



FEDEX-EMBARQ MOBILITY AND ACCESSIBILITY PROGRAM

Annual Report 2013

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LETTER FROM THE DIRECTOR



The FedEx EMBARQ Mobility and Accessibility Program (MAP) continues at an auspicious time. Transportation's impact on the environment remains urgent as the world's population continues to explode and be increasingly urban. Private motorization will continue to grow if actions are not taken to alter the course. By 2050, approximately 7.5 billion trips were made each day in cities worldwide. In 2050, there may be three to four times as many passenger-kilometers traveled as in 2000 in a business-as-usual mode. Freight movement could also rise more than threefold during the same period.¹

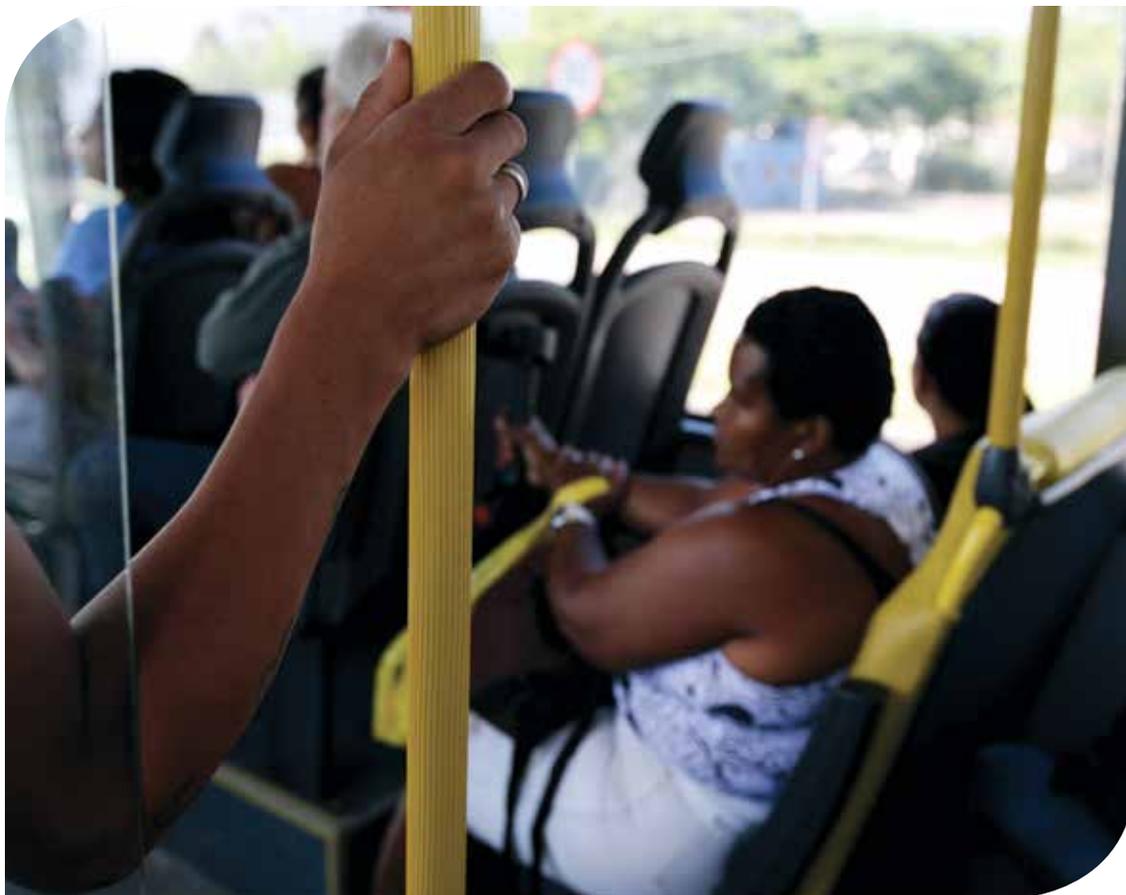
Within this urgent scenario, cities, national governments, and international agencies are increasingly recognizing and elevating the role of mobility in mitigating harmful environmental impacts, advancing economic development, and enhancing opportunities for all. The latest United Nations Environment Programme's Emissions Gap Report, acknowledges the enormous potential of the transportation sector to bridge the emissions gap by 2020, including a 1.7 to 2.5GT CO₂ reduction.² The International Energy Agency (IEA) also highlights the need for collective action to reduce vehicle kilometers and increase the demand to nonmotorized and public transportation. (IEA suggests increasing BRT +25,000 km, among other measures.)³ This is especially important in rapidly developing countries like Brazil and India and has the opportunity of saving US\$20 trillion in expenditures annually (savings mainly from not requiring road and parking expansion and related maintenance).

The good news is that there are promising signs that we are presently on the verge of a tipping point of a global rise of mass transit. We are in a period where the adoption rate of sustainable transport solutions is changing from a few cities or a small number of users

per year to exponential growth. Many emerging concepts in sustainable transport are on the rise, including congestion pricing and vehicle quota systems. Some concepts are becoming mainstream, like bike-sharing, bus rapid transit (BRT), and smart tickets. In fact, BRT and busway systems currently operate in 166 cities, cover 4,336 kilometers (2,694.27 miles), and carry nearly 29.7 million passengers daily—a majority of that since 2000.⁴ Still others that are already mainstream in industrialized economies are now emerging or tipping in developing regions, such as low emission zones, car-sharing, and metro. Where we have seen positive outcomes is where the public and private sector work together effectively.

The FedEx-EMBARQ MAP is a great example of how collaboration can contribute to shifting the trends toward even more sustainable transport solutions that are good for the planet and people. Through MAP, which is built on common values and leveraged expertise, cities can create better access to where people work, shop, learn, and play while limiting impacts on the environment.

2013 was a year that further proved the concept for the FedEx-EMBARQ MAP: MAP was consolidated in Mexico and India; work in these two countries was leveraged



and expanded upon in Brazil; and a body of research was created that received international recognition, including the Volvo Sustainable Mobility Award.

