Project Management

Prof. A. Ramesh

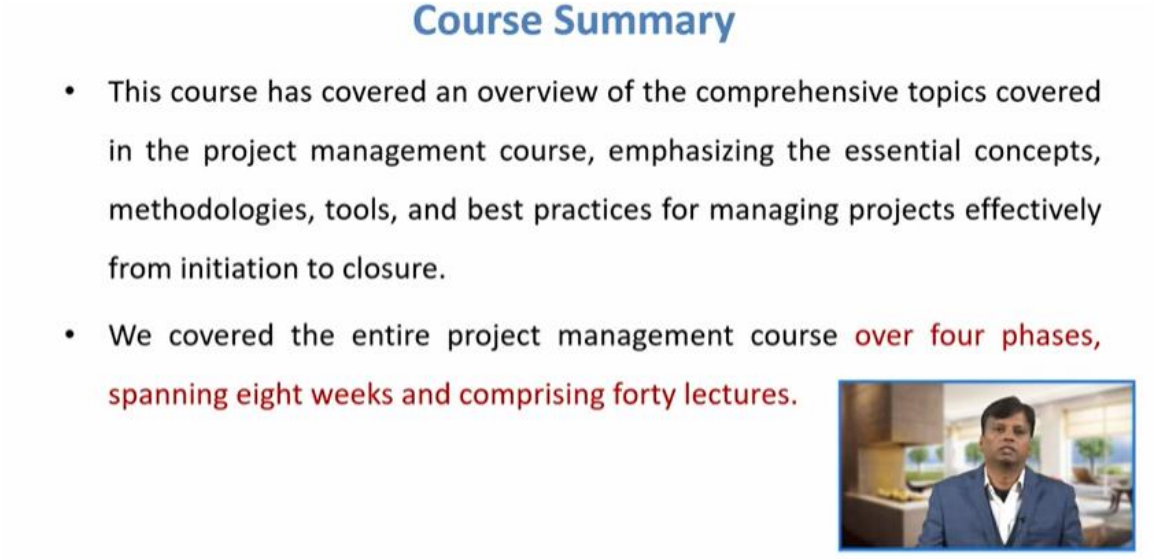
Department of Management Studies

Indian Institute of Technology Roorkee

Week: 8

Lecture 40 - Course Summary

Dear students, I am going to summarize this course about what we have learned so far. In this course, so the previous lecture I have discussed about simulation software for project management. Now, this is the last lecture I am summarizing about this course. What is the course summary? This course has covered an overview of the comprehensive topics covered in the project management, emphasizing the essential concepts, methodologies, tools and best practices for managing projects effectively from initiation to closure. We covered the entire project management course over four phases spanning eight weeks and comprising 40 lectures. The phase one is the project initiation, the phase two is project planning, the phase three is project execution and the final phase is information technology for project management.



Course Summary- Phase wise

- Phase I – Project Initiation
- Phase II- Project Planning
- Phase III-Project Execution
- Phase IV-IT for Project Management

We cannot separate this phase separately because this IT may come in every phases, it may come in phase one, phase two and phase three. In the first week, I have discussed about history of the project, then we defined what is project, then I have shown some differences between programs, projects, task and work packages. After that we discussed about very important three triple constraint like cost, time and scope, then we studied in detail about the scope and apart from this we studied about some of the ancillary goals. Then we have explained the characteristics of the project, like every project is a unique project, every project is a temporary activity, there will be a starting, there will be a predefined ending like this some of the characteristics we have studied.

Course Summary- Week 1

Introduction to Project Management-I

- History of projects
- The Definition of a "Project"
- Program, Project, Task and Work Packages
- Triple Constraint
- Concept of Scope
- Ancillary goals
- Characteristics of Projects

Course Summary- Week 1

Introduction to Project Management-II

- Non-projects, Quasi-Projects
- Why Project Management?
- Benefits of Project Organization
- Disadvantage of project-based organizations
- Limitations on Project Management
- The Project Life Cycle and its types

Source: Meredith, J. R., Shafer, S. M., & Mantel Jr, S. J. (2017). *Project management: a strategic managerial approach*. John Wiley & Sons.

In week two, I have compared what is the project and non-project, there we discussed about the quasi project because once the scope, time and cost are not properly defined, so that project is called quasi project. Then we studied why project management is important, then what is the benefit of having a project based organization, then we discussed about disadvantage of project based organization, then we have studied some limitation of project management also because in certain activities, we need not use the concept of project management. Then we discussed about the project life cycle, we talked about S shaped project life cycle, then we discussed about inverse S project life cycle, then we discussed about J shaped, extended J shaped project life cycle. Then we discussed about agile project management, first we discussed some agile principles, we discussed about the characteristics of agile approaches and explained the concept of scrum also, then we discussed about the benefit of doing the project in agile manner, then we have discussed about implementing agile project management. After that we discussed about project selection models, there are different numerical model and non-numerical model we have studied about like non-numerical model, qualitative models like sacred cow, operating necessity, competitive necessity, product line extension, comparative benefit and sustainability.

Course Summary- Week 1

Agile project management

- Agile principle
- Characteristics of Agile Approaches and Scrum
- Benefits of Agile project management
- Implementing Agile project management

Course Summary- Week 1

Project selection models

- Sacred Cow
- Operating Necessity
- Competitive Necessity
- Product Line Extension
- Comparative Benefit
- Sustainability
- Payback
- NPV
- Scoring
- Window of opportunity
- Discovery-driven

These are qualitative way of choosing the project. Also, we discussed about the quantitative methods like payback, net present value, scoring method, window of opportunity and discovery driven and we have concluded that the scoring method is the most popular method because it can cover both quantifiable criteria, even we can a subjective criteria also can be incorporated. So, we suggested that the scoring method of choosing project is most popular. Then we discussed about net present value, weighted scoring model, internal rate of return and analytic hierarchy process with the help of numerical examples. So, what you have taken, we have taken some problems with the help of problems we explained how to calculate NPV, weighted scoring model, IRR and AHP.

Course Summary- Week 1

Examples of Project selection Model

- The Net Present Value (NPV)
- Weighted Scoring Model
- Internal Rate of Return (IRR)
- Analytic Hierarchy Process (AHP)

ource: Meredith, J. R., Shafer, S. M., & Mantel Jr, S. J. (2017). *Project management: a strategic managerial approach*. John Wiley & Sons.

The other week too we discussed about the role of project manager because project manager and functional manager we have differentiated and major questions facing a project manager, challenges faced by the project manager. Next we studied about the responsibilities for the project manager and what will be the career path those who are working as a project manager, we discussed about what are the some special demand for a project manager that also we discussed about. Then we discussed about the characteristics of team, team members. Then we have studied suddenly different stages of formation of the team with the help of Tuckman Ladder. Then we discussed about why the scope creep has occurs.

Course Summary- Week 2

Project manager

- Project Manager & Functional Manager
- Major Questions Facing Project Managers
- Project Manager Responsibilities
- Project Manager Career Paths
- Special Demands on the Project Manager
- Characteristics for Team Members
- Tuckman Ladder
- Scope Creep

Course Summary- Week 2

Attributes of Effective Project Managers

- Credibility
- Sensitivity
- Leadership, Ethics and Management Styles
- Ability to handle stress

Here the scope creep in the sense when we are why the scope is keep on changing, what are the reasons, how that can be reduced that also we have studied. Then we have studied about attributes of effective project manager, some of the very popular attributes like credibility, sensitivity, leadership, ethics, management styles and ability to handle stress. These are the some of the attributes of an effective manager. Then we studied about managing for stakeholders. Also I have emphasized we cannot manage the stakeholders but we have to engage, we have to involve the stakeholders for successful implementation of our project.

