The influence of actors on the diffusion of Advanced Driver Assistance Systems (ADAS)

Modelling actor decision-making

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Contents

Abstract

Advanced Driver Assistance Systems (ADAS) are expected to reduce transportation problems, such as traffic unsafety, congestion and environmental pollution. While several ADAS, such as Adaptive Cruise Control and Lane Departure Warning, have already entered the vehicle market, user adoption is still low. A number of actors in the transportation system, such as public authorities, industry and insurance companies, have an interest in a wider user adoption of these systems. However, the decisions of these actors to influence user adoption often depend on the decisions other actors make. Currently, possible actor decisions and their responses are uncertain. In this paper a model of individual actor decision-making that integrates the decisions of other actors is introduced, and some preliminary results towards estimation of this model are presented.

Keywords

Advanced Driver Assistance Systems (ADAS), diffusion, actors, decision models

1 Introduction

Nowadays, the road transportation network and its use in Western European countries, like the Netherlands, is of vital importance to maintain the current level of welfare and social interaction, and to offer potential for economic growth. However, three major problems have been identified regarding this desire for mobility: congestion, traffic safety and the environment. Driving behaviour is a major cause of these traffic problems as, for example, time of departure, route choice, speed choice, lane choice, and distance keeping directly affect congestion, unsafety and environmental stress.

Since a decrease in mobility is not a desirable goal, an effective way to decrease transportation problems is to influence (the consequences of) driving behaviour. Driving behaviour can be most directly influenced by making the vehicle more intelligent, with Advanced Driver Assistance Systems (ADAS) that support the driving task. Examples of ADAS that are currently on the market are Adaptive Cruise Control (ACC), Intelligent Speed Assistance (ISA) and Lane Departure Warning (LDW). The effects of several ADAS on traffic safety, throughput, and the environment are being studied using driving simulators, traffic simulations and field operational tests. The results of these studies show, for instance, an accident reduction of 10-36% for ISA (depending on the system characteristics) (Carsten and Tate, 2005), and an accident reduction of 8% for a combination of ACC and LDW (Alkim et al., 2007a). In this paper, the focus is on ADAS as a solution towards sustainable mobility.

Despite the positive effects expected from ADAS, the diffusion of ADAS in vehicles is low (De Kievit et al., 2008). ADAS that are currently available on the market are mainly convenience and safety systems such as Lane Departure Warning, Adaptive Cruise Control and Blind Spot Warning (Bishop, 2005). The current popularity of navigation systems might indicate that there is a market for in-vehicle technology. However, since each specific ADAS has, for instance, a different relative advantage and a different observability for users (which areimportant success factors for innovations (Rogers, 2003)), this is not expected to show us anything about the near future of ADAS. Since different ADAS have different effects on the individual driver and on society, they are of different interest for actors. As such, three types of forces driving ADAS diffusion can be distinguished: *market pull*, *technology push* and *policy push*. As a result, the market penetration of these systems will develop differently (e.g. eSafety Support, 2007, Abele et al., 2005). Behind these forces are different actors who can influence user adoption, such as public authorities, industry, insurance companies, user organisations and research institutes (Hermeler, 2008). The question is who will take action first and how does this action influence diffusion?

Many different actors, such as public authorities, industry, insurance companies and interest groups, are able to influence diffusion by applying certain instruments they have at their disposal. From current literature it can be concluded that there is a lack of knowledge on the tradeoffs actors (will) make in order to influence ADAS diffusion (Walta et al., 2006). This includes the role of criteria in their decisions, the (perceived) effects of their decisions on these criteria, and the influence of the actions of other actors on their decision-making. This lack of knowledge requires, among others, methodological considerations in order to increase knowledge on this subject.

In this paper, a methodology for studying the preferences of individual decision-makers regarding ADAS diffusion is presented as well as some initial results. In section 2 the methodology is discussed, introducing a conceptual model of individual decision-makers regarding ADAS diffusion. This conceptual model is next operationalised and translated into a survey in section 3. Section 4 presents the results of a test-survey, including a model estimation. Finally, the conclusions and explanation of further research steps are given in section 5.

