

URBANISM AS A MAJOR FACTOR OF ROADS' FUNCTION AND SAFETY

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ABSTRACT

Urbanism and traffic safety, observing from the distance, have no important connection between each other. The truth is different. Urbanism has a significantly greater impact on traffic safety than we might think. Unfortunately a lot of people who deal with urbanism are unaware of that fact.

The lack of knowledge regarding roads' primary function and safety issues, like access control, planning, designing and responsible decision-making (competences of different authorities and municipalities), often bring problems to residents alongside roads, to road users and to all other participants in traffic. Therefore, all road users and residents are affected by the consequences of the inappropriate actions. Finally, the road operator has to deal with the problem. Since the majority of the roads are public and funded from the budget, the taxpayers pay for the mistakes – again!

Such problems originate from the lack of political willpower and government's vision regarding urbanism, spatial and traffic planning/management, as well as from the absence of responsible decision-making with penalty liability. All this is of great social and economic importance by inducing costs and health problems to residents and road users.

Keywords: urbanism, traffic safety, human factor

1 PRIMARY FUNCTION OF ROADS

An efficient and safe road network is organized like our blood system. It is a hierarchy of arteries and veins. It is further divided to main arteries, distributor arterioles and capillaries to access single cells in the muscles and organs. The blood moves much faster in the main arteries than in capillaries (Table 1).

Table 1: Blood system function in comparison to blood flow

Blood system	Flow / speed
Main arteries (to legs and arms)	5,8 cm/s
arterioles (to organs)	0,28 cm/s
capillaries (to organs)	0,05 cm/s

Taken from Hans-Joachim Vollpracht, PIARC Road Safety Seminar, Lome, Togo, October 2006

The main blood vessels never provide their surrounding tissue and the organs directly (Figure 1). The road network has a similar function (at least it should have) and therefore fast and long-distance traffic is separated from the slow local traffic. The main roads of the road network should have a strict access control, to be in the same function as the arteries are in our blood system.

The road's function is defined by the shape and size of vehicles, presence of other participants in traffic as vulnerable road users (mixed function), speed limit, traffic volume, road geometry and connecting. Roads should be designed by considering road's functions, in such a way for the traffic to flow smoothly and evenly, with a clear, credible and safe design – to provide safety for all.

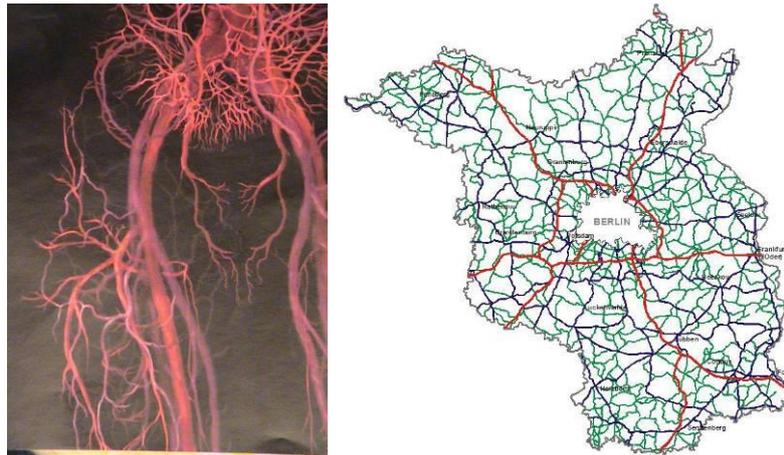


Figure 1: The comparison of the blood system and the road network

Taken from Hans-Joachim Vollpracht, PIARC Road Safety Seminar, Lome, Togo, October 2006

When the road is being planned, designed and positioned into the environment (put in to space), the most important issue for the planners and designers should be the road's function and its impact on the traffic safety.

In the Slovenian Rules on road design, the roads are (similarly to the other EU countries) divided into following groups: long-distance roads, connecting roads, collectors and access roads.

The long-distance roads are connected with the rest of the long-distance roads in the country and in the neighbouring countries. They connect regional centres with higher level of service. The number of accesses on those roads is limited and only level-separated junctions are allowed.

The connecting roads link two long-distance roads and connect the regional centres to the rural residential areas and industrial zones. Junctions are allowed on the same level.

The collector roads have the function of an area distribution. They allow entering and exiting from the residential, recreational areas, industrial zones and they connect small residential areas or city parts. The access roads allow actual access from the street to the properties.

