Software Project Management
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Lecture - 53
ISO 9001 (Contd.) & SEI CMM

Welcome to this lecture.

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In the last lecture, we had said that ISO 9000 is a very important quality standard. There are lots of benefits to an organization who gets ISO 9000 certification. We had discussed about what benefits accrues to an organization and how to apply for the registration and get the ISO registration and finally, awarded the ISO certificate and after that we were discussing about the major requirements that the organization must fulfil.

We had identified several important points; now let us proceed from there. It said that some of the important requirements are the management responsibility; how is the management setup; are they committed to the quality; how do they do it; the quality system itself that how is the quality system setup; is it independent of the development system; contract review – before entering into contract is the contract reviewed for the capability schedule and so on; design control; document data control; control of supplier product; control of customer supplied product; product identification; process control and all these we said that configuration management is key to this.

Without configuration management we cannot have control of the documents traceability the changes that have occurred over time and so on. And, therefore, one of the major requirement of ISO 9001 is to use a configuration management tool and inspection and testing is another major requirement, have to identify at what stages inspection occurs and what are the types of testing that are undertaken and also if there are some test equipments are used.

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How are these calibrated? There are few more requirements. Inspection and test; control of nonconforming product that when there are rejections or defects how are these kept out of a circulation to the customers. If it is found that one of the product is having defect then how is it ensured that the same product is not given to another customer, and again here it means use of configuration management tool because in configuration management tool we can easily identify where a defect has been fixed and get the latest software.

Corrective and preventive action; how are these corrections and preventive action taken. Handling, storage, packaging, preservation and delivery; control of the quality records. It is not that the quality is the quality system just does inspection and it just approves but it must maintain the quality record. The quality system must be audited, who audits the internal quality system that must be clearly identified.

Another important requirement of the ISO 9000 requirement is that periodic training should be given to the developers. The developers must undergo periodic training because the skill changes frequently that needs to be a skill up gradation and this has been identified by ISO 9001. The document must also identify at what frequency training will be given, in what mode, how and so on. Servicing – how will servicing be provided; statistical techniques – what statistical techniques will be used and so on.

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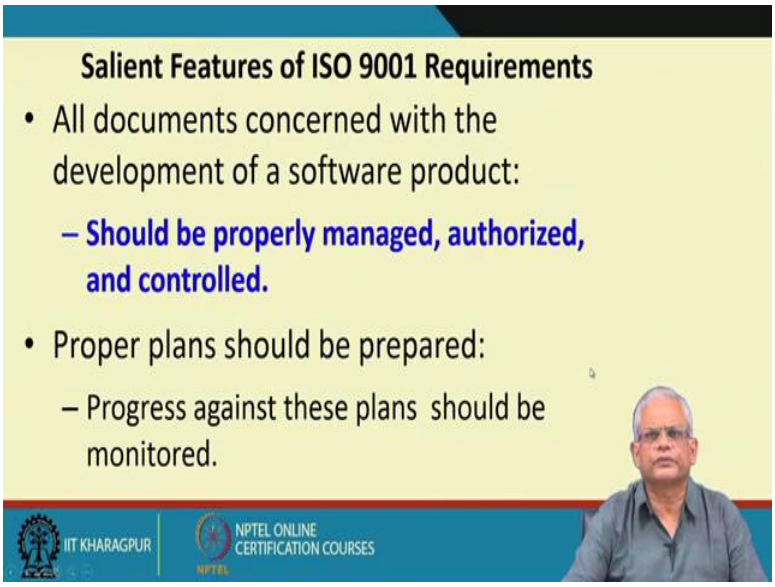

Now, let us look at some of the points some of the requirements more elaborately. As we mentioned that we are not going to look at all the requirements that will be too much for a short discussion. We are just getting a overall idea about the ISO 9000 certification process, the major requirements and so on. I am not really going into the nitty gritty of every clause that needs to be satisfied.

One of the major requirements is that all documents that are produced during developed must be properly managed, authorized and controlled. That means, who is authorized to change the document should be identified and enforced that is controlled and without a configuration management tool the authorization system will not work because somebody else may change it. The configuration management tool enforces the authorization and who makes change and so on are noted here.

Project planning is a important requirement of ISO 9001. Proper plan should be made and progress against these plans will be monitored. So, planning, monitoring and control

should be practiced by the organization without which ISO 9000 certification will not be given. It mandates planning, monitoring and control. So, proper project manager has to be there who has to do the planning monitoring and control.

