Patent Search For Engineers And Lawyers
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Lecture - 26
Hands on Patent Landscape

Welcome to the lecture on Hands on analysis in relation to Patent Search with respect to Patent Landscape. In the earlier lectures, we have understood the basic purpose of a patent landscape; why a patent landscape is done and how a patent landscape is done; what are the important considerations that one needs to keep in mind in relation to a patent landscape. How a patent landscape can be done from the point of view of a broad and narrow analysis. Let us venture into understanding what are the practical aspects of patent landscape in this lecture.

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The concepts that we would be dealing with in this hands-on patent search for landscape is to understand the different art areas, the technical art areas, mechanical, chemical, electrical and electronics and biotechnology. So, using these examples from these areas, we will understand how to walk through the entire process of doing a patent landscape. Identifying the search methods, doing the data analysis and what are the kind of conclusions and recommendations that we can derive out of preparing a patent landscape.

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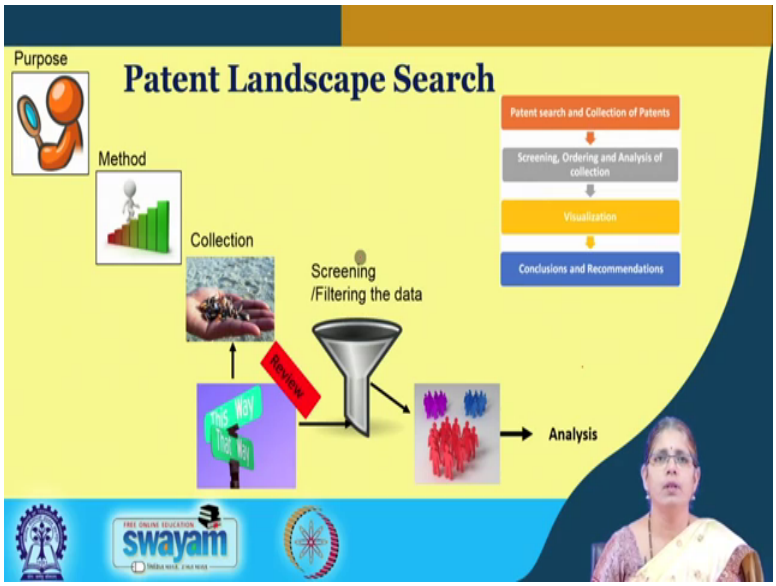

So, just for us to revisit our understanding on patent landscape. Understanding the purpose is the first important aspect of a patent landscape search. So, a patent landscape search must start with an objective, keeping that objective in mind identifying the right method for analysis is important, where we outline different steps in doing the analysis. The third step is the collection of the data based on the search done.

Now, this collection can be a broader collection, it can be a very specific collection and so, therefore, one of the important things that we do after collection of the patent data is to filter through or screen through the data, to choose specific categories which are in line with the objectives of the patent landscape. So, it is at this stage that it is important to understand their need for review of the patent collection to decide on which is the approach one would take in relation to the data and so, therefore, this is one of the very important steps in relation to the prior step towards data analysis.

Once the review of the patent data is done, it is at this stage one looks at grouping of the patent collection in order to approach the analysis. So, this is in broadly what are the different aspects of a patent land landscape search. Using this approach, let us now look at individual areas and examples from those individual areas, how to go about with the patent landscape in that particular discipline.

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One of the important areas where a lot of patent landscape searches are done is the area of mechanical arts. Now, mechanical arts involves the aspects of devices, processes, manufacturing and today, we are dealing with advanced manufacturing aspects which are again interdisciplinary from the point of view of mechanical aspects and electronics which is mechatronics is one area. Then, you have mechanical with a very close link with the chemistry and chemical engineering areas.

Similarly, you have mechanical and a lot of interface with biology, where you look at medical devices and some such applications. So, let us understand with some examples from this area on how to go about doing a patent landscape and deriving value out of that particular search.

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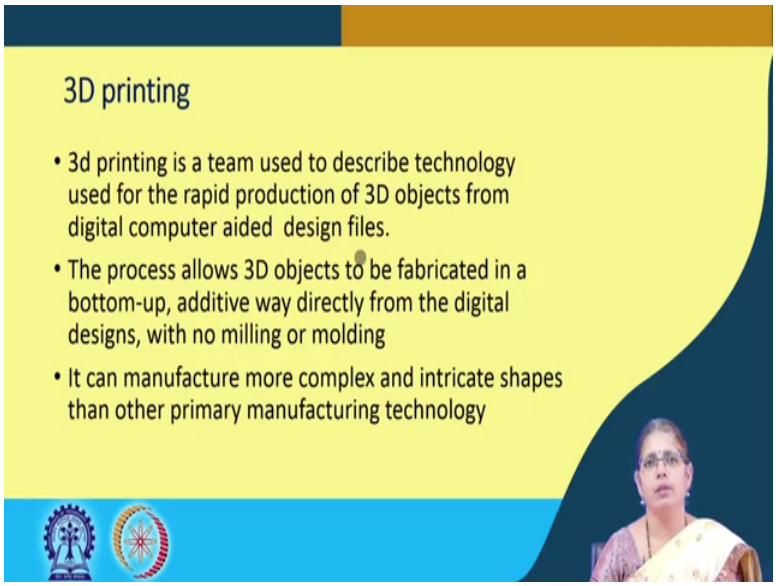

One of the important areas in relation to mechanical engineering is the area of 3D printing; three-dimensional printing. This has made a big change to the way manufacturing is being looked at these days. The developments in relation to 3D printing are not only from the point of view of the advances in manufacturing, they are also because of the coupling of that with computer aided design. So, bringing these two disciplines together has led to what we call the today the ability to 3D print parts. Whether it is apparatus or it means also where tissues are being printed.

