



# Transit Tech Lab

2023 Challenges:  
Proof of Concept Results



**Transit Innovation  
Partnership**

**AUGUST 2023**

# Operational Efficiency and Human Capital Challenge Finalists Present Proofs-of-Concept

August 2023

At the start of 2023, the Transit Tech Lab launched the Operational Efficiency and Human Capital Challenges in partnership with four New York Metro regional transit agencies: the MTA, NJ TRANSIT, the Port Authority of New York and New Jersey, and the NYC Department of Transportation.

The program received nearly 150 applications from companies around the world. To select the most compelling solutions, subject-matter experts and executives from participating transit agencies evaluated each company and selected 23 semifinalists. Of those, 15 companies were selected to participate in the finals — a 50% increase from the 2022 cohort.

In May 2023, the companies began an eight-week proof-of-concept phase, working closely with their respective transit agency partners to test and implement their solutions to enhance operational performance and improve employee recruitment and retention.

The following report details each company's solution, how it was used, and its potential for bringing new technology to the public sector while improving the public transportation experience for millions of people in the tri-state area.

## Program Overview

**15** POCs

**08** weeks

**04** agencies

## Transit Tech Lab Net Promoter Score (NPS):

Company NPS:  
**9.1**

Agency NPS:  
**8.6**



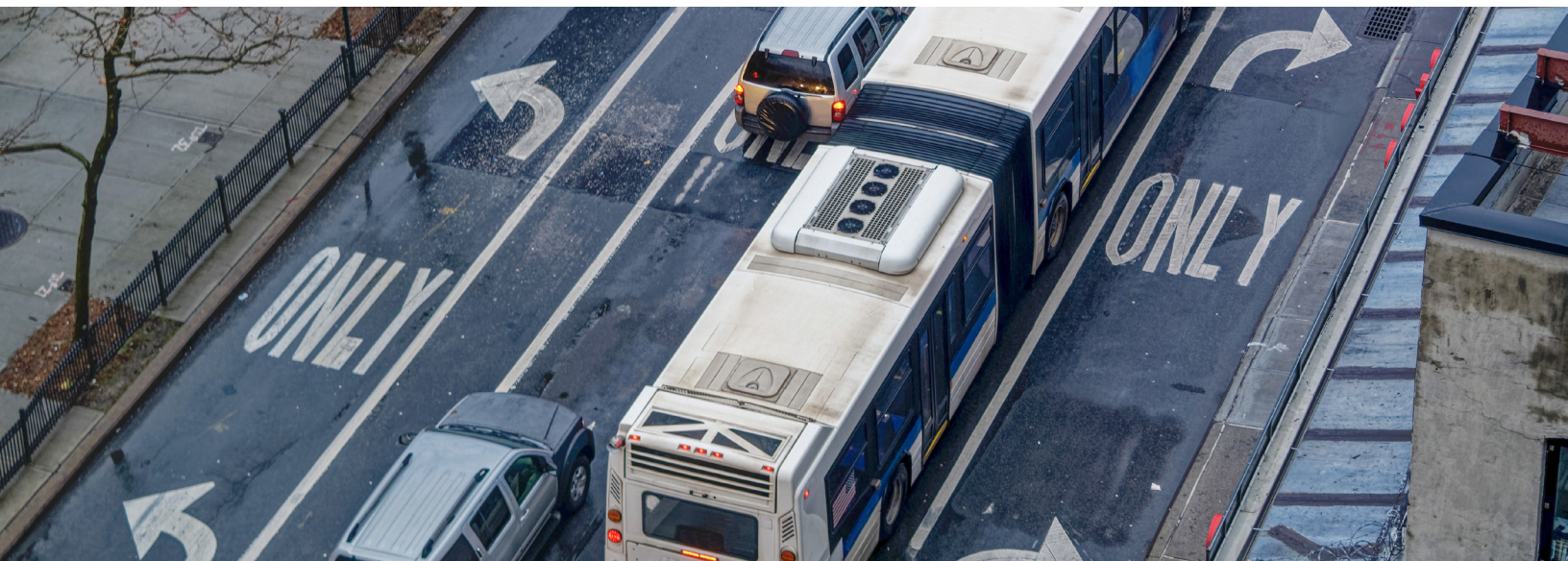
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## Operational Efficiency Challenge

In response to post-pandemic reduced ridership and revenue, NYC regional transit agencies are seeking tools that can reduce costs while increasing efficiency.

