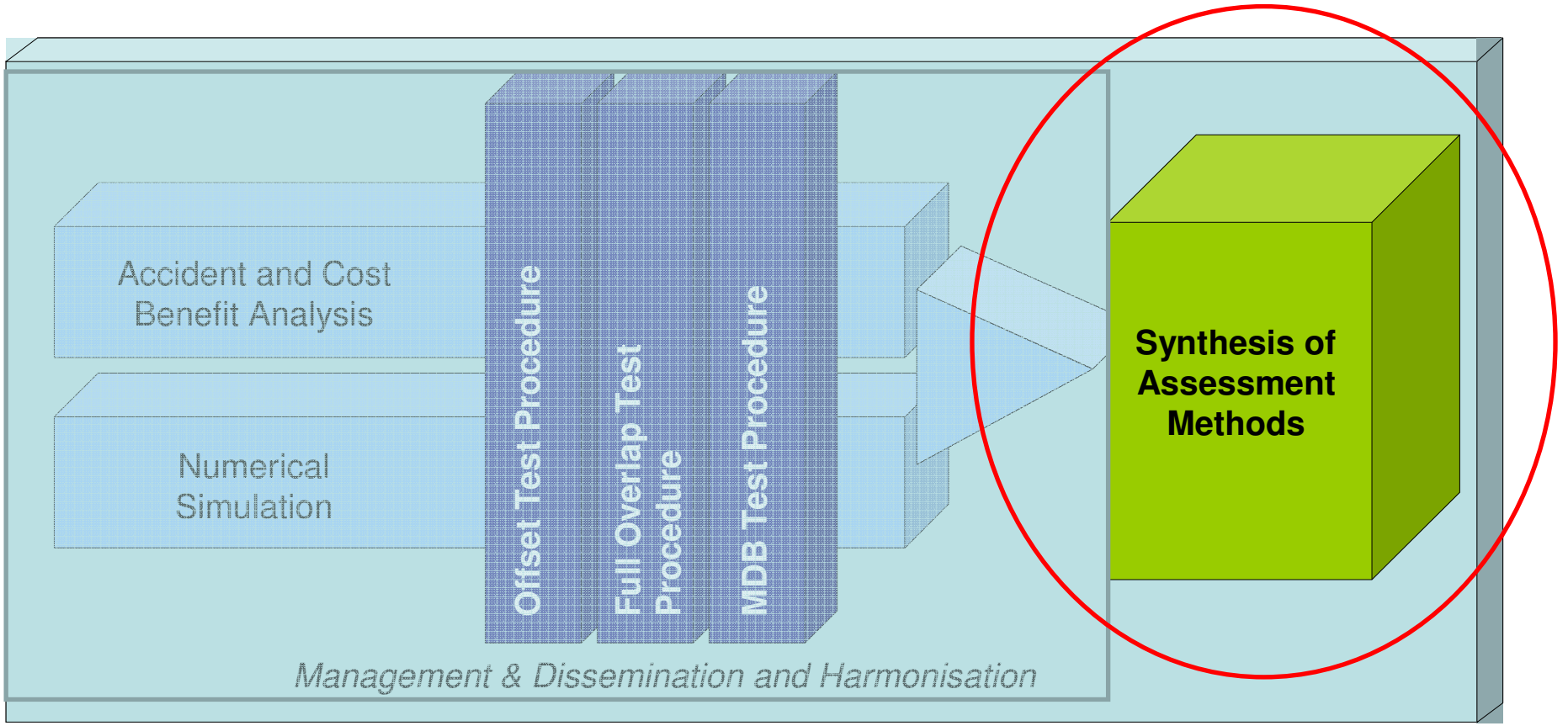
FIMCAR
frontal impact and compatibility assessment research

SEVENTH FRAMEWORK PROGRAMME

FIMCAR
Priorities and Strategies
for
Selecting Test Procedures

FIMCAR Project



FIMCAR Project

What is compatibility?