Another important development has also been the area of lithography, where the developments in that area also have propelled. The growth of 3D printing; for instance if one wants to embark on doing a landscape of 3D printing, we need to keep in mind first the understanding of the technology. So, from the general definition of what is 3D printing, to understanding what are the focus areas, this is the first fundamental step.

So, simply put 3D printing is used to describe technology or a set of technologies which helps in the rapid production of 3D objects; aided with computer aided design. How is it different from additive manufacturing? Today, the terms of 3D printing are being synonymously used with additive manufacturing. However, there are certain differences 3D printing can actually go into what we call subtractive manufacturing and there are other facets of it which are not the aspects with respect to additive manufacturing.

So, understanding the value in relation to what is the technology, that is core to the defining the purpose of the search. So, the technological focus in relation to 3D printing will mean understanding the basic aspects of what is this technology; what are the different types of domains available in this relation.

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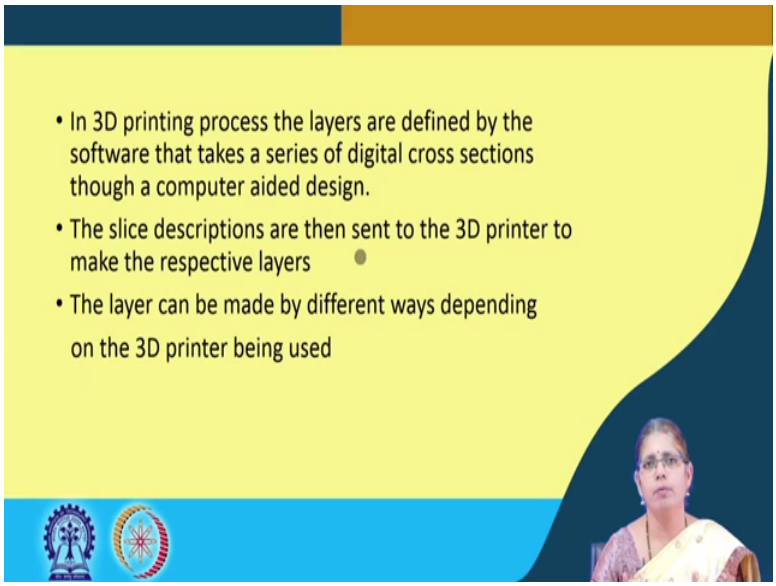

So, today when we look at the area of 3D printing we have to understand the basic process. So, where we look at the it is a systematic layering of the 3D printed material based on a design generated with the digital area, digital in the digital form and this is done by different methods. So, there can be different ways of actually achieving 3D printing printed objects. So, one phase of developments represents process developments in this area; another phase represents the device developments.

So, you need printers that can be enabled to do 3D printing. Those printers will be different with respect to those which are printing normal apparatus and instruments and those which print tissues could be subtly different. So, there are device improvements; there are also process improvements in this particular area. So, let us understand further what are the different types of technologies that 3D printing encompasses.

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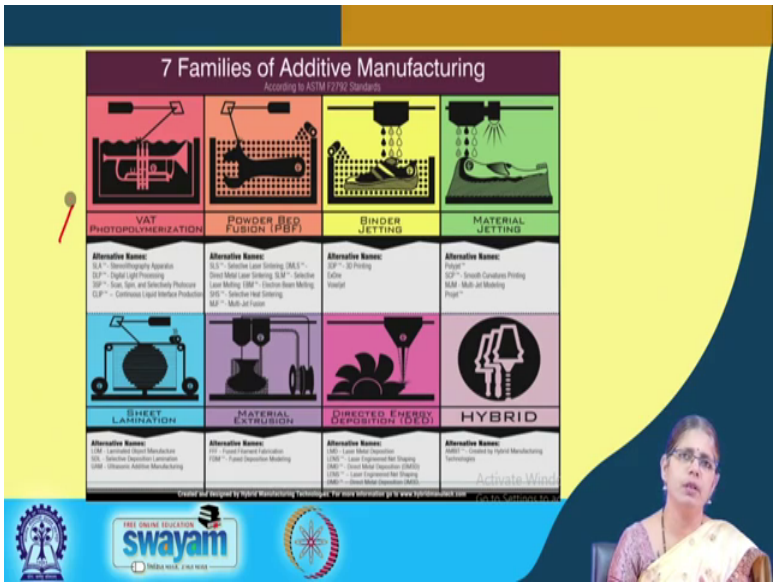

So, this illustration represents the standard way of looking at the area of additive manufacturing, there are 7 different ways in which additive manufacturing can happen. The first one is what we call vat polymerization. This has certain way in which the technology is implemented.

Then, there is powder bed fusion technology. So, then another set of technologies are in relation to binder jet which are again implemented with respect to certain type of technology is involved with that. Then you have fused deposition as one of the then methods and then, there is a laser object modeling which is again another technology available and sometimes there has been implementation in relation to one or more of these technologies, where we look at hybrid technologies.

So, understanding the nuances of each of these areas is important when we are looking at improvements in relation to 3D printing. So, one can actually go ahead with looking at a broad landscape, where we are looking at assembling the patent dataset in relation to all these different types of technologies or one can actually do a narrow landscape looking at a given set of technologies.

