IX ICTCT Extra Workshop in Ribeirao Preto, Brazil
April 24th & 25th 2014

on

Risks and risk taking and how they
are related to road safety?

Book of abstracts

The workshop is organised in co-operation with:

Faculty of Engineering of Bauru-UNESP
The workshop is organised with the support of:

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What is ICTCT?

ICTCT is an association developed out of an international working group of safety experts with the aim to identify and analyse dangerous situations in road traffic on the basis of criteria other than past accidents, analogous to the methods of air and industrial safety.

Our Goal

International co-operation in the identification and analysis of potentially dangerous situations in road traffic, and their causes, on the basis of relevant safety data derived from observations and surveys.

The aim of ICTCT is to achieve a deeper understanding of problems in the area, to harmonise future research activities, and to provide for means for an optimal utilisation of research results from different countries.

To fulfil these aims ICTCT has been involved in a number of co-operative research efforts (workshops, calibration studies, formulation of international guidelines, clearing house for reports, etc.).

"WE DON'T NEED ACCIDENTS IN ORDER TO PREVENT ACCIDENTS!" because we are aware of "danger indicators"

Danger indicators are, for example, traffic conflicts and near-accidents, as well as the behaviour and interaction patterns in which they are rooted. To improve knowledge about these events and behaviour patterns, which in the long run lead to accidents, is to be collocated within the ICTCT’s sphere of activities.

Today’s activities and future plans of ICTCT

- Information and co-ordination service for the international exchange of information
- Production and distribution of a regularly-published research journal ("Newsletter")
- Encouragement of international co-operation by the organisation of conferences and other events
- Development of research structure for the planning, realisation and implementation of projects
- Organisation and administration of an archive and a library ("Clearing house")
- Establishment of advisory centres for the identification, analysis, and solution of safety problems in line with the present state-of-the art
- Advice on the development of facilities for the training of safety experts in the identification of risk indicators in traffic
- Publishing of material (e.g. handbooks, brochures, guidelines...)
- Public relations work
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Keynote Sessions
PRA – Program of Accident Reduction on Highways in the State of Sao Paulo.

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The Artesp - Regulatory Agency of Public Services Transportation of the State of São Paulo, created in January 2002, has among others, the function of regulation and supervision of the Road Concession Program implemented by the State Government of Sao Paulo. The 19 lots of road concession are in granting of almost 5.108 km from the 200,000 km of roads in the State of São Paulo.

These concessions involve operation services - the system of toll gates, the weigh stations for trucks, road user support, emergency and specific operational schemes, monitoring of traffic conditions on the highway - conservation services - pavement drainage, engineering construction, automation and control systems, etc. - And reconstruction and extension services - implementation of new lanes and roads, engineering construction, safety devices, communication systems etc. The performed interventions focus on enhancing safety conditions are studied, planned and presented in PRA - Program to Reduce Accidents prepared annually for each road tool concessioned company. The main goal of these programs is to provide better security to road users.

The main goal of the program is to offer safety condition to the road user, by monitoring the evolution of highway accidents and setting new goals, year after year, such as: reduction of death rate, reducing pedestrian accidents, actions at critical points etc. In line with the guidelines of the United Nations, ARTESP established in the year 2013, two goals to be achieved by Highway System concession companies until the year 2020: reduce the amount of 50% dead and 20% the amount of injuries in relation to 2010.

PRA – Program of Accident Reduction includes engineering support to a efficient use of the highway; actions within the “forgiven roads” concept; signs, information and new equipment for the safety of road users, and other measures to improve drive safety behaviour, cyclists and pedestrians.

The development of the Program follows the major items: diagnosis and description of problems, evaluation of alternative solutions, definition and development of the chosen, planning and implementation, evaluation and monitoring the results, re-adaptation and maintenance of the implemented actions.

The introduction of the program brought satisfactory results so far:. Since the year 2000 - beginning of concessions - until the year 2012, the rates of accidents, injuries and deaths have reduced by a constant. There is a 30.3% reduction in total number of accidents, 27.9% in the rate of injuries and 52.2% in fatality rates.
Global Road Safety Programme in Ten Countries: Project “Vida no Trânsito” in Brazil

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Brazil is one of the countries included in the Bloomberg Philanthropies Global Road Safety Programme which is being conducted over five years (2010-2014) by a consortium of international partners together with national governments and local organizations. The overall goal of the Vida no Trânsito, as the project is known in Brazil, is to support the Government of Brazil to implement good practices in road safety in line with the national road safety policy. The principal objective of the project is to reduce road traffic deaths and injuries, by preventing drink–driving and speeding.
Session I

Risky behaviour
Interaction with IVT-systems – Results of driving behaviour observations from the EU-project INTERACTION

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The development of information and communication technologies (ICT) in the field of road transport provides drivers with access to various functions and services which, if designed ergonomically and used appropriately, have potential to significantly enhance driver safety, mobility, enjoyment and comfort. However, little is known about how drivers actually interact with most of these In-Vehicle Technologies (IVT) in everyday life, about the differences and similarities of drivers regarding their interactions with IVT and about the long-term effects of IVT use on driver behaviour, performance, risk taking and safety. The European project INTERACTION ("Differences and similarities in driver INTERACTION with in-vehicle technologies") aims to contribute to close this knowledge gap.

Within the INTERACTION project an in-depth analysis by two on-board observers, using the observation method "Wiener Fahrprobe" was carried out. The observers registered the drivers’ behaviour during their interaction with IVT systems. Four IVT systems were selected for a detailed analysis, at an earlier stage of the project, namely: Cruise Control, Speed Limiter, Mobile Phone and Navigation system.

The drivers were observed twice. Once with the IVT system active and once with the system shut down so that the differences in driving behaviour with and without the use of IVT could be observed. Both behaviour observations were carried out on the same standardised route which the partners selected at the beginning of this task. The two observers registered the variables in a standardised and in a qualitative way (called "free" observation”) in order to get a good overview of the influence of the IVT on the driving task. Seven European partners carried out in total almost 100 behaviour observations.