In theory, it looks perfect, but the reality is far away. Because of bad and unprofessional decision-making, spatial planning and urbanism, as almost anyone can build a house, warehouse or other industrial structure alongside long-distance roads, their function has changed towards the connecting roads and the connecting roads have become collector roads.

The consequences are lower level of service, lower travel speed, worse traffic safety and all that adds up to great financial losses (every traffic jam = social/economic cost for the country). It is time to take a step forward, especially in decision-making, spatial planning and urbanism.

2 URBANISM AND PLANNING

Urbanism and spatial planning is one of the tools for achieving synergy among requirements, possibilities and roads' function in order to achieve sustainable development of a certain area. By proper planning, we can ensure efficient public transport with a positive traffic and mobility impact, energy savings and positive influence on the environment.

To minimize the present costs (which is a very shortsighted and inappropriate philosophy), a lot of town planners decide to allow direct access from a land or plot to the public road. So they do not have to provide or give away any additional land for access roads or provide funds for their construction. As we can see in reality, those planners do not think about the problematic consequences of their decisions (urbanism and access control) to road's

function and its safety. When selling land to people and companies they are leading them astray as the buyers are unaware of the oncoming problem or do not concerned about them – yet. When they buy and build on the plots, they also have a right to access their land, so they force the permit for accessing the land, or build access illegally. Of course, this is a problem of the authority (road administration) and supervision (road, building and planning inspectors). The problem is of course wider, as in the end, the municipalities, the residents and drivers are influenced by those interventions. At the very last when they see no solution and they do not know how to cope with the problem (which they have created themselves), they put the problems and the blame to the road administration.

The multinational trading companies present another significant problem. They want to have access directly to main roads and/or additional accesses to roundabouts or junctions. They only have in mind their own business and profit.

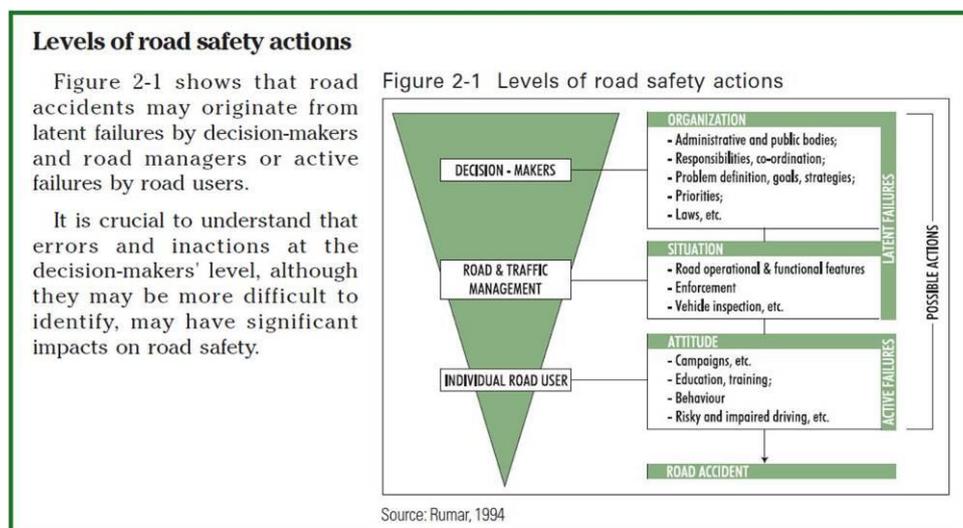


Figure 2: Safety impact from decision makers to road users
 Source: PIARC, Road Safety Manual

They do not think or care about the road users' safety even though they are their own customers of products or services. The truth is that the city planners and the road authorities – government and decision-makers, allow (un)professionals to make such decisions and impact the road's function, safety and wellbeing of road users and residents – taxpayers (Figure 2).

3 INDIVIDUAL JUNCTIONS

It is necessary that planners pay full attention to individual junctions for private houses or new trading and industrial structures. In the planning documents, defining locations for the new settlements the access roads and their connection with main road have to be defined. In addition, when categorizing or classifying the existing non-categorized roads (for example forest roads and other existing access roads), they must firstly consider function, safety and traffic flow on the connecting roads.

For the new trading and industrial companies, they must plan industrial zones near motorway or expressway junctions.

Not only individual junctions, but also collective junctions and settlements – if not controlled (Figure 3) are problematic. Especially if they are not clearly visible to the drivers (the driver does not perceive them in time = self-explanatory road design), or the view from those junctions is limited by trees, buildings or elements of the main or access road. In

addition, an increased traffic volume from junction poses problems to traffic flow on the main road and the safety of the road and the junction – again the function of the road is insufficient.

