

**INTERNATIONAL STUDY  
OF HIGHWAY DEVELOPMENT  
AND MANAGEMENT ISOHDM  
HDM-4 SESSION**

Tuesday 21 October 2003 (1.30 – 5.00 p.m.)

**SESSION AGENDA &  
INTRODUCTORY REPORT**

# Session Agenda

## **PART 1: Utilization of the HDM-4 Version 1.0**

### **1. Introduction**

Mr. Pierre JOUBERT  
(Session Chairperson, Coordinator of the HDM-4 Expert Group/FRANCE)

### **2. Presentation about the case in Lebanon**

Ms. Emmanuelle FRENEAT (Scetauroute/FRANCE)

### **3. Presentation on the case in Czech Rep.**

Dr. Miloš CIHÁK (Czech Road and Motorway Directorate/CZECH REP.)  
Mr. Andy CLARKE (Mott MacDonald Consultants/UK)  
Mr. Vratislav ŠKVOR (PRAGOPROJEKT/ CZECH REP.)

### **4. Presentation on the case in Japan**

Dr. Jian XING (Expressway Technology Center/JAPAN)

### **5. Presentation on the case in Finland**

Mr. Pasi PATRIKAINEN (Finnish National Road Administration/FINLAND)

## **PART 2: Utilization of the HDM-4 Version 2.0**

### **1. Introduction**

Mr. Pierre JOUBERT  
(Session Chairperson, Coordinator of the HDM-4 Expert Group/FRANCE)

### **2. Presentation on the HDM-4 Version 2.0**

Dr. J. B. ODOKI (University of Birmingham/UK)

### **3. The future organization of the HDM-4**

Mr. Jean-François CORTÉ (PIARC Secretary General/FRANCE)

### **4. Closure**

Mr. Pierre JOUBERT (Session Chairperson, Coordinator of the HDM-4 Expert Group/FRANCE)

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# INTRODUCTION

The International Study of Highway Development and Management Tools (ISOHDM) was established in 1994 to develop improvements in knowledge, practice and systems to support effective investments in road transport infrastructure. Four principal sponsors (The World Bank, Asian Development Bank, UK Department for International Development (formerly ODA), and the Swedish National Road Administration) jointly established the ISOHDM Study. The Finnish National Road Administration, the Federal Highways Administration (USA), and the Inter-American Federation of Cement Producers (FICEM) also made major contributions to the Study.

In 1998, PIARC took responsibility for the implementation and maintenance phases of the ISOHDM project, on behalf of the original project sponsors. PIARC established the ISOHDM Project Secretariat at the central office in Paris, led by the ISOHDM Project Coordinator (Neil Robertson, on secondment from Australia). In early 2001, two part time Associate Coordinators (Pierre Joubert, LCPC, France and Andrés Caroca, Chile) were appointed to help manage regional implementation and language issues.

Under PIARC ISOHDM direction, Version 1 of HDM Technology was released globally in February 2000. HDM Technology consists of the publication of improved knowledge and practice in the Highway Development and Management Series documents, and new road investment analysis software, known as HDM-4. Subsequent updates to HDM-4 Version 1 (Versions 1.1, 1.2 and 1.3) have been released in the period to early 2002, in response to identified needs for user-requested enhancements and corrections.

The ISOHDM Project has established a strong position in its global market place in a relatively short period of time. User interest registrations have been received from more than 800 people from 113 countries. Of the interest registrations, 32% have come from developing countries, while of the countries represented, 63% are developing countries or economies in transition.

In the 18 months between March 2000 and October 2001, more than 700 HDM-4 software licences had been sold, distributed across all regions of the world. Developing and in-transition economies have taken 38% of the licence sales.

During 2000 and 2001, 161 training and dissemination events have occurred in 51 countries across all world regions. The training and dissemination events have allowed 5124 people to participate, including 1207 attending courses, and 1021 attending workshops.

During the implementation period (years 2000 and 2001), interactions between HDM-4 users and the project teams have provided numerous channels for feedback on user satisfaction in the Version 1 product, and on user's requirements for corrections to, and enhancement of the existing products. User interactions have included software testing, training courses, user and technical support interactions, and formal user feedback and change requests captured by the internet-based Project Change Management System.

A commissioned study was conducted in 2000 of the requirements of senior management of road administrations for decision support for road investment planning (McCoubrey, 2000).

A survey has been conducted during 2002 of the opinions of users of the HDM-4 software suite for analysis of road investments. The survey has evaluated measures of user satisfaction with the functionality of the existing version of the analysis tools, and also has tested the support for proposals to upgrade the tool with new or improved functions.

The survey was conducted by way of questionnaire distributed to interested stakeholders registered on the ISOHDM contacts database, and was open for responses between July and October 2002. A total of 55 responses were received from 34 countries from all regions of the world.

There are about 1300 trained users at the present time. However there are an estimated 1800 untrained users. About 2100 investment studies have been conducted using HDM-4 since its release nearly three years ago.

The opportunities for continued growth in the acceptance and application of good practice in road investment decision support rely on delivering fundamental improvements to HDM Technology to meet client's needs for the future. These improvements can be delivered only through the development and implementation of a new version (Version 2) of the HDM Technology products.

The main goal of HDM-4 Version 2 will be to build on the capabilities built into Version 1 and provide additional facilities that:

- meet the needs of senior decision makers in both developing and developed countries;
- strengthen the management of road systems as business assets over long term planning horizons;
- have improved integration with existing road asset management systems;
- have improved models for estimating the costs and benefits to non-motorised transport;
- expand the scope of HDM-4 to more effectively deal with low traffic roads, and hence emphasising their importance within a road network;
- provide a simpler intuitive user interface for all categories of users.

In addition, there is an important opportunity with the Version 2 developments to improve the documentation of practical guidelines for practitioners in applying the technology.

A HDM-4 session will take place on Tuesday 21 afternoon in Durban. During this session, HDM-4 version 1.x applications from all over the world will be presented. The ongoing developments for version 2 will also be detailed. Specific time will be allocated to discussion with participants.

# BACKGROUND, ACHIEVEMENTS, PERSPECTIVES

## 1. Background

The International Study of Highway Development and Management Tools (ISOHDM) was established in 1994 to develop improvements in knowledge, practice and systems to support effective investments in road transport infrastructure. Four principal sponsors (The World Bank, Asian Development Bank, UK Department for International Development (formerly ODA), and the Swedish National Road Administration) jointly established the ISOHDM Study. The Finnish National Road Administration, the Federal Highways Administration (USA), and the Inter-American Federation of Cement Producers (FICEM) also made major contributions to the Study.

In 1998, PIARC took responsibility for the implementation and maintenance phases of the ISOHDM project, on behalf of the original project sponsors. PIARC established the ISOHDM Project Secretariat at the central office in Paris, led by the ISOHDM Project Coordinator (Neil Robertson, on secondment from Australia). In early 2001, two part time Associate Coordinators (Pierre Joubert, LCPC, France and Andrés Caroca, Chile) were appointed to help manage regional implementation and language issues.

Strategic management of the PIARC ISOHDM Project has been guided by the ISOHDM Business Plan (*ISOHDM, 2000*)<sup>1</sup>

The ISOHDM Project Secretariat works closely with a number of critical project teams, which are in the main contracted to the project to fulfill specific responsibilities. Principal among these teams are the following:

- ISOHDM Technical Secretariat, in the Department of Civil Engineering, University of Birmingham (responsible for HDM-4 system analysis, design, development, maintenance, technical support and documentation);
- International Division of TRL Ltd. (formerly the Transport Research Laboratory), UK (responsible for modelling specification and advice, training resource development and advice, and advice on regional implementation issues);
- Latin American Study Team, based in Chile and Argentina (responsible for concrete pavement modelling technology);
- Kudos International, UK (responsible for technical editing of HDM Series documents);
- Document and software user interface translation teams supporting French, Spanish and Russian editions of HDM Technology products;
- HDM Technology product distributors based in USA, France and Spain;
- Many individuals providing expert advice on product specifications, software testing, regional applications and training services;
- The HDM-4 Project Group, a reference group of international experts and practitioners that advises the ISOHDM Project Secretariat on strategic project issues.

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<sup>1</sup> ISOHDM *The International Study of Highway Development and Management Tools (ISOHDM): A Business Plan for 2000 – 2003*. PIARC ISOHDM, June 2000.

Under PIARC ISOHDM direction, Version 1 of HDM Technology was released globally in February 2000. HDM Technology consists of the publication of improved knowledge and practice in the Highway Development and Management Series documents, and new road investment analysis software, known as HDM-4. Subsequent updates to HDM-4 Version 1 (Versions 1.1, 1.2 and 1.3) have been released in the period to early 2002, in response to identified needs for user-requested enhancements and corrections.

Achievements of the PIARC ISOHDM Project to date are outlined in the following section.

During the implementation period (years 2000 and 2001), interactions between HDM-4 users and the project teams have provided numerous channels for feedback on user satisfaction in the Version 1 product, and on user's requirements for corrections to, and enhancement of the existing products. User interactions have included software testing, training courses, user and technical support interactions, and formal user feedback and change requests captured by the internet-based Project Change Management System.

A commissioned study was conducted in 2000 of the requirements of senior management of road administrations for decision support for road investment planning (*McCoubrey, 2000*)<sup>2</sup>.

During 2001, the ISOHDM Project (in particular the Technical Secretariat) developed a discussion paper on requirements for improvements to the HDM Technology in Version 2 of the ISOHDM products (*ISOHDM 2001*)<sup>3</sup>. This paper has taken into account the priority issues raised by HDM Technology users, together with identified technology demands to maintain market relevance. Many members of the HDM international community, including the HDM-4 Project Group, reviewed the paper, and gave advice on user priorities for action.

Proposals for HDM-4 improvements, based on the above collation of requirements, were discussed by the World Road Council during a Seminar on Road Management and HDM-4, held with the Council meeting in Rome in October 2001. On that occasion, Council members were asked to consider opportunities for continuing support for the PIARC ISOHDM Project, including sponsorship by PIARC member countries. The Council Resolution on these matters is presented in Appendix 1 to this document. In particular, the Council resolved that:

- Budget will be reserved for the development of HDM-4 Version 2, which should take into account the requirements of users, and which is based on a business case;
- The HDM-4 project will be extended to the end of 2003;
- PIARC member countries are asked to consider contributing towards the budget shortfall;
- Every effort should be made to minimize the possible project budget deficit.

