



• REPORT 4TH UITP INDIA URBAN RAIL SEMINAR 2021

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International Association of Public Transport (UITP) Rue Sainte-Marie, 6 | B-1080 Brussels | Belgium

Tel: +32 2 673 61 00 info@uitp.org www.uitp.org

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INTRODUCTION

⁶⁶A developed country is not a place where the poor have cars, it is where the rich use public transportation⁹⁹ - Gustavo Petro

The first metro in India started in Kolkata in October 1984. To realise the dream of then PM Late Shri Atal Bihari Vajpayee's vision of 'Jai Vigyan', it was important to realise the crucial role that Mass Rapid Transit System (MRTS) plays in the cities of India which are far from compact. Later, Delhi Metro, the first modern rail system in India started its operations in December 2002, with an 8km line. Since then, it has come a long way and has a longer way to go. The developments are going on at a faster pace and without a doubt, new and better technologies are in line. There has been a robust thrust on the expansion of the metro network with 717km in 18 cities. Further, about 1000 km of network is under construction in 27 cities.



With the burgeoning population in our country, rise in demand for transit agencies to deliver reliable and technology efficient transit services, having a pan India and pan city coverage is the need of the hour.

Moreover, the recent outbreak of the global coronavirus pandemic had halted the passengers' mobility and left the urban rail sector in tatters. During the lockdown, the underuse of the rail sector could have led to the collapse of the urban transport system, however the authorities approached the new normal with resilience and practical solutions.

Keeping this vision, International Association of Urban Transport (UITP) India organised its flagship annual event, supported by Delhi Metro Rail Corporation (DMRC) on Urban Rail. The fourth edition of the UITP India Urban Rail Seminar was held on a digital platform from 23-26 February 2021. The lead sponsor for the seminar was Ducab, while the technical sessions were co-sponsored by KfW IPEX Bank, and Hitachi Rail. The media partners were Rail Analysis India and the Urban Transport News.

The four-day virtual event featured a keynote speech from Shri Jaideep, Officer on Special Duty (Urban Transport), Ministry of Housing and Urban Affairs, Government of India. The seminar also included contributions from about 25 key Indian dignitaries, representation from several metros in India, metro operators, financing institutions, ministries involved in Urban Rail landscape of India and many other industry players who shared the wide spectrum of their knowledge and experiences in the urban rail sector.

This flagship annual event witnessed worldwide recognition with participation from more than 36 countries, 115 companies and a total of 381 registrations with 39% registrations from outside India. The highlight was 61% female speakers present in technical sessions.



Figure 1: Participant's distributions

While the seminar was held online due to Covid-19 pandemic, it acted as an opportunity for countrywide and worldwide outreach by breaking the barriers of distance. It witnesses key national and international speakers sharing their knowledge and experiences on various topics, namely the impact of Covid-19 on the rail sector & the road to recovery, technological innovation, new financing and governance approaches, and digitisation in urban rail.

KEY OUTCOMES FROM EACH SESSION

The event was set about with an Inaugural Session where eminent speakers from the urban rail landscape gave an overview of their experience and learnings in the sector. It was followed by a Plenary Session where the discussion was focused on the impact of Covid-19 on the urban rail sector and its road to recovery.

Following is a summary of the key points discussed in the later days of the event:

TECHNICAL SESSION- I (TECHNOLOGI-CAL INNOVATION IN URBAN RAIL SEC-TOR BROUGHT BY THE PANDEMIC)

1. Jacqueline Gorospe, Light Rail Manila Corporation (LRMC), Manila gave an overview of the key objectives followed by their management to serve the employees, the passengers and the partners based on safety, welfare, passenger confidence, information, and support to mobility.

2. Thiagarajan P, Chennai Metro Rail Ltd (CMRL) explained the mechanism and working of the Micro-plasma Oxidation technology, its challenges and how they came up with a portable disinfection system that can result in cost savings of upto INR 1.14 cr per year.

3. Margarita Kolosova, Moscow Metro shared how they introduced a time differentiated fare system in the Metro which resulted in a reduction in the peak hour load on its busiest lines.

4. Sheena Sasi Kumar, Transdev Group talked about creating a risk-based approach for a tailor-made recommendation plan while using technology driven disinfection and cleaning.

5. Daria Kuzmina, UITP informed how raw data collection from several places on the depot can be used for analysis, thereby helping in occupancy monitoring and demand management.

TECHNICAL SESSION- II (NEW FINANC-ING AND GOVERNANCE APPROACHES IN URBAN RAIL SECTOR)

1. Since there was a significant drop in the passenger ridership post the lockdown, T. Manoj Kumar Daniel & Aishwarya Nale, Maharashtra Metro Rail Corporation shared some of the non-fare revenue (NFR) initiatives through which Nagpur metro authorities have successfully reported a 60% increase in their total revenue.



2. Julian Ware, Transport for London (TfL) explained about the process of financing for London Public Transport in the context of obtaining funds, role of government, and the forthcoming challenges in financing due to the impact of Covid-19.

3. Michaela Altmann, KfW IPEX Bank talked about the ridership risk in urban rail financing, challenges in urban rail investment, and mobility owner concept from the state and city perspective.

4. Flavio Chevis, Addax, Brazil presented the three forms of procurement- traditional, pure concessions, PPP arrangement- to enable investments and service solutions i n urban rail through the perspective of Latin America.

5. Stephanie Kam, Nossman LLP, USA gave an overview of the contracting techniques for timely project completion, namely design-build and PPP contract while taking into account the concept of fixed contract, liquidated damages, amongst others.

TECHNICAL SESSION- III (DIGITALISA-TION IN URBAN RAIL)

1. S S Joshi, Delhi Metro Rail Corporation (DMRC) recalled and shared their journey, starting from using microprocessor-based Train Control and Management System (TCMS) for physically downloading the data to using radio connectivity for real-time data download. He also talked about their ambitious project called Super-SCADA.

2. Graham Turner, Ducab talked about mobility solutions from Ducab, specifically referring to the wide variety of cables used in railways including the ones made with LSZH compound.

3. Ignasi Oliver Gonzalez, TMB Barcelona informed that the company has been using monitoring and data analysis tools since 2006. He also gave an overview of the new age maintenance techniques in Barcelona for reducing service delays and stop time, getting good availability and overcoming the difficulty to find the cause of failure.

4. Mangal Dev & Narendra Ashar, Hitachi India Ltd talked about Mobility as a Service (MaaS) and the role of digitalisation. They also shared their idea of creating a Service for Mobility (S4M) Ecosystem within Hitachi to form working solutions for value proposition as 'One Hitachi'.