### SNAPSHOT

- **Lux Modus** collected 142 GB of data across 27 miles of track at four MTA and NJT locations. Lux Modus used its technology to generate 3D maps, which can help improve the accuracy of asset management systems and potentially replace expensive and manual surveying methods.
- **Humatics** monitored a 5 mile stretch of track from NJT's Grove St Station to Newark Penn Station to help detect track anomalies and provide early warnings of potential maintenance needs.
- **Signapse** applied their technology to translate thousands of words on webpages into ASL videos as well as demonstrated its ability to create live announcement videos in train stations, airports, and ferry terminals which would help improve transit accessibility for deaf and hard-of hearing riders.
- **Throughput** analyzed lead times for over 10,000 products used by Metro-North maintenance teams to create a data-driven recommendation plan for rebalancing inventory across 142 locations, which has the potential to help mitigate unnecessary operational spend.



“ All the agencies were extremely collaborative and responsive with our requests for support, with no time delays...Without the TTL, innovation like the technology on offer can take years to be seen and effectively tried.”

*Brett Stein — Vice President of Sales, North America, Accure*

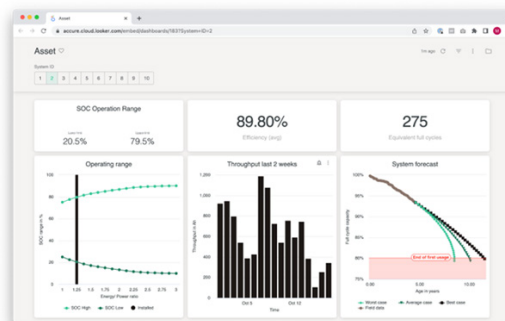
## ACCURE BATTERY INTELLIGENCE

ACCURE Battery Intelligence is a leader in predictive battery analytics software that prevents battery fires and reduces the operations and maintenance costs of Electric Vehicle (EV) fleets.

The company partnered with the electric vehicle (EV) fleet teams at NYCT, NJT, and PANYNJ with the focus of addressing battery safety and efficiency priorities. ACCURE assessed the battery data from fifteen electric buses using its analytics solutions and shared detailed insights as well as broader educational materials about battery health.

**Primary Partner Agencies:** New York City Transit (NYCT), Port Authority of New York and New Jersey (PANYNJ), NJ TRANSIT(NJT)

**Feedback:** “The partnership with ACCURE will allow for the MTA to better understand electric bus battery management issues and the efficient utilization of data that is generated from battery management systems.”



*ACCURE dashboard displays several important metrics of battery health and performance.*

This will not only aid the MTA in battery health diagnostics and potential failure modes but also enable early detection of incipient issues with the batteries on board zero emission buses. Utilizing a mixture of machine learning and intelligent parsing of data, the work pioneered by ACCURE only further improves upon MTA's capabilities in the emerging field of battery preventive and predictive maintenance.”

- NYCT Project Manager, ACCURE

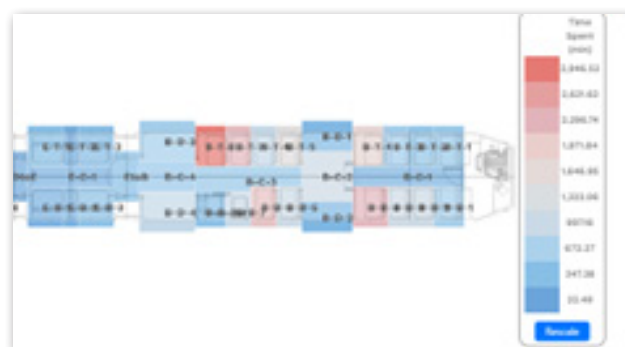
## DIGITAL MORTAR

Digital Mortar uses passenger-flow sensors to provide real-time customer journey analytics for queue management, dynamic labor allocation, lost revenue analysis, and space planning and commercial real-estate optimization.