Course Summary- Week 2

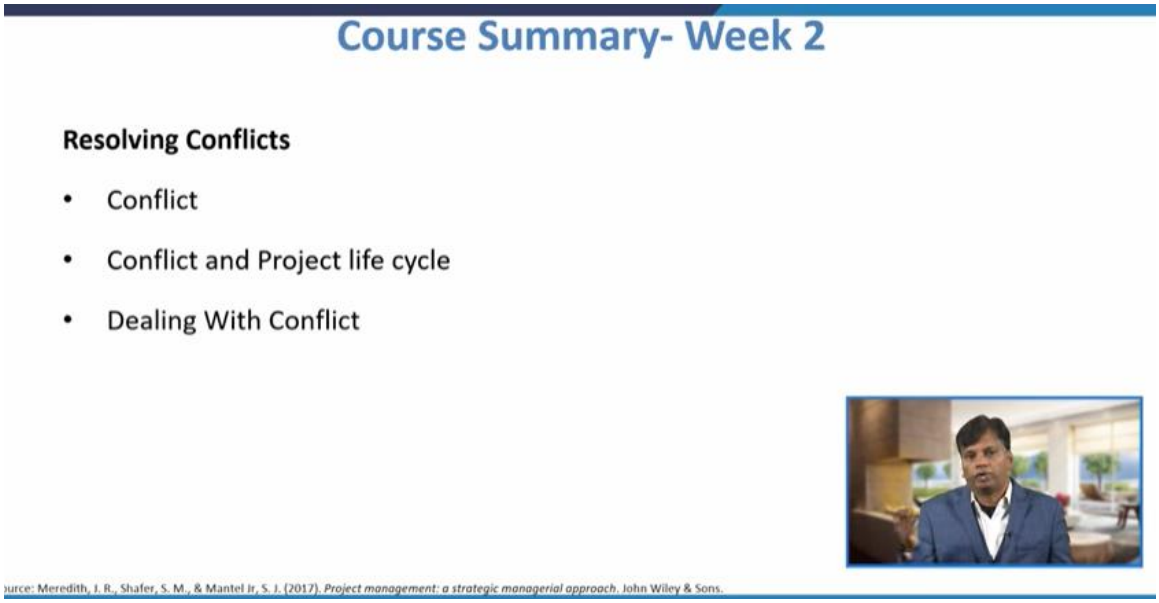
Managing for stakeholders

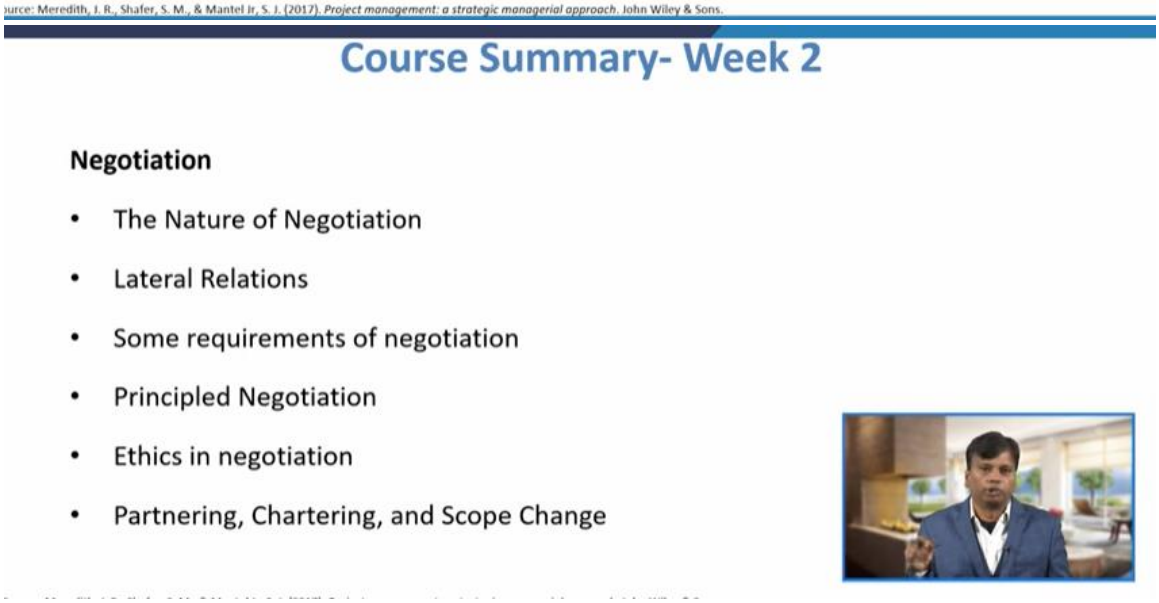
- Stakeholders
- Stakeholders Analysis
- Power-Interest Grid
- Commitment Assessment Matrix
- Managing Stakeholder Engagement

e: Meredith, J. R., Shafer, S. M., & Mantel Jr, S. J. (2017). *Project management: a strategic managerial approach*. John Wiley & Sons.

So, we defined who is the stakeholders. Then we studied stakeholder analysis. We have used one tool called power interest grid. Then also you have seen commitment assessment matrix. Then we also provide some suggestions how to manage stakeholders engagement.

Then we discussed about resolving conflicts. We defined what is conflict. Then conflict and when the conflict will come different stage of project life cycle. Then we also provide a solution how to deal with the conflict. So, one important solution is a negotiation.





We studied in detail about the negotiation skill, importance of negotiation skill for a project manager. So, we studied about nature of negotiation. Then we talked about what is a lateral relations. Then we discussed about some specific requirement for negotiation. Then we studied some of the principles for negotiation and we emphasized ethics in negotiation.

Course Summary- Week 3

Project in the organization structure

- Need for Organization Structure
- Need for project-oriented organizations
- Organizational issues for project-oriented structure
- Major organizational forms
- Project Characteristics and Project Home
- Selecting a Project Form

Source: Meredith, J. R., Shafer, S. M., & Mantel Jr, S. J. (2017). *Project management: a strategic managerial approach*. John Wiley & Sons.

Course Summary- Week 3

Human factors and the project team

- Project Team
- Problems that prevent a team from performing effectively
- The Six Basic Human Needs
- Our Driving Needs
- Becoming a Better Leader
- Two Specific Strategies to drive engagement and gain commitment

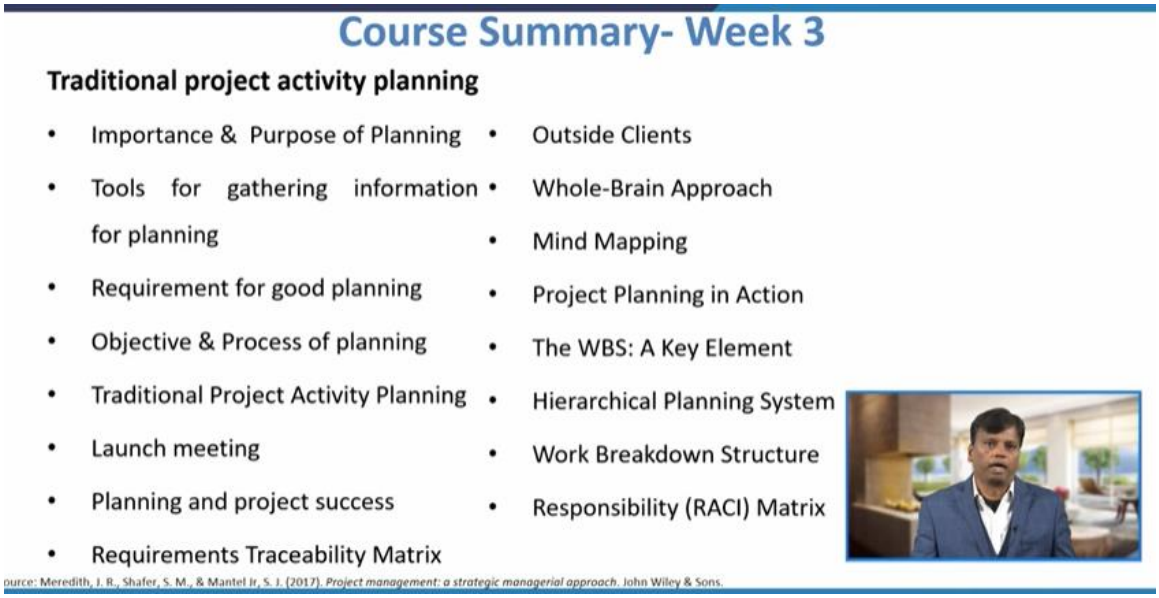
Then some of the ways to achieve negotiation like partnering, chartering and scope change. In week 3, we discussed about organization structure, project in the organization structure. So, how to tie our project with our parent organization. So, that we have studied about this linkages. So, we studied about need for organization structure.

