

Software Project Management
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Lecture - 32
Team Management

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Welcome, to this lecture. In this lecture, we will discuss about Team Management, some very basic concepts and then, we will look at the organization structure.

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A slide with a yellow background and a blue header. The word 'Motivation' is written in bold black text on a yellow rectangular background. Below it are several bullet points: 'Motivation and hard work can often make up for shortfalls in innate skills', 'Taylor's approach - financial incentives', and 'Abraham Maslow (1908-1970)'. Under Maslow's name are three sub-bullets: 'Motivations vary from individual to individual', 'hierarchy of needs - as lower ones fulfilled, higher ones emerge', and 'Lowest level - food, shelter'. The final sub-bullet is 'Highest level - self-actualization'. In the bottom right corner is a small video inset of Prof. Rajib Mall. The bottom of the slide features the IIT Kharagpur logo and the text 'NPTEL ONLINE CERTIFICATION COURSES'.

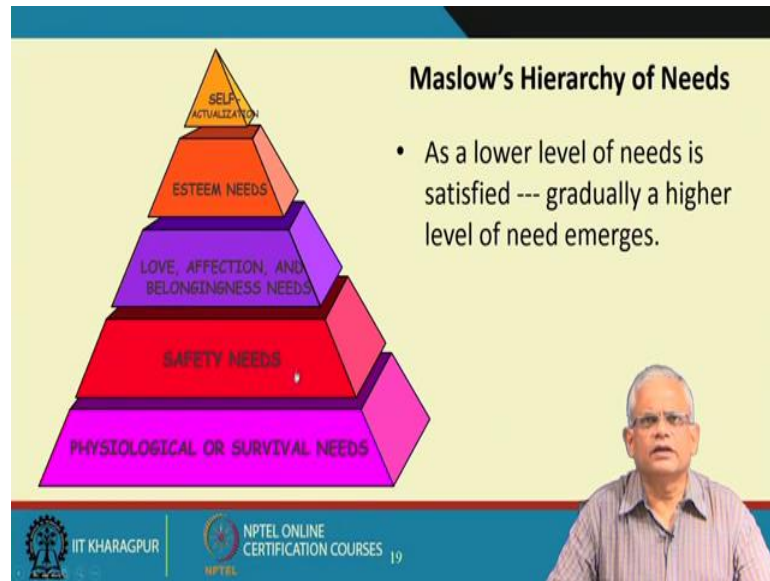
In the last lecture, we had seen some very basic theories that the manager must be aware for effective team management; today, in this lecture we will see few more concepts. The first one is with respect to motivation. We had said that software project manager sorry, the software developer has certain skills and there is a wide variance in the capability of the software developers.

But, then we must also be aware that motivation and hard work can often make up for the shortfall in the skills. We had said that some studies found that the competency or the effectiveness of the developers varies from a in a scale of 1 to 25, but then the one who is less competent, if he is very sincere, motivated and hard worker he can make up for the gap in the competency.

We had discussed about the Taylor's approach about giving financial incentive as the major motivator. But, Abraham Maslow he said that financial incentives often do not work. The motivation actually vary from individual to individual and also based on the time or the point of time in his carrier when you are giving him the incentive. For every individual there is a hierarchy of needs, as the lower items in the hierarchy are filled then the higher ones emerge.

At the lowest level the requirements are food, shelter. A worker who is not having enough food, shelter and so on, and you provide him he will feel motivated, but then the workers who were well of, employed for long time and then you give them these incentives it may not motivate them much. And, at the highest level of the hierarchy are the self-actualization. Let us look at this.

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Maslow's Hierarchy of Needs

- As a lower level of needs is satisfied --- gradually a higher level of need emerges.

