

WELCOME! BEM VINDOS!  
¡BIENVENIDOS!



Please **say hello!**

WELCOME! BEM VINDOS!  
¡BIENVENIDOS!



Today's presentation is in English with  
**simultaneous translation** to English  
and Portuguese

WELCOME! BEM VINDOS!  
¡BIENVENIDOS!



**Download** the presentation in  
English & Portuguese:  
Follow the **link** in the **chat**



# VISION ZERO CHALLENGE

Lead your city from #vision2action

VISION ZERO CHALLENGE WEBINAR SERIES: VISIBILITY IN URBAN TRAFFIC

VISION ZERO CHALLENGE



# WELCOME, VISION ZERO CITIES!

1. Arequipa, Peru
2. Belo Horizonte, Brazil
3. Buenos Aires, Argentina
4. Bogotá, Colombia
5. Cali, Colombia
6. Curitiba, Brazil
7. Colima, Mexico
8. Cusco, Peru
9. Fortaleza, Brazil
10. Guadalajara, Mexico
11. Indaiatuba, Brazil
12. La Paz, Bolivia
13. Lima, Peru
14. Medellín, Colombia
15. Merida, Mexico
16. Montevideo, Uruguay
17. Pachuca, Mexico
18. Rosario, Argentina
19. Salvador, Brazil
20. Santiago, Chile
21. Sao Paulo, Brazil
22. San Jose, Costa Rica
23. San Salvador, El Salvador
24. Santa Cruz, Bolivia

# WELCOME, VISION ZERO CHALLENGE PARTNERS



WORLD  
RESOURCES  
INSTITUTE | ROSS  
CENTER



FIA FOUNDATION



FUNDACIÓN  
GONZALO  
RODRÍGUEZ



IDB  
Inter-American  
Development Bank



International  
Transport Forum

LATIN NCAP



TOWARDS ZERO FOUNDATION



VISION ZERO  
ACADEMY



Global Road Safety Facility



WORLD BANK GROUP

VISION ZERO  
CHALLENGE

# THANK YOU, VISION ZERO CHALLENGE SPONSORS





## Q&A

Please use  
the chat  
**"all panelists  
and attendees"**  
function to submit  
your questions!



# Vision Zero Challenge

Argentina – Brazil – Bolivia – Chile - Colombia – Costa Rica – El  
Salvador – Mexico - Peru - Uruguay

July 2021

# ¿Quiénes somos?



**Victor Cabrera**

Director for Traffic Safety for Latin America

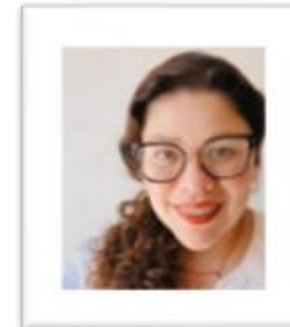
[vmcabreraandrade@mmm.com](mailto:vmcabreraandrade@mmm.com)



**Salvador Morales**

Technical Service Engineer responsible for the Central America and Caribbean Region for Traffic Safety

[smorales@mmm.com](mailto:smorales@mmm.com)



**Malu Moggolón**

Technical Service Engineer responsible for the Andean Region and for Traffic Safety

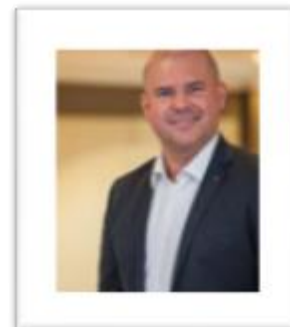
[mlmogollon@mmm.com](mailto:mlmogollon@mmm.com)



**Paula Abreu**

Government Relations for Traffic Safety and Vehicle License Plate Portfolio Leader for Latin America

[phabreu@mmm.com](mailto:phabreu@mmm.com)



**Michel Miquilin**

Technical Service Engineer responsible for Brazil for Traffic Safety

[mamiquilin@mmm.com](mailto:mamiquilin@mmm.com)

# Agenda

## 1. Corporate presentation 3M

## 2. Introduction

## 3. Road accidents

## 4. The importance of visibility for road safety

- Vision and driving: Accident rate in the absence of light
- Information from day to night: Visibility Day vs Night
- Cognitive process of the human (perception reaction)
- How does retroreflectivity work?
- Retroreflectivity technology

## 5. Protection of vulnerable road users

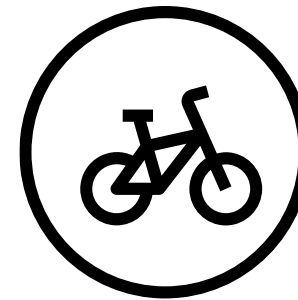
School zones

Visibility for motorcycles/bicycles

## 6. Urban signage

Countermeasures to improve road safety

⇒ Experiences in Latin America



# Corporate Presentation

# 3M Value Model

## Vision

3M technology developing every company  
3M products developing every home  
3M innovation improving every life

## Strengths

Technology  
Manufacturing  
Global Capabilities  
Brand

## Priorities

Portfolio  
Transformation  
Innovation  
People and Culture

## Values

Inclusion  
Diversity  
Sustainability  
Respect, motivation, challenge



Founded in 1902, in  
Minnesota USA.



**72** countries with subsidiaries  
**90,000+** employees  
**10,000+** scientists and  
engineers





# We help our customers through our four business groups

## Safety and industry



Accelerate industry safety and performance by serving the industrial, electrical and security markets.

## Transport and electronics



Moving transportation and a connected world, serving automotive, electronics and OEM customers.

## Health



Connecting people, knowledge, science and technology to enable better health worldwide by serving the healthcare industry.

## Consumer



Innovating to simplify life and work by serving the global consumer

# 3M is one of the most ethical companies in the world

There is only one way to do business: the right way.

**2020** | **WORLD'S MOST  
ETHICAL  
COMPANIES®**

---

**WWW.ETHISPHERE.COM**





Ciencia.  
Aplicada a la vida.™

# Road safety In Infrastructure and Vehicles

On the roads, what matters is life.



# International initiatives for Zero road fatalities



DECADE OF ACTION FOR  
**ROAD SAFETY**

2021 - 2030



United Nations and the World Health  
Organization



# Prevention of crashes

# Injury reductions

# Save lives

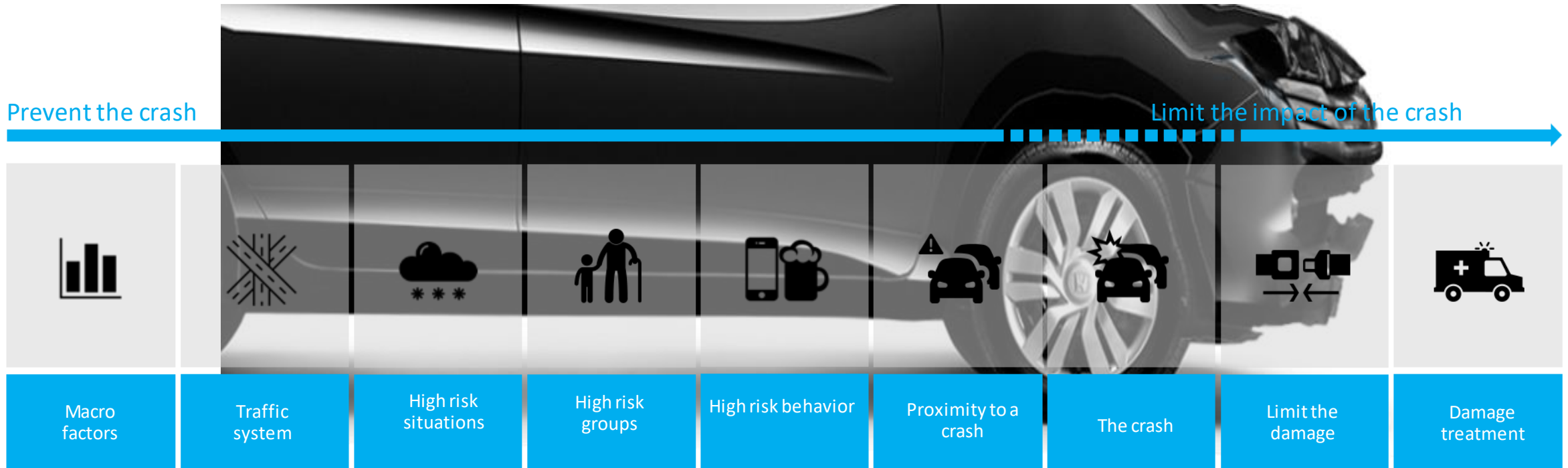
A safe transit system is of great importance to society.



# Prevention of crashes

## Injury reductions

## Save lives



# Principales causas de los siniestros viales



**People's recklessness**  
alcohol | drugs | cell phones



**Lack of use of safety equipment**



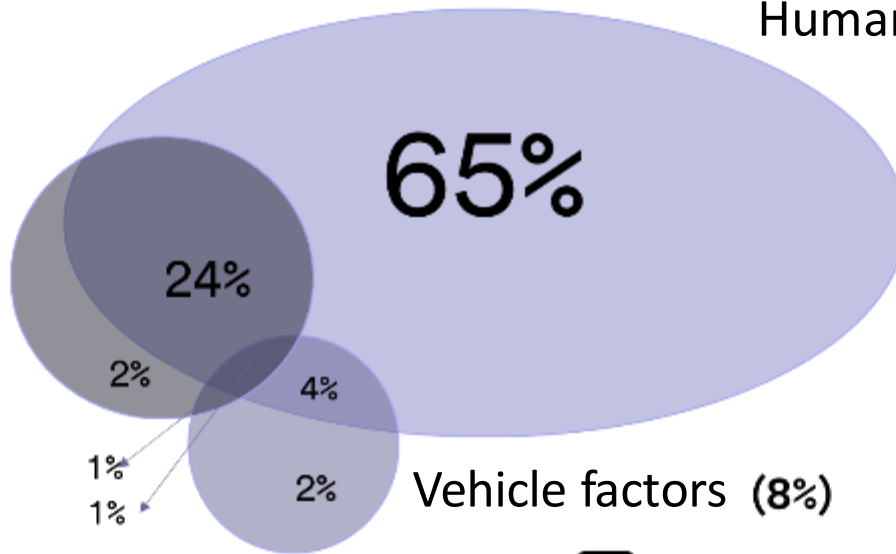
**Deficient infrastructure**

## Contributing factors:

Road factors  
and around  
road (28%)



