Urban Transport

Ministry of Housing and Urban Affairs
Government of India

ITDP INDIA

TRANSPORT 4 ALL

DIGITAL INNOVATION CHALLENGE

Innovating Public Transport

Solving needs of public transport users in Indian cities through the **Transport4All Challenge**



October 2026

Knowledge Partner

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Publication Design Varsha Jeyapandi

We would also like to thank the participating cities, startups and other contributors who provided us with content and photographs that are featured in this compendium.

Key Organisers

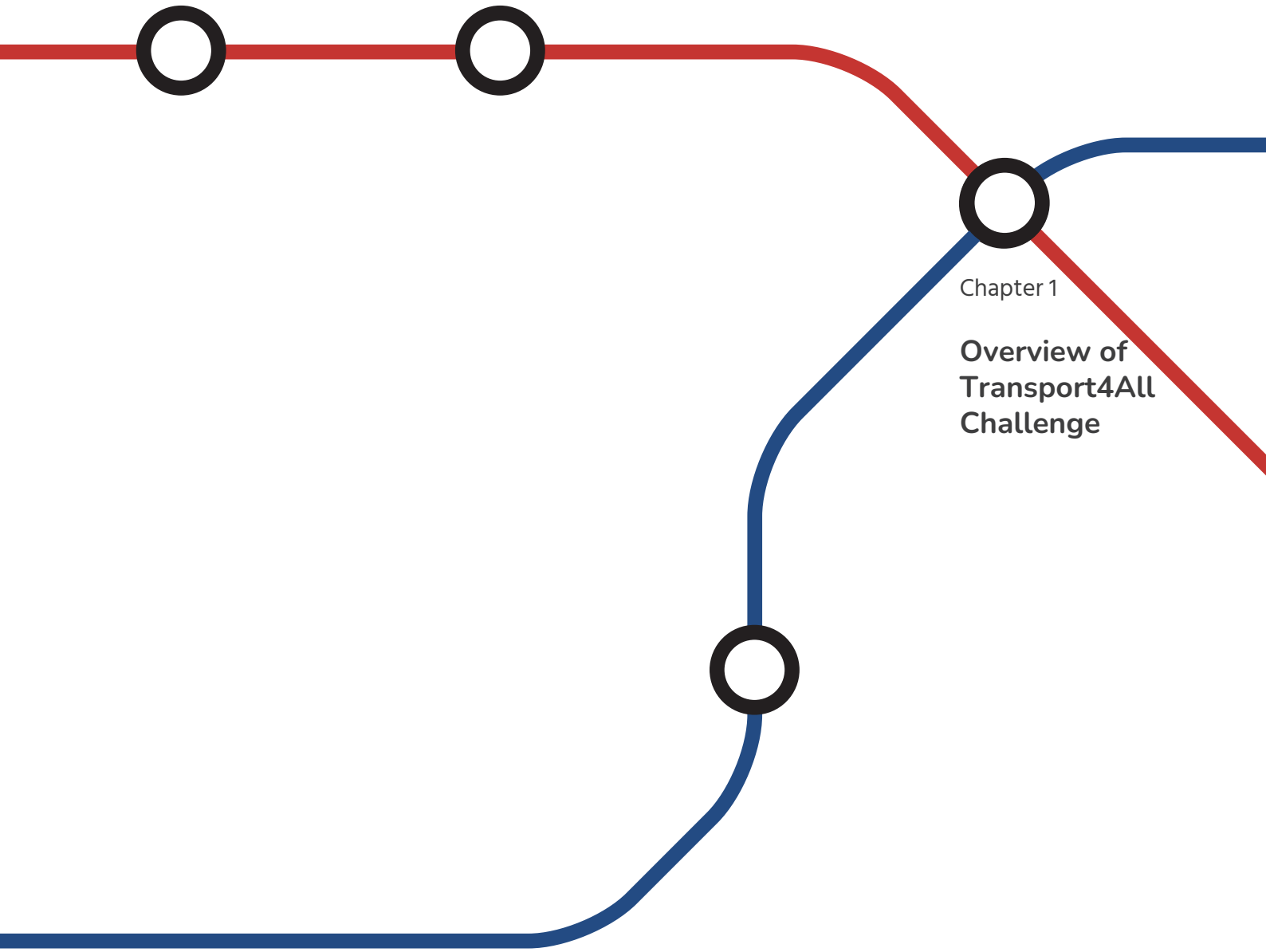
Ministry of Housing and Urban Affairs
Government of India

The Ministry of Housing and Urban Affairs is the apex authority of Government of India to formulate policies, coordinate the activities of various central ministries, state governments, and other nodal authorities, and monitor programmes related to issues of housing and urban affairs in the country.

ITDP INDIA

The Institute for Transportation & Development Policy (ITDP) is a global non-for-profit organisation that works with cities worldwide to promote transport solutions that reduce traffic congestion, air pollution, and greenhouse emissions while improving urban liveability and economic opportunity. ITDP is represented in India by ITDP Pvt Ltd and works with governments, multilateral agencies, and civil society to make visible, on-the-ground improvements by providing technical expertise, policy solutions, research publications, and training programmes.

Disclaimer: The information in this report is collected from cities and startups through digital forms. While efforts have been made to ensure accuracy, the team assumes no responsibility for errors or omissions. Readers should verify and use this data at their discretion.



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Chapter 1

Overview of Transport4All Challenge

Vision

The Transport4All Challenge—an initiative of the Ministry of Housing and Urban Affairs (MoHUA) of the Government of India—aimed to bring together cities, citizens, and startups to develop solutions that improve public transport to better serve the needs of all citizens.

This Challenge is an important step towards improving urban mobility, and aligning with the vision of the National Urban Transport Policy (NUTP), which focuses on safe, affordable, quick, comfortable, reliable public transportation for everyone. By fostering digital solutions, and collaboration between stakeholders, the Challenge supported cities in revitalising public transport systems, increasing ridership, and making public transport the first choice for people's mobility.

At the core of the Challenge were citizens who played a dual role of identifying the issues that required solutions, and assisting startups and cities in refining those solutions to align with their specific requirements.

The first edition of the Challenge focused on digital innovation. Cities and startups received guidance to develop and test various solutions, learn from them, and scale them to build people's trust in public transport and enhance their mobility.

The Challenge envisions a future where the solutions are able to ensure the safety, convenience, and affordability of public transport, encompassing both formal and informal modes, accessible to everyone.


CR INCHARGE CABI
INTEGRATED COMMAND & CONTROL CENTER





Challenge Team

Host & Convenor

Ministry of Housing and Urban Affairs
Government of India

• Host the Challenge • Encourage cities to participate • Give awards to startups

Co-host & Technical Partner

ITDP INDIA

- Facilitate engagement between cities and startups
- Guide cities and NGOs on outreach and citizen engagement
- Support startups in developing and testing solutions
- Organise capacity building workshops
- Conduct outreach for the challenge

Technology Platform Partners

#startupindia

CiX City Innovation Exchange
Turning Challenges into Opportunities

FORGE Innovation & Ventures

• Engage with Startups • Assist in evaluating prototypes & solution scale-up
• Provide a platform for startups to engage with cities

Knowledge Partner

THE WORLD BANK

- Bring global technical expertise in digital innovation to provide guidance to startups and cities
- Assist in evaluating prototypes and solution scale-up

STU Engagement Partner

Association of State Road Transport Undertakings

• Engage with STUs across India to support startups in piloting the solutions

Bringing Together Cities, NGOs, & Startups



What did cities do through the challenge?

Cities tackled public transport challenges by collaborating with citizens, startups, and NGOs. They identified issues through NGO partnerships, worked with startups for solutions development and testing. They also learnt from peer experiences to implement effective, citizen-centric solutions swiftly.

Cities- Refers to the Municipal Corporations, Smart Cities, Special Purpose Vehicles (SPVs) and State Transport Undertakings (STUs).

What did startups do through the challenge?

Startups collaborated with city governments and NGOs to create and refine innovative solutions tailored to the citizens' needs. They piloted these solutions on-ground with cities, gathered their feedback for improvement and ensured compliance with existing standards.

What did NGOs do through the challenge?

NGO's played a crucial role in the Challenge by leveraging their expertise, using their community connections, and engaging in advocacy. They supported the cities in conducting surveys and public consultations to gather citizen perspectives and also guided the cities and startups in tailoring the solutions' to citizen needs.



The *Transport4All* Challenge unfolded in three stages to enhance public transport.

Stage 1

Problem Identification

Cities, with the support of NGOs, identified key recurring problems experienced by citizens and public transport operators.



Stage 2

Solution Generation

Startups developed digital solutions to improve public transport with inputs from cities and NGOs.

Stage 3



Pilot Testing

Cities engaged selected startups for large-scale pilots, and startups refined the solutions based on feedback from cities and citizens.

In this stage, cities collaborated with NGOs to identify the main issues faced by citizens as well as by public transport operators. This stage set the foundation for comprehensively understanding the challenges in the existing system.

In this stage, startups were a key participant. They created digital solution prototypes aimed at improving public transport, taking into account the insights provided by cities and NGOs. This stage was critical for innovating and devising practical solutions.

Cities now implemented the devised solutions on a larger scale through pilots. In this phase, the effectiveness of the solution was tested and refinements were made based on feedback from citizens. This ensured that the final solutions are well suited to meet the actual needs and challenges that were identified in Stage 1.

टी ने सार्वजनिक परिवहन की
ने के लिए शुरू किया सर्वेक्षण



स्मार्ट सिटी: पब्लिक ट्रांसपोर्ट ऑल चैलेंज के लिए शुरू हुआ सर्वे

भोपाल। भोपाल स्मार्ट सिटी डेवलपमेंट कॉर्पोरेशन लिमिटेड शहर में पब्लिक ट्रांसपोर्ट सर्विस यानि सार्वजनिक परिवहन सेवा को और बेहतर बनाने और इसमें लोगों का विश्वास जगाने के लिए काम करेगा। इसके अंतर्गत ऑनलाइन व ऑफलाइन सर्वे के माध्यम से लोगों से परिवहन को बेहतर बनाने के लिए सुझाव लिए जाएंगे। सुझावों के आधार पर सार्वजनिक परिवहन व्यवस्था में सुधार के लिए कार्य किये जाएंगे। दरअसल आवासन एवं शहरी कार्य मंत्रालय, भारत सरकार ने 100 स्मार्ट

ऑनलाइन सर्वे से सुधारेंगे शहर की परिवहन व्यवस्था

पत्रिका न्यूज नेटवर्क
patrika.com



सतना. आवास एवं शहरी कार्य मंत्रालय भारत सरकार द्वारा संचालित ट्रांसफॉर्म फॉर आल चैलेंज अंतर्गत शहर के सार्वजनिक परिवहन को विकसित करने स्मार्ट सिटी की सीईओ तन्वी हुड्डा के निर्देश पर नगर निगम प्रशासन ने शहर की जनता से परिवहन व्यवस्था पर ऑनलाइन सर्वे कराने का निर्णय लिया है। परिवहन व्यवस्था सामने आने वाली सबसे महत्वपूर्ण समस्याओं को हल करने की दिशा में कार्य किया जाएगा। जैसे वाहनों में भीड़भाड़ को

Davanagere Smart City Limited
5 m ·

Are you an NGOs, CSOs, academic & research institute interested in helping your city's public transport services recover from the COVID-19 crisis? If yes, you have a crucial role to play in the #Transport4All Challenge since Davanagere Smart City Limited has pledged for safe, convenient and affordable public transport for all the residents of Davanagere.
Register here to lend your support
bit.ly/2HOsAW
#Transport4All
Ministry of Housing and Urban Affairs
Smart Cities Mission
Directorate of Urban Land Transport



हरिभूमि

पब्लिक ट्रांसपोर्ट ऑल चैलेंज

- आवासन एवं शहरी कार्य मंत्रालय, भारत सरकार ने पब्लिक ट्रांसपोर्ट सर्विस यानि स्मार्ट सिटीज को दिया चैलेंज

स्मार्ट सिटी: पब्लिक ट्रांसपो चैलेंज के लिए शुरू हुआ

भोपाल(आवासन)। भोपाल स्मार्ट सिटी डेवलपमेंट कॉर्पोरेशन पब्लिक ट्रांसपोर्ट सर्विस यानि सार्वजनिक परिवहन सेवा को और बेहतर लोगों का विश्वास जगाने के लिए काम करेगा। इसके अंतर्गत ऑनलाइन के माध्यम से लोगों से परिवहन को बेहतर बनाने के लिए सुझाव लिए जाएं आधार पर सार्वजनिक परिवहन व्यवस्था कार्य किए जाएंगे।

दरअसल आवासन एवं शहरी कार्य सरकार ने 100 स्मार्ट सिटीज के लिए ट्रांस शुरू किया है। भोपाल स्मार्ट सिटी सीईओ बताया कि सार्वजनिक परिवहन को विकसि शहर के हर वर्ग को जोड़ा जाएगा। यह का सीधे सर्वे के माध्यम से होगा। इस चैले विचार, व्यावसाय पूर्णिमा, [illegible]

भारत सरकार ने पब्लिक ट्रांसपोर्ट बेहतर करने 100 स्मार्ट सिटीज को दिया चैलेंज

make our public transport
ugh the #Transport4All
seeking the support of NGOs,
& research institutes in this
e interested, please register at
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ng and Urban Affairs
UA

ప్రజా రవాణా మెరుగుకు కృషి



Chapter 2

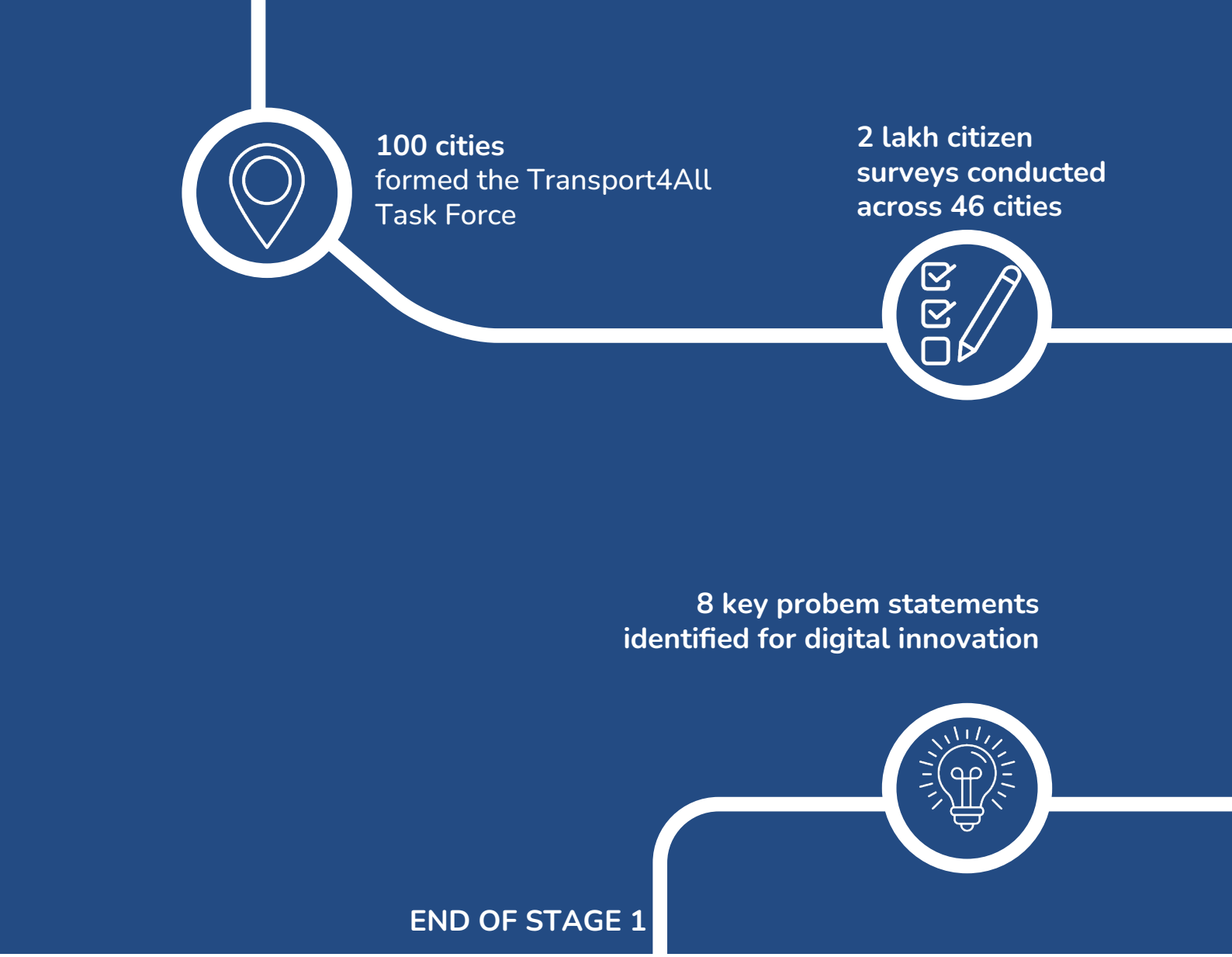
Analysing India's Public Transport Needs

Stage 1
Apr '21 to Oct '22

The Ministry of Housing and Urban Affairs (MoHUA) launched the Transport4All challenge on 15th April 2021. Of the 156 eligible cities, 130 signed up for the challenge. By registering to participate in the challenge, cities agreed to engage with citizen groups and form a 'Transport4All Task Force'(TTF) with relevant stakeholders. A total of 100 cities created TTFs as part of the challenge.

This Task Force unites all key players involved in the city's public transport system, such as:
- Municipal Corporations
- Smart City Special Purpose -Vehicles (SPVs)
-City bus services,
-Metro and Suburban Rail authorities
-Regional Transport Offices
-Traffic police
-Road authorities
-Unions for Informal Public Transport (IPT)
-NGOs and educational institutions focusing on sustainable mobility.

The Task Force aims to speed up the decision-making process by working together closely and effectively.



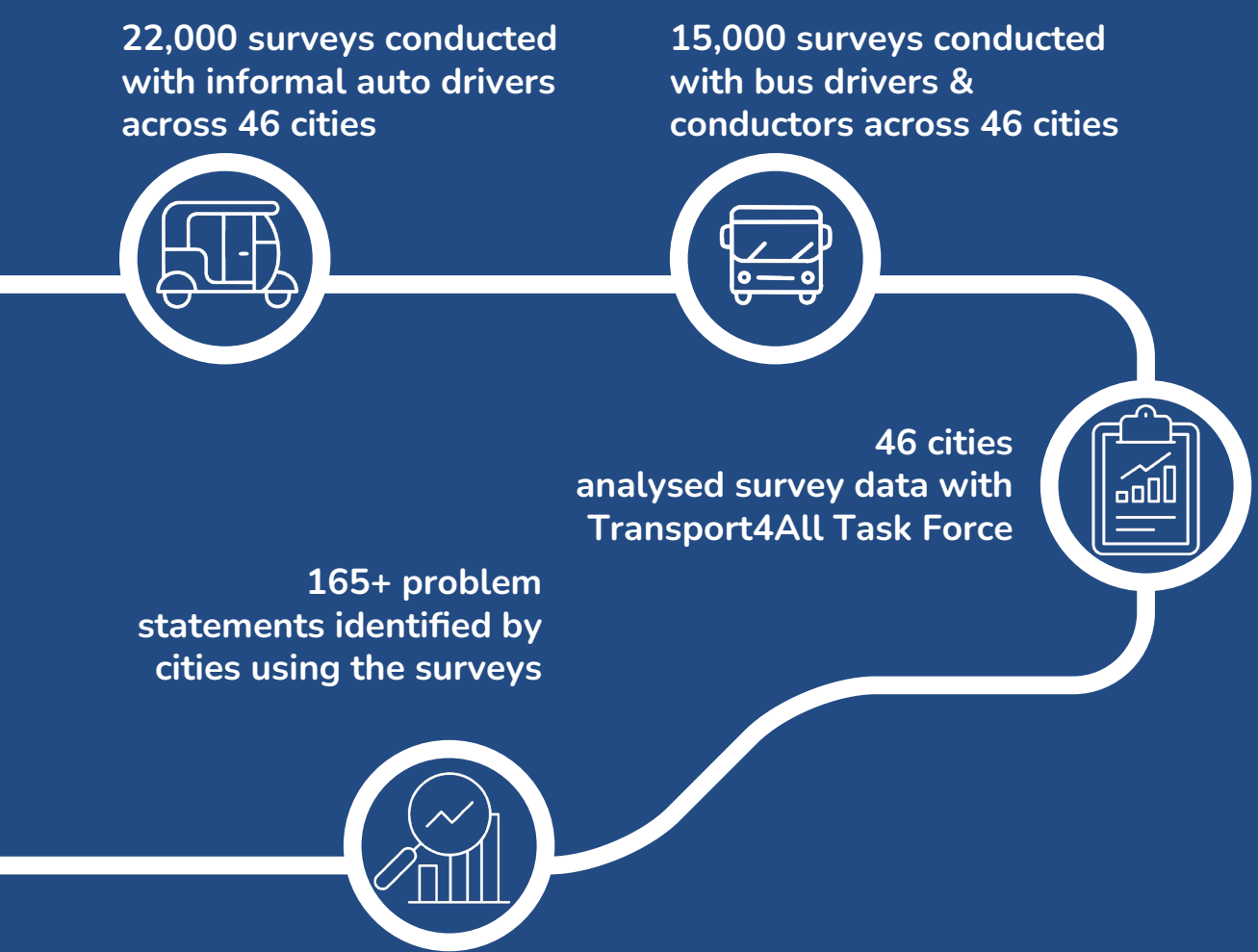
During Stage 1, the cities collaborated with over 200 NGOs for an intense data collection exercise. This was the largest of its kind in India yet, and aimed to understand the full range of challenges faced by citizens and public transport operators.

For the first time, cities had extensive data that was local, specified and disaggregated, to guide and direct them to the problems that needed fixing.

The Institute for Transportation and Development Policy (ITDP) India supported the cities by providing survey questionnaires, training NGOs and officials on conducting these surveys, and offering spreadsheet templates for easy data analysis. The data was collected using extensive surveys with citizens, IPT drivers, bus drivers and conductors and auto drivers. 46 cities conducted the surveys, and a total of over 2,40,000 responses were gathered.

