Can societal collaboration prevent railway suicides?

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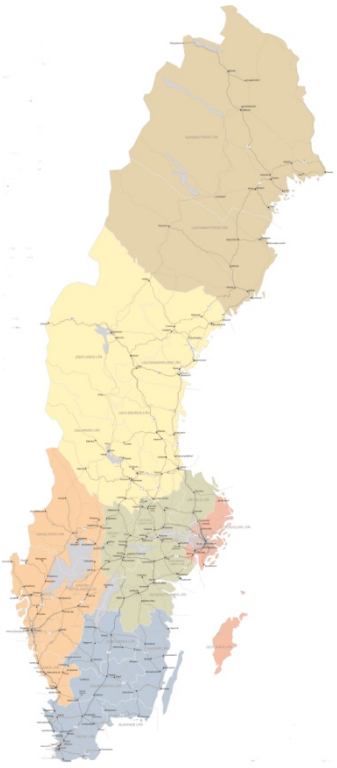
SUMMARY

Every year a number of fatal accidents occur in the railway system. Most of these fatalities are due to suicides. To prevent these unwanted accidents the railway sector needs to take a responsibility for their system and look into what preventative measures that can be taken.

Since October 2011 the authors has been a part of the EC project RESTRAIL (REduction of Suicide and Trespass on RAILway property). RESTRAIL is a project with the goal of finding the most effective measures to prevent suicides and trespass accidents. One of the promising measures found in RESTRAIL is about collaboration between local authorities when there is a threat of suicide or trespass in the system. This measure will described how it is in progress in the southern part of Sweden. The participants in the project are the regional police authority, the regional rescue services, the emergency call center, the regional psychiatric health care and the transport administration (Trafikverket). When there is a report to either of the stakeholders of an unauthorized person is in the track area, an immediate traffic shutdown is requested. All of the involved parties are informed and meet up at the scene to perform search and rescue.



BACKGROUND

The Swedish Railway system

The Swedish Transport Administration is responsible for long term planning of the transport system for road, rail, maritime and air transport, as well as for the construction, operation and maintenance of state-owned roads and railways. It is our job to ensure efficient, safe and sustainable travel and transportation for industry and private citizens alike.
The Swedish Transport Administration's duties also involve strategic and operational customer work, research and innovation, collaborations for effective crisis management and international work.
The railway network in Sweden consists of 16.500 km of railway line and The Swedish Transport Administration is the infrastructure manager for 14.700 km, the waste majority, about 80 % is electrified. We also manage 11.400 switches and there are 560 stations for boarding and alighting.

