Software Engineering
Prof. Shashi Kelkar
Department of Computer Science and Engineering
Indian Institute of Technology, Bombay
Lecture - 35
Quality Management System - I

We are now going to talk about Quality Management Systems and for that we need to understand two things; what is quality management and what is Quality Management System and then we will study them in more details.

Quality management is a coordinated activity to direct and control the organization with regard to quality like for finance you have financial management, for materials you have materials management, for human resources you have human resources management similarly for quality you have to manage the same with quality management.

Quality management is that aspect of management function which determines and implements the quality policy of the organization. It has to set the objectives, the processes, the measures of effectiveness then take the necessary action to achieve these particular objectives and last but not the least keep improving with the feedback. So it is basically a systematic way of guaranteeing that all activities are planned to ensure quality and those activities are performed according to the plan. Preventing occurrence of a problem is better than having a problem on hand and problems can be prevented to some extent by creating the right attitude amongst the people who are performing the processes and controls a mistake or a problem going unnoticed.

(Refer Slide Time: 2:33)

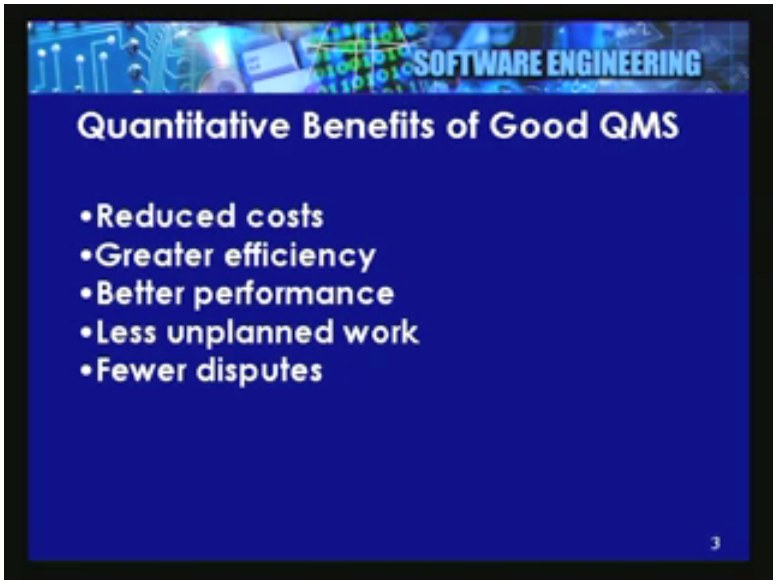
So we say the Quality Management is basically a catalytic function which encourages the right attitude and the disciplines amongst all members of the organization. Today most of the people keep on talking of total quality management TQM. TQM basically is a philosophy, it focuses on customer satisfaction, prevention rather than detection, team work, leadership, management's responsibility, never ending quest for improvement and control of business processes. All these are possible unless there is absolute commitment from the top management to [t….3:21] activity. Then we have the next question what is called Quality Management System.

Quality management in management can happen without a formal system put in place. Like for your financial management you have financial management system, you have materials management you have materials management system by the same particular token you have Quality Management System. Systems are basically a matter of organizing elements to achieve a specific objective, system to establish a quality policy and the quality objectives so that these particular objectives are achieved. So what does it mean to us?
Here when you look at the slide you say from an organizational point of view the Quality Management System basically describes the organizational structure, the responsibilities, the procedures, the processes, what resources are allocated for implementing the quality management. So the system describes all these particular aspects.

What are the objectives of QMS?
The objective of QMS is to organize and ensure enforcement or conformance for achieving and improving the quality on a continuous basis. It is an on-going activity it is not a one time activity. It also provides confidence to all concerned that the quality will be achieved and the product quality will go on improving on an on-going basis. Scope-wise it covers all parts and all levels of organization. There is nothing outside the purview of Quality Management Systems. It documents appropriate best practices in the organization and then of course makes sure that these particular practices adhere to. It formally demonstrates management for the quality. You say that this is the way we manage quality in the organization.

What are the corner stones [acc…5:21] QMS basically defines processes in process checks and feedbacks leading to continuous improvement. In case you have to do this particular kind of a thing how will you benefit?

(Refer Slide Time: 5:36)

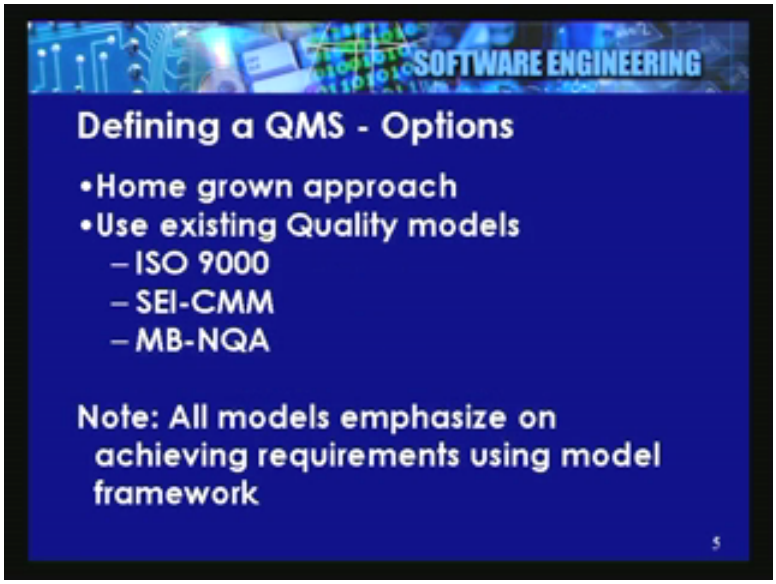


As you see in this slide there are some quantitative benefits and some qualitative benefits. The quantitative benefits could be reduced costs, greater efficiency, better performance, less unplanned work and fewer disputes.

(Refer Slide Time: 5:54)

The qualitative benefits will be like improved visibility and predictability, reduced risk, problems showing up earlier than later, overall improvement in the quality, overall improvement in the customer confidence, portable and reusable products and better control over the contracted products that you have. Then we come to the next particular question.

(Refer Slide Time: 6:28)

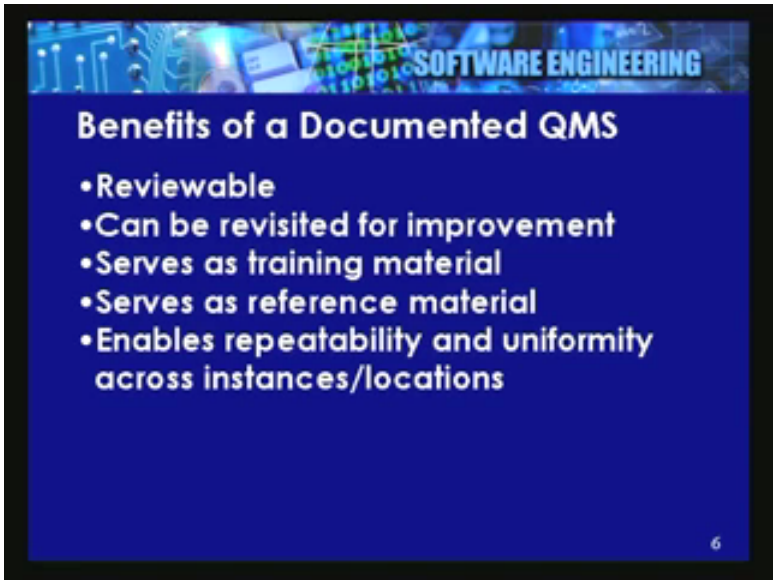


How we go about specifying the QMS?
There are two ways of doing it. if you look at the slide again one is you have a home grown approach where you go down, sit down and define your own key QMS and make sure that you follow it and make sure that the QMS that you have defined is adequate for achieving the objectives.