The collaboration with FedEx continued to accelerate the dissemination of knowledge that helped to create real change on the ground in 40 cities. Its impact has been tremendous, helping reduce 20,000 tons of CO₂ emissions and transferring expertise to 1,667 transport officials and drivers. With FedEx support, both

financial and technical, MAP's footprint has expanded and demonstrated the potential to help even more cities in the future.

When FedEx and EMBARQ began traveling down this shared course in 2010, the vision was a model to bring an existing body of expertise to those who could use it most effectively to create sustainable transport solutions. Today, that vision is not only a reality through the FedEx-EMBARQ MAP, but a new standard for how corporate social responsibility should work. The commitment by FedEx employees across departments and regions has energized the EMBARQ team.

That energy will come in handy as the opportunities may be great, but the road ahead remains challenging. It will take a sustained effort from all sectors and segments of society. And EMBARQ looks forward to continuing the course with FedEx.

Thank you,

Holger Dalkmann
Director, EMBARQ

EXECUTIVE SUMMARY

A WINNING COLLABORATION

EMBARQ and FedEx have been working together for four years with the common goal to improve the quality of life for people in Brazil, India, and Mexico by improving sustainable transportation and mobility solutions for cities. This collaboration was crystalized in the Mobility and Accessibility Program (MAP). MAP's strategy is to leverage FedEx's extensive know-how and expertise in vehicle patterns, fuels, transportation technology, driver safety, telematics, etc., to accelerate EMBARQ's ability to help cities create mobility and access to marketplaces, jobs, schools, and community in ways that minimize environmental impacts.

About EMBARQ

EMBARQ is the World Resources Institute's Center for Sustainable Transportation. EMBARQ works with local authorities to catalyze and help implement clean, efficient, affordable, and sustainable transportation solutions that improve quality of life in urban areas. EMBARQ provides practical strategies for change and effective tools to implement them. EMBARQ measures success in the form of new policies, products, and practices that are seen on the ground.

Since 2002, EMBARQ has grown into a network that includes Mexico, Brazil, India, Turkey, the Andes, and China. EMBARQ is currently in the middle of a five-year strategy to influence 200+ cities around the world to adopt high-quality sustainable mobility and urban development practices and policies, which will save lives, cut CO₂ emissions, and reduce travel times for millions of people, while leveraging investments. FedEx is playing a crucial role in reaching these targets.

MAP represents a model for corporate social responsibility based on shared values and high-skilled employee engagement.

Both FedEx and EMBARQ are committed to reducing emissions, improving safety, and managing congestion. Cities in developing countries mostly lack the capacity, knowledge, and tools to make informed decisions to improve mobility. The involvement of highly skilled volunteers from FedEx accelerates the pace at which EMBARQ can disseminate knowledge and build the much needed capacity for cities to design and implement sustainable transportation solutions.

This report outlines the most important accomplishments achieved by the global team and the MAP centers during fiscal year 2013. Cutting-edge research, comprehensive tools, and innovative capacity building on sustainable transportation have contributed to achieve positive and concrete external changes in 40 cities where the MAP centers intervene, directly and indirectly, as exemplified by the following MAP highlights:



- In Mexico City, Metrobus has successfully incorporated the EMBARQ Mexico's safety first program (adapted from FedEx's Safety First Program) as an institutional practice and trained 100 percent of its 1,080 drivers.
- In India, thanks to the technical and financial advice provided by EMBARQ India, which built on cross-center learning through MAP, the North East Karnataka Road Transport Corporation (NEKRTC) successfully leveraged a total investment of US\$11 million to implement bus systems for the first time in six cities.
- In Brazil, EMBARQ Brasil, the last MAP center to join the program, is accelerating its impact by building on the FedEx Safety First Program and the training manual published by EMBARQ Mexico to develop a pocket manual for drivers and form the basis for a series of training sessions.
- The research funded by FedEx, "Exhaust Emissions from Transit Buses," has made EMBARQ a sought-after adviser to companies looking to make decisions about their fleets. In addition, MAP fellows including Erin Cooper, Magdala Arioli, Aileen Carrigan and Umag Jai, won the Freud Burggraf Award for excellence in transportation research. Furthermore, the team expanded the research scope to include two additional areas: the cost of the full life cycle of the vehicle—including buying, maintaining, and fueling the bus, and upstream emissions from manufacturing buses and fuel—and developed a comparison tool.

Thanks to FedEx financial and technical support, the MAP program has promoted real change on the ground and demonstrated the potential to help even more cities in the future.

EMBARQ looks forward to continuing to collaborate with FedEx to consolidate and scale up the MAP strategy. Thanks to FedEx's renewed commitment with a two-year grant (2014–2015), the MAP strategy aims to increase its impact to 60 cities and further strengthen the institutional and technical capacity in sustainable transport solutions with the overall goal to deliver access to a high quality of life for all. Here are some highlights from upcoming projects:

- Led by the EMBARQ Global Research and Practice team, MAP will apply the emissions comparison tool to pilot a direct engagement model with at least three to five transit agencies in three cities.
- MAP in Mexico will launch a quality-of-service project, based on FedEx's quality-of-service program.
- MAP in Brazil will pilot a road safety manual in Belo Horizonte through BHTrans.
- MAP in India will continue and scale up the institutional capacity-building program on sustainable transportation to include more than 12 cities and 22 transit agencies within the country.

CONSOLIDATING THE MAP STRATEGY

A POWERFUL RIPPLE EFFECT

MAP's strategy generates a ripple effect from the FedEx-EMBARQ collaboration, which has grown beyond what was initially conceived. During the first two years (2010–2011), MAP projects directly provided technical advice to 300 transport officials in cities in Mexico, influencing their decision making and associating the FedEx brand with sustainable transport more than 300,000 people. During the last two years (2012–2013), the MAP project has been consolidated and scaled up to include India and Brazil, as well as the fellowship program and global research in fuels and vehicles, which increased the impact of MAP. During this period, MAP succeeded in reducing 20,000 tons of CO2 emissions and transferred FedEx and EMBARQ expertise to 1,667 transportation officials and drivers.

“When you drop any new idea in the pond of the world, you get a ripple effect. You have to be aware that you will be creating a cascade of change.”

JOEL BARKER

These important outcomes have been achieved thanks to the financial support and extensive know-how and expertise provided by FedEx and EMBARQ. Innovative research on sustainable transport led by the global team and locally relevant projects developed by the MAP centers, has successfully leveraged state-of-the-art practices to cities that would not have access to them otherwise.