Human factors (94%)



60%



Speed



Drink driving



Cell phones

YOUR CHOICE



Distractions



Seatbelt



Car seat



Helmet

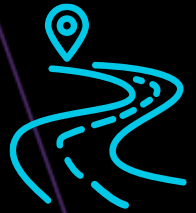




10%



Security systems



30%



Road infrastructure





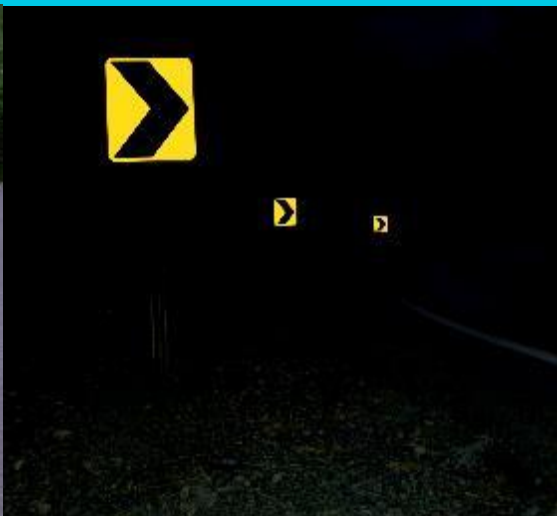
**How can we travel more safely on the roads?**



# Self-explaining roads

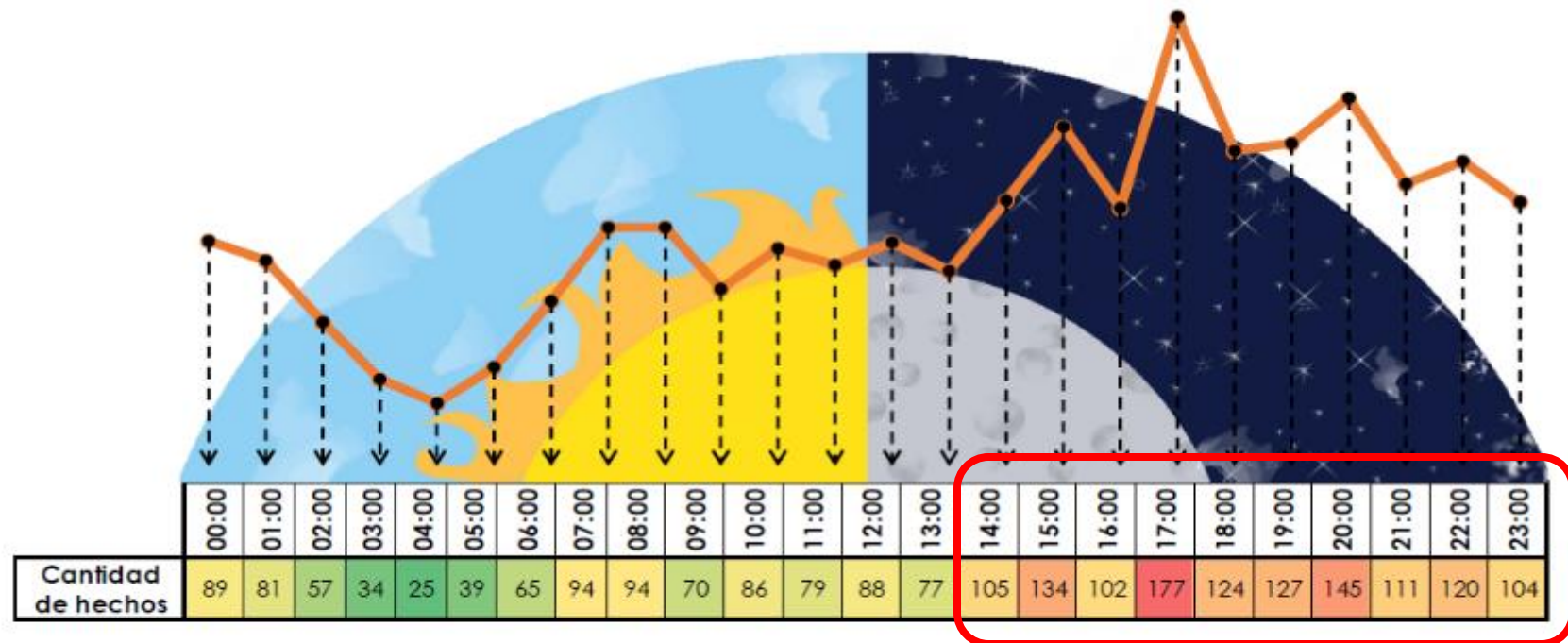
On the roads and in the cities

All the time  
By day, dawn / dusk and at night



# Distribution of traffic events per hour

2/3 of deaths occur at night or in periods of low visibility



Visibility as a tool for road safety.

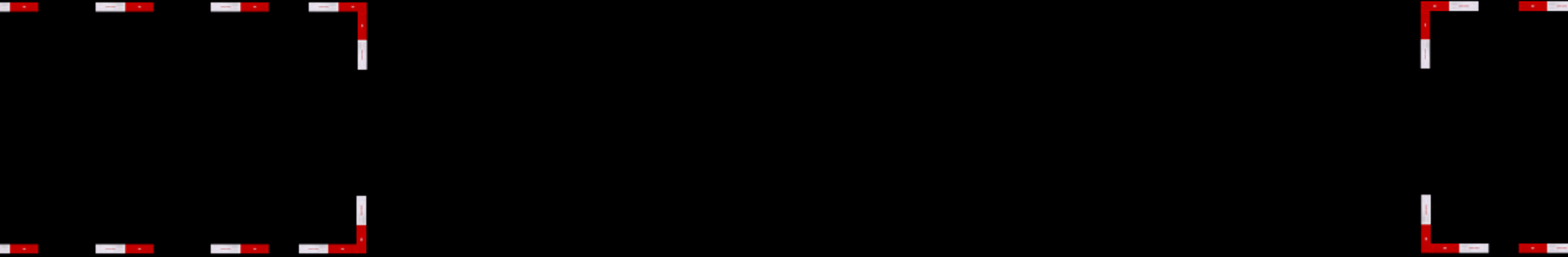
What happens on the road?

What we see by day...





# Is not the same as what we see at night!

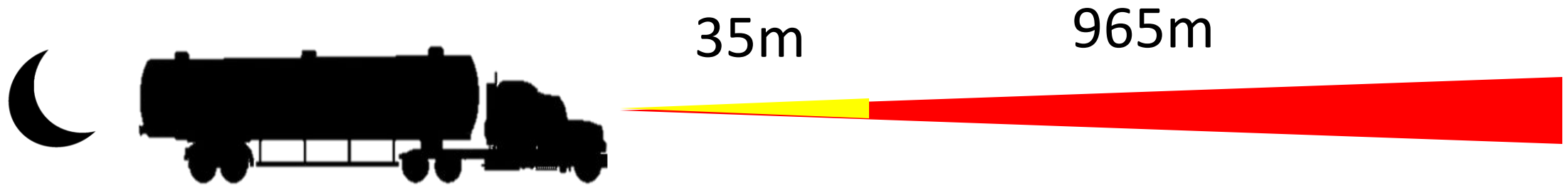


Only 5% of the information we see in the day can be captured by the human eye at night

# Day and Night Visibility



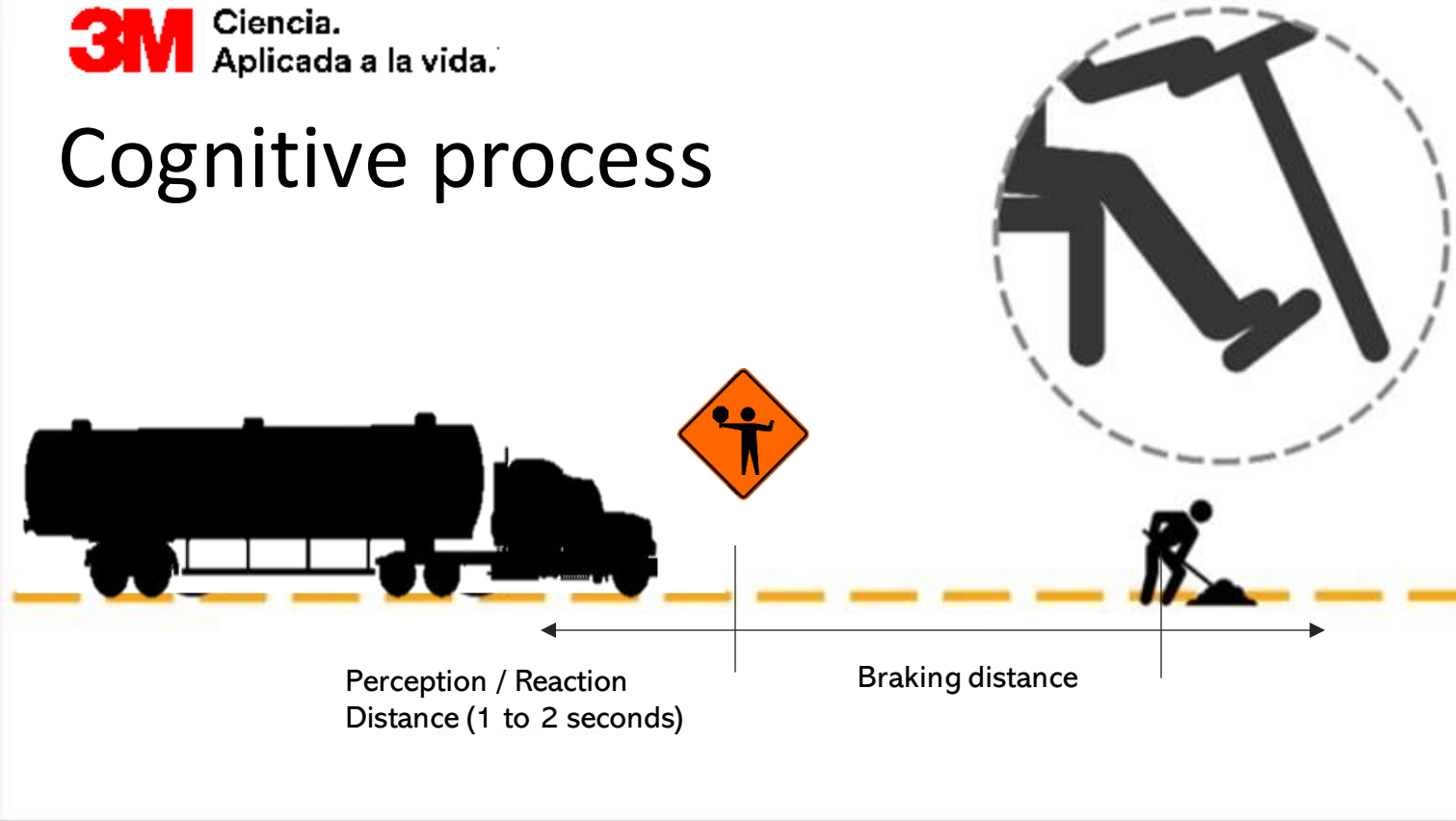
On a conventional road with good weather conditions



