# MASS TRANSIT

**HITACHI**
Inspire the Next

# Inspiring the Next Transportation Revolution

## Smart Transit Trends and Analysis
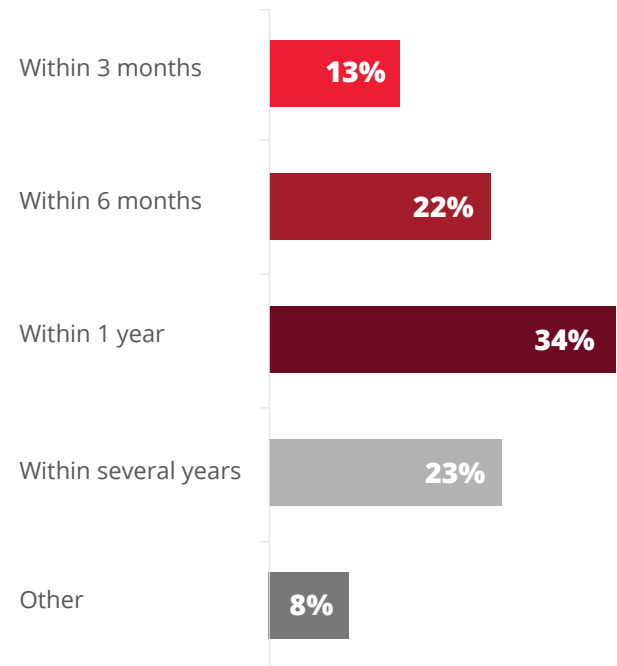
# Intro

The public transportation industry is undergoing a revolution unlike any it has ever experienced. Providers and passengers alike are facing significant changes as new challenges arise, like ensuring health and safety as we continue to battle widespread service disruptions (such as those caused by the COVID-19 pandemic), rapidly changing consumer expectations for service, swiftly evolving technological advances, as well as a societal (and even political) shift toward sustainable travel.

Passengers are returning to public transportation, with as many as 69% of transit agencies expecting to be at or above pre-pandemic levels of ridership within less than 12 months or sooner. We are all adapting to the "new normal," and passengers are expecting safe, secure, sustainable, and efficient transit options that meet or exceed their needs.

Question: If you are not currently operating at 100% pre-pandemic capacity levels, when do you anticipate returning to maximum passenger capacity?

| | |
|---|---|
| Within 3 months | 13% |
| Within 6 months | 22% |
| Within 1 year | 34% |
| Within several years | 23% |
| Other | 8% |

## Across the industry, the most significant new challenges include:

- Passenger expectations for health and safety are higher because of the COVID-19 pandemic. In fact, 70% of respondents to a transit industry poll conducted in the summer and fall of 2021 as a collaborative effort between Hitachi Vantara and Mass Transit Magazine stated that "maximizing health and safety" are either extremely or very important objectives when considering smart technology implementations.

- Rising costs, inflation, labor shortages, and supply-chain issues continue to negatively affect timely and convenient delivery of transportation services.

- Expectations for the industry to adopt green technologies to reduce carbon footprint are a high priority for a variety of stakeholders, including public transportation users themselves.

