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A STRATEGIC APPROACH FOR SAFETY: PUTTING KNOWLEDGE INTO PRACTICE

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THE ROAD TO SAFETY –
ROAD SAFETY STRATEGIES IN AUSTRIA

1. INTRODUCTION

Road accidents result in a large social and economic loss for society. Over the past 25 years strategies and programmes have been developed in many countries all over the world in order to raise road safety standards. The Austrian government under the leadership of the Ministry for Transport, Innovation and Technology decided to carry out a comprehensive road safety programme starting in January 2002 for the period until the end of 2010 (Figure 1).

For the first time this programme created a structured approach to road safety work and presented an overview of possible steps to reduce accidents. The primary objective of this effort was the reduction in deaths and injuries. This was achieved by effective implementation and financing, securing political and social acceptance, as well as providing evidence of the cost-effectiveness of the programme. In the Road Safety Programme four basic categories came into focus: human behaviour, infrastructure, vehicles and transport policy/legal framework. A total of 31 priority areas were listed in these categories and over a hundred concrete specific measures figured at the heart of the programme.

Figure 1 – Austrian Road Safety Programme 2002 – 2010

- The area of human behaviour focused on restraint systems, alcohol and other drugs, driving speed, basic driver education and advanced driver training, pedestrian safety, driver fatigue, motorised two-wheeled vehicles, following distances and traffic education.
- The area of infrastructure focused on high-risk site management, safety on rural roads, tunnel safety, wrong-way driving on motorways, safety management in urban areas, the implementation of Road Safety Audit (RSA) and Road Safety Inspection (RSI), motorway roadwork zones, the properties of road surfaces, road-side telematics and railway level crossings.
- The area of vehicles included the introduction of accident data recording, heavy goods vehicle safety as well as active and passive vehicle safety.
- Finally, the area of transport policy and legal framework covered the themes of the European Road Safety Charter, the Austrian Road Safety Council, independent accident investigation, heavy goods transport, legislation, land use planning and influencing modal choice.

The overall goal of the programme was a 50% reduction in the number of fatalities resulting from road accidents by 2010. This ambitious target was in accordance with numerous national targets within the EU and also corresponded to the long-term reduction target of the European Commission. Another target was a 20% reduction of injury accidents by the year 2010.

This programme was a success story as the collaborative efforts of the past years have shown a clear impact. Since the start of the programme the numbers of road traffic deaths have decreased year by year and are altogether lower than those at the beginning of official accident statistics in the early 60s. A structured and targeted approach has proven to be the right way to tackle the problem.

Historically there has always been the tendency to establish road safety measures that focus on driver or technology failures as the accident cause. Today there is an international trend to implement a forgiving road safety system and follow an integrated approach to road safety. Drivers should not solely be made responsible for accidents since other aspects of the road environment, such as infrastructure planning and the preparedness for handling traffic demand, traffic flows and traffic conflicts are also responsible in certain respects.

2. CHARACTERISTICS OF SUCCESSFUL ROAD SAFETY PROGRAMMES

Successful road safety programmes are characterised by long-term and clearly conceived methods and a detailed catalogue of measures and evaluation plans. Such programmes should be further supported by the relevant road safety legislation, setting clearly defined reduction goals and ensuring the necessary financing is readily available. Just as important are ongoing measures of effectiveness and transparency. In order for the programme to be successful it is necessary to have a platform on which experiences can be exchanged and for gaining the support of these measures at the national, regional and local levels.

An international analysis of road safety programmes indicates the following points for elaborating a successful programme:

- Developing a long-term strategy in road safety policy based on a clear philosophy.
- Establishing quantified and manageable targets.
- Passing the programme at the parliamentary/governmental level.
- Achieving close co-operation between authorities at all levels.
- Having a federal programme budget, complemented by funding with regional and local budgets.
- Establishing a continuous communication framework between actors and citizens: public relations, civic participation.
- Establishing problem-oriented measures.
- Regularly collecting relevant safety performance indicators such as speed levels, seat belt use and alcohol levels.
- Continuously evaluating and improving the programme with a view to achieving the targets.

3. DEVELOPMENT OF ROAD ACCIDENT STATISTICS IN AUSTRIA

Over the years there has been a noticeable downward trend in the number of road deaths. The Austrian Road Safety Programme has shown obvious results: more than 1,400 lives could be saved since 2002. Still, in 2009 the number of road fatalities was 633 and the number of persons injured 37,925. When the Road Safety Programme was introduced the number of persons killed amounted to almost 1,000 and the number of persons injured to over 43,000.

