

HEAVEN Tool Book

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1 INTRODUCTION

This document provides a comprehensive overview of data gathering tools (evaluation tools) used for evaluation purposes within the HEAVEN project.

The HEAVEN Evaluation Team, i.e. Local Evaluation Managers of the six HEAVEN sites in co-operation with Rupprecht Consult, has developed evaluation tools. Each site took the lead in developing at least one measurement tool. Hence, there was always one tool development leader and five followers.

The followers adapt the tool developed by the leader, thereby ensuring common and co-ordinated measurement conditions throughout all six HEAVEN sites. Certain tools will have to be translated into the national language of the followers while other tools may have to be customised in order to account for possible site-specific issues. The HEAVEN "Tool Book" forms the basis for these final activities regarding the development of evaluation tools.

The HEAVEN "Tool Book" is structured as follows:

- Chapter 2 provides a brief overview of common evaluation tools and the approach used within the evaluation workpackage.
- In chapter 3, overview table show the interrelationship between the various HEAVEN indicators and tools.
- In the remaining chapters 4 to 9, all evaluation tools are described in detail.
- "Lengthy" evaluation tools such as questionnaires, interview guidelines and tools involving sensitivity tests can be found in the annexes to this document.

2 COMMON EVALUATION TOOLS

Tools are defined in the Final Evaluation Plan in overview form (pp.69-71).

In the Final Evaluation Plan, categories of common evaluation tools included verification-specific tools and monetarisation of data as possible tool categories in HEAVEN evaluation. During the “brainstorm meeting” in Paris in September 2001, it became apparent that there are no “verification-specific tools” to be applied in HEAVEN evaluation. Instead, a new category “monitoring campaigns” has been introduced in order to accurately measure indicators 1.3 air and 1.3 noise.

A tool originally foreseen under the category “monetarisation” will also not be applied as intended, since “the time taken for trained staff to produce source emission noise levels for every required line source” cannot be derived. In other words, there is no reference case for increased efficiency of noise pollution description (which was to be expressed in time savings for staff to produce them).

The following categories of tools will be applied during the course of the HEAVEN large scale demonstration phase:

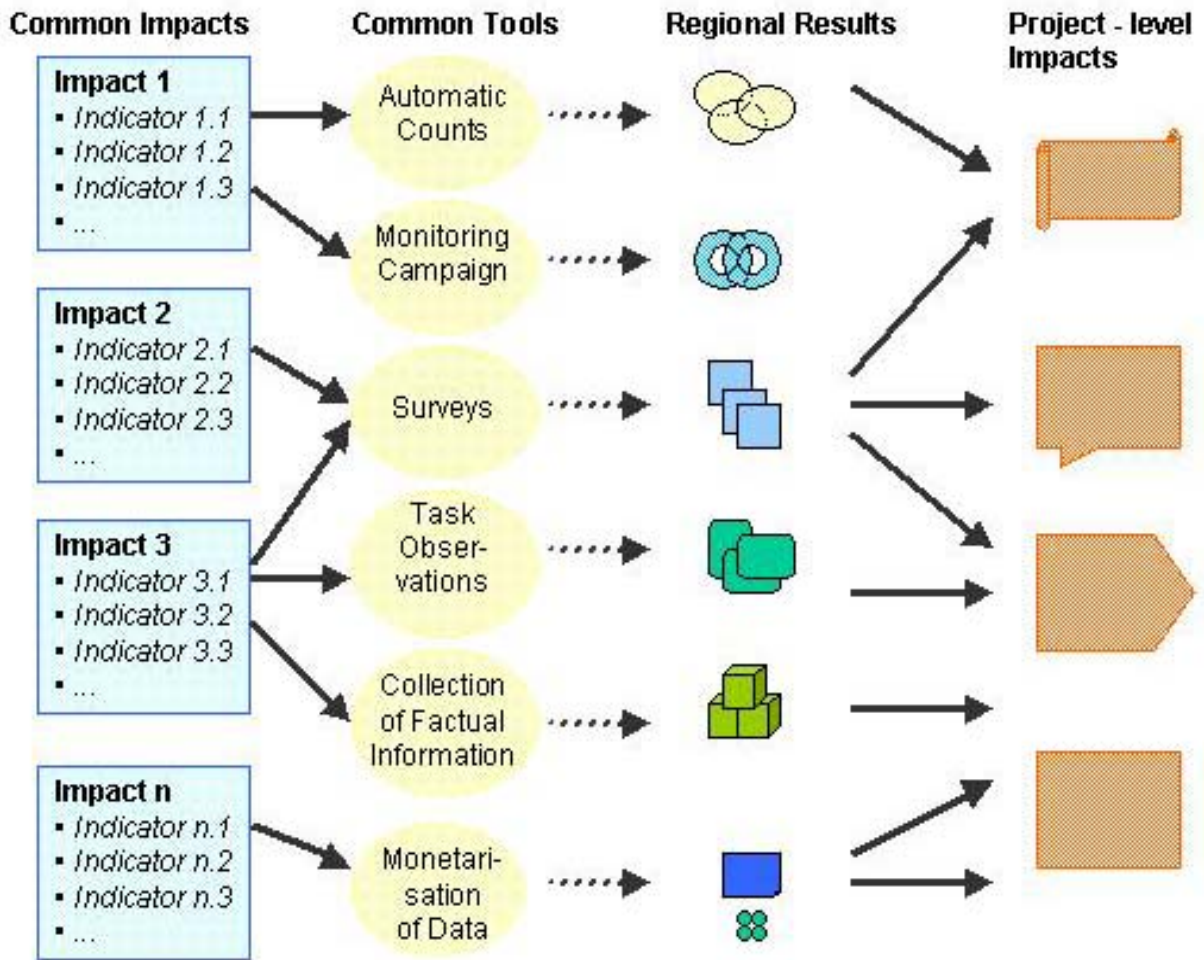
- Automatic Counts (AC)
- Monitoring Campaign (MC)
- Surveys (SUR)
- Task Observations (TOB)
- Factual Information Collection (FACT)

In the context of the calibration of air quality and noise models, it will be necessary to undertake monitoring campaigns. To assess the quality of a predicted model, outputs from the respective environmental models are compared with monitored data. To enable this comparison, the appropriate monitoring equipment (e.g. noise monitors, air quality monitoring stations) need to be available for a pre-defined period and placed at the selected test sites according to definitions in respective regulations. The results of the monitored data will be evaluated and finally compared with the modelled data.

Common Approach

During the practical exercise, it will be important to achieve an efficient and co-ordinated approach towards actual measurement of related indicators at all HEAVEN sites. Common operational evaluation tools have been defined which enable Local Evaluation Managers to approach their target groups in a co-ordinated manner and to save resources. The integration of these common tools in the process of operational evaluation is illustrated in figure 1.

Figure 1: Integration of Measurement Tools in the Evaluation Process



One tool can appropriately measure more than one indicator (e.g. a questionnaire can address a couple of divers issues). At the same time, one indicator may have to be measured by more than one tool (e.g. specific aspects of an indicator may require an in-depth interview with key decision makers, but may have to consider responses to a more simply designed questionnaire addressed to a larger group of public users).

3 OVERVIEW OF INDICATORS AND TOOLS

Table 1: Tools and Indicators

Ind. Nr.	Indicator Name	Measurement Tool	Tool No.	Tool Development Leader
1.1	Increased coverage of the traffic and roadside pollution network	Automatic Count	AC1 (air)	Rotterdam
1.2	Increased grid resolution	Automatic Count	AC2	Paris
1.3 air	Accuracy of roadside description	Monitoring Campaign	MC1	Rotterdam
1.3 noise	Accuracy of roadside description (noise)	Monitoring Campaign	MC2	Leicester
1.4	Increased frequency of update intervals regarding air quality	Task Observation	TOB1	Berlin
1.5	Increased efficiency of air quality description	Factual Information Collection	FACT1	Rome
1.6	Increased frequency of update intervals regarding noise quality	Task Observation	TOB2	Leicester
1.7	Increased efficiency of noise pollution description	Monetarisation	MON1 ¹	Rupprecht Consult
1.8	Noise roadside emission: Length of network	Automatic Count	AC1 (noise)	Leicester
2.1 air	Increased coverage of the traffic and roadside pollution network	Automatic Count	AC1 (air)	Rotterdam
2.1 noise	Increased coverage of the traffic and roadside pollution network (noise)	Automatic Count	AC1 (noise)	Leicester
2.2	Increased grid resolution used in modelling	Automatic Count	AC2	Paris
2.3	Reduced time to produce environmental descriptions regarding air quality based on scenario analysis	Task Observation	TOB3	Paris
2.4	Reduced time to produce environmental descriptions regarding noise quality based on scenario analysis	Task Observation	TOB4	Leicester
3A.1	Improved time resolution	Automatic Count	AC3	Paris
3A.2	Reduced delivery time	Task Observation	TOB 1	Berlin
3A.3	Increase in usefulness (interviews)	Factual Information Collection	FACT2	Rome
3A.4	Increased efficiency of daily/ weekly bulletin	Task Observation	TOB5	Paris
3B.1	Improved time resolution	Automatic Count	AC3	Paris
3B.2	Reduced delivery time	Task Observation	TOB1	Berlin

¹ It will be very difficult, if not impossible, to apply tool MON1 as intended, since "the time taken for trained staff to produce source emission noise levels for every required line source" cannot be derived. In other words, there is no reference case for increased efficiency of noise pollution description (which was to be expressed in time savings for staff to produce them).

Ind. Nr.	Indicator Name	Measurement Tool	Tool No.	Tool Development Leader
3B.3	Increase in usefulness (questionnaires)	Survey	SUR1	Rome
3B.4	Increased efficiency of daily/ weekly bulletin	Task Observation	TOB5	Paris
4.1	Increased quality of co-operation (interviews)	Factual Information Collection	FACT3	Berlin
4.2	Increase in time efficiency of information exchange	Factual Information Collection	FACT3	Berlin
5.1	Amount of data entered in common repository	Survey	SUR2	Paris
5.2	Increased usefulness for urban planning (including quality of data structure and storage of common repository)	Survey	FACT4/SUR3	Rome / Rotterdam

Table 2: Tools by Indicator

Ind. No.	Tool	Indicator Name
1.1	AC1 (air)	Increased coverage of the traffic and roadside pollution network
1.2	AC2	Increased grid resolution
1.3 air	MC1	Accuracy of roadside description
1.3 noise	MC2	Accuracy of roadside description (noise)
1.4	TOB1	Increased frequency of update intervals regarding air quality
1.5	FACT1	Increased efficiency of air quality description
1.6	TOB2	Increased frequency of update intervals regarding noise quality
1.7	MON1	Increased efficiency of noise pollution description
1.8	AC1 (noise)	Noise roadside emission: Length of network
2.1 air	AC1 (air)	Increased coverage of the traffic and roadside pollution network
2.1 noise	AC1 (noise)	Increased coverage of the traffic and roadside pollution network (noise)
2.2	AC2	Increased grid resolution used in modelling
2.3	TOB3	Reduced time to produce environmental descriptions regarding air quality based on scenario analysis
2.4	TOB4	Reduced time to produce environmental descriptions regarding noise quality based on scenario analysis
3A.1	AC3	Improved time resolution
3A.2	TOB1	Reduced delivery time
3A.3	FACT2	Increase in usefulness (interviews)
3A.4	TOB5	Increased efficiency of daily/ weekly bulletin
3B.1	AC3	Improved time resolution
3B.2	TOB1	Reduced delivery time
3B.3	SUR1	Increase in usefulness (questionnaires)
3B.4	TOB5	Increased efficiency of daily/ weekly bulletin
4.1	FACT3	Increased quality of co-operation (interviews)
4.2	FACT3	Increase in time efficiency of information exchange
5.1	SUR2	Amount of data entered in common repository
5.2	FACT4 / SUR3	Increased usefulness for urban planning (including quality of data structure and storage of common repository)

Table 3: Indicators by Tools

Tool	Indicators
AC1 (air)	1.1, 2.1 air
AC1 (noise)	1.8, 2.1 (noise)
AC2	1.2, 2.2
AC3	3A.1, 3B.1
MC1	1.3 air
MC2	1.3 noise
SUR1	3B.3
SUR2	5.1
SUR3	5.2
TOB1	1.4, 3A.2, 3B.2
TOB2	1.6
TOB3	2.3
TOB4	2.4
TOB5	3A.4, 3B.4
FACT1	1.5
FACT2	3A.3
FACT3	4.1, 4.2
FACT4	5.2

4 AUTOMATIC COUNTS – AC TOOLS

4.1 AC1

4.1.1 AC1 (Air)

Maarten van Bemmelen (Goudappel Coffeng and Local Evaluation Manager of Rotterdam) had the lead in developing tool AC1 (Air).

AC1 (Air) gathers data for indicators 1.1 and 2.1 (Air). The respective indicator fact sheets are provided in tables 4 and 5 below.

Table 4: Indicator 1.1 Fact Sheet

Impact:	Enhanced Description of Current Environmental Situation (Impact 1)
Number:	1.1
Indicator:	Increased coverage of the traffic and roadside pollution network
Relevance:	Better description in near real time of the environmental impacts: Roadside air pollution. More extensive description.
Key terms:	Roadside air pollution - In accordance with Council Directive 1999/30EC, Annex VI Traffic network - Main road network of area under consideration
Involved appraisal groups:	Operators of the application
Methods:	Comparison of the length (in km) of the traffic network for which air pollutant concentrations are described.
Reference case:	Length (in km) of network described before HEAVEN.
Operational issues:	Computation of the length (in km) of the network described. Computerised approach.
Success criterion:	Increase in the length (in km) of the network described for various air pollutants
References to other indicators:	2.1

Table 5: Indicator 2.1 (Air) Fact Sheet

Impact:	Enhanced Environmental Scenario Analysis (Impact 2)
Number:	2.1
Indicator:	Increased coverage of the traffic and roadside pollution network
Relevance:	Assist the cities in identifying TDMS which reduce the impact of traffic on the environment: same relevance as the indicator 1.1 but in the framework of TDMS analysis. This indicator measures the same as indicator 1.1, however, in a different context of use. Indicator 2.1 does not focus on real-time situations (like indicator 1.1), but on longer-term time scales. It compares the effects of TDMS within a scenario analysis
Key terms:	Roadside air pollution - In accordance with Council Directive 1999/30 EC, Annex VI Traffic network - Main road network of area under consideration
Involved appraisal groups:	Operators of the application
Methods:	Comparison of the length (in km) of the traffic network for which air pollutant concentrations are described.
Reference case:	Length (in km) of network described before HEAVEN
Operational issues:	Computation of the length (in km) of the network described. Computerised approach.
Success criterion:	Increase in the length (in km) of the network described for various air pollutants.
References to other indicators:	1.1
Site specific issues:	To be defined in the "Local Evaluation Plans"

Tool Description

Within three months after the HEAVEN system is put into operation, a member of the evaluation team requests one of the system operators to perform an automatic count on the length (in km) of the network covered by the HEAVEN system. This exercise can only be done after the operator has performed a number of scenario calculations.

Indicators 1.1 and 1.2 measure the length (in km) of the traffic network for which roadside air pollution concentrations are available. The roadside air pollution concentrations are evaluated according to the ad hoc EU definitions for roadside measurements (Directive 1999/30, Annex VI). Quantitative data will be gathered for the indicators as the ratio of the whole length (in km) of the traffic network described after the implementation of HEAVEN to the whole lengths of the traffic network described prior the implementation of HEAVEN.

These indicators will concern four pollutants:

- PM10,
- NO₂,
- CO, and
- C₆H₆.

Indicator 1.1 focuses on real-time situations, while indicator 2.1 is directed towards longer-term time scales for comparing the effects of TDMS within a scenario analysis.

With respect to the most “critical” reference values defined by the daughter air quality directives, the results for Indicator 1.1 should concern at least:

- the 24-hour-value for PM10,
- the 1-hour-value for NO₂,
- the 8-hour-value for CO, and
- the annual value for C₆H₆.

The success criterion will be the increased coverage of the traffic and roadside pollution network, i.e. positive ratios. A data table will be used to document the data required to measure indicators 1.1 and 2.1. The six HEAVEN cities will be asked to complete the data tables below.

Table 6: AC1 (Air) Data Table

Pollutants	Indicator 1.1 Data	Berlin	Leicester	Paris	Prague	Rome	Rotterdam
Traffic description	Traffic network length (in km) before HEAVEN						
	Traffic network length (in km) after HEAVEN						
	Length after / length before > 0 ?						
PM10 (24 hours)	Traffic network length (in km) before HEAVEN	⊗					
	Traffic network length (in km) after HEAVEN						
	Length after / length before > 0 ?						
NO ₂ (1 hour)	Traffic network length (in km) before HEAVEN	⊗					
	Traffic network length (in km) after HEAVEN						
	Length after / length before > 0 ?						
CO (8 hours)	Traffic network length (in km) before HEAVEN	⊗					
	Traffic network length (in km) after HEAVEN						
	Length after / length before > 0 ?						
C ₆ H ₆ (annual)	Traffic network length (in km) before HEAVEN	⊗					
	Traffic network length (in km) after HEAVEN						
	Length after / length before > 0 ?						
Pollutants	Indicator 2.1 Scenario Data	Berlin	Leicester	Paris	Prague	Rome	Rotterdam
Traffic description	Traffic network length (in km) before HEAVEN						
	Traffic network length (in km) after HEAVEN						
	Length after / length before > 0 ?						
PM10	Traffic network length (in km) before HEAVEN	⊗					
	Traffic network length (in km) after HEAVEN						⊗
	Length after / length before > 0 ?						
NO ₂	Traffic network length (in km) before HEAVEN	⊗					
	Traffic network length (in km) after HEAVEN						⊗
	Length after / length before > 0 ?						
CO	Traffic network length (in km) before HEAVEN	⊗					
	Traffic network length (in km) after HEAVEN						⊗
	Length after / length before > 0 ?						
C ₆ H ₆	Traffic network length (in km) before HEAVEN	⊗					
	Traffic network length (in km) after HEAVEN						⊗
	Length after / length before > 0 ?						