Other alternative is use one of those standard quality models and modify these particular models to suit your requirements. We are going to study three modules in our session. The Malcolm Baldrige National Quality Award of USA and ISO 9000 and SEI-CMM software engineering institute capability maturity model. All these models basically emphasize on achieving on a requirements by using the framework of the module. The ultimate objective is obviously to meet the requirements and the way you go about making the requirements is very important.

Understand the difference between the product quality and the process quality. In a lighter way if we say, if our hero in a cinema has a sick mother and needs a lakh of rupees to go on for an operation and one day he brings that lakh of rupees and tells the mom to get operated then the mother is likely to ask him a question like from where did he get this money from, how did you get it, whereas the doctor who is going to operate on her is really not worried about how this particular money was acquired. By the same particular token we are not interested in achieving a good quality product but we are interested in achieving a systematic and an organized way. So, from that point of view we need to define our particular thing.

(Refer Slide Time: 8:21)



There are many advantages in having a documented QMS. If you look at the slide, if you have a documented QMS what are the benefits?
One thing is that the document becomes reviewable. Therefore any short comings can easily be detected, it can be revisited for improvements, you see the lacuna so as and when you require you can really improve it, it can also serve as a training material, it can serve as a reference material, it can enable repeatability and uniform practices across many projects and many locations.

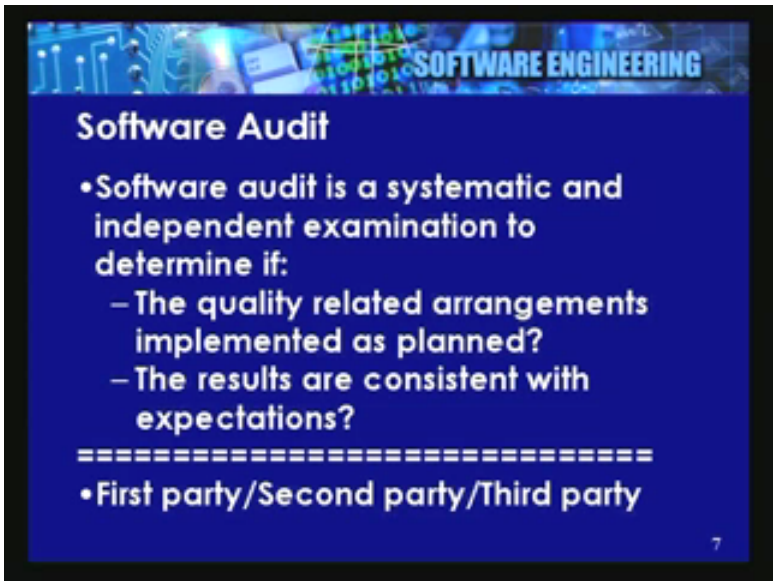
Of course one question that people always have is to what extent you should document, what should be the level of detail. It is a very difficult question to answer. Basically the practice that you have must be supported by the documentation and the training and the user's background and the tradition and the culture etc all these things together will determine to what level of details we need to document that particular practice.

Now, whenever you have a documented QMS, there are many QMS documentations like quality, policy, procedures, standard guidelines, forms, training materials and the system also results in generating a lots of QMS records. These records are very different than the product records that we are taking of. Some examples are review records, training records, testing records and audit records are not a part of the product in the true sense. But having documented evidence that you went through this particular motion makes a lot of difference in giving confidence to all concerned, your management and your customers.

Again to revisit, the first and foremost, quality policy is at the focus. The overall intention and the direction of the organization towards quality must be expressed in a formal manner. To take a simple example, somebody may state a quality policy as; we are committed to quality and excellence in all our endeavors.

We set our goal to achieve total customer satisfaction and deliver error free competitive product and solutions on time with service, second demand etc and you can go on mentioning many things that we would like to be the number one person, we would like to achieve excellence in the particular niche market, whatever way you would like to describe it you will have to mention it in the quality policy.

(Refer Slide Time: 11:10)



The next particular question that we have is, it is all fine but how do we know that the things are working the way we have set it up and for that we need an independent assessment. So, software audits are a very important part of the Quality Management System. Audit is basically a systematic independent examination to determine if the quality, first of all that you have planned the quality related arrangements, is everything planned so that the quality will be achieved and the second is did you really perform things the way you planned. Last but not the least is to check whether the product is consistent with your expectation. So to some extent it is like a sampling exercise and based on judgment of the competent people you would like to see if the QMS has been effective or not. So the audits give confidence again to both the customer and the management. The audit process itself is subject to audit.

Now we ask a question, who should audit?
So we can have first party, second party or third party audits.
What is the first party audit?
First party audit is basically in-house audit perform by people within the organization but not working on that particular project. It is a defensive action prior to certification of any particular commitment that you make. It ensures that implementation is satisfactory, it serves as a means for improvement, complies with the contracted requirements and in general it evaluates any particular quality problem that you may face in the organization.

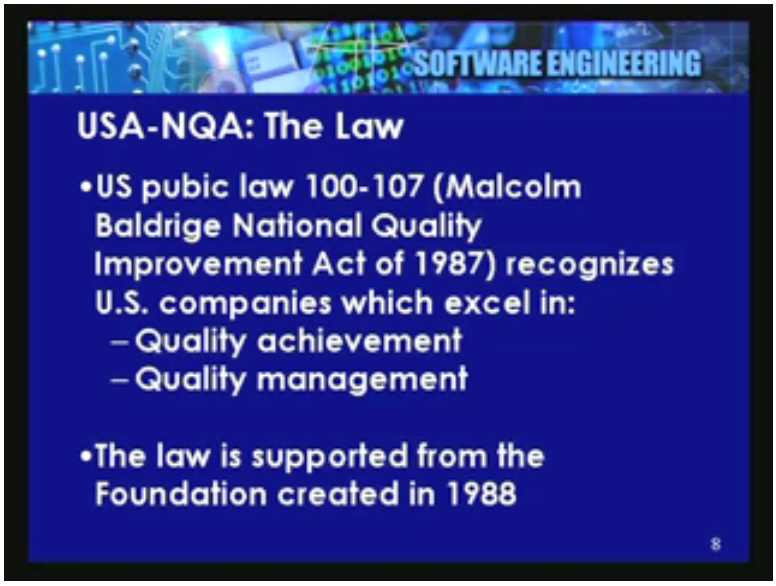
Second party audits are normally performed by the customer. A customer wants you to develop something for him. He wants a guarantee before he contracts that job to you that you will be in a position to do that. On one hand you specify why you are the best person to make that particular product or to enter into that particular project.

Second thing is that the customer would really like to say that do you really work the way you say you do. And from that particular point of view the second party audits are often performed by the customer. And they may also play a very useful role like vendor selection, when you want to go find a vendor you would like to go and do a second party audit on your vendor.

Now the third party audits or conducted by certification agencies. They may also be conducted by professional bodies or national legal requirements or it may be a prerequisite for certain things so if you are doing a ISO 9000 certification then the ISO 9000 certifying body will come and audit your working.

