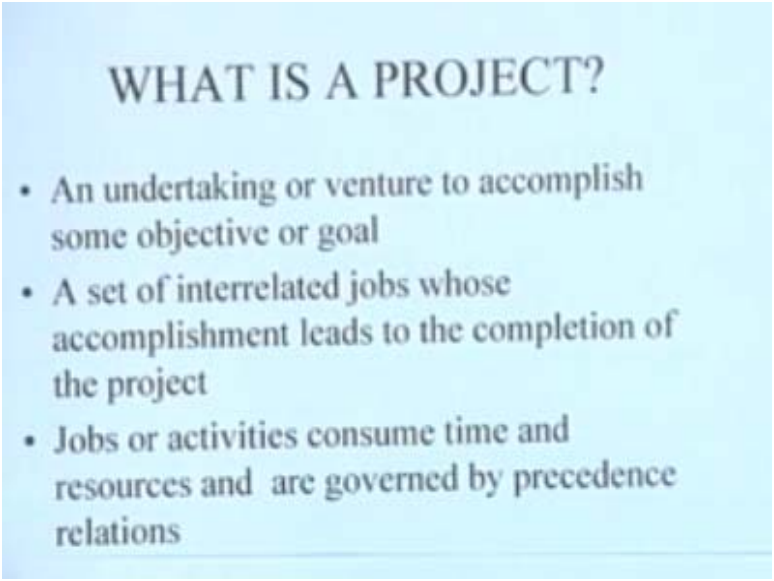
Project and Production Management
Prof. Arun Kanda
Department of Mechanical Engineering,
Indian Institute of Technology, Delhi

Lecture – 2
An Overview

We are going to begin this course on project management today. I am going to give you an overview of project management in this introductory lecture. I think you are all familiar with the notion of a project. During your course curriculum you have done a number of projects. At home you have probably been exposed to a variety of projects that you have undertaken on behalf of the family. But in this course we are going to look at projects in a more systematic fashion and are to going to identify the major features of a project and what exactly we would be doing. Let us start by dealing with what a project is.

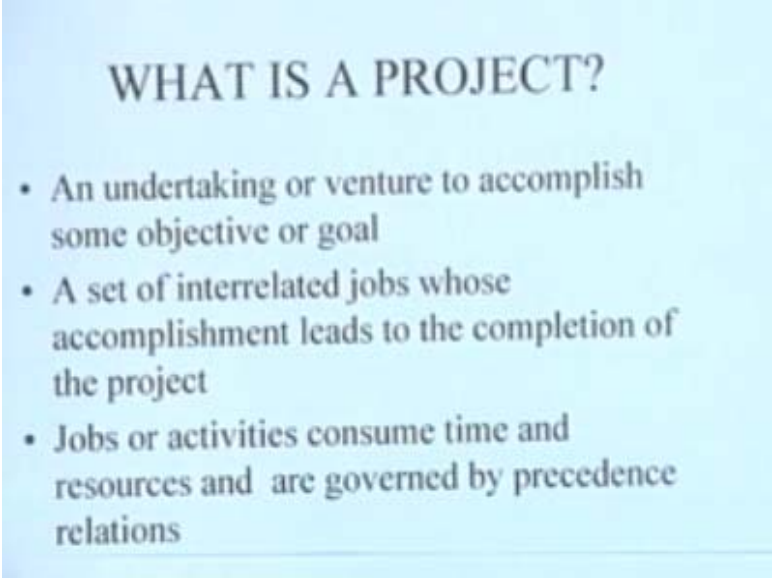
(Refer Slide Time: 03:50)



A very broad definition of a project is that it is an undertaking or a venture to accomplish some goal or objective. You see this is a very general definition and this definition is capable of encompassing a wide variety of projects. You can see that it is the broad objective goal which tries to subsequently define what a project is all about. Let us comment on the structure of a project. A project can be viewed as a set of interrelated jobs whose accomplishments lead to the accomplishment through the completion of the project. Essentially speaking, although here we talked about the basic objective of a project, the composition or the structure of a project includes that it is composed of a variety of jobs and these jobs are interrelated and the completion of these jobs leads to the completion of the project. Since these jobs are the constituents of a project, we must understand what these jobs or activities really are. When you view these jobs or activities

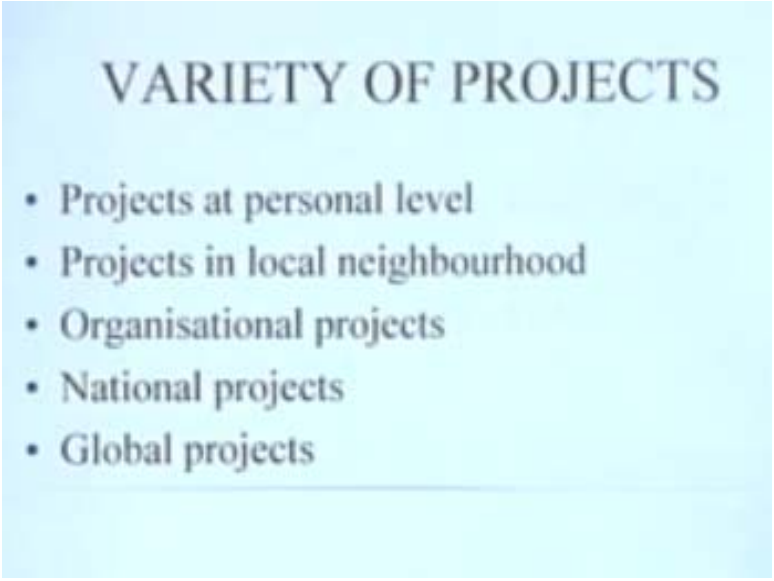
you must remember that these jobs or activities consume time and resources and are governed by precedence relations.

(Refer Slide Time: 03:50)



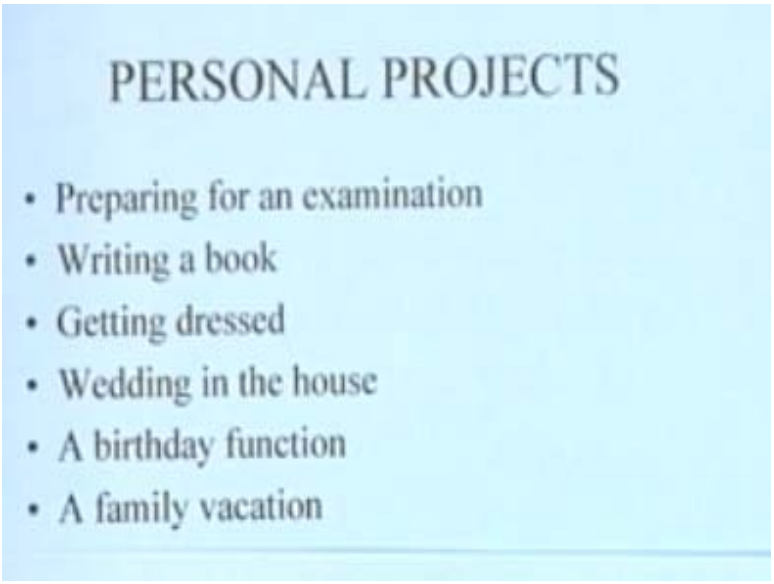
We have tried to look at a project from three different angles. We have tried to identify the objective of a project, the constituents of a project and we have tried to look at the basic composition of these jobs or activities which are very important because they are the ones which consume time and resources and are actually responsible for project completion. Let us now try to look at some examples of projects so that you can get an idea of different kinds of projects and the features. There could be a variety of projects. We shall look at some examples. We can talk of projects in the local neighborhood. We could talk about organizational projects and we could also talk about national projects, - projects done by a particular nation, projects done by a government and we could also talk about projects at a global level.

(Refer Slide Time: 05:10)



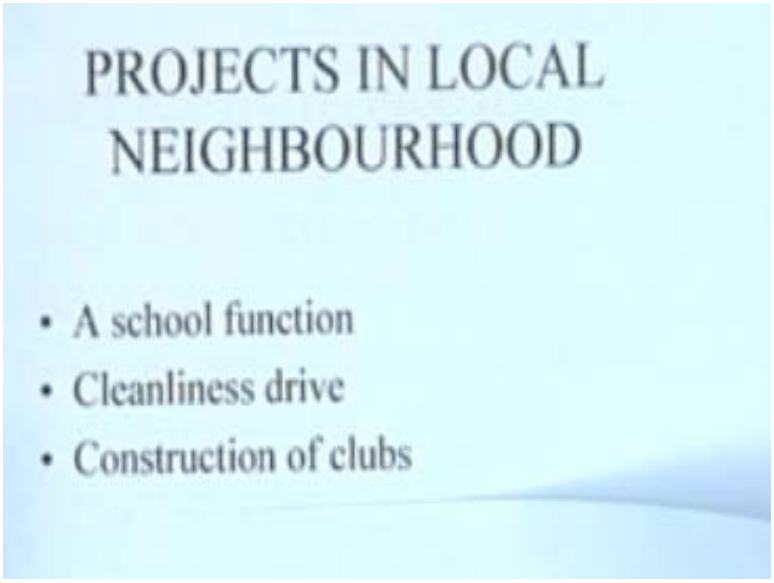
Let us try to look at some examples of these. For instance let us try to identify some personal projects. All of you are students and are therefore very familiar with this notion of preparing for an examination. Preparing for an examination can be considered a very important project in itself. It could be preparation for the JEE or the GRE or GATE or an IAS examination. All that this involves is to undergo a variety of tasks and activities in a systematic fashion and all those activities together are responsible for this successful completion of the examination. Another example at a personal level would be writing a book. This is also an activity which per se would involve a large number of activities and this is therefore an example of a personal project. At a more personal level even getting dressed is a project because there are a number of clothes you have to wear and there is a specific preference among the clothes that you have got to wear. You got to wear your underclothes before you wear your shirts and trousers and other things. Another example could be a wedding in the house. Whenever a wedding takes place in the family a large number of jobs have to be accomplished. Everyone is busy with an activity for the accomplishment of the project. Organizing a birthday function is a small version of a wedding where a large number of activities are involved too. Organizing a family vacation is again an example of a project at a personal level.

