Patent Search For Engineers And Lawyers
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Lecture - 30
Hands on Patent Landscape (Contd.)

Welcome to the Hands on Patent Landscape searcher analysis. In this lecture we will take up the aspects of biotechnology.

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The area of biotechnology has seen a lot of inventions from the point of view of the implementation of biological processes in relation to applications in different fields. Today, this is a emerging area from the point of view of it is interdisciplinary understanding in relation to many other areas. Let us look at how a patent landscape search can be done in this particular area. This is a large area where you have the area of agriculture, life sciences, medical sciences and also today it has close link with the area of manufacturing. So, depending on the focus area that is the objective of the patent landscape search in this area one would undertake the landscape analysis.

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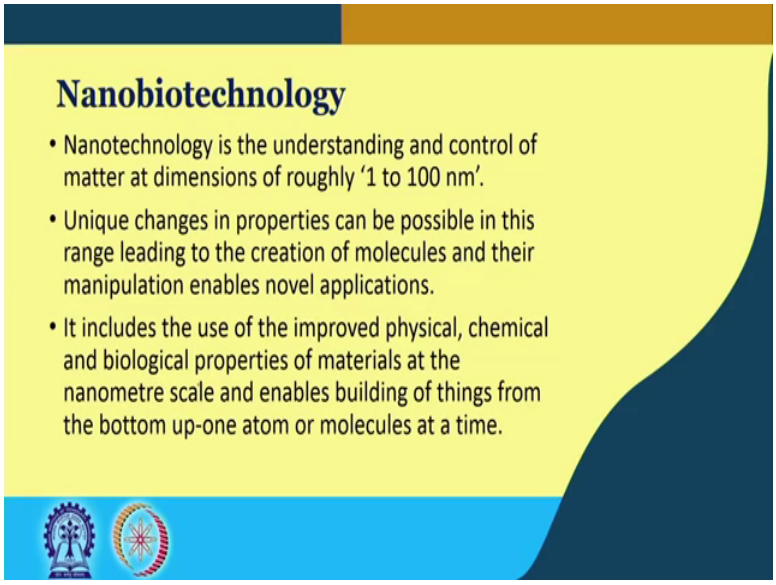

So, one of the important areas in relation to biotechnology is the emerging area of nano biotechnology, empowered with the understanding on of nanotechnology and it is applications, the area of biotechnology has also been susceptible to the developments in the area of nanotechnology.

So, let us understand fundamentally, what is nanotechnology before we embark on understanding, what is nano biotechnology? Nanotechnology is the understanding and the control of matter, which is in the dimension of the range of 1 to 100 nanometers typically, why is this area important? Due to the advanced instrumentation in development, which has enabled the preparation of nanomaterials and the ability to look at the properties of materials at the nano scale, it is now clear due to the developments of this technology that there are unique properties of materials, when the nano scale is being constrained.

So, a material at the macro level would have different properties. A material at the micro level would have other different properties, when a material is looked at the nano scale, one is that the size dimension is very small, which brings in the ability to interact with other molecules. And, also because of the small size there is a possibility of the reaction and rapidity of movement of these molecules.

So, there are unique changes in properties that happen when materials are looked at the nano scale, for instance the high surface area provides for greater reactivity, greater

ability of reaction with respect to a particular system, there are greater conductivities of material, greater optical properties are possible and so on and so forth.

So, all in all there is an improvement of the physical, chemical, properties of materials. Now, this has become the starting point of building material from the nano scale. So, this is one set of technologies that has helped and revolutionized the way applications are being looked at these skills. So, far as biological materials are concerned, there are natural biological materials which are at the nano scale for instance DNA and many other molecules. Often reactivity is a major concern so, far as the area of chemical sciences as biological sciences are concerned.

Today, we are looking at one rapid availability of material in a biological system, targeted delivery is another area which has become very important; enhanced reactivity is the other aspect, which is also relevant in a biological system. We also are looking at breaking the barriers in a biological system, because in many biological systems within a cell the architecture has been created by nature that materials get excluded out from the let us say a nucleus. In some cases you want better permeability in the nucleus.

So, the preparation of nanomaterials and their use is targeted into several different applications. And, the purported applications have been realized in the area of medicine, diagnostics, agriculture, life sciences from the point of view of biological sciences. While the area of nanotechnology has also led to a lot of potential in many other areas for instance in the area of chemistry, there are a lot of bio pesticides we write which are at the nano level, which are nano bio pesticides. In the area of biology a whole lot of molecules are now susceptible to what we call modification, because of the technology that is available.