- Telecommuting and alternative forms of transportation continue to offer attractive options for commuters and other travelers, including shared-ride services such as Uber and Lyft, other private operators, and car sharing.
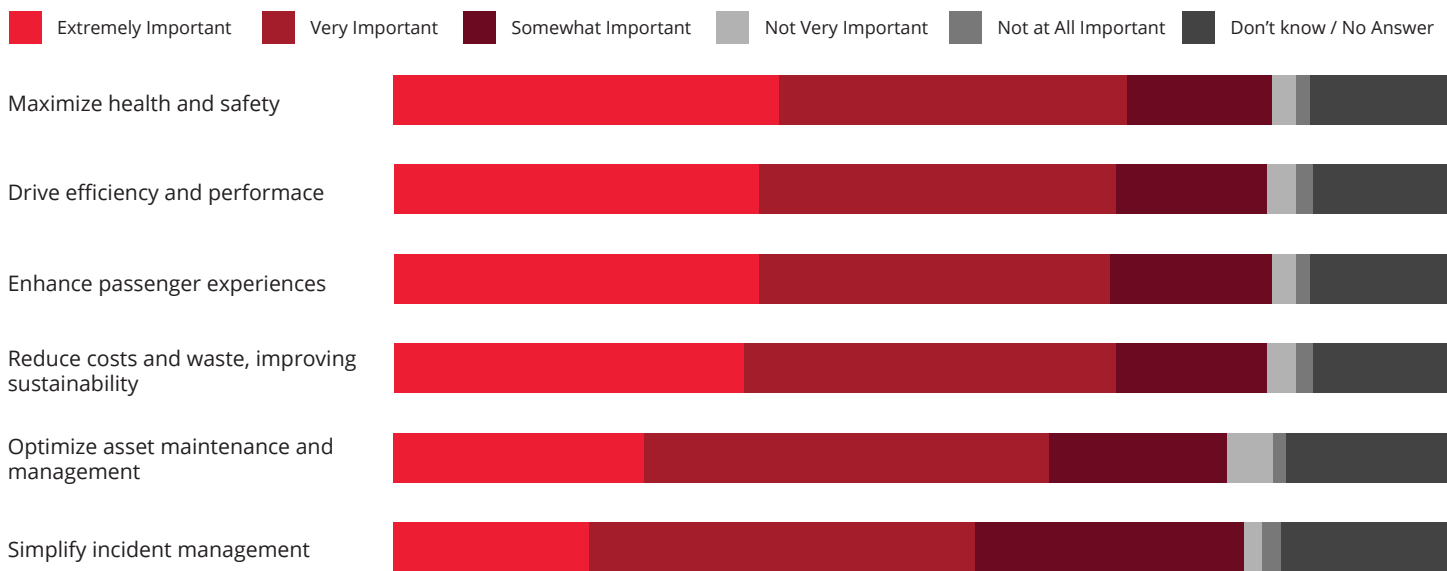
Federal programs and funding are becoming available to help overcome these challenges, and there are opportunities to invest in the reformation of the industry. As one might imagine, these opportunities are rooted deeply in information and technology, and specifically in how mobility providers leverage both to provide passengers with a travel experience that is as smooth and frictionless as possible for their entire journey.

# Smart Transit Solutions Facilitate
## Frictionless Travel

According to the recent transit industry poll mentioned above, more than two-thirds of transit agencies consider smart transit technologies extremely or very important to achieving the following objectives:

- Maximizing health and safety
- Driving efficiency and performance
- Enhancing their passenger experience
- Reducing costs and waste to support sustainability

Question: How important are the following objectives driving your transformation to using "smart transit" technologies?

**Legend:** Extremely Important | Very Important | Somewhat Important | Not Very Important | Not at All Important | Don't know / No Answer

Maximize health and safety

Drive efficiency and performace

Enhance passenger experiences

Reduce costs and waste, improving sustainability

Optimize asset maintenance and management

Simplify incident management

From an internal organizational perspective, more than half of all survey respondents also consider smart technologies critical to optimizing asset management and simplifying incident management.

Providing an optimal, secure, and enhanced passenger experience — one that is also efficient and cost-effective — can ensure long-term success for transit authorities. The data, when properly utilized, can address passenger and operational concerns, while creating a memorable experience for customers seeking additional value beyond simply moving from destination to destination.

