

The user needs and requirements of the PISa system

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PISa – Powered two-wheeler Integrated Safety

- *WP2 Objectives*
- *Workpackage 2 Activities:*
 - What scenarios should PISa system work in? Statistics
 - What technologies were available? Literature
 - What might users want or accept? User information survey
 - What functions are needed - Intervention priorities
 - what method was used?
 - what was decided?
 - What was proposed to WP3/PISa?
- *Conclusions*

PISa – Powered two-wheeler Integrated Safety

WP2 Objectives

PISa – WP2 partners

3 Universities



2 Research Institutes



WP2 - Objectives

- Use literature, accident statistics, user information, in-depth accident data and video
- Identify those accidents scenarios where integrated safety systems will make a positive contribution to accident/casualty reduction
- Determine and prioritise the potential integrated safety systems.

PISa – Powered two-wheeler Integrated Safety

WP2 Activities

What scenarios should PISa system work in? Statistics

- Used existing data - 7 crash scenarios from 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

- 7 scenarios verified using national data (Germany, Italy, Spain & the Netherlands) and national and fatal data from Great Britain
- Public deliverable D02 is available on PISa website

What technologies are available? Literature

Literature review of PTW safety:

- Vehicle types, features
- Use, mileage, weather conditions
- Riders' age, gender, behaviour
- Technologies available on 4 wheels/PTWs or near to market








Many technologies exist which if applied to a much wider range of PTWs will achieve many of the PISa objectives.

- Public deliverable D03 is available on PISa website

What might users want/accept?

User information survey

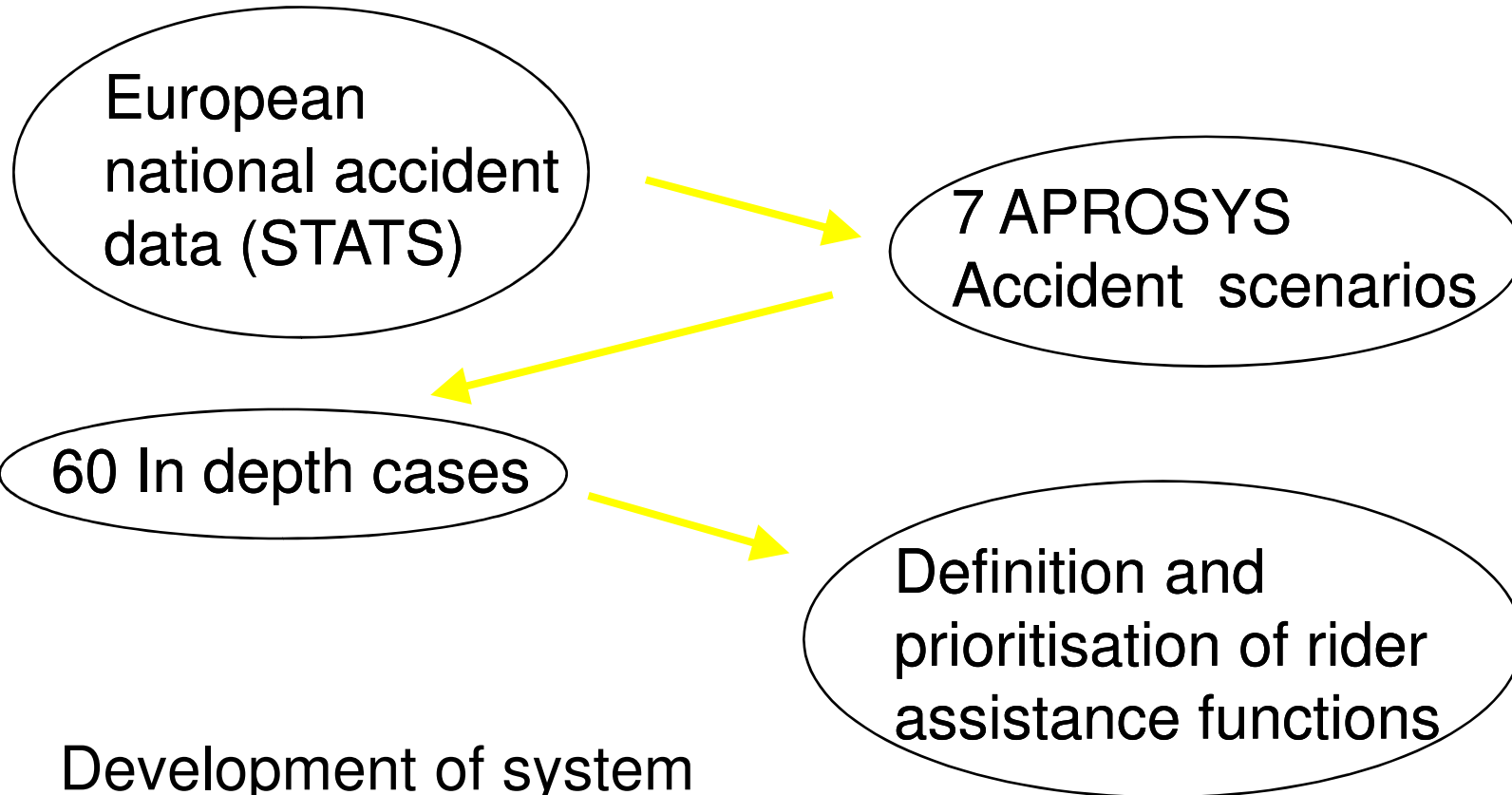
- Survey of PTW users in Germany, Italy, the Netherlands and complimented by existing survey data from GB.
- 261 PTW riders of whom
- 223 (85%) were male ♂ and 38 (15%) were female ♀
- Of the 253 PTWs owned:

35% sports bikes	35% roadster/ tourer/cruiser	10% offroad/ trail bikes	16% scooters >250cc	4% scooters <250cc
	  			

What might users want/accept? User information findings (D12)

- ☺ The participants were in favour of (and willing to pay a small amount for) direct driving support systems
 - ☺ Automatic Handling Systems: eg. ABS
 - ☺ Navigational Support: eg. GPS
 - ☺ Night vision displays
- ✗ The participants disliked Automatic Support Systems which take away tasks from the PTW rider eg. ACC

What functions are needed - what method was used?



Development of system functional requirements

Review of In-depth accident cases

- 60 in-depth crash cases from Germany and Great Britain;
- For each crash summary & for most ride-through videos
- Crash description: circumstances, vehicles and damage, rider and injuries, location and road features, environmental and weather, scene plan and photographs.

Functions

- 43 functions identified - pre-crash, crash, post-crash phases
- Vehicle dynamics, rider behaviour, protective equipment, HMI issues, environmental and road infrastructure, technological developments and vehicle to vehicle/infrastructure communications
- Each crash was reviewed
- Determined contribution (score 0-5) of each function to accident avoidance or injury avoidance/mitigation.

Functions matrix

N = 60 →

Function Number	Functional Requirement	System Global	System Specific	Accident Case Number		
				TRL0001	VSRC0002	LMU0003
1	Prevent PTW from starting if BAL (blood alcohol level) > 0.5mg	Drive Safe	Alco-lock key	1 (blue)	0	4 (red)
23	Improve PTW conspicuity	Enhanced Conspicuity	Active lighting	0	2 (blue)	3 (orange)
28	Prevent PTW wheels from locking in straight line	Optimised Braking	ABS	5 (red)	1 (blue)	0

↓ N = 43

Total = 2580

What functions are needed – what was decided?

- Used a process based on frequency of occurrence and level of applicability to prioritise the interventions in order of importance
- Top 2 priorities were:
 - Warning the **other** vehicle in the crash of the PTW presence
 - Automatically stopping the **other** vehicle

What was proposed to WP3/PISa?

1. Slow/stop PTW - Autonomous Braking
2. PTW to detect other vehicle and provide warning to the PTW rider
3. Improve PTW conspicuity - special lights or fairings
4. Improve braking/Anti-lock braking system (ABS)
5. Improve braking/Brake assist – enhanced braking system (EBS)
6. Improve braking/Brake assist – combined braking system/linked brakes (CBS)
7. Safe following – distance support system (DSS)

Conclusions

- PISa has used existing accident statistics, user information and the literature, together with an analysis of in-depth accident data, to determine the system specification for an integrated safety system (ISS).

www.pisa-project.eu

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