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List of KATnet II partner organisations

Role	No	Organisation	Short name	Country	Date enter project	Date exit project
CO*	1	Airbus Operations GmbH	A-D	DE	Month 1	Month 39
CR	2	Airbus Operations Ltd	A-UK	UK	Month 1	Month 39
CR	3	Airbus Operations SL	A-E	ES	Month 1	Month 39
CR	4	EADS Military Aircraft	EADS M	DE	Month 1	Month 39
CR	5	Dassault Aviation SA	DAA	FR	Month 1	Month 39
CR	6	Alenia Aeronautica S.p.A.	ALA	IT	Month 1	Month 39
CR	7	Deutsches Zentrum für Luft- und Raumfahrt	DLR	DE	Month 1	Month 39
CR	8	ONERA	ONE	FR	Month 1	Month 39
CR	9	QinetiQ Ltd	QQ	UK	Month 1	Month 39
CR	10	Swedish Defense Research Agency	FOI	SE	Month 1	Month 39
CR	11	Vyzkumny a zkusebni letecky ustav, a.s.	VZLU	CZ	Month 1	Month 39
CR	12	Dziomba Aeronautical Consulting	DAC	DE	Month 1	Month 39
Subcontractor		BAE SYSTEMS	BAE-S	UK	Month 1	Month 39
			Project funded by the European Community under the Sixth Framework Programme			

*CO = Coordinator
CR = Contractor

Overview

KATnet II was a co-ordinating action on Key Aerodynamic Technologies focusing on open upstream research from 2006 to 2009. It was providing input to the development of strategies and technologies to meet potential future aeronautical requirements on emissions, fuel consumption, noise and safety.

KATnet was covering the relevant technology areas for aircraft performance improvement including the corresponding EU funded projects/ platforms as

- **Aircraft Configuration Technologies - TA1**
  Shape Optimisation – Adaptive Sections – Wing-Tip Devices – High Lift Systems – Engine Integration – Novel Configurations

- **Drag Reduction Technologies - TA2**
  Laminar Flow Technology – Turbulence Control – Vortex Drag Reduction Technologies – Wave & Interference Drag Reduction Technologies

- **Separation Control Technologies - TA3**
  Control Surfaces – Vortex Generators – Surface Suction – Tangential Blowing – MEMS – Load Control

The addressed relevant RTD projects in TA1 are NACRE, HISAC, FLIRET (finished), REMFI, EUROLIFT II and M-DAW; TELFONA, SUPERTRAC and M-DAW in TA2; in TA3 AWIATOR (finished), EUROLIFT II, AEROMEMS II, AVERT and UFAST. The Integrated Technology Demonstrator (ITD) Smart Fixed Wing Aircraft (SFWA) of the Joint Technology Initiative “CleanSky” addresses topics on all three areas.

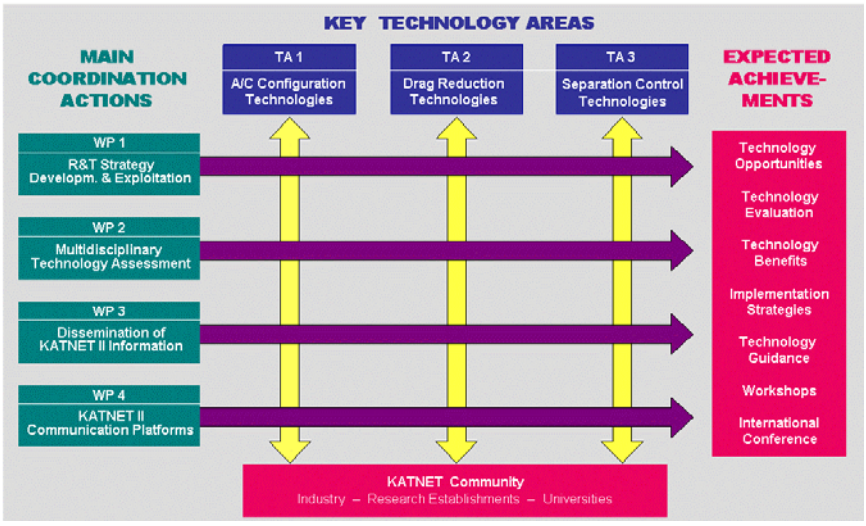
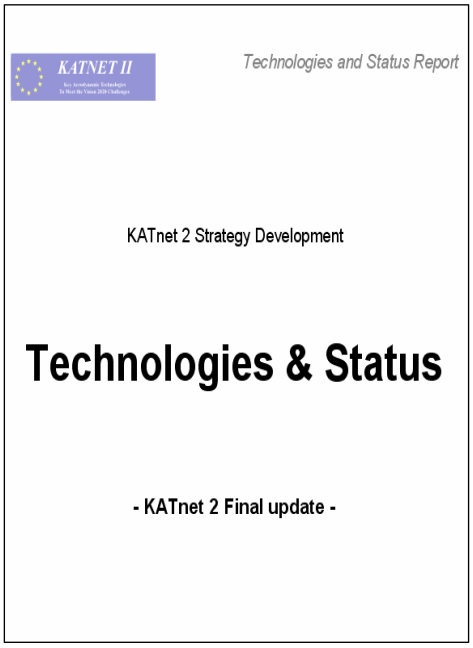


Figure 1 KATnet II Work Flow Matrix

The KATnet II work programme was set up as a matrix structure (Figure 1), combining the management capabilities of the Work Packages (WP) with the technological competence of the Technology Areas (TA).

