

BCOOL

Low Cost and High Efficiency CO2 MAC system for lower segment cars

Speaker: Roberto Monforte - FIAT Auto

Fiat Auto - Corso Agnelli 200 - Torino - Italy

Project Leader: Carloandrea MALVICINO - Centro Ricerche Fiat

- **Project Major Objectives**
- **The Consortium**
- **Project motivations**
- **Technical and Scientific Objectives**
- **WorkFlow and Timing**

Development of a low cost and high efficiency air-conditioning system based on CO₂ (R-744) for A, B and similar vehicles (low C class or LCV)

Identification of agreed methods to assess:

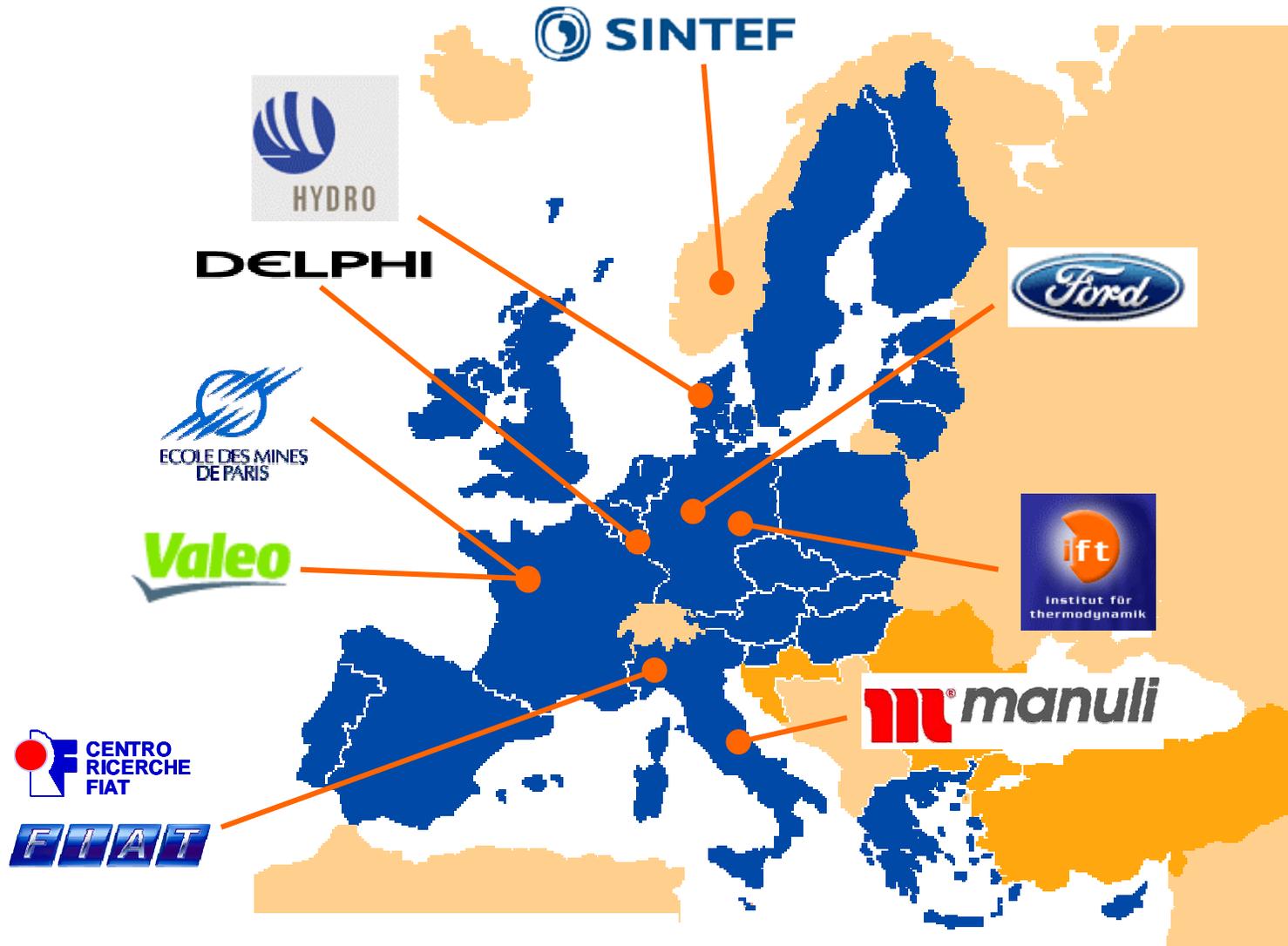
- **performance**
- **fuel annual consumption**
- **environmental impact**

