XXIInd PIARC World Road Congress

19 – 25 October 2003 – DURBAN, SOUTH AFRICA

GENERAL REPORT AND CONCLUSIONS

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INTRODUCTION

For us to prosper necessitates development and economic growth, but our early steps into the 21st century have already taught us to move past the pragmatism of this approach. We have to evolve our thinking by encompassing social goals reducing poverty and improving the quality of life. Road infrastructure, as community assets, has shown itself through the years to be a powerful tool in improving the quality of life. However, to ensure sustainability thereof requires integrated, participatory and inclusive processes ensuring deliverability of the outputs.

For developed and developing countries alike, it is important to, together, take hands and responsibility for our shared goals of sustainable development and eradication of poverty. Roads have always played a pivotal role in development and create economic potential to stimulate the fabric of societal changes.

PIARC has since its inception taken the lead in gathering the world road community and has supported progress towards the development and social welfare. Although the Strategic Plan 2000-2003 has re-directed PIARC's activities to meet the changing environment and needs of its members, its main objectives of international cooperation and technology transfer has been retained. Through its Strategic Plan, PIARC has focused on five strategic themes:

- Road Technology
- Road Transport, Livability and Sustainable Development
- Road and Road Transport Operations
- Management and administration of the Road System
- Appropriate levels of Road and Road Transport Development

In keeping with other issues important to the member countries and other international organisations, special themes have also been included in the Congress. A number of sessions debated issues, among them were the following:

- Road safety
- The New Partnership for Africa's Development (NEPAD)
- Public Private Partnerships
- The integration of finances and delivery of service in the local government environment
- Transport's contribution to sustainability

The conclusions reported in this General Report reflect the work of PIARC over the past four years and the conclusions of the debates in the Congress

MINISTER'S SESSION

Hosted by South Africa's Minister of Transport, Dr Abdullah M Omar, the ministers' session had as its central theme "Sustainable Development – the role of road infrastructure".

The session was attended by 22 Ministers, 7 Deputy Ministers, 5 Provincial Ministers and 4 senior government delegates collectively representing 31 countries.

Historically, there has always been a complex interplay between state and private enterprise; between funding from the fiscus and private tariffs or tolls; between regulated controls and the dynamism of market forces. The role of governments has evolved, more rapidly in the case of developing countries where there is greater need for state intervention in the provision of economic and infrastructural development. But even in the developed world the state is central to economic and social development, both as a direct provider and as a partner, catalyst and facilitator. Globally, governments need to search for institutional arrangements and development strategies that promote growth while extending the benefits of social and economic progress more equitably. At the World Summit for Sustainable Development, held in South Africa in 2002, the three fundamental prerequisites for sustainable development - economic growth, social equity and management of the environment - had to be viewed as a holistic concept. It was against this backdrop that the role of roads was discussed during the session under three topics.

The first of these was "Mobilising partnerships for sustainable development" at which the crucial role these partnerships play between nations, between diverse organizations and between public and private sectors was discussed. The relationship between state and private enterprise is important to promote growth, social mobility, trade and broad-based development and it has been proven that this is most successfully achieved through partnerships. But, account must be taken of a balance between economic and social demands, between public and private financing and between meeting the specific needs of road users.

The second topic, "Harnessing private investment in support of public infrastructure development", discussed the role of foreign capital in achieving sustainable development. Developing countries are likely to attract direct foreign investment, essential for economic and social growth, as a source of income. However, for there to be a conducive enabling environment there has to be a synergy between taxation and investment policies. It was a moot point whether such responsibility fell to the public sector, private sector or development agencies. Ultimately, to harness private investment successfully requires the state to recognize its accountability for the management of information around service delivery monitoring, and the regulation of quality, access and costs.

The final topic was "Good governance, a prerequisite for sustainable development". Government systems must promote, support and sustain

development, all within an environment that engenders confidence. Effective democracies rely on public participation, transparency and accountability; particularly financial accountability where public resources are at stake. It is here that practical solutions are required if transparency and responsible governance are to be taken seriously.

In the course of deliberations this session dealt with other issues, which included promotion of growth through competition, social development as a necessity and not just a spin-off.

STRATEGIC THEMES

This section provides a brief report on the five strategic direction sessions devoted to the five themes flowing from PIARC's Strategic Plan 2000-2003.

ROAD TECHNOLOGY (ST1)

The purpose of a road authority is to provide the best possible service to road users. For this, it is necessary to have quality indicators to express road user needs with regard to construction, maintenance and operation, and also to assess how well objectives are being met. In addition, road authorities increasingly need to look for ways of optimizing the capacity of existing road infrastructure in order to avoid a decrease in the quality of the level of service. This session concentrated on the following topics:

- procedures to describe user expectations concerning road condition and quality of service,
- road quality indicators that can be used to measure the degree of compliance with those expectations, and
- road technology innovations that have been developed during the last four years to improve the quality of service.

Presentations addressed the existing situation in developed and developing countries as well as the need for major improvements. It has been found that many countries are evolving from purely technical approaches to road management, towards a process in which objectives are set to comply with user expectations.

The following topics were presented and discussed during this session:

- Various user categories expectations,
- Evaluation procedures of users' satisfaction, requests and suggestions,
- Possible parameters to assess user expectations meeting,
- Choice of pavement surfacing and its characteristics according to the needs,
- Pavement selection criteria based on quality of service,
- Improvements in the domains of management systems, operation and maintenance procedures to reduce negative impacts on the quality of service and increase the safety of users and staff in roadwork areas.

C1 - Surface Characteristics

Recommendations to Decision makers

The growth in road traffic is increasing the technical demands made on road surfacing. This in turn has implications for road managers and decision makers in the allocation of limited financial resources to maintain, in a sustainable way, an acceptable level of safety, riding comfort and traffic noise. In addition the introduction of new contracts, for the management of road networks that incorporate functional specifications, further emphasizes the need for good quality data on road condition. Hence, the need for the wider adoption of available high-speed road condition survey technologies to provide the required data at an economic cost and with minimum disruption to normal traffic operations. Road administrations should encourage and support developments of appropriate technologies for the different aspects of surface distress.

Already, high-speed prototype systems for the detection of cracking on paved roads are available in a number of countries. However, the assessment of other distress modes, such as loss of surface material and road edge deterioration also needs to be addressed. The potential of robust and reduced versions of the equipment for assessing the maintenance needs of poorly financed road networks also needs to be examined. When such systems are widely available and applied they should lead to more efficient and sustainable maintenance practice.

Technical aspects

Technical developments in the measurement of a wide range of pavement surface characteristics continue to advance. Much work, led by PIARC, has in recent years been devoted to the comparison of existing systems for the measurement of friction, texture and longitudinal and transverse unevenness of pavements. Though this work has made considerable progress, and has produced large quantities of very useful data, there are still difficulties to be overcome before an acceptable level of harmonisation can be achieved regarding the measures used in different countries. In addition, the growing trend in the use of end product and functional performance type specifications, in the construction and management of roads, has made the provision of accurate and consistent road monitoring systems essential. This provision should also include appropriate quality assurance procedures to ensure proper calibration of equipment and checks on the condition data collected by the equipment. The benefits to be gained from harmonisation of assessments are clear to all parties. Future work should therefore focus on further advancing developments in this area in particular with the measurement of road-tyre noise and road surface distress.

Recommendations to PIARC

International road organisations play a very valuable role in the dissemination of information on new technical developments and, importantly, encouraging the adoption of best practice in the application of new/improved technology in road construction and maintenance. This is done, most efficiently, by the development of improved Standards and Specifications, at the national and international level, that incorporate appropriate developments. PIARC has a wide range of links with such bodies, through members in common etc. It is, therefore, in a good position to influence such developments by playing a leading role in the co-ordination of international experiments, in particular, in the harmonisation of measurement techniques for pavement surface characteristics not only for roads but also for airfields in both developed and developing countries. In particular, although a lot of efforts were made in the recent years, in which PIARC C1 played a significant role, the goal of harmonising measurement and assessment methods - including global indices - is still to be pursued actively.

In particular, following the work done and the recommendations made by this Committee, a durable solution has to be developed by the next Committee with a view to providing a stable, reproducible test tyre for friction testing.

C7/8 - Road Pavements

Recommendations to decision makers

Innovation, performance specifications, recycled products and recycled materials are major topics for decision makers. The key recommendations emerging from C7/8 works on these topics are:

- Many factors must be considered in determining pavement types. This selection should be supported by a well thought-out process based on sound engineering practices. Costs estimates that encompass the entire life of pavements must be used to compare different pavement designs and to aid in the decision-making recommendations.
- Society demands more mobility, sustainable development, shorter delays to satisfy its expectations. Innovation is necessary to meet these current and emerging needs. Road Administrations have a major role to play in anticipating needs and in supporting innovation programs.
- Innovation is not the exclusive preserve of one party. Contractors' knowledge is essential to optimise material uses and to develop new construction techniques. Owners must retain experienced and knowledgeable staff to support programs and for fair evaluation of innovations.
- Introduction of performance specifications in road building contracts make use of the expertise available in all its forms. Greater flexibility is allowed to contractors who are freer to select their own solution. These specifications offer many advantages but their implementation runs into obstacles that nonetheless can be overcome. Both the client and the contractors are still

at a learning stage that calls for adaptation to their new roles and new responsibilities. Adopting these specifications still requires their testing and their gradual expansion to make the most of these experiments.

- Selection of pavement types and use of performance specifications do not rely on a universal recipe. They must be fit to the particular stage of development that a country has reached.
- Knowledge of long-term performance of pavements built with recycled materials has not been mastered in most countries. A few countries have more than two decades of experience whereas this is completely new for others. However, the gains resulting from recycling are so great that using recycled materials remains an option that inevitably must be examined.
- A market for recycled products and recycled materials is a precondition. Governments play a major role in setting political goals that can create markets by legislation or taxes. Recycled products have to stay competitive (price/performance) over one of more life cycles compared to traditional materials. Co-operation between clients and contractors is needed for effective implementation and widened use of recycling.

Technical Conclusions

- *Selection of pavement types*

No universal formula exists for selecting pavement types. The facts affecting the decision vary from country to country and from one project to another. To establish an equitable comparison among the various options, the decision should be supported by the costs estimated by applying whole life cycle costing and the anticipated performance.

- *Innovative pavements*

Innovation does not only materialise in products and techniques but also in the programs and structures set up to help it flourish. Reconsidering evaluation methods, contractual procurements and conventional standards for judging the quality of pavement materials and structures is difficult but may turn out to be indispensable to avoid suppressing innovation.

- *Performance specifications*

It is difficult to associate costs to the implementation and use of performance specifications. The form of contract, the definition of warranties and the assignment of risk are seen as being of prime importance in determining both the initial and the whole life costs.

Even though performance specifications look advantageous, three major issues will still have to be addressed in the future:

- harmonisation of definitions of performance specifications according to the level to which they apply (user, functional, construction demand or material properties) ,
- profitability of the investment associated with their implementation, and
- advantages and disadvantages of the different warranty formulas.

- *Recycling pavements*

Introduction of new materials as recycled materials takes time because performance of materials has to be validated. In some cases, recycled materials have a larger heterogeneity compared to virgin materials. This and the lack of performance tests capable of predicting lifetime characteristics are hindrances to a quick acceptance of recycled materials.

Hot mix recycling of bituminous material and in situ recycling with cement are proven and robust techniques. Although in situ recycling with emulsion or foamed bitumen is also a proven technique, the retreated mix design is still empirical, which might preclude quick acceptance. The work has to be organised in such a way that sufficient lengths of road can be processed, otherwise costs might be too high.

Equitable risk sharing between the partners and performance in terms of quality and total cost continue to be key factors to ensure the long-term viability of recycling techniques. Used material will have to be recycled in the future again, calling for awareness at the design stage.

Recommendations to PIARC

Integrated topics based on a more global approach have been part of the work programme of the current C7/8 Committee on Road Pavements. Technical and organisational interfaces are key points that can progress within PIARC works.

C7/8 suggests the following topics be considered for future committee work:

- comparing pavements using broader criteria than whole of life costs,
- selection of pavement rehabilitation techniques,
- pavement recycling,
- long lasting pavements and their design methodologies,
- techniques to reduce disturbance from noise, pollution and congestion, and
- multimodal and multifunctional pavements.

The concept of supporting Seminars in developing and emerging countries should stay as an effective way of sharing knowledge as well as gathering reactions and suggestions to PIARC proposed products.

PIARC Reports	• Guideline of factors for determining pavements types (in process)
	• Design of Innovative Pavements (78.03.B)
	• A fact finding review of performance specifications in 2002 (78.01.B)
	• PAVEMENT RECYCLING: Guidelines for
	  • In place Recycling with Emulsion or Foamed Bitumen
	  • Hot Mix Recycling in Plant
	  • In place Recycling with Cement (78.02.B)

Other Documents	• *Special Edition of Routes/Roads Magazine on Functional Specifications, July 2002* • *Report on the PIARC International Seminar on Road Pavement Recycling* • *Documents on the First International Symposium on "ROADS INNOVATION 2003", Paris, March 2003*

C12 - Earthworks, Drainage and Subgrade

NATURAL MATERIALS NOT COMPLIANT WITH SPECIFICATIONS AND RELEVANCE OF EARTHWORKS CONTROL

- The varying levels of consideration of pavement subgrade in the pavement design phase leads to very different practices throughout the world. This deserves further attention, as it is a significant issue with regard to practices in favour of sustainable development;

- Reconciling earthworks and pavement techniques to optimize investments in low-cost roads (low investment roads, low traffic roads, roads requiring a high level of maintenance). This was revealed to be an urgent matter at the seminar held in Ulaan Baatar (Mongolia) to meet the needs of developing and transition countries and/or with extreme climate conditions, for earthworks techniques mainly and a consistent pavement type design.