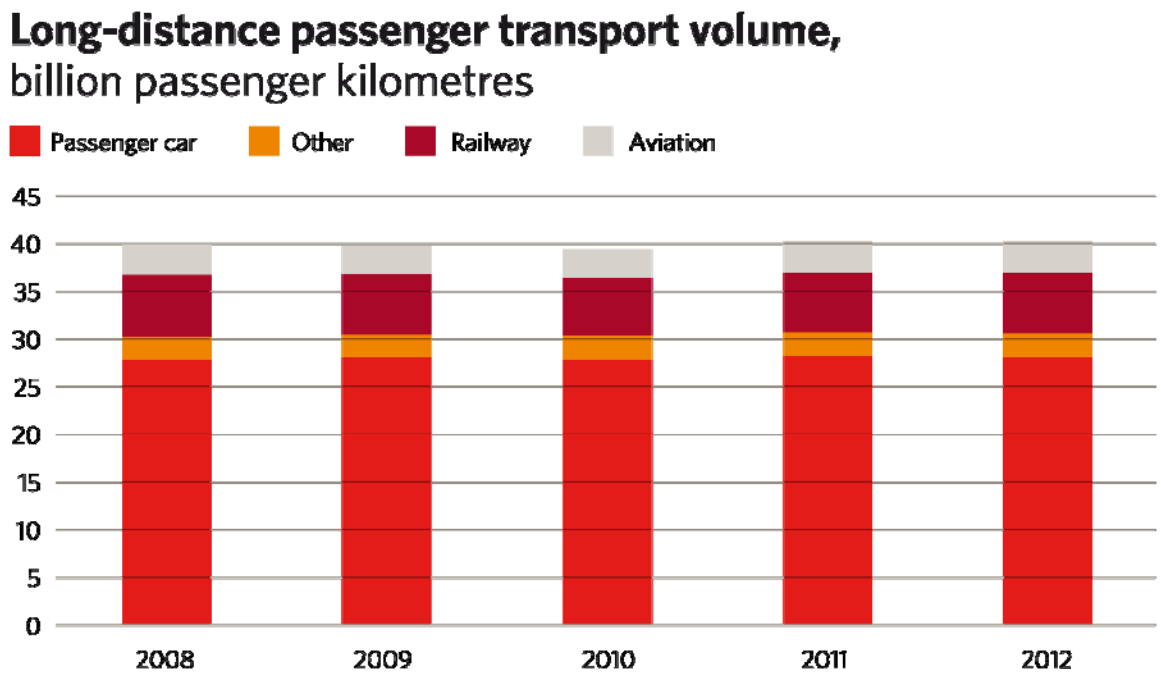


Figure 1: Long-distance passenger transport volume *(1)*.

Long-distance railway transport volume amounted, preliminarily, to 6.3 billion passenger kilometres for 2012. Traffic volumes for passengers on the public railways amounted to 99.4 million train kilometres in 2012.

50% less fatalities in the railway system by 2020

The Swedish Transport Administration's goal is that the number of fatalities occurring on the railway system will be halved between 2010 and 2020. This means a reduction from 110 fatalities in 2010 to 55 in 2020. In 2012, it is estimated that 97 people were killed on state-owned railway tracks and 16 were seriously injured. The number of fatalities and serious injuries has remained unchanged over the last ten years.

Suicide

Suicides in Sweden

In Sweden, the annual number of suicide cases amongst persons aged 15 years or older is approximately 1,378, if uncertain cases are also counted (2). This means that about 17 out of every 100,000 citizens in our country die as a result of suicide every year. That is more than five times as many as those who died in road accidents during the year 2010 or as if three passenger ferries that cross the Baltic Sea would sink. The number of suicide cases has gradually declined over the last 30 years, with the exception of the youngest age group, 15-24 years old.

In a report from The Swedish National Institute of Public Health 2010 the theory is that the major reason behind the numbers of suicides in the youngest age group is the high numbers of unemployed in this age group. In this report concludes that in this age group, there has been a pronounced deterioration in mental health (3). Several investigations show a two-fold incidence, or more, of symptoms such as unease, anxiety, dejection, sleep disorders and hospital care to treat depression or self-harm. This deterioration has been particularly distinct since the middle of the 1990s. Mortality among young men ages 16 to 24 has also shown an unfavourable development in this period of time. It is possible that similar factors affect both the increased incidence of mental health problems and increased mortality among young men.

There is data that indicates that the school system does not function optimally and that this may have a negative health impact on young people. School results are getting worse and a growing proportion of young people leave the 9th year of compulsory school without qualifications to enter upper-secondary school. Even fewer are qualified for college or university studies after upper-secondary school. Also**,** young people's integration into the labour market is problematic since youth unemployment in Sweden is among the highest in the EU in terms of relative unemployment, which compares youth unemployment to the general unemployment rate. The problems in the school system, as well as the difficulties for young people in getting a job, probably contribute to their mental health problems.

In many societies, suicide is a taboo subject that we prefer not to talk about. A common misconception is that there is no benefit in trying to prevent people from taking their own lives because they will only make another attempt later. But actually, that has only proved to be true in a very small number of cases.

Research shows that about 90 per cent of those prevented from committing suicide die much later in life and of causes other than suicide (4).

Railway suicides

Approximately 7 per cent of suicide cases occur within the transportation system, all transport modes (road, rail, maritime and air transport) included. In the rail system, suicide is the overriding cause of death. Between 60 and 80 suicides occur every year in the Swedish railway system (around 70% of all fatal accidents annually). This indicates that the railway system alone account for approximately 5 per cent of the total number of suicides each year.

