Introduction to Industry 4.0 and Industrial Internet of Things
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Lecture - 55
IIoT Applications: UAVS in Industries

Our next discussion in this lecture will focus on facility management, which is a very important aspect in manufacturing plants. So, how IIoT can improve facility management applications of IIoT for facility management is what we are going to discuss briefly. So, as I told you in all these application lectures, we are essentially talking about the same old thing whatever we have learnt in the previous lectures in the other modules, but we are implementing them. I am just showcasing you how we could implement them in order to make these different domains smarter and to have different facilities which are going to be smarter.

So, what is this facility management? We need to understand this. What is facility first of all? So, facility is a general purpose term which means buildings, precincts which could mean community infrastructure. So, facility in the context of manufacturing plants would basically imply the company infrastructure that is there, the manufacturing company their infrastructure, their buildings, their machines, different machinery, the different trucks, the fleet, etc. all these different types of infrastructure buildings, machinery, etc. all are these different types of facilities.

So, management of these facilities is what is required. So, essentially what facility management talks about is captured through this particular definition, it is basically the guiding and managing of the operations and maintenance of different facilities such as buildings, precincts, community infrastructure on behalf of property owners we need to manage all of these. So, once again let me draw and try to analyze what this facility management is going to be like.
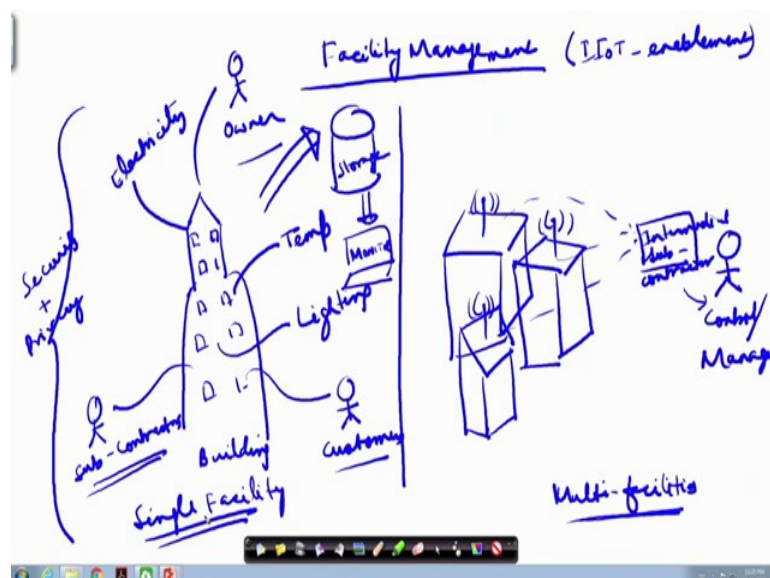
So, facility management and in this particular lecture our focus will be on IIoT enablement. So, IIoT enabled facility management. So, if we are talking about, let us talk about 2 types of facilities. It could be a single facility, we could have a single facility where we could have some kind of, I am just taking an example let us say that we have some kind of a building, a facility having different floors, different rooms, etc. and so on. This building let us say, will have an owner, has different rooms, different departments different offices, different infrastructure in them.

So, these different units are going to be powered through electricity. There could be different rooms which will have to be temperature conditioned. So, temperature conditioning of these rooms, these rooms are going to be lighted; so, lighting of these rooms is important. There are going to be different not just the owners, but there could be different other actors who are going to use this facility like, let us say customers. There could be different in an industrial facility, there could be different let us say contractors or subcontractors who could be using.

So, whenever we are talking about facility management you know we need to have a department, a facility management department which will take care of the management of all of these different entities that I have talked about, particularly this fixed infrastructure, these machinery, the buildings, the floors, the rooms, their temperature conditioning, the lighting conditioning, monitoring control all of these things plus the different users and the different actors who are going to perform different actions on this particular facility or using this particular facility.

So, owners, customers, subcontractors are examples of the different users or the actors of these facilities. So, now, if we are talking about this kind of system ultimately we need to have these different units, these different actors, work much more efficiently in order to have improved facility management. For improved facility management again as usual we need to have sensor enablement; IoT devices will have to be enabled. So, we need to have these devices which will be enabled depending on the use cases being implemented and so on. These different devices which are monitoring the condition of these different facilities, they are going to throw in data which will have to be stored; this is your storage of the data in the common database.