For example, one can look at selective laser sintering SLS method in which case you are looking at all the different patents in that particular area and the improvements in relation to that. So, actually it depends on the how you define the purpose of the search.

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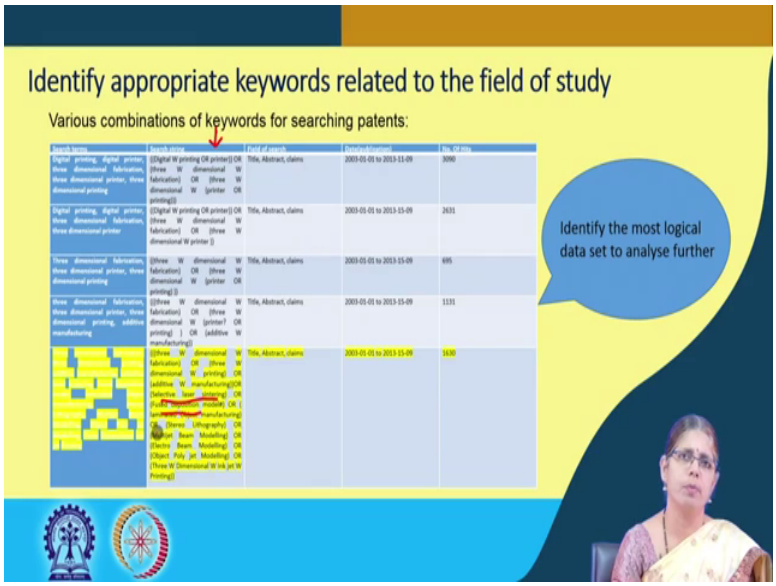

Moving on, if one is looking at a general landscape in relation to 3D printing, it is important to now keep in mind what we have understood about 3D printing. One from the point of view of the process, there are different ways in which 3D printing can be done and then, there are also device based improvements in this particular area. So, if the important differences that are there are with respect to the process in relation to this particular area.

So, if we were to look at preparing a patent landscape in relation to the process developments, this is where we start with the search of the patent dataset and as we are aware, there are different ways in which one can now conduct the search by utilizing keywords as well as IPC combinations and identify the patent dataset based on the keyword and the IPC search. What you see in this illustration are the keyword strings that are provided and based on the keywords, the search strings are made this column too provides that information.

So, you can actually have a very broad keyword definition, you can also have a very narrow or a specific one. So, as you can see in the different in the last row, you can find out that there specific technology is being also used as the keywords. For instance, selective laser sintering fused deposition model laminated object manufacturing. These are the different processes involved.

So, when you are looking at these this itself can be the keywords. So, the earlier slide was important for us to understand because we need to also know what is the standard way of representation of these processes in that given area. Unless we know that we will not be able to define the right set of keywords and whenever there are standards available in the in an area, most often patents will be using those standard words.

So, once we built that into the keyword set. So, here since it is a broad patent landscape, we are looking at any of those different technologies which patents represent. So, in this case we are actually taking up all of those different technologies as one nested search string and this we are looking at it from the point of view of searching in definite field searches. For instance, here we are looking at a either a title an abstract or a claim. So, once you identify what are the search strings, then you define the field in which you would look at the data, you want to pull out the data. So, in this case the field of study is the title abstract or the claims are the fields in which we want to pull out the data.

Another important aspect is to look at defining that date stamp that is what is the data time period that you want to consider in relation to the search of patents. Now, this data has been created in the timeline of at around 2013. So, normally one can choose either a 5 year data or a 10 year data. It is good to start with a 10 year data to understand the developments in relation to a given area, since a patent landscape represents trends in technology. Sometimes one also uses a 5 year data, where you are looking at wherever they are emerging areas.

So, you want to look at just the published applications in the last 5 years. So, in which case you limit the data period to the last 5 years of the information. But generally, it is good to look at least a 10 year data and sometimes one can actually go into even at 20 year data depending on if the objective of the landscape is to look at the first patent to the current in which case capturing the lead patent in the area is as much important.

So, once we define the type of search string, then depending on the field of the search and the time period for consideration, the patent dataset is taken out. This is pretty much a hit and trial. So, how to choose what would be the right data set is an important thing to keep in mind. How do we actually go about with that? For instance, if you look at the very first row there we are looking at digital printing three-dimensional, you know in the three-dimensional part printers, it is a very; very; very; very broad string.

So, that would bring in not only 3D printers, it would bring in information relation to any printer; not necessarily 3D printing, though one we have actually made a nested string. It is possible that you may get actually hits which are actually completely not relevant to the search objective. So, it also depends on the strength of the developments in the area. So, with review of the area, you would get a general understanding of how diverse is the area; what is the time period of development. So, initially before we actually look at identifying which is the right data set to use, it is good to screen through the data set.

So, a preliminary screening of the data set will help us identify whether the hits that are arrived at are actually the relevant hits. You may have a lot of hits which are actually not relevant to the area of 3D printing, then there could be a lot of duplicates. So, screening out that information is important. So, arriving at a logical set of data points depends on the one the developments in the area, what is it that the review tells you with respect to the types of you know the innovations in that area and this the scope of subject matter. So, for instance, in the case of 3D printing, here we are looking at process improvements, device improvements.

So, in many patent claims you would have process claims in the patent and as well as product claims. So, the same patent will be a hit for the process as well as the product. So, some of these are important considerations. Again, a lot of patent family information can be also obtained. So, arriving at the logical data set would mean dealing with a few thousands of patents. So, in this case the last set of search streams that are used are specific. They relate specifically to 3D printing. The technologies that are covered under 3D printing and so, therefore, this is the data set which is going to be the favorable one for further steps in the patent landscape.

