Health, Safety and Environmental Management in Offshore and Petroleum Engineering

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Module - 02
Operational Safety
Lecture - 02
HSE practices

Friends, today we are going to talk about the second lecture titled, "H S E rules" in the second module, which is on operational safety of the online course that is health, safety and environmental management in offshore and petroleum engineering. Module two actually focuses on applications of safety practices in oil and gas industries.

In the last lecture, we started introducing certain basic terminologies, which are very common in H S E practice. Let us continue with that in this lecture as well and also discuss certain rules and practices, which are healthy for H S E to achieve better safety in operational production, especially in oil and gas sector.

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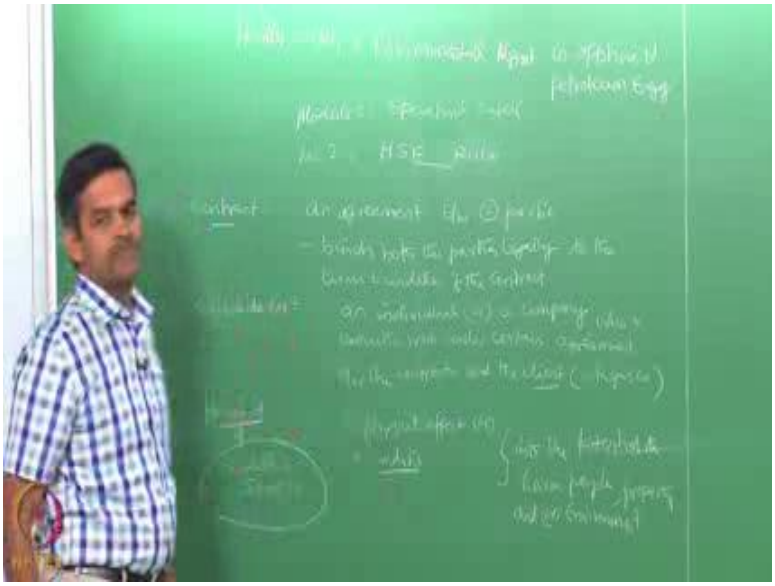

Continuing with the definitions what we had in the last lecture, contract actually is an

agreement, which is executed between two parties. This agreement binds both the parties legally to the terms and conditions of the contract. Contractor or contractors may be an individual or a company, who is executing work under certain agreement, which is generally between the contractor and the client. We already had a definition for client. We have already said why client ship is important in H S E practice. Usually, the client is the oil and gas company itself.

Let us come to more classical definitions hazard. We already said even in module one, hazard actually is a scenario. So, a physical effect or a condition with the potential to harm people, property and or the environment, in general hazard is actually a condition or a scenario.

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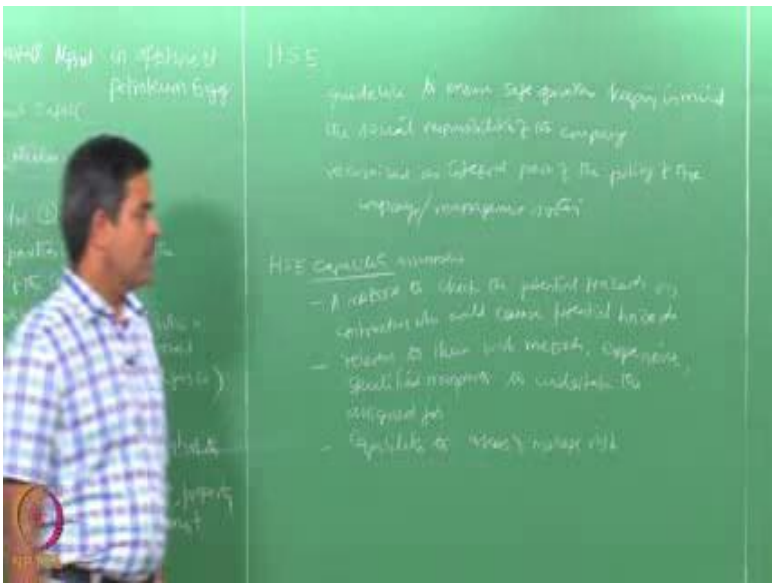

H S E, of course stands for health, safety and environment. Basically, this is a guideline to ensure safe operations, keeping in mind the social responsibilities of the company. This is recognized as integral part of the policy of the company. So, HSE policy becomes an integral part of the management system. So, let us say I want to assess the HSE capability. What do I mean by this? It is nothing but a method to check the potential hazards or the contractors, who could cause potential hazards. When you do this checking, it should be relevant to their work methods, experience, qualified manpower,

etcetera. Qualified manpower to undertake the assigned job, they want to assess that. It also assesses the capabilities to assess and manage risk.

