

Improved Exploitation of Composite Airframe Structures by Accurate Simulation of Collapse - The COCOMAT project

Aeronautics Days, Vienna, 19-21 June 2006

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**Deutsches Zentrum
für Luft- und Raumfahrt e.V.**
in der Helmholtz-Gemeinschaft



Overview

1. The EC 6th Framework Programme
2. POSICOSS and COCOMAT – Interaction
3. Consortium
4. Structures considered
5. What is collapse
6. Objective, workplan, main results
7. Benefit
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The EC 6th Framework Programme

Integrating and strengthening the European Research Area

Work Programme:

Priority 4: Aeronautics and Space

Area: Strengthening competitiveness

Objective: Reduction of aircraft development and operating costs by 20% and 50% in the short and long term, respectively.

COCOMAT contributes to this aim by:

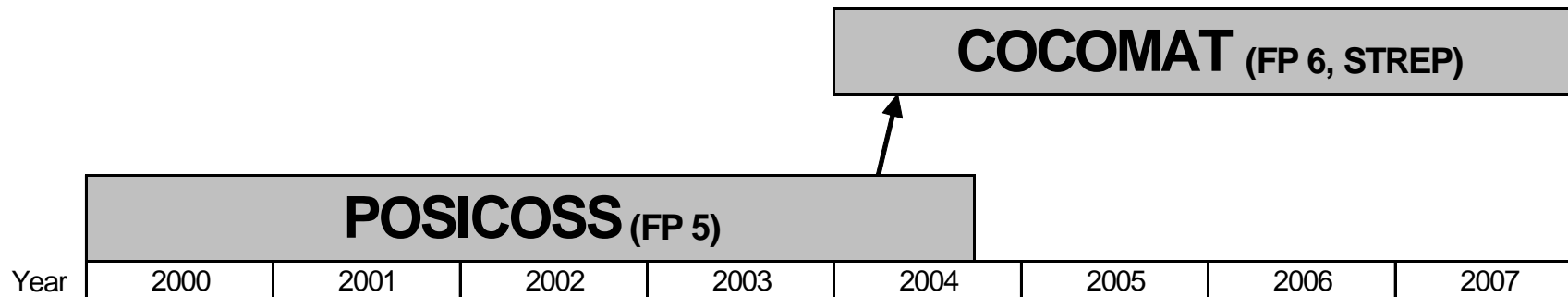
Instrument: Specific Targeted REsearch Project (STREP)

Goal: Reducing structural weight at safe design by exploitation of considerable reserves in primary fibre composite fuselage structures by accurate simulation of collapse



POSSICOSS and COCOMAT - Interaction

Improved **MAT**erial Exploitation
at Safe Design of **CO**mposite Airframe Structures
by Accurate Simulation of **CO**llapse





Improved
POstbuckling
SImulation for Design of Fibre
COmposite
SIstiffened Fuselage
SItructures








