

**PIARC ACTIVITY REPORT  
2000 - 2003**

**From Kuala Lumpur Congress  
(October 1999)  
to Durban Congress  
(October 2003)**

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# I. FOREWORD

The 2000-2003 Activity Report gives me the opportunity to take stock of the intense work accomplished since the highly successful Kuala Lumpur Congress. The World Road Association's technical and administrative bodies have worked relentlessly during this period to meet the goals set by the Second Strategic Plan. It is impressive to see the efforts that are being deployed to make the Durban Congress as successful, or even more successful, than the previous events.

The increase in mobility on our planet has continued in recent years, particularly as regards road transport. Socio-economic development relies on improvements in accessibility and sustainability of the regions concerned. Road infrastructure, which tends to be easily accessible and cost-effective, is by far the main source of today's and tomorrow's increasing mobility.

With its second Strategic Plan covering the 2000-2003 period, PIARC has reoriented its activities while maintaining international cooperation and technology transfer as the main guideline, in order to focus more closely on members' ever-increasing needs.

Our Association's work and unfolding development are infused with the principles and ideas that are central to sustainable development. Current and future trends have been defined and broken down into five strategic directions. The work of the twenty Technical Committees has thus been built up around these five strategic themes that form the backbone of PIARC's goals.

I am pleased to note that most of the Technical Committees have produced reports and publications presented at seminars and symposiums or as articles published in our "Routes/Roads" magazine.

The Technical Committees' Activity Reports included in this document are an eloquent expression of the richness, variety and developing trends of road transport in today's challenging context.

The Executive Committee has made significant administrative changes in our Association, with the great help of the three Commissions, the Finance Commission, the Strategic Plan Commission and the Communication Commission.

The General Secretariat, while providing support to the functioning of the Association, has played a key role in the modernization and widening of its influence.

The purpose of the XXII<sup>nd</sup> World Road Congress in Durban will also be to strengthen PIARC's links with many organisations, federations, and international, regional or national institutions concerned directly or indirectly with road transport and road infrastructure problems.

The expansion of our Association, which now has 107 member countries and 30 National Committees is most heartening. In accordance with the goals of the Strategic Plan, many contacts have been established with a view to organising seminars in developing countries and countries in transition, and setting up Technology Transfer Centres. These efforts are bearing fruit and the development of these new activities is extremely encouraging.

The wealth of meaningful results presented in this Activity Report give reason to expect that the Durban Congress will be a high-calibre event.

My thanks go to all those who, through their contributions and their enthusiasm, work towards the success of PIARC and all its activities in order to meet the expectations of road users.

Olivier Michaud, President of PIARC

# II. GOALS AND ACTIVITIES CONSISTENT WITH NEEDS

## II.1 Context

PIARC was founded in 1909 following the first International Road Congress held in 1908 in Paris. It is the oldest international association in the road sector. It had an initial membership of 15 countries and has since developed into a real world association. Since 1999, a further 13 countries have joined PIARC, which has now grown to 107 member governments and other members (regional authorities, collective members and individual members) from some 130 countries.

### The 107 PIARC Member Governments in May 2003

ALGERIA	CUBA	KUWAIT	SAUDI ARABIA
ANDORRA	CZECH Rep.	LATVIA	SENEGAL
ARGENTINA	DENMARK	LITHUANIA	SLOVAK Rep.
AUSTRALIA	ECUADOR	LUXEMBOURG	SLOVENIA
AUSTRIA	EGYPT	MADAGASCAR	SOUTH AFRICA
BANGLADESH	ESTONIA	MALAYSIA	SPAIN
BELGIUM	FINLAND	<b>MALI</b>	SRI LANKA
<b>BENIN</b>	FRANCE	MAURITIUS	<b>SWAZILAND</b>
<b>BHUTAN</b>	<b>GABON</b>	MEXICO	SWEDEN
BOLIVIA	GERMANY	MONGOLIA	SWITZERLAND
BRAZIL	<b>GHANA</b>	MOROCCO	SYRIA
BULGARIA	GREECE	<b>NAMIBIA</b>	TANZANIA
BURKINA FASO	GUATEMALA	<b>NEPAL</b>	THAILAND
<b>CAMBODIA</b>	GUINEA	NETHERLANDS	<b>TOGO</b>
CAMEROON	HONDURAS	NEW ZEALAND	TONGA
CANADA	HUNGARY	NICARAGUA	TUNISIA
CANADA-QUEBEC	<b>ICELAND</b>	NORWAY	TURKEY
<b>CAPE VERDE</b>	INDIA	PAKISTAN	<b>UGANDA</b>
CHAD	INDONESIA	PANAMA	UKRAINE
CHILE	IRAN	<b>PAPUA NEW GUINEA</b>	UNITED KINGDOM
CHINA (Peop. Rep.)	IRELAND	PARAGUAY	UNITED STATES
COLOMBIA	ISRAEL	PERU	URUGUAY
CONGO (Dem. Rep.)	ITALY	PHILIPPINES	UZBEKISTAN
CONGO (Rep.)	IVORY COAST	POLAND	VENEZUELA
COSTA RICA	JAPAN	PORTUGAL	<b>VIETNAM</b>
CROATIA	KENYA	ROMANIA	YEMEN
	KOREA (Rep.)	RUSSIA	ZIMBABWE

Members since 1999 in **bold** type

PIARC is a non-profit, non-political association financed by members' subscriptions. The official languages are French and English but other languages are also used occasionally for congresses, seminars, etc, depending on their context.

PIARC carries out its activities through 20 Technical Committees that represent the same number of study and discussion forums and bring together experts from the member countries. This network shares and compares knowledge and promotes international cooperation on roads and road transport. The PIARC publications, its website <http://www.piarc.org>, restructured in 2002-2003, and the technical events it organises or supports are vehicles for the exchange and dissemination of best practices and knowledge transfer.

## **II.2 PIARC's role**

Since 1909, PIARC has considerably developed both in its membership and its scope. PIARC's members come from all over the world and its the field of activities has expanded. Although technical road matters naturally still play a significant part, PIARC also addresses economic and environmental matters, road safety, road infrastructure financing, as well as the organisation of the Road Administrations, which are all central to current concerns of public authorities and professionals in the road and road transport sector.

The World Road Congresses, organised every four years, and the PIARC Winter Road Congresses, provide opportunities to review the state of the art and practices and have forward-looking discussions to give direction to our action in the years to come. These congresses are the highlights of the PIARC Technical Committee activities.

In 1995, PIARC drew up the first Strategic Plan to meet the new challenges arising out of its strong international development and the changing general context. This Plan was used as a basis to redefine PIARC's role, including its missions, values, vision and goals. It enabled the organisational and operational rules to be drawn up on this basis and thus strengthened its leading position in the road sector.

To mark this evolution, PIARC changed its name. On 2 September 1995, it became the "World Road Association", which gives a better idea of the Association's activities than the original name "Permanent Association of International Road Congresses".

## **II.3. 2000-2003 Strategic Plan**

### **II.3.1. PIARC's Mission, Values and Vision**

The basic aspects of PIARC's purpose, mission, values and vision, as previously identified, are still considered to be relevant. They are formulated as follows in the 2000-2003 Strategic Plan.

PIARC exists to serve all its members by:

- being a leading international forum for analysis and discussion of the full spectrum of transport issues, related to roads and road transport, especially good transportation infrastructure, operations, safety and sustainability world-wide.
- identifying, developing and disseminating best practice and giving better access to international information,
- providing within its activities special emphasis for developing countries and countries in transition,
- developing and promoting efficient tools for decision making on matters related to roads and road transport.

PIARC's values are:

- to provide universal quality service to its members,
- to be open, objective and impartial,
- to promote sustainable and sound economic solutions,
- to recognize road transport in an integrated transport and land use context,
- to be customer driven,
- to respect the differing international road transport needs,
- to be a leader in technology transfer
- PIARC aims to be the world's leading source of information on roads and road transport policy and practices within an integrated sustainable transport context.

### II.3.2. Strategic Objectives

The first Strategic Plan, which covered the 1996-1999 period, was based on analysis and reflection on the purpose of PIARC and the partners to whose service it is dedicated. This plan sought to identify current and emerging problems in the field of roads and road transport and to develop action strategies. The Technical Committees' activities have been organised around six themes: Road Technology, Road Management, Sustainable Development and the Role of Roads in the Transport System, The User's Perspective, Value for Money and Technology Transfer.

With the 2000-2003 Strategic Plan, which developed out of the conclusions of the Kuala Lumpur Congress sessions and a survey on the First Delegates of the member countries, PIARC made a few changes to its activities which were now organised into five themes: Road Technology, Road Transport, Livability and Sustainable Development, Road and Road Transport Operations, Management and Administration of the Road System and Appropriate Levels of Road and Road Transport Development.

These changes particularly mark an intention to pay greater attention to the following:

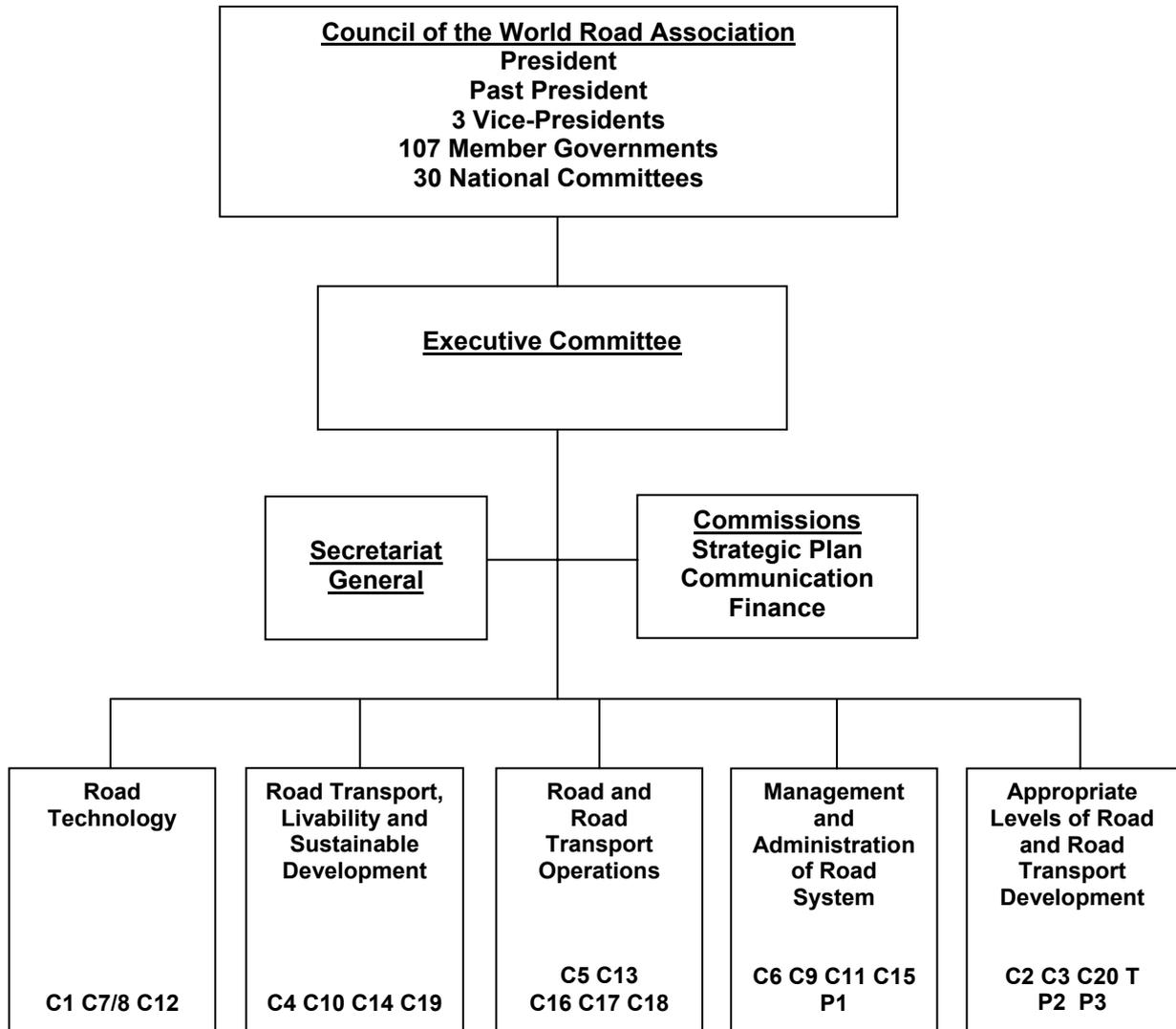
- with the last theme, the situation and needs of developing countries and countries in transition,
- problems of road operations, road transport and intermodality.

The 2000-2003 Strategic Plan has also defined a series of organisational goals to help PIARC fulfil its mission. These goals, listed below, have been translated into strategies for action:

- A. To provide and enhance international networks and forums to help members exchange information and world best practice;
- B. To develop and encourage professionally worthwhile and effective personal contact networks;
- C. To develop practical means for efficient and effective technology transfer among countries;
- D. To run Congresses that are major and valuable events for information exchange among members of the road transport community, and to run them so that they are viable from PIARC's point of view;
- E. To produce and disseminate authoritative, impartial and interesting publications that address current road and road transport issues;
- F. To increase the number of member governments, and to increase the number of members of the road community benefiting, whether through National Committees or by direct participation in PIARC Technical Committees;
- G. To improve continuously the management and operation of PIARC in order to provide members with a service that represents good value for money;
- H. To promote cooperation with other international and regional groupings with related goals.

# III. PIARC'S STRUCTURE

PIARC's Structure reflects the orientations of the Strategic Plan.



C1, C7, etc., represent the Committees, P1, P2, etc. the Projects and T the Committee on Terminology.

### **III.1. Council of the World Road Association**

The Council has overall responsibility for PIARC administration. It meets once a year and is composed of member government delegations each led by a First Delegate.

Over the 2000-2003 period, the Council held the following meetings:

#### Durban, 11-12 October 2000

- The new 2000-2003 Strategic Plan was approved.
- The dates of the XXII<sup>nd</sup> World Road Congress (Durban) were fixed: 19 to 25 October 2003.
- Mr Olivier Michaud was elected President of PIARC for the 2001-2004 period.
- The Executive Committee Members and the Vice-Presidents were elected for the 2001-2004 period.
- The Council appointed Mr Victor Mahbub Honorary President of PIARC.

#### Rome, 10-11 October 2001

- Turin and Sestrieres (Italy) have been selected to host the XII<sup>th</sup> International Winter Road Congress in 2006.
- Two new Executive Committee Members were elected:
  - Ms Ginny Clarke (United Kingdom) to replace Mr John Kerman (United Kingdom),
  - Mr M'hamed Ben N'cer (Morocco) to replace Mr Karim Ghellab (Morocco)
- Mr Jean-François Corté was appointed PIARC Secretary General as of 1 May 2002.

#### Melbourne, 24-25 October 2002

- Two new Executive Committee Members were elected:
  - Mr Keiichi Inoue (Japan) to replace Mr Michio Suzuki (Japan),
  - Mr Charles Nottingham (USA) to replace Mr Walter Sutton (USA),
- The Council accepted France's candidature for the organisation of the XXIII<sup>rd</sup> World Road Congress in 2007.

## III.2. Executive Committee

The Executive Committee meets at least twice a year and is in charge of supervising management of the Association. As of 1 January 2001, the Executive Committee Members have been as follows:

<b>President</b>	Mr Olivier Michaud	Switzerland
<b>Past President</b>	Mr Hiroshi Mitani	Japan
<b>Honorary Presidents</b>	Mr Roger COQUAND Mr Enrique BALAGUER Mr Victor MAHBUB	France      died in 2001 Spain Mexico
<b>Honorary Vice-President</b>	Mr Robert DE PAEPE	Belgium
<b>Vice-Presidents</b>	Mr Pablo ANGUITA SALAS Mr Colin JORDAN Mr Patrick GANDIL	Chile Australia France, Mr Karim GHELLAB up to 2001
<b>Members</b>	Mr Nazir ALLI Mr Antonio ALONSO BURGOS Mr M'hamed BEN N'CER Mr Karim GHELLAB up to 2001 Ms Maria-Pia CERCIELLO Mr Henning CHRISTIANSEN Ms. Ginny CLARKE Mr John KERMAN up to 2001 Mr Gerold ESTERMANN Ms Anne-Marie LECLERC Mr Marc LEMLIN Mr Charles NOTTINGHAM Mr Walter SUTTON up to 2002 Mr Richard RANDRIANARISOA Mr Manuel RODRIGUEZ Mr Anton ŠAJNA Mr Keiichi INOUE Mr Michio SUZUKI up to 2002 Dato' Ir. HJ. ZAINI bin Omar	South Africa Spain Morocco Italy Denmark/NVF United Kingdom Austria Canada-Quebec Belgium USA Madagascar, up to 2002 Mexico, up to 2002 Slovenia, up to 2002 Japan Malaysia
<b>National Committee Representative</b>	Ms Brenda BAIRD	Canada
<b>Secretary General</b>	Mr Jean-François CORTÉ	France      Mr J.F. COSTE up to 2002

The Executive Committee has held the following meetings:

<b>2000</b>	Sapporo (Japan), 2-3 February Durban (South Africa), 10-12 October	<b>2002</b>	Vancouver (Canada), 24-25 April Melbourne (Australia), 23-24 October
<b>2001</b>	Vienna (Austria), 15-16 March Rome (Italy), 9-10 October	<b>2003</b>	Lisbon (Portugal), 13 March Durban (South Africa), 17 October

The most important subjects addressed at these meetings were as follows:

- Implementing and revising the Strategic Plan,
- Activity guidance and monitoring by Themes and Committees,
- Approving the Committee Chairs,
- Use of Association funds,
- Membership approvals of new member countries,
- Preparing memorandums of understanding for Congresses, technical programme approvals, and registration fee charges,
- Preparing questions to be submitted for the Council's approval,
- Implementing Council decisions,
- Monitoring projects financed out of the Association Fund.

### **III.3. Commissions**

Three Commissions assist the Executive Committee in its tasks:

1. Finance Commission,
2. Communication Commission,
3. Strategic Plan Commission.

#### **III.3.1. Finance Commission**

The Commission, chaired since 1999 by Mr Marc Lemlin (Belgium), prepares all questions with the Secretariat General connected with the use of the Association Funds in order to submit them to the Executive Committee. Specific questions over this period have mainly concerned the management of the Association's assets, financing of the HDM-4 Project, use of the Special Fund and the Technology Transfer Centres.

#### **III.3.2. Communication Commission**

During this period, the Communication Commission, chaired by Mr Henning Christiansen (Denmark), mainly addressed the following activities with the help of the Secretariat General:

- Improving existing communication tools, including the Routes/Roads magazine, with the participation of the Editorial Committee;
- Developing a new PIARC website that is more user-friendly and easier to update and integrates the World Interchange Network WIN);
- Developing and organising the PIARC Essay Competition associated with the Durban Congress;
- Strengthening relations with universities by implementing the "Reference Shelf" Project;
- Assessing PIARC's output in collaboration with C3 Committee.

The PIARC Essay Competition, which aims to maximise the potential of the road sector and promote PIARC's action, has given rise to many proposals. After the first selection by member countries, 30 essays from 19 countries were submitted to the international jury chaired by Mr Henning Christiansen and composed of R. Aguerrebere (Mexico ), J. Beauverd (Switzerland ), G. Clarke (UK), H. J. Kwang (Malaysia), C. van Rooten (Belgium ) and J.-F. Corté (PIARC). These essays are entered for one of the following five prizes:

- Young Professionals,
- Sustainable Development,
- Developing Country Issues,
- Construction, Maintenance and Operation of Roads,
- And the Maurice Milne Medal for the most innovative idea.

The results of the competition will be announced at the Durban Congress Ministers' session.

### III.3.3. Strategic Plan Commission

The role of the Strategic Plan Commission is to monitor the implementation of this plan and revise it with a view to planning the new work cycle.

The Strategic Plan Commission was restructured after the Kuala Lumpur Congress to integrate the Strategic Theme Coordinators. The task of each Strategic Theme Coordinator, chosen from among the Executive Committee Members, is to ensure that all work in a given field has been carried out according to the goals approved in the Strategic Plan, and to provide guidance and support to the Technical Committees associated with the theme.

For the 2000-2003 period, the Coordinators were as follows:

<b>1. Road Technology</b>	Mr Antonio ALONSO BURGOS	Spain	
<b>2. Road Transport, Livability and Sustainable Development</b>	Mr Patrick GANDIL	France	
<b>3. Road and Road Transport Operations</b>	Ms Ginny CLARKE since 2001	United Kingdom	Mr John KERMAN up to 2001
<b>4. Management and Administration of the Road System</b>	Mr G. ESTERMANN	Austria	
<b>5. Appropriate Levels of Road and Road Transport Development</b>	Dato' Ir. HJ. ZAINI bin Omar since 2001	Malaysia	Mr Karim GHELLAB (Morocco) up to 2001

During the present period, the Strategic Plan Commission, chaired by Mr Colin Jordan (Australia), has mainly addressed the following actions with the help of the Secretariat General:

- Drafting of the final version of the 2000-2003 Strategic Plan,
- Setting up the five Strategic Themes,
- Setting up the twenty Technical Committees, and initiating the preparation of their work programmes and seminars,
- Proposals for strengthened cooperation with the appropriate international organisations.
- Proposals for changes to the Statutes and Internal Rules as a result of the development of the Association and experience gained.
- Proposals for revision of the Strategic Plan and PIARC's structure.

#### **III.4. National Committees**

PIARC encourages the creation of National Committees to represent PIARC at national level, help to intensify involvement in PIARC activities and disseminate results and recommendations more widely.

Since 1999, 6 new National Committees have been set up in Burkina Faso, Canada, Hungary, Madagascar, Slovenia and Romania, now enabling PIARC to have relays in 30 countries. Note that the new Committee in Burkina Faso has been set up under the sponsorship of the PIARC-Quebec Committee.

The National Committee Chairs have met once a year under the Chair of Ms Brenda Baird (Canada), who represents the National Committees before the Executive Committee.

Every year, the National Committees have organised meetings such as one-day study sessions and seminars under their sole responsibility or in liaison with the PIARC Technical Committees, National Road Administrations or other organisations.

A new brochure has been produced: "*Why and How do you create a PIARC National Committee*" which will be disseminated in all member countries before the Durban Congress.

### **III.5. PIARC Secretariat General**

The PIARC Secretariat General team comprises salaried administrative staff of the Association and executives seconded to the Association by some member countries.

For the 2000-2003 period, France has accordingly renewed its support for the offices of Secretary General and Deputy Secretary General of PIARC:

- Jean-François Coste, Secretary General, 1997-2002,
- Jean-François Corté, Secretary General, as from 2002,
- Patrice Retour, Deputy Secretary General, 1986-2000,
- Gilbert Batac, Deputy Secretary General as from 2000.

Japan and the Nordic Road Association have renewed the secondment of Technical Advisers:

- Nobuhiro Nakao (Japan), 1997-2000,
- Soichiro Kako (Japan), 2000-2002,
- Hitoshi Sakuma, (Japan), as from 2002,
- Esko Sirvio (Finland), in 1999,
- Per Morten Lund (Norway), in 2000,
- Ulrika Sundgren (Sweden), in 2001,
- Tytti Viinikainen (Finland), in 2002,
- Marit Due Langaas (Norway), in 2003.

Since 2003, a further two countries, Australia and Spain, have been providing their support for the PIARC Headquarters by seconding technical advisers:

- Kristina Sikich (Australia), under a PIARC/Austroroads agreement,
- Joseba Echave (Spain), under a PIARC/Spanish National Committee agreement.

Headquarters also benefited from the help of Neil Robertson, seconded by Australia from 1998 to 2001 in Paris and then part time in 2002 in Australia, to carry out the activities of HDM-4 Project Coordinator.

The salaried staff are as follows:

- Véronique Anselin, Director's Assistant, since 1985
- Marie Pastol, Translator/Interpreter, since 1991
- Roger Apharel, Accountant, since 1995
- Nathalie Sabbah, Secretary, since 1995
- Cécile Aurousseau, Publications Assistant, since 1997
- Nathalie Poirier, HDM-4 Secretariat, since 1998.

# IV. PIARC'S ACTIVITIES IN 2000-2003

In June 2003, PIARC had 107 Member Governments and 1,755 other Members (including 1,108 Individual Members).

The number of Member Countries is continually on the increase. Since 1990, 50 countries have joined PIARC, which has more than doubled the number of member countries. During the past five years, the following 13 countries have become members:

1999 Benin, Uganda  
2000 Cape Verde, Gabon, Mali  
2001 Namibia  
2002 Bhutan, Cambodia, Ghana, Nepal, Papua New Guinea, Swaziland  
2003 Iceland

It should be noted that the countries that have recently joined the Association are mostly developing countries or countries in transition. These countries now account for more than two thirds of the Member Governments. This new context is requiring PIARC to adapt in order to optimise the response to new members' expectations and better integrate these countries' decision-makers and experts into PIARC's activities.

## IV.1. Technical Committees

20 Committees have been formed and organised around the five Strategic Themes to address questions adopted by the Strategic Plan. Approximately 650 experts and decision-makers from nearly 50 countries and other international organisations have participated in the work of the Committees.

Each Committee has met about twice a year to accomplish the Work Programme adopted in 2000. These meetings have sometimes been coupled with one-day study sessions, conferences or congresses, which has made it possible to hold a greater number of discussions outside the circle of the Committee and to ensure better dissemination of the work.

Note that the Committees have been the backbone of the seminar programme decided by PIARC for developing countries and countries in transition, for which further information is given in IV.2.

This section will be limited to an outline of the goals and terms of reference of these Technical Committees' themes and work for the 2000-2003 period. Detailed information on the activities of each Committee and their output over this period is given in the scientific reports included after the General Activity Report.

## Theme 1: Road Technology

This theme covers the activity of Technical Committees C1 (Surface Characteristics), C7/8 (Road Pavements) and C12 (Earthworks, Drainage, Subgrade). This traditional activity is developing to encompass user and market oriented approaches and total cost evaluation during the whole life cycle.

The aim of this theme is to improve the provision and maintenance of road infrastructure in accordance with international best practice.

To meet this aim, the work of the Committees addresses the following issues:

- Defining functional and quality requirements requested by users.
- Life-cycle cost analyses and development of production and products from the client, operator and user points of view, including recycled and marginal materials
- Taking account of innovations and the results of research, and promoting their utilisation, when developing best practices and giving recommendations,
- Adapting appropriate technologies to developing countries (DC) and countries in transition (CIT)
- Promoting the development of durable highway structures that can be kept in efficient and safe operation.

### C1: Surface Characteristics

Chair: Mr Bjarne SCHMIDT (Denmark)  
French-speaking Secretary: Mr Guy DESCORNET (Belgium )  
English-speaking Secretary: Mr Mark E. SWANLUND (USA)

### C7/8: Road Pavements

Chair: Mr Nelson RIOUX (Canada-Quebec)  
French-speaking Secretary: Mr Jean-Pierre CHRISTORY (France)  
English-speaking Secretary: Mr Allan BELL (Australia)

### C12: Earthworks, Drainage, Subgrade

Chair: Mr Giorgio PERONI (Italy)  
French-speaking Secretary: Mr Jules NOMERANGE (Belgium )  
English-speaking Secretary: Mr Edward J. HOPPE (USA)

## Theme 2: Road Transport, Livability and Sustainable Development

This theme covers the activities of Technical Committees C4 (Interurban Roads and Integrated Interurban Transport), C10 (Urban Roads and Integrated Urban Transport), C14 (Sustainable Development and Transport) and C19 (Freight Transport).

The aim of this theme is to encourage the development of road transport policies and programmes that take full account of the need for integration with other transport modes and result in beneficial community outcomes in economic, environmental and social terms.

To meet this aim, the work of the Committees addresses the following issues:

- General consequences of the Kyoto agreement, including quantitative analyses of technical, social, and political issues addressing road policies.
- How to improve communication between community and decision-makers
- Development of integrated interurban transport,
- The impacts and consequences of land use planning on transport demand,
- Integrated transport in urban areas,
- How to promote non-motorised trips in urban planning
- Understanding of the contribution of efficient movement of freight to national and international economies

### C4: Interurban Roads and Integrated Interurban Transport

Chair: Mr Gary LIDDLE (Australia) then Jean-Michel GAMBARD (France)  
French-speaking Secretary: Mr Erwin VAN DESSEL (Belgium)  
English-speaking Secretary: Mr Amund BOLDSTAD (Norway)

### C10: Urban Roads and Integrated Urban Transport

Chair: Mr George HAZEL (United Kingdom)  
French-speaking Secretary: Mr Christian MAUROIT (Belgium )  
English-speaking Secretary: Mr Graham LAIDLAW (United Kingdom)

### C14: Sustainable Development and Transport

Chair: Mr Anders H.H. JANSSON (Finland)  
French-speaking Secretary: Mr Jean-Charles POUTCHY-TIXIER (France)  
English-speaking Secretary: Ms Shari SCHAFTLEIN (USA)

### C19: Freight Transport

Chair: Mr Anders LUNDQVIST (Sweden)  
French-speaking Secretary: Ms Wanda DEBAUCHE (Belgium )  
English-speaking Secretary: Ms Gail MOODY (Australia)

## Theme 3: Road and Road Transport Operations

This theme covers the activities of Technical Committees C5 (Road Tunnel Operation), C13 (Road Safety), C16 (Network Operations ), C17 (Winter Maintenance) and C18 (Risk Management for Roads).

The aim of this theme is to improve the safe and efficient use of the road system, including the movement of people and goods on the road network, while effectively managing the risks associated with road transport operations, human factors and the natural environment.

To meet this aim, the work of the Committees addresses the following issues:

- Risk management (including natural, industrial, technical, etc., risks.).
- Keeping the road network, including bridges and tunnels, in safe, useable operation in all conditions.
- Traffic demand management, including investigating the opportunities for integrated information flows to travellers.
- How to develop the concept of a fully integrated high quality transport network operator role, e.g. how to operate a major road network to service standards and slot booking in the same way as rail, air and sea services.
- The promotion of global technology standards to maximise opportunities.
- To understand the safety responses to many advances, including the identification of safety issues which are priorities for developing countries.

### C5: Road Tunnel Operation

Chair: Mr Didier LACROIX (France)

French-speaking Secretary: Mr Willy De LATHAUWER (Belgium )

English-speaking Secretary: Mr Alan WEST (United Kingdom)

### C13: Road Safety

Chair: Mr Peter M.W. ELSENAAR (Netherlands)

French-speaking Secretary: Mr Michel LABROUSSE (France)

English-speaking Secretary: Mr Malcolm READ (United Kingdom)

### C16: Network Operations

Chair: Ms Sandra SULTANA (Canada-Quebec)

French-speaking Secretary: Ms Catherine SOUSSAN (France)

English-speaking Secretary: Mr James L. WRIGHT (USA)

### C17: Winter Maintenance (1998-2002)

Chair: Mr Tadayuki TAZAKI (Japan)

French-speaking Secretary: Mr Didier GILOPPÉ (France)

English-speaking Secretary: Mr Kent GUSTAFSON (Sweden)

### C18: Risk Management for Roads

Chair: Mr Minoru HIRANO (Japan)

French-speaking Secretary: Mr Richard PLAMONDON (Canada-Quebec), then Mr Georges PILOT (France), then Ms Line TREMBLAY (Canada-Quebec)

English-speaking Secretary: Mr Hiroshi AOKI (Japan)

## Theme 4: Management and Administration of the Road System

This theme covers the activities of Committees C6 (Road Management), C9 (Economic and Financial Evaluation), C11 (Road Bridges and other Structures) and C15 (Performance of Road Administrations). P1 on the HDM-4 Project belongs to this Strategic Theme.

The aim of this theme is to improve the performance of Road Administrations in the provision, operation and management of road infrastructure and its use in accordance with international best practice.

To meet this aim, the work of these Committees addresses the following issues:

- Developing, improving and implementing asset management processes
- Management and technology systems within an integrated transport system
- Utilisation of the results of the PIARC/HDM-4 project in improving road management
- Effective coordination between network managers, operators and the community
- Making more efficient use of the road budget
- Introduction of new forms of road financing
- Introduction of road pricing
- Organizational structure and effective performance management within road administrations
- The role and application of Public Private Partnerships (PPPs) in the provision, operation and maintenance of the road network

### C6: Road Management

Chair: Mr Michel GORSKI (Belgium )

French-speaking Secretary: Mr Arnold PREVOT (Belgium )

English-speaking Secretary: Mr James SORENSON (USA)

### C9: Economic and Financial Evaluation

Chair: Ms Sherri Y. ALSTON (USA)

French-speaking Secretary: Mr Patrice DANZANVILLIERS (France)

English-speaking Secretary: Mr Tom WORSLEY (United Kingdom), then Mr. Barry Moore (Australia)

### C11: Road Bridges and other Structures

Chair: Ms Brigitte MAHUT (France)

French-speaking Secretary: Mr Michel DONZEL (Switzerland )

English-speaking Secretary: Mr Ikuo HARAZAKI (Japan)

### C15: Performance of Road Administrations

Chair: Ms Miranda DOUGLAS-CRANE (Australia)

French-speaking Secretary: Mr Laurent DONATO (Belgium )

English-speaking Secretary: Mr Rick VAN BARNEVELD (New Zealand)

## Theme 5: Appropriate Levels of Road and Road Transport Development

This theme covers the activities of Committees C2 (Community Consultation), C3 (Technological Exchanges and Development), C20 (Appropriate Development) and T (Terminology).

In addition, the P3 Creation of Technology Transfer Centres Project and the WIN belong to this theme.

The aim of this theme is to foster the development of road transport policies and programmes that take account of the particular needs of developing nations and countries in transition and of rural and remote areas.

To meet this aim, the work of these Committees addresses the following issues:

- Evaluate effectiveness of PIARC technology transfer
- Development of techniques to facilitate the exchange of technology among and within PIARC member countries and professionals
- Improve understanding of the needs of developing countries
- Adapting transportation policy to users' expectation
- Addressing problems of traffic congestion, environment and mobility in urban areas of developing countries (DC) and countries in transition (CIT)
- Evaluation methods for road investment priorities in DCs and CITs and rural and remote areas
- Develop relationships with international technology transfer and financing organizations
- Application of road user charges, particularly in countries in transition, in some developing countries and in rural and remote areas
- Analyses of road user costs and quality of service levels for various transport modes
- Community consultation
- Technical standards for DCs and CITs

## C2: Community Consultation

Chair: Mr Willy BURGUNDER (France)

French-speaking Secretary: Mr Kurt KESTELOOT (Belgium ), then Mr. Baudoin SERRUYS (Belgium)

English-speaking Secretary: Mr Mark ELFORD (Australia)

## C3: Technological Exchanges and Development

Chair: Mr Oscar De BUEN (Mexico )

French-speaking Secretary: Mr Jean-Philippe LANET (France) then Mr Bertrand GUELTON (Belgium )

English-speaking Secretary: Mr Johan LIEBETRAU (South Africa)

## C20: Appropriate Development

Chair: Mr Jean-Paulin NKILI-BENGONE (Gabon) then Mr Kesogukewele MSITA (Tanzania)

French-speaking Secretary: Mr Jean-Claude THERRIEN (Canada) then Mr Abdennebi RMILI (Morocco)

English-speaking Secretary: Mr Alasdair SIM (South Africa), then Mr. Phil HENDRICKX (South Africa)

## T: Terminology

Chair: Mr Angel LACLETA (Spain ) then Mr Patrice RETOUR (France)

French-speaking Secretary: Mr Patrice RETOUR (France)

English-speaking Secretary: Mr Doug COLWILL (United Kingdom)

## **IV.2. Congress**

### IV.2.1. World Road Congress

The aim of the World Road Congress is to bring together decision-makers and experts from all over the world in the field of roads and road transport to present and discuss recent experiences and recommendations. The World Congresses are held every four years, the most recent of them being in Kuala Lumpur (Malaysia) in 1999.

This XXIst World Road Congress was highly successful. It drew nearly 2,700 participants from 115 countries, and 47 countries were represented at ministerial level. The General Report and the conclusions of the meetings have been published in the report (21.61.B) and all the congress proceedings have been compiled in a CD-ROM. The financial result of the congress was positive, which made it possible to consolidate the Association's equity and to fund new projects

Much activity has gone into preparing the XXIIInd World Road Congress in Durban (South Africa) from 19 to 25 October 2003, both by the South African Organising Committee, the PIARC Secretariat General and the PIARC Committees.

The South African Organising Committee has published Circular No. 1, which was sent to all PIARC members in January 2002, and Circular No. 2 was sent out in May 2003.

Besides the five “Strategic Direction” sessions organised by the Theme Coordinators, and the twenty sessions of the Technical Committees, the congress programme comprises 10 special sessions organised by PIARC in conjunction with other international organisations, and 15 additional sessions at the initiative of the Technical Committees. During the Congress, the second International Conference on Technology Transfer in the road sector and an Airfield Pavements seminar will also be held.

The official languages for the Durban Congress will be English, French and Spanish, together with Portuguese at the initiative of South Africa.

The Council decided at its meeting in Melbourne in 2002 that the XXIIIrd World Congress will be held in Paris (France) in 2007.

#### IV.2.2. PIARC Winter Road Congress

The XIth Congress, organised by Japan, was held in January 2000 in Sapporo on the general theme “New challenges for winter road service”. It drew the exceptional participation of 2,285 people from 64 countries. And as for the exhibition, that attracted 76,600 visitors!

The following topics were on the technical programme:

- Winter road policies and strategies
- Snow and ice management and its costs.
- Winter road issues and traffic safety in urban areas
- Environment and energy
- Telecommunications technology
- Development of Snow-Removal and Ice-Control Technology.

The call for papers met with great success, with 169 papers selected from 26 countries. All the proceedings were published by the Secretariat General in 2003 in a CD-ROM. The financial result of the congress was positive, which will make it possible to fund new projects.

The XIIth International Winter Road Congress will take place in Turin-Sestriere (Italy) in March 2006.

### IV.3. Association projects

To carry out its missions, particularly those concerning technology transfer and the participation of developing countries and countries in transition, and to promote PIARC's international action, in 1999 the Council adopted resolutions to make funding possible out of the Association Fund for various projects.

#### IV.3.1. Seminars

To better identify the needs of developing countries and countries in transition, to facilitate exchanges and knowledge transfer involving more participants from these countries, in 1999 the council made financial provision to enable seminars to be held in these countries. A recommendation was made for the Technical Committees to hold some of their meetings in developing countries or countries in transition, and at the same time as these meetings, to organise a seminar on the themes addressed by the Committees' work. The aim was to hold a total of 40 seminars.

This aim was only partially met, but 21 seminars were organised in 18 countries, with the help of 15 Technical Committees, as shown by the following table.

Committee	Date	Seminar Theme	Host Country
C20	June 2000	Road Commercialisation	Benin
C6	May 2001	The Main Road Operation Problems	Estonia
C3 / HDM4	May 2001	First African Conference on Technology Transfer	Tanzania
C16	May 2001	2nd International Conference on ITS	Czech Rep.
C18	October 2001	Risk Management for Roads	Chile
C14 (+ST2)	November 2001	Sustainable Development in Road Transport	India
C1	April 2002	Surface Characteristics	Cuba
C5	April 2002	Road Tunnel Operation	Chile
C3 & C20	May 2002	Rural Transport – Key Factors of Development	Cambodia
C11	June 2002	Intertraffic Asia 2002 – Bridge Management	Thailand
C13	June 2002	Intertraffic Asia 2002 –Road Safety Management	Thailand
C12	June 2002	Good Use of Natural Materials in the Road Sector	Mongolia
C9 & C15	September 2002	Institutional Strengthening & Financing for Road Administrations – Development Opportunities	Cuba
C7/8	October 2002	Pavement Recycling	Poland
C5	November 2002	Tunnels and Road Technology	China
C18	November 2002	Risk management for roads	Hungary
C3 & C20	November 2002	HDM-4, Road maintenance management and pavement management techniques	Costa Rica
C14	November 2002	Transport and Sustainable Development	Argentina
C12	March 2003	Slope management	Nepal
C4	April 2003	Interurban roads	Senegal
C14	April 2003	Sustainable Transport Management	Romania

The seminars brought together between 50 and 700 participants, who on the whole, expressed their satisfaction and that of the host countries. However, the general assessment made of this seminar programme on behalf of C3 Committee and the reactions of the Technical Committees have demonstrated the benefit of having centralised management in future, and the need for greater logistical support from headquarters and closer ties with other international organisations, to give more impact to these seminars.

#### IV.3.2. Creation of Technology Transfer Centres

In 1999, the Council decided to allocate funds for the creation of Technology Transfer Centres over the 2000-2007 period.

PIARC's aim was to create 10 Centres during the 2000-2003 period. By February 2003, the projects of 9 countries had been approved (Bangladesh, Burkina Faso, Chad, China, Cuba, India, Madagascar, Mongolia and Tanzania) and contacts had been established with Benin and Zimbabwe.

These Centres will form part of the World Interchange Network (WIN) and they will enable the countries concerned to make better use of their existing knowledge and experience to develop their roads and their road transport.

#### IV.3.3. The PIARC Special Fund

The PIARC Special Fund, managed by the Secretariat General, is intended to facilitate the participation of members from developing countries and countries in transition in PIARC activities, particularly those of the Technical Committees.

From 2000 to mid-2003, 240,000 euros were allocated to expenses made out of the Special Fund, which helped 55 people from 28 countries.

#### IV.3.4. The Reference Shelf

To facilitate the dissemination of knowledge of road issues to the academic world, PIARC decided to conduct a pilot operation for the distribution of reports and the Routes/Roads magazine free of charge to 8 training organisations. An assessment made on this operation in 2003 showed a mixed result of the use of PIARC publications and the benefits of continuing the operation along new lines based on a marketing plan that is to be drawn up.

#### IV.3.5. World Interchange Network(WIN)

The World Interchange Network (WIN) was founded in 1994 to put road professionals with specific problems in touch with people who may have advice and solutions to offer at national, regional and global levels. In 2000, it became a PIARC activity placed under the responsibility of the C3 Committee.

The experience of recent years showed that it was necessary to completely revise WIN's structure and the IT medium for these exchanges in order to better meet user needs. The Secretariat General, together with the coordination group of the World Interchange Network, has thus redesigned the WIN website to make the most of the communication potential offered by the Internet. The new WIN website will be inaugurated at the Durban Congress.

#### IV.3.6. The PIARC / HDM-4 Project

In 1996, the PIARC Executive Committee first suggested the role that PIARC could play when taking over the management of the HDM-4 Project. After two years of development from 1998 to 2000, under the authority of Neil Robertson, the HDM-4 Project Coordinator, Version 1.0 was made available in March 2000 in English, French and Russian. It was an immediate success, mainly with users in developing countries, international engineering firms and consultants and training organisations. This version was gradually corrected and improved. The latest version 1.3 came out in April 2001 and included a Spanish edition.

Software user licences have been sold through three distributors, MacTrans (University of Florida, USA), Ponts Formation Edition (ENPC-France) and more recently, the Spanish Technical Road Association. The prices have been adapted to user profiles (professionals, students, etc.) and to the country's economic level, with 60% of the receipts reverting to PIARC. Nearly 900 licences have been granted to date, distributed in more than 65 countries.

Surveys made in the Member Countries on decision-makers (McCoubrey report, September 2000) then on users (User Satisfaction Survey, July 2002), have highlighted expectations and needs for a new version (version 2) including substantial improvements as regards both software and modelling or the introduction of new functions.

In 2001, at the Council's request, a Business Case was drawn up on the basis of which contracts have been signed with the University of Birmingham for the production of Version 2. A version that does not cover all the specifications of the Business Case was supplied for testing at the end of March 2003. It will not be distributed until the second half of 2003. An examination of this version, possible developments and externalised management solutions as from 2004 are on the agenda of the Executive Committee's meeting in July 2003, in answer to a request made by the Council in 2002. Examples of applications of HDM-4 and Version 2 will be given at a presentation session during the World Road Congress in Durban in October 2003.

The HDM-4 product is now a reference in the field of road network development and technico-economic management. Not only is it a software suite but also a body of knowledge in this field. The website <http://hdm4.piarc.org> provides users with the most recent information. It also enables them to download the updates and order the software reference material.

## **IV.4. Cooperation**

### **IV.4.1. International Cooperation**

One of the goals of the PIARC Strategic Plan (Goal H) is to promote cooperation with other international and regional groupings with related goals.

Cooperation covers exchanges of information, coordination of work programmes to avoid duplication, and pooling of resources for joint studies, experiments and international seminars.

Many organisations and international associations have representatives on PIARC Committees related to their activities. These include but are not limited to: the World Bank, FISITA, Eurobitume, The United Nations (ILO/ASSIST programme), and ASTM.

Cooperation continued with the International Road Federation (IRF) and its utility was confirmed, with the organisation of sessions in conjunction with the world congresses of both associations and co-sponsorship of some events. A memorandum of understanding was signed with the Institute of Transport Engineers (ITE) in 2000. A cooperation programme with the Organisation for Economic Cooperation and Development (OECD) is in the study phase. More broadly, the Strategic Plan Commission is analysing the priorities, nature and content of the cooperation projects that PIARC should develop with the other international organisations.

#### IV.4.2. Regional Cooperation

PIARC has established close links with regional associations such as the Road Engineering Association of Asia and Australasia (REAAA), the Maghreb Road Association and the Nordic Road Association (NVF), which have activities similar to those of the National Committees but organised on a regional scale.

Contacts remain close with the Group of Western European Road Directors and initiatives have been taken to dynamise discussions and contacts with the African Road Directors (AGEPAR, Association des Gestionnaires et Partenaires Africains des Routes – African Road Managers and Partners Association, which has succeeded ADAR, Association des Directeurs Africains des Routes – African Road Directors' Association) and Latin American countries.

Closer cooperation with the Transportation Research Board is also being sought and has found its first expression in the organisation with the Federal Highways Administration (FHWA) of a session on road asset management at the TRB Conference in January 2003.

### IV.5. Publications

The results of the Technical Committees' work are published through articles in the "Routes/Roads" magazine and in technical reports in paperback or CD-ROM form.

The specific Activity Reports that follow this General Activity Report contain details of these outputs for each Committee. As regards the technical reports, in view of the cyclical nature of the Technical Committees' work organisation, the reports produced by the Committees in place were not finalised until 2003 and will be published as from Summer 2003 for the first of them, and then in 2004. The technical reports published by the Secretariat General between 2000 and 2002 consequently concern the work of the period preceding the Kuala Lumpur Congress.

#### IV.5.1. "Routes/Roads" Magazine

The magazine is the Association's quarterly news and information tool. It contains articles on the latest developments in the field of roads and road transport in Member Countries, syntheses of the PIARC Committees' work, conference reports and information on the life and activities of the Association and within its target area. The magazine is intended for both decision-makers and practitioners. The circulation of the magazine has remained fairly steady at around 6,000 copies.

#### IV.5.2. PIARC reports

From 2000 to 2002, 27 technical reports on the output of 14 Technical Committees were published by the Secretariat General.

A new edition of the PIARC Publications Catalogue was printed in 2002. Its contents can also be consulted on the PIARC website, where it is now possible to edit order forms.

#### IV.5.3. CD-ROMS

During the previous period, a large body of documents (nearly 300 full documents including PIARC reports published between 1991 and 2000, and about 700 bibliographic records of other PIARC publications) were placed on a CD-ROM: CD-ROUTE. The 3rd edition, which came out in June 2000, contained 18,000 pages.

All the bilingual publications issued for the XX1st World Road Congress in Kuala Lumpur are on a CD-ROM, CD-KL. And all the proceedings of the XIth PIARC Winter Road Congress (Sapporo 2002) are contained in a CD-ROM produced by the Secretariat General in 2003.

It is also the medium adopted for the proceedings of the XXIIInd World Road Congress (Durban 2003).

PIARC is continuing work on road-related terminology and is maintaining an update of the PIARC Technical Dictionary of Road Terms and the PIARC Lexicon of Road and Traffic Engineering. The CD-ROM "CD-Terminology" published in 2000, contains both documents together with a set of specialised dictionaries and glossaries. Coupled with the Internet, it enables updated documents to be downloaded and consulted (c.f. Terminology Committee Activity Report).

# V. FEEDBACK ON THE 2000-2003 STRATEGIC PLAN

As reported in II.3, the 2000-2003 Strategic Plan has defined a set of organisational goals to help PIARC to fulfill its mission. It is useful at this stage to note the actions that have been accomplished for each of these goals.

## **A – ... *help members exchange information ...***

Five new National Committees have been set up, which is a 20% increase.

The operating concept of the World Interchange Network has been completely revised and a new Internet communication medium has been created.

But little has been achieved towards better participation of young professionals and women in PIARC activities.

## **B – ... *encourage professionally worthwhile and effective personal contact networks***

The discussion topics have been introduced into Council meetings.

Close contacts are maintained between PIARC and the regional groups of Road Directors.

## **C – ... *practical means for efficient and effective technology transfer among countries***

The first PIARC Technology Transfer Centres have been set up.

20 seminars have been organised in developing countries or countries in transition.

But little progress has been made in the participation of DC or CIT representatives in the Technical Committees.

## **D – *run Congresses that are major and valuable events ... run them so that they are viable from PIARC's point of view***

The Kuala Lumpur and Sapporo Congresses were well attended and produced a positive financial result for PIARC, which makes it possible to envisage new projects.

The Durban Congress will be characterised by strong participation of the African countries and organisations working on this continent.

**E – produce and disseminate authoritative, impartial and interesting publications ...**

The PIARC website has been entirely restructured to enable better use of the Internet.

27 technical reports were published between 2000 and 2002 and about 40 reports are announced by the Technical Committees on completion of the work performed during the 2000-2003 period.

An assessment of development of the content and form of the Routes/Roads Magazine has been undertaken but the transformations will not be considered until after the Durban Congress.

Note that the draft directive of the European Parliament and the Council regarding the minimum safety requirements applicable to the tunnels of the transeuropean road network makes explicit reference to the PIARC C5 Committee work on road tunnels. The same applies for the final report "Recommendations of the Expert Group on Safety in Road Tunnels" published by the United Nations Economic and Social Council.

**F –increase the number of member governments, and (..) increase the number of members of the road community ...;**

The number of Member Countries has continued to increase, rising from 92 to 107.

However, except for a few countries, there has not been a significant progression in the number of collective and individual members.

No groups of young professionals have been set up, nor any specific action to encourage their membership.

**G – improve continuously the management and operation of PIARC ...**

The role of the Theme Coordinators in the Technical Committees in harmonising their activities has shown its value even though progress is still required towards more consistent action.

At the beginning of 2003, PIARC acquired a new, more user-friendly website that offers new functionalities for the public and the Association members, including a series of work spaces for the different groups (committees, commissions, etc.).

**H – promote cooperation with other international and regional groupings with related goals.**

Subject already mentioned in IV.4

# VI. PROSPECTS

At the time of writing this Activity Report, the new 2004-2007 Strategic Plan is being drawn up. It is therefore not appropriate to anticipate the Council decisions that must be taken in October 2003 in Durban on the priorities to be given to Technical Committee work for the 2004-2007 period, on the structuring of the themes, the goals for the operation and evolution of the internal rules and organisation of the Association.

The Strategic Plan revision process has been conducted through broad consultation associating all the member countries right from the outset. The discussions of the Strategic Plan Commission and the Executive Committee have shown the will to draw lessons from operations during the past period and to respond to the expression of needs considered as priorities by the member countries.

The manner of addressing the expectations of developing countries and countries in transition will thus necessitate a thorough reform. The same is true for the management of some projects, such as the seminar programme or HDM-4.

To improve the interest aroused in its work, PIARC will state its goals in a manner that will be more in step with societal needs. And study and discussion, while continuing to focus on roads and road transport, will be conducted in the broader context of the mobility problem and demands for all the transport modes combined.

As more than two thirds of its member countries are developing countries or countries in transition, PIARC must experiment, through pilot operations, with new work forms that will enable the effective participation of representatives of these countries who do not become involved in the traditional formats of Technical Committee operation. This remains a major challenge for PIARC if it is not to disappoint these countries whose membership it has gained in recent years.

Action with respect to young professionals and the academic world is another challenge for the vitality of the association – a field in which everything remains to be invented by PIARC.

# VII. PARTICIPATION IN PIARC

## VII.1. Member Categories

There are four PIARC member categories:

1. Governments (Ministries in charge of roads and road transport),
2. Regional Authorities (first level below the national level),
3. Collective Members (Municipal Councils, universities, laboratories, consultants, contractors, etc.),
4. Individual Members.

The Member Governments are responsible for designating representatives in the Council of the World Road Association and for appointing PIARC Committee members. These representatives may belong to the public or private sector.

## VII.2. Subscription Fees

The fees include the subscription to the PIARC "Routes/Roads" magazine.

### Annual subscription fees for the 2000-2003 period

Countries	Australia, Austria, Belgium, Canada, Canada-Quebec, Denmark, Germany, Finland, France, Ireland, Israel, Italy, Japan, Kuwait, Netherlands, New Zealand, Norway, Saudi Arabia, Singapore, Spain, Sweden, Switzerland, United Kingdom, USA. International Organisations	Argentina, Portugal and other countries
Collective Members	385 euros	230 euros
Individual Members	46 euros	23 euros

Please contact the Secretariat General for any further information:

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President: **Olivier Michaud (Switzerland)**  
Secretary General: **Jean-François Corté (France)**

# ROAD TECHNOLOGY

A. Alonso Burgos (Spain)  
ST1 Coordinator

The goal of Strategic Theme 3 – *Road Technology* – is to improve the provision and maintenance of road infrastructure in accordance with international best practice.

This Strategic Theme comprises three Committees:

- Surface Characteristics (C1),
- Road Pavements (C7/8), and
- Earthworks, Drainage and Subgrade (C12).

During the period 2000-2003, these three Committees worked actively to implement the actions defined in their programme, as shown by the activity reports hereafter.

These Committees represent a wide range of issues encompassing vehicle/tyre interaction, soils improvement and recycling of flexible and rigid pavements.

Among these Committees' achievements, it is worth mentioning the organisation of several PIARC international seminars: in Cuba by C1, in Mongolia and Nepal by C12, and in Poland by C7/8. They also contributed considerably to PIARC's Routes/Roads magazine. In particular C7/8 contributed a special issue on technical specifications of materials based on performance.

Each of these Committees will have the opportunity to present its achievements at their sessions, in Durban.

I would like to conclude by extending thanks to all the experts who have been involved in the ST1 Technical Committees. Their work made possible the production of many very useful reports including technical recommendations issued from the sharing of experiences between countries. They also organised productive international meetings, which contributed to knowledge transfer and helped to identify the needs of developing countries and countries in transition in the domain of road techniques.

**SURFACE CHARACTERISTICS  
(C1)**

**Activity Report 2000-2003**

# COMPOSITION OF THE COMMITTEE

AS OF JANUARY 2003

## **Chairman**

B. Schmidt (Denmark)

## **Secretaries**

Guy Descornet (Belgium)

Roger Larson until January 2002 (United States)

Mark Swanlund from January 2002 (United States)

## **Members**

Kym NEAYLON (Australia)

Peter MAURER (Austria)

Gerhard RAUSCHER (Austria)

Lucien HELEVEN (Belgium)

Paul HARBIN (Canada)

Mathieu GRONDIN (Quebec-Canada)

John EMERY (Canada)

Mislav JURIC (Croatia)

Vaclav BOLINA (Czech Republic)

Alaa M. KAMEL (Egypt)

Michel BOULET (France)

Siegfried HUSCHECK (Germany)

J. Martin ROWELL (Germany)

Andras GULYAS (Hungary)

Indu PRAKASH (India)

Mansour FAKHRI (Iran)

Pietro GIANNATTASIO (Italy)

Amir KAVUSSI (Iran)

Takemi INOUE (Japan)

Radu ANDREI (Romania)

Kazuo SAITO (Japan)

Luis A. GOMEZ (Mexico)

Abdelhamid IDRISSE JANATI (Morocco)

L. GOMBO (Mongolia)

Torleif HAUGODEGARD (Norway)

Mirostaw GRACZYK (Poland)

Cezary SAGANOWSKI (Poland)

Witold ZAPASNIK (Poland)

Maria de LURDES ANTUNES (Portugal)

Manuel Carlos MIRANDA de VALVERDE (Portugal)

Eduardo FERNANDES (Portugal)

Maria Elisa FONSECA (Portugal)

Cherif NIANG (Senegal)

Bojan LEBEN (Slovenia)

Louw KANNEMEYER (South Africa)

Marta ANCHUELO ALONSO (Spain)  
Adolfo CANCELA GÜELL (Spain)  
Johan LANG (Sweden)  
Ivan SCAZZIGA (Switzerland)  
L. Bert de WIT (The Netherlands)  
Ramesh SINHAL (United Kingdom)  
James C WAMBOLD (United States)

**Associate members**

Anglo BOCCANFUSO (Canada)  
Léon CHESSION (ETRTO)  
Michel GOTHIE (France)  
Maurizio CRISPINO (Italy)  
Francesca LA TORRE (Italy)  
Akira KAWAMURA (Japan)  
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# I THE MEETINGS OF C1

Paris (France)	3 April 2000
Nantes (France)	25 May 2000
Washington DC (USA)	11 - 12 January 2001
Copenhagen (Denmark)	3 - 5 September 2001
Havana (Cuba)	11 - 12 April 2002
Rotterdam (The Netherlands)	10 - 11 September 2002
Toronto (Canada)	7 - 8 May 2003
Durban (South Africa)	21 October 2003

Several of the meetings coincided with other activities. These are:

- May 2000 meeting in Nantes and the SURF 2000; organized by C1
- January 2001 meeting in Washington DC and the TRB Annual Meeting organized by Transportation Research Board (7 - 11 January 2001)
- April 2002 meeting in Havana and the first international seminar for DC/CIT countries organized by C1.

## II. PROGRAMME AND ORGANISATION OF C1 BETWEEN 2000 AND 2003

### II.1 Terms of reference

#### **Methods and systems to measure surface characteristics**

including using the results from the two international experiments carried out by PIARC on friction, texture and evenness

#### **Noise emission measurement**

#### **Pavement/vehicle interaction**

#### **Indicators to define pavement quality of use**

### II.2 Work programme and organisation

The work programme for C1 between 2000 and 2003 adheres closely to the Terms of Reference approved by the PIARC Executive Committee and the work items proposed by the C1 members in order to fulfil the Terms of Reference specified for C1. In order to meet the Terms of Reference, four working groups were established in C1. Special attention was paid to the execution of two international seminars concerning surface characteristics with focus on developing countries (DC) and countries in transition (CIT). For that purpose two working groups were established especially assigned to organize these seminars.

The working groups and their leaders were as follows:

**Working group A** Measurement of surface characteristics  
Leader: R. Sinhal

**Working group B** Better understanding of interaction phenomena between vehicle, tyre and surface.  
Leader: J. Wambold

**Working group C** Derivation of surface condition indicators based on the needs of the user  
Leader: B. Leben

**Working group D** Standard PIARC Test tires  
Leader: M. Gothié

**Working group S1 and S2** Organization of seminars in DC/CIT countries.  
Seminar 1: Leader: G. Descornet  
Seminar 2: Leader: until January 2002 R. Larson, thereafter M. Swanlund.