4.1.2 AC1 (Noise) (=> Chapter 9.1)

Please refer to chapter 9 which covers noise-related tools. Tool AC1 (noise) is described in chapter 9.1.

4.2 AC2

Mireille Lattuati and Dominique Gombert (both AIRPARIF) had the lead in developing tool AC2.

AC2 gathers data for indicators 1.2 and 2.2.² The respective indicator fact sheets are provided in tables 7 and 8 below.

Table 7: Indicator 1.2 Fact Sheet

Impact:	Enhanced Description of Current Environmental Situation (Impact 1)
Number:	1.2
Indicator:	Increased grid resolution
Relevance:	Better description in near real time of the environmental impacts: Background air pollution. Improved resolution.
Key terms:	Background air pollution – In accordance with Council Directive 1999/30EC, Annex VI Grid size - Spatial resolution for which background air pollution is assessed
Involved appraisal groups:	Operators of the application
Methods:	Comparison of grid size
Reference case:	Grid size of the modelling tool before HEAVEN
Operational issues:	-
Success criterion:	Smaller grid size
References to other indicators:	2.2

² The HEAVEN Guidelines for Local Evaluation state that AC2 also gathers data for indicators 3A.1 and 3B.1. This does not prove feasible. Therefore a “new” tool AC3 has been developed which gathers data solely for these two indicators.

Table 8: Indicator 2.2 Fact Sheet

Impact:	Enhanced Environmental Scenario Analysis (Impact 2)
Number:	2.2
Indicator:	Increased grid resolution used in modelling
Relevance:	Assist the cities in identifying TDMS which reduce the impact of traffic on the environment: same relevance as the indicator 1.2 but in the framework of TDMS analysis.
Key terms:	Background air pollution - In accordance with Council Directive 1999/30EC, Annex VI Grid size - Spatial resolution for which background air pollution is assessed
Involved appraisal groups:	Operators of the application
Methods:	Comparison of grid size
Reference case:	Grid size of the modelling tool before HEAVEN
Operational issues:	-
Success criterion:	Smaller grid size
References to other indicators:	1.2

Tool Description

The HEAVEN project is expected to provide a better and more frequent description of current environmental situations. Besides an extended geographic coverage of the traffic network, a more precise description of the current environmental situation, i.e. the background air quality situation, has yet to go through more accurate and efficient environmental modelling, and consequently through better grid resolutions. Nevertheless, one must be aware that grid resolution modelling is limited by computer time processing (probably in the short run), but mainly by our knowledge of the description in space and time of the current environmental situation, i.e. dynamic processes and data and emissions inventories.

Indicator 1.2 measures grid resolution modelling. It will be evaluated quantitatively for at least two pollutants:

- O₃ and
- NO₂.

The evaluation could be extended to other pollutants, like CO, C₆H₆ or PM₁₀, considering their specific relevance for the background locations.

The situation observed prior to the implementation of HEAVEN will serve as the reference case.

The success criterion will be the increase of grid resolution, i.e. the reduction of grid cells size.

This increased grid resolution is also of major interest for public and decision makers in the framework of TDMS implementation, with regards to indicator 2.2. A finer grid size provides a more precise description of the air pollution patterns and allows a better decision process.

Evaluation process

For the different ad-hoc pollutants (NO₂ and O₃), the system operator will have to precise the geographical extension of the domain covered (demonstration area). This domain can be different for NO₂ and O₃.

In addition, inside the whole domain of description, the modelling tool can provide a more precise description for a specific area (i.e. a more precise description for the NO₂ levels in the centre of the cities).

The information can be summarised as :

Table 9: AC2 Data Table

Pollutant (NO ₂ and O ₃)	Before		After	
	Grid size (in km)	Number of cells	Grid size (in km)	Number of cells
Domain 1				
Domain 2				
.....				

Typically, "Domain 1" has to be understood as inner-city domain, "Domain 2" as outer-city domain.

The success criterion will be either:

- a) the increase of grid resolution or
- b) the increase in the number of cells if the grid resolution (extension of the domain) remains unchanged.

The "improved resolution" evaluation is related only to the point a), i.e. if, before Heaven, there was a 6 km grid and after HEAVEN, there was 2 km grid, this means that a more refined information is potentially available.

Success criterion b) is also relevant. If, before Heaven, a description in a 20 x 20 km domain with a 6 km grid is provided and after Heaven, a description in a 25 x 25 km domain is provided with the same grid resolution, this means that there will also be an improved resolution, because information is delivered with an extended resolution in a domain not previously covered.

4.3 AC3

Dominique Gombert (AIRPARIF) had the lead in developing tool AC3.

AC3 gathers data for indicators 3A.1 and 3B.1. The respective indicator fact sheet is provided in table 10 below.

Table 10: Indicator 3AB.1 Fact Sheet

Impact:	Improved Access and Quality of Environmental Information for Professional Users (3A) and Public Users (3B) (Impact 3)
Number:	3AB.1
Indicator:	Improved time resolution
Relevance:	Better description in near real time of the environmental impacts: more precise temporal description of the environmental situation provided to Public and Professional users.
Key terms:	Time resolution - Smallest time unit associated to an available air pollution concentration Roadside air pollution - In accordance with Council Directive 1999/30EC, Annex VI Background air pollution - In accordance with Council Directive 1999/30EC, Annex VI
Involved appraisal groups:	Operators of the application
Methods:	Comparison of the time resolution available for professional and public users with and without the HEAVEN tools.
Reference case:	Time resolution of the air pollution description available before the HEAVEN tools.
Operational issues:	-
Success criterion:	Improvement of the time resolution, it means more precise description of the temporal behaviour of air pollution.
References to other indicators:	-
Site specific issues:	To be defined in the "Local Evaluation Plans"

Tool Description

The HEAVEN project is expected to improve both the user's access and the quality of environmental information for professional and public users. The improvement of the user's access refined to a better temporal description of the current environmental situation.

Indicator 3.1 evaluates this time resolution. It will be estimated quantitatively for roadside (PM10, NO₂, CO and C₆H₆) and for background (at least NO₂, O₃) air quality.

The situation observed prior to the implementation of HEAVEN will serve as the reference case.

The success criterion will be the reduction of the time resolution, i.e. a better description of the current environmental situation (for example 1 hour rather than 24 hours).

Evaluation process

Back

The time resolution has clearly to be understood as the finest temporal description of the air pollution patterns obtained after the development of the HEAVEN system.

As an example, if the Heaven system broadcasts three times a day a background air pollution map concerning the 1-hour concentrations values, its "time resolution" has to be considered as 1 hour.

The evaluation conducted for professional and public users has to be clearly distinguished, since the time resolution of the maps broadcasted is potentially different.

The success criteria will be the reduction of the time resolution, for most of the basic pollutants described.

The evaluation will be conducted through the following tables :

Time resolution for professional users :

Table 11: Time resolution for professional users

Pollutants	Indicator 3A.1 Data	Berlin	Leicester	Paris	Prague	Rome	Rotterdam
PM10 (Roadside description)	Time resolution before HEAVEN						
	Time resolution after HEAVEN		⊗				
	Resolution after > resolution before ?						
NO ₂ (Roadside description)	Time resolution before HEAVEN						
	Time resolution after HEAVEN		⊗				
	Resolution after > resolution before ?						
CO (Roadside description)	Time resolution before HEAVEN						
	Time resolution after HEAVEN		⊗				
	Resolution after > resolution before ?						
C ₆ H ₆ (Roadside description)	Time resolution before HEAVEN						
	Time resolution after HEAVEN		⊗				
	Resolution after > resolution before ?						
O ₃ (Background description)	Time resolution before HEAVEN						
	Time resolution after HEAVEN		⊗				
	Resolution after > resolution before ?						
NO ₂ (Background description)	Time resolution before HEAVEN						
	Time resolution after HEAVEN		⊗				
	Resolution after > resolution before ?						

Time resolution for public users :

Table 12: Time resolution for public users

Pollutants	Indicator 3B.1 Data	Berlin	Leicester	Paris	Prague	Rome	Rotterdam
PM10 (Roadside description)	Time resolution before HEAVEN						
	Time resolution after HEAVEN		⊗				
	Resolution after > resolution before ?						
NO ₂ (Roadside description)	Time resolution before HEAVEN						
	Time resolution after HEAVEN		⊗				
	Resolution after > resolution before ?						
CO (Roadside description)	Time resolution before HEAVEN						
	Time resolution after HEAVEN		⊗				
	Resolution after > resolution before ?						
C ₆ H ₆ (Roadside description)	Time resolution before HEAVEN						
	Time resolution after HEAVEN		⊗				
	Resolution after > resolution before ?						
O ₃ (Background description)	Time resolution before HEAVEN						
	Time resolution after HEAVEN		⊗				
	Resolution after > resolution before ?						
NO ₂ (Background description)	Time resolution before HEAVEN						
	Time resolution after HEAVEN		⊗				
	Resolution after > resolution before ?						

5 MONITORING CAMPAIGNS – MC TOOLS

5.1 MC1

Maarten van Bemmelen (Goudappel Coffeng and Local Evaluation Manager of Rotterdam) had the lead in developing monitoring campaign tool MC1.

MC1 gathers data for indicator 1.3 (Air). The respective indicator fact sheet is provided in table 13 below.

Table 13: Indicator 1.3 Fact Sheet

Impact:	Enhanced Description of Current Environmental Situation (Impact 1)
Number:	1.3
Indicator:	Accuracy of roadside description
Relevance:	Better description in near real time of the environmental impacts: accuracy of the description provided by the HEAVEN DSS and model calibration.
Key terms:	Accuracy - In accordance with Council Directive 1999/30 EC, Annex VIII Roadside air pollution - In accordance with Council Directive 1999/30 EC, Annex VI Model calibration – Comparison of modelled with monitored concentrations
Involved appraisal groups:	Operators of the application, air pollution experts
Methods:	Comparison of observed and calculated air pollutant concentrations for specific roadside locations.
Reference case:	No reference case. This indicator is related to the performance of the new existing tools, developed in the framework of HEAVEN. Therefore, the comparison with an ex-ante situation is not relevant.
Operational issues:	Definition of the evaluation sites. Availability of monitoring data and calculated data.
Success criterion:	Provided by the annexes of the ad hoc air quality directives
References to other indicators:	-
Site specific issues:	To be defined in the “Local Evaluation Plans”

Introduction

The HEAVEN project is expected to contribute to the improvement of modelling systems. The performances of the simulation of a current environmental situation are obtained by comparing the model outputs with air quality observed data. In the case of background pollution, the implementation of such a validation is hard enough to be implemented in the HEAVEN context. In fact, it would be, by itself, a real research subject. However, such a validation can be easier done for roadside pollution description. As for indicator 1.1, the roadside air pollutant concentrations are evaluated according to the ad hoc EU definitions, provided by the directive 1999/30. Indicator 1.3 concerns this point, i.e. the roadside description accuracy, and evaluates the model calibration by limited measurements.

It will be expressed as the ratio of pollutant concentrations observed to pollutant concentrations calculated during an evaluation period. The evaluation period, the pollutants and the site typologies could be refined according to the local implementation framework. An evaluation period of about two weeks for the four pollutants PM10 (24 hours) NO₂ (1 hour), CO (8 hours) and C₆H₆ (annual) and, if applicable, for two typologies (a canyon and an open roadside sites) is suggested as a minimal approach.³

The score will be successful when the ratios will be lower than pre-defined limit values. These limit values are defined as the "accuracy of simulation" in annex VIII of the directive 99/30 for PM10 and NO₂ and the annex VI of the directive 2000/69 for CO and C₆H₆.

Monitoring campaign

Validation of the HEAVEN model structure is performed by the evaluation of real-time model calculations and actual measurements during a pre-defined period at pre-defined sites.

Before the validation can take place the HEAVEN-model structure as well as the measuring site structure should be operational under the boundary conditions given below.

Set-up of the HEAVEN model structure

- Determination and implementation of the highway and inner-urban road structure in the model as well as linkage to traffic intensity data.
- Determination and linkage to the HEAVEN-model structure of relevant (a) background station(s) and (b) meteorological station(s) close to the HEAVEN-area for (a) the key air quality parameters and (b) the necessary meteorological parameters
- Determination and set-up of representative measuring site(s) for the validation of the HEAVEN-model (named as "validation" sites)

Criteria of the key input parameters for the HEAVEN-model structure

As the air quality model calculates on an hourly basis all data should be available on an hourly basis for :

- traffic composition and traffic intensity
- meteorological parameters
- background concentrations of NO₂ and O₃
- traffic influenced concentrations of NO₂ at the measuring sites used for validation

³ HEAVEN sites Berlin, Leicester, Paris, and Rotterdam confirmed that their evaluation period concerning the monitoring campaign will exceed the minimum requirement of two weeks while Prague and Rome intend to stick to the two-week minimum.

For the other two key air quality parameters (PM₁₀ and benzene) data should be available as daily average values.

Location and set-up of the “validation” sites

For each type of road (highway or inner-urban road) at least one “validation” site should be chosen. The “validation” site should be located in such a way that it is under influence of the highway or inner-urban road that will be described by the air quality model (e.g. within 200 m from the highway and within the same street for inner-urban roads). EU-daughter directives may be used for more specific criteria for the “validation” sites.

For an efficient use of the validation period it is strongly recommended that the site(s) for the validation of the highway segments should be located in such a way that it is influenced most by the prevailing wind direction.

The air quality monitors for the relevant parameters shall be operated under the commonly employed QA/QC procedures and practices (see also EN standards of the specific air quality parameters).

Duration of the validation period

The validation period should be representative for the seasons and therefore for at least 10% of the time of a season should be covered by the validation measurements. For the “validation” sites for the highway segments the data used for validation should be within a wind direction sector of about 120° (this is ± 60° around the wind direction perpendicular on the highway segment).

Success criteria

The average difference between calculated and measured data should be less than 50% for all data points (60% for NO₂).

Table 14: MC1-Indicator 1.3 Data Summary Table

Pollutants	MC1-Indicator 1.3 Data	Berlin	Leicester	Paris	Prague	Rome	Rotterdam
PM10 (24 hours) ⁴	Concentration observed						
	Concentration calculated						
	$\Delta C < 50 \% ?$						
NO ₂ (1 hour)	Concentration observed						
	Concentration calculated						
	$\Delta C < 60 \% ?$						
CO (8 hours)	Concentration observed						
	Concentration calculated						
	$\Delta C < 50\%$						
C6H6 (annual)	Concentration observed						
	Concentration calculated						
	$\Delta C < 50 \%$						

⁴ Directive 99/30 sets out accuracy objectives only for annual averages of modelled PM10-concentrations. In the absence of objectives for annual averages, the tougher objectives for annual averages have been used instead. As the modelling of daily averages, which is the focus within HEAVEN, is associated with higher uncertainties than the modelling of annual averages, the tougher number used here is to be considered an indicative benchmark rather than a strict limit.

5.2 MC2 (=>chapter 9.2)

Please refer to chapter 9 which covers noise-related tools. Tool MC2 is described in chapter 9.2.

6 SURVEYS (QUESTIONNAIRES) – SUR TOOLS

6.1 SUR1

Luca Persia (Local Evaluation Manager of Rome) had the lead in developing tool SUR1.

SUR1 is a questionnaire used to gather data for indicator 3B.3. The respective indicator fact sheet is provided in table 15 below.

The actual questionnaire is provided in annex 1 to this document.

Table 15: Indicator 3B.3 Fact Sheet

Impact:	Improved Access and Quality of Environmental Information for Public Users (3B)
Number:	3B.3
Indicator:	Increase in usefulness (questionnaires)
Relevance:	HEAVEN is expected to improve the availability of environmental information in a form desired by the users and to the guarantee of an efficient delivery of such information.
Key terms:	Usefulness - the capability in machine functional terms to fulfil the specified range of tasks within the specified range of environmental scenarios.
Involved appraisal groups:	Public Users
Methods:	Questionnaires directed at public users
Reference case:	Existing situation
Operational issues:	Questionnaires need to be “customised” in order to account for site-specifics.
Success criterion:	Majority of answers in the interviews positive.
References to other indicators:	Indicator 3A.3
Site specific issues:	To be defined in the “Local Evaluation Plans.”

Additional operational details

The surveys will be carried out at a time when the HEAVEN information system will have been operational for a reasonable number of months (i.e. 4-5 months) in order to allow public users to “digest” the new service. The foreseen assessment period is from about 1 July to 13 October 2002.

