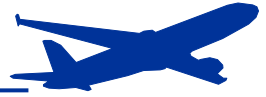




# Aircraft External Noise Network

Achievements and Future Activity





## Aircraft External Noise Network *Main Features & Objectives*

- Network active since 1998 (X-Noise, then X<sup>2</sup>-Noise Thematic Networks)
- Extended workprogramme (X<sup>3</sup>-Noise Coordination Action) now retained for period 06/2006 - 06/2010
  - Establish detailed research plans to support ACARE SRA
    - Roadmaps
  - Seek constructive debate to address forward looking technical issues
    - Stakeholders Seminars in support of regulation related issues (ICAO, EC directives)
  - Ensure Dissemination
    - Annual Scientific Workshops
  - Improved integration of the European Aircraft Noise Research Community
    - Network of National Focal Points (NFPs) ,
  - Link with other Environmental Networks
    - CALM II, AERONET III, ECATS, International (US, TTC...)





## **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*

**Creating and maintaining a Strategic Research Agenda (SRA)**

**agreed by all European stakeholders**



# The SRA1 noise goals

## 2020 Vision Targets

- Reduce CO<sub>2</sub> by 50%
- Reduce NO<sub>x</sub> 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

ACARE Strategic Research Agenda (SRA)

## Goals

**-10 EPNdB / Operation**  
**65 LDEN at Airport Boundaries**

## Contributors

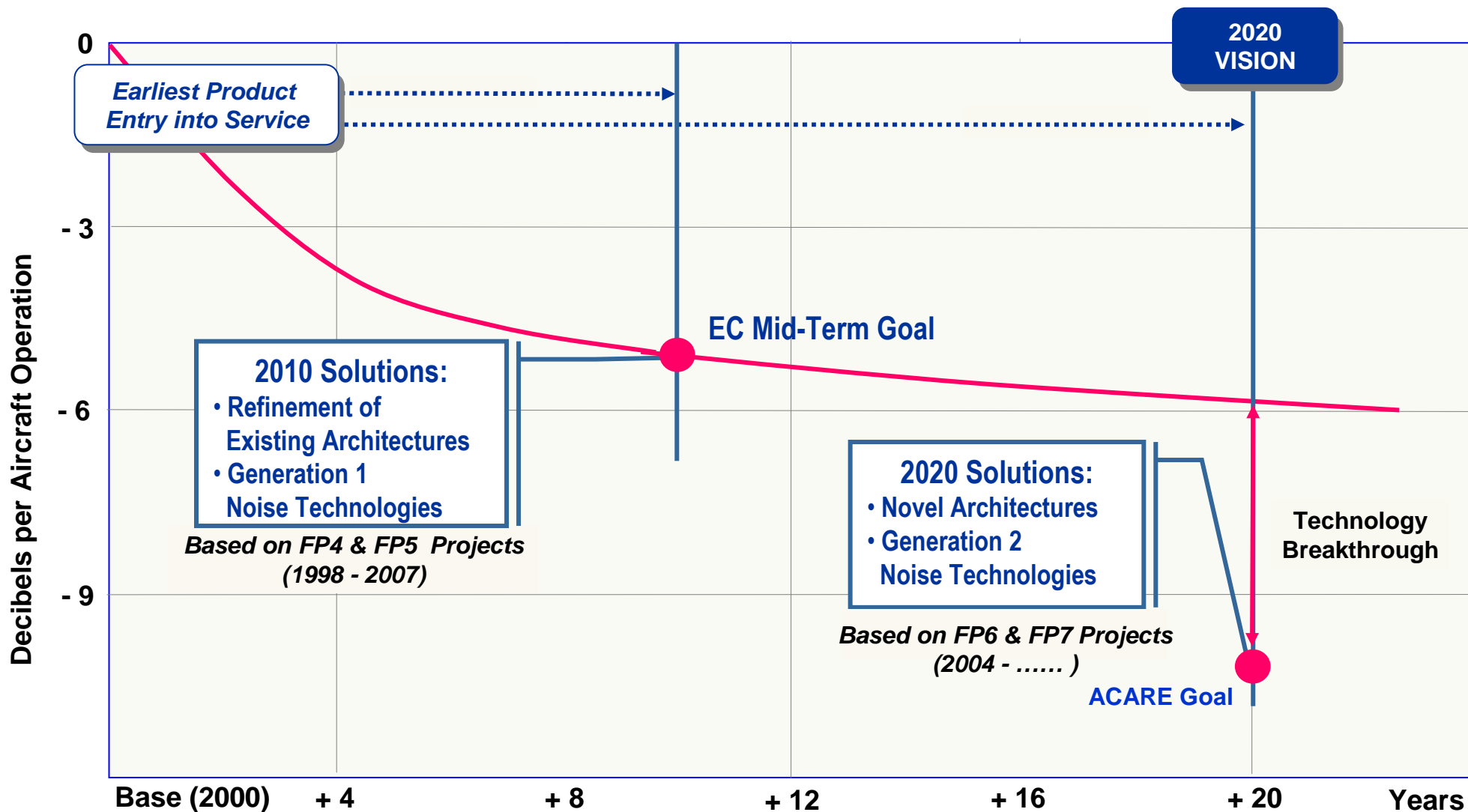
**The Quiet Aircraft**

**Noise Abatement Procedures**

**Community Impact Management**



## Noise Reduction Objectives & Technology Paths



# Aircraft Noise Projects Roadmap

Generation 1 Solutions

Generation 2 Solutions

Years →

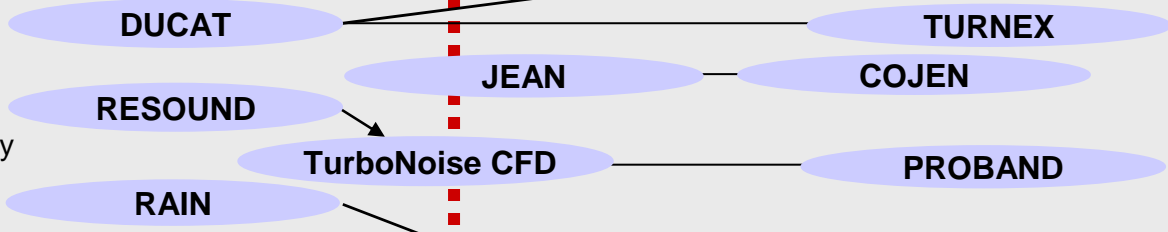
98 99 00 01 02 03 04 05 06 07 08 09 10

**Basic Tools & Source Understanding**

Propagation Models

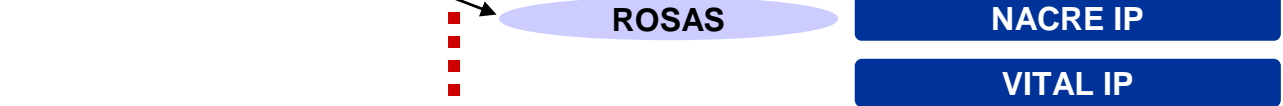
Source Models and Advanced CFD/ CAA

Jet  
Turbomachinery  
Airframe



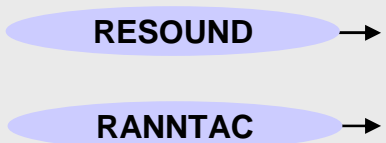
**Advanced Configurations**

Aircraft Architectures  
Engine Architectures



**Turbomachinery Noise Reduction Technology**

Noise Reduction at Source  
Nacelle Technologies



**Exhaust Noise Reduction Technology**

Nozzle Design & Liner Technology



**Airframe noise Reduction Techniques**

High Lift Devices & Landing Gear



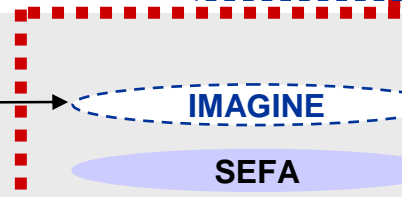
**Operational Practices**

Noise Abatement Procedures



**Impact Management Tools**

Noise / Emissions Tradeoffs Evaluation  
Noise Mapping  
Virtual Neighbourhood



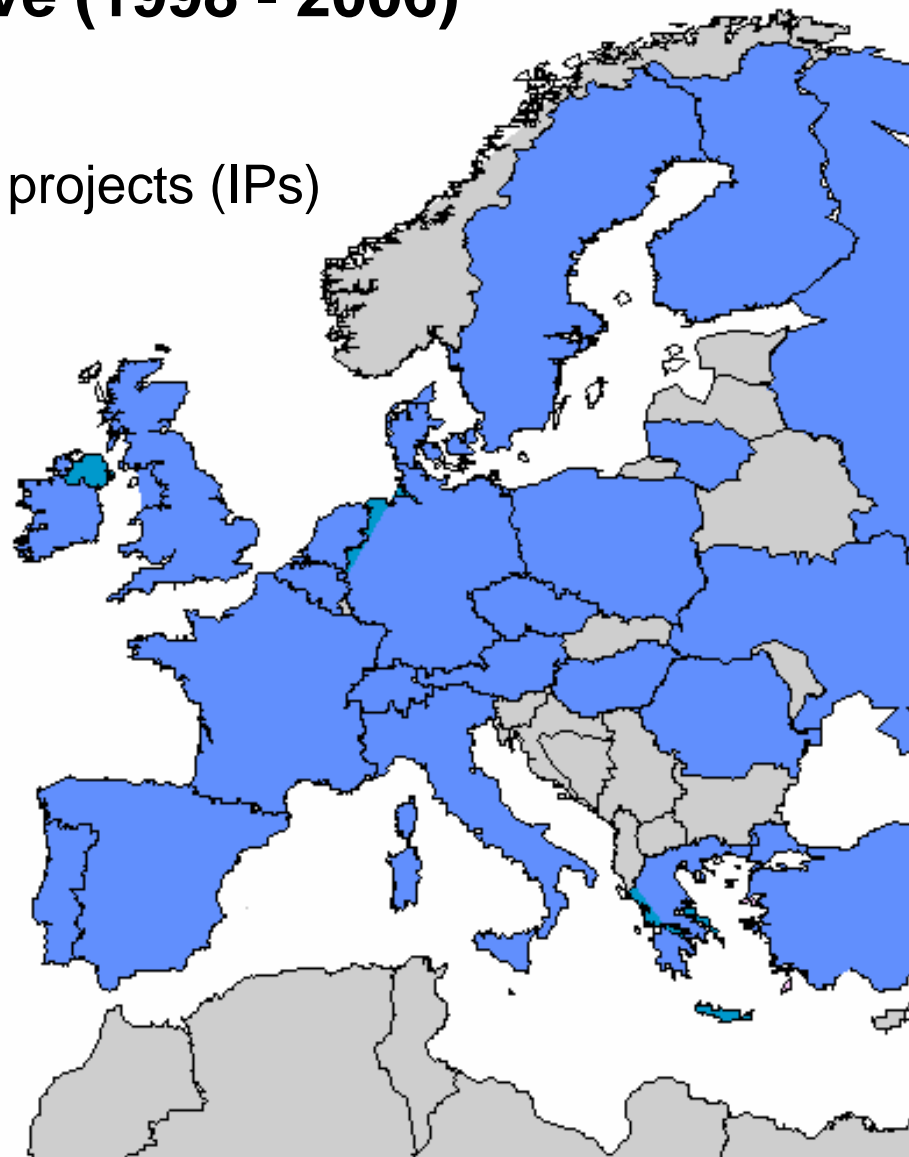
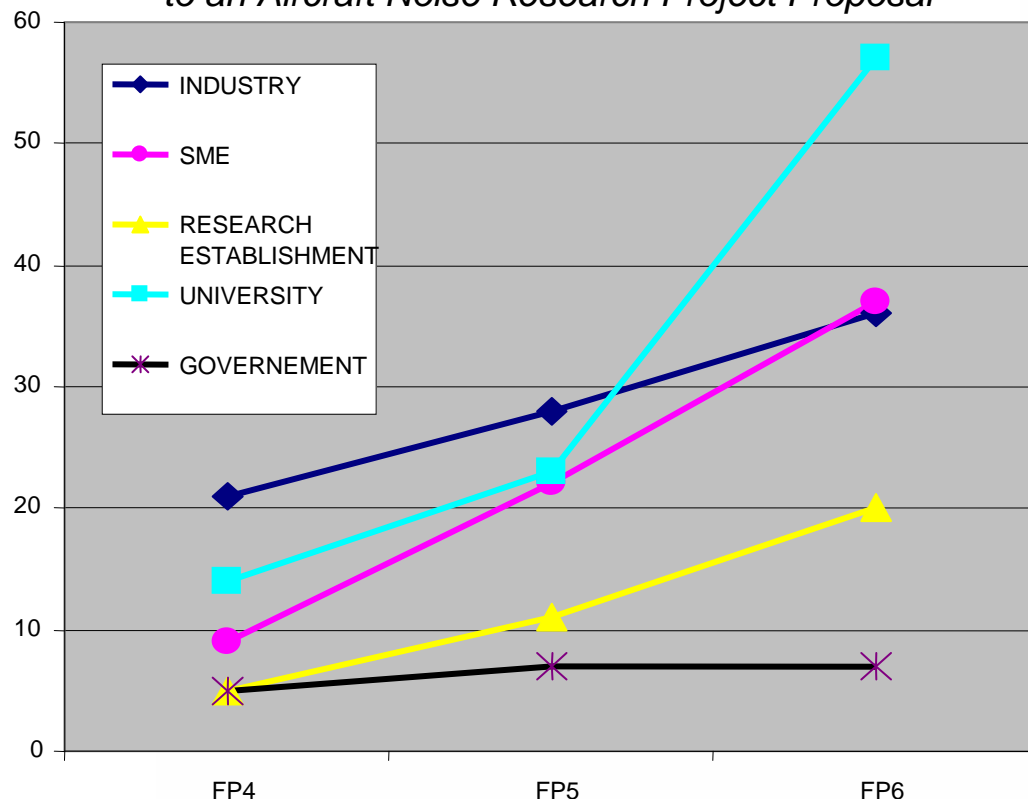