# III THE WORK PERFORMED BY C1 TO COMPLY WITH TERMS OF REFERENCE

## III.1 Introduction and benefits of work performed by C1

The work within C1 is of vital importance for road user safety and comfort. However, also people living and working close to roads, whether they are smaller city roads or major arterial highways are influenced by the performance of the road.

For maintenance purposes and to secure optimized use of the resources whether they are financial or natural resources used to build or maintain the road network the work of C1 is important for creating a solid foundation when optimizing maintenance strategy through pavement maintenance systems as the HDM-4.

C1 initiated previously a more permanent cooperation between the Committee members of C1 and the vehicle industry through the FISITA organization and the tyre industry through the ETRTO. This cooperation has been strengthened in the present period with the aim to increase the synergy of knowledge regarding the interaction between vehicle/tyre and the road to benefit the road user.

The task of providing information and cooperation not only between the working groups of C1 but also other PIARC Committees and external organizations has been a major issue for the Committee during this period. The issue of cooperation is illustrated in figure 1.

This figure also illustrates the task of formulating information and technology transfer where more specific technical issues are tailored into information, which can be used in a broader sense in road administrations, etc.

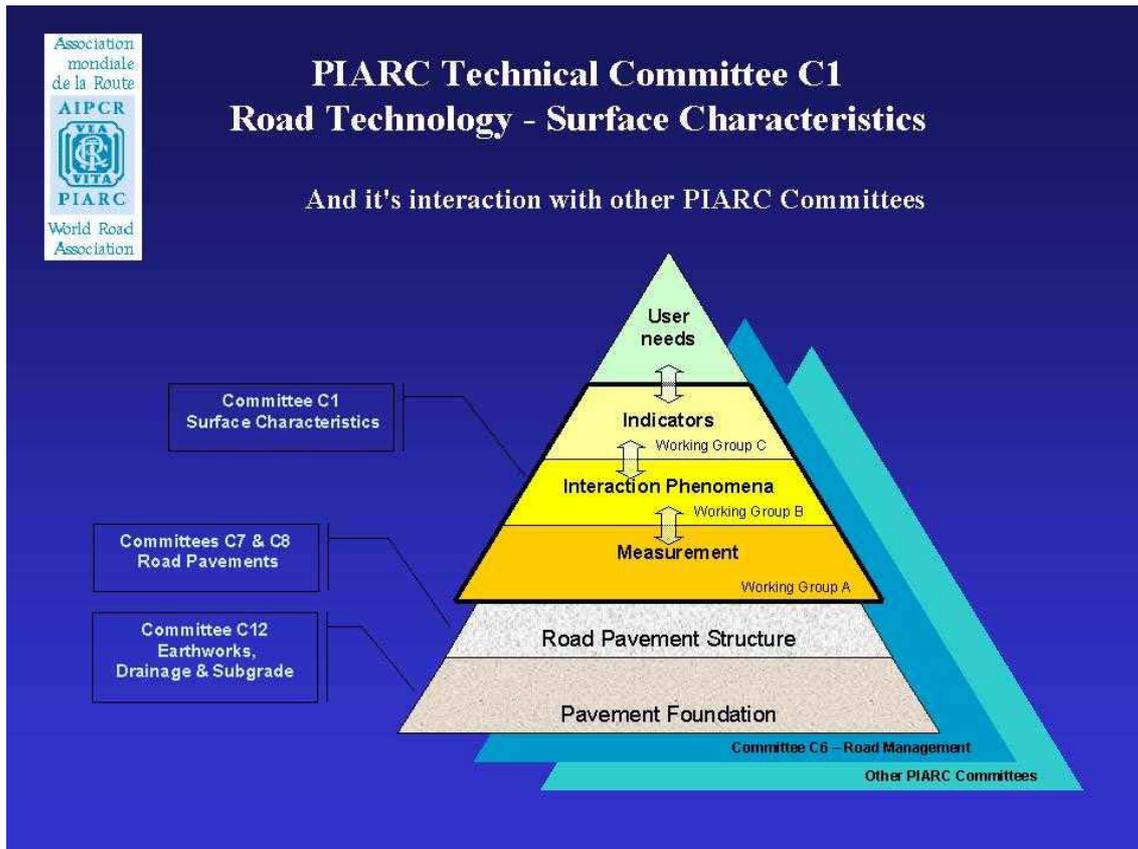


Figure 1 – The cooperation “triangles”.

PIARC’s strategy concerning increased information and cooperation with DC and CIT countries to increase traffic safety, comfort and create a better infrastructure requires that basic knowledge about road standards and the development of technologies is transferred to these countries. Much of the theoretical knowledge and knowledge on technology of surveying and monitoring road conditions is within the expertise of C1. It is therefore important that the work of C1 will be continued and developed in the future.

Within the framework of C1, the exchange of knowledge and technologies is of great importance for the members, associate members and corresponding members, who represent many parts of the world. The internal co-operation of C1 is of significant value for the participants and it is the frequent exchange of expertise which leads to developments in the public and commercial sector of the respective countries.

Two specific benefits, which are the outcome of the work in C1, are the results of the two international experiments on friction and texture in 1992 and on evenness in 1998. Both of these experiments have brought new knowledge to the road sector and especially as regards the friction and texture measurements, the results have contributed to the formulation of new standards on friction and texture around the world.

The opportunity to investigate the performance of equipment of high technology under equal conditions makes it possible for any nation in the world to make use of the results. One major consideration is that executing such experiments, demands significant resources, which often are not sufficient in DCs. The results of the two experiments are hence of vital importance for these countries as a platform for introducing new technologies for road surface measurements requiring only limited costs for investigating the appropriate use.

Finally, the results coming from C1 open new international opportunities, which now or in the future can benefit the international road community.

### **III.2 Methods and systems to measure surface characteristics**

The subject methods and systems to measure surface characteristics were dealt with by working group A. The major task for the working group was to finalise the report from the second international experiment on evenness. The report was approved by C1 in 2001 and published by PIARC in the beginning of 2002. The primary results were published in an article in Routes/Roads No. 308 in 2000, shortly after the results were presented at a special session at the Transportation Research Board Annual Meeting in January 2000. The second international experiment was carried out as regional experiments in USA, Japan and Europe. The European part of the experiment was conducted by the Forum of European National Highway Research Laboratories, FEHRL, and the detailed results from this part of the experiment have been published by FEHRL, but only the major results were reported in the PIARC report.

One of the issues addressed by working group A, following the results of the second international experiments, were the use of reference devices for measuring longitudinal and transverse evenness of roads. One important use of reference values is in the procurement process when profilometer systems have to qualify before they can be used. Sometimes the equipment used as reference equipment act as the control equipment. Table 1 shows the presently known equipments suitable for qualification as a reference device and its primary use.

**Table 1 - Reference equipment**

EQUIPMENT	Use		Principle
	Transverse profile	Longitudinal profile	
Rod and Level	Support	Support	Stationary Reference Plane
Total station	Support	Support	Stationary Reference Plane
PRIMAL	Yes	Yes	Stationary Reference Plane
VTI TVP	Yes	No	Moving reference Plane
Swivelling Dipstick	Yes	Yes	Moving reference Plane
Rolling Dipstick	Yes	Yes	Moving reference Plane
Walking Profiler	Yes	Yes	Moving reference Plane
"Laserscanners"	Yes	?	Moving reference Plane

For the first international experiment conducted by C1 in 1992 on friction and texture working group A has produced a state-of-the-art report concerning the future work and use of the International Friction Index, IFI which followed the publication of the report from the experiment in 1995. In the USA, the IFI became a standard within the American standards organization ASTM. In Europe, several national and across borders experiments were established to investigate the use of the IFI. One of the objectives was to extend the use of the IFI to surfacings, which were not or insufficiently covered in the PIARC experiment. These included porous asphalt, stone mastic asphalt, slurry layers etc. It was concluded from the European experiments that by testing different pavement types than those in the experiment, the IFI gave in general valuable results.

An issue raised in Europe in connection with the standardisation of the IFI was that it was found more suitable to alter the reference speed from 60 km/h to 30 km/h as this complied more with the testing speed of the devices used in Europe. In Europe, the IFI then became the EFI for European Friction Index. In connection with the standardisation of friction measurements in Europe it became evident that a periodic calibration of the devices is necessary, and it was obvious to use the EFI as the common friction scale. The work to produce a calibration process for the European devices is carried out by FEHRL, in close contact with the European Standardisation Working Group Technical Committee on Road Materials of the European Committee for Standardisation.

In Hungary, the IFI has been used in connection with a probabilistic pavement performance model, where local threshold values for friction and texture have been transformed into IFI values.

In Mexico, a study has been conducted to describe comparative analysis between the British Pendulum and the Mu Meter. A correlation was made between the devices on actual measurements and a correlation was made between the devices based on the IFI, where the texture was measured by the Sand Patch test. It was concluded from these experiments that the use of IFI provided an important improvement for harmonising friction measurements.

Studies in New Zealand showed that the correlation between three different devices did not improve by using the IFI as a common scale. One explanation of the lack of better correlation between the devices tested in New Zealand could be that the texture values on the pavements tested in New Zealand were much higher than for the pavements tested in the PIARC experiment.

Based on the concepts of IFI a specific harmonised friction index has been developed for airfield runways, International Runway Friction Index, IRFI. The IRFI is anticipated to become a standard criterion used by airports to assess the condition of a runway under winter conditions. Safe take-off and landing decisions will then be facilitated by use of a standard index worldwide. The IRFI is described in Routes/Roads No. 312 in 2001.

In general, it can be said that the work and effort put into the execution of the first experiments has led to many new considerations towards the measurement and interpretation of pavement friction to the benefit of user safety.

### **III.3 Noise emission measurement**

Noise affects people physiologically and psychologically and traffic noise is one of the major environmental problems as transport demand continues to grow. The World Health Organization (WHO), has specified the following noise levels and their influence on the human body. Noise levels above 40 dB influence well being. Noise levels at 50 dB make people moderately annoyed and at 55 dB seriously annoyed, whereas levels above 65 dB are detrimental to health. The European Environment Agency informs that in Europe more than 120 million people are exposed to road traffic noise levels above 55  $L_{dn}$  dB, which is more than 30% of the total population in Europe. More than 50 million people are exposed to noise levels above 65  $L_{dn}$  dB and hence are exposed to a noise level, which is detrimental to their health.

Based on these numbers is it important that the issues regarding noise and how to measure noise in relation to road traffic are a focus area. In C1, noise measurements have been a subject for discussion during the last periods, and it has been considered whether noise measurements should be a subject for a third experiment due to the fact that relatively new measuring equipment is available for monitoring the noise generated between the pavement surface and the tyre. C1 has in this period produced a state-of-the-art report on how to measure noise characteristics of pavements with the aim of providing a brief review of the practices currently in use and future possibilities and needs for measuring the noise generated from vehicles and the interaction between the tyre and the road surface.

The state-of-the-art report highlights that much work has been carried out to investigate different equipment and methods to measure road noise. In Europe, an experiment was performed to test the different noise measurement trailers, which measure the noise generated between the tyre and the pavement using the so-called Close Proximity Method (CPX). The outcome of this experiment showed that at that time there was a rather big difference between the results measured from the trailers. In 2002, a special European project, SILVIA, was initiated which, among other things, will look at the measuring principle for tyre/road noise. In the Netherlands, a large project named "Innovative Noise Reduction Program for Road Traffic" has been launched in 2002 with the aim of investigating noise reduction pavement types but also including measuring methods.

Based on the present international activities on road noise, which has been initiated within recent years, the C1 state of the art report on noise recommends that no third international PIARC experiment be initiated. However, it is recommended that C1 in the period from 2004 to 2007, should continue its focus on the activities of tyre/road noise within the international road community and closely follow the progress and results coming from those projects and experiments already in progress and those which will come in the future. A major activity for PIARC should be to offer assistance to these international projects by disseminating and spreading the knowledge to the world road community. Based on the importance of measuring road noise and investigating possible ways and methods of noise reduction it is recommended that road noise emission is given a higher priority and ambition for the coming periods of PIARC.

#### **III.4 Pavement/vehicle interaction**

The interaction between the vehicle and the pavement influences the vehicle, its operators, passengers and goods, but also the lifetime of the pavement, especially dynamic forces induced by unevenness in the road surfaces can have a significant influence on the structural lifetime of the pavement. The keyword in maintenance of roads and road networks is optimisation, which means that the goal is to get the best quality of the road network with the resources available.

For that purpose, pavement maintenance systems are a globally used tool. A vital part of such systems is modelling of the interaction phenomena between vehicle, tyre and the pavement surface. These models are investigated through comprehensive research around the world and C1 have produced a state of the art report for the modelling of these characteristics including:

- **Safety**  
The pavement surface has an influence on the safety aspects for the road users in relation to wet friction, winter friction, vehicle control and splash-spray. To secure sufficient friction across a wide range of traffic speeds both micro and macro texture are important pavement surface characteristics and especially important where water depths increase and the tread of the tyre is worn. Significant fall in friction can occur when the tyre tread approaches the legal minimum, which in many countries is 1.6 mm. One noticeable issue in relation to traffic safety raised in the state-of-the-art report is that road accidents seldom have one cause. The tyre/road interface is only one component of the complex combination of circumstances that influences the risk of traffic accidents.
- **Serviceability**  
The serviceability of the road or the road network encompasses many factors when looking at the parameters related to the work of C1. These factors include ride quality, noise, vibrations and slab curl. Of these four parameters, pavement performance is most generally related to road roughness, which can be determined by different models whereof the International Roughness Index, IRI, is the one most commonly used around the world. However, several research initiatives and work within standardisation organizations and also in many countries imply that other and more sophisticated analysis methods and models provide more information on the roughness characteristics of the pavement. These methods are harmonic analysis, Power Spectral Density, and amplitude/frequency distribution. As an example, the harmonic analysis is useful in isolating periodic spatial wavelength in a road surface that causes poor ride quality. The more widespread use of high-speed profiling equipment where the road profile is digitised makes it possible to use these types of analysis in a broader sense and thereby makes it possible to detect the occurrence of possible periodic spatial wavelength which can have a significant effect on the ride quality but also affects the vertical loading on the pavement and hence influences the bearing capacity of the road, which can cause early deterioration of the pavement structure.

Of other serviceability related parameters discussed in the state-of-the-art report are noise, vibrations and slab curl. Especially for noise, the state-of-the-art report supplements the special state-of-the-art report written on this issue to comply with the terms of references.

- User costs

The user cost models include pavement loading, fuel consumption, transport costs, and tyre and road wear. The state-of-the-art report mentions several models developed for analysing and calculating the above-mentioned features. For pavement loading, a commonly used model is the fourth-power law although the magnitude of the fourth-power law in the last few years has been questioned, as it is believed to vary in the range of 3 - 6, depending on the road design. The interest for modelling dynamic loading on pavements has been in focus for several years and one of the major contributions to this work has been the OECD project DIVINE, which took place in 1992 to 1996.

Models for fuel consumption and transport costs, tyre and road wear is one of the issues, which has been seen as a major input to optimisation in pavement management systems. However, through the years it has been extremely difficult to quantify these types of costs when relating them to the pavement surface. The state of the art report now mentions a computer program from the Swedish Road and Traffic Research Institute (VTI) for calculating vehicle costs as a function of road surface characteristics. The calculation models include a high degree of freedom in performing calculations regarding various properties of the road surface, different road alignment, speed limits, vehicle types and driving behaviour. Vehicle costs are calculated in the form of fuel consumption, tyre wear, repair costs, capital costs and exhaust emissions.

In general, it can be said that there is great focus in the world to model the different aspects, which relate the interaction between the vehicle, the user and the pavement surface. The liaison between C1 and the vehicle and tyre manufactures is a vital piece in the jigsaw puzzle to create a better understanding of vehicle/road interactions. Hence it is important that this liaison is kept and intensified in the future in order to provide higher quality of the safety, serviceability and user cost for road users.

### **III.5 Indicators to define pavement quality of use**

Indicators to define pavement quality of use are an important part of pavement management systems and often these represents only one characteristic of the pavement surface. One of the issues of C1 has been to identify the needs for combined indicators for different surface characteristics into one single indicator. The work has also focused on preparing recommendations for data processing and storage. Functional classification using different levels of indices (single and combined) by the use of these levels to support maintenance planning including structural and functional index ratings has been investigated. One of the major findings in the investigation has been that indices used around the world have limited comparability due to the use of different factors, rating systems and measuring procedures, etc. In order to make further development of combined indices which can be used globally, it is important that a worldwide initiative of harmonising used indices is initiated.

# IV PUBLICATIONS

## IV.1. PIARC "Routes/Roads" magazine

Year	Title	Publication	Author
2000	International Experiment to Harmonise Longitudinal and Transverse Profile Measurements and Reporting Procedures	R/R 308	Bjarne Schmidt, Denmark
2001	PIARC Technical Committee C1 – Surface Characteristics	R/R 312	Bjarne Schmidt, Denmark
2001	Joint Winter Runway Friction Measurement Programme	R/R 312	J-C Wambold, CDRM Inc. T-J Yager, NASA, J.J. Henry Penn State- USA
2003	Evaluation of investigations into the application of the IFI (International Friction Index),	April 2003	Bert de Wit et al., DWW, the Netherlands
2003	Reference measurement methods for evenness	July 2003	Leif Sjögren, VTI Sweden
2003	Development of standardisation and Harmonisation of Road Surface Characteristics Testing in Europe	July 2003	Michel Boulet, LCPC France Guy Descornet, BRRC, Belgium
2003	Report from C1 International seminar in Cuba	April 2003	Mark Swanlund, FHWA, USA Marta Alonso Anchuelo, CEDEX Spain

## IV.2. Articles in other magazines

Year	Title	Publication	Author
2001	PIARC Technical Committee C1	Nordic Road and Transport Research	Bjarne Schmidt, Denmark

# V CONTRIBUTIONS TO NATIONAL AND INTERNATIONAL CONFERENCES

## V.1. Events organised by C1

### V.1.1 International symposium on pavement surface characteristics Nantes (France) May 22 - 24, 2000

After State College (Pennsylvania, USA) in June 1988, Berlin (Germany) in June 1992, Christchurch (New Zealand) in September 1996, PIARC C1, in association with the French National Committee of PIARC, the French Road Research Laboratory (LCPC), the French Ministry of Public Works, Transport, and Housing (Road Directorate and General Directorate of Civil Aviation), the Association of French toll motorways company (ASFA), the Federation of French Road Industry (USIRF), organized the fourth symposium of this type in Nantes (France) on 22 - 24 May 2000. M. Boulet was responsible for coordination. The symposium included 49 papers covering the following topics:

- Pavement evenness
- Texture and skid resistance measurements
- Factors influencing skid resistance
- Acoustical and photometric properties
- Road surface characteristics and vehicle dynamics: phenomena and consequences.

The SURF 2000 also included a special seminar for presentation of the main results and conclusions of the European FILTER research project, which was a part of the second international experiment.

### V.1.2 International seminar on surface characteristics Havana (Cuba) April 9 - 10, 2002

The first International Seminar of Road Surface Characteristics was held on 9-10 April, 2002 in Havana, Cuba. This seminar is part of the PIARC Program of International Seminars on Road, Transport, and Development to share transportation technology with developing countries (DC) and countries in transition (CIT). The Seminar was sponsored by Technical Committee C1 and hosted by the Cuban Ministry of Construction and the Ministry of Transport.

The objective of the International Seminar was to share with DC/CIT representatives the appropriate technology on the road surface characteristics of pavement friction, pavement evenness, pavement/tyre noise, and ways to effectively use this technology to improve user comfort and safety, as well as minimise environmental impact and user cost.

The Seminar was structured to provide four technical sessions and a workshop consisting of discussion groups focusing on current practice and needs in DC/CIT countries relative to road surface characteristics. The technical sessions were structured to build on each other. The first technical session described the importance of road surface characteristics. The second technical session covered measurement and assessment methods. The third technical session described the importance of references, specifications, and standards, while the fourth technical session described application of road surface characteristics data to improve transportation systems in DC/CIT countries. The workshop was designed to facilitate two-way exchange of information between representative from DC/CIT countries and other workshop participants.

### V.1.3 XXIIInd World Road Congress, Durban, 19 - 25 October 2003

Two Congress sessions to be led by C1 have been organized. The detailed programmes are given in the introductory reports for these two sessions. The objectives and principle topics are as follows:

The main session of C1 (October 21, morning) chaired by B. Schmidt will be devoted to:

1. A review of the activities of C1 during the period –2000 -2003
2. Measurement of surface characteristics presented by R. Sinhal
3. Interaction models presented by J. Wambold
4. Indicators presented by B. Leben
5. Contribution to asset management presented by J. Emery
6. Reference tyres presented by M. Gothié.

The supplemental session organized by group A and chaired by R. Sinhal will deal with further studies of the use of the International friction Index IFI and the issue concerning the precision of reference devices for evenness measurements which is a follow up on the second international experiment on evenness measurements.

The session will also present the state of the art regarding Tyre/road noise, which was one of the items listed in the terms of reference for C1. Further presentations will be given on automated crack detection, general aspects of measurement needs and finally the objectives of harmonisation and standardisation of surface characteristic measurements.

1. State of the art - Slipperiness and texture presented by B. de Wit
2. HERMES project presented by Guy Descornet
3. Reference profilers presented by Leif Sjögren
4. Noise presented by Ulf Sandberg
5. Automated detection of cracks presented by Andras Gulyas and Mathieu Grondin
6. Measurement needs presented by Brian Ferne
7. Harmonisation and standardisation presented by Michel Boulet.

## **V.2 Participation of C1 in conferences**

### **V.2.1 TRB Annual Meeting 2001, Washington DC**

C1 held a special session at the Annual TRB meeting 2001 in Washington DC titled World Road Association (PIARC) International Experiment to Harmonise Longitudinal and Transverse Profile Measurements and Reporting Procedures (EVEN).

The session was sponsored by TRB committee A2B07 - Committee on Surface Properties - Vehicle Interaction.

C1 committee members made four presentations:

1. EVEN: PIARC International Experiment to Compare and Harmonize Methods for Assessment of Longitudinal and Transverse Evenness of Pavements - Bjarne Schmidt, Danish Road Institute, Denmark

The paper described the analysis performed on longitudinal profiles measured on in-service roads during the Second International Experiment, which was conducted in USA, Japan and Europe in 1998. Results of the analysis of the correlation between the IRI of measured by the high-speed devices and the "true" profile obtained by a combination of three different hand-operated profiling devices were presented. Also a detailed analysis of the measurements of the test sites with the poorest and the best correlation between the IRI of the high-speed devices and the true profile were presented. Finally, the paper presented the results of the analysis of the repeatability and the reproducibility of the participating devices in the experiment in USA and in Japan.

2. Basic Analysis of Measurement Data from Japan in PIARC EVEN Project Akira Kawamura, Kitami Institute of Technology, Japan

The paper summarised the basic analysis and measurement results for roughness conducted in Hokkaido, Japan. The paper also comparatively analysed longitudinal profile measurements obtained by 7 high-speed profilometers in Japan, their influence on roughness indexes such as IRI, and the correlation between roughness indexes, together with Japan's current measurement and evaluation system for roughness.

3. FILTER Project - Guy Descornet, Belgian Road Research Centre, Bert de Wit, Road and Hydraulic Engineering Institute, The Netherlands

The paper gave an introduction to FILTER, the FEHRL Investigation on Longitudinal and Transverse Evenness of Roads, which aimed at providing European highway research laboratories and standardisation bodies with the knowledge required to harmonise the methods of measuring and assessing road evenness. The paper presented three types of actions that had been conducted at that time:

- drawing up an inventory of high-speed evenness measuring equipment in use in Europe,
- carrying out a theoretical study for comparing the various longitudinal evenness processing methods and the influence of various measurement conditions,
- organizing a comparison experiment between the European measurement and assessment methods.

The paper reported about the first two actions while expanding somewhat more on the comparison experiment.

4. Analysis of Correlations Between Longitudinal Indexes in FILTER Experiment - Marta Alonso Anchuelo, CEDEX, Spain and Sixto Yanguas, CEDEX, Spain

The paper reported on the task of the FILTER project concerning the analysis of the European data obtained from an experiment, which was conducted by PIARC, Committee C1. The Road Research Centre of Spain (CEDEX) was in charge of analysing the results regarding longitudinal indices from the FILTER Experiment. The number of longitudinal indices was 29 and 20 participants in total reported them. The paper explained the method used to analyse the data, together with some of the conclusions obtained from the correlation between the longitudinal indices. The work was described as an important contribution to achieve one of the main topics of FILTER project, which was to try to harmonise the different methods of measuring evenness in Europe.

IV.2.2. Tyre Technology Expo 2002, 20 – 22 of February 2002 in Hamburg, Germany

The work of C1 was presented at the Tyre Technology Expo in Hamburg in 2002

IV.2.3. Tyre Technology Expo 2003, 5 - 7 of March, 2003 in Hamburg, Germany

Based on the information given at the Tyre Technology Expo in 2002, the organizers of the conference were interested in having another presentation from C1 at their conference in 2003. The presentations given at these conferences are a vital step for the liaison and cooperation between the tyre industry and the road engineering community.

**ROAD PAVEMENTS  
(C7/8)**

**Activity Report 2000-2003**

# INTRODUCTION

The Technical Committee on Road Pavements (C7/8) was created for the PIARC Congress held in Rome in 1962. It was then called "Technical Committee on Pavement Design" and subsequently split into C7 Concrete Roads and C8 Flexible Roads in 1965. The activities of the Technical Committee on Testing of Road Materials (C2) which was created in Munich in 1934, were transferred to C7 and C8 in 1992. In 2000, those two Committees merged into one single Technical Committee: C7/8 Road Pavements, with 68 members and 19 corresponding members from 38 countries. The first meeting of the C7/8 committee was in Paris in April 2000 and was attended by 33 members.

Based on the direction given in PIARC Strategic Theme 1: Road Technology, C7/8 developed the following topics for study during 2000 - 2003:

- decision making methodology and criteria for the selection of pavement type;
- rehabilitation and strengthening of pavements: inventory of available techniques;
- technical recommendations on recycling and re-treatment of pavements;
- innovative pavements design; and
- functional pavement specifications, working towards performance-based technical specifications.

A sub-group was formed to deal with each topic.

The work of the Committee was progressed at eight meetings, some of which were conducted in conjunction with other activities as follows:

- Paris (France), 4 April 2000;
- Barcelona (Spain), 18 -19 September 2000 in conjunction with Euroasphalt and Eurobitume Congress;
- Brugge (Belgium), 15-16 March 2001;
- Orlando (United States), 6- 7 September 2001, in conjunction with the 7th International Conference on Concrete Pavements;
- Rotterdam (the Netherlands), 14-15 February 2002;
- Quebec City (Canada), 23-24 May 2002;
- Warsaw (Poland), on 8 and 9 October 2002;
- Paris (France), on 18 and 19 March 2003.

In addition to preparing PIARC reports on each of the topic areas, the Committee has been involved in two seminars where the work of two sub-groups has been discussed with a wider audience. These seminars support the challenging PIARC agreement made in Kuala Lumpur to run 40 international seminars before October 2003. The first was in Warsaw and was supported by the Road and Bridge Research Institute (IBDiM). It was aimed at raising awareness of pavement recycling technology in countries in transition, while the seminar in Paris, supported by the French PIARC National Committee, addressed road innovation.

In Durban the Committee will present the sub-group reports and hopes to stimulate discussion on new ways to foster innovations and improve road pavement performance, including success factors involved in developing and implementing innovations, use of performance specifications, benefits expected and barriers to be overcome.

The remainder of this report covers the activities of the sub-groups and some concluding observations.

# SUB-GROUP 1: PAVEMENT TYPE SELECTION

The members of the sub-group were:

P. TENG (USA); Chairman	J. MARCHAND (France)
N. RIOUX (Canada - Quebec)	L. GASPARD (Hungary)
A. BELL (Australia)	Y. TORII (Japan)
B. PERRIE (South Africa)	H. ROOS (The Netherlands)
B. VERHAEGHE (South Africa)	J. POTUCEK (Sweden)
R. BULL-WASSER (Germany)	M. CAPREZ (Switzerland)
R. GRUNING (Germany)	C. MARIN (Romania)
H. PIBER (Austria)	D. SYBILSKI (Poland)
C. CAESTECKER (Belgium)	
L. PIERCE (USA)	

## Work Program

The goal of this sub-group's (SC1) activity was to establish a decision-making methodology and criteria for the selection of pavement types for both new and rehabilitated pavements. It is anticipated that the multi-criteria methodology will provide decision-makers with information enabling them to make the most appropriate decisions in terms of sustainable development. Paul Teng (Federal Highway Administration USA) was asked to serve as the Subgroup Chair, sharing the leadership with Linda Pierce (Washington State, USA).

During the Committee's September 2000 meeting in Barcelona, Spain, a working session with the full committee membership was devoted to this subject. Paul Teng led the discussion and shared with the C 7/8 membership alternative approaches for accomplishing this task through SC1 surveys of practice or development of the criteria using the expertise in SC1. After a lengthy discussion, the full committee decided that C 7/8 should try to develop such criteria for PIARC. It was agreed that Paul Teng and Linda Pierce should start the subcommittee's activity by putting together a framework. The countries interested in participating in this task were Poland, South Africa, France, Romania, Netherlands, Belgium, Australia, Austria, Sweden, Switzerland, Germany, Japan, and the United States.

During the Committee's March 2001 meeting in Bruges, Belgium, a Proposed Outline of Factors for Determining the Type of Pavements was revised and discussed at the subcommittee meeting. This meeting's major decision was to eliminate the distinction between primary and secondary factors. This compartmentalizing was not relevant because a factor considered to be primary in one country may not be so in another country. Subcommittee members were to provide further review and feedback to the Subcommittee Chairman by June-July 2001 for further discussion at the September 2001 meeting in Orlando, Florida, USA.

The proposed outline was reviewed and amended during the September 2001 meeting. It was also brought to the subcommittee's attention by South African committee members Benoit Verhaeghe and Bryan Perrie that their country had recently developed a guideline which appeared to parallel the subcommittee's philosophy on pavement type selection. The subcommittee decided to accept South Africa's generous offer and agreed that Benoit Verhaeghe and Bryan Perrie revise the South African guideline and include SC1's outlines as the SC1's draft guidelines. They were also to delete South Africa-specific detail. C 7/8 Chairman Nelson Rioux also shared his paper "*Using Total Cost and Multi-Criteria Analysis to support Selection of Pavement Treatment*" as an input to the subcommittee's work. A Proposed Outline of Factors for Determining the Type of Pavement dated November 2001 was circulated to the full committee via e-mail in early December 2001.

The subcommittee reviewed the November 2001 version during the February 2002 meeting in Rotterdam, Netherlands and made several suggestions for strengthening the Traffic, Materials, and Climate factors. A revised version dated March 2002 was prepared by the US team (Pierce and Teng) and circulated to the full committee prior to the May 2002, Quebec, Canada meeting.

During the Quebec meeting, a subcommittee of 12 participants conducted a detailed review and made significant changes to the draft guideline. They decided that the final version should concentrate only on the determination of pavement structure. Associated factors should be mentioned only briefly, but heavily referenced to provide sources of details. With this major change in direction, Linda Pierce and Paul Teng indicated that they would work with Dr. Joe Mahoney (Professor at the University of Washington) to revise the draft to reflect the subcommittee's wishes. Another revision dated September 2002 was circulated to the full committee prior to the October 2002 meeting in Warsaw, Poland.

Nine members of the subcommittee conducted a detailed review of the September 2002 version during the Warsaw meeting and provided significant input for Linda Pierce and Paul Teng to finalize the Guide. Linda Pierce and Paul Teng incorporated all their changes and submitted the final version of the guide, now titled " *Guideline of Factors for Determining Pavement Type*" in January 2003.

## Principal Findings

The selection of pavement type is not an exact science but one in which the highway engineer or administrator must make a judgment on the basis of many factors such as traffic, materials, drainage, construction, safety, and traffic noise. Pavement type selection may be dictated by an overriding imperative for one or more of these factors. The selection process may also be facilitated by comparison of different structural designs for one or more pavement types. Comparative cost estimates using whole life costing analysis can be applied to the different pavement designs to aid in the decision-making process.

Asphalt concrete and Portland cement concrete are the two major paving materials for many countries. Competition between the two material suppliers and paving industries often causes controversy when a decision is made to use only one of the two materials for the final design. SC1's proposed guideline for PIARC countries considered almost all relevant factors to provide decision makers with information that will enable them to make and justify their decisions.

## Outputs

- A PIARC Report will be produced for the World Road Congress in Durban in 2003.
- The results of sub-group activities will be presented at the World Road Congress.

# SUB-GROUP 2: INNOVATIVE PAVEMENT DESIGN

The members of the sub-group were :

J. P. CHRISTORY (France); Chairman	L. GOMBO (Mongolia)
J. ABDO (France)	Y. GUIDOUX (France)
J. AUNIS (France)	A. HASSAN (Malaysia)
C. BARTOLOMÉ (Spain)	J. POTUCEK (Sweden)
R. BLAB (Austria)	B. PERRIE (South Africa)
C. CAESTECKER (Belgium)	N. RIOUX (Canada-Québec)
M. CAPREZ (Switzerland)	D. SYBILSKI (Poland)
R. DEBROUX (Belgium)	P. TENG (USA)
C. FRETET (France)	V. ZOLOTAREV (Ukraine)
F. FUCHS (Belgium)	
L. GASPAR (Hungary)	

## Work Program

The sub-committee (SC2) overall objective was to identify and analyse innovative pavement designs developed in various countries, so as to implement the most appropriate range of new pavements and rehabilitation techniques.

The work plan developed by SC2 included the following components:

- an international survey of current practices: their evolution and innovations;
- an international conference on innovative pavements;
- papers given in international institutional conferences;
- a report for the World Road Congress to be held in Durban.

The sub-committee was a fairly small group from 18 countries, comprising a dozen active members and a similar number of contributors. The pooling of their experience and analysis enabled the Committee C7/8 meet their goals after a series of 7 combined work/plenary sessions.

The four assignments were all delivered on time, in the sequence in which they are described below.

## Questionnaire

A questionnaire was drafted to cover four topics:

1. What needs are met by innovative pavements in your country?
2. What actions have been implemented to help, complement, and promote innovative pavements?
3. What stage of development has your country reached with these innovative pavements?
4. Identify and describe the three most characteristic, innovative pavement designs that offer the greatest potential for your situation.

To illustrate the organisers' expectations and organise the respondents' ideas, a number of categories of pavement innovation were developed:

- Eradication of pathologies
- Ergonomics
- Environmental functionality
- Travel functionality
- Network functionality
- Road safety and site integration
- Energy saving and sustainable development
- Natural resources conservation
- Highway operation
- Resistance to severe stresses
- Economics
- Heritage management
- Other needs.

The questionnaire was designed to include highway networks as well as local and urban roads. Because the Committee and representatives were so diverse and scattered, the latter goal was more difficult to reach. There were, however, some examples, such as the answers received from French cities and metropolitan areas, and Canada's global answers, underscoring their need for innovation. It was evident that urban facilities are generating a high volume of needs that are not met or could be met in a better way by innovating.

The follow-up and analysis of the results was based on the replies from the following 18 countries:

South Africa	Belgium
Estonia	Indonesia
Japan	Romania
Germany	Canada/Quebec
France	Iran
Netherlands	Ukraine
Australia	Denmark
United Kingdom	Italy
Poland	USA

## Report

The report “*Design of innovative pavements*”, submitted by the sub-committee and validated by the plenary assembly of C 7/8, was issued to the General Secretary in early 2003. This report examines the definition, design and particular aspects of roadwork innovation, and includes the results and conclusions from the above-mentioned survey. It provides the basis for a response to the four questions, mainly in the context of highway networks, with a special emphasis on the various drivers for innovation and the contribution of cities. It describes the successful initiatives to develop roadwork innovation, such as the Dutch “Roads for the future” project, the research chairs in Canada/Quebec, and the French roadwork innovation charts. Finally, it presents, in the form of illustrated sheets, details of 18 international pavement innovations.

## Seminar

The Road Innovation 2003 meeting was the first international meeting of its kind. It is proof of the Committee’s commitment to offer an information, discussion and proposition platform for going beyond identifying needs and collecting testimonies, and actually proving that success can be achieved through innovation. This was also demonstrated by the international survey.

It was crucial to rekindle the sense of innovation amongst road and professional administrations by calling upon high-calibre speakers who would speak on behalf of road-users, employers and infrastructure and business managers. Speakers were selected to generate discussion on:

- road innovation issues and needs
- methods to counteract the restraints imposed on innovation
- achieving successful outcomes by innovation
- innovation for a sustainable development
- the perspective of a new order to stimulate innovation.

This will form the backbone of the proposal to be put forward for the international road community.

This meeting constitutes a prototype, and was used to produce a learning package, which the various continents involved in this initiative can tailor to their specific situation. This is a first step in planning for future seminars in accordance with PIARC guidelines.

## Papers

The promotion of our initiatives by industry sectors at major international events has progressed well. In addition to decentralising Road Innovation 2003 events, as mentioned earlier, our research conclusions were recorded in the report *Design of innovative pavements*. Wider dissemination will occur at a Durban special session “*Transport innovations*” which has been instigated by several technical committees and the Dutch national PIARC committee.

We are also planning to give an account of our works and conclusions at the 9<sup>th</sup> International Symposium for Concrete Roads (organised by CEMBUREAU) in Istanbul (Turkey) in 2004, and have proposed inclusion of our work at the January 2004 meetings of the Transportation Research Board in Washington DC (USA) in January 2004, and the 2004 Eurasphalt/Eurobitume Congress in Vienna (Austria).

SC2 has issued a call for papers for the Durban congress, seeking contributions on both present and future innovation needs in the following priority areas:

- cost reduction
- improvements to the environment
- meeting the demands of road infrastructure users, residents, and owner agencies.

## Principal Findings

SC2 found that there is a group of emerging needs for innovation currently driving technical progress in the roads area such as urban works, sustainable development, safety, and reducing disturbance to users and local residents.

The varying levels of innovation between countries highlight the ongoing need for PIARC’s fundamental role in the gathering, promotion and dissemination of best engineering practice.

There are a number of ways in which road authorities seek to foster innovation and the effectiveness of these efforts needs to be shared to inspire others, particularly in the developing world, to adopt similar schemes. The report describes some good systems for removing blockages to innovation.

## Outputs

- A PIARC Report will be produced for the World Road Congress in Durban 2003.
- A seminar on road innovation was held in Paris in March 2003.
- The results of the sub-group activities will be presented at the World Road Congress.
- Papers will be presented at a number of future international conferences.

# **SUB-GROUP 3: FUNCTIONAL SPECIFICATIONS FOR NEW AND RECYCLED MATERIALS**

Members of the subgroup were:

J. WILLIAMS (United Kingdom); Chairman	E. NDLOVU (Zimbabwe)
AAVIK (Estonia)	B. PALKOVIC (Croatia)
C. de BACKER (Belgium)	M. PARADIS (Canada – Quebec)
A. BELL (Australia )	B. PERRIE (South Africa)
R. BULL-WASSER (Germany)	H. PIBER (Austria)
M. CAPREZ (Switzerland)	N. RIOUX (Canada-Québec)
M. da CONCEICAO AZEVEDO (Portugal)	H. ROOS (Netherlands)
B. CORMIER (Canada – Quebec)	S. SAID (Sweden)
Q. Dinh Duong (Canada – Quebec)	J. SANTOS (Portugal)
S. ELLIS (United Kingdom)	P. SIMONSEN (Denmark)
J. FRIERE (Portugal)	A. STAWIARSKI (Eurobitume)
L. GASPAR (Hungary)	P. TENG (USA)
R. GRUENING (Germany)	Y. TORII (Japan)
I. GSCHWENDT (Slovakia)	J. T. VAN DER ZWAN (Netherlands)
D. JONES (United Kingdom)	M. VARAUS (Czech Republic)
C. KRAEMER (Spain)	B. VERHAEGHE (South Africa)
J. KUDRNA (Czech Republic)	T. YOSHIDA (Japan)
J. P. MARCHAND (France)	V. ZOLOTAREV (Ukraine)
A. NADERI (Iran)	

## **Work Program**

In Paris, the working group (SC3) resolved to provide a general view of the state-of-the art on international practices for performance-based specifications. In addition to describing the practices, organised feedback will permit a partial assessment of the advantages and limits of this new approach. This will cover all paving techniques and materials as used in new pavements (surfacing and base), rehabilitation and recycling. From the outset, the aim has been to provide a report on performance-based specifications for the Durban Congress.

In Barcelona, SC3 developed a work plan which started with a questionnaire on practices in various countries and finished with a report for the Durban congress, which summarised, compared and analysed the different practices.

There were early discussions on problems of vocabulary and definitions, which needed agreement before being included in the questionnaire. This began with questions about what is meant by traditional specifications, performance-based specifications, performance-based specifications involving financial penalties, etc. Several countries, including the Netherlands, Canada-Quebec, the USA and the United Kingdom were invited to outline their position on the matter, as it was felt that these countries could clearly identify the nature of specifications based on essential performance and the tests allowing their evaluation.

Mr John Williams arranged for the Highways Agency in the United Kingdom to sponsor the Transport Research Laboratory to prepare a questionnaire which was finalised by review through the SC3 members.

Ninety-five questionnaires were dispatched to 46 countries and responses were received from 23. An initial summary of the results was presented to SC3. During the discussion that followed it was apparent that there were three key areas that led to confusion or difference of opinion:

- definition of performance specifications,
- costs associated with the implementation of performance specifications and the potential value for money,
- warranty / guarantee periods in procurement processes.

Two trends which were discernible from the data received, are that:

1. there was a perceived increase in initial cost but a decrease in whole of life cost associated with the introduction of performance specifications, although this was by no means unanimous, and
2. the warranty periods associated with performance specifications are traditionally 1 year, sometimes 2 to 5 years, but rarely 10 years or greater except for 30 year DBFO contracts in the UK and South Africa.

SC3 members also sought or prepared papers on pavement performance specifications and seven were published in the special edition of Routes / Roads No. 315 of July 2002.

The results of the survey were formatted into a report titled *A Fact Finding Review of Performance Specifications in 2002* by Ms Sally Ellis. This draft was reviewed by C7/8 and prepared for publication at the Durban congress.

For the Durban Congress, SC3 has issued a call for papers on subjects ranging from specification of the end-product performance of materials and case histories, to key performance indicators and associated payment regimes for private finance contracts.

## Principal Findings

Over the two-year period it has taken to retrieve data on performance specifications and appreciate the attitudes of different countries, it appeared that performance specifications are:

- continually developing
- here to stay
- the key to achieving a quality road network in the future
- essential to the world in the context of sustainable development.

A sustainable future for the world requires prudent use of natural resources and, more importantly, a 're-use/ recycle' mentality that will be more easily supported by performance specifications. Performance specifications will help preserve the environment by encouraging innovation in the use of materials. This review has revealed three main areas that those considering the use of performance specifications should review carefully:

- cost
- guarantee / warranty period
- definitions.

The final report of SC3 has raised awareness of these issues, which should result in performance specifications that can be more easily implemented in the future.

## Outputs

- A PIARC Report will be produced for the World Road Congress in Durban in 2003.
- A special edition of the PIARC publication *Routes/Roads* was produced which included seven SC3 papers on performance-based specifications;
- The results of the sub-group activities will be presented at the World Road Congress.

# SUB-GROUP 4: PAVEMENT REHABILITATION AND OVERLAYING: INVENTORY OF AVAILABLE TECHNIQUES

Members of the subgroup were:

J. AUNIS (France); Chairman	L. PIERCE (USA)
J. ABDO (France)	A. JASIENSKI (Belgium)
C. BARTOLOMÉ (Spain)	C. JOFRÉ (Spain)
C. CAESTECKER (Belgium)	C. MARIN (Romania)
J. P. CHRISTORY (France)	V. PARVU (Romania)
R. DEBROUX (Belgium)	B. PERRIE (South Africa)
F. FUCHS (Belgium)	J. POTUCEK (Sweden)
Y. GUIDOUX (France)	D. SYBILSKI (Poland)
J. G. HAMMERSCHLAG (Switzerland)	A. VOLLPRACHT (Germany)
A. HASSAN (Malaysia)	
A. NEDERI (Iran)	

## Work Program

SC4, under the leadership of Mr J. Aunis, began by trying to define Pavement Rehabilitation and Overlaying by drawing a distinction between surface rehabilitation and structural rehabilitation. It was proposed not to consider surface rehabilitation and concentrate on structural matters, including the problem of rutting treatments. It was also decided to include recycling techniques in the catalogue, but not in the detail to which SC5 would work.

The Orlando meeting decided upon the structure of the proposed guide and established drafting teams. The guide was intended to have four chapters as follows:

Chapter 1	Types of pavement
Chapter 2	Visible degradation both surface and structural faults
Chapter 3	Investigation of defects both surface and structural in the pavement or subgrade
Chapter 4	Solution techniques and bibliography of additional information on solutions.

## **Principal Findings**

The subgroup found that there were a large number of documents on pavement rehabilitation available internationally which describe a large range of techniques. They set themselves the task of cataloguing and summarizing them and describing how to select appropriate treatments on the basis of the existing pavement condition.

## **Outputs**

Outputs are not available at the moment.

# SUB-GROUP 5: PAVEMENT RECYCLING AND RETREATMENT - TECHNICAL RECOMMENDATIONS

Members of the sub-group were:

J. VAN DER ZWAN (Netherlands) Chairman	
A. JAKANI (Morocco)	J. KUDRNA (Czech Republic)
A. VOLLPRACHTS (Germany)	J. HAMMERSCHLAG (Switzerland)
A. BELL (Australia)	J. MARCHAND (France)
A. JASIENSKI (Belgium)	J. WILLIAMS (UK)
A. AAVIK (Estonia)	J. FREIRE (Portugal)
A. NADERI (Iran)	J. NOBRE Santos (Portugal)
B JEFIMOW (Poland)	M. DA CONCEICA AZEVEDO (Portugal)
C. JOFRÉ (Spain)	R GRUENING (Germany)
C. KRAEMER (Spain)	R. BULL-WASSER (Germany)
C. DE BACKER (Belgium)	S. SAID (Sweden)
J.F. CORTÉ (France)	S. ELLIS (UK)
E. NDLOVU (Zimbabwe)	Y. TORII (Japan)
F. MOURAO (Brazil)	Y. GUIDOUX (France)
G. TEMPLETON (Mexico)	

## Work program

### Guidelines

The sub-group's working plan concentrated on drafting three technical guidelines on pavement recycling, the topics of which were selected after intense deliberations. These deal with:

- in-situ recycling with cement
- in-situ recycling with bitumen emulsion or foamed bitumen
- hot mix recycling in plant.

In addition to preparing the guidelines, SC5, together with the host country, organised a seminar in Warsaw, Poland on 10-11 October 2002, on those three recycling techniques. For the PIARC World Congress in Durban, the Committee is working with the South African hosts to organise a special session on 'pavement recycling in developing countries'.

The former PIARC Technical Committee C7 had already started preparation of the guideline *In situ Recycling with Cement*, but had not completed it within the agreed timeframe. It was decided that SC5 should take over the work already done, finalise and publish it. The other two guidelines have been prepared from scratch.

It was decided to write the guidelines with the help of experts. The technical guideline on in-situ recycling with cement was already in a more advanced form and served as a blueprint for the others.

The work on the guidelines had been divided between the members, with Mr. Carlos Jofré (Spain) assuming responsibility for in situ recycling with cement, Mr. Jean-Francois Corté (France) the in-situ recycling with emulsion or foamed bitumen and Mr. Jan van der Zwan (Netherlands) taking hot asphalt mix recycling in plant.

The guidelines' framework was modified to align with the experience acquired during their writing and the drafts presented for discussion amongst the SC5. Those drafts have been presented to the plenary meeting of the Committee and accepted.

### Seminar in Poland

As a result of the progress of the three guidelines, it was decided to give a two-day seminar in a developing country or one in transition. Based on the information received from possible candidates, Poland was chosen as it is a country in transition with a high need for infrastructure rehabilitation, due to the increase in heavy traffic.

The seminar was organised in conjunction with the Polish Road and Bridge Research Institute. A call for papers and presentations was made and it was decided to have speakers from transition and developing countries present results of their research into the three techniques as well as their needs.

SC5 members presented the draft guidelines, which were discussed amongst the 200 participants. Based on post-seminar evaluation, the seminar was judged to have been a success. The papers and the presentations will be distributed, on a CD Rom.

### Special Session in Durban

A special session on pavement recycling for developing countries is being organised by the South African host of the Durban congress, with SC5 members providing input.

## Principal Findings

Following are the subgroup's major findings:

- Hot mix recycling is capable of producing an asphalt mix as good as virgin asphalt using old asphalt up to 100%;
- Insitu recycling with cement is being widely used and is now more or less proven technology;
- Insitu recycling with emulsion or foamed bitumen is still being developed and care has to be taken with its application for high volume roads.

Although insitu recycling techniques can be used very effectively, there are still technical questions on how best to carry out characterization testing.

Recycling has to be cost effective, otherwise the technique will not be applied. Conquering a market is difficult and there are a lot of preconditions to be fulfilled. There is a very tight relationship between recycling success and government and client policies.

Recycling pavement materials is most common in developed countries that have limited possibilities for excavating new high quality paving materials. As a result of high levels of environmental concern, these countries also have limited opportunities for dumping waste materials. Recycling is therefore encouraged either by environmental legislation and/or taxes on landfill or new materials.

If attention is paid to investigation, design and construction quality, the performance of recycled pavements should be as good as that of new pavements

## Outputs

- PIARC Guidelines will be published for the 2003 World Road Congress in Durban covering:
  - in situ recycling with cement
  - in-situ recycling with emulsion or foamed bitumen
  - hot asphalt mix recycling in plant.
- The PIARC Seminar on Pavement Recycling in Warsaw, produced:
  - A CD of papers and presentations
  - A PIARC report on the seminar.
- A special session on pavement recycling for developing countries, based on the Warsaw Seminar, is being organised by the South African host for the Durban Congress.
- The results of the sub-group activities will be presented at the Durban Congress.

## OTHER COMMITTEE ACTIVITIES

C7/8 was active in the work of the terminology committee (T) summarizing. Mr Joseph Abdo prepared a submission for the inclusion of a large number of new pavement related definitions in French and English into the 7th edition of the PIARC Dictionary, as well as identifying terminology from the subgroup reports which should also be included. This work was discussed by C7/8 and submitted to the Technical Committee on Terminology.

## ACKNOWLEDGEMENTS

The Chairman gratefully acknowledges the contributions made to the committee activities of:

- the secretaries: J. CHRISTORY (France) and A. BELL (Australia)
- the sub-group leaders: P TENG (USA), J. CHRISTORY (France),  
J. VAN DER ZWAN (Netherlands),  
J. AUNIS (France),  
.WILLIAMS (United Kingdom)
- the Members, Corresponding and Associate Members of the Committee,
- the PIARC National Committees of France, Belgium, United States, Spain, Poland, Netherlands and Canada-Quebec for hosting meetings,
- the Polish Road and Bridge Research Institute for supporting the Warsaw seminar , and the French National Committee of PIARC for supporting the Paris seminar.

## CONCLUSIONS

The committee's formation was initially an amalgamation of two previous PIARC technical committees, but the cooperative efforts of all involved has proved fruitful, having produced a range of technical reports on pavements, two international seminars and several papers for *Routes/Roads*. The reports address the range of strategic topic suggestions made by PIARC in its strategic plan.

**EARTHWORKS, DRAINAGE  
AND SUBGRADE  
(C12)**

**Activity Report 2000-2003**

# INTRODUCTION

This report describes the activities of the Committee C12 (Earthworks, Drainage and Subgrade), aimed at implementing the PIARC Strategic Plan 2000-2003. C12 contributed to the Strategic Theme 1 – Road Technology, with the goal of improving the provision and maintenance of road infrastructure in accordance with the international best practice.

The Committee's outputs during 2000-2003 work period include PIARC reports, "Routes/Roads" articles, and international seminars. C12 organized seminars on the "Appropriate Use of Natural Materials in Roads" and on the "Sustainable Slope Risk Management for Roads", held in Ulan Bator (Mongolia) and Kathmandu (Nepal), respectively. These seminars were a contribution to PIARC's mission of technology transfer to developing nations.

C12 undertook three main topics during the 2000-2003 work period:

- Natural Materials Not Compliant With Specifications and Relevance of Earthworks Control
- Column Supported Embankments
- Slope Risk Guidance for Roads

# LIST OF PARTICIPATING MEMBERS

G. PERONI (Italy), Chairman  
E. J. HOPPE (United States), English secretary  
J. NOMERANGE (Belgium), French secretary  
M. de VAULX de CHAMPION (Belgium)  
E. SAGOL (Cuba).  
H. LIMA (Portugal).  
B. ALEXANDER (South Africa)  
G. TOPHINKE (Germany)  
E. VAN DEN KERKHOF (Belgium)  
M. SAMSON (Canada-Québec)  
I. MINTAS (Croatia)  
T.K. ANDERSEN (Denmark)  
E. DAPENA (Spain)  
J. SANTAMARIA (Spain)  
C. DUMAS (United States)  
H. HAVARD (France)  
C. AIME (France)  
E. NZAMBA (Gabon)  
A. MARCHIONNA (Italy)  
A. SHIMAZU (Japan)  
M. MAHMUD (Malaysia)  
I. SANCHEZ MORA (Mexico)  
J. DAVAASUREN (Mongolia)  
A.C. MAAGDENBERG (Netherlands)  
P. LUBKING (Netherlands)  
L. RAFALSKI (Poland)  
C. BARBOSA (Portugal)  
P. KOMAREK (Czech Republic)  
S. DOROBANTU (Romania)  
A. PHEAR (United Kingdom)  
D. PATTERSON (United Kingdom)  
A. PARRIAUX (Switzerland)

# WORK PROGRAMME AND ORGANIZATION

Three broad topics were studied during the 2000-2003 work period.

## 1. **Natural Materials Not Compliant With Specifications and Relevance of Earthworks Control**

This topic resulted in two outputs, as follows:

### 1.1 PIARC Seminar in Mongolia (June 18-21, 2002)

Committee C12 organized a seminar on "The Appropriate Use of Natural Materials in Roads" in Ulan Bator, Mongolia. The subject matter dealt with the design and construction of earthworks under extreme conditions. Mongolia was selected due to its harsh climate and the resulting challenges posed in road construction. The Mongolian Committee of PIARC received 39 presentations, which were compiled and published on a CD-ROM. A number of papers were found applicable to other developing countries, particularly those situated in cold regions. Approximately 60 delegates took part in the seminar. Twelve countries were represented.

### 1.2 PIARC Report

A survey was developed shortly after the first C12 meeting in March 2000. It was distributed to all C12 members and corresponding members in 38 countries. The responses came from 13 countries: Germany, United Kingdom, Belgium, Canada, Croatia, Cuba, Spain, United States, France, Italy, Japan, Portugal, and Switzerland. A report summarizing the survey results was compiled at the end of 2002. This synthesis report, entitled "Limitations of use of natural soils - earthwork specifications and controls" will be available at the Durban Congress.

The principle of sustainable development is one that more and more countries subscribe to. The earthworks represent by far the most significant amounts of material moved during road construction. For this reason, they deserve a close attention when the objective is to limit the use of non-renewable resources, either directly through extracting from the ground, or indirectly by designing more efficient roadway sections. It is also of vital importance to limit the impact of earthworks on the environment and the quality of life (see PIARC C12 Report "Methods and requirements for earthworks in order to reduce the impact of road projects", published for the Kuala Lumpur Congress).

Thus, the main objective of this study was to compile the state-of-practice report on the reuse of natural soils in embankment construction and to synthesize the requirements for materials used in the upper parts of embankments and in road subgrades (in particular to underscore the targets for bearing capacity on the capping layer, and to initiate thoughts about improving the use of the best materials, including after stabilization, in the design of pavement structures). As a closely related matter, the report also deals with earthwork control methods related to acceptance of soils.

Survey results revealed significant variations between countries in matters relating to the use and acceptance of natural soils for fill construction. These variations are sometimes justified by unique geographical conditions. Often, the practice appears to be overly conservative in view of the stated economic and environmental considerations of a given country. Construction controls pertaining to fill placement sometimes refer to different specifications designed for the same outcome. Moreover, they were frequently developed for materials that are easy to work with and not for those that are difficult to evaluate in-situ (for example, coarse soils on which density measurements cannot be effectively carried out in the laboratory, nor in-situ).

Practices relating to the dimensioning and performance of the upper parts of embankments and subgrades are very diverse, indicating that significant improvements can be made in optimizing the soil treatment and selecting high bearing capacity materials in order to reduce the roadway section. Construction controls for subgrades are adapted to various practices and indicate some similarities.

The results of the survey also provide some insight into the control of drainage works associated with roadway construction. The importance of good drainage has been documented in the previous study (April 2000 "Routes/Roads" No. 306 article on "Synthesis of results of the survey on the pathology of road embankments in service") and it should be stressed that a significant improvement in the quality of earthworks can be attained in many countries by devoting more attention to drainage.

## 2. Column Supported Embankments

An efficient highway system is an economic necessity for most countries. In recent years, however, the public has been subjected to the effects of ageing and deteriorating highways, combined with dramatic increases in traffic volumes. Expanding existing roadways and introducing additional roadway capacity through new construction frequently pose a unique set of problems. In many places the only remaining available land is one that is not economically viable for most commercial purposes. Typically, the soils are very soft and/or contaminated, requiring a substantial amount of ground improvement in order to make them suitable for supporting roadway embankments.

The use of column supported embankments as a construction alternative has greatly increased in popularity in recent years, mainly due to economic considerations. The column support technique allows for the construction of embankments on sites otherwise unsuitable to support large embankment loads. The benefits include reduction in settlements and earth pressures, and ability to construct embankments in a single stage.

Column supported embankments have been used occasionally for more than 60 years. Recent technological advances and improvements have dramatically increased their application world-wide. Consequently, C12 has decided to examine various column technologies and synthesize the current state of the practice.

The final report, compiled by C12, addresses the following issues:

- Design and construction methodologies,
- Case studies,
- Decision protocol for selecting a column support system,
- General conclusions and recommendations,
- Future directions and research needs.

Technologies encompassed in the report include Stone Columns, Concrete Vibro Columns (VCC), Combined Stabilization with Vertical Columns (CSV), and Geosynthetically Reinforced Bridging Mats.

### 3. Slope Risk Guidance for Roads

This topic resulted in two outputs, as follows:

#### 3.1. PIARC Seminar in Nepal (March 25-28, 2003)

Committee C12 organized a seminar in Nepal on the subject of «Sustainable Slope Risk Management for Roads ». The objective was to synthesize the current practice in the area of slope risk management. Nepal was selected due to its geographic location in the proximity to the Himalayas. The topic of slope risk management was very relevant to Nepal because of the extremely challenging topography and climate. The seminar attracted 245 delegates from 16 countries. The following key issues were identified:

- selection of appropriate standards and acceptable risks,
- guidance on selection and application of technologies, including those related to hazard/risk assessment and mapping,
- focus on mainstreaming practical applications and good engineering practices.

