

Ethics in Engineering Practice
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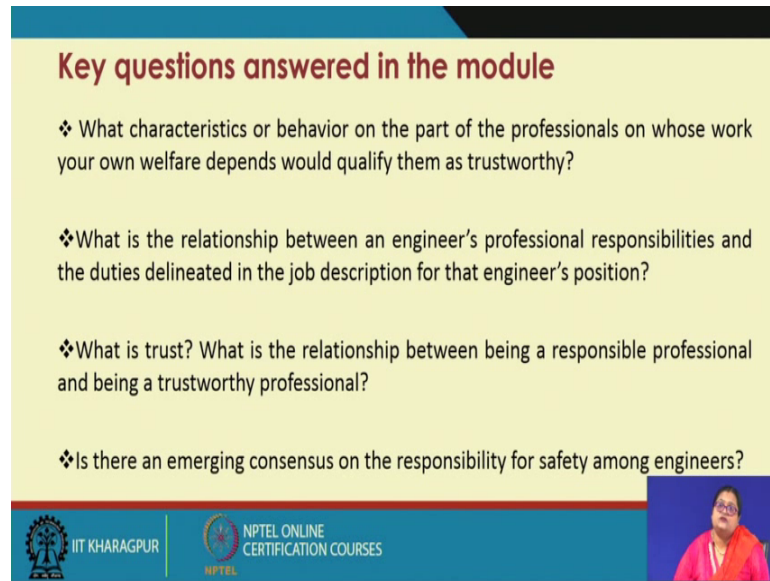
Lecture - 32

Key Questions - Central Professional Responsibilities of Engineers

Welcome. In today's module, we are going to discuss about the Key Questions related to the Central Professional Responsibilities of the Engineers. In the previous module, we have discussed about the Ethical Responsibilities of the Engineers and there in that discussion will (Refer Time: 00:40), we have mentioned about the professional ethics of the engineers, professional values of the engineers and they should be respecting their professional values when and they should move by their professional values, if they are facing any conflict of interest or conflict of loyalty towards like whom they are more loyal should be more loyal to the organization, if it is doing something unethical and the loyalty to the stakeholders at large.

And we have talked about like the professional values or the guiding principles which helps the people engineers to like find out a part of their action and to find out the answer for their, whom they should be more loyal to. Based on that discussion in today's module now, we are going to discuss about the Key Questions pertaining to Central Professional Responsibilities of Engineers. So, let us see what are the Key Questions that we are going to discuss in this module?

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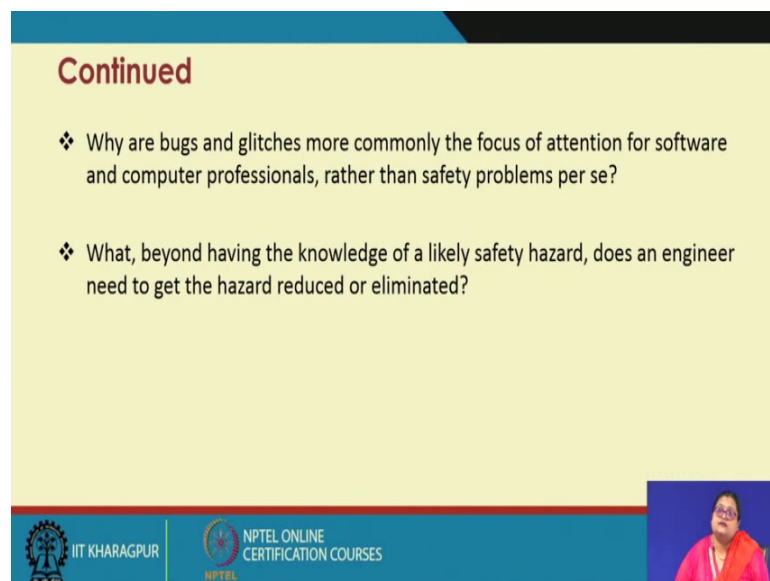
Key questions answered in the module

- ❖ What characteristics or behavior on the part of the professionals on whose work your own welfare depends would qualify them as trustworthy?
- ❖ What is the relationship between an engineer's professional responsibilities and the duties delineated in the job description for that engineer's position?
- ❖ What is trust? What is the relationship between being a responsible professional and being a trustworthy professional?
- ❖ Is there an emerging consensus on the responsibility for safety among engineers?

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So, in this module that Key Questions that would be answered is are what characteristics or behaviour on the part of the professionals on whose work your own welfare depends would qualify them to be trustworthy? What is the relationship between an engineer's professional responsibilities and the duties delineated in the job description for that engineer's position? What is trust? What is the relationship between being a responsible professional and being a trustworthy professional? Is there a consensus on the responsibility of safety amongst engineers?