Today, nano biotechnology is coming up with a great promise of what we call directed improvement, whether it is in the area of agriculture or is it is in the area of health. So, the word nano bio technology itself will encompass a lot of different technological domains. So, it would mean the area of medical devices, it would mean the area of agriculture other aspects of life sciences.

So, if one is embarking on an area of looking at a patent landscape in relation to nano biotechnology. It is first important to understand, where nanotechnology has had an impact in relation to what specific areas of biotechnology.

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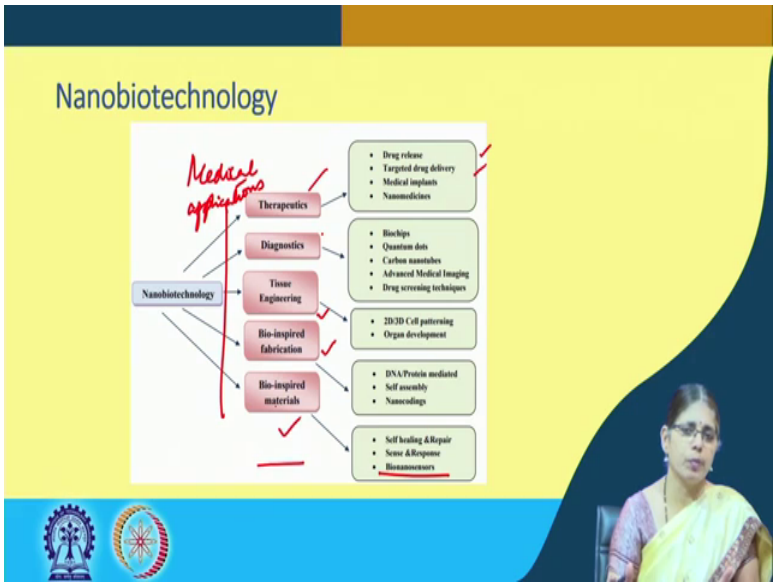

One area of importance in relation to nano biotechnology is the area of medical applications. So, if one way to look at from the broader aspect of nano biotechnology to bringing it to a defined focus area of medical applications.

So, here we are looking at medical applications. These are the different technologies which are relevant to the area of medical applications, therapeutics diagnostics tissue engineering, bio inspired fabrication and bio inspired materials. Now, even within these areas you can have specific sub focus areas in relation to the applications of nanotechnology. For instance applications of nanotechnology in relation to drug release targeted drug delivery medical implants, nano medicines; today they are also available in the market.

The area of diagnostics particularly is all about building greater amount of flexibility in the use of diagnostic tools, not only that the other aspect of it is to use nanotechnology to enhance the ability to process data and also the different interventions in relation to their use of diagnostics in vivo. So, the area of biochips quantum dots carbon nanotubes, the advanced medical imaging area as well as screening techniques for drugs come under the purview of this particular sub area.

Today, the area of tissue engineering has become very relevant from the point of view of reach in terms of human health. The area of 2 D or 3 D cell patterning, since nanotechnology also looks at bottom up approach. So, how to really look at organ

development? So, again the area of nanotechnology is relevant from the point of view of building materials, in the earlier lectures we talked about the 3 D printing area. So, today they are also looking at printing organs and the question is one is the printing of the organ, second is the use of it from the point of view of medical applications.

So, one can see that there are various technologies that are relevant in relation to these interventions. The area of bio inspired materials is also bringing in a huge difference in the area of medicine from the point of view of nano materials that are utilized for self-healing and repair. So, you have nano silver and many other particles that are suspended in creams available today, in the burn wounds all of those areas.

The other area is the area of bio nano sensors which is also very relevant from the point of view of bio inspired materials. So, one can actually if you are looking at preparing a broader landscape, you will need to take into consideration many of these different technologies in mind. One can also do a very narrow landscape for instance one of the interesting areas to look up to understand the trends in technology is the area of bio nano sensors particularly in the area of medical applications. So, creating this mind map is important before we embark on conducting the patent landscape search.