A number of recommendations were provided at the end of the seminar. These recommendations centered on site assessment, management systems, sustainable engineering, hazard and risk, interaction with road neighbours, and institutional set-up.

#### 3.2. PIARC Report

The scope for this work topic was to develop guidelines for the evaluation of risks associated with soil slopes in highway construction. This evaluation would be facilitated through the development of a framework for risk assessment and this would, in turn, be used to review and present case examples drawing on poor and best practices.

Previous PIARC Reports, which have led to this work topic, include:

- Soil erosion during and after construction (Marrakesh, 1991)
- Landslides: Techniques for evaluating hazard (1997)
- Contribution to risk management of existing slopes (Mr. Shimazu, 2000)

Also a survey was undertaken on the pathology of in-service embankments (published in Route Roads No. 306 11-2000) to understand embankment performance and to begin assess the quantitative scale of instability. At the first committee meeting in Paris (March 2000), slope risk guidance was identified as a major need for all countries within the design and construction work theme and a programme for the work topic developed.

The highway geotechnical asset principally comprises: embankments and cuttings; reinforced and stabilised slopes; subgrade and capping beneath carriageway; structural foundations; environmental/landscape earthworks; ground drainage and landscaping. Being largely natural materials, there is more inherent variability to geotechnical asset engineering performance and sensitivity to long-term degradation or changes, than is exhibited by other materials (largely manufactured) used to construct other elements of the highway network. The consequences of their response can significantly influence construction costs and programme and the safety, environment, performance and whole life cost of the highway. Also owners of assets have a duty of care to adjacent land owners and public at large in respect of retention of support to land, control of run-off and groundwater. Predicting performance is also difficult and not yet understood, but the aim must be to develop a concept of the “residual life” for the geotechnical asset, which will enable effective evaluation and allow worthwhile maintenance strategies to be formulated.

C12 has concentrated on embankment slopes because of their greater frequency of failure than any other geotechnical asset and the threat they pose economically and socially. It was determined that there is increasing rigour in the assessment of slope hazards and their risk. This rigour is described based on evidence from many countries involved in C12. The final report contains slope risk guidance, supplemented by case studies.

# PRODUCTIONS OF THE COMMITTEE

## List of Publications

### PIARC Reports

- Practical Guidelines for the Design and Construction of Road Embankments (12.03.B).
- Equipment and Methods Specific to Soil Treatment Works (12.05.B).
- Methods and Requirements for Earthworks in Order to Reduce Environmental Impact of Road Projects (12.07.B).
- Contribution to Risk Management of Existing Slopes (12.11.B).

### Articles in "Routes/Roads"

- Synthesis of Results of the Survey on Pathology of Road Embankments in Service (H. Havard) (N° 306 – April 2000).
- Techniques for Motorway Widening (P. Wilson) (N° 310 – April 2001).
- The Use, Design, and Construction of Bridge Approach Slabs (Part 1) (E. J. Hoppe) (N° 311 - July 2001).
- The Use, Design, and Construction of Bridge Approach Slabs (Part 2) (E. J. Hoppe) (N° 312 - October 2001).
- The French Technical Guide on Soil Stabilisation with Lime and Hydraulic Binders (H. Havard) (N° 313 - January 2002).

## Other Publications

- Proceedings of the International Seminar on the Appropriate Use of Natural Materials in Roads – Ulan Bator, Mongolia (Cd-Rom).
- Proceedings of the International Seminar on the Sustainable Slope Risk Management for Roads – Kathmandu, Nepal (Cd-Rom).

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## Computer Software

LYNX Geosystems Inc (Canada)  
RocFall Rocscience Inc (Canada)  
@Risk Palisadi Corporation (Australia, USA & Europe)

## Web sites:

<http://www.ggsd.com>

Geotechnical & Geoenvironmental Software Directory

<http://rru.worldbank.org/Toolkits/highways>

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# **ROAD TRANSPORT, LIVABILITY AND SUSTAINABLE DEVELOPMENT**

P. Gandil (France)  
ST2 Coordinator

Sustainable development dates back from the 1970s when environmental concerns appeared. Then the concept matured and integrated social and economic concerns. The question that is raised to us is: *“How to meet the needs of the present without compromising the ability of future generations to meet their own needs?”*.

In response to the expectations of the citizens and the international community, the activities of ST2 Committees allow to analyse the means to design, maintain and operate roads in a sustainable development context, i.e. by integrating the concern to minimise the adverse impact on the environment and human beings, while maintaining a favourable context for economic and social development.

How can we build roads that are integrated in the environment, while minimising the impact on fauna, flora and human beings? How can we involve the citizens in a public consultation process before, during, and after the building of an infrastructure? How can we reconcile consideration of consultation and general interest? How can we adjust the new constraints of sustainable development according to the needs for infrastructure and the development capacity of each country? What does sustainable development mean in practice when applied to urban or interurban roads, freight or passenger transport? These are questions ST2 Committees have worked on during the last four years and for which they have provided some answers.

These four Committees are:

- C4 - Interurban roads and Integrated Urban Transport
- C10 - Urban Areas and Integrated Interurban Transport
- C14 - Sustainable Development and Road Transport
- C19 - Freight Transport.

**Committee C4** has studied interurban road aspects and has sought to reply to the following questions. Can we separate economic transport and growing transport demand? Is the supremacy of roads over other modes of transport ineluctable? Can we have control on modal split? Analysing transport systems by a multimodal approach, expressing a strong political will, investing massively in alternative modes: does this allow to reduce the share of roads?

Because these studies have shown that mobility and growth are strongly interrelated, and because roads will in the short and medium term at least remain the prevailing transport mode, C4 had made several suggestions to harmonize interurban roads with the requirements of sustainable development. This involves technical and financial measures: optimizing the network, improving safety, congestion mitigation, improved maintenance management for infrastructures to relieve the busiest roads. It also involves social considerations to facilitate the acceptance of new projects: create opportunities for dialogue as early as possible, with the support of decentralized decision centres, develop a communication strategy about the project or integrate multidisciplinary and coordinated teams.

To carry out these thoughts further, and given the ever-stronger integration of the local level in decision processes, C4 raises the issues of the impact of roads on regional development. Moreover, C4 envisages to give thought on the means that make the freight chain run more smoothly so that it can better adjust to the predicted growth in freight transport.

**Committee C10** has worked on the role of road infrastructures in cities so that urban growth does not impair the quality of life, and that pollution levels and congestion remain stable. With that background, the studies have focused on the cohabitation of the various users of urban roads, on the link between land planning and transport policies, and on city centres, which are both life centres, and intermodal places. C10's work was based on surveys carried out with cities in more or less developed countries, with various urban structures.

C10 makes practical recommendations in favour of an improved interaction between project developers, public authorities and citizens, and in favour of the implementation of planning strategies with a high degree of flexibility. C10's findings are also in favour of involving citizens in the definition of realistic indicators that enable to assess the contribution of transportation to the cities' displayed goals.

C10's work reveals the need to consider in the future the growth of mega-cities, mainly in developing countries. In particular, future studies could endeavour to find out how to reconcile the constraints and requirements of sustainable development with the urgent social, health, urban and economic issues that mega-cities are confronted with.

**Committee C14** first focused its work on the way decision processes, in the implementation of transport policies, take into account climate changes, mobility and motorization at national, regional and local levels. The seminars that were organized during the last four years have highlighted the importance of maintenance, improvement of road infrastructures—with special emphasis on rural roads—and safety within the sustainable development context, as well as the importance of regional cooperation. C14 has also identified a number of practices that reconcile sustainable development notions to the constraints of the African continent.

The survey carried out by C14 with many countries reveals the importance of concerns relative to health, local pollution, biodiversity, landscapes, vehicle regulations and promotion of less polluting vehicles.

Another report on the regional context of sustainability was produced by C14. The report discusses the selection of sustainable transport policies for a wide range of countries: India, South Africa, United States, Colombia, and European countries. Several basic aspects to evaluate the environmental impact of roads are presented, including a European manual on habitat fragmentation. C14 is now paying attention to the integration of social and cultural aspects into sustainable development policies, to the definition of the quality of projects and the evaluation of environmental risks.

**Committee C19** has reviewed road freight transport policies by road that were implemented over the last 10 years in various regions of the world and has found out that the deregulation of the road sector has resulted in an increase in the road share. Road transport has changed considerably over the last years. It should be more and more flexible to meet the needs of the just-in-time policies applied by companies, and the decrease in the processing of orders with the introduction of e-business. Competition in the sector decreases transport costs and the industry prefers to outsource freight haulage. The increase in road transport activity generates many nuisances and C19 believes that the development of multimodal platforms – of which C19 has identified the advantages and good practice to be considered – could be a springboard to encourage the transfer of freight onto other modes. In Europe, multimodal transport faces difficulties caused by technical problems, different standards among the national rail networks (width of tracks, electrical systems, etc), lack of flexibility and competitiveness of alternative modes due to the absence of lanes dedicated to rail freight and the priority given to passenger transport.

C19 encourages the control and standardization of truck weights. It has focused on the measures taken in member countries to limit the hazards and nuisances caused by heavy vehicles. C19 has attempted to compile road accident statistics involving heavy vehicles. It was found out that accident rates for trucks are lower than for light vehicles, that motorways are the safest roads for road transport, that accident rates are higher in urban areas and that the fatality risk is 4 times higher when a truck is involved.

In this context of nuisance and hazards related to the sharing of roads between light and heavy vehicles, C19 should in the future evaluate the potential and conditions of the construction of infrastructures dedicated to trucks, while evaluating the level of competition of road transport with the development of intermodality in a context of growing road saturation.

The Reports produced by C4, C10, C14 and C19 of ST2 allow everyone to assess the issues and strategies to be developed in order to face the challenge of sustainable development. Including road design in a sustainable development perspective is an inescapable necessity for all countries, whatever the level of development.

Taking sustainable development into consideration has allowed to develop methods and measures that are designed both for high road-density countries--that have to face society's refusal of roads and seek better social and political acceptance of projects—and for developing and transition countries. For the latter countries, it is essential to design tools that enable to implement the sustainable development concept according to their needs.

**INTERURBAN ROADS AND INTEGRATED  
INTERURBAN TRANSPORT  
(C4)**

**Activity Report 2000-2003**

# COMMITTEE COMPOSITION AND MEMBERS INVOLVEMENT

C4 has 34 members (including Mr. Baral representing AIU – “Association internationale des urbanistes”). There are 12 Corresponding members. See appendix for complete list of Committee members.

Mr. Liddle resigned from the Committee early 2002 and the Executive Committee appointed Mr. Gambard as his successor as Chairman for the rest of this working period. In addition to a new member from Australia in this respect also representation from Portugal and Sweden has changed during the period.

Geographical distribution:

- 17 from Western Europe,
- 4 from Eastern Europe,
- 3 from North America,
- 1 from Latin America,
- 3 from Africa,
- 3 from Asia,
- 1 from Australia.

There have so far been eight Committee meetings: Paris, Weinfelden, Havana, Timisoara, New Delhi, Whitehorse, Nice and Dakar.

Average participation has been 20 members with variations from 12 (India closely after 11 September) up to 27 (first ordinary meeting in Weinfelden, Switzerland).

Attending 6 or all-7 meetings: 13 members\*

Attending 3 – 5 of the meetings: 11 members

Attending 0 – 2 meetings: 9 members

\*(including the present Chairman, Secretaries and Working Group leaders)

As we have few active representatives from developing countries/countries in transition there have been problems in balancing the work and discussions as related to the challenges in this type of countries. This will also be reflected in our following up of PIARC’s goal for seminars.

# WORK PROGRAMME AND ORGANISATION

## Work programme

At the Paris meeting the Committee selected three main topics in accordance with the Strategic Plan. The programme was further developed at the next meeting in Weinfeldern and afterwards approved by the Strategic theme Coordinator, Mr. Gandil:

### **1) Multimodal Organisation and Global Impacts of the Interurban Transport System**

Short description

- Social economic and environmental impacts of (road) transport policies, focusing on relations between mobility, economic growth and social development (including accessibility and regional development).
- Developing a multimodal approach of the transport system, including comparisons between modes (competition and/or complementarity), foreseen scenarios (tendencies) for different types of countries and factors influencing the modal split.

### **2) Optimise the Existing Road Network**

Short description

Examination and assessment of techniques for optimising the service quality of inter-urban road networks. The relative performance of all known optimisation techniques will be assessed and balanced across the service quality areas of safety, congestion and mobility.

### **3) Achieving Social Acceptance of Transportation Projects**

Short description

- Project development/decision process.
- Team composition and skills to help road authorities evaluate projects.
- Communication with the public to help decision-making process.

## Organisation

The Committee established three Working Groups (WG) within its members, respectively headed by:

- Topic 1: Mr. Shaw
- Topic 2: Mr. Egger
- Topic 3: Mr. Vuillemin

About 7-8 members have been actively involved in each Group. WG 2 and 3 also got additional input from questionnaires.

# PRODUCTIONS – PUBLICATIONS AND EVENTS

As already mentioned the Committee has arranged for seven meetings after the Paris 2000 meeting.

## Committee reports and Congress preparations

Most work has been concentrated on the development of **the three Committee reports from each Working group respectively** (due to be submitted to the PIARC Secretariat for printing before 31 March 2003).

The common question addressed by these reports, and which will also be the main theme for the C4 Congress session, is:

**How to cope with future demand for interurban transport (passenger and goods)** focusing on the following related influencing factors and means:

- Mobility and economic development - could some degree of decoupling be achieved? (from WG 1)
- Ways to influence modal split (from WG 1)
- Ameliorating the road transport system by:
  - (a) optimising the use of the existing network (WG 2)
  - (b) by improving public acceptance of new infrastructure projects (WG 3);
- and how development and priorities depend on type of country/region.

Further comment on key questions to be raised in this respect will be found in the Introductory report for the C4 session.

## Seminars/cooperation

- The meeting in Cuba was arranged in parallel with a gathering of the Latin American Road Directors Association. There was a joint gathering where the C4 Committee was presented together with a short summary of the Working Group programs. The C4 President and Secretaries together with Mr. Shaw further participated in the continuation of the Road directors meeting where Mr. Shaw gave a presentation on the subject of PFI (Private Finance Initiative) financing roads in his home country.

- In cooperation with other ST2 Committees C4 participated and presented papers based on ongoing Committee work and other member experiences at an international seminar on “Sustainable Development in Road Transport” in India November 2001. (Representatives from India were also invited to a Committee meeting and the technical presentations given there)
- A seminar in cooperation with West African country officials was held in Senegal in April 2003, gathering about one hundred African participants. The topics of the Seminar were related to C4's work areas and infrastructure financing issues.

## Exchange of information - presentations

Committee members and representatives from host countries have given several interesting presentations at Committee meetings:

- **Canada** (Mr. Robin Walsh from host country)  
Presenting Yukon and challenges related to its transportation system not at least the permafrost problems. Considerable parts of construction costs are paid by the US due to the heavy need for transit traffic. The largest trucks on the network have a length of 26 meters.
- **France** (Mr. Gambard)  
Informing on the Toll Motorway System in France.
- **Germany** (Mr. Boltze)  
An overview of “Traffic management and ITS implementation in Frankfurt am Rhein-Main”, which is a polycentric region. Strategies include:
  - Influencing traffic
  - Divert streams
  - Advice for the use of public transport.
- **India** (Mr. Pawar)  
Presentation on Indians Roads – Vision 2021. The Indian road network has a length of 3,3 million km. The national Highways (60 000 km or 2 %) handles about 60 % of the traffic. As for accidents there are around 75.000 deaths annually.  
Visions for 2021 are among others to connect all villages (40 % are not yet connected), giving adequate capacity, emphasis on safety and environment and an optimal intermodal mix. The 10-year investment program will require 160 billion USD half of it for National Highways and Expressways.  
The railway network (63 000 km) is one of the longest in the world.

- **Italy** (Mr. Colonna)  
On the Mont Blanc Tunnel.
- **Japan** (Mr. Koroda)  
Historical background for the development of the transportation system in Japan in general and the expressway system after 1963. As for integration he informed that Japan has merged the Construction and Transport Ministries, and that they have established a Committee for the promotion of multimodal transport. Bus transport is an important part of public transport also for intercity transport.
- **Switzerland** (Mr. Egger)  
Reporting on Safety in Tunnels with special reference to the recent accident in the St. Gotthard tunnel.
- **The Netherlands**  
Mr. Tinselboer: presenting a report dealing with the optimal use of existing highways in the Netherlands - looking into the possibilities of revising some of the traditional design elements in this respect permanently or dependent on demand. This is one of the concepts in the new National Transport Plan (October 2000) in addition to the use of pricing and investments to deal with the future demand for mobility.
- **United Kingdom**  
Mr. Wright: presenting a UK Highways Agency Route Management Strategy concept and  
Mr. Shaw: Presenting a rehabilitation project.

## Technical Visits

Most meetings were followed by a short technical visit.

# APPENDIX: PIARC COMMITTEE C4

NAME	COUNTRY	WORKING GROUP
<b>M. Patrick GANDIL</b> (ST2 Coordinator)	FRANCE	
<b>Members C4: 34</b>		
<b>M. Jean-Michel GAMBARD</b> (Chairman)	FRANCE	1
<b>Mr. Amund BOLSTAD</b> (English speaking Secretary)	NORWAY	1
<b>M. Erwin VAN DESSEL</b> (French speaking Secretary)	BELGIUM	3
Mr. Manfred UKEN	SOUTH- AFRICA	1/2
Mr. Manfred BOLTZE	GERMANY	1
Mr. Rob RICHARDS (replacing Mr. Gary LIDDLE)	AUSTRALIA	
Mr. Christoph PICHLER	AUSTRIA	2
M. Claude MONETTE	BELGIUM	3
M. Jean-Marie PEETERS	BELGIUM	1
Mr. Rob HARVEY	CANADA	3
Mr. Luis E. SERRANO RODRIGUEZ	CUBA	2
Mr. Lars JUHL POULSEN	DENMARK	2
M. Justo BORRAJO	SPAIN	1
Mr. Seppo SILLAN	UNITED STATES	3 (Co Leader)
Mr. James F. BYRNES	UNITED STATES	2
Mr. Pauli VELHONHOJA	FINLAND	3
<b>M. Gerhard VUILLEMIN</b>	FRANCE	3 Leader
Mr. Péter LANYI	HUNGARY	2
Mr. A.B. PAWAR	INDIA	2
Mr. Mahmoud SAFFARZADEH	IRAN	
M. Pasquale COLONNA	ITALY	1
Mr. Hitoshi IEDA	JAPAN	1
Mr. Hans J.J.M. TINSELBOER	THE NETHERLANDS	2
Mr. Marek ROLLA	POLAND	2
Mr. Francisco COSTA PEREIRA (replacing Mr. José A. Valle)	PORTUGAL	
Mr. Liviu DIMBOIU	ROMANIA	3
<b>Mr. Robin SHAW</b>	UNITED KINGDOM	1 Leader
Mr. David WRIGHT	UNITED KINGDOM	2 (Co Leader)
Mr. Ales HOCHEVAR	SLOVENIA	1
Mr. Hjalmar STRØMBERG (replacing Mrs. Lena Ericsson)	SWEDEN	
<b>M. Michel EGGER</b>	SWITZERLAND	2 Leader
M. Houcine LAHZAMI	TUNISIA	1
Mr. G. NHEMACHENA	ZIMBABWE	
M. Hari BARAL	FRANCE (AIU)	3
<b>Corresponding members: 12</b>		
Mr. Nico SWART	SOUTH AFRICA	
Mr. Khoudja Nououi HAMIDI	ALGERIA	
M. Paul ARSENAULT	CANADA-QUEBEC	
Mr. Mehran GHORBANI	IRAN	
Mr. Koji KURODA	JAPAN	
M. ISSOUF	MADAGASCAR	
M. Kadir LAMRINI	MOROCCO	
Mr. Alberto MENDOZA	MEXICO	
M. José da Franca TELLES de MENEZES	PORTUGAL	
Mr. Vladimír VOREL	CZECH REP.	
Mr. Milan SKYVA	SLOVAK REP.	
Mr. Sunant KLIENGPRADIT	THAILAND	

**URBAN AREAS AND INTEGRATED URBAN  
TRANSPORT  
(C10)**

**Activity Report 2000-2003**

# PURPOSE OF THIS REPORT

This Activity Report presents an overview of the activities of the PIARC Technical Committee, C10 – Urban Areas and Urban Integrated Transport during the period 2000-2003.

This Activity Report:

- outlines the background to Strategic Theme 2,
- sets out details of the work programme of C10 and how that programme was organised,
- records the series of meetings that have taken place,
- details the productions, publications and events,
- focusses on the work of the 4 Sub-Groups who undertook the technical tasks assigned to C10,
- lists the the Committee members who have contributed to the activities, and
- makes recommendations for future work.

# STRATEGIC THEME 2 - ROAD TRANSPORT, LIVABILITY AND SUSTAINABLE DEVELOPMENT

The main aim of the Strategic Theme "Road Transport, Livability and Sustainable Development" is to enable road transport policies to be evolved which take full account of the need for integration with other transport modes and result in beneficial community outcomes in economic, environmental and social terms.

Transport has always been a factor of economic and social progress, and among the land transport modes, road transport takes pride of place, simply because of its economic and social efficiency, which tends to be sustainably greater than that of the other means of transport. But we cannot ignore the nuisances caused by road transport, such as harmful emissions, noise and greenhouse gases. The solution to the sustainable transport problem is probably intermodal. That is why the purpose of the Strategic Theme 2 - Road Transport, Livability and Sustainable Development is to gain better knowledge of the economic, social and environmental impacts of transport policies (all transport modes combined), to analyse complementarity between transport modes with a view to an integrated transport system, and to improve processes enabling social acceptance through public debate.

The main aim of the Strategic Theme 2 is to provide concrete answers to the questions highlighted by the survey conducted on PIARC First Delegates and by the conclusions of the XX1st World Road Congress. The replies will take into account the situations and specific requirements of developing countries or those in transition, and of rural or isolated areas. Strategic Theme 2 will draw on the work of a number of Committees. This report is concerned with the work of one such Committee - C10.

# C10, URBAN AREAS AND URBAN INTEGRATED TRANSPORT

The remit of Technical Committee, C10 – Urban Areas and Urban Integrated Transport is extensive covering a wide variety of subject areas. Some of the aspects C10 were asked to consider were the relationships between transport and urbanism, improvement of the road network, integration with public transport system, sharing urban roadways among the various transport modes (including non-motorised transport), emerging transport modes, integrated payment systems for the use of road infrastructure by public transport and parking facilities, public consultation methods while making a distinction between programs and projects.

In order to undertake the assigned tasks, C10 organised itself into 4 Sub-Groups as detailed below:

- Sub-Group 1 – Sharing the Main Street;
- Sub-Group 2 – Land Use and Transport Policies in Urban Areas;
- Sub-Group 3 – Transport Interchanges and Urban Development; and
- Sub-Group 4 – Evaluation of Transport Performance Measures for Cities.

These 4 Sub-Groups were largely free standing, albeit regular reports on progress were given to the other C10 members in the other Sub-Groups. The other C10 members in turn provided feedback and often assistance to the other Sub-Groups.

Each active C10 member, with the exception of the Chairman of C10, was assigned to one of the 4 Sub-Groups. Each Sub-Group had a leader with responsibility for both managing the work of the Sub-Group and liaising with the Chairman and the two Secretaries of C10. Details of the 4 Sub-Group leaders and the members of each Sub-Group are given in the subsequent reports on the work of each of the Sub-Groups.

The Chairman of C10 is Professor George Hazel from the UK. The “English Secretary” of C10 is Mr Graham Laidlaw also from the UK and the “French Secretary” is Mr Christian Mauroit from Belgium.

## Schedule of Meetings

During the period 2000-2003, C10 held a series of meetings to help define the work, monitor and report on progress, update the work and prepare papers and reports for each of the 4 Sub-Groups within Technical Committee C10. During this period the meetings were held in a number of different countries including developed countries, countries in transition and developing countries. The meetings were always hosted by a local C10 member and were generally held twice yearly at approximately 6 monthly intervals. The full list of meetings held to date, and those that are being planned, is set out in the list below:

- March 2000 – Paris, France,
- July 2000 – Rotterdam, Netherlands,
- January 2001 – Marrakech, Morocco,
- June 2001 – Copenhagen, Denmark,
- January 2002 – Bern, Switzerland,
- July 2002 – Brisbane, Australia,
- October 2002 – Budapest, Hungary,
- March 2003 – Stockholm, Sweden,
- September 2003 – Edinburgh, Scotland, UK,
- October 2003 – World Road Congress, Durban, South Africa.

Fairly quickly the meetings fell into a regular format. The meetings tended to be over 2 days with two half days devoted to the work within the Sub-Groups. A half-day was usually given over to the Sub-Groups reporting back to the rest of C10 as well as the management and administration matters relating to the whole of C10. The final half-day was usually taken up by the host taking C10 members on a technical visit to an interesting and relevant local transport project(s).

## Productions

Numerous productions are planned as a consequence of the work of C10 during the period 2000-2003. Each of the 4 Sub-Groups are due to produce a PIARC Report summarising the work of their individual Sub-Groups. As of January 2003 all of these PIARC Reports are in production and should be finalised by end March 2003 to allow them to be available at the World Road Congress in Durban.

In addition two of the Sub-Groups have prepared articles for the Routes/Roads magazine. Depending on editorial decisions both of these articles may well have appeared in the Routes/Roads magazine by the time of the World Road Congress in Durban.

At the meeting in Budapest, Hungary in October 2002 C10 members held a seminar for Hungarian students in civil engineering. At this seminar the Chairman presented a detailed vision, mission and values of PIARC. Members of the Sub-Groups then gave a summary of findings and conclusions of their Sub-Groups to the local representatives. Following that there was an interactive discussion with the local students.

At the C10 meeting planned for March 2003 there is intended to be an interactive talk with Swedish engineers to discuss the work that the C10 members have been doing in their Sub-Groups.

For all of the C10 meetings that have been held over the period full and detailed minutes have been taken.

It is the intention at the World Road Congress in Durban that C10 will hold a Technical Committee Session. The purpose of this session will be to:

- provide a brief summary of the activities carried out over the period and progress achieved,
- highlight the main productions,
- discussion of the work undertaken, and
- discussion on the future direction of Technical Committees

In addition, at the World Road Congress in Durban, C10 will take the lead along with two other Strategic Theme 2 Technical Committees, C4 and C19 in a Workshop "Interchanges and Urban Development – Intermodal Freight Transport".

# WORK OF THE 4 SUB-GROUPS

The following four sections of this report summarises the work of the 4 Sub-Group in C10. It also details the names of the members of C10 who contributed to the work of these Sub-Groups as well as the work of C10 overall.

## Sharing the Main Street - Sub-Group 1

In this subgroup the following persons participated:

Ms Hillie TALENS – Netherlands - Sub-Group Leader  
Mr Jürgen GERLACH - Germany  
Ms Anne Sigrid HAMRAN - Norway  
Mr Thomas KIELIGER - Switzerland  
Mr Dominique THON - France  
Mr Naofumi TAKEUCHI - Japan  
Mr Isao TAKEMASA - Japan  
Mr Hiroshi WATANABE - Japan  
Mr Toshiaki FUKUMOTO - Japan  
Mr Hunki LEE - Japan  
Mr Bystrík BEZÁK, Slovakia (also joined another Sub-Group)  
Mr H.K. SRIVASTAVA - India

## Introduction

Based on Strategic theme 2 Sub-Group 1 studied the design of Main Streets.

It is hard to give a one-sentence definition of a Main Street. In our study a Main Street is best described as follows:

A Main Street is a (mostly old) street in an urban area leading to a city centre. Along such a street many activities take place; people live in these streets, or they work there. There are shops that need to get goods to sell and customers to buy things and restaurants and resting-places.

Sometimes you can find schools or religious buildings along the street.

And there is through traffic on their way to the city centre.

All these functions are hard to combine in an often-narrow space. Everybody has to share the main street. That is why road designers, economists and planners struggle with a main street.

We want to make life a bit easier for them to offer them a range of possible solutions from all over the world, both in theory and in practice.

At first a main street is part of the urban area and has:

- buildings for different purposes (on both sides) that are connected directly to the street; e.g. shops, offices, houses, restaurants and cafes;
- both through traffic and local traffic;
- at least one kind of public transport on street level;
- (lots of) pedestrian and (hopefully) bicyclists and other slow moving traffic as animal drawn carriages;
- more than 10 and less than 50 meters between the opposite building fronts;
- no more than app. 50.000 pcu/day (passenger car units (or vehicles) per 24 hours).

A Main Street can be found all over the world, in large cities and small towns, in developing countries, counties in transition and developed countries.

In order to avoid confusion between an urban boulevard and a main street we made the following distinction:

#### **Difference between a Urban Boulevard and a Main Street**

<b>Urban Boulevard</b>	<b>Main Street</b>
app. 100 m wide	less than 50 m wide
app. 160.000 pcu/d	less than 50.000 pcd/d
'man made'	historically grown
mostly a ring road	always a radial

The study is split up into three parts:

- Part I: comparison of several guidelines
- Part II: examples from all over the world
- Part III: bibliography

## Part I

For the comparison we used standards, guidelines and handbooks from all over the world. Documents from the following countries have been used:

- Norway
- The Netherlands
- South Africa
- Belgium
- Switzerland
- Czech Republic
- France
- United Kingdom (Scotland)
- Finland
- Hungary
- Australia
- Japan
- The United States of America
- Germany
- Denmark
- Slovakia
- Canada

It is interesting to see that this case study shows many ways of formulating guidelines and dealing with an urban main street. This can be related to many aspects, as the culture of the different countries, legal system and practice for road planning and design.

To give a reliable picture of how an urban main street is dealt with in the different countries, the analyses should be related to the practice for how urban streets normally are dealt with in the different countries. In this project the documents are only analysed according to what is actually written, and should not be taken as expression of how the urban main street is dealt with in real life.

On the basis of this analysis and without the framework of the culture in the different countries, it is hard to extract the "good practice" of document approach, design philosophy and working methods. Seen together with other works, this might be a basis to discuss the issue.

The results of the study might also work as a basis for discussion of cultural differences in emphasis of different transport modes (private car, bicycle, public transport) and design of urban main streets.

## Part II

For this part we have got the following examples:

Traffic volume → Width ↓	0-10,000 pcu/day	10,000-30,000	30,000-50,000
10 – 20 m	Hikone, Japan Oslo I, Norway Oslo II, Norway	Arnhem, Netherlands Montélimar, France	
20 – 30 m	Rhenen, Netherlands	Hennef, Germany Bern, Switzerland	
30 – 40 m		Bratislava, Slovakia Schwerin, Germany	Wuppertal, Germany Durban, South Africa
40 – 50 m		Bogotá, Colombia Habana, Cuba	Okayama, Japan

 = Not in this project

The examples vary a lot. We have one case of a street where many things are technically wrong, but every change will make things worse and the public is happy with it the way it is. And we have a case where all the surrounding buildings are replaced and rebuilt so that the street could have a wider profile.

Of some examples we got a lot of information, before and after studies et cetera of other examples we got only a few details. We considered that all information was worth publishing so we took them all into account.

With regards to the examples some important conclusions can be drawn:

1. In a Main Street you can combine some carefully selected functions;
2. These functions should be in balance; no function may be dominant to the others;
3. There is a world wide trend to create more space for cyclists and pedestrians;
4. There is an other trend that the same space is used for different functions on different times (time sharing);
5. When you allow motorized traffic in a main street (through traffic or local traffic) you must allow parking in the street;
6. Public involvement is good for the acceptance of solutions;
7. To avoid boring uniformity it is important to save or create unique elements that characterize the local community or refer to historical issues.

## Part III

It is hard to make a complete list of all sorts of documents and publications that have to do with the subject. We succeeded in making a list with almost 60 titles.

The books are published all over the world. For people who want to know more about urban traffic in general and main streets especially this list can be very useful.

We tried to make a list of interesting websites. We had to stop that action for two reasons:

- Lack of time of subgroup members; it is hard to find new websites apart from the standard ones of PIARC, other international organisations and some national governments;
- Lack of continuity on certain websites; some sites are there for only a short period, others are places on the Internet and never renewed

Therefore a list of interesting Internet sites would be very incomplete and not very useful.

We also tried to make a list of useful CD-roms. We stopped making that kind list because CD-roms are most often very hard to trace and get hold of.

## **Land Use and Transport Policies in Urban Areas - Sub-Group 2**

### Members of Sub-Group 2

Mr Peter JORRITSMA – Netherlands – Sub-Group Leader  
Mr Andre DELMARCELLE - Belgium  
Mr Juan Luis TORRES - Cuba  
Ms Anne BERNARD- GELY - France  
Mr Giovanni CORONA – Italy  
Mr Anis BALAFREJ - Morocco  
Mr Mitsuyuki ASANO - Japan

## Summary

There is a common understanding among professionals (scientists, urban- and transport planners etc.) that there is a close relationship between land use, transport, economic activities and the environment. Therefore integrated approaches are developed to ensure that urban, regional and economic development can take place in an environment that addresses social needs. Despite the enormous amount of approaches, theories, concepts and good intentions the world is still faced with a continuing dispersion of urbanization and activities, congested areas, increased trips by car, increasing commuter distances, a lack of alternative transportation systems, and higher social costs.

This general problem applies to all types of industrialised countries, countries in transition and the developing countries. However, in different countries and regions there are varying structural relationships and problems that planners must address. It is not necessary to have a conflict between economies and improving the environment: but it is necessary to avoid such a conflict. There is no standard solution for solving problems to ensure appropriate development. So it is important to have knowledge of the cause of the problems and the effect of measures in different situations.

The objective of this study is to get more insight into the relationship between urban land-use policies and urban transport policies. The research focuses on the development of integrated land use and transport practices in a limited amount of case studies. These studies must be conceived as working examples.

The aim of the work is to investigate 'strategic approaches', which are planned and/or implemented by city authorities. This means that the focus is on packages of land use and transport policies and not on individual transport projects. Nevertheless, the emphasis of policy development can be on a particular transport policy (metro or light rail development) or land use policy (inner city revitalisation, suburbanization) but this policy is always analysed within the context of integrated land-use and transport systems.

In the first place an analysis has been made of an extended survey among 18 cities in 15 countries. In the survey data was collected to explore different policies and to measure in a qualitative way the performance of the policy.

A comparison between developing countries, countries in transition and the developed countries is made to recognise different and common issues. The comparison is made on Common Goals and Objectives, Land-use Policy, Transport Policy, Integration of Land-use and Transport Policies and Institutional Issues. This is done to determine in what way land-use and transport policy is diversified among the different countries and to find trends at the macro level.

From the survey results, each city's land-use and/or transport policy is obviously diversified among the different country categories, not to mention the differences in the socio-economic background and the size of the city. In addition to that, it is quite difficult to simplify trends of such varied policies, even at the macro level. For example it is clear that a common goal like 'improvement of the urban environment' is treated quite differently among the distinctive country categories. In developing countries it is about the improvement of traffic safety and comfort while in the countries in transition it is assumed to be a condition to promote economic development. In the developed countries the focus is on sustainability.

In the second part of the report three cases are described in more detail i.e. Durban (South Africa), Montréal (Canada) and Bratislava (Slovakia).

Durban is an example of a city in a developing country. The case describes the problems encountered by the transport sector in relationship with land-use patterns and socio-economic characteristics. To overcome these problems a strategy for sustainable transport is developed on the basis of the introduction of so called "High Priority Public Transport Network".

In the Montreal case, as an example of a city in a developed country, a vision on transportation, economic development, land-use and the quality of life is presented. The case also addresses to vulnerable populations groups in society and recommends actions for future projects.

Bratislava, a small city in Slovakia, is the example of a case in a country in transition. The development of the transport sector and socio economic characteristics of the city are described in relation to past and future land-use and transport policies.

In addition a chapter is added about the law on "Developing Interdependence and Renewing Urban Concepts" in France. It is an example of new legislation in the field of transport and land-use.

This new law goes towards a greater consistency between town planning, housing, travel, leisure and service policies. It gives regulations and pragmatical tools for local authorities to coordinate, monitor and estimate the different aspects of their urban policies, in particular those in link with urban planning and transport. It should gradually enable improved control of town expansion and improve organization in conurbations, and in this way rise to meet the social, cultural and economic challenges with which towns are confronted. On the basis of the outcome of this an attempt will be made to link the results to common trends in land-use and transport issues

The report for Sub-Group 2 will conclude with some conclusions and recommendations.

### **Transport interchanges and urban development - Sub-Group 3**

#### Members of the sub-group

Mr Csaba KOREN – Hungary - Sub-Group Leader  
 Mr Noboru HARATA - Japan  
 Mr Olli-Pekka POUTANEN - Finland  
 Mr George SCHOENER – USA  
 Mr Christian MAUROIT - Belgium  
 Mr Gerhard MENCKHOFF - World Bank

#### Goals

The previous PIARC C10 report (2000) described passenger interchanges as one of the measures to promote public transport use. Based on the above output and considering the widespread research activity about the transport function of interchanges, the present subgroup put emphasis to the other functions of interchanges. So the main goals of this work were:

- To identify best practices of integrated passenger interchanges in urban development and freight interchanges in city logistics;
- To examine the land-use impact and finances of passenger interchanges and city terminals.

#### Themes studied

- a) Integrated passenger interchanges with urban development in terms of institution, finance and organisation.
- b) Freight interchanges with city logistics strategy to reduce traffic impacts on CBD and/or Inner city area

## Methods

The subgroup has first conducted some desktop research on interchanges. Valuable results were found in Europe, Japan and in the USA. Some projects of the EU 4<sup>th</sup> R+D Framework Programme used also the case study approaches.

As a second approach to get information, the subgroup decided to collect case studies. In order to receive comparable studies, the outlines of two types of case studies on passenger interchanges/freight interchanges were developed. A list of potential case studies was set up.

Based on literature review and our discussion, the subgroup put focus on the following three questions for passenger interchanges:

1. What are policy objectives and driving forces of integrated passenger interchanges with development?
2. What are typical dilemmas between transport function and activity centre function?
3. Then, is there any effective remedies for the dilemmas?

In August 2000, a letter was sent to members of C10 asking them to provide one or two cases. As a result, we selected 6 case sites of integrated passenger interchanges (Table 1.).

**Table 1. Passenger Interchanges surveyed**

<b>City, country</b>	<b>Public Transport</b>	<b>Development</b>
Ballston, USA	Arlington Metro	Sector development plan for stations
Osaka CAT, Japan	Shuttle/Intercity Bus	Minato-machi redevelopment project
Saitama, Japan	Japan Railway	Saitama New Urban Center Project
Stuttgart, Germany	German Railway	Stuttgart 21 project
Stratford, UK	Underground/Jubilee line	Town center redevelopment
Budapest, Hungary	Hungarian State Railways	West End City Center development

As for freight interchanges, two types of cases were distinguished. Six cases can be classified as regional interchanges (Table 2.), whereas the other six are dealing with city logistics systems (Table 3.).

**Table 2. Regional Terminals / Interchanges surveyed**

<b>City, country</b>	<b>Status</b>
Kobe FDC, Japan	existing / developing
Nishijin FDC, Japan	existing / developing
Duisburg, Germany	existing
Helsinki, Finland	planned / construction starting
Budapest, Hungary	planned / construction starting
Newark, New Jersey, USA	planned

**Table 3. City Terminals / City Logistics sites surveyed**

<b>City, country</b>	<b>Status</b>
Duisburg, Germany	existing
Bremen, Germany	existing
Kassel, Germany	existing
Nurnberg, Germany	existing
Wien, Austria	planned
Wiener Neustadt, Austria	planned

## Findings

Based on the case studies, the subgroup formulated its findings according to the three key questions about policy objectives and driving forces, about typical dilemmas between transport function and activity centre function, and about effective remedies for the dilemmas.

### Policy Objectives and Driving Forces

Passenger interchanges are very important for seamless and attractive transport services. Driving forces of integrated passenger interchange projects are basically summarised under three headings:

1. policy objectives by government,
2. development of rail-technology, and
3. institutional changes (privatisation of railway companies).

Policy objective to promote sustainable development by the government is the general background of high priority on public transport. Policy objective to regenerate local economies is another driving force.

The development of rail-technology makes possible to utilise some parts of previously occupied areas.

The institutional changes of railway companies may be a major driving force of integrated passenger interchanges. Most typically, the privatisation of railway companies makes them more sensitive to business chances in railway station areas.

### Typical dilemmas between transport function and activity centre function

Typical dilemmas between transport function and activity centre function have been summarized under three headings, namely:

1. physical and functional dilemma,
2. financial dilemma, and
3. temporal dilemma.

The complexity of integrated interchanges with activity centre function causes physical and functional dilemma. The integration means involvement of many organisations and interests, many functions and physical competitions.

The high costs of the integrated interchanges and financial difficulties of railway companies and/or governments require the activity centre function vital enough to cover the costs.

Uncertainty of the related decisions makes the temporal schedule of integrated interchange projects unclear. It may cause significant delay of the project. Any integrated interchange has always a big risk, because it must include many organisations and require coordination of transport interchanges and surrounding developments.

### Effective remedies for the dilemmas

As expected, there is a wide variety of remedies for the dilemmas found both in previous studies and in our case studies. We can summarize them under two headings namely:

1. 'capacity to make an innovative and realistic vision' and
2. 'strategy to have flexibility'.

The 'capacity to make an innovative and realistic vision' is a key to reduce physical/functional dilemma and financial dilemma. In order to make the capacity, the following two points must be addressed:

1. a good partnership among developer, railway company and local government,
2. an open process with public consultation.

There are uncertainties in future even for the innovative and realistic plan. Because integrated interchange projects are so large and complex that needs many years to be completed, they may face unexpected change of economic condition and related decisions of government funding and bank investment.

In order to reduce or cope with the uncertainties and the temporal dilemma, the strategy to have flexibility is needed. To make the strategy, the following two points must be addressed;

1. accountable and logical planning process
2. continuous monitoring system on related decisions and economic condition.

## **Evaluation of Transport Performance Measures for Cities Sub-Group 4**

### Members of Sub-Group

Ms Ysela LLORT - USA - Sub – Group Leader  
Mr Alain BROES - Belgium  
Mr Andre BROTO - France  
Ms Vibeke FORSTING - Denmark  
Mr Graham LAIDLAW - UK  
Mr Neil DOYLE - Australia  
Mr Tsuyoshi KUROSACA - Japan  
Mr Cornel BOTA - Romania  
Mr Hermann KNOFLACHER - Austria

### Background

In today's cities, quality roads and transport systems can help achieve a better quality of life. Managers of transport organizations need to make decisions that contribute to city objectives that are broader than just transportation efficiency. Transport organizations face increasing challenges in meeting public expectations and to become more efficient and accountable for their actions. There is an increasing awareness that there are linkages between transport and other public policy domains: safety, the environment, the economy, social equity and mobility. Ideally, transport objectives reflect those linkages; are measurable so that transport performance can be evaluated, and assist in achieving city, regional and national policy goals.

Transport performance is assessed in numerous world cities, but there is no coherent body of knowledge about how transport contributes to broader city goals. Consequently, the members of Sub-Group 4: Measurement and Monitoring of Quality, of PIARC C10, reviewed available literature and the experiences of the members themselves. Subsequently, Sub-Group 4 undertook a questionnaire survey of selected world cities in 2001/02. The purpose of the survey was to assess the strength of the alignment between:



## Survey Results

Eighteen cities located in Europe, Asia, Australia/Oceania and North America responded to the questionnaire survey. In most cases, respondents did not or could not respond to some of the questions. While the survey provided compelling insights, caution must be used when interpreting the responses because of the differences in perspectives and responsibilities of the organizations preparing responses.

## Settings

Seven cities have populations of one million or less, while six have populations of more than two million. Five respondents reported recent metropolitan area growth rates in excess of one percent per year, while three have experienced losses. None expect significant changes in recent population growth rates over the next five to ten years. Population densities range from 580 to about 4,000 persons per square kilometer. Automobile ownership ranges from about 300 to more than 600 per 1,000 persons.

Transport responsibilities vary by mode, and to a lesser extent, by the phases of the planning, delivery and operation process. In many cases, these responsibilities are shared with other levels of government or other entities. Multiple ownership of the road system – usually corresponding to the national/regional/local function of individual roads – means that different elements of the network are managed and funded by different levels of government. Rail and port transport are generally not the responsibility of city agencies. However, in most instances cities manage or oversee and fund most mass transit and non-motorized transport.

There are clear objectives for land use/housing, economic development and the environment in most cities. However, no more than four of the respondents reported that their organization has significant influence over those objectives. Most reported “some” influence, which recognizes that transport is but one – albeit important – component of urban society.

## Policy Framework

The responding cities have a wide range of goals that address the economic, environmental, social and safety aspirations of their citizens. This research sought to consider how transport organizations determine the extent to which they are meeting public policy objectives for the transport system and how those policy objectives meet broader city goals.

Respondents reported a number of transport objectives for five major issue areas. However, only a few transport objectives were measurable, such as “a 30% reduction of the number of accidents with injuries and fatalities.” The following table is a summary of issues deemed most significant and the total number of measurable objectives reported by the 18 respondents.

**Significance of Urban Policy Issues and Reported Measurable Objectives (All Respondents)**

<b>Issue Area</b>	<b>Most Significant Issues</b>	<b>Measurable Objectives</b>
Safety	Transport fatalities Transport injuries	Five
Environment	Air quality General indicators (population growth, traffic volumes, etc.) Climate change	One
Economy	Business attraction and growth Access to markets Employment	One
Social Equity	Access by the disadvantaged	None
Mobility	Accessibility Modal share Delay Quantity of travel Average speed	Eight

**Data and Technical Support for Decision Making**

Transport policy objectives and related performance measures can play a critical role in setting policy, allocating resources and reporting on the results of transport programs and projects. Responding cities reported few examples of how such objectives and measures are used in decision making at system, corridor and project levels.

Respondents reported that many performance measures and a substantial variety of data are collected. Thirteen respondents provided detailed information on indicators of performance, outputs based on assessments of the indicators and the consequences of transport services. The most prominent measures are for safety (injuries and fatalities), the environment (vehicle-related emissions), the economy (employment and business attraction and growth), and mobility (accessibility, modal share, quantity of travel, delay, and average speed).

**Conclusions and Recommendations of the Work of Sub-Group 4**

In today's cities, transport organizations responsible for moving people and goods face new and increasing challenges. These organizations also obtain, and use, a wealth of data and measures in carrying out their responsibilities. However, based upon the responses of the cities surveyed, there appears to be an absence of measurable policy objectives that could be used to determine if and how the goals of the city and transport agency are actually being met. If this is the case, then current transport policies in those cities are not being clearly supported by the data and measures that are currently available.

If these research results are indicative of practices in other world cities, it appears that significant changes are needed in:

- articulating measurable, realistic transport policies that support city goals;
- identifying performance measures and associated data for those policies that can be used to make informed investment decisions; and
- involving citizens and stakeholders in formulating the policies and assessing the results.

This will not be an easy task for many transport organizations. They must take into account planning and data collection budget realities, organizational competencies, and the extent to which decision-makers accept a performance-driven approach. Incremental approaches to improving the linkage between policy objectives and performance-driven decision making may be necessary.

Additional research on the appropriate linkage between city aspirations and transport performance is needed to assist transport agencies in fulfilling their expanding role. This research study – limited by time and resources – is a starting point for discussions and a basis for further work.

# FUTURE WORK OF C10, STRATEGIC THEME 2 AND PIARC

All four Sub-Groups have, or will in their PIARC Reports, be making detailed and specific recommendations for taking forward the work that each of the Sub-Groups have been leading on. These largely fall under a recommendation for follow-up work for future C10 Technical Committee. In addition, during discussions on PIARC's New Strategic Plan and the future priorities for the work of PIARC, the C10 members have made a number of suggestions for future work and recommendations on the way that this work is organised and disseminated.

The key areas that C10 members see PIARC should be focussing its future attention in respect of "Urban Areas and Integrated Urban Transport" are:

- Pleading in favour of continuity between old and new Technical Committees before the World Road Congress in Durban;
- A recommendation in favour of a new direction for Technical Committee C10 and for that committee to include more non-Western European type countries;
- C10 members felt PIARC had a lot of individual member expertise that could be helpful for people in poor countries, especially in mega cities;
- PIARC needed to organise itself around advising and not surveying;
- The risk could be suffocation in symptoms without solutions;
- C10 members felt future work should be a balance between mega cities and social sustainable transport;
- The C10 members felt that proposed Strategic Theme 2 issues were not enough for the future because there was no link with the poor;
- C10 should focus on mega cities in developing countries instead of in developed countries;
- In focussing on the urban poor the future direction of PIARC work should look at Africa, Asia and Latin America;

- The C10 Chairman's view was that the key future issues should be: mega cities + poverty + transport;
- There is a need to analyse what makes people poor. There are many factors;
- Problems for the coming decades were truly situated in the big cities, but that there was a complete difference between France and for example India. The problem of poverty in mega cities in developing countries is difficult to discuss in the current group of C10 members since few members had a good notion of this problem;
- Although C10 has members from Morocco, India, Cuba, and Madagascar they weren't active in the work of C10 and many other representatives from developing countries and countries in transition weren't coming to C10 meetings;
- In conclusion C10 members will be preparing a discussion paper for PIARC in early 2003 that will draw together all of these comments into a coherent form.

**SUSTAINABLE DEVELOPMENT  
AND ROAD TRANSPORT  
(C14)**

**Activity Report 2000-2003**

# COMMITTEE MEMBERS

## HAVING CONTRIBUTED TO THE ACTIVITIES

Chairman: Anders HH JANSSON, Finland  
English-speaking joint secretary: Shari SCHAFTLEIN , USA  
French-speaking joint secretary: Jean-Charles POUTCHY-TIXIER, France

### **Working Group 1: Decision-making process (Facilitator: J. STRICKER)**

Australia: Jay STRICKER (Facilitator)  
Austria: Alexander WALCHER  
Canada: Carl CLAYTON  
France: Jean-Charles POUTCHY-TIXIER  
Portugal: Maria Isabel GUERRA  
Sweden: Lars NILSSON  
United Kingdom: Mike GARNHAM, then Simon PRICE  
United Kingdom: Andy SOUTHERN  
Asian Development Bank: Stephen CURRY (for 2000 – 2001)

### **Working Group 2: Limitation of impacts (Facilitator: W. TERRYN)**

Austria: Friedrich ZOTTER  
Belgium: Wilfried TERRYN (Facilitator) and Alain LEFEBVRE  
Denmark: Birger MUNCH  
Spain: Felipe RUZA  
USA: Shari SCHAFTLEIN and Gloria M. SHEPHERD  
France: Pierre SKRIABINE  
Hungary: Istvan FI  
Japan: Hirofumi OHNISHI  
Malaysia: Roslan Md TAHA  
Norway: Taale STENSBYE  
Netherlands: Paul M.C.B.M. COOLS  
International Society of City and Regional Planners (ISOCARP): Hari BARAL

## **Other members having participated in Committee meetings or activities**

Cuba:	Haydée ALVAREZ GORIS
Spain:	Javier CACHON DE MESA
France:	Janic GOURLET
Italy:	Antonio TRAMONTIN
Hungary:	Istvan FI
Norway:	Taale STENSBYE
Poland:	Tadeusz WOJCICKI
Russia:	Dmitri N. KAVTARADZE
Slovakia:	Maria KOCIANOVA
Switzerland:	Pierre-Alain OGGIER
Tanzania:	Willey A. LYATUU (in both WG1 & WG2)

As well as:

for Chile: Sabah ZRARI

for Japan, standing in occasionally for Hirofumi OHNISHI: Moriyasu FURUKI, Eiki ARAMAKI and Fukashi KOGURE.

# THE WORK PROGRAMME AND ITS ORGANISATION

The committee work programme for 2000 – 2003 has been defined and organized in 2000 in the following way (cf. "Work Programme of Technical Committees 2000-2003), with two titles of actions, each one entrusted to a working group:

## **Action 1: Decision-making process in the implementation of road transport policies (led by J. STRICKER, Australia)**

Short description:

Decision-making processes with climate change, mobility and motorization, primarily addressed in terms of how global issues are translated at national, regional and local level. (References to the Strategic Plan 2.1, 2.2 & 2.4).

Outputs scheduled:

- Preliminary survey on greenhouse gas emissions policies
- Communication: dialogue with scientists, media influence, role of public, participation vs information, collective responsibility for the future, communication tools and skills
- Powers: definition of "decision", blocking (by unions), EU SEA & IAIA requirements, legislative vs voluntary public involvement, drivers for decision (fears vs hopes for the future), time horizons (driven by elections)
- Structures: levels of decision-making, institutional / organization structures and responsibilities, strategic goals vs tactics
  
- Different levels: strategies, policies, programmes, plans and projects
- Seminar in India concerning the motorizing countries
- Set up possible outputs for HDM-4 implementation (?)

## **Action 2: Evaluation and limitation of impacts of road networks and transport policies (led by W. TERRY, Belgium)**

### Short description

Issues related to the impact of road networks and transport policies on health, local pollution, biodiversity, landscapes, vehicle regulation and promotion of less polluting vehicles.

### Outputs scheduled

Report on the statement of skills, best and wisest practice in the matter concerned drafted from the results of a survey.

# PRODUCTIONS

## Committee's actions in general

Numbering 28 members in 2000, membership of the C14 Committee increased gradually to reach 35 members in 2001, then 34 members in 2002 – 2003. Taking departures and arrivals into account, Committee membership averaged 37 members between 2000 and 2003, and all participated in at least one Committee meeting, with the sole exception of the Iranian member.

In addition to the 34 members and 12 correspondents of C14, the Committee has developed relationships with other international organizations like OECD, ECMT, IRU and IENE who have associated members within the Committee.

The Committee meetings have been held:

- In March 2000 in Paris, France
- In June 2000 in Helsinki, Finland
- In November 2000 in Madrid, Spain
- In May 2001 in Vienna, Austria
- In November 2001 in New Delhi, India, which meeting was combined with an international seminar on sustainable development in road transport gathering the Strategic Theme 2 Coordinator, members of C14, C4 and C10 and C19 partly
- In May 2002 in Sydney, Australia
- In November 2002 in Buenos Aires, Argentina, which meeting was combined with a Pan-American Seminar on Roads and Environment for South American countries
- In May 2003 in Bucharest, Romania, which meeting was combined with a workshop of Central and Eastern European countries on rehabilitation of the rail, road and river transport networks.

The participation of members at Committee meetings was good. However, two periods of time can be distinguished:

- That prior to summer 2001, when the average participation was 23 members out of 32 (72 %) for the committee's meetings organized in Western Europe.
- After summer 2001, when the average participation was 17 members out of 34 (50 %) for the seminars and meetings organized in other continents (India, Australia and Argentina, except for Romania, not included in these statistics).

The lower participation from summer 2001 can be explained easily. The seminar in India was held immediately after the onset of the Afghanistan war; this constrained some countries to refuse their members permission to participate. The seminar in Argentina followed the severe economic crisis. And Australia, the distance and the relatively high participation costs (trip plus accommodation costs) put it at a disadvantage.

Each meeting combined both plenary sessions and sessions for the two working groups respectively. At the meetings, presentations were given by committee members on specific issues, issues specific to the member's own country, or issues from international conferences, as part of the objective of sharing experience and best practice.

## **Production and publications**

### Productions and presentations related to meetings

The presentations during meetings covered various subjects such as freight transport, sustainable transport in OECD, greenhouse gas policies, urban mobility (Mobicity), infrastructure and urban sprawl, environmentally sustainable transport (EST), habitat fragmentation of landscape and climate change, environmental planning, overcoming institutional barriers to implementing sustainable urban travel policies (OECD), clean air and the environment, motorway planning in sensitive areas, non-motorized transport, transport and biodiversity, regulations, best practices and technical guidebooks about Noise, etc.

### Articles in Routes / Roads

Three articles written by C14 members have been published in Routes / Roads:

1. "Greenhouse Gas Policy and the Transport Sector ", by A. JANSSON, n° 308, April 2000,
2. "European Union Policy on Transport Emissions and Greenhouse Gas " by J.C. POUTCHY-TIXIER and T. VEXIAU, n° 308, April 2000,
3. "Conducting Sustainable Regional Development Projects " by J.C. POUTCHY-TIXIER, n° 311, July 2001.

Two other articles have been written by other ST2 members in continuation of the seminar of New Delhi and have also been published in Routes / Roads:

1. "Strategies for Sustainable road Development", by A. PAWAR, President of the Indian Roads Congress and C4 member, S. K. SABNIS and J.M. TORVI, n° 314, April 2002,
2. "Measures to Protect Sensitive Environments", by W. JEGER, C19, n° 314, April 2002.

Lastly, an article in Routes / Roads presents the optimisation method taking in account sustainable development in road projects, worked out by the Swiss federal Roads Authority:

- "NISTRA, taking the sustainable development concept into account in road project assessment and optimisation", by A. CUCHE, n° 317, January 2003.

#### Publications of the Committee's works related to seminars

The presentations made at the seminars and their conclusions are mentioned in the following titles. The Committee's publications following the seminars comprise 4 articles and published presentations deriving from the New Delhi seminar and 8 from that held in Buenos Aires. It is worth noting that at New Delhi, the C4 and C19 committees each made 2 presentations published as part of the seminar.

C14's work published in the two volumes relating to the New Delhi seminar:

- "The Influence of Sustainable Development on Institutional Structures for Decision-making" by A. SOUTHERN,
- "Knowledge of the Social and Environmental Impacts of Transport policies" by W. TERRY,
- "Taking into Account Non-Motorized Transport in Road Network Planning" by J.C. POUTCHY-TIXIER,
- "Sustainable Transport System for Rural Development" by H. BARAL.

C14's work published in the CD-ROM relating to the Buenos Aires seminar:

- "Road Transport Policy Decision-making" by A. JANSSON,
- "Recuperation Techniques of the Areas Degraded by Aggregates Extraction" by J. CACHON DE MESA,
- "Environmental Vigilance plan" by F. RUZA,
- "Environmental Control During Road Construction" by J. STRICKER,

- "Strategic Environmental Assessment Indicators " by P. SKRIABINE,
- "Development of Low Noise Pavements for Abatement of Road Traffic Noise" by H. OHNISHI,
- "Environmental Cost in Alternative Selection" by L. NILSSON & S. PRICE,
- "Integrating Environment, Human Activities and Local Development in the Whole Process of Road Design and Implementation" by J.C. POUTCHY-TIXIER.

### Other publications

The working groups also prepared the publications, mentioned hereafter. Other papers and documents have also been set out and published in "Routes/Roads", on the occasion of the XIth Winter Road Congress or as draft documents or common study matters in conjunction with other committees and international organizations. For instance, following the New Delhi seminar, a draft document on non-motorized transport was produced from a presentation and a supporting text; 70 copies of this was then replicated for circulation to international organizations such as the World Bank, Asian Development Bank, United Nations, OECD, Vélo Mondiale or some other countries.