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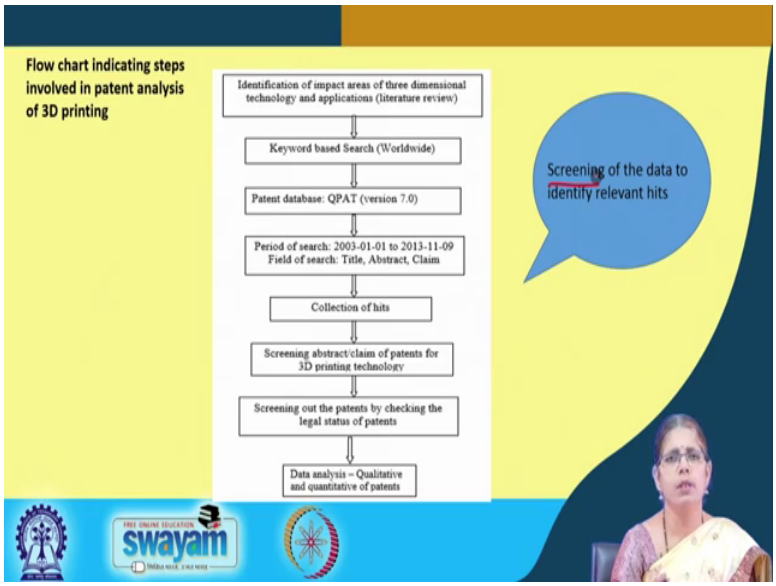

Developing a good search methodology is very important in relation to a patent landscape search. Just as we do experiments and we record information so that one can go back and review and make changes. In this case also one actually prepares what we call a flow chart on the which defines the methodology of the search.

After going through the first step of identifying from the literature and the review of the literature, we have embarked on the keyword search in relation to this particular area. One can choose a subscribe database collection or even have free database collection to pull out the patent dataset. At this stage one can also look in for certain geographies only depending on the objective of the patent landscape.

Defining the period of the search is important and also the field of search. Once we come to the collection of the hits, it is at this stage that we are looking at now grouping the information that is obtained on the patent dataset. Then comes the aspect of the data analysis which can be qualitative or quantitative or both. So, one important step in relation to the patent landscape is the screening of the data set. So, that relevant hits are identified.

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The key aspect of the technology and its applications need to be kept in mind when we are looking at the data. So, the classification of the data is this step which becomes important; post the collection of the patent documents. Based on the reading of the description, the claims, the title one can mark off the patents in relation to the end applications.

So, the end applications can be one part of the classification. Since there are process based improvements in this particular area, one can also look at process enhancements that is the name of those specific sub domains in the technology also to be the way in which the patents can be classified.

The when one is looking at the claims of a patent, it is typically the independent claims that one keeps into consideration. So, in some of the earlier lectures, we talked about mapping of claims in relation to specific areas. This pretty much is also the case, when we take up a patent landscape as well.

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The next step is the organization of the results. So, here we are with the data set in relation to 3D printing which represents the data set in relation to improvements in the area as well as the different applications. So, there are two different types of information that we can actually catalog based on the patent data set. One is the general bibliographic data and the other is the technical data. So, it can be as elaborate as possible. So, one can understand who are the top assignees in this area, this technology is represented by what type of different IPC codes and which IPC codes are the major IPC codes, where there is a lot of populated data in relation to patents.

So, one can look at top IPC, top CPC; one can go for multiple cataloging that is one can look at assignee versus geography assignee versus priority and the trends from the point of view of looking at the growth in that particular time period. Here, the data set has been defined from 2013 backward to 2003. So, one can get a time series in relation to published patent applications granted patent applications.

So, another aspect that can be looked at is the geographical distribution. So, how are these patents organized from the point of view of understanding; which are the countries which have had these technologies captured in a major way. The legal status of the patents can also be understood in terms of how many are expired patents, how many are in force, how many are abandoned that data can be also captured. One can also see how many of the published applications are translating into the grants in a given year.

So, in a given year you can have published applications and granted patents that time series can be captured. One can also look at geographical distribution with respect to technology. So, it is at this stage that understanding the relationship with the data is important. So, here we are looking at performing statistical analysis and the most simple way in which you can draw a lot of statistical data is by simply using a Microsoft Excel; the excel higher versions have the ability, where you can go into enhanced features and one can actually draw bibliographic maps as well as technology maps based on the grouping of the data.

It also depends on the based on the purpose of the patent landscape, one can also have additional points that one can be capturing under the data. So, this can actually go in into numerous different aspects of data organization.

