Blind Spot Information Systems

VRU-Proxy March 2018

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General Comments

- Scope of BSIS:
  - Right Side, Front, Left
  - Pedestrians, Cyclists
  - Lateral Distance is too high

- HMI:
  - Information vs. Warning
  - Timing of Information

- Scope of Regulation
  - Trucks vs. Trucks and Buses
  - Component Solution

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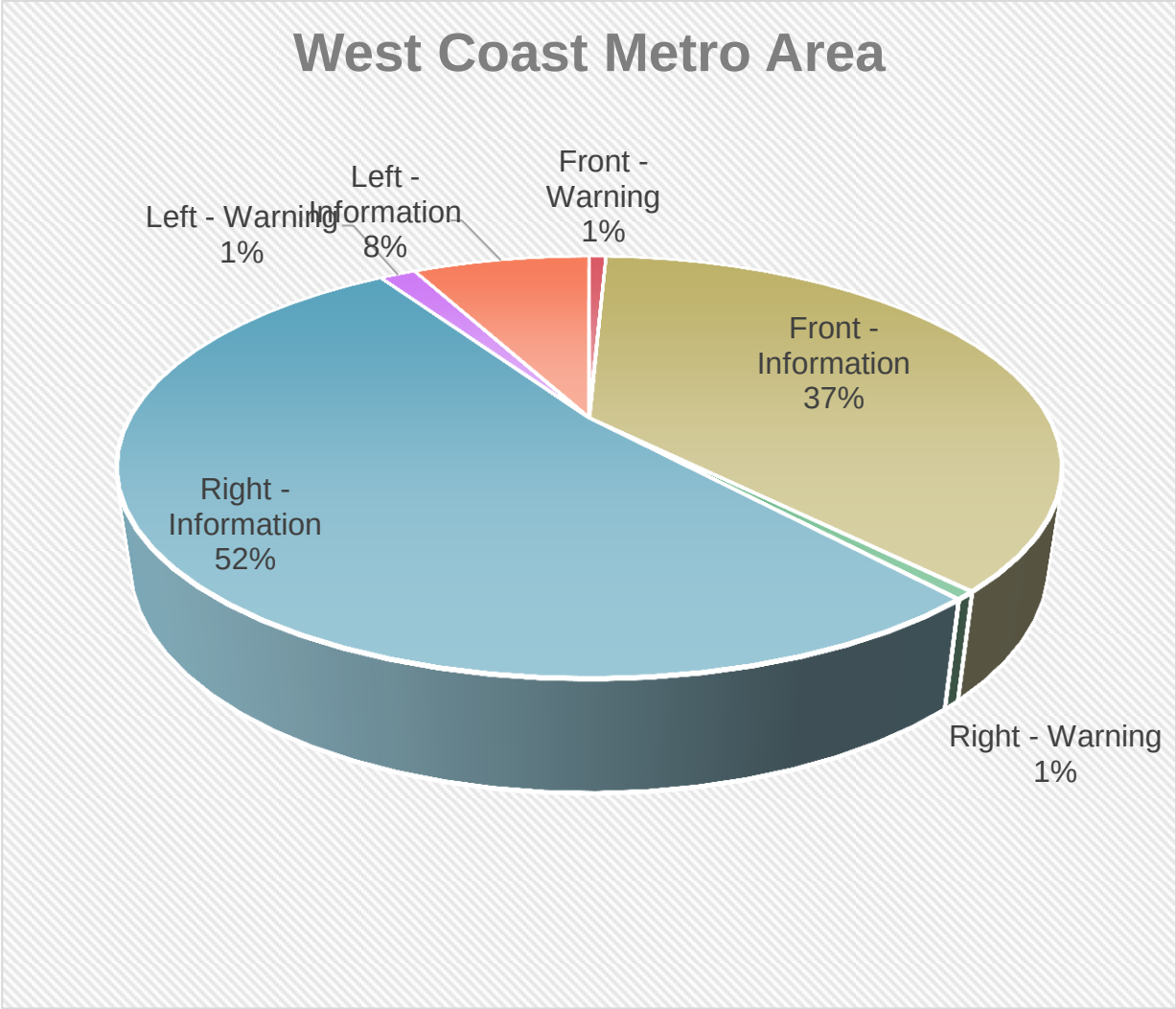
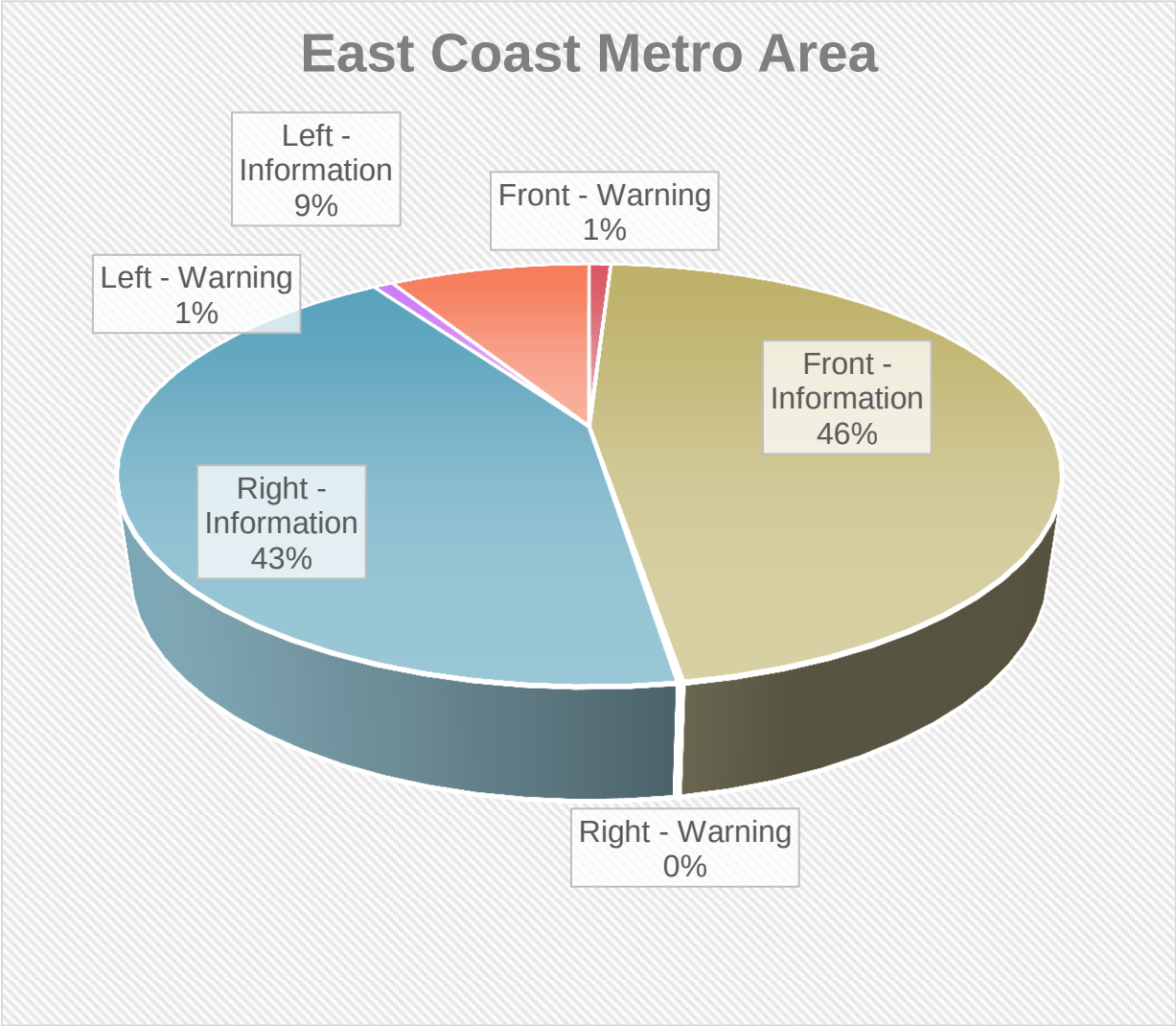
Existing Solution Alert Data

