TECHNICAL COMMITTEE SESSION

30 September 2011 (am)

TECHNICAL COMMITTEE D.1
MANAGEMENT OF ROAD INFRASTRUCTURE ASSETS

INTRODUCTORY REPORT

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2. INTRODUCTION AND GUIDELINES OF THE PIARC ORGANIZATION

2.1. General Description of TCD.1 - Management of Road Infrastructure Assets

The goal of PIARC, Theme D is to improve the quality of road infrastructure through the effective management of assets in accordance with user expectations and managers' requests. While new technologies, social and environmental developments are expanding the sphere of interest for road authorities, infrastructure and management of assets remains their core business. The need for more efficient use of funds requires constant improvement in techniques in terms of the design, management and maintenance of assets. A better understanding of asset infrastructure and its condition is essential in order to plan maintenance and allocate limited resources across asset types, and this is reflected in the terms of reference of Technical Committee D.1.

2.2. Working Groups and Issues

The objectives for Technical Committee D1 for the period 2008-2011 were achieved by the work undertaken by 3 Working Groups.

- Working Group 1 – Benchmarking of asset management methods (Issue D.1.1)
- Working Group 2 – Data collection for road infrastructure management (Issue D.1.2)
- Working Group 3 – Allocation of resources across asset classes (Issue D.1.3)

Working Group 1

The aim for Working Group 1 was to illustrate best practice asset management systems for road authorities to adopt and to benchmark costs for typical systems, relative to their investment in assets. Using case studies, the Working Group should identify best practice and key aspects for road authorities at different stages of development to consider when choosing a system, review costs associated with implementing systems and recommend where funds are best focused.

Working Group 2

The aim for Working Group 2 was to produce a report which identifies options for cost effective data collection for different elements of the road infrastructure and identifies best practice for the use of that data in developing infrastructure management strategies.
This means the second issue deals with the evaluation and follows up of the performance of a network, and the high level indicators which can be used for that purpose. These High Level Management Indicators (HLMI) directly reflect the performance of the network as a whole (pavement, bridges, equipment, etc.) with respect to the expectations of various stakeholders (e.g. safety for users, noise for neighbours, pollution for society). These indicators constitute the essential base of a rational approach for road infrastructure management.

Working Group 3

The aim for Working Group 3 was to review approaches used in different countries to allocate asset management resources and prioritise investment in different asset classes. Using case studies, the Working Group should examine different resource allocation approaches and identify the benefits and dis-benefits of the prioritisation processes used, noting the differences across asset classes.

This Introductory Report attempts to give a vision of the main topics to be presented and discussed in the session TC D.1 “Management of Road Infrastructure Asset“.

3. QUESTIONNAIRES AND CASE STUDIES

Countries having responded to the questionnaires and/or submitted Case Studies prepared by Working Groups:

Working Group 1: Case Studies submitted by:
The Netherlands, England, Namibia, New Zealand, Scotland, Mexico, Spain, USA (Utah).

Working Group 2: Case Studies elaborated locally.

Working Group 3: The following countries responded to questionnaires:
Australia, Belgium, Botswana, Denmark, England, Estonia, Finland, France, Germany, Hungary, Japan, Malawi, Namibia,
The Netherlands, Norway, Portugal, Scotland, South Africa, Sweden, USA.

Case Studies submitted by:
England, Sweden, Japan, USA, Australia, the Netherlands, South Africa.

The data collected during the study is grouped, summarised, analysed and evaluated as presented in the final report.

4. EXECUTIVE SUMMARY

4.1. General Information

What is asset management? – A question, for which there are many answers.

PAS 55 (British Standards Institute, 2008) defines asset management as *"Systematic & coordinated activities and practices through which an organization optimally manages its physical assets and their associated performance, risks and expenditures over their lifecycles for the purpose of achieving its organizational strategic plan."*

But, the requirements on asset management are almost as many, as there are nations on the globe. The demands of infrastructure, stakeholders (e.g. users, neighbours), climate conditions and the environment, the available budget as well as long term investment strategies, are some of many parameters which can have a considerable influence on the definition of asset management.