The operational challenges for buses were understood by surveying more than 15,000 bus drivers, and 22,000 auto drivers, a group that is often missed out of public transport surveys, were also surveyed to gather their concerns.

All these insights helped cities and the Task Force develop the key problem statements.



Selection of Problem Statements

At first, a total of 165 problem statements were identified in the surveys. The Transport4All Challenge team analysed each of these statements, and found that multiple problem statements eventually fed into one or more of the following five solution areas:

- Service monitoring and planning
- Passenger information and interaction
- Fare products and payment
- Financing, procurement and regulation
- Prioritisation of bus transport

Finally, the team curated **eight problem statements** that need tech-based solutions.

200+
NGO partners
registered
to support 130 cities

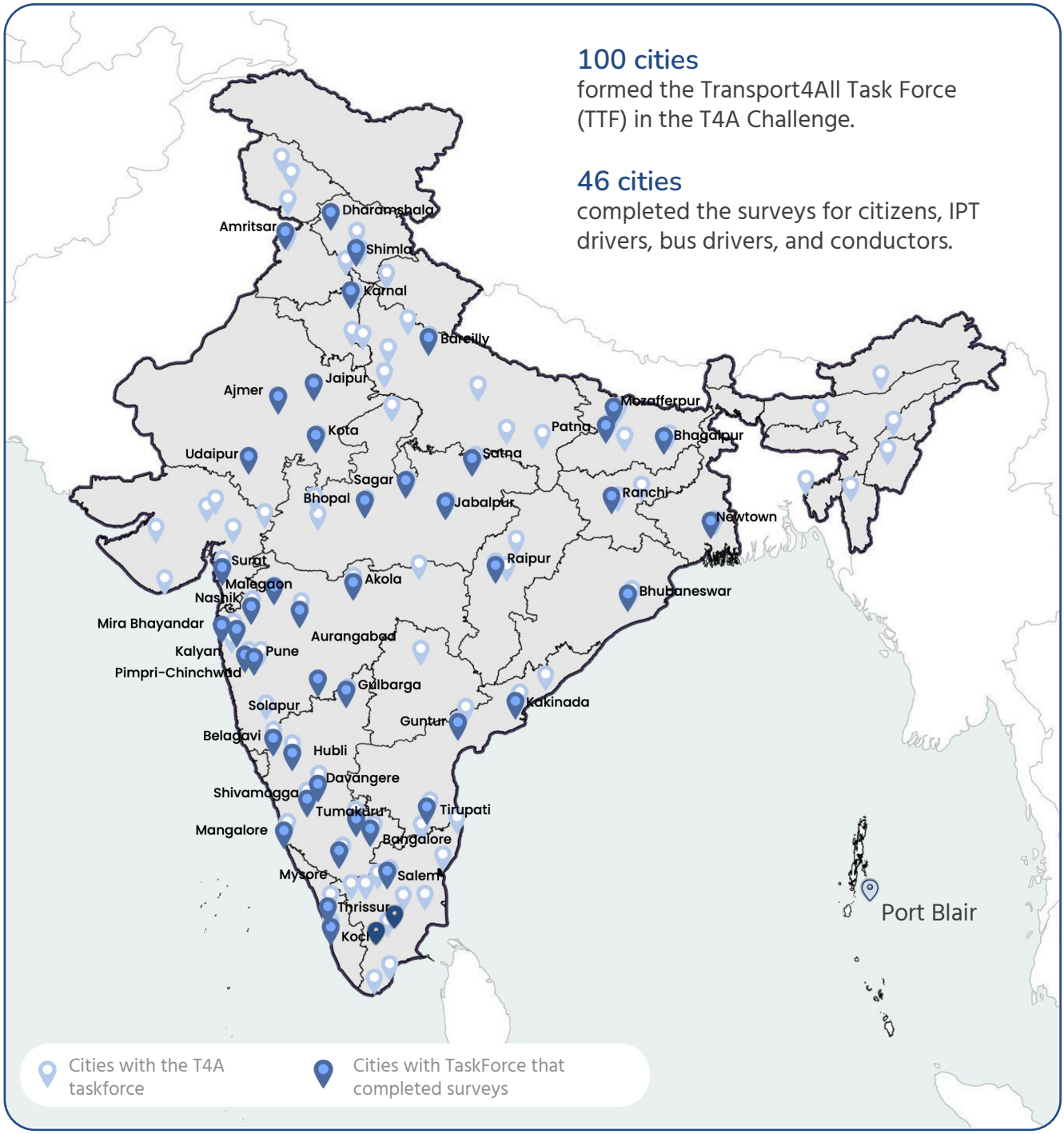
Civil Society Organisations

Research Organisations

Educational Institutions

100 cities
formed the Transport4All Task Force (TTF) in the T4A Challenge.

46 cities
completed the surveys for citizens, IPT drivers, bus drivers, and conductors.




ASHOK LEYLAND

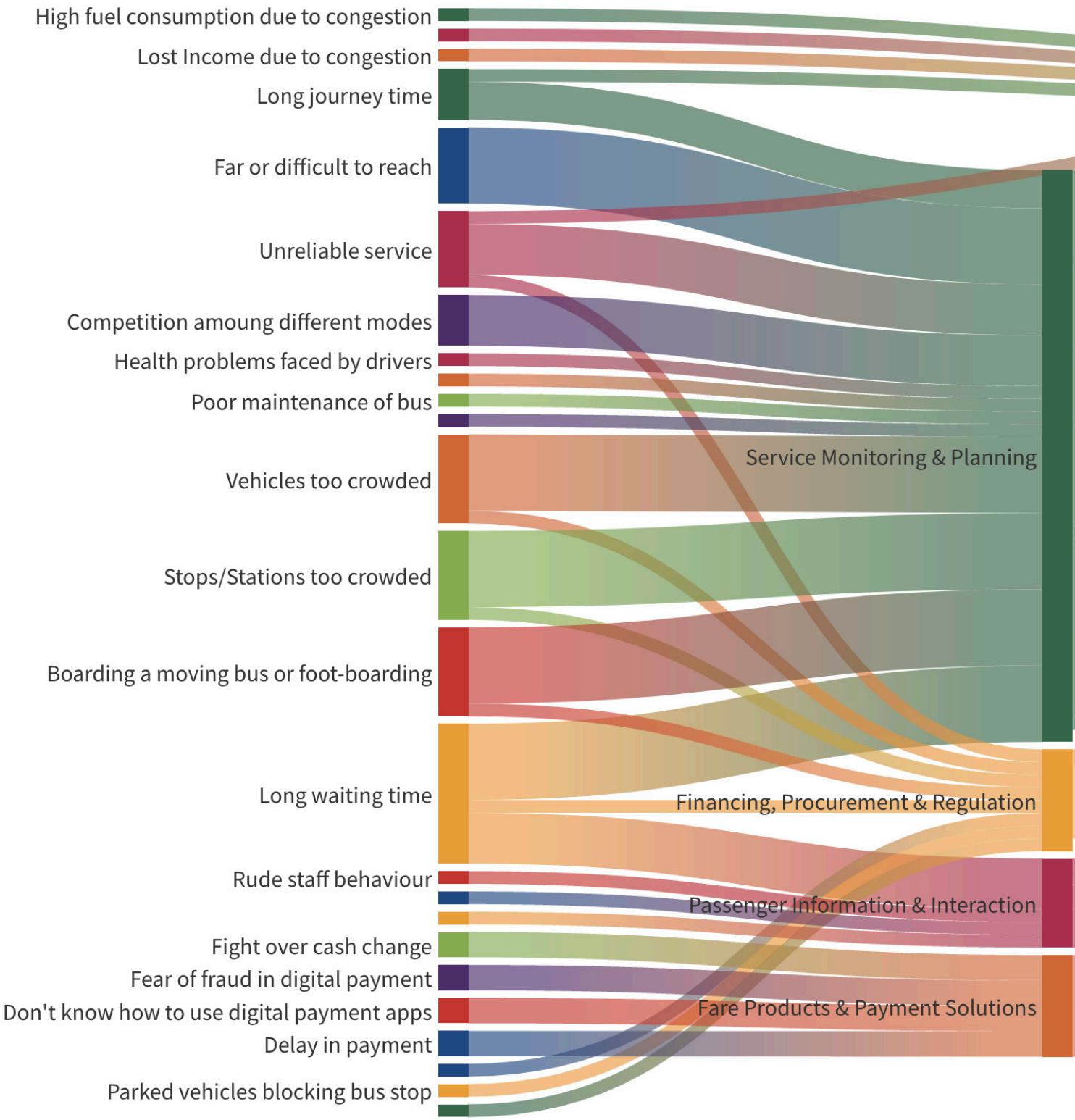



PETALS

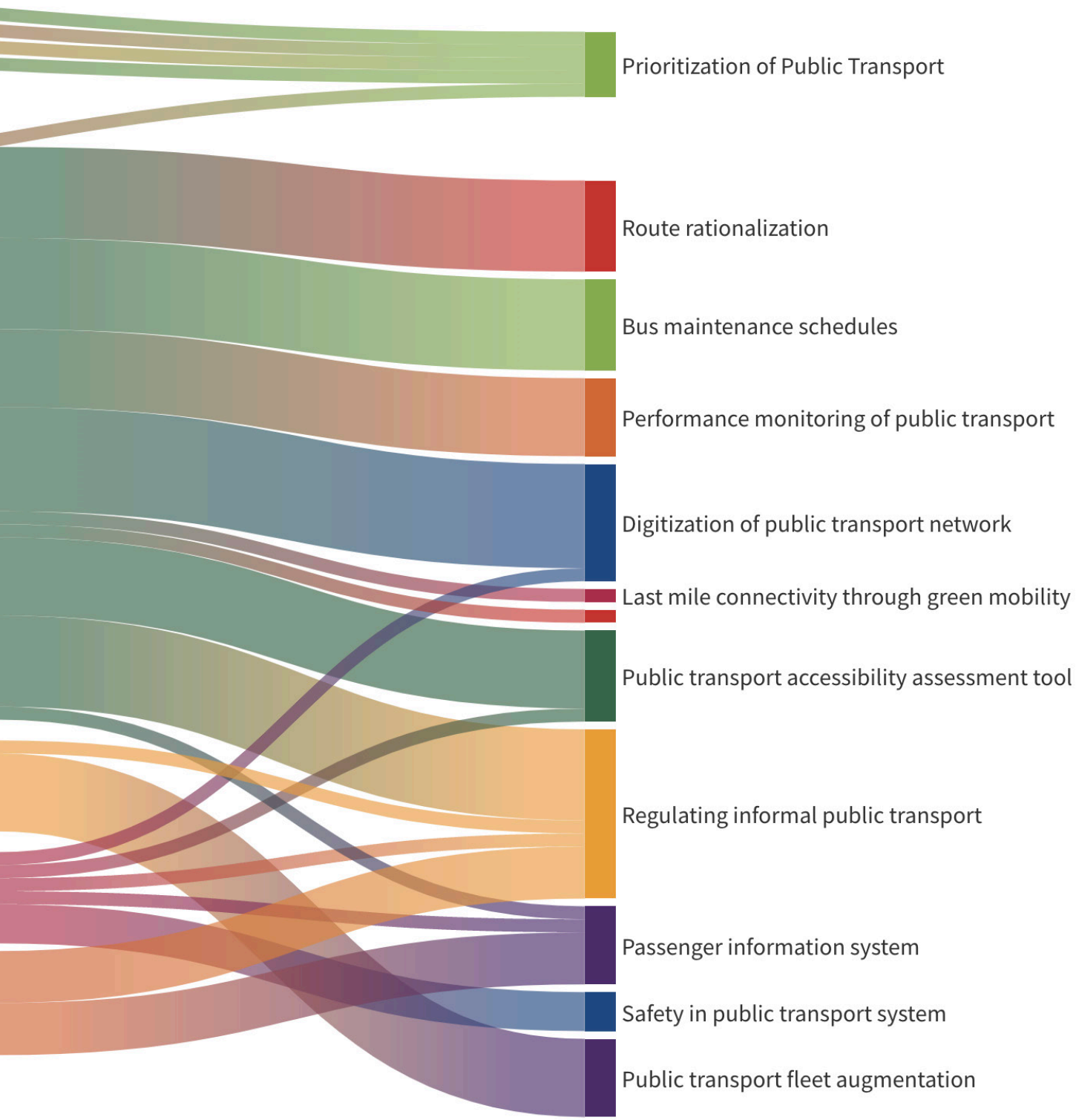

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Sankey diagram showing the various problems identified, matched to their respective finalised problem statement



The left of the sankey diagram collates all the major problems identified in the survey. The problems are grouped together into categories and marked as five primary problem statements (marked in the middle of the diagram). The right side represents the solutions that will help solve each set of problems.
The colourse are not representative of their problem statements.

Tools and Support for Stage 1

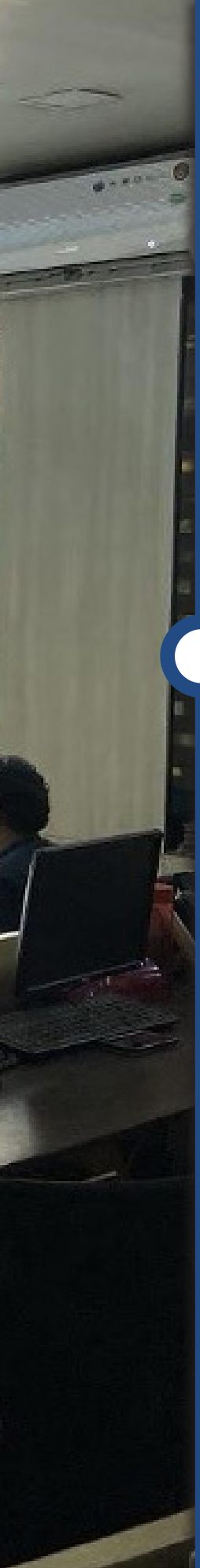
In Stage 1 of the Transport4All Challenge, workshops, toolkits and one-one-one calls were the important tools to kickstart the challenge.

These efforts were designed to engage citizens and cities, gather insights, and collaboratively work on drafting the problem statements once the survey results were in. The workshops and special 'T4A clinics' were conducted to provide cities and their partners with knowledge and practical skills to address local challenges. Over 10 toolkits were prepared, which provided structured guidance to the cities. Around 500 one-on-one calls were also conducted with the cities to help address city-specific concerns, ensuring that each city could refine their identified problem statements.




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डेव्हलपमेंट
कॉर्पोरेशन लिमिटेड
PUNE
SMART CITY
DEVELOPMENT
CORPORATION LTD.


sit Management System Dashboard
All available



Chapter 3

Improving Public Transport by Developing Startup Solutions

Stage 2
Nov '22 to Aug '23

Preliminary Screening

In October 2022, Stage 2 of the Challenge was launched on Startup India, to motivate innovators to participate in the challenge.

By January 2023, 157 startups registered with their innovative idea pitches for the eight identified problem statements.

The preliminary screening of the startups was designed based on the SmartProcure Guidelines for Innovation Procurement by the City Innovation Exchange(CiX)*.

A panel of experts from partner organisation evaluated startups based on the evaluation criteria based on the Smart Procure Guidelines. The main criteria included:

Relevance
Solution Maturity
Team capability

*CiX-The City Innovation Exchange is an initiative of the Smart Cities Mission, and facilitates innovation procurement through transparent and collaborative processes.

Preliminary Screening Criteria

	Low Score	Medium Score	High Score
Relevance	The solution cannot meet the requirements of the city as stated in the Challenge brief.	The solution might be able to meet some of the requirements of the city as stated in the Challenge brief.	The solution can potentially meet all the requirements of the city as stated in the Challenge brief.
Solution Maturity	The product or solution is still in ideation or initial development stage.	The product or solution is in a Proof-of-concept (PoC) or prototype stage and has undergone a few customer validations via paid pilots or trials.	The product is at a Minimum Viable Product (MVP) stage and has been validated with customers through multiple paid pilots or trials.
Team Capability	The core team lacks tech and domain expertise for the product and technology development, and for long term holistic partnerships.	Founders have strong tech and domain expertise and can focus on strengthening the core team for the same, but lack experience with long term partnerships.	Founders have strong domain and tech expertise, and are focused towards strengthening their core team to develop holistic capabilities across tech, domain, strategy and partnerships.

Preliminary Screening Jury



Sukhbeer Singh
Consultant
Public Policy, MoHUA



Andrew Salzberg
Consultant
World Bank



Vaishali Singh
Deputy Manager
ITDP India



Pallavi Gupta
Assistant Manager
Startup India



Arun Suresh
Principal
CiX, Forge Ventures

Based on this, a total of 70 applications submitted by 44 different startups got selected.

To support the 70 selected startup applications, five two-hour workshops were organised to explain the requirements related to identified problem statements.

Workshop 1 March 6th, 2024	Workshop 2 March 7th, 2024	Workshop 3 March 9th, 2024	Workshop 4 March 10th, 2024	Workshop 5 March 10th, 2024
Route rationalization and network digitization	Bus, staff, and maintenance scheduling	Transit performance monitoring	IPT aggregation	Passenger info & ticketing, grievance redressal

Phase I and Phase II Evaluations

The workshops provided the guidance to the startups with the problem statements identified by the cities. It offered startups the necessary knowledge and framework to develop innovative solutions that directly address the city's needs. However, the workshops alone were not sufficient to ensure that all startups would deliver relevant, mature and feasible solutions. A more formal evaluation process was required to assess the quality of each solution, due to the diversity of the startups and the complexity of the brief.

Thus, the Challenge team conducted detailed Phase I and Phase II evaluations. The evaluations were conducted with technical experts in the fields, including the Challenge partners- ITDP India, World Bank and CiX. Experts in the field of public bus planning, operation and maintenance were also consulted.

The startups were evaluated based on the criteria drawn from the SmartProcure Guidelines, elaborated in the table below.

Phase I and II Evaluation Criteria

	Low Score	Medium Score	High Score
Solution Fit	The solution cannot meet the requirements of the problem statement.	The solution meets some of the requirements of the problem statement.	The solution meets all or most of the requirements of the problem statement.
Deployment Readiness	Solution is ready or prototype has been developed.	The product is at the MVP stage.	The draft MVP is been tested with data.
Clarity	The purpose, functionality, timelines and value proposition of the solution are not clear.	The purpose, functionality, timelines, and value proposition of the solution are somewhat defined.	The purpose, functionality, timelines, and value proposition of the solution are very well established.

The evaluation of Phase II commenced in July 2023. At this stage, 46 solutions were received. After eliminating duplicate and invalid entries, a total of 45 solutions from 28 unique startups were evaluated.

Phase I and II Evaluation Jury



Sivasubramaniam Jayaraman
National Lead, ITDP India



Ravi Gadepalli
Consultant
World Bank



Prashanth Bachu
Consultant
World Bank



Manohar Mina
Authority Engineer ITS, NHAI



Dr. Valavan Amudhan
Advisory Board Member, TN State Road Transport Corporation

Technological Solution Showcase with Cities

A 'Technological Solution Showcase' was organised in August 2023, for the startups to get feedback on the solutions from the cities. During the showcase, the top 24 startups presented their solutions to the 45 cities that submitted the problem statements in Stage 1 of the challenge.

The startups were evaluated based on the jury score and feedback from city authorities. Of the 24 startups, the best 10 were selected for Stage 3 of the Challenge based on the combined score of the jury and the cities. None of the selected startups had worked on the problem statement that dealt with IPT aggregators. Hence, this problem statement had to be eliminated from the Challenge.

The top 10 startup solutions were announced on 1st September, 2023 startups and cities were also given the next steps in the Challenge.

Problem Statements		Stage 2 Winning Startups	
1	Route Rationalisation	1	Amiraj Wahan
2	Network Digitisation	2	Anamar Technologies
		3	Amiraj Wahan
3	Bus & Staff Scheduling	4	Innoctive Technologies
4	Transit Performance Monitoring	5	Vrishchik Technologies
5	Passenger Info & Ticketing	6	Anamar Technologies
		7	Aloha Tech Ventures
6	Grievance Redressal	8	Zooper Technologies
7	Bus Maintenance Scheduling	9	Amiraj Wahan
		10	Qed Analyticals


ROUTE NO-25
DUMDUMA - RANGAMATIA - AC
OD33AH0105
100% Electric bus



Chapter 4

Implementation of On-Ground Pilot Solutions

Stage 3
Sep ‘23 to Nov ‘24

The third stage of the Challenge kicked off in September 2023. At this stage, the startups engaged with the cities that qualified in Stage 1, to secure orders for pilot testing of their innovative solutions. The startups received 17 pilot orders to implement their solutions in eight cities, with implementation commencing in mid-April 2024.

The pilot implementation phase was supported by four rounds of individual mentorship sessions with the Challenge team and industry experts. These sessions aimed at guiding the startups in deploying their solutions, and ensuring that they aligned with the requirements of the cities.

The startups made substantial progress in their respective pilot projects addressing critical challenges within the public transport system and providing measurable improvements in efficiency, user satisfaction, and operational cost savings in all eight pilot cities.

Meet the Mentors



Alok Jain
CEO & Managing Director,
Trans-Consult Ltd



Abhijit Lokre
Partner,
The Urban Lab



Debashish Biswas
Partner,
Deloitte



Prashanth Bachu
Consultant,
The World Bank



Vijay Kovvali
Research Professor, Centre for Infrastructure Sustainable Transportation and Urban Planning, IISc



Venkata Subbarao Chunduru
Director,
Arcadis IBI Group



Shalini Sinha
Senior Associate Professor,
CEPT University



Venka Reddy Ballela
Senior Manager,
Telangana State Road Transport Corporation



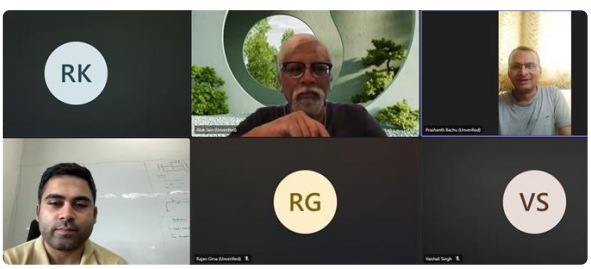
Vaishali Singh
Progamme Manager-Transport Systems,
ITDP India

The Stage-3 Mentorship Sessions included four key rounds, each providing one hour of dedicated time for each startup.

