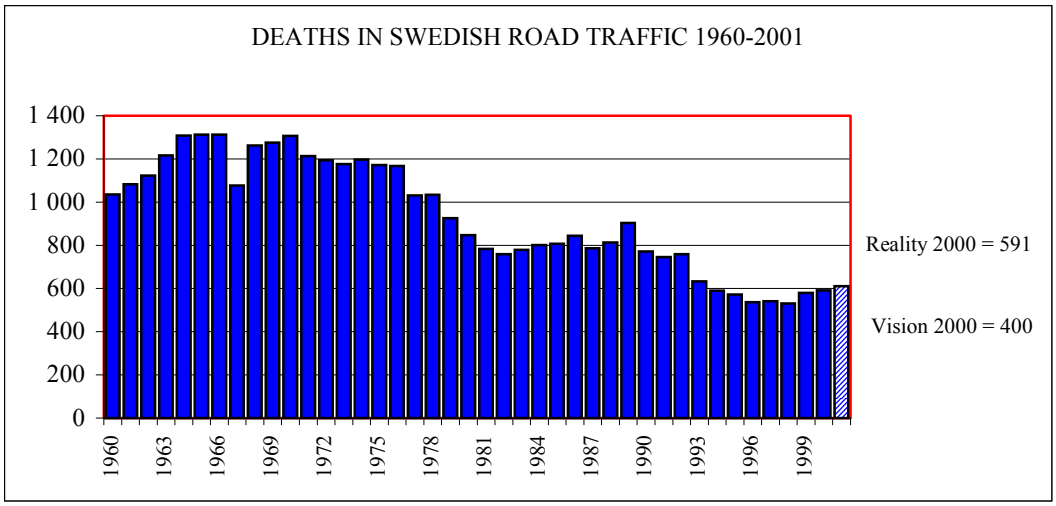
SWEDEN'S VISION ZERO:

THE LEAST MOURNED TRAFFIC CASUALTY



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1 BACKGROUND

This is the first draft of a paper intended as a critical epitaph of Vision Zero and as fuel to the debate of this quite peculiar concept. Several deficiencies in this draft remain and some statistics are approximate. As becoming for a first draft, it is a bit drastic in order to provoke immediate reactions (else these will not arrive in time for the next draft). Unless deemed a path leading to nowhere, a revised text will follow in the fall of 2001. Do not quote this version without a prior check with the author. Comments are truly welcome.

While the author's affiliation and present position as a lecturer for prospective graduate engineers hint a background in engineering, this is not the case. My field of work is economics and political science with a 25-year record of writing papers in the areas of transport, policy, energy and various other issues. A 10-year position as the infrastructure economist of the Swedish Civil Aviation Authority, a few years as a part-time regional airline pilot and a long-standing interest in rail transport issues set the stage for a critical view on the road sector. Still, this is my first paper dedicated solely to traffic safety. Doubtlessly some readers will gleefully recommend that it be the last.

1.1 Scope, limitations and biases

The late Vision Zero, henceforth V0, was a strange component of the otherwise fairly well developed and successful Swedish traffic safety policy. This paper deals with the birth and demise of vision zero and the question whether devices of this sort are of any use at all in the striving for improved road traffic safety. Critics have argued that V0 will not, and cannot, materialize – this paper adds the view that even if it were possible, V0 should not be realized as it would bring about an increase in the total number of avoidable deaths.[1] Finally, the safety potential of a policy affecting the modal split of transport is discussed. For some strange reason this possibility is totally neglected by the V0 proponents and others.

Vision Zero was in all probability a unique Swedish concept. Hence a post-mortem report like this on V0 may be of little interest to the outside world. However, the problem of traffic safety is universal and the question whether ideas of this kind are of any use at all in promoting traffic safety is, hopefully, interesting even beyond the Swedish horizon. Note that V0 included a zero number of deaths as well as severely injured but for reasons of space this paper deals only with the number of deaths. The number of severely injured per death peaked in 1982 with 7.94 and had a through in 1965 with 2.41. In 2000 the value was 6.94.

Several issues have to be left out from the discussion. The one I would be most interested to include is the rather philosophical question of whether the leading proponents of V0

a) truly believed that the vision really would visualize in the foreseeable future,

or

b) if they just considered it a suitable carrot for guiding the ignorant traveling masses in the right direction.

There seems to be no middle way between these two interpretations and the implications of both are gloomy. In the first case, the judgment of the proponents should be seriously

[1] See KFB (2000) for the standard criticism, some of it exaggerated.

questioned regardless of their indisputably crushing merits. In the second case, their views on society and humanity should be regarded with the utmost skepticism – what could possibly justify presenting a clear-cut illusion, which nobody will ever see even dimly beyond the horizon, as an achievable goal? The aim of the paper is not to offend earnest and ambitious researchers so this question is left aside.

1.2 The concept of a vision

The word "vision" is a bit ambiguous in English, meaning roughly 1) visibility; line of sight; 2) an idea about the future; 3) clear-sightedness; 4) the output of a TV set. In Swedish, only interpretation 2 is valid which is something to bear in mind when reading this paper, as V0 was a Swedish concept. Should the Swedish word "nollvision" be *vision zero* or *zero vision* in the Queen's English? Zero vision is an aviation term, meaning that you can see nothing due to fog or clouds. To avoid confusion, the chosen translation in this text is Vision Zero.[i]

Having accounted for the translation, the nature of a vision remains to be explored as this point is crucial for the paper. Most people (this expression is often a euphemism for "I") would say that a vision is to be construed as a goal that cannot be achieved with the best-practice or blueprint methods available today, *but appears possible within the foreseeable future.* A textbook example is the challenge of putting a man on the moon (and bring him back safe, which complicates the task immensely). When introduced by president Kennedy in the early 1960's, it was clearly not possible. The launchers of that time could barely put a small satellite in orbit around the Earth and numerous other complications had to be addressed. Given the immense resources allocated to what became known as the Apollo project, still the task at that time appeared possible in the future and indeed proved so in July 1969. Vision turned into reality. Today, visiting Mars qualifies in theory as a vision but so far the reasons put forward for actually going there form a variety of ignorance rather than the basis of a vision.