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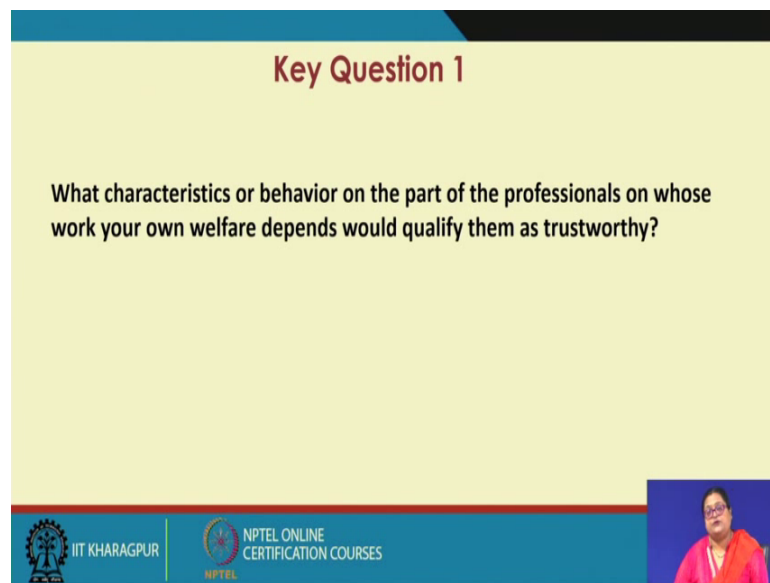
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- ❖ Why are bugs and glitches more commonly the focus of attention for software and computer professionals, rather than safety problems per se?
- ❖ What, beyond having the knowledge of a likely safety hazard, does an engineer need to get the hazard reduced or eliminated?

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Then, will discuss also about why are bugs and glitches more commonly the focus of attention for software and computer professionals, rather than safety problems per se? What, beyond having the knowledge of a lighting safety hazard, does an engineer need to get the hazard reduced or eliminated?.

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The slide features a yellow background with a blue header and footer. The header contains the text "Key Question 1" in red. The main body of the slide contains the question: "What characteristics or behavior on the part of the professionals on whose work your own welfare depends would qualify them as trustworthy?". In the bottom right corner, there is a small video inset showing a woman with glasses speaking. The footer includes the IIT Kharagpur logo and the NPTEL Online Certification Courses logo.

So, these are some of the Key Questions that we are going to discuss now. Starting with Key Question 1 that is what are the characteristics or behaviour of the part of the professionals on whose work your own welfare depends would qualify them as trustworthy? So, what needs to be present in the behaviour of the engineers took so that we can tell like they are reliable, they are trustworthy; those characteristics we are going to discuss now [vocalised-noise].

So, like when in today's world we understand the world is so much specialized about specialized knowledge, we have to depend on the engineers for their expertise for their knowledge that they are having. And it is for our professionals, we have to define depend on the professionals for the safety health and well being of us. Because they are more expert, more knowledgeable than us as per the safety issues, health issues are concerned.

What we expect from the engineers is when they have the knowledge, they should be using that knowledge and skills and exercise; then, in taking professional judgments like if they are in the situation of dilemma and if they are going to give their opinion about certain things, they need to like examine the different alternatives present for a particular

answer and they need to choose one alternative. It is expected that they will use their knowledge and skills for taking this decisions so that they can assure us that they are going to deliver us the best outcome.

So, two things that qualify them to be trustworthy are exercising are exercising moral judgment and taking moral responsibility and professional responsibility of the outcomes because they are more knowledgeable; because they have the subject knowledge; because they have the competency and they at the best person to decide amongst the alternatives present. So, owning up the decision so that is important exercising the moral judgement and taking moral responsibility and professional responsibility of the outcomes are two qualifiers which are there for considering the persons as to be trustworthy.

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The slide is titled "Introduction" in a bold, dark red font. The background is a light yellow color. The text on the slide is as follows:

In today's era of specialized knowledge, we all must depend on professionals for our safety, health, and well-being.

What we expect from professionals like engineers is that they use their knowledge and skills and exercise their professional judgment to assure the best of outcomes in situations.

Two things that serve as benchmarks for qualifying them as trustworthy relates to;

Exercising moral judgment and Taking moral responsibility and professional responsibility of the outcomes

At the bottom of the slide, there is a blue footer bar containing the IIT KHARAGPUR logo on the left and the NPTEL ONLINE CERTIFICATION COURSES logo on the right. A small number '5' is visible in the bottom right corner of the slide.

So, you not only exercise moral judgment, but you also own up, you take responsibility for your decisions.

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Exercising professional judgment

This requires taking into account a range of factors, marshaling relevant parts of the body of knowledge specific to one's profession, and devising a course of action that achieves a good (or even "the best") outcome in the circumstances.

Taking moral responsibility and professional responsibility of the outcomes

In simple words, the crux of it lies in considering many potentially competing factors that might influence the outcome in that particular situation.



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So, when you talk of exercising professional judgment. So, it talks it taking care of range of factors. So, going through referring to relevant parts of the knowledge, body of knowledge which is very specific to us profession and then, taking a course of action which is based it that situation. so and taking moral responsibilities so because you have taken a decision based on all the analyzing all the different options possible and you have taken a best judgment with respect to it. (Refer Time: 07:30) when I gone through all the competing factors. So, you have must have checked it is expected that you have checked for it and then, you own up the responsibility for the outcomes.

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Lets read this case

An Exemplary Professional Response: Landing a Disabled Plane

A handy example of someone who succeeded in taking account of a wide range of relevant factors in the situation and provided an exceptionally *good* outcome is the pilot, Chesley "Sully" Sullenberger, who landed his disabled Airbus A320 airplane in the Hudson River with no loss of life.

The basic facts of the case are that within *90 seconds* after takeoff on January 15, 2009, US Air flight 1549 collided with a flock of birds. That collision disabled *both* of the plane's engines. Captain Sullenberger then took over the flight controls from the copilot, who had been at the helm and who then turned his attention to the complex task of trying to restart the engines.

Sullenberger's judgment under pressure has been consistently praised. Some commentators have pointed out the extensive training that pilots receive. The unique features of the situation, including the location of the plane, could not have been joint features of any of the pilot's training situations, however.