Mentorship Session 1

Plans of Action by Startups

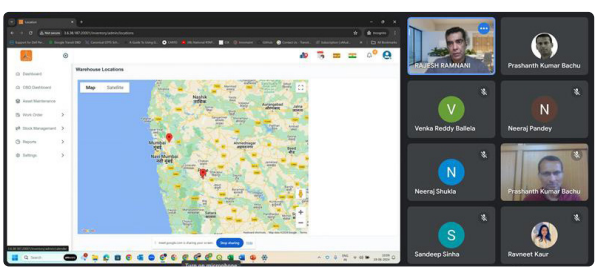
The first mentorship session focused on startups presenting their plans of action. During this session, they demonstrated their unique selling points (USPs) and outlined how their solutions would address specific urban mobility challenges. Mentors provided valuable feedback by identifying potential gaps in implementation plans, offering insights into operational feasibility, and guiding startups to align their solutions with city-specific needs.



Mentorship Session 2

Showcase of Business Models

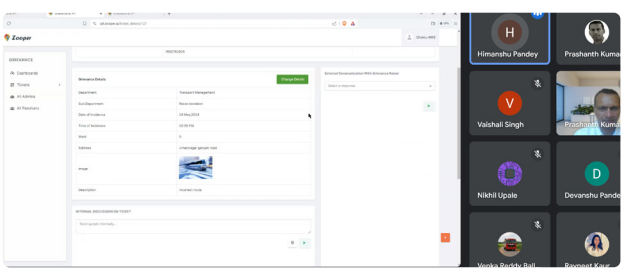
The second mentorship session, held later in the process, was an opportunity for startups to refine their business models based on feedback from the first session. Startups demonstrated their progress, showcasing improved alignment with the problem statements and a deeper understanding of user requirements. Mentors contributed by critically evaluating these refinements, offering suggestions for scalability, and providing strategies to address potential challenges during implementation.



Mentorship Session 3

Product Demonstrations

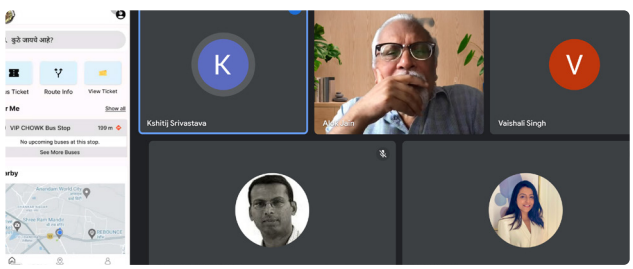
The third mentorship session emphasized product demonstrations, where startups presented functional prototypes. This session allowed mentors to engage directly with the solutions, testing their usability and performance in real-world scenarios. Mentors added value by highlighting areas for improvement, ensuring the solutions were robust, and providing technical guidance to enhance functionality. This specific feedback helped startups fine-tune their products for better alignment with operational realities.



Mentorship Session 4

Final Feedback and Roadmap Creation

The final mentorship session focused on preparing startups for on-ground implementation. Startups presented their final solutions, highlighting how previous feedback was integrated into their systems. Mentors evaluated the readiness of these solutions and provided tailored advice for successful deployment. Additionally, a roadmap for scaling the solutions and handling post-deployment challenges was discussed, equipping startups with strategies to ensure long-term sustainability and impact.



A glimpse into the implementation

After identifying key challenges and developing potential solutions in earlier stages, the final phase moved toward testing these ideas through on-ground pilot implementations.

These pilots were not just a test of technological capabilities but a critical step toward creating scalable models that enhance the efficiency, reliability, and accessibility of public transport systems. From improving operational efficiency through automation to providing passengers with real-time information and seamless ticketing, these interventions demonstrated the transformative potential of well-designed transport solutions.

The outcomes show the importance of innovation in addressing public transport challenges and showcase how collaboration among cities, startups, and other stakeholders can create lasting improvements. The following pages provide a detailed account of the on-ground implementation of these solutions and the measurable impact of these initiatives on users and public transport systems.

Problem Statement	Startup and Solution	Implementation City	Timeline
Multi-Modal Passenger Information & Ticketing	Apli PMPML by Anamar Technologies	Pune	May-Oct 2024
	Transit by Aloha Tech Ventures	Mira Bhayandar	Jun-Oct 2024
Network Digitisation	Anamar Technologies	Pune	Apr-Oct 2024
	Apna Wahan by Amiraj Wahan	Mira Bhayandar	Jun-Oct 2024
Bus and Staff Scheduling	CargoFL RTMS by Innoctive Technologies	Belagavi	May-Oct 2024
Route Rationalisation	Amiraj Wahan	Kalyan-Dombivali, Belagavi, Mira Bhayandar	May-Oct 2024
Bus Maintenance Scheduling	Apna Wahan by Amiraj Wahan	Pune	Jun-Oct 2024
Transit Performance Monitoring	Iksha by Vrischik Technologies	Davanagere	Jun-Oct 2024

Problem Statement

MULTI-MODAL PASSENGER INFORMATION & TICKETING

Current scenario

The absence of an integrated information platform poses a hurdle for passengers attempting to plan their journeys seamlessly. Lack of real-time data leaves passengers without up-to-date information. Passengers are also burdened with the complexity of purchasing separate tickets for each leg of their journey. These factors become deterrents to using public transport.

Need

A one-stop mobile or web platform with real-time passenger information, schedules, routes and service disruptions is needed for commuters to plan their journeys efficiently with vital information about routes, schedules, and service disruptions to purchase and use a single ticket or payment method across various modes of transport, such as buses, trains, and metros.

Users

Transport authorities in charge of operating public transport service

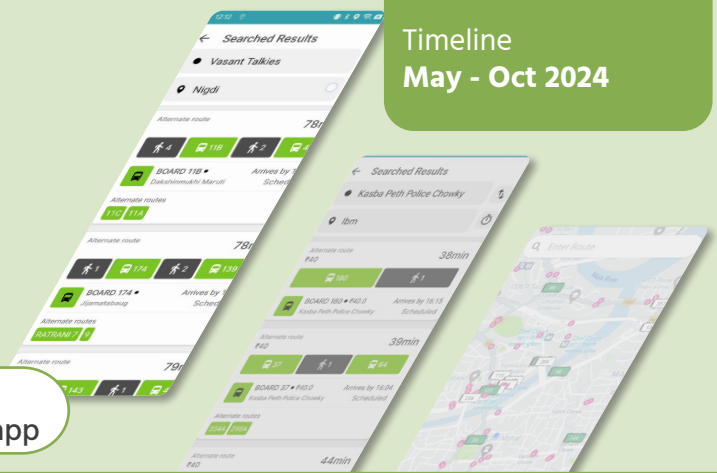
Public transport users viewing routes and purchasing tickets

Ticketing staff validating app-purchased tickets

Solution Pilot #1 Apli PMPML by Anamar Technologies

Implementation city
Pune

Timeline
May - Oct 2024



USP Seamless real-time journey planning, live tracking, ticketing app

✔ **Implemented in more than 1 city (Delhi- DTC and DIMTS, Kalaburagi & Trivandrum)**

✔ **Easily scalable for every city with cloud computing services.**

Features

- User-friendly static route information, journey planning, fare information, and ticket booking, all on the same app
- Real-time bus location and Estimated Time of Arrival (ETA) at bus stops
- Up-to-date information about multiple modes i.e bus and metro routes
- Real-time location of upcoming stops, route details, and any changes or updates in the schedule
- Easy to integrate and scale using standardised General Transit Feed Specification (GTFS) format

The **Apli PMPML** mobile application, developed by the Anamar Technologies, enables passengers to purchase bus tickets by scanning QR codes, on buses and to make digital payments through various methods such as UPI, credit and debit cards, and electronic wallets.

The app offers a convenient payment management feature by calculating fares based on the destination. The solution provides live tracking for the complete bus network, so users can see bus locations, upcoming stops, routes, and arrival times. This is especially helpful for daily commuters.

This comprehensive, contactless ticketing system, coupled with live tracking, real-time information, and multi-modal planning, not only enhances the experiences of public transport users, but also assists transportation agencies in improving overall service quality.

Solution Pilot #1 In action

Before

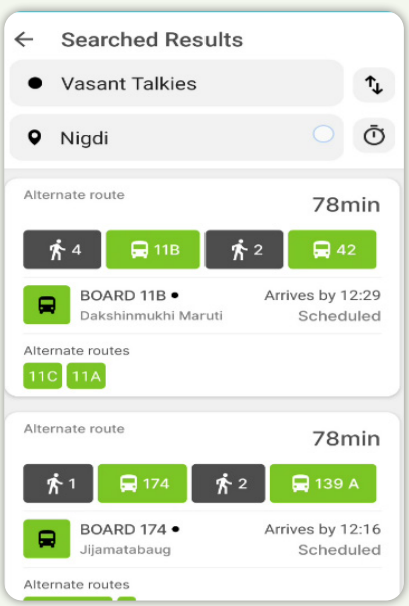


Bus schedules were manually written on a staircase wall, noting departure time from different locations.

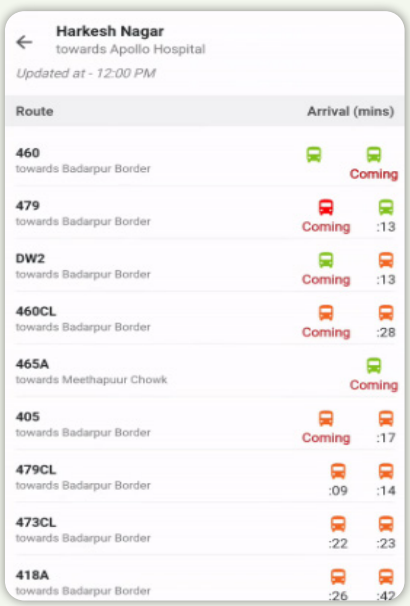


Bus tickets were physically printed showing details like date, fare, route, and validity.

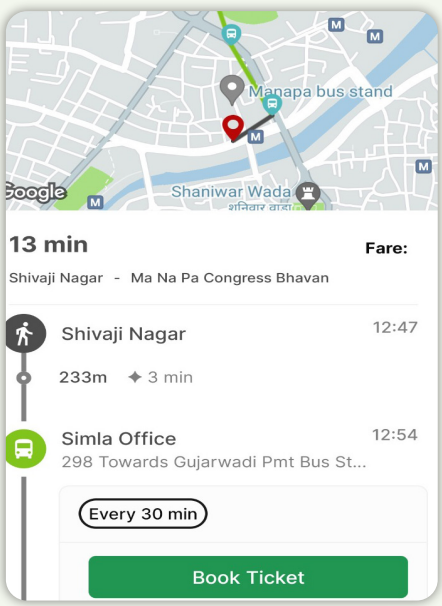
After



App provides detailed route options across multiple modes



Real time arrival information for buses at each stop is available on the app



Route maps, with an option to purchase tickets on the selected route

After



Pune Mahanagar Parivahan Mahamandal Ltd
@PMPMLPune

१५ ऑगस्ट २०२४ रोजी, स्वातंत्र्यदिनाच्या निमित्ताने पीएमपीएमएलच्या "आपली पीएमपीएमएल" मोबाईल ॲपचे उद्घाटन व्यवस्थापकीय संचालक श्रीमती दिपा मुधोळ-मुंडे यांच्या हस्ते करण्यात आले. हे ॲप १७ ऑगस्ट २०२४ पासून गुगल प्ले स्टोअरवर "Aapli PMPML" नावाने उपलब्ध असेल.

#pmpmlpmc #AapliPMPML

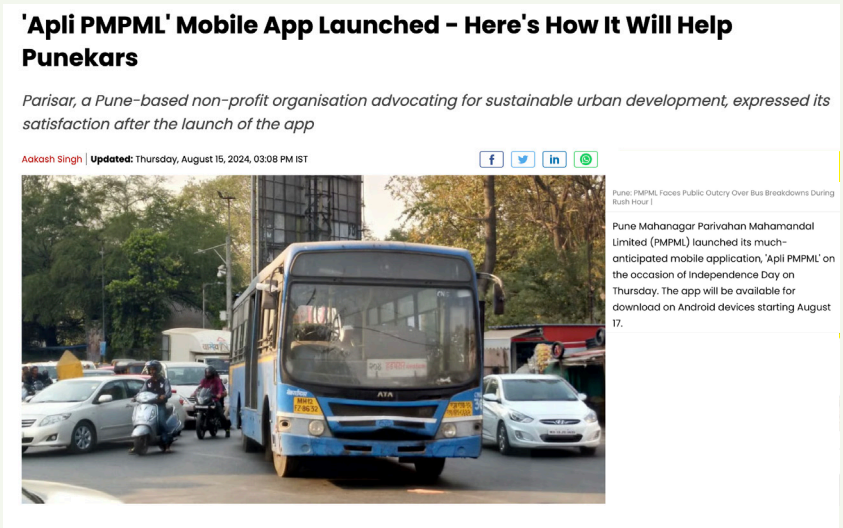
Translated from Marathi by Google

On 15th August 2024, on the occasion of Independence Day, PMPML's "Aapli PMPML" mobile app was inaugurated by Managing Director Smt. Deepa Mudhol-Munde. This app will be available on Google Play Store from 17th August 2024 under the name "Aapli PMPML".

#pmpmlpmc #AapliPMPML

Was this translation accurate? Give us feedback so we can improve:

Post from X (formerly Twitter) announcing the launch of the app.



'Apli PMPML' Mobile App Launched - Here's How It Will Help Punekars

Parisar, a Pune-based non-profit organisation advocating for sustainable urban development, expressed its satisfaction after the launch of the app

Aakash Singh | **Updated:** Thursday, August 15, 2024, 03:08 PM IST

Pune: PMPML Faces Public Outcry Over Bus Breakdowns During Rush Hour |

Pune Mahanagar Parivahan Mahamandal Limited (PMPML) launched its much-anticipated mobile application, 'Apli PMPML' on the occasion of Independence Day on Thursday. The app will be available for download on Android devices starting August 17.

As published in the local newspaper the app was launched on 15th August 2024.

Digitised tickets with users also getting confirmation after booking.



What did users think?

*Source: Google Playstore

"Great customer support! They resolved my issue quickly and refunded my money..." —NiksLogy, App User

"...It's user-friendly and provides accurate and timely information. The interface is clean, making it easy to navigate through various features.The real-time tracking and schedule updates are extremely helpful for planning my commute efficiently..." —Chetan Said, App User

"The new app for live bus tracking and online ticket booking is a game-changer. It not only allows users to track buses in real-time but also enables convenient online ticket purchases, eliminating the need for carrying cash..." —Ronald Agrawal, App User

Solution Pilot #1 On-ground results

4.3
out of 5 average rating

Customer rating

Even with a ridership of 10 lakhs in the region, digital ticketing was at 0%.



4% of tickets

15% of passes

are sold digitally

6,60,000+

app downloads since launch with **82% active users**

Ticket Revenue



₹18,00,000 per day

as in December 2024

1500

buses of the PMPMP fleet is GPS-enabled (100%) and has live tracking within 1 month of implementation



Live tracking

ETA accuracy

The app estimates the arrival time with an accuracy of



±2 mins

Real-time insights

Optimised journey planning reduces travel time by providing passengers with real-time options.

Multi-modal journey planning

Access to all available journey options, facilitating seamless multi-modal journeys.

GPS Integration

Integration with 12 vendors has enabled greater visibility into the data quality.

Feedback mechanism

Passengers can now provide the feedback directly on the app.

Ease-of-use

100% of passengers have been able to use the app without help.

Solution Pilot #1 What does the city think?



Gaurav Kulkarni, IT Consultant for PMPML, Manager, KPMG

We are experiencing a significant positive impact from the implementation of Anamar Technologies' multi-modal passenger information and ticketing solution in Pune. Through the introduction of the Apli app, passengers now have access to a digital platform for ticketing, replacing paper tickets and reducing costs. Our experience working with the startup has been highly satisfactory, and the city-wide implementation is currently ongoing. Customer feedback has been very favorable, with an average rating of 4.3.

Additionally, 1,500 buses in the PMPML fleet are now GPS-enabled, providing passengers with live tracking. The solution generates Rs. 18 lakh per day in revenue, with expectations to touch approximately Rs. 25 lakh when we will launch iOS versions of the app, contributing 20% of the total daily revenue through the app. The buses are color-coded based on their fuel type: CNG, electric, and diesel. The journey planner feature allows passengers to view all routes, and online tickets, validated for 30 minutes, can be easily booked.

We have also signed an MoU for two years of implementation services, during which we received complimentary software to track all buses in the command control center, enhancing our operational efficiency.





Venkata Subbarao Chunduru
Director,
Arcadis IBI Group

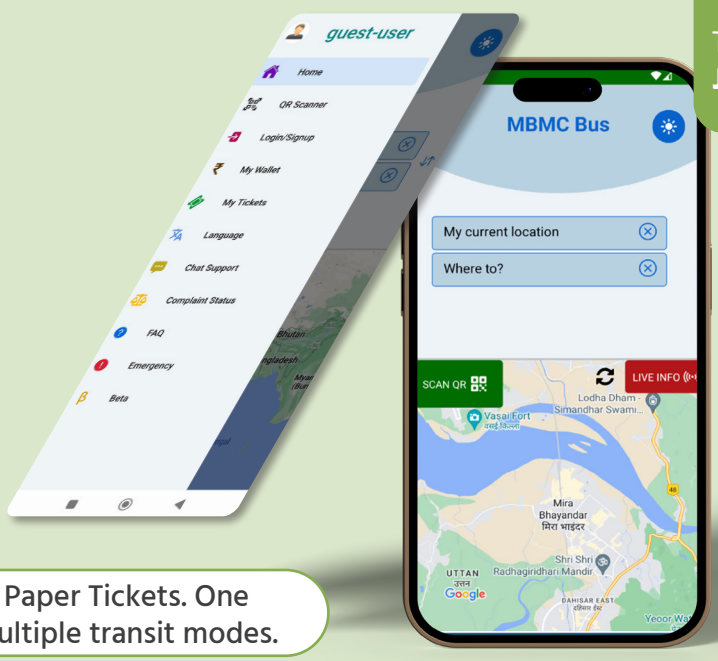
It was a privilege to mentor startups during their journey in development and deployment of Passenger Information and Ticketing system under the Transport4All Challenge. The team exhibited remarkable technological expertise and a commitment to innovation, which is commendable. However, their initial struggles with domain-specific, field level integration and implementation challenges highlighted the importance of blending technical solutions with a deep understanding of public transport operations and user behaviour. Through collaborative discussions and focused mentorship, I observed their growth in aligning their solutions with real-world scenarios, ultimately enhancing their ability to create impactful digital tools. This challenge stands as a testament to the power of learning, iteration, and collaboration in shaping the future of mobility in our cities.

Solution Pilot #2

Bon Transit by Aloha Tech Ventures

Implementation cities
Mira Bhayandar

Timeline
Jun - Oct 2024



USP Say No to Paper Tickets. One app for multiple transit modes.

✔ Implemented in more than 1 city (Honolulu and Sydney)

✔ Easily scalable

Features

- Multi-modal journey planning
- Last mile connectivity
- Multilingual support
- Semi-automated, AI-based chatbot for efficient grievance redressal
- Seamless integration with existing ITMS systems for accurate time estimation

Bon Transit by Aloha Tech Ventures is a passenger information and ticketing app that offers real-time transit information, route information, multi-modal journey planning, digital ticketing, payment collection and grievance redressal.

The application utilises data such as route network, fleet timetables, stop locations and GPS feeds, sourced from external Application Programming Interfaces (APIs) and transport agencies. It offers reliable information and convenient digital payment options to commuters.

The application comprises three interconnected modules: an admin dashboard, a sub-admin POS, and a client module. Powered by a backend with advanced tools like machine learning, route optimisation, payment gateways, and customer management, it supports integration with both existing and new systems for seamless adaptability.

Solution Pilot #2 In action

Before


MBMT
No.1BKITP0003
12/01/24 14:58 R01 ORDT1
Bhayandar Station East To
Bhayandar Railway Station
No of Passenger : 2
Total Amount: ₹30
TRN NO : ec0b4ec6-5731-4103-91eb-9614ae7a0784
W1107241006 M1000
MH-04-ST-0000

Paper based tickets
issued without any user metrics



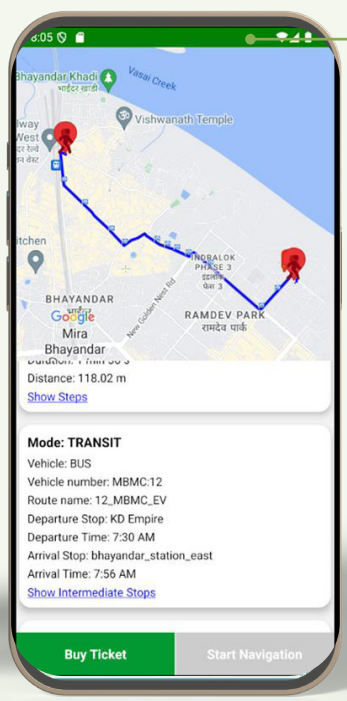
Passengers wait at bus stops without any
accurate information about bus timings

After

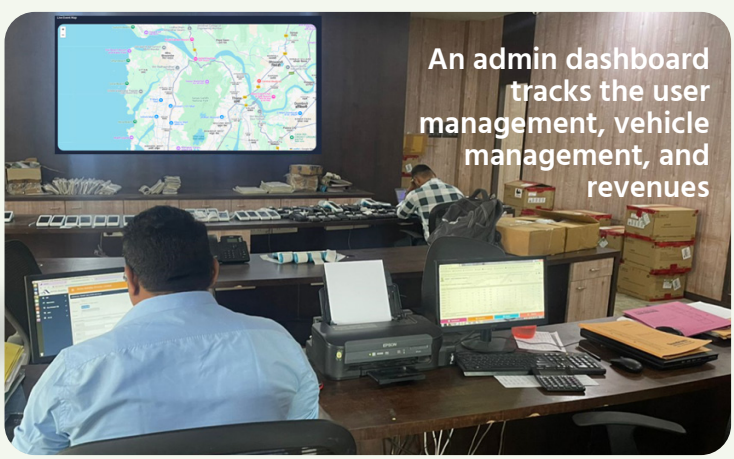
Conductors validate tickets with ETM machines

QR code based tickets issued for passengers





Bon Transit app and Electronic Ticketing Machines (ETMs) are integrated for digital payments and user analytics



An admin dashboard tracks the user management, vehicle management, and revenues

Solution Pilot #2 On-ground results

4.1
out of 5 average rating

Customer rating

~2%
of tickets

12%
of passes were scanned.