- The crucial part here is that *a vision has to be achievable in a not too distant future, else it is not a vision but a dream, whim or caprice* and should be treated accordingly.

Manned visits to the outer planets in our solar system, not to mention other solar systems, do not qualify as visions - there are no methods available, in progress or even envisaged to get us there.[ii] The same holds true for V0.

Finally, as a vision must be achievable within a reasonably foreseeable future, it cannot live forever. To survive even 10 or 20 years, it has to be supported by progress – successive steps towards its final realization. Without such life-maintaining progress, the vision will lose its attraction, petrify into an illusion and die. A prime example of a vision nearly starved to death through lack of progress is power generation through nuclear fusion processes, where little has happened since the late 1950's when such a process allegedly was around the corner. By this we leave the concept of a vision.

1.3 Peculiarities of the Swedish traffic environment

Western Europeans and Americans tend to regard Sweden as somewhat odd in many respects. In this context, suffice it to say that Sweden's population, 8,9 million, is the (quantitative) equivalent to that of Greater Paris or Greater London with an area corresponding to 80 % of

France or 185 % of the United Kingdom at its disposal. The area is 450.000 sq.km. of which some 39.000 are lakes. Population density averages 21 persons per sq.km total area. Due to climate and topography, vast areas to the northwest have less than 1 inhabitant per sq.km. Finland and Norway are even less densely populated.

1.3.1 Road traffic characteristics

The diagram on the front page depicts road traffic casualties from 1960 to 2000 plus a guess of 610 for 2001. Compared to the UK and Western European continental countries, Swedish road traffic has a higher content of interregional travel – few people driving long distances, rather than many people driving short distances. This will probably increase the relative occurrence of serious accidents, as speeds are higher than in rural travel. On the other hand, interregional travel is more susceptible to competition from safer traffic modes - rail and air.

When it comes to lorries, the situation is a bit extreme. Sweden sports Europe's probably heaviest, longest and (to others) most dangerous lorries, allowing a total weight of 60 tons, a length of 25.25 meters and speeds of 80 km/h on ordinary roads and 90 km/h on highways. The traffic is heavily subsidized (i.e. charges on traffic are well below its marginal cost to society) and society also turns a blind eye towards much of the deeply rooted speeding and overloading habits in this trade. In practice, a lorry driver not having a police in sight will observe the speed limit under one of two conditions only: 1) a slow vehicle is in front of the lorry and cannot be overtaken or intimidated into driving on the verge; 2) the lorry is in an upslope. A substantial part of this traffic could be transferred to rail and such a transfer would require little more than a political will.

Long-distance bus travel has historically been detrimental to traffic safety and environment as the bus services have been used to destroy railway traffic, more efficient in both respects, rather than to supplement it. In general, travel distances in Sweden are a bit on the high side for bus travel, making this a mode preferred by students and elderly not willing to pay much for the travel time reductions offered by other modes. Bus traffic is deregulated and in terms of speed limits it appears always to have been so – a long-distance bus observing speed limits is even more sensational than a lorry doing so (probably due to a better power/weight ratio). As a result, the accident statistics for heavy lorries (>3,5 tons) and buses is appalling:

Statistics for 1998		Male	Female	**Total**	*ICD10 number*
Total transportation deaths		422	142	**564**	*XX V01-V99*
Of which heavy lorries and buses					
killing	pedestrians	10	5	**15**	*V04.0, V04.1, V04.9*
	cyclists	6	2	**8**	*V14.4*
	motorcyclists	5		**5**	*V24.4, V24.9*
	car drivers	43	11	**54**	*V44.5*
	car passengers	2	12	**14**	*V44.6, V44.9*
	bus passengers		1	**1**	*V74.6*
	TOTAL	**66**	**31**	**97**	

Table 1-1 Fatal accidents involving heavy lorries and buses

Source: Compiled from SCB (2001), table 4A. ICD = International Statistical Classification of Diseases and Related Health Problems. At the end of 1999, SIKA statistics had 963 tanker lorries, 169,200 flat lorries, 1,500 timber lorries, 6,500 semi-trailer lorries and 14,900 buses in the Swedish register.

The table does not distinguish between lorries and buses but accidents are totally dominated by the former. Neither does the table attribute guilt; in fact this question is of little interest in a V0 perspective. In contrast to the 97 external victims, there were no internal - no drivers of heavy lorries or buses were killed in accidents involving other vehicles, although four lorry drivers and four bus drivers/passengers were killed in other transport accidents (ICD V67.5-V68.5 and V70-V79). Hence the outcome profile of accidents involving heavy lorries and buses is extremely biased to the detriment of their traffic environment.

1.3.2 Rail and air travel

The railway net peaked at 16,885 km in 1938 and was roughly unscathed around 1950 when a period of outrageous mismanagement was entered.[iii] At present, barely 10.000 km retain scheduled passenger traffic but most of it displays high standard. All is Western European normal gauge[2] and some 80 % is electrified. Large parts allow top speeds of 160-200 km/h. The train type X2, marketed as X2000, with 318 seats and a top speed of 200 km/h performs the bulk of the passenger traffic.