Where the environmental information will be delivered via Internet, online questionnaires will be used. Otherwise, the sample selection method will be chosen according to the used delivery mean.

If different kinds of information will be delivered, separated questionnaires will be used (a single questionnaire for each kind of information).

With regard to the success criterion, in general terms, a majority of positive answers in the interviews is expected (e.g. the number of respondents “absolutely” or “partly” agreeing is higher than the number of respondents “partly” or “absolutely” disagreeing).

The existing situation will be considered as the reference case. Even if the surveys will be conducted after the HEAVEN information system implementation, some preliminary questions on the pre-HEAVEN situation will be asked.

With regard to the sample size, considering a 95% confidence level, the objective is to collect 400 responses (100 responses are the minimum) for each questionnaire, but, obviously, in the case of the online questionnaire, the exact number of respondents can't be known in advance, since each user will be free to decide whether to complete the questionnaire.

A possible bias of the survey results can be given by a segmentation of the respondents. It can be expected that mainly users with a “strong” judgement (either positive or negative) will fill in the questionnaire. Other possibilities were explored (e.g. a mailing list of users to be interviewed by e-mail) but each of them presented possible sources of biases (e.g. low expected number of respondents) or technical problems (e.g. privacy issues).

The evaluation process could be affected by an insufficient number of respondents, due to a low response rate or to significant delays in the actual implementation of the HEAVEN information services. If this is the case, a contingency plan would require to select an experimental panel of public users, asking them to test the information service and, then, to be interviewed.

The actual questionnaire is provided in annex 1 to this document.

6.2 SUR2

Dominique Gombert (AIRPARIF) had the lead in developing tool SUR2.

SUR2 gathers data for indicator 5.1. The respective indicator fact sheet is provided in table 16 below.

As agreed at the WP3 workshop in Brussels, indicators 5.1 and 5.2 have been modified. Indicator 5.1 now has a quantitative focus and reads "Amount of data entered in common repository". Indicator 5.2 maintains its qualitative focus and now includes the qualitative aspects of the former indicator 5.1. Indicator 5.2 now reads "Increased usefulness for urban planning (including also quality of data structure and storage of common repository)". As a consequence of these changes, tool SUR2 (=> 5.1) has been re-developed and tools FACT4 and SUR3 have been combined (=>5.2).

Table 16: Indicator 5.1 Fact Sheet

Impact:	Increased Support of Urban Planning on an Environmental Basis (Impact 5)
Number:	5.1
Indicator:	Amount of data entered in a common repository
Relevance:	Through HEAVEN, urban planning is supported by accumulating specific data related to the environmental situation (i.e. in the fields of traffic, pollution, noise and meteorology) in a common data repository which allows a flexible use for planning processes. The indicator evaluates the revised data structures and storage in the common repository and assesses the amount of data available.
Key terms:	Common repository - Database with relevant information on traffic, its environmental effects and boundary conditions (meteorology, topography, TDMS)
Involved appraisal groups:	Operators of common data repository. Urban planners.
Methods:	Quantitative questionnaire for the operator of the common repository.
Reference case:	Situation observed prior to the implementation of HEAVEN.
Operational issues:	
Success criterion:	Significant stated improvement in the quality of urban planning processes through data availability.
References to other indicators:	5.2
Site specific issues:	

Introduction

The HEAVEN project is expected to increase the support for urban planning by accumulating specific data related to the environmental situation (i.e. in the fields of traffic, pollution, noise and meteorology) in a common data repository which allows a flexible use for planning processes. Indicator 5.1 takes into account, under its quantitative aspect, the new “hardware side” provided by HEAVEN as well as the benefit derived from the additional “packets of data” (data sets). In this respect, the indicator evaluates the data availability.

The quality and usefulness of the amount of data will be evaluated by methods of a quantitative questionnaire for the operator of the common repository and through qualitative interviews with planners. Indicator 5.2 is more especially focused on this specific aspect.

The situation observed prior to the implementation of HEAVEN will serve as reference case.

Evaluation process

The quantitative evaluation of the common repository will focus on the main HEAVEN products, i.e. air pollution and noise data.

Data not being directly produced by the project are not considered for this specific evaluation (meteorological data, ...).

Concerning air pollution, the main data sets obtained through the HEAVEN development are related to air pollutants traffic emissions, background and roadside concentrations.

For each item, the annual potential data availability will be evaluated, taking into account the pollutants described, the geographical elementary description and the time resolution.

For air pollutants traffic emissions data, with reference to indicator 2.3 and its associated tool, NO_x, CO, CO₂, VOC_s, and PM10 if available, will be taken into consideration.

For background concentrations, NO₂ and O₃ will be considered.

For roadside concentrations, PM10, NO₂, CO and C₆H₆ will be considered. The success criteria will be the comparison of the number of data available before and after HEAVEN and its significant increase.

The practical quantitative evaluation will be done, for each data set, through the following tables.

Traffic Emissions Data

Before Heaven

Table 17: Traffic Emission Data – Before HEAVEN

Pollutant	Number of elementary units (1)	Time resolution (5)	Annual potential number of data (2)
NO _x			
CO			
CO ₂			
VOC _s			
Other (4)			

Total annual potential data available (3)	
----------------------------------------------	--

With Heaven

Table 18: Traffic Emission Data – With HEAVEN

Pollutant	Number of elementary units	Time resolution	Annual potential number of data
NO _x			
CO			
CO ₂			
VOC _s			
Other			

Total annual potential data available	
------------------------------------------	--

- (1) Number of grids or links described for each pollutant considered.
- (2) For example, if for NO_x, we have 100 grids described with a 1-hour time resolution, the annual potential number of data for NO_x will be : $100 \times 24 \times 365 = 876000$.
- (3) The total amount of data available, on an annual basis, is the sum of the number available for the different pollutants taken into consideration.
- (4) To be specified.
- (5) Hour, day, 8 hours, annual ...

Background Air Pollutants Concentrations

Before Heaven

Table 19: Background Air Pollutants Concentrations – Before HEAVEN

Pollutants	Number of grids	Time resolution	Annual potential number of data
NO ₂			
O ₃			
Other			

Total annual potential data available	
---------------------------------------	--

With Heaven

Table 20: Background Air Pollutants Concentrations – With HEAVEN

Pollutants	Number of grids	Time resolution	Annual potential number of data
NO ₂			
O ₃			
Other			

Total annual potential data available	
---------------------------------------	--

Roadside Air Pollutants Concentrations

Before Heaven

Table 21: Roadside Air Pollutants Concentrations – Before HEAVEN

Pollutants	Number of links	Time resolution	Annual potential number of data
PM10			
NO ₂			
CO			
C ₆ N ₆			
Other			

Total annual potential data available	
---------------------------------------	--

With Heaven

Table 22: Roadside Air Pollutants Concentrations – With HEAVEN

Pollutants	Number of links	Time resolution	Annual potential number of data
PM10			
NO ₂			
CO			
C ₆ N ₆			
Other			

Total annual potential data available	
---------------------------------------	--

6.3 SUR3 (FACT4/SUR3)

Luca Persia and Maarten van Bemmelen (Local Evaluation Managers of Rome and Rotterdam, respectively) had the lead in developing tool FACT4/SUR3.

FACT4/SUR3 gathers data for indicator 5.2. The respective indicator fact sheet is provided in table 22 below.

The actual interview guideline/questionnaire is provided in annex 2 to this document.

Table 23: Indicator 5.2 Fact Sheet

Impact:	Increased Support of Urban Planning on an Environmental Basis (Impact 5)
Number:	5.2
Indicator:	Increased usefulness for urban planning (including quality of data structure and storage of common repository)
Relevance:	Transport and environmental quality are key parameters in any urban planning context, but scenarios are often difficult to interpret, lack reliability among planners and are costly to produce. The benefits of scenarios which are trusted and considered as relevant by their users are, therefore, important for urban planning based on an integrated view of transport and environmental quality, full exploitation of available data and increased overall reliability of urban development plans.
Key terms:	<p>Scenarios (As described under indicator 2.3)</p> <p>an homogeneous speed reduction of 20% for the whole running fleet (passengers cars, Light Duty Vehicles, Heavy Duty Vehicles, Buses, Mopeds, Motorcycles);</p> <p>a vehicle fleet without Heavy Duty Vehicles (>3.5 t) (Heavy Duty Vehicles will not be reallocated among the other vehicles categories),</p> <p>a vehicle fleet without two wheelers (mopeds and motorcycles) (two wheelers will not be reallocated among the other vehicles categories),</p> <p>a scenario without traffic related emissions (i.e. emissions without snap 07),</p> <p>a scenario anticipating for each type of vehicle fleet (passengers cars, Light Duty Vehicles, Heavy Duty Vehicles, Buses, Mopeds, Motorcycles) the implementation of the most advanced legislation (Euro IV or Euro V) related to the emission factors.</p>
Involved appraisal groups:	Planners in departments responsible for urban planning issues
Methods:	Qualitative interviews assessing quality of information in scenarios (comprehensiveness, level of detail, credibility), usefulness (long, medium, and short-term planning), additional needs and intention to use scenarios in the future
Reference case:	Stated preference by urban planners to the situation before HEAVEN
Operational issues:	-
Success criterion:	Confirmed increase in reliability and usefulness of HEAVEN scenarios by urban planners.
References to other indicators:	Indicators 2.3 and 5.1
Site specific issues:	

Additional operational details

The interviews/questionnaires address both the common repository and the scenario calculation.

The interviews will be carried out when the common repository will have been operational for a reasonable number of months (i.e. 4-5 months) and the urban planner have been made themselves familiar with it. The foreseen assessment period is from about July the 1st to October the 13th 2002.

With regard to the success criterion, in general terms a majority of positive answers in the interviews is expected (e.g. the number of respondents “absolutely” or “partly” agreeing is higher than the number of respondents “partly” or “absolutely” disagreeing).

The existing situation will be considered as the reference case. Even if the interviews will be conducted after the HEAVEN information system implementation, some preliminary questions on the pre-HEAVEN situation will be asked.

A statistically significant sample size is difficult to determine in advance, since it will be conditioned by the dimension of the universe of urban planners to be interviewed. A minimum sample size of about 20 respondents could be considered acceptable. Given the small sample size, face-to-face interviews are suggested.

The evaluation process could be affected, in addition to an insufficient number of respondents, by significant delays in the actual implementation of the HEAVEN common repository. If this is the case, a contingency plan would require to select an experimental panel of urban planners, asking them to look at the common repository and, then, to be interviewed.

The actual interview guideline/questionnaire is provided in annex 2 to this document.

7 TASK OBSERVATIONS – TOB TOOLS

7.1 TOB1

Martin Lutz (Senatsverwaltung für Stadtentwicklung Berlin) had the lead in developing tool TOB1.

TOB1 gathers data for indicators 1.4, 3A.2, and 3B.2. The respective indicator fact sheets are provided in tables 24 and 26 below.

Table 24: Indicator 1.4 Fact Sheet

Impact:	Enhanced Description of Current Environmental Situation (Impact 1)
Number:	1.4
Indicator:	Increased frequency of update intervals regarding air quality
Relevance:	Better description in near real time of the environmental impacts: evaluation of the "near real time" character of the HEAVEN tools.
Key terms:	Near real time - To be specified in local evaluation Frequency of technical update intervals - To be specified in local evaluation
Involved appraisal groups:	Operators of the application
Methods:	Evaluation of the time resolution and/or update time interval of the simulation of the roadside and background pollution, respectively. Here, time resolution means the time elapsed between two consecutive model runs (incl. elementary data capture of e.g. traffic data, meteorology, the calculation of the pollution fields and the production of air pollution maps), while the update time interval indicates the time, within with an updated description of background and roadside concentration is produced
Reference case:	time resolution/update time intervals before the application of the HEAVEN system.
Operational issues:	-
Success criterion:	Enhanced time resolution and/or reduced update time interval of the calculated data
References to other indicators:	3AB.1, 3AB.2
Site specific issues:	To be defined in the Local Evaluation Plans

Introduction:

The purpose of the tool TOB1 is to provide an objective measure for improvements

- in the time resolution of the data and information on air quality and noise (Indicator 1.4)
- in the efforts and time needed to produce or deliver the data and information (Indicator 3AB.1) to the user

achieved by the HEAVEN system in comparison to the pre-HEAVEN situation.

It should be noted here that TOB1 is closely linked to tools AC3, in so far as AC3 measures to what extent the frequency of publication of new updated data has been enhanced through HEAVEN (see chapter 4.3 for the description of AC3).

Table 25: TOB1-Indicator 1.4 Data Summary Table

Pollutants	TOB1 (Indicator 1.4) Data	Berlin	Leicester	Paris	Prague	Rome	Rotterdam
PM10 (Roadside description)	Update interval before HEAVEN ❶						
	Update interval after HEAVEN ❷		⊗				
	Assessment of the improvement through HEAVEN? ❸						
NO ₂ (Roadside description)	Update interval before HEAVEN ❶						
	Update interval after HEAVEN ❷		⊗				
	Assessment of the improvement through HEAVEN? ❸						
CO (Roadside description)	Update interval before HEAVEN ❶						
	Update interval after HEAVEN ❷		⊗				
	Assessment of the improvement through HEAVEN? ❸						
C ₆ H ₆ (Roadside description)	Update interval before HEAVEN ❶						
	Update interval after HEAVEN ❷		⊗				
	Assessment of the improvement through HEAVEN? ❸						
O ₃ (Background description)	Update interval before HEAVEN ❶						
	Update interval after HEAVEN ❷	⊗	⊗				
	Assessment of the improvement through HEAVEN? ❸						
NO ₂ (Background description)	Update interval before HEAVEN ❶						
	Update interval after HEAVEN ❷		⊗				
	Assessment of the improvement through HEAVEN? ❸						

Explanation of the evaluation for Indicator 1.4:

- ❶ Indicate in numerical terms the time resolution/update interval (e.g. annual mean/every three years) of the noise and air pollution calculations (if there were any) conducted before the use of HEAVEN
- ❷ Indicate in numerical terms the time resolution/update interval (e.g. hourly mean/every hour) of the noise and air pollution calculations when using the HEAVEN system
- ❸ Provide a judgement of the improvement gained through the use of HEAVEN by choosing one of the three categories:
no improvement
slight improvement
significant improvement

In the event that the pre- and post-HEAVEN situation is not directly comparable in pure numerical terms, please provide additional comments in order to allow an evaluation of the possible benefits through the use of the HEAVEN system

Table 26: Indicator 3AB2 FACT Sheet

Impact:	Improved Access and Quality of Environmental Information for Professional Users (3A) and Public Users (3B) (Impact 3)
Number:	3AB.2
Indicator:	Reduced production/delivery time for air quality
Relevance:	Better description in near real time of the environmental impacts: evaluation of the "near real time" character of the HEAVEN tools and the "freshness" of the information accessible by the public and the professional users.
Key terms:	Near real time - To be specified in local evaluation
Involved appraisal groups:	Operators of the application
Methods:	Evaluation of the time needed to produce an up-to-date simulation of the roadside air pollution, i.e. the time elapsed between the occurrence of a given traffic situation in a given road section and the delivery to the public or the professional users of air pollution maps indicating the simulated air pollution associated with that particular situation
Reference case:	Delivery time before the availability of the HEAVEN tools.
Operational issues:	-
Success criterion:	Reduction of the delivery time, i.e. the better, the "fresher" the information practically available for the public or the professional users
References to other indicators:	1.4
Site specific issues:	To be defined in the Local Evaluation Plans

Table 27: TOB1-Indicator 3AB.2 Data Summary Table

Pollutants	TOB1 (Indicator 3AB.2) Data	Berlin	Leicester	Paris	Prague	Rome	Rotterdam
PM10 (Roadside description)	Delivery time before HEAVEN ❶		⊗				
	Delivery time after HEAVEN ❷						
	Assessment of the improvement through HEAVEN? ❸						
NO ₂ (Roadside description)	Delivery time before HEAVEN ❶		⊗				
	Delivery time after HEAVEN ❷						
	Assessment of the improvement through HEAVEN? ❸						
CO (Roadside description)	Delivery time before HEAVEN ❶		⊗				
	Delivery time after HEAVEN ❷						
	Assessment of the improvement through HEAVEN? ❸						
benzene (Roadside description)	Delivery time before HEAVEN ❶		⊗				
	Delivery time after HEAVEN ❷						
	Assessment of the improvement through HEAVEN? ❸						

Explanation of the evaluation for Indicator 3AB.2:

- ❶ Indicate the time needed (e.g. one month) to produce an up-to-date description of the roadside air pollution (if there was any) before the HEAVEN system became available; this time includes gathering/monitoring of traffic data, running the air pollution models (incl. background pollution) and production of maps, charts, table, etc, so as to allow presentation of the results to the users
- ❷ Indicate the time needed (e.g. one hour) to produce an up-to-date description of the roadside air pollution with the HEAVEN system
- ❸ provide a judgement of the improvement gained through the use of HEAVEN by choosing one of the three categories:
 - no** improvement
 - slight** improvement
 - significant** improvement

In the event that the pre- and post-HEAVEN situation is not directly comparable in pure numerical terms, please provide additional comments in order to allow an evaluation of the possible benefits through the use of the HEAVEN system

7.2 TOB2 (=> Chapter 9.3)

Please refer to chapter 9 which covers noise-related tools. Tool TOB2 is described in chapter 9.3.