This will constitute a first step for EU new standards

- **The Project cost is of about 6 Millions of Euro**
- **The EU supports the project in the framework of the “Sustainable development, global change, and ecosystems” research program**



SIXTH FRAMEWORK PROGRAMME

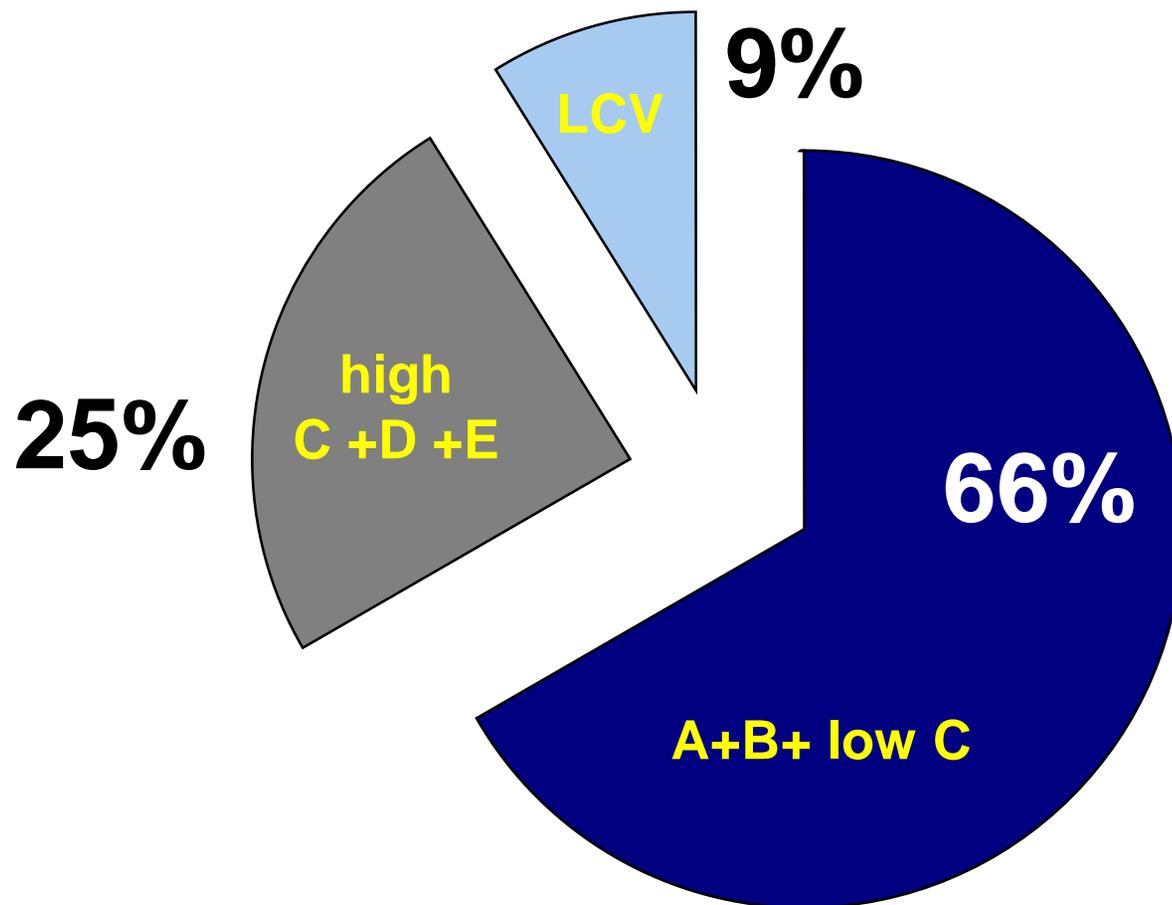


- **Centro Ricerche Fiat/Fiat Auto** - **C. Malvicino/R. Monforte**
- **Ford-Werke GmbH** - **M. Markowitz**
- **Delphi Automotive Systems** - **N. Achaichia**
- **Valeo Systèmes Thermiques** - **D. Pouret**
- **Manuli Automotive S.p.A.** - **P. Mancinelli**
- **Hydro Aluminium** - **C. Post**
- **ARMINES - Paris** - **D. Clodic**
- **SINTEF Energy Research** - **A. Hafner**
- **Tech. Univ. of Braunschweig** - **J. Köhler**

