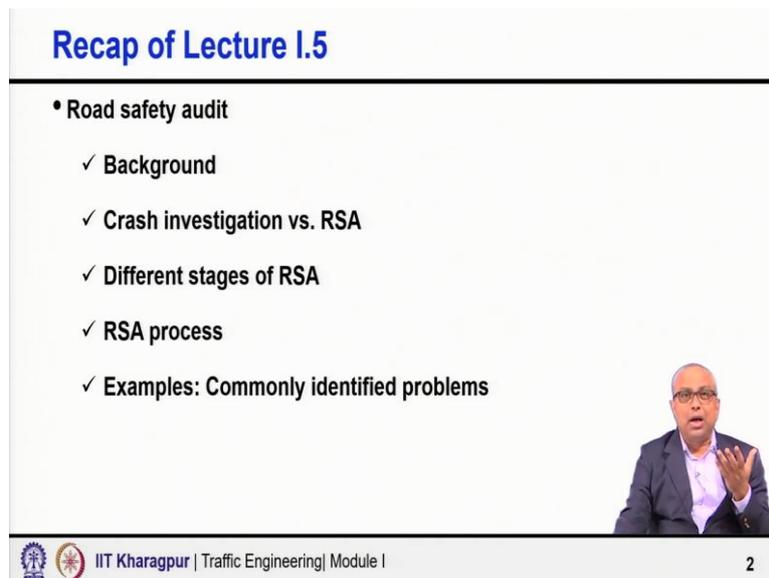


Traffic Engineering
Professor Bhargab Maitra
Department of Civil Engineering
Indian Institute of Technology Kharagpur
Lecture 64
Safe System Approach

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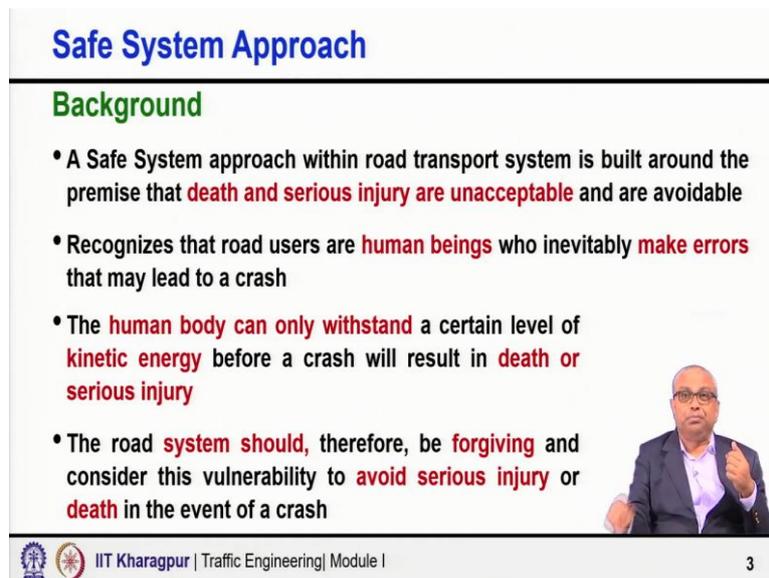


The slide is titled "Recap of Lecture 1.5" in blue text. Below the title, there is a bulleted list of topics covered in the lecture. A small video inset of Professor Bhargab Maitra is visible in the bottom right corner of the slide content area. The footer of the slide includes the IIT Kharagpur logo and the text "IIT Kharagpur | Traffic Engineering | Module I" on the left, and the number "2" on the right.

- Road safety audit
 - ✓ Background
 - ✓ Crash investigation vs. RSA
 - ✓ Different stages of RSA
 - ✓ RSA process
 - ✓ Examples: Commonly identified problems

Welcome to module I lecture 6. In this lecture, we shall discuss about the Safe System Approach. In lecture 5, we discussed about the Road Safety Audit, what is Road Safety Audit? Why do we need Road Safety Audit? What is the difference between Crash Investigation and Road Safety Audit, different stages where the Road Safety Audit may be applied starting from two feasibility stage to preliminary design to DPR during construction and then operation and maintenance, then the Road Safety Audit process and also indicated to you some of the common deficiencies which we normally find when we audit some of the roads in India.