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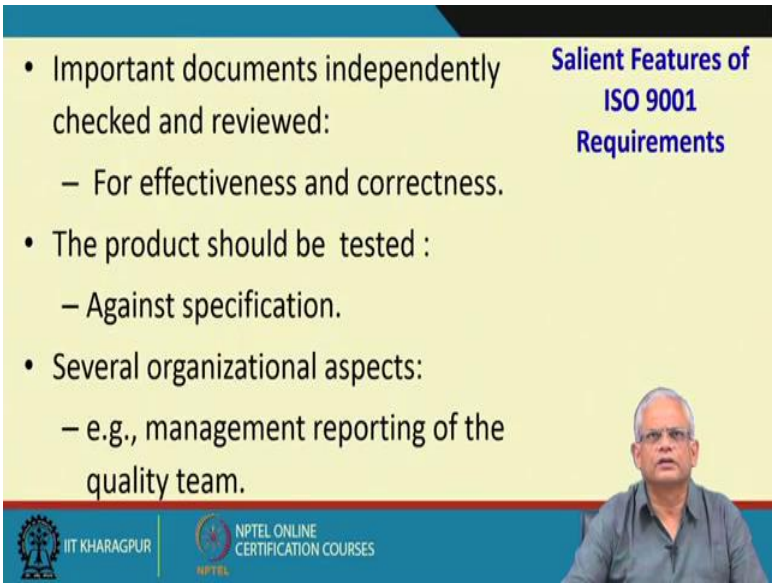

Review of documents is another important requirement. Testing against specification, unit integration and system testing must be there and also there are several organisational aspects like how whom does the quality system report. Does it report to the project manager, in that case certification will not be given. The quality system needs to report to the top management and not to the project manager. This is one of the major requirements of the ISO 9000 certification process.

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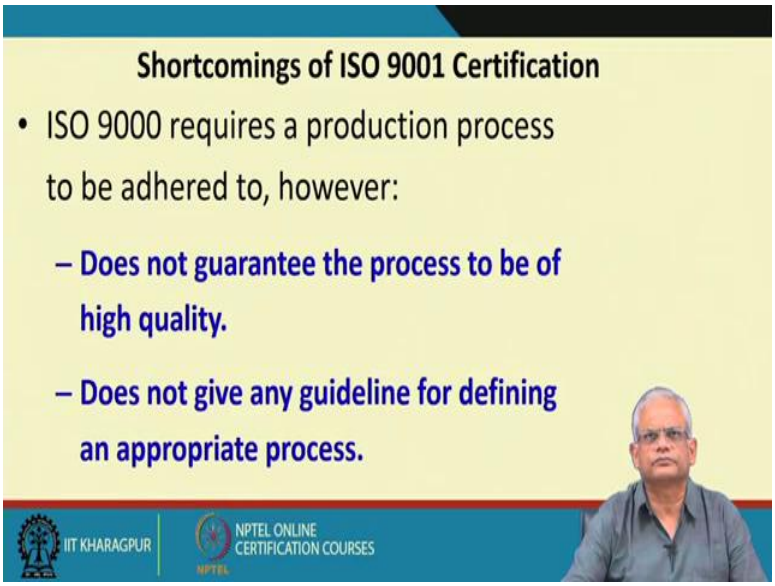

So far, we discussed about some of the important points regarding ISO 9000 certification process we said that the registrar looks at the documents, the process document, the quality document and so on and based on that awards the certificate. This we can interpret to say that the organisation has a good document, good setup document. It has proper production process quality system documented.

But, then one of the short coming of the ISO 9000 certification is that it does not provide any guarantee that the organization actually follows those documents because it is given on the documents the documents that reviewed they are made to have all the requirements of the ISO 9000 but whether the organization actually following that across all projects that is not monitored by ISO 9001.

And, also it says that what are some of the points that are required, but how do have that process is not there in the document and that is also very difficult because it is applicable across many industries and even in the software industry there are various types of projects for which different processes may be required and that is the reason why the consultants make a roaring business to help the organization set up guidelines to help them define an appropriate process on which the certification will be obtained.

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Also we had mentioned at the beginning of our discussion that the ISO 9001 certification process is given by an accreditation agency and it is not given by the ISO and there are various degrees of rigour with which the accreditation agencies they give the certificate some may be very flexible, in some country it may become very easy and so on. There is no international accreditation agency exists.