- A review by member countries of the criteria used for refusing embankment soils would be very interesting. Many differences have been identified among countries, which are not always justified by local characteristics (climate, relief, etc.)

- Monitoring of acceptance and laying of coarse materials (materials for which it is not possible to perform the Proctor Test) often lacks sound technical references and control methods.

- Control methods and frequency: this topic would no doubt lead to interesting and fruitful discussions. Indeed practices should be based on an objective risk analysis, which is not always the case.

- Earthworks controls do not prevent possible conflicts between the client and the contractor and therefore require to be improved to enable contractors to assess the works to be carried out and warn of difficulties in contract management.

- The goals of compaction, both in terms of density percentage of the Proctor reference and range of acceptable water content vary considerably from one country to the other. The reasons for this are not clear in many cases. A scientific foundation of these goals would represent a real progress.

- Monitoring the laying and functioning of drains is essential, as their malfunction is the cause of a large part of earthworks defects.

COLUMN SUPPORTED EMBANKMENTS

The current state of the practice has been given for the following column support technologies: Stone and Sand Columns, Concrete Vibro Columns (VCC), Conventional Driven Pile Column and Continuous Flight Auger (CFA), Jet Grouting, Geosynthetic Bridging Mats. The main aspects have been dealt with regard to the different technologies, including the general conditions for its utilization, the frequency of its utilization (common or special), construction details, and methods of construction control.

The technology of stone and sand columns is mature, with detailed design and construction protocols. Major improvements in the construction equipment have occurred. This technology, limited to very soft soils, can be used with a geotextile mat.

Concrete Vibro Columns, installed using basically the same equipment as that for stone columns, used more frequently than stone columns in many parts of the world, are applicable to very soft soils, have low cost per vertical capacity.

The quality and economics of CFA (Column and Continuous Flight Auger) system have improved dramatically in recent years. The usage of geosynthetic bridging mats has significantly improved the cost effectiveness of these “high” capacity piles. A special design of the binder has to be carried out for every soil.

In the geosynthetic bridging mats technology the use of geosynthetic reinforcement has dramatically improved the economics of column supported embankments. Geosynthetics allow increased column/cap spacing without the use of expensive concrete slabs.

The design protocol is not yet mature and there is no generally agreed

standard. Numerous methodologies are available, and several countries have developed Guidelines and Standards. However, the methods employed change with project designers. In order to get good results it is imperative to use high quality materials, and attentively caring for their placing.

SLOPE RISK GUIDANCE FOR ROADS.

The following slope risk issues, as related to roadways, have been identified also during the Seminar held in Nepal on 'Sustainable Slope Risk Management for Roads', in Spring 2003:

- The scale of the problem ranges from one of the most devastating geo-hazards with threats to life and economies, to one of nuisance requiring increased maintenance costs only ;

- The slope behaviour has been studied focusing until now on the current or past mechanical aspects and not on the prediction of future instability ;

- More study is required on the effect of global climate change and the frequency and size of areas of slope instability ;

- The terms and methodology for determining risk are now well developed. The understanding of risk must cover the life of a slope from design, through construction to operation ;

- It is important to select appropriate 'standards' when assessing the acceptability of risks. These 'standards' may typically relate to safety, whole life cost, environmental impact, journey reliability and ride quality ;

- Developing Countries seek guidance on the selection and application of Technologies for remediation and improvement, as well as hazard and risk assessment ;

- The management of slopes on a whole transport route is relatively new, not from a technical aspect, but from an operations, planning and business perspective. Geotechnical Asset management should form part of a more holistic approach to Road Infrastructure Management ;

- The seminar has highlighted the need to provide guidance to developing countries.

The committee members made the following proposals for future topics:

- Infiltration of surface runoff
- Intelligent compaction (including sensors, quality control issues, and performance-based specifications)
- Criteria for selection of materials for paved and unpaved roads
- Earthworks in countries with extreme weather conditions
- Earthworks in countries lacking materials to construct roads economically

- Optimization of the use of natural materials in unbound pavement construction
- Requirements for the preliminary site investigation from the viewpoints of the owner and the contractor
- Selection of appropriate risk standards
- Guidance on the selection and application of new technologies for risk assessment
- Importance of effective geotechnical asset condition information
- Utilization of GIS for slope monitoring
- Use of waste materials in road construction
- Road section adjoining the bridge
- Performance criteria for earthworks control
- Taking into account the subgrade as a parameter of pavement design.

ROAD TRANSPORT, LIVABILITY AND SUSTAINABLE DEVELOPMENT (ST2)

Today roads are the leading transport mode in the world. They are not only crucial to our economies, but also in our daily life when it comes to having access to essential services such as health, education, essential goods and leisure facilities. Sustainable development should be based on roads that are designed, built and operated in harmony with the environment, adequate land planning and meeting social demands. In order to identify the avenues that enable the reconciliation of the requirements of economic and social development and environmental protection, this session dealt with the following two topics:

- roads as an integral part of human activities. This part placed emphasis on the strong impact of roads on the economy of the areas crossed, on the functioning of urban areas, and on sensitive environments;
- the need to implement the sustainable development concept according to the areas concerned. This part raised the issue of prioritisation of constraints and issues at stake according to the specificity of regions, the introduction of decision-making processes and adequate implementation.

C4 - Interurban roads and integrated interurban transport

Technical Committee 4 on Interurban Roads and integrated interurban Transport reported that the transportation demand growth is at a faster pace than network capacity growth. This happens within a framework of limited resources for infrastructure investment/maintenance and increasing environmental awareness. So,

“How to cope with future demand for interurban transport (passengers and goods) taking into account sustainable development objectives?”

Considering this question, the Committee has looked at the following three main areas:

- to what extent can other modes of transport reduce the pressure on the road sector? Possibilities and limits to modal split,
- how to improve the road transport system by optimising the use of the existing road network,
- how to improve on public acceptance of new infrastructure projects.

The conclusions of the Committee were as follows:

Economy and transport

Mobility is regarded as a basic need and an incontrovertible factor in our economic life insofar as it takes account of a certain number of principles of solidarity and environmental protection. The Committee thus reported that it did not find it very realistic - in the foreseeable future - to expect

disconnections to any considerable degree between this need for mobility, the provision of transportation networks and demands of economic development.

Intermodality

- Generally there is a limited potential to influence modal choice in the interurban transport market to a significant degree without using means that would affect international competition and economic growth in a negative way. In the long term, the regional planning policy could be an important factor.

- Any significant modal transfer supposes highly deliberate policies and often high investments in favour of the alternative mode, to improve both infrastructures (capacity) and quality of service while obtaining significant gains in productivity. Organisational and logistic solutions are crucial for success.

- Freight and passenger transport are to a large extent using the same infrastructure and can thus not be treated separately. A high percentage of road freight transport covers short distances where there no realistic alternative for change of mode exists. Road congestion is mainly due to high volumes of passenger cars (and incidents), while heavy goods vehicles are the main cause of road deterioration.

- It is not possible to draw up a set of ready-made rules to deal with every situation. A reflective approach should be taken by focusing on different parameters, such as accessibility, safety, duration, cost, pricing, information to users and decision-makers, quality of service, etc.

- It is obvious that investments in road infrastructure will still be necessary to cope with the global growth in transport demand, especially for improving accessibility in developing countries. The appropriate scale of this investment and obtaining the right balance between roads and other modes will be the challenge facing decision makers. The optimum decision will vary from country to country depending on existing conditions and the scale and type of planned economic growth.

- In developing countries with existing public transport infrastructure, it will be vital to maintain and improve this infrastructure as well as to respond to the demands for new and improved roads. Not doing this will fail to fulfill our sustainability obligations.

Optimising existing interurban road network

- Dealing with mobility, safety and congestion on the interurban road network, is very complex and the opinions expressed indicated that there exists no single measure for achieving the given objectives of improved mobility, increased safety and reduced congestion.

- The interurban road network in the developed countries is substantially completed. As the existing network ages, it can hardly keep pace with the ongoing traffic increase. Due to financial and environmental constraints the emphasis for improving and optimizing the road network is changing from structural measures to making better use of the existing infrastructure by measures managing the existing interurban road network - emphasizing safety benefits and improvement of incident response times of emergency services. Incident management has become the key, rather than operations improvement or congestion reduction.

- Capacity problems in road transportation are to a large extent related to the explosive growth in the use of private cars. To reduce excessive growth in sensitive areas, increasing usage is made of regulations and pricing measures especially in big cities, with possible future extensions to interurban situations by regulation of road space/lanes (buses/freight transport), and road pricing among other actions.

- At present different kinds of interventions are required according to the country. These interventions depend mainly on the state of development of their road network as well as their overall economic situation and traffic development. It is therefore suggested that within the framework of the future program of the Committee, recommendations on optimizing measures be divided into two groups, i.e. those for economically strong countries with a highly developed motorway network and those for countries with rather limited financial resources for the development of their road infrastructure.

- Taking measures for optimising the interurban roads network requires not only considerable investment in terms of costs but also in terms of time, as the build-up of a suitable organisation and proper training of its personnel cannot be considered an easy task.

Achieving Social Acceptance of Transport Projects.

- One desirable approach is to formalise public debate throughout the life of a project, either through legislation and regulations, or via good practices based upon fundamental principles of quality management.

- The public in many countries often claim that they are only consulted when it is too late, when the project has already progressed so far that it is difficult to reverse earlier decisions. One answer to this concern is to intensify dialogue at the beginning of the process or to introduce discussion about the principle and major functions of the link to be built, prior to the design stage.

- The process of determining the levels of service to be applied to transportation networks and the resulting priorities for action are an important issue in the political debate and in discussions at national and

regional level in order to make clear the major orientations and strategies of governments.

- To create conditions of social acceptance, project managers must play their full part at national and local level: identifying and highlighting all the quality criteria of the project at the outset - which in fact will facilitate its evaluation at a later stage -, oversee the introduction of quality as concerns the processes of drawing up the project and the results to be expected, and finally be able to draw up clear and reliable instructions for managers and then for contractors, within a comprehensible technical and legal framework.

- The stage of government approval may be the opportunity for the project managers to undertake to reduce the impact of the project on the environment, such commitments being liable - so long as they are fulfilled - to facilitate the social acceptance of projects.

- It is important that members of the public should be able to find out where decisions are taken and to identify the decision-makers, and that they should be aware of the milestones in the different stages of the projects when important decisions are to be taken, and the level at which they can intervene with regard to these decisions.

- The expectations of users are not limited to mobility. It is in the interest of road authorities to acquire resources for continuously evaluating the nature of their needs by introducing what may be called marketing departments. These departments should be given the responsibility, through continuous dialogue with users, for defining their expectations, predicting developments, monitoring the response to users, and measuring their degree of satisfaction.

C10 - Urban Areas and Integrated Urban Transport

One of the most critical issues to be addressed in the field of transport, livability and sustainable development is the growth of population, and hence traffic, in the urban areas of the world. World population will grow by 50% from 6.1 billion in mid-2001 to 9.3 billion by 2050. By 2025, the total urban population is projected to double to more than 5,000 million people; 90% of this increase is expected to occur in developing countries.

This growth, and the growth of the world's economies, is causing consequent growth in private car ownership; this is a world-wide trend. The number of motor vehicles worldwide could grow from a recorded 580 million in 1990 to 816 million in 2010. This trend affects developed, developing countries and countries in transition. The growth results in increasing pressure on the infrastructure of our urban areas, causing congestion and pollution and reducing quality of life.

Over the past 4 years the C10 Committee has been addressing 4 key areas with respect to future transportation in urban areas. These are

- Sharing the main street and how to resolve the competing claims for space in the main streets of urban areas. The main street is a key component in the life expectancy of any major urban area;
- Land Use and Transport Policies in Urban Areas. In order to address the growing issue of world urbanisation and congestion the relationship between land use and transportation must be addressed;
- Transport Interchanges and Urban Development. This interrelates to the first two topics and is key to the efficient working of passenger and freight networks in urban areas;
- The Evaluation of Transport Performance Measures for Cities and how they contribute to a city's goals and objectives. This area is one which is not well researched and the work carried out is very much at the cutting edge. It is vital to the successful operation of our transportation systems that we are able to successfully and effectively monitor the performance and success of our initiatives in relation to the city's overall goals.

C14 - Sustainable development

The Committee's session presented an overview on decision-making in the implementation of road transport policies and on the evaluation and limitation of adverse impacts of road networks and transport policies.

The Committee organized three international seminars in India, Argentina and Romania. The major conclusions of these seminars concerned the importance of maintenance, upgrading road infrastructure, with special attention to rural roads, and of safety in sustainability, as well as the importance of regional cooperation.