5. Takahito Sahoda, East Japan Railway presented various ways of using artificial intelligence in railways to improve the customer experience through big data, AI, 5G and IoT.

INAUGURAL SESSION

The event kick-started with an inaugural session where **Mr Mohamed Mezghani, Secretary General, UITP** talked about three major priorities which need solutions. First, finding innovation in technology and services to attract non-vehicular commuters and effectively managing growth to avoid any means of Covid-19 transmission. Second, financing and government approaches. Finally, the third being digitalisation, which is rapidly changing the way people use services, and is a key aspect that all transaction systems need to embrace to stay relevant in a changing world.

Mr Mezghani also warned of being mindful of the emerging challenges to the Covid-19 pandemic but at the same time to not forget the traditional challenges that were already impeding the growth of public transport.

Throwing light on such challenges during the lockdown period, **Dr Mangu Singh, Managing Director, DMRC** explained that bringing such high-tech intensive metro services to a halt for weeks or months was not a possibility as it would later prove to be very difficult to restart the entire system. So, even though the services were not operational for the public, DMRC kept the depots functioning throughout. Next, the authorities adopted the lockdown as an opportunity to clear the backlog of repair works which were required on critical locations and could not have been done on the usual working days before the lockdown.



Alongside, Dr Singh reiterated that after the metro operations began in September, DMRC was prepared to welcome the limited number of passengers travelling, as for many, work from home, online classes and reduced social interaction continued. However, DMRC ran the trains with full frequency to ensure social distancing and to build confidence amongst the commuters.

⁶⁶Even though the expenditure remains the same, the capacity of passengers has been 1/3rd of the earlier capacity. However, we expect that within a year or so, we will get back to the pre-Covid capacity of passengers.⁹⁹ - Dr Mangu Singh



Shri Jaideep delivering his keynote address in the inaugural session

Shri Jaideep, Officer on Special Duty (Urban Transport), Ministry of Housing and Urban Affairs (MoHUA) highlighted the Government initiatives and policies which restate the fact that urban economy accounts for roughly 60% of the GDP and that public transport infrastructure is of paramount importance as the sustainable development of urban centres largely depends upon their physical, social, and distributional infrastructure.

One of these policies is the National Urban Transport Policy (2006) which aims to provide safe, affordable, reliable, and successful access to growing numbers of cities, residences and jobs majorly focusing on moving people, not vehicles.

Propelled by several mega trends, public transport has been undergoing several changes across the world and India is no exception. It is estimated that in India, approximately 88 million trips are made on public transport including buses, railways and airways on a daily basis which translates to 6-9% of the total trips which are being catered to public transport as against 32-35% in most countries across the world.

Talking about the importance of transportation as the lifeline of a nation, Shri Jaideep also mentioned the first modern rail system - Metro, which has added speed and efficiency to our country's progress. Yet, some of the biggest challenges still exist. This includes managing capacity increase, improving reliability in the system and delivering a more customer focused approach of running the system intelligently and efficiently.

In line with this, the Metro Rail Policy (2017) focuses on compact urban development, cost reduction and multi-modal integration. Further, it also gives flexibility to the States to adopt different contract models. While the most popular model is the 50-50 equity participation of the Central and State government, the States can also opt for a fully state funded metro system. The policy has also made it mandatory to include the public private partnership (PPP) component with a view to explicitly harness private resources, entrepreneurship, and views.

Interestingly, no metro can be profitable merely with passenger fare revenue. Thus, the Value Capture Finance Policy Framework issued in 2017 identifies tools such as transferable development rights (TDRs), betterment levy fee for changing land use, vacant land tax, land cooling system etc. as the source of financing infrastructure projects. In some of the states, several initiatives have been taken in this direction to improve the financial viability of the metro system.

The government also issued a National Transit Oriented Development (TOD) Policy in 2017 as part of Metro Policy (2017) to integrate land use and transport planning for developing compact and inclusive growth centres within the zone of 500 to 800 m. This promotes living close to mass urban transit corridors, encourages public transport usage and achieves reduction in private vehicle ownership. Another initiative as part of the policy is the creation of a Unified Metropolitan Transport Authority (UMTA) for all modes of transport in the city.

One of the major outcomes of Metro Policy is the new transact mode called Regional Rapid Transit System (RRTS). It aims to create a balanced and sustainable urban development through better connectivity and access in the region. RRTS projects have been started in the regions across NCT and will carry more people with an average speed of 100 kmph, while occupying just 3 m space of land, thus reducing congestion on the road.

Shri Jaideep also noted that the Ministry has laid down guidelines for a lighter and cost intensive system called Metro Lite and Metro Neo to fulfil the aspirations of small urban centres which are the low hanging fruits for implementing the innovative mobility solutions. The Metro Lite system is suitable for peak hour peak direction traffic of 50,000 and can be constructed with 40% of the cost of a conventional metro system. Presently, one metro lite corridor of Delhi Metro between Rithala and Narela is under approval. The other initiative is Metro Neo, which is suitable for peak hour, peak duration traffic of 8,000 and costs 25% of the conventional metro system.

As per the veteran, such systems can also act as a feeder system to high-capacity metro or other mass transit systems. In addition to reduced capital costs, the operation and maintenance cost for Metro Lite is expected to be less, making the system more viable, which will also encourage private participation.

Several other initiatives include indigenous development of automated supervision systems by Bharat Electronics Ltd in association with DMRC, setting up of four manufacturing units in India, solar power installations, and driverless mode on DMRC Magenta Line, amongst others. Further, the industry leader applauded the recent Union Budget 2021 presented by the Finance Minister Nirmala Sitharaman, on February 1 which witnessed a strong focus on public transport, including INR 180 bn (\$US 2.48 bn) scheme for buses, and substantial funding for metro networks.

Later, Mr K K Saberwal, Director Finance, DMRC closed the inaugural session with a Vote of Thanks to all the speakers.

PLENARY SESSION: COVID-19 IMPACT ON URBAN RAIL SECTOR AND THE ROAD TO RECOVERY

The session witnessed how the global pandemic has impacted passenger mobility while highlighting various innovative solutions imbibed by the transport authorities across the world.

Ms Karen McCarthy, Chief Customer Officer, Sydney Trains, NSW shared that they received a government relief in the form of support funding as much as the levels of pre-Covid farebox income, which the company ensured to pass on to the suffering advertising companies as



Plenary session discussion on urban rail sector and the road to recovery

well. In addition, Sydney Trains started a school campaign in collaboration with education partners encouraging students to take on buses for school.