And finally, there is going to be some kind of a monitoring station, a control station from where this monitoring is going to be performed. So, this is going to be a common monitoring station for monitoring the facilities in the buildings using IIoT implementation. So, once again we should not forget that if you are doing all of these things; we should not forget about the security and the privacy issues. So, this was the single facility examples. Let me now give you another example, this is the multi facility so, where you have multiple facilities being monitored.

So, here we are not just talking about a single building, but we are going to have maybe a cluster of buildings and so on which all will have to be monitored. So, we are going to have different antennas fitted with them to send the data out of these buildings and so on. So, we have this multiple collection units and each of these buildings have their own subcontractors and finally, this data will have to be sent to the manager, manager or the control station. So, there could be a manager sitting in the control station, who is the facility manager taking keeping an eye on the entire facility.

In between because we are talking about multiple subcontractors and so on, in between again you could have an intermediate subcontractor, who could be sitting in between and could help this controller or the manager to monitor the facilities appropriately. So, this will be for multi facilities; multiple facility scenario and the single facility scenario and IIoT enabled facility management in both of these scenarios is what I just showcased you.

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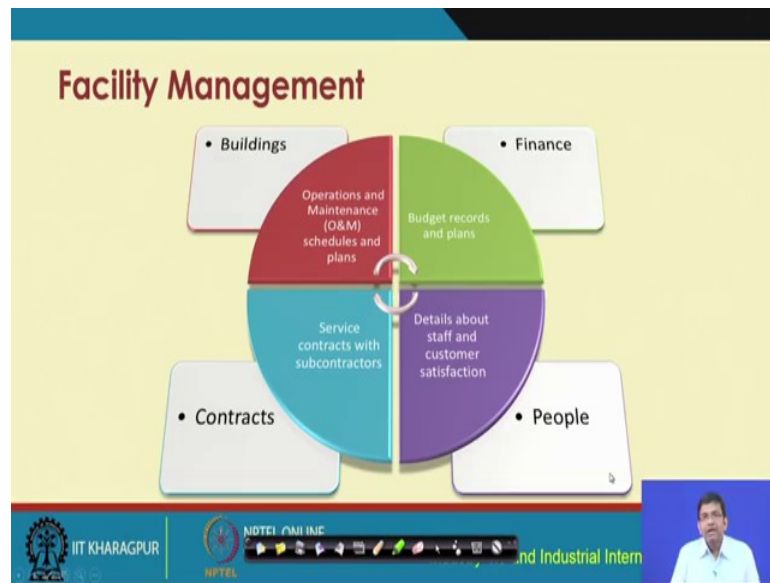
So, let us now go forward and try to understand the different concepts in facility management. So, whenever we are talking about facility management we are talking about buildings, finance, people, and contracts and so on. So, all of these will have to be managed it is not merely buildings; it is not merely people; facility includes all of these different dimensions and their management is what facility management talks about.

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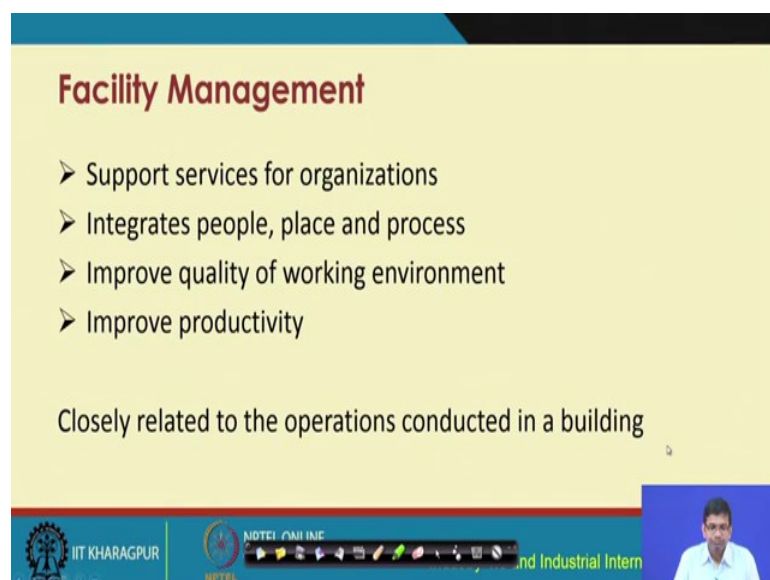
So, facility management would offer support services for organizations, would integrate people, place, process, would improve the quality of the working environment, would

improve productivity and these are closely related to the operations that are conducted in a building and monitoring, managing those different operations. So, facilities manager is going to do all of these different things.