The company used existing Xovis sensors on NJT Train 107 to demonstrate its software's ability to measure and analyze train car usage, occupancy, and dwell times. Four full use cases were demonstrated, showing the technology's ability to provide real time information on crowding by car to passengers waiting at the next station, deliver loitering alerts, replace manual people counting processes, and send real-time service notifications to dispatch additional buses in response to overcrowding.

**Partner Agency:** NJ TRANSIT (NJT)

**Feedback:** “The accurate and granular passenger flow data this technology enables has many valuable use cases, from improving capital planning during



*Screenshot of Digital Mortar's technology demonstrates its ability to capture a heat map of passenger flows within seats of a train car.*

station reconstruction and helping aid concessionary experience, to more accurate ridership data which can inform where service should continue and can help inform federal subsidies.” - NJ TRANSIT Project Manager for Digital Mortar

“Working with the TTL was a great experience. Not only did the format of the POC enable us to showcase and prove our technology to a wide audience, but it also afforded us extremely valuable insight and experience.”

Joseph Hlady — CEO, Lux Modus

## HUMATICS

Humatics enables revenue service rolling stock to provide near real-time monitoring of track condition with precise positioning of track anomalies for improved maintenance.

The company installed its Focus system on two of NJT's Newark Light Rail Vehicles and monitored a five-mile area from the Grove Street Station to Newark Penn Station. Humatics used data from 626 round trips, covering 5007.7 miles of track to provide track anomaly detections with precise geotagging. This technology can enable preventative maintenance by providing insights into track deterioration, enabling projections of future track conditions, and ensuring the detection of abrupt track failures.

**Partner Agencies:** New York City Transit (NYCT), NJ TRANSIT (NJT)



Humatics analysis reflects the status of track conditions detected along segments of NJT's Newark Light Rail track.

**Feedback:** “This could be a force multiplier for the Track Geometry Car (TGC) and could help reduce costs and digitally log track defects. Marrying [track] defect detection and accurate location would help systematically show where the ride quality is decreasing and aid in preventative maintenance efforts.” - NJ TRANSIT Project Manager for Humatics

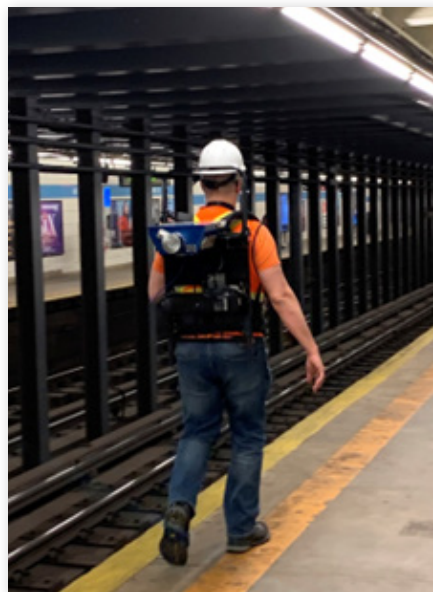
## LUX MODUS

Lux Modus uses LiDAR and imagery fusion technology to automate 3D mapping to optimize asset management on critical transit infrastructure.

The company collected 142 GB of data across 27 miles of track at four MTA and NJT locations. Lux Modus used its technology to generate 3D maps, which can help improve the accuracy of asset management systems and potentially replace expensive and manual surveying methods.

**Partner Agencies:** New York City Transit (NYCT), NJ TRANSIT (NJT)

**Feedback:** “While this can certainly help improve existing maintenance efforts, the real value here is the 3D modeling aspect — this technology could create a 3D model of the entire network which can help our asset management teams and inform capital plans.” - MTA Project Manager for Lux Modus



Lux Modus team in the field collecting LiDAR data with their sensor array at the Grand Street Station in Manhattan.