The impact of IVT on drivers was investigated in terms of risk-taking behaviour, and in terms of changes of on-road interpersonal communication, for instance due to workload increase, system misunderstanding, delegation of responsibility towards technologies etc.. With the data gathered by the free observer, a qualitative evaluation was carried out describing in detail the behaviour of the test persons especially in critical situations. The results of this analysis will be presented.
Motivational background of risk behaviour among drivers with high recidivism rate

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Our research aims at better understanding to motivational background of risk behaviour on the roads. The target group consist of drivers, who were sent to driver improvement courses due to the high recidivism rate (alcohol and speeding). This group objectively fails in safe behaving on the roads, so it is important to understand to their point of view on risk and preparedness to take risk. Classical risk/hazard perception test assess only one part of risk – whether is driver able to recognize the risk and adapt his or her behaviour. But we know very little about motivation to such an adaption. Sometimes drivers see the risk but willingly don't react safely. It is necessary to go more into deep and ask drivers why they react in the way they do. With better insight into the motivational background we can develop better measures and more valid assessment. That is why we use the interview and focus group as a method in this research. For comparison to these self-reported data we use also objective data – evidence of driver history (demerit points, fines) and results from traffic psychological assessment.
Comparing Simulated Safety Performance to Observed Crash Occurrence

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Transportation safety has been recognized as a public health issue worldwide, consequently, transportation researchers and practitioners have been attempting to provide adequate safety performance for the various transportation components and facilities to all road users given the usually scarce resources available. Safety engineers have been trying to make decisions affecting safety based on the knowledge extracted from different types of statistical models and/or observational before-after analysis. It is generally recognized that this type of factual knowledge is not easily obtained either statistically or empirically.

Despite the intuitive link between road safety and observed crashes, a good understanding of the sequence of events prior to the crash can provide a more rational basis for the development of engineering countermeasures. The development of more comprehensive mechanistic models for safety assessment is heavily dependent on detailed vehicle tracking data that is not readily available. The potential of microscopic simulation in traffic safety and traffic conflict analysis has gained increasing interest mostly due to recent developments in human behaviour modelling and real-time vehicle data acquisition.

The general idea of using microscopic simulation for safety assessments is somewhat similar to traffic conflict studies since it applies the safety continuum concept and applies the so-called surrogate measures of safety (SMoFs). SMoFs also known as proximal safety indicators have been estimated from microscopic simulation packages to reflect high risk events involving at least one vehicle in relation to a projected point of collision. The most commonly documented SMoFs are time to collision (TTC), deceleration rate to avoid the crash (DRAC), post encroachment time (PET) and crash potential index (CPI). The usefulness of microscopic simulation for assessing safety depends on the ability of these measures to capture complex behavioural relationships that could lead to crashes and to establish a link between simulated safety measures and observed crash risk.

This paper describes an objective approach for linking simulated safety performance expressed in terms of the crash potential index (CPI/veh) to observed crash occurrence, with the primary focus being on rear-end crashes. The underlying premise is that if CPI/veh reflects high risk behaviour in the traffic stream, then crashes that are caused by such behaviour, will take place when this measure is higher than normal for the period preceding each crash. Conversely, it is expected that in non-crash situations this measure would be closer to the average for the prevailing traffic conditions and location.

Three tests are introduced that attempt to link CPI/veh at a given location to observational crash occurrence for a time interval preceding each crash. This should help providing
objective evidence that crashes will tend to occur in the higher range of CPI/veh values. Observed speeds and volumes extracted in real-time from an instrumented freeway segment in Toronto were used to obtain accurate estimates of CPI/veh in the simulation for comparable crash and non-crash situations. Test 1 compares CPI/veh in 1 minute increments for a period five minutes prior to the time of the crash. Test 2 compares CPI/veh aggregated in 1 minute increments over five minutes period for compatible crash and non-crash situations. Test 3 compares CPI/veh to the observed crash rate for a one hour period at the same site.

The results from these tests suggest that crashes take place on this freeway segment when the average CPI/veh prior to the crash is higher than normal for the traffic stream, and that this measure safety performance proves to be sensitive to the time interval preceding each crash. Furthermore, increases in average CPI/veh rates were found to correspond to increases in crash frequency (relative validity).
The risky behaviour of young drivers in ArRyadh (Saudi Arabia)

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In 2011 FACTUM Chaloupka & Risser carried out a large study on behalf of the ArRyadh Development Agency ADA. The reasons why young drivers in Riyadh – or by the way in all Saudi Arabia – showed tremendously risky behaviour should be explored. The results of the study should be the basis for measures. "Young drivers" in Saudi Arabia are exclusively males as women are not (yet) allowed to drive cars. In December 2011 a work plan was developed in Riyadh, that included state-of-the-art work, focus-groups with young drivers, expert workshops with persons working professionally in the areas of traffic and traffic safety and behaviour observations on selected sites in Riyadh in order to assess traffic characteristics in general were carried out. The latter was done because we had the hypothesis that behaviour of the general car driver population would incite young drivers to drive in a risky way. In March 2012 data collection started under the supervision of FACTUM who acted as a consultant, there. Data were then compiled on site and transferred to Vienna where they were evaluated. Results showed, not surprisingly that there was a clear correspondence between the behaviour of the total "grown-up" population and the behaviour of the young drivers. Results were then presented to experts in ArRyadh and measures were discussed. All results were compiled, discussed and commented in the frame of 4 extensive project reports. In this ICTCT presentation the main results will be displayed. Especially, the hypothesis that risky behaviour of young drivers is "produced" by the general behaviour of the total population will be discussed extensively. One conclusion could be that experienced drivers who are able to carry out statistically speaking dangerous behaviour without causing too much danger to themselves (e.g. high speeds) still produce damage because they generate a dangerous system that cannot be handled well by, e.g., young drivers.
Use of driving simulators at road safety in the behavioral perspective: a brief literature review

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At the beginning of the XXI Century the road accidents turned out a public health’s problem, generating about 1.3 million deaths and more than 50 million injuries per year. In order to overcome that situation, the United Nations (UN) proclaimed the period 2011-2020 as the Decade of Action for Road Safety, with the unique goal to reduce the fatalities records around the world by increasing the countries’ actions to understand and prevent the road crashes. Acknowledging that near 90% of the road safety crisis correspond to drivers risky behaviors, one of the five policy’s statements pretends to form safer drivers. In that context, the driving simulators play a key role on the understanding and training of driver behavior, thanks to its controlled and safety conditions to simulate real scenarios through visualization technologies, and its capability to realize, reproduce, analyze and correct possible sources of road accidents in a laboratory environment. Particularly, this work gives a brief review of the actual state-of-the-art about driving simulators researches on road safety from the driver’s behavior perspective, expecting to establish some considerations about the key aspects that should be followed in future researches on the topic.
Session II:

Programmes and Measures
TRAFFIC ACCIDENT REDUCTION IN THE CITIES OF ARARAQUARA AND JAU

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An analysis of traffic crash reduction in the cities of Jau and Araraquara, both located in the interior of the State of Sao Paulo – Brazil is done in this paper. There are also presented the main actions implemented and tax reductions related to traffic crashes.