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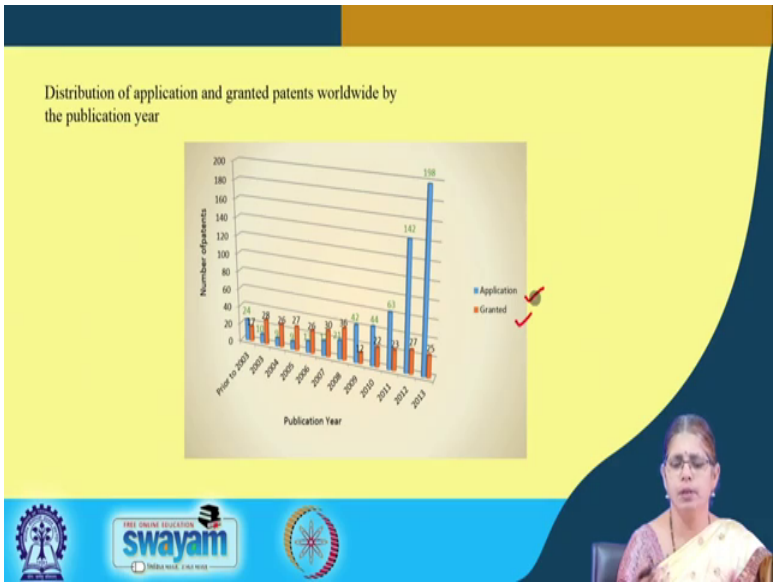

This is one representation of the distribution of the patents in relation to 3D printing based on applications and granted patents. So, since the data period is 2013 to 2003, one can look at the growth in relation to the applications and the granted patents and that gives an idea about how many grants are going through the patent office in general even in the worldwide collection.

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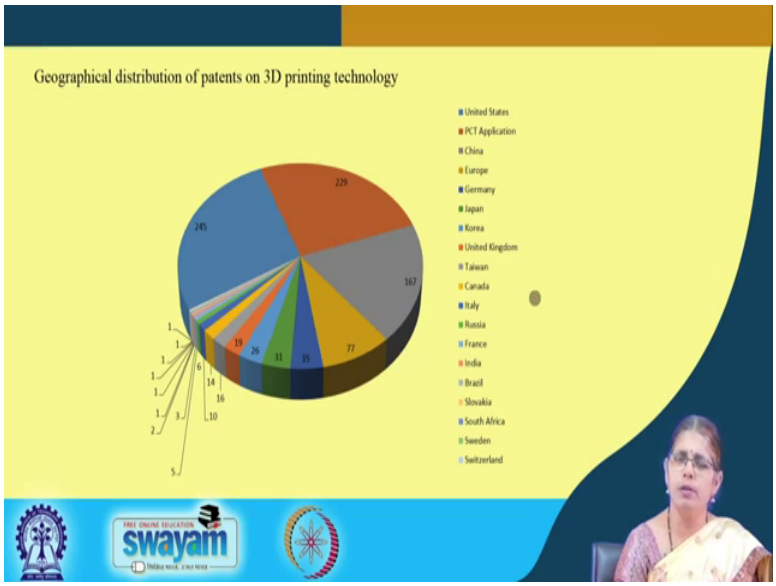

So, this is one simple information one can get. One can also get the information relation to geographical distribution. Now, let us understand based on the search that we have carried out, you can actually drop a pie chart based on the different countries and in this case, it tells us the spread of the technology in relation to different geographies. PCT applications are actually categorized as one different set because they represent a worldwide published information through the PCT mode. Keeping that as one dataset, if you look at other different countries this is how you can see the spread of the patent data set in relation to 3D printing technologies.

Based on the numbers that are available in the pie chart, we can understand which are the major countries which have patents in relation to this particular area. One can also understand which are the emerging countries, which are beginning to work in this particular year. So, in this pie chart we have all that information which is captured.

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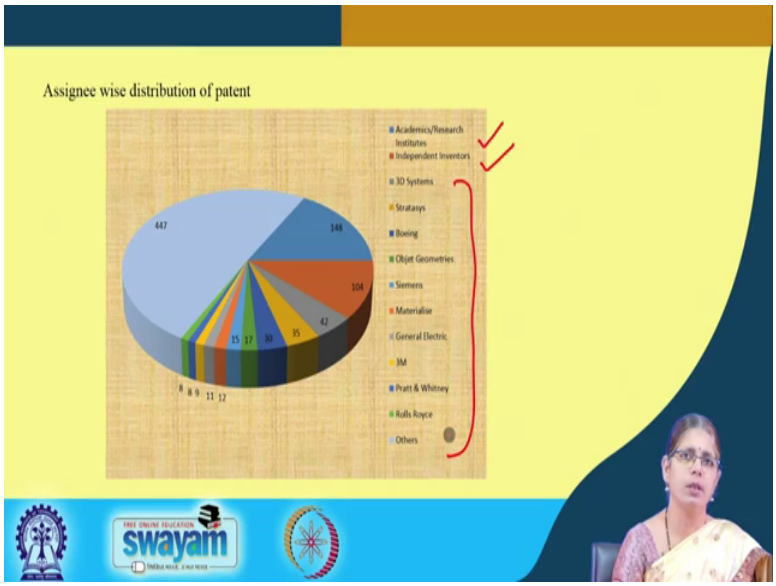

Another type of information which is of lot of value is the technology based information. So, here we know that in a particular area there are a lot of different companies which are operating institutions of working in a given area. So, assignee wise information will give us the value in relation to who are the people, who are dominant in this particular area with respect to patents. Here, you see academic and research institutions.

There are independent inventors and then, there are a whole lot of companies which are involved in the 3D printing area. So, a one general view of this pie chart would mean that there is representation from research institutions, there is representation from independent inventors, there are some companies which have major filings, there are other companies which are actually also players in this particular segment.

So, this gives us a view into who are the companies. Sometimes it also gives us a very interesting dimension in relation to the name of the companies associated with this particular technology. Some companies are corely looking at this particular area and are known for and they develop based on these. There are other companies which have actually branched into working in the area. So, this will get us that kind of information. So, in a general area when you know which are the companies, the data set when organized into a pie chart will also give us information into who are the new players into the market in relation to this particular technology.