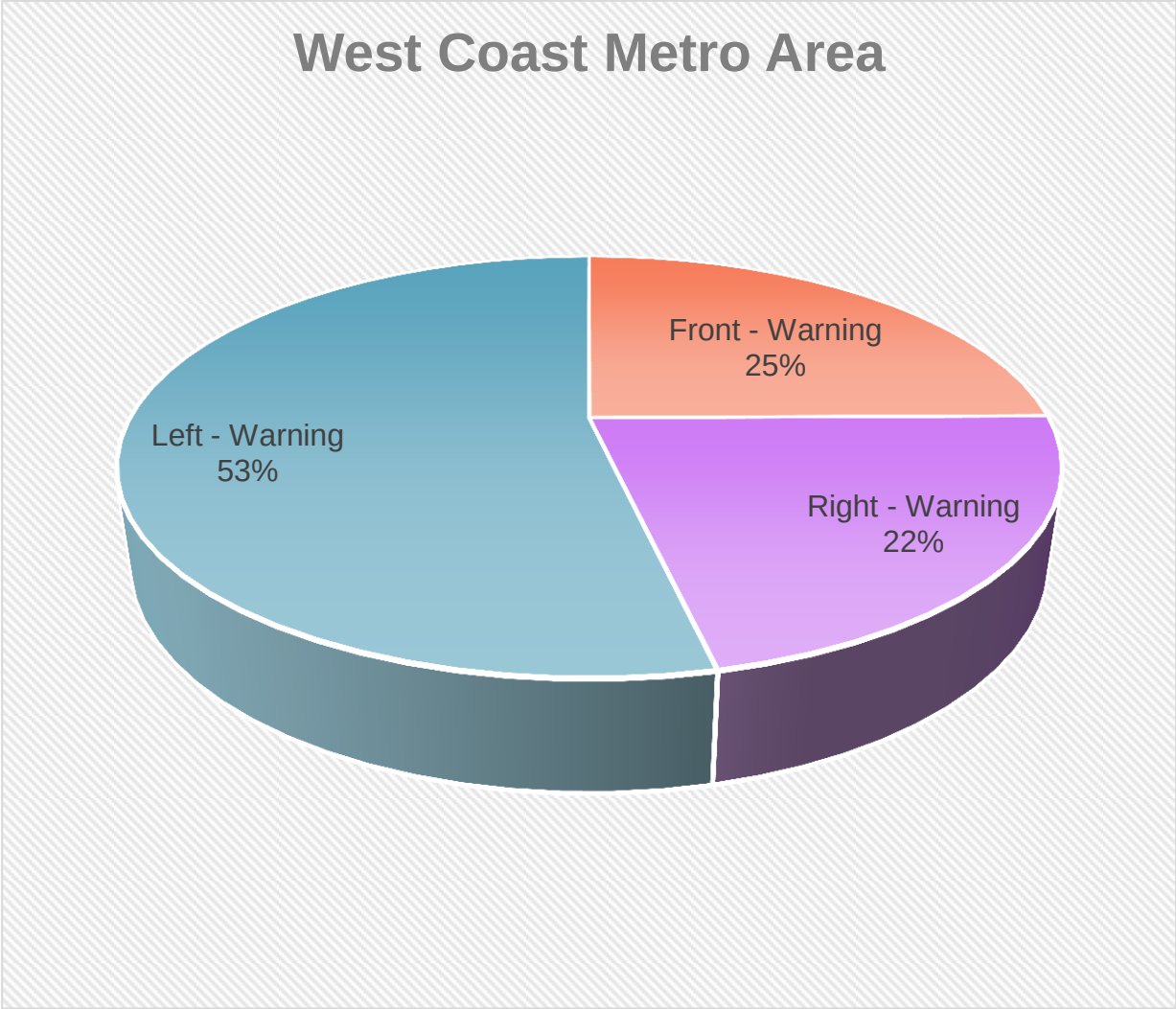
Cyclists and Pedestrians, Double Information Layer