Over the past decade a strong downward trend of death rates could be observed in many countries in western and northern Europe. It is common knowledge that this trend is mainly to be attributed to improved passive safety equipment in vehicles, advances in post-impact and accident care and shorter response time of emergency medical services.

Figure 2 shows the development of accidents in Austria from 1990 until 2009 comparing it to the targets of the first Austrian Road Safety Programme.

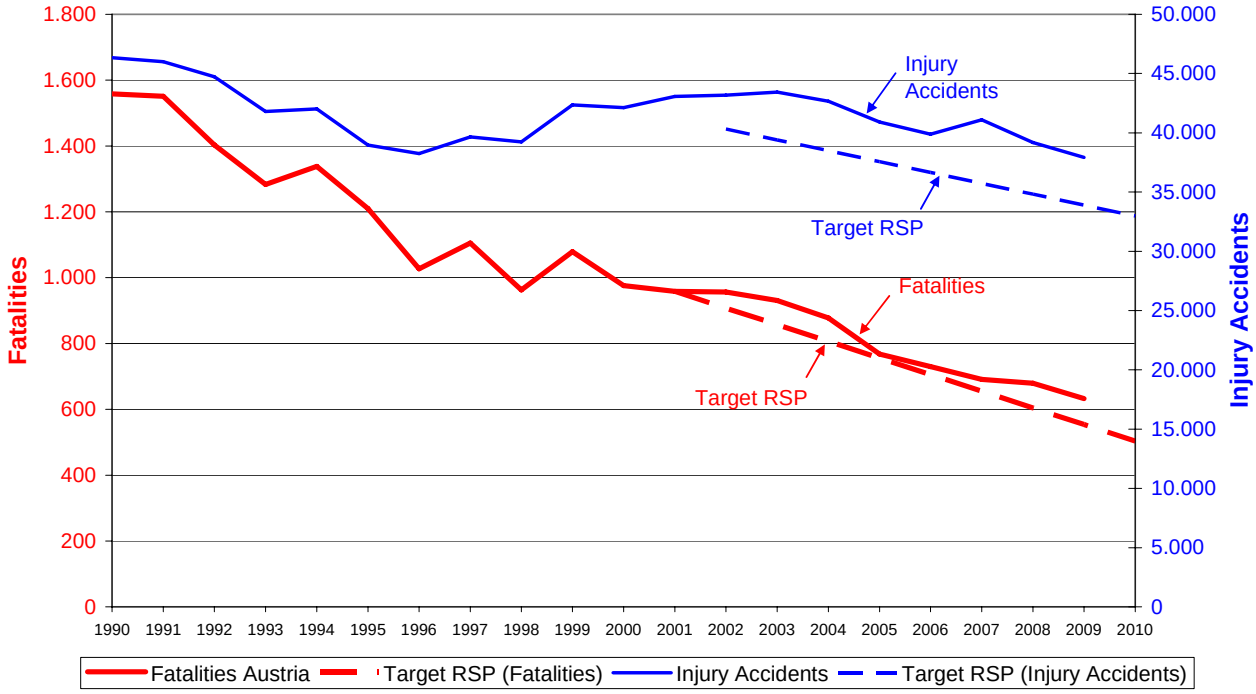

Figure 2 – Targets of the Austrian Road Safety Programme 2002 -2010
(Accidents with injuries and fatalities)

By comparing the death toll among all road users in 2009, car occupants account for 54% of all fatalities and significantly exceed all other groups (Figure 3, left). Next are pedestrians (16%), motorcyclists and their passenger riders (14%) and cyclists (6%).

A consideration of the trend development shows an increase of fatalities only for mopeds/motorcyclists. The number of fatalities in the other modes of transport could mostly be reduced (especially those of car occupants). Increases for accidents and injuries are shown for mopeds and bicycles as well as for motorcycles and pedestrians.

At approximately 65% the majority of deaths occur on rural roads (Figure 3, right). A fourth of the fatal accidents occur in urban areas and only 11% on motorways. The trend for fatalities shows an improvement for all road types (in urban as well as rural areas), while the largest decline is registered on national rural roads. As for accidents and injuries, the reductions refer to rural roads only, while the respective numbers in urban areas are stagnating. The least improvement in the past years has been experienced on local urban roads.

