"To achieve a very large step change in the performance of aircraft requires a radical, integrated approach. We are highly committed to this project and look forward to its success."

Dr Nigel Birch, Rolls-Royce plc

This project's appeal goes far beyond the air transport sector, touching the lives of virtually everyone who uses or lives near an airport.

By embracing this larger community, the Silent Aircraft Initiative seeks to produce a truly optimised concept design that is technically feasible, economically viable and contributes to the prosperity of the UK in an environmentally sustainable way.

There are many benefits to joining the Silent Aircraft Initiative

- **Insight into future developments in air transport, policy, knowledge exchange and education**
- **Access to world-class researchers**
- **A forum for influencing future research and policy-making decisions**
- **An extensive network of potential partners**
- **Special interest groups**

Profs Jack Kerrebrock, Head of Research at CMI, Karen Willcox and ZoltanSpakovzsky of MIT and Prof Ed Greitzer, Lead PI at MIT

Delegates at a recent twice-yearly summit meeting held at the University of Cambridge

Prof Ann Dowling, Lead PI at Cambridge and Hilary Barton, Head of Noise Engineering at Rolls-Royce

Cambridge–MIT Institute

The Cambridge-MIT Institute (CMI) is a pioneering partnership between Cambridge University and the Massachusetts Institute of Technology (MIT).

CMI was set up in 2000 to enhance the competitiveness, productivity and entrepreneurship of the UK economy by improving the effectiveness of knowledge exchange between university, industry and government.

Knowledge Integration Communities – look out for the latest CMI strategy document and the forthcoming paper by Edward Acworth & Siddhartha Ghose, The Cambridge-MIT Institute, November 2004

Reaching out

Our twice-yearly summit meetings give partners a chance to discuss our latest research findings, present their own and keep up to date with other advances in their various fields.

We also work with other knowledge transfer professionals to share our experiences and find new ways to engage, particularly with SMEs and existing initiatives, with a view to improving competitiveness through better knowledge exchange.

How can my organisation get involved?

We are interested to hear from anyone connected with air transport, education, knowledge exchange or public service.

For more information about any aspect of the Silent Aircraft Initiative or how you will benefit from partnership, please contact:

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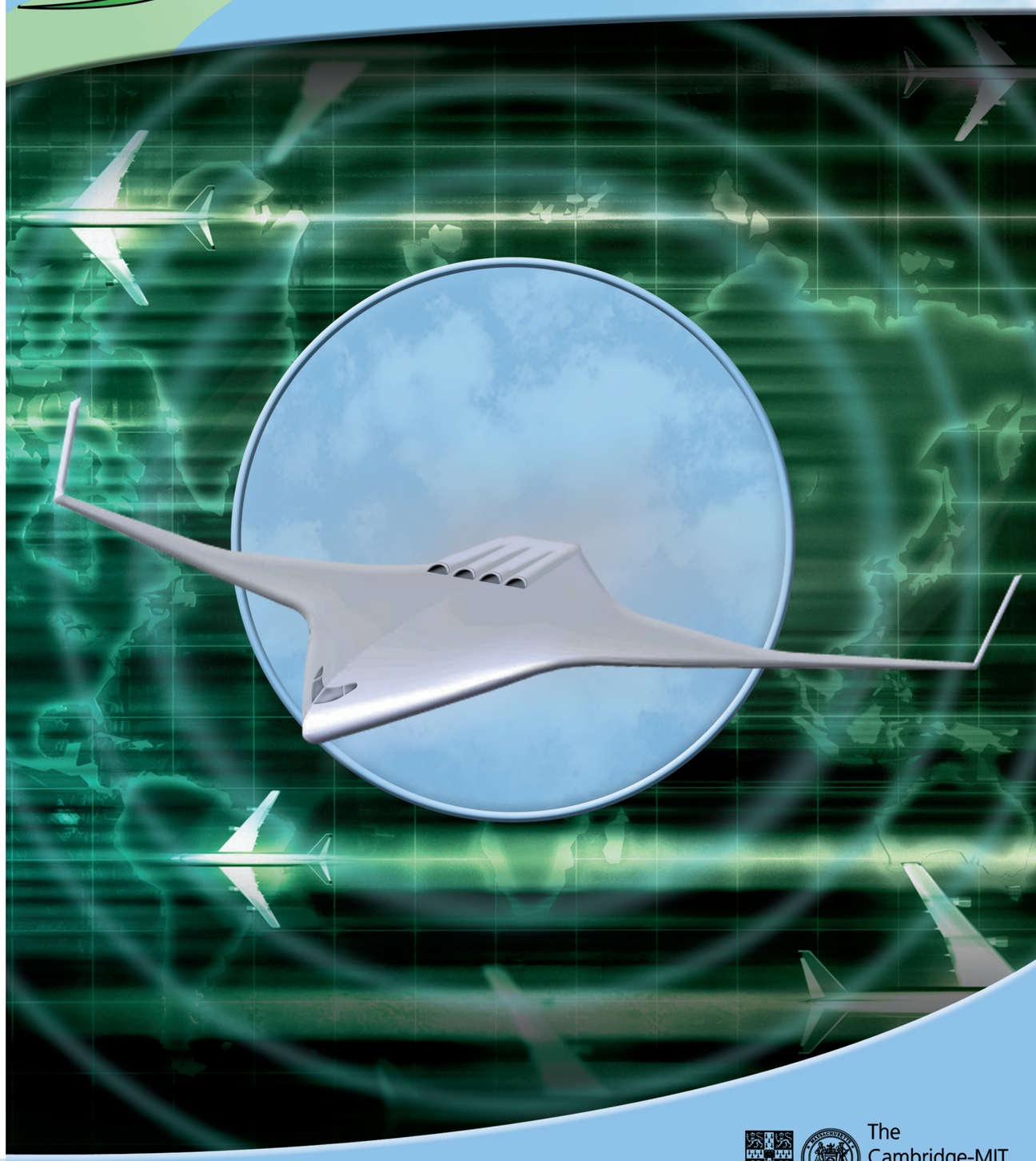
The Cambridge-MIT Institute