Then we have shown importance for project oriented organization. Then we studied organization issues for project oriented organization structure. Then we studied about major organizational forms. Then we studied about line organization. We studied about project organization.

We studied about matrix organization. We studied about composite organization and so on. So, then studied about project characteristics and project home. So, finally, we have suggested how to choose correct organization structure. So, that is selecting a appropriate

project form.

Then very important things we studied the human factors and the project team because the project is so successful not because of resources, not because of top management support, but if you consider the human factors who involved in that execution of the project even for us accepting the project also. So, we discussed about project team, then problems that prevent a team from performing effectively, we studied about that. Then we studied about six basic human needs because that will affect the behavior of the project team members. Then how to become a better leader, we discussed about. Then we discussed about two specific strategies to drive engagement and gain commitment.



Then we discussed about traditional project activity planning. We discussed about the importance of project planning, tools for gathering information for planning, requirement for good planning, objective and process of planning, traditional project activity planning like launch meeting, planning and project success, what are the linkage, requirement traceability matrix we studied about. Then we see how to handle the outside clients like we studied about different planning methodology, whole brain approach, mind mapping, project planning in action. Then we discussed about work breakdown structure, what are the key elements. Later we discussed about hierarchical planning system, work breakdown structure, then responsibility matrix, RACI matrix.

Course Summary- Week 3

Agile project planning, Project Charter

- Project Charter
- Agile Project Planning
- Comparison of Agile Project Management with Traditional Waterfall Approach
- Project Planning with Scrum
- Scrum Artifacts Supporting Project Planning
- Scrum Events for Project Planning

Then we talked about agile project planning and project charter. We studied about what is project charter, what are the element in the project charter. Then how to do planning for agile projects. Then we compared agile projects with traditional waterfall approach. Then we have studied about project planning with the Scrum.

Then we studied about various artifacts of Scrum, then Scrum events for project planning. Then we studied about coordination through integration management. So, very important enabler for successful project management is coordination. So, we studied about what is project integration management, importance of integration management, if importance of multidisciplinary teams and integration management and what is the problems that affect the coordination. Then we studied about coordination through integration management.

Course Summary- Week 3

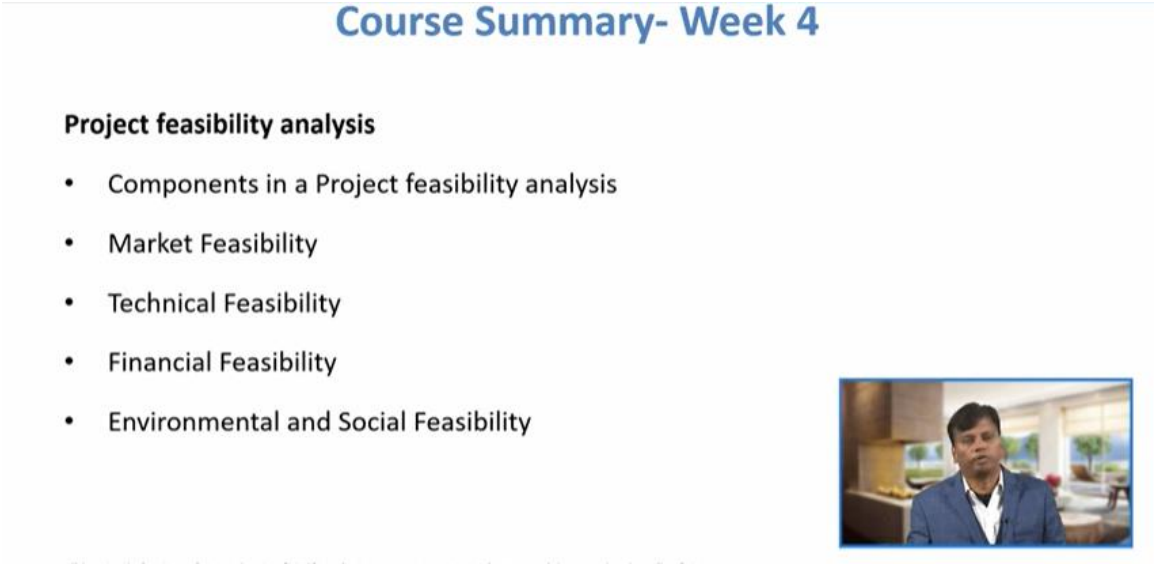
Coordination through integration management

- What Is Project Integration Management
- Importance of Integration Management
- Multidisciplinary teams (MTs) and Integration Management
- Problems of lack of Coordination
- Coordination through Integration Management
- RACI matrix for integration Management
- Managing Projects by Phases and Phase-Gates
- Fast tracking and Interface control systems

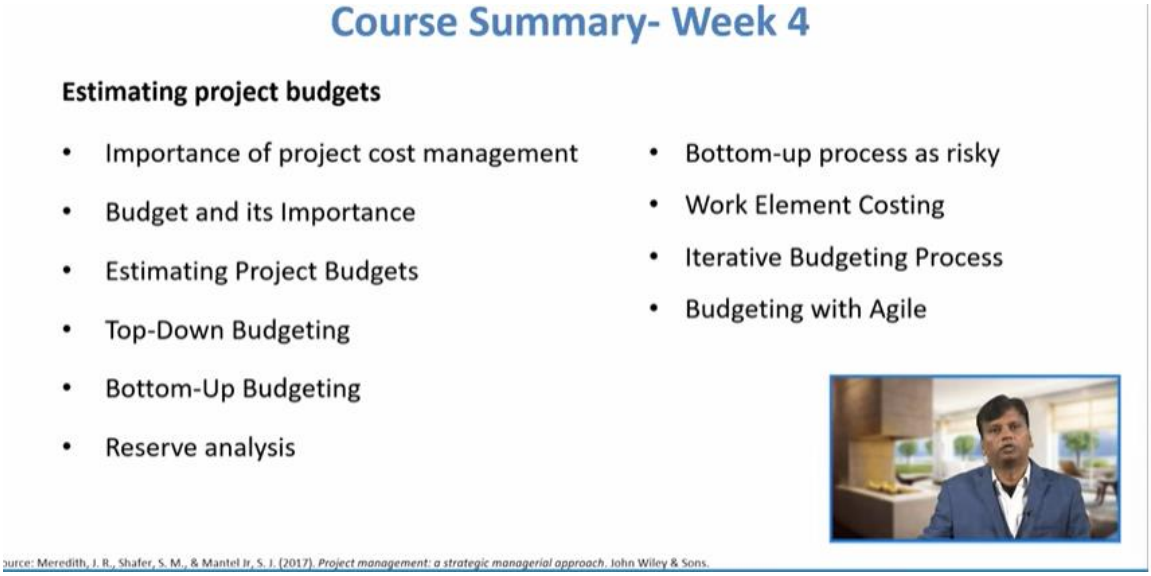
ource: Meredith, J. R., Shafer, S. M., & Mantel Jr, S. J. (2017). *Project management: a strategic managerial approach*. John Wiley & Sons.

Then we studied about the RACI matrix for integration management. Then managing

projects by face and face gates. Then we studied about fast tracking and interface control system. After that we studied about project feasibility analysis. One thing I wanted to say in the project feasibility analysis, we did not take any numerical examples.