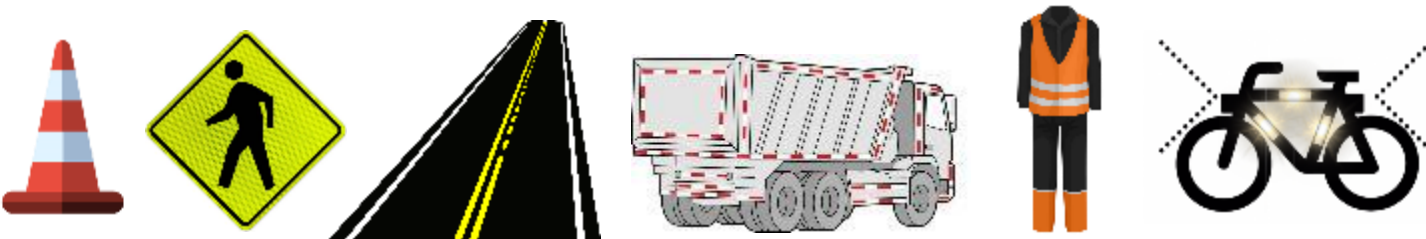
Low beam range.

When driving at night on a route, obstacles can only be seen when they are 35 m from the driver, which is insufficient distance to stop the vehicle and avoid an impact

# Cognitive process

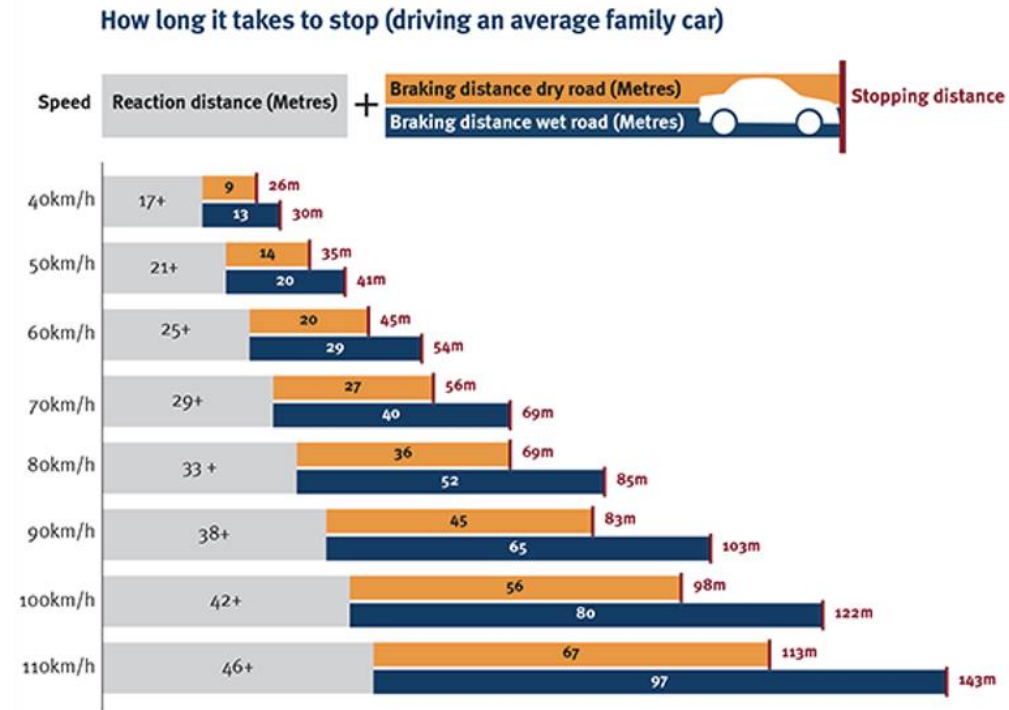


Distance traveled from when a driver senses the need to stop (visibility - readability) until the vehicle stops



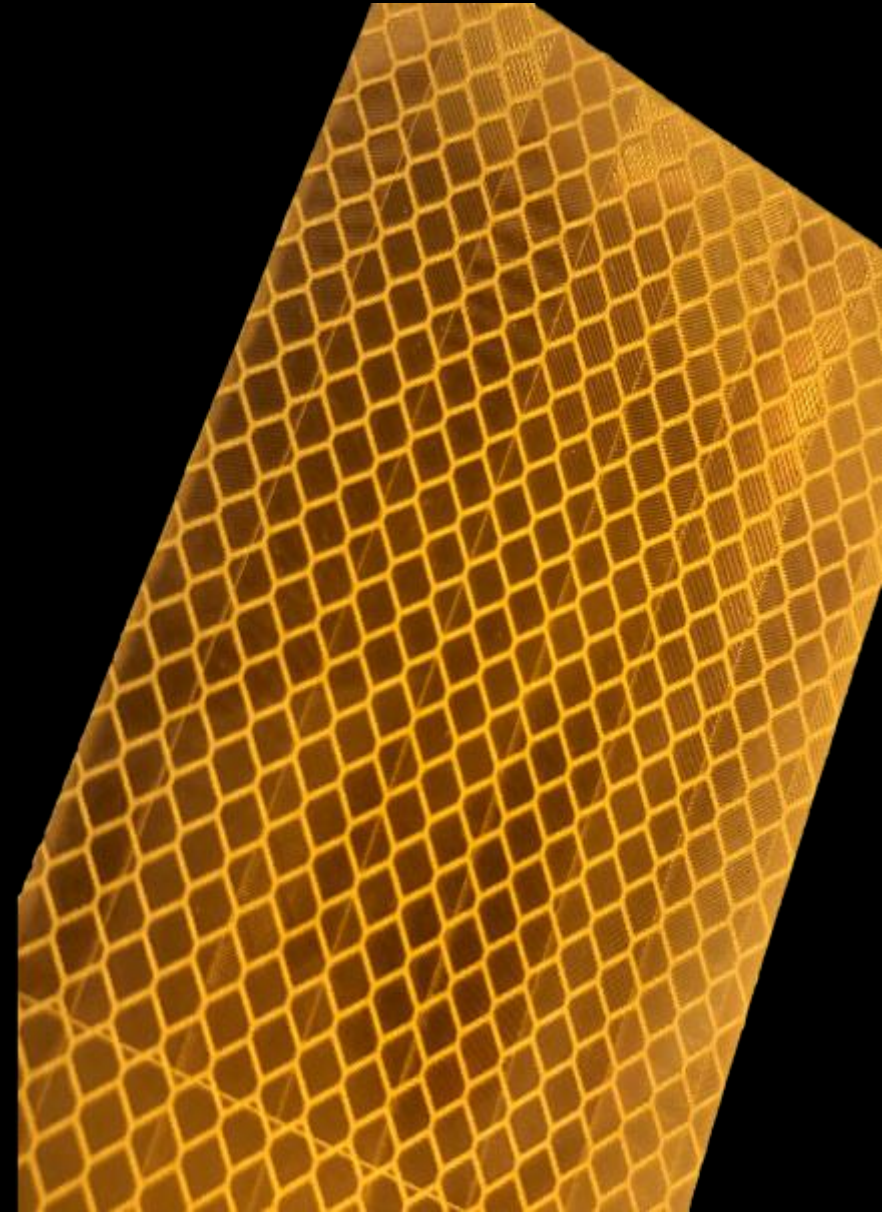
## BRAKING DISTANCES

Dry Floor - Normal Conditions



Source "Queensland Government, Australia, 2016."

# How can we improve Road Safety?





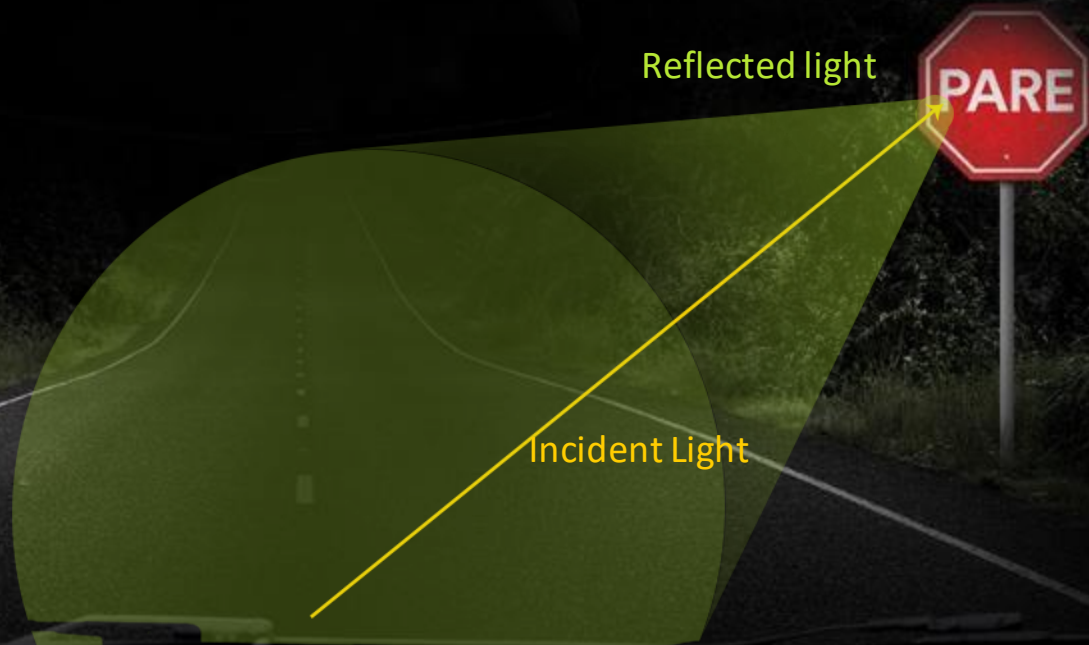
# What is retroreflectivity?