Using IT based management systems it is possible to model treatment impacts and compare a range of funding and quality scenarios. In this way, objective bases can be established for medium-term maintenance and financial planning to optimise maintenance effectiveness.
By selective data analysis, it is possible to evaluate an immense amount of information, showing the results with many different criteria but how much of this management and controlling is really necessary? Which asset management method delivers the greatest benefit for the least cost? Is it sensible to become dependent on complicated 'black-box' software solutions often requiring specialist support? Are there possibly even more common procedures which deliver valuable information, which are appropriate to build and improve an asset management system and are able to be adapted to agency needs?

A myriad of questions and there is only one thing for certain: **sound infrastructure is a fundamental requirement for strong economic development**.

Maintaining safe and effective road infrastructure and thereby assuring the mobility of society, is at risk from increasing traffic loads, aging infrastructure, an increasingly diverse asset base, greater community expectations and funding constraints going forward. And most of the time this task already starts with the necessary social and political acceptance.

Are road assets important parts of this infrastructure? The value of an effective road network is often most appreciated when the system fails through unexpected delays, accidents, catastrophic collapse or natural disasters. Then counteractive measures are often being taken far too late and have to be realised in a short period of time. Depending on is the scale of the problem, repairs may be very difficult or impossible to be realised in a sensible and cost effective manner.

Maintenance plans based on network-wide optimisation of treatments and systematic road maintenance delivery are fundamental to effective road management. These are supported by continuous improvement of strategies and equipment and long term planning security. Only then is it possible to guide maintenance sensibly and reach social and political goals.

Within the framework of the Technical Committee D.1 “Management of Road Infrastructure Assets” various possible solutions have been gathered, discussed, evaluated and have been aligned with existing know-how. The results will be published in three technical reports, at seminars and at the World Road Congress, as well as in further publications.

4.2. Working Group 1 – Benchmarking of asset management methods

To undertake the work the objectives of issue D.1.1 were further refined:

- Asset management system refers to processes and systems and includes but is not limited to computer systems.
- Best practice is actual practice and describes the level needed to meet the needs, not expectations, of stakeholders.
- The review of asset management practices will focus at the management level in the road administrations and not at lower levels.
- Costs will be considered to include the value of all resource inputs, not just expenditure by the road administration.

It was recognised that the results of the review of asset management methods needed to reflect the different needs in different economies and that it should identify those differences. The work of the Group therefore addressed asset management methods in a variety of countries across the world using contributions from representatives from those countries in the Group.

The work plan of the Group covered 3 main phases:

- Case studies of asset management methods in specific countries
- Identification of good practice in those countries
- Assimilation of good practice to be described in the Working Group Report

Seven case studies of asset management methods have been prepared for the following countries; (Mexico, Namibia, Netherlands, Spain, UK – England, UK – Scotland, USA – Utah). The structure of each of the case studies was based on a review of guidance for asset management provided in the International Infrastructure Management Manual (IPWEA, 2006), PAS 55 (British Standards Institute, 2008) and the Transportation Asset Management Guide (AASHTO, 2011). The overall structure of the case studies comprised current practice, future development plans, how the approach has been developed and delivered, how was the investment justified, what benefits are expected and have been achieved, what costs have been incurred and where in the organisation, what has been learned from the approach adopted, what are the gaps in the current methodology, how

will those gaps be filled and what have been the most important aspects of asset management that the approach has addressed.

For each case study, internal review by members in the Working Group identified examples of good practice that could be used for the benchmarking of best practice. These examples have been summarised and will be presented as the results of the review.

The results of the review undertaken by the Working group will be presented at the World Road Association Congress in Mexico (2011), various other international seminars (e.g. Namibia and Sweden) and will be described in an article for Routes Roads.

4.3. Working Group 2 – Data collection for road infrastructure management

In considering the objectives of D.1.2, the Group agreed to focus on the best practice for the use of data in developing infrastructure management strategies by developing a methodology for the production of High Level Management Indicators (HLMI).