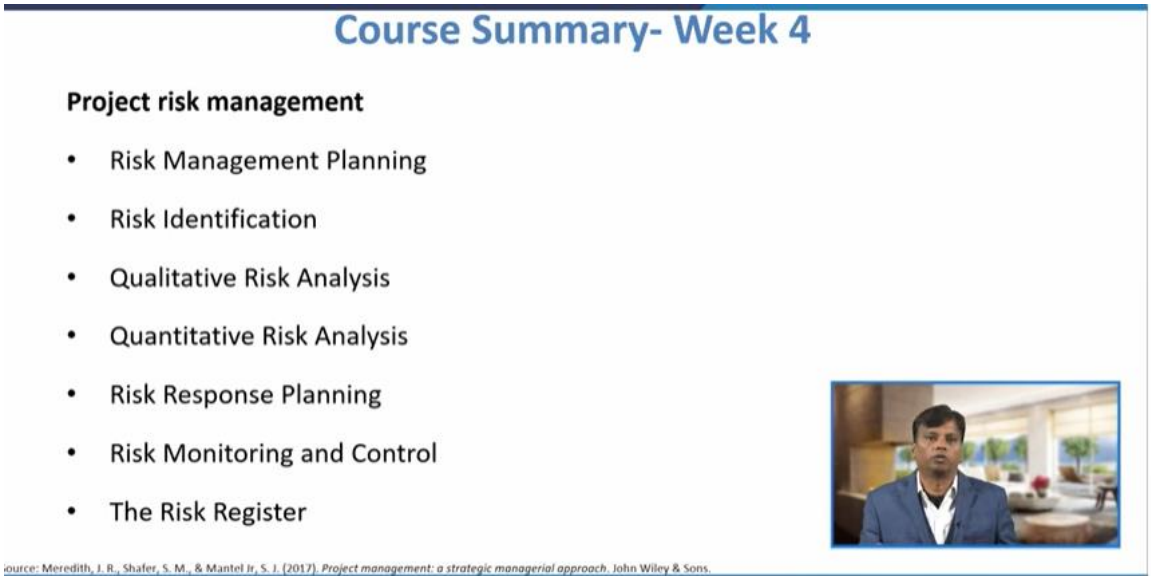


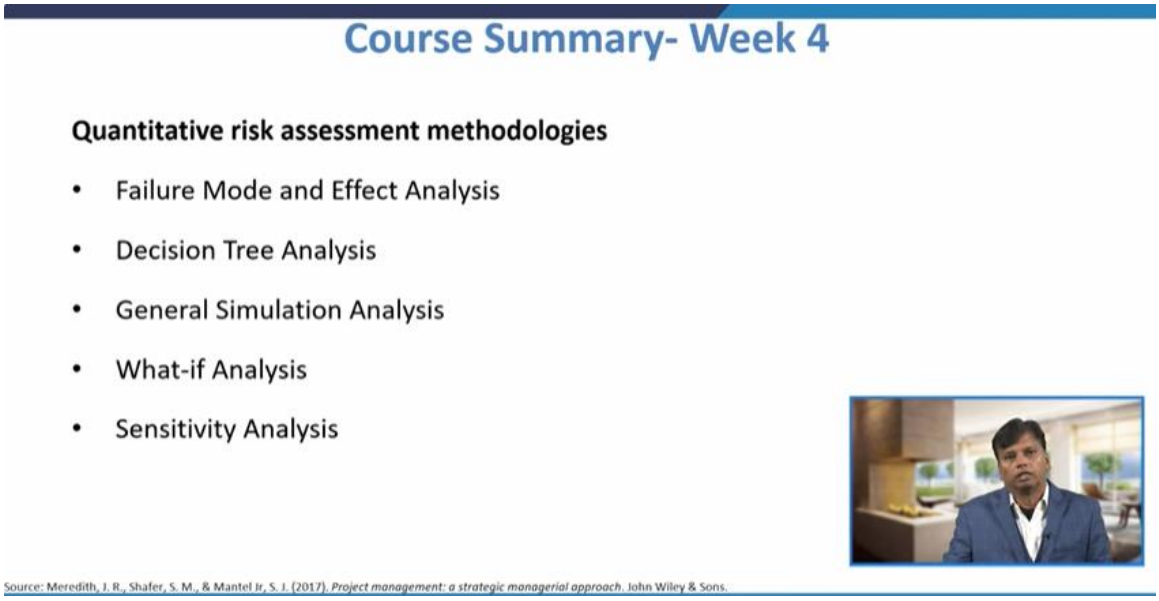
I have covered only the theoretical concepts like components of a project feasibility like market feasibility, technical feasibility, financial feasibility and environmental and social feasibility. The reason why I did not consider more numerical problems, this course is more on the strategic perspective. If you want to know about in detail about market feasibility, technical feasibility with the help of numerical examples, you can refer many popular project management books. Then we discussed about estimating project budget, where we discussed about importance of project management, project cost management, then estimating project budgets, we discussed about top-down budgeting, bottom-up budgeting, what is the importance of giving some resource, contingencies. Then we compared why bottom-up process is risky.



Then we have explained how to do the work element costing, then how to do the iterative

budgeting processes. Then later we explained how to do the budgeting for a agile project. Then we covered project risk management. Then we have studied about risk identification and some of the techniques for risk analysis we have studied, for example, qualitative risk analysis and quantitative risk analysis. Then we studied about risk response planning, then risk monitoring and control.