Sullenberger's experience is commonly mentioned. His familiarity in making a host of previous flight decisions would have been an asset to him in noticing and promptly taking account of relevant features of his situation. Not only did he need to decide whether there was time to return to the airport from which he had taken off (or reach another) or to risk ditching the plane in the river but also how to go about landing in the river in a way that made it possible to evacuate the plane. To accomplish this he had to maneuver the plane so that it would float for at least a few minutes. He also chose a location in the river close to an active ferry terminal, where boats could quickly reach the plane and remove its passengers and crew before the plane's wings sank.

Sullenberger demonstrated many virtues, including courage, steadfastness, and what, following Aristotle, is called "practical wisdom" in this emergency. Unlike a test pilot, Sullenberger did not have an ejection seat, so he could not have ejected himself from the aircraft to save only himself. Therefore, acting in the interests of others coincided with his interests in handling the crash. He exited the plane last, however.



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And you like you give an assurance to the people like we have gone through all the options and this is the best outcome that we have delivered to you. So, will go through a small case to understand this; so, An Exemplary Professional Response: Landing of a Disabled Plane. A handy example of someone who succeeded in taking account of a wide range of relevant factors in the situation and provided an exceptionally good outcome is the pilot, Chesley “Sully” Sullenberger, who landed his disabled Airbus A320 airplane in Hudson River with no loss of life.

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So, this what we see is a classic case of professional response, where we talk of taking care of the lives of others being like owning up the responsibility, taking judgments finding out alternative courses of action like which is a better course of action like if we like airport is near or not; how to land plane near the where the ferry services are available. This needs to be taken care off, owning of worth action and that is where he find he exited the plane less at the last.

So, and after others have been depleted properly.

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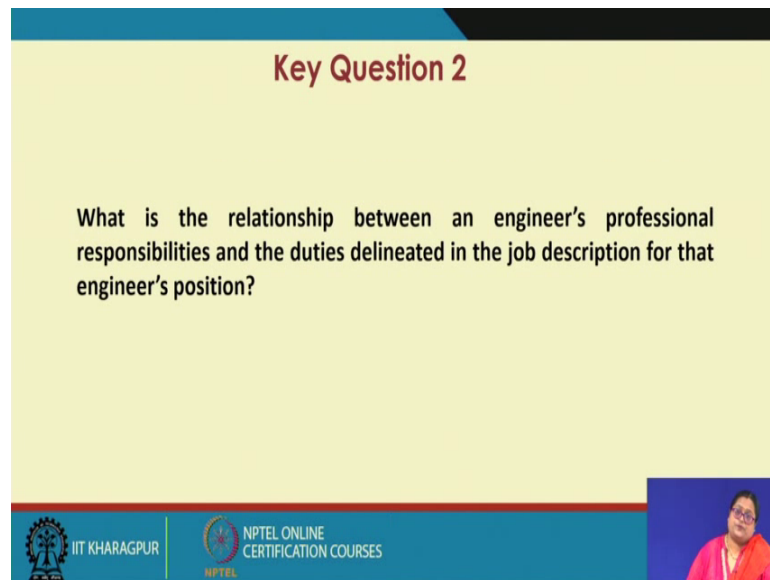
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The case on the previous slide as an example illustrates the development of judgment to which education in the ethics of a profession such as engineering is intended to contribute. In this case, Captain Sullenberger exercised professional judgment that brought together his theoretical and practical knowledge as a pilot to bear on the unique circumstances that faced him. His first professional responsibility was for the safety of those on board. His goal was to save their lives, a goal that he achieved.

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So, it develops the development of judgment to which like ethics of professions in engineering is like relates to. Captain Sullenberger exercised professional judgment that brought together his theoretical and practical knowledge as a pilot to bear on the unique circumstances that faced him. His first professional responsibility was to save the people who were on board; to think of their safety, this his goal was to save their lives. A goal that he achieved, and to achieve that goal he brought all his theoretical and professional practical judgments into consideration and then, he took an action based on that he owned a responsibility for his actions too.


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Key Question 2

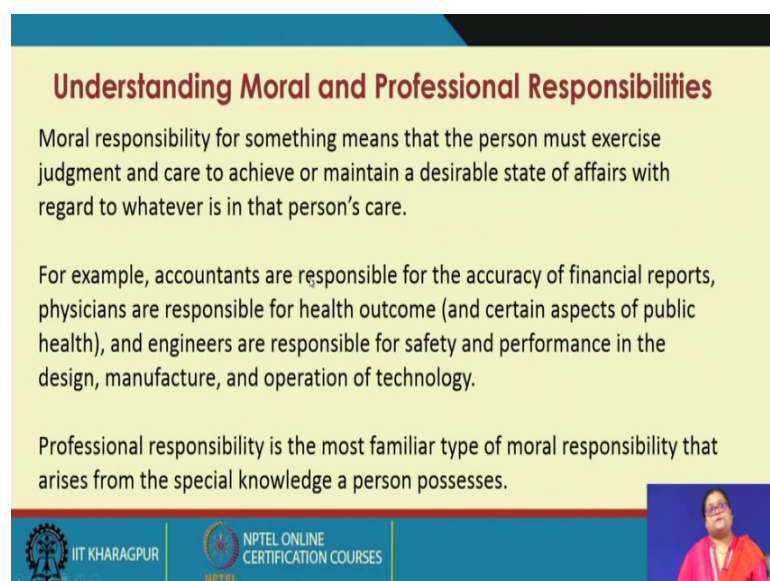
What is the relationship between an engineer's professional responsibilities and the duties delineated in the job description for that engineer's position?