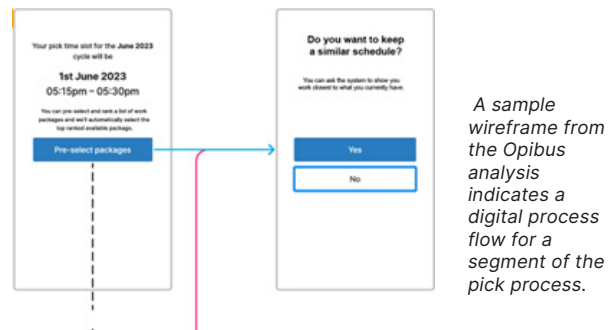
“It was great having the Transit Tech Lab team responsible for locking in and facilitating weekly updates, with plans of action for all parties — this let the companies focus more on their POCs than planning.  
 - MTA Project Manager

## OPTIBUS

Optibus uses artificial intelligence and optimization algorithms to empower planners and operators to improve public transit schedules and routes, with the potential to digitize the bus operator bid/pick process to optimize service needs.

The company interviewed over 30 staff across seven departments, conducted four design sprints, and created multiple personas and wireframes to inform a final report with recommendations to improve the process bus operators use to “pick” schedules, as the current process is manual, paper based, and time intensive. The qualitative research conducted by Optibus has created a roadmap to help New York City Transit enhance and digitize the bus pick process.

**Partner Agency:** New York City Transit (NYCT)



A sample wireframe from the Optibus analysis indicates a digital process flow for a segment of the pick process.

**Feedback:** “My overall takeaway is that this has been an incredibly valuable engagement for the MTA. It has helped us appreciate the impact that human-centered design can have on empowering thousands of employees to choose work programs that are best for them and their families.” - MTA Project Manager for OptiBus

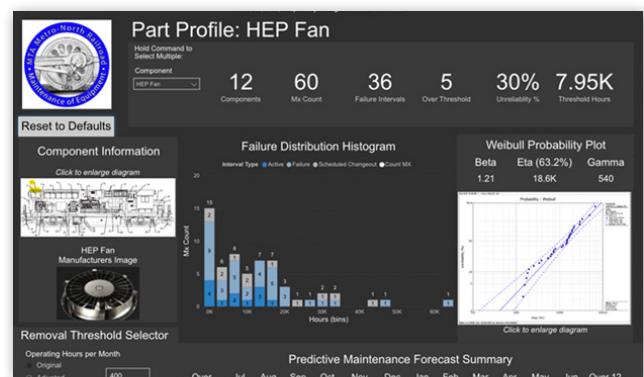
## PAVCON

PavCon, LLC uses domain expertise, existing technology, and maintenance/operational data to deliver predictive maintenance and parts supply forecasts.

PavCon demonstrated how its CRiSTL Clear™ approach can identify underlying failures on the Head End Power (HEP) Fan of MNR’s BL20 Locomotive fleet using the company’s unique data cleaning, and predictive maintenance solutions. After reviewing 540 maintenance records and cleaning 153 records, the company forecasted five parts would be over the threshold of a 30% unreliability rate after one month. This sort of insight can be used to refine maintenance plans, reduce maintenance costs, and reduce risk of breakdowns during service.

**Partner Agencies:** Metro-North Railroad (MNR), New York City Transit (NYCT)

**Feedback:** “Data integrity is essential to predictive maintenance. Pavcon’s amazing data cleansing process



PavCon Dashboard shows the predicted maintenance forecast schedule for a HEP fan, a part which has a high replacement rate and frequently causes maintenance delays.

enabled them to uncover a key component failure and develop a data-driven, cost-effective predictive maintenance program.” - MTA Project Manager for PavCon

“ We absolutely loved the TTL program and found tremendous value from it. It helped illuminate key challenges facing transit agencies today and facilitated ways for us to meaningfully engage some of the largest agencies in the country.”

