



Noise Research Strategies **for a Quieter Europe**

Conference
Brussels
19 Oct. 2004



Aircraft Noise 2020 Strategic Research Agenda

as developed through the ACARE structure

**Bruxelles
October 19, 2004**

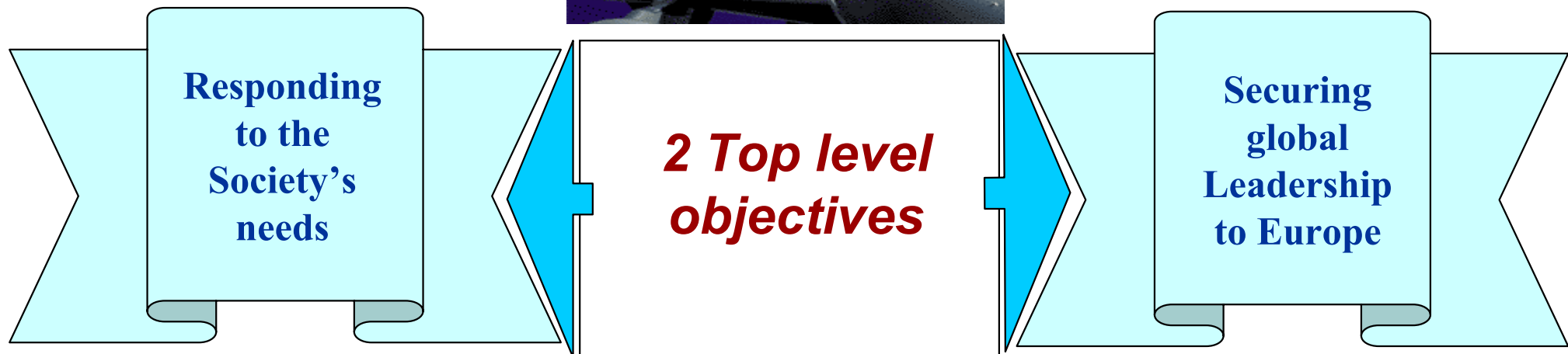


First Step: The Vision 2020

- *Initiated and chaired by Commissioner Philippe Busquin*
- *Prepared by a group of 14 high-level personalities (GOP)*



- *Focused on Research / Technology / Development*
- *Takes a pan-European perspective with a 2020 horizon*



Vision 2020 report was delivered on January 2001



ACARE and The SRA

Advisory Council for Aeronautics Research in Europe (ACARE)

Member States with aeronautical research plans

European Commission

Manufacturing industry (airframe, engine, equipment and ATM)

Airlines

Airports

Regulators

Eurocontrol

Research establishments

36 members

Creating and maintaining a Strategic Research Agenda (SRA)

agreed by all European stakeholders

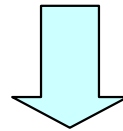


The Strategic Research Agenda : The challenges towards the top level objectives



Vision 2020 (January 2001)

- Responding to the Society's needs
- Securing global leadership to Europe



The Strategic Research Agenda (SRA) : 5 Challenges

Quality and
Affordability

Environment

Safety

Air transport
System
Efficiency

Security

SRA report was delivered on October 2002



The SRA : A Reference

The SRA was established by 4 technical working teams and 2 institutional working teams (WT) :

- WT 1 : Quality and affordability
- WT 2 : Environment
- WT 3 : Safety and Security
- WT 4 : ATM
- WT5 : Education and research infrastructure
- WT6 : Supply chain and issues across the member states



www.acare4europe.org

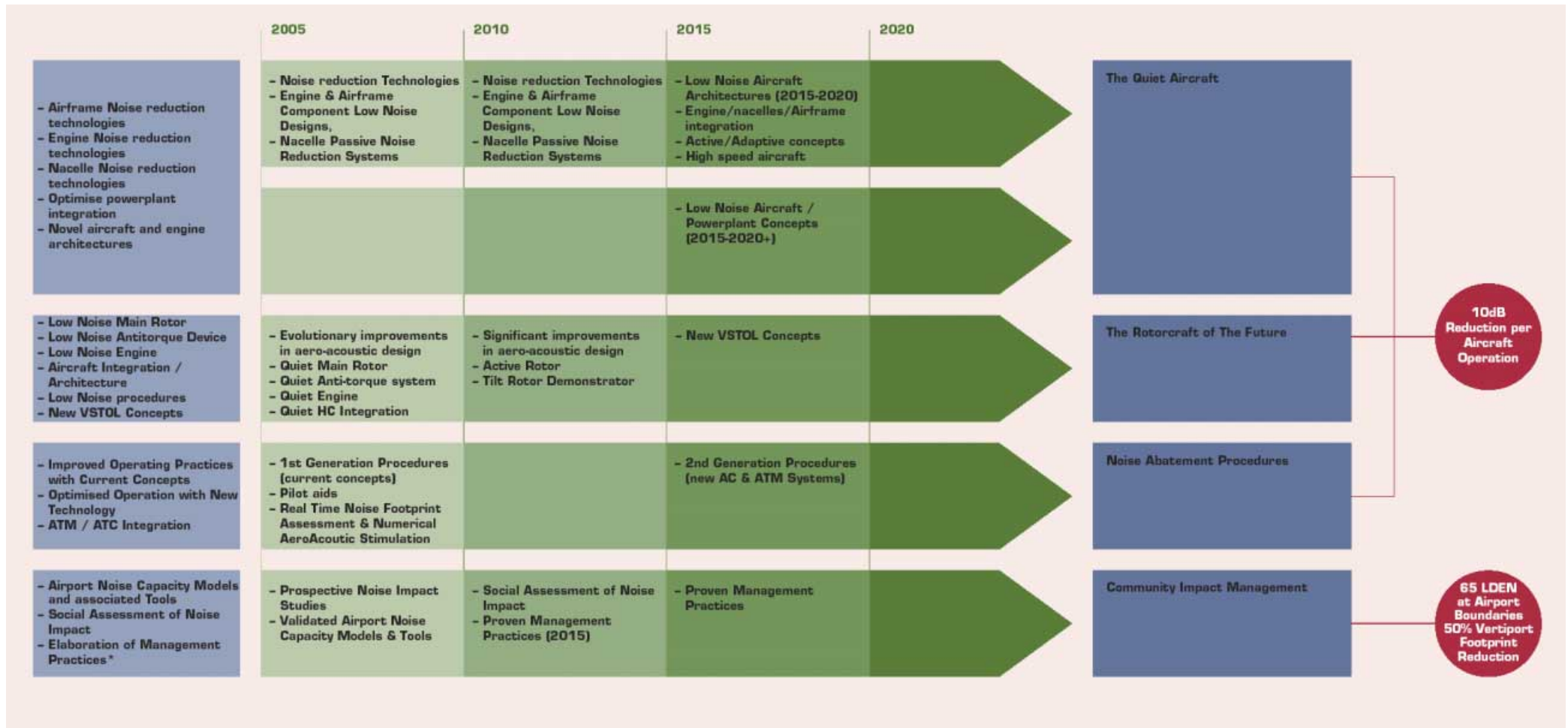
Structure Of The Strategic Research Agenda





