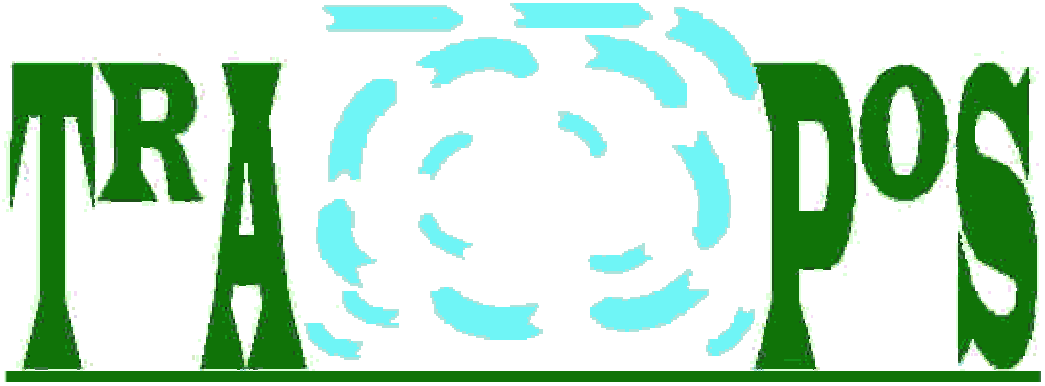
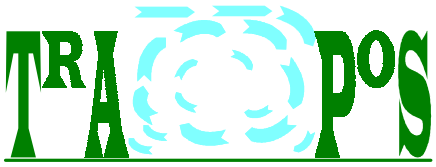
RESEARCH NETWORKS

TRAINING AND MOBILITY OF RESEARCHERS 1994 - 1998

Training and Mobility of Researchers

Optimisation of Modelling Methods for Traffic Pollution in Streets





Established: November 1997

Duration: 36 months

Total Budged: 1,500,000 EURO

PARTICIPANTS

National Environmental Research Institute (NERI)	Denmark
University of Surrey (U.Surrey)	United Kingdom
University of Karlsruhe (U.Karlsruhe)	Federal Republic of Germany
Swiss Federal Institute of Technology (ETHZ)	Switzerland
Ecole Centrale de Nantes (ECN)	France
Ingenieurbüro Dr.-Ing. Achim Lohmeyer (IBAL)	Federal Republic of Germany
Aristotle University of Thessaloniki (LHTEE/AUT)	Greece
Cambridge Environmental Research Consultants Ltd (CERC)	United Kingdom
Netherlands Organisation for Applied Scientific Research (TNO)	The Netherlands
University of Hamburg (MIHU)	Federal Republic of Germany

