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PISa

Powered Two Wheeler Integrated safety

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Executive Summary

The objective of this task was to select appropriate in-depth Powered Two Wheeler (PTW) accident data and to derive a common methodology for the review of these in-depth cases. The information gathered from this process is an input to later activities reported in D13&D14 to understand the issues of accident causation in order to identify functional requirements of intervention methods that would be effective for accident avoidance or mitigation. Existing in-depth databases, comprising a forensic accident database and the COST 327 database held by LMU, the UK On The Spot (OTS) database and the UK Fatals accident database held by TRL, and the UK OTS database held by the VSRC were used.

Accident scenarios previously defined by the APROSYS project formed the basis for the selection of relevant accidents. National data from Germany, Italy, Spain and the Netherlands was shown to fit well these APROSYS scenarios. However, since the in-depth datasets available to the PISa project were largely from the UK OTS project, it was necessary to consider whether the accident scenarios identified in Task 2.1.1 are also relevant in the accident statistics for Great Britain and to confirm if, and to what extent, they differ. A review of the national statistics for Great Britain (STATS19) was therefore undertaken. Although this analysis showed that the priority of the scenarios is different, largely due to the different kinds of PTW in the UK fleet compared to that in Europe, it was concluded that a vast majority of the STATS19 accident cases could be described using the APROSYS scenarios. Analysis was also carried out to ensure that the two regional OTS databases held by TRL and the VSRC were representative of the national GB statistics. Thus, as a result of the general applicability of the APROSYS scenarios and the representativeness of the OTS data, it was considered that the in-depth cases from Great Britain could be used and that the findings from these cases were applicable to European accidents in general.

Each team reviewed their existing in-depth accident cases according to an outline of accident characteristics and selected, according to a developed set of selection criteria, a number of cases (+/- 20) which fell within the scenarios of relevance as identified by 2.1.1 and which contained sufficient in-depth information.

The selected cases were analysed in detail to determine their characteristics (reciprocal vehicle positions, vehicle speeds, etc), which in turn could allow the detection of a dangerous situation (e.g. stability hazard) or a pre-crash condition. A series of inter-team workshops was held to establish a common understanding to the analysis of the in-depth accident cases. This analysis addressed the pre-crash, crash and post crash accident phases. Case summaries were produced to aid the inter-team case review and validation process. Drive through video data for each accident case (where available) was also used to obtain aspects of pre-crash information. Deliverable D11&D15 - Report summarising the in-depth accident case and video analysis - provides further information. The detailed case reviews considered accident characteristics including accident causation, vehicle (PTW and opponent) characteristics, environmental factors, human factors, PTW rider and opponent vehicle occupant characteristics. All the selected cases were reviewed by all three teams to clarify and confirm the issues and employ a common understanding and approach to the case analysis process.

The result of this analysis was the finalisation of a list containing 43 intervention functions taken from the in-depth and fatal accident case analyses. This list was taken forward into Tasks 2.3.1 and 2.3.2 in order to assign safety functions to each of the functions and then prioritise them as described in Deliverable D13&D14 - Report summarising the selection and prioritisation of solutions.



This deliverable is a summary of the findings from the in-depth case analysis activity of Task 2.2.1 of the PISa project. The objective of this task was to review in-depth powered two wheeler (PTW) accident data to identify relevant scenarios, to understand the issues of accident causation and outcome. This information was used to identify functional requirements of intervention methods that could be used for accident avoidance or mitigation. In order to achieve this objective, activities planned in the proposal were undertaken along with some additional activities which were identified during the course of the work.

The original work plan was for the partners involved in Task 2.2.1 to refer to their existing databases. These existing in-depth databases include a forensic accident database and the COST 327 database held by LMU, the UK On The Spot (OTS) database and the UK Fatals accident database held by TRL, and the UK OTS database held by the VSRC. Each team reviewed their existing in-depth accident cases according to an outline of accident characteristics and selected, according to a developed set of selection criteria, a number of cases (+/- 20) which fell within the scenarios of relevance as identified by 2.1.1 and which contained sufficient in-depth information. These selected cases were analysed in detail to determine their characteristics (reciprocal vehicle positions, vehicle speeds, etc), which in turn could allow the detection of a dangerous situation (e.g. stability hazard) or a pre-crash condition. The detailed case reviews considered accident characteristics including accident causation, vehicle (PTW and opponent) characteristics, environmental factors, human factors, PTW rider and opponent vehicle occupant characteristics. All the selected cases were reviewed by all three teams to clarify and confirm the issues and employ a common understanding and approach to the case analysis process.