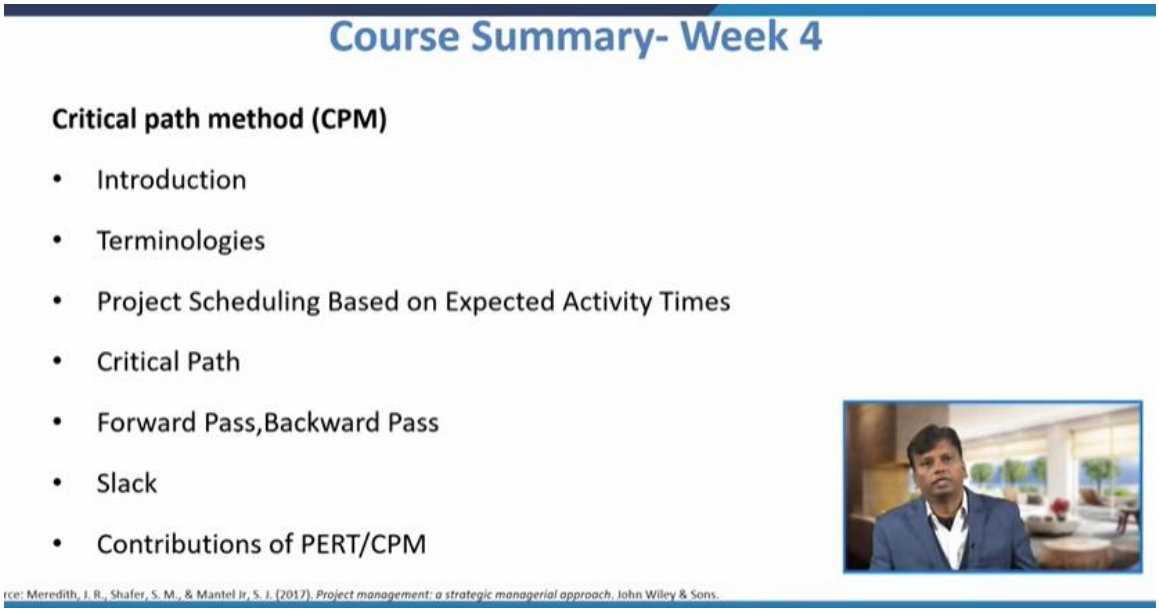




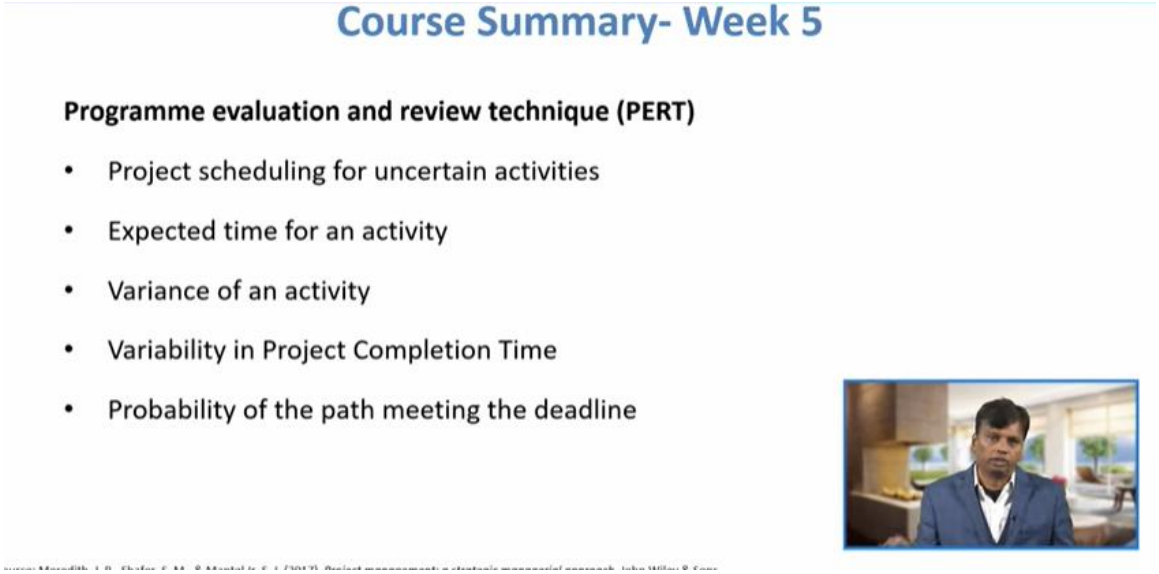
Then finally, we discussed about risk register. So, after that we discussed about quantitative risk assessment methodology. Some tools is failure mode effect analysis, decision tree analysis, simulation analysis. Then we have done what-if analysis and sensitivity analysis. Then we have entered to project scheduling.

Then we discussed about the critical path method. Then we discussed about various terminologies, then project scheduling based on expected activity time, we discussed about what is a critical path. So, we have studied two algorithms to find out the earliest starting

time and the latest finishing time, forward pass and backward pass. Then I explained the meaning of slack, total slack. There are other slacks are available, free slack and independent slack, but we have mainly focused on total slack.

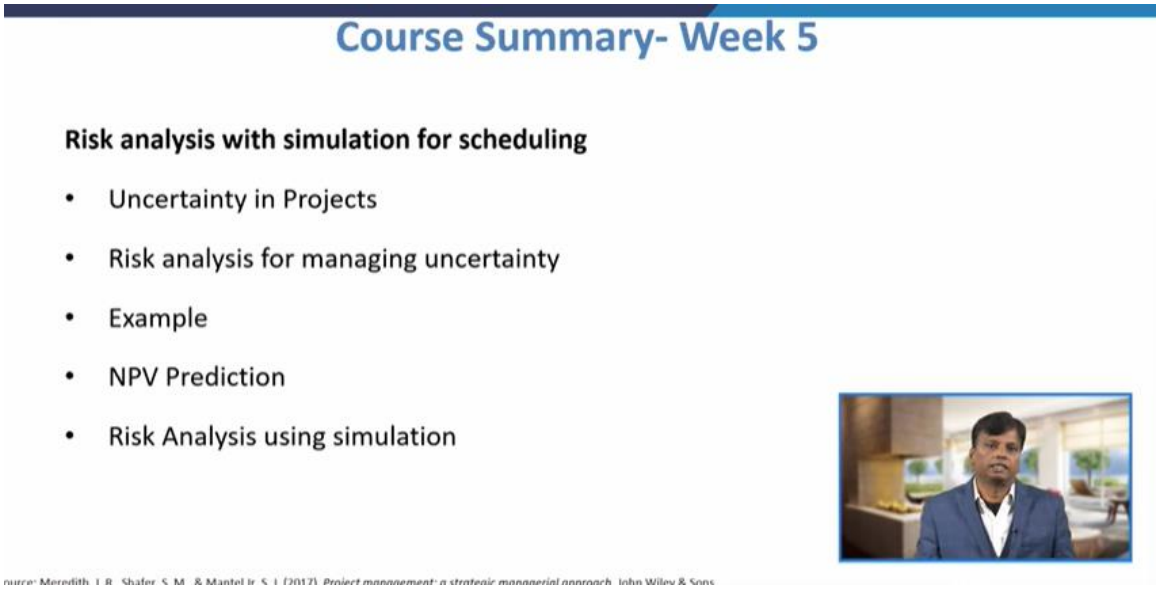


Some books they call out total float. So, that many days that activity can be delayed that would not affect the overall project duration. Then we have studied the contribution of PERT and CPM. Next we discussed about the PERT. Here whenever the project duration is uncertain in nature, it is not deterministic project activity duration. Then we have recommended the PERT method.

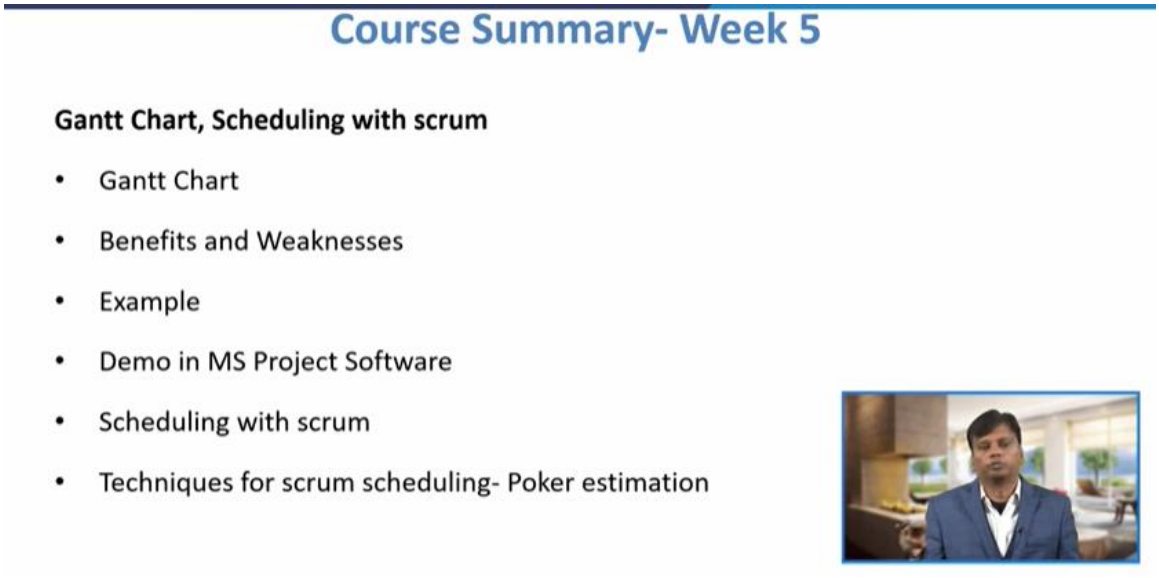


Then we studied about project scheduling with uncertain activities, expected time for an activity, then we found the variance of activity, then the variability in completion time, then what is the probability of path meeting the deadline. We have taken one numerical example, then we have explained what is the probability of completing the project. The two part which I have emphasized in this lecture is, so the project activity time followed

beta distribution, but the project completion time with respect to specific deadline. So, that will follow normal distribution. Then with the help of simulation, we have done how to do the risk analysis.