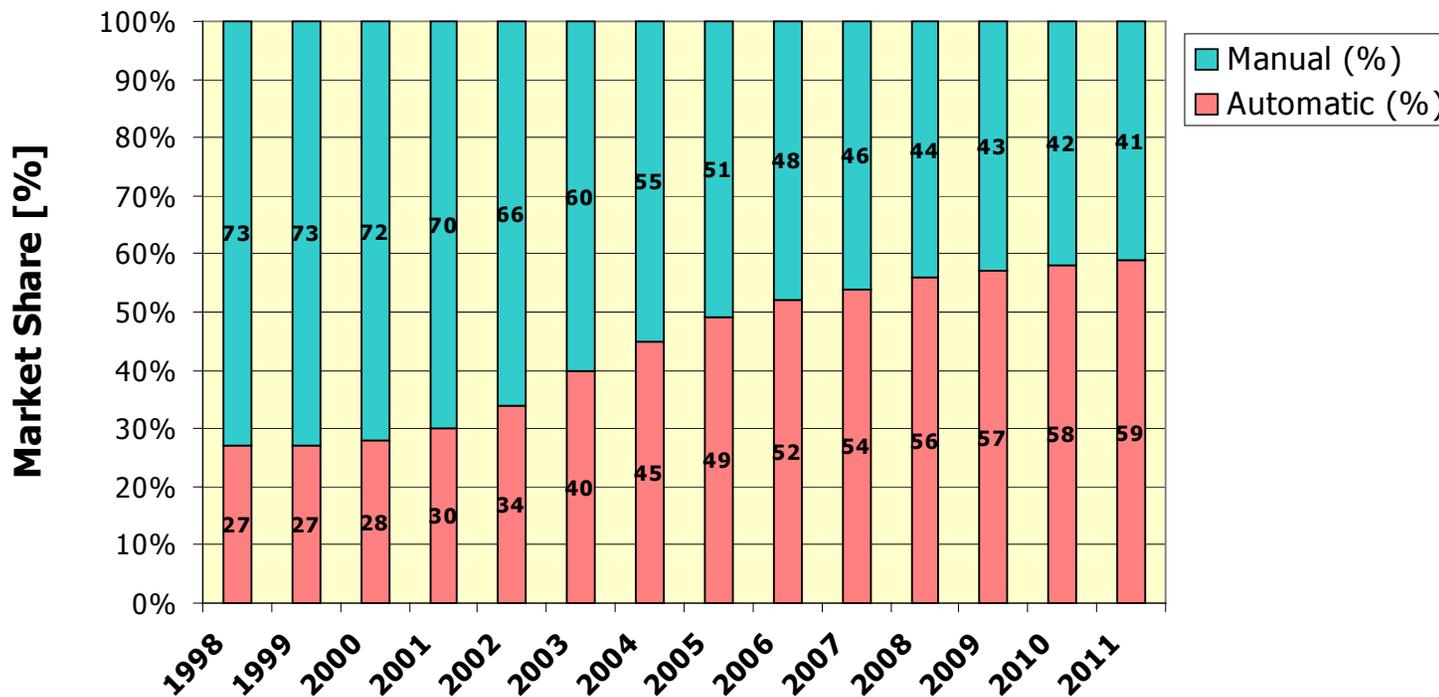
- **Centro Ricerche Fiat/Fiat Auto** - **Coordinator/End User**
- **Ford-Werke GmbH** - **End User**
- **Delphi Automotive Systems** - **Components development**
- **Valeo Systèmes Thermiques** - **Components development**
- **Manuli Automotive S.p.A.** - **Flexible Hoses and Fittings**
- **Hydro Aluminium** - **Aluminium lines and heat exch. tubing**
- **ARMINES – Paris** - **Standards identification**
- **SINTEF Energy Research** - **Life Cycle Analysis and Tech. Support**
- **Tech. Univ. of Braunschweig** - **Mathematical modelling**

The lower priced vehicles constitute up the 70% of the present EU car market.

This number will rise up to the 80% with the EU enlargement.