Environmental Strategic Research Agenda

Exterior Noise





Towards the SRA 2nd edition

Objectives of SRA2

- Better integration between sectors
- Considering various societal, economical and political world evolution scenarios
- Implementation of SRA1
- Evaluate resources, validation needs, infrastructures, etc...
- Publication November 2004





SRA2 instrument : The High Level Target Concept

- Thematic concept for a well identified sub-system of the Air Transport System (ATS)
- Identifies implication of each scenario on the whole ATS
- Identifies the set of key-technologies and their readiness level needed to carry out the target concept.





SRA2 instrument : The High Level Target Concepts

- Ultra Green ATS
- Very Low Cost ATS
- Highly customer oriented ATS
- Highly time efficient ATS
- Ultra Secure ATS
- 22nd Century

**Each target concept takes a holistic approach of the Air
Transport System : Aircraft, Airports, ATM**





The Environmental Strategic Research Agenda

Development of the Fixed Wing Aircraft Noise Goals

2020 Vision Targets

- Reduce CO₂ by 50%
- Reduce NO_x by 80%
- **Reduce perceived noise by half**
- **Eliminate noise nuisance outside airport boundaries**
- Substantial cuts in operating costs
- Five-fold reduction in accident rate
- Drastic reduction in the impact of human error
- 99% of flights within 15 minutes of timetable
- New standards of quality and effectiveness
- Halve the time to market
- Improve synergies between civil and military research

-10 EPNdB / Operation
65 LDEN at Airport Boundaries

Goals

Noise Reduction
At Source

Operating
Practices

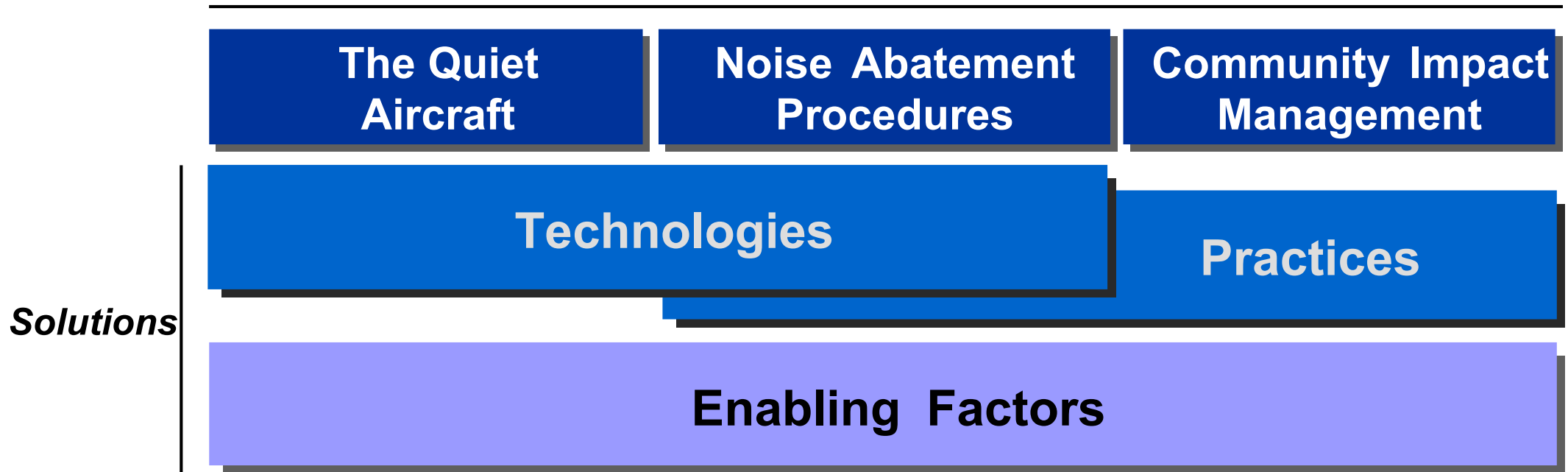
Management
of Noise Impact

Contributors



Network Activities: Developing the Aircraft Noise SRA

Contributors



X2-Noise to Proceed with Definition and Implementation of Detailed FP6 Strategy to support ACARE Noise Reduction SRA