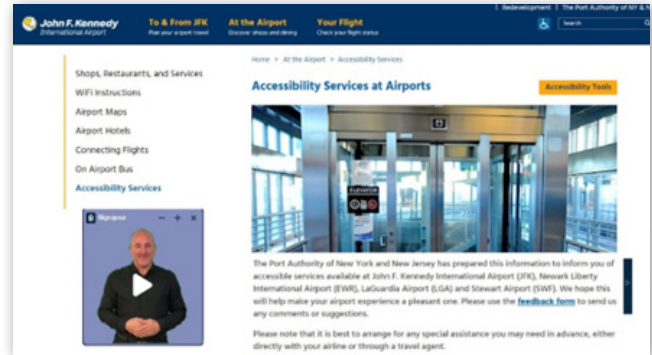
Jonny Simkin — CEO, Swiftly

## SIGNAPSE AI

Signapse AI uses AI to automatically translate written text to sign language enabling scalable, cheaper, and faster accessible content for the Deaf community.

The company demonstrated how its AI can automate written text into American Sign Language (ASL) across three different use cases: 1) translating a sample of Staten Island Ferry terminal announcements; 2) translating the 1330 word accessibility page on the JFK airport website into 51 videos and installing a signer overlay to help Deaf users navigate the page in their native language; and 3) providing departure, destination and five-minute-warning videos for Newark Penn Station which, in conjunction with the company's AI software, can be used to generate live, dynamic announcements.

**Partner Agencies:** Port Authority of New York and New Jersey (PANYNJ), NYC Department of Transportation (NYC DOT), NJ TRANSIT (NJT)



A Signapse generated video appears on the Port Authority's JFK Accessibility Services webpage adjacent to the paragraph of text it is translating.

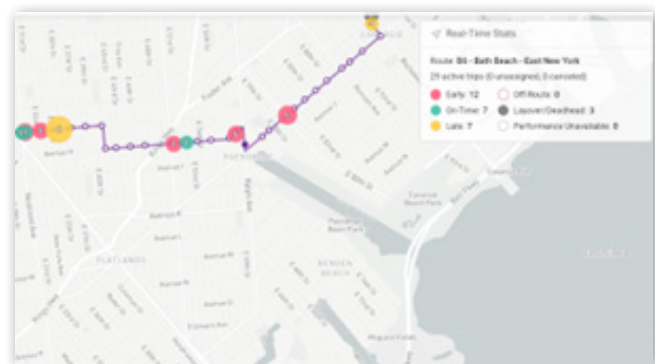
**Feedback:** “The POC results showed that Signapse's technology has the potential to be piloted in a live environment for deaf or hard of hearing NYC riders to experience and provide their feedback. There is potential to use this technology to bring equal access to rider information, and in the preferred, native language of deaf/hard of hearing individuals – ASL.” - NYC DOT Project Manager for Signapse

## SWIFTLY

Swiftly provides a transit data platform for agencies to share real-time passenger information, manage day-to-day operations, and improve service performance.

The company analyzed over 125 million bus arrival-time predictions to ensure accuracy and consistency, and identified opportunities to improve arrival prediction accuracy for more than 83 million trips annually across both NYCT and NJT's bus systems. After interviewing 20 cross-departmental NYCT & NJT staff, Swiftly created a roadmap for each agency to improve the accuracy of real-time information. Swiftly demonstrated plans to improve prediction algorithms, streamline communications during detours to reduce service delays, provide tools to reduce staff time spent responding to riders' inquiries, and improve overall on-time performance through run-time optimizations.

**Partner Agencies:** New York City Transit (NYCT), NJ TRANSIT (NJT)



Screenshot of Swiftly's technology demonstrating bus time arrival statuses of the B6 route in Brooklyn

**Feedback:** “There is a huge opportunity to improve the timeliness and quality of real-time information bus customers receive about detours.” - MTA Project Manager for Swiftly

“ One of the standout advantages of TTL is its ability to facilitate introductions to key decision-makers at transit agencies. For companies like TekTracking, gaining access to these influential individuals can be a game-changer.”

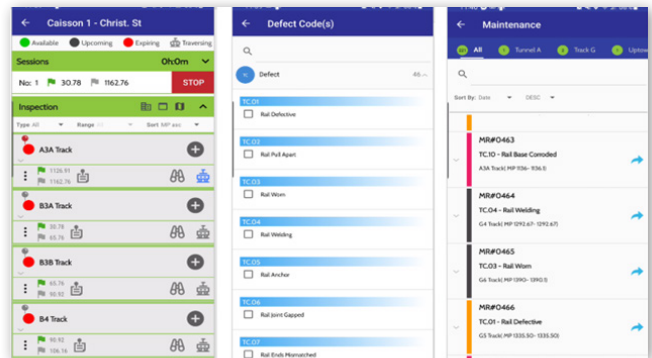
Gregory Fogarty — CEO, TekTracking

## TEKTRACKING

Tektracking provides a suite of mobile applications to automate the process for reporting on track inspection & signal testing.

