



HDM4 Upgrade: Ensuring the centrality of resilience and climate change in Road Management : Second Steering Committee Meeting

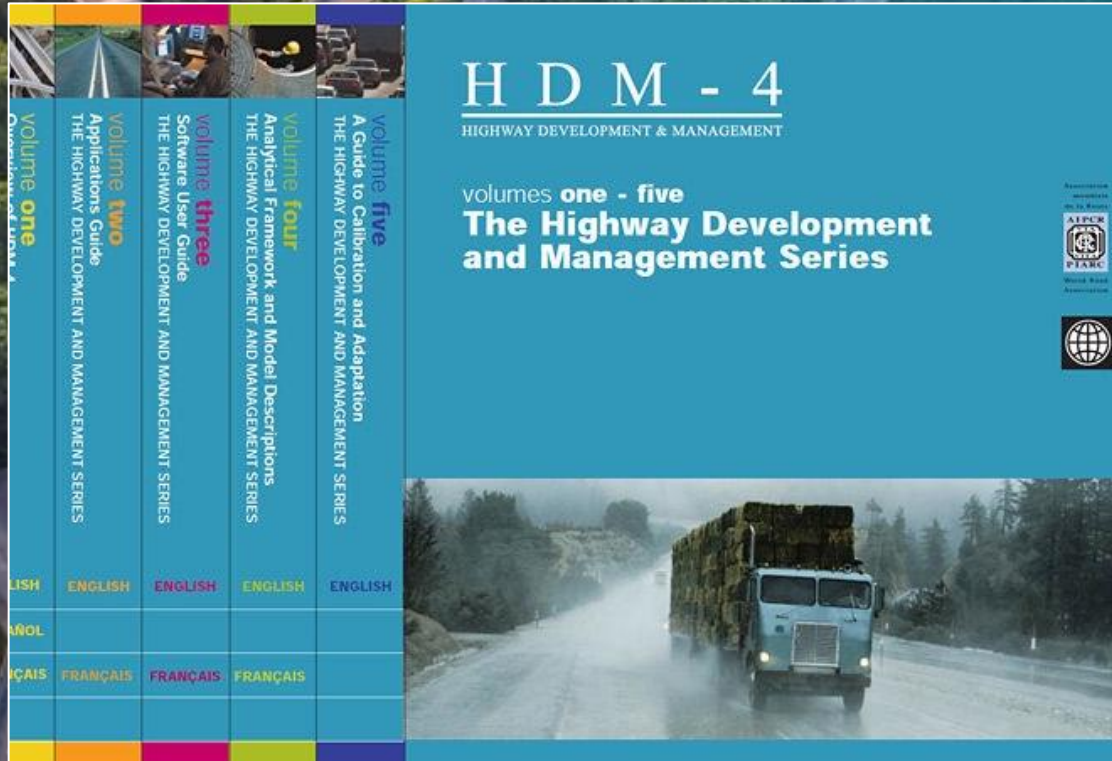
TRANSPORT GLOBAL PRACTICE

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Global Expertise and Knowledge Unit
November 16th 2023