In both cities, they were carried out several actions in the fields of Engineering, Education and Enforcement.

The reductions obtained on the city of Jau in the period 2004-2007 in relation to the period 2001 -2003 were: 25.4% of all accidents, 24.7% of accidents with no injuries, 26.9% of accidents with injured and 35.5% of accidents with fatalities.

The traffic crash reductions obtained on the city of Araraquara in the year 2013 in relation to the year 2012 were: 20,22% of accidents with injured, 39,88% of the victims with serious hurts and 46,93% of fatalities.
Rehabilitation of mis-/non-users of child restraint systems in cars in Austria

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Heavy traffic accidents with children of a very young age up to 14 years result mainly from not having being buckled up at all or not correctly in cars. 38% of all children who have been involved in traffic accidents in 2011 in Austria have been endangered while sitting in a car. While when driving on motorways 93% of the children are buckled up, parents seem to feel much safer in cities – here only 87% of children are safed correctly by child restraint systems.

Causes for this risky behaviour of adults – primarily parents – lie in lack of knowledge of physical principles, ignorance of existing traffic laws, taking too little time to handle the buckling up or delegate the responsibility to other technical in-car-systems like airbags. But also not checking if the child is still buckled up while driving can cause problems.

In Austria since about four years drivers who have ingored the traffic law about using the safety devices for children adjusted to age and heigh have to undergo some kind of rehabilitation course to keep their driving licence.

The actual presentation will give insight into the Austrian traffic law regarding the correct use of child restraint systems as well as information about the criteria which have to be taken into consideration while conducting rehabilitation courses – deriving from the existing law as well as from psychological know how about how to make clients aware about having done something risky in traffic.

The psychological treatment will be discussed under consideration of underlying psychological theories about behaviour modification.
GRADUATED DRIVER LICENSING (GDL): SEARCHING FOR THE BEST COMPOSITION OF COMPONENTS

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Looking back to the beginning of the area of driver education and training research – which started in the 1960s – two major trends can be identified: The first one, the traditional driver education training which, in terms of research efforts, prevailed till the late 1980s, concentrated on formal driver training, knowledge and skills. The second and innovative trend, which roughly started in the mid 1980s with night-time curfews, still prevails and is now known as Graduated Driver Licensing (GDL). GDL is, however, not well-defined in terms of the composition of components and many different layouts are put into practice. An overview of GDLs currently practiced in American and Canadian jurisdictions identifies some 20 different GDL-components. If a jurisdiction tries to select the best, say three components from the pool of measures by belief or conviction, it is obvious that the number of combinations is enormous and beyond what is practically possible to assess by evaluation studies. It is also obvious that jurisdictions need advice from research to elaborate the most effective GDL, and it is likewise obvious that researchers need predictions based on theory to propose solutions regarding the best composition of GDL-components. The present paper will sum up and give an overview of the effects of components belonging to the traditional driver education and training as well as more recent innovative proposals of components.
Brazilian Actions for the Road Safety

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Brazil faces a dramatic road safety scenario: In accordance to National Road Department and National Research Institute of Economy, the social cost of traffic accidents is around R$ 30 billions per year. With this numbers, Brazil has developed a plan for the next Decade, in line with the Global Plan for the Decade of Action for Road Safety. The Brazilian Plans provides a framework for activities which are taking place together with the government, civil society organizations and private sectors. Traffic Management System, Education, Enforcement, Safety vehicles and Safety roads are the pillars of the national strategic goals. This paper will present some implemented actions, its expectations and obstacles. It will describe the Brazilian strategy related to “Drivers” as Drink and Drive law, the controversies about Drug and Drive Law, Improvements at Drive license process, to “Education” as National Program for traffic education in the schools, traffic school instructors national program, to “Safety Vehicles” as mandatory safety items, to “Safety Roads” related to enforcement, rescue and hospital service for victims of accidents, roads reconstructions, and new safety tools under the context of minimizing the severity of the accidents on the road.
GERAR - Strategic Group for Accident Reduction of Arteris and Autovias’s Actions

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Arteris is a toll road concession company in Brazil. The company administers 3,250 kilometers of highways through nine dealers in the states of Santa Catarina, Paraná, São Paulo, Rio de Janeiro and Minas Gerais. In 2012, there were approximately 39,000 injuries and 924 deaths in our roads. Arteris introduced the Strategic Group for Accident Reduction GERAR, with the aim to reduce 50% the number of deaths in our highways until 2020, the end of World Decade of Action of Road Safety from United Nations. GERAR proposals are: monitoring the most critical points of administered roads, preventive actions directed at our workers, road users and pedestrians protection; road safety audits; government’s support programs and awareness actions; cooperation with drive school and trainings, and project with the hospital referral network to enhance the care of accident victims on highways; courses on traffic safety; awards by reducing accidents, and action together with the Federal highway Police and the State highway Patrol of São Paulo, to intensify surveillance.

Autovias a toll road concession, member of Arteris, administers 316,5 km of highways, connecting the city of Ribeirao Preto to Araraquara, Sao Carlos, Brodowski, Batatais, Franca and Santa Rita do PassaQuatro. This paper will present the project of Autovias ongoing on its roads, in line with GERAR.
SÃO PAULO TRAFFIC OBSERVATORY

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São Paulo State Department of Road Traffic (DETRAN-SP) is an executive agency, part of the National Road Traffic System, established in the Brazilian Road Traffic Code (Federal Law no. 9,503, of September 23, 1997). By law, it has responsibilities related to driver training and license, vehicle registration, enforcement and statistics and analysis on accidents and its contributing factors, among others.