Mr Pradeep Yadav, Managing Director, Chennai Metro Rail Ltd (CMRL) informed that they made special efforts to emphasise on quality of air in underground stations by increasing the intake of fresh air using air purifiers, applying UV solutions, and engaging a third party for its testing. CMRL also came up with mobile ticketing solutions, foot operated lifts and an in-house travel card reader, which enables the updating of the passenger's validity on a single tap. CMRL also worked on long pending, civil systems. However, the authorities were in the middle of a project when the lockdown began. Thus, post the resumption of operations, they ended up managing construction activities with less than half of the planned resources due to labour migration.

In addition, CMRL organised regular virtual meetings and refresher courses for maintaining morale amongst the staff members and offered kits to the ones who joined the office. Mr Yadav pointed out that post-lockdown, he went to the office every day to set an example of safety and productivity amongst the staff. He added that CMRL has reached almost 70-80% ridership of pre-Covid times.

⁶⁶Fixed cost was taken care of by the government since the farebox revenue remained critical.⁹⁹ - Mr Pradeep Yadav

Talking on similar lines, **Mr Anil Kumar Saini, Chief Operating Officer, L&T Metro Rail, Hyderabad** mentioned that they have three running lines with a standalone signalling system. Due to this, inter-corridor running was not possible on usual days pre-lockdown. Thus, the authorities utilised the lockdown period to perform extensive testing to solve this problem, along with heavy maintenance works on the rolling stocks.

The organisation also conducted a survey to gauge the fear of the people travelling on public transport. They tied up with hospitals and incorporated para medical staff to be available on the stations. With an aim to get back the major portion of their IT sector ridership, the authorities are in active discussions to provide their services and last mile connectivity.

As for non-farebox funding, L&T Metro Rail took small steps by introducing QR Tickets along with the app partners who paid some royalty. Secondly, they augmented



a training academy to increase its capacity by training 200-300 people at a time.

Mr Alvin Kek, Vice President- Operations, SMRT Trains, Singapore said that they had expected a drop in ridership post the lockdown. However, with an aim of attending to the public's concerns about social distancing, they worked on normal frequency of trains even though the ridership was limited.

Further, appreciating the government for its constant support in the form of grants, incentives, and support schemes, he informed about the introduction of a Job Support Scheme (JSS) that aims to provide support to the companies to help them retain their local employees.

Going forward, SMRT Trains indicated that they are working to deploy robots in commuter enrichment services like cleaning and disinfecting on stations, as it is a very labour-intensive task. Considering staff as the backbone of the organisation, Mr Kek said that they kept a check of some special measures such as ensuring business continuity, encouraging WFH wherever possible, providing free essential protective equipments like masks and PPE, enforcing mandatory use of contact tracing apps, and stepping up public communication efforts to wear masks while taking good care of personal hygiene.

TECHNICAL SESSION I- TECHNOLOGICAL INNOVATIONS IN URBAN RAIL SECTOR: LESSONS FROM THE PANDEMIC

Day two of the event consisted of inspirational stories and their learnings from across the world, where technology was used as a medium to fight-back the pandemic with confidence.

INNOVATION IN LIGHT RAIL MANILA

Following the Covid-19 lockdown and subsequent unlock after 2.5 months, Jacqueline Gorospe, Light Rail Manila Corporation (LRMC), Manila shared that LRMC focused on three values to get back to business, viz, teamwork, innovation, and excellence. Using these values, the management came up with seven objectives to serve the employees, the passengers and partners based on the need of the hour for safety, welfare, passenger confidence, information, and support to mobility. Some of these objectives are:

For Passengers:

- Application of UVC technology in train and office disinfection by designing UVC lamps
- Improvement of train ACU filtration system
- Peer review for the spatial simulation study
- Use of GOAL system to implement passenger limit per platform





4th UITP INDIA URBAN RAIL SEMINAR 23-26 FEBRUARY 2021 | O N L I N E



MEET THE SPEAKERS

TECHNICAL SESSION I: TECHNOLOGICAL INNOVATIONS IN URBAN RAIL SECTOR: LESSONS FROM THE PANDEMIC 24 FEBRUARY 2021 | 14:30 IST - 10:00 CET



JACQUELINE GOROSPE Head, Communications and Customer Relations Light Rail Manila Corporation



Deputy General Manager Rolling Stock Chennai Metro Rail Ltd



MARGARITA KOLOSOVA Deputy Chief at Investment Department

KFW



SHEENA SASI KUMAR Group Safety Director Transdev Group



DARIA KUZMINA Knowledge & Innovation UITP



KFW IPEX-Bank

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First technical discussion on technological innovations in urban rail sector

- FLIR/ thermal imaging scanners at six busiest stations
- Contact tracing feature in ikonMNL mobile app using **BLE** technology
- Promotion of stored value cards and deployment of additional e-tap kiosks

For Employees:

HITACHI

Inspire the Next

- Provision of hygiene supplies
- In-house developed clinic teleconsultation platform in addition to HMO
- HEPA filters in office air conditioning units

- Automated daily health check and weekly updates on compliances sent
- Provision of financial support, availability of loan facilities
- Use of various technology channels like learning management systems (for training)

For Partners:

- Partnership with local government and bike groups for bike lanes
- Installation of bike racks at LRT-1 stations
- Provision of shuttle services for three months to medical front liners

While ensuring quality service for commuters and an efficient work environment for employees, LMRC said its systems and processes meet international standards. In line with this, it has received a recertification for ISO 9000-2015 (quality management system) after the successful audit conducted on-site in November 2020.

MICRO-PLASMA DISINFECTION SYSTEM AT CMRL

Thiagarajan P, Chennai Metro Rail Ltd (CMRL) explained that they used the chemical free Micro Plasma Oxidation technology for disinfection of rolling stocks and stations. The process works on the science of mixing air and water to form nitric oxide, hydroxyl radicals and ozone with the help of a micro plasma generator. It utilises only air as its raw material, leaving no residue on surfaces. However, it has some challenges like power supply requirements at multiple locations at the depot and workshop, and the time limitation of the product, as it is active for only 20 minutes.



As a sustainable alternative, the authorities re-engineered and integrated the micro-plasma oxidation system with sprayer to form a compact and portable Micro-plasma disinfection system which works on a three-step process of adding water, switching on the electric point, and spraying.



A Disinfection Efficacy Testing was conducted by a NABL accredited laboratory where samples were collected from over 20 sites inside the train before and after disinfection of the train. As a result, it was found that there was over 98% reduction in microbial presence through aqueous disinfection. In case of Air disinfection (for underground stations), there was a reduction in microbial presence to Below Detectable Limits (less than 0.01%).

When compared to the chemical-based disinfection which costs INR 1.2 crore per year, the cost of micro plasma disinfection per year is INR 7.04 lakh, resulting in the cost savings of INR 1.14 crore per year.

