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- * PU-public usage, LI-limited to programme participants, RP-restricted to project participants
** PR-prototype/demonstrator, RE-report, SP-specification, TO-tool, OT-other
*** PD-project deliverable, X-submitted on request deliverable

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This HEAVEN Verification Plan (Milestone 7.1) has been prepared for internal use within the HEAVEN project.

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*³ In general the author. If more than one author, the (principal) editor is the originator.

Executive summary

HEAVEN (**H**ealthier **E**nvironment through **A**batement of **V**ehicle **E**mission and **N**oise) is a research project co-funded by the Information Society Technologies Programme of the European Union. In the project consortium, valuable expertise in the field of transport and the environment - is provided from research institutes, the private sector (leading industry and supporting consultants), and the public sector.

The paramount objective of the project is to develop and demonstrate a Decision Support System (DSS) that is able to evaluate the environmental effects - air quality and noise quality – of near real-time traffic flows and Transport Demand Management Strategies (TDMS) in large urban areas. The EU cities of Berlin, Leicester, Paris, Rome, and Rotterdam as well as the CEEC city of Prague serve as the demonstration sites of the project. These cities will demonstrate the HEAVEN DSS in working practice and assess its contribution towards improved transport planning and a cleaner environment.

Overall Verification Framework

Workpackage 7, Verification, will test the technical performance of the HEAVEN system and yield preliminary findings on user acceptance. The analysis of the results will lead to recommended modifications, if necessary, to the HEAVEN DSS before the start of the demonstration phase.

In the HEAVEN project, WP7 is responsible for the verification procedure and concentrates on the accuracy of modelling and monitoring, the physical functioning of the system and the preliminary user acceptance. WP7 develops a common verification concept, co-ordinates detailed local verification planning, analyses local results across sites, and makes recommendations on system modifications before the start of the demonstration stage. Verification builds on the Evaluation Plan (Del. 3.1) prepared in WP3.

Verification Indicators, and Assessment Methods

In close co-operation with Workpackage 5 “Functional Specifications/System Architecture” and Workpackage 6 “Build Integrated Systems”, a list of common verification indicators has been defined. HEAVEN verification is based on a common verification concept necessitating that indicators are measured in the same way, or at least yield comparable results across the sites. The indicators have been grouped into the three main themes of verification:

- Accuracy of modelling and monitoring for roadside description
- Testing physical functioning of the system
- Preliminary user acceptance

The approach and methodologies applied in WP7 have been closely tuned with the overall evaluation process to avoid disproportional overlap between the Evaluation and Verification reports. One of the WP3 indicators is in operation as part of the verification stage, namely Indicator 1.3 Accuracy of Roadside Description. All other indicators in the verification stage are specific for verification.

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1 Introduction

1.1 Guide to the Reader

The aim of this document has been to prepare a comprehensive report, which encompasses the consolidated agreement process within WP7 (Verification) of the HEAVEN project.

In order to serve different groups of readers best, a certain degree of redundancy is apparent in this document. Readers will find the following information in the respective chapters of this document:

- A brief overview of HEAVEN is provided in section 1.2 for readers unfamiliar with the project.
- Verification relevant results from WP4 (User Requirements and Implementation Framework), WP5 (Functional Specifications) and WP 6 (Build Integrated Systems) are summarised in sections 1.3, 1.4 and 1.5 respectively.
- Section 1.6 contains a summary of the Overall Evaluation Framework developed in WP3.
- Chapter 2 describes the agreed verification structures and concepts and provides the timetable of WP7.
- Chapter 3 contains the technical core of the verification framework, including descriptions of indicators, reference cases, success criteria, and methods of assessment.
- Chapter 4 addresses the outline for the Local Verification Plans based on the common approach defined in Chapters 2 and 3.

1.2 Project Structure

1.2.1 HEAVEN Consortium

The project consortium combines valuable expertise in the field of transport and the environment from research institutes, the private sector (leading industry and supporting consultants), and the public sector. The EU cities of Berlin, Leicester, Paris, Rome, and Rotterdam as well as the CEEC city of Prague serve as the demonstration sites of the project. An overview of the HEAVEN consortium is provided in table 1.

Table 1: The HEAVEN Consortium

SECTOR AFFILIATION	PARTICIPANT NAME	COUNTRY	STATUS
Public Sector	Società Trasporti Automobilistici S.p.A. (STA)	Italy	Co-ordinator
	Senatsverwaltung für Stadtentwicklung Berlin	Germany	Principal Contractor
	City of Rotterdam	Netherlands	Principal Contractor
	DCMR Environmental Protection Agency	Netherlands	Assistant Contractor
	AIRPARIF	France	Principal Contractor
	Ville de Paris	France	Assistant Contractor
	DREIF/SIER	France	Assistant Contractor
	Leicester City Council	United Kingdom	Principal Contractor
	City Development Authority of Prague (URM)	Czech Republic	Principal Contractor
	Institute of Municipal Informatics of the City of Prague (IMIP)	Czech Republic	Assistant Contractor
	Institute of Transportation Engineering (UDI)	Czech Republic	Assistant Contractor
Industrial Suppliers and R&D Companies	Mizar Automazione S.p.A.	Italy	Assistant Contractor
	Elsag S.p.A.	Italy	Assistant Contractor
	IVU Traffic Technologies AG	Germany	Assistant Contractor
	Swedish Meteorological & Hydrological Institute (SMHI)	Sweden	Assistant Contractor
	Czech Hydrometeorological Institute (CHMU)	Czech Republic	Assistant Contractor
	ARIA Technologies	France	Sub-Contractor
Research and Dissemination Institutes	World Health Organisation (WHO)	Italy	Assistant Contractor
	Netherlands Organisation for Applied Scientific Research (TNO)	Netherlands	Assistant Contractor
	Institute for Transport Studies (ITS), University of Leeds	United Kingdom	Assistant Contractor
	European Academy of the Urban Environment	Germany	Assistant Contractor
Consultants	B&SU	Germany	Assistant Contractor

SECTOR AFFILIATION	PARTICIPANT NAME	COUNTRY	STATUS
	Goudappel Coffeng	Netherlands	Assistant Contractor
	Carte Blanche Conseil	France	Assistant Contractor
	MERCUR	France	Assistant Contractor
	ECOAIR	Czech Republic	Sub-Contractor
	Luca Persia	Italy	Sub-Contractor
Key Sub-Contractors	Heich Consult	Germany	Sub-Contractor
	Rupprecht Consult GmbH	Germany	Sub-Contractor
	Regional Environmental Centre for Central and Eastern Europe (REC)	Hungary	Sub-Contractor

1.2.2 Work Programme

The project will be implemented during the course of three years within nine WPs. The exact phasing of project work follows the general process required to realise a decision support system. The first three WPs cover the horizontal issues Project management, Dissemination and Validation Co-ordination whereas the six technical WPs cover the lifecycle of a combined Research and Demonstration project. WPs 4-7 focus on the research and development of the systems, while WPs 8-9 cover the Demonstration phases of the project.

Table 2: HEAVEN Workpackages

Workpackage Number	Description
1	Project Management
2	Dissemination
3	Validation Co-ordination
4	User Requirements and Implementation Framework
5	Functional Specifications/ System Architecture
6	Build Integrated Systems
7	System Verification
8	Large Scale Demonstration
9	Exploitation and Business Planning

WP 1 Project Management:

This workpackage refers to the overall project management. STA Rome as the principle contractor carries out the overall project management. The technical co-ordination is subcontracted to Heich Consult.

WP2 Dissemination:

The Dissemination workpackage is a horizontal activity, which will be undertaken throughout the life of the project. The key objective of this WP is to ensure a European wide dissemination of the project outcomes to the main target groups of transport and environmental decision-makers in large urban areas, as well as to national and regional government decision-makers, the international research community, local stakeholders, the press and other “multipliers.” Dissemination media will be the HEAVEN web site(<http://heaven.rec.org>), project brochures and newsletters, reports and deliverables, conference presentations, press releases and scientific papers. Furthermore, a technical workshop as well as a final conference will be organised.

WP3 Validation Co-ordination:

Evaluation has a key role in establishing the benefits that all users of the HEAVEN products can gain. The evaluation of the achieved results allows the project to verify to what extent the project has met its objectives, what impacts have been generated on the city level, and what European added values could be identified. The results from the evaluation process will provide important input to the definition of business cases, exploitation and marketing plans. The workpackage will develop an Evaluation plan that defines the evaluation concept, common impacts and indicators, reference cases, success criteria and methods for assessing the indicators. The evaluation will be undertaken by the cities following this evaluation plan. Finally, WP3 will clearly outline the results gained and lessons learnt.

WP4 User Requirements and Implementation Framework:

The basic task of this workpackage is to analyse the users needs with regard to the DSS and the Information Platform. Users are public administrations (e.g. traffic, environment, health and urban development authorities), decision makers, the citizens and other interest groups. After the identification of the user groups and the definition of a uniform approach, the analysis of the user needs in the HEAVEN cities will take place. After compiling and summarising the results on the EU-level, the findings will be cross-checked with other European cities in order to ensure the transferability of the HEAVEN system. Other tasks in this workpackage are the development of the framework for the implementation and demonstration of the DSS and the identification of data exchange requirements.

WP5 System Architecture:

This workpackage will develop the technical specifications for the HEAVEN system on the basis of the user needs analysis performed in WP4. The work will follow a common and structured approach. Starting from a common system architecture, the site specific system architectures will be defined taking the local anomalies and constraints into account. The underlying purpose of this workpackage is to design the functions and architectures suitable to meet the needs of the users. Furthermore, an implementation plan will be provided. Both the system architecture and the implementation plan are essential input to WP6.

WP6 Build Integrated System:

Relying on the architecture and systems design provided by WP5 and based on that infrastructure already implemented within the demonstration sites, this workpackage will first finalise the system design. This step will comprise of the detailed definition of the basic system components and communication links. In the second task, the procurement of components and modules will be undertaken. The third task of WP6 will co-ordinate the integration of all system modules and components.

WP7 System verification:

This workpackage will first conduct a pilot implementation of the HEAVEN DSS on the sites. Following this first step, the user acceptance will be verified through the involvement of a small group of users. This will make sure that the DSS complies with the user needs, as identified in WP4. Another important step will be the evaluation of the operating performance of the system. Based on the results of the verifications, final specifications for the large scale demonstration will be prepared.

WP8 Large scale demonstration:

Based upon the completion of the research work conducted in WPs 4-7 and the respective results i.e. fully verified systems the on-site implementation and real-life operation of both the DSS and the information platforms will occur. The demonstration phase will reflect modifications made in response to the verification phase conducted in WP7. Additional minor adjustments will proceed during the demonstration period, according to the milestone schedule. Once the system is in operation, the DSS will be used to evaluate a host of TDMS.

WP9 Exploitation and business planning:

This workpackage will assess the added value and the exploitation possibilities of the suite of HEAVEN end products (in particular, the DSS for evaluating TDMS, the information platform, and any of the refined models incorporated into these end products). This workpackage will provide a detailed Exploitation and Business Plan for the industrial partners, identifying what market possibilities they have ascertained for the developments completed in this project.

1.2.3 Management Structure

The management structure of HEAVEN, as depicted in figure 1, includes the following roles:

Steering Group: is formed by executive level representatives of the principal contractors; is responsible for providing strategic guidance and in charge of steering of the project.

Technical Management Committee: formed by all Local Site and Workpackage Managers and the Project Manager; meets regularly to review technical progress on overall and site level and identify needs for corrective actions; reports regularly to the Steering Committee via the Project Manager.

Project Manager: is the single contact point for the European Commission Project Officer; has overall responsibility for the day-to-day management and all regular reporting according to the contract (e.g. tri-monthly progress reports, Annual reports, Annual Review Report), representing the Co-ordinating Contractor; specific responsibility for administrative and financial management and quality control; assists the Steering Committee and prepares and follows up on its decisions. The project manager is in charge of the organisation of frequent partner meetings and discussion forums, as well as continual communication via email, fax and telephone conferences in order to ensure the necessary flow of information.