---

## Retroreflection

---

A retroreflective signal reflects the light from the car's headlight back to the headlight, including the driver in the "cone of light."





# Visibility

**Technology is important**



# Visibility



# Technology is important



Engineering degree

1942

Type I

8% -10% Efficiency

7 year warranty



High Intensity / Prismatic

1972/2005

Type III & IV

30% return of light

10 years warranty

**3M**



Diamond Grade Cube

2005-present

Type XI

60% light return

12 years warranty

How technology improves  
Road Safety in  
Infrastructure?



# A new vision of Road Safety

## Traditional approach

- Deaths from traffic accidents are preventable.
- Integrate human failure into the approach
- Prevent severe and fatal accidents.
- System approach.
- Saving lives is not expensive.

- Deaths from traffic accidents are inevitable
- Perfect human behavior
- Prevent Collisions
- Individual responsibility
- Saving lives costs a lot of money.

## Vision Zero

# Main trends impacting mobility in Latin America

## COVID-19 pandemic



The global pandemic has had short-term negative impacts, for example, the bankruptcy of micromobility companies. However, in the medium term, it will drive changes in mobility modal choice patterns in favor of active mobility solutions and services.

## Urban Infrastructure



All major cities in LATAM are developing a light infrastructure for exclusive bicycle traffic, as well as massive public bicycle parking facilities.

## Changes in mobility modes



The private bicycle is gradually increasing its share as the mode of transportation of choice in most LATAM cities and in most demographic segments. Local governments aim to integrate public bicycle-sharing systems and micro-mobility operations with general urban transport and private mobility offerings.

Global Automotive & Transportation Research Team at Frost & Sullivan



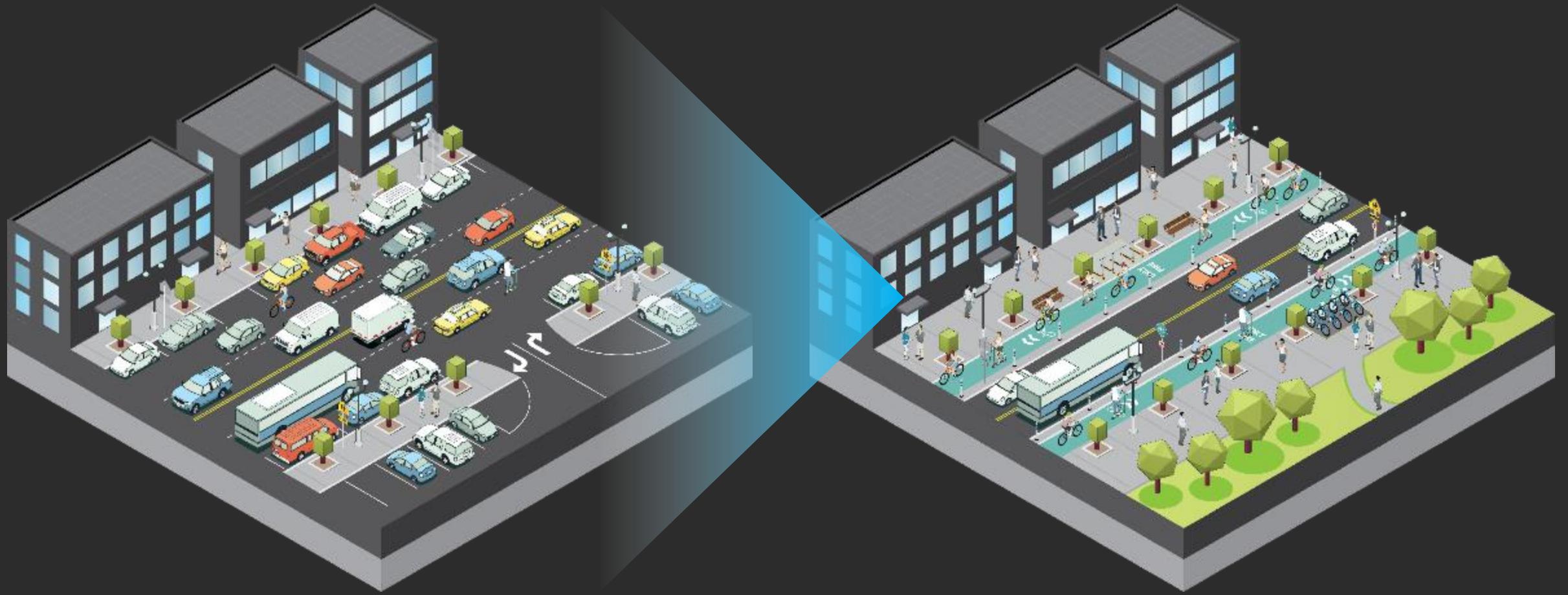
# Streets for life

#Love30



- Streets limited to 30 km / h (20 mph) save lives and protect all who travel on them, especially the most vulnerable, such as pedestrians, cyclists, children, the elderly and people with disabilities.
- Streets limited to 30 km / h (20 mph) where people and cars mix help prevent deaths from traffic accidents and encourage physical activity, since when the streets are safe, people choose more to walk or go cycling.





These trends and challenges are going to fundamentally alter the roads of our cities and how we interact with them.



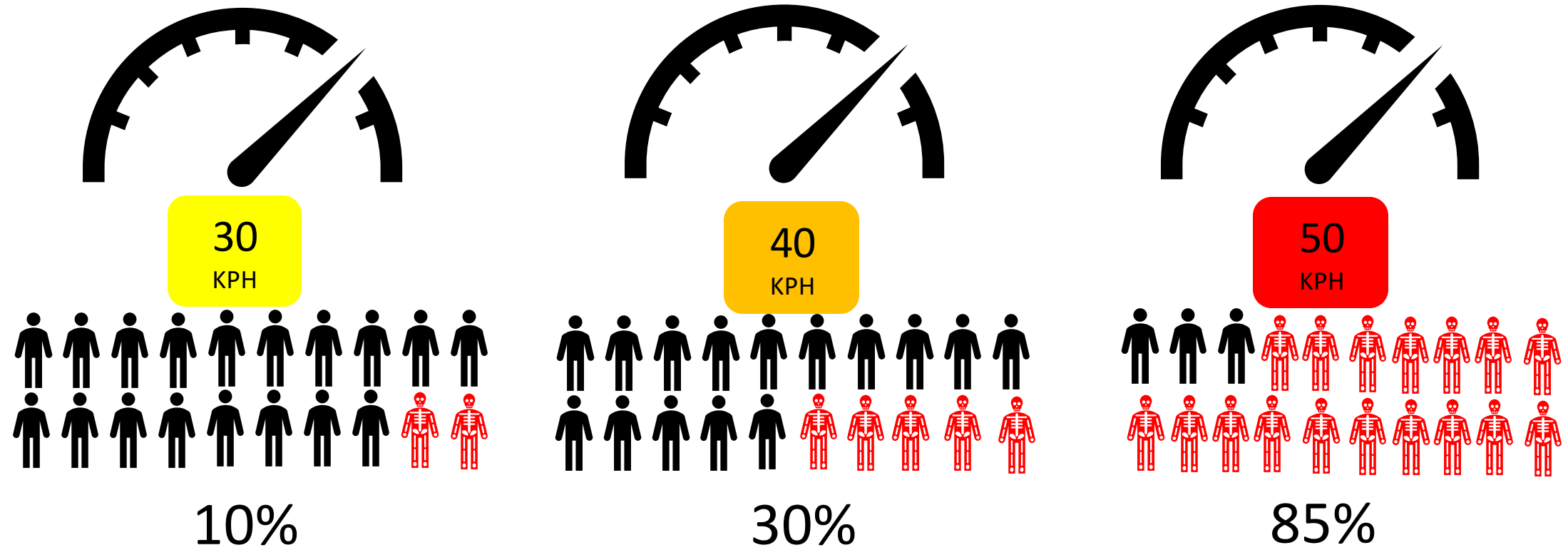
# Infrastructure for people

"... it is necessary to redesign the roads in order to effectively meet the needs of pedestrians, cyclists, users of public transport and those who carry out other public activities"

Safe cities by design - WRI



# High speeds increase the chance of death for pedestrians / cyclists in collisions



Elements and devices that can be used to achieve the desired target speeds



# Low Speed Zone Guide

## Marks on the Pavement



Pavement markings provide drivers with physical signals that they are entering a different environment and can communicate the appropriate speed.

## Warning signs



Warns drivers of an upcoming road change for decision-making and caution

## Speed limit signage



Anuncian el límite de velocidad para la zona a medida que los conductores ingresan. Además, es mejor si se utilizan señales y marcas en el pavimento para reforzar el mensaje.

# Low Speed Zone Guide

## Lane narrowing



Straight roads can allow or encourage drivers to accelerate. Introduce traffic lane alignment changes that require drivers to pass through an area at slower speeds

## High visibility at junctions



Crosswalks establish the form of pedestrian traffic through a street and must be highly visible, can be unique and context-based, and

## Stop zones



STOP signs in all directions provide the best safety by reducing the approach speed in all arms of the intersection and minimizing the risk of a higher speed vehicle having a right-angle collision with another vehicle.





Human beings are vulnerable  
and we make mistakes.

“Traditional approaches have focused on changing driver behavior. But behavior is only one piece of the puzzle. Humans will always make mistakes, we cannot punish someone with death or serious injury if they make a mistake along the way.”

- Claudia Adriaola Steil.

