

Dear Readers,

■ HEAVEN is coming into the most challenging phase: from theory to practice. The goal is to estimate air and noise pollution from traffic in near-real time. To achieve this, Berlin, Leicester, Paris, Prague, Rome, and Rotterdam jointly develop and demonstrate new concepts and tools for local decision makers and planners. In this newsletter we will present in detail the HEAVEN demonstration sites Paris and Leicester, the other sites will follow in the next newsletter.

The common HEAVEN system architecture has been designed and partners are currently developing the HEAVEN system. The implementation is being undertaken on the basis of the common concept for the Decision Support System (DSS). Learn more about the HEAVEN project by looking at the articles on the following pages. I am pleased to invite you to the HEAVEN workshop on 7th December

2001 in Paris. This first project workshop will give you the opportunity to find out more about HEAVEN and take a role in the development process yourself. Your suggestions and remarks on the preliminary results are very welcome. This first public HEAVEN event may well be the beginning of a regular contact – it might even provoke the need for a HEAVEN "User Workgroup".

In this 2nd issue of the HEAVEN Newsletter we would like to invite you to become a "virtual project partner" via the HEAVEN website at: <http://heaven.rec.org>. Through the website and virtual community, we will keep you informed about HEAVEN's progress, results and events.

I look forward to meeting you in Paris!



Maurizio Tomassini
Project Manager

A Glimpse of HEAVEN in Paris

HEAVEN presented on earth

HEAVEN Workshop

Urban Transport, Air Quality & Noise

- The Solution from HEAVEN -

**7 December 2001
in Paris**

For more details please visit:
<http://heaven.rec.org/Parisworkshop.html>

What can you expect from the workshop

The HEAVEN project will present its innovative technical solutions to the challenges of transport, air quality and noise in cities. Presentations and discussion will include:

- Prototype of the Decision Support System (DSS),
- Strategies for implementation of a DSS to validate impacts of Transport Demand Management Strategies (TDMS),
- Solutions for the integration of different sources of environmental data and traffic related information,
- Making this information accessible to the different administrative services and the public.

Now that the prototype of the HEAVEN DSS is available, it is time to continue the process of interaction with the end-users.

Parallel to the Heaven Workshop, the Pollutec environmental trade show and exhibition, 4-7 December in Paris, provides an additional opportunity to keep up with the latest information on all sectors of environmental technologies (www.pollutec.com).

CAFE for Cleaner Air in Europe

■ The European Commission is increasing its efforts to reduce air pollution. In May this year the European Commission launched its Clean Air for Europe Action Programme (CAFE). The explicit goal of CAFE is to identify the most suitable and efficient measures for achieving air pollution levels that do not have any significant effects on humans or the natural environment.

CAFE is being carried out in the context of a number of new political developments. One of the most important of these is the negotiation of the 6th Environmental Action Programme (6EAP) which will lay down the priorities for the European Union's environmental policy in the coming years. In its proposal for the 6EAP the Commission has committed itself to adopting a number of thematic strategies, of which one of the first will be a thematic strategy on air pollution to be delivered in 2004. Delivering this strategy will be the essential output of CAFE. The Commission services, in collaboration with national experts and stakeholder representatives, are currently developing a detailed work plan outlining the main expected and required technical inputs for the CAFE Steering Group on 8-9 October.

Further details about CAFE can be found on the European Community's Europa site at the following address:
<http://www.europa.eu.int/comm/environment/air/index.htm>

Peter Gammeltoft
European Commission, DG Environment

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HEAVEN in the Application Sites

HEAVEN in Paris

■ Traffic management is a key environmental issue in Paris and the Ile-de-France region. The HEAVEN project will allow a significant step forward in the description and understanding of the links between traffic and environmental impacts.

Scope

The implementation of the HEAVEN project in Paris is focussed on the merging of real time traffic description with air quality modelling tools. The aim is to deliver high quality information for professional users and the public. This information will be updated several times a day and related to Paris and the whole Ile-de-France region (12000 km² with 11.2 million inhabitants, see Figure 1). The system will also allow the environmental impact assessment of different transport management strategies (e.g. traffic restriction, speed limits reduction, improved vehicle fleet) through the Decision Support System (DSS).