This Business Case results from the described processes of user and stakeholder consultation.

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<sup>2</sup> McCoubrey, W.J. *HDM-4 Review Project: Information Needs for Decision Taking*, University of Birmingham, September 2000.

<sup>3</sup> ISOHDM *HDM-4: Way Forward: Outline Proposals for Version 2* ISOHDM Technical Secretariat, University of Birmingham, August 2001.

## 2. HDM-4 Market Position

The HDM Technology products in Version 1 consist of the following components:

- A framework of principles and practices for road asset management decision support;
- Publication of state-of-the-art knowledge, modelling theory, procedures, and application of good practice in road investment decision support;
- Publication of algorithmic processes and logic rules involved in predicting road investment performance;
- Publication of road investment analysis software (HDM-4) that implements the principles, practice and algorithmic processes, as a practical, user friendly analysis tool;
- Publication of training resources and materials that define the minimum standards required by PIARC ISOHDM for training products supplied by others, and provide resources that commercial training providers can use and adapt to their needs.

Currently, much of the HDM market responds most to the software level of product, even though it is only one of a "hierarchy" of products. It is possible for individual user organisations to utilise the product range at any of the levels of knowledge, algorithmic processes or HDM-4 software. The choice will depend upon influences such as the maturity of decision support existing practices in the organisation, the nature of available resources (e.g. existing road management information), and the organisation's road asset management objectives, and requirements for decision support systems.

The ISOHDM Project has established a strong position in its global market place in a relatively short period of time. User interest registrations have been received from more than 800 people from 113 countries. Of the interest registrations, 32% have come from developing countries, while of the countries represented, 63% are developing countries or economies in transition.

In the 18 months between March 2000 and October 2001, more than 700 HDM-4 software licences had been sold, distributed across all regions of the world. Developing and in-transition economies have taken 38% of the licence sales.

Take-up of the technology (measured in terms of licence and document acquisitions) is currently significantly higher than the volume of legal sales (approximately 500) of the previous investment analysis software, HDM-III, over its life of 14 years. The take-up has occurred at a rate of acquisition approximately three times greater than that planned in original business plans at the start of the PIARC project.

During 2000 and 2001, 161 training and dissemination events have occurred in 51 countries across all world regions. Of these events, 54% were formal training courses of between 3 days and 3 weeks, and 22% were workshops of up to 2 days duration. The training and dissemination events have allowed 5124 people to participate, including 1207 attending courses, and 1021 attending workshops.

A summary of the achievements of the ISOHDM Project during 2000 and 2001 is presented in Appendix 2.



Market penetration has occurred in all regions of the world, in both developed and developing economies. The HDM technology products are receiving broad and strongly positive support in developing countries and economies in transition. HDM Technology is proving particularly popular because it offers a rational and logical framework for reform of road investment management that is capable of demonstrating the benefits of reform, even in relatively short term planning horizons. It is also a framework that is supported and promoted by the international development funding agencies, to justify their investments.

The HDM-4 software package tends to be popular in developing countries, because it provides a solution that can be relatively rapidly implemented without major system implementation effort. Components of the HDM Technology (for example particular models or analysis methodologies) have been used in developed countries to enhance their existing systems and practices.

While the rate of take-up has been very pleasing, this success has not been reflected in the same way in terms of income to the project from product sales. The ISOHDM Project has offered its products in a range of "packages", and has offered substantial discounts for multiple licence sales, for educational applications, and for applications in Special Consideration Countries. This was done to reflect PIARC's policy to promote ready accessibility to good practice and technology according to the user's ability to pay. The pricing policy and discounting have been too popular, and have resulted in lower project sales income than was planned. Furthermore, project costs for product development, maintenance and distribution have been higher than originally budgeted.

There are important opportunities for continuing product enhancement, and for continuing awareness raising. However, while the products are well regarded, the market size is small, is geographically widely distributed, and serves many different language groups. Product viability continues to be difficult to sustain without subsidy through sponsorship.

### **3. HDM-4 User satisfaction**

As is often the case in the release of new software systems, the Version 1 release has received a steady stream of feedback on user satisfaction, both positive and negative. Negative feedback, generally user reports of poor or incomplete functionality or errors, has been dealt with promptly, in terms of corrections released in maintenance updates of Version 1. Two years after first release, the Version 1 products are stable, and relatively negligible levels of negative feedback are now received.

A review of ISOHDM Project strengths, weaknesses, opportunities and threats showed that project products are meeting needs for sound support for road investment decisions. The project has good relationships with its clients and stakeholders, and receives strong support from its user base.

The project products carry some negative perceptions in some markets, such as being not suitable for high traffic, high quality road networks, being "data hungry", or requiring major management cultural change in road administrations. However, these perceptions are usually not correct when compared with product capabilities.

A survey has been conducted during 2002 of the opinions of users of the HDM-4 software suite for analysis of road investments. The survey has evaluated measures of user satisfaction with the functionality of the existing version of the analysis tools, and also has tested the support for proposals to upgrade the tool with new or improved functions.

The survey has been conducted at a time when the existing HDM-4 tools have been used in many countries for more than two years. A business case for the development of HDM-4 Version 2 products has been prepared for the guidance of the World Road Association, and for the information of users.

The objectives of the survey were to:

1. Establish demographic information about usage patterns for HDM Technology;
2. Investigate how well the existing HDM-4 tool is meeting the needs of its users;
3. Investigate whether the proposed improvements are regarded by users as meeting priority outstanding needs;
4. Investigate how effective the ISOHDM project implementation activities have been.

The survey was conducted by way of questionnaire distributed to interested stakeholders registered on the ISOHDM contacts database, and was open for responses between July and October 2002. A total of 55 responses were received from 34 countries from all regions of the world. The number of responses represents approximately 10% of active HDM-4 users, and approximately 5.5% of all HDM-4 licences distributed. One third of responses represent developing countries or economies in transition.

A summary of the results of this survey is presented in Appendix 3.

This opinion survey has produced credible and representative results in each of the four areas that it addressed. The principal conclusions include the following:

- HDM-4 is used to conduct road investment studies primarily for government road administrations, government road agencies and funding agencies, accounting for slightly more than two thirds of all usage. Most of these studies are conducted by consultants to those agencies and by agency staff. Education, training and research activities account for slightly more than one quarter of all usage.
- There are about 1300 trained users at the present time. However there are an estimated 1800 untrained users. About 2100 investment studies have been conducted using HDM-4 since its release nearly three years ago.
- Overall, users are very highly satisfied with the current version of HDM-4, with an 81% satisfaction rating. Satisfaction is reasonably evenly distributed across the seven aspects of functionality that were assessed.
- Overall, users show very strong support for the priorities for proposed improvements in Version 2 of HDM-4, with an 87% overall approval rating. The proposed improvements that were polled comprised many individual improvement aspects classified within five principal areas for improvement.
- The most supported improvement areas are Project Level Applications, Software Enhancements and Existing Technical Models.

## 4. A Vision for the Future of HDM Technology

The Business Plan for the ISOHDM Project (PIARC,2000) sets out a vision, goal, and objectives for ISOHDM, which is reproduced here.

Accordingly, the vision for the ISOHDM has been defined as follows:

**ISOHDM will be a world-wide recognized forum for learning and sharing of best practice road management processes, procedures and management systems.**

### Goals of the ISOHDM

ISOHDM will achieve improvements in good practice in developing and managing road transport systems in all countries, by applying relevant knowledge, and appropriate decision support processes and products.

In other words, ISOHDM:

- will assist institutional management of road systems throughout the world, and
- will develop and sustain the HDM-4 software tools against the best practice management systems.

### Objectives of the ISOHDM

To realise these goals, ISOHDM has as its specific objectives:

- To provide the planning and implementation functions to the administering sponsor, PIARC, to achieve elements of planned goals and strategies within the PIARC Strategic Plan over the period of 2000-2003.
- To ensure that the needs and views of all stakeholders in the road transport sector are known and adequately reflected in the development and implementation of ISOHDM objectives and products.
- To promote the application of ISOHDM research products as best practices in road management processes, which relate to the needs of the Road Transport System and to the Road Administration's performance.
- To provide an international standard tool for road agencies to use as part of their road management functions, to demonstrate best practice procedures in road investment planning, and to make the system as far as possible an important investment decision support component of an "ideal Road Management System".
- To encourage and facilitate international cooperation in improving the tools and approaches that support road management and development in developing, transition and developed countries.

## 5. Objectives for HDM-4 Version 2

The opportunities for continued growth in the acceptance and application of good practice in road investment decision support rely on delivering fundamental improvements to HDM Technology to meet client's needs for the future. These improvements can be delivered only through the development and implementation of a new version (Version 2) of the HDM Technology products.

The main goal of HDM-4 Version 2 will be to build on the capabilities built into Version 1 and provide additional facilities that:

- meet the needs of senior decision makers in both developing and developed countries;
- strengthen the management of road systems as business assets over long term planning horizons;
- have improved integration with existing road asset management systems;
- have improved models for estimating the costs and benefits to non-motorised transport;
- expand the scope of HDM-4 to more effectively deal with low traffic roads, and hence emphasising their importance within a road network;
- provide a simpler intuitive user interface for all categories of users.

In addition, there is an important opportunity with the Version 2 developments to improve the documentation of practical guidelines for practitioners in applying the technology.

# APPENDIX 1

## WORLD ROAD COUNCIL

### RESOLUTION COUNCIL/01/10,

### OCTOBER 2001

On proposal of the Executive Committee, the Council:

- a) agreed to reserve the budget needed for the development of Version 2 of HDM-4, which should take account of requests from users, and which is based on a business case proposed by an ad hoc group to the Executive Committee and approved by the Executive Committee,
- b) decided to extend the HDM-4 project until the end of 2003, at which date the development phase of the project is expected to be completed,
- c) asked member countries to make a contribution towards the budget shortfall of USD 60,000, after taking into account the USD 60,000 offered by the United Kingdom, in accordance with Comex resolution /01-03/6 taken in Vienna in March 2001,
- d) took note of the risk of a deficit at the end of the project, the amount being estimated at USD 80,000,
- e) asked that every effort should be made to minimise the possible deficit, but if this is not possible that PIARC cover the deficit by special provision. The funding for the short term to be agreed by the Secretary General.