The Committee discussed the following topics:

- Linking transport policy to broad societal objectives

Sustainability objectives require transport to be considered in terms of the contribution that schemes and policies can make to environmental, economic and social goals. This encourages decision-making responsibilities for transport to be vested in organizations and directorates with a wider mandate than just transport.

- Transparency, responsiveness and honesty

Success in gaining community acceptance of road projects through public involvement is conditional on transparency, responsiveness and the honesty of the project team. Seeing other people's points of view, being sensitive to an audience, working with representatives of social networks in an atmosphere of mutual respect, responding to different cultures, education systems and values, providing information in a meaningful way without being

condescending or using technical jargon, are the essential attributes that governmental authorities should develop in order to bring about effective public involvement.

- Ensuring a healthy transport system

Adverse effects are mainly due to accidents. Indirect effects result from air pollution and in the long term from greenhouse gas emissions and noise. Effects on human health due to road maintenance chemicals impacting on groundwater and soil have to be assessed. Close collaboration with conservationists and environmentalists is important in order to ensure a healthy transport system for all.

- Mitigating local pollution

The problem of local pollution has been a subject of concern in many countries. In urban environments, noise, vibration and air pollution need to be given serious consideration. In rural areas local impact concerns mostly the pollution level of soil and water. It must be a clear goal for road engineers to find solutions that deal with environmental demands in a balanced way.

- Protecting biological diversity

The loss, fragmentation, disturbance and pollution of habitats are the major negative impacts on biological diversity. Various measures have been taken in order to improve the current situation. In areas with intensive agricultural use or in heavily built-up areas, road verges and road greenery can offer some species a habitat and a migration route.

- Maintaining landscape values and cultural heritage

Maintaining a register of valuable buildings and urban structures is a simple method for the mapping of architectural quality and buildings worth preserving. Measures for the conservation of landscape value and cultural heritage are sometimes very global, sometimes very specific and difficult to combine in one major “rule”. A combination of measures seems to be the best approach. Public participation is important to promote landscape value.

- Developing vehicle regulation and promotion of less polluting vehicles

Techniques to reduce the harmful effects of motor vehicles are being deployed worldwide. A detailed scan and documentation process of effective practices would serve as an intellectual platform.

At the World Road Congress, there was unanimous support for the sustainability principles and unanimity that practical applications need much further work. The Committee made strides in some areas that support the developing, transitional and developed countries but in varying ways. These gaps have to be filled or we will be in the situation, as stated by a delegate

from Cameroon, “where a few people have been to the moon, while the majority of the world population can’t travel from their village”.

C19 - Freight transport

The Freight Transport Technical Committee reported during their session that the movement of freight by road continues to dominate in most developed countries, developing countries and countries in transition. The question during the session was posed as to how could the movement of goods by road be continued while at the same time meeting the needs of society for a more sustainable environment. The effect of moving goods by road, as the dominant mode of transport is as follows:

- Safety: although the number of accidents involving heavy vehicle are low compared to other road users, the gravity of accidents are more serious;
- Environment: heavy vehicles cause noise and pollution especially in environmentally sensitive regions;
- Accessibility: road freight transport contributes to congestion, reduced accessibility and decreased mobility.

The work undertaken by the committee has resulted in divergent conclusions such as the continuing dominance of freight transport by road is encouraged and enhanced by the increasing weight and dimensions of trucks and trailers. This increase is often based on the view that by increasing the loading capacity of vehicles, the number of trucks on the road will be reduced. This is not necessarily the case, in that due to cheaper costs and therefore pricing, good transport will be transferred from another mode (such as rail) which cannot compete against these efficiencies and the number of trucks will increase.

Evolution of modal sharing:

- Generally, modal sharing between road and rail is going in the wrong direction, i.e. road is increasing and rail is either stagnant or dropping.

- The analysis of trends of modal share highlights the continuing increase of transport demand and the problems with still more intensified road freight transport. One approach to dealing with this transport growth is to encourage increased intermodality. The different transport modes have to be considered as complementary and not competing. Road freight transport should be included in the general logistical chain. However, modes other than road transport have to improve their attractiveness to achieve a bigger share of the transport growth.

- Road transport needs to be a well functioning link in the entire transport chain, with well developed interchange to other modes. The application of integrated land use planning would facilitate this outcome.

- The development of road freight transport is being limited by congestion, safety and lack of harmonisation of regulation.

- A reduction of the number of heavy goods vehicles on roads can be achieved if other modes take a bigger share provided that the other modes are able to meet market demands (including efficiency).

- The present situation with regard to increased modal division is that governments generally promote it, but do not follow through with concrete actions.

Role of regulation and deregulation:

- Transport in the developed world has on the one hand been deregulated with respect to access to the occupation, but even more regulated with respect to traffic regulation (driving time, weight and dimension).

- The harmonisation of regulation is not easy due to the level of development and policies in different countries. This has a big influence on the modal share, the use and the organisation of logistics.

- Deregulation of road transport has increased competition within the road transport sector while increasing the competitiveness of the road mode against other modes. The same should happen also by deregulation in other modes.

Emerging problems, potential answers offered by logistical platforms

- To promote intermodality, very good quality and level of infrastructure is required. That means efficient platforms but also very good road accessibility to these platforms. The major issue with achieving this outcome is who is going to pay for the investment necessary to achieve this. New partnerships are required between public and private investors. Road authorities should consider playing a role in establishing and/or maintaining logistics platforms.

- Regarding the logistic platform itself: to offer benefits to users and achieve economy of scale, it must be dimensioned for a large regional area.

- The location and function of a logistic platform is a balance between the advantage of having large freight vehicles in sensitive areas like a historical city centre or having many small vans in the same area with the disadvantage of increased congestion and air pollution, etc.

- Logistic platforms may offer some solutions in congested areas; however the lack of terminals is the main obstacle for increased intermodality.

Experience gained in monitoring and control of vehicle size and weight limits including emerging trends:

- Weighing in motion heavy vehicles is necessary for knowledge of the current situation and fair competition as well as for road safety and observance of the laws.

- There is one point that is common for developing countries and other countries; the control and monitoring of weight and dimension of trucks which can be developed further and is important for all countries regarding road wear and tear, as well as assisting in ensuring adequate pavement design and condition.

- The efficiency of the road freight transport is dependent on harmonisation in monitoring, and controlling weights and dimensions of the vehicles. This is important for developed countries as well as for developing countries.

Control and enforcement in the road freight transport:

- In each continent, there is a need for harmonisation of weight limits for freight vehicles and the implementation systems for control and monitoring.

- It is necessary to intensify control of heavy vehicles and their trailers for safety reasons and for having equal conditions.

- Enforcement of road traffic in general and of freight vehicles in particular is necessary for a sound road freight market.

Heavy vehicle safety, including accident statistics and risk analysis processes:

- To find solutions for increased road safety is one of the most important topics for the coming years.

- Road safety can be improved by training of drivers and control of drivers and vehicles.

- Standardisation of accident statistics would offer benefits of comparability by country.

Reflections for PIARC coming activities in the area of Freight Transport

- The modal shift is influenced by the qualities of the different modes. Until now road transport is considered to be more competitive because it's cheaper, more flexible and reliable. But is that still the case? Traffic congestion slows down the speed of freight delivering by road and makes the service less reliable. In the future even more problems are expected due to the increase of cars and goods vehicles (especially in urban areas). A lot of regulations make (road) transport more difficult (vignettes, limited accesses). Road pricing will make road transport more costly (e.g. Germany). Especially rail/water transport is promoted through the European Commission.

- What are the key factors in the decision process of companies to choose carriers for the distribution of their products? Do companies take the fact that alternative transport is more environmentally friendly into account in the choice of transport companies? This could be a positive signal to the clients (campaigns).

- Until now an ex-post analysis of logistic platforms is often missing. What kind of arguments should be taken into account? A standardized methodology for evaluation could make the comparison between platforms interesting.

- Various (policy) measures can help to support the use of logistic platforms (access restrictions, time windows, financial support, campaigns e.g.) but how effective are they? What's the impact of those measures on the use of logistic platforms?

- The topic "Energy consumption; emerging technologies" had to be postponed for the present period and still remains as an important topic. Included should also be new and better driving techniques to minimize the fuel consumption and in that way decrease the amount of pollution per transported ton or unit of volume.

- Contribution and weight on pollution (emission, noise, vibration).

- Better utilization of the existing road network and of the vehicles.

- A study recently done in Sweden shows that the involvement of heavy goods vehicle in road fatalities are much too big, their share of the traffic product is about 8 % but they are involved in about 20 % of the fatalities. It makes it especially important to focus on traffic safety and heavy vehicles to identify measures to decrease their involvement in road accidents and to reduce the consequences when an accident happens.

More work has to be continued in the following areas:

- Heavy vehicle weights and dimensions:
- Harmonisation at international and continental level;
- Innovation in freight vehicle and regulation of freight transport on road;
- A review of experience gained in application of Weigh in Motion Systems;
- Monitoring and control of road freight transport.

ROAD AND ROAD TRANSPORT OPERATIONS (ST3)

The challenges for Road Administrations as operators are to meet the demands of road users. The discussion focused on the identification of these needs and on the proposed solutions taking into account the constraints that Administrations face.

The contrasting user demands in developed and developing countries were highlighted through the experience of those closely involved in either providing the service or helping to identify user needs. Contributions from the five Technical Committees associated with the strategic themes added further evidence of the needs for improving service as well as reviewing the work carried out over the last four years.

The changing demands of customers within a developed road network were identified and the key aspect of customer service was clearly highlighted through performance measures. Significant organizational changes are forecast for managing traffic on mature networks to respond to the challenge of increasing congestion.

In sharp contrast the experience of rural communities, where road provision is poor, clearly brought into focus the need to address rural accessibility in a holistic manner. It became evident that the keys to development were not all about providing roads but recognizing the real causes of poverty.

Having addressed the institutional framework for funding it was recognized that good governance needed to be in place in all situations.

The sharing of views on user demands and possible solutions will provide a broader perspective of the customer viewpoint and a clearer insight into the key issues for the operators of road networks.

C5 - Road Tunnel Operation

More and more tunnels are put into operation every year adding to the already large number of operated tunnels. Tunnels are sensitive parts of the road system and raise specific problems concerning their geometry, equipment, operation, safety and environmental impact. After the tragic fires in Europe in 1999, more emphasis had to be placed on the operational aspects of tunnels.

In addition to the special session on “Safety in Road Tunnels”, the PIARC Technical Committee on Road Tunnel Operation (C5) organised three sessions mainly devoted to presenting and discussing its activities during the 2000-2003 cycle.

Special Session on Safety in Road Tunnels

This special session was co-organised by the PIARC Technical Committee on Road Tunnel Operation (C5), the United Nations Organisation (Economic Commission for Europe – UN ECE), the European Commission (EC, Directorate General for Energy and Transport – DG TREN – and Directorate General for Research – DG RTD), and the International Tunnelling Association (ITA).

In the aftermath of the catastrophic fires which have occurred in European road tunnels in the last few years (Mont Blanc – 1999, Tauern – 1999, St Gotthard – 2001), earlier work on road tunnel safety has been reviewed and a number of new initiatives launched at national, European and international level. The aim of this session was to gather major players in this field in order to disseminate information on the numerous ongoing activities and discuss their current status, to ensure common understanding, improve co-ordination and direction, and to bring together policy makers and technical experts to discuss the way forward.

For more than 40 years, PIARC C5 has been issuing worldwide-recognised publications in the field of tunnel geometry, equipment, operation, safety and environment. However, public opinions had not been really concerned with these issues until 1999. The dramatic tunnel fires of 1999 raised a new awareness and provoked immediate reactions to improve tunnel safety in a number of countries, firstly in Europe.

In early 2000, in order to foster and harmonise safety measures in road tunnels, the Economic Commission for Europe of the United Nations Organisation (UN ECE, which is located in Geneva and covers 55 countries) convened a multidisciplinary group of experts, which issued a report at the end of 2001. The representative of UN ECE described their conclusions aimed not only at the infrastructure, but also at the users, operation and vehicles, as well as the current follow-up in UN ECE legal instruments.

The European Union, which consists of 15 countries, and will be enlarged by 10 more countries in 2004, was also concerned by this topic. They funded a number of research projects and thematic networks which should be completed within a few years. They also have prepared for a directive on minimum safety requirements in tunnels on the Trans-European road network, i.e. a legislation which would be transposed and enforced in all member States.

The topic of human behaviour is an example of co-operation between the aforementioned bodies: in this field, recommendations to users have been prepared by PIARC C5, improved by UN ECE and finally published by EC.

Outside Europe, road tunnel safety has been on the agenda in several countries too. In 2001, in the USA, the National Fire Protection Association (NFPA) issued a standard, which is continually under review, with a new revision expected in 2004.

At the international level, PIARC, which will soon publish several new reports on road tunnel safety, co-operated with the International Tunnelling Association (ITA) in the field of resistance to fire of tunnel structures. ITA is finalising recommendations on materials and construction techniques to meet the goals defined by PIARC.

The fire-fighting organisations were also involved and a representative of the International Technical Committee for the Prevention and Extinction of Fire (CTIF) demonstrated with a real example the implications of a tunnel fire for the fire-fighters.