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Safe System Approach

Background

- A Safe System approach within road transport system is built around the premise that **death and serious injury are unacceptable** and are avoidable
- Recognizes that road users are **human beings** who inevitably **make errors** that may lead to a crash
- The **human body can only withstand** a certain level of **kinetic energy** before a crash will result in **death or serious injury**
- The road **system should**, therefore, be **forgiving** and consider this vulnerability to **avoid serious injury or death** in the event of a crash

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With this background today, we shall discuss about the Safe System Approach. A Safe System Approach within road transportation system is built around the premise that death and serious injury are unacceptable and are avoidable. That is the first thing we are saying that death and serious injury these are unacceptable and are avoidable. Second, it is recognized that road users are human beings and therefore, they inevitably make errors all of us we make errors and therefore, such errors may also lead to a crash.

But human body can only withstand a certain level of kinetic energy before a crash will result in death or serious injury. So, first point, death or fatality and serious injury leading to particularly permanent disability these are not acceptable and may be avoided. Second, we are all human being.

So human being make error and which may even lead to crash, but we must understand that human body can only withstand a certain level of kinetic energy before a crash will result to death or serious injury. Therefore, the road system should be forgiving in nature, should be forgiving in nature, it does not mean that it should not happen that if as a driver I do a mistake or as a pedestrian if I do a mistake means I will be killed.

So, the road system should therefore be forgiving and considered this vulnerability to avoid serious injury or death in the event of a crash. We may not be able to eliminate crash it may happen but the crash should not lead to fatality or should not result serious injury leading to permanent disability.

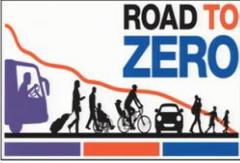
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Safe System Approach

Zero Deaths & Safe System

- The zero deaths vision acknowledges that even one death on our transportation system is unacceptable and focuses on safe mobility for all road users
- This idea was first adopted in **Sweden in 1997** as "**Vision Zero**"
- Reaching zero deaths requires the implementation of a Safe System approach

What word or phrase would best describe Safe Systems for you?



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Coming to the concepts of Zero Death and Safe System, the Zero Death vision acknowledges that even one death in our road system is unacceptable and focuses on safe mobility for all road users. So, even one death on our transportation system is unacceptable. And we need to focus as per the Zero Death Vision on safe mobility for all road users, the road is for all road users across all categories, age group.

So, the idea was first adopted in Sweden way back in 1997. As Vision Zero, then it became increasingly acceptable to others and reaching Zero Deaths requires the implementation of a Safe System Approach, what we are talking about today and trying to understand what is really the Safe System Approach. So, the Safe System Approach and Zero death, they are actually interrelated.

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Safe System Approach

Guiding Principles

- 1 • Death/ serious injuries are unacceptable
- 2 • Humans make mistakes
- 3 • Humans are vulnerable
- 4 • Responsibility is shared
- 5 • Safety is proactive
- 6 • Redundancy is crucial



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What are the primary guiding principles? There are, maybe we can call six guiding principles. I have mentioned already some of those when I was in the first slide itself, trying to give you an introduction, one, death or serious injuries leading to disability are unacceptable. That is the first thing. Second, accept that humans make mistakes.

Third, humans are vulnerable, only certain level of kinetic energy we can tolerate. Before you know when a crash occurs, to decide whether the fatality will occur or major injury will occur. This three I mentioned here in the first slide itself, right? Human beings make error, human body can withstand only a certain level of kinetic energy before the crash results in death, and death or serious injuries are unacceptable. So first three, are this. Fourth one, Responsibility Shared.

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Safe System Approach

Shared Responsibility

- All stakeholders together must ensure that crashes don't lead to fatal or serious injuries

Safety is Proactive

- Proactive tools should be used to identify and mitigate latent risks, rather than waiting for crashes to occur and reacting afterwards

Redundancy is Crucial

- Reducing risks requires that all parts of the transportation system are strengthened, so that if one part fails, the other parts still protect people



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What I mean by that all stakeholders together must ensure that crashes do not lead to fatal or serious injuries. We cannot simply blame to give the blame to road user, it is the user's fault. So, he died or she died. We cannot say that. It has to be yes, it is obviously the responsibility of road user if you are a driver, it is your responsibility as well, to drive safely following the rules and regulations, the speed limits to everything with the proper driving license.