# Aircraft Noise Research Initiative (1998 - 2006)

## 20 FP4 / FP5 / FP6 Projects

+ participation in several FP6 multidisciplinary projects (IPs)

*Organisations with at least one participation to an Aircraft Noise Research Project Proposal*





## Aircraft External Noise Network *Main Features & Objectives*

- Network active since 1998 (X-Noise, then X<sup>2</sup>-Noise Thematic Networks)
- Extended workprogramme (X<sup>3</sup>-Noise Coordination Action) now retained for period 06/2006 - 06/2010
  - Establish detailed research plans to support ACARE SRA
    - Roadmaps
  - Seek constructive debate to address forward looking technical issues
    - Stakeholders Seminars in support of regulation related issues (ICAO, EC directives)
  - Ensure Dissemination
    - Annual Scientific Workshops
  - Improved integration of the European Aircraft Noise Research Community
    - Network of National Focal Points (NFPs) ,
  - Link with other Environmental Networks
    - CALM II, AERONET III, ECATS, International (US, TTC...)

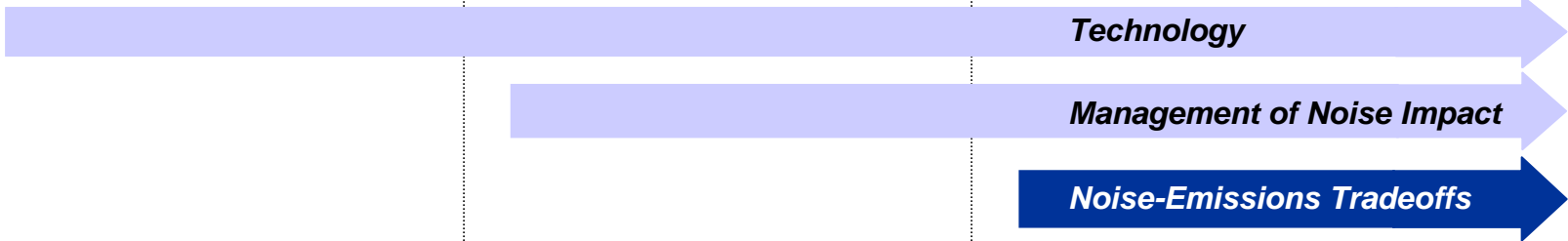