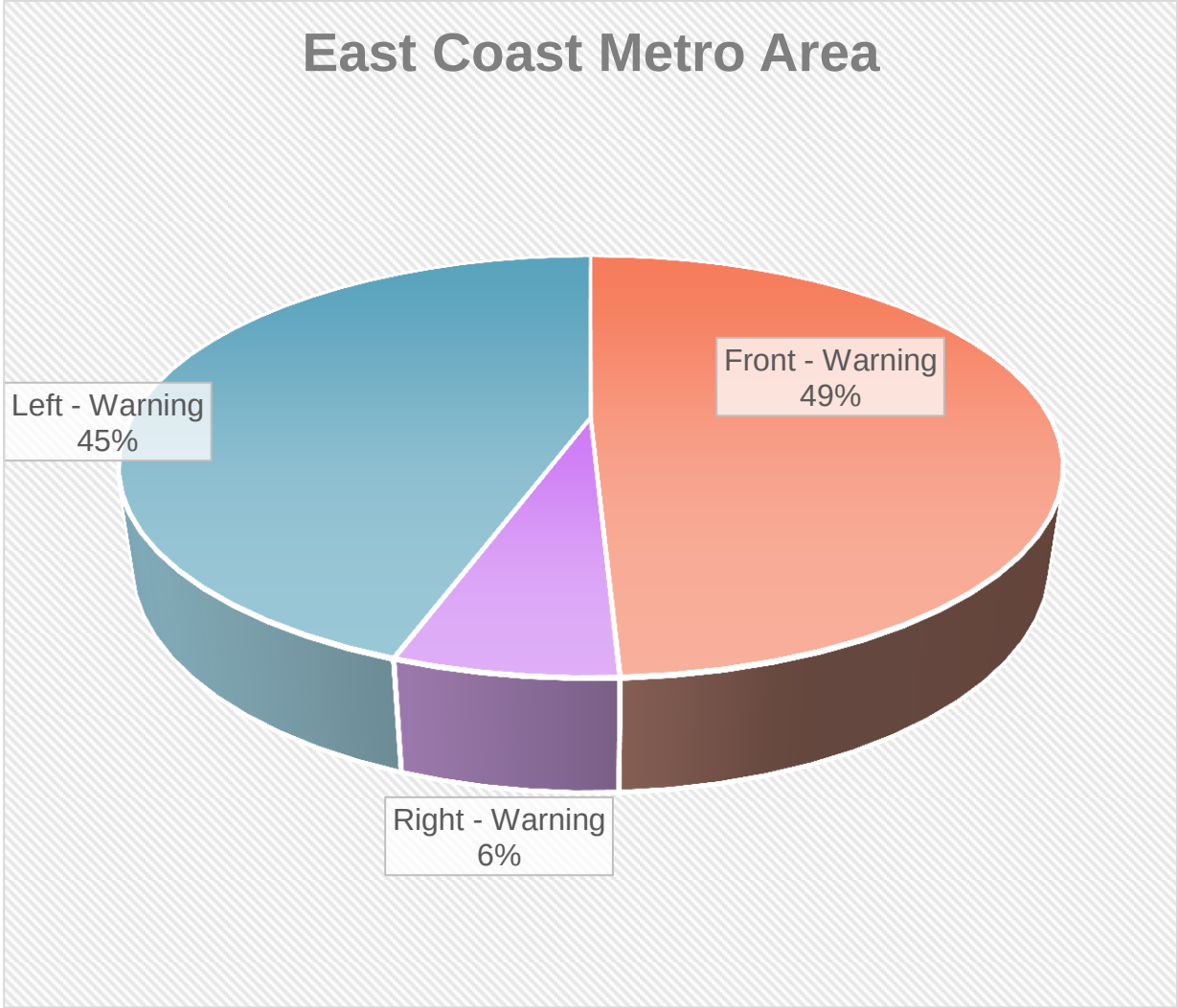




Existing Solution Alert Data

More Warnings on the Left side vs. Right, Front



