Software Project Management
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Lecture - 45
Project Monitoring and Control (Contd.)

Good afternoon, last class we have discussed about cost monitoring and monitoring earned value. Now, let us see how we can prioritize the, we can prioritize the monitoring activities.

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So, prioritizing the monitoring first will see; then will see a if a project is getting late how to get the project back to the planned tracked; to the original target.

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So, far we have assumed that all the aspects of a project; it will receive equal treatment in terms of degree of monitoring applied. That means, during monitoring we are treating all the activities the similar footing. We have assumed that all the what activities during monitoring they will receive equal treatment, but actually in practice that does not happen some activities they require a more priority, some activities they require less priority.

Now, let us see how we can assign priorities to the different activities. For example, which are critical path activities they should given maximum priority highest priority, but which are activating what which having less what float less then we can give priority to the activities with no free float. Then activities is less than a specific fold float and a we can also give some priority to high risk activities and we can also consider activities which are using critical resources.

So, in that way we will assign some priorities depending or to the different activities depending upon certain parameters.

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We will first see about critical path activities. We know that if there is any delay in an activity lying on the critical path then that will; obviously, cause a delay in the completion of the whole project. So, critical path activities they have to be given very high priority during for close monitoring; otherwise the project the end a completion date of the project will be delayed and we cannot meet the target line.

So, critical path activities; that means, activities lying on the critical path must be given very high priority.

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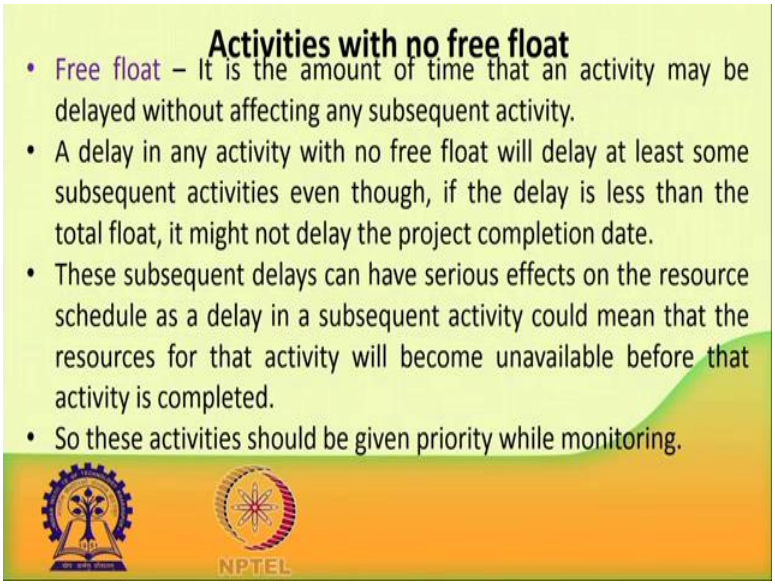

Similarly, activities which are having no float; activities with no free float they also should be given some priority during monitoring; we have already discussed what is free float in some of the earlier classes.

Free float it represents the amount of time that an activity may be delayed without affecting any subsequent activity. So, we can there is some free time available with some activities such that if a some urgency occurs; that activity can be a little bit delayed. So, that that free time can be consumed.

So, we define free float as it is a slack time or a free time. So, it is amount of that free time that an activity it can be delayed, so that the other subsequent activities will not be affected; they are target dates their completion dates will not be affected. Now, you see a delay in an activity which has no free float; it will delay at least some subsequent activity later on.

If the delay is less than the total float value, then what will happen? It might not delay; if it is less than the total float, then it will it might not delay the project completion date. But if delay is more than the total float then it will affect the other activity, it will delay the project completion date of the it will delay the project completion date for the whole project.

Now these subsequent delays can have serious effects; so in such a way if one activity is affecting another activity another the next activity. If we are changing this what their execution dates; the subsequent activities they are delayed, then in turn the end date of the whole project it will be affected and it will be delayed.

So, that is why this subsequent delays it can have serious effects on the resource schedule also because it delay in subsequent activity it means that the resource for that activity; it is now become now unavailable for that activity completed. And other activities they will be now waiting for the resources held up by that activity which do not have any free float, but that is being delayed. So, these activities should also be given priority during the monitoring process.

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Next is activities with less than a specified float, say you are saying that a float is one week. And if the activity is delayed by more than 1 week; what will happen? Obviously, the subsequent activities that deadlines will be missed. So, that is why we should give also some priority to the activities with the less than a specified float maybe 1 week or what 2 weeks or like that. So, if any activity has very little float maybe 1 week or less than that; then it might use up this float before the regular activity monitoring brings the problem to the project managers attention.

And hence; what will happen? This activity which is have been less than a specified float; if the whole free time is consumed due to delay then what will happen? It will become an actor what critical activity and this will create problem. So, that is why it is a common practice to monitor closely those activities which are less than or which have less than a specified float maybe a 1 week of a free float or like that.