**X-Noise**

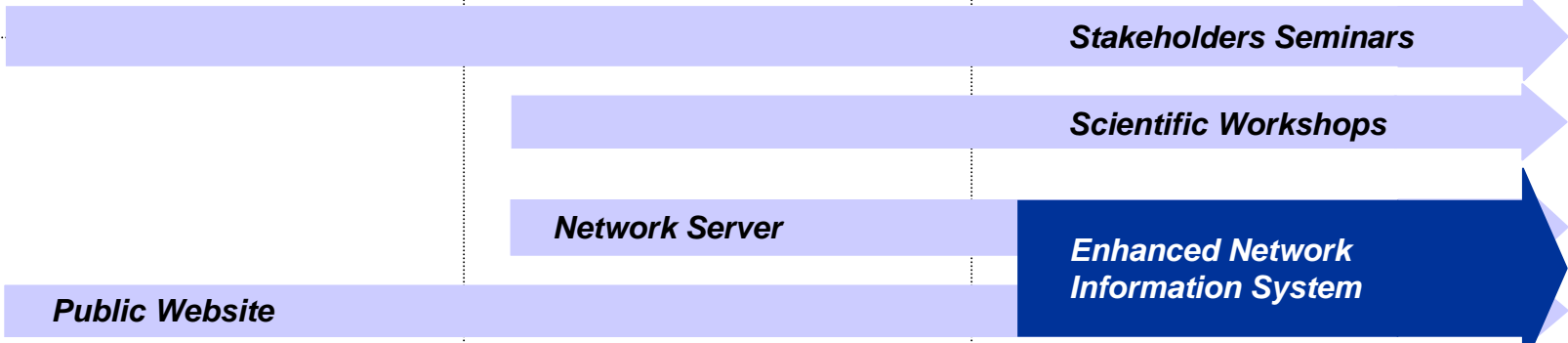
**X2-Noise**

**X3-Noise**

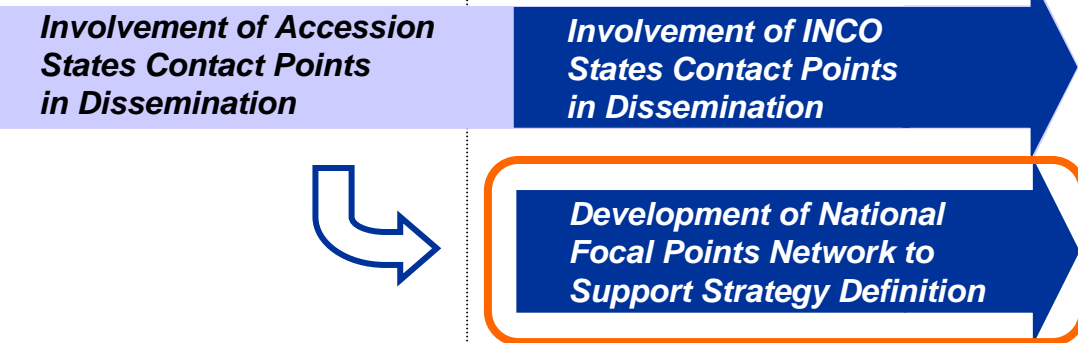
**Definition of Research Agenda**



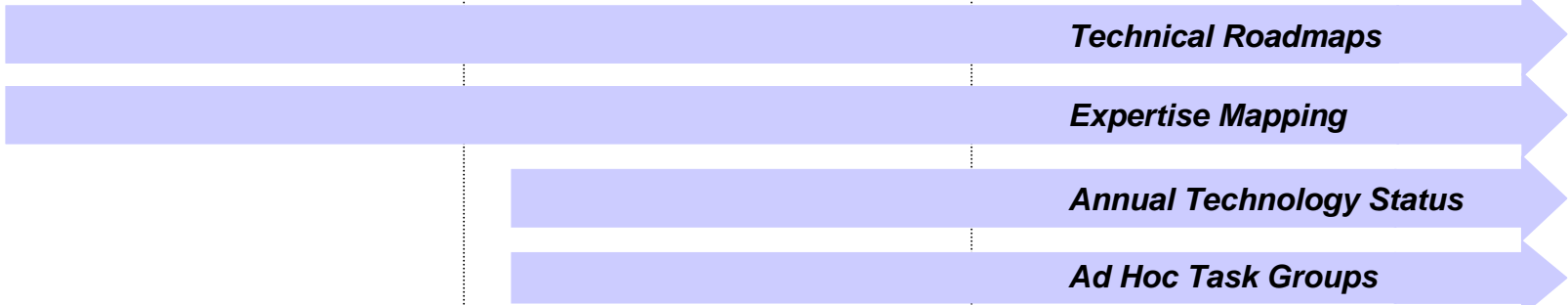
**Dissemination**



**Integration of Research Community**

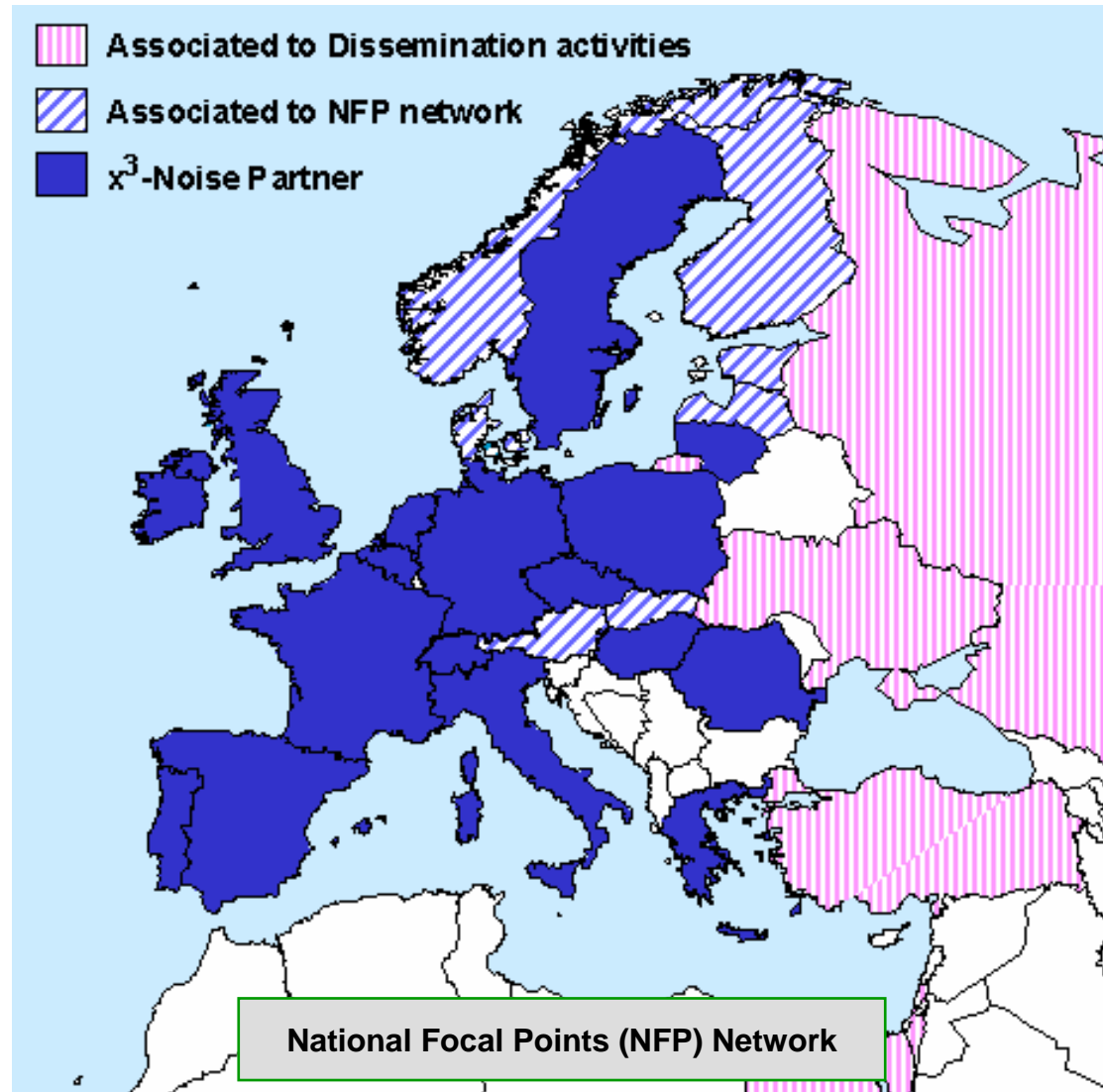


**Methodologies**





## Project Geographic Coverage

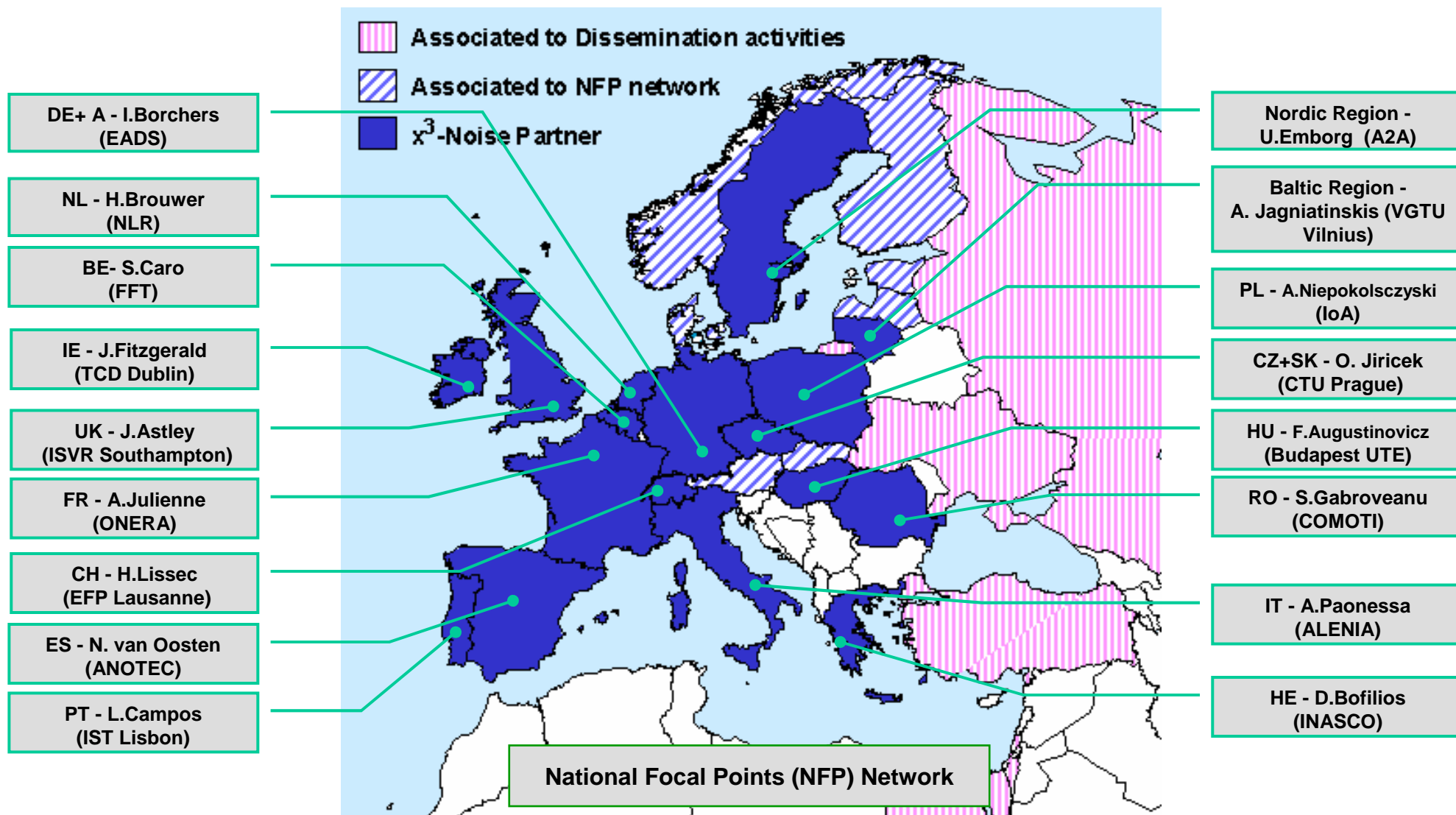


- ⇒ Consolidate Expertise Mapping
- ⇒ Inform on Strategic Priorities (European and local)
- ⇒ Identify Novel Ideas
- ⇒ identify potential input from national programmes