WORLD BANK GROUP
Transport

AGENDA



- 1 The Governance Structure
- 2 Current Progress
- 3 The Next Steps



1

The Governance Structure



1. The Governance Structure



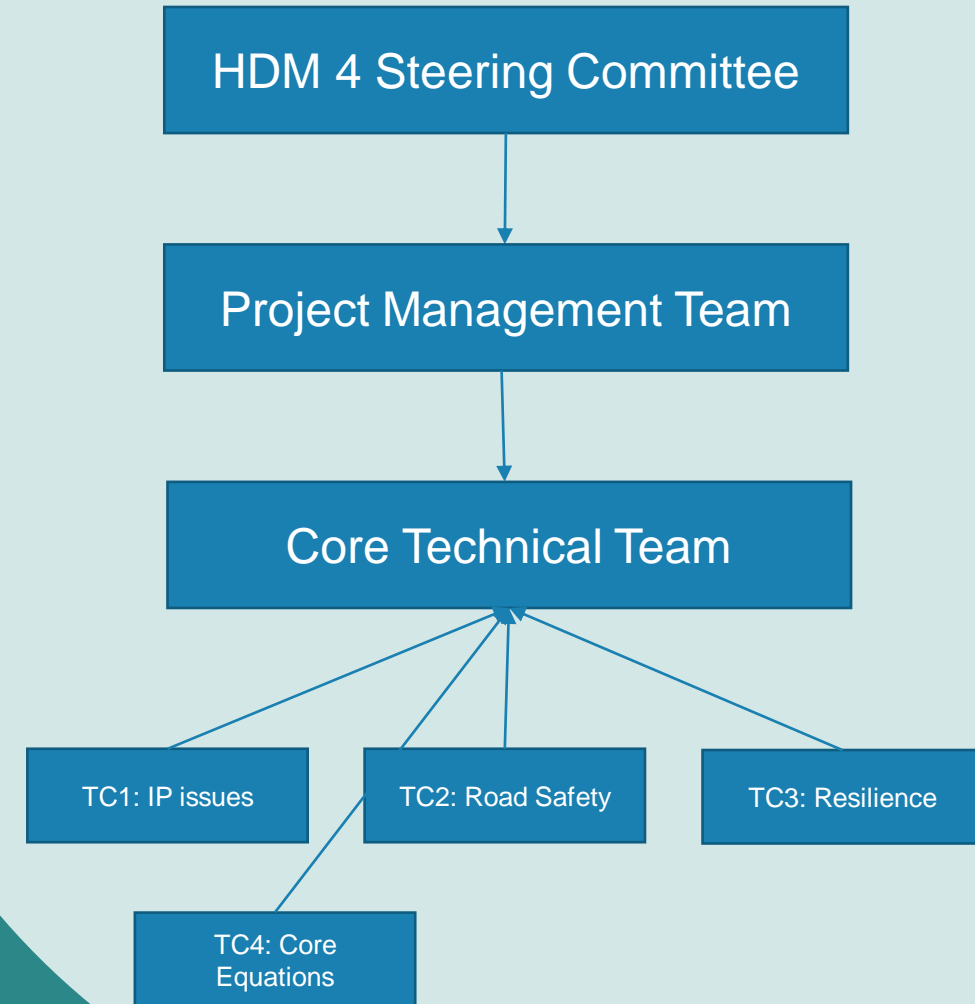
The Steering Committee (SC) oversees the upgrade and provide strategic direction to the work program;



Membership of the SC is restricted to partners who have provided support directly or in kind – Chaired by WB, UK FCDO, ADB, PIARC, EIB (tbc), AfDB (tbc);



A number of Technical Committees have met/are meeting – the process involves the TCs making recommendations to the CTT who will consider how best to reflect the recommendation in the core equations;



2

Current Progress



2. Current Progress – The Major Tasks

ITEM	START DATE	CURRENT STATUS
1. Legal Review	5/30/2022	Complete
2. Survey of Users and Road Administrations (RAs)	6/17/2022	Complete
3. Business Plan Update	6/17/2022	Complete
4. Core Technical Team (CTT) established	7/28/2022	Complete
5. Technical Committees (TCs) established in part	31/03/2023	In Progress
6. Scoping Papers – Road Safety, Resilience...	9/09/2022	In progress
7. HDM-4 website exists – redesign and updates will now be posted	6/30/2023	In progress
8. Three draft ToRs ready for procurement – PDWE, RUE, and FR – more later	10/1/2023	In progress
9. ToR for the main licensee (Design, IT Architecture, Beta Testing and Rollout) ready in draft	6/30/2022	In progress

2. Task 1 : The Legal Review

Search for a soft copy of the memorandum of agreement (MoA) regarding Intellectual Property of HDM-4 from 1998 to 2000. No body could not find a copy, we proceed without it. To handle Intellectual Property (IP) rights in future, the WB Lead Counsel suggested the following approach:

1. Draft a new MoU to be signed by all financial contributors that nullifies the previous one and agrees the following step; and

2. We would establish a new robust technology transfer agreement, that would transfer the IP rights as part of the license to the consortium/firm/entity procured to undertake the construction of the IT architecture.