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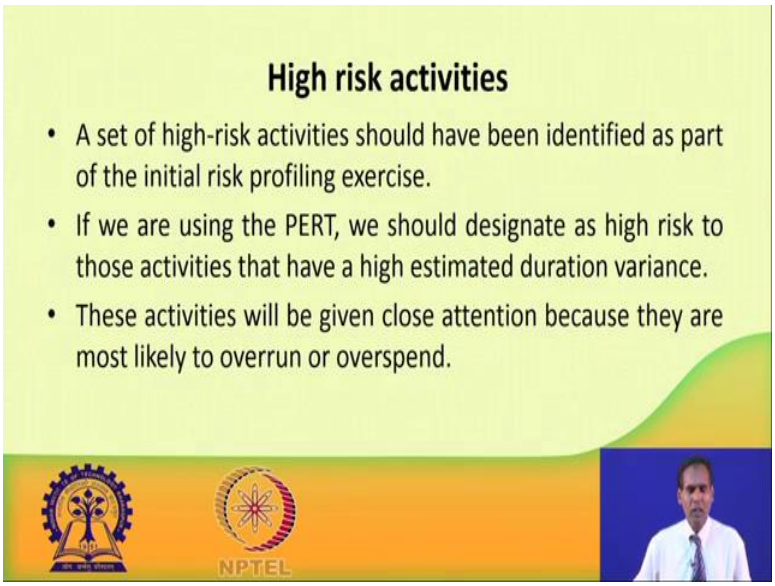

Similarly, high risk activities also given some priority during monitoring; so, you know in several cases that a set of high risk activities should have been identified. So, the activities user of cost which are of risky if any what dead line is missed or so then a severe consequence will occur. So, these; so, first we have to identify the set of high risk activities and as part of the initial risk profiling exercise, I hope you have already read or will read on this risk handling methodologies.

So, the so first we have to identify a set of high risk activities and then and you see you have already known about PERT. So, if you are using PERT; then what will happen? You can easily identify which are of high risk activities. We should designate high risk to those activities that have a high estimated duration variance.

So, the activities which are having high; what variance they will be treated as what most risky and you should give some priority to what while monitoring them. So, these activities will be given very close attention; they should be very closely monitored because they are most likely to overrun the schedule or they might what most likely to overspend the budget might be more. So, you should give a sufficient attention; you should give more priority in handling these activities said while the monitoring these activities.

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Then activities using critical resources; see there are some resources which are very critical and those critical resources are very less. So, the activities which are using these critical resources, they have to be also monitored very carefully. So, activities can be also critical because they are very expensive just you can consider the example of case of specialized contract programmers. And those contract programmers are very much expensive and they are very much expensive.

So, the activities those are using those specialized contract programmers; they are very much critical. These contract programmers are hired for only few days; if within those few days say 1 month, you cannot complete the job then they cannot stay beyond that 1 month or if they will stay then again they will charge a very high amount.

So, that is why activities they can be also critical because they are expensive. So, staff or other resources might be available only for a limited period. As I have already told you the a specialized contract programmers they may be available for an activity maybe for 1 month. If you do not finish your work within 1 month; then they will not stay or even if they will stay they will what charge very high amount.

So, that is why; so you have to give what special priority to them while you are monitoring you should closely monitor their progress. So, staff or other resources might be available only for a limited period; especially if they are very a controlled outside if they are controlled outside the project team.

Now in any event an activity that demands a critical resource requires a high level of monitoring. So, if a project if there are some activities that those demand a critical resource; they should be monitored with a high priority.

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Now, we will see the another aspect for this project monitoring that is getting the project back to the target. Suppose you have made a plan, but the project is not moving according to schedule it is lagging behind. So, how what steps we can take to bring the project back to the original target? So, almost any project it will be subject to delays and unexpected events that is not under our control. So, one of the tasks to the project manager; so here we will see that one of the task of the project manager is to recognize when this is happening; that means, you when this delay is occurring, when these unexpected events are occurring ok.

So, that is one of the important task of the project manager to identify when these unexpected events or these delays they are happening. So, and with the minimum delay and disruption to the project team he should attempt to mitigate the effects of the problem. So, he should try somehow to mitigate to handle these delays on unexpected events. In most cases, the project manager or at least initially what we can say; he should try to ensure that this scheduled project end date remains unaffected; whatever happened maybe in between he should tried that the project end date, it should not be affected; it should remain non effected. There should not be any change in this.

So, this he should take utmost care to the see that the project end date it remains unchanged. So, this can be done by several ways; we will see some of the ways how we can whatever problem might happen in between how we can try to see that the project end date still it is met it is unaffected.