2 Methodology

In this section, we briefly address the theoretical framework assumed in this study, followed by an introduction of a model of individual actor decision-making and the methodology that is applied to estimate this model.

2.1 Theoretical framework

The focus in this investigation is on actor decisions that influence the diffusion of ADAS in order to achieve their specific goals regarding ADAS diffusion. Multiple actors can influence the diffusion of ADAS, and it is assumed that their decisions can influence diffusion decisions of other actors as well. Furthermore, it is expected that the actor that will take the lead in taking action to increase diffusion depends on the type of ADAS, i.e. who is the change agent (Rogers, 2003). This determines which innovation force (market pull, technology push, or policy push) prevails for the introduction of a specific ADAS in real-world traffic. Within this multi-actor arena, the ADAS market, consisting of automotive industry and vehicle-drivers, is key: in essense, vehicles have to be equipped with ADAS and drivers have to use them. Other actors, such as public authorities, insurance companies, interest groups and media, can influence the ADAS market at both the demand (user) and the supply (industry) side. The influence relations between the actors are depicted by the arrows in Figure 1.

Within this multi-actor arena, the individual actor is assumed to make his decisions by utility maximizing, based on subjective (i.e. based on the actor’s expectations) values of criteria (the plausibility of this assumption is discussed in Walta et al., 2007a). Furthermore, as stated above, it is assumed that individual actors take into account decisions of other actors in decision-making.

Based on these assumptions, a model of individual actor decision-making was developed.

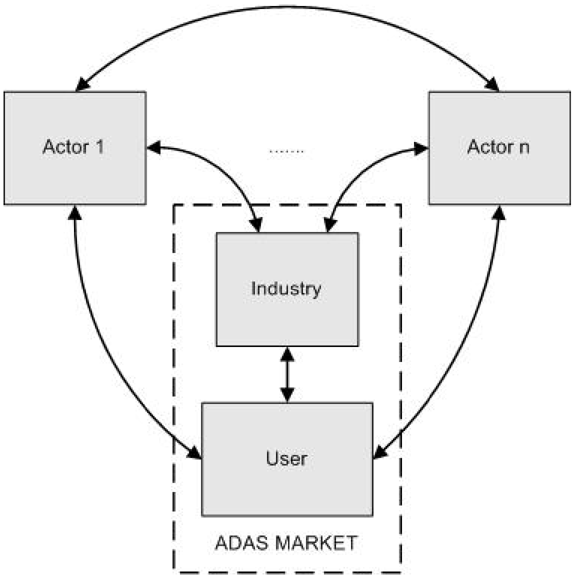

Figure 1: Multi-actor decision-making regarding ADAS diffusion

2.2 Model of individual actor decision-making

The following conceptual model (see Figure 2) represents the choice of an individual decision-maker for some instrument to influence ADAS diffusion. In this model we assume that the decision-maker's action can be described by a set of characteristics , such as costs and liability, and the ADAS can be described by a set of transportation system characteristics, such as safety, throughput and environment. The impacts on these criteria are included in the model as internal impacts and system impacts respectively.