1500+
app downloads since launch with **65% active users**

Estimated Revenue



₹10,00,000
per day
with cost of licensing in discussions with the city.

52 buses
have GPS tracking devices installed. Integrated live tracking is indicated by a moving bus icon.



Live tracking

The app estimates the arrival time with an accuracy of



±10 secs
after the pilot, compared to ± 60 seconds before implementation.

Ridership Increase

The ridership is estimated to increase by 15% every year. For October 23 vs 2024 the increase is around 40%.

Ticket Collection

8932 tickets were sold through the app, while 98,000 tickets (including student passes) were sold through other modes.

Accuracy

The accuracy rate of the app's journey planning function is 90%.

Payment Methods

All digital payment methods like UPI, credit and debit cards and internet banking are supported.

Implementation Time

The solution needs only 1 month to be implemented after receiving all the required data.

Third party data

Data retrieval from third parties was resolved, and the GPS data is provided in a JSON format through API calls, making it easy to integrate.

JSON- JavaScript Object Notation

What did the city think?*

*Source: Feedback Form



Shashikant Sarade, ITS Manager, Mira Bhayandar Municipal Corporation

Aloha successfully obtained API access despite navigating a challenging and time-consuming process, largely due to third-party interference. Their approach to digital e-ticketing was notably innovative, and they introduced a multimodal planning feature that added significant value to the city. They implemented a user-friendly solution while also addressing the administrative requirements effectively. Additionally, Aloha demonstrated excellent collaboration with various teams and departments within MBMC, ensuring smooth execution of the project.

Problem Statement

NETWORK DIGITISATION

Current scenario

City expansion complicates travel and transport networks. With increasing demand, transport authorities have to juggle a network of complex routes and schedules for weekdays, weekends, and holidays. The current practice of manual management of route timetables through hard copies or spreadsheets leads to inefficiencies and increased time in planning. Having the data on paper and on Excel also makes it difficult to understand the demand spatially and plan for frequent changes in routes.

Need

Network digitisation can help transport agencies efficiently manage and disseminate information on transport networks, timetables, and fares, both digitally and spatially. Additionally, it enables the computation of accessibility index for areas, streamlining route planning and monitoring processes.

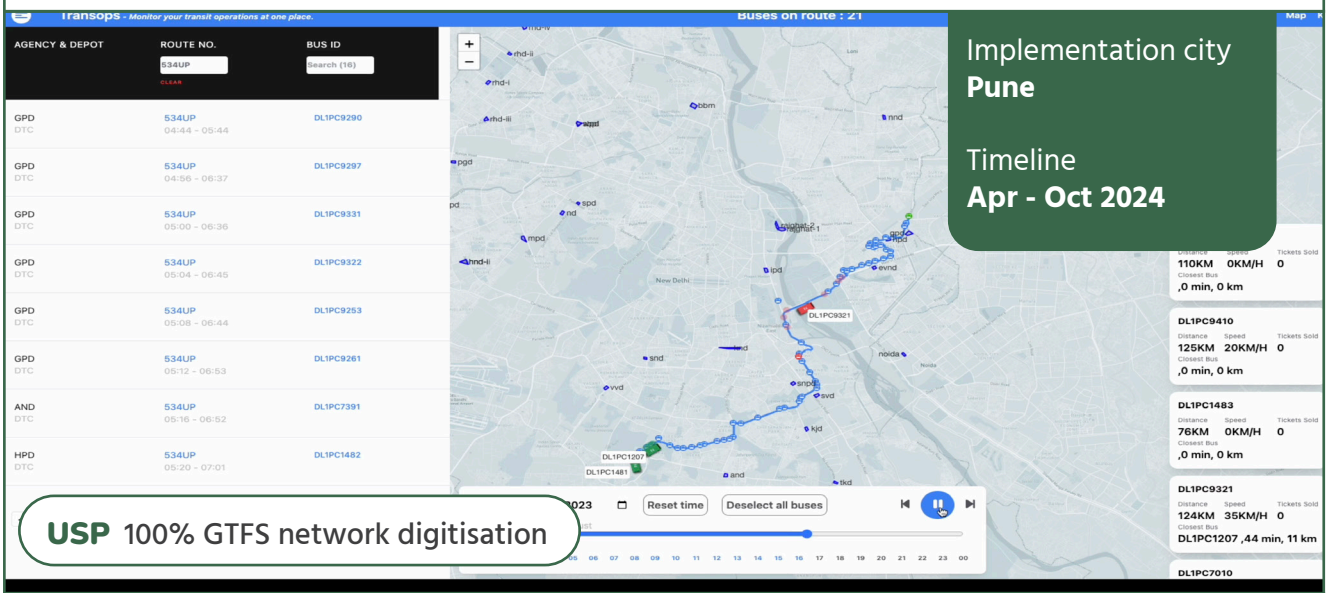
Users

Transport authorities operating public transport service and defining routes

Ticketing staff validating app-purchased tickets

Solution Pilot #3

Anamar Technologies



Implementation city
Pune

Timeline
Apr - Oct 2024

USP 100% GTFS network digitisation

✔ **Implemented in more than 1 city (Delhi and Kalaburagi)**

✔ **Easily scalable for other cities with minimal resources**

Features

Intuitive spatial tool to create and view routes and bus stops, replacing current paper spreadsheet-based data

Easy-to-use and quick-to deploy depot management system

Functionality to upload and download globally standardised GTFS data

Illustrative maps of network connectivity provide real-time data monitoring

Anamar Technologies digitalisation solution aims to bring about a fundamental transformation in urban transit systems by seamlessly digitising schedules, routes, and stops to provide a foundational layer of transit data. The solution offers deeper analytical insights into network connectivity and accessibility, offering invaluable data to city authorities for informed decision-making.

The solution also digitises how buses are managed daily at the depot ensuring better fleet management. The solution supports real-time GPS tracking to fully digitise live bus tracking systems.

Solution Pilot #3 In action

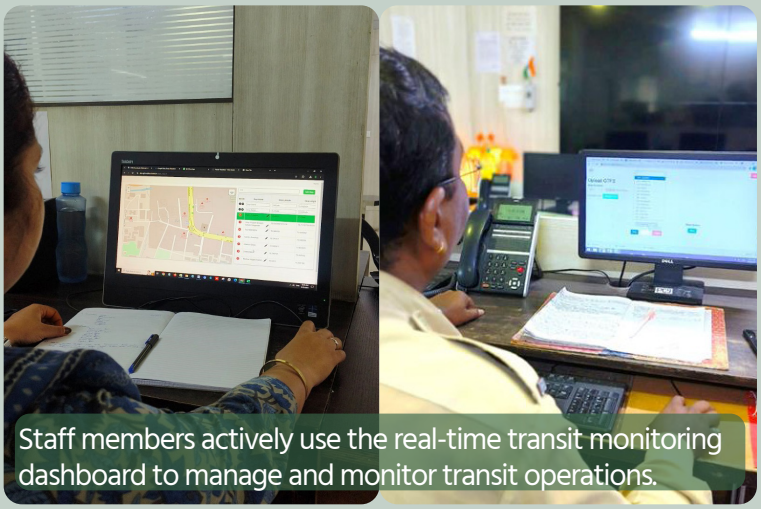
Before



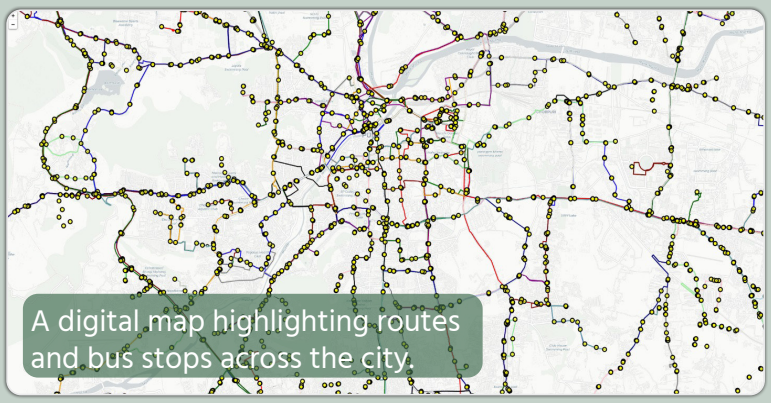
			Stop Name	Stop Name Marathi	K. M.	Latitude	Longitude	
1	343A-U	1	Bhosari Chakan Road	भोसरी चाकण रोड	00.00	18.6238	73.8512	5
	343A-U	2	Dhawde Vasti	धावडेवस्ती	00.70	18.6296	73.8510	5
	343A-U	3	Bhosari Depot	भोसरी डेपो	01.00	18.6323	73.8499	5
2	343A-U	4	Sadguru Nagar	सद्गुरूनगर	01.30	18.6350	73.8495	5
	343A-U	5	E Kshetriya Karyalay	ई-क्षेत्रिय कार्यालय	02.00	18.6415	73.8505	10
	343A-U	6	Panjarpol	पांजरपोळ	02.30	18.6436	73.8504	10
	343A-U	7	Vakhar Mahamandal Bhosari	वखार महामंडळ भोसरी	02.80	18.6482	73.8507	10
	343A-U	8	Gandharva Nagari	गंधर्वनगरी	03.10	18.6503	73.8503	10
	343A-U	9	Sainath Hospital Moshi	साईनाथ हॉस्पीटल मोशी	03.70	18.6558	73.8489	10
	343A-U	10	Moshi Jakat Naka	मोशी जकात नाका	04.30	18.6610	73.8484	10
3	343A-U	11	Borate Vasti Nasik Road	बोराटेवस्ती नाशिक रोड	04.90	18.6658	73.8486	10
	343A-U	12	Bankar Vasti	बनकरवस्ती	05.40	18.6708	73.848415	10
4	343A-U	13	Moshigaon	मोशी गांव	06.10	18.6761	73.8495	10
	343A-U	14	Nageshwar Vidyalay	नागेश्वर विद्यालय	06.70	18.6816	73.8475	15
	343A-U	15	Moshi Toll Naka	मोशी टोल नाका	07.20	18.6855	73.8468	15
5	343A-U	16	Chimbli Phata	चिंबळी फाटा	08.60	18.6972	73.8479	15
	343A-U	17	Gaikwad Vasti Nasik Road	गायकवाडवस्ती नाशिक रोड	09.00	18.7011	73.8477	15
	343A-U	18	Barge Vasti	बर्गेवस्ती	10.10	18.7105	73.8483	15
6	343A-U	19	Kuruli Phata	कुरुळी फाटा	10.60	18.7153	73.8487	15
	343A-U	20	Sandesh Model Colony	संदेश मॉडेल कॉलनी	11.20	18.7199	73.8505	20
	343A-U	21	Kalyani Forge Chakan Road	कल्याणी फोर्ज चाकण रोड	11.60	18.7227	73.8522	20
	343A-U	22	Spicer India Company	स्पायसर इंडिया कंपनी	12.10	18.7268	73.8543	20
7	343A-U	23	Alandi Phata	आळंदी फाटा	12.80	18.7323	73.8566	20
	343A-U	24	Gavte Vasti Petrol Pump	गवते वस्ती पेट्रोल पंप	13.30	18.7369	73.8575	20
	343A-U	25	Vijay Oil Mill	विजय ऑईल मिल	13.90	18.7414	73.8591	20
	343A-U	26	Balaji Petrol Pump	बालाजी पेट्रोल पंप	14.50	18.7474	73.8597	20
8	343A-U	27	Chakan Talegaon Chowk	चाकण तळेगाव चौक	15.50	18.7552	73.8583	20
	343A-U	28	Sherya Lawns	शेरया लॉन्स	15.90	18.7553	73.8544	25
	343A-U	29	Ranubaimala	रानुबाईमळा	16.20	18.7553	73.8537	25
	343A-U	30	Sanjivani Hospital	संजीवनी हॉस्पीटल	16.40	18.7563	73.8470	25
9	343A-U	31	Kharabwadi	खराबवाडी	17.40	18.7574	73.8417	25
	343A-U	32	Pancharatna Complex	पंचरत्न कॉम्प्लेक्स	18.00	18.7587	73.8359	25
	343A-U	33	Ibp Pump	आयबीपी पंप	18.70	18.7592	73.8292	25
10	343A-U	34	Kores Company	कोरस कंपनी	19.10	18.7599	73.8259	25
	343A-U	35	Kalyan Hotel	कल्याण हॉटेल	19.40	18.7598	73.8253	30
	343A-U	36	Lumax Company	ल्युमॅक्स कंपनी	20.00	18.7587	73.8180	30
	343A-U	37	Maharashtra Vajan Kata	महाराष्ट्र वजन काटा	20.80	18.7560	73.8111	30
11	343A-U	38	Mhalunge Phata Chakan	म्हाळुंगे फाटा चाकण	21.00	18.7559	73.8108	30
	343A-U	39	Mide Phata Chakan Road	माइडचौकी फाटा चाकण रोड	21.50	18.7549	73.8054	30
	343A-U	40	Bajaj Company	बजाज कंपनी	21.80	18.7547	73.8021	30
	343A-U	41	Lumax Company Gate No. 2	ल्युमॅक्स कंपनी गेट नं. 2	22.20	18.7512	73.7944	30
	343A-U	42	Om Logistic Company	ओम लॉजीस्टीक कंपनी	22.70	18.7543	73.8004	30
	343A-U	43	Ag Hotel Pune Telegaon Kathada Road	ए.जी. हॉटेल पुणे तळेगाव कठाडा रोड	23.10	18.7509	73.7936	30
12	343A-U	44	Rp Chowk Telegaon Dabhade Road	रावडी चौक तळेगाव दाभाडे रोड	23.70	18.7458	73.7885	30
	343A-U	45	Poona Pressing Company	पुना प्रेसिंग कंपनी	24.20	18.7423	73.7854	35
	343A-U	46	Khalumbre	खालुम्ब्रे	25.20	18.7415	73.7768	35
	343A-U	47	Sai Niwas Khalumbre	साई निवास खालुम्ब्रे	25.50	18.7418	73.7757	35
13	343A-U	48	Sadumbre Gaon	सदुम्ब्रेगांव	26.70	18.7417	73.7629	35
	343A-U	49	Kunjari Lawns	कुंजरी लॉन्स	27.20	18.7399	73.7586	35
14	343A-U	50	Dehu Phata Chakan Road	देहू फाटा चाकण रोड	27.70	18.7391	73.7544	35
	343A-U	51	Toll Naka Chakan Road	टोल नाका चाकण रोड	28.50	18.7390	73.7477	40
15	343A-U	52	Bhandara Dongar Pavetha	भंडारा डोंगर पावठा	29.30	18.7386	73.7394	40
	343A-U	53	Bhandar City	भंडारा सिटी	29.70	18.7388	73.7310	40
	343A-U	54	Tolani Institute	तोलानी इन्स्टिट्यूट	30.40	18.7378	73.7300	40

Manual logs and static data records showcasing traditional transit and network management processes

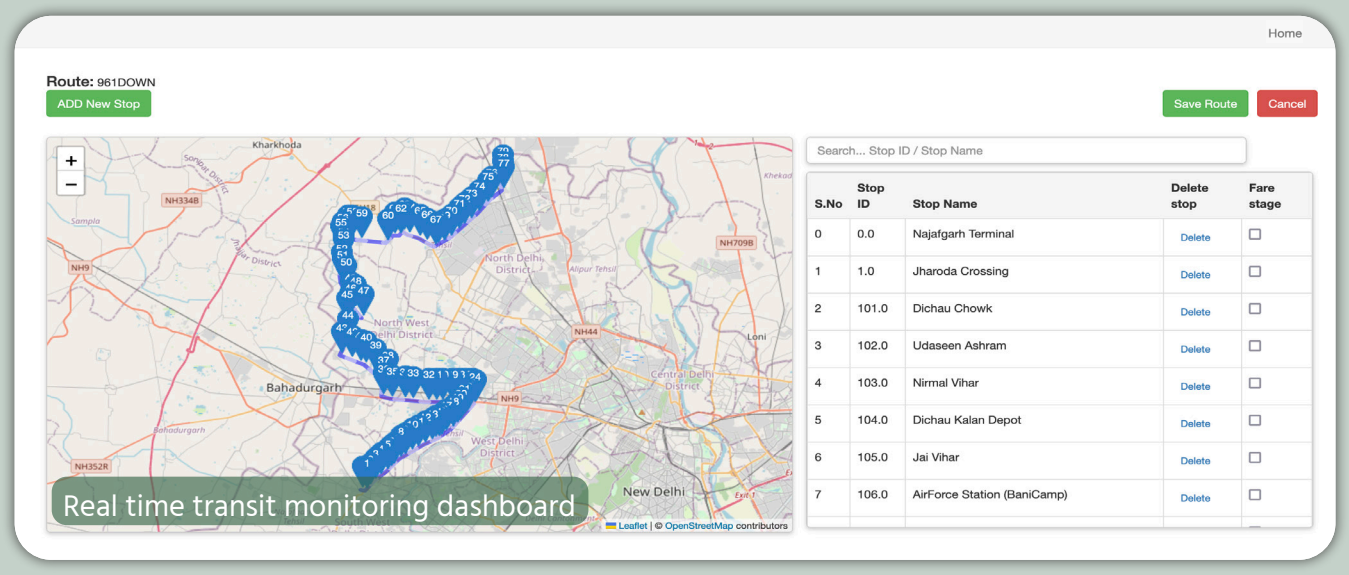
After



Staff members actively use the real-time transit monitoring dashboard to manage and monitor transit operations.



A digital map highlighting routes and bus stops across the city.



Real time transit monitoring dashboard

Solution Pilot #3 On-ground results

1100 routes
across 1500 buses have been digitised in GTFS.
Previously, no routes were digitised.



Network Digitisation

Digitisation and publishing of the entire transit network can be done in
3-4 weeks.



Implementation Time

Google Maps Integration

There is discussion with city authorities to publish the data in Google Maps for more access.



Ease-of-use

Multiple staff members were able to use the app easily.

Compatibility

All the schedules have been imported as per GTFS formats.

Solution Pilot #1 What does the city think?



Gaurav Kulkarni, IT Consultant for PMPML, Manager, KPMG

Our experience has been outstanding with the digitization of 1100 routes into GTFS format. This has made it much easier for us to adapt and update routes dynamically as needed. What used to be a manual process, managed through Excel sheets, is now fully digitized, and the team has been incredibly supportive in helping us implement changes quickly and smoothly. Their solution solved a major challenge we faced and has given us the flexibility to manage an evolving network effortlessly. The collaboration has been seamless, and their responsiveness has made a big difference in how we handle route management.



Alok Jain
CEO & Managing Director,
Trans-Consult Ltd

Transport4All Challenge was a unique mechanism to crowd-source ideas and initiatives from the masses to promote sustainable transportation solutions for urban environment in India. The solutions proposed by the participants were not only innovative but also adapted to the Indian political and administrative setup. During my mentorship process, I could challenge these start-ups on various possibilities and they were agile, responsive and innovative in their responses. They all deserve to be funded and hand-holded to the next stage of scaling up. International institutions like ITDP and other MDBs should not miss this opportunity to groom this up and scale them globally. This funneling process through this challenge should be sustained on an ongoing basis to ensure the transport industry attracts the best and the brightest.





Debashish Biswas
Partner, Deloitte

It was a privilege to mentor Anamar Technologies during the Transport4All Challenge. Their innovative approach and ability to navigate real-world challenges during the program was truly impressive. The T4A Challenge has been a great platform for fostering meaningful solutions in urban mobility, and I'm confident the team will continue to contribute to this growing field. Best wishes to the team for continued success.

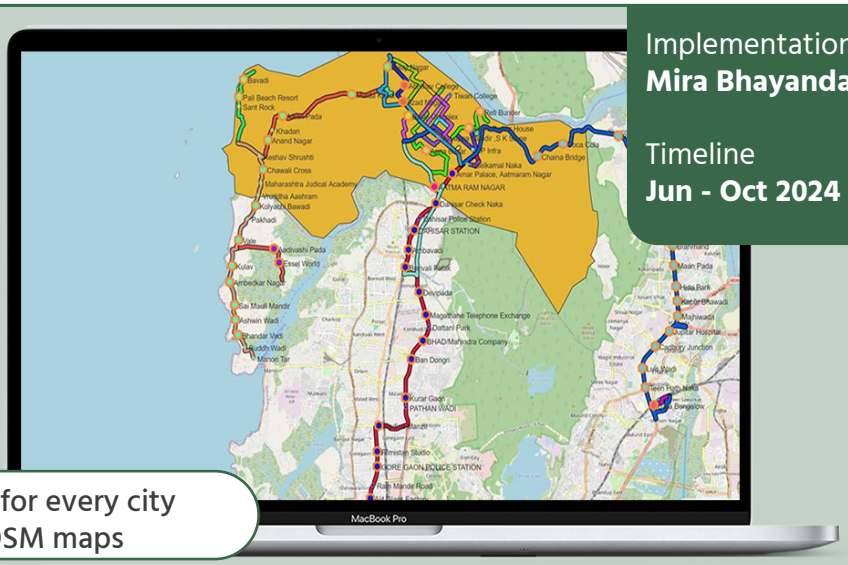


Prashanth Bachu
Consultant, The World Bank

Urban bus transit agencies face immense challenges from increasing congestion, rising costs, and stagnant passenger affordability, resulting in persistent financial imbalance. ITS promised to remedy this situation but has largely had no impact, with very limited technology solutions in the market. The Transport4All Challenge has been a transformative initiative, bridging the gap between cities and startups to address critical issues of efficiency and reliability. The remarkable ability of these solutions to deliver positive impacts during pilot implementations is a testament to their potential when scaled. Witnessing startups transform ideas into impactful, on-ground implementations has been truly rewarding. The next crucial step is enabling transit agencies to adopt these innovations by rethinking traditional procurement practices that often hinder innovation. My best wishes to these innovators as they work towards transforming urban mobility at scale.