## Project Geographic Coverage

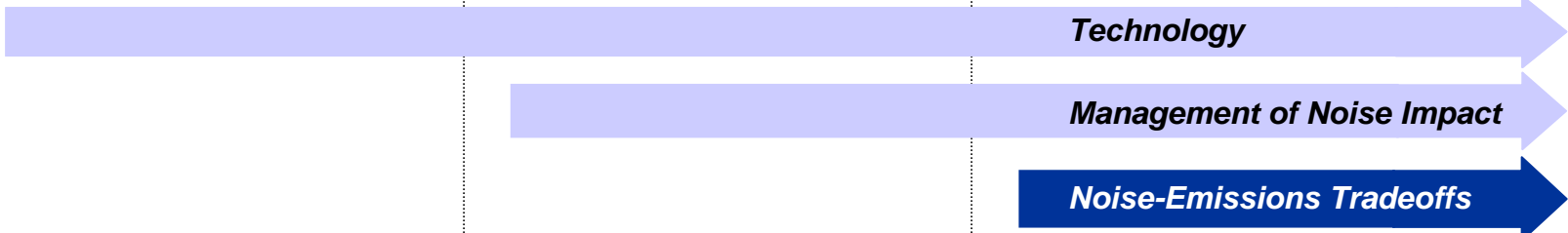


**X-Noise**

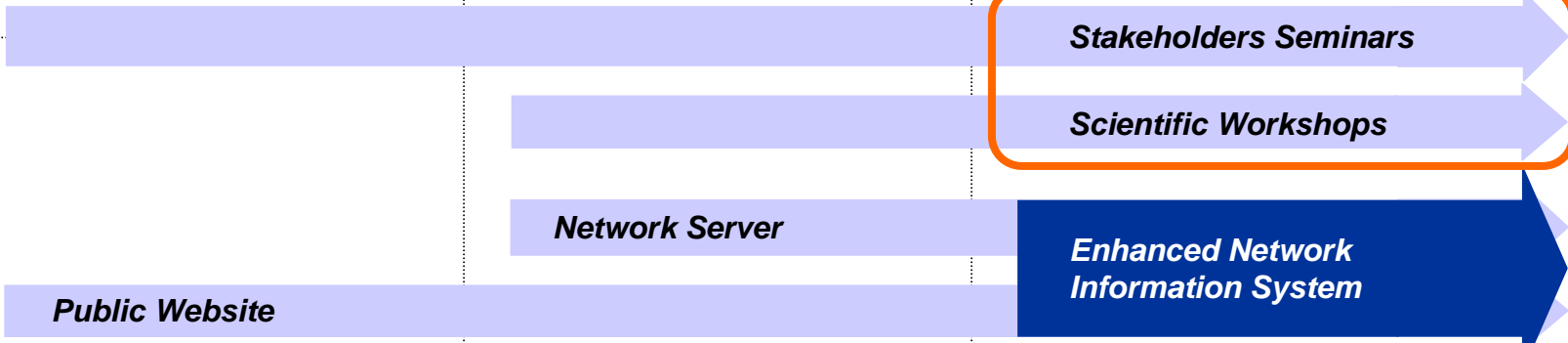
**X2-Noise**

**X3-Noise**

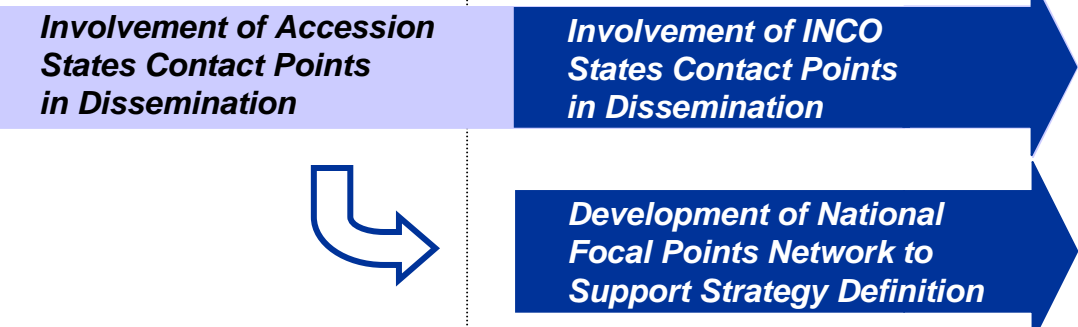
**Definition of Research Agenda**



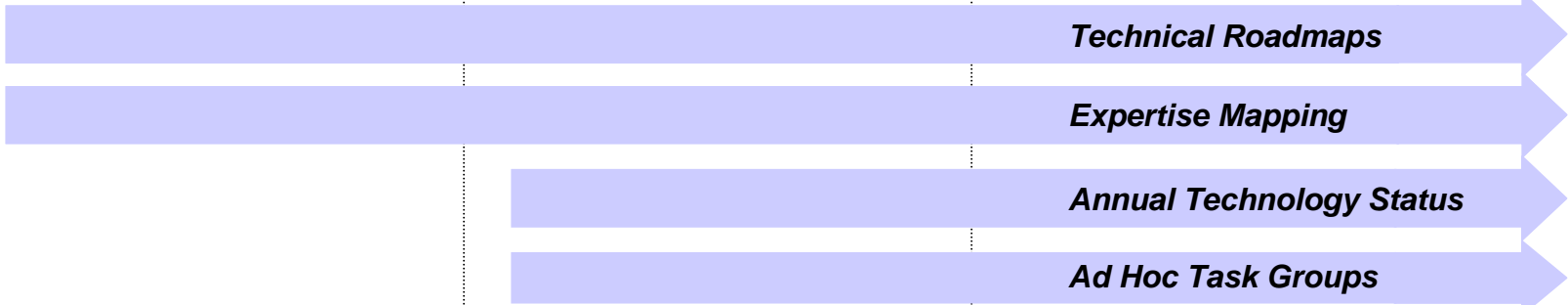
**Dissemination**



**Integration of Research Community**



**Methodologies**



## X-Noise

## X2-Noise

## X3-Noise

Definition of  
Research  
Agenda

Worldwide Noise  
Technology  
2007

Noise/ Emissions  
Tradeoffs  
2008

EU Noise Mapping  
Directive Final Method  
2009

Ultra Green  
Airport  
2010

*Stakeholders Seminar*

Dissemination

*Scientific Workshops*

Jet  
Noise  
2006

Combustor  
Noise  
2007

Integration of  
Research  
Community

Experimental  
Techniques  
2008

Fan  
Broadband  
2009

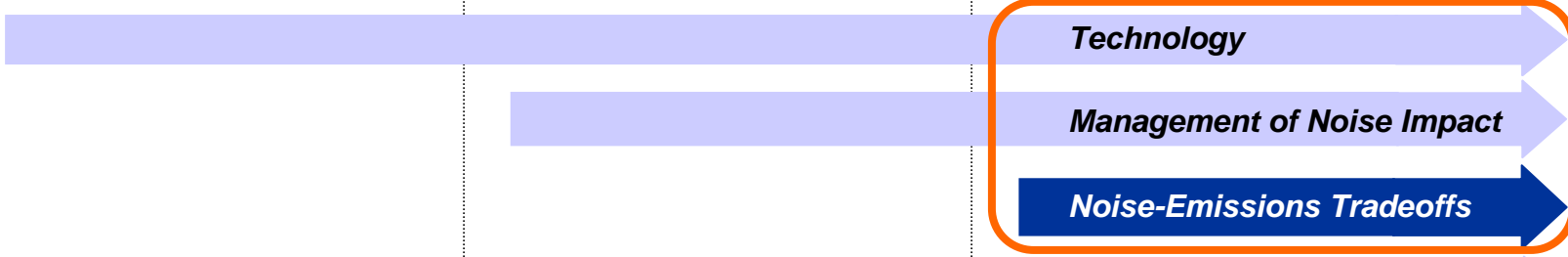
Methodologies