PASSENGER FLOW MANAGEMENT DUR-ING PEAK HOURS IN MOSCOW METRO

Worldwide, the introduction of a time differentiated fare system in a Metro, by providing discounts during nonpeak hours show that it leads to a decrease in peak hour ridership from 1.5 to 8%, thereby helping in capacity management.

Margarita Kolosova, Moscow Metro highlighted how they applied a similar technique to obtain successful results. Prior to its pilot project, the authorities conducted a survey among its passengers. The results of the survey showed that 10-15% of passengers are likely to change their daily schedule.

While the most critical load on its busiest lines (Line 7 and Line 15) is from 7:15am to 8:45am, Moscow Metro provided discounts in two slots, from the time of opening of the metro to 7:15am and from 8:45am to 9:15am i.e., before and after the peak hour.

The main goals of this project were to reduce the load of passengers on the given lines, to assess the effectiveness of providing off-peak discounts, and to analyse the change in passengers' behaviour in response to the introduction of a discount. Meanwhile, the authorities informed the passengers about the pilot project through billboards, audio information, stickers and digital screens on metro stations, media press releases, social media posts, app notification and updating its website with daily statistics.

Various schemes of discount provisions depending on the type of ticket were also introduced. For example, passengers with a transport card with an e-wallet received a different amount than the ones paying with a bank card or a transport card with a season ticket. Passengers also got an option to check bonus points balance within the mobile app. As a result of the pilot project, Moscow Metro observed up to 3% reduction in the peak hour load on its busiest lines.

TECHNOLOGY DRIVEN DISINFECTION AND CLEANING

French-based mobility company Transdev Group has a business base operating in 18 countries. **Sheena Sasi Kumar, Transdev Group** informed that post-lockdown, each Transdev entity worked on a tailor-made recommendation plan that is appropriate for a particular risk profile and situation. The plan was based on factors like severity of the risks, main sources of transmission, incubation period, time duration that the virus persists on the surface, government measures etc.

The launch of the pilot project has led to a 3.0% reduction of the load of Line 7 and Line 15



To determine the frequency and timing of cleaning and disinfecting, a risk-based approach was used. It was done while assessing various factors like volume of individuals coming through the common area, identifying the high frequency touch areas, whether the area is single occupied or shared, existing controls (temperature checks, masks, sanitisers) etc.

Some of the cleaning and disinfecting technologies used were:

- Dry steam: Use vapour above boiling conditions
- Fogging: Disinfectant product is applied in fine droplets on all surfaces of the vehicle by an individual equipped by a nebuliser

- Plasma: Based on ionisation technology within the air conditioning system, continuously disinfect the air and surfaces of the vehicle throughout the day
- Ozone: A powerful oxidant produced with oxygen and electricity
- Surface disinfection field: Self-cleaning coating for a period of time
- UV: UVC light radiates the genetic material by electromagnetic radiation with wavelength shorter than visible lights

OCCUPANCY MONITORING AND DE-MAND MANAGEMENT

Daria Kuzmina, Knowledge & Innovation, UITP explained how data collection and its analysis can help in occupancy monitoring systems for managing passenger demand.

According to her, raw data about passenger occupancy can be collected from station infrastructure (escalators, CCTVs, ticket validators), vehicles (weight sensors, drivers, automatic passenger counting), operational staff (drivers, platform staff, staff monitoring CCTV), data from phones (Bluetooth, mobile phone signals, Wi-Fi), and ticket sales. The collected data is then used to inform the passengers at stations and stops, analyse its impact and then adjust the timetables accordingly.

Some of the external factors that can alter passenger behaviour include weather, events, holidays, change in school hours, or changing restrictions. Other factors may be based on optimised resource planning, boarding and alighting times, online ticketing etc.

UITP conducted a survey which was sent out to companies on the modal committees of Light Rail, RSR, Metro, Bus and Waterborne, with 38 companies responding to the survey. As per the survey results for operators:

• Most companies offer bus, followed by light rail or tram services as the mode of transport.



- Maximum companies do not have any evidence that occupancy monitoring has helped to change passengers' habits or change when they travel.
- While 50% of the companies do not share the occupancy monitoring data with their employees, some of them have started doing so since the Covid-19 outbreak.
- Out of all the companies that share the data with their employees, most of them share a combination of static and dynamic data.

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Industry – what is on offer?



What technologies do you have on offer?

The results of the survey for the industry showed that APCS (Automatic Passenger Counting System) and CCTV monitoring were the most-used techniques.

TECHNICAL SESSION II- FINANCING AND GOVERNANCE APPROACHES IN URBAN RAIL SECTOR

Day 3 of the seminar witnessed discussion on financing and governance approaches in urban rail sector among different cases.

INCREASING REVENUE THROUGH NFR INITIATIVES

Since no metro can be profitable solely with passenger fare revenue, **T. Manoj Kumar Daniel & Aishwarya Nale, Maharashtra Metro Rail Corporation Limited** explained how Nagpur metro authorities have reported about increasing 60% of their total revenue through non-fare revenue (NFR) initiatives. Some of these include:

- Additional cess on stamp duty (1%) during registration of properties within cities. The said surcharge can be levied in cities, where Vital Urban Transportation projects are implemented.
- Transit Oriented Development (TOD) under which additional FSI is given on premium payment. 500 m distance on either side of the Nagpur Metro Rail measured from its middle of the line, including the area falling within 500 m distance from the longitudinal end of the last metro railway station, and up to 4 FSI is allowed subject to plot area and width of road.



The second technical session discussion on financing and governance approaches in urban rail sector

- Development Fund revenue applicable on construction area and %@ ASR construction rate.
- Property Development on standalone plots by optimising the area required for viaduct and stations.
- Leasing of Retail Spaces within Metro Stations- Until now, total retail spaces of approx. 16,000 sq. ft inside seven operational metro stations have been leased out.
- Co-branding rights of metro stations- Branding rights assigned to the licensee to suffix its brand name with the name of licensed metro station along with other rights in accordance with terms & conditions of the agreement. Till now, two metro stations have been awarded for co-branding rights of metro stations.
- Advertisement rights within metro stations/ train wrapping/ outdoor advertisement- The licensee shall

be provided with a minimum advertisement area of 100 sqm for display of advertisement in each station. Till now, five metro stations have been awarded for licensing of advertisement rights inside metro stations.

- Premium on direct connectivity Walkways into metro stations.
- Branding of metro cards AFC royalty income.
- External Projects Urban local bodies & exploring private entities for developing local markets & malls).

Other sources of NFR that the authorities are looking for include ATM policy, domestic cargo/ courier services, telecom mobile towers, monetisation of mobile apps, e-vehicles charging stations, solar energy, commercial motion film shoots, consultancy and training services, parking charges and MMI hub.