Digital solutions can unlock the value of data, which transit authorities and municipalities can collect from their vehicles,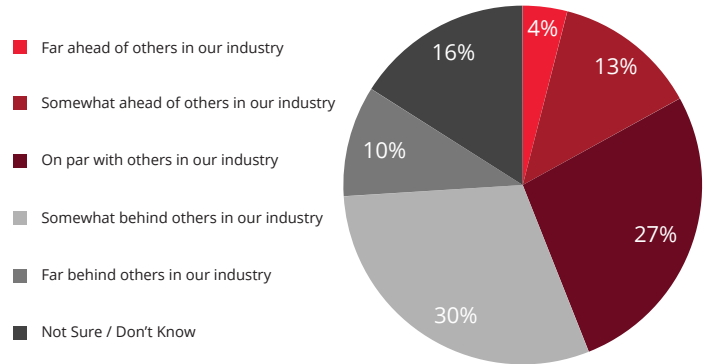 operations, and passengers. The effective use of advanced analytics can ensure efficient, multi-modal transportation, allowing passengers various options to get to their destination, even informing them of their environmental impacts and cost savings, resulting in truly frictionless passenger travel. For example, digital solutions can allow riders to build multimodal trips that get them from origin, to destination, and back to origin with the fewest possible transactions or interactions.

Analytics can also be used to enhance the transit experience by creating new forms of communication, payment, and community engagement. These insights, technologies, and capabilities can be used to address capacity, distancing, and cleanliness concerns from passengers, allowing for real-time feedback of conditions on vehicles.

# The Status of Smart Transit Technology Implementation

In the recent industry poll, a majority of transit agencies (57%) reported implementing contactless or automated fare payment technologies to reduce touchpoints in the public transportation journey and 70 % of agencies plan to implement or enhance their fare payment technology within the next five years. According to the same poll, four out of 10 agencies have also implemented free onboard Wi-Fi technologies, and 34% have already implemented dynamic scheduling based on real-time and predicted demand for service.
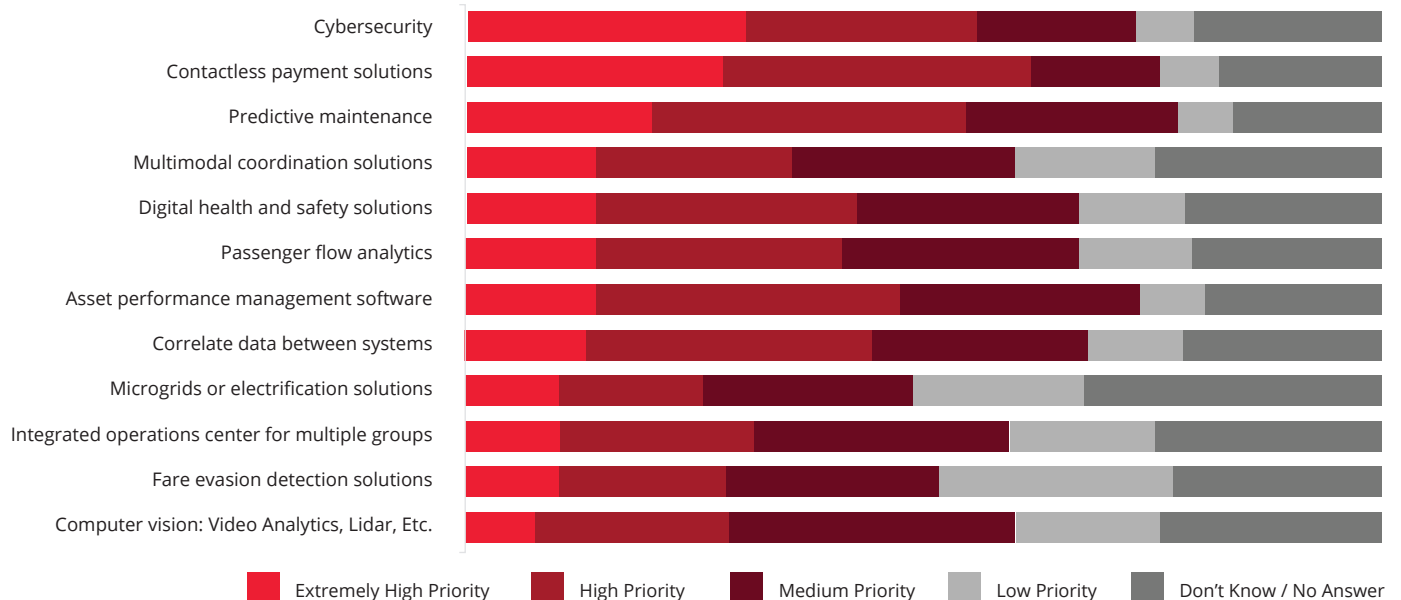
Question: How would you describe your agency or organization's adoption of smart transit technologies compared to others in your industry?