For the whole Ile-de-France region, the final HEAVEN product is expected to deliver in near real time:

- Traffic description on the main road network (34000 road axis and 21000 km length) covering more than 80% of the traffic volume,
- Air pollutant emission maps highlighting traffic emissions,
- Air pollutant concentration maps on both background locations at the regional scale and roadside locations along the main traffic network.

To reach these ambitious objectives both Airparif, the air quality monitoring network of the Ile-de-France region, and the local administrations from the transport sector (City of Paris and traffic control centre SIER/DRE) are strongly committed in HEAVEN.

Status of Work

Today, Paris and the Ile-de-France region already have an extended air quality monitoring network (50 monitoring stations and 150 automatic analysers, see Figure 1) that delivers a permanent description of the air pollution level at specific background and roadside locations. Additionally, Airparif uses regional and roadside modelling tools to enable an extensive description of the air quality patterns, especially after particular pollution episodes.

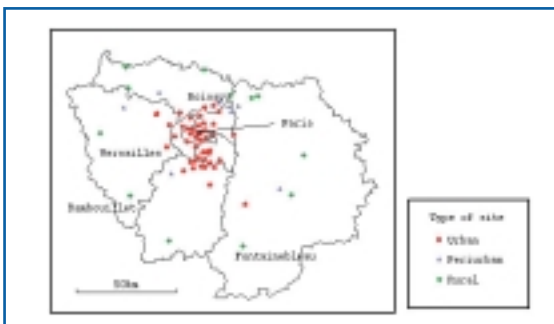


Figure 1: Paris and Ile-de-France region

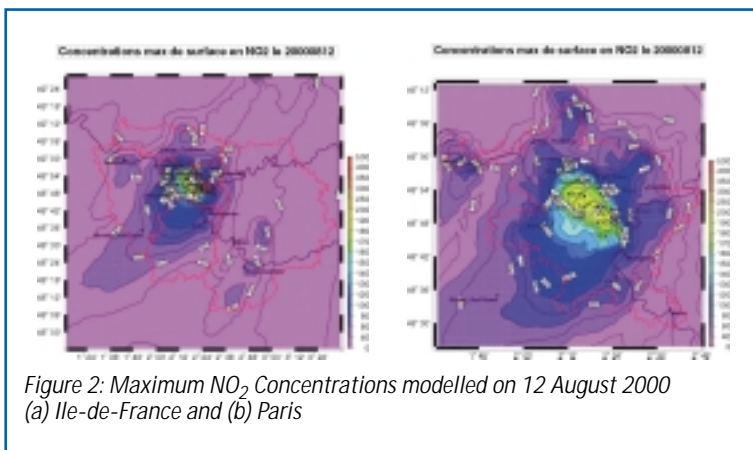


Figure 2: Maximum NO₂ Concentrations modelled on 12 August 2000 (a) Ile-de-France and (b) Paris

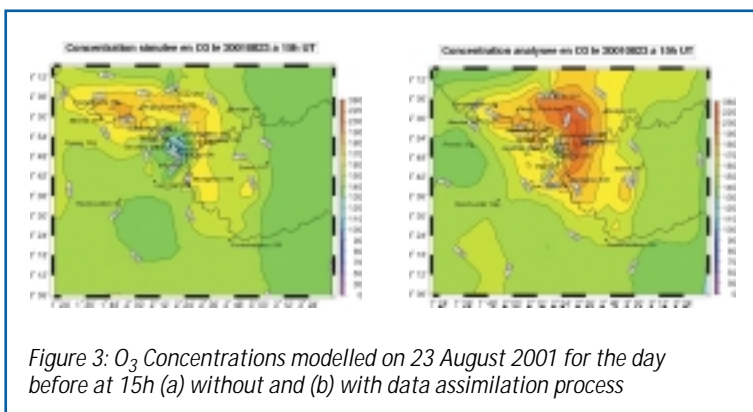


Figure 3: O₃ Concentrations modelled on 23 August 2001 for the day before at 15h (a) without and (b) with data assimilation process