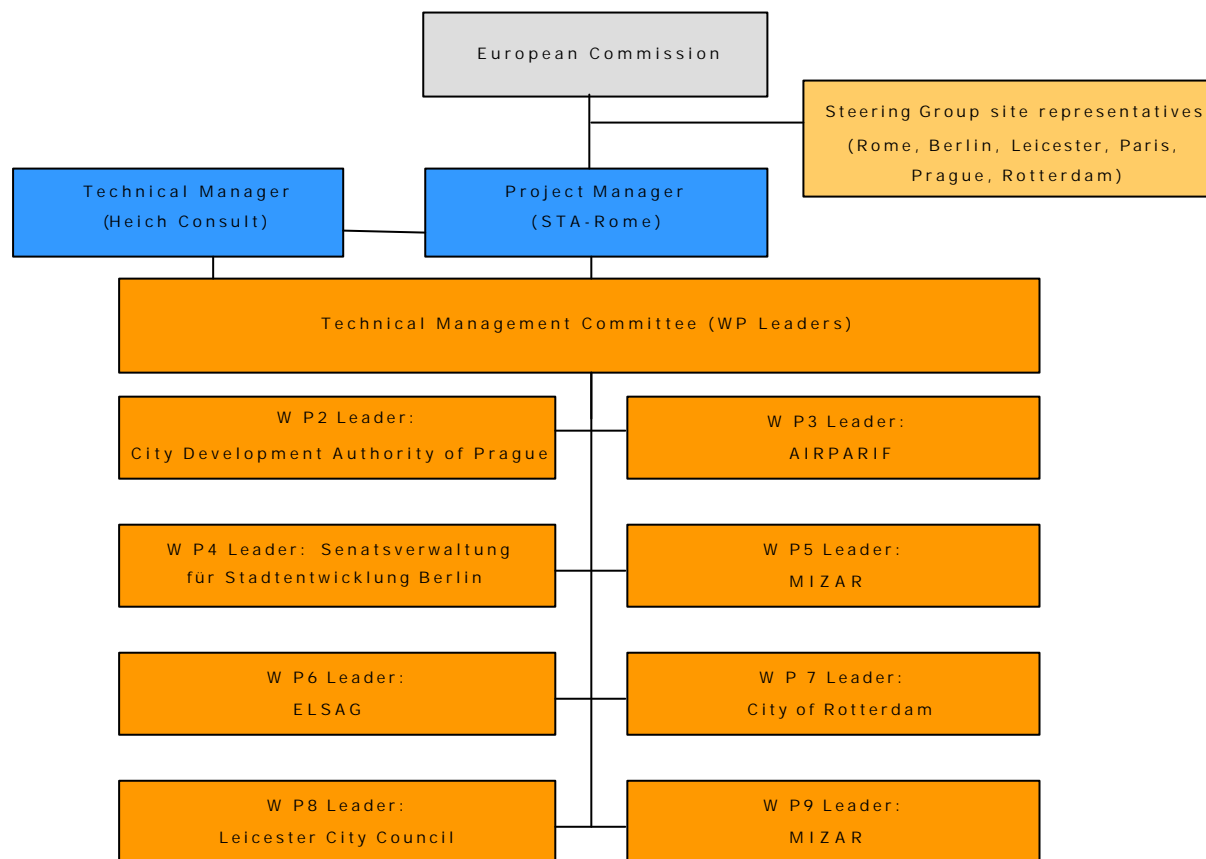
Technical Manager: is responsible for the day-to-day management of the project, co-ordination of the various tasks and work between the sites and WP Leaders according to an overall project workplan, organisation of frequent technical meetings and information exchange between sites and partners via e-mail, fax, in order to ensure the necessary flow of information. The Technical Manager's responsibilities encompass workpackage supervision, interfacing with workpackage leaders, and overall co-ordination of deliverable production.

Additionally, the Technical Manager is in charge of co-ordinating the participation in programme level clustering and ensuring a high level of evaluation.

Workpackage Leaders : have the key task to co-ordinate activities on site and at project level for the duration of a workpackage, assist the Technical Manager during the active period of their workpackage and co-ordinate production of the deliverables of the workpackage.

Local Site Managers : co-ordinate all contributions to the project from their respective local partners (especially during the demonstration and exploitation phase). They are the single contact point for their sites towards the project consortium.

Figure 1: Management Structure of the HEAVEN Project



1.3 Summary of User Requirements and Implementation Framework (WP4)

Although each city has its own local context, a common approach has been followed for the user needs analysis. The user requirements deliverable D4.1 identified potential users for both the Decision Support System (DSS) and the Common Information Platform as well as the needs and requirements of the intended users of the system.¹ In addition, D4.1 supports the

¹ Source for chapter 1.4 of this milestone document is the executive summary of Deliverable D4.1 "User Requirement Report."

system design process and outlines the physical implementation framework for the system installation.

User Groups and their objectives

Three types of users were identified, **public administrators, decision makers and the general public**. The administrators using the HEAVEN system are generally found on a city level, but can also include district and state level organisations. The policy fields covered by the administrators are traffic, environment, health, and urban planning.

As a second user group, decision makers are indirect users of the system. The public administrators advise on policies to these decision makers. The HEAVEN system will support more informed decision making with regard to environmentally friendly urban transport policies.

The main objectives for the DSS and the common information platform for the administrators are:

- to provide the critical connection between pollution and traffic by providing near real time modelling of emissions and dispersion of pollutants as a function of traffic flow
- improvement of data flows regarding pollutants by providing near real time information
- informing the general public
- modelling the environmental effects of temporary and long-term transport policies and measures
- support policy makers in determining future transport policies.

The general public and diverse interest groups form the third user group. The general public will mostly access the Common Information Platform as a component of the DSS, rather than the DSS itself. This user group includes research institutions, groups and citizens interested in issues of traffic-related noise and air pollution, environmental and traffic related organisations, as well as chamber of commerce and transport lobby groups.

The general public indicated they were predominately interested in actual pollution levels, especially at “hot spots” where emissions are very high. They are also interested in obtaining information on the impacts of pollutants and actual pollution levels on health. This includes practical advice on what to do when ambient air quality or noise pollution is at a critical level. They also would like to receive information on which streets or transport modes to use/ avoid in the event that temporary traffic measures have been taken.

Requested functions of the DSS

Users expressed the need for the functions of the DSS to go beyond the generation and statistical handling of traffic and environmental data. Instead, the DSS should support the decision making process within public administrations by modelling the environmental effects of traffic related measures.

In accordance with the objectives for the DSS, the public administration respondents, particularly the traffic departments, indicated the DSS could be used for the following:

- as a support tool to model the environmental effects of long-term transport policies,
- as a support tool to model the environmental effects of temporary measures to reduce traffic, and
- to optimise transport flows in the field of traffic management and TDMS.

The following core functions should be provided by the system:

- information on historical data in order to compare existing levels with historic levels,
- alarm levels and alarm functions including forecasts,
- modelling functions in order to evaluate the environmental effects of long term transport policies (also of area wide traffic schemes), and
- modelling functions in order to evaluate the environmental effects of operational TDMS.

Requested functions of the common information platform

The users had very precise opinions about the pollutants to be addressed, as well as their spatial and time resolution. Mostly, the demands are in line with the new limit values and other regulations set by the EU, such as hourly update of pollutants, etc.

With reference to the pollutants, the users are interested, for air quality, in CO – carbon monoxide, NO_x – nitrogen oxides, HC – hydrocarbons, O₃ – Ozone, PM 10 / 2.5 – particulate matter and, for noise, to Noise level and number of people affected.

The requested spatial resolution goes from street to city level as a basic function and to regional level as an additional function.

Different ways of presenting the information to administrators and / or the general public were suggested. Some suggestions include information on actual pollution levels at street level with variable message signs. Real time information when pollution exceeds certain levels can also be displayed via RDS / TMC and RDS / EON or radio broadcast.

Users indicated that more complex information on pollutants in the city should be made available via the internet or teletext / videotext. Via these channels, an overview of the pollution levels could be given and maps and tables can be displayed via internet. In addition to these real time information services, the general public emphasised the need for periodic reports on air and noise pollution.

In addition to the above mentioned functions, the users of the common information platform indicated that they would like to be informed by a warning message when critical pollution levels have been exceeded. They also specified that it would be beneficial to have access to data records of historical pollution levels that would be useful in supplementing organisational reports and research, as well as assessing trends.

Users also indicated that traffic information, forecasts and especially information on any restrictions, would be very important to commercial traffic, which would allow them to react better to given traffic situations.

1.4 Summary of Functional Specifications (WP5)

The HEAVEN DSS will be demonstrated in the cities of Rome, Paris, Berlin, Rotterdam, Leicester and Prague. In each city the DSS general system concept will be implemented based on pre-existing infrastructure, tools and models and will take into account local anomalies concerning functional, physical and organisational requirements as well as context constraints.

In this framework, based on the detailed User Need Analysis performed in the context of WP4 “User Requirements and Implementation Framework,” WP5 produced the²:

- Design of the Overall System Architecture corresponding to the HEAVEN DSS general concept.
- Design of the System Architecture of the DSSs to be implemented and demonstrated in each project site.
- Definition of the technical specifications for the local DSS components.
- Elaboration of infrastructure adaptation and local DSS implementation plans.

The outcomes of the WP directly feed the activities of WP6 “Build Integrated Systems.”

In the first deliverable (D5.1) of WP5, “Environment Monitoring and DSS Architecture,” the Overall System Architecture designed for the HEAVEN DSS and the functional and information architectures designed for the local decision support systems have been presented.

The deliverable describes the technical approach adopted for designing the overall and the local system architectures. It presents the Overall System Architecture and describes the functional and information architectures of the DSS specific to each site.

The HEAVEN DSS has been conceived as a tool suitable to:

- support the decision making processes concerned with the definition of temporary measures as well as medium-term and long-term TDMS, by facilitating the evaluation of their impacts on air and noise quality
- build a common information platform on traffic and environment for local authorities, including existing and potential users
- compile appropriate information reports on traffic and environment to be delivered to end users through different media.

The HEAVEN DSS combines near real-time traffic flow information with emission models, allowing the contribution of mobile sources to air quality and noise to be determined. In order

² Source for chapter 1.5 of this milestone document is the executive summary of Deliverable D5.1 “Environment Monitoring and DSS Architecture.”

to estimate emissions based on current traffic levels and on planned demand management scenarios, the system can operate on-line, based on current traffic and environmental information, and off-line, based on planned traffic and environmental conditions and pre-defined TDMS.

The HEAVEN DSS characteristics are derived from system requirements context, functional and non-functional requirements that reflect the user needs as identified in the User Needs Analysis and include operational and organisational requirements.

The Overall System Architecture is a consistent representation of the HEAVEN DSS concept. This overall architecture consists of three modelling modules, namely the Air Quality Modelling, the Traffic Modelling and Forecast and the Noise Modelling, that are fully integrated within the HEAVEN system. The data from these three components are fed into the database which, in turn, supplies information to the Common Information Platform. The HEAVEN system operator communicates with the DSS through a specific interface.

The HEAVEN DSS overall architecture has been used as a reference to design the DSS architecture in the project demonstration sites. Therefore, the characteristics of the local DSS architectures reflect the general characteristics of the overall architecture, although duly customised according to the anomalies of the site, i.e. availability and type of data sources external to the system, modelling objectives and modules, models adopted, operational constraints, etc.

The local DSS functional and information architectures achieve the same level of the HEAVEN DSS overall architecture description. Complementary and detailed information concerning main functions, sub-functions and data flows of the local DSSs constitute the main input to the subsequent deliverable D5.2 of WP5.

1.5 Summary of Build Integrated System (WP6)

Workpackage 6 within HEAVEN is devoted to:

- the provision of detailed specifications of the DSS elements at all sites,
- the identification of the components of the DSS that will be used site by site,
- the identification of commonalities among the individual DSS and
- finally the integration of the identified components for building off-line implementations of the local Decision Support Systems.

In order to fulfil the criteria specified above, WP6 began with a thorough analysis of the Deliverables produced within the WP5 and a general diagram of the DSS processing chain (which uses time as reference axis). This DSS processing chain is generally valid at all sites, which allows the functional diagrams presented in WP5 to be translated into a sequence of modules whose components must be specified.