- Far ahead of others in our industry
- Somewhat ahead of others in our industry
- On par with others in our industry
- Somewhat behind others in our industry
- Far behind others in our industry
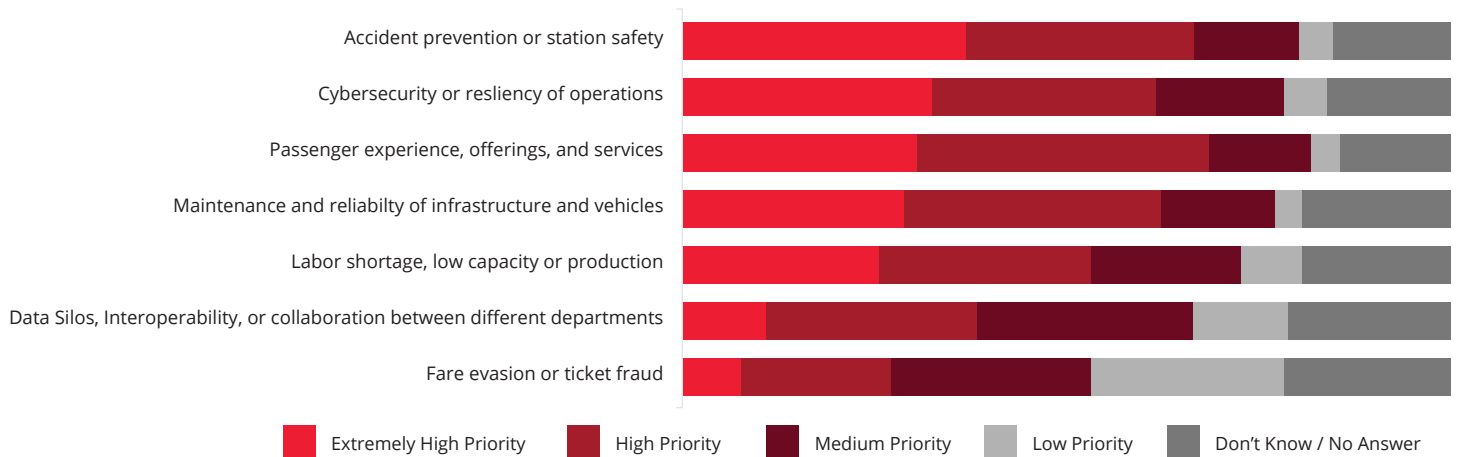- Not Sure / Don't Know

4% / 13% / 27% / 30% / 10% / 16%

Even with some of the implementations that have been made, the industry experts continue to believe that it is largely behind the curve when compared to their peers in transit. Only 4% of respondents participating in the survey felt that their agency or organization's adoption of "smart transit" technologies was "far ahead of others" and 13% described their agencies adoption as "somewhat ahead of others." A combined 40% thought they were "somewhat or far behind" their industry peers, and another 16% simply don't know or are not certain how they compare.

Despite this perceived lag in technology adoption, the industry's overall priorities for smart transit technologies include automated fare payment (62% consider it an "extremely high" or "high" priority), along with cyber security (57%), and predictive maintenance (54%). These three technologies represent an industry blending of customer experience, safety and security, and internal asset management.

Question: How would you prioritize the following "smart transit" technologies for your agency or organization?