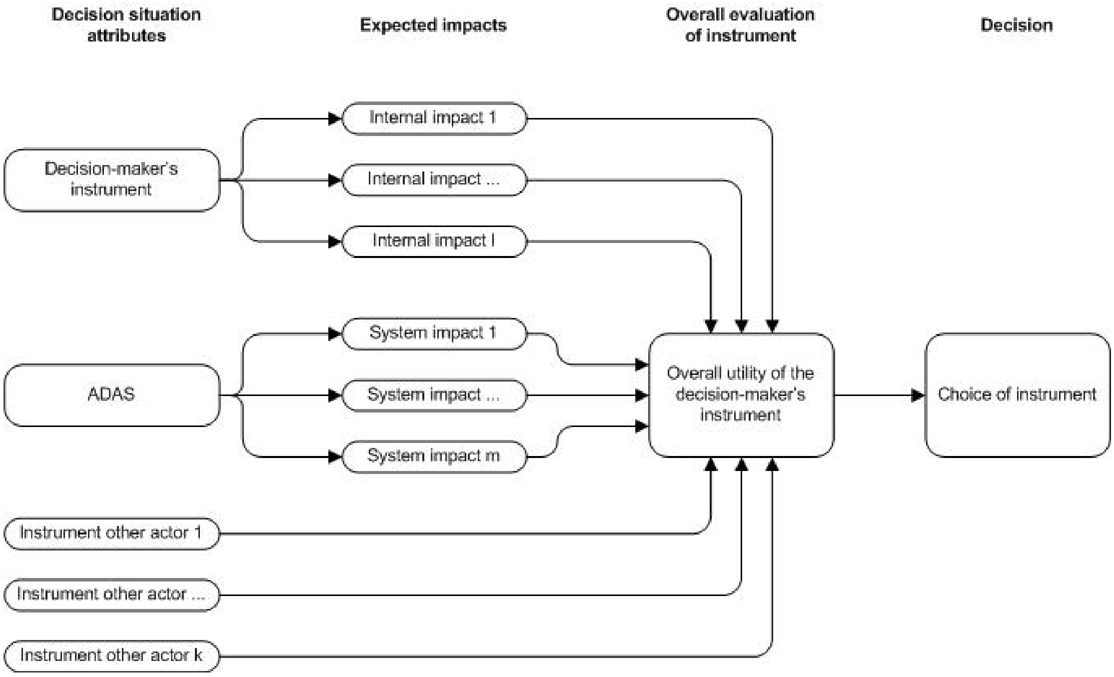

Figure 2 Conceptual model of individual actor decision-making

This conceptual model was translated into the following conceptual model (based on Timmermans, 1982).

For each decision-maker *i*, there exists a set of objective instruments *I* that can be applied to influence ADAS diffusion:

$$I^{i} \in \{I1,....,In\}(n \geq 2) \quad [1a]$$

Furthermore, there exists a set of objective ADAS alternatives *A*, that the instruments can be applied to:

$$A \in \{A1,....,Am\}(m \geq 1) \quad [1b]$$

For each other actor *k* there exists a set of objective instruments *O* as well, which they can apply to influence ADAS diffusion:

$$O^{k} \in \{O1,....,Op\}(p \geq 2) \quad [1c]$$

Each decision-maker *i* faces a set D^i of decision situations, which includes an instrument I^{ij}, an ADAS A^j and instruments that other actors will apply $O^{j1}\ldots O^{jk}$ for decision situation *j* and other actor *k*.

$$D^{i} := \left[I^{ij}, A^{j}, O^{j1}...O^{jk}\right] \quad [2]$$

Each decision-maker *i* makes a valuation R^{ijl} on internal criterion *l* for decision situation *j*, which is some function f^{il} of his instrument I^{ij}:

$$R^{ijl} := f^{il}\left(I^{ij}\right) \quad [3a]$$

Analogously, each decision-maker *i* makes a valuation S^{ijm} on transportation system criterion *m* for decision situation *j*, which is some function g^{im} of ADAS A^j:

$$S^{ijm} := f^{im}\left(A^{j}\right) \quad [3b]$$

Each decision-maker *i* derives a certain (part-worth) utility R^{ij} from the instrument attribute of decision situation *j*, which is some combination $f^{**}$of the valuations of internal criteria R^{ijl}, and is equal to some function f^i of instrument I^{ij}:

$$R^{ij} := f^{**}\left(R^{ijl}\right) = f^{i}(I^{ij}) \quad [4a]$$

Analogously, each decision-maker *i* derives a certain (part-worth) utility S^{ij} from the ADAS attribute of decision situation *j*, which is some combination g^{**} of the valuations of transportation system criteria S^{ijm}, and is equal to some function g^i of instrument I^{ij}:

$$S^{ij} := g^{**}\left(S^{ijl}\right) = g^{i}(A^{j}) \quad [4b]$$

Each decision-maker *i* derives a certain (part-worth) utility T^{ijk} from each instrument applied by other actor *k* in decision situation *j*, which is some function h^i of the instrument O^{jk}:

$$T^{ijk} := h^i(O^{jk}) \qquad [4c]$$

The overall utility V^{ij} that decision-maker *i* derives from decision situation *j*, is some combination f^* of the part-worth utilities R^{ij}, S^{ij} and T^{ijk}:

$$V^{ij} := f^*\left(R^{ij}, S^{ij}, T^{ijk}\right) \qquad [5]$$

The decision rule can be described as the chance $P(I^{ij})$ that decision-maker *i* would actually apply the instrument in decision situation *j*. This chance can be represented by some function f^{-i} of overall utility V^{ij}.

$$P(I^{ij}) = f^{-i}\left(V^{ij}\right) \qquad [6]$$

This mathematical model is schematically represented by Figure 3.

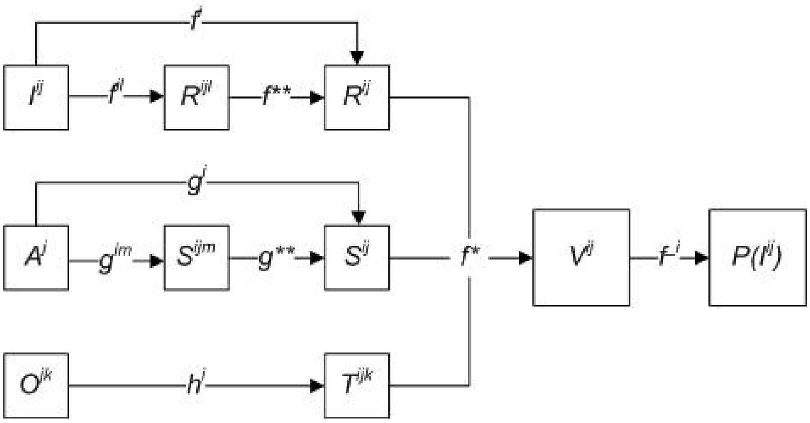

Figure 3 Mathematical model of individual actor decision-making

2.3 Estimation of the model

The model will be estimated based on data collected by a Stated Preference survey among relevant actors. Data collection will include the measurement of the overall utility (V^{ij}) and the expected impacts on the criteria (R^{ijl} and S^{ijm}), from which the model then can be estimated. In addition, the decision rule, which is assumed to be utility maximizing, will be checked on possible threshold values within the attributes and criteria for which an instrument becomes feasible or infeasible to apply.

In the following section, the model will be operationalized and the design of the questionnaire will be discussed.

3 Individual decision model set-up

The questionnaire will consist of two parts, the measurement of overall utility combined with the measurement of the decision rule, and the measurement of the expected impacts on the criteria. For these two parts, the operationalization of the individual actor decision models and the experimental design is discussed in 3.1 and 3.2 respectively.

3.1 Measurement of overall utility

3.1.1 Selection of attributes and attribute levels

The attributes that will be included in the investigation were already introduced in chapter 3: decision-makers instruments, ADAS and other actors' instruments. In this section, these attributes are further operationalized, as to which actors, which instruments and which ADAS are included in the investigation. For each of the instruments and ADAS, three attribute levels were included.

3.1.2 Actors

The actors to be included in this investigation should be the actors that are most important in influencing the user adoption of ADAS. By Figure 2.2 it was already defined that the actors in the ADAS market – industry and users – are key actors within this area. From the investigation of the eIMPACT project (Alkim et al, 2007) with respect to the effectiveness of instruments for ADAS deployment, it can be concluded that, in addition to industry, public authorities and insurance companies have the most effective instruments at their disposal.