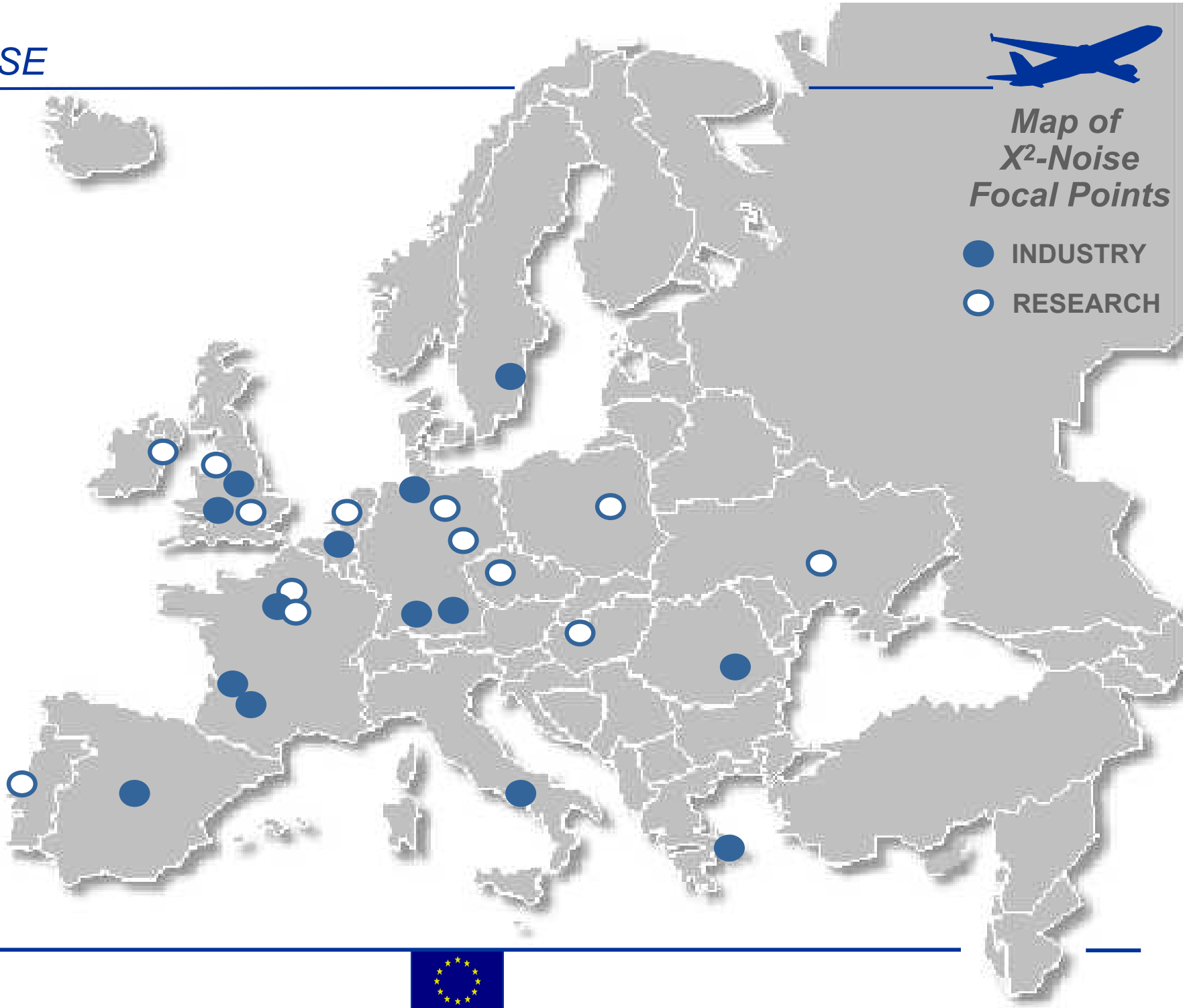


X^2 - NOISE



*Map of
 X^2 -Noise
Focal Points*

- INDUSTRY
- RESEARCH



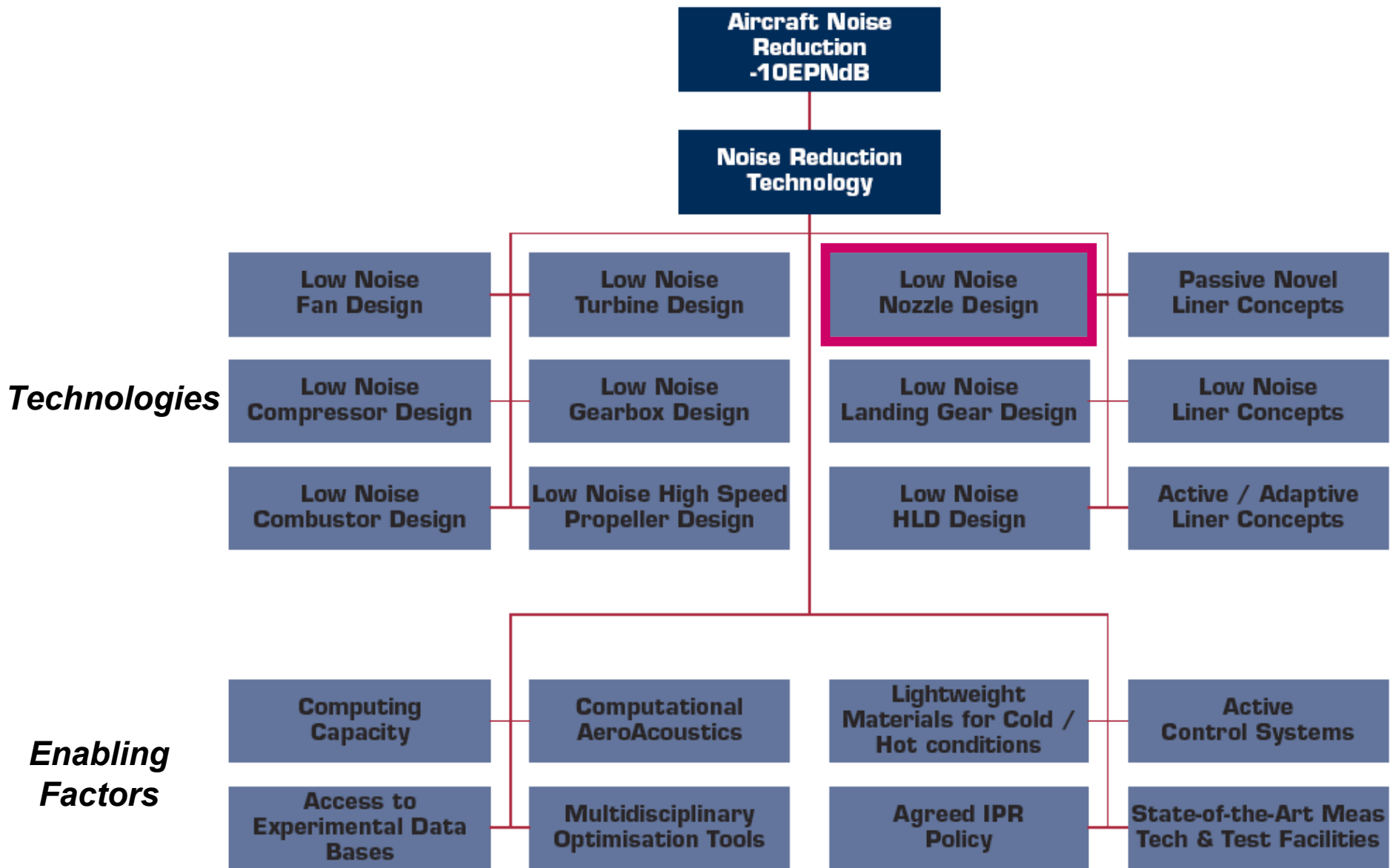


Contributor: The Quiet Aircraft

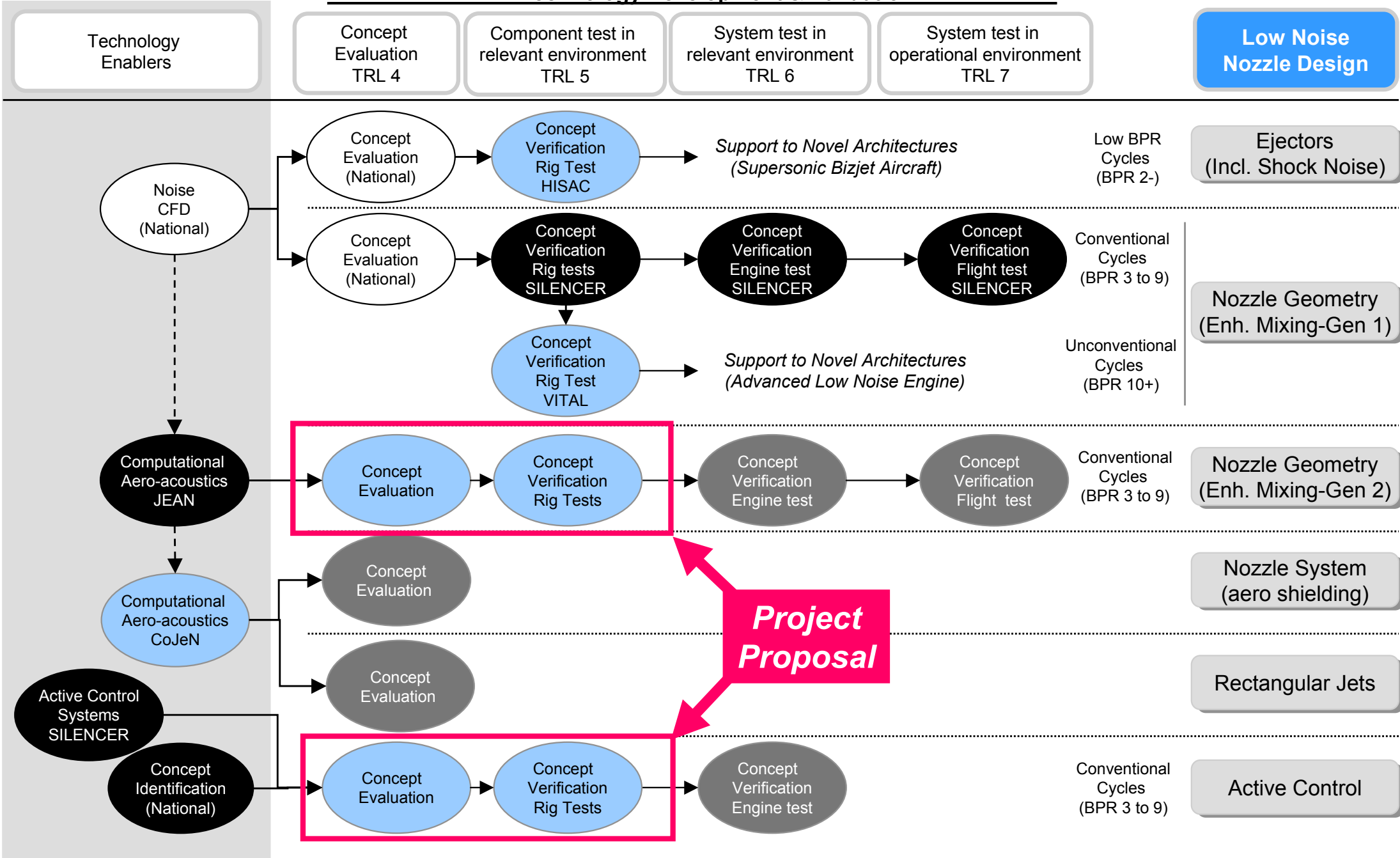
	2000	2010	2020
Goals		- 6 dB / Operation	- 10 dB / Operation
Solution	<ul style="list-style-type: none"> - Generation 1 Technologies for Noise Reduction at Source <ul style="list-style-type: none"> - Airframe - Nacelle - Engine 		<ul style="list-style-type: none"> - Generation 2 Technologies for Noise Reduction at Source: <ul style="list-style-type: none"> - Airframe - Nacelle - Engine - Optimised Powerplant Integration - Novel Aircraft / Engine Architectures
Technology Targets	<ul style="list-style-type: none"> - Engine Components Low Design (Fan, Compressor, Combustor, Turbine, Gearbox, Propeller) - Aircraft Components Low Noise Design (Landing Gear, High lift Devices) - Improvement Nacelle and Nozzle Liners - Inlet / Nozzle Aeroacoustic Design 		<ul style="list-style-type: none"> - Low Noise Concepts & Architectures (Airframe, Nacelle, Engine) - Active Control Applications (Airframe, Nacelle, Engine) - Improved Aircraft Aerodynamics
Technology Enablers	<ul style="list-style-type: none"> - Coupling of Noise / Aero design (CFD) - Improved Duct Propagation & Radiation Models - Lightweight Materials for Cold / Hot conditions - Computing Capacity - Multidisciplinary Optimisation Tools 		<ul style="list-style-type: none"> - Extensive application of Computational Aeroacoustics (CCA) - Active Control Technology Element - State-of-the-Art Measurement Techniques & Test Facilities - Efficient Integrated Noise Design Process