MAP Vision

Cities in key FedEx markets are served by excellent public transportation; are more productive, healthier, and connected; and have fewer cars on the road, safer streets, cleaner air, and faster commutes and deliveries.

MAP Objective

To accelerate dissemination of FedEx and EMBARQ expertise to enable government officials to make informed decisions that will improve the quality of life of people.

MAP Impact

EMBARQ projects in key FedEx markets help reduce congestion and CO₂ emissions and increase the accessibility, road safety, and efficiency of public transportation systems.

MAP Program Structure

MAP Centers – India / Brazil / Mexico

Global Research – Vehicles and Fuels

Fellowship Program

FedEx – EMBARQ

EMBARQ MAP PROJECTS

TRANSFERRING BEST PRACTICES TO CITIES

The FedEx EMBARQ Mobility and Accessibilities Program is a road map for how best practices from the private sector can accelerate how and when new standards in the public sector are set and applied. The MAP projects are learning labs that EMBARQ leverage to bring state of the art practices to cities that would not have access to them otherwise.

GLOBAL

The EMBARQ team, based in Washington, DC, coordinates efforts on the global level to accelerate the MAP strategy and ensure consistency and sharing of best practices.

Key Pillar: FedEx Transportation Fellowship Program FY13

The FedEx Transportation Fellowship (FTF) is the pillar of the MAP strategy. The program provides EMBARQ's staff from different countries with the opportunity to learn FedEx's expertise in many areas and take the knowledge home to apply it on real projects on the ground. The first class of FTF fellows took part in an intensive training program at FedEx World Headquarters in November 2011.

In the next couple of years, the fellows applied their newly gained expertise to develop local and international projects. For example, Prashanth Bachu and Ashwin Prahbhu, two FedEx fellows from India, have successfully led important BRT projects in their cities. Erin Cooper from the global team led the award winning research on "Exhaust Emissions from Transit Buses." These important transport milestones wouldn't have been possible without the leadership, perseverance, and expertise of the fellows who succeeded to put into practice the important knowledge they learned from FedEx experts at the fellowship program.

FedEx-EMBARQ Transportation Fellows, 2011

- **Aileen Carrigan**, Senior Associate, EMBARQ
- **Erin Cooper**, Research Analyst, EMBARQ
- **Ashwin Prabu**, Associate–Urban Transportation, EMBARQ India
- **Umang Jain**, Associate–Urban Transportation, EMBARQ India
- **Prashanth Bachu**, Urban Transportation Program Manager, EMBARQ India
- **Saul Alveano**, Program Coordinator, EMBARQ Mexico
- **Marco Priego**, Program Coordinator, EMBARQ Mexico
- **Magdala Arioli**, Transportation Engineer, EMBARQ Brasil

A survey conducted by EMBARQ showed that the fellowship is a success. The FTF fellows say that they learned important skills and knowledge from FedEx, which helped them lead local projects in their respective countries. EMBARQ staff is eager and excited to start the new class of FTF fellows in 2014. They are expecting a deeper dive into the processes and techniques adopted by FedEx so that they can bring state-of-the-art practices to cities.

Global Research: Sustainable Urban Transportation Fuels and Vehicles

Leveraging FedEx technical expertise, EMBARQ launched the Sustainable Urban Transportation Fuels and Vehicles (SUTFV) project to develop research and create a database on clean fuels and vehicles. In 2012, the program published its first report, “Exhaust Emissions from Transit Buses,” which assessed exhaust emissions of different urban bus fuel and technology combinations. The results were presented at three major transportation conferences—the Transportation Research Board in January 2013, Connect Karo in April 2013, and Thredbo in September 2013—sharing important insights on how vehicle choice relates to air pollution and greenhouse gas emissions in developing countries.

Due to the success of the first research paper, in 2013 the global team expanded the research scope to include two additional areas: the cost of the full lifecycle of the vehicle, including buying, maintaining, and fueling the bus, and upstream emissions from manufacturing buses and fuel. This research is helping transport agencies, which might not otherwise have access to this information, understand the trade-offs between buses of different fuel types. For instance, buses that may not create air pollution, like electric buses, can be prohibitively expensive for small agencies or can generate large amounts of CO₂ emissions if the local electricity is produced from coal.

The team has also used this research to develop a tool that compares the full life cycle costs and life cycle emissions of buses using different fuel types. As the team began to engage with agencies in Mexico City, Porto Alegre, Jaipur, and more, it found that vehicle cost information is very different for each country, and therefore the original model needed to be adapted for each MAP center. At present, the team is working on this adaptation, with the first draft model for Mexico having already been completed.

This work will provide decision makers with key background information on emissions and costs, as well as the environmental, financial, and regulatory context relevant to each city. Developing this research also will help the MAP team engage with a variety of experts with different backgrounds, whose expertise will be incorporated into the work. The resulting

material will allow the MAP centers to bring this knowledge to a wider audience beyond the pilot cities, including development banks and ministries, which are regularly making fleet decisions and regulations.

During FY14, the global team will focus on the following steps:

- **Review the model:** The global team will review and finalize the model in collaboration with FedEx experts.
- **Implement three additional pilots:** The team will pilot a program with three agencies to fine-tune the model and develop fleet decision case studies. Puebla, Belo Horizonte, and Indore have been identified as potential cities.
- **Publish the life cycle emissions research:** The results from the research and cases studies will be presented in a complete work, titled “Clean and Cool Bus Fleets: How Transit Agencies in Developing Countries Can Make Cost-effective Emissions Reductions through Fuel and Vehicle Choice.” The first draft of the publication is expected by the end of FY14.
- **Engage with mayors, city transport and transit agencies:** Next year, the team will set up working groups consisting of three to five transit agencies per city. These groups will be led by the MAP centers with support of the global team.

FedEx-EMBARQ Transportation Fellows 2011 win the Freud Burggraf Award for excellence in transportation research

The EMBARQ-FedEx Vehicles and Fuels team comprised of FedEx Transport Fellows Erin Cooper of Washington D.C., Magdala Arioli of EMBARQ Brazil, Aileen Carrigan also of Washington D.C., and Umang Jain of EMBARQ India won the Fred Burggraf Award in recognition of excellence in transportation research by researchers 35 years of age or younger.