So, when ISO 9000 certificate given by different accreditation bodies may mean different and therefore, let us say an Indian company or some other company or wants to bid for the project in Europe, they may need the certification from a European accreditation agency like (Refer Time: 11:48) or something. Since these are given by accreditation bodies across different countries that are likely variation in the norms of ordering the certificates.

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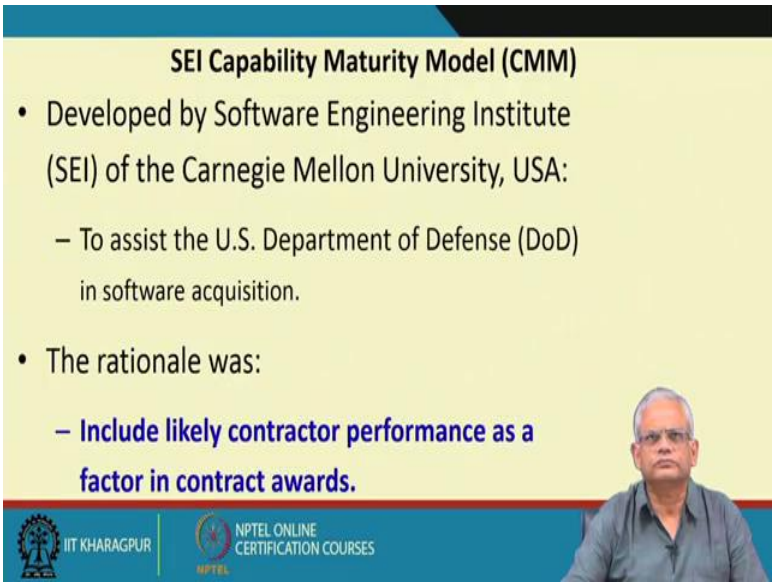

With this brief idea of ISO 9000 which is very important for a project manager let us look at another quality system standard which is the SEI capability maturity model or the CMM. The SEI stands for the software engineering institute at the Carnegie Mellon University in USA, itdeveloped a capability maturity model which in fact, in the quality system the set of quality system guidelines, but then this was done by the Carnegie Mellon University in USA on the request from Department of Defence in the USA. The Department of Defence in USA is one of the largest purchaser of software. It takes the help of many contractors or software developers to get its software.

But, then it was facing a problem that some of the developers used to give poor quality work them some of them even could not complete the work and so on and with that purpose it gave this project to the Carnegie Mellon University to develop a quality system guidelines which can be checked by the Department of Defence to see if the vendor organization has a good quality system and it can deliver the software. Or, in other words, the US Department of Defence by using the CMM model can assess the contractor performance before awarding a contract.

Since the work gets delayed money wasted if the work is awarded to an organization who cannot complete the work or does a poor job. It is very important for the Department of Defence before awarding the contract to make an assessment of the

contractor to check whether you it can be awarded the contract for software development and this was precisely done by the CMM.

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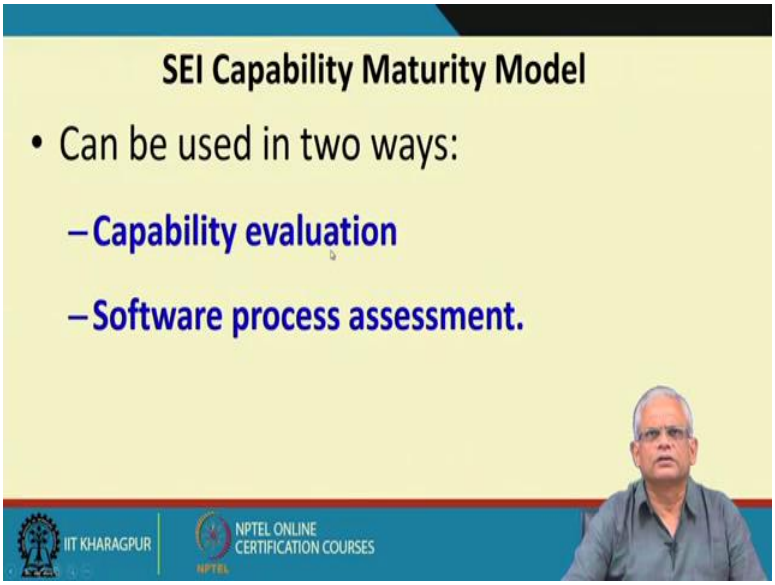

But, then the CMM can be used in two ways, one is capability evaluation. This was used by the department of Defence to evaluate the capability of the vendor that whether it can actually develop a good quality software and deliver but then the CMM also is useful for doing a software process assessment. In the software process assessment it is not done by the organization awarding the contract and checking the contractor likely performance, but here a software development organization checks its own quality system.