Almost all of the railway the net allows axis loads of 25 tons One four-axis freight car will easily take the weight load, if not always the volume, of about 1.9 maximum-size lorries with trailers (75 tons) and one train will easily take 15-20 such railcars, had it only politically been allowed to do so. The blatant neglect of the railway system in the years 1950-1990, and partly thereafter although at least some investments were made in the 90's, clearly qualifies as by far the most disastrous component of Swedish traffic policy. Had the railway net been used more wisely the last 50 years, *thousands* of lives could have been saved. Rail transport is deregulated but dominated by SJ, the state railways. In 1979, an interesting experiment including drastic reductions of fares was implemented, leading to a substantial increase in rail travel. In 1978 a low-fare concept hade been introduced for the domestic scheduled aviation. This led or contributed to an unprecedented decline in road traffic deaths with 27 % from 1978 to 1982. Unfortunately the low-fare concept on rail was killed off around 1987 by a battalion of business consultants, knowing little about transport policy and nothing about accident rates or environmental impacts. After that, the railway policy returned to the high-fare/low-traffic mode earlier proven so pitiably inefficient.[iv]

In November 1987 six passengers were killed in a rail accident caused by a tragic signal wiring error. After that only a few minor accidents have occurred, killing less than 10 passengers totally in the past 14 years. However, there are some fatal accidents among the staff of SJ and a few staff and third-party electrical accidents, some of which fatal. As the focus of this paper is on travelers, these accidents are left aside but not forgotten. For all practical purposes, the *passenger* accident rate of the railways can be regarded as zero. Hence, transferring road passengers to rail will bring about a net accident reduction equal to the average accident load of the affected road traffic.[3]

The domestic airline system, deregulated in 1992, connects 44 airports spread over the entire country including some very sparsely populated regions. In spite of deregulation it is totally dominated by airline SAS and its 25 % regional subsidiary Skyways. In general, prices are "high" compared to taking the car. SAS, Scandinavian Airlines System, is a successful

[2] 1,435 mm (4'8½'') in contrast to the Russian/Finnish/Baltic standard of 1,524 mm (5')

[3] In addition, traffic remaining on the roads would experience less congestion entailing even further improvement of the accident rate.

Danish-Norwegian-Swedish consortium where each government owns 50% of the respective, national parent companies (DDL in Denmark, DNL in Norway and ABA in Sweden). This fact would facilitate an active use of the airline net to reduce traffic casualties, had the political will to do so been present. Traffic volumes grew almost continuously until 1991 when a recession hit. In 200 the number of domestic passengers was 7.9 million; not quite in par with the 1990 peak of 8.7 million. Transportation volume in 2000 was 3.62 billion passenger kilometers.

Scheduled, domestic air services have had only three fatal accidents in modern times: 1964, killing 32 people; 1977, killing 22 and 1989, killing 16. The first two included technology no longer relevant for assessing the accident load. In 1964 it was a Douglas DC3 piston-engine aircraft, unable to cope with the adverse weather around Ängelholm airport. In 1977 it was Vickers Viscount outmoded turboprop where the de-icing system of the elevator proved insufficient on approach to Bromma airport. The 1989 accident was a Beech 99 turboprop stalling on final approach to Oskarshamn airport due to overload. In 1991 a SAS MD80 was brought down by icing north of at Gottröra north of Arlanda, but remarkably none of the 129 aboard was killed.[v] General aviation (private, taxi and training flights etc) kills 5-10 people annually but these accidents are not relevant to this discussion.[4] In the scheduled aviation case with very few but fairly big accidents, two of which involving factors no longer present, it is not easy to determine an average accident load. For this paper however, we could make the same conclusion as for the railways: For all practical purposes, the passenger accident load of air travel can be regarded as zero.[vi] These facts should be used wisely.

Moving freight from road to air is, in contrast to moving it to rail, not a viable option for reducing road traffic accidents. A large proportion of the lorry freight volume cannot be transported in an aircraft and the environmental penalty for such a transfer is appalling. If the specific energy use (kWh per ton and km) is 1 for rail transport, it is at least 5 for lorry transport and more than 100 for airfreight.[vii].

1.3.3 A note on perceived and real risks

As concluded above, the risk level in domestic rail and air traffic is next to infinitesimal while road traffic kills about 600 people annually and severely injures seven times as many. It remains a riddle why these facts do not have a profound impact on the modal split of passenger travel. Several explanations offer themselves but only two will be discussed here.

Number one is the lacking willingness or ability of public media to fulfill its role as objective scrutinizers. In the media reports about accidents, there is a huge bias towards air and rail incidents while road accidents attract little interest. Unless fatal, it will not be noted at all. A road accident involving 1-2 casualties will take the same space in the daily papers as an advertisement for one used car. In TV and radio news it will not be reported at all, unless severe news drought prevail. An accident involving 4-5 casualties will be noted when it happens and rapidly forgotten thereafter, unless it involves the possibility of a new trend like dangerous minivans. In contrast, air and rail incidents (there are rarely any accidents) will be covered at length. A rail incident or derailment, even without any injuries, will prompt the journalist to recall all major rail accidents since Getå in 1918 (the preceding major accident in 1875 may sometimes be omitted). A scheduled traffic incident or general aviation accident

[4] SCB (2001) has 8 killed in 1998 (V95-V97); SOS Luftfart 2000 has 12 in 1999 (of which 8 in one single Piper Navajo accident) and 4 in 2000.

will, likewise, bring forward a list of the air accidents in section 1.3.2 and possibly also the Karlstad accident in 1950. The difference in media interest between accidents on the roads and incidents on rail and in the air has grown out of all proportions. Many people will be given the totally erroneous impression that rail and air transport are dangerous compared to the car. Unfortunately V0 did not improve this situation during its short life and neither the Swedish Civil Aviation Administration nor the state railways SJ is doing anything about it. A search on the CAA website for the word "*säkerhet*" (safety) returns 200 hits but only one refers to the superior safety of aviation and unfortunately it is exaggerated as aviation is claimed to be *the* safest mode of travel. Trains are equally safe and high-speed trains actually superior. In addition the statement is in bad company with severely flawed environmental "information". A search on the state railways website returns no hits at all! In contrast, both administrations have spent large sums on advertising campaigns centered on very far-fetched features.

