CISB | CENTRO DE PESQUISA E INOVAÇÃO SUECO-BRASILEIRO

5th Annual Meeting 2015

November 9-13

CISB | CENTRO DE PESQUISA E INOVAÇÃO SUECO-BRASILEIRO
5th Annual Meeting

Case in traffic engineering and safety

Helena Beatriz Bettella Cybis
Universidade Federal do Rio Grande do Sul

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5th Annual Meeting

Helena Beatriz Bettella Cybis

PhD in Transport Engineering (ITS University of Leeds UK, 1993)

Civil Engineer (UFRGS, 1980).

Professor of the Engineering School, UFRGS, teaching graduate and undergraduate transportation courses, supervisor of master and PhD students in traffic and transport.

Head of LASTRAN (Laboratory of Transport Systems - UFRGS).

Coordinator of several research and applied projects developed at LASTRAN.

Director of Brazilian Association for Research and Teaching in Transport /ANPET

Scientific Director of ANPET and chair of the Scientific Committee of ANPET's annual Conferences in 2007-2008, 2011-2014.

Ad-hoc consultant of research councils in Brazil, CNPq, CAPES, FAPERGS

LASTRAN
LABORATÓRIO DE SISTEMAS DE TRANSPORTES

LASTRAN is held at the Department of Transport and Industrial Engineering at UFRGS.

Its purpose is to develop research and applied projects in transport planning and operation and to develop skills and best practice among transport professionals and decision-makers.

LASTRAN has strong colaboration with researchers from Institutes of Mathematics, Architecture, Economics, and Computer Science.

Research projects frequently involve collaboration with other Brazilian and International Universities and organizations.

Most recent research projects involved University of Leeds, PUC Chile, Universidad del Norte Colombia, Universidade de São Paulo, Universidade de Brasília, Universidade Federal do Ceará.

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Main research areas:

- Traffic modelling and simulation – interrupted and uninterrupted conditions.
- Traffic management and control.
- Traffic safety: road safety audit, analysis of traffic conflicts, road design.
- Choice modelling: study and prediction of people's preferences and decisions in a variety of contexts, e.g. demand for services and products.
- Economic appraisal and evaluation.

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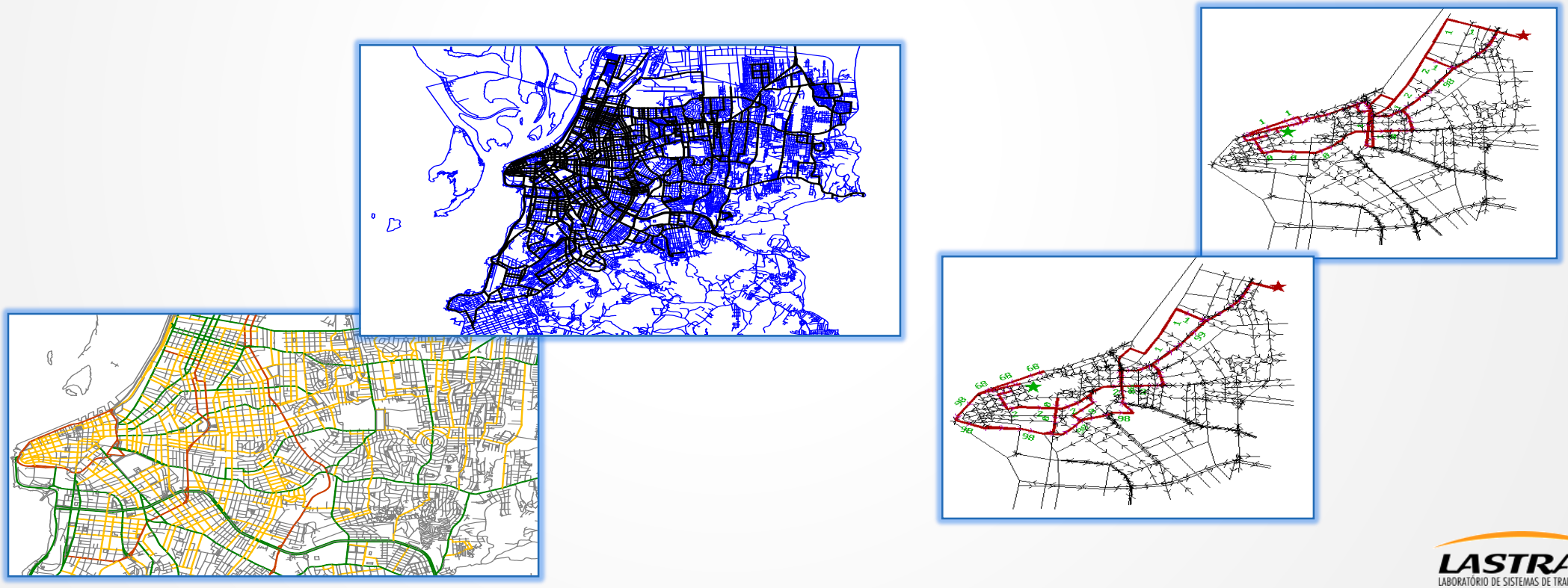
LASTRAN´s main researchers:

- Helena Beatriz Bettella Cybis, PhD
- Luiz Afonso dos Santos Senna, PhD
- José Luis Ribeiro, Dr.
- Cristine Tessele Nodari, Dr.
- Carla Ten Catten, Dr.
- Daniel Sergio Presta García, Dr.
- Fernando Dutra Michel, MSc.
- Ana Margarita Larranaga, Dr.
- Carlos Pretto, Dr.

Projects related with caracterization of traffic and driver behaviour

Traffic management - Implementation of traffic assignment model SATURN in Porto Alegre (1995- 2000)

(Agrement with City of Porto Alegre)



Projects related with caracterization of traffic and driver behaviour

Micosimulation in urban environments

Aplication of the model DRACULA (ITS Leeds)
Case studies and staff training

Agreement with the City of Porto Alegre 2001 – 2003

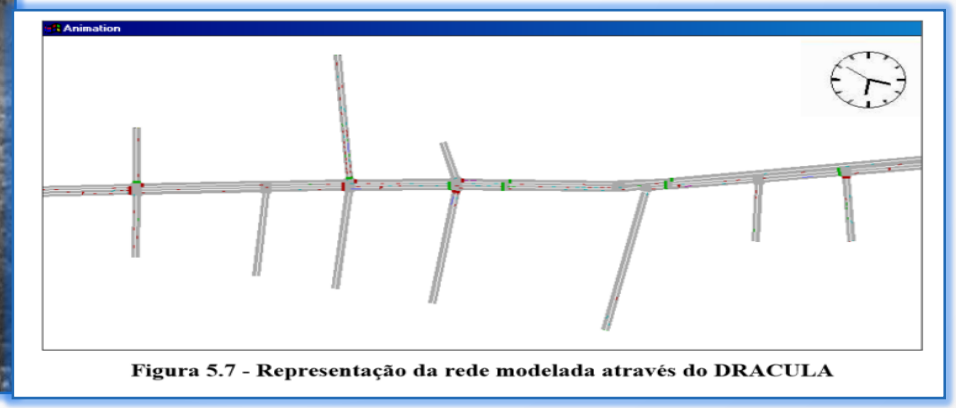
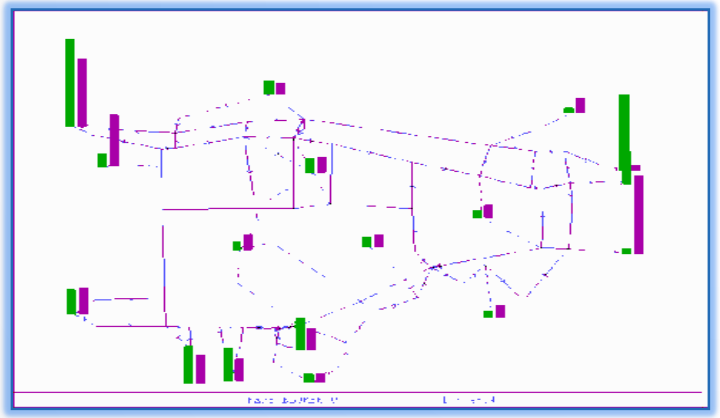