7.3 TOB3

Mireille Lattuati and Dominique Gombert (both AIRPARIF) had the lead in developing task observation tool TOB3.

TOB3 gathers data for indicators 2.3. The respective indicator fact sheet is provided in table 28 below.

The actual data table for scenario analyses is provided in annex 3 to this document.

Introduction

Table 28: Indicator 2.3 Fact Sheet

Impact:	Enhanced Environmental Scenario Analysis (Impact 2)
Number:	2.3
Indicator:	Reduced time to produce environmental descriptions regarding air quality based on scenario analysis
Relevance:	Assist the cities in identifying TDMS which reduce the impact of traffic on the environment: time spent for specific scenario resulting from more efficient analysis tools.
Key terms:	Scenario analysis - A set of data and measures to be tested and evaluated in a comparative way TDMS - Transport Demand Management Strategies in urban areas Reference scenarios - A set of data and measures as basis for comparative evaluation
Involved appraisal groups:	Operators of the application, air pollution experts
Methods:	Comparison of the time spent for the scenario analysis with and without the HEAVEN tools.
Reference case:	Time spent for analysis before the development of the HEAVEN tools.
Operational issues:	Production of reference scenario analysis.
Success criterion:	Reduction of the time spent.
References to other indicators:	5.2

Introduction

Indicator 2.3 measures the person time spent to produce environmental description of scenarios using the DSS and compares it to the average time spent to produce the same environmental description prior to using HEAVEN DSS implementation.

One must point out that the purpose is not to choose “politically correct” scenarios but simple “black and white” scenarios involving basic crucial parameters. Furthermore, these common scenarios will be used as primary sensitivity tests to demonstrate the potential impact of simple strategies designed to reduce environmental impacts.

These common scenarios will be used, within the framework of the indicator 2.3, as a support for a quantitative assessment related to the time spent for various scenario analyses. In addition, these scenarios will also be used, within the framework of the indicator 5.2, for a qualitative assessment related to the utility of the Heaven DSS for urban planning.

Five parameters can be tested:

- 1) an homogeneous speed reduction of 20% for the whole running fleet (passengers cars, Light Duty Vehicles, Heavy Duty Vehicles, Buses, Mopeds, Motorcycles) ;
- 2) a vehicle fleet without Heavy Duty Vehicles (>3.5 t) (Heavy Duty Vehicles will not be reallocated among the other vehicles categories),
- 3) a vehicle fleet without two wheelers (mopeds and motorcycles) (two wheelers will not be reallocated among the other vehicles categories),
- 4) a scenario without traffic related emissions (i.e. emissions without snap 07),
- 5) a scenario anticipating for each type of vehicle fleet (passengers cars, Light Duty Vehicles, Heavy Duty Vehicles, Buses, Mopeds, Motorcycles) the implementation of the most advanced legislation (Euro IV or Euro V) related to the emission factors.

Indicator 2.3 will be evaluated for roadside (PM10, NO₂, CO and C₆H₆ at the morning rush hour) and for background (at least NO₂, O₃ on one day) air quality. In addition to the above-mentioned pollutants each city can include additional pollutants.

Each scenario will be described for two different sets of meteorological conditions. One set will be related to the average meteorological conditions observed in the demonstration area, the other will be related to more acute conditions, leading to higher levels of air pollution.

The success criterion will be the reduction of time spent regarding air quality description.

Evaluation process

For the different scenarios to be tested, the respective Local Evaluation Managers will have to fill in a specific table, describing in all the details the conditions of testing. Each of the five identified scenarios has to be treated clearly independently. This table will support the evaluation activity and will be a summary of the results for the primary sensitivity tests demonstrating the interest of HEAVEN.

The table is self-explanatory. It is annexed to this document (annex 3).

The Local Evaluation Managers will have to describe in details the scenario tested. The general hypothesis will be explained focusing on the sources directly concerned by the emissions modifications; the hypothesis concerning the remaining sources (urban sources, fixed emitters, etc.) will also be described.

For each scenario, beyond the general conditions of implementation (for example meteorological conditions) and the pollutants of relevance, the Local Evaluation Managers will provide a map summarising for the ad-hoc temporal period and the reduction of air pollution concentrations expected.

The general success criterion will be the reduction of time spent regarding air quality description, before HEAVEN versus after HEAVEN.

In the context of this tool, time means time needed for the data preparation plus computation time. Obviously, the time needed for data preparation, starting from scratch, will be an estimate.

Table 29: TOB3 Data Summary Table

Scenario	Indicator 2.3 Data	Berlin	Leicester*	Paris	Prague	Rome	Rotterdam
Speed reduction	Time spent before HEAVEN						
	Time spent after HEAVEN		⊗				
	Time after < time before ?						
Heavy duty vehicles	Time spent before HEAVEN						
	Time spent after HEAVEN		⊗				
	Time after < time before ?						
Two wheelers	Time spent before HEAVEN						
	Time spent after HEAVEN		⊗				
	Time after < time before ?						
Passenger cars	Time spent before HEAVEN						
	Time spent after HEAVEN		⊗				
	Time after < time before ?						
Traffic emissions	Time spent before HEAVEN						
	Time spent after HEAVEN		⊗				
	Time after < time before ?						

Evaluation tables to complete scenario analyses can be seen in annex 3.

7.4 TOB4 (=> Chapter 9.4)

Please refer to chapter 9 which covers noise-related tools. Tool TOB4 is described in chapter 9.4.

7.5 TOB5

Mireille Lattuati and Dominique Gombert (AIRPARIF and Local Evaluation Manager of Paris) had the lead in developing task observation tool TOB5.

TOB5 gathers data for indicators 3A.4 and 3B.4. The respective indicator fact sheet is provided in table 30 below.

Table 30: Indicator 3AB.4 Fact Sheet

Impact:	Improved Access and Quality of Environmental Information for Professional Users (3A) and Public Users (3B) (Impact 3)
Number:	3AB.4
Indicator:	Increased efficiency of daily/ weekly bulletin
Relevance:	HEAVEN is expected to improve the availability of environmental information in a form desired by the users and to the guarantee of an efficient delivery of such information.
Key terms:	Efficiency - Expressed here in the time needed to deliver a daily/ weekly bulletin. Daily/ weekly bulletin - Built on a common approach and including key environmental data, it will provide global information about the current environmental situation.
Involved appraisal groups:	Personnel from authorities (direct HEAVEN users) and decision makers (indirect HEAVEN users) involved in the production of the daily/ weekly bulletin.
Methods:	Task observation (task being the delivery of the daily/ weekly bulletin) in form of quantitative measurements of bulletin delivery time.
Reference case:	Situation observed prior to the implementation of HEAVEN.
Operational issues:	The bulletin needs to be produced by each HEAVEN city on a daily or weekly basis. It will contain at least information about meteorology, traffic, noise, roadside and air quality current situation, but may also contain European limit values and specific indicators related to air quality or noise.
Success criterion:	Better efficiency in the delivery of the bulletin, i.e. less delivery time.
References to other indicators:	

Introduction

HEAVEN is expected to have a positive impact on the access and quality of environmental information for professional and public users. This improvement refers to the availability of the information in a form desired by the users and to the guarantee of an efficient delivery of information.

Indicator 3.4 evaluates the efficiency of information access and delivery for professional and public users as a daily/ weekly bulletin. This virtual bulletin, built on a common approach and including key environmental data, will provide global information about the current environmental situation. It will contain at least information about meteorology, traffic, noise, roadside and air quality current situation, but may also contain European limit values and specific indicators related to air quality or noise .

The time to deliver a daily/ weekly bulletin in the respective HEAVEN sites will be evaluated.

The situation observed prior to the implementation of HEAVEN will serve as the reference case.

The success criterion will be a better efficiency in the deliverable bulletin, i.e. less delivery time.

Evaluation process

The basic idea is to produce a common information bulletin, taking into account the specific information needs in the different HEAVEN cities and promoting the main results obtained through the HEAVEN tools.

Such a bulletin will have to deliver pertinent information on the key issues managed by HEAVEN, i.e. information regarding traffic, meteorology, air pollution emissions, air pollution for roadside and background locations, noise levels.

Different types of bulletins can be suggested, i.e. a specific bulletin for public users (indicator 3B4) and a specific bulletin for professional users (indicator 3A4).

An example of a general daily/ weekly bulletin is provided in figure 2 below. It is underlined that the HEAVEN bulletin has been presented as a common product among the cities. Therefore, each city has to produce a bulletin as close as possible to the suggested bulletin.

Each city will have to precise :

- the numbers of bulletins prepared (one or two), i.e. a common one for professional and public users or two specific ones.
- The update frequency (daily / weekly).

For those HEAVEN sites concerned with noise within the project, a sample daily noise bulletin is provided in figure 3 below.

The success criterion will be a better efficiency in the deliverable bulletin, i.e. less delivery time.

The situation observed prior to the implementation of HEAVEN will serve as the reference case.

Table 31: TOB5 Data Summary Table

Bulletin	Update frequency	Indicator 2.3	Success
Public users	Daily / weekly	Time spent before HEAVEN	Yes / No
		Time spent after HEAVEN	
		Time after / time before	
Professional users	Daily / weekly	Time spent before HEAVEN	Yes / No
		Time spent after HEAVEN	
		Time after / time before	

In order to provide a clearer view of the total time spent for the preparation of the bulletin, the Local Evaluation Managers will fill in the following table. This table will specify for the basic elements of the bulletin the necessary time of production, supposed that basic impact data are available.

Table 32: Time Spent to Produce Basic Elements of Daily/ Weekly Bulletin

Public users / Professional users	Time spent (1) without HEAVEN	Time spent with HEAVEN
Meteorological data		
Emissions data		
Air pollution Background data		
Air pollution Roadside data		
Noise data		
Others if necessary		

(1) In some cases, before HEAVEN, the time spent could be “infinite”, the production of the related maps or charts being impossible.

Figure 2: Sample General Daily/ Weekly Bulletin

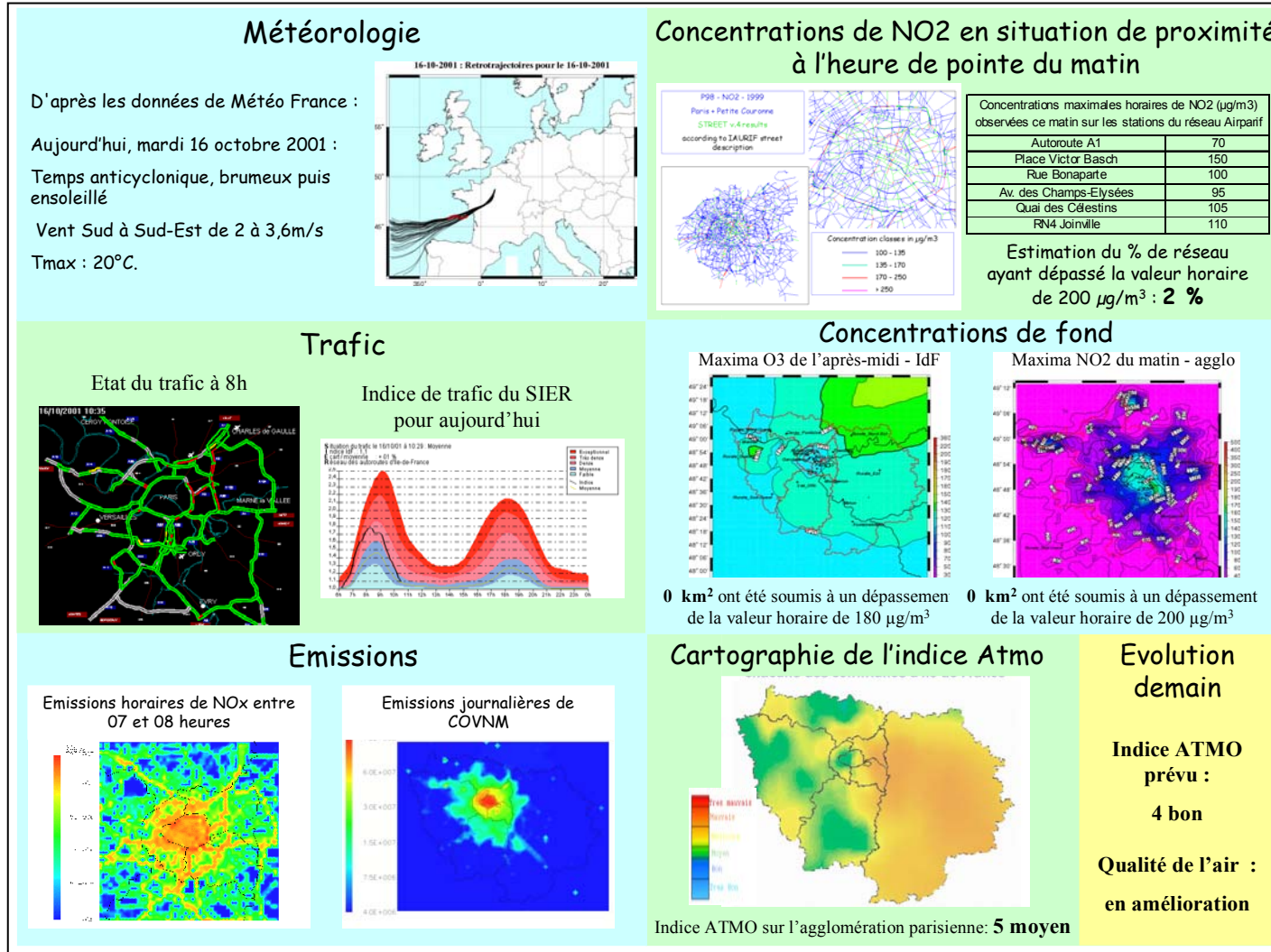
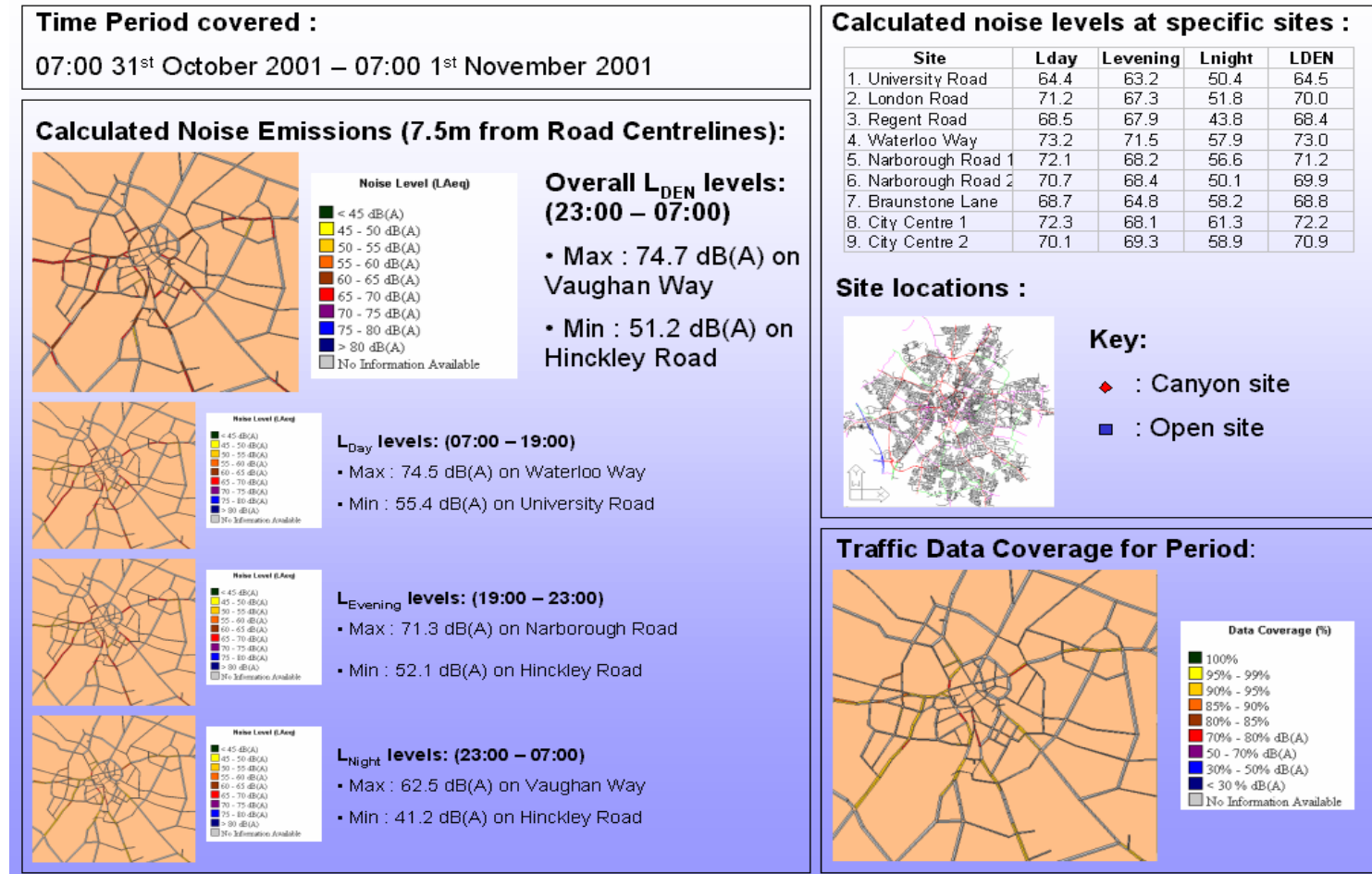


Figure 3: Sample Daily Noise Bulletin

HEAVEN DSS Daily Noise Bulletin



8 COLLECTION OF FACTUAL INFORMATION – FACT TOOLS

8.1 FACT1

Luca Persia (Local Evaluation Manager of Rome) had the lead in developing tool FACT1.