The networking activities provided by KATnet II are implemented through four main areas of activity:

The R&T Strategy Development & Exploitation identifies critical technologies and promotes their development for meeting the Vision 2020 targets.



The primary objective of this work package was to identify those aerodynamic technologies which have the potential to deliver to a more effective, environmentally friendly air transport system and improve the competitiveness of future European aerospace products. In addition to build up the necessary roadmap for those identified technology to be implemented, including running activities and possible gaps.

The key outcome of this activity is a technology implementation strategy written down in the KATnet II strategy development document. It provides an overview of key aerodynamic technologies identified within the KATnet network and how they are aligned against the European aerospace Vision 2020 goals. The main findings are presented below.

A number of technologies are identified having now reached a significant level of maturity. They have been flight tested with the AWIATOR and SILENCE® projects. These technologies have high potential for a further step towards the Vision 2020 goals.

Significant improvements in drag and noise can be made though the adoption of a Proactive Green Aircraft configuration. This is optimised for minimum fuel burn and noise and has a relatively low cruise Mach number enabling a reduced wing sweep, but increased span and therefore low induced drag. This has a significant benefit on high and low speed performance. The reduced sweep allows for the exploitation of Natural Laminar Flow.

A number of as per today relatively immature technologies have been identified which can give a further step in the direction of the Vision 2020 goals and, if successful, could see the goals being achieved. These technologies mostly fall into the area of flow control of which 3 categories can be defined.

- *Separation control* – offers a reduction in aircraft weight for the same level of performance. Potential in terms of improving high lift and control device effectiveness. Sub-Boundary Vortex Generators are well known, however the use of mass-less jets may be a more effective means of separation control to be realised.
- *Active delay in laminar-turbulent transition* – offers significant drag reductions but at the cost of increased complexity. The mass transpiration solution (hybrid laminar flow control) is well understood however the application of new technologies such as Micro-Electro-Mechanical Systems (MEMS) and distributed roughness could yield greater benefits and are worthy of investigation.
- *Reduction in turbulent skin friction* – offers some drag reduction though the exploitation of micro and nano-scale technologies to control turbulent structures in the boundary layer. Fundamental flow physics research is required to understand the mechanisms for achieving a significant drag reduction.

The Multidisciplinary Technology Assessment pays attention to technologies with a strong dependence on multidisciplinary effects such as performance related technologies, aerodynamic noise and safety.

An online Multidisciplinary optimisation and Trade Study Tool *AeroSens* was developed to allow researchers assessing online a technology evaluation tool based on real aircraft applications. Interested scientists can enter their research topic and get an estimate on the potential benefit this technology will have for future, but also for existing aircraft. The tool calculates (estimates) the impact of a technology relative to two standard aircraft configurations, a two engine short range aircraft for 150 passengers and a four engine long range aircraft for 295 passengers.

Figure 2 Internet entry page to the AeroSense technology Assessment tool of FLIRET.

The tool is hosted on the website of the KATnet partner DLR and is linked to the KATnet II website www.kat-net.net. This arrangement allows access to the tool beyond the lifetime of KATnet II. Figure 3 provides a screen shot of one of a variety of options for the online presentation of the results for a specific query.

Figure 3 Presentation of the results comparing influence of different technologies to the reference aircraft performance. Here shown are the attributes thrust, lift over drag and block fuel

Dissemination of KATnet II Information is concerned with providing network support by updating/using the existing KATnet website, distributing newsletters, and promoting involvement of the academic community networks.

The website as main public window of KATnet II (www.kat-net.net) provides information on KATnet II itself as well as on the relevant topics, cf. **Figure 4**. The KATnet II Strategy and Roadmap documents were made available and a link to the KATnet II AeroSens multi-disciplinary technology evaluation tool is offered.

Figure 4 Screenshot of the KATnet II website

KATnet II Communication Platforms used the existing KATnet know-how to organise an international conference and four international workshops. The following table provides an overview on the events organised.

Date	Title	Location	Partici-pants
23/24 Apr 07	Workshop on KATnet R&T Strategy Development	Getafe, Spain	19
28/30 Jan 08	Workshop on Multi-Disciplinary Design Optimisation	Braunschweig, Germany	65
1/3 Apr 08	Workshop on Separation Control	Toulouse, France	61
14/16 Oct 08	Workshop on Drag Reduction & Configuration Technologies	Ascot, UK	75
12/14 May 09	Conference on Key Aerodynamic Technologies to meet the Challenges of the Vision 2020	Bremen, Germany	About 150

The workshops and the conference were widely recognised events with international participants including specialist from the United States.

Organising the Conference required selecting the papers, the sessions and respective chairmen. Keynote presentations were given by all the major parties concerning the 2020 vision challenges from the perspectives of the legislators, airframe manufacturers and the research community. Around 75 invited and formal papers were presented and the conference was concluded with an informative round table discussion, where the format and content of the conference were praised and a consensus was reached that the work of KATnet should be carried on into a further programme. All presentations and papers that were available were distributed on CD-ROM at the conclusion of the conference and further presentations have been made available on the KATnet website.

Figure 5 CD ROM with the proceedings of the KATnet II conference

Acknowledgements

The consortium would like to thank the European Union for the support of KATnet II.