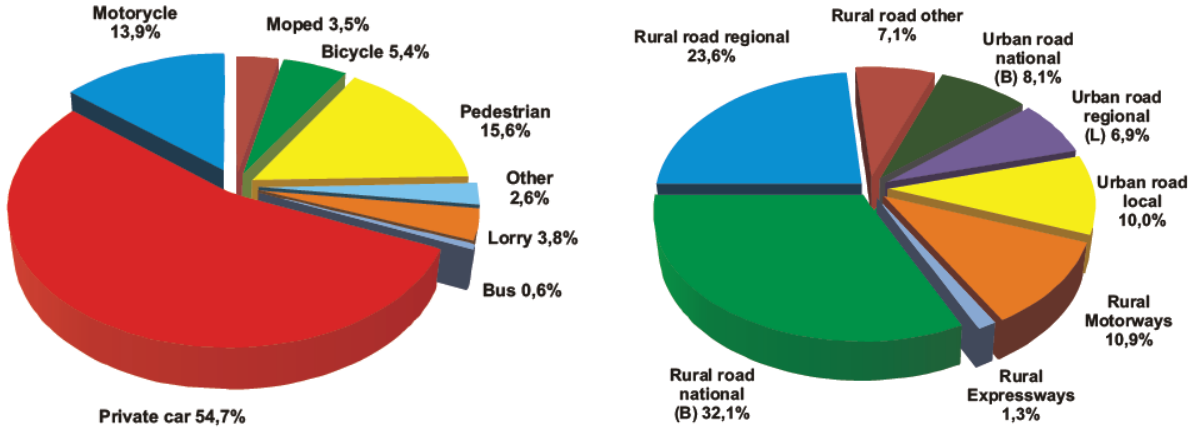

Figure 3 – Road fatalities in 2009 by mode of transport (left) and road type (right)

Comparing the years 2000 and 2009 a strong improvement could be observed for the age group of 15 to 39 years (Figure 4). This is due to the fact that the Austrian Road Safety Programme focussed on this group by significantly improving driver education and training, introducing lower alcohol limits for novice drivers and creating awareness for the dangers of risky driving amongst male youngsters.

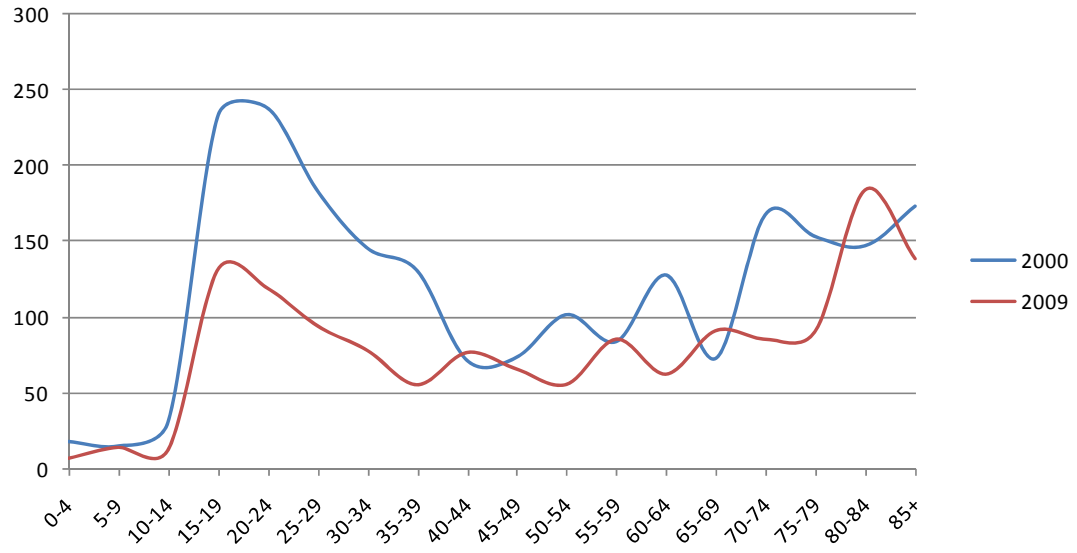

Figure 4 – Age groups of road fatalities

By European comparison it can be seen that Austria still ranges in the middle of the EU-27 countries and is 15% worse than the mean of the EU-15. Some member states of the European Union have managed to reduce the number of road-related deaths to half the number reported in Austria. As shown in Figure 5, Austria had to claim 81 road fatalities per million inhabitants, which is close to the EU mean value of 78. The European countries with best results are the Netherlands (41), UK (43) and Sweden (43).