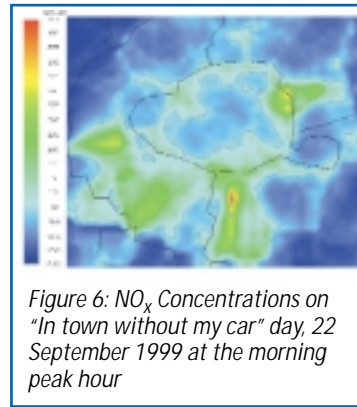
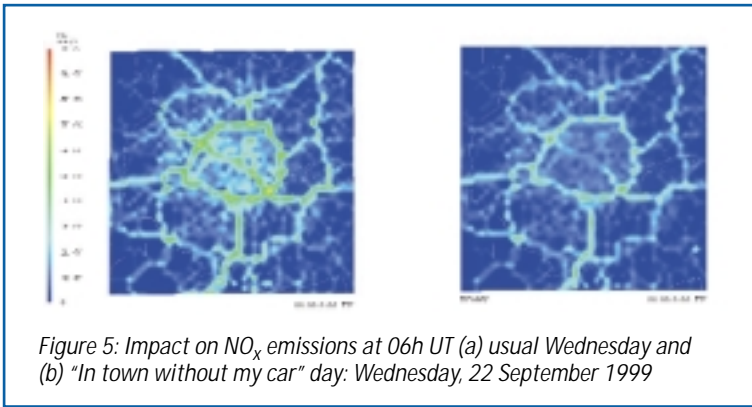
So far, the following results have been obtained within HEAVEN in Paris:

- The regional air quality modelling tool "Pollux" has been implemented and validated through daily runs. The modelling domain of 180 km x 180 km with a 6 km x 6 km grid size has been refined in the Paris area (i.e. 3 km x 3 km) (see Figure 2).
- The data assimilation process of observed air quality has been developed within the regional modelling tool to obtain a more realistic description of background air pollution (see Figure 3).
- The roadside air quality modelling tool "Street" for annual values and "static" traffic matrix has been implemented and validated.



Figure 4: Description of the road typology - Example of Paris City Centre. Each colour is associated to a reference road typology (i.e. canyon street, large avenue)

HEAVEN in the Application Sites



- Road typologies have been worked out, of which about 18 typologies describe 70% of the road network (see Figure 4).
- The qualitative description of the vehicle fleet has been improved.
- First tests of the Transport Demand Management Strategies (TDMS) have been carried out (see Figure 5, Figure 6 "In town without my car").
- The non-traffic emission inventories have been improved.

- Real time acquisition of traffic data and traffic description.
- Fast computation algorithms for traffic emissions.
- Dynamic description of the hourly roadside air quality through the roadside model.
- Implementation of the DSS.

Details of 'HEAVEN in Paris' will be highlighted during the workshop on 7 December in Paris.
Online information is available at:
<http://heaven.rec.org/Earth/Paris.html>

Outlook

Significant results have already been achieved and others will be accomplished in the month to come:

HEAVEN in Leicester

■ In Leicester HEAVEN supports network managers and policy makers in assessing and managing the impact of traffic on air and noise quality. New methodologies for assessing Traffic Demand Management Strategies (TDMS) targeted at reducing transport related pollution are being developed. These strategies ensure compliance with legislation and the public dissemination of information. Leicester City Council as Local HEAVEN project manager is assisted by two institutes: The Institute for Transport Studies (ITS) - the developers of the AVTUNE noise and WebCOMIS traffic congestion models and the Swedish Meteorological and Hydrological Institute (SMHI) - responsible for integrating the background pollution, Street Canyon and noise models. The HEAVEN Decision Support System (DSS) has already played a role in the Local Transport Plan (LTP) and Leicester's Air Quality Review and Assessment (AQRA). These were both approved in 2000 and provide an outline for progress over the next 5 years. Figures 7 and 8 illustrate the relationship between the predicted nitrogen dioxide levels for 2005 and the designated Air Quality Management Areas. HEAVEN will also assist in the development of Air Quality Action Plans involving Airviro and the TRIPS traffic model to assess the impact of various TDMS. These will include a city centre Low Emission Zone (LEZ), and encourage 'cross-administrative boundary' participation and decision making.

