GOVERNMENT OF INDIA
MINISTRY OF URBAN DEVELOPMENT

Proceedings of UMI 2016

9th Urban Mobility India Conference & Expo 2016

Planning Mobility for City's Sustainability

November 8 – 11, 2016, Mahatma Mandir, Gandhinagar, Gujarat

Partner Organiser | Organiser | Partner Organiser

INSTITUTE OF URBAN TRANSPORT (INDIA)

www.urbanmobilityindia.in

Preface

The National Urban Transport Policy, 2006 (NUTP) of the Government of India, inter-alia, lays strong emphasis on building capacities at the state and city level to address the problems associated with urban transport and lays down the guidelines for developing sustainable urban transport systems as well. As part of NUTP enunciations, the Ministry of Urban Development, Government of India has taken two important steps to develop the capacity of officials in cities for improving urban mobility.

- Organizing an Annual Conference-cum-Exhibition on 'Urban Mobility' under the brand name Urban Mobility India (UMI) for dissemination of information, facilitate exchange of ideas and update on best urban transport practices.
- According recognition to good urban transport initiatives taken by states / cities, researchers and exhibitors by giving them awards for excellence in selected categories.

The 9th edition of the Urban Mobility India (UMI) Conference was held from 8th to 11th November, 2016 at the Mahtma Mandir in Gandhinagar, Gujarat. The theme of the conference was "Planning Mobility for City's Sustainability". For the first time, the UMI conference was held outside Delhi in the capital city of Gujarat, Gandhinagar. The conference was organized by the Ministry of Urban Development, Government of India in collaboration with the Government of Gujarat. The Institute of Urban Transport (India) provided the technical and logistics support in organizing the conference.

It was attended by more than 4400 delegates, including 650 students from planning / engineering colleges, 1600 Councillors and Mayors, 2100 urban transport experts, practitioners, resource persons, researchers, scholars and senior government officials from 23 States across India and 50 delegates from 24 foreign countries including Australia, the United States of America, United Kingdom, France, Netherlands, Singapore, Sweden, Switzerland, United Nations, etc. About 1% of participants were foreign nationals, 15% students, 36% from urban local bodies and 48% from other organizations.

The Conference and Exhibition was inaugurated by Shri M.Venkaiah Naidu, Hon'ble Minister of Urban Development, Housing & Urban Poverty Alleviation and Information & Broadcasting, Government of India on 8th November, 2017. He delivered an inspiring inaugural address and briefed the gathering about the initiatives taken by his Ministry. Prior to that Shri Rajiv Gauba, Secretary, Ministry of Urban Development, Government of India gave the welcome address, Shri Vijay Bhai Rupani, Hon'ble Chief Minister of Gujarat also addressed the gathering in which he highlighted the achievements of Gujarat State. Key Note address was delivered by Mr. Chang Woon Lee, President, Korea Transport Institute. Vote of thanks was given by Shri Durga Shanker Mishra, Additional Secretary, Ministry of Urban Development. After the inaugural session, a Special Session for Municipal Councillors from the States of Maharashtra, Gujarat and Madhya Pradesh on Decongesting Roads / Intersection for Relieving Congestion was organized, which was chaired by Shri Nitin Bhai Patel, Hon'ble Deputy Chief Minister, Govt. of Gujarat.

As part of the Conference, CEPT University, Ahmedabad coordinated the Research Symposium which was organized on 9th and 10thNovember, 2016 in which selected research work in the field of urban transport was disseminated through 20 presentations.

An exhibition was also organized as part of the event in which 28 exhibitors, including 7 international and media partners participated. The participating organizations showcased their best practices, latest technologies & state of the art products on urban transport.

After 4 days of deliberation, knowledge sharing and exchange of ideas through 15 Technical Sessions, 3 Round Table Discussions, 3 Plenary Sessions and 4 Special Sessions, the conference concluded on 11th of November, 2016. The valedictory function was graced by Shri Rao Inderjit Singh, Hon'ble Minister of State for Urban Development, Housing and Urban Poverty Alleviation, Government of India and Shri Nitin Bhai Patel, Hon'ble Deputy Chief Minister of Gujarat. Awards for Excellence for best practice in urban transport projects were given to 9 cities selected by a jury and also to best research projects and exhibitors.

The following events / actions made the conference lively, entertaining and informative.

(i) Quiz Competition on urban transport, open to all participants on the second and third day of the conference.

(ii) A multi-coloured newsletter was issued on each day of the event which carried the highlights of the previous day's important events.

(iii) Poster session.

(iv) Colourful exhibition with video clippings on LED screen.

All these exercises generated a lot of enthusiasm and were appreciated by the participants.

The proceedings and outcome of the conference are presented in this document. Detailed presentation of technical papers, UMI photos and proceedings of the conference are available on the website- www.urbanmobilityindia.in

(Mukund Kumar Sinha)
Officer on Special Duty (UT) &
Ex-Officio Joint Secretary
Ministry of Urban Development
&
Officiating Director General
Institute of Urban Transport (India)
June, 2017

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A. Important Outcomes

UMI-2016
Planning Mobility for City's Sustainability
(Outcomes and Proposed Action)

Sl No	Actionable Point	Action to be taken
1.	Proposed New Metro Policy With the increase in the demand for Metro Rail Projects in the country, a new Metro Rail Policy highlighting the innovative models of implementation, enabling provisions for private participation, appraisal framework, increased standardisation and indigenisation comprehensive approach towards integrating metro with the overall mobility needs in urban areas, etc. should be formulated.	Action by MoUD.
2.	Revision in the Metro Acts Presently the metro projects are governed by two central acts viz: New Metro Act combining the provisions of (i) The Metro Railways (Construction of Works) Act, 1978 & (ii) The Metro Railways (Operation & Maintenance) Act, 2002 and greater enabling provisions for PPP and Private initiatives in Metro Rail & Delegation of greater powers to State Governments would be required for smooth operation of Metro.	Action by MoUD.
3.	Standardisation & Indigenisation of Metro System Standardisation and indigenisation of metro systems in India is required to be consolidated further. Quite a few multinational companies have set up their factories in India to manufacture the components of Metro systems. Alstom, a French Company, has set up a rolling stock factory in Sri City. Bombardier has set up a factory near Vadodara. Those specifications, which have large cost implications from the manufacturer's point of view in adapting its facilities for even a minor change, will need to be frozen and made	Broad standards for rolling stock and signalling of metro systems formulated by MoUD in April, 2017.

	mandatory. This will provide further incentive for the manufacturers to set up their facilities in India. Rolling stock and signalling are the two major components which are imported. Hence, standardising the broad parameters of these two systems will have the maximum impact on indigenisation.	
4.	The majority of crashes causing fatalities or major injuries are preventable if transport policies truly prioritize moving people over moving cars. Roads should not be allowed to turn into traffic death traps.	Urban Road Design Manual is being developed by IRC under H-8 committee.
5.	Non-motorised transport as a viable alternative mode of mobility would be effective if there is a close relationship between work and living place. The more dispersed these are, the more people will need to use transport, whether public or private. This can be avoided only if self-contained urban centres are created with most places accessible by walking or cycling.	National ToD Policy formulated by MoUD in April, 2017.
6.	Proposed Green Urban Mobility Scheme The government of India is exploring the possibility of bringing out a GREEN URBAN MOBILITY SCHEME to promote urban mobility initiatives other than metro rail projects. This scheme will cover, inter alia: a) Sustainable urban mobility projects such as footpaths, cycle tracks, public bike sharing, bus rapid transit systems, intelligent transport systems and urban freight management b) Public transport systems based on sustainable vehicles and fuels such as electric vehicles or non-fossil fuel based buses and c) Other low carbon projects that contribute to improved urban mobility.	Action by MoUD.
7.	Public Transport and Non-Motorised Transport i) Expressing deep concern over growing inequity in sharing public spaces in urban areas and declining share of public transport, the Conference called for inclusive urban	Action by all stakeholders, i.e. MoUD, MoRTH, State Govts. & ULBs.

	transport solutions including restoration of the first right of pedestrians to road use and increased investments to provide accessible, efficient and reliable public transport under the overarching frame work of people centric planning	State Govts. & ULBs.
	ii) All the stakeholders who participated in the four day deliberations on various aspects of urban mobility called for increased promotion of Non-Motorised Transport with the objective of promoting walking and cycling as viable alternatives to increased use of private motorized vehicles	Action by all stakeholders, i.e. MoUD, MoRTH, State Govts. & ULBs.
	iii) Rejecting the myths including the one that states that people don't want to travel by buses, experts, planners and other stakeholders strongly advocated promotion of efficient and comfortable bus services in cities including BRT	Action by all stakeholders, i.e. MoUD, MoRTH, State Govts. & ULBs.
	iv) Need for promotion of NMT and public transport has been emphasized under smart city development	Action by all stakeholders, i.e. MoUD, MoRTH, State Govts. & ULBs.
	v) To enable 'walk to work' living, urban development along mass rapid transit systems i.e. Transit Oriented Development has been supported	Action by all stakeholders, i.e. MoUD, MoRTH, State Govts. & ULBs.
8.	<u>Comprehensive Mobility Plans (CMP)</u> The Conference felt it is necessary to make CMPs mandatory before financing of urban transport projects by both the Central and State Governments, noting that CMPs ensure exploration of other available alternatives before deciding on capital intensive projects like Metro Rail Projects	Action by all stakeholders, i.e. MoUD, State Govts. & ULBs.
9.	<u>Climate Change</u> Further to recent Paris Agreement on Climate Change and in the context of growing atmospheric pollution with serious implications for quality of life in urban areas, the stakeholders underlined the need for incorporating climate change concerns while planning for urban transport interventions so as to promote low carbon transport solutions	Action by all stakeholders, i.e. MoUD, MoRTH, State Govts. & ULBs.
10.	<u>Integration of Land Use and Transport Planning</u> Distressed over the chaotic transport conditions in urban	Action by all

	areas adversely impact the life and productivity of its citizens, because of poor urban planning. The Conference stressed on the need for effective integration of land use planning with transport planning. Integration of Development Plans, Transport Plans and Local Area Plans has been strongly advocated	stakeholders, i.e. MoUD, State Govts. & ULBs.
11.	Institutional Integration for better Coordination The Conference strongly urged the Central and State Governments and Urban Local Bodies to set up Unified Metropolitan Transport Authorities (UMTA) with in a specific time frame	Action by all stakeholders, i.e. MoUD, MoRTH, State Govts. & ULBs.
12.	Private Sector Investments The Conference favoured an enabling environment for effective utilization of PPP model of resource mobilization by reviewing the current principles of PPP and providing for risk sharing by government agencies for making PPP a success	Action by all stakeholders, i.e. MoUD, MoRTH, State Govts. & ULBs.
13.	Metro Projects i) Metro Rail projects being capital intensive, innovate financing mechanisms like Land Value Capture have been suggested for recovery of capital investment in conjunction with annual fare revision and increased non-fare revenue	Action by MoUD, Metro Companies and State Govts.
	ii) Capacity enhancement of metro projects has been recommended through necessary automation and other innovations for enhancing 'customer experience' and revenue maximisation instead of focusing on cost reduction	Action by MoUD, Metro Companies and State Govts.
	iii) The Conference opined that Metro projects need to be viewed as urban transformation initiatives rather than as mere transport interventions, given their impact on socio-economic development in an urban setting	Metro Policy
14.	Multi-Modal Integration Stressing on the need for integration of various modes of transport to incentivize people to use public transport, the stakeholders suggested effective regulation of Intermediate Public Transport (IPT) like e-rikshaws for their orderly growth and safety and security of passengers as well as drivers and for ensuring reliable first and last mile connectivity	Action by MoUD, State Govts. & ULBs.

15.	Bus Services i) While calling for efficient City Bus Service systems, the participants suggested a shift from only 'intra-city' services to 'inter-city' operations, to connect close by satellite towns, for improving viability of such services by taking advantage of urban expansions	Action by MoUD, State Govts. & ULBs.
	ii) Expeditious introduction of electrical vehicles and clean fuel based vehicles has been recommended in the context of growing reliance on renewable and low carbon forms of energy	Action by MoUD, Department of Heavy Industries (DHI) and State Govts.
16.	Small and Medium Towns Taking note of mobility problems in major cities proving to be intractable, the Conference has highlighted the need to focus on small and medium towns with necessary long term planning for sustainable urban transport solutions to prevent the situation in these towns getting out of hand, focusing on NMT, vertical growth for dense urban living etc.	Action by MoUD, State Govts. & ULBs.
17.	Parking Solutions Expressing concern over chaotic parking conditions in cities, the Conference called for effective measures to address the problem through various fiscal and non-fiscal measures after building a consensus besides adopting smart parking solutions	Action by MoUD, State Govts. & ULBs. National ToD policy formulated.
18.	Others i) City governments have been urged to undertake studies on traffic flows, modal preferences, present and future transport corridors etc. and develop effective data bases for informed decision making and planning and ii) The Conference underlined the need to ensure that governmental support is effectively directed to reach the more deserving sections of the people, while financing urban transport projects.	Action by MoUD, State Govts. & cities.

B. Inaugural Session

At the inaugural session of 9th Urban Mobility India (UMI) 2016 Conference-and-Expo, Shri Rajiv Gauba, Secretary, Ministry of Urban Development, Government of India while welcoming the dignitaries, delegates and participants gave a brief background of the annual Conference –and- Expo organised by the Ministry of Urban Development. The conference's aim is to strengthen the government's capacity building efforts in the country. He highlighted the importance of the theme of the Conference "Plannig Mobility for City's Sustainablity" and the sub-themes which were to be deliberated upon in 3 Plenary Sessions, 15 Technical Sessions, 3 Round Table Discussions and State Specific Sessions (Conference Programme at Annexure-I). He added that this year's annual event is significant in the sense that for the first time it is being held outside Delhi as directed by the Hon'ble Minister of Urban Development in the last year conference. It is in the fitness of things as the subject matters of urban planning and urban transport are the domain of the states and cities. "We are setting the good trends in recognition of reality. Secondly, over the last 2 years Ministry has been addressing the urban challenges and issues with the launching of 3 missions on Smart Cities, AMRUT, Housing for All, which focus on creating smart city with better quality of life and efficient mobility. Urban mobility assumes greater importance when the country is experiencing demographic transition with changing age-profile, rapid urbanization and need for sustainable urban infrastructure. The challenge is how to encourage public transport to make our cities functionally efficient by integrating land use and transport system".

In his keynote address in the inaugural session Mr. Chang Woon Lee, President, Korea Transport Institute (KOTI) highlighted the emerging transport challenges with ICT advancements. "The need is to make the transit productive and enjoyable. With increasing urbanization followed by motorization in developing countries during the last few decades the transportation has reached to a critical level. Over the years there is a steady change in transport modes in the cities from bike to motorcycle and now cars. The key solutions for such a scenario could be adoption of transit oriented development policy, application of ICT in public transport and promotion of green transport strategies. In Seoul, application of ICT in public transport has made it fast, convenient, productive and enjoyable. Smart ITS with ICT has generated big data in planning for transport strategy. It is simple, cheaper and easier for mobility integration. One click app service help in managing all services in hand held mobile. Sharing mobility as a service reduces the personal car use. There is a paradigm shift in Korea where average speed is 30 km per hour. Traffic may be slow but smoothly flowing and the roads are safe. He emphasized that in developing countries, low

Secretary delivering Welcome Address

Mr. Chang Woon Lee delivering Key Note Address

cost high effective transport system is required and in this context Korean expertise and experience could be shared to develop transport policy".

In his address Shri Vijaybhai R. Rupani, Hon'ble Chief Minister, Gujarat welcomed all the dignitaries and delegates present in the conference to the state of Gujarat. He highlighted the problems, issues and programmes of urban transport in Gujarat which are in line with the national perspective. Gujarat being the highly urbanized state has taken up urban transport programmes on large scale to strengthen and upgrade the transport infrastructure in its cities. Like in India, vehicle population is also increasing in Gujarat, leading to traffic jams and other transport problems. He said that sustainable urban transport system should be inclusive addressing the needs of all socio economic classes and physically challenged persons. MEGA project under implementation will provide seamless connectivity between Ahmedabad and Gandhinagar. BRT system in Ahmedabad has got national award. A similar system in Surat and Vadodara is also in progress. Gujarat is among the first few states where public transport is using CNG as fuel. As part of Delhi – Mumbai Industrial Corridor, Dholera and Dahej are being developed as futuristic vision cities. Gift city being developed will have environmentally sustainable transport system. Acts and rules have been framed to promote low carbon strategies and approaches. Multi modal transport facilitated by technology solutions such as smart cards, mobile applications, ICT are the way forward.

On this occasion, Hon'ble Urban Development Minister launched the Knowledge Management Centre for Urban Transport, an initiative by the Ministry of Urban Development (MoUD) Govt. of India under Sustainable Urban Transport Project (SUTP). The center is being developed at IUT which will provide a knowledge and learning platform for diverse set of users within the transport ecosystem. Target users of KMC would be government agencies, entrepreneurs, consultants, academician, policy makers, industries, researchers, citizens etc.

Launch of KMC by Hon'ble Minister

Inaugurating the 9th Urban Mobility India, Conference-and-Exhibition Hon'ble Minister for Urban Development said that urbanization is one of the most glaring realities of the 21st century. Continuous increase of urban population particularly in the large and million plus cities have implications for urban transport management strategy. Although urbanization is inevitable, it is better to see this as an opportunity and by adopting this approach a big difference

Address by Hon'ble Chief Minister, Gujarat

Inaugural Address by Hon'ble Minister

can be made in the cities. In fact, demand for transport facilities outpaces the capacity of the city's transport system. Urban transport is, therefore, to be guided by the existing and future needs of urbanization.

He stated that the theme of this year's Conference is very important in the context of the flagship programmes of Smart City and AMRUT being implemented by the Ministry. He complimented the Ministry for choosing the theme of the Conference which is in line with the

Audience at the Inaugural Session

current programmes of urban development. As enunciated in the National Urban Transport Policy, 2006, efficient urban mobility focusing on public transport and non-motorized transport modes particularly walking and cycling should figure quite prominently in the urban transport system. Since mobility is the most dynamic factor for cities economic growth, the health of cities and their ability to generate income and wealth is improved when the efficiency of transport system increases. Urban transport planning has to be people centric and be able to meet the city's aspirations.

In view of the emerging needs of urban transport, Ministry has taken a number of initiatives to improve the urban transport system in various cities. Considerable progress in the development of BRT system has been made. About 580 kms of BRTS is in various stages of development across 16 cities, of which about 200 kms is operational in 8 cities of Ahmedabad, Rajkot, Surat, Indore, Bhopal, Jaipur, Pimpri-Chinchwad and Pune. Ahmedabad Janmarg is the largest BRTS network in the country with a daily ridership of more than 1.25 lakh. As of now, 313 kms of metro rail is in operation in the country in the major cities of National Capital Region of Delhi, Kolkata, Chennai, Bengaluru, Mumbai and Jaipur. About 630 kms of metro rail is under construction and another 600 kms is under planning stage. Ministry has sanctioned 22500 buses to 177 cities across the country which have made a significant impact on improving the city bus system. The flagship AMRUT programme also provides for assistance to the cities to procure buses. In both the flagship missions on Smart City and AMRUT due emphasis is being given on development of non-motorized transport (walking and cycling) and road safety measures. NMT initiative taken by the government includes pedestrian and cycle track network development and promoting eco cabs and electric rickshaws for last mile connectivity. As regards efficiency of public transport system the model shift from private cars to metro rail has proved that given acceptable alternate, people would shift to public transport. It is for the planners and the policy makers to ensure this modal shift. Urban transport in cities is greatly affected by the urban planning and development regulations, mixed land use, compact and dense development as stipulated in the National Mission on Sustainable Habitat. It will ensure the success of public transport system in cities. In this context Ministry has recently issued the model building by laws which have provisions for development control and building regulations for orderly and planned development of sustainable habitat. For regulation of traffic in a city, travel demand management, use of intelligent transport system have to be promoted on a wider scale for efficient mobility. He highlighted the initiatives taken by the Ministry in preparing a new Metro Policy as well as the new Metro Act and developing a scheme on Green Mobility India. Ministry of Urban Development will be acting as a catalyst to provide safe, clean, dependable and quick public transport that is people oriented and is committed to plan liveable, loveable and sustainable cities through the instrument of efficient urban mobility. The future of urban transport in India lies in sustainable mobility and eco-friendly

alternatives. Smart City has to have smart mobility. Earlier the Hon'ble Minister inaugurated the Exhibition and visited various pavilions from India and abroad which have

Hon'ble Minister releasing the IUT Publications

showcased the latest development in transport technology and services. On this occasion the

following publication were also released by the Hon'ble Minister:-

(I) E-rickshaw in Indian cities: Status and Scope for Improvement.

(II) Operation Documents for Unified Metropolitan Transport Authority (UMTA) and Urban Transport Fund (UTF).

(III) Operation Documents for Traffic Management and Information Control Center (TMICC) and National Urban Transport Helpline (NUTH).

(IV) Guidance Documents for Transit Oriented Development (TOD), Non-Motorized Transport (NMT) and Public Bicycle Sharing (PBS).

(V) Guidelines Document and Model Contracts for City Bus Private Operations.

The Hon'ble Minister also launched Knowledge Management Centre being developed at IUT. On this occasion two MoUs were signed for mutual cooperation between: (i) IUT and Korea Transport Institute and (ii) CEPT and Korea Transport Institute.

Shri Durga Shanker Mishra, Addl. Secretary (UD), Ministry of Urban Development, Government of India proposed a vote of thanks. He thanked all the dignitaries, delegates, participants as well as members of the organizing committee (Composition of organizing committee is given at Annexure – II).

Signing of MoU between IUT & KOTI

Signing of MoU between CEPT & KOTI

Add. Secy giving vote of thanks

C. Special Session for Municipal Councillors - Decongesting Roads/ Intersection for Relieving Traffic Congestion

After the inaugural session, a special session for municipal councillors from western states of India was organised on "Decongesting Roads / Intersection for Relieving Traffic Congestion". The session was Chaired by Shri Nitinbhai Patel, Hon'ble Deputy Chief Minister, Government of Gujarat. About 500councillors participated and shared their experiences in the session. In his introductory remarks Shri Rajiv Gauba, Secretary, MoUD talked about the role of councillors in emerging urban growth scenario in Indian cities. After the 74thConsitution Amendment Act, importance of local bodies and that of elected representatives in managing urban affairs has been significant– paricularly in addressing the problem of reduction in the share of public transport. Impact of higher growth of private vehicles is tremendous on environment and climate. The need is to reduce congestion on roads by using public transport.

Introductory remarks by Secretary

In his opening remarks Hon'ble Deputy Chief Minister highlighted that the rapid growth of urbanisation has led to uncontrolled rapid motorization which has worsen the urban transprot situation even in small and medium towns in terms of reduction in travel speed, increase in travel time, rising air pollution level, high rate of accidents, deficiency of parking space and increasing use of fossil fuel. He said that to solve the impending problems of urban transport,cities need to adopt smart and innovative solutions by retrofitting of road section as per road design guidelines. There is a need to develop Non-Motorsed Transport network throughout the city. Parking should not be free rather appropriately priced and managed. The traffic management such as introduction of one way traffic and ITS facilities will go a long way in relieving the congestion. Road conditions, quality of vehicles and users behaviour are some of the other factors which have to be addressed holistically. He emphasised that we should move with a motto of moving people and not the vehicle otherwise negative externalities of transport system will go on multiplying as seen in the case of Delhi which is one of the most polluted cities in the world. Public transport will help in saving time, environment and money. In the special session expert presentations were also made by eminent speakers, sharing their views on how to address moblity challenges to relieve the traffic congestion in various cities.

Opening remarks by Hon'ble Chief Minister, Gujarat

Presentations in the session highlighted on the emerging pattern of sprawling cities with longer travel distances, more usage of personal car, poor integration of land use and transport planning, poor public transprot in terms of quantity, quality and coverage, unsafe walking and cycling etc. which are some of the reasons for rapid motorization causing congestion on the roads. This is a myth that congestion will go along with metro. Motor vehicles in Delhi have doubled

in the last 10 years after the metro became operational. Hence metro needs to be integrated with other system and it should be concieved as an urban transformation initiative and not just a rail transport project. Good comprehensive mobility plans for all cities of more than 1 lakh population, land transprot insitutions for all cities with more than 5 lakh people and demand management measures would go a long way in this regard. Equitable allocation of roads space for all modes of transport is necessary with strong political will. Expansion of area under road should be simultaneous with the growth of cities to keep pace with development. Shri D. S. Mishra, Addl. Secretary, (Urban Development), MoUD, Government of India in his concluding remarks highlighted the need for involvement of urban local bodies in tackling urban tansport problems and issues

Concluding Remarks by Add. Secretrary

Glimpses of Special Session

D. Plenary Sessions

Plenary Session 1: Mobility in Small and Medium Towns

As per Census of India, 2011 a total of 44 (out of 497) cities are in the bracket of tier-II cities. Unlike the mega cities, these cities are witnessing explosive decadal population growth ranging from 30 – 60 percent coupled with rapid economic growth. This high growth rate has put a severe strain on the cities basic infrastructure. The urban local bodies are finding it difficult to provide support infrastructure due to the manpower, financial and economic constraints. Most of these cities do not have integrated land use-transport plan and also lack technical manpower as well as funds. The scheme like AMRUT launched by the Government of India is a major step in addressing these problems. But until a major intervention is made, these cities will continue with a very unsustainable development pattern. In this session, an attempt was made to highlight various challenges related to mobility being faced by these cities and the sustainability measures required for countering the challenges.

Chairperson :

- Dr. O.P.Agarwal, Executive Director, ISB Mohali

Panelists :

- Mr. Michael Kihato, National Treasury, South Africa.
- Mr. H. S. Ashokanand, Managing Director, NEKRTC
- Mr. Kamal Nagar, OSD, (Transport), Urban Administration and Development Department (UADD), Govt. of Madhya Pradesh
- Mr. Lalmuansanga Ralte, Under Secretary, Urban Development & Poverty Alleviation, Govt. of Mizoram

Rapporteurs

- Ms. Srinavya and Mr. Subhadeep Bhattacharjee, CEPT University, Ahmedabad

Highlights of Discussion

- In South Africa, public Transport is playing a key role in economic growth, social inclusion and spatial transformation.
- Provincial bus system is however costly because of distances and extreme peaking.
- Municipal Bus, Metro Bus, Brakpan Bus, Tshwane Bus, etc. in African cities have high operating cost although the trips are shorter.
- Bus rapid transit operating in 4 cities has given specific attention to spatial transportation.
- Fare box recovery rates in the systems are very modest. Mini bus taxis carry more than two-thirds of people in metro areas.
- The challenge is creating greater efficiencies within modes and to deal with high fragmentation of institutions.
- North Eastern Karnataka Road Transport Corporation (NEKRTC) which is operating city bus service in small and medium towns of Karnataka has shown 42% shift from autos to bus

- In operation of city bus services NEKRTC faced viability constraints in term of operation within city limits, shorter route length, low vehicle utilization, higher cost of operation, lower non-traffic revenue in small cities, reduced occupancy, etc.
- It also faced infrastructure issues regarding inadequate road network, problem for last mile connectivity and lack of passenger amenities.
- In addition, lack of inter-institutional coordination, poor enforcement of traffic regulation and absence of appropriate land use policies are some other issues.

Panelists on the dias

- In a state like Madhya Pradesh current public transport scenario in medium size cities reflect overcrowded IPT modes and congestion on roads
- Multiplicity of agencies and lack of an integrated accountable agency both at state and city levels are the major issues of urban transport in various cities of Madhya Pradesh.
- Presently, organized city bus service is available in 4 cities of Bhopal, Ujjain, Jabalpur and Indore. In other large cities like Gwalior, Sagar, Katni, Ratlam, Raison unorganized private operators are running the city bus services.
- Vision for urban transport in the state is to bring all transport modes under one umbrella through integrated dedicated and empowered urban transport agency.
- State has also formulated draft State Urban Transport Policy - 2016, Sate Parking Policy, Advertisement Policy and Transit Oriented Policy.
- Even in hill cities like Aizawl there is an explosive increase in number of vehicles which cause severe congestion in hill cities. The north eastern states together have 2.7 million registered vehicles.
- Challenges faced by hill cities include narrow roads, land constraints, greater dependence on personal vehicles, enormous congestion, pollution and parking problems.
- In Aizawl city specifically, road geometry is very poor because of acute bends and curves, gradient and angle. All roads converge to the city Centre. Absence of road hierarchy leads to low capacity and speeds on the networks
- Majority of the trips are by walking. Due to lack of pedestrian facilities and public transport, congestion on roads is severe.

Opening remarks by chairperson

Outcomes

- For creating institutional and funding synergy, spatial pattern of the cities should have a paradigm shift from sprawling low density urban form to compact development. Financial instruments can be helpful in shaping the spatial change.
  - Rethinking in funding for public transport is required particularly when public transport exacerbate sprawl.
  - For viability of city bus service its operation should be extended beyond city limits catering to the cluster of city operations.
  - Non traffic revenue can be attracted by providing advertisement revenue tax holiday from municipal authority.
  - Govt. of India should reintroduce finance scheme for replacement and augmentation of buses and to provide viability gap funding for operation.
- A unified transport authority like UMTA should be established immediately by the state govt. to address the institutional and infrastructure issues.
- There is a need to promote rural connectivity and modernize the regulatory environment.
- Reforms may be initiated to improve the institutional mechanism for creation of public transport infrastructure facilities.
- In hill cities pedestrian infrastructure and public transport needs to be given top priority to reduce congestion on roads and to ensure safety.
- Ropeway facilities are required connecting east-west points in Aizawl city.