“Our donor for this project, FedEx, did a great thing to help us start the project. Because we are an international team they brought us all together at their Memphis headquarters so we were all able to meet each other and learn about the topic a little bit more from FedEx’s perspective, where they told us about their own experience with heavy duty vehicles and meeting stringent emissions standards in California.

Having the team come together was very useful to establishing the relationships that you need to do these types of international

FedEx-EMBARQ Transportation Fellows Awarded

- Aileen Carrigan, DC
- Erin Cooper, DC
- Magdala Arioli, EMBARQ Brazil
- Umang Jain, EMBARQ India

research projects. Other than that, it is a challenge to be working so closely on a project with people who are so far away all the time, in many different time zones. It required a lot of dedication from the team to try to see everything through. It is much easier to go ask someone a question, or to explain data if you are sitting in the same room. If you’re remote it requires a lot more effort. That was on the whole team, everyone made the effort to make sure we were communicating.”

—Erin Cooper, FedEx-EMBARQ Transportation Fellow, Global Team

2013 Transforming Transportation

EMBARQ hosts the annual Transforming Transportation conference in partnership with the World Bank. The 10th edition took place in January 2013 and gathered more than 500 policy makers and transport experts from around the world to discuss big opportunities for action on sustainable transportation in cities. Julia Chicoskie, Earth Smart Program Advisor, and David Short, senior counsel, Trade and International Affairs, attended as FedEx representatives and also participated in a roundtable discussion to explore the concept of an EMBARQ corporate council, which was inspired by the collaborative model with FedEx.



MAP CENTER: EMBARQ MEXICO

In 2010, EMBARQ Mexico was the first MAP center to engage with FedEx. This collaboration started with a workshop series in which FedEx expertise and know-how in vehicle asset management, vehicles, fuels technologies, and telematics was leveraged. Empowered with this knowledge and based on local urban transportation needs, EMBARQ Mexico opted to focus its MAP local projects on improving road safety in the country.

Safety First Project (Proyecto Seguridad Primero)

The MAP center in Mexico has successfully pioneered road safety management in public transport systems in Mexico City, Guadalajara, and León thanks to FedEx's expertise in safety operations. The Safety First project goal is to save lives and reduce the road accident rate in Mexican cities by establishing a driver training program and establishing effective institutional policies to insure road safety. This project is extremely valuable to the transit agencies in Mexico as they had never carried out such a program before. The ripple effect the Safety First project can be far-reaching as the project can be replicated not only in Mexico but in other countries as well.

Based on the FedEx Safety First program, the Safety First Project in Mexico focuses on strengthening capacity building and developing

technical tools to equip transit agencies with the best international standards in road safety. In 2012, a driving training workshop was piloted in Mexico City and Guadalajara, benefiting a total of 950 drivers. In 2013, the MAP center in Mexico further increased the scope of the driving training program, disseminated regional benchmarking and good practices guidance, and established a monitoring framework to audit infrastructure plans and implementation.

BENCHMARKING AND BEST PRACTICES IN ROAD SAFETY

A comprehensive assessment in road safety management was carried out in 10 cities and 3 countries. Several factors were analyzed in the transport systems, including institutional policies, data management, infrastructure, surveillance and regulation, and communication. Through 63 interviews with directors, operators, and drivers, important lessons were learned and common challenges were identified.

Participant Cities:

Brazil: São Paulo, Belo Horizonte, and Curitiba
Colombia: Bogotá, Cali, Pereira,
and Barranquilla

México: León, Guadalajara, and México City

"[...] our goal is that every public transport in Mexico City counts with the bests international standards on road safety, represented by a better infrastructure, new buses and vanguard, pedestrian and cyclist integration, and constant communication with all users."

RUFINO H LEÓN TOVAR
Director, Electric Transport
Services of Mexico City

Road Safety Workshop

A road safety workshop, aimed at decision makers of BRT public transportation systems and road safety managers, was hosted by EMBARQ Mexico at the 8th International Sustainable Transportation Conference, which took place October 4, 2013. The workshop was aimed at decision makers of BRT public transport systems and road safety managers. The workshop's objective was to disseminate EMBARQ's road safety efforts to save lives through sustainable transportation and included the case study from Mexico City (Metrobus), FedEx strategic collaboration, and road safety guidelines.

Next Steps

FedEx has ratified its commitment with the MAP center in Mexico to further support and consolidate the Safety First project by taking the following next steps:

- Publish a report on policies of road safety for urban public transport BRT systems. This publication will compile all the milestones of the Safety First project since its start in 2011.
- Host one workshop on defensive driving tailored to managers and directors.
- Carry out peer reviews by FedEx experts and other international organizations in road safety to validate quality and reliability of deliverables.

Safe Driving Training: A Multiplier Effect

In 2012, EMBARQ Mexico carried out two pilot training workshops in Mexico City and Guadalajara. In total, 38 drivers were trained in the main policies and standards for defense driving, the common language on safety management, and the value of personal safety. By the end of the year, Metrobus applied that training to 50 percent of its 950 drivers.

In 2013, EMBARQ Mexico hosted a second workshop in Mexico City where 128 drivers of Metrobus were trained for the second time. With comprehensive knowledge of defensive driving, they became important multipliers,

transferring their knowledge to a total of 1,080 drivers, representing 100 percent of Metrobus drivers. In this way, Metrobus successfully incorporated the Safety First program as an institutional practice. Both important accomplishments contribute to increased safety for the 800,000 passenger that use the system daily and enhance the safe driving culture in one of the largest cities of the region.

Also in 2013, the driving program was replicated in León, Guanajuato. Optibus, the city's BRT agency, will start training drivers in 2014.

- Develop guidelines for road safety management to communicate road safety recommendations to government officials.
- Involve private operators in the Safety First program through their corporate social responsibility projects.
- Launch a quality service project by identifying the cities to be assessed and carrying out a needs assessment.