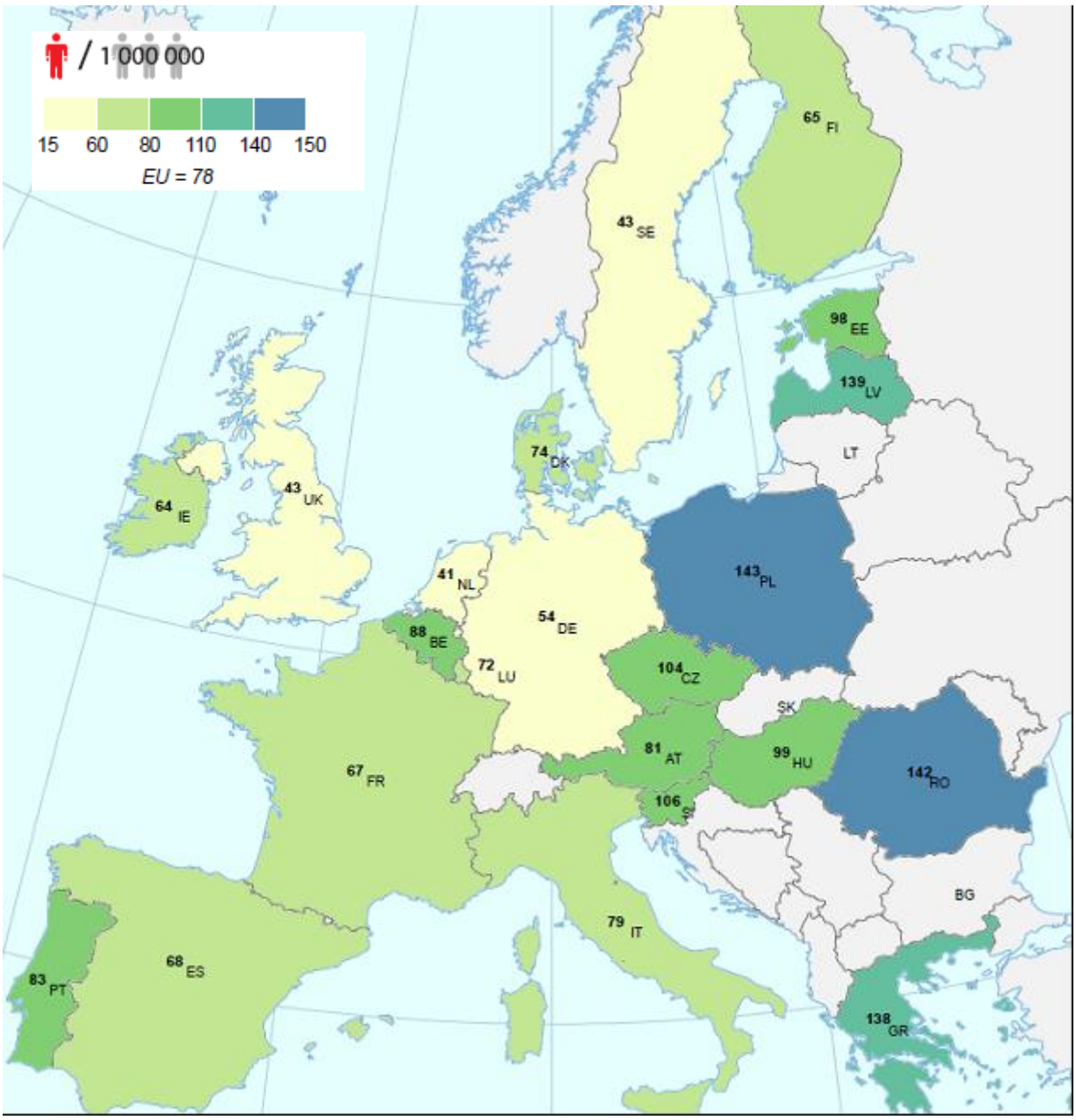

Figure 5 – EU comparison: road fatalities per million inhabitants 2008
(Source: EU Road Accident Database CARE)

4. SOCIO-ECONOMIC COSTS OF ROAD ACCIDENTS

Road safety is last but not least a question of economics. Austria cannot afford to continue having accident rates that result in socio-economic costs currently amounting to five billion Euros annually. The following socio-economic costs have contributed most to the total costs of Austrian road accidents:

- Cost of human suffering (49%)
- Cost of property damage (22%)
- Loss of economic potential (18%)
- Insurance administrative costs (7%)
- Legal costs (2%)
- Cost of medical care (1%)

Table 1 gives an overview of the costs per cost unit and compares the calculations with and without considering human suffering.