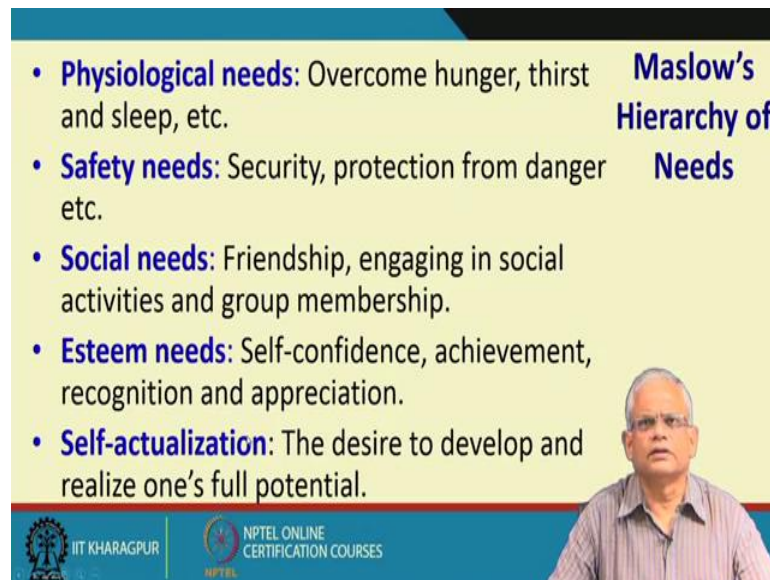
The diagram shows a pyramid with five levels, from top to bottom: SELF-ACTUALIZATION (yellow), ESTEEM NEEDS (orange), LOVE, AFFECTION, AND BELONGINGNESS NEEDS (purple), SAFETY NEEDS (red), and PHYSIOLOGICAL OR SURVIVAL NEEDS (pink). The speaker in the bottom right corner is a man with glasses wearing a striped shirt.

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Maslow's hierarchy of needs we can see that at the lowest level of the hierarchy is the physiological or survival needs – these are food, shelter and so on. And, then at the safety needs, freedom from danger and so on. Safety then the social needs and once these are filled like belongingness, liking the organization, people liking, then the esteem needs and finally, self-actualization.

As one of the level is filled for a project member then the higher ones emerge, once the lower one is filled more of that does not motivate the team member. We need to give a higher level incentive. Let us look at these incentives are sorry this hierarchy of needs in some detail.

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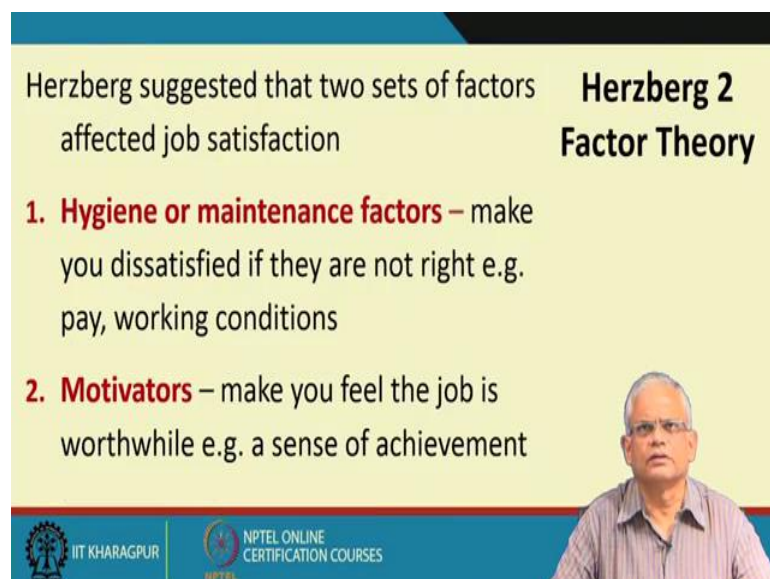
Maslow's Hierarchy of Needs

- **Physiological needs:** Overcome hunger, thirst and sleep, etc.
- **Safety needs:** Security, protection from danger etc.
- **Social needs:** Friendship, engaging in social activities and group membership.
- **Esteem needs:** Self-confidence, achievement, recognition and appreciation.
- **Self-actualization:** The desire to develop and realize one's full potential.

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The physiological needs are the need to overcome hunger, thirst, sleep etcetera. The safety needs are security, protection from danger and so on. The social needs are friendship, engaging in social activities, group membership and so on. The esteem needs are self-confidence, achievement, recognition, awards, appreciation and so on. And, at the top level is the self-actualization where all the previous needs are filled and the employee, the motivation is the desire to develop one's full potential.

