhole markup language.

This is basically an XML based language schema for expressing geographic annotations and visualization of existing web based two-dimensional maps and three-dimensional earth resources. That is exactly why it is used in Google Earth. So observations and measurements, these are other parts of the standard baseline. Then you have OGC reference model.

So as I said, whenever you create something, you have a reference model. So OGC also has a complete set of reference models for it to be very clearly implemented. Then we have OLS that is open location service where which helps us in servicing the locational data for any kind of imagery responses.

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Then we have OGC web service context document that defines application state of an OGC integrated client, which means there is a client, it may be a browser. So you have an OGC integrated browser. Then it should it also should define how the

application state is being mentioned. So that is through the OGC web service. Then you have OWS which is again OGC web service common.

So this is also very important now it is taking huge steep in and more there have been implementation which has seen all across the globe. Then you have SOS which is sensor observation service, how the sensors are observed and how it is implemented. Then you have SPS the sensor planning service and the SensorML which is a sensor model language. So these are few of the examples that can be stated.

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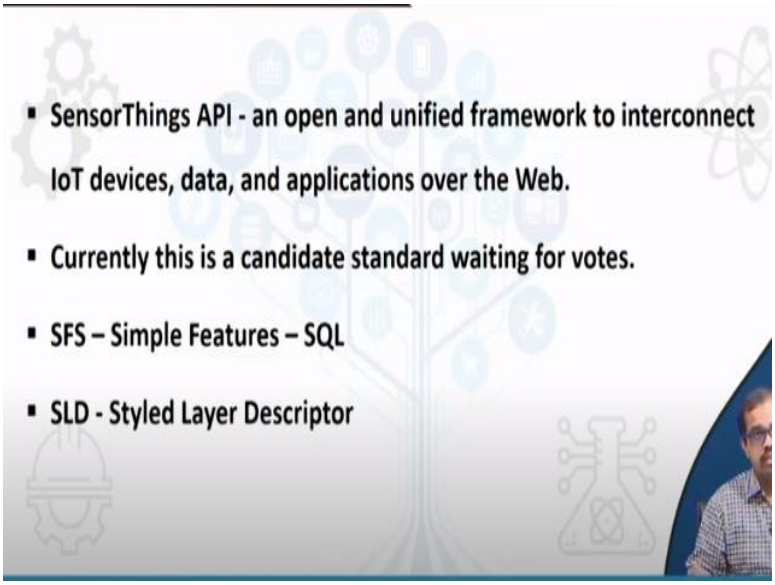

So when you are looking at another thing is very important a SensorThings API. So this is an open and a unified framework to interconnect IoT devices, data and applications over web. So this forms a very important aspects aspect in today's context. Now today whatever is happening is through API and IoT. So if sensor things API is implemented, then an open and unified framework can be easily developed.

Then then you have two candidates for example, simple features like SQL and the stylized later descriptors. So these are other two formats, but SensorThings API is actually awaiting to be standardized. So it is yet not a standard but it is awaiting to be standardized. If it is standardized, then it becomes a thing that can be easily implemented as a standard platform all across.

Everyone can easily implement, how the IoT or how the Internet of Things interact over the web with the user. So that will be quite standardized. As of today it is not very standardized, but yes, it is being implemented all over.