Contributor: The Quiet Aircraft



Technology Development & Validation



○ FP4 ● FP5 ● FP6 ● FP7



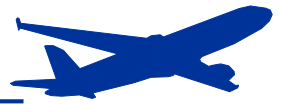
Contributor: Noise Abatement Procedures

	2000	2010	2020
Goals	- 6 dB / Operation		- 10 dB / Operation
Solutions	<ul style="list-style-type: none"> - Improved Operating Practices with Current Concepts 		<ul style="list-style-type: none"> - Optimised Operation with New Technology - ATM / ATC Integration
Technology Targets	<ul style="list-style-type: none"> - Definition of Noise Abatement Procedures - Implementation of Fixed Routes - Optimum Implementation of PANS-OPS - Different ILS interception altitude & slopes - Continuous Descent Approach - Rotorcraft - Real Time Noise Footprint Assessment & Numerical AeroAcoustic Simulation - Tradeoffs - Support to Future regulation 	<ul style="list-style-type: none"> - Definition of Noise Abatement Procedures: - Use of Automated Power Management - Customised Departure Procedure - Customised Final Approach - Advanced Continuous Descent Approach - Novel Procedures associated with - Advanced A/C Design - Tradeoffs - Support to Future regulation 	
Technology Enablers	<ul style="list-style-type: none"> - Realistic Airport Noise modeling - Improved (precision) navigation performance - Adapted Display and guidance System 	<ul style="list-style-type: none"> - Tools to support Decision Making on Customised Procedures - Improved avionics speed / power management - ATM of multiple glide-slope - Overall Integration 	