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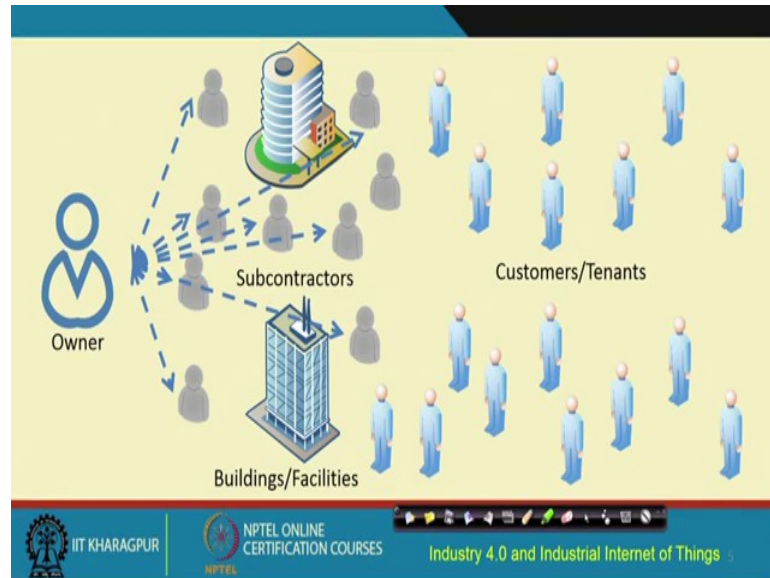
So, let us run through this particular example; I am going to now show you step wise how we are going to have this facility management. So, let us say that we have all these different ones like buildings, facilities, etc. like the ones that are shown in the figure in front of you. We also have a building owner and we have different customers, tenants of these different buildings. We may have the different subcontractors performing different things like different buildings, different floors could be handled by the subcontractors and what is required is to have this owner manage all the subcontractors and through these subcontractors manage these facilities, these buildings and so on.

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So, scope of IoT in facility management basically concerns the deployment of these different IoT devices, to get new insights through the access or gathering of the data, reducing power consumption in these facilities. Implementing different newer technologies such as LiFi, advanced security mechanisms and many different other technologies. Addressing the cost barrier, increasing the operating efficiency, reducing maintenance cost, these are the scopes of IoT implementation in facility management.

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Support services will have to be offered in terms of finance, IT, human resources, management of all of these different support services is also of concern of facility management.

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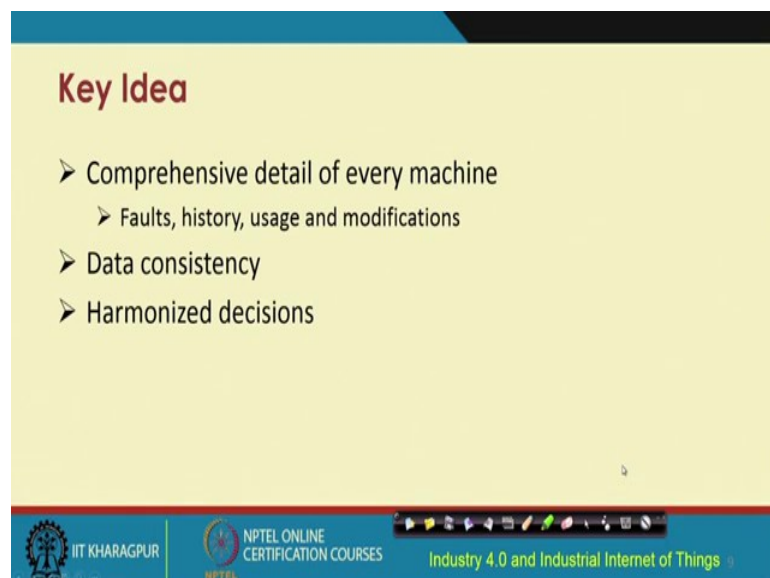
Facility management also talks about administrative support, offering administrative support, marketing, knowledge management, and business development and so on. So, these are the broader services offered as part of facility management, but these are also inclusive in facility management.