FACT1 is used to gather data for indicator 1.5. The respective indicator fact sheet is provided in table 33 below.

Table 33: Indicator 1.5 Fact Sheet

Impact:	Enhanced Description of Current Environmental Situation (Impact 1)
Number:	1.5
Indicator:	Increased efficiency of air quality description
Relevance:	Better description in near real time of the environmental impacts: extensive description of air pollution situation (roadside and background) provided by an optimal use of “classical” methods based on direct measurements and innovative simulation approaches.
Key terms:	Efficiency – The ratio of the useful work done to the effort spent on it. Numerical tools – Computer models for air and noise pollution (e.g. emission and dispersion models) Monitoring network – Periodic or continuous determination of pollutants in the air through monitoring devices integrated into a network
Involved appraisal groups:	Operators of the application, air pollution monitoring network managers
Methods:	Combination of already described indicators 1.1 - 1.4.
Reference case:	Existing situation
Operational issues:	-
Success criterion:	Success for other indicators without a significant increase of the “direct” monitoring network.
References to other indicators:	Indicators 1.1, 1.2, 1.3, 1.4
Site specific issues:	To be defined in the “Local Evaluation Plans.”

Additional operational details

The definition of the indicator will occur after the assessment of the indicators 1.1, 1.2, 1.3 and 1.4. The foreseen assessment period is from September to October 2002.

With regard to the success criterion, since indicator 1.5 would be the logical combination of indicators 1.1, 1.2, 1.3 and 1.4 in the event that no new measurements happened, it would be the logical score of the following combination:

- at least two success criteria among the four indicators (1.1, 1.2, 1.3, 1.4), with the rule that a criterion is successful if at least half of the pollutant criteria are successful;
- less than 20 % of new monitoring stations in the area covered by the whole monitoring network.

Table below will be used to derive the data for measurement of indicator 1.5.

Table 34: FACT1 Data Summary Table

Indicator 1.5 Data	Berlin	Leicester	Paris	Prague	Rome	Rotterdam
Indicator 1.1	⊗					
Indicator 1.2	⊗	⊗				
Indicator 1.3						
Indicator 1.4		⊗				
Less than 20 % of new monitoring stations						
Increased efficiency ?						

8.2 FACT2

Luca Persia (Local Evaluation Manager of Rome) had the lead in developing tool FACT2.

FACT 2 is an interview guideline used to gather data for indicator 3A.3. The respective indicator fact sheet is provided in table 35 below.

The actual interview guideline is provided in annex 4 to this document.

Table 35: Indicator 3A.3 Fact Sheet

Impact:	Improved Access and Quality of Environmental Information for Professional Users
Number:	3A.3
Indicator:	Increased in usefulness (interviews)
Relevance:	HEAVEN is expected to improve the availability of environmental information in a form desired by the users and to the guarantee of an efficient delivery of such information.
Key terms:	Usefulness - the capability in machine functional terms to fulfil the specified range of tasks within the specified range of environmental scenarios.
Involved appraisal groups:	Authorities (direct HEAVEN users) Decision Makers (indirect HEAVEN users)
Methods:	Personal interviews with representatives of involved departments (authorities) and key decision makers.
Reference case:	Existing situation
Operational issues:	Interviews need to be "customised" in order to account for site-specifics.
Success criterion:	Majority of answers in the interviews positive.
References to other indicators:	Indicator 3B.3
Site specific issues:	To be defined in the "Local Evaluation Plans."

Additional operational details

The interviews will be carried out when the HEAVEN information system will have been operational for a reasonable number of months (i.e. 4-5 months) in order to allow professional users to "digest" the new service. The foreseen assessment period is from about 1 July to 13 November 2002.

With regard to the success criterion, in general terms a majority of positive answers in the interviews is expected (e.g. the number of respondents "absolutely" or "partly" agreeing is higher than the number of respondents "partly" or "absolutely" disagreeing).

The existing situation will be considered as the reference case. Even if the interviews will be conducted after the HEAVEN information system implementation, some preliminary questions on the pre-HEAVEN situation will be asked.

A statistically significant sample size is difficult to determine in advance, since the sample size will be conditioned by the dimension of the universe of professional users that will be allowed to access the HEAVEN information. Professional users are defined, in this case, as authorities (direct HEAVEN users) and key decision makers (indirect HEAVEN users). In broader terms, also some interest groups, i.e. NGOs and research institutions can be considered professional users. A minimum sample size of about 20 respondents could be considered acceptable. Given the small sample size, face-to-face interviews are suggested.

The evaluation process could be affected, in addition to an insufficient number of respondents, by significant delays in the actual implementation of the HEAVEN information services. If this is the case, a contingency plan would require to select an experimental panel of professional users, asking them to test the information service and, then, to be interviewed.

The interview guideline, FACT2, can be seen in Annex 4.

8.3 FACT3

Harald Fietz (EAUE and Local Evaluation Managers of Berlin) had the lead in developing tool FACT3.

FACT3 gathers data for indicators 4.1 and 4.2. The respective indicator fact sheets are provided in tables 36 and 37 below.

The actual interview guidelines for interviews of authorities and decision makers are provided in annex 5 and annex 6 to this document.

Table 36: Indicator 4.1 Fact Sheet

Impact:	Improved Institutional Co-operation (Impact 4)
Number:	4.1
Indicator:	Increased quality of co-operation
Relevance:	The indicator the expected improvements in the quality of co-operation between transport/ traffic, environment, health, and urban planning departments and agencies in the HEAVEN cities.
Key terms:	Quality of co-operation - In the context of this indicator, expressed by fewer conflicts and/ or increased trust between involved parties, new joint initiatives and new inter-departmental work arrangements, facilitated access to data, or common tools used.
Involved appraisal groups:	Authorities (direct HEAVEN users) Decision Makers (indirect HEAVEN users)
Methods:	Factual information collection through interviews of key personnel and surveys.
Reference case:	Stated quality of co-operation prior to the implementation of HEAVEN.
Operational issues:	Interviews and surveys need to be "customised" in order to account for site-specifics.
Success criterion:	The majority of statements about the quality of co-operation positive.
References to other indicators:	
Site specific issues:	To be defined in the Local Evaluation Plans.

Table 37: Indicator 4.2 Fact Sheet

Impact:	Improved Institutional Co-operation (Impact 4)
Number:	4.2
Indicator:	Increase in time-efficiency of information exchange
Relevance:	Departments and agencies involved in the abatement of air emissions and noise are exchanging an abundance of information. The delivery of information in a timely manner, i.e. the time-efficiency of information exchange, is expected to increase.
Key terms:	Time-efficiency - Delivery of information in a timely manner.
Involved appraisal groups:	Authorities (direct HEAVEN users) Decision Makers (indirect HEAVEN users)
Methods:	Personal interviews with personnel of involved departments and agencies.
Reference case:	Stated time efficiency of information exchange at the beginning of HEAVEN demonstration.
Operational issues:	
Success criterion:	Stated increase in time-efficiency due to HEAVEN compared to a task completion where no HEAVEN tools are used.
References to other indicators:	3AB.4
Site specific issues:	

8.4 FACT4 (FACT4/SUR3) (=> Chapter 6.3)

Please refer to chapter 5.3.

9 NOISE-RELATED TOOLS

Paul Goodman and Margaret Bell (ITS Leeds) had the lead in developing noise-related tools AC1 (noise), MC2, TOB2, and TOB4.

Introduction

This chapter covers the noise tools to be used for the evaluation of specific indicators of success within the overall HEAVEN project. As defined in the evaluation guidelines and discussed at the Rotterdam WP3 meeting on 24th Oct 2001, the Table 38 lists the noise tools which Leicester has been charged with developing.

Table 38: List of noise tools to be developed by Leicester

LEICESTER			
Development Leader for Tool			Methods & Operational Issues
Tool ID	Work-Intensive	Indicators Measured	
AC 1	no	1.8 2.1 noise	<ul style="list-style-type: none"> - Clarification of units to use, for example kilometres, to allow for common data reporting across the sites - A formal set of requirements for the technical providers has to be established
MC 2	yes	1.3 noise	<ul style="list-style-type: none"> - Work-intensive tool development - Monitoring of noise levels; Statistical comparison of measured and modelled noise levels
TOB 2	no	1.6	<ul style="list-style-type: none"> - Task Observation, method 1.6: Direct comparison of the time to produce noise levels for the day, evening and night periods, for each link in the demonstration areas prior to and post HEAVEN implementation - Reference case: Time taken to produce noise levels for all links prior to HEAVEN
TOB 4	no	2.4	<ul style="list-style-type: none"> - Task observation, method 2.4: Direct comparison of the time taken to produce analyses of the noise levels from each scenario with and without the use of HEAVEN DSS - Reference Case: Time taken to produce all required noise level values for each scenario without the use of the HEAVEN DSS

Noise Tools

The definition of noise tools will be dealt with in the order that they are presented in Table 38. Where appropriate information from the HEAVEN Final Evaluation Plan, D3.1 (Wefering *et. al*, 2001) has been reproduced regarding the indicators associated with the tools.

9.1 AC1 (Noise)

Tool AC1 is intended to evaluate the performance of Indicators 1.8 (Noise roadside emission – Length of Network) and 2.1 (Increased coverage of the traffic and roadside pollution network).

Definitions

An individual link within the network for AC1 will be defined as either:

- 1) An individual line source within the noise model, consisting of a single lane of traffic in a single direction, where the noise emission level along the link is not expected to vary by more than ± 2 dB(A) along the entire length, OR alternately;
- 2) An individual link controlled by a single detector unit as defined by the requirements of Urban Traffic Control (UTC) – e.g. a single SCOOT link in Leicester.

NB: For Leicester, the above elements will only usually differ when a single UTC detector loop is used to count flows for multiple lanes of traffic.

The unit of measurement for line source length shall be the kilometre (KM).

A road should be included as a line source (or multiple line sources if the road has multiple lanes) within the noise model if that road has an average vehicle flow in the given direction of over 200 vehicles per hour (during the day period) or 50 vehicles per hour (evening/ night) (i.e. 3000 vehicles/day in a given direction). Roads with flows below these values may be included at the site's discretion.

The exact location of the demonstration areas for each site has been defined elsewhere.

Assessment Approach

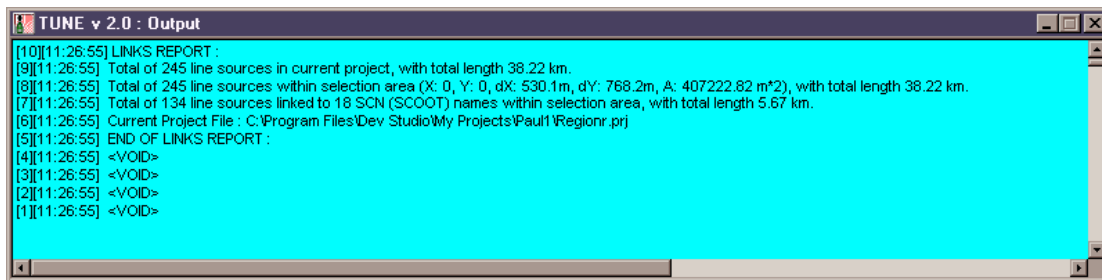
For the reference case in Leicester no attempt at real time noise modelling has ever been made – therefore the initial length of network, used for the reference case, will be 0 links spanning 0 km. Even though this tool has been termed “Automatic Count 1”, the final comparison between reference case and post-HEAVEN case will therefore be completed manually.

For indicator 1.8, determining the length of links used in real time noise modelling after the implementation of HEAVEN, the GIS functions of the DSS (or the noise model as appropriate) should be used. A text report page should be provided from the software showing the following information:

- 1) The total number and overall length of road line sources, used for real-time noise calculations or otherwise, in the entire network.
- 2) The total number and overall length of road line sources, used for real-time noise calculations or otherwise, falling within a user-defined area (i.e. the demonstration area).
- 3) The total number and overall length of links used for real time noise calculations within the demonstration area.

A sample report (from AVTUNE SNEM – development version) is given below:

Figure 4: Sample Automatic Report for links in selection area AVTUNE SNEM development version



```
[10][11:26:55] LINKS REPORT :
[9][11:26:55] Total of 245 line sources in current project, with total length 38.22 km.
[8][11:26:55] Total of 245 line sources within selection area (X: 0, Y: 0, dX: 530.1m, dY: 768.2m, A: 407222.82 m^2), with total length 38.22 km.
[7][11:26:55] Total of 134 line sources linked to 18 SCN (SCOOT) names within selection area, with total length 5.67 km.
[6][11:26:55] Current Project File : C:\Program Files\Dev Studio\My Projects\Paul1\Regionr.prj
[5][11:26:55] END OF LINKS REPORT :
[4][11:26:55] <VOID>
[3][11:26:55] <VOID>
[2][11:26:55] <VOID>
[1][11:26:55] <VOID>
```

For indicator 2.1 a similar report should be generated. However, rather than showing the number of line sources used in the model for real-time noise monitoring, the report should display the number of links that are included in the given scenario, both within the entire network, and within the demonstration area.

Indicators 1.8 and 2.1 also require that 100% of the required major links (see definition above) are defined within the demonstration area for real-time noise modelling, or scenario analysis. Again, whilst tool AC1 has been termed an 'Automatic Count', assessment of success for this criterion will have to be undertaken manually by the DSS operator.

Note that inclusion of links in the real-time calculation system, may not necessarily involve real-time traffic data from on-street detectors. Where this data is not available (e.g. because of the absence of detector units), data may be substituted from prior modelled traffic assignments (e.g. TRIPS assignments in Leicester).

9.2 MC2

Tool MC2 is intended to assess indicator 1.3 (Accuracy of Roadside Description: Noise). Detailed guidelines as to the measurement locations and time periods have already been given by Task Force Noise and reported in HEAVEN Deliverable 3.2 (HEAVEN Final Evaluation Plan).

Definitions

The location at which noise measurements should be taken should meet the following criteria:

- 1) The measurement location should be adjacent to a road link, where a road link is defined as:
 - A single section of road, over whose length the noise level is not expected to vary by more than ± 2 dB(A) and is controlled in the UTC system by a single detector unit or group of detector units at the same location.

The definition of a road link for tool MC 2 differs slightly from the definition used in tool AC 1 above. This is a necessity considering that AC 1 assesses the adequacy of the modelled road network to reflect source noise emissions as individual line sources, whereas MC 2 is concerned with noise at a point adjacent to actual roads. Noise at a given point may have propagated from a number of road sections consisting of traffic on multiple lanes (i.e. from multiple line sources within the model).

- 2) The measurement location should be approximately mid-link, in order to minimise noise contributions from other adjacent road links.
- 3) The measurement location should be sited 2m (± 0.1 m) from the façade of a “typical” building adjacent to that link. If this criterion is not possible, then the distance from the measurement location from the façade should be recorded and an appropriate transform in the propagation model used to calculate the modelled noise level at the measurement location. The distance from the measurement location to the kerb of the road should always be recorded.
- 4) The measurement location should be at a vertical height of greater than 3.5m above the surrounding ground level (preferably 4m ± 0.2 m). If this criterion is not possible then the vertical height of the measurement location should be recorded and an appropriate transform in the propagation model used to calculate the modelled noise level at the measurement location.

Measurements should only be taken when the following meteorological conditions apply:

- 1) No appreciable wind (i.e. mean wind speed below 2 m/s) in the direction of source line to the receiver.
- 2) No precipitation and road surface is dry.
- 3) Mean temperature between 0°C and 30°C.

Measurement periods will be defined as laid down as follows:

- 1) All measurements shall take place on weekdays (Mon - Thu).
- 2) A day measurement period is defined as at least 4 consecutive hours between 07:00 – 19:00.
- 3) An evening measurement period is defined as 4 consecutive hours between 19:00 – 23:00.
- 4) A night measurement period is defined as at least 4 consecutive hours between 2300 – 0700.

As a minimum requirement measurements should record $L_{Aeq, 1-hour}$ levels in dB(A) over a specified measurement period. Ideally, other measurements such as $L_{Aeq, 1/2 hour}$, $L_{Aeq, 5-min}$, L_{A1} , L_{A10} , L_{A50} , L_{A90} and L_{A99} should also be recorded.