Glimpses of Plenary Session

Plenary Session 2:- Institutional and Financial Framework for Metro Systems

As per Census of India, 2011 a total of 44 (out of 497) cities are in the bracket of tier-II cities. Unlike the mega cities, these cities are witnessing explosive decadal population growth ranging from 30 – 60 percent coupled with rapid economic growth. This high growth rate has put a severe strain on the cities basic infrastructure. The urban local bodies are finding it difficult to provide support infrastructure due to the manpower, financial and economic constraints. Most of these cities do not have integrated land use-transport plan and also lack technical manpower as well as funds. The scheme like AMRUT launched by the Government of India is a major step in addressing these problems. But until a major intervention is made, these cities will continue with a very unsustainable development pattern. In this session, an attempt was made to highlight various challenges related to mobility being faced by these cities and the sustainability measures required for countering the challenges.

Chairperson :

- Mr. D. S. Mishra, Addl. Secretary, Ministry of Urban Development, Govt. of India.

Presenter :

- Mr. Dominic Patella, Senior Transport Specialist, World Bank.
- Richard Anderson, Director, RTSE, Imperial College, London

Panelists :

- Shri I. P. Gautam, Managing Director, MEGA Ltd.
- Ms. Ashvini Bhide, Managing Director, Mumbai Metro
- Shri P.K. Bansal, Managing Director, Chennai Metro
- Shri Brijesh Dixit, Managing Director, Nagpur Metro
- Shri Vinay Kumar Singh, Managing Director, NCRTC

Rapporteurs

- Mr. Sarang Pingale & Ms. Anuja Kothawala, CEPT University, Ahmedabad

Highlights of Discussion

- For operation of metro system the operator has to consider and deal with a number of issues such as :-
  - Financing regime including fare policy and taxation
  - Current land use, future land use planning, transport policy environment regulations and industrial structure.
  - At international level an institution called as COMET i.e. Community of Metros has undertake a study of 34 urban rail systems in 32 cities which is a good reference for planning and design of metro rail systems.
  - The successful operation of metro has been a good tool for urban transformation within a wider network.
  - In Toronto, metro has a greater impact on urban form while in Santiago, efficiency of the network increased due to integration of bus with metro.
  - Capacity has the greatest impact on additional passenger and revenue.

- Higher capacity is better than lowering fares to increase passenger. Extra capacity and frequency could pay for itself in additional revenue.
- About 60% of operational expenditure is fixed costs – maximizing capacity can achieve overall cost recovery.
- The trends show more metros are coming in comparison to BRTS. The moot question is how much we are equipped for non-fare revenue.
- In spite of large number of issues, integration in metro system is not happening.
- With the building of metro, feeder system should also be taken up simultaneously.

Outcomes

- A metro is a capital intensive project that never stops – one should be able to pay for it.
- The focus should be on spending more on the right metros and not spending where metro does not make sense.
- As part of fare policy, increase the fare on regular basis to make metro sustainable. Fare formula of Singapore and Hong Kong is a good example.
- Robust Institutional and financial mechanism needs to be established to complete metro projects in time and to bring down the cost.
- Setting up of an institution like UMTA and capturing urban gains should be the priority as has been done in many cities of the world.
- Alternatives should be explored and studied before laying down the metro system by looking at agglomeration benefits.

Snapshot of Plenary Session

Plenary Session 3:- Climate Resilient Transport

The transport sector is vital for enhancing economic growth and social connectivity. It is the second largest and one of the fastest growing energy end-user sectors contributing 23% of global energy-related greenhouse gas emissions. The transport sector in India is the second largest consumer of energy after industry and has the largest share in petroleum consumption.NUTP2006 and NTDPC report emphasized promoting the use of cleaner technologies to reduce pollution. The use of hybrid vehicles, electric vehicles and newer fuel saving technologies are a step towards cleaner environment. The use of public transport also reduces the amount of emissions. The improvement in environmental emissions standards like upgrading to BS IV is another major step to promote low carbon urban transport. Avoid, shift and improve approach needs to be followed in urban transport planning through appropriate intervention to reduce reliance on personal vehicles, make them more fuel efficient and increase the share of public transport and NMT.

The session focused on impact of transport on climate and national policies and regulations on climate change in the context of urban transport.

Chairperson :

- Shri D.S. Mishra, Additional Secretary (Urban Development), MoUD, Government of India

Presenter :

- Mr. Dominic Patella, Senior Transport Specialist, World Bank.
- Richard Anderson, Director, RTSE, Imperial College, London

Panelists :

- Ms. Marion Hoyez, Cooperation Project Manager, CODATU - India
- Dr. Sewa Ram, Professor, School of Planning and Architecture, New Delhi
- Ms. Anumita Roy Chaudhry, CSE, Delhi

Rapporteurs

- Mr. Banshi Sharma & Ms. Priyanka Sawant, CEPT University, Ahmedabad

Highlights of Discussion

- Reducing or avoiding the need to travel improves the system efficiency.
- Shifting from personal mode to public transport or maintaining the share of more environment friendly modes improves the trip efficiency.
- Improving the energy efficiency of transport modes and vehicle technology results in vehicle efficiency.
- World picture on CO_2 emission from transport in different cities reveal that cities from USA, Canada, Australia on an average have 2 to 8 ton CO_2 per capita while European cities have between 1 or 2 tone CO_2 per capita as compared to Asian cites which have less than 1 ton CO_2 per capita.
- Cities with same population but having compact development show less CO_2 emission than the sprawled city of the same size.
- In Karnataka, some innovations in alternate fuels have been made and it started using ethanol blended diesel and 100 percent bio-diesel. It helped in reducing the emissions and improving air quality.

- There are some challenges in usage of ethanol in terms of limit to use in inline injection pump, clearance and approval from Ministry of Petroleum and Natural Gas, OEMs etc.
- In usage of bio-diesel also, consistency in bio-diesel supply, less shelf life of bio-diesel, approval from OEM, less favorable to low temperature, approval for bio-diesel vehicle, etc. are the major issues and challenges.
- Twenty percent of the world's population living in developed countries account for 46.4 percent of global greenhouse gas emissions.
- Eighty percent of the world's population living in developing countries account for the remaining 53.6 percent
- The United States and Canada alone account

Panelist in interacting mode

for 19.4 percent of global greenhouse gas emissions, while all of South Asia accounts for 13.1 percent, and all of Africa just 7.8 percent.

- Transport scenario in India is likely to change drastically by 2030.The total passenger kilometers expected to increase from nearly 3,635 billion in 2005 to nearly 19,437 billion by 2030.
- The transport sector accounted for 142.04 million tons of CO_2 emissions i.e., 7.5% of the total GHG emission in the country in the year 2007..
- Policies for dealing with climate change are:
  - Minimising the potential impact on the transportation system from climate change.
  - Reduction in greenhouse gas emission resulting from movement of goods, services and people in cities.
  - A-S-I approach makes an important contribution towards climate change adaptation strategy.
- Mandatory emission norms, road pricing schemes, low emission zone and vehicle quota system are some of the regulatory instruments dealing with climate change.
- Emission taxes, congestion charges as followed in Singapore and road pricing

Panelist making presentation

scheme in London are some of the economic instruments in various countries.

- Cleaner fuels and efficient vehicle technologies are part of technology instruments dealing with climate change.
- India signed the United Nations Framework Convention on Climate Change and acceded to the Kyoto Protocol in 2002.
- India has communicated its voluntary mitigation goal of reducing the emissions intensity of its Gross Domestic Product (GDP) by 20-25 percent, over 2005 level, by 2020
- The Government formulated the National Action Plan on Climate Change (2008).
- The National Mission on Sustainable Habitat – emphasizes on Better Urban Planning and Modal Shift to Public Transport.
- National Auto fuel Policy, 2003 adopted a roadmap for progressively tighter fuel quality

and vehicle emission standards through 2010.

- National Transport Development Policy Committee, 2010 recommended tighter Bharat IV fuel quality standard to be implemented nationwide by the middle of this decade, with a target to reach Bharat VI by 2020.
- National Environment policy (NEP) recommended formulation of a national strategy for urban transport to ensure adequate investment, public and private, in low pollution mass transport systems.

Presenter making presentation

- Numerous Legislative Acts have been enacted so far which have aimed at mitigating climate change and adapting to sustainable transport.
  - The type of urban form affects the travel behaviour in terms of vehicle kilometer travelled (VKT), energy consumed and tailpipe emissions. Studies show
- Energy Consumed (EC) by the residents living in peripheral areas (18km from CBD) = 2.5* EC of residents in central areas (1.2 km from CBD)
- Each 10% increase in urban Density reduces the vehicle kilometers travelled (VMT) per capita by 2-3 %
- Studies indicate that TOD can reduce traffic congestion and air pollution upto 25 to 50 percent compared to typical suburban development.
- Benefits of TOD over climate change are :
  - Reduces trip lengths, implies lesser vehicular emission.
  - Increase walking and transit use, implies less use of motor vehicles.
  - Enhances pedestrian and regional accessibility
  - Increases land value around the transit corridor, which helps generate the funds for promoting environmental awareness and controlling environmental pollution.:
- In Delhi, winter pollution is severe. CSE study

Presenter making presentation

shows that during November 2015, 73% days were having severe pollution while in December 2015 it had 67% days in severe category.

- Emergency actions are taken in global cities during severe pollution.
  - In Beijing, pollution emergency measures are taken as red alert days. In US cities, air pollution emergency contingency actions are taken for PM and Ozone. In Paris also red alert day are announced.
- As per CPCB study odd even scheme implemented during January 1–15, 2016 in Delhi made no difference to air quality in Delhi. However there was a drop in the intensity of smog episodes during odd and even fortnight.
- IIT Kanpur study states – vehicles are the most consistent and dominant source of pollution throughout the year.

- Global evidences on pollution reduction with emergency action are as under :
- Paris implemented emergency action in March 2014 and repeated in March 2015, saw 18% reduction in traffic volume and 6% in pollution levels.
  - Beijing – more stringent programme – has shown 38% reduction in PM10.

Outcomes

- EASI conceptual approach in urban mobility will help in reducing the climate change effect and mitigating the CO_2 emission (E stand for enable, A – Avoid, S – Shift and I – Improve).
- Mitigation policies for sustainable urban mobility should include comprehensive approach on mobility issues towards public transport.
- Transport and emissions action plan should include the following :
- **Mode shifting**
  - From road based transport – to Rail and IWT and also from Personal vehicles to Public transport and NMT
- **Improving vehicle efficiencies and fuel quality**
  - Through fuel economy standards for manufacturers and establishing efficient monitoring systems encouraging growth of cleaner fuels
- **Alternate technology and source of fuels**
- **Incorporation of alternate / hybrid technologies like :**

Pure EV,	**- Hybrid Gasoline**
Hybrid Diesel	**- Plug-in Hybrid Gasoline**
Plug-in Hybrid Diesel	**- CNG and LPG**
Hydrogen Hybrid ICE	**- Hydrogen Fuel Cell**

View of Plenary Session

Technical Sessions 1, 4, 6 :- (Coordinated by PTV Group)

The PTV Group provides software and consulting services for transport, logistics and geo-marketing. The Group plan and optimize all the mode which move people and goods worldwide in terms of transport routes or sales structure, private or public transport. The range of products includes software and services data components, consulting and research services.

The first technical session organized by PTV Group focused on the activities of the group and what is new in PTV software.

The session focused on impact of transport on climate and national policies and regulations on climate change in the context of urban transport.

Chairperson :

- **Mr. Thomas Schwerdtfeger**

Presenter :

- Mr. Sonal Ahuja, PTV Group

Highlights of Discussion

- PTV has developed new software known as VISUM / VISWALK 9 which can do scenario comparison in terms of un-signalized intersection, signalized intersection and roundabout.
- It can do faster simulation, edit the large matrix, do the evaluations, visualization in 3D and can be used in data collection etc.
- PTV in the academic programme has strengthened its links with the academic world supporting educators and innovators
- Theoretical skills combined with practical software experience can give software based transport modeling.
- PTV VISUM 16 is another new package for simulation based dynamic assignment evaluations.

Presenter making presentation

- It is the first macroscopic planning tool to model and evaluate sharing systems.
- This can help in usage of data from e-ticketing systems..

Technical session 4 by PTV Group dwelt on smart traffic solutions for smart cities.

Presenter :

- Shri Shriniwas S Arkatkar, Asst. Professor CED, SVNIT, Surat

- Shri Sahil Chawla and Ms. Shalini Sinha, CEPT University, Ahmedabad
- Shri K. S. Anbumani, L&T Infrastructure & Shri Manraj Bains, Transaxiom
- Shri Prabhu TD& Mr. Sonal Ahuja, PTV Group

Highlights of Discussion

- In the study area of Delhi-Gurgaon expressway and arterial road in Chennai (Saidapet) macroscopic validation of calibrated WIEDEMANN 74 and WIEDEMANN 99showed some interesting results.
- WIEDEMANN 74 model is one of the two car following models available in VISSION.

Presenter making presentation

- This model is suggested for use in urban traffic. The driver behavior modeling in car is based on perception thresholds.
- In case of Delhi and Chennai sections taken for study, calibrated WIEDEMANN 74 and WIEDEMANN 99 models have performed better in replicating the observed field condition with and without accelerations.
- With calibrated WIEDEMANN-74 and WIEDEMANN-99 models, the simulated models are performing well in replicating the field conditions.
- In another research study VISSIM package focused on performance assessment of queue jumper and transit signal priority on bus performance. Case study of Sanand Toll Plaza near Ahmedabad city used micro simulation for increasing the efficiency of the existing toll plaza and upcoming toll plaza.
- It is observed from the study that a simulation model with an accurate representation of the toll plaza configuration including the ability to consider lane-use imbalance, service time distributions, traffic arrival pattern and other particular user behaviour can be calibrated and validated to study toll operations for Indian highways using PTV Vissim.
- Smart traffic management with PTV optima is a dynamic traffic control tool for real time data fusion and traffic prediction.
- Smart signaling with PTV balance and PTV epics keeps city's rhythm flowing..

Presenter making presentation

Technical session 4 by PTV Group dwelt on smart traffic solutions for smart cities.

Presenter :

- Shri Sudershan K Popli, RITES & Shri Manraj Bains, Transaxiom
- Mr. M. Jobson Joseph, Rajiv Gandhi Institute of Technology, Kottayam

- Ms. Dipika Gupta, L. D. College of Engineering, Ahmedabad
- Shri Rishi Ahuja, Sunovatech Group

Highlights of Discussion

- Safety audit of pedestrian safety measures at T-junction of Baba Banda Singh Bahadur Setu with Aurbindo Marg has been done using Micro simulation.
- PTV VISSIM is a microscopic, time step and behaviour based simulation model and it is the most powerful tool available for simulating multi-modal traffic flows, including cars, trucks, buses, heavy rail, trams, LRT, bicyclists and pedestrians.
- In a case study of Thiruvananthapuram city impact of implementing congestion charging assessed using dynamic assignment in VISSIM. The conclusion of the study are:

Presenter making presentation

- Overall delays in CBD area get reduced by 44%.
- Overall traffic volume at intersections has been reduced by 25%.
- An overall travel time reduction of 48% has been observed in the CBD area.
- Speed of vehicles has been increased by 16%.
- Emissions within the CBD get reduced by 40%. Also significant reduction in fuel consumption was observed.
- In another example, pedestrian facilities in congested urban area using VISSIM software have been improved in Kalupur railway station area, Ahmedabad.
- Traffic simulation is one efficient operative tool for estimating further traffic, traffic planning and designing, pedestrian estimation, testing different alternatives and evaluating traffic management schemes.
- Road safety management with PTV solutions and accident mapping has been a success story over the last 40 years in Germany where 11 federal states use PTV Euska.
- The accident data can be filtered depending on the main attributes of accident. Easy filtering of accidents with cyclists.

Participants at the session

- PTV VISUM safely generates a heat map based on accident data to focus safety action programmes on the significant areas e.g. cyclists.
- Pro Accident Mapper application- Core functions are as under:
  - Capture Geo-referenced Data of Road Accidents.
  - Real-time & Efficient information to Handle Accidents.
  - Collaborates Multiple Emergency Response Teams.

- Detailed Scientific Data for Post-Accident Analysis.
- Capture Geo-tagged Accident Photographs & Videos.
- Easy Customizations to Any Region and Language.
- 40 Reporting Parameters for Road Accidents.
- Over 200 Reporting Scenarios for Road Accidents.

Outcomes

- The system Predict and prevent Road Disasters.
- Create positive and good governance image.
- Improve quality of life.
- Provide backbone for policy framework.
- Help develop world class infrastructure and smart traffic management for smart cities.
- Use of models or tools to forecast and compare effects with respect to change in traffic congestion charging.
- Invest in alternative travel options

Audience in interacting mode

Technical Session 2:- Improving City Bus Service

Governments all over the world are looking for sustainable approach to improve safety on roads and environmental protection while meeting the citizen's mobility needs at affordable cost and lesser travel time. Buses are instrumental in effectively achieving the sustainable mobility objectives. In fact, they are the first form of public transport in cities. However, the sector has been neglected as revealed by the various studies over the years and the share of buses in total number of registered vehicles in the country is only about 1%. Several initiatives have been taken by the central government to develop this sector by giving grants as part of a stimulus package for purchase of buses. However, the initiative could benefit only few cities. Therefore, there is a need to change the policy and perception to promote city buses on priority basis in all class-I cities having a population of one lakh and above.

This session focused on modernizing city bus service, best practices and use of technology in making bus operations efficient.

Chairperson :

- Dr. M. Ramachandran, Former Secretary, MoUD

Presenter :

- Shri Prasanna Patwardhan, CMD, Prasanna purple
- Shri Jayant Deshmukh, MP group
- Mr. Bill Delany, MD, Trapeze Group Asia Pacific
- Ms. Nupur Gupta, Senior Transport Specialist, GTIDR, The World Bank

Rapporteur

- Ms. Visakha K A & Ms. Avni Mehta, CEPT University Ahmedabad

Highlights of Discussion

- Develop excellent pedestrian and NMT network for last mile connectivity. Permit only pedestrian, cycles and buses in congested areas.
- Plan should be made as per traffic requirement with a capacity to carry People Per Hour Per Direction (PPHPD) for various modes as under :
  - Monorail – 8000
  - BRT : Single Lane / Direction - 12000
  - BRT with passing lane – 45000
  - Metro Rail – 60000
- In a given budget of Rs. 1000 crore, various systems of varied length could be built.
  - Underground Metro – 2.5 km
  - Elevated Metro – 5.0 km
  - Mono Rail – 6.7 km
  - BRT – 6.7 km
- High quality transit with
  - Dedicated right of way, safe, easy step-less boarding, electronic fare payment, real time passenger information and high quality service can attract users from personal vehicles.
  - BRT has advantages on other modes in terms of quick and easy access to station, multiple services per corridor, express services and affordability for customers and the city.
- For instance MP Group started with merely 2 buses in 1997 now operates over 550 buses and has pan India presence.

- For maintenance of buses infrastructure requirements, depot design, equipment requirement, manpower requirements, bus maintenance schedules, stores and inventory management, MIS, etc. are the key components.
- Bus scheduling is based on schedule planning, demand and calculation of running time.
- Monitoring of bus operation is through ITS.
- Absence of attractive public transport results into growing dependence on personal modes and unsustainable investment in road infrastructure. It leads to growing congestion, road safety hazards and environment degradation.
- The Bus funding scheme improved the organized bus service in many cities in terms of ridership and strengthened the fleet of state transport undertaking.
- Still there is a large gap in the public transport supply in some tier 2 cities. In cities like Gangtok, Guwahati and Patna buses are plying less than 100 km a day as against the capacity of 150 – 200 km per day.
- Number of passenger per bus per day are quite low in some of the tier 2 cities ranging between 150 – 200 compared to over 700 – 1000 in the better managed systems due to poor service, reliability and competition from unorganized sector.
- A survey of 12 cities revealed that 75% users and 65% non-users would continue using or start using the bus if it is improved.
- As per survey, about 72 percent use city bus service because it is economical and 43 percent opt for it because of easy availability. About 30 percent users find the city bus service as time saving, good in connectivity and safe.
- Comfort and facilities are the attractions for using the city bus services.
- Overcrowding, longer commuting time, non-availability during peak hours etc. are some of the reasons which discourage people in not using the city bus service.
- In cities like Delhi, Kolkata, Kochi, Navi Mumbai and Jaipur general perception is that women are unsafe while traveling in city buses. Whereas they feel safe in cities like Bhopal, Chandigarh, Raipur, Chennai, Bangalore.
- Awareness about ITS and new technologies improved for both existing and new players

Chairperson addressing the sesson

but few successfully implemented these complex systems.

- Cities such as Bhopal and Raipur have launched well operated services with high levels of user satisfaction.
- Several cities encountered problems with hiring and management of private operators – weak capacities, poor contracting arrangements, one sided risk frameworks etc.
- In almost all instances, the new services launched in competition with the existing informal (or unregulated) service seriously impacted the SPV operations.
- Adequate resourcing of SPV's is a major challenge.

Outcomes

- Efficiency, privatization and sustainability are the major global themes for efficient bus operation. Capture data once – use many times.
- City bus system can be cost effective public transport solution for most of the Indian cities.
- Drivers for Efficient Operations are :

Population – Efficient mass transit

- On time predictive service
- Commuter friendly
- Informed choices

Pollution : Environment friendly

- Periodic and predictive corrections for well-maintained bus
- More coverage using same fleet
- Ease burden on existing resources

Profitability : Self-sustaining operations

- Optimized use of crew and fleet
- Manage overall cost (workshop, tyre &fuel)
- Increased life of fleet
- Achieve target with existing resources

Glimpses of Technical Session

Technical Session 3:- Financing Metro Systems

Indian cities are witnessing tremendous growth which has created a high level of travel demand. In order to support such high level of travel demand, there is a need to develop sustainable mass transit systems in cities. Rail based systems like metro, mono and light rail are the most cost intensive mass transit systems as compared to city bus service. For providing adequate transit facilities and for its operation and maintenance, large scale investments are needed. With billions of dollars to be spent on metro rail projects in the country, it is necessary to use innovative financing mechanism such as capturing the gains from property value along the transit corridor. The financial sustainability of these systems needs to be studied in detail to opt for better and viable alternative.

This session dwelt on the need of metro systems to be developed in an integrated manner, financial structure for metros and financial sustainability of RRTS.

Chairperson :

- Shri I.P. Gautam, MD, MEGA Ltd.

Presenter :

- Shri Mohinder Singh, Advisor, LTA, Singapore
- Shri Brijesh Dixit, MD, Nagpur Metro
- Shri Vinay Kumar Singh, MD, NCRTC
- Dr. Jinsu Mun, Research Fellow, Korea Transport Institute

Rapporteur

- Mr. Hitav Patel & Ms. Urvashi Yadav, CEPT University, Ahmedabad

Highlights of Discussion

- In Singapore integrated multimodal master planning and development programme has been prepared for city wide public transport network.
- The planning process includes longterm30-40 years Concept Plan for Rapid Transit System, medium term 10-15 years Master Plan, planning feasibility studies (5-10 years) ,5 year Road Development Programme and Rail lines.
- Integrated Master Planning helps in enhancing accessibility to public transport and reducing car dependency.
- At present in Singapore Rapid Rail Transit Network is 182 km which is proposed to be expanded to 360 km by 2030.
- Buses also provide comprehensive coverage through 2 multimodal operators and 3 bus operators in specified assigned areas. But the plan is to reorganize the bus service.
- Public transport has been integrated in terms of physical, modes, fare and information and now the transit systems is also integrated with coming up developments.
- Govt. provides more first mile and last mile commute options to supplement existing public transport systems.
- For promoting cycling, dedicated bicycle tracks, bicycle racks at MRT stations and bicycling sharing are taken up.
- Pros and cons of the current financing structure of government funded projects:

- Pros and cons of the current financing structure of government funded projects

Pros

- Standing frame work with DEA & MoUD available for funding - Saves Time.
- Multiple agencies for funding available hence higher capacity – Bigger Kitty.
- Government backed financing – Competitive Rates.
- Reliability& Continuous funding for the full tenure of the project assured – provides flexibility in case of Time or Cost overrun.

Cons

- Absence of long term hedging mechanism.
- State government contribution significantly higher due to additional RoW acquisition charges &entire impact of currency fluctuations to be borne by the state government.
- Insignificant role of domestic financial institutions due to lack of long term funds available in the domestic debt market.

- Pros and Cons of the current Financing Structure of Private Projects

Pros

- Additional resources available for projects in addition to govt. / public resources.
- Leverage efficient private sector management experience.

Cons

- Likely higher interest rates due to perceived higher risks.
- Limited ability to recover investments through fare box revenue .
- Limited ability to capture full land value due to absence of necessary reforms in the non-fare revenue streams.
- Absence of ability to tap long term funding resources locally.
- Limited overseas funding due to risk of currency fluctuations.
- Absence of effective dispute resolution mechanism in the concession agreements causing delays

Participant asking the question to the Panelist

- With many new projects / extension planned the onus of funding is bound to be huge on MoUD and state governments. As such new streams of revenues / funding avenues have to be tapped.
- Private rapid metro is more suitable for small scale feeder systems / network covering particular real estate projects.
- The current arrangement of GOI facilitating external funding for the SPV, is most efficient and competitive (low interest rates).
- In the current SPV structure of 50-50 equity contribution by the Govt. of India and State Govt. in absolute terms the actual equity contribution of GOI is not more than 4-15% and subordinate debt of -5%, total 20%, State Government's share other than equity &subordinate dept also include R&R cost, cost escalation, currency fluctuation on debt etc. thereby making the state share significantly higher at 25%. Including land costs the state government's share is at 28.5%.
  - It would hence be prudent to evaluate if the 50-50 structure can actually be implemented in letter and spirit i.e. other items that the states currently bear proportionately. Land cost/ R&R costs can be retained in its current form of being funded by the state given that the benefit of

the asset created would be benefitting the people of the state.

- Challenges facing financial structure of Metro Projects.
  - Long gestation periods to build the Metro and recover the capital investment.
  - Fare revenues are not sufficient to offset capital cost.
  - Monetization of Land value takes time.
  - GOI's contribution not proportionate to State government's contribution on account of the state's sole responsibility to provide for land, forex fluctuations & cost over-runs, GOI's contribution available only up to 20%.
  - Debt sustainability issue of state governments due to their precarious financial condition.
  - It is to be seen how GST will change this situation.
  - Intermodal transport financing not secure and works independently.

Outcomes

- Dubai, Singapore, Paris and London already have a successful Unified Transport Authority.
- Having an integrated system that oversees all public means of transportation can significantly improve the regulatory framework, feeder service, financing requirements, first mile – connectivity and overall improve the public transport.
- Metro projects should come up only in those cities where ridership visibility is strong in terms of PHPDT.
- Alignment of the route should ensure strong ridership.
- Fare fixation mechanism should be independent and related to costs – both construction and O & M.
- Tap Non-Fare Revenue in terms of :-
  - TOD-income from sale of premium or extra FSI, Share from Stamp Duty, Development Fee, Advertising Rights, Advertising / Parking / Vehicle Cess.

Audience at the session

- Innovative Finance Instruments vary widely and have been applied by local governments and related agencies in different parts of the world, Financing Transit and Transit Oriented Development (TOD) related investments.
- Primary Drivers:-
  - Once the Metro is operational in any state, land bank at the stations can be used for station development for real estate and a revenue stream can be generated.
  - With decreased costs and enhanced revenues through various non-fare sources, Metro finances will be in a much better state.
  - Metro can get its ratings done through a rating agency and increase its ability to raise domestic debt at attractive rates.
  - Metros being environment friendly can look at tapping funds through issues of Metro Bonds, Climate Bonds, Masala Bonds etc.
- Regional Rapid Transit System (RRTS) – (Regional Rail based) is a dedicated high speed, high capacity, comfortable and safe commuter service connecting regional nodes.
- RRTS is different from conventional Railways as it will provide high frequency and point to point regional travel for passengers at a high speed along a dedicated railroad.
- RRTS is different from metro as it caters to

passengers looking to travel relatively longer distance with fewer stops and at higher speed.

- Rapid & Mass connectivity catering to unmet and induced travel demand can lead to Sustainable Regional Development.
- MRTS and RRTS are note supplementary but complementary to each other.
- RRTS can support creation of urban agglomeration and satellite cities or new economic centers around main city like Delhi.
- Resultant impact of RRTS in terms of incremental value is much larger as it improves regional connectivity.
- World over mass transport systems are financially not sustainable on standalone basis and are supported through Government support / subsidy.
- Financial viability definition needs to be revisited; the project needs to recover O&M expenses, preferably through fare box collections.

Chairperson addressing the audience

- Urban railway in Korea includes Seoul Subway line 1 & 2, expansion of Seoul subway lines and subway lines in other cities.
- A total of 23 lines (670 km) of urban railway in 9 cities of which 3 lines are constructed through PPP.
- Metropolitan rail is getting 70% central funding while urban rail is getting 40 – 60% funding.
- Seoul city enacted the Ordinance on the first Seoul city subway bonds in 1973 to finance the construction of Seoul Metro Line 1 - Bonds covered about 10% of the total project cost.
- Share of bonds in financing urban railways has steadily increased.
- Urban Railways Law stipulates compulsory purchase of the urban railway bonds.
- Foreign loans were used for Seoul Metro Line 1 and other in 1970s and 1980s.
- Metropolitan Transport Infrastructure Fund (MTI Fund)is available for the construction of Metropolitan railway lines.
- Special Account for Transport Infrastructure:
- Introduction of the account for provision of transport infrastructure in 1994.
- The special account is main source for national transport infrastructure investment.
- Legal Framework of PPP system was first introduced in1994 with succeeding several revisions.
- In Minimum Revenue Generation (MRC) projects a certain portion of projected annual revenues may be generated when actual operation revenue falls short of projected revenue prescribed in the contract.
  - Standardization of Technical Specifications would be necessary for Multiple Urban Transportation Projects coming up in the Country.
  - Opportunity for economy of scale by fixing common standards for similar projects and encourage common tendering.
- Unified Transport Planning Authority:
  - A planning authority which can facilitate the coherent working of multiple transportation / government agencies.
  - The agency's mandate should be to decrease the cost and time of project execution through better management of land acquisition / RoW issues and promote multi modal integration.