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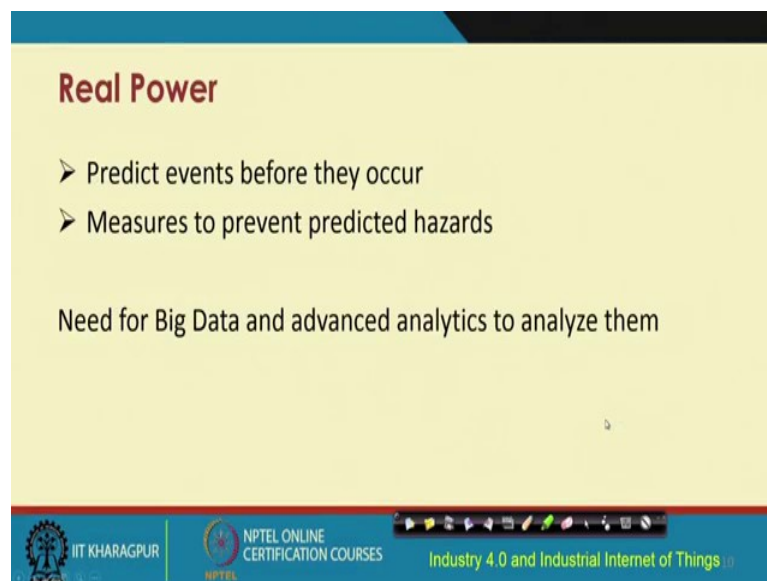
So, basically the key idea of facility management is to get a comprehensive detail of each and every infrastructure, every facility, every machine, the faults, the history, usage, modification. So, obviously, without this IoT implementation efficiently effectively getting all of these types of information, managing these information over a connected system would not be possible. So, IoT implementation is paramount for improved efficient facility management. Ensuring data consistency, making harmonized decisions is what a facility manager should also deal with.

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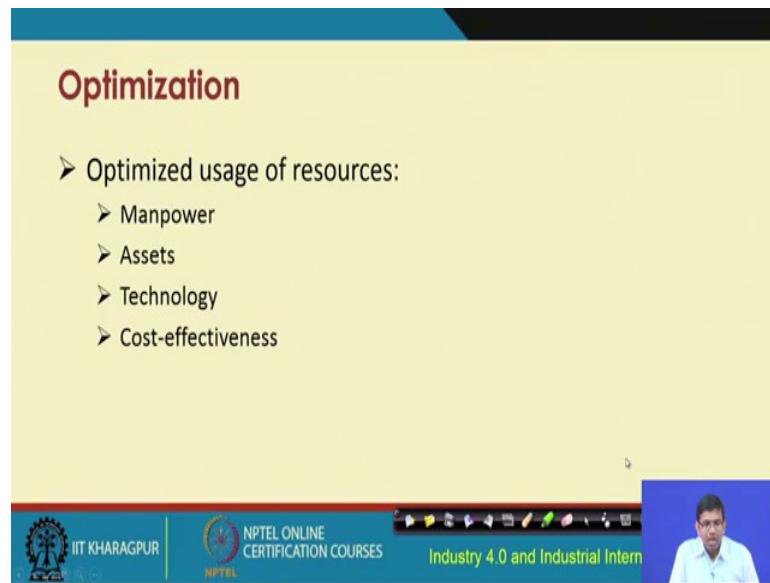
So, the real power of facility management is to predict the events before they actually occur and to measure and prevent the predicted hazards. So, advanced analytics, big data management needs to be implemented because actually the nature of the data that we deal in facility management through the IIoT implementations are basically the big data.

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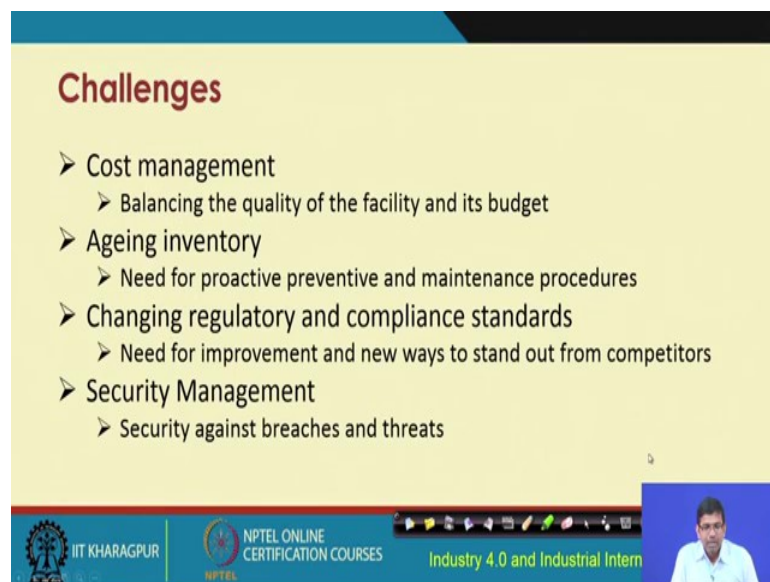
Optimization of different resources, manpower resources, assets, technology, cost effectiveness these are also different optimization issues that a facility manager deals with.