### Seminars

Three international seminars were organized in accordance with the objectives defined in PIARC strategic plan 2000-2003:

- The first seminar took place in November 2001 in New Delhi, India, with the Indian Roads Congress (IRC) and its theme was "Sustainable Development in Road Transport". This seminar was extended to include the 4 committees of PIARC Strategic Theme 2 "Road Transport, Liveability and Sustainable Development".
- The second seminar was the "Pan-American Seminar Roads and Environment" organized in November 2002 in Buenos Aires, Argentina, with the Dirección Nacional de Vialidad and the Foundation CENATTEV.
- The third, scheduled for 12 and 13 May 2003 in Bucharest, Romania, with the National Haulers Union of Romania, is essentially a workshop to focus on rehabilitation of rail, road and river transport networks in Eastern Europe.

Considering that the Bucharest workshop will have been held after the publication of the present activity report, only the New Delhi and Buenos Aires seminars will be detailed here.

## New Delhi International Seminar "Sustainable Development in Road Transport"

Between 7 and 10 November 2001 were held in New Delhi:

- PIARC Strategic Theme 2 co-ordination meeting "Road transport, liveability and sustainable development", chaired by Patrick GANDIL, theme coordinator.
- The international seminar on sustainable development in road transport which attracted some 400 participants despite the difficult international situation then prevailing (first American military air raids on Afghanistan).
- PIARC C4 and C14 technical committees meetings.

Excellent organization and the presence of many personalities turned these encounters into a major event for Asian countries, India, IRC and PIARC.

The three major themes of the seminar were:

1. Road transport technology and energy conservation
2. Social, economic, environmental and safety concerns
3. Sustainable development of road infrastructures.

One hundred and two presentations have been published by IRC in books forming two volumes.

Three major conclusions have been identified during this seminar:

1. Importance of maintenance in sustainability, necessity to mitigate adverse social and environmental effects;
2. Importance of upgrading road infrastructure, with special attention to rural roads;
3. Importance of safety in sustainability: accidents, driving education, training, designing, taking non-motorized transport into account.

Gaps have also been identified for low or middle-income countries:

- It is essential to define priorities appropriate for developing countries, for whom copying developed countries is not often an appropriate solution.
- The multiplicity of agencies responsible for road development and maintenance leads to a lack of interagency coordination.
- Road infrastructure development requires a global and holistic approach.

The conclusions of the Indian Roads Congress President, Mr. Ajit PAWAR, suggest that we should look at sustainability from various standpoints, we should consider long term goals as truly sustainable development, we should always look with a shift towards environmentally oriented thinking.

Identified lessons for future PIARC seminars have been that smaller sessions with a sharper focus could be a way to encourage discussion and dialogue, that participation of students, of other stakeholders, outside the professional road sector, of NGOs and of interest groups should be encouraged and that mixed sessions based on a non adversarial approach promotes mutual problem solving.

### Buenos Aires "Pan-American Seminar Roads and Environment"

Between 25 and 28 November 2002 were held in Buenos Aires:

- PIARC C14 Technical Committee meeting
- The three-day Pan-American Seminar Roads and Environment "SEPAVIAM", with half a day of technical visits, jointly chaired by the Road Directors of Argentina and Uruguay, which attracted some 100 participants from 22 countries. Participants represented both road and environmental authorities and organizations from all of Latin America.

The initial seminar arrangements were complicated by the difficult economic situation in Argentina and by some communication problems, but finally proved excellent. As in New Delhi, the efforts of the host country and the organizers were considerable. The social arrangements were also conducted to a very high standard.

Fourteen presentations were given in the 3-day seminar, eight by C14 members and the rest by representatives of Argentina, Spain, Chile and Colombia. An important time frame was allocated for questions and answers after each presentation and during the closing session. This time frame prompted discussion, with an average of 4 participants addressing comments or queries to every presentation. The concerns of the region were clearly focused by the Latin American experts. A CD-ROM holding all the papers and presentations has been edited and given to all the participants.

Three major conclusions for PIARC were identified during this seminar:

1. The productivity of the discussion was very much due to the encouraging attitude of those chairing the sessions and to the expertise of the participants.
2. The importance of the regional cooperation within Latin America was enhanced, as participants from different countries were well acquainted with each other and the neighbouring countries' concerns. Organizations such as the Ibero–American Council of Roads Directors, the foundation CENATTEV, or SLUAT, forum for exchange of experience, located in Medellin, Colombia, also form a natural cooperation network for PIARC committees and activities.
3. It is the importance of PIARC technical committees members' real involvement into these other organizations which determines the limits of liaison and communication to those organizations. It would be advantageous for PIARC as an organization to make these links, especially with regional organizations, more visible in its work. The Technology Transfer Centres may, alternatively, best serve to address this problem.

Reflections on issues concerning the seminars' joint organization are:

- Coordination is often quite difficult to implement, because the host country's fundamental interests should accord with the agenda of the committee and PIARC. However, a sufficient and reasonable coordination can be achieved if those involved are willing to apply some flexibility.
- There is still much room to improve our practical understanding of how things are managed in different countries. It is an essential component of successful technology transfer to understand both how solutions are influenced by the country of origin and how the usefulness of such solutions is influenced by the country applying them.
- Methods to support day-to-day exchange of experience may also be further improved by the committees and their members. For instance regarding the imminent revision of the Argentinean Manual of Environmental Management (MAGA), or the development of environmental management in the Bolivian transport administration, direct comments and advice could be a quick and simple way to support the work.

The seminar underlined again the usefulness of developing Spanish as one of PIARC's languages of general communication.

## Working group 1 on decision-making process

The work of the Group progressed well in a very positive spirit of cooperation despite having some changes of membership. The consideration of the topic commenced with a review of the previous work done by PIARC in the area of the decision-making for sustainable transportation. It is important that, as each Technical Committee is newly formed after World Road Congresses, the members are aware of and build on previous work in the subject area to maximize the value of that work and avoid duplication of effort. The group members collectively have considerable experience in the implementation of decisions in transport initiatives, and have been able to draw on that experience to develop the report in addition to the previous work by C14 prior to the Kuala Lumpur Congress.

The Group recognized the diversity of socio-political structures and influences around the world, and conscientiously attempted to include global examples and case studies to illustrate those differences. The regional seminars provided further information and insights for the group through the interaction with local road transportation authorities.

The Facilitator liaised with members of C4, C10 and C2 regarding the work of those Committees on related topics to reduce any potential overlap in work and to compare experiences and learning.

Concerning the outputs initially scheduled:

- The preliminary survey on greenhouse gas emission policies had been achieved in 2000 and corresponding articles have been published in *Routes / Roads* (n° 308, IV-2000).
- The three areas Communication, Powers and Structures form the main body of the report entitled "Decision-making process in the implementation of road transport policies" aimed to be published in 2003 as a publication for the Congress. This document deals with the different levels mentioned in the work programme (strategies, policies, programmes, plans and projects) and is illustrated by case studies.
- In addition, a booklet intended for decision-makers is planned to be published after the Congress. It will be perhaps a 10-12 page document directed to executive level, but also applicable to project manager, jointly published with an international organization.
- After the seminar in India concerning motorizing countries, documents and partnerships have been set up on non-motorized transport, which are to be developed in greater depth with partners and other Committees of the Strategic Theme after 2003.
- For HDM-4, there are 'flow-on' benefits from the improvement of road smoothness. For sustainability, these relate to the improved fuel efficiency that is derived from smooth road surfaces and to the corresponding reduction in greenhouse gas emissions.

## Working group 2 on limitation of impacts

The work responsibility of Working Group 2 concerns "The evaluation and limitation of impacts of road networks and transport policies".

During the meetings of C14 the members discussed many issues related to the impact of Road Networks and Transport Policies on health, local pollution, biodiversity, landscapes, vehicle regulation and promotion of less polluting vehicles, and decided to design a questionnaire for respondents to provide answers to a survey. The purpose of the questionnaire was to gain a better knowledge of the social and environmental impacts of transport policies, to improve processes designed to gain social acceptance through public debate, and to provide concrete answers to the questions highlighted by the survey.

In accordance with the goals of the World Road Association's Strategic Plan, the fields of actions that have been outlined are:

1. health,
2. local pollution,
3. biodiversity,
4. landscape,
5. vehicle regulation and promotion of less polluting vehicles.

Five subgroups have been set up with facilitators and four additional coordination meetings for the working group 2 have been held apart from the C14 meetings:

- in January 2001 in Brussels, Belgium
- in January 2002 in Brussels, Belgium
- in September 2002 in Vienna, Austria
- in November 2002 in Delft, Netherlands.

In August 2001, an inquiry was sent to all PIARC countries and independent organizations, with a request to participate in the discussion on the major topics outlined.

More particularly the working group wanted to know which definitions, approaches to the problem or available information that PIARC countries and independent organizations considered important for inclusion in the final report.

The responses to the survey have been evaluated by a drafting team. Those activities resulted in the drafting of a report "Evaluation and limitation of impacts of road networks and transport policies". This survey represents a very broad view of the subject and will need to be posted perhaps on the PIARC's expanded website of the future to support technology transfer. The aim is to publish it in 2003 for the Congress too.

## Future topics for PIARC and the Committee

During the meeting with Theme Coordinators, Committee Chairs and Secretaries in Bern in July 2002, topics suggested as future possible work areas for the Strategic Theme included:

- project quality
- facing growth
- transport and development
- urban problems.

The topic "project quality" would cover decision-making processes (including the role of the "e-" in public participation and governance), implementation, control measures, protection measures (biodiversity, etc.). The topic "facing up to growth" would cover existing networks, ITS, innovation, intermodality. The topic "transport and development" would cover economy and development, transfer of practices, and the gap between social demand for welfare and the means to set it out. The topic "urban problems", linked to the previous one, would cover sharing the space, innovations for financing, delivery in towns, growth of big cities.

Other cross-cutting themes have been mentioned, concerning also sustainable development issues: knowledge transfers, safety, human behaviours, risk assessment and management, sustainability and environment, role of NGOs, asset management, demand mastery.

In other respects, concerning the period 2000 – 2003, other topics have been mentioned on which the Committee has not been able to work: eco-taxes, monitoring evaluation, contract specifications, set up and usage of Strategic Environmental Assessment in a road structure that is becoming more fragmented.

To define future work themes, it would be useful also to know the thrust of other international organizations to ensure that PIARC work could be organized in synergy with these other reflections, without the assumption that their findings will be transferable worldwide: case in point for ECMT products.

A first list of work themes for the Committee could concern the issues related to project quality as mentioned before, demand mastery, role of NGOs, risk assessment and human behaviour.

Concerning international seminars "Roads, Transport and Development" forming the P3 project, the exceptional quality standards of the New Delhi and Buenos Aires seminars raise a fundamental question: it is quite understandable that the host countries wish to ensure the best possible success, but if 40 seminars are held to the same scale and standard, resources may grow scarce. PIARC could perhaps plan to consider a "mid-size seminar guideline" or an agreed-upon model for smaller scale seminars to reduce costs and demands in resources, to relieve the financial burden on future host countries, and maybe to increase the exchange of views frequency.

Organizing videoconferences or forums would also allow, now that these technologies are accessible to the majority of countries, reduction of travel costs for members' participation and encourage thus the involvement of low income countries in the work. It would also test in real terms the role of the "e-" in participation within PIARC in parallel with the strategic reflection on the role of the "e-" in public participation and governance.

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**FREIGHT TRANSPORT  
(C19)**

**Activity Report 2000-2003**

# INTRODUCTION

The work within PIARC is carried out in four years cycles and every four-year period ends with a World Congress. After the Marrakech Congress in 1991, it was considered that it was important for PIARC to find out how freight vehicle issues should be dealt with in a road organisation. A special working group, G4 "Heavy Freight Vehicle Issues" then was established. The G4 was renewed after the Montreal World Congress in 1995 and after the Kuala Lumpur World Congress in 1999 a Committee C19, "Freight Issues" was established.

The C19 is one of the Committees of the strategic theme 2,: Road Transport, Livability and Sustainable Development. Its goal is to encourage the development of road transport policies and programs which take full account of the need for integration with other transport modes and result in beneficial community outcomes in economic, environmental and social terms. The other Committees under the strategic theme 2 are:

- C4 "Interurban Roads and Integrated Interurban Transport",
- C10 "Urban Areas and Integrated Urban Transport"
- C14 "Sustainable Development and Road Transport".

# COMMITTEE MEMBERS

The composition of Committee C19 at 1 January 2003 is the following:

**President** Anders LUNDQVIST (Sweden)

**French speaking Secretary** Wanda DEBAUCHE (Belgium)

**English speaking Secretary** Gail MOODY (Australia)

## Members

Peter TSCHIRNER (Austria)

Jean-Louis GLUME (Belgium)

Jari GROHN (Finland)

Jean Pierre ORUS (France)

Jozsef PALFALVI (Hungary)

Emanuele SCOTTO (Italy)

Eiichi Taniguchi (Japan)

J. HOOKHAM (United Kingdom)

Mircea NICOLAU Counselor (Romania)

Werner JEGER (Switzerland)

## Corresponding Members

Donald FALLU (Canada-Quebec)

Raul DIAZ JARA (Chili)

Darryl ANDERSON (Canada)

Gary MARING (United States)

Djavad SAGHAY (Iran)

Soren RASMUSSEN (IRU - Switzerland)

Kinji HASEGAWA (Japan)

Claude Roger RAJAONARISON (Madagascar)

Ronald J. HENNY (The Netherlands)

Dina ALVES (Portugal)

I. CORFIELD (United Kingdom)

Pavel SUROVEC (Slovakia)

# THE MEETINGS OF COMMITTEE C19

The Committee C19 has held 7 meetings:

Paris (France)	9 – 10 March 2000
Göteborg (Sweden)	19 – 20 June 2000
Wadhurst (United Kingdom)	18 – 19 January 2001
Brussels (Belgium)	7 – 8 June 2001
Brussels (Belgium)	14 – 15 May 2002
Budapest (Hungary)	23 – 26 October
Verona (Italy)	26 – 27 – 28 March 2003.

# WORK PROGRAMME AND ORGANISATION OF C19 BETWEEN 1999 AND 2003

## General Orientations

The activities conducted by C19 between 2000 and 2003 adhere closely to the programme of work approved by the Executive Committee of PIARC.

This programme follows the orientations outlined in the presentation report of the PIARC Strategic Plan and takes account of the conclusions of the Kuala Lumpur Congress and the proposals of C19.

## Organisation of work within the Committee

The Committee's activities for the period between 1999 and 2003 were defined as following. The country leader of the task is mentioned in the last column of the table.

	<b>THEME</b>	<b>Leader</b>
1	Evolution of modal sharing	<b>Australia</b> Gail MOODY
2	Role of regulation and deregulation	<b>France</b> Jean-Pierre ORUS
3	Comparative analysis between developing, emerging and industrialised countries	integrated in all the other themes
4	Emerging problems et potential answers offered by logistical platforms	<b>Belgium</b> Wanda DEBAUCHE
5	Review of experience gained in monitoring and control of vehicle size and weight limits including emerging trend	<b>Romania</b> Mirceau NICOLAU
6	Control and enforcement in the road freight transport	<b>Hungary</b> Jozsef PALFALVI
7	Review of heavy vehicle safety, including accident statistics and risk analysis processes	<b>Japan</b> Eiichi TANIGUCHI
8	Practices for reducing impacts on sensitive environments (natural, population, strategic)	<b>Switzerland</b> Werner JEGER
9	Energy consumption; emerging technologies.	-

## State of progress and major conclusions

### Evolution of modal sharing and - Role of regulation and deregulation

The objectives of these themes were to describe the main aspects of the regulations implemented by the different countries in terms of objectives, content, changes in the modal split during the last 10 years and attempt to explain how deregulation is a contributing factor to the increase of the share of road transport.

**The first group of countries under study are the European Union Countries.** Several directives have changed the organisation of road transport. At first, the rules to access to the market.

The objectives have always been to harmonize the admission to the profession of road transport operator in national and international transport and to promote the effective exercise of the right of establishment.

Since 1st January 1993, any road operator wishing to carry goods has to hold a community driving licence. This document is granted by the state in which the hauler resides and gives him an unlimited access to the whole market of the European Union member countries.

In addition, since July 1998, road cabotage is fully liberalised. This means that any haulier of a member state who gets the community driving licence may transport goods in any country of the European Union with the restriction of respecting the national regulations.

Another important element is the liberalisation of prices. For a long time the prices of transport were controlled in each country. This was often required by the hauliers themselves because they feared the trend of decreasing prices and their consequences. However, the liberalisation of prices was decided in 1990 for international transport.

The common market of road transport required also the definition of common rules on weight and dimension for heavy lorries. The harmonisation of weight and dimension was done in different steps at first for international transport then for national transport. This point has been studied by working group 5.

Regarding safety, several measures have been taken in order to improve safety in road transport. The most important deals with driving time and resting time and technical inspection of vehicles.

**The Eastern European Countries** started a deregulation process at the beginning of 1990 in preparation of entering into a market economy.

In **Hungary** the process started with the law of 1988 on the privatisation of the state-owned companies.

Hungary introduced several reforms with the objective of preparing for the entry of the country into the market economy. The deregulation of the road haulage sector started before the deregulation of the rest of the economy, although the legislative framework for implementation was in place in 1986.

The year 1995 was also a significant year for road haulage. The requirement to possess an operating licence was introduced in the domestic haulage sector.

In **Poland**, in 1990, the largest state-owned road transport business was split into smaller companies and were privatised. In 1993 a law was passed for privatisation of the industry. It permitted the launch of the “ Mass Privatisation Programme”. To be qualified for privatisation, firms had to satisfy two conditions: their turnover must exceed a specified amount and they must be profitable.

In **Japan**, until the end of the year 1990, a business that wanted entry into the market was required to obtain a licence which could be granted depending on the existing supply and demand conditions. The new law after 1990 abolished supply and demand regulation and an approval system was instituted. Before 1990, categories of licence were different for line businesses that transport unspecified cargo loads on regularly scheduled routes, and for territorial businesses that provide vehicles for specific clients.

The deregulation process of trucking industry is divided into three steps. Step1: the law introduced in 1990 changed the licensing system for the tariffs and rates from a permit system into an advanced notification system. Step2: the administration changed its operational and application system for the business territory system in 1999, which expanded the business territory from the 47 prefectural boundaries to 8 economic zones. The business territory system requires the trucking operators to have either origin or destination points as well as their offices or branches in their territory. Step 3: in April 2003, both licensing and business territory system will be abolished entirely, which will bring about the environment that encourage the trucking operators to introduce more flexible rate systems.

In the old standard, the vehicle weight was 20 tonnes or less for any vehicle. In the new standard, the gross weight has been deregulated according to furthest axle distance and total vehicle length.

**In North America and particularly in Quebec (Canada)**, the road haulage sector experienced a major restructure in 1988 with a new regulation redefining the access to the profession. More recently, the agreement on domestic trade implemented in 1996 has defined a timetable leading to a full deregulation of road transport extra-provincial enterprises. The agreement provides for the abolition of the extra-provincial haulage licence and of the intra-provincial licence for extra-provincial road transport companies. In addition all the provinces of Canada have accepted to deregulate all types of intra-provincial haulage apart from Quebec for bulk transport.

Until 1988, each province of Quebec determined its own standard, then harmonisation was agreed and progressively integrated in the different legislations. The maximum length is 25 metres in the case of a road train and the gross vehicle weight limit authorised in normal period is 62,5 tonnes with a maximum load per axle of 9 tonnes.

**In Australia**, a safe and efficient road transport system is of vital importance because Australia's economy is very freight dependent. In the late 1980's, vehicle operators and drivers had to comply with a myriad of different regulations in each jurisdiction, which added unnecessary high costs to transport operation. So heavy vehicle charges were differently determined.

A national approach to transport regulation was vital and in 1991 the National Road Transport Commission (NRTC) was established to develop a national system of transport regulation. The main focus of NRTC has been to develop a national approach to heavy vehicles.

General mass and dimension limits for articulated trucks have increased and the NRTC has had a major role in this increase. In the early 1990s the axle mass limits increase from 38 to 42.5 tonnes for six-axle articulated trucks, and within the last few years, it has recommended that mass limits increase across the board for heavy vehicles fitted with road-friendly suspensions.

The NRTC's approach is to make others in the transport chain – who also exercise control over the transport task – legally responsible for offences. The provision has been incorporated in the national driving hour's laws, the laws governing the road transport of dangerous goods and will apply to proposed laws for overloading and exceeding vehicle dimensions.

The NRTC have recently developed a Third Heavy Vehicle Reform Package, which sets the reform program for the next three to four years.

## The deregulation as contributor factor of modal split

During the last ten or fifteen years, the road transport modal share has significantly increased in the different countries studied in this presentation. A lot of factors may influence the modal share and it is always difficult to isolate the role of one of them because they are often inter-dependent. Among the different factors, it can be noted that the change in the nature and the type of goods, the individualized production versus mass production and the dematerialization of economy are elements that have a role in favour of road transport.

The deregulation may also influence the modal split and it cannot be denied that some aspects of deregulation have encouraged the increase of the modal share of road transport.

**Western European countries** noticed a strong increase of the modal share of road haulage to the detriment of railways transport. Some measures of deregulation particularly greater facility to access to the market, the liberalisation of prices for international transport, the liberalisation of cabotage and the raise in the size and weight of vehicles have played in favour of road transport. So in Europe the number of transport businesses raised quickly as a result of the facility to access the market. In addition, the liberalisation of prices combined with the previous factor has caused a greater competition between businesses and a decrease in the level of relative road transport prices. Moreover gains of productivity have been made thanks to the increase of the vehicle size. All these factors have contributed to the increase of market share of road transport.

**In Japan**, the effects of deregulation have resulted in market revitalization in the transport sector and improvement in efficiency. Following implementation of the Trucking Business Law, the number of new entrants to the industry increased. The number of regular motor freight businesses increased by 23% from 1990 to 1997.

During the period from 1991 to 1994 the volumes of freight transported remained relatively stagnant or grew only slightly, reflecting the economic slowdown at the time. Beginning 1995, however, the economy began showing signs of recovery, the rate of increase in freight volume began to exceed the increase in the number of operators, leading to an increase in the quantity of freight carried by operator.

In addition, increased productivity may be noticed in road transport sector. While the number of employees in the trucking industry has been increasing its rate of increase has been smaller than that of freight volume. Due to the increase in the number of trucking operators, the trucking market has been highly competitive. Trucking operators are making every effort to make their transport systems more efficient in order to survive in such environment. For instance, in response to the slow economy, many corporations with their own transport department have begun to outsource their freight transport to trucking operators for cost purposes.

Trucking operators are very active in taking such outsourced jobs by establishing efficient trucking systems. For instance, some operators introduced larger trucks so that more freight is transported at a time. Further, some operators introduced a system that enables them to search for cargos to be picked up using the Internet and inform the drivers of unloaded back-haul to pick up these cargos, and some operators introduced nighttime delivery services. Deregulation has promoted the transition of transport practice from private transport department to truck operators, improvement in transport efficiency by increasing average laden weight, and improvement in overall delivery services and flexibility.

**In Canada-Quebec and Australia**, the deregulation process is marked by implementation of harmonisation measures between the different states and provinces such as access to the market, size and weight of vehicles, that have had as a consequence, an increase in competition and productivity and thus made the road freight transport sector stronger.

**In the two European Eastern countries studied, Poland and Hungary**, deregulation had as framework the privatisation of road sector. The privatisation has given a real advantage to road transport that has quickly adjusted to the new condition of market economy due to its flexibility, reliability and cost of transport compared to rail transport and this has raised significantly the market share of road freight.

#### Comparative analysis between developing, emerging and industrialised countries

It has been decided to integrate this point into all the others in order to obtain a transversal analysis of the situation in developing, emerging and industrialised countries through all the specific aspects the C19 was dealing with.

## Emerging problems, potential answers offered by logistical platforms

The work consisted of making a categorisation of the different kinds of platforms you can find, to identify the conditions for success for their implantation and their effects. To the literature review, which was carried out, were added concrete examples from different countries. The main results are the following.

New observed concepts have big consequences for freight transport:

- Just-in-time producing: Industries produce only the necessary quantities at the right moment. More trips are generated because no/less stock is held. This trend is possible due to relative low transport costs.
- New delivering systems (logistic concepts) such as home deliveries and e-trade are implemented. Goods are delivered to the clients themselves or they can be picked up at local depots closer to the clients.
- Companies are focussing on their core-business. Secondary activities as freight transport and logistics are delegated to specialised companies.
- Distribution is becoming more competitive.

Due to the increase of traffic, the speed of vehicles is reduced. As a consequence, negative effects like a higher energy consumption and more air pollution and noise are produced. A modal shift towards rail- and waterways is promoted. European policies e.g. try to stimulate multimodal transport through incentives or higher taxation of road freight traffic. In contrast the American multimodal policy is market-driven.

In this context, even if a logistic platform can be defined as a tool for a multimodal transport policy in favour of sustainable development (the shifting to other modes helps to decrease the present ton-kilometres by roads), European application of multimodal transport is still not evident due to:

- different technical standards as track gauges, electrification systems and information systems are different;
- relative short distances covered at present by road transport;
- the absence of dedicated infrastructure for rail transport: conflicts between passenger and freight transport can't be avoided. Priority is given to passenger transport;
- the alternative modes (water/rail) have a relative poor level of quality; Flexibility, reliability, frequency e.g. are lower and costs are higher.

This working group also defined the main effects (positive/negative) generated by a platform:

- Synergy effects can be obtained by grouping logistic activities. Common services like gas stations and truck maintenance on site can reduce the number of trips.
- It's not obvious if positive or negative environmental effects must be awaited. For urban deliveries (using UTC<sup>1</sup>) e.g. more vehicle kilometres will be generated due to the use of vans (5 for a similar truck). This will lead to congestion and to a higher rate of fuel consumption (related to the reduction of the average speed of all vehicles). As consequence also an increase of air pollution will be obtained. On the other hand, heavy goods vehicles will be avoided in certain zones (historical centres or residential zones e.g.) so less noise and less negative visual impacts<sup>2</sup> will be generated there. Transfer to alternative modes is considered as positive (especially water transport).
- When logistic platforms are not located near dense populated zones, goods can also be delivered at night.
- Creation of job opportunities.
- Chances for land-use planning.
- Implementation of cooperation between forwarders located at the platform but actually there's a lot of resistance of transport companies to use logistic platforms/cooperate because then they are losing contact with the client
- Reduction of long distance road trips (alternative rail/water modes).
- Due to a higher efficiency/vehicle load factor (using UTC) or reduction of fleet (changing to other modes) e.g., costs can be reduced but that's not guaranteed. Replacing trucks through vans (equivalence of 5 vans for 1 truck) leads to an increase of kilometres and congestion. Also the costs related to extra transshipments are quite high which makes the transport chain more expensive.

A general problem is that there are now a lot of ex-ante (theoretical based) data/guidelines but a lot of projects about logistic platforms were not executed/evaluated: an ex-post analysis is missing. So the effects are not quantified and monetarized.

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<sup>1</sup> UTC: Urban Transshipment Centre

<sup>2</sup> Heavy goods vehicles are considered to molest people more than light goods vehicles. Actually it's not sure that this is true. For delivering with vans you need a bigger fleet.

Chances of a successful implantation of a logistic platform are bigger when certain conditions are fulfilled:

- There's a very good knowledge of the existing and future situation in terms of market, traffic flows and positive/negative effects on local and regional level. It's important to have realistic, clear objectives.
- A good signalisation for guiding trucks to those platforms is implemented.
- There's a good connection to the road (rail/water) infrastructure. The location of the terminal should be well considered.
- A set of policy measures concerning distribution (access restrictions, time windows for delivering e.g.) is applied.
- Financial means to counter extra costs (public support) are foreseen. Especially when extra transshipments must be executed.
- A continuous information system is available to control without interruption the advancement of the journey of the packages (telematics). Until now telematics are only used through big companies.
- Additional services are present. They make terminals attractive (cost savings).

A review of experience gained in monitoring and control of vehicle size and weight limits including emerging trend

There are two important problems with regard to the weight and dimensions of vehicles used in road freight transport :

- The overload tendency  
The growth in the dimension and weight of means of road transport is the result of a campaign by transport companies to achieve more efficient use of vehicles and staff. With the rapid growth of the economy the demand for road transport is also growing and the number of vehicles which are constantly overloaded is also increasing rapidly. The result is that road maintenance departments are being faced more and more often with a rapid deterioration of roads and in the quality of the road service. This trend also has a negative influence on road safety.
- The standardization.  
Different continents and countries have different legislation concerning permitted weight and dimensions of road vehicle. Harmonization of legislation between countries is therefore important so that the vehicles can run in different countries without exceeding legal limits.

A standardization of weight and dimensions of vehicles in international traffic within the EU are established by the European Council in Directive 96/53/EC.

The objective of this working group was to make an overview of problems concerning vehicle weight and dimensions monitoring and enforcement, such as:

- National and international regulation for vehicle weight and dimensions and need of harmonization; the Directive 96/53 as a legal basis of the harmonization within the EU and other European Countries
- Monitoring and control systems of freight vehicle traffic, methods and equipments
- Heavy vehicles aggressiveness on road pavement
- Weigh in motion system as an efficient tool to evaluate the traffic aggressiveness
- Enforcement and penalties, legal basis and methods.

The basic information has been obtained from national and international documentation and from the answers given by the C19 members to a survey by questionnaire.

The main conclusions of the analysis of the state of the art of monitoring and control of vehicle size and weight limits are:

- Need of harmonisation of legislation for the maximum weights and dimensions of motor vehicles and vehicle combinations. Maximum weight and dimensions of vehicles in international traffic within EU have been established by the European Council in Directive 96/53/EC. This Directive serves as a guide for other countries in Europe;
- Simple and accurate enforcement methods are required to ensure that the legislation on vehicle weight and dimensions limits is respected;
- Weigh-in-motion of road vehicles provide useful tools to collect data about the vehicles weights and dimensions for traffic monitoring and weight limits enforcement and for other applications in pavement and bridge engineering;
- New data is needed in order to identify the extent of overloaded vehicles on the road. For that purpose reliable WIM stations have to be established in an increased extent. Making use of WIM system the estimation of the aggressiveness of heavy traffic against road condition become more accurate by establishing the real axle loads of freight vehicles in current traffic.

## Control in the road freight transport

Every year more than 1.17 million people die in road crashes around the world. The majority of these deaths, about 70 percent, occur in developing countries. Sixty-five percent of deaths involve pedestrians and 35 percent of these pedestrians are children. It is estimated that developing countries currently lose in the region of \$100 billion every year. This is almost twice as much as the total development assistance received world-wide by the developing countries. These losses undoubtedly inhibit the economic and social development of each country, consequently ***one of the reasons of the control of road freight vehicles is increasing the safety of the road transport.***

One of the problems about the heavier trucks with the new suspension is that many bridges would have to be upgraded. That is significant and a costly task. However, when carried out in conjunction with general maintenance and rehabilitation programmes, the saving in transport costs should outweigh the additional bridge-related expenditure in the longer term. Consequently ***the other reason of the control of road freight vehicles is protecting the state of the roads and bridges.***

The report has the following structure:

### **Division by the scope of control**

- Control of drivers (driving hours and rest regimes)
- Vehicle control (weight and dimension / roadworthiness)
  - Special vehicles:
    - . oversize, overweight vehicles
    - . vehicles carrying dangerous goods
    - . vehicles carrying livestock
  - According to vehicles' registration:
    - . with domestic registration:
      - engaged in domestic transport only
      - engaged in international transport
    - . with foreign registration
- Load control (in general)

### **Division by levels of control**

- Technical inspection
- Environment supervision
- Road control
- Control at premises
- Border crossing control

### **Division by the ways of implementation of the control**

- Measurement, testing
- Control of papers and authorisations

The report also mentions the different authorities involved in the control: (transport supervisory authority, police, customs authority, Ministry of Transport, Ministry of Interior, veterinary officer etc.)

In conclusion, it seems that there are two conceptions by which universal progress can be made in this field:

- a) countries try to make universal prescriptions for periodical technical vehicle inspections in order to screen the faults;
- b) through technical development of vehicles they enhance passive safety and eliminate road damages.

However, these unification programmes are still under way since there are significant discrepancy among continents and countries as well.

## A review of heavy vehicle safety, including accident statistics and risk analysis processes

The Japanese Delegates to PIARC-C19 have distributed questionnaires concerning the data maintenance of road accident statistics, the number of accidents, and the accident rates to the members of PIARC-C19. Apparently, many member countries had difficulties in completing the questionnaire, possibly due to the differences in which statistics are presented in each country. For this reason, the sections for data analysis were developed by the delegates using the Japanese database. There are presented hereafter.

### 1. Characteristics of traffic accidents of goods vehicle in member countries

#### a) Major characteristics of accident database

The way in which the accident database is structured varies according to the member country.

#### b) Major issues concerning accident database

- Even though accident data of most member countries are categorized in detail such as vehicle types, vehicle kilometer, data are not categorized in the same manner. Due to this, it is impossible to study safety related analysis such as the accident rates from these data.
- There are no data available for gross vehicle weight and vehicle size in accident or traffic databases. Accordingly, it is difficult to analyze the relationship between the sizes of vehicle and the road accidents.
- Although there is a variety of safety measures addressing goods vehicles, there is no linkage between the statistics of the road accidents and safety measures. Thus, it is difficult to evaluate the effects of these measures. Moreover, there is no information on the characteristics of accident location, such as designated routes or restricted areas.

## c) Starting date of chronological statistics

The answers from the member countries indicate that each country has been maintaining road accident statistics over 30 years. Accordingly, it is possible to chronologically observe the transitions in road accident trends.

## d) Accessibility to database

The answers from the member countries indicate that the database is not accessible enough to the public for data analysis purposes. Further, even research institutions do not have an access to all statistical data in many member countries.

## 2. Status of road safety measures of each country

Various road safety measures are being implemented for goods vehicles in member countries. A list of examples is given below.

## a) Examples of measures employed nation wide

- Large trucks are to keep certain distance between 2 vehicles as a safety distance.
- Speed limit for goods vehicles and articulated goods vehicles.
- Heavy vehicles are to be fitted with speed limiter.
- Special travel permission is required for over weight or over sized vehicles.
- Routes are designated by administrative organization for special vehicles.
- Driving time is limited to maintain driver's physical condition.
- GPS device installation is required for mobile cranes.

## b) Examples of measures taken in urban areas

- Delivery time is restricted for certain hours to avoid peak hours.
- Certain goods vehicles are restricted to access certain parts of urban areas.
- Certain goods vehicles are designated to travel in certain lanes.
- Reduced speed limit for residential areas.
- Parking is restricted for goods vehicles in certain parts of urban areas.
- Goods vehicles are restricted to travel through the city area. Ring roads are designated for through goods vehicles.

- Goods vehicles are restricted to travel downtown areas. When entering for unavoidable reasons, permission is required and goods vehicles must travel on designated routes.
- Goods vehicles are not allowed to park continuously for more than certain hours in urban areas.
- Special on-street zones are reserved for deliveries.
- Loading and unloading space is to be installed to new buildings.

A review of practices for reducing impacts on sensitive environments (natural, population, strategic)

Following the definition used by the UN/ECE, "sensitive environments" are areas in which the ecosystem is particularly sensitive, the geographic conditions and the topography may intensify pollution and noise, or where unique natural resources or cultural heritages exist.

Based on the premise that the construction of roads in environmentally sensitive areas and the traffic that subsequently uses them will give rise to the risk of permanently harming the natural development of these areas, and that heavy goods vehicles pose a major threat to the environment in addition to other risks, a workgroup of C 19 conducted a study called "Freight transport — review of practices for reducing impacts on sensitive environments".

A survey has been conducted among a variety of countries that were asked to describe potential actions and implemented measures aimed at protecting sensitive environments. The countries concerned were also asked to give details concerning potential problems and the difficulties associated with implementing management strategies/monitoring procedures.

The various reported measures may be classified into five categories: technical, functional, financial, structural and transport policy measures<sup>3</sup>, and in effect these mainly take the form of traffic regulations, specifications governing the construction and equipment of motor vehicles, and financial policy decisions. The cited measures range from complete bans to simple lane restrictions, while others in between include minimum or maximum speed limits, compulsory carriage of fire extinguishers, regulations governing the construction of tunnels and bridges, etc. Depending on their intensity, the negative impacts of some of the measures on other public interests vary greatly. Some are extremely difficult, if not impossible, to realise or cannot be adequately monitored by the relevant authorities. In some cases, it is possible to avoid or at least reduce negative impacts by combining certain measures. As a rule, the most efficient effect can be achieved through economic or transport policy measures. In this connection, the measures concerned are usually aimed at preventing the need for goods transport at all, or giving preference to other forms of carriage over road transport.

It appears that the risks posed by heavy goods traffic are basically the same for all types of sensitive environments, and it is the effectiveness of the chosen measures that tends to vary. Although practically all the cited measures may be applied to all types of sensitive environments, the actual choice of measures needs to be varied in order to achieve the desired effect.

A policy of sustainable mobility of freight is intended to ensure a dynamic balance between the promotion of economic efficiency and enhanced social solidarity. It is also to help preserve natural resources and habitats for human beings, animals and plants.

It is therefore important for national governments to take due account of ecological, economic and social dimensions of sustainability when defining their policies. This means constantly weighing up the three key factors of sustainability. The consequences of any foreseen measure have to be carefully analysed and evaluated, and equal attention should be paid to all criteria. It is important that this weighing-up process does not systematically overlook the same key factor and at least takes the minimum requirements and sensitivity of the environment into account.

Since pollutants are carried through the atmosphere, environmental protection is not a localised problem. Areas that are classified as sensitive environments should therefore not simply trace national borders, and any measures — whether single or combined — should be decided together with the governments of neighbouring countries.

Energy consumption - emerging technologies.

Because a lack of human resources, this theme has been dropped.

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<sup>3</sup> reduce the freight traffic volumes or the proportion of road freight transport by promoting other options (e.g. rail transport)

# PUBLICATIONS

## PIARC Journal Routes/Roads

"Measures to protect sensitive environments" by Werner JEGER, Vice-Director of the Swiss Federal Roads Authority (Switzerland). Routes/Roads n°314. II-2002-April.

"The road : key to mobility and the economy" by Wanda DEBAUCHE, Responsible for the Mobility Departement of the Belgium Road Research Center (Belgium). Routes/Roads n°314. II-2002-April

## Publication of congress papers

Apart from the documents prepared for the XXIIst World Congress, the members of Committee C19 have made an active contribution, individually or collectively to the:

Seminar on Strategic Theme 2 : "Road Transport, Liveability and sustainable Development", New delhi (India) 2001/10/7-10

Descriptions of these contributions appear in the published proceedings.

# CONTRIBUTIONS TO NATIONAL AND INTERNATIONAL CONFERENCES

## Events organised by C19

C19 organised, in association with the Hungarian Ministry of Economy and Transport, a seminar at Budapest, on the 25 October 2002. About 50 participants were present when 8 papers on the following topics were discussed:

- Categorisation of logistic platform and their effects;
- Logistic centre in Verona;
- Logistics in Hungary;
- Measure to protect sensitive environment;
- Transport policy and environmental protection
- Freight modal split in the world
- Transport infrastructure in Hungary and 21st century's challenges;
- Mutual impacts between the economy and transport.

The seminar was held in the conjunction with the "Safe roads in the XXIst Century" Conference organised on the 28-30 October by the Hungarian Ministry of Economy and Transport in collaboration with the Hungarian Road Association, Intelligent Transport Systems and Services-Europe (ERTICO) and World Road Association (PIARC/AIPCR).

## Participation of Committee C19 in conferences

Seminar on Strategic Theme 2 : "Road Transport, Liveability and sustainable Development", New Delhi (India) 2001/10/7-10

The seminar took place from 6 to 12 November for the purposes of participating in the International Seminar on Sustainable Development in Road Transport on 8 and 9 November, the meeting of the C4, C10, C14 and C19 Technical Committees<sup>4</sup> and the Coordination Meeting of Strategic Theme 2 "Road transport, liveability and sustainable development" to which the four Technical Committees belong.

The objective of the seminar was to encourage exchanges of ideas, information and methods between engineers, planners, consultants and suppliers on the subject of sustainable development in road transport.

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<sup>4</sup> C 4: Interurban roads and integrated urban transport.  
 C 10: Urban areas and integrated urban transport  
 C 14: Sustainable development and road transport  
 C 19: Freight transport

The seminar was organised jointly by the Indian Road Congress (IRC) and the World Road Association (PIARC), and more specifically by TS 2.

The seminar focused on three themes:

- Theme 1: Road transport technology and energy conservation.
- Theme 2: Social, economic, environmental and safety concerns.
- Theme 3: Sustainable development of road infrastructure.

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« Plan stratégique de l’AIPCR 2000-2003/PIARC Strategic Plan 2000-2003 », rapport AIPCR/PIARC report, Secrétariat Général de l’AIPCR/PIARC General Secretariat, Paris, 2000

XXIst World Road Congress. General report and detailed conclusions, Kuala Lumpur, 1999.

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“Measures to protect sensitive environments” by Werner JEGER, Deputy Director of the Swiss Federal Road Authority (Switzerland). Routes/Roads n°314. II-2002-April.

”The road : key to mobility and the economy” by Wanda DEBAUCHE, Responsible for the Mobility Departement of the Belgium Road Research Center (Belgium). Routes/Roads n°314. II-2002-April

Ministry of Transport and Communications Finland: “Integrated Intermodal Strategies for Road, Rail and Water Transport” – Institute for Highway and Maritime Education (IHME) (PIARC-seminar 22-27 October 2000 in Helsinki) (FIN)

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DATAR : Schéma national des plates-formes multimodales – Réflexions et propositions pour une stratégie de localisation et d’optimisation des terminaux du transport combiné et des plates-formes multimodales de fret (April 1997) (F)

CERTU : Les Espaces Logistiques Urbaines (E.L.U.) – un bilan des initiatives publiques en matière d’Espaces Logistiques Urbains (September 2001) (F)

Freight logistics in Australia: An action agenda – Industry Steering Committee for the Freight Transport Logistics Industry Action Agenda (October 2001) (AU)

Kriterienkatalog für ökologisch besonders sensible Gebiete, Hauptstudie und Anwendungsfall Verkehr, published by the Federal Ministry of Agriculture, Forestry, Environment and Water Management, Austria

Are we moving in the right direction ? – Indicators on transport and environment integration in the EU – TERM – 2000, EEA, Environmental issues series no. 12, Copenhagen

The way to sustainable mobility – cutting the external costs of transport (UIC, 2000)

“Competitiveness of the Hungarian haulers before the joining to EU” by Jozsef PALFALVI (Presentation in Hungarian). Conference “Transport and Communication on the doorstep of accession to EU.” Days of Hungarian Sciences (organised by Hungarian Academy of Sciences), Budapest, 2001.

# **ROAD AND ROAD TRANSPORT OPERATIONS**

Ginny Clarke (United Kingdom)  
ST3 Coordinator

The PIARC Strategic Plan set a new way of organising PIARC's work, co-ordinating the technical work of PIARC under five strategic themes. The strategic themes are based around the issues of importance to road authorities in the 21<sup>st</sup> century and address them in an interdisciplinary manner.

Strategic Theme 3 – *Roads and Road Transport Operations* – comprises five committees: Road Tunnel Operations, Road Safety, Network Operations, Winter Maintenance and Risk Management. The Technical Committees have been working throughout the 2000 – 2003 period on the achievement of their own strategic plans, culminating in these Activity Reports.

The Strategic Theme 3 goal is to “improve the safe and efficient use of the road system, including the movement of people and goods on the road network, while effectively managing the risks associated with road transport operations and the natural environment”.

The five Committees represent a range of issues important to both network operators and transport service providers across the world as diverse as the transportation of dangerous goods through tunnels to the mitigation of the effects of natural disasters.

An important new aspect of the Committees' work has been the introduction of the PIARC Seminar Programme for developing countries. The ST3 Committees have supported this programme with numerous events, including the C18 Risk Management Seminars in Temuco, Chile and Budapest, Hungary and the C5 meeting organised in conjunction with the Ministry of Communications in China.

The Activity Reports are to be presented to the World Road Congress in Durban and discussed at the sessions held for each Committee. The exception to this is the Winter Maintenance Committee whose work has already been presented to the Winter Congress at Sapporo in 2002. A seminar on 'Roads and Road Transport Operations' will address some of the broader themes.

I would like to take this opportunity to thank all the members of the ST3 Technical Committees for their hard work in producing reports, seminars and other products to support the ST3 goal. These provide an invaluable resource and opportunity for sharing knowledge for road engineers and managers across the world.

**ROAD TUNNEL OPERATION  
(C5)**

**Activity Report 2000-2003**

# I. MEMBERSHIP OF C5

The Membership of C5 was as follows during the cycle 2000 – 2003 :

<b>Chairman</b>	Didier LACROIX, Centre d'Etudes des Tunnels, Bron, France
<b>French-speaking Secretary</b>	Willy DE LATHAUWER, Service public fédéral Mobilité et Transport, Belgium
<b>English-speaking Secretary</b>	Alan WEST, Mott MacDonald Group, United Kingdom

## Members (\* indicates a fair participation in the meetings)

<b>South Africa</b>	Eddie VILJOEN, Tollink
<b>Germany</b>	Bernd THAMM, Bundesanstalt für Strassenwesen (1,*) Jürgen KRIEGER, Bundesanstalt für Strassenwesen (2)
<b>Australia</b>	Garry HUMPHREY, Road and Traffic Authority, New South Wales (*)
<b>Austria</b>	Rudolf HORHAN, Federal Road Administration (*) Gerhard EBERL, Austrian Motorway & Expressway Co (*)
<b>Belgium</b>	Jozef VAN GINDERACHTER, Ministerie van de Vlaamse Gemeenschap Pierre SCHMITZ, Ministère de la Région de Bruxelles-Capitale (*)
<b>Canada</b>	John EMERY, John Emery Geot. Eng. Ltd
<b>Croatia</b>	Aleksej DUSEK, Institut Gradevinarstva Hrvatske (*)
<b>Denmark</b>	Jens Veljby THOMSEN, Danish Road Directorate (*)
<b>Spain</b>	Rafael LOPEZ-GUARGA, Ministerio de Fomento (*) Manuel ROMANA RUIZ, Ingeotec (*)
<b>USA</b>	Anthony CASERTA, Federal Highway Administration (*)
<b>European Commission</b>	Bernd THAMM, General Directorate TREN (3)
<b>France</b>	Yves DARPAS, Setec – Tpi (*) Bernard FALCONNAT, Scetauroute
<b>Greece</b>	Dimitrios NIKOLAOU, Ministry of Environment, Planning & Public Works Georgios ZIAKAS, Egnatia Odos (*)
<b>India</b>	P L BONGIRWAR, Maharashtra State Road Development Corp
<b>Iran</b>	Morteza GHAROUNI – NIK, Ministry of Road & Transportation
<b>Italy</b>	Bernardo MAGRI, c/o Sitaf Spa
<b>Japan</b>	Toshinori MIZUTANI, Advanced Construction Technology Center (*)
<b>Norway</b>	Karl MELBY, Staten Vegvesem (*)
<b>Netherlands</b>	Jelle HOEKSMAN, Rijkswaterstaat, Bouwdienst Evert WORM, Rijkswaterstaat, Bouwdienst (*)
<b>Poland</b>	Marek MISTEWICZ, General Directorate for Public Roads
<b>Portugal</b>	Mario OLIVIERA, Departamento Projectos e Apoio Technico (*)
<b>UK</b>	Robert FORD, Highways Agency (*) Martin MORRIS, Hyder Consulting Ltd.
<b>Slovakia</b>	Martin BAKOS, Vahostav Tunely
<b>Sweden</b>	Bernt FREIHOLTZ, Swedish National Road Administration (*)
<b>Switzerland</b>	Andreas HOFER, Office Fédéral des Routes (*)
<b>Czech Republic</b>	Jaromir ZLAMAL, POHL a.s.

(1) : until 30.09.2001

(2) : from 01.11.2002

(3) : from 01.10.2001

**Associated members**

<b>Spain</b>	Ignacio DEL REY
<b>USA</b>	Arthur BENDELIUS, Parsons Brinckerhoff (*)
<b>Greece</b>	Christos TSATSANIFOS, Pangaea Cons. Eng.
<b>Italy</b>	Salvatore GIUA
<b>Norway</b>	Oivind SOVIK, Public Road Administration (*)
<b>UK</b>	John POTTER, TNS, North Wales (*)
<b>Switzerland</b>	Urs WELTE, Amstein + Walthert AG (*)

**Corresponding members**

<b>Algeria</b>	B. MAHFOUD, Agence Nationale des Autoroutes
<b>Canada</b>	Alexandre DEBS, Ile de Montreal Denis DOMINGUE, Ile de Montreal Ceri HOWELL, Armtec
<b>Chile</b>	R. RAMIREZ, National Road Directorate
<b>China</b>	BI Renzhong, Academy of Transportation Sciences
<b>Finland</b>	Olli NISKANEN, Finnish National Road Administration
<b>Israel</b>	Uzi CARMEL, Public Works Dept Alex SAGY, Public Works Dept
<b>Japan</b>	Hideto MASHIMO, Public Works Research Institute
<b>Madagascar</b>	M. RABENATOANDRO, Ecole supérieure polytechnique
<b>Mexico</b>	Enrique LAVIN, Cotriza
<b>Slovenia</b>	Anton MARINKO, Druzba za Drzavne Ceste
<b>Switzerland</b>	Hans Rudolf SCHEIDEGGER, Ingenieur – Unternehmung AG
<b>Thailand</b>	Nopadol PRAPAITRAKUL, Location & Design Bureau

**Affiliated members**

ITA	Claude BERENGUIER, Secretary General
ITU	Soren RASMUSSEN, Head of Technical Affairs

## II. WORK PROGRAMME AND ORGANIZATION

Since its creation in 1950, the Committee on Road Tunnels has concentrated its activities on the fields of internal design, safety of users, equipment, operation and environment of road tunnels. It has voluntarily excluded from its activities the subjects concerning construction, repair and maintenance of structures, which are dealt with by the International Tunnelling Association ITA-AITES, with which a good cooperation is maintained.

The fires which occurred in 1999 in European tunnels have brought PIARC to put two points forward :

1. the importance of the operation of road tunnels, which has led to changing the name of the Committee from "Road Tunnels" to "Road Tunnel Operation";
2. the role of human behaviour in safety, especially in case of fire, by the creation of a working group specifically devoted to this subject.

In this context, the Committee has set up the programme described below. As before, it is distributed between several working groups, which prepare the reports that the Committee will discuss and finally approve.

### WG n° 1 - Operation

**Leader :** O. SOVIK (Norway)

**Members :**

J. KRIEGER, Germany  
H. WIESER, Austria  
J.V. THOMSEN, Denmark  
L. ESPINOZA, Spain  
S. LUCHIAN, USA  
J.C. MARTIN, France  
M. TROPIANO, Italy

T. IWASAKI, Japan  
E. NORSTROM, Norway (secretary)  
P. FOURNIER, the Netherlands  
R. FORD, UK  
P. ANDERSSON, Sweden  
H.R. SCHEIDEGGER, Switzerland

Programme

1. Complete the work to produce a Best Practice Manual
2. Continue the work on management systems
3. In service structures : life expectancy of tunnel equipment
4. Training of operational staff.

## **WG n° 2 - Pollution, Environment, Ventilation**

**Leader:** Y. DARPAS (France)

**Members:**

D. TETZNER, Germany	H. BIOLLAY, France
G. HUMPHREY, Australia	R. ARDITI, Italy
A. DIX, Australia	V. FERRO, Italy
P. STURM, Austria	C. BARBETTA, Italy
J. RODLER, Austria	S. GIUA, Italy
E. JACQUES, Belgium	K. IWAI, Japan
G.W. KILE, USA	J.E. HENNING, Norway
E. ALARCON ALVAREZ, Spain	H. HUIJBEN, the Netherlands
R. LOPEZ GUARGA, Spain	W.G. GRAY, UK
I. DEL REY, Spain	F. ZUMSTEG, Switzerland
V. CARRASCO ARIAS, Spain	A. JEANNERET, Switzerland
C. MORET, France	J. ZAPARKA, Czech Republic

**Programme:**

1. Update on equipment and techniques to deal with pollution in tunnels and at portals
2. Improvement of ventilation sizing and efficiency.

## **WG n° 3 - Human Factors of Safety**

**Leader:** B. THAMM (European Commission, formerly Germany)

**Members:**

O. LUDWIG, Austria	M. PERARD, France
W. DE LATHAUWER, Belgium	E. WORM, the Netherlands
M. ROMANA RUIZ, Spain	M. MARTENS, the Netherlands
M. VARA MORAL, Spain	Y. SCHREIER, Switzerland
G. ARNAUDET, France	W. STEINER, Switzerland

Note : Two of the members are psychologists, one is a lawyer.

Programme:

1. Information/communication problems between tunnel users and tunnel operators
2. Information/communication problems between fire brigades / rescue teams / police and tunnel operators
3. Training.

## **WG n° 4 - Communication Systems and Geometry**

**Leader:** U. WELTE (Switzerland)

**Members:**

W. BALTZER, Germany  
G. EBERL, Austria  
J. HOLST, Denmark  
J. ALMIRALL, Spain  
J. BURACZYNSKI, USA  
J.P. MIZZI, France  
B. MAGRI, Italy

H. FUJIKAWA, Japan  
H. BUVIK, Norway  
B. RIGTER, the Netherlands  
M. KELLY, United Kingdom  
T. ROCK, UK (secretary)  
T. BERGH, Sweden  
A. HOFER, Switzerland

Programme

1. Data on effective communication for in-service facilities
2. Harmonisation of I/C techniques
3. Standardisation of geometry
4. Reduction of size of signalling panels in tunnels
5. Adaptation and improvement of in-service facilities
6. Communication techniques for incident management.

## WG n° 5 - Dangerous Goods

**Leader:** J. POTTER (UK)

**Members:**

G. HUNDHAUSEN, Germany  
A. DEBS, Canada  
I. DEL REY, Spain  
R. LOPEZ GUARGA, Spain  
A. CASERTA, USA  
P. CASSINI, France  
M. PERARD, France  
P. PONS, France

A. SARAMOURTSIS, Greece  
A. TUMBIOLO, Italy  
H. MASHIMO, Japan  
J. HOEKSMAN, the Netherlands  
R. HALL, UK  
J. HANSEN, Sweden  
D. GILABERT, Switzerland

**Programme**

Follow-up on the conclusions of the joint OECD/PIARC research project ERS2 on "Transport of Dangerous Goods through Road Tunnels".

The designated outputs for WG5 include :

- Validation and dissemination of the ERS2 project results
- Follow up of the policy aspects (in liaison with UN and UNECE)
- Support to the users of the tools produced by the ERS2 project: Quantitative Risk Assessment Model (QRAM) and Decision Support Model (DSM)
- Continuing support and development of the tools
- Review of the existing work on the "Cost Effectiveness of Risk Reduction Measures" for new tunnels and tunnels in operation

## WG n° 6 - Fire and Smoke Control

**Leader:** A. BENDELIUS (USA)

**Members:**

W. FOIT, Germany  
A. HAACK, Germany  
D. TETZNER, Germany  
A. DIX, Australia  
R. HORHAN, Austria  
K. PUCHER, Austria  
P. STURM, Austria  
N. BADEN, Denmark  
B. CELADA, Spain  
S. ESTEFANIA, Spain  
F. HACAR, Spain  
A. CASERTA, USA  
M. JARVINEN, Finland  
E. CASALE, France  
A. VOELTZEL, France

R. ARDITI, Italy  
C. BARBETTA, Italy  
C. BARTOLI, Italy  
G. GECHELE, Italy  
B. MAGRI, Italy  
A. SORLINI, Italy  
A. TUMBIOLO, Italy  
H. MASHIMO, Japan  
H. HUIJBEN, the Netherlands  
H. BUVIK, Norway  
K.I. DAVIK, Norway  
N. RHODES, UK (secretary)  
B. FREIHOLTZ, Sweden  
M. ALLEMAN, Switzerland  
I. RIESS, Switzerland

**Programme**

1. Lessons from past disasters (including database of fires)
2. Safety concept for tunnel fires (objectives; design scenarios)
3. Structures resistance to fire (objectives; design fires)
4. (Semi-) transverse ventilation (design and operation)
5. Emergency exits (characteristics; spacing)
6. Fire specific equipment (automatic fire detection; fixed fire suppression systems)
7. Fire response management (fire drills; users' behaviour)
8. Operation / control of emergency ventilation systems.

### III. MEETINGS

The Committee C5 successively met in :

- Paris (France), on 01-02.03.2000, at the initiative of PIARC
- Vienna (Austria), on 29-30.06.2000, at the invitation of the Austrian members
- Hamburg (Germany), on 19-20.10.2000, at the invitation of the German member
- Jaca (Spain), on 07-08.06.2001, at the invitation of the Spanish members
- Ionnanina (Greece), on 19.09.2001 at the invitation of the Egnatia Odos motorway company, which gave the opportunity for a seminar devoted to the safe operation of the Egnatia Odos tunnels
- Vina del Mar (Chile), on 22-23.04.2002, at the occasion of a locally coorganised PIARC Seminar
- Beijing (China), on 04-05.11.2002, at the occasion of a locally coorganised PIARC Seminar
- Stockholm (Sweden), on 22-23.05.2003, at the invitation of the Swedish member

Two of these meetings were held in connection with seminars organised in developing or transition countries:

1. An International Seminar on Road Tunnel Operation was co-organised with the Ministry of Public Works of Chile on 24-26 April 2002 in Vina del Mar.
2. An International Seminar on Tunnel and Road Technology was coorganised with the Ministry of Communications of the People's Republic of China on 6-8 November 2002 in Beijing.

The six working groups held the following meetings, independently of the Committee:

- WG n°1 : Paris (31.03.2000), Oslo (14-15.09.2000), Lyon (01-02.03.2001), London (13.09.2001), Brussels (17-18.01.2002), London (27-28.06.02), Paris (03-04.10.2002), Paris (23-24.01.2003)
- WG n°2 : Paris (13.10.2000), Neuchâtel (09-10.04.2001), Lyon (01-02.10.2001), Graz (11-12.04.2002), Bad Ragaz (17.09.2002), Torino (22-23.01.2003), Amsterdam (11-12.04.2003)
- WG n°3 : Bergisch Gladbach (29-30.05.2000), Nice (21-22.09.2000), Vienna (17-18.05.2001), Göschenen (04-05.10.2001), Madrid (30-31.05.2001), Amsterdam (03-04.10.2002), Brussels (11-12.02.2003), Trondheim (12-13.06.2003)
- WG n°4 : Croydon (4-5.05.2000), Utrecht (28-29.09.2000), New York (05.2001), Gothenborg (27-28.09.2001), Chamonix (03.2002), Berlin (09.2002),

WG n°5 : Madrid (18.07.2001), Utrecht (12.11.2001), London (07.03.2002), Thessaloniki (17.10.2002), ( 04.2003), ( .09.2003) ; specific meetings were held for the QRA and DS Models, the final one having been in Paris on 29.01.2002

WG n°6 : Lyon (25-26.05.2000), Helsinki (14-15.12.2000), Madrid (06.04.2001), Essen (04-05.10.2001), Graz (11-12.04.2002), Bad Ragaz (17.09.2002), Torino (22-23.01.2003), Amsterdam (11-12.04.2003).