2. Tasks 2 - 4



Task 2: Survey of Users –complete (funding – HVT – UK FCDO)



Task 3: Detailed Business Plan – complete (funding HVT – UK FCDO)



Task 4: Core Technical Team Established – Meeting held in August 2023 and Early November 2023– next meeting, third meeting due in December 2023



2. Tasks 5 -7 . Technical Committees Established and Scoping Papers produced



Contact has been made with Chairs/Co-Chairs of TCs to prepare Scoping papers in the key topic areas.



Road Safety – Draft Scoping Paper now available – TC meeting held in April – paper now with Core Technical Committee;



Resilience – module for the upgraded HDM-4 is being prepared by the University of Oxford, with the support of the FCDP CCG program; and

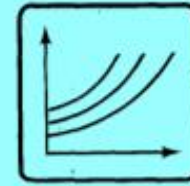


Meeting of the Resilience TC to be arranged in December 2023.

THE HIGHWAY DESIGN AND MAINTENANCE STANDARDS SERIES

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The Highway Design and Maintenance Standards

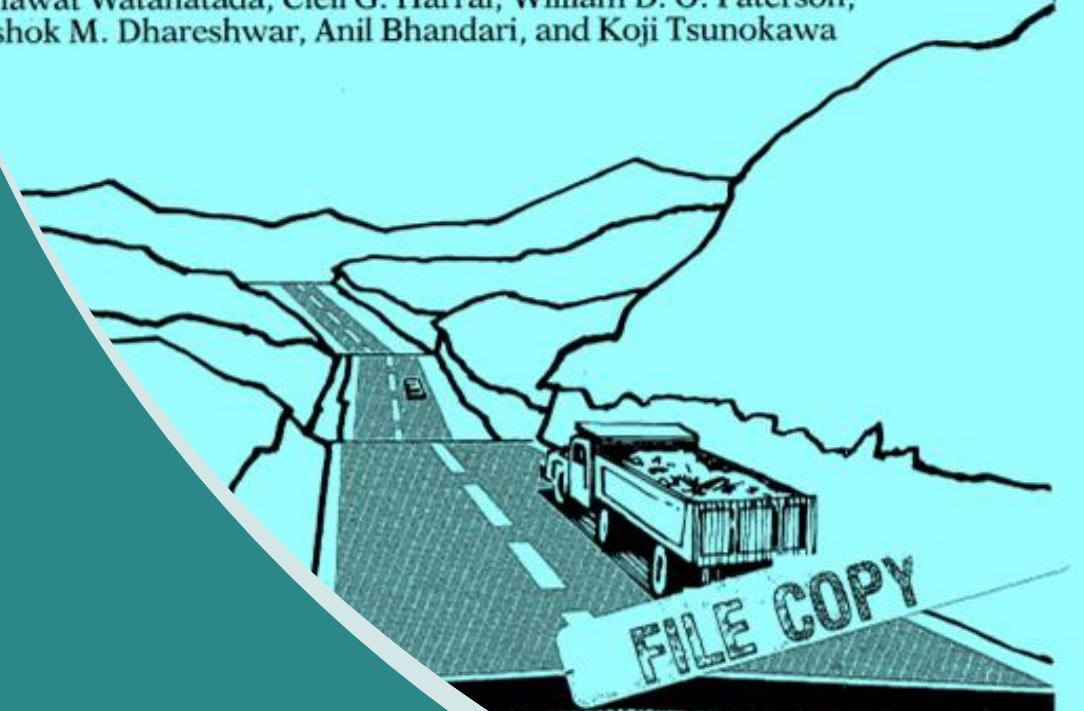


Model

Volume 1

Description of the HDM-III Model

Thawat Watanatada, Clell G. Harral, William D. O. Paterson,
Ashok M. Dhareshwar, Anil Bhandari, and Koji Tsunokawa



