Introduction to Lean Construction
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Module – 01
COLPLASSE: Look-Ahead Plan, Constraint Analysis, Weekly Plan, Summary

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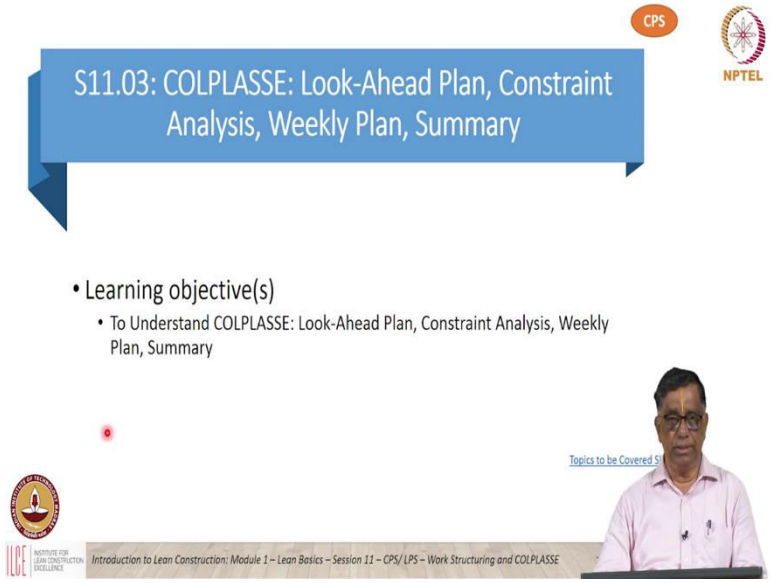

In this session, we look at the, we look at a newly developed software for practicing CPS in an easier manner. One of the problems faced in project sites is traditionally each company has many much lot of documentation to be produced at the site to keep track of progress. In addition to it, if they have to keep track of look-ahead plans, weekly plans, and so on sometimes it becomes more of a burden. So, we have developed a software in IIT Madras called COLPLASSE which simplifies this work for the site people and they think they are reasonably happy with using this.

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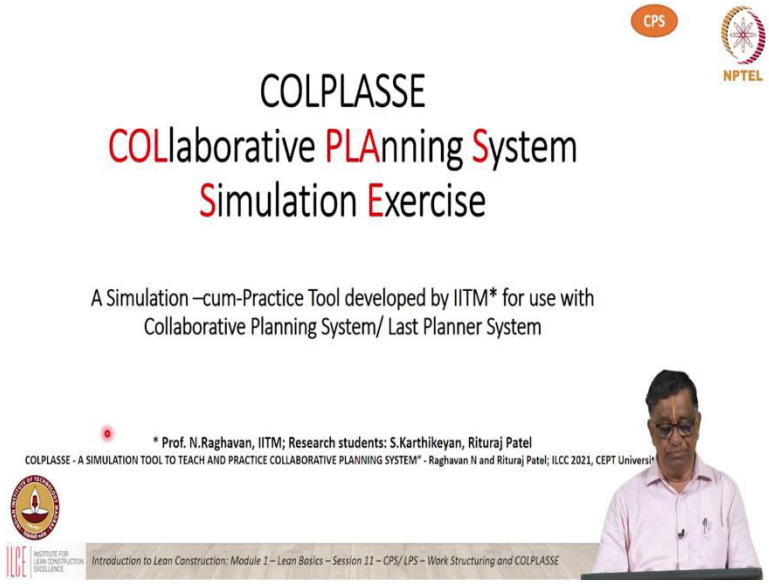

COLPLASSE stands for Collaborative Planning System Simulation Exercise, there are a number of simulation games available for lean concepts, to understand lean concepts better, to practice them and so on, but most of them are commercial. One needs to buy them, they are quite expensive to buy, you need to buy them and then some of the most of them are quite cumbersome to you practice very involved somewhat complex and so on.

So, what we thought, this COLPLASSE should be a simple one, simple one to understand, simple to practice and is an open-source software, anybody can download, anybody can modify, any way they want to suit their own requirements. It is a simulation-cum-practice tool developed by IIT Madras for use with the collaborative planning system or last planner system.

