INTRODUCTION
Road safety is one of the world’s main causes of loss of years of life [1]. A central aspect is the velocity of the traffic. The higher average speed the more road fatalities. To reach a reduced number of fatalities due to inappropriate speed, new tools must be used. In this context Intelligent Speed Adaptation (ISA) could be a key tool. ISA can be categorized as informative, advisory, recording, or intervening systems depending on how it interact with the drivers [2].

In a number of countries, ISA trials have been carried out in the last decade with significant results [3]. In Denmark two trials with ISA have been carried out in the last years. Results from one trial with 26 commercial vehicles (ISA C) and from one with approx. 150 private car owners (Pay As You Speed (PAYS)) will be presented [4, 5 & 6]. Based on these results considerations about the real effect from ISA will be briefly discussed.

METHODS
In the Danish ISA trial with commercial cars (ISA C), ISA was tested with non-voluntary company drivers. In addition to an informative and advisory function, the ISA system had an incentive function based on recording ISA. It consisted of penalty points if a driver violated the speed limit. The ISA equipment became active if the velocity passed the speed limit + 5 km/h. Each driver got a personal key and a ‘key reader’ which could read the driver’s unique key ID and hence distinguishes between several drivers’ behaviour in the same car. The trial went on for 14 months of which the two first were as baseline where ISA was deactivated but did register the behaviour only.

In PAYS basically the same ISA system was installed. However, as incentive for avoiding speeding a 30 % discount on the car insurance rate was offered. The discount was reduced bit by bit depending on how much the driver was speeding. The drivers drove with ISA between 12 and 33 months of which the first 1.5 and the last 1.5 months were a baseline and a post period, respectively. In the two latter mentioned periods ISA was deactivated but did register the behaviour.

In both trials each driver had access to a personal webpage where any penalty points were shown. If the driver found some of the penalty points incorrect a hotline could be contacted. The data flow in the trials appears below (Figure 1).

![Figure 1: Data and information flow in the two trials.](image)

By comparing the driving behaviour in baseline/post period with the behaviour while driving under ISA conditions, the effect from ISA combined with incentives, is calculated. Also any effect on the drivers’ attitude to driving behaviour due to ISA has been studied by means of questionnaires before and after activation of the ISA equipment. Results presented in this paper are based on GPS data and include a driven distance of 345,000 km from ISA C and 2.8 million km from PAYS.

RESULTS
In ISA C the driving behaviour was affected substantially due to ISA. However, the effect from ISA was highly depending on the drivers’ attitude to speeding. In general, informative and warning ISA did not affect a substantial part of
the drivers. These drivers were in general more negative towards ISA and they did not identify them self much with the key ID. The other group were keen of using their key ID and got virtually no penalty points (Figure 2).

It appears that when driving with key ID speeding virtually disappeared, while no effect from ISA can be detected without key ID use. If drivers were motivated by incentive a significant effect from ISA appears, else no effect can be documented. A similar pattern can be found regarding the drivers attitude to risky behaviour in traffic.

In PAYS the drivers got incentive if speeding was avoided. They got a promised bonus equivalent to 30% discount on their insurance rate. This bonus was reduced according to the amount of speeding. Regardless of the behaviour they could never got a negative bonus due to a lot of speeding etc. Speeding was reduced to approx. 1/3 after activating ISA. After 9 to 30 months ISA was deactivated but the behaviour was still registered in a post ISA period.

ISA combined with a bonus connected to the amount of speeding reduces speeding substantial. However, even though many drivers drove under ISA conditions in more than two years, it has not changed their approach to speeding measurable.

CONCLUSIONS

The main conclusions from these two ISA trials are that ISA reduces speeding substantial if the drivers are motivated to avoid speeding. It has also become clear that there is no learning effect from ISA. If the full safety potential from ISA should be utilised sticks and/or carrots should be used to motivate the drivers. If not, we will never reach the drivers who need ISA the most but have the biggest resistance towards it.

REFERENCES

5. Agerholm N et al., Intelligent Fartilpasning i firmabiler - endelige resultater (in Danish), Trafikdage, Aalborg University, pp. 1-11, 2009.
6. Lahrmann L et al., Accid Anal Prev, Pay As You Speed, ISA with Incentive for not speeding. Results and Interpretation of Speed Data, under publication.

1 The final results are presented in a paper under publication and are therefore only available as a principle sketch [6].