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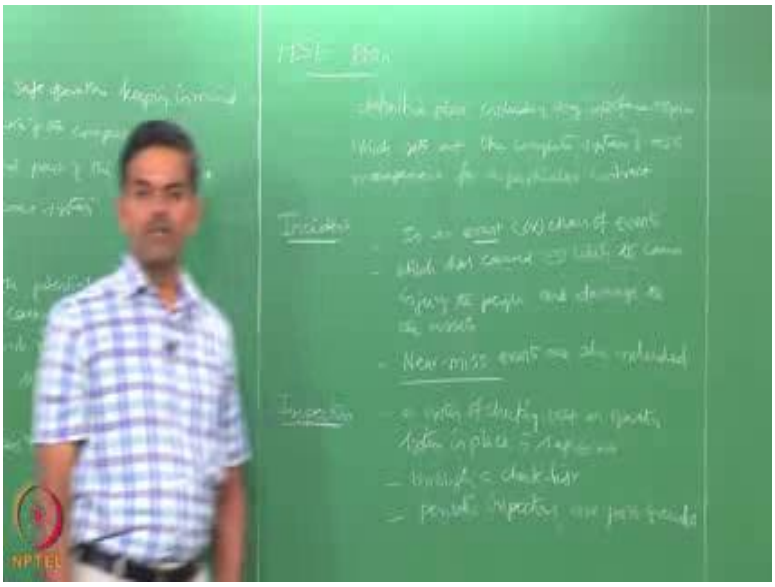

Let us see what is a H S E plan? H S E plan is a definitive plan including interface topics, which sets out the complete system of H S E management for a particular contract. More interestingly, let us talk about what is an incident. An incident is an event or chain of events, which has caused or likely to cause injury to people and damage to the assets. It will also include something called near-miss events. They are very important. The incident is likely to happen, but has not happened. So, they are called near-miss events.

So, please understand incident is different from accident. Incident is only an event or chain of events, which is caused or likely to cause in (Refer time: 09:31). Then, what is accident? Very interesting, it is a maturity of incident. We will talk about that.

Inspection; inspection is again a system of checking that an operating system is in place, system of checking that an operating system in place is safe or not. Usually, this is done by or through a checklist. So, you have important do' s and do not' s. And, the manager carries a checklist goes for inspection and completes the checklists and reports. Very importantly, periodic inspections in HSE are from or part of the audit. They are form of

part of the audit reports. It is very important. So, you cannot ignore a periodic inspection reports.

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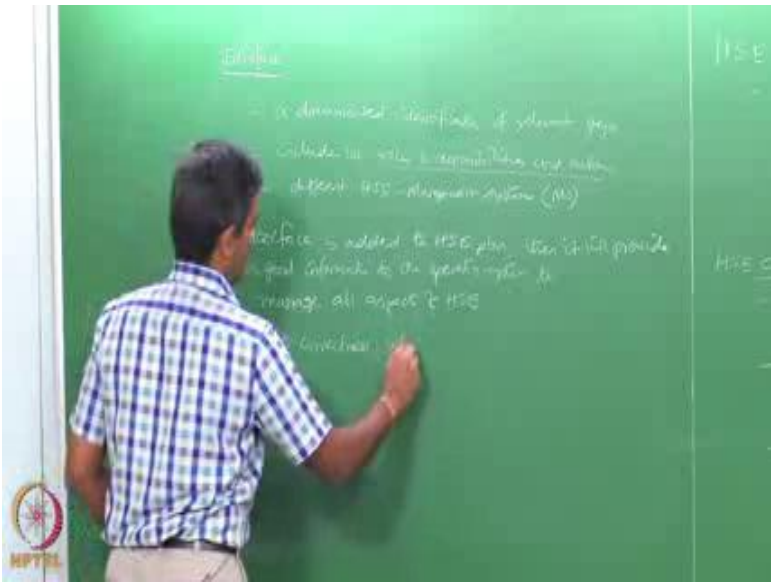