Table 1 – Socio-economic costs of road accidents in Austria (2004)

Cost unit	Costs (€), incl. human suffering	Costs (€), without human suffering
Death	2.461.345	1.287.004
Serious injury	291.275	55.925
Slight injury	20.896	2.792
Property damage (per accident)	4.075	4.075

Adding up the individual cost units results in the following accident costs according to injury severity and type of property damage. The total costs for road accidents in Austria amount to five billion Euros annually. This number rises to over ten billion Euros when also the cost of human suffering is included, which has become an international standard for calculating costs. Thus, on pure economic grounds, a healthy economy has needs to reduce accidents.

5. ANALYSIS OF THE ATTITUDES OF ROAD USERS

An important basis for developing a sound road safety strategy to be accepted by the public is an analysis of the attitudes of road users. These attitudes differ significantly from country to country. The European-wide study “SATRE 3” surveyed Austrian driver opinions regarding possible causes of car accidents. One of the results is given in Figure 6.

The study shows that Austrian drivers are as much concerned about road accidents about loss of employment. The actual causes of road accidents are realistically estimated: high speeds, excess alcohol, overly short following distances and fatigue. Nevertheless, Austrian drivers are less likely to admit performing certain risky driving manoeuvres, such as crossing an intersection on a yellow light, overtaking in short distances or tail-gating, as compared to drivers from other European countries.

There is a general agreement in Austria regarding the measures that need to be introduced in order to improve road safety: More than two-thirds of persons interviewed agree that enforcement of legal provisions and punishment for traffic violations are useful and call for increased enforcement of traffic laws, and tougher penalties for traffic offences. There is more support for this measure in Austria than in other European countries.

Four out of five persons interviewed approve tougher fines for drivers under the influence of alcohol and for lowering the current alcohol limit by approximately one third. Yet Austria is next to last in the rankings for support of this. Support for this measure is significantly higher In the majority of the other European countries.