International Sustainable Transportation Conference (2012)

Every year, EMBARQ Mexico organizes the International Sustainable Transportation Conference (Congreso), which brings together leading government officials, practitioners, academics, and civil society leaders to explore lessons learned and find new solutions to global transportation challenges. With more than 26 participant countries and 250



In Mexico, more than
17,000

annual deaths are caused by traffic accidents and remain the leading cause of deaths for young people aged 5–35, the second cause of parents lost, the second cause of permanent motor disability, and the cause of 350,000 serious injuries annually.



organizations, Congreso represents a strategic networking space for the public and private sectors, as well as civil society.

During the last three years, FedEx has actively participated in the conference as a sponsor and expert. At the 8th annual Congreso, which took place in October 2012, Russ Musgrove, FedEx managing director of Global Engineering Planning and Asset Management, gave a presentation on “Mobility and Asset Management” in which he shared his extensive expertise on asset management of different technologies, including hybrids and electrical vehicles. Musgrove’s presentation enriched the debate by also demonstrating the environmental benefits of asset management in addition to the economic ones. Finally, FedEx also participated as the sponsor of the welcome cocktail.

“Thanks to FedEx support through EMBARQ India’s Bus Karo Plus Program, five cities in India will improve operations of 25,000 buses resulting in 30 percent increased fuel efficiency and enhanced safety that will benefit 18 million users every day.”

MADHAV PAI
Director of
EMBARQ India

MAP CENTER: EMBARQ INDIA

India is one of the last major countries in the world to experience urbanization. In 2001, only 28 percent of India’s people lived in cities, and by 2040 is expected to rise to 40 percent. However, Indian cities are not ready to provide transport solutions to emerging urban populations. Today only a few cities have formal public transportation services. The existing ones are of poor quality, and there is a lack of institutional capacity to design and implement high-quality transport systems. EMBARQ India has taken this challenge as an opportunity to advance concrete sustainable transport solutions.

Bus Karo Plus Program

EMBARQ India has identified an enormous need to build local capacity on the operation and implementation of bus systems within Indian cities. On the one hand, the Ministry of Urban Development has created national policies and awarded large financial incentives to encourage cities to design and implement transport systems. On the other hand, local governments and transit agencies lack the capacity to plan, set up, and maintain such systems.

In 2009, EMBARQ India developed a guidebook on bus planning and operations to train practitioners, academics, and policymakers. Two years later, with FedEx



support, this initiative was further expanded to a knowledge-sharing forum. The Bus Karo Plus Program (“Do the Bus” in Hindi) serves as a best practice and peer learning network for public transport providers in Indian cities. This network provides an ideal space for city officials and local transportation planners to exchange information, best practices, and lessons learned. It also helps cities access and leverage government funds, optimize the use of these funds for high-quality bus systems, and reduce fuel costs. By 2016, the project aims to reach 20 cities and to have more than 40 percent of motorized trips take place by means of public transportation.

The Bus Karo Plus program has three components, two of which are sponsored by FedEx: “Talking Transit” and “Mentoring Transit.”

TALKING TRANSIT

Talking Transit is a workshop series that brings together public transport agencies to discuss technological, operational, and planning best practices for city bus services. So far, the workshops have provided technical advice to 22 transit agencies, which altogether operate 42,000 buses and serve 28 million passengers daily. Under this component, two workshops were conducted in 2013:

Workshop 1: Design of Feeder Services

On April 15–16, 2013, EMBARQ India hosted the fourth Talking Transit workshop: “Design of Feeder Services” in Mumbai. The workshop’s goal was to provide technical support on urban transport and feeder design alternatives. In collaboration with Brihanmumbai Electric Supply and Transport (BEST), one of the oldest public bus operators in the country, the conference brought together officials from various city and state transport agencies, municipal corporations, and state-level planning agencies from across India. Local and international experts shared their experience, best practices and lessons learned with 50 participants responsible for influencing public transport operations in more than 20 cities.

Workshop 2: Telematics for Improving Efficiency in Bus Operations

In collaboration with Karnataka State Road Transport Corporation (KSRTC), the workshop “Telematics for Improving Efficiency in Bus Operations” was held in Visakhapatnam September 12–13, 2013. The workshop’s objective was to expose Indian cities to the role of telematics in public transport operations to improve efficiency.

The workshop was attended by more than 60 staff and personnel from public and private operating agencies, private consulting firms, and state transport experts from national and international agencies. A highlight of the event

was a site visit to the Karnataka State Road Transport Corporation Control Centre and depot where participants were guided through the telematics system.

MENTORING TRANSIT

Mentoring Transit has benefited 12 cities, which operate 11,700 buses, catering to 8.2 million passengers daily. In 2013, EMBARQ India has provided technical expertise and close mentorship on a wide variety of topics, including technology, planning, service optimization, and finance. A brief description of EMBARQ India’s role in each of these cities is as follows:



TALKING transit

"Talking Transit" is a workshop series that convenes public transport agencies in order to discuss various aspects of city bus services as well as providing capacity building training.

MENTORING transit

"Mentoring Transit" involves assisting public transport agencies in implementing pilot projects that aim to improve city bus services.

LEARNING transit

"Learning Transit" develops and disseminates materials documenting Indian and international best practices in city bus service operation.

- Bangalore: assistance to the Bangalore Municipal Transport Corporation for route rationalization (BIG Service Launch)
- Mysore: technical advice to Karnataka State Road Transport Corporation with terminal and ITS evaluation to improve its city bus operations
- Mumbai and Chennai: in collaboration with Brihanmumbai Electric Supply and Transport Undertaking and the Metropolitan Transport Corporation, a driver training workshop for safety and eco driving to improve fuel efficiency and safety

- Jaipur: assistance to Jaipur City Transport Services Ltd. with performance monitoring and service optimization to improve system efficiency and operations
- Bhopal: planning for operation of BRT buses to the city bus agency

Connect Karo Conference (2013)

In April 2013, EMBARQ India hosted the Connect Karo conference in Mumbai in collaboration with Brihan Mumbai Electric Supply and Transport Undertaking. The theme of the workshop was Karo, which means “to make it happen” in Hindi. More than 150 experts, including government officials,

policymakers, and practitioners in the field of urban transport and planning gathered to discuss how sustainable transport solutions and integrated land development alternatives can be replicated and adapted in India. At the conference, Holger Dalkmann, director of EMBARQ, presented the results of FedEx-funded research on “Exhaust Emissions from Transit Buses.” These important research findings on exhaust emissions of different urban bus fuel and technology combinations in developing countries contributed largely to the debate on sustainable transport solutions in India.