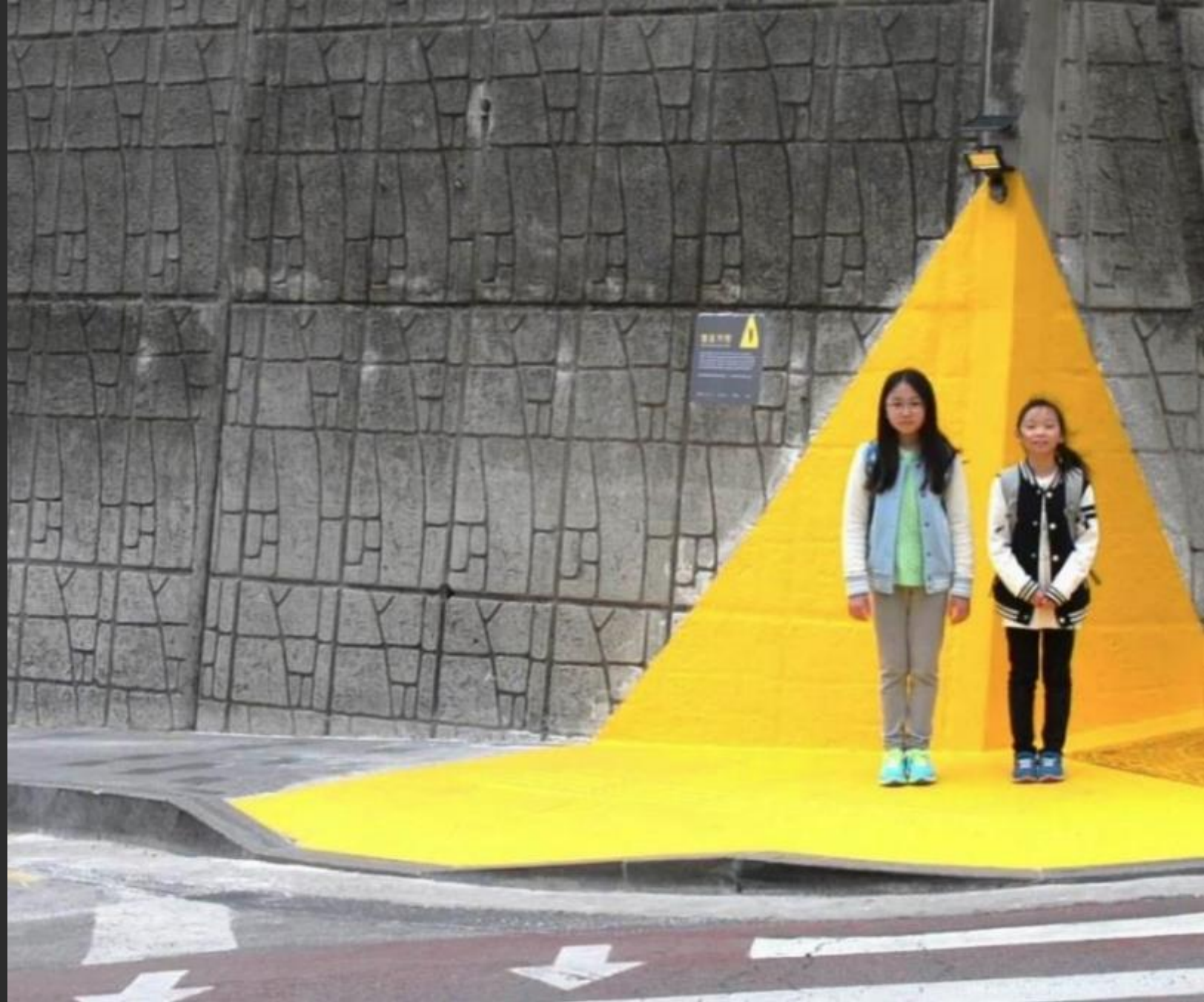
Director of Health and Road Safety  
WRI Ross Center for Sustainability



# Safe places to learn and travel

"Children are more vulnerable to road collisions than adults, since their activities and movements are more unpredictable."

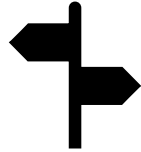
Safe Cities by Design - WRI



# Most representative problems



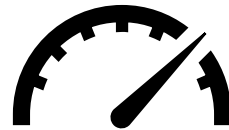
Inappropriate behaviors of parents, mobility and students.



Inconspicuous, missing, or outdated signage.



Priority for the car and not other forms of mobility



Speed limits are not respected



Presence of public transport and unauthorized stops

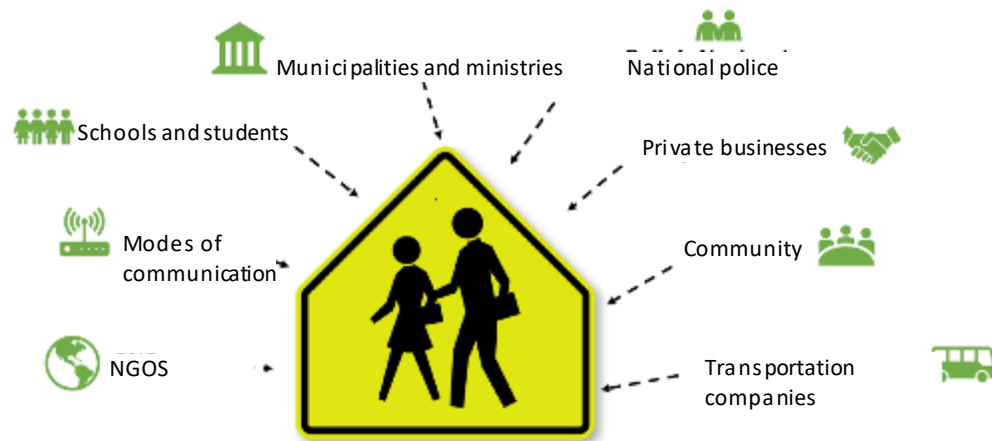


Infrastructure that promotes human error



Unfavorable weather conditions for visibility

# Schoolchildren as Vulnerable Users in Latin America



## Installation of signs and painting

The installation of Signs linked to the project has a symbolic character of appropriation of the space and divisibility of the project



## Traffic management

Traffic regulation measures that are cheaper than those of infrastructure works such as prohibiting parking and or the passage of vehicles at certain times and also reducing speed

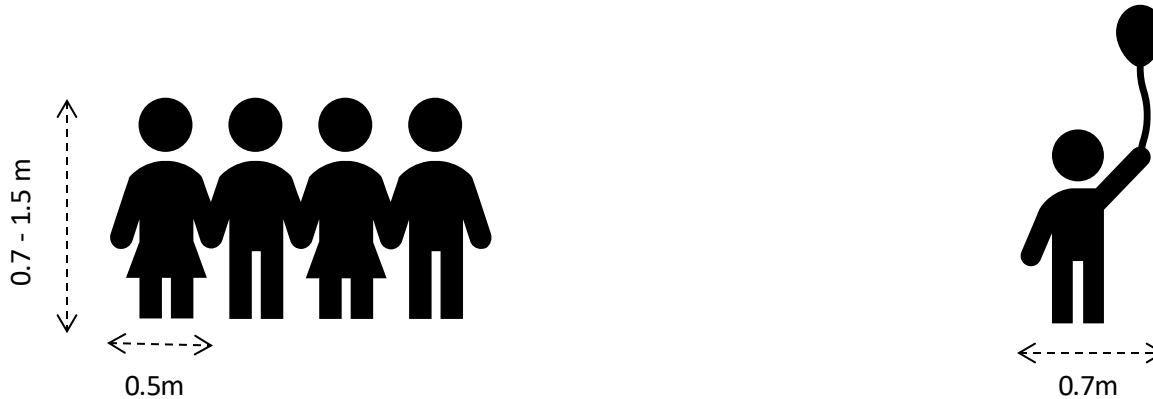


## Intervention in public space

Some of the traffic regulation measures transform the geometry of the streets, such as the amplification of the sidewalks or the creation of elevated pedestrian crossings.



# Safe infrastructure for children



GLOBAL STREET DESIGN GUIDE- NACTO

- Children are less able to judge speed, the responsibility for providing safe movement options rests with designers and drivers.
- Your shorter height and your slower speed must be considered in the design of the crosswalk and the timing of the traffic light.
- Child-safe intersections have slow traffic speeds, very slow turning speeds, and highly visible crosswalks.
- The design of all streets must take into account children by limiting the speed of vehicles and the efficient introduction of properly marked pedestrian infrastructure.

# What should we signal?

- ✓ Approach Zone School Zone.
- ✓ Parking and prohibitions.
- ✓ Speed control and its limits.
- ✓ Pedestrian facilities
- ✓ Intersections and crosswalks.
- ✓ Highlights
- ✓ Road narrowing
- ✓ Bike paths
- ✓ Medians and pedestrian shelters.
- ✓ School bus stop.
- ✓ Parking and stop signs.
- ✓ School Zones Completion Area



# Tactical Urbanism in School Areas

VAS 분석 결과 홍익초교 '엘로카펫' 설치 현황

**설치 전**

**설치 후**

‘엘로카펫’ 설치현황을 VAS 시뮬레이터 분석결과, 시공성 및 비용에 미치는 영향이 매우 긍정적 것으로 확인되었습니다.

공부초교 해당 구간별  
34% → 85%

홍익초교 해당 구간별  
34% → 95%

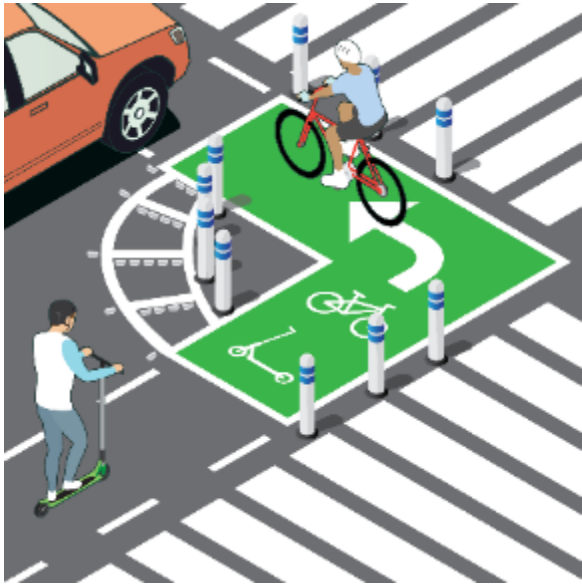
결론적으로, 시공성 및 안전성 측면에서 매우 긍정적인 영향을 미친 것으로 분석되며, 시공성 및 비용 측면에서도 매우 긍정적인 것으로 확인되었습니다. 또한, 홍익초교 주변에 설치된 엘로카펫이 주변 도로의 안전성을 높여주는 것으로 확인되었습니다.