Yes, same is true for a pedestrian as well, if a pedestrian is crossing the road, it is also pedestrians' responsibility, but what we are considering in the Safe System Approach, that it cannot be only the blame to the user, that it is your fault and So, this fatality happened, No. So, I have shown here who should be all the key stakeholders in a road safety framework, starting from educational institutes to media, to corporates, to Police, enforcement, health department, transport department, road department, insurance agencies, tourism, hospitality industry, vehicle manufacturers, driver training and licensing agencies, all as stakeholders all have to take responsibility.

Nobody can say no, it is not my job, all have to take responsibility. So, that has to be cannot blame only the road user or cannot escape giving the blame to the driver or to the pedestrian. So, responsibility shared. Next, safety is proactive, not our basic focus should be proactive. What do you mean in last class only I talked about the Road Safety Audit.

So, proactive tools should be used to identify and mitigate Latent risks rather than waiting for crashes to occur and reacting afterwards. So, it has to be safety is proactive. We have to use proactive tools like the Road Safety Audit to identify and mitigate risks rather than waiting for crashes to occur and then reacting afterwards.

Last, Redundancy is crucial. What I mean by that reducing risk requires that all parties of the transportation system are strengthened so that if one part fails the other parts still protect people. Backside is the system. Everybody together like a team. Say I should give driver training properly and they normally hand over the license to the trade driver. So, my driver training also has to be proper, my enforcement also has to be proper, my road design also has to be forgiving in nature, my post crash care has to be excellent.

Now, when multiple things fail, then only fatality will happen otherwise, if driver is not proper the road will take care of it. If the road is not so good, maybe the enforcement can take care of it, even if other is crash occurs, maybe the speed management should have taken care of the things even if crash occurs, the immediate care post kind of scar care can could save the life.

So, redundancy is crucial reducing risk requires all parts of the transport system to be strengthened. So that if one part fails, the other parts still protect people. And end of the day we are achieved able to achieve a state where eventually long run we eliminate the fatality and serious injury.

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Safe System Approach

Guiding Principles

- 1 • Death/ serious injuries are unacceptable
- 2 • Humans make mistakes
- 3 • Humans are vulnerable
- 4 • Responsibility is shared
- 5 • Safety is proactive
- 6 • Redundancy is crucial

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A quick comparison between the traditional approach and the Safe System Approach traditional approach in a way indirectly or directly whatever we you say assumes that traffic deaths are inevitable. So, we are forecasting we are forecasting fatality, how the fatal accident changes with fought factors. Of course, there could be multiple other reasons for doing a forecast or doing the modelling. So, please do not take my statement in a negative way. But as if like okay deaths are inevitable, it will go and talk to people they will so drivers for unruly pedestrians do not know anything.

And in this system, obviously the deaths are inevitable. Some deaths will lock but say Safe System Approach or Vision Zero considers that traffic deaths are preventable death we can prevent. Traditional approach attempts to prevent crashes, fine, Safe System Approach prevents fatalities and serious injuries even if crash occurs that should not lead to fatality or serious injury. Traditional approach considers improved human behaviour.

Safe System Approach tells that design the system for human mistakes or limitations create infrastructure which is forgiving in nature, try to do that great environment where human behaviour even if they want to be unruly, they will get restricted they cannot be so unruly. Individual's responsible as per traditional approach, Safe System Approach says it is a shared responsibility all stakeholders have to be responsible.

In traditional approach is generally we react based on crash history. In Safe System Approach, we say proactively identify and address risk. Last but not the least, saving life is expensive. Safe System Approach directly considered that saving lives is not expensive. We need a systematic approach. That is what the same system approach following the key pillars we can save life it is not expensive in that sense. Anyhow life always we should save life there is no argument.