When a contract awarding authority contract awarding organization evaluates the capability of a vendor it is the capability evaluation, the CMM also supports software process assessment where an organisation can assess its own capabilities to check where all it has to improve to come up with a good quality software.

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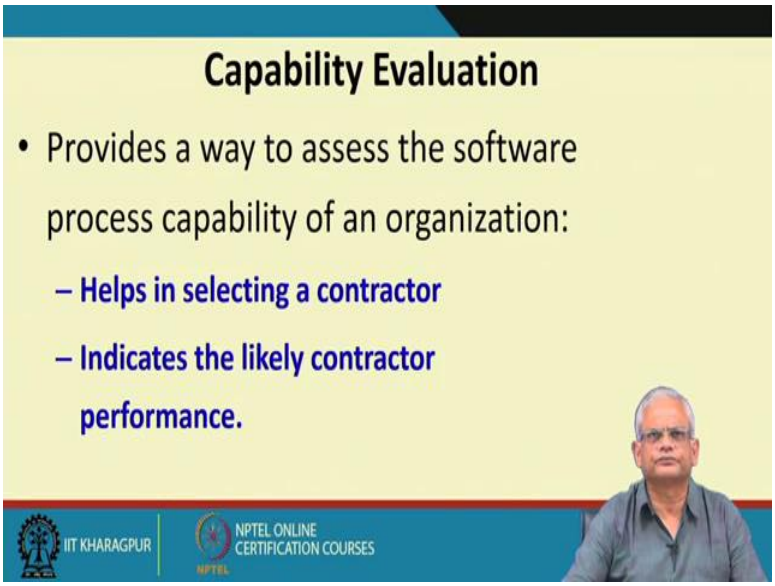

The capability evaluation can be used by an organization to select a contractor. The CMM model can be used by the contract awarding authority and go to the contractors premises and carry out the capability evaluation and that would give the likely contracted performance for a project that is awarded to the organization and based on the capability evaluation the organizer the organization awarding the contract can decide whether to award the contract or not.

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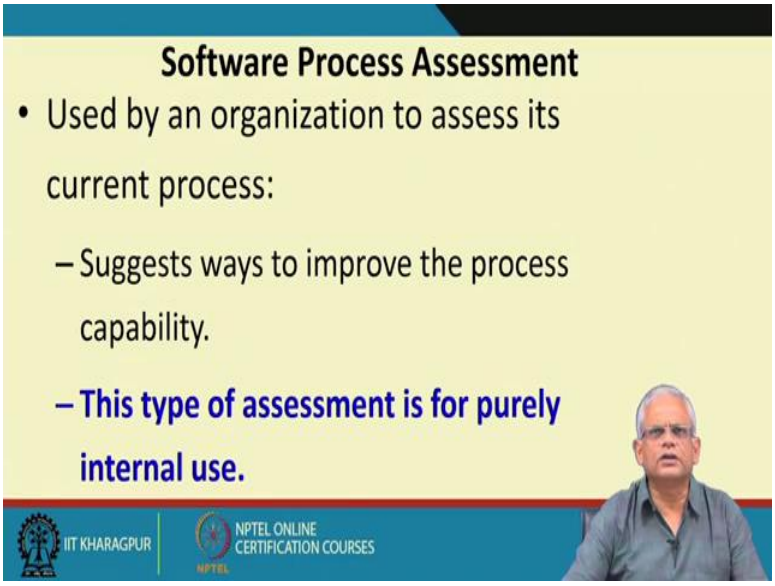

The other use of the CMM model is software process assessment. Here it is used by an organization to assess its own process the objective of this is to find out how to improve its own process and naturally this assessment is purely for internal use because the organization is assessing itself with the objective of improving its short comings. And, therefore if it says that we have been assessed at SEI CMM, level 5 and so on that would mean very little because we have assessed themselves with the objective of improving where it is improvements are required and therefore, it is not very meaningful to claim that they have the level 5 capability.