# Proven countermeasures

## Urban mobility



Sidewalk Extension



Mid-Block Crossing



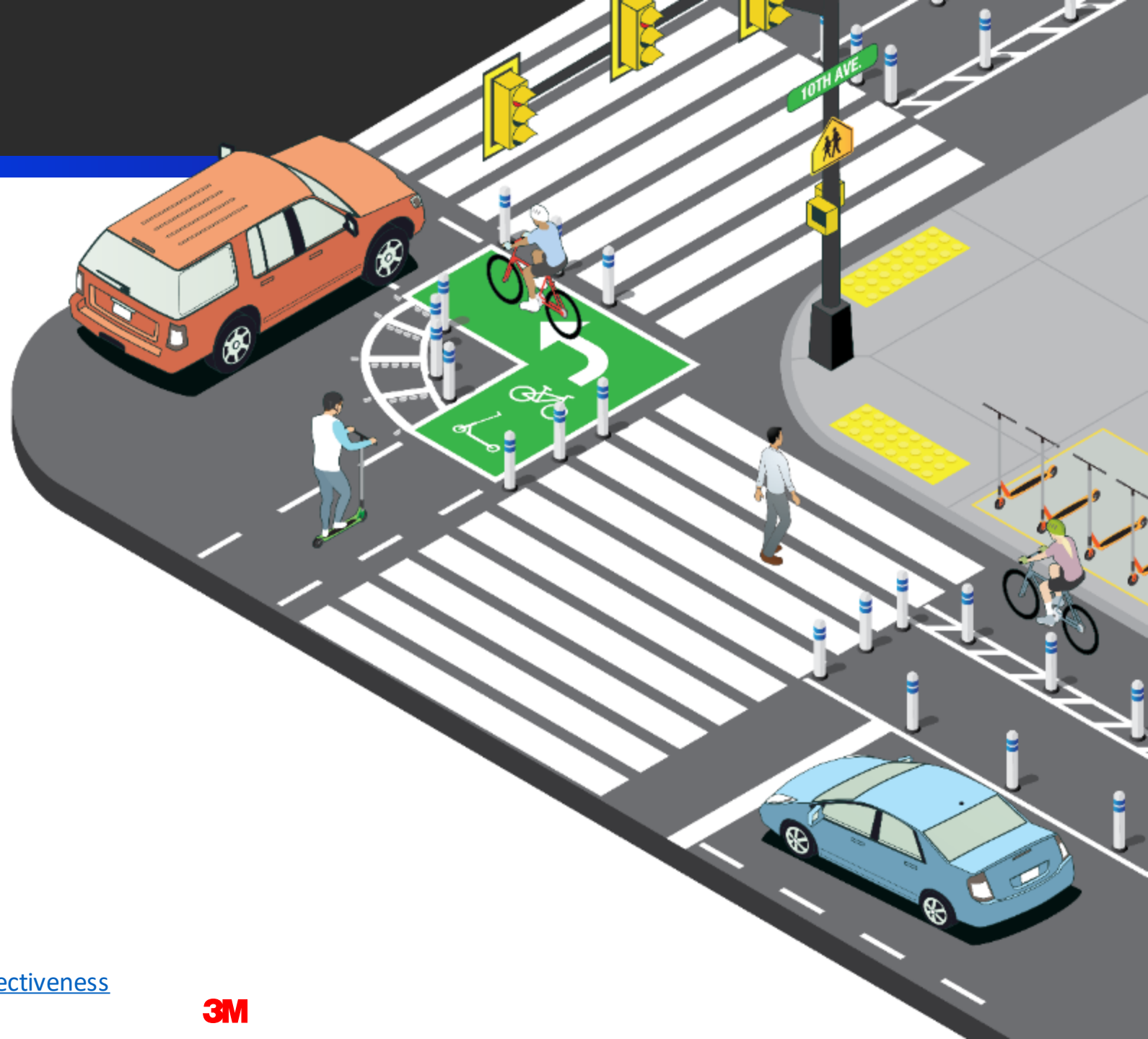
Bike Lane



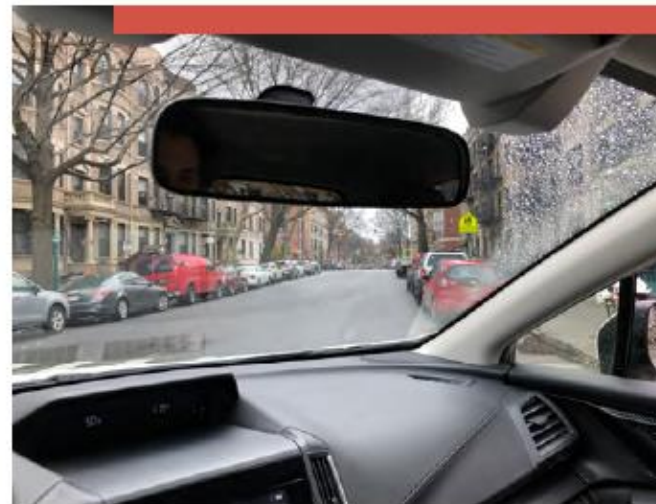
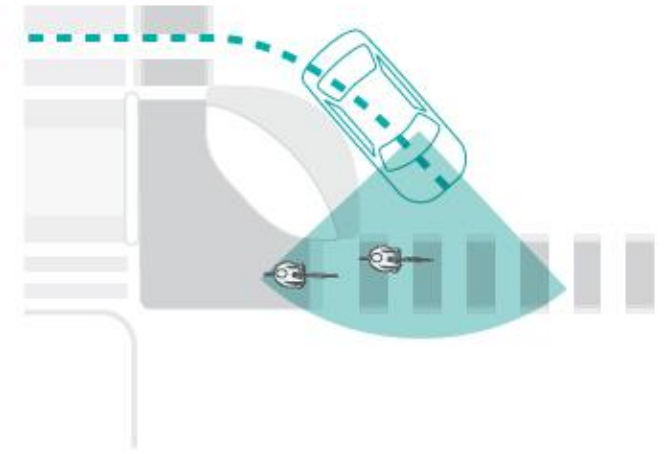
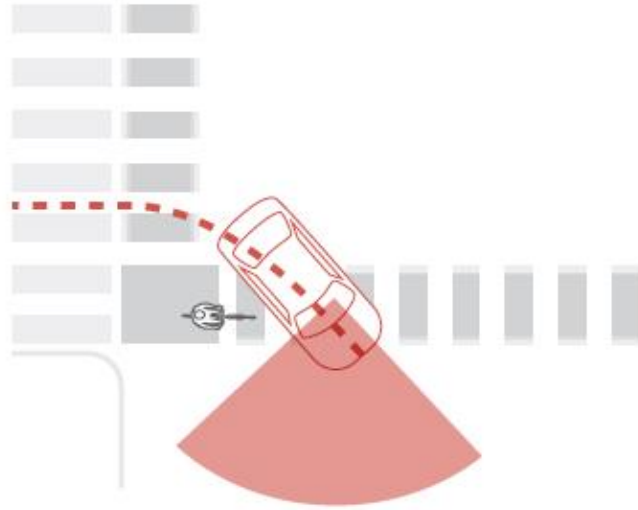
Intersection

# Curb or curb extension

- Calm traffic
- Reduction of conflict zones
- Dedicated space for everyone
- Simple and scalable
- Economic