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Next, we will move on to the Key Question 2 which is also very important like what is the relationship between an engineer's professional responsibilities and the duties delineated in that in the job description for that engineers position? So, the job description based on maybe the role description, the hierarchy the organization that you are in may restrict you from doing certain acts taking certain decisions and but your professional responsibilities may also tell what are your degrees of responsibilities. So, sometimes these to me coincide with each other. Sometimes there could be a point of conflict between these two things. If it is so, then how then you handle this situation.

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Understanding Moral and Professional Responsibilities

Moral responsibility for something means that the person must exercise judgment and care to achieve or maintain a desirable state of affairs with regard to whatever is in that person's care.

For example, accountants are responsible for the accuracy of financial reports, physicians are responsible for health outcome (and certain aspects of public health), and engineers are responsible for safety and performance in the design, manufacture, and operation of technology.

Professional responsibility is the most familiar type of moral responsibility that arises from the special knowledge a person possesses.

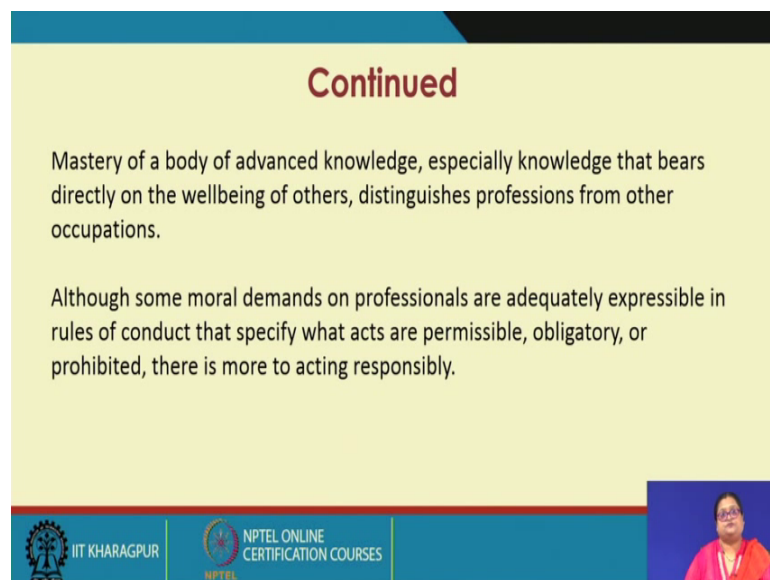
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So, when you talking of moral judgments moral responsibility, it is using your moral judgment and to care to achieve or maintain a desirable state of affairs, to with regard to whatever is in the person's case. Professional responsibility is a form of moral responsibility which arises due to the special knowledge the person possesses about a particular domain. With talking of like professions, then accountants are responsible for the accuracy of financial reports; physicians are responsible for the health outcome and certain aspects of the public health; engineers are responsible for safety and performance in their design, manufacture and operation of technology.

So, these are professional responsibilities. By virtue of profession, you get these responsibilities.

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Mastery of a body of advanced knowledge, especially knowledge that bears directly on the wellbeing of others, distinguishes professions from other occupations.

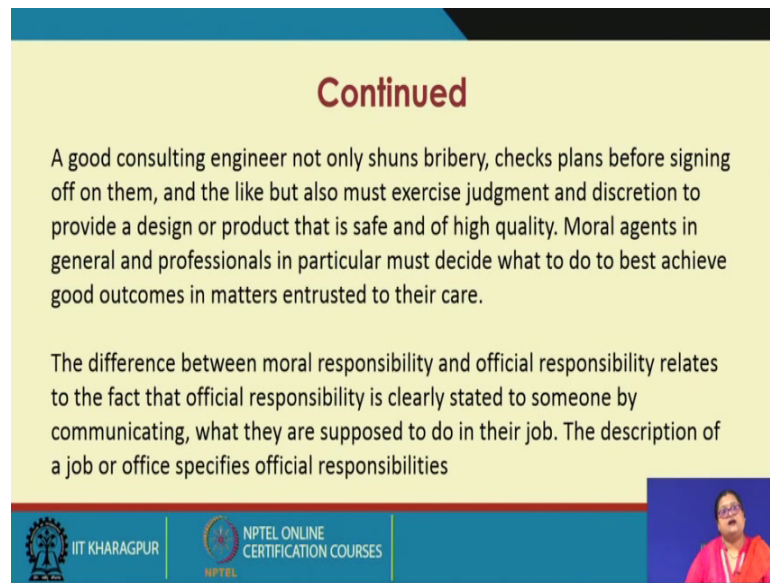
Although some moral demands on professionals are adequately expressible in rules of conduct that specify what acts are permissible, obligatory, or prohibited, there is more to acting responsibly.

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And by the mastery of a body of advanced knowledge; so, which directly bears has an implication on the welfare of others and that it is that which distinguishes a profession from other occupations. So, some moral demands and professionals are adequately expressible in terms of codes of conduct, rules of conduct that specify what acts are permissible, obligatory or prohibited super. So, that they are like they can act responsibly.

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A good consulting engineer not only shuns bribery, checks plans before signing off on them, and the like but also must exercise judgment and discretion to provide a design or product that is safe and of high quality. Moral agents in general and professionals in particular must decide what to do to best achieve good outcomes in matters entrusted to their care.