- Cybersecurity
- Contactless payment solutions
- Predictive maintenance
- Multimodal coordination solutions
- Digital health and safety solutions
- Passenger flow analytics
- Asset performance management software
- Correlate data between systems
- Microgrids or electrification solutions
- Integrated operations center for multiple groups
- Fare evasion detection solutions
- Computer vision: Video Analytics, Lidar, Etc.

Extremely High Priority | High Priority | Medium Priority | Low Priority | Don't Know / No Answer

Question: How high of a priority are the following areas when it comes to digitizing in order to improve your transit system?



| | Extremely High Priority | High Priority | Medium Priority | Low Priority | Don't Know / No Answer |
|---|---|---|---|---|---|

Accident prevention or station safety

Cybersecurity or resliency of operations

Passenger experience, offerings, and services

Maintenance and reliabilty of infrastructure and vehicles

Labor shortage, low capacity or production

Data Silos, Interoperability, or collaboration between different departments

Fare evasion or ticket fraud



When asked: "How high of a priority are the following areas when it comes to digitizing in order to improve your transit system?" survey respondents had a similar range of highest priorities:

- Nearly 70% of respondents consider passenger experience, offerings, and services as either "extremely high" or "high" priorities for digitization, representing a shift in mindset toward an even more passenger-centric, technology-based experience than before the pandemic.

- Accident prevention and/or rail station safety is considered an "extremely high priority" for 37% of respondents and a "high" priority for an additional 29%, for a total of approximately two-thirds of the industry.

- 62% reported cyber security or resiliency of operations as extremely high or high priority for digitization.

- Asset management (defined in the survey as "maintenance and reliability of infrastructure and vehicles") is considered an extremely high or high priority for 63% of respondents.

Such high rankings of priorities indicate the absolutely critical nature that smart transit and digitalization are playing in how agencies are now setting their goals and measuring their respective successes when it comes to implementing new technologies.

The key to turning data into new insights for transit operators lies within removing system silos, utilizing the right data, and combining it into a platform geared toward improving operations and the passenger experience.

# The Latest and Greatest Smart Transit Solutions

An effective technology platform leverages a mix of movement analytics, fleet optimization, digital twin technology, and mobile messaging and wallet options to provide solutions to their passengers. These solutions integrate with existing systems to provide frictionless, optimized mobility for passengers by:

| Utilizing stored data | Capturing real-time data | Modeling predictive data. |

**Smart Spaces:** Technology advances, from the proliferation of smart video cameras and internet of things (IoT) sensors, are driving safer, more sustainable environments that improve passenger experiences and safety. Metropolitan centers and related organizations are using data-driven solutions to make their communities smarter, safer, and more vibrant.



**Asset Performance:** Asset-intensive organizations such as transit agencies face many challenges around aging assets, stagnant budgets, new operating risks, and a workforce in transition. Advances in predictive and prescriptive analytics offer new capabilities to help meet the expectations of these high-reliability challenges. Asset management solutions enable transit agencies to identify degrading asset conditions, risks, and their relative importance to provide actionable insights and priorities for resolution, analysis, and mitigation. These solutions help agencies get the bigger picture from the myriad asset data sources to know where to prioritize in-depth analyses and scarce field resources.

**Health and Safety:** Evolving digital health and safety programs require implementing new policies and processes. An end-to-end digital health and safety solution can help stakeholders understand the historical health and performance of its resources. Agencies can efficiently view and maximize safety metrics for its passengers and operations on a single pane of glass. Paired with a holistic, flexible strategy, digital tools, and processes, organizations can proactively ensure worker compliance and safety without interrupting operational momentum.



**Operations Management:** Transportation organizations need to look beyond tools and technology alone and concentrate on addressing today's core challenges by enhancing their performance, reducing costs, and tapping into new revenue streams. Transit agencies should seek to establish:

- A strategic partnership focused on understanding your organization and its distinct challenges, and positioning you to realize the outcomes you envision.