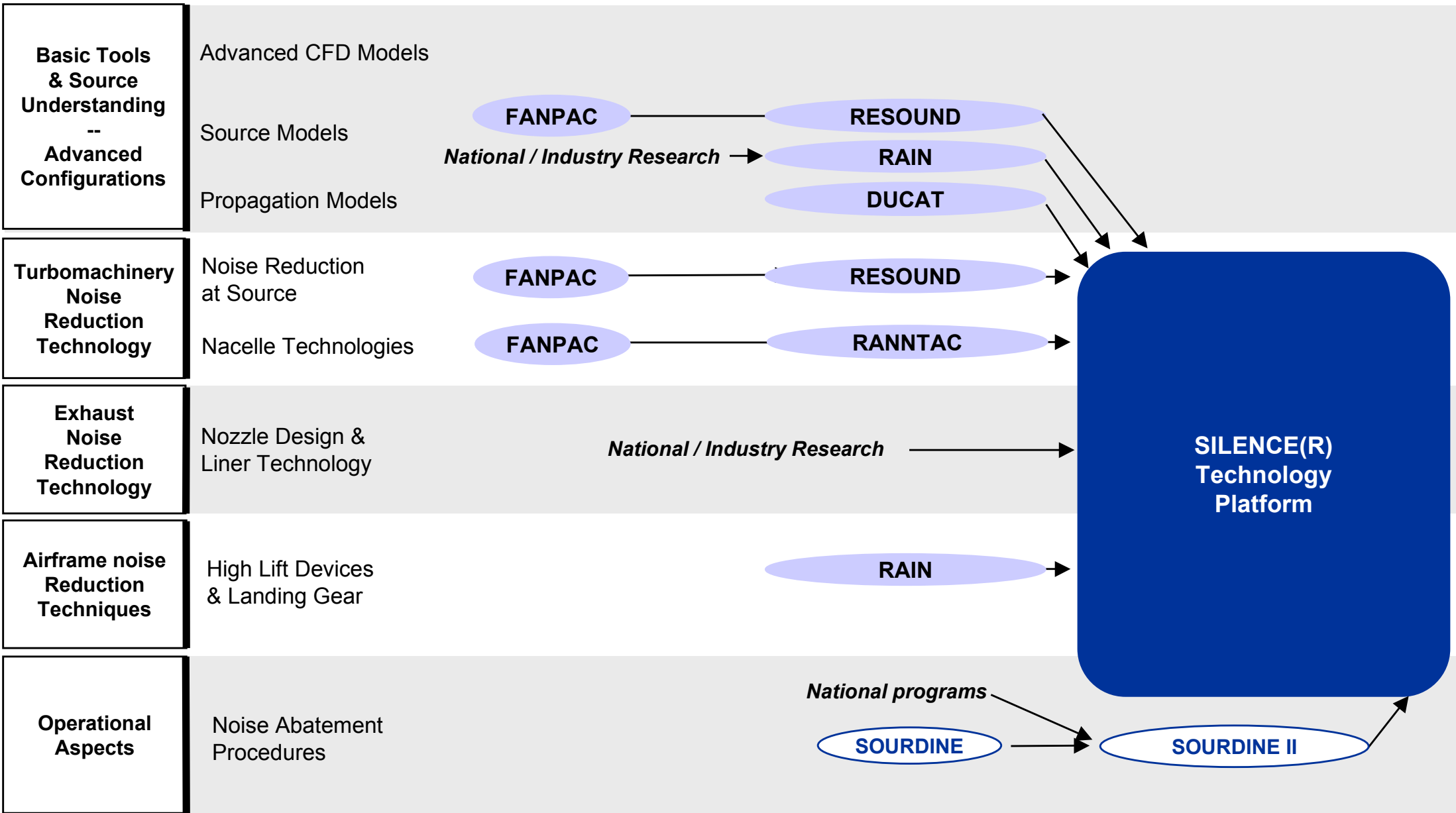
Contributor: Management of Noise Impact

	2000	2010	2020
Goals	<p>65% LDEN at airport boundary 50% Vertiport Footprint Reduction</p>		
Solutions	<ul style="list-style-type: none"> - Airport Noise Capacity Models and associated Tools 	<ul style="list-style-type: none"> - Social Assessment of Noise Impact - Elaboration of Management Practices * 	
Technology Targets	<ul style="list-style-type: none"> - "What if?" Studies - Correlating Predicted to Measured Noise Levels 	<ul style="list-style-type: none"> - Community Annoyance Rating Studies - Relation Between Perceived Noise and Other factors - Airport Environmental Capacity Studies - Review of Mitigation Options - Assessment of Current Land-Use Practices 	
Technology Enablers	<ul style="list-style-type: none"> - Generic (Macro) Community Noise Model - Data Bases to support Noise Impact Prediction and Validation 	<ul style="list-style-type: none"> - Psycho Acoustic Studies Protocol - Data Bases to support Assessment of Social Impact - Agreed Noise Metrics - Harmonised Policy framework 	



Projects Roadmap for 2010 Solutions

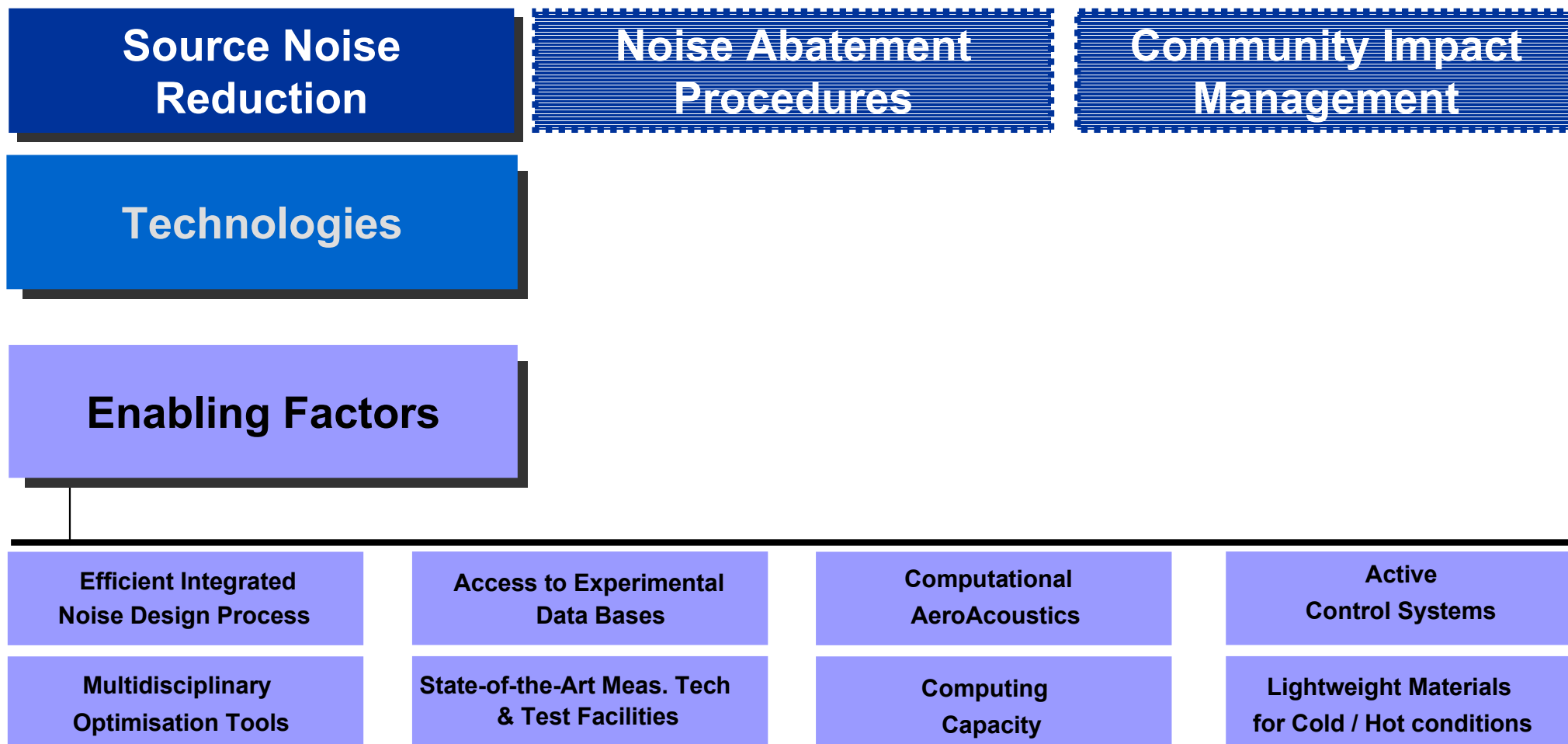
Years → 93 94 95 96 97 98 99 00 01 02 03 04 05