The user itself will not directly be included in the investigation. Instead, we assume the actors have a certain perception of how their instruments, and the instruments of other actors, influence user adoption. Since the impacts on criteria are highly dependent on user adoption, this is a key assumption to this investigation. [1]

3.1.3 Instruments

Generally, attribute levels should cover a broad but realistic range. We assume an ordinal scale of instruments here, ranging from the lowest till the highest possible influence on user adoption. For the lower endpoint we chose the attribute level "do nothing" for all of the actors. Hereby we implicitly assume that there will be no negative influence on user adoption, which could be regarded as pro-innovation bias, but "do nothing" is expected to be negative enough here. For the higher endpoint, realistic instruments are chosen that are expected to have the highest positive impact on user adoption. These usually involve some form of forced adoption. For the intermediate level, some, effective, way of stimulating adoption is considered.

Public authorities' instruments
For the authorities, mandatory ADAS equipment of all vehicles by legislation is the instrument that influences user adoption most effectively, since it forces all users to adopt the system. Therefore is it chosen as the high level attribute here. For the intermediate level, several forms of stimulation are available, of which tax incentives and awareness campaigns are expected to be most effective or desirable (Alkim et al., 2007; Walta et al., 2007b). Here, tax incentives are chosen as the intermediate level,

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[1] It is still being considered to add a user survey to this investigation, in order to cover the user part.

since it more concrete and more directly focused on the user than awareness campaigns.
The instrument "tax incentives" should be more specific in order to have all respondents understand it in the same way. Taking into account the fact the vehicle purchase tax subsidies in the Netherlands granted for dust filters in cars with diesel engines (600 euros) and hybrid vehicles (2500-5000 euros depending on the energy efficiency of the vehicle), it may be realistic to think of a tax incentive in an order of magnitude of 1000-2000 euros. Here, 1500 euros will be applied.

Industry's instruments
The high level of the industry instrument most likely involves standard equipment on all new vehicles. Intermediate instruments of industry are related to the usual marketing strategy in which a new product is first introduced in high end vehicles in order to recover the development costs, that are referred to as the a cascade of innovation in the SEiSS report (Abele et al., 2005). These strategies are valid for both optional as standard equipment of vehicles. Here, as an intermediate level ADAS as optional equipment on all new vehicles is included.

Insurance companies' instruments
The most obvious instrument insurance companies can apply to influence ADAS diffusion is insurance premium reduction. However, there are different ways to offer such a reduction. Currently, premium calculations are mainly based on accident statistics from the past, and differentiation takes placed based on vehicle type and driver type. As the level of ADAS penetration is still too low, there are no real-world statistics available about the influence of ADAS on traffic safety. Hence, this is not yet a feasible instrument to influence user adoption. There is an upcoming trend of more dynamic "pay-as-you-drive" based insurance policies, with premiums based on important and measurable variables regarding accident statistics (e.g. Litman, 2005). Aspects of driving behaviour that are related to accident risk can be monitored, such as kilometres driven, speed and following distance, and rewarding drivers for safe driving behaviour has been shown to be effective (Agerholm et al., 2007; Mazureck and van Hattem, 2006).

Here, we will select two options involving dynamic premium calculation. For the high attribute level an instrument to force adoption is to only offer insurance with a prospective discount if the vehicle is equipped with an ADAS. The intermediate level would then be to offer such an insurance policy voluntary, which means it is optional for the insurant. An appropriate level of insurance premium reduction is, according to the authors, currently unknown, apart from the 30% discount of the Danish ISA trial (Agerholm et al., 2007). Since a number of different ADAS will be considered here, of which ISA could be the most effective regarding safety, it is decided to include a slightly lower reduction, of maximum 25%.

3.1.4 ADAS

There are three main criteria to select the ADAS included in this investigation, (1) the systems should all be technologically feasible, but not yet deployed on a large scale, (2) there has to be some evidence of effectiveness of these systems, and, most important, (3) they should be distinguishable by the expected actor who will take the first major step in deployment. The latter corresponds to the different forces that can be active in the diffusion of technology: technology push, market pull and policy push.