Consortium

 AGUSTA WESTLAND A FINMECCANICA COMPANY	I
	E
	GR
	IL
	PL
Large industries	

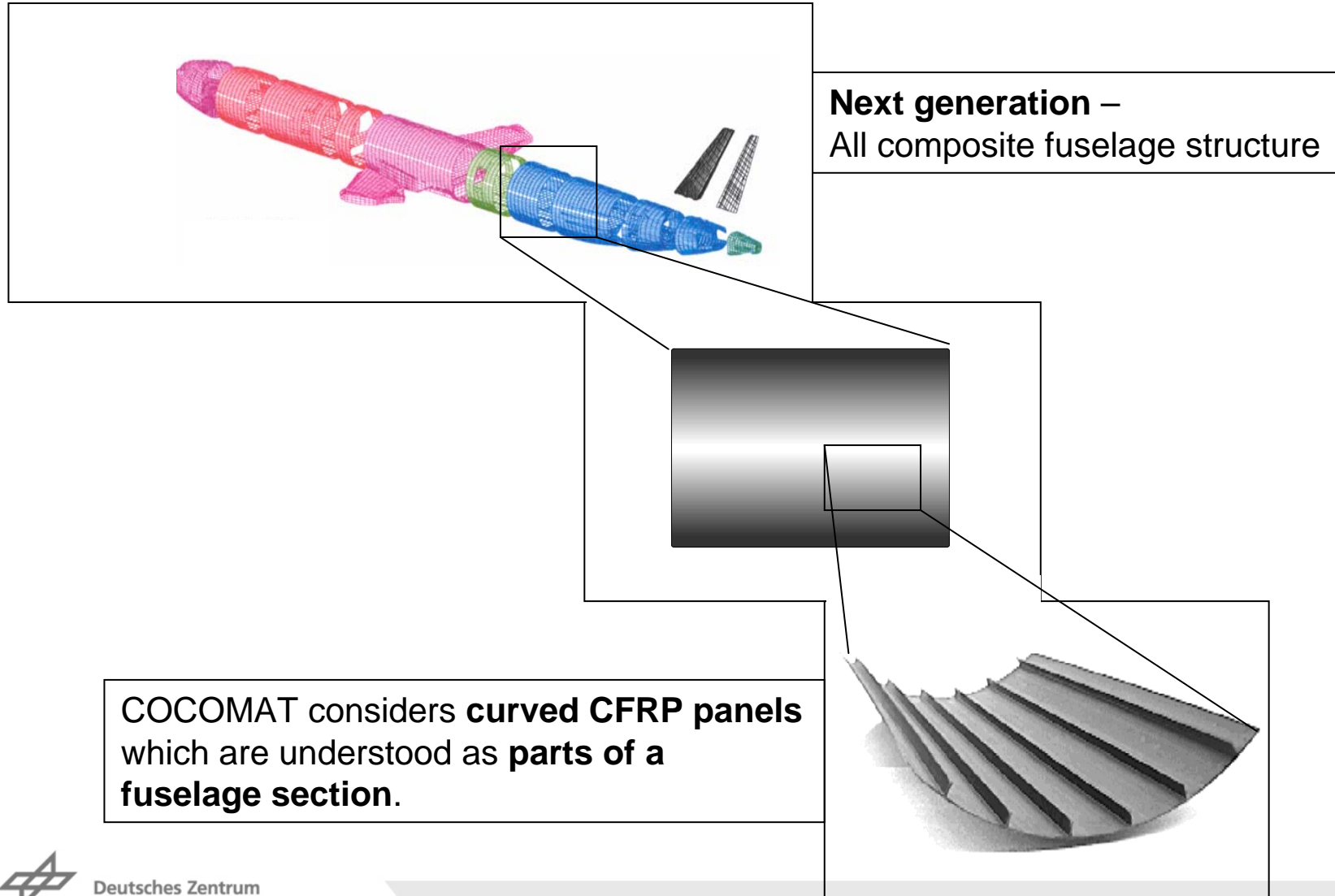
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SMEs	