Due to its role related to statistics and analysis, it was created a new sector, an Observatory on the office of the chief executive officer, in the transformation process to public department to a public autarchy, in March 2013. This sector has assignmentsto collect, process and analyze data and related information on victims and road traffic accidents, among others, aiming at contributing to the management of road safety issue by the different sectors of the DETRAN-SP, as well as promoting the dissemination of indicators on the issue for society, other traffic agencies and technicians who work in the area or conduct research on the issue.

The importance of generating more and better indicators and analysis for road safety management in Brazil has been highlighted by several papers in the area. The World Health Organization has also addressed the issue in their reports on road safety, in particular those related to the Decade of Action for Road Safety - 2011-2020, established by a United Nations resolution in 2010. These reports have emphasized the need for indicators and other information for proper foundation of planning, design, implementation, assessment and further improvement of public policies and actions developed by road safety agencies.

In Brazil, despite the establishment of the National Register of Accidents and Traffic Statistics (RENAEST) in 2006, replacing the National Statistics System of Transit (SINET), it is out of operation for some years, and the only yearbook still available is 2008.

Thus, from this context, it has being developed the DETRAN-SP Observatory, for which two strategic lines of action were established:

1) Interaction: with society, road traffic agencies and academic community, aimed at disseminating information, elucidation and accountability on the issue;

2) SUPPORT THE MANAGEMENT OF ROAD SAFETY: generating statistics and analysis and other results for proper foundation of management on the issue.

Some activities that have been developed so far in these strategic lines:

1) INTERACTION: in partnership with FUNDAÇÃO SEADE, implementation of a website (http://www.observatorio.detran.sp.gov.br), which are presented data of deaths from road transport accidents occurred in the State of São Paulo, as the city of the victims' homes. The
goal is to be an efficient instrument for planning and action strategies for public managers and traffic agencies. The site is open and interactive, allowing the intersection of data and preparation of research at different levels of complexity. Information is available through tables, graphs and maps.

2) SUPPORT FOR ROAD SAFETY MANAGEMENT - development and proposing two projects:
   a. Integration and Data Exchange and Information and Traffic Accident Victims Pilot Project (INTEGRAT), in partnership with other agencies, to being developed in Campinas - SP;
   b. Operational Management Program for Reduction of Road Traffic Accident Victims in the State of São Paulo, in partnership with the Fire Department.

In this line of action has also been developed the analysis of data from DATASUS/Brazilian Department of Health (and other sources) on road traffic accidents victims in the State of São Paulo, aiming its use by DETRAN-SP managers. From this analysis, it was obtained the following summary of the situation of the state of São Paulo to the problem of road traffic accidents:

1) In 2011, 7,559 were killed (with an upward trend in recent years; 2012 not yet published) and 41,119 other people hospitalized (fell in 2012 to 38,764) because of road traffic accidents. The majority of the victims are male, about 80%;

2) Among the dead, the largest share, about 26%, is still pedestrian, but the share of occupants of motorcycles grows every year, now reaching about 24%.

3) Among hospitalized, the largest portion is now the occupants of motorcycles, with about 48%, with pedestrians in second with about 25%.

4) From the mortality rates for 100mil inhabitants, by age group and ranked by type of victim involved in the accident, it appears: pedestrians are the most frequent type of victim from 0 to 14 years and 40 to 75 years and more, but motorcyclists are the most frequent from 15 to 39 years.

5) From the hospitalized rates, also for 100mil inhabitants, by age group and ranked by type of victim involved in the accident, it appears that: pedestrians are the most frequent type of victim from 0 to 14 years and from 50 to 75 years and more, but motorcyclists are the most frequent from 15 to 49 years.
Session III

Alcohol and Drugs
Amphetamine use by truck drivers on highways of Sao Paulo State: a risk for the occurrence of traffic accidents?

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The use of amphetamines in Brazil is common among truck drivers, which may be an important factor in the occurrence of traffic accidents. This article seeks to estimate the prevalence of amphetamine use among truck drivers. Drivers (N = 134) were stopped on two different highways in Sao Paulo state and they were asked to answer a questionnaire and provide a urine sample for toxicological analysis. All data were analyzed on Stata 8.0. All participants were males with low levels of schooling, whose mean age was 40.8 years. The presence of amphetamines was detected in 10.8% of all urine samples collected, being commonly justified in order to make truck drivers able to maintain their state of awareness. Amphetamine use was detected among truck drivers on Sao Paulo highways. The problem is that when the stimulant effects wear off, sleepiness due to sleep deprivation reduces concentration and good driver performance, making drivers vulnerable to traffic accidents and the related effects.
Amphetamine, cocaine and cannabinoids use among truck drivers on the roads in the State of Sao Paulo, Brazil

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Drugs are important risk factors for traffic accidents. In Brazil, truck drivers report using amphetamines to maintain their extensive work schedule and stay awake. These drugs can be obtained without prescription easily on Brazilian roads. The use of these stimulants can result in health problems and can be associated with traffic accidents. There are Brazilian studies that show that drivers use drugs. However, these studies are questionnaire-based and do not always reflect real-life situations. The purpose of this study was to demonstrate the prevalence of drug use by truck drivers on the roads of Sao Paulo State, Brazil, during 2009. Drivers of large trucks were randomly stopped by police officers on the interstate roads during morning hours. After being informed of the goals of the study, the drivers gave written informed consent before providing a urine sample. In addition, a questionnaire concerning sociodemographic characteristics and health information was administered. Urine samples were screened for amphetamines, cocaine, and cannabinoids by immunoassay and the confirmation was performed using gas chromatography–mass spectrometry (GC–MS). Of the 488 drivers stopped, 456 (93.4%) provided urine samples, and 9.3% of them (n = 42) tested positive for drugs. Amphetamines were the most commonly found (n = 26) drug, representing 61.9% of the positive samples. Ten cases tested positive for cocaine (23.8%), and five for cannabinoids (11.9%). All drivers were male with a mean age of 40 ± 10.8 years, and 29.3% of them reported some health problem (diabetes, high blood pressure and/or stress). A high incidence of truck drivers who tested positive for drug use was found, among other reported health problems. Thus, there is an evident need to promote a healthier lifestyle among professional drivers and a need for preventive measures aimed at controlling the use of drugs by truck drivers in Brazil.
Detecting Alcohol and Illicit Drugs in Oral Fluid Samples Collected from Truck Drivers in the State of São Paulo, Brazil

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Alcohol and drug use by truck drivers is a current problem in Brazil. Though there is evidence that alcohol consumption is occurring in higher proportions, the use of stimulant drugs to avoid fatigue and to maintain the work schedule has also been reported. The purpose of this study was to estimate the incidence of alcohol and illicit drug use among truck drivers on Sao Paulo state roads. Sao Paulo is the most populous state in Brazil and has the largest industrial park and economic production in the country.