It has to be quoted that Working Groups n° 2 and 6 met together in Graz (12.04.2002), Bad Ragaz (09.2002), Torino (01.2003) and Amsterdam (04.2003), in order to coordinate their work and produce a joint report.

## IV. RESULTS OF THE WORK

In addition to the own activities of the Committee and its working groups, a number of activities were led in cooperation with other entities and resulted in specific productions.

### A. Activities of the Committee C5 and its Working Groups

The Introductory Report for the C5 session at the Durban congress present the activities and results of the committee and working groups.

### B. Common activities with other entities

OECD (Organisation for Economic Co-operation and Development)

A joint research project on the “Transport of dangerous goods through road tunnels” was launched by OECD and PIARC in 1995 and funded by a number of countries worldwide as well as the European Commission. The final report was issued in 2001 as a common publication of OECD and PIARC; the final versions of the models on quantitative risk analysis and decision support, developed under the project, were delivered separately in 2003.

ITA (International Tunnelling Association)

During the previous cycles, an agreement had been reached between PIARC and ITA for a co-operative effort regarding tunnel structures resistance to fire. This co-operation was conducted between PIARC’s Working Group No. 6 “Fire and Smoke Control” and ITA’s Working Group No. 6 “ Repair and Maintenance”.

UN ECE (United Nations Economic Commission for Europe)

In 2000, the Economic Commission for Europe of the United Nations (Geneva – 55 European countries) set up a Multidisciplinary Group of Experts on Safety in Tunnels and asked PIARC to take part. A majority of the experts were C5 members, whose role was essential in the preparation of the final report on safety of road tunnels, issued in December 2001. This report will play an important role in the future, as it provides the basis for possible changes in the European agreements concerning e.g. signing, transport of dangerous goods, etc., in order to take into account the specificities of safety in tunnels.

## EC (European Commission) activities for tunnel users' information

Working Group No. 3 of C5 had prepared recommendations for the behaviour of non-professional tunnel users. These recommendations have been improved by the aforementioned UN ECE group of experts and finally published and distributed as leaflets by the European Commission (Directorate General Transport and Energy) inside the 15 member countries. These leaflets, entitled "Safe driving in road tunnels", can be also be published out of the European Union and in other languages, if requested by interested countries.

A specific leaflet for professional drivers (trucks, busses, coaches) has been prepared and should be published and disseminated in the same way.

## EC (European Commission) activities for research

Further to the dramatic fires in the Mont Blanc and Tauern tunnels in 1999, the European Commission (Directorate General Research) has included the topic of tunnel safety in its 5<sup>th</sup> and 6<sup>th</sup> framework programmes for research and development. The following thematic networks and research projects have been funded, and have strong links with C5.

## FIT (Fires in Tunnels)

The European thematic network FIT (Fire in Tunnels) has been launched in 2001 and will run for at least 4 years. The objective is to assist in the forming of an European consensus on fire safety in tunnels and facilitate the exchange of knowledge gained from current practice and research. The FIT network has 33 partners from 12 European countries and also has strong links with most relevant European organisations and research projects. Several members of C5 and its Working Group 6 on Fire and Smoke Control are members / chairman of the Steering Committee of FIT and ensure the liaison between C5 and FIT.

## UPTUN (UPgrading of existing TUNnels)

UPTUN is a very large research project, which was launched in September 2002 to investigate cost-effective, sustainable and innovative upgrading methods for fire safety in existing tunnels. It will last 4 years. Several members of C5 and its Working Group 6 on Fire and Smoke Control are members of the Steering Board of UPTUN and ensure the liaison between C5 and UPTUN.

## SAFE T

SafeT is an European thematic network on safety in tunnels, launched in 2003 in order to develop European guidelines for the safety of existing tunnels. The work plan includes four themes: prevention and detection of incidents or accidents, consequence mitigation of incidents and accidents, post accident investigation and evaluation, harmonised risk assessment. The Steering Committee of SafeT includes members of C5 and proper liaison is being organised.

## C Publications

The work of C5 and its working groups resulted in various productions:

- PIARC reports,
- Articles in Routes/Roads,
- Presentations at the seminars co-organised in Greece and in developing and transition countries (Chile, China) – see at “Meetings” above,
- Presentations at the Durban sessions organised or co-organised by C5 (C5 main session, special session on “Safety in Road Tunnels”, additional C5 sessions on “Fire Safety and Ventilation of Road Tunnels” and “Road Tunnel Operation and Transport of Dangerous Goods”).

Publications on the following topics were prepared during the cycle 2000-2003 as PIARC reports and articles in Routes/Roads:

### PIARC Reports

- Pollution by Nitrogen Dioxide in Road Tunnels (published in 2000)
- Cross section geometry in uni-directional road tunnels (published in 2001)
- Traffic Incident Management Systems used in Road Tunnels (to be published in 2003)
- Best Practice Manual for Road Tunnel Operation (to be published in 2004)
- Vehicle Pollutant Emissions for Tunnel Ventilation Sizing (to be published in 2004)
- Risk Reduction Measures relating to the passage of dangerous goods through road tunnels (to be published in 2004)
- Systems and equipment for fire and smoke control in road tunnels (to be published in 2004)
- Cross section geometry in bi-directional road tunnels
- Lay-bys and SOS stations in road tunnels

## Routes-Roads

- Human Factors of Road Tunnel Safety – Behaviour of Tunnel Users
- Results of the Joint OECD-PIARC Research Project on the Transport of Dangerous Goods through Road Tunnels
- Lessons from the recent fire disasters in Europe
- Requirements for Fire Resistance of Tunnel Structures (together with ITA in Tunnelling and Underground Space Technology)

**ROAD SAFETY  
(C13)**

**Activity Report 2000-2003**

In this summary report, planned and executed activities are reported as well as providing some suggestions for better operation of PIARC Committees and in support of the Durban Conference.

Work Plan, draft a report for the PIARC Durban Conference on:

- RSA: Evaluation, benchmarking and promotion
- Design standards: Integration of the results of research on behaviour
- Evaluation methods of safety concepts
- Enforcement: tools and measures
- Education targeted on developing countries
- Produce a Safety Booklet for politicians (added later)
- Finalise the Road Safety Manual

## COMMITTEE ACTIVITIES, EXECUTED AND PLANNED

February 2000	Paris constituting meeting
June 2000	Brussels first Committee meeting, and start of the work plan
October 2000	Budapest Meeting and PIARC sponsored Conference the week after
September 2000	Durban, PIARC Council Seminar Road Safety (voting) session
April 2001	Brno Committee Meeting
June 2001	PIARC sponsored session at IRF World Conference.
November 2001	Oviedo Meeting with National Spanish Road Safety Conference
April 2002	Berlin Meeting with National German Road Safety Conference
June 2002	Bangkok, restricted meeting, Safety Conference with C3/C11
Oct. 28-30 2002	Budapest, PIARC sponsored International Road Safety Conference
August 2002	Geneva, Participation in WHO Meeting for World Health Day 2004
November 2002	Rotterdam Committee Meeting with focus on Dutch Safety Concepts
April 2-3, 2003	Mexico Traffic and Safety Conference with C13 representation
April 22-25 2003	Lisbon Committee Meeting and National Safety Seminar
October 2003	Durban, PIARC World Conference

When the Committee meets, the schedule is in general: first morning: general matters, afternoon: 6 working groups meet, next morning: general summing up and discussion, afternoon: general exchange, special item or excursion. There is a good presence, two active secretaries, an active vice chair, large and well spread and numerous representation (Malaysia, Cuba, New Zealand, Mexico, etc) and active members in the working groups.

### **Products of the Committee so far**

- Three articles in Routes/Roads
- Publication on Road Safety Audits
- Presentations on about 10 (inter) national conferences on behalf of PIARC , being actively involved in the organisation in 3 of them.
- Booklet on road safety for Ministers and high level decision makers with GRSP/DFID, presented June 2002 in Bangkok,
- Draft Road Safety Manual, to be issued on CD-ROM in a beta or zero version in 2003

### **Durban Activities Proposed by C 13**

- Sunday noon: Committee Meeting
- Monday am: Ministers meeting with the Road safety Booklet on the agenda
- Monday pm: Innovations in Road Safety with IRF and organisations,
- Tuesday am: Road safety in developing countries (with C 3 and GRSP)
- Tuesday pm: Strategic Theme 3, in which Road safety is integrated.
- Thursday pm: C13 Plenary session, including the results of the previous sessions.

On the CD ROM for individual papers there will be over 30 papers reviewed by C 13 on road safety, which are a basis of inspiration for the safety activities.

# COMPOSITION OF C13

Peter Elsenaar (Chairman), (Netherlands)  
Hans Joachim Vollpracht, (Vice Chairman), (Germany)  
Michel Labrousse, (French-speaking Secretary), (France)  
Malcolm Read, (English-speaking Secretary), (United Kingdom)  
Ian Appleton (Australia)  
Larus Agustsson (Denmark)  
Carl Belanger (Canada-Quebec)  
Jacques Boussuge (France)  
Joao P Lourenco Cardoso (Portugal)  
Atze Dijkstra (Netherlands)  
Rob Eenink (Netherlands)  
Andreas Gantenbein (Switzerland)  
Abel Martinez Gomez (Cuba)  
Miguel Angel Gomez (Mexico)  
Ada Lia Gonzalez (Argentina)  
Krzysztof Kowalski (Poland)  
Roberto Llamas (Spain)  
Stein Lundebye, World Bank  
Josef Mikulik (Czech Republic)  
Mary M Moehring (United States)  
Jamilah Mohd Marjan (Malaysia)  
Izumi Okura (Japan)  
Tomaz Pavcic (Slovenia)  
Michel Peeters (Belgium)  
Monica Colas Pozuelo (Spain)  
Hubrecht Ribbens (South Africa)  
Yves Robichon (France)  
Sandro Rocci (Spain)  
Carlos de Almeida Roque (Portugal)  
Armand Rouffaert (Belgium)  
Randy Sanderson (Canada)  
Jose Lisboa Santos (Portugal)  
Pierangelo Sardi (Italy)  
Susanna Simonova (Italy)  
Anneli Tanttu (Finland)  
Alberto Todaro (Italy)  
Ole Torpp (Norway)  
Hubert Treve (France)  
Peter Vasi (Hungary)  
Marion G Waters (United States)  
Eddy Westdijk (Netherlands)  
Stuart Yerrell (United Kingdom)

## **Expert Contributors**

Goff Jacobs (United Kingdom)  
Phillip Jordan (Australia)

**NETWORK OPERATIONS  
(C16)**

**Activity Report 2000-2003**

# OVERVIEW OF C16

In the period from 1996 to 1999, Technical Committee 16 (C16) was named Intelligent Transport and focused on ITS (Intelligent Transportation Systems) publishing the "ITS Handbook 2000" which addressed issues such as:

- 1) ITS requirements, services, and architectures,
- 2) Evaluation methods and results from various countries,
- 3) Institutional issues encountered throughout the world, and
- 4) The application of ITS in economies in transition and developing countries.

In the period, 2000 to 2003, Technical Committee 16 was renamed Network Operations and with this, expanded its focus towards operating the road network. The transition between the two topics was fluid, Network Operations being the objective or strategy and Intelligent Transportation Systems being one of the tools to deliver this strategy.

The Committee is active in collecting and correlating an impressive body of information on Network Operations which will be synthesized in a handbook, the Road Network Operations Handbook, to be published in 2003. This Handbook is proposed to be adopted as 'guidelines' or 'best practices' in many countries. It discusses the following:

- The shift in network operations from the traditional building and maintaining of the road network to a service oriented policy towards the road user,
- The road network operators missions and user services,
- ITS solutions for network monitoring, maintaining road serviceability and safety, traffic control, travel aid and user information and demand management,
- The institutional and organizational aspects of network operations, and
- Performance indicators for network operational performance.

The following report lists the activities and products of C16 over the period 2000-2003.

# LIST OF C16 MEMBERS

The following is a list of all the C16 members who have either participated in C16 activities or contributed to the drafting of C16 products during the period 2000-2003. The list includes full members, corresponding members and associate members. The members are listed with the country that they represent.

<b>C16 Member</b>	<b>Country</b>
Sandra SULTANA (Chairperson)	Canada-Québec
Catherine SOUSSAN (French Secretary)	France
James L. WRIGHT (English Secretary)	United States
Ramiz AL-ASSAR	World Bank
Johann ANDERSEN	South Africa
Victor AVONTUUR	Netherlands
Ernesto BARRERA GAJARDO	Chile
Mustapha BELGUESSAB	Algeria
Terry BROWN	New-Zealand
Nick CARTER	United Kingdom
Jean-Marc CHAROUD	France
Chequer Jabour CHEQUER	Brazil
Kan CHEN	United States
Martial CHEVREUIL	France
Robert CONE	United Kingdom
Dorin DUMITRESCU	Romania
Raymond FEVRE	France
Sérgio FINO	Portugal
Roberto J. LUIS FONSECA	Cuba
Janusz FOTA	Poland
John GOODAY	United Kingdom
Constantin GRIGOROIU	Romania
Tore HOVEN	Norway
Ir. Md. Salleh ISMAIL	Malaysia
Ralph JONES	Canada
Susanne JUDMAYR	Austria
Tsuneo KATO	Japan
Miroscav KELLER	Croatia
Eric KENIS	Belgium
Joseph M. KOP	Israel
Finn KRENK	Denmark
BEN-ZION KRYGER	Israel
Christian LAMBOLEY	France
Luc LEFEBVRE	Canada-Québec
Agnes LINDENBACH	Hungary
Jeffery LINDLEY	United States
Yvon LOYAERTS	Belgium
John MILES	United Kingdom

Olivier MOSSE	Belgium
Ilpo MUURINEN	Finland
Makoto NAKAMURA	Japan
Yuriy OSYAYEV	Ukraine
Anne PELLETIER	Canada-Québec
Bob PETERS	Australia
Gerhard PETERSEN	Switzerland
Willie PIENAAR	South Africa
Pavel PRIBYL	Czech Republic
Nirina RAJOELIHARISON	Madagascar
Matthias RAPP	Switzerland
Michel RAY	France
T. S. REDDY	India
Santiago RICO	Mexico
Antonio Manuel RODRIGUES	Portugal
Maurizio ROTONDO	Italy
Martin ROWELL	Germany
Agustin SANCHEZ-REY	Spain
Tibor SCHLOSSER	Slovakia
Claudio Augusto SOARES DE ANTRADE	Brazil
Alex VAN NIEKERK	South Africa
Auke W. VELEMA	Netherlands
Charles VORSTER	South Africa
Paul VORSTER	South Africa
Per WENNER	Sweden
Richard WILLSON	United Kingdom
Hiroo YAMAGATA	Japan
Heinz ZACKOR	Germany

# C16 WORK PROGRAMME AND ORGANIZATION

For the period 2000-2003, C16 is chaired by Sandra Sultana, Director of Office of Public Private Partnerships of the Quebec Ministry of Transportation (Canada-Quebec). The French-speaking secretary is Catherine Soussan of SETRA (France) and the English-speaking secretary is James Wright of the Minnesota Department of Transportation (United States).

C16 is organized according to four main work areas listed:

1. Network Operations: definition, missions, fields, tasks and measures
2. ITS Solutions
3. Institutional and Organizational Issues
4. Performance Assessment.

Each work area has a team leader in charge of gathering and compiling information from team members. The information gathered in each of the areas is synthesized into a handbook, the Road Network Operations Handbook, which is scheduled to be published in 2003.

# C16 PUBLICATIONS

The major product being developed by C16 during the 2000-2003 period is the Road Network Operations Handbook. The handbook focuses on the “soft” engineering approaches/tools available to the network operator to improve network operations.

Various case studies from around the world were collected and incorporated in the handbook to provide the reader with practical examples. The information gathered and presented in the Road Network Operations Handbook will be helpful to transportation professionals and transportation decision-makers in highway authorities, in considering how to optimize and improve the road network’s performance and in such, better serve our customers, the road users. An operations focus will also ensure the development of sustainable transport, providing mobility while avoiding negative environmental impacts.

The Road Network Operations Handbook is structured into six chapters:

1. Road Network Operations – Introduction
2. Road Network Operations – Challenges, Fields and Missions
3. Road Network Operations - Tasks and Measures
4. ITS Solutions
5. Institutional and Organizational Aspects of Road Network Operations
6. Performance Indicators for Road Network Operational Performance.

Further, throughout this Handbook, five main fields have been identified in relation to road network operations and each chapter, except for the Chapter 6, has been organized correspondingly:

- network monitoring
- viability and safety maintenance
- traffic control
- travel aid and user information
- demand management.

Besides the Road Network Operations Handbook, C16 also undertook to update the ITS Handbook 2000, produced in the last term (1996-1999) of C16. The work is contracted out to the editors of the original version and funding is insured through external sponsorship. Input for the updated version is provided by C16 members. Members from C16 also form the editorial board of the Handbook. The final draft of the revised version of the ITS Handbook will be available in October 2003 with the published version available in spring 2004.

Other publications coming out of PIARC C16 during 2000-2003 include the following papers in the Routes/Roads magazine:

1. N°308 : “Network Operations – Issues and Tasks for the Technical Committee on Network Operations” – October 2000
2. N°314: “ITS-based Transport Management Strategies in Switzerland” - April 2002
3. N°317: “Network Operations and Telematics Activities in Central and Eastern Europe” – January 2003

# C16 MEETING AND EVENTS

C16 convenes twice a year to discuss past, present and future C16 activities. Besides discussing Committee activities, these meetings usually include breakout work sessions for discussions on the Road Network Operations Handbook and technical tours in the host country. From 2000 to 2003, the following C16 meetings occurred:

- June 2000 in Montreal (Canada)
- October 2000 in Torino (Italy), during the 7<sup>th</sup> ITS World Congress
  
- May-June 2001 in Prague (Czech Republic) in conjunction with the Seminar “ITS Prague 01”
- October 2001 in Sydney (Australia), during the 8<sup>th</sup> ITS World Congress
  
- April 2002 in Liege (Belgium)
- October 2003 in Chicago (United States), during the 9<sup>th</sup> ITS World Congress
- April 2003 in Mexico City (Mexico) in conjunction with the Seminar on “Roads into the Future”
- October 2003 in Durban (South Africa) during the PIARC XXII<sup>nd</sup> World Road Congress

C16 has maintained a very visible presence at each of the past two ITS World Congresses. The ITS World Congress in Sydney and in Chicago both had specific sessions covering C16 activities.

## **Presentations at Technical Session #129 in Sydney**

- “C16 Activities” by Sandra Sultana
- “*A Network Operator’s View of Services*” by Jim Wright and John Gooday
  
- “*Choosing ITS Solutions for Services*” by John Gooday
  
- “*ITS Solutions Survey*” by Heinz Zackor
- “*PIARC Survey Synthesis on Traffic Control*” by Jean-Marc Morin, Michel Ray and David Clowes.

## Presentations at Discussion Session # DS10 in Chicago

- “C16 Activities” by Sandra Sultana
- “*Network Operations from a South African Perspective*” by Alex Van Niekerk
- “*ITS & Network Operations for Transitional Countries and Emerging Economies*” by Martial Chevreuil
- “*ITS in Brazil: The Challenges for a Deployment*” by Chequer Jabour Chequer

C16 was also very active in organizing the Seminars in Prague and Mexico City. Specific sessions were set aside to discuss Network Operations and presentations included the following:

### In Prague

- “*ITS Trends in the USA*” by Jeffery Lindley
- “*PIARC C16 Activities*” by Sandra Sultana
- “*Network Operator’s Role and Mission*” by Maurizio Rotondo
- “*Services and ITS*” by Makoto Nakamura
- “*ITS Applications in Germany*” by Heinz Zackor
- “*Network Operations: Eastern European Perspective*” by Tibor Schlosser
- “*ITS and Countries in Transition*” by Michel Ray
- Workshop on ITS and Network Operations in Countries in Transition (half day workshop)

### In Mexico City

- “C16 Activities” by Sandra Sultana
- “*Incident management*” by John Miles
- “*Speed Harmonization*” by Eric Kenis
- “*Freight and border crossings*” by Jeffery Lindley

For the Congress in Durban, C16 is coordinating or participating in the coordination four sessions:

1. Strategic Theme 3 session
2. Session on “Innovations”
3. C16 session
4. Session on an “*Automotive Industry Review and Update*” in collaboration with FISITA (Fédération Internationale des Sociétés d’Ingénieurs des Techniques de l’Automobile)

The C16 session will include the following presentations:

- Network Operations Committee - Activities Report
- A Balanced Network Operations Strategy – The Western Australia Case
- The Feasibility of ITS as a Tool for Improved Network Operations for Freeways in South Africa
- Demand Management through Road Pricing – Case studies in London and Trondheim
- The Swiss Distance Related Heavy Vehicle Fee – A Novel Approach to Area-Wide Road Charging
- Traveller Information Services in Europe
- The benefits of traffic forecast and travel time estimation for drivers and network operators
- Applying Intelligent Transportation Systems in developing and transitional countries
- Network Operations Committee – Future Actions

**WINTER MAINTENANCE  
(C17)**

**Activity Report 2000-2003**

# 1. OVERVIEW

Succeeding activities of its forerunner ad hoc committee G1, the C17 has started as a permanent Committee engaged in winter road issues. In addition to the conventional mission of making preparations for an International Winter Road Congress, its scope includes winter-road related information exchange, technology development, and support for developing and transitional countries.

# 2. ORGANIZATION OF C17

As listed in the appendix, it consists of 45 members from 29 countries and they have worked for development of the technical programme, review and selection of papers presented at the XIth International Winter Road Congress 2002.

They contributed to the technical sessions operation as Chairpersons and Co-Chairpersons to support active exchange of views between presenters and congress participants.

# 3. THE PIARC XI<sup>TH</sup> INTERNATIONAL WINTER ROAD CONGRESS, JANUARY 2002, SAPPORO, JAPAN

The XI<sup>th</sup> International Winter Road Congress 2002 was the first Congress in the 21<sup>st</sup> Century and also the first one held in Asia. Its theme was New Challenges for Winter Road Service under which the following six topics were set. At the Congress, 169 papers from 27 countries were presented.

Congress topics:

1. Winter Road Policies and Strategies
2. Snow and Ice Management, and Its Costs
3. Winter Road Issues and Traffic Safety in Urban Areas
4. Environment and Energy
5. Telecommunications Technology
6. Development of Snow-Removal and Ice-Control Technology

### 3.1. Review of the Technical Session and expectations for the next International Winter Road Congress

Achievements of the Congress are summarized below.

The sessions were held in relation to the six topics. Both the oral and the poster presentation sites saw active presentations and discussions on issues relevant to winter roads. Useful information has been exchanged on winter road maintenance among participants.

#### Importance of winter road maintenance

Winter road maintenance is obviously indispensable in securing winter traffic safety and keeping economic and living activities in good condition.

In the past century, winter road service has been improved to satisfy the needs of road users as much as possible. However, issues have come to be recognized, such as budgetary constraints including limited expenses for personnel and machinery, the pollution of groundwater, and damage to the roadside vegetation caused by anti-freezing agents.

In the new century, we must find solutions to these issues that are confronting us. The general theme of the Congress was **"New Challenges for Winter Road Service"**. Through paper presentations and discussions, goals were identified regarding four winter road maintenance issues that relate to this theme.

The first issue comprises traffic safety, service level, and cost reduction.

How traffic safety and sufficient road service levels are ensured is an age-old concern. Although safer traffic and higher service level are desirable, costs should be considered. In addition, prioritisation of necessary services is also required.

To ensure traffic safety and a good service level, the provision of appropriate information on road surface conditions, traffic, and weather is significant. And, it will contribute to reducing the costs of winter road maintenance.

The second item was reduction of adverse effects on the environment.

Winter road maintenance has the following adverse impacts on the environment.

- Pollution of roadside soil and vegetation, and of groundwater caused by anti-freezing agents, particularly by chlorides;
- Dust produced by studded tires;
- The emission of greenhouse gases generated by the combustion of fossil fuels for road heating and snow removal.

Continued focus should be put on the reduction of adverse effects on the environment, on environmental conservation policies, and on the assessment of these policies' effects.

The third one is public-private partnership.

It is not just road administrators who are responsible for road maintenance. Partnership among road users, residents and road administrators needs to be established. Road information provision to road users and public announcement of road service levels will make such partnership more effective.

As an example of partnership, a case was introduced in which local residents share the responsibility of snow removal. In this relation, the activities of non-governmental organizations should be noted.

Reduction of the cost and improvement of the efficiency of winter road maintenance will be made possible by contracting out works to the private sector. But, in those cases, the respective roles of public sector and private sector, and their relation should be clearly defined. In particular, the public sector is expected to establish the standards for road service levels. An evaluation system should also be developed to check the service level of road links whose management has been contracted out to the private sector.

The fourth item was research and development of new technologies and their application.

Utilization of new technologies will break new ground for winter road maintenance. And, the importance of new technologies is rising remarkably.

What drew special attention was the rapid pervasion of information technologies. The following technologies are very promising:

- the combination of image-processing technology and information technology that enables more sophisticated monitoring of real-time weather and road surface conditions;
- the integrated Global Positioning System and Geographic Information System that enable automated snow-removal.

Real-time monitoring of weather and road surface conditions as well as forecasting of these has become possible by integrating image-processing technology with information technologies. This is a great step forward, because it has enabled road administrators to detect the effects of anti-freezing agents and to observe road surface conditions continuously. The combination of these technologies has realized more rapid and proper road maintenance. More effective and efficient winter road maintenance measures will be established by accumulation of these data.

### **3.2. Special session**

Under the theme of Winter Road Service in the 21st Century, a Special Session was held in conjunction with the Congress. In the Session, the following topics were discussed.

Ms. Ginny CLARKE, ST 3 Co-coordinator, participated in the Session as the rapporteur and summarized overall discussions from the viewpoint of road and road transport operations.

Topics:

- Winter mobility and service level of winter roads
- Safety and environment
- Sharing of responsibility between the public and private sectors
- Future technologies for winter road maintenance.

## **4. C17 ACTIVITIES LEADING TO THE SAPPORO CONGRESS**

### **4.1. Third C17 meeting held in Paris, France on March 20, 2000**

- It was confirmed that the C17 will continue to work on the basis of the PIARC Strategic Theme 3.
- Toward the Sapporo Congress, outline of the Technical Program, organization of the paper review panels, paper review process, recruitment of congress attendees, development of winter maintenance glossary, publication of Snow and Ice Databook were discussed and confirmed.

### **4.2. Fourth Meeting of the C17 held in Salzburg, Austria on December 4-5, 2000**

- Paper abstract review results were discussed and adoption/rejection of papers was determined. Full-paper review process, assignment of Coordinators and Assistant Coordinators, and Congress work schedule were examined and decided.
- The three projects, compilation of the winter maintenance glossary, support for developing and transitional countries, and publication of the Snow and Ice Databook were discussed and the members' cooperation was requested.

### **4.3. Fifth C17 Meeting held in Tallinn, Estonia on October 8-9, 2001**

- Full-paper review results and the Technical Program were discussed and finalized.
- Details of support for the oral presentations and poster session by the Japanese Organizing Committee were explained.
- Preparatory work progress for the opening/closing ceremonies, the special session and for Technical Program was explained.

### **4.4. Sixth C17 Meeting in Sapporo, Japan on January 27, 2002**

Organization of the Congress Technical Program was confirmed immediately before the Congress.

# 5. NEXT MILESTONES

## 5.1. XIIIth International Winter Road Congress in 2006 in Turin-Sestriere

The C17 will organize the technical programme of XIIIth International Winter Maintenance Congress in 2006 in Italy. This will include in short:

- selecting the principal themes, topics and sub topics of the congress,
- defining the procedures concerning the technical programme and the papers,
- drafting the call for paper leaflet and the technical programme in the bulletins,
- working out the technical programme, including paper selection,
- coordination with other organizations and associations, i.e. SIRWEC,
- preparation of post congress reports.

## 5.2. Snow and Ice Databook

A Snow and Ice Databook was published as part of C17 activities to commemorate the Sapporo Congress. The Databook is the first publication including 15 countries' data edited in a uniform format.

Various winter-related information unique to each country including that on weather, winter road management systems, and service levels of winter maintenance is presented.

However, this Databook is only an interim report.

Further data concerning cost reduction, environment preservation, public-private partnership, and newly developed technology are expected to be supplemented with it.

Likewise data from other countries should be submitted and included in a revised version.

In addition to this collection of national data, this revised Winter handbook would include two new topics:

- New technology (ITS, management systems, procurement of road-maintenance operation quality through competition of contractors)  
A number of countries are reporting difficulties in recruiting staff to work in winter maintenance. A greater use of technology would probably assist in meeting the skills gap. C17 will review what appears to be the most promising technological progress in relation with this issue and it will make suggestions on the topics where progress would be highly desirable.
- Traffic safety improvement and environment preservation consistent with cost reduction.

### **5.3. Winter maintenance glossary**

The winter maintenance glossary for which the C17 had worked was finalized within the framework of a joint project with COST 344 in 2002. It is now available in eleven languages. The C17 will continue to work to maintain and further develop the glossary now that the COST action is terminated. C17 will work in cooperation with the Technical Committee on Terminology of PIARC to further develop this glossary and dictionary of winter terms. This includes choice of terms, classification, translation and proposals for definitions.

### **5.4. Support for developing countries**

As for the continued project, support for developing countries in the process of modernizing winter road management, a joint meeting with C6 was held on the occasion of the Congress in Sapporo. At the meeting, it was agreed that the C6 and C17 would set up a joint task force to find what technical support is needed by developing countries with regard to winter road maintenance. The C17 will work with assistance from developing countries and countries in transition on this issue.

## **6. PUBLICATIONS**

1. The Proceedings of the XI<sup>th</sup> PIARC International Winter Road Congress (CD-ROM in French and English)
2. Snow and Ice Databook (printed matter)
3. Abstracts of the Congress Proceedings (printed matter in French and English)
4. Abstracts of the Congress Proceedings (printed matter in Japanese)

# APPENDIX

## List of C17 Committee members

C17 members Chairman Tadayuki TAZAKI (Japan)  
 French Secretary Didier GILOPPE (France)  
 English Secretary Kent GUSTAFSON (Sweden)

### **Member**

Rupert RIEDL (Austria)	Tatsuo SUZUKI (Japan)
Xavier COCU (Belgium)	Keishi ISHIMOTO (Japan)
Tom ROELANTS(Belgium)	Namho KIM (Korea)
Arnold PREVOT (Belgium)	Mohamed DARDOURI (Morocco)
Raymond DIERICX (Belgium)	Nyamjav ADILBISH (Mongolia)
Richard CHARPENTIER (Canada-Québec)	Øyvind ANDERSEN (Norway)
Paul DELANNOY (Canada)	Marek MISTEWICZ (Poland)
Urmars KONSAP (Estonia)	Maria Tereza BATALHA (Portugal)
Anne LEPPÄNEN (Finland)	Neculai TAUTU (Romania)
Jean LIVET (France)	Juan Ignacio DIEGO (Spain)
Otmar SPETH (Germany)	Peter PENGAL (Slovenia)
Suri B. K. BASU (India)	Rolf JOHANSSON (Sweden)
Mashallah HADJIALI (Iran)	Ulrich SCHLUP (Switzerland)
Roberto GIANNETTI (Italy)	Patrick C. HUGHES (USA)
Takashi SAKAI (Japan)	Paul PISANO (USA)
Harutoshi YAMADA (Japan)	

### **Corresponding members**

Abdelmadjid ZOUANE (Algeria)  
 Keith WHITE (Canada)  
 Roland Toloza NORAMBUENA (Chile)  
 Abbas SADEGHI (Iran)  
 Yoichi NAKAGAMI (Japan)  
 Mohamed LAGNANDI (Morocco)  
 J.G.VAN SAAN (Netherlands)  
 Otakar VACIN (Czech Republic)  
 Jorge MACHADO (Portugal)  
 Stefan LAPSANSKY  
 (Slovak Republic)  
 Igor STARIC (Slovenia)

### **Previous members who had contributed to C17 activities 2000-2003**

Guido VAN HEYSTRAETEN (Belgium)  
 Eero KARJALUOTO(Finland)  
 Juris TAURINS (Latvia)  
 Pierre LA FONTAINE (Canada-Québec)  
 R. Bruce DIXON (United Kingdom)  
 Andrew MERGENMEIR (USA)

## Photos related to C17 activities in the 2002 XIth PIARC Winter Road Congress

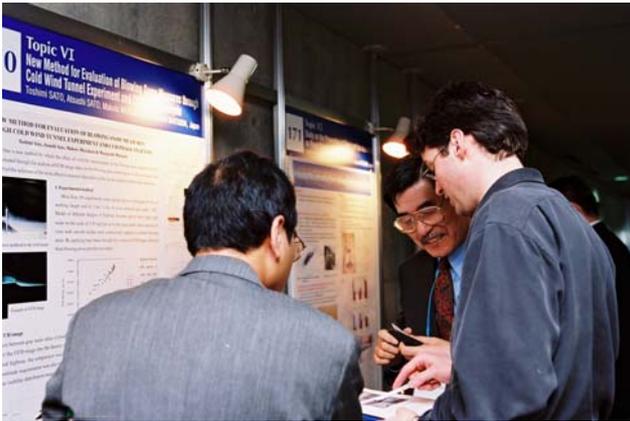
1 Opening address of the opening session by PIARC president



Oral presentation



3 Poster session



4 Summary of the Technical Program by Tadayuki TAZAKI, C17 Chairman at the Closing Session



Products of 2002 XIth. PIARC Winter Road Congress



**RISK MANAGEMENT FOR ROADS  
(C18)**

**Activity Report 2000-2003**

# INTRODUCTION

After 10 years of activity by Group G2 (Working Group on Natural Disaster Reduction) and within the perspective of the recent natural disasters affecting roads and road transportation, such as the damage caused to roads by earthquakes and hurricanes, the PIARC Executive Committee has emphasized the importance of natural disasters and recommended that risk management should be one of the subjects covered by the new Strategic Plan.

Thus the C18 Committee "Risk Management for Roads" was created under Strategic Theme 3 "Road & Road Transport Operations". The C18 Committee deals with risks for roads caused not only by natural disasters but also by man-made disasters. The C18 Committee began its activities in 2000 at a meeting in Paris chaired by the Strategic Theme Coordinator.

C18 held 8 meetings (including Vancouver) and organized two international Seminars. C18 is coordinating an international survey on risks for roads with the objective of identifying the risks and best practices in several countries.

The Committee C18 is composed of the following members for the term 2000 to 2003:

**Theme Coordinator**

United Kingdom                      Ginny CLARKE

**Chairperson**

Japan                                      Minoru HIRANO

**Secretaries**

Canada-Quebec                      Line TREMBLAY  
Japan                                      Hiroshi AOKI

**Members**

Australia	John FENWICK
Austria	Klaus FINK
Canada	Michel CLOUTIER
Cuba	Wigberto SANCHEZ GONZALEZ
Spain	Federico FERNANDEZ-ALONSO
Spain	Ricard DIAZ-ZOID
United States	James D. COOPER
France	Georges PILOT (Former French Speaking Secretary)
France	Jean-Louis DURVILLE
Hungary	Peter HOLLO

India	R.P. INDORA
Italy	Sascia CANALE
Japan	Hiroyuki NAKAJIMA
Norway	Lars LEFDAL
New Zealand	Terry BROWN
Poland	Janusz FOTA
Portugal	Ana COSTA
Rumania	Petre DUMITRU
United Kingdom	Michael SELFE
United Kingdom	Richard PARSONS
Switzerland	Carlo MARIOTTA

**Corresponding Members:**

Algeria	Mokhtar BOULARAK
Chile	Marcelo MEDINA SANTIBANEZ
Czech Republic	Pavel KRATOCHVIL
Iran	Naser ASHRAFI
Iran	Fariborz YAGHOUBI-VAYEGHAN
Japan	Yoichi NAKAGAMI
Japan	Michio OKAHARA
Mexico	Eduardo CADENA SANCHEZ
United Kingdom	Colin GOODWILLIE

**Former Members:**

Canada-Quebec	Richard PLAMONDON
France	Georges PILOT
Italy	Georgio PERONI
South Africa	Luis WESSELS
United States	Stephen BARBER

## WORK PROGRAMME

In the terms of reference of the PIARC Technical Committees for 2000 – 2003, the following four items in C18 should be considered:

1. Identification and classification of natural or industrial risks,
2. Risk exposure plans,
3. Risk prevention methods, and
4. Crisis management.

At the first meeting in Paris there was a discussion based on the terms of reference. After the discussion among C18 members, work programs have been determined as follows:

1. Organizing seminars for exchange of experience and transfer of technologies (Leader G. PILOT and R. DIAZ);

These are Regional Seminars inviting decision-makers and experts from various fields (road sector authorities, engineering firms, companies, research institutes) with a view to sharing their experiences and practices (risk prevention and crisis management, infrastructure repair, etc.).

2. International survey on risks on roadways to identify and classify risks (Leader H. AOKI and L. TREMBLAY);

This is a two-stage international survey conducted for the purpose of identifying and classifying risks for roads:

- a) in all PIARC member countries to come up with general ideas concerning risks for roads.
  - b) in selected countries including C18 member countries for the purpose of obtaining detailed information on risk prevention practices, risk exposure plans and crisis management.
3. Study on risk prevention methods and crisis management (Leader: C. MARIOTTA).

This is a study based on experiences and practices in risk and crisis management in most C18 member countries. The results are published in the form of recommendations intended for developing countries. Three main topics are covered, including the concept of crisis management, risk identification and management based on an approach in terms of operational and organizational methods.

# MEETINGS OF C18

The activities of C18 related to these three work programs were coordinated by the following C18 meetings:

## First Meeting (March 2000)

The first C18 meeting was held in Paris, France on March 2 and 3, 2000 with the attendance of the Secretary General of PIARC the Strategic Theme Coordinator and C18 members.

The following items were discussed:

- Introduction for the newly joined C18 members from various countries;
- The Strategic Theme and general framework of activities of Technical Committee 18, Risk Management for Roads;
- Designation of two secretaries (French speaking Georges PILOT, France and English speaking H. AOKI, Japan);
- Nomination of the Chairman, Mr. HIRANO, Japan; and
- Setting up three working groups and nomination of leaders.

## Second Meeting (July, 2000)

The second meeting was held in Lugano, Switzerland on July 7 and 8, 2000.

The following items were discussed :

- Presentation of the work program by the Chairman of C18;
- Preparation of the questionnaire format as the first international survey;
- The first seminar location was discussed; Chile as the most probable seminar location was proposed;
- Guidelines of the seminar were discussed; and
- Setting up the working group composed of about five people, who were to present the detailed plan on study on risk prevention and crisis management at the third meeting in Kobe.

## Third Meeting (November, 2000)

The third meeting was in Kobe, Japan, on November 15 through 18, 2000 with the attendance of the President of PIARC.

The following items were discussed :

- Progress of the international survey was reported;
- Detailed plan of the study on risk prevention methods and crisis management was presented and discussed;
- The first international seminar program to be held in Chile was presented;

- A special session on risks on roadways was held. The lectures were as follows:
  - Kobe Awaji Great Earthquake of 1995 and Restoration of Highways (Japan).
  - Risk Management – Volcano Eruption of Mt. Usu in Hokkaido (Japan)
  - A Risk Management Study for the Development Phase of a Bridge Management System (Australia).
  - Risk Management Study in the Case of Earthquake (Turkey).
  - Risk Management in Japan (Japan).

### **Fourth Meeting (June 2001)**

The fourth meeting was organized in Bergen, Norway, on June 7 and 8, 2001.

The following items were discussed :

- Presentation of risk management in Norway;
- Presentation of the results of the “International Survey on Risks on Roadways” from 30 countries;
- Detailed seminar program was presented and discussed :
  - Date: October 23 through 26, 2001, including technical visit ;
  - Venue: Temuco, Chile ;
  - There will be 9 technical sessions during the three-day seminar ;
  - Chairmen and possible lecturers and contributors were nominated.
- Study on risk prevention methods and crisis management was also discussed; and
- Other discussions on the possible location of the second international seminar (tentatively in Hungary) and the next meeting place.

### **Fifth Meeting and First International Seminar (October 2001)**

The fifth C18 meeting and the first International Seminar on “Risk Management for Roads” were held on October 22 (meeting) and 23 to 26 (seminar) 2001 in Temuco, Chile.

The following items were discussed:

- Explanation of questionnaire of the second survey targeted to selected countries;
- Explanation of the first drafts of the study on risk prevention methods and crisis management;
- Discussion on the detailed seminar program and technical visits; and
- Discussion on the next international seminar and next meeting.

### **Sixth Meeting (April 2002)**

The Sixth Meeting of C18 was held on April 3, 4 and 5, 2002 in Rotorua, New Zealand. The following items were discussed:

- Content, size, style and language of presentation of the report on the study of risk prevention and crisis management methods.
- Presentations on risk measurement and assessment and on North Island (New Zealand) volcanoes.
- Progress report on Stage Two of the International Survey
- Program proposed for the Second International Seminar (Hungary)

### **Seventh Meeting and Second International Seminar (November 2002)**

The seventh C18 meeting and the second International Seminar on “Risk Management for Roads” were held on November 4, 5 (meeting) and 6 to 8 (seminar) 2002 in Budapest, Hungary. The following items were discussed:

- The report on the study of risk prevention and crisis management methods.
- Presentation on “Risk Management in Hungary”.
- Presentation on “August 2002 Floods in Czech Republic”.
- Discussion on the World Road Congress in Durban.
- Discussion on the detailed seminar program.

### **Eighth Meeting (May 2003)**

The eighth C18 meeting is to be held in May 2003 in Vancouver, Canada.

# INTERNATIONAL SURVEY ON RISKS ON ROADWAYS

This international survey seeks to identify and classify risks for roads by asking questions about the types of risks and damage affecting roads and road infrastructures that may cause major socioeconomic problems. These problems in turn have an impact on human and industrial activities, as do natural disasters. The questionnaires were mailed out in November 2000. The survey involved two stages.

## Stage One

Stage one of the survey was conducted on the basis of a questionnaire addressed to 95 PIARC member countries. Thirty responses were received. The countries which responded are: Austria, Belgium, Bulgaria, Canada, Chad, Chile, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Japan, Latvia, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Philippines, Poland, Slovenia, South Africa, Sweden, Turkey, United Kingdom, United States and Zimbabwe.

The survey results showed that the disasters caused by accidents during transport of dangerous goods occurred more frequently in the category of disasters due to human, social or industrial activity. The other risks identified are fires in tunnels, fires near roads, accidents related to the chemical industry, nuclear accidents and terrorism.

The responses also show that landslides and floods rank among the four leading disasters: as well as, earthquakes and avalanches. The other natural disasters identified in the questionnaires are volcanic eruptions, cyclones, rockslides, snowstorms and windstorms.

## Stage Two

Stage Two of the survey sought to obtain more detailed information on the risks of natural and man-made disasters in 20 selected countries based on the results of the first questionnaire. The countries that sent replies are Austria, Czech Republic, Hungary, Italy, Japan, United Kingdom and United States.

In the light of these responses, the risks can be presented according to the following classification:

### Natural disasters

- Earthquakes
- Floods
- Landslides
- Avalanches
- Other disasters: volcanic eruptions, cyclones, rockslides, snowstorms and windstorms.

### Disasters caused by human, social or industrial activity

1. Incidents involving road vehicles
  - Major road accidents
  - Overloaded vehicles causing severe damage to the road network
  - Objects falling on the road network
  - Fire in enclosed spaces such as tunnels
  - Train, boat or airplane crashes on highway infrastructures.
2. Incidents involving spills
  - Toxic spills on the road network
  - Accidents involving toxic spills
3. Incidents resulting from the proximity of housing
  - Explosions or fires in industrial sectors located near highways
  - Radioactive spills resulting from the nuclear transformation process
4. Incidents resulting from social disruptions
  - Terrorist attacks or result of a war affecting the road network
  - Strikes of drivers on roads
  - Vandalism.

# C18 INTERNATIONAL SEMINARS

Many countries are facing the threat of natural disasters every year in spite of efforts made by a wide range of authorities including road authorities. Especially in developing countries where they are facing lack of plan, equipment and money have suffered from ever growing natural hazards partly due to changes of global conditions such as global warming effects. In addition to these natural hazards to roads so-called manmade hazards disturb safe and smooth road transportation and highway structures.

Road experts and decision-makers have relatively less opportunities to exchange their experiences and information on risks associated with natural hazards and social, industrial and economic activities. This is particularly true for those who are in developing countries and countries in transition. In order to cater for the needs of these countries, PIARC C18 has set the international seminar on risk management for roads in several regions of the world as one of the three activities in the year 2000 to 2003. The aim of the seminar is to gather engineers and decision makers in a specific region and C18 members so as to be able to exchange knowledge and experiences regarding risk management of both natural and manmade risks for roads. This activity was coordinated by G. Pilot (France), former French Speaking Secretary of C18, R. Diaz (Spain), M. Medina (Chile) representing Chilean Organizing Committee and P. Hollo (Hungary) representing Hungarian Organizing Committee.

Proposed guidelines of the C18 seminar were the following:

- 1) Seminars held and organized with low organizing costs to ease participation by the various countries of the region.
- 2) Number of participants from 100 to 200
- 3) Expected registration fees would be 100 USD per day.
- 4) Three-day seminars would include the following:
  - Inaugural Session
  - Various Technical Sessions on landslide, earthquake, flood, man-made risks, or risk and crisis management etc.
  - Closing Session.

Following the PIARC recommendations, C18 included in its work programme for 2000-2003 period, a seminar activity comprising the 2 International Seminars. One was to be located in South America, the other one in Central Europe.

## Temuco (Chile) Seminar, 23-26 October 2001

Taking into account the high level of natural risks in Chile, which has a Corresponding Member on C18, and also the fact that the Chilean Road Director was PIARC Vice-President, this country was selected to host the first Seminar.

The Seminar was organized in Temuco City located about 700 km South of Santiago de Chile. Temuco was chosen because many natural disasters existing in the vicinity allowed to organize a one-day technical visit to areas affected by volcanic eruptions, earthquakes, landslides and floods.

The Seminar was held in Hotel Terraverde, equipped with excellent facilities for seminars, and very comfortable for participants. Additionally, Temuco is easy to get to by air from Santiago.

### Participants at the Seminar

147 participants were recorded, from 22 countries:

- a majority of Chilean attendants coming from all the Chilean Regions,
- attendants from other South-American countries: Cuba, Peru, Venezuela, Bolivia, Argentina, Brazil and Paraguay,
- C18 members: Australia, Canada, Cuba, France, Hungary, Italy, Japan (with a very active delegation), Norway, Canada-Quebec, Spain, Switzerland, UK, USA, New-Zealand.

### Program of the Seminar

#### ***Opening session***

*Mr. Nelson Belmar*, National Road Director of Chile, opened the Opening Session.

*Mr. Minoru Hirano*, C18 Chairman, expressed his gratitude to the Chilean Authorities for their strong support, as well as to C18 members.

*Mr. Carlos Barrientos*, Regional Road Director (10<sup>th</sup> region), welcomed the participants.

*M. Hiroshi Aoki* introduced PIARC and C18 Committee Activities.

### **Session 1**

#### ***Hazard and Risk Evaluation and Emergency Prevention Methods during Project Planning and Design***

*James Cooper (USA)* gave a lecture on “Methods to mitigate earthquake hazards and risks for highway bridges through planning and design”, based on US practice.

*Noboyuki Tsuneoka (Japan)* introduced his lecture on “Risk management technologies for rock bed and slope failure of roads”. A set of pictures illustrated how many slopes are sliding in Japan, with the consequences of traffic blocking and costly repair works. Measures are now operational, which allow evaluating the level of risk of a slope, taking into account rainfall and distortion signal of glass fibre sensors.

### **Session 2**

#### ***Hazard and Risk evaluation and Emergency Prevention Methods during Construction***

*Carlo Mariotta (Switzerland, C18 member)*. His lecture deals with questions during construction: type of natural or human disaster involved, how to avoid or to prevent, which measures to take in case of problems?

*Yasuji Nagaya (Japan.)* “Avalanche information exchange system”. Information exchange systems are established between residents and local authorities.

### **Session 3**

#### ***Hazard and Risk evaluation and Emergency Prevention Methods during Maintenance***

*Terry Brown (New Zealand, C18 member)*. “Road hazards and risk management in New Zealand”. New Zealand is prone to many natural disasters and man-made disasters can also affect road traffic. So, Road authorities are particularly attentive to get efficient services for risk management on roads. Safety management systems and Emergencies considerations are developed ended by the 4R's rules: Reduction, Readiness, Response, Recovery. (Guides are available on: [www.transit.govt.nz](http://www.transit.govt.nz))

*Shinjuro Komata (Japan)*. “Road hazard zoning and risk evaluation due to rainfall in Oyashirazu”.

#### **Session 4**

##### **Management of Road Emergencies: Mitigation Actions**

*Richard Parsons (United Kingdom, C 18 member).* “Experience in the United Kingdom” This comprehensive lecture introduces, first of all, categorization of incidents (type of structure, spillage, form of transport, social disruption, etc.) and the consequences (traffic delays, loss of lives, damages on infrastructures).

*Toshimi Mizuno (Japan).* “Characteristics of large rockfall and hazard evaluation along the western coast of Hokkaido”. This lecture introduces the local characteristics and natural disasters (volcanoes, earthquakes, rock falls), the effects on cliff failures (3 kinds of failure). Then he describes the regional disaster prevention partnership.

#### **Session 5**

##### **Management of Road Emergencies: Evaluation of the magnitude of Physical and Economic Damage**

*Hiroyuki Nakajima (Japan).* “Evaluation of magnitude of physical and economic damage in the case of Hanshin-Awaji earthquake and Mt Usu volcanic eruption in Japan”.

*Rolando Toloza (Chile).* “Evaluation of magnitude of physical and economical damages in the 11<sup>th</sup> region in Chile”. The lecture describes disasters that affect the region: heavy snowfalls and avalanches, heavy rainfalls, volcanic eruptions, earthquakes. It also describes the impacts in the region.

#### **Session 6**

##### **Latin-American Hazard and Risk Prevention Experiences**

*Wigberto Sanchez (Cuba).* “Mitigation of disasters in the Republic of Cuba.” This lecture describes, natural disasters that affect Cuba (tornadoes and cyclones induce floods and many landslides and other soil movements). Then the legal base of mitigation actions in Cuba is detailed. Finally, the results of mitigation actions are introduced.

*Juan-Carlos Antibilo (Chile).* “Risk management on roads in the Atacama region”. This lecture introduces, as a first element, the very special conditions of the Atacama region, extremely dry and arid, which makes the soils very sensitive to rain.

*M. Romero (Peru).* “Prevention and emergency plan in Mogueara Region”. Peru is affected by the El Nino phenomena, but also by earthquakes (June 23rd, 2001 for example). So a plan was launched, including prevention actions, road information systems, protection systems, emergency plans, etc.

## **Session 7**

### ***Latin-American Crisis Management Experiences***

*Fernando Salazar (Chile)*. “Road N° 5: Victoria-Liucura- Paso de Pino Hachado”. The 22-km long end section of this road to Argentina has to face severe winter conditions (rainfall, strong “white-wind”, snow accumulation, etc.).

*Fernando Galligos (Chile)*. “Emergency operational actions related to disasters affecting the road infrastructure (Santiago Metropolitan Region)”. The Santiago region shows characteristics prone to Natural Disasters: mountains up to 6,000m (snow, landslides), earthquakes, rapid rivers (floods), etc. So, an operational plan was prepared, including geographic information systems (GIS) and telecom systems.

*Federico Fuentes (Venezuela)*. “The Coastal Disaster”. The 1999 disaster was caused by very heavy rain, probably as a consequence of El Niño event: the equivalent of 3 months rain fell in 11 days. Huge mudflows, debris flows and landslides affected the coastal road and villages, as well as the motorway La Guaira Airport Caracas. Around 80,000 person died.

## **Session 8**

### ***Technical Visit Analysis***

A one-day technical visit was organized, with an offer of three options:

- *Technical visit N°1: the Coastal Area (West Temuco)*. This option was cancelled because of bad weather conditions for this trip.
- *Technical visit N°2: the Mountain Area (East Temuco)*. Main problems encountered: landslides, cut slope instability.
- *Technical visit N°3: the Lakes Area (South Temuco)*. Main problems encountered: collapse of bridges by scouring of foundations.

## **Session 9**

### ***Need for Risk Prevention Plan Models for Road Emergencies and their insertion in the Latin-American Road organization and in the National Emergency Plan***

*Edgardo Masciarelli (Argentina)*. Tools for assessment of the impact of disasters on road projects.

This lecture states, first of all, that roads must be classified from a strategic point of view. They then should be evaluated in terms of vulnerability of the road, taking into account all environment problems, more especially dealing with natural hazards.

The author mentions the program which is under preparation by the American Organization of States, named: "Vulnerability of Trade Corridors in Latin-American Countries", which takes into account works to be done on roads in order to improve their safety vis-à-vis natural hazards.

*Gustavo Fuente Alba (Chile)*, South Andes Volcano Observatory. Many activities are in progress in the volcanoes area close to Temuco (ski resorts for example), and then it is of strategic importance to ensure the safety of such areas. So a very sophisticated system has been elaborated and implemented in order to follow the seismic activity, which is normally associated to arrival of volcanic eruptions. The system includes accelerometers implemented on site, sophisticated data transmission system, then treatment methods of data, realized in a centre located in Temuco.

### **Session 10** **Chilean National Emergency Plan**

*Waldo Moraga Bravo (Chile)*: "National Plan for Natural Disaster Prevention and Emergency Actions". The lecture begins with a presentation of natural hazards which affect Chile, taking into account "El Niño" effects, as well as related costs. Year 1997 was specially unfavourable, then a national plan was prepared with following characteristics:

- Mission: to reduce negative effects of hazards on Chilean activities
- Policy: to improve Chilean mitigation policy
- Objectives: to decrease costs, to find again regularity in transport.

Also to be mentioned:

- The operational Unit for prevention and emergency,
- The National Council for Prevention and Emergency Operations,
- Alarm thresholds defined through "emergency areas": blue, yellow and red,
- Specific organization at Road Directorate,
- Regional secretaries of Ministries in charge of prevention and preparedness,
- Operational response plan,
- Communication network.

### ***Concluding session.***

*Alfredo Basilio* mentioned the interest of such a seminar in order to allow experts to share their experience.

*Minoru Hirano* emphasized the success of the seminar: 145 attendants coming from 17 countries. It offered an excellent opportunity to demonstrate various experiences and to learn more from others. He thanked warmly all attendants for their participations.

*Nelson Belmar* thanked sincerely all attendants for coming in Temuco, sometimes from very far countries.

*Juan Carlos de la Torre, Vice-Minister of Public Works*, closed the Seminar.

## **Budapest (Hungary) Seminar, 6-8 November 2002**

### Participants at the Seminar

Sixty participants were recorded, from 11 countries:

- a majority of Hungarian attendants coming from all regions,
- attendants from other countries: Australia, Canada, Canada-Quebec, Czech Republic, Estonia, France, Japan (with a very active delegation), New Zealand, Norway, Switzerland and United Kingdom.

### Program of the Seminar

#### ***The opening session.***

*Mr. László Holnapy*, Head of Department, Ministry of Economy and Transport, Hungary, opened the Opening Session.

*Péter Hollo*, Chairman of the Organizing Committee welcomed the participants.

*Mr Minoru Hirano*, C18 Chairman, expressed his gratitude to the Hungarian Authorities for their strong support, as well as to C18 members.

### **Session 1**

#### **Road Traffic Effects of Natural Disasters Related Risk Management**

*Terry Brown replacing James Cooper (USA)* gave a lecture on “Reducing Seismic Vulnerability of Highway Bridges through Risk Management, Design and Retrofit”.

*József Reimann (Hungary)* introduced his lecture on “Statistical Treatment of the Floods and Their Risks”

*John Fenwick (Australia)* introduced “Risk Management in Bridge Design”.

*Makoto Maruyama (Japan)* “Systematic Road Administration Considering Risk Management under Severe Rainfalls”

*Antal Papp (Hungary)* “Experiences Gained in Hungary in the Periods of Making Arrangements of Preparation, Prevention and Reconstruction in the Case of Natural Disasters with Special Regard to Impacts on Road Traffic”.

### **Session 2**

#### **Road Traffic Effects of Disasters Caused by Man Related Risk Management**

*Hiraku Murata (Japan)* “Emergency Measures for Expressway during Criticality Accident of the Nuclear Processing Plant”

*Attila Tatár (Hungary)* “International Norms Concerning the Carriage of Dangerous Goods and Their System of Relation with the Seveso II Directive”.

*Carlo Mariotta (Switzerland)* introduced “Fires in the Gottard Tunnel”.

### **Session 3**

#### **Legal Issues Addressed to the Decreasing of the Effects the Effects of Road Traffic Disasters**

*Gyula Vass (Hungary)* “System of Disaster Prevention Tasks of the Hungarian Road Transport Legislation Relating to the Carriage of Dangerous Goods”.

*Pavel Kratochvil (Czech Republic)* introduced area-wide floods in Europe in August 2002 “Floods in Czech Republic”.

### **Session 4**

#### **Duties of Official Enforcement in Road Transport Risk Management Related to Transport of Hazardous Materials, Training and Education**

*Michel Cloutier (Canada)* “Canadian Transport Emergency Center of the Department of Transport”

*Lars Lefdal (Norway)* “Transport of Dangerous Goods in Norway”

### **Session 5**

#### **Tasks and Experience of the Organizations Involved in Risk Management and Mitigation of Disasters Effects and Road Traffic Accidents**

*Terry Brown (New Zealand)* “Emergency and Incident Management”

*Dana Prochazkova (Czech Republic)* “Emergency Management Principles”.

*Tamás Jádi (Hungary)* “Matters Concerning the Deployment of the Forces and Means of Intervention”.

*Isao Yoshida (Japan)* “Development of a GIS-Using Support System for Road Traffic Planning Work”

*Tibor Dobson (Hungary)* “Hungarian Experience Related to the Communication Strategy in Case of Disasters, Serious Mass Accidents”

### **Session 6**

#### **Reconstruction Following the Road Traffic Accidents and the Elimination of the Disaster Co-ordination of Activity of Participants**

*Olivier Michaud (President, PIARC)* introduced as a keynote speech “Road and the Sustainable Mobility”.

*Michael Selfe replacing Richard Parsons (U.K.)* “Management of Road Emergencies and Mitigation Action”

*István Tatárka (Hungary)* “Providing for Information in the Occurrence of Road Traffic Accidents, Future Schemes”

#### **Closing session.**

*Peter Hollo* mentioned the interest of such a seminar in order to allow experts to share their experience.