EUROPE: MANUAL AND AUTOMATIC A/C SYSTEMS



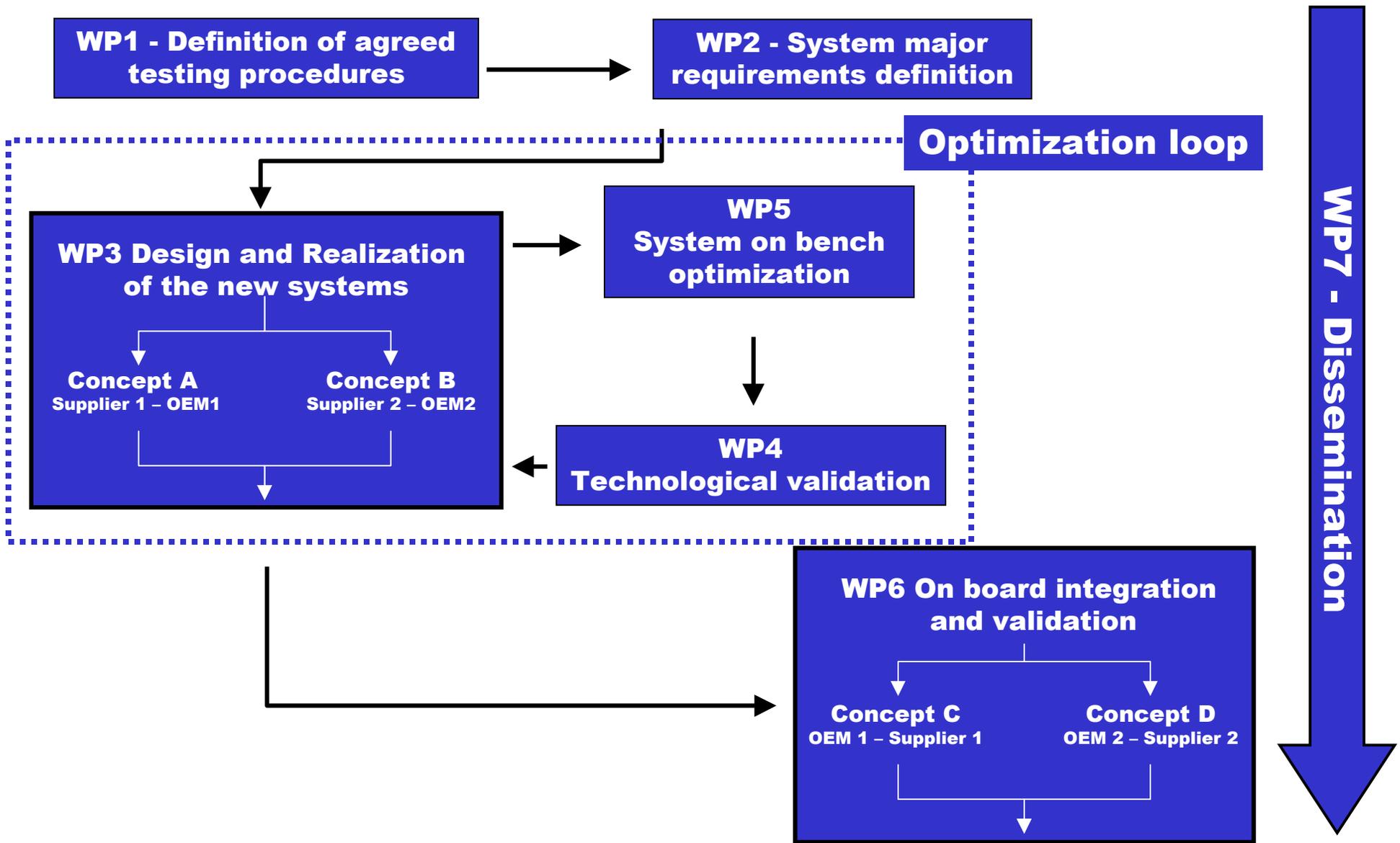
The diffusion of automatic systems is reaching 60%, after that it is expected to remain nearly constant.