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Herzberg suggested that two sets of factors affected job satisfaction


Herzberg 2 Factor Theory

1. **Hygiene or maintenance factors** – make you dissatisfied if they are not right e.g. pay, working conditions
2. **Motivators** – make you feel the job is worthwhile e.g. a sense of achievement

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The Herzberg's 2 factor theory: here Herzberg suggested that two sets of factor affected job satisfaction. One, he called as the hygiene or the maintenance factor and if these are not right the employees become dissatisfied. For example, the pay, working conditions etcetera. And, there are several things which are motivators. These factors make it worthwhile the make the job worthwhile and there is a sense of achievement for the employees.

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• Motivating factors relate to content of job.

- Called '**satisfiers**' and are factors which can increase the motivation to work better and harder.

1. **Recognition of effort and performance**
2. **The nature of the job itself – does it provide the employee with an appropriate degree of challenge?**
3. **Sense of achievement**
4. **Opportunity for promotion**

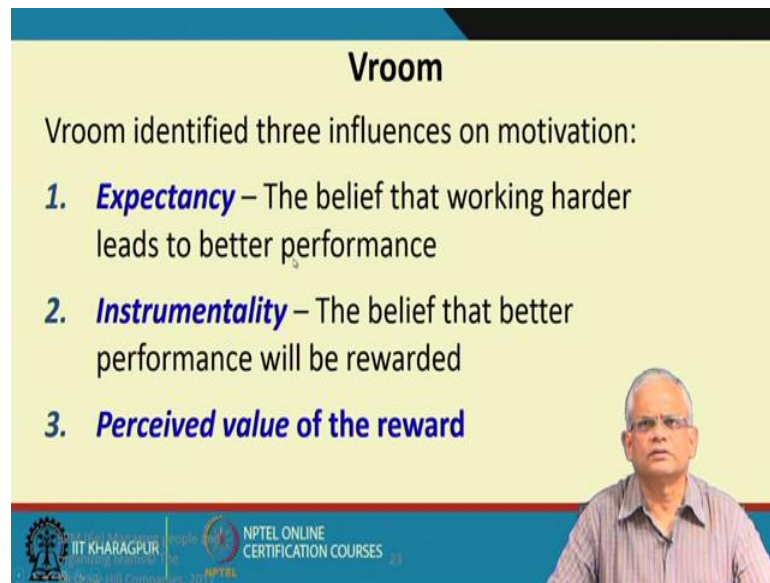
Motivating factors

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Let us look at the motive motivators, these are also called as satisfiers. Examples of these are recognition of effort and performance. The manger or the organization need to recognize employees who put lot of effort, show superior performance. Another motivator is the nature of the job itself – is it a routine job where the employee finds no challenge at all or it makes him think put his best. The sense of achievement, opportunity for promotion and so on these are the satisfiers.

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Vroom

Vroom identified three influences on motivation:

1. **Expectancy** – The belief that working harder leads to better performance
2. **Instrumentality** – The belief that better performance will be rewarded
3. **Perceived value of the reward**

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Vroom identified three influences on motivation. One was expectancy; the belief that working harder leads to better performance. Just to give an example where expectancy does not hold let us say a software has a bug and different developers are put large number of hours trying to locate the bug and still are not able to find it. And, here they are demotivated because they do not have the expectancy. They do not believe that if they put another 10 hours, they would really be able to detect the bug because already hundreds of hours have been spent without detecting the bug. There is no expectancy that a few hours of additional work will help them detect the bug.

Instrumentality – the belief that better performance will be rewarded. Let us say the developers are developing a software and if they implement all the features well, then this will be accepted by the customer, appreciated and so on. But, let us assume that already the customer has got hold of another software which is working quite well and since they have already given this project it is being developed, but then they may not use it actually, just because they had given it and not able to cancel, then the project team feel demotivated.

They do not have the instrumentality, that is, if they do a good software that will be appreciated because it may just gather dust and put into cold storage, nobody will use it because the customer is already using another software. So, in that case, there is no

instrumentality; just giving an example. The perceived value of reward. This is another motivator what the developers perceived the reward to be.