FINANCING FOR PUBLIC TRANSPORT: TFL CASE STUDY

Transport for London (TfL) is an integrated transport authority responsible for most transport in London including underground, DLR, London overground, trams, buses, river services, Dial-a-Ride, Victoria coach station, cycle hire and the Emirates Air Line. Other services also involve regulating taxis and private hire vehicles, implementing congestion charging schemes and ULEZ, managing 580 km main roads, encouraging cycling, and operating all the Capital's 6,300 traffic signals. However, it is not responsible for most heavy rail, airports, and local roads and parking.

Julian Ware, Transport for London talked about the sources of funding for TfL, which includes grants, use of borrowing, working capital and cash reserves, passenger income, and other incomes. For instance, if the total source of funds is 9.8 bn euro, then 2.3 bn accounts from grants, 0.8 bn from cash reserves, 4.8 bn from passenger income and 1.9 bn from other incomes like leasing rental spaces. Out of this, 73% is spent on running and operating the network every day, while 27% is spent on reviewing and improving the network. The funds are further used for new capital investments (2.1 bn), capital renewals (0.5 bn), operating costs (6.7 bn) and financing (0.5 bn).

Since the global pandemic has impacted the public transport sector in a big way, TfL had converging challenges pre-Covid, which have now been worsened. While the population of London is 8.6 million today, it is expected to reach 10 million by 2030, which will lead to 25% more public transport trips and 14% more road congestion thus inviting the need to invest efficiently to meet the growing demand. Next, the organisation was already facing funding pressures due to the withdrawal of government operating grants. With this post-Covid challenges have added up, namely passenger ridership dropping to 17% of normal on tube and 33% on buses. This has led to significant short term financial problems where no borrowing is possible.

>>> Navigating Complex Mobility Investments



CHALLENGES OF URBAN RAIL INVESTMENT

Founded in 2008, KfW IPEX Bank is a 100% subsidiary of the state-owned promotional bank KfW. Having been in the market for over 60 years, it has its Head Office in Frankfurt am Main, Germany.

According to Michaela Altmann, KfW IPEX Bank, urban rail investments have massive challenges in the context of stakeholders. Some of these include:

- The public expects new public mobility options from the policymakers as a contribution to climate protection.
- Politicians expect public transport authorities as well as municipal and private transport operators to provide future-oriented and cost-effective solutions for public transport.

- The transport companies are confronted with high innovation costs.
- The public transport authorities and municipalities expect the transport companies to provide the best service at the lowest possible costs.
- Citizens expect the expansion of a customer- and future-oriented as well as inexpensive public transport system.

From the state and city perspective, compared to other financing structures, the mobility owner concept can be set up easily. For this, one can implement any such entity or start with a simple Special Purpose Company (SPC) structure. As the operational side is separate from the financing side, one can decide by themselves what they want to do here. For instance, one can do tenders, increase competition, or give it to one single operator. By

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KFW IPEX-Bank How KfW IPEX-Bank tackles ridership risks in Urban Rail Financing - 25th February 2021

separating the asset financing from the operations side, one can have more control over the operation and the operator.

For the State and the City, one may:

- Increase competition of operation and quality of service.
- Control over operators in the short term through interchangeability.
- Secure mobility assets in the long run.

Transparent cost for operation and assets.

Cashflow

• Cost of finance potentially close to state pricing level.

Chain of liability project contract

• Potential to reduce budget commitment to annual lease rate.

BUSINESS MODELS ADOPTED IN URBAN RAIL: LATIN AMERICA PERSPECTIVE

Flavio Chevis, founder of Addax, Brazil presented the three forms of procurement to enable investments and service solutions in urban rail. As per the Brazilian leg-

>>> Mobility Owner Finance in India – IRFC

islation, this consists of traditional (tenor is limited to a 5-year contract), pure concessions (only farebox revenues), and PPP which includes sponsored (farebox + public grants) and administrative (only public grants) concessions.

According to Mr Chevis, one must note that there is no best model, and it ought to be customised. However, a PPP Arrangement should be submitted on a prior basis, to acceptance of the project from the society's standpoint. It shall bring about Value for Money (VfM), where Value is a metric that differs from simple Cash Flow Impact; it accounts for risk adjustments, quality levels, intangible valuation and acceleration of society's benefits appropriation. Each PPP contract presents different risk sharing mechanisms and can combine different forms of procurement:

- Assets procured traditionally + PPP/Concession of Operation.
- Part of Assets procured traditionally + PPP/Concession of some assets + Operation.
- Assets can be reverted to the Grantor (publicly owned).

^{(C}Although the legal framework depends on the country, there are several forms of procurement that involve the participation of the private sector, bringing about an array of association or partnership models⁽⁾ - Flavio Chevis, Addax, Brazil

US CONTRACTING TECHNIQUES FOR TIMELY PROJECT COMPLETION: DESIGN-BUILD VS PUBLIC-PRIVATE PARTNER SHIPS (PPP)

According to **Stephanie Kam, Nossman LLP, USA**, design-build combines design services and construction work under one contract where the design builder accepts responsibility for errors and incomplete designs. Its procurement may be based on "best value" as it goes to the lowest costs. On the other hand, a typical PPP contract includes Design-Build-Finance-Operate-Maintain, where the facility is returned to the owner at the end of the period of performance.

For a fixed term contract, the design build commences on contract execution/notice to proceed and ends upon project completion (subject to warranty period). The maintenance services under separate contracts/performed by the owner. However, for PPP it commences on financial close and ends when the asset is handed back to the owner (~20 to 30 years) or a fixed operating term commences upon project completion. Here, one must consider a reasonable rate of return on investment to the developer, preferred condition of asset upon return to owner, and technological life of the asset or major upgrade or refurbishment timing.

Ms Kam also added that the liquidated damages are more common in design-build than fixed term PPP as the AP/ revenue payments are typically unpaid till the project completion. Exception for PPP is when reduction in AP/ revenue payments are insufficient to cover owner's direct and quantifiable financial losses.

Parent company guarantee is typically sought in design-build projects if the contractor does not have the financial capacity to carry out the responsibilities through completion. However, it is not usual in a 'purist' PPP structure.

TECHNICAL SESSION III-DIGITALISATION IN URBAN RAIL

The last day of the seminar witnessed the last technical session on digitisation in the urban rail systems and the benefits of it.

Digitalisation has revolutionised the way ticketing systems used to work, and the customers paid for their commute (cashless to cardless). **Ms Gayang Ho, Leader of research and policy development, AP, UITP** explained how smart multichannel customer services like mobile chat box and in station humanoid have provided a proactive approach on how and when to be communicated. Advancements in sensors, surveillance cameras and loT have helped to create safer, responsive, and cleaner environments. Developments in drones, robotics and AI video analytics can improve railway safety by increasing accuracy in inspection and minimise human exposure in high-risk tasks.

