

Merging rail and road safety

A match made in heaven?

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A match made in heaven?

Trafikverket (the Swedish Transport Administration) is the agency responsible for all modes of traffic: traffic on roads and railways, on the sea and in flight. We will plan for all modes of traffic for a long time to come.

Trafikverket will also build, maintain, and operate all national roads and railways.

After the start on april 1st 2010 it have been an intensive time for “The Swedish Transport Administration”. Not only is there a new organization for 6.500 employees. But there is also an arranged marriage between two Infrastructure Managers, Road and Rail, each one carrying their own history on how to manage safety.

The history tells us that even though we have been aiming for the same goal, we have used two completely different ways to reach the destination. And even, two completely different sets of responsibilities and powers for the individuals in the system

When it comes to rail, the system itself have had a responsibility for keeping everyone in the system safe. In the road sector a lot of responsibilities have been put on the shoulders of the individuals using the system. But even if a lot of responsibility has been placed on users of the system, Vision Zero, a road traffic safety project that aims to achieve a highway system with no fatalities or serious injuries was established in the late 1990s. A core principle of the vision is that “Life and health can never be exchanged for other benefits within the society”. This has affected the transport politics in Sweden who now says that the design, function and use of the transport system shall be aligned to that no one is killed or seriously injured.

Last year, the number of casualties in the road traffic was the lowest in almost 100 years. The road safety work in Sweden is conducted in a systematic manner and gives any significant operator a way to easily identify what effective measures he should take himself, or in collusion with others, to achieve the goals. The result itself proves that the methods used are working.

We have started to work to identify the targets and indicators for the rail sector. By this, we hope to make it possible to measure effects on different methods and actions more effective in the rail sector.

This paper will show the work done and how the targets and indicators were found but also our planned way forward.

The history of road safety in Sweden

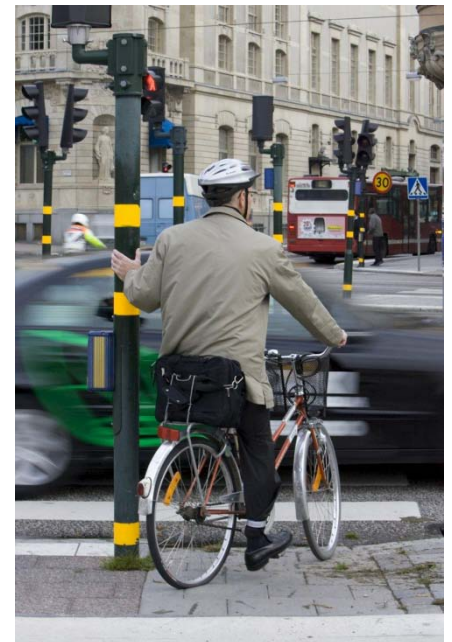
During the latter half of the 1800s the car began to resemble what we today call a car. The pace was leisurely 15-20 km / hr. And at first, when the cars were few and slow, there were no major threat to other road users. But soon the increasing number of cars resulted in an increasing number of cars in traffic accidents. And then came the need for road safety measures. In 1906 the first regulation on automobile traffic was issued, and the driving license was introduced in Sweden under the name "Competency Evidence of Automobile Drivers." Some training was required if someone wanted to obtain it.

In 1908 the motorism called for the first fatal victim in Sweden. In 1923 more than a 100 people were killed in traffic.

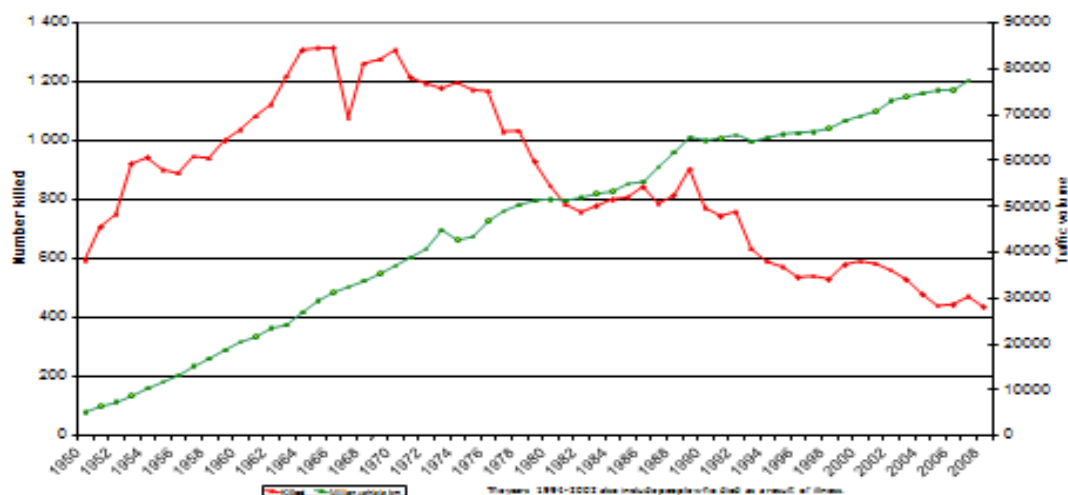
In the early 1920s came the first traffic signs in Sweden and in 1931 the rear-view mirror was made mandatory.

