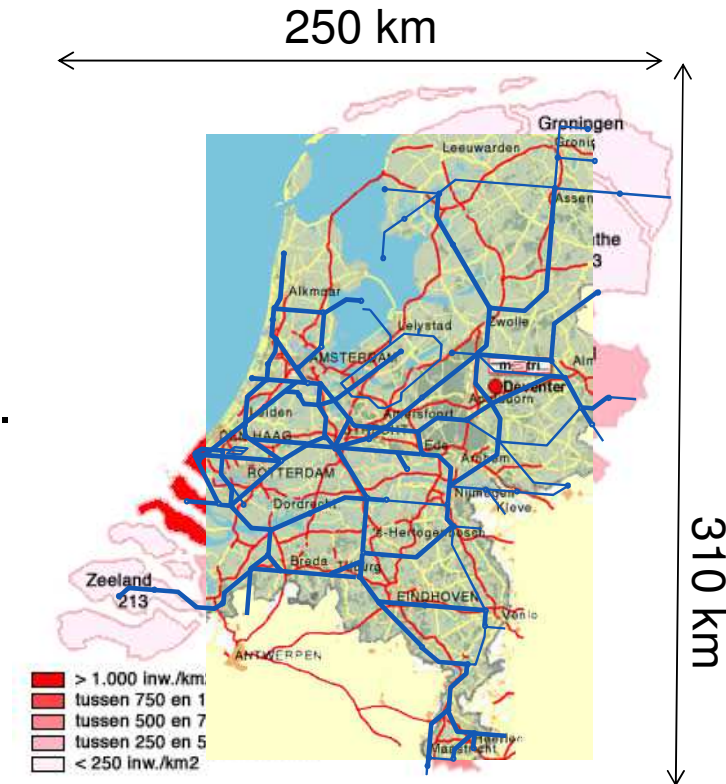


***How to prevent slow pedestrians to get locked
between barriers?***

**Jeroen Nederlof
Brenda Struve
ILCAD Zagreb 7-6-2018**

The Netherlands :

- Small, flat.
- High population density.
- Fine-grained road network.
- 3400 km railway network.
- Natural level crossings.
- High traffic density.
- High train intensity.



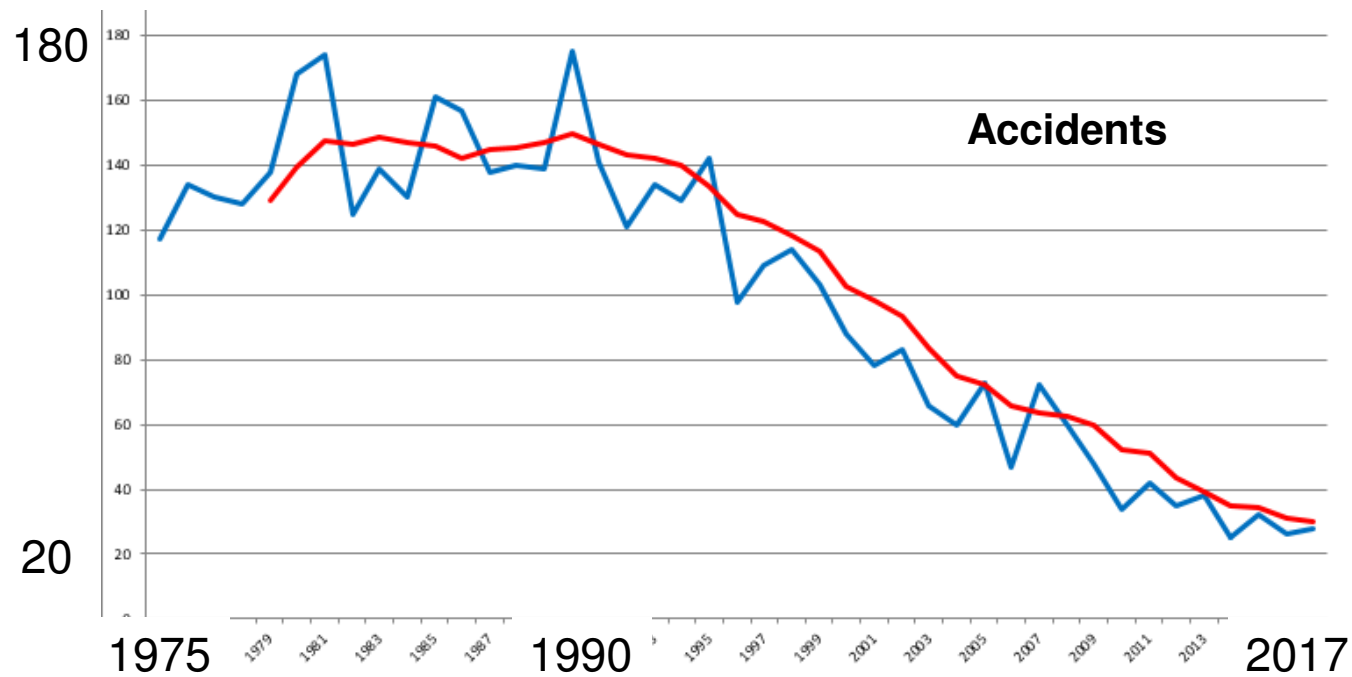
17 million inhabitants

20 million bicycles

26 trains/hours @LX

The Netherlands :

- Almost 2400 level crossings
 - 1900 on passenger lines (max 140 km/h)
 - 500 on low speed harbour & industrial lines
- 2017 : 28 accidents, 5 fatalities



Some physical measures :

- Closing level crossings (>1200 in 40 years).
- Active crossings with barriers (>90% on public crossings).
 - Ambition: 100% in 2023.
- Short closure times.
 - ETCS will further improve this.
- Separated lanes for pedestrians and cyclists.
 - Full barriers on both sides of the tracks.

Our improvements seem to be more than can be clarified by the physical measures since 1990.

The missing link could be education campaigns !

The Dutch standard: automatic protected level crossing with half barriers.



ProRail

Number of accidents	Period	AGE										age known	total
		<20	20	30	40	50	60	70	80+				
	1978-1987	252	351	240	177	134	86	51	18	1309	1383		
	1988-1997	254	379	232	154	127	94	56	29	1325	1435		
	1998-2007	158	189	156	126	104	53	57	14	857	941		
	2008-2017	32	46	42	47	39	19	27	26	278	417		
	total	696	965	670	504	404	252	191	87	3769	4176		

As a percentage of "age known"	AGE								
	<20	20-29	30-39	40-49	50-59	60-69	70-79	80+	
1975-1984	18,2	26,8	18,3	13,5	10,2	6,6	3,9	1,4	
1985-1994	18,7	28,6	17,5	11,6	9,6	7,1	4,2	2,1	
1995-2004	17,7	22,1	18,2	14,7	12,1	6,2	6,7	1,5	
2007-2016	11,5	16,5	15,1	16,9	14,0	6,8	9,7	8,3	

The best results for younger people, increasing percentage for older people.

Measures to discourage dangerous behaviour may introduce a new problem for all decent people.

The problem:

The full barriers discourage bad behaviour. For a crossing over 2 tracks after minimal 23 seconds the train arrives, which is sufficient for slower people. The full barriers will be closed after 17 seconds which may be a problem.

The longer the crossing distance the larger the problem.

- Complaints
- Panic
- Accidents

period :	2000 - 2005	2006 - 2011	2012 - 2017
accidents :	1	3	8
fatalities :	7		

ProRail

Video's :

The idea :



- An additional green light which says that the level crossing will not be activated for some time.
- No obligation, no resemblance with general traffic signs.

ProRail

Presentation Brenda Struve