Improvement of Vehicle Crash Compatibility through the Development of Crash Test Procedures

VC-COMPAT

by

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Duration and Cost

- 3 year duration, expected start date 1st November
- Total cost 5.8 Meuros
  - Car 3.8 Meuros, truck 2 Meuros
- EC funding 3 Meuros
  - Car 2 Meuros, truck 1 Meuros

Objectives - Car to Car Impact

- To develop draft test procedures and performance criteria outlines to assess and control car frontal structures for frontal impact compatibility
- To ensure that the number of additional test procedures is a minimum to keep the test burden on industry to a minimum
- To develop a framework for a crash compatibility rating system
- To provide general recommendations for the design of a compatible car
- To provide an indication of the costs and benefits of improved compatibility

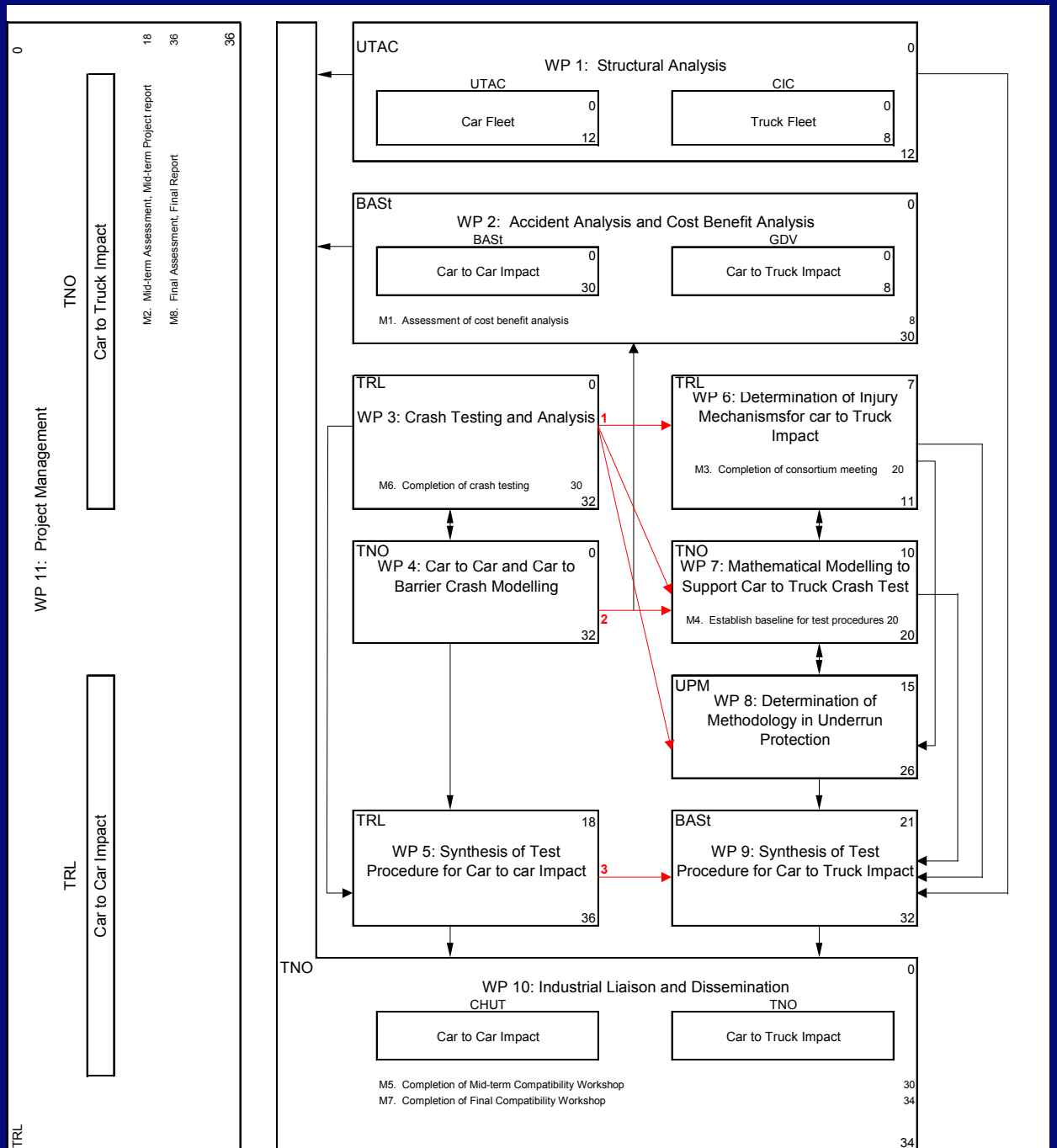
Objectives - Car to Truck Impact

- To develop test procedures and performance standards for (energy absorbing) (front) underrun protection systems for trucks
- To define criteria for energy absorbing front underrun protection systems for trucks
- To provide guidelines for improvement of existing legislation on rear underrun protection
- To provide an indication of the benefits and costs of (energy absorbing) front and rear underrun protection systems for trucks

Consortium

- Car to car impact