The difference between moral responsibility and official responsibility relates to the fact that official responsibility is clearly stated to someone by communicating, what they are supposed to do in their job. The description of a job or office specifies official responsibilities

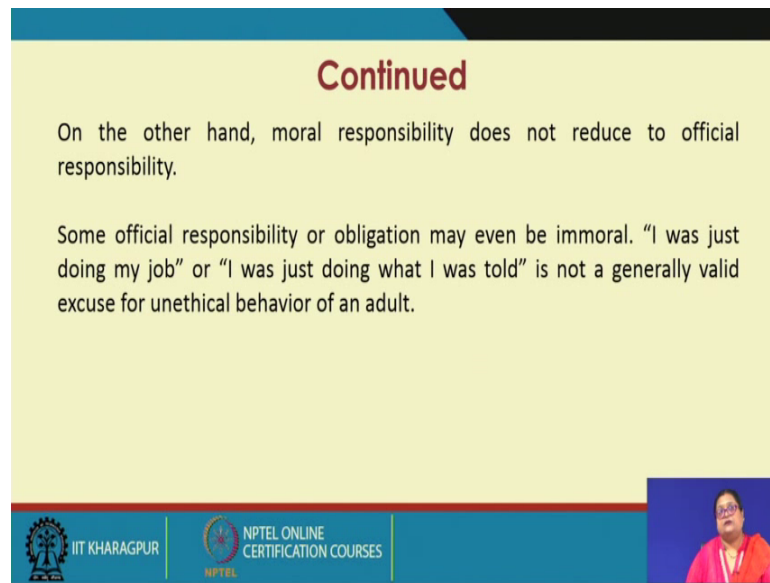
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A good consulting engineer not only shuns bribery, checks plans before signing off on them and the like, but also must exercise judgments and discretion to provide a design or product that is safe and of high quality. Moral agents in general and professionals in particular must decide what to do best to achieve good outcomes for those who were entrusted in their care.

The difference between their moral responsibility and official responsibility is that official responsibility is clearly stated to someone by communicating, what they are supposed to do with their job. The job description in the office specifies official responsibilities.

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On the other hand, moral responsibility does not reduce to official responsibility.

Some official responsibility or obligation may even be immoral. “I was just doing my job” or “I was just doing what I was told” is not a generally valid excuse for unethical behavior of an adult.

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So, what happens in many cases this may coincide, but what happens moral responsibility is a bigger frame and it does not reduce to official responsibility. Why?

Some official responsibilities may be even immoral like you are asked to do something. “I was just doing my job”, “I was doing what I was told to do”. So, these are certain excuses that you find when you are doing an official responsibility, you are not doing. But in case of professional responsibility, you do not have any please for these excuses, you have to follow it. You cannot like violate any of your professional responsibilities and ethics.

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Sometimes, these may come into conflict your official responsibilities may put a question mark on your professional like you maybe put a point of dilemma like my official responsibilities tell me to do this, follow this path. But the professional responsibilities I understand like this is not the correct, but what do I do. Let us understand it with a small case over here.

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The slide has a light yellow background with a dark blue header and footer. The word 'Case' is centered in a dark red font. A white text box with a black border contains the case study text. The footer includes the IIT Kharagpur logo, the NPTEL Online Certification Courses logo, and a small inset video of a woman in a red and orange sari.

Case

The Responsibility for Safety and the Obligation to Preserve Client Confidentiality

Tenants of an apartment building, annoyed by many building defects, sue the owners to force them to repair those defects. The owner's attorney hires Lyle, a structural engineer, to inspect the building and testify for the owner. Lyle discovers serious structural problems in the building that are an immediate threat to the tenants' safety. These problems were not mentioned in the tenants' suit. Lyle reports this information to the attorney who tells Lyle to keep this information confidential because it could affect the lawsuit. Lyle complies with the attorney's decision.

Source: Adapted from NSPE Board of Ethical Review (BER) Case 90-5

What, if anything, might Lyle do other than keep this information confidential? Which, if any, of those actions would have better fulfilled Lyle's responsibilities as an engineer?

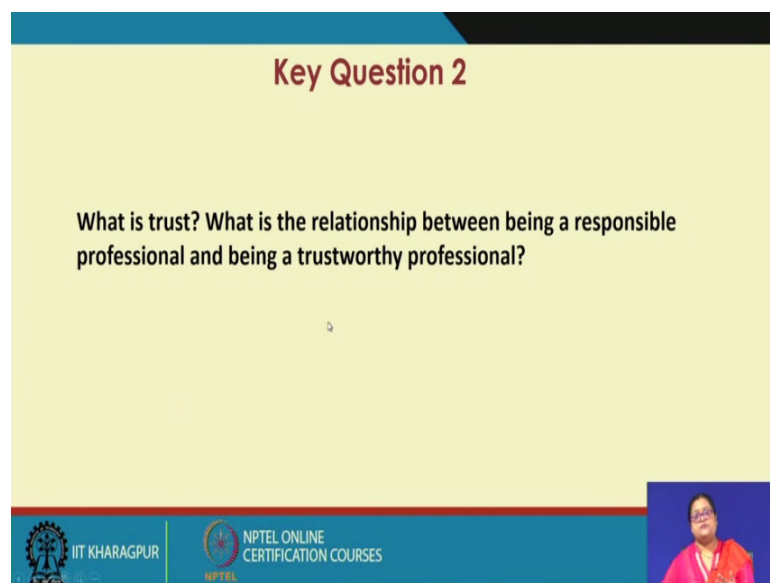
What other information may be needed to make this decision?

So, The Responsibility for Safety and the Obligation to Preserve Client Confidentiality, tenants of an apartment building, annoyed by many building defects, sue the owners to

force them to repair their defects. The owner's attorney hires Lyle, a structural engineer, to inspect the building and testify for the owner. Lyle discovers serious structural problems in the building that are immediate threat to the tenant's safety. These problems were not mentioned in the tenant's suit. Lyle reports this information with attorney who tells Lyle to keep this information confidential because it could affect the lawsuit. Lyle complies with the attorney's decision. So, this is adapted from NSPE Board of Ethical Review Case 90 subsection 5.