**X-Noise**

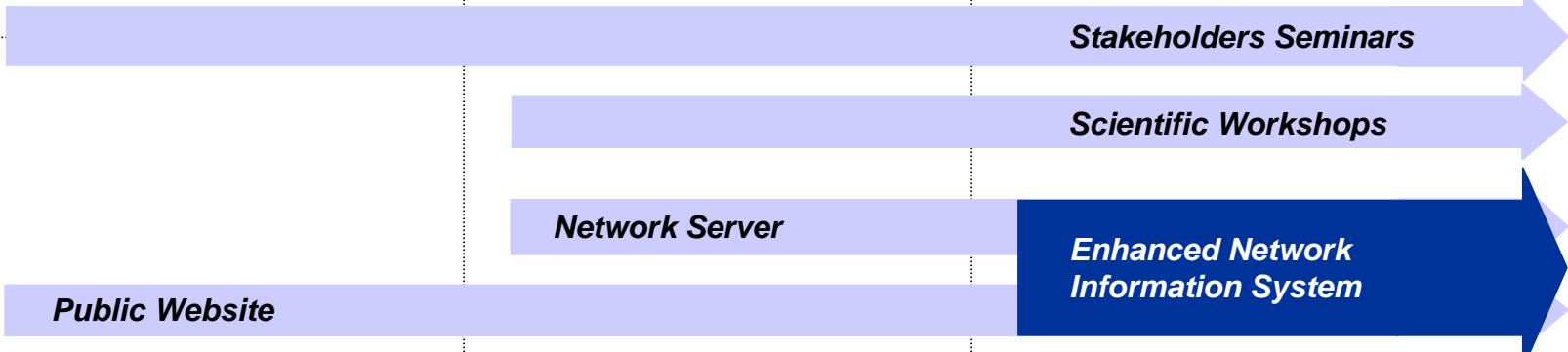
**X2-Noise**

**X3-Noise**

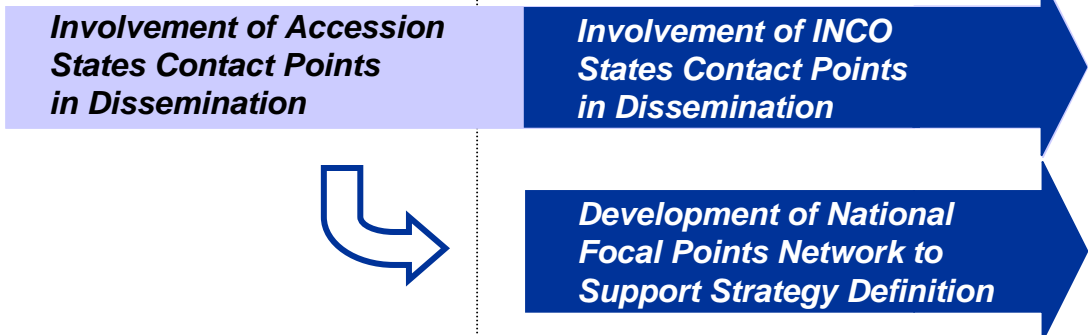
**Definition of Research Agenda**



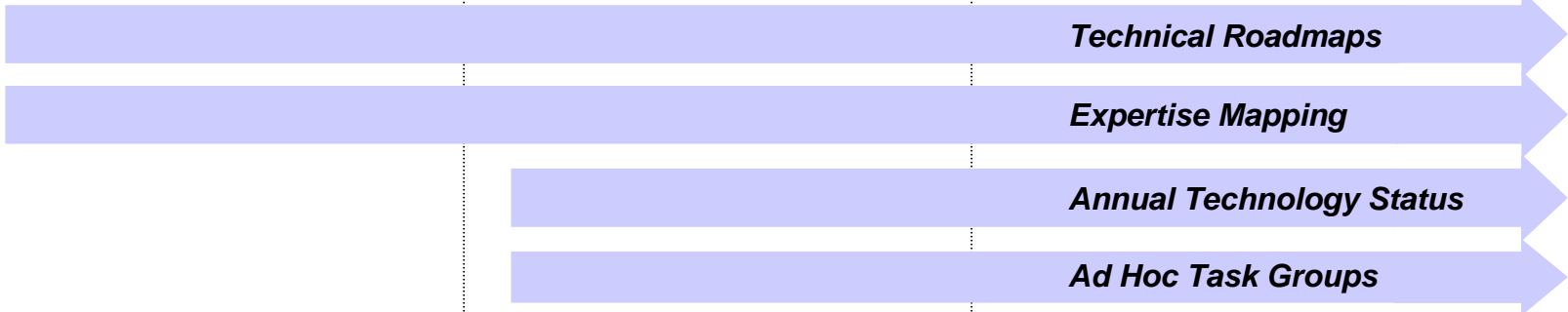
**Dissemination**



**Integration of Research Community**



**Methodologies**



# Aircraft Noise Projects Roadmap

Generation 1 Solutions

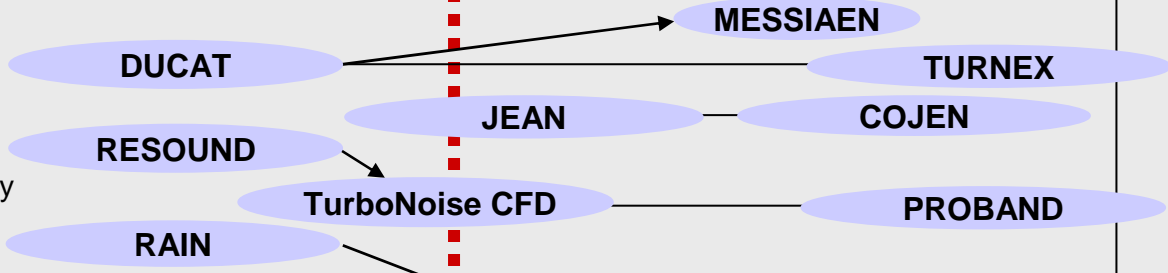
Generation 2 Solutions

Years →

98 99 00 01 02 03 04 05 06 07 08 09 10

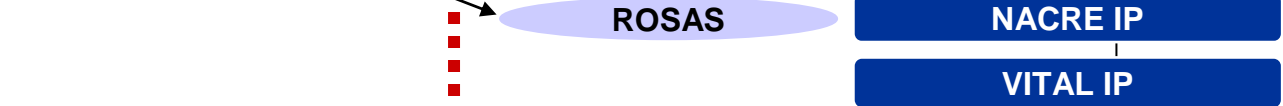
**Basic Tools & Source Understanding**

Propagation Models  
 Source Models and Advanced CFD/ CAA  
 Jet  
 Turbomachinery  
 Airframe



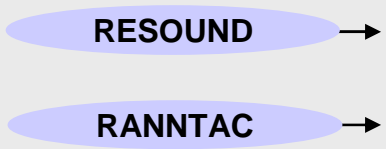
**Advanced Configurations**

Aircraft Architectures  
 Engine Architectures



**Turbomachinery Noise Reduction Technology**

Noise Reduction at Source  
 Nacelle Technologies