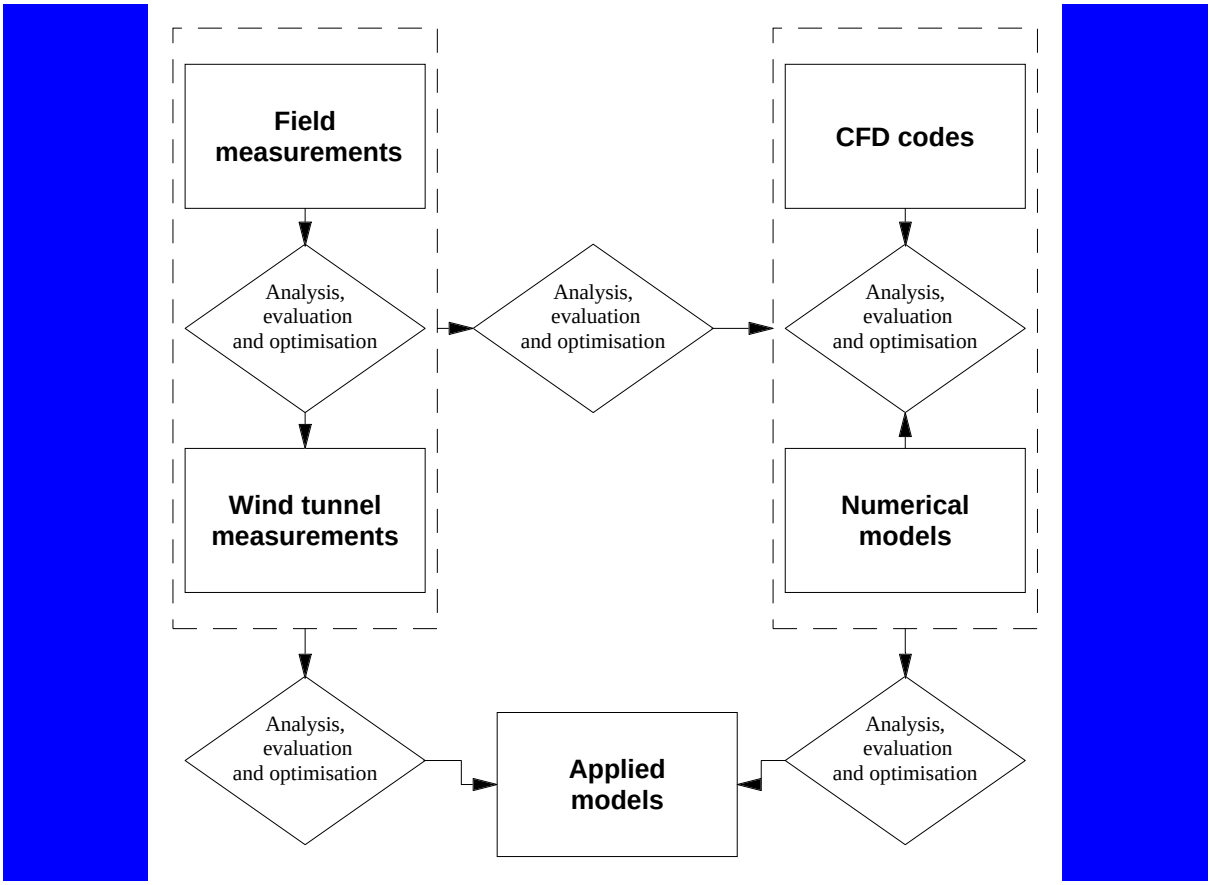
OBJECTIVES

- **TRAINING AND MOBILITY**

- **SCIENTIFIC OBJECTIVES**

RESEARCH TOPIC

- Improvement and optimisation of the methods that are used for mathematical modelling of traffic pollution in urban areas.