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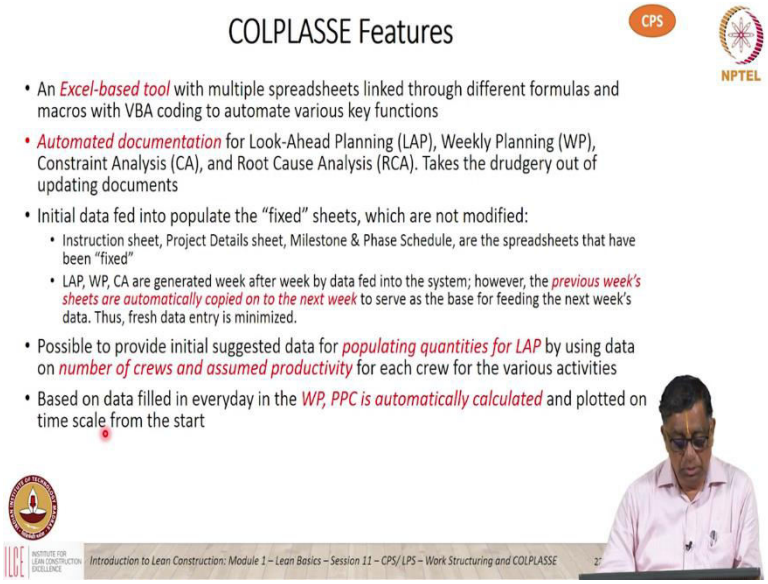

To look at some of the features is actually an excel based system with multiple spreadsheets which get automatically opened by using VBA program, VBA coding and a lot of macros are also inbuilt. Then there is look ahead planning, weekly planning, your constraint analysis and root cause analysis all these are carried out automatically automated manner once you feed the basic data.

So, there are some initial data to be fed in about the various activities what kind of quantities, number of crews, the productivity for various crews, and the overall timelines the milestone schedule and the phase schedules, once these are fit into it, then the look-ahead planning for the specified number of weeks opens out.

So, as you fill up the data in that, the current week opens out and it and again these planned quantities for the current week are taken automatically from the look ahead plan and every day we enter the actual quantities executed and the PPC is calculated automatically again, and wherever the PPC is less than 100, the program also prompts you for the root causes, and the root causes get built up since the beginning and you also have an analysis of what is the predominant root cause, and then what are the progression of root causes. So, the PPC and root cause pie chart they get plotted automatically that plot gets updated week after week based on the actual data input on daily basis.

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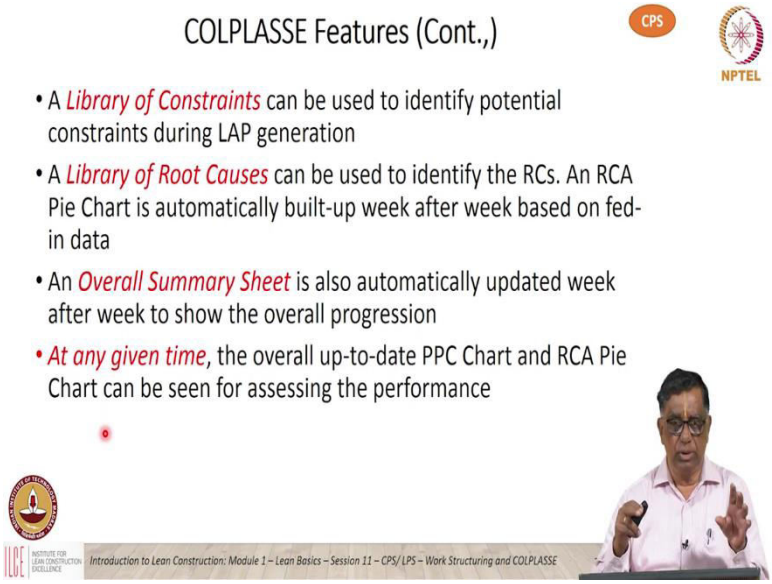

So, there is actually if you look at the constraint analysis, the program prompts you with a set of standard constraints in the library of constraints which is inbuilt. One can also keep on adding more and more constraints depending on the current project's requirements and you can just say choose a particular constraint by specifying that number or dragging it down dropping it in the constraint analysis that makes it much simpler.

Similarly, for root causes again, there is a library of standard root causes built in into the software and one can keep adding additional root causes depending on the actual experiences in the current project. At any given time, there is an overall summary sheet which gives you a birds-eye view of the entire project performance, the total PPC chart and the total root cause analysis pie chart, they are available to any time as a summary.