The following diagram is a representation of the afore-mentioned DSS processing chain:

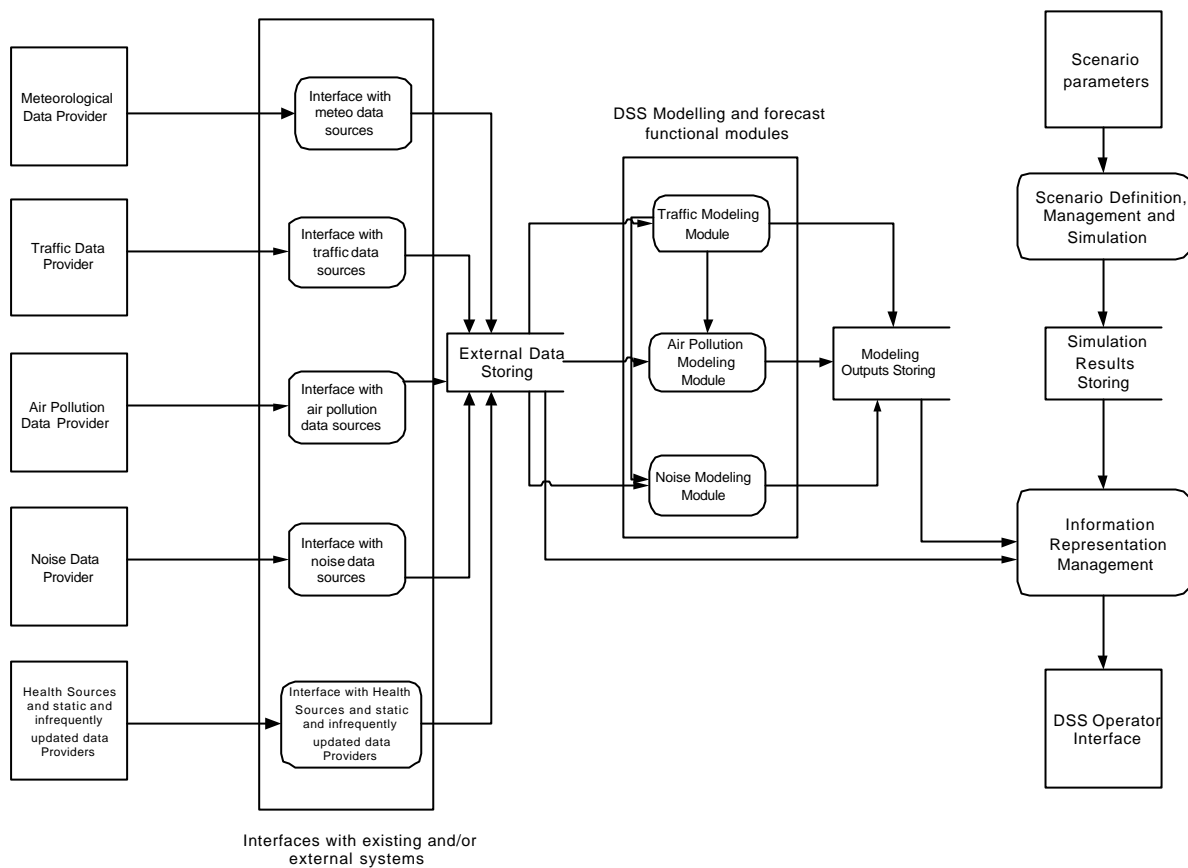


Figure 2 General DSS Processing Chain

By using this kind of representation, it is easier to understand which sequence of operations must be performed for each one of the following parts:

- Interfaces with external and/or existing systems
- Traffic Modelling Modules
- Air pollution modelling modules
- Noise modelling modules
- Scenario and System Management
- DSS Operator Interface

WP6 for each site will specify as a minimum:

- the type of data provided by each part;
- the frequency of updating the data;
- the exact format of data arriving from each part;
- processing operations that are performed on the incoming data;
- the detailed strategy for the integration of the data into the DSS.

In addition to these points, the DSS Heaven database must be described for each site.

The outputs of the DSS processing chain will be presented to the DSS users through a human machine interface with a common template that has been agreed among all local WP6 managers. An example of this common template is presented below:

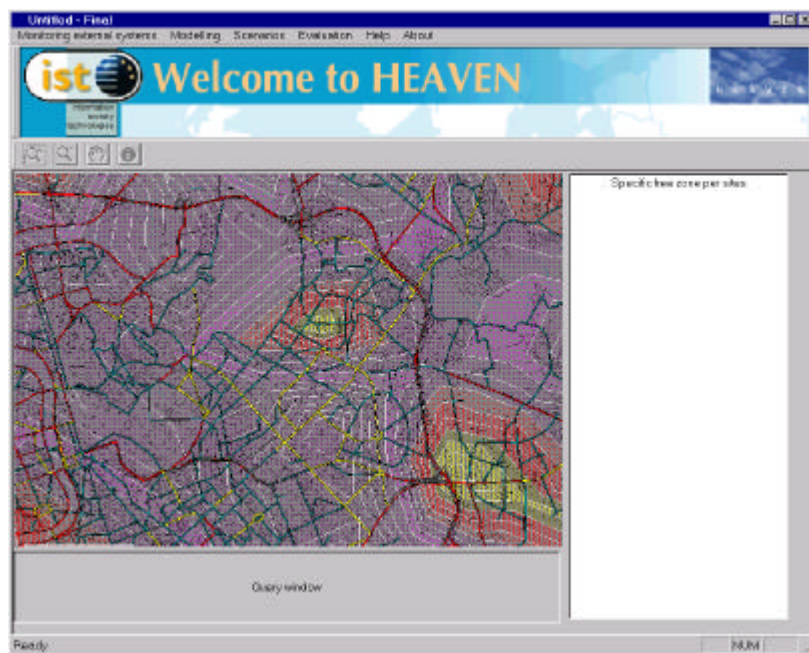


Figure 3 Example of Human Machine Interface for DSS monitoring

In conjunction with the specifications of the mentioned components, a WP6 task also consists of a type of “validation” of the selected components, with specific attention on the selection and validation of the environmental models, predominantly focusing on their “informatics” aspect.

The final point of the first phase of WP6 is an analysis of the commonalties of the DSS implementations across the sites.

The output of the first phase of WP6 is the production of the Deliverable 6.1, “Definition of system components and analysis of commonalties”, which should be released by the end of June 2001.

The second part of the WP6 will be devoted to the actual implementation of the local DSS site by site and the output of this part is represented by the production of the second WP6 Deliverable, named “Analysis of actual implementation of sites”.

1.6 Summary of Overall Evaluation Framework (WP3)

Workpackage 3 (WP3) provides the evaluation within HEAVEN³. The workpackage has a key role in establishing the benefits which all stakeholders, i.e. internal and external users, operators, and content providers can gain from the developed system. Despite the fact that HEAVEN will be implemented and applied at six different European cities, its evaluation process is based on commonality. The main aspects considered in establishing a common evaluation basis are:

- impacts and indicators common to all sites and
- indicators selected for measurement at all sites need to be measured in the same way, or at least yield comparable results, across the sites.

Applications and Appraisal Groups

The common appraisal groups to be involved in HEAVEN evaluation are:

- Authorities (traffic and transport departments, environmental departments, health departments, and urban planning departments) as direct HEAVEN users,
- Decision makers in urban development, traffic/ transport, environment, and health as indirect HEAVEN users, and
- Public and interest groups, including citizens, residents of “hot spot” areas, patient groups, NGOs, research institutions, chambers of commerce, public transport operators, and others as other stakeholders.

Six applications have been identified and defined by the evaluation team:

- Air Quality Monitoring,
- Air Quality Modelling,
- Urban Noise Modelling,
- Decision Support System,
- Common Information Platform, and
- Health Data Platform

Three of these applications (Air Quality Modelling, Decision Support System, and Common Information Platform) are common, i.e. covered by all six HEAVEN cities.

³ The information in this section is taken from the HEAVEN Final Evaluation Plan.

Impacts, Indicators, and Assessment Methods

In four evaluation workshops and various other consultations the evaluation team defined impacts, indicators, and assessment methods as the key elements of the evaluation process.

The expected HEAVEN impacts are:

- Impact 1: Enhanced description of current environmental situation
- Impact 2: Enhanced environmental scenario analysis
- Impact 3: Improved access and quality of environmental information for professional users (3A) and for public users (3B)
- Impact 4: Improved institutional co-operation
- Impact 5: Increased support of urban planning on an environmental basis

For each expected impact, clear assessment objectives and a series of operational indicators have been identified and described. Throughout these exercises, an effort was made to reach the highest degree of commonality in defining these key elements of evaluation.

Stages of assessment

Verification stage

Demonstration stage

2 Overall Verification Framework

2.1 Verification Approach

According to a definition by the European Commission (source in ANIMATE guidelines), “the verification stage ... will use a small but sufficient sample of users in a real-life situation to test the technical feasibility of the demonstrator and to yield preliminary findings on user acceptance.”

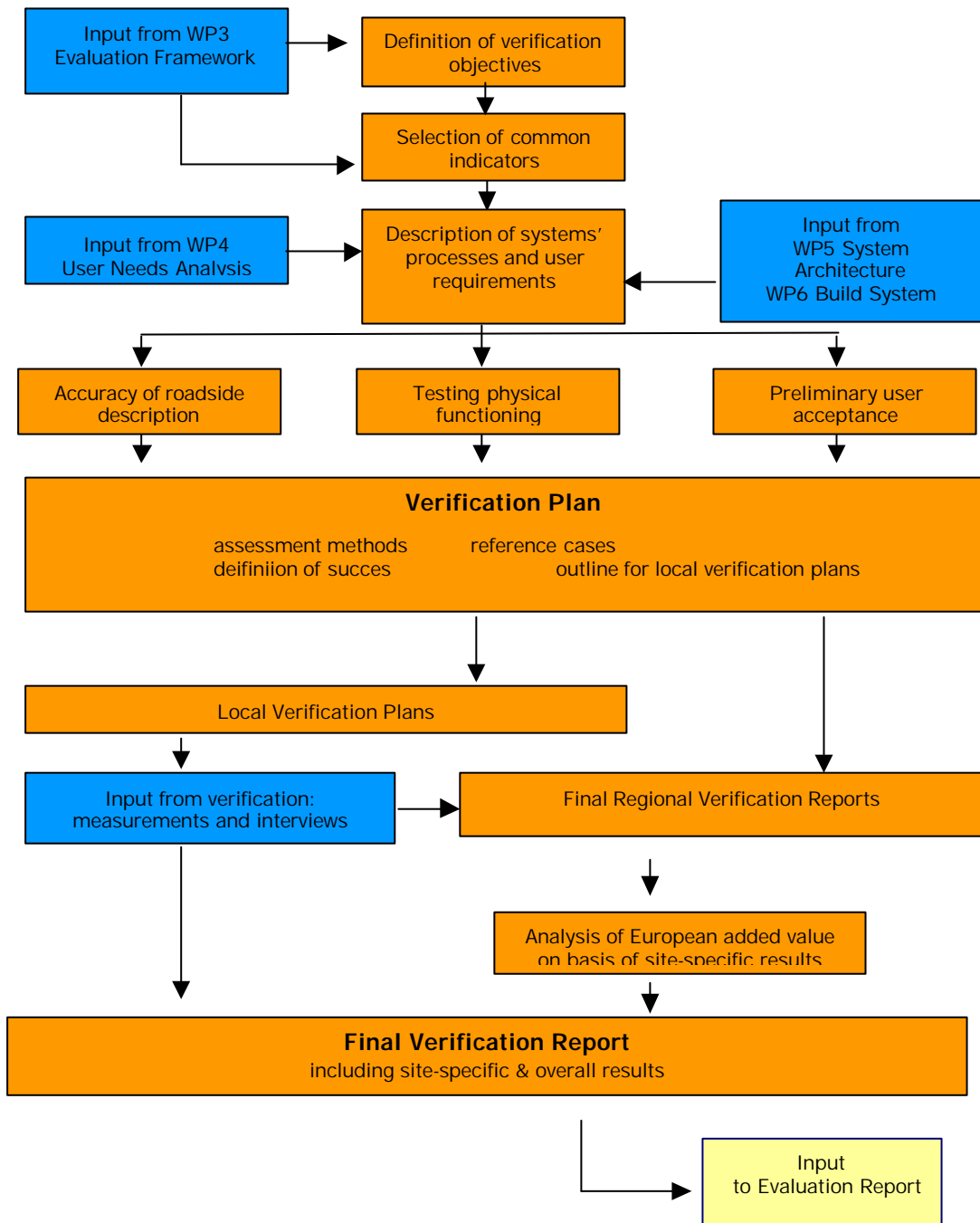
The HEAVEN verification stage will test the technical performance of the HEAVEN system and yield preliminary findings on user acceptance. Verification conclusions will be used for recommendations on small changes, if necessary, in the system before the demonstration starts.

In the HEAVEN project, WP7 is responsible for the verification procedure and concentrates on the accuracy of modelling and monitoring, the physical functioning of the system and the preliminary user acceptance. WP7 will develop a common verification concept, co-ordinate detailed local verification planning, analyse local results across sites, and make recommendations on system modifications before the start of the demonstration phase.

The approach and methodologies applied in WP7 have been closely tuned with the overall evaluation process, to avoid disproportional overlap between the Evaluation and Verification reports. One of the WP3 indicators is made operational in the verification stage, namely Indicator 1.3 Accuracy of Roadside Description. This indicator addresses the accuracy of the updated roadside environmental models that are built into the HEAVEN DSS. The assessment of this indicator is started in the verification stage. The intermediate findings on accuracy of roadside description will be described in the verification report. The final conclusions on the accuracy of roadside description will be included in the evaluation report.

All other indicators in the verification stage are specific for verification.