Solution Pilot #4

ApnaWahan by Amiraj Wahan



Implementation city
Mira Bhayandar

Timeline
Jun - Oct 2024

USP Easily scalable for every city with Google/OSM maps

✔ **Implemented in more than 1 city (Sagar, Shimla, Jhansi, and Davangere)**

Features

- Integration with Google Maps to show static routes and real time information
- Machine learning system to identify new routes
- Capture ‘dead kms’, i.e non revenue generating routes, and provide insights on cost optimisation
- All-in-one network digitisation solution with suitable ticketing and maintenance add-ons
- Real-time updates to enhance revenue, optimise routes, and increase ridership

Apnawahan network digitisation platform is an AI based transport management solution. It is designed to digitise paper and spreadsheet based route data spatially, analyse current and future demographic patterns, and provide recommendations to maximise ridership, improve passenger satisfaction, and increase utilisation of buses.

The platform’s outputs can be easily added to mapping tools like Google and Open Street Maps (OSM), making it easier for users to plan their journey. The solution also gives the transport authorities access to live reports and dashboards, which helps make them quick changes to services. This makes the overall operations more flexible and responsive.

Solution Pilot #4 In action

Before



A traditional, cluttered schedule board displaying bus routes and timings in an outdated format.



Public transport users referring to a manually updated and printed route map, highlighting lack of easily accessible data.





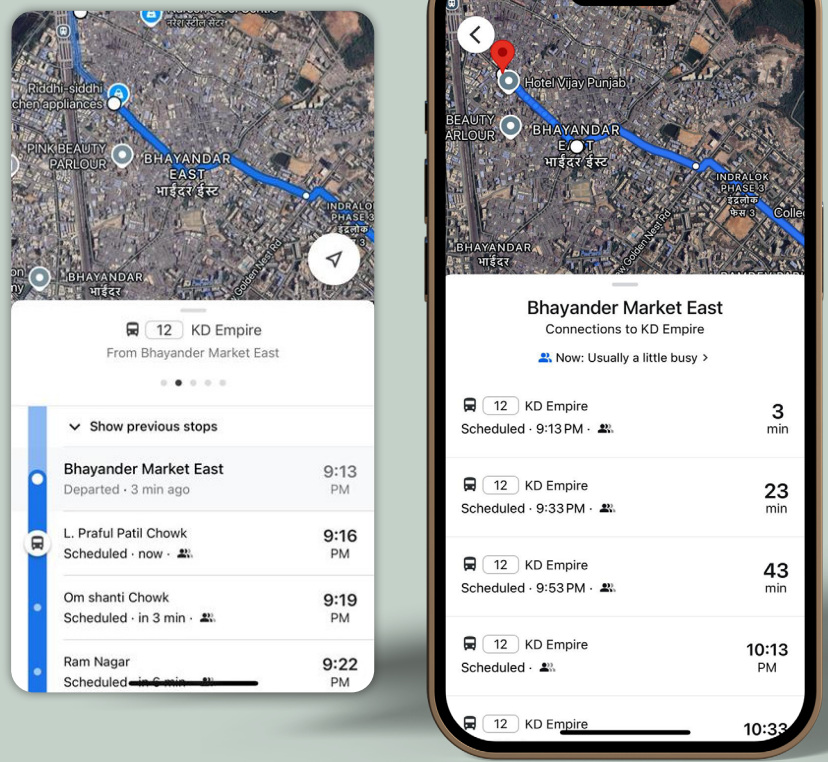




Route and schedule information displayed at a bus stop in a unorganized manner, limiting usability and clarity for commuters.

After

Digitisation now allows real-time bus tracking, with live updates on bus arrival times, providing a seamless and user-friendly commuter experience.





A digitised map showing detailed and organized bus routes along with precise bus stop locations, reflecting advancements in network digitisation map.

Solution Pilot #4 On-ground results

3 routes
(15 buses)
in Mira Bhayandar are published on Google Maps.



Real-time details available on
100%
of published routes.

Ease-of-use

The app has been designed for easy use, and two people were able to use the app within 3 hours of training.

Scalability

The system can import up to 5600 routes and 9500 bus stops.

Implementation Time

The digitisation of routes can be done within minutes with an efficiency of 99%. Earlier, the time to do this manually was around 3 days.

Solution Pilot #2 What does the city think?



Shashikant Sarade, ITS Manager, Mira Bhayandar Municipal Corporation

The startup, Amiraj Wahan, successfully enabled access to Google Maps in record time. They effectively showcased the existing routes on Google Maps and provided a detailed demonstration of their dashboard. The startup displayed professionalism throughout the engagement, and their approach was methodical and well-structured.





Shalini Sinha
Senior Associate Professor,
CEPT University

A spatial tool for digitising and analysing the transit network is crucial for enabling city authorities to make more informed decisions towards providing customer-focused services. The Transport4All initiative has contributed significantly to development of city-specific solutions for enhancing efficiency of public transport systems.

Problem Statement

BUS & STAFF SCHEDULING

Current scenario

In cities with constant changing demands, and rising congestion, route travel times fluctuate throughout the day, requiring constant updates in scheduling duties for drivers and conductors. In most cities, transport authorities prepare duty schedules manually, which also need to be changed frequently. Manual staff rostering is time consuming, impractical, hampers optimisation, and elevates operational costs, reducing the quality of services.

Need

Automated bus and staff scheduling can help transport authorities create and update route timetables, bus schedules, and staff duties in the most efficient way to minimise costs by utilising resources effectively. This also ensures fairer workloads and equitable distribution of work shifts.

Users

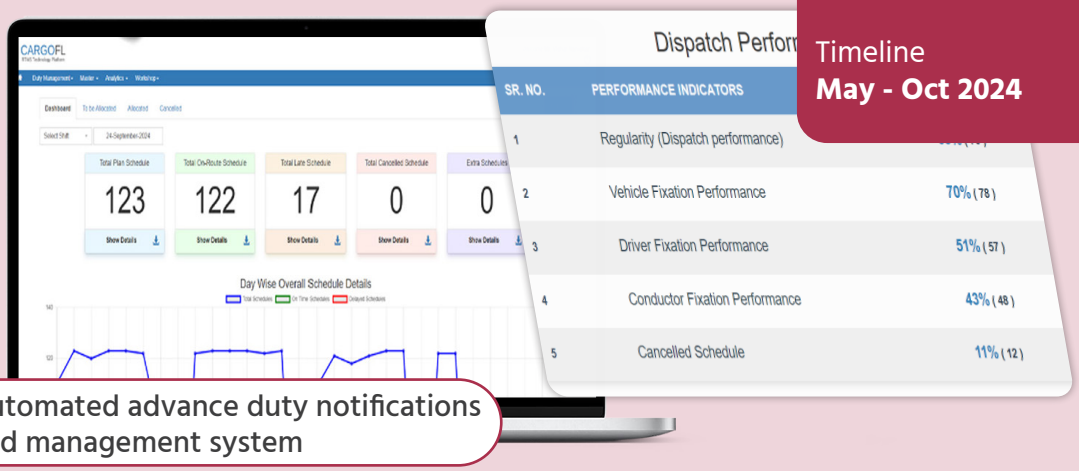
Transport authorities in charge of defining routes, timetables and fares

Bus drives and conductors working with transport authorities

Solution Pilot #5 CargoFL RTMS by Innoctive Technologies

Implementation city
Belagavi (B2 Depot)

Timeline
May - Oct 2024



USP Automated advance duty notifications and management system

✔ **Implemented in 1 city (Pune)**

✔ **Easily scalable with cloud computing services.**

Features

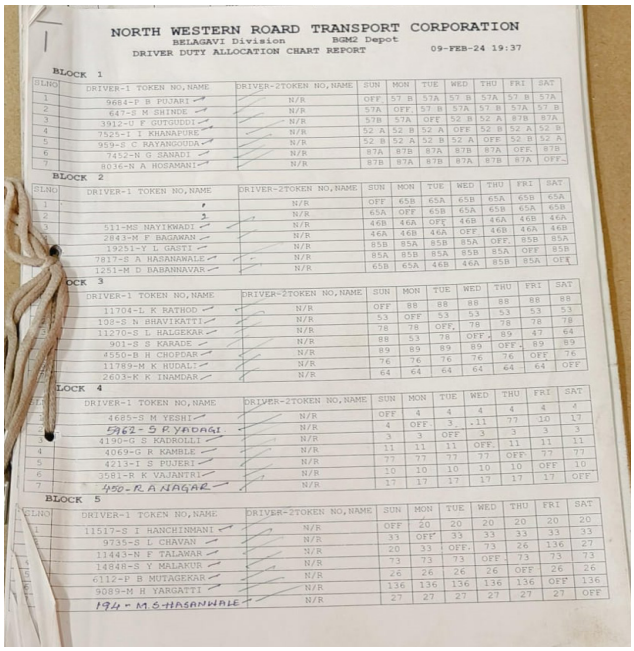
- Master data management for routes, schedules, stops, stages, trips, bus stands, buses and depots
- Digital allocation of drivers, conductors, schedules, and buses on particular routes over manual route allocation planning
- Accurate data on real-time bus schedules vs planned schedules
- Automatic log sheet generation for every trip
- Dashboard to display duty allocation

CargoFL RTMS Technology Platform by Innoctive Technologies is a cutting-edge solution to empower transport authorities, including State Transport Undertakings (STUs), by providing them with seamless digital capabilities for the streamlined execution of their daily operations.

This comprehensive software offers route planning and optimisation, real-time tracking and reporting, route scheduling, vehicle performance monitoring and fleet management. Additionally, the system provides valuable insights through data analytics, enabling informed decision-making and efficient resource allocation.

Solution Pilot #5 In action

Before



NORTH WESTERN ROARD TRANSPORT CORPORATION
BELAGAVI Division BGM2 Depot
DRIVER DUTY ALLOCATION CHART REPORT 09-FEB-24 19:37

BLOCK 1

SLNO	DRIVER-1 TOKEN NO, NAME	DRIVER-2TOKEN NO, NAME	SUN	MON	TUE	WED	THU	FRI	SAT
1	9684-F B PUJARI	N/R	OFF	57 B	57A	57 B	57A	57 B	57A
2	647-S M SHINDE	N/R	57A	OFF	57 B	57A	57 B	57A	57 B
3	3912-U F GUTGUDDI	N/R	57B	57A	OFF	52 B	52 A	87B	87A
4	7525-I L KHANAPURE	N/R	52 A	52 B	52 A	OFF	52 B	52 A	52 B
5	959-S C RAYANGOUDA	N/R	52 B	52 A	52 B	52 A	OFF	52 B	52 A
6	7452-N G SANADI	N/R	87A	87B	87A	87B	87A	OFF	87B
7	8036-N A HOSAMANI	N/R	87B	87A	87B	87A	87B	87A	OFF

BLOCK 2

SLNO	DRIVER-1 TOKEN NO, NAME	DRIVER-2TOKEN NO, NAME	SUN	MON	TUE	WED	THU	FRI	SAT
1		N/R	OFF	65B	65A	65B	65A	65B	65A
2		N/R	65A	OFF	65B	65A	65B	65A	65B
3	511-MS NAYIKWADI	N/R	46B	46A	OFF	46B	46A	46B	46A
	2843-M F BAGAWAN	N/R	46A	46B	46A	OFF	46B	46A	46B
	19251-Y L GASTI	N/R	85B	85A	85B	85A	OFF	85B	85A
	7817-S A HAJANAWALE	N/R	85A	85B	85A	85B	85A	OFF	85B
	1251-M D BABANNAVAR	N/R	65B	65A	46B	46A	85B	85A	OFF

OCK 3

	DRIVER-1 TOKEN NO, NAME	DRIVER-2TOKEN NO, NAME	SUN	MON	TUE	WED	THU	FRI	SAT
	11704-L K RATHOD	N/R	OFF	88	88	88	88	88	88
	108-S N BHAVIKATTI	N/R	53	OFF	53	53	53	53	53
	11270-S L HALGEKAR	N/R	78	78	OFF	78	78	78	78
	901-S S KARADE	N/R	88	53	78	OFF	89	47	64
	4550-B H CHOPDAR	N/R	89	89	89	89	OFF	89	89
	11789-M K HUDALI	N/R	76	76	76	76	76	OFF	76
	2603-K K INAMDAR	N/R	64	64	64	64	64	64	OFF

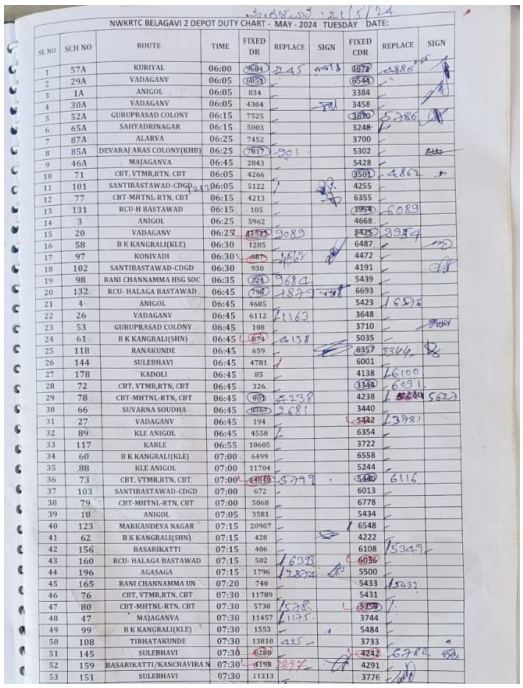
LOCK 4

	DRIVER-1 TOKEN NO, NAME	DRIVER-2TOKEN NO, NAME	SUN	MON	TUE	WED	THU	FRI	SAT
	4685-S M VESHI	N/R	OFF	4	4	4	4	4	4
	5962-S K YADAGI	N/R	4	OFF	3	11	77	10	17
	4190-S S KADROLLI	N/R	3	3	OFF	3	3	3	3
	4069-G R KAMBLE	N/R	11	11	11	OFF	11	11	11
	4213-I S PUJERI	N/R	77	77	77	77	OFF	77	77
	3581-R K VAJANTRI	N/R	10	10	10	10	10	OFF	10
	450-R A NAGAR	N/R	17	17	17	17	17	17	OFF

BLOCK 5

SLNO	DRIVER-1 TOKEN NO, NAME	DRIVER-2TOKEN NO, NAME	SUN	MON	TUE	WED	THU	FRI	SAT
	11517-S I HANCHINMANI	N/R	OFF	20	20	20	20	20	20
	9735-S L CHAVAN	N/R	33	OFF	33	33	33	33	33
	11443-N F TALAWAR	N/R	20	33	OFF	73	26	136	27
	14848-S Y MALAKUR	N/R	73	73	73	OFF	73	73	73
	6112-P B MUTAGEKAR	N/R	26	26	26	26	OFF	26	26
	9089-M H YARGATTI	N/R	136	136	136	136	136	OFF	136
	194-M S HASANWALE	N/R	27	27	27	27	27	27	OFF

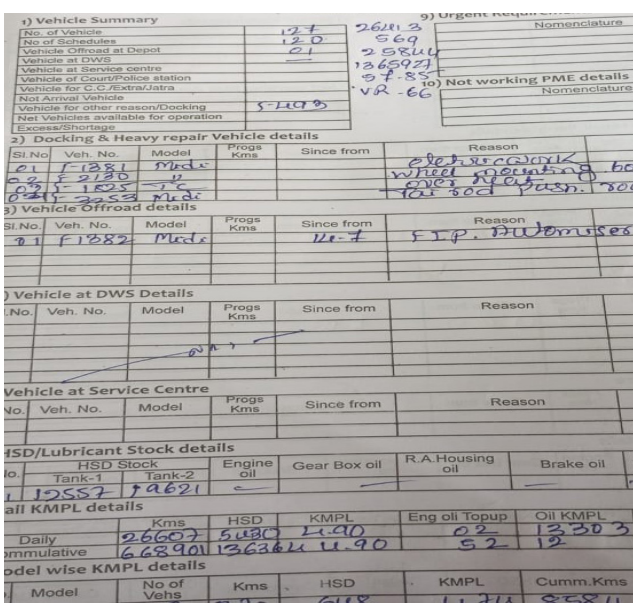
Driver duty allocation done manually



NWKRTC BELAGAVI 2 DEPOT DUTY CHART - MAY - 2024 TUESDAY DATE:

SL NO	SCH NO	ROUTE	TIME	FIXED DR	REPLACE	SIGN	FIXED CDR	REPLACE	SIGN
1	57A	KURIYAL	06:00	3684	245		4072	4886	
2	29A	VADAGANV	06:05	4025			6544		
3	1A	ANIGOL	06:05	834			3384		
4	30A	VADAGANV	06:05	4304			3458		
5	52A	GURUPRASAD COLONY	06:15	7525			3700	5786	
6	65A	SAHYADRINAGAR	06:15	5003			3248		
7	87A	ALARVA	06:25	7452			3700		
8	85A	DEVARAJ ARAS COLONY(KHB)	06:25	7817	301		5302		
9	46A	MAJAGANVA	06:45	2843			5428		
10	71	CBT, VTMR,RTN, CBT	06:05	4266			3500	4862	
11	101	SANTIBASTAWAD-CDGD	06:05	5122			4255		
12	77	CBT-MHTNL-RTN, CBT	06:15	4213			6355		
13	131	RCU-H BASTAWAD	06:15	105			3954	6089	
14	3	ANIGOL	06:25	5962			4668		
15	20	VADAGANV	06:25	4145	3089		8425	3924	
16	58	B K KANGRALI(KLE)	06:30	1285			6487		
17	97	KONIVADI	06:30	687	4667		4472		
18	102	SANTIBASTAWAD-CDGD	06:30	930			4191		
19	98	RANI CHANNAMMA HSG SOC	06:35	291	3681		5439		
20	132	RCU- HALAGA BASTAWAD	06:45	3798	1877		6693		
21	4	ANIGOL	06:45	4685			5423	6556	
22	26	VADAGANV	06:45	6112	1163		3648		
23	53	GURUPRASAD COLONY	06:45	108			3710		
24	61	B K KANGRALI(SHN)	06:45	874	4138		5035		
25	118	RANAKUNDE	06:45	659			6357	3364	
26	144	SULEBHAVI	06:45	4781			6001		
27	178	KADOLI	06:45	85			4138	6100	
28	72	CBT, VTMR,RTN, CBT	06:45	326			3334	6691	
29	78	CBT-MHTNL-RTN, CBT	06:45	905	5238		4238	5623	
30	66	SUVARNA SOUDHA	06:45	3187	5681		3440		
31	27	VADAGANV	06:45	194			5402	3781	
32	89	KLE ANIGOL	06:45	4558			6354		
33	117	KARLE	06:55	10605			3722		
34	60	B K KANGRALI(KLE)	07:00	6499			6558		
35	BB	KLE ANIGOL	07:00	11704			5244		
36	73	CBT, VTMR,RTN, CBT	07:00	4418	5779		5440	6116	
37	103	SANTIBASTAWAD-CDGD	07:00	672			6013		
38	79	CBT-MHTNL-RTN, CBT	07:00	5868			6778		
39	10	ANIGOL	07:05	3581			5434		
40	123	MARKANDEYA NAGAR	07:15	20907			6548		
41	62	B K KANGRALI(SHN)	07:15	428			4222		
42	156	BASARIKATTI	07:15	406			6108	5349	
43	160	RCU- HALAGA BASTAWAD	07:15	502	4238		6036		
44	196	AGASAGA	07:15	1796	2874		5500		
45	165	RANI CHANNAMMA UN	07:20	740			5433	1583	
46	76	CBT, VTMR,RTN, CBT	07:30	11789			5431		
47	80	CBT-MHTNL-RTN, CBT	07:30	5730	5238		3258		
48	47	MAJAGANVA	07:30	11457	1175		3744		
49	99	B K KANGRALI(KLE)	07:30	1553			5484		
50	108	TIRHATAKUNDE	07:30	13810	225		3733		
51	145	SULEBHAVI	07:30	6280			4242	6788	
52	159	BASARIKATTI/KANCHAVIRA N	07:30	4198	1877		4291		
53	151	SULEBHAVI	07:30	11313			3776		

Daily duty schedule chart was also static and manually checked



1) Vehicle Summary

No. of Vehicle	127
No of Schedules	120
Vehicle Offroad at Depot	01
Vehicle at DWS	—
Vehicle at Service centre	
Vehicle of Court/Police station	
Vehicle for C.C./Extra/Jatra	
Not Arrival Vehicle	
Vehicle for other reason/Docking	5-1493
Net Vehicles available for operation	
Excess/Shortage	

2) Docking & Heavy repair Vehicle details

Sl.No.	Veh. No.	Model	Progs Kms	Since from	Reason
01	F1381	Mids			Electrical work
02	F2180	"			Wheel painting
03	F1825	"			Full body Pain
04	3249	Mids			

3) Vehicle Offroad details

Sl.No.	Veh. No.	Model	Progs Kms	Since from	Reason
01	F1382	Mids		12-7	FIP. Dismissed

) Vehicle at DWS Details

.No.	Veh. No.	Model	Progs Kms	Since from	Reason

Vehicle at Service Centre

No.	Veh. No.	Model	Progs Kms	Since from	Reason

HSD/Lubricant Stock details

HSD Stock Tank-1	HSD Stock Tank-2	Engine oil	Gear Box oil	R.A.Housing oil	Brake oil
12557	9621				

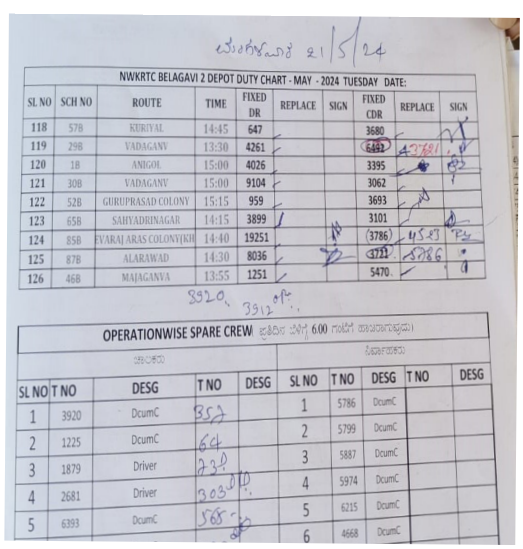
ail KMPL details

	Kms	HSD	KMPL	Eng oil Topup	Oil KMPL
Daily	26607	5180	4.90	02	13303
ommulative	668901	136364	4.90	52	12

odel wise KMPL details

Model	No of Vehs	Kms	HSD	KMPL	Cumm.Kms

Operational crew duty and replacement chart prepared manually



NWKRTC BELAGAVI 2 DEPOT DUTY CHART - MAY - 2024 TUESDAY DATE:

SL NO	SCH NO	ROUTE	TIME	FIXED DR	REPLACE	SIGN	FIXED CDR	REPLACE	SIGN
118	57B	KURIYAL	14:45	647			3680		
119	29B	VADAGANV	13:30	4261			6493	4781	
120	1B	ANIGOL	15:00	4026			3395		
121	30B	VADAGANV	15:00	9104			3062		
122	52B	GURUPRASAD COLONY	15:15	959			3693		
123	65B	SAHYADRINAGAR	14:15	3899			3101		
124	85B	EVARAJ ARAS COLONY(KH	14:40	19251			(3786)	4583	
125	87B	ALARAWAD	14:30	8036			3772	4886	
126	46B	MAJAGANVA	13:55	1251			5470		

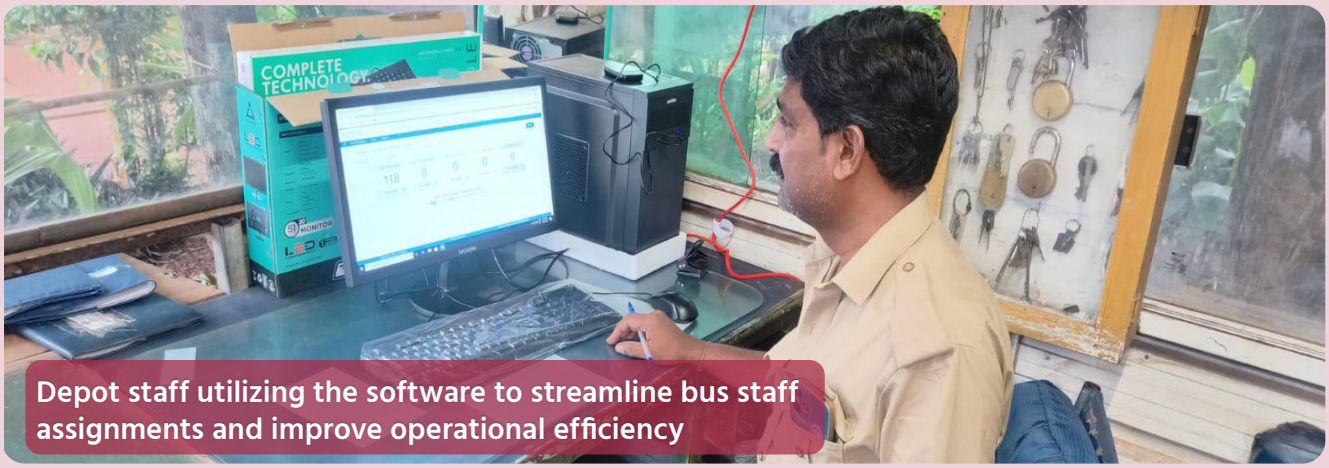
8920
3917

OPERATIONWISE SPARE CREW

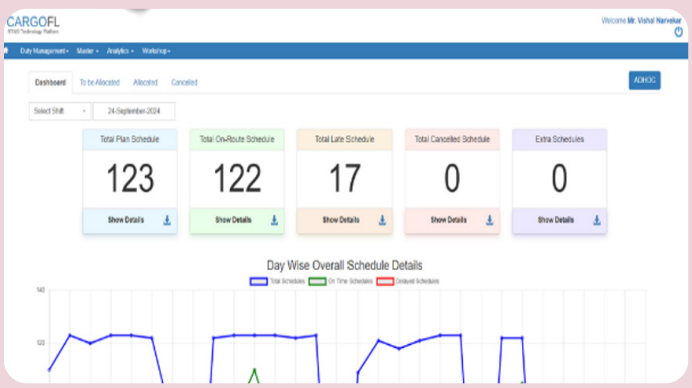
SL NO	T NO	DESG	T NO	DESG	SL NO	T NO	DESG	T NO	DESG
1	3920	DcumC	357		1	5786	DcumC		
2	1225	DcumC	64		2	5799	DcumC		
3	1879	Driver	732		3	5887	DcumC		
4	2681	Driver	3032		4	5974	DcumC		
5	6393	DcumC	585		5	6215	DcumC		
					6	4668	DcumC		

Daily vehicle position report done manually

After



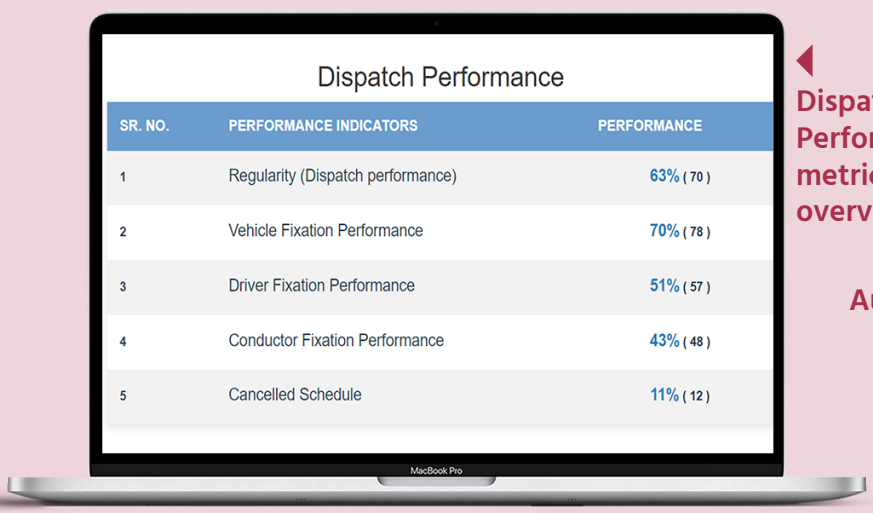
Depot staff utilizing the software to streamline bus staff assignments and improve operational efficiency



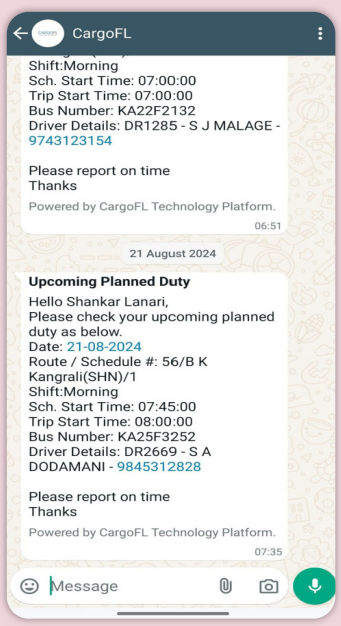
Centralised dashboard for real-time scheduling overview.



Training to city officials in Belagavi on the effective use of bus staff scheduling tools



Dispatch Performance metrics overview



Automated duty notification for drivers via WhatsApp

Solution Pilot #5 On-ground results

The solution can be integrated into the existing system **within one week**, with

95%

increase in overall efficiency.

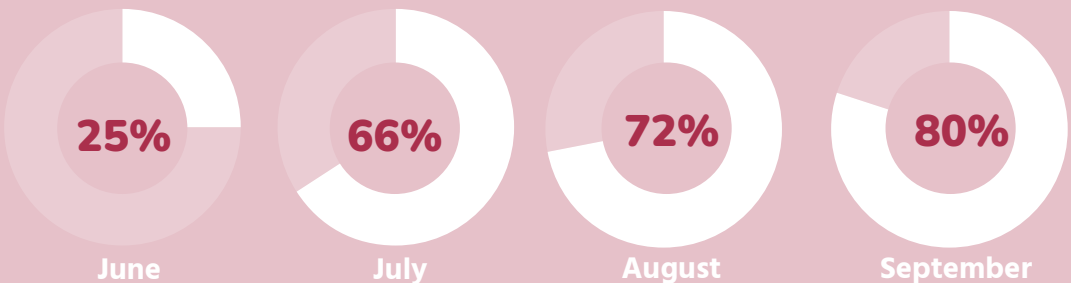
Cost Savings

12-13 Lakhs

can be saved per depot per year

Vehicle Utilisation

The data from the CargoFL shows visible results in increased vehicle utilisation over time.



Personnel Efficiency

The number of people needed at each depot for managing this activity has reduced from 6 before

to 3 now after digitisation.

Efficiency

Daily duty allocation time reduced through this intervention

1410 minutes

120 minutes

User Satisfaction

The staff have expressed satisfaction with the digital system over phone calls to receive duty updates.

Digital notification

Drivers and conductors are informed about upcoming duties and changes through automated WhatsApp alerts.

Live reporting

Regular reports (daily, weekly, monthly, and yearly) get generated in the system real-time.

Performance improvement

The tool has helped maintain time, with an 86% improvement in on-time performance of duty.

Solution Pilot #5 What does the city think?



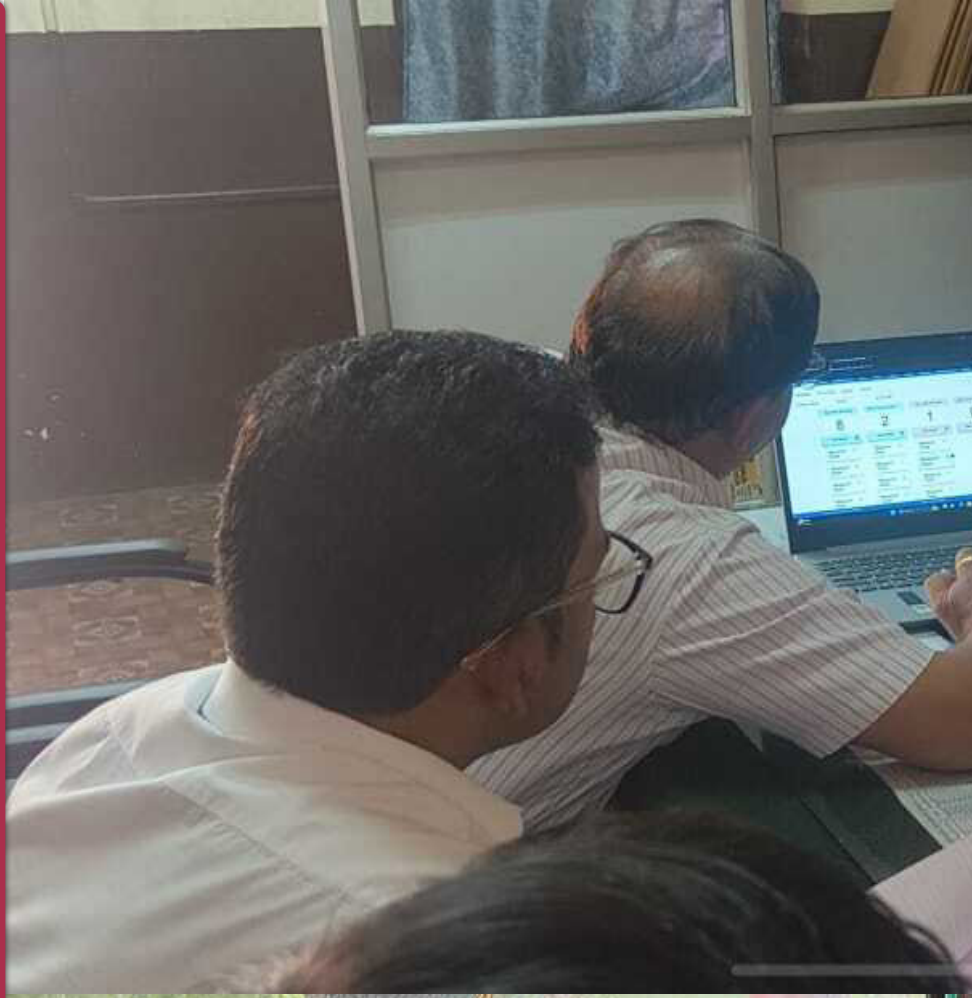
Salman Sindgikar, IT Manager, Belgavi

We are highly satisfied with the Cargo FL solution implemented for bus and staff scheduling. The startup is currently in discussions with the MD of the NWKRTC region to expand the solution to all NWKRTC cities. The solution has resulted in a cost reduction of approximately ₹12-13 lakhs per year. Overall efficiency has increased by 95%, and we have seen a significant reduction in the number of personnel required to manage the activities.

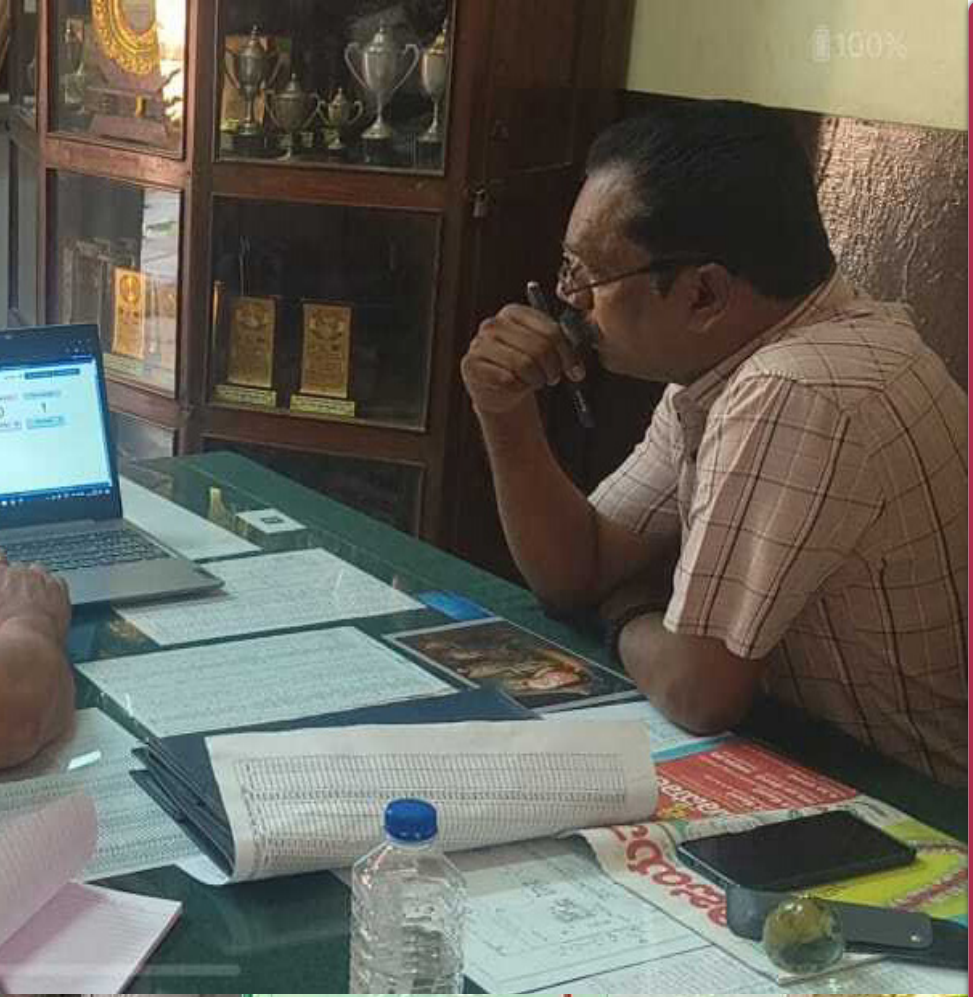


Abhijit Lokre
Partner,
The Urban Lab

The review of the T4A work has been interesting. It is good to see the synergy between data analysis and the need to get actionable outputs for decision makers. There is a great potential to mine data that can shorten analysis and help fast forward actions on ground.











Venka Reddy Ballela
Senior Manager,
Telangana State Road
Transport Corporation

Being a mentor in the Transport4All Challenge has been an inspiring journey. Watching the startups evolve their ideas into practical, scalable solutions was a testament to their dedication and innovation. This initiative has not only fostered groundbreaking solutions for urban mobility but also highlighted the importance of collaboration in addressing complex challenges. I am confident that the impact of their work will resonate far beyond this challenge, paving the way for a more accessible and inclusive transport system

Problem Statement

ROUTE RATIONALISATION

Current scenario

As cities grow, travel patterns become complex and keep changing. Traditional methods of collecting travel data through manual surveys are slow, inaccurate, and expensive. This often results in inefficient transport planning, causing low bus ridership in some areas and overcrowding in others. Consequently, public transport becomes less favorable, triggering a cycle of increased traffic congestion and pollution.

Need

Route rationalisation can help cities assess travel patterns, forecast demand, and optimise services by aligning routes and transit frequency with demand, thereby, maximising ridership efficiently and quickly.

Users

Transport authorities in charge of defining routes, timetables and fares

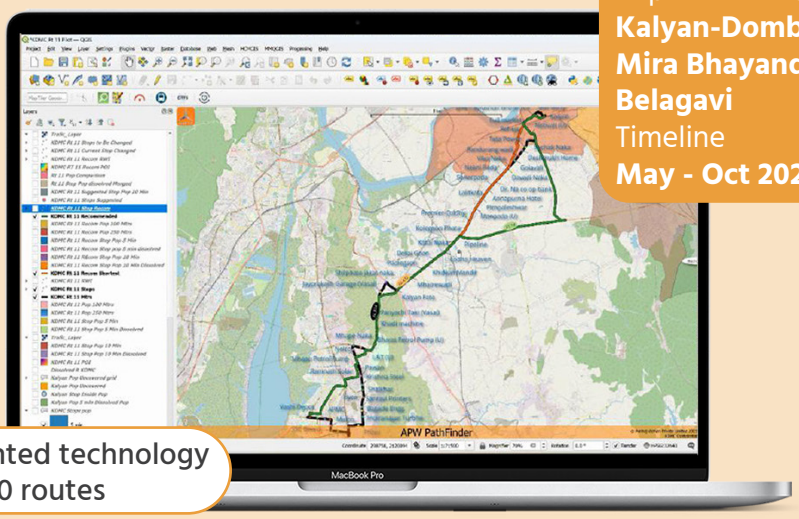
Municipal and development authorities responsible for strategic planning and sustainable development

Urban & transport planners, academicians, and researchers supporting cities in defining routes, timetables, and fares

Solution Pilot #6

ApnaWahan by Amiraj Wahan

Implementation cities
Kalyan-Dombivali, Mira Bhayandar & Belagavi
Timeline
May - Oct 2024



USP Proven and patented technology tested with >6500 routes

✔ **Implemented in more than 1 city (Shimla, Pune and Bhiwandi)**

✔ **Easily scalable for all cities with Google maps integration**

Features

- AI powered route creation and maintenance updates
- Route rationalisation based on city demographics
- Revenue improvement through digitally generated route optimisation
- Centrally administered console to track user travel patterns, and transport mode choice
- Easy integration with special features like e-ticketing, bus maintenance information, grievance redressal, advertisements, and sponsorships

Apnawahan is a digital platform for public transport. The solution captures satellite data including population density in neighbourhoods, and travel patterns of the city. This information along with data retrieved from ticketing and passenger feedback, can help transport agencies make better decision to optimise bus routes and identify bus stop locations.

The solution gives the transport authorities complete visibility into the location of the vehicle through GPS which can be subsequently used to provide real-time information to passengers. The solution can identify new routes, contributing to increase in revenue and enhance passenger convenience.

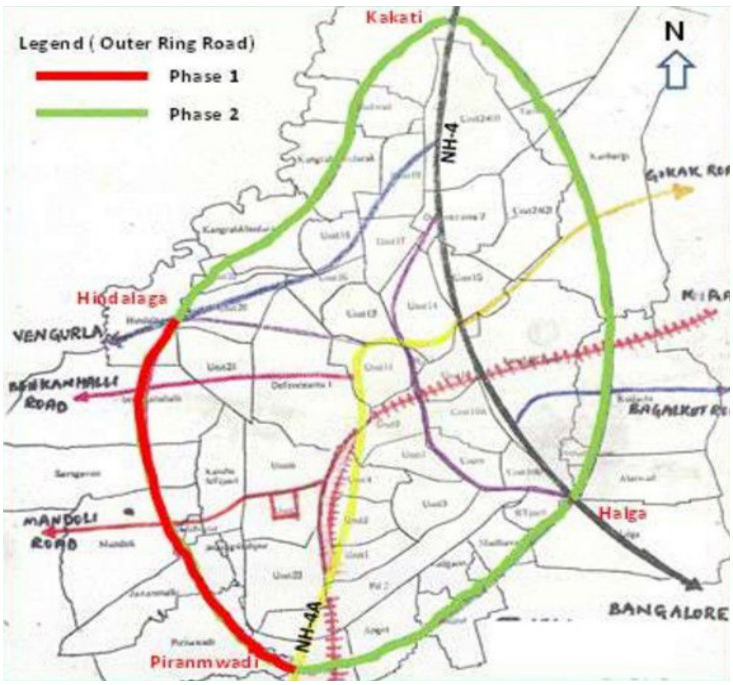
The product can integrate these routes into Google Maps, making them easily accessible to city residents and visitors. Additionally, the solution can support e-ticketing, auto and cab bookings, grievance redressal, lost and found services, vehicle maintenance (real-time health of buses). It also supports management of sponsorship and advertisements to generate additional revenue for cities.

Solution Pilot #6 In action

Before



Manual records used for route planning before digitization.



Hand-drawn map created to represent the planned routes.