A lively discussion included numerous topics, even though clear conclusions had not been always reached yet:

- there was general consensus that effort would be required on the interpretation and implementation of a number of aspects of the EU directive. Worldwide there should be a stronger emphasis on risk analysis with regards to the decision process associated to tunnel safety;
- a topic of particular interest is that of sprinkler systems. The majority of countries currently do not favour their use, but opinions are starting to move especially with the arrival of water mist systems. Additional research is required into this topic;
- thermal portals to detect overheated lorries before they enter a tunnel are being tested. Preliminary findings suggest they can be an aid but not relied upon as a primary safety system;
- work has still to be done in the field of human behaviour, so that it is taken into account in tunnel design and operation. With regards to the general public, efforts should be made to establish the effectiveness of the various communication strategies adopted.

Each of the bodies involved in road tunnel safety had been analogised to pieces of a jig-saw puzzle. The objective of the session had been to clarify how these pieces fitted together and it was felt that this had been generally achieved. However, it must be remembered that the picture is always changing and the dialogue between the various parties must be maintained.

Fire Safety and Ventilation of Road Tunnels

An additional session was devoted to these topics. Questions were raised about:

- ventilation control in complex urban road tunnel systems with multiple entrances and exits,
- cost-effectiveness of expensive fire protection arrangements in tunnels compared to a reduction of risks on the trucks themselves (e.g. better resistance and reduced maximum capacity of fuel tanks, on-board fire suppression systems, etc.),

- the functioning of the new and improved installations in the recently fully reopened Mont Blanc tunnel between France and Italy.

The session also widened the scope to other important aspects of tunnel fire safety, including emergency exits, fire detection and the controversial topic of fire suppression systems. Once again, emphasising the strength of opinions surrounding this subject, the question of sprinklers was discussed at length. It became clear that further work will be necessary to tackle this issue to the satisfaction of all parties.
Other means to contain and control smoke and suppress fire were discussed, and the conclusion reached was that the situation would have to be tackled quickly in this rapidly developing area.

Road Tunnel Operation and Transport of Dangerous Goods

This additional session started with a presentation of the results of the joint OECD/PIARC research project ERS2 on 'Transport of Dangerous Goods through Road Tunnels', including a Quantitative Risk Assessment (QRA) and a Decision Support Model (DSM), which were demonstrated using real examples.

The results of the Committee's activities on traffic incident management systems in tunnels were then presented, followed by an overview of specific experience of low-trafficked tunnels in Norway.

Then, several papers were presented, which focused on various aspects related to tunnel management and the human behaviour of tunnel users, operating staff and emergency teams. The discussion emphasised the concern of tunnel designers and operators regarding the behaviour of users. As tests are being performed in several countries, exchange of results and drawing up of common conclusions seemed necessary. This could include the means to maintain sufficient distances between vehicles as well as the influence of tunnel environment (e.g. cladding) on human behaviour.

Committee main session

This session underlined the excellent co-operation with the international bodies that have been dealing with the crucial problem of safety in road tunnels in the recent years and emphasised the two PIARC seminars on road tunnels, which were organised by C5 in Chile and China, as well as a few other national seminars at which C5 presented its activities.

This session focused on the following technical topics:

a. Good practice in tunnel operation and maintenance

   Questions from the floor were debated about:

   - the need to involve the operational teams as soon as possible in the process of preparation of a project, as well as to take into account their needs, both technical and financial,

- procedures to ascertain that sufficient budget is available for maintenance and to fix and meet appropriate levels of service and safety,
- the management of safety in tunnels, and especially the optimisation of the maintenance works with regard to maintaining or totally rerouting the traffic.

b. Air quality in the environment of road tunnel portals

Questions from the floor were debated about:

- the application of the European standards in the field of emission of pollutants by vehicles,
- the determination of the relative quantities of particulates coming from engines, tunnel surfaces, tyres, brakes etc.

c. Cross-sectional geometry of road tunnels

A question from the floor was debated about the criteria regarding the need for and characteristics of emergency stopping lane(s), lay-bys and / or walkway(s).

d. Lessons learnt from recent tunnel fire disasters

Emphasis was drawn upon the need to increase the training of both the drivers and all "responders" in case of incidents.

In addition to the subjects already studied, some new topics were brought forward by the audience for examination by the Committee during its next cycle:

- drawing up a policy regarding handicapped people in view of incidents in road tunnels, including relevant adaptation of the infrastructure,
- the use of sprinklers or other devices for fire fighting, both as immediate response and to reduce the consequences for the structure,
- risk analysis (both quantitative and based on scenarios),
- reduction of time required for rescue service / automatisation of first actions,
- best practices regarding the refurbishment of old tunnels while keeping the traffic going through: case of uni- and bi-tube tunnels,
- design of urban tunnels to cope with congestion due to the physical conditions at the exit (e.g. roundabouts, traffic lights, etc.) or inside the tunnel (e.g. underground interchanges) including use of intelligent systems,
- risk of over-equipment of new tunnels compared to the older ones,
- security issues in tunnels (i.e. to face terrorism),
- prevention of accidents inside tunnels (including use of intelligent systems, automatic sanctioning of offences, breaking of the monotony of long tunnels, etc.),
- improving communication with tunnel users, including international harmonisation of the appearance and the signage of the safety facilities of the tunnels,
- criteria for the centralisation in one centre of the control of several tunnels,

- and last, but not least, fixing priorities.

C13 - Road Safety

One million people are killed and 50 million people injured in road crashes each year with an estimated cost of about 500 billion USD, or 1 to 2% of each country's GNP. The WHO has calculated that road crashes will be the third highest cause of premature deaths by 2020. However, road safety is still not high on national priority lists for the following reasons:

- the problem appears complex and road crashes are perceived to be normal,
- organisations investing in road safety do not get the return on their investment,
- road safety interventions are only effective if they contain a multidisciplinary approach,
- it is often overlooked that a proper monitoring system and a set of cost effective counter measures can have significant benefits.

The conclusions of the session are as follows:

- International exchange on the implementation of Road Safety Audits (RSA) should be continued and the organisation of a second International Road Safety Audit Forum should be encouraged. At the Forum the Road Safety Review (RSR) should be highlighted, as this inspection, evaluation or review of existing roads is often confused with RSA which is connected with new projects. RSR, as opposed to RSA, is of particular importance to developing countries.

- Design guidelines can continuously be improved by integrating human behaviour sciences. In addition, a road categorisation that can be recognised by the road user is needed. In successful safety concepts like the Swedish Vision Zero and the Dutch Sustainable Safety, these elements are a basis for such an approach. Recognisable, uniform road layouts encourage drivers to adopt appropriate speeds and recognise their human characteristics.

- Proposals are made in this report for evaluation methods of safety concepts. The danger exists that this becomes a basic research project. Accessible safety databases are essential for this evaluation. It is recommended to use databases like CARE (EC) or IRTAD (OECD). The evaluation of road safety concepts in the EC project SUNFLOWER, which draws a comparison between Sweden, the United Kingdom and the Netherlands, is a good example of such an evaluation on a smaller scale.

- Behaviour and persuasion are subjects in which the traditional PIARC community has limited expertise. Police, road safety foundations and unions have more practical experience in these subjects. By cooperation with such organisations the PIARC community can achieve knowledge and experience. It might encourage the road engineer to create a users manual for designs for instance for roundabouts, tunnels and road work signalling.

- In reviews, the PIARC Road Safety Manual was rated a unique masterpiece. As only a first edition will be issued soon, updates at regular intervals should be organised. This attempt to provide a common global knowledge base on road safety might be a source of inspiration for national road safety manuals, like TRB is setting up nowadays.

- The booklet "Keep death off your roads" is the second PIARC Booklet in this series; the first was devoted to the importance of road maintenance. Activities are under way to translate this booklet into Thai, Bengalese, Spanish and other languages. The C 13 Committee promotes this idea as long as the message and source is treated well.

- The cooperation with PIARC C3 and the Global Road Safety Partnership should be continued. Over 80% of the 1 million fatalities occur in developing countries and countries in transition. Strategies and techniques can be transferred from developed countries which have a moral obligation to take an active role in this knowledge transfer. Nowadays the economic loss due to road crashes in developing countries is larger than the total investments in aid programs.

- As road safety interventions need a multi-disciplinary approach, joint activities and programs on national and international level should take place. Common advocacy is crucial to convince national and local authorities to act. Road users' organisations and automobile clubs can assist in raising safety awareness together with road victim organisations, civil society and the private industry. Marketing of the road safety problem and its sometimes unpopular solutions is needed.

- As a large proportion of the crashes occur on urban, local and other non-national roads, information and action plans should be initiated by local authorities. They need simple and reliable tools to execute this effort.

- C13 recommends that in the next PIARC Strategic Plan every Committee fosters and highlights a road safety technique or recommendation in its working area. Safety should be an integral part of all PIARC activities, and is not exclusively the responsibility of C 13. C13 can assist to integrate these activities and link safety with activities in other disciplines.

In order to facilitate the drafting of the next PIARC working program and to build more cohesion in the work of global organizations related to road safety, a number of non-road technicians expressed their views.

Solutions are obviously different in developed and developing countries. The establishment of Road Safety offices, sustainable projects, political will, acknowledgement of the importance of road safety and global solutions are needed to involve both users and technicians, with differentiated strategies according to the country.

Organising closer co-operation between health sectors and road managers is a key priority for the World Health Association (WHO). World Health Day is celebrated annually on the 7th of April. The theme for World Health Day 2004 is Road Safety.

Vision “zero tolerance”, shared responsibilities, sustainability of actions, and international cooperation are the four thrusts of the strategy of PRI (*International Road Safety Organization*).

The private sector is a full member in the concept of global cooperation in the field of road safety and it can be a leader in technical innovations. For companies that participate in the Global Road Safety Partnership (G.R.S.P.) or equivalent organisations, there is the aim to support moral values with their know-how. The negotiations between the different partners on concrete projects always focus on well shared and balanced interests.

C16 - Network Operations

In order to meet the expectations of road users and the demands of society needing to move rapidly and securely, the road network operator strives to provide a trafficable network, adequate capacity, a safe roadway, real-time accurate traveler information, a sustainable infrastructure and an environmentally friendly resource.

Recently, the transportation community has been implementing new strategies to alleviate the negative effects of road accidents and congestion. With this new approach the attention shifts to a customer oriented focus. Under this network operations approach, the outputs and performance issues deal more directly with customer requirements.

For policy leaders

- A major transition needs to occur from a public works mentality to a mobility service mentality. A transition of this magnitude will require leadership and constituency building by governmental and private sector organizations. Policy makers must provide this leadership.
- Network Operations need to be defined and institutionalized in agencies' policies, in their processes and in their programs. This will have a significant impact on budgets and human resources.
- The new focus will require a customer performance point of view rather than just a facilities performance point of view.
- Establishment of performance measures for multiple modes and for interdependent agencies will be required. This will require inter-agency collaboration and cooperation.
- Policy shifts towards road user charging open up new possibilities for demand and mobility management. Road user charging also brings new opportunities for funding transportation facilities.
- There is an urgent need to foster partnerships between the roads authorities, the automotive industry and other key players to exploit new technologies for the benefit of sustainable mobility.

For transport professionals

- Transport professionals will be the ones implementing the policies, operating the systems and actually measuring performance. Therefore, the organizations' plans, programs and staffing will need to reflect network operations concepts.
- A continuous learning and training process will be required as the transition takes place from the traditional emphasis on public works towards new service-driven network operations.
- Professionals will need to develop and maintain awareness and knowledge of the new tools and technologies such as ITS.
- New technologies bring opportunities to achieve better network efficiency, and to enhance road safety. Therefore roads authorities will need to work in partnership with the automotive and other industries to realise the goal (of vehicle to infrastructure communications).
- Mechanisms to establish measurable customer expectations and to actually measure customer satisfaction will have to be developed and refined.
- Education and training institutions will be required to modify transportation curricula to include network operations concepts, practices, tools and techniques.
- There is an urgent and continuing need for network operators to participate in research and development activities (including demonstration applications).

For international organisations

- There is a need to give more prominence to the concept of network operations.
- Information sharing on network operations concepts, best practices, benefits and funding sources should become a high priority.
- Introducing network operations modules into international roads and transportation conferences would be valuable in sharing the experiences of many countries.
- Publication of handbooks in several languages and in different media, including the Internet, could facilitate a better understanding of the concepts and the potential benefits of network operations.
- International organizations can encourage international study visits, which are of great assistance for the transfer of know-how.

C18 - Risk management of roads

The C18 programme of work included four issues:

- Identification and classification of natural or industrial risks
- Risk exposure plans,
- Risk prevention methods,
- Crisis management,

which have been dealt with by carrying out the following actions:

- International survey on risks to roadways,
- Study on risk prevention methods and crisis management,
- Seminars for exchange of experience and transfer of technologies.

International surveys conducted in 2000 and in 2001 led to the following conclusions:

- natural hazards, especially floods and landslides, are the main causes of disturbance to highway networks and transportation systems particularly in developing countries;
- disturbances caused by dangerous goods transportation occurred most frequently in the category of man-made risks all over the world;
- there are wide varieties in the legal framework among the countries surveyed;
- selection of appropriate risk management approaches is important to minimize the effects of both natural and man-made disasters;
- 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;
- risk potential evaluation methods should be sought and studied to minimize probable incidents of both natural and man-made risks.