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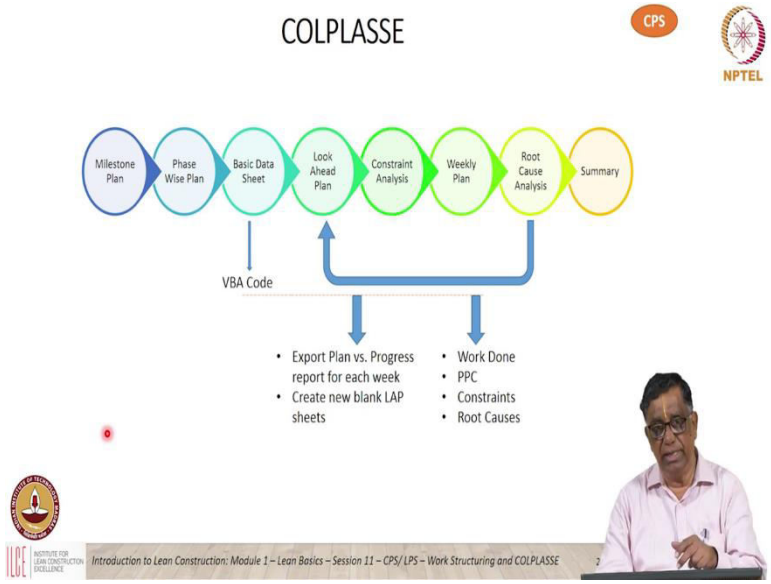

The progression of work you know is similar to whatever standard CPS process, start with the milestone and phase schedules, work out your look-ahead plans, weekly plan, daily plan, the in-between constraint analysis, the root cause analysis, so the whole thing, the whole and then the summary of the actual performance.

So, they are all available to you and the given data sheets like project data, number of crews and so on, they are fixed they cannot be changed. Otherwise, once your week, once a look ahead plan is proposed for so many weeks that again number of weeks can be changed in the program by the user and from there the data is taken to the weekly plans and then every day one can enter the actual quantity performed and then it does the calculation for PPC and so on.

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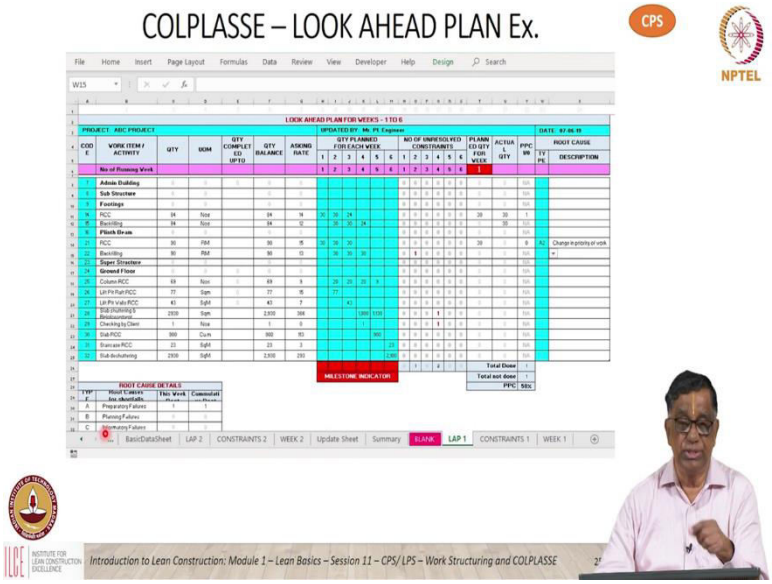