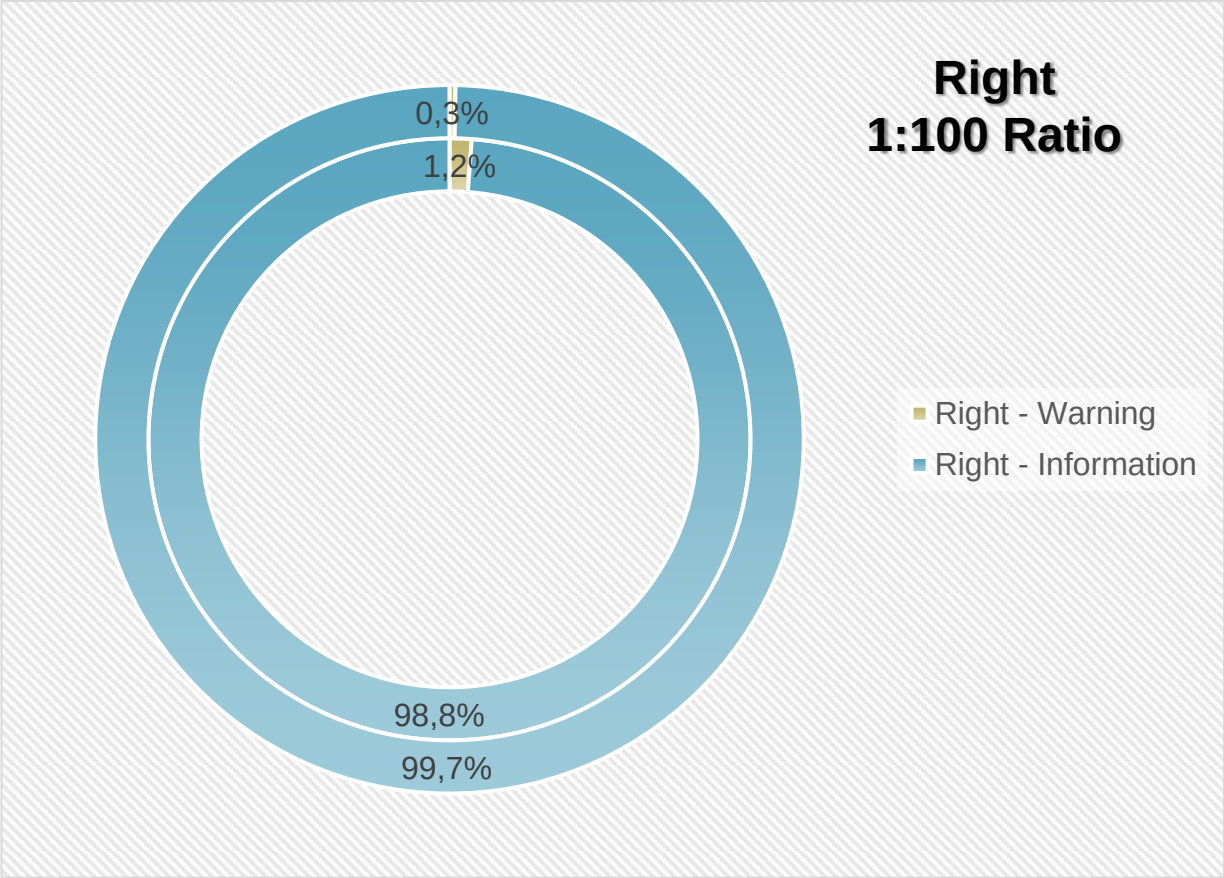


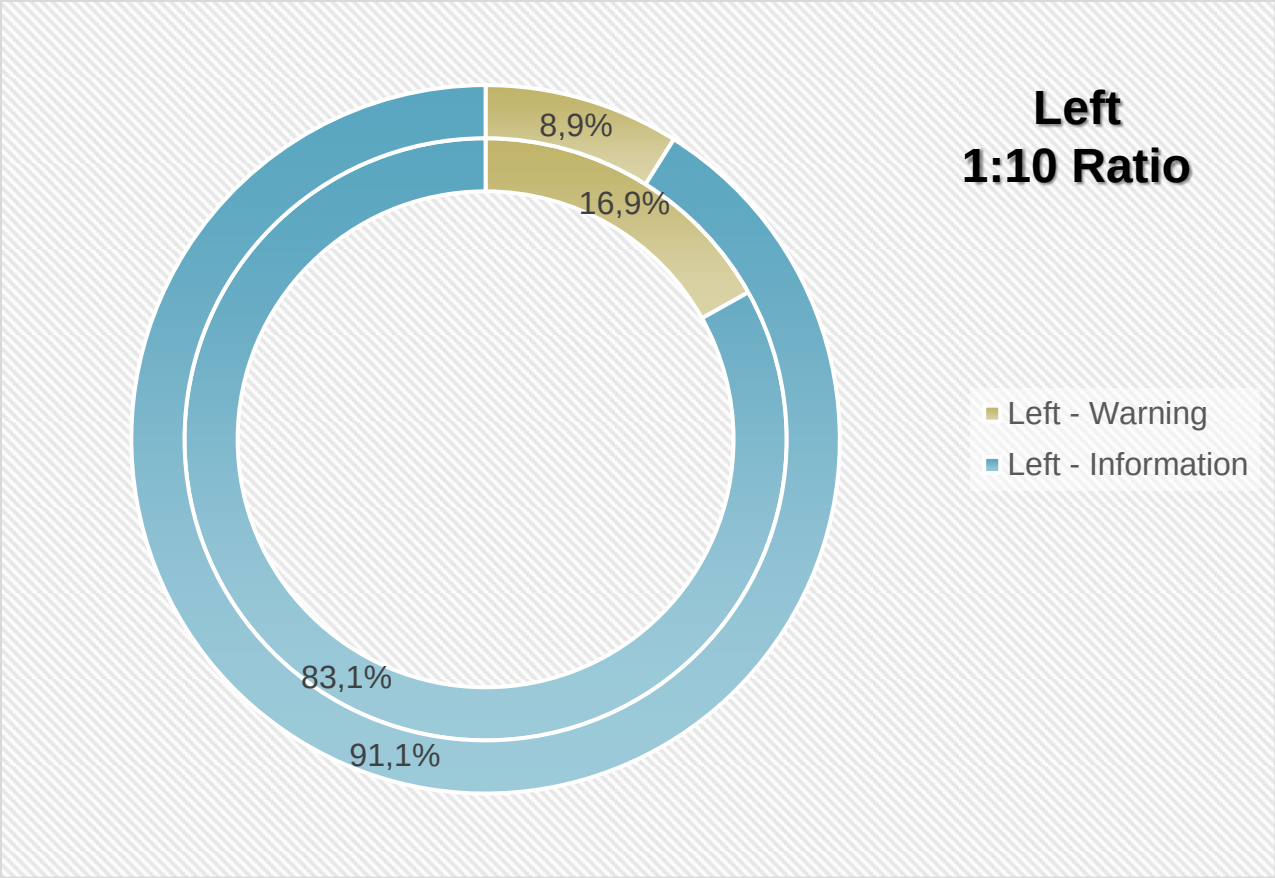
Existing Solution Information Data

Warning vs Information – Left Side, Right Side