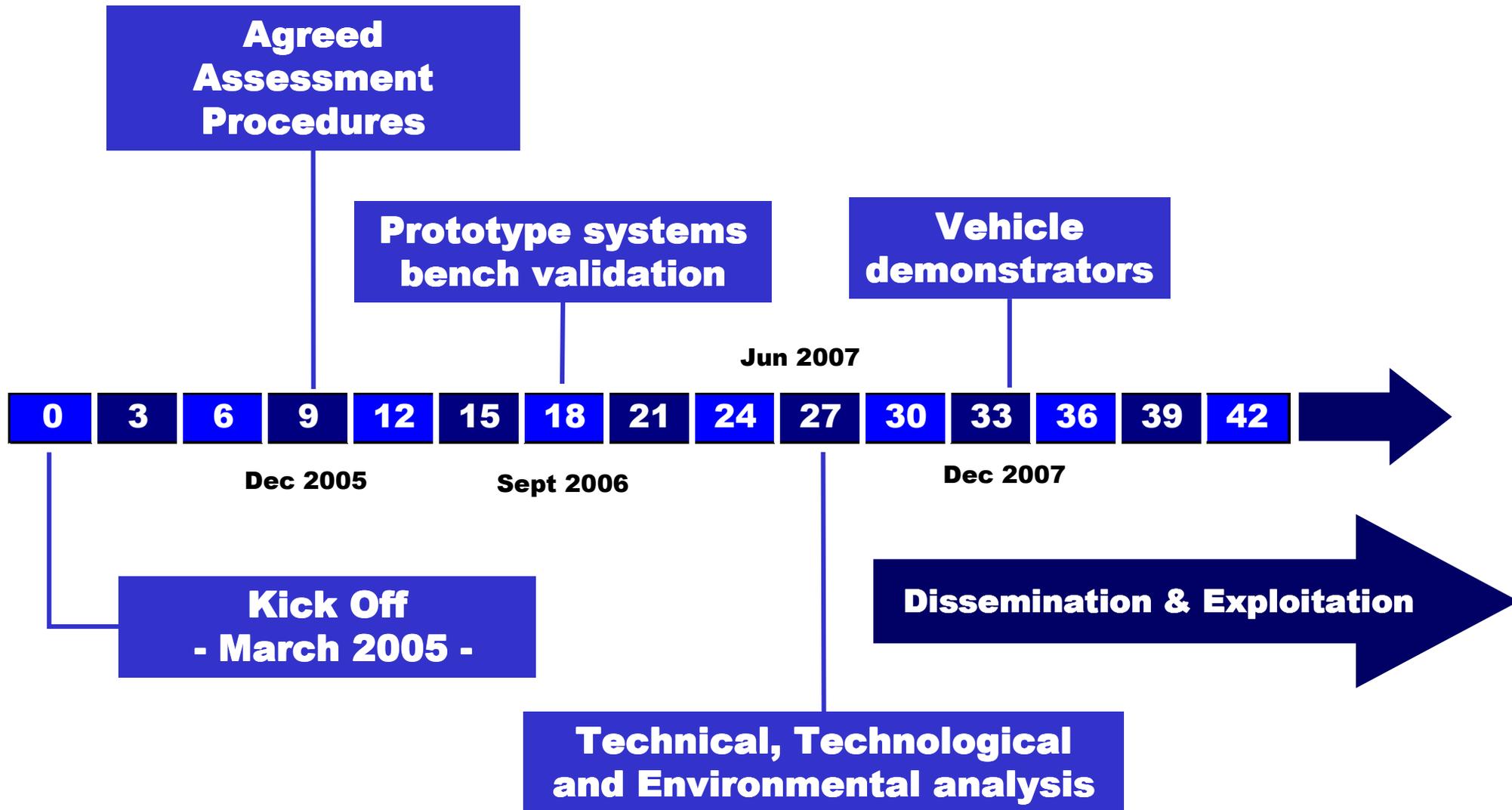
A low cost and high efficiency CO₂ (R-744) system will:

- **allow a rapid diffusion of CO₂ systems with the related environmental benefits**
- **increase the EU competitiveness**

		Technical Advances	
		R-134a	B-COOL
B- Class Vehicle	Comfort rate (1-10 scale)	7.5	7.5
	Fuel over consumption (l/100km) @ 28 °C - 50% R.H. NEDC cycle	18%	14%
	Cost - 500 kPcs/year (Euro)	185	215
	Weight (kg)	10.5	11.5
	Reliability - failure freq. 12 months		Equivalent to present R-134a systems
	Re - Charge period	2 year	2 year
	Safety	100%	100%

Scientific and Methodological Advances		
	State of the art	B-COOL
Modelling tools	Limited Transient conditions	Full Transient conditions including controls and oil separation effect
EU Standards		
	State of the art	B-COOL
Comfort	None	Proposal for EU Standard
Fuel overconsumption	None	Proposal for EU Standard
Environmental impact	None	Proposal for EU Standard







Thank You



DELPHI