- Compatibility consists of self and partner protection
  - Structural interaction
  - Compartment strength
  - Front end force / deformation characteristics
    - force levels transferred to collision partner
    - deceleration pulse and restraint system

FIMCAR
frontal impact and compatibility assessment research

SEVENTH FRAMEWORK PROGRAMME

Global Priorities from FIMCAR and Previous Work

Assessment requirements

	Structural Interaction		Front End Force / Deformation (Consisting of)		Compartment integrity		Restraint system	
	Alignment	Load Spreading (Load paths / connections)	Deformation forces of frontal structures	Energy Absorption Management	Sufficient for single vehicle accident	Enhanced for light vehicles in vehicle to vehicle accident	(Assess over range of pulses)	Test Restraint Capacity
Priorities For FIMCAR	1	1	2	1	1	2	1	1

Strong Evidence in FIMCAR and previous studies

Acceleration injuries need to be addressed, small car issues hard to identify in FIMCAR data

Current R94 / EuroNCAP gains must continue, small car issues need further analysis

Acceleration injuries need to be addressed, assess safety for a range of pulses

FIMCAR
frontal impact and compatibility assessment research

SEVENTH FRAMEWORK PROGRAMME

How Frontal Impact and Compatibility Priorities are being addressed in FIMCAR

No.	Assessment requirements							
	Structural Interaction		**Front End Force / Deformation (Consisting of)**		**Compartment integrity**		**Restraint system**	
	Alignment	Load spreading (load paths / connections)	Deformation forces of frontal structures	Energy absorption management	Sufficient for single vehicle accident	Enhanced for light vehicles in vehicle to vehicle accident	(Assess over range of pulses)	Test restraint capacity
FWRB								
FWDB								
ODB								
PDB								
MDB (fixed mass/speed)								
MDB (variable mass/speed)								

FIMCAR has high priority on establishing structural interaction assessments using both a FW and Offset test – Choice of barrier types under investigation

FIMCAR
frontal impact and compatibility assessment research

SEVENTH FRAMEWORK PROGRAMME

How Frontal Impact and Compatibility Priorities are being addressed in FIMCAR

No.	Assessment requirements							
	Structural Interaction		Front End Force / Deformation (Consisting of)		Compartment integrity		Restraint system	
	Alignment	Load spreading (load paths / connections)	Deformation forces of frontal structures	Energy absorption management	Sufficient for single vehicle accident	Enhanced for light vehicles in vehicle to vehicle	(Assess over range of pulses)	Test restraint capacity
FWRB								
FWDB								
ODB								
PDB								
MDB (fixed mass/speed)								
MDB (variable mass/speed)								

Vehicles must have minimum energy absorption requirements, likely resolved with FW and offset test.

Force level issues rated as priority 2 and are unlikely to be resolved.

FIMCAR
frontal impact and compatibility assessment research

SEVENTH FRAMEWORK PROGRAMME

How Frontal Impact and Compatibility Priorities are being addressed in FIMCAR

No.	Assessment requirements							
	Structural Interaction		Front End Force / Deformation (Consisting of)		Compartment integrity		Restraint system	
	Alignment	Load spreading (load paths / connections)	Deformation forces of frontal structures	Energy absorption management	Sufficient for single vehicle accident	Enhanced for light vehicles in vehicle to vehicle accident	(Assess over range of pulses)	Test restraint capacity
FWRB								
FWDB								
ODB								
PDB								
MDB (fixed mass/speed)								
MDB (variable mass/speed)								

FIMCAR will maintain an offset test with sufficient test severity as current levels.