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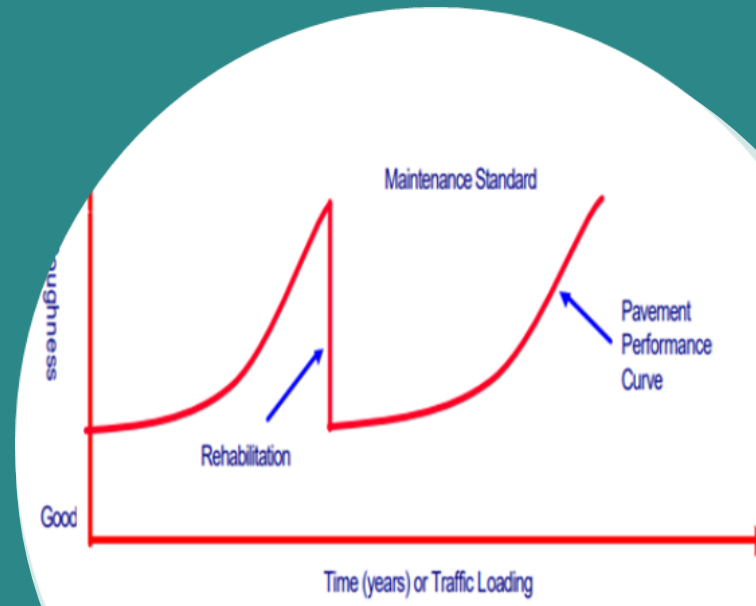
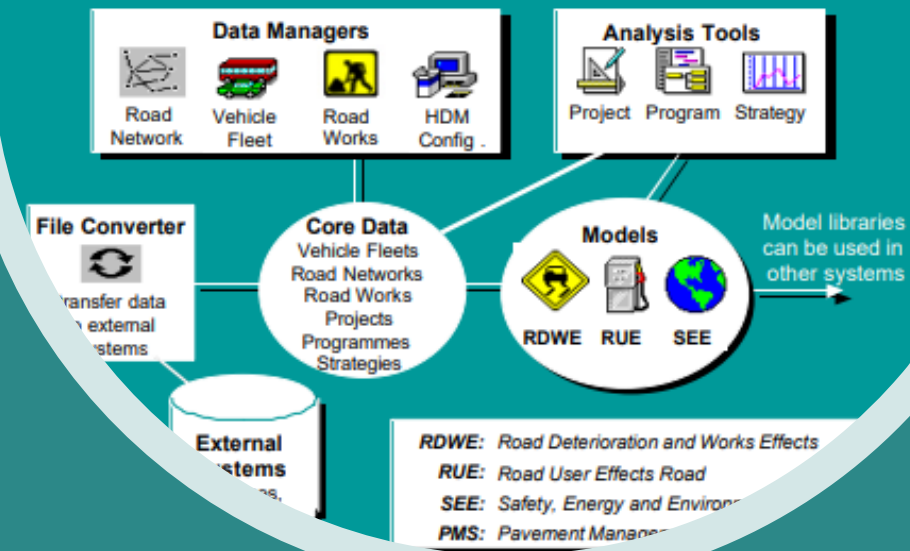
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2. Tasks 8-9 Core Technical Committee

1. Core equations and priority areas of research underway. (CTC meetings were held in August and early November).
2. Three Terms of Reference are being readied for procurement:
 - i. Gap Analysis - PDWE – Survey: 30 years of research, different pavement types, pavement technologies (polymer, recycling, waste streams).
 - ii. Gap Analysis of Rd User & Env effects (RUE); and
 - iii. Gap Analysis & Functional Review - system and software and propose improvements to MVP.



3. ToR for the main licensee (Design, IT Architecture, Beta Testing and Rollout) is ready in draft.



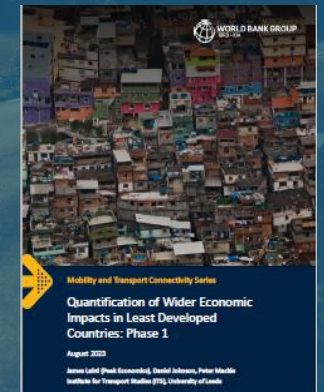
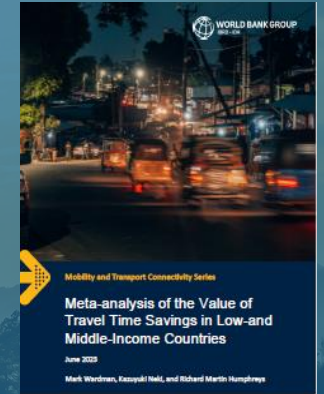
2. Current Progress - Complementary Work