Future Activities

- To identify the tools which will enhance road authorities' ability to undertake risk prevention functionally (ITS and others can be applicable)
- For the above purpose, measures of risk analysis and evaluation should be searched which are useful in the road risk evaluation. Probabilistic approach can be one of the easier ways for this purpose.
- C18 should function as a showcase of risk management practices of advanced countries.
- Risk mapping (hazard mapping) can be applied not only to natural hazards but also to man-made hazards
- Transportation of dangerous goods should be discussed from the viewpoint of overall risk management to roads.

MANAGEMENT AND ADMINISTRATION OF THE ROAD SYSTEM (ST4)

The growth of traffic, and particularly of road traffic, increasingly exceeds acceptable environmental, economic and financial thresholds. The desirable approach would be the integration of the various transport modes. To ensure this, more partnerships are needed to stimulate healthy competition. Combined transportation, park and ride, terminals, intermodal platforms and corridors also are very concrete examples of that trend. The prerequisites for this are fair and efficient prices for all transport modes and intermodal planning. The questions that were examined were:

- How do road administrations react to these challenges?
- Which will be more successful: the private or the public sector?

The definitions of “integrated transport”, “intermodal transport” and “combined transport” were discussed. The future role of roads within intermodal transport was closely examined to determine PIARC’s strategic plan for the coming years.

C6 - Road Management

Four subgroups were established:

The 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 focused in particular on the following questions: What is asset management? What are the benefits of asset management?

The subgroup “Framework of Performance Management” focused 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.

The subgroup “Maintenance Programming and Budgeting” presented 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.

A debate on the orientations and future developments led to the definition of the following topics:

- integrated asset management;
- description of infrastructure condition and the use of performance indicators;
- organising and financing road infrastructure management;
- training issues: technical skill shortages, training experts;
- communication and user information;
- preservation of natural resources and selection of road techniques.

Finally it would be useful:

- to identify the needs related to road management in case of low volume roads or unpaved roads and make the difference between urban and non-urban context;
- to examine the specific needs of road management at nodal points interconnecting different modes of transport (air, sea, waterways, and rail) with roads.

C9 - Economic and Financial Evaluation

In most countries, road networks constitute one of the largest assets of the society and are predominantly government-owned. The financing of road infrastructure is a critical issue for countries at all stages of development.

The Committee has focused on means of improving road provision and maintenance through consideration of economic evaluation tools, road pricing strategies, and financing of road infrastructure through public and private sources. Three sub-groups undertook work in the areas of economics of road assets, pricing and costing, financing and public private partnerships (PPPs).

In all of these areas, a key issue for policymakers is to ensure that the correct objectives are sought, that these objectives reflect broad societal goals and that information is available to enable effective implementation. Overall there is a need to enhance the sharing of experience and knowledge on evaluation, data collection systems and project financing.

Economics of road assets

Work was undertaken on the topics of economic evaluation of road projects, evaluation of road maintenance and economic analysis of roadside information technology.

Further work is recommended, specifically to continue to refine and develop cost benefit analysis (CBA) and multi-criteria analysis (MCA) methodologies, to develop common evaluation methods for all transport modes (where appropriate) and to make greater use of risk analysis. When considering road maintenance evaluation, it is important that all costs and impacts are taken into account, including road agency costs, road user costs and environmental externalities.

Work on the topic of evaluation of information technologies needs to be continued to lead to conclusions.

Road Pricing

To enable the achievement of social objectives in road pricing, greater knowledge is required of the impacts of road use, through greater quantification of the relationship between road use and community effects. Rapid reductions in the cost of road pricing technology is opening new options for achieving social objectives related to road provision and use. Successful application of road pricing requires:

- clear identification of objectives,
- choice of the pricing approach which will best achieve the identified objectives,
- appropriate allocation of funds derived from road pricing depending on the objectives and ascertaining user acceptance,
- recognition of multiple impacts. For example, a pricing scheme aimed at funding expenditure will also act to moderate travel demand,
- transparency, so that road users are fully informed of costs prior to making decision on use. This is of particular importance in demand management applications, but is also important to achieving public acceptance of other pricing applications, and
- inter-operability of road pricing applications.

Public Private Partnerships (PPP)

PPPs should not be seen as a panacea for all problems in the provision of roads infrastructure. Before initiating a PPP, the goals of this arrangement should be explicit and well thought through. A PPP should be used when it is the most appropriate instrument to meet these goals. In defining a PPP, a clearer distinction should be made between public and real private (i.e. not state-owned) risk-taking parties.

Many parties may be involved in a single PPP. The choice of how to involve different public and private parties will be determined by the institutional and economic characteristics of the countries as well as the maturity of their road network. The co-operation of national, regional and local parties is crucial.

Meeting community needs for the provision and maintenance of road infrastructure requires that:

- consideration of all forms of innovative partnerships are made, and not only PPP's,
- additional work on the management of PPP's (or innovative partnerships) in terms of allocation of risk and responsibilities, and full specification of required outputs and service levels are made,
- the evaluation of PPPs against explicit project goals and broader community expectations are made, so that the partnership approach can be improved in future applications, and
- the development, through the public domain, of more effective regulatory and institutional frameworks is pursued.

C11 - Road bridges and other structures

To follow on from the previous four-year period, the work of Committee 11 was primarily devoted to the issue of structure management.

Six reports were produced:

1.1 Asset management in relation to bridge management (in process)
1.2 Comparison study on bridge management activities (in process)
2.1 Towards performance management of bridges (and other structures) (in process)
2.2 Management of bridges in Australasian and in African countries - Results of surveys (in process)
1.1 Indicators for bridge performance and prioritization of bridge actions (in process)
1.2 Survey on concrete rehabilitation actions of bridges (in process).

Moreover, an article on "Repair of bridges under traffic" was published in Routes/Roads (N°317 - I 2003) and an international seminar on Bridge Management in Asian countries was organized in June 2002, in Thailand.

These reports show well that the management of structures requires:

- a well defined policy - at the highest level - of the management of infrastructures (roads and other structures) as a whole (report 1.1), with clear objectives. In all countries, this policy currently gives an increased importance to the user (see the article in Routes/Roads magazine);
- appropriate management methods and tools, properly selected to meet the needs from this policy and its implementation (report 1.2);
- better taking into account economic criteria in the strategies of management, the technical criteria alone being not sufficient to guarantee the optimal use of allocated budgets (report 2.1);
- in all continents (report 2.2 devoted to Australasia and Africa) and in all countries, essential steps of inventory and assessment of the condition of the assets to be managed,

- a major role of the technical criteria which must be expressed through indicators relating not only to safety but also to the capacity of the work to fulfil its function under definite operating conditions and which must make it possible to lead to the definition of priorities of work (report 3.1);
- in any case, qualified technicians, able to establish relevant diagnoses and to propose adapted and durable repair methods (report 3.2 devoted to the concrete works).

In all countries, the steps implemented for the structure management have similarities. Many countries already accumulated a long experience and made their system evolve according to their needs. It is clear that this experience can only be profitable to the countries which are starting on such a move, and it is the role of PIARC indeed to build up the knowledge available in order to help them. However it would be a mistake to believe that there is a universal method to manage bridges.

The approaches followed by Madagascar and South Africa clearly demonstrate that, in any case, there is a basic need for a strong political will, supported by capable and determined persons.

Finally, where are the potential sources of progress as regards bridge management? Of course, in the search of savings. But, how to find them?

- For new structures:
  - by improving the durability requirements regarding the design, the materials, the facilities to be provided to facilitate further maintenance, or their equipments for example,
  - by searching of a design enabling to adapt the structure to new function needs (e.g. traffic change, widening, installation of anti-noise barriers, etc.),
  - by thinking ahead at design stage, and taking the most likely evolutions into account (slight over sizing for example).

- For the existing structures:
  - through a route-based management approach, with the aim of programming the work sites more rationally, thus increasing the user acceptability,
  - through a better knowledge of the actual condition of the structures, by means of methods easy to implement and if possible non-destructive (for example, knowledge of actual prestressing condition),
  - through a better forecast of deterioration speed,
  - by more targeted inspections (currently all structures are generally inspected with the same frequency) according to the type of structure and beforehand detected disorders,
  - through the definition of intervention priorities based on the probability and the gravity of possible consequences in case of a structure suddenly being unable to fulfil its function, and not on the seriousness of the disorder occurred.

Also private public partnerships and concessionary companies are more and more frequently used.

Orientations for future work

The topics considered can be classified into two main categories, the one covering durability aspects (durable design and maintenance of bridges) and the other one dealing with safety and risk management issues.

The first category includes all concerns relating to structure design and construction methods, in order to improve their durability and to facilitate and reduce maintenance works (Concept of "zero" maintenance structures). This category also includes bridge equipment, which is expensive in terms of design, implementation, maintenance and frequent replacement during the structure lifetime. The equipment alone would deserve a particular work. Finally the issue of - preferably non-destructive - investigation methods could be also dealt with, to apprehend the actual condition of the structure as well as the techniques which allow extending the lifetime of existing or new structures, and the requirements for long-lasting repairs.

The second category includes issues related to safety and risk management, which are sensitive and essential questions to owners. How to avoid being faced with an unforeseen risky situation? How to define the acceptable levels of risk and the required protection levels? What are the detection and alarm means and how to manage the corresponding situations? Which help can be provided by probability based management tools?

Other specific issues, like financing, would also deserve to be dealt with, benefiting in particular from the recent concessions experience.

Finally, the Committee could also make its contribution to broader reflections on road infrastructures in 2030: Which needs for bridges? How to meet them?

Some recommendations

The majority of the work undertaken by the Committee, as well as the topics proposed for the future period are, without any doubt, of interest to most of the developing countries or countries in transition, insofar as they already set up a bridge management policy and as specificities of their assets and their socio-economic context are well taken into account. But, it should be stressed that a regular and active participation of representatives of developing countries and countries of transition in the Committee activities is necessary to allow the Committee to meet these countries' expectations.

C15- Performance of Road Administrations

The roles, responsibilities, strategic direction, structure and renewal of Road Authorities are shaped by a complex set of forces. The main driving forces however, are economic, social, political, environmental and technological developments within each individual country.

National development generally progresses from an agricultural and industrial economy through a service based economy to a knowledge based economy producing different road transport characteristics that in turn shapes the road management task in each country.

At each step of the economical development, road administrations have to contribute to the achievements expected by the community. In general, during the first steps, efforts are mainly focused on economical concerns. A more complex combination of socio-economic, health-related and ecological expectations has to be met at further steps.

Road networks undergo different phases of development that are categorised as Birth, Growth, Upgrading and Mature phases.

There is a clear correlation between the socio-economic development and the road network development: developing countries are mainly concerned by their network development, whilst developed countries are more interested in the modernization of the existing network.

Road Administrations have faced political, economic, social, ecological and technological forces challenges as they develop their road network.

Institutional reform has occurred to provide greater value for money and to bring clearer lines of accountability in the necessary policy, regulation, funding, procurement and delivery functions. Further reform is occurring to take account of the greater involvement of both the community and the private sector in the planning, funding and delivery of road transport improvements.

Road Administrations have also needed to develop different capabilities as road networks develop and the road system management task changes.

The Committee collected examples of good practice, which demonstrate that there are performance improvement opportunities within existing road administrations. Governments, road users, and communities should benefit from this potential profit: this is an essential challenge for road managers. Possible improvements have been identified in the following areas:

- Good governance
- Strategic and business planning
- Organisational structures with transparent accountabilities
- Appropriately trained and managed human resources
- Management systems supporting outputs and performance measures of Key Performance Indicators (KPIs).

The Committee achieved some groundbreaking results by establishing a framework and performance indicators for measuring the performance of road networks and Road Administrations applicable to all countries. The performance indicators that have been proposed are divided into result categories (economic, social, health/security, environment) and more importantly, they are classified according to the network development phases (Birth, Growth, Upgrading and Mature) and to the authority in charge (road administration or government).

Conclusions:

- There is increasing pressure for Road Authorities to demonstrate value for money with optimum value being economic outcomes in birth and growth stages, and a more balanced set of economic, social, health, and environmental outcomes in later stages.
- The proposed conceptual model is not deterministic but could be useful in proactively managing changes.
- Road Authorities have responded well to external forces and institutional reform ongoing.
- More private sector and community involvement will be important in the future.
- Management of interfaces and interactions will become more complex and cover a wider range of stakeholders.
- More commercial approaches are being adopted.
- Performance based systems are critical.
- Road Authorities must develop the capabilities of staff in order to meet changing delivery / policy imperatives.

The Committee advises PIARC to carry on with work in the following areas:

- Identify trends in organisational modes
  - Road Authority structures which help achieve broader government transport policy
  - Road Authority structures which reflect increased accountability with respect to commercialisation and customer focus.

- Identify Best Practice/new management approaches in the following areas and communicate these
  - relationships between Government and Road Authorities
  - partnerships with all stakeholders
  - relationships with other transport network providers, eg other Road Authorities, public transport agencies and private sector operators

- matching service provision to road user and stake holder needs
- limiting the adverse effect of corruption on procurement.