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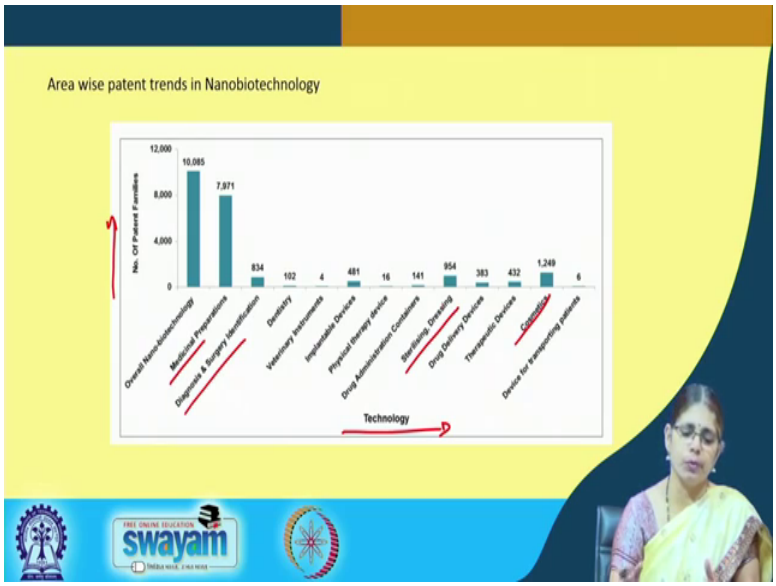

The important consideration here is how to go about with the search in relation to the keyword or the IPC. Since, nanobiotechnology in relation to medical applications is a big area, which involves a lot of different technologies and sub technologies under that. One

consideration from the point of view of looking at keyword classification will be to look at is there a standard classification system available for nano biotechnology applications in the area of medicine. Often a set of technologies are given a particular terminology and so that can become the starting point, what we saw in this particular illustration? So, these can be the different keywords which can be utilized.

However, the difficulty in utilizing keywords is if you give the keyword therapeutics, you will need to also have the keyword built which is in relation to nanotechnology else, it would build up it will bring up the entire patent dataset generally with respect to therapeutics. The other relevant way of looking at is the utilizing the classification system, because the nanotechnology classification system, has a separate set of IPC codes. In that there are specific ones in relation to the applications in the area of medicine either diagnostics or therapeutics.

So, one can utilize IPC search to conduct the patent search and identify the data set. So, once you identify the data set organization of the data becomes important, because we are looking at an area which is really large. So, you will have a whole set of patents available. So, how do you actually go about the area wise classification, one way is to take the reference from technology.

So, in the state of the art in relation to this area, the technology domains are represented in a standard way those can become the starting point for identifying the focus areas in relation to the search. When one undertakes the manual search of an analysis of these patents, one can refer to these particular technological domains and identify the different analytical options.

Subscribe databases also have this option of classification set which is available already within the database, which is a general classification technology based classification, which is utilized. So, if you are looking at it by doing it manually one can refine it as per the area. So, here you have the spread of the patent trends in relation to nanobiotechnology particularly the medical applications.

So, if you look at the total number of patent families on the y axis, vis a vis the technology represented on the x axis. This is how you see the spread of the data. The large amount of patents which are filed in relation to medical applications are on medicinal preparations followed by diagnostics; that means, the area of diagnostics has

not been that susceptible to the interventions of nanotechnology compared to the area of medicinal preparations, which include pharmaceuticals and drugs.

Some of the areas which have been where nanotechnology has been utilized also have certain patent counts for instance cosmetics, sterilization and dressings. So, this is again shows where are the areas of technology, which are susceptible to nanotechnology in this particular area.

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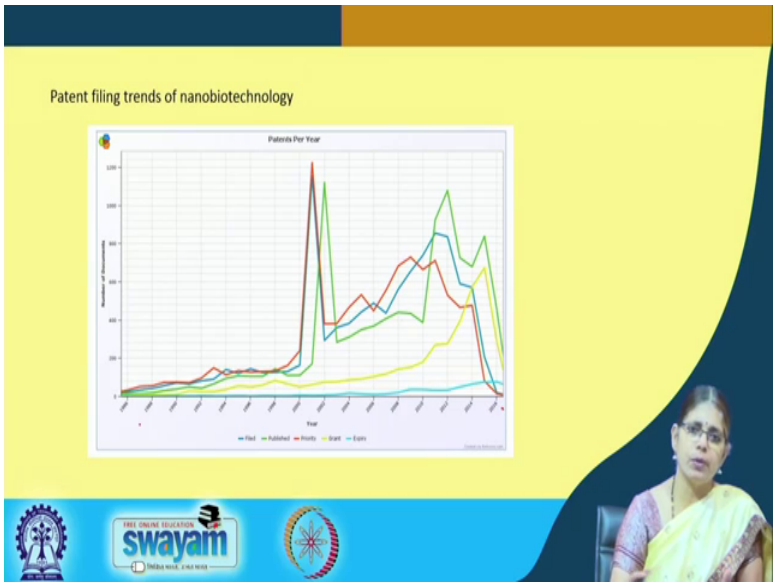