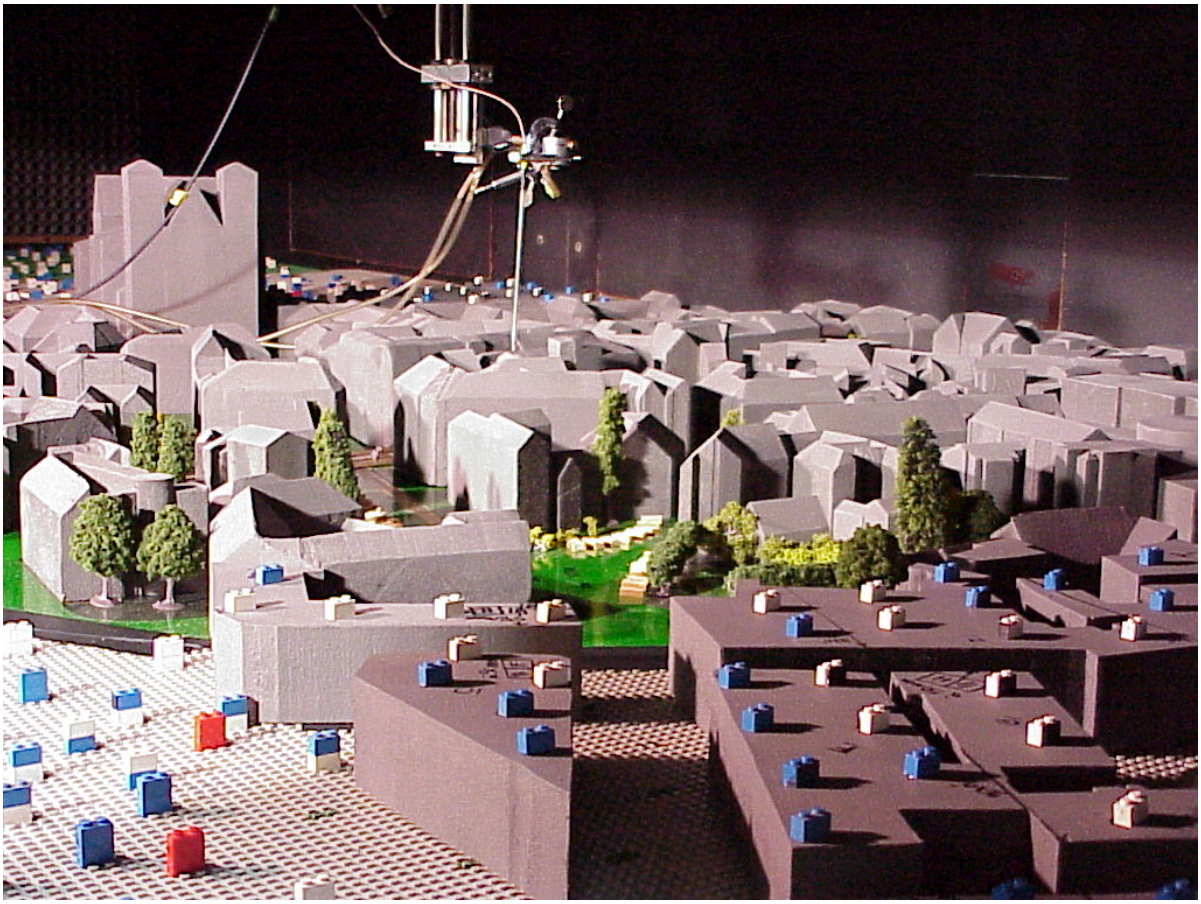
MAIN RESEARCH TOPICS

- Traffic created turbulence and its influence on dispersion of pollutants in the street
- The influence of thermal effects on flow modification within street canyons with special regard to low wind speed conditions
- The sensitivity of the flow and turbulence characteristics to the architecture of the street and its surroundings
- Fast chemical processes with special regard to NO-NO_2 conversion
- Dispersion and transformation processes of Respirable Suspended Particulate matter (RSP)

- Combined use of wind-tunnel and field data

Jagtvej site, Copenhagen, Denmark

Wind-tunnel model built by the Hamburg University



Rue de Strasbourg site, Nantes, France

Wind-tunnel model built by the University of Karlsruhe

The numerical models used within the Network comprise several advanced CFD models:

- CHENSI, a microscale model developed by the ECN group,
- The Stochastic Particle Dispersion model developed at ETHZ,
- CFX-TASCflow, a commercial fluid dynamics model applied by LHTEE,
- MIMO, a microscale model developed by LHTEE,
- MISKAM, a German microscale regulatory model.

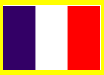
Other models used within the Network are parameterised practical models, such as the Danish Operational Street Pollution Model, OSPM, and the UK ADMS-Urban model. It is the aim of the Network research efforts to improve the performance of these models using the results achieved within the Network project.

RESEARCH and WORKING METHODS:

Participant	Field measurements	Wind tunnel experiments	CFD and numerical models	Applied models
NERI	x		x	x
U.Surrey		x		
U.Karlsruhe		x		x
ETHZ	x		x	x
ECN	x		x	
IBAL			x	x
LHTEE			x	
CERC	x			x
TNO				
MIHU	x	x	x	