(including pedestrians)

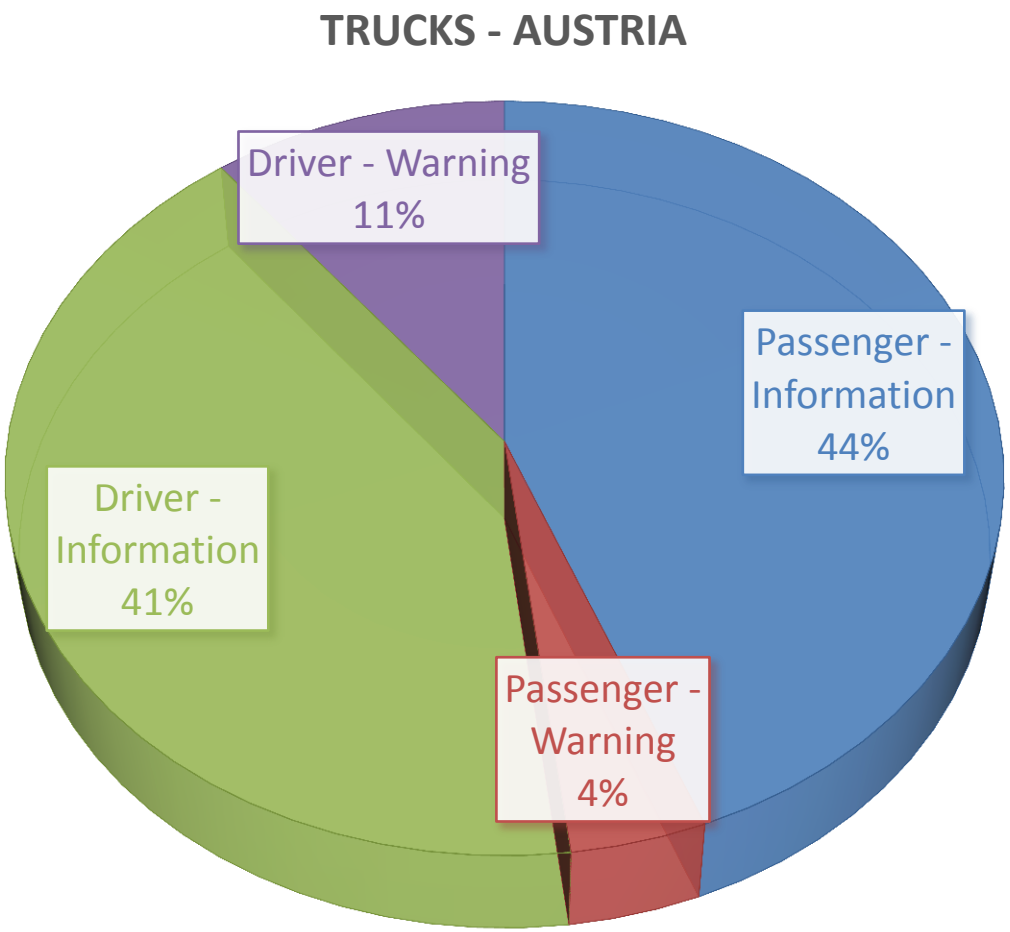
Pedestrians are identified by existing solutions currently on the road