One can also understand in general, what are the different trends in patenting in this particular area, which means one can understand filings publications grants how many patents have expired. So, this is an overlay this graph represents an overlay of the data collected between 2016, 1986 to 2016. So, you can see the systemic growth of the technology with the peak points in relation to publications as well as, which gives you an idea of the growth of the technology.

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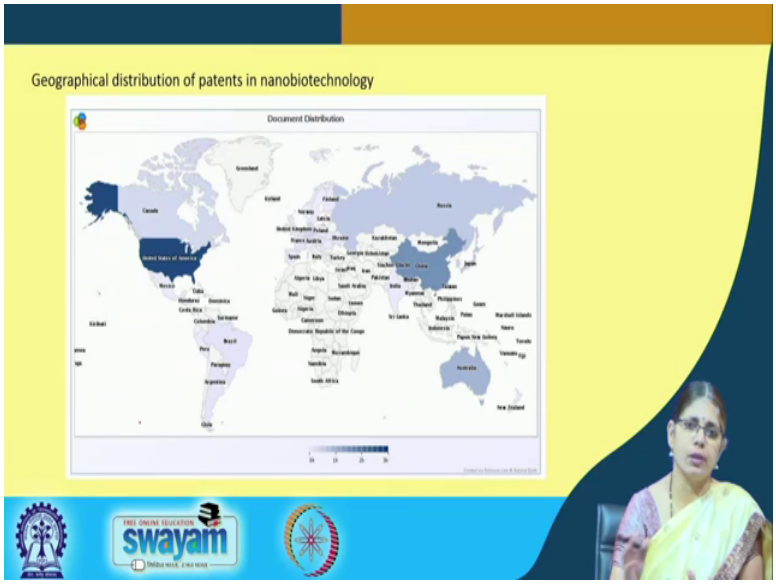

Considering the area of nano bio technologies applications in the area of medicine, understanding the geographical relevance of where the technology is being worked is another important consideration,

Here you see the global map and the areas which are colored represented by the set of patents. So, on this global map one can see who are the major countries in which the data is filed, the patent data is available from the point of view of publications and the number of patents. So, some of the subscribe databases provide you this enhanced feature of looking at it from the point of view of the global spread all at once the information is so, this is one way in which the data can be visualized.

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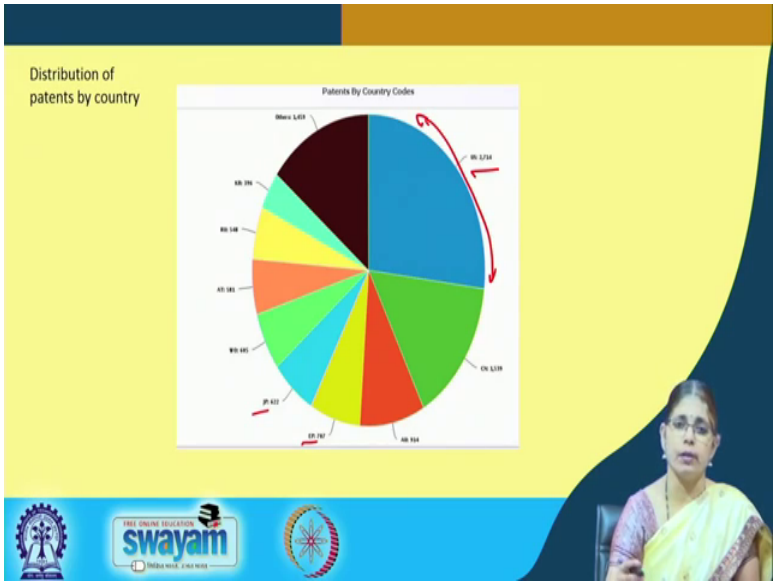

Another important aspect to look at is which are the different countries where the technology is relevant from the point of view of high number of publications in the patents. So, a simple pie chart provides information on which are the different countries here you have European Union, Japan, many other countries Korea, the United States with a huge spread of patents available in this particular domain.