So, question is, what, if anything, might Lyle do other than keep this information confidential? Which, if any, of those actions would have better fulfilled Lyle's responsibilities as engineer? What other information may be needed to make this decision?

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Key Question 2

What is trust? What is the relationship between being a responsible professional and being a trustworthy professional?

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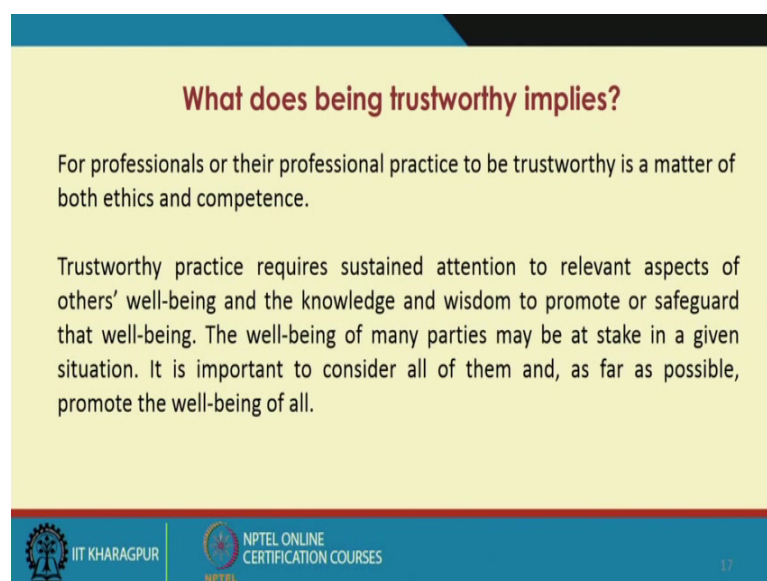
What we find over here like he discovered certain Ah things which were not mentioned in the lawsuit and which the attorney discussed, told to keep secret and the structural engineer kept it secret, confidential based on like the maybe being loyal to the organization who has hired the person, the engineer. But if you are talking of the professional responsibility, it is much above the official responsibility and in that is if the structural engineer have truly discovered like there are certain structural issues which may endanger the safety of the tenant's; it is a part of the professional responsibility, to first tell the organization about it to repair it and to take care of it.

So, that they are not the tenants at larger not who harmed. But if we see that the organization is reluctant about it its telling me to keep this information confidential, not to share it; then, it is a part of my professional responsibility. Also to make it known to the engineers because professional responsibility is much and much above the official respond ability. Because my profession of a structural engineer demands me to find out like whether the structure is safe for the life and security of the people.

Now, if something happens like, I do not disclose it and if something happens; how do I feel as a structural engineer? Will I be able to face myself in this situation or what is my conscience going to tell about it? So, this is where your virtue speaks and this is where your professional ethics guides you towards taking a proper course of action. First definitely report to your organization which is like hired you for it, but beyond your self interest for getting hired or repeat getting part of commission for it, it is your responsibility to the safety of the tenants which should be of primary importance and you should really focus on it.

Next Key Question that we are going to discuss what is trust? And what is the relationship between being a responsible professional and being a trustworthy professional?

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What does being trustworthy implies?

For professionals or their professional practice to be trustworthy is a matter of both ethics and competence.

Trustworthy practice requires sustained attention to relevant aspects of others' well-being and the knowledge and wisdom to promote or safeguard that well-being. The well-being of many parties may be at stake in a given situation. It is important to consider all of them and, as far as possible, promote the well-being of all.

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So, what we found is that trustworthiness is important and for trustworthiness, it is a matter of both ethics and competence. So, do you know your you have a sound

knowledge based; are you competent for your decisions and because the welfare of the people depends on you like whether you are taking a decision, whether you are capable of taking a decision based on your competence our questions which talks of the trustworthiness.

So, trustworthiness practices requires attention towards others well being and do you have the knowledge and wisdom to promote or safeguard that well being. So, and whether you are competent for it.

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What would a Trustworthy Structural engineer do?

Before giving a green light to any project, a trustworthy structural engineer would check;

- If there is any concern for public safety, public convenience, and environmental protection that would be disturbed because of the project
- Is there any proficiency in structural design or not; an understanding of the characteristics of building materials and their quality
- An understanding of traffic demands viz. a viz. strength of materials required
- An understanding of the environmental implications of the work
- An estimate of the likelihood and severity of earthquakes, hurricanes, and other
- natural threats to the integrity of the bridge