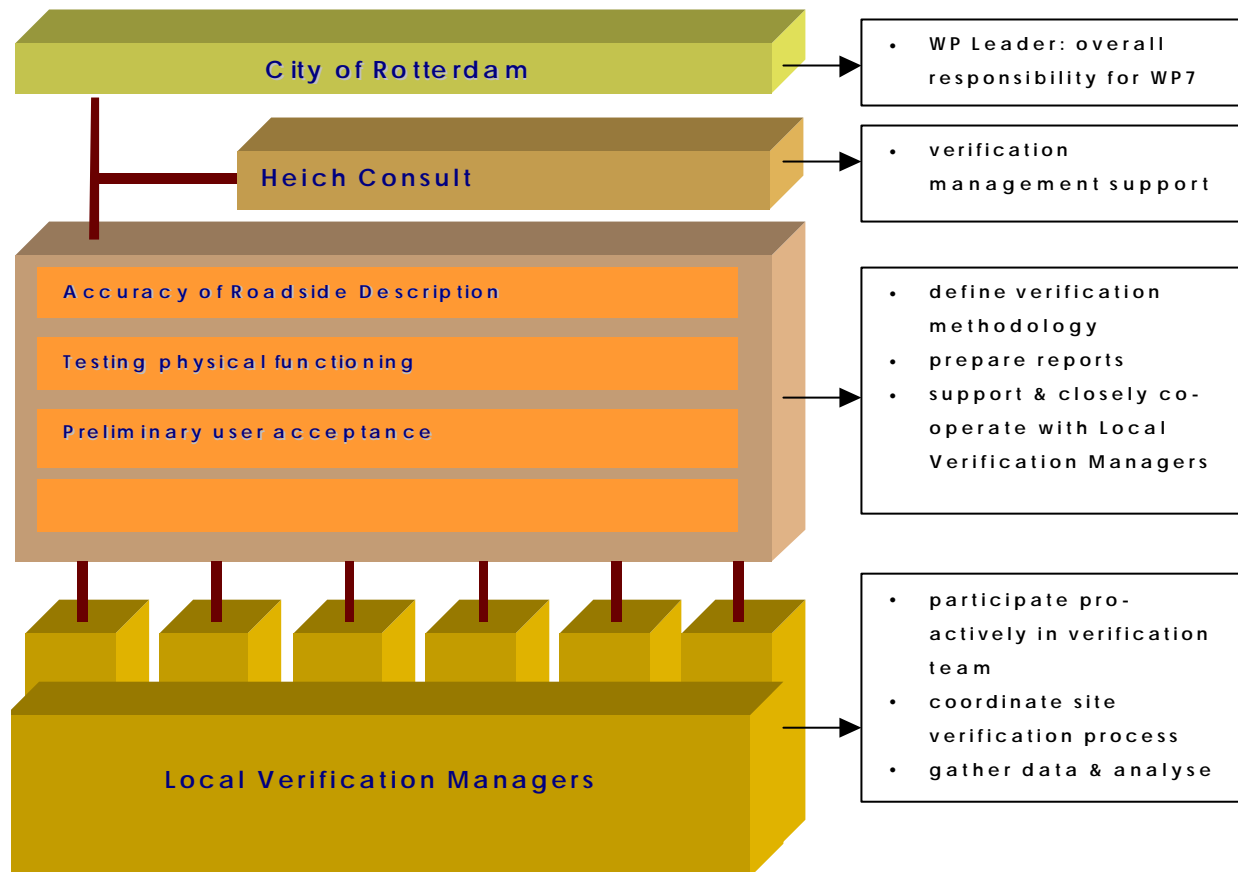
Figure 4: Steps in the Verification Process



Verification Management Structure

The HEAVEN verification team consists of a workpackage leader (City of Rotterdam), the technical coordinator (Heich Consult) for interaction with other WP's, and the local verification managers from the participating HEAVEN cities.

Figure 5: Management Structure of WP7 Verification



2.2 Agreement Process

Throughout the duration of WP7, a number of verification workshops has been scheduled where local verification managers, the verification co-ordinator as well as other HEAVEN participants directly or indirectly involved in verification processes meet. To date, two verification workshops have been held. In addition, the technical co-ordinator, the WP7 verification co-ordinator and the WP3 evaluation co-ordinators gathered for a two-day brainstorming meeting. An overview of these workshops and meetings is provided in table 3.

Table 3: Overview of HEAVEN Verification Workshops and Meetings

Previous HEAVEN Verification Workshops and Meetings
<p>Brainstorming Meeting Place: Cologne, Germany Date: 7-8 September 2000 Contents:</p> <ul style="list-style-type: none"> • Set-up of responsibilities between WP3 Evaluation and WP7 Verification
<p>Joint Evaluation/Verification Workshop Place: Genoa, Italy Date: 5 April 2001 Contents:</p> <ul style="list-style-type: none"> • Co-operation between WP3 and WP7
<p>Verification Workshop Place: Brussels Date: 2 May 2001 Contents:</p> <ul style="list-style-type: none"> • Common indicators • Common assessment methods, success criteria • WP7 input for the Final Evaluation Plan • Planning of the pilot implementation

Two Task Forces the Task Forces Air and Noise have been established in the framework of WP3 to provide specific (technical) support to the verification and evaluation teams. The task forces are composed of technical experts in the area of air pollution and noise pollution, respectively. The Task Force Air is intended to further develop the verification and evaluation concept for air pollution measurements and air quality modelling issues (in particular, practical criteria) and to further air-related indicators. The Task Force Noise is intended to develop guidelines for noise measurement, modelling, and assessment in HEAVEN cities and plan and provide guidance for sensitivity testing of noise.

The discussions during the meetings form the basis for the documents that are produced within the workpackage. Between meetings, documents are produced in an iterative process between the workpackage leader and the local verification managers, making use of e-mail correspondence and telecommunication.

The described means of communication allowed the HEAVEN verification team to maintain a productive cycle of proposals, comments, and revisions that ultimately resulted in mutual agreement. This agreement process was particularly important in finding commonalities across the cities, such as common indicators and questionnaires.

2.3 Common Verification Basis

HEAVEN is a truly European project. Cities from five EU countries (Germany, the United Kingdom, France, Italy, and the Netherlands) and the Czech Republic as an accession country are participating. After completion of the project, it is intended to implement HEAVEN in further European cities. For the task of verification, it is therefore important to focus on the commonalities of HEAVEN.

In close co-operation with Workpackage 5 “Functional Specifications/System Architecture” and Workpackage 6 “Build Integrated Systems”, a list of common verification indicators has been defined. HEAVEN verification is based on a common verification concept necessitating that indicators are measured in the same way, or at least yield comparable results across the sites. The indicators have been grouped into the three main themes of verification:

- Accuracy of modelling and monitoring for roadside description
- Testing physical functioning of the system
- Preliminary user acceptance

With respect to indicators that are specific to noise, commonality will be reached when all HEAVEN cities concerned with noise (Berlin, Leicester, and Prague) agree to use them. The DOAS system is only tested in the city of Rotterdam.

Table 4: Verification Indicators

Ind. Nr.	Indicator	Berlin	Leicester	Paris	Prague	Rome	Rotterdam
Accuracy of modelling and monitoring for roadside description							
v.1	Accuracy of DOAS monitoring equipment			⊗			✓
v.2	Accuracy of roadside description, air models	✓	✓	✓	✓	✓	✓
v.3	Accuracy of roadside description, noise models	✓	✓		✓		
Testing physical functioning of the DSS							
v.4	Testing Processes of DSS Interfaces	✓	✓	✓	✓	✓	✓
v.5	Testing DSS Modelling & Forecast Processes	✓	✓	✓	✓	✓	✓
v.6	Testing DSS Operator Interface and Scenario Processes	✓	✓	✓	✓	✓	✓
v.7	Functioning of the main system components and their interaction	✓	✓	✓	✓	✓	✓
Preliminary user acceptance							
v.8	User acceptance of the DSS by professional users	✓	✓	✓	✓	✓	✓
v.9	User acceptance by panel of general public	✓	✓	✓	✓	✓	✓
<p>Legend:</p> <p>✓ Indicator will be applied.</p> <p>⊗ No new development within the framework of HEAVEN, since experience has already been achieved in the past. Results from previous initiatives or projects will be reported in HEAVEN.</p> <p>DOAS monitoring or Noise pollution is not a specific concern of the city within HEAVEN.</p>							

For the respective indicators, sub-indicators have been defined that target a specific aspect to be tested. The sub-indicators are described in chapter 3. The common verification concept will be taken over in the local verification plans, where the approach is further designed to fit the site-specific situation.

Results of the verification will be reported along a common structure and finally presented in the Verification report (D7.1). This report will also contain recommendations for the demonstration phase.

Accuracy of modelling and monitoring of roadside description

Verification for monitoring is directed at the possibilities of the DOAS system for roadside description of air pollution. The indicator refers to the HEAVEN operational goal R1.1: Use DOAS-based measurements for validating and refining air models, and verification of the DOAS system. In the tests, the DOAS system in Rotterdam is compared to measurements of the traditional chemiluminescence system.

Verification for modelling is directed at those models that are built or updated within the framework of the HEAVEN project. The method has already been described for evaluation indicator 1.3 on accuracy of roadside description. In the verification stage, a distinction is made between the air models and noise models.

Testing the physical functioning of the DSS

In the functional architecture (D5.1) the different functions and sub-functions of the HEAVEN DSS have been grouped into four main functional blocks. The four functional blocks shown in the HEAVEN DSS top level Functional Architecture are:

- Functioning of the DSS database
- Functioning of DSS interfaces
- Functioning of DSS Modelling and Forecast
- Functioning of DSS Operator Interface and Scenario definition

For the implementation of the system, the functions have been translated in terms of “processes” in Deliverable 5.2. For the local systems, the processes and sub-processes are described in Chapter 4 of this deliverable. For systems verification, we distinguish three groups of processes to be tested, these are:

- v.4 Testing processes of DSS Interfaces
- v.5 Testing DSS Modelling and Forecast Processes
- v.6 Testing DSS Operator Interface and Scenario definition processes

The functional block of the DSS database has a central role in the DSS functional architecture and is therefore included in the processes of the three groups. The DSS Database is included in the processes in three general ways. First, data from external sources is acquired then converted and then stored in the DSS-database. Second, data from the DSS database is retrieved, then converted and then stored again in the DSS database. Third, data from the DSS database is retrieved, then converted and then displayed on a human machine interface.

Within the three groups a number of common processes have been identified. For these common processes tests will be performed for “number of system failures”, “speed” and “correct data in and out”. Testing processes for number of system failures and speed implies that the software components, hardware components and connections are tested simultaneously for their joint performance within this process.

In addition to the testing of the three groups of processes, the performance of the main system components and their interaction will be examined to confirm that the integration of the processes has been established successfully.

Preliminary User acceptance

The preliminary user acceptance will be assessed for both professional users and the general public. The indicator for user acceptance by professional users can be described by three main questions:

- Does the DSS meet the system requirements as described in WP5?
- Is the information provided by the system understandable?
- Is the human machine interface (HMI) easy to operate?

A targeted presentation is given to a minimum of 5 single professional users at each of the sites. The presentation is followed by a structured interview using a common set of questions.

The user acceptance of the general public will focus on the clarity of the information (Is the information provided easy to understand?). A targeted presentation of the information platform is given to a minimum of 5 representatives of the general public. These can be both representatives of NGO's and individual citizens. After the presentation a structured interview will take place using a set of common questions.

2.4 Timetable

The preparations for the common verification approach were started in March 2001. The common approach will be described in the Verification Plan that is due in June 2001. Subsequently, Local Verification Plans will be ready in August 2001 (Milestone 7.1). The Local Verification Plans follow a common structure and follow the HEAVEN verification concept and methodology of assessment.

The Pilot Implementation and user verification on the HEAVEN sites will be conducted in October/November 2001.

The results of the user verification will be evaluated and described in the local verification results reports (M7.2), by the end of November 2001. These reports will include recommendations to WP8 (Large Scale Demonstration) on desired modifications into the system.

The horizontal results and recommendations will be reported in Deliverable 7.1: System Verification Report. The Final System Verification Report is planned to be finished in December 2001.

Table 5: WP7 Timetable

Action point WP7	Deadline	Responsible
Verification concept to be included in Final evaluation plan		
1st Draft for Comments to sites	20 th April 2001	Cleo Pouw
Comments from sites to WP leader	24 th April 2001	Local verification managers
2nd Draft for discussion at WP7 meeting to sites	27 th April 2001	Cleo Pouw
WP7 meeting in Brussels	2 nd May 2001	Local verification managers
3rd Draft for Comments to sites + draft input for Final	4 th May 2001	Cleo Pouw

Evaluation Plan		
Comments from sites (after consultation of local WP6 and WP5 managers) to WP leader	11 th May 2001	Local verification managers
Input to be included in Final Evaluation Plan	16 th May	Cleo Pouw
Milestone 7.1 Verification Plan		
1st Draft Verification Plan for Comments to sites	25 th May 2001	Cleo Pouw
Comments from sites to WP leader	1 st June 2001	Local verification managers
2nd Draft Verification Plan for Comments to sites	8 th June 2001	Cleo Pouw
Comments from sites to WP leader	13 th June 2001	Local verification managers
Final version of Verification plan ready for Peer Review	19 th June 2001	Peer reviewers
Local Verification Plans	17 th August 2001	Local verification managers
Pilot Implementation/User verification		
Start of pilot implementation	17th September 2001	Local verification managers
All activities for user verification finished	10th November 2001	Local verification managers
Milestone 7.2 Local Verification Results		
Local reports on verification results	17th November 2001	Local verification managers
Deliverable 7.1 System verification report		
First draft of system verification report	1st November 2001	Cleo Pouw
WP7 meeting on reports on verification results	5th November 2001	Local verification managers
Comments from sites to WP leader	10th November 2001	Local verification managers
Second draft of System Verification Report	5th December 2001	Cleo Pouw
Comments of from sites to WP leader	12th December 2001	Local verification managers
Review of System Verification Report	19th December 2001	Peer reviewers
Final System Verification Report	21st December 2001	Cleo Pouw

3 Operational Verification

3.1 Common indicators

HEAVEN verification is based on a common verification basis necessitating that indicators are measured in the same way, or at least yield comparable results across the sites. With respect to indicators that are specific to noise, commonality will be reached when all HEAVEN cities concerned with noise (Berlin, Leicester, Prague) agree to use them. The DOAS system is only tested in the Rotterdam. Paris has already applied the DOAS system in the past and will contribute to the respective indicator based on their previous experiences.