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Research establishments	

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Universities	



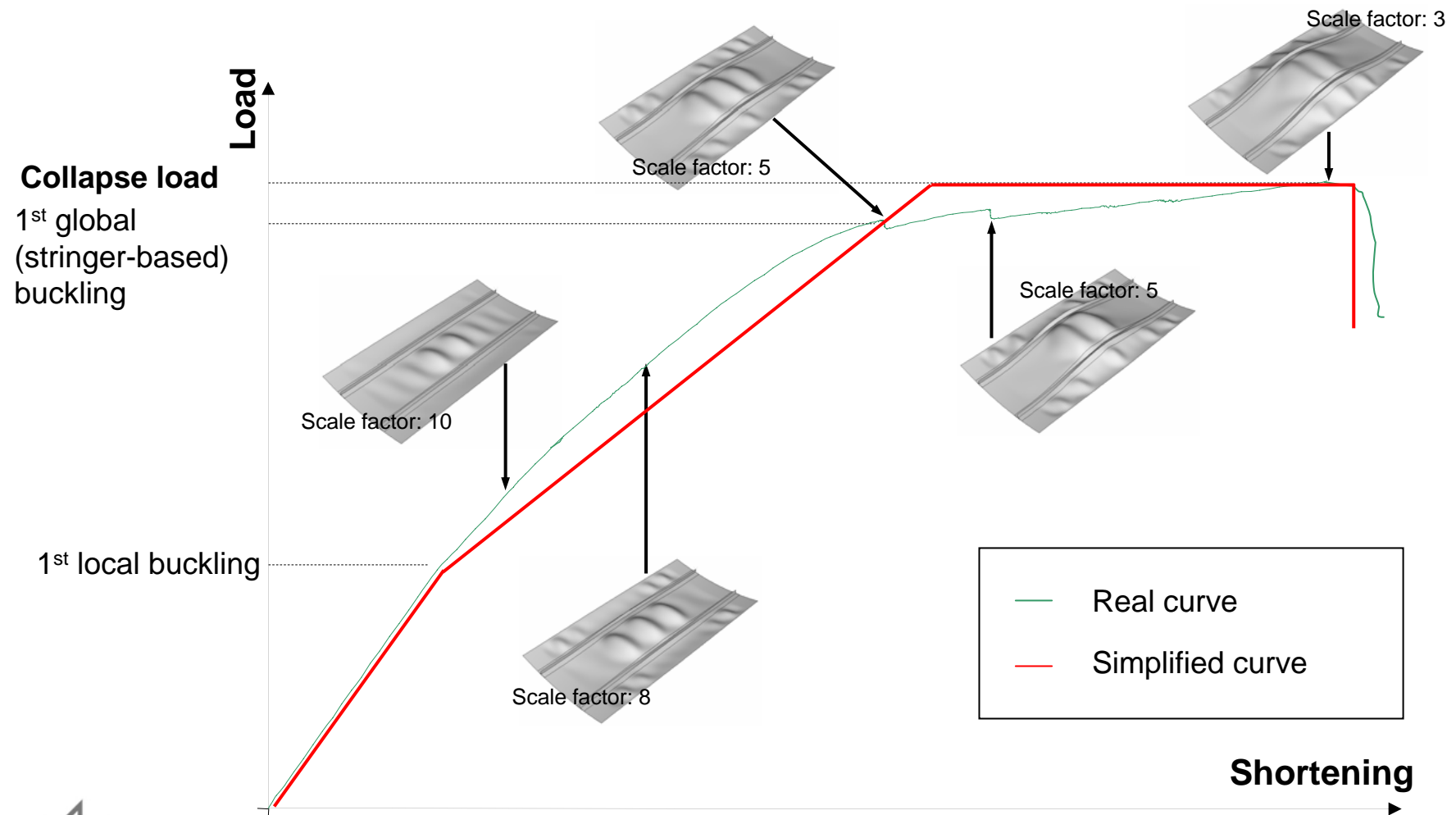
Structures considered





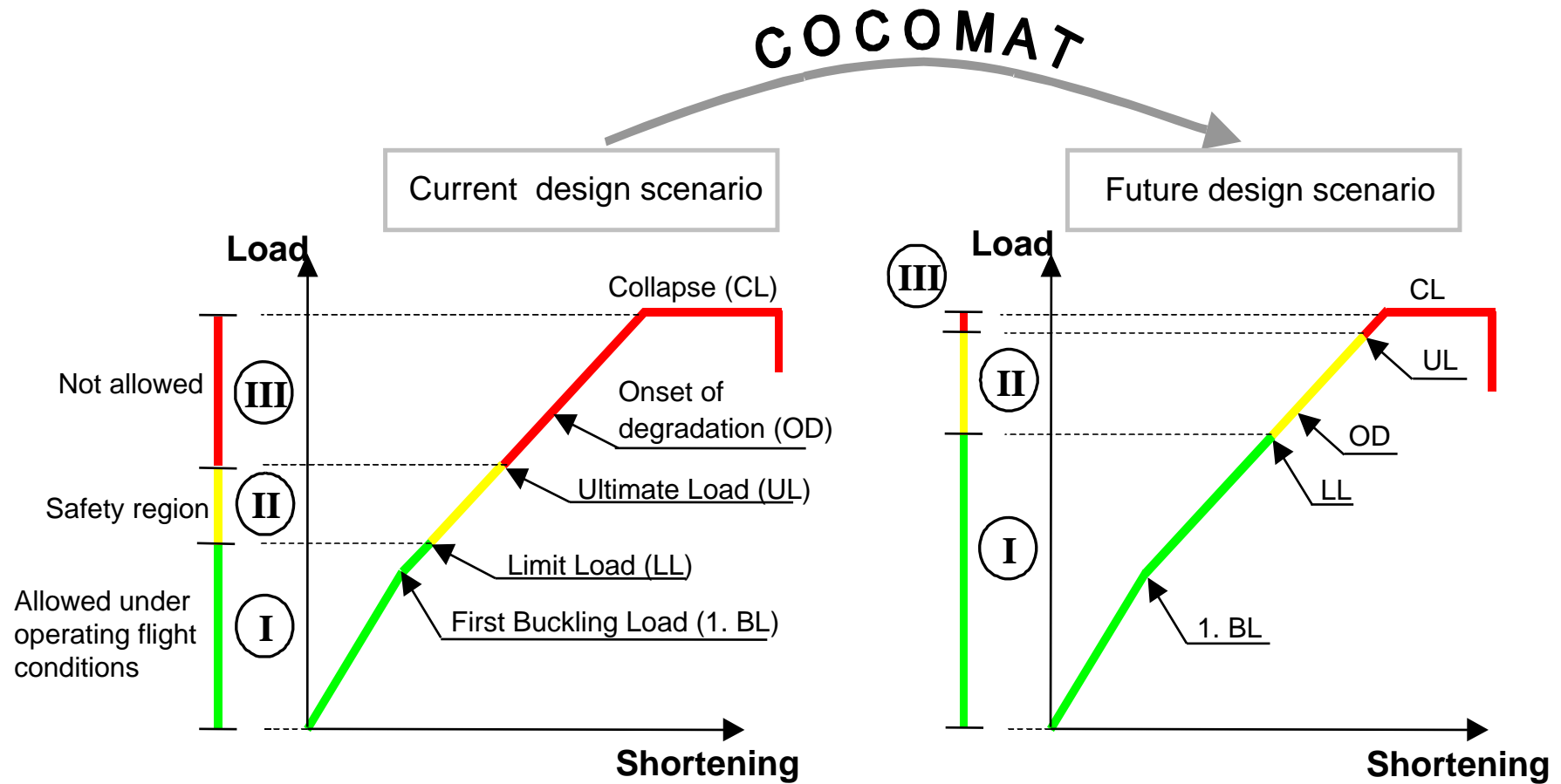
What is collapse

(Example: Axially compressed curved stiffened CFRP panel)





COCOMAT – Main objective

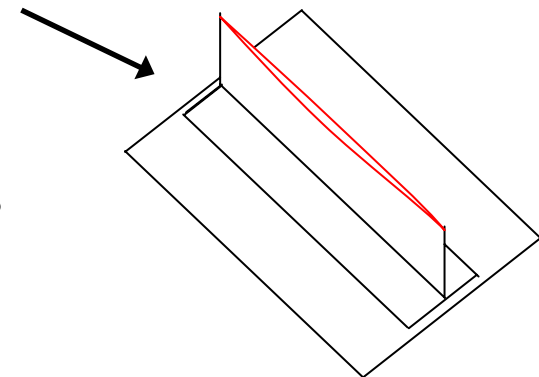
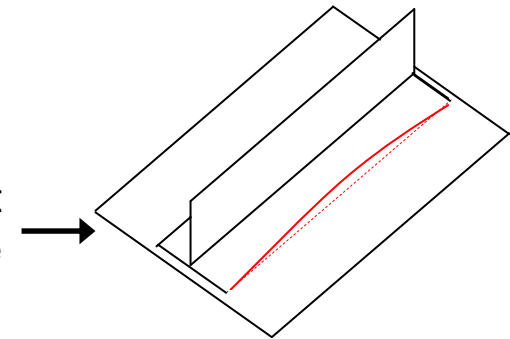




Kind of degradation

Failure propagation will be taken into account.

- Skin-stringer separation is considered as the most important and dangerous mode and will be investigated in any case.
- Delamination in the stringer blade was also observed in the POSICOSS project and will be considered.
- Delamination in the skin will be considered as less important case.