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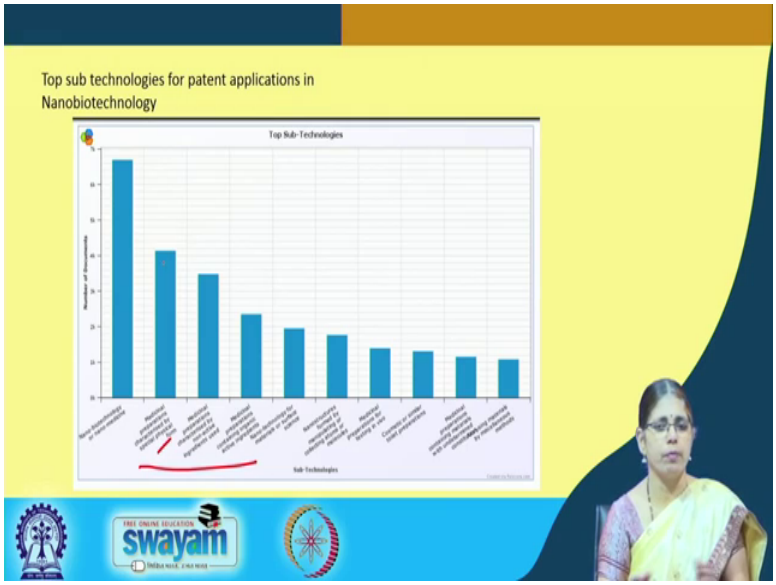

So, another important facet of this data is to look at, what are the sub technologies in which the patent raises data set is classified into. So, when we are looking at medicinal preparations specifically, what in medicinal preparations is relevant from the point of view of the data? So, in the earlier instance we looked at category based here we are looking within category.

So, if you look at the top sub technologies this is the illustration based on the analysis. So, for that data set here we are looking at the sub technology spread. So, if you are looking at medicinal preparations, which we discussed earlier is the major sub set for patenting. This is how the spread of that entire set of patents is relation in relation to medicinal preparations appears. So, this is a deeper analysis of the data.

So, in this chart we are looking at the different types of medicinal preparations in which the patent data is represented, for instance those medicinal preparations which are characterized by specific physical form are represented by these different patent numbers. Where non active ingredients are used, then you have another set of patents

been shown here. Those which have organic active ingredients those are another set of patents.

So, it tells us the specific technologies in relation to the main technology of medicinal preparations. Similarly, where you are looking at the area of diagnostics one can also look at the spread of the data in relation to that. So, this is how one the sub technologies can be opened up in relevance to a given area, when you do the sub technology classification again one can go back to the reference in relation to that this particular technology, the standard way in which it is represented use those terms and then classify the data to prepare a chart of this nature.

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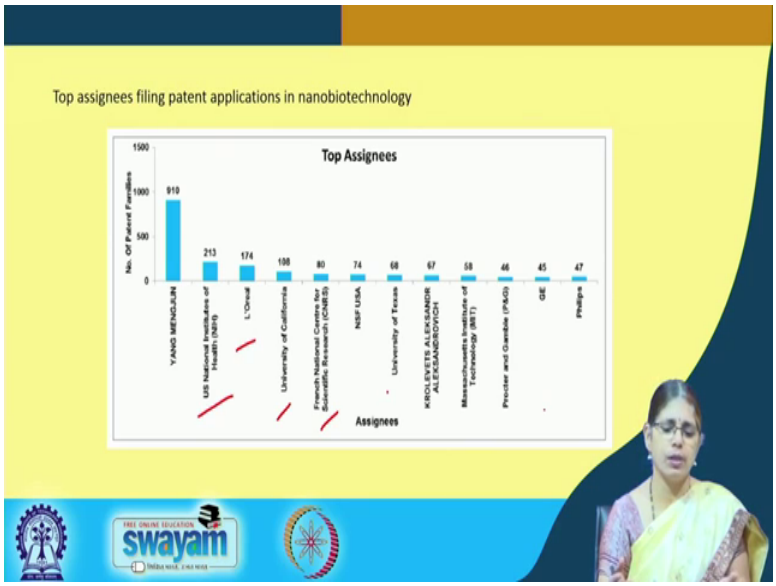

In the area of medical applications in relation to nano bio technology as we have seen there are medicinal preparations, their diagnostics, there are cosmetic applications. So, one would wonder who are the different assignees, who have the patent data in relation to this particular area and how do we see the growth of these assignees in this area. So, one can actually prepare a top assignee map, that is the major assignees either one goes by top 10 assignees or the top 5 assignees.