Source: NACTO





Source: NACTO

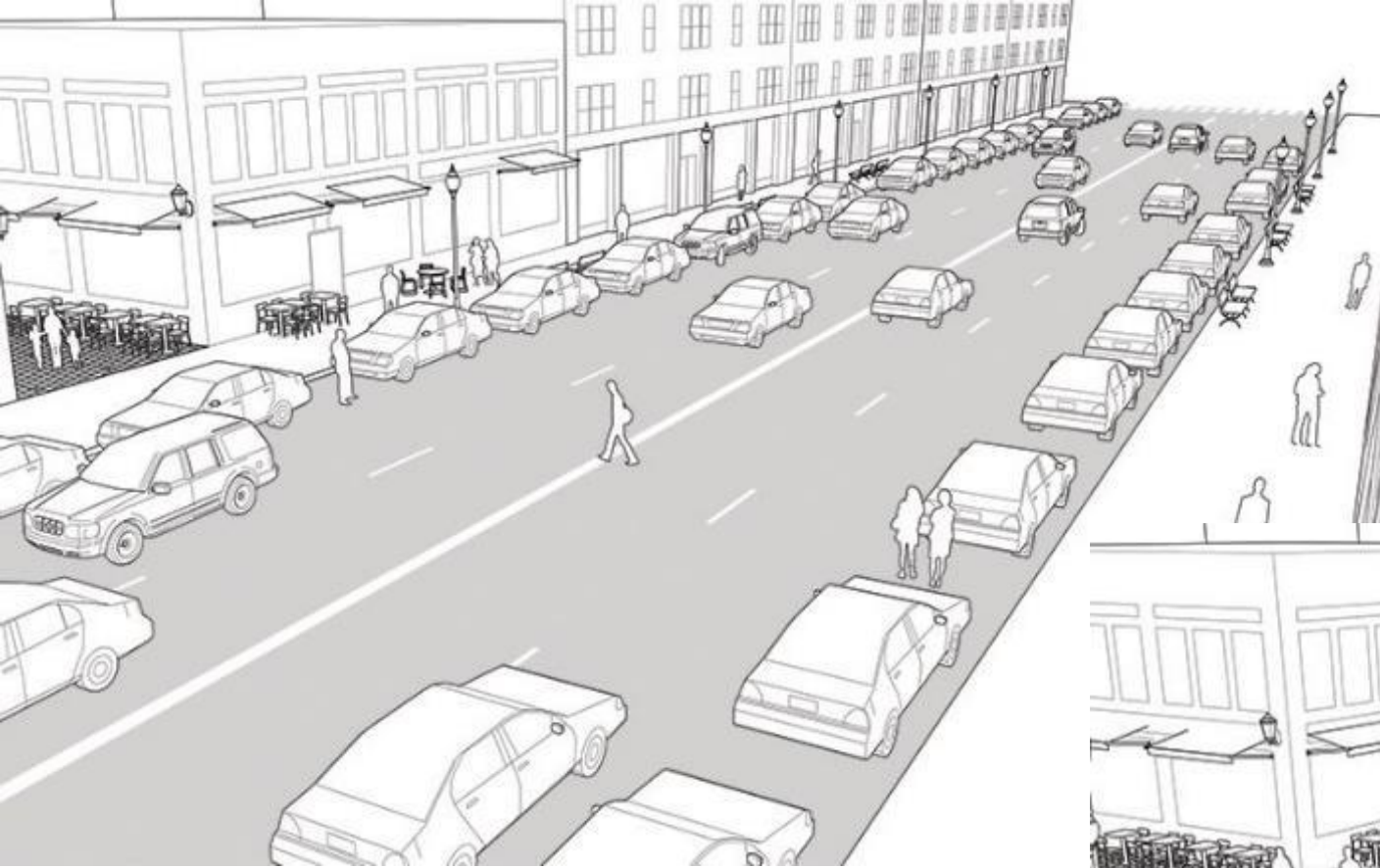
# Crosses half a block

- Increased visibility
- Calm traffic
- Simple and effective
- Easy to understand



[FHWA Toolbox of Countermeasures and Their Potential Effectiveness for Intersection Crashes](#)





Before



After

Source: NACTO





COMCAST CENTER

xfinity



STATE LAW  
STOP  
FOR  
WALKING  
CROSSWALK

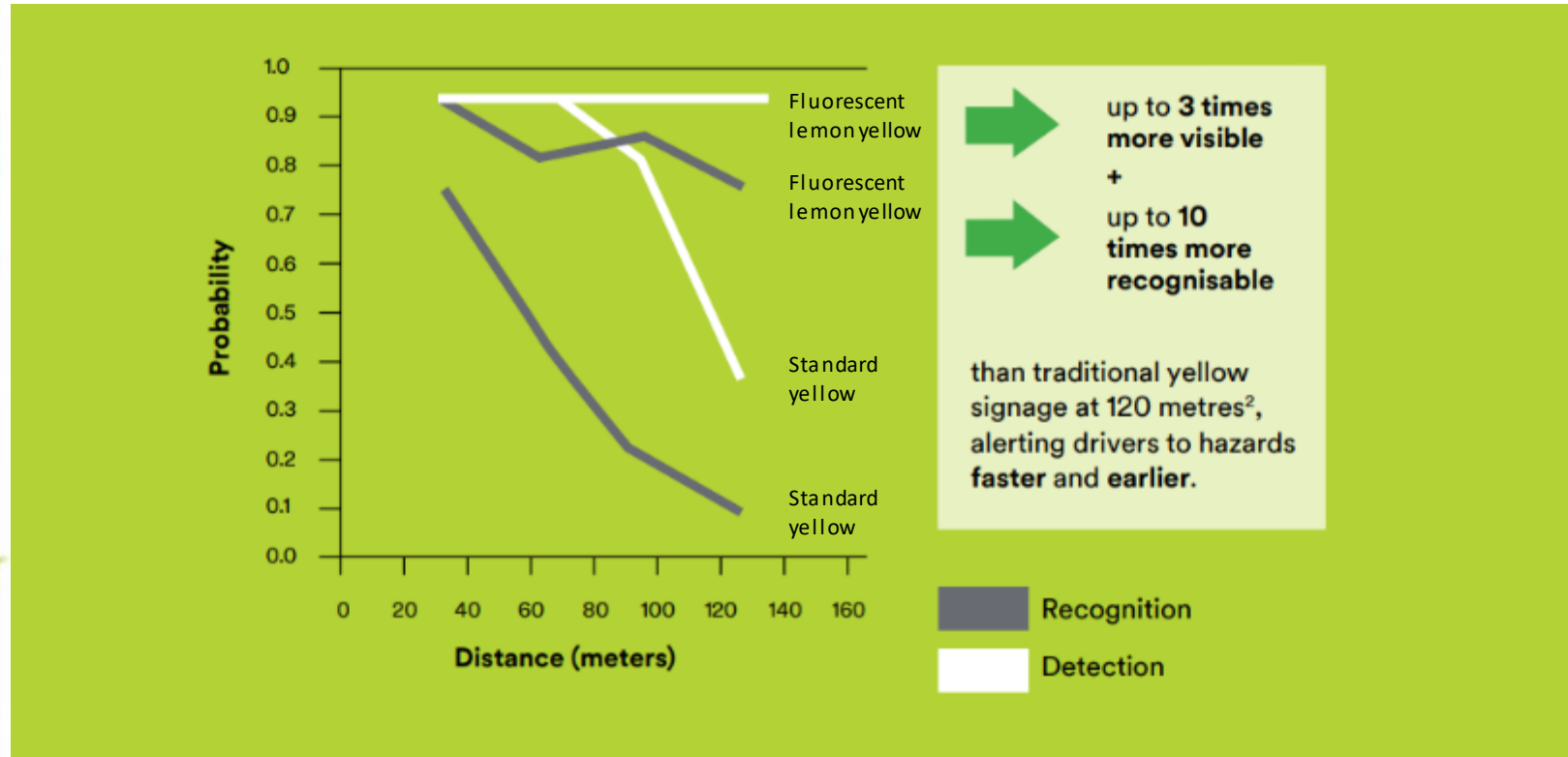




# Fluorescence makes the difference



**Fluorescent Sheeting**



I. Burns and L.A. Pavelka, Visibility of Durable Fluorescent Materials for Signing Applications, COLOR Research and Application, Volume 20, Number 2, April 1995

# High visibility at Intersection

- Help make pedestrians and / or crosswalks more visible.
- Bad weather visibility
- Permanent and temporary options



[FHWA Crosswalk Visibility Enhancements](#)



# Bike paths

- Vulnerable user exclusive space
- Safer
- Easy to install
- Easy to modify
- Permanent and temporary options.

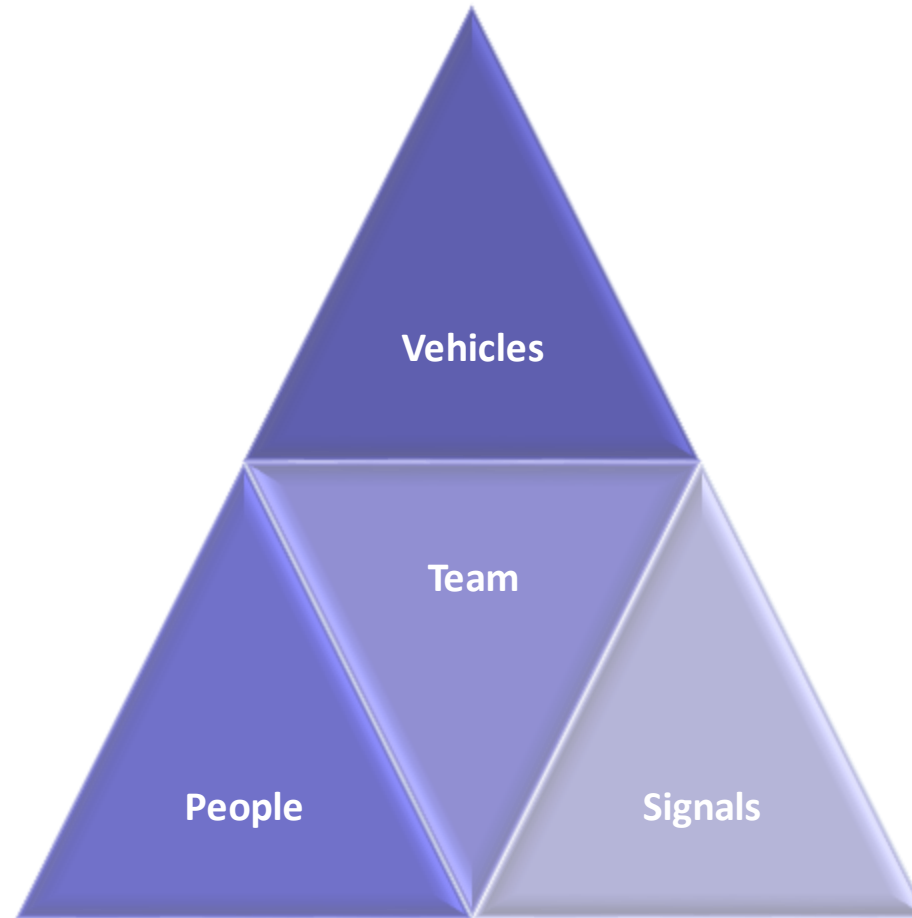


[FHWA Toolbox of Countermeasures and Their Effectiveness of Bike Lanes](#)

# Trends in order to Motorcyclists



# What should be Always Visible?





**3M** Ciencia.  
Aplicada a la vida.™

Tiras Refle



Tu Visibilidad te da Seguridad

**#HazteNotar**



# The parallels of poor visibility for trucks and motorcycles

Truck - Dangerous obstacle, a danger to other drivers in smaller vehicles



Motorcycle / motorcyclist - at risk of being hit by other larger vehicles - cars and trucks



**Trucks or motorcycles / motorcyclists are not visible to other drivers at night**

# Solving the problem of poor visibility on the roads at night

## Desired regulatory outcome in most countries



- The United States ordered conspicuity markings on new trailers as of December 1, 1993, expanded to cover truck tractors and all new / old vehicles as of June 1, 2001.
- Mandatory EU visibility markings on new trucks over 7.5 tn trailers over 3.5 t since July 10, 2011.
- Both US and EU regulations were widely replicated in the Americas and Asia Pacific.
- These mandates arose out of more than 30 years of visibility security research findings in the US and the EU.