# APPENDIX 2

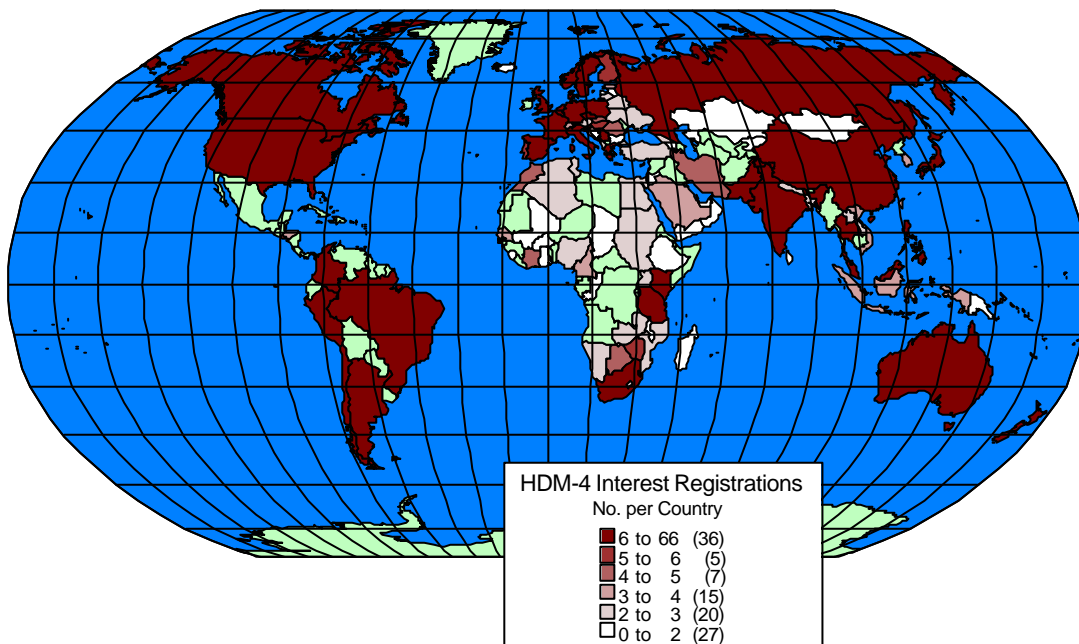
## ISOHDM PROJECT ACHIEVEMENTS

### 2000 AND 2001

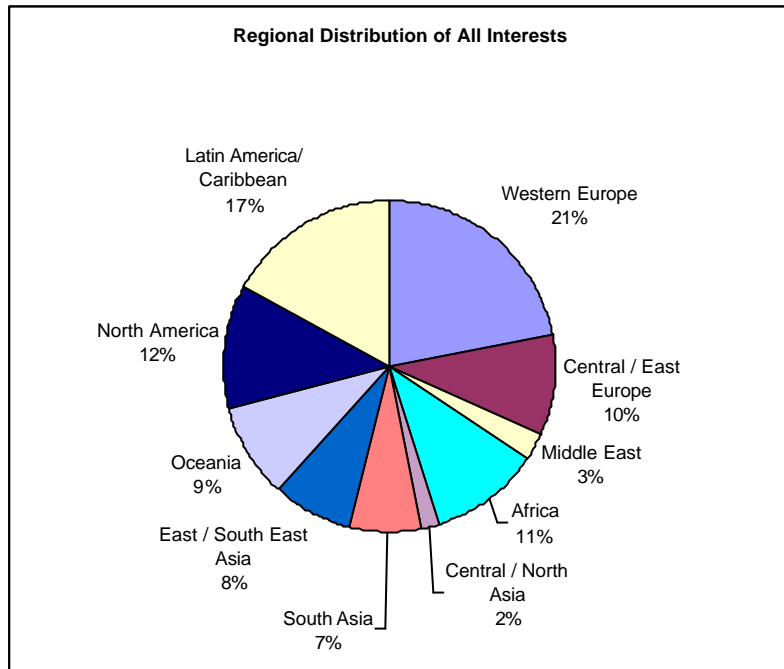
#### User Interest Registrations

Countries that have registered interest in using HDM Technology at January 2002 are shown here. The map represents 822 interest registrations from 113 countries.

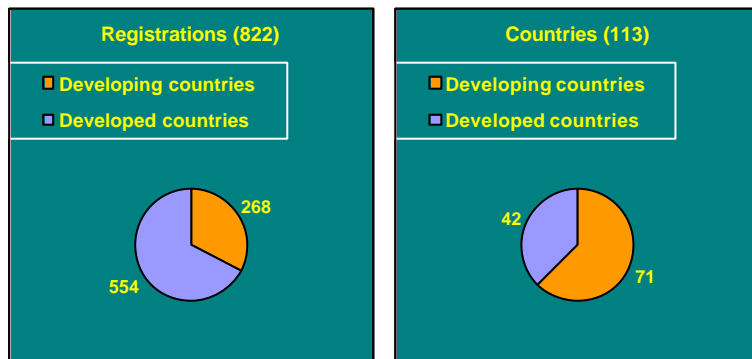
Distribution of Interest in HDM-4



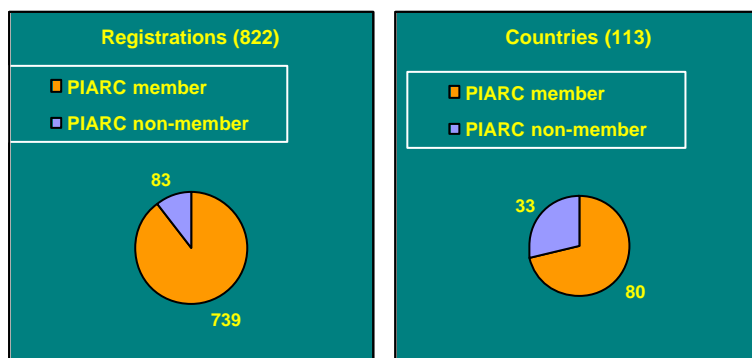
The regional distribution of interest is as follows.



About one third of the interest registrations come from developing countries or economies in transition. About two thirds of the countries represented are developing or transition countries.



Nearly 90% of all interest registrations come from PIARC member countries. PIARC countries represent nearly three quarters of the countries expressing interest in HDM Technology.

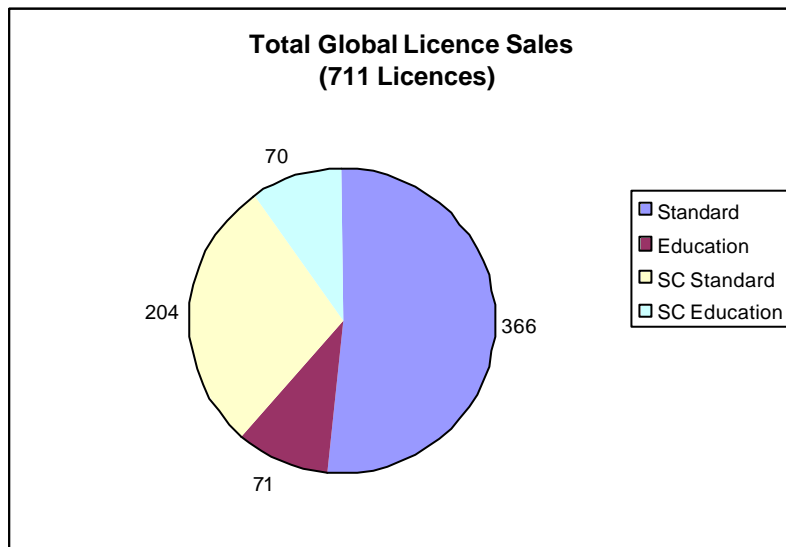


## HDM Technology Product Release History

- HDM-4 Version 1.0 released February 2000
  - HDM Series Volumes 1 - 5
  - HDM-4 software
  - Case studies database
  - English, French & Russian editions
- Version 1.1 update August 2000
  - major software maintenance release - error fixes
- Version 1.2 update April 2001
  - major software maintenance and enhancement release
  - Spanish edition released
- Version 1.3 update January 2002
  - major software maintenance release
  - English, French & Spanish editions

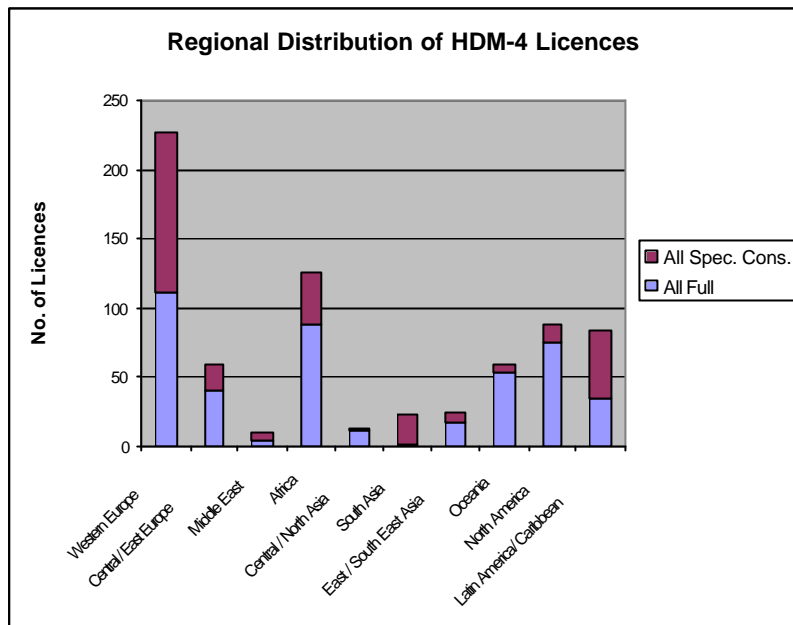
## HDM-4 Licence Sales

At October 2001, a total of 711 licences for HDM-4 Version 1 have been distributed, as single and multiple licence packs.





