CALM
Noise Research Strategy Plan

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Basics Aspects of Strategy Plan

- ***The Aim of Research:***

  Vision for 2020

- ***Fundamentals:***
  - **EU Noise Policy in general**
  - **Environmental Noise Directive in particular**
- ***Essential Inputs:***
  - **Noise Working Groups**
  - **CALM Workshops with Stakeholders and European Research Advisory Councils**
  - **Studies on Road Traffic Noise and Noise from Outdoor Equipment**
  - **Conferences, Publications, ...**

The Vision for 2020

EC Green Paper of 1996 on Future Noise Policy:

... no person should be exposed to noise levels which endanger health and quality of life.

6th Community Environment Action Programme of 2002:

... substantially reducing the number of people regularly affected by long-term average levels of noise ... which cause detrimental effects on human health.

... to avoid harmful effects of noise exposure from all sources and preserve quiet areas.

WHO:
Guidelines for Community Noise (1999)

General Principles of Noise Reduction

Technical Principles:

1. Avoid and reduce noise at its source
2. Reduce noise in its propagation
3. Reduce noise at the receiver

Legal Principles:

- *Polluter pays principle (PPP):* the polluter pays for counter-measures or adverse effects
- *Precautionary principle:* avoid or reduce emission of pollutants by best available technologies
- *Co-operation:* common challenge for citizens, government, industry and all other parties involved
- *Subsidiarity and shared responsibility:* decisions at levels closest to the citizens and actions at levels with best efficiency

Reduction of Environmental Noise

Strategic Priorities

European Noise Policy

Assessment and Management of Environmental Noise (END)

- Assessment of noise exposure
- Information to the public
- Actions at the most efficient levels

Annex I: Special Indicators
Annex II: Assessment Methods
Annex III: Harmful Effects