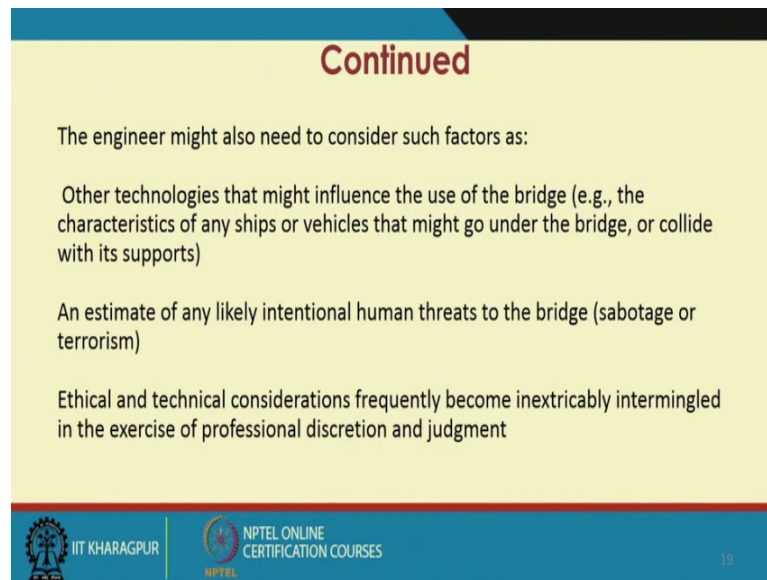
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It is not only your ethical; but whether you are competent for it. So, first trustworthy structural engineer like the project that we discussed, before giving green light for any project, it is a part of their responsibility to find out if there is any concern for public safety, public convenience and environmental protection that would be disturbed because of the project.

Is there any proficiency in structural design or not; understanding of their building materials and their quantity, quality like the. An understanding of the traffic demands that is the strength of material required an understanding of the environmental implication of the work. An estimate of the likelihood and severity of the earthquakes, hurricanes, and other natural threats; so, which may disturb the building or the structure. So, these needs to be taken care of.

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The engineer might also need to consider such factors as:

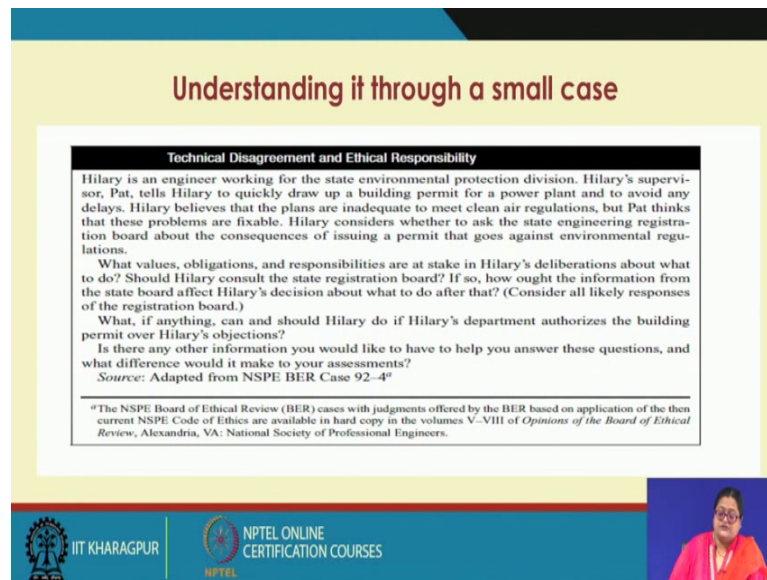
- Other technologies that might influence the use of the bridge (e.g., the characteristics of any ships or vehicles that might go under the bridge, or collide with its supports)
- An estimate of any likely intentional human threats to the bridge (sabotage or terrorism)
- Ethical and technical considerations frequently become inextricably intermingled in the exercise of professional discretion and judgment

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Then, also, the engineer might also need to consider other factors like the other technologies that may use influence the use of bridge like factors that may be going or ships or so we are just discussing the example of bridge over here, this can be applied to the building case that we discussed also. So, any intentional, what could be any intent you have to like expand your thought of imagination to find out what could be the possible threats to the structure that you are examining and how to protect it from these threats.

So, ethical and technical considerations become like intermingle with each other, when you are talking of professional discretion and judgment.

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Understanding it through a small case

Technical Disagreement and Ethical Responsibility

Hilary is an engineer working for the state environmental protection division. Hilary's supervisor, Pat, tells Hilary to quickly draw up a building permit for a power plant and to avoid any delays. Hilary believes that the plans are inadequate to meet clean air regulations, but Pat thinks that these problems are fixable. Hilary considers whether to ask the state engineering registration board about the consequences of issuing a permit that goes against environmental regulations.

What values, obligations, and responsibilities are at stake in Hilary's deliberations about what to do? Should Hilary consult the state registration board? If so, how ought the information from the state board affect Hilary's decision about what to do after that? (Consider all likely responses of the registration board.)

What, if anything, can and should Hilary do if Hilary's department authorizes the building permit over Hilary's objections?

Is there any other information you would like to have to help you answer these questions, and what difference would it make to your assessments?

Source: Adapted from NSPE BER Case 92-4^o

^oThe NSPE Board of Ethical Review (BER) cases with judgments offered by the BER based on application of the then current NSPE Code of Ethics are available in hard copy in the volumes V-VIII of *Opinions of the Board of Ethical Review*, Alexandria, VA: National Society of Professional Engineers.