- An open, flexible ecosystem approach that brings together the best technology solutions, perfectly aligned to your organization's unique imperatives.

- Proven solutions that have been shown to deliver measurable results for global customers across transportation domains.

- A holistic approach to transportation, encompassing leading-edge technology, software and consulting services based on decades of OT and IT experience in the transportation industry.

# Implementing User-Friendly Data Solutions to Add Value

While advanced data solutions enable optimal transit, making the solutions user friendly and actionable are key to truly enhancing the passenger experience with features riders value most. The good news is that most transit providers already have access to much of the data they need to make informed decisions, but without effective guidance and consultation of experts they may be missing the opportunity to leverage the data. For example, available data may currently be locked away or siloed inside of an application or some separate subsystem, and additional third-party expertise may be needed to help unlock and retrieve this data.



Evaluating transit operational and passenger data can be a daunting task with the reality of the industry's ongoing economic and resource challenge. Transit authorities and municipalities are not able to add more staff or data analysts, so they need to integrate digital solutions into their existing roles and responsibilities whenever feasible, and the data tools need to be user-friendly and familiar so they become native to the users.

Providers need to ask themselves, "How are we innovative with our data and what can we improve by evaluating it?" A great example is how transit providers can use their data to address the post-pandemic passenger concerns about capacity and the ability to maintain acceptable social distancing. Proper harnessing of available data can assist operators in evaluating ridership data to promote ridership on vehicles or routes that have higher capacities, for example.

Another way to use data to enhance operational efficiencies is to use rider engagement tools to influence their behaviors to direct them to other higher-capacity portions of the transportation network. For example, operators can use marketing promotions to help distribute traffic and direct people who may be attending a sporting event to utilize less-crowded portions of the network.

Of course, the benefits of evaluating and using the organization's data are not confined to the organization itself. For example, there is a lot of economic value within the data that can assist employers and private businesses in your service area. With the ongoing employment challenges employers of all types and sizes are facing, your agency's route and ridership data can be crunched and shared with employers to help them direct their recruiting efforts. This can be invaluable in identifying candidates who will be able to utilize your transit network to get to and from their places of employment.

# Mobility as a Green Service

Efficiencies powered by the effective use of technology have been a part of the transportation industry for decades, driven largely by the desire to provide multimodal solutions that were also cost-effective and conveniently delivered. More recently, however, there is a new "greener" way of thinking regarding the integration of environmental initiatives. Previously, it was an "either/or" proposition — either transit solutions were economical, or they were environmental. With new technologies and the shift in focus toward green initiatives, public transportation can be both.

Societal shifts toward sustainability and government incentives for electric vehicles (EVs) are creating new opportunities for transit authorities to transition to net-zero transportation. However, doing so can be tricky between costs, operations, and infrastructure. This is where data-driven operations can meet EV technologies, creating a green service that optimizes fleets before, during, and after the transition.

For example, EV technologies are continuing to develop rapidly, and the costs of operation and infrastructure are leveling off, leading more transportation providers to include EV in their fleet decisions. These decisions need to be based on reliable data about passenger behaviors and desires, optimal routes and schedules, and vehicle capacity, range, and reliability. Designing the ideal EV fleet while optimizing efficiency and passenger experience is essentially a data exercise that requires the right partner and expertise for proper execution.