- Employing Value Engineering to bring down the project's cost.

- Rationalizing Manpower Cost - Promoting Cross functioning and Multi-Tasking, Outsourcing on non-critical activities
- Bringing down the energy expenses – Optimized Operations and Employing PPP to use non-conventional energy sources at lower rates.
- Reducing Spare Costs:
  - Development of local vendors for supplying spares.
  - Use of IT to enable optimum utilization (Assets Management System)
- Minimize interest cost - Adherence to Project time lines to reduce IDC, Selection of soft loans after due diligence.
- Mass Transit projects on standalone basis are financially not viable, as they may not match the benchmark criteria for FIRR by GoI.
- Need to evaluate "RRTS projects" on overall regional socio-economic impact basis and not only on pure financial feasibility.
- The deficit (in capex or opex or both), needs to be met through appropriate value capture mechanisms.
- State governments, being the largest beneficiaries to take lead in capturing the value addition and passing on to projects – GoI guidelines.

Dignitaries on the dias

- As part of Minimum Revenue Guarantee : A certain portion of projected annual revenues may be guaranteed when actual operation revenue falls short of projected revenue prescribed in the contract.
- PPP projects have increased with introduction of minimum revenue generation and unsolicited proposal and built transfer lease scheme; however PPP projects are decreasing recently.
- BTO Risk sharing:
  - Government and private sector share not only capital and operation costs, but also operational profits and losses.

Technical Session 5:- Intermediate Public Transport: Systems in between Public Transport and Private Vehicles

India is witnessing rapid urbanization and motorization. While the urban population is growing at a rate of 3.16% per year, motor vehicles are growing at a rate of 9%. Still very few Indian cities have organized and regulated public transport system. Between public transport and private vehicles, intermediate public transport (IPT) is filling the gap as a major mode of public transport like 3-wheelers, auto-rickshaws, tempos, e-rickshaws etc. which provide public transport services. The concept of IPT differs in developed and developing countries. In developed countries, IPT is often used as a demand responsive system such as shared-ride taxis and dial-a-ride services. In developing countries with low per capita income, high population density and huge manpower generate demand for a variety of transport modes. Several benefits of IPT include easy mobility and connectivity, market responsive services and low-cost travel option. This sector faces tremendous challenges in Indian cities due to their un-regularized nature of operations.

The session focused on improvement areas in IPT operations and future of IPT services like auto-rickshaw and e-rickshaw

Chairperson :

- Shri Y.P. Sachdeva, Group General Manager, RITES

Presenter :

- Ms. Akshima T Ghate, Fellow and Associate Director, TERI
- Shri Nirmal Kumar, Director, Nirmal Foundation
- Ms. Kanika Kalra, Urban Transport Expert, Acting Director- KMC, IUT (India)
- Shri M.L. Chotani, Consultant, IUT

Rapporteur

- Mr. Navnit S & Ms. Pooja Ghosalkar, CEPT University, Ahmedabad

Highlights of Discussion

- Informal public transport is publicly available passenger transport service that is outside the traditional public transport regulatory system (World Bank 2002).
- In the absence of well accepted definition, informal transport is used loosely to study wide range of modes except regulated transport system like city bus service or metro.
- Informal public transport modes in Indian cities include a wide array of modes ranging from high capacity four wheeler mini buses to medium capacity Tata Magics, low capacity three wheeled motorized auto rickshaws and many other locally manufactured modes.
- Informal public transports emerge on the scene to meet the unmet demand for public transport services spatially and temporally. Operational flexibility provides it an edge over formal systems.
- In some cities like Noida these modes are the only modes of public transport.
- Urban areas have higher share of formal vehicles as compared to peri-urban regions.
- Type of services offered by these modes include personal hire services and share services.
- Route or zone of operation is guided by the permit issued by RTO. However, there is high degree of non-compliance with respect to permit regulations.
- Usually a queue system is followed based on the occupancy. These modes are highly

demand responsive with profitability as the motive of operation.

- Vehicles are being operated either by the owner themselves or by the drivers employed by the owner (gross cost model) or are being driven on rent (net-cost model).
- As per the study of 5 towns, most of these modes are found to be operating in profit.
- The cost per km and earning per km is found to be higher in urban services than for peri-urban services.
- Generally users are satisfied with the service in terms of comforts and convenience offered by informal modes.
- Operational characterization of various modes are as under :
- Cycle rickshaws
  - Neither routes nor zone of operation is defined.
  - No permit, licensing / driver registration, vehicle registration, PSV badge required.
  - Operate from any stand
  - Usually informal driver groups follow a queue system
  - Union is often weak or non-existent.
  - Cover distances upto 2-3 km on an average and undertake 10-12 trips per day.
  - Cost involved in daily operations is miniscule
  - Mostly operated on rent.
  - Rent per day usually varies from Rs. 30-50 per day.
  - A cycle rickshaw puller typically earns Rs. 200-300 per day.
  - Annual maintenance is Rs 1000-300
  - Cycle rickshaws are generally unregulated in most of the cities.
- At present G-Auto is operating in Ahmedabad, Delhi, Gurgaon, Rajkot, Surat and Vadodra.
- Technology has an important role in G-Auto in banking through call, website or mobile app and safety & security of passenger.
- G-Auto is cheapest, safe, less polluting and available frequently at railway station, airport, bus stop and tourist spots.
- E-Rickshaws serve feeder service to public transport in metro cities while in small and medium towns it functions as public transport. It is also a mode of transport for some tourist places.
- In a study conducted by IUT, it is observed that although numbers of e-rickshaws are increasing the system is not regulated. Overcrowding, lack of safety, no economic stability for drivers and lack of financial support are some of the common problems faced by e-rickshaws in various cities.
- Social Benefits to Drivers (Available schemes) : - Pradhan Mantri Surksha Bima Yojna, Pradhan Mantri Jan Dhan Yojana, Atal Pension Yojana, Sarva Siksha Abhiyan, Provision for Free medical check-up and Setting up of e-rickshaw unions.

Panelist in interacting mode

- Institutional framework Like Special Cell (Suggested Functions) :- Regulation, Assisting in providing social benefits, Driving skill & education, Providing infrastructure, Monitoring system, Providing various revenue options and Introducing New Technology.

Outcomes

- Integrate informal systems with formal system and give informal transport cognizance in city mobility services.
- Enforcement must be strengthened to ensure strict adherence to rules and regulations.
- Fare should be left to the market.
- Vehicle and driver registration for NMV should be made compulsory by the local bodies. Possibility of insurance to be looked into.
- New modes that emerge need to be considered by the authorities and type approval and safety test be performed before they are allowed to ply and move passengers.
- Permits for shared services (autos, shared jeep / cruisers, Tata Magics, etc.) may be considered by the authorities, as is the case in cities like Kolkata and Surat.
- Passenger limit for three wheeler vehicles may be increased depending on vehicle capacity / size.
- Scheduling system followed in Jaipur has immense scope for replication in other cities.

Future areas of improvement

- **Economic Stability to drivers may be provided through :**Cheaper / subsidized loans, Rent Fixation, Optimum Fare Structure, Providing Social Security under different schemes, Setting-up of Local Repair Workshops, Higher revenue through advertisement, aggregator model etc.

- **Regulatory Measures:** Registering optimum number of e-rickshaw in a city and Strong Enforcement of rules.

Glimpses of Technical Session

Technical Session 7:- ITS for Smart Mobility

(Organized by SPA)

Intelligent Transport Systems (ITS) are vital to increase safety, monitor emissions and solve congestion problems. Information and Communication Technologies can make transport system safer, efficient and sustainable. Moreover, the integration of existing technologies can create new services like wider application of mobile system in passenger information system and tracking of vehicles. In order to be effective, the ITS infrastructure needs to be properly coordinated along with existing transport infrastructure and services.

The session focused on experience of congestion pricing, advanced traffic signal control system, role of ITS in mobility plans and deployment of infrastructure using cellular network and GPS technology.

Chairperson :

- Prof. (Dr.) P. K. Sarkar, Head, Department of Transport Planning, School of Planning and Architecture, New Delhi

Presenter :

- Dr. Jitendra Bajpai, Adjunct Faculty (Sustainable Cities), Earth Institute, Columbia University, New York.
- Mr. Ravi Kumar, Director, ITNS, CDAC
- Prof P. K. Sarkar, HOD, SPA
- Mr. Manish Chaturvedi and Mr. Sanjay Srivastava, DA-IICT, Gandhinagar

Rapporteur

- Mr. Sarang Pingale & Ms. Anuja Kothawala, CEPT University, Ahmedabad

Highlights of Discussion

- By charging a fee for driving a motor vehicle at time and places where demand exceeds road capacity, people alter travel behaviour and reduce congestion.
- Pricing modalities are:
  - Variable pricing of road way or lanes (time based)
  - Zone or cordon pricing (area entry time)
  - Area or system wide pricing (distance, time and place based)
- Key findings of international practices:
  - In zone or area based pricing in Singapore, car trips reduced by 24% and travel speed increased by 10 kmph. In London, car trips reduced by 36% and bus use increased by 25%. While in Stockholm, car trips reduced by 20%.
  - In terms of variable pricing of lanes or facilities, dynamic toll on single occupant vehicles facilitated increase in public transport ridership by 25% as well as increase in carpoolers in Sandiago (USA).
  - Bridge pricing in Lee County (US) reduced peak demand by utilizing 50% discount on off peak users.
  - Peak and off peak tolls for single occupancy vehicles in Nam San Tunnels in Seoul (Korea) helped in reduction of 13% traffic and 38% increase in speed from 20-30 kmph as well as increase in car pooling and use of public transport and taxis.

Manchester, San Francisco, Kaula Lumpur rejected congestion pricing proposals.

- Public perceptions also show some concerns and risks in implementation of these schemes and have doubt whether it is a double taxation or is it to reduce congestion or simply to raise revenue and how the technology would protect the privacy of users.

- Traffic Signal Controllers in India are classified into 3 categories :-

  i Pre-timed signals – which are simple and inexpensive, signal time derived from the statistical data, duration and order of green phases fixed, and not responsive to real time demand.

Panelist in interacting mode

  ii Actuated signal controller for few vehicles are signal time based on real time traffic demand.

  iii Adaptive Traffic Control Systems for very few vehicles are real time signal control applied to a network of traffic junctions.

- Junctions of similar characteristics only can be coordinated (e.g. junctions requiring more or less same cycle lengths).

- Signal coordination can be assumed for 70-80% of vehicles in the platoon and generally the only direction of maximum flow is coordinated.

- Advanced Traffic Signal Control System

  - Provides real-time signal coordination for a group of traffic signals based on real-time traffic demand. Phase timings, Cycle lengths, Signal coordination route.

  - Operates at two levels

    - Local level: Traffic Signal Controller and other field equipment.

    - Central level: ATCS application software running on a computer.

    - Both levels are networked on a robust communication backbone.

- Operational categorization of ATCS includes:

Model based

  - Use macroscopic, mesoscopic, or microscopic models to estimate the current state of traffic.

  - The estimated value is further used as an input to adjust signal timings.

  - Most of the currently operational ATCS are Model based (e.g. Delhi, Mumbai).

Non-model based

  - Based on functional relationship between parameters that describe change of traffic conditions.

  - Use feedback of the traffic measured during the previous interval (e.g. Jaipur system)

  - **In reality ATCS helps in improving the traffic conditions in terms of:**

  - Increased lane carrying capacity and travel speeds.

  - Reduction in delay, stops, queue, fuel consumption, emissions and drop in accident rate.

  - Better Traffic Management – Green wave routes, diversions and incidents detection.

- Some ATCS perform some kind of optimization, which is usually constrained by its domain or time allowed to conduct the optimization process.

- ATCS Philosophy

- An area is divided into corridors of closely spaced traffic junctions having similar flow characteristics and synchronizes them independently based on real-time demand.
- How Adaptive are the Adaptive Traffic Control Systems on our Road
- **The analytical models are constrained by inadequate input data -** Low level of lane discipline, High mix of traffic, Higher percentage of two wheeler population, Poor junction geometry.
- **And we are constrained by -** Lack of expertise, Power and Network connectivity interruptions.
- Adaptive Traffic Signal control is one of the major components of all Smart City Mission Projects.

Participant asking the question to the Panelist

- In developed or developing countries the focus is now shifting from infrastructure development to the optimum use of the existing facilities where role of ITS proves very useful.

  In the case study of comprehensive Mobility Plan of Gandhinagar based on network characteristics, travel characteristics, base year modelling, modal split, estimated travel demand, etc. four different scenarios were suggested.

  Scenario – 1: Business as Usual (Base year network & modal split)

  Scenario – 2: Base network + Proposed MRTS + BRTS (20m) + Organized Bus System & Feeder connectivity.

  Scenario – 3: Base network + Proposed MRTS + BRTS + PRT + Organized Bus System & Feeder connectivity.

  Scenario – 4: Base network + Proposed MRTS + BRTS + PRT + Organized Bus System & Feeder connectivity + ITS components (Real time information, Common Ticketing and Control Centre)

  - Planning strategic transport system as in scenario 4 has lead to a reduction in 41% vehicle-hrs &44% vehicle-km compared to scenario – 1.

- Smart transport approaches have benefits of seamless travel, improvement in transit delivery, reliability of public transport, saving in transaction and journey time, diffusing demand and managing assets more efficiently.
- ITS tools like Road Time, Passenger Information System, Smart Card, Speed Cameras, Control Centers, etc. are the good systems for smart transportation.
- Efficient use of Road Network is required using Intelligent Transportation Systems.
- Deployment and maintenance cost of dedicated ITS infrastructure being high the need is to exploit availability of Cellular Network and GPS probes.

Outcomes

- The Success of ITS application will depend on
  - Effective leadership & supporting team.
  - Visible benefits of the scheme with quality options.
  - Enabling environment & legislation.
  - Organization & inter-agency co-ordination.
  - Planning process, quality & integration with city level comprehensive transportation plan (defining objectives, geography, technology, pricing, winners & losers).

- Education, outreach & public, business & civic organization involvement.
- Cost & revenue management (sharing across agencies & jurisdictions, short fall management.)
- Begin with easy, convenient, transparent & predictable pricing structure but prepare for location, time & distance based.
- Implementation (pilots to learn & build support, technology choice & testing, flexibility and enforcement approach.)
- Monitoring for mid-course corrections & maintenance.
- Handle non-lane based mixed traffic flow conditions.
- Implementation of complex phasing schemes.
- Self-calibrating for phase lengths and cycle lengths.
- Dynamic Route Selection.
- Real-time Signal Coordination.
- Fallback operation in Vehicle Actuated mode.
- Remote Monitoring and Administration.
- Scalable.
- Decision Support Reports.
- Local Expertise.
- Simulator interface.

• System comprising combination of smart, low capacity & eco-friendly system like PRT, integrated with high capacity MRTS and BRTS along with ITS turns out to be most sustainable to meet future demand.

Audience at the session

Technical Session 8:- Sustainable Urban Mobility Planning: Lessons Learned

Coordinated by CODATU:-

Sustainable Urban Mobility Plans (SUMPs) consists of an integrated and sustainable approach towards mobility planning taking into account all transportation modes for both passengers and freight and promoting urban transport policies that foster public transport and active transport modes. Sustainable urban mobility greatly contributes to the reduction of urban transport negative externalities i.e. air pollution, road congestions, improves road safety, favours more inclusive urban transport and more prosperous cities. But, considering international benchmarks, how integrated planning can make transport investment efficient? All these issues were discussed in the session.

Chairperson :

- Mr. Ali Huzzayin, Vice President, CODATU

Presenter :

- Ms. Rosario Macario, University Of Lisbon
- Ms. Nitika Bhakuni, Assistant Professor, CEPT University, Ahmedabad
- Ms. Kanika Kalra, Urban Transport Expert & Acting Director (KMC)
- Shri M.L. Chotani, Consultant, IUT (India)
- Mr. Etienne Lhomet, Urban Transport Expert, CODATU

Rapporteur

- Ms. Visakha K. A., CEPT University, Ahmedabad

Highlights of Discussion

- There are number of access related barriers that generate social exclusion like
  - Availability and physical accessibility of transport.
  - The cost of transport.
  - Safety and security etc.
- Social inclusion is better achieved through equity of access –demanding combination of land use, transport, environmental aspects and income distribution.
- While accessibility adds value to land use but business and lack of transport affect both land use and business development.
- Govt. of Portugal has prepared national directive for mobility and its incorporation in Municipal land use and Mobility Plans.
- The concept of land use transport integration involves two simultaneous mutually supportive processes such as organizing the physical form and land use pattern in the city and organizing all system of transportation from pedestrian pathway to mass transit systems.
- At present planning land use and transportation is undertaken separately as two different exercises often by two different agencies without proper integration leading to unintended consequences.
- Land use planning framework is statutory and urban transport planning framework is non statutory.
- Vision of the Integrated Mobility Plan for Greater Ahmedabad Region is to integrate city structure and the transport system towards greater accessibility, efficient mobility and lower carbon future.

- The plan proposed to connect cluster level
- road with public transport.
- In the transit oriented zone, higher density of development, pedestrian friendly streets, green network, higher transit connectivity and high intensity of infrastructure have been suggested.
- The plan has suggested strategies for fleet augmentation, route rationalization, improvement in service quality, creation of complete streets for facilitating non-motorized movements, demand and freight management and development framework.
- Rapid increase in vehicle population is leading to increased pollution, adversely impacting health and quality of life, increased use of non-renewable resources adversely impacting energy security, serious safety concerns etc.
- In all these conditions poor are worst affected. Hence, there is a need to improve mobility for improving economic conditions and quality of life in the cities to make them liveable cities.
- Major components of sustainable transport include efficient public transport, parking management, freight management, priority to non-motorized transport, land use transport integration and safety.
- Key strategies for sustainable urban transport are as under:

Opening Remarks by Chairperson

- For improving public transport, route planning and scheduling, road pricing, investment in public transport and taxation of private vehicles are the key strategies.
- For improving non-motorized transport the need is to reserve ROW and improvement in NMT infrastructure.
- The strategy for improving urban structure should focus on zoning regulations, land use and housing policies and floor area ratio.
- Technological changes need to emphasise on R & D investment, standard and labeling and tax incentives.
- In a case study of Agra Mobility Plan prepared by IUT the outcome suggested for improvement of level of services in terms of public transport, NMT, use of ITS, travel speed, road safety and pollution level.

- Enable, avoid, shift and improve (EASI) approach followed in Bordeaux, (France) has helped in improving the transport system.
- Enable is an overall strategy shared with all stakeholders.
- Avoid emphasis is on transit oriented development.
- Strategy for shift is to develop tramway, bus network and bicycle lanes to pull people out of cars.
- With regard to improve approach the emphasis is on improvement in technology for cars.

Outcomes

- Planning for transport and managing mobility should have full political support while considering the interest of all other stakeholders.
- Sustainable mobility should have the following major objectives:
  - Containing the use of private cars.
  - Increase use of public transport.
  - Increase active mobility with soft modes.

- Public transport as part of Sustainable Urban Mobility Plans should develop networks of centrality articulated with network of accessibility.
- There is a need to shift the planning paradigm by containing the urban sprawl, densification of urban use, promoting corridors for public transport and soft modes and develop and upgrade pedestrian networks.

Glimpses of Technical Session

Technical Session 9 & 11:- Smart mobility – Swiss Innovations

(Sponsored by Embassy of Switzerland)

Compared to other European cities, the Zurich Region in Switzerland has by far the highest public transport share. Zurich's public transport system is known for its dense network, punctuality and reliability. The presentation in the session showed aspects of the strategic network planning and the success factors of urban public transport. In 2015 a new 10 km cross city link was opened after 15 years of planning and construction adding a long list of improvements and upgrades for national long-distance and commuter trains. Many obstacles had to be overcome to create this sophisticated structure under existing buildings, railways tracks and rivers.

High value traffic system is a prerequisite for social welfare, economic prosperity and political stability. The mobility demand for persons and goods is increasing continuously and the modes of transport reach their limit of capacity at peak hours. Each mode of transport has its own advantages, which could complement each other perfectly. Implementation of this knowledge however is still not a core competence of current transport policy. The challenges are worth considering and all those engaged in the area of transport policy are required to contribute their inputs. The study "Vision Mobility Switzerland 2050" is such a contribution outlining a mobility vision for Switzerland in the year 2050, based on a value system of "good" mobility and possible upcoming development trends.

Switzerland has been able to implement some smart urban mobility and transport solutions. The distinguished Swiss and Indian speakers discussed changes and opportunities for a more sustainable future of mobility in India. The session shared the lessons and explored how Swiss innovations in urban mobility can be put into practice in the Indian context. While it is understood that these solutions may not be replicated in the Indian context, but can some of the Swiss experiences and innovations be adapted to meet the growing requirements of the cities in India?

Chairperson :

- Mr. Andreas Baum, Ambassador of Switzerland to India and Bhutan

Moderator

- Mr Shirish Sinha, Deputy Director of Cooperation, Swiss Agency of Development and Cooperation in India (SDC)

Presenter :

- Dominik Brühwiler, Deputy Director, Zurich Transport Authority ZVV
- Michele Molinari, Board Member Swiss Rail Industry Association, CEO Molinari Rail Ltd.

Sub-theme

- Driverless Public Transport

Chairperson

- Prateek Khare, Head of Innovation and Entrepreneurship, Swissnex India

Presenters

- Prof. Yann Bocchi, Head of the Software Engineering Unit, Business Information Systems Institute at University of Applied Sciences and Arts, Western Switzerland (HES-SO) Valasis
- Raphael Gindrat, CEO, Bestmile
- Martin Stucki, CEO Transitec Consulting Engineers Ltd.
- Dr. Thorsten Klaas-Wissing, Vice–Director, Chair of Logistics Management University of St. Gallen

Discussants -

- Mr. Vijay Nehra, Vice Chairman and Managing Director, Gujarat State Road Transport Corporation
- Mr. Sidharth Sihag, Commissioner, Udaipur Municipal Corporation
- Mr. I. C. Sharma, National Project Manager - SUTP

Highlights of Discussion

- With changing composition of traffic in major cities of the world, Switzerland is moving forward with autonomous buses and autonomous cars.
- Autonomous mobility promises safety and multi-tasking through numerous sensors. It will not have accident and one can work while being driven.
- The future of mobility is not in autonomous vehicles but in what they can offer once they are operated and managed together.

Opening Remarks by Chairperson

- Best / mile product – a unique B2B2C solution for autonomous fleet has the following steps. Get real time demand and / or schedule to follow, Vehicles send data to the platform, Optimize the systems, Translate to missions, Send missions and Provide relevant information to passengers in real time.
- The more the system is used the smarter it gets.
- In 10 years, autonomous mobility will be a hundred billon $ industry. Fifty percent of it will be covered by new players. Swiss innovations in rail sector cover passenger, technology and operation and it is a continuous process.
- It addresses the issues of seamless integration of all the modes, availability of infrastructure and vehicles, reliability of systems, maintenance of infrastructure and vehicles, safety, zero emissions, lightweight design, energy efficiency, Apps, punctuality of services and capacity and stability of system.
- Shape of mobility of the future is to create, develop and test innovative mobility solutions.
- Smart shuttles developed in Switzerland can access almost everywhere. It is safe especially in pedestrian zone and quiet without any pollution.
- It is convenient and easy to use and in near future it will have dynamic pricing and data analysis for better scheduling.
- In Zurich town higher income of people correlates with higher use of public transport. It has 340 cars per 1000 persons as against 131 in Delhi. Switzerland has 497 cars per 1000 persons as against 18 in India.

- Public transport in Zurich has high usage supported by competitive journey time, high frequency and dense network.
- It has easy access with one ticket for everything by having integrated ticket system nationalized by law.
- The network, however, is completely saturated. Traffic grows faster than the network with complexity of regulations.
- Optimistically the network has high political and public acceptance. Further extension projects planned and the financing is still comfortable.

Audience at the session

- Infrastructure bottlenecks in Switzerland are foreseeable today and are bound to increase in
- future.
- The transport policy consists of separate plans and decisions suitable for different transport modes as well as for passenger and freight transport.
- Necessity of an integrated approach for designing a multi-modal transport system.
- The scope of projects currently in planning is at the most geared towards 2035 (too short for comprehensive infrastructure projects) – It's high time to deal with Mobility 2050!
- Increasing demand for mobility stretches the mobility system to its limits.
- Decision making processes foster sectorial interests instead of holistic prioritization.
- Extension of infrastructure capacities is often not critically reflected in policymaking, but is controversial on local level, extension plans are frequently blocked.

Audience at the session

- Government funding for the infrastructure extension tends to decrease, against increasing funding needs for infrastructure maintenance.
- All modes of transport will gradually be influenced by information technology (digitalization).
- Initial investment in infrastructures is financed predominantly by tax money; reinvestments and maintenance are paid by traffic system users.
- The traffic is technologically extensively automated. Autonomous and linked systems are to a large extent implemented in most instances.
- For travel to work and Business travel, there is no tax relief any more.
- The extension of the transport infrastructure has to be oriented towards bottlenecks alone as long as the bottlenecks cannot be removed by intelligent (capacity) management.
- Technical and organizational measures to ensure the safety and security of transport users should always be tested according to the current state of the technology.

Outcomes

- User experience is more important in new mobility / transportation system to encourage

people to change habit.

- Traditional strategies focusing transport modes should be replaced by an integrated master plan, consequently conventional planning processes will become less significant.
- Future development drivers especially information technology and data are owned and controlled by companies, which cannot be nationalized.
- New business models will meet the market demands of users in a better way than the conventional forms of the service provider agency and accounting.
- **"Urban Mobility Optimizer"** are: Policy Planning Design, Governance, Economy Tech. Assistance, Training and R&D.
- EASI conceptual framework follow Enable, Avoid, Shift and Improve approach. Enable will lead to governance efficiency, Avoid will achieve land use efficiency, shift will increase multimodal transport system efficiency and improve will contribute to infrastructure service and vehicle efficiency.

Glimpses of Technical Session

Technical Session 10:- Electric Mobility for City's Sustainability

The transport sector is not only a vital enabler of economic activity and social connectivity but is also the second largest and one of the fastest growing energy end-use sectors, generating about23% of global energy-related greenhouse gas emissions. The Urban Electric Mobility Vehicles Initiative (UEMI) of UN-Habitat to phase out conventionally fueled vehicles aim at increasing the share of electric vehicles in cities to at least 30% by 2030. However, the high uptake and adoption of electric vehicles depend on a number of factors, such as advances in vehicle and battery technologies and reduction in cost of production, availability of charging infrastructure, increased awareness of citizens, enabling policy environment and incentives provided by the governments including city governments. In India an ambitious target of putting 5 million electric and hybrid vehicles per year on the road by 2020 has been set under the National Mission for Electric Mobility (NMEM). In addition to supporting the industry, NMEM seeks to create a significant positive impact on the health index of the country by promoting zero pollution electric vehicles and reducing the dependence on fossil fuel. FAME India – Faster Adoption and Manufacturing of Hybrid and Electric vehicles in India – is a part of the National Mission for Electric Mobility. The scheme envisages providing a support of Rs. 795 crore in the first two fiscal years starting with 2015-16 financial year, to promote eco-friendly vehicles, offering incentives on electric and hybrid vehicles to the extent of Rs. 29,000 for bikes and Rs. 1.38 lakh for cars. NUTP, 2006 and NTDPC report also emphasised on promoting the use of cleaner technologies and use of electric vehicles to reduce vehicular pollution.

The session deliberated on the need of electric vehicles, modes of electric transport like cable cars, buses etc. and the future opportunities in the electric vehicle industry.

Chairperson

- Mr. P. K. Banerjee, Deputy Executive Director, SIAM

Presenters

- Dr. Kulwant Singh, Coordinator, IRU-led All India Smart Move High Level Group, India
- Dr. Pawan Kumar, Associate TCP, Town & Country Planning Organization
- Dr. Johannes Fiedler, Head Research, Doppelmayr Urban Solutions
- Mr. Emmanuel Jupet, Vice President, Volvo Bus Corporation

Rapporteur

- Ms. Sneha Mohan Nair & Mr. Hitav Patel, CEPT University, Ahmedabad

Highlights of Discussion

- Four global sustainable development pillars are :-
- UN 2030 Sustainable Development Agenda - 7 out of 17 SDGs address mobility and transport either directly or indirectly.
- Paris Climate Change Agreement - Strengthening collective response to climate change threat.
- New Urban Agenda - Transformation in mobility policy.
- Public-Private Partnership - SDG 17 and 2015 Addis Ababa Action Agenda provides a basis for PPP.
- Sustainable transport – key contributor to SDGs
  - Paradigm shift needed a focus on people

and their quality of life – access through transport.

- Prioritising door-to-door collective public transport.
- Key role of private transport.
- Setting clear policy and business targets for growth of public transport.

- Smart Move vision
  - Collective land transport is the backbone of sustainable, seamless, affordable and

Participant asking the question to the panelist

inclusive mobility for all.

- Buses, coaches and taxis are the most dynamic part of the door-to-door mobility chain, and the closest competitor of the private car.
- Setting a mobilising policy objective of doubling the use and modal share of collective transport, in particular by bus, coach and taxi, is the key.
- From a shared vision towards a structured implementation, backed by a coherent governance plan and a dedicated funding instrument.

- Initiated by UN Habitat and SOLUTIONS, the Urban Electric Mobility Vehicles Initiative (UEMI) aims to:
  - Decreasing urban CO_2 emissions by increasing the market share of electric vehicles in cities to 30% of annual vehicle sales (incl. LDV and motorized 2 – 3 wheelers).
  - Integrate electric mobility into a wider concept of sustainable urban transport that achieves a 30% reduction of GHG emissions in urban areas by 2030.
- UEMI: An integrated to e-mobility includes avoid, shift and improve approach.
- Cable car comprises ropeway, aerial tram, sky tram, aerial tramway. It is also known as "Udan Khatola" or "Gagan Khatola" in India.
- It is motor less and engine less vehicle and pulled by a cable (rope) that is rotated by a motor off board.
- Cabins are suspended from fixed cables (Track ropes) and pulled by another cable (Haulage rope).