(Refer Slide Time: 07:20)



Let us now try to look at projects in the local neighborhood. Organizing a school function is a project which could be taking place in your local neighborhood. Cleanliness drive within your locality where you probably collect donations from all the residence of the colony is again a project. Construction of clubs for playing badminton or going for swimming, within a locality is again instances of projects in the local neighborhood.

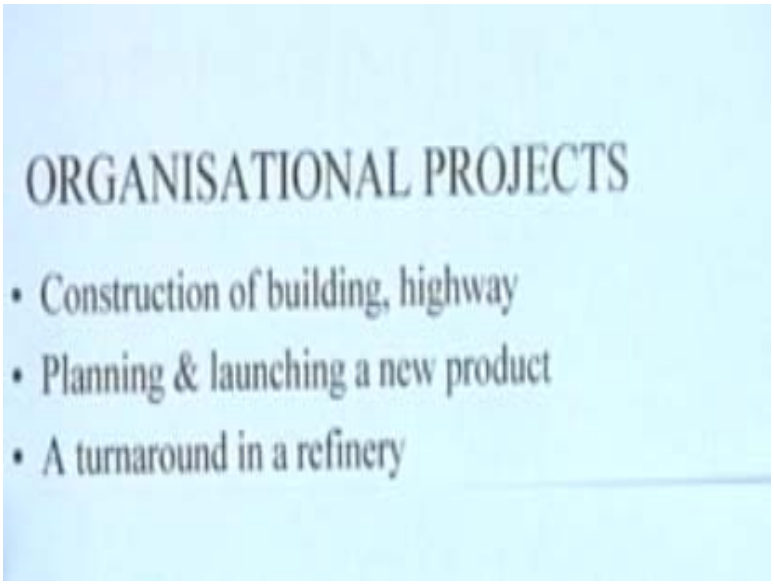
(Refer Slide Time: 07:59)



Let us now look at some organizational projects. Projects can be carried out by the organizations; one example could be construction of a building or a construction of a highway. This is an example of a project that might be undertaken by any organization.

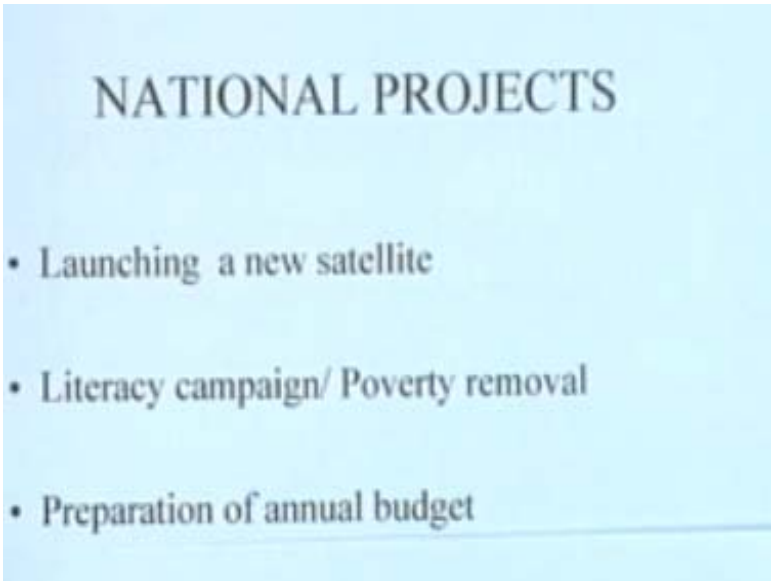
Planning and launching a new product by any organization which would involve research and development, marketing, development, production and subsequently selling the product are all examples of project. A turnaround in a refinery is a major aspect because you would not like the refinery to be closed for a long period of time.

(Refer Slide Time: 08:46)



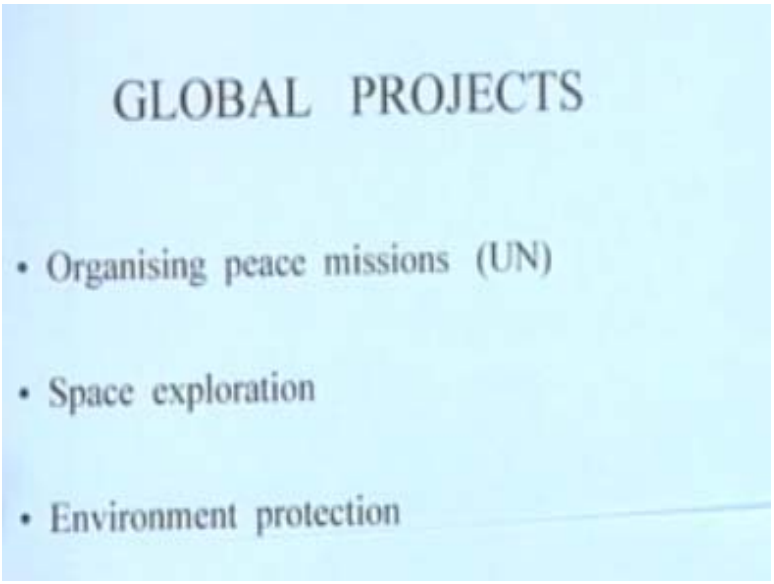
You have to make sure that all the maintenance activities required for the refinery are done as soon as possible. There are precedence restrictions for these and you can think of a turnaround in the refinery as an example of an organization project. Some examples of national projects are launching a new satellite by ISRO, a literacy campaign or a campaign to eradicate poverty by the government. Preparation of the annual budget by the government is again a major project.

(Refer Slide Time: 09:36)



We have to consult with various sections of society. They have to talk to various entrepreneurs. They have to set their own objectives and then do this exercise every year. This again is a major project. A major national project can be a global project that is organizing peace missions, for example, Kofi Amoah is currently trying to undertake this project (between Iraq and United States). You have to organize these kinds of projects and the United Nations is organizing a number of such projects the same time. Space exploration is again an instance of a global project. I mean most space explorations need not necessarily be done by only the United States or only by Russia. There could be collaborative ventures and they are very massive major projects like Randebu in space of certain vehicles and carrying out certain repairs of space vehicles. These are again examples of global projects which are carried out at that level and environment protection is again an example of a situation where either individual countries or countries together in a group could collaborate to make sure that the ozone layer is disturbed.

(Refer Slide Time: 11:07)

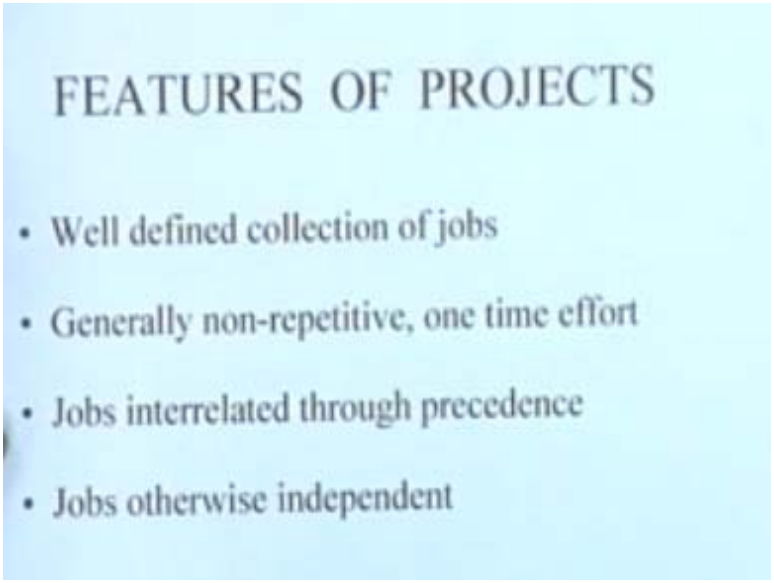


These are all instances of projects which are done at global level. What we have seen is that projects could have a tremendous variety. They could have a small sized project to a large size project. We have seen various types of examples of projects and what we would like to therefore understand is this discipline of project management that we talked about. What are the features of projects that we think are common to all projects and how do we use those features for planning, leading and controlling various kinds of projects.
Now from these examples, let us try to identify some features which are common to all kinds of projects. You can see for instance that all these projects are the examples we talked about. All of them could be considered as a well defined collection of job. Of course, the set of jobs would be different from one project to the other. Each project is nothing but a collection of different jobs to be done.

That is the most interesting thing and it is the management of this portfolio of jobs which really is the most significant thing in a project. Then most projects have this feature where they are generally non repetitive and it is a onetime effort. I think this is important for us to understand because projects are different from routine production. If you talk about mass production systems or batch production systems, their production is going on constantly and you are producing one good after another of a similar kind. The maruthi factory is producing identical maruthi cars all through. But a project is essentially a onetime venture. Setting up a factory for maruthi is a project, once the factory is setup and handed over to the company, it is going into routine production. Remember that projects are generally non-repetitive and it is a onetime effort. Even if projects are similar, if I am constructing a fly over here in Nehru place another fly over at the meroli road crossing. There would be differences in terms of soil testing in terms of the detailed stresses which are built up. The structural design could be different. Though these projects could be similar, no two projects even of a similar kind are generally identical and one has to keep this in mind. The project management is essentially one activity which tries to manage this uniqueness of a project. That means for every project which is

unique, we try to manage it in its own way and the project management gives us a set of tools by which this can be done. These jobs which we are talking about are essentially interrelated through precedence. I think the notion of precedence is very common and generally well understood. For instance you cannot build though the brick work for a house until the foundation has been completed. Doing the foundations becomes a predecessor for doing the subsequent brickwork. Similarly in all, projects are interrelated through precedence and precedence is an important aspect in trying to plan project execution.