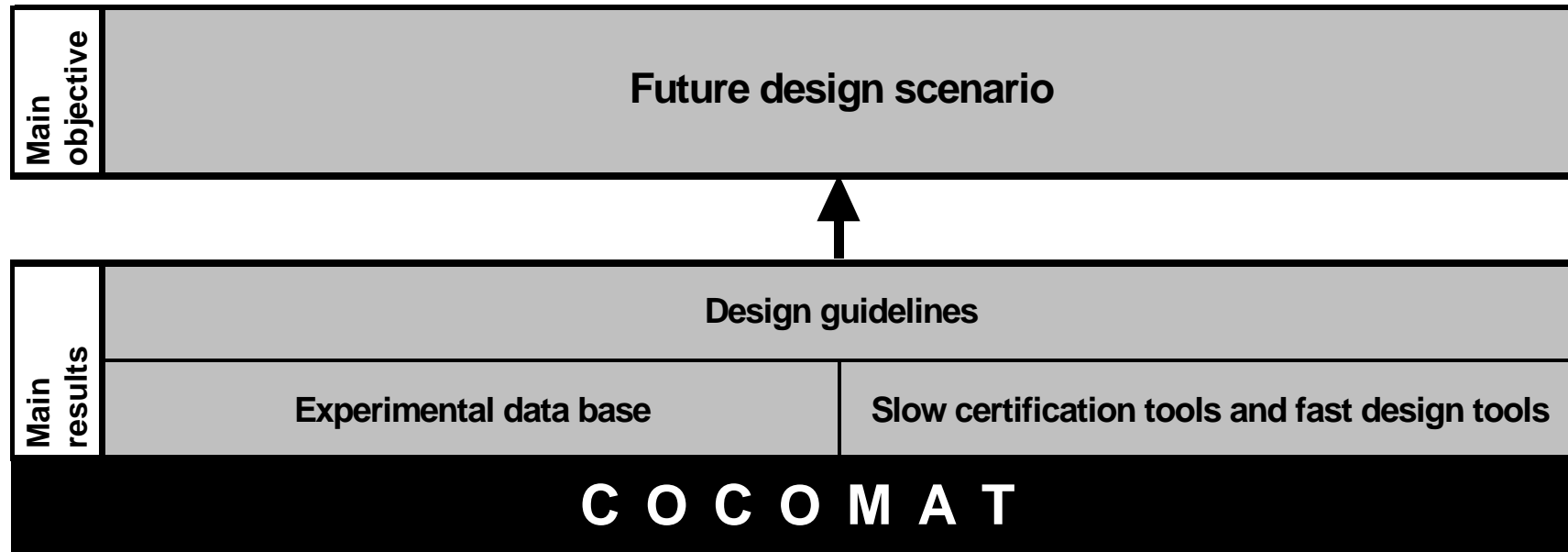


Work plan

WP 1: Benchmarking on collapse analysis of undamaged and damaged structures with existing tools				
WP 2: Material characterisation, damage investigation and design of structures for static and cyclic tests				
WP 3: Development of improved simulation procedures for collapse				
WP 4: Manufacture, inspection and testing by static and cyclic loading of undamaged panels from WP2				
WP 5: Manufacture, inspection and testing by static and cyclic loading of pre-damaged panels from WP2				
WP 6: Design guidelines and industrial validation				
Year	2004	2005	2006	2007


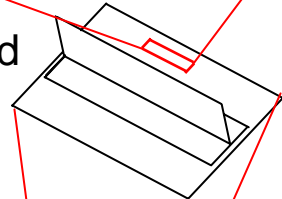
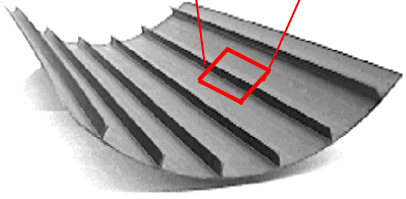