A train is unable to swerve, and its braking ability is limited (large mass, high speed and low friction between wheels and rails). Suicide attempts in the railway system almost always have a lethal outcome in Sweden and Europe. The railway suicide often provides a clearer indication of intent than for example road suicide (persons who jump in front of trains or who sit, lie, stand or walk on the rails without any attempt to avoid the train).

But still it is not always possible to be sure whether it is a case of suicide or not. The main reason, though, is that both suicide and trespass accidents have the same consequences and that the preventative measures available are essentially the same, but can also be contradictory. This gives us the indication that we need to prevent unauthorized access to the railway system.

A further reason for focusing on measures against unauthorised access to the railway system is the "essential requirements" set out in Annex III to the European Interoperability Directive (2008/57/EC). It is therein required that "appropriate steps must be taken to prevent access to or undesirable intrusions into installations" and that "Steps must be taken to limit the dangers to which persons are exposed, particularly when trains pass through stations."

It should also be noted that most pedestrian collisions in the railway segment occur in areas where there is a rail capacity shortage. The fairly lengthy traffic delays that are the result of these incidents further exacerbate the capacity shortage. A follow-up that was carried out a few years ago indicates that there could be as much as 450 minutes of train delays for each pedestrian collision. Steps taken to prevent pedestrian collisions (including suicides) will therefore also contribute to meeting the strategic challenges of "well-functioning travel and transportation in metropolitan areas" and "robust and reliable infrastructure" (5).

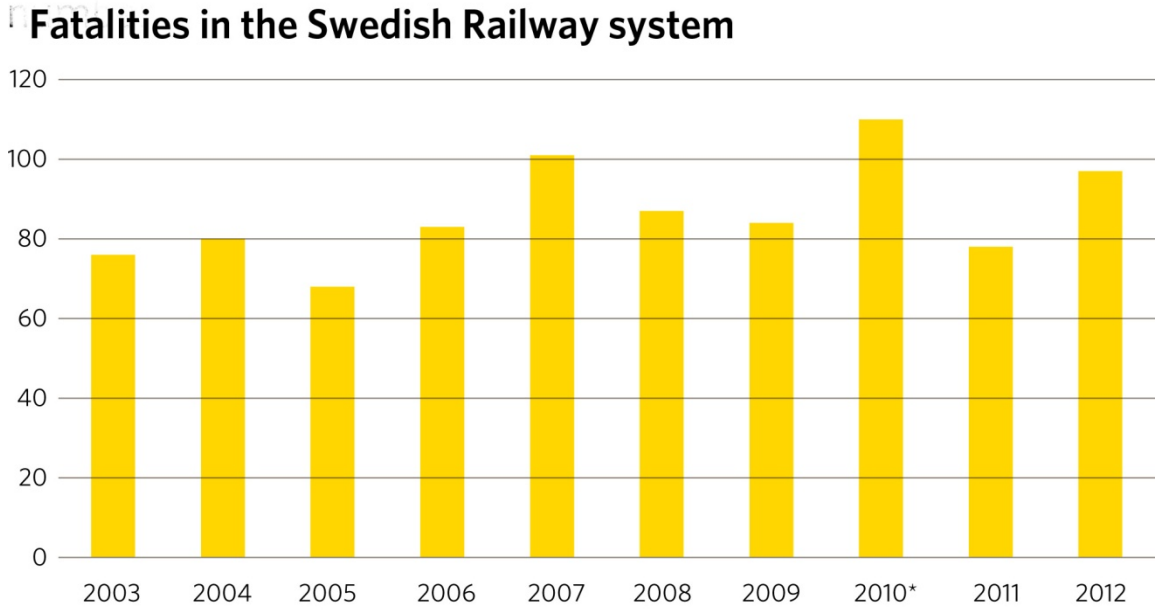


Figure 2: Fatalities in the Swedish railway system *(1)*.

Railway accidents and suicide in Europe

In 2011, railway safety continued to improve across the EU, with 1 032 significant accidents resulting in 1 183 fatalities and 1 032 seriously injured. The number of accidents has been decreasing considerably over the past five years; the casualty numbers have seen slight, close to uniform reductions over the same period.