1. A meta-analysis of the Value of Time (VoT) studies for passengers for all modes globally, with the emphasis on MDB client countries as an extension to a similar European wide study undertaken earlier, has been undertaken. This builds on and extends earlier work funded by the EIB. Complete;

2. A similar meta-analysis of all work on Freight VoT (road, rail and IWT) will be commissioned, again with the emphasis on MDB client countries, but not ignoring the evidence from Part 1 countries. A similar study in June 2021 did this exercise for 23 countries, but only 4 of our countries (China, India, Brazil and Indonesia), so hardly representative. Additional primary research was needed here. Delayed. Funded in kind by the ADB;

3. A similar meta-analysis of all work on Value of Statistical Life (VoSL) is being undertaken in house (road, rail, public transport etc.), again with the emphasis on MDB client countries, but not ignoring the evidence from Part 1 countries. The statistical modelling has been completed, now needs to be written up. This work has been supported by a WB Trust Fund, and should be complete by the end of 2023; and

4. A Scoping Paper on the inclusion of wider economic benefits involving a literature review, assessment of applicability to Less Developed Countries (LDCs), transferability to specific types of projects, and initial guidance in terms of parameters for HDM-4 and for more general guidance, together with research needs is available in draft, excepting a case study. Phase 1 Complete, Phase 2 starting now.