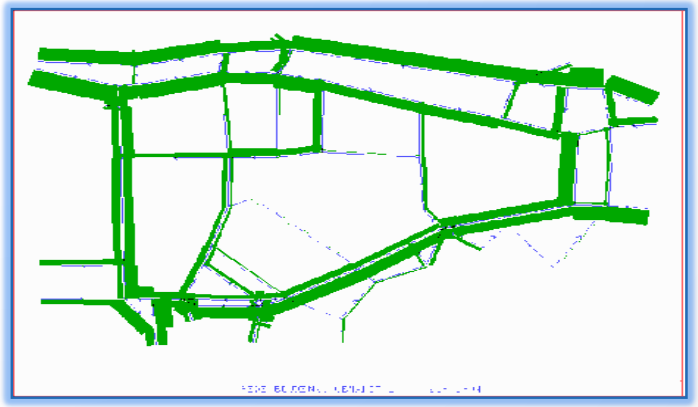
Figura 5.7 - Representação da rede modelada através do DRACULA

Projects related with caracterization of traffic and driver behaviour

ProjetoPSPPG/CNPq (2001-2003)

Joint use of the models SATURN (traffic assignment) e TRANSYT (traffic control model) in the City of Blumenau.



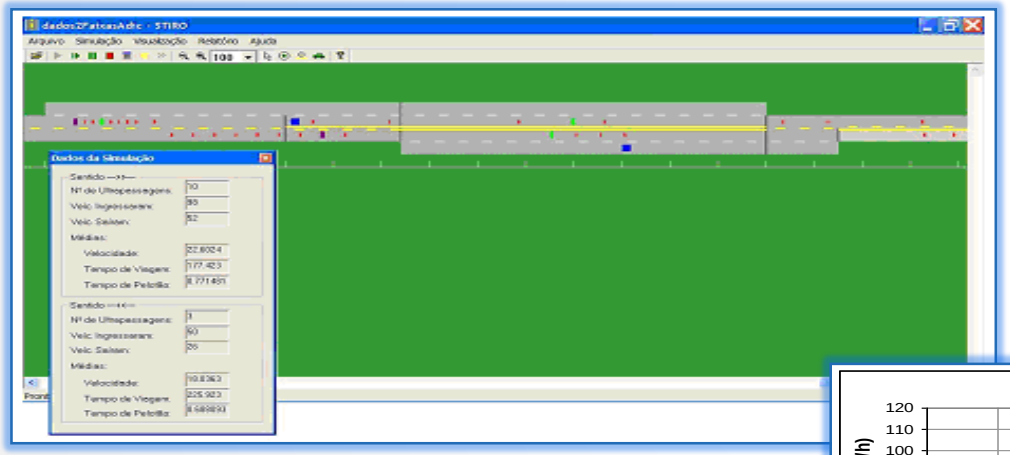


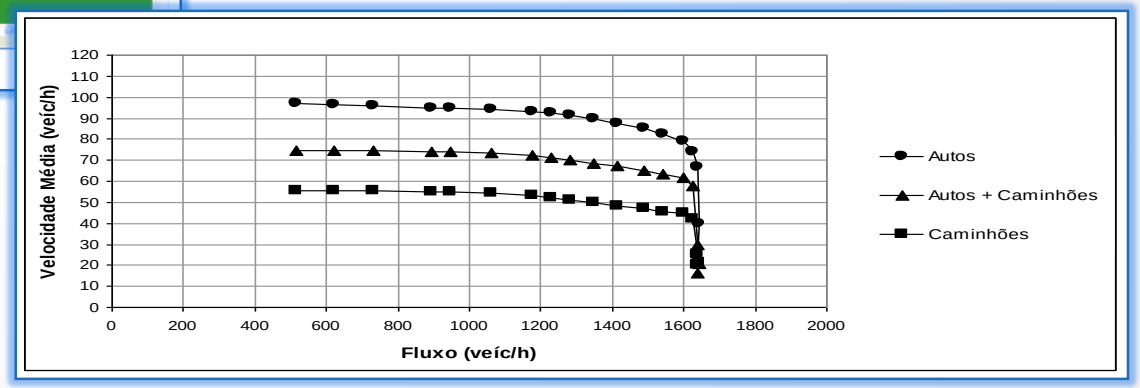
Projects related with caracterization of traffic and driver behaviour

Traffic simulation in single lane highways

Development of simulation model - concern with proper traffic representation.