Thanks to the technical and financial advice provided by EMABRQ India, the North East Karnataka Road Transport Corporation successfully leveraged a total investment of US\$11 million to implement bus systems for the first time in six cities in Karnataka, including Gulbarga, Bijapur, Bellary, Hospet, Bidar, and Yadgir.

MAP CENTER: EMBARQ BRASIL

High-quality and affordable transport has been identified as one of the most important demands for Brazilian citizens. Public riots in Brazilian streets that occurred in June 2013 started because of an increase in public transportation fares. Even though the protests were a fuse to ignite larger economic and political problems, citizens made a clear statement: They will not accept paying high fares for low-quality transport systems. Every day, people spend hours stuck in traffic congestion, inside overcrowded buses, without reliability and comfort. The users' dissatisfaction prompts them to change to motorized vehicles, especially motorcycles, thereby contributing to further congestion and pollution in a vicious cycle.

EMBARQ Brasil is committed to increasing quality, performance, and safety of BRT systems and is currently working with Rio de Janeiro, Belo Horizonte, Curitiba, São Paulo and Brasília to improve urban public transportation in those cities. EMBARQ Brasil started its MAP project in October 2012, focusing on two components: driver safety and quality of service.



Quality of Service for Bus Systems

The quality of service project aims to provide transit agencies and private operators with the necessary tools to assess and improve the overall quality and efficiency of the transport systems, based on the user's needs and perceptions. Improved quality of BRT transport systems is expected to provide the an array of benefits whereby cities will be able to assess and improve their systems' performance and provide higher standards of service, thus attracting and retaining even more passengers. The products expected from the project are a set of three manuals: BRT day one operation, system perception and image surveys, and operational processes and performance.

During the first year of implementation, the project focused on the first two components:

BRT DAY ONE OF OPERATIONS:

Several Brazilian cities will launch BRT systems very soon. In an attempt to imagine all possible problems that could jeopardize an effective and safe BRT operation starting from day one, the MAP center in Brazil, together with international specialists, is developing a guide for operational procedures designed to insure the successful operation of the first day of a BRT system. The manual explores the main procedures for operating BRT systems and mapping public and private stakeholders directly related to the operation of BRT systems including authorities, service providers, and emergency networks. The guideline will be piloted during a BRT Day One workshop to be held in Belo Horizonte in October 2013.



April 2, 2013, will remain in people's memories due to a dramatic bus crash in Rio de Janeiro. At least 7 bus passengers died, and other 10 were seriously injured. The causes of the crash? A dispute between the driver and a passenger that ended with the bus crossing the flyover and falling.

This accident generated impressive press coverage all over the country, and raised an issue that has been neglected for a long time: the relationship between bus drivers and passengers. While passengers complain about drivers' behavior, drivers complain about the lack of education and politeness of passengers. This case was a road crash, but it reflects the quality of service

offered to transit users. The bus service providers who should understand that their passengers are clients usually perceive them as people with no other modal choice. Changing this paradigm is a challenging task as bus service providers usually consider training and safety programs to be a penalty for drivers and an unwanted expenditure for companies. There is cultural resistance among bus service providers. They think the business as usual is fine.

EMBARQ Brasil is engaged in leveraging cases of success in BRT and bus system safer operation. Presenting these cases is fundamental for introducing a new management standard focused on quality and safety.

SYSTEM PERCEPTION AND IMAGE:

The system perception and image component is focused on the development of a toolkit that includes an ideal quality-of-service survey for transit agencies as well as recommendations on how to transform the results of the surveys into best marketing, operational, and management practices. During 2013, EMBARQ Brasil designed the quality of service Survey and piloted it in the city of Belo Horizonte. The survey is a robust tool to evaluate bus transit users' perceptions among Brazilian cities. The survey explores basic information about bus riders and their transportation habits. It includes 16 additional modules to deeply evaluate users' perception and 4 modules to identify problems faced by bus users, evaluate their perceptions regarding the entire citywide bus system, and estimate a potential modal change.

The results of the quality of service survey pilot that were presented to Belo Horizonte officials, revealed the most critical aspects of the current bus service. The survey was approved by a general consensus that it truly reflects the reality faced by bus users, and city officials have committed to prioritize efforts on improving key elements according to users' needs.

Finally, several cities, including Curitiba, São Paulo, Sorocaba, and Belém, have already shown interest in applying the quality of service survey developed by EMBARQ Brasil.

“We would like to have EMBARQ support on how to anticipate any potential problem in the BRT operation. We also want to create a guideline to provide the correct actions for these eventual situations.”

CELIO BOUZADA

Planning Director of BHTRANS,
the transit and traffic agency from
Belo Horizonte



Safer Driving for Bus Systems:

A specific component in the quality of public transport is safety. Crashes involving buses tend to be serious. Public transport drivers have the responsibility of carrying hundreds of passenger per day in an environment with many different actors—pedestrians, cyclists, motorcyclists, car drivers, etc.—which highlights the importance of ensuring that bus drivers are aware of best practices and trained in defensive driving in order to reduce the risk of crashes in many situations. Properly trained drivers are able to refrain from engaging in dangerous behavior, and can anticipate unsafe situations, despite adverse conditions or the mistakes of others.

Best practices in road safety: EMBARQ Brasil has collected information on existing best practices in Belo Horizonte, Curitiba, Rio de

Janeiro, and Sao Paulo. In some cities, many actors were interviewed, including transit agencies, regulatory agencies, bus transit unions, and not-for-profit entities focused on valorizing workers in the transport sector. Key lessons learned included driver training programs, evaluation frameworks, and penalties.

Safety pocket manual: Based on best practices in road safety, the MAP center in Brazil opted to develop a pocket safety manual for BRT drivers. The manual will build on the FedEx Safety First program and the training manual published by EMBARQ Mexico.

Next Steps:

- BRT Day One of Operations workshop: In collaboration with BHTrans, workshop will be held in Belo Horizonte October 2013.