- Benchmark processes underlying the data to identify opportunities for performance improvement.

APPROPRIATE LEVELS OF ROAD AND ROAD TRANSPORT DEVELOPMENT (ST5)

Access to mobility is a basic social service and every citizen should be bestowed the privilege to use the road infrastructure. As such, assessing need in infrastructure should be based on parameters other than just purely economic justification.

The social and economic impacts of road developments that occur differ between countries. Road transport development, on the other hand, varies between urban, rural and remote areas. The analysis of needs thus differ between countries and between regions. The goal of ST5 is to foster the development of road transport policies and programs, which take account of the particular needs of developing nations and countries in transition and of rural and remote areas.

Focus has been on rural accessibility and mobility, transfer of technology and public consultation.

The theme for the Strategic Orientation Session in the Congress was "Access to mobility: A basic social service".

The Congress had succeeded in raising the awareness of politicians and decision makers on the prudent responsibility of every government to provide access to mobility to its people. Minimum level of development had to be identified. As provision of access to mobility is synonymous to provision of access to the primary healthcare, education or business opportunity, road and road transport development should indeed be *supply driven* rather than *demand driven*.

Priority directions for the next cycle (2004-2007) include:

- need for education, training, research and innovation
- need to build up institutional capacity that envisage public/private partnering
- sustainable road infrastructure financing capacity
- reduction of malpractice and corruption and enhancement of corporate governance
- freight transport for rural areas
- environmental sustainability and the use of non-motorised transport.

Academic and research institutions, industries, public-private enterprises and non-governmental organizations can be involved as partners and collaborators to meet these priority needs more quickly. The involvement of international donors in providing project funding is critical.

Training of personnel from these countries in the developed countries is one way to impact on technology transfer. Another is the organization of international seminars through PIARC. Activities under the Technology Transfer Center (TTC) and World Interchange Network (WIN) shall continue to be important.

It was acknowledged the unfortunate but real close association of road development with corruption. The best counter to corruption and malpractice was to strive for improvement in corporate governance with emphasis on transparency and accountability.

It is clear that roads are necessary to bring social services to the communities and to take goods out. PIARC should thus address issues related to provision of basic access to rural and remote areas. The issue of how we can strike a balance between motorised and non-motorised transport is thus pertinent.

Prior to the Durban Congress a resolution was passed for Strategic Theme ST5 to be upgraded to a commission, which is to be a permanent body of the World Road Association (PIARC). It was hoped that the new commission, known as "the Commission on Technical Exchanges and Development", would promote greater representation in PIARC of members from developing countries and countries in transition.

C2 - Community Consultation

Public involvement is being increasingly recognised as a fundamental requirement for Road Authorities across the world. For this reason the C2 Committee was established in Kuala Lumpur in order to focus efforts on developing a user-friendly model for public involvement. This model can be applied to any project and at any stage of the project's life cycle. The Committee has developed a model that consists of two dimensions namely;

- Breadth, consisting of
  - Communication,
  - Consultation,
  - Participation.
- Depth, consisting of
  - Strategic/Master planning,
  - Project planning,
  - Project design,
  - Construction,
  - Operation.

The benefits of using the model include:

- Improved Public / Community / Stakeholder commitment,
- Improved targeting,
- More reliable data,
- Improved negotiations skills,

- Cost effective solutions.

The Committee came to the following conclusions:

- the benefits and necessity of public involvement - which is legally mandated in some countries - should be recognised,
- the choice of the extent of public involvement is dependent on a number of factors such as culture, project complexity, project history and legal requirements,
- future activities should include the sharing of this information at appropriate seminars,
- the issue of public involvement in road projects should remain on PIARC agenda for the next cycle.

C3 - Technical Committee on Technological Exchanges and Development

The Session started with a report on Committee achievements in the period 2000-2003. Then, two Ministers from developing countries (Mozambique and El Salvador) addressed the audience with a presentation on the role of transportation and highway systems in developing countries, stressing the importance of mobility for development and for living standards.

Two speakers from multinational agencies engaged in road technology transfer highlighted how their efforts helped to improve local practices and what specific benefits they generated for local agencies.

Three representatives from developing countries, one from each major region of the world (Africa, Asia and Latin America) also presented their views on what constitutes a successful effort and what conditions need to exist both before, during and after the technology transfer initiative takes place.

The participants discussed the above topics and proposed ideas and initiatives that PIARC might pursue in the future to enhance the value of its technology transfer efforts for developing countries. Two major recommendations were put forward:

- it is very important to take the institutional and functional aspects into consideration in addition to technical/technological aspects. The sole transfer of technology is nothing if it does not take place in an adequate institutional framework;
- the cooperation between PIARC and the bilateral and multilateral donors should be increased, as well as the cooperation with all other organizations active in the field of knowledge exchange and development.

C20 - Appropriate Development

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. The papers presented covered 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,
- institutional capacity building for rural roads development and management.

The terms of reference 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

The actual participation of developing countries and countries in transition in PIARC activities is critical to ensure that the road and road transport related needs of DCs and CITs are recognized so that priority issues are addressed by PIARC within the appropriate development context.

WIN - World Interchange Network

The World Road Association (PIARC) has inaugurated its new World Interchange Network (WIN), which connects persons having road related questions with experts who can provide answers.

WIN was launched in 1995, at the occasion of the Montréal World Road Congress and integrated with PIARC five years later. Since the beginning, WIN aims to provide access to road expertise, accelerate the diffusion of various technologies and facilitate the evolution of local practices compared to international practices. It is of service to the road community and mainly to the developing countries and those in economic transition.

The new WIN is structured by means of national relays. Its website, which is part of the general PIARC website, has been completely redesigned. It enables users to find the relay most likely to provide the desired information, according to the selected continent or country, language or field of expertise. Users can then access the website of the relay and consult its technical documentation, or address themselves directly to the relay's services to obtain more accurate information.

On the other hand, the website offers additional functionality to PIARC members who can fill an expertise request form, on line. The request is processed by the relay, free of charge, and within a short time if necessary, the relay calls upon an expert within its network.

Increasing need for knowledge exchange

Because technology evolves more rapidly, knowledge increases and specialities multiply, the exchanges between road and road transport professionals become increasingly frequent and necessary. WIN is a modern tool designed to meet this need.

More and more numerous relays

Each PIARC First Delegate is invited to appoint one relay or more if necessary, to represent his or her country or region. On October 20th, 2003, 33 relays from all continents were already part of the new WIN. They are mainly technology transfer centers, road research institutes and public ministries of transport. In the long term, all PIARC member governments should join the new WIN and have a relay.

Dynamic relays

Firstly, WIN provides means to promote the expertise of the relay and its country, on an international scale. In addition, the relays will make profitable all information circulating in WIN in order to improve their knowledge exchange activities, by targeting the most innovative fields or those which require more research or training. Thanks to WIN, the relays intend to consolidate their knowledge exchange mission for the national road community of their country.

WIN: a new forum within PIARC

The new Commission on Technological Exchanges and Development will realize this network and encourage exchanges between relays and their networks of experts.

A website in constant evolution

An experimental phase begins with the inauguration of the new WIN website. According to the extent that WIN is used, adjustments and improvements will be made to the system.

WIN: a tool to promote

PIARC adopted a communication plan concerning WIN. The objectives are to promote the improvements made to the Network, enhance and increase its use by the international road community, mainly the developing countries or those in economic transition.

After the Durban Congress, the relays will be promoting WIN in their respective circles. Firmly established and recognized in their countries and benefiting, in general, from good exposure in their road communities, relays are the best candidates to promote WIN and the advantages from which road communities can profit.

: Innovative translation techniques in the road field

The notion of a translation machine capable of overcoming in an instant all language communication problems between the world's populations is a dream as old as time along the same lines as the dream of flying.

The PIARC Technical Committee on Terminology has the role of facilitating the communication between members of the road community and, more particularly, between those who use different languages. The developments in computer science and the Internet, including packages and software translation, are enabling the rapid sharing of information. This is why the Committee is resolutely engaged in the assessment of modern tools (dictionaries and computer-aided translations) that facilitate the time consuming task of translating into different languages.

English and French, the official languages of PIARC, are the principal languages with which PIARC already offered “dictionary services” in many other languages:

Arabic	German	Polish
Chinese	Greek	Portuguese
Czech	Hungarian	Romanian
Danish	Italian	Russian
Dutch	Japanese	Slovak
English	Khmer	Spanish
Finnish	Lithuanian	Swedish
French	Norwegian	Vietnamese

Although PIARC has been active in the field of terminology since the 1930s, there has never been a session on Terminology at a World Congress.

In the last four years, the PIARC Dictionary and Lexicon have been produced in electronic versions rather than the conventional hard copy; this change has enabled the Committee to update the documents on a continuing annual cycle rather than the eight-year cycle previously possible with hard copy. The existence of these electronic versions of the terminology documents has led to the possibility of more accurate computer-aided translation.

For Decision-Makers

Electronic terminology databases and computer-aided translation software programs will provide more rapid, accurate and cheaper translation of documents thereby generating a better understanding between people in different countries and accelerating technology transfer. Consequently, decision-makers should support the development of terminology tools for activities in PIARC's field.

For Technical Experts

The more technical experts contribute to terminology in their speciality field, especially by improving the PIARC terminology data bases, the more accurate will be the computer-aided translation.

For PIARC

The development of electronic versions of the PIARC Dictionary and Lexicon, together with the computer-aided translation systems being developed, is facilitating the transfer of technology in the road field.

In order to increase this transfer, it is recommended that:

- PIARC Technical Committees continue to feed the Technical Committee on Terminology with new terms in order to make the PIARC terminology database as up to date as possible;

- National Committees of PIARC should be encouraged to make translations of the PIARC terminology database into their respective language;

- before the next World Road Congress (Paris, 2007) PIARC should make the PIARC Dictionary and Lexicon available, at no cost for non-commercial purposes, on the Internet.

SPECIAL AND ADDITIONAL SESSIONS

The previous pages reported on the strategic direction sessions and Technical Committee sessions. Many others were organised to deal with specific topics, which are mentioned hereafter.

Road Safety

In addition to the C13 Session, two other ones dealt with road safety:

- Road safety in developing countries;
- Innovations for road safety.

Safety in developing countries

This session was devoted to developing countries in Africa, Asia, Latin America and the Middle East, which account for 80% of the world's road accident fatalities. The session focused on the following subjects:

- Two wheeler safety in mixed traffic,
- Educating young road users,
- Partnerships and organisations for Road safety,
- Road safety priorities in the world.

In Malaysia, about two-thirds of fatalities are motorcyclists and initiatives are taken in four directions to remedy this situation:

- increasing conspicuity
- improving bad habits and behaviour
- increased protection against injuries
- improvement to the road environment.

The strategy has resulted in a 25-30% drop in fatalities to motorcyclists.

In Ghana, children between the ages of 0-16 years constitute 25% of the national pedestrian fatalities and it is very difficult to fight against this scourge because of the lack of immediate and credible data, the fatalistic, social and spiritual beliefs and the lack of political and administrative support. However, some achievements seem promising:

- the establishment of lead agencies with the assistance of donor agencies
- the creation of awareness among politicians and decision makers
- improvement in data collection.

Two members of GRSP (Global Road Safety Partnership) gave a presentation on the partnerships and organisation for road safety. GRSP brings together business, government and civil society to tackle road safety problems in developing countries and countries in transition.

Two key factors make it difficult to manage road safety activities. Firstly, coordination is complicated by the number and variety of organizations involved. Secondly, the various statutory bodies dealing with roads and road transport (health, police, etc.) do not have road safety as their first priority.

In Ghana, the GRSP activities include:

- child safety programmes
- community education
- driver competence improvement.

In South Africa, they include:

- the pedestrian visibility programme
- the junior Traffic Training Centre
- periodic Vehicle Testing.

According to the World Bank, road traffic fatalities in developing countries are predicted to rise by 83% between 2000 - 2020. The World Bank position is to:

- bring about a coordinated and concerted effort by all stakeholders,
- promote a multi-sector approach to policies, programmes and actions,
- ensure that reliable data on causes of injuries is obtained in order to guide policy formulation.

Important observations include:

- The need to bring about the realization that road safety is a public health issue
- The fact that road traffic injuries are not inevitable, they are man-made
- The need to create institutions that focus on research and policy development
- A need for innovation and leadership.

Innovation for road safety

This session was jointly organised by PIARC and the International Road Federation (IRF). Road safety improvements are of utmost importance to all stakeholders, who have to promote innovations in all domains (road design, construction and operation).

Several presentations gave examples of recent engineering innovations, which contribute to improvement of road safety:

- innovative methods in the geometry and design of rural roads, which take most of non motorized traffic
- for complex projects, the use of computer visualisation and the use of a driving simulator allow to understand drivers' behaviour according to road layout and equipment parameters
- the use of pavement surface techniques providing appropriate skid resistance,
- the installation of road equipment appropriate to the traffic conditions and to the use of electronic guidance.

The IRF also presented their White Book on road safety improvements.

However, accidents are the result of complex combinations with interactions between many components. Special consideration should be made to the interfaces, of namely 'Man-Machine', 'Car-Road' and 'Road-Human'.