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The slide is titled "Safe System Approach" in blue. Below the title, it says "Components of Safe System Approach" in green. On the left, there is a vertical stack of six colored boxes representing components: "Road Safety Management" (orange), "Safe Roads & Roadside" (grey), "Safe Speeds" (yellow), "Safe Road Users" (light blue), "Safe Vehicles" (green), and "Effective Post-Crash Care" (light green). On the right, there is a circular diagram with "THE SAFE SYSTEM APPROACH" in the center. The diagram is divided into five segments: "Safe Road Users" (top-left), "Safe Vehicles" (top-right), "Safe Speeds" (right), "Safe Roads" (bottom), and "Post-Crash Care" (bottom-left). The outer ring of the diagram contains the text "UNACCEPTABLE RISK IS UNACCEPTABLE" at the top, "RESPONSIBILITY IS SHARED" at the bottom, and "ROAD SAFETY IS A SYSTEMIC ISSUE" on the sides. Below the diagram is a small video inset of a man in a suit speaking. At the bottom left of the slide is the IIT Kharagpur logo and the text "IIT Kharagpur | Traffic Engineering | Module I". At the bottom right is the number "8".

Coming to them next, what are the components of Safe System Approach? There are traditionally five pillars five major components I should say. Here also recently people are using it say road safety management is also considered as another component which is basically in some way or other integrating all the five components together you can say in that sense.

But here I have again shown traditionally people consider five elements Safe roads and Roadside. Safe speeds, Safe Road user, Safe vehicle and Effective post-crash care. These are the five fundamental or basic components. And then overall the road safety management you can consider it is not as the bigger umbrella in that sense.

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Safe System Approach

Road Safety Management

- Key enabler for delivery of safety interventions
- Elements of a Good-Practiced Road Safety Management:
 - ✓ Adopting a Safe System approach to addressing road safety
 - ✓ Undertaking a road safety management capacity review and implementing the findings
 - ✓ Providing strong road safety leadership through a **“lead agency”**

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Coming fast to Road Safety Management is the key enabler for delivering these safety interventions. Certain key elements of a good practice road safety management may include the following. For example, adopting a Safe System Approach to addressing road safety, everything the whole approach, overall team is working based on the Safe System Approach.

Second, undertaking a road safety management capacity review and then implementing the findings that providing strong road safety leadership through a lead agency if you go state wise, every state it is a joint responsibility fine. multiple departments of the government are involved in it. Health, education, transport, enforcement, multiple departments are involved road development departments, road development departments also maybe Urban Development Authority, public works department, so many other Panchayat and Rural Development department they also build roads in many states in India. But we need is strong lead agency. So, providing strong road safety leadership through a lead agency. That is very important.

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Safe System Approach

- ✓ Establishing a road safety management framework with **Key Performance Indicators** (KPIs), including the requirement for data collection strategies to effectively plan and monitor road safety activity and outcomes
- ✓ Building road safety capacity across the sector
- ✓ Developing and adopting ambitious strategies and road safety targets with regular reporting on progress



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Establishing a road safety management framework with key performance indicators clearly identified key performance indicators including the requirement of data requirements for data collection strategies to effectively plan things and monitor, monitor also road safety activities and outcome. All the states that are collection strategies to effectively planning the things monitoring everything is includes.

Also building road safety capacity across the sector's and finally, developing an adopting ambitious strategies and road safety targets. With regular reporting on the progress we need to set targets, but only setting targets will not help there should be strong leadership lead agency must lead it, plan it, monitor it and regularly also review the progress further we are able to really achieve.

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Safe System Approach

Safe Roads and Roadsides

- Infrastructure interventions to improve safety outcomes by eliminating fatalities and serious injury
- Designing **to accommodate human mistakes and injury tolerances**
- Should start with the needs of the most vulnerable users and then progress through to the safety needs of the least vulnerable



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Next, Safe Road and Roadsides. Infrastructure intervention to improve safety outcomes by eliminating fatalities and serious injuries. We want infrastructural interventions what all we can do with the roads and roadsides to ensure that we eliminate fatality and serious injury all infrastructural interventions to create a safe roads and roadsides for all road users.

So, basically, designing to accommodate human mistakes and injury tolerance, we say infrastructure itself has to be forgiving in nature, we cannot say that we have simply built the road. So, the blacktop surface is very good pavement condition geometry is very good and I have done my job. No, we have to ensure that we are creating safe roads and Roadside. So, the road Development Agency also cannot think that I have done my job because I have build the road.