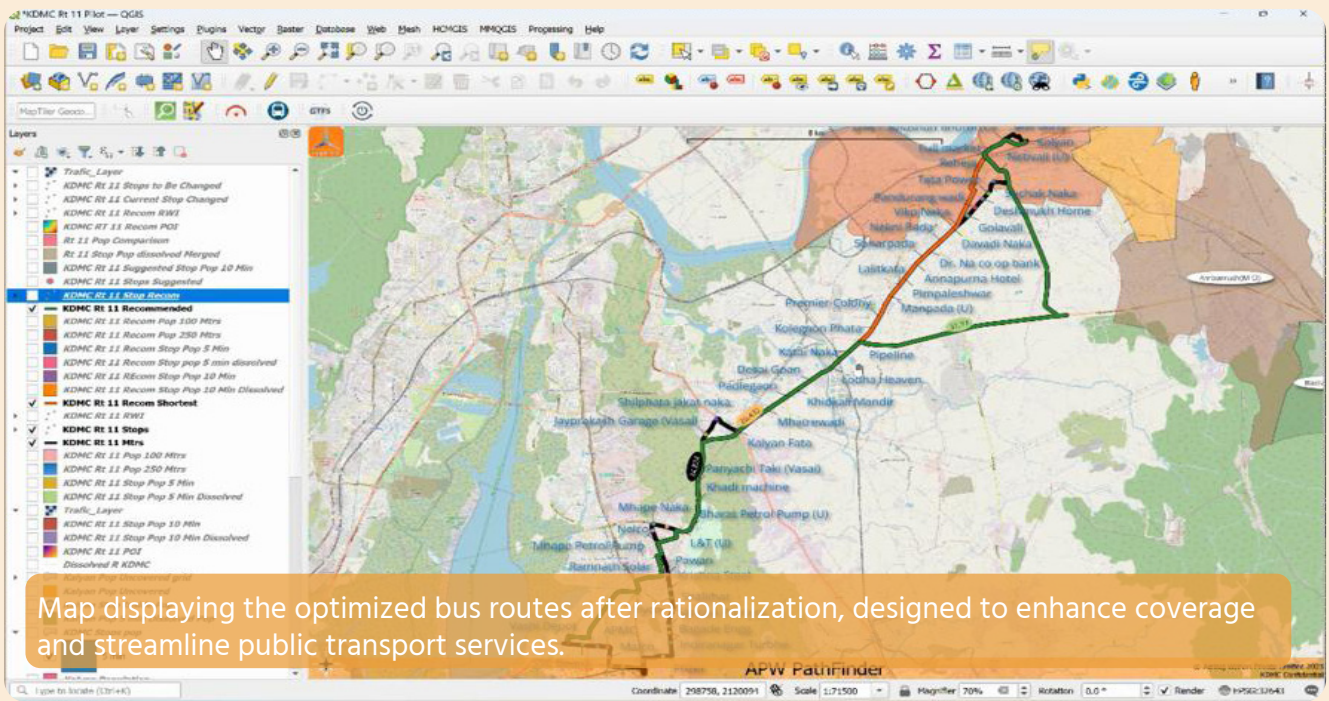


City staff conducting on-ground surveys to manually mark locations.

After



Real-time monitoring and performance dashboard in Mira Bhayandar



Map displaying the optimized bus routes after rationalization, designed to enhance coverage and streamline public transport services.



Training session conducted by the project team with city officials in Belagavi, Karnataka, to ensure smooth implementation

Solution Pilot #6

On-ground results

Kalyan Dombivali

84+
routes rationalised, increasing the population covered from 6.23 lakhs to 7.23 lakhs.

28%
increase in ridership estimated upon analysisng existing routes and changes in stops.

4-25%
revenue increase expected depending on city after route rationalisation software usage.

97%
Cost Reduction

The solution can help in a 97% reduction in cost due to the speed with which the software can do the analysis.

A task that took 4-member team 3 days to do would cost ₹27,000 can be done in 1/30th of the cost using the software

Accuracy

The solution showed an accuracy of 75% when tested over a network of 394km.

Network expansion

Apart from 49km of existing network, 20 new routes over 333km are proposed for under-served locations.

Efficiency improvement

98% efficiency improvement, completing feeder services for 7 train stations in just 3 hours compared to 12 days before with 90% more accuracy.

Data sources

The solution draws from **7 data sources** (static and dynamic population, demand, wealth index, ridership potential, landmarks, points of interest and Google data) as opposed to the earlier **2 sources** (transport and ticketing data).

Mira Bhayandar

28
routes assessed, 5 routes were rationalised.

40%
ridership increase estimated as a result of the analysis of existing routes and changes in stops.

The revenue is estimated to increase by **26%** depending on the city after route rationalisation using the software.

90%
Cost Reduction

The solution can help in a 90% reduction in cost due to the speed with which the software can do the analysis.

A task that took 4-member team 3 days to do would cost ₹27,000 can be done in 1/30th of the cost using the software

Accuracy

The solution showed an accuracy of 61% when tested over a network of 96km.

Network expansion

Expanding the uncovered areas of the network has the potential to impact 8.52 lakh people, compared to the current reach of 5.65 lakh.

Efficiency improvement

Changes to stop locations contributed to efficiency improvements ranging from 15% to 278%.

Data sources

The solution draws from **7 data sources** (static and dynamic population, demand, wealth index, ridership potential, landmarks, points of interest and Google data) as opposed to the earlier **2 sources** (transport and ticketing data).

Belagavi

58
routes assessed, 5 routes were rationalised.



62%
ridership increase estimated as a result of the analysis of existing routes and changes in stops.

The revenue is estimated to increase by
~39%
depending on the city after route rationalisation using the software.

90%
Cost Reduction

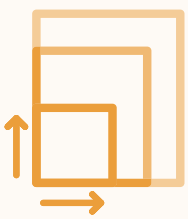
The solution can help in a 90% reduction in cost due to the speed with which the software can do the analysis.
(A task that took 4-member team 3 days to do would cost ₹27,000 can be done in 1/30th of the cost using the software).

Accuracy

The solution showed an accuracy of 82% when tested over a network of 121 km.



Network expansion



Expanding the uncovered areas of the network has the potential to impact 7.5 lakh people, compared to the current reach of 3.43 lakh.

Efficiency improvement

Changes to stop locations contributed to efficiency improvements ranging from 17% to 280%.



Data sources



The solution draws from **7 data sources**
(static and dynamic population, demand, wealth index, ridership potential, landmarks, points of interest and Google data)
as opposed to
the earlier **2 sources**
(transport and ticketing data).

Solution Pilot #6 What do the cities think?



Deepak Choudhary, Traffic Inspector, Kalyan Dombivli Municipal Transport

We worked closely with the startup, which conducted a detailed analysis and implemented a pilot project across 5 routes to improve ridership and accessibility for our citizens. Their route rationalisation software has been a great help, considering population density, demand, key locations, and socio-economic factors to create well-optimized routes. The system allows us to plan routes quickly, integrates real-time data from reliable sources, and ensures passengers can easily access updates through Google Maps without needing a separate app. With alternative routes proposed and detailed data available on apnawahan.live, their cooperative, data-driven approach has provided us with practical, scalable solutions.



Salman M S, Deputy General Manager - IT, Belagavi Smart City

We are quite satisfied with the results of the route rationalization implemented by Amiraj Wahan. A total of 5 routes were rationalized, leading to an increase in efficiency and coverage from 17% to 39%. We had a positive experience working with the start-up, as they successfully addressed the challenges we faced. We have even recommended this solution to other cities in our region.



Shashikant Sarade, ITS Manager, Mira Bhayandar Municipal Corporation

The startup successfully provided route rationalization for five routes and proposed two new routes. Based on their calculations and assessment, they analyzed approximately 180 km of the network, with 60% falling within the Mira Bhayandar Municipal Corporation boundary. Additionally, they provided a link to access detailed reports, enabling us to download the data and conduct our own analysis.

Problem Statement

BUS MAINTENANCE SCHEDULING

Current scenario

Transit fleets operate continuously, serving numerous passengers daily. Breakdowns or major maintenance issues cause significant passenger inconvenience. While automobile manufacturers allow predictive maintenance, transport authorities struggle to utilise this data for operational enhancements and improved passenger satisfaction.

Need

A digitalised bus maintenance scheduing can support the transport authorities monitor bus fleet health and manage maintenance through data analytics.

Users

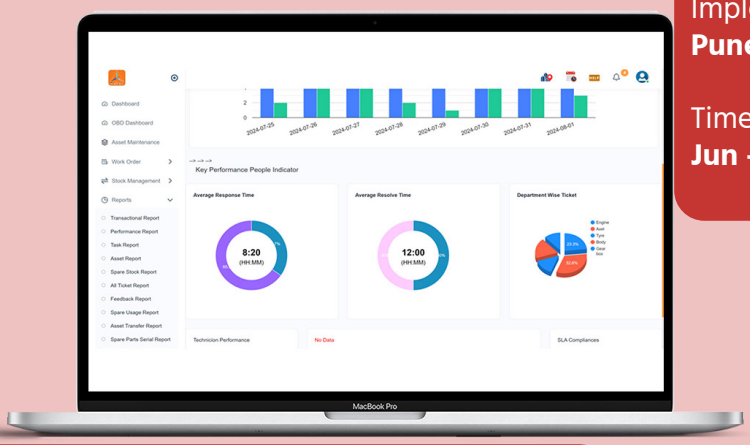
Transport authorities and fleet maintenance managers responsible for bus upkeep

Solution Pilot #7

ApnaWahan by Amiraj Wahan

Implementation city
Pune

Timeline
Jun - Oct 2024



USP Proven and patented technology integrates vehicle maintenance with depot management

✔ **Implemented in more than 1 city (Cochabamba and Kenya)**

✔ **Easily scalable for other cities with Google maps integration**

Features

- Real-time bus health information
- Comprehensive bus financial data including tickets and challans
- AI-based bus servicing and direct integration with Original Equipment Manufacturers(OEMs)
- Integration with the back end bus scheduling and ticketing systems
- Modules for spares, warehouse inventory, resources, staff, vendors, and suppliers

Apnawahan is a digital platform for public transport designed to provide a digital dashboard that captures both health and financial statistics for buses. The platform consists of three segments, which work together to deliver a comprehensive solution. The first segment is data capture, which maintains various logs related to buses, relevant staff like mechanics and technicians and for spare parts and consumables.

The second segment facilitates real time data capture through CAN/OBD units, and onsite staff such as drivers, through a connected approval process. The third segment establishes connections among various assets, resources, depots, spares, and workshops, using smartink technology for super-fast service and issue resolution. The finance dashboard clearly displays data related to base unavailability and revenue loss.

The maintenance platform is further integrated with other systems, including a database of ticketing and scheduling for buses, providing direct alerts in case of bus unavailability.

Solution Pilot #7 In action

Before

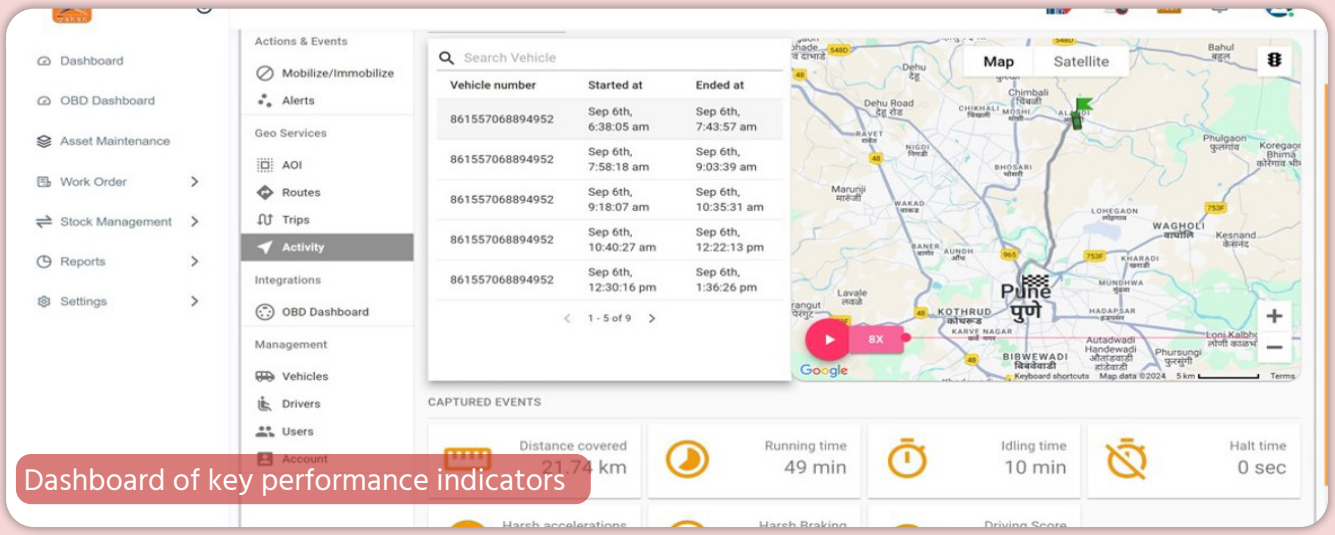


A bus severely damaged due to lack of timely maintenance, highlighting the need for an effective maintenance scheduling system.

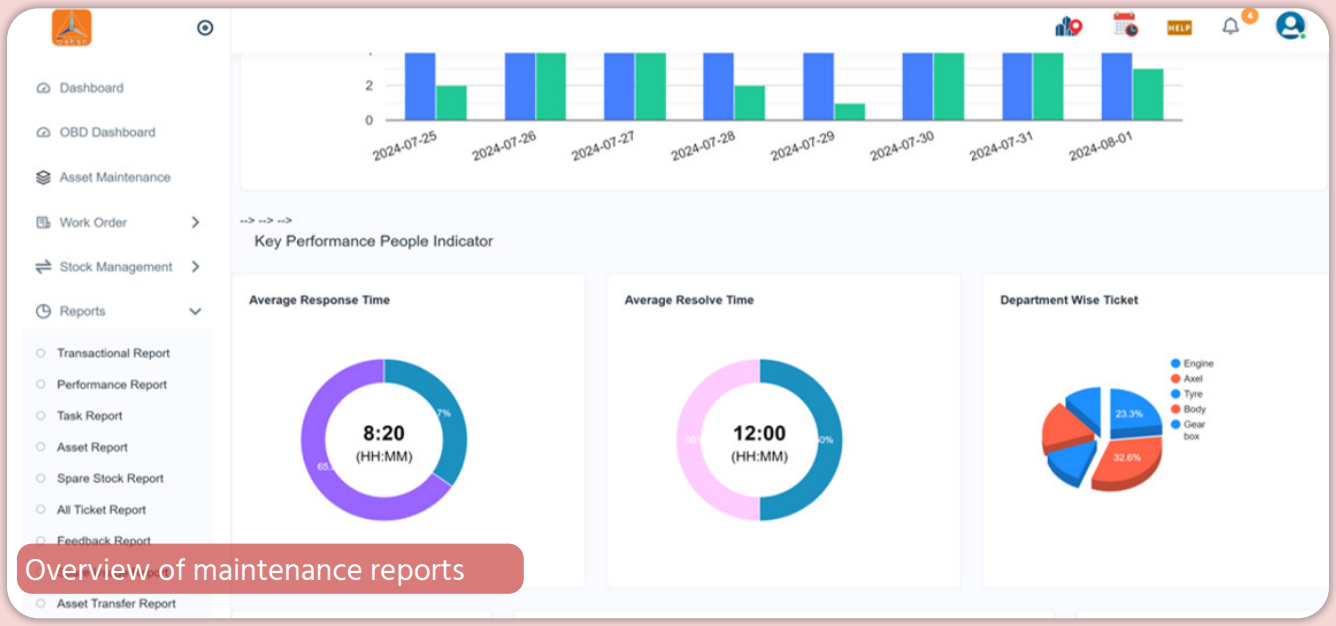


Bus staff and citizens manually pushing a stalled bus, emphasizing the challenges faced due to inadequate maintenance

After

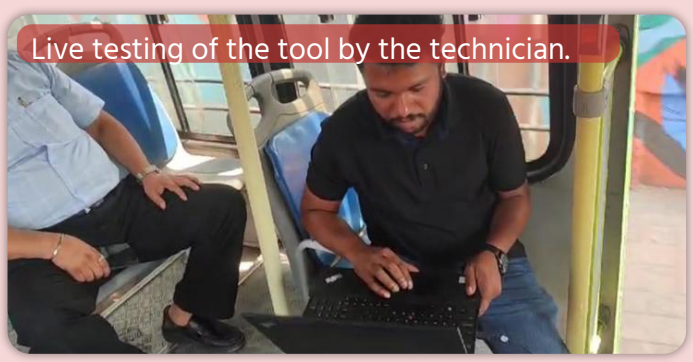


Dashboard of key performance indicators



Overview of maintenance reports


Implementation of the tool at the bus fleet in PMPML, Maharashtra.


Live testing of the tool by the technician.

Solution Pilot #7

On-ground results

50%
reduction in repair average turn around time.

3 hours
1.5 hours



93%
fleet availability achieved as opposed to 80% before.

16%
Cost Reduction

Annual cost	₹12,50,000
Cost of spares	₹37,50,000
Downtime costs	₹85,000

Overview of Resources

For the testing phase, 5 buses were allocated at 1 depot to conduct the trial. 12 staff members were involved in the process. They provided 1200 bus spare parts which were used to evaluate the effectiveness of the solution.

Real-time customisable dashboards with

15 reports for vehicle maintenance, 7 for driver performance and 5 for depot management.

Real-time health monitoring

Alerts are shared every 30 seconds over SMS and email to technicians and the depot managers on bus health.

Transition to real-time monitoring

The real-time monitoring system that was introduced ensures continuous monitoring of eight significant parameters.

User satisfaction

Users have indicated a high level of satisfaction.

False alerts

After implementation false alerts were completely eliminated as opposed to 60% alerts being false before.

Breakdown alerts

16 breakdowns were proactively detected by the system.

Optimising bus inventory management

After optimising inventory, the spare part inventory was reduced by 15%.

Predictive failures

Predictive failures will be altered across 18 categories based on a specific threshold, and no failures were alerted in the pilot.

Solution Pilot #1 What does the city think?



Gaurav Kulkarni, IT Consultant for PMPML, Manager, KPMG

We truly appreciate the work they've done so far in setting up OBD devices for health monitoring, with one installed in each bus. The current dashboard is helpful, but having an exclusive dashboard designed specifically for our city would make it much more practical and user-friendly. We suggest refining the alert system to better align with the scope and ensure alerts are sent directly to our team. Since this is still in the early stages, thorough testing would help address any issues. Expanding the devices to more buses would also make the solution even more effective for our needs.



Solution Pilot #8

QEDSense by QED Analyticals



Implementation city
Raipur

Timeline
Sep - Oct 2024

USP Easily sacalable for any city through intuitive, predictive and robust models

✔ **Implemented in more than 1 city (Delhi and Kalaburagi)**

Features

- Reduction in maintenance costs
- Preventive breakdowns and incresed uptime for buses
- Reduction in fuel consumption
- Enhanced safety and optimised inventory
- Asset lifetime increment

The startup was unable to complete the pilot within the Challenge timelines, and therefore, the impacts have not been demonstrated further.

QEDSense is a predictive maintenance solution that employs IoT sensors and AI models to optimise vehicle maintenance. Additionally, the solution incorporates inventory management to streamline maintenance operations.

This analytical module predicts the optimal maintenance timing and type for the vehicle. It also forecasts the ideal inventory level that should be maintained at each depot, according to maintenance needs.

The approach involves installing non-invasive sensors on the vehicle's critical components. Data from these sensors, along with the vehicle's Electronic Control Unit (ECU), is transmitted to a cloud-based server via a telematics device installed in the vehicle. Analytical models, which reside on the cloud, also receive historical maintenance data for the bus and input from driver feedback. Driver behavior is analysed, and a score is assigned to each driver, accompanied by a live leaderboard displaying these scores. These results are shown on a central server and an in-bus display in each vehicle.

Problem Statement

TRANSIT PERFORMANCE MONITORING

Current scenario

City transport operations are complex, with many challenges in monitoring and optimising supply to meet passenger demand. Despite the wealth of data from GPS vehicle tracking and ticketing machines, transport authorities struggle to use this information for tangible improvements and to enhance passenger satisfaction.

Need

Transit Performance Monitoring is needed to evaluate the actual performance in terms of Key Performance Indicators (KPIs) and (Service Level Benchmarking) SLBs of the system to enhance and optimise services by assessing daily operations. This evaluation helps in route refinement and fine tuning the timetable.

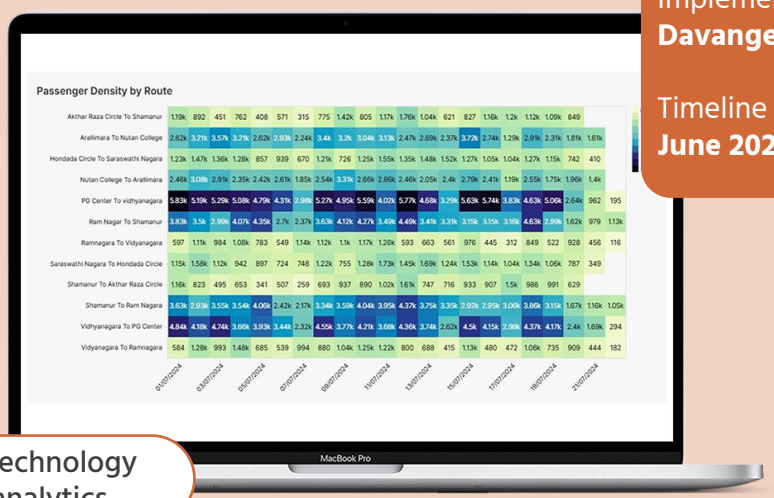
Users

Transport authorities in charge of operating public transport service

Solution Pilot #9 Iksha by Vrishchik Technologies

Implementation city
Davangere

Timeline
June 2024



USP Cutting edge technology with intuitive analytics

✔ **Easily scalable for every city**

Features

- Developing engaging and reader-friendly reports
- Fully digitised operations
- Real-time alerts for the fleet through AI-based technology
- AI-based route generation
- User-friendly interface with efficient navigation on both PCs and smartphones, allowing quick completion of tasks

Iksha is a comprehensive Enterprise Resource Planning (ERP) solution offered by Vrishchik Technologies. It is tailored to cater to a diverse range of logistics and transportation operators, including State Transport Undertakings (STUs). The solution serves as a strategic tool for extracting valuable insights into fleet performance.

The AI-driven solution comes loaded with an array of features aimed at digitalising and optimising the entire operational ecosystem. These features include vehicle management, driver oversight, driver attendance tracking, bus timetables and schedules, automated generation of routes and timetables, automatic creation of geofences, and automated generation of scheduled reports.