http://silentaircraft.org

All pictures courtesy of CMI, unless otherwise stated.

Silent Aircraft Initiative

...a new approach



http://silentaircraft.org

The Cambridge-MIT Institute

Silent Aircraft Initiative

…a new approach

University of Cambridge, UK

Massachusetts Institute of Technology, USA

The Silent Aircraft Initiative was launched in November 2003 with the aim of improving competitiveness in the UK aerospace sector by changing the way fundamental research is accessed by end users.

Set up as a Knowledge Integration Community, with knowledge exchange as its core driver, the Silent Aircraft Initiative aims to change the way aerospace research is undertaken, through extensive collaboration with a much wider franchise of stakeholders than ever before.

"This integrated research project is different in that we are developing ideas with consideration of use"

Ed Greitzer, Lead Principal Investigator at MIT

In developing ideas with a consideration of use, we need input from the key players in the air transport sector, building on their experience and developing ideas that are relevant to future needs.

These include not just our strategic partners, such as Rolls-Royce and Boeing, but also the SME supply chain, aircraft and airport operators, the regulators in the CAA, DfT and DTI, RDAs, community interest groups, trade associations and advisory groups.

"Having industrial input early in the project has been invaluable in terms of making key technical decisions"

Karen Willcox, MIT Principal Investigator, Integration

Networking the networks

SAI researchers discuss engine design with Joe Walsh of Rolls-Royce

In this world of information overload, the challenge is to find what you need when you need it.

Our network of Special Interest Groups gives partners:

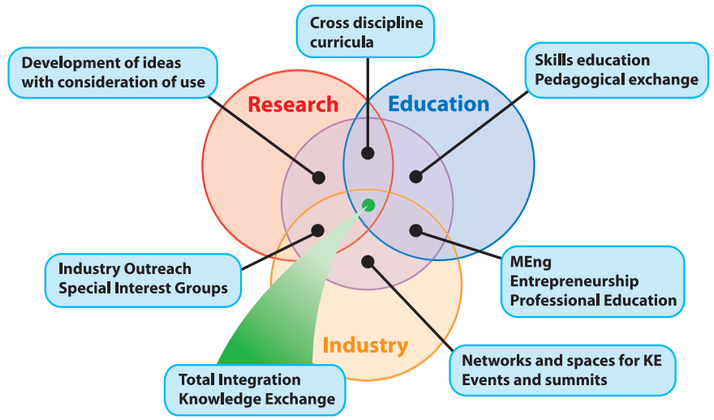
- An insight into what the future holds
- Access to leading-edge research
- A forum for exchanging ideas
- A voice to influence the direction of the industry
- A network of potential business partners

Joining our project gives you access to the right information when you need it.