The engineering part of it say creating good pavement and surface condition. That is not the only thing. We have to think of the road users all road users all age group and their safety and end of the day, the infrastructure should be forgiving in nature. So, we can should we infrastructure should be able to accommodate human mistakes and must recognize the injury tolerance that says kind of elements, that kind of infrastructure we need. Should start with the need for the most vulnerable road user and then progress through to the safety needs of the least vulnerable, the whole range, but starting from the most vulnerable.

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Safe System Approach

- Could be a **challenging task in LMICs** due to diverse traffic mix, lower user compliance levels, and setting of rules and regulations by different authorities
- Examples include:
 - ✓ Roadside and central barrier systems on high speed roads
 - ✓ Physically separating vulnerable road users from other road users
 - ✓ infrastructure that supports speed reduction, when required
 - ✓ Alerting road users to hazards, etc.



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Could be a challenging task especially in low- and medium-income countries, because we have diverse traffic means we have low user compliance level there are different multiple authorities who are having their power I will Police will do something transport department do something local authority may do something local administration may decide to do something multiple levels the hierarchy very difficult, challenging, but yes, we should be able to address those challenges effectively to create a better and safer road environment as per the Safe System Approach. If we want to reduce fatality, road fatality and improve the Country's performance.

Several examples are there we will discuss also a little bit in more details. I have one more lecture next lecture also some of the interventions will show but here are some quick examples, what could be like interventions related to safe road and Road site many things are possible. I have mentioned a few here say roadside and central barrier system on high-speed roads.

The moment we are thinking of high-speed rotary must have the roadside and central barrier systems on high-speed roads, then, physically separating vulnerable users from the other road users. We know the human injury tolerance criteria. So how we can segregate how we can create not only the load, but the footpaths, walkways, safe walkways, segregated walkways, safe crossing facility, if we have a bus stop then how people will cross.

So, if there are market areas, then obviously people will work people will use bicycle. So, physically how we can separate vulnerable users from the other reduces any interventions will come under this category, infrastructure that supports speed reduction, when required. Speed is one very important factor I will here also I will discuss and the last lecture of this module is

dedicated on that only speed management speed is very, very important in the context of fatality, road fatality.

So, wherever speed reduction is necessary, then the infrastructure should be supportive. That means let us create if we know that we do not want speed more than this, then my infrastructure itself should we should create a deterrence if somebody wants to travel higher than the safe speed limit. So, do infrastructural intervention make it difficult for the road users to travel at a speed beyond the safe speed limit, enforcement yes, that is there. But the infrastructure itself should help me to achieve that then alerting road users to hazards maybe pedestrian maybe to motor vehicle user so many forms you can do it.

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Safe System Approach

Safe Speeds

- Humans are unlikely to survive high-speed crashes
- Reducing speeds can accommodate human injury tolerances in **three ways**:
 - ✓ Reducing impact forces
 - ✓ Providing additional time for drivers to stop, &
 - ✓ Improving visibility

IMPACT SPEED km/h	DEATH Percentage	SERIOUS INJURY Percentage	SLIGHT INJURY Percentage
30	10%	15%	75%
40	32%	26%	42%
50	80%	3%	17%
60	95%	3%	2%



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Next going to save speeds very, very important. Humans are unlikely to survive high speed crashes, as they say that human injury tolerance all over while people are recognizing people are accepting this. Reducing speeds can accommodate human injury tolerance in three ways. First, reducing impact forces inversely, speed is reduced the impact forces less providing additional time for drivers to stop and get more time see an object want to stop or get additional time to provide additional time. Also improving the visibility, the vision.

So, particularly in Indian context where anywhere an area people are crossing the road and the school children, school children may come right straight on the on the carriage way or trying to cross the road without looking at the traffic, that kind of thing a driver has to be vigilant about the root sight and the environment.

So, they are the reduction in speed can help also here I have shown something very interesting that depending on the impact speed, how the death risk, serious injury, slight injury risk will change, you can see that the speed is going the death percentage risk is increasing, Death percentage is increasing. So, higher speed higher fatality directly related and 30 to 60 the percentage risk is increasing from 10 percent to 95 percent. Just imagine a single factor. So, powerful and we must recognize this.