Methods:

Data were assessed not only using a questionnaire but also, and more reliably, through toxicological analysis of oral fluid samples. Between the years 2002 and 2008, 1250 oral fluid samples were collected from truck drivers on the roads during morning hours. The samples were tested for the presence of alcohol, cocaine, tetrahydrocannabinol (THC), and amphetamine/methamphetamine. A previously published, validated gas chromatographic (gas chromatography–flame ionization detection and gas chromatography–mass spectrometry) method was applied to the samples for alcohol and drug detection.

Results:

Of the total analyzed samples, 3.1 percent (\(n = 39\)) were positive: 1.44 percent (\(n = 18\)) were positive for alcohol, 0.64 percent (\(n = 8\)) for amphetamines, 0.56 percent (\(n = 7\)) for cocaine, and 0.40 percent (\(n = 5\)) for THC. In one case, cocaine and THC were detected. The results are indicative of the extent of alcohol and drug use by truck drivers in the state of Sao Paulo, Brazil.

Conclusions:

This research provides evidence that not only alcohol but also illicit drug use is a real problem among professional drivers. The use of these substances should be controlled to better promote safe driving conditions on Brazilian roads.
Alcohol-related traffic accidents with fatal outcomes in the city of Sao Paulo

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Aims: The aims of the present study were to characterize fatal traffic accident victims in a major urban center in Brazil and their association with alcohol consumption.


Results: Adult males between the ages of 25 and 54 represented the majority of cases with positive blood alcohol concentrations (BAC). Overall, males had a higher proportion of BAC and mean BAC than females. Pedestrians, particularly those with no detectable BAC, were typically older than other victims. Most accidents (total and BAC-positive) happened on weekends between midnight and 6 a.m. Considering all victims, 39.4% were positive (BAC over 0.1 g/l). When only drivers (automobile, motorcycle and bicycle) were evaluated, 42.3% had BAC over the legal limit (0.6 g/l).

Conclusions: Alcohol is associated with nearly half of all traffic accident deaths in the city of Sao Paulo, especially for days and times associated with parties and bars (weekends between 12 a.m. and 6 a.m.).
Session IV

Risk perception
Identification of hazardous intersections a comparison of two approaches - a study the case in Brazil

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The intersections are usually places with greater likelihood of accidents. In Brazil the DENATRAN method is used to detect critical locations, which used an index of accidents severity. According to Elvik and Vaa (2004) the total change in the count of accidents at intersections can be decomposed into random and systematic variation, and in general the number of accidents follows Poisson distribution, where the variance is equal to the average, so the size of the random variation in the count of accidents is equal to the expected number of accidents, in this way an hazardous location is where the systematic variation is large. The objective of this study is to compare the two methodologies by ranking the hazardous intersections for which method. The research was divided into two parts: first, performed data collection by the Municipality of São Carlos and tabulation of the data, then the distribution of accidents has been calculated for 1,409 intersections with a stop sign and 140 intersections with traffic signals. Based on the data obtained it was then possible to determine the average of accidents and their standard deviations and verify systematic variation to find the critical intersections, according to the methodology proposed by Elvik and Vaa (2004) and the method DENATRAN. The results showed that both the methods identify the most hazardous intersections, but the order in which they appear is different. However, the DENATRAN method is simple to use and more feasible for the Brazilian reality.
SEST SENAT and Health Project on the Road

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Health Project on the Road is a education campaign in partnership with Federal Road Police and Justice Ministry since 2006, on the main motorways around the country, with the aim of strengthening the professional drivers the health care consciousness in order to avoid road accidents and get statistic indicator of the health of the target group of SEST SENAT.

It combines medical examinations, lecturers, gifts and educational material about daily life of the driver, and inform about health and road safety focusing in avoiding traffic accidents on the road.

The Federal Traffic Police approaches the drivers and invite them to medical examination and lectures about several themes. Those activities are connected with SEST SENAT and partners.

The medical examination is blood pressure, weight, visual test, hearth, blood sugar concentration, etc. The result of the first examination allows the first evaluation of the clinical condition of the driver, and if it is necessary he will be invited to continue treatment at SEST SENAT Units.

While waiting for the results, drivers get hair cut, massage, and gymnastic, etc.
Session V

Accident Analyses
Accident risk for and accident factors regarding non-motorized road users in Denmark – a central road safety challenge with deficient data

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Vulnerable road users (VRU) contribute significantly to the more than 1.24 million road fatalities recorded worldwide each year, since VRU amount to more than half of all fatalities. The number of registered injured road users is more than 50 million per year and VRU also contribute significantly to these. In addition, the dark figures regarding VRU are unreasonably high in most countries and the real number of injured VRU each year is probably much higher.

Road safety improvements for VRU have been a central goal in many countries, including Denmark. The official Danish accidents statistics seem to indicate that these efforts have been beneficial. There has been a significant increase in safety for all road users, particularly regarding the non-motorized ones, i.e. pedestrians and cyclists. The number of fatalities per 100,000 inhabitants thus decreased to 3.0 in 2012 and is the lowest in more than 80 years. As for the specific development for injured non-motorized road users (NMRU), the numbers have decreased by 47% in the last decade in the official statistics, which is equivalent to 1,800 injured per year.

However, the dark figures regarding these injuries are distinctive. Hospital data show a completely different pattern regarding injured cyclists. The number of injured cyclists has decreased slightly over time but has been 18-20,000 per year over the last decade. The dark figure is considerable, and the registration rate is as low as 5-6% for all injured cyclists, and 0.4% regarding injured cyclists in single accidents. 68-74% of all cyclist injuries result from single accidents.