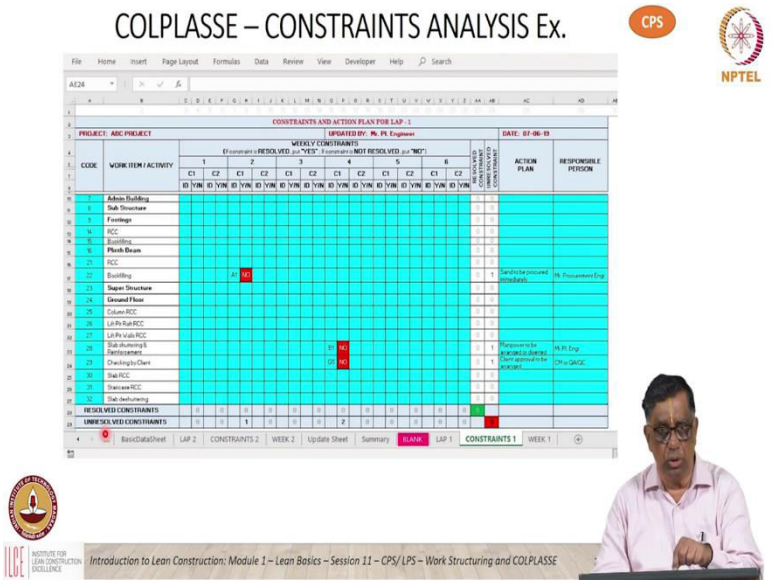

So, this is a typical look ahead plan template in COLPLASSE. So, this template has been adopted based on the actual usage in a number of sites, we have studied how people are doing it in the sites and develop the template accordingly. The same thing for constraint analysis, so every week in the look-ahead plan there are the corresponding constraints.

So, before you go into the weekly plan for the given week, the program prompts you have the constraints for the given week been resolved or not, if not it again goes back to the constraint analysis where we need to enter who the person is responsible? The constraint is resolved or not and only when they are resolved you are able to go into the weekly plan and do the weekly planning day after day from Monday through Saturday.

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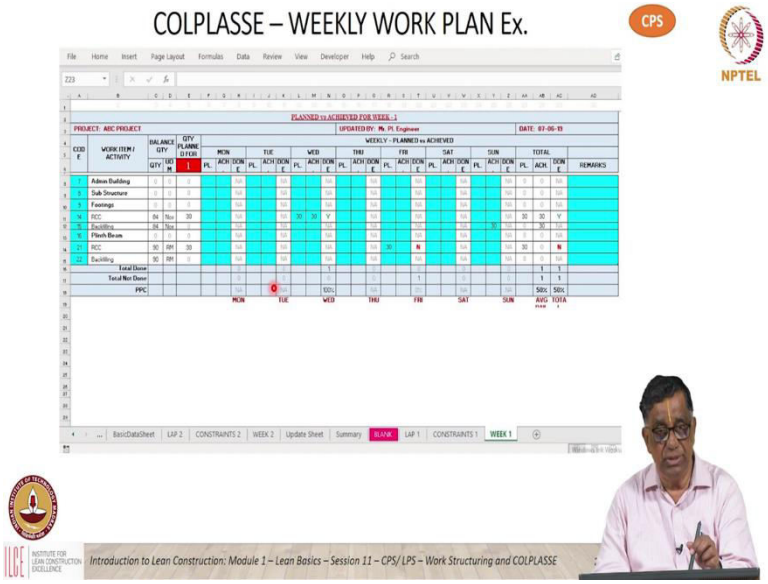