Steep slopes high percentage of trucks on traffic flow.





Projects related with caracterization of traffic and driver behaviour

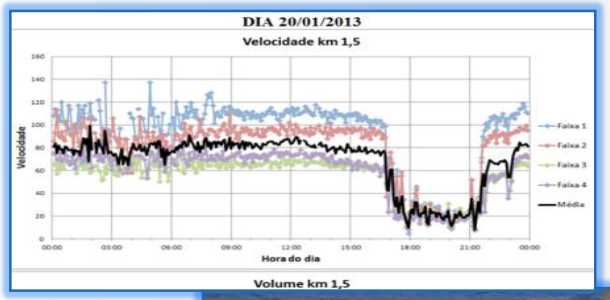
Active Traffic Management

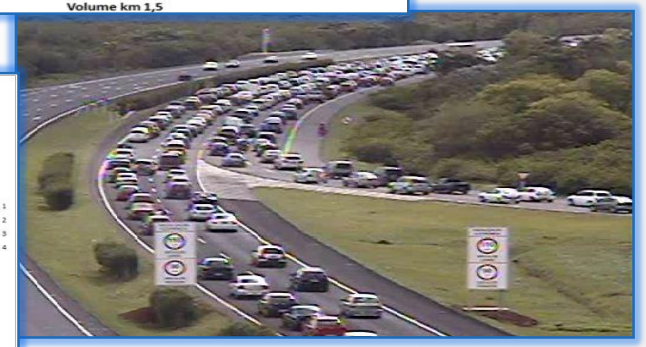
Study of active traffic management systems, and evaluation of conditions for implementation in Brazilian highways.

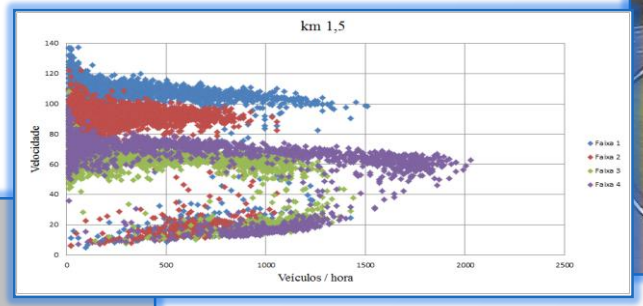
Modelling variable speed limits.

Conception and implementation test of temporary use of hardsholder during peak period.

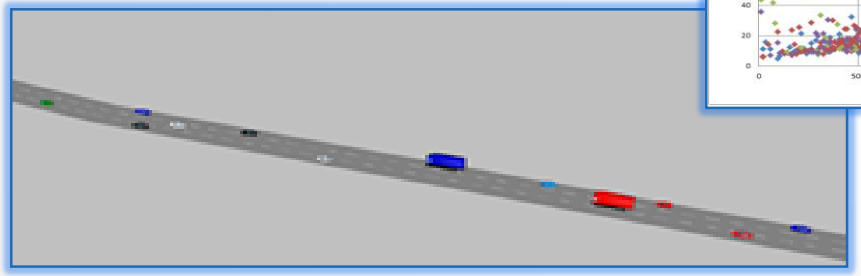
Analysis of implementation of reversible express lanes.