This can be done by shortening the remaining activities say what activities so far we have already executed and what are left. So, time is less; so what we can do? We can shorten some of the remaining activities, we can reduce their execution time or we can shorten the overall duration of the remaining project. So, what is the total project say 1 year and a by 6 months if the 50 percent of the activities are not over; we have to reduce the overall duration of the remaining project. So, these are different ways by following which we can get the project back to the original schedule or the original target.

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So, now but this is not always the most appropriate response to disrupt your plan. Always it is not actually suitable or appropriate to disruptive to a plan. So, there is a little point also in spending considerable sums in overtime payments. It is also not what its very little required that always you will a higher manpower or you will employ your existing employee in overtime basis to speed up a project this also may not be what viable every time. And particularly if the customer is not overly concerned with the delivery, if he accepts that delivery date can be little bit late or there is no other valuable

work for the team members in other what activities; then why you will employ them in overtime and why you will pay extra money? Not required.

So, there are, but let us see how we can get back or how the project can get back to the original target; so two main strategies are there. So, one is shortening the critical path, two, altering the activity precedence requirement; let us see first the first one how to shorten the critical path length so that we can what try to get back to the original target date.

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The overall duration of a project is determined how? It is determined by the current critical path. So, speeding; so if you will try to just speeding up the noncritical path activities; that means, activities lying on other noncritical paths then it will not solve the purpose; it will not bring forward a project completion date.

There are several ways in which this problem can be solved; number 1 by adding resource, you can add more resources especially more staff members of course; it will lead to more cost. Then increase use of concurrent resources; if some things some activities can run parallelly give concurrent or assigned concurrent resources; maybe concurrent or what manpower or concurrent computers or concurrent output devices or concurrent input devices so that some activities can run parallelly.

Reallocate staff to critical activities. So, bring the take away some of the staffs from noncritical activities and reallocated them to the activities lying on the critical path and then reduce the scope otherwise you can reduce what is the original scope. Now, we see it is not possible to achieve all the scopes. So, we can reduce this scope and the last alternative is reduce the quality. If it is not possible to what achieve the desired quality with the limited amount of time; you will be forced to reduce quality so that the project can be completed on the specified date on the original date.

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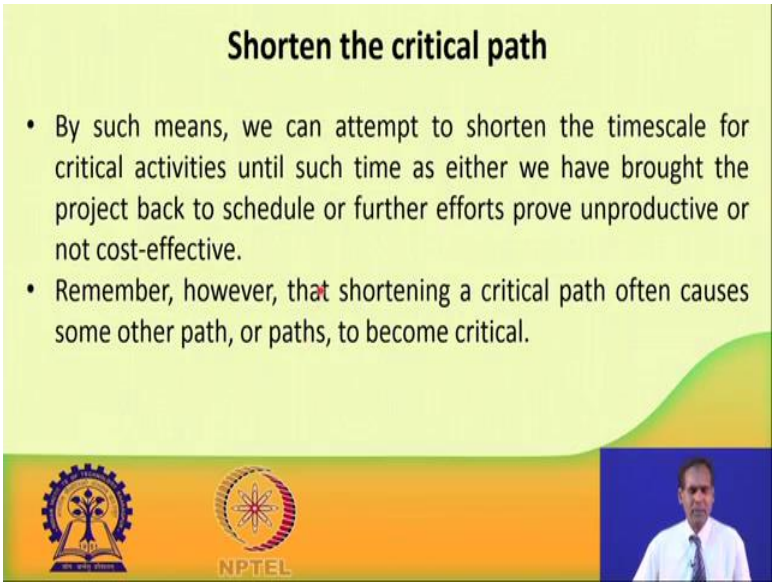

By such means so now, let us see how to shorten the critical path. So, by this means we can attempt to certain the timescale, to reduce the timescale for the critical activities until such time as we have other either we have brought the project back to schedule or further efforts to be unproductive or non cost productive effective. So, these ways we can follow so that the critical what path time or the time required for the executing the critical activities that it will be now reduced.

So, these things should be continued till either we have brought the project back to the original schedule original target or if we will prove that or if we can justify that; if we will further do this it will be unproductive or it is not cost effective, then we must stop this activity here. So, remember that a shortening a critical path upon causes some other path or paths to become critical.

So, when you are shortening a critical path; then it can happen that some other path may become critical, ok, or either only one path or more than one path also become critical during the process of shortening a critical path. So, you have to handle this case accordingly.