Regarding injured pedestrians, the challenge, besides significant dark figures, is that only accidents, which include vehicles, are recorded as traffic accidents. Hospital registered traffic accident statistics show that about 1,400 pedestrians were injured in 2011. This number had decreased by 44% over the last decade. However, single accidents, i.e. skid and fall accidents, are not included despite the fact that a significant share of these are due to e.g. icy or bumpy surfaces, lack of marked kerbs, or insufficient lighting – problems which are normally traffic safety-related. There is little documentation on these accidents, but according to a Swedish study 87% of all pedestrian accidents are single accidents. This share is likely to be the same in Denmark. Transferring the Swedish findings to Denmark, a recording of 1,400 hospitalised pedestrians due to traffic accidents (including vehicles), the total number of injured pedestrians would, roughly speaking, amount to 11,000 on roads in Denmark in 2011.

The overall situation is that injured NMRU account for 50-55% of all injured in traffic accidents in Denmark. 76-79% of the injured NMRU derives from single accidents – a share which has hardly changed in the last decade, although it is not visible in the official traffic
accident statistics. Some safety improvements have been detected in the last decade for NMRU, but the development is significantly less positive than the general traffic safety development in Denmark.

So why do we not see the same positive development in road safety for NMRU as for the motorized ones? The hurdle is that the problem is not visible for decision makers and road safety practitioners. A number of location-based solutions to improve cyclist safety have been implemented and evaluated in the last decade in Denmark, but without clear positive results, partly because evaluation is difficult due to lack of data. Measures targeting pedestrian safety problems have been very scarce and no evaluations have been made. Practitioners and decision makers do not realize that there might be some low-hanging fruit available in this hidden safety problem.

The paper will be focused on these two research questions:

- What has been the development in the number of injured NMRU in the last decade in a high-developed country such as Denmark?
- What safety-improving solutions have been implemented regarding NMRU, and what effects have been found by the evaluation studies?
How to achieve a good accident data base system? Especulations from Brazil

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The idea of this paper come from two basic and simple questions: What is needed to have a good accident database system (ADS)? and what are the main stumble blocks to obtain one? In developing countries this is a concern for the road safety specialists, because an ADS is essential for traffic safety analysis, even for dated analysis as black spot identification. Without a proper ADS, that are maintained systematically, none conclusion or goals toward safety can be estimate with a sort kind of precision. Two things are very clear, first the main characteristics of the ADS must be mandatory from the federal government, with adequate empowerment of people and resources. Second, partnership must be made among municipalities, police and hospital. So if we know the basic steps for built an ADS why countries like Brazil did not have a good ADS? In this way this paper make a field research in six Brazilian cities in order to identify the procedures for maintain an accident database system. The results showed that each municipality makes its own partnership with police, the databases maintenance is not regular and changes every time when municipal mayor change, and none have information from hospital. The information varies from municipality to municipality; the level of accidents reported also varies. The developing countries could have advantage for a technologic leap. Because they have to start almost from ground zero to built an ADS they could start think in spatial data infrastructure for accident database. This is a new approach that had been used for some other purposes, but it is perfect applied to road accidents. In this way the countries can establish data protocols to build their spatial data infrastructure (SDI).
Accidents between motorcycles: analysis of cases that occurred in the state of Paraná between July 2010 and June 2011

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Statistics for accidents between two motorcycles have been overlooked in the vast number of traffic accidents in Brazil, though they deserve closer analysis. This study sought to conduct an epidemiological analysis into accidents between two motorcycles compared with other accidents based on data in the state of Paraná. Information from the Fire Department site was collected for a period of one year (July 2010 to June 2011), reporting the number and type of accident, day of the week, time, number of victims, gender, age and severity of injuries. Accidents involving two motorcycles represented 3.4\% of traffic accidents and 6.2\% of accidents involving motorcycles; and the victims of these accidents accounted respectively for 4.4\% of victims of traffic accidents and 8.5\% victims of motorcycle accidents. Accidents occurring on Saturdays involving males aged between 20 and 29 were more common. Among the ten most populated cities in the state, some revealed high accident rate between two motorcycles, which appears to be related to the total number of motorcycles in the cities concerned. Thus, constant analysis of these indices is essential together with the implementation of measures to ensure safer highway traffic.
An overview of traffic accidents involving risks to elderly people in the city of São Paulo

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This paper presents the development of accidents indicators involving elderly people in the city of São Paulo and discusses the most common types of accidents involving elderly in urban streets of São Paulo. It was also studied possible causes with respect to accidents involving elderly on URBAN roads in the city of São Paulo. The establishment of this scenery allows the analysis of the risk that seniors face in road traffic.

To make it possible, we address road safety and traffic accidents in Brazil and around the world demonstrating absolute values as well as percentage of injured people per 100,000 inhabitants and 100,000 vehicles. Through Datasus, Denatran and Seade sources, we obtained the percentage of fatal accidents from 2003 to 2012 in the city of São Paulo compared to Brazil and fatal accidents involving elderly in Brazil and in the city, as well as their relationship with the population per 100,000 inhabitants, with 100,000 vehicles and 100,000 elderly residents. Comparisons were made with the fatal accidents involving pedestrians and elderly pedestrians, these also faced with 100,000 inhabitants and 100,000 vehicles. For all these comparisons we can conclude that public policies involving the safety of the roads, especially for those who are more vulnerable, are necessary.

Confronting the data of fatal accidents involving elderly / 100,000 inhabitants in the city of São Paulo, from 2003 to 2012, the average percentage of fatal accidents is 21.74%, which is rising with an increase of 13.5% if we compare these two years. And this same average remains very close when calculated per 100,000 vehicles, where the average results are of 21.73%, which represents an increase of 13.73% from 2003 to 2012. In the comparison of fatal accidents involving elderly / 100,000 senior inhabitants in the city of São Paulo, the average is 7.55%. Comparing senior fatal victims by trampling in relation to the number of fatal accidents by elderly the average is 77.28%, while in 2003 this figure was 71.9% and in 2012 reached 85.8%. Thus, we observe that it is quite evident the increase in fatal accidents involving elderly pedestrians, a growth of 13.9% between 2003 and 2012. The percentage of pedestrian accidents with fatalities involving elderly / 100,000 inhabitants is 33.20%, the average of the last 10 years. The indicator of fatal pedestrian accidents involving elderly victims per 100,000 senior inhabitants has an average of 58.5%.