Panelists on the dias

- Cables cannot be detached from the moving cabins. It has a total capacity of 200 – 2800 PPHPD @ 100- 200 passenger per cabin.
- Cable car is known by :
- Portland Aerial Tram, Oregon, (USA),
- Aerial Tramway in Engadin (Switzerland),
- Port Vell Aerial Tramway in Barcelona (Spain),
- Cable cars Tramway in Albuqueryque, New Mexico,
- Manali Ropeway, Himachal Pradesh.
- Detachable Gondolas (Cable Propelled Transit) have a capacity of 3600 – 6000

PPHPD @ 15 – 35 passengers per cabin.

- These types of cable car are operated in :
- Algeria, Brazil, Colombia, England, India, Singapore, Venezuela, Gulmarg – Jammu and Kashmir.
- Cable Cars are used for: tourism, religious and material transportation purposes.
- Ropeway is used for Mass Transit in Roosevelt Island, New York, USA and **Medellin Metro-Cable, Colombia.**
- Cable cars in India
  - Ropeways of Rajgir Bihar runs to the top of Ratnagiri hill and passes over 40 mt high Vishwashanti Stupa. It is a single person ropeway (one person at a time can take the ride).
- Gulmarg Gondola, Jammu and Kashmir.
  - Asia's largest and highest cable car which connects Gulmarg to Apparwath Peak.
- Ropeway in North Eastern States
  - Damovar Ropeway in Gangtok is a cable car located at Deorali.
  - It has a ride from Deorali to Tashiling over the city of lower and upper Gangtok

Outcomes

- Basic requirements for electric vehicles
  - Standardized charging infrastructure.
  - Battery replacement and recycling.
- Aerial Ropeway Technology is economical ascompared to BRT / MRT.

S.No.	Modes	Cost/ km (Rs. Crore)
I.	MRTS	250 – 400
ii.	BRTS	30 – 50
iii.	Cable Car	15 – 25

- Aerial ropeway is considered as Environmentally Sustainable Transport (EST)
  - Relatively Low Carbon foot prints.
  - Electric Engine / Motor used at Stations.
  - Greenhouse Gas emissions credit (Medellin Cable Car, Colombia).
  - Cable car vehicles have no motors and therefore no noise and air pollution along the route.
  - Little disturbance in Micro environment both during construction and operation.
- Mass Transit
  - Cable car as Unconventional Technology (not like BRT / MRT) used as mass transit. Its route design has little consideration for horizontal and curb-alignment. It is comparatively easy in operation.
  - It follows a dedicated route having 5,000 passengers per hour per direction.
  - Modern technology provides spacious cabin having capacity @ 30 – 50 persons.
  - Comparatively safer mode of transport.
  - Direct connection between two points in spite of physical barriers and obstacles.
  - Demands low space for towers & stations and are environmentally and cost effective mode of transport.
  - Less capital, maintenance, construction time, operating costs, etc.
- Development of urban ropeway fulfills all three criteria of smart city:
  1. Creation of infrastructure.
  2. Smart solution for smart mobility in undulating terrains.
  3. Suitable for area based development. (Retrofitting / New Development).
- Planning of ART Corridor may promote implementation of transit oriented development in newly developed or redeveloped areas.
- E-mobility includes electricity driven rail

transport, e-buses, e-rickshaws, e-bicycles and ropeways. E-mobility will be sustainable only if electric energy is produced in a clean way.

- Cable systems are driven by electric motors which are placed in station and not in the vehicles.
- To transport 10000 passenger / hour (5000 in each direction) one cable car is required as compared to 2000 cars and 100 buses.
- Cable car in Indian cities can address the problem of congestion, useful in difficult topography and informal urbanization and can reduce car dependency.
- Hybrid, electric hybrid and electric buses are the tools for different levels of electrifications.

Snapshot of Technical Session

Technical Session 12:- Ensuring Equity and Accessibility in Urban Transport

(Organized by SVNIT, Surat)

There are different meanings of pedestrianisation. The simplest meaning could be regulation of vehicular traffic on city streets for promoting pedestrianisation. The aim is to improve pedestrian's safety and mobility. Another important benefit is related to the environment. These schemes can help to reduce both noise and pollution by discouraging or restricting access of non-essential vehicles. Furthermore, it helps to promote walking as a transport mode by making the walking experience more enjoyable. All these issues were discussed in this session.

Chairperson -

- Shri C.K. Khaitan, JS&CEO, National Trust, Ministry of Social Justice & Empowerment, Government of India

Presenters -

- Prof. K.V.K. Rao, Dept. of Civil Engineering, IIT Bombay
- Mr. Harsh Mittal, IIM, Ahmedabad
- Dr. Johannes Fiedler, Head Research, Doppelmayr Urban Solutions
- Ms. Nidhi Madan, Director, Samarthyam and Ms Anjalee Agarwal, Executive Director, Samarthyam

Highlights of Discussion

- Car ownership in cities of North America, Newzealand, Australia, Western Europe and Japan is more than 500 cars per 1000 persons compared to 100-200 in the cites of developing and less developed Asian countries.
- In Mumbai, number of motorized vehicle per 1000 persons has shown a sharp increase from 28 in 1981 to 164 in 2016.
- There is a vicious cycle between the use of car and public transport. Increase in income leads to increase in car ownership causing more congestion and delay as well as reduced demand for buses. Due to congestion, mileage per bus is less and operating cost increases.
- Again increased operating cost of bus demand increase in fare which makes the car use attractive.
- The trends show diminishing public transport share. In Vadodra city (Gujarat) the fleet size of 200 in 1985 has dipped to 85 in 2006 because of the last mile connectivity problems, lack of information on bus schedule, poor frequency, discomfort in vehicles, lower travel cost in private vehicles, poor coverage of bus service and improper integration with land use planning.
- Components of generalized cost include walking time, waiting time, transfer, inter-change time, perceived cost of travel and cost of discomfort.
- Investment in formal motorized public transport, mass transit system and buses is a way to solve the problems of congestion, pollution and externalities of private motorized transport.
- Another school of thought argues that the majority of poor in Indian cities is relying on non-motorized transport and makes a case for promoting private non-motorized transport to

achieve both sustainability and equity given the mixed land use patterns in most Indian cities. Intermediate Public Transports (IPT) has a substantial mode share in large cities and almost exclusively relied upon in small and medium towns.

Outcomes

- Net benefit to travellers in terms of reduction in generalized cost of travel can be used as an equity measure.
- The net benefits to travellers of different socio-economic groups can be worked out with the implementation of any transportation improvement in terms of net benefits to travels by income class, net benefits to travels by age group, net benefits to travels by gender and net benefits to travels by disadvantaged group.
- In the sphere of IPT, states need to use tools of taxation and subsidies to shift commuters to sustainable modes.
- Policy initiatives for promoting IPT are required to incentivise regulation and promotion of progressive versions of IPT, GPS based mobile applications, national common mobility card, etc.
- Formal public transport is appealing to the middle class. Change in values and transport behaviour of middle class are essential for the shift towards sustainable mobility.
- The success of high capacity system depends on the conditions of access such as walkable and bicycle friendly environment of stations and good feeder system.
- In order to have equity and inclusion, transport system should be designed for universal accessibility provisions and not with special provision.
- There should be seamless connectivity between pedestrian infrastructure, public transport and mass rapid transit system.

Panelists on the dias

Audience at the session

Technical Session 13:- Transport and Road Safety

(Organized by IIT Gandhi Nagar)

Globally, India is witnessing the highest number of deaths due to road accidents. About 1 lakh lives are lost due to road fatalities. The fatalities have been increasing at a rate of 8-9% every year. In 2011, the number of deaths due to road accident was as high as 1.4 lakh. The issue of security for women, children, old and physically disabled needs special attention in this regard. This technical session dwelt on various aspects of road safety including elements such as signage on the roads, the road geometry, cognitive aspects of the road user as well as the effect of road rules enforced. Presentations made in the session are based on experiences and observations in the field.

Chairperson -

- Shri S.K. Lohia, CEO, Indian Railways Station Development Corporation

Presenters -

- Prof Krishna Prasad, IIT Gandhinagar
- Prof. Dr. C. Ramachandraiah, Centre for Economic and Social Studies (CESS), Hyderabad
- Mr. Anuj Malhotra, Centre for Green Mobility (CGM), Ahmedabad.
- Prof Amit Sheth, IIT Gandhinagar

Highlights of Discussion

- Road safety passes through the stage of controlled process (spatial coordination) to automatic process (motor coordination).
- Cognitive engineering emphasis think form the human perspective when we have multiple technology solutions for road safety.
- The World Bank estimates that 55 percent of Indian pedestrians become victims of road crashes at some point in their lives.
- Some of the key factors for pedestrian injury are vehicle speed and lack of safe infrastructure for pedestrians.
- In Hyderabad, footpaths hardly exist. While safe pedestrian crossings are non-existent.
- According to National Crime Records Bureau (NCRB), Hyderabad has the second highest number of road accidents in the country after Delhi (2013).
- After introducing traffic rules like 'free left, traffic dividing barricades and closing of right-turns it became more hazardous for pedestrians to cross the roads.
- Study of some busy junctions and their design at Hyderabad reveal the following:
  - Closing of right-turns may be a feasible option in some specific situations but not as a general practice to ease traffic problems.
  - Construction of the elevated metro corridors has provided an alibi for the traffic police to close the signals and right-turns at many places.
  - What appeared to be only a temporary measure at such places has been made a permanent feature.
  - In the process, the pedestrians have not only been totally ignored, but have also been put at a very high risk.

- The issues at some of the road intersections are parking at intersection and footpath, conflict between traffic, pedestrians and parked vehicles, no safe crossing path for pedestrians, high speed of turning vehicles, etc.
- The improved geometric design of the junction have shown the positive results for safety of cyclists, reducing speed at turning as well as reduction of waiting time at junctions.
- Persons with significant loss of sight or no sight at all experience an information deficit.
- Driving at high speed or duress also results in not being able to or having difficulty in reading road sign – an information deficit.

Outcomes

- Engineering, education and enforcement are the important solutions for safe road design and its function.
- Professional transport planners, engineers and road designers should work on a proper road sign manual to be inclusive for a diverse society like ours.
- Educate the police, road engineers, road inspectors, advertising professionals, as well as the public about the relevance of signs.
- The police should not only penalize the road users who are breaking the rules but also check the advertisement on the roads which interfere with the road safety signs.

Glimpses of Technical Session

Technical Session 14:- Metro Rail Technologies

With increasing size and population of cities not only the trips are increasing but the travel distance is also becoming longer. Rail based mass rapid transit system are coming up in many metro and mega cities. Over the years new rail technologies are being developed for making the operation and management of metro rail system smooth and economical. The experiences gained so far in the operation and management of metro rail system and the future requirements need to be analyzed for further improvement in the system.

This session focused on integration of Metro with other transit modes, innovative rail solutions developed in India and bench marking in metro cities.

Chairperson -

- Shri Mukund Kumar Sinha, OSD (UT) & Ex – officio, JS, Ministry of Urban Development, Government of Indi

Presenters -

- Shri Sriram Raju, Director - Sales, India, Bombardier Transport
- Shri R.K. Gupta, General Manager /Consultancy, Delhi Metro
- Shri Prashant Varma, MEGA Ltd.

Rapporteur -

- Mr. Navnit S & Ms. Srinavya Annem, CEPT University, Ahmedabad

Highlights of Discussion

- Bombardier's new formula for total train performance balances energy, efficiency, economy and ecology with convincing and reliable solutions, services and products.
- Innovation and Technology –MITRAC energy saver recuperates energy. It stores electrical energy on board of LRV, Metro and DMU to re-use for acceleration or autonomous operation. It saves energy upto 30% for a train and is also environment friendly as well as reduces CO_2emission.
- Thermo – efficient manages the energy consumption of HVAC systems which have unique benefits of improved air quality in train and saves upto 26% energy.
- Flexx tronic the intelligent and active bogie has more space, increased speed and reduced vibration.
- Flexx Eco the light weight bogie has low maintenance cost, reduced track wear and risk of real damage.
- Primove catenary free energy supply for vehicles has invisible and contact less power supply, no wear of high voltage, lower service and maintenance costs and reliable performance in all weather and ground conditions.
- Eco silent minimizing noise pollution impact limits, noise pollution and help in promoting expansion of railway infrastructure and rail as a preferred mode of transportation.
- Bombardier delivers global rail technology locally. Savli Rolling stock facility in Vadodra can roll out first car body in 19 months of land allotment including setting up of green field factory.
- In the Metro from Gandhinagar to Ahmedabad under construction the following components are proposed to be used.

- Propulsion
  - Brush less 3 phase induction motors.
  - Speed is regulated by VVVF control.
  - Regenerative braking by lowering the frequency and the voltage.
  - DC voltage from the 3rd Rail is stepped up through a 'STEP up Chopper which feeds inverter operated with PWM control technology and using IGBT.
  - Percentage of Motorization: 50% or 67% or 75%.
- Bogies
  - Bolster less lightweight fabricated / cast steel bogies with rubber springs are now universally adopted in metro cars.
  - Use of air spring at secondary stage to keep floor level constant irrespective of passenger loading.

Chairperson addressing the session

- Train information & management system
  - TIMS is a microprocessor based systems used for the automatic monitoring and display, control and fault reporting and recording of the subsystems on the train through the Train bus and Local bus (RS-485).
  - The main on-board devices are constantly monitored and any failures are recorded and notified to the driver in real time mode. This supports fast and accurate corrective measures to be taken when fault or emergency situations occur and helps to promptly identify the cause of failure.
- **Train Control System in India**
  - Fixed Block Absolute Block system.
  - Fixed Block Distance to Go System (DTG) normally employed in Metro Signaling in India.
  - New system like: Moving Block Based – like in Dubai Metro.
  - Moving Black Radio based or communication based Train control – In Hyderabad Metro, DMRC Phase III, Ahmedabad Metro, Lucknow Metro, Kochi Metro, Nagpur Metro etc.
- Communication Based Train Control (CBTC) systems based on moving block allows the reduction of the safety distance between two consecutive trains.
- CBTC Signaling solution is worldwide proven system with moving block technology and different grades of Automation.
- **Overhead traction system**
  - Uses higher voltages for efficiency consideration.
  - Smaller energy loss.
  - Economical system.
  - Special structure needs to be constructed for overhead line.
  - Special provision to be made where there is overhead cross-over in urban areas and for tunnel entry.
- **Feature of AFC systems**
  - Contactless smart card and token for journey tickets.
  - Contactless Smart Card also useful for multiple journeys over a period.
  - Bank interface for top-up of cards.
  - Station computers to monitor / control activities of whole section / network.

- Networking though OFC base Wan.
- Central Clearing House (CCH) for interface with banks / other operators etc.

- **Two types of Payment modes :**
  - **Closed Loop System**: - Transit authorities have based their AFC systems on closed loop payment cards such as Desfire and Sony Felica, i.e. proprietary travel cards and are only valid within a specified transit environment.
  - **Open Loop System**: - Open Payment System or open standard system which accepts and validates all kinds of media such as EVM cards i.e. EURO, Master and VISA cards, RuPay, Near field communication enable devices (NFC), Mobile app such as Barcode and QR code etc.

Audience at the session

- Operational Highlights of Delhi Metro.
  - About 3017 train trips a day – with 227 train sets (1394 coaches) on 6 lines.
  - Each train used to consist of 4 coaches. With the increase in commuters, the trains are progressively being lengthened to 6 coaches and 8 coaches. FMTC have 127 six car sets & 58 eight car sets and balance 42 four car sets.
  - Average Ridership – more than 2.9 million passengers per day (week days), which means about 1,14,000 vehicles off the road. The highest ridership in a day has so far been 3.37 millions (on 17.08.2016) off boarding. Average lead: 16 kms.
  - The trains now operate from 5.00 AM to 12 PM.
  - One coach reserved for lady commuters in all trains.
  - Step free access upto platform.
  - DMRC has introduced feeder bus short loop services to help the commuters.
  - Punctuality measured with a least count of 59 sec. and invariably the punctuality percentage is above 99%.
  - Fare : From Rs. 8 to Rs. 30
  - DMRC is able to service and pay back the loans despite no subsidy from the Government and the Fare Structure being lowest in the world except Kolkata.
  - Till Sept. 2016, DMRC has paid Rs. 3427.40 crore to GOI towards JICA related payments.
  - Approx. 25% of DMRC's revenue is from Non-operational sources – mainly external projects, consultancy, real estate development and advertisements.
- Technological Initiatives in Civil Engg.
  - Road and Metro Structure supported on single pillar.
  - Metro Stations on Single row of Pillars on 11 m cantilevers.
  - Adoption of double U precast girders in viaducts and precast pier cap.
  - Precast slabs for track in tunnels.
  - Mass spring system for controlling vibrations in u/g portion.
- Safety features of present rolling stock.
  - Automatic Train protection (ATP).
  - Constant Braking Distance irrespective of loading.

- Emergency Brakes using friction brakes only.
- Concept of Brake Loop and Emergency Brake Loop to monitor safety related parameters.
- Increase in Brake Cylinder pressure to maintain service brake distance in case of bogie brake isolation.
- Automatic Brakes (Brake Pipe) as back up brake.
- Automatic Slop-slide protection.
- Continuous two way communication between OCC and driver in group / private mode.
- Emergency announcement on the train possible by OCC.
- Communication possible between passenger and driver.
- Provision of emergency ventilation using battery in the event of failure of Air conditioning.

Chairperson interacting with the audience

- Status on Visual Display Unit (VDU) as well as through hard wired circuit for safety related items.
- Traction possible only after doors closed, brakes released and other safety conditions met.

• **Bogie**

- Light weight bolster less bogie.
- Steel and rubber primary spring in place of helical springs.
- Air springs as secondary suspension – as a result, floor height is unaffected by passenger loading.

• **Brake system**

- Advantages of regenerative braking.
- 25% to 35% traction energy regenerated.
- Less consumption of brake blocks.
- Improvement with new phases of Rolling Stock Procurement in terms of passenger comfort, technical improvements and safety features.
- The Integrated Platform gate (PDG) system provides a barrier between the track and the platform accessible to passengers. It is used in Phase 3 network of DMRC.
- Automatic Fare Collection system.
- Wi-Fi facility at stations. Service already started at 10 stations.
- Wi-Fi facility will be provided at all the stations of Phase-I & II, work for the same will start by Jan'2017.
- Bombardier's metro platform focuses on standardization, indigenization, state of the art technology, modular solution, energy efficiency and high capacity.

Presenters making presentations

Technical Session 15:- Benchmarking Urban Transport, Past, Present and Future

The challenges of urban sector in India are multifarious such as rapid growth of urban areas, deficiency in basic services, deteriorating environment etc. Government agencies at various levels are taking steps to address the gaps in service delivery. The ministry of Urban Development (MoUD), Government of India has prepared Handbooks on Service Level Benchmarks (SLB) in 2009 to measure the quality of infrastructure and services delivery in urban transport and advised all JnNURM mission cities to identify their Level of Service (LoS). The Ministry has identified 10 areas of intervention in urban transport. These are Public Transport Facilities, Pedestrian Infrastructure Facilities, Non-Motorized Transport (NMT) Facilities, Level of usage of Intelligent Transport System (ITS) facilities, Travel speed (Motorized and Mass Transit)along major corridors, Availability of parking spaces, Road safety, Pollution levels, Integrated land use Transport System and Financial Sustainability of Public Transport. The SLB Handbook is envisaged to help Urban Local Bodies (ULBs) and other agencies in identifying performance gaps and effecting improvement by sharing information and best practices, resulting in better services to the people. CEPT University and IUT have been entrusted by the Ministry to undertake this study in 12 cities. The focus of this session has been to understand the status of SLB in the 12 cities and discuss how the gaps in implementation could be addressed.

Chairperson

- Mr. D.S. Mishra, Additional Secretary, (Urban Development) MoUD, Government of India

Presenters

- Prof. H.M. Shivanand Swamy, Executive Director, CEPT
- Ms. Nitika Bhakuni, CEPT University, Ahmedabad
- Ms. Anindita Ghosh, Urban Transport Planner, IUT (India)

Rapporteur

- Mr. Jatin Shah & Ms. Pooja P., CEPT University, Ahmedabad

Highlights of Discussion

- A study of service level benchmarking for 6 cities of Ahmedabad, Bhubaneswar, Hubli-Dharwar, Kohima, Mysore and Surat revealed that during 2012 – 15 level of services in respect of financial sustainability of public transport and integrated land use transport system has improved by one point in Ahmedabad. Kohima has also showed improvement in public transport.
- Surat witnessed improvement in application of ITS facilities and parking management.
- In Hubli-Dharwar, there is an improvement in parking management and IPT while application of ITS facilities dipped.
- In Bhubaneswar, pedestrian infrastructure and parking management improved while road safety conditions worsened.
- Improvements are observed in case of two cities- Hubli-Dharwar (efforts made by SUTP) and Surat (efforts made as a result of Municipal Corporation) however, all other cities are showing stagnancy in terms of improvements.
- The situation in all the cities with respect to NMV is still very poor. Apart from this PT improvement are also limited in all the cities.
- Cities are investing in parking management

and hence improvements are seen in this focus area.

- Bringing the NMT agenda to center stages needs to be the focus for improvement in PT as well. Government has recognized this in its various programmes like AMRUT and SMART cities which now needs to be further strengthened.
- Urban transport service level benchmarking is to assess, describe and inform what is going on.
- Review and explore – how are we doing and where are we.
- Cities to decide on how they can do better and what strategies will work.
- Hill cities to have different indicators due to geographical constraints, scale, size and functionality.
- In assessing and monitoring service level benchmark, availability of data is a major concern.
- During 2012 – 15, in Jaipur, public transport facilities like availability of parking spaces and road safety conditions improved.
- In Nanded, pedestrian infrastructure improved and pollution level worsened.
- In Patna, Jammu and Katra nothing changed while in Vijayawada, road safety and pollution level deteriorated. Pollution level in Delhi has also gone higher.

Outcomes

- Data collection cell needs to be put in place and implementation agencies be identified at local / state level.
- Application of ITS, availability of parking space, pedestrian infrastructure and NMT facilities and public transport need priority attention for improving the level of services.

Glimpses of Technical Session

F. Round Table Discussions

Round Table 1:- Mobilize Your City - Comprehensive Mobility Plans for Low Carbon Strategies

(Organized by CODATU)

Comprehensive Mobility Plan (CMP) is a very useful tool to define urban mobility strategies in Indian cities. By giving a multimodal and long term vision, CMPs can provide useful solutions towards low carbon urban mobility. However, for many Indian cities the challenge is to turn the plan into implementation. In 2017, Mobilize Your City initiative will start in India to assist local governments in their mobility policies and to support their efforts to cut at least 50% of their urban transport related emissions by 2050 compared to business as usual. Thanks to international exchanges and specific technical assistance, three Indian cities engaged in the programme will receive support to improve their transport system and to make it more energy efficient. Experiences in this regard were shared in this session.

Moderator

- Mr. Julien Allaire, Executive Manager, CODATU

Presenter

- Dr. Sanjay Gupta, Head of Department (Urban Planning), School of Planning and Architecture, New Delhi.
- Mr. G. P. Hari, Deputy General Manager, Kochi Metro
- Ms. Rima Le Coquic, Head of Transport and Energy, AFD
- Mr. Etienne Lhomet, Urban Transport Expert, CODATU

Rapporteur - Ms. Marion Hoyez, Cooperation Project Manager, CODATU – India

Highlights of Discussion

- In India, preparation of Comprehensive Mobility Plan (CMP) gained momentum after the launch of National Urban Transport Policy – 2006 and flagship Mission of Jawaharlal Nehru National Urban Renewal Programme (2005 – 2012).
- The major change in urban transport planning is to make it people centric planning. For any MRTS project, CMP is required with a focus on public transport, non-motorized transport and pedestrian.
- France has also gone through the same process like India. People-centric planning approach is given importance while preparing CMP.
- Today new generation of CMPs emphasise on low – carbon strategies and participative process.
- Mobilize your city initiative emphasizing integrated approach between city planning and transport planning is important with focus on reducing GHG emission. In India, Kochi, Nagpur and Ahmedabad are three pilot cities in this initiative.
- Under mobilize your city initiative, capacity building, development of sustainable urban mobility planning and monitoring of emission are the important components.
- Water transport to be integrated with buses, electric mobility and other modes.

- Public consultation with stakeholders will help in improving the mobility situation in cities.
- Revenue model using multi – purpose card based on EMV needs to be developed.
- Challenges in implementation of CMP can be addressed by prioritization of projects, capacity building and generation of additional resources.
- The transport system should fund the transport projects by capturing land value and encouraging commercial activities at the station.
- In Europe, public transport is not sustainable. Fare box revenue covers only 30 -40 percent of the O & M expenditure and the rest is funded through subsidies.
- Electric mobility is not a solution to all the problems, public transport is not enough; the need is for poly centric development.
- EASI process that is Enable, Avoid, Shift and Improve is important.
- **Outcomes**
- CMP needs to be developed as more people centric document and be integrated with the city master plan to have a common vision.
- CMP should also provide mechanism for monitoring of GHG emission and give importance to transit oriented development.
- The need is to articulate CMP / Master Plan / Climate Change Action Plan as one comprehensive document.

Audience at the session

Round Table 2:- Advancing Bus-Based Public Transport for Green Urban Mobility in India

(Sponsored by the Federal Government of Germany through KFW)

The total number of motor vehicles in India increased from 52.37 million in 2000 to 121.63 million in 2011 registering an average growth rate of 9% per annum. The rapid growth of motor vehicles has had its impact on the share of public transport vehicles which decreased from 11% in 1951 to 1.1% in 1991 and the trend continuing till date. The reasons behind this decline in share are many - like multiple increase of private vehicles, buses not treated as essential public service, skewed taxation structure with more taxes on buses than on cars, lack of infrastructure and technology, etc. Hence to increase the usage of public transport, the city bus service in India needs a complete transformation and paradigm shift as this is the most flexible, scalable, cost effective, convenient and fastest mode.

In the above context the discussions focused on **a)** integrating the private and public sector involved in urban public transport in terms of different modals (e.g. transport department, SPV, Municipal Corporation, Private Operator with Service-level agreements), **b)** integration of different transport modes and observed best practices in India, **c)** role of intelligent transport systems / other IT – based innovations for improved integration, **d)** policy changes, **e)** suitable ways of introducing innovation & financial support in fuel technology and **f)** bridging the financial viability gaps and role of UMTA's in achieving balanced sustainable financing.

Chairperson	-	Shri Mukund Kumar Sinha, OSD (UT) & E.O.J.S., Ministry of Urban Development, Government of India
Moderator	-	Ms. Sonia Arora, Urban Transport Expert, IUT (India)
Presenter	-	Mr. Ishan Chanda, Urban Transport Planner, IUT (India)
Lead Discussants	-	Mr. Robert Valkovic, Senior Project Manager, KfW Development Bank, Urban Development & Mobility, South Asia
	-	Shri C. K. Goyal, Associate Vice President (Road Transport), DIMTS

Highlights of Discussion

- India Bus Sector study taken up by IUT is to assess the need for increased usage of public transport in India.
- It will identify and assess current and ongoing bus development investments in Indian cities.
- Study is to assess international developments to determine its appropriateness in Indian context.
- It will develop and disseminate lessons, best practices and broad guidelines for new bus investments.International lessons from developing countries:-

1. **Integrating public and private sector**
   - Publicly funded public transport requires ongoing subsidies to meet all user demand it needs (lower revenue basis not offset by some lower cost).
   - Within typical government frameworks it is

difficult to incentivize operational efficiency and performance standards and overcome existing vested interests.

- Private sector can more readily introduce innovation but cannot be expected to meet full service requirements of a city and still be viable.
- A need is to have a Public Private Partnership approach.

2. Integration of different transport modes

- Public transport users expect seamless and convenient modal transfers, as such integration of planning and investment in associated modes is important for bus services.
- Higher frequency of service and density of services valued over high capacity corridors.
- Capacity of bus services need to be planned and long term requirements considered – up gradation of BRT and / or substitution to LRT.
- ITS for operating and information purposes is expected, with best practices providing enhanced utility – free WiFi, apps, etc.

Panelist reviewing the presentation

3. Facilitating fuel technology policy changes

- Major developing countries are moving beyond simply improved carbon based fuels (diesel to CNG, LPG)
- Electric options are evolving fast but systems are still very diverse (and higher degree of proprietary restrictions), making substantive investment more risky.

• **Bridging the financial viability gap**

- Financial requirements usually exceed government resources or bond market. Under-developed or private sources are risk adverse – international financial institutions offer competitive interest rates and closer match to revenue return / period.
- Viability gap financing eligible for global climate change sources.
- GHG saving under innovative buses technologies can receive GCF grant / loans.
- Financial sustainability of individual investments at high risk if a holistic strategy for all public transport is not addressed (even if implemented separately).
- Financing of associated non-system integration infrastructure needs to be considered in a social cost context-some degree of equity is unavoidable but viewed an "external" cost.

• KfW: Success Factors for Bus investments

- Clear regulatory framework – strong support for integration with an effective strong PTA and city institutional leadership.
- Integration of last mile connectivity – development of appropriate user focused system– para transit, walkable paths, bicycle friendly access and parking and secure and safe environment.
- Maximize revenue streams – multiple sources, partnering with private sector where appropriate.
- Strengthening of operational efficiency – determine and monitor key performance criteria to minimize loses.
- Diversify other funding sources – loans, bonds, PPP where feasible.
- Sound preparation and implementation of

investments – minimize period to achieve revenue streams through prioritization and phasing / dimensioning of scope and efficient procurement and contracting.