Table 6: Verification Indicators

Ind. Nr.	Indicator	Berlin	Leicester	Paris	Prague	Rome	Rotterdam
Accuracy of modelling and monitoring for roadside description							
v.1	Accuracy of DOAS monitoring equipment			⊗			✓
v.2	Accuracy of roadside description, air models	✓	✓	✓	✓	✓	✓
v.3	Accuracy of roadside description, noise models	✓	✓		✓		
Testing physical functioning of the DSS							
v.4	Testing Processes of DSS Interfaces	✓	✓	✓	✓	✓	✓
v.5	Testing DSS Modelling & Forecast Processes	✓	✓	✓	✓	✓	✓
v.6	Testing DSS Operator Interface and Scenario Processes	✓	✓	✓	✓	✓	✓
v.7	Functioning of main system components and their interaction	✓	✓	✓	✓	✓	✓
Preliminary user acceptance							
v.8	User acceptance of the DSS by professional users	✓	✓	✓	✓	✓	✓
v.9	User acceptance by panel of general public	✓	✓	✓	✓	✓	✓
Legend:							
✓ Indicator will be applied.							
⊗ No new development within the framework of HEAVEN, since experience has already been achieved in the past. Experiences with DOAS in Paris in previous initiatives will be reported in HEAVEN.							
□ DOAS monitoring or Noise pollution is not a specific concern of the city in HEAVEN.							

3.2 Accuracy of modelling & monitoring for roadside description

The accuracy of roadside description comprises of three indicators. Indicator v.1 is specific for the city of Rotterdam, which has made use of the previous experiences in Paris. Indicators v.2 and v.3 are equal to the Evaluation indicator 1.3 from the Final Evaluation Plan. The preliminary findings on model accuracy for roadside description will be described in the Verification report. The final conclusions on model accuracy will be included in the Evaluation Report.

3.2.1 Indicator v.1: Accuracy of DOAS monitoring equipment

This indicator refers to the second part of HEAVEN operational goal R1.1: Use DOAS-based measurements for validating and refining air models and verification of the DOAS system. This indicator is only applicable to Rotterdam. Paris contributes to the indicator by reporting on previous experiences with the DOAS system. The INERIS system that has been used previously in Paris, will be transferred to Rotterdam and included in the tests at the Rotterdam demonstration site.

Nr.	Indicator	Method of Assessment	Reference Case	Success Criterion
v.1	Accuracy of DOAS for NO/NO ₂ compared to traditional equipment	Correlation Sample size: 250 hours Confidence level: 80%	Measurements of traditional system: chemiluminescence	Equal performance

3.2.2 Indicator v.2: Accuracy of roadside description, air models

The HEAVEN project is expected to contribute to the improvement of modelling systems. The performance of the simulation of a current environmental situation is obtained by comparing the model outputs with air quality observed data. In the case of background pollution, the implementation of such a validation is difficult 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 more easily performed for roadside pollution description. The roadside air pollutant concentrations are evaluated according to the ad hoc EU definitions, provided by the directive 1999/30. Indicator v.2 concerns this point, i.e. the roadside description accuracy, and evaluates the model calibration by limited measurements.

The results 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 sites typologies could be refined according to the local implementation framework. An evaluation period of a minimum of 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 location and an open roadside site) is suggested as a nominal approach.

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.

Nr.	Indicator	Method of Assessment	Reference Case	Success Criterion
v.2	Accuracy of roadside description air models PM10 (24 hours) NO ₂ (1 hour) CO (8 hours) C ₆ H ₆ (annual)*	Comparison of observed and calculated air pollutant concentrations for specific roadside locations.	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.	Provided by the annexes of the ad hoc air quality directives

* C₆H₆ is not measured in Leicester

3.2.3 Indicator v.3: Accuracy of roadside description, noise models

In terms of noise levels, indicator v.3 attempts to assess the accuracy of the HEAVEN modelling tools in predicting source noise emissions at the roadside, or at building façades adjacent to the roadside. Direct noise measurements will be taken using a Type 1 Integrating Sound Level Meter at point sites within the verification and demonstration area. The evaluation period and the sites typologies could be refined according to the local implementation framework

The accuracy of the modelling tools will be assessed by two measures:

- The absolute difference between measured noise levels and the levels predicted by the HEAVEN modelling tools.
- The correlation between the measured noise levels and modelled noise levels.
- Where appropriate, the ½ hour L_{Aeq} levels will be used to calculate L_{day}, L_{evening}, L_{night} and L_{DEN} levels, as defined in ISO 1996-2: 1987.

Key terms:	<p>L_{Aeq} – Equivalent sound pressure level in dB(A). L_{day} – Overall L_{Aeq} level for the period from 0700 – 1900. L_{evening} – Overall L_{Aeq} level for the period 1900 – 2300. L_{night} – Overall L_{Aeq} level for the period 2300 – 0700.</p> $L_{DEN} = 10 \log_{10} \frac{1}{24} \left(12 * 10^{\frac{L_{day}}{10}} + 4 * 10^{\frac{L_{evening}+5}{10}} + 8 * 10^{\frac{L_{night}+10}{10}} \right)$ <p>Façade position – Microphone positioned at 4.0m ± 0.2m height, 2.0m ± 0.2m horizontally from building.</p> <p>Correlation Coefficient – R value = Cov (x, y) / σ_xσ_y.</p>
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Nr.	Indicator	Method of Assessment	Reference Case	Success Criterion
v.3a	Absolute differences between measured and predicted noise levels (LAeq, Leq, Lden, Lnight).	Direct measurement of noise levels over 6 4-hour periods at 1 site (Berlin) and multiple sites in the verification area (Leicester). Noise parameters recorded will be ½ hour LAeq levels. Daily Lden and Lnight levels will be calculated from Leq levels.	Measured noise levels (LAeq, Leq, Lden, Lnight). Measurements to be taken on a weekday (Tues, Weds, Thurs). Measurements will take place over 6 periods of 4 hours at a fixed point. Meteorological conditions must meet the relevant country standards (i.e. little or no wind, dry road surface etc.).	95% of all modelled LAeq values will be within ±2 dB(A) of the measured values. All modelled Lday, Levening, Lnight and LDEN levels will be within ±2dB(A) of the measured values.
v.3b	Correlation coefficient, R, calculated from an origin-constrained linear regression analysis between measured and predicted values.	Origin-constrained regression analysis to be carried out between the measured and predicted levels.	Measured noise levels (LAeq) as above.	The correlation coefficient (R-value) between measured and modelled LAeq levels from all measurement periods and sites shall be above 0.7.

3.3 Testing physical functioning

In the functional architecture (D5.1) the different functions and sub-functions of the HEAVEN DSS have been grouped into four main functional blocks. The four functional blocks of the HEAVEN DSS are shown in the HEAVEN DSS top level Functional Architecture:

- Functioning of the DSS database
- Functioning of DSS interfaces
- Functioning of DSS Modelling and Forecast
- Functioning of DSS Operator Interface and Scenario definition

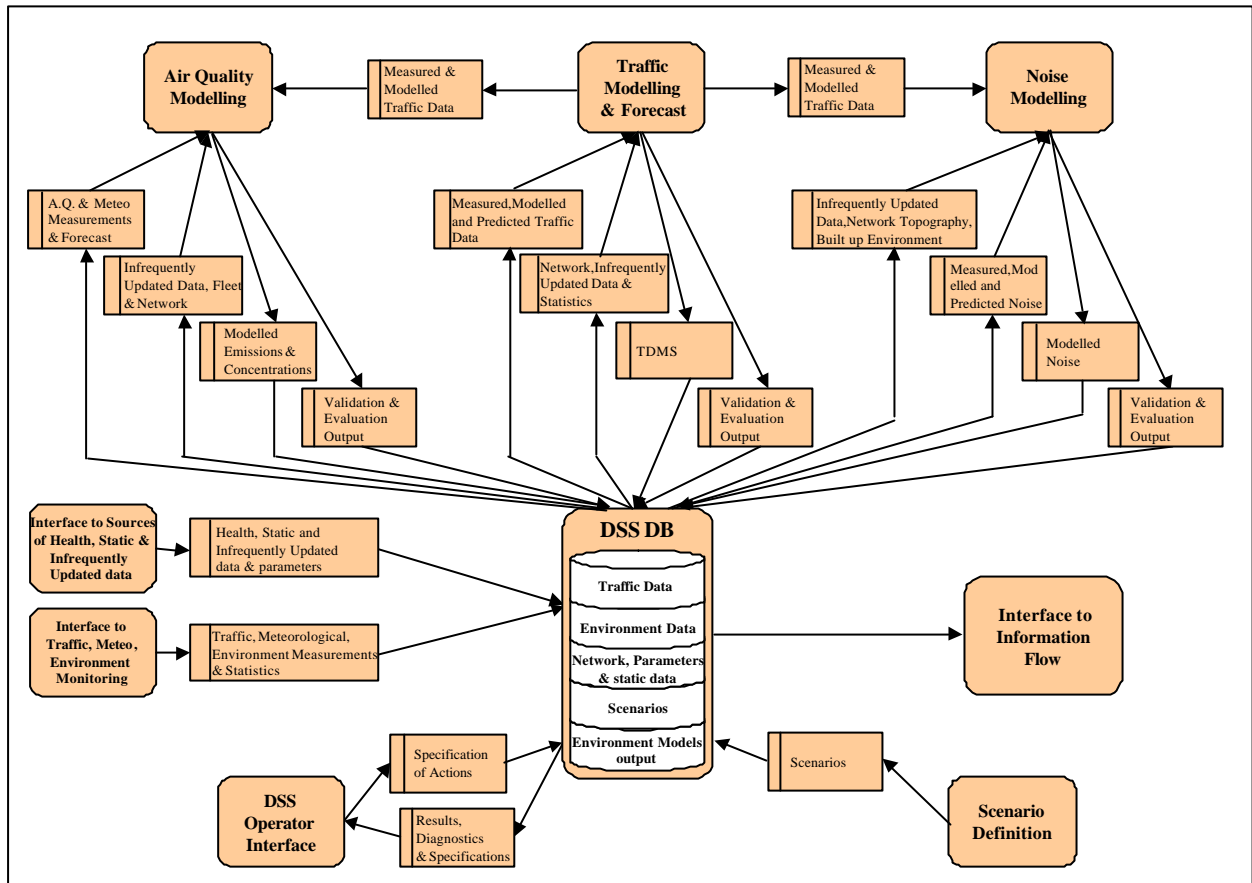


Figure 6 – The HEAVEN DSS top level Functional Architecture

Legend:



For the implementation of the system, the functions have been translated in terms of “processes” in Deliverable 5.2. For the local systems, the processes and sub-processes are described in Chapter 4 of this deliverable. For systems verification, we distinguish three groups of processes to be tested, these are:

v.4 Testing processes of DSS Interfaces

v.5 Testing DSS Modelling and Forecast Processes

v.6 Testing DSS Operator Interface and Scenario definition processes

The functional block of the DSS database has a central role in the DSS functional architecture and is therefore included in the processes of the three groups. The DSS Database is included in the processes in three general ways. First, data from external sources is acquired then converted and then stored in the DSS-database. Second, data from the DSS database is retrieved, then converted and then stored again in the DSS database. Third, data from the DSS database is retrieved, then converted and then displayed on a human machine interface.

Within the three groups a number of common processes have been identified. For these common processes test will be performed for “number of system failures”, “speed” and

“correct data in and out”. System failures are divided into system breakdowns and other errors. Testing processes for number of system failures and speed implies that the software components, hardware components and connections are tested simultaneously for their joint performance within this process.

The method followed to assign the processes from D5.2 to the common verification indicators is described in Annex 1 by first giving the example based on the situation in the city of Rotterdam. Secondly, overview tables containing all the sites are presented, linking the processes to the verification indicators following the same methodology.

In addition to the testing of the three groups of processes, the performance of the main system components and their interaction will be tested (Indicator v.7).

3.3.1 Indicator v.4 Testing processes of DSS Interfaces

This indicator comprises two kinds of interfaces. The interfaces on the left side of the diagram of the Functional Architecture (Monitoring and static data) acquire data from outside the DSS. On the right side of the diagram, the interface to the information flow acquires data inside the DSS, from the DSS database.