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Safe System Approach

- There is a direct, causal link between speed and safety outcomes
- No other risk factors that have such a substantial and pervasive impact on safety as speed. It has an **impact on both the likelihood** of a crash occurring, and **severity** of the outcome
- If infrastructures cannot be improved in the foreseeable future and a road has a high crash risk, then managing speed (supported by appropriate and competent enforcement to support compliance), can be a crucial alternative

Mean speed change	Fatal crashes (%)	Serious injury crashes (%)	Minor injury crashes (%)
-10%	-40%	-20%	-10%
0%	0%	0%	0%
10%	50%	30%	15%

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There is a direct causal link between speed and safety outcome here also it is shown the fatal crashes, serious injury cases minor injury crashes and you can see the maximum gain we can get in terms of reducing the fatality risk of fatality. No other risk factor that have such a substantial and pervasive impact on safety as speed. It has an impact on both the likelihood of crash occurring that also you are getting reduced, and also the severity of the outcome that is again very important.

In, if infrastructure cannot be improved in the foreseeable future and the road has a high crash risk, then managing speed can be a crucial alternative. So, make the roads such that do the design and make all features such that the traveling at a high speed is not even possible. If you cannot do that, then the speed management supporting by appropriate and competent enforcement to support compliance is very, very crucial because it can bring a lot of benefit, especially in reducing the fatal accidents or being reducing fatal accidents or even reducing the fatality.

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Safe System Approach

Safe Road Users

- Safe System approach addresses the safety of all road users, including those who walk, bike, drive, ride transit, and travel by other modes
- Maximising road user behaviour that is compliant with road rules is an important issue
- Human error, rather than deliberate illegal behaviour, is an important contributor to fatal and serious crashes
- Measures to reduce the prospect of human error need to be taken to guide use of the network



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The next third going to Save road users, Safe System Approach addresses the safety of all road users including those who walk, use by cycle drive right transit or if interval by other words, safety for all road users. Now maximizing road users, we have here that is compliant with route rule is an important issue human errors rather than deliberate illegal behaviour is an important contributor to fatal and serious crashes that shall be the same, the human make error the illegal behaviour deliberate violation is one part of it that is handled through enforcement.

But human error is slightly different problem is there both in terms of human error and also the illegal behaviour. Deliberate violation both exist. Now, we need to take measures to reduce the prospect of human error that need to be taken to guide use of the network. To we need to take appropriate measures to reduce the prospect of human error.

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Safe System Approach



50% OF ALL ROAD ACCIDENTS ARE LINKED TO HUMAN ERROR
THE BEHAVIOUR OF ROAD USERS IS THE AREA WITH BY FAR THE BIGGEST POTENTIAL FOR IMPROVING ROAD SAFETY

IN 90% OF FATAL ACCIDENTS SPEEDING IS THE MAIN FACTOR

DISTRACTION CAUSES 10% OF ROAD DEATHS

20% OF ALL ROAD FATALITIES IN EUROPE ARE SCHOOL-RELATED

ABOUT 60% OF FATAL ACCIDENTS ARE CAUSED BY VIOLATIONS OF TRAFFIC RULES

EDUCATION AND TRAINING ARE CRUCIAL IN INSTILLING APPROPRIATE BEHAVIOUR AND ATTITUDES IN ROAD USERS

PROVIDING GOOD ROAD INFRASTRUCTURE WILL MAKE A DIFFERENCE

- Methods used for improving road user behavior include implementation of driver licensing, training, education, enforcement, monitoring (for example, through vehicle telematics) and road safety campaigns.
- Stringent enforcement, education and awareness can play crucial role to reduce the human errors on road



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There are several methods for improving road user behaviour which may include implementation of driver licensing, proper driver licensing, proper training, education, enforcement monitoring, for example, through vehicle telematics and road safety campaigns. But remember that one thing again as per the Safe System Approach, not only focusing on driver education and awareness, yes, it can bring some benefit in some cases. Right. But the other things are equally also important. Creating infrastructure.