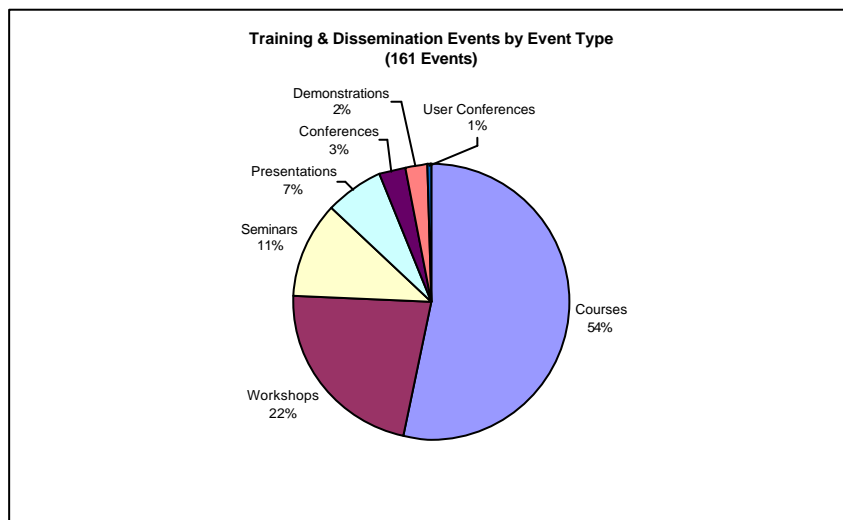
The regional distribution of licences is as follows.

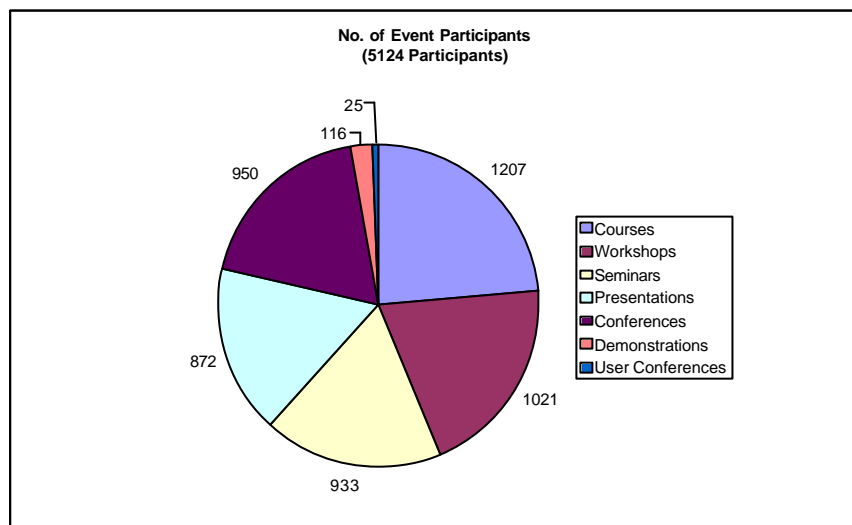
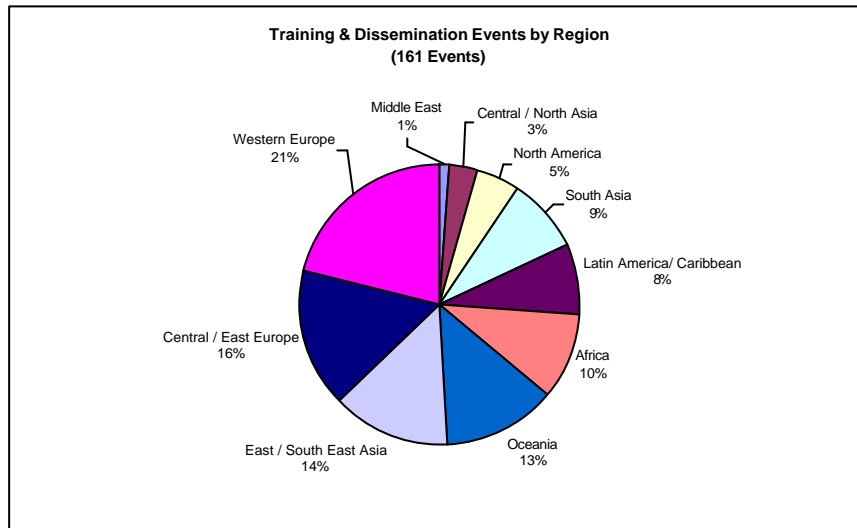


Special Consideration Countries have received 38% of the licences distributed.

## Training and Dissemination Events

In the period June 1999 to September 2001, a total of 161 training and dissemination events have occurred in 51 countries, representing all world regions.





## HDM-4 Website

The HDM-4 Information Centre website <[hdm4.piarc.org](http://hdm4.piarc.org)> was established in January 2000, and provides the following information services.

- General information on road investment decision support, the ISOHDM Project, and HDM Technology products;
- How to obtain HDM Technology products;
- Training opportunities and suppliers;
- User information and support;
- ISOHDM documents and publications;
- Downloading services for project documents, HDM Series publications, reports, training materials, software and HDM-4 data sets;
- Web site topic search and index.

## ISOHDM Document Downloads

The current totals on internet access to downloadable objects from the HDM-4 website are as follows.

Document Type	Total Count			
	English	French	Spanish	Russian
HDM Series volumes	3684	604	698	98
Software documents	1560			104
ISOHDM Reports	2718			
Training presentations	1874			
Software updates	1758		278	
Case study data sets	393	76		
<b>Totals</b>	<b>11987</b>	<b>680</b>	<b>976</b>	<b>202</b>

# APPENDIX 3

## SURVEY OF USER SATISFACTION

This report presents the results of a survey of users of the HDM-4 road investment analysis software suite. The survey has evaluated measures of user satisfaction with the functionality of the existing version of the analysis tools, and also has tested the support for proposals to upgrade the tool with new or improved functions.

The survey has been conducted at a time when the existing tools have been used in many countries for more than two years (following the release of HDM-4 Version 1.0 in March 2000). A business case for the development of HDM-4 Version 2 products has been prepared for the guidance of the World Road Association, and for the information of users. This report complements the business case by providing detailed measures of HDM-4 market opinion to support the direction of future developments.

### Objectives of User Satisfaction Survey

The Business Case<sup>4</sup> for development of HDM-4 Version 2 presented proposals for development of improvements to the HDM-4 investment analysis suite, based on extensive consultation with project stakeholders, including expert users of the technology. After publication of the business case, the user opinion survey was designed to assemble a broadly based series of measures to test the level of acceptance of the existing HDM products (Version 1), and acceptance of the development proposals.

The objectives of the survey were to:

- 1) Establish demographic information about usage patterns for HDM Technology;
- 2) Investigate how well the existing HDM-4 tool is meeting the needs of its users;
- 3) Investigate whether the proposed improvements are regarded by users as meeting priority outstanding needs;
- 4) Investigate how effective the ISOHDM project implementation activities have been.

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<sup>4</sup> PIARC (2002) *ISOHDM: Business Case for the Development of HDM Technology Version 2* The World Road Association, Paris, April 2002.

## Survey Methodology

The survey was conducted by way of questionnaire distributed to interested stakeholders registered on the ISOHDM contacts database. The questionnaire was available to be accessed via internet in two forms:

An on-line form (in the English language) published within the HDM-4 web site;

Questionnaire files in Acrobat PDF form available for download from the HDM-4 web site. Separate files were offered in the English, French and Spanish languages

All registrants on the ISOHDM contacts database contactable by email were invited (by email) on two occasions to respond to the questionnaire. Links to the survey pages in the website were also included in the site home page and "What's New" page.

The survey was open for responses between July and October 2002.

### Survey Questions

The questionnaire contained a total of 36 questions, divided across the questionnaire sections as follows.

Respondent Information	17 questions
HDM-4 Version 1.3 satisfaction	7 questions
HDM-4 Version 2 expectations	8 questions
Effectiveness of HDM Technology implementation	4 questions

Almost all questions were designed for response by multiple choice selection, to limit responses to pre-defined values for analysis purposes. All questions seeking expressions of user opinion also provided for free text comments by the respondent.

### Responses Received

A total of 55 responses have been received from 34 countries, and are included in the analysis of results. In some cases, where a respondent referred to more than one country in which HDM-4 has been applied by the respondent, each country response was included as a separate response.

All responses were submitted using the on-line form.

The number of responses represents approximately 10% of active HDM-4 users, and approximately 5.5% of all HDM-4 licences distributed. This level of response is considered to be a sufficient sample to represent overall opinions of the user base.

Responses have been received from all regions of the world, using a set of 10 global regions adopted for analysing HDM-4 market statistics. The regional distribution of responses is presented in Figure 1.

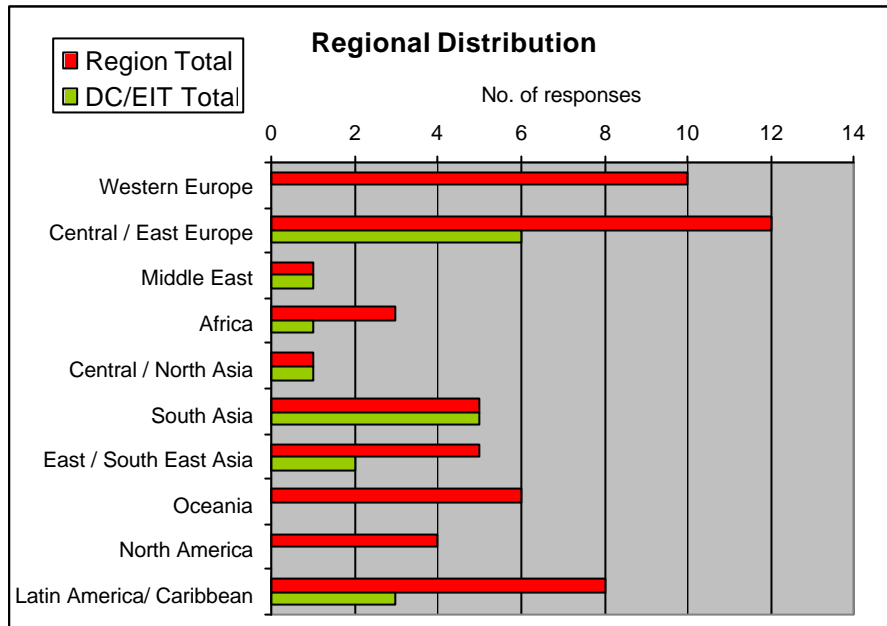


Figure 1 – Regional Distribution of Opinion Survey Responses

Approximately one third of responses have been received from developing countries or economies in transition.