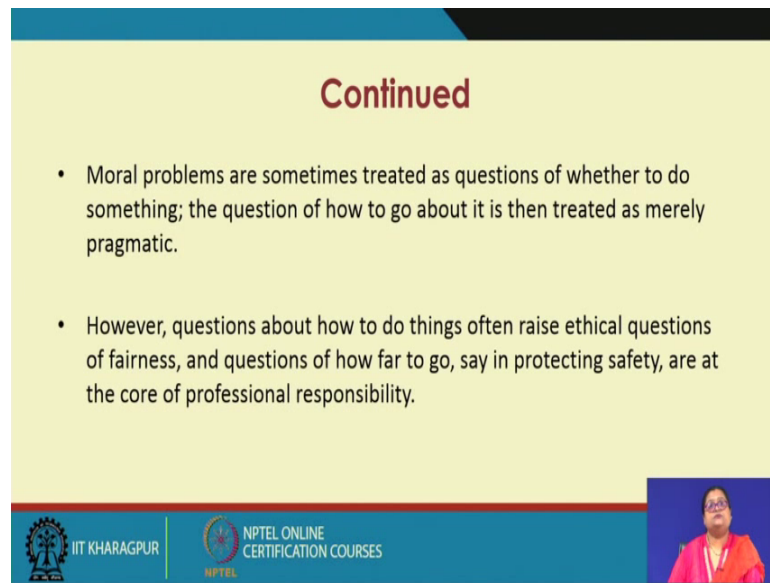
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So, will discuss it again with our small case like Hilary is an engineer working for the state environmental protection division Hilary's supervisor, Pat, tells Hilary to quickly draw up a building permit for a power plant and to avoid any delays. Hilary believes that the plants are inadequate to meet clean air regulations, but Pat thinks that these problems are fixable. Hilary considers whether to ask the state engineering registration board about the consequences of issuing a permit that goes against environmental regulations.

So, what stay values, obligations and responsibilities are at stake in Hilary's deliberation about what to do? Should Hilary consult the state registration board? If so, how ought the information from the state board affect Hilary's decision about what to do after that? What, if anything, Hilary can and should do if Hilary's department authorizes the building permit over Hilary's objections? Is there any information you would like to have to help you answer these questions, and what is the difference would it is going to make in your assessment?

So, what we find over here like that if there is like and ethically Hilary feels like it is a not going to be environment friendly and inadequate to meet clean air regulation. So, the suggestions of the state environmental regulation board can always be sought for, if they want to find the guidelines like what requires to be done and given the guidelines Hilary may take or like a decision about it.

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The slide is titled "Continued" in a dark red font. It contains two bullet points. The first bullet point states: "Moral problems are sometimes treated as questions of whether to do something; the question of how to go about it is then treated as merely pragmatic." The second bullet point states: "However, questions about how to do things often raise ethical questions of fairness, and questions of how far to go, say in protecting safety, are at the core of professional responsibility." At the bottom of the slide, there are logos for IIT Kharagpur and NPTEL Online Certification Courses, along with a small video inset of a woman in a red top.

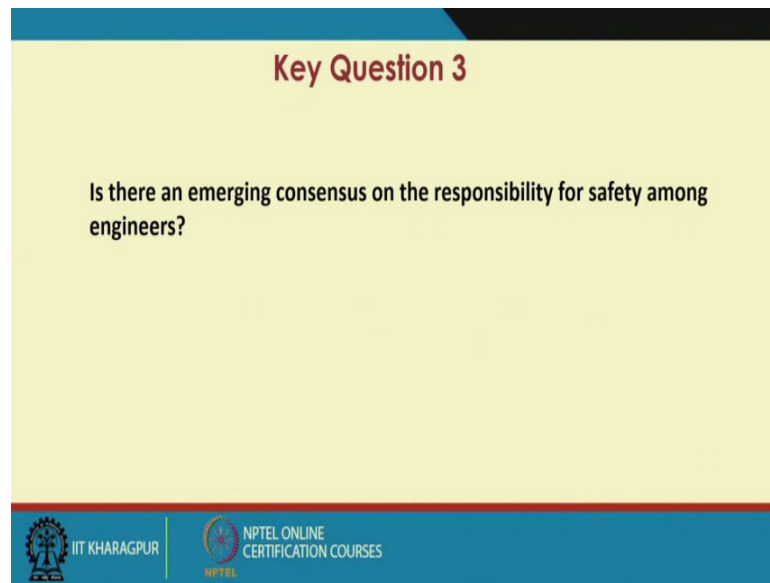
- Moral problems are sometimes treated as questions of whether to do something; the question of how to go about it is then treated as merely pragmatic.
- However, questions about how to do things often raise ethical questions of fairness, and questions of how far to go, say in protecting safety, are at the core of professional responsibility.

Now, if Hilary's organization takes a decision which is in spite of the objection takes the decision, then it is a part of the professional responsibility. It is part of the trustworthiness. It is a responsibility towards the greater public at large, where this matter should be known to the like beneficiaries at large. So, that if like voice could be reached from all the stakeholders may be this kind of like projects may be stopped.

So, like when you talk of moral problems, it is treated as questions of whether to do something or not to do something and whether it is fair to do like when you like questions about how to do things, it raises ethical questions of fairness like what is the correct way of doing; how far should we go likely protecting the safety.

So, these are see protecting the safety well being thinking of environment, thinking of synergy, sustainability; these are the professional responsibilities of engineers and that makes them trustworthy also because people believe like they are going to use their expert knowledge and discretion with take help of that knowledge to arrive at a particular conclusion which is focused towards the well being of the stakeholders at large.

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Key Question 3

Is there an emerging consensus on the responsibility for safety among engineers?

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That makes them trust worthy. It is not only their being ethical, but they are competent also enough. Hilary by seeking the state modes judgment on it, has tried to look into the law improve the knowledge base before trying to take a decision about clean environment issue clearance and all.

So, that what are the to make myself knowledgeable, once I am knowledgeable about what are the regulations given and whether it is violating on what aspects so that if I believe something is wrong, I can have reasons to tell properly where things are going wrong and to what extent and why this needs to be chopped stop. So, that is where it makes not only a professional responsibility; but it talks of the trustworthiness also, which is the two important pillars which are expected of a engineer because you are responsible for the well being and safety of the people at large.

We will be taking up more Key Questions with relevance to the professional ethics in the next module to come.

Thank you.