TekTracking installed its Track Inspection Management Planning and Scheduling system (TIMPS) across five locations along the PATH system to help digitize track inspections. Over five weeks, 63 PATH inspectors logged 2068 inspections, created 203 work orders, and tracked 275 defects along 84 main track assets in the TIMPS mobile application and web-based office tool. The company demonstrated how this tool can help inspectors and maintainers understand the real-time health of assets while concurrently improving the data accuracy needed to inform future capital plans and expenditures.

**Partner Agency:** Port Authority of New York and New Jersey (PANYNJ)



TekTracking dashboard shows the TIMPS tool in action, flagging and logging information about PATH track segments.

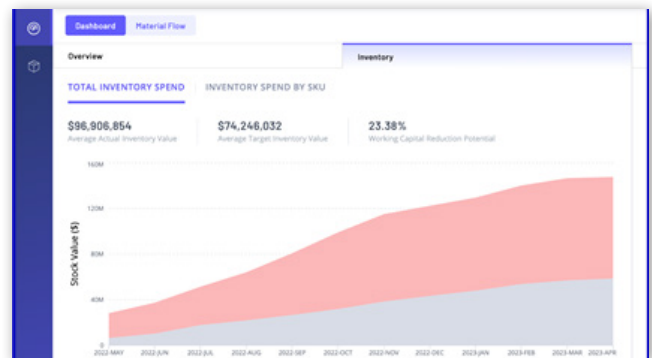
**Feedback:** “We found TekTracking to be very adaptive and user friendly” - PANYNJ Project Manager for TekTracking

## THROUGHPUT INC.

ThroughPut Inc. provides a rapid supply-chain diagnostics software that enables immediate operational intervention, eliminating maintenance downtime caused by supply-chain delays and unavailability of parts.

ThroughPut showcased its software’s ability to enhance fleet readiness by effectively managing parts shortages through comprehensive categorization and tracking. By analyzing real usage and projected supply lead times of over 10,681 products across 142 locations, ThroughPut enabled data-driven recommendations for inventory rebalancing. The company highlighted the potential to reduce 23% of working capital spend in the data sets provided and an estimated \$568k in savings by eliminating the ordering of overstocked parts. Its inventory flow management technology outlined insights into supply-chain processes, rolling stock availability, and unnecessary expenditures.

**Partner Agency:** Metro-North Railroad



Throughput dashboard shows an overview of MNR’s inventory spend for a segment of data, demonstrating this segment’s working capital reduction potential.

**Feedback:** “The ThroughPut Team quickly demonstrated how changes in our material planning and management could significantly improve fleet availability and cost savings.” - MTA Project Manager for ThroughPut



“ Support through the program allowed us to complete complex tasks and installations quickly, with agency executives stepping in to unblock hold-ups.”

Andrew Young — Business Development Director, Passenger, Wi-Tronix

## WIDENSENSE

Widesense provides real-time AI optimized actionable guidance to fleet operator dispatch and maintenance teams to ensure optimized work assignments and charging schedules.

WideSense integrated with NJT’s GTFS feed to provide daily optimized EV fleet operations guidance for 8 electric buses and chargers at the Camden garage, based on each day’s service needs and weather conditions. They demonstrated a charging and operational schedule for the eight buses which could lead to a 40% increase in electric bus utilization and a reduction of operating costs by \$55,000/year per electric bus.

**Partner Agency:** NJ TRANSIT (NJT)



Widesense dashboard shows a new proposed charging schedule, with potential to increase utilization rates, for eight NJT buses at the Camden Garage.