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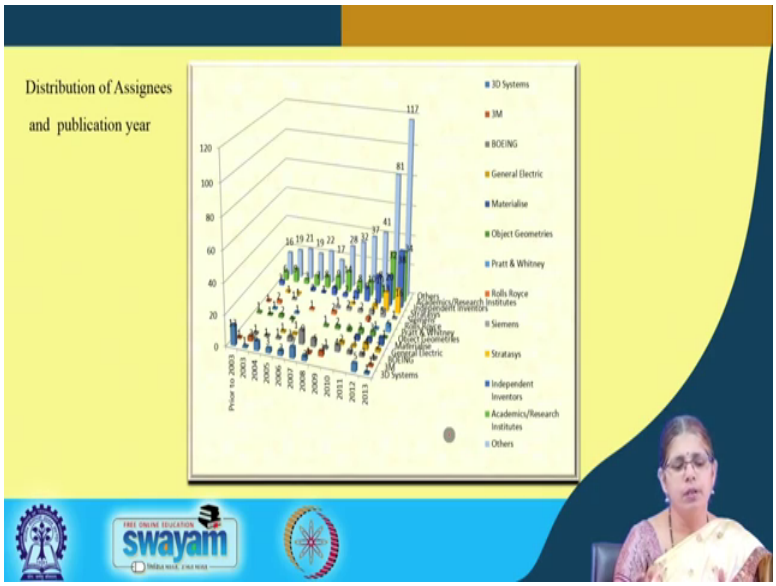

The other information is the growth of filing by a given assignee in relation to a publication year. So, you can use multiple categories. So, that one can overlay that information and understand with respect to different categories. So, here we are looking at if you look at it in the x axis, there is the time period that is mentioned and then, we have the number of patents and in the individual colors that you see you have the different assignees. So, here we have 3D systems, 3M is in this area, Boeing general electric.

So, what we saw earlier was a simple representation of just the assignees only. Here we are looking at the assignees visa v the period of time scale as well as number of patents. So, at one go we are understanding the information in relation to each of these different categories.

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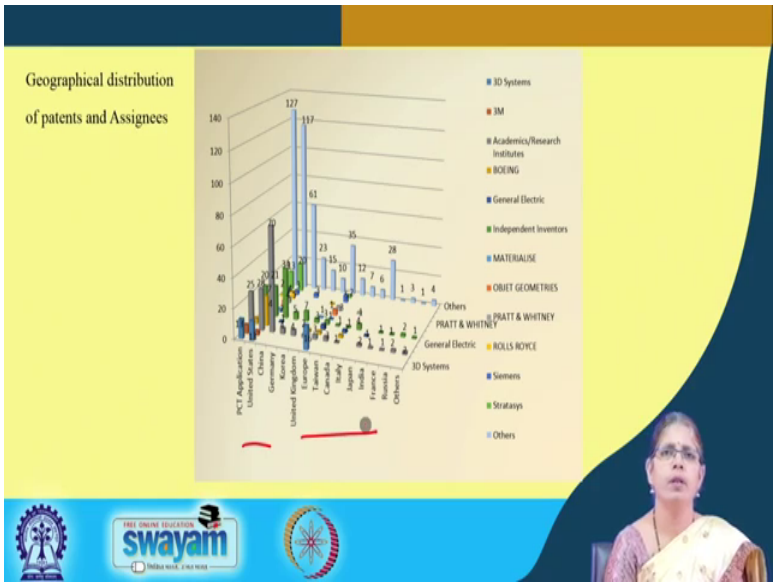

Another representation that one can also actually prepare is the geographical status visa v assignee. So, in this case we know that there are a given set of companies, institutions, individual inventors involved in this particular development of the technology representing which is represented in the patent data set. In this case, we are understanding the growth of technology with respect to different geographies.

So, there is a given company which may be mainly based in one country, but has filings in other country. So, this also gives us information on where the market is moving globally based on the filings with respect to different countries. So, here we have the major jurisdictions. Then you have summation countries and those which represent filings which are one or two are categorized as others. In fact, one can split this further into specific countries. So, one can actually organize information so that we understand the spread of technologies with respect to a given entity.

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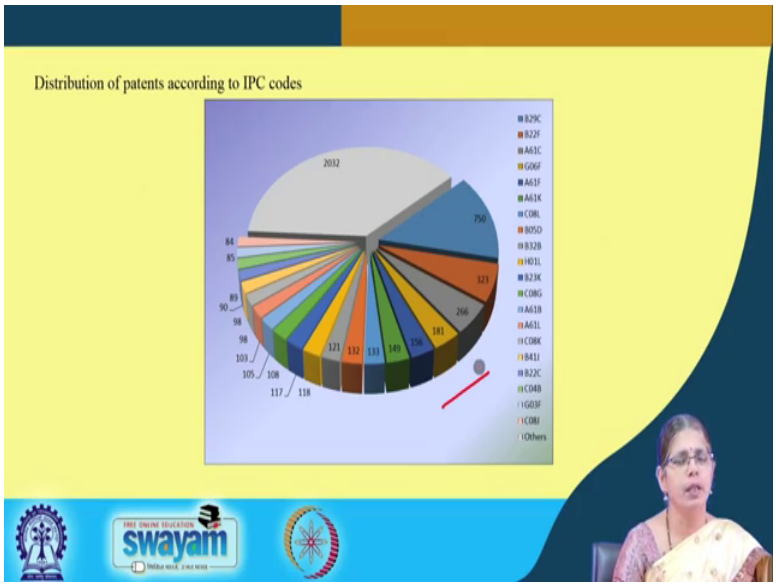

One can also understand the growth of technology based on IPC codes. The international patient classification codes represent technological domains in relation to certain areas which as we are aware are classified from A to H in that, then there are several subclasses and it goes on. The distribution based on IPC codes provides us information on which are the major classes where the technology is captured in.