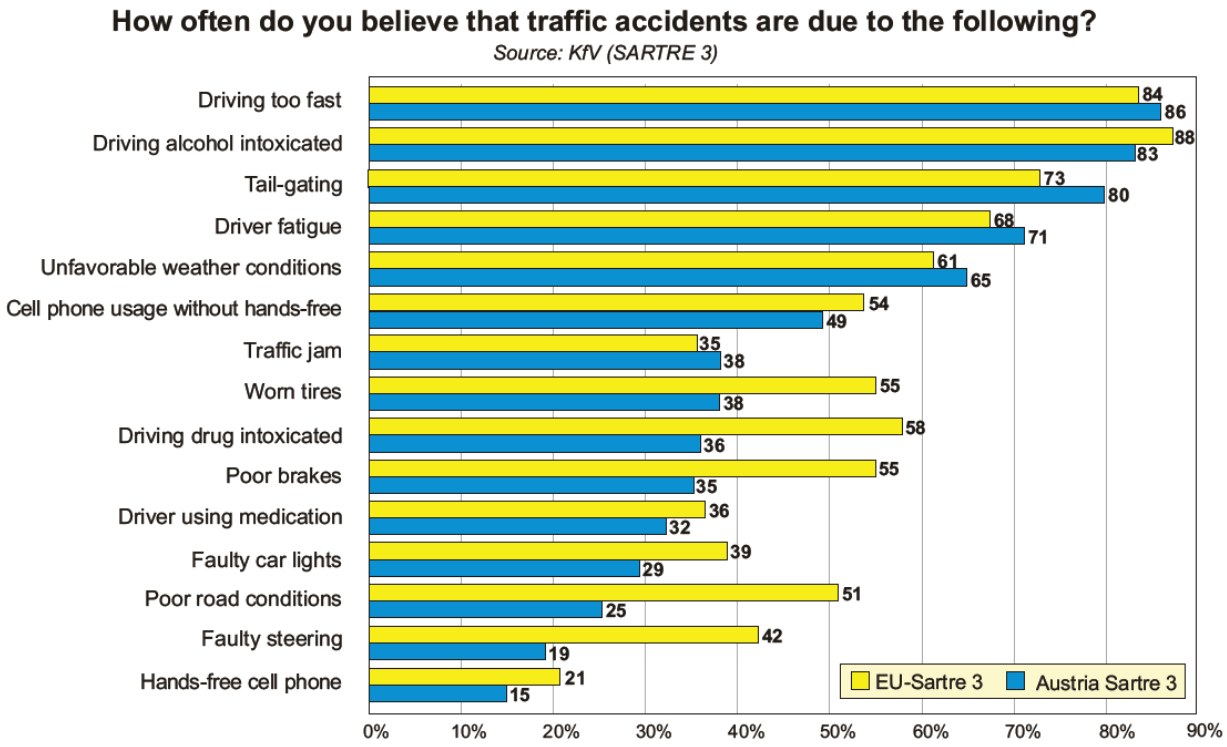

Figure 6 – Comparison of Austrian and EU driver attitudes

Comparing the opinions of Austrian drivers with those of drivers in other countries shows that Austrians tend to be more sceptical about newer technologically advanced equipment for improving road safety, such as speed limiters, alcohol interlocks, navigation or congestion warning systems.

6. ROAD SAFETY FOR THE FUTURE – DEVELOPMENT OF THE AUSTRIAN ROAD SAFETY PROGRAMME 2011 – 2020

With the new Road Safety Programme 2011 – 2020 Austria aims at continuing the successful result of the first road safety programme. The focus of the new programme is on an integrated approach to road safety actions. The safety philosophy is built on the well known approaches of “Safe System”, “Vision Zero” and “Sustainable Safety” with the major goal of making Austria one of the top 5 countries in Europe as far as road safety is concerned. The safety philosophy implies the “5xS”:

- **S**afe infrastructure
- **S**afe vehicles
- **S**afe road users
- **S**hared responsibility
- **S**mall administration

The road safety strategy of the programme is based on the following prerequisites:

- Humans will always make mistakes despite all efforts and prevention work.
- The transport system has to be designed in such a way that collisions don’t lead to fatal or very serious injuries.
- The suppliers of the transport system have joint responsibility for its safety.

- The users of the transport system are obliged to respect the rules and the capacity of the system.
- A close cooperation and a matching of targets with other relevant stakeholders, e.g. from the police, the environmental, the health or the education sectors and with regional and local authorities as well as lobbyists is necessary.
- All measures are oriented towards the achievement of long-term numerical targets.

Ten priority fields were identified for which – in terms of management by objective – concrete numerical targets and potentials of accident reduction have been set. These priority areas are seat belt use, alcohol and drugs, speed management on rural roads, vulnerable road users, high-risk sites and integrated safety management of the road network, railway crossings, fatigue and inattentiveness, driver training and the enforcement of traffic laws.

A focus of the programme in terms of research and implementation will be put on the changes in mobility and in this context on e-mobility. Due to their lack of noise electric vehicles require a change in behaviour of road users, e.g. children, elderly people or visually impaired persons. Children are currently conditioned to “Stop – Look – Listen” in their road safety education; with electric cars “listen” might not be relevant any more. This has to be considered early on to avoid negative effects on road safety. In addition, the crash behaviour of electric vehicles and their braking and acceleration properties have to be determined.

The Austrian Road Safety Programme 2011 – 2020 is very ambitious and its implementation will only be possible with the support and co-operation of all stakeholders concerned. Still, the effort is worth it for every life saved and for preventing the suffering of victims, their families and friends. Thus, the overall motto of road safety work in Austria has not changed: every road death or severe injury is one too many!

7. A ROAD OPERATORS APPROACH FOR SAFETY – THE ASFINAG ROAD SAFETY PROGRAMME 2020

ASFINAG is the Austrian operator of motorways and expressways and is to 100% toll financed.

Responsibilities: planning, construction, maintenance, operation and financing of the Austrian motorway and expressway network and toll collection

Road network: in operation: approx. 2,170 km, more than 300 km Tunnels
planning stage/under construction: approx. 320 km

Personnel: approx. 2,700 staff members

Motorways and expressways are already very safe roads in Austria, thanks to the measures ASFINAG havs implemented in the past years. Nevertheless, there is still much to do. Every casualty is a tragedy. All stakeholders in the transport system have to give their best to avoid accidents and to minimise their consequences. Road safety is the top priority at ASFINAG´s.