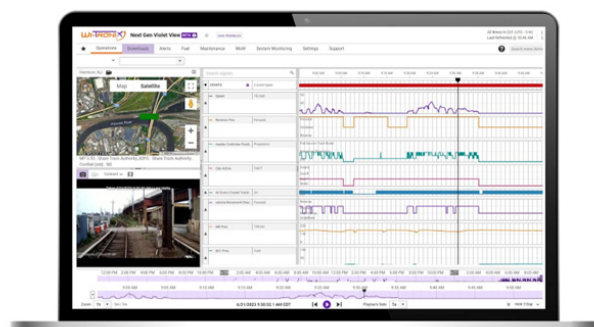
**Feedback:** “The Widesense team proved themselves to be capable and flexible and their proof-of-concept offered exciting opportunities in electrification planning” - NJT Project Manager

## WI-TRONIX

Wi-Tronix is an immersive, real-time IoT platform that is essential for railroads and transit systems to continuously improve operations, safety practices, and service reliability; Wi-Tronix collects insights from onboard systems and enables remote visibility for customers to make decisions and respond to issues quickly and efficiently.

The company installed a Violet Edge on a MNR 9130 train car and a PATH 5743 train car, collecting over 17 million data points daily to provide real-time remote visibility to HVAC and other key vehicle data systems for 19 unique users. The remote visibility, real-time data, and rich telemetry insights enable condition based and predictive maintenance which can help improve both maintenance time to repair and reliability of trains.

**Partner Agencies:** Metro-North Railroad (MNR), Port Authority of New York and New Jersey (PANYNJ), NJ TRANSIT (NJT)



Wi-Tronix dashboard shows a series of signals aligned with a live video feed from a PATH train car.

**Feedback:** “The amount of rolling stock data that Wi-Tronix can communicate in an actionable format is remarkable. Predictive maintenance methodologies are now within reach.” - MTA Project Manager for Wi-Tronix

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## Human Capital Challenge

NYC regional transit agencies, along with other public transportation agencies across North America, are facing a workforce shortage. To meet service needs, agencies are seeking tools to improve employee recruitment and retention through the Human Capital Challenge.

### SNAPSHOT

- Jetdocs deployed their Microsoft Teams-integrated digital ticketing solution with over 145 MTA and PANYNJ staff, demonstrating the tool's potential to reduce internal bottlenecks and increase process transparency.
- Eskill tested 3 job postings with PANYNJ and one mock remote proctoring exam with the MTA in their digital talent assessment platform, demonstrating a 40-50% time savings by the hiring managers compared to traditional analog methods.
- PyxAI tested their video-enabled interview screening tool to screen for 16 key soft skills over two job postings, demonstrating the tool's ability to highlight overlooked talent and increase qualified candidate pools.



“

This was my first time participating in the Transit Tech Lab initiative and I would be more than willing to participate in future iterations. The team is supportive and non-biased to the process.”

- PANYNJ Project Manager

## ESKILL

eSkill Corporation provides a Talent Assessment Platform, including an online testing library and a remote proctoring solution, to easily evaluate job candidates through a fully configurable online platform.

The company tested a comprehensive testing solution with both the MTA and PANYNJ. For the MTA, eSkill built an electronic practical exam with 10 mock assessments, tested by six MTA employees, showing potential to reduce practical exam processing time from weeks to hours, as current practical exams are paper-based and are administered in person. For the Port Authority, the company created six pre-hiring assessments for three candidate roles which were tested by five job candidates, enabling real time access to testing results and a 40-50% time savings by the hiring managers.

**Partner Agencies:** The Metropolitan Transportation Authority (MTA), Port Authority of New York and New Jersey (PANYNJ)

Subject	All	Correct	Partially Correct
Logical Thinking	4	3	0
Urban and Regional Development (US)	5	2	1
State Government (US)	2	2	0
Local Government (US)	5	2	0
Business Systems Analyst	5	3	0

Screenshot of an eSkill test dashboard reflects the clear presentation of information of candidate test results for hiring managers via the digital platform.

**Feedback:** “We were really impressed with [eSkill’s] functionality...The team was willing to work with the MTA to explore the agency’s feedback and ideas.” - MTA Project Manager for eSkill

## JETDOCS

Jetdocs provides a centralized catalog for users to submit tickets, requests and approvals, enabling easy standardization of processes to streamline workflows and enhance internal collaboration.