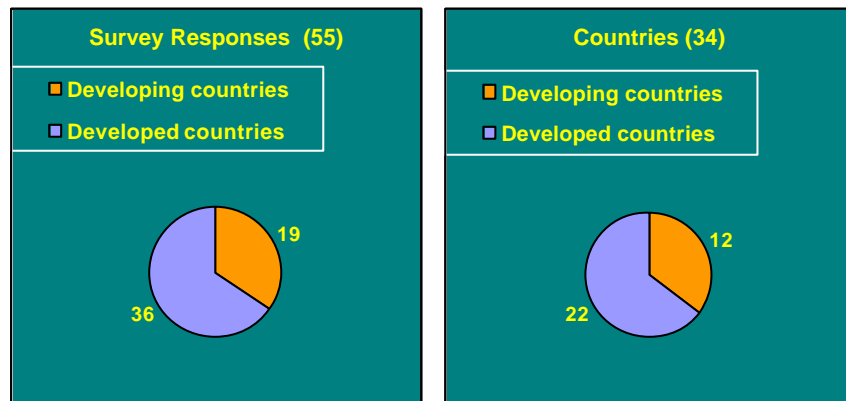


Figure 2 – Survey Responses from Developing and Developed Countries

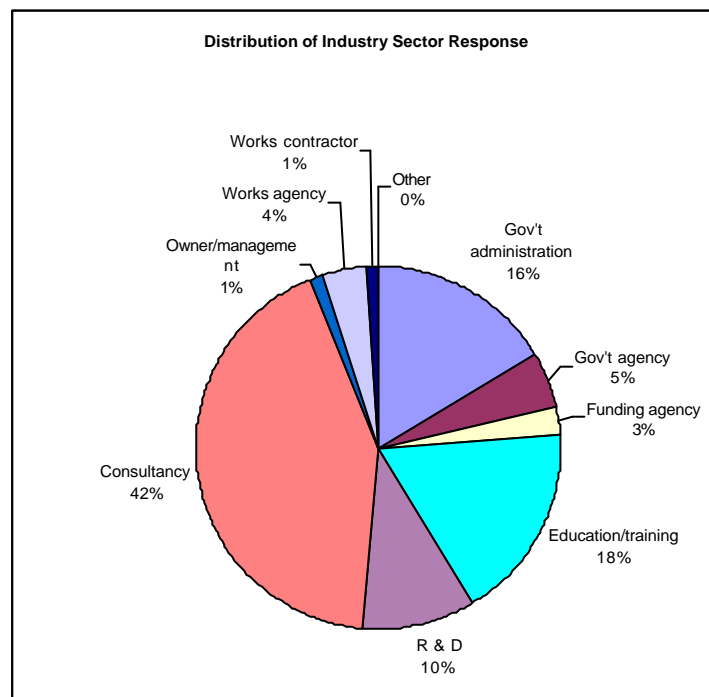
## Survey Results – Quantitative Analysis

The survey responses have been collated and analysed to yield a range of measures of the ways that HDM Technology is being employed in problem solving, the attitudes of users towards how well the tools are meeting their needs, and may meet needs in future, and how well the PIARC ISOHDM Project is guiding the implementation of the technology.

### Demographics of HDM-4 Usage

#### *Industry and Professional Interests in HDM Technology*

Figure 3 shows how usage of HDM-4 is distributed across sectors of the road administration and delivery industry.



**Figure 3 – Distribution of Industry Sector Usage**

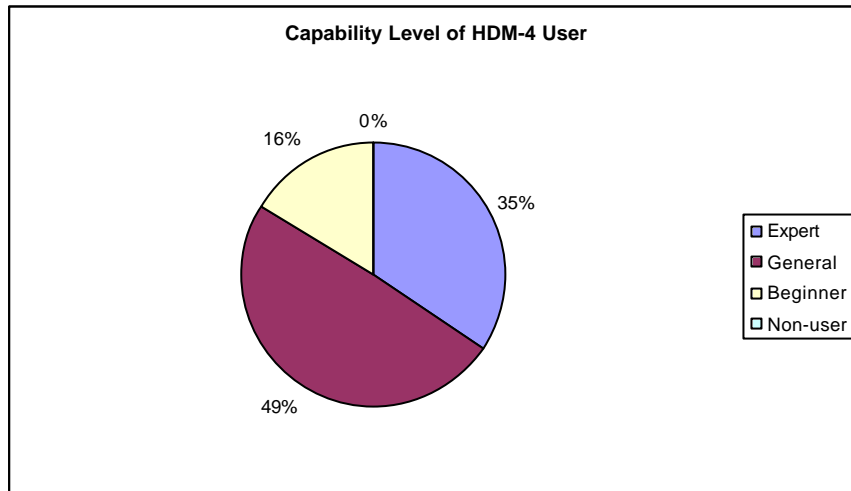
The largest sector is consultancy (42%), followed by government administration and government agencies (21% combined) and education / training (18%). The consultancy sector mainly services the government sectors, private sector infrastructure owners and funding agencies.

The sector proportions shown in Figure 3 closely resemble the proportions arising from general registrations of interest in HDM Technology registered over the past four years.

### Usage and capability level

About half of respondents consider themselves to be general users, while an impressive 35% of respondents reported that they were expert users (

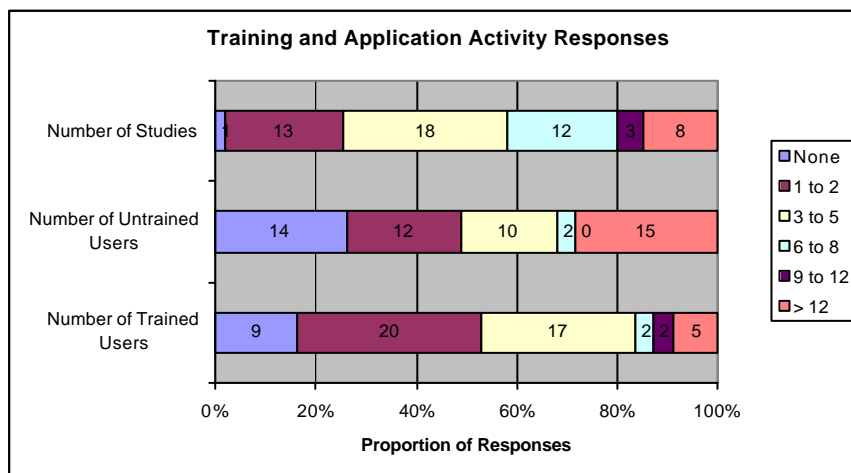
Figure 4). These proportions appear to reflect the reported frequency of usage.



**Figure 4 – Relative Capability Levels of HDM-4 Users**

Figure 5 gives insight into the relative numbers of trained and untrained users in the organisations reported by respondents, and also the number of HDM-based studies undertaken by those organisations.

About 75% of organisations have undertaken more than two HDM-based studies in the first two years of HDM-4. About 20% of organisations have undertaken nine or more studies in that period.



**Figure 5 – Measures of HDM-4 Training and Application Activity**

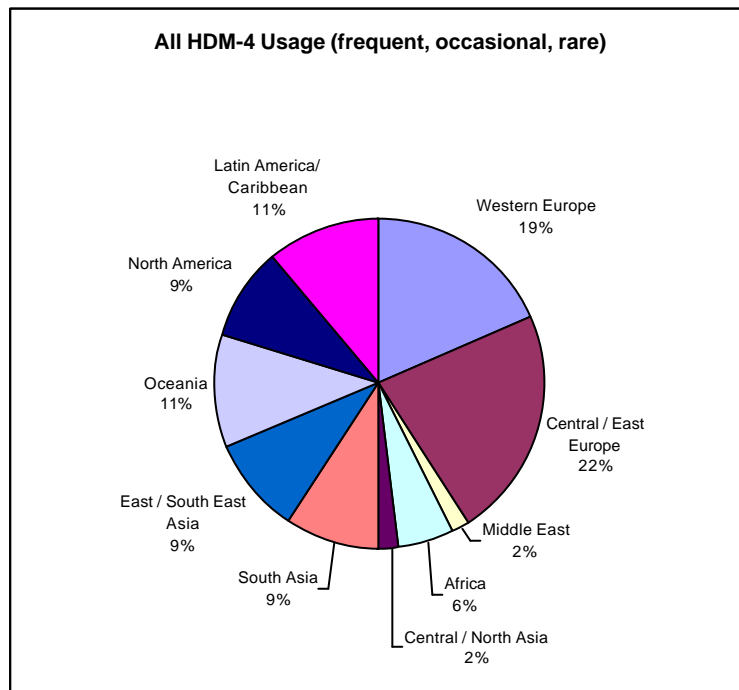


The statistics reported in Figure 5 have been used to calculate the following estimates, based firstly on the actual number of respondents, and secondly on the assumption that there are at least 400 active HDM-4 users.

	Base of 55 respondents	Base of 400 active users
No. of trained users	182	1324*
No. of untrained users	246	1857
No. of studies	295	2145

\* This estimate is similar to an independent estimate of the number of trained HDM-4 users (1207) that resulted from an unpublished survey of training and dissemination achievements conducted in October 2001.

HDM-4 is used in all regions of the world ( Figure 6).



**Figure 6 – Regional Distribution of HDM-4 Usage**

The greatest usage is reported in Europe (Central and Eastern Europe 22% of all usage, Western Europe 19%), followed by Latin America/Caribbean, Oceania, North America, East/South East Asia and South Asia, all with similar usage levels.

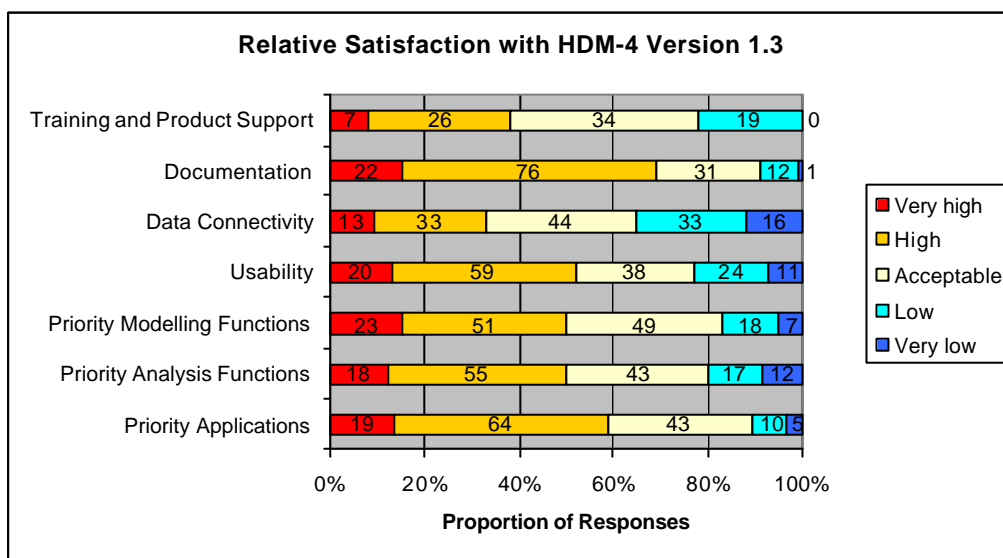
## User Satisfaction with HDM-4 Version 1.3

Satisfaction with HDM-4 V1.3 has been assessed for the following functions:

- Priority applications
- Priority analysis functions
- Priority modelling functions
- Usability
- Data connectivity
- Documentation
- Training and product support

Respondents rated their satisfaction with the three most important aspects they have chosen in the list defined within each functional area.