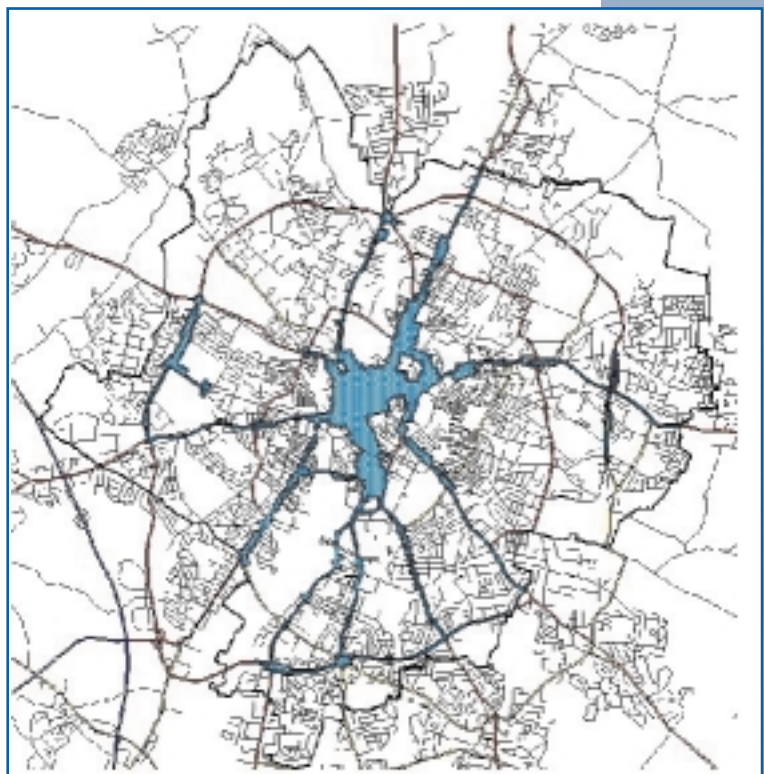


Figure 7: Air Quality Management Areas

HEAVEN application site

Air quality monitoring and modelling is being developed within Leicester using the Airviro air pollution modelling system. It incorporates real time traffic data, near real time prediction and 24/48 hour forecasting. Data for the system

comes from a variety of sources (the UK Met Office provides meteorological and pollution forecasts, the city wide pollution monitoring network provides local real time



HEAVEN in the Application Sites

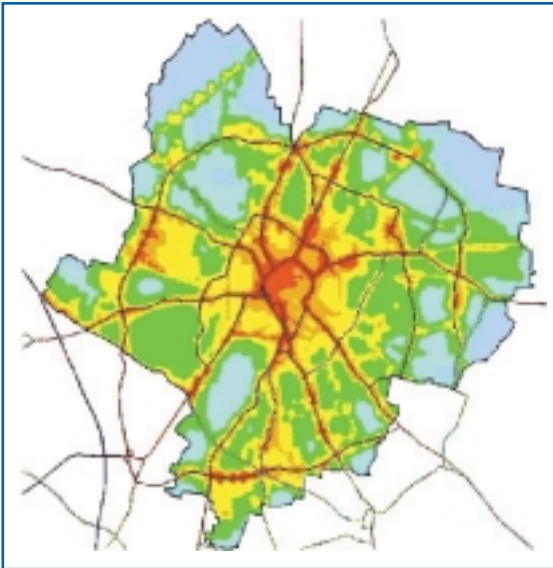


Figure 8: Predicted NO₂ levels for 2005

air quality information and a meteorological mast provides local data).

Through the HEAVEN project, the provision of real time traffic data has been extended across the City. A 'Street Canyon' model is being incorporated into the HEAVEN system to further support pollution predictions. Future exploratory work may include integrating a health database. In anticipation of future noise legislation, work is continuing on the design and development of the AVTUNE noise model. It will form an important feature of the Leicester's Traffic Demand Management system. The model will use real time monitored traffic and meteorological data and other static data including network, topography and emissions factors etc. (see Figure 9).