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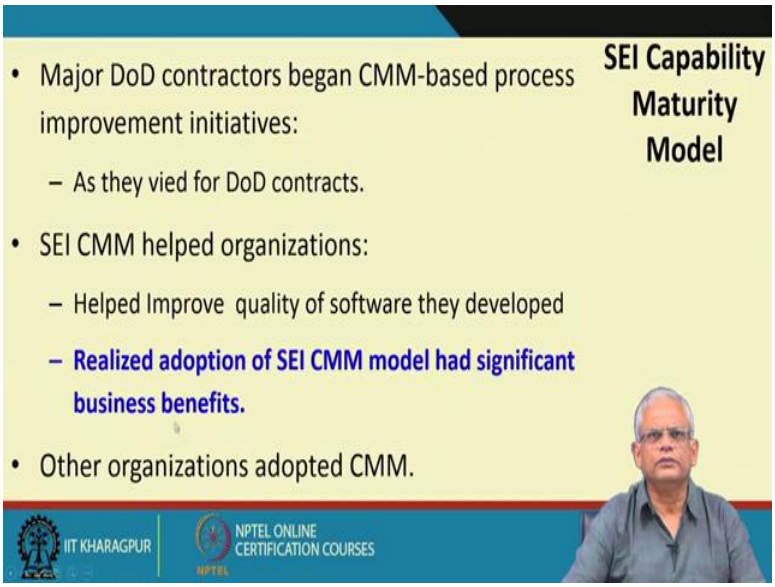

But, as the DoD the Department of Defence of United States, it awarded the project to the Carnegie Mellon University who developed the CMM and then the department of DoD enforced the capability evaluation, then all the contractors for the Department of Defence they used the CMM on themselves before the capability evaluation, so that, they can win the contracts at the Department of Defence. So, that helped them to get the contract, but also it helped the organizations themselves.

It was found that it helped definitely helped them to improve the quality of the software they developed. They could meet the timelines more frequently and they could develop the software within the required cost and because the organisations realized that using the SEI CMM was beneficial to them also not only winning the contract but also it had benefits to themselves in developing better quality software within time and cost

effectively they adopted the SEI CMM model and even other organizations who were not really contractors of the Department of Defence they started using the CMM for this purpose that it will help them come up with good quality software cost effectively and within time.

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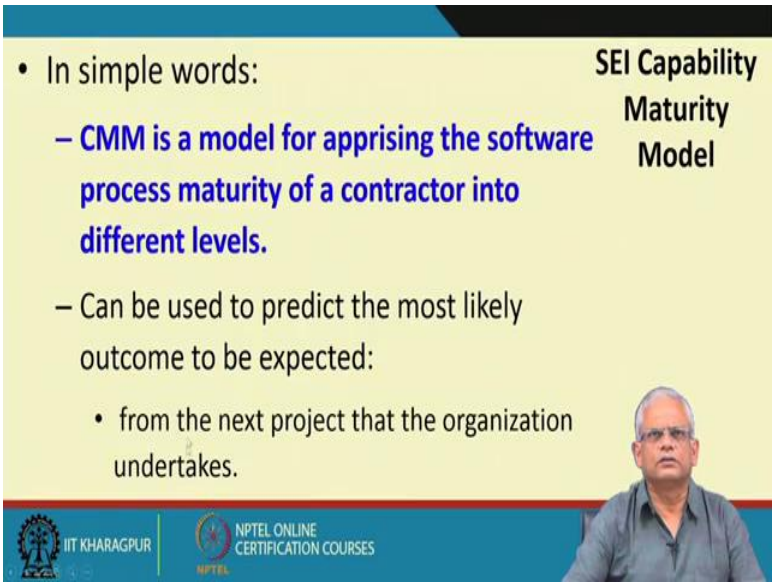

Now, let us look at the SEI CMM model itself. So far we have been discussing how it originated, what are its benefits, its uses – two major uses of the CMM, capability evaluation and process assessment and so on. Now, let us look at the SEI CMM model itself.

In simple words the CMM model can be used to appraise the process maturity of an organization into different levels and the implicit assumption here is that an organization using a good process produces good software. So, here we classify the organizations into different levels based on the process they are following and it has been found that this class actually is an indicator, this class of the contractor or the class of the vendor is a likely indicator of the performance when a project is awarded.

If it is at level 1, it is likely to produce poor quality work schedule slippage, higher cost compared to a level 5 organization who is likely to produce work that is cost effective within time and higher quality.