There is something called interface. It is a document or a documented identification of relevant gaps, which will include the roles and responsibilities and actions. This will identify what? The different H S E management systems, when interface is added to a H S E plan, which will connect the roles and responsibilities of various offices present in the chain of contract as a part of interface, then it will provide a good information to the operating system to manage all aspects of HSE related to that particular contract. So in terms of efficiency and correctness, interface is input.

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Leading indicator; it is a measure if adopted, helps to improve the performance. It could be skill identification of an employer, skill identification of perfection of machinery, operating conditions of any given machinery and equipments, etcetera.

Subcontractor; he can be an individual or a company again or a group of people performing some of the work of the contract. Not all, but partly. It may be related to the work, may be related to the original client or the contractor. They are also bound by H S E rules of the client. They do also have to follow all the H S E practices insisted by the client. Third party; because we used to often say H S E is a third party audit. It can be again individuals or group of people, other than the principal contractor who may be affected or likely to be affected or involved in the contract.

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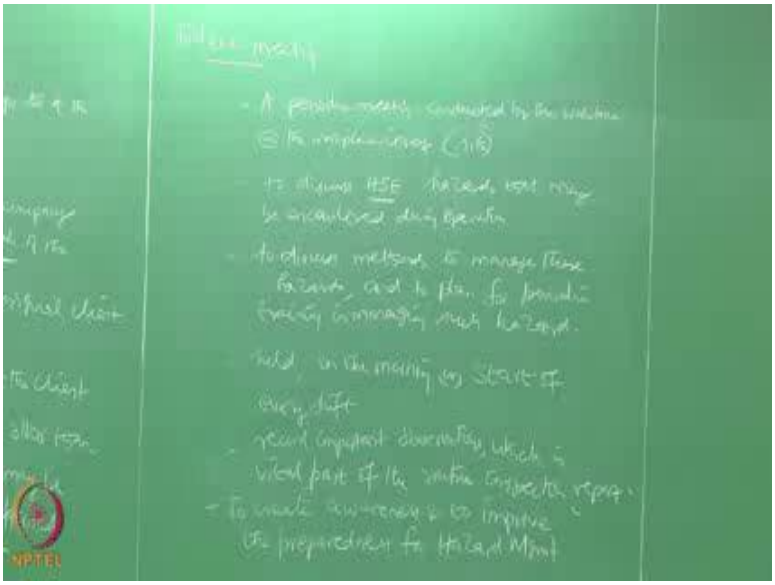

Tool box meeting; this is actually a periodic meeting conducted by the work force at the workplace itself. Not in the office, it is in the site. What does it do? To discuss HSE norms or HSE hazards that may be encountered during operation. It also discusses; to also discuss methods to manage these hazards and to plan for periodic training in managing such hazards.

Generally, tool box meetings were held in the morning or start of every shift. Tool box meetings record important observations, which is a vital part of the routine inspection report. What is the primary objective of tool box meeting? To create awareness and to improve the preparedness for hazard management; sometimes earlier, we talked about incident. And, hazard is a scenario; incident is actually a part which can or a probable tentative item or a work or a method, which can cause risk to the given system.

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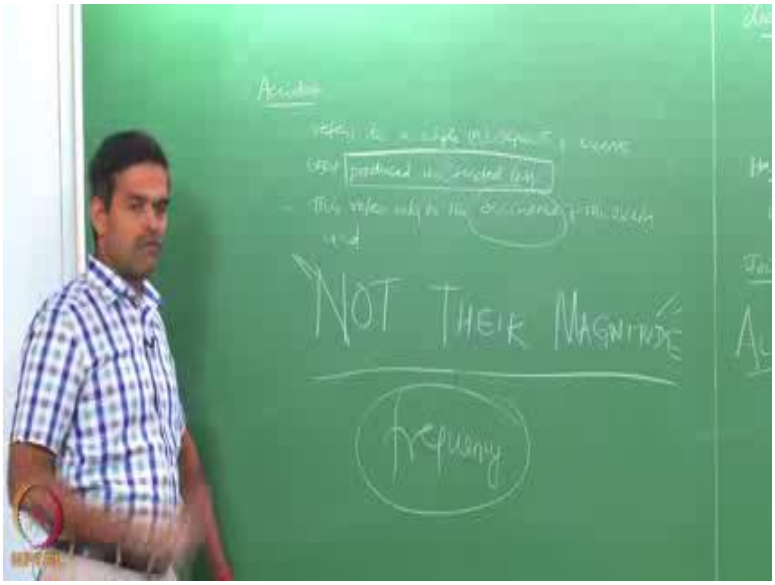