In its second part, the panel discussion was posed the question: "Must we change Road Users Behaviour or adapt the transport system to their nature". It was concluded that the road user's behaviour needs to be changed, with emphasis on the youth. Together with this behaviour change, the engineering system must be adapted to take into account the nature of the road user.

The New Partnership for Africa's Development (NEPAD)

The NEPAD is a vision and strategic framework for Africa's renewal. The NEPAD strategic framework document arises from a mandate given to the five initiating Heads of State (Algeria, Egypt, Nigeria, Senegal, and South Africa) by the Organisation of African Unity (OAU) to develop an integrated socio-economic development framework for Africa. The 37th Summit of the OAU in July 2001 formally adopted the strategic framework document.

The objectives of NEPAD are:

- to eradicate poverty;
- to place African countries, both individually and collectively, on a path of sustainable growth and development;
- to halt the marginalisation of Africa in the globalisation process and enhance its full and beneficial integration into the global economy;
- to accelerate the empowerment of women.

NEPAD, a pledge by African leaders on a common vision and firm and shared conviction to eradicate poverty on a path of sustainable growth and development, strives towards Africa's active participation in the world economy and political bodies. Through this new relationship and partnership, this programme consolidates the relationship between Africa and the international community with a view to overcoming the development chasm that has widened over centuries of unequal relations.

The session started with an overview of NEPAD, and then the Development Bank of Southern Africa (DBSA) provided evidence of the problems facing the continent in its presentation on transport infrastructure in Sub-Saharan Africa. The trend for diminishing use of the rail networks and transfer to road transport was confirmed. The challenge facing NEPAD was to bring the average kilometre cost of freight transport into line with international norms, which presently are half that of Africa's.

This was followed by a presentation by the African Development Bank on NEPAD's short-term action plan for road infrastructure. Central to the action plan, deliverable between 2003 and 2007 was the development of safe road-trade corridors without borders and barriers. The Trans African Highway network, consisting of 9 distinct interlinking routes, covers 54 000 kilometres of which 14500 are presently missing links.

Finally, the Global Research Alliance gave a presentation on the role of research and how it could assist NEPAD in achieving its goals and a panel discussion moderated by NEPAD Secretariat closed the session.

Public Private Partnerships

Two sessions on Public Private Partnerships were organised in co-operation with several international organisations.

The International Bridge, Tunnel and Turnpike Association (IBTTA) presented its mission and work. IBTTA is the worldwide alliance of toll operators and associated industries that provides a forum for sharing knowledge and ideas to promote and enhance toll financed transportation services. IBTTA has more than 250 members in 25 countries on all five continents.

This was followed by a presentation entitled "Technology in Transportation: Cause or Effect?" There is a revolution taking place today in the transportation industry, with the toll industry and IBTTA at the forefront. It may be the case that our strategic and policy thinking is lagging behind the actual capabilities of our technologies. Our views on what we want may not be completely informed by the latest information on what can be done. The latest information and telecommunication technologies available can be harnessed, to significantly effect, through strategic thinking and planning.

The presentation delivered by the European Investment Bank was entitled "Fast-tracking to Nash equilibrium in PPP loan Negotiations". Public Private Partnerships represent a classic case of "game theory", an approach to economics which evaluates individuals' and groups' strategies not only in the context of their own expectations, but with these expectations moulded by their perceptions of the aims and agendas of other participants. The presentation began with a brief analysis of trends in development finance over the last few years and showed how the PPP approach tried to overcome some of the shortcomings that have arisen. Using the example of a toll road negotiation it then highlighted how a "game theory" perspective can provide greater understanding of the roles and strategies of the various participants. Finally the presentation underlined those aspects which can help to fast-track the whole negotiation process. Special emphasis throughout the presentation was afforded to the role that can be played by multilateral financiers in the PPP project arena.

A presentation was also delivered on "Moving off the gas tax: What It might mean for the Toll Industry". This presentation looked at the potential implications for the world's toll industry of shifting to direct road user charges. While the specifics need to be worked out, someday all motor vehicles will be equipped with devices that can register and communicate direct road user charges, probably on a per-mile basis. If this happens, we could see significant changes in the toll collection process itself, the method by which toll collection technology is procured and deployed, and the competitive balance between existing toll roads and tax-supported facilities. This presentation also explored several examples of anti-tolling campaigns in the United States and the apparent disconnect between political perceptions of the public's attitude toward tolls and actual public opinion as expressed in opinion polling and at the ballot box.

A presentation on "The Evolution of Toll Road Financing" showed that Public-Private Partnerships (PPPs) in the road sector are no longer a matter of debate – they are an established feature of the landscape and bankers, investors and contractors have moved on from arguing pros and cons. What is more intriguing is the ongoing evolution in the financing of this sector and particularly how this evolution is driven by innovations in:

- charging structures;
- regulatory frameworks;
- tolling and other technology;
- the financial markets themselves.

These forces for innovation are sometimes intersecting but mostly aligning with the effect that the market for toll road financing is gaining massive momentum.

Then, several presentations dealt with the following issues:

- road projects in Croatia, by this country's Minister of Public Works, Reconstruction and Construction

- legal and jurisdiction issues relating to PPP's
- the recent activity in the South African Road Concession Market
- Structural evolution of Infrastructure Equity Markets
- PPP Toolkit and its possibilities and uses, by the World Bank
- the role of PPP's in poverty reduction, by the Asian Development Bank.

The session was wrapped up by a panel discussion on the topic "The Future of Toll Road Financing – For Whom the Roads Toll". The topic focused on the need to maintain the balance between the socio-economic sustainability and the commercial soundness of privately-financed road schemes.

Transport's contribution to sustainability

Regional Context of Sustainability

Transport serves the functions of society and can be sustainable only through the manner in which it performs that task. In different countries, in different economies, the task is expressed in different ways.

This presented responses to the call for papers made by the Committee on Sustainable Development and Road Transport (C14). Sustainable transport policy choices were discussed for a broad spectrum of countries – India, South Africa, USA, Colombia and many European countries.

Some basic aspects of assessing the environmental impacts of roads were taken up, among them a European handbook on habitat fragmentation.

The conclusions presented by the Committee were:

On managing the transport system:

- Transport has the highest CO_2 emission growth rate of all economic sectors and this growth will continue. Thus, priority should be given to policies and measures that simultaneously address climate change and other negative effects on environment.
- As economies develop, the share of public passenger transport and rail freight transport generally declines dramatically. In part, this follows from the changes in economic and social structure, but it is possible and important to focus specific emphasis on active development of public transport services, economy and standards. Too much is lost, if the system cannot offer or take up the new opportunities and alternatives available.

On the role of road transport in development:

- There is a need to put continuous emphasis on some basic aspects of sustainability: maintenance, upgrading rural infrastructure, and traffic safety, especially taking account of non-motorised transport.
- Many strategies targeted at improving accessibility and traffic safety will also reduce emissions.
- The technology used should be appropriate for the country and its stage of development. For a developing country, the technology of road construction and maintenance needs to be adapted to the peculiar problems of scarcity of capital and abundance of labour, and a predominantly rural setting.
- The effect of construction, and especially infrastructure construction, on nature remains a fundamental aspect of sustainability. Land use changes and fragmentation are to a great extent linked to urban sprawl, but large-scale linear infrastructures, such as main roads, can have enormous direct as well as indirect impacts in rural and wilderness areas. Progress is being made progressively for ecological impacts. In addition, ecological data is being collected and mapped along roads to support road side management plans that enhance wildlife and plant diversity.

On national and regional action:

- In road administrations, it is essential to define priorities and to ensure co-operation and co-ordination between the agencies involved.
- There are decision-making tools to assist in setting priorities, choosing the lines of action and overseeing their implementation (multi-criteria analysis, life cycle assessment, performance evaluation or environmental indicators, etc.).
- It is important to provide for broad regional co-operation, to ensure that the countries become well acquainted with each other's practice. It would be advantageous for PIARC as an organisation to make these links more visible in its work. In this context, the Technology Transfer Centres can have an important role.

Local Authority Session

This session was hosted by the Mayor of eThekwini Municipality. The session comprised of two parts.

Part 1 provided an opportunity for political authorities and policy makers to exchange and share views on topics within the broader theme "Politico-economic Integration of Transportation Infrastructure in the Urban Environment".

Three diverse papers were presented by delegates from Canada, China and South Africa on the rationale behind the Transport Systems of the Greater Vancouver Transport Authority (Canada), Guangzhou City (South China) and

eThekwini City (South Africa), respectively. All dwelt on the need for developing sustainable transport systems despite having vastly different approaches to the question of city size and integration, e.g. Canada having 21 cities involved with the Greater Vancouver Transport Authority compared to eThekwini and Guangzhou unified cities.

The second part was entitled “The Hidden Face of Urban Roads”. It explored the impact of public utility systems on the streets of the cities around the world. This session looked at how managers of cities can review their revaluation methodology, allowing a more integrated approach during rehabilitation of infrastructure taking into consideration of the road pavement and other systems.

Most urban organizations traditionally deal with surface phenomena such as traffic and safety. However, the presence of urban public utility systems under the streets of the vast majority of towns and cities around the world has a significant impact on the quality and durability of the urban road system and the speed with which repairs can be carried out.

The three papers that dealt with such subjects were the master plan for eThekwini roads, Canadian tools for good management of infrastructure and the management of utilities to be laid in roads within the Singapore Land Transport Authority. These papers dealt with the quality of rehabilitation following work on infrastructural elements.

Effective rehabilitation actions take account of the presence of other systems and at the very least include checks of their condition. The thrust of the session revolved around integration and managing of services as a holistic approach.

Technology Transfer Conference

The session was opened with a presentation by Cuba. It was reported that the Cuba Technology Transfer (CTT) centre was established in 1976 under the Ministry of Construction in order to promote access to information through technical assistance and technology transfer in rural areas where information is not easily accessible. It is aimed specifically at Cuban professionals in the transportation sector.

Information is disseminated through publications, video recordings and electronic bulletins.

The following conclusions were drawn:

- activities were found to be mutually beneficial,
- transparency was found to be critical,
- transfer of skills and information needs to be adaptable and applicable.

The International Focus Group (IFG) was then introduced: it is a partnership of countries, institutions and practitioners that were committed to the provision of sustainable transport access for poor communities and has 22 member countries. The IFG disseminated information through meetings, newsletters, technical papers, CD-ROMs and also publishes a website.

TRAC South Africa, which is aimed at the youth, is a programme currently reaching children at 51 schools across the country with laboratories at 3 universities. TRAC aims to stimulate an interest in the understanding of applied science amongst high school learners enabling them to enter technological careers.

The TRAC programme in Tanzania reaches 3 private high schools and the University of Dar es Salaam. The programme faces challenges of inadequate staffing and inadequate computer skills.

There were, however, opportunities to promote TRAC at technical forums and through networking with other countries utilizing TRAC. The attachment of the T2 centre with the Tanzania National Roads Agency would also ensure adequate staffing and sustainable financing.

Following these presentations, the KwaZulu-Natal Model of Technology Transfer Centres was presented. This model is an expansion of the FHWA model which seeks to address issues pertaining to research, training, management systems and information resources. Successes have been reached with the re-organisation of administration processes, the creation of a documentation centre and a quarterly newspaper.

The Session was concluded by a report on the activities of the Regional Technology Transfer Centre of ASANRA. The Regional T2 centre compiles a database of information, common protocol and information resources related to roads and transportation. It liaises with international T2 centres, runs an information centre and promotes and supports annual regional T2 conferences.

ASANRA has its Terms of Reference in place and has finalised its workplan on standing committees.

Conclusions

- Technology Transfer Centres should collect and disseminate useful information.
- In order to help them to meet this objective, there is a need for strategies to access information and funds are necessary.
- However, because of the amount and diversity of the available information, efforts should be made to select and disseminate really useful information.
- PIARC can help developing countries to identify useful information and to make it available to professionals in a convenient way.

- Technology Transfer Centres can help to find the best means to manage knowledge and to use it for improving road systems in the less developed countries.

HDM-4:

HDM-4 is a set of software tools for the management of road construction and maintenance projects, which has been developed by PIARC since 1998. The session aimed at presenting:

- applications using version 1,
- new functionalities included in version 2, which is currently being developed, and dissemination plans.

During the first part a short history of the development of the version 4 of the Highway Development and Management Model was presented. The reasons with PIARC committed itself in this project, and the actions that were led within the frame of this project were explained.

Four presentations showed different studies led with HDM-4 model, in Lebanon, Czech Republic, Japan and Finland. These studies shared common features:

- They were carried out by road authorities in charge of a road network management, and
- They used HDM-4 together with other tools, within a more comprehensive approach of road management.

The audience raised different questions, one of them being the issue of model calibration. Calibration is a difficulty, in particular for developing countries which are short of historic data. These countries suggested that regional calibration factors should be available. The way this should be organized has still to be discussed.

In the second part, presentations explained how desirable improvements had been identified from a user survey. The University of Birmingham, in charge of software developments, described the main changes of version 2, which will be produced some time in 2004.

Lastly, the General Secretary informed that PIARC had made the decision of outsourcing this project management as well as the assistance to users. A call for tenders is in progress and the contract is expected to be signed in 2004, in due time to disseminate version 2.