*Minoru Hirano* stressed the success of the seminar and thanked the efforts made by the Hungarian Organizing Committee.

# C18 REPORT

The report entitled "Study of Risk and Crisis Management", prepared during the 2000-2003 period, marks the completion of the C18 Committee's work. The report was prepared under the leadership of C. MARIOTTA (Switzerland) in close collaboration with H. AOKI (Japan). This report has 4 chapters:

- Chapter 1** Introduction prepared by M.HIRANO and G. PILOT.
- Chapter 2** "Risk management" prepared by J. FENWICK (Australia), T. BROWN (New Zealand), L. LEFDAL (Norway) and R. PARSONS (United Kingdom). The purpose of this chapter is to present risk management methods.
- Chapter 3** "Crisis management" prepared by T. BROWN (New Zealand), M. CLOUTIER (Canada) and M. SELFE (United Kingdom). The purpose of this chapter is to present crisis management methods through a few examples.
- Chapter 4** "Conclusions and perspectives" prepared by M. HIRANO (Japan) and C. MARIOTTA (Switzerland).
- Reference 1** "International survey on risks affecting the road network" prepared by H. AOKI (Japan). This chapter presents a summary of the survey results. It also proposes a classification of risks affecting the road network.
- Reference 2** "Examples of recent major disasters" prepared by L. TREMBLAY (Canada-Quebec). This chapter presents in detail a few examples of disasters of human, social or industrial origin and, more summarily, a few natural disasters.
- Reference 3** "Organizations and data" prepared by H. NAKAJIMA (Japan), C. MARIOTTA (Switzerland) and R. DIAZ (Spain).
- Reference 4** International Seminars: "Temuco" Seminar and "Budapest" Seminar.

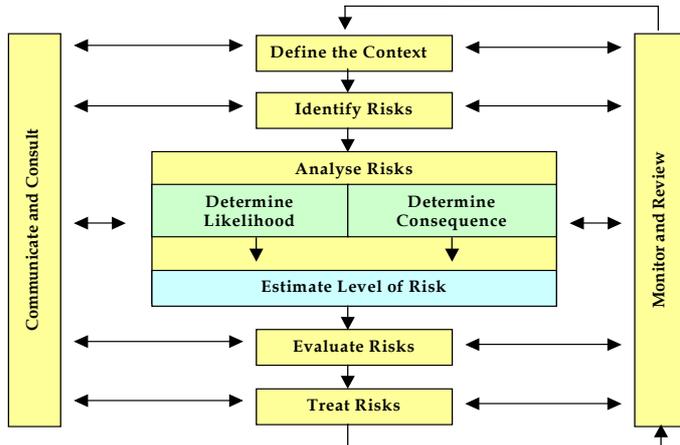
## RISK MANAGEMENT PROCESS

This chapter briefly introduces the part of the C18 Report especially related to the chapter on Risk Management.

### General

Risk management is recognized as an integral part of good management practice. It is an interactive process consisting of steps, which enable continuous improvement in decision-making. Risk management is the term applied to a logical and systematic method of establishing the context, identifying, analysing, evaluating, treating, monitoring and communicating risk associated with any activity, function or process in a way that will enable organizations to minimize losses and maximize opportunities.

The main elements of the risk management process are the following:



Risk management can be applied at many levels in an organization. It can be applied at the strategic level and at operational levels. It may be applied to specific projects, to assist with specific decisions or to manage specific recognized risk areas.

Risk Management is an interactive process that can contribute to organizational improvement. With each cycle risk criteria can be strengthened to achieve progressively better levels of risk management.

## Establish The Context

### The Strategic Context – Legislative and Organizational

Road Authorities work in a legislative and organizational framework. In general, governments will have emergency response organizations equipped and trained to deal with natural forces such as cyclones, floods and earthquakes, where these events occur relatively frequently.

In a crisis situation, access to the devastated area is essential to take in emergency response crews, food, water, shelter and to evacuate the injured. In most cases, the major access will be by road, so the rapid recovery of the road network is the basis of emergency planning in many cases.

### Establish the Risk Management Context within the Road Authority

Risk management must be done within the road authority consistent with the roles and capability of organizational units, but coordinated to meet the strategic objectives, and to liaise with stakeholders.

### Establish the Risk Management Context

The goals, objectives, strategies and parameters of the activity or part of the organization should be established. Risk, costs, benefits and opportunities must be considered.

### Develop Risk Evaluation Criteria

Determine the criteria for risk evaluation. These may include

- Operational
- Technical/Engineering
- Financial
- Legal
- Social/Political
- Environmental.

### Define the Structure of an Activity

## Risk Identification

This process should ensure that all risks are identified. The possibility of rare and unusual events and deliberate acts of war or terrorism must be considered.

- What can happen?
- How and why it can happen?

In general, natural environmental risks are easier to identify and to codify into magnitude of event vs. frequency of occurrence. Man-made risks are often harder to identify, especially in new transport systems built in the last few decades, where there is no history to enable estimates of the rare but highly damaging events.

## Risk Analysis

The objectives of analysis are to separate minor (and acceptable) risks from major risks which require some actions to manage (reduce or avoid) and to provide data to assist in this evaluation and treatment.

### Determine Existing Controls

Identify the existing management technical systems and procedures to control risk and assess their strengths and weaknesses

### Consequences and Likelihood

Consequences and likelihood combine to produce a “level of risk”. In a “sensibly designed” system, the “level of risk” is relatively constant and so likelihood (probability of occurrence) is inversely proportional to “consequence”.

### Types of Analysis

Risk analysis can be undertaken to various degrees of refinement depending on the information and data available.

Analysis may be qualitative, semi-quantitative or quantitative, or a combination of these. Complexity and costs are lowest for qualitative and highest for quantitative.

### Sensitivity Analysis

## Risk Evaluation

Risk evaluation involves comparing the level of risk found during the analysis process with the previously established risk criteria. Risk analysis and criteria used in an evaluation should be of the same type (qualitative or quantitative etc).

## Risk Treatment

### Identifying Options for Risk Treatment

Typical options, which are not necessarily mutually exclusive or always appropriate, include the following:

- a) avoid the risk by deciding not to proceed with the activity or project which generates the risk (where this is practical).
- b) reduce the likelihood of occurrence through appropriate management and technical systems and procedures.
- c) reduce the consequences through planning, design, construction standards, disaster management planning etc.
- d) transfer the risk. This is only appropriate for financial losses through insurance. It is not practical to transfer the risk of death and injury.
- e) retain the risk and plan to manage the consequences if the risk eventuates.

### Assessing Risk Treatment Options

Options should be assessed on the basis of any additional benefits or opportunities created, taking into account the criteria developed. A number of options may be considered and applied separately or in combination.

### Prepare Treatment Plans

## Monitoring and Review

It is necessary to monitor risks, the effectiveness of the risk treatment plans and the management system that controls the process. Few risks remain static.

## Communication and Consultation

Communication and consultation with relevant stakeholders are essential at each stage of the risk management process.

In many cases, complex risks will need to be managed by several organizations and consultation is essential.

# CONCLUSIONS/ISSUES TO BE TACKLED WITH IN THE FUTURE

PIARC C18 “ Risk Management for Roads” was established at the turn of the century as a successor of the PIARC G2, which functioned as a forum of the natural disaster experts for roads of PIARC member countries during the UN IDNDR period. C18 was established within the Strategic Theme 3 and new terms of reference were entrusted to C18 by the Coordinator as follows:

1. Identification and classification of natural or industrial risks
2. Risk exposure plans
3. Risk prevention methods, and
4. Crisis management.

PIARC made a very timely and prudent choice of organizing C18 to tackle the man-made risks on roads in addition to the natural risks. In the new century, still natural disasters occurred from the increasing amplitude of variation in weather conditions. And global instability occasioned by the activities of a wide spectrum of bodies from sovereign states to those of terrorist cells.

The terrorist attack of September 11, 2001 to the New York World Trade Center buildings and subsequent potential threats to the transportation systems of the United States have unveiled an unexpected genre of road disaster of a man-made character. This incident initiated a call for a quite new caution in respect to the risk management for road engineers worldwide. Incident management partnership involving police and other emergency services and agents responsible for managing the road network is desired to be set up in good efficiency. On the contrary to our regret actual performance observed so far cannot be considered sufficient enough among almost all the member countries.

C18 conducted two international surveys, “ Survey on risks to roadways” circulated to all member countries and the following survey to selected countries. C18 held two international seminars; the first one in Temuco, Chile, during October 23-26, 2001, and the next one in Budapest, Hungary, November 6-8, 2002.

From the two international surveys it was revealed that there are various types of risk to roadways in both the natural and man-made character. And they are changeable from place to place.

In summary of our activities through international surveys, seminars, meetings and studies the followings is presented as the C18 conclusions of this 2000 to 2003 term.

1. Natural hazards especially floods and landslides are main causes of disturbance to highway networks and transportation system particularly in developing countries.
2. Disturbances caused by dangerous goods transportation occurred most frequently in the category of man-made risks all over the world.
3. There are wide varieties in the legal framework among the countries surveyed.
4. Selection of appropriate risk management approach is important. The risk management approaches would be a part of risk management process of each road agency that can lead to minimization of the effects of both natural and man-made disasters.
5. Exchange of experiences and technical information on risk management practices among the member countries should continue in order to contribute to reduction of catastrophic life loss, property damages and social economic disruption which may result from various types of risk to roadway.
6. Risk potential evaluation methods should be sought and studied to minimize probable incidents of both natural and man-made risks.

Through our committee members' discussion, it was pointed out that C18 have to exert more efforts to the following subjects in the future that could not be studied in depth in the first 4 years term.

1. The tools that will enhance road authorities' ability to undertake the risk prevention functionally (ITS and others can be applicable).
2. For the above purpose, measures of risk analysis and evaluation should be searched which are useful in the road risk evaluation.
3. A probabilistic approach can be one of the easier ways for this purpose.
4. C18 should function as a showcase of risk management practice of advanced countries.
5. Risk mapping (hazard mapping) can be applied not only to natural hazards but also to man-made hazards.
6. Transportation of dangerous goods should be discussed from the viewpoint of overall risk management to roads.
7. Insurance policies covering various risks.

## REFERENCES

- [1] PIARC C18 Report Draft, "Study on Risk and Crisis Management" (2003)
- [2] PIARC C18 International Survey on Risk (2000)
- [3] C18 Seminar, Chile (2001); Report
- [4] C18 Seminar, Hungary (2002); Report

# **MANAGEMENT AND ADMINISTRATION OF THE ROAD SYSTEM**

G. Estermann (Austria)  
ST4 Coordinator

As part of the Strategic Plan 2000–03, the task of Strategic Theme 4 was redefined as follows:

'to improve the performance of road administrations in the provision, operation and management of road infrastructure and its use in accordance with international best practice.'

In accordance with organisational procedures, four technical committees were allocated to ST4 to complete this task. These four committees were:

- C 6 Road Management
- C 9 Economic and Financial Evaluation
- C 11 Road Bridges and other Structures
- C 15 Performance of Road Administration

These tasks covered both operative and strategic issues and technical and financial problems. As a result, ST4 was responsible for dealing with a wide range of questions.

Questions on road and bridge management: How should the future road system be designed so that it can be operated and maintained efficiently over a long period? What strategies, concepts, tools and targeted measures can be used to take into account the growing importance and increasing status of road management?

Questions on road financing: How can the growing need for adequate funding for construction, maintenance and operation be met? What form of funding will allow this need to be met fairly over the course of several generations? Who should provide funding? Who should be charged? How can these means be distributed efficiently and fairly?

Questions on road administrations: How can future road administrations be optimally organised? What form should they take? Should they move more towards the public or the private sector? What is the role of the road administration in general transport management?

When answering these questions and drawing up proposed solutions, the committees paid particular attention to the requirements and overall conditions that are expected to prevail in the future:

- The resources available for the construction, maintenance and operation of transport infrastructures will be very difficult to increase and it is unlikely that the balance of distribution among the various modes of transport will not be tipped in favour of the road network.
- At the same time, demand will continue to increase and expectations relating to quality standards will rise, particularly in terms of operation.

- The interaction with other means and modes of transport will become much closer and more intense; demands for more intermodality and interoperability will have to be taken into account.
- The cooperation with other areas of politics—such as finance, environment, economy, regional planning, research and development and safety—will become more intense. In future, transport problems will only be solved as part of an integrated transport policy.

All told, over 140 members in 13 subgroups were involved in the work of the four committees. Each subgroup held an average of seven to eight meetings. These meetings took place on all five continents. The committees also held joint meetings to coordinate their work within ST4. Particular attention was paid to the organisation of seminars and the publication of reports, e.g. in Roads/Routes.

There follows a brief summary of the work conducted by the four technical committees:

## C 6 - Road Management

Four subgroups were established:

1. Asset management
2. Framework of performance management
3. Economic prediction models
4. Maintenance programming and budgeting

Subgroup **Asset Management** decided to concentrate on providing practical guidance for those administrations that are considering introducing asset management into their organisations, paying particular attention to the needs of developing countries and countries in transition. It focussed in particular on the following questions: What is asset management? What are the benefits of asset management?

Subgroup **Framework of Performance Management** focussed on “Road quality service levels and innovations to meet user expectations” in its attempts to come up with the best way of offering users optimum service quality. The idea was to use existing performance indicators and the results of former PIARC and OECD studies to develop service quality indicators.

The subgroup dealing with **the role of economic and socio-economic prediction models in road management** was charged with the following tasks: defining the aims of the road administrations, clarifying the needs and requirements of road-managing authorities for economic models, and developing a framework and models on the basis of existing projects, issued reports and references in the IRRD database.

Subgroup **Maintenance Programming and Budgeting** presents a report entitled 'Planning and Budgeting of Maintenance – Practical Implementation' with a practical analysis of the various alternatives for road administrations (or agencies) and instructions on how to present maintenance budgets to decision-makers with a view to convincing them to allocate the sums required for adequate maintenance.

## **C 9 - Economic and Financial Evaluation**

The work of committee C 9 focused on:

- The economics of road assets
- Pricing and costing
- Financing and public private partnership (PPP)

The subgroup **Economics of Road Assets** updated earlier C 9 committee work on economic evaluation methods for capital infrastructure projects and dealt with the economic evaluation methods for road maintenance projects and economic benefits of ITS projects.

Subgroup **Pricing and Costing** tried to assist PIARC member countries in gaining an understanding of the principles of costing and pricing road transport with the main focus on prices and charges for road transport, identifying and allocating transport user costs, infrastructure, congestion and environmental costs as well as road transport benefits.

The subgroup **Financing and Public Private Partnership (PPP)** worked on the different forms of funding/financing and reviewed best practices (with special consideration of developing countries and countries in transition). Special emphasis was put on considering how to evaluate PPP and what the elements of a successful PPP are.

## **C 11 - Road bridges and other structures**

The following topics were dealt with by the road bridges committee:

- Asset management
- Performance management
- Bridge and structure conditions

The needs of the following parties were taken into account here: decision makers, owners and authorities responsible for network management, authorities responsible for bridge management, and engineers responsible for the technical assessment or the condition of bridges.

In subgroup **Asset Management**, asset management was compared with bridge management, and a comparative study of bridge management activities and the state of the art in repairing bridges under traffic was carried out.

Subgroup **Performance Management** dealt with the requirements of the infrastructure owners, users and the community. It also covered the following issues: management systems of the structures, users' cost and benefit, impact of the costs related to traffic, safety and the whole issue of life costing.

The work programme of subgroup **Bridge and Structure Condition** included indicators for bridge performance and prioritisation of bridge actions and a survey on rehabilitation actions of concrete bridges.

C 11 held a seminar in Bangkok. The objectives of this seminar were to give advice on the principles, concepts and strategies of effective bridge management based on individual countries' situations and to provide appropriate and practical recommendations for bridge maintenance in Asian/African countries.

## **C 15 - Performance of Road Administrations**

Three subgroups were established:

1. Positioning of Road Administrations
2. Internal Performance
3. Performance Management

The main focus in subgroup **Positioning of Road Administrations** was on trends in the role and position of the road administration in relation to the government, private sector and users, and less towards other transport modes on the basis of a two-step questionnaire. Much attention has been given to the reasons behind these trends and the relative impact of such trends.

The subgroup on **Internal Performance** drafted a report on current best practice principles in relation to internal performance improvement and took principal responsibility for facilitating the Development Country Seminar in September 2002 in Havana (Cuba).

Subgroup **Performance Management** worked to identify and disseminate effective performance management and tools to evaluate performance with these frameworks and dealt with the performance of PPP too. The most important performance indicators were grouped and matched to the stages of road network development.

**ROAD MANAGEMENT  
(C6)**

**Activity Report 2000-2003**

# INTRODUCTION

In order to comply with the objectives of the Strategic Plan, the activities of the Technical Committee on Road Management (C6) were divided into four working groups with the following orientations:

Asset management.  
Framework of performance management.  
Economic prediction models.  
Maintenance programming and budgeting.

A seminar on "Priority Issues in Road Management" was organized in TALLINN, ESTONIA on may 17 and 18, 2001.

The objectives of the Seminar were:

- to provide an overview of the "state of the art" in Road Management.
- to understand the needs of Estonia and neighbouring countries in this field.
- to confirm the aims and planned work programmes of the Technical Committee C6 on Road Management.

The seminar was intended as a regional event centred on the European Baltic States and neighbouring countries. The seminar was sponsored by the Estonian Road Administration, the Finnish Road Administration, the Swedish National Road Administration and PIARC.

# ASSET MANAGEMENT

## Sub-Committee Members (The Champion's name is first on the list)

D. Baker	Transport for London Kingdom	United
G. Breyer	Ministry of Transport	Austria
O. Gutierrez-Bolivar	Centro de Estudios de Carreteras	Spain
C. van Haasteren	C.R.O.W.	Netherlands
C. Hennum	Ministry of Transp. Of Ontario	Canada
O. Jakoet	ASCH Civil Transport & Structure Engineers	South Africa
D. Jonsson	National Road Administration	Sweden
W. Kurylowicz	Road Network Development Office	Poland
F. Rizzardo	Emcon Services Inc	Canada
J. Saarinen	Finnish Road Administration	Finland
B. Skoglund	Public Road Administration	Norway
M. Srsen	I.G.H.	Croatia
C. Sylvest	Danish Road Directorate	Denmark

## Objectives and Programme

The Asset Management Sub-Committee took as their overall objective the principal goal of Strategic Theme 4 – “To improve the performance of road administrations in the provision, operation and management of road infrastructure and its use in accordance with international best practice”. In particular, however, its contribution was directed at:

- Issue 4.1 Developing, improving and implementing asset management processes;
- Issue 4.4 Effective coordination between network managers, operators and the community; and
- Issue 4.5 Making more efficient use of the road budget.

To be even more specific, the Sub-Committee decided that its remit should be to confirm, to clarify, and to extend the cumulative knowledge and experience of Asset Management. As always, special consideration had to be given to the needs of developing countries, and countries in transition. With this latter point in mind, the Sub-Committee took the view that its work should concentrate on practical guidance for those who might be thinking of introducing Asset Management into their organization.

The Sub-Committee held meetings at the following times in the following places:

April 2000	Paris, France To agree a definition of Asset Management and to plan the scope of the review
May 2000	Nantes, France To confirm the scope of the review and to begin to plan a questionnaire
October 2000	Vancouver, Canada To finalise the questionnaire and to plan the detailed content of the final report
May 2001	Tallinn, Estonia To discuss the responses to the questionnaire
October 2001	Coolum, Australia To confirm the content of the final report and to agree authors for specific sections
May 2002	Rotterdam, Netherlands To discuss a first draft of the final report and to prepare for a workshop at the World Road Congress
October 2002	Tokyo, Japan To discuss an almost final draft of the report, to agree consultation arrangements, and to confirm details of the proposed workshop
May 2003	Costa Rica (planned) To discuss consultation responses, to agree a final report, and to finalise details for the workshop

## Work Organization

The tasks undertaken and completed by the Sub-Committee at each of its meetings are summarized above. At a very early stage it was agreed that, since the overall subject of asset management was very large and, to some extent, all-embracing, the Sub-Committee would need to clearly define the scope of its review. This was done, and individual members agreed to tackle specific topics within this defined scope. Special mention should be made of contributions from Jani Saarinen and Carl Hennem, who were able to provide direct experience of implementation of a new asset management approach within their own countries.

Early agreement was also reached within the Sub-Committee to the need to collect information through a questionnaire. This was duly prepared and circulated in 2000, in conjunction with one from another C6 Sub-Committee. Over 40 responses were received from all over the world.

A literature search was carried out, the principal reference documents being the OECD Report *Asset Management For The Roads Sector*, published in 2000, and recent publications on the subject from the US and Australia.

In May 2001, Technical Committee C6 held a meeting in Estonia and arranged a simultaneous seminar. Representatives from all the Baltic States, and other Eastern European countries, were invited to hear about the topics being tackled by the Technical Committee, and to contribute their views about how they were being addressed and what outcomes should be aimed for. This provided the Working Group with useful guidance.

In October 2001, in Queensland, the Sub-Committee held a fruitful joint meeting with a C11 Sub-Committee investigating the specific issue of bridge management techniques.

## **Deliverables**

The principal deliverable from the Sub-Committee will be its final report. The contents are expected to be as follows:

- Introduction
- What is Asset Management?
- What are the Benefits of Asset Management?
- Framework for Asset Management Implementation
- Principles for Adoption of Asset Management
- Asset Valuation
- Conclusions
- Future Work
- Summary of Questionnaire Responses
- Summary of Current Practice in Canada, Australia, UK, and Sweden.

As mentioned above, the Sub-Committee participated in a seminar in Estonia in 2001, and looks forward to further opportunities to present its work in Costa Rica and at the World Road Congress in 2003. In the latter case, detailed plans are being prepared for a workshop.

# FRAMEWORK OF PERFORMANCE INDICATORS

## Sub-Committee Members (The Champion's name is first on the list)

G. Camomilla	Autostrade SpA	Italy
P. Alves Pereira	Universidade do Minho (Dep. Genie Civil)	Portugal
G. Norwell	Main Roads W.A. Road Maintenance Strategy	Australia
J.Sorenson.	Federal Highways Administration	USA
K Inoue	Japan Institute of Construction Engineer	Japan
M.Maruyama	Tokyo Construction Bureau.	
	Metropolitan Expressway	Japan
J.H.Swart	Rijkwaterstaat - Dienst Weg- & Waterbouwk.	Netherlands
A. Garcia Garay	Ministerio del Fomento	Spain
R.Debak	TEB Engineering	Croatia
F. Rizzardo	Encome Service Inc.	Canada
M Srsen	I.G.H.	Croatia

## Objectives, program

The actions conducted in the sub-committee 2 contributed to the Strategic Theme 1 "Road quality service levels and innovations to meet user expectations" made to offer the best service quality to users. In order to evaluate the satisfaction level of users with regard to that objective, it is necessary to establish a set of *Service Quality Indicators* connected to Performance Indicators. The sub-committee 2 work is also connected to theme 4 "Management and Administration of the Road System".

Although it more or less contributed to all issues to, this contribution was direct for issues:

for the theme 1

- road maintenance methods evaluation;
- service quality indicators to evaluate the level of user demand satisfaction;

and for the theme 4

- Making more efficient use of the road budget

The WG 2 also intended to promote best practices in road management; this is the slogan of sub-committee 2: « Performance Indicators provides the best results for users and community<sup>5</sup>, at minimum life cycle cost »

The programme of work was drafted in Nantes, in May 2000, and adapted all along the progress of the action, especially by October 2001, after the meeting in Coolum Australia, and by October 2002, during the meeting in Tokyo.

In 1995, the OECD Road Transport Research Programmed started with a Scientific Expert Group to investigate Performance Indicators for the Road Sector (OECD ROAD TRANSPORT RESEARCH, *Performance Indicators for the Road Sector*, OECD, Paris, 1997).

In the previous PIARC work period, from 1996 to 1999, the work group C6.6/7, taking into account the recommendations established by the OECD Road Transport Research Programmed, dealt with the theme of Performance Measures and Benchmarking.

The research undertaken by the C6.6/7 work group, during the previous period, was mainly related with a wider and qualitative approach than a quantitative one.

Following these two previous research approaches, the work undertaken by the C6.2 work group has considered a more pragmatic approach to help the road administrations.

In this context, the C6 sub committee 2 work, after 4 years of experiences in the field, emphasizes the benefit for the road administration derived from the process of indicators benchmarking use, before going through the process of performance indicators measures benchmarking; this evaluation can involve criteria such as the number of accidents, congestion time caused by road maintenance works, average travel speed reduction caused by road pavement deficiencies, poor winter road service, etc.

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<sup>5</sup> Stakeholders: customers, owners and operator, inhabitants long the road and all community.

As main recommendations of this research it was concluded that:

- the process of benchmarking has, as precondition, the recognition and the definition of the correct performance indicators, as well as the description and comprehension of the administration's core processes;
- it is not recommended to start the collection of data on a certain number of indicators, without understanding the underlying process, or the objective of the data;
- road administrations should contact other different administrations, in order to observe how they have defined their process, carry out their business, thus learning from them.

Performance indicators today used, can be divided into three broad groupings which align with these stakeholders, being

1. Road Planning Indicators – These reflect higher level considerations based on desired outcomes or benefits such as safety, accessibility, mobility, etc. (Owner's view)
2. Infrastructure Indicators – These normally relate to asset condition that is a reflection of the level of maintenance. They reflect the Road Management Administration level and include structural road quality for pavement, bridges and tunnel, geotechnics, complementary devices such as signs, barriers, etc. (Operator's view)
3. Users indicators – These normally related to users evaluation

The indicator, in advanced utilisation, is often dedicated to road operation and is not a dimensional number derived from elaboration on the physical parameter.

Naturally, there are some cases when a "parameter" is named "indicator".

For all the different indicators used by a country some principal criteria can consequently be deduced for identifying the indicators of performance PI:

- P.I. can be a technical parameter (and is a Plain Performance Indicator) to define one of the road characteristics and a way of maintaining it ;
- P.I. can identify also the *diffusion of the various reliability levels* of the technical parameter on the road (your name is Quality or Weighted Performance Indicator Q.P.I. or W.P.I. or only Performance Indicator - P.I.) This type of indicator is utilised for road exploitation uses ;
- Moreover in such a manner we will have a Performance Indicator, without physical dimension (P.I. is a pure number varying from 0 to 100), that is easily and interpreted immediately; can also to be combined to arrive at Combined Performance indicators (like  $I_{Pav}$ , resulting from 2 or 3 different single P.I.) and Global Indicator.

All countries use the geometrical classification of roads. The most widespread PI are the “structural” (Structure management indicators); they relate to the characteristic of the different parts of roads.

As concerns the structural indicators, pavement PI are the most widespread, especially as regards skid resistance and roughness<sup>6</sup> (bearing capacity is less diffuse).

The P.I. connected to the user evaluation are connected to the different travel times and some interesting systems are described in the final report of the group.

Other activity of C6 Group2

During the Tallinn meeting of C6 Committee a conference was held to explain the basic criteria for road Management System based on P.I.

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<sup>6</sup> The IRI International Roughness Index, is the result of recent PIARC work by C1 Committee. It was disseminated with different specific experimental measurements in different countries-Other technical parameters are developed by other PIARC Committees; for example C13 set the Global Accident Rate and C6 the Traffic Fluidity parameter.

## Work organization

The sub-committee took the opportunities of several of its meetings to put on the paper the technical definitions of the concepts used in Performance Indicators connected to road management, and especially those dealing with road maintenance modelling. These definitions are gathered in the sub-committee final report.

The work method of C6 group 2 project was:

1. Collect data from different countries (at least C6 members) related with performance indicators adopted for different road categories and for different stakeholders.
2. Analyse the data collected in order to produce a report on the “state of the art” regarding the present operative practice in the field of performance indicators.
3. From the previous analysis, produce recommendations on performance indicators related to different road categories considering different perspectives (owner, operator, user, community) with emphasis on the customer perspective.

This work will lead to the development of the following outputs by C6.2.

1. Report on PIs used by road administrations to monitor performance based on road classification. This includes information on the application of data collected both by high performance road condition survey devices and subjective methods. The systems for road condition survey are, of course, the task of C1 or other Committees.
2. Guidelines for the application of PIs by road administrations.

This project is designed to collect good examples of how performance indicators are being used or how management can be improved through the use of performance indicators in order to achieve better performance based management.

In parallel, a literature survey was conducted by several members of the sub-committee:

- Mr. Camomilla provided information about European projects; he also wrote the first version of the questionnaire and the report;
- Mr. Pereira and Mr. Maruyama reviewed reports issued by OECD and first version of report;
- Mr. Norwell made some transformation to the first questionnaire for clarifying questions and to address the answers to the aims of the group 2;

- Mr. Sorenson addressed every part of document toward the user's point of view

A synthesis of the results achieved in the domain of advanced road management and more specifically, of PIs use, was derived by each member and delivered to the champion of the group, who prepared the final report.

## **Deliverables**

The main deliverables from the sub-committee consists in its final report. It is a 57-page report, with the following content:

- I. INTRODUCTION
  - I.1. Background
  - I.2. Objectives of the research
  - I.3. Structure of the report
- II. STATE OF THE ART ON PERFORMANCE INDICATORS
  - II.1. Previous work undertaken by C6/7 Work Group
  - II.2. Different types of Performance Indicators
- III. METHODOLOGY OF DATA COLLECTION
  - III.1. Preparation of the Questionnaire
  - III.2. Structure of the Questionnaire
- IV. PRESENTATION AND DISCUSSION OF DATA COLLECTION
  - IV.1. Presentation of the data collected
  - IV.2. Discussion of the data collected
- V. 5 CONCLUSIONS AND RECOMMENDATIONS

Furthermore, several presentations of the sub-committee action were made, as a part of the presentation of C6 committee works:

- first, during the workshop in Tallinn (Estonia), which took place in May 2001,
- during the meeting in Tokyo, on October 2002;
- finally, during the meeting in Costa Rica, on May 2003.

Of course, an other production of subcommittee 2 is contributing to the presentation of the results of the C6 Committee during the World Congress, in Durban (R.S.A.), by the end of 2003.

The final production is also a special seminar still in Durban, together with C1 members, on practical uses of Performance Indicators. The seminar will explain the separation between arguments and aims of each Committee C1 and C6 and then will make a connection of these arguments, with the common aims of the Advanced Management of Roads Pavements, using Performance Indicator P.I.

In this way we will be able to offer ideas and examples to develop and improve road management with PIs.

# THE ROLE OF ECONOMIC AND SOCIO-ECONOMIC PREDICTION MODELS IN ROAD MANAGEMENT

## Sub-Committee Members (The Champion's name is first on the list)

P. Lepert	Laboratoire Central des Ponts et Chaussées	France
M. Gorski	Centre de Recherches Routières	Belgium
W. Pichler	Carinthia Tech. Institute	Austria
T. Kaal	Technical Centre of Road Administration	Estonia
J. Litzka	Technische Universität Wien	Austria
G. Rhode	Transportation Division AFRICON	South Africa
N. Robertson	HDM4 Project coordinator	PIARC
G. Woltereck	Autobahndirektion Südbayern	Germany

## Objectives, program

The actions conducted in the sub-committee contributed to the strategic theme 4 "Management and Administration of the Road System". Although it more or less contributed to all issues 4.1 to 4.9, this contribution was direct for issues:

- 4.1 "Developing, improving and implementing asset management processes"
- 4.5 "Making more efficient use of the road budget"
- 4.7 "Introduction of road pricing"

The WG also intended to promote best practices in road management, and as such, contributed to the issue 4.3, on ISO-HDM project.

The programme of work was drafted in Nantes, in May 2000, and adapted all along the progress of the action, especially by October 2000, after the meeting in Vancouver, and by May 2002, during the meeting in Rotterdam.

Within the main objective of promoting the development and use of economic and socio-economic analysis framework and models, the WG identified five phases of work:

1. giving clear definitions of the aims of road management ;
2. clarifying the needs and requirements of road managing authorities for economic models ;
3. conducting an overview of the projects that were or are conducted in the world to develop such frameworks and models ;
4. making a synthesis of the results which have been achieved in this domain ;
5. finally, providing elements such as case studies to convince :
  - road managing authorities, to use existing tools to improve their practices ;
  - development staffs, to better meet the requirements and expectations of managing authorities.

Important note: Initially, an other objective was also devoted to the WG, consisting in monitoring and advising the PIARC special project "ISOHDM". After the meeting in Vancouver in October 2000, it clearly appeared that the ISOHDM project was covering a field quite broader than the economic or even socio-economic models. The four working groups of the committee were dealing with questions and items that could contribute to fruitful advises to the project. Therefore, it was proposed that the monitoring and advising task was re-allocated at the committee level, rather than at the WG level.

## Work organization

The sub-committee took the opportunities of several of its meetings to put on the paper the technical definitions of the concepts used in road management, and especially those dealing with road maintenance modelling. These definitions are gathered in the chapter II of the sub-committee final report.

In order to clarify the needs and requirements of road managing authorities for economic models, the sub-committee primarily intended to prepare and send a questionnaire. Nevertheless, there are a lot of questionnaires sent, all over the world, to road managing authorities, road experts and firms (by European projects, PIARC working groups, CEN committees, etc.). In such a context, it was decided that no specific questionnaire will be emitted by the sub-committee C6-3, which will rather examine the answers to the questionnaire prepared and disseminated by the sub-committee C6-4: "Maintenance Planning and Budgeting". For the sub-committee C6-3, the most interesting findings derived from these answers were mainly dealing with the implementation of road management systems, especially if they aim at performing economic analysis (chapter IV). They mainly reflect the difficulties encountered in this critical stage of the use of a PMS.

In parallel, a literature survey was conducted by several members of the sub-committee:

- Mr. Litzka reviewed reports issued by OECD (chapter III.3);
- Mr. Lepert provided information about European projects (chapter III.4); he also reviewed the HDM (III.2) models;
- Mr. Gorski was in charge of finding relevant references in the IRRD database, and to make a synthesis of these references (chapter III.1); he was also charged to collect information from the World Bank (chapter III.5).

A synthesis of the results achieved in the domain of road management and more specifically, of economic models for maintenance management, was derived by each member and delivered to the champion of the group, who prepared the final report.

The findings from both the questionnaire and the literature study were very useful to write the recommendations of the sub committee C6-3 for a good and satisfying implementation of economic evaluation procedures (chapter V.4).

## Deliverables

The main deliverables from the sub-committee consists in its final report. It is a 26-page report, with the following content:

- I – Objectives and Programme of Action
  - I.1 Introduction
  - I.2 Reference to the Strategic Plan
  - I.3 Programme
- II – Generalities
  - II.1 Definitions of network and project levels
  - II.2 Definitions of models and decision rules
  - II.3 Needs and requirements of road managing authorities
- III – Literature Review
  - III.1 Review of works from the IRRD database
  - III.2 Brief review of HDM technico-economic models
  - III.3 Review of OECD reports
  - III.4 Review of European recent and on going projects
  - III.5 Other international works
- IV – Gathering information: Questionnaire
- V – Analysis and Recommendations
  - V.1 Basic procedures for economic evaluation of maintenance
  - V.2 Benefits from using a PMS with socio-economic models
  - V.3 Recommendations
- VI – Conclusions
- VII – References

Furthermore, several presentations of the sub-committee were made, as a part of the presentation of C6 committee works:

- first, during the workshop in Tallinn (Estonia), which took place in May 2001,
- at the mid term PIARC seminar, by the end of 2001 in Australia ;
- finally, during the meeting in Costa Rica, on March 2003.

Of course, the final production of the sub-committee is contributing to the presentation of the results of the C6 Committee during the World Congress, in Durban (South Africa), by the end of 2003.

# MAINTENANCE PROGRAMMING AND BUDGETING

## Sub-Committee Members (The Champion's name is first on the list)

C. Morzier	Département des Ponts et Chaussées	Switzerland
S. Allen	VicRoads	Australia
D. Thompson	VicRoads	Australia
A. Prévot	Ministère de l'Équipement et des Transports	Belgium
P. de Backer	Ministerie van de Vlaamse Gemeenschap	Belgium
D. Peshkin	Applied Pavement Technology, Inc.	United States
A. Laslaz	Ministère de l'Équipement. Direction des Routes	France
P. Hernadi	Techn. & Infor. Service on National Roads	Hungary
J. Timar	Techn. & Infor. Service on National Roads	Hungary
M. Wilson	The Highways Agency	United Kingdom

## Work programme and organization

### Objective

Committee 6 has been entrusted with a practical analysis of the various alternatives for road administrations (or offices or agencies) to present maintenance budgets to decision-makers with a view to convincing them to allocate the necessary sums to adequate maintenance.

### Programme:

Working group C6.4 was put in charge of this analysis.

It made a list of the methods most commonly used in practice and then prepared a survey questionnaire asking for a short description of the method used and including a number of questions that were to allow a quantitative analysis of the replies, as well as a number of fields for respondent organizations to state the advantages/disadvantages of their methods and to make comments.

The questionnaire was circulated to all the First Delegates of PIARC, with a request to forward it to the organizations concerned.

The replies were first analyzed both quantitatively and qualitatively. A statistical analysis was performed on the items that lent themselves to it: number of countries having used, using, or planning to use the various methods; assessment of effectiveness; consideration of users. The advantages and disadvantages of the methods and the comments were summarized in order to present the readers of the report with an overview of the opinions expressed.

Starting from this overview, the methods suggested in the questionnaire and those added by the replies were discussed in detail.

The analysis has also resulted in recommendations that should enable network managers to select the most appropriate method(s) for their particular case.

#### Organization:

Date	Meeting	Activities
April 2000	Paris (France)	Definition of the general objective, formation of the working group
May 2000	Nantes (France)	Final definition of objectives, definition of the work programme
August 2000		Initial proposal for the questionnaire
October 2000	Vancouver (Canada)	Discussion et finalization of the questionnaire
December 2000		Circulation of the questionnaire to the First Delegates, by the General Secretariat
March 2001		Receipt of replies
May 2001	Tallinn (Estonia)	First analysis of replies, shareout of tasks for the analysis, first outline of the report
August 2001		Summary table of replies to the questionnaire
October 2001	Coolum (Australia)	Finalization of the outline of the report, analysis of data, first conclusions, definition of additional analyses
April 2002		First draft of the report
May 2002	Rotterdam (Pays-Bas)	Discussion of the report, definition of complements, shareout of tasks
October 2002	Tokyo (Japan)	Discussion of the recommendations
December 2002		Final draft, validation by the working group
February 2003		Translation
May 2003	San José (Costa Rica)	Discussion and validation by Committee 6
June 2003 (expected date)		Corrections decided by the Committee, delivery to the General Secretariat for publication

## Implementation

Committee 6 « Road Management » will publish a report entitled:

Planning and budgeting of maintenance – Practical implementation.

Road management is a key element in the process of preserving existing assets and road safety. Budgets allocated for that purpose have, however, often been found inadequate. This may be due to a lack of means, but also to the poor presentation and justification of budget proposals to decision-makers.

Committee 6 has been entrusted with a practical analysis of the various alternatives for road administrations (or offices or agencies) to present maintenance budgets to decision-makers with a view to convincing them to allocate the necessary sums to adequate maintenance. The objective of this work is to define best practice while inventorying the various alternatives for presentation.

Defining best practice does not mean recommending a single method – rather than any other – for use in any case. As a matter of fact, the work undertaken does not allow us to say that one method is better than another regardless of the context. Depending on the desired degree of precision, on the items of road infrastructure that are being analyzed and on the human and financial resources available, the choice will be in favour one method or another. Current practice and future prospects reported in the replies to the survey questionnaire have shown that no method must be rejected. On the other hand, it clearly appears that the use of technical and techno-economic models will increase in future. Their field of application is, however, not wide enough to cover all the needs for analysis.

In any case, one should be careful about using a single method of presentation. Only by using several methods in combination, with a reasonable estimation of their precision and knowledge of their limitations, will it be possible to convince decision-makers. The latter are, indeed, not a homogeneous group, and each of them should be presented with results suited to his or her individual expectations.

**ECONOMIC AND FINANCIAL EVALUATION  
(C9)**

**Activity Report 2000-2003**

# COMMITTEE MEMBERS

## Meetings Attended 2000-2003

Mr. Mohammad-Esmaeil Alikhani (Iran)		
Ms. Sherri Y. Alston (United States)	6	Chairperson
Mr. Oscar Alvarez Robles (Spain) 2000-2001	2	
Mr. Aleksander Bacciarelli (Poland)		
M. Aurel Balut (Romania) 2000-2002		
Dr. Art T. Bergan (Canada)	1	
Mr. Curtis F. Berthelot (Canada)	5	
Mr. Mariano Canas Fuentes (Spain) 2002-2003		
Mr. Federico Cempella (Italy)	1	
Mr. Gérard Charpentier (France)	7	
Dr. Milos Cihak (Czech Republic)	6	
Mr. Patrice Danzanvilliers (France)	7	Secretary
Mr. Patrick Debaere (Belgium)	6	
Mr. Enrique Diaz Morales (Mexico)	4	
Mme. Maria Fortunata Dourado (Portugal)	5	
Mr. Awad A. A. El Shazly (Egypt)		
Mrs. Teresa Espino Pestana (Cuba)	2	
Mr. Alain Fayard (France)	4	
Mme. Sophie Féraud (Belgium)	2	
Mr. Ashraf M. Hayat (Pakistan) 2000-2002	2	
Mr. Henrik Nejst Jensen (Denmark)	6	
Mr. Amir Kasim (Malaysia)	1	
Mr. Armin Keppel (Germany)	4	
Mr. Jin-Koo Lee (Asian Development Bank)	1	
Mr. Jan Fredrik Lund (Norway)	7	
Mr. H. S. Makundi (Tanzania)		
Mr. Hasan Mahmood (Pakistan) 2002-2003		
Mr. Ian Melsom (New Zealand)	6	
Mr. Jan Mikolaj (Slovak Republic)	1	
Mr. Barry Moore (Australia) 2002-2003	2	Secretary
Mr. Hisa Morisugi (Japan)	3	
Represented by Takeshi Kobayashi	1	
Mr. Marinus Noppers (Netherlands) 2000-2001		
Ms. Katarina Norén (Sweden)	7	
Mr. John Pauley (Australia) 2000-2002	5	
Mr. Aurel Petrescu (Romania)		
Mr. Hans Schaller (Switzerland)	7	
Mr. Friedrich Schwarz-Herda (Austria)	7	
Mr. G. Seydack (Namibia) 2002-2003		
Mr. A. V. Sinha (India)		
Mr. Arpad Siposs (Hungary)	7	
Mr. J. J. "Koos" Smit (South Africa)	5	
Mr. Peter Struik (The Netherlands)	5	
Represented by Caroline Visser	1	
Mr. E. Tendele (Zimbabwe)		

Mr. F. J. M. Van Den Berg (The Netherlands) 2002-2003	
Mr. James Weinstein (United States)	2
Represented by Mr. James Healy	4
Mr. Tom Worsley (United Kingdom) 2000-2001	4
Mr. Moncef Ziani (Morocco)	2

### Committee Corresponding Members

Mr. Jose M. <b>Alonso-Biarge</b> (World Bank)	
Mr. Anil <b>Bhandari</b> (World Bank)	
Mr. Johannot <b>Boba</b> (Madagascar) 2000-2001	
Mr. Gavin <b>Cooper</b> (South Africa)	3
M. Abdehafid <b>Daoud</b> (Algeria)	
Mme. Jacqueline <b>Desrosiers</b> (Canada)	1
Mr. Ahmed <b>Imzel</b> (Morocco)	
Mr. Aram <b>Kornsombut</b> (Thailand)	
Mr. Mykola <b>Likhostup</b> (Ukraine)	
Mr. Pedro <b>Lopes</b> (Portugal)	
Ms. Maria Ines <b>Martinez Gomez</b> (Chile)	
Mr. Jure <b>Miljevic</b> (Slovenia)	1
Mr. J. <b>Molenveld</b> (Namibia) 2002-2003	
Mr. Luc <b>Parent</b> (Canada) 2000-2001	1
Mr. Daniel <b>Ranaivoson</b> (Madagascar) 2002-2003	
Mr. Dusan <b>Samudovsky</b> (Slovak Republic)	
Mr. Kazuhiro <b>Sawada</b> (Japan)	
Mr. Michel <b>Servranckx</b> (Belgium)	
Mr. Charles <b>Solomon</b> (Israel)	
Mr. Ted <b>Van Geldermalsen</b> (New Zealand)	
Mr. Shideh <b>Yavari</b> (Iran)	

### Strategic Theme Coordinator:

Mr. Colin Jordan (Australia) 2000-2001  
 Dr. Gerold Estermann (Austria) 2002-2003

# SCOPE OF WORK AND FEATURES OF PIARC C9

The activities of the C9 Committee during the current work program cycle have been to support the PIARC Strategic Plan goal of improving the performance of road administrations through an exchange of information on best practices throughout the world. Several strategies were set forth in the Strategic Plan which focused on a comparison of methods of economic appraisal of road construction and maintenance expenditure, enhanced evaluation tools to accommodate social and environmental benefits, identifying means for efficiently implementing road programs and identifying the impact of road investment on the economy. Other strategies included identifying the application and benefits of existing and new forms of financing, identifying sustainable funding mechanisms for the provision and maintenance of roads in rural and remote areas, identifying road pricing systems and their impact in the development and management of the existing network, and exchanging information on developments in road pricing technology. Additional strategies included identifying and disseminating successful experiences in public private partnerships (PPPs), with particular regard to structural arrangements, risk assignment, finance, and revenue collection, taking into account life cycle analysis and identifying and defining types of PPPs, their relevance and application.

The Committee members reflect the strong interest of their respective road administrations in gaining understanding of how to more effectively and efficiently operate and manage the economic and financial framework of their respective administrations. Members include economists, engineers, academics, accountants, planners, bankers and infrastructure experts. There was a high level of active participation by the Members and Corresponding Members that contributed to the overall achievement of the Committee's work.

As financial resources are becoming more constrained for infrastructure development, more research is being targeted toward analyzing road-financing strategies. The ability of government budgets to continue to finance road construction, operation and maintenance through traditional funding mechanisms has become very difficult. Under funding for road improvements and maintenance is a problem for developed and developing countries. The situation has steadily worsened since the 1970s as the needs continue to grow disproportionately to revenues. These factors have led many countries to consider alternative sources of revenue for road finance. Discussions on infrastructure costs, transport system taxes, external costs and infrastructure charges are also prevalent.

Public private partnerships have worked but encouraging further development of PPPs needs a greater understanding and acceptance of risks by all parties, new procedures for public contracts and the elimination of legal uncertainties. This is the environment in which the Members of Committee 9 have conducted their research activities.

The areas of concentration for the 2000-2003-work plan for the Economic and Financial Committee focused on:

1. the economics of road assets,
2. pricing and costing,
3. financing, public private partnership

# PRODUCTIONS (PUBLICATIONS AND EVENTS)

## **Routes/Roads**

No. 310 II – April 2001, pp. 37-48

*Tom Worsley* (United Kingdom, Former Member of C9)

Transport Costing and Pricing – A Guide to the Concepts, Objectives and Terminology

## **8<sup>th</sup> International Road Conference**

Budapest, Hungary, 23 May 2001

*Armin Keppel* (Germany, Member of C9)

Private Funding of Federal Roads in Germany

## **Routes/Roads**

No. 311 III – July 2001, pp.5-20

*Armin Keppel* (Germany, Member of C9) and *Dr. Stefan Hinrichs* (Germany)

Private Sector Financing for Federal Trunk Roads in Germany – Regulations, Current Situation, Perspectives

## **PIARC/Austroroads Seminar**

Coolum, Queensland, Australia, November 2001

*Sherri Alston* (United States, Chairperson of C9)

PIARC C9 Work Program

## **PIARC Developing Country Seminar – Institutional Strengthening and Financing for Road Administrations – Development Opportunities**

Havana, Cuba, September 2002

*Arpad G. Siposs* (Hungary, Member of C9)

Motorway Private Financing in Hungary in the 90's

*J. J. "Koos" Smit* (South Africa, Member of C9)

Using PPP to Build Society

*Katarina Noren* (Sweden, Member of C9)

Public/Private and Other Innovative Partnerships in Financing Infrastructure

## **German Roads and Transportation Congress**

Munich, Germany, 10 October 2002

*Armin Keppel* (Germany, Member of C9)

Operator Models for the Federal Trunk Roads in Germany

In 2000, there was an exchange of correspondence between Tom Worsley (United Kingdom) and Colin Ellis of the Department for International Development, London in which the Department offered assistance with organizing a meeting of the Committee in a developing country.

In 2001, an exchange of e-mails was conducted between the Chair and David Baker of Committee 6 to discuss Committee 9's interest in C6's survey on asset management that contained information on the economics of road assets.

Ms. Katarina Norén (Sweden) worked with Committee 15 on Performance of Road Administrations to structure a developing country seminar that focused on institutional strengthening and financing of road infrastructure. This collaboration resulted in the successful co-hosting by C9 and C15 of the developing country seminar in Havana, Cuba in September 2002.

The Chair of the Committee C9 represented the committee at a meeting of Strategic Theme Coordinators and Technical Committee Chairs in Bern, Switzerland on 5 July 2002 to discuss the upcoming World Road Congress in Durban in 2003.

Consultations with the PIARC President and the Chair on preparations for the presentation and organization of a joint session with the World Bank on public private partnerships at the Durban World Congress were also held in Bern on 5 July 2002.

# WORK PROGRAMME AND ORGANIZATION

## Sub-group 1: Economics of road assets

The work of Sub-group 1 comprised the following topics:

1. Update earlier C9 committee work on economic evaluation methods for capital infrastructure projects;
2. Economic evaluation methods for road maintenance projects;
3. Economic benefits of ITS projects that provide road information.

Sub-group 1 was formed in 2000 with Ian Melsom (New Zealand) as the chair. Other group members included :

Ms. Sherri Alston (United States)  
 Mr. Curtis Berthelot (Canada)  
 Mr. Milos Cihak (Czech Republic)  
 Mr. Patrice Danzanvilliers (France)  
 Mr. Enrique Diaz Morales (Mexico)  
 Mr. James Healy (United States), replaced James Weinstein  
 Mr. Henrik Nejst Jensen (Denmark)  
 Mr. Hisa Morisugi (Japan).

In 1999 PIARC Report 09.02B, "Evaluation Methods for road projects in PIARC Member Countries" was published as the result of surveys from member countries in 1996/97. An update to this comprehensive report is designed to obtain (where possible) more detailed information on specific issues, including: the different factors now included in project evaluations, the methods used for valuing these factors (including environmental factors), the different monetary values put on these factors, and the economic indicators used for making decisions on which projects to fund. A questionnaire was distributed to Member Countries and will be the basis for an article for PIARC.

In many countries the economic evaluation of road maintenance is in its infancy or non-existent. Member countries were surveyed to collect data on how different countries determine their road maintenance requirements and what economic analysis (if any) is undertaken to justify the maintenance expenditure. The survey data will be outlined in a PIARC article.

A survey was attempted on the economic benefits of intelligent transport systems (ITS). Response to the survey was less than desired, in part because of the relative newness of ITS benefit analysis. A literature search was also conducted to obtain additional information. The results of these efforts will be compiled in an article that will present: a general overview of ITS and its benefits; a review of the responses from the Member Countries survey; a summary of key articles on ITS benefits from the literature search; a selected bibliography of resources (books, articles, websites); and a summary of international organizations and entities that have an interest in ITS benefits and methodologies for benefit analysis (relevant to such areas as international trade and travel facilitation).

## **Sub-group 2: Pricing and Costing**

The work of Sub-group 2 comprised the following topics:

1. Terminology, concepts and principles of costing and pricing
2. Estimation, measurement and allocation of transport costs
3. Review of the full range of pricing instruments and regulations.

The Sub-group was originally chaired by Mr. Tom Worsley (United Kingdom) and Mr. Arpad G. Siposs (Hungary) assumed this role when Mr. Worsley left Committee 9 in 2001. Other members of the Sub-group included

Mr. Gavin Cooper (South Africa)  
Mr. Amir Kasim (Malaysia)  
Mr. Jan Fredrik Lund (Norway)  
Mr. Jure Miljevic (Slovenia)  
Mr. Barry Moore (Australia, from 2002)  
Mr. Luc Parent (Canada, until 2001)  
Mr. John Pauley (Australia, until end of 2001)  
Ms. Teresa Espino Pestana (Cuba)  
Mr. Friedrich Schwarz-Herda (Austria).

Committee members assisted in the preparation of an article designed to assist the PIARC member countries in gaining an understanding of the principles of costing and pricing to road transport. Topic areas covered included prices and charges for road transport; identifying and allocating transport user costs; infrastructure, congestion and environmental costs; and road transport benefits. Further research efforts are outlined in an article in Routes/Roads discussing road pricing – its objectives, instruments and outcomes.

A final consolidated report on costing and pricing expands on the themes of the earlier research efforts to include case studies from other countries. The conclusions of the report are designed to assist PIARC countries in considering needs; possibilities and solutions of transport pricing and costing. A glossary and definitions are also provided in the report. Based on the work of the Sub-group, it was concluded that there is a longer term need to continue work in the pricing field, especially for application across modes.

### **Sub-group 3: Financing, public-private partnership (PPP)**

The work of Sub-group 3 comprised the following topics:

1. Identification of different forms of funding/financing.
2. Review best practices, with special consideration of developing countries and countries in transition.
3. Consider how to evaluate public private partnerships and what are the elements that make for a successful PPP.

The Sub-group was chaired by Mr. Peter Struik (Netherlands).

Other members of the group included

Mr. Gérard Charpentier (France)  
 Mr. Patrick Debaere (Belgium)  
 Ms. Maria Fortunata Dourado (Portugal)  
 Mr. Alain Fayard (France)  
 Ms. Sophie Féraud (Belgium)  
 Mr. Jin-Koo Lee (Asian Development Bank)  
 Ms. Katarina Norén (Sweden)  
 Mr. Oscar Alvarez Robles (Spain, till 2001)  
 Mr. Hans Schaller (Switzerland)  
 Mr. Koos Smit (South Africa).

The work of the Sub-group focused on developing state-of-the-art information on public private partnerships. Through surveys from Committee member countries, information was gathered on how these countries were using PPPs to further their roadway programs. The report developed from this information uses case studies from various countries to illustrate a number of different topics. Among these topics are: unsolicited proposals, flexibility in contracting, integrated planning and property development, and the involvement of small communities in maintenance. The report concludes:

- (1) there is great diversity among Committee 9 countries in the implementation of PPP;
- (2) PPP is motivated by both finance and quality;
- (3) sometimes the public-public partnership is more important than private involvement; and
- (4) there is a need for systematic and comparable evaluation methods.

## Future Research Areas for Committee 9

While the research activities undertaken by Committee 9 produced tangible results that can be shared with PIARC members, the work also suggested several areas for future study by PIARC. These topic areas include:

### Economics of road assets

- The provision of optimal financing for road maintenance.
- The assessment of environmental externalities – in terms of financial and economic evaluation, plus evaluation of the physical effects of these externalities.
- Economic evaluation of freight transport and comparison of modes – looking for optimal solutions for freight transport.

### Pricing and Costing

- Pricing as a means of demand management;
- How, when and where to implement road pricing?
- Is there an optimal pricing level?
- Efficiency of road pricing (which to choose: taxes and/or road pricing?);
- The pricing of externalities (environment, accidents, congestion, etc.);
- Road pricing as a financial base for inter-modal cross financing.
- New financing sources for road construction and maintenance with special focus on maintenance.

### Financing and Public Private Partnerships (PPPs)

- Transformation of the administration to conduct successful PPP:
  - Managing contracts
  - Allocating risks
  - Regulator role (instead of “doer”)
- Evaluation of PPP: is PPP a good way of adding resources to improve infrastructure?
  - Effectiveness of private and public partnerships
  - Efficiency
  - Evaluation standard
- How to judge a PPP bid?
- Models of repayment of PPP
  - According to performance
  - According to availability

# COOPERATION WITH OTHER PIARC COMMITTEES

At the first meeting of the Committee in Paris in April 2000, the following Committee members were designated correspondents/contact persons to facilitate cooperation with the other PIARC Committees:

- C3 Technological Exchanges and Development  
Correspondent/CP: Gavin Cooper (South Africa)
- T Terminology  
Correspondent/CP: John Pauley (Australia)

In 2001 Committee C9 and Committee 15 met in Coolum, Queensland, Australia to plan for a seminar in a developing country – Cuba.

At Coolum a joint meeting was held with Committee 11 to discuss the economic evaluation of bridges. The discussion covered issues associated with difficulties of integrating economic and strategic information and technical information in determining intervention strategies for bridges. The participants agreed on the need to develop better tools to integrate economic and technical data as a key part of future bridge management.

The Committee conducted a joint seminar in a developing country with Committee 15 in Havana, Cuba 18-19 September 2002. Over 60 participants from all over the world attended the seminar “Institutional Strengthening and Financing for Road Administrations – Development Opportunities”. The first day was organized by Committee 15 and was devoted to institutional strengthening and procurement. The 2<sup>nd</sup> day was organized by Committee 9 and was devoted to financing. The Cuban Ministry of Transport organized a technical visit in conjunction with the seminar on 20 September 2002. Mr. Patrice Danzanvilliers, on behalf of Ms. Sherri Alston, chairperson of C9, chaired the Committee 9 session of the seminar. The Cuban Minister of Transport closed the session. The following presentations were made:

- *Prof. Henry Kerali (United Kingdom)* - Financing road infrastructure.
- *Christina Mahlberg-Calvo (World Bank)*  
Public-private partnerships for low volume roads.  
Public-private partnerships for highway management and financing – a toolkit.
- *Katarina Norén (Sweden, C9 member)* - Public-private and other innovative partnerships in financing infrastructure.
- *J.J. Smit (South Africa, C9 member)* - Using PPP to build a society.
- *Sven Ivarsson (Sweden)* - Managing of low volume roads.
- *Arpad Siposs (Hungary, C9 member)* - Motorway private financing in Hungary in the 90's.
- *John Robinson (United Kingdom)* - Public-private partnerships in England.
- *Sandra Zelaya (Honduras)* - Maintenance management in Honduras through Road Fund.

# MEETINGS AND TECHNICAL VISITS OF C9 2000-2003

The Committee Members representing the Host Country, in collaboration with the PIARC National Committees, organized the regular meetings of the Committee 9. The meetings lasted two days. On an average, 25 Members of the Committee 9 attended each meeting. At the Committee's opening plenary session, following introductions and a welcome address of the host organization, the Chair and the Secretaries informed participants about on-going activities of the World Road Association (PIARC) and presented communications from the Central Office and other PIARC Committees. After the plenary session, each of the three Sub-groups met to discuss their work areas. Each leader of the Sub-groups presented progress reports at the final plenary session and all Committee 9 Members were invited to comment on the reports and contribute to the work. There was a great deal of constructive discussion on the topics.

A preliminary agenda for the Committee 9 meetings was prepared by the Chair and communicated to the host Member. After arrangements had been completed, the Chair instructed the Secretaries to forward information on the meeting venue and the invitation to the meeting to the Committee members. Minutes of the meetings were prepared by the Secretaries, reviewed and approved by the Chair and then were sent to the Committee members. The overall organization and management of the regular meetings and the distribution of the relevant materials met the needs of the Members and the Corresponding Members.