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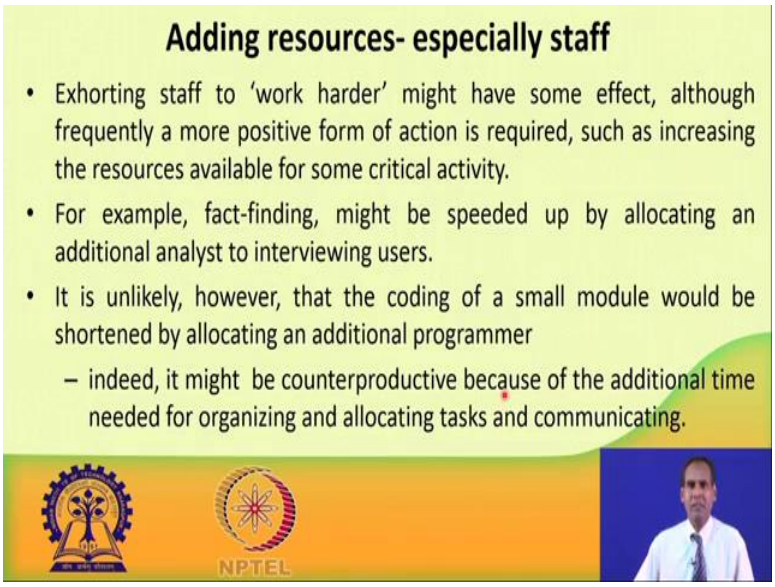

Now, let us see the second option that is this adding resources; especially the staff members. So, exhorting staff to work harder might have some effect; although frequently a more positive form of action is required such as increasing the resources available for some critical activity.

So, whenever you have exhorting the staff to work harder; it might have some effect definitely and more positive form of action is required; such as you have to increase the resources available for some critical activity. So, what other resources are required you have to increase those resources.

For example, suppose you are doing the requirement analysis; you are conducting the fact finding a process, collecting the requirements; then this process can be or this activity can be speeded up by what allocating an additional analyst to interview users. You know the different fact finding techniques like interview and a questionary, on site observation, record review etcetera. So, if you are using interview method for collecting the facts then what you can do? In order to speed up the process, you can assign, you can

allocate another analyst staff to help in the interview process; so, we can meet the deadline.

So, it is unlikely; however, that the coding of a small module would be shortened by allocating an additional programmers. See, one programmer is doing the coding and if you will see that say that I will speed up the coding process; I will allot another program or two programmers will do, that will not help in speeding up the activity. And it might be rather counterproductive because the additional time that is needed for organizing and allocating tasks and communicating that will be more, so you should not do this kind of thing.

So, you have to judiciously think which activities can be what speed up can be speeded up by allocating additional staffs that you have to think judiciously.

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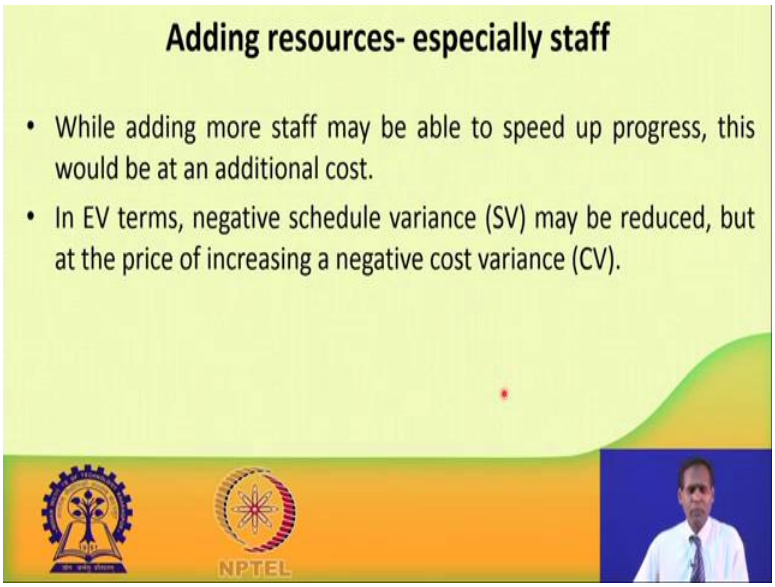

So, while adding more staff maybe able to speed up the progress; this should be at an additional cost this I have already told you. You can take more staff members, but; obviously, it will take more cost. We have already last class discussed the terms like EV that earned value, PV planned value, SV schedule variance, CV cost variance etcetera. So, if we will express this thing in EV terms then a negative schedule variance may be reduced. If it is negative schedule variance can be reduced, but at the price of increasing negative cost variance.

So, if we will add a staff members then mathematically we can say that this negative schedule variance it may be reduced, but at the cost of increasing a negative cost variance CV.