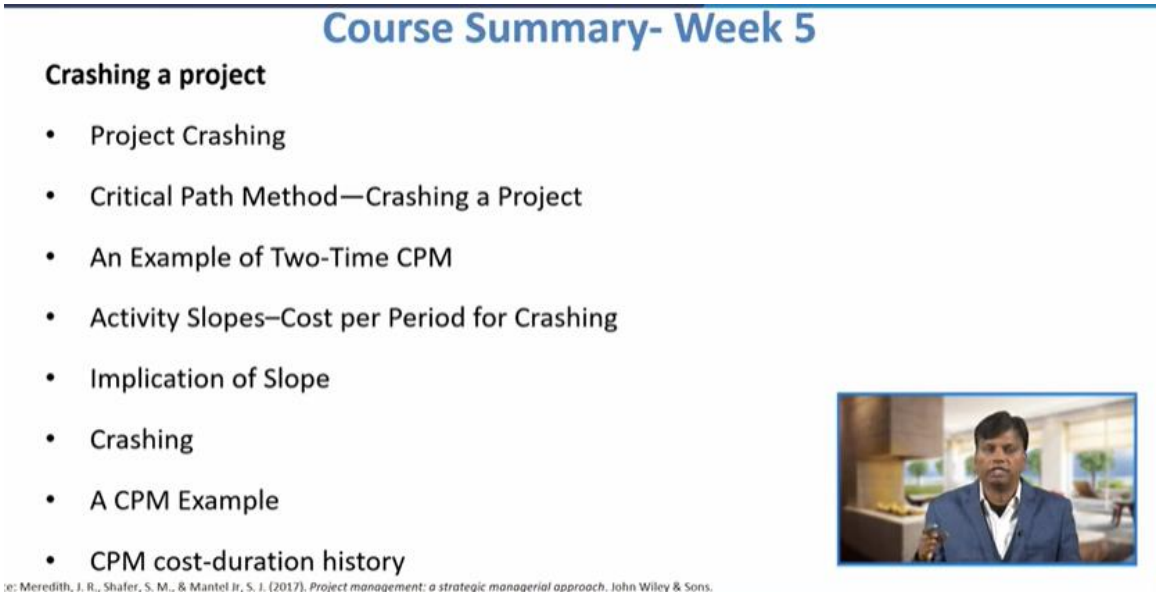


We discussed about uncertainty in project, then we have discussed how to do risk analysis for managing uncertainty. Then we have with the help of a crystal ball software, I explained how to do the risk analysis. Previously, we the same way we have done NPV prediction also, then I have done risk analysis using simulation. Next we studied about GANTT chart and scheduling with Scrum. We studied in detail about the GANTT chart, benefit and weakness of GANTT chart examples, then I have started some demo in MS project software.

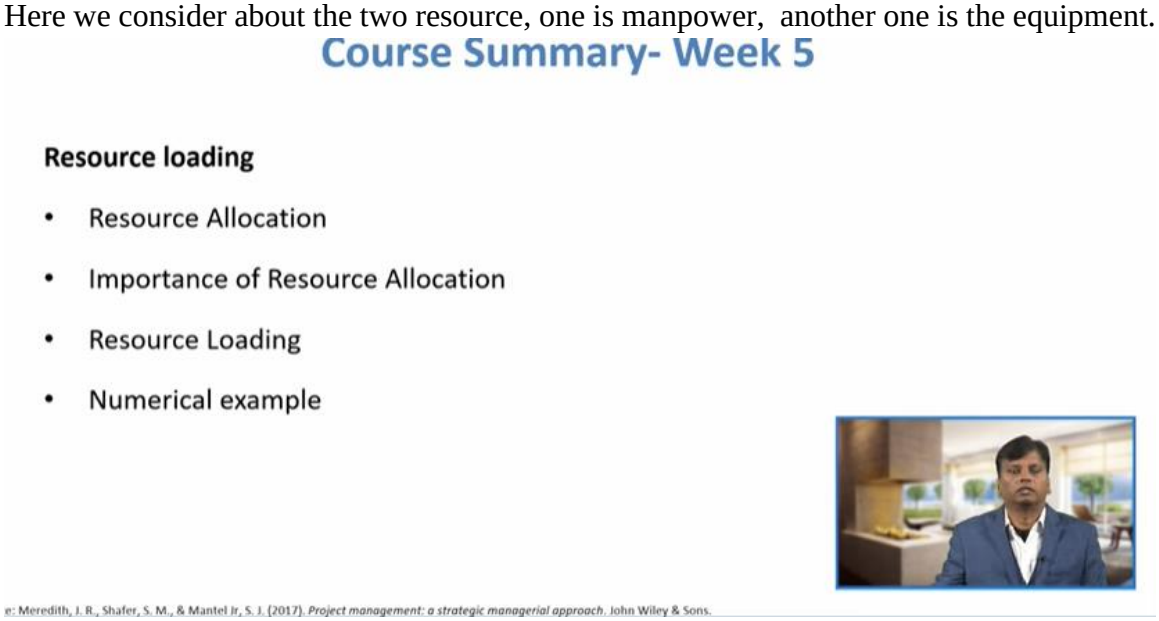


So, just have given you an overview of how to construct a GANTT chart. The next we discussed about scheduling with Scrum, then some techniques for Scrum scheduling like a poker estimation that I have covered it. The next part is the week 5, I have explained

how to crash your project. So, when you allocate the resources, two possibility will be possible. When you allocate more resources, the project duration will decrease.



When you allocate less resources, project duration will increase. So, with the help of numerical example, I have explained what is a project crashing, then crashing a critical path that I have explained, then I explained activity slope cost, because that is very useful, which activity has to be scratched first, then I have taken here example, then I have drawn a picture about the cost duration history. So, that picture will show what is the optimal duration of the project, so that the project cost will be minimized. Then I have discussed about the resource allocation, there I have taken a numerical problem of resource loading. Here we consider about the two resource, one is manpower, another one is the equipment.



Here we followed only a heuristic method, that is why it will take little more time when you do it in the heuristic manner. So, when you use MS project software that can be done very easily. Then we discussed about the resource leveling. So, what will happen when

you allocate the resources, sometime we can allocate, over allocation is possible, we allocated more resources. Otherwise, in some days the requirement of resources are very high, some days it is very low.

Course Summary- Week 6

Resource leveling

- Need for Resource levelling
- Resource levelling vs Crashing
- Heuristic Procedure for Resource Levelling
- Resource Levelling -Example

So, what will happen, we have to smoothen the loads, so that we have done with the help of a numerical example. There I have explained the need for resource leveling, then I have compared resource leveling versus crashing, then we have explained a heuristic procedure for resource leveling with the help of a numerical example. Then we talked about the critical chain, then here the concept is so far we consider more focus on time and cost, but we did not consider the criticality of the resources. So, in this lecture we discussed about if certain resources are very scarce resources, the whole scheduling or activity the total project duration will depend on that scarce resources, that is why this concept of critical chain is important. Then we discussed about reason for optimistic bias, then we discussed about when you finish certain activity very early, so whether that can be compensated with other activity which are finishing late.

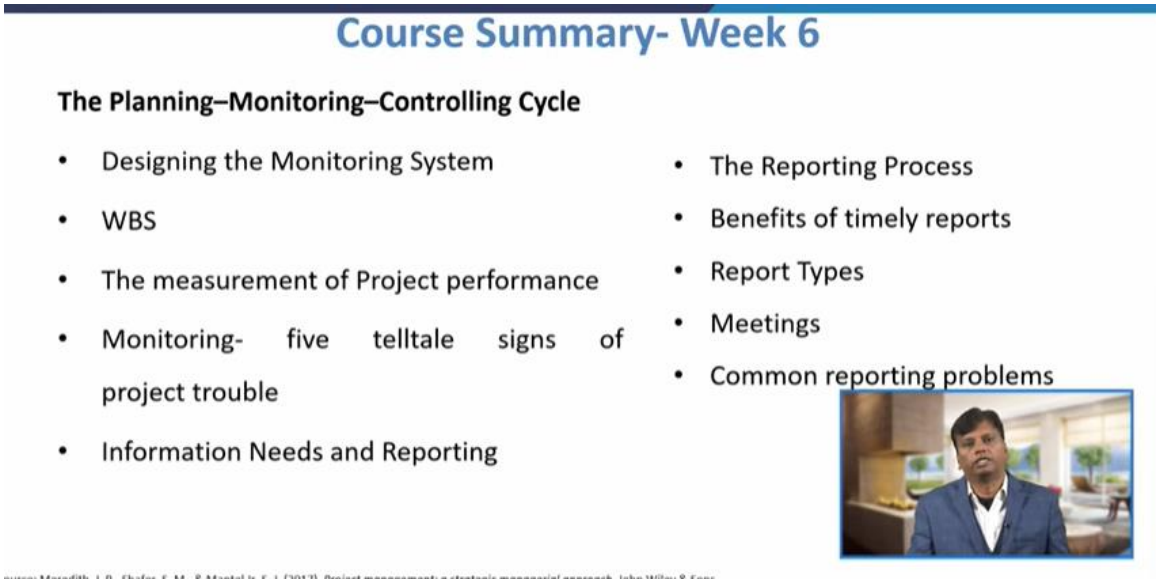
Course Summary- Week 6

Goldratt's Critical Chain

- Reasons for optimistic bias
- Do Early Finishes and Late Finishes Cancel Out?
- Common Chain of Events
- Inference from statistics
- Project Buffer
- The Critical Chain
- The Feeder Chain

So, that is why we answered this question, do early finishes and late finishes cancel out. Then common chain of events, then interface with statistics, because when you aggregate it the risk, the requirement, the variations can be reduced. Then we talked about the project

buffer, we talked about critical chain and the feeder chain. Then we discussed about planning, monitoring and control cycle, because once the project is planned it has to be properly monitored, so we have studied about designing the monitoring system for work breakdown structure. Then we measurement of project performance we studied, then five telltale sign of project trouble.