Number two is the blunting effect. The risk of being killed in a road accident is administered to almost all of us almost every day, but in miniscule proportions which we tend to get used to. Assume 600 annual fatalities affecting 90 % of the 8.9 million population. Now imagine that some superior force beyond human grasp distributed the accidents, and did this on an annual basis *in advance*. On the first of January each year, a list of names of the coming deaths and severe injuries is published. Under these circumstances, the risk that your name is on the death list would be about one in 13,350 on the average (much higher for motorcyclists and a bit lower for back-seat belted car passengers). The risk of being on the severely injured list would be about seven times higher, i.e. at least one in 2000. Now assume that the only way to make really sure that your name is not on the lists is to abstain from all road travel except bus for the whole year. This would probably have a profound effect on the road traffic volume in spite of the *actual* (in contrast to the perceived) risk level being unchanged. If the media could give this picture instead of repeating irrelevant historical air and rail accidents, much would change.

1.3.4 The emergence of lobbycracy

Lobby groups are present in all modes of transport but nothing compares to those of the road sector, sometimes labeled the automotive-political complex. The Swedish Road Union (*Svenska Vägföreningen, SVF*) outstrips all others combined in terms of resources, impudence, flexible approach to truths and facts and contempt for those holding another view. The union staged an unprecedented slander campaign towards the hard-working *Kommunikationskommitten*, which in 1994-1997 prepared a new transport policy. A part of this depressing campaign is still found on the SVF website, where it is also claimed that the environmental problems of road traffic are solved.[viii] Using one of the most inferior consultancy reports seen in the transport sector (where competition in this respect is fierce), SVF even claims that the *electrified* railway Uddevalla-Strömstad should be abandoned in favor of buses and cars. Its more covert actions behind the 1998 transport policy decision have recently been analyzed in a dissertation (Melin, 2000). Kommunikationskommittén was in action for about three years, had 10 members and was assisted by more than a dozen experts. A sigh from its chairman Rolf Annerberg, quoted in Melin (2000, p 177), summarizes lobbycracy in a nutshell: *"...even if it was a big and costly committee, its cost was a fraction of what SVF spent on calumniating its results."*

As regards lobbycracy, V0 aggravated the situation by providing yet another argument to cast concrete and spread asphalt. Normally road construction cost/benefit analyses include the

safety effect at a value of SEK 14,300 (about US$ 1,400) per mill of death risk reduction.[5] As V0 turned a blind eye and a deaf ear towards economics, V0 proponents are forced to endorse all road projects having *any* risk reduction effect whatsoever. This suited the automotive-political complex perfectly.

1.4 Accident statistics

The front-page diagram depicts the development of fatalities the last 41 years. In the early 1990's a substantial reduction was seen but no improvement whatsoever has been recorded for the past seven years. Vision Zero has left no trace at all and the latest development indicates increasing numbers. Note that rolling 12-months averages are permanently on display at www.vti.se. These have shown no improvement since 1994.

Comparing the development to the V0 subgoals offers no consolation. Figure 1-1 depicts the grotesque difference between vision and reality, between talk and (lack of) action. The latest bar shows the death toll from August 2000 to July 2001 which was the worst for several years, 613. Not only did the December 2000 (=year 2000) result of 591 exceed the V0 goal by 49 %; the actual development thereafter is increasing. The 270 figure to the right refers to the December 2007 (=year 2007) objective of V0.