Initial Information

Trajectory Based Information ws over 2 times more prevalent on the Driver's side



Real Life Scenarios

Right Side traffic, Lateral Distance, Traffic Lights, Multi-agent Scenarios

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Real-Life Scenarios

Right Side traffic, Lateral Distance, Traffic Lights, Multi-agent Scenarios

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HMI

Long Vehicle Specifications

- More Information
- Multi-talking Driver
- More Blind Spots

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BSIS Tests

Adding a warning layer

Dynamic Tests

- Comment 1: Adding a layer of warning with indication of imminent collision based on trajectory:
  - On straight movement the TTC needs to be no more than 1 sec
  - On turnings movement the TTC needs to be 2.5 sec.
    - Ttc needs to be calculate in all the distance of the vehicle

- Comment 2: Need to define a clear zone where to receive the alert with min and max point.

Static Tests

- Add scenario with a lateral distance of less than 1 m.

General Comments

- Front Sensing, Right Sensing, Pedestrians.

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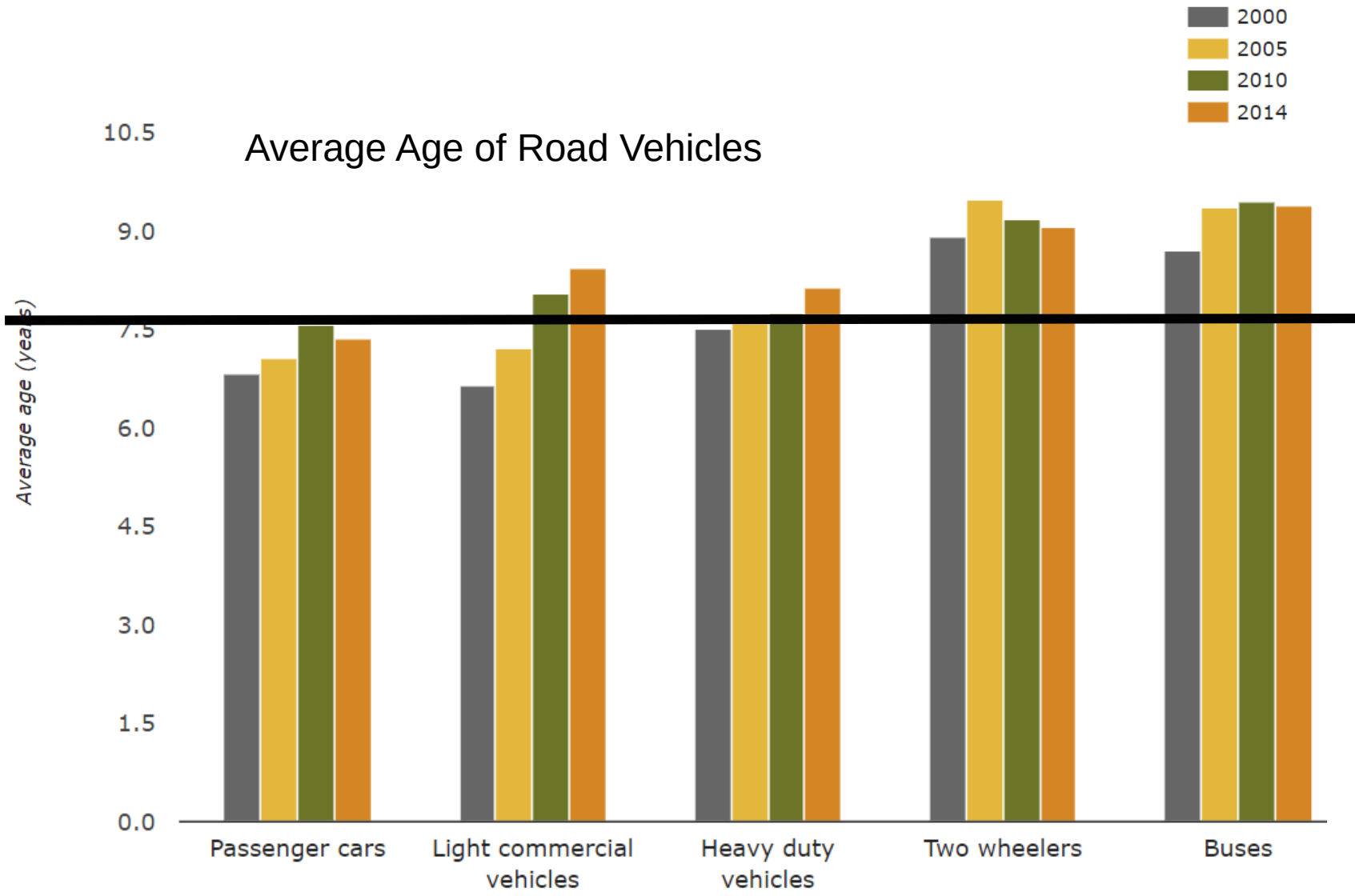
Component Approach