Public authorities are expected to take the first step in systems that are of major interest to society, and of less interest to individual users. The main driving forces for such a policy push are safety, efficiency, and environment. Since speed is an important cause for traffic accidents, in-vehicle speed measures, such as Intelligent Speed Assistance (ISA), are systems of interest for public authorities. There are three types of ISA with respect to the level of intervention: warning-, assisting-, and limiting ISA. Since the largest effects on safety are expected from assisting- and limiting ISA (Carsten and Tate, 2005), and limiting ISA is not well accepted among users and industry, the assisting level is chosen as the type of ISA included in this investigation. Assisting ISA works with an active accelerator pedal, giving couterpressure when the speed limit has been reached, and is overridable by the driver. Here, this system will be called a *Speed Assistant* (see figure 4).

Industry is expected to introduce systems in vehicles that they have developed and want to make profitable (technology push) or for which customers have expressed a need (market pull). A system that has been shown to meet the needs of car drivers is the combination of Adaptive Cruise Control and Stop&Go (Van Driel, 2007; Benz et al., 2003). This system is also called a *Congestion Assistant* (see Figure 4).

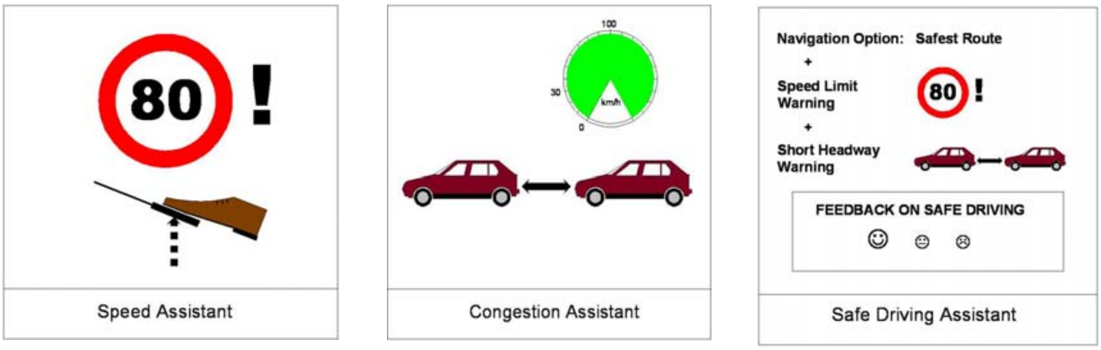

Figure 4 ADAS included in investigation

Insurance companies are expected to be mainly interested in systems to decrease accidents, and since their instruments with respect to ADAS are limited to variable insurance premiums, it is likely they will stimulate ADAS that influence driving behaviour on crucial and measurable safety characteristics (we could call this insurance policy push). Since there is a reward for safe driving behaviour, an informing/warning system which gives feedback to the driver can be effective enough (e.g. Mazureck and Van Hattem, 2006). Here, we consider a navigational aid to find the safest route option combined with speed and distance warning, i.e. a *Safe Driving Assistant* (see Figure 4).

3.1.5 Experimental design to measure overall utility

The identification of preferences requires the combination of attribute levels into profiles for which the utility will be measured. The number of profiles required depends on the number of attributes, the number of attribute levels and the type of rule that is assumed for combining part-worth utilities into overall utility. There are a few considerations to be made with respect to the combination rule. First, fewer profiles lead to less, and likely more accurate responses. Second, an additive rule generally explains most of the variance in the model (Louviere, 1988). However, this result is related to research on consumer preferences with respect to end-products. This studie clearly differs at two main points: (1) the instruments are less tangible than consumer products, and (2) alternative decision situations are measured instead of alternative end-products. Therefore, these considerations on selecting a combination rule should be handled with care.