Regular meetings and technical visits of the Committee 9 were held as follows:

1. Paris (France), April 2000
2. Antwerp (Belgium), July 2000 - Transport Facilities in Antwerp
3. Cape Town (South Africa), December 2000 - Transport Facilities in and around Cape Town
4. Prague (Czech Republic), 3-4 May 2001 - Surface transport in Prague
5. Coolumb, Queensland (Australia), 29 October – 2 November 2001 - Meeting with Strategic Theme Coordinator and Theme 4 Technical Committees - Provincial roadway system in Queensland
6. Ottawa, Ontario (Canada), 30 April – May 3, 2002 - Presentation from Deputy Minister of Transport Canada - Tour of Bombardier Facility
7. Havana (Cuba), 16 September – 20 September 2002 - Joint Seminar with C15 - Technical Tour of Cuban Transport Facilities
8. Budapest (Hungary), 14-16 May 2003
9. Durban (South Africa), 20 October 2003

An extra work session was held in Vienna, Austria (2-3 December 2002) to prepare the activity report, the introductory report and the report from sub-group 2.

**ROAD BRIDGES AND OTHER STRUCTURES  
(C11)**

**Activity Report 2000-2003**

# 1 - INTRODUCTION

Since the last World Road Congress in Kuala Lumpur, Committee C11 has held ten meetings and organised one seminar. The dates and locations of these meetings and seminar are as follows:

April 11 and 12, 2000	Paris (France)
July 10 and 11, 2000	Bern (Switzerland)
November 9 and 10, 2000	Paris (France)
April 26 and 27, 2001	Lofoten (Norway)
October 29 and 30, 2001	Coolum (Australia)

- (parallel meetings of C6, C9, C11 and C15, under the strategic theme of PIARC ST 4 - Management and Administration of the Road System)
- joint meetings with C6 – Roads Management and C9 – Financing and Economic Evaluation )
- participation in the PIARC/Austrroads seminar “Road Management within an Integrated Transport System” November 1<sup>st</sup>, 2001

March 4 to 6, 2002	Washington D.C. (United States)
June 11 to 14, 2002	Bangkok (Thailand) linked to the seminar “Management of bridges in Asian countries” – Bangkok, 12-13 June 2002
February 20 and 21, 2003	Chester (United Kingdom)
June 2 and 3, 2003	Bled (Slovenia)
October 21, 2003	Durban (South Africa) to be held prior to Congress

Approximately 20 members have attended the meetings on most occasions.

A seminar titled “Management of bridges in Asian countries” – Bangkok, 12-13 June 2002 was organized jointly with the Department of Highways of the Ministry of Transport and Communications, Thailand, the Road Association of Thailand, and PIARC/C11 in parallel with the PIARC/C13 Seminar on Management of Road Safety during the Exhibition of Intertraffic Asia 2002

A second seminar was planned to be held in Madagascar “Management of bridges in African countries” – Madagascar, 27-28 February 2003. Unfortunately, due to the situation in Madagascar in 2002, the decision to cancel this seminar was taken jointly by Madagascar representatives, and PIARC.

## 2 – TOPICS

The first meeting of the working group occurred in Paris in 2000 to identify the important issues to meet the goals of PIARC Strategic Plan, Topic Area 4 - Management and Administration of Road System pertaining to bridge performance. Specifically these topic areas referenced to this effort are :

- 4.1 Developing, improving and implementing asset management processes
- 4.2 Management and technology systems within an integrated transport system
- 4.4 Effective coordination between network managers, operators and the community
- 4.5 Making more efficient use of the road budget
- 4.8 Organizational structure and effective performance management within road administrations

To investigate the current status of bridge management systems used and performance measures employed, the Committee, in accordance with the aim of the strategic plan, chose the following three study topics :

Topics :

**1 – Asset management**

including Bridge repair under traffic

**2 – Performance management**

**3 – Bridge and structure conditions**

including rehabilitation actions of concrete bridges

Leaders :

J. Bjerrum (Denmark)

S. Troive (Sweden)

T. Ljunggreen

B. Stensvold (Norway)

M. Donzel (Switzerland)

G. Delfosse (France)

B. Hayes (UK)

G. Romack (USA)

P. Squires (South Africa)

I. Harazaki (Japan)

These form a consistent set of topics. They respectively aim at one of the three levels in charge of the management of bridges :

**Decision makers, owners and authorities in charge of the management of network:**

They have a vision where the management of bridges must be integrated into the management of the network.

**Authorities in charge of the management of bridges**

They need performance tools in order to define priorities at the level of the bridge stock, based on technical and also on economical criteria.

**Engineers in charge of the technical assessment of the condition of bridges**

They have to provide condition indicators, mainly based on the visual inspection and examination of the bridges.

Under this organisation in three topics, the study work on each topic was interrelated:

- Topic 1 was concerned by the harmonised management of roads and bridges, so it needs information provided by topic 2 regarding bridges ;
- Topic 2, for a bridge management based on technical and economical criteria, was mainly in charge of working on the economical aspect and it needed information provided by topic 3 regarding technical criteria.
- Topic 3 was in charge of defining technical criteria used to define priority of works.

Following the first meeting, the topic leaders, with the assistance of other individual members, have been working on developing the subjects.

The three topics relied primarily on the results of preliminary questionnaires, followed by complementary questionnaires sent to the members of the committee. Draft documents were prepared and refined at the subsequent meetings. The following members have generally attended the meetings and have contributed to the draft reports through valuable comments and written contributions.

B. Mahut (France) - **Chairperson**

I. Harazaki (Japan)

**English-speaking secretary**

**Members**

P. Squires (South Africa)

L. Coci (Australia)

E. Winter (Austria)

L. Didier (Belgium)

José Iglesias Garcia (Cuba)

M. Donzel ( Switzerland)

**French-speaking secretary**

A. Monforte (Mexico)

T. Ljunggren (Norway)

B. Stensvold (Norway)

J. Ciesla (Poland)

W. Walerych (Poland)

J. Bjerrum (Denmark)	E. Zabawa (Poland)
G. Romack (United States)	B. Hayes (United Kingdom)
G. Delfosse (France)	J. Collins (United Kingdom)
D. Konstandinidis (Greece)	A. Znidaric (Slovenia)
G. Kolozsi (Hungary)	S. Troive (Sweden)
M. Tabatabai (Iran)	H. Sato (Japan)
M. Romagnolo (Italy)	

**Corresponding members :**

T. Mendonça (Portugal)	N. Prapaitrakul (Thailand)
P. Matt (Switzerland)	M. Rajoelinantenaina (Madagascar)

**and Associate members :**

T. Nose (Japan)

Six reports to be published before Durban Congress in October 2003 or in the beginning of 2004, and one article published in Routes/Roads (N° 317 – January 2003) titled “Repair of bridges under traffic” have resulted from this work.

This activity report gives a brief outline of each of the issues. The descriptions cover the backgrounds of the study topics and some of the technical details.

## 2.1 TOPIC 1 : Asset Management

### Topic 1.1 Bridge Management in relation to Asset Management

PIARC Committee C11 has gathered valuable information from 29 central and local road administrations in 19 countries in Asia, Australia, Europe, North America and Africa regarding the actual degree of implementation of Asset Management (AM) systems, the basic ideas/philosophies behind already developed AM systems and systems under development and the exchange of data between AM systems and Bridge Management (BM) systems.

AM systems in this context include the overall management of all the road assets: pavement, bridges, tunnels and road furniture (guardrails, signs, lightning etc) and other assets within the road/bridge administration, e.g.: construction and maintenance equipment, real estate and human resources.

There is no world-wide official unambiguous definition of AM-systems, but OECD’s Expert Group on Asset Management Systems (IM1) and FHWA, Office of Asset Management of United States, have been dealing with this matter for some time and have more or less set the standard or approach for development of AM-systems. Therefore, in general, the study follows the work of OECD and FHWA.

The information on AM systems was collected from a Preliminary and a (detailed) Supplementary questionnaire in year 2001/2002. The questionnaires have been forwarded to C11 member countries and member countries of C6 Committee on Road Management.

The general philosophy and ideas behind the AM-systems reported appears from one of the replies from USA:

*“An AM system is bound by road administration goals and policies that reflect desired transportation system performance from both the administration and the customers’ perspectives. The system will have an inventory of the assets and a means to assess their condition and model their performance to enable the administration to identify infrastructure needs. Based on this information, the system will be able to identify options or alternatives for addressing the needs, which are analysed and evaluated on the basis of their cost-effectiveness using analytical tools and other optimisations techniques. Budget and resource allocation constraints are incorporated into the alternative evaluation criteria. Selected alternatives are included in the list of projects that will go into the administration’s short- and long-range plans. The final stages in the AM system process consist of implementing the projects and monitoring the resulting performance of the assets. ”*

24 out of the 29 road administrations have replied that they have implemented, intended to implement or helped other entities to implement AM systems. Only 5 had indicated they are not dealing with AM systems for the moment.

This study indicates that the growth of interest about development of AM-systems for the last 4-5 years has been remarkable, and it is anticipated that the interest will accelerate in the future.

The data exchanged between AM and BM systems are:

- location
- size/extent
- type/material
- age

and in some cases :

- the value of the bridges
- data on hydraulics
- load limit
- cost and repair history
- traffic information along the road and traffic volume.

The data on condition assessment and other preconditions that have been reported to be exchanged between AM and BM systems are :

- damage description
- condition mark
- maintenance/repair description
- maintenance/repair cost.

## Topic 1.2 Comparative Study on Bridge Management Activities

PIARC Committee C11 has gathered valuable information from 21 central and local road administrations in 20 countries or states in Asia, Australasia, Europe, North America and Africa regarding how their agencies perform different types of Bridge Management (BM) activities.

The information on BM-activities was collected from a Preliminary and a (detailed) Supplementary questionnaire in the year 2001/2002. The questionnaires have been forwarded to C 11 member countries and PIARC member countries.

The purpose of the study was to compare the performance of the most essential BM-activities. The activities in question include :

- inventory
- inspection (5 different types, including condition evaluation and damage assessment)
- priority-ranking of works
- carrying out operation, preventive maintenance or repair works
- skills and Training
- management of exceptional haulage
- measurements of user satisfaction
- measurements of personnel satisfaction
- research and development programs.

All the activities are compared regarding to the following parametres:

- philosophy
- method
- extent
- recording/storing of data
- frequencies
- organisation
- personnel skills
- cost.

For general comparisons the characteristics of the bridge stocks and road networks are also collected. The final report will be completed in 2003.

### Topic 1.3 Repair of Bridges under Traffic

The traffic management during repair or maintenance works appeared to be an issue of this topic Asset Management.

It had already been addressed by the Committee C11 during the work period 1988-1991. A survey was made and the results were published as a Committee report for the Marrakech Congress in 1991 (PIARC Reference 19.11.B). In addition, 33 case studies had been published under the title "Repair of Bridges under Traffic" (PIARC Reference 11.03.B).

It appeared that the Marrakech report covered the main aspects of the repair of bridges under traffic and that the principal conclusions were still valid. Therefore, it was decided to update the report using the experience of the Committee and to propose it as an article for Routes/Roads (N°317 - January 2003). This article, written by M. Donzel, covers all activities such as monitoring, maintenance, modification and renewal. It deals with:

- traffic restrictions (information policy and economic aspects),
- traffic arrangement and work safety,
- inspections and additional investigations (tools to work under traffic),
- general considerations on maintenance and renewal (such as the importance of planning, structural safety, temporary bridges),
- maintenance and renewal of bridge equipment (replacement of bearings, replacement of expansion joints, waterproofing, surfacing, structural renewal),
- feedback on bridge design in order to facilitate repair under traffic and minimize the maintenance,
- research and development.

## 2.2 TOPIC 2 : Performance Management

### Topic 2.1 Towards a Performance Management of Bridges

Historically, technical considerations were always dominant in structures management and the definition of priorities of works. More and more, in addition to these technical criteria, countries develop policies which takes much more into account :

- requirements of the users of the infrastructure which can be regarded as a “customer”;
- economic consideration for an optimised use of the public funds, and the justification in terms of best value for an increasing social demand in terms of safety of the roads.

Consequently new concepts and tools need to be developed.

PIARC Committee C11 has gathered valuable information from 18 central and local road administrations in Asia, Australia, Europe, North America and Africa regarding management systems, with questions about :

- requirements of the users, the infrastructures owners, the community
- management systems of the structures
- users cost and benefit, concept of cost over the lifespan (whole life costing)
- impact of the costs related to traffic
- safety (of the users, of the structure).

This preliminary questionnaire highlighted some particular questions that had to be investigated and discussed. So a second questionnaire mainly focused on whole life costing was provided (8 answers).

The purpose of whole life costing (WLC) is to compare the merits of alternative options for projects in a rational manner by taking account of all future costs in addition to the initial (construction) costs. Such comparisons are made while considering new projects, as well as during the life of a project when choosing management strategies.

The future costs considered in whole life costing generally include all maintenance, operating, decommissioning and replacement costs. Although the process is referred to as costing, all future benefits and income also need to be taken into account.

It is clear that such an approach is very attractive but its application to bridges is confronted to some difficulties, particularly linked to the very long life span of the bridges :

- Uncertainty of Maintenance Needs: bridges are traditionally long-life structures, their engineering life being generally in excess of 100 years. Trying to determine the maintenance needs of bridges being built today for the whole of their life must therefore be considered as a doubtful exercise.
- Uncertainty on traffic and loads evolution
- Discount rate: discounting of future costs and benefits to present value, using a high discount rate (e.g. 6% in a great number of countries) has the effect that all calculations, beyond about 30 years or so, become insignificant. As such, WLC is particularly appropriate for short life projects. Long life projects, such as highway structures, pose a number of difficulties regarding WLC.

The report analyses these difficulties, gives example taking into account economic considerations.

## Topic 2.2 Survey on Bridges Management in Asian, Australasian and African countries

In the framework of Topic 2, a special questionnaire was disseminated respectively to Asian and Australasian countries and to African countries in view of the seminars scheduled. The aim was to gather information in order to have a better knowledge of the bridge management in these countries, the difficulties encountered and the needs.

The questions were about :

- stock (bridges, retaining walls)
- condition of the stock
- definition of work priorities
- organization (who does what ?)
- training
- management policy
- problems encountered.

The results of this questionnaire and the analysis of the answers are presented in a report.

## 2.3 TOPIC 3 : Bridges and Structures Condition

### Topic 3.1 Indicators for Bridge Performance and Prioritization of Bridge Actions

To investigate the current status of bridge management systems used and performance measures employed, a detailed questionnaire was developed by the group in charge of this topic and sent to PIARC member countries. Twenty-two member countries responded to the initial survey, and a customized follow-up questionnaire was prepared and issued to the respondents in 2001. A first draft report was presented to the Committee in October 2001, and a second draft report was given at the Committee meeting held in Washington, DC in March 2002.

The aim of the survey was to establish the effectiveness of current bridge management systems in two specific areas :

1. Criteria used to assess bridge performance, with specific reference to :
  - safety
  - serviceability including functionality
  - structural condition (adequacy/deterioration).
  
2. Indicators considered when setting priorities for repair, rehabilitation and replacement of bridges, including such factors as :
  - damage and defects
  - usefulness for public use
  - cost benefit to the network owner and road user
  - effectiveness of maintenance carried out.

The report presents feedback on the following :

- the findings of the survey
- the effectiveness of Bridge Management Systems
- guidance is provided for performance measures that could be used both for basic systems and for those more advanced.

This information should be beneficial to bridge owners in documenting and tracking the performance of road bridges and other structures. It complements a previous PIARC Report titled "Towards an Indicator of Health Conditions of Bridges" (PIARC Reference 11.05.B). In addition, the information obtained proved very useful to the other two working groups in C11 studying and evaluating bridge economic issues and asset management systems.

The findings also complement the work of C11 Committee report entitled “Socio-economic Demands and Modifications of Bridges” (PIARC Reference 11.07.B).

### Topic 3.2 Survey on Rehabilitation Actions of Concrete Bridges

The purpose of the study is:

- To identify and evaluate the effective current practice for various bridge rehabilitation actions which have broad applicability for a majority of bridges;
- To provide the bridge engineer with practically informative examples of various bridge rehabilitation alternatives.

The questionnaires have been forwarded to C11 member countries. The valuable information on effective rehabilitation actions was collected from a preliminary and a supplementary questionnaire from 9 road administrations in the year 2001/2002.

This report presents a review of rehabilitation actions for concrete bridges structure and comprehensive directions of future research activities based on 22 examples of actual practices of various rehabilitation. This review covers the following main points:

1. Principal types of damage and defect, and causes in concrete bridge components;
2. Inspection, investigation and diagnosis;
3. Methodology for selection of rehabilitation actions;
4. Rehabilitation action
  - to cope with salt/chloride attack, freeze/thaw, overloading, poor drainage and poor execution and other defects;
5. Necessary research and development in the field of:
  - inspection to supplement visual inspection and investigation of the durability of concrete material with various non-destructive testing as a part of broad approach
  - rehabilitation and strengthening techniques.

## 3 - SEMINARS

Two seminars on bridge management were scheduled :

1. in Bangkok, dedicated to Asian countries
2. in Madagascar, dedicated to African countries.

Unfortunately the second one was cancelled due to the situation in Madagascar in 2002.

In view of these two seminars, a specific questionnaire was sent to Asian and Australasian countries and to African countries respectively. The aim of this inquiry was to get a good description of the situation and of the problems confronted on bridge management in these regions.

The results of the inquiries in Asian and Australasian countries were presented at the seminar in Bangkok.

They are part of the proceedings of the seminars and also of the report from topic 2.

### 3.1 “Management of bridges in Asian countries” Bangkok, 12-13 June 2002

This international seminar was organized jointly with the Department of Highways of the Ministry of Transport and Communications, Thailand, the Road Association of Thailand, and PIARC/C11 in parallel with the PIARC/C13 Seminar on Management of Road Safety during the Exhibition of Intertraffic Asia 2002. A total of 447 participants from all over the region attended these two seminars on Management of Road Bridges in Asian Countries and Management of Road Safety. Approximately 160 representatives from more than 10 Asian and Australasian countries attended the seminar on bridges.

**Target Audience:** Decisions-makers, owners, operators in charge of the management of bridges

**Objectives:**

- Facilitate the expression of the needs of Asian countries in the field of bridges management;
- Advise on the principles, concepts and strategies of effective bridge management based on individual countries situations;
- Exchange knowledge and experiences of bridge maintenance (inspection, assessment, repair);
- Provide appropriate and practical recommendations for the bridge maintenance in Asian countries

There were seven Technical Sessions which included the following topics :

- Situation of Stock, Inventory, Maintenance, Problem of Management System of Bridges and Other Structures in Asian countries
- Implementation of Bridge Management System
- Evaluation of Bridge Condition
- Inspection and Monitoring Techniques
- Maintenance, Repair, and Modification of Bridges
- Identification of Necessary Research and Development
- Maintenance of Long-span Cable-stayed Bridges

All the C11 members who regularly attend the C11 meetings were involved as speakers or chairs or secretaries of sessions.

Thanks to the very efficient management by the Thai Organising Committee, Mr. I. Harazaki from C11, and the help from Mr Colin Ellis C3, the seminar was held successfully.

Proceedings of the seminar presentations of speakers have been published by the Local Organising Committee in Thailand .

A report of the seminar has been provided by C11. It describes a synthesis of the sessions, a synthesis of the evaluation of the seminar by participants and some general recommendations for organising PIARC seminars.

### **3.2 “Management of bridges in African countries” Madagascar, scheduled on 27-28 February 2003**

A face to face contact with Mrs Celestine Razanamahefa, *Directeur des Ouvrages d’Art, des travaux maritimes et fluviaux* of the Ministry of Public works of Madagascar was organized in Paris in October 2001 in order to work out the details of the program and the coordination between C11 and the host country. Unfortunately due to the situation in Madagascar in 2002, this seminar was cancelled.

### **3.3 Participation in the seminar in Australia**

The seminar "Road Management within an Integrated Transport System" organized by PIARC and Austroads took place on 1st November 2001. The participants were Australian engineers and members of the PIARC-Committees C6, C9, C11 and C15.

An overview of the C11 work program was given, and Mr. Bjerrum and Mr. Collins presented the activities of C11 on Topic 1 - Asset Management.

# 4 - EXCHANGE OF INFORMATION

## 4.1 Exchange of Information within C11

C11 attaches great value to its role as a forum to exchange of information.

During C11 meetings, presentations by members, followed by discussion, on items selected in advance are organised. These items can be either relevant to technique, or to management. List of presented topics from 2000 to 2003:

- General information on Swiss National Highway System and its engineering structures M. Donzel (Switzerland) – C11
- Weigh in motion Znidaric (Slovenia) – C11
- Bridge management in France G. Delfosse (France) – C11
- Bridge management in Norway – Presentation of BRUTUS B. Stensvold (Norway) – C11
- Strengthening of bridges in Wales, UK J. Collins (UK) – C11
- Bridge management in Australia Dr. Fenwick (Australia – member of C18)
- Collapse of a bridge in Portugal M. Louca-Ferreira (Portugal) C11
- Compared analysis of bridge management methods in Europe (BRIME Project) B. Mahut (France) C11
- Asset Management Mr. F. Botelho, Office of Asset Management, FHWA
- Bridge Management in the US G. Romack (USA) - C11 and the Director, Office of Asset Management, FHWA
- Asset management research Mr. C. Jencks (USA), Transportation Research Board
- Woodrow Wilson Bridge Project Virginia DOT -Mr. Fawas Saraf (USA), Ms. Norine Walker, Mr. Tom Jenkins
- Leonard de Vinci Bridge T. Ljunggren (Norway) – C11
- Herning Foot Bridge J. Bjerrum (Denmark) – C11
- Repair of Masonry G. Delfosse (France) – C11

At the program of the technical visit at Turner-Fairbank Highway Research Center, FHWA, presentations were given by TFHRC:

- Bridge Management
- Bridge management research activities at TFHRC- Messrs. Steve Griff & Bill Grenke, Roy Jorgenson & Assoc.
- Exploratory data analysis and data mining of National Bridge Inventory Dr. Chris Nutakor
- Web based Query System for National Bridge Inventory
- Nondestructive evaluation research activities at TFHRC- Dr. Lakshmi Viswanathan
- Study of limitations of visual inspection Dr. Glenn Washer
- Evaluation of stress concentration with thermo-elastic imaging Dr. Paul Fuchs
- Investigation of nuclear methods for bridge inspection Dr. Habib Saleh
- Test in laboratory on concrete reinforced structures with composite M. Romagnolo (Italy) – C11
- Bridge management in the area of Vienna E. Winter (Austria) – C11
- Replacement of Kintai Bridge I. Harazaki (Japan) – C11
- Repairs to Barnes Bridge Manchester with carbon fibre plating G. Marshall and N. Thoday Parkman (UK)
- The owners perspective in probability-based bridge management J. Bjerrum (Denmark) – C11
- Development of a resource accounting compliment bridge management system J. Collins (UK) – C11

## **4.2 Exchange Outside C11**

### **With other committees of PIARC**

Taking advantage of the PIARC - TS 4 meetings in Coolum (October 2001) joint meetings were organised with :

- C6, for some exchanges with this Committee which deals with road management,
- C9, in order to have an exchange of views and suggestions on economic considerations.

### **With TRB**

A joint session TRB-PIARC has been organized in January 2003 on Asset Management with the participation and a presentation on C11 activities by G. Romack (USA).

**PERFORMANCE  
OF ROAD ADMINISTRATIONS  
(C15)**

**Activity Report 2000-2003**

# INTRODUCTION

The World Road Association (PIARC) has established a Technical Committee, C15 Performance of Road Administrations (RA's), to undertake activities in accordance with the PIARC Strategic Plan 2000-2003.

C15's goal is to improve the performance of RA's in the provision, operation and management of road infrastructure and its use in accordance with best practice.

# TERMS OF REFERENCE

The Terms of Reference of C15 Committee are as follows:

**To identify and disseminate information relating to:**

- New management and organization modes of Road Administrations (RA's),
- Public/private and public/public management and risk sharing,
- New public road authority competencies,
- Internationally comparable measures of Performance Indicators of the Road System and RA's,
- Effective performance management systems and processes and tools to evaluate performance,
- Tools for improving optimal resource allocation,
- Procurement methods for works.

# COMMITTEE MEMBERS

The following people appointed to the Committee attended meetings and/or made contributions to discussions and report preparation.

Miranda Douglas- Crane (Australia), Chair  
Laurent Donato (Belgium), French-Speaking Secretary  
J.H. Rick Van Barneveld (New Zealand), English-Speaking Secretary

## Working Group 1

John Robinson (United Kingdom)  
Laurent Donato (Belgium)  
Miranda Douglas-Crane (Australia)  
Manfred Hessle (Austria)  
Tapani Maata (Finland)  
Rui Manteigas (Portugal)  
Justine Rasoavaniny (Madagascar)  
Fernando Rodarte (Mexico)  
Ludmila Vodzinska (Slovak Republic)  
Connie Yew (United States)

## Working Group 2

Paul Van der Kroon (the Netherlands)  
Lars Bergfalk (Sweden)  
Maurice Boucher (Canada-Quebec)  
Rudolf Dieterle (Switzerland)  
Kjell Haaland (Norway)  
Mladen Lamer (Croatia)  
Pascal Lechanteur (France)  
Jerzy Pych (Poland)  
Jesús Rubio (Spain)  
Yvan Verbakel (Belgium)

## Working Group 3

Niels Christian Skov Nielsen (Denmark)  
Albert Bourrel (France)  
Maria-Pia Cerciello (Italy)  
Eric Ghilain (Belgium)  
Ijaz Khan (Pakistan)  
Steve Lee (United Kingdom)  
Erdene Oyunchimeg (Mongolia)  
Omar Rodriguez Comes (Cuba)  
Jan Svarc (Czech Republic)  
J.H. Rick Van Barneveld (New Zealand)

# WORK PROGRAM AND ORGANISATION

At the meeting in November 2000, the Committee appointed a Steering Committee, comprising the Chair, three working group leaders and the French and English-speaking secretaries. The Steering Committee was established to guide the work of the Committee.

A C15 website was established to facilitate the effective delivery of the work program and to store C15 documentation as well as references/articles, relevant to the Committee's work.

In the first two meetings, the Steering Committee developed clear operating principles, procedures and arrangements. It also documented the roles of the Chair, Working Group Leaders, Secretaries and participants.

The C15 Terms of Reference provided a clear focus for the Committee's work. In addition, the PIARC Executive requested all Committees to address the issues of environment and safety and to pay particular attention to developing country needs within their work program.

In considering the approach to take in relation to its work, the Committee tried to determine how it could best provide focus to the Committee work program and make the work relevant and useful to all PIARC member countries. Since RA's cannot operate in isolation, we decided we needed a framework on which to test our ideas, test our research and map our experience. We reviewed the literature and engaged Dr. John Cox to do some work on Road Network Development.

After considerable discussion by the Committee, a paper titled 'The Economic, Social and Technological Forces Shaping RA's' was developed. The purpose of the paper was to set out the key forces shaping the overall context within which RA's operate and to outline the range of responses that are taking place to meet the pressures. This set the framework on which the rest of our work was tested and developed.

A shortened version of the paper titled 'The Economic, Social and Technological Forces Shaping RA's' was published in the July 2001 edition of the PIARC Routes/Roads magazine.

The three working groups used this initial framework as a reference point for their work. The main areas of their work are as follows:

- 1. Positioning of RA's**
  - Trends impacting RA's
  - Trends in organizational modes
  - Interactions with central Government and other network providers
  
- 2. Internal Performance**
  - Management framework for RA's
  - Case Studies on Procurement, Quality/Benchmarking and building capability to meet future needs
  - Developing country seminar on Institutional Strengthening
  
- 3. Performance Management**
  - Matching requirements to road user and stakeholder needs
  - Performance indicators for developing and developed countries
  - Private/public partnerships

## MEETINGS

C15 Committee held the following meetings

Paris (France)	April 2000
Leiden (Netherlands)	November 2000
Rome (Italy)	May 2001
Coolum (Australia)	November 2001
Tromsø (Norway)	May 2002
Havana (Cuba)	September 2002
Lisbon (Portugal)	January 2003

# PUBLICATIONS/EVENTS

## Publications

Articles in Routes/Roads (World Road Association – PIARC)

- 'The Economic, Social and Technological Forces Shaping Road Administrations,
- 'Internal Performance Improvement'
- Some Typical Problems and Solutions of Outsourcing in Developing Countries

Article in Transport Research Record (Transport Research Board - TRB)

- 'The Economic, Social and Technological Forces Shaping Road Administrations

PIARC Reports 2003

- 'The Economic, Social and Technological Forces Shaping RA's'
- 'Role and position of Road Administrations in a Changing Environment'
- 'Defining the Birth, Growth, Upgrading and Mature Phases in Road Transport Infrastructure Development'
- 'Internal Performance Improvement for Road Administrations'
- 'Procurement of Works, Goods and Services for Road Administrations'
- 'Improving the Performance of Road Administrations - Best Practice Case Studies'
- 'A Conceptual Framework for Road System and Road Agency Performance Indicators'
- 'Comparative Road Sector Performance in Developing and Developed Countries Phase One'

## Events

C15, in conjunction with C9, planned and conducted a developing country seminar, entitled 'Institutional Strengthening and Financing for RA's – Development Opportunities' in Cuba, September 2002.

# REPORT FROM EACH WORKING GROUP

## Working Group on Positioning of RA's

The activities of the Working group centred on the role and position of the RA.

The work built upon a selected group of items and trends found by the previous C15 committee. The main focus was on trends in the role and position of the RA in relation to the government, private sector and users, and less so towards other transport modes. Also much attention has been given to the reasons behind these trends ('drivers') and the relative impact of such drivers. The most recent experiences of Road Administrations were reviewed to identify common lessons and conclusions.

Various activities were combined to form the basis of this report. Firstly, the group drafted a questionnaire for RA's, identifying basic information, trends and the impact of external drivers. This questionnaire was sent first to members of C15. In a later stage, various other (developing) countries were approached.

Secondly, based on the initial results from the questionnaire, a framework paper was prepared by the Steering Committee for C15, and more detailed information on recent changes collected from a range of RA's.

Results from discussion of this information were used to focus on the various aspects of the role and function of RA's, in particular in relation to the external drivers.

These drivers, first defined in the discussion paper from the Steering Committee, were grouped as follows:

- economic,
- environmental and safety,
- political,
- social, and
- technological.

A discussion note was drafted and debated via a videoconference in March 2002 involving a selected group of member countries of C15. The remarks made in this discussion were incorporated in the paper, which sought to further elaborate on the framework.

The revised paper presented to the C15 meeting in Tromsø, Norway in May 2002, formed the basis for descriptions by various countries on the relative importance of each of the external drivers on the role and position of their Road Administration. The group's final report rounds present the working group's conclusions and examples of the experiences of RA's in terms of current changes in role, function and position and the main external drivers behind these changes. The report aims to help to draw lessons for RA's around the world in dealing with these drivers, and their impact to enable RA's to better prepare themselves to meet the challenges ahead.

## **Working Group on Internal Performance**

At its first meeting, the work group decided to do two main pieces of work relating to best practice for improving road administration performance, and procurement of goods, services and works.

The Working Group also decided that outline or framework reports identifying the key trends in best practice on internal performance improvement and procurement respectively, should be prepared for discussion at the developing country workshop planned for 2003. This approach was adopted to allow the initial work of the group to be tested by developing country participants so that the final published report and the conclusions presented to the Durban congress, would be robust.

The development of the summary report on current best practice principles in relation to internal performance improvement was completed in draft form for the Working Group meeting in Leiden, the Netherlands, and progressively enhanced with input from the full committee until its adoption for publication at the September 2002 meeting in Cuba.

At its meeting in Coolumb, Australia, in November 2001 a draft of the complementary report on Procurement of Works, Goods and Services for RA's was reviewed and it was also progressively enhanced until its adoption in September 2002.

In parallel with the preparation of these two overview reports the Work Group completed the assembly of a compendium of some 20 case studies which provide a valuable insight into emerging best practice in relation to the key opportunities for performance improvement identified in the two framework reports.

The group took principal responsibility for facilitating the Development Country Seminar in September 2002 at Havana, Cuba. The seminar successfully attracted some 20 participants from low or middle-income countries and allowed the Committee's key conclusions in relation to internal performance improvement and procurement to be reviewed and refined. Invited presentations from developing country representatives on Committee C15 and known to members provided a robust context for two interactive workshop sessions facilitated by Committee representatives.

The feedback from the participants confirmed the value of the Committee's work and the huge support the Cuban Organizing Team is acknowledged as an important factor in the workshop's success. It is, however, Committee C15's view that the effort and commitment required to successfully run this type of event is not sustainable unless PIARC develops stronger support systems and resources.

## **Working Group on Performance Management**

There has been considerable work done in the past by PIARC and the OECD on how to measure the outputs from RA's and their effective management. The Working Group benefited from members who had been involved in the previous work and who had considerable direct experience. At the World Congress in Kuala Lumpur member countries said that they "*were having difficulty identifying indicators that were meaningful and measurable*".

The Group was asked to focus on two strategic themes namely, "*identify internationally comparable measures of performance of the road system and RA's*" and to "*identify and disseminate effective performance management and tools to evaluate performance with these frameworks*". In addition, the Group was asked to take a special interest in the performance of Public Private Partnerships (PPPs).

The Group started by reviewing the work already published and confirmed the Kuala Lumpur findings. A large number of useful indicators were identified but these were largely output based and based on experience from those managing well-developed road networks. Members of the Group spoke from their own experiences and it was decided to attempt to identify the most important indicators.

At the meeting in Leiden (November 2000) a paper was discussed that used the C15 work on 'The Economic, Social and Technological Forces Shaping RA's' to group the most important performance indicators and start to match these to the stages of road network development. This work was further developed at the Rome meeting.

The Rome meeting (May 2001) was also the venue for a presentation from Italy on the use of PPP for the management of parts of their road network. An integral part of their management system is their unique approach to the measurement of performance.

Coolum was the venue for considerable progress to be made with outlining a conceptual framework for Performance Indicators and to agree a simplified approach to the grouping of indicators according to outcomes and the development stage reached on the road network (Birth, Growth, Upgrading and Maturity).

The draft Conceptual Framework paper was tabled in May 2002 at Tromsø. It builds on the simplified approach by laying down the principles behind the Framework and describes and defines sets of indicators that are measurable. The Framework contains an annex providing a Toolkit for managing the indicators.

The Conceptual Framework report was well received by the whole committee at the meeting in Cuba. And has been published as the main output from the Working Group.

In addition to the Conceptual Framework Report, the Working Group has produced a UK case study of PPP that has been placed on the PIARC web site. This case study formed the basis of a presentation to the Developing Countries Seminar in Cuba.

The Working Group has also contributed to C15's library of case studies. The Working Group has produced a report titled "Comparative Road Sector Performance – Phase One".

# **APPROPRIATE LEVELS OF ROAD AND ROAD TRANSPORT DEVELOPMENT**

D. Zaini (Malaysia)  
ST5 Coordinator

Under the broad topic of the Strategic Theme on Appropriate Levels of Road and Road Transport Development, projects were undertaken focusing on topics related to access to mobility as a basic social service to the population at large. This theme was aimed at targeting developing countries and countries in transition where the developments of rural infrastructures are still scarce. This theme direction also focused on ways of dissemination of information and the methods of technology transfer using some of the projects like Technology Transfer Centres and the World Interchange Network (WIN), and Public Consultation.

The main achievements and result of Technical Committees activities can be summarized as follows:

The C20 Committee on Appropriate Development reviewed the methodologies used throughout the world to identify and measure non-economic benefits of road infrastructure in developing countries through the Action Plan No. 1. The committee reviewed successful practices for providing basic access against the many limitations in implementing projects. A draft list of experiences from countries like Morocco, Mexico, including the World Bank and PIARC was discussed to assess the methods of economic evaluation of projects. Action No. 2 on the other hand, recommended the best practice to incorporate non-economic benefits in transport investment evaluation.

Action 3 of this committee discussed about providing access within resource constraints. This entails reviewing the successful practices, i.e. the methodological approach to establish appropriate standards which took into account the local resources, socio-economic factors, technology options, resource costs, financial social economic delivery options, traffic characteristics, adaptability and the evolution of needs over time. Reports on a number topic including standard/designs, financing/costing, mode of delivery, training and maintenance were prepared.

Three working groups were formed under the C3 Technical Committee on Technological Exchanges and Development. The task carried out by working group 1 was on the training towards social and economic development whilst the working group 2 undertook investigations on technology transfer, that is, on ways to improve access to technology. The findings, however indicated that the various means of technology transfer identified were somewhat varied.

Technology Transfer Centers (TTC) have been formed in countries like Burkina Faso, Bangladesh, Mongolia, Cuba, Chad, China, Tanzania, Madagascar and India. These were through the concerted efforts of TTC Managers and the countries' First Delegate. It was felt that a good liaison between TTC Managers and PIARC first Delegate of the country must be established to ensure its effectiveness. Overall, a number of nine (9) seminars were organized by the C3 Technical Committee as part of its program on dissemination of information.

The C2 Technical Committee on Public Consultation met five times over the last three years to formulate plans and direction towards their strategic objectives. Projects include presentation of papers to carry out an overview of the subject. These include papers entitled: “*Organised Road Management - An Integrated System for Optimised Management of Road Networks*” in the context of public participation. A presentation based on the Romanian model for road system management was made. An overview of the Japanese road management experience focused on performance indices to ensure transparencies and customer satisfaction as well as various media mechanisms.

Projects undertaken through the activities of working groups under this Strategic Theme direction by the respective technical committees had focused on topics that are related to this theme. A substantial amount of progress has been made during the present four-years’ strategic theme cycle.

**COMMUNITY CONSULTATION  
(C2)**

**Activity Report 2000-2003**

# LIST OF MEMBERS OF THE COMMITTEE C2 WHO TOOK PART IN THE ACTIVITIES

## Chairman - secretariat

Willy Burgunder, Switzerland (Chairman)  
Mark Elford, Australia (English-speaking secretary)  
Kurt Kesteloot, Belgium (French-speaking secretary 2000 – End of 2001)  
Baudouin Serruys, Belgium (French-speaking secretary)

## Topics

Mark Elford, Australia (Introduction, Overview)  
Istvan Bakonyi (Communication)  
Ganief Fish, South Africa (Consultation)  
Hubert Resch, Austria (Participation)

## Corresponding member for terminology

Ioan Druta, Rumania

## Members who took part in C2 meetings

M. Cairoli, Italy; Philippe Chanard, France; Ioan Druta, Rumania; Maurizio Lieggio, Italy; Rita Piirainen, Finland; R. Randrianarisoa, Madagascar (corresponding member); Siegfried Rinke, Germany; M. Rolla, Poland; B. Ssebugga-Kimeze, Uganda; Tseden-Ish Togtmol, Mongolia; Tetsuo Yai, Japan

# THE WORK PROGRAMME AND ITS ORGANIZATION

## Background

The Technical Committee C2, «Community Consultation», was established by the PIARC Congress held in Kuala Lumpur in 1999. The topics included in the terms of reference of C2 had already been treated to varying degrees by other PIARC Committees (C4, C10, C14), though not always using the same definitions. Accordingly, it was necessary to begin with a strict delineation and demarcation of the topics.

As C2 was a new committee, a certain amount of time was clearly needed to become acquainted with the PIARC organization and working methods. The work of the committee was not facilitated by changes in membership (person in charge of Strategic Topic ST 5, person in charge of Communication Topic, French-speaking secretary) and a frequently low level of attendance at working meetings.

## Content orientation

Bearing in mind the required demarcation of topics, the method adopted by C2 for Durban was to draw up only one report consisting of the related parts, preceded by a theoretical overview. From the point of view of content, the demarcation was based on the degree of involvement of those concerned with road projects, ranging from simple unilateral information to full participation in the process (Communication – Consultation – Participation). The fact that the Committee was assigned the title «Community Consultation» could be misleading, as this reflects only a part of the range of possibilities for involvement of the parties concerned. However, from the point of view of content, the naming was significant, particularly as it should be understood as referring to the thrust of the work rather than to any precise description of its remit.

## **The planned result**

C2 organized its schedule in such a way that, in the period 2000-2003, a PIARC Report was produced, setting out the theoretical bases and placing the emphasis on instrumental possibilities. In a following period, the Committee would like to develop an electronic platform providing a direct opportunity to access the various instruments at the different project and planning stages of road schemes, thus creating a powerful new aid for road authorities and political decision-makers. It was with such a goal in mind that, in tandem with the preparation of the PIARC Report for the Durban Congress, a possible electronic structure was worked out which could be developed during the period 2004-2007, were the Committee to be so instructed.

## **The work carried out**

The Committee started out by holding an initial meeting in Rabat to lay down the outlines of organization and content. The necessary knowledge was then obtained by means of a detailed questionnaire, permitting a comparative analysis of the conditions and instruments applying in the participating countries

During the next stage, four members each assumed editorial responsibility for one part of the overall report. The drafts were then discussed at a total of seven further meetings (held in Paris, Port Elizabeth, Berne, Antwerp, Adelaide, Budapest and once again in Berne) to provide the basis for the final report presented to the Durban Congress.

# THE ACHIEVEMENTS

The PIARC Report for the Durban Congress was the one concrete product to emerge from this period of work. As the emphasis needed to be placed clearly on the preparation of the instrumental bases, it was not useful to organize a seminar in one of the developing countries. Though the outcome of the work of C2 will be of great value to the developing countries in the future, the first step was to establish a solid platform. With that objective in mind, the period was treated by C2 as a means of laying the foundations for future achievements.

Through the work of the Committee, the members had the benefit of most enlightening presentations of practical examples by I. Druta (Rumania), T. Yai (Japan), and Ph. Chanard (France). In addition, members gained on-the-job experience through extensive field visits: Port Elizabeth (development of a new industrial district), Antwerp (IT centre in Namur), Adelaide (relief motorway with alternating traffic directions) and Budapest (new stretch of motorway in Eastern Hungary).

**TECHNOLOGICAL EXCHANGE  
AND DEVELOPMENT  
(C3)**

**Activity Report 2000-2003**

# 1. COMPOSITION OF THE COMMITTEE AS OF DECEMBER 31, 2002

## Members

**President** Oscar de Buen Richkarday (Mexico)

**Secretaries** Johan Liebetrau (South Africa)  
Jean-Philippe Lanet (France)

## Members

Nazir Alli (South Africa)	Mohamed Jellali (Morocco)
Klaus Gruning (Germany)	Enrique Leon de la Barra (Mexico)
Michel Servranckx (Belgium)	Dashdorjiin Sarandulam (Mongolia)
Bertrand Guelton (Belgium)	Kjell Levik (Norway)
David T. Olodo (Benin)	P.W. Ssebanakitta (Uganda)
Marcel L. Lavigne (Canada)	Ijaz Khan (Pakistan)
Jean Mathieu Mbaucud (Congo Rep. )	John P. Boender (The Netherlands)
Fidel Delgado Pino (Cuba)	René Vaandrager (The Netherlands)
Jasper Kyndi (Denmark)	Aleksandra Hutnik (Poland)
Ricardo Diaz-Zoido (Spain)	Maria Fatima Pinto (Portugal)
Stephen Gaj (United States)	Jiri Kubita (Czech Republic)
Olli Nordenswan (Finland)	Mihai Iliescu (Romania)
Michele Cyna (France)	Colin Ellis (United Kingdom)
Tamas Nagy (Hungary)	Peter Pengal (Slovenia)
Prabeer K. Sikdar (India)	Lennart Axelson (Sweden)
Siavash Khodabakhsh (Iran)	André Gilles Dumont (Switzerland)
Piero Maggiorotti (Italy)	Jean-Baptiste Klamti (Chad)
Eiki Aramaki (Japan)	Kingstone Gongera (Zimbabwe)
Richard Randrianarisoa (Madagascar)	Nelson Kudenga (Zimbabwe)
Dato' Ir. Chua Soon Poh (Malaysia)	Ashok Kumar (World Bank - India)

## Corresponding Members of C3

Abdelnacer Kalli (Algeria)	Mario Fernandez (Chili)
Farouk Chiali (Algeria)	Behnam Djenabi (Iran)
Rosa Serratore (Australia)	Moha Hamaoui (Morocco)
Johann Pippich (Austria)	Victor Carneiro (Portugal)
Wolfgang Haslehner (Austria)	Teeracharti Ruenkairergsa (Thailand)
Jacques Menard (Canada-Québec)	Fedir Horcharenko (Ukraine)

## Corresponding Members of Other Technical Committee at C3

C1 - Marta Alonso (Spain)	C11 - Leo Coci (Australia)
C2 - Ioan M. Druta (Romania)	C13 - Michel Peeters (Belgium)
C4 - Gary Liddle (Australia)	C14 - Hari Baral (France)
C5 - Pierre Schmitz (Belgium)	C15 - Ludomir Szubert (Poland)
C6 - Oscar Gutiérrez Bolívar (Spain)	C16 - Michel Ray (France)
C8 - Rudolf Bull – Wasser (Germany)	C19 - Jozsef Palfalvi (Hungary)
C9 - Brian Alexander (South Africa)	C20 - Abdennebi Rmili (Morocco)
C9 - Koos Smit (South Africa)	

## 2. WORK ORGANIZATION

### Background

At the XIXth World Road Congress held in Marrakech (1991), Technical Committee C3 was established to function both as a technology transfer resource to PIARC member countries, particularly developing countries, and to serve as a liaison to other PIARC Committees to identify opportunities for further transfer of technology

For the period 1996-1999, the Executive Committee requested C3 to perform the following activities:

- identify priority needs of developing regions for roads and road transport;
- formulate and recommend practical means to respond to priority needs;
- strengthen and develop technical exchange and cooperation between emerging countries and between developing and industrialized nations;
- collaborate with other PIARC Committees, under the aegis of the Executive Committee of PIARC to ensure better response to the concerns and particular needs of emerging nations.

To accomplish this mission, C3 undertook various activities and identified the following topics as suitable for the future PIARC work:

- opportunities for improving the technology of technology transfer:
  - assessment tools for PIARC technology transfer products and programs;
  - identify future role of World Interchange Network and other support tools;
  - promote training in technology transfer formation;
- opportunities for improving outreach to emerging countries:
  - integrate needs of emerging countries into PIARC Committees agenda;
  - promote regionally based partnerships;
  - promote continuity of participation;
  - C3's role in serving other PIARC Committees.

## Technical Committee Organization

For the period 2000-2003, the C3 Technical Committee has followed the orientations and guidelines of the PIARC Strategic Plan for this period. These are:

- continue identification / coordination with PIARC Technical Committees on advances in the "State of the Art",
- continue identification of methods of successful technology transfers,
- facilitate identification of needs among developing countries,
- supplement the training of road engineers with a human and social facet (sociology and social psychology).

During these four years, C3 activities have been organized in the following five working groups:

### Working Group 1: Training directed towards social development

Members: Richard Randrianarisoa, André Gilles Dumont, Kjell Levik, René Vandrager, J.M. Mbaucard , S. Khodabakhsh, Klaus Gruning, Jean-Philippe Lanet, Johan Liebetrau, Piero Maggiorotti.

### Working Group 2: Technology of Technology Transfer

Members: Michel Servranckx, Claire Monette, Jacques Menard, Bertrand Guelton, Ricardo Díaz-Zoido, Lennart Axelson, Eiki Aramaki, John Boender, Daniel Hargreaves, Jean-Philippe Lanet, Kjell Levik, Olli Nordenswan.

### Working Group 3: Evaluation of PIARC Products

Members: Stephen Gaj, Marcel Lavigne, Enrique León de la Barra, Colin Ellis, John Boender, Olli Nordenswan and Jiri Kubita.

### World Interchange Network (WIN):

Members: Claire Monette, Daniel Hargreaves, Bertrand Guelton, Ricardo Diaz Zoido.

### Project P3

Members: Colin Ellis, Stephen Gaj, Jean Philippe Lanet, Ricardo Diaz-Zoido, Peter Ssebanakitta, Richard Randrianarisoa, Nobuhiko Takagi.

## Meetings

To accomplish its activities, the Committee met at various times in the following places:

Rabat, Morocco (Joint Meeting with ST5 to initiate activities according to PIARC's Strategic Plan for 2000-2003)

During this meeting, PIARC'S vision, mission and the new structure of the Committees was presented, in particular the five strategic themes and the way in which the different committees were grouped linked to each theme.

At this meeting, the activities of all Technical Committees, C3 included, were set in perspective and the work program of the technical committee was outlined. After this meeting, the Executive Committee designated the President and the English and French-Speaking Secretaries and members were incorporated to it according to each country's proposals.

Mexico City, Mexico (June 29-30, 2000)

The PIARC C3 meeting held in Mexico City on June 29-30 was attended by 17 C3 members.

The objectives of the meeting were:

- finalize the C3 committee work program;
- advance the action program activities of the working groups;
- strengthen the linkages of C3 with other entities including developing countries, economies in transition and other PIARC committees.

During this meeting, the goals of the PIARC Strategic Plan for the 2000-2003 period were presented and the development of practical means for efficient and effective technology transfer between countries, and in particular towards developing countries and countries in transition, was identified as a priority task for PIARC. In addition, the working groups were formed and their initial work programs were proposed.

### Kampala, Uganda ( February 14-15, 2001)

This C3 meeting was attended by 19 C3 members.

The items on the agenda and the aims of this meeting were:

- review progress of Working Groups activities;
- discuss the reorganization and development of the World Interchange Network;
- review the Project P3 – PIARC seminars and creation of Technology Transfer Centers.

### St. Petersburg, USA (July 29-August 2, 2001)

This C3 meeting was attended by 24 C3 members, and its main objective was to review the progress of the different working groups.

The C3 meeting was organized at the same time and place as the International Symposium on Technology Transfer, an initiative to encourage networking and information exchange among road technology transfer professionals. The symposium brought together professionals and organizations from around the world to share information on best practices in technology transfer techniques, applied to the roads sector, and it provided a forum for open discussion of the tools of technology transfer.

The topics of discussion included the following:

- improving the technology of technology transfer;
- innovative training;
- sharing information resources;
- networking and twinning: partnering technology transfer centers;
- marketing and promoting your services.

The international seminar was co-sponsored by the Federal Highway Administration (FHWA)'s Local Technical Assistance Program (LTAP), the World Road Association (PIARC), the Pan American Institute of Highways (PIH) and the Transportation Research Board (TRB).

The C3 meeting included a joint meeting with the PIH and their Technology Transfer Centers. This session, which was attended by a large number of people from Latin America, enabled the presentation of technology transfer activities implemented by PIARC and by PIH.

In general, the organization of the C3 meeting at the same time as the meetings of other organizations with similar mandates proved to be highly successful, as participants considered that having the opportunity to interact with other professionals active in their own fields added much value to their trip and their participation in the C3 meeting. As a consequence, it was recommended that in the future, periodic efforts should be made to join other technology transfer organizations in implementing joint meetings.

#### Rome, Italy (October 9<sup>th</sup>, 2002)

The special C3 meeting held in Rome on October 9<sup>th</sup>, 2001 coincided with the PIARC Council meeting, and it was attended by 11 C3 members.

The meeting sought to review the progress of the three Committee working groups and the two special projects. In addition, a meeting with the Communications Commission took place to explore the way in which the activities of WG3 should be linked with the work done by the Commission on the evaluation of PIARC products.

#### Siem Reap, Cambodia (May 13-14, 2002)

The C3 meeting was attended by 19 C3 members. The C3 meeting coincided with the International Seminar on Rural Road Transport Development sponsored by the Ministry of Public Works and Transport and the International Labour Office (ILO) Upstream Project. The topic of the seminar was "Rural Transport, Key Element of the Development". The aim was to provide an inventory of best practices to recommend and to identify relevant topics for research to improve rural transport, in order to achieve sustainable development. The C3 meeting also took place at the same time as the C20 meeting, and this provided an opportunity to strengthen links among the two Technical Committees and to identify opportunities for future development of mutually interesting projects.

After the C3 and C20 meetings, a workshop on Technology Transfer Centers was organized to review progress on the development of the existing centers (Bangladesh, Benin, Burkina Faso, China, India, Madagascar, Mongolia, Tanzania, Chad). This meeting also allowed to welcome the representatives of new countries interested in the creation of TTCs (Cambodia, Vietnam) and particularly in the real benefits for the road communities in their respective countries.

The objectives of the Siem Reap workshop were the following:

- analyze and understand the present environment of a TTC;
- share experiences gained to date by already established centers;
- present specific methodology that will enable the TTC managers to better assess their performance and to analyze their training requirements.

To prepare the workshop, a questionnaire had been sent to all countries concerned. An analysis of the replies was made at the beginning of the meeting and served as a basis for a broad exchange of experiences between the countries.

San José , Costa Rica (November 10-14. 2002)

The C3 meeting had the attendance of 20 C3 members. The meeting provided an opportunity to once again review the progress of the working groups, the WIN group and Project P3. The main topic of this session was to prepare the participation of C3 at the XXIIInd World Road Congress in Durban. As in Siem Reap, C20 decided to meet at the same time as C3 to increase linkages between the two Technical Committees.

The C3 & C20 joint meeting coincided with the PIARC Seminar on HDM-4, Road Maintenance Management and Pavement Maintenance Technology Seminar, organized by C3 Technical Committee. The Seminar was supported by the Costa Rican Ministry of Public Works and it was highly successful, as shown by the participation of 150 professionals from 35 countries and by the high quality of the presentations and the discussions.

The seminar focused on how the HDM-4 has contributed to improve road management and to set investment priorities, how road maintenance management is done and what kind of pavement maintenance technology is applied in developing countries in an appropriate development context. A series of case studies highlighted how these issues are being addressed around the world.

### **3. WORKING GROUP 1: TRAINING DIRECTED TOWARDS SOCIAL DEVELOPMENT**

#### **Work Program**

The main objective of this working group was the integration of social and economic aspects into the training of people involved in road construction and maintenance: environment, safety, maintenance, accessibility, consultation, management, etc. through:

- assessing needs in developing and transition countries (Africa, Asia, Latin America, Central and Eastern Europe);
- finding the best practices and experiences of multilateral or bilateral agencies;
- identifying the state of local training institutions;
- preparing an inventory of available tools for communication to the road community;
- developing an inventory of donors or institutions that finance or provide training.

#### **Activities and Main Outcomes**

To obtain the information needed to analyze the existing situation and develop conclusions for future PIARC work, a questionnaire was drawn up for this purpose.

The questionnaire was sent to representatives of all PIARC members, but answers to the survey were scarce. Despite of this circumstance, C3 Technical Committee concerns are that this is an important issue that should be approached in the future.

## 4. WORKING GROUP 2: TECHNOLOGY OF TECHNOLOGY TRANSFER

### Work Program

At the World Road Congress in Brussels in 1987, a conference-discussion was held on the transfer and adaptability of technical information to developing countries. This conference has strongly marked subsequent work by PIARC in this field.

The report and the discussion pointed out the prerequisites for a transfer and its chances of success. The existence of a technological fabric in the recipient country was highlighted in particular.

Political, economic and sociological conditions have changed both in developing and developed countries. There is a trend to reconsider aid models and aid itself, and the private sector has grown stronger - also in areas of activity traditionally covered by the Administration.

The work of group 2 of the C3 Technical Committee aims to draw a picture of the transfer of road technological information in the early years of the 21<sup>st</sup> century.

The program of this Working Group centered on the following activities:

- information and knowledge transfer ;
- technology transfer itself, and tentative recommendations for their best use;
- identification of existing technology transfers techniques;
  - project,
  - amendments,
  - C3 survey ;
- coordination with "PIARC product evaluation" group to integrate techniques (and products) used and/or recommended by PIARC;
- drawing up draft document ;
- C3 internal survey ;
- letter to PIARC first delegates and active operators in developing countries and those in transition, for opinions and to obtain case studies to be included in document;
- final document.

## Activities and Main Outcomes

For analysis purposes, Working Group 2 of PIARC Committee C3 prepared a questionnaire. The information provided was used to identify and evaluate the effectiveness of the different tools for transferring technical information.

The general remarks obtained from this survey, based on 26 replies from Brazil, Burkina Faso, Canada, Columbia, Costa Rica, Finland, France, Japan, Lithuania, Madagascar, Mexico (2), The Netherlands, New Zealand, Norway, Peru, Sri Lanka, Switzerland, Tanzania, Chad, Turkey (2), USA(2) and Zimbabwe (2), are the following:

- Language is the main obstacle to information exchange. This is true for all the examined transfer modes (written, oral, electronic, etc.), without exception.
- Oral transfer obtains by far the best results, according to this inquiry, together with field experience. Consulted people privilege well-targeted seminars or tailor-made training sessions organized at regional or local level. The programs of these seminars/training should not be too broad. They should deal with specific subjects that meet the needs of the users. Organizing these events at the local level should allow the participants to reduce their travel expenses and to meet other people facing the same problems or similar problems.
- Training centers and technology transfer centers are considered as key elements that are very effective for knowledge transfer. It is recommended to try to create new centers, to give them support for both human and equipment resources.
- It is highly recommended to clearly define specific targets for the technology transfer centers and, with the help of PIARC, to assign them a mission of organizing tailor-made training and seminars at the local level. International working groups are also appreciated. However, the transfer of the results of these working groups to the technical personnel should be improved. A solution would be to have committees at local level to relay the information. Furthermore, the cost of publications is a major barrier.

- With respect to publications, there is a real need to publicize the available documents (both at international and local level) and to enhance access to these documents (e.g. through internet, possibly with a role of relay towards the local road communities played by knowledge transfer centres and based on more traditional means).
- The development of road laboratories should be encouraged where such laboratories do not exist. Disseminating the results of the work of these laboratories is extremely important, especially when we know that language is a major barrier to the transfer of knowledge and that these laboratories would disseminate their results in the local language of the field practitioners.

## 5. WORKING GROUP 3: EVALUATION OF PIARC PRODUCTS

### Work Program

The evaluation of PIARC Products seeks to develop methods and processes for PIARC to implement internally, in order to generate more effective products that meet the needs of all its members. This goal is to be achieved through the following actions:

- explain the role of C3 in undertaking a performance evaluation of PIARC products and emphasize the importance of having all Committees involved;
- identify categories of PIARC products to be included in the evaluation process;
- define role of an independent external consultant and the units of measurement;
- identify key indicators of performance for these categories, with the assistance of the consultant. Explain to the Committees how to perform self-evaluation;
- review and update the draft "Guidelines for evaluating PIARC products";
- review comments and develop final version of "Guidelines for evaluating PIARC products";
- compile and analyse results received from Committees (by the consultant);
- carry out survey at the customer level in sample of member/countries to evaluate client perception of product effectiveness (by the consultant);
- analysis of results by C3 with issue of report and recommendations.