Similarly, for SCE CMM somebody will come and evaluate where you are currently standing with respect to the Quality Management System, the same thing with Malcolm Baldrige National Quality Award or in India we have something equivalent like JRD QE for Tata companies. So the third party audits may be performed by somebody outside your organization and outside the client's organization obviously with some specific purpose. Now let us look at three specific models for Quality Management System. First let us look at the United States Malcolm Baldrige National Quality Award.

(Refer Slide Time: 14:54)



There were many reasons why this particular law was passed. First of all there was globalization that brought lot of importance to competitiveness and the productivity. In order to compete effectively it was necessary to bring about a fundamental change in the way organization does business and from that point of view it was realized in US that

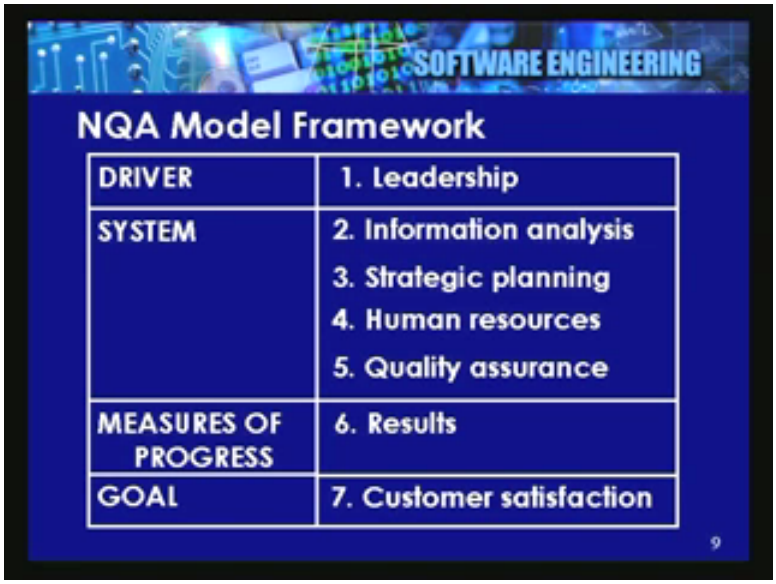
they were losing lot of their national product in terms of [fo15:26]. So, from doing that they thought that they must come out with something that will encourage people to follow good quality practices. So the purpose for setting up the national quality award from there point of view U.S. leadership in product and process quality was very strongly being challenged from foreign competition particularly countries like Japan and Germany, US business and industry was losing up to 20% of their total turnover in the rework.

Strategic planning for quality and quality improvement programs was not done as well and it was very essential for doing it for improving national economy. Dramatic improvements in cost of quality could not have really been brought up without having a formal quality system and concept of quality improvement directly had to be used by all organizations. So, quality management programs of this particular time can be successful only if they are management lead, customer oriented then of course there is some kind of appreciation. So in case on a national level people who excel in quality the way they do it and what they have achieved. Then some kind of recognition can greatly help in promoting the concept for quality. This will also help in documenting some best practices and enable others to use those particular practices for improving there own state of affairs. So if you look at the slide now the US public law Malcolm Baldrige National Quality Improvement act of 1987 recognizes the US companies which excel in quality achievement and quality management. And the law is supported by some foundation.

Now the law is aimed at encouraging quality improvements in all sectors of a [..17:41] both big and small and manufacturing and agricultural mining and construction you name it even service organizations. If it is aimed at creating public private partnership make sure that the quality becomes the corner stone of all the work that happens. At the moment three are eligible categories known as the manufacturing, service and small industries small businesses specially those employing less than five hundred people and every year two awards in each category could be given if required.

Of course if the organization gets an award once then it is not eligible to apply for a second award. So any profit making business located in US both in the public and private sector, domestic or foreign joint venture companies were all eligible. But the local, state and national government and non profit organization, trade association and professional bodies were not eligible to apply for this particular award.

(Refer Slide Time: 18:58)



Now the frame work for national quality award model is centered on seven examination categories. Let us look at the slide now. The first particular one is leadership. So what do you do?
In your application you need to specify that how do the senior executives provide leadership to the organization in excellent quality. They have to facilitate, create and sustain clear and a visible quality value system. Build quality valued in the way the organization does business, project the quality values outside the organization, and support the quality development for within and outside the organization. So what they consider for evaluation is the appropriateness, effectiveness and the involvement of the management. It does not look whether you have a formal quality department like you have a label somewhere and you say this is the quality department which is not enough. So the quality department need not be located as a separate department but it needs to achieve this particular thing and needs to provide a leadership to all concerned.

The second point is the system. Here we need to have several particular considerations. Information analysis is one of them. Now what happens is you have data but you are not able to make any meaning out of it and then you are in trouble. So, information analysis tells you the adequacy of scope, validity, use of the management data on the organization system. So basically this is the way you encourage a preventive kind of approach and the concepts like management by fact.

One would like to hear from you all the time like a background kind of a music our data shows that and that is why we took a particular kind of action. So it considers for evaluation the appropriateness and effectiveness of the methods, the technology and how this particular quality related data is managed in the organization, how is this particular data analyzed and how it is used.

Again to repeat; it is not necessary that you have a formal information processing department or how that department is organized or which technology uses by itself is of no consequence. You can have a very simple kind of a technology and the job being done etc but what you need to show is that you have the data and that data is being used for prevention and detection and continuous improvement on an on-going basis.

Now the third particular point is strategic planning. All these things cannot happen unless you plan. Again you keep saying plan, plan, plan because basically management is all about planning but planning at a strategic level is very important, adequacy of approach to planning like do you set short term goals or do you set long term goals or do you set priorities etc is not possible for you to achieve everything all at once in one goal. Therefore you need to say what you will do now in short term and what you will do in the long term. So it is one thing to say that you would like to be the most outstanding suppliers of a particular product and another thing is to say that you would like to reduce the number of defects from five defects per million to three defects per million and something like that.

Therefore, integrating the quality planning with business planning is very important. There is this famous story of a dog food manufacturer who ultimately confesses that he got the ISO 9000 certification but the dogs did not like the dog food. We do not want to get into that kind of a situation. The success of the business is as important as ensuring quality, but whatever it is the two are in a true sense not separable. So when you plan for quality you are actually integrating your plan with the business plan.

Similarly, you will also like to say what kind of benchmarks you are setting for your people, what kind of competitive data that you have and how it is used to make sure that you are at least as good as or if not better than what your competitors are or try to achieve to beat them if you can.

Remember; one famous question people ask, how much customer satisfaction is good enough and it says it depends a great deal not how good you are but how good your competitor is and a simple rule is that the customer satisfaction with you and your product has to be more than the customer satisfaction with the competitor and the competitor's product. By the same particular token you need to set some goals for yourself. Again the thoroughness and the effectiveness of process is essential. How you use the data to do strategic planning is more important and whether you formally have a department which is called strategic planning department that particular part is not important. The next point is human resources.

From software point of view the bulk of resource consumption is in terms of people. So, organizations effort to involve the entire workforce in total quality is very important. You need to develop and utilize the potential of the workforce, maintain conducive environment to ensure that there is a full participation, there is a continuous improvement and personal growth do not conflict with the organizational growth but both go hand in hand. To repeat the same particular kind of music the appropriateness and effectiveness

approach is more important than having a formal training department or formal HRD department or facilities etc.

The facilities and all that are fine but if the proof of the pudding is in eating then what is important is are you able to get better performance out of your particular people, get better commitment to quality from your people. Let us look at the slide for the next part. Then we need to say what quality assurance practices we are following. Therefore this means what kind of approach you take in quality control or preventive actions and quality control. It is integrating control with a continuous quality improvement. Every time you encounter a mistake you must correct the product and you must correct the process with appropriateness. Therefore this whole approach is very important. So, considered from evaluation point of view is the consistency in execution of the quality operations and emphasis on prevention and continuous improvement is more important. The formal existence of the department or a responsibility chart by itself is of no consequence. So we go to the next point.