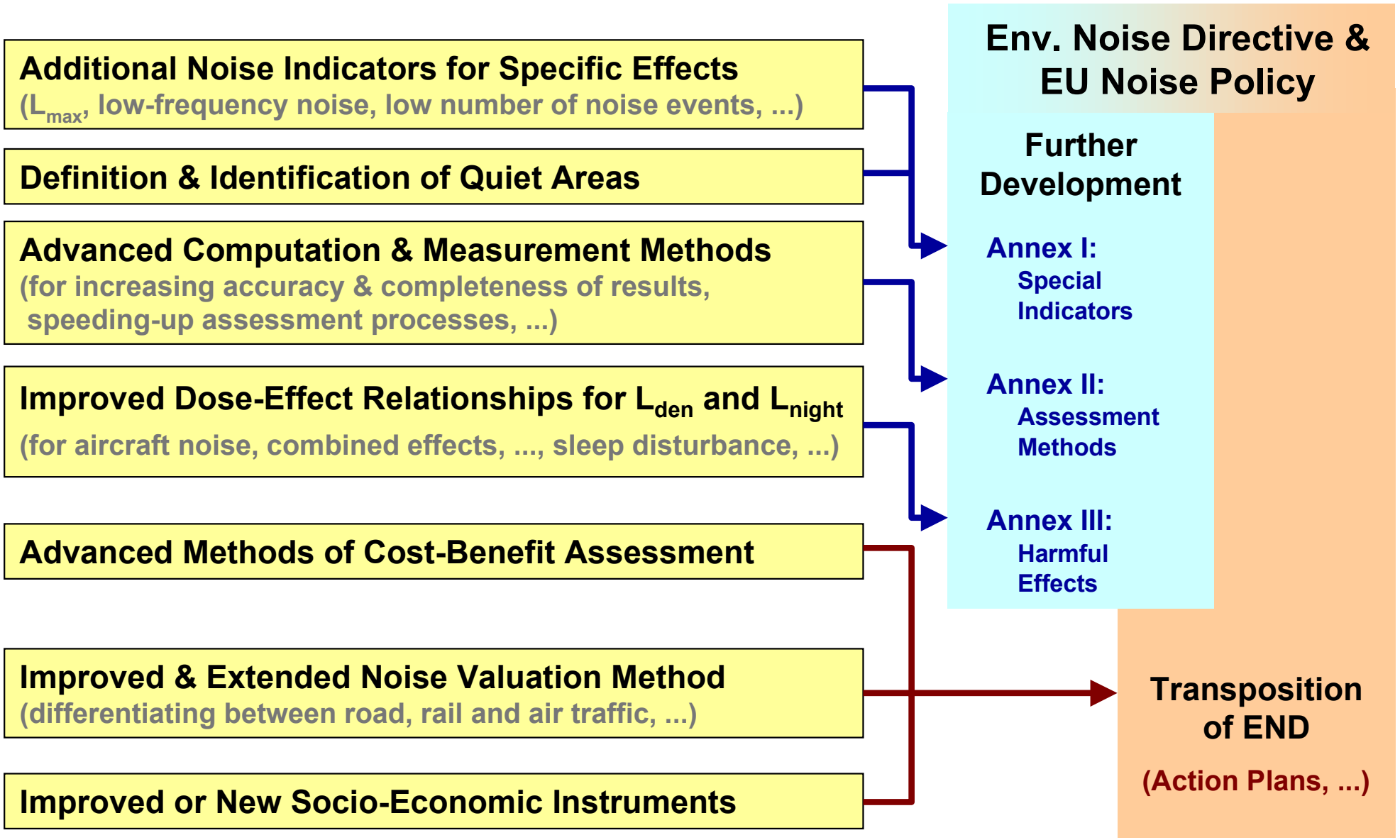
Control of Noise Emission

- Emission-Related Legislation
  - Further development of existing legislation
  - New directives
- Noise Control at Source (by Best Available Technologies)

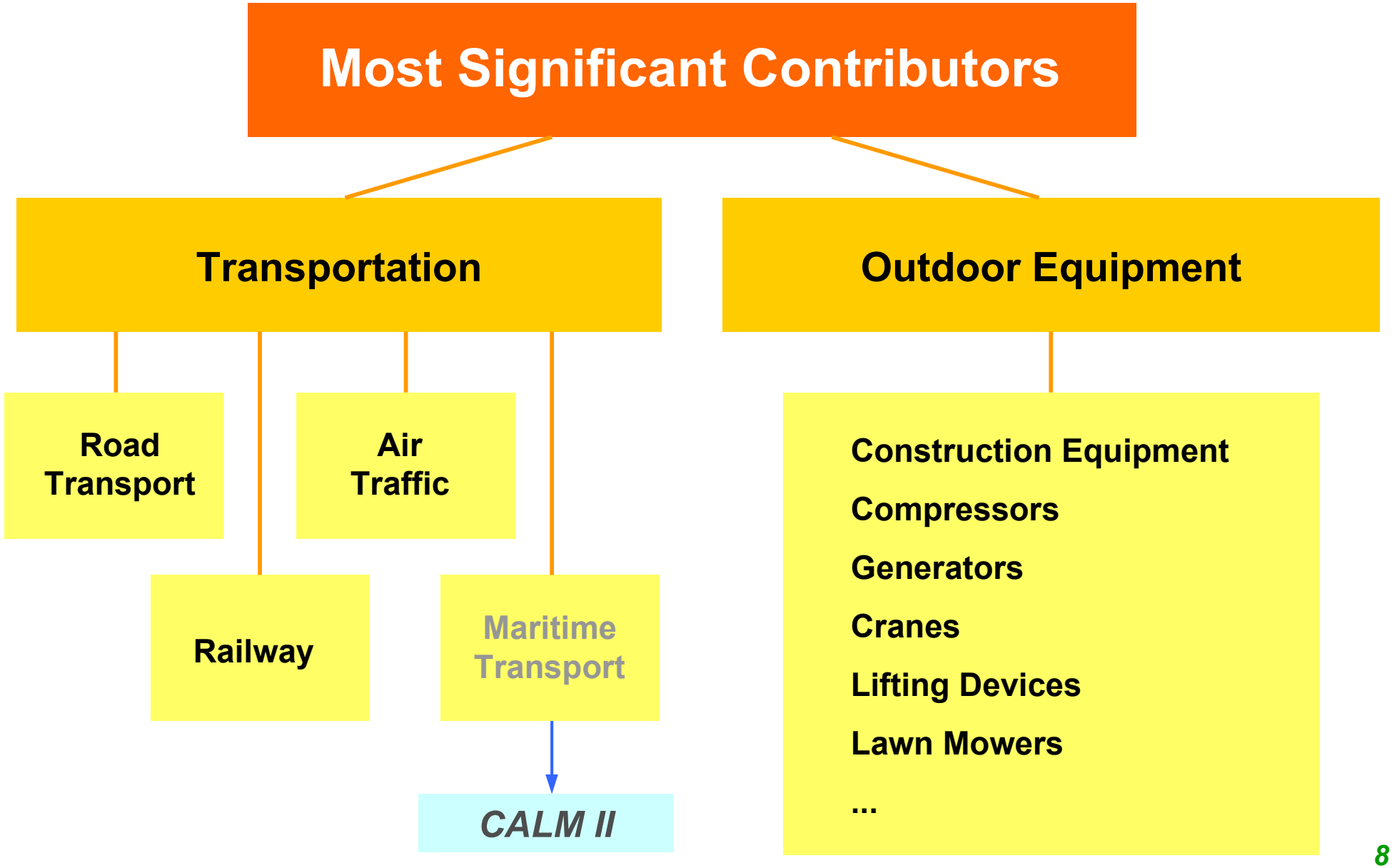
Perception-Related | **Emission-Related**