(Refer Slide Time: 15:11)

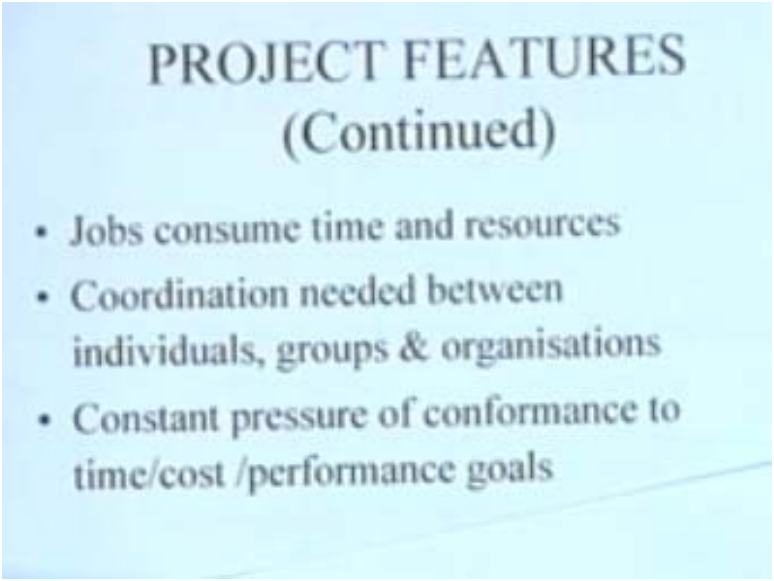


Otherwise jobs are independent. Although the jobs are related by precedence, when we talk about implementing a project, the individual jobs, once the precedence restrictions are met could be done at our will. For instance I could do the digging for the foundations and there is no time lag which is definitely required. There is an independence of job. Besides the underlying features the individual jobs consume both time and resources. This is important to mention and because these jobs are the constituents of the project which have to be managed therefore we have to be careful about the individual time and resources. In fact these jobs or activities are the micro cost centre in a project. If you have to control your costs, your durations, meet the deadlines, then you got to make sure that these individual jobs are done as well as possible. It is like trying to say, if you want to get a very good score in your degree, you want to get a very good CGPI. You must try to do well in all the courses because the courses are the constituents of the degree. Same way the jobs are the constituents of the project.

Another important aspect to be born in mind about these jobs is that there is a tremendous amount of coordination needed between individuals and organizations as far as the project is concerned. This coordination is required because invariably these jobs could be done by different individuals. They could be subcontracted to different agents. For instance in a thermal power plant, the turbines could be made by one particular agency.

The electrical circuitry can be made by another agency. When you talk of managing the project, all these individual jobs have to be completed before the whole project is complete. There is a great need for coordination between the various individuals and agencies handling different kinds of projects and this is a skill which is very important when one is trying to deal with projects. One of the key features in project management is really the fact that there is a constant pressure of conformance to time cost and performance goals. Projects have to be done in time. They have to be done within the cost, as minimum a cost as possible and have to make sure that all the specifications which are required for the completion of the individual activities are adhered to. Basically when one is trying to monitor the execution of a project, one must ensure that time cost and performance are actually monitored and in fact when you are talking about project implementation, we are primarily talking about monitoring and control of time and cost as well as the performance. We are trying to measure the performance of a project with regard to time cost and performance goals.

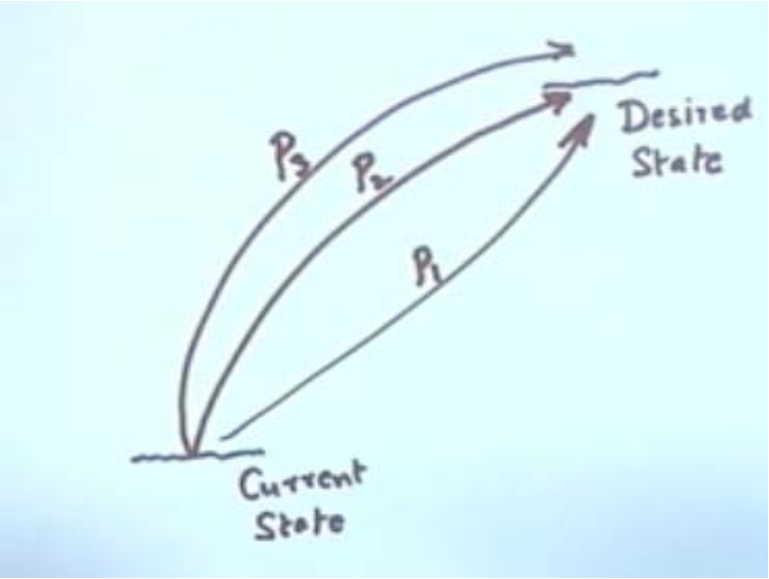
(Refer Slide Time: 19:05)



Whether it is a personal project or an organizational project, you find these components or these features relevant. Let us look at a project in terms of its life cycle. I think you are all aware of the phenomenon of life cycle. A project is something that is done to accomplish a goal, to accomplish an objective. A project is like; I want to go from a current state to desired state. Suppose I am currently here (Refer Slide Time: 19:57), this is my current state. You can see that a project is nothing but a path that takes you from the current state to the desired state and incidentally there could be many such projects possible which would possibly be able to go from the current state to the desired state. To give you an example, suppose I am interested in reducing the vehicular pollution in Delhi, or in any big city, there could be a number of measures that the government or any enforcing agency could think of. There would be a severe check on the emission performance of individual vehicles that is project p_1. There could be another project for instance which might say that we ban the entry of new diesel vehicles and let us say call

that project p_2. A third project might be that, we want to increase the greenery in the city. How do we increase the greenery in the city? Afforestation drive could be the third kind of project. Each of these projects could be identified and they could either be competing with each other or whatever they are but they could all be viewed as nothing but paths to achieve an objective.

(Refer Slide Time: 21:47)



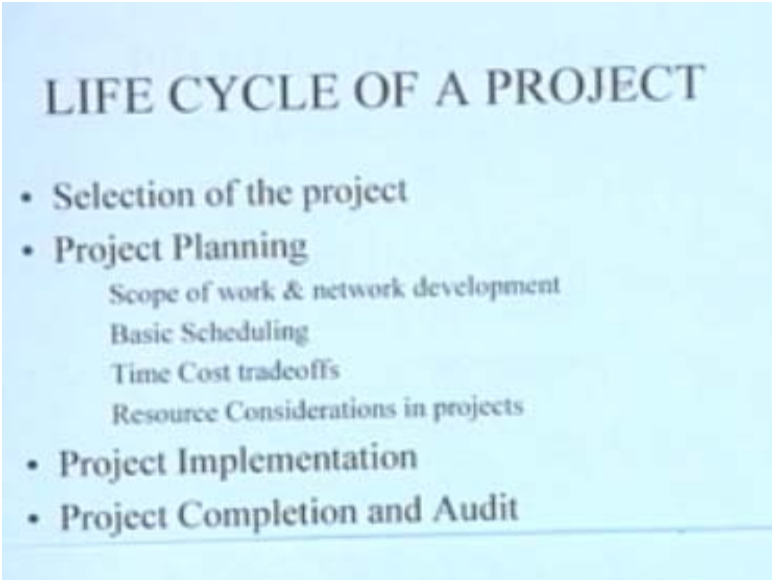
How do you define your projects is again an exercise, which has to be done depending upon the economics, depending upon the resources that are at your disposal and you should be able to do this kind of exercise. Each of these projects is basically a temporary thing. It is like something which will transport you from here to here and once your journey is over the project is over. So that is the life of every project. It is conceived, it is born and subsequently it is executed and once it is executed the machine is accomplished, the project dies. In that sense it is like you can compare it do a journey. It has a lifecycle.
If you look at the life cycle of a typical project, the first and the most important stage in the life of a project is the selection of the project.

We took up some examples just now of different projects which could possibly be conceived and ultimately you take one particular project which you would like to implement. The next stage would be the stage of project planning. Planning a project so that whatever you had targeted to achieve, can be achieved actually and this project planning is actually the major junk of project management. What does this project planning involve? It involves a number of things. For instance the first thing that it involves is determining the scope of work and then developing a network to represent all the activities. We develop the scope of work, what all has to be done, each of the 3 projects which we just talked about for vehicular pollution. You have to define exactly as to what is going to be your target area.
How are you exactly going to do the work? You define the scope of work and once the scope of work is defined, you identify which are the individual jobs and you develop a

network for doing this. The next basic activity in project planning is what they call basic scheduling. We will talk about this in greater detail later. But basic scheduling is intended to determine essentially the time schedule. When should what activity be done? Are they flexible in doing various activities? There are issues of time, cost, tradeoffs i.e., a project can normally be completed within a year. Can we do it in 9 months instead? May be putting in more resources, more money, these kinds of issues are answered in time cost tradeoffs.