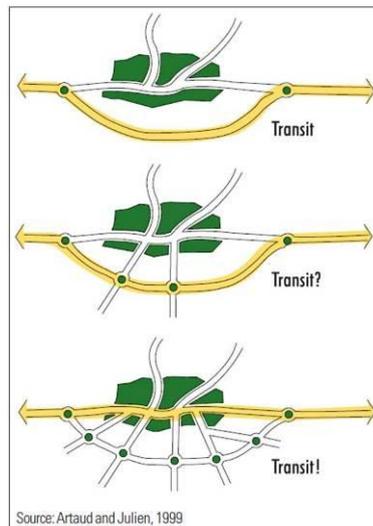


Figure 3: Uncontrolled Access Management – unprofessional planning and urbanism

Source: PIARC, Road Safety Manual

4 LINEAR SETTLEMENTS AND DISPERSED CONSTRUCTION

When we talk about linear settlements and dispersed construction (Figure 4) we often refer to developing countries, as developed countries have already dealt, or have been dealing with the problem. Unfortunately, due to unprofessional decision-making and political influence (lobbying), we often witness new linear settlements. Instead of dealing with the problem of the existing linear settlements (which is a legacy of previous decision-making and planning), we are creating new ones. In 21st century, when many countries (communities) and professionals are well aware of the problem – even organisations like World Health Organization/WHO, World Road Association/PIARC are emphasizing the inappropriateness and danger of such settlements warn professionals and decision makers worldwide.

Linear settlements are inappropriate and dangerous because the road layout allows or gives the impression to drivers that they are driving outside the unite settlement. The width of the road, vertical and horizontal alignments and road environment are not coherent with to urban environment. This kind of environment confuses the drivers, as driving 50 km/h (max. speed limit in cities) is too slow, while driving 90 km/h (max. speed limit outside the cities) might be too fast. In addition, drivers driving through do not perceive speed as such a problem to the same extent as the residents living in those settlements. The vehicles driving through present a threat to them, vibrations and pollution (exhaust, dust, noise) deteriorate the living environment. The resident (families) daily commute and access the road, walk alongside it etc. If we combine all the factors, with road's functions in mind (the traffic volume and structure of vehicles), we can make an assertion that this kind of settlements are a danger to themselves and to bypassing traffic. They also reduce traffic flow and safety and consequently road function.



Figure 4: Beginning of the linear settlement alongside the road and uncontrolled access – unprofessional planning and urbanism

A similar problem for the traffic safety is dispersed construction which is very typical for our country. In Slovenia, we have more than 6000 settlements on 20273 km² with just 337 residents on average. In fact, 49.2 % settlements have less than 100 inhabitants. Numerous settlements along the state roads are dispersed, which looks like that: a few houses there, then nothing for fifty meters, after that ten houses together, again 70 meters without buildings, between that two or three junctions, one forest road, some individual accesses with low visibility and so on. In certain areas, this goes on for several kilometres. In such cases it is very difficult to define whether and where to determine a speed limit of 50 km/h (valid rules for driving in the settlement). Whatever done, someone will not be satisfied (lower speed limit-angry drivers, higher speed limit-angry local residents), and all this of course has negative influence on traffic safety.

5 HUMAN FACTOR

Human factor is involved in the whole process of road safety, from urbanism (the human as the decision-maker) to participants in traffic (drivers, pedestrians ...).

We know that driver can perceive (see and process) only a limited amount of information (Figure 5, 6), such as traffic signs, road layout, roads environment, traffic situations.

What happens usually is that because of inappropriate urbanism and decisions made, the drivers cannot drive and (re)act in traffic situations with care and safely. The municipalities and residents alongside the roads are then demanding from the road operators to fix problems by traffic signs. Such situations are very difficult for the road users and unnecessary. The driver experiences a visual overload and the signs have no effect. On the contrary, they

confuse the driver and require extra attention. The problems originating from the inappropriate and unprofessional urbanism cannot be fixed with traffic signs.