Implementing the Aircraft Noise SRA

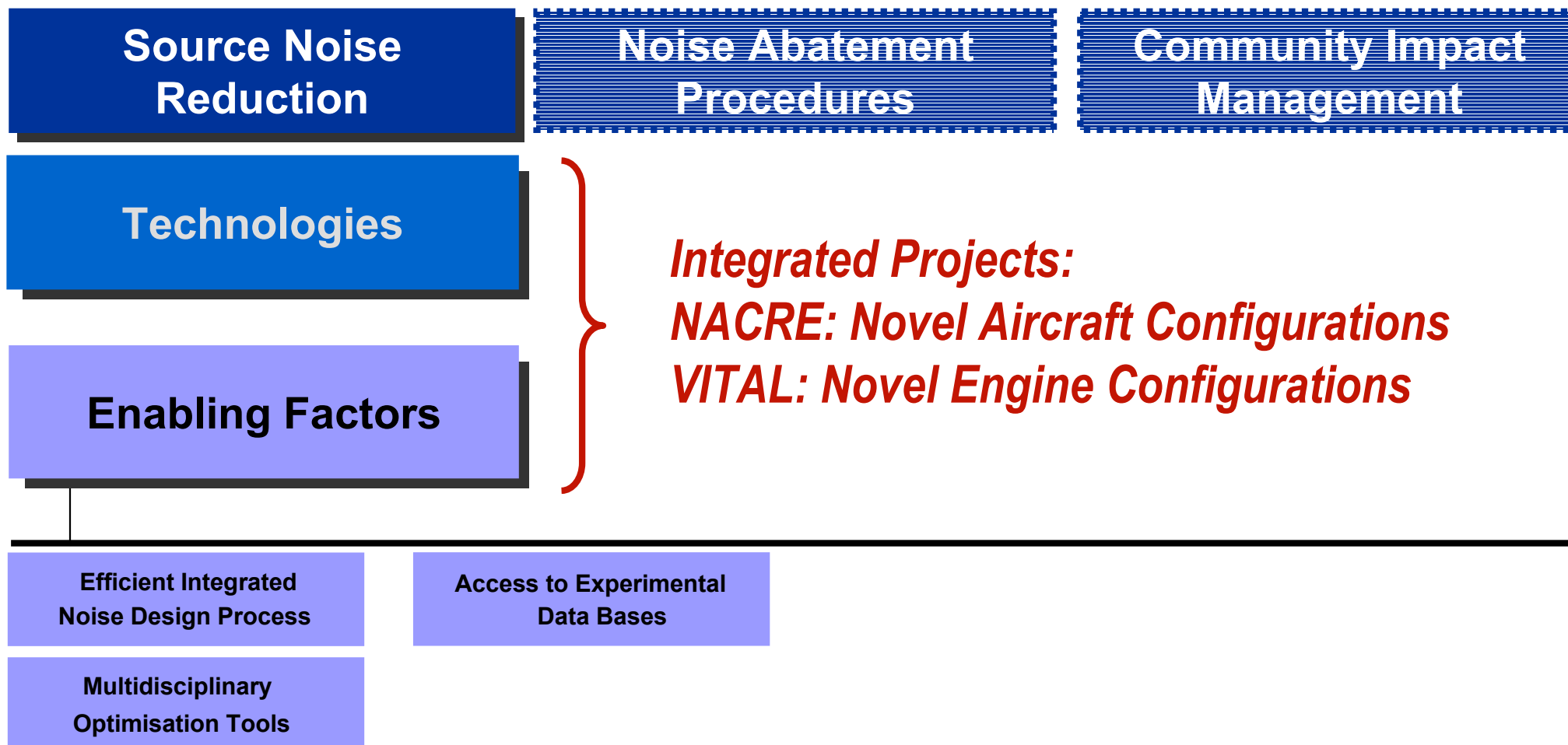
Enabling Phase: Priorities to initiate 2020 Effort