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The slide features a yellow background with a blue header and footer. A yellow box highlights the title 'Oldham-Hackman job characteristics'. A small video inset of a man is in the bottom right corner. The footer contains logos for IIT KHARAGPUR and NPTEL ONLINE CERTIFICATION COURSES.

- Identified the following characteristics of a job which make it more 'meaningful'
 - Skill variety
 - Task identity
 - Task significance
- Two other factors contributed to satisfaction:
 - Autonomy
 - Feedback

The job characteristics which make the job more meaningful and motivate the team members is given by the Oldham-Hackman job characteristic model. Here he identified three aspects of the job; one is skill variety. If the developer is trying do just one type of thing over the years, there is no skill variety and the developer loses motivation. To think of it just somebody who is doing coding over several years may not be as highly motivated, as somebody who is having skill variety, for example, a designer or an analyst who is having a much wider things to do.

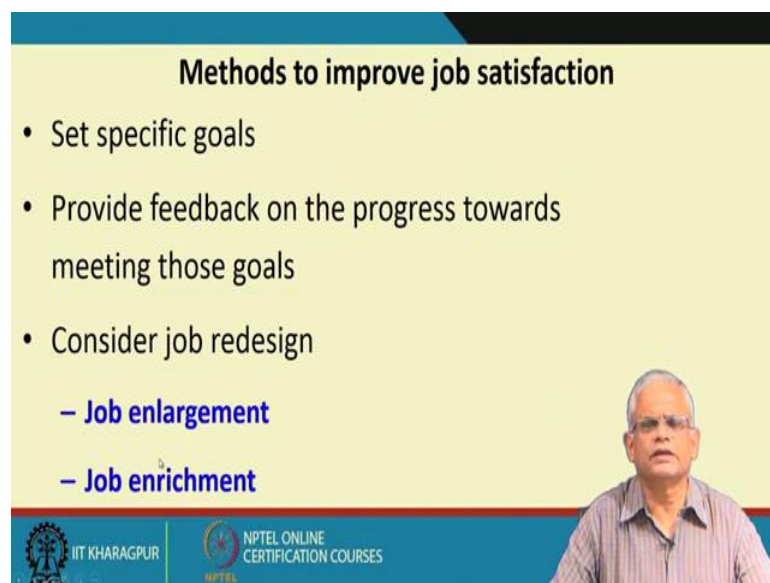
The task identity ones the task is complete can the developer be identified who has contributed to develop it or is it that there several people who contributed and no one in particular can be identified about who can be given credit. Here, if the manager gives clear objective, clear work to the developers then there is a task identity and this is the motivator, that somebody is responsible for some work and he as he completes does a good work it will be appreciated that this specific work is done by certain team member.

The task significance whether the task that is assigned to somebody it is significant, whether it will be useful to the team to the organization to the customer; if it is a very insignificant work like let us say just collecting all information from various developers

and just storing it, then it may not be so motivating as doing a crucial piece of the user interface or certain I/O tasks and so on which are easily noticed and are identified.

Two other factors he identified which contributed to the job satisfaction are autonomy, is the developer has freedom to work on his own way or he is told every step. He is told the exact steps he has to follow, he cannot use his mind then he lacks autonomy and he will be less motivated. And, the feedback from the manager, that is another factor which motivates the team members.