Ultimately, improving mobility to be more sustainable helps meet customer and societal expectations, and can be run in parallel with digital solutions enhancing the passenger experience. To do both successfully, it will require the right partners and expertise for proper execution and follow-through to ensure the transit operator and its passengers reap the benefits of their innovation and investments.
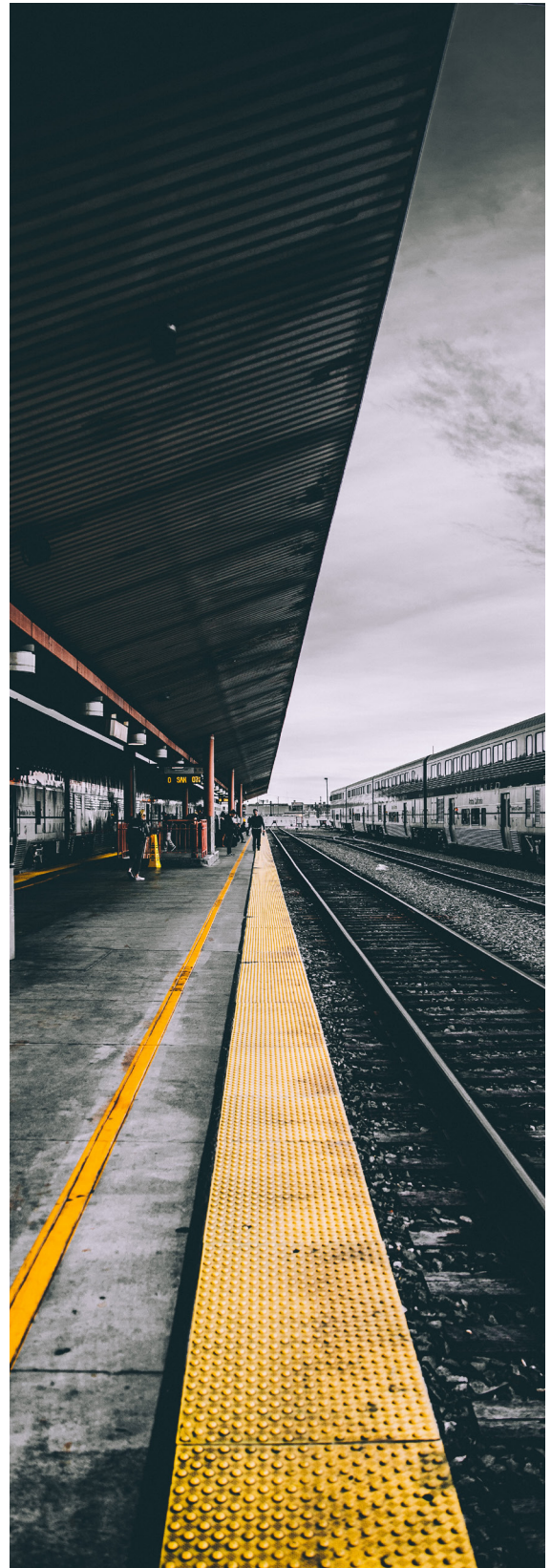
# Overcoming Barriers to Implement Smart Transit Solutions

According to the transit agency representatives who responded to the survey, the largest impediment to implementing smart technologies is considered to be a lack of current funding sources (53% of survey respondents).
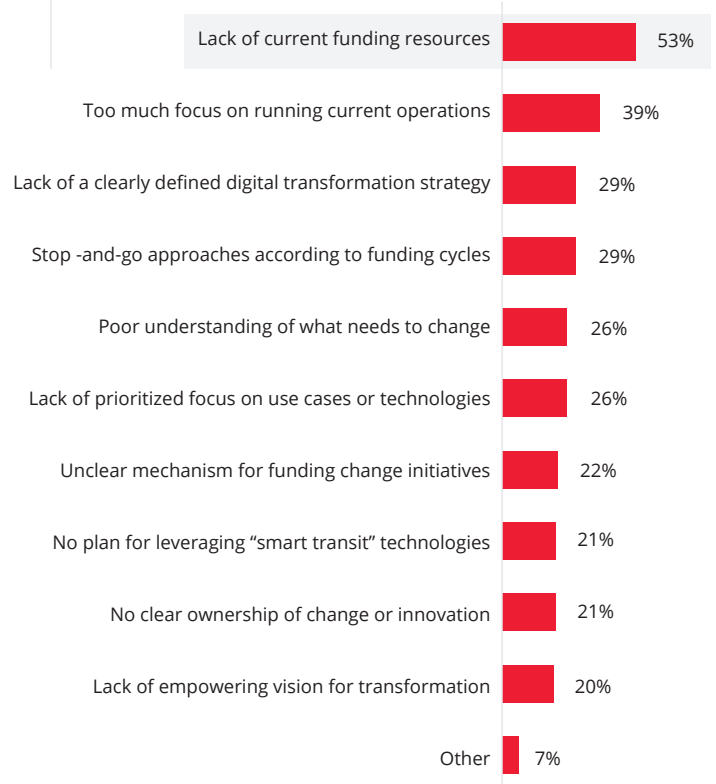
More than one-third of the transit professionals also cite the prioritization of operational issues as a barrier to implementation of smart technologies, and nearly 30% of survey respondents acknowledge that a lack of a clearly defined digital transformation strategy and "stop-and-go" approaches according to funding cycles inhibit smart transit adoption.