COCOMAT – Main results



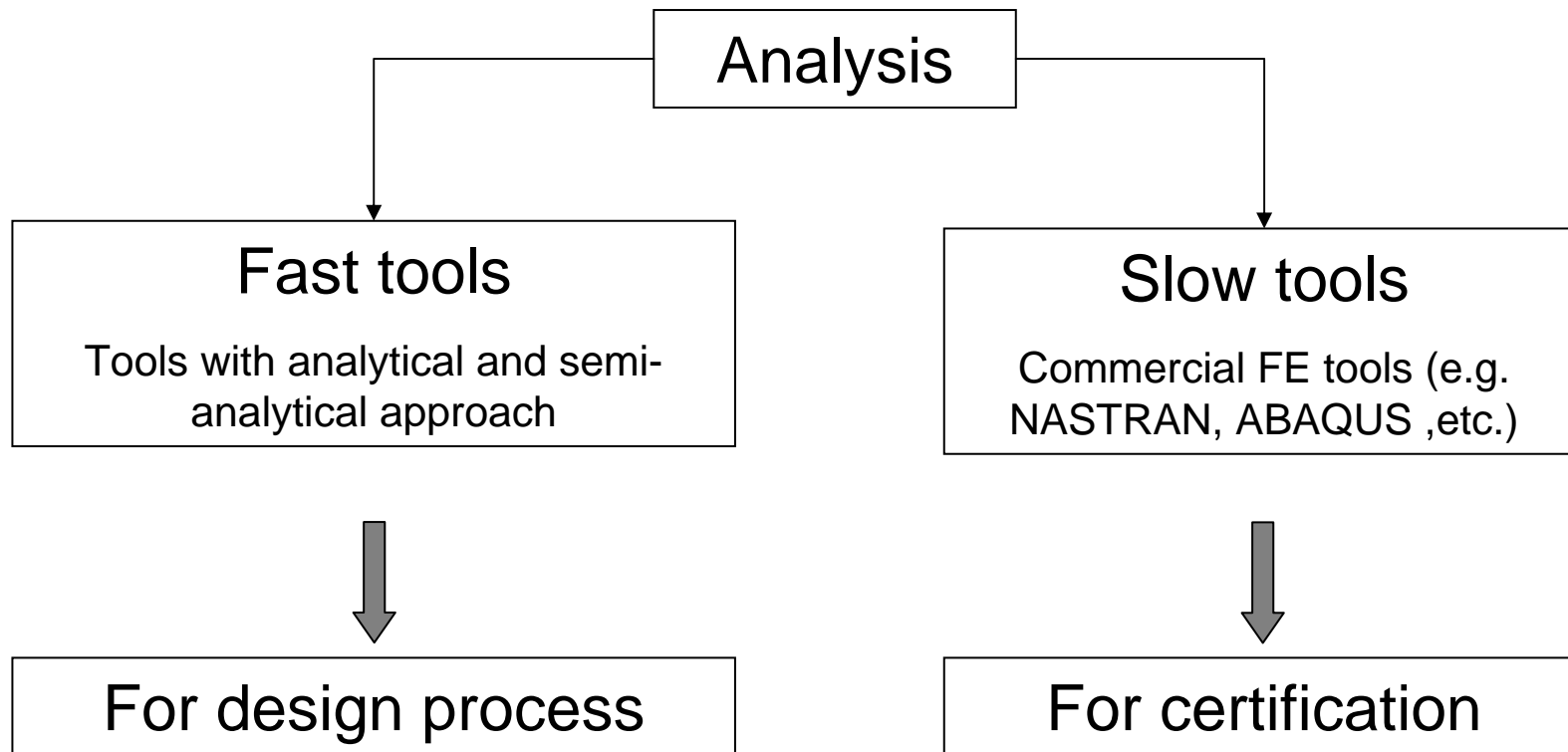


Experimental data base

Workpackage		Kind of structure	Objective
WP 2.1	Characterisation of material properties	<p>Specimens</p>  <p>GFRP layer</p>	Material properties
WP 2.2	Investigation of degradation by tests and development of degradation models	<p>Stiffened strips</p> 	Degradation models for the improved tools
WP 4	Manufacture, inspection and testing by static and cyclic loading of	<p><u>undamaged</u> panels</p> 	Validation of the improved tools
WP 5		<p><u>pre-damaged</u> panels</p>	



Simulation Tools





Benefit


- Results transferable to other airframe structures
- Contribution to *Reduced development and operating costs, by 20% and 50% in the short and long term, respectively.*
- Improvements in competitiveness of future European aircraft
- Traditional aircraft design can be replaced by an advanced procedure including degradation models for composite structures
- Considerably reduced structural weight at safety not impaired
- Reduced design and analysis time
- Substantially improved response-to-market time




Dissemination of results

- Training courses at industry
- Lectures at universities
- Continual contact with certification authorities
- Presentations at technical conferences
- Users' Group
- Internet presentation

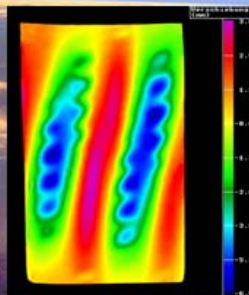


 **COCOMAT**
 Improved **MAT**erial Exploitation
 at Safe Design of **CO**mposite Airframe Structures by
 Accurate Simulation of **CO**llapse

Specific Targeted Research Project
 funded by the **European Community**
 Thematic Priority 4 - Aeronautics and Space



[Project flyer](#) [Project film](#) [Publications](#) [Conferences](#) [Forerunner project POSICOSS](#)



List of participants:

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2. [AGUSTA](#)
3. [GAMESA](#)
4. [Hellenic Aerospace Industry](#)
5. [Israel Aircraft Industries](#)
6. [PZL Swidnik](#)
7. [SAMTECH](#)
8. [SMR S.A.](#)
9. [CRC-ACS –Advanced Composite Structures Limited](#)
10. [FOI – Swedish Defence Research Agency](#)
11. [Karlsruhe University](#)
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15. [TECHNION](#)

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Link to POSICOSS homepage