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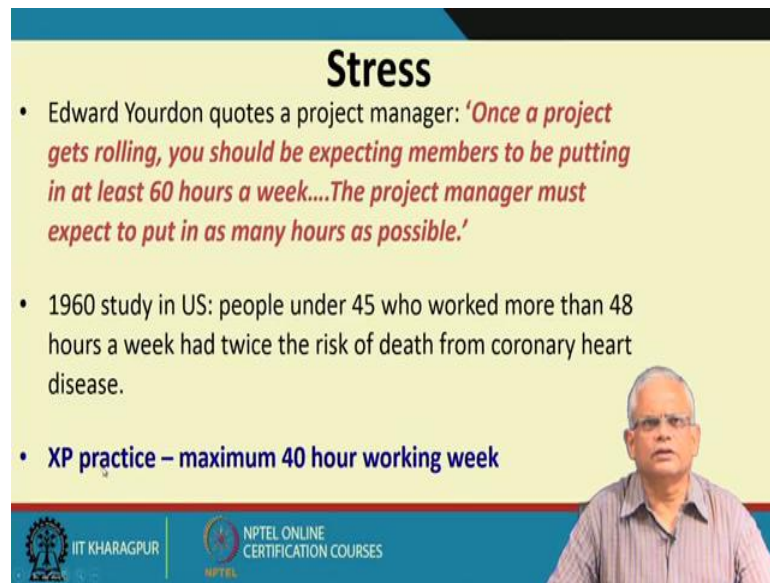
Methods to improve job satisfaction

- Set specific goals
- Provide feedback on the progress towards meeting those goals
- Consider job redesign
 - **Job enlargement**
 - **Job enrichment**

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What does the project manager do to improve job satisfaction? Have to set specific goals; this clearly defines the activity that is given to a developer. Provide feedback and progressed towards meeting those goals. Consider job redesign if it is becoming too mundane, widen the job. Job enlargement, job enrichment that is give some decision power.

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Stress

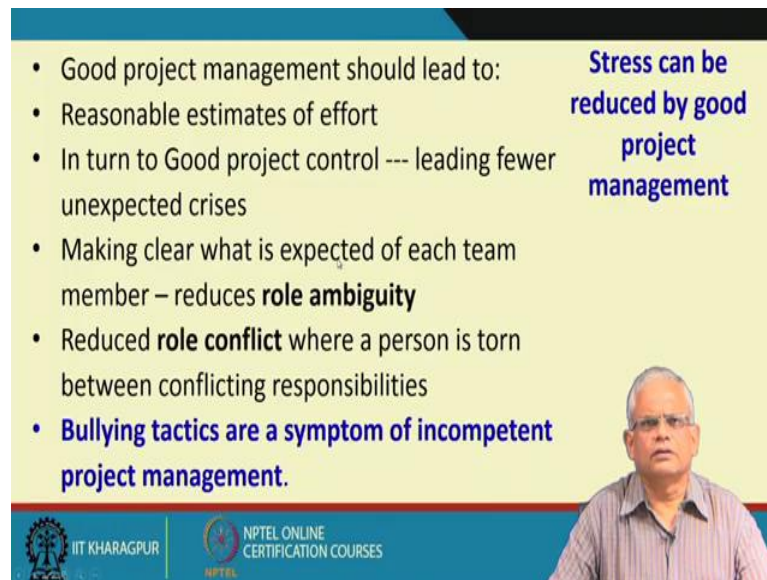
- Edward Yourdon quotes a project manager: *'Once a project gets rolling, you should be expecting members to be putting in at least 60 hours a week....The project manager must expect to put in as many hours as possible.'*
- 1960 study in US: people under 45 who worked more than 48 hours a week had twice the risk of death from coronary heart disease.
- **XP practice – maximum 40 hour working week**

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Another aspect which the project manager needs to be aware is the stress that the team members undergo. Edward Yourdon quotes a project manager saying: Once a project gets rolling, should be expecting members to a putting in at least 60 hours a week and also the project manager must expect to put in as many hours as possible. Every project when it starts there is not much stress on the team members, but as the project develops, the project team is under time pressure and there is a stress. Often they are asked to work long hours as his quoted by Edward Yourdon.

But, then as a manager will must be aware of the 1960 study in US, where people under 45 who worked more than 48 hours a week had twice the risk of death from coronary heart disease. And, many of the popular development practices like the extreme programming here it clearly identifies 40 hour working week.

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The slide features a list of bullet points on the left and a video feed of a speaker on the right. The text on the slide is as follows:

- Good project management should lead to:
- Reasonable estimates of effort
- In turn to Good project control --- leading fewer unexpected crises
- Making clear what is expected of each team member – reduces **role ambiguity**
- Reduced **role conflict** where a person is torn between conflicting responsibilities
- **Bullying tactics are a symptom of incompetent project management.**

Stress can be reduced by good project management

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An effective project manager reduces stress on the team. If the team is under stress it is partly the project manager who is to blame. A good project manager should have reasonable estimate of the effort. The project plan should be proper. There should be good project control, so that the crises in the project are very few and what is expected of the team member should be unambiguous. If the project manager is not able to assign clear work to the team members that creates lot of stress.