In 1934, motoring was not to stop and thus also increased accidents in alarming degree. In Sweden, there were approximately 195,000 vehicles which caused approximately 10,000 accidents. Motorist organizations and authorities discussed what to do.

In 1951 direction indicators became mandatory. In the late 1950s voluntarily installation of safety belts in cars was proposed. The good idea was curbed some of that there was only two-point belts that were not self-adjusting on the market, which was perceived as difficult.



Number killed in the road traffic in relation to the traffic volume



In 1967 Right-hand traffic was introduced in Sweden. And it is also in the 1960's that the number of fatalities in relation to traffic volume starts to decrease. If this is the result of right-hand traffic, safer cars or/and the use of safety belt have never been analyzed.

In 1975 a law was introduced that required the use of the safety belt in the front seat.
- Who wants to sit strapped into a car! Some skeptics commented, when the pros and

cons of seat belts was debated. . Full-scale crash-test convinced most of the population, of the benefits of seat belts.

In 1986 a law on the use of seat belt in the back seat from 15 years of age was introduced. And then in 1988 all age limits were abolished, when a law requiring children to be belted in the car was introduced.

Vision Zero - Working together for road safety

Vision Zero - the vision of zero deaths and zero serious injuries in road traffic - was adopted in 1997 as Parliamentary long-term vision for traffic safety for all transport modes.

Road safety in the spirit of Vision Zero means that roads, streets and vehicles must be much more adapted to human capacity and tolerance. The responsibility for safety is shared between those who design and those who use the road transport system

This vision is not an objective but still gives us an incentive when taking decisions on objectives.

When Vision Zero was first introduced it represented a whole new way of viewing the problems concerning safety in road traffic – including how those problems should be solved.

Vision Zero emphasises that the road transport system is an entity in which the different components such as roads, vehicles and road users must interact in order to ensure safety. Never before has there been this kind of overall perspective.

Vision Zero alters the view on responsibility. Those who design the road transport system bear the ultimate responsibility for safety: road managers, vehicle manufacturers, road transport carriers, politicians, public employees, legislative authorities and the police. It is the responsibility of the individual person to abide by laws and regulations. Prior to this, practically all the responsibility had been put on the individual road user.

Vision Zero is composed of several basic elements, each of which affects safety in road traffic. These concerns ethics, human capability and tolerance, responsibility, scientific facts and a realisation that the different components in the road transport system interact and are interdependent.

The Vision is also based on the ethical standpoint that no one should be killed or seriously injured for life in road traffic. The only acceptable figure for the number of fatalities and serious injuries in traffic is zero. The moral basis of Vision Zero means that views on safety within the road transport system must correspond to safety values in society at large. For example, it is obvious that nobody should die through an accident at work or in connection with rail, sea or air travel.

Mistakes should not be punishable by death. The road transport system is not adapted to the fact that people sometimes make mistakes. There is no perfect human being. In road traffic it is all too often a case of simple mistakes being punished by death. The work conducted on road safety in compliance with Vision Zero is based on doing everything to prevent road deaths or serious traffic injuries. While effort is being made to prevent accidents, the road transport system must be designed from the realization

that people do make mistakes and that traffic accidents can therefore not be avoided completely. Vision Zero can accept that accidents occur, but not that they result in serious human injury.

Each year an analysis of the road safety development on the basis of data on selected road safety performance indicators is conducted by analysts from the Transport Administration, Transport Agency, VTI (Swedish National Road and Transport Research Institute) and Traffic Analysis. The analysis aims to make a forecast on whether the interim target will be achieved or not based on the current pace of development.