- Modal Share of Public Sector Buses (India)

Year	%
1961	32
1976	45
2012	8

(Source : CIRT report 2015)

- **City Bus Scenario in India**

Transport Organization	% fleet
- Road Transport corporations	75
- Govt. Companies	17
- Municipal Undertakings	4.5
- Govt. department undertaking	3.5

- Legal Framework.
  - A statutory body – formed under MV Act, 1988.
  - Company – Registered under the Company's Act of 1956.
  - Registered Society – under the Societies Registration Act of 1960.
  - Corporation – under the Road Transport Corporation Act of 1950.
  - Challenges in Bus Sector in India.
  - Policy – CBS does not come in the priority of the Government while planning for cities.
  - Institutional – Multiple institutions with no common plan, agenda and program for Public Transport.
  - Infrastructure – Lack of bus stops, proper depots and interchanges for the city buses.
  - Industry - Few manufacturers with limited production capacity and finances.
  - Regulatory – No periodic fare revision system.
  - Operator & Service provider – Violation of permits and quality of service is not proper.
  - Capacity Building – Inadequate Technical staff.
  - Planning – Lack of comprehensive planning.
  - Skewed Taxation – Buses have more taxes than private vehicle.

Presenter making presentation

- International case studies covered in the Bus Sector Study reveal that bus cost is high, allied infrastructure is complex and expensive and for patented technology there is no open market.

Outcomes

- Cost effective subsidy to be provided for bus and ancillary infrastructure.
- There is an urgent need for coordination between authorities, strengthening of SPV, legal backing, R & D in alternative fuels, open market for technology, strengthening of PPP model, comprehensive Planning &Implementation and skilled manpower at all levels.
- Central Government to create wider awareness and acceptance level at political and administrative level for promoting bus based advance technology.
- State Government to identify priority cities to run CBS on non-conventional fuel bus technology.

- City Authority to take up comprehensive planning for operation and management and develop ancillary infrastructure including ITS.
- Manufacturers – Should undertake R&D on priority basis to switch over to new technology for which Government should provide incentives.
- Operator should be made aware about the benefits of technology.
- Integrating the private and public sector in urban public transport and different transport modes (NMT, Metro, LRT, Bus, Ferry).
- Facilitating fuel technology policy changes.
- Bridging the financial viability gaps.

Discussion during the session

Round Table 3:- Road Pricing: A Demand Management Tool

Urban Population as well as the vehicle pollution in India is growing at an alarming rate. MoRTH statistics has revealed that the total registered vehicles in India are 182 million (2013) of which buses constitute only about 1%. To accommodate these vehicles, authorities have augmented the supply of road infrastructure. But, increasing the road infrastructure like road network, or adding on more flyovers will not solve the problem of congestion, pollution or growing energy consumption. This will only create induced traffic and worsen the situation further. The current traffic scenario will consume more and more valuable developed urban land.

Though Indian cities have road tax, parking fees, fuel duty, vehicle excise duty etc. it does not compensate the losses incurred due to the negative externalities on the roads. Therefore, in order to address the problem, an innovative method of Travel Demand Management like Road Pricing can be imposed upon road user to control the growing undesirable traffic condition impacts. Road pricing helps in getting more value for money for the usage of road space. This also helps to increase the share of public transport in the city and reduce dependence on private vehicles as has been stipulated in the National Urban Transport Policy, 2006. Such measures have also been recommended by various policy documents and reports of the expert committees on urban transport. This session discussed importance of road pricing policy outline.

Chairperson	-	**Dr. Mohinder Singh, Advisor, LUTP, Singapore**
Moderator	-	Ms. Sonia Arora, Urban Transport Expert, IUT (India)
Presenter	-	Ms. Baveena KV, Transport Planner, IUT (India)
Lead	-	Dr. Jitendra Bajpai, Adjunct Faculty (Sustainable Cities),
Discussant	-	Earth Institute, Columbia University, New York
Rapporteur	-	Mr. Karia Parth, IUT (India)

Highlights of Discussion

- Road pricing, paying directly for use of a particular roadway or road network, can be implemented at city, area, corridor and facility levels.
- Types of road pricing include high road taxes, distance based charges, priced parking and time limits, parking taxation in buildings in commercial and institutional areas, area / congestion / corridor pricing, fuel based tax, unbundled parking, emission fee based on fuel used etc.
- Travel demand management like road pricing is required in India to address the issue of increasing usage of private vehicles, declining in usage of public transport, falling share of NMT users and alarming environmental problems.
- The expected benefits of road pricing are less traffic jams, shift towards sustainable modes of transport, minimize consumption of fuels, reduction in pollution, additional revenue generation etc.
- Internationally, congestion charges (around inner city) in Stockholm (2007), Area

Licensing Scheme (1975 – 1998) and Electronic Road Pricing (ERP1998 – ongoing) in Singapore, congestion charging in Milan have proved to be useful schemes in road pricing and yielded positive results.

- In Seoul, the congestion impact fee system, TDM policy for companies, congestion charge at Namsen tunnel, parking thresholds, priority for pedestrian in urban transport policy are very effective road pricing policies which helped in improved air quality, increased average travel speed, decreased share of personal cars and increased share of public transport.

Outcomes

- Road pricing strategies should be integrated with other schemes and be reviewed with the changing transport scenario.
- NMT facilities and infrastructure should be developed in a fast mode to promote modal shift.
- In Institutional areas, personal vehicle should be restricted.
- Political and administrative support and people's cooperation are the pre-requisites for the success of such schemes.
- Revenue generated through road pricing should be invested in urban transport.
- Central government may formulate model policy / guidelines for the states for providing statutory backing to road pricing.
- State government to provide a framework to the cities for implantation of road pricing.
- City authorities should take up detailed studies of the cities to identify the road stretches / areas for implantation of road pricing as short, medium and long term strategies.
- Public transport agencies / operators are required to provide services to enable access to areas affected by the road pricing scheme.

Panelists interacting with the audience

G. State Specific Session

State Specific Session 1:- Mobility Solutions in Smart Cities of Gujarat

(Organized by CEPT)

Chairperson - Shri Poonam Chand Parmar, Additional Chief Secretary, Urban Development & Urban Housing Department, Government of Gujarat.

Co-Chair - Prof. H. M. Shivanand Swamy, Executive Director, CEPT University, Ahmedabad

Presenters - Shri Mukesh Kumar, Municipal Commissioner, Ahmedabad
- Shri M. Thennarasan, Municipal Commissioner, Surat
- Shri I. P. Gautam, Managing Director, MEGA

Rapporteur - Mr. Palash Shukla & Ms. Vrunda Shukla, CEPT University, Ahmedabad

Highlights of Discussion

- Initiative in the form of BRTS (Janmarg), Metro and Ahmedabad Municipal Transport services have been taken to improve smart mobility in Ahmedabad.
- Public transport share has increased from 7% in 2005 to 12% in 2016.
- BRTS is operational in 97 km with fleet size of 250 buses having daily ridership of 1.5 lakh passenger. It is the first full-fledged BRT system in India.
- Metro Link Express for Gandhinagar and Ahmedabad under implementation for 39.259 kms in phase I will be operational by October 2018.
- Ahmedabad Municipal Transport services, famously known as AMTS is serving Ahmedabad since 1st April, 1947.
- It has a total fleet of 977 covering an area of 466 sq.km. About 6 Lakh passenger use AMTS daily.
- Smart Mobility Solutions.
- Physical integration
  - AMTS as feeder to BRTS and BRTS as feeder to Metro.
  - Physical integration of Metro and BRTS is planned.
  - Around 150 AMTS buses pass through BRTS corridor providing last mile connectivity.
- Route Rationalization for AMTS is also planned.
- Ahmedabad Intermodal Hub is planned.
- Jan Mitra
- Common City Payment Card.
  - Single Card will be used for METRO, BRTS and AMTS.
  - All services of AMC will be covered through one prepaid open loop card.
  - Other services such as Online Shopping, Malls, Petrol pumps etc. may be availed.
  - 1000 cards already distributed on pilot basis.

- Encouraging cashless transit.

- System Integration
  - New ITMS system for integration of AMTS and BRTS comprises of Automatic Vehicle Locating System, Automatic Fare collection System, Passenger Information System, Scheduling and Dispatch System and CCTV cameras on all BRTS stations. Provision for online tickets through QR codes on cell phone and via PAYTM application (Proposed).

- Introduction of seamless connectivity through own OFCS network of 172 Kms.

- Surat, the 8th largest city in India and the 4th fastest growing city in the World, is the economic capital of Gujarat.

- Surat Municipal Corporation has taken an initiative of development of Integrated Mass Transit System.

Opening remarks by Chairperson

- The existing transport system in Surat is comprised of BRTS having 60 km. operational network with approximate ridership of 38000 passengers per day.

- In addition, Surat has city bus service with a fleet size of 125 buses and a ridership of 40000 passengers per day.

- Major load of public transportation in Surat is taken by shared autos. The city has 60-80 thousand autos plying on 37 major routes with a ridership of 6 – 8 lakh passengers per day.

- In order to promote sustainable mobility in the city, Surat Municipal Corporation has adopted multipronged approach. It has built / building 102 km of BRT network. In the heart of the city a 12 km ring corridor with high mobility is planned to support economic activities.

- For providing last mile connectivity, the city is developing a system of 515 km network covering 94% urbanized areas.

- Bus system is designed keeping in view the current market size and targeted ridership. The facility as well as the fleet acquisition has been planned. It will be the first BRT system to run midi buses as part of its fleet.

- Surat uses technology to facilitate rapid mobility of buses through IT system providing passenger information system, as well as easy and reliable fare payment through automated fare collection system (AFCS).

- Surat is planning for integrated mobility in association with MEGA and DMRC and working on feasibility report for Urban Metro Rail Services.

- Surat Municipal Corporation is developing an operational plan focusing on operational efficiency of all three types of bus services and is in the process of development of comprehensive mobility plan.

- For the first time Surat has established a municipal transport under BMPC which will oversee the operations of all the bus transport system. A special purpose vehicle is created under companies Act.

- Outer ring road in Surat is being developed along 66 km road length having 90 m width.

- It will have 500 m wide residential zone on both sides of ring road. The scheme is being implemented through special purpose vehicle.

- Surat Metro Rail Project and Surat Multimodal Transportation (MMTH) Development and Logistic Park are also in planning stage.

- Ahmedabad Metro Rail Project is expected to have a total ridership of about 5 lakh in 2018 which is projected to increase to 11.2 lakh by

2031.

- Metro stations may have interchange with BRTS, AMTS and even Rail.
- The present AMTS and BRTS transportation system will act as feeder system to metro.
- The stations would be physically connected to these modes to ensure comfortable and hassle free transfers.

Outcomes

- Effective Execution for ITMS and OFCS network.
- Fare Integration for AMTS, BRTS and Metro.
- Policy Framework for Uniform Parking facility.
- Smart solutions like Mobile Applications, Online Passenger information etc. for ease in commuting.
- Development of Intermodal Hub.
- Policy framework to make it sustainable.
- The public transport system of Ahmedabad will be integrated with the development of the metro.
- Bus network in the form of BRTS, AMTS and GSRTC provide coverage across most parts of the city.
- Metro will be a high speed link between various terminals and will help in avoiding congestion on roads.

Panelists interacting with audience

Audience at the session

State Specific Session 2:- Mobility in Smart Cities of Madhya Pradesh

Chairperson - Shri Jitendra Dubey, Engg in Chief & Director (Operations), UADD, Madhya Pradesh

Co-Chair - Mr. Kamal Nagar, OSD (UT)& Additional Collector UADD, Madhya Pradesh

Presenters
- Shri Sandeep Soni, CEO, AICTSL, Indore
- Ms. Ankita Gupta, Transport Planner, Jabalpur City Transport Services Limited
- Shri Rahul Tiwari, Urban Transport Officer, UADD, Madhya Pradesh.

Rapporteur - Mr. Palash Shukla & Ms. Vrunda Shukla, CEPT University, Ahmedabad

Highlights of Discussion

- Indore having a population of 2.3 million is the financial capital of Madhya Pradesh.
- Atal Indore City Transport Services Ltd. is a special purpose vehicle registered under companies Act, 1956. AICTSL, an integrated multimodal public transport, is fast, comfortable, safe, reliable, affordable and environment friendly.
- Its services include city bus operation, BRTS operation, intercity and interstate AC bus operation, metro taxi, Public Bicycles, Rental Bike Service (two wheeler) and Tele Rickshaw.
- City buses having a fleet of 110 buses ply on 16 routes. They cover 80% of the area and carry 60000 passengers per day.
- All the buses are equipped with GPS controlled system, CCTV camera and App based tracking. The buses attracted 16 % shift from private car users.
- Midi buses numbering 65 are equipped with advanced comfortable seats, passenger information system, CCTV surveillance system, and ply on 15 new routes.
- BRTS in operation since May 2013 has a route length of 11.46 km with 40 buses in operation and ridership of 52000 passengers per day.
- Sky Bus having intercity and interstate AC bus operation is an initiative to enhance the safety in urban transport for long route buses.
- Public Bicycle system (PBS) is a service in which bicycles are made available for shared use to individuals on a very short term basis.
- It provides free or affordable access to bicycles for short distance trips in an urban area as an alternative to motorized public transport or private vehicles thereby reducing traffic congestion, noise and air pollution. It also serves as last mile connectivity.
- As of July 2015, I – Bike has a membership count of 497 and is increasing.
- Tele Rickshaw is an Auto Rickshaw Aggregator (ARA) which uses modern technology to enhance the safety by using GPS, panic button, route deviation alert, power back up etc.
- Call center operation with more than 800 calls per day is equipped with the latest technology and data base management system.
- I – Ride bike service on rent is GPS / GPRS

controlled which enables the location tracking of vehicle with a mobile application.

- Priority indicators for assessing the level of service of public transport are travel time, congestion, safety, access to mobility services, inclusive access, intermodal connectivity and quality of public area / infrastructure.
- Indore is the first city to provide free Wi-Fi network and is planning to give seamless Wi-Fi facility throughout the city.
- Upcoming Smart Mobility Solutions are Green City Buses (Smart Electric Buses), Street transformation as no vehicle zone and IT solution in PAN city.
- Jabalpur, third largest city in Madhya Pradesh, is one of the 20 cities selected initially in smart city challenge.
- Public Transport system in the city has dedicated lane for BRT buses, the route connects dedicated corridor to the existing bus system.
- It has automatic fare collection system with platform level boarding.
- Bench marking of urban transport has been used as a tool for evaluation and monitoring the process and outcomes of public transport system.
- Parameter for benchmarking urban transport can be broadly classified into Physical, operational, financial, organizational, perceptional and social categories.
- In order to understand the commuters and their aspirations from public transport services operating in Bhopal a study was conducted whose findings are as under :
- There is a strong co-relation between the socio-economic and public transport services.
- Set of parameters to evaluate public transport services should have some rationale for inclusion.

Glimpses of the Session

State Specific Session 3:- Mobility in Smart Cities of Maharashtra

Chairperson - Shri K V Krishna Rao, Prof. IIT Bombay

Presenters - Shri Khubchand Pawar, Mumbai Metropolitan Development Authority (MMRDA)
- Shri Sidharth Gondhale, Mumbai Metropolitan Development Authority (MMRDA)
- Shri Rajendra Jagtap, Additional Municipal Commissioner, Pune
- Shri Pratik Dave, Technical Advisor BRTS, Pimpri Chinchwad

Rapporteur - Ms. Visakha K A & Ms. Priyanka Sawant, CEPT University, Ahmedabad

Highlights of Discussion

- Mumbai is one of the largest public transport dependent cities in the world.
- The suburban trains (7 million) and bus system (5 million) carry nearly 12 million commuters daily.
- The trains with a carrying capacity of 1600 passengers carry 4500 passengers.
- The density in suburban train is 12 passenger / sq.m. while internationally acceptable norm is 5 to 7 passenger / sq.m.
- Average standees per coach are12 passenger / sq.m. US federal Transit Administration Report (1996) indicates totally intolerable 5 passengers / sq.m. and unacceptable 8 passenger / sq.m.
- Mumbai Metro Master Plan has identified 8 corridors in 172 km.
- Comprehensive Transport Study for MMR (2008) has suggested the following upto 2031.
- Physical Infrastructure
  - 450 km of Metro network
  - 248 km of Sub-urban network
  - 1740 km of Highway network
- Critical Issues for Implementation of metro projects are: Utility shifting, Narrow width of ROW, Land for construction of depot, Land for sub-station, Land for Casting yard, Labour camp & stacking material, Rehabilitation & Resettlement, Staircase landing on Footpath of narrow road, Tree cutting issues, Dealing with other agencies, Station facilities, Space for firefighting (UG Tanks)and Difficulty in Erection of Girders.
- Kerb side lane in Bandra Kurla complex (BKC) is a low cost, small and quick transport initiative which will increase the speed of existing bus service and reduce the travel time.
- Purpose of the experimental Kerb lane is to understand what is possible through discipline and not through full engineering like BRTS. IT will have dedicated bus lane along BKC road.
- Benefits of the dedicated bus lane are improved carrying capacity i.e. 180 buses / hour carrying 8000 passengers, average travel time reduced from 33 min to 15 min and bus speed increased from 7KMPH to 24.7 KMPH
- Traffic has consistently emerged as number one concern for Pune citizens. Transportation

and mobility is the top concern of 30% of Pune citizens.

- Key mobility parameters will become even worse unless an integrated mobility plan is created for Pune.

Panelists on the dias

- In order to resolve the mobility issues, a comprehensive Mobility Plan has been prepared by Pune city.
- The 8 major pillars of the plan are public transport enhancement, BRTS, urban street design, pedestrian policy, dedicated bicycle track, new development control regulation focus on TOD, high capacity mass transit route and metro network.
- Pimpri – Chinchwad is known as the industrial hub of Pune Region.
- A Comprehensive Mobility Plan prepared for Pimbri – Chinchwad in 2006 has identified 10 mobility corridors of 130 km length.
- Of the 10 corridors, 4 mobility corridors will have mass rapid transport system in a total of 45 km in length.
- BRT has quick and easy access to stations with a carrying capacity of more than 20000 PPHPD. It will have multiple routes per corridor, express services and affordability for the customer and the city.
- PMPML – Pune Mahanagar Parivahan Mahamandal Ltd.
  - As on October 2016, BRT services have been operational on 2 corridors of 22.5 km length.The services on the remaining 2 corridors is planned to start by mid-2017.
  - Rainbow is the common name selected by PMPML Board of Directors as a unique brand and identity for BRT system of Pimpri – Chinchwad and Pune.

Audience at the session

- PCMC has created dedicated 'Urban Transport Fund" for securing investments for transport projects.
- By allowing additional 0.4 FSI to densification on 100 m either side of BRT corridor, PCMC has managed to generate revenue from real estate development along BRT corridor which is directed to UTF.
- The land values have increase 5 to 10 times along the corridor in last 5 years.
- Future Initiatives:
  - Introduction of Automatic Fare Collection System.
  - Smart Cards.
  - Bus Fleet augmentation with introduction of new 500 AC and 800 Non-AC BRT buses.

Participants and Panelists in an interaction mode

H. Technical Session for Municipal Councilors

Technical Session for Municipal Councilors 1:– Inclusive Mobility: Improving Access for Pedestrians

Chairperson - Dr. Mangu Singh, Managing Director, Delhi Metro Rail Corporation

Presenters
- Shri Pashim Tewari, Technical Director, AILSG
- Shri Nalin Sinha, ITDP India
- Dr. Sanjay Gupta, Head of Department (Urban Planning), School of Planning and Architecture, New Delhi
- Ms. Abha Negi

Rapporteur - Mr. Arnab Sen, Senior Project Officer, AILSG

Highlights of Discussion

- Lack of proper parking, road side parking reduces walking space.
- Proper maintenance of footpath helps in smooth walk.
- Lack of disabled friendly infrastructure.
- Florence, New York city, Marrakech, Buenos Aires, are some of the most pedestrian friendly cities of the world.
- A number of solutions tested in various cities across the world can make the cities pedestrian friendly.
- Car free initiatives having car free days trailed across the globe from Bogota to Bangalore.
- Pedestrian and health campaigns through walking and marathon aimed at improving health can be popularized by getting support from local organization.
- Local champions involving celebrities, local heroes could be powerful advocates for pedestrian right and promoting walking as an attractive option.
- Economic incentives and disincentives including subsides and taxes like congestion charges can be used to encourage behaviour change. Using modern technology, pedestrians can be rewarded for their active life style with points or actual money.
- Density and mixed functions in terms of location of living, work places and facilities are the most structural determinants of transport demands and transport mode choice. The compactness of a city is the most decisive attribute that gets people walking.
- Walkable connectivity by removing barriers at crossing and intersection promote walking. Minimal disruption provides safe connectivity.
- Road share or shared space with little segregation between pedestrian, cyclists and drivers is the holistic approach towards traffic calming and space activation. Shared spaces encourage drivers to slow down, creating a pedestrian oriented environment.
- Integration of public transport with pedestrian network contributes in developing a more sustainable, efficient and healthy city and also provide pedestrian friendly environment.
- Safe crosswalks and intersection with audio visual aids to cross the intersection increase the safety and ease of travel for pedestrians.

- Traffic calming measures including speed bumps, filtered permeability slows traffic and improves safety on the streets.
- Improved Signage's with pedestrian information street signs can reduce dependency on additional device and helps pedestrians understand the network and increases the ease of navigation and permeability in public space.
- Innovative public spaces such as underground or an attractive way to get people exploring on foot.
- Creative and attractive street design and furniture will result in improved functionality and often stimulate individuals to walk more.
- Inclusive design can remove barriers between physical space and communities by providing elevators or way finding aids for people with different needs.
- The Copenhagen Model convert street into pedestrian thoroughfares, turn parking lots into public square, keep scale dense and low and populate the core. It promotes cycling as a major mode of transport.
- Out of 5 million km length of roads across India, less than 0.1% are built keeping in mind pedestrian safety and convenience to promote walking.
- As per census 2011, 47% people walk, cycle and take bus to work and more than 90% people who travel to work use NMT and some form of public transport or intermediate public transport.
  - Walking & Pedestrian concerns today are:-
- Unsafe to walk and difficult to cross a road or intersection.
- Shrinking pedestrian infrastructure and deteriorating quality makes walking inconvenient.
- Waiting time at traffic signals is high.
- More road space being taken over for and by motor vehicles.
- Pedestrians treated as nuisance and sometimes undesirable.
- Worrying mindset that shows pedestrians and walking in a poor light as compared to driving a vehicle.

Panelist on the dias

- In spite of pedestrians and non-motorized being in majority in their modal share, they are getting marginalized.
  - Issues & Challenges before policy makers and planners:-
- Lack of pedestrian infrastructure and facilities in cities and along high speed roads.
- Design, Quality &conditions of available footpaths / sidewalks.
- Safety and security concerns specially, for women, children and elderly.
- Poor planning & no integration of informal sector / services along pedestrian walkways often resulting in people using available space in haphazard manner causing inconvenience to pedestrians.
- Majority of Government's road infrastructure priorities & investments benefit mostly motor vehicle users.
- Hostile and intimidating behaviour of motor vehicle drivers towards pedestrians.
- Lack of enforcement and action against motor vehicle users using or parking on footpaths and people encroaching the space.

- Pedestrians forced to walk on mixed traffic roads and risking their lives to cross the road or traffic junction.
- Poor information, signage and no assistance available from traffic police to help pedestrians cross on fast moving and heavy traffic intersections.
  - Everyday around 400 people die on Indian roads and 1370 are injured.
  - National Highways witnessed 51,204 deaths and State Highways 40,863.

Green Transport Scheme

- To be launched soon, Green Urban Transport Scheme seeks to encourage growth of urban transport along low Carbon path.
- Aims at substantial and measurable reduction in pollution.
- Will provide a sustainable framework for funding urban mobility projects at National, State and City level.
- Will encourage innovative financing of projects.
- Being considered for implementation in cities with population of five lakhs and above and in all capital cities.
- Estimated central assistance of about Rs. 25,000 crore is required over the next five years which is likely to trigger private investments to meet the resource needs.

Principles of Inclusive Mobility:

- A transport system that works for the poor and the vulnerable.
- A walkable, bike able and accessible city.
- Moving people, not vehicles.
- Mobility with safety and civility.
- Planning and communicating better and travel less.
- Sharing information to increase connectivity and accessibility.
- Making our neighborhood more accessible.
- Changing mind-sets and behaviour.
- Mobility of all, for all, by all.

Audience at the Session

- Some of unique examples in Indian cities could be replicated:
- Pedestrian only shopping street known as Mall Road in Shimla.
- Segregated pedestrian facilities in Gangtok where walk trips are higher than motorized trips.
- Charminar and historical precinct pedestrian zone in Hyderabad.
- Greenway to preserve and create an integrated mobility project at Ukkadam lake project Coimbatore.
- Pedestrianizing the spinal commercial street in the city of Aizawl.
- Internationally – pedestrianized streets in Istanbul and New York.
- Converting street for car into a great public space for people in Vienna are some of the good examples.
- Comfortable walking environment requires free space for walking, walking friendly paving, pedestrian priority infrastructure, well-lit streets etc. IT should promote safe crossing, way finding system, creating city spine, boulevard, streets, routes and

connections and waterfronts.

- About 40 – 50 percent of daily trips in our cities have distances of less than 5 km.
- Unfriendly walking conditions and lack of dedicated pedestrian lanes, even walking and NMT trips are being replaced by motorized trips.

Outcomes

- Pedestrianisation is vital and needs orchestration of various parameters for implementation.
- Identify pedestrian priority streets, identify direct links, decide minimum footpath width and plan for multi-use activities….. public space.
- Initiating scheme may be easy but it's sustainability is critical.
- Government structure is vital for funding, implementing and managing pedestrian projects.
- Stakeholder consultation necessary for its success.
- Develop barrier free, uniform and accessible pedestrian infrastructure.
- Road Safety Programs to be introduced in school curriculum.
- All smart city initiatives must have a pedestrian and NMT master plan.
- Accessible and continuous pedestrian pathways.
- Traffic calming methods to be deployed.
- Introduce cycle / NMT lanes.
- Introduce more mass public transport systems like BRT's, Road Safety Programs to be introduced right from school.

Glimpses of the Session

Technical Session for Municipal Councilors 2:– Smart Parking Solutions

Chairperson - Capt. Anant Modi, DG, AILSG

Presenters - Shri. Saswat Bandyopadhyay, Area Chair of Infrastructure Planning, CEPT University, Ahmedabad
- Shri Ranjit Gadgil, Program Director at Parisar Pune Area, India
- Ms Sarika Bhatt, Manager -Sustainable Cities, WRI India

Rapporteur - Mr. Arnab Sen, Senior Project Officer, AILSG

Highlights of Discussion

- During 2001 – 2011 growth of registered vehicle has been very sharp from 55 million in 2001 to 141.8 million in 2011.
- More than 30% of road length is used for on street parking in some of the large cities in India.
- Emerging challenges of on road side parking are as follows:
  - Shrinking of usable road space.
  - No listing / mapping of city road wise parking priorities.
  - Lack of wider parking guidance network.
  - Limited technological / ICT applications / automation.
  - Absence of city wide parking demand assessment.
- An analysis of 60 smart cities proposal show that out of 323 projects, mobility sector and multi-level smart parking project are 80 and 21 respectively accounting for 22% and 7% of total projects respectively.
- Among the smart city parking proposals – most of the proposals are for isolated multi level city parking and integrated parking solutions type.
- There are limited proposal for IT enabled parking applications or automatic parking solutions.
- Almost no proposal of city / area based wide parking networks and management.
- Cities are facing mobility crises in terms of severe conflict between multiple modes and reducing speeds which are even less than 10 km / hr. in most areas.
- With growing city size, rise in vehicle number is inevitable.
- In Pune, since 1960, population increased by 4 times, road surface increased by 5 times while motorized vehicles increased by more than 100 times. On the other hand public transport decreased by 60%.
- In a vicious circle increase in roads, flyover, parking and other related infrastructure leads to increased vehicle use.

Outcomes

- Smart Parking has both on street and off street advantages.
- On street
  - Traffic congestion decreases.
  - Pollution is reduced.

- Local business gets improved due to footfall.
- Streets are safer.
- Drivers are less stressed.

Dignitaries on the dias

- Best possible use of available space.

• Off streets
  - Less time spent on parking.
  - Traffic flow improves.
  - Integrated with smart parking App for pay by phone compliance and information to attendants.
  - Available space gets maximum use.

• Paradigm shift required in our attitude and approach towards urban parking management.

• Based on the city specific demands, local parking micro zonation should be done.

• Integrated city parking networking rather than isolated local multi-level car parking.

• Trying to solve traffic jams by building more roads is like trying to put out a fire with gasoline (Enrique Penalosa).

• As part of Urban Transport Policy a balanced approach putting restrictions on personal motorized vehicle, improvement of public transport and NMT should be followed.

• Parking policy should discourage use of personal vehicles and encourage people to explore other options such as Public Transport, Walk, cycle, Car-pool and IPT.

• Principles of Parking Policy should be - no free parking, dynamic rates, IT enabled, effective enforcement and revenue for better parking services.

• Automobile oriented planning is like a vicious cycle. Increased vehicle ownership leads to automobile oriented transport planning which in turn demands parking supply which results into alternative modes being marginalized. It further causes decreased dependency on public transport and results in suburbazsation and long commute.

Panelist in an interacting mode

• Shared mobility is changing the ownership and usage of private vehicles like Uber and Ola.

• Alternative solutions for sustainable urban transport include pedestrian and bicycles, public transportation, transit oriented development, disincentive car use, cleaner and cooler fuels and vehicles.

• Use parking as revenue generation mechanism to support suitable transport.

• Look at off-street parking through Development Control Regulations (DCRs), TODs and urban form.

I. Research Symposium

INTRODUCTION

The **Research Symposium on Urban Transport** was held on 09th and 10th November, 2016 at the 9th Urban Mobility India Conference and Exhibition 2016. It was the seventh Research Symposium being held at UMI. The symposium provides a platform to highlight the current research carried out by academia and research institutes in urban transport, especially by young researchers pursuing post graduate or Ph.D programs. The objective of research symposium is to:-

- Encourage young researchers working in various facets of urban transport to present their research work and provide them an opportunity for networking with fellow researchers and professionals.
- Enhance capacity building of young researchers in the field of urban transport and
- Contribute towards building up of research data base, its dissemination and identification of thrust areas for research in the country.