We now talk about accident. It, this refers to a single or sequence of events, which has produced unintended loss. This refers only to; please understand the occurrence of the events and not their magnitude. This is very important. It does not talk about the magnitude at all. It only talks about the occurrence. It means frequency.

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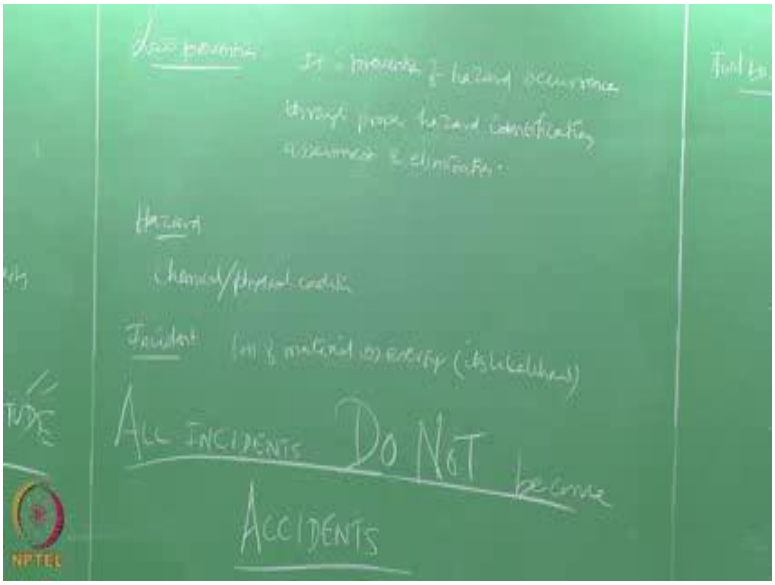

Let us talk about loss prevention. It is prevention of hazard occurrence through proper hazard identification, assessment and elimination. We already said what is a hazard. Hazard is a chemical or physical condition. We also said what is an incident. Incident is the loss of material or energy and its likelihood. Please, understand all incidents do not become accidents; whereas, accident is a singular sequence of events, which has produced definitely an unintended loss. But still, even in accident description, we do not talk about the magnitude. We only talk about the occurrence or frequency of the occurrence of the incident.

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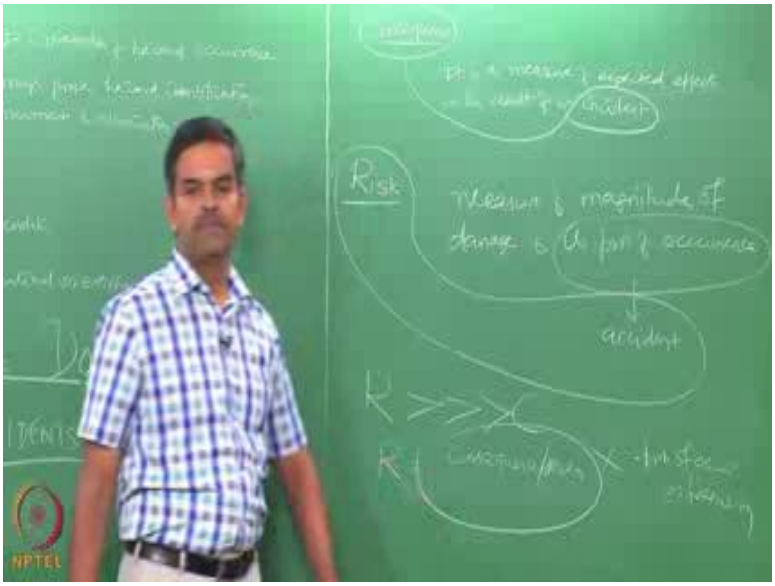

Consequence; it is a measure of expected effects on the result of an incident. So, consequence is initially related to incident. Then, what is risk? Risk is the measure of magnitude of damage and its probability of occurrence. So, please understand the probability of occurrence, data is fed from the accident. Accident does not talk about the magnitude; risk talks about magnitude. So, risk is connected to accident; consequence connected to incident. So, one can easily see risk is superior to consequence. Consequence is milder compared to risk.