$L_{Aeq, 1-hour}$ levels may be calculated by logarithmic summation of $L_{Aeq, 1/2 hour}$ or $L_{Aeq, 5-min}$ levels, using the following formula:

$$L_{Aeq, 1-hour} = 10 \log_{10} \frac{1}{n} \left[\sum_{i=1}^n 10^{\frac{L_{Aeq,i}}{10}} \right] \quad \text{[Equation 1]}$$

where:

$L_{Aeq, i}$ is the i^{th} measurement value and n is the number of L_{Aeq} measurements taken in 1-hour;

L_{day} , $L_{evening}$ and L_{night} levels should be calculated from the addition of at least 4 $L_{Aeq, 1-hour}$ levels from the appropriate measurement period, at the same measurement location. The addition may be carried out using a modified version of Equation 1 above (assumes 4 $L_{Aeq, 1-hour}$ measurements taken):

$$L_{(day, evening, night)} = 10 \log_{10} \frac{1}{4} \left[\sum_{i=1}^4 10^{\frac{L_{Aeq, 1-hour, i}}{10}} \right] \quad \text{[Equation 2]}$$

L_{DEN} levels should be calculated from addition of the L_{day} , $L_{evening}$ and L_{night} levels, with a 5 dB(A) penalty for the evening period, and a 10 dB(A) penalty for the night period, i.e.:

$$L_{DEN} = 10 \log_{10} \frac{1}{12} \left[4 * 10^{\frac{L_{day}}{10}} + 4 * 10^{\frac{L_{evening} + 5}{10}} + 4 * 10^{\frac{L_{night} + 10}{10}} \right] \quad \text{[Equation 3]}$$

Regarding the number of measurements to be undertaken as part of MC 2, then:

- 1) At least one L_{DEN} value should be calculated for comparison with a result obtained from using the HEAVEN system.
- 2) At least six measurements of L_{day} , $L_{evening}$ and/or L_{night} should be produced. Berlin has agreed to produce three L_{day} measurements, one $L_{evening}$ measurement and two L_{night} measurements. Leicester has agreed to produce a set of L_{day} , $L_{evening}$ and L_{night} measurements for two sites.

In order to aid in the development of the AVTUNE model, Leicester will also provide additional $L_{Aeq, 1-hour}$ measurements for comparison with modelled results taken at locations adjacent to every SCOOT link in the demonstration area.

Assessment Approach

Indicator 1.3 defines two approaches to the assessment of the accuracy of roadside noise levels, these being:

- 1) That 95% of the façade $L_{Aeq, 1-hour}$ levels obtained through using the HEAVEN system should be within ± 2 dB(A) of the on-site measured values. This comparison may be done most appropriately using an Excel spreadsheet to calculate absolute differences between measured and modelled values. A simple macro may be used to highlight calculated difference cells whose absolute value exceeds 2 dB(A) and automatically calculate the percentage of differences falling within the criteria. A sample analysis is shown in Figure 5 below:

Figure 5: Sample Analysis of Noise Level Differences

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1														
2	Limit value	2.0	dB(A)											
3														
4	Modelled	Measured	Difference											
5	72.27	71.9	0.37											
6	70.61	70.4	0.21											
7	71.58	71.7	-0.12											
8	71.34	71	0.34											
9	64.76	62.8	1.96											
10	63.97	64.5	-0.53											
11	63.63	65.5	-1.87											
12	68.29	67.6	0.69											
13	68.01	66.8	1.21											
14	67.01	67.4	-0.39											
15	66.94	65.4	0.54											
16	64.33	62.5	1.83											
17	68.78	66.7	2.08	## Out of limit ##										
18	67.72	65.9	1.82											
19	73.17	69.9	3.27	## Out of limit ##										
20	71.77	71.7	0.07											
21		Total # of Samples:	16											
22		Total # within Limit:	14											
23		% within Limit:	87.50%	< HEAVEN Criteria II										
24														
25														
26														
27														
28														
29														
30														
31														
32														
33														
34														

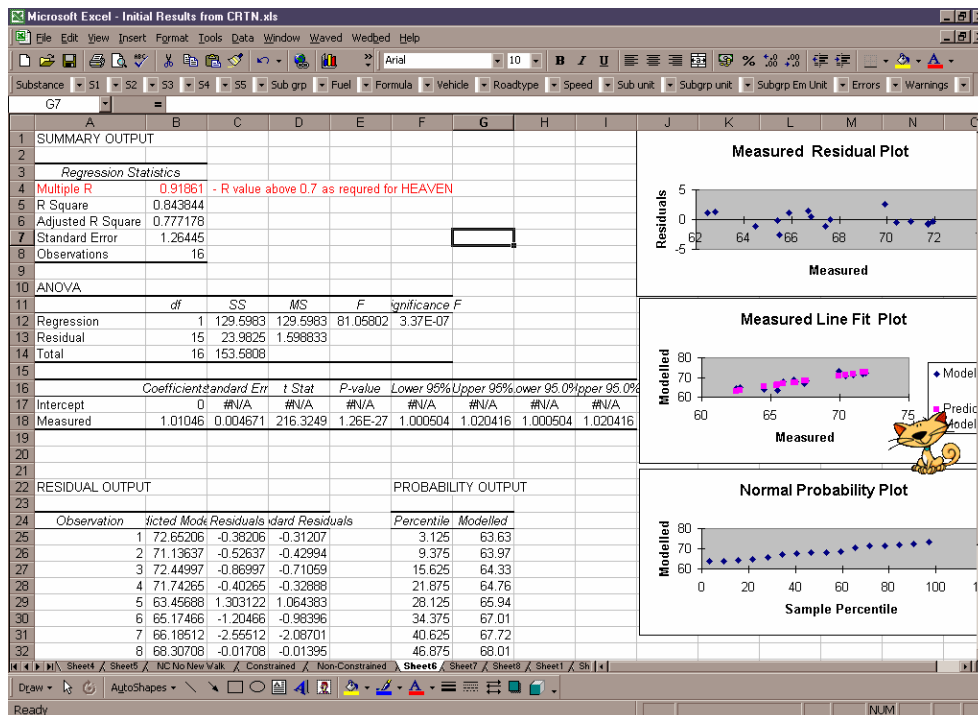
Note that as Leicester and Berlin have committed themselves to a total of 12 $L_{Aeq, 1-hour}$ measurements, the 95% criterion means that 11 values must be within the ± 2 dB(A) limit. It is therefore suggested that more $L_{Aeq, 1-hour}$ measurements need to be included over and above the minimum number of 12 measurements suggested.

Additionally, all of the L_{day} , $L_{evening}$, L_{night} and L_{DEN} levels calculated using the HEAVEN system should be within ± 2 dB(A) of the values calculated from the measured noise levels. This criterion should be fulfilled automatically given the rest of point 1 above.

- 2) That a least squares linear regression analysis of modelled noise levels (y-axis) against measured noise levels (x-axis) should yield a correlation coefficient (R-value) of greater than 0.7. Again the most appropriate method of calculating and displaying this result is through the use of an Excel spreadsheet and the Excel regression analysis tool. Figure 6 shows a sample analysis carried out using the Excel Regression Analysis tool on the same data as given in Figure 4:

Note that as Deliverable 3.2 and the Evaluation Guidelines stand, use of constraining the regression analysis through the origin is recommended. This obviously alters the R-value from that of an unconstrained analysis. For example in the recent verification exercise, the regression analysis for modelled AVTUNE noise levels ($L_{Aeq, 1-hour}$) against measured levels gave an R-value of 0.91 with the unconstrained analysis and 0.92 with the constrained analysis.

Figure 6: EXCEL Regression Analysis (part of the Analysis ToolPak Extension)



9.3 TOB2

Tool TOB 2 is concerned with the evaluation of Indicator 1.6 (Increased frequency of update intervals regarding noise pollution) in order to demonstrate the utility of the real-time HEAVEN system. Note that assessment of Indicator is somewhat artificial, given that most sites will only produce noise descriptions prior to HEAVEN on a very infrequent basis (i.e. yearly, if at all).

Definitions

The reference case for this indicator is the time taken for trained staff to produce source emission noise levels for every required line source (as defined for tool AC 2) in the demonstration area, using methods existing prior to the implementation of the HEAVEN system for a typical day, i.e. given pre-HEAVEN methods how long would it take staff to produce 24 $L_{Aeq, 1-hour}$ levels, plus L_{day} , $L_{evening}$ and L_{night} and L_{DEN} levels for every link in the demonstration area for a weekday in December (for example).

The actual time taken shall be calculated from:

- 1) The time taken for trained staff to collect the required traffic data, either from:
 - on-street observation;
 - use of appropriate OD data and a traffic assignment model;
 - collection of data from existing detectors;
 - collection of data from appropriate digests.
- 2) The time taken for trained staff to process the required traffic data into hourly values (if it is not already available in such format).
- 3) The time taken for trained staff to then use the traffic data to calculate $L_{Aeq, 1-hour}$ emission levels for each line source identified in the demonstration area, using an appropriate method (pen-and-paper, spreadsheet, via an existing noise model etc.)
- 4) The time taken for trained staff to calculate L_{day} , $L_{evening}$ and L_{night} and L_{DEN} levels from the $L_{Aeq, 1-hour}$ data.

The total of the above times will be summed to produce an overall time. It is suggested that this overall time be used as an indicator of the 'update interval' for noise pollution descriptions for the reference case. It may be necessary to repeat the exercise at least 3 times to give an average result.

The day, evening and night periods for which noise levels are to be calculated are defined to be the same as those in tool MC 2, i.e. a day is every hour from 07:00-19:00, evening is every hour from 19:00 – 23:00 and night is every hour from 23:00 – 07:00.

The time taken for the reference case will be compared to the time taken for an operator to produce noise levels for the same day(s) as used in assessing the reference case using the HEAVEN system. Again this task should be attempted at least 3 times to produce an average result.

An additional criterion has been stipulated in indicator 1.6 for the HEAVEN system, that the system should be able to produce source noise levels for every link within the demonstration area within 1-hour of receiving real-time traffic data.

Assessment Approach

The assessment approach will use the concept of a timesheet, to be completed by the relevant staff, in which the duration of each step, as defined above will be recorded.

Table 39 provides a possible example of such a timesheet:

A similar sheet should be used to record the time taken for a trained operator to extract the same information using the HEAVEN system, though such a sheet could only include a couple of tasks (Extraction of L_{Aeq} , 1-hour levels and calculation of L_{day} , $L_{evening}$, L_{night} and L_{DEN} levels).

Table 39: Sample Reference Case Assessment Timesheet for Indicator 1.6

TEST NO :	1			
Test Description :	Produce noise levels for 05/12/01			
Staff Name :	Paul Goodman			
TASK	Date/Time Started	Date/Time Finished	Total duration	Notes & Method Used
1. Collect traffic data	18/12/01 – 14:00	18/12/01 – 14:30	30 minutes	Collected SCOOT 5-min M02 data from Instrumented City
	18/12/01- 14:30	18/12/01- 15:30	1 hour	Extracted TRIPS data from AIRVIRO workstation
2. Process traffic data	18/12/01 – 15:30	18/12/01 – 16:30	1 hour	Processed traffic data using Excel spreadsheet
3. Calculate $L_{Aeq, 1-hour}$ levels	18/12/01 – 16:30	18/12/01 – 17:00	30 minutes	Calculated L_{Aeq} levels using Excel spreadsheet.
4. Calculate L_{day}, $L_{evening}$, L_{night} and L_{DEN} levels	18/12/01 – 17:00	18/12/01 – 17:15	15 minutes	Calculated Levels using Excel spreadsheet.
TOTAL TIME TAKEN:			3 hours 15 mins	

9.4 TOB4

Tool TOB 4 is concerned with the assessment of Indicator 2.4 (Reduced time to produce environmental descriptions regarding noise pollution based on scenario analysis). The same timesheet based approach may be used, as previously discussed for tool TOB 2 with the main exception that rather than using traffic levels as assessed through direct observation (by detector or manually) or from previously observed or modelled data, the time taken to model the traffic patterns required for the scenarios should be taken into account.

The data table for scenario analyses as well as examples for a noise emission maps are provided in annex 7 to this document.

HEAVEN Tool Book

Annex 1

SUR1 Questionnaire



HEAVEN Project

Questionnaire to assess the usefulness of the environmental information (public users)

Could you please answer the following questions, expressing your opinion on the quality and usefulness of the environmental information delivered by the HEAVEN information system and on the user-friendliness of the way it is provided.

I. Overall situation before HEAVEN

1. Please let us know to what extent you agree to the following statements.

Please mark one box for each statement.

	absolutely agree	partly agree	neither agree nor disagree	partly disagree	absolutely disagree
a. The overall amount of environmental information accessible before HEAVEN was satisfactory.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. The overall quality of environmental information accessible before HEAVEN was satisfactory.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

II. HEAVEN information acceptance

2. Please let us know to what extent you agree to the following statements.

Please mark one box for each statement.

	absolutely agree	partly agree	neither agree nor disagree	partly disagree	absolutely disagree
The information provided in HEAVEN is...					
a. comprehensible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. easy to use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. detailed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. credible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. useful, in general terms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. How often do you use the HEAVEN information system ?
- a. times a day
 - b. times a week (if less than once a day)
 - c. times a month (if less than once a week)
 - d. Less than once a month
 - e. This is the first time (Please go to question 6)
4. Did you use in the past the received information for your travel choice ?
- a. Always
 - b. Often
 - c. Sometimes
 - d. Rarely
 - e. Never (Please go to question 6)
5. How did you use the received information for your travel choice ?
- a. Confirming my decision
 - b. Not travelling
 - c. Changing the route
 - d. Changing the transport mode
 - e. Changing the departure time
6. Do you intend to use the HEAVEN information system in the future?
- a. Yes
 - b. Only if it will be improved
 - c. No

III. Overall situation after HEAVEN

7. Please let us know to what extent you agree to the following statements.

Please mark one box for each statement.

- | | absolutely
agree | partly
agree | neither
agree nor
disagree | partly
disagree | absolutely
disagree |
|------------------------------------------------------------------------------------------------|--------------------------|--------------------------|----------------------------------|--------------------------|--------------------------|
| a. The overall amount of environmental data accessible (after HEAVEN) is satisfactory. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. The overall quality of environmental information accessible (after HEAVEN) is satisfactory. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

8. What are, in your opinion, the still existing main weaknesses of the environmental information supply (what kind of additional information would be needed) ?

 Please specify (if necessary add an additional sheet):

.....
.....
.....
.....

9. What alternative means could be used to deliver the environmental information?

 Please specify (if necessary add an additional sheet):

.....
.....
.....
.....

10. Do you have additional comments?

 Please specify (if necessary add an additional sheet):

.....
.....
.....
.....

IV. Statistical information


11. Gender

- a. Female
- b. Male

12. Age (category)

- a. Under 25
- b. 26 – 45
- c. 46 – 65
- d. 66 +

13. Occupation

 Please specify

.....

Thank you for your participation & contribution!

HEAVEN Tool Book

Annex 2

FACT4/SUR3 Interview Guideline/Questionnaire



HEAVEN Project

Questionnaire to assess the increased quality and usefulness of data entered in the common repository and scenario calculation

Could you please answer the following questions expressing your opinion on the amount of data entered in common repository including quality of data structure and storage and the HEAVEN scenario calculation.

Please briefly describe your role and your field of activity:

Institution:

Role:

Field of activity:

.....

I. Overall situation before HEAVEN

1. Please let us know to what extent you agree to the following statements.

Please mark one box for each statement.

	absolutely agree	partly agree	neither agree nor disagree	partly disagree	absolutely disagree
a. The overall amount of traffic and environmental data available before HEAVEN was satisfactory.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. The overall quality of traffic and environmental data available before HEAVEN was satisfactory.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. The traffic and environmental data available before HEAVEN was reliable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

II. HEAVEN common repository acceptance

2. Please let us know to what extent you agree to the following statements.

Please mark one box for each statement.

	absolutely agree	partly agree	neither agree nor disagree	partly disagree	absolutely disagree
The information contained in the HEAVEN common repository is...					
a. comprehensible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. detailed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. easy to manage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. credible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. useful for short-term planning activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. useful for medium-term planning activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. useful for long-term planning activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. How could this common repository be improved in order to be more useful for your planning activities ?

a. adding further data

if this is the case, please suggest which kinds of data:

.....

b. adopting different formats

c. making easier the procedures to access the data

d. other

Please specify:

.....

4. Do you intend to use the HEAVEN information in the future?

Please mark one box for each statement.

- a. Yes
- b. Only if it will be improved
- c. No

III. HEAVEN scenario analysis acceptance

5. Please let us know to what extent you agree to the following statements.

Please mark one box for each statement.

	absolutely agree	partly agree	neither agree nor disagree	partly disagree	absolutely disagree
The information contained in the HEAVEN scenarios is...					
a. comprehensible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. detailed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. easy to manage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. credible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. useful for short-term planning activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. useful for medium-term planning activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. useful for long-term planning activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. How could the scenario calculation be improved in order to be more useful for your planning activities ?

a. adding further indicators

if this is the case, please suggest which indicators:

.....

b. adopting different formats

c. making easier the procedures for entering other scenarios

d. other

Please specify:

.....

7. Do you intend to use the HEAVEN scenario calculation in the future?

Please mark one box for each statement.

a. Yes

b. Only if it will be improved

c. No

IV. Overall situation after HEAVEN

8. Please let us know to what extent you agree to the following statements.

Please mark one box for each statement.

	absolutely agree	partly agree	neither agree nor disagree	partly disagree	absolutely disagree
a. The overall amount of traffic and environmental data available after HEAVEN is satisfactory.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. The overall quality of traffic and environmental data available after HEAVEN is satisfactory.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. The traffic and environmental data available after HEAVEN is reliable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9. Other comments

please specify:

.....
.....
.....
.....
.....