Since, basically, we want to know the utility of an instrument in a specific situation, defined by the ADAS and the other actor's instruments, the attribute of the decision maker's own instrument (I^{ij}) will be kept constant. This means that the profiles consist of the ADAS and other actor's instruments, and the measurement task includes the three instruments of the decision-maker. In the end this will lead to three models per decision-maker.

Consequently, the profiles will consist of three attributes, each with three levels, and are different for each actor group as decision-maker. Several types of models can be estimated by conjoint analysis, here we consider two types: an additive model, and a model including all two way interactions (i.e. products of attributes) as well. The additive model requires at least an orthogonal design of 9 profiles. An orthogonal design includes the smallest possible set of profiles from which a model can be estimated. In order to estimate the two-way interactions as well, a full factorial design of 27 profiles, including all possible combinations of attributes, is required here. A preliminary questionnaire will be distributed among colleagues to determine the expected significance of the interactions and the necessity to include all 27 profiles in the investigation. The results of this test are presented in chapter 4.

Some combinations of attribute levels in the profiles may not be realistic, in this case this may occur in combinations with the industry instruments. For example, the combination of a mandate by public authorities and do nothing by industry is not logical in a strict sense. If these instruments are regarded as the positions that actors take, it is more realistic. In the questionnaire, therefore, the instruments of the other actors will be presented as "preferred instruments".

In this study, individual models for each decision-maker will be estimated. Since the number of potential respondents is limited, and their background differs, estimating a unique model per actor group would not lead to meaningful results.

The measurement task regarding utility of the instruments consists of a rating task for each of the three instruments per profile. The rating scale used is a 10-point scale, as most Dutch respondents are used to this scale (the same scale is used for grading at school in the Netherlands). The presence of thresholds within the utility maximizing decision rule will be tested by a binary measurement task (yes/no) in which the respondent has to indicate whether the instrument is feasible in the given situation. See the example in Figure 5.

SITUATION X	
ADAS system	
Industry's preferred instrument	System as optional equipment for all new vehicles
Insurance companies' preferred instrument	Optional up to 25% premium reduction for safe driving

How attractive is it to you as a Public Authority to apply the following instruments in this situation?
(1 = not attractive at all, 10 = very attractive)

Would you actually apply such an instrument in the given situation?

Do nothing

1	2	3	4	5	6	7	8	9	10	YES	NO
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

1500 euros tax reduction for vehicles with system

1	2	3	4	5	6	7	8	9	10	YES	NO
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Mandate system for all vehicles by legislation

1	2	3	4	5	6	7	8	9	10	YES	NO
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Figure 5: Example question

3.2 Measurement of the expected impacts on criteria

3.2.1 Selection of criteria

The most important criteria regarding ADAS diffusion have been selected based on a literature review and a workshop with actors (Walta et al., 2007b) This list of criteria is presented in Table 1, in rank order of importance as determined in this workshop. Based on the comments of the actors collected during the workshop, it was further concluded that there are two types of criteria involved in decision-making regarding ADAS: *prerequisites* and *objectives*. A criterion is considered a prerequisite here if it is an important point of action that has to be satisfied to make an ADAS feasible, and is not expected to influence decision-making on ADAS deployment. Therefore prerequisites will not be included in this investigation, and are assumed to be satisfied for the ADAS included (see Table 1, column 3). Furthermore, a distinction between internal and transportation system criteria was made in columns 4 and 5 of Table 1.

Criteria to be included in the investigation should clearly distinguish the instruments and ADAS, and not coincide with respect to the magnitude of effects. Therefore, and for modelling reasons, a number of criteria were combined (see Table 1, column 6). The criterion deployment aspects was removed comprises most of the criteria, and is not specific enough.