So, here we have the technology captured across an A class. So, there is A represented. This B class is represented well A is about human necessities. So, you have B class, you have the C class and then, you have the G class. So, across four different IPC codes you have the technology represented in relation to these and then, of course, you have the specific IPC codes which are listed.

So, one can actually look at the entire data in relation to distribution as per the IPC course and what is it that we can get from the information on IPC code distribution? One can understand which are the top IPCs. So, one can go for top 10, top 5 IPCs in relation to the representation.

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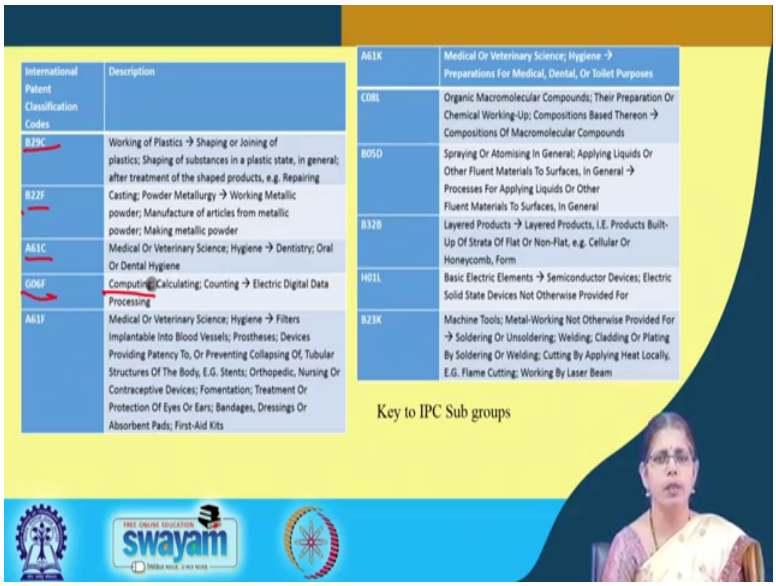

Similarly, one can actually also do a distribution as per the CPC codes, which is also one way of looking at the information. So, if you go into the details of what are those specific IPC subgroups, you need to go into the classification system. So, what is B29C? B29C is that representation of the data set in relation to 3D printing which is related to the working of plastics which involves a whole lot of individual areas.

We talked about powder bed fusion you know powder bed techniques so that comes under the purview of 22F, where casting powder metallurgy is the major node and then there are several areas within. A class A61C is about applications in the medical and the veterinary science today, we know that 3D printing has had a lot of value in dental area and many other areas prosthetics and many other things like that.

Wherever the technology is represented by the area of growth in the CAD processing based on digital areas those will be represented by G06F and so, therefore, this also becomes relevant from the point of view of capturing the improvements in relation to computing which are very relevant for 3D printing. So, this is how actually one can walk through the different IPC codes to understand the relevance of the IPC code in relation to the data set.

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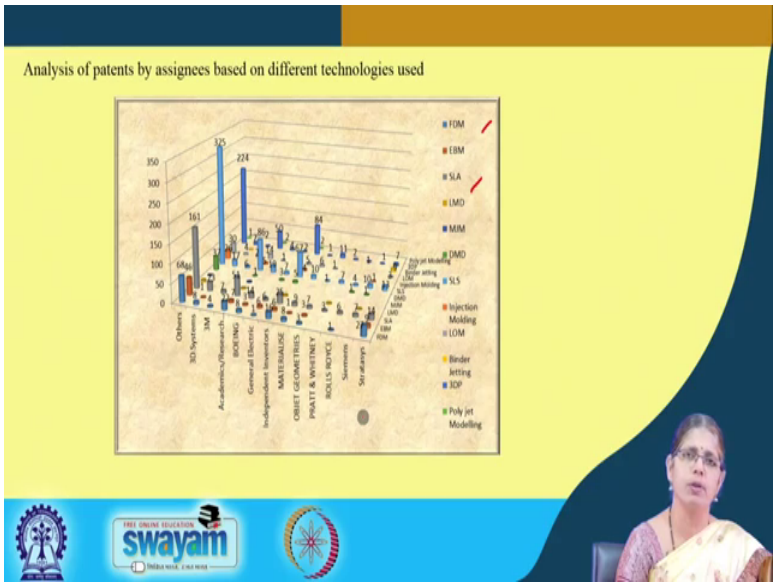

So, another way of looking at the plotting of the data is to look at assignee versus technology and this is very valuable. We talked about that the 3D printing encompasses a set of technologies. Now, one important question to ask which is very relevant is which technology is captured by which company in the form of patent. So, fused deposition modeling we have SLA stereo lithographic capitals then we have LMD. So, there are many of these different ways in which 3D printing is represented from the technological perspective.

So, we understand that from this graph in which area which assignee has patents. So, based on that we understand who are the major assignees with respect to a given method. This again provides information so that in future one can look at either gaps in the patent to identify R and D or can look at licensing opportunities with respect to that particular technology. So, this is another way in which one can look at the data analysis.