Some proposals that can contribute to the reduction of traffic accidents, especially with the elderly, are: review the walking speed used in the calculation of pedestrian traffic lights, produce a manual with guidelines aimed at elderly people on safe behavior in road traffic, use the community spaces dedicated to seniors to an orientation process, and discuss the traffic education in this age segment growing significantly in our society.
Poster Sessions
Road safety audit focusing on slope stability

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In the operation safety management of highway the slope stability analysis is not a common practice. When there is a rupture of a slope, especially in roads where there is a large flow of vehicles, the recovery of this area is often costly and generates immeasurable economic and social losses. In most cases this rupture could be avoided or at least minimized, if there is a previous study concerning a proper stabilization of slopes surrounding the highway. This article aims to present a proposal for a highway project management aiming at stabilization and maintenance of slopes in a proactive manner using the approaches of the Road Safety Audit (RSA). The international manuals about RSA do not present a detailed checklist and description of how to proceed in analysis of slope stability. In addition, the Brazilian standard NBR 11682 does not provide information about monitoring and maintenance of the slope, its only concern is about the stage of preliminary procedures for preparing the project to slope stabilization. In Brazil, landslides are common and cause significant damage to society and the government. In addition, events triggered at certain times of the year have caused irreparable damage associated with loss of human lives. The RSA is an ally in road safety management, however, is still incipient in Brazil. The preparation of a specific checklist for the stability and maintenance of slopes is an important step in establishing this practice in Brazil, being a useful tool to monitor the slopes, especially those considered critical in order to prevent accidents. For future research it is suggested to establish procedures for store information in a database and geo referencing information in order to streamline the data management by the highway managers.
Persistent amphetamine consumption by truck drivers in São Paulo State, Brazil, despite the ban on production, prescription, and use

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Introduction: Amphetamine use by truck drivers for occupational purposes is widely known. The production and consumption of amphetamines was banned by the Brazilian National Health Surveillance Agency (ANVISA) in October 2011.

Aims: This study analyzes persistent amphetamine use by truck drivers since the ban was implemented.

Methods: A convenience sample of 427 truck drivers was taken along highways in São Paulo State in 2012. Participants were asked to answer a structured questionnaire and provide a urine sample to screen for recent amphetamine consumption through toxicological analysis.

Results: Among the interviewed drivers, 7% had used some illicit drug recently and 2.7% had used amphetamines. Amphetamines are still consumed by truck drivers despite the risks and the recent ban.

Discussion: The authorities should thus monitor the possession and use of amphetamines by drivers in order to effectively enforce the ban.
Typical scenarios of non professional motorcyclist accidents: Prevention in the center of story

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In Brazil, many accidents have occurred with non-professional riders, those who use this vehicle for their own transportation. This study aims to recognize accident’s typical scenarios involving non-professional motorcyclists in situations of use of motorcycles as transport and not as a work. For this, explores 20 cases of nonprofessional motorcycle accidents in 2011 in Paranavaí, Paraná, with semi-structured interviews, focus groups and inspections in accidents locals, and analyzes supported by concepts of Activity Ergonomics and guided by the analysis model and prevention of accidents. Attempted to identify common nucleus in the accidents by performing tree graphs or diagrams that assemble sets of factors participants. The first typical scenario: Surprise at normal driving was recognized in situations without changes and alert signals recognized by drivers and it all happens as if the system is already close their safety margins. The typical scenario two: Surprise associated with situational constraints includes recognition of interacting factors in the accident/ driving situation, were relevant on the event cause. The third typical scenario: Surprise associated with pre-situational motivation includes diachronic constraints with origins in work and school aspects, among others. The typical scenarios allow thinking new targets for prevention strategies accidents involving motorcycles. Actions aimed at reducing traffic accidents should be based on studies that recognize these factors in interaction.

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The Highway Safety Manual (HSM) published by the American State Highway and Transportation Officials (AASHTO) in 2010 offers a set of tools to evaluate and to identify opportunities to promote safety in highway segments or intersections of urban roads. This work aims at applying these tools to signalized intersections in Belo Horizonte city, in order to carry out the evaluation of the transferability of this American method to predict accidents for these city local conditions. The procedure comprises the following steps: (1) definition of the study area and selection of sites; (2) survey of Crash Modification Factors to be applied to the case; (3) traffic volumes data processing; (4) accidents data processing; (5) method of calibration and validation of the SPF; and (6) use of the empirical Bayes method and the calibration of the overdispersion parameter (k) to refine the results obtained with the model.

After the application of method for the calibration/validation of the SPF it was measured the performance of the crash prediction estimation and the transferability of the HSM predictive method for signalized urban intersections in Belo Horizonte city, for both calibration and validation samples. The analysis of cumulative residuals plots, the Mean Absolute Deviation and the plot of the frequency of predicted–versus–observed crashes it was noticed that the HSM model does not predict well. In a similar study carried out in Fortaleza city by Cunto et al (2013) the calibration sample performed well concerning the cumulative residuals plot in relation to the calibration sample of the current study, and in both studies the validation sample did not generated a good result as demonstrated by the cumulative residuals plot. Only for the validation samples the result of the cumulative residuals plot converges for Fortaleza as well as for Belo Horizonte, indicating the failure of the model in predicting accidents for this sample. Comparing the plot of the frequency of predicted–versus–observed crashes at signalized intersections of Fortaleza city with the results of this study, it is detected in the model a noticeable trend to underestimate the prediction of accidents for sites with more than 25 observed accidents in both studies.

Finally, the analysis of z–score values and \( \chi^2 \) (Pearson’s statistics) were used to investigate the effects of the calibration of the overdispersion parameter (k) according to local conditions. The results advocate that small samples may have influenced the performance of the calibration of k parameter. The overall increase in the \( \chi^2 \) values after the calibration of the parameter k, also gives an indication of the disagreement of the database dispersion in relation to the error structure of the model. Regarding the transferability of the HSM predictive method for urban intersections of the city of Belo Horizonte, the results suggest that such a model did not succeeded. One of the reasons may be related to the definition of the intersection limits adopted by HSM. The accident database used in this study does not present accuracy in the location of the crash, which may have been registered beyond the intersection limits considered by HSM. As a result of this procedure crashes could be
misrepresented at intersections. Nevertheless, this predictive method can be an alternative to the development of specific MPA for urban intersections of other Brazilian jurisdictions, as long as it is applied with caution, and used with large samples in order to reduce the influence of the database dispersion in the performance of the predictive method.
Relationship between travel length and drug use among Brazilian truck drivers

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Objective: To investigate whether the use of the stimulants amphetamines and cocaine by truck drivers in Brazil was related to travel length.