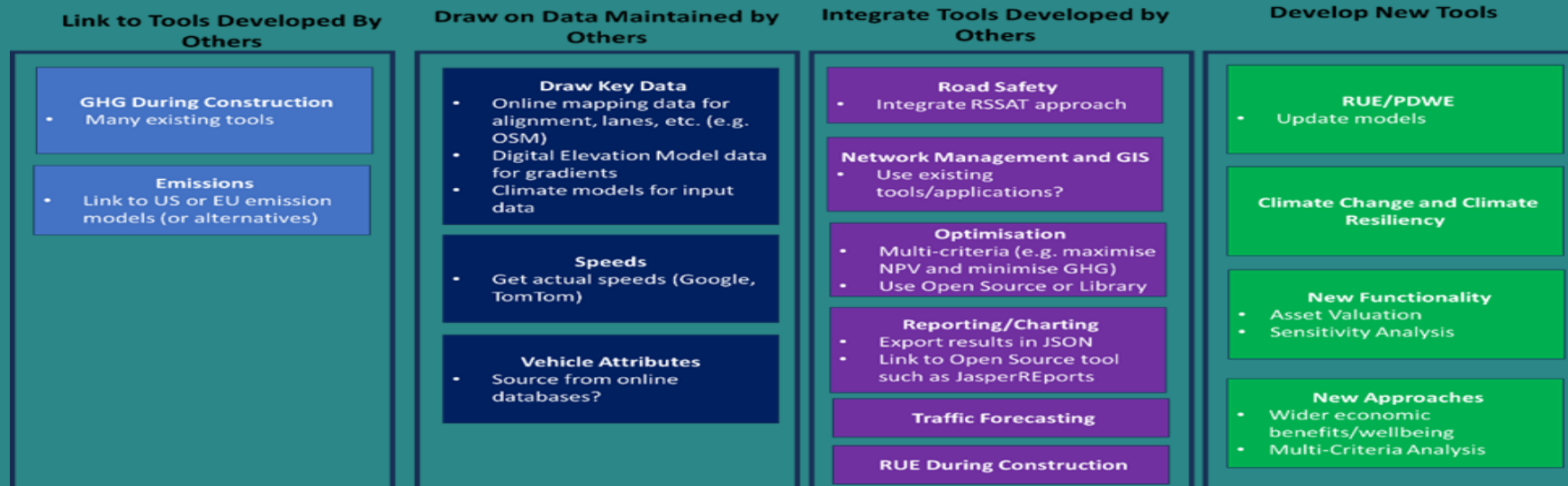
SUMMARY OF RELEVANT ADB WORK

Initiatives	Deliverables / Outputs	Countries
1. Mapping the Future of Road User Charges	1. Road maintenance financing and cost recovery options	Pakistan, Uzbekistan, Mongolia, Nepal, Bangladesh, India, Cambodia, Timor-Leste, Tonga, PNG
	2. Technology options for road user charging systems	
	3. Road user charging transition roadmaps	
2. Climate-Resilient Transport	1. Freight Value of Time	Bangladesh, Pakistan, PNG
	2. Transport network criticality analysis	
	3. Multi-hazard risk analysis	
	4. Adaptation pathways and project concepts	
3. Green Roads	1. Green roads toolkit	All
	2. Green roads guidance note	
4. Asian Transport Outlook	1. Cost database, Grid Factors, Policies, Vehicle Fleets, etc.	ADB DMCs
5. Lifecycle Carbon Impact of Road Investments	1. Toolkit for lifecycle analysis CO2 emissions (works with HDM-4)	All
	2. Guidance Note	

2. Current Progress – DRAFT Conceptual Approach for developing the HrDM-5.0 Software



Browser based interface. Applications and tools are seamlessly integrated so users only have a single interface to work through. Cloud operations optional?





3.

The Next Steps



3. The Next Steps

1. TC meeting on Resilience in early December
2. Launch Procurement for the following TORs:
 - i. PDWE
 - ii. RUE
 - iii. Functional Requirements
 - iv. Main TOR
3. Organize a workshop at time of TRB/TT
4. Organize a workshop at the ADB
5. Next SC meeting at time of TT



ANNEX



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Transport

1. What is the HDMM?

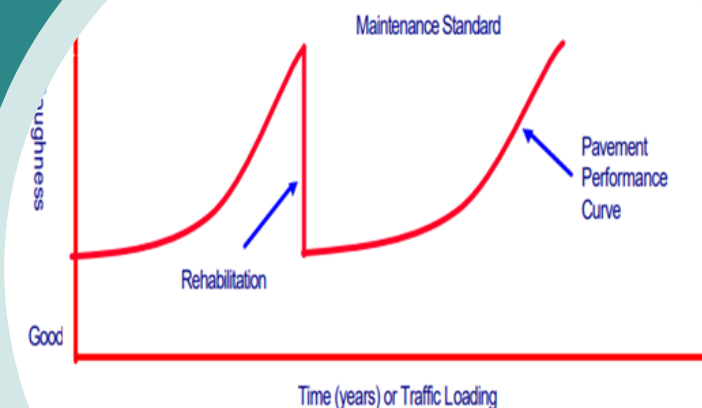
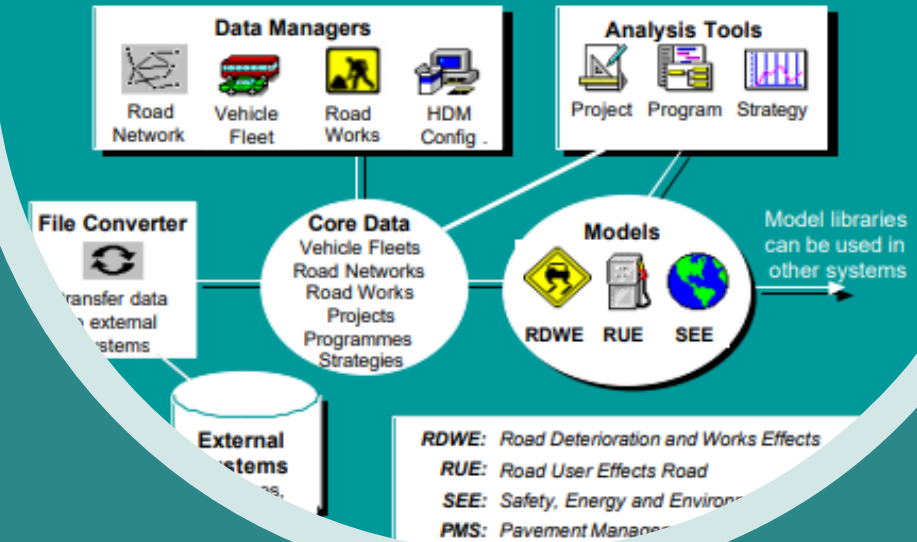
- The HDMM (HDM4 version 2 in its latest iteration) is a software package and associated documentation for road authorities around the world;
- It is intended to serve as **the primary tool** for the analysis, planning, management and appraisal of investment decisions on the road network at three levels:
 - **Strategic Level Analysis** of the whole network for longer term budget planning under different budget scenarios, different maintenance strategies, to optimize expenditures.
 - **Program Level Analysis** in the form of the definition of a single or multi-year rolling work maintenance program under a defined budget constraints.
 - **Project Level Analysis** to assess the financial and economic feasibility of specified project alternatives against a base case (do nothing).