The workshop agenda will include interviews with key technical staff from BHTrans and bus service providing companies, visits to the BRT construction site, and discussions with main stakeholders on the key issues to be improved in the operational procedures manual being developed by BHTrans.

- Scale up the quality of service survey: the survey will be applied in November 2013 by URBS, the transit agency of Curitiba. The questionnaire will be distributed to 1,800 BRT and bus users in the city.
- Pilot the road safety manual: Belo Horizonte has requested EMBARQ Brasil's guidance and expertise in piloting the manual with the city's transit agency BHTrans in 2014.



➤ MEASURING IMPACT AND PERFORMANCE

METRICS LEAD TO SUCCESS

Reports form an important part of the accountability mechanisms of any grant and ensure that the project is on track to meet the goals specified at the beginning of the grant. Measuring impact and performance also provide a vital tool to analyze the effectiveness of EMBARQ's projects.

KEY PERFORMANCE INDICATORS

EMBARQ's key performance indicators are intended to summarize our impacts. This includes projects where EMBARQ had either direct or indirect engagement.

FedEx Project Impacts – Ex-Post Reporting

2010	2011	2012	2013	Total
A. Environmental Benefit: Carbon reduced (tonnes CO₂e reduced).				
	0	10,000	10,000	20,000

2010	2011	2012	2013	Total
C1. Team Member Engagement:¹ Number of FedEx team member participants				
2	5	29	7	43²

2010	2011	2012	2013	Total
D1. Brand Enhancement: Annual number of people reached with message/learnings from the project				
1,200	1,200	304,009	377,436	683,687

Notes:

1: A FedEx team member engaging in two projects in one year is counted as two team member engagements.

2: In Mexico, FedEx experts spoke at conferences and workshops.

Notes:

In Mexico, this includes those who attended the annual sustainable transport conference. In India, this includes staff of the 270 participants in transit workshops. In Research and Practice, this includes those outside of EMBARQ who have had access to research findings.

2010	2011	2012	2013	Total
B1. Community Mobilization: Annual number of people directly benefitting from the project				
110	350	470	920,828	921,748

2010	2011	2012	2013	Total
C2. Team Member Engagement: Average satisfaction (1-10 with 10 outstanding) ratings from FedEx participants				
Note: will start reporting in 2014				

2010	2011	2012	2013	Total
D2. Brand Enhancement: Annual number of people indirectly influenced as a result of the project				
			160	160

Note: People attending programs, workshops, and seminars in Mexico and India regarding safety training for bus drivers, improved bus operations, improved vehicle and fuel selection, and telematics. This also includes improved expertise among EMBARQ staff through workshops and data collection.

Note: People attending targeted presentations of road safety in México City and León.

2010	2011	2012	2013	Total
B2. Community Mobilization: Annual number of people directly influenced as a result of the project				
			1,277	1,277

Note: In Mexico City, the road safety workshops trained 237 drivers who transferred their knowledge to 100 percent of the 1,080 drivers of Metrobus

Final Financial Report

October 2012 to September 2013

Expense Line Items	Expenses This Period
Salaries	\$204,310
Benefits	80,374
Facility Costs (e.g., rent, utilities, office services)	73,367
Research Expenses	44,199
Conference Expenses	29,894
Publications	54,204
Travel	29,346
Reproduction, Supplies and Equipment Maintenance	6,358
Research Materials & Services, Misc. Project Expenses	47,243
Subgrants*	221,553
Other Direct Costs	4,407
G & A Expenses**	72,623
Total	886,655

* Subgrants to EMBARQ Mexico and EMBARQ Brasil

** General and Administrative Expenses: organization-wide costs including senior management, accounting, grants management, human resources, web management, audit and legal services, and corporate insurance.

“EMBARQ prioritizes solutions that address the long-term roots of urban mobility problems, rather than ones that marginally improve the status quo.”