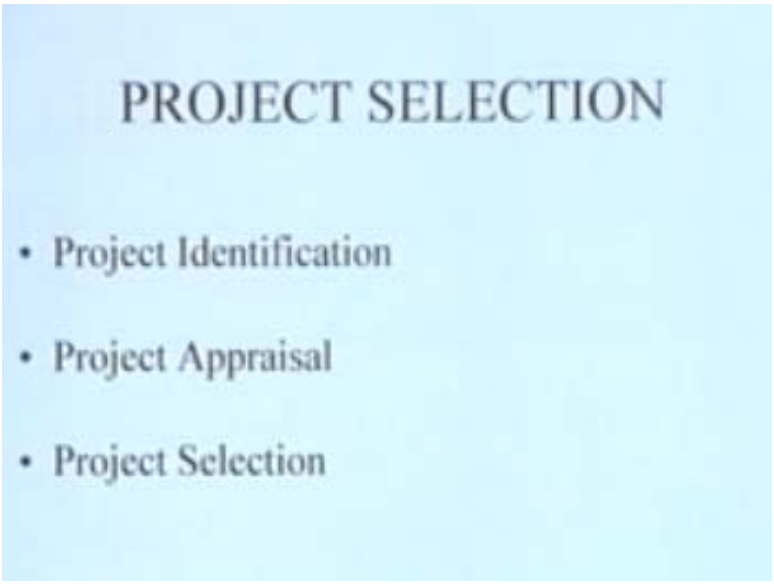
A very vital issue this is, because quite often you might be interested in shortening projects by investing more money if it is worthwhile to do so. We can then talk about the various resource considerations in projects like manpower and availability of machines and various other resources required for doing that project. So, essentially project planning deals with these. Once a plan is made, the next thing is project implementation which is called the 'third phase of the project life cycle' where the project is actually implemented. It involves basically expenditure of resources doing work at site coordinating between various people and agencies and things of this kind and after the project is implemented, the last stage would be project completion and audit.

(Refer Slide Time: 26:04)



Once the project has been completed successfully you would like to document your experiences and you might want to do an audit to find, so that you might even use this information as a data bank for planning future projects. So this constitutes essentially the life cycle of a project. Now let us look at each of these stages in little greater detail because that is exactly the job of project management. During this course of project management, we will be looking at look at for instance project selection which is the first phase. We have already talked about project selection. It essentially involves three things.

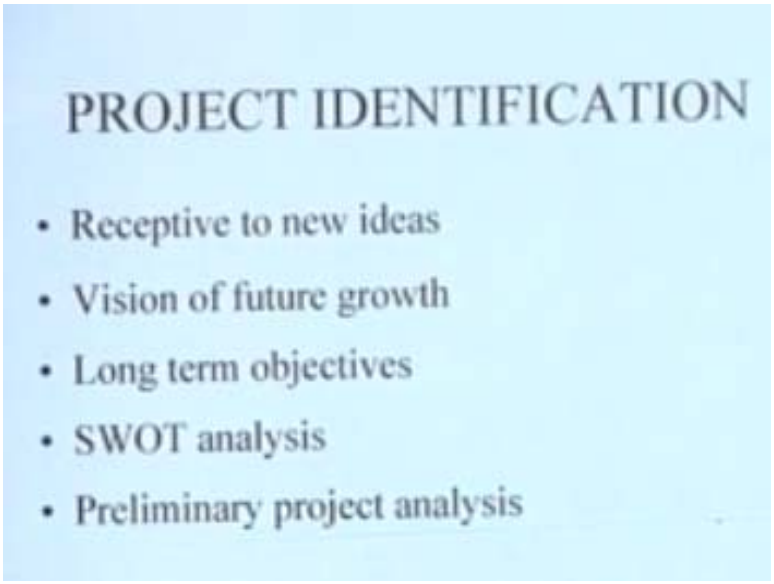
(Refer Slide Time: 26:49)



They are Project identification i.e., identification of new projects, their appraisals and finally the selection of the best project. Project identification really involves that anybody who is interested in identifying a new project should be receptive to new ideas. It is very important because the idea for a new project come from anywhere. It could come from the marketing people, it could come from top management, it could come from the production people or from a consumer who is dealing with your project and is therefore aware of the problems that you are facing. You should have a vision of future growth. That is very important because it is a problem. It is something like dreaming into the future to find out exactly what you are going to do. So vision of future growth is very important. You should be clear about your long term objectives. If you are in the steel industry you would like to stay within the steel industry or would you like to diversify into the electronic sector or would you like to do something else? These kinds of issues become very important.

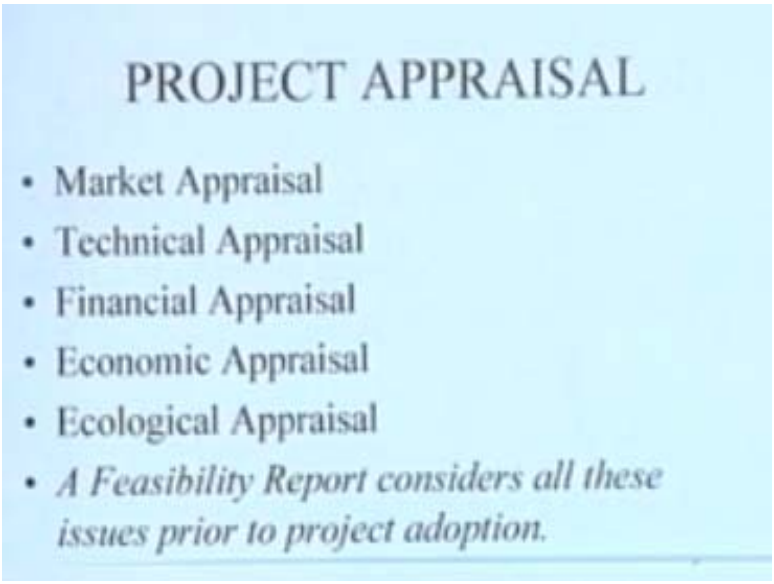
A SWOT analysis, strength, weakness, opportunities and threat analysis can be undertaken to find out my current weaknesses, strengths that I have accumulated over the years, opportunities which the market is offering me now and the threats. A systematic analysis of this will help you identify the right projects. Project identification is really very important and of course on the basis of this you would be able to do some preliminary project analysis. Basically this project analysis will help you in ultimately identifying which out of the ten or twenty odd projects that you have identified you should be pursuing in greater detail.

(Refer Slide Time: 28:36)



After the project identification the next phase is the phase of project appraisal. Project appraisal is generally initiated with a market appraisal. It helps in finding out what the market is, what are the needs of the market and what is the scope for the new product. Market appraisal is followed by a technical appraisal. Technical appraisal is followed by a typically financial appraisal of the project and financial appraisal is followed by any economic appraisal which talks of the broader issues and an ecological appraisal dealing about how this would affect the environment. All these appraisals are required before you make a feasibility report.

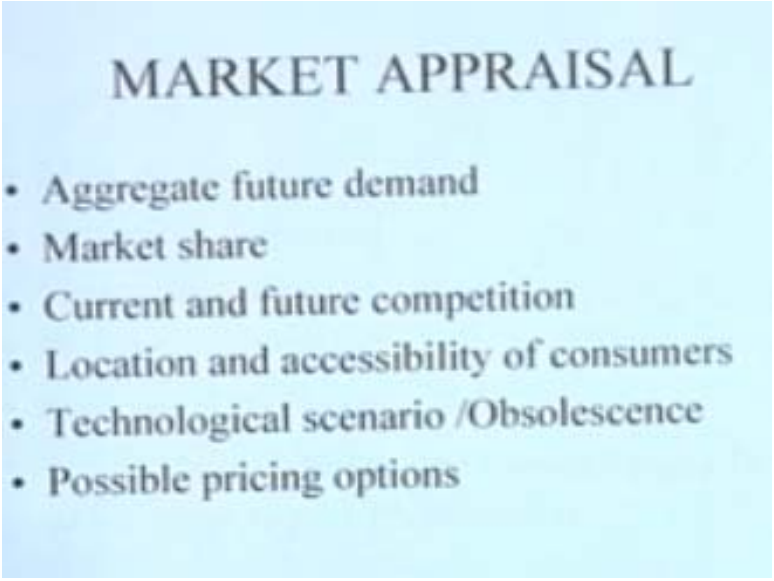
(Refer Slide Time: 29:55)



A feasibility report considers all these issues prior to project adoption. So a project feasibility report which is a very important document actually identifies how the project is, why the project is selected, what is the profitability and things of this nature is actually a document which is talking about the various kinds of project appraisals so that a proper decision on project selection could be made. Let us look at some of the issues involved in various appraisals. In a market appraisal, what is the aggregate future demand of the product? The total demand for tyre, (if you are talking about entering the tyre market), what is likely to be your market share? This is again an estimate which would have to be made and what is the state of the current and the future competition in the area? We have to access these things.