Methods: Truck drivers were randomly stopped by the Federal Highway Police on interstate roads in São Paulo State during morning hours in 2008 to 2011 and invited to participate in the project “Comandos de Saúde nas Rodovias” (Health Commands on the Roads). Participants were asked about the use of drugs, travel distance and age, and the gender was recorded. Samples of urine were collected and analyzed for amphetamine, benzoylecgonine (a metabolite of cocaine) and carboxytetrahydrocannabinol (THC-COOH; a metabolite of cannabis) by immunological screening and quantification by gas chromatography-mass spectroscopy.

Results: Truck drivers reported current use of amphetamine, cocaine and cannabis with 5.7%, 2.1% and 0.3%, respectively. Amphetamine, benzoylecgonine and THC-COOH was found in urine samples from 5.4%, 2.6% and in 1.0% of the drivers, respectively. There was a significant association between the positive cases for amphetamines and reported travel length; 12.0% of urine samples from drivers reported travel length of 500 km or more were positive for amphetamine, and 12.9% of those drivers reported current use of amphetamines. In most cases, appetite suppressants containing amphetamines had been used, but the purpose was most often to stay awake and alert while driving. No significant association was found between the use of cocaine or cannabis and travel length. The use of those two drugs was significantly under-reported as compared with analytical findings of urine samples.

Conclusion: Truck drivers who reported driving more than 500 km had significantly more often positive urine sample for amphetamine and reported significantly more often current use of amphetamines than those who reported shorter driving distances.
Reducing the legal blood alcohol concentration limit for driving in developing countries: a time for change? Results and implications derived from a time–series analysis (2001–10) conducted in Brazil

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**Aims** In Brazil, a new law introduced in 2008 has lowered the blood alcohol concentration limit for drivers from 0.06 to 0.02, but the effectiveness in reducing traffic accidents remains uncertain. This study evaluated the effects of this enactment on road traffic injuries and fatalities.

**Design** Time–series analysis using autoregressive integrated moving average (ARIMA) modelling.

**Setting** State and capital of São Paulo, Brazil.

**Participants** A total of 1 471 087 non-fatal and 51 561 fatal road traffic accident cases in both regions.

**Measurements** Monthly rates of traffic injuries and fatalities per 100 000 inhabitants from January 2001 to June 2010.

**Findings** The new traffic law was responsible for significant reductions in traffic injury and fatality rates in both localities (\( P < 0.05 \)). A stronger effect was observed for traffic fatality (-7.2 and -16.0\% in the average monthly rate in the State and capital, respectively) compared to traffic injury rates (-1.8 and -2.3\% in the State and capital, respectively).

**Conclusions** Lowering the blood alcohol concentration limit in Brazil had a greater impact on traffic fatalities than injuries, with a higher effect in the capital, where presumably the police enforcement was enhanced.
The Brazilian environmental legislation as a risk factor for accident *in itinere* – the case of large trees at roadside

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This study aimed to discuss the so-called “accident of commuting” or "accident *in itinere*" related to journey that worker makes from home to work and vice-versa. According to Brazilian law the employer is indirectly responsible for this kind of accident. There are numerous risk factors of accidents in an urban and rural road, despite the Human Factor (driver) is the most common factor the via / environment could account for 37.60% of the urban and road accidents, and this factor is aggravated by the presence of large trees at the roadside, which are generally unprotected and compromises the safety of motorists, and as consequence the employer is responsible for an accident with a tree when the employee are commuting. The methodology was based on a bibliographic review and technical visits. The paper concluded that the current environmental legislation is responsible for the impossibility of effective attitudes towards the suppression of those trees affecting a safety journey, making difficult and sometimes is an impediment to the appropriate action by road authorities and employers in order to minimize the risk of workers that are commuting. In this way the present paper defends the removal of trees present at the safety zone of the roadside without environmental compensation, putting the workers lives in priority.
Analysis of capacity and conflicts with vulnerable road users in a parking lot – a case study at UNESP-BAURU’S campus

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In the last thirteen years the Brazilian vehicle fleet has grown from 30 million to over 80 million. This fact did not come attached with adequate investments in road infrastructure to deal with this demand. The result was a considerable increase in traffic congestion not only in major Brazilian cities but also in medium and even small towns. At the campus of UNESP in Bauru, this is not different. The number of cars that go to the campus every day increased over time and nowadays some of the existing parking lots are overloaded. Some drivers are spotted parking in irregular places, disturbing the traffic of other vehicles and compromising people’s safety. This work aims at the application of spatial analysis methods to evaluate the capacity of the parking lots at the campus of UNESP in Bauru, establishing direction lines for planning policies and territory management. Also, to analyze the conflicts that arise between cars parked in regular and irregular places and vulnerable road users (pedestrian, cyclists and people with mobility restrictions). The proposed methodology is based on the theoretical parameters of georeferenced information systems and uses the free GIS software SPRING. A composed data bank was set with image and cartographic databases, parking spots data, parked vehicles data, and field observation notes. The processed data made possible the creation and visualization of the demand and the supply for each parking lot. Investigating the relation between supply and demand, an occupancy rate was established. For the conflict analysis, it was used in loco observations and a checklist. Some parking lots are close or already exceed 1 car per spot. Critical places can be observed with their respective risk situations and risk behaviours attached on the database. These results are essential for the future of the planning and organization of the campus regarding traffic safety and parking lots.
Study of organizational climate in a vessel – reflections on the behavior and safety crew

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The increase of organizations from XXI century on and due to a fast transforming scenery due to the globalization process that affect the groups as a whole, changing working relationships, habits and even their culture, unleashing conflicts between the leaders and co-workers. In the labor market range, each job has their own features and specific natures that deserve special attention, as for the experts on the Fluvial Trade Navy, as they work on board in limited spaces, for several days, and though in a totally isolated, even when they rest, without their families or friends. So, the vessel becomes an atypical place to work which may interfere in the organizational climate. Then, the aim of this paper is to analyze the threads and opportunities of the organizational climate where the crew members in watercrafts, and also the welfare of the officers aboard in the Fluvial Navy and their safety. This paper was done by means of results obtained by a questionnaire applied to the fluvial sailors and the comparison to the organizational climate was seen “in loco”.
The IX ICTCT Extra Workshop gratefully acknowledges the support of its sponsors:

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