So, what are the symptoms that project is in trouble where we have to go for monitoring. Then information needs and reporting we discussed, then how to do the reporting, how what are the benefits of timely reports, types of reports, then we have given some guidelines how to conduct a meeting, then what are the common problems in reporting that also we covered it. In the week 6 we discussed about earned value analysis, this is to measure the performance of the project. So, we have explained percent completion, 0 percent completion, 100 percent completion, 50-50 percent completion we discussed about. Then I have explained earned value chart, there we discussed about various terminologies, planned value, actual completion, earned value, like that many terminologies have studied about.

Course Summary- Week 6

Earned value analysis

- Earned value chart and calculations
- Estimating 'Percent Completion'
- Earned Value chart
- Terminologies used
- Variance
- Example
- Updating a Project's Earned Value

ure: Meredith, J. R., Shafer, S. M., & Mantel Jr, S. J. (2017). *Project management: a strategic managerial approach*. John Wiley & Sons.

Course Summary- Week 6

Agile Tools for Tracking Project Progress

- Task Boards
- Burnup and Burndown Charts
- Burndown Charts
- Burnup Charts
  - MS Project Example

Then variance, if there is a difference, cost variance, schedule variance, then I have taken a numerical problem, I have calculated all these terminologies which I have discussed, then how to update your projects earned value that also I have discussed. Then I have discussed about agile tools for tracking project progress, then we studied about three important tool one is a task board, burn up chart and burn down chart. In that lecture also I have given more detailed in a more detailed way how to construct a Gantt chart and how to find out the critical path, then how to see the earliest starting time, earliest finishing time. Then week 7 we studied about three types of project controlling like cybernetic control, go no go control and post control. So, before explaining this three type of controlling then I have given how to control the physical assets, then how to control the human resources and what is the importance of controlling financial resources.

Course Summary- Week 7

Three types of project-controlling

- Project Control
- Physical Asset Control
- Human Resource Control
- Financial Resource Control
- Three Types of Control Processes
- Cybernetic Control
- Go/No-Go Controls
- Post control
- Recommendations for Performance and Process Improvement

Course Summary- Week 7

Control of change scope and scope creep

- Causes for Project Change
- Scope Creep reason
- Purpose of the formal change control system
- Guidelines for effective change control
- Controlling Creative Activities
- Process Review
- Personnel Reassignment
- Control of Input Resources

ource: Meredith, J. R., Shafer, S. M., & Mantel Jr, S. J. (2017). *Project management: a strategic managerial approach*. John Wiley & Sons.

Then I discussed about three way of project controlling cybernetic go no go post control, then recommendations for performance and process improvement also I have discussed. Then control for change scope and scope creep, suppose the scope is keep on extending how to control that because when you extend the scope of the project or the budget will be affected, the duration will be affected, the manpower will be affected. So, we have to we should not allow more changes in the scope at the end of the project. If there are more changes we should go to agile project, but we have discussed about causes for project change that is a scope change. Then purpose of formal change control system if somebody bringing a new change that has to be properly incorporated, then what are the guidelines for effective change control, then how to control creative activities, then we discussed about the process review, personal tree assignment and control of input resources.

Course Summary- Week 7

Project Audit

- Purposes of Evaluation—Goals of the System
- Direct Goals
- Ancillary Goals
- Project Audit Report format
- Financial vs Project Audits
- Depth of the Audit
- Information in the Audit Report
- Responsibilities of the Project Auditor/Evaluator
- Steps for carrying out an Audit
- Project Audit Life Cycle

Course Summary- Week 7

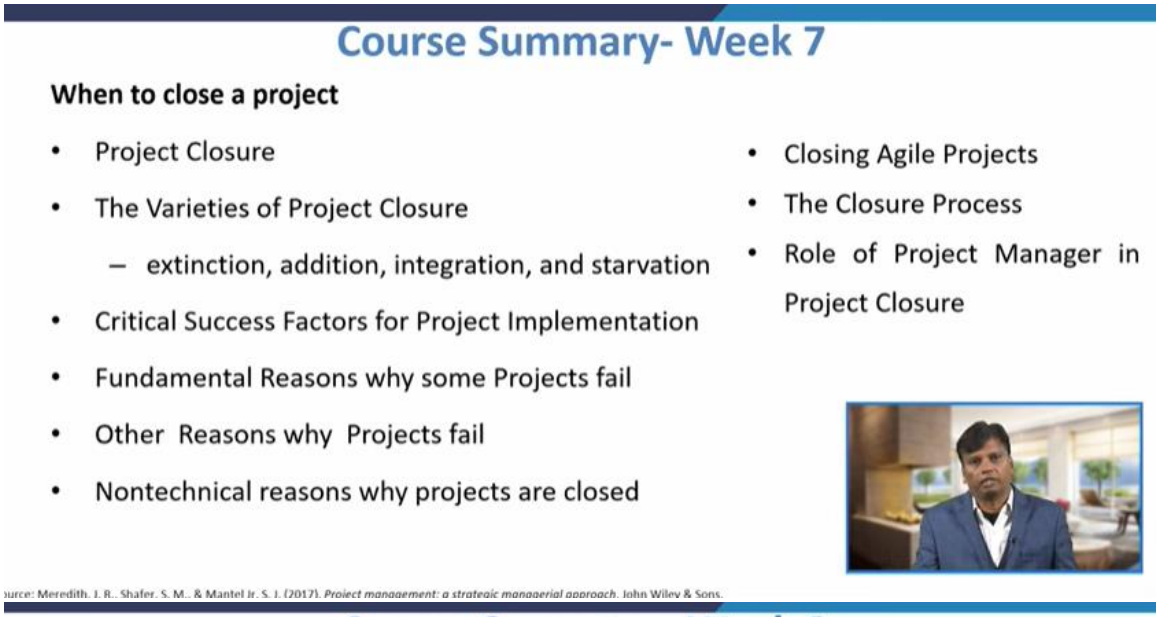
Essentials of an Audit/Evaluation

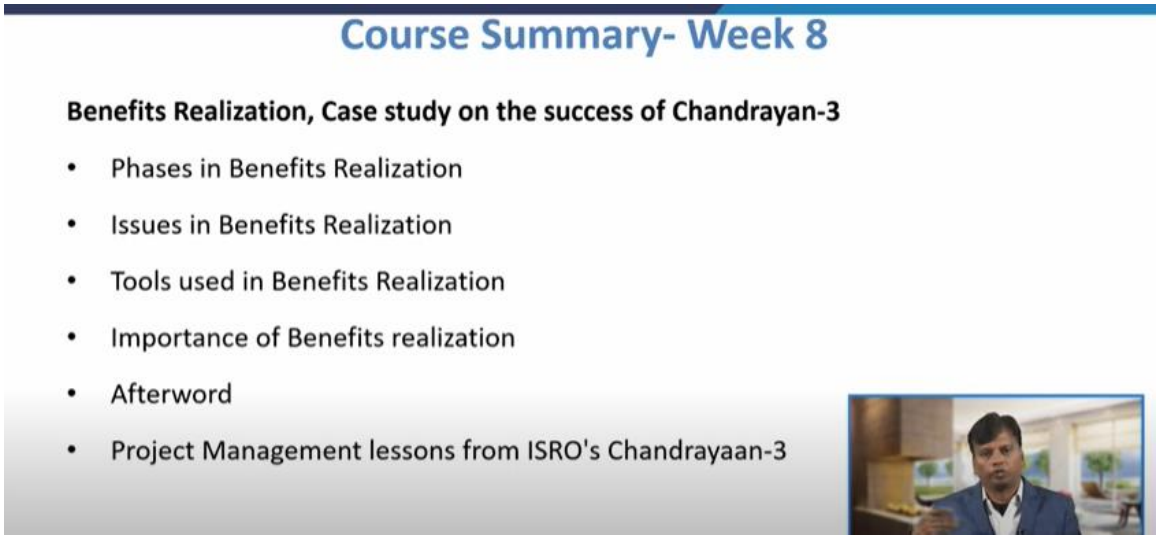
- The A/E Team
- Access to Records
- Access to Project Personnel and Others
- Measurement
- A Note to the Auditor/Evaluator
- Charts, written reports, and firsthand observation
- The auditor: 7 golden rules
- The auditee: 7 golden rules

urce: Meredith, J. R., Shafer, S. M., & Mantel Jr, S. J. (2017). *Project management: a strategic managerial approach*. John Wiley & Sons.