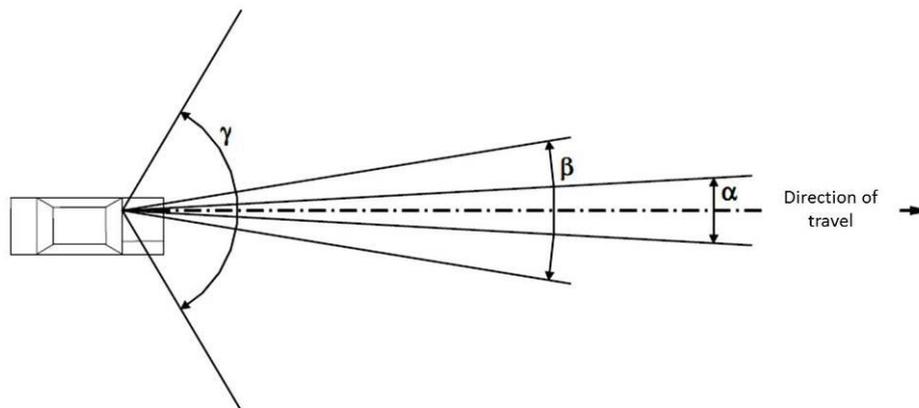


Figure 5: The angle of visual perception depending on speed

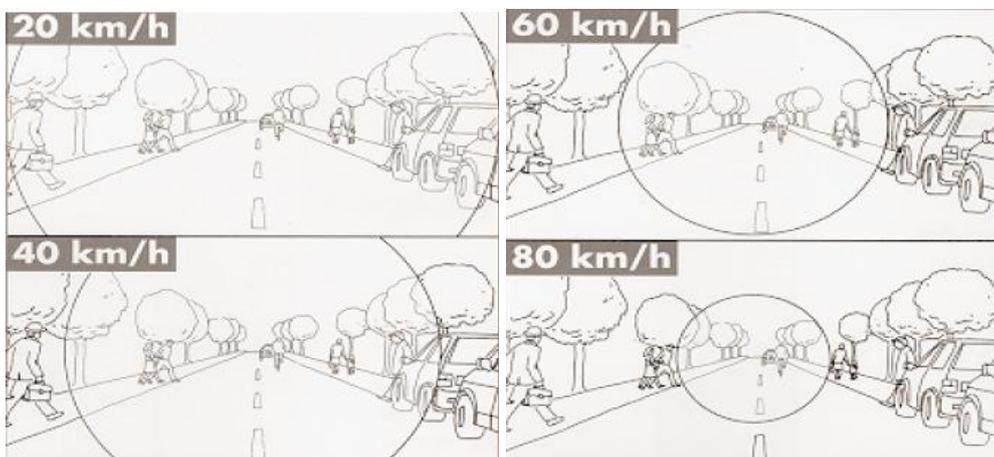


Figure 6: Tunnel vision depending on speed

In addition, other distractions like billboards and “non-self-explanatory road design” have its own negative impact to road safety.

“Therefore, complex situations create unsafe or inefficient operations because it takes so long for drivers to identify and process the information. This means that as complexity increases a longer perception-reaction time must be available. The visual limitations combined with cognitive constraints and complexity of traffic conditions require much longer processing times, and thus longer perception-reaction times.”¹

6 URBANISM AND TRAFFIC SAFETY

Urbanism has a great impact on traffic safety and roads' function. If we (professionals, communities, decision-makers) will not deal with the problem, our roads will not comply to the European standards and vision regarding safety and welfare. In the end, the costs of dealing with the problem will be too high and we will not be able to finically cope with them. Low price (unprofessional) decisions prove themselves to be the most expensive in the long run. We should learn something from the past. The government and the municipalities must be more meticulous about (regional, town) planning/urbanism. The dispersed construction

¹ Dixon K.K., Layton D.R., The Influence of Human Factors on Access Management Design, 4th International Symposium on Highway Geometric Design, Valencia 2010

alongside the roads is a very negative phenomenon, for the environment/space use, traffic safety and roads' function.



Figure 7: Linear settlement and improvements made – Belgium

Taken from Philip Vaneerderwegh, PIARC International Seminar “Promoting Road Safety for Vulnerable Road Users”, Cape Town, South Africa, October 2009

We have to minimize the number of junction on roads and the effect of possible conflicts between road users (service roads, concept of more concentrated settlements ...). A special care must be taken in the vicinities of schools along or near the highways. The investments in infrastructure must be made to improve road safety for the vulnerable road users (Figure 7), and make sure that their locations and designs are adequate. We have to reach the public approval, when public hearings will be held in future, regarding urbanism and planning, the public will disagree or at least start to pose questions about the problems of inadequate and unprofessional urbanism. The public will demand the answers from the city planners and decision-makers, to provide sufficient safety and symbiosis for all.

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