Reduced role conflicts that is if a project manager assigns different duties, different work to a project team and those are conflicting. For example, he has to attend the project team member has to attend two meetings at the same time because he is member of the quality team and also he is a developer, he has to attend a review and at the same time he has to attend a quality meeting, that creates stress. And, often the project manager tries to control the project using bullying tactics we just saying the theory X managers, but then the theory X managers are incompetent project managers, there should be theory Y managers.

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Organization and Team structures

- **Organization structure:**
 - How an organization is structured into teams
- **Team structure:**
 - How individuals in a team are structured
- **Typical organization structures are:**
 - **Functional organization**
 - **Project organization**
 - **Matrix organization**

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Now, let us look at the organization and team structures. In a software development organization if you visit in organization, how is the organization structured into teams? We can visit various companies and find how are these companies they have structured into teams like organization might have been might be having let us say two dozen projects and each project will be having a project team. So, how are these two dozen projects organized, whom do they report and who are the members of this team?

The other question is that how the teams individually are structured. These two aspects we call as the organization structure. The organization how is it organized in to teams and then the second thing is the individual teams, how are they structured. First let us look at the organization structure, then we will look at the team structure.

There are three basic types of organization structures. If you visit a organization you can identify that some organizations have functional organization. We will look at what is meant by functional organization. The second is the project organization and the third is the matrix organization. Let us look at three organizations structures.

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Functional organization

- Well known structure: Military, Police, hospitals,...
- Typical pyramidal structure.
 - Within each functional specialization.
- Enables development of a better technical capability for the organization
 - Specialists grouped to share knowledge
- Projects become cost effective

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In the functional organization we have various functional groups. For example, we might have analysts several analysts under the functional group. There may be another group called as designers, another group as coders, testers, database experts, networking experts and so on.

And, the organization might have several project teams and as the project starts the manager determines who or what type of expertises needed, he will contact the respective functional group managers and then they are assigned to the project. For example, project team 1 might have some designers, database experts and as the designers complete their work, the manager may determine and he will return the designer to the functional group and then request for coders and so on.

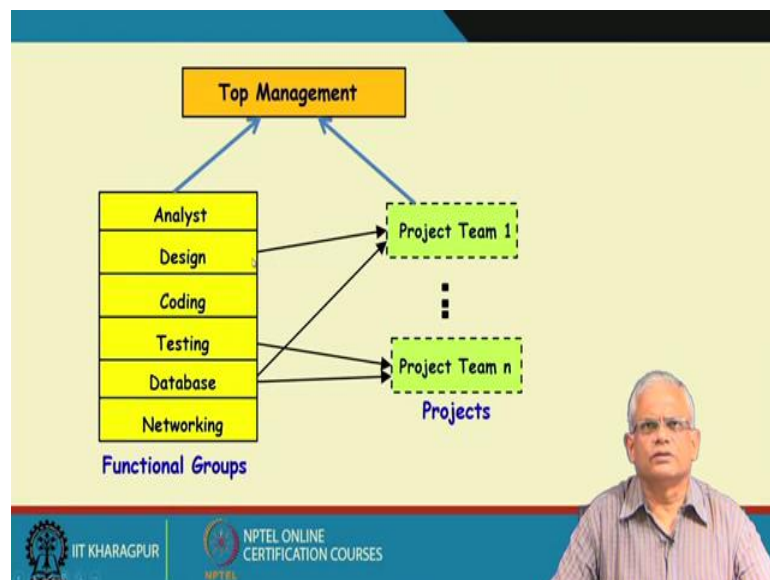
This is a well known structure for military, police, hospitals etcetera. For example, in a hospital there may be functional group of nurses, there may be functional group of various types of doctors, specialists, pharmacists and so on. And, for each activity for each patient they might need some of these. Similar is the case for military. There are various types of functional groups here, there are doctors, hospitals, there are soldiers, there are airman and so on.