Level crossing users are the only category of third-party/external victims for which the number of causalities has seen a reduction over the past five years; yet this reduction was less significant than the reduction in road casualties over the same period.

The number of suicide and trespasser fatalities has not seen any significant reduction over time. In consequence, while suicide and trespasser fatalities accounted for 84 % of all fatalities in 2007; their share

has increased to 90 % in 2011. External victims, i.e. suicides, trespassers and level crossing users accounted for 98 % of the railway fatalities in 2011 (6).

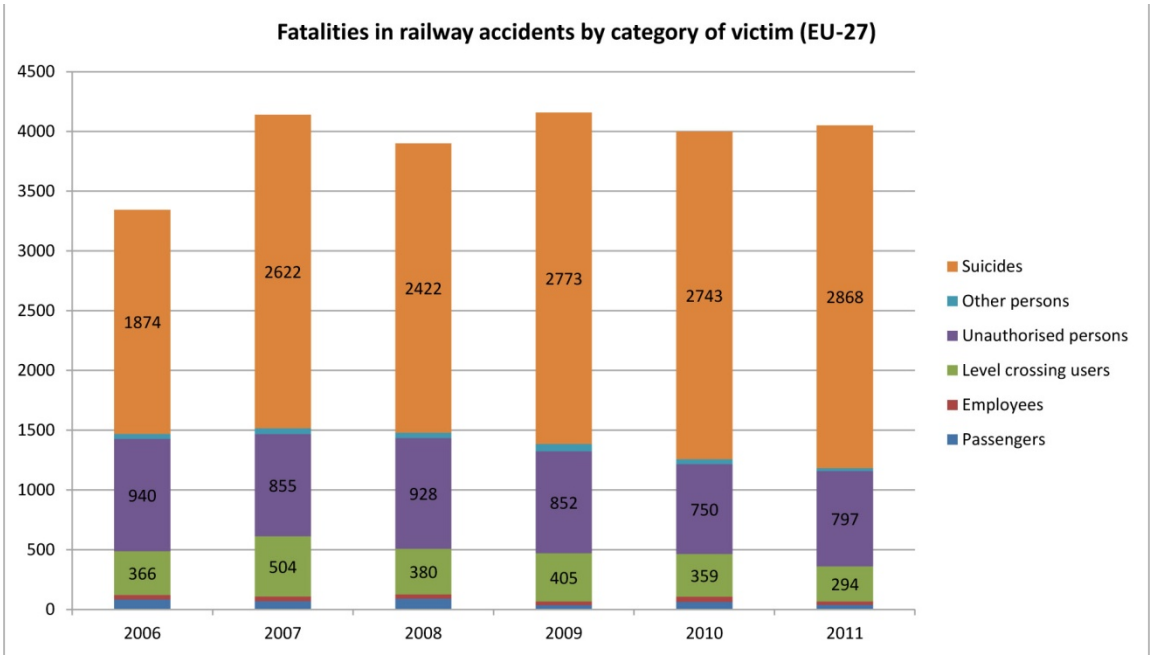


Figure 3: Fatalities in railway accidents *(6)*

Research about railway suicide and trespass

"In the last 45 years suicide rates have increased by 60% worldwide. Suicide is among the three leading causes of death among those aged 15-44 years in some countries, and the second leading cause of death in the 10-24 years age group" (7). Research on suicide prevention and trespass has been performed in several countries. This research usually describes the situation from a country perspective; where-when-how collisions take place and some facts about the victims e.g. (8-21). Research is also conducted in psychiatric field, then from the perspective of providing care at the right time of underlying psychiatric disorders or substance abuse and dependencies. Similarly, there is research about how to educate physicians and other key individuals on effective ways to prevent suicide (22). Additionally there is a lot written about how to reduce access to lethal means and methods of suicide e.g. prevent jump from bridges (23).