Try to influence human behaviour human behaviour through infrastructure, try to influence human behaviour through technology and enforcement much more effective. But yes, drivers should know we cannot ignore this part entirely. I mean, if you look at the traditional way the driving licensing has been done in many of the low- and medium-income countries it has been used just as a as an instrument for employment generation not without education and knowledge and skill the driving licenses have been given it has been largely taking as a skill development activity how to operate steering or gear or clutch.

But I am driving on a public road where other road users are there other vehicles are there pedestrians are there bicyclists, that they are for it is equally important for me, it is very, very important to know all the rules regulations and safe driving tips. Ultimately, if we think that we will just give the license and we enforce by with the help of police and correct the system, it will fail. So, education is also important, giving proper education and proper training to the driver creating awareness among the schoolchildren, all these are important, but we are saying we also have to look at the other side that how we get people make errors but that should not lead to death.

So, the create infrastructure, forgiving infrastructure to handle such situation, if speeding is an issue, our infrastructure can that also take care of that thing. Can we say that if this stretch of the road, it this should be the speed limit, the infrastructure can deter, can it act as it deterrents for high speeding or traveling at the highest speed or enforcement can it also be effective anybody violets will be caught. No tolerance there is well those are important also stringent enforcement; education awareness can play a crucial role to reduce human errors on road.

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Safe System Approach

Safe Vehicles

- Vehicles are designed and regulated to minimize the occurrence and severity of collisions using safety measures that incorporate the **latest technologies**
- **Road safety agencies must promote the benefits of safety features & overall vehicle safety levels**
- **Many opportunities for improvement still exist in the vehicle safety features available to LMIC markets**

ACTIVE SAFETY SYSTEMS

- Continually monitor the performance and knowledge of a vehicle
- Prevent accidents from happening altogether... or actively help the driver to recover the proper
- Avoid or mitigate an accident **before** or **before** it happens

EXAMPLES OF ACTIVE SYSTEMS THAT GIVE THE DRIVER ADDITIONAL PROTECTION:

- Adaptive cruise control (ACC)
- Lane departure warning (LDW)
- Automatic emergency braking (AEB)
- Lane keeping assist (LKA)

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Then safe vehicles, vehicles are designed and regulated to minimize the occurrence and severity of collision using safety measures that incorporate the latest technologies and road safety agencies must promote the benefits of safety features and overall vehicle safety level. Unfortunately, the vehicles which are in low- and medium-income countries, many cases are deficient, they want to vehicle manufacturers want to bring down the price to make things competitive, but many times the cut the safety features that is a major concern.

So, safe vehicle is also important as important as safe infrastructure safe drivers. Efficient enforcement like that the safe vehicle as a system approach, every component has to work. If the vehicle is designed is proper, if it is the same vehicle naturally the fatality will come down. Vehicle also has a role to play that we must recognize only we cannot blame the road agency or road Development Authority or the police, vehicle also is important.

So, many opportunities for improvement still exist in the vehicle safety features available in LMIC markets. People need to be again aware and government also has a role to play that the vehicle should not be allowed which are having some sort of compromise to the safety features.

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Safe System Approach

Effective Post-Crash Care

- When people are injured in a collision, they rely on emergency first responders to quickly locate them, stabilize their injury, and transport them to medical facilities
- Fatal and serious outcomes are directly related to how injuries resulting from road traffic crashes are handled immediately after the incident occurs, as well as on-going care and rehabilitation



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Then last but not the least, very important thing Effective post-crash care, when people are insured in a coalition crash has happened someone then they rely on emergency first respondents to quickly locate them. crashes happen, what people expect, the others will look at them that yes, there has been a crash as quickly as possible they should be looking at it. Then they should also people should help them to stabilize their injury and then transport them to medical facilities.

The is again important all other components are important, but this is also important for saving life and avoiding fatality or major injury. Fatal and serious outcomes are directly related to how injuries resulting from road traffic cases are handled immediately, immediately is very important here immediately after the accident occurs as well as ongoing care and rehabilitation. Through all these, again a lot of lot of benefits in terms of reducing or bringing down the number of fatalities is possible.