  - TRL (lead), TNO, BASt, UTAC, CHUT, Fiat
- Car to truck impact
  - TRL, TNO(lead), BASt, UPM, CIC, DC, GDV, VGT, Scania, DAF

Project Workplan



WP1 - Structural Analysis

- **Objective**
  - To collect vehicle structural data and construct a database to provide information about vehicle geometric incompatibility
- **Participants**
  - **UTAC**

WP2 - Cost Benefit Analysis

- **Objective**
  - To determine the benefits and costs of improved compatibility for car frontal impact.
- **Participants**
  - **BASt (leader), CHUT, TRL, UTAC, Fiat**

WP3 - Crash Testing

- **Objective**
  - To perform crash tests and associated analyses to continue the development and perform initial validation of the 4 proposed test procedure outlines to improve car frontal impact compatibility
- **Participants**
  - **BASt, CHUT, Fiat, TNO, TRL (leader), UTAC**

WP3 - Crash Testing

Partner	Test Units	EuroNCAP LCW
BAST	10	5
CHUT	2	0
FIAT	5	0
TNO	2	10
TRL	12	6(**)
UTAC	12	5
TOTAL	43	26

WP4 - Modelling

- **Objective**
  - To provide modelling support for the development and initial validation of the crash test procedures and cost benefit analysis for car to car impact

- **Participants**
  - **CHUT, TNO(leader), TRL, UTAC**

WP5 - Synthesis of Test Procedures

- **Objective**
  - To determine test procedure strategy for car to car frontal impact, collate results from other work packages and write draft test procedures