While the technology is faster than the policy developments in our country, there are certain challenges faced by regulators and railway operators:

- Reliance on cloud computing for data storage causes growing concerns over cyber security.
- Ambiguity in policies related to use of data, data sharing and data privacy.
- Greater demand for seamless travels.
- Rising concerns on ethics on autonomous operations and its decision making

JOURNEY OF DIGITALISATION AT DMRC

Delhi Metro Rail Corporation (DMRC) has used microprocessor-based Train Control and Management System (TCMS) in its Rolling Stock since the beginning. Mr S S Joshi, Director- Rolling Stock, Delhi Metro Rail Corporation (DMRC) shared the journey of digitalisation explaining how the data captured is used for troubleshooting faults.

Earlier, in the initial corridors, the maintenance personnel had to physically connect to the TCMS system in each train in the depot and download this data during the night hours to analyse it. However, with digitisation, DMRC created a Wi-Fi backbone in depots in its Phase-2 extension, due to which the diagnostic data from a train can be downloaded automatically in the server without human intervention. Moving one step further, DMRC has now created Radio connectivity between a train and





The Operation Control Centre/Maintenance depots in its Phase-3 extension for real time data download.

Case Study (Wheel wear measurement)

Previously, DMRC used to capture data by manually taking the measurements using a mechanical gauge and completed the data analysis manually, where they recorded all the data in a book. Subsequently, the authorities started using a laser based

non- contact system which is semi-automatic and calculates the data through a standard profile. However, the oddity existed when they were required to go near each of the wheels to put the laser profile over it physically to capture the data.

Interestingly, DMRC has now made the entire process fully automatic. It tracks the mounted wheel wear monitoring system in the incoming point of the depot. Whenever the train enters a depot, the wheel wear is captured, gets analysed and the rule engines are in place.

Mr Joshi highlighted that the captured data is not just important from the troubleshooting or maintenance point of view, but helps in inventory management as well. Similarly, there are other MIS applications which are using this data to work out the maintenance cost, occupancy of the human resources and utilise the resources for further use.

This data is also useful for trend analysis which helps in interpreting and optimising the maintenance schedule. Based on the value of data, DMRC has critically reviewed the periodicity as well as the quantum of work which is required to be done based on the OEM recommendation for the maintenance schedule. As a result of this, the authorities have pointed out several benefits such as:

- Duration of maintenance schedule has been reduced significantly. For example, maintenance requirements for lumatic balls have been reduced to about 1/10th. Similarly, maintenance schedule of rubber items has been improved from 8-10 years (typical recommendation of the OEM) to improved significantly. This helps in reducing the maintenance cost as well.
- Replacement schedule of replaceable items such as rubber items has been extended.
- Periodicity of inspections have been extended, without compromising on its reliability, thereby eliminating over-maintenance. For instance, first inspection can be extended to 72 hr check as compared to the OEM recommendation of 24 hr, which can be further extended to 7 days as well.
- Duration of the above schedule can be reduced to 30 minutes from 2.5 hr. at present for UTO enabled stock. With this, the optimisation of schedules has increased the availability of rolling stocks from 90% to 95%. As the space availability is a major concern for the bigger cities, it also helps in downsizing maintenance infrastructure in future depots.

Since condition monitoring has been successful for the rolling stocks, DMRC is now planning to expand its footprint to other systems including Track Monitoring and Overhead Equipments.

Super-SCADA

This is an ambitious project of DMRC where condition monitoring will be expanded to capture fault data in the systems including AFC gates, lifts, escalators, and CCTV cameras. A platform is being developed to integrate various IoT based applications for a unified MMI for all assets and to link with existing Enterprise Resource Planning (ERP) such as inventory management, budget allocation and HR for synergy. The idea is to make the data accessible to the third-party or the decision makers.

MOBILITY SOLUTIONS FROM DUCAB

Ducab is a 100% UAE government owned cable manufacturing company. With an invested capital of USD 0.45 bn, it employs over 1600 people from 30 nationalities across 6 countries and claims to have received approval from the BASEC (British Approval Services for Cables).

According to **Graham Turner, Ducab** has internationally powered metro projects across the cities of Delhi, Lucknow, Doha, Riyadh, Dubai, Hongkong, Singapore, Shiraz Rail and London underground adding up to a total of USD 150 mn cables sold to the metros till date.

With a wide range of cables for railways, the company provides signalling power cables, control panel wiring for rolling stock, DC traction feeder cables for supply of main power between substation and conductor rail. It also provides fire performance products for the railway industry.

As per the company, Ducab cables made with LSZH compound meet the UV radiation resistance test and the toxicity index test. Based on the customer requirement, Ducab also makes anti termite, anti-rodent & anti-fungus/ mold resistance cable with LSZH compound.

NEW-AGE MAINTENANCE TECHNIQUES IN BARCELONA

TBM Metro de Barcelona opened in 1924. The organisation has been using monitoring and data analysis tools since 2006. Currently, it operates on 8 lines, with a network of 124 km on 161 stations, with 30% of its network being driverless.

As per **Mr Ignasi Oliver Gonzalez, TMB Barcelona**, data analysis and monitoring must be incorporated to solve real needs. This can help in reducing service delays and stop time, getting good availability and overcoming the difficulty to find the cause of failure. It is also necessary to succeed in delivering new technology and adopting new ways of working. Some other benefits of data analysis and monitoring include:

- Prevention of failures by early detection of degradations and quick attendance
- Quick recovery of incidents by operational and technical, good information
- Rationalising preventive maintenance by CBM and particularising
- Effective analysis of breakdowns by correcting weaknesses or defective parts
- Evaluate maintenance efficiency with technical supervision
- Evaluate quality of assets with specifications and guarantees

TMB also advises to avoid solutions that are much more than affordable. As per the company, the best tool is not useful if it is not used efficiently. Thus, one should look for a technological partner that can build your solution and fit in their company culture. Alongside, enthusiastic participants in the project can also help to overcome the fears of people that do not line with the changes.

BUILDING A S4M ECOSYSTEM AS THE FUTURE OF MOBILITY: HITACHI

Hitachi delivers digital solutions in the world of mobility. Claiming to have a business that is customer-focused and designed to improve consumer experience through next generation digital technology, **Mr Mangal Dev & Mr Narendra Ashar, Hitachi India Ltd** informed that their major customers are the passengers, governments, operators, transport authorities and regulators, investors, banks, and financiers.