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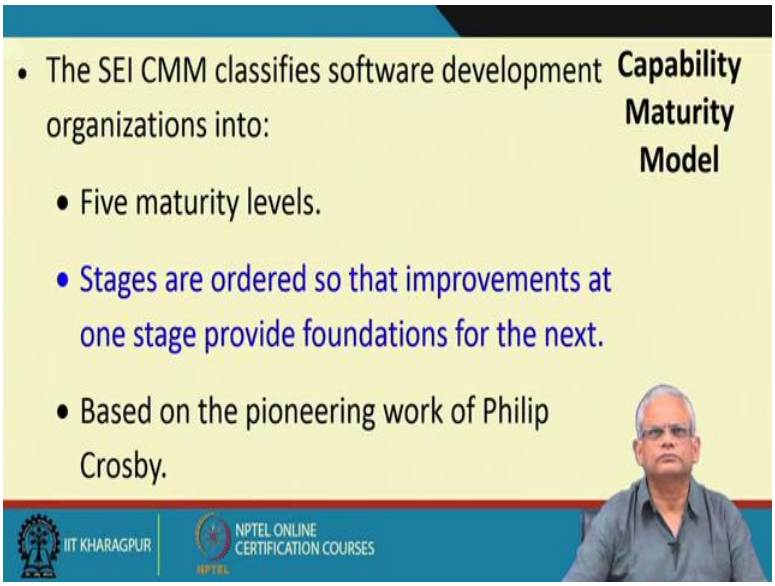

The CMM actually classifies organisations into five levels called as five maturity levels of the process that is how mature is the process and not only that that it classifies them into five levels. It also tells that what the organization needs to do to improve its process from one stage to another. If an organization is assessed at level 1, it clearly says that what it needs to do, what aspects it must improve and how to go to the level 2 and from level 2 to level 3 and so on.

But, then from level 1 it can go to the level 2 and not directly to level 3 without going to level 2 because the requirements of level 2 are a pre-requirement for level 3 without meeting the requirements for level 2 it cannot directly go to level 3. So the requirements of level 3 also have pre-requirement of level 2; requirement of level 4 needs the pre-requirement or that the organization is already satisfying level 3 and level 3 requires already satisfied level 2 and so on.

And, the CMM model if we really dissect it we will find that it is largely based on the work of Philip Crosby who had published a book called is Quality is Free. There also we have five levels of organizational process maturity and so on. But, then the CMM model has structured it and identified the specific questions to be asked based on which the organisation can be assessed and so on.

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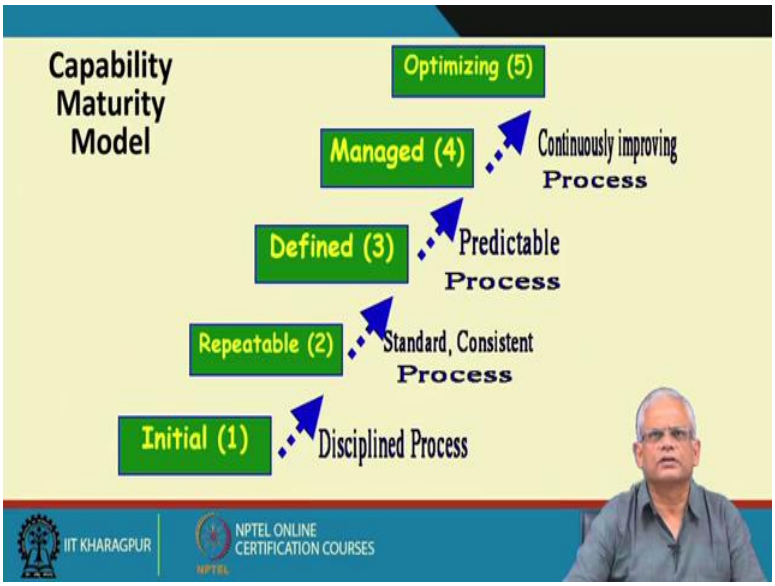

The five levels that the CMM identifies are the following. The lowest level is the initial, this is level 1. Every organization by default is at initial level and then is the repeatable level or the level 2. The third level is the defined level, the fourth is the managed level or level 4 and the fifth level is called as optimizing. This is the continuously improving process.

We are already at the end of this lecture we will stop here, and in the next lecture we will discuss about the specific requirements that the organization must meet to be able to a to be able to qualify for a specific level of the SEI CMM model. We will stop here.

Thank you.