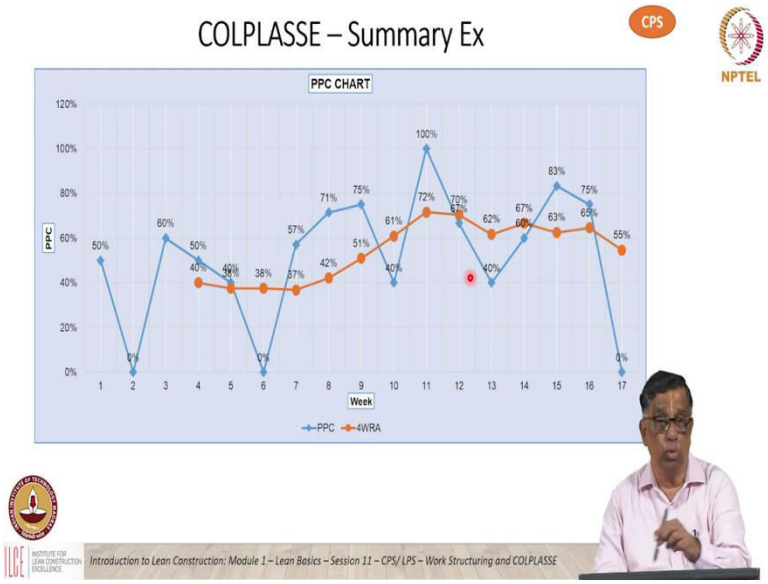

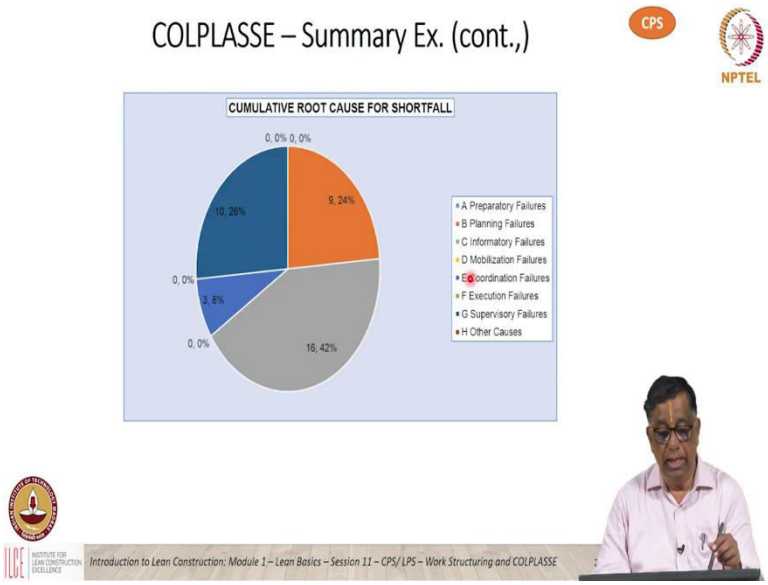

So, here the required quantities they are coming in again from the look-ahead planning and the actual quantities are entered on a daily basis depending on the actual performance, actual production, and then the PPC comes automatically and then on the PPC gets plotted along with the actual plot and a moving average part, you can specify you want a four-week moving average, six week moving average, and so on. And depending on the root causes you also get a cumulative root cause summary in the form of a pie chart from right from the beginning.

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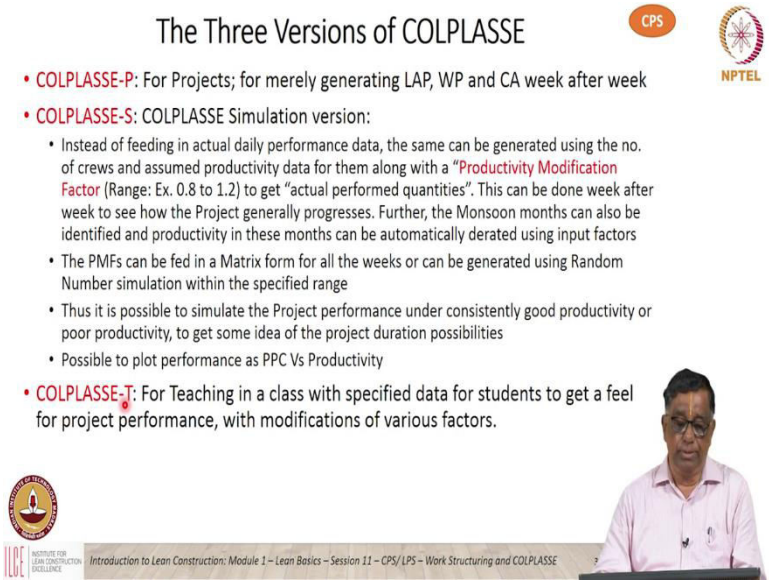