Nr.	Indicator	Method of Assessment	Reference Case	Success Criterion
v.4a	Test Interface to Traffic Monitoring process (external retrieval, conversion and storage in DSS database)	Number of system failures. Test period: 1 to 3 days	N/A for new system	95% of time operational
		Correct data in and out. Frequency of testing: 1 to 3 times	Data in monitoring station	Data in database equals data in monitoring station
		Speed Test period: 1 to 3 days	N/A for new system	Fast enough to allow the entire system to reach an hourly update
v.4b	Test Interface to Meteo Monitoring process (external retrieval, conversion and storage in DSS database)	Number of system failures. Test period: 1 to 3 days	N/A for new system	95% of time operational
		Correct data in and out. Frequency of testing: 1 to 3 times	Data in monitoring station	Data in database equals data in monitoring station
		Speed Test period: 1 to 3 days	N/A for new system	Fast enough to allow the entire system to reach an hourly update
v.4c	Test Interface to Environmental Monitoring network process (external retrieval, conversion and storage in DSS database)	Number of system failures. Test period: 1 to 3 days	N/A for new system	95% of time operational
		Correct data in and out. Frequency of testing: 1 to 3 times	Data in monitoring station	Data in database equals data in monitoring station
		Speed Test period: 1 to 3 days	N/A for new system	Fast enough to allow the entire system to reach an hourly update

v.4d	Test Interface to sources of Health information process (external retrieval, conversion and storage in DSS database) NOTE: Not applicable for Berlin	Number of System failures Test period: 1 to 3 days	N/A for new system	95% of time operational
		Correct data in and out. Frequency of testing: 1 to 3 times	Data in data source	Data in database equals data in source
		Speed Test period: 1 to 3 days	N/A for new system	Fast enough to allow the entire system to reach an hourly update
v.4e	Test Interface to static & infrequently updated information process (external retrieval, conversion and storage in DSS database)	Number of System failures Test period: 1 to 3 days	N/A for new system	95% of time operational
		Correct data in and out. Frequency of testing: 1 to 3 times	Data in data source	Data in database equals data in source
v.4f	Test interface to Information flow process (retrieval from DSS database, conversion and presentation)	Number of System failures Test period: 1 to 3 days	N/A for new system	95% of time operational
		Correct data in and out. Frequency of testing: 1 to 3 times	Data in DSS database	Data information presentation equals data in database
		Speed Test period: 1 to 3 days	N/A for new system	Fast enough to allow the entire system to reach an hourly update

Method of Assessment per process:

Number of system failures: Operates database without system breakdowns or other errors during period of 1 to 3 days. Testing period decided at site-level and dependent on the critical position within the overall system.

Correct data in and out: the fact that data storage and retrieval as such works without errors. Compare the data in the DSS database with that in the data source. Is data complete (no losses) and correct?

Speed: Since HEAVEN builds on the hourly update connection the time needed for the processes is of importance.

3.3.2 Indicator v.5: Testing DSS Modelling and Forecast Processes

Nr.	Indicator	Method of Assessment	Reference Case	Success Criterion
v.5a	Test Air Quality Emission process (retrieval from DSS database, conversion and storage in DSS database)	Number of system failures Testperiod: 1 to 3 days	N/A for new system	95% of time operational
		Speed Test period: 1 to 3 days	N/A for new system	Fast enough to allow the entire system to reach an hourly update
v.5b	Test Air Quality Concentration process (retrieval from DSS database, conversion and storage in DSS database)	Number of system failures Test period: 1 to 3 days	N/A for new system	95% of time operational
		Speed Test period: 1 to 3 days	N/A for new system	Fast enough to allow the entire system to reach an hourly update
v.5c	Test Noise Modelling process (retrieval from DSS database, conversion and storage in DSS database)	Number of system failures Test period: 1 to 3 days	N/A for new system	95% of time operational
		Speed Test period: 1 to 3 days	N/A for new system	Fast enough to allow the entire system to reach an hourly update
v.5d	Test Traffic Modelling & Forecast process: (retrieval from DSS database, conversion and storage in DSS database)	Number of system failures Test period: 1 to 3 days	N/A for new system	95% of time operational
		Speed Test period: 1 to 3 days	N/A for new system	Fast enough to allow the entire system to reach an hourly update

Method of Assessment per process:

Number of system failures: Operates database without system breakdowns or other errors during period of 1 to 3 days. Testing period decided at site-level and dependent on the critical position within the overall system.

Speed: Since HEAVEN builds on the hourly update connection the time needed for the processes is of importance.

3.3.3 Indicator v.6: Testing DSS Operator Interface and Scenario processes

Nr.	Indicator	Method of Assessment	Reference Case	Success Criterion
v.6a	Test DSS operator interface presentation process (retrieval from DSS database, conversion and presentation)	Number of system failures Test period: 1 to 3 days	N/A for new system	95% of time operational
		Correct data in and out Test Frequency: 1 to 3 times	Data in DSS	Presented data in equals data in DSS
		Speed Test period: 1 to 3 days	N/A for new system	Fast enough to allow the entire system to reach an hourly update
v.6b	Test DSS Operator Interface intervention process (external retrieval, conversion and storage in DSS database)	Number of system failures Test period: 1 to 3 days	N/A for new system	95% of time operational
		Correct data in and out Test Frequency: 1 to 3 times	Data introduced by operator	Stored data in DSS equals introduced data
		Speed Test period: 1 to 3 days	N/A for new system	Fast enough to allow the entire system to reach an hourly update
v.6c	Test DSS scenario process (external or internal retrieval, conversion and storage in DSS database)	Number of system failures Test period: 1 to 3 days	N/A for new system	95% of time operational
		Correct data in and out. Test Frequency: 1 to 3 times	Scenario data	Data stored in DSS equals scenario data

Method of Assessment per process:

Number of system failures: Operates database without system breakdowns and other errors during period of 1 to 3 days. Testing period decided at site-level and dependent on the critical position within the overall system.

Correct data in and out: the fact that data storage and retrieval as such works without errors. Compare the data in the DSS database with that in the data source. Is data complete (no losses) and correct?

Speed: Since HEAVEN builds on the hourly update connection the time needed for the processes is of importance.

3.3.4 Indicator v.7: Functioning of the main system components and their interaction

Nr.	Indicator	Method of Assessment	Reference Case	Success Criterion
v.7a	To test functioning main system components and their interaction in producing environmental information	Number of system failures Test period: two weeks	N/A for new system	90% of time operational
		Speed Test period: two weeks	N/A for new system	Hourly update

Method of Assessment per process:

Number of system failures: Operates database without system breakdowns or other errors during 90% of time during period of two weeks.

Speed: The total system should be fast enough to supply an hourly update of the information.

3.4 Preliminary User Acceptance

3.4.1 Indicator v.8 User acceptance by professional users

The indicator for user acceptance by professional users can be described by two main questions:

v.8a: Does the DSS meet the system requirements as described in WP5?

v.8b: Is the information provided by the system easy to understand?

Nr.	Indicator	Method of Assessment	Reference Case	Success Criterion
v.8a	User Acceptance Professional users: Does DSS meet system requirements?	Targeted presentation to 5 single professional users. Followed by face-to-face interview using common questions across sites	Description of system requirements in D5.1	95% of system requirements score 4 or higher on a 1-5 scale
V8b	User acceptance by Professional users: Is presented information on HMI understandable?	Targeted presentation to 5 single professional users. Followed by face-to-face interview using common questions across sites	Information systems before HEAVEN	Positive ratings by professional users

A targeted presentation is given to a minimum of 5 single professional users at each of the sites. As a general guideline 2 environmental, 2 traffic, 1 health and/or 1 urban planning professionals will be included in the verification. After the presentation a structured interview is performed using a set of common questions for indicators v8a and v8b.

For **v.8a** a list of common questions is constructed on the basis of the overall system requirements as described in WP5. Professional users will be asked to assess on a 1 to 5 scale

to what extent, **in their opinion**, the functional requirements have been met by the system. A score of 5 indicates that the requirement has been met completely; whilst a score of 1 indicates that the requirement has not been met at all. For any score below 4 the respondents will be asked for an additional clarification. An outline for common questions for v.8a (professional users) is presented in Annex 2. The outline contains the comprehensive set of functional system requirements defined to design the HEAVEN DSS. These functional system requirements concern the services the system is expected to provide. In addition to the checklist, system requirements specific to each site can be added in the local verification plans.

For **v8.b**, on “Information Presentation”, a common list of questions is made, containing the following elements:

- Presentation through Environmental Maps
- Presentation through Environmental Charts and Tables
- Presentation through Traffic Maps
- Presentation through Traffic Charts and Tables
- Presentation of Health information
- Presentation of Information output
- Operator interface

An outline for Common questions for v.8b “Information presentation” (professional users) is presented in Annex 3.

3.4.2 Indicator v.9 User acceptance by general public

Nr.	Indicator	Method of Assessment	Reference Case	Success Criterion
v.9	User acceptance by general public	Presentation of information platform to five single users from the general public. Followed by structured face-to-face interview using common questions across sites	Information systems before HEAVEN	The general public perceives an improvement compared to the amount of information that was available to them before the existence of the HEAVEN project

A targeted presentation is given to a minimum of 5 representatives from the general public. These can be both representatives of NGO’s and individual citizens. After the presentation, a structured interview will take place using a set of common questions. For this purpose a common checklist is developed that takes into account the specific situation of the general public. The indicator concentrates on the Information Platform. Local verification can add questions that are specific to the sites to the common checklist.

The common checklist for **v.9** will contain the following elements:

- Presentation through Environmental Maps
- Presentation through Environmental Charts and Tables
- Presentation through Traffic Maps
- Presentation through Traffic Charts and Tables
- Presentation of Health information

The outline for Common questions for v.9 (general public) is presented in Annex 4.

4 Outline for local verification plans

4.1 Introduction

The pilot implementation and verification tests will be performed at site level. To ensure the European added value for the project, the local verification plans and reports will be developed following a common structure and using common tools and presentation methods. This way the local results can be compared and project level conclusions on verification can be drawn in the Verification Report.

In this chapter the common structure of the local verification plans is introduced in section 4.2. Section 4.3 refers to the methodology for Testing Physical Functioning at site level (Indicators v.4- v.7). The methodologies for Accuracy of Modelling and Monitoring and Preliminary User acceptance have already been introduced in the Final Evaluation Plan and the Common outline for User-questions in Annexes 2-4 respectively.

4.2 Structure of local verification plans

1. Introduction
2. Overview of horizontal indicators
3. Local testing environment
4. Verification method
 - 4.1 Accuracy of modelling and monitoring for roadside description
 - 4.1.1 Description of local DOAS system and air and noise models
 - 4.1.2 Local version of table describing method, success criterion and reference case for v.1, v.2 and v.3
 - 4.2 Testing physical functioning
 - 4.2.1 Description of processes and sub-processes of local system (to be taken over from D5.2, Chapter 4)
 - 4.2.2 Assignment of local processes and sub-processes to horizontal verification indicators
 - 4.2.3 Local version of table describing method, success criterion and reference case for v.4, v.5, v.6 and v.7
 - 3.3 Preliminary user acceptance
 - 3.3.1 Description of professional users and general public
 - 3.3.2 Local version of table describing method, success criterion and reference case for v.8 and v.9
5. Overall planning
 - 5.1 Detailed planning
 - 5.2 Responsibilities

Annex 1 Local version of questions for professional users and general public

4.3 Testing physical functioning on the site level

In section 3.3 and Annex 1, the methodology for assigning system processes to the verification sub-indicators is laid out. In the local verification plans this methodology has to be taken a step further to clarify which specific hardware, software and connections have to be tested. In co-operation with the local WP6 managers the local Verification managers will identify the hardware, software and connections for each of the sub-indicators. The success criteria in this verification plan are handled as minimum demands. If deemed necessary, the local verification managers can apply more stringent success criteria at site level.

In Annex 5 a working table for this methodology applicable to Rotterdam is given. This table will be further elaborated and included in the Local Verification Plan for Rotterdam. In the fourth column of this table the hardware, software and connections are specified. In regard to the indicators on speed, more stringent success criteria have been defined for the sub-indicators.

5 References

ANIMATE Guidelines for the Preparation of Validation Plans.

See **Maltby et al.** (1996).

Council directive 1996/62/EC, September 1996, on ambient air quality assessment and management

Council directive 1999/30/EC, 22 April 1999, relating to limit values for sulfur dioxide, nitrogen dioxide, particulate matter and lead in ambient air.

Council directive 2000/69EC, 16 November 2000 relating to limit values for benzene and carbon monoxide in ambient air.

COM(96) 540 final, 5 November 1996 European Union Green Paper on Future noise policy.

COM(2000) 468 final, 27 July 2000, A proposal for a Directive of the European Parliament and of the Council relating to the assessment and management of environmental noise.

CONVERGE Checklist for Preparing a Validation Plan. See **Maltby et al.** (1998).