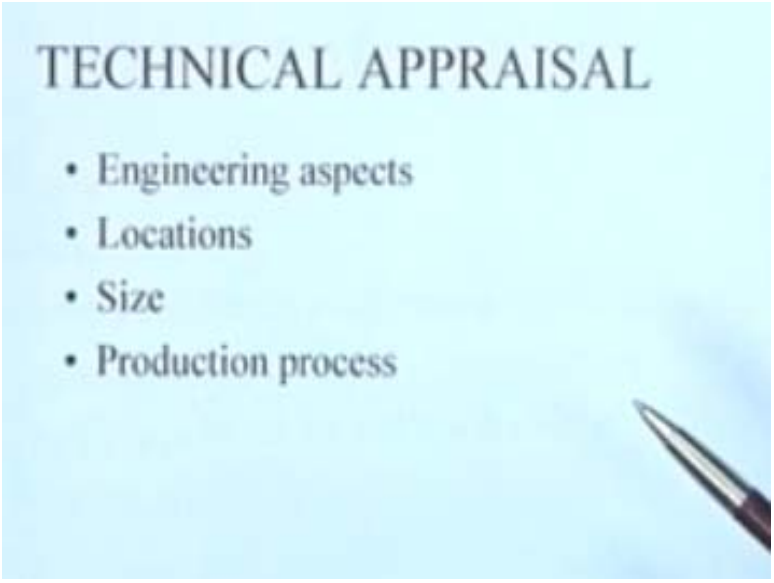
What is the location and accessibility of consumers? You have a consumer who is located at one particular location or you have a consumer who is spread out geographically over a whole region because an understanding of this is going to be very important because consumers have to be targeted, located and accessed for not only their opinion but even ultimately the product has to go to them. What is the current technological scenario and how long does obsolescence last? I mean when does obsolescence take place? For instance in the electronic sector, obsolescence rates are very high. You have newer models of the product in electronics or computers coming up in less than 3 months and 6 months whereas if you talk about capital machinery and so on, the rate of obsolescence is relatively smaller. These issues are important when you are trying to talk about product. What are the possible pricing options? These are some of the major issues that one is likely to handle, like to talk about when one is talking about a market appraisal.

(Refer Slide Time: 32:18)



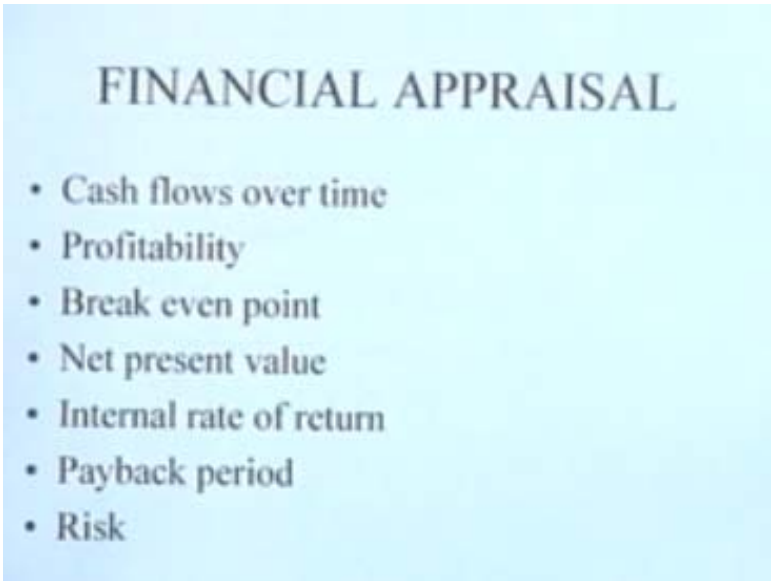
Similarly a technical appraisal will deal about aspects concerning the engineering, locations, size and the production process.

(Refer Slide Time: 26:04)



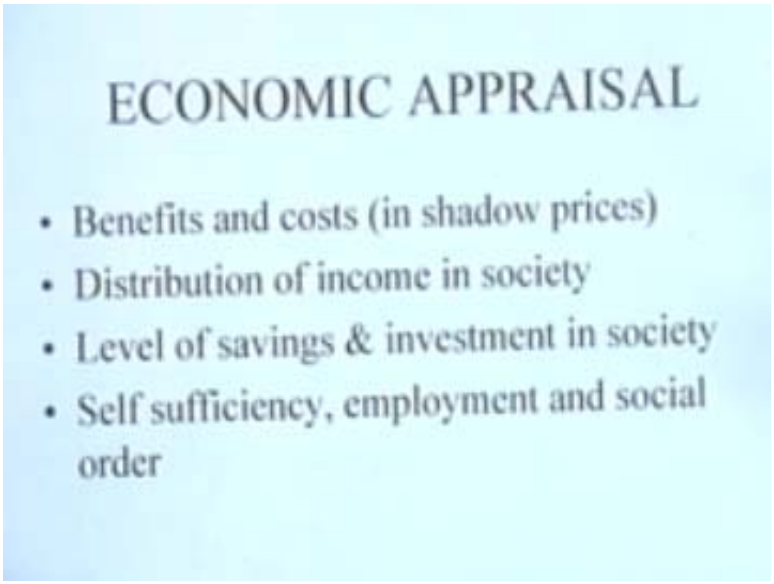
A financial appraisal would deal about cash flows over time, profitability of the product breakeven point, net present value, the internal rate of return, the payback period and the risk. All these together would give us an indication of the financial health of the project.

(Refer Slide Time: 32:56)



Now if you compare this with the economic appraisal of a project, an economic appraisal incidentally would focus about issues that are of greater concern to the society at large, the socio-economic benefits. We would talk about the benefits and costs not necessarily in monetary terms but in terms of their shadow prices and by shadow prices really I mean for instance, if you have a hydroelectric project and you are utilizing land, it will probably have to be acquired from society. Medha Patkar for instance is making a huge issue of this particular Narmada dam and the whole issue is really that if a proper socioeconomic analysis is carried out, you would probably be able to find that what would be the true benefits per hectare of land which is actually taken up from the villagers and you should take up this project only when the benefits warrant that this particular investment in resources is made is in terms of shadow prices. So what is the effect on distribution of income and society? What are the level of savings and investments in society? These kinds of issues are important.

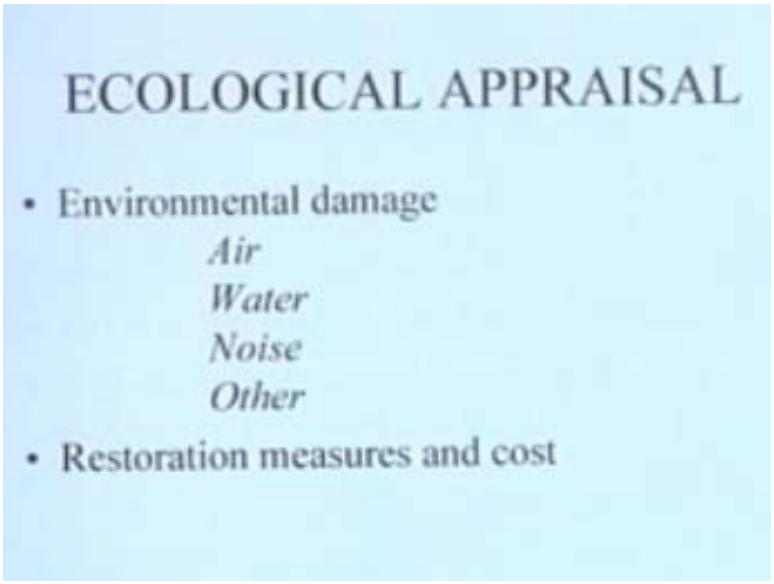
(Refer Slide Time: 34:30)



Self sufficiency, employment and social order are also important. These are also important. If I setup a factory for manufacturing tyres, I am actually generating avenues for employment for people in that area. These are the kinds of issues which come up when you are talking about a broad economic appraisal of any project. When for instance national project or a global project is being considered, these issues would become very relevant. Issues pertaining to the environment are assuming greater and greater importance so an ecological appraisal of projects is also very important. We should assess as to what is the extent of environmental damage that is likely to come about by setting up this particular project. What is this damage to the quality of air to the quality of water? Now is it going to contribute to noise levels and to other measures as far as the environment is concerned?

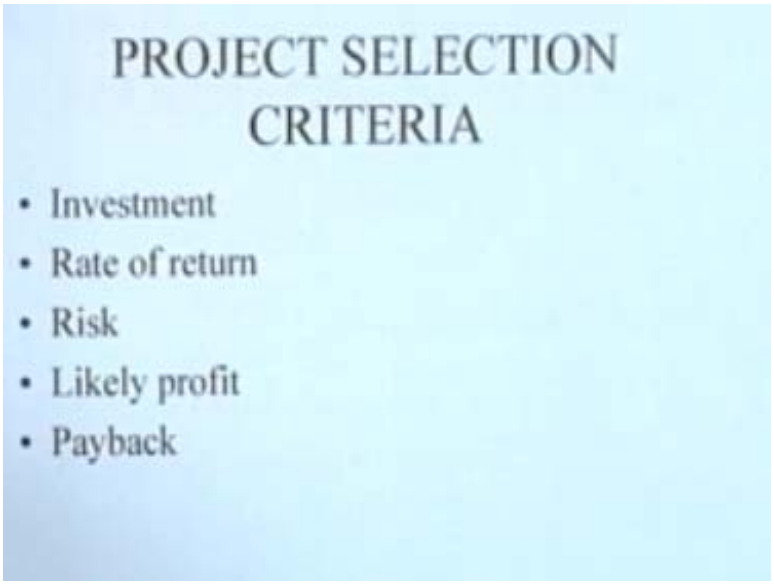
So there could be legislation on a number of these factors that this is the level of air permitted or the level of carbon monoxide permitted and various other pollutants in the air permitted. But you have to be careful. The essence really is that you got to be concerned and be careful about any environmental damage and you have to be thinking about taking restoration measures and the kind of costs that are involved in restoration. If you are going to dirty the air or you are going to dirty the adjoining rivers, you probably have to make sure that you do a filtration setup, a filtration plant to clean up the remaining thing. So there is a cost of restoration of the quality of environmental life. There are also some issues pertaining to an appraisal.

(Refer Slide Time: 36:38)



We have talked broadly about some of these major issues involved in the appraisal of a project which involves various functions. Once a project is appraised or projects are appraised, how do we select a project? We finally come to this stage of project selection, which is in fact the first stage where the birth of the project has taken place. Some of the criteria which are important in project selection are the investment, the rate of return, risk, likely profit payback and issues like similarity to existing business.