The company tested seven distinct business processes in their Microsoft Teams digital ticketing solution with over 145 MTA and PANYNJ staff. Jetdocs demonstrated how this technology can provide visibility to often opaque internal processes which can reduce bottlenecks across teams, and improve productivity via automated approvals and integrated touchpoints.

**Partner Agencies:** The Metropolitan Transportation Authority (MTA), Port Authority of New York and New Jersey (PANYNJ)

Item	Date Submitted	Reporter	Assigned To	Date Submitted	Latest Activity
New Hire Checklist - Multiple Human Resources	Jun 5 at 3:47 pm	andrew@jetdocs.io	andrew@jetdocs.io	Jun 20 at 9:36 pm	15 days, 2 comments
Procurement Example - Legal and Compliance	May 31 at 8:41 pm	andrew@jetdocs.io	andrew@jetdocs.io	Jun 20 at 9:36 pm	20 days, 3 comments
Vendor Management - Operations	May 8 at 4:53 pm	andrew@jetdocs.io	andrew@jetdocs.io	Jun 20 at 9:37 pm	1 month, 1 comment

Screenshot from the Jetdocs dashboard demonstrating various work streams and process flows.

**Feedback:** “The JetDocs team was very responsive. We worked well together to help JetDocs improve and refine its product offering for the Port Authority.” - PANYNJ Project Manager for Jetdocs



“ Working with TTL and the transit agencies has been an exciting and invigorating process. It is refreshing to work alongside professionals that are passionate about the work they do while also striving for win-wins for all parties involved.

*Kurt Edwards — CEO, PyxAI*

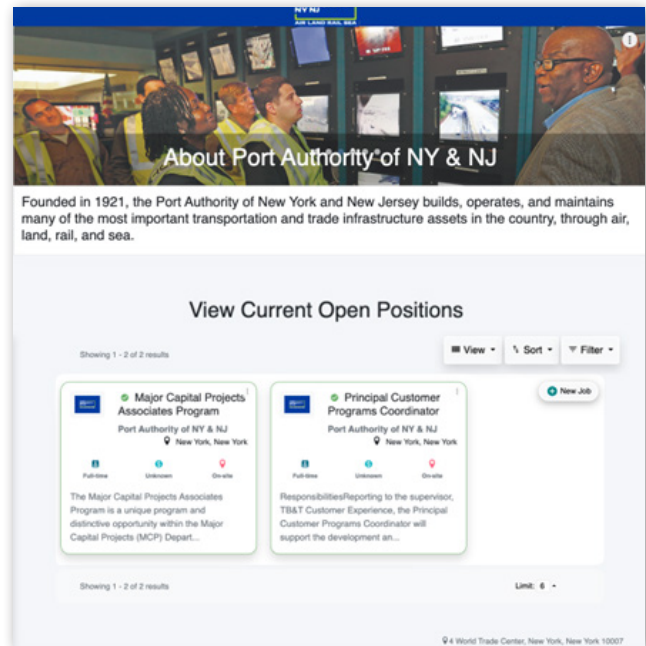
## PYXAI

Pyxai provides a virtual video-enabled assessment platform that evaluates and collects data on soft skills (e.g., communication, problem solving, adaptability, etc.) to help identify overlooked talent, improve retention rates, and reduce recruitment costs.

Pyxai deployed a video-enabled interview tool to screen for 16 key soft skills across two Port Authority open job positions. Of the 36 job candidates who tested the system, 30% were identified as good quality, higher than a typical first screen which demonstrates the tool's ability to highlight overlooked talent and increase qualified candidate pools.

**Partner Agencies:** Port Authority of New York and New Jersey (PANYNJ), NJ TRANSIT (NJT)

**Feedback:** “This product has great value to our agency’s HR department to reduce the time for the recruiter and hiring manager when interviewing candidates for upcoming jobs. Soft skills are hard to come by and this product can definitely increase retention.” - PANYNJ Project Manager for Pyxai



*Pyxai's software was tested on two job postings on the Port Authority's website.*





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