Figure 7 – ASFINAG Network

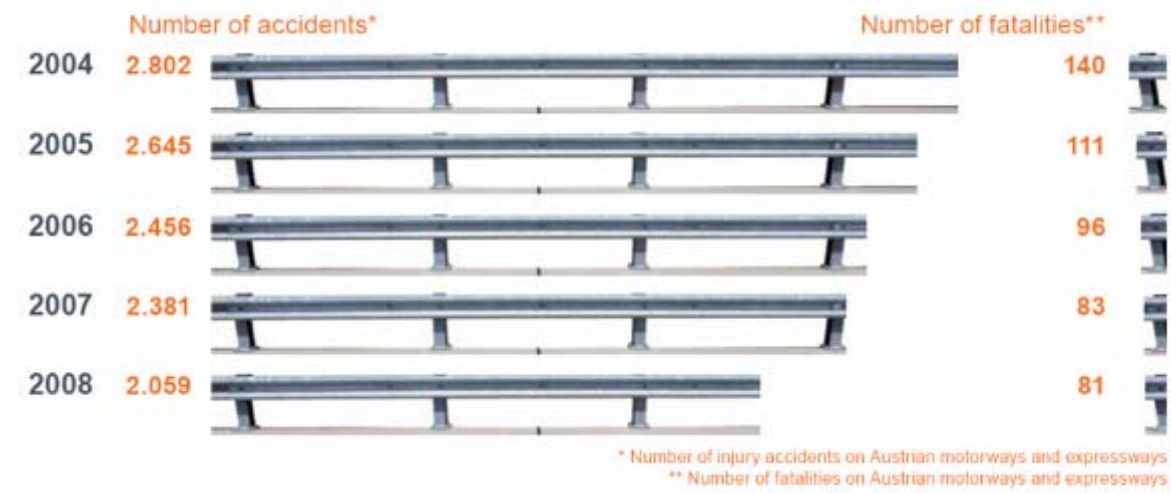

Figure 8 – Accidents and fatalities on ASFINAG operated roads

Therefore it is necessary to have

- a programmatic and systematic approach in the Road Safety Management Systems,
- conformity with the political and social frames, and
- an economic balance in the investment

to manage the economic challenges of the next years and to reach common targets in road safety.

13 target areas, 32 priorities and 130 individual measures were defined In the ASFINAG´s Road Safety Programme, to be implemented systematically.

The possible accident causes are complex and so are the contact points for further improvements. Besides structural improvements on the road and the roadside, additional lanes are built and new tunnel sections installed in order to avoid two-way traffic. The maintenance of roads (e.g. winter and roadside maintenance) will also be further improved. New technology in the telematics field will be consistently applied to enhance road safety. Communication will be even more important - and partly automated. The timely warning before an event occurs is not only a matter of comfort but also a safety issue.

Figure 9 – ASFINAG´s Road Safety Programme 2020

The Road Safety Programme displays the ASFINAG commitment to integrated road safety actions by targeting three areas of intervention: infrastructure – human factors – vehicles. In doing so ASFINAG makes a decisive step beyond the “common” safety tasks of infrastructure operators and includes measures in the areas of driver compliance and vehicle inspection. This involves support by the police for the effective enforcement of legal provisions along the whole network and an intensified creation of awareness on the part of drivers.

7.1. The “Safe System” Approach of ASFINAG

In accordance with the general principles of a Safe System ASFINAG has supplemented and extended the philosophy formulated for the daily activities of motorway personnel and customized the general principles within the new ASFINAG Road Safety Programme:

- It is of upmost importance to guarantee (and promote) maximum safety for all participants in the road traffic system, and in case of minor mistakes (human performance limit) to prevent system-related, severe consequences of spurious actions (considering the biomechanical tolerance of humans).
- Another principle is Shared Responsibility, i.e. ASFINAG takes an active part in its responsibility to raise awareness of its clients.
- At the core of this systematic approach are strategies geared to the physical strain a human can handle (impact energy).
- All measures will be implemented according to cost-benefit estimates: measures with the highest safety potential are given the highest priority.
- Effective communication and management structures for all responsible parties ensure the efficiency of the programme.
- Road safety goals are harmonised with other economic goals (e.g. environment, health).