HEAVEN Tool Book

Annex 3

TOB3 Evaluation Table for Scenario Analyses (Air)

Scenario analysis

Title :

Practical description of the scenario implemented :

Extension of the geographical domain described ⁽¹⁾ :

- Size of the domain : _____ km² (for background)
- Length of the network : _____ km (for roadside)

Pollutants described :

- | | | | | | |
|-------------------------------------|------------------------------------------|------------------------------------------|--------------------------------------------------------|----------------------------------|--------------------------------------------------------|
| <input type="checkbox"/> Roadside | <input type="checkbox"/> PM10 | <input type="checkbox"/> NO ₂ | <input type="checkbox"/> CO | <input type="checkbox"/> Benzene | <input type="checkbox"/> Others, to be mentioned _____ |
| <input type="checkbox"/> Background | <input type="checkbox"/> NO ₂ | <input type="checkbox"/> O ₃ | <input type="checkbox"/> Others, to be mentioned _____ | | |

Reference period :

- hourly description
- Average Annual Monthly Daily Others, to be mentioned _____

Meteorological :

- | | | | |
|------------------------------------|--------------------------------------------------------|---------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Academic | <input type="checkbox"/> Acute Air pollution Episode | <input type="checkbox"/> Static profiles | <input type="checkbox"/> If static :
Wind Direction :
Wind speed :
Temperature :
Others : _____ |
| | <input type="checkbox"/> Average Air pollution Episode | <input type="checkbox"/> Temporal evolution | |
| <input type="checkbox"/> Real case | <input type="checkbox"/> Acute Air pollution Episode | Date : _____ | |
| | <input type="checkbox"/> Average Air pollution Episode | | |

(1) Map to be provided

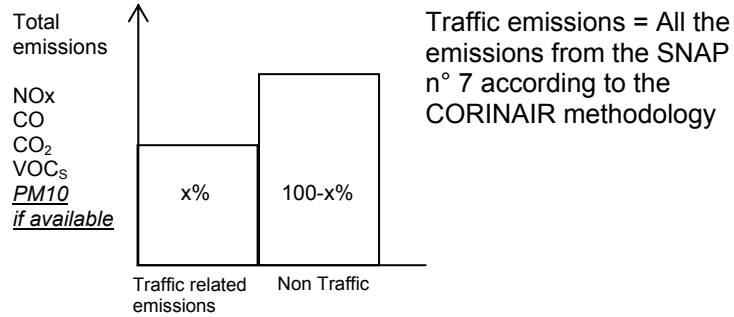
(2) To be described by figures if necessary

Description of the emissions reductions

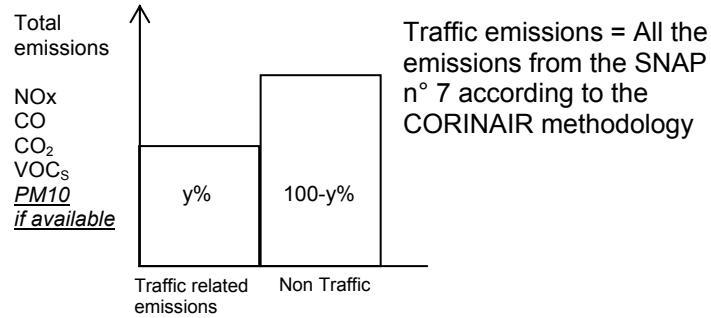
(to be focused at least on NO_x, VOCs or specific species like C₆H₆, CO, CO₂ and PM10 if available)

Traffic versus non traffic :

Description of the emissions for the baseline scenario



With scenario implementation

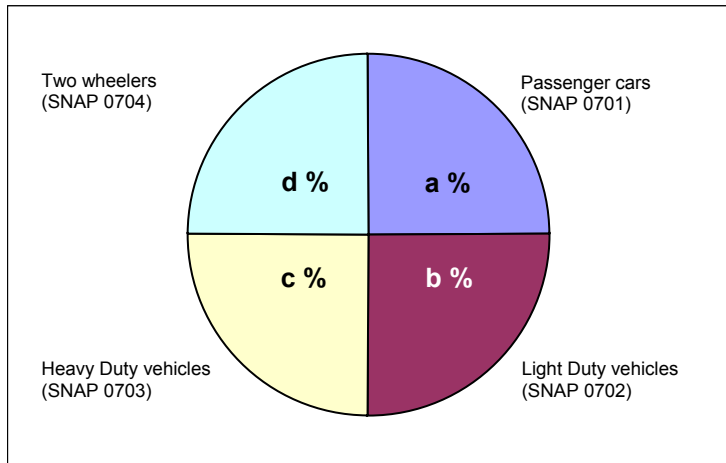


Estimation of time needed to produce the chart related to the emissions pattern (traffic versus non traffic) modification :

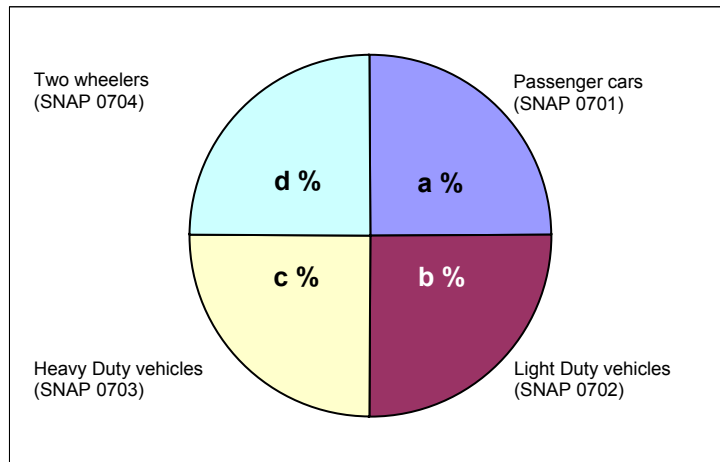
- without Heaven : _____
- with Heaven : _____

Traffic Emissions Description :

Traffic Emissions Descriptions a Baseline



Traffic Emissions with scenario implementation



Estimation of time needed to produce the chart related to the emissions pattern (traffic versus non traffic) modification :

- without Heaven : _____
- with Heaven : _____

Comment MB: These pie charts are not really giving any indication in the changes expected in total emissions. The areas of the circles should change to reflect reduction/increase in overall network emissions.

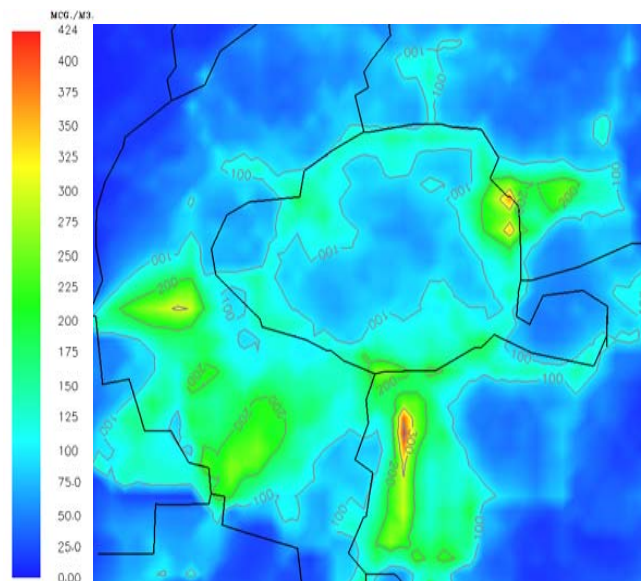
Description of the concentration maps

(to be focused on the ad-hoc pollutants : one set of maps for each pollutant described)

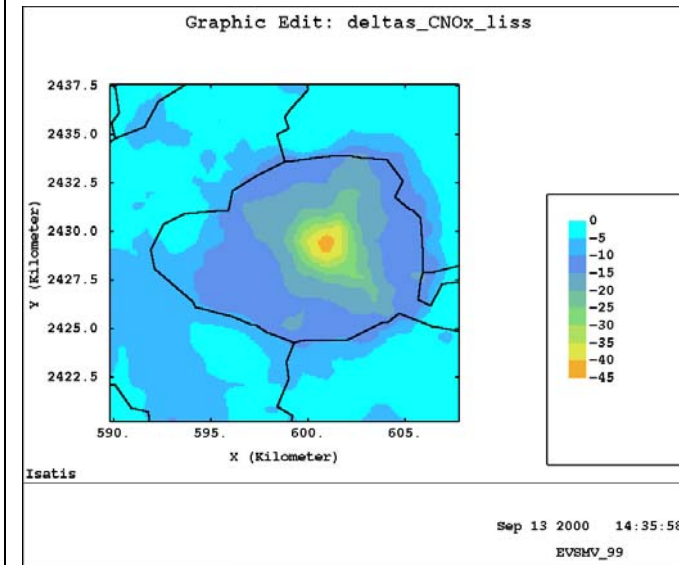
Baseline scenario

With scenario implementation

Map of simulated difference



NOx concentrations at 9.00, the 22nd of September



Percentage of reduction for the NOx

Estimation of the time needed to produce the different maps :

- without Heaven : _____
- with Heaven : _____

Total estimated time for the scenario prepared :

- without Heaven : _____
- with Heaven : _____

HEAVEN Tool Book

Annex 4

FACT2 Interview Guideline



HEAVEN Project

Questionnaire to assess the usefulness of the environmental information (professional users)

Could you please answer the following questions, expressing your opinion on the quality and usefulness of the environmental information delivered by the HEAVEN information system and on the user-friendliness of the way it is provided.

Please briefly describe your role and your field of activity:

Institution/Company:

Role:

Field of activity:

.....

I. Overall situation before HEAVEN

1. Please let us know to what extent you agree to the following statements.

Please mark one box for each statement.

	absolutely agree	partly agree	neither agree nor disagree	partly disagree	absolutely disagree
a. The overall amount of environmental information accessible before HEAVEN was satisfactory.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. The overall quality of environmental information accessible before HEAVEN was satisfactory.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

II. HEAVEN information acceptance

2. Please let us know to what extent you agree to the following statements.

Please mark one box for each statement.

	absolutely agree	partly agree	neither agree nor disagree	partly disagree	absolutely disagree
The information provided in HEAVEN is...					
a. comprehensible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. easy to manage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. detailed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. credible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. useful to manage urban mobility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. useful to the end users for their travel choice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. How often do you use the HEAVEN information system ?

- a. times a day
- b. times a week (if less than once a day)
- c. times a month (if less than once a week)
- d. Less than once a month
- e. This is the first time (Please go to question 6)

4. Do you intend to use the HEAVEN information system in the future?

- a. Yes
- b. Only if it will be improved
- c. No

III. Overall situation after HEAVEN

5. Please let us know to what extent you agree to the following statements.

Please mark one box for each statement.

	absolutely agree	partly agree	neither agree nor disagree	partly disagree	absolutely disagree
a. The overall amount of environmental data accessible (after HEAVEN) is satisfactory.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. The overall quality of environmental information accessible (after HEAVEN) is satisfactory.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. What are, in your opinion, the still existing main weaknesses of the environmental information supply (what kind of additional information would be needed) ?

 Please specify (if necessary add an additional sheet):


.....

.....

.....

.....

7. What alternative means could be used to deliver the environmental information?

 Please specify (if necessary add an additional sheet):

.....

.....

.....

.....

8. Do you have additional comments?

 Please specify (if necessary add an additional sheet):

.....

.....

.....

.....

Thank you for your participation & contribution!

HEAVEN Tool Book

Annex 5

FACT3 Interview Guideline – Authorities



What is your opinion about HEAVEN?

Guideline for Interviews of Authorities (Members of Authorities) in **YOUR SITE**

<u>Interview Facts</u>	
Interviewer:	
Date of interview:	
Location of interview:	
Context* of the interview:	
<u>Person Interviewed</u>	
Name of person interviewed:	
HEAVEN appraisal group** the person interviewed belongs to:	
Administrative level of person interviewed:	
Tasks of person interviewed:	
Involvement of person interviewed in HEAVEN:	
<u>Institution of person interviewed</u>	
Institution the person interviewed belongs to (employer):	
Responsibilities of organisation/institution:	
Involvement of institution in HEAVEN	

* For example within a demonstration of the HEAVEN system, visit of the interviewer or the person interviewed, etc.

** As members of authorities, persons interviewed belong to the appraisal groups of *Direct HEAVEN Users* from either traffic and transport departments, environmental departments, health departments, or urban planning departments.

YOUR SITE – Guideline for Interviews of Authorities


Prior to the interview, the HEAVEN system and, in particular, features of interest to the person interviewed will be demonstrated.

- *Introduce yourself.*
- *Start off with emphasizing the importance of involving the person interviewed. S/he is important to HEAVEN as a member of an authority or as a decision maker. Her/his answers will be used to improve the HEAVEN system.*
- *Emphasize that all data will be treated confidentially.*
- *Mention that the interview will take about 45 minutes.*
- *Explain that you will take notes of the answers given and that, at the end of each question block, you will ask to what extent the person interviewed agrees (or disagrees) to a statement that you will provide.*
- *Each interview will be different. “Put yourself in the shoes” of the person interviewed when you prepare for the interview. Take into account that each person interviewed may have a (slightly) different perspective of HEAVEN.*
- *Be prepared to “encourage” the person interviewed to provide (more) detailed answers, in particular regarding what worked well and what needs to be improved within HEAVEN from their perspective.*
- *Begin the interview.*

I. Current state of responsibilities and co-operation


Joint responsibilities are tasks which are fulfilled by several institutions or departments.

1. Within your sector of work, what are the joint responsibilities that your institution shares with other institutions? Please name the respective institutions.

 Please write down (if necessary add additional sheet)


Joint responsibilities within the same sector	Name of the respective institution

2. Please state the year the co-operation started as well as the reason for the co-operation!

 Please write down (if necessary add additional sheet)

Name of institution	Year co-operation started	Reason for co-operation

3. What are the joint responsibilities that your institution shares with institutions of other sectors? Please name the institutions and their respective sectors.

 Please write down (if necessary add additional sheet)

Joint responsibilities within the same sector	Name of the institution and respective sector

YOUR SITE – Guideline for Interviews of Authorities

Note that HEAVEN is likely to affect institutional co-operation:

- *within the same department of the same policy level,*
- *across different departments of the same policy level,*
- *across the same departments of different policy levels, or*
- *across departments of different policy levels.*

The departments involved, typically, are:

- *transport departments (TR)*
- *environment departments (ENV)*
- *health departments (HE), or*
- *urban planning departments (UP).*

Policy levels involved, typically, are:

- *district level,*
- *city level, or*
- *regional level.*

The following matrix provides all possible combinations of co-operation between departments and policy levels.

		District				City				Regional			
		TR	ENV	HE	UP	TR	ENV	HE	UP	TR	ENV	HE	UP
District	TR												
	ENV												
	HE												
	UP												
City	TR												
	ENV												
	HE												
	UP												
Regional	TR												
	ENV												
	HE												
	UP												

II. Spheres of improved institutional co-operation – decision-making process

Although the starting situation differs in each HEAVEN site, it is assumed that improved institutional co-operation affects each of the below mentioned areas in one way or another.

Questions 6-10 focus on the allocation of responsibilities in the process of policy formulation.

6. Common policy formulation within same departments (of same policy levels)



- a. How are policies prepared within departments of the same policy level? What has been the effect of HEAVEN in this regard?

Please write down (if necessary add additional sheet)

.....
.....
.....
.....
.....
.....
.....
.....

- b. How would you characterise the elements of co-operation, for example common data access, joint meetings, joint initiatives, joint programmes, joint budgets, etc.? What has been the effect of HEAVEN in this regard?

Please write down (if necessary add additional sheet)

.....
.....
.....
.....
.....
.....
.....
.....

7. Common policy formulation across the same departments of different policy levels




- a. How are policies prepared if the same departments of different policy level are involved? What has been the effect of HEAVEN in this regard?

Please write down (if necessary add additional sheet)

.....
.....
.....
.....
.....
.....
.....
.....

- b. How would you characterise the elements of co-operation, for example common data access, joint meetings, joint initiatives, joint programmes, joint budgets, etc.? What has been the effect of HEAVEN in this regard?


 Please write down (if necessary add additional sheet)

.....
.....
.....
.....
.....
.....
.....
.....
.....

8. Common policy formulation across different department of the same policy levels




- a. How are policies prepared if different departments of the same policy level are involved? What has been the effect of HEAVEN in this regard?

 Please write down (if necessary add additional sheet)

.....
.....
.....
.....
.....
.....
.....
.....

- b. How would you characterise the elements of co-operation, for example common data access, joint meetings, joint initiatives, joint programmes, joint budgets, etc.? What has been the effect of HEAVEN in this regard?

 Please write down (if necessary add additional sheet)

.....
.....
.....
.....
.....
.....
.....
.....

9. Common policy formulation across different departments of different policy levels



- a. How are policies prepared if the different departments of different policy level are involved? What has been the effect of HEAVEN in this regard?

Please write down (if necessary add additional sheet)

.....