Figure 7 presents aggregated summaries satisfaction rating across all priority aspects of each functional area, while Figure 8 presents overall satisfaction.



**Figure 7 – Satisfaction Measures for HDM-4 V1.3 Functions**

Satisfaction is reasonably evenly distributed across all rated functions.

Within Priority applications, Investment strategy studies and Project level studies are rated as the most important functions, with a high satisfaction (92 % and 90 %).

Within Priority analysis functions, the most important items are Performance prediction and Economic evaluation. Performance prediction gets a high satisfaction (91 %), Economic evaluation a lower one (78 %).

Within Priority modeling functions, Road deterioration and Road user effects are identified as the most important functions, and get a very high satisfaction (resp 92 % and 87 %). Surprisingly, Model calibration is not considered as an important function, and the satisfaction level is low 50 %.

Within Usability, User interface and Report generation are considered as the most important functions. While User interface gets a 92 % satisfaction, Report generation gets only 56 %, which obviously is not good.

Data connectivity is indicated as a software function having relatively lower satisfaction than other functional areas: 65 % (very high, high or acceptable). Within this functional area, Data export, Connection to road databases, Interactivity with spreadsheets and Report export are the most criticised items. This functional deficiency is being addressed in Version 2 improvements.

Documentation is evenly rated as important and satisfactory.

Training and product support were rated as not very important (less than 20 respondents rating these items).

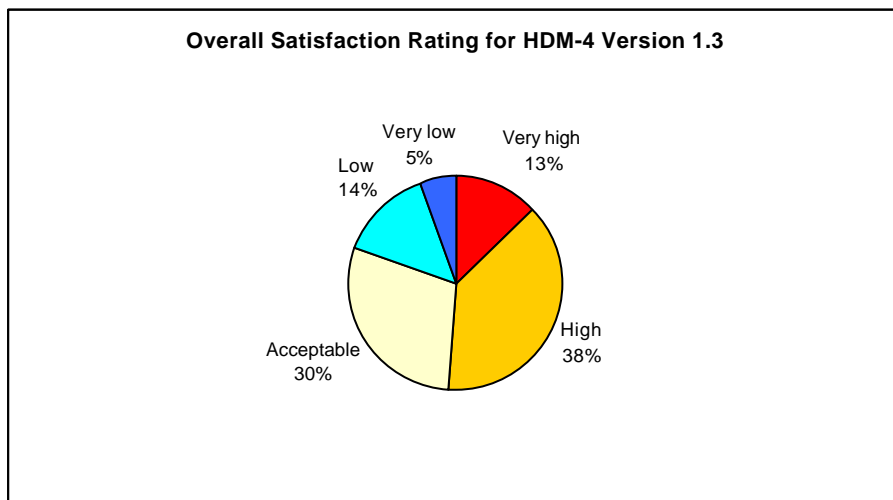


Figure 8 – Overall Satisfaction with HDM-4 V1.3

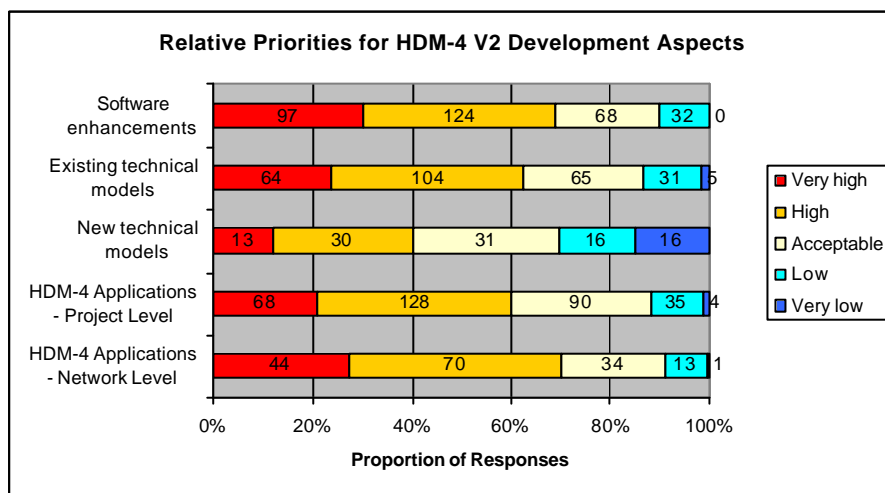
HDM-4 Version 1.3 achieved an 81% satisfaction rating (very high, high or acceptable).

## User Priorities for HDM-4 Version 2 Improvements

User priorities for HDM-4 V2 improvements have been assessed for the following development aspects:

- Scope of HDM-4 applications – network level
- Scope of HDM-4 applications – project level
- New technical models
- Improvements to existing technical models
- Software enhancements

The proposed improvements comprised individual improvement tasks within each development aspect. Respondents rated their priority, using a 5 level scale (very high to very low) for each improvement defined within each development aspect. Figure 9 presents the aggregated summaries of priority rating for all improvements grouped within each development aspect, while Figure 10 presents overall satisfaction.



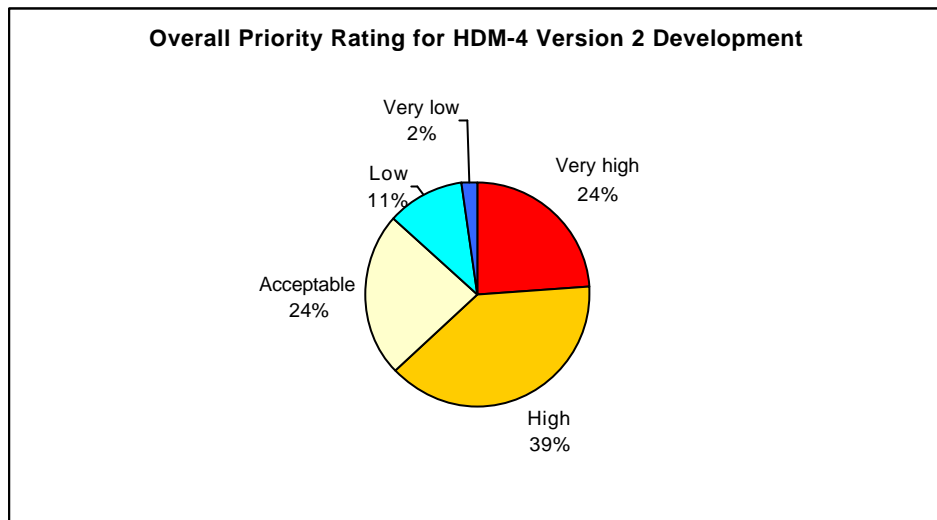
**Figure 9 – Relative Priorities for HDM-4 V2 Development Aspects**

Except for New technical models, all the development aspects get a very high priority. The highest priority development aspects are Network level application improvements and Software enhancements.

Within Network level application improvements, the most popular items are Budget scenario analysis (92 % of Very high, high and medium priority) and Network performance indicators (93 %), while Asset valuation gets a lower support (88 %).

Inside Software enhancements, all items, except the stand alone modules, get a very high support.

There is relatively low support for proposed new technical models expressed by the respondents. However, other stakeholders, including project sponsors place greater importance in this aspect of the proposed developments.



**Figure 10 – Overall Priority Rating for HDM-4 V2 Development**

The proposed HDM-4 Version 2 developments received an 87% overall approval rating (very high, high or acceptable priority).

### User Satisfaction with ISOHDM Implementation Activities

User satisfaction with ISOHDM implementation activities has been assessed for the following aspects:

- Product distribution arrangements
- Product support arrangements
- Information dissemination
- Training coordination

Respondents rated their satisfaction with each aspect using a 5 level scale (very good to very poor). The satisfaction results for each implementation aspect are presented in Figure 11 while overall satisfaction is summarised in Figure 12.