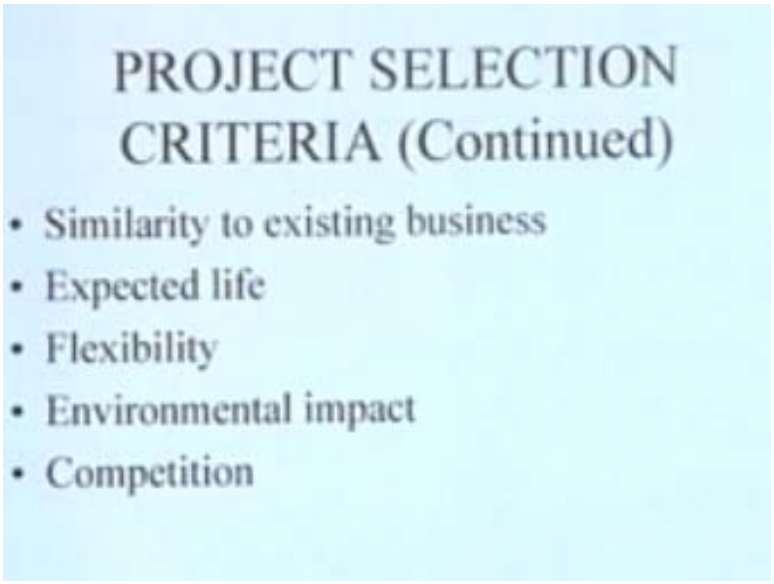
(Refer Slide Time: 37:20)



This is important because you may want to utilize the experience that you have gained in particular profession in setting up or in propagating your new project. What is the

expected life of this project? What kinds of flexibilities does it afford to you? What is the environmental impact? You have talked about these issues.

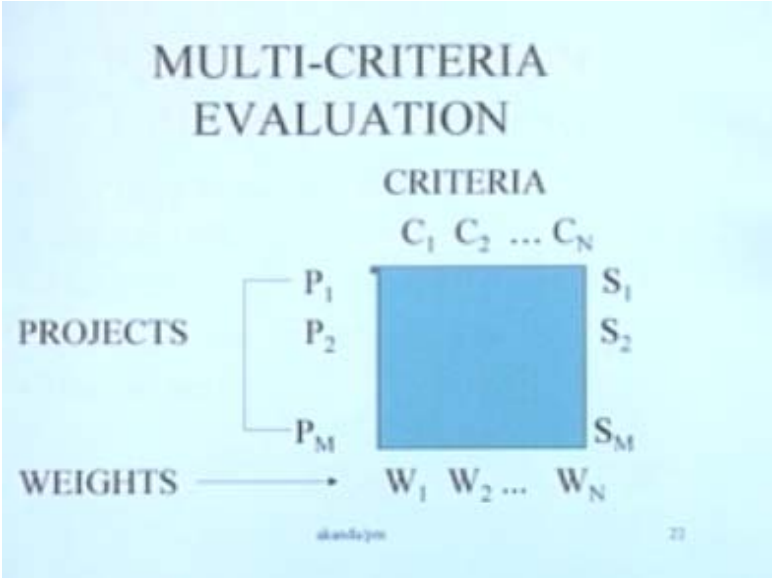
(Refer Slide Time: 38:00)



What is the status of competition? Conceptually, when we talk about these issues there are a multiple criteria. Actually speaking, the problem is one of multi criteria evaluation, so conceptually we can say that there are a number of projects. Let us say P_1, P_2 and so on up to P_M. There are M projects which we have identified and we want to weigh them on a variety of criteria which we just discussed. C_1, C_2 and so on up to C_N and what you could possibly be doing is you could probably be assigning greater weights to these criteria. We have a weights W_1 W_2 and so on up to W_N to these individual criteria and what we would like to do is that each of these projects would be evaluated on each of these criteria and given some score on each of these criteria and then depending upon the weightages which are there for these individual criteria, we could work out a consolidated score for each of the projects. S_1 is a score for the project. S_2 is a score for the second project and S_M is a score for the Mth project.

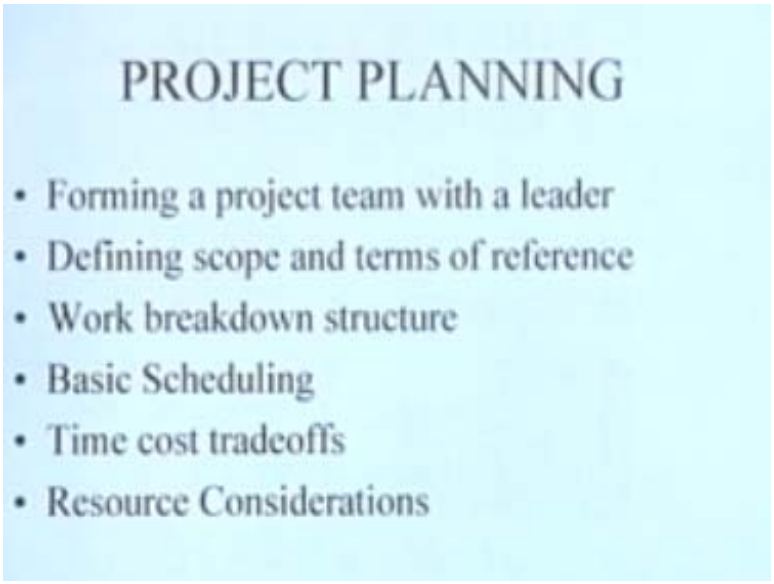
A variety of means are available for doing this but remember that this is very much like the process of assigning marks to students in a university. For instance you are the candidate and each one of you undergoes various courses. These courses have certain weightages. Your performance in each of these courses is ultimately combined to give an overall score and therefore we can rank the individual students in the university. We are essentially trying to use similar types of concepts in trying to rank the various projects. So multi criteria evaluation of projects can be done in this particular way, using a decision matrix approach.

(Refer Slide Time: 32:56)



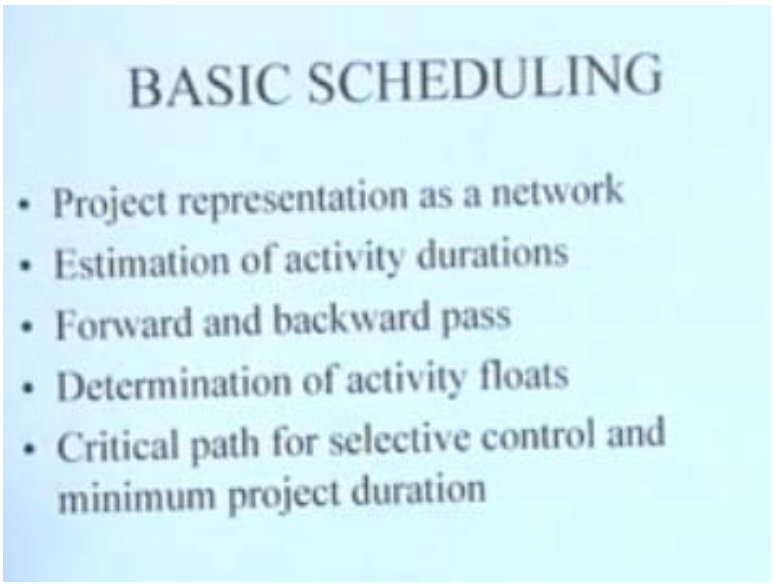
There are various other techniques like topses like simple additive weighting or hierarchical additive weighting which can be utilized for carrying out this kind of analysis. Let us now come to the second phase of the project which is project planning. Project planning involves forming a project team with a leader, defining the scope and terms of reference of the work, the work breakdown structure, developing the work breakdown structure. Doing basic scheduling, time cost tradeoffs and subsequently resource considerations.

(Refer Slide Time: 40:56)



This is the gamete of project planning. Let us look at these activities in greater detail. Basic scheduling for instance talks about project representation as a network, estimation of activity durations, doing a forward and backward pass and ultimately determining the critical path and the floats and this critical path is a v curve which is used for selective control and it identifies the minimum possible project duration.

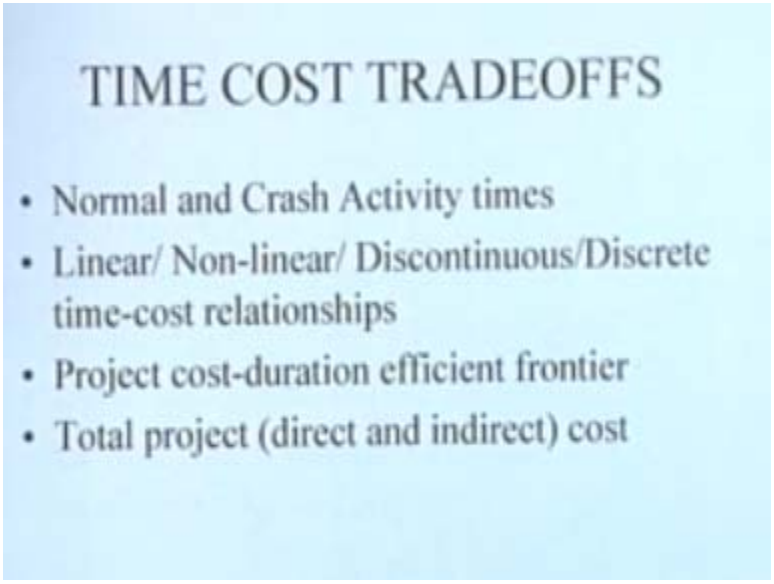
(Refer Slide Time: 41:29)



In that sense this provides very useful guidelines to management, how the project is to be done. In time costs tradeoff for instance, our concern is that we are trying to identify the