Changes in the railway environment can be a successful way to make the railway less attractive and less available as a method. Actions can be divided into categories based on how the measures influence the suicidal process for the victim. This method is based on the idea that the actions of one person is seen as a process over time, starting with the victim's suicidal thoughts and then go into action, choosing the location and positioning themselves on the track. This categorization of measures is as follows:

- Measures reducing the attractiveness of railway as a means of suicide
- Measures obstructing the accessibility to the track area
- Measures influencing the victim's determination while awaiting train
- Early warning systems, enabling the train to brake sufficiently or the victim to be removed before collision
-Measures to make the collision less violent and thereby less fatal and injurious (24).

RESTRAIL

RESTRAIL (REduction of Suicide and Trespass och RAILway property) is a 3-year project that started on October 1st 2011. The project is co-funded by the European Commission's FP7 Programme. There are seventeen different partners in the project from 12 different countries ranging from infrastructure managers, railway undertakings, universities to research institutes. The aim of the RESTRAIL project is to reduce the occurrence of suicides and trespasses on railway property and the costly service disruption these events cause, by providing the rail industry with an analysis and identification of cost-effective prevention and mitigation measures.

The RESTRAIL project have been divided in workpackages, where the most cost-effective measures to prevent suicide and trespass are discussed and evaluated in different ways

- WP1 Quantitative analysis of suicides and trespass on railways properties
- WP2: Assessment of measures targeted to reduce railway suicides

- WP3: Assessment of prevention measures targeted to reduce railway trespass
- WP4: Mitigation of consequences by improving procedures and decision-making
- WP5: Field tests and evaluation

The outcome of the first four workpackages is now the input for the field tests in WP5. The assessment of the different measures have categorized them as promising or recommended. One of the measures categorized as promising to prevent suicide was a project conducted in Skåne, the south of Sweden.
This project is called “Societal collaboration to prevent railway suicide and trespass”. The evaluation of this project will also be the field test for Sweden.

Societal collaboration to prevent railway suicide and trespass

A model for collaboration

This project is based on experiences from another Swedish region, Jönköping, who began collaboration under threat of suicide ten years ago, 2004. The model shows how different stakeholders should act on threats of suicide (25). Involved parties in this collaboration are emergency services, police, ambulance and rescue services. They cooperate and act together to stop suicide attempts when someone is acting to take their life outdoors. Since the cooperation involves threats of suicide outdoors, it may also be jumping from bridges, the threat of drowning, jumping from high buildings etc. A number of Swedish laws support this proactive way of work. The psychiatric care is also an important stakeholder and every “saved” person is submitted to them. Based on the experiences from the stakeholders in Jönköping, this way of cooperation and acting together has been spread to other regions, including Region Skåne, the host of our filed-test.

Previous ways of preventing trespass and suicide

The Swedish law have ensured the railways liability for trespass and suicide accidents for several years. During the past decade, the view has changed gradually and rail industry now sees that they can and should take more responsibility for these matters. Among other measures, camera surveillance was introduced on several different locations in Skåne. The first cameras were used in a station area to prevent graffiti and damage to signals and other equipment. Security guards, trained to work in the railway area, responded to the alarms. As a side effect, it was also discovered, that these guards saved several suicidal persons detected by the cameras. Monitoring through cameras have since then been a part of the preventive measures against unauthorized track access in Sweden (and other countries).
Almost all railway infrastructure managers have put up fences to prevent unauthorized access to the railway, but it have seldom been evaluated to see the effect over a longer period of time, or how it has affected other parts of a rail link.

Purpose

The main purpose of our field test is to describe the collaboration between the societal stakeholders to stop and prevent the suicide and trespass accidents, but also to see the effects of the measure.

Methodology

Information and statistics will be retrieved from the Transport Administration different data base's holding accident statistics, accident investigations and reports. The field test will describe the work and evaluate as far as possible based on existing material and reports of the parties involved.