CONVERGE Guidebook for Assessment of Transport Telematics Applications. See **Zhang et al.** (1998)

Enning, J., Eurlings, F., Talmon, J., Vissers, M., Nykänen, P., Roine, R., Hoyer, D., Thayer, C., and Coello, E. (1997): Guidelines for the Evaluation of Telematics Applications in Medicine. Validation of Telematics Applications in Medicine. VATAM Project HC1115HC, D3.2b.

European Commission (1999): Guidelines for Contract Preparation Co-ordinators of IST projects. European Commission, Fifth Framework Programme, DGXIII/132/99-EN.

Maltby, D., Cunge, J.A., and Heich, H.-J. (1996): Guidelines for the Preparation of Validation Plans (Version 2.0-Final). European Commission – DGXII, Fourth Framework Telematics Application Programme, Environment Sector, First **ANIMATE** Validation Quality Support Contract.

Maltby, D., Morello, S., Perrett, K., and Hopkin, J. (1998): Checklist for Preparing a Validation Plan: Updated Version (Issue 3). Fourth Framework Telematics Application Programme, Transport Sector, **CONVERGE** Project TR 1101, Deliverable 2.4.1.

Zhang, X., Kompfner, P., White, C., and Sexton, B. (1998): Guidebook for Assessment of Transport Telematics Applications: Updated Version. Fourth Framework Telematics Application Programme, Transport Sector, **CONVERGE** Project TR 1101, Deliverable 2.3.1.

6 Appendices

ANNEX 1 Assigning processes to the verification indicators

Step 1a: Identify the processes from figure in chapter 4 of D5.2

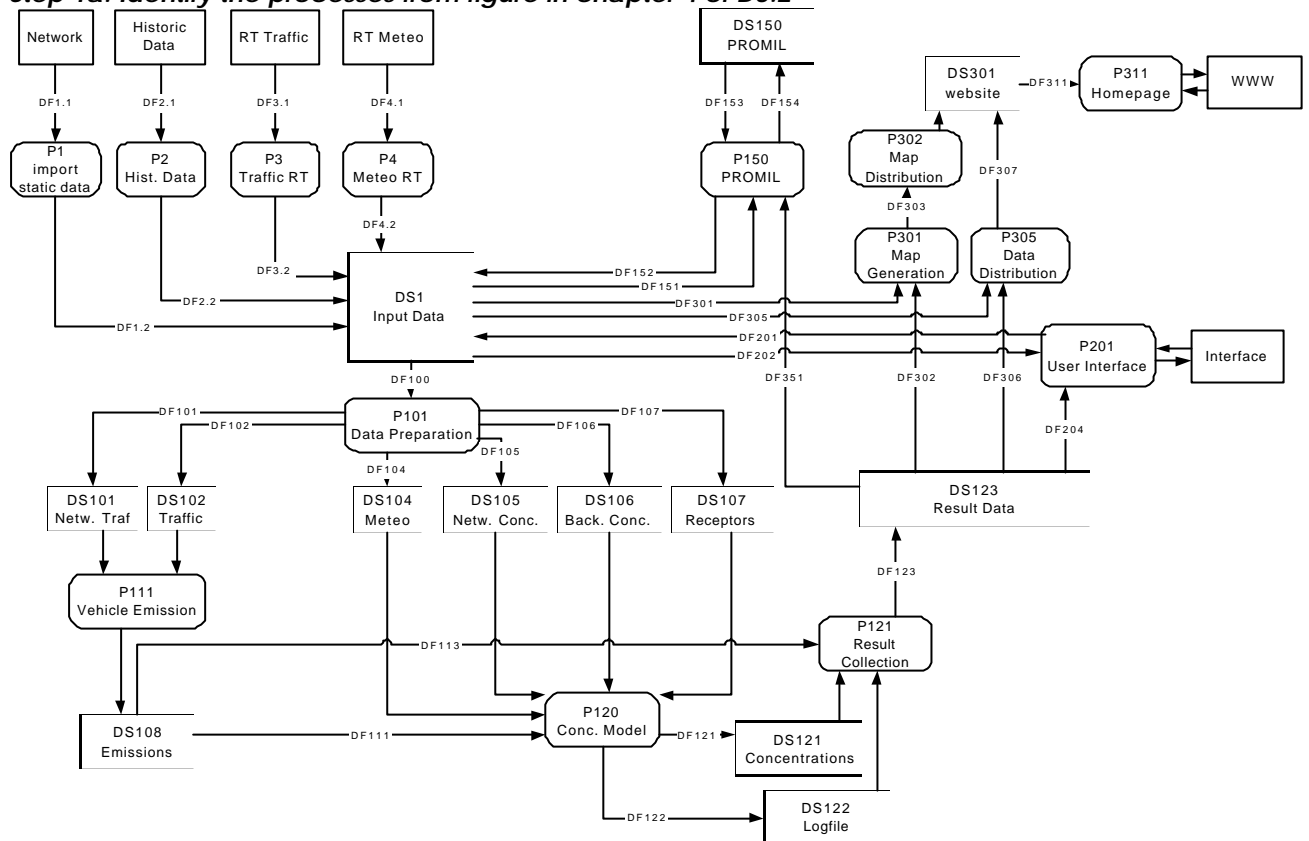


Figure – The top level Data Flow Diagram of the Rotterdam DSS

Step 1b: A description of the functions is given in the table below the figure

Process
P1 import static data
P2 historic data
P3 RT traffic data
P4 RT meteo data
P5 forecast meteo data
P6 RT background concentration
P101 Data Preparation
P111 Vehicle Emission
P112 Meteo Prepro
P120 Concentration Model
P121 Result Collection
P150 PROMIL
P201 Key-User interface
P301 Map Generation
P302 Map Distribution
P311 Homepage

Step 2: For the verification the processes are tested including the incoming and outgoing data flows
 Step 3: The processes and their data-flows can logically be assigned to the verification sub-indicators:

V4.	Indicator	R'dam*
v.4a	Test Interface to Traffic Monitoring process (external retrieval, conversion and storage in DSS database)	P3 RT Traffic Data DS1 Input data
v.4b	Test Interface to Meteo Monitoring process (external retrieval, conversion and storage in DSS database)	P4 Meteo RT DS1 Input data
v.4c	Test Interface to Environmental Monitoring network process (external retrieval, conversion and storage in DSS database)	P6 Background concentration DS1 Input data
v.4d	Test Interface to sources of Health information process (external retrieval, conversion and storage in DSS database)	P2 Historic data DS1 Input data
v.4 ^e	Test Interface to static & infrequently updated information process (external retrieval, conversion and storage in DSS database)	P1 Import static data DF1 P2 Historic data DF2 DS1 Input data DS150, P150 Promil
v.4f	Test interface to Information flow process (retrieval from DSS database, conversion and presentation)	DS1 Input Data DS123 Result Data P301 Map generation P302 Map distribution DS 301 Website P311 Homepage

Nr 5	Indicator	Rdam
v.5a	Test Air Quality Emission process (retrieval from DSS database, conversion and storage in DSS database)	DS1 Input data DF101 P101 Data preparation DF102, DF 103 DS 101 Network traffic DS 102 Traffic P111 Vehicle emission DS 108 Emissions
v.5b	Test Air Quality Concentration process (retrieval from DSS database, conversion and storage in DSS database)	DS1 Input data DF 101 P101 Data preparation DF 104,105, 106, 107, 108 DS 104, 105, 106, 107 DS 108 Emmission DF112, DF114 P120 Concentration model DS121, DS122
v.5c	Test Noise Modelling process (retrieval from DSS database, conversion and storage in DSS database)	N/A
v.5d	Test Traffic Modelling & Forecast process: (retrieval from DSS database, conversion and storage in DSS database)	DS150, DS123, DS1 DF153, DF154, DF151, DF351 P150 Promil

v.6.	Indicator	Rdam
v.6a	Test DSS operator interface presentation process (retrieval from DSS database, conversion and presentation)	DF123, DF124 P121 Result collection DF125 DS 123 Result data DF204 P201 User interface
v.6b	Test DSS Operator Interface intervention process (external retrieval, conversion and storage in DSS database)	P201 User interface DF 202 DS1 Input data
v.6c	Test DSS scenario process (external or internal retrieval, conversion and storage in DSS database)	P201 User interface DF 202 DS1 Input data

Following the same methodology as described above for the Rotterdam example, the processes have been assigned as follows to the sub-indicators at each of the sites:

Indicator v.4 Processes assigned to sub-indicators at site level*

Nr.	Indicator	Berlin	Leicester	Paris	Prague	Rome	R'dam*
v.4a	Test Interface to Traffic Monitoring process (external retrieval, conversion and storage in DSS database)	P2.1	P1 P1/ AVTUNE P1/RISO	P2.1 P2.2	P1	P6 DF1 DF2 DF3 DF4 DS1	P3 DS1
v.4b	Test Interface to Meteo Monitoring process (external retrieval, conversion and storage in DSS database)	P2.2	P3.2 P3.3 DFA6	P2.3	P3	P7 DF 11 DF 12 DF 13 DF 35 DS5	P4, DS1
v.4c	Test Interface to Environmental Monitoring network process (external retrieval, conversion and storage in DSS database)	P2.3	P3.3 DFA7	P2.4	P3	P7 DF 12 DF 13 DF 35 DS5	P6 DS1
v.4d	Test Interface to sources of Health information process (external retrieval, conversion and storage in DSS database) NOTE: Not applicable for Berlin	N.A.	T.B.D.	N.A.		N.A.	P2 DS1
v.4 ^e	Test Interface to static & infrequently updated information process (external retrieval, conversion and storage in DSS database)	P31	P3.2	P1	P1, P2 P150	P7 DF6 DF7 DS5	P1 P2 DS1 DS150 P150
v.4 ^f	Test interface to Information flow process (retrieval from DSS database, conversion and presentation)	P4 P3	P6	P7	P301 P302 P311 P121	P5	DS1 DS123 P302 P305 DS301 P311

* processes from D5.2

Indicator v.5: Processes assigned to sub-indicators at site level*

Nr.	Indicator	Berlin	Leicester	Paris	Prague	Rome	Rdam
v.5a	Test Air Quality Emission process (retrieval from DSS database, conversion and storage in DSS database)	P2.4	P3.3	P5.1.1 P5.1.2 P5.2.1 P5.2.2 P5.2.3 P5.2.4	P5	P2 DF 9 DF 14 DF 21 DS4	P101 P111 DS1 DS101 DS102 DS108
v.5b	Test Air Quality Concentration process (retrieval from DSS database, conversion and storage in DSS database)	P2.4	P3.3 DFA17	P5.3 P5.4 P5.5 P5.6	P5	P2 DF 14 DF 20 DF 22 DF 28 DF 36 DS6	P120 P101 DS104 DS105 DS106 DS107 DS108 DS121 DS122
v.5c	Test Noise Modelling process (retrieval from DSS database, conversion and storage in DSS database)	P2.5	P3.4 DFN9	N.A.	P5	NONE	N.A.
v.5d	Test Traffic Modelling & Forecast process: (retrieval from DSS database, conversion and storage in DSS database)	P2.1	P2	P4.1.1 P4.1.2 P4.2 P4.3 P4.4 P4.5	N/A	P1 DF 5 DF 8 DF 16 DF 18 DF 15 DS3	P150 DS150 DS123 DS1

** processes from D5.2*

Indicator v.6: Processes assigned to sub-indicators at site level*

Nr.	Indicator	Berlin	Leicester	Paris	Prague	Rome	Rdam
v.6a	Test DSS operator interface presentation process (retrieval from DSS database, conversion and presentation)	P5	P6	P8	P6	P5 DF 21 DF 22	P121 P201 DS123
v.6b	Test DSS Operator Interface intervention process (external retrieval, conversion and storage in DSS database)	P5	P6	P8	P8	P5 DF 18 DF 21	P201 DS1
v.6c	Test DSS scenario process (external or internal retrieval, conversion and storage in DSS database)	P5	P4	P6	DS8	P3 P4 DF 23 DF 24 DF 25 DF 26 DF 27 DS 8	P201 DS1

** processes from D5.2*

ANNEX 2 Common outline for questions of indicator v.8a (professional users)