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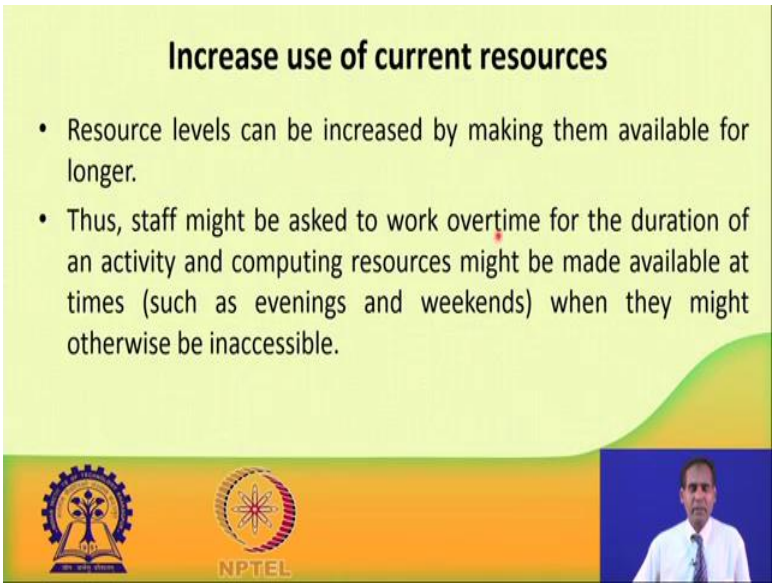

Now, increase a use of concurrent resources. So, a resource levels can be increased by making them available for longer. So, the resource levels what you can do? You can also increase them and by making them available for a longer period of time.

Thus the staff might be asked to work overtime if the staff is working daily say 8 hours; then what you can do? He may be requested to work overtime maybe another 2 hours or 4 hours for the duration of a activity. And the competing resources also you should provide at during the overtime; they must be are made available at those times such as evenings or weekends or holidays etcetera; when they might otherwise be inaccessible.

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Another thing is that, a reallocate staff to critical activities. The project manager may consider allocating more efficient staff to activities on the critical path or swapping resources between critical and noncritical activities. So, there are two major activities as you know critical activity or non noncritical activity. So, if you observe that after some days the project is getting delayed; the critical activities they are getting delayed what you can do? You can transfer some of the staff members, you can swap some of the; either you can transfer or swap some of the staff members from the noncritical activities to the critical activities so that you can take an attempt to meet the deadlines of the critical path activities.

When a project is actually executed, the critical path may change as the actual durations of activities will vary from the original estimates and staff allocations maybe adjusted to reflect this; this very correct that when the start activities are executing. Initially you have a drawn the critical path, you have identify what is the critical path at the plan.

But actually when the project is running the activities are running due to the actual running times execution times; there might be changes in the durations of the critical activities and hence the critical path may be changed. So, if the critical path is changed accordingly you have then that will be what different from the original estimates and the staff allocation that you have originally made that may be changed.

So, accordingly you have to change this plan and you have to accordingly alert accordingly estimate the resources, accordingly alert the what staffs to the critical activities based on this change in the critical path durations.

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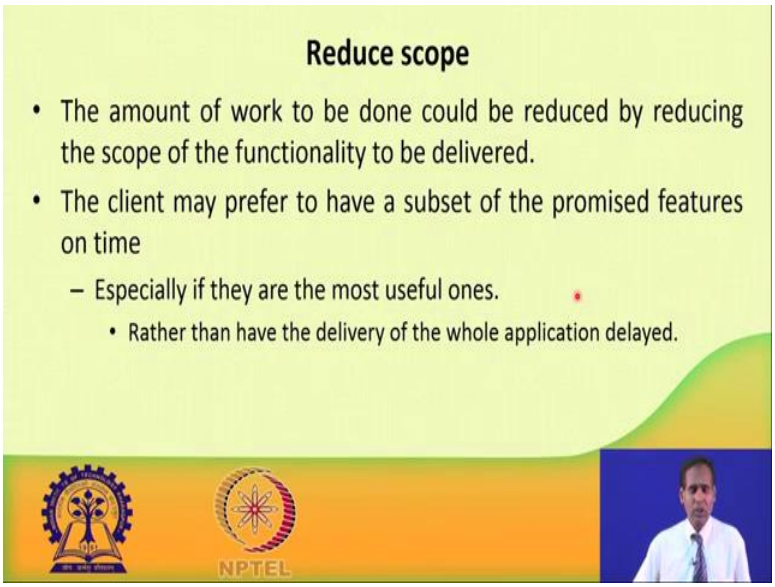

So, this I have already told you about reduce scope; the amount of work to be done could it be reduced by reducing the scope of the functionality to be delivered. If you see that the actually the project is getting delayed; we cannot meet all the, we cannot achieve all the, what planned scopes. So, what we can do? Then we can reduce the scope, the amount of the work to be done it can be reduce by reducing the scope, but the client may prefer to have a subset of the promised features on time.

So, the client definitely he may want to have a subset of the promised features on time; that means, that you have agreed during the software requirement specification; so, especially if they are the most useful ones rather than have the delivery of the whole application delays. So, instead of making or delivering the whole application delayed; the customer may want that the some subset of the promised features may be delivered on time.