Educational Collaboration

The work of the universities is not concerned only with research, but also with producing a new cadre of engineers who understand the complex context of their work in society.

The structure of the Silent Aircraft Initiative reflects not only the multi-disciplinary aspects of developing a new aircraft, but also the increasingly international nature of collaborative research.



Based on CMI Strategy Document and the forthcoming paper *"Knowledge Integration Communities"*

Cross-discipline curricula and common course modules are being developed by combining:

- Depth of understanding in core disciplines
- Entrepreneurial, project-based working
- Cross-cultural exchange schemes

In addition, our partnership with Cranfield University demonstrates how independently managed and separately funded projects can be tightly integrated around a common theme, acting as a showcase for collaborative research between institutions.

The Catalytic Effect

Regional Development Agencies, councils and other public bodies have a strategic role to play in driving business growth.

One of the key aspects of our economics research is looking at the catalytic effect that quieter air transport can have in drawing in new business. We can analyse important factors that drive the development of key sites and can provide insight into what lies over the horizon, so necessary for informed long-term planning.

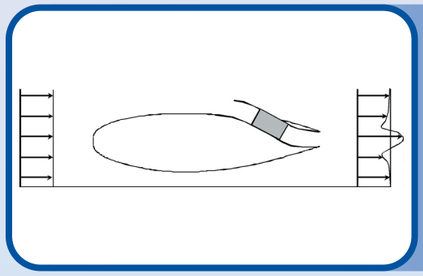
Fast and Frequent Communication

With multiple teams and many partner organisations, innovative communications are essential for effective knowledge exchange.

- Extensive use of video conferencing to supplement telephone and email
- "Access anywhere" web-based services, including secure file sharing
- Briefing Room: zero-prep Q and A meetings for rapid knowledge transfer
- Exchange of personnel with industry and between universities for several-week sojourns
- Visits to partner sites for hands-on exposure to their field of expertise
- Task-force operations to focus on and solve specific technical issues

Our effectiveness is under constant review using a formal study of our performance (the Study in Innovations in Knowledge Exchange)

http://silentaircraft.org



Embedding the engines will shield people on the ground from noise

Image courtesy of: SAI

The Silent Aircraft will look radically different

The huge advances over the last forty years in engine noise reduction are set to continue – by changing the way the engines are mounted on the aircraft.

Instead of hanging them below the wing, we are looking to embed them in the aircraft to shield people on the ground from the noise. Our Integration Team have come up with the design you see on the front cover, while our Engine Team are tackling the issues of having to bring the inlet air to the engines through ducts.

The distorted airflow leads to very high loads on the fan blades that go beyond the limit of current designs.

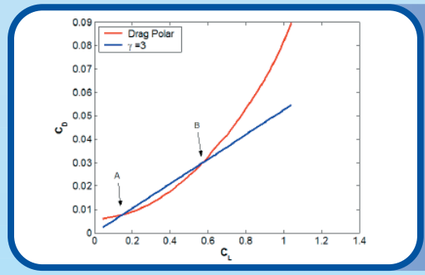
Advanced measuring techniques show noise "hot spots" around the undercarriage during landing

Image courtesy of: NLR

A New Type of Undercarriage is Needed

It is hard to believe, but the airframe of a landing aircraft is now about as noisy as the engines.

The steady reduction in engine noise in recent years now means that the noise generated by turbulence around the aircraft body has started to become obtrusive. Our Airframe Team is looking at ways to generate drag (needed to slow the aircraft down for landing) more quietly. One of the biggest sources of airframe noise comes from the undercarriage, which up to now has been used as a useful source of drag on approach. The challenge they face is to find a way to slow the aircraft down while not making so much noise.



Design tools like the wing's "Drag Polar" help engineers to optimise noise as well as performance

Image courtesy of: SAI

Steeper Approaches are Quieter Approaches

Not only do you stay higher for longer, but the plane has to fly more slowly.

It's all to do with the power balance, say the Airframe Team: more of the power to fly the aircraft comes from making a steeper descent – just as you can take your foot off the accelerator in a car going down a steep hill – so the engines of the airplane are throttled back. The power has to be reduced even more, as the plane also has to slow down so that it is at the right speed for landing, and it is this slower approach that helps make it quieter. The noise generated by the airframe reduces very quickly as you slow down, so even a slightly slower approach can make a big difference in terms of noise.

The Cambridge-MIT Institute