And, here it is a typical pyramidal structure with each functional specialization. Here the advantage is that since the analysts are together a team reporting to a manager. Similarly, the designers together form a team, a functional group. There is a better coordination

among them. They discuss among each other. They develop better capabilities. The specialist groups at the functional groups who share knowledge. And, also the project becomes cost effective because the project team request for personnel agent when the need arises and returns them and takes the other functional groups as happens in a hospital and so on.

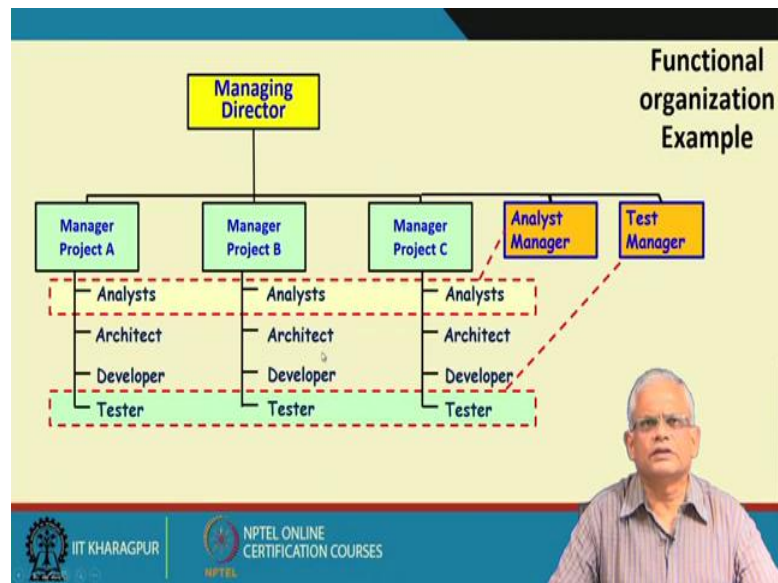
But, what about in a software organization? Let us look at the other organizations and then we will compare that how does these different organizations they perform in a software development work.

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So, this is the functional organization. We have different functional groups and as the project teams are formed and the project develops they request from different functional groups and return them. And, all of them the project team and the functional team they report to the top management.

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This is just a different diagram to explain what happens. The analysts they form a functional group, report to the analyst manager, and for different projects they may request analysts and the analyst manager assigns them specific analysts. Similarly, the architects are needed for different projects and they have each of these team members have two managers to report: one is their functional manager and another is the project manager.

Similarly, the coders, the developers, the testers they report to the test manager and also to the project to which they have been assigned. And, all of them, all the managers report to a managing director.

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Advantages of functional organization

- **Specialists in the same area:**
 - Better professional environment
 - Cooperation between specialists in the same area
- **Maximum flexibility in the use of staff.**
 - Better manpower utilization.

The advantage of the functional organization as we said that it provides better professional organization, better professional environment where the different designers, they can discuss with each other; the different analysts who form a functional group can share their ideas; there is a cooperation between specialists in the same area, they can consult each other and so on.

And, one of the biggest advantage of the functional organization is the flexibility in use of the staff. As you are saying that as and when required the specialists are requested to complete their work and go back to their functional group, but in a project organization as we will see shortly that the team members are assigned permanently to the project. And, therefore, somebody who is a tester, he may not have work all the time. Somebody who is a designer once design is complete what does he do?

Compare to a project organization where the team members are there throughout the project, in a functional organization they come and go and this provides better manpower utilization. We will see more of this as we proceed in the other lectures.

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Disadvantages of Functional Organization

- **Conflicts:**
 - Project manager and functional manager give different directives.
- **Project manager's control decreases**

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The disadvantages of the functional organization is that each team member has two managers to report to. They might give different directives and there can be conflict. And, also the project manager is control over the team decreases because he might ask his team members to do something and they might say that see we have other work to do as given by our functional manager. We will just stop at this point because the lecture hour is getting over and we will continue in the next lecture.

Thank you.