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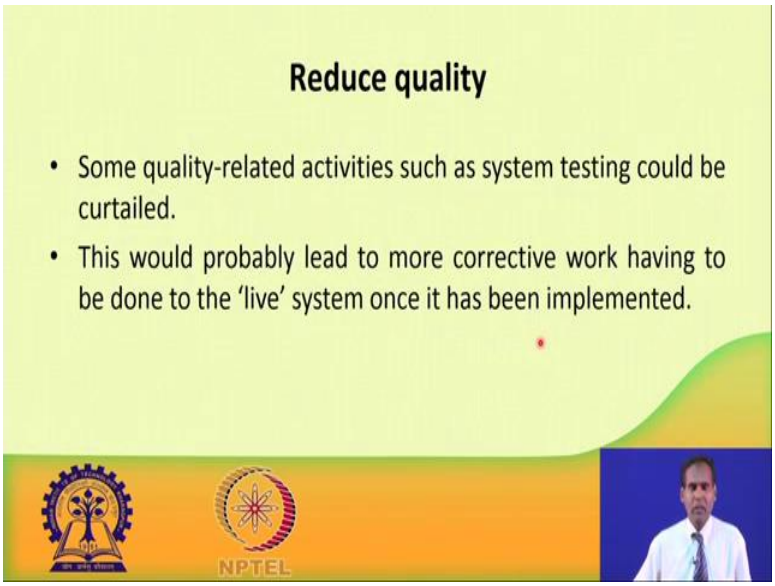

And one option is also there to get back the project onto the original track; that is reducing the quality. Some quality related activities such as system testing etcetera could be curtailed because there is a very less time. And this would probably lead to more corrective work having to be done to the 'live' system; once it has been implemented. So, by reducing the quality also we can try to what get back to the original target.

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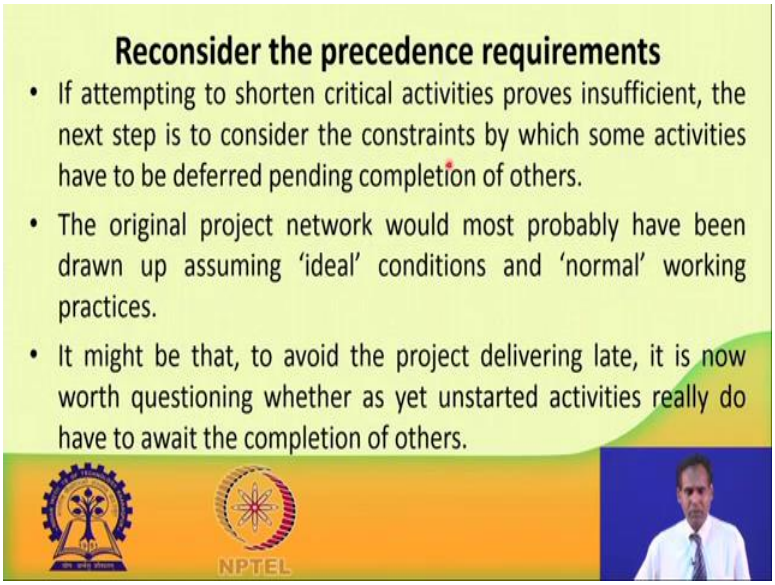

But you see that the customers sometimes may not be agreed if you are reducing the quality, if we are skipping the system testing the customer may not be agreed. So, there

is a what; there is a doubt or there is a what, you can say dilemma what to do in this case. And next this is the last option if all these what, thing what or the if you are not able to reduce the critical activities; so, this is the last option that we have to reconsider the precedence requirements.

So, if we are attempting to shorten critical activities it proves in sufficient what we should do? The next step is to consider the constraints by which some activities have to be deferred; some activities have deferred pending completion of others. So, some activities in the activity network we have already identified the activities. So, if the critical activity we cannot reduce the or shorten the critical activities or it will be proven to be insufficient; then we have to consider the other constraints by which some activities they have to be deferred pending until completion of the others.

So, the original project network would most probably have been drawn up assuming ideal conditions on normal working practices; while you have considered the while you will have drawn the what original project network or the activity network; there we have assumed two important things that the project is running under ideal conditions and normal working practices are followed, but I in practice that will not happen. So, that is why we have to; what we have to reconsider the precedence requirements. It might be that to avoid the project delivering date; it is now worth questioning whether as yet unstarted activities really do have to await the completion of others.

So, is it possible that to avoid the end project delivery date in order to avoid the end project what; the late in the end project delivery date what we can question that whether it is possible that the unstarted activities can they really await till the completion of others?