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Safe System Approach

- Improving the effectiveness of post-crash response care include
 - ✓ Training of first responders (including community members) and emergency medical services staff: Training needs to be comprehensive and follow best practice principles
 - ✓ Provision of adequate equipment for emergency response units and trauma units within hospitals



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Improving the effectiveness of post care, crash care at post Crash Response care may include one multiple things, but here I have mentioned a few trainings of first respondents including community members, sometimes on highway system in our country, I believe that the other drivers sometimes will be the first visitors in the crash spot. So, community members, others who in think even the drivers and emergency medical staff training for them, train them how to handle how an injured person is to be removed, one has to learn that wrong way of removing a person may cause permanent disability.

So, they should be trained and the training needs to be comprehensive and must follow the best practice principles. Second, provision of adequate equipment for emergency response units and trauma units within hospital you transfer it but if the hospital is not equipped with all the things that are required to treat such accident victims, then nothing finally end of the day nothing is going to happen. So, this is also very important.

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Safe System Approach

Safe System Implementation

- Progress in LMICs depends heavily on substantial expert support to accelerate a **'learning by doing'** approach
- The pathway to safe system implementation includes:
 - ✓ Commitments from the heads of different agencies and stakeholders
 - ✓ Adopting aspiration to eliminate FSIs in the long-term
 - ✓ Conducting a management capacity review and identification of investment plans
 - ✓ Planning and designing of multi-sectoral Safe System demonstration projects
 - ✓ Establishing a reliable national crash data system

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Last is safe system implementation. Progress in LMICs, low- and medium-income countries depends heavily on substantial expert support to accelerate a learning by doing approach that has to be the thing we do not have many cases experience. So, learning by doing approach is highlighted here. So, depends LMICs is depend heavily on substantial expert support to accelerate a learning by doing approach.

We need to accelerate the learning by doing approach. The pathway to safe system implementation may include a number of things, which are very important, say commitments from the head of different agencies and stakeholders. There are multiple stakeholders I mentioned this including, the lead agency to all other departments. So, there must be commitment, strong commitment from the head of different agencies and stakeholders, adopting aspiration to eliminate emphasize fatal and severe injuries in the long run.

That should be the dream. And dream. Not only dream, dream with action and systematic approach, Safe System Approach, conducting management capacity review and identification of investment plans, planning and designing of multi sectoral safe system demonstration projects. These demonstration projects are extremely again, meaningful and practical, and establishing a reliable national crest data system. I am having happy that the country is really moving in the right direction. many good things are happening.

We have to keep our patients enhance our understanding. And even though there are a lot of challenges, many things are happening but many more things should happen also. So, it is a long way not so easy, path is not so easy, but you A lot of positive things are happening.

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Safe System Approach

Core Elements and Action Areas of the Safe System Approach

PRINCIPLES	CORE ELEMENTS	ACTION AREAS	
Humans Make Errors	Economic Analysis	Land Use Planning	Street Design and Engineering
Humans Are Vulnerable to Injury	Priorities and Planning	Improved Mobility Options	Speed Management
Responsibility Is Shared	Monitoring and Evaluation	Enforcement, Laws and Regulation	Education and Capacity Building
No Death or Serious Injury is Acceptable	Comprehensive Governance and Management	Vehicle Design and Technology	Post-crash Emergency Response and Care
Proactive vs. Reactive	Strong Targets and Data		



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So, here I have shown another presentation, core elements and action areas of the Safe System Approach principles what I have mentioned then already then what are the core elements and what are the action areas starting from landings planning to street design and engineering speed management, improved mobility options, enforcement law and educate regulation, education and capacity building vehicle design and technology and post-crash emergency response and care. These are all different action areas. This is again another very interesting representation. So, I wanted to include it also under core elements and action area.

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Summary

- Safe System Approach
 - ✓ Background
 - ✓ Guiding principles
 - ✓ Traditional approach Vs. Safe system approach
 - ✓ Components of safe system approach
 - ✓ Safe system implementation



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So, what we discussed focused on Safe System Approach we said what is Safe System Approach what we do, what are the guiding principles, how the traditional system and Safe

system what are the key differences, then what are the components of the safe system approach each component we discussed we address little bit, and then the last step system implementation what I have shown you that how what are the pathway to safe system implementation? What are the elements are necessities? So, with this I close this lecture, thank you so much.