Young researchers working in the area of urban transport were invited to submit abstracts based on the work carried out by them as part of their academic/research work.

Call for papers and selection

Extended abstracts of about 500 words for the research symposium were invited online. After receiving the abstracts the same were sent for peer review to the members of Peer Review Committee of Research Symposium. The symposium was co-ordinated by the CEPT University, Ahmedabad. Young researchers working in the areas of urban transport were invited to submit abstracts on any of the following themes:

- Integrated approach to transport and land use planning.
- Transport policy and practice.
- Public transport planning, operations and management.
- Travel demand management for sustainable mobility.
- Green, safe and inclusive transport.
- Transport economics and finance.
- Planning for future transport systems.
- Freight management.

Each abstract was given for peer reviews to three reviewers/members of Peer Review Committee not affiliated to author's institution and were requested to evaluate on a scale of 1 to 10. The scores so assigned were averaged out on weighted average method and a final score was arrived at for selection. In all, 130 abstracts were received till due date of 31st July, 2016 from various institutions across the country of which 64 abstracts were shortlisted for submission of full paper.

The full paper clearly stating the objective of the paper, key results and accomplishments, the significance and the advancement over previous work were invited for review following a given timeline. Papers were assessed based on their originality, timeliness, significance, relevance and clarity of presentation. It was notified that submission of a paper should be regarded as a commitment, in case the paper is accepted, at least one of the authors was to register and attend the conference to present the work.

These 64 full papers were evaluated by the reviewers/members of Peer Review Committee for selecting the final papers that can be presented at the Conference. On the basis of evaluation of full papers by the Review Committee, selected 22 authors were asked to make presentation at the Research Symposium at the UMI 2016 Conference.

The shortlisted papers for the presentation were clubbed under the following six themes based on the papers subject:-

1. **Integrated land use Transport planning.**
2. **Transport Policy and Practice**.
3. **Public Transport Planning - Operations & Management.**
4. **Travel Demand Management for Sustainable Mobility.**
5. **Green, Safe and Inclusive transport.**
6. **Freight Management Transport Economics & Planning for Future Mobility.**

The research symposium was conducted in six sessions which were moderated by a Chair and Co- Chair as detailed out below:

Research Symposiums – 1: Integrated land use Transport planning

Chair: Dr. G.J. Joshi, HOD (Transportation Engineering), SVNIT, Surat	
Author / Presenter	**Institution**
Ms. Pratibha Singh	CEPT University, Ahmedabad
Ms. Priyadarshika Das	School of Planning & Architecture New Delhi
Ms. Urvi Bhatt	CEPT University, Ahmedabad
Ms. Mithila Chaudhari	CEPT University, Ahmedabad
Rapporteurs - Mr. Navnit S & Ms. Pooja Ghosalkar, CEPT University, Ahmedabad	

Summary

In this session four papers on the subject were presented.

1. Assessment of TOD Policies and Implementation Process: Cases of Delhi and Ahmedabad.
2. Impact of Metro System on the Development of Twin cities: Kolkata and Howrah.
3. Land use Transport Decision in the Development Plan: A case study of Vadodara.
4. Relation between Urban Form and BRTS Transit use.

Research Symposium – 2: Transport Policy and Practice

Chair: Dr. Sanjay Gupta, HOD (Urban Planning),School of Planning and Architecture, Delhi **Co- Chair: Ms. Nitika Bhakuni,** Associate Professor, CEPT University, Ahmedabad	
Author / Presenter	**Institution**
Mr. Mustafa Sonasath	Centre of Excellence in Urban Transport, Ahmedabad
Ms. Supraja Krishnan	CEPT University, Ahmedabad
Mr. Vivek M Chandran	CEPT University, Ahmedabad
Mr. Udit Jain	IIT Roorkee
Rapporteurs : Ms. Sneha Mohan Nair & Mr. Hitav Patel, CEPT University, Ahmedabad	

Summary

In this session four papers on the subject were presented.

1. Assessment of TOD Policies and Implementation Process: Cases of Delhi and Ahmedabad.
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3. Land use Transport Decision in the Development Plan: A case study of Vadodara.
4. Relation between Urban Form and BRTS Transit use.

Research Symposium – 3: Public Transport Planning, Operations and Management

Chair: Dr. O.P. Agarwal, Executive Director, ISB, Mohali	
Author / Presenter	**Institution**
Mr. Sahil Chawla	CEPT University, Ahmedabad
Mr. Ashwini Soman Ranade	CEPT University, Ahmedabad
Mr. Rohit RP	School of Planning & Architecture New Delhi
Mr Rohit Anand	School of Planning & Architecture, New Delhi
Rapporteurs : Ms. Srinavya Annem & Mr. Subhadeep Bhattacharjee, CEPT University, **Ahmedabad**	

Summary

The session had four papers on the subject.

1. Effect of Transit Signal Priority on Bus Rapid Transit System (BRTS).
2. Analysing Urban Mass Rapid Transit Networks Using Graph Theory.
3. Fuzzy Logic Based Human Perception Model for Public transport Planning: A case study of Thiruvananthapuram city.
4. Productivity of Railway Stations: Case Study of New Delhi Railway Station.

Research Symposium - 4: Travel Demand Management for Sustainable Mobility

Chair: Dr. Sewa Ram, Professor, School of Planning and Architecture, New Delhi	
Author / Presenter	**Institution**
Mr. Dipanjan Nag	IIT, Kharagpur
Ms. Neolene Marisa Yesudas	CEPT University, Ahmedabad
Ms. Minoti Rawat	CEPT University, Ahmedabad
Mr. Aritra Chatterjee	School of Planning and Architecture, New Delhi
Rapporteurs : Ms. Srinavya Annem & Mr. Subhadeep Bhattacharjee, CEPT University Ahmedabad	

Summary

The session had four papers on the subject.

1. Sustainable Transportation Options for a Tourist Hill Town: Case Study Darjeeling.
2. Alternative Travel Demand Management Strategy.
3. Employer Travel Demand Management Measure Congestion Pricing: A Case of Delhi.
4. Modeling the Activity Based Travel Pattern of Workers of an Indian Metropolitan city: Case Study of Kolkata.

Research Symposium – 5: Green, Safe and Inclusive Transport

Chair: Dr. Vinay Maitri, Professor, School of Planning and Architecture, New Delhi **Co- Chair:**Ms. Shalini Sinha, Associate Professor, CEPT University, Ahmedabad	
Author / Presenter	**Institution**
Ms. Jyoti Vijayan Nair	The University of Edinburgh
Ms. Marisamynathan S.	IIT Bombay
Mr. Shawon Aziz	School of Planning and Architecture, New Delhi
Rapporteurs - Mr. Navnit S & Ms. Pooja Ghosalkar, CEPT University, Ahmedabad	

Summary

The session had three papers on the subject.

1. Pedaling through Partnerships: Role of Private and Third sector in Active Travel Strategies in Delhi.
2. Are Signalized Intersections with Crosswalk Safer in India: A Study Based on Safety Analysis Using Video Data.
3. Developing Methodology for Prioritization of Road Safety Measures: Case study of NCT Delhi.

Research Symposium - 6:-Freight Management, Transport Economics & Planning for Future Mobility

Chair: Dr. P. J. Gundaliya, LD Engineering College, Ahmedabad	
Author / Presenter	**Institution**
Ms. Ankita Bharti	PEC University of Technology, Chandigarh
Ms. Saloni Gupta	School of Planning & Architecture, New Delhi
Ms. Monika Singh	School of Planning & Architecture, New Delhi
Rapporteurs : Ms. Sneha Mohan Nair & Mr. Hitav Patel, CEPT University, Ahmedabad	

Summary

The session had three papers on the subject

1. Maintenance Free Planning of a Transport System: An Image Processing Approach.
2. Potential of Freight Transport through Island Waterway.
3. Potential of Freight Distribution through Urban Rail System: Case study of Delhi.

Awards

All the sessions were well received and interactive. The presentations were judged by an independent Jury and the following papers were adjudged first, second and third. The awards were given by **Shri Rao Inderjit Singh**, Hon'ble Minister of State for Urban Development, Housing and Urban Poverty Alleviation at the Valedictory Session of the conference to the following researchers:

S.No.	Position	Name	Name of Institution	Title of Research Paper
1.	**FIRST**	Ms. Ashwini Soman Ranade	CEPT University, Ahmedabad	Analyzing Urban Mass Rapid Transit Networks Using Graph Theory
2.	**SECOND**	Ms. Monika Singh	School of Planning & Architecture, New Delhi	Potential of Freight Distribution through Urban Rail System – Case Study Delhi
3.	**SECOND**	Mr. Shawon Aziz	School of Planning & Architecture, New Delhi	To Develop Methodology for Prioritization of Road Safety Measures : Case Study of NCT Delhi
4.	**THIRD**	Mr. Vivek M. Chandran	CEPT University, Ahmedabad	Contestations in Parking Policy

Glimpses of Research Symposium

J. Leaders Forum

Under the leaders forum, the projects and studies assigned to the officers of the state governments as part of the leaders Programme in Urban Transport Planning and Management of Ministry of Urban Development, Govt. of India and the World Bank were reviewed by expert reviewers and experiences were shared by various urban transport agencies. The programme was organized by the Centre of Excellence in Urban Transport, CEPT University, Ahmedabad. Officers associated with the projects and studies made presentation on the projects in terms of structure of the project, objectives, scope and limitations, current status, interim suggestions and way forward for further action on the project.

First session under the leader's forum was organized to share the experiences by the executives of state urban transport department, urban administration, metro agencies and municipal corporations.

Chairperson -

- Mr. M.K. Sinha, OSD (UT) and EO J.S., Ministry of Urban Development, Government of India.

Presenters -

- Mr. Kamal Nagar- Joint Director, UAD, MP
- Mr. GP Hari- Dy. Chief Engineer, Kochi Metro Rail Limited
- Ms. Deepa Dave- Assistant Manager, AMC
- Mr. Chirag Pandya, City Engineer at Rajkot Municipal Corporation
- Mr. Y.K Goswami, Assistant Town Planner, Rajkot Municipal Corporation
- Mr. Harshadray J. Solanki., Director, Solid Waste Management, AMC

Highlights of Presentations (Experiences)

- In Madhya Pradesh, current public transport scenario in medium size cities is dominated by highly overcrowded and unsafe shared autos.
- There is no dedicated wing for urban transport in the state.
- Issues related to city bus services in Bhopal, Jabalpur, Ujjain and Indore are as under:
  - Financial viability of system.
  - Automatic fare revision.
  - Non-existence of UMTA.
  - Inadequate number of bus stops.
  - Weak SPVs.
  - Non involvement of district administration.
  - Illegal operation in some areas.
  - CNG prices are high in Indore as compared to other cities.

  Unavailability of spare parts for CNG Buses.
- There is a multiplicity of agencies and lack of an integrated accountable agency both at the state and city level.
- - Out of 33 cities in the state, organized

public transport is in operation in 4 cities of Bhopal, Ujjain, Jabalpur and Indore.

- Twenty cities have been identified for cluster based city bus services under AMRUT programme.
- Kochi's water transport system is the world's second largest water transport system. It covers 78 km of route length and 38 pairs.
- A holistic approach followed for addressing transport solution.
- Emphasis is on seamless and integrated transport solutions rather than going for a stand-alone system.
- City specific transport solution needs to be evolved rather than a prejudice approach is taken in selection of transport systems and solutions.
- Enactment of city specific MTA is essential for common command and control of city transportation systems.
- Transport solution plans should be outward looking and deliver what the citizens want and not what the operators want.
- In Gujarat, Ahmedabad Urban Development Authority learnt lessons from other cities while taking decisions for urban transport development in the city.
- Urban planning is a 3 tier planning process. The first tier is a Development plan at macro level which includes Ahmedabad Urban Development Authority and Ahmedabad Municipal Corporation. The second tier is Town Planning schemes at micro level and the third tier is a local area plan at local level.
- In transit oriented zone the following aspects are considered.
  - Higher density of development
  - .Pedestrian friendly streets
  - Green network.
  - High intensity of infrastructure.
  - Well designed and well managed on-street and off street parking.
- This helps in facilitating public transport, improving walkability and expanding the public realm.
- Success of the project depends upon proper planning, proper execution, taking possession and initiation of development.
- Sharing the experiences from Odisha, it was highlighted that moving people and not vehicles in and around Berhampur city in Odisha has led to the development of city bus services.
- The city bus services in the Berhampur, Chattrapur, Gopalpur and Hinjilicut cluster is a success story and have become the most dependable and affordable commutation by the general public.
- The city bus services has brought about a sea change in the mindset of the people and created trust towards public transport services. Ridership has gone up from 10000 to about 16000 over the years.
- In the NCR, thrust for development of sustainable transport system is on multimodal transport system.
- It includes development of metro / regional centers in NCR and areas outside NCR for balanced development.
- It provides for regional transport linkages – Regional Rapid Transit System (RRTS) (an interstate greenfield project) and its integration with Delhi Metro and the peripheral expressway around Delhi.
- RRTS will offer high speed connectivity at high frequency with high capacity and affordable fare.
- Under the system Transit Oriented development around the stations with high FAR is suggested.
- It will have multimodal integration, automated fare collection, modern passenger information system and high safety.

Six sessions under Leaders forum were organized on Mid-term Review of Mentoring Projects.

Session – 1

Chairperson -	**Shri D. S. Mishra, Additional Secretary, Ministry of Urban Development, Government of India**
Reviewers -	
- Mr. O.P. Agarwal, Executive Director, ISB, Mohali - Mr. Laghu Parashar, Senior Manager, UMTC - Mr. A. S Lakhra, Visiting Faculty, CEPT Ahmedabad - Mr. Jaideep, Director (Electrical) Railway Board, Government of India - Mr. Vijay Anadkat, Senior Manager (Urban Transport) WRI India	
Rapporteur – Ms. Chintan Daftardar, CEPT University, Ahmedabad	

In this session 4 projects were presented and reviewed.

Presenter:	Paper Title
1. Ms. Shikha Juyal	Technology can Influence Policy Decisions.
2. Mr. Sandeep Laha and Mr. Parvez Bashir	Study of Mobility Plan of Meerut: Rerouting of City Bus Routes and Relocating the Regional Depots in Light of Upcoming Metro Railway.
3. Mr. M. Kharkrang	Project to Decongest Polo Area, Shillong and its Surroundings.
4. Mr. B. C. Renukeshwar	Structuring of Feeder Services of Metro: A case study of East West Corridor, Namma Metro, Bangalore.

Highlights of Presentations

- Absence of up-to-date data base with scientific management and analysis of SRTU's has constrained the ability to formulate sound policies.
- Physical and financial performance indicators need to be clubbed to calculate sustainable SRTU indicator.
- In the study of Mobility Plan in light of upcoming metro railway in Meerut city, the main objective is to ensure excellent regional connectivity of the city while simultaneously reducing the unnecessary impact of regional through traffic on the city's infrastructure.
- In the project on decongest Polo area in Shillong and its surrounding the emphasis is on the stretch of Polo areas having three intersections leading to north eastern hills university, Neighrhims hospital and New Shillong city.
- Study on Feeder Bus Services of Metro covering east-west corridor of Namma Metro, Bangalore, the emphasis is on promoting mass transport and connectivity for metro users by integrating bus services and metro services.
- Feeder bus service serves short distance, with high frequency. It connects commercial and residential modes to the trunk corridor

- providing first and last mile connectivity. Bus stops on the route are spaced within walking distance of each other.
- There are, however, some challenges in structuring feeder service in terms of deciding prime criteria, lack of information on origin / destination travel pattern and lack of infrastructure facilities.
- Feeder Bus systems enhance coverage and operational efficiency and it should not be an afterthought.

Session – 2

Reviewers -
- Shri D.S. Mishra, Addl. Secretary, MoUD, Govt. of India - Prof. Shivanand Swamy, Executive Director, CEPT University, Ahmedabad - Mr. K. Ramamurthy, Karnataka State Road Transport Corpration - Mr. Gautam Patel, Managing Director, MEGA Ltd. - Ms. Kanika Kalra, Urban Transport Expert, IUT (India) & Acting Director KMC - Mr. I.C. Sharma,National Project Manager, SUTP
Rapporteur –

In this session 4 projects were presented and reviewed.

Presenter:	**Paper Title**
1. Mr. Surender Kumar Mriga	Intelligent Transport Systems in Chhattisgarh.
2. Mr. Sachin Vishwakarma and Ms. Ankita Gupta	J card - an RFID based Automated Public Transport Fare Collection Systems for the City of Jabalpur.
3. Mr. Rahul Shrouti	Fare Integration and Developing a Common Mobility Card for AICTSL Different Services.
4. Mr. N. S. Periyaswamy and Mr. V. Kumar	Redevelopment Plan for Station Area Integrating Land-use and Mobility – Case Study: Tambaram Station
Rapporteur – Ms. Sneha Sharma, CEPT University, Ahmedabad	

Highlights of Presentations

- City Bus Intelligent Transport System in Chhattisgarh attempts to address real time monitoring and tracking of buses to reduce road congestion as well as tackle other transport issues.
- ITS improves passenger safety, fleet efficiency, services and traffic situation through transmission of real time information.
- Progress made under the project includes launching of common card for city buses in 4 cities and development of Mobile App, a multipurpose Mobility card for the city of Jabalpur which will deal with the nuisance of cash handling. The card known as J-card is integrated with Aadhar Number Samagra ID and is secure.
- Main focus is on its utility in public transportation system, where the card would help to collect the fare automatically.
- Request for proposal floated by JCTSL to start with the project.
- At present city bus cards have been used only in one route. Still the ticket system is in Vogue.
- In order to launch such a system public awareness and promotion is necessary along with facilities to strengthen the system.
- The project is cost effective and has led to convenience to users, service providers, operator and the authority.
- Fare integration and developing a common mobility card for AICTSL in different services / modes of public transport will result in unified ticketing system.
- It will benefit in reconciliation of revenue collected and help the citizens to use a single common ticket for all modes of transport.
- The project is a way forward to bring all PPP services of AICTSL under one umbrella.
- Redevelopment plan for station area integrating land use and mobility at Tambarm Station would enhance pedestrian and bicycle access as well as connectivity in and around Sub-urban rail station.
- At present there is no proper integration between the rail and road transport modes and the passenger facilities are being provided in a piece meal manner.
- The study would recommend parking management plan at station, station improvement plan covering inside station premises as well as outside station area and traffic management plan.

Session – 3

Reviewers
- Mr. Laghu Parashar, Senior Manager, UMTC - Ms. Shalini Sinha, Associate Professor, CEPT University, Ahmedabad - Mr. I. C. Sharma, National Project Manager, SUTP - Ms. Sonia Arora, Urban Transport Expert, Institute of Urban Transport (India)
Rapporteur – Ms. Chintan Daftardar, CEPT University, Ahmedabad

In this session 5 projects were presented and reviewed.

Presenter:	Paper Title
1. Mr. Manoj Kumar Mandapati and Ms. Sucheta Yarakala	Planning of Rapid Public Transit System for Andhra Pradesh Capital Region.
2. Mr. Arvind Kr. Maurya	Design of the Sustainable Pedestrian Infrastructure Based on Empirical Analysis of Pedestrian Traffic in Lucknow.
3. Mr. Soujanya Sharma	Comprehensive Plan for Decongestion of Cities/ Towns (2 towns) of Jammu.
4. Dr. Hemant R. Sonawane	Comprehensive Strategy to Decongest Pune Railway Station Area.
5. Mr. Aghore Kumar Roy	A Plan for Kolkata –Tram

Highlights of Presentations

- A study on planning for rapid public transit system for Andhra Pradesh Capital Region would assess the level of services of the existing infrastructure and suggest a concept plan for developing public transport system.
- A project on design of the sustainable pedestrian infrastructure based on empirical analysis of pedestrian traffic in Lucknow is taken up to understand the existing condition of walkways near Lucknow metro rail station.
- The project objective is to identify important parameters necessary for development of pedestrian infrastructure which can provide safe, secure and convenient walkability conditions to the city dwellers.
- Five important proposed metro stations i.e. Alambagh, Charbagh, Chowk, Aminabad and Indira Nagar have been surveyed.
- Important concerns for walkway users in Lucknow are:-
  - Bad condition of Pathways.
  - Narrow pathways.
  - Infringement and obstructions on the pathways.
- Survey reveals that people are willing to walk up to one km if the above concerns are taken care.

Session – 4

Reviewers -
- Shri D.S. Mishra, Addl. Secretary, MoUD, Govt. of India - Prof. Shivanand Swamy, Executive Director, CEPT University, Ahmedabad - Mr Gautam Patel - Mr. Abhijit Lokre - Mr. I.P Gautam, Managing Director, MEGA Ltd. - Ms. Nupur Gupta, Senior Transport Specialist, GTIDR, The World Bank
Rapporteur – Ms. Sneha Sharma

In this session 4 projects were presented and reviewed.

Presenter:	Paper Title
1. Mr. Amit Talwar	Automated Collection of Adda Fee (Parking fee at ISBT)
2. Mr C. Lalmuanawma, Mr C. Vanlalvena and Mr. Lalmuansanga Ralte	Improvement of Footpaths for Pedestrians in Aizwal city
3. Mr. Tofael Matto	Sustainable Transport System in Anantnag Town
4. Mr. Shivaji Jagtap and Mr. Mahesh Gupta	Project Structure for Parking Policy and Plan for Better Mobility in the City of Nagpur

Highlights of Presentations

- Implemented Terminal Management System at ISBT – 43 Chandigarh aims at enhancing the public convenience through IT applications.
- It will cover two main components:
- - Ticketing window and passenger information system
  - .Gate management (entry / exit control and automation of parking fee (adda fee) charging.
- It will have economic benefits in terms of replacement of staff, reduction in transaction cost and closing of separate enquiry counter.
- Operational benefits will provide more public space, operational efficiency and dynamic bay scheduling and improved aesthetics.
- Improvement of footpath for pedestrians in Aizawl city would considerably enhance state of the art walking and cycling infrastructure in the city.
- Project would cover enhancement and improvement of footpaths in three sections.
  - Axis bank, Chanwari to Hrangbana college to Sumkhuma traffic point and Zarkawt.
  - Construction of footpath over side drain from Hrangbana traffic point to new market junction.
  - Sustainable transport system in Anantnag

town suggests, overhandling the traffic and transport infrastructure.

- It will have focus on mass public transportation system, bypassing through traffic and provision for BRT for greater connectivity with surrounding towns and settlements.
- Provision of cycle tracks on bund roads along taming river of Anantnag.
- Provision of footpaths and designated bus bays.
- Segregation of slow moving (tongas) and vehicular transport modes.
- Project for parking policy and plan for better mobility in the city of Nagpur is to provide safe, convenient, user friendly and accessible parking systems and improve facilities that are sustainable, mitigate traffic congestion, promote public transport throughout the city by enforcing parking regulations.

• - The project would also promote NMT as the maximum trips are of 1.5 km trip length.

- The proposed Parking strategy will be for mobility corridor, core areas of the city and mixed zones.
- There will be variable pricing in parking, it will be costlier in the city core than on the periphery as the value of the land is different. It will also be hourly based i.e. more in peak hours and lower in off peak hours. Larger the vehicle size, higher its fee.

Session – 5

Reviewers -
- Dr. Sewa Ram, Professor, Transport Planning, SPA, New Delhi - Mr. Kunal Parikh, Independent Consultant - Mr. Jaideep, Director (Electrical) Railway Board, Government of India - Dr. G. J. Joshi, HOD (Transportation Engineering), SVNIT, Surat - Mr. Vijay Anadkat
Rapporteur Ms. Himangi Dalwadi, CEPT University, Ahmedabad

In this session 4 projects were presented and reviewed.

Presenter:	Paper Title
1. Mr. Akhilesh Kumar Saxena	Metro Rail Project as a Catalyst for Enhancing Heritage Value of Walled City of Jaipur
2. Mr. Rajesh Kr. Kaushik	Zoning and Development Regulations for NPT in Transit Oriented Development –Southern Periphery

3. Mr. Kotrappa D., Mr. Suresh Pattar and Mr. Kempana Gudennavar	Last Mile Connectivity in Kalaburagi City on the Rammandir Ring Road to Sedam Ring Road Corridor
4. Mr. Prath Pratim Nath, Mr. Raj Kumar Varshneya and Mr. Satyabir Singh	A Framework for Seamless Integration of the Regional Rapid Transit System (RRTS) with Land uses and Other Transport Modes in NCR

Highlights of Presentations

- Jaipur metro rail project is a catalyst for enhancing heritage value of walled city.
- Metro system requires 1 / 5th energy per passenger km compared to road based system.
- It causes no air pollution in the city and has lesser noise level.
- Carries same amount of traffic as 5 lanes of bus traffic or 12 lanes of private motor cars.
- It will reduce vehicular traffic and parking requirement in the walled city.
- Heritage walks and bicycle tracks can be planned from metro station.
- A project on zoning and development regulations for transit oriented development (TOD) around metro stations / along SPR metro corridor in Gurgaon is to suggest a growth strategy to move people away from private vehicles towards public transportation.
- The aim is to evolve land use zoning regulation for TOD / DOT around metro stations / along with metro corridors in Gurgaon.
- Study on last mile connectivity in Kalaburgi city on the Ram Mandir to Sedam road corridor is to evaluate the public transport system so as to identify the missing link for integrated transportation. Kalaburgi earlier known as Gulbarga is the 4th largest city of Karnatka.
- Study recommends for development of non-motorized transport, fare and timetable integration and physical integration issues.
- This plan will benefit in increasing the ridership of public transport system in competition with private and other modes.
- A high level of modal share is expected by attracting more passengers especially walk, two wheelers, auto and other.
- The motto is to discourage use of personalized motorized modes and to promote public transport accessibility to larger section of population.
- A framework for seamless integration of the Regional Rapid Transit System (RRTS) with land uses and other transport modes in NCR covers Delhi – Panipat RRTS corridor and suggest regulatory framework for development along the corridor.
- There is a need to introduce innovative mechanism to make land available for public projects like land pooling and transfer of development rights. It will imply to amend the existing statutes to facilitate this.
- The project will have to go for innovative financing methods by capturing the increase in land and property value, cess and charges, vacant land tax or under utilization of FAR tax, higher parking charges, congestion charges, auction based motor vehicle registration quota system etc.

Session – 6

Reviewers -
- Shri D. S. Mishra, Addl. Secretary, MoUD, Govt. of India - Dr. Sanjay Gupta, Professor, SPA, New Delhi - Mr. Sudesh Kumar, Mott Macdonald - Mr. I. C. Sharma, National Project Manager, SUTP - Dr. Gundaliya, LD College of Engineering, Ahmedabad
Rapporteur – Ms. Noelene Yesudas, CEPT University, Ahmedabad

In this session 4 projects were presented and reviewed.

Presenter:	Paper Title
Mr. Ambuj Bajpai, Mr. Rajeev Kumar and Mr. S. Anbarasan	Development of Mumbai Metro Line-3 as a Measure to De-Congest Mumbai and Providing Alternate Mode of Transport to the Public
Mr. Ravi Kant, Mr. A. K. Agarwal and Mr. Manoj Kumar	Decongestion of Delhi Roads
Mr. Anilkumar K. Kokate and Mr. Kunwar Shushil Kumar	A Smart Mobility to Nagpur Metro Rail- Through Effective Feeder Bus Services
Mr. Amit Kumar Jain and Ms. Priya Agrawal	Transport Demand Management Tools for Metro Rail System- Strategy to Ease Congestion in DMRC

Highlights of Presentations

- A case study of Mumbai Metro line 3 as a measure to decongest Mumbai and providing alternate mode of transport to the public reveals that prompt action should be taken for re-settlement and rehabilitation issues so that project affected peoples are provided with alternate housing facilities.
- Action should be taken in advance to remove encroachment of land to ensure smooth implementation of the project.
- There should be close coordination with various departments / agencies so that transfer of land from one department to other takes place in a smooth manner.
- Close coordination with Municipal Authorities for effective implementation of the project.
- Decongestion strategies for Delhi roads highlighted the problems which are largely responsible for clogging the streets in Delhi.
- The problems include – fewer buses, illegal parking, freight vehicle movements, road engineering and design, encroachment, last mile connectivity, traffic violations, more cars, lack of NMT infrastructure and poor use of ITS.
- Decongestion strategies in terms of multi-modal integration, provision of NMT infrastructure, bicycle sharing system, improvement of junctions, bus system and BRT corridor development, integrated road network parking pricing and management and smart transport system should be followed.
- Study on smart mobility by Nagpur metro rail

through effective feeder bus service reviews the efficiency of feeder bus services for metro rail system.

- It will explore the best practices and identify the desired feeder bus service planning and operation norms for case stations i.e. Anjani, Chhatrapati and Jai Prakash Nagar.
- Study will estimate the potential demand for feeder bus services at the case study stations.
- Transport demand management tools for metro rail system in Delhi is to identify the congestion related impacts on ridership.
- Yellow line of DMRC has been taken as the case corridor under the study to assess the potential benefits.
- DMRC's approach to tackle congestion:
  - Increase in number of trains per hour; DMRC runs 27 trains per hour in yellow line.
  - Converting 4 car trains to 6 car trains and 6 car trains to 8 car trains on busy lines.
  - Use of a combination of front and rear cross over's at terminal stations to reduce rake turnaround time.
  - Use of Automatic Trains Operations (ATO) to improve efficiency and reliability of operations.
  - Auto Turn Back (ATB) of trains at terminals to minimize turn back time.
  - Intermediate reversal of trains (rather than end stations) to improve the availability of trains on high demand sections.
  - Introduction of additional trains from sidings and terminals during the peak hour in peak direction traffic.
- Demand Management Tools
  - Differential pricing: Higher fares for non peak hours.
  - Parking Policies: Higher parking rates in peak hours encourage commuters to start early and travel in non-peak.
  - Mix land use: Multiple economic and social activities in a region to avoid long distance travel. Development of Multiple CBDs.
- Proposed TDM for Metro systems
  - Differential Fares.
  - Incentives to travel in off peak hours e.g. INSINC scheme of Singapore.
  - Integration with other modes
    - Physical
    - Fare
  - Network Design – Multiple interchange points
  - Promote non congested routes in case of multiple routes
  - Parking Policies
- Time Tabling – Supply more than demand in off peak hours to attract leisure travellers / Sr. Citizens etc. in off peak hours.