Questions about Functional Requirements <i>To which extent are the following requirements implemented satisfactory?</i> Rating 1-5 (1=not at all satisfactory 5=very satisfactory) When the rating is below 4, please ask explanation		Berlin	Leicester	Paris	Prague	Rome	Rotterdam	SCORE
Traffic information management								
1	Does the system support on-line network traffic monitoring through interface with the traffic control and monitoring systems	X	X	X		X	X	
2	Does the system support accurate and efficient incident detection?	X	X			X	X	
3	Does the system support recording of traffic data and formation of historical series and statistics	X	X	X	X	X	X	
4	Does the system support traffic forecasting?	X			X	X	X	
5	Does the system support traffic demand modelling?		X	X		X		
6	Does the system support the optimisation of traffic control?		X			X		
7	Does the system support the evaluation of short-term and long-term traffic measures?	X	X	X	X	X	X	
8	Does the system support near real-time traffic status representation for the whole demonstration area	X	X	X		X	X	
Air quality modelling								
9	Does the system support emissions modelling based on near real-time traffic measurements?	X	X	X	X	X	X	
10	Does the system support emissions modelling based on modelled traffic data?	X	X	X	X	X	X	
11	Does the system support pollutants dispersion modelling at the street and area levels?	X	X	X	X	X	X	
12	Does the system support recording of monitored pollutant levels and modelled data?	X	X	X	X	X	X	
13	Does the system support background pollution modelling?	X	X	X	X	X		
14	Does the system support noise modelling at the <i>hotspots</i> ?	X	X		X			
15	Does the system support air quality modelling based on current traffic levels and on predefined traffic and demand management scenarios?	X	X	X	X	X	X	
16	The system shall support evaluation of the environmental effect of short and long term transport policies	X	X	X	X	X	X	

ANNEX 3 Common outline for questions for v.8b (professional users)

<p>Questions about understandable information Rating 1-5 (1=not at all satisfactory 5=very satisfactory) When the rating is below 4, please ask explanation</p>	B e r l i n	L e i c e s t e r	P a r i s	P r a g u e	R o m e	R o t e r d a m	SCORE
Information presentation							
Does the system support data representation via maps, charts and generic tables	X	X	X	X	X	X	
Environmental maps							
How do you rate the comprehensibility of the HEAVEN information presentation via <i>maps</i>	X	X	X		X	X	
How easy to use is the HEAVEN information presentation via <i>maps</i>	X	X	X		X	X	
How usefull is the HEAVEN information presentation via <i>maps</i> to manage urban mobility		X	X		X	X	
How do you rate the comprehensibility of the colour codes used on the <i>maps</i>	X	X	X		X	X	
Is the level of geographical detail presented in maps satisfactory	X	X	X		X	X	
Environmental charts and generic tables							
How do you rate the comprehensibility of the HEAVEN information presentation <i>via charts and generic tables</i>	X	X			X	X	
How easy to use is the HEAVEN information presentation <i>via charts and generic tables</i>	X	X			X	X	
How usefull is the HEAVEN information presentation <i>via charts and generic tables</i> to manage urban mobility		X			X	X	
Traffic maps							
How do you rate the comprehensibility of the HEAVEN information presentation via <i>maps</i>	X	X	X		X		
How easy to use is the HEAVEN information presentation via <i>maps</i>	X	X	X		X		
How usefull is the HEAVEN information presentation via <i>maps</i> to manage urban mobility	X	X	X		X		
How do you rate the comprehensibility of the colour codes used on the <i>maps</i>	X	X	X		X		
Is the level of geographical detail presented in maps satisfactory	X	X	X		X		
Traffic charts and generic tables							
How do you rate the comprehensibility of the HEAVEN information presentation <i>via charts and generic tables</i>	X	X	X		X		
How easy to use is the HEAVEN information presentation <i>via charts and generic tables</i>	X	X	X		X		
How usefull is the HEAVEN information presentation <i>via charts and generic tables</i> to manage urban mobility	X	X	X		X		
Health information							
How do you rate the comprehensibility of health information presented		X			X	X	
How easy to use is the health information presented		X			X	X	
Information output							
Does the system deliver reports dealing with model outputs and evaluation of traffic demand management strategies	X	X		X	X	X	
Does the system support attention and alarm pollutant levels achievement detection and forecast	X	X	X		X	X	
Is Information presentation driven through a suitable MMI	X	X	X	X	X	X	
Are you satisfied with the update interval of the information	X	X	X		X	X	
Operator interface							

	Questions about understandable information Rating 1-5 (1=not at all staisfactory 5=very satisfactory) When the rating is below 4, please ask explanation	B e r l i n	L e i c e s t e r	P a r i s	P r a g u e	R o m e	R o t t e r d a m	SCORE
	Does the system interface support operator driven scenario definition	X	X	X	X	X	X	
	Is the system interface for support of operator driven definitions comprehensible?		X	X		X	X	
	Is the system interface for support of operator driven definitions easy to use?		X	X		X	X	
	Is the system interface for support of operator driven definitions useful to manage urban mobility?		X			X	X	
	Does the system interface drive the operator through the tasks related to off-line evaluation of the impact of scenarios on the environment		X	X	X	X	X	
	Are these procedures comprehensible		X	X		X	X	
	Are these procedures easy to use		X	X		X	X	

ANNEX 4 Common outline for questions for v.9 (general public)

<p>Questions on understandable information</p> <p>Rating 1-5 (1=not at all satisfactory 5=very satisfactory)</p> <p>When the rating is below 4, please ask explanation</p>	B	L	P	P	R	R	SCORE
	er	ic	ar	ra	om	ot	
	li	es	is	g	e	te	
	n	st		u		r	
		e				d	
		r				a	
		t				m	
Information presentation	X	X	X	X	X	X	
Environmental maps							
How readable is HEAVEN information via <i>maps</i>	X	X	X		X	X	
How do you rate the comprehensibility of the HEAVEN information presentation via <i>maps</i>	X	X	X		X	X	
How easy to use is the HEAVEN information presentation via <i>maps</i>	X	X	X		X	X	
How usefull is the HEAVEN information presentation via <i>maps</i>	X	X	X		X	X	
How do you rate the comprehensibility of the colour codes used on the <i>maps</i>	X	X	X		X	X	
Is the level of geographical detail presented in maps satisfactory	X	X	X		X	X	
Environmental charts and generic tables							
How readable is HEAVEN information via <i>via charts and generic tables</i>	X	X			X	X	
How do you rate the comprehensibility of the HEAVEN information presentation <i>via charts and generic tables</i>	X	X			X	X	
How easy to use is the HEAVEN information presentation <i>via charts and generic tables</i>	X	X			X	X	
Traffic maps							
How do you rate the comprehensibility of the HEAVEN information presentation via <i>maps</i>		X	X		X		
How easy to use is the HEAVEN information presentation via <i>maps</i>		X	X		X		
How do you rate the comprehensibility of the colour codes used on the <i>maps</i>		X	X		X		
Is the level of geographical detail presented in maps satisfactory		X	X		X		
Traffic charts and generic tables							
How do you rate the comprehensibility of the HEAVEN information presentation <i>via charts and generic tables</i>		X			X		
How easy to use is the HEAVEN information presentation <i>via charts and generic tables</i>		X			X		
Health information							
How do you rate the comprehensibility of health information presented					X	X	
How easy to use is the health information presented					X	X	

ANNEX 5 Working table on testing physical functioning on the local level for the local verification plan of Rotterdam

V.4	Indicator	Processes (Del 5.2)	HW, SW & Connections	Method of Assessment	Reference Case	Success Criterion
v.4a	Test Interface to Traffic Monitoring process (external retrieval, conversion and storage in DSS database)	P3 RT Traffic Data DS1 Input data	modem, cable, arrangements with dS+V, arrangements with RWS	Number of system failures. Testperiod: 1 to 3 days	N/A for new system	95% of time operational
				Correct data in and out. Frequency of testing: 1 to 3 times	Data in monitoring station	Data in database equals data in monitoring station
				Speed Testperiod: 1 to 3 days	N/A for new system	Process completed within 1 minute
v.4b	Test Interface to Meteo Monitoring process (external retrieval, conversion and storage in DSS database)	P4 Meteo RT DS1 Input data	modem, cable, arrangements with KNMI	Number of system failures. Testperiod: 1 to 3 days	N/A for new system	95% of time operational
				Correct data in and out. Frequency of testing: 1 to 3 times	Data in monitoring station	Data in database equals data in monitoring station
				Speed Testperiod: 1 to 3 days	N/A for new system	Process completed within 1 minute
v.4c	Test Interface to Environmental Monitoring network process (data stored into Heaven database by external process)	DS1 Input data	process by DCMR, write-rights for DCMR to put data in DS1 , arrangements with DCMR	Number of system failures. Testperiod: 1 to 3 days	N/A for new system	95% of time operational
				Correct data in and out. Frequency of testing: 1 to 3 times	Data in monitoring station	Data in database equals data in monitoring station
				Speed Testperiod: 1 to 3 days	N/A for new system	Data available max. 25 minutes past completed hour

v.4d	Test Interface to sources of Historic information process (external retrieval, conversion and storage in DSS database)	P2 Historic data DS1 Input data	sourcefiles with historic data for conversion	Number of System failures Testperiod: 1 to 3 days	N/A for new system	On demand
				Correct data in and out. Frequency of testing: 1 to 3 times	Data in data source	Data in database equals data in source
				Speed: not applicable		
v.4e	Test Interface to static & infrequently updated information process (external retrieval, conversion and storage in DSS database)	P1 Import static data P2 Historic data DS1 Input data DS150 PROMIL P150 PROMIL	sourcefiles with historic data for conversion, PROMIL software	Number of System failures Testperiod: 1 to 3 days	N/A for new system	On demand
				Correct data in and out. Frequency of testing: 1 to 3 times	Data in data source	Data in database equals data in source
				Speed: not applicable		
v.4f	Test interface to Information results (retrieval from DSS database, conversion and presentation)	DS1 Input data DS123 Result data P302 Map distribution P305 Data distribution DS301 Website P311 Homepage	modem, cable, arrangements for webhosting	Correct data in and out. Frequency of testing: 1 to 3 times	Data in DSS database	Data information presentation equals data in database
				Correct data in and out. Frequency of testing: 1 to 3 times	Data in monitoring station	Data in database equals data in monitoring station
				Speed Testperiod: 1 to 3 days	N/A for new system	Fast enough to allow the entire system to reach an hourly update

V.5	Indicator	Rdam	HW, SW & Connections	Method of Assessment	Reference Case	Success Criterion
v.5a	Test Vehicle Emission process (retrieval from DSS database, conversion and storage in DSS database)	DS1 Input data P101 Data preparation DS 101 Network traffic DS 102 Traffic P111 Vehicle emission DS 108 Emissions		Number of system failures Testperiod: 1 to 3 days	N/A for new system	95% of time operational
				Speed Testperiod: 1 to 3 days	N/A for new system	Fast enough to allow the entire system to reach an hourly update
v.5b	TestConcentration process (retrieval from DSS database, conversion and storage in DSS database)	DS1 Input data P101 Data preparation DS 104, 105, 106, 107 DS 108 Emmission P120 Concentration model DS121, DS122		Number of system failures Testperiod: 1 to 3 days	N/A for new system	95% of time operational <i>to be defined</i>
				Speed Testperiod: 1 to 3 days	N/A for new system	Fast enough to allow the entire system to reach an hourly update
v.5c	Test Noise Modelling process (retrieval from DSS database, conversion and storage in DSS database)	N/A		Number of system failures Testperiod: 1 to 3 days	N/A for new system	95% of time operational
				Speed Testperiod: 1 to 3 days	N/A for new system	Fast enough to allow the entire system to reach an hourly update
v.5d	Test Traffic Modelling & Forecast process: (retrieval from DSS database, conversion and storage in DSS database)	DS150, DS123, DS1 P150 PROMIL		Number of system failures Testperiod: 1 to 3 days	N/A for new system	On user demand
				Speed: not applicable		
v.5e	Test resultprocessing process (retrieval from temporary resultfiles, storage in DSS database, map conversion)	DS108 Emissions DS121 Concentrations DS122 Logfile P121 Result collection DS123 Result data P301 Map generation	ArcView GIS	Correct data in and out. Frequency of testing: 1 to 3 times	Data in DSS database	Data information presentation equals data in database
				Correct data in and out. Frequency of testing: 1 to 3 times	Data in monitoring station	Data in database equals data in monitoring station
				Speed Testperiod: 1 to 3 days	N/A for new system	Fast enough to allow the entire system to reach an hourly update

V.6	Indicator	Rdam	HW, SW & Connections	Method of Assessment	Reference Case	Success Criterion
v.6a	Test DSS operator interface presentation process (retrieval from DSS database, conversion and presentation)	P121 Result collection DS 123 Result data P201 User interface	ArcView GIS	Number of system failures Testperiod: 1 to 3 days	N/A for new system	On user demand
				Correct data in and out Test Frequency: 1 to 3 times	Data in DSS	Presented data in equals data in DSS
				Speed: not applicable		
v.6b	Test DSS Operator Interface intervention process (external retrieval, conversion and storage in DSS database)	P201 User interface DS1 Input data	ArcView GIS	Number of system failures Testperiod: 1 to 3 days	N/A for new system	On user demand
				Correct data in and out Test Frequency: 1 to 3 times	Data introduced by operator	Stored data in DSS equals introduced data
				Speed: not applicable		
v.6c	Test DSS scenario process (external or internal retrieval, conversion and storage in DSS database)	P201 User interface DS1 Input data	ArcView GIS PROMIL OMNITRANS	Number of system failures Testperiod: 1 to 3 days	N/A for new system	95% of time operational
				Correct data in and out. Test Frequency: 1 to 3 times	Scenario data	Data stored in DSS equals scenario data
				Speed: not applicable		