- **Participants**
  - **BASt, CHUT, Fiat, TNO, TRL(leader), UTAC**

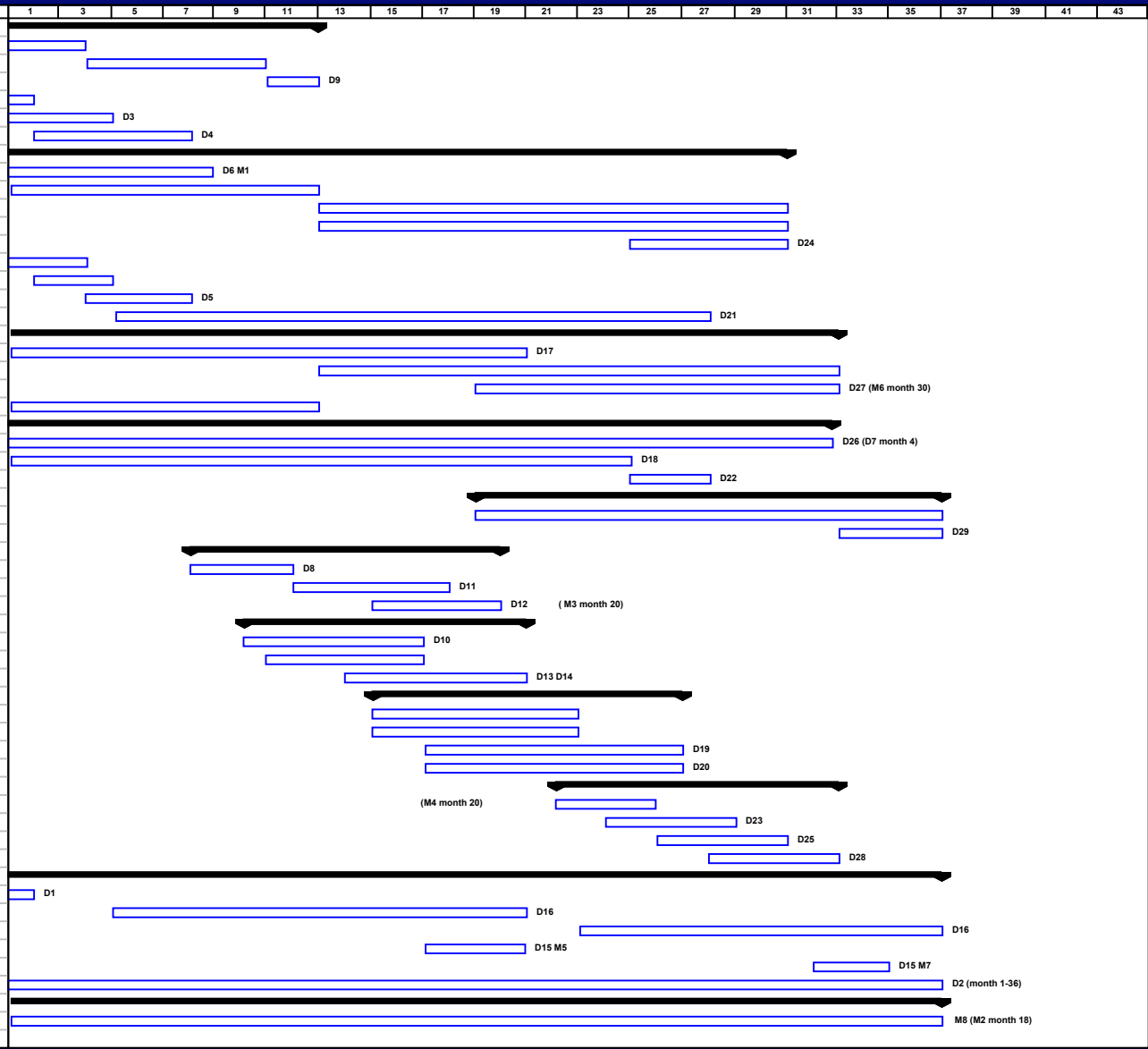
WP10 - Dissemination

- **Objective**
  - To facilitate the dissemination of results of the research to stakeholders in vehicle safety design and obtain feedback to ensure that the test procedures proposed are acceptable