So, here you see the top assignees in relation to the patent dataset based on the patent family information, you can have in this case you have Lorieal, you have NIH institution in lot of institutional patents university of California, French National Center for Scientific Research, NSF USA University of Texas. So, MIT companies Procter and

gamble G Philips. So, here you are looking at it from the point of view of what is the spread of the data in relation to assigning?

So, sometimes it throws us a very interesting result of where they are top assignees, there are also the major, there are only few assignees which are actually operating in the field. Sometimes you would find also the technology development will be very diverse. So, therefore, there will be a whole lot of players not only in the area of companies, but also in research institutions. So, this information can be captured from this data.

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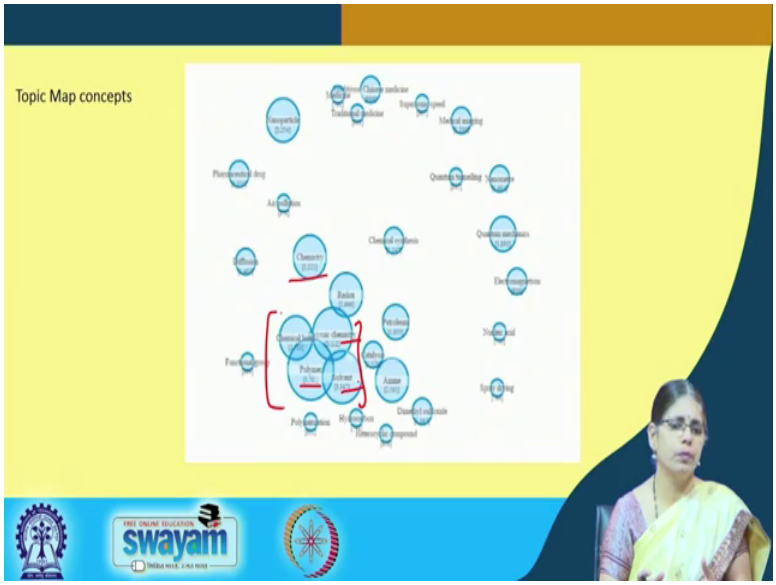

This is one illustration of how the data is organized based on topic maps. So, today you have a lot of databases subscribed databases, which can give you the different modes in which the data can be visualized. So, what does this illustration tell us about the area of nano biotechnology in the area of medical applications? From the point of view of the core areas, the topic map helps us understand where is the inventions are based on which specific topic areas. For instance here you look at the area of polymers organic chemistry is the relevant area solvent systems chemistry itself. Then, so, it is giving us a topic map of what are all the relevant aspects of let us say chemistry or within that in relation to the patent.

So, these patents represent this set of topic maps from the point of view of where the inventions are directed to. So, the inventions may be directed towards functional groups, maybe towards synthesis, which is process based maybe dealing with the aspects of

traditional medicine. So, there are set of patents in relation to that some are in relation to core particle development. So, it is all about nano particle synthesis. So, those set of patents are all about nano particle synthesis itself.

Similarly, you have different catalysis as one option. So, either based on the process or based on the development of products, you can see the topic areas shown. Also what is relevant to understand from the point of view of a topic map is the overlap that you can see here in relation to this particular illustration. A lot of these topic maps can give us what is the strength of a set of areas, which are relevant for patents.

So, this is again shows this the cluster in relation to what are the set of aspects in relation to a technology, which are relevant for those patents. So, a lot of focus is on polymer polymers solvent systems, organic chemistry based research as well as redox reactions are the area of focus and also their the ability to look at the value with respect to these in relation to the applications.