It was anticipated that this would be an iterative review process with the ultimate objective being to identify a selection of cases for which the issues of accident causation and outcome were fully understood. This was the case in practice, but it was not possible to combine UK Fatals accident cases with the other detailed case review process. Therefore, the selected in-depth cases were only from LMU's databases and the OTS database. However, analysis of the UK Fatals data was undertaken using objective criteria developed for the accident conditions for each functional requirement. The 60 selected in-depth cases and the Fatals database were available for use by Task 2.3 to identify and prioritise the driver assistance functions to be taken forward to WP3. In addition the case summary and video information is available to subsequent Workpackages and can be referenced in Deliverable D11&D15 - Report summarising the in-depth accident case and video analysis.

In preparing and carrying out the in-depth case review process of T2.2.1 it became clear that several additional activities were necessary to set the in-depth accident data in the context of the statistical data.

The set of accident scenarios, determined according to their frequency and severity, was taken from existing European accident data used in the APROSYS project (Advanced Protection Systems) as shown in Table 1. This work was undertaken in Task 2.1.1 and is reported in deliverable D2. However, it was considered necessary to validate these scenarios from the perspective of the PISa project. This was undertaken using additional existing national accident data for 4 European countries (Germany, Italy, Spain, and the Netherlands).





Table 1: The most frequent and severe PTW accident configurations identified by APROSYS

Importance	Location	PTW type	Struck object	Junction
1	Urban	Moped	Car	Intersection
2	Urban	Moped	Car	Straight
3	Urban	Motorcycle	Car	Intersection
4	Urban	Motorcycle	Car	Straight
5	Non-urban	Motorcycle	Single vehicle	Not stated
6	Non-urban	Motorcycle	Car	Straight
7	Non-urban	Motorcycle	Car	Intersection

In line with the brief for the PISa project agreed with the European Commission, existing in-depth accident data was to be reviewed and this data was provided by three PISa partners from Germany and the United Kingdom. As previously mentioned these existing in-depth databases included a forensic accident database and the COST 327 database held by LMU, the UK OTS database and the UK Fatals accident database held by TRL and the UK OTS database held by the VSRC. As a consequence of the existing datasets available to the PISa project, the majority of the in-depth accident cases were from the UK. As accident statistics from Great Britain were not included in the earlier validation of the scenarios, it was necessary to consider whether the accident scenarios identified in Task 2.1.1 were also significant in the accident statistics for Great Britain and to establish if, and to what extent, they differed. A review of the national statistics for Great Britain (STATS19) was therefore undertaken and the important accident scenarios confirmed. It was also important to understand the representativeness of both the UK OTS in-depth data and the UK Fatals data. Thus a description of the OTS database is included and the analysis of the UK Fatals data also includes consideration of the important accident scenarios and whether these differ from those identified in Task 2.2.1, together with the representative nature of this dataset.

Finally, in addition to the planned activities of Task 2.2.1, a small sample of Indian statistical data and in-depth cases were provided by TVS Motor Company Limited. This information was used by the group to begin to identify both the similarities and differences between the PTW accident circumstances in India and Europe. Information was provided which includes an overview of the automobile scenario in India (powered two wheeler production, sales and accident statistics), 3 case examples and probable reasons for accidents and associated counter measures. The data from India were not included in the detailed analyses and are not referenced in this report but have been considered in the process of identifying and prioritising the driver assistance functions to be taken forward by WP3.

The detailed case review process involved each team reviewing their existing in-depth accident cases according to an outline of accident characteristics. Each team selected, according to a developed set of selection criteria, a number of cases (+/- 20) which fell within the scenarios of relevance as identified by 2.1.1 and which contained sufficient in-depth information.

The selected cases were analysed in detail to determine their characteristics (reciprocal vehicle positions, vehicle speeds, etc), which in turn could allow the detection of a dangerous situation (e.g. stability hazard) or a pre-crash condition. A series of inter-team workshops was held to establish a common understanding to the analysis of the in-depth



accident cases. This analysis addressed the pre-crash, crash and post crash accident phases. Case summaries were produced to aid the inter-team case review and validation process. These included descriptions of the crash circumstances, vehicles involved and damage sustained, individuals involved and injuries received and on some occasions witness statements of those involved. Also included were photographs of the scene, vehicles and approach and where available, scene plans with measurements and key scene information. Drive through video data for each accident case (where available) was also used to obtain aspects of pre-crash information. Deliverable D11&D15 - Report summarising the in-depth accident case and video analysis - provides further information. The detailed case reviews considered accident characteristics including accident causation, vehicle (PTW and opponent) characteristics, environmental factors, human factors, PTW rider and opponent vehicle occupant characteristics. All the selected cases were reviewed by LMU, TRL, VSRC and UNIFI to clarify and confirm the issues and employ a common understanding and approach to the case analysis process.

The result of this analysis was the finalisation of a list containing 43 intervention functions taken from the in-depth case analyses and ordered according to the pre-crash, crash and post-crash phases. Each of the 60 in-depth cases was assessed against the list of 43 functions to determine whether each function might have made a contribution to crash avoidance, crash severity or injury severity reduction. This list was taken forward into Tasks 2.3.1 and 2.3.2 in order to assign safety systems to each of the functions and then prioritise them as described later.

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