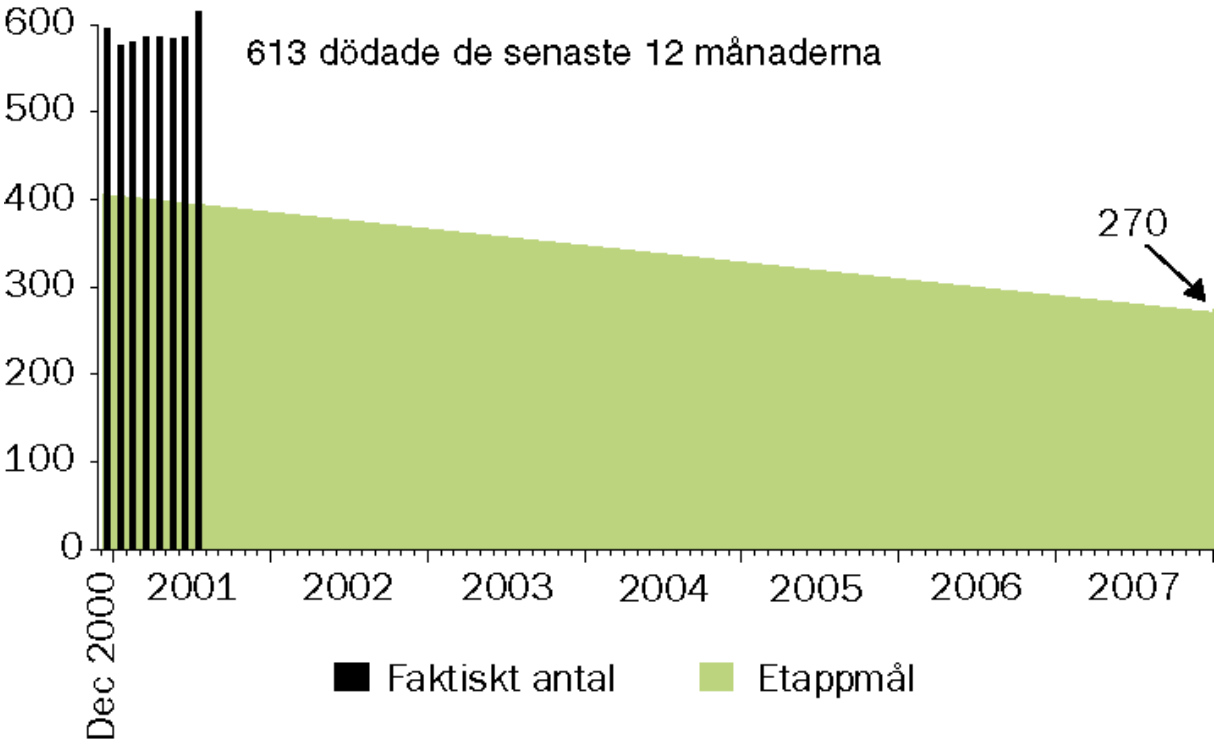

Figure 1-1 Actual development (bars) and V0 (area) as rolling 12-months averages

Source: www.vti.se. Faktiskt antal = actual; Etappmål = subgoal.

[5] All calculation values are found in SIKA (1999).

2 ROAD TRAFFIC DEATHS IN A PERSPECTIVE

This section will apply two different angles on the traffic death problem. For statistical reasons only fatalities are included, however it should never be forgotten that for each traffic casualty there are seven cases of severe injury.

2.1 The epidemic view

Traffic death could be regarded as an ongoing epidemic of long standing. Its pattern of infliction includes maybe 99% of the population, as almost all of us are travelers. Only inmates, the very ill and the very old find themselves protected from the dangers of traffic as they are rarely able to be travelers. Everyone else is in the risk zone. The "road traffic epidemic" has, according to figures not yet double-checked, killed some 65,000 people from (probably) 1911 when the statistics system was revised. Aids has, after its emergence in the mid-1980's, killed less than 1,000 people.[6] The widespread "Asian flu" 1957-58 and the "Hong Kong flu" 1968-70 were rarely mortal but killed a small number of people already weakened by other diseases or old age. By far the biggest epidemic disease, the Spanish flu of 1918-20 killed about 38.000 Swedes out of a population of around 6 million in those days.[ix] This amounts to the 1960-2000 road traffic toll of 38,400. Viewed from this perspective, the road traffic epidemic surpassed the Spanish flu decades ago and will do so by 200% around the year 2010. The figure may have a wide interval of uncertainty; nevertheless it is obvious that road traffic is the by far most fatal epidemic of modern times in Sweden.

2.2 Road traffic vs other causes of death

While the previous section indicates that road traffic death does not get the attention it should have, this is not a rationale for V0-type ideas. Road traffic is not exactly the only cause of death. In 1998, 531 people died from road traffic accidents and 93,100 from other reasons. It is not obvious why we have a V0 for 0.6 percent of the total death toll. In this context however, "natural" deaths should be left aside. Fortunately SCB 2001 has a statistical category much more suitable as a background for V0 (or rather as a shroud for its body).

2.2.1 Avoidable deaths

In the mid-1980's the European Union introduced the concept of avoidable deaths. These are 17 ICD classes where medical or health care efforts can make a real difference. Efficient health care can prevent a disease from ever breaking out; efficient medical care can cure it, mitigate its symptoms or at least delay death. Using standardized data systems, the avoidable deaths concept can be used to compare the situation in various EU states. Sweden uses a modified 21-category list, however some categories like typhoid fever, whooping cough and measles normally have no fatal outcomes.

As pointed out in KFB (2000) and other references, an ethic justification was provided for V0: *"It can never be ethically defensible that people are being killed or severely injured when moving around in the road traffic system."*[7] The first reaction to this claim is "of course"; at second thought the question arises whether there are *any* activities in society where the contrary applies. While it could be argued that the statement above may be a bit less valid for

[6] 29 cases in 1998 (ICD B20-24).
[7] Unauthorised translation of the statement in KFB (2000), p 11.

activities where people willingly take a great risk, like mountaineering or deep-sea diving, these possible exceptions are insignificant in the number of accidents. Consequently, the allegedly sublime ethic principle behind V0 becomes confusing: is it "ethically defensible" that people die from any of the causes given in Table 2-1?

Avoidable deaths in 1998	**Deaths** total	of which 1-74 group	**Lost years** 1-74 group	**Year per death**	*ICD10 number*
Medical care indicators	**20 092**	**2 863**	**27 915**	**9,8**	
Stroke	10 480	1 924	16 617	8,6	*I60-I69*
Diabetes	1 563	528	6 285	11,9	*E10-E14*
Hypertonia	629	108	870	8,1	*I10-I15*
Cervix cancer	143	93	1 671	18,0	C53
Asthma	228	67	874	13,0	*J45-J46*
Cronical rheumatic heart desease	164	47	283	6,0	*I05-I09*
Tubercolosis	102	28	121	4,3	*A15-A19, B90*
Gallstone etc	193	24	300	12,5	*K80-K81, K83.0*
Abdomen hernia	77	12	149	12,4	*K40-K46*
Hodgins desease	39	11	385	35,0	*C81*
Appendicitis	22	9	69	7,7	*K35-K38*
Pregnancy complications etc	14	7	256	36,6	*O00-O99*
Osteomyelitis	20	4	31	7,8	*M86-M87*
Respiratory organ deseases*	6 418	1	3,5	3,5	J00-J99
Health care indicators	**4 315**	**2 875**	**41 591**	**14,5**	
Lung cancer	2 909	1 752	18 944	10,8	*C34*
→ Some automotive accidents, approx.	*(500)*	494	14 126	28,6	*See SCB 2001 app 3*
Liver cirrosis	557	430	6 514	15,1	*K70, K73-K74*
Gullet cancer	349	199	2 007	10,1	*C15*
TOTAL	**24 407**	**5 738**	**69 506**		

*) considered avoidable only in the 1-14 age bracket

Table 2-1Avoidable deaths and lost years in 1998

Source: Compiled from SCB (2001), tables K and 4A. Note that table K in this publication is erroneous, revised and additional data have been provided by Annika Edberg at Socialstyrelsen.