In 2010, Sweden had the lowest number of road fatalities relative to population size.. Last year 266 people were killed on the Swedish roads. This is a record, which places Sweden as the best country in the world when it comes to the number of deaths relative to population size. The number being the lowest for over a 100 years.

Extensive toolbox

To conclude you can say that the road system is basically an unsafe system with a lot of responsibility on the individual user (even if the current development is enhancing the responsibility of the system manager). To deal with this situation the road sector have developed an extensive tool box to be used when setting objectives, decide on effective actions, and ensuring that these activities is relevant and will be possible to reach. Our belief is that this tool box also can give the rail sector an effective way dealing with many of the remaining risks.

The history of rail safety in Sweden

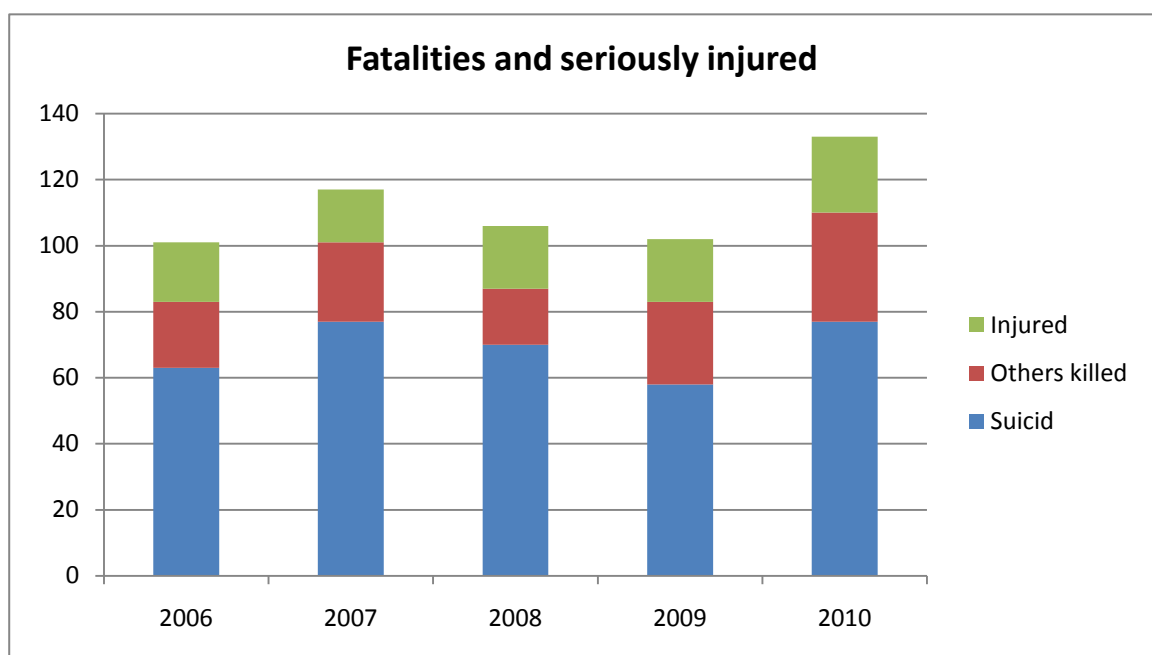
As this in many aspects is a known and shared history, we will deal with it rather comprehensively. The rail operations in Sweden started 1849. The mayor line was built by the state-owned operator/infrastructure manager and the branch lines by private companies. That meant that the mayor part of the network (app. 70%) was built by private companies.



1939 there was a parliament decision that the state should take full responsibility of the railway system, even if the procurement of private lines had already began earlier. This was then the case until 1988 when the Swedish Rail Administration (Banverket) was founded with responsibility as Infrastructure Manager. Gradually the operations was open for competition until today when it is free both for passenger and freight transport. And the 1st of April 2010 the new merged Swedish Transport Administration was founded.

The railway system, was from the beginning built to be safe, even if the meaning of what this meant has shifted over the years. From the beginning it was emphasis of rules and personal responsibility, just as was the case in the road sector. But by learning from the different experiences, i.e. by accidents, the need of building technical systems to help the staff to take correct actions emerged. With the huge physical energy that is the hallmark of the railway system one person is not enough of a barrier against accidents. This has lead to the development of line blocking systems, ATP and all the other technical systems that is part of the modern railway system of today.

This means that today we have almost eliminated the classical train accidents but still there are app. one hundred fatalities per annum. They are mainly accidents with one or few individuals, i.e. suicides, persons hit by train, level crossings accidents, etc.