Vs. Passenger vehicles –

Higher Casualties



Source: European Environment agency, European Consortium for Modelling of Air Pollution and Climate Strategies

Drive Safely

Adding a Warning Layer

- Driving Side Blind Spot
- Adding a layer of warning with indication of imminent collision based on trajectory:
- The system should issue a warning when geometric position of bicycle is 1.5 m and not more than
- When the vector of the lateral position go closer we need to give a different warnings. On straight scenario the TTC need to be least of 1 sec
- On turnings scenario the TTC need to be 2.5 sec.
- The ttc need to be calculate in all the distance of the vehicle

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AV Normative Safety

RSS and Other Requirements

Standard Requirements

Stopping at Red Light
Maximum Speed Limit
Lane Prioritization
Stopping at a Stop Sign

Principal Requirements

Keeping a Safe Distance
Right of Way is Given, not Taken
Avoid an Accident..

Human Drivers

Laws of Traffic

Human Judgement

Experience, Expert Opinion..

AVs

Laws of Traffic

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RSS

Formalizing New Principles

- RSS is a defined set of actions that an Autonomous Vehicle, sharing it’s driving space with other, Human and Automated Vehicles, will be allowed to be performed.

- The model is designed to ensure the AV will never cause accident, and will properly respond to mistakes of other drivers, ensuring safety, while driving in an assertive, human-like manner.

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RSS – Model Elements

- **The Proper Driving Patterns** – The set of actions allowed to be performed by the car, designed at avoiding dangerous situations.
- **Proper Response to dangerous situations**- The Proper Response is a set of actions that the car must take in order to avoid a collision, when found in a dangerous situation.
- **Responsibility Time** the time in which the Dangerous Situation was triggered.
- **Minimal evasive effort –** According to the model, a car/ an agent is to make an effort to evade a potential collision, even if the agent wasn't the one who caused it.
- **Dangerous Situation**- According to the model, a situation is dangerous if *both* the longitudinal and lateral distances between two cars are non-safe, and the model defines such distances.

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General comments

- Driving Side Blind Spot
- Adding a layer of warning with indication of imminent collision based on trajectory:

- Lateral ttc (red) / geometry position (yellow)
- Don't take in consideration the lenght of the vehicle
- Need to define a clear zone where to receive the alert with min and max point. Suggestions:
- Geometric Zone according to the position
- And Lateral ttc not depend on the geometric.
- The system should issue a warning when geometric position of bicycle is 1.5 m and not more than
- When the vector of the lateral position go closer we need to give a different warnings. On straight scenario the TTC need to be least of 1 sec
- On turnings scenario the TTC need to be 2.5 sec.
- The ttc need to be calculate in all the distance of the vehicle

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