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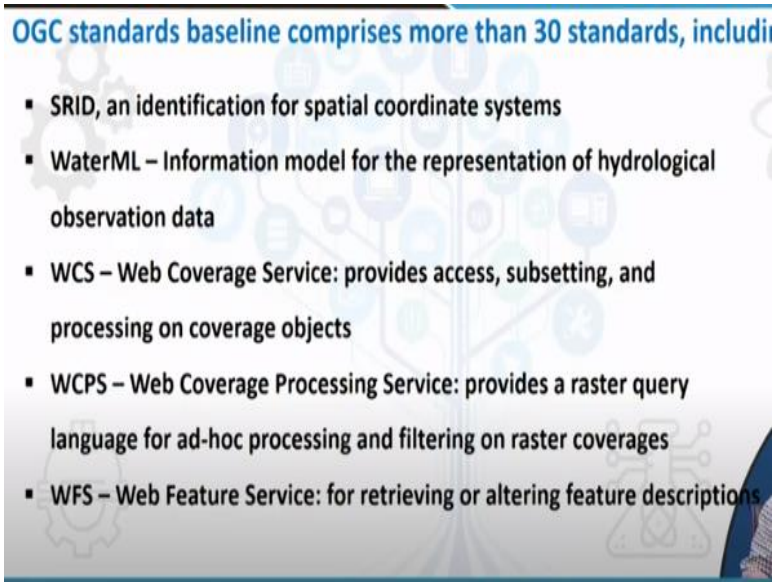

So this is about the different standard and when you look at other standards, you have SRID and identification of spatial coordinate systems. So this SRID also came into effect very recently. So it helps in identifying the coordinate systems and you have WaterML, which is information model for representation of hydrological observation data. So very specific thing. So WCS is a web coverage service and WCPS is a web coverage processing service.

This provides a raster query language for an ad-hoc processing and filtering on raster coverages. So when you are looking at certain things, so you have to look at very specific. For example, there is WFS web feature service. It is for retrieving and altering feature descriptions. So for example, when you have your data represented on the web, when if you put it as a web feature service, it is a feature, okay.

So you can any user can download that feature. So it has to be standardized, certain standard way of using that feature. Also there are certain standards written by for WFS. That has to be used in order to represent it as a WFS feature. So all these are extremely important when you have to put out the standardization.

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Then you have WMS which is web map service that provides map images. Then you have WMTS which is web map tile service that provides map tile map image tiles. You have WPS which is web processing service, the remote processing services that are normally there. Then GeoSPARQL which is geographical SPARQL protocol.

And RDF query language that is representation of an querying of a geospatial data for semantic webs. So that can be used and there is WTS, which is a web terrain service. So all these form different formats of standardization, okay, including the one awaiting standard.

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So we can have about 31 standard ways of representing the data. So when we look at data representation, this is what is the necessity of the AR. But when you are looking

at there are certain baselines and the reference model that has to be mentioned. For example, when you are developing a web service application, so you have to use an OGC standards.

So that you understand the relationship between the OGC standards and how you actually publish the data. If you do not understand the standardization and the data representation publishing, so you will not be able to represent a web service in a more flexible way, okay. So this is through application of web services environment. So the thing is that we have publish, find and bind.

Publish is resource providers advice their resource. So then you find that is the end users and their application can discover resources and bind. You bind the end users and their application that can access and excise resources and runtime. So that is how the OGC baseline and the OGC reference model is actually built.

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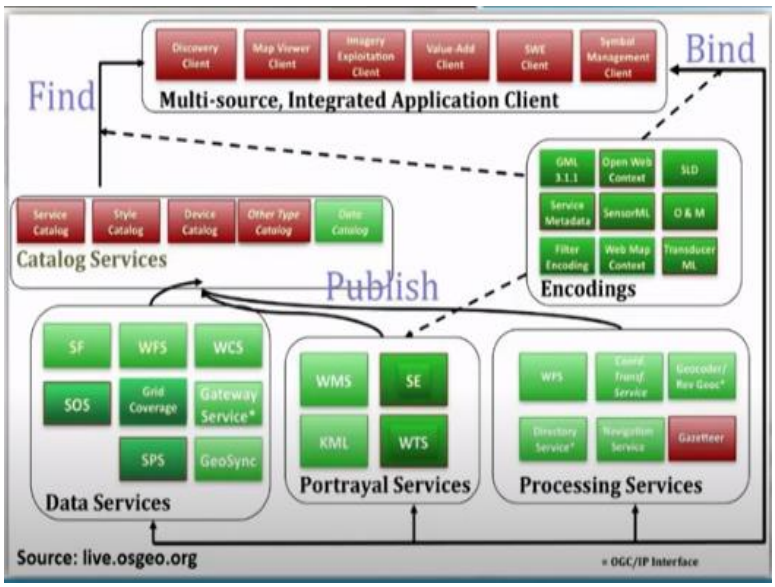