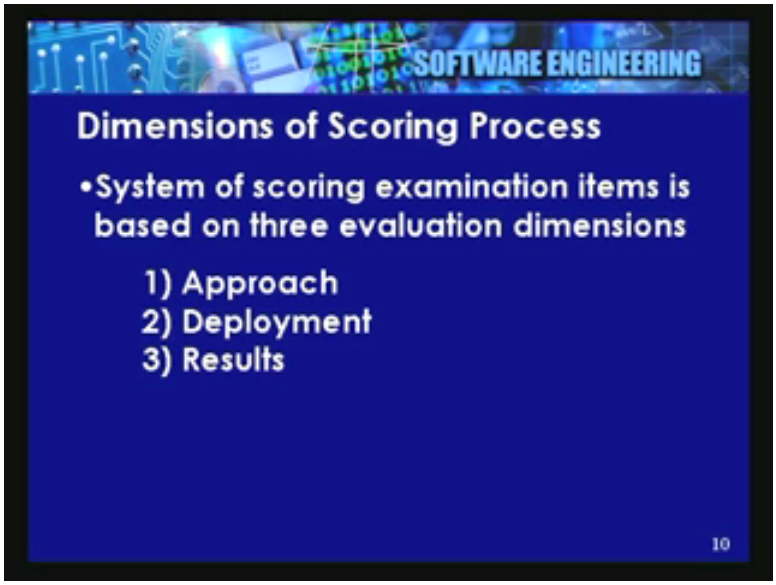
You say the proof of the pudding is in eating so that the results are important. In case you do everything but you are not able to achieve the results that you plan for then again you are in deep trouble. So we need to specify current levels of quality, the trends that we have in relation to those with comparable organizations and competitors and quality improvement levels based on the objective analysis like what are the customer requirements and what are the organizational operations etc and how they are done. So the proper measurements will only help you in realizing whether you are achieving what you are supposed to achieve or not. Hence, measuring the results is all report. Therefore the overall improvement achieved by the organization in establishing clear quality levels and making comparisons is the benchmarks that you have set with the help of these results which is what the evaluators look for.

Go one more step and what is your ultimate goal?
Your ultimate goal is satisfy the customer. So you might make a good product you might make it in a good way and your people may be happy but is the customer happy or not. So, from an organization's point of view the customer requirements, their ability to meet the requirement and the service systems that you provide to the customers and the responsiveness to the services that you provide all these are important. You cannot really have customer satisfaction unless you are able to do some customer service and get a feedback about what the customer expects from you and also to make sure that you are basically giving customer everything that the customer expects from you to achieve his own goal with your product. Hence customer satisfaction is very important.

Thus, evaluation is based on the measurement of several indicators such as appropriateness and effectiveness of achieving satisfaction, use of available instruments within the resources to serve the customer, he is really bending backwards to serve the customer. So, evaluation is not done in terms of the existence of the sale, after sale service department or responsibility metrics and so on but what is more important is that you make sure that you show that you have done everything within your particular limit to achieve. [……28:48] has a very elaborate scoring process. It involves people put in. of

course the applications are voluntarily put in and then we select some top performers and then classify the applicants into those who are likely to be going towards the award and those who also ran. But at the same time people who applied each one of them must get a very good feedback as to why they did or did not meet the expectations of the examiners. So, from the examination point of view the senior, junior examiners are all appointed to different evaluations and from this we are able to get the job done. The evaluation that is being done is on three particular counts.

(Refer Slide Time: 29:52)



As shown in the slide, one is the approach, then deployment and the results. So let us now look at each of these particular points in detail. The approach refers to the methods the organization uses to achieve the purpose of the examination items.

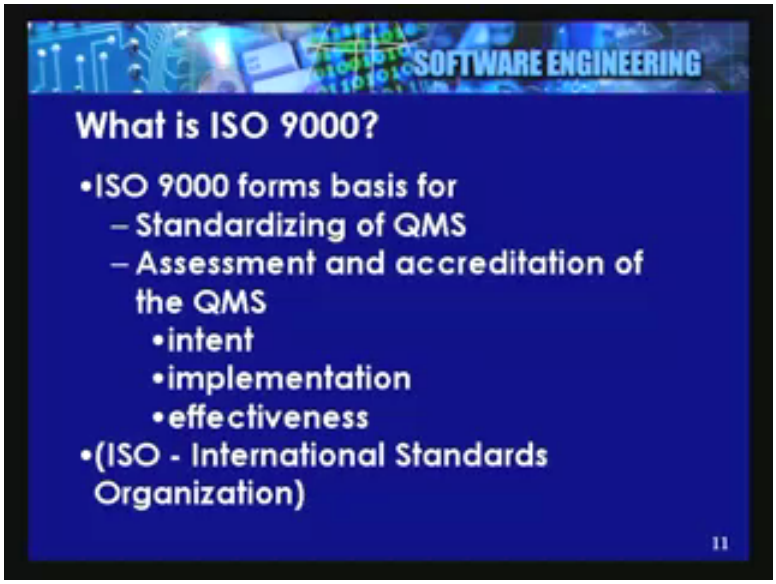
What is the criterion for evaluation basically?
Degree to which the approach is preventive based, it is systematic, it is integrated with business processes and it is consistently applied across the organization. So in that sense degree to which the approach embedded is the effective self evaluation, feedback, adaptation cycles and continuous improvement is also equally important. Use of novel tools, techniques, methods to do this is also evaluated in the approach. It indicates the unique or innovative approach that you may be using and obviously in course of time many of the people may use that particular kind of approach. Then we talk of deployment.

You should have identified what are all the things that you should know, how you really need to go about in planning. So it refers to the extent to which the approach that you have outlined is applied to all the relevant areas in the organization. And activities that are examined will be examined on that particular point of view. So the criteria for evaluation could be like appropriateness and effectiveness of applications to all transactions and interactions with the customers and providers of goods and services and

the public at large and other internal interactions associated with different groups which is also important. Internal processes, activities, facilities, employees, service characteristics all these are looked in deployment.

How have you gone about really ensuring that your approach is put into practice?
Once you got the approach right your next particular thing is results. Results refer to the outcome, the effect in achieving them. Like again we mention, “the proof of the pudding is in eating”. So, criteria for evaluation would be like quality levels which are demonstrated, have you been able to show that improvement, the contribution to outcomes of quality improvement, then rate of quality improvement, that significance demonstrating that the improvement has been derived from the past mistakes, comparison with the industry standards and basically you need to keep on showing that you are continuously improving your results, you are sustaining improvement. So if you do this particular job in this fashion then you are likely to be meeting these results.