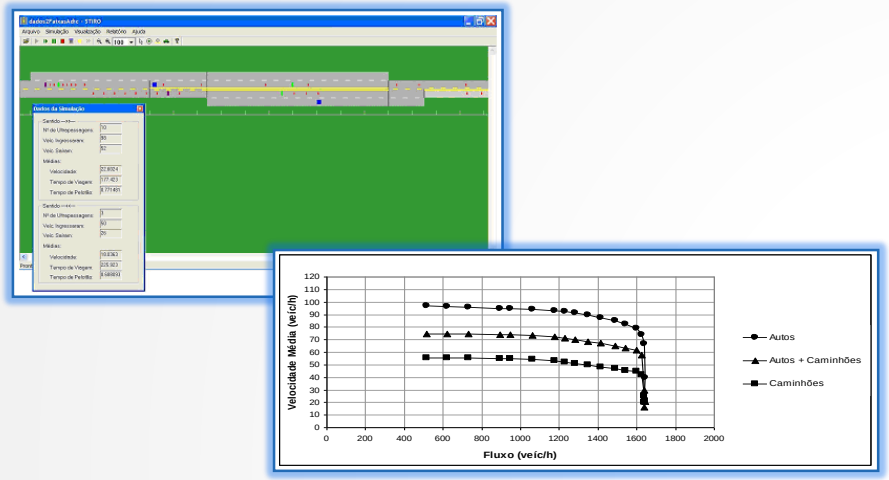


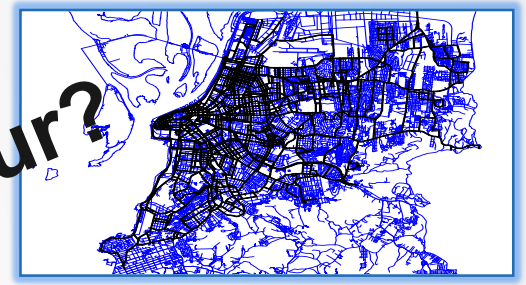


Research suported by RDT ANTT/CONCEPA

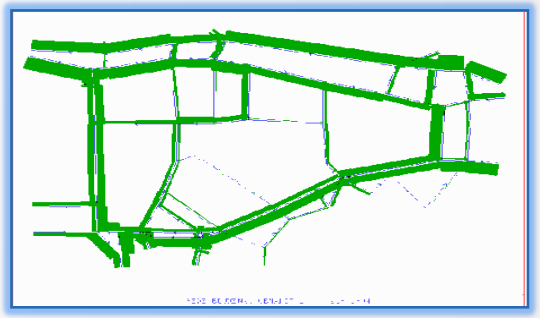


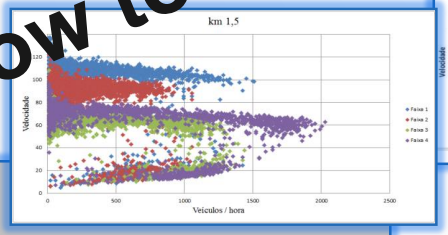
Projects related with caracterization of traffic and driver behaviour

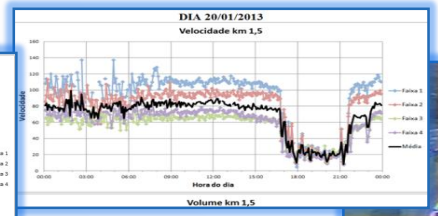


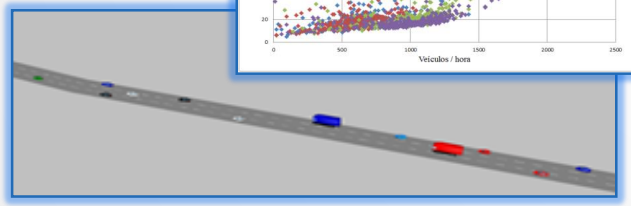


How to represent properly traffic behaviour?









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Workshop focus

... Volvo has turned its attention to Brazil and has recognized the great potential of the country but at the same time, the complexity of its mobility scenario…

… One solution that has been walking side by side with traffic safety and has been highly prioritized by Volvo's research strategy is autonomous driving, a broad line of research which addresses from information technology and embedded systems to human behavior and traffic environment.

Issues to consider about Brazilian mobility when we think about automous driving:

- Roads
- Vehicles
- Drivers behaviour

Road network

- Road network present heterogeneous conditions.
- High percentage of roads in poor conditions.

CNT Road Research (20 00 kms of paved roads throughout the country:

- 86,5% of analysed sec
- 57,3% present some kin alization or geometry problems)
- 22% where considered in b roads;
- 42% where considered in good or excellent conditions.

Road network

- Road network present heterogeneous conditions.
- High percentage of roads in poor conditions.

CNT Road Research (2015) - evaluated more than 100,000 kms of paved roads throughout the country:

- 86,5% of analysed segments are single lane highways;
- 57,3% present some kind of disability (pavement, signalization or geometry problems)
- 22% where considered in bad or very bad conditions;
- 42% where considered in good or excellent conditions.