In other words, the product of chance of occurrence of specific event and the severity of consequence together is what we call risk. So, risk is nothing but the product of the

consequence or severity multiplied by the probability of occurrence or frequency of occurrence. So, this gives me the magnitude and frequency. One can ask me how does it give me the magnitude. As I said in the beginning in offshore industries, effects are always measured in indirect phase. When we talk about environmental management, we never wanted to measure the concentration of pollution dispersion coefficients directly on the water or maybe at the atmosphere. We are always interested in measuring the consequences caused because of the pollution in terms of marine culture.

Similarly here, though we are interested in measuring the magnitude of damage, we really wanted to know what is the consequence caused by the damage; it may be on the asset, maybe on the human being, maybe on the environment. So, consequence or severity multiplied by probability of occurrence, which is again a part of risk, which is not a part of accident; together, will give me risk.

So, here interestingly if you try to express the consequences on a relative value, this gives me qualitative risk assessment. If we express the risk in quantitative value in absolute terms, in terms of money, in terms of dollars, whatever may be the case, it gives me quantitative risk assessment. So, risk assessment can be carried out in two formats. Both are unfortunately called as QRA. One is qualitative; other is quantitative. We can quantify risk in terms of number; can qualify this in terms of a relative scale, very interesting. So, risk is the ultimate term to understand violation of safety; hazard is an indication of likelihood of violation of safety. So, two things are entirely different. We should not get confused with hazard and risk. Hazard is a scenario; it is a condition. Risk is a maturity of an incident, which arises because of the hazard situation. But, however materializes to cause a potential damage of a good magnitude, either to human being or to asset or to environment or all of them. So, that is what risk is.

So, the ultimate measure of violation of safety should be rather given in terms of risk. However, one can also measure hazard at that level itself and try to control hazard. So, risk can also be controlled; hazard can also be managed. So, there are different levels, different terms, different conditions, different methods, different tools, and different mode of understanding of risk aversion mitigation control, hazard assessment monitoring and control, which we will see in down the lectures, subsequently in the modules. Let us

continue with the discussion now.

So, risk analysis is actually a quantitative estimate of risk using engineering tools and mathematical techniques. It involves estimation of hazard, probability of occurrence or the combination of both. So, it can be either qualitative or quantitative; whereas, hazard analysis.

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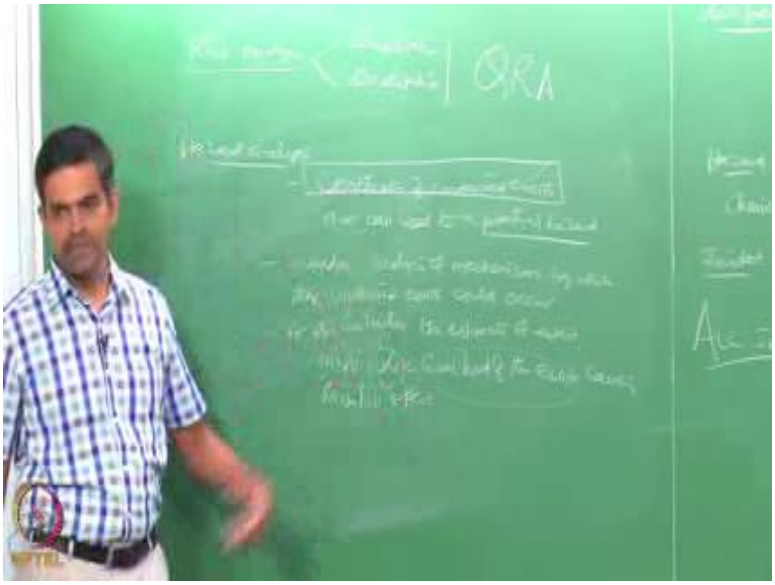