The company is working to combine various segments namely building system, finance, transportation, energy, security, logistics and automotive. It aims to create a Service for Mobility (S4M) Ecosystem within Hitachi to form working solutions for value proposition as One Hitachi to address a large number of areas using these subsets of solutions. These services may include:

- Seamless ticketing with integrated pricing services
- Wellbeing and environmentally sustainable services
- Free Revenue Management System
- Loyalty Programs and Incentive Systems
- Luggage Management Systems E2E
- First and Last Mile Services
- Security and Smart Parking Systems
- Integrated Traffic Management System

Considering a passenger and operator centric framework, Hitachi Rail S4M involves smart ticketing, vehicle tracking, multimodal traffic management system, disruption management, congestion monitoring and prediction, capacity planning and dynamic headway.

Hitachi Rail Services for Mobility (S4M): Passenger and Operator Centric Framework

HITACHI Inspire the Next



For instance, usually there is a crowd at the station gates while the stations themselves are not as crowded. For this, one must opt for the Be-In and Be-Out feature, rather than the Check-In and Check-Out system.

IMPROVING CUSTOMER EXPERIENCE WITH DX IN JAPAN: JRE CASE STUDY

The East Japan Railway Company (JR East) is a major passenger railway company in Japan. With over 17.9 million passengers travelling per day through JR East lines, the organisation has a network of 7,401 km with 1,676 stations running about 12,800 rolling stocks per day. **Mr Takahito Sahoda, East Japan Railway** shared that the company is working to improve the customer experience by the fusion of infrastructure and services with DX (Digital Transformation) through big data, AI, 5G and IoT. JRE experiments in its own huge test fields to validate and develop AI. As per the company, DX is a strategy of enabling business innovation predicted on the incorporation of digital technologies into the operational process, products, solutions, and customer interactions. It can be utilised in the following manner:

- Utilisation of Al in call centre: Various queries regarding time, fare, ticket, inquiries to various events can be answered through Al in the process of question content analysis, ranking and scoring while collecting the response data.
- Realisation of smart maintenance: Investing in effective maintenance innovation by changing Time Based Maintenance (TBM) to Condition Based Maintenance (CBM) using Google Cloud AI for CBM. This will also help in predicting future accidents and preventing accidents.

What is DX ?

DX is a strategy of enabling business innovation predicated on the incorporation of digital technologies into your operational process, products, solutions, and customer interactions.



Going forward, for advancements of AI in the urban rail sector, the speakers suggested three key takeaways. First, creating a platform of collaboration between the user, customer, and the technology provider. Second, integrated operations planning, as a lot of people have made very good progress in the use of data and data analysis, yet a lot of data is still fragmented. Finally, the third being trusting the product pricing.

PROGRAM OF THE SEMINAR

23 FEBRUARY

INAUGURAL SESSION

11:00 AM - 11:40 AM

Moderator: Rupa Nandy, Head of UITP India

- Opening Remarks Mohamed Mezghani, Secretary General, UITP
- Welcome Address Dr Mangu Singh, Managing Director, DMRC
- Keynote Speaker Shri Jaideep, Officer on Special Duty (Urban Transport), Ministry of Housing and Urban Affairs (MoHUA)
- Vote of Thanks K K Saberwal Director Finance, DMRC

PLENARY SESSION: COVID-19 IMPACT ON URBAN RAIL SECTOR AND THE ROAD TO RECOVERY

11:40 AM - 13:10 PM

Moderator: Angé Anczewska, UITP ANZ

- Ms Karen McCarthy Chief Customer Officer Sydney Trains, NSW
- Shri Pradeep Yadav Managing Director Chennai Metro Rail Ltd
- Shri Anil Kumar Saini Chief Operating Office L&T Metro Rail, Hyderabad
- Mr Alvin Kek Vice President Operations SMRT Trains, Singapore

24 FEBRUARY

TECHNICAL SESSION I- TECHNOLOGICAL INNOVATIONS IN URBAN RAIL SECTOR: LES-SONS FROM THE PANDEMIC

14:30 PM - 16:30 PM

Moderator: Daria Kuzmina, Knowledge and Innovation, UITP

- Innovation in Light Rail Manila Jacqueline Gorospe, Light Rail Manila Corporation, Manila
- Innovative techniques of sanitisation in India Case Study Chennai Metro- Thiagarajan P, Chennai Metro Rail Ltd
- Moscow Metro's experience in passenger flow management during morning peak hour Margarita Kolosova, Moscow Metro
- Technology driven disinfection and cleaning Sheena Sasi Kumar, Transdev
- Occupancy monitoring and demand management Daria Kuzmina, UITP

25 FEBRUARY

TECHNICAL SESSION II- FINANCING AND GOVERNANCE APPROACHES IN URBAN RAIL SECTOR

17:30 PM - 19:30 PM

Moderator: Hilia Boris, Knowledge and innovation, UITP

- Increasing revenue through NFR-Case Study Mahametro T. Manoj Kumar Daniel & Aishwarya Nale, Maharashtra Metro Rail Corporation Limited
- Financing for London Public Transport Julian Ware, Transport for London
- Ridership risk in Urban Rail financing Michaela Altmann, KfW IPEX Bank
- Enabling Investments and service solutions in Urban Rail in Latin America Flavio Chevis, Addax, Brazil
- Contracting for timely project completion Stephanie Kam, Nossman LLP, USA

26 FEBRUARY

TECHNICAL SESSION III- DIGITALISATION IN URBAN RAIL

14:30 PM - 16:30 PM

Moderator: Gayang Ho, Leader of research and policy development, AP, UITP

- Technological initiatives of DMRC for predictive maintenance S S Joshi, Delhi Metro Rail Corporation
- Mobility Solutions from Ducab Graham Turner, Ducab
- New age maintenance techniques in Barcelona Ignasi Oliver Gonzalez, TMB Barcelona
- MaaS: The Future of Mobility and the role of Digitalisation Mangal Dev & Narendra Ashar, Hitachi India Ltd.
- Artificial intelligence in railways and beyond Takahito Sahoda, East Japan Railway







SHRI, JAIDEEP Officer on Special Duty - UT Ministry of Housing & Urban Affairs Government of India

INAUGURAL SESSION



DR. MANGU SINGH Managing Director Delhi Metro Rail Corporation



MR. MOHAMED MEZGHANNI Secretary General UITP



SHRI, K K SABERWAL Director Finance Delhi Metro Rail Corporation



SHRI. PRADEEP YADAV, IAS Managing Director Chennai Metro Rail Ltd.