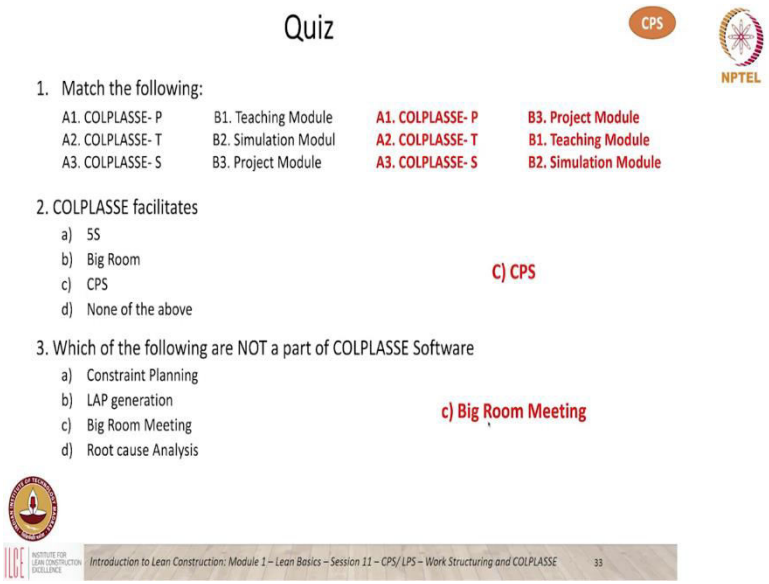

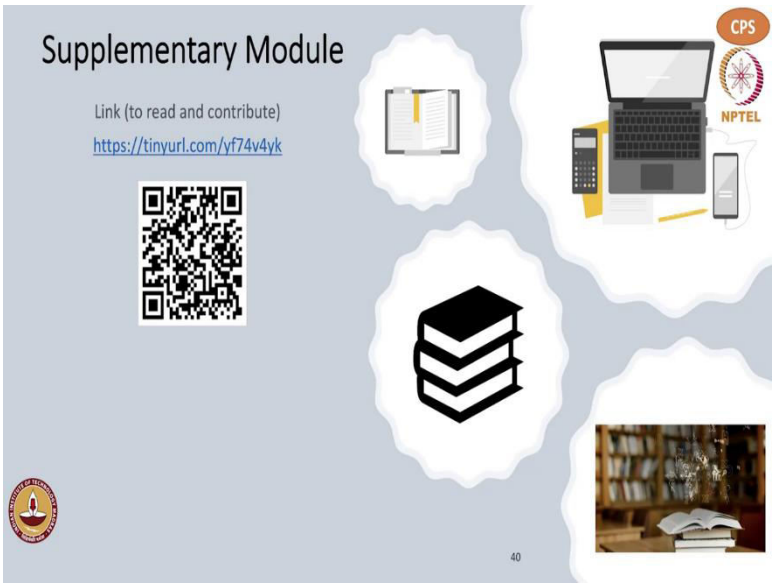

So, that is the advantage here. And there are three versions available in COLPLASSE, the first one is COLPLASSE-P for projects, whatever I have described to you so far, the generation of look ahead planning, weekly planning, and the calculation of PPC, and root cause analysis, they are all carried out for a given project. So, there the planner has to choose, the planned quantity for the look ahead planning and the actual quantity will come from the actual performance in the project. So, there is nothing to be calculated, it is all decided by the planner.

The main advantage is the formats are available to you in a standard manner. Once you finish one week, the next week's look-ahead plan gets automatically transferred from the previous week the first week, the last week gets deleted, a new week gets added, all the items are transferred, so the bookkeeping becomes much simpler for these site planners, that is the main advantage of COLPLASSE-P.

COLPLASSE-S is a very interesting software, it is actually a simulation version, instead of giving actual daily performance by feeding it there you can simulate the production, what we do actually is, if you have to give the number of crews and the planned productivity for each crew, so the actual quantity is taken as a product of number of crews multiplied by the productivity per crew. Now, these numbers which you get can be modified by, what they call productivity modification factor which ranges from 0.8 to 1.2 which again can be changed by the user.

So, these factors either you can give them in a matrix form for the entire project, week after week, and then activity wise you can give 0.8, 1.23 in random whatever manner you want or you can use the random number generation, the property of excel to get these numbers within

that range, whatever number your range you give within that range the productivity can be generated randomly and used.

The advantage is if you want to just rush through run through the project duration completely and see what kind of duration you get with the standard, currently commonly what happens productivity wise it can reduce or you can increase, but it does not go normally plus minus more than plus minus 20 percent, so we said it can range from 0.8 to 1.2.

If you want to find out the you know of pessimistic or optimistic durations for a project, you can you can stipulate throughout a factor of 1.2 for the productivity to get an optimistic idea of the project duration or you can put 0.8 throughout to get a pessimistic duration for the project.

So, a priory what will be the project duration for these two ranges and then for the monsoon during months, you can again specify a monsoon modification factor maybe 0.8, 0.9 or even 0 if you want, depending on the location of the project and the propensity of the project to get affected by monsoon, you can specify a monsoon modification factor.

So, with these you know you can do a number of simulations to understand, how the project will progress from start to end. It can give a very good idea for people and then you can also plot the performance of PPC versus productivity. You remember the graph I showed you the last session you can do the simulation and check-up what is the graph between PPC and productivity.

Finally, the third version is called COLPLASSE-T, for teaching in a class, we had the simulation class in IIT Madras using this particular version of how to teach the students to use COLPLASSE. So, you can have again different productivity modification factors and different students will come up with different durations, then they will debate, what are the constraints they had? And why you know their durations are more or less? How to improve that? So, it can generate and foster good discussion on the actual construction production process.

So, the three versions are available in excel form free of cost and anybody can download and you can even modify the sheets to suit your requirements, to suit your project, that is the freedom available, it is completely open source and we hope it will be useful to the construction community at large.