

Costs of investigation versus flow in accidents

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Every now and then it (unfortunately) happens that parts of some major roads in the Netherlands are stuck. Last Monday the Rotterdam area came to a standstill, mainly caused because a truck on the Van Brienoord bridge crashed through the guardrail. Diesel was spoiled on the road which needed to be removed. Yesterday many drivers in the Apeldoorn/Deventer/Zutphen area were looking at the rear lights of their predecessor because a truck transporting gas cylinders had caught fire near a gas station on motorway A50. On 9 September, the region around Den Bosch halted after an accident. In the case of an accident (and on 9 September) it often happens the police shuts down the road for technical examination so the liability can be established and claims can be settled. The result is predictable: massive traffic jams. Closing down a road is logical from a legal perspective. But is it as logical as we look at it from asset management perspective? Shouldn't the police in such a case first make a cost / benefit analysis, and if financially beneficial clear the road as quickly as possible without conducting investigation? Traffic jams with associated downtime costs can then be avoided and we could agree that the insurance company pays all directly involved immediately (irrespective of liability), where the total additional payments will be taken into account in the insurance premiums. A higher insurance premium thus offset by lower costs for society. Smart?

We're conducting a cost / benefit analysis on the basis of the accident of 9 September. We take a look at the downtime costs and the ability to reduce these cost (benefits) and compare these benefits with the damage of the cars involved in the crash and injuries (costs). We also take a short look at the uncertainty of the figures and then draw a conclusion.

On that September 9th at 6:17 there was an accident on the motorway A2 from Den Bosch to Utrecht. There were two cars and a truck involved. In addition to property damage, there were unfortunately two people wounded. The police decided to conduct a technical examination with large traffic jams as a result. Three of the four lanes were closed. Before we look at the costs involved, first some facts.

At 6:30 on the traffic jam on the A2 was 6 km and at 8am even 17 km. On the adjacent A15 the jam was 3 km (because traffic that wants to proceed on to the A2 towards Utrecht stops) and on the detours it was even worse: the A59 from Den Bosch to the west contained 9 km of congestion and the following route (A27 in the direction of Gorinchem) 11 km. On 9 pm the A2 was released again (an hour earlier than expected) and the traffic jam on the A2 shrunk to 14 km. However the A59 contained over 19 km of slow traffic, and the traffic jam had the same length on the A27. An hour later, the A2 was empty again, but the A59 and A27 still contained 16 and 7 km respectively¹. Meanwhile Rijkswaterstaat (the road asset manager) asked people who still had to make the trip to postpone it or to go traveling in a different way. It is clear that the quality of the function is not so good for the users of the road. That led to substantial direct effect costs.

Some parts the A2 contains 3 and other parts 4 lanes (for simplicity we assume 3,5), the other motorways contain 2 lanes. Now imagine that every kilometre of traffic jam contains 120 cars² and that one hour of traffic jam costs 26,25 euros per car. The results of the cost of the accident are shown below³. For simplicity the downtime costs are calculated as an average of two consecutive periods.

¹ De Stentor, 10 September 2014

² For figures refer to <http://www.kennislink.nl/publicaties/file>

³ <http://www.nrc.nl/carriere/2013/06/17/uurtje-in-de-file-kost-2625-euro/>

Time	Length of traffic jam (km)					Av.	Time (min)	Length x time	# cars per km	# lanes				# cars				Total	Av.	Time (min)	# x time	Downtime costs (on basis of 26,25 per car per hour)	
	A2	A15	A59	A27	Total					A2	A15	A59	A27	A2	A15	A59	A27						
6:30	6	0	0	0	6	23	30	690	120	3,5	2	2	2	2520	0	0	0	2520	7590	30	5692,5	€ 149.428	
7:00	17	3	9	11	40	46	60	2760		3,5	2	2	2	7140	720	2160	2640	12660	13830	60	20745	€ 544.556	
8:00	14	0	19	19	52	37,5	60	2250		3,5	2	2	2	5880	0	4560	4560	15000	10260	60	15390	€ 403.988	
9:00	0	0	16	7	23	11,5	60	690		3,5	2	2	2	0	0	3840	1680	5520	2760	60	4140	€ 108.675	
10:00	0	0	0	0	0	0	0	6390		3,5	2	2	2	0	0	0	0	0	0	0	0	0	€ 0
																							€ 1.206.647

This shows that the downtime cost nearly 1,2 million euros. Now normally there is also some delay at this time on the A2 towards Utrecht, so the cost of extra downtime is somewhat lower (4 km on average so about 200.000 euros). If due to the rapid release of the motorways there would be 'only' 4 km of extra traffic jam, then the benefits are roughly 800.000 euros.

For the cost of direct damages, we can only guess, but I will try anyway. Suppose that the two cars were fully destroyed (for ease an average of 25.000 euros each⁴) and 50.000 euros additional cost for the truck. As indicated there were two casualties with hospitalization. In 2009, the cost of a serious injured person in traffic were almost 281.000 euros⁵. We take 600.000 euro due to injury into account. The direct damage is about 700.000 euros, so this is about the same as the benefits.

Now in this calculation there is quite some 'uncertainty'. What about the duration of the closure (in this example was the A2 released an hour earlier than expected, but in reality the traffic jam on the A59 was not resolved until around 12 o'clock⁶), the number of cars in the regular congestion on the A2, the cost per car in traffic, direct consequential damages (value of the cars involved, what is the damage of the cargo for trucks), not to mention the personal injury. The benefits vary roughly between 3 tons and 1,3 million. The direct damage varies even more strongly: if the medical costs are lower than expected, then these are at least a ton and in case of permanent disability a few million.

It is clear that an agent can not see the effect of the decision to be made. At the time of closing the agent does not know both cost of the accident as the cost of closing down the road. Even in this extreme case the calculation example shows that the downtime costs and the cost of the direct damage are at the same magnitude, but that there are many uncertainties in the figures. How an agent under these circumstances can take a defensible individual decision is completely unclear. That means a generic rule should be created. Because the damage costs are probably higher for many accidents than the congestion costs⁷, my first impression is that the policy to close a road and conduct an investigation into the cause is the most sensible.

But whether it is always most sensible, it can be demonstrated after some research (on which I'm curious about). The steps needed to create a generic rule we have described earlier, just as the application of that rule⁸. Until that time, but also afterwards, I especially wish everyone an accident-free trip.

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⁴ <http://gemiddeldgezien.nl/prijzen/gemiddelde-prijs-auto>

⁵ <http://www.letselschade.nl/statistiek-cijfers/kosten-van-letselschade-in-het-verkeer-in-beeld/>

⁶ <http://www.nu.nl/binnenland/3872776/lange-files-a2-ongeluk-bij-beesd.html>

⁷ http://www.swov.nl/rapport/Factsheets/NL/Factsheet_Kosten_verkeersonveiligheid.pdf

⁸ <http://www.assetresolutions.nl/en/column/asset-management-for-dummies>