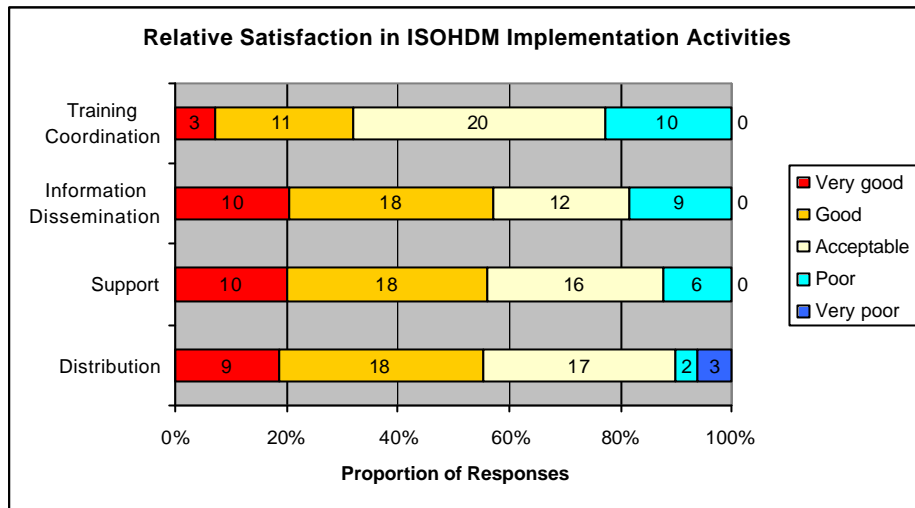


Figure 11 – Relative Satisfaction with ISOHDM Implementation Activities

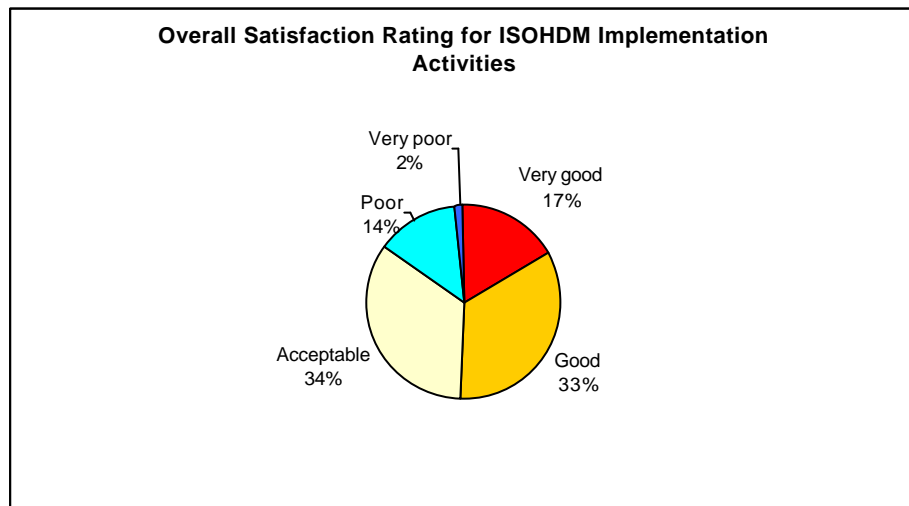


Figure 12 – Overall Satisfaction with ISOHDM Implementation Activities

Overall, 84% of responses express satisfaction in the way implementation activities have been undertaken. Satisfaction is distributed relatively uniformly across the four measured aspects. The lowest level of satisfaction relates to training coordination, at around 77% satisfied, while the highest relates to distribution arrangements at 90%.

## Survey Results – Qualitative Analysis

Additional comments were welcome in all questions, and they gave a very valuable amount of information about the way HDM-4 is used and perceived, the practical problems that have been faced by users, and about clients expectations. Not surprisingly, the comments were frequently used to express dissatisfaction, balancing the very positive opinion deriving from quantitative analysis. In the following, we have tried to summarise the expressed concerns.

## HDM-4 running process

Two main areas cover most of the comments: Data management and Reports.

Data management in version 1.3 is often judged as not satisfactory, especially regarding traffic data management and connectivity with external systems. The amount of data is not really criticised, but wishes are expressed for a simplified data input, with options to use more detailed input data.

Reports have been generally poorly evaluated: difficult to find the right report, difficult to get it, disappointing export function.

## HDM-4 Studies

Model **calibration** is a real concern for HDM use, however only 20 respondents out of 55 mentioned this problem in the three main Priority Modelling Functions. This problem is much more present in the comments, that stress the difficulty of the calibration process, and require more user friendly tools for that purpose. Linked to this problem, there are a few comments about the difficulty to evaluate the results got from HDM-4 studies against the “local expertise”.

Many comments relate also to the complexity of HDM-4, and complain that this complexity is not illustrated enough through examples in the available documentation.

## Models

Complains for missing models are not very frequent. Unpaved road deterioration is apparently the most important concern, followed by “cold climate” deterioration models on freeze, snow and ice. More linked to running process, a facility to model deferred treatments should be welcome.

## Conclusions

This opinion survey has produced credible and representative results in each of the four areas that it addressed. Responses represent opinions from all regions of the world, and one third of responses represent opinions from developing countries or economies in transition.

## Demographics of HDM-4 Usage

- HDM-4 is used to conduct road investment studies primarily for government road administrations, government road agencies and funding agencies, accounting for slightly more than two thirds of all usage. Most of these studies are conducted by consultants to those agencies and by agency staff. Education, training and research activities account for slightly more than one quarter of all usage.
- Local activities are having an impact in regions, in the form of training, user groups and local customisation and calibration of models. A majority of users are making use of local calibration and customisation, but there is a significant minority (>30%) who are not making use of this important activity. A minority (40%) of users are aware of local training and user group activities.
- Users make use of the HDM-4 software and HDM Series documents relatively often, with 40 to 50% of users using them frequently. About half of users report a general capability level, while a further one third consider themselves expert.
- There are about 1300 trained users at the present time. However there are an estimated 1800 untrained users. About 2100 investment studies have been conducted using HDM-4 since its release nearly three years ago.
- About three quarters of users are using the latest version release, and a small but significant proportion still uses the original Pre-release version, which is unsupported, and contains errors. Almost all (94%) of users use the English edition of the software.
- HDM-4 is used in all regions of the world. The greatest usage occurs in Western, Central and Eastern Europe, followed by the Americas, Oceania and parts of Asia.

## Satisfaction with HDM-4 Version 1.3

- Overall, users are very highly satisfied with the current version of HDM-4, with an 81% satisfaction rating. Satisfaction is reasonably evenly distributed across the seven aspects of functionality that were assessed.
- The weakest priority aspect of functionality was Data Connectivity. This is being improved in Version 2.
- Strongest satisfaction was registered for Central / North Asia, South Asia and Central / Eastern Europe. The weakest satisfaction (still quite sound at approximately 70% satisfied) lies in Oceania, East / South East Asia and Africa.



## Priorities for HDM-4 Version 2 Improvements

- Overall, users show very strong support for the priorities for proposed improvements in Version 2 of HDM-4, with an 87% overall approval rating. The proposed improvements that were polled comprised many individual improvement aspects classified within five principal areas for improvement.
- The most supported improvement areas are Network Level Applications, Software Enhancements and Existing Technical Models. Within these areas, the most supported improvements are generally the improvements that favour operational use of the software. New functions are generally rated as less important.
- Strongest support for the improvements was registered for South Asia, Africa, Latin America / Caribbean, and Central / Eastern Europe. The weakest support (still quite sound at between 65% and 75% overall support) lies in the Middle East (only one response received) and Oceania.

## Satisfaction with HDM Technology Implementation

- Overall, 84% of respondents express satisfaction in the way implementation activities have been undertaken, again a very strong result. Satisfaction is distributed relatively uniformly across the four measured aspects.
- The lowest level of satisfaction relates to training coordination, at around 77% satisfied, while the highest relates to distribution arrangements at 90%.
- The most satisfied regions are East/South East Asia, South Asia, Latin America/Caribbean and Central/Eastern Europe, while the least satisfied were the Middle East, Africa and North America.

# APPENDIX 4

## HDM-4 USER OPINION SURVEY

### 2002

This form invites you to respond to this user opinion survey in four parts:

- **Respondent information:** information that will allow us to better understand some demographics of the HDM Technology market;
- **HDM-4 Version 1.3 satisfaction:** your assessment of how well the current HDM-4 analysis tool meets your requirements;
- **HDM-4 Version 2 expectations:** your assessment of priorities for the primary initiatives proposed for HDM-4 Version 2;
- **Effectiveness of HDM Technology implementation:** your assessment of implementation activities coordinated by the PIARC ISOHDM project.

Please return your response to the ISOHDM Secretariat in Paris by fax or mail, before **31 August 2002**.

**Fax:** +33 1 49 00 02 02

**Mail:** PIARC ISOHDM  
La Grande Arche niv. 8  
92055 La Defense  
FRANCE

#### **Better still... Why not prepare your response on-line and send it to us direct?**

The on-line form is at

<http://hdm4.piarc.org/forms/survey2002-e.shtml>

A document describing the proposed new features and enhancements for HDM-4 Version 2 is available at

<http://hdm4.piarc.org/docs/topics/ISOHDMplanning-e.htm>

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# 1 Respondent information

## 1.1 Respondent profile

Choose the **Industry Sector** that best fits your situation.

- |                                                                     |                                                                        |
|---------------------------------------------------------------------|------------------------------------------------------------------------|
| <input type="checkbox"/> Government road / transport administration | <input type="checkbox"/> Consultancy                                   |
| <input type="checkbox"/> Government agency - other                  | <input type="checkbox"/> Private sector road system owner / management |
| <input type="checkbox"/> Funding agency                             | <input type="checkbox"/> Construction / maintenance agency             |
| <input type="checkbox"/> Education / training                       | <input type="checkbox"/> Construction / maintenance contractor         |
| <input type="checkbox"/> Research & development                     | <input type="checkbox"/> Other:                                        |

Choose your **Professional Interest** areas that you associate with your interest in HDM-4.

- |                                                                    |                                                                        |
|--------------------------------------------------------------------|------------------------------------------------------------------------|
| <input type="checkbox"/> Road investment funding                   | <input type="checkbox"/> Asset / pavement management system            |
| <input type="checkbox"/> Transport planning                        | <input type="checkbox"/> Research - transport planning                 |
| <input type="checkbox"/> Transport economics                       | <input type="checkbox"/> Research - road deterioration & works effects |
| <input type="checkbox"/> Road authority management                 | <input type="checkbox"/> Research - road user effects                  |
| <input type="checkbox"/> Budget allocation and management          | <input type="checkbox"/> Research - system development                 |
| <input type="checkbox"/> Works / maintenance program management    | <input type="checkbox"/> Consultancy - engineering                     |
| <input type="checkbox"/> Works / maintenance program planning      | <input type="checkbox"/> Consultancy - other                           |
| <input type="checkbox"/> Works / maintenance program delivery      | <input type="checkbox"/> Education / training                          |
| <input type="checkbox"/> Construction / maintenance management     | <input type="checkbox"/> Other:                                        |
| <input type="checkbox"/> Road asset data collection and management |                                                                        |

Does your organisation possess a modern road investment analysis tool such as HDM-4?

Yes	
No	
Don't know	

Which of these aspects of HDM Technology are used by your organisation, or by you?

Knowledge (the HDM Series documents)	
Models (algorithms, relationships, etc)	
Software (the HDM-4 executable)	
None of the above	

Do you have access to a local or regional user group?

Is HDM training and dissemination supported locally?

Does your organisation invest in research or adaptation studies related to HDM-4 to support local needs?

Yes	No	Don't know

**Country** that you work in

Your **Email address** (optional)


### 1.2 Usage and capability levels

How much do you use the HDM-4 software?

Frequently	
Occasionally	
Rarely	
Do not use	

How do you rate your capability level with the HDM-4 software?

Expert	
General	
Beginner	
Non-user	

How much do you refer to the HDM Series document set?

Frequently	
Occasionally	
Rarely	
Do not use	

How many users of HDM-4 in your organisation have received **some formal training** in using the tool?

None	
1 to 2	
3 to 5	
6 to 8	
9 to 12	
More than 12	

How many users of HDM-4 in your organisation have **NOT** received formal training?