Research Task	Teams involved
Flow and turbulence characteristics within and above urban streets	U.Karlsruhe, ECN, ETHZ, MIHU, NERI
Sensitivity of the flow and turbulence characteristics to the architecture of the street and its surroundings	MIHU, U.Karlsruhe, U.Surrey, ECN, LHTEE, NERI
Flow modification within street canyons due to thermal effects	ECN, LHTEE, U.Surrey
The traffic created turbulence and its influence on dispersion of pollutants in the street,	U.Karlsruhe, NERI, ECN, MIHU, CERC, IBAL, ETHZ
Fast chemical processes with special regard to NO-NO_2 conversion	LHTEE, ECN, NERI
Dispersion and transformation processes of Respirable Suspended Particulate matter (RSP)	NERI, IBAL
Practical implementation of traffic pollution models	IBAL, NERI, CERC

Employment of Young Researchers

Name	Nationality	Place and country of work	Previously at another Partner
Silvana Di Sabatino		CERC, GB	
Petroula Louka		ECN, FR	
Petra Kastner-Klein		ETHZ, CH	U.Karlsruhe
Jana Lataste		ETHZ, CH	
Giulia Clai		IBAL, DE	
Peter Sahm		LHTEE, GR	
Emmanuel Le Huu Nho		MIHU, DE	
Christian Chauvet		MIHU, DE	
Matthias Ketzel		NERI, DK	IBAL
Jose Ribeiro		U.Karlsruhe, DE	
Emmanuel Guilloteau		U.Karlsruhe, DE	ECN
Alexis Madrange		U.Karlsruhe, DE	ECN
Thierry Renouf		U.Surrey, GB	ECN
Anke Kovar-Panskus		U.Surrey, GB	MIHU
Michael Czech		U.Surrey, GB	

The current employment of the Young Researchers within the Network, taking into account contracts signed so far, corresponds to 191 man-months.

Participant	Young researchers financed by contract so far (man-months)			Contract deliverable of young researchers to be financed by the contract (man-months)		
	Pre-doc (a)	Post-doc (b)	Total (a + b)	Pre-doc (a)	Post-doc (b)	Total (a + b)
1. NERI	12	0	12	0	24	24
2. U.Surrey	12	3	15	0	24	24
3. U.Karlsruhe	13	1	14	6	18	24
4. ETHZ	0	13	13	0	24	24
5. ECN	0	10	10	0	24	24
6. IBAL	5	0	5	0	18	18
7. LHTEE	0	21	21	0	30	30
8. CERC	0	9	9	0	24	24
9. TNO	0	0	0	0	36	36
10. MIHU	0	17	17	12	24	36
TOTAL	**42**	**74**	**116**	**18**	**246**	**264**

Special events, meetings and workshops

Four network meetings have been organised so far.

The first meeting took place in Brussels on January 29-30, 1998. This was a kick-off meeting, where the working plan and the methodology were discussed.

The second meeting took place at the University of Hamburg on August 28, 1998. The meeting was mainly devoted to the discussion of the subject related to one of the Network activities - the traffic created turbulence. During the meeting, a presentation of the wind-tunnel model of the monitoring site, Jagtvej, was also organised.

The Network co-ordination meeting took place in Madrid on March 4, 1999, in connection with The Second International Conference on Urban Air Quality. The meeting was devoted to discussion of the progress in employment of young visiting researchers, preparation of the Mid-term evaluation and planning of the future Network activities.

A special TRAPOS workshop was organised in Aveiro, Portugal on August 22-25, 1999 in connection with the 3rd SATURN Workshop. The main topic of the meeting was presentation and discussion of the CFD modelling study conducted within TRAPOS. The second subject of the meeting was the discussion of methods used for measurements and modelling of the traffic induced turbulence.

Network meetings were organised to coincide with other major events related to air pollution modelling. The meetings were also open to participants from outside the Network. Hence, about 20 to 30 persons were present at each of the meetings.

“Podbielski” model intercomparison study:

The majority of the TRAPOS teams participated in the so-called “Podbielski exercise”.

This study was organised by the German Research Foundation Projektträgerschaft "Baden-Württemberg Programm Lebensgrundlage Umwelt und ihre Sicherung" (BWPLUS).