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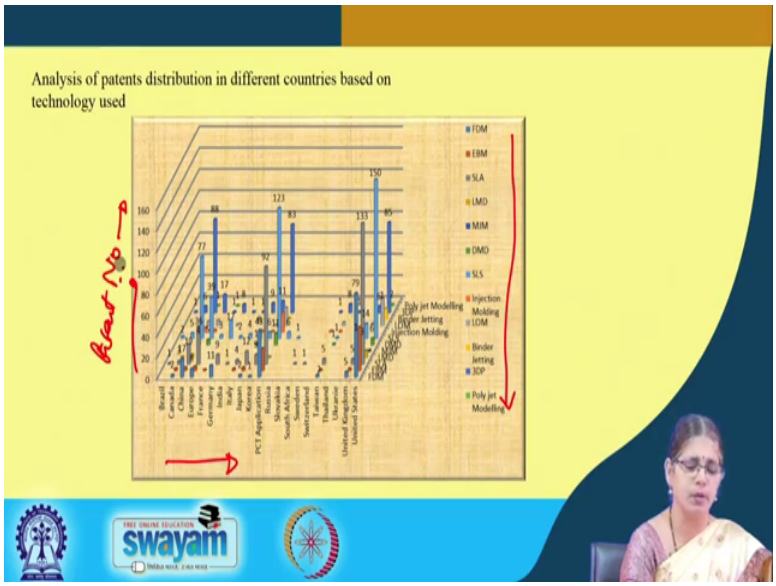

Another way of representing is combining the aspect of assignee country and patent number. This is how we can see the data in relation to not only the technology, but also the strength of the number of patents in relation to that. How many patents are represented given that particular assignee and that particular technology.

So, here you have the technology line aspects there is several domains in that; on the x axis here you have the different countries lined out and then, you have the patent number here. So, in one go you are able to understand who are the assignees; where are their major filings and then how many number of patents are represented in relation to this data set.

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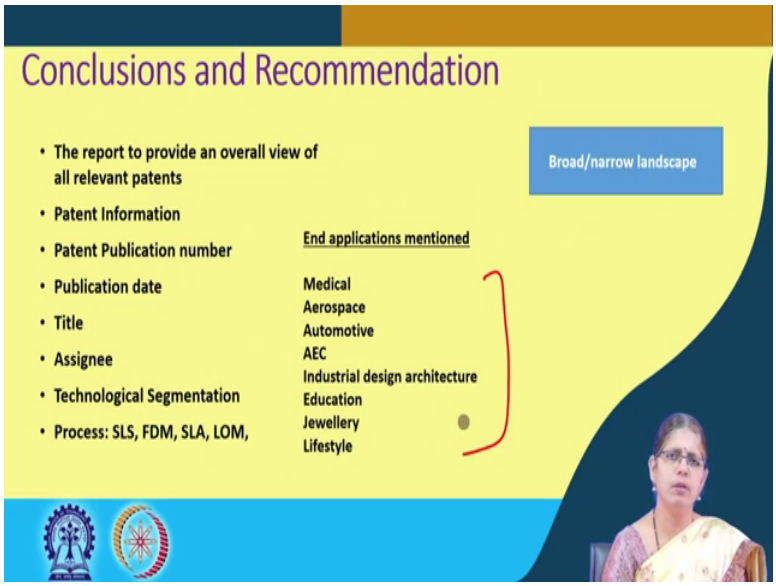

So, with the amount of information that we have captured, now is the time when we should look at preparing the report. So, how do we go about preparing the report? The report is like a technical report which will provide one the understanding of the area. So, if someone is looking at your report, they would want to understand what is it that you mean by 3D printing; what are the different facets of 3D printing that you have taken into consideration for your analysis.

So, therefore, the explanation of the technology, a lucid way of representing the technology into the different domains; what are the different applications of the particular technology and what are the developments in that particular area. With that understanding the search methodology should be presented next, then has there been a screening of the data. So, on what different time aspects that the screening of the data has been done that needs to be represented. So, it is a narrative that you would give and one important aspect is the review.

So, if you have reviewed the data and read worked out by once again conducting the search that information should come within the purview of the report. So, an exhaustive information is provided as a methodology in relation to the search. So, that anyone who is visiting that report has a complete understanding of why the review was done.

Then the details in relation to the patent information is captured as we have presented those several different data analysis aspects. So, all those graphs would come in and

notes on those graphs should be captured to understand, who are the major assignees; assignee versus geography; assignee geography versus patent number. So, based on those notes one can look through the entire view of that area and draw a lot of correlations. Another thing which is important since this is this represents a technology based a you know the search; one can actually also systematically plot the developments in relation to let us say a given area. For example, selective laser sintering or SLA or FDM any of these different methods.

So, that the person who is looking at your report has gets a fair understanding of where is the important aspect that needs to be looked at in future. The end applications are again very important from the point of view of understanding the value of a technology in relation to creation of products. So, here you see the end applications are across different areas, there is some represent medical areas, some are into automotive sector, some are as actually about jewelry.

So, that means, the area has a lot of opportunity across different disciplines and across different product types. So, again we it can also mean 3D printed material which can have value to in terms of users in hysterics in architecture all of that. So, understanding the end applications is also important. So, when we group the patent data in terms of the use of that particular technology, one can actually capture those patents into each of these areas.

So, it is therefore, important to note that the landscape that is done with respect to 3D printing can be very broad where you are just looking at the technology trends, wanting to know what are all the technologies, who are all the players, how does the area represent growth in relation to specific time periods, one can also conduct a very narrow search which will be a very purposive search in relation to only some set of technologies. So, keeping this in mind is very important.

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Thank you.