Road network

Minas Gerais

BR-050 Uberaba

BR262 Bela Vista de Minas

BR-365 Buritizeiro

BR-251Unaí

BR-381Central de Minas

Source: CNT 2015

Road network

São Paulo

SP 255 Guatapará

Piraposinho SP 425

BR158 Caibi SC

BR 116 SC

Guaraciaba BR 163 SC

Santa Catarina

Source: CNT 2015

Road network

Analysis of pavement conditions:

- 48.6% (48,897 km) of surveyed segments have some kind of problem
- 39.8% (40,139 km) have eroded pavement
- 79.5% (15,745 km) of roads under concession have good or excellent rating

Source: CNT 2015

Road network

Analysis of roads geometry

- 77.2% (77,787 km) of surveyed extension have some type of problem
- 86.5% (87,128 km) of surveyed extension are single lanes
- 39.6% (39,923 km) of surveyed extension does not have hard shoulder
- 42.1% (14,711 km) of surveyed extension where there are dangerous curves, there are no signs or warnings or defendeses.

Source: CNT 2015

Road network

Road signs

- 51.4% (51,840 km) have problems
- 17.4% (16,115 km) of surveyed extension have damaged or unreadable signs
- 23.1% (23,271 km) of surveyed extension, do not have speed limit signs
- 16.6% (16,724 km) of the extension have no indication signs
- 37.4% (37,609 km) of the surveyed extension have paint worn or nonexistent central strips
- 45.7% (46,014 km) of the extension have no sidebands or the paint is worn out

Source: CNT 2015

Vehicle profile

In the last decade, Brazilian fleet registered an increase of 136.5% -

102.6% increase in number of cars;

269.8% increase in motorcycles.

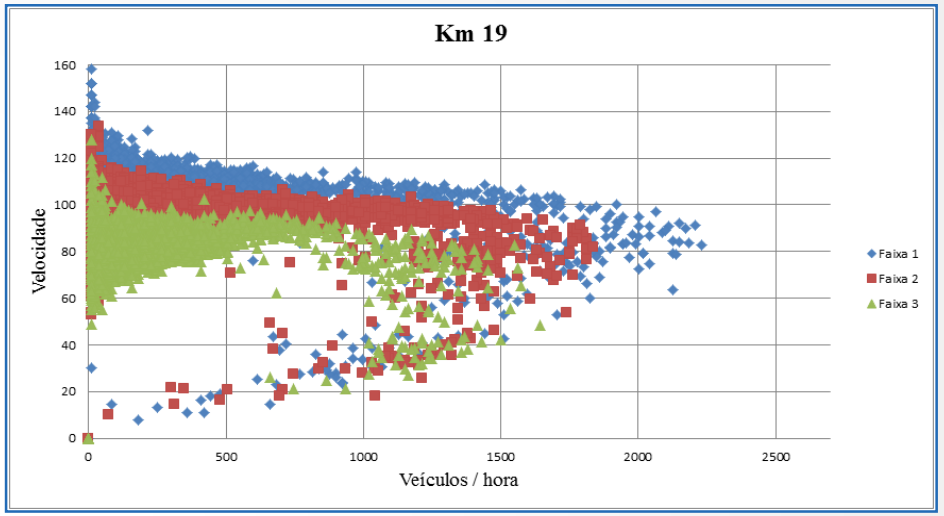
High percentage of trucks on roads

High number of motorcycles, particularly on urban areas.

Heterogeneous fleet - significant % old and poorly mainteined vehicles .

No vehicle inspection policy (except for Rio de Janeiro)

Drivers behaviour



Driving behaviour in highways:

- agressive driving behaviour coexisting with slow vehicles;
- variable speed limits for different vehicles categories – incentive to change lanes;
- distances from leading vehicles is smaller and
- frequency of lane changing is significantly higher than observed in other countries.

Drivers behaviour

Driving behaviour in urban areas

- agressive driving behaviour associated with slow vehicles
- motorcycle driving pattern driving betweeen car lanes, dangerous manouvers

.