So when we look at this, this gives this is from live.osgeo.org, which actually gives you the entire schema of how actually this particular thing the whatever I spoke about in the previous slide happens. For example, you have the data that is actually created, okay. We first create a data catalog and you create a style catalog and a service catalog. Then you have a client who will be looking at how you represent that particular data on the web service, okay.

So this is then represented through the encoding service. Both of these are represented through an encoding service. But before that, when you started, you will have to look at first is the data services, which is either WCS WFS or WCS, SOS, so whatever kind of data service that is necessary. Once you have understood the data service, you have to see whether you are looking at data services, portrayal services or the processing services.

If you are looking at processing services, then you have to look at WPS. If you are looking at portrayal services, then you will look at WMS. So first select one of these services. Then once you have selected the services your data should have a catalog. Once the catalog is created, then you will look at the client, what kind of client? Whether it is a map your client whether it is a imagery exploration client whether it is a value added client whether it is SW client.

So you use certain clients to find out what is the application there. Then you bind this application through certain encoding okay. So that encoding is it may be a GML, it may be service metadata, filtering encoding or a web map content. So using this you will create the entire data service for that or create an OGC IP interface for any of the web client that to be delivered.

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Okay, just to just an example for that. And when we look at the organization standards, normally OGC has standards program that is technical committee and the planning committee work in a formal consensus process to arrive at a approval OGC

standards. So they have consensus for different subcommittees only then they will be able to look at approved OGC standards.

Then they have innovation program. A global innovation, hands on prototyping and testing program that is basically designed to accelerate interface development and validation and bring interoperability. So interoperability wherever you go, interoperability you cannot miss. So interoperability is very important in terms of whenever you create a GIS data.

So that is very important when you are looking at the market. And then learn about different initiatives. So that is where the innovation programs comes.

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Then you have compliance program. So OGC compliance program provides the resource, the procedure, the policy that will help in improving software implementation, compliance with OGC standards. Then you have community and outreach program. The OGC and its members offer resources to help technology developers and users take advantage of OGCs open standards. So that is also extremely important and is actually gaining ground very late.

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Then, as far as membership, OGC is an open membership organization. So you can anyone can have membership. The OGC offers a range of membership options for whether it is industry, whether it is government, whether it is academic, whether it is research and not-for- profit organization interested in supporting the consortium's global mission.

Which is to develop data specifically in the standard format and the format that is easily transferable. So that the membership is available and this has various ways of looking at it. If it is a industry standard industry membership it has various things to add to it. If it is academic membership then the way of outlook is very different. When it is research membership, then the outlook is quite different.

So depending on what kind of membership, the outlook actually changes, and the way it is actually characterized is also very different.

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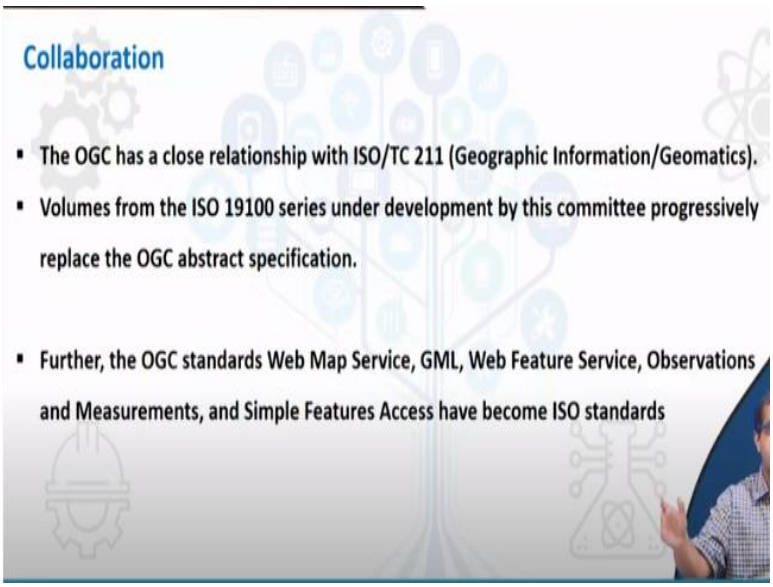