The Engagement - The safety policy of the Swedish Transport Administration

Late summer 2010 a large number of people, working with safety on both road and rail traffic within the Transport administration, met. Their task was to jointly discuss issues about the characteristics of a safe road and rail system. The results of the day formed the basis for the Transport Administrations Safety Policy.



The Swedish Transport Administration shall live up to the demands and expectations of our employees, customers and society, that we have a safety culture that supports a safe and secure transport system. Our vision is that "everyone journey is smooth, green and safe". By this we mean that there is transportation in a simple and effective way

throughout the journey and that we have a sustainable and energy efficient transportation system, and of course that everyone should be and feel safe in any parts of our transport system.

Vision Zero will guide our safety. Transport safety and security is a prerequisite for the traffic to work effectively, with good accessibility and that our systems are reliable. Good safety means that we will achieve both real and perceived safety. Our goal is that there are no serious injuries or deaths in the transport system or in our workplaces, and that damages and losses are minimized.

Everyone has a responsibility for safety. We see safety as an integral part of all our activities. Everyone has a responsibility that the work carried out is done with safety that is equal to the risks and consequences.

The Transport Administration regards safety as a collective term for the areas of rail safety, road safety, electrical safety, information security, emergency preparedness, security and crime, protection from hazardous substances and fire.

We are continuously improving our safety. And we do this in cooperation with all our colleagues in the transport sector and the surrounding community. We strive to be a learning organization that effectively prevents accidents, injuries and losses and increase safety for our employees and customers. In our safety work we seek a holistic approach in which mankind, technology and organization shall function well together and where the Transport Administrations safety work is systematic and integrated into the management system.

This policy covers all our activities, including activities of external actors on behalf of the Transport Administration, as well as products and services procured by the Transport Administration.

This document is part of The Swedish Transport Administration's safety management system for railways. At a revision of the document the regulatory authorities' observations need to be obtained before it is decided. See special rules for the management of the safety case.

The safety policy was decided by the Executive Board in April 2011 and by the Board in June 2011.

Our Safety policy should guide all work within the Transport Administration. But it still remains a major work to introduce and implement it in all 6,000 employees so that it permeates our work and we are able (and allowed) to put safety first.

Setting goals, targets and indicators in the road sector

After failing to reach the target for 2007, a maximum of 270 fatalities, an evaluation was made. The evaluation suggested a combination of reasons why the interim target was not achieved. Primarily the failure was due to the implementation of too few effective

measures. According to the evaluation, the target lacked firm foundation. And it was set without consultation with or commitments from involved parties. The goal also failed to provide sufficient guidance to all the stakeholders in planning their own activities.

A proposal was then made to the stakeholders in the road sector of a system of management of objectives that is based on cooperation when drawing up interim targets, more measure-related interim targets and annual result conference where road safety developments and target achievements are evaluated. The aim for this is to create long-term and systematic road safety efforts.

To create cooperation in the work with drawing up interim targets the OLA methodology was used (OLA=Objective data, List of solutions/actions, Addressed action plans). The basis of the OLA methodology is the participation of all involved parties. OLA methodology comprises three stages: analysis of objective facts relating to the problem, investigation into what can be done to solve the problem, and finally what stakeholders intend to contribute to solve the problem.

Another lesson learned was that more action-related interim targets were needed. This is understood to mean indicators that help stakeholders to identify measures that can contribute towards changes in conditions states of the transport system that are necessary to achieve the targets for the number of fatalities and seriously injured.

In order to coordinate and streamline our work, we use an approach based on that we constantly measure and evaluate our efforts to see what works and what needs to be improved. And perhaps most important of all - we spread knowledge to each other and the outside world.

Setting goals, targets and indicators for the rail sector

The railroads essence is characterized by the fact that there are powerful forces in motion, the movement is on the rail, and it takes only a relatively small amount of energy to implement transport. The main reason for the latter is that the friction between wheel and rail is small. That gives the disadvantage that braking distances are extremely long. In short, it means that the train cannot ditch or slow down for obstacles coming in its way. The physical force is very high also at a low speeds. It provides that the risks normally need to be handled by reducing the probability of the undesired event.