Glimpses of Leaders Forum

K. Audience Opinion Poll

As in previous years, an audience opinion poll was conducted in UMI 2016 as well. In various Technical Sessions, 3-4 standard questions related to theme and sub-theme of each session were posed to the audience at the end of the discussions to seek their opinion. Audience present in the hall responded through voting meters and the compiled results were displayed on the screen immediately. Questions, where majority of the participants or more than 50% agreed are listed below:-

Sr. No.	Questions	Yes / No	Percentage View (%)
	Mobility in Small and Medium Towns		
1.	Do you think any major interventions are being made in Small and Medium Towns for development of sustainable transport system?	No	55
2.	Is it a fact that currently major investment in transport is being made in Metro and Mega cities than small and medium town?	Yes	92
3.	Do you feel problems of urban transport need priority attention in small and medium towns before they become unmanageable?	Yes	92
	Institutional and Financial Framework for Metro System		
4.	Is there any need to bring some changes in the existing institutional framework in various metro rail system?	Yes	85
5.	Do you think fare fixation mechanism followed by Metro Rail System in various cities is robust?	No	68
6.	Are the dedicated levies and tax exemption the best way of financing?	No	56
	Climate Resilient Transport		
7.	Do you think the efforts being made for hybrid vehicles, electric vehicles and vehicle using other newer fuels are satisfactory?	No	66
8.	Are we really following Avoid, Shift and Improve approach while planning for urban	No	79

	transport system in various cities?		
9.	Do you think sufficient studies have been made to assess the impact of various motorised mode on climate change in cities?	No	75
	City Bus Service		
10.	Do you think State Transport have taken enough measures to improve City Bus Service in class I cities?	Both Yes / No	46
11.	Do you think there is a need to change policy and perception to promote city buses on priority basis?	Yes	85
12.	Do you think the existing City Bus Service in operation are properly integrated with IPT and other modes?	No	52
13.	Is there adequate application of ITS in operation and management of city Bus Service?	No	76
	Financing Metro System		
14.	Do you think Metro Rail system in Operation have taken enough measures to capture gains from property value along transit corridors?	No	90
15.	Before deciding the rail based mass transit system, do we really study the financial sustainability to opt for viable alternative?	Yes	50
16.	Do you think Metro Rail system coming up in major cities is well integrated with other modes?	No	66
17.	Do you think non-budgetary resources for financing the metro system have been tapped to its full potentials?	No	73
	Intermediate Public Transport Systems in Between vehicles		
18.	Does the IPT really fill the gap between public transport and private vehicles in your city?	Yes	86

19.	Do you agree that IPT operation need strict regulations in your city?	Yes	66
20.	Is there any need for flexible approach to increase the share of IPT in Public Transport?	Yes	68
21.	Has the use of ITS picked up to regulate IPT service?	Yes	44
	Sustainable Mobility Planning – Lessons		
22.	Do you think the existing planning approach helped in preparation of Sustainable Urban Mobility Plan?	No	44
23.	Have we developed any performance standards for sustainable urban transport system?	Yes	47
24.	In view of rapid urbanisation, are we giving due priority to sustainable urban mobility?	No	55
	Electric Mobility for City's Sustainability		
25.	Do you think we are making enough efforts to promote electric vehicles in the cities to achieve the required targets by 2020?	No	82
26.	Are we taking the required steps to promote the use of cleaner technologies to reduce vehicular pollution?	No	69
27.	Is there enough scope for cable car to be used as a mode of public transport in Indian cities in plain areas?	No	53
	Inclusive Mobility : Improving Access for Pedestrians		
28.	Do we consider the issues of inclusiveness at the planning stage of urban transport infrastructure?	Yes	53
29.	Do we have adequate regulatory framework to address pedestrian issues in urban transport?	No	69
30.	Are you aware about the harmonised guidelines and space standard for barrier free built environment for persons with	No	60

	disability and elderly persons recently launched by the Ministry of Urban Development?		
	Comprehensive Mobility Plan for Low Carbon Strategies		
31.	Do you think tempo of preparation of Comprehensive Mobility Plan has slowed down after JNNURM?	Yes	52
32.	Do you think CMPs prepared for about 70 cities earlier have proved to be useful for taking up urban transport projects in cities?	No	46
33.	Are we following low carbon strategies while preparing CMPs?	No	64
34.	Do you find the Revised Toolkit of IUT useful for preparation of Comprehensive Mobility Plan of your city?	Not sure	40
	Road Pricing : A Demand Management Tool		
35.	Do you think unabated addition of road infrastructure like widening of roads, construction of flyover etc. really help in solving the problem of congestion?	No	69
36.	Do you think road tax, parking fee, vehicle excise duty etc. help in mitigating the negative externalities on the road?	Yes	77
37.	Is the time ripe to impose road pricing as travel demand management tool in some selected cities in India?	Yes	76

L. Exhibition

The expo is a special feature of UMI to disseminate and showcase the latest development in urban transport technology and systems, implementation of best transport projects, propagation of innovative ideas, presentation of research in the topical areas of interest in urban transport and exchange of good urban transport initiatives and practices in the field. In all, 31 sponsors and 28 exhibitors (Annexure III & IV) participated in the exhibition and exhibited their products, technology, projects and transport systems for wider dissemination. The exhibition was inaugurated by Shri M. Venkaiah Naidu Hon'ble Minister for Urban Development, Housing & Urban Poverty Alleviation and Information & Broadcasting, Govt. of India on 08th of November, 2016. Seven foreign companies participated in the expo and showcased their products and technologies. A large number of participants and invited guests visited the expo area. The latest technology, particularly the modern buses and computer systems helping in traffic management were special attraction. Exhibitors received a lot of specific queries from the participants to solve urban transport problems in their respective cities.

On the whole the expo was received well by both the participants and the visitors. Award for best exhibitor was given to the following companies. A glimpse of expo area clearly shows the keen interest taken by the delegates in various pavilions of the exhibition.

PRIZE	COMPANY
First Prize	Metro Link Express for Gandhinagar and Ahmedabad (MEGA) Co. Ltd.
Second Prize	Surat Municipal Corporation
Third Prize	Trapeze Group & Tata Motors
Consolation Prize	Mumbai Metro Rail Corporation Limited & Nagpur Metro Rail Corporation Limited












Hon'ble Minister and delegates having a round of the Exhibition

M. Valedictory and Closing Session

Welcome Address by Add. Secy

Shri Durga Shanker Mishra, Additional Secretary, Ministry of Urban Development, Govt. of India welcomed the dignitaries and participants. He highlighted on the large scale participation of delegates both national and international, presentation of technical and research papers, exhibition of products and knowledge portals, presentation of live projects in leader's forum and key messages which emerged out of the 4 day conference. He expressed his gratitude to Govt. of Gujarat, MEGA MD, for their tremendous support, kind cooperation and help in making the conference successful. He said that this was the first conference held outside Delhi but organized better than Delhi with the support of state government and other agencies. He said that deliberation in the conference were intense, useful and fruitful. In the conference more than 4000 delegates registered which included 650 students, 1600Councillors and Mayors, 2100 from different spheres and 50 foreign delegates. The conference had 3 Plenary Sessions, 3 Round Table Discussion, 15TechnicalSessions,6 Research Symposium besides Special Sessions for States and Technical Session for Municipal Councillors. He said that the Ministry of Urban Development is in the process of formulating Metro Policy, Green Urban Mobility Policy and Revised Metro Act.

Address by Dy. Chief Minister of Gujarat

In his address Shri Nitinbhai Patel Hon'ble Dy. Chief Minister of Gujarat stated that conference, as a joint effort of Govt. of India and Govt. of Gujarat has been a successful event. He extended a warm welcome to the Hon'ble Minister of State for Urban Development and Housing and Urban Poverty Alleviation, Govt. of India and all other dignitaries, participants and delegates. He highlighted that Gujarat with 44 percent urbanization level is one of the highly urbanized state in the country. With increasing urban population, cities are facing severe problems of congestion, inadequate facilities and services but Govt. of Gujarat is addressing all such issues holistically. Aspirations of the people are becoming very high. Economic resources of urban local bodies are limited and they look towards state and Govt. of India. State Government has initiated many schemes for urban local bodies in the areas of water supply, other urban facilities, institution and capacity building. Govt. is availing the benefit of central sector schemes by providing the matching grant effectively. In the field of urban transport, Govt. has taken action in improvement of carriage way, traffic regulation and pollution reduction. Development of BRTS, Metro system, parking system and power saving in street light have been taken up with the help of Govt. of India.

On this occasion, the Hon'ble Minister of state for urban Development and Housing and Urban Poverty Alleviation Shri Rao Inderjit Singh gave the awards for excellence in urban transport projects, planned and implemented, by state and city authorities in the following categories:

S.No.	Category	Award Winner	Commendable Initiative
1	**Best NMT Project**	-None-	(i) G – Bike, Cycle Sharing Project, Gandhinagar (ii) Sanjhi Cycle, Karnal
2	**Best City Bus Service Project**	(i)Best City Bus Service, Dharwad, (NWKRTC)	(i) Rajkot City Bus Service
3	**Best Urban Mass Transit Project**	(i) Integrated Mass Transit System (with focus on Bus Rapid Transit System), Surat	(iShort term Mass Transit Solution for Simhastha 2016, Indore
4	**Best Intelligent Transport System Project**	**-None-**	(i) Integrated Depot Management System (IDMS) under strengthening of transport system schemes, Gangtok (ii) J Card, Jabalpur
5	**Best Initiative For Improved Road Safety**	**-None-**	(i) Safety Begins with Team Work, Chandigarh

Hon'ble Minister also gave the best exhibitor awards.

Valedictory Address by Hon'ble Minister of State

In his valedictory address Shri Rao Inderjit Singh Hon'ble Minister of State for Urban Development and Housing and Urban Poverty Alleviation highlighted the vision for changing India for betterment under the leadership of Hon'ble Prime Minister Shri Narendra Modi. He said that 9th Urban Mobility India Conference and Expo has been held at a time when the national capital of Delhi is going through a very harrowing experiences requiring schools be closed, employees are being asked to work from homes, cricket matches cancelled and people scared of coming out as they gasp for fresh air. Delhi is sending a serious warning to all of us. Let us awake before it is too late. In that sense, the relevance and utility of this conference needs no reiteration. The rapid urbanization in our country and the attendant challenges are consequence of deficient urban planning which put's stress on infrastructure.

He said that for our country to realize its full potential, management of urbanization is very critical and we don't have the luxury of time to fix the problems of urban sector. This warrants a collective effort by the Central and State Governments, Urban Local Bodies and all other stakeholder. Urban mobility decides how our cities will grow and hopefully thrive as effective engines of economic growth. Challenges are huge as are the attendant opportunities, if only we make the right moves at the right time.

Substantial participation from foreign countries both in the deliberations and in the exhibition prove the growing attraction that this conference has found over the last eight years. The fact that Swiss Embassy and CODATU have lined up two sessions each on different aspects of urban mobility is a certain evidence of the appeal of this multi-stakeholder consultation forum.

Policy makers and officials from Central and State Governments, experts, professionals, academia, corporate sector and other stakeholders have brainstormed over the current and future concerns about urban mobility, sustainable development and crystallized common concerns after four days of deliberations. These common positions emerging from this conference and relating to Public Transport, Non-Motorized Transport, issues concerning small and medium towns, Comprehensive Mobility Plans, Metro Projects, Climate change concerns, Road safety etc., will form vital inputs for further policy and executive actions. In other words, the outcomes of this conference reflect our shared concern for urban renaissance in the framework of inclusive and sustainable urban development. While complimenting all concerned in this regard he summarized the major conclusions and recommendations of the 9th Urban Mobility India Conference.

Public Transport and Non-Motorized Transport

1. Expressing deep concern over growing inequity in sharing public spaces in urban areas and declining share of public transport, the Conference called for inclusive urban transport solutions including restoration of the first right of pedestrians to road use and increased investments to provide accessible, efficient and reliable public transport under the overarching frame work of people centric planning.

2. The conference called for promotion of Non-Motorized Transport with the objective of promoting walking and cycling as viable alternatives to increased use of private motorized vehicles and efficient and comfortable bus services in cities including BRT. Need for promotion of NMT and public transport under smart city development. To enable 'walk to work' living under development along mass rapid transit systems i.e. Transit Oriented Development has been supported.

3. Preparation of Comprehensive Mobility Plan (CMP) should be mandatory before financing of urban transport projects by both the Central and State Governments. Noting that CMPs ensure exploration of other available alternatives before deciding on capital intensive projects like Metro Rail Projects, there is need for incorporating climate change concerns while planning for urban transport interventions so as to promote low carbon transport solutions, effective integration of land use planning with transport planning by incorporation of Development Plans, Transport Plans and Local Areas Plans.

4. Central and State Governments and Urban Local Bodies to set up Unified Metropolitan Transport Authorities (UMTA) within a specific time frame for effective coordination. In view of the vast potential for private sector involvement, enabling environment should be created for effective utilization of PPP model of resource mobilization by reviewing the current principles of PPP and providing for risk sharing by government agencies for making PPP a success.

Metro Rail projects being capital intensive, innovate financing mechanisms like Land Value Capture be followed for recovery of capital investment in conjunction with annual fare revision and increased non-fare revenue.

Audience at the Valedictory Session

Capacity enhancement of metro projects be done through necessary automation and other innovations for enhancing 'customer experience' and revenue maximization instead of focusing on cost reduction. Metro projects needs to be viewed as urban transformation initiatives rather than as mere transport interventions, given their impact on socio-economic development in an urban setting.

Multi-Modal integration is required to incentivise people to use public transport. Effective regulation of Intermediate Public Transport (IPT) like e-rickshaws for their orderly growth and safety and security of passengers as well as drivers and for ensuring reliable first and last mile connectivity is necessary. A shift is required not only from 'intra-city' operations but also to connect close by satellite towns, for improving viability of such services by taking advantage of urban expansion. Expeditious introduction of electrical vehicles and clean fuel based vehicles in the context of growing reliance on renewable and low carbon forms of energy is recommended. Need is to focus on small and medium towns with necessary long term planning for sustainable urban transport solutions to prevent the situation in these towns getting out of hand, focus on NMT, vertical growth for dense urban living etc. In order to address the chaotic problem of parking in cities, effective measures should be taken through various fiscal and non-fiscal measures after building a consensus besides adopting smart parking solution.

City governments to undertake studies on traffic flows, modal preferences, present and future transport corridors etc., and develop effective data bases for informed decision making and planning. Governmental support is effectively directed to reach the more deserving sections of the people, while financing urban transport projects. He said that Data Management Centre to be managed by the Institute of Urban Transport launched during the Conference will serve as repository of information and researched literature for empowering all concerned for policy and project formulation.

It is through such deliberations that we broaden our horizons and move ahead by addressing the challenges through shared consciousness. Emboldened by the success of this conference, now let us look forward to the next Conference to be held in Hyderabad next year and CODATU (Cooperation for Urban Mobility in the developing world), a non-profit organization launched in 1980 and based in France, will also be associated with the next conference. The next year's meet, UMI-CODATU Conference will be held during November 4 – 6, 2017 on the theme “Intelligent, Inclusive and Sustainable Urban Mobility”, jointly by the Ministry of Urban Development, Government of Telangana and CODATU.

This Conference is the first ever to be held outside Delhi in the state of Gujarat, famously known as the happening State. While sincerely thanking the Government of Gujarat for co-hosting this meet and extending full support, he complimented officials of both the Governments and all the participants for making the Conference a success. Let all of us collectively build a resurgent Urban India.














Hon'ble Minister of State giving away the awards for the best projects

Annexure I: Detailed Conference Programme

Day 1 (8th November, 2016)	
1600 – 1630	**Inauguration of the Exhibition** *(Exhibition Hall 1)*
1630 – 1730	***Inaugural Session*** *(Seminar Hall 4)*
	Welcome Address by Shri Rajiv Gauba, Secretary (UD), Ministry of Urban Development, Government of India Key note address by Mr Chang Woon Lee, President, Korea Transport Institute (KOTI) Address by Shri Vijaybhai R. Rupani, Hon'ble Chief Minister, Gujarat Launch of Knowledge Management Centre, release of publications on Urban Transport by Chief Guest and signing of MoU between IUT and KOTI Inaugural address by Shri M. Venkaiah Naidu, Hon'ble Minister of Urban Development, Housing & Poverty Alleviation and Information & Broadcasting, Government of India Vote of Thanks by Shri Durga Shanker Mishra, Additional Secretary (UD), Ministry of Urban Development, Government of India
1730 – 2000	***Hi-Tea and poster presentation followed by Visit to Dandi Kutir/ Exhibition***
1800 – 2000	***Special Session for Municipal Councillors*** **-** Decongesting Roads/ Intersection for relieving Traffic Congestion*(Seminar Hall 3)* **Chairperson** - Shri Nitin Bhai Patel, Hon'ble Deputy Chief Minister, Government of Gujarat Introductory Remarks by Shri Rajiv Gauba, Secretary , Ministry of Urban Development, Government of India Opening Remarks by Hon'ble Deputy Chief Minister, Gujarat Presentation 1 - Dr. O.P. Agarwal, ED, ISB, Mohali Presentation 2 - Mr. V. Ravichander, Chairman, Feedback Business Consulting Presentation 3 - Shri Bimal Patel, President, CEPT University, Ahmedabad Open House Discussion • Vote of Thanks by Shri D.S Mishra, Additional Secretary, Ministry of Urban Development, Government of India
2000 onwards	***Inaugural Dinner hosted by Ministry of Urban Development, Government of India*** *(Exhibition Hall 1)*

Day 2 (9th November, 2016)	
0930 - 1100	**Research Symposium 1 - Integrated Land use Transport Planning** *(Seminar Hall 1)*
	Chairperson – Dr. G.J. Joshi, HOD (Transportation Engineering), SVNIT, Surat Assessment of TOD Policies and Implementation Process, cases of Delhi and Ahmedabad – Ms. Pratibha Singh, CEPT University, Ahmedabad Impact of Metro System on The Development of Twin Cities: Kolkata and Howrah – Ms Priyadarshika Das, School of Planning & Architecture, New Delhi Land Use – Transport Decisions in the Development Plan: a case study of Vadodara - Ms. Urvi Bhatt, CEPT University, Ahmedabad Relation Between Urban Form and BRTS Transit Use – Ms Mithila Chaudhari, CEPT University, Ahmedabad **Rapporteurs** - Mr. Navnit S & Ms. Pooja Ghosalkar, CEPT University, Ahmedabad
0930 – 1100	**Research Symposium 1 - Integrated Land use Transport Planning** *(Seminar Hall 1)*
	Chairperson – Dr. Sanjay Gupta, HOD (Urban Planning), School of Planning and Architecture, New Delhi **Co-Chair** – Ms Nitika Bhakuni, Associate Professor, CEPT University, Ahmedabad Transportation Affordability for Relocated Urban Poor: Case Study of Sabarmati Riverfront, Ahmedabad - Mr Mustafa Sonasath, Centre of Excellence in Urban Transport, Ahmedabad Travel Time Dynamics: A Study of Travel Time Budgets in an Indian City – Ms Supraja Krishnan, CEPT University, Ahmedabad Contestations in Parking Policy – Mr Vivek M Chandran, CEPT University, Ahmedabad Guidelines for Selection of Appropriate Pedestrian Crossing Facility at Mid-Block Sections – Mr Udit Jain, IIT Roorkee **Rapporteurs** - Ms. Sneha Mohan Nair & Mr. Hitav Patel, CEPT University, Ahmedabad
0930 – 1100	**Research Symposium 3 - Public Transport Planning, Operations and Management** *(Seminar Hall 3)*
	Chairperson – Dr. O.P. Agarwal, Executive Director, ISB, Mohali • Effect of Transit Signal Priority on Bus Rapid Transit System (BRTS) – Mr Sahil Chawla, CEPT University, Ahmedabad

	Analyzing Urban Mass Rapid Transit Networks Using Graph Theory – Mr Ashwini Soman Ranade, CEPT University, Ahmedabad Fuzzy Logic Based Human Perception Model for Public Transport Planning: A Case Study of Thiruvananthapuram City – Mr Rohit RP, School of Planning & Architecture, New Delhi Productivity of Railway Stations: Case Study of New Delhi Railway Station – Mr Rohit Anand, School of Planning & Architecture, New Delhi **Rapporteurs** - Ms. Srinavya Annem & Mr. Subhadeep Bhattacharjee, CEPT University, Ahmedabad
0930 – 1100	**Technical Session 1 – Introductionto PTV** *(Meeting Room)* (Sponsored by PTV)
	Welcome & Introduction – Mr Thomas Schwerdtfeger, PTV Group PTV Group Activities in India & PTV Academics Launch – Mr Sonal Ahuja, PTV Group What's New in PTV Software – Mr Sonal Ahuja, PTV Group
1100 – 1130	*Tea &Coffee Break/ Networking Break/ Transport Quiz (Exhibition Hall 1)*
1130 – 1300	**Technical Session 2 – Improving City Bus Service***(Seminar Hall 1)*
	Chairperson – Dr. M. Ramachandran, Former Secretary, MoUD Modernizing City Bus Service in Future Cities – Shri Prasanna Patwardhan, CMD, Prasanna purple Best Practices in Operation and Maintenance of Urban Buses - Shri Jayant Deshmukh, MP group Delivering Efficient Bus Operations through Proven Technology - Mr Bill Delany, MD, Trapeze Group Asia Pacific Experience with Implementing Efficient & Sustainable City Bus Systems in Indian Cities – Ms Nupur Gupta, Senior Transport Specialist, GTIDR, The World Bank **Rapporteurs** - Ms. Visakha K A & Ms. Avni Mehta, CEPT University, Ahmedabad
1130 – 1300	**Technical Session 3 – Financing Metro Systems***(Seminar Hall 2)*
	Chairperson – Shri. I.P. Gautam, MD, MEGA Multimodal Integration to Develop a City Wide Public Transport Network and its Impact on Financial Sustainability - Shri Mohinder Singh, Advisor, LTA Financial Structure for Metros of Future Cities – Shri Brijesh Dixit, MD, Nagpur Metro

	Financial Sustainability of Regional Transit: RRTS – Shri Vinay Kumar Singh, MD, NCRTC PPP Scheme for financing Urban Railways in Korea - Dr. Jinsu Mun, Research Fellow, Korea Transport Institutei **Rapporteurs** - Mr. Hitav Patel & Ms. Urvashi Yadav, CEPT University, Ahmedabad
1130 – 1300	**Round Table Discussion 1 – Mobilize Your City - Comprehensive Mobility Plans for Low Carbon Strategies***(Seminar Hall 3)* (organized by CODATU)
	Moderator – Mr Julien Allaire, Executive Manager, CODATU Dr. Sanjay Gupta, Head of Department (Urban Planning), School of Planning and Architecture, Delhi Shri. G. P. Hari, Deputy General Manager, Kochi Metro Ms. Rima Le Coquic, Head of Transport and Energy, AFD Mr. Etienne Lhomet, Urban Transport Expert, CODATU **Rapporteur –** Ms Marion Hoyez, Cooperation Project Manager, CODATU – India
1130 – 1300	**Technical Session 4 – Smart Traffic Solution for Smart Cities***(Meeting Room)* (Sponsored by PTV)
	Car Following Model for Heterogeneous Traffic Conditions – Shri Shriniwas S Arkatkar, SVNIT, Surat Effectiveness of Queue Jumper Lane and TSP for Bus Performance Improvement – Shri Sahil Chawla, CEPT University, Ahmedabad Optimizing/Modelling Toll Way Operation Using Micro Simulation: Case Study Sanand Toll Plaza, Ahmedabad – Shri K S Anbumani, L&T Infrastructure & Shri Manraj Bains, Transaxiom Smart Signaling by PTV Epics & PTV Balance, Case Study: Delhi & Pune– Mr Prabhu TD, PTV Group
1130 – 1300	**Leaders Forum- Sharing of Experience** *(Conference Room 1)*
	Chairperson – Shri Mukund Kumar Sinha, OSD (UT) & E.O. J.S., Ministry of Urban Development, Government of India **Presenters** Mr Kamal Nagar- Joint Director, UAD, MP Mr G.P. Hari- Dy. Chief Engineer, Kochi Metro Rail Limited Ms Deepa Dave- Assistant Manager, AMC Mr Chirag Pandya, City Engineer at Rajkot Municipal Corporation Mr. Y.K. Goswami, Assistant Town Planner, Rajkot Municipal Corporation Harshadray J. Solanki., Director, Solid Waste Management, AMC

1300 – 1430	*Lunch/ Visit to Exhibition (Exhibition Hall 1)*
1430 – 1600	**Technical Session 5 – Intermediate Public Transport: Systems in between Public Transport and Private vehicles** *(Seminar Hall 1)*
	Chairperson – Shri Y.P. Sachdeva, Group General Manager, RITES Improving and Upgrading Autos and Shared Tempos – Ms Akshima T Ghate, Fellow and Associate Director, TERI Financial Sustainability of Auto Service: Aggregator Model, G-Autos Surat – Shri Nirmal Kumar, Director, Nirmal Foundation E-rickshaw: The Future in Indian Cities – Ms Kanika Kalra, Urban Transport Expert & Acting Director- KMC, IUT (India) and Shri M.L. Chotani, Consultant, IUT (India) **Rapporteurs** - Mr. Navnit S & Ms. Pooja Ghosalkar, CEPT University, Ahmedabad
1430 – 1600	**State Specific Session 1 – Mobility Solutions in Smart Cities of Gujarat***(Seminar Hall 2)* (organized by CEPT University, Ahmedabad)
	Chairperson: Shri. Poonam Chand Paramar, Additional Chief Secretary, Urban Development & Urban Housing Department, Government of Gujarat. **Co-Chair:** Prof. H. M. Shivanand Swamy, Executive Director, CEPT University, Ahmedabad Opening Remarks Smart Mobility Plan for Ahmedabad – Shri Mukesh Kumar, Municipal Commissioner, Ahmedabad Smart Mobility Plan for Surat – Shri M. Thennarasan, Municipal Commissioner, Surat Metro Systems in Ahmedabad and Surat – Shri I.P. Gautam, Managing Director, MEGA **Rapporteurs** - Mr. Palash Shukla & Ms. Vrunda Shukla, CEPT University, Ahmedabad
1430 – 1600	**Technical Session for Municipal Councillors – Inclusive Mobility: Improving Access for Pedestrians***(Seminar Hall 3)*
	Chairperson – Dr. Mangu Singh, Managing Director, Delhi Metro Rail Corporation **Presenters:** Inclusive Design for Pedestrians - Shri Pashim Tewari, Technical Director, AILSG Planning for Sustainable Pedestrian Infrastructure – Shri Nalin Sinha, ITDP India

	New Emerging trends towards inclusive Pedestrianisation - Dr. Sanjay Gupta, Head of Department (Urban Planning), School of Planning and Architecture, New Delhi How to Implement Walkable Urbanism - Ms. Abha Negi **Rapporteurs** - Mr Arnab Sen, Senior Project Officer, AILSG
1430 – 1600	**Technical Session 6 – Solution for Multimodal Urban Transport***(Meeting Room)* (Sponsored by PTV)
	Safety Audit of Pedestrian Safety Measures at T-junction of Baba Banda Singh Bahadur Setu with Aurobindo Marg using Micro Simulation – Shri Sudershan K Popli, RITES & Shri Manraj Bains, Transaxiom Impact of Implementing Congestion Charging Using PTV Vissim – Mr m Jobson Joseph, Rajiv Gandhi Institute of Technology, Kottayam Improving Pedestrian Facility in Congested Urban Area – Ms Dipika Gupta, L. D. College of Engineering, Ahmedabad Integration of PTV Vistad with Accident Mapper (Mobile Application) – Shri Rishi Ahuja, Sunovatech Group Interactive Session on Future Development Vote of Thanks
1430 – 1600	**Round Table Discussion 2 – Advancing Bus-Based Public Transport for Green Urban Mobility in India** *(Conference Room)* (Sponsored by the Federal Government of Germany through KFW)
	Chairperson- Shri Mukund Kumar Sinha, OSD (UT) & E.O.J.S., Ministry of Urban Development, Government of India **Moderator**- Ms Sonia Arora, Urban Transport Expert, IUT (India) **Presenter** Mr Ishan Chanda, Urban Transport Planner, IUT (India) Mr Robert Valkovic, Senior Project Manager, KfW Development Bank, Urban Development & Mobility, South Asia **Lead Discussants** Mr Robert Valkovic, Senior Project Manager, KfW Development Bank Urban Development & Mobility, South Asia Shri C.K Goyal, Associate Vice President (Road Transport), DIMTS
1600 – 1630	*Tea & Coffee Break/ Networking Break/ Transport Quiz (Exhibition Hall 1)*

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1430 – 1600	*Tea & Coffee Break/ Networking Break/ Transport Quiz (Exhibition Hall 1)*

1630 – 1800	**Plenary Session 1 – Mobility in Small and Medium Towns** *(Seminar Hall 1)*
	Chairperson – Dr. O.P. Agarwal, Executive Director, ISB, Mohali Public Transport in South African Cities: A Spatial Conundrum – Mr Michael Kihato, National Treasury, South Africa Planning City Bus Service in Small and Medium Towns – Shri H.S. Asokanand, Managing Director, NeKSRTC Transforming Urban Transport Scenario in the State of Madhya Pradesh - Shri Kamal Nagar OSD (Transport), Urban Administration and Development Department (UADD), Government of Madhya Pradesh Addressing Mobility Challenges in Hill Cities - Mr. Lalmuansanga Ralte, Under Secretary, Urban Development & Poverty Alleviation, Govt. of Mizoram **Rapporteurs** - Ms. Srinavya Annem & Mr. Subhadeep Bhattacharjee, CEPT University, Ahmedabad
1800 onwards	Site Visit to Janmarg BRTS (optional)