The column "lost years" is a feature included in the avoidable deaths concept. It is assumed that if not killed by the factors in Table 2-1 the victim would have lived until the age of 75. The column gives the total number of lost years in the population aged 1-74 (92% of the total), as determined by the number of deaths and the age of the victims in each category. As can be seen, the automotive category does not hold a unique position, neither in terms of total deaths nor in the number of lost years.

While neither the number of deaths nor the volume of lost years could justify a V0 for road traffic alone, the number of lost years per death could do so. For the relevant road accidents it is almost 29, i.e. the average age of the road victim is around 36. However, if we lean on this criterion, we need to do away with the 18 cases of Hodgins disease and pregnancy complications first. Unfortunately there are several other causes of death surpassing road traffic.

2.2.2 Other aspirants to V0 status

Some causes of death not included in the previous section may still be considered as clearly avoidable. To begin with, 1,944 people died form non-transportation accidents. External factors not constituting an accident accounted for another 1,839 deaths. These 3,783 deaths in 1998 are distributed as shown in Table 2-2. For this paper it is sufficient to look at the suicides which, at 1,229, amounted to 230 % of the 531 road traffic deaths. The number of lost years for the 1-74 age bracket, where 1,041 suicides occurred, was 49,000, i.e. 350 % of the 14,126 recorded for road traffic. Average age in the 1-74 bracket was around 47 years so the number of lost years per death equals that for road traffic, 28.[8] Hence suicide is in every respect as qualified a candidate for a V0 as road traffic. This is even truer if we confine the discussion to the 1-49 age bracket where the number of victims was 549, in parity with the road traffic toll of 531. Here the average age was 35 and the number of lost years per victim consequently around 40. So, if society can accommodate only one V0, suicide should be its target.

External causes of death 1998, non-transport	**Deaths**	***ICD 10***
Suicide	1 229	*X60-X84*
Non-specified	826	*X58-X59*
Falling accidents	480	*W00-W19*
Unclear injuries	312	*Y10-Y34*
Smoke, fire, heat	144	*X00-X19*
Suffocation	137	*W75-W84*
Poisoning	129	*X40-X49*
Drowning	111	*W65-W74*
Late effects of accidents etc.	108	*Y85-Y89*
Assault	98	*X85-Y09*
Medical complications	90	*Y40-Y84*
Non-living mechanical forces	54	*W20-W49*
Cold, lightning, avalanche	47	*X30-X39*
Electricity etc	11	*W85-W99*
Bites etc	4	*W50-W64*
Police actions	2	*Y35-Y36*
Hornets and bees	1	*X20-X29*
TOTAL	**3 783**	

Table 2-2 External causes of death, non-transport

Source: Compiled from SCB (2001), table 4A. Categories are somewhat ad hoc.

3 BIRTH, LIFE AND PASSING OF VISION ZERO

3.1 Genealogy

Major traffic policy decisions have been passed by the parliament in 1963, 1979, 1988 and 1998. On the 3rd of September 1967 the nation switched to right-hand traffic and general speed limits were introduced in June that same year.[x] The standard operating procedure is the establishment of a parliamentary committee, producing reports and suggestions although no committee precluded the 1979 decision. Suggestions are accepted, rejected or modified by the government and summarized in a proposal to the parliament, where further modification may occur before the final decision. All four decisions have favored road traffic in one way or another while only the 1979 decision, later set aside by the consultants mentioned above, entailed a real boost of rail traffic.

From a traffic safety point of view, in particular the 1963 policy decision was a disaster as it brought about the uncontrollable growth of road traffic in general and lorry traffic in particular. It also meant an unparalleled waste of transportation resources as a large part of the

[8] Calculations are made from SCB (2001) table 4A under the assumption that the mean of each 5-year age bracket can represent the entire bracket. A more refined calculation may alter results by a few percent

railway net was abandoned and its traffic transferred to road. As a result road traffic deaths exceeded 1,300 in 1964-66 and 1970. Had it not been for the drastic reduction of traffic pace and volume brought about by the switch to right-hand traffic and the accompanying low speed limits (40 km/h in urban areas and 70 elsewhere, now 50 and 70-110), the 1967 death toll would probably have exceeded 1,350. In spite of this rather appalling situation, the vision zero idea did not emerge until the mid-1990's. Prior to this, the Parliament adopted a policy decision in 1982 with, i.a., the following content:

- The total number of fatalities and severe injuries shall decrease continuously
- The accident risk shall decrease continuously for all traffic categories

These decisions were confirmed by the Parliament in 1988 and 1993 and was also, by and large, underpinned by the long-term accident trend. As can be seen on www.vti.se, this positive development ceased in 1994 and has not returned. Nevertheless, V0 was adopted by the Parliament in October 1997. The essence of V0 is that

- in the long run, the number of fatalities and severely injured by road traffic shall be zero.

In addition, two subgoals were added. In the year 2000, a maximum of 400 dead and 3,700 severely injured should be allowed. From the 1997 point of departure, this implied a drastic reduction of fatalities from its 1996 level of 537 but only a minor reduction of the 3,837 severely injured.