# Demarcation for motorcycles



## This gives other drivers

- ... more time to maneuver the vehicle safely
- ... a better judgment of the vehicle's distance from afar
- ... better recognition of parked vehicles



A demarcated motorcycle is recognized more quickly than an unmarked motorcycle

## Results in:

- ... fewer accidents
- ... improved safety for drivers and their passengers
- ... increased safety for other road users

# Marked two-wheelers | Motorcycle

Daylight



Nightlight



# Marked two-wheelers | Scooter

Daylight

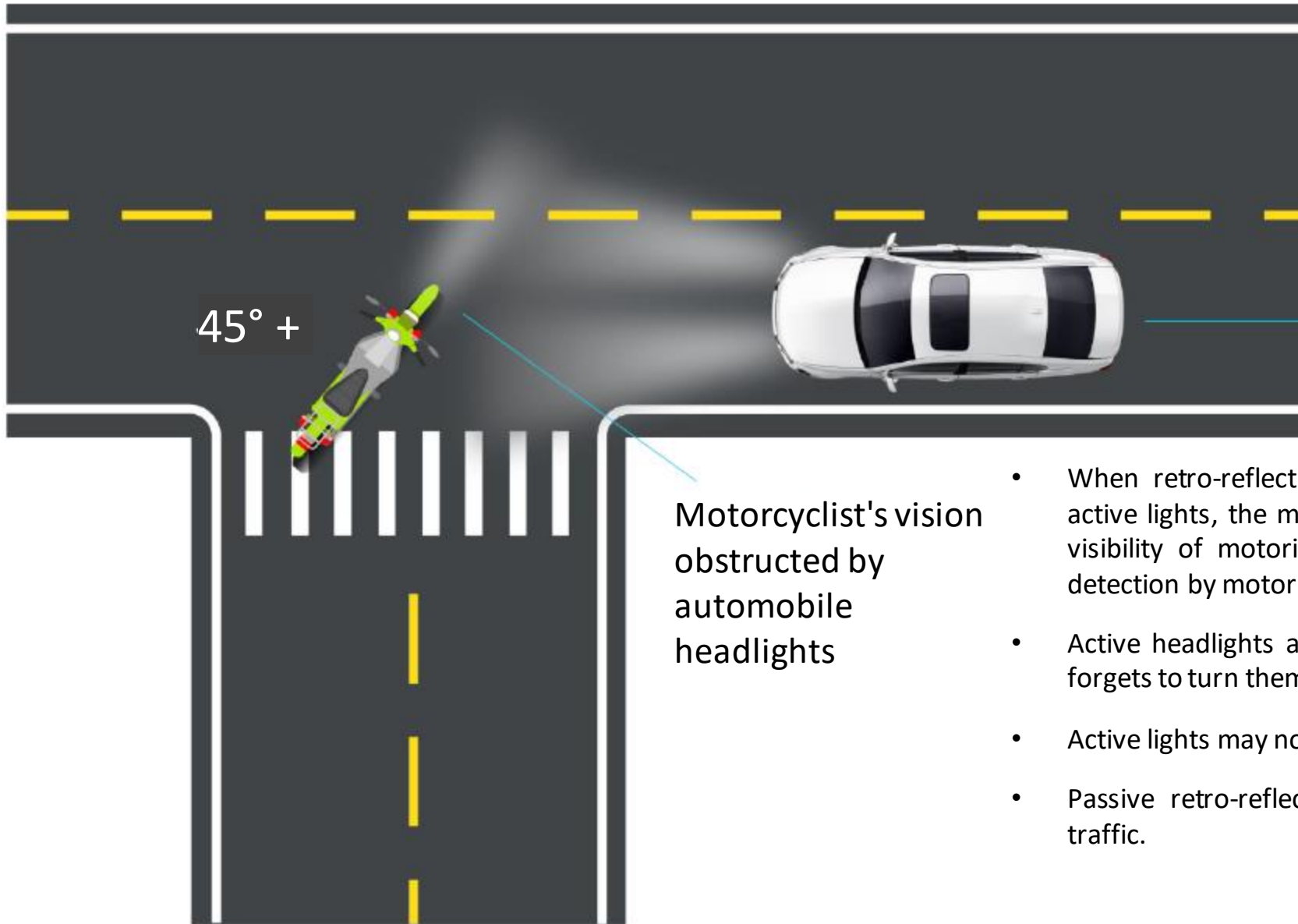


Nightlight





# Conspicuity Application Scenario



- When retro-reflective markings are present in conjunction with active lights, the markings can significantly improve the nighttime visibility of motorized two-wheeled vehicles and increase their detection by motorists.
- Active headlights and taillights do not always work or the driver forgets to turn them on.
- Active lights may not be aimed at approaching traffic.
- Passive retro-reflective markings always work and always face traffic.



# Biking culture



Daytime visibility





Night visibility

Evaluate your  
conditions



Reflectives are important!

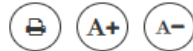
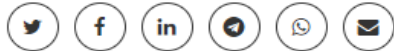




## Cintas retro reflectantes imprescindibles en bicicletas para reducir accidentes: IRF

La IRF dijo que el Centro Internacional de Tecnología Automotriz (ICAT) encontró que los catadióptricos tradicionales utilizados por los fabricantes nacionales de bicicletas eran de calidad inferior y no se ajustaban a los estándares.

PTI • 05 de junio de 2015, 7:09 pm IS



NUEVA DELHI: Es necesario buscar mejores cintas retrorreflectantes en las [bicicletas](#) para minimizar los accidentes, ya que alrededor de 6.600 ciclistas murieron solo en 2012 debido a la mala visibilidad, dijo el viernes la Federación Internacional de Carreteras ( [IRF](#) ). La IRF dijo que el Centro Internacional de Tecnología

Automotriz ( [ICAT](#) ) encontró que los catadióptricos tradicionales utilizados por los fabricantes nacionales de bicicletas eran de calidad inferior y no se ajustaban a los estándares.

Dijo que el ministro de la Unión, [Nitin Gadkari](#), había escrito el año pasado al ministro de Asuntos del Consumidor, Alimentos y Distribución Pública, Ram Vilas Paswan, para garantizar [los](#) estándares de [seguridad](#) para las bicicletas, incluidas las disposiciones para la fijación de cintas retro reflectantes, en lugares específicos para que sean visibles durante la noche.

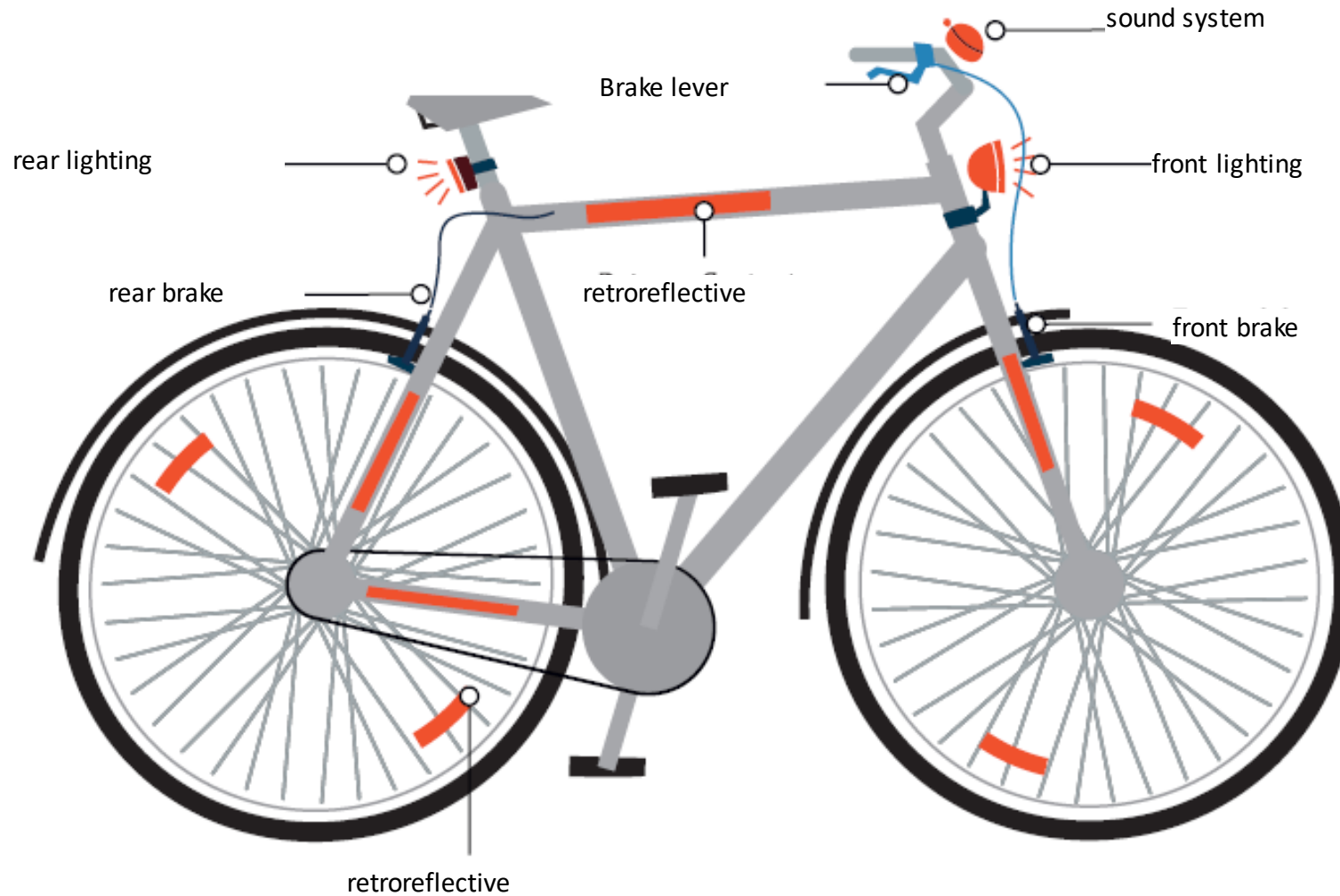
"Poor visibility of cyclists due to lack of proper reflective devices installed on bicycles is the main reason for the high rate of accidents with motor vehicles"  
Gadkari





# Compulsory Bicycle Equipment Manual for Peruvian Cyclists

21



Thank you