Day 3 (10th November, 2016)	
0930 - 1100	**Research Symposium 4 - Travel Demand Management for Sustainable Mobility***(Seminar Hall 1)*
	Chairperson - Dr. Sewa Ram, Professor, School of Planning and Architecture, New Delhi Sustainable Transportation Options For a Tourist Hill Town, Case Study: Darjeeling – Mr Dipanjan Nag, IIT Kharagpur The Alternative Travel Demand Management Strategy: Employer Travel Demand Management Measures – Ms Noelene Marisa Yesudas, CEPT University, Ahmedabad Congestion Pricing: A Case Of Delhi – Ms Minoti Rawat, CEPT University, Ahmedabad Modeling The Activity Based Travel Pattern of Workers of an Indian Metropolitan City: Case Study of Kolkata – Mr Aritra Chatterjee, School of Planning & Architecture, New Delhi **Rapporteurs** - Ms. Srinavya Annem & Mr. Subhadeep Bhattacharjee, CEPT University, Ahmedabad
0930 – 1100	**Research Symposium 5 – Green, Safe and Inclusive Transport** *(Seminar Hall 2)*
	Chairperson - Dr. Vinay Maitri, Professor, School of Planning and Architecture, New Delhi **Co-Chair** - Ms Shalini Sinha, Associate Professor, CEPT University, Ahmedabad Pedalling Through Partnerships: Role of Private and Third-sector in Active Travel Strategies in Delhi – Ms Jyoti Vijayan Nair, The University of Edinburgh Are Signalized Intersections with Crosswalks Safer in India? A Study Based on Safety Analysis using Video Data – Ms Marisamynathan S., IIT Bombay To Develop Methodology for Prioritization of Road Safety Measures: Case Study of NCT Delhi - Mr Shawon Aziz, School of Planning & Architecture, New Delhi **Rapporteurs** - Mr. Navnit S&Ms. Pooja Ghosalkar, CEPT University, Ahmedabad
0930 – 1100	**Research Symposium 6 - Freight Management, Transport Economics & Planning for Future Mobility***(Seminar Hall 3)*

	Chairperson - Dr. P. J. Gundaliya, LD Engineering College, Ahmedabad Maintenance Free Planning of a Transportation System- An Image Processing Approach – Ms Ankita Khatri, PEC University of Technology, Chandigarh Potential of Freight Transport Through Inland Waterways – Ms Saloni Gupta, School of Planning & Architecture, New Delhi Potential of Freight Distribution through Urban Rail System- Case Study Delhi – Ms Monika Singh, School of Planning & Architecture, New Delhi **Rapporteurs** - Ms. Sneha Mohan Nair&Mr. Hitav Patel, CEPT University, Ahmedabad
0930 – 1100	**Leaders Forum (Mid-term Review of Mentoring Projects) – 1** *(Conference Room1)* (organized by CEPT University, Ahmedabad)
	Chairperson: Shri D.S. Mishra, Additional Secretary, Ministry of Urban Development, Government of India **Reviewers** - Mr. O.P Agarwal, Mr Laghu Parashar, Mr. A.S Lakhra, Mr. Jaideep and Mr Vijay Anadkat Technology can influence Policy Decisions - Ms. Shikha Juyal Study of Mobility Plan of Meerut: Rerouting of City Bus Routes and Relocating the Regional Depots in Light of Upcoming Metro Railway - Mr. Sandeep Laha and Mr. Parvez Bashir Project to Decongest Polo Area, Shillong and its Surroundings - Mr. M. Kharkrang Structuring of Feeder Services of Metro: A Case Study of East West Corridor, Namma Metro, Bangalore - Mr. B. C. Renukeshwar **Rapporteur** - Ms Chintan Daftardar, CEPT University, Ahmedabad
0930 – 1100	**Leaders Forum (Mid-term Review of Mentoring Projects) – 2***(Conference Room2)* (organized by CEPT University, Ahmedabad)
	Reviewers - Shri D.S. Mishra, Prof. Shivanand Swamy, Mr. K. Ramamurthy, Mr Gautam Patel, Ms. Kanika Kalra, Mr. I.C. Sharma Intelligent Transport Systems in Chhattisgarh - Mr. Surender Kumar Mriga J card - an RFID based Automated Public Transport Fare Collection Systems for the City of Jabalpur - Mr. Sachin Vishwakarma and Ms. Ankita Gupta Fare Integration and Developing a Common Mobility Card for AICTSL Different Services - Mr. Rahul Shrouti

	Redevelopment Plan for Station Area Integrating Land-use and Mobility – Case Study : Tambaram Station - Mr. N. S. Periyaswamy and Mr. V. Kumar **Rapporteur** - Ms Sneha Sharma, CEPT University, Ahmedabad
1100 – 1130	*Tea &Coffee Break/ Networking Break/ Transport Quiz*
1130 – 1300	**Technical Session 7 – ITS for Smart Mobility***(Seminar Hall 1)* (organized by SPA)
	Chairperson - Prof. (Dr.) P. K. Sarkar, Head, Department of Transport Planning, School of Planning and Architecture, New Delhi Experience of Congestion Pricing in Large cities: Lessons Learned - Dr Jitendra Bajpai, Adjunct Faculty (Sustainable Cities), Earth Institute, Columbia University, New York Advanced Traffic Signal Control System in Indian Cities - Mr. Ravi Kumar, Director, ITNS, CDAC Comprehensive Mobility Plan: Role of ITS - Prof. (Dr.) P. K. Sarkar, Head, Department of Transport Planning, SPA, New Delhi Optimal ITS Infrastructure Deployment using Cellular Network and GPS Probes – Mr Manish Chaturvedi and Mr Sanjay Srivastava, DA-IICT, Gandhinagar **Rapporteurs** - Mr. Sarang Pingale&Ms. Anuja Kothawala, CEPT University, Ahmedabad
1130 – 1300	**State Specific Session 2 – Mobility in Smart Cities of Madhya Pradesh** *(Seminar Hall 2)*
	Chairperson - Shri Jitendra Dubey, Engineer in Chief & Director (Operations), UADD, Madhya Pradesh **Co-Chair** – Mr. Kamal Nagar, OSD UT & Additional Collector UADD, Madhya Pradesh Smart Mobility Plan of Indore - Sri Sandeep Soni, CEO, AICTSL, Indore Smart Mobility Plan of Jabalpur – Ms. Ankita Gupta, Transport Planner, Jabalpur City Transport Services Limited Bench Marking Urban Transport - A Strategy to fulfil Commuter Aspiration - Shri Rahul Tiwari, Urban Transport Officer, UADD, Madhya Pradesh. **Rapporteurs** - Ms. Srinavya Annem &Mr. Subhadeep Bhattacharjee, CEPT University, Ahmedabad

1130 – 1300	**Technical Session 8 – Sustainable Urban Mobility Planning: Lessons Learned***(Seminar Hall 3)* (Organized By CODATU)
	Chairperson - Mr. Ali Huzzayin, Vice President, CODATU Sustainable Urban Mobility Plan In Portugal – Ms Rosario Macario, University Of Lisbon Integrated Mobility Plan for Ahmedabad - Ms. Nitika Bhakuni, Assistant Professor, CEPT University, Ahmedabad Low-Carbon Mobility Plans in India – Ms Kanika Kalra, Urban Transport Expert & Acting Director (KMC) and Shri M.L. Chotani, Consultant, IUT (India) SUMP in Bordeaux – Mr. Etienne Lhomet, Urban Transport Expert, CODATU **Rapporteur** – Ms. Visakha K. A., CEPT University, Ahmedabad
1130 – 1300	**Technical Session 9 – Smart mobility – Swiss innovations***(Meeting Room)* (Sponsored by Embassy of Switzerland)
	Welcoming address - Mr. Andreas Baum, Ambassador of Switzerland to India and Bhutan **Moderator** – Mr Shirish Sinha, Deputy Director of Cooperation, Swiss Agency of Development and Cooperation in India (SDC) Urban Transport Planning within Existing Mobility and Transport Infrastructures – Dominik Brühwiler, Deputy Director, Zurich Transport Authority ZVV Swiss Innovations in the Rail and Metro sector - Michele Molinari, Board member Swiss Rail Industry Association, CEO Molinari Rail Ltd. **Driverless Public Transport** **Chairperson**: Prateek Khare, Head of Innovation and Entrepreneurship, Swissnex India Prof. Yann Bocchi, Head of the Software Engineering Unit, Business Information Systems Institute at University of Applied Sciences and Arts, Western Switzerland (HES-SO) Valais Raphael Gindrat, CEO, Bestmile
1130 – 1300	**Leaders Forum (Mid-term Review of Mentoring Projects) – 3** *(Conference Room 1)* (organized by CEPT University, Ahmedabad)
	Reviewers - Mr. Laghu Parashar, Ms. Shalini Sinha, Mr. I C Sharma, Ms Sonia Arora

	Planning of Rapid Public Transit System for Andhra Pradesh Capital Region - Mr. Manoj Kumar Mandapati and Ms. Sucheta Yarakala Design of the Sustainable Pedestrian Infrastructure Based on Empirical Analysis of Pedestrian Traffic in Lucknow - Mr. Arvind Kr. Maurya Comprehensive Plan for Decongestion of Cities/ Towns (2 towns) of Jammu - Mr. Soujanya Sharma Comprehensive Strategy to Decongest Pune Railway Station Area - Dr Hemant R. Sonawane A Plan for Kolkata –Tram - Mr. Aghore Kumar Roy **Rapporteur** - Ms Chintan Daftadar, CEPT University, Ahmedabad
1130 – 1300	**LUTP Review – 4** *(Conference Room 2)* (organized by CEPT University, Ahmedabad)
	Reviewers – Shri D.S. Mishra, Prof. Shivanand Swamy, Mr Gautam Patel, Mr. Abhijit Lokre, Mr. I.P Gautam, Ms Nupur Gupta Automated Collection of Adda Fee (Parking fee at ISBT) - Mr. Amit Talwar Improvement of Footpaths for Pedestrians in Aizawl city - Mr C. Lalmuanawma, Mr C. Vanlalvena and Mr. Lalmuansanga Ralte Sustainable Transport System in Anantnag Town - Mr. Tofael Matto Project Structure for Parking Policy and Plan for Better Mobility in the City of Nagpur - Mr. Shivaji Jagtap and Mr. Mahesh Gupta **Rapporteur** - Ms Sneha Sharma
1300 – 1430	*Lunch/ Visit to Exhibition*
1430 – 1600	**Technical Session 10 – Electric Mobility for City's Sustainability** *(Seminar Hall 1)*
	Chairperson – Mr P. K. Banerjee, Deputy Executive Director, SIAM India needs Sustainable Electro-Mobility to Decarbonize Transport: Way Forward by IRU-led All India Smart Move High Level Group - Dr Kulwant Singh, Coordinator, IRU-led All India Smart Move High Level Group, India Cable Car in Urban India: Scopes and Opportunities - Dr. Pawan Kumar, Associate TCP, Town & Country Planning Organization Urban Cable Transport - Dr Johannes Fiedler, Head Research, Doppelmayr Urban Solutions (Sponsor) Imperatives to Deliver on the Electro Mobility Vision in India - Mr Emmanuel Jupet, Vice President, Product Management & Business Development, Business Region International, Volvo Bus Corporation **Rapporteurs** - Ms. Sneha Mohan Nair & Mr. Hitav Patel, CEPT University, Ahmedabad

1430 – 1600	**State Specific Session 3 – Mobility in Smart Cities of Maharashtra** *(Seminar Hall 2)*
	Chairperson – Shri K V Krishna Rao, Prof. IIT Bombay Urban Transport infrastructure in MMR - Mr Khubchand Pawar, Mumbai Metropolitan Development Authority (MMRDA) Implementation of Kerb Side Bus lane in Bandra- Kurla Complex – Mr Sidharth Gondhale, Mumbai Metropolitan Development Authority (MMRDA) Smart Mobility Plan of Pune – Shri Rajendra Jagtap, Additional Municipal Commissioner, Pune BRTS Pimpri Chinchwad – Shri Pratik Dave, Technical Advisor BRTS, Pimpri Chinchwad **Rapporteurs** - Ms. Visakha K A & Ms. Priyanka Sawant, CEPT University, Ahmedabad
1430 – 1600	**Round Table Discussion 3 – Road Pricing: A Demand Management Tool** *(Seminar Hall 3)* (organized by IUT & funded by Shakti)
	Chairperson - Dr. Mohinder Singh, Advisor, LUTP, Singapore **Moderator**- Ms Sonia Arora, Urban Transport Expert, IUT (India) **Presenter** – Ms Baveena KV, Transport Planner, IUT (India) **Lead Discussants** Dr Jitendra Bajpai, Adjunct Faculty (Sustainable Cities), Earth Institute, Columbia University, New York **Rapporteur** – Mr. Karia Parth, IUT (India)
1430 – 1600	**Technical Session 11 – Smart Mobility – Swiss innovations** *(Meeting Room)* (Sponsored by Embassy of Switzerland)
	Lessons Learnt from Emerging Countries on Integrated Mobility Solutions - Martin Stucki, CEO, Transitec Consulting Engineers Ltd. Integrated Transport Systems: Mobility Policy for the Future - Dr. Thorsten Klaas-Wissing, Vice–Director, Chair of Logistics Management University of St. Gallen **Roundtable** **Moderator** - Shirish Sinha, Deputy Director of Cooperation, Swiss Agency of Development and Cooperation in India (SDC)

	Discussants Dr. Thorsten Klaas-Wissing, Vice-Director Chair of Logistics Management, University of St. Gallen Dominik Brühwiler, Deputy-Director Zurich Transport Authority Martin Stucki, CEO, Transitec Mr. Vijay Nehra, Vice Chairman and Managing Director, Gujarat State Road Transport Corporation Mr. Sidharth Sihag, Commissioner, Udaipur Municipal Corporation Mr. I. C. Sharma, National Project Manager - SUTP
1430 – 1600	**Leaders Forum (Mid-term Review of Mentoring Projects) - 5** *(Conference Room1)* (organized by CEPT University, Ahmedabad)
	Reviewers - Dr. Sewa Ram, Mr. Kunal Parikh, Mr. Jaideep, Dr. GJ Joshi, Mr Vijay Anadkat Metro Rail Project as a Catalyst for Enhancing Heritage Value of Walled City of Jaipur - Mr. Akhilesh Kumar Saxena Zoning and Development Regulations for NPT in Transit Oriented Development –Southern Periphery Road, Gurgaon Manaser Urban Complex - Mr. Rajesh Kr. Kaushik Last Mile Connectivity in Kalaburagi City on the Rammandir Ring Road to Sedam Ring Road Corridor - Mr. Kotrappa D., Mr. Suresh Pattar and Mr. Kempana Gudennavar A Framework for Seamless Integration of the Regional Rapid Transit System (RRTS) with Land uses and Other Transport Modes in NCR - Mr. Prath Pratim Nath, Mr. Raj Kumar Varshneya and Mr. Satyabir Singh **Rapporteur** - Ms Himangi Dalwadi, CEPT University, Ahmedabad
1430 – 1600	**Leaders Forum (Mid-term Review of Mentoring Projects) - 6** *(Conference Room2)* (organized by CEPT University, Ahmedabad)
	Reviewers – Shri D. S. Mishra, Dr. Sanjay Gupta, Mr. Sudesh Kumar, Mr. I C Sharma, Dr. Gundaliya Development of Mumbai Metro Line-3 as a Measure to De-congest Mumbai and Providing Alternate Mode of Transport to the Public - Mr. Ambuj Bajpai, Mr. Rajeev Kumar and Mr. S. Anbarasan Decongestion of Delhi Roads - Mr. Ravi Kant, Mr. A. K. Agarwal and Mr. Manoj Kumar A Smart Mobility to Nagpur Metro Rail- Through Effective Feeder Bus Services - Mr. Anilkumar K. Kokate and Mr. Kunwar Shushil Kumar Transport Demand Management Tools for Metro Rail System- Strategy to Ease Congestion in DMRC - Mr. Amit Kumar Jain and Ms. Priya Agrawal

	Rapporteur - Ms Noelene Yesudas, CEPT University, Ahmedabad
1600 – 1630	*Tea &Coffee Break/ Networking Break/ Transport Quiz (Exhibition Hall 1)*
1630 – 1800	**Plenary Session 2 (Panel Discussion)– Institutional and Financial Framework for Metro Systems***(Seminar Hall 1)*
	Chairperson – Shri D.S. Mishra, Additional Secretary, Ministry of Urban Development, Government of India **Presenter** Dominic Patella, Senior Transport Specialist, World Bank Richard Anderson, Director, RTSC, Imperial College London **Panelist** Shri I.P. Gautam, Managing Director, MEGA Ms Ashvini Bhide, Managing Director, Mumbai Metro Shri P.K. Bansal, Managing Director, Chennai Metro Shri Brijesh Dixit, Managing Director, Nagpur Metro Shri Vinay Kumar Singh, Managing Director, NCRTC **Rapporteurs** - Mr. Sarang Pingale&Ms. Anuja Kothawala, CEPT University, Ahmedabad
1800 onwards	Site Visit to Sabarmati River Front (optional)

Day 4 (11th November, 2016)	
0930 – 1100	**Plenary Session 3 - Climate Resilient Transport** *(Seminar Hall 1)*
	Chairperson – Shri D.S Mishra, Additional Secretary (Urban Development), Ministry of Urban Development, Government of India Impact of Urban Transport on Climate Change – Ms Marion Hoyez, Cooperation Project Manager, CODATU - India National Policies and Regulations to Address Implementation of International Commitments on Climate Change in the Context of Urban Transport – Dr. Sewa Ram, Professor, School of Planning and Architecture, New Delhi Environmental Impact of Odd even in Delhi – Ms Anumita Roy Chaudhry, CSE, Delhi **Rapporteurs** - Mr. Banshi Sharma & Ms. Priyanka Sawant, CEPT University, Ahmedabad
1100 – 1130	*Tea &Coffee Break/ Networking Break/ Transport Quiz (Exhibition Hall 1)*
1130 – 1300	**Technical Session 12 – Ensuring Equity and Accessibility in Urban Transport***(Seminar Hall 1)* (being organized by SVNIT, Surat)
	Chairperson – Shri C.K. Khaitan, JS&CEO, National Trust, Ministry of Social Justice & Empowerment, Government of India Towards Better Accessibility and Mobility in Indian Cities – Prof. K.V.K. Rao, Dept. of Civil Engineering, IIT Bombay Strengthening Intermediate Public Transport for Urban Poor Mobility – Mr Harsh Mittal, IIM, Ahmedabad Ropeways as Facilitators - Dr Johannes Fiedler, Head Research, Doppelmayr Urban Solutions Road to an Equitable, Sustainable and Inclusive Urban Future – Ms Nidhi Madan, Director, Samarthyam and Ms Anjalee Agarwal, Executive Director, Samarthyam
1130 – 1300	**Technical Session 12 – Ensuring Equity and Accessibility in Urban Transport***(Seminar Hall 1)* (being organized by SVNIT, Surat)
	Chairperson – Shri S.K. Lohia, CEO, Indian Railways Station Development Corporation Cognitive Aspects of Road Traffic Users - Prof Krishna Prasad, IIT Gandhinagar Endangering Pedestrian Safety due to Free-Left and Closing of Right-Turns in Hyderabad - Prof. Dr. C. Ramachandraiah, Centre for Economic and Social Studies (CESS), Hyderabad The Crosswalk Lab - Mr Anuj Malhotra, Centre for Green Mobility (CGM), Ahmedabad. Road Signage - Implementation Issues/ Challenges and Learnings in Indian Context - Prof Amit Sheth, IIT Gandhinagar

1130 – 1300	**Technical Session for Municipal Councillors – Smart ParkingSolutions** *(Seminar Hall 3)*
	Chairperson – Capt. Anant Modi, DG, AILSG **Presenters:** The Role of IT in Effective and Efficient Parking Solutions - Shri. Saswat Bandyopadhyay, Area Chair of Infrastructure Planning, CEPT University, Ahmedabad New Public Private Partnership for Effective Parking - Shri Ranjit Gadgil, Program Director at Parisar Pune Area, India New Emerging Trends in Parking - Ms Sarika Bhatt, Manager - Sustainable Cities, WRI India **Rapporteurs –** Mr Arnab Sen, Senior Project Officer, AILSG
1130 – 1300	**Technical Session 14 – Metro Rail Technologies** *(Meeting Room)*
	Chairperson – Shri Mukund Kumar Sinha, OSD (UT) &E.O., JS, Ministry of Urban Development Delivering Innovative Rail Solutions from India for India – Shri Sriram Raju, Director - Sales, India, Bombardier Transport New Technological initiatives – Shri R.K. Gupta, General Manager /Consultancy, Delhi Metro Metro Technology in Indian Scenario – Shri Prashant Varma, MEGA Ltd. **Rapporteurs** - Mr. Navnit S & Ms. Srinavya Annem, CEPT University, Ahmedabad
1130 – 1300	**Technical Session 15 - Benchmarking Urban Transport Past, Present and Future** *(Conference Room 1)*
	Chairperson: Shri Durga Shanker Mishra, Additional Secretary (UD), Ministry of Urban Development, Government of India **Co - Chair:** Prof. H.M. Shivanand Swamy, Executive Director, CEPT University, Ahmedabad Concept of Benchmarking Urban Transport –Prof. H.M. Shivanand Swamy, Executive Director, CEPT University, Ahmedabad Benchmarking Cities- Comparison Past and Present Ahmedabad, Surat, Hubli Dharwad, Mysore, Bhubaneshwar and Kohima-Ms. Nitika Bhakuni, CEPT, Ahmedabad Benchmarking Cities – Comparison Past and Present Delhi, Jaipur, Nanded, Jammu, Patna and Vijaywada-Ms. Anindita Ghosh, Urban Transport Planner, IUT **Rapporteurs** - Mr. Jatin Shah & Ms. Pooja P., CEPT University, Ahmedabad

1300 – 1415	***Valedictory Session*** *(Seminar Hall 1)*
	Address and Launch of UMI 2017 and Special Address by Shri Nitinbhai Patel, Deputy Chief Minister, Gujarat Presentation of Awards for Excellence in Urban Transport & Urban Mobility by Shri Rao Inderjit Singh, Hon'ble Minister of State (UD), Ministry of Urban Development and Ministry of Housing & Urban Poverty Alleviation, Government of India Valedictory Address by Shri Rao Inderjit Singh, Hon'ble Minister of State (UD), Ministry of Urban Development and Ministry of Housing & Urban Poverty Alleviation, Government of India Vote of Thanks by Shri Durga Shanker Mishra, Additional Secretary (UD), Ministry of Urban Development, Government of India

Annexure II: Organizing Committee Members

OSD (UT) & Ex-officio Joint Secretary, MoUD	:	Chairman
Director (UT), MoUD	:	Member
Deputy Secretary (Finance), MoUD	:	Member
Director General, IUT	:	Member
Vice President, IUT	:	Member
Honorary Secretary, IUT	:	Member
National Project Manager, SUTP	:	Member
Director General, SIAM	:	Member
Executive Secretary(IUT)	:	Member
Urban Transport Expert, IUT	:	Member
Sr. Manager (A & C), IUT	:	Member
Nodal Officer, MEGA	:	Member
Nodal Officer, Ahmedabad Municipal Corporation	:	Member
Representative of CEPT Ahmedabad	:	Member
Manager (UMI)	:	Member

Annexure III: List of Sponsors

S. No.	Name of Organizations
Diamond Sponsors	
1	Delhi Metro Rail Corporation Limited
2	Metro Link Express for Gandhinagar and Ahmedabad (MEGA) Co. Limited
3	Chennai Metro Rail Limited
4	Mumbai Metro Rail Corporation Limited
5	Nagpur Metro Rail Corporation Limited
6	Bangalore Metro Rail Corporation Limited
7	Kochi Metro Rail Limited
Platinum Sponsors	
1	Ahmedabad Janmarg Limited & Ahmedabad Municipal Corporation
2	Surat Municipal Corporation
Gold Sponsors	
1	Embassy of Switzerland in India
Silver Sponsors	
1	Atal Indore City Transport Services Limited
2	Karnataka State Road Transport Corporation
3	Gandhinagar Municipal Corporation
4	Rajkot Municipal Corporation
5	Jamnagar Municipal Corporation
6	Bhavnagar Municipal Corporation
7	Junagadh Municipal Corporation
8	Jaipur Development Authority
Other Sponsors	
1	Kolkata Metro Rail Corporation Limited
2	Volvo
3	Trapeze Group
4	M.P. Enterprises & Associates Ltd.
5	Dopplemayr
6	Bombardier Transportation India Private Limited
7	Lucknow Metro Rail Corporation Limited
8	Ujjain Municipal Corporation
9	SIAM
10	RITES
11	Rehau
12	GIRO
13	Jabalpur City Transport Services Limited

Annexure IV: List of Exhibitors

S. No.	Name of Exhibitor
1.	Delhi Metro Rail Corporation Limited
2.	Chennai Metro Rail Limited
3.	Kochi Metro Rail Limited
4.	Nagpur Metro Rail Corporation Limited
5.	Trapeze Group
6.	Embassy of Switzerland in India
7.	Metro Link Express for Gandhinagar and Ahmedabad (MEGA) Co. Limited
8.	TSS-Transport Simulation Systems SL
9.	Allison Transmission India Pvt. Ltd.
10.	PAKO Communications Private Limited
11.	KPIT Technologies Ltd.
12.	Jaipur Development Authority
13.	Gujarat Urban Development Agency
14.	Mumbai Metro Rail Corporation Limited
15.	PTV Group
16.	Dopplemayr
17.	CEPT University, Ahmedabad
18.	Rajkot Municipal Corporation
19.	Gandhinagar Municipal Corporation
20.	Surat Municipal Corporation
21.	Vadodara Municipal Corporation
22.	Ahmedabad Janmarg Limited & Ahmedabad Municipal Corporation
23.	Tourism Corporation of Gujarat Limited
24.	Force Motors
25.	Tata Motors
26.	Institute of Urban Transport (India)
27.	Knowledge Management Centre
28.	Sustainable Urban Transport Project

Annexure V: Abbreviations and Acronyms

AMRUT	Atal Mission for Rejuvenation and Urban Transformation
BRT	Bus Rapid Transit
CEPT	Centre for Environment Planning and Technology (Ahmedabad)
CERT	Computer Emergency Response Team
CIRT	Central Institute of Road Transport
CMP	Comprehensive Mobility Plan
CNG	Compressed Natural Gas
CO_2	Carbon Dioxide
CODATU	(French) Cooperation for urban mobility in the developing world
CPCB	Central Pollution Control Board
CSE	Centre for Science & Environment
DMRC	Delhi Metro Rail Corporation
EASI	Enable, Avoid, Shift, Improve
FIRR	Financial Internal Rate of Return
GHG	Green House Gases
GOI	Government of India
GTIDR	Global Practice of Transport & Information and Communication Technology
HVAC	Heating, Ventilation and Air Conditioning
ICT	Information Communication and Technology
IDC	Internet Database Connection
IIT	Indian Institute of Technology
ISB	Indian School of Business
ITDP	Institute for Transport and Development Policy (USA)
ITMS	Integrated Transport Management System
ITNS	Integrated Transport Network System
ITS	Intelligent Transport System
IUT	Institute of Urban Transport (India)
IWT	Inland Water Transport
KMC	Knowledge Management Centre
KOTI	Korea Transport Institute
LDV	Light Duty Vehicle
LRT	Light Road Transit
LTA	Land Transport Authority (Singapore)
MEGA	Metro-Link Express for Gandhinagar and Ahmedabad
MITRAC	Modular Integrated Traction
NMV	Non-Motorised Vehicle
MoUD	Ministry of Urban Development
NCRTC	National Capital Region Transport Corporation

NEKRTC	North Eastern Karnataka Road Transport Corporation
NMEM	National Mission for Electric Mobility
NMT	Non-Motorized Transport
NTDPC	National Transport Development Policy Committee
NUTH	National Urban Transport Helpline
NUTP	National Urban Transport Policy
OEM	Original Equipment Manufacturer
OFCS	Optical Fiber Communication System
OSD & E.O. JS	Officer on Special Duty & Ex-Officio Joint Secretary
PBS	Public Bicycle Sharing
PM	Particulate Matter
PPHPD	Passengers per hour per Direction
PTA	Public Transport Authority
R&R	Rehabilitation & Resettlement
RITES	Rail India Technical and Economic Services Ltd.
ROW	Right of Way
RRTS	Regional Rapid Transit System
SIAM	Society of Indian Automobile Manufactures
SPA	School of Planning and Architecture
SPVs	Special Purpose Vehicle
SUTP	Sustainable Urban Transport Project
SVNIT	Sardar Vallabhbhai National Institute of Technology
TERI	The Energy and Resources Institute
TMICC	Traffic Management and Information Control Centre
TOD	Transit Oriented Development
UADD	Urban Administrative Development Department
UEMI	Urban Electric Mobility Vehicles Initiative
UMI	Urban Mobility India
VMT	Vehicle Miles Travelled
VVVF	Variable Voltage Variable Frequency

Annexure VI: List of Knowledge Partners and Media Partners

Knowledge Partners:-

- PTV Group
- SVNIT, Surat
- CEPT, Ahmedabad
- SPA, Delhi
- All India Institute of Local Self Government
- IIT, Gandhinagar

Media Partners:-

- Impressions India
- Infrastructure today
- Metro Rail News
- Rail Analysis
- Traffic Infratech

Awardees of UMI 2016.

Proceedings prepared by Shri M. L. Chotani, Consultant / RDO, IUT

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