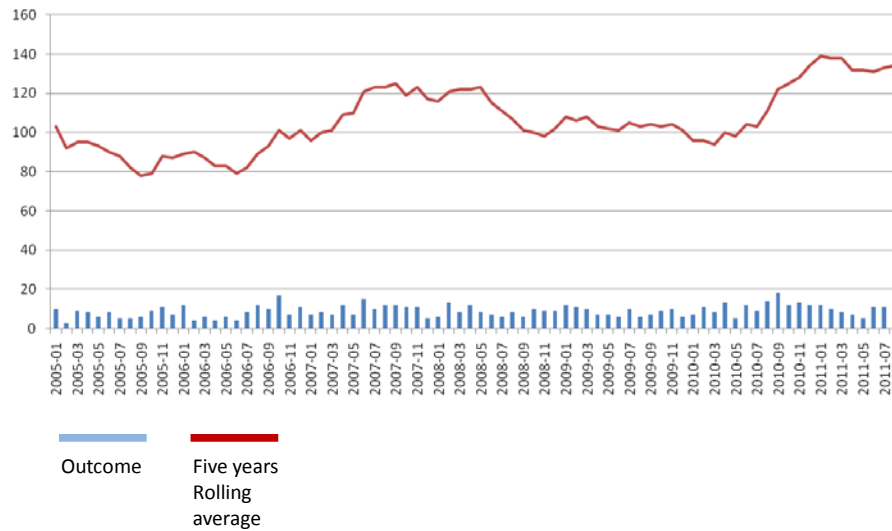
There are great similarities between the situation the road sector faced in 2006 and the situation in the railway sector today in terms of management by objectives. Even if these activities are structurally different it is reason to believe that the use of a similar method on the management should give a positive development also to the rail sector.

A new project regarding rail safety

The Transport Administrations safety target for rail has been short and simple.

The number of deaths and serious injuries should be reduced.

Dead and seriously injured - rail



In December last year the outcome was that we should not meet the objective of reducing the number of fatalities. It was also obvious that there was not enough emphasis of the process of setting objectives and finding effective activities to reach them. Therefore the Director General decided on a project to improve this.

The task is that until June 1st 2012 propose a model for setting and measuring objectives regarding rail safety based on the existing model regarding road safety. The proposal should also take into consideration how to deal with areas of common concern between road and rail.

There are the following intermediate objectives:

To have an impact catalogue (i.e a catalogue on what theoretical impact different activities will have on reducing fatalities and serious injuries) including indicators (i.e what are relevant indicators to measure and manage by)

A structure on how to measure and analyze the outcome (including improvement of measuring techniques), as well as follow up of the effectiveness of the activities

The indicators shall, as far as possible, be independent from the activities (i.e they shall primarily measure if or not we are reducing the fatalities, not if we have done the activities). Alternatively indicators measuring what can be considered a “safe system” can be used. This also gives a possibility to gradually increase the demands on the “safe system”. This is done by the road sector for example regarding crash worthiness (EURO/NCAP).

Establish a group to ensure participation from relevant stakeholders. All the work shall be done in close cooperation with these stakeholders.

Establish a yearly conference to present and discuss analyses and evaluations of the outcome.

The trippel zero Vision - 000

When we scrutinized the railway system from a safety perspective the idea of triple zero arised. The bearing thought for this being

If we have a railway system where

- no trains can derail
- no trains can collide with another train
- no unwanted and unauthorized objects in the track area

The idea being, that if we have zero derailments, zero collisions and zero unwanted objects in the track area, we have “triple-zero” and no accidents will occur.

Thus, also said that in relation to other stakeholders the railroad should be a closed system. It can be described as made above in the so-called "triple zero". However, we are far from it in reality and even if the vision can be a beacon for sustainable development, there are a number of points of conflict between the railway and other actors. These conflicts against the desired state will be processed in a processing chain.

The headings in this shown in the table below, in the table, you can also see some examples of indicators and targets.

Processing chain, broken into a number of examples of milestones and state indicators for the Transport Administration.

Organization	Action	Traffic system			Society
Performance-measurement	Action/ action quality	Operational conditions	State target (here is the milestones, for example the one for Visio Zero)	Dimension (state indicators)	Society impacts / consequences
Business planning Plant Design (internal regulations)	Station Design CCTV Fencing Platform Doors	Area: Impact due to unauthorized objects in the track area	0 traffic where unauthorized track access is possible	Percentage of vehicle mileage that is secured against unauthorized objects in the track area	Major potential to reduce the number of fatalities.