Noise Research

Perception-Related Research Needs



Emission-Related Research



Emission-Related Research

Road Transport Noise

Research Target: **Reduction of $L_{eq}^{Real\ Traffic}$ up to 10 dB**

(for 2020 Vision)

Main Research Needs:

- **Low-Noise Tyres**
  - **Improved simulation of interaction with road surface**
  - **New concepts** (geometry, design, material, matching to road surface)
- **Quiet Road**
  - **Advanced concepts** (surface design & material, prod. technologies, barriers, ...)
  - **Maintenance techniques** (cleaning, renewal, winter maintenance)
- **Vehicle**
  - **Quiet powertrain** (light-weight, high damping, quiet combustion, alternatives)
  - **Active control of intake/exhaust orifice noise** (production feasible solutions)
  - **Thermal management** (for more efficient acoustic shielding)
- **Traffic Flow**
  - **Sophisticated traffic flow management systems**
  - **Driving behaviour** (electronic assistance, specific training programmes)

Emission-Related Research

Railway Noise

Research Target: **Reduction at source: ≤ 20 dB (freight trains)**
(for 2020 Vision) ≤ 5 dB (high speed trains)

Main Research Needs:

- **Rolling Noise**
  - **Cost-efficient composite braking shoes** (for retrofitting of cast iron blocks)
  - **Rail grinding technologies** (esp. for urban traffic, „in service“ grinding)
  - **Curve squeal and brake screech** (basic understanding, control technologies)
  - **Quieter wheel and bogie design** (new materials & shapes, damping, shrouds)
  - **Quieter tracks** (track & rail design, embedded rails, low-noise bridges)
- **Traction Noise**
  - **Quiet diesel engines** (technology transfers from automotive engines)
  - **Low-noise cooling systems** (fan noise)
  - **Control of orifice noise** (compact mufflers, active systems)
- **„High Speed“ Noise**
  - **Low-noise train design** (compatible to all other constraints)
  - **Low-noise pantograph** (aerodynamic & contact noise)

Emission-Related Research

Air Traffic Noise

Research Target: (for 2020 Vision)

10 dB Reduction per Aircraft Operation
65 dBA L_{den} at Airport Boundaries

Main Research Needs:

- **Quiet Aircraft**
  - **Noise reduction technologies** (airframe, engine, nacelle)
  - **Novel aircraft and engine architecture** (incl. powerplant integration)
- **Rotorcraft**
  - **Low-noise technologies** (main rotor, antitorque device, engine, rotorcraft architecture, rotorcraft integration)
  - **Low-noise procedures & VSTOL concepts**
- **Noise Abatement Procedures**
  - **Optimised operation with new technologies and integration of air traffic management and control**
- **Community Impact management**
  - **Elaboration of management practices** (incl. airport capacity models & associated tools, social assessment of noise impacts)

Outdoor Equipment Noise

Research Target: **50 % Reduction of Noise Annoyance from OE**
(for 2020 Vision)

Main Research Needs:

- **Further Development of the Directive on Noise Emission of OE**
  - **Most suitable noise-relevant parameters per OE type** (for efficient setting of emission limits)
  - **Correlation between noise emission under testing and real operation** (including correlation with performance parameters)
  - **Improved regulation and test methods** (for a better adaptation to the real situations)
- **Noise Perception**
  - **Effect of single and combined noise sources**
- **In-Use Compliance**
  - **Practicable methods for testing and maintenance** (to avoid noise increase during the life cycle)

Innovation: Research & Implementation

Conclusions

- Future reduction of environmental noise in EU requires further research in
  - some interim items within the Environmental Noise Directive,
  - better adaptation of test methods to real world situations,
  - new or improved abatement technologies in all sectors of relevant noise contributors.
- Successful transposition of research results into innovative products and solutions requires integration of all relevant stakeholders and industry already in the research stage.