Table 1: Selection of criteria

#	Criterion (Walta et al., 2007)	Prerequisite	Internal criterion	Transportation system criterion	Combined with criterion
1	Safety			X	
2	Driver acceptance/user friendliness		X	X	
3	Technical performance	X			
4	Liability		X		
5	Driver distraction			X	1
6	Costs		X		
7	Level of adaptation needed			X	2 (system)
8	Certification/validation	X			
9	Standardization/international appl.	X			
10	Environment			X	
11	Public acceptance		X	X	2
12	Deployment aspects				
13	Profitability		X		
14	Driver comfort			X	2(system)
15	Travel time/network efficiency			X	
16	Legislation/laws	X			
17	Privacy			X	2(system)
18	Driver freedom			X	2(system)
19	Incrementability	X			
20	Image			X	2(system)

Some of the criteria were renamed, to apply them to all actors involved, and make them less ambiguous: safety became *traffic safety*, travel time/network efficiency became *traffic efficiency*, and driver acceptance became *user acceptance of the instrument* for the internal criterion, and *user acceptance of the ADAS* for the transportation system criterion. The criterion profitability was not included as an internal criterion for public authorities.

3.2.2 Experimental design

The measurement of the impacts on criteria involves a relatively straightforward procedure. Remind that we are not measuring the objective impacts on criteria, such as number of fatal accidents or costs of applying an instrument, but the perceived impacts on criteria, in terms of their own estimations. For each of the instruments, the actor's internal criteria should be evaluated, and for each of the ADAS the transportation system criteria should be evaluated.

The measurement scale to be used in this part of the investigation should be quantitative in order to enable inclusion in the overall model. Furthermore the scale should include positive and negative values. While some effects will be only positive or negative, one scale is used for clarity and leave the respondent more freedom of choice. Since there are three instruments and three ADAS for which criteria will be valued, it is logical to apply a 7-point scale with 3 negative, 1 neutral and 3 positive values, so the respondent can always distinguish between the instruments or the ADAS. See Figure 6 for an example

How do you value your instruments on the following criteria with respect to your own objectives?

		Very negative			Neutral			Very positive		No opinion
INSTRUMENT	**CRITERION**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**		
Mandate system for all vehicles by legislation	User acceptance of the instrument	☐	☐	☐	☐	☐	☐	☐		☐
	Liability	☐	☐	☐	☐	☐	☐	☐		☐
	Costs	☐	☐	☐	☐	☐	☐	☐		☐

Figure 6: Example question of expected impacts of an instrument on criteria

4 Results from test questionnaire

The results from the test questionnaire are not available yet, and will be included in the final paper.

5 Conclusions and further investigation

In this paper we have presented an approach towards modelling individual decision-making regarding Advanced Driver Assistance Systems (ADAS) diffusion. Different actors can take different decisions to influence user adoption of ADAS, of which the most important ones are public authorities, industry, insurance companies, and users. Since all these actors have an interest in user adoption of ADAS and its effects on the transportation system, their decisions influence the decisions of other actors. These decisions of other actors have been integrated in a model of individual decision-making regarding ADAS diffusion presented in this paper.

The different instruments the actors have at their disposal to influence user adoption of ADAS include doing nothing, instruments to stimulate ADAS adoption, and instruments to force ADAS adoption. The preferences for these instruments will be investigated for different decision situations, consisting of different ADAS and instruments preferred by other actors, based upon the model presented in this paper. Three different ADAS will be included, a Speed Assistant, a Congestion Assistant and a Safe Driving Assistant, for which it is expected that public authorities, industry, and insurance companies are likely to make the first move towards influencing adoption respectively. Furthermore, it is expected that decision-makers base their decisions on their expected impacts on criteria. A limited number of criteria is included in this investigation, in order to examine their importance in decision-making.

Based upon the models that will result from this investigation, a further analysis will be made regarding multi-actor decision-making regarding ADAS diffusion. In this analysis three methodological steps will be taken. The first step includes the identification of feasible decision scenario’s (i.e. combinations of actor instruments) for each of the ADAS, and the analysis of which of these decision scenario’s are most preferable or most likely based on their attractiveness to actors. The second step includes an analysis of the accomplishment of these scenarios, if the actors take their decisions consecutively. Finally, the rate of ADAS diffusion to be expected from the feasible scenarios will be identified.

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