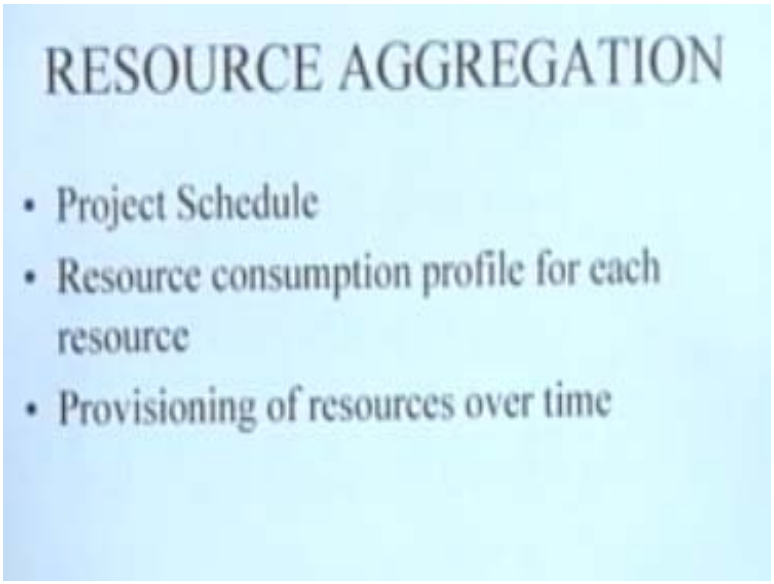
flexibility in activity durations. We talk about normal and crash activity durations. There could be various kinds of relationships, linear, non-linear, discontinuous, discrete time-cost relationships and the objective is to discover ultimately the project-cost duration efficient frontier and from here to identify the total project cost consisting of both the direct and indirect cost.

(Refer Slide Time: 42:08)



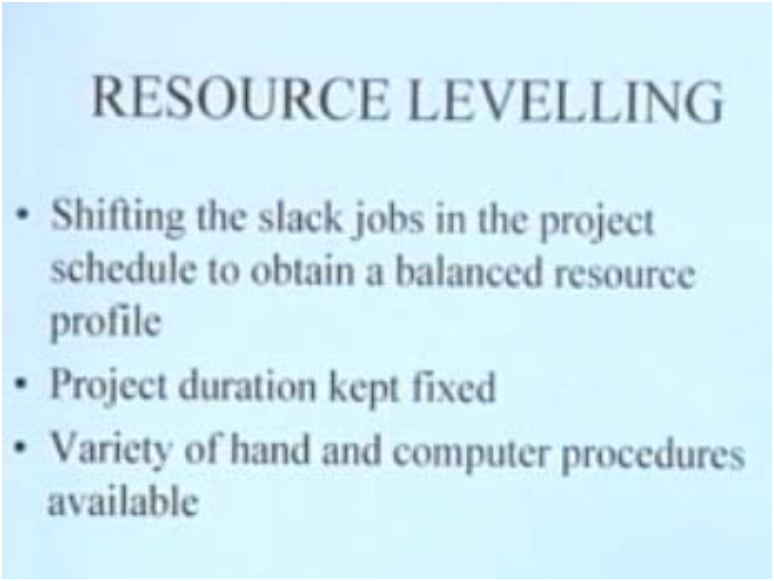
There are a number of procedures available for doing this. I would like to just talk about some aspects of resources. We can talk about resource aggregation which talks about determining the project schedule, resource consumption profile for each resource and provisioning of resources over time.

(Refer Slide Time: 42:35)



Basically aggregating all the resources, so that you know what the total resource requirement is and then sources of leveling these resources. By shifting the jobs which are slacked to obtain a balanced resource profile, keeping the project duration fixed and there are a variety of hand and computer procedures available which we will be discussing as we go along in this particular course.

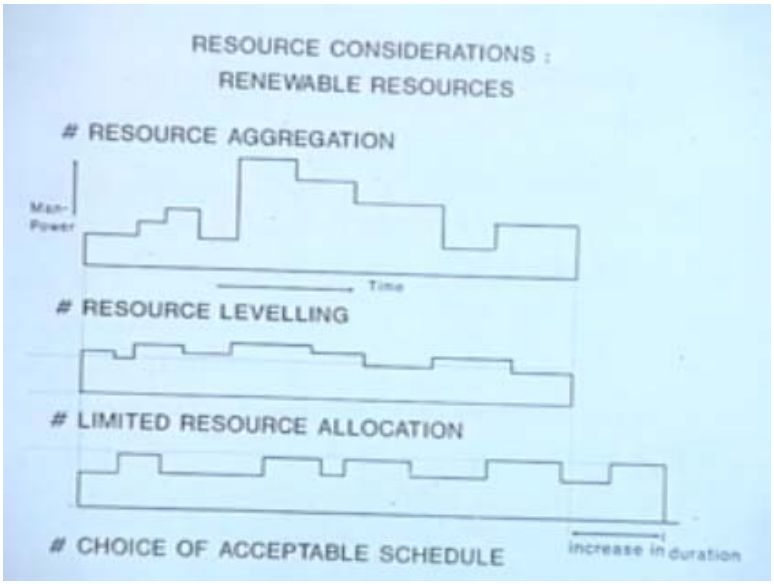
(Refer Slide Time: 43:00)



Limited resource allocation is another thing which is extremely important, which talks about the minimum duration schedule satisfying the limited availability of resources. This might involve in delaying some critical jobs to keep the resource profile within the

available limits and there is again a number of hand and computer procedures are available for doing this.

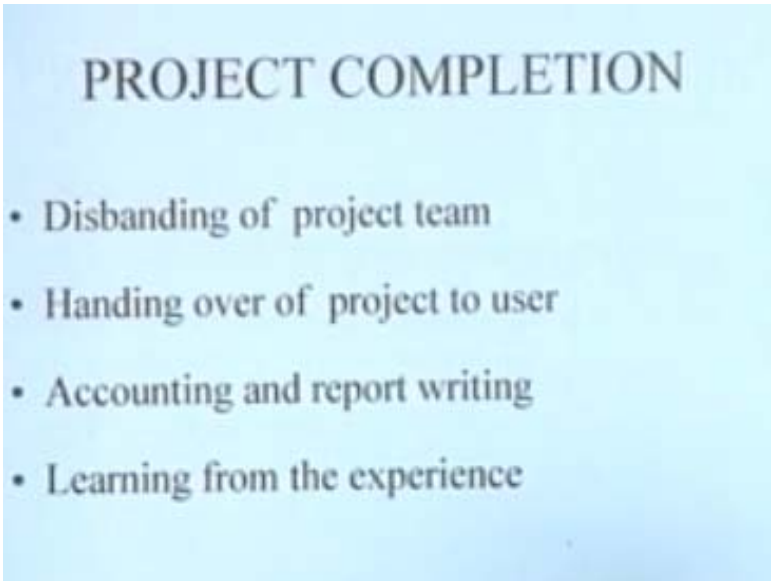
(Refer Slide Time: 43:53)



Here is a pictorial representation of the process. In resource aggregation we are simply interested in finding out what is going to be the manner in which resources are utilized over time. In resource leveling, we are not increasing the project duration but we are trying to shift some jobs so that this becomes more leveled. We might have a certain limited availability of resources and this might be violating that limited availability. So we might have to delay some of the jobs so that all this resource peaks come within the limited availability. This is what we mean by limited resource allocation where the project duration tends to increase a little beyond the critical path duration but the objective is to keep this increased to the minimum.

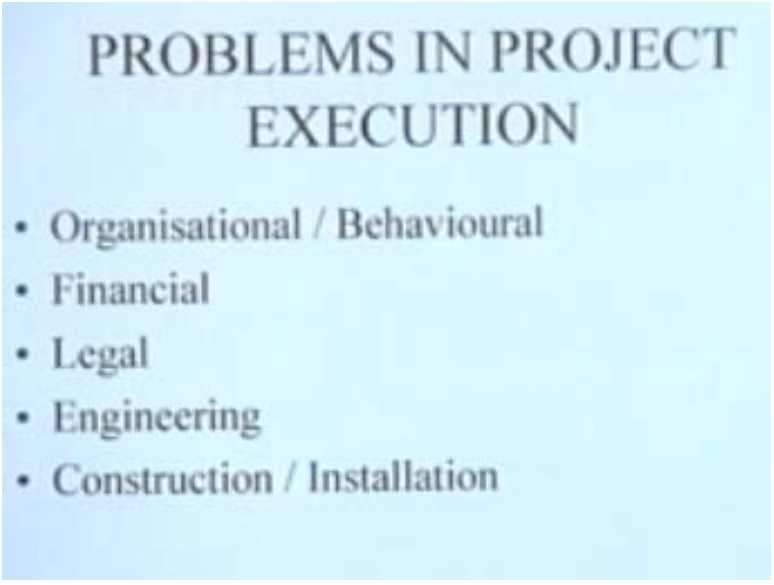
Now when one talks about project implementation, which is the next major phase, the issues involved here are organizing your team and work, clear cost time performance goals, project monitoring with regard to cost value of work and time and project control. These are some of the major issues when one talks about project implementation. In project completion, issues are disbanding of the project team. The job is done. So, people go to their respective places or respective units, handing over the project to the user, accounting and report writing and learning from the experience.

(Refer Slide Time: 45:12)



These are some of the issues which are important when you are talking about project completion. So the important thing to bear in mind here is that if any project which is completed can face a number of problems. Typically these problems can be at the organizational level, the behavioral level, financial problems, legal problems, and engineering problems.