- **Participants**
  - **BASt, CHUT(leader), Fiat, TNO, TRL, UTAC**

Timescales

ID	Task Name
1	**Work Package 1. Structural Analysis**
2	1.1/ Definition of car database structure and selection of car models.
3	1.2/ Measurement of geometric parameters and generation of database.
4	1.3/ Analysis of the database to investigate geometric compatibility
5	1.4/Definition of truck database structure and selection of trucks/trailers
6	1.5/Measurement of geometric parameters and generation of database
7	1.6/Analysis of current underrun devices
9	**Work Package 2. Accident Analysis and Cost Benefit Analysis**
10	2.1 Analyse national databases.
11	2.2 Develop benefit estimation methodologies for improved compatibility.
12	2.3 Estimate national benefits of improved compatibility.
13	2.4 Estimate cost of improved compatibility.
14	2.5 Estimate cost benefit for EU by extrapolation of national data.
15	2.6 National statistics update
16	2.7 In-depth analysis
17	2.8 Prediction of effects on having effective underride protection
18	2.9 Cost benefit assessments
20	**Work Package 3. Crash Testing and Analysis**
21	3.1/ Improvement of test procedures
22	3.2/ Modification of cars
23	3.3/ Initial validation of test procedures
24	3.4/ Analysis to support truck frontal under-run test procedure development.
26	**Work Package 4. Car to Car and Car to Barrier Crash Modelling**
27	4.1/ Modelling support for improvements of crash test procedures.
28	4.2/ Investigate Vehicle-Vehicle behaviour via fleet models
29	4.3/ Investigate Vehicle -Barrier relationship to real wold
31	**Work Package 5. Synthesis of Test Procedures for Car to Car Impact**
32	5.1/ Determine test procedure strategy.
33	5.2/ Draft test procedure outlines.
35	**Work Package 6. Determination of Injury Mechanisms for Car to Truck Impact**
36	6.1/ Preparation of trucks/trailers
37	6.2/ Full-scale reconstruction
38	6.3/ Summary, discussion, conclusions
40	**Work Package 7. Mathematical Modelling to support Car to Truck Crash Test**
41	7.1/ Numerical simulations, parameter studies
42	7.2/ Recommendations for crash testing and underrun protection design
43	7.3/ Establishment of reference
45	**Work Package 8. Determination of Methodology in underrun protection**
46	8.1/ Definition of the bullet vehicle
47	8.2/ Definition of the target: the fixation of the UPeaS
48	8.3/ Experimental evaluation bullet/target
49	8.4/ Numerical evaluation bullet/target
51	**Work Package 9. Synthesis of Test Procedures for Car to Truck Impact**
52	9.1/ Collection and grading of the relevant information
53	9.2/ Setup of procedure(s) and performance criteria
54	9.3/ Evaluation test procedure(s) and performance criteria
55	9.4/ Draft final version of test procedure(s) and performance criteria
57	**Work Package 10. Idustrial Liaison and Dissemnation**
58	10.1/ Industrial liaison/ Stakeholder survey
59	10.2/ Preparation of joint consortium papers
60	10.2b/ Preparation of joint consortium papers
61	10.3/ Project workshops: midterm and final
62	10.3b/ Project workshops: midterm and final
63	10.4/ Launch and maintenance of a project website
65	**Work Package 11. Project Management**
66	11.1/ Project management and administration
67	



Requested Role of EEVC WG15

- Steering group for technical issues
  - Expert advice, especially for determining final suite of test procedures
  - Link to industry
- Initial tasks envisaged include:
  - Compile list of tasks to do / questions to answer, to complete development and initial validation of candidate test procedures
  - Compile crash test matrix for above
  - Determine modelling work for above
  - Provide guidance for cost benefit analysis

Full Width Deformable Barrier Test

- Assessment protocol
  - Complete phase 1 development, includes setting suggested performance limits
  - Phase 2 development
- Validation
  - Proof of principle validation (phase 1)
  - Check that barrier design is acceptable, Are structures that are set back correctly assessed?
  - Initial validation (phase 2)
  - Are modified cars correctly assessed
- Further Developments ?

PDB Test

- Assessment protocol
  - Complete phase 1 development of assessment protocol, including suggested performance limits
  - Phase 2 development
- Validation
  - Proof of principle validation (phase 1)
  - Acceptability of barrier deformation measurement?
  - Initial validation (phase 2)
  - Are modified cars correctly assessed?
- Further Developments?

64 km/h Frontal Stiffness Test

- Assessment protocol
  - Development of assessment protocol for measuring LCW peak force and setting suggested performance limits
  - Phase 2
- Validation
  - Proof of principle (phase 1)
  - Is peak force an adequate measure to control stiffness?
  - Should vertical force distribution and / or average height of force be controlled in this test?
  - Initial validation (phase 2)
- Further Developments?

80 km/h Compartment Strength Test

- Assessment protocol
  - Develop assessment protocol and performance limits
  - Is a compartment stability criterion necessary?
  - Develop criteria to measure end of crash force
  - Phase 2
- Validation
  - Proof of principle
  - Is this test appropriate and acceptable to assess compartment strength, how sensitive is the test to variations in load path load sharing?
  - Initial validation (phase 2)
- Further Developments?