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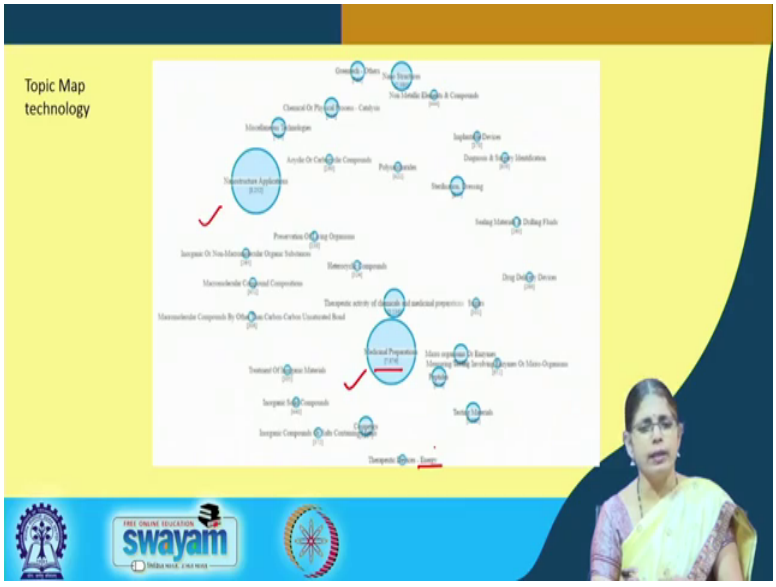

This is another spread of the topic map with respect to the areas in relation to one another sub technology. So, here we are looking at medicinal preparations and nano structural applications which are the predominant ones with respect to the total number of patent applications. So, what you see in the bracketed the bracketed number is the total number of patents represented in that particular area. And again we can see the surrounding you know smaller circles which represent other disparate development in relation to patents

in the area with the major in the area of medicinal preparations and nanostructure applications.

So, in one go one can understand not only what are the major technologies being looked at, but also what are the other areas which are also very interesting and those which are also developing. For instance therapeutic devices which are relevant to the energy area is one important thing and then there is a smaller spread of patents in relation to that. So, from here one can either look at the major area or identify some of these sub areas to go in for an in depth search.

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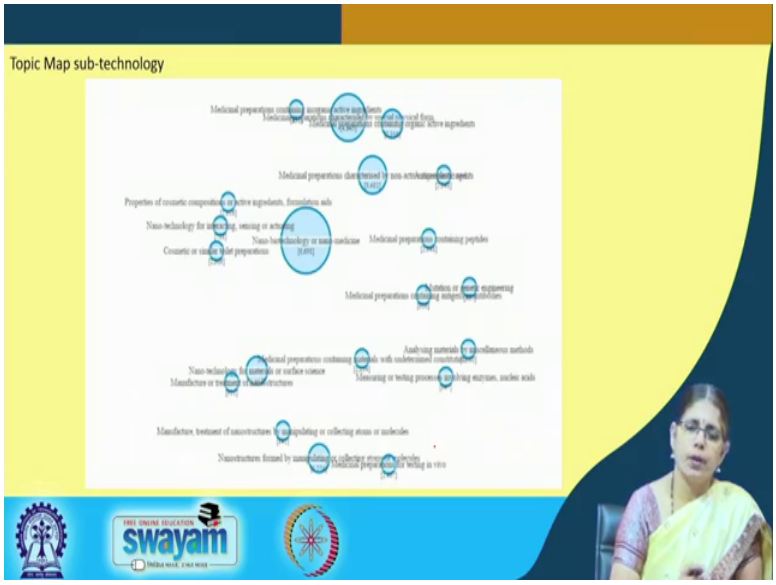

Another sub technology map in relation to specific areas so, this is how one can create a several different subtopic maps and understand the data spread.