Implementing the Aircraft Noise SRA

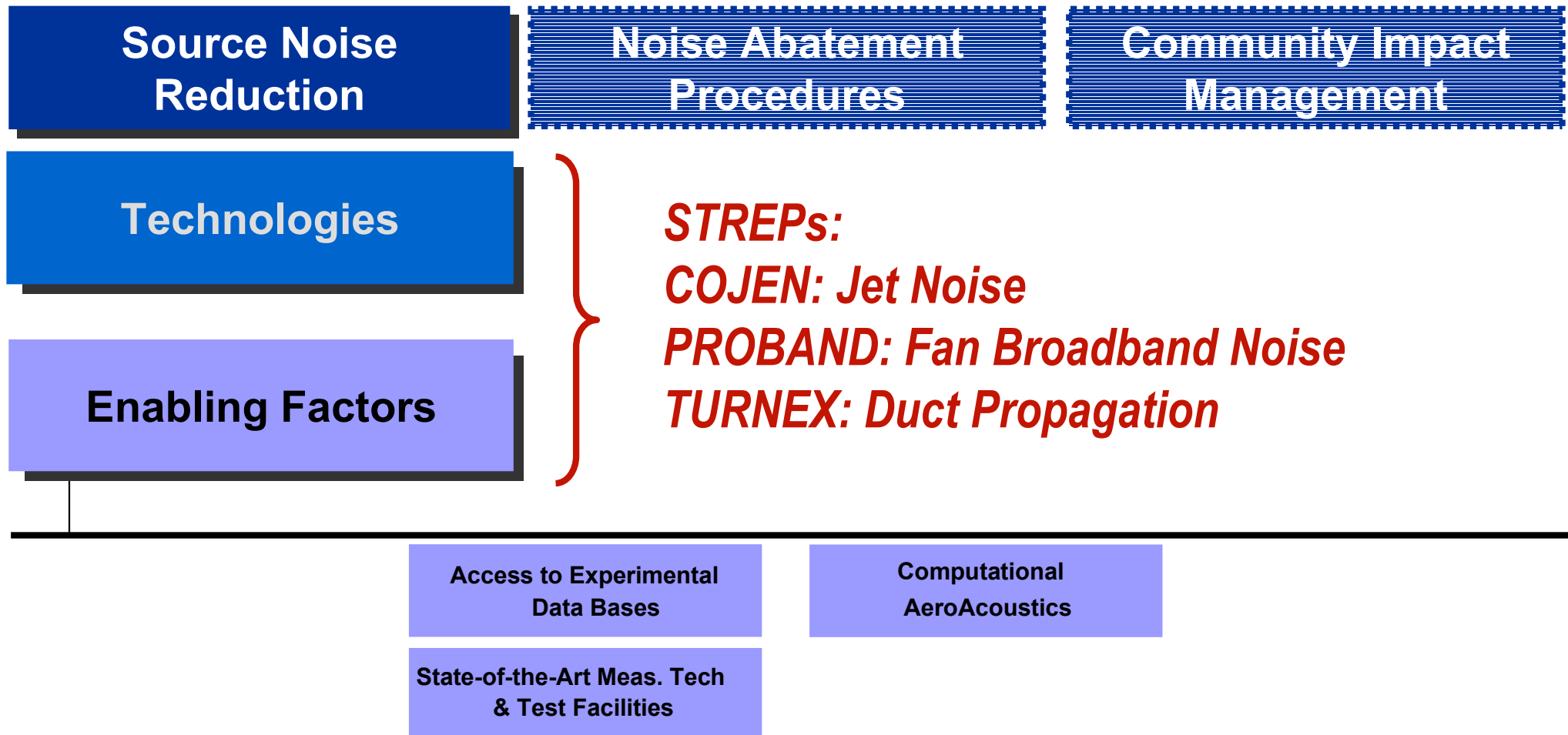
FP6 Calls 1 & 2





Implementing the Aircraft Noise SRA

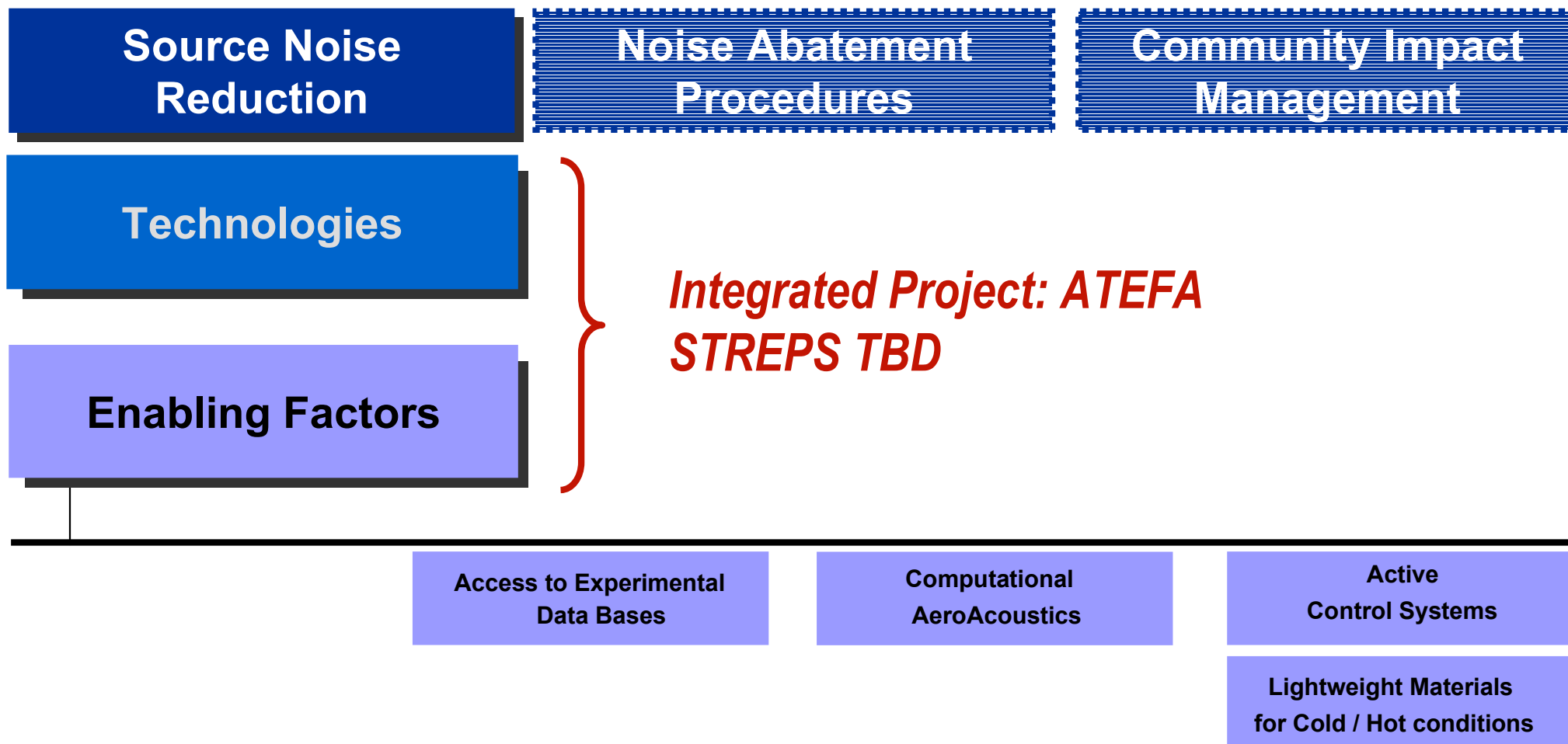
FP6 Calls 1 & 2





Implementing the Aircraft Noise SRA

FP6 Call 3





Implementing the Aircraft Noise SRA FP6 Priorities

Source Noise
Reduction

Noise Abatement
Procedures

Community Impact
Management

Call 1: SEFA - Sound Engineering for Aircraft
**Call3: SINEAD - Impact of Aircraft Noise In
European Airports Neighbourhoods ?**

Practices

Community Annoyance
Rating Studies

Airport Noise
Capacity Studies

Relation between
Perceived Noise and
Other Factors





Implementing the Aircraft Noise SRA FP6 Priorities