The AVTUNE noise model is composed of a Sound Propagation Module (SPM) and a Source Noise Emissions Module (SNEM). The SNEM will calculate emissions and will make it possible to map noise emissions across the city. The SPM considers the effects of local topography and buildings on noise pollution. It will be integrated with the 3D environment of the Verification Area by December 2001.

The Leicester DSS will be implemented and tested at two sites where roadside pollution and traffic monitoring is already underway. London Road, where traffic enters the city from neighbouring districts, has a high level of congestion. Extensive research data is available along the 0.8 km verification section.

The six month HEAVEN demonstration phase will commence in 2002 on Narborough Road, the main road from the motorway into the city centre. With high levels of congestion, it has been designated an Air Quality

Online information on HEAVEN in Leicester is available at:
<http://heaven.rec.org/Earth/Leicester.html>

Management Area (see figure 11).

Various TDMS will be implemented in this area (including using SCOOT).

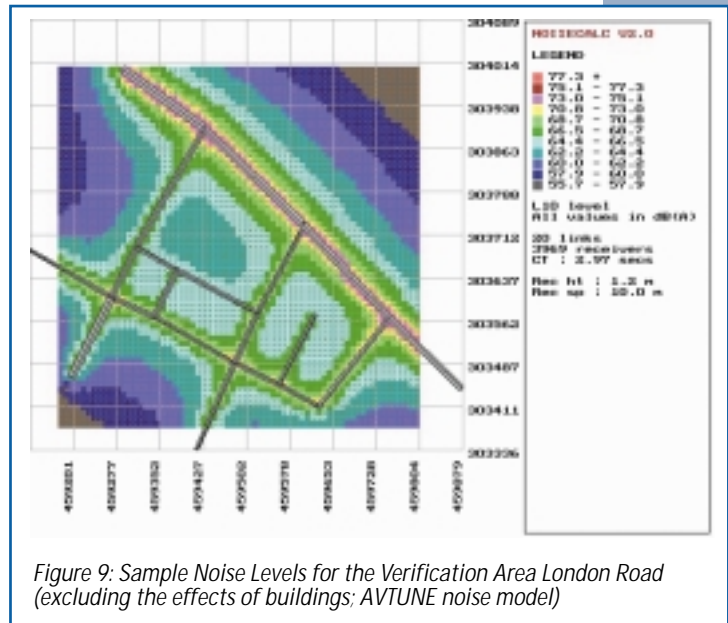


Figure 9: Sample Noise Levels for the Verification Area London Road (excluding the effects of buildings; AVTUNE noise model)

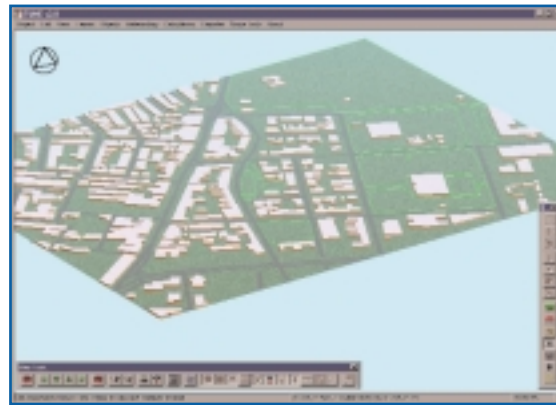
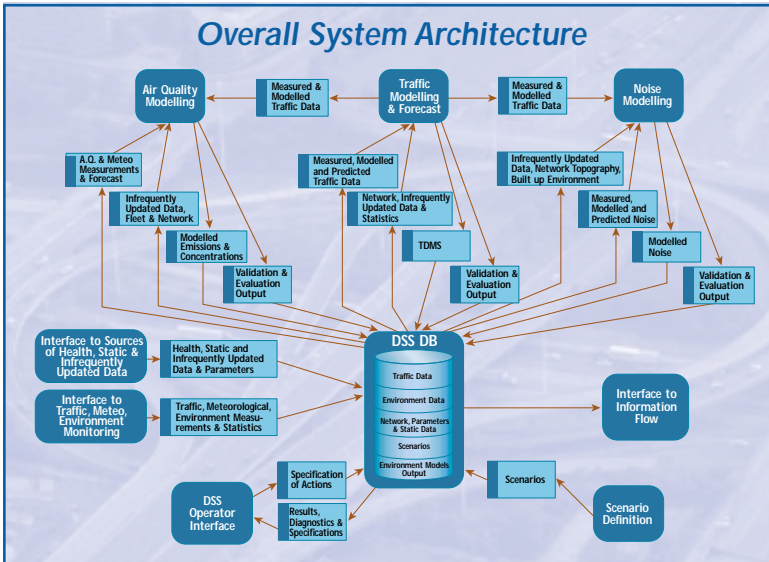