We already said risk analysis can be quantitative, qualitative. They are different tools. We will see them later. Hazard analysis is actually an identification of undesired events that can lead to potential hazard. So, hazard analysis primarily focusses on identification of the events itself. Whereas, risk analysis deals with understanding the consequences caused by those events, which have created a definite damage. So, possibly risk analysis can be a post-accident information. Hazard analysis can be preemptive accident information. So, hazard prevention is a very effective method; risk mitigation is a very effective control. So two things, I mean they are going parallel. But, however there is always a bridge which is getting expanded between them as we go ahead in the forward direction. So, hazard analysis includes analysis of mechanisms by which these undesired events could occur. It also includes the estimation of extent, magnitude and likelihood of the event.

Now, there is a confusion here, causing harmful effects. The confusion is hazard analysis also talks about estimation of magnitude, likelihood, that is, frequency which is causing the potential damage. Risk analysis also talks about magnitude and frequency. Then, what is the difference?

Please understand gentleman and ladies, hazard analysis only talks about undesired events, which are likely to have or cause a potential hazard. There is no occurrence of the event. The events may likely occur. It is an anticipation, whereas, risk deals with occurred events.

The damage is caused. For sure, it has happened. The damage has caused. Since the damaged has caused, there is a definite number of frequency or such damage is being caused by certain specific events. So, risk analysis is more intrinsically mathematical; whereas, hazard analysis is more intrinsically science level. This is a guess; that is a reality.

So, one should be interested in risk analysis, rather than hazard analysis. But, unfortunately hazard and risk are interconnected. How? If the conditions prevailing in the system is not corrected and the safety norms are violated, hazard will get matured to become a risk. So, they are connected. So, the connection between them is nothing but the HSE practices. Now, when H S E was first introduced as a part of the integral algorithm in the management policies of stakeholders of oil and gas sector, what was the initial reaction and how an HSE should have been defined? So, we would like to look at the history of HSE introduction. It is very important; because to know the mistakes, we always look at the history. Then, let us see these quickly.

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So, initially when H S E rules or practices were introduced, they will get divided as they proceed forward. Goal setting regimes have a duty holder, who assesses the risk. There is a responsible person, what we call as a duty holder, who assesses the risk. The expectation from this program was it should demonstrate understanding of risk, its severity and management. And very importantly, it should upkeep with the occurrences of events, then and there. So, this involves a constant update to the workforce.

If we look at the rule based regime, it consists of a legislature, maybe an administrator, who sets the rules. You are only requested or ordered to follow the rules. So, this program actually emphasizes compliance, rather than outcomes. I mean, it does not bother about the benefit what you achieved by following the so called HSE rules. But, it says that you must follow the rules. So, compliance is insisted; outcomes are not traced.

So, now the interesting part, the deficiency in this is there is no constant upkeep or update from the lessons learnt because even if you know there are some modifications required in the rules, the rules cannot be changed; because they are made by a legislator, whereas, in this case the workforce is constantly educated. It is updated. Therefore, if you really wanted to make certain changes in the HSE practices or rules and regulations, you can always have a foot forward and you can change them. So, constant update is

possible.

What is the weakness of this rule? The weakness of this rule is since there is no rule based on which you have to follow, there is no order; there is no legislation. People may not follow this intrinsically. They may take it this very casually. Whereas, in this case if you do not follow the rules, the legislature will impose penalty. So, you are bound to follow the rules. So, if you want to have an HSE practice based on rule based regime, your rule should be full proof. If you really wanted to have a practice of HSE based on goal based regime, then your rules need to be dynamic. Therefore, if a company follows this kind of materialism, then HSE practices based on this may not be uniform along and across the globe because every practice, every update, every training program, every demonstration, every work force are different.

If the company follows a rule based regime, this can ensure the uniformity along and across all the stakeholders or oil and gas industries in the globe. So, there is some beneficialization of a globalization in rule based regimes of HSE practice, but there are some missing points which have to be taken care from the goal based regime. So, a good safety program should integrate both. And, HSE practices should be based on both kinds of rules and regimes, which are followed, which we will discuss in the subsequent lectures.

Thank you very much.