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Recycling and rehabilitation in developing countries

Most governments are faced with the problem that available funding to maintain and/or upgrade their road networks seldom matches the need. This calls for greater efficiency and effectiveness in the management and delivery of roads. The conclusions reached at this session were as follows:

- to improve efficiency and effectiveness in service delivery, the adoption of good governance principles, particularly those that pertain to authority, stewardship, leadership, direction, control and accountability is essential;

- the costs for maintaining unsealed roads to acceptable standards are disproportionably high when measured against vehicle kilometres of travel. Innovative approaches providing highly beneficial and cost-effective solutions for their maintenance and upgrading are available, but have not adequately been implemented due to lack of exposure. A synthesis document on best practice, addressing the needs of developing countries in particular, is required;

- in countries with high unemployment and poverty levels, the roads sector can contribute to employment creation by the adoption of labour-intensive construction. The socio-economic benefits of this approach are significant, despite a possible decrease in cost-effectiveness at project level. Materials and construction techniques need to be customized for labour-intensive methods, particularly in the case of rehabilitation, and adequate training in their use needs to be provided so as to ensure that quality standards can be upheld;

- Cold recycling with foamed bitumen, bitumen emulsion and/or cement can achieve significant cost and time savings if the technology is used appropriately. This, together with the ability of this technique to preserve natural resources and reduce energy demands, makes it highly competitive, cost-effective and very attractive from an environmental perspective. Recent improvements in mix design and construction, and better understanding of the structural behaviour and performance of such materials have resulted in a marked increase in confidence in their use.

Innovation in infrastructure design and utilisation

This session was organised by the Dutch National Committee of PIARC in cooperation with PIARC Committees C7/8 and C16. It aimed at presenting and exchanging views on new processes to stimulate innovation and experimentation in road network systems, road construction and the institutional framework for innovation.

The main conclusions were as follows:

Major innovations in infrastructure design and utilization are highly dependant on the existence of an adequate governmental/institutional framework. The development of technical innovations should be a cooperative effort between government and the private or semi private sector (research organizations, contractors, etc.).

Experience in different countries has shown that existing (legal) regulations can pose a problem, but that solutions can be found to create the right background for innovation.

Innovation will be stimulated when there is a shortage of money (budget) or materials and when the circumstances in the policy of a country change.

There is a great need to exchange experiences around the world in the area of innovation in infrastructure design and utilization. It is recommended that in the next four years PIARC includes innovation as a specific item in the areas of:

- management of network operations,
- sustainable development and road transport,
- road/vehicle interaction.

The road sector should learn from innovations in other areas such as telecommunications, automobile sector, etc.

The large scale research facilities for civil engineering, road and transportation

Within the 5th Framework Programme on Research and Development of the European Union, the French Central Laboratory for Roads and Bridges (LCPC) is running the TREE project (Transport Research for Equipment in Europe).

This round-table on large testing facilities brought together researchers from the TREE network and the National Institute for Land and Infrastructure Management of Japan. The goals of the round-table were to:

- widen the scope of activity for researchers dealing with large testing facilities,
- facilitate the exchange of expertise and knowledge between various regions of the world,
- and to give greater consideration to socio-economic and environmental needs while increasing corporate competitiveness.

Significant challenges:

- The identification of large public and private testing facilities in various countries has revealed considerable wealth as a result of major investments, which, are unfortunately under-utilised at the moment in certain cases;
- While the need for these facilities remains significant, there are changes in priorities of research themes, the profiles of the actors involved as well as countries involved; while the need for such facilities remains significant, funding for new investments and maintenance is gradually decreasing;
- In this context, the TREE project, with its catalogue on large testing facilities, becomes interesting, especially if it begins with:
  - public and private facilities ;
  - the needs of developing countries and of countries in transition ;
  - and with new contracting practices relating to multi-client research, which makes it possible to reduce costs for everyone.

Proposals:

- propose to PIARC the creation of a specific Working Group for the purpose of not only promoting an international approach to the use of this equipment, whose operational cost is generally high, but also to cluster needs of a similar nature. This group could also maintain a high level of professionalism and the exchange of experiences between laboratories responsible for monitoring road works and assessing innovations;
- enhance research and the development of specific studies on indigenous or altered materials which do not have the same characteristics as those found in developed countries ;
- and to obtain a validation from Major International Institutes of studies done with these large facilities during projects relating to infrastructure and land use.

Managing Roads for the Customer

This session organized by the International Road Federation (IRF), looked at the way road agencies around the world have been responding to the need to become more commercial and customer-oriented. In other words, how they have been responding to the need to "manage roads like a business, not like a bureaucracy." In this connection, the term "customer" is taken to be synonymous with stakeholders, or with road users and the wider business community. The following presentations were given:

Part I: Mature Road Agency Experience

- New Public-Private Partnerships: Coping with the Changing Needs of the Customer, Mr. Takeo Nakajima, Director of National Highway Risk Management Division, Japan Road Bureau.

- Moving Towards Greater Involvement of the Customer: UK Highways Agency Experience, Mr. Andrew Jones, UK Highways Agency.

- History of the South African Roads Board: Bringing Road Users into the Decision-Making Process, Mr. Nazir Alli, Chief Executive, South African National Roads Agency

Part II: Developing & Transition Country Experience

- Involving Road Users in Management of Roads: the Zambian Experience, Mr. Henry Chipewo, Chairman, Zambia National Roads Board.

- Benchmarking State-Level Road Agencies and Measuring Customer Satisfaction in India, Mr. Alok Bansal, World Bank Resident Office, New Delhi.

- Public Relations and Public Involvement in Preparation of the Phnom Penh Metropolitan Transport Master Plan, Professor Tetsuo Yai, Tokyo Institute of Technology, Tokyo.

Transportation and its Role in Toward Shaping Successful Communities

Today professionals are expected to plan, design, operate and maintain transportation systems that provide safe, efficient and environmentally compatible mobility of people and goods. And in addition the solutions must contribute to shaping successful communities. This session, co-organised by PIARC and the Institution of Transportation Engineers (ITE), showcased these evolving societal expectations, strategies and products that have been developed to fulfill them. The roundtable that followed the initial presentations provided an opportunity for the attendees and presenters to better define how

these expectations may be met, additional tools to facilitate doing so, and performance measures to determine if our efforts are successful.

The following presentations were given:

- "Context Sensitive Transportation Solutions", by John R. Freeman International President, Institute of Transportation Engineers.

- "Serving the Needs of All Transportation Systems Users", by Peter M. W. Elsenaar, Chairman, Technical Committee on Road Safety, World Road Association.

- "Reducing fatalities and injuries on rural and urban streets through operations enhancements", by Hein J. Stander, BKS (Pty) Ltd, South Africa and Professor Christo J. Bester, Department of Civil Engineering, University of Stellenbosch, South Africa.

- Transportation's Contribution toward an Active Public", by Thomas W. Brahms, Executive Director and CEO, Institute of Transportation Engineers.

Automotive Industry Review and Update

Within the coming decades, cars and commercial vehicles will continue to evolve, with unceasing applications of electronics and Intelligent Transport Systems (ITS), which will have impacts on the whole transportation environment. The designers of road infrastructure and the management of road networks cannot ignore these evolutions. Conversely, the design of new vehicles will take advantage of infrastructure and telecommunications developments. This special session was jointly organised by PIARC and FISITA, the International Federation of Automotive Engineering Societies (the world body for automotive engineering, representing over 158 000 automotive engineers in 32 countries), in order to promote better understanding and cooperation between the automotive industry and the road sector.

This session featured keynote speeches from automotive industry representatives together with leading edge presentations from PIARC C14 (Sustainable Development and Road Transport) and C16 (Network Operations) Technical Committee experts.

The following presentations were given:

- "In-Vehicle Telematics – The government perspective on ITS development", by E. Kenis and G. Wils, Flemish Road Authority.

- "Vehicle Probe Processing to Support Infrastructure Management", by T. Russell Shields, Ygomi LLC, USA.

- "Pushing the Telematics Market by Using Electronic Toll Collection as a Platform for Value Added Services", by Dr. Thomas-Axel Stenske, DaimlerChrysler Services Mobility Management GmbH.

- "Mobility and Sustainable Development", by Tsutomu Kagawa, Japan Automobile Association Inc.

- "The Sustainability Challenge – Automotive Industry Readiness for Road Authority Innovations", by Lars Nillson, Swedish National Road Administration).

- "Road, Road Vehicles and Road Infrastructure Interface - Challenges and Opportunities in the Transportation Network", by Steven Farmer, Qinetiq (UK).

Airfield Pavements Seminar

The aim of the seminar was to promote good practice in airfield pavement engineering including promising new initiatives.

Objectives and Outcomes

Objective 1: to provide a state of art coverage of key topics in airfield pavement engineering.
To this end the seminar was divided into 3 Sessions comprising Functional Requirements of Airfield Pavements, Design and Construction of Airfield Pavements and Rehabilitation of Airfield Pavements and Pavement Management Systems. States of the art/leading technology issues were addressed in all Sessions.

Objective 2: to establish worldwide participation by representatives from principal organisations involved in airfield pavement engineering.
At the Seminar there was substantial representation from the US and Europe and also key participants from South Africa and Japan.

Objective 3: To highlight differences and synergies between airfield pavement and highway engineering.
The Seminar identified a number of key issues that are specific to airfields. In particular the design parameters in respect of aircraft loading, friction, evenness and jet blast and the criteria for failure having regard to the safety of aircraft operations and the high risks involved. However much of the base technology used in airfield pavement works is derived from highway engineering and to this end a number of synergies between road and airfield pavement design, construction and maintenance were highlighted in the Seminar.

Objective 4: To highlight the benefits of a collective/working group approach.
The limited lead-time from the inception of the Airfield Seminar to the Congress didn't facilitate much collective working. However several key joint

papers gave a good indication of the potential benefits to be gained from an established international airfield pavement working group.

Future

It is suggested that the airfield pavement engineering fraternity would greatly benefit from an established Airfield Working/Sub Group within PIARC. In particular the following points are relevant:

1. There isn't a standing global working group covering a broad range of key topics in this field of engineering.
2. The synergies with highway engineering have the potential to provide a natural fit for an airfield sub-group within the PIARC structure perhaps to the benefit of both engineering fields.
3. There is considerable potential to expand the airfield sub-group particularly in respect of a broader global coverage.
4. A collective approach on a number of topics offers considerable potential benefits in achieving a common understanding and broader knowledge base and consequent development of the state of the art. It also does much to promote good practice and promising new initiatives.
5. One of the key objectives of a new airfield sub-group should be to develop liaison with ICAO (International Civil Aviation Organization) on certain key topics.

CONCLUSION

The true business of PIARC XXII World Road Congress began on Monday 20 October with the Ministers' Session. Hosted by South Africa's Minister of Transport, Dr. Abdullah Omar, 22 Ministers, 7 Deputy Ministers and 4 senior government delegates representing 31 countries discussed the issue of "**Sustainable development** – the role of road infrastructure". Predominant among the conclusions drawn was the evolving role of the state in the administration of road networks. Recognition was also given to the complex interactions between the many factors that influenced the development, growth, upgrade and progress to maturity of road infrastructures globally.

Indeed, the various factors were revealed as themes that recurred time and again through all presentations of the congress, like fine threads of the fabric that is the cloth which binds road transportation. These threads were visible, not only among the special sessions chosen for the Durban congress but also among the strategic themes identified in 1999. It was acknowledged that **road transport is the preferred mode for the foreseeable future**, despite recognition of the need to promote intermodality as a means to preserve mobility. Traffic growth has become a global problem as the rate of increase outstrips capabilities to undertake capacity upgrades and rail networks decline.

Congestion, coupled with ageing networks leads to high accident statistics. Forecasts show that by 2020, the 3rd highest cause of death will be fatalities from road accidents, with more than 80% occurring in developing countries. Little wonder that **road safety** was identified as a critical factor in almost every presentation and was itself the special subject of several sessions on road tunnels as a result of fatal incidents in Alpine European countries in recent years.

The **role of technology** continues to be an important weapon in the armoury required to provide innovative and appropriate solutions to the demands of network growth and maintenance within diminishing budgets.

Globally, the concept of **technology transfer** has been taken to new levels of information accessibility with the set up of the World Interchange Network that already has 33 relays among the 107 member countries. The need to collate, capture, store and recover data becomes increasingly important as does the need to harmonise standards and specifications so that it may be used more effectively.

The **recurrence of risk** as an influencing factor was identifiable in several other sessions. The identification, analysis and management of risk are, therefore, recommended for further investigation.

In Africa, the need for sustainable economic growth is immense. The special session on the New Partnership for Africa's Development (NEPAD) shed light on the demands facing the road transport sector in Africa where, currently, the average kilometre cost of freight is double that of international norms. The

capabilities among the individual players exist now and simply need to be harnessed. Given the political will to make it happen success will be assured.

The **social aspect of sustainable mobility** and access was evident from a number of African experts. The provision of mobility and access to rural communities and regional peripheries is a fundamental instrument for the reduction of poverty and local developments. In this regard the phrase "**The Road to Development begins with the Development of Roads**" appears to be a landmark of this congress.