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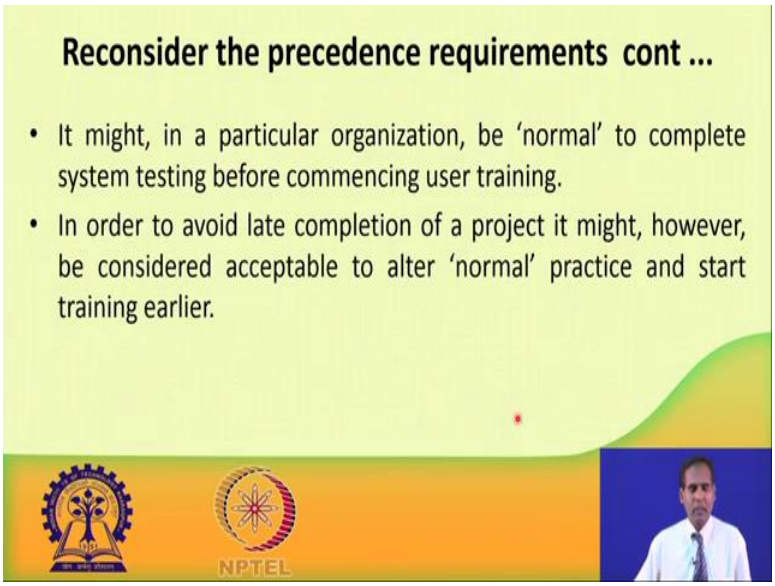

So, it might be in a particular organization on that the normal it; it may be normal to complete system testing before commencing user training. Let us see one of the example how we can reconsider the precedence requirements. Normally, the system testing must be or should be conducted before commencing the user training. First complete the system testing then you can give training to the users.

But if we are having what so; that means, this user training is dependent on the system testing. After system testing; then start the user training, but if you do not have time; what you can do? In order to avoid late completion of the project, what can be done? That the; we have to alter the normal practice that start the training first and then you can what after this training is completed then you can perform the system testing, you can alter the normal practice, you can reconsider change the precedence requirements.

So, now, we will assume that training is not dependent on system testing so that a first system testing can be performed; sorry first this training can be performed and then system testing can be done.

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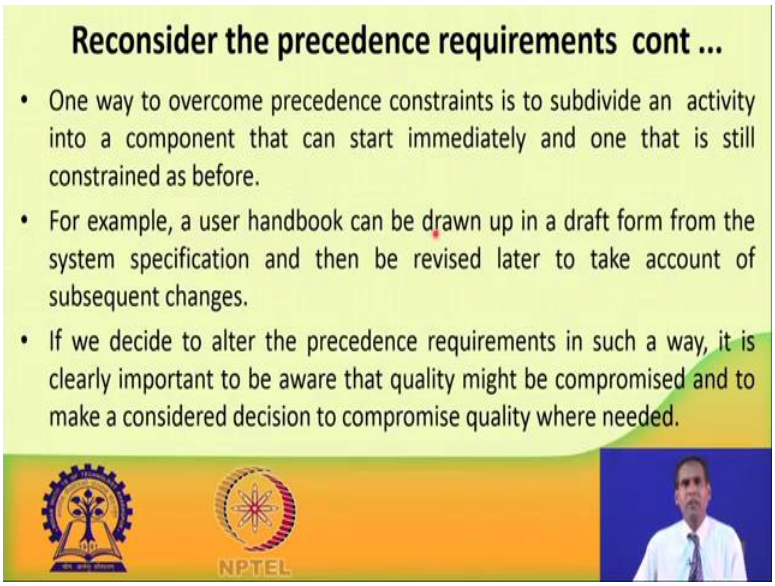

So, now one way to overcome the precedent constraint is to subdivide an activity into a component, which can start immediately and the one that is still what constraint before see. So, one way to overcome the precedence constraints requirements is that we can divide the activity into a component, which can start immediately and one that is still constrained at before; it is under constraint.

So, for example, suppose a user has a; user handbook can be drawn in a draft; form from the system specification. And then be revised later to take account of this subsequent changes what we can do here? You can see that one first; we want to prepare a user manual, what we can do? We can prepare a draft form; from where? From the, what system specification and then that can be revised later on to accommodate the subsequent changes.

If we decide to alter the precedence requirements in such a way that; it is clearly important to be aware that a quality might be compromised; so, if you will altered the precedence requirements in some cases what will happen? The quality might be compromised and to make a considered decision to compromise quality where needed. So, we have to take a judicious decision whether we can compromise with the quality or not. Because we are changing the precedence requirements due to the changing the precedence requirements; this what quality might be compromised.

So, whether the; a customer can accept this a compromise with the quality or not? We have to take a judicious decision whether we can compromise the quality when we are changing the precedence requirements.