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Different challenges with facility management include cost management; that means, balancing the quality of the facility with respect to the budget, aging of the inventory so, taking proactive and preventive maintenance these are also part of this facility management. Changing regulatory and compliance standards and enforcing those within

the facility; these are also part of the facility management, security management to protect these different infrastructure facilities, machinery against security breaches and threats that is also part of security management, but is a challenge.

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So, IoT application in facility management would include; using these IoT devices to have smart lighting, smart refrigeration, use of smart meters, smart fire suppression systems. If there is a fire that occurs then detecting that in a smart way, controlling that fire, suppressing the fire in a smart way these are also part of the IoT application, improved IoT application in facility management.

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Iot application in facility management also includes installation of security systems; safety alarm systems and so on. Dealing with the HVACs, which are basically the Central Heating Ventilation and Air Conditioning systems and these are the systems which are like central systems for air conditioning, central ventilation and so on.

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Room reservation, scheduling that is also part of facility management, using IoT real time status updates of the meeting rooms to ensure double booking this is also done. This is just an example of IoT enabled facility management that can be achieved monitoring

of the stocks, usage of supplies, these are also possible efficiently these could be done with IoT application.

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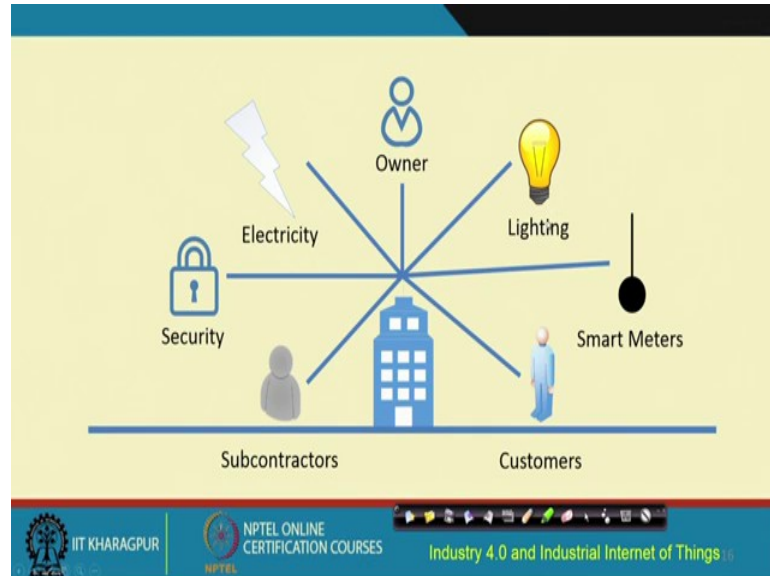
So, we are essentially talking about facilities like this these buildings which have their owners, they have electricity, lighting, different power meters, etc., managing this whole thing, having smart electricity deployment, smart lighting systems, smart temperature control and so on. So, all of these are the concerns in a single facility, smart facility management system using IoT.

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Analytics is very important because there is no use of this data that are collected through the deployment of these IoT devices if you cannot deal with this data and try to get insight out of the data; means then this data is going to be useless. So, managing the energy consumption, making data driven decisions, operational cost optimization, and remote monitoring of facilities, etc. these are of concerns with respect to analytics in facility management.

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The benefits of facility management would be having or offering improved customer experience, preventing unauthorized access, real time tracking of different things, different activities that are going on within the facilities; real time tracking of those real time tracking of intruders, surveillance. Surveillance is also something that I did not mention, but that is also part of facility management surveillance using different cameras, the CCTV cameras and so on. Then most importantly optimize; that means, ability to do more with less resources, optimization of resources and improved productivity this is also within the purview of facility management. So, this is an important benefit of facility management.

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So, IoT enablement for facility management improved customer experience and so on this is what this particular lecture concerned about, I have given you highlights about the different concerns in facility management, how IoT can help in improving these different concerns, addressing these different concerns and so on. So, for further reading these are different references that have been given to you and in case you are interested you can go through them to get further insights about facility management and facility management using IoT and IIoT.

Thank you.