### Activities and Main Outcomes

The Technical Committee C3 was given the task 'to evaluate the performance of PIARC in technology transfer and information dissemination'. This work was undertaken by C3 Work Group 3 in collaboration with the Communication Commission. The PIARC Technical Committee C3 proposed that there should be guidelines for developing and evaluating PIARC technology transfer products. The objectives of this work were to define and recommend the most efficient communication tools to disseminate the results and ideas of PIARC's professional activities and to develop a methodology for PIARC that could be applied internally for self-evaluation of the products in meeting the needs of all of PIARC's members.

The following products were identified as suitable for evaluation:

- basic PIARC documents,
- PIARC brochures,
- technical reports,
- CD-ROMs,
- the Routes/Roads magazine,
- the World Road Congresses,
- Technology Transfer Centers,
- Seminars,
- PIARC Reference Shelf.

In order to actually perform the evaluation, the Executive Committee requested the Communications Commission to hire a consultant. After a tendering process, the Performance Assessment Resource Center (PARC) of the United Kingdom was chosen to carry out the evaluation of PIARC products.

The project will be carried out in four phases, each based on the findings of the previous ones. The outcome of the project will be presented in two reports and will be disseminated at a workshop at the Durban World Road Congress.

## 6. WORLD INTERCHANGE NETWORK (WIN)

### Background

The World Interchange Network (WIN) was created at the occasion of the World Road Congress in Montreal (Quebec) in 1995.

The mission of the World Interchange Network (WIN) is to promote on a global scale the technology transfer of road related information and knowledge particularly for the benefit of developing countries and those in economic transition. By means of the Internet, WIN puts people with road-related questions, "the users", in contact with experts or organizations commonly called "nodes", who can provide answers.

The nodes are the main components of the World Interchange Network (WIN). They are the road information and knowledge transfer centres. A node is a public or private organization, an association, a university centre, a research centre, an international body or even an individual able to help and interested in helping road information and knowledge exchange.

### The Integration of the World Interchange Network (WIN)

In March 2000, the agreement for the integration of WIN to the activities of PIARC was signed and submitted for approval to the General Assembly of WIN which agreed with the dissolution of the WIN Corporation.

The World Interchange Network (WIN) was integrated within the framework of the activities of PIARC's Technical Committee on Technological Exchanges and Development (C3) under the name WIN Group. The WIN Group activities are coordinated by the President, Mrs. Claire Monette (Quebec), assisted by three Secretaries, Messrs. Bertrand Guelton (Belgium, English-speaking Secretary), Ricardo Diaz Zoido (Spain, Spanish-speaking Secretary) and Daniel Hargreaves (Quebec, French-speaking Secretary). The WIN Group holds its meetings at the same place as the C3, immediately before or after the C3 meeting.

At the time of the integration, the World Interchange Network (WIN) was composed of 75 nodes in 44 countries :

- 20 nodes from Europe,
- 34 nodes from the Americas,
- 13 nodes from Asia,
- 6 nodes from Africa,
- 2 nodes from Oceania.

## The WIN Group Work Program

Strategies for the future of the WIN Group were elaborated and a meeting of the nodes responsible persons was organized in order to work on the Action plan for the period 2001-2003. The work program was presented at the C3 meeting in Paris, in December 2000.

The three main objectives of the Action Plan 2001-2003 are as follows :

1. carry on the integration of WIN activities to PIARC
2. extend the network by associating all PIARC members
3. develop tools to facilitate exchanges between users and experts.

The five strategic actions to be carried out are :

1. review the node membership structure
2. establish a communication plan to mobilize node commitment
3. develop the Internet site
4. establish tools and means in order to reach developing countries and countries in transition
5. review similar networks and study the possibilities of cooperation.

## The WIN Group Activities and Main Outcome

### The WIN Group survey

In May 2001, the WIN nodes representatives were asked to confirm their interest in pursuing their work within the WIN Group. A majority of WIN nodes representatives confirmed they would collaborate with the WIN Group.

In July 2001, at the C3 meeting in St. Petersburg (U.S.A), several presentations were made with regards to the progress reports on the WIN Group Action plan by Mr. Michael Tillie (Switzerland), Mr. Ralph Jones (Canada), Mr. Bertrand Guelton, WIN Group English-speaking Secretary and Mr. Daniel Hargreaves, WIN French-speaking Secretary.

The work carried out until now within the framework of this action plan has shown the need for modernizing the WIN concept, the Internet site and particularly its search engine. Before its integration within PIARC, WIN could count on a permanent secretariat that managed the Internet site and was the intermediary between the users (requests for information) and the nodes (experts providing the answers). Henceforth, WIN must pursue its mission by creating the most user-friendly possible interface mechanism in order to reach not only the nodes of the Network but also PIARC members and its partners.

## The WIN Group consultation and proposals

In August 2001, in order to clarify certain issues for the future, the WIN Group consulted the C3 members and the WIN nodes representatives, on four questions namely: the users of the WIN concept, the research tool for the WIN concept, the management of the WIN concept, the future of the nodes within the WIN concept.

Based on the analysis of the results of the consultation and the WIN Group's recommendations the PIARC Executive Committee decided to set up a special workgroup of the Commission on Communication. The workgroup was composed of Mrs. Ulrika Sundgren (PIARC Secretariat General) as well as Messrs. Colin Ellis (United Kingdom, C3 representative), Mike Mabasa (South Africa, representing the Commission on Communication) and Daniel Hargreaves (Quebec, representing WIN).

In March 2002, in Paris (France), the Commission approved the basic principles proposed for the establishment of the new WIN Website and for its integration within the PIARC Website by October 2003. In October 2002, in Melbourne, PIARC's Council approved the new orientations proposed for the concept of the World Interchange Network (WIN) and its new Web site.

## The new WIN concept

Thus, WIN will be structured according to a new concept, that of national "relays" replacing the variety of expert organizations which constituted the "nodes" of the former system. A relay is an organization chosen by each PIARC member government to connect, by means of Internet, persons having questions (the users) with experts who can provide the answers. A relay will rely on a network of experts to ensure the processing of information requests.

The role of a relay consists in insuring the knowledge exchanges in the transport field, in at least one of the three official languages of the World Interchange Network, namely French, English or Spanish, to the benefit of the road community of its country or region, as well as of the international community.

A relay can be identified with an existing transport technology transfer centre or with any other existing non-profit organization and interested in the road related knowledge exchange. Preferably, a relay has an expertise in several transport disciplines of infrastructures and road transport, so as to be able to answer directly or obtain an answer to the majority of requests.

The directory of fields of expertise will allow the user to obtain a personalized list of relays according to his/her needs, from a WIN data bank relating to the fields of expertise classified by continent, by country and in the desired language of response. Tools will be developed and made available to the relays to enable them to archive questions and answers and to put these in relation.

There is no particular status for the « nodes » of the current system in the new WIN. Those who will not become a relay in their country can, if necessary, be sought by the relay because of their particular expertise for a given request.

### The new WIN Internet site

WIN will dispose of an integral part of the PIARC Internet site. It will remain accessible to all. However, it will be conceived as to offer a particular service to the sole PIARC members who can draft their information request on-line and send it via Internet directly to the chosen relay. The other Internet users will simply have access to the coordinates of the relays and to the indication of their fields of expertise and will address themselves individually to a relay.

The official presentation of the new WIN Internet site is planned on the occasion of the World Road Congress, in Durban (South Africa), in October 2003. An experimentation phase will follow allowing to improve the process.

### The WIN session in Durban

A specific WIN Session is organized for the official inauguration of the new WIN with special guests such as the President of PIARC, the President of the WIN Group and the first delegates. An on-line demonstration of the new WIN site is to be carried out. Workshops are planned so as to facilitate exchanges between the relays representatives and their experts and present the first experiments of relays operation.

## The future

The proposed action plan for the period 2004-2007 contains:

- the main objectives,
- the administrative considerations for the operation of the new WIN,
- the mobilization of the relays and their network of experts,
- the follow-up and adjustments in the new WIN operation.

## Recommendations

So that WIN be a tool on the scale of PIARC to obtain road related information, it is desirable that in the long term, every PIARC member government join in and count a relay.

By its activities, the relay promotes at the world level the expertise of its organization and its country. Promoting the use of WIN by road professionals around the world will energize the network of WIN and bring new expertise to all.

The creation of technology transfer centres in developing countries and those in transition as well as the multiplication of relays joining WIN, would widespread the usage of the new WIN Internet site and its research tool and therefore contribute to the exchange of knowledge and information to the benefit of these countries.

# 7. PROJECT P3 PIARC SEMINARS AND TECHNOLOGY TRANSFER CENTERS

## Project P3 PIARC Seminars

### Background

The PIARC Strategic Plan places great emphasis on the need to ensure greater involvement in PIARC activities by the less affluent member countries. It recognizes that the costs associated with regular attendance at meetings presents a problem to many member countries. It also recognizes that the work programs are often targeted at the specific needs and interests of the affluent member countries and this also can discourage active involvement of many members.

The Special Fund was set up to address this problem but the impact of this measure has been limited. Therefore at the XXIst World Congress in Kuala Lumpur PIARC agreed that further measures were necessary. It was agreed that, in the period up to the end of 2003, each Technical Committee should try to hold at least two of their meetings in one of the developing or emerging countries and that where possible those meetings should be associated with a PIARC seminar. The coordination of this program was allocated to Committee C3.

It was agreed that the programme would be known as: the PIARC Programme of International Seminars - Roads, Transport and Development

### Work Programme

Regarding the PIARC program of seminars this working group looks to coordinate the PIARC program of seminars in developing and emerging countries. The Working Group's main activities have been the following:

- obtain, from all PIARC technical committees, details of their proposals or ideas on seminars/meetings in developing/emerging countries and offer assistance;
- design an overall package to cover the proposed seminar program and to ensure a uniform image and presentational advantages to PIARC as a whole;

- initial progress recognized that it was unrealistic to expect to achieve the full target of 2 seminars for each committee before the Durban World Congress;
- review ideas and suggestions and submit proposed guidelines to PIARC HQ Paris for approval. Copy sent to C3 members;
- PIARC HQ approval and 'advert' submitted for inclusion in Routes/Roads. Seminar guideline document passed to all technical committees;
- liaise with PIARC technical committees to ensure that seminar topics are appropriate and that all member country interests are fairly represented. Recommend payment of PIARC financial contribution;
- collate reports of seminars and assist in assessing usefulness of seminars;
- present progress reports at C3 Meetings;
- prepare a report for consideration by Executive Committee in Lisbon March 2003.

### Activities and Main Outcomes

The current status of the PIARC Program of International Seminars - Roads, Transport and Development is summarized below:

Seminars have been held successfully at 18 locations. A further 3 seminars have been agreed and planned to take place before the next World Congress in Durban in October 2003.

Only 5 Committees (C5, C12, C14, C18 & C20) are on track to meet the PIARC target of arranging 2 seminars per Committee before the Durban World Congress in October 2003. Additionally 2 Committees (C3, and C6) have been involved in 2 seminars as a result of sharing in the management of joint seminars. The table below shows the progress of each Strategic Theme against this target.

Theme 1 – 66% of target  
Theme 3 – 60% of target  
Theme 2 – 50% of target  
Theme 4 – 44% of target  
Theme 5 – 44% of target

No.	Committee	Date	Topic	Country	1st. Language
			Completed Seminars		
1	C20	Jun 2000	Commercialisation of Roads	Benin	French
2	C6	May 2001	Priority issues in Road Management	Estonia	English
3	C3 / HDM4	May 2001	First African Technology Transfer Conference	Tanzania	English
4	C16	May 2001	2nd International Conference ITS Prague 2001	Czech Rep	English
5	C18	Oct 2001	Road Risk Management	Chile	Spanish
6	C14 (+ST2)	Nov 2001	Sustainable Development in Road Transport	India	English
7	C1	Apr 2002	Surface Characteristics	Cuba	Spanish
8	C5	Apr 2002	Road Tunnel Operations	Chile	Spanish
9	C3 & C20	May 2002	Rural Transport – Key Element of Development	Cambodia	English
10	C11	June 2002	Intertraffic Asia 2002 – Management of Bridges	Thailand	English
11	C13	June 2002	Intertraffic Asia 2002 – Road Safety Management	Thailand	English
12	C12	June 2002	Appropriate use of Natural Materials in Roads	Mongolia	English
13	C9 & C15	Sep 2002	Institutional Strengthening & Financing for Road Administrations – Development Opportunities	Cuba	Spanish
14	C7/8	Oct 2002	Road Pavement Recycling	Poland	English
15	C5	Nov 2002	Tunnel and Road Technology	China	English
16	C18	Nov2002	Risk Management for Roads	Hungary	English
17	C3 & C20	Nov 2002	HDM-4, Road Maintenance Management & Pavement Maintenance Technology	Costa Rica	Spanish
18	C14	Nov 2002	Sustainable Transport Development	Argentina	Spanish
19	C12	March 2003	<i>Slope Management &amp; Risk Guidance</i>	Nepal	English
20	C4	April 2003	<i>Inter-urban roads</i>	Senegal	French
21	C14	May 2003	<i>Sustainable Transport Development</i>	Romania	English

The PIARC guidelines also required that at least 50% of seminars should be held in low or lower middle income countries. This target is being met overall with 75% of seminars held or planned in such countries compared with 25% in upper middle income countries. At the Theme level only Theme 3 is below this target level with 33% of their seminars in low or lower middle income countries.

General impressions of the seminar program to date appear to be favourable and it seems that the host countries have been particularly pleased with the outcome. Seminar organizers from within the sponsoring PIARC Committees have identified a number of problems in setting up the seminars particularly where the host country has not been actively involved in the Committee meetings. There appears to be an emerging consensus that future seminar programs should be identified and managed centrally. This would relieve the pressure on committee representatives and enable seminar objectives to be targeted separately from committee objectives and work programs.

## Future Plans

There are now limited opportunities to identify and arrange new seminars prior to the World Congress in October 2003.

The main priority for the immediate future is to ensure that the arrangements for the World Congress make provision for seminar conclusions to be discussed and considered against the PIARC work program for the next four year cycle.

An evaluation questionnaire has been sent to all seminar organizers and the results have been collated and presented in a report to the Executive Committee in Lisbon in March 2003.

## Project P3 - PIARC Technology Transfer Centers

### Background

Early in 1999 PIARC Head Office sent a questionnaire to the First Delegates of all member countries with a GNP of less than 1,000 USD per capita (i.e. low income) seeking their interest in Technology Transfer Centres. On the basis of the results of this questionnaire the Executive Committee decided to allocate funds for the creation of such centres during the period 2000 - 2003 in countries where GNP per capita was less than 3,100 USD (i.e. low & lower middle income). The Council approved this decision at their meeting in Kuala Lumpur in October 1999. The agreed aim was to implement the program in between 10 and 20 countries before the Durban Congress in October 2003.

### Work Programme

The main goal of this WG was to facilitate the formation of technology transfer centres using seed funding from PIARC.

This goal was to be accomplished by doing the following planned actions:

- Write letters to first delegates of all PIARC member countries with GNP less than 3,000 USD per capita inviting applications to use PIARC seed funding in establishing a technology transfer centre;
- Evaluate applications received and recommend to PIARC HQ up to 5 countries to be included in Phase I of the program subject to approval;
- Approve countries to be included in Phase 1;
- Appraise proposals of Phase 1 countries by site visits by 2 members of project team and confirm release of PIARC funds;

- Evaluate new applications alongside those submitted previously and recommend countries for inclusion in the Phase II program (maximum 20 countries in total);
- Appraise Phase II countries and confirm release of PIARC funds;
- Monitor performance of new centres;
- Prepare a report for consideration at Durban 2003.

## Main Activities and Outcome

Invitations were initially sent to 50 target countries and applications for the pilot phases were received from 7 countries. The P3 project team evaluated these applications and recommended that 3 were selected for appraisal (i.e. Tanzania, India and Madagascar). Appraisal visits were made to the selected pilot countries by members of the P3 team and subsequently PIARC Executive Committee approved the allocation of 10,000 USD to each.

Procedures were initiated for identifying applicants for the second phase and the Executive Committee agreed to invite 8 further countries to submit applications. These were appraised by the P3 Project team and led to the Council approval of new TTCs in Bangladesh, Burkina Faso, Chad, China, Cuba and Mongolia.

Members of the P3 Project team made a short TTC inception visit to the new TTCs in Burkina Faso and Chad in April 2002.

Council invited First Delegates concerned to nominate their TTC manager as the national representative to PIARC Technical Committee C3 and decided, by exception, to meet from the Special Fund the full travel and accommodation costs of regular attendance of this representative at C3 meetings until the Durban Congress.

As a result of discussions within C3 and with the Secretary General it was agreed that the concept of a National PIARC TTC should be extended, without PIARC funding, to upper middle and high income countries

A short training course for the TTC managers was held during the meeting of C3 in Cambodia in May 2002. An independent consultant led a one-day workshop designed to:

- analyse and understand the current environment of a TTC;
- share experiences to date of established TTCs;
- provide an opportunity for TTC managers to benefit from the experience of others;
- present methodologies needed to enable each TTC:
  - to diagnose more accurately their present level of performance,
  - to better define staff training needs.

This training course was attended by TTC managers from Bangladesh, Burkina Faso, Chad, Madagascar and Mongolia. It was also attended by interested parties from Cambodia and Vietnam and by representatives of Committee C3.

A Memorandum of Understanding (MOU) has been agreed and submitted to all TTC countries for signature by the First Delegate and the TTC manager. Signed MOUs have now been received from Bangladesh, Burkina Faso, Chad, China, Madagascar, Mongolia, and Tanzania.

Applications were received from Benin and Zimbabwe but contained insufficient information for evaluation and have been referred back for further information.

### Future plans

Communication with India remains a problem and the MOU has not been signed and returned.

The opportunity to have a meeting of all TTC managers in conjunction with the C3 meetings provides an invaluable occasion for C3/P3 members to monitor progress of the TTC programme and to provide guidance for the continued development of the TTC's.

Further opportunities for the TTC managers to meet together will be provided by the next C3 meeting in Malaysia in June and the TTC session at the World Congress in Durban in October 2003.

## 8. CONCLUSIONS AND FUTURE DIRECTIONS FOR C3

In its Strategic Plan for 2000-2003, PIARC expressed a very strong commitment to strengthen its activities and linkages with developing countries and countries with economies in transition. As a consequence, the Association supported a number of initiatives with the primary goal of adding value to highway professionals in developing countries.

Technical Committee C3 on Technological Exchanges and Development received a clear mandate to develop and pursue these initiatives for PIARC during the period 2000-2003. The activities that C3 undertook during these three years and which have been described in the previous sections of this report reveal the Association's main lines of work with respect to developing countries.

In setting them in context and reviewing the Committee's achievements for the period and suggesting the way forward for the 2004-2007 period, the following general comments can be made:

During the period 2000-2003, PIARC has followed an approach that classifies less developed countries and countries with economies in transition in a broad category that presupposes that these countries share broadly the same problems and that PIARC can follow a basic common approach in its work with them.

This approach is useful for certain aspects of the Association's work and can offer a suitable departure point for a number of activities. However, it is also true that developing countries and countries with economies in transition are very different, and that sometimes their concerns, resources, priorities and programs have more differences than aspects in common.

In recognizing the above fact, and in trying to develop effective approaches to deal with such differences, PIARC should favor a technology transfer model that originates from the countries' stated needs and priorities rather than on external perceptions. As a consequence, PIARC should reflect about the characteristics, the design and the implementation of the technology transfer model that it wishes to adopt in its dealings with less developed countries, as an effective model will probably help to increase PIARC's value and recognition in such countries.

If developing such a model is recognized as a key project for PIARC, a first suggestion would be to eliminate a special treatment of developing countries within the structure of the Association, except for the issues that could be handled by a specific administrative body to deal with developing countries. This body (for example, a Commission dedicated to developing countries and countries with economies in transition), should concentrate only on managing activities, programs and tools such as the seminar program, the Special Fund, the Technology Transfer Center Program, and so forth.

Actual technical problems and issues should be addressed within each one of the Technical Committees, where attention dedicated to developing countries should be strengthened and fully incorporated within the Technical Committee's agenda for the period. To accomplish this, PIARC should stress the role of First Delegates from developing countries and countries with economies in transition and ask them to propose, for each Technical Committee, the topics and issues of relevance to their countries that they would like to see addressed as part of the Committee's four-year program.

In addition, PIARC should nominate, for each Technical Committee, a co-chair from a developing country or a country with economy in transition who would be specifically requested to emphasize his or her Committee's activities and value for developing countries. The expected result of this procedure would be to incorporate a stronger participation from developing country representatives in the substantive activities of each Technical Committee and thus have their work accomplish more valuable results for such countries.

In conclusion, the following recommendations can be proposed to strengthen PIARC's role in developing countries:

1. Have the Council approve the creation of a permanent Commission on Developing Countries and Countries with Economies in Transition, based at PIARC's Central Office in Paris, to handle all administrative and managerial issues related to the World Interchange Network (WIN), to the Seminar Program, to the Special Fund and to the approval and evaluation of Technology Transfer Centers. This Commission would replace the existing Technical Committee C3 as it is currently constituted.
2. Continue and consolidate each one of the above mentioned projects and programs to enhance PIARC's presence in developing countries and countries with economies in transition and its value to such countries. As part of this consolidation, clearly stated and measurable objectives and goals should be developed to systematically assess results and provide inputs to PIARC's decision-making bodies.

3. Incorporate developing country concerns and active representatives into Technical Committees to ensure that each one of them produces outputs of interest and relevance to such countries, while at the same time increasing the awareness of Technical Committee members about issues of concern to developing countries in their fields of specialization.
4. Introduce other languages to PIARC's work and develop cost-effective proposals to generate technical materials in languages other than English or French. The addition of other official languages is probably unnecessary, as long as the Association develops and implements a clear, systematic strategy to publish and distribute some of its products in languages that are understood by the majority of road professionals in countries where English or French are not routinely spoken.
5. Increase the Association's involvement and support for projects of wide interest and application in developing countries that individually cannot aspire to formulate and develop such projects. In this respect, PIARC's support for tools such as HDM-4, for road safety topics and for projects dealing with better ways to manage environmental topics in road programs is key to provide developing countries with examples of best practice and to increase the quality of their investments in roads.
6. Develop initiatives that help developing countries and countries with economies in transition to build and consolidate their own capacities for better managing and expanding their road networks.
7. Strengthen PIARC's links to other technology transfer organizations that are active in highways and transportation to increase the effectiveness of their respective efforts and help to contribute with each other in the implementation of projects and initiatives of interest to developing countries.

**APPROPRIATE DEVELOPMENT  
(C20)**

**Activity Report 2000-2003**

# INTRODUCTION

Appropriate level of road development was one of the key themes at the XXI<sup>st</sup> World Road Congress in 1999. On an attempt to define the concept of “appropriate levels of road development”, a number of useful recommendations were made, whose implementation contributed to the establishment of Committee C20 on Appropriate Development under the umbrella of PIARC Strategic Theme 5 on Appropriate Levels of Road and Road Transport Development. Thus, Committee 20 on Appropriate Development is a new committee which started its operations during the period 2000 to 2003 work cycle. It contributes to PIARC’s goal of fostering the development of road transport policies and programmes which take into account of the particular needs of developing nations and countries in transition and of rural and remote areas.

The Work Programme of the Committee was being implemented under two working groups whose tasks were:

- To review and issue best practice recommendations on the methodologies used throughout the world for identifying and measuring non-economic needs and benefits of road transport infrastructure in poor countries such as the provision of basic accessibility of populations to educational, social, and administrative services.
- Review successful practices for providing appropriate access within resource constraints, and establishing appropriate standards taking into account local resources, delivery options, adaptability and evolution of needs over time, and traffic characteristics.

The Committee held six meetings during the four years. In the course of implementation it became evident that the terms of reference for the Committee were very ambitious, requiring a longer timeframe for their implementation with resources which were not readily at its disposal. Thus, the Committee adopted an approach that sought to come up with outputs which were achievable by the time of the XXII<sup>nd</sup> World Road Congress in October 2003.

As a way of strengthening the Committee for its future, a recommendation has been forwarded to the General Secretariat for formalisation of collaboration arrangements between PIARC through Committee C20 and the International Focus Group (IFG).

In the Committee C20 Session for the XXII<sup>nd</sup> World Road Congress in October 2003, apart from reviewing the activities of the four-year work-cycle, will focus on the state of the art on rural roads transport planning, development and management.

In its infancy, the Committee suffered from lack of effective leadership and low participation of members and potential members. The conclusions for the Durban Congress and the proposal for the future work programme will take into account these issues. Directions for the future provide some of the possible suggestions.

## COMMITTEE MEMBERS

Composition of the Committee as of 31<sup>st</sup> December 2002 was as follows:

**Chairman** Kesogukewe M.I. M. Msita (Tanzania)

### **Secretaries**

Phil Hendricks (South Africa) – English Speaking Secretary

Abdennebi Rmili (Morocco) – French Speaking Secretary

### **Members (Active)**

Safry Kamal Ahmad (Malaysia) – ST 5 Correspondent

Albab Akanda (ADB – Philippines)

Kingstone Gongera (Zimbabwe)

Harald Julsrud (Norway) Correspondent

Maral Kabre (Burkina Faso)

Mour Kimsan (Cambodia)

Jean-Claude Klamti (Chad)

Kesogukewe M.I.M. Msita (Tanzania) - Chair

Peter O'Neill (UK – DFID) (Replaced Peter Roberts)

Robert Petts (UK)

Phil Piper (Australia)

Dejene M. Sahle (ILO/ASIST - Zimbabwe)

Jean Soulier (France)

David Tighe (Canada) - Correspondent

Franc Zepic (Slovenia)

Composition of the Committee up to year 2001 was as follows:

**Chairman**

J.P. Nkili Bengone (Gabon)

**Secretaries**

Alasdair Sim (South Africa) – English Speaking Secretary

Jean-Claude Therrien (Canada) – French Speaking Secretary

**Members**

Albab Akanda (Philippines – ADB)

Moudabirou Bachabi (Benin)

S. Bagonza (Uganda)

Hacene Bekhouche

Fidel Delgado Pino (Cuba)

Giorgio Elia (Italy)

King Gee (U.S.A)

Carlos N. Gonzalez (Mexico) - Correspondent

Jean-Noel Guilloso (U.S.A.) - Correspondent

Phil Hendricks (South Africa)

Hajime Ikeda (Japan)

Graham Johnson-Jones (ILO/ASIST – Zimbabwe)

Harald Julsrud (Norway) - Correspondent

Koji Kaminaga (Japan) - Correspondent

Mohamed Amir Khosravi (Iran) - Correspondent

Jean-Claude Klamti (Chad)

Nelson Kudenga (Zimbabwe)

Jean-Philippe Lanet (France) – PIARC C3 - Correspondent

Sonia Morales Pinto (Chile) - Correspondent

Hocine Necib (Algeria) - Correspondent

Ali Reza Nematollahi (Iran)

Jean-Paulin Nkili-Bemgone (Gabon) - Chair

Robert Petts (U.K)

Chayatan Phromsom (Thailand) - Correspondent

Maria Fatima Pinto (Portugal)

Phil Piper (Australia)

Leslie J. Quaresma (Portugal)

Patrice Retour (France)

Abdennebi Rmili (Morocco)

Peter Roberts (UK)

Esko Sirvio (Finland)

Jean Soulier (France)

K.B. Thandavan (India)

David Tighe (Canada) - Correspondent

Jane Tournee (ILO/ASIST Zimbabwe)

Leslie J. Wright (U.S.A.)

Dr. Horia Zarojanu (Romania)

Franc Zepid (Slovenia)

# WORK PROGRAMME AND ORGANIZATION

The Work Programme for the Committee was:

- to carry out research work to define a methodology for setting up an inventory of road needs as a social service;
- to set the appropriate objectives to be met on the basis of appropriate development concept;
- to compare methods that are used to qualify and quantify those needs and derive best practices from them;
- to define a “Universal model” or “framework” accepted by the road community in setting up road investment priorities in poor countries;
- to create a database of new indicators directed towards appropriate development.

Three action areas were identified in the implementation of the work programme and were organized under two work groups. Group 1 was assigned two action programmes:

## Action No. 1

Review of methodologies used throughout the world to identify and measure non-economic needs for road transport infrastructures. This envisaged making a comprehensive inventory of experienced methodologies aiming at incorporating non-economic benefits (elementary accessibility by populations to educational, social and administrative services; etc.) into road project evaluations in poor countries.

Expected outputs were:

- a draft list of experiences by committee members (Morocco, Mexico, others, including WB and PIARC (ref. Document “method for Economic Evaluation of Projects”);
- a comprehensive list of references.

## Action No. 2

Best Practice Recommendations for Incorporation of Non-economic Benefits in Transport Investment Evaluations.

The work was to involve analysis of all listed experiences, preparation of draft recommendations and making final recommendations.

Group 2 was concerned with Action No. 3 about Providing Appropriate Access within Resource Constraints. The work was to involve review of successful practices – methodological approach to establish appropriate standards taking into account local resources; socio-economic factors; technology options; resource costs; financial social economic delivery options; traffic characteristics; adaptability and evolution of needs over time.

The expected outputs were draft reports on a number of topics including standard/design, financing/costing, mode of delivery, training and maintenance.

During the 3<sup>rd</sup> meeting in January 2001 the activities and the expected output were critically examined. Group 1 saw the need to refocus the work as follows:

- first, to conduct an exhaustive inventory of experienced methodologies aiming at incorporating non-economic benefits (minimum access to educational, social and governmental services, etc) into project evaluations in developing countries;
- second, to recommend best practices in incorporating non-economic benefits into road project investment evaluations.

It was noted that this approach will not permit to meet totally the terms of reference of the Committee and to recommend a universal methodology to deal with accessibility of rural communities. The Group decided to gather and present relevant experiences from various countries, and recommend techniques to incorporate non-economic benefits into road project evaluations.

Group 2 identified five objective areas on the topic meeting the needs, namely:

1. standards/norms/design,
2. financing/costing,
3. mode of delivery & techniques,
4. training,
5. maintenance.

The group refocused the objective of its output to be:

- to collate as much information as possible on the above areas and to present recommendations to the Committee on the most appropriate best practices. Each area will be investigated on the basis of a literature/available information basis. The most appropriate information sources will be utilised and individual summary reports prepared. These summary reports will be compiled into a single subject report by the group, collated by the responsible member.

By the fourth meeting in April 2002, not much had been done by Group 2. Difficulties were expressed by the group, as the limited responses received on the questionnaire and the natures of the responses were not good enough for the work of the group. Group 1 had some output but needed more time to come with an appreciable output. Generally, the terms of reference of the Committee were considered, to be very ambitious, requiring a longer timeframe, with resources which were not readily available to the Committee. Thus, the Committee adopted a pragmatic approach that sought to come up with achievable deliverables by the XXII<sup>nd</sup> World Road Congress.

## **Expected outputs**

Expected outputs from the Committee are:

- technical guidelines on rural roads surface options (Group 1) – Group Leader: Robert Petts (United Kingdom)
- a bibliography of valuable maintenance documentation (Group 1) ) – Group Leader: Robert Petts (United Kingdom)
- a documentation/paper on approaches to investing in low-volume rural roads (Group 2) – Group Leader: Jean Soulier (France)
- suggestions on future Work Programme for the Committee after Durban.

# MEETINGS AND SEMINARS

The Committee held six meetings as follows:

- 1<sup>st</sup> Meeting - April 2002: Rabat Morocco
- 2<sup>nd</sup> Meeting - July 2002: Cotonou, Benin
- 3<sup>rd</sup> Meeting - January 2001: East London, South Africa
- 4<sup>th</sup> Meeting - April 2002: Siem Reap, Cambodia.
- 5<sup>th</sup> Meeting - November: Heredia, Costa Rica
- 6<sup>th</sup> Meeting – June 2003: Colombo, Sri Lanka

In collaboration with C3 and respective governments, the Committee meetings were organized to coincide two seminars on:

- Rural Road Transport in May 14-16, 2002 in Siem Reap, Cambodia
- HDM-4 , Road Maintenance and Pavement Maintenance Technology in November 12-14, 2002, in Heredia, Costa Rica.

In addition the Chairman attended the following meetings in Bern, Switzerland in July 2002:

- Meeting of ST5 Coordinator and Chairs of Technical Committees under ST5 on 3<sup>rd</sup> July 2002,
- Meeting between PIARC Secretariat, Members of the Executive Committee, Strategic Theme Coordinators, Chairs and Secretaries of Technical Committees on 5<sup>th</sup> July 2002.

# COOPERATION WITH OTHER COMMITTEES AND ORGANIZATIONS

The Committee initiated cooperation arrangements with the International Focus Group (IFG). The Chairman attended the IFG meeting in Ghana in October 2002. Two IFG representatives attended the C20 meeting in Costa Rica at the invitation of the Chairman. Attendance to the two meetings was meant to make exploration on possible cooperation arrangements.

The International Focus group is a partnership of countries, institutions, and practitioners committed to the provision of sustainable transport access for the poor. The group aims at meeting sustainable transport access needs in support of poverty reduction objectives in developing countries by promoting priority research needs, facilitating the application of research outputs, and mainstreaming best practices in rural roads engineering. Its vision is to be the leading platform for articulating and disseminating information on rural roads engineering within the context of poverty reduction.

On the other hand PIARC exists to improve international cooperation and to foster progress in the field of roads and road transport. Its particular aims of PIARC include; encouraging the pursuit of research into road and road transport issues and the open and prompt exchange of the results of this research between all countries, and to be a leader in international cooperation and technology transfer. The means of achieving aims of PIARC include; encouraging and supporting international regional road associations in organizing and conducting regional and international road seminars and conferences, to seek a sharing of roles and close cooperation with other international organizations

The proposal for IFG and PIARC cooperation is within the above aims and means for achieving such aims; and IFG's mission and vision, are complementary to those of PIARC. Cooperation with IFG is also a means of strengthening C20; institutionally and in terms of future outputs. The Committee considers cooperation with IFG is beneficial to PIARC; thus forwarded its recommendations to the Secretary General for formalization of the arrangement.

# PREPARATION FOR THE XXII<sup>ND</sup> WORLD ROAD CONGRESS

The C20 Session during the Congress is scheduled for the afternoon of Friday, October 24 2003.

During the session, an overview of the work programme and products will be given and proposals on the future work programme will be considered. About two thirds of the time will be used for discussions on theme: “the state of the art on rural transport planning, development and management” under the following sub-themes:

- basic access needs,
- appropriate rural planning for rural road development and management,
- standards and specifications for rural accessibility,
- economics and financing of basic access needs,
- effective maintenance,
- research and innovation needs, and
- institutional capacity building for rural roads development and management.

The Committee has been conscious of the need to include a number of interests in the sector, and making sure that it reached out to as many geographical, cultural and institutional groups as possible. Thus, the theme and sub-themes have been proposed with these ideas in mind; believing that the Congress generates a unique opportunity to document and disseminate important innovations and best practices. The Committee received 30 papers covering all the sub-themes. Some of them will be presented during the Session and others will be a subject of the poster session.

The discussions during the session will be an important contribution towards the definition of the future work programme of the Committee and the strategic themes of PIARC in the four-year cycle after the Congress.

# FUTURE DIRECTIONS FOR C20

## Participation of members from Developing Countries

PIARC boasts of 105 national member governments. Two thirds of these members are developing countries (DCs) and countries in transition (CIT). The participation of DCs and CITs in the work of the Committee has been so far limited. The current PIARC Strategic Plan for the period 2000 to 2003, places emphasis on the need to meet the requirements of developing countries with a GNP less than US \$ 3,100 per capita. However, their limited participation in the work of the Committee and is the case for the other technical committees, makes them unable to ensure that the work programme fairly reflects the problems and issues that are most important to them. PIARC has undertaken some positive measures in favour of developing countries and countries in transition which include:

- setting up of a Special Fund to provide support for attendance to meetings and seminars for delegates from countries with GNP less than USD 3,100 per capita;
- decision to run 40 international seminars during the period 2000 – 2003; and allocation of US\$ 8,000 for each approved seminar to contribute for some of its costs;
- decision to establish 20 Technology Transfer Centres in countries with GNP less than US\$ 3.100 per capita for the period 2000 – 2003;
- establishment of Committee C20: Appropriate Development to serve the needs of its members, particularly DCs and CITs.

The continued low participation is clear demonstration that the measures are still inadequate. PIARC should take further actions including:

- arranging for a post-congress developing country workshop which will market the activities of PIARC and the Work Programmes of technical committees;
- formalisation of the cooperation with the International Focus Group (IFG) for which a specific Work Group to deal with issues of Rural Roads Engineering would be established.

## Work Programme

The terms of reference of Committee C20 for the period 2000 – 2003, have been considered by members of the Committee to be very ambitious, requiring a longer time frame, with resources that were not readily available to the Committee. The Work Programme provided the PIARC its outputs should be tailored to the needs of DCs and CITs taking into account the strength/expertise available with team members and any facilitation that may be available from other agencies. The need for early appointment of members of the TCs and ensuring their participation in the meeting for definition of outputs becomes then crucial. Furthermore:

- PIARC should promote the establishment of National Committees – these will assist the deepening of PIARC activities in respective countries;
- effort should be made to notify members of meetings and seminars at least six months prior to their occurrence;
- the participation of the Spanish constituency remains equally very limited. Partly because the invitations are sent in English or French. Notices for meetings should be in three languages. PIARC should assist with translation;
- support the participation of regional and sub-regional associations of developing countries in PIARC/C20. ASANRA, AGEPAR (formerly ADAR), etc. Respective delegates should be able to access the facilitation of the Special Fund;
- PIARC Seminars and meetings should be combined with a major national or regional event;
- aggressively seek the cooperation of funding agencies in organizing seminars – these agencies will be able to fund some delegates;
- strengthen and disseminate to the DCs and CITs measures already undertaken.

## **Effective leadership of the Committee**

Support to the work of the Committee from the Theme Coordinator, during the first two years (2000 and 2001) was inadequate.

The first Chairman of the Committee was Mr. J.P. Nkili-Bengone of Gabone. Contact with him was lost in about March 2001. Thus, in January 2002 a new Chairman was appointed. The first Secretaries of the Committee, Mr. J.C. Therrien and Mr. A. Sim resigned in March 2002 and in 2001 respectively.

Developing countries which agree to the appointment TC Chairs of their nationals, should equally be prepared to ensure their effective participation in PIARC activities. It should also be the obligation of respective First Delegates to inform PIARC General Secretariat of unforeseen discontinuation of Chairs appointed from their countries.

## **Participation of non-engineers in the Committee**

The Committee has mainly been dominated by engineers. Effective implementation of the Committee will require the involvement of other professionals; particularly economists and sociologists.

**TERMINOLOGY  
(T01)**

**Activity Report 2000-2003**

# 1. COMPOSITION OF THE COMMITTEE

## 1.1 Chairmen

Angel LACLETA-MUNOZ (Spain – until May 2002)  
Patrice RETOUR (France – since May 2002)

## 1.2 Secretaries

Didier CLAIVAZ (Switzerland – until November 2001)  
Doug M. COLWILL (United Kingdom)  
Patrice RETOUR (France – since November 2001)

## 1.3 Active Members

Jean ECKERT (Switzerland – until November 2002)  
Herman FRITZ (Switzerland – since November 2002)  
Hans W. HORZ (Germany)  
Gheorghe LUCACI (Romania)  
Lidia NOBRE (Portugal)  
Sylvie PROESCHEL (France)  
Celestino TRANI (Italy)  
Boldizsar VASARHELYI (Hungary)  
Daniël VERFAILLIE (Belgium)

## 1.4 Other Members and Corresponding Members

Daryoush ABBASI (Iran)  
Rasoul BIPARVA (Iran)  
Angel LACLETA-MUNOZ (Spain – corresponding member since June ,  
2002)  
Klara LUKACOVA (Slovakia)  
Theo MICHELS (Netherlands)  
Abdennebi RMILI (Morocco)

## 1.5 Terminology Correspondents in other Technical Committees

James C. WAMBOLD (United States)	<b>C1</b>	Brian HAYES (United Kingdom)	<b>C11</b>
Ioan M. DRUTA (Romania)	<b>C2</b>	Martin SAMSON (Canada)	<b>C12</b>
Richard RANDRIANARISOA (Madagascar)	<b>C3</b>	Eddy WESTDIJK (Netherlands)	<b>C13</b>
Manfred UKEN (South Africa)	<b>C4</b>	Jean-Charles POUTCHY-TIXIER (France)	<b>C14</b>
Willy DE LATHAUWER (Belgium)	<b>C5</b>	Albert BOURREL (France)	<b>C15</b>
Philippe LEPERT (France)	<b>C6</b>	Tore HOVEN (Norway)	<b>C16</b>
Joseph ABDO (France)	<b>C7/8</b>		<b>- C17</b>
Barry MOORE (Australia)	<b>C9</b>	John FENWICK (Australia)	<b>C18</b>
Hari BARAL (AIU)	<b>C10</b>	Mircea NICOLAU (Romania)	<b>C19</b> <b>- C20</b>

## 2. THE MEETINGS OF T1

The Committee had six plenary meetings:

Paris (France):	April 19, 2000
Berlin (Germany):	December 11-12, 2000
Madrid (Spain):	November 15-16, 2001
Rome (Italy):	May 30-31, 2002
Lisbon (Portugal):	November 7-8, 2002
Timisoara (Romania):	May 22-23, 2003

## 3. ACTIVITIES AND ORGANIZATION OF T1 BETWEEN 2000 AND 2003

### 3.1 The tools

#### 3.1.1 “Hard copy” terminology documents

PIARC has two “home-made” terminology documents:

The PIARC *Technical Dictionary of Road Terms* was first published in 1931. It has been the subject of seven hard copy editions since that time (the seventh edition [1] dating from 1997). For more than thirty years, it has been published in English and in French (the basic version in the two official languages of the Association), and translated into many languages including Arabic, Chinese, Japanese, and Vietnamese.

The Dictionary basically includes specific road terms validated by the competent PIARC Technical Committees within their respective fields of expertise and, consequently, officially “endorsed” by PIARC. Its object is to establish a one-to-one link between French and English terms expressing the same concepts, thereby facilitating translations into other languages. The seventh edition contains about 1,500 terms –with definitions for approximately one third of these– and a few illustrations.

The PIARC *Lexicon of Road and Traffic Engineering* was first published in 1991. A second hard copy edition was released in 2000 [2].

The object of the Lexicon is to help French- or English-speaking readers to translate technical documents on roads and road operation. The second edition contains over 16,000 terms in English and French in common usage by road engineers, including –unlike the Dictionary– terms used in related fields, such as the environment, land use, geography, mathematics and statistics, etc.

#### 3.1.2 “Soft copy” terminology database

In 1999, PIARC ordered a French software company to develop a computer programme to make both the Dictionary and the Lexicon available in electronic form. This was the start of the “PIARC Terminology” project, which brought the Technical Committee on Terminology into the computer era.

This work resulted in the release of a CD-ROM of the same name in November 2000 [3]. In addition to the seventh edition of the Dictionary (in the basic version and in a few other languages: Spanish, Japanese, Russian, Portuguese and Hungarian) and the second edition of the Lexicon, this CD-ROM contained a number of specialized glossaries: one on sustainable transport (based on a document published at the Kuala Lumpur Congress), one on bridges (English, Swedish, Finnish and German), and one on weigh-in-motion (WIM) techniques (English, French and German). Each of these terminology documents can be extended with translations into other languages, and new documents can be added. In this way, an electronic terminology database is built that can be updated any time.

The CD-ROM “PIARC Terminology” is intended for three levels of use.

After installing the programme and the terminology data files on the hard disk of a computer,

- *a user* can consult a terminology document – or several at the same time – for a given term; the result of the search can be displayed in three languages at a time. Moreover, updates that have become available since the CD was released can be freely downloaded from PIARC’s Web site (see Sections 3.3.1 and 3.3.2);
- using a password, *an editor* has the additional option to make proposals for additions and amendments. These include new terms, new definitions, a new language for a given terminology document, or even a new terminology document;
- finally, *the administrator*, representing PIARC as the owner of the copyright of the terminology data bank, makes the validated additions and amendments available on the Web site of the Association.

## 3.2 Work programme

### 3.2.1 General objectives

A common terminology that is understood by road professionals all over the world is instrumental in promoting technology transfer under PIARC’s Strategic Theme No. 5, that is, to achieve appropriate levels of road and road transport development – especially in developing countries, countries in transition and rural and remote areas.

In this context, the PIARC Strategic Plan developed for the inter-Congress period 2000-2003 [4] defined the following tasks for T1:

- to update and circulate the PIARC Dictionary and Lexicon;
- to provide Internet terminology services;
- to develop tools to assist translation.

During its meeting in Berlin in December 2000, Committee T1 defined two actions to be undertaken for the first of these three tasks [5]:

- updating the Dictionary, that is, to check the currency of terms and to produce new terms and/or new chapters covering all the technical fields of road and transportation, especially integrated transport and to add definitions for technical terms that need to be explained;
- assessing the parallel work in the German language undertaken by Germany, Austria and Switzerland, and validating this work and noting quantitative and qualitative equivalence with the PIARC documents produced in French and English.

### 3.2.2 Organization of work

Input from all the other Technical Committees is essential to the work of T1 to update the basic versions of both the Dictionary and the Lexicon. To this effect the Committee developed a procedure involving:

- 1 - a *terminology correspondent* appointed in each Technical Committee (see p. 37 of the PIARC Blue Guide [6]) to act as an “editor” proposing additions and amendments to existing PIARC terminology documents in the specific area of expertise of his Committee;
- 2 - a number of members of Committee T1 act as *contact persons* to request and collect these proposals. Specifically:
  - D. COLWILL “interfaced” with Committees C1, C7/8, and C12;
  - B. VASARHELYI with Committees C4, C10, C14, and C19;
  - H. FRITZ (after J. ECKERT) with Committees C5, C6, and C13;
  - S. PROESCHEL with Committees C11, C15, C16 and C17;
  - G. LUCACI (after A. LACLETA) with Committees C2, C3 and C20;
  - and L. NOBRE (after A. LACLETA) with Committees C9 and C18.
- 3 - a *coordinator* (D. VERFAILLIE) within Committee T1 to collate all the proposals in an appropriate format for discussion in T1 and for final comment by all the Technical Committees;
- 4 - and an *administrator* (P. RETOUR) to make the “validated” proposals available on Internet to all the users of the CD-ROM “PIARC Terminology”.

A complete run of this procedure – from the first contacts between members of T1 and the terminology correspondents in the Technical Committees, through the discussion and validation of the proposals in T1 and in all the Technical Committees, to the installation of the validated update on the PIARC Web site – was planned to take about one year. This meant that updated basic versions of the Dictionary and the Lexicon were to become available every year – which is almost continuously.

As for translations of the basic versions of the Dictionary and Lexicon into other languages, the Committee considered that these are the responsibility of the respective National Committees and that the designation of national “terminology correspondents” (see the Blue Guide, p. 37) using the CD-ROM “PIARC Terminology” as “editors” to create new languages for the two terminology documents should be strongly recommended.

### **3.3 Current state of progress**

#### **3.3.1 Updating the PIARC Dictionary and Lexicon**

According to the PIARC Blue Guide, the revision of the Dictionary and the Lexicon is an ongoing activity to be performed by the Technical Committee on Terminology, using the “PIARC Terminology” database as a working tool, which has been specially developed for this purpose.

In the past, the production of new “hard copy” editions of the Dictionary and Lexicon was a long and tedious task for the Commission on Terminology that was limited in membership; it used to take a full cycle of eight years – or two inter-Congress periods. A major disadvantage of this cyclical “hard copy” updating approach was the impossibility of keeping up with the rapid developments in terminology associated with new technologies and the extension of PIARC’s activities to other fields of interest such as intermodality and multimodality. By the time the Commission released its new editions, they were virtually out of date!

The “PIARC Terminology” CD became available in November 2000 and T1 developed the permanent “soft copy” updating procedure described above (see Section 3.2.2).

Following this procedure, a first series of additions and amendments proposed, discussed and validated in 2001 became available for downloading from the PIARC Web site in March 2002. For the Dictionary, the updating consisted mainly of minor corrections suggested by people working on a Dutch translation of the seventh edition together with some proposals made by Committee C1 (Surface Characteristics), whereas for the Lexicon, several hundreds of new terms were added. Some of these were suggested on behalf of Committees C4 (Interurban Roads and Integrated Urban Transport), C14 (Sustainable Development and Road Transport) and C19 (Freight Transport), but most were taken from the PIARC Activity Report 1996-1999 [7].

For the year 2002, the update was based mainly on extensive proposals from Committees **C7/8** (Road Pavements), **C11** (Road Bridges and other Structures) and **C15** (Performance of Road Administrations), and on a multilingual glossary of winter road maintenance terms prepared by Committee **C17** (Winter Maintenance) in cooperation with the European Union's COST Committee 344 (Improvements to Snow and Ice Control on European Roads and Bridges).

For the year 2003, T1 has received proposals from Committees **C1** (Surface Characteristics – draft standard ISO/FDIS 13473-2:2001-E), **C5** (Road Tunnel Operation), **C6** (Road Management), **C12** (Earthworks, Drainage, Subgrade), **C13** (Road Safety), **C14** (Sustainable Development and Road Transport, - EU/ECMT/UN-ECE document "Terminology on Combined Transport"), **C16** (Network Operation, - document NVF 53 "Road Transport Informatics Terminology version 2"), and **C18** (Risk Management for Roads). In addition, it intends to submit the "SWECO<sup>7</sup>" additions to Chapter 12 (Engineering Structures) of the Dictionary (see Section 3.3.4) to Committee 11 (Road Bridges and other Structures), and a EUROSTAT/ECMT/UN-ECE document "Glossary for Transport Statistics" to Committees C14 and C19 (Freight Transport).

### 3.3.2 Translations into other languages

Since the release of the CD-ROM in November 2000, an Italian translation of the seventh edition of the Dictionary was installed on the PIARC Web site in March 2001, a German version (developed in cooperation with Austria and Switzerland) in May 2002, and a Portuguese version in November 2002. A Dutch translation of the first edition of the Lexicon has been available for downloading since November 2001.

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<sup>7</sup> SWECO International AB is a Swedish company involved in the European project TACIS (harmonisation of road standards in Russia)

The Dutch Information and Technology Centre for Transport and Infrastructure (CROW) and the Belgian Road Research Centre (BRRC) have started a joint project to produce a Dutch translation of both the seventh edition of the Dictionary and the second edition of the Lexicon. The expected completion time of this project is early 2004.

### 3.3.3 Parallel work for German terminology

Work on this item chiefly resulted in a German translation of the Dictionary (see Section 3.3.2). However, little progress was achieved in promoting the use of PIARC terminology in European Standards.

### 3.3.4 Internet terminology services

These essentially consisted in making updates and translations of the Dictionary and Lexicon available on the Web site of PIARC (see Sections 3.3.1 and 3.3.2 for details).

Furthermore, an English-German-Russian version of the PIARC Dictionary, adapted for use in a European engineering structure project (SWECO), was added in 2002 to the series of downloadable specialized glossaries.

### 3.3.5 Development of computerized tools to assist translation

The release of the CD-ROM "PIARC Terminology", making the PIARC Dictionary and Lexicon and a number of specialized glossaries available in an electronic form, not only brought about a big change in the working method of T1, but also provided a new tool in the form of a computerized terminology database that can be installed on the hard disk of a computer to assist in translating technical texts on road and road transport.

The next steps considered by the Committee were to use this database as an automated translation tool and to link it with commercially available translation software.

A test had already been performed in 1999 with thirty sentences comprising about a thousand words to be found in all chapters of the PIARC Dictionary and Lexicon. These sentences had been translated from French into English using, on the one hand, the PIARC Dictionary/Lexicon and, on the other, a general dictionary. When comparing the results, 75-80% of the terms appeared to have been translated differently. Consequently, an automatic translation system based on the Dictionary/Lexicon seemed to be entirely justified.

In 2000, PIARC signed an agreement with the French *Laboratoire central des Ponts et Chaussées* (LCPC) and *Service technique des Routes et Autoroutes* (SETRA) for the evaluation of translation software (Systran®), software to create and consult dictionaries (Babylon®), and the software to create and consult the terminology database of PIARC (“PIARC Terminology” – see Section 3.1.2). Work under this agreement has shown how both Systran® and Babylon©, coupled with specific adaptations of the PIARC Lexicon for use as a “personal” dictionary, under given conditions, can help to save precious time in translating texts in the field of road and traffic engineering. The advantage of using these tools was defined according to the level of output quality required (perusal, sharing, publication, standardization) and the user’s command of the target language (low, medium, high). Details of the adaptation of the Lexicon for use in Systran® and Babylon© and of the results of tests with these software packages used with or without the PIARC Lexicon can be found in an article published in “*Routes/Roads*” [8].

In addition, Committee T1 is conducting a session on “Innovative translation techniques in the road field” at the Durban Congress. At this session, the state of the art of electronic dictionaries specializing in the road field will be presented, including demonstrations of computer-aided translation to show the contributions and the present limitations of the packages. The updating and dissemination of PIARC’s electronic terminology documents will be presented as well. The discussion will provide a first evaluation of the prospects opened up by computer-aided translation in the roads field. The Introductory Report for this session gives more details [9].

## 4. FUTURE ACTIVITIES

### 4.1 Involvement of the Technical Committees

Although most PIARC Technical Committees have appointed terminology correspondents as directed (see Sections 1.5 and 3.2.2), it has been the experience of T1 that, with a few remarkable exceptions, the response of the terminology correspondents to the calls of the contact persons for proposals has not been as effective as first hoped.

T1 is composed of a limited number of members whose knowledge and competence do not cover the full range of subject areas dealt with in PIARC and, particularly, the specialities within those areas.

Therefore, input for the revision of the PIARC Dictionary and Lexicon must come from the Technical Committees. The Dictionary and Lexicon should be the reference works of the Technical Committees that are active within PIARC. It is in their interests to revise terminology and transmit specialized vocabulary in their specific areas of expertise to the Terminology Committee.

That is why the PIARC Blue Guide 2000-2003 stipulated on p. 67 that a glossary should be attached to all reports and specialized papers published by Technical Committees, and that all the glossaries created by the Technical Committees should be submitted to T1 before publication. However, this process is not working at present.

In addition to these glossaries, a valuable source of new terms for terminology correspondents are the Introductory Reports for the sessions of their Technical Committees at the PIARC World Congress and the Activity Reports of these Committees as collected in a PIARC Activity Report published at the end of each inter-Congress period.

A letter endorsed by the Secretary General of PIARC was circulated to the Chairpersons of all the Technical Committees reminding them of the obligation to include glossaries and suggesting a search for specialist terms through the reports they published since the year 2000 or were about to publish.

Keeping up with terminology in all of the areas of expertise within PIARC is a goal that can be achieved only if all the Technical Committees cooperate fully and on a continuing basis.

## 4.2 Involvement of the National Committees

The limited number of corresponding members of T1 (see Section 1.4) indicates that, in spite of advertising in "Routes/Roads" and the publication of a pamphlet [10] to draw attention to the CD-ROM "PIARC Terminology", the work and products of the Committee on Terminology are still little known to the National Committees of PIARC.

As stated previously (see Section 3.2.2), a paragraph in the Blue Guide extends the circle of "editors" of the PIARC terminology database to national "terminology correspondents", designated in each PIARC member country, in order to translate and/or revise terminological information in the language of their country.

One way to encourage National Committees to nominate their correspondents may be to send the First Delegates a letter briefly explaining the "PIARC Terminology" project, its objectives and the tasks of "editors", and inviting the latter to attend a training course.

Translations of the basic versions of the Dictionary and Lexicon into other languages are the responsibility of the respective National Committees. The involvement of these Committees should be encouraged in order to make maximum use of the multilingual potential of the PIARC terminology database.

## 4.3 Contents of the Dictionary

Technical Committees have reported difficulty with the structure of the Dictionary when they wish to review the terms for a specific subject area. As the structure of the Dictionary has not changed since 1931, it should be reviewed to see if it still covers the themes of the Technical Committees. The possibility of relating the existing terms in the Dictionary to the Technical Committee structure should be examined as well.

Moreover, in developing and updating the basic version of the Dictionary, the opinions of the members of Committee T1 have been divided for several years between two alternatives:

- to create a definition for each term, like in most specialized dictionaries – such as the "Colas Bilingual Dictionary" [11] and the "Dico-TP" [12]. This represents the view of those who believe that restricting the number of definitions in the Dictionary is incompatible with the development of a project as ambitious as "PIARC Terminology". Furthermore, to allow unequivocal translation into a target language, they consider that any term or expression must be unambiguous in the source language. To attain this objective in technical terminology, a definition is absolutely necessary;

- the other is to define only specific road terms (such as “Ring-and-Ball test”) not known to non-specialists, and general terms (such as “ageing”) that have a specific meaning in road technology. This option raises the problem of assessing what non-specialists may know or may not know, but has the advantage of avoiding “inflating” the Dictionary to a volume that would be too bulky for practical use and make translations of the Dictionary into other languages prohibitively costly in many countries. Another argument in favour of restricting the number of definitions are possible problems in giving harmonized definitions to concepts that have not only a technical but also an institutional (legal) content, such as “motorway”.

There may even be a third alternative, that is, to make a hard copy version of the Dictionary that is only a selection from the electronic version – but this would require criteria for the selection process.

It would greatly assist the Terminology Committee if National Committees of PIARC would express a view on this matter.

Better use should be made of the possibilities of data processing to supplement the Dictionary with images illustrating the terms and definitions.

#### **4.4 PIARC and European Standardization( CEN )**

French, English and German are the official languages for European standardization. The addition of German to the PIARC Dictionary (see Sections 3.3.2 and 3.3.3) provides an opportunity to make it one dictionary for dissemination and use in CEN working groups. In addition to its basic work on French and English terminology, T1 should, therefore, continue its parallel work on German terminology (see Section 3.3.3).

Although feedback from CEN working groups in the form of internationally agreed terms and definitions is hampered by the fact that terminology work in CEN is usually limited to the context of a specific standard – whereas that in PIARC is more comprehensive in scope – it would be useful to establish and maintain contacts with the various CEN working groups active in road and road-related fields. Members of PIARC Technical Committees who participate in CEN working groups should be encouraged to report on CEN terminology work to the terminology correspondents in their Committees. This would enable PIARC and CEN to harmonize their terminology for the benefit of the international road community.

#### **4.5 Internet terminology services**

Current work should be continued to install updates and translations of the basic versions of the PIARC Dictionary and Lexicon on the PIARC Web site for free downloading by the users of the CD-ROM "PIARC Terminology", as soon as they become available.

PIARC should consider providing a multilingual terminology database at no cost for non-commercial purposes, on line on the Internet. This project could be supported by the Council of PIARC (for financing) and by the National Committees (for input).

#### **4.6 Computerized tools to assist translation**

Although the first automated translation tests with Systran®, coupled with specific adaptations of the PIARC Lexicon for use as a "personal" dictionary, have been encouraging, we are still some way from the "perfect" output that no longer requires human verification. Efforts, such as those made in cooperation with LCPC and SETRA, should, therefore, be continued in order to improve further the Lexicon for use with translation software packages. An organization should be set up to gather feedback on users' experiences. Also, the intellectual and commercial property rights of the PIARC Lexicon should be considered.

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