3.2 Life, decline and demise

These stages can be lumped together as there is not much evidence to indicate that V0 ever had a life. This is all the more surprising as the development from 1997 on clearly indicated that V0 was not on its way. Still, nothing was done to turn the development, which should be borne in mind when assessing claims that V0 will be able to reach the year 2007 subgoal of 270.

Even more alarming is the latest development, indicating *increasing* accident rates. Standard prevarications include "traffic volume has grown" and "we have entered a business boom". These explanations are pathetic and embarrassing. Traffic growth has been the normal state since 1945 and a boom so far has followed every business recession. V0 was launched unconditionally, not with a set of reservations like "provided zero growth" or "if the country never again enters a boom". However, something should be learnt from these prevarications. If traffic growth and business booms are major drivers behind increasing death tolls, then we should strive to place road traffic in a state of zero growth and a permanent recession.

After a protracted period of malnourishment and crippling illness, V0 passed away by the end of 2000 when its explicit subgoal of 400 casualties was blatantly exceeded by 49 %. As with any other celebrity, some fans will claim that their object of worship is not really dead but only temporary disabled or hidden and that a resurrection can be expected soon. However, V0 should not have been born in the first case and is now best left to rest in peace, allowing resources and actions to be shifted to areas where a difference can be made. Ten years from now, V0 will probably be regarded as a most bewildering but temporary deviation from normal scientific standards and methods. V0 was not petrified into an illusion - it was born one.

4 SCENARIOS FOR THE FUTURE

4.1 Make-believe scenario

This scenario is simply more of the same sort - a lot of talk and little action. A large number of extremely qualified people have invested a lot of prestige into the late V0. It was born or at least baptized by an impressive and competent committee, Kommunikationskommittén, so possibly a congregation of equal splendors is necessary to establish its demise. The powerful automotive-political complex, most notably the deplorable lobby organization SVF, has a vested interest in picturing road traffic accidents as a disappearing, solvable problem. As a result, there is a substantial risk that many people will not recognize the V0 demise but continue to claim that it is alive, a success and on the road to fulfillment. At worst, this could go on to the year 2007 when the next subgoal, 270 casualties, is due. A reduction with 56% from the 613 casualties recorded August 2000 – July 2001, only a miracle will materialize this goal. Hence the years until then will see all kinds of prevarications, trumped-up excuses, subterfuges, claims that only a delay has occurred, re-definitions of "zero" and any other embarrassing rhetoric necessary to cover up the fact that V0 died years ago.[xi]

This scenario is gloomy, not only because a lot of people will be killed in accidents that could have been avoided with a more powerful scenario but also because it's other effects on society. The concept of V0 will attract more and more ridicule and scorn as accident development makes its futility more and more conspicuous. V0 proponents will find their credibility and professional authority increasingly called in question. This is very bad as traffic accidents really constitute a major problem and we really need our experts to be fit, willing and able to cope with it; not browbeaten by a futile defense of a cause already lost.

4.2 Resurrection scenario

Is V0 really dead or only apparently dead? At age four, it has not indicated any signs of life, but in theory resurrection could be possible. This would require the year 2007 subgoal, 270 casualties, to be fulfilled or at least only near-missed. As 2001 will be a lost year with around 610 casualties, such a development would require an annual reduction of 12.7 %. While such a development is possible, it would require a determination which V0 has already proven totally incapable to muster. A vision that for five years has proven unable to bring about any reduction whatsoever will not produce such an improvement for six consecutive years. Only 1967, due to the right-hand traffic reform, 1990 and 1993 have seen reductions of that magnitude. Hence the resurrection path is not feasible. V0 is stone dead, not apparently dead.

4.3 Extension scenario

Now assume that V0 was alive and had proven to be an effective policy tool. Then the obvious question arises why this marvelous approach should not be applied to all areas where it could make a difference. Let's have a V0 for all avoidable deaths in section 2.2! While this idea has an inherent appeal, it suffers from the same flaws as the late V0 for road traffic: It is hardly possible to come to zero or even close for most of the categories, save where the number of deaths is very low like Hodgins disease or cervix cancer. For most other categories, more drastic reductions of their toll involve increasing and soon astronomical costs per saved life.[9] As resources are limited, this will mean less resource available to the non-avoidable

[9] See Ramsberg and Sjöberg (1996) for examples.

deaths (accounting for 4/5 of the total). Hence the death toll in these categories will actually increase (they are not *that* unavoidable) and we are back in the insoluble dilemma shadowing all vision zeros: Economics cannot be defined away as the resources of society are limited. This fact is, in passing, established in SCB (2001, p 10) where the declining trend in avoidable deaths between 1987 and 1998 now is broken, in all probability due to the senseless budget cuts in the 1990's.

4.4 Constant reduction scenario[10]

As the closing down of V0 is inevitable, it should be done now while the credibility of the involved experts is only scratched, not years from now when it may be beyond repair. Inverting the previous scenario, the constant reduction alternative implies less talk and more action. The first thing to do in this scenario is to abandon V0, leave it to the political scientist to find out how this idea could ever gain a footing and take the steps necessary to prevent any recurrence. Possibly this retreat will require some verbal smokescreens. The goal should be redefined as the annual reduction of traffic deaths with at least X every year, where X should be at least 10 %. Increasing traffic volume should not be accepted as an excuse for failure. If traffic growth is not compatible with the goal, then the growth should not be allowed to happen. Following this redefinition of the objectives, the following steps should be taken:

- Implement all policy measures intended for V0 (there is nothing wrong with these, save a few exceptions, but they will not bring about a zero accident rate).

- Reduce the demand for road traffic. There is an array of fiscal and administrative tools at hand for this purpose. One suitable policy tool is to redirect investment from demand-increasing, like highways, to safety-increasing like improvements of existing infrastructure, railings etc.

- Introduce zero tolerance towards the now widespread over-loading and over-speeding of lorries and buses. All required equipment is there but the political will is not.