Figure 10: Image of the Verification Area taken from the AVTUNE noise model



Figure 11: Narborough Road Demonstration Site

© Getmapping



main functions of the HEAVEN DSS. It is based on three modelling and forecasting modules that are fully integrated in the HEAVEN system, namely:

1. Traffic Modelling
2. Quality Modelling
3. Noise Modelling

The data from the main components are fed into the Database, which supplies information to the Common Information Platform, and thus to the user.

The Overall System Architecture is very detailed for the three Modelling and Forecast Functional Blocks concerned with traffic and environmental modelling and forecast. They are linked in a dynamic chain fed by the near real-time traffic and environmental

HEAVEN aims to support traffic planners and local decision makers to implement urban transport policies which reduce environmental burden. The HEAVEN Decision Support System (DSS) is designed to assess the environmental impact of urban traffic on air quality and noise. The HEAVEN System will be demonstrated in six European Cities: Berlin, Leicester, Paris, Prague, Rome and Rotterdam.

One important milestone in the HEAVEN DSS development process was the System Architecture design. It was developed in two phases:

1. 'Overall System Architecture' design as a consistent representation of the HEAVEN DSS-concept,
2. 'Local System Architectures' design according to the site specifics of the six European cities.

The Overall System Architecture (see diagram) reflects the

measurements and modelled data. The three functional blocks as a whole evaluate the impacts of the Transport Demand Management Strategies (TDMS) on traffic, air quality and noise.

Following the Overall System Architecture, a **Local System Architecture** has been developed for each of the six demonstration sites. Based on existing local infrastructure, tools and models the DSS general system concept will be implemented at each site. This required thorough customisation taking local site specifics into account i.e. functional, physical and organisational requirements.

HEAVEN's 'Functional Specification' and 'System Architecture' are described in detail in two project reports, namely Deliverables D5.1 and D5.2. Please refer to the 'News section' of this newsletter for more information.

From Architecture to System Development

The common system architecture design is the starting point for developing the HEAVEN Decision Support System (DSS). The system development is currently addressing the detailed specifications of the DSS components at site level. Following a top down approach it integrates components, making use of commonalities across sites to create a single generic local Decision Support System.

The main components of the HEAVEN DSS are:

- Traffic Modelling Module
- Air Pollution Modelling Module
- Noise Modelling Module
- Scenario Management
- DSS Operator Interface
- HEAVEN Database
- Interfaces with External Systems

The traffic module processes data in order to obtain the road network status characterised by flows and speeds. Following the chain process, the air pollution module uses the output from the previous module to provide pollutant emissions associated with each network link. The final output is a concentration map of the whole area produced through dispersion models. The noise model work in parallel with the air pollution module and its output provides the noise level in the demonstration area.

Users of the HEAVEN DSS will be able to work with the results of the processing chain through a well-designed human machine interface (see Figure 14 as an example).

Its functionalities are common for all the HEAVEN sites.

Monitored meteorological, traffic, air pollution, noise and health sources data are acquired through specific interfaces. The data is stored in the DSS database in a way which allows easy access to related data for any specific demonstration area. The second phase of HEAVEN system development will be the actual implementation of the local DSS at each HEAVEN application site.