1. What is the HDMM?

- How does it do this:
 - Calculates the structural performance of pavement;
 - Includes a life cycle prediction of deterioration, given maintenance, weather, fleet composition and traffic levels;
 - The CBA assesses road user costs and benefits and agency costs and benefits over the project life.
- 67 countries around the world currently hold the license for the existing software;
- Seen as commercially independent, cheaper than proprietary alternatives
- Pre-requisite to the provision of finance to client countries by a number of MDBs, including the World Bank, ADB, EIB, AfDB.
- WB currently has 162 active transport projects in its portfolio amounting to US\$31 billion, of which approx. US\$ 20 billion are for connectivity (inter-urban and rural).
- Pipeline of connectivity projects is US\$18 billion over the next 3 years

Software Structure - System Architecture



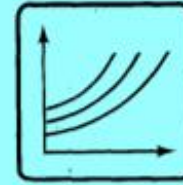
2. A Short History of the HDMM

- The first move towards producing a road project appraisal model was made in 1968 by the World Bank, in conjunction with the Transport and Road Research Laboratory (TRRL);
- The resulting Highway Cost Model (HCM) in 1971 was a considerable advance over other models used for examining the interactions between road work costs and vehicle operation costs;
- A major field study was undertaken in Kenya (1971-75) by the same partners led to the Road Transport Investment Model (RTIM) for developing countries in 1977, and the HCM model to become Highway Design and Maintenance Standards model in 1979 (HDM-I) – Both based on a mainframe;
- Further work in a number of countries (Caribbean, India, Brazil) to extend the geographic scope of the models, led to the RTIM2 model and HDM-III in 1987 – both PC based;
- Further development led to HDM-PC (1989), HDM-Q (1993) and HDM-Manager (1994).

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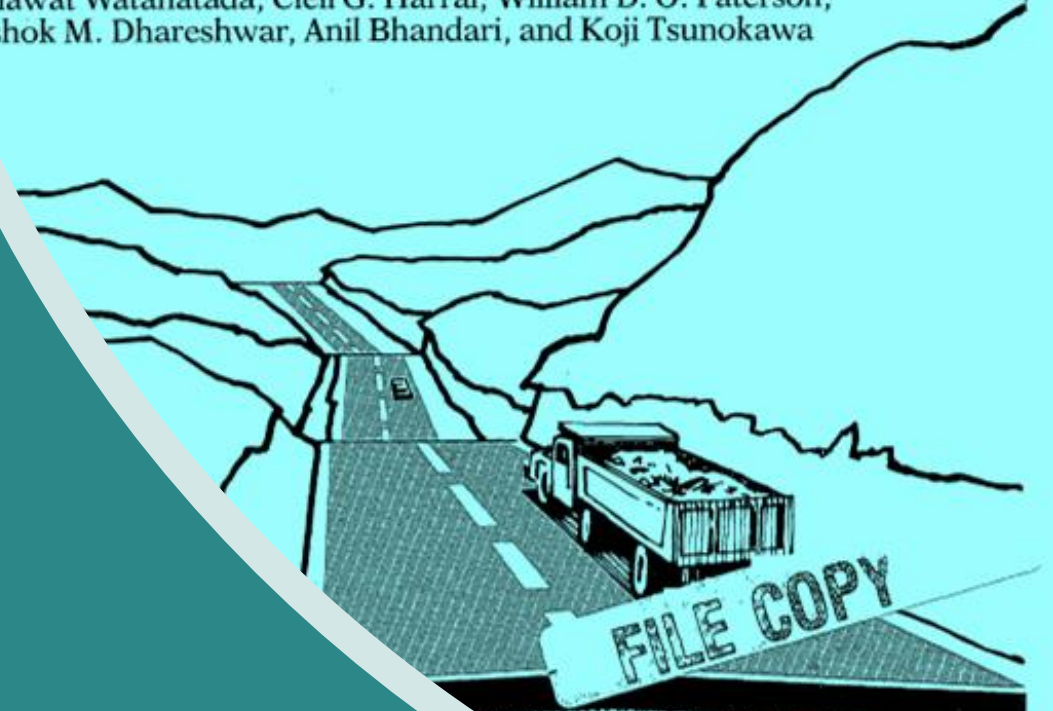
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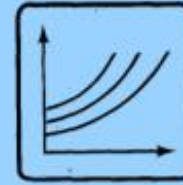
2. A Short History of the HDMM