Business planning Plant Design (internal regulations)	Build flyover Close level crossings	Area: Level crossings	0 traffic that crosses over the rail on the same level as the rails	Proportion of traffic that crosses the rail on flyover	15 fatalities annually (new definition).
Urban Planning (Avoid demographic barriers / obstacles) Business planning Plant Design (internal regulations)	Mandatory consultation with concerned parties Risk Analysis Construction of the "safe site"		Pending that all level crossings are grade separated the existing level crossings is to be as safe as possible	Percentage of traffic at a level crossing that are as safe as can be	
Business planning Plant Design (internal regulations)		Area: Un authorized track access	All rail traffic is safe from unauthorized track access	Proportion of train-km, which is safe from unauthorized track access	Annually 80-90 fatalities. Train delays corresponding to a "half-Snow chaos" every year only on suicide (60-70% of events).

The wedding

Starting out with two completely different backgrounds we can see today that we can and shall learn from each other's experiences.

We have already learned that rail can give a lot of knowledge on how to build fail safe systems dealing with potential catastrophic accidents.

Road can give a lot of experience on how to deal with frequent accidents with limited consequences.

Will there be a golden wedding (conclusions)

We see that the merger have a good potential of learning from each other. Strengths and weaknesses complement each other. The above described project is a good example on this. Nevertheless we still are in an early stage and there are numerous unbeaten track paths to wander along. Therefore it is much possible we will come back with further presentations on coming conferences.

This paper, and our presentation is about the project in the current status. We will conclude the project next summer and hope that we can come back and report the outcome at a future IRSC conference.

Some things that might be of interest



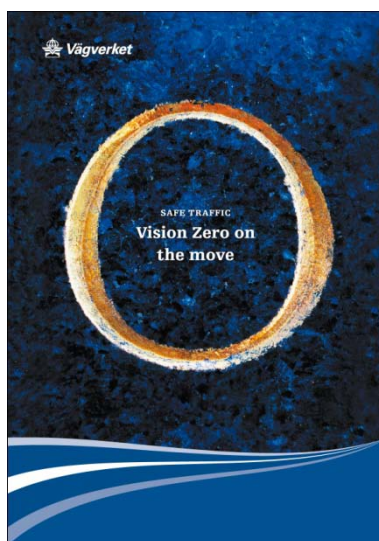
Management by objectives
for road safety work
Stakeholder collaboration towards new interim targets 2020

SUMMARY

Management by objectives for road safety work - stakeholder collaboration towards new interim targets 2020 - summary

This is a summary of the proposal for new interim targets for road safety in Sweden which the Swedish Road Administration has delivered to the Ministry of Enterprise on the 1st of April 2008.

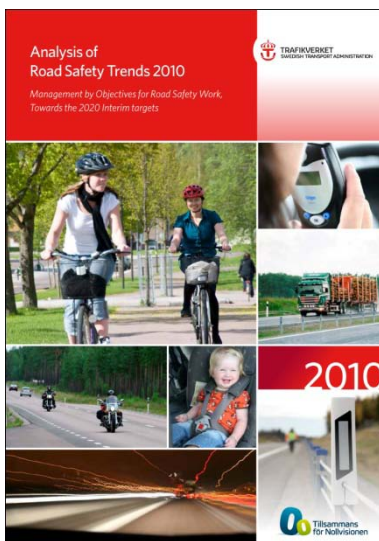
http://publikationswebbutik.vv.se/upload/4253/89217/management_by_objectives_for_road_safety_work_stakeholder_collaboration_towards_new_interim_targets_2020_summary.pdf



Safe traffic - Vision Zero on the move

Road safety in the spirit of Vision Zero means that roads, streets and vehicles must be much more adapted to human capacity and tolerance. The responsibility for safety is shared between those who design and those who use the road transport system. Since Vision Zero was established in Sweden there have been fewer people killed on roads

http://publikationswebbutik.vv.se/upload/1723/88325/safe_traffic_vision_zero_on_the_move.pdf



Analysis of Road Safety Trends 2010

Analysis of Road Safety Trends 2010, Management by Objectives for Road Safety Work, Towards the 2020 Interim targets.

http://publikationswebbutik.vv.se/upload/6340/201118_analysis_of_road_safety_trends_2010.pdf



OLA

According to Vision Zero, the system designers the ultimate responsibility for safety on our roads. System designers are businesses, governments and organizations with their work can contribute to traffic safer.

The approach OLA means that we are trying to solve problems together.

The approach OLA has been launched by the then National Road Administration and is a systematic actor- and action-oriented approach for improving road safety.

The acronym OLA stands for objective facts, solutions and intentions.

http://publikationswebbutik.vv.se/upload/6136/100362_it_must_not_happen_again_ola.pdf