For ASFINAG this translates into a new aim at the strategic level of: ‘We provide a safe, high-level road network for Austria’. Especially important for success is the collaboration with the road users. Infrastructural measures cannot compensate for excessive risk taking and careless driving.

In order to integrate these principles into the operating process a reliable database is needed. Only a detailed analysis can reveal the specific needs for, and benefit of, concerted action, and such an analysis also provides the opportunity for setting up realistic goals and economic targets. For this reason ASFINAG started the process by carrying out a detailed data analysis and calculating an ambitious but realistic target, aiming at a 50 % reduction of the rate of fatalities until 2020 by means of an investment of approximately € 300 million per year in measures directed at increasing safety.

Figure 10 – Goals and Mission of ASFINAG

Priorities and measures determined are based on the operational goal, and operational key figures defined and an evaluation processes established accordingly . ASFINAG has set up its own Road Safety Program based on clearly defined targets, definitions, instructions and about 130 measures encompassing 13 priority topics.

Figure 11 – Target areas of the ASFINAG Road Safety Programme 2020

7.2. Methodology of the Catalogue of Measures

All 130 measures will be implemented in four different time periods within the road safety programme:

Figure 12 – Time periods for measures

The following example is presented in order to demonstrate the methodology of the catalogue and to show the principles of the Safe System Approach.

Target area: **1/13 Safety Standards in the Existing Network**
Priority: **Road Safety Inspection (RSI)**

Main facts and target of the measures:

At the regularly conducted safety inspections, potential safety deficits on the existing road network and its surroundings are documented by standardised reviews. The necessary measures will be taken to remove problem areas before any increase in accidents occurs.

The ASFINAG inspection practise is being aligned with the EU Directive “Infrastructure Safety” and the entire network (on simplified criteria) and at least 150 km of the network are (thoroughly) analysed every year, using the new RSI Handbook. The road sections in need of a thorough inspection are subject to a distinct selection process and the results are to be consistently implemented. Employees of the ASFINAG Road Service are trained on the basis of the inspection results in order to be able to better detect emerging problems in their daily visits.
In addition, annual safety inspections are performed and documented by the responsible road surveyor.

Key facts of the measures:

The key facts of each measure are listed in a table as shown below. For basic safety management measures (so-called general preparatory efforts) the following data are neither scientifically nor statistically fully quantifiable:

Injury accidents per year		Basis is the average of 2004 to 2008 (5 years) for each priority	
Fatalities per year		Basis is the average of 2004 to 2008 (5 years) for each priority	
Reduction potential		In percent (injury accidents or fatalities involved) or absolute numbers (on availability: Injury accidents, fatalities, severe injuries, minor injuries)	
Cost	Cost-efficiency	Investment cost and annual expenditure	Cost-benefit analysis (poor [<1], good [1-3], excellent [>3])
Operational goal		**Description of quantifiable goal and time period for the priority**	

List of measures:

All measures are listed in tables such as shown in this example, with a fixed time period for operational implementation.

Start package	Short-term	Mid-term	Long-term	Road Safety Inspection (RSI)
✓	✓	✓	✓	Annual implementation of detailed Road Safety Inspections on at least 150 km of the network
✓				Clarification of the status and use of the existing RSI in fulfilling the EU Directive for Safety Management (in collaboration with the Austrian Ministry for Transport, Innovation and Technology, BMVIT)
	✓	✓		Clear selection process and priority-setting for the road sections under inspection

7.3. Catalogue of Measures

The catalogue of 130 measures represents the core of the Road Safety Programme. Some of the priorities are:

- Safety inspections
- Black spots and Network Safety Management
- Road markings
- Traffic signs
- Grip, lane grooves
- Road restraints: guardrails and median barriers
- Monitoring and inspections of bridges and tunnels
- Winter maintenance
- Vegetation control
- Extension of the network (new construction)
- Improvement of the existing network

- Road Safety Audits (RSA)
- Road Safety Impact Assessment (RSIA)
- Employee Safety
- Research and Development
- Enforcement of traffic laws
- Communication and Awareness Raising
- Motorcycle Safety
- Real-time traffic control
- Emergency action plans
- Tunnel Safety
- Roadwork zones
- Heavy goods vehicle safety

All measures and detailed information on the ASFINAG Road Safety Programme are available under http://www.asfinag.at/en.