- b. How would you characterise the elements of co-operation, for example common data access, joint meetings, joint initiatives, joint programmes, joint budgets, etc.? What has been the effect of HEAVEN in this regard?

Please write down (if necessary add additional sheet)

.....

10. Please let us know to what extent you agree to the following statements.

Please mark one box for each statement.


Due to HEAVEN, institutional co-operation in the area of common policy formulation...	significantly deteriorated	slightly deteriorated	not lead to a change	slightly improved	significantly improved
a. within departments of the same policy level has...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. across the same departments of different policy levels...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. across different departments of the same policy levels...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. across different departments of different policy levels...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11. Common policy implementation within same departments (of same policy levels)

Again the purpose is to detect to what extent work relations and work arrangements have improved.

How would you characterise the elements of co-operation in the process of implementing policy measures (common data access, joint meetings, joint initiatives, joint programmes, joint budgets etc.)? What has been the effect of HEAVEN in this regard?




 Please write down (if necessary add additional sheet)

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12. Common policy implementation across the same departments of different policy levels

How would you characterise the elements of co-operation in the process of implementing policy measures (common data access, joint meetings, joint initiatives, joint programmes, joint budgets etc.)? What has been the effect of HEAVEN in this regard?




 Please write down (if necessary add additional sheet)

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13. Common policy implementation across different department of the same policy levels

How would you characterise the elements of co-operation in the process of implementing policy measures (common data access, joint meetings, joint initiatives, joint programmes, joint budgets etc.)? What has been the effect of HEAVEN in this regard?



 Please write down (if necessary add additional sheet)

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14. **Common policy implementation across different departments of different policy levels**

How would you characterise the elements of co-operation in the process of implementing policy measures (common data access, joint meetings, joint initiatives, joint programmes, joint budgets etc.)? What has been the effect of HEAVEN in this regard?



 Please write down (if necessary add additional sheet)

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15. Please let us know to what extent you agree to the following statements.

Please mark one box for each statement.


Due to HEAVEN, institutional co-operation in the area of common policy implementation...	significantly deteriorated	slightly deteriorated	not lead to a change	slightly improved	significantly improved
a. within departments of the same policy level has...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. across the same departments of different policy levels...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. across different departments of the same policy levels...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. across different departments of different policy levels...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

III. Spheres of improved institutional co-operation – improvement of basic work arrangements

Questions 16-19 are concerned with the functioning of specific issues that can highlight significant improvements in institutional co-operation.

16. Conflict solving


The sphere of common conflict solving is the most sensitive area and the interviewer should carefully search for this issue at all levels of policy formulation and implementation. Can you please outline your experience in case you have used any conflict solving measures?

 Please write down (if necessary add additional sheet)

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17. Joint projects


Joint projects of different institution often prove to have positive effects on the improvement of institutional co-operation. Can you please outline your experience in case you have been involved in such projects?

 Please write down (if necessary add additional sheet)

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18. Co-operation with non-governmental organisations


Institutional co-operation is not only concerned with better contacts to other authorities but can be the result of improved contacts with non-governmental bodies. Can you sum up the “new” quality of such contacts if they have been set up as result of the HEAVEN project?

 Please write down (if necessary add additional sheet)

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19. **Other factors**

What other factors characterise improved institutional co-operation in your city?

 Please write down (if necessary add additional sheet)

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20. Please let us know to what extent you agree to the following statements.

Please mark one box for each statement.

Due to HEAVEN, institutional co-operation in the area of...	significantly deteriorated	slightly deteriorated	not lead to a change	slightly improved	significantly improved
a. common conflict solving has...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. joint project set-up has...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. co-operation with non-governmental organisations has...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. other factors of institutional co-operation has...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Ad d) Other factors include:

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IV. Future prospects of further institutional co-operation

If we consider HEAVEN and its products as a step to improve institutional co-operation, we also have to ask whether there will be any further progress to continue the path of institutional co-operation and what are likely next steps.


21. What future plans/ initiatives will you put into practice? Can you name the one with the highest priority first!

1.	
2.	
3.	
4.	

V. Time efficiency

HEAVEN is a project that aims to contribute to better time-efficiency regarding the exchange of transport-related and environment-related information.

22. What is your experience in terms of time efficiency of the HEAVEN system for the fields mentioned below?

 Please write down (if necessary add additional sheet)

a. Transport

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b. Environment – Air Quality

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c. Environment - Noise

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d. Drawing up Scenarios

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YOUR SITE – Guideline for Interviews of Authorities

23. Please let us know to what extent you agree to the following statements.

Please mark one box for each statement.

Due to HEAVEN, time-efficiency of...	significantly deteriorated	slightly deteriorated	not lead to a change	slightly improved	significantly improved
a. transport-related information exchange has...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. environment (air quality)-related information exchange has...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. environment (noise)-related information exchange has...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. drawing-up scenarios has...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Thank the person interviewed for her/his participation & contribution!

HEAVEN Tool Book

Annex 6

FACT3 Interview Guideline – Decision Makers



What is your opinion about HEAVEN?

Guideline for Interviews of Decision Makers in **YOUR SITE**

<u>Interview Facts</u>	
Interviewer:	
Date of interview:	
Location of interview:	
Context* of the interview:	
<u>Person Interviewed</u>	
Name of person interviewed:	
HEAVEN appraisal group** the person interviewed belongs to:	
Political function of person interviewed:	
Responsibilities of person interviewed:	
Involvement of person interviewed in HEAVEN:	
<u>Institution of person interviewed</u>	
Institution the person interviewed belongs to (employer):	
Responsibilities of organisation/institution:	
Involvement of institution in HEAVEN:	

* For example within a demonstration of the HEAVEN system, visit of the interviewer or the person interviewed, etc.

** As decision makers, persons interviewed belong to the appraisal groups of *Indirect HEAVEN Users* from either the area of urban development, traffic and transport, environment, or health.

YOUR SITE – Guideline for Interviews of Decision Makers


Prior to the interview, the HEAVEN system and, in particular, features of interest to the person interviewed will be demonstrated.

- *Introduce yourself.*
- *Start off with emphasizing the importance of involving the person interviewed. S/he is important to HEAVEN as a member of an authority or as a decision maker. Her/his answers will be used to improve the HEAVEN system.*
- *Emphasize that all data will be treated confidentially.*
- *Mention that the interview will take about 45 minutes.*
- *Explain that you will take notes of the answers given and that, at the end of each question block, you will ask to what extent the person interviewed agrees (or disagrees) to a statement that you will provide.*
- *Each interview will be different. “Put yourself in the shoes” of the person interviewed when you prepare for the interview. Take into account that each person interviewed may have a (slightly) different perspective of HEAVEN.*
- *Be prepared to “encourage” the person interviewed to provide (more) detailed answers, in particular regarding what worked well and what needs to be improved within HEAVEN from their perspective.*
- *Begin the interview.*

I. Current state of responsibilities and co-operation with other decision makers


Joint responsibilities are tasks which are fulfilled by several institutions or departments.

1. Within your sector of work, what are the joint responsibilities that your institution shares with other institutions? Please name the respective institutions.

 Please write down (if necessary add additional sheet)


Joint responsibilities within the same sector	Name of the respective institution

2. Please state the year the co-operation started as well as the reason for the co-operation!

 Please write down (if necessary add additional sheet)

Name of institution	Year co-operation started	Reason for co-operation

3. What are the joint responsibilities that your institution shares with institutions of other sectors? Please name the institutions and their respective sectors.

 Please write down (if necessary add additional sheet)

Joint responsibilities within the same sector	Name of the institution and respective sector

YOUR SITE – Guideline for Interviews of Decision Makers

Note that HEAVEN is likely to affect institutional co-operation:

- *within the same department of the same policy level,*
- *across different departments of the same policy level,*
- *across the same departments of different policy levels, or*
- *across departments of different policy levels.*

The departments involved, typically, are:

- *transport departments (TR)*
- *environment departments (ENV)*
- *health departments (HE), or*
- *urban planning departments (UP).*

Policy levels involved, typically, are:


- *district level,*
- *city level, or*
- *regional level.*

The following matrix provides all possible combinations of co-operation between departments and policy levels.

		District				City				Regional			
		TR	ENV	HE	UP	TR	ENV	HE	UP	TR	ENV	HE	UP
District	TR												
	ENV												
	HE												
	UP												
City	TR												
	ENV												
	HE												
	UP												
Regional	TR												
	ENV												
	HE												
	UP												

YOUR SITE – Guideline for Interviews of Decision Makers

- b. How would you characterise the elements of co-operation, for example common data access, joint meetings, joint initiatives, joint programmes, joint budgets, etc.? What has been the effect of HEAVEN in this regard?


 Please write down (if necessary add additional sheet)

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8. Common policy formulation across different department of the same policy levels




- a. How are policies discussed and prepared if other decision makers of the same policy level are involved? What has been the effect of HEAVEN in this regard?

 Please write down (if necessary add additional sheet)

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- b. How would you characterise the elements of co-operation, for example common data access, joint meetings, joint initiatives, joint programmes, joint budgets, etc.? What has been the effect of HEAVEN in this regard?


 Please write down (if necessary add additional sheet)

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9. Common policy formulation across different departments of different policy levels




- a. How are policies discussed and prepared if the different decision makers of different policy level are involved? What has been the effect of HEAVEN in this regard?

 Please write down (if necessary add additional sheet)

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- b. How would you characterise the elements of co-operation, for example common data access, joint meetings, joint initiatives, joint programmes, joint budgets, etc.? What has been the effect of HEAVEN in this regard?

 Please write down (if necessary add additional sheet)

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10. Please let us know to what extent you agree to the following statements.

Please mark one box for each statement.


Due to HEAVEN, institutional co-operation and decision-making in the area of common policy formulation...	significantly deteriorated	slightly deteriorated	not lead to a change	slightly improved	significantly improved
a. within departments of the same policy level has...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. across the same departments of different policy levels...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. across different departments of the same policy levels...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. across different departments of different policy levels...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11. Common policy implementation within same departments (of same policy levels)

Again the purpose is to detect to what extent work relations and work arrangements in the decision-making process have improved.

How would you characterise the elements of co-operation in the decision-making process (common data access, joint meetings, joint initiatives, joint programmes, joint budgets etc.)? What has been the effect of HEAVEN in this regard?




 Please write down (if necessary add additional sheet)

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12. Common policy implementation across the same departments of different policy levels

How would you characterise the elements of co-operation in the decision-making process (common data access, joint meetings, joint initiatives, joint programmes, joint budgets etc.)? What has been the effect of HEAVEN in this regard?




 Please write down (if necessary add additional sheet)

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13. Common policy implementation across different department of the same policy levels

How would you characterise the elements of co-operation in the decision-making process (common data access, joint meetings, joint initiatives, joint programmes, joint budgets etc.)? What has been the effect of HEAVEN in this regard?




 Please write down (if necessary add additional sheet)

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14. **Common policy implementation across different departments of different policy levels**

How would you characterise the elements of co-operation in the decision-making process (common data access, joint meetings, joint initiatives, joint programmes, joint budgets etc.)? What has been the effect of HEAVEN in this regard?



 Please write down (if necessary add additional sheet)

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15. Please let us know to what extent you agree to the following statements.

Please mark one box for each statement.


Due to HEAVEN, institutional co-operation and decision-making in the area of common policy formulation...	significantly deteriorated	slightly deteriorated	not lead to a change	slightly improved	significantly improved
a. within departments of the same policy level has...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. across the same departments of different policy levels...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. across different departments of the same policy levels...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. across different departments of different policy levels...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

III. Spheres of improved institutional co-operation – improvement of work arrangements in the decision-making process

Questions 16-19 are concerned with the functioning of specific issues that can highlight significant improvements in institutional co-operation.

16. Conflict solving


The sphere of common conflict solving is the most sensitive area and the interviewer should carefully search for this issue at all levels of policy formulation and implementation. Can you please outline your experience in case you have used any conflict solving measures?

 Please write down (if necessary add additional sheet)

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17. Joint projects


Joint projects of different institution often prove to have positive effects on the improvement of decision making. Can you please outline your experience in case you have been involved in such projects?

 Please write down (if necessary add additional sheet)

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18. Co-operation with non-governmental organisations


Decision making is not only concerned with better contacts to other authorities but can be the result of improved contacts with non-governmental bodies. Can you sum up the “new” quality of such contacts if they have been set up as result of the HEAVEN project?

 Please write down (if necessary add additional sheet)

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19. **Other factors**

What other factors characterise improved decision making in your city?

 Please write down (if necessary add additional sheet)

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20. Please let us know to what extent you agree to the following statements.

Please mark one box for each statement.

Due to HEAVEN, institutional co-operation and decision-making in the area of...	significantly deteriorated	slightly deteriorated	not lead to a change	slightly improved	significantly improved
a. common conflict solving has...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. joint project set-up has...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. co-operation with non-governmental organisations has...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. other factors of institutional co-operation has...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Ad d) Other factors include:

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IV. Future prospects of further institutional co-operation

If we consider HEAVEN and its products as a step to improve decision making, we also have to ask whether there will be any further progress to continue the path of decision making process and what are likely next steps.


21. What future plans/ initiatives will you put into practice? Can you name the one with the highest priority first!

1.	
2.	
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4.	

V. Time efficiency

HEAVEN is a project that aims to contribute to better time-efficiency regarding the exchange of transport-related and environment-related information.

22. What is your experience in terms of time efficiency of the HEAVEN system for decision-making in the fields mentioned below?

 Please write down (if necessary add additional sheet)

a. Transport

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b. Environment – Air Quality

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c. Environment - Noise

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d. Drawing up Scenarios

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YOUR SITE – Guideline for Interviews of Decision Makers

23. Please let us know to what extent you agree to the following statements.

Please mark one box for each statement.

Due to HEAVEN, time-efficiency of...	significantly deteriorated	slightly deteriorated	not lead to a change	slightly improved	significantly improved
a. transport-related information exchange has...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. environment (air quality)-related information exchange has...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. environment (noise)-related information exchange has...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. drawing-up scenarios has...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Thank the person interviewed for her/his participation & contribution!

HEAVEN Tool Book

Annex 7

TOB4 Evaluation Table for Scenario Analyses (Noise)

Scenario Analysis

Title :

Practical description of the scenario implemented :

Extent of the geographical domain described⁽¹⁾ :

- Size of overall domain : _____ km²
- Length of noise emission network used : _____ km

Noise emission parameters defined for :

- Sound power level at source Sound pressure level at reference distance of _____ m from link centreline


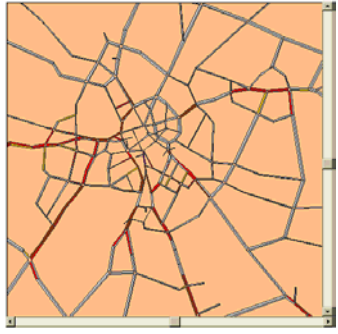
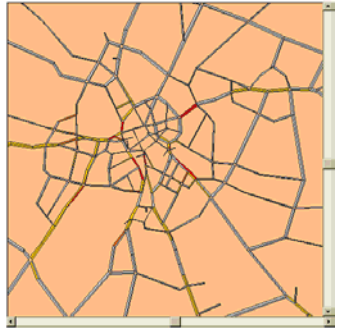
Noise parameters calculated :

- L_{Aeq}, 1-hour L_{A10}, 1-hour L_{Day}, (L_{Aeq} for 07:00 – 19:00) L_{Evening}, (L_{Aeq} for 19:00 – 23:00)
- L_{Night}, (L_{Aeq} for 23:00 – 07:00) L_{DEN}, (L_{Aeq} for 24 hours = L_{Day} + L_{Evening} + L_{Night})

(1) Map to be provided

Description of the Noise Emission Maps

(one set of maps of L_{Aeq} levels for each time period (e.g. 1-hour, day, evening, night, 24-hour) under consideration)

Baseline scenario	With scenario implementation	Map of difference in emissions
 <p style="text-align: center;">Noise Level (LAeq)</p> <ul style="list-style-type: none"> < 45 dB(A) 45 - 50 dB(A) 50 - 55 dB(A) 55 - 60 dB(A) 60 - 65 dB(A) 65 - 70 dB(A) 70 - 75 dB(A) 75 - 80 dB(A) > 80 dB(A) No Information Available 	 <p style="text-align: center;">Noise Level (LAeq)</p> <ul style="list-style-type: none"> < 45 dB(A) 45 - 50 dB(A) 50 - 55 dB(A) 55 - 60 dB(A) 60 - 65 dB(A) 65 - 70 dB(A) 70 - 75 dB(A) 75 - 80 dB(A) > 80 dB(A) No Information Available 	 <p style="text-align: center;">Change in Noise Level (LAeq)</p> <ul style="list-style-type: none"> > -6 dB(A) -4 - -6 dB(A) -2 - -4 dB(A) -0 - -2 dB(A) 0 dB(A) +0 - +2 dB(A) +2 - +4 dB(A) +4 - +6 dB(A) > +6 dB(A) No Information Available
<p>Estimation of the time needed to produce the different maps:</p>		
<ul style="list-style-type: none"> • without HEAVEN : _____ • with HEAVEN : _____ <p>Total estimated time for scenario preparation:</p> <ul style="list-style-type: none"> • without HEAVEN : _____ • with HEAVEN : _____ 		