There are any number of mechanisms available to fund smart transit technologies, and many more resources will soon be available through the Federal Transportation Administration and Department of Transportation.

However, navigating what the best resources are for your agency can be difficult in these times of limited staffing and resources. Because funding is the biggest hurdle when it comes to smart transit implementation, it is important to understand costs up front and to have a plan for funding any smart transit project.

One of the best ways to locate funding sources is to work with an experienced industry partner from the private sector who will help your agency find the best funding opportunities and offer some comfort that together you can bring the smart transit solutions to fruition.

Question: Which of the following challenges does your agency or organization face in adopting "smart transit" technologies and systems?

| Challenge | Percentage |
|---|---|
| Lack of current funding resources | 53% |
| Too much focus on running current operations | 39% |
| Lack of a clearly defined digital transformation strategy | 29% |
| Stop -and-go approaches according to funding cycles | 29% |
| Poor understanding of what needs to change | 26% |
| Lack of prioritized focus on use cases or technologies | 26% |
| Unclear mechanism for funding change initiatives | 22% |
| No plan for leveraging "smart transit" technologies | 21% |
| No clear ownership of change or innovation | 21% |
| Lack of empowering vision for transformation | 20% |
| Other | 7% |

# Find a Collaborative and Innovative Partner to Foster Resilience

Sourcing an effective partner for smart transit solutions is a critical step for passenger transportation providers who wish to leverage their data to offer frictionless travel to their passengers. Hitachi Vantara, a global leader in technology development and implementation, can provide these solutions. Hitachi's approach is to discover each customer's pain points and tailor a package of mobility and sustainability solutions to meet the needs of their passengers and operations, in addition to offering a guiding roadmap to ensure success.

It is important to note that what works in one situation does not necessarily work in another. Because every organization has unique challenges, one size does not fit all. Every organization has its own personality, motivations, goals, and pain points. Engaging an industry partner — like Hitachi Vantara, who is collaborative and consultative — is critical. Transit providers can set themselves up for success with partners who drive innovation by providing experienced project management, a clear vision of the objectives, and the right technology.

Finally, and perhaps most importantly, it is important to understand the costs of implementation, management, and maintenance up front, and to have a plan for funding the project all the way through to it becoming operational. Transit operators can often be cautious about where the funding will come from. Every agency, even with the newly available funding, will continue to be resource constrained. But, your partner should help you locate the best funding opportunities and offer some comfort that together you can bring the solutions to fruition.



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Founded more than 110 years ago, Hitachi is a global company focused on providing cutting-edge technology to better people's lives, combining information technology (IT), operational technology (OT), and products. Today, Hitachi has approximately 350,000 employees worldwide and drives digital innovation across six domains – IT, Energy, Industry, Mobility, Smart Life, and Automotive Systems.

Hitachi Vantara, a subsidiary of Hitachi, solves compelling digital challenges by guiding our customers from what's now to what's next. With integrated digital solutions and services, we empower organizations to produce business outcomes that matter to society. We enable our customers to rapidly scale digital business, harness the power of data operations, and make data centers more effective.

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