**Exhaust Noise Reduction Technology**

Nozzle Design & Liner Technology



**Airframe noise Reduction Techniques**

High Lift Devices & Landing Gear



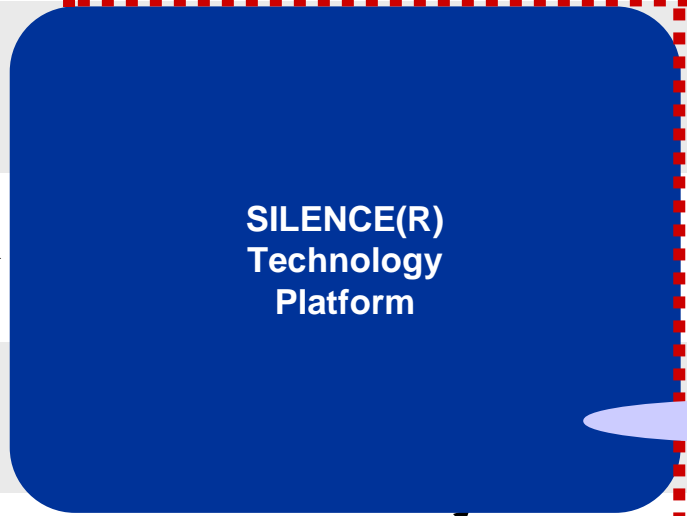
**Operational Practices**

Noise Abatement Procedures



**Impact Management Tools**

Noise / Emissions Tradeoffs Evaluation  
 Noise Mapping  
 Virtual Neighbourhood



?

?

?



- 3 Technical Areas for technology aimed at noise reduction at source
  - Novel Architectures (Aircraft, Propulsion Systems, Nacelles)
  - Multidisciplinary Component Design (AeroAcoustic optimisation, Composites...)
  - Active / Adaptive / Flow Control Techniques
- But also keep Balanced Approach in mind
  - Noise Abatement Procedures
  - Noise Impact Management Tools, including study of noise-emissions tradeoffs
- First set of roadmaps available by end of summer 2006



Thank You  
For Your Attention



*X<sup>3</sup>-Noise*