(Refer Slide Time: 33:04)



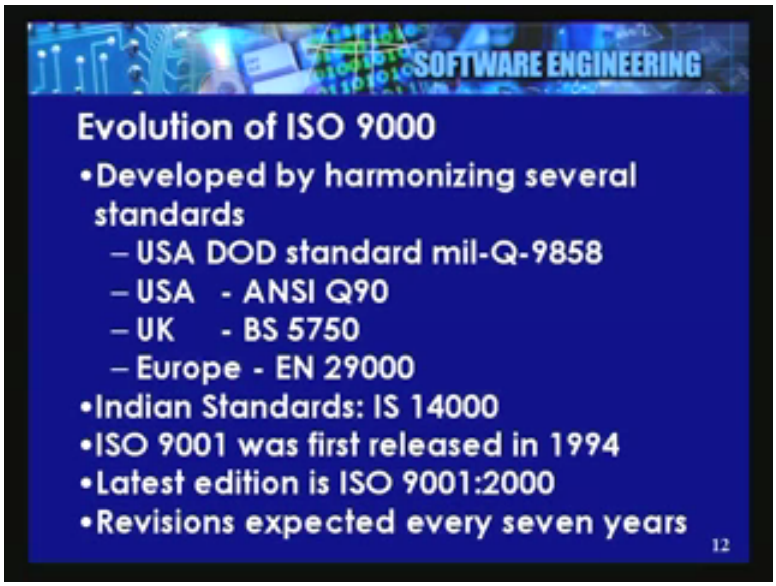
Let us look at another Quality Management System.
ISO 9000: ISO 9000 is a family standard generally known ISO 9000 which forms the basis for standardizing the quality system software in an organization. They form the basis for assessment and accreditation of intent implementation and effectiveness. ISO 9000 is applicable to all generations for both the producers of products and services, it is irrespective of size and nature and it can be applicable to domestic as well as export business. Anything ranging from a software development organization to poultry manufacturing polity equipment manufacturing company or Roman Catholic Church to a recent lock up hospital, restaurant you name it all these particular organization are eligible to apply and get them certified for ISO 9000 kind of a thing.

Basically we need to be clear what ISO 9000 is also not. It is not a product certification. It only tells you that your Quality Management System conforms to certain particular

standards. Of course it implies that the chances that the product you produce will be good. But it does not certify your product like you have a pressure cooker with ISI mark so you cannot put a brand on your particular product and say that this is ISO 9000 product, it is not a product certification. It does not set out extraordinary requirement. It basically says that put practical standards that can be achieved by […35:08…..] document them and make sure that you achieve it. It does not necessarily say that you have to be the top. Of course it emphasizes on your improvement. So please realize that we are talking of the way you work and the Quality Management System for that. So a Parker pen and a Jotter pen can both have an ISO 9000 certification.

Similarly, a BMW and may be Maruti 800 can also have ISO 9000 certification. So ISO does not standardize the quality in terms of the features. So what it does is it standardizes the management system for this. It only spells out the desirable framework for establishing the Quality Management System. Similarly ISO 9000 does not give any legal impunity to anyone. And another interesting feature of ISO 9000 is it is not a permanent certification unlike SCE CMM which is like an examination which you pass and then you get results and you could flout the results for the rest of your life.

(Refer Slide Time: 36:31)



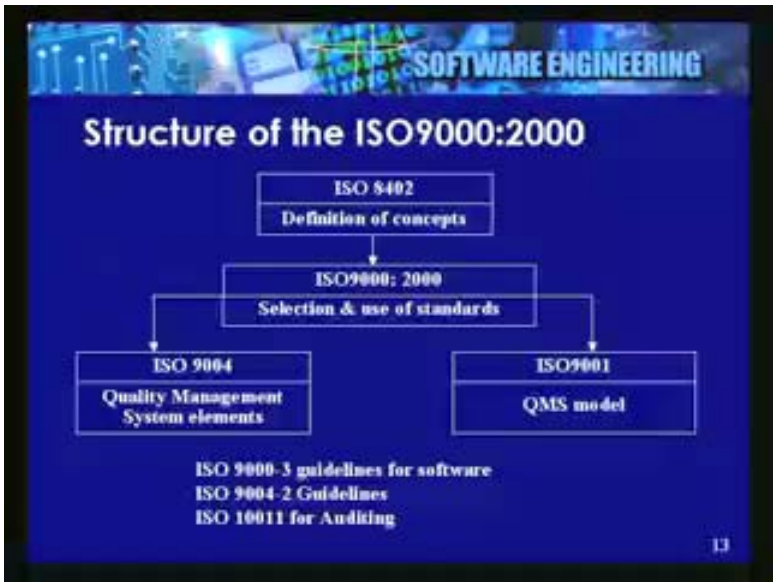
ISO 9000 basically was evolved by harmonizing the standards from various countries USA, UK, Europe etc and from that particular point of view what we currently have is a standard which is published by International Standards Organization and the certification standard 9001 was first released in 1994. The latest edition is ISO 9001:2000 expect a release every seven years. In India the participation in ISO is there by bureau of Indian standards and the equivalent to ISO 9000 family is IS 14000 both are in that particular sense.

So what we get next is. What is the purpose of ISO 9000?

It is to promote and develop a common standard world wide to achieve, sustain and improve the quality of products. How do you do it is by assuring the customer that the product will conform to requirement when it is made because you work in a particular way. So we ask a question why we need ISO 9000 certification. It basically must impact the bottom line of the business; it will help you in ensuring consistency of products and services that you produce.

Registration may be compulsory for certain type of bidding government organizations, overseas customers, many of them may insist, people who apply for that particular contract in that particular job must be certified. So focus on international trade, better image and generally also taking advantage of government incentives is why you would like to have that. Remember, if you were to have the ISO 9000 certification then both suppliers, customers and third party everybody stands to benefit from this.

(Refer Slide Time: 38:52)

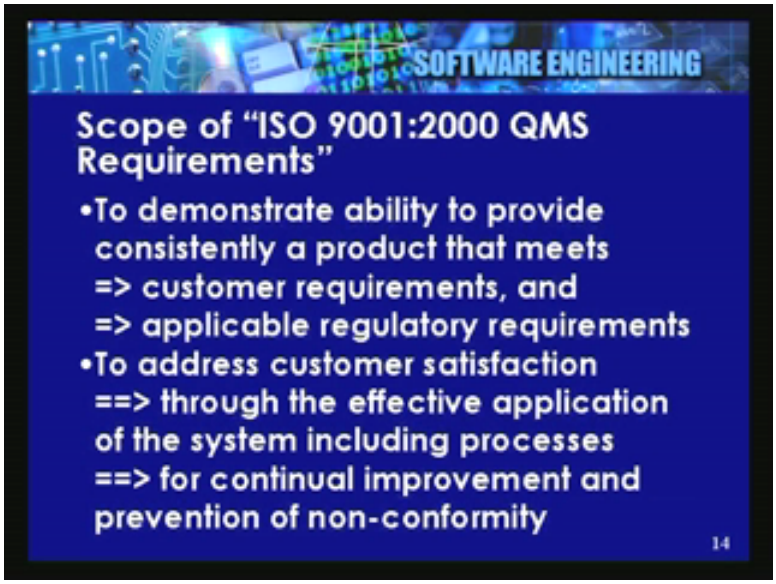


Now if you look at the slide you say this is structure of the ISO 9000 standards. At the top is the ISO 8402 which is basically the definition because as you know different people mean different things by the same word so from that point of view it is very essential to have a common definition terminology. Then we have the ISO 9000: 2000 which gives you the selection and use of standards. Then the ISO 9001 actually is the certifying standard, the QMS model. So when you really make your QMS and go for certification your QMS is compared with ISO 9001 and if it is found satisfactory then you are certified.