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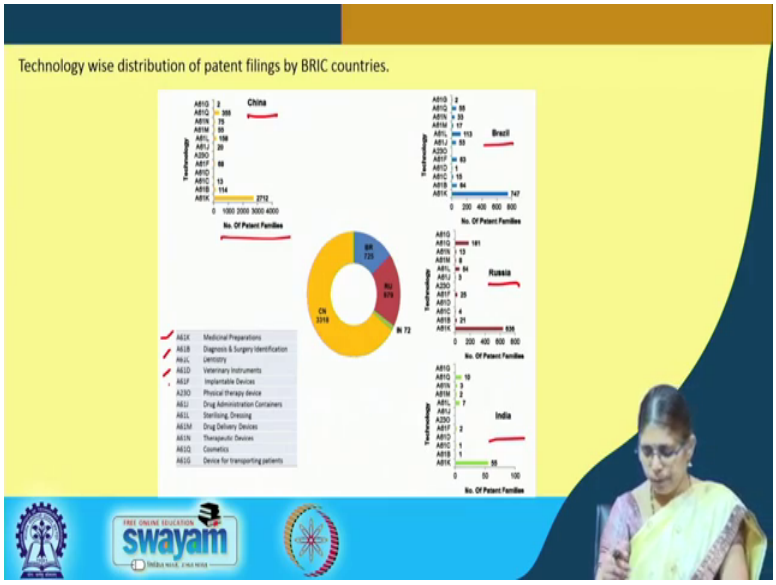

One of the important things in relation to understanding patenting index is looking at the emerging economies. So, in some times in some cases we look at the analysis in relation to developments in different geographies. And, if one looks at the emerging economies of the BRIC countries one can filter the data set to only BRIC countries and then look at the spread of information. So, this is an illustration where different figures have been merged to give a one single view of the spread of the data.

So, what you see in the center is the spread of the patents in relation to China, Russia and Brazil and India. The what is the percentage distribution of patents from the basic data set. How are they classified in relation to each individual country China, what kind what are the number of patent families. As per the since it comes under medicinal preparations A61 is the relevant IPC code and under that you have the different ones A61 KP all of those.

So, what is the spread of patent families in relation to that, then here you have Brazil, Russia and India. So, the important part of looking at this in one single illustration is you get the information co relatively with respect to one country vis a vis the other country. And, again here you have the different IPC codes which represent these particular areas.

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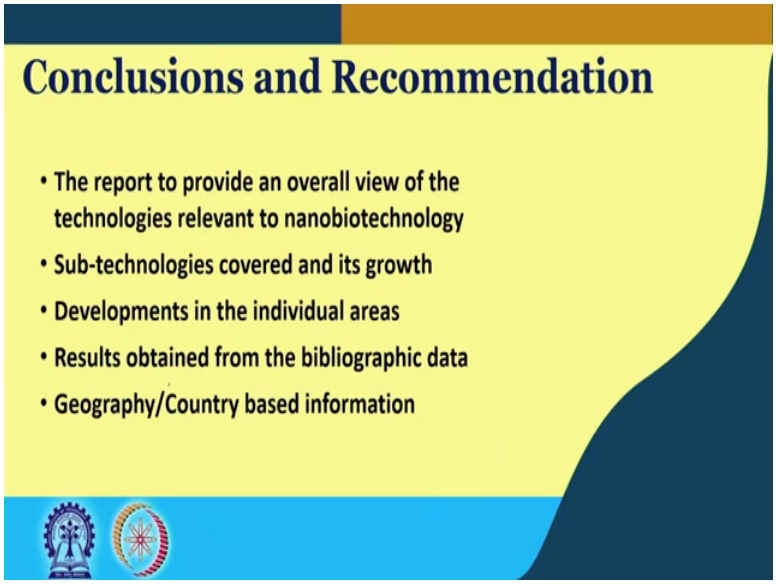

So, if one is looking at a landscape in the area of nano biotechnology. The important thing would be to look at what is the specific area that you are looking at focusing and so, one needs to decide on that specific area and then go about understanding the technological classification, if it is broad again then you look at combining that with IPC and then looking at this search of the patent dataset. What are the what is the growth in the different sub technologies, what are the developments in the individual area? And, based on the patent data set that you get one can actually plot the different results coming out from the bibliographic information as well as the patent data. Geography based information can also be identified.

So, in this kind of a patent landscape report one would find a lot of data captured from the point of view of a broader area. So, such landscape reports would be more thorough and need to be much more exhaustive than the other areas, which we have discussed in the different type a part of the lecture.

So, a patent landscape report may be up to 20 pages or may be actually also going into 50 pages. So, it depends on the one is the purpose of the study the focus in the area, the growth in the area. So, keeping this in mind it is important to look at the preparation of the report to derive a lot of value.

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The references for this lecture are the wipo patent scope which can be utilized for doing the search in relation to the examples provided. Also the patent search workbook, which has been created under this course there are several examples that are given which can be utilized for understanding, how patent landscapes are made.

Thank you.