MS. KAREN McCARTHY Chief Customer Officer Sydney Trains at NSW



PLENARY SESSION

SHRI. ANIL KUMAR SAINI Chief Operatiang Officer L&T Metro Rail Hyderabad

TECH SESSION - I



MR. ALVIN KEK Sr. Vice President, Operations SMRT Trains, Singapore



ANGE ANCZEWSKA UITP – Australia and New Zealand



JACQUELINE GOROSPE Head, Communications and Customer Relations Light Rail Manila Corporation



THIAGARAJAN P Deputy General Manager , Rolling Stock Chennai Metro Rail Ltd



MARGARITA KOLOSOVA Deputy Chief at Investment Department Moscow Metro

TECH SESSION - II



SHEENA SASI KUMAR Group Safety Director Transdev Group



DARIA KUZMINA Knowledge & Innovation UITP



T. MANOJ KR. DANIEL DGM - MMI & TP Mahametro



JULIAN WARE



MICHAELA ALTMANN Head-Major Project Funding Director - Mobility ~ See London Transport, KFW IPEX Bank



FLAVIO CHEVIS Chief Executive Officer Addax, Brazil



STEPHANIE KAM Attorney at Law Nossaman LLP. USA



HILIA BORIS Knowledge & Innovation UITP



S S JOSHI Director Rolling Stock, DMRC



GRAHAM TURNER National Sales Manager, Ducab



IGNASI OLIVER Director Project Area of Metro, TMB Barcelona



TECH SESSION - III

MANGAL DEV Head of Railway Systems Business, . Hitachi India Ltd.



GM - Digital Railway Hitachi India Ltd.



NARENDRA ASHAR TAKAHITO SAHODA Senior Manager East Japan Railway



GAYANG HO Lead-Research & Policy Development UITP Asia Pacific

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ABOUT UITP

INTERNATIONAL ASSOCIATION OF PUBLIC TRANSPORT (UITP) is the international network for public transport authorities and operators, policy decision-makers, scientific institutes and the public transport supply and service industry. It is a platform for worldwide cooperation and the sharing of know-how between its 1,800 members from 100 countries.

In March 2007, UITP opened its first **Indian office in Bangalore** and in December 2019 in **New Delhi**. The prime objective of the Indian office is to better address the specific needs of regional members as well as the Indian public transport sector and its stakeholders. UITP in India aims to offer assistance and services to public transport organisations in the country through access to knowledge on national and international technical and policy developments in urban mobility, peer reviews, projects and studies on specific issues of concern.

UITP supports the public transport sector and its development in India by advocacy, knowledge sharing, organising technical trainings, data collection, international benchmarking, etc. There are over 50 UITP members in India.

FOR FURTHER INFORMATION

Rupa Nandy

Head of UITP India Mob- +91 9811864099 Email- <u>rupa.nandy@uitp.or</u>

Delhi Office

UITP India Office of Chief Project Manager-5 Delhi Metro Rail Corporation Ltd Ground Floor, Airport Express Metro Station, Dhaula Kuan New Delhi-110010

Bangalore Office UITP India Regional Office 2nd Floor BMTC Shanti Nagar Bus Station Complex, Shanti Nagar

PUBLICATIONS

Some key publications from UITP focusing on urban rail are:

- Digitalisation in public transport: Implementing predictive asset maintenance Knowledge Brief (available to everyone): https://www.uitp.org/publications/digitalisation-in-public-transport-implementing-predictive-asset-maintenance/
- The global tram and light rail landscape Statistics Brief (available to everyone): <u>https://www.uitp.org/publications/the-global-tram-and-light-rail-landspace/</u>
- World report on metro automation Statistics Brief (available to everyone): <u>https://www.uitp.org/publications/world-report-on-metro-automation/</u>
- New urban rail infrastructure Statistics Brief (available to everyone): <u>https://www.uitp.org/publications/new-urban-rail-infrastructure-2018/</u>
- Occupancy Monitoring Report (members only): <u>https://mylibrary.uitp.org/PermaLinkRecord.htm?ar-</u> <u>chive=181281390946</u>
- Strategy for the technological renewal of signalling interlocking Report (members only): <u>https://</u> mylibrary.uitp.org/PermaLinkRecord.htm?archive=182918090019

ABOUT UITP METRO DIVISION

The **Metro Division** is composed by close to 100 metro operators (and several organising authorities responsible for the planning of metro systems). Any metro operator member of UITP is de facto a member of the Metro Division.

Within the Metro Division, there are several working structures; not all members participate actively in all of them.



The **Metro Assembly** is the meeting that gathers, usually once a year, the main contacts (CEO, technical directors, etc.) of all UITP Metro Division members. In the Assembly, top level Metro Division members share their news and discuss problems at the highest level in a closed, non-commercial environment. Participant members also receive an update on the technical activities developed by the Division in the course of the year and a preview of upcoming working topics, and can propose new working topics, contributing to shape the future of the Division and the metro sector.

The **Metro Committee** is the strategic and executive force of the Metro Division. It plans, coordinates and monitors the work of the four technical Subcommittees and the Observatory of Automated Metros, and prepares the programme of Metro Assemblies and Conferences. This working body is composed by the Chairpersons of the technical Subcommittees, the Observatory of Automated Metros, and a number of regional representatives.

SUBCOMMITTEES AND REGIONAL BODIES

In general, Subcommittees meet twice a year; membership to the Subcommittees is voluntary – each Metro network applies to become a member according to their own priorities. The technical Subcommittees are:

- Electrical Installations and Safety Systems (EISS) subcommittee
- Operations Subcommittee
- Fixed Installations Subcommittee
- Rolling Stock Subcommittee
- Observatory of Automated Metros

The work of the Metro Subcommittees is complemented by **Metro Regional Platforms** - exchange forums set in each of the world regions to facilitate exchanges at a closer level among members.

Currently there are 3 active regional platforms

- Asia Pacific Urban Rail Platform (APURP)
- International Rail Forum for North America (IRF-NA)
- Grupo de Rieles de America Latina (Latin America Rail Group)

For more information on UITP Metro Division activities, please contact Corentin Wauters

Manager, Knowledge & Innovation <u>corentin.wauters@</u> <u>uitp.org</u>

This is an official Report of UITP, the International Association of Public Transport. UITP has more than 1,800 member companies in 100 countries throughout the world and represents the interests of key players in this sector. Its membership includes transport authorities, operators, both private and public, in all modes of collective passenger transport, and the industry. UITP addresses the economic, technical, organisation and management aspects of passenger transport, as well as the development of policy for mobility and public transport worldwide.

This Report was prepared by UITP India.





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Rue Sainte-Marie 6, B-1080 Brussels, Belgium | Tel +32 (0)2 673 61 00 | Fax +32 (0)2 660 10 72 | info@uitp.org | www.uitp.org