Accidents

Accidents in Federal Roads:

Accident involving motorcycles account for 18% of total accidents 30% of deaths, 40% serious injuries

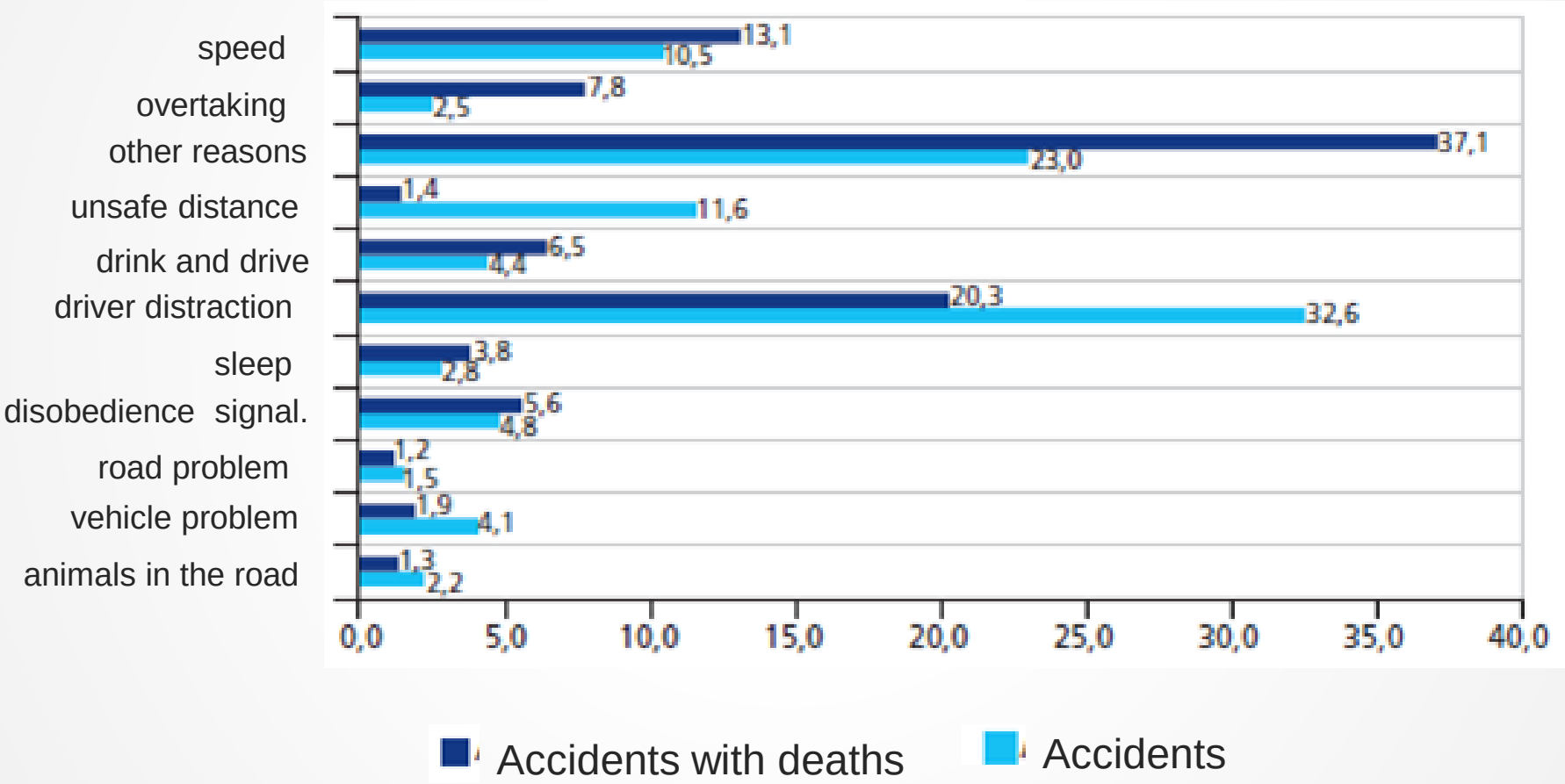
Frontal collisions and pedestrian accidents have low incidence (6.5% of all accidents), but account for almost half of the deaths on federal highways.

The inattention of drivers, drinking alcohol and violation of traffic rules are the most frequent causes of accidents with fatalities.

Source IPEA
http://www.ipea.gov.br/portal/images/stories/PDFs/relatoriopesquisa/150922_relatorio_acidentes_transito.pdf

Accidents

Cause of accidentes on federal roads 2014 (%)



SOURCE PRF