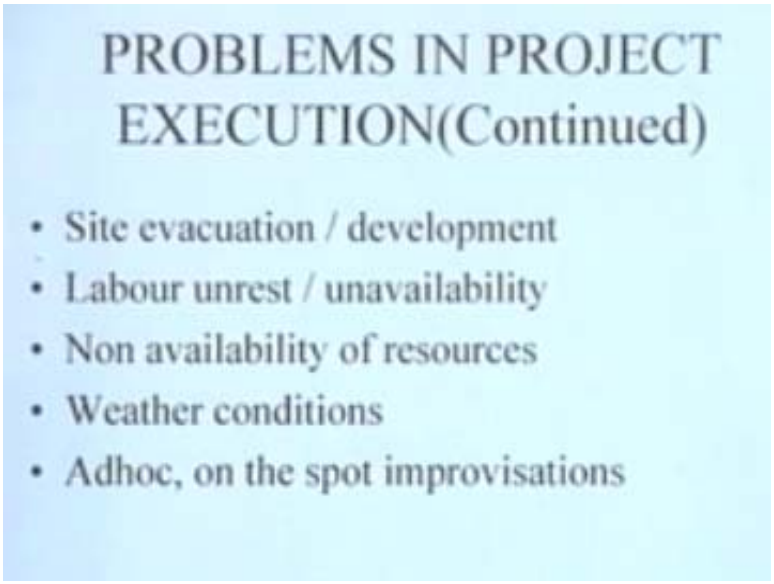
(Refer Slide Time: 45:35)



This is followed by problems at site of construction or installation of a particular machine, there could be problems of site evacuation or development of the site, labor

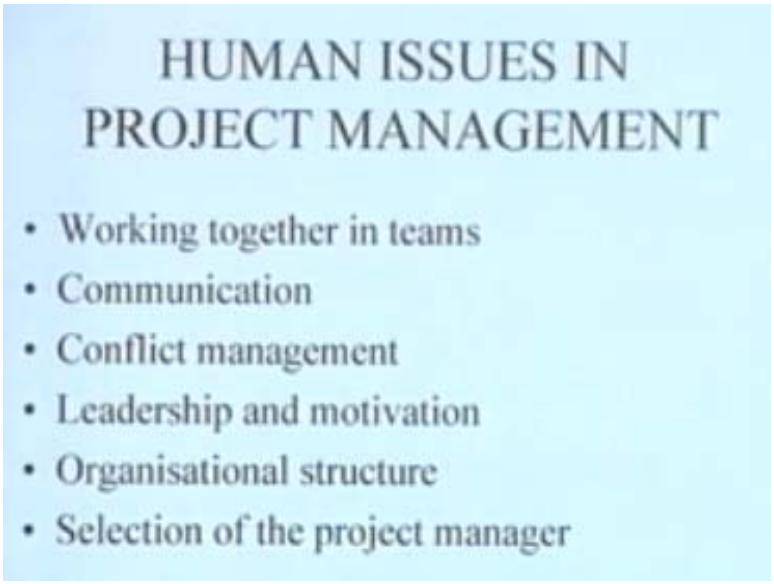
unrest or the unavailability of labor, non availability of resources, weather conditions or adhoc on the spot improvisations.

(Refer Slide Time: 45:58)



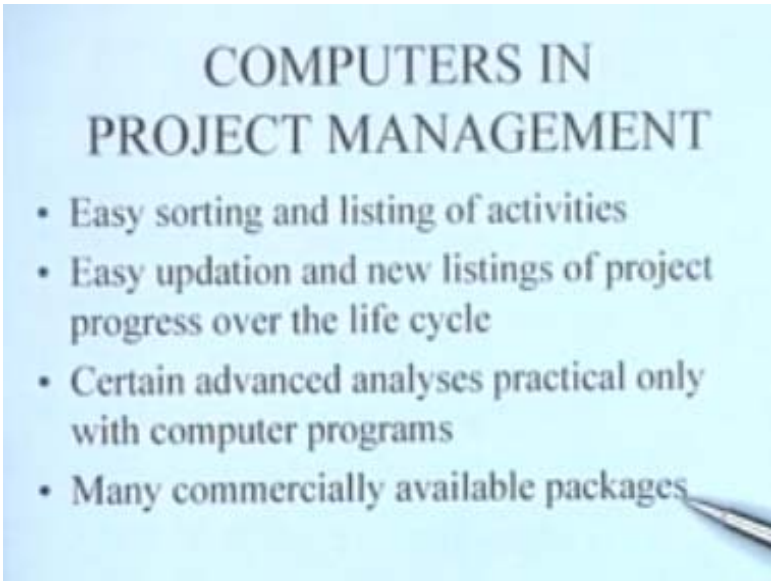
I think this is a particular feature of project that you do not know what exactly is in store for you. You have to go ahead with these things kinds of improvisations. Besides these typical problems, human issues in project management are of great concern. What is actually required is working together in teams, proper communication, conflict management, leadership and motivation. You should have a leader who is able to motivate you, the proper organizational structure. It is said that matrix organizations are the best organizations for projects. We will see what is so special about matrix organizations and selection of the project manager.

(Refer Slide Time: 46:40)



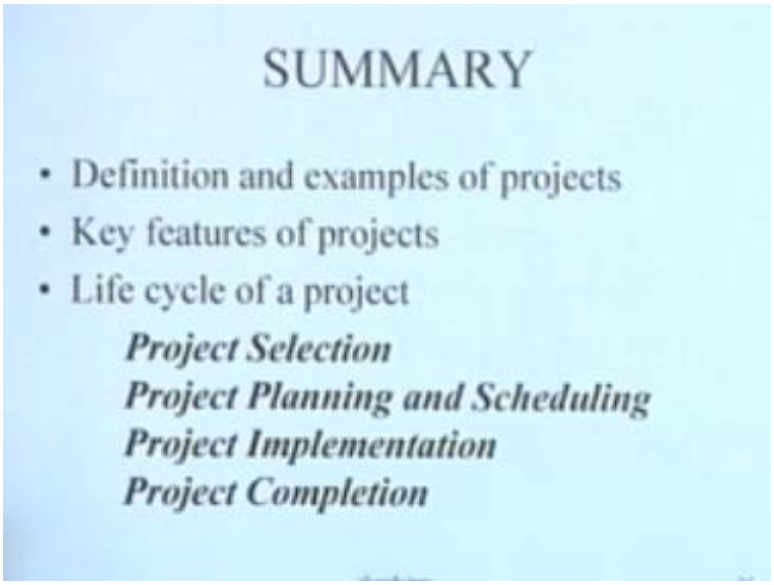
These are important issues. Finally I just like to talk before I close, about issues in computers in project management. Computers have come up in a big way. So we should know exactly their primary use in project management. Computers are used primarily for easy sorting and listing of activities. This is a very great skill because if you have let us say 5000 activities or jobs, you can prepare lists, either department wise or specialty wise or according to the times at which the activities are to be undertaken. This is a great skill. So sorting and listing of activities is a great inconvenience. The next would be easy updation and new listings of project progress over the life cycle. You do not have to draw the project network only once. As the project progresses, various activities are completed and you have got to do this again and again. This is very convenient and certain advanced analyses like time cost tradeoffs and source considerations like source leveling and resource allocation are practical only with computer programs and there are many commercially available packages.

(Refer Slide Time: 48:00)



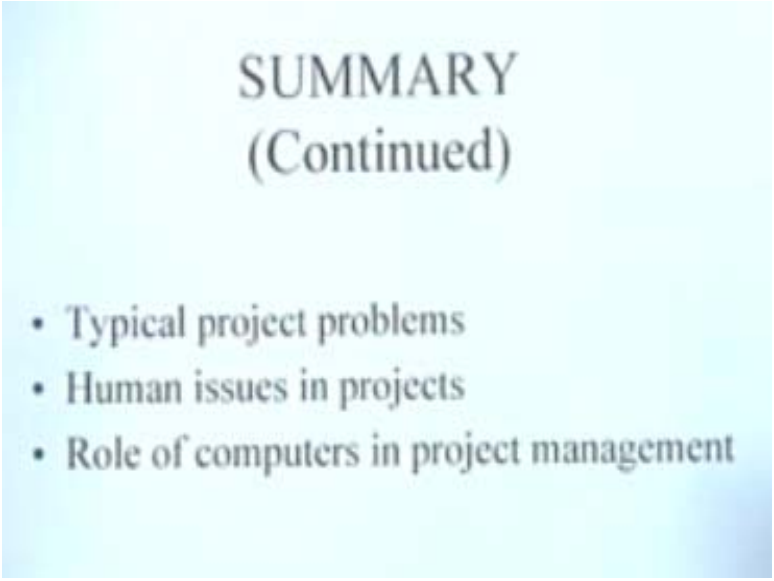
MS project is one example. Of course there are other examples like hardwood project manager, primavera and so on which are commercially available for doing this. So computers are in fact a blessing to project management because they help in effective implementation of the project. So let us try to see what we have tried to do in this particular project. Let us try to summarize what we have learnt in this lecture. The first introductory is an overview, we have seen definition of a project and we have seen examples of different kinds of projects. You understand the diversity of projects, and you know what their common features are. We have tried to identify key features of projects. Some of these key features are important because they define major elements on which project management is based. We have talked about the life cycle of a project.

(Refer Slide Time: 49:10)



The various phases in the life cycles starting from project selection, project planning, project scheduling, project implementation and project completion and the kinds of problem which crops up at these individual stages. Finally we have tried to look at some typical project problems, problems associated with projects. We have seen that the problems could be very varied in their content starting from human to technical to behavioral problems. We have identified some of the human issues in project management, like the importance of working in team.

(Refer Slide Time: 49:40)



Finally we have seen how computers help in project management, so I hope this helped you. If you have any questions, you are welcome to ask.

Thank You!