So this is about membership. Then you have collaborations. OGC has a very close relations with ISO/TC 211 which has geographic information of Geomatics. Then volumes from ISO 19100. So international standardization of organization. So if you see the 19100 series is completely devoted to OGC standards.

So this is actually under development, but I would say it has over years has developed in fact developed a lot in terms of how the standardization has to be done. So and normally this OGC committee meets very often and they replace the OGC abstract specification whenever the new specification has to be entered. Then you have further the OGC standards web mapping service, GML web feature service, observation and measurements and simple feature access.

This have become all have become ISO standards. If you look at if you just look at all of these, they have specific ISO codes. So these are different if you ISO is international standard of organization is not an organization which actually awards you a certificate. But it is a voluntary service, okay.

So ISO, if I say it is ISO 19100 certified means say that certification is actually provided by a third party who actually looks at the organizational structure, who looks at your data, who looks at how it is represented. All of this once it is verified, then it is the certificate is provided. So if someone says it is ISO certified, it means that it is certified by a third party and not by the ISO. ISO only provide standards.

It mentions what are the different ways that it has to be looked at to get this standardization. Otherwise, ISO has no role in providing certifications, okay. So that is about collaborations.

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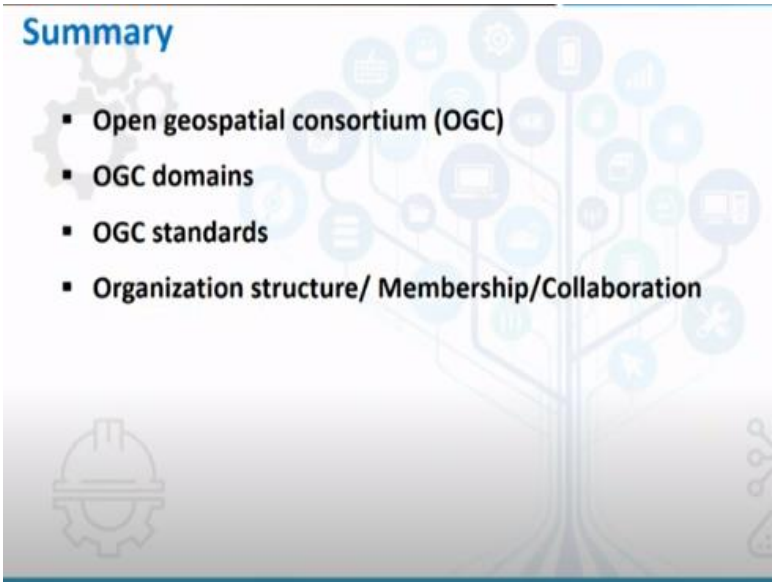

So when we look at we looked at the open space Open Geospatial Consortium OGC. So we looked at how OGC works, what are the different domains in it? We looked at 30 different domains, how it works, what are the different ways that you have to look at. Then we looked at OGC standards, which is extremely important in terms of representing the data. Then organizational structure or the membership and collaboration.

So this is how an organization actually is maintained. So this is all about OGC. In my next class, I will also speak about the NSDI. So it is a Indian Government initiative to bring standardization and the data that is developed by the Indian researchers, Indian organization, the Government, the Academy, etc. So we will look at that part in my next lecture. Until then, have a nice time. Thank you very much.