- By 1993, the models had been extensively used, but there was a need to incorporate the extensive research that had been undertaken over the previous ten years.
- Moreover, whilst the models had been mostly used in developing countries, industrialized countries also started to make use of the models. This resulted in the need for additional capabilities to be introduced.
- The International Study of Highway Development and Management Tools (ISOHDM) was set up in 1993 to extend the scope of HDM-III.
- This led to the development of HDM-4 version 1 in 1999, and HDM-4 Version 2 in 2005.

THE HIGHWAY DESIGN AND MAINTENANCE STANDARDS SERIES

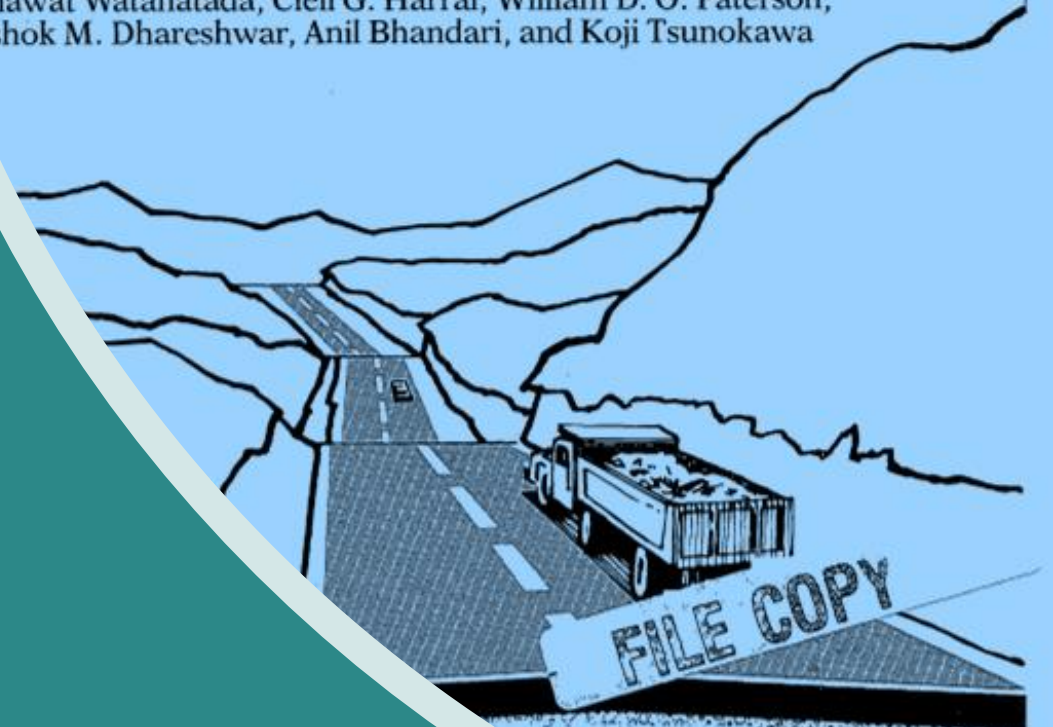
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The need for change



3. The Need for Change

Since 2005, the functional needs of the HDMM have grown including *inter alia*:

- Climate Change;
- Resilience;
- GHG emissions;
- road safety benefits;
- Tertiary roads;
- Vehicle Fleet;
- Wider economic benefits;
- Indexing of the real value of time and life;
and
- Written for a PC based platform; and
- The current license period.