IBAL was responsible for implementation of the project, together with the collecting and processing of the results. The objective of this exercise was the determination of the uncertainties in estimation of traffic pollution in streets due to such factors as:

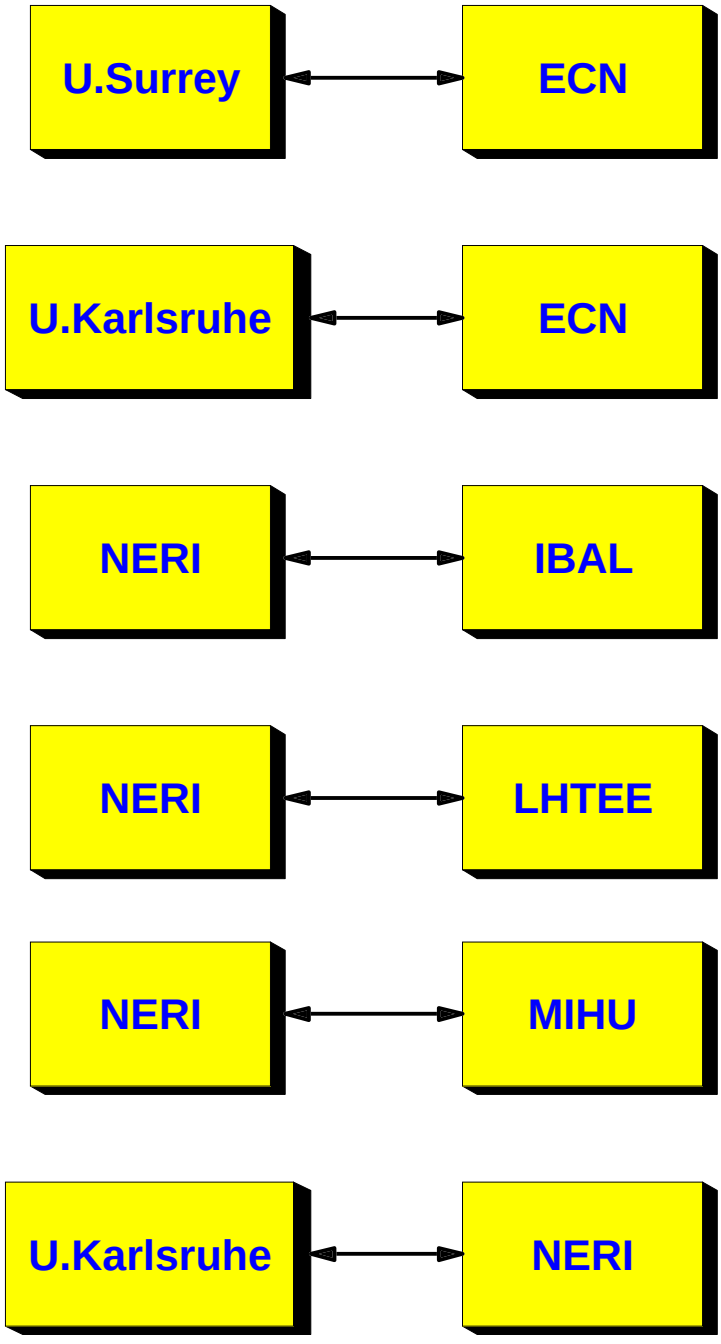
- use of different models,
- application of the same model by different users,
- use of different procedures for pre-processing of the available input-data and
- use of different methods for post-processing of model output.

Thirteen European modelling groups participated in this exercise.

The second phase in the “Podbielski exercise” is planned for the year 2000.

A workshop on the “Podbielski exercise” was organised in connection with the 6th International Conference on Harmonisation within Atmospheric Dispersion Modelling for Regulatory Purposes, October 11 - 14, 1999 in Rouen, France.

Beside the regular meetings, several short visits of scientific staff members to other Participants were organised either for exchange of information, to conduct an experiment or for preparation of a publication.



CONCLUSIONS:

The Network is now operating effectively and efficiently with extensive collaboration between young researchers placed in Universities, government laboratories and "Small and Medium-size Enterprises".

The considerable effort required to set up the network of young researchers has been worthwhile.

Prolongation of the network by 6 months will ensure that the effort required to set up the network will be fully reworded.