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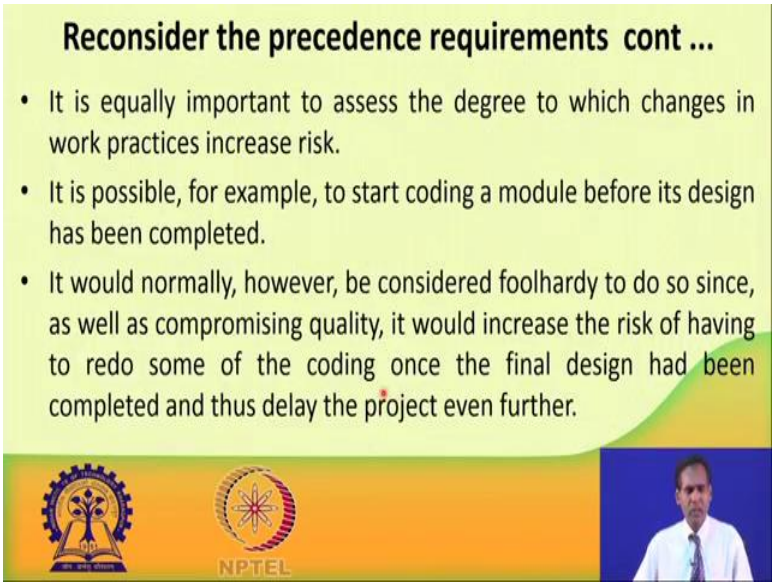

It is equally important to assess the degree to which changes in work practices increase risk. So, during this what, re-considering the precedence requirements; now it is also equally important to assess the degree to the extent to which the changes in the work practices it increase the risk. It is possible for example, to start coding a module before its design has been completed. See normally, normal practice say that first we should do the requirement analysis, then design, then coding, then testing. So, if somebody said that the first we will start coding and later on we will do the testing; then you see what is the; what problem will occur.

So, it would normally; however, be considered foolhardy to do since as well as compromising quality here it will be a; it will be foolhardy as well as it might be you might compromise with the quality. And there will also risk involved because if you are doing coding first, then design then if there will be the changes on the final design; then what will happen? You have to do you have to redo so many things in the code, so which is not advisable.

So, that is why before what changing the precedence requirements; please assess what is the degree to which changes in the work practices they increase the risk. So, here starting

the code before design it is a risky thing and you have to re do so much so many works if the design is changes. So, though and the quality also maybe what compromised. So, that is why a while a doing or making these changes in the precedence requirements or changing the normal practices; judiciously think and then take the action.

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So, now, let us summarize what we have studied how to get back on track. First negotiate renegotiate the deadline with the client, if the kind client is happy yes we can still wait some days we can tolerate a few more days delay; then no problem. If he does not agreed, if negotiation is not possible regarding the deadline then if not possible then try to shorten the critical path by what working overtime or by allowing your staffs to work overtime. By re-allocating staff members from the noncritical or the less pressing work to the critical activities or by what buying or hiring more staff. Also you can reduce the scope of the work to get back the project on track.

Another option is that we can reduce the quality so that by compromising the; with quality; we can finish the project on time. And the last option is that reconsidering the activity dependencies wherever possible you can change alter the activity dependencies. You can reconsider the activity dependencies by overlapping the activities so, that the start of one activity it does not have to wait for completion of another and by splitting the activities. Also by splitting the activities you can change the activity dependencies or

these, what did by splitting the activities you can also what alter the dependency among the activities.

In this also in this way also you can get back or the project can be the project can be brought back to the original target or the original track. It can be possible to meet the target line by following these options or by following these methods.

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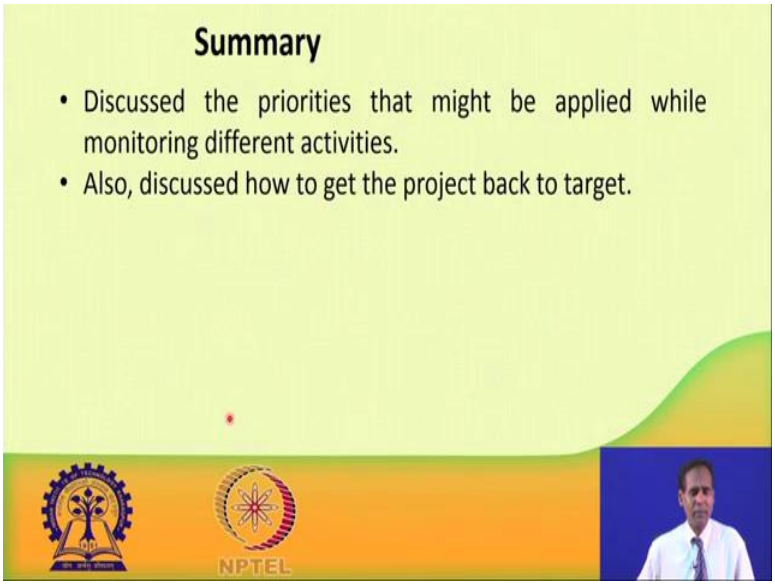

So, in this class we have discussed the priorities that might be applied while monitoring different activities such as we should give a top priority to the critical path activities and we should also give priorities to the activities having no float and etcetera. And we have also discussed the project how; we can back to the target different options I have just told.

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We have taken the references here and.

Thank you very much.