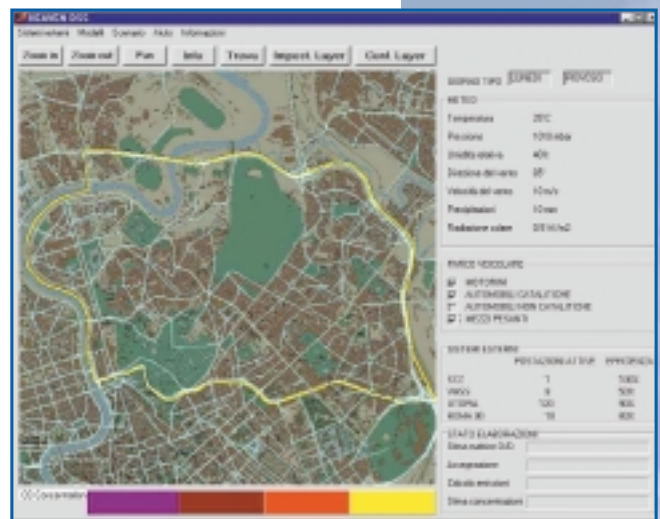


Fig. 14 – Common Man Machine Interface

More details on HEAVEN system development are available in two HEAVEN reports, Deliverable D6.1 and D6.2. Please have a look at the 'News section' on the last page of this newsletter.



Verifying HEAVEN



During the Autumn 2001 Verification phase the technical performance of the HEAVEN system and its components will be tested and user feedback obtained.

In the light of the analysis of the results, the HEAVEN Decision Support System will be adapted before the start of the demonstration phase.

Common Verification Concept

HEAVEN verification uses a common verification concept. Where these indicators are measured uniformly across sites to yield comparable results.

A list of common verification indicators has been defined

in close co-operation with the "Functional Specifications/System Architecture" and "Build Integrated Systems" workpackages. These indicators have been grouped into the three main verification themes:

- Accuracy of Modelling and Monitoring for Roadside Description,
- Testing Physical Functioning of the System,
- Preliminary User Acceptance.

The approach for evaluation and verification methodologies applied have been jointly developed to avoid overlap. All sites will prepare a local Verification Plan.

News

HEAVEN documents available now

Two reports on the **System Architecture of the HEAVEN Decision Support System (DSS)** have been prepared. The report "Environmental Monitoring and DSS Architecture" (Deliverable 5.1) defines the Overall System Architecture. The report "Overall System Architecture and Implementation Action Plan" (Deliverable 5.2) presents the activity plans and the technical specifications of the software and hardware components of the HEAVEN DSS's

Following the definition of the System Architecture, the first report on "Definition of System Components and Analysis of Commonalities" (Deliverable 6.1) has been prepared. It specifies the main models and modules as they will constitute the HEAVEN DSS.

A comprehensive "**Evaluation Plan**" (Deliverable 3.1) has been prepared, this defines the common HEAVEN evaluation concept. It is built on a set of impacts, indicators and evaluation tools and forms the basis for the development of site specific evaluation plans. This common approach for evaluation ensures that the results are measured uniformly and yield comparable results across the demonstration sites. Reports can be provided upon request. Please refer to the contact list below.

Milestones

Development of the common concept for the verification of the HEAVEN DSS.

This forms the basis for the development of local verification plans. The verification period will take place in Autumn 2001.

Dissemination

Urban Transport, Air Quality & Noise - HEAVEN will present its innovative technical solutions during the Heaven workshop on 7 December 2001 in Paris. For more information on the agenda, venue, hotels and other please visit our website.

In July 2001 the HEAVEN Project was presented at the EUROLATIS Workshop in Ecuador and on 10th-12th October at the 15th International Symposium Informatics for Environmental organised in Zürich (Session A6). The full paper of the Zurich presentation "Environmental Assessment of Transport Demand Management Strategies in European Cities" will be published in the conference proceedings and can also be downloaded from the HEAVEN website.

The HEAVEN workshop agenda, newsletters, brochure and public documents can be downloaded from the HEAVEN web site:

<http://heaven.rec.org>

Contact

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