The collaboration in Skåne

Skåne county, the area for the this study have elements that are both densely populated with high frequency of train services but also less populated areas. Malmoe is the third largest town in Sweden, with two of the major rail lines from Sweden to the European continent going through.
In this collaboration, the major measure is that the train traffic is adapted to prevent collisions. If an unauthorized person is detected in the railway system a temporary traffic shutdown ensures the safety of this person, but also the safety for the police and rescue services, the ones that are conducting the search and rescue.
The initiative for this collaboration was initiated by the police. Working together to prevent an accident, often advocated as a necessary measure, is in practice not always easy. Mostly because involved parties have different organizations governed by different laws and governing documents and they also have various responsible authorities.
The current collaboration stated as a project in 2009. And it was enforced in practice by September 2012. After the first six months the involved stakeholders agree that this is a good way to work to prevent accidents, and the “project way of working” is now established.
These include cameras in the tunnel in central Malmö that triggers an alarm if someone walks into the tunnels. Similarly, driver alerts dispatchers if they see people in the wrong place. In this way, the railway traffic is alerted and acts to prevent accidents.

Participants in the collaboration

- The Police Authority, always alerted to the threat of suicide, and according laws have the right to act to prevent danger of fatal injury.
- The Emergency Rescue service, provided by municipalities and organized in different unions and smaller operations, divided into 32 units in Skåne. The municipalities have the right to organize these themselves and there is no "national" organization that enacts rules however, there is Swedish Civil Contingencies Agency (MSB), which promotes and develops national guidelines.
- SOS Emergency Service is the organization that first receives an alarm and then alerts out all parties
- The Traffic Control Center is alerted to introduce a temporary stop of the traffic on the identified site
- The ambulance service is dispatched to help with transportation and medical expertise
- The Transport Administrations Accident site manager is called to the site to make sure that the track is safe for search and rescue, but this is also the person authorized to give approval that the traffic may be started again after a traffic stop
- Psychiatric care are informed of threats of suicide and are prepared to receive the suicidal person

Workflow

Any of the involved parties can contact the emergency services and through them request a traffic stop when it is discovered that a person is in the wrong place in the sector, in danger of being hit by a train.
How traffic is affected depends on if the exact location of the person is known. If the exact location is known all traffic is stopped in that area. But if only a larger area is defined the speed of the trains is lowered until a more exact position is received.
The participants in the search and rescue are then gathered on the location to try and find the person who needs help.
If the person is found the ambulance services helps to person to the psychiatric clinic for help. If necessary the police can establish that a person is not fit to take care of themselves and therefore take the person into custody so that they are forced to go to the psychiatric clinic for help.
How the alarms are received and alerted is also an important subject to establish guidelines for. Previously, the governing rules for the emergency services (i.e. fire brigade) said that they could only act on the immediate threat for a person's life. Therefore they would turn back to the station as soon as the traffic was stopped.
In the current workflow the fire brigade have an active role even if the traffic is stopped. They are often the first part on the site, since they have stations in more places than, the police and ambulance services.
It has also proved important that only one of the involved stakeholders, in this case the Traffic Control Center together with the infrastructure managers accident site manager, can decide when the traffic can continue again.
The work of the Emergency Call Center has also proved important. How alarms are received and who is alerted, have shown to be an important task to solve to enable established routines and guidelines. Previously it was not clear how these alarms should be transferred. And they were often they were sent on the attending priest, who maintain confidentiality and are not able to quickly alert others to save the person's life.

The outcome

Preliminary numbers and data from train stops have been delivered from the Polis department, regarding the period August 2012 to May 2013. A number of about 13-18 train stop is executed in this area every month that demand efforts from the police (in total 163 train stop for the period). These are short stops, about 15 minutes, and affect traffic to a lesser extent than an actual accident would, where the traffic might be stopped up to two hours. Of these events there are 66 persons that receive attention from the police and are taken away to psychiatric care for help. 15 people have deceased and 28 traffic stop consider crime like copper thief's, fights within station areas or other. In some traffic stops there was no result and the person that was reason for the turnout has disappeared from the site before polis, rescue service and ambulance have arrived.
Of all public functions that the rescue service have for the period Oct 1th 2012 to May 17th 2013 about 0,4 per cent was according to events in the track area. Some was from accidents (0,1%) that have occurred and some was threat of suicide in front of a train (0,3%).