These are controlling creative activities. Then we discussed about the project audit, there we studied about purpose of evaluation, direct goals, ancillary goals, then what should be the format of project audit, then I have compared financial audit versus project audit, there I have explained what is the depth of audit and information, what kind of information is required for preparing audit report. Then I have discussed about responsibilities of auditor and evaluator, then steps for carrying out audit, then I discussed about which stage of the project life cycle that audit has to be done, whether it has to be starting at the stage or the end stage. Then we discussed about more detailed about essentials for auditor evaluation like importance of an auditor having access to records, access to project personnel, then how to measure the project performance, then given some note that important point for auditor, then discussed about some benefits of advantage, disadvantage of certain project reports like charts, written reports and finished observations. Given some guidelines for auditor and auditee, seven golden rules that will be very useful for an auditor also and an

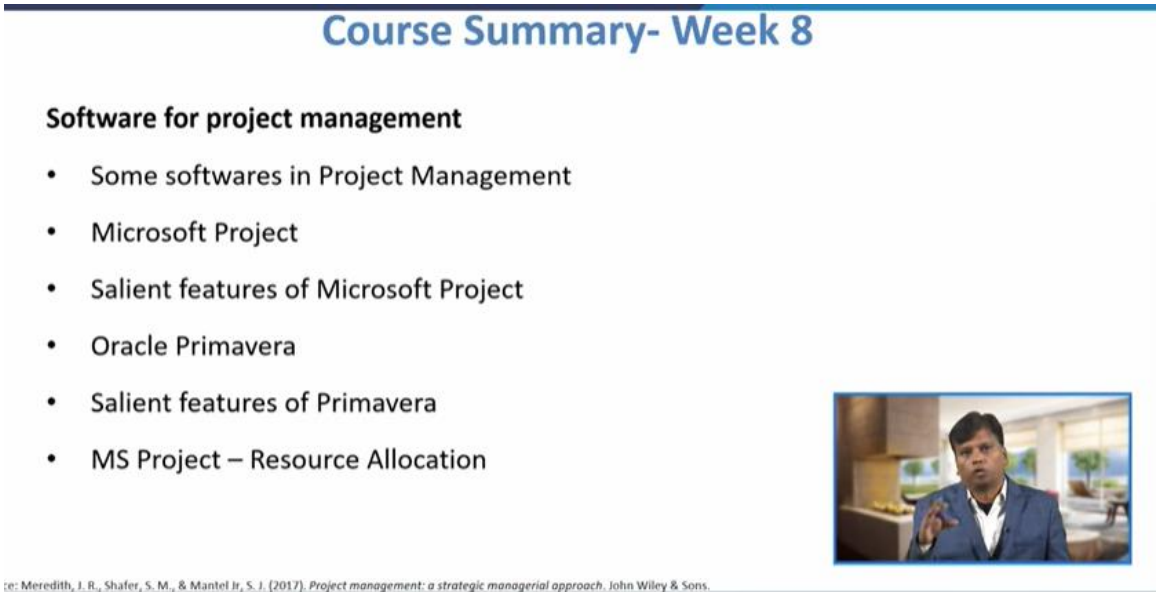
auditee also. Then we discussed about the project closure, then different way of closing a project like extension, addition, integration and starvation, then discussed about critical success factors for project implementation, then we discussed about why fundamental, what are the fundamental reasons that project fail, then there are other non-technical reasons that project fails, then how to close an agile project, then what are the closer process and what is the role of project manager in project closure that I have discussed.

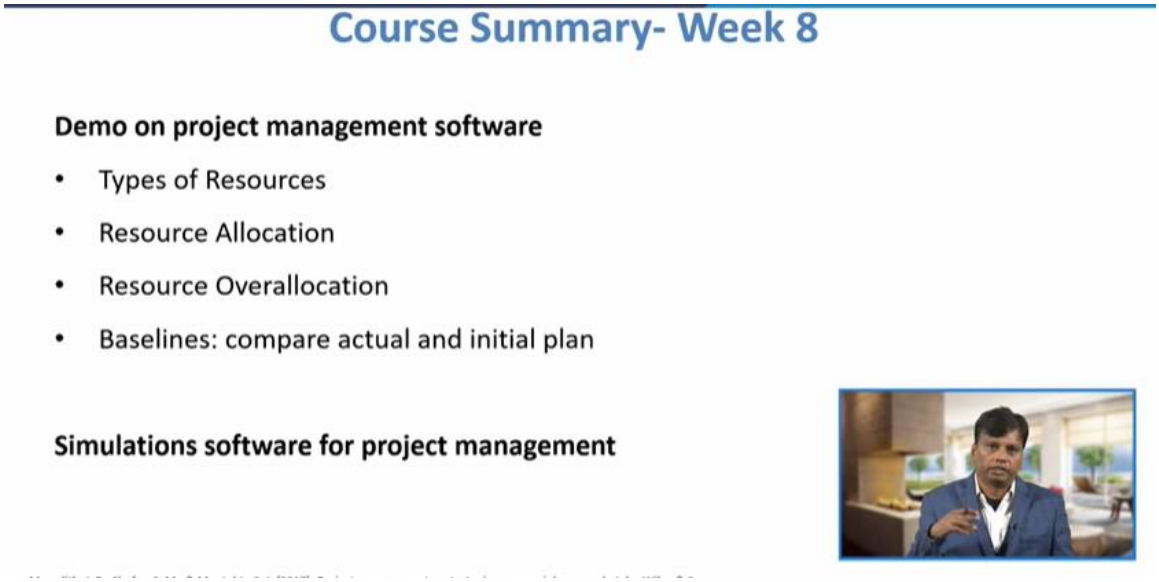




After that I discussed about the benefit realization and we have taken a very important case study that learning from Chandrayaan 3 projects. There I discussed about the different phases in benefit realization. So, when you hand over the project, there are many behavioral issues to adopt that project, that is why there I under the heading of issues in benefit realization, I have explained about some behavioral issues for accepting or implementing new projects, then I discussed about tools in benefit realization, then we have given after benefit realization what to do, there I have explained it, then I have explained what are the project management lessons from successful launching of

Chandrayaan 3 by ISRO. The last phase I discussed about softwares for project management. First I discussed about the softwares, then I have explained salient features of Microsoft project and Primevera.





So, in that lectures I have given some theoretical concept, what is a milestone, what is the resource allocation, then how to combine various task into work packages, work packages into project. In the next lecture I have discussed about some more features of MS project, there I have discussed about resource allocations and various maneuvering into the MS project like various tools, various customization options in the MS software with the help of a numerical example. After that I discussed about some simulation software for the project management. So, I have taken a sample problem with the help of sample problem for your project management.

For example, project completion time. Dear students, in this course I have covered only

basics of project management and also I have shown a few points on introduction about project management softwares and simulation softwares. If you want to become an expert in the area of project management, I strongly recommend you to study more freely available or commercial softwares. I would like to thank my TA for this course, Mr. Siddharth and Ms. Aparna for their continuous support. I have enjoyed for taking this lecture and interacting with you. Once again, I thank you for enrolling in this course. Thank you.