Special actions for small vehicles are still being investigated by accident studies

FIMCAR
frontal impact and compatibility assessment research

SEVENTH FRAMEWORK PROGRAMME

How Frontal Impact and Compatibility Priorities are being addressed in FIMCAR

No.	Assessment requirements							
	Structural Interaction		Front End Force / Deformation (Consisting of)		Compartment integrity		Restraint system	
	Alignment	Load spreading (load paths / connections)	Deformation forces of frontal structures	Energy absorption management	Sufficient for single vehicle accident	Enhanced for light vehicles in vehicle to vehicle accident	(Assess over range of pulses)	Test restraint capacity
FWRB								
FWDB								
ODB								
PDB								
MDB (fixed mass/speed)								
MDB (variable mass/speed)								

Full Width test is proposed to assess restraint capacity and address acceleration injuries found in accident analysis

Combination of tests is advised for sensor and restraint performance evaluation

FIMCAR
frontal impact and compatibility assessment research

SEVENTH FRAMEWORK PROGRAMME

Planned FIMCAR Results

1. Full Width test will be proposed
   - In order to create a high deceleration pulse
   - Use of deformable barrier to be determined
   - Metric for structural alignment to be proposed
   - Possible concept for frontal force level requirements
2. Offset Barrier test will be proposed
   - In order to test compartment integrity
   - PDB is only barrier being investigated for load spreading evaluation
   - Existing ODB will be maintained if PDB cannot meet necessary performance requirements

Planned FIMCAR Results

3. MDB will be developed with a PDB barrier face
   - structural evaluation criteria will be tied to PDB research
   - MPDB barrier can address mass ratio compatibility issues which are probably not fully addressed in the fixed barrier tests
   - MPDB envisaged as a replacement for an offset barrier test

FIMCAR
frontal impact and compatibility assessment research

SEVENTH FRAMEWORK PROGRAMME

FIMCAR Selection Process

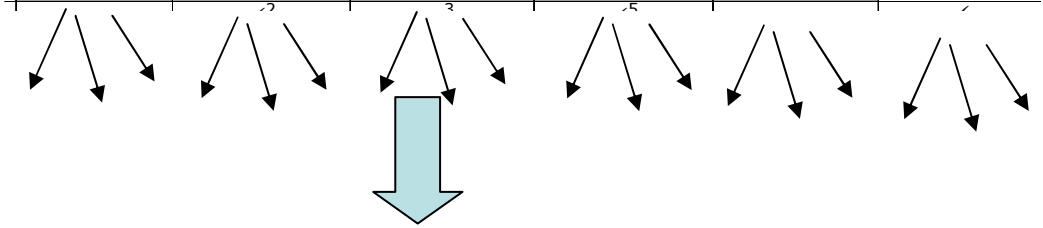
- Compatibility assessment is currently a subjective process
  - Vehicle performance is not easy to classify in ”pass/fail” terms for all 8 characteristics presented above
- FIMCAR final selection process to be established before candidate assessments are conducted

FIMCAR
frontal impact and compatibility assessment research

SEVENTH FRAMEWORK PROGRAMME

FIMCAR Test Synthesis Process

Assessment requirements					
Structural Interaction		Frontal force matching	Compartment integrity		Restraint system
Alignment	Load Spreading (Load paths / connections)	Limit aggressiveness of heavy vehicles	Sufficient for single vehicle accident	Enhanced for light vehicles in vehicle to vehicle accident	(Assess over range of pulses)



Test Data

Accident Data

Simulation Data

List of “test cases” to establish performance criteria

Possible Measurements			1) Assessment	2) Differentiates reference vehic	3) Results robu tolerance	4) Results robu tolerance
Show vertical force/deformation distribution of the car front *Geometry*	*Vertical Position*	*Vertical Extent*				
Candidate 1	330-580 mm	250 mm				
Candidate 2	350-600 mm	250 mm				
Candidate 3	406-508 mm	102 mm				

Library of car performance of “good” and “bad” behaviour

WP 6 Evaluation Procedure

FIMCAR
frontal impact and compatibility assessment research

SEVENTH FRAMEWORK PROGRAMME

Key Criteria for Assessing Test Candidates

- What is the best barrier face?
- Do the metrics proposed by FIMCAR address the compatibility issues?
- What are appropriate pass/fail thresholds?
- Do the assessment results reflect real world performance?
- Is the test severity appropriate?

http://www.fimcar.eu/