The solution also provides a wide range of essential KPIs that are crucial for any transport authority or STU to make decisions based on data, thus improving operational efficiency and service delivery.

Solution Pilot #9 In action

Before

TARR0340 KSRTC Date : 12/11/2024 07:31

DAVANAGERE - DAVANAGERE2

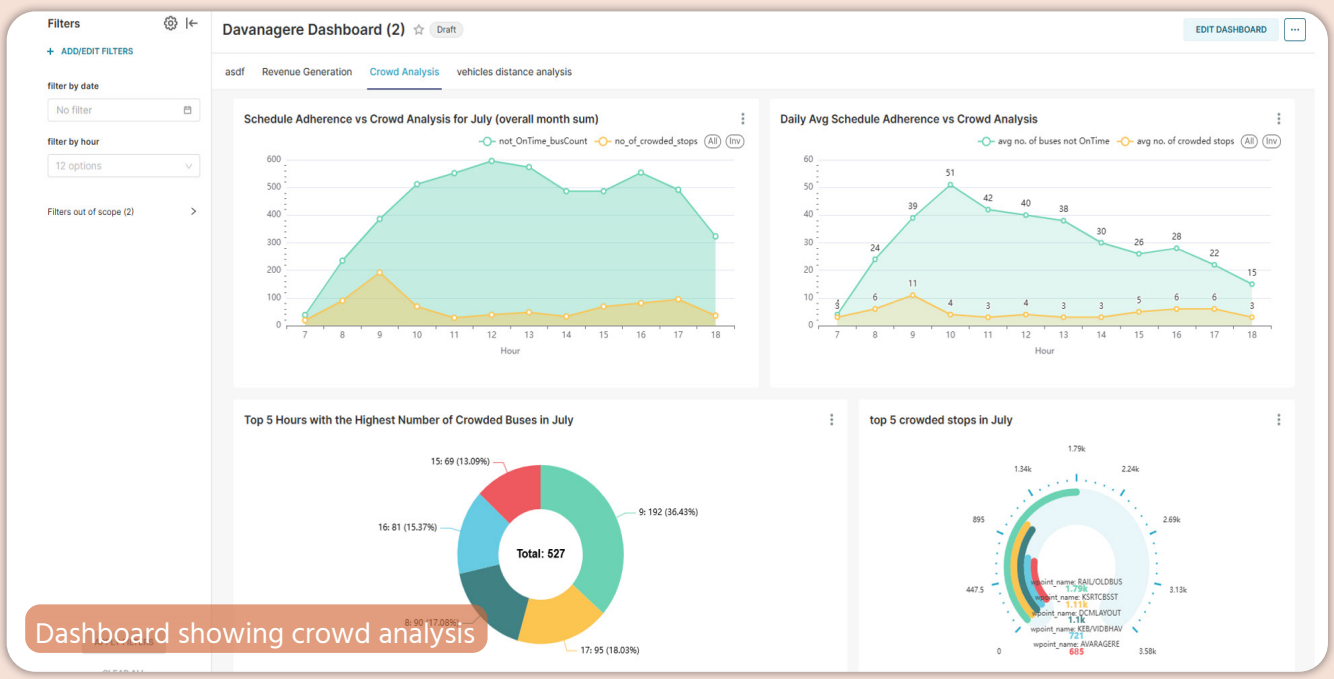
ETM Stagewise Report Page No: 1 of 134

Schedule No : 105/10 Period : 01/10/2024 to 31/10/2024

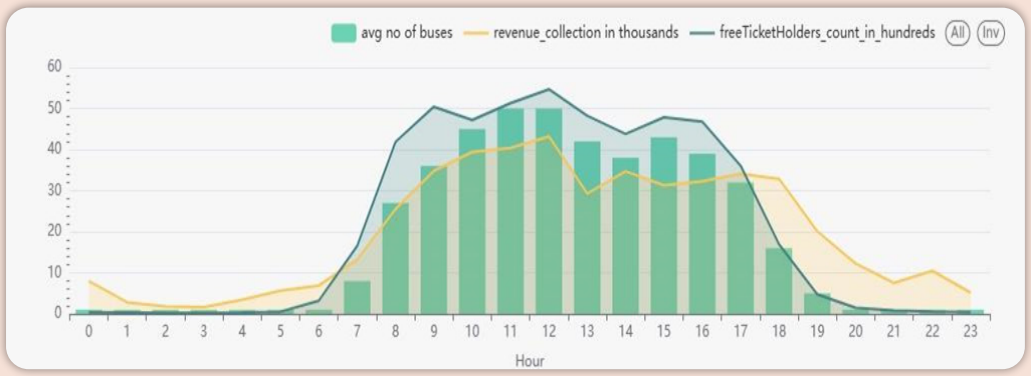
Date	Trip No	Start Place	End Place	Service Type	Stage	Place Name	Psngrs Boarded	Psngrs Alighted
01/10/2024	1	RAMNAGA/SOG	SSM NAGAR	CITY	011	VIMAN/JILLA	0	0
					005	VINOB NAGAR	13	5
					009	ITI/DRR	0	0
					013	BASAV/BUDDA	0	0
					014	RAM GOVT SC	0	0
					008	VIDYA/BAPUJ	3	0
					002	AKTAR RAJA	1	8
					010	VANI RICE M	2	0
					004	COURT	0	0
					003	RTO	1	2
					007	KEB/AVK	0	0
					001	SSM NAGAR	0	5
					012	INDUSTRIAL	0	0
					006	RLY/CORP	0	0
	2	AKTHARRAJCI	SHAMANOORU	CITY	003	CGHOSPITAL	33	21
					009	AKTHARRAJCI	111	0
					001	SHAMANOORU	0	65
					005	RAIL STATIO	11	54
					007	CORT	7	4
					002	LAKSHMIFLOO	3	15
					006	VINOBNAGR	0	0
					008	RTO OFFICE	0	4
					004	VIDRTBHAVN	15	17
	3	SHAMANOORU	AKTHARRAJCI	CITY	008	RTO OFFICE	20	2

Day-wise ticket breakdown by route

After

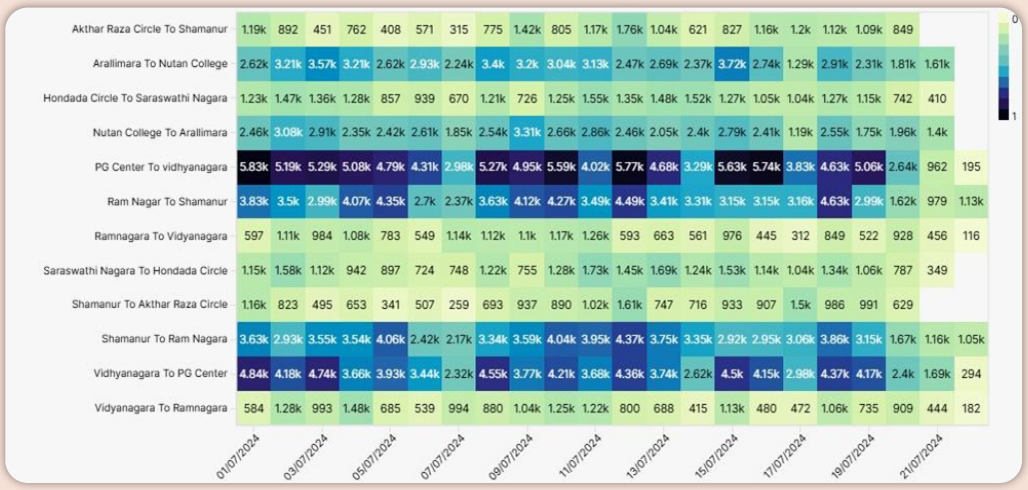


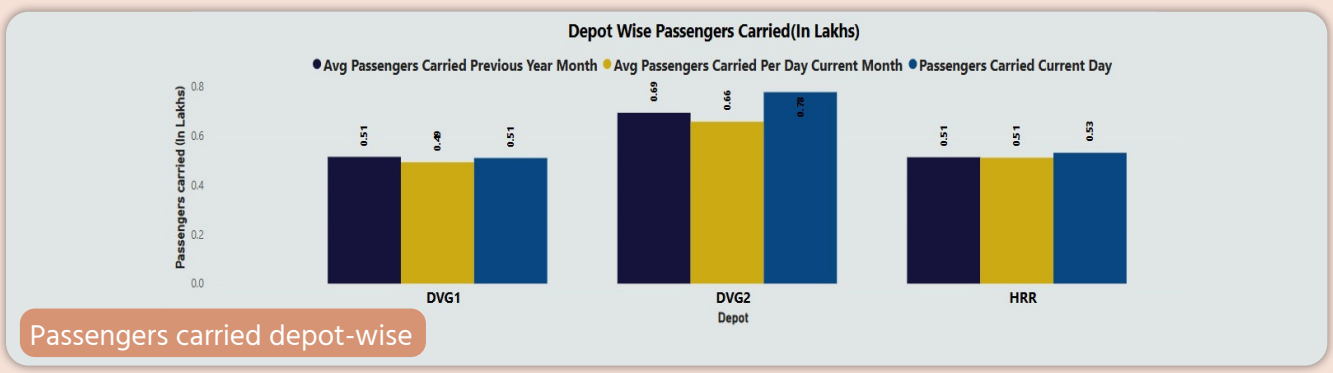
Dashboard showing crowd analysis



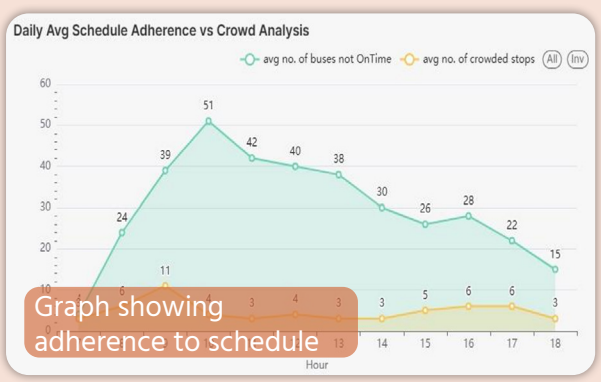
Route efficiency through revenue collection and utilisation of buses

Density of passengers carried in each route everyday

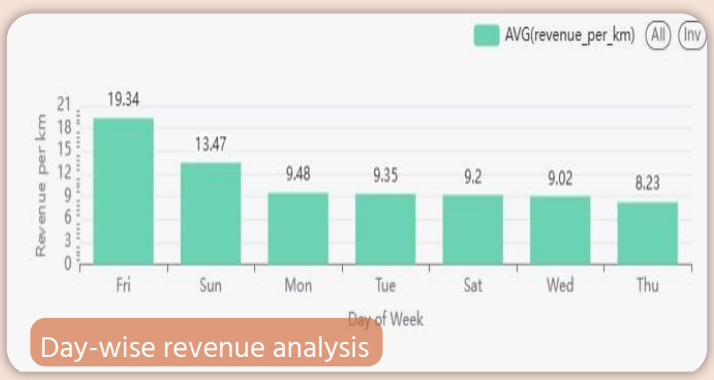




Passengers carried depot-wise



Graph showing adherence to schedule



Day-wise revenue analysis

Solution Pilot #9 On-ground results

The system has an accuracy of over

95%

in comparison with on-ground checks

Integration Time

The solution requires just 2 weeks to be integrated with the existing system.

Fuel-based analytics

Including fuel spent versus wasted, insights drilled down to specific routes or aggregated at the vehicle or depot level.

Revenue tracking

The solution provides separate reports for tracking revenue per route. Previously, they did not have a report to verify whether the revenue aligned with utilization.

Identifying performance

Identified exact additional buses needed for specific routes and timeframes based on passenger demand, e.g., 1 extra bus on route 101U/UP from 3 PM to 4 PM every Friday.

Ease-of-use

The tool is easy to use, and the ICCC staff and managers could use it without help.

Report generation

The tool can provide 4 dashboards, generate 30 reports and is highly customisable showing different levels of data like executive-level views or specific details.

Solution Pilot What does the city think?



Mamatha Gopagondanahalli, Deputy General Manager - IT, Davanagere Smart City Limited

We've seen a significant positive impact since implementing the startup's solution. They conducted a detailed analysis of fuel consumption, helping us understand fuel usage patterns better, and developed a dashboard to present this data clearly. On top of that, they provided separate reports to track revenue for each route, which has been extremely helpful in optimizing our operations. The solution also enabled us to identify peak hours, analyse bus frequencies on different routes, and determine how many additional buses are needed to meet passenger demand. Overall, the startup has made a meaningful difference by addressing some of our key challenges.





Vijay Kovvali
Research Professor,
Centre for infrastructure sustainable transportation and urban planning, IISc

Let me begin by congratulating ITDP for the vision to launch the Transport4All Challenge, a thoughtfully designed initiative to enhance public transport in India. Mentoring Vrishchik Technologies in developing the "Transit Performance Monitoring Tool" for bus agencies was a truly rewarding experience. It was inspiring to witness a young, dynamic team driven by a passion for improving mobility across the country. I am proud to have been part of their journey and look forward to seeing successful implementations of their platform in multiple cities.

Problem Statement

GRIEVANCE REDRESSAL

Current scenario

Most cities and transport authorities lack a streamlined system for collecting user feedback and managing grievances, making it challenging for passengers to share their concerns and suggestions for improving services.

Need

There is a need to develop a mobile/web portal for registering and managing passenger complaints and feedback. This will foster transparency, accountability, and continuous improvement in the service. Such a system would not only empower commuters to actively participate in shaping the quality of public transport service, but also enable transport authorities to identify and address issues proactively, ultimately enhancing the overall passenger experience.

Users

Transport authorities
in charge of operating public transport service

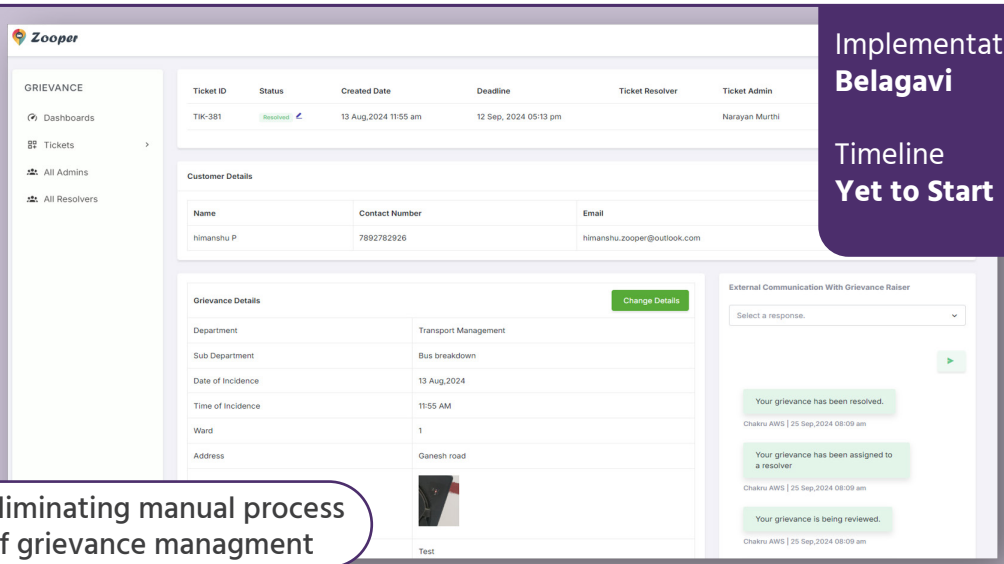
Public transport users
who can share feedback and concerns

Solution Pilot #10

Zooper by Zooper Technologies

Implementation city
Belagavi

Timeline
Yet to Start



USP Eliminating manual process of grievance managment

✔ **Easily scalable for other cities**

Features

Monitor and identify the locations, vehicle types and time periods where most complaints arise, to prioritise corrective measures

Escalation of unresolved questions to 3 levels using an auto-escalation matrix

A unique ticket ID generation and tracking feature for users to ensure timely and satisfactory updates

Provision for last-minute updates enhancing service awareness

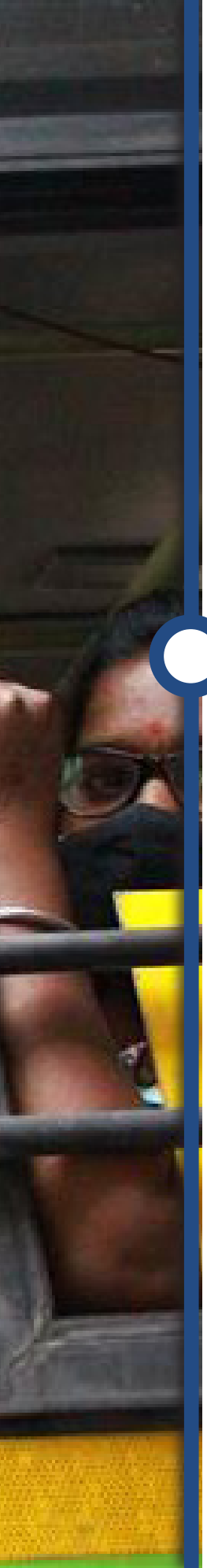
The startup was unable to complete the pilot within the Challenge timelines, and therefore, the impacts have not been demonstrated further.

Zooper's grievance redressal platform comprises two main components. The first is the user mobile application, designed to cater to a diverse base of users from different age groups and occupations. The second is the grievance management portal that is used to view and act on user feedback.

The solution enables the easy lodging of grievances in a few simple steps. It features a chatbot at the first stage to address and resolve most queries instantly, and redirects further queries to a call centre or assists in creating a ticket within the system.

Both internal communication within the department and external communication with the complainants are handled through a single platform. Additionally, the solution will incorporate an app for the on-ground team in the future, enabling the transport authority to update the ticket status and upload evidence, thereby keeping communication swift and streamlined. An AI-powered auto chat system will address common questions directly.


MADAAN



Chapter 5

City-Level Scale Up

Introduction

Urban mobility is the backbone of modern cities, enabling economic growth, social inclusion, and environmental sustainability. This publication has journeyed through the conceptualization of the Transport4All Challenge, delving into the critical analysis of India's public transport needs, and detailing the development and on-ground implementation of innovative solutions that address complex urban challenges. These efforts culminate in the critical next step—scaling these solutions to the city level, thereby amplifying their impact and transforming urban mobility systems across the nation. The scaling of solutions represents the transition from pilot projects to city-wide scaling, an integrated approach that embeds innovation into the core of urban systems. Scaling these innovative solutions requires not only technological innovation but also institutional frameworks and procurement methodologies that align with the evolving needs of cities.

Innovative solutions tested through pilot projects have demonstrated their ability to enhance efficiency, improve user experience, and drive operational cost savings. However, city-level implementation calls for robust frameworks that ensure these solutions integrate seamlessly into existing ecosystems while being adaptable to future challenges.

Expanding Solutions Across Cities

Cities are moving beyond pilot projects to implement innovative mobility solutions across their entire areas. This step is key to building better, more inclusive public transport systems.

Belagavi is planning to implement Amiraj Wahan for Route Rationalisation and Cargo FL for Bus and Staff Scheduling citywide. The city has reached out to the Managing Director of NWKRTC and is working on expanding these solutions throughout the NWKRTC region, aiming to improve transport in the region.

The network digitised by anamar technologies in pune, has enabled the integration of various functionalities, such as live tracking, ticketing, and network information, into a passenger information app. Without the initial digitization of the routes, this app would not have been possible. This success story, particularly evident in Pune, highlights how network digitization not only solves the immediate problem but also paves the way for broader digital transformation and enhanced user-centric solutions within the city's transportation system.

Pune has already implemented a citywide solution from Anamar Technologies to address multimodal information and ticketing issues. The city has also signed a Memorandum of Understanding (MoU) with the startup to ensure continued support and expansion of the solution for its residents. These examples show how cities are committed to scaling up effective solutions to solve transport challenges and improve mobility for everyone. By taking these steps, cities are creating stronger, more reliable public transport systems that can adapt to future needs.

Building on the Pilots

The experience of the Transport4All Challenge demonstrates how targeted innovation can support cities in addressing persistent public transport challenges. The lessons generated through these pilots can assist other cities and transport authorities in identifying context-appropriate approaches for improving their systems.

Enabling Cities to Build on Tested Approaches

The Transport4All Challenge has established a foundation for cities to move from experimentation to wider implementation. The solutions tested through the Challenge address recurring public transport challenges faced by cities across India, including access to passenger information, digital ticketing, transit-network digitisation, route rationalisation, depot operations, fleet maintenance and performance monitoring.

The pilot results and implementation experiences documented in this publication provide cities and transport authorities with a practical evidence base. Cities facing similar challenges are encouraged to examine these solutions, assess their relevance to the local context and consider their adoption at an appropriate scale.

Pathways for Adoption

Cities may build upon the Transport4All pilots by:

- Identifying solutions featured in the Transport4All Challenge publication that can address local city challenges.
- Engaging relevant departments and transport agencies to assess institutional and technical requirements.
- Adapting the solution to the city's network, operating conditions and passenger needs
- Planning for integration with existing systems, data sources and operational processes
- Establishing arrangements for staff capacity, long-term operation and maintenance
- Taking forward suitable solutions from the Transport4All Challenge publication through the procedures applicable to the concerned authority.

Adoption need not involve replicating a pilot in its original form. Cities may draw upon the tested approach, functionality and implementation experience to develop a solution that responds to their own requirements. Where appropriate, implementation may be undertaken in phases, beginning with priority routes, depots or service areas before extending across the wider network.

By taking forward solutions that have demonstrated relevance under real operating conditions, cities can extend the impact of the Transport4All Challenge and accelerate improvements in public transport operations and passenger experience.

Scaling up solutions marks a significant step toward realizing the broader goals of the Transport4All Challenge: creating efficient, reliable, and inclusive public transport systems that prioritize citizens' needs. This phase consolidates the lessons learned, refining and expanding solutions to benefit entire cities. By fostering collaboration and aligning resources, cities can achieve lasting transformations that enhance the quality of life for all.

As cities implement these solutions, they not only resolve present challenges but also build resilient, future-ready systems. This collective effort sets a benchmark for innovation in urban mobility, embodying the spirit of collaboration and progress that defines the Transport4All Challenge. With every scaled solution, we take a step closer to cities that are not just smart in technology but also in their ability to serve the diverse needs of their people.


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