Discussion

Need of collaboration

The importance of collaborate demonstrates a system and society that reacts when a person can't manage to sort out a serious psychological crisis, and have given up. To prevent serious suicide attempts are significant; since previous research shows that as many as 90% of those that was prevented do not make another attempt (Seiden, 1978). They die of other, nonviolent causes much later in life.
By action with different preventive measures, lives can actually be saved. Research shows that if others than the suicidal take the responsibility for preventing collisions than the suicidal, it creates a greater potential to save lives (Rådbo et al., 2012). Preliminary data from Skåne area shows that 66 persons have been helped to the psychiatric care by the police and if some of these are saved life, this is a prevention action that concrete help people in a very sensitive situation when they need help. There are several places in Europe that use traffic stop if a person tries to commit suicide. The strengths of this approach are that suicidal persons are apprehended and taken into care. The collaboration with psychiatric care is put in place and therefore society's contribution to this kind of life crisis really works.
This collaboration is a good example of a responsible social system that reacts and takes action. It also shows that if society is to take responsibility and act, it takes more than just the drivers braking when he sees person on the track. Because then it is often too late to save lives.

Continued research

There is still a lot of knowledge that can be further investigated in this collaboration. In pipeline now is to interview involved partners and compile each version of this work. If possible it will be valuable to listen to opinion of responsible person at the psychiatric care if they think there are saved life over short time but also in long time. It is also of interest to ask operators in the area how their experience is of several interruptions in the regular train traffic.

Conclusion

Still, there are over all few preventive measures that are evaluated for their efficiency and cost benefit. In this societal collaboration the experience from the involved stakeholder is that this work makes a difference. But it needs to be systematically evaluated. Our involvement in the RESTRAIL-project makes it possible for us to do so as a RESTRAIL pilot test. The first evaluation is in progress and within a year a more distinct result will be analysed and compiled. And we will be able to share this with those who are interested.

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Annex A: Evaluation and guidance from RESTRAIL

Method for evaluation

The first part of work package 2 in the RESTRAIL project was targeted to develop a *Method for the evaluation of measures targeted to prevent railway suicides and trespassing accidents* (Merged deliverables D2.1 & D3.1). Discussions between experts, extended analyses and lessons learnt from participants' experience have revealed and/ or confirmed that for IMs and RUs, suicide and trespassing are problems that are addressed together.
Since this overlapping exists between preventive measures against suicide and trespassing, the developed model takes into account shared and specific suicide and trespassing characteristics. The model also makes it possible to visualize how each stage of the suicide or trespassing processes can be linked to certain families of measures. Several criteria were chosen for the evaluation procedure: (1) durability of effects, (2) costs and benefits (based on expert judgment and not on calculation of the C/B ratio), (3) integration with other policy measures, (4) impact on railway operations, (5) impact on people and jobs, (6) technological issues, (7) environment, (8) acceptance, and (9) transferability issues.
For the working method in Skåne, the evaluation that concluded that this was a promising measure was conducted in this manner.

Evaluation process

The evaluation and assessment of the measure was conducted in three steps.

1. Preparation of background material

Information regarding the implementation the effectiveness was sought and examined by an internal group of experts from WP2 (suicide) and WP3 (trespassing) using assessment forms. Both an assessment based on the chosen critera (durability, cost-benefit, impact on railway operations, transferability to other countries, integration with policy measures, impact on people, technological issues, environment issues, acceptance issues) and separately according to whether they were aimed at preventing suicide or preventing trespassing. Thereafter a calculation and an estimate of the likely effectiveness of the measures in those two contexts were done

2. Assessment by a group of experts

For each family of measures, the likely effectiveness and 11 criteria related to implementation were examined and where necessary re-assessed during an expert group session involving WP2 and WP3 task leaders and expert guests from the advisory group and the rail sector. The session resulted in a preliminary classification of the families of measures using preferences, effectiveness estimates and implementation criteria.

3. Second assessment

Using the collected data and the preliminary classification, a second assessment was conducted with WP2 and WP3 task leaders and sector experts to agree on the criteria thresholds and the principles according to which measures would be classified as "Recommended" or "Promising". In addition, the group concentrated on the practicalities of implementation and the execution of a cost-effectiveness assessment. This phase resulted in a set of recommended and promising measures to be tested in the field test. One of the promising measures was "Societal collaboration to prevent railway suicides".