None	
1 to 2	
3 to 5	
6 to 8	
9 to 12	
More than 12	

How many HDM-4 Studies (Strategy, Programme, Project, Research) have been completed, or are in progress, in your organisation?

None	
1 to 2	
3 to 5	
6 to 8	
9 to 12	
More than 12	

### 1.3 Version and language used

Which is the most recent version of HDM-4 that you have available to you?

Pre-release	
1.0	
1.1	
1.2	
1.3	
None	

Which language edition do you use most?

English	
French	
Spanish	
Russian	
Other	
None	

## 2 HDM-4 Version 1.3 satisfaction

In each of the questions in this section, we ask you to choose up to three different priority aspects, and to rate your satisfaction for each aspect. The response matrix is repeated three times across the page. In each matrix, mark the priority aspect that you have chosen (on the left side of the matrix), and select your satisfaction level for that aspect on the right side of the response matrix.

### 2.1 Priority applications

What is your level of satisfaction with HDM-4 Version 1.3 capabilities to conduct investment studies? Rate your satisfaction for up to three application types that you regard as the most important, chosen from the list shown.

<input type="checkbox"/>	Transportation policy studies	Very high	
<input type="checkbox"/>	Investment strategy studies	High	
<input type="checkbox"/>	Works programming	Acceptable	
<input type="checkbox"/>	Project level studies	Low	
<input type="checkbox"/>	Research studies	Very low	
<input type="checkbox"/>	Other .....		

<input type="checkbox"/>	Transportation policy studies	Very high	
<input type="checkbox"/>	Investment strategy studies	High	
<input type="checkbox"/>	Works programming	Acceptable	
<input type="checkbox"/>	Project level studies	Low	
<input type="checkbox"/>	Research studies	Very low	
<input type="checkbox"/>	Other .....		

<input type="checkbox"/>	Transportation policy studies	Very high	
<input type="checkbox"/>	Investment strategy studies	High	
<input type="checkbox"/>	Works programming	Acceptable	
<input type="checkbox"/>	Project level studies	Low	
<input type="checkbox"/>	Research studies	Very low	
<input type="checkbox"/>	Other .....		

Comments on Priority Applications

.....

.....

.....

## 2.2 Priority analysis functions

What is your level of satisfaction with HDM-4 Version 1.3 analysis functions? Rate your satisfaction for up to three analysis functions that you regard as the most important, chosen from the list shown.

<input type="checkbox"/>	Performance prediction	Very high	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Performance prediction	Very high	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Performance prediction	Very high	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Treatment effects	High	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Treatment effects	High	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Treatment effects	High	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Life-cycle cost analysis	Acceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Life-cycle cost analysis	Acceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Life-cycle cost analysis	Acceptable	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Economic evaluation	Low	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Economic evaluation	Low	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Economic evaluation	Low	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Investment prioritisation	Very low	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Investment prioritisation	Very low	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Investment prioritisation	Very low	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Investment optimisation		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Investment optimisation		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Investment optimisation		<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Non-economic needs analysis		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Non-economic needs analysis		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Non-economic needs analysis		<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Result reporting		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Result reporting		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Result reporting		<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Other .....		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Other .....		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Other .....		<input type="checkbox"/>	<input type="checkbox"/>

Comments on Analysis Functions

.....

.....

.....

## 2.3 Priority modelling functions

What is your level of satisfaction with HDM-4 Version 1.3 modelling functions? Rate your satisfaction for up to three modelling functions that you regard as the most important, chosen from the list shown.

<input type="checkbox"/>	Traffic prediction	Very high	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Traffic prediction	Very high	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Traffic prediction	Very high	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Road deterioration	High	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Road deterioration	High	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Road deterioration	High	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Works effects	Acceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Works effects	Acceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Works effects	Acceptable	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Agency costs	Low	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Agency costs	Low	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Agency costs	Low	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Vehicle performance	Very low	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Vehicle performance	Very low	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Vehicle performance	Very low	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Road user effects / costs		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Road user effects / costs		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Road user effects / costs		<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Road accidents		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Road accidents		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Road accidents		<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Vehicle emissions		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Vehicle emissions		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Vehicle emissions		<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Total energy balance		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Total energy balance		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Total energy balance		<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Model calibration		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Model calibration		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Model calibration		<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Other .....		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Other .....		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Other .....		<input type="checkbox"/>	<input type="checkbox"/>

Comments on Modelling Functions

.....

.....

.....

## 2.4 Usability

What is your level of satisfaction with the usability of HDM-4 Version 1.3? Rate your satisfaction for up to three usability characteristics that you regard as the most important, chosen from the list shown.

<input type="checkbox"/>	User interface	Very high	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	User interface	Very high	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	User interface	Very high	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Report generation	High	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Report generation	High	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Report generation	High	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	User help text	Acceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	User help text	Acceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	User help text	Acceptable	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	User language	Low	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	User language	Low	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	User language	Low	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	User documentation	Very low	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	User documentation	Very low	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	User documentation	Very low	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Ease of analysis process		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Ease of analysis process		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Ease of analysis process		<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Other .....		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Other .....		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Other .....		<input type="checkbox"/>	<input type="checkbox"/>

Comments on Usability

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## 2.5 Data connectivity

What is your level of satisfaction with HDM-4 Version 1.3 data connectivity functions? Rate your satisfaction for up to three data connectivity functions that you regard as the most important, chosen from the list shown.

<input type="checkbox"/>	Manual data input	Very high	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Manual data input	Very high	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Manual data input	Very high	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Data import	High	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Data import	High	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Data import	High	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Data export	Acceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Data export	Acceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Data export	Acceptable	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Connection to road databases	Low	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Connection to road databases	Low	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Connection to road databases	Low	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Interactivity with spreadsheets	Very low	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Interactivity with spreadsheets	Very low	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Interactivity with spreadsheets	Very low	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Report export		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Report export		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Report export		<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Other .....		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Other .....		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Other .....		<input type="checkbox"/>	<input type="checkbox"/>

Comments on Data Connectivity

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## 2.6 Documentation

What is your level of satisfaction with HDM-4 Version 1.3 documentation? Rate your satisfaction for up to three HDM Series documents that you regard as the most important, chosen from the list shown.

<input type="checkbox"/>	Overview of HDM-4	Very high	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Overview of HDM-4	Very high	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Overview of HDM-4	Very high	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Application Guide	High	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Application Guide	High	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Application Guide	High	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Software User Guide	Acceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Software User Guide	Acceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Software User Guide	Acceptable	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Analytical Framework and Model Descriptions	Low	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Analytical Framework and Model Descriptions	Low	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Analytical Framework and Model Descriptions	Low	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Guide to Calibration and Adaptation	Very low	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Guide to Calibration and Adaptation	Very low	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Guide to Calibration and Adaptation	Very low	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Other .....		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Other .....		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Other .....		<input type="checkbox"/>	<input type="checkbox"/>

Comments on Documentation

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## 2.7 Training and product support

What is your level of satisfaction with HDM-4 Version 1.3 training and product support? Rate your satisfaction for up to three training and support issues that you regard as the most important, chosen from the list shown.

<input type="checkbox"/>	Training calendar	Very high	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Training calendar	Very high	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Training calendar	Very high	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Third party training courses	High	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Third party training courses	High	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Third party training courses	High	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Information seminars	Acceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Information seminars	Acceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Information seminars	Acceptable	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Support services	Low	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Support services	Low	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Support services	Low	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	User request and complaint processes	Very low	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	User request and complaint processes	Very low	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	User request and complaint processes	Very low	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Other .....		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Other .....		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Other .....		<input type="checkbox"/>	<input type="checkbox"/>

Comments on Training and Product Support

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### 3 HDM-4 Version 2 expectations

NOTE: The terms referring to proposed improvements below are described briefly in the document referred to in the introduction to this questionnaire.

#### 3.1 Scope of HDM-4 applications – network level

What priority rating to you give to each of the proposed improvements to HDM-4 network-level applications?

	Very high	High	Medium	Low	Very low
Budget scenario analysis					
Asset valuation					
Network performance indicators					
Comments on network level applications					

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#### 3.2 Scope of HDM-4 applications – project level

What priority rating to you give to each of the proposed improvements to HDM-4 project-level applications?

	Very high	High	Medium	Low	Very low
Additional improvement & maintenance standards					
Sensitivity analysis					
Risk analysis					
Estimating social benefits					
Estimating environmental benefits					
Multi-criteria decision support					
Comments on project level applications					

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#### 3.3 New technical models

What priority rating to you give to each of the proposed new technical models?

	Very high	High	Medium	Low	Very low
Work zone effects					
Non-motorised transport facilities					
Comments on new technical models					

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#### 3.4 Improvements to existing technical models

What priority rating to you give to each of the proposed improvements to existing technical models?

	Very high	High	Medium	Low	Very low
Road accident effects					
More improvement types					
Unsealed road deterioration					
Road deterioration enhancements					
Road user effects enhancements					
Comments on existing technical models					

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### 3.5 Software enhancements

What priority rating to you give to each of the proposed software enhancements?

	Very high	High	Medium	Low	Very low
Managing traffic data					
Model calibration data sets					
Stand-alone model libraries and tools					
Data exchange with external databases					
Improved reporting facilities					
Stand-alone report viewer					

Comments on software enhancements

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### 3.6 Price for purchasing a new HDM-4 licence

At what price will you **not** be willing to purchase a new single licence for Version 2?

Not willing  
to pay

USD1000
USD2000
USD3000
USD4000
USD5000

Comments on new HDM-4 licence price

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### 3.7 Price for purchasing an HDM-4 licence upgrade

At what price will you **not** be willing to purchase an upgrade from a Version 1 single licence?

Not willing  
to pay

USD500
USD1000
USD1500
USD2000
USD2500

Comments on HDM-4 licence upgrade price

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### 3.8 Drivers for sustainability of HDM Technology

In your view, what is (are) the most important reason(s) for maintaining and developing HDM-4 in the future?

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In your view, what would be the main long-term consequences if financing of future development of HDM-4 is not secured?

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#### 4 Effectiveness of HDM Technology implementation

How do you rate the effectiveness of the following aspects of HDM Technology implementation within the ISOHDM Project?

Very good      Good      Acceptable      Poor      Very poor

Distribution arrangements


Product support arrangements

Information dissemination

Training coordination

Comments on HDM Technology implementation

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N. Robertson  
ISOHDM Project Coordinator