LOOKING BEYOND 2013

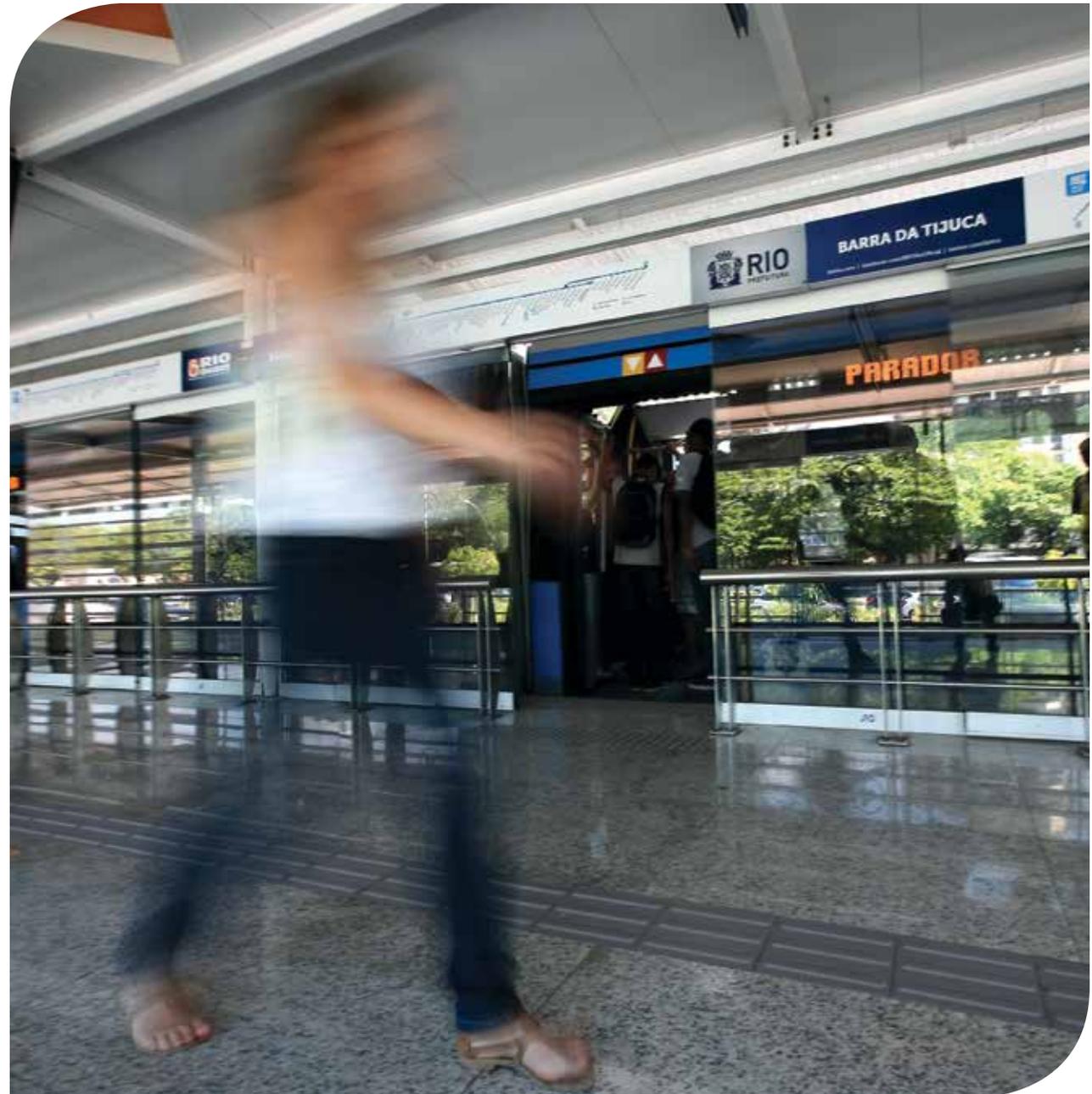
THE ROAD AHEAD

Since the majority of the world's population now lives in cities, advancing sustainable urban public transport systems has never been more crucial. This challenge is paramount in the developing world, where almost all of the world's urban population growth will occur during the next 30 years. The population of cities in developing countries is expected to more than double to nearly 5.2 billion by 2050. As a result, there is a growing need for more compact and efficient cities with well-planned urban transportation systems that are essential for creating more equitable, healthy, and productive urban living environments that benefit both people and the planet.⁵

In the next two years, the MAP footprint is expected to include 60 cities across 3 countries. Each MAP core program and MAP center will have activities and outputs under three primary objectives:

- 1) Solidify the **knowledge transfer platform** through the existing fellowship program and a new microsite platform where knowledge between and among the centers will be exchanged. Expertise within the centers will be strengthened, and duplication will be avoided thanks to coordinated information exchange.
- 2) **Improve operational and service quality and safety** of current transport systems. Led by a global expert, each MAP center will work to consolidate the knowledge gained and adapted from FedEx to refine its work. The final outputs will be a transit rider perception survey, day one BRT performance standards, road safety and driver training, and a high-quality strategies for integrated sustainable transportation according to local needs.
- 3) **Increase institutional capacity** and more sustainable transport systems. Globally, this objective will refine EMBARQ's prior FedEx-funded research and analysis of bus fleet costs and emissions to create decision-making tools for cities. Targeted engagement with local decision makers will help cities apply the tools to select cost-effective buses that also reduce CO₂ emissions.

EMBARQ is deeply grateful to FedEx for its continuing support to deepen and scale up the FedEx-EMBARQ Mobility and Accessibility Program, extending the unique collaboration that has achieved successful results for environmentally sustainable mobility in cities around the world.



APPENDIX - EMBARQ'S GLOBAL STRATEGY

SHAPE EFFECTIVE, SCALABLE SOLUTIONS

Cities, national governments, and international agencies are increasingly recognizing and elevating the role of mobility in advancing economic development, mitigating harmful environmental impacts, and enhancing opportunities for all.

EMBARQ's story fits into this larger global story and flows straight out of WRI's narrative, working at the intersection of the world's most pressing environmental and social challenges. The latest United Nations Environment Programme's Emissions Gap Report, acknowledges the enormous potential of the transportation sector to bridge the emissions gap by 2020, including a 1.7 to 2.5GT CO₂ reduction.⁶ The International Energy Agency (IEA) also highlights the need for collective action to reduce vehicle kilometers and increase the demand to nonmotorized and public transportation. (IEA suggests increasing BRT +25,000 km, among other measures.)⁷ This is especially important in rapidly developing countries like Brazil and India and has the opportunity of saving US\$20 trillion in expenditures annually (savings mainly from not requiring road and parking expansion and related maintenance).

EMBARQ's mission is to catalyze and help implement environmentally and financially sustainable transport solutions to improve the quality of life in cities. EMBARQ's story starts with key megatrends. By 2050, 75 percent of the world's population will be in cities. At the same time, the middle class is booming, anticipated to reach 5 billion strong by 2030. Coupled with that has been the rapid increase of car ownership, which has contributed to transport emitting 24 percent of energy-related CO₂. In addition, US\$1.6 trillion is spent annually around the globe on transport infrastructure, but much of it is focused on



unsustainable solutions. EMBARQ is positioned to decouple these impacts and avoid locking in environmental and social consequences.

The scale of these challenges demands an effective, scalable solution. EMBARQ's theory of change and its reputation is based on scaling up best practices. EMBARQ takes three interrelated approaches: (1) Deliver "game changer" projects in cities. (2) Replicate best practices via technical assistance, capacity building, and national policy guidance. (3) Shift international policy to leverage sizeable sustainable investments from national governments. EMBARQ is targeting change in 200+ cities by 2016, with priority growth in Brazil, China, and India.

EMBARQ conducts its work across a multidimensional matrix. The key framework is three-pronged: avoid-shift-improve, the objectives being to avoid long trips or reduce motorized trips whenever possible, shift to more sustainable options, and improve fuel and vehicle technologies where needed.

The next dimension is EMBARQ's four global flagships: integrated transport, urban development and accessibility, health and road safety, and climate and transport. Through these flagships, EMBARQ provides the global strategy that is shared across each of EMBARQ's centers in six countries, the geographic dimension of the matrix. The centers define and implement projects under each strategy that are adapted to the local context but with the intention to build programs that are replicable around the world. In addition to supporting real change on the ground, these projects serve as iconic case studies that are cited by EMBARQ to influence policies and investments at national and international levels.

ENDNOTES

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