Managing assets is not only reporting, or communicating on asset condition or performance. There is an increasing interest in maintaining and operating the transport infrastructure in an efficient and sustainable way. Decision support tools based on a revised suite of indicators are increasingly required to improve the consideration of sustainability criteria in asset management decision making.

The Group put some effort into identifying the existing management indicators and highlighting the lack of management indicators when necessary. However, its final report does not provide a list of ready-to-use indicators. It proposes a methodology that every road authority could apply to identify the indicators it actually needs to properly and efficiently achieve its objectives, and to build these indicators if they are not available in the literature or from other authorities.

The methodology proposed by the Group consists of four steps:

1. **Stakeholders:** Identify all the stakeholders in road asset management, distinguishing, if necessary, different socio-economic categories inside each stakeholder group.
2. **Expectations:** For each stakeholder group, analyse their road management concerns or expectations and assess the priority.
3. **Existing HLMIs:** Propose definitions for one or more indicators to address each of the expectations and identify if there are suitable existing indicators through a literature search or through the input of individual members.
4. **Needs for HLMI:** If no suitable indicators exist try to identify the basic parameters on which an indicator should be based (without building the relevant indicator). Review if these parameters already exist or if it is necessary to built them (principle, measurement method…) and propose some method to aggregate and combine them to get HLMI.

The report introduces a framework to apply this methodology, in order to assist with the application of the method in the road authorities. The framework includes:

- The definition of each category and sub-category of stakeholders;
- The list of the expectations of these stakeholders, with the priorities that are proposed by the Group;
- The type of HLMI that should be used, according to the Group, to manage these expectations.
- Detailed considerations about the basic indicators which could relevantly contribute to build these HLMI, considerations coming from the knowledge and experience of its members, from literature and from some existing data bases (e.g. Austroads).

The report illustrates the methodology on an example (the HLMI required to evaluate the road network efficiency from the point of view of various stakeholders).

4.4. Working Group 3 – Allocation of resources across asset classes

While new technological, social and environmental developments are expanding the sphere of interest for road authorities, infrastructure and management of assets remains their core business. The need for more efficient use of funds requires constant improvement in techniques in terms of the design, management and maintenance of assets. A better understanding of asset infrastructure and its condition is essential in order to plan maintenance and allocate limited resources across asset types, and this is reflected in the terms of reference of Technical Committee D.1: "Management of Road Infrastructure Assets". This report focused on:

1. Approaches taken by countries in allocating resources based upon asset management, and
2. Prioritisation process used in a range of countries for investing in maintaining the different assets (pavements, bridges, geotechnical structures, etc).

The methodology followed by the D.1.3 workgroup was to utilise a structured questionnaire distributed to group members to establish the most common used approaches taken by member countries in allocating resources based upon asset management and between different assets. A total of 35 completed questionnaires were received from 20 different countries. From the responses received to the questionnaire, it can be concluded that:

1. Approaches taken by countries in allocating resources based upon asset management are overall at a basic level, with pavements and bridges being most advanced in that they frequently use condition data to trigger budget allocations when a pre-defined condition level is reached. The use of advanced methods, such as optimised decision making based on benefit cost analysis (BCA) that minimises road authority costs or economic costs (agency and user/community), are limited, and if used, mostly only applied for pavements;

2. The most common approach currently used for determining budget allocations between asset classes still remains a % split based on historic allocations. Furthermore no clear preferred future method could be identified, but the following methods are considered:
    a. Risk ranking based on the consequences of failure and probability of failure;
    b. Based on historic splits;
    c. By comparing competing projects for multi assets classes using a common economic indicator such as NPV, BCR or IRR, and
    d. Using multi-criteria analysis (MCA) to score each project on an equal basis for multi asset classes.

From the responses to the above questionnaire, 7 member countries where selected to prepare case studies on how these approaches are actually utilised within their countries.

This report details the most common used approaches, as well as typical case studies on how these approaches are actually utilised by member countries.

5. NOTE REGARDING THE DRAFT CONCLUSIONS

The draft conclusions will be elaborated at the final meeting of the TC D.1 in Namibia and presented on the 24th world road congress in Mexico on Sept. 2011.

6. BIBLIOGRAPHY

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