- Reduce the allowed length, weight and speed of lorries. As a first step 18 meters, 45 tons and 70 km/h should be applied.[xii]

- Improve the competitive positions of safer traffic modes:

    - Reduce rail passenger fares for all distances by 50% to start with. A more sophisticated fare system should be developed thereafter.
    - Reduce rail cargo fares by the same proportion and give the rail combi alternative (lorries on trains) a real chance.
    - Reduce long-distance air fares with a suitable proportion. This is a more complicated task than for the railways, but far from impossible.

- Make safety the prime marketing feature of air and rail:

    - Provide, and distribute, correct statistics.
    - Establish a public website where you can compare risk levels, not only fares, for all domestic travel citypairs.

[10] The author would welcome anyone's cooperation in elaborating this sketchy section.

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5.2 Websites

Swedish Civil Aviation Administration:	www.lfv.se	
Swedish State Raiways:	www.sj.se	
Vision Zero (non-official site):	www.nollvisionen.com	
	www.vti.se	
Swedish Road Union:	www.vagforeningen.se	(skepticism recommended)
Swedish Institute for Transport and Communications Analysis:	www.sika-institute.se	

6 NOTES

[i] As a sidetrack comment, it should be pointed out that "zero vision" makes taking off with an aircraft impossible regardless of aircraft and airport equipment. Landing is possible at the very few airports – a handful in Europe but none in Sweden - equipped with the category IIIc instrument landing system, provided that the aircraft carries the corresponding equipment and the crew is properly trained. Only the biggest airlines find the cost justified.

[ii] The closest star is Alpha Centauri some four light-years away but it has no solar system. Man-made space vessels require at least 20.000 years to cover one light-year.

[iii] "Mismanagement" refers to the remarkable feat of reducing the passenger kilometer volume from 6.7 billion in 1947 to 6.4 in 1996. A modest annual growth of 3% would have been quite possible and would have resulted in 29 billion pkm in 1996.

[iv] The consultants managed to reduce the passenger kilometer volume from 6.69 billion in 1984 to 6.35 in 1990. These years were a business boom.

[v] The accident investigation report clearly reveals that this accident could have been a major one, killing all aboard. However, even if that had happened, the accident load per person kilometer for the period 1989-2000 would still be vastly superior to that of road traffic!

[vi] A complication frequently overlooked is that airports are located remotely compared to railway stations. Consequently, air travel contributes to road travel to a much higher extent than does rail travel, possibly to such an extent that it should be charged with 0.5 – 1% of the annual road traffic accidents. This possibility is left aside in this paper.

As a literal sidetrack comment, the rail connection between Stockholm city and Arlanda Airport, 41 km away, provides an interesting example of impressing railway technology and most of the transport policy mistakes found in the economist's textbook. The railway opened in 1999 but is a separate business entity and profit center, not a part of the state railways. Consequently the fare level is very high (US$ 14, one way), the trains are not compatible with the rest of the railways, passengers on SJ trains to Arlanda are discouraged by a surcharge and there is no cooperation whatsoever between the Arlanda trains and the extensive suburban rail traffic of Stockholm. While the trains are far from empty, the infrastructure capacity use is probably below 30%.

[vii] A Swedish mega-sized lorry loading 40 tons will, at best, use 5 liters of diesel fuel per 10 km. To carry the same load by air, an Airbus 300 is required, using an average of 138 liters of jet fuel per 10 km (calculated for a 1500 NM trip from it's operating handbook). Both fuels hold 9.6 kWh per liter, Consequently the specific use will be 5*9.6/40 = 1,2 kWh per 10 tonkm and 138*9.6/40 = 33 kWh per 10 tonkm, respectively. A train hauled by an RC electric engine will use, roughly, 70% of its installed effect of 3800 kW hauling a 1200 ton load at 90 km/h. Specific use will be 3800*0.7/(1200*9) = 0,23 kWh per ton and 10 km. These calculations are a bit rough but refinement will not change the basic picture.

[viii] According to SVF the environmental problem has been solved a long time ago as this part of the website has not been updated since September 1996.

[ix] The Spanish decease had a strange pattern of infliction as it posed the greatest relative danger to, roughly, the 20-40 year age bracket. Many of the victims had barely survived World War 1, which made the decease all the more tragic. Medical research seems to lack a clear explanation to this property of the decease and no research can be performed as the virus is extinct, save the possibility (brought forward now and then) that it may have survived in victims buried in permafrost regions like Spitzbergen. Other parts of Europe were devastated by the war and its population more susceptible to the decease. All in all about 20 million people were killed in Europe, more than the total toll of WW1, hence the Swedish relationship between Spanish decease and traffic victim is not valid outside Sweden.

[x] While few people would dispute the wisdom in turning right, the 1963 decision to do so nevertheless left an eternal bad taint. The 1955 referendum on the issue, overridden by the 1963 decision, resulted in 83 % voting for retained left hand traffic and 16 % in favor of a change.

[xi] Regrettably this dismal process seems already on its way. According to newspaper reports from the recent Tylösand conference, the subgoal appears to have been redefined to around 350 in the year 2013 including the 40-50 dying from disease or natural causes while driving. As regards these fatalities, some would argue that V0 pertains only to accidents and hence could be regarded as fulfilled when the death toll is down to these 40-50. This however is not the case. Drivers dying from natural causes will frequently cause accidents to other travelers and as some of these will be killed or severely injured, V0 must include also the natural casualties.

[xii] The spinal reaction to suggestions like these is that reduced length, weight and speed of lorries would increase the number of lorries. This is true only under the strange assumption that the volume of freight is exogenous or God-given and not determined by relative transport costs which, in turn, are heavily influenced by lorry capacity.