ISO 9004 basically gives a lot of supporting information of different particular type. There is one particular document which is associated with the earlier version of ISO 9000 what you call 1994 and that is ISO 9000-3 which are the guidelines for software. What this particular document did was to give you a cross reference one to one cross reference some kind of a cross reference between the ISO 9001 standard and the organization of the

QMS which is appropriate for a software development organization. So you had a one to one correspondence what you call as tables to trace every clause in ISO 9001 to ISO 9000-3 and vice versa, every clause in ISO 9003 now had to be identified and associated with the ISO 9001. ISO 9000 with 10011 basically was the internal audit standard, how to carry out audit for a company having such particular standards. Now we ask a question; what is the scope of ISO 9001:2000?
This document is basically called QMS requirement, the Quality Management System requirements is to demonstrate ability to provide consistently a product that meets the customer's requirements and its applicable regulatory requirements.

(Refer Slide Time: 41:20)

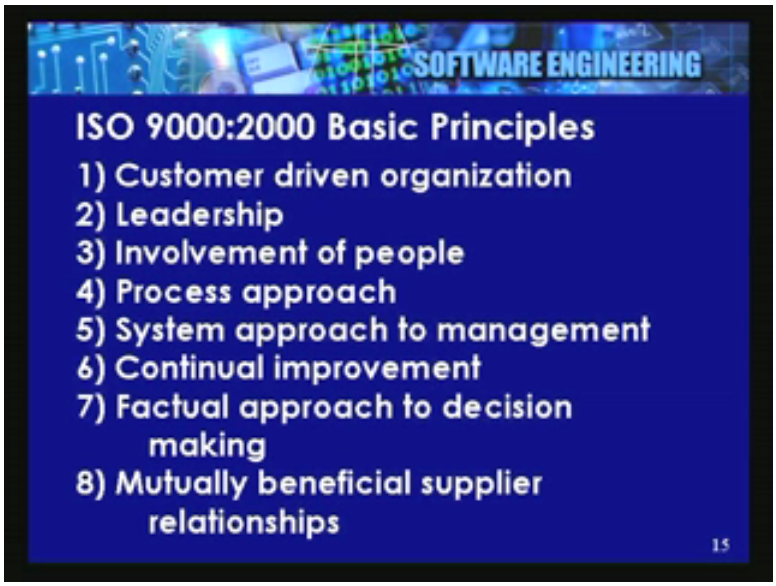


That means you must meet the stated, implied, legal and all kinds of requirements then to address customer satisfaction through the effective application of the system including the processes for continuous improvement and prevention rather than detection, correction etc.

Remember, detection, correction is important but prevention is to be focused on. So the philosophy behind ISO 9000 certification is the same thing as we talked of, to produce consistent output that is fit for use at a reasonable low cost within the constraints of the resources, have a clear definition of all facets of the work process, specify how you are going to work then in clearly specifying the organizational structure, the responsibilities associated with the quality, build quality at every stage rather is not something that you add on when the job is done but you need to built a product in a quality manner to say so. Therefore deploy a formal management system and guide the operations, provide reviews and audits to ensure that things are not going wrong. So conformance to agreed specification, adherence to define processes and traceability and transparency of system is very important.

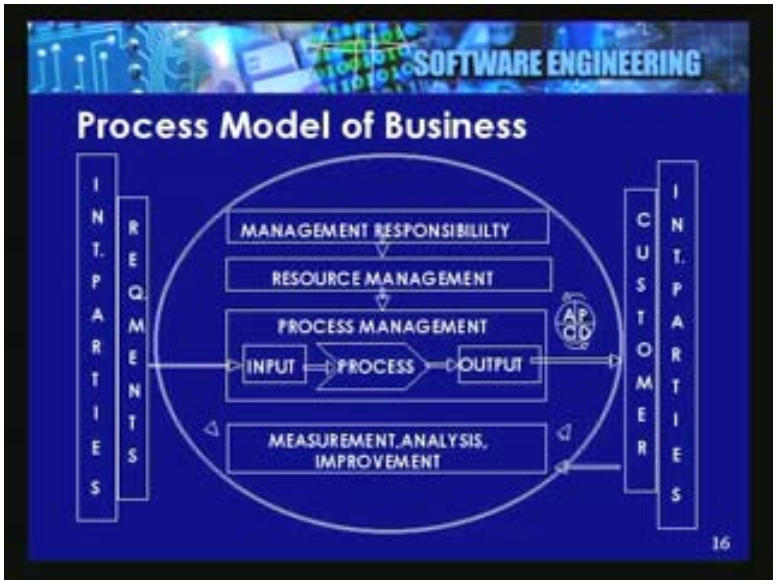
Last but not the least training of all persons for performing the relevant job is an absolutely essential part of ISO 9000. ISO 9000 is basically based on eight basic principles. It is just something about the way the document is organized.

(Refer Slide Time: 43:19)



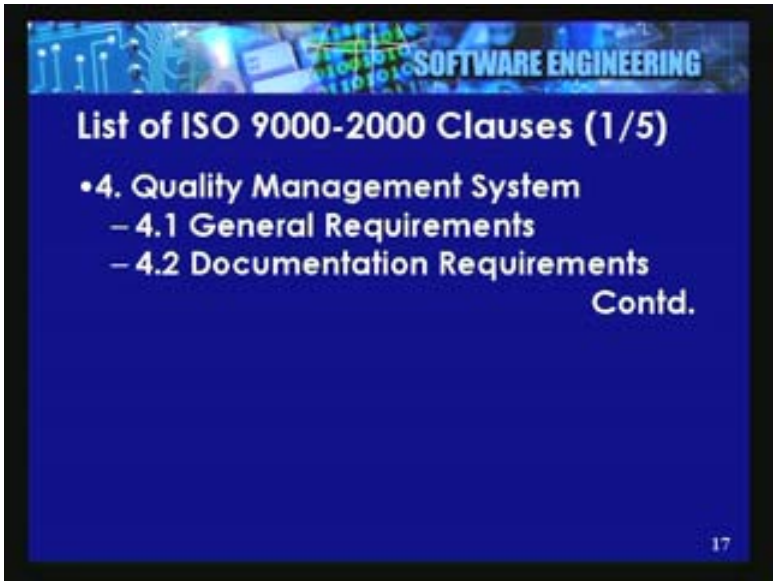
As you look into the slide, the first particular thing is customer driven organization. We have talked enough about it then we talked about leadership, then involvement of everybody in the organization, having a processed approach like you work according to pre-defined kind of methods, systems approach to management we work on a piece-meal basis, we plan the whole thing together to make sure that at the end of the day we are going to get a product and we also make sure that continual improvement is there, factual approach, management by facts as we would say and mutually beneficial supplier relationship is also equally important. So once you got these particular kinds of basic principles then we say how it is organized. So, the process model in ISO 9000 is indicated on the slide.

(Refer Slide Time: 44:10)



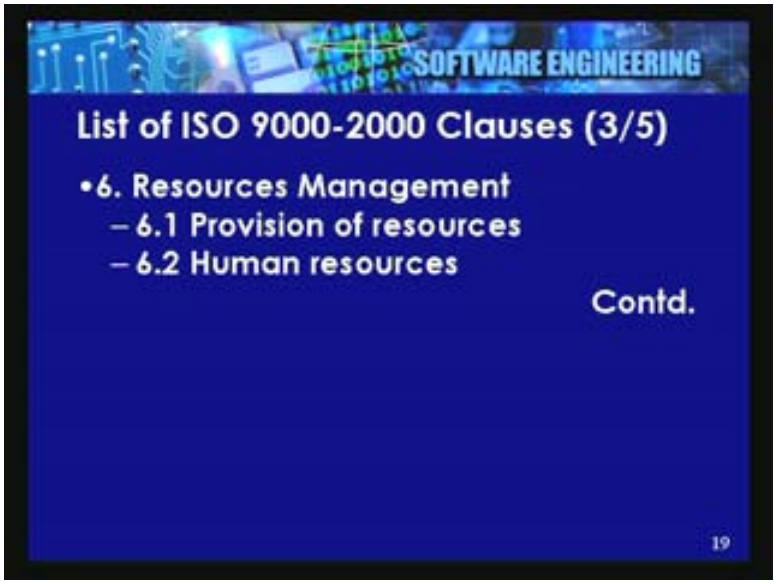
What you have is at one particular aspect you have all the interested parties and their requirement includes the customers requirements, the requirements of the top management, of the other people who may be affected all the stake holders the requirements come in and if you look at it the output also ultimately goes to customers and the interested parties. In between you have input process and output so basically a process management and it works within the framework of management's responsibility, the resource management and measurement, analysis, improvement etc. So basically what you are doing is follow a PDCA kind of a cycle. So this is the way the ISO 9000 focuses on doing that. Let us briefly look at the clauses in ISO 9001.

(Refer Slide Time: 45:20)



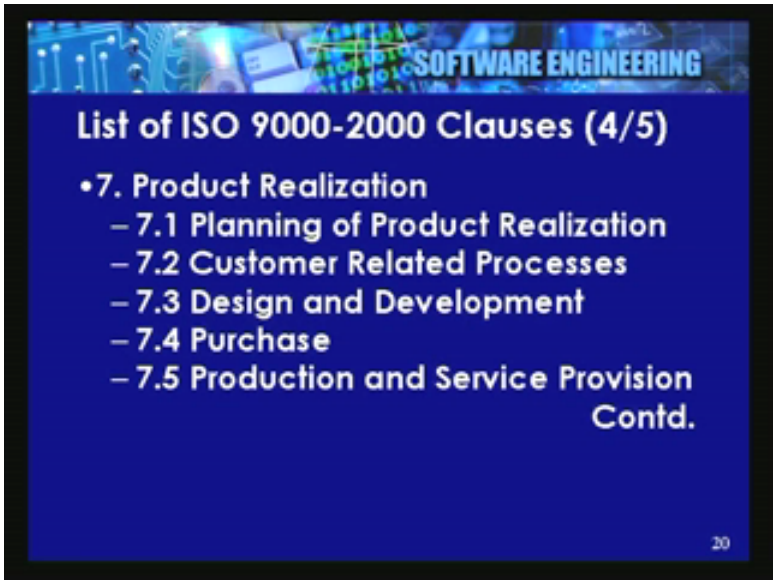
Basically they fall under the categories numbered from 4, 5, 6, 7, 8, look at the sub clauses to one level of detail. Here 4.1 specify the general requirements of the Quality Management System and 4.2 specify the documentation requirements. Then in level five we look at what is the management's commitment. How do you make sure that it is visible to everybody that the management is committed to quality?
It must demonstrate customer focus, must have quality policy, it must show planning for quality, it must have responsibility, authority, communication and last but not the least regular management reviews to make sure that the things are happening the way they are intended to happen.

(Refer Slide Time: 46:21)



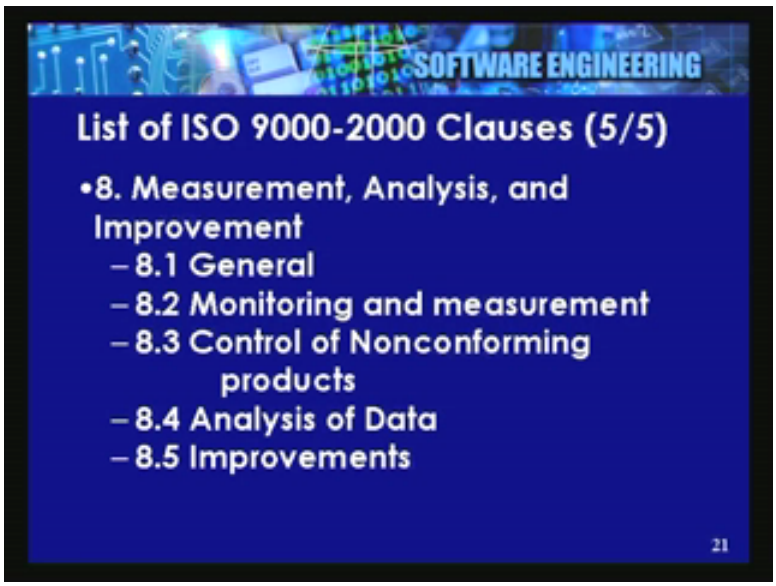
The 6.1 specifies how do you provide, things do not happen only by planning you need to support the planning activity by providing appropriate resources. So this includes providing human resources and other particular resources.

(Refer Slide Time: 46:40)



Once you have done that then you see how you make sure that the product realization takes place. So planning for product realization, how do you expect to get the product out which includes customer related processes, how you deal with the customer from requirement through design through delivery how do you deal with the customer, design and development processes, purchase procurement processes, production and service provisions after the product has been delivered all these things are of importance.

(Refer Slide Time: 47:13)

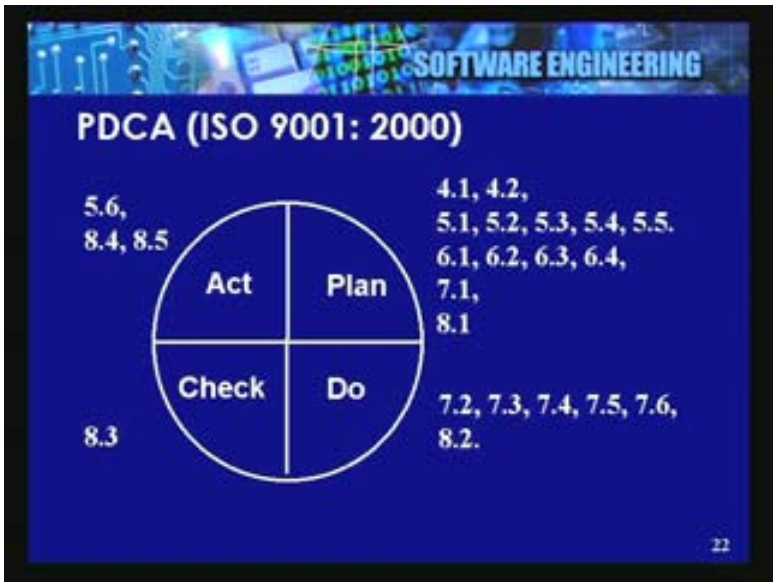


Let us look at the last particular part. The foundation for all these processes comes only from measurement, analysis and improvement.

So the general requirements, monitoring and measurement requirements, the control of non conforming product is very important which is like a enough factory [short flow…….47:20] in case you find the defective part then probably you will put a label around data and then say this particular piece is defective and either you rectify it or scrap it or whatever you may do but the label stays with it to say that this piece is defective.

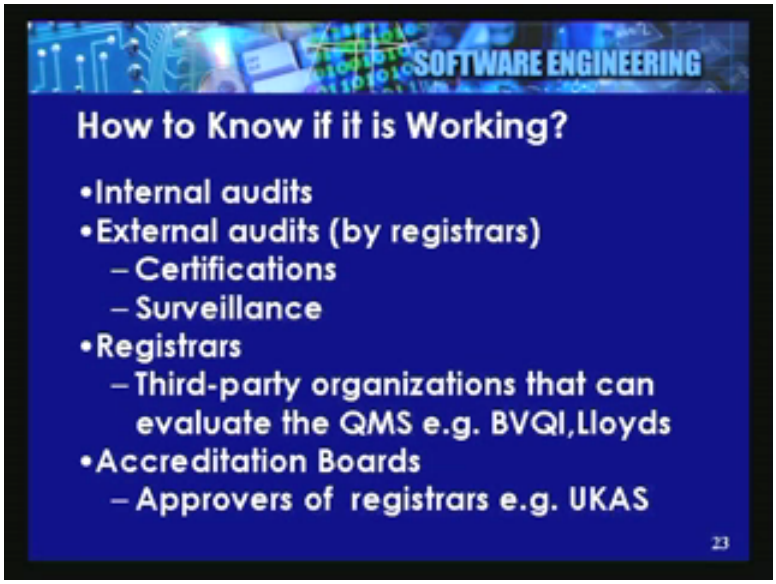
By the same particular token suppose you had a program and you found that number of error in this particular program was prohibitively large and in case you had to label it and say that this under no circumstance this particular piece should be released. So how do you make sure that this piece will not get released until some corrective action has been taken?
Then comes the long term basis the analysis of the data and demonstrating continuous improvement is the same….[48:13]

(Refer Slide Time: 48:16)



So if you were to look at all these particular clauses you find that you are basically following the PDCA cycle and each one of the clauses that we have seen just know either fall into plan, do, check and act. It is this plan, do, check and act kind of a cycle. So in this particular context you must realize that the PDCA cycle sort of adhere to in ISO 9001 standard. There are lot of processes which can be looked at such as the quality management process, resource management process, regulatory, monitoring processes, research and market research and product design, purchasing, production, service processes, a whole list of these including training, planning, reviews etc need to be derived, defined and followed.

(Refer Slide Time: 49:19)



Then we have the next particular question like how do you know that it is working. So how do you know it is working? Basically you look at the audit certification and registration aspect. So we need to make sure that you are actually working the way you say you are working and this can be done by particular standards and we have internal auditors, customer auditors, we have seen first, second and third party audits from that point of view. So basically a registrar is a third party company that is contracted to evaluate the organization's Quality Management standard and accreditation board approves the registrars so based on that you would get your certification.

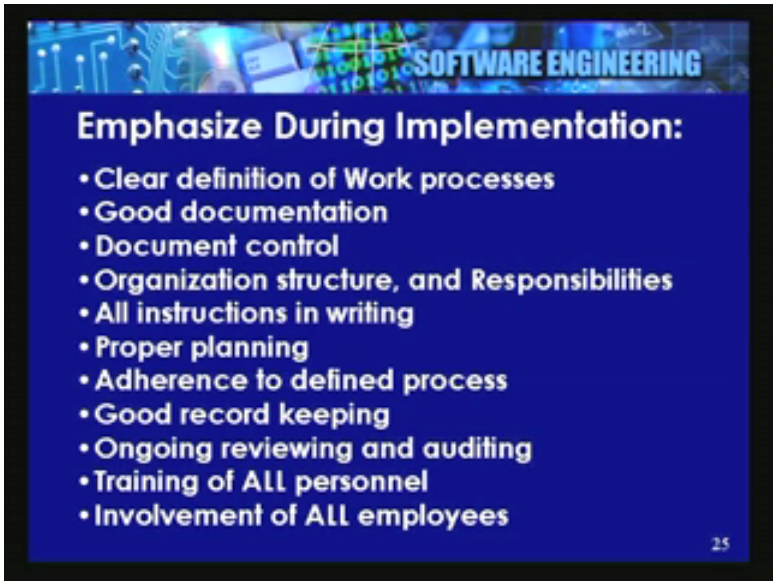
(Refer Slide Time: 50:07)

The process for getting the certification is like this. Look at the slide now. Basically first is, you have to look at selection and application of certification body as to whom you would like to go and deal with. The next step would be for you to design your Quality Management System. Once you have designed your Quality Management System the third particular step would be to send it to the certifying body for adequacy audit that they will say prima facie on paper does your QMS confirmed to the model that they have identified. Once you have done that you need to implement it.

Of course many of these steps may overlap with each other, you need to implement your QMS and then somewhere down the line you will tell the certifying agency yes I am ready for being audited for certification in which particular case the external QMS review and pre-assessment will take place. This is just a cursory visit just to make sure that you really are ready for the assessment. Once you go through this particular step then the certification body will come and assess you.

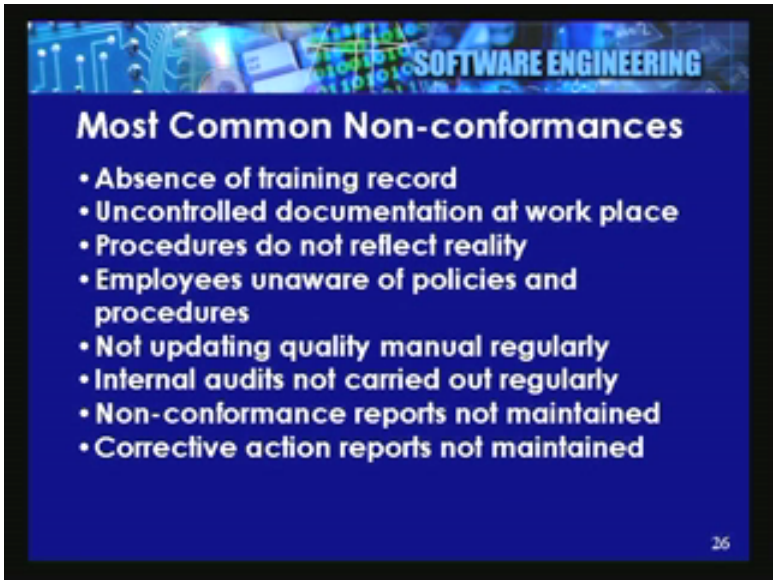
After you have done the assessment they might come and find some lacuna short coming and may ask you to improve certain things and once you have done that you will get the certification. But your certification is not a permanent kind of certification and from that point of view you will have to maintain and improve the Quality Management System on an on-going basis. So this will be achieved by doing surveillance audits. So adequacy audit, compliance and surveillance audit are basically the corner stones on that.

(Refer Slide Time: 52:04)



Then on implementing the ISO 9000 you need to emphasize on clear definition of work processes, good documentation, documentation control, organizational structure, responsibilities, giving instructions in writing, proper planning etc.

(Refer Slide Time: 52:19)



The next particular thing is like if you were to look at the warning signal what are the most common non conformances that are observed by certifying bodies; one is absence of training records, uncontrolled documentation at work place, procedures do not reflect realty, employees are unaware of organization's policies and procedures, not updating quality manual on an on-going basis, internal audits are not carried out or the findings of these audits are not acted upon, non conformance reports are not maintained and corrective action reports are not there.

Now if you have to do that then will not be the end of the story then they will start looking after analysis of the data and the continuous improvement kind of a thing. So we can of say that adhering to all these things and implementing a QMS will help everybody, it will help the owners and the investors in terms of high returns and meeting the market needs, satisfied customers that is the next particular thing and so on.

(Refer Slide Time: 53:19)

You might have improved productivity and from investors' point of view better return on this thing. Hence owners, customers, investors all these people stand to benefit from it, the users are a part of the customer organization therefore they will also be very happy because the product is good, the suppliers who supply you things as a part of your particular product will also be very happy with you, the employees in your organization will be happy because their working environment will be better, morale will